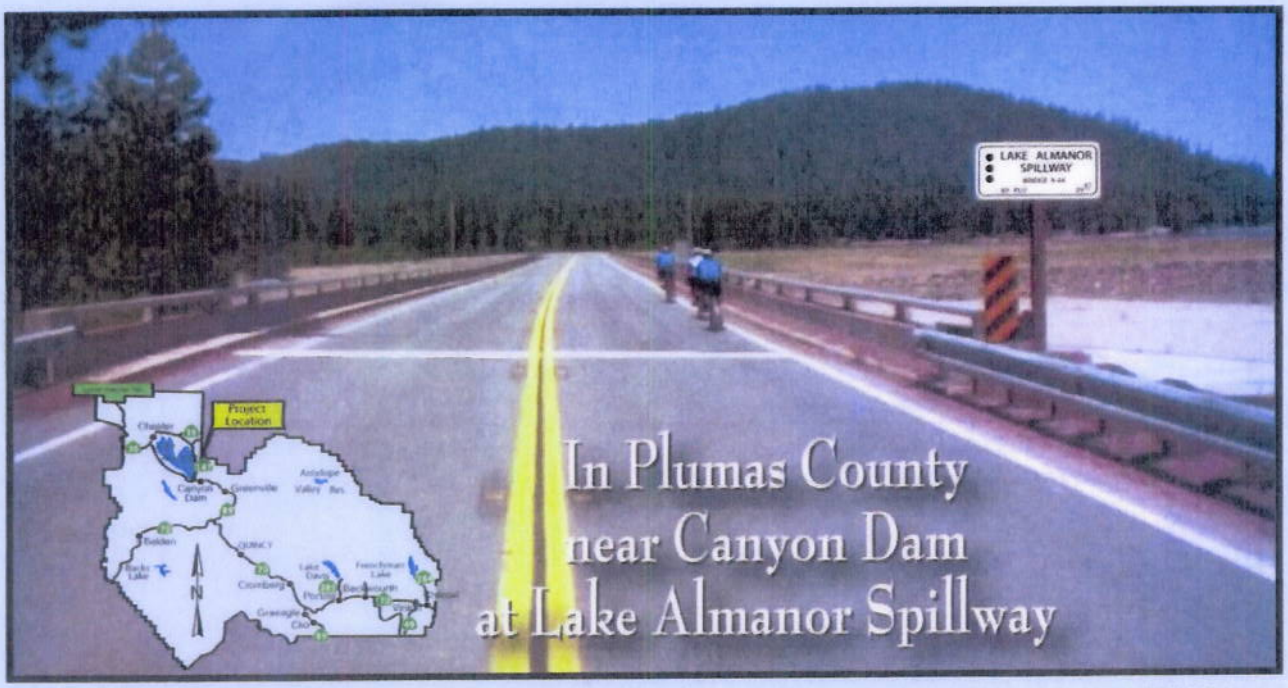
Advance Planning District 2

Caltrans

02-PLU-89 PM 29.5/30.5
20.XX.201.113
PPNO 3349
02 0000 0022
02-0E180K
June 2011

PROJECT SCOPE SUMMARY REPORT

Lake Almanor Spillway Bridge Replacement - Seismic Retrofit



I have reviewed the right of way information contained in this Project Scope Summary Report and the R/W Data Sheet attached hereto, and find the data to be complete, current and accurate.

Karen Hawkins 6/10/11

KAREN HAWKINS Date
North Region
Right of Way Manager

APPROVAL RECOMMENDED:

6-10-11

ERIC ORR, P.E. Date
Project Manager, District 2

6-10-11

ED LAMKIN, P.E. Date
Deputy District Director,
Maintenance and Operations, District 2
SHOPP Program Manager

APPROVED BY:

6/21/11

JOHN BULINSKI, P.E. Date
District Director, District 2

This Project Scope Summary Report has been prepared under the direction of the following registered civil engineer. The registered civil engineer attests to the technical information contained herein and the engineering data upon which recommendations, conclusions, and decisions are based.

GLENN F. HAMMOND, P.E.
Registered Civil Engineer

June 7, 2011
DATE

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Summary

This project proposes to rehabilitate and or replace the Lake Almanor Spillway Bridge near Canyon Dam, in Plumas County, thereby increasing its service life a minimum of 20 years for rehabilitation and 100 years for replacement.

Project Limits:	02-PLU -89- PM 29.97
Structure Type Length/Net Width:	Concrete box girder 467'/ 28'
Capital Costs:	$2.6M- $9.0M escalated
Preferred Alt:	$9.0M - escalated
Right of Way Costs:	$38,000- $60,000 escalated
Alternatives:	4 , plus a "No Build"
Project Program:	20.10.201.113
Type of Facility:	Two lane express-way, signed 65 MPH within access controlled ROW
Construction Year	2016
Construction Year AADT:	1450 vehicles/day
Anticipated Environmental Determination (CEQA/NEPA):	Initial Study- Negative Declaration/ Categorical Exclusion
Preferred Funding Alternative:	Alternative 4
Working Days:	
Alt 1:	130 Days
Alt 2:	150 Days
Alt 3:	180 Days
Alt 4:	360 Days (2 seasons)

Figure 1, Bridge and Spillway Looking East

Figure 2, The spillway bridge offers little usable shoulder for pedestrians, bicyclists or stalled vehicles. Nearby recreational attractions and facilities increase potential for non-motorized users.

Introduction

The Lake Almanor Spillway Bridge (BR#09-0044) is located on State Route 89, a north-south minor arterial highway linking the rural mountain communities of north-eastern California.

The existing facility is a 2-lane expressway with 4 foot wide shoulders. The State Route 89 Transportation Concept Report (TCR) states that the 20-year facility concept for this location is a 2-lane expressway with 12-foot lanes and standard 8-foot shoulders.

Project Description

This project proposes to address chloride contamination, seismic deficiencies, and substandard bridge rail identified by Structure Maintenance and Investigations at the Lake Almanor spillway bridge. Chlorides at elevated levels can cause corrosion of the reinforcement steel and compromise the structure's integrity. Additionally, consideration has been given to a total replacement alternative, which consequently has been shown to have the optimum cost to benefit ratio at the lowest risk.

Figure 3, The Lake Almanor Spillway Bridge is critically contaminated with chlorides from the use of de-icing salts.

Background

The existing bridge, built in 1963, was fitted with an impressed current cathodic corrosion protection system in 1974. However, the system did not perform as intended. Problems with the system design and insufficient maintenance contributed to its unpredictable service, and subsequent abandonment. Core samples taken periodically from the bridge deck have revealed elevated levels of chlorides present in the uppermost deck concrete.

A 2002 investigation of the structure reported the bridge deck and wearing surface to be in poor condition. An Initial Report for District Approved Projects (IRDAP) was issued in 2003, outlining rehabilitation and seismic retrofits and EA 02-1C040 was assigned to the Division of Engineering Services (DES). Further investigations in 2004 found the deck to be generally sound, but indicated it contained high levels of chloride. With this new information, the recommendation was expanded in April 2005 to include deck replacement. However, given the structure type, the Lake Almanor Spillway Bridge was not a good candidate for deck replacement and the recommendation was changed to structure replacement. The following year, all structures with replacement recommendations were reviewed district wide. Lake Almanor Spillway Bridge was subsequently reevaluated, and EA 02-0E180 was created to explore other rehabilitation strategies.

Background – Cont.

An Advance Planning Study (APS), issued in July 2008, illustrated three alternatives that each included a proprietary chloride extraction technology that would stop further deterioration of the reinforcement and significantly extend its useful life. Estimates of the extended lifespan provided by this treatment are based largely on the effectiveness of the technology applied under similar circumstances, and vary from 10 to 30 years.

Need and Purpose

The primary need of the project is to address deterioration of the reinforcement steel caused by high level of chloride contamination in the bridge deck concrete. Additionally, seismic design deficiencies identified in the abutments and columns put the structure at risk of damage during a seismic event. Any efforts to extend the life of the structure should include seismic retrofit and bridge rail upgrade strategies.

The purpose of this project is to stop or slow the deterioration of the bridge deck, bring the bridge up to seismic standards, improve ride quality, and extend the life expectancy of the structure.

Recommendation

At this time, a total replacement of this structure is the preferred alternative for funding purposes. A total replacement strategy will provide a structure with a 100 year life span, standard shoulder widths and bridge railings consistent with current standards.

Existing Facility and Deficiencies

Bridge No 09-0044 was constructed over the Lake Almanor Spillway in 1963, to facilitate realignment of SR 89. The structure is a three cell box girder design supported on single column piers. The four spans of the structure total 467' and accommodate a two lane conventional highway with a net width of 28.0', which does not provide standard shoulder facilities. The adjacent highway has 12' lanes and 4' shoulders.

At 4525 feet elevation, the project site receives snow roughly 4 months of the year. De-icing salts routinely used to improve safety during winter driving conditions are the source of chlorides.

Traffic Data

The statewide Traffic Accident Surveillance and Analysis System (TASAS) indicates that within the project limits, no accidents are reported in the previous 3 year period.

2015 AADT = 1400 **2007 Directional split =71%** **2007 Trucks = 17%**

Measure\Yr.	2007	2018	2023	2033	2043	2053
AADT	1150	1550	1750	2100	2450	2800
DHV	n/a	336	380	450	530	610

The project lies completely within a posted 65 MPH speed limit zone.

Alternatives 1 through 3 (seismic retrofit and deck rehabilitation strategies) were evaluated in the Traffic Management Plan (TMP) Datasheet dated April 2008. All 3 of those alternatives would require stage construction with K-rail and 24-hour, one-way traffic control over two construction seasons. Expected impacts included truck restrictions, conflict with snow removal operations, conflict with local bicycle events, and increased delays and queuing during designated holidays. The addition of Alternative 4 (replacement of the structure) would alleviate the majority of these impacts because the existing roadway would be unaffected while the new structure is constructed on a parallel alignment. A TMP for the project is required and shall be requested when the design is complete enough to determine specific traffic impacts, but early enough to make design changes/additions required for traffic mitigation.

Summary of Project Alternatives

For the purpose of examining concepts for different scopes of work, an Advance Planning Study (APS) was developed by Structures Design and Engineering Services in June 2008. That study provided three rehabilitation scenarios that each included Electrochemical Chloride Extraction (ECE), seismic retrofits and polyester overlay. The three alternatives differ by the extent of widening and bridge rail upgrades. An additional APS has been requested and will be followed up on in the next phase of this project. This alternative will provide for complete structure replacement. Given the number of possibilities for structure replacement, it is outside of the resources available for this report to study them all. For this report, $350/sf has been used to estimate the cost of complete structure replacement.

The ECE process is a proven proprietary technology that has not yet been used by the California Department of Transportation but is recognized by the Federal Highways Administration. The technology has been successfully applied to many bridge and other concrete restoration projects around the world. The process utilizes a low voltage electric current applied for 4 to 8 weeks to the wetted concrete in order to mobilize dissolved contaminants and restore its natural alkalinity

to non-corrosive conditions. The chlorides are removed in solution by means of a contained irrigation system or by rinsing with fresh water.

Alternative #1 provides the minimal scope. It proposes to address the chloride contamination by grinding the wearing surface to expose the existing deck, repair joints and unsound concrete, and apply ECE to the deck. Following the removal of contaminants, the bridge deck would be sealed with a polyester overlay that would protect the surface from further contamination. The seismic retrofit strategy includes encasing the columns in steel containment jackets, placing a concrete cap over and pinning the spread footing of pier 2, and placing concrete catcher blocks at the abutments. Safety improvements would be limited to upgrading approach rails and barrier (MBGR) connections to the existing bridge. Due to changes in deck height, a conform grind and asphalt overlay will be required at the bridge approaches. This alternative would require design exception(s) and is generally considered an undesirable shoulder configuration.

Alternative #2 has the same items as Alternative #1, but also proposes to remove and update the existing bridge rail. This configuration would allow widening the existing 2' shoulders to 4' and still provide an 11'-7" lane. Bridge rail would be brought to current standards. This would also require design exception(s) for shoulder and lane widths, but represents a significant improvement for non-motorized users over the existing condition.

Alternative #3 proposes to include all of the work in Alternative #1, but proposes to additionally widen the structure on both sides to a total net width of 40'-0" and thus provide 8' shoulders and standard lanes. This configuration is ideal, but would be a considerable expense. The potential risk of this option increases with the cost of making a significant investment in a structure with a limited life expectancy. The life of the structure is largely dependent on the success of the chloride extraction as well as the extent of irreversible damage that may have taken place before treatment. This alternative would not require a design exception, but is the most expensive rehabilitation option.

Alternative #4 proposes to replace the Lake Almanor Bridge. Several alternatives are being investigated to achieve the project's need and purpose. Given the complexity of implementing the chloride extraction process, and the uncertainty of the structure's life expectancy once the chlorides have been extracted, the replacement option appears to be the most feasible, cost effective, and best overall value to the State. Given the amount of resources needed to do the additional studies to determine which replacement alternative is the most feasible, it is suggested that this project be approved as a bridge replacement project and moved to the next phase allowing for a more thorough investigation into the best replacement alternative. The current "ballpark estimate" of a bridge replacement project is approximately $8,000,000 at current prices.

The "do nothing" alternative #5 will most likely result in a premature loss of structural integrity of the bridge deck either resulting in the loss of permitted load capacity or eventual closure of the structure. This option would likely trigger a bridge replacement project within 10 years.

Other potential solutions were explored in light of the fact that this structure may not be necessary. The Lake Almanor spillway has never conveyed lake water and is unlikely ever to be used as a control for managing lake levels. The bridge could theoretically be replaced with a less expensive alternative structure. Currently, there is no mandate by the dam licensing and permitting agencies to modify the spillway, however the dam license sets the maximum full pool elevation of the lake to six feet below the elevation of the spillway threshold, thereby effectively eliminating the spillway as a tool to manage ordinary lake inflows. The outlet structure and a diversion tunnel allow for the successful management of lake levels by the dam owner, Pacific Gas and Electric Company. A possible at-grade-crossing scenario for elimination of the structure was evaluated, and was found to require up to 4000' of realignment of Route 89, which would cost an estimated $4,500,000, with many unknown R/W and other costs.

System Planning

The post 20-year facility concept is a 2-lane expressway with 12-foot lanes and standard 8-foot shoulders. Alternatives that include widening shoulders are consistent with State and local transportation plans and programs. The 2005 Plumas County Regional Transportation Plan (RTP) identifies the need for shoulder width improvements at this location. This route is part of the Interregional Road System (IRRS) and is also a Terminal Access Route as described in the Surface Transportation Assistance Act of 1973 (STAA) for interregional trucks.

Structure Geometric Information Bridge #09-0044

	Facility Location Net Width	Min. Curve Radius	Through Traffic Lanes	Paved Shoulder	Shoulder is Bicycle Lane	Other Bicycle Lane	Bike Route
Exist	28.0'	2000'	12'	2'*	NO	NO	YES
Alt. #1	28.0'	2000'	12'	2'*	NO	NO	YES
Alt. #2	31.4'	2000'	11.6'*	4'**	NO	NO	YES
Alt. #3	40.0'	2000'	12'	8'	YES	NO	YES
Alt. #4	40.0	2000'	12'	8	YES	NO	YES

* Requires design exception
**Does not meet RRR guidelines

Proposed Funding

This project is proposed for inclusion in the 2012 State Highway Operation and Protection Program (SHOPP) under the 20.10.201.113 program for programming in the 15/16 fiscal year. This PSSR has been prepared in anticipation of a possible 2010 SHOPP amendment, in the event

funding becomes available. This project is exempt from Federal Highways Administration (FHWA) (State Authorized) full oversight.

Cost Estimate Summary (2011)

	Alt. #1	Alt. #2	Alt. #3	Alt.#4
Roadway	**$ 665,000**	**$ 693,000**	**$ 765,000**	**$ 959,000**
Structures	**$1,587,000**	**$1,859,000**	**$3,446,000**	**$6,863,000**
ROW & Task orders	**$ 38,000**	**$ 38,000**	**$ 38,000**	**$ 60,000**
TOTAL	**$2,290,000**	**$2,590,000**	**$4,250,000**	**$7,880,000**
Projected cost with 3.5% escalation rate	**$2,630,000**	**$3,000,000**	**$4,880,000**	**$9,060,000**

Pavement Life Cycle Cost Analysis

For Alternatives 1-3, the only portion of the work possibly requiring new pavement is limited to bridge approach conforms, an area that is routinely subject to conform grinding in typical capital improvement or maintenance projects. This often results in a thinner pavement section than on the adjoining highway due to proximity to the bridge. The pavement required for these alternatives is only to provide smooth transitions onto a new deck surface which should have a minimum 20 year target life; therefore it is recommended that only the 20 year flexible pavement section be considered. For Alternative 4, a structural section will be determined in the design phase.

Right of Way

Only Alternative 4 (bridge replacement) will require new right of way. In addition, a construction easement will be required for an area northeast of the structure in order to access the spillway, and would be necessary for all alternatives. The combined cost of the easement and new right of way is estimated to be $21,200. An additional $30,000 has been included in the estimate for task orders and environmental contingencies that may arise prior to construction.

Preferred Alternative

After considering the project's need, purpose and benefit to cost ratio the preferred strategy for funding purposes is Alternative #4.

Coordination with Other Agencies and Stakeholders

The Lake Almanor Spillway is part of the hydroelectric facility owned and operated by Pacific Gas and Electric Company (PG&E) and licensed by the Federal Energy Regulatory Commission (FERC). These facilities are also subject to regulations and authority of the State Water Resources Control Board, Division of Safety of Dams (DSOD). As such, the work proposed within the spillway would be subject to review at the Project Plans and Estimates (P&E) phase by each of these regulatory agencies. Hydraulic studies of the effects caused by modifications of the spillway,

as well as a narrative description of any temporary or permanent modifications to the spillway, should be anticipated. These reviews should be included into the project schedule allowing for additional response time prior to the PS&E milestone. PG&E has requested to serve as the intermediary in coordinating these reviews. PG&E should also continue to be included as a stakeholder in the project development process.

Performance Measures

- 1 Bridge – Replaced
- 944' Bridge Barrier Rail (Result of Replacement)
- 0.25 miles new 8' shoulder (Result of Replacement)

CEQA/NEPA Compliance

It is anticipated that the Environmental Document and determination will be an Initial Study/Negative Declaration and Categorical Exclusion for compliance with the California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA) respectively. The timeframe for providing CEQA/NEPA compliance is estimated at 24 to 36 months from the date a complete Environmental Study Request (ESR) is received, depending on which alternative is implemented. It is presumed that Alternatives #1, #2, and #3 would be less likely than Alternative #4 to result in an adverse effect to historic properties. Additionally, the work season may be subject to restrictions due to the close proximity of protected bird species nesting activities. Coordination with the California Department of Fish and Game for biological monitoring may be required. Potential adverse effects upon nesting birds can be avoided by scheduling work during the non-nesting period, August 15 through February 15. However, winter weather conditions would inhibit much of the proposed work and chloride extraction would likely be impossible during freezing conditions.

A Preliminary Environmental Assessment Report (PEAR) has been prepared for this project and is attached to this document. Refer to the PEAR for details on anticipated study, permitting and consultation requirements by the various regulatory agencies for Alternatives 1-3. The North Region Environmental Office was consulted regarding bridge replacement to review the potential for additional impacts. Changing the alignment and removing the old bridge could result in adverse impacts beyond those incurred by rehabbing the existing bridge. An updated PEAR will need to be requested in the next phase of this project once bridge replacement options are developed.

Project Schedule

M000	ID Need	01/01/03	M378	Draft Structures PS&E	03/26/15
M010	Approve PID	06/30/11	M377	P&E to DOE	04/24/15
M015	Program Project	04/16/12		Structures Final PS&E	07/01/15
M040	Begin Project	07/02/12	M380	HQ Project PS&E	08/01/15
M020	Begin Environmental	10/01/12	M410	Right of Way Certificat	10/05/15
M224	Right of Way Requests	11/01/12	M460	Ready to List	11/15/15
M225	Regular Right of Way	02/01/13	M470	Fund Allocation	12/19/15
M221	Bridge Site Data Accep	03/01/13	M480	HQ Advertise	02/16/16
M030	NOP	~	M490	Bid Opening	03/29/16
M120	Circulate DED	~	M495	Award	04/29/16
M275	General Plans	03/01/14	M500	Approve Contract	05/16/16
M200	PA&ED	10/03/14	M600	Contract Acceptance	01/05/19
	Structures P&Q	01/15/15	M700	Final Report	04/05/20

Project Personnel

Project Manager	Eric Orr	530.225.3439
Design Senior	Mark Miller	530.225.3094
Project Engineer	Glenn Hammond	530.225.3001
Environmental	Chris Quiney	530.225.3174
Right of Way	Lisa Harvey	530.225.3201
Structural Engineer	Joey Aquino	916.227.8098
District Program Advisor	Roy Cahill	530.225.0522

Capital & Support Costs (Alt. 4)

NOTE		CAPITAL & SUPPORT COSTS BY PROGRAM AND PROJECT FUNDING COMPONENT (Lake Almanor Spillway Bridge)						
Please provide input to all yellow cells								
Program	Component	"Baseline" (Original Identified Hours and Funding)						
EA 02-0E180		Planned (Hours)	Loaded Rate Estimate ($/Hr.)	Program Funding by Component (x1000)				
				Prior Allocation	Initial Programming Expectation		Total Component Funding	Support/ Capital (%)
					Direct Charges	*Indirect Charges (ICRP)*		
201.110	**PA&ED**	12,000	$85.00	$0	$679	$341	**$1,100**	12.14%
201.110	**PS&E**	13,000	$94.00	$0	$813	$409	**$1,300**	14.35%
201.110	**R/W**	3,500	$83.00	$0	$193	$97	**$300**	3.31%
201.110	**CON**	21,300	$87.00	$0	$1,233	$620	**$1,600**	20.97%
SUPPORT SUBTOTAL		49,800		$0	$2,891	$1,468	$4,600	**50.77%**

		Baseline	Escalation	Program Funding Total
201.110	**R/W Capital**	$46.9	$10.1	**$60**
201.110	Construction	$6,257	$923	$7,190
201.110	Con Contingencies	$1,564	$231	$1,800
201.110	**Con Capital total**	$7,821	$1,154	**$9,000**
CAPITAL SUBTOTAL		$7,868	$1,164	$9,060
TOTALS				$13,660

PPM Deputy Directors Initials SV

Rate Information	Input
Capital Contingency Rate %	25%
ICRP Rate %	33.47%
Escalation Rate Construction	3.50%
Escalation Rate R/W	5.00%
# of years to escalate	4

Historic Program Support/Capital Cost Data (%)		
RANGE	Lowest Similar Project	60.30%
	Highest Similar Project	92.40%
	Average Similar Project	69.90%
Cumulative 2012 SHOPP Support/Capital		31.7.%

Attachments

Attachment A: Corrosion Report dated May 27 2008, #09-0044
Attachment B: Right-of-Way Data Sheet
Attachment C: Advance Planning Study dated June 2008
Attachment D: Preliminary Environmental Evaluation Report (PEAR) dated June 2009
Attachment E: Preliminary Cost Estimates (6-Page Format) for Alternatives #1 - 4
Attachment F: Traffic Management Plan Data Sheet

Errata:
The cover sheet legal description has been updated to reflect changed project limits, and should read as follows: "In Plumas County near Canyon Dam Form 0.5 miles South to 0.5 miles North of Lake Almanor Spillway"

MATERIALS ENGINEERING AND TESTING SERVICES

OFFICE OF TESTING AND TECHNOLOGY SERVICES
CORROSION TECHNOLOGY BRANCH

5900 Folsom Boulevard
Sacramento, California 95819

Recommended Corrosion Mitigation Strategy for Lake Almanor Spillway Bridge (Bridge No. 09-0044)

Robert A. Reis, P.E. – Corrosion Specialist
Senior Materials and Research Engineer
Corrosion Technology Branch

May 27, 2008

ATTACHMENT A

INTRODUCTION

We have completed our review of potential corrosion mitigation strategies for the Lake Almanor Spillway Bridge (Bridge No 09-0044). Our review included information listed in two bridge inspection records information systems (BIRIS) reports for the structure, dated 6/14/2007 and 10/03/2007. Additional information reviewed included chloride test results retrieved from the Corrosion Technology Branch's, Corrosion Test Database for concrete cores extracted from the deck in 1994 and 2004.

BACKGROUND

BIRIS reports indicate that the structure consists of continuous reinforced concrete box girders supported on single column reinforced concrete piers and open-end seat abutments with spread footings (with the exception of abutment #5 which is supported on steel piles). The structure was constructed in 1963. It is approximately 467 feet long and 28 feet wide with 2 lanes and shoulders.

The deck is subjected to deicing salts during winter months. In 1974, an impressed current cathodic protection (CP) system was installed on the structure that consisted of 48 silicon iron primary anodes, a 2 inch thick conductive coke breeze overlay as a secondary anode material, and an additional asphalt concrete (AC) overlay of approximately 2 inches as a protective wear surface. An evaluation report prepared in 1981 on the CP system indicated that the system as originally designed was underpowered. Based on criteria used at that time, the system was operated at higher amperages. This likely resulted in operating the system at much higher operating electric currents than necessary to run the system. Acceptable criteria in conformance to the current National Association of Corrosion Engineers (NACE) standards do not require such high electric currents.

Concrete cores extracted from the deck in 1994 and 2004 indicated the presence of high chloride concentrations in the concrete. Chloride concentrations averaged about 3.7 lb/yd^3 in the top inch of concrete, 1.8 lb/yd^3 at a depth of 1 to 2 inches below the deck surface, and 1.2 lb/yd^3 at a depth of 2 to 3 inches below the deck surface. However, inspection reports prepared in 2007 indicated that deck delamination appeared to be relatively minor.

CORROSION REVIEW

To facilitate our review, we examined the California Department of Transportation's (Caltrans) use of CP on reinforced concrete decks, and contacted industry representatives regarding state of the art practices for rehabilitation methods of chloride contaminated bridge decks. Mitigation measures examined included the use of CP methods (Caltrans' conductive polyester concrete overlay, zinc metallizing, and coke breeze with AC overlay). In addition, proprietary systems such as galvanic anode systems and electrochemical chloride extraction (ECE) as a method of chloride removal were considered.

Based on our review of available information, we believe that ECE is the preferred corrosion mitigation method for this structure, if used with a subsequent conventional polyester concrete overlay.

ECE is a technique that uses a direct current electric field, temporarily established with electrical connections between the deck reinforcement and an anode mesh placed on the deck surface, to reduce the chloride concentrations in the concrete. The ECE system is installed after deck repairs are made, and typically needs to stay in-place for about 6 to 8 weeks. The anode mesh is covered with a moisture retaining material (blanket) that needs to be kept moist usually by installing some form of water drip line. The mesh and moisture blanket can be covered with steel utility plates to allow traffic to travel on the deck (at low rates of speed up to about 25 mph) if needed. However, operating the system without steel plates would facilitate easier inspection of the moisture blanket and wetting system. Staged construction with traffic signaling is the preferred method to allow operation of the ECE system without traffic flow over the mesh and moisture blanket.

Unlike CP, ECE is a treatment that is temporary and is applied for a limited amount of time. Therefore, long-term maintenance and monitoring is not required. We believe that the chloride concentrations measured in the Lake Almanor Spillway bridge deck can be successfully reduced below the chloride threshold needed to cause active corrosion with the application of ECE within a relatively short time period. Concrete core sampling during the ECE process allows monitoring of the ECE chloride removal process. Subsequent placement of a conventional polyester concrete overlay effectively seals the deck from further intrusion of chlorides and moisture after the ECE treatment.

Cost Estimate

Based on discussions with Vector Corrosion Technologies, the cost to install the ECE system for this bridge will range between $34 and $43 per sq. ft. of deck surface. The wide range in cost is likely due to the uncertainty regarding water containment, traffic control, and other particulars such as selection of anode material and electrolyte treatments used with the wetting solution. As a conservative approach, you may consider using the higher cost of $43 per sq. ft. The system requires about 2 weeks to install, and can be installed separately for multiple lanes if needed.

The attached documents from Vector Corrosion Technologies (2007 Norcure Data Sheet and Preliminary Recommendations and Budgets) describe the ECE technique in more detail and provide some additional background information on the system for your review. In addition, I have attached an AASHTO specification that may be of some help if and when project specifications are developed.

We recommend using the catalyzed titanium mesh for the anode material to prevent rust staining and additional contamination of the deck surface inherent with carbon steel anode mesh.

Potential drawbacks of an ECE system include the following:

- Water is needed to maintain moisture in the moisture retention blanket covering the anode mesh.
- Water containment measures are often required.
- An additional light sandblasting and pressure washing of the deck surface would likely be needed after applying the ECE treatment (and prior to placing polyester concrete) to remove calcium carbonate deposits and salt deposits that develop on the deck surface.

- AC power source is required to run power units for the ECE treatment.
- The use of ECE treatment is proprietary and may require a sole source justification.

CP Alternatives

A conductive polyester impressed current (electrically powered) CP system was considered. However, difficulties associated with placing the conductive polyester mix and concerns regarding longevity of the system due to poor bond of the overlay with the concrete substrate eliminate the use of conductive polyester at this time.

A zinc-metallized impressed current CP system with an AC overlay was considered. However, we have not had good success with this type of system in the past.

Other impressed current CP systems in general were considered, but they all require on-going maintenance and monitoring. Caltrans is not currently resourced to provide long-term maintenance and monitoring of CP systems.

A proprietary galvanic CP system (passive system that does not use an external DC electric power to drive the system) was considered. However, we do not believe that adequate corrosion protection can be achieved with a galvanic CP system. This type of system would also require on-going monitoring.

Attachments

c: M. J. Lee
W. Siu
D. Parks
C. Sparkman

ATTACHMENTS

ELECTROCHEMICAL TREATMENTS

Vector™

Norcure® Chloride Extraction

Electrochemical chloride extraction process for chloride-contaminated structures

Description

Norcure electrochmical chloride extraction (ECE) is a treatment which a) extracts chloride ions from contaminated concrete and b) reinstates the passivity of steel reinforcement. Chloride extraction is carried out by temporarily applying an electric field between the reinforcement in the concrete and an externally mounted anode mesh. During the process chloride ions are transported out of the concrete. At the same time, electrolysis at the reinforcement surface produces a high pH environment. This process returns the steel reinforcement to a passive condition.

Advantages

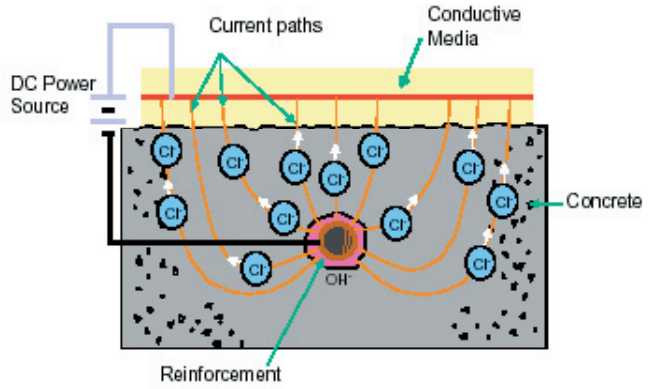
Norcure chloride extraction offers major advantages over other methods of concrete repair.

- The cause of corrosion is addressed and removed.
- The success of the treatment is documented on-site.
- The rebars are passivated throughout the treated area not just in isolated areas.
- The non-destructive nature of the treatment results in vastly reduced concrete break-out, which means:
    - Major time-savings
    - Less noise, dust and environmental pollution
    - No need for expensive structural support
    - Reduced risk of inducing micro-cracks
- The Norcure Chloride Extraction process is silent.
- The need for permanent electronic monitoring is eliminated.
- Architectural and exposed aggregate finishes can be maintained.
- Fixed prices can frequently be offered.

General Technical Specification

The Norcure Chloride Extraction treatment is carried out in full accordance with the Operators' Manual. To obtain a comprehensive guideline specification for the Norcure Chloride Extraction process, contact Vector Corrosion Technologies.

Anode	Metallic mesh temporarily mounted on concrete surface
Cathode	Existing steel reinforcement
Electrolyte	Fresh water (calcium hydroxide may be added)
Current density	1 A/m^2 of concrete surface
Treatment time	Four to eight weeks
Applied voltage	Between 10 to 40 V DC



Norcure Chloride Extraction process mitigates corrosion in chloride contaminated structures

Preparation Prior to Treatment

- Any existing surface finishes shall be removed.
- Any cracks, spalls and delaminations shall be located and repaired using an approved cementitious mortar.
- All metallic features on the concrete surface shall be located and insulated, or removed.
- The thickness of the concrete cover shall be determined and built up to a minimum of 10 mm if necessary.
- Reinforcement continuity shall be examined and, if necessary, improved to give full continuity.

Treatment

- Treatment sections shall be identified to ensure even current distribution within each section.
- Electrical connections to the reinforcement shall be established.
- Test locations for concrete sampling shall be determined and marked.
- The chosen anode system, consisting of an anode mesh and an electrolyte reservoir, shall be installed.
- Electrical connections to the anode mesh shall be established.
- The leads from the reinforcement shall be connected to the negative pole of the rectifier unit(s).
- The leads from the anode mesh shall be connected to the positive pole of the rectifier unit(s).
- A voltage shall be adjusted to give approximately 1 A/m² of concrete surface.
- Current, voltage and efficiency of the anode system shall be controlled and, if necessary, adjusted throughout the treatment.

Post-treatment

- When the process is complete, the anode system shall be removed and the concrete surface cleaned and allowed to dry.
- If required, the concrete surface shall be treated with an approved protective/decorative coating system.

4001 - 2007Apr01

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ATTACHMENT A

Vector Corrosion Technologies, Inc. *Date: *May 2008*
1330 Bellaire St. *(Revised)*
Broomfield, CO 80020
(303) 465-5806; Fax: (303) 438-1800

PRELIMINARY RECOMMENDATIONS & BUDGETS

For The

California Dept. of Transportation

@

Lake Almanor Spillway Structure, Pumas County, CA (Bridge No. 9-44-02-Plu-89-R29.97)

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ATTACHMENT A

Introduction:

In order to provide these preliminary recommendations & budgets, we have reviewed the two "BIRIS" reports and the additional information provided in e-mails. We have been asked to provide a conservative preliminary budget amount for re-passivating the concrete deck by using Electro-Chemical Chloride Extraction (ECE).

Alternately, they are also considering repairing and/or replacing the existing deck Impressed Current Cathodic Protection system (CP). We have also only been given a couple days to provide these budgets, so recommend a more detailed and complete estimate should be provided at a later stage of the project design.

Project Description:

This is a 45-year old concrete box girder bridge structure with three cells that has four spans for a total width and length of 10.3 m & 142.3 m respectively. There is about 18,000 sq. ft. of deck to be treated by ECE. There is also an AC overlay to be removed and an existing CP system that is non-functional and has been abandoned.

Recommendations:

This deck appears to be a good candidate for ECE and it also could be a viable candidate for a new or repaired CP system.

1) **ECE**-Is a Temporary electrochemical bridge restoration method and process for mitigating corrosion in reinforced concrete structures. ECE does this by moving chlorides away from the reinforcement and out of the concrete while simultaneously increasing the alkalinity of the electrolyte near the reinforcing steel. This process provides an extended long-term service life and requires no on-going maintenance. The advantage of this system is its long life and the flexibility of installing any type of new topping, including an AC topping, if so desired

   Note: See Figure 1. Below

2) **CP**- A new or repaired 'active' impressed current deck protection system could be installed, as already determined by the DOT. The DOT has already determined a budget for this option, but needs to also include additional on-going and continuous maintenance / adjustments costs in order to compare this option to the ones above. In addition, with this option no corrosion protection is provided if this system fails or is disabled in the future. Please let us know, if you would like us to evaluate or independently provide budgets for this item.

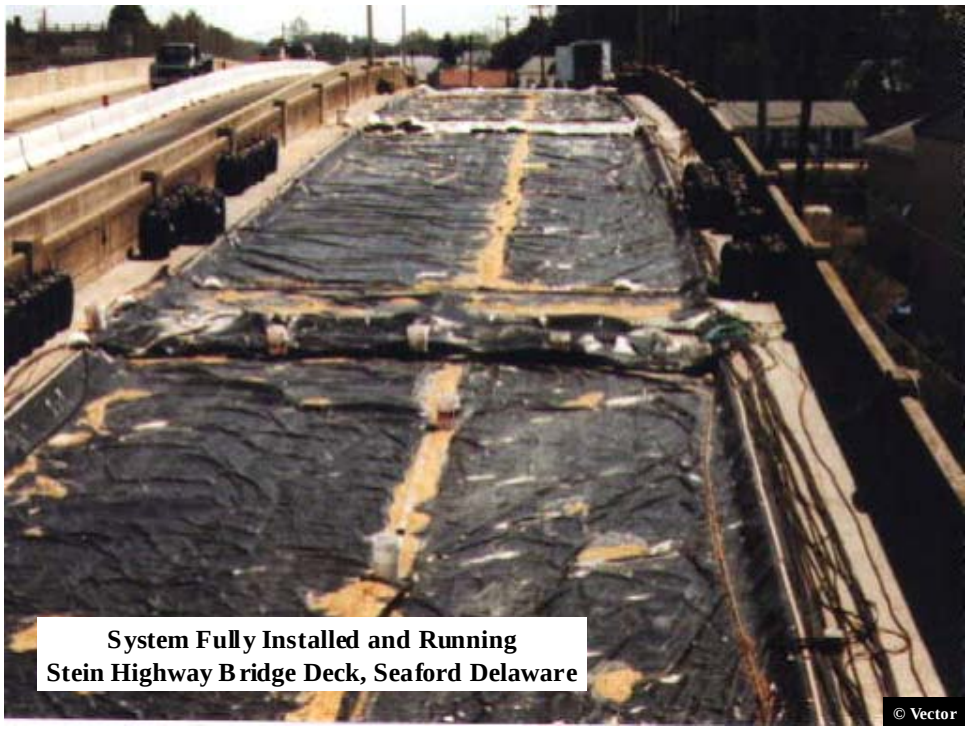


Figure 1.

Project Preliminary Budget

ECE Amount:

Unit Cost = $34 to $43 per sq. ft. of deck

Schedule:

After installation, the ECE system must operate for 4-8 weeks

About Vector:

Vector Corrosion Technologies is a member of the Vector Construction Group with 12 offices in North America. Vector Corrosion Technologies' primary mission is to provide services and products for the investigation and mitigation of corrosion in reinforced concrete structures throughout the Americas, including:

- Corrosion Investigation and Testing Services

- Cathodic Protection Services
- Anodes for Impressed Current Cathodic Protection
- Electrochemical Chloride Extraction and Re-alkalization
- Discrete Galvanic Anodes for Concrete Repair and Protection
- Humectants-activated Arc Spray Zinc Metallizing
- Activated Reinforced Galvanic Overlay Systems
- Galvanic Jackets Cathodic Protection for Marine Structures

Vector provides these services with a highly capable and trained staff. Included on our team are Professional Engineers, Business Management Graduates, and Engineering Technologists. Many engineers also undergo training and hold certifications from the National Association of Corrosion Engineers. In addition to servicing the North American market, Vector has as completed a variety of international projects including project in Romania, Argentina, Bermuda, China, and Chile.

Sincerely,

VECTOR CORROSION TECHNOLOGIES

Tore O. Arnesen, P.E., S.E.
Business Development Manager
Western U.S.

ATTACHMENT A

Standard Specification for
Electrochemical Chloride Extraction

AASHTO Designation:

1. Introduction - This standard provides a specification for Electrochemical Chloride Extraction (ECE) of a chloride contaminated concrete structure, i.e. a bridge sub-structure or a bridge deck.

2. Scope

2.1 This standard provides installation and operation specifications for Electrochemical Chloride Extraction of chloride contaminated concrete structures.

2.2 This standard may involve hazardous materials, operations, and equipment. It does not purport to address all of the safety problems associated with its use. It is the responsibility of whomever uses this standard to consult and establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

3. Referenced Documents

3.1 AASHTO Designations

T 260-94 Sampling and Testing for Chloride Ion in Concrete and Concrete Raw Materials

R 18 Establishing and Implementing A Quality System for Construction Materials Testing Laboratories

3.2 ASTM Standards

C876-91 Measurement and Interpretation of Half-Cell Potentials of Reinforcing Steel in Concrete

4. Terminology

4.1 Alternating Current (AC) - Electric current which repeatedly reverses direction on a periodic cycle, usually at a frequency of 60 cycles per second (60 Hz).

4.2 A.C. Service - Alternating current supply to the rectifier; 240 or 480 volts AC.

4.3 Anode - The electrode at which oxidation reactions (i.e. corrosion reactions) occur, and to which negatively charged ions migrate when an electric current is passed through an electrolyte. The anode may be any material that distributes the ECE current to the entire surface to be treated. Anode used for ECE shall be either catalyzed titanium, or steel as specified.

4.4 Anode Subzone - An electrically isolated anode circuit within an Anode Zone occupying an area not exceeding 200 ft^2. All subzones within a zone operate in parallel.

4.5 Anode Zone - An isolated anode circuit on the concrete surface occupying an area not exceeding 1,500 ft^2.

4.6 Cathode - The electrode at which reduction occurs, and to which positively charged ions migrate when an electric current is passed through an electrolyte. When applying ECE systems, the cathode is the embedded reinforcing steel.

4.7 Cell - An electrochemical system consisting of an anode and a cathode in metallic contact and immersed in an electrolyte. The anode and cathode may be different metals.

4.8 Constant Current - An operating mode in a rectifier in which the current is set at a fixed level, and the voltage varies. Variations in the rectifier output voltage and current will occur with the changes in the concrete resistance and AC line voltage.

4.9 Constant Voltage - An operation mode in a rectifier in which the voltage is set at a fixed level, and the current varies. Variations in the rectifier output voltage and current will occur with the changes in the bridge deck resistance and AC line voltage.

4.10 Corrosion - The natural tendency of a metal to revert to its native state because of a reaction with its environment. In order for corrosion to occur there must be an anode, a cathode, an electrolyte and a conductive path between the anode and cathode.

4.11 Current - A movement of electricity through a solid or solution; commonly measured in amperes or milliamperes. In an ECE system, the direct current flow

ATTACHMENT A

is ionic (through the electrolyte) and electronic (through the metallic paths).

4.12 Current Density - The current per unit area of surface of metal or concrete. A common unit is A/m^2 (amperes per square meter).

4.13 Direct Current (D.C.) - Electric current that flows in only one direction.

4.14 D.C. Wiring - All insulated conductors necessary for connecting the anode zones, reinforcing steel and other instrumentation with the rectifier and/or junction box.

4.15 ECE Installation Supervisor (IS) - Representative who is familiar with all aspects of the ECE process and its installation.

> Note 1 - The IS gives advice in the field regarding the installation and operation of the ECE process and may perform necessary quality control field tests to ensure proper system operation. The IS should have a minimum 1 year of relevant experience with Electrochemical Chloride Extraction systems.

4.16 Electrical Continuity - A closed circuit (unbroken electrical path) between metal components under consideration. For ECE of concrete structures, continuity typically refers to the electrical connection of reinforcing steel.

4.17 Electrical Discontinuity - The physical separation between metal components under consideration. For ECE of concrete structures, electrical discontinuity typically refers to discontinuous or unconnected reinforcing steel.

4.18 Electrolysis - Chemical changes in an electrolyte brought about by the passage of an impressed electric current.

4.19 Electrolyte - Any medium which serves as a conductor for the passage of ionic current (i.e. concrete, soil and water).

4.20 Energize - (turn on) The process of initially applying power to an ECE system.

4.21 Engineer - The owner's representative or project engineer.

4.22 Filter - A device used to increase the conversion efficiency of a rectifier. Filters typically consist of an inductor or choke, which is used to reduce the ripple component in the D.C. output.

4.23 Half-Cell - A single electrode in contact with an electrolyte and which, in contact with another half-cell, forms a full electrochemical cell. This term is sometimes used to designate a reference electrode or reference cell.

4.24 Ion - An atom or group of atoms that have lost or gained one or more electrons. and have therefore acquired an electric charge (i.e. $C1^-$, OH^-, H^+, Na^+).

4.25 Macro Cell - A corrosion cell with a large anode to cathode relationship.

4.26 Meter - An instrument which is used for measuring and recording such as in the case of rectifier voltage, current and half-cell potential. Rectifier meters may be analog or digital.

4.27 Micro Cell - A corrosion cell with a small anode to cathode relationship.

4.28 Ohm's Law - The relationship between voltage, current and resistance ($E = IR$).

4.29 pH - A value taken to represent the acidity or alkalinity of a solution. A pH of seven is considered 'neutral', with lower numbers representing solutions which are acidic and higher numbers solutions which are basic or alkaline.

4.30 Potential - A voltage measurement (i.e. half-cell potential).

4.31 Potential Survey - obtaining half-cell potentials at multiple locations on the surface of a structure.

4.32 Remote Monitoring System - A device used to collect and transfer rectifier operating data to a remote computer terminal, thus eliminating the need for regular inspections of the ECE system during the treatment process. The remote monitoring system typically consisting of a data recorder, modem, telephone service and personal computer at the receiving end.

4.33 Resistance - Opposition offered by a conductor to the passage of electrical current, measured in ohms.

4.34 Resistivity - The electrical resistance of a substance (i.e. concrete, water and soil) commonly measured in ohm-centimeters (ohm-cm). Concrete of lower resistivity is likely to be more corrosive than

concrete of higher resistivity.

4.35 Rectifier - A device used to convert alternating current to direct current. In an ECE system the rectifier is used to control the voltage and current output to each zone.

4.36 Ripple - Percent ripple = Ripple Voltage (RMS)/Volts DC x 100. Ripple voltage shall be measured across the output terminals of the rectifier with a true RMS AC voltmeter. Volts DC shall be measured across the output terminals of the rectifier with a DC voltmeter.

4.37 System Negative Connections - Cable connections to the reinforcing steel from the rectifier negative (-) output.

4.38 Voltage - Difference of potential expressed in volts or millivolts (1 volt = 1,000 millivolts).

5. Summary

5.1 This standard presents specifications for the installation and operation of Electrochemical Chloride Extraction (ECE) systems for chloride contaminated concrete structures. It incorporates the use of other available standards which are applicable to the accomplishment of this task. The procedure allows adjustments to accommodate the needs of individual agencies.

5.2 The specifications and procedures consist of three major sections: (1) general requirements for all Electrochemical Chloride Extraction installations, (2) specific requirements for application to vertical and overhead surfaces, (3) specific requirements for application to horizontal surfaces.

6. Significance and Use

6.1 Significance - Electrochemical Chloride Extraction (ECE) was designated as one of the most important technologies to come out of the SHRP program. Initial research of ECE began in the U.S. in the 1970's. A Norwegian company developed a commercial system in the 1980's. SHRP then evaluated the technology during the 1980's and early 1990's. ECE is a treatment process typically taking 6 to 8 weeks. It is a non-destructive treatment that does not alter the final appearance of the strucuture to which it is applied. ECE halts corrosion by migrating chlorides, the source of the corrosion, away from embedded reinforcement. At the same time, electrolysis at the reinforcement surface produces a high pH environment, repassivating the steel reinforcing. Variations of the ECE system which are available include the Traffic Bearing System for situations that require full traffic access during treatment, Realkalisation to increase the pH of carbonated concrete, and electrochemical lithium migration to treat ASR affected concrete.

6.2 Use

6.2.1 Electrochemical Chloride Extraction applied to a vertical or overhead surface typically employs a steel anode fastened to the concrete. Titanium anodes are generally specified for architectural applications where rusting of the anode is unacceptable. A spacer is used to keep the anode from being in direct contact with the concrete, allowing room for the electrolyte media between the anode and the concrete. The electrolyte media usually consists of a sprayed on cellulose fiber mixture, which is easily applied to vertical and overhead surfaces. The electrolyte media is designed to retain moisture. The system is then wrapped with plastic to help retain moisture, and is continuously wetted. The treatment duration is typically 6 to 8 weeks, after which time all materials are removed from the concrete surface. When steel anode is used there will be some rust staining. Abrasive blast cleaning is generally specified to remove the rust staining and prepare the surface for the application of an appropriate sealer or coating.

6.2.2 Electrochemical Chloride Extraction when applied to a horizontal surface also employs an anode. Typically the anode used for these applications is catalyzed titanium. The electrolyte media is generally made up of two layers of absorbent felt, although cellulose fiber can used. The anode is sandwiched between the two layers of felt and laid on the concrete surface. The system is then covered with plastic to help retain moisture, and is continuously wetted. The treatment duration is typically 6 to 8 weeks, after which time all materials are removed from the concrete surface. Moisture and pH conditions are controlled to prevent the generation of acid and etching of the concrete surface if catalyzed titanium anode is used. Abrasive blast cleaning is conducted to prepare the surface after treatment for an appropriate sealer, coating or overlay.

7. Laboratory Apparatus and Materials

7.1 Personal safety equipment required by the

specified test method.

7.2 Testing equipment required by the specified test method.

8. Field Apparatus and Materials

8.1 Personal safety equipment required by the laboratory, field organization, or OSHA for work in the ECE installation area.

8.2 Materials for Concrete Repair - Materials for Concrete Repair shall meet the requirements of sections 8.2.1 through 8.2.2.

8.2.1 The material used in concrete repairs shall be Portland cement concrete or mortars having an appropriate electrical resistivity.

8.2.2 Bonding agents or additives that are non conductive or electrically insulating in nature shall not be used.

8.3 Anode System - The Anode System shall meet the requirements of sections 8.3.1 through 8.3.5

8.3.1 The anode system shall consist of an anode embedded in an electrolyte reservoir on the concrete surface. The electrolyte reservoir may consist of either cellulose fiber or felt cloth, saturated with an electrolyte.

8.3.2 Anode - Catalyzed titanium or steel may be used. The use of steel anode may be suitable for applications where rust staining produced by the steel can be removed without disrupting the client.

8.3.3 Cellulose Fiber - Sprayed on Cellulose Fiber material shall have excellent adhesion to overhead and vertical surfaces, high moisture retention properties, and a proven track record. Contractor to supply references of use of the proposed material on a minimum of three previous projects. Prior to spraying of the cellulose fibers onto the concrete surface to be treated, wooden battens if used or suitable spacers shall be installed.

8.3.4 Felt cloth - In order to provide appropriate spacing and moisture retention, each layer of felt cloth shall be no less than 3mm thick, and shall be primarily used on horizontal or deck surfaces.

8.3.5 Electrolyte - The electrolyte shall consist of potable water. Calcium Hydroxide may be added if deemed necessary. Lithium based electrolyte may be used if specified for cases where concrete suffering from ASR is identified.

8.4 Electrical Insulating Material - Electrical Insulating Material used to cover all electrical connections shall be waterproof.

8.5 AC Power Supply - the AC Power Supply shall be sufficient to operate the required number of DC power rectifiers.

8.6 DC Power Supply - DC Power Supply shall meet requirements of sections 8.6.1 through 8.6.4.

8.6.1 Each AC/DC rectifier shall be rated to provide total output current and voltage to meet the current demand of the individual zone. A current distribution box shall be provided for each zone, such that each zone shall be divided into subzones that operate electrically in parallel. The DC voltage side shall be limited to approximately 40 VDC. Rectifiers shall be rated to operate continuously at maximum output under site conditions of temperature and relative humidity.

8.6.2 Enclosures - The rectifiers shall be housed in vandal-proof enclosures suitable for site conditions.

8.6.3 Controls and connections - Each AC/DC rectifier shall be provided with: (i) All output controls, (ii) One output voltmeter and one output ampmeter, (iii) Provision for direct measurement of output voltage with an external meter, (iv) Easy access to the positive and negative terminals of each output, which shall be clearly marked "+VE Anode" and "- VE Rebars". All output terminals shall be fully insulated from the chassis or its enclosure, (v) An adequately rated circuit breaker or fuse, on the main input to ensure protection against short circuit and thermal overload, (vi) AC cable connections shall conform to all relevant NEC codes and standards.

8.6.4 Electrical components - Electrical Components of AC/DC rectifiers shall meet the requirements of sections 8.6.4.1 through 8.6.4.4.

8.6.4.1 All electronic component subassemblies shall be encapsulated in epoxy resin or varnishes, which shall be recommended by the component manufacturers.

8.6.4.2 The rectifiers shall be suitable for continuous operation at the specified output ratings, with a peak inverse voltage of at least 800 volts. Rectifiers shall have double windings, which must be separated by a grounded metallic screen or mounted on separate limbs

of a grounded core.

8.6.4.3 Rectifiers shall be of the silicon type with suitable AC surge protection. Fuses shall be used to protect the rectifiers on the DC output side.

8.6.4.4 AC ripple on DC output of all rectifiers shall not exceed 2V at all output settings from 10 to 100% of rated voltage and current.

8.7 Cables and Wiring - Cables and Wiring shall meet requirements of sections 8.7.1 through 8.7.4.

8.7.1 All AC Cables or wiring shall be stranded copper conductors. The cables shall be insulated with cross linked polyethylene listed by UL.

8.7.2 DC Cables for connection to the anode (positive) shall be identified by red insulation and shall have a minimum gauge of 10 AWG.

8.7.3 DC Cables for connection to the reinforcing steel (negative) shall be identified by black insulation and shall have a minimum gauge of 6 AWG.

8.7.4 Each DC cable shall be labelled according to the zone or portion of a concrete structure to which it is connected.

8.8 Digital Voltmeter - A battery-operated Digital Voltmeter (DVM) shall be provided to enable testing and monitoring during the treatment period. Spare batteries shall be provided. The DVM shall, have a minimum 3.5 digit display, resolution of 1 mV, and an error of no more than 1 digit. The input impedance of the DVM shall be at least 10 MΩ.

8.9 Current Probes - A battery-operated current tong probe, with spare batteries, shall be provided for current readings during the treatment period. The error of the probe shall be no more than + 5%.

8.10 Corrosion Potential Half-Cell - A suitable half-cell such as copper-copper sulphate shall be used to measure corrosion potentials of the concrete structure.

8.11 Apparatus for Monitoring Chloride Concentrations - Core or rotary impact drills are to be used to obtain concrete samples to monitor the chloride concentrations

9. Testing

9.1 Half-Cell Corrosion Potential Survey - Half-Cell Corrosion Potential Survey as specified to be conducted in accordance to ASTM C 876-91.

9.2 Chloride Analysis - Chloride Analysis to determine the residual water-soluble chloride content in the concrete shall be in accordance with AASHTO T260-94. Measurements may be made using the rapid chloride test method.

9.3 Sampling - Sampling of concrete for chloride analysis is performed by drilling either powder or core samples. Powder samples may be collected directly from drill cuttings at selected depths. If cores are selected, they shall be cut into slices and crushed to fine powder.

9.3.1 Sampling of the concrete before and after treatment should be carried out by experienced personnel. Care shall be taken to prevent cross contamination between samples.

9.3.2 Chlorides in unreinforced concrete do not cause any deterioration of the concrete. It is therefore important that testing is performed in the concrete area directly in the vicinity of the reinforcing steel. The exact location of the reinforcing steels, in the area to be tested, shall be located with a cover meter, pachometer, or other suitable reinforcing steel-locating device. Core samples shall be taken directly over a single reinforcing steel while dust samples may be drilled adjacent to the intersection of two reinforcing steels.

9.3.3 The samples shall be extracted by taking cores no greater than 50mm in diameter down to the depth of the reinforcing steel and if permitted by the Engineer, through the reinforcing steel. Alternatively, dust samples may be extracted with the use of a hammer drill. The drill bit should be the smaller of 1.5 times the diameter of the reinforcing steel in the location being tested, or 25mm. Samples shall be taken within 1.5 times the diameter of the rebar or 1 inch of the nearest rebar. To eliminate surface variability, the concrete shall be drilled to a depth of 6mm and the dust discarded. Dust samples shall be taken in standard increments from the surface to the depth of the reinforcing steel. To avoid cross contamination the drill bit shall be cleaned or changed to one of a smaller diameter for the subsequent increment. The hole shall be thoroughly cleaned with compressed air at each increment.

9.3.4 Samples shall immediately be placed into sealed airtight bags, or other suitable containers. They should then be clearly marked with the contract name, the date,

the location of the sample, the depth from which the sample was removed, the cover depth of the reinforcing steel at that location, and the lateral distance to the nearest reinforcing bar.

10. Hazards

10.1 Observe the safety procedures required by the Laboratory and/or Field Agency and/or OSHA for each laboratory and field operation as applicable.

10.2 Obtain a material safety data sheet for all materials that require one, and plans for storage, handling, and placement, prior to receiving such materials at the jobsite.

11. Preparations

11.1 Pre-Project Submittal - A Pre-Project Submittal shall be made before the commencement of any Electrochemical Chloride Extraction project. The Pre-Project Submittal shall include items identified in sections 11.1.1 through 11.1.6.

11.1.1 Project name and location.

11.1.2 The type of anode to used, whether steel or titanium or a combination of the two.

11.1.3 The electrolyte materials to be used, including cellulose, felt, water, chemical additives, etc...

11.1.4 Approximate size and layout of zones and subzones.

11.1.5 AC power requirements if power is to be provided by the owner.

11.1.6 Approximate project schedule.

12. Standardization

12.1 Laboratories conducting inspections or testing in accordance with this standard shall comply with the requirements of AASHTO R18.

12.2 Verify the calibration of instruments used for testing components or systems as designated in this standard in accordance with the requirements of the standard used for testing.

13. General Requirements for all Electrochemical Chloride Extraction Installations

13.1 Installation Procedure - Installation Procedure shall conform to items identified in sections 13.1.1 through 13.1.5.

13.1.1 Preparation of the concrete for Electrochemical Chloride Extraction treatment shall include items identified in sections 13.1.1.1 through 13.1.1.8.

13.1.1.1 Preparation of the Concrete Surface - The surface of the concrete shall be cleaned of any grease, coating, etc., that may interfere with the passage of electrical current, to ensure optimum treatment efficiency. Sandblasting or water jetting may be required to achieve this. The specification shall state whether pre-cleaning of the concrete surface is required and a separate bid item shall be provided as required.

13.1.1.2 Pre-installation survey - Visual and sounding surveys shall be carried out over the full surface area of the structure to determine where delaminations and previous repairs have been carried out. In addition, areas where concrete cover over the rebars is insufficient (i.e., less than 10 mm) shall be located, by means of a cover meter / pachometer survey and selective chip-outs. Also a pre treatment corrosion potential survey shall be performed if specified throughout the surface area which will be repeated not less than three months after completion of the treatment. The specification shall state whether the tests (survey) are to be performed by the Owner, Engineer, or Contractor and a separate bid item shall be provided as required.

13.1.1.3 Removal and replacement of delaminated concrete - Delaminated and spalled concrete areas shall be repaired before beginning the ECE treatment, and are not considered part of the ECE treatment itself.

13.1.1.4 Remediation for insufficient concrete cover - Cement-based mortar shall be applied over all areas determined to have insufficient concrete cover until the total cover at each area is at least 10 mm or has comparable resistance to 10mm of concrete. Alternatively, localized areas may be isolated by applying an epoxy or other non-conductive coating to the affected area.

13.1.1.5 Insulation of visible or shallow metal components - Any tie wires, nails, or other metal

components, that are close to the surface or visible on the surface of the concrete, shall be removed or insulated with silicon rubber or non-conductive epoxy. If necessary, these may be cut back to not less than 10 mm below the surface, then patched with a cement-based mortar.

13.1.1.6 Reinforcement continuity - The top-layer of reinforcing steel in the structure shall be checked for electrical continuity prior to treatment. This can be done either at existing spall locations, or at cathode (reinforcing steel) connection points. If necessary additional holes can be drilled or chipped to access the reinforcing steel. If the voltage difference between any two reinforcement steel locations(from different locations in the structure) is less than 1.0 mV (when measured with a high input impedance voltmeter with a resolution of no less than 0.1 mV), or resistance is less than 5 Ohms (when measured in Ohms with a multimeter) these reinforcement steels are considered to be continuous. Drawings of the structure showing reinforcement details shall be inspected to locate areas where continuity might not exist, and direct measurements of voltage differences or resistance between rebars in these areas and other areas in the structure shall be made. In addition, measurement points shall include the perimeters and the middle of each structural component. Records of the locations of measurement points and the measured voltage/resistance differences shall be submitted to the Engineer with the final report, or sooner if requested. Where any electrical discontinuity is identified, proposals for providing continuity shall be submitted to the Owner for approval before proceeding. Compensation for insulation of shallow metal, remediation of insufficient cover, continuity bonding and the correction of other hidden defects is generally by separate bid item or based on force account rates.

13.1.1.7 Reinforcement (negative) connections - There shall be at least 1 reinforcing steel connection per $50m^2$ of concrete surface area, and never less than two connections per zone. Reinforcing steel connections shall be installed and tested for continuity. Immediately after a connection has been made, the reinforcement connection shall be coated with a non-conductive material, such as silicon rubber, or the hole may be sealed with an approved patch repair mortar.

13.1.1.8 Connection of Metal Fixtures - Any metal fixtures attached to the concrete structure must be protected against corrosion by electrical connection to the reinforcement. Any cable used in providing electrical connections shall comply with the requirements of sections 8.7.3 through 8.7.4 and the sheathing shall be color coded black.

13.1.2 Installation of the anode system shall meet the requirements of sections 13.1.2.1 through 13.1.2.3.

13.1.2.1 To prevent short circuits, any exposed steel, in or on the surface of the concrete, shall be adequately masked and, if necessary, connected to the reinforcement or removed, before applying the anode system.

13.1.2.2 Anode Zones - The concrete surface to be treated shall be divided into isolated Anode Zones. The Anode Zones may then be divided into anode subzones. Anode subzones should be of approximately equal resistance, size, and geometry where possible. Anode zones and subzones should be spaced 50mm to 100mm apart to ensure electrical isolation from each other.

13.1.2.3 Electrolyte Media - The anode shall be embedded within electrolyte-saturated media. Different combinations of anode and electrolyte media may be used for different applications.

13.1.3 Connection of Cables - All DC cables shall be placed and connected so they do not cause any unnecessary inconvenience. Cable insulation shall be checked; any damaged insulation shall be repaired using a generous amount of an appropriate insulation material, or by making new joints.

13.1.4 Placement of the AC/DC Rectifiers - A suitable location for placement of the AC/DC rectifiers shall be chosen to provide minimal disturbance. The chassis of the AC/DC rectifiers shall be grounded in accordance with relevant NEC codes and standards. All AC power cables shall be installed in accordance with relevant NEC codes and standards.

13.1.5 Inspection of the Installation - The installed anode system, its electrical connections, and power cables shall be inspected prior to the initiation of the ECE treatment. AC power shall be connected by a certified electrician as required by relevant NEC codes and standards.

13.2 System Operation and Maintenance - System Operation and Maintenance shall meet the requirements of sections 13.2.1 through 13.2.3.

13.2.1 System Start-Up - System Start-Up procedures shall meet requirements of sections 13.2.1.1 through 13.2.1.2.

13.2.1.1 Circuit Verification - Prior to start-up or energization of power, tests shall be undertaken to ensure that all measurements, and power distribution circuits are correctly wired, connected and labelled. Where appropriate, the circuits shall have the expected resistances. Using a suitable voltmeter, the polarity of the reinforcement shall be ascertained when the power sources are switched on.

13.2.1.2 Adjustment of current output - The initial current used for the ECE treatment shall generally be between $1A/m^2$ to $2A/m^2$ and shall not exceed $5\ A/m^2$. During the treatment, the current output shall be measured individually in each anode cable (as detailed in section 13.2.2). The total current can be adjusted by decreasing or increasing the applied voltage. If the results indicate an unexpected current distribution, an inspection shall be carried out to determine the reason, and remedial action shall be taken.

13.2.2 Monitoring of System Operation - Monitoring of System Operation shall meet requirements of sections 13.2.2.1 through 13.2.2.2.

13.2.2.1 Inspections - During the treatment, the operation of the system shall be checked regularly and the following records shall be made: (i) date and time, (ii) current (to each zone and subzone as appropriate), (iii) voltage (to each zone). Any problems that develop shall be identified, recorded, solved, and reported. Visual inspection of cable connections, cable insulation, anode condition, and wetting of the electrolyte media shall be conducted regularly. Any interruption in the operation shall be recorded and reported.

13.2.2.2 Determination of chloride content - In addition to the regular inspection, determination of the residual water-soluble chloride (Cl^-) in the concrete adjacent to the steel (per AASHTO T 260-94) shall be carried out as deemed necessary during the treatment. The determination shall be conducted on concrete samples to be taken at pre determined points in the vicinity of the rebar. These locations shall be submitted to the Owner for approval prior to commencement of treatment. If the results of any of these analyses indicate that the system is not operating properly, the Contractor shall determine the cause and rectify the situation.

13.2.3 Remedial Work - During the treatment, remedial work shall be conducted whenever any inspection indicates the system is not performing properly. This remedial work shall include, but not necessarily be limited to, the following: (i) repair or replacement of defective components of the system, (ii) modification to correct any electrical short circuits or to prevent stray currents. The materials and workmanship for remedial works shall be in accordance with standard concrete repair practices, except where otherwise agreed.

13.3 Termination of the ECE Treatment - The ECE treatment shall be performed: (i) for approximately 60 days, or (ii) until a total of $600A\text{-}hrs/m^2$ has been passed, or (iii) until the chloride in the concrete in the vicinity of the reinforcing steel has decreased to 0.03% by weight of concrete after correction for background chlorides, whichever is the earliest.

13.4 Dismantlement and Disposal of The System - After the system is shut down, remove all electrical cables, conduits, hangers, and power supplies from the site. The anode, electrolyte media and wooden battens or dams (if used) shall also be removed from the site or be disposed in accordance with applicable disposal and safety regulations.

13.5 Post Treatment Surface Cleaning and Patching of the Concrete - The surface of all treated concrete shall be either washed with pressure cleaning, using clean water, or light abrasive blasting as preparation for the application of the specified surface treatment/protective coating. The entire treated structure shall then be inspected; the occurrence, location, and extent of any physical damage or changes to the concrete shall be noted. Any such defects such as core and sample holes made in the concrete shall then be repaired. The surface of all the treated and prepared concrete shall be treated with a penetrant sealer or coating as defined elsewhere in the design specifications. The site shall be clean at the end of the job.

14. Specific Requirements for Vertical and Overhead Surfaces

14.1 Installation of the anode system for vertical and overhead surfaces shall meet the requirements of sections 14.1.1 through 14.1.3.

14.1.1 Anode - The Anode for vertical and overhead surfaces unless otherwise specified shall be welded wire steel mesh. Spacers such as wooden battens shall be used to keep the anode from coming in direct contact with the concrete surface and to allow room for the electrolyte media between the anode and the concrete surface. The Anode shall be securely fastened to the concrete surface via insulated anchors to prevent any shorting of the system.

14.1.2 Electrolyte Media - The Electrolyte Media shall be sprayed cellulose fiber unless otherwise specified. The cellulose fiber material shall provide high moisture retention and be easily applied to awkward and uneven surfaces. The cellulose fiber and the electrolyte shall be delivered through separate hoses, then mixed at a nozzle and sprayed directly onto the concrete surface. The fiber-electrolyte mixture shall be applied only after the anode is securely installed. The fiber-electrolyte layer shall be approximately 1.5 to 2" thick.

14.1.3 Wetting of Electrolyte Media - The Electrolyte Media must be kept 'wet' at all times. The treatment areas can be wrapped in plastic to minimize moisture loss due to evaporation. An irrigation system with a continuous supply of electrolyte can be set up to ensure all surfaces are continuously wetted.

15. Specific Requirements for Horizontal Surfaces

15.1 Installation of the anode system for horizontal surfaces shall meet the requirements of sections 15.1.1 through 15.1.3.

15.1.1 Anode - The Anode for horizontal surfaces shall be a catalyzed titanium unless otherwise specified. This mesh is suitable to apply to horizontal surfaces and will not produce any rust staining. Steel anode may be used with the appropriate electrolyte media.

15.1.2 Electrolyte Media - The Electrolyte Media for horizontal surfaces can be either a cellulose fiber, as in section 14.1.2, or multiple layers of felt cloth. In most applications felt cloth can be used as the electrolyte media. Using this system, a layer of felt will be followed by the titanium and covered with a top layer of felt, thus producing a felt/titanium/felt sandwich. If a titanium anode is utilized, a proposal for mitigating acid generation at the titanium shall be submitted by the contractor. The proposal shall contain a minimum of three reference projects where the proposed method has been used by the contractor.

15.1.3 Wetting of the Electrolyte Media - A small watertight barrier (min 40mmm in height) shall be erected around the perimeter of the horizontal surface to be treated. To continuously wet the electrolyte media, the area inside the barrier shall be flooded with electrolyte. To keep the electrolyte media saturated a irrigation system may be utilized. Also, covering the surface with plastic will reduce evaporation and retain moisture.

16. Report and Data Sheets - After completion of the work, the contractor shall prepare a final report as defined below. The final report shall include the following information on the ECE project:

16.1 Project name and location.

16.2 Reinforcing steel continuity testing completed on the structure and locations of any continuity bondings made.

16.3 Surface preparation performed before treatment.

16.4 Description of the ECE installation and procedure used.

16.5 Materials used with manufacturers' data sheets.

16.6 Description of test locations and test procedures.

16.7 Current and voltage readings during treatment.

16.8 All test results including pre and post Cl^- levels.

16.9 Pre treatment corrosion potential survey measurements if specified. In order to allow sufficient depolarization of the structure, post treatment corrosion potential survey may not be taken prior to 3 to 6 months after treatment..

16.10 Locations and repair of any damage to the concrete arising from the treatment.

16.11 Discussion of results, including consideration of any local anomalies or variations in results.

16.12 Statement on the effectiveness of the treatment.

17. Key Words - Electrochemical Chloride Extraction, ECE, bridge sub-structure repair, bridge deck repair, concrete repair, corrosion remediation, corrosion mitigation

ATTACHMENT A

State of California
Department of Transportation

Business, Transportation and Housing Agency

Memorandum

Flex your power!
Be energy efficient!

To: Mark Miller

Department of Transportation, District 3

Attention Glenn Hammond
Project Engineer

Date: January 20, 2011

File: 2-PLU-89/PM 30
E.A. 0E180
Alternate No. N/A

Lake Almanor spillway

From: LISA HARVEY,
Senior Right of Way Agent
Project Delivery
Redding

Subject: Current Estimated Right of Way Costs

We have completed an estimate of the right of way costs for the above referenced project based on information received from you December 28, 2010
Right of Way Lead Time will require a minimum of **12** months after we receive project first appraisal maps, utility conflict maps, and the necessary environmental clearance and freeway agreements have been approved and obtained. Additionally a minimum of **9** months will be required after receiving the last appraisal map to Right of Way for certification. Shorter lead times will require either more right of way resources or an increased number of condemnation suits to be filed. Either of these actions may reflect adversely on the District's other programs or our public image generally.

Lisa Harvey

LISA HARVEY,
Senior Right of Way Agent
Project Delivery

Attachments:
Right of Way Data Sheet

cc. Eric Orr

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

RIGHT OF WAY DATA SHEET

REVISED

Date: January 20, 2011

2-PLU-89/PM 30
E.A. 0E180
Lake Almanor spillway

Caltrans

1. Right of Way Cost Estimate:

	Current Value Future Use	Escalation Rate		Escalated Value
A. Total Acquisition Cost	$16,875	5%		$21,234
B. Mitigation acquisition & credits	$0			$0
C. Project Development Permit Fees	$0			$0
Subtotal	$16,875			$21,234
D. Utility Relocation (State Share) (Owner's share: _____)	$0			$0
E. Relocation Assistance (RAP)	$0			$0
F. Clearance/Demolition	$0			$0
H. Title & Escrow	$0			$0
I. Total Estimated Right of Way Cost	$16,875		**Rounded**	**$21,200**
J. Construction Contract Work	$0			

2. Current Date of Right of Way Certification October 5, 2015

3. Parcel Data:

Type		Dual/Appr
X	0	
A	1	
B	0	
C	0	0
D	0	0
Total	1	

Utilities	
U4 - 1	0
- 2	0
- 3	0
- 4	0
U5 - 7	3
- 8	0
- 9	0

RR Involvements	
None	X
C&M Agrmt	
Svc Contract	
Easements	
Rights of Entry	
Clauses	

Areas:

R/W:	1.86 Ac.
Excess:	N/A
Mitigation:	N/A

No. Excess Pcls: 0

Misc. R/W Work	
RAP Displ	N/A
Clear/Demo	N/A
Const Permits	N/A
Condemnation	0
USA Involvement	no

4. Are there any major items of construction contract work?
Yes _____ No X

5. Provide a general description of the right of way and excess lands required (zoning, use, major improvements, critical or sensitive parcels, etc.).

Fee and temporary rights will be needed from PGE property. This project is adjacent to Plumas National Forest, coordination may be required.

6. Are any properties acquired for this project expected to be rented, leased, or sold?
Yes _____ No X

7. Is there an effect on assessed valuation? Yes _____ Not Significant _____
No X

8. Are utility facilities or rights of way affected? Yes X No _____

Utility relocations are not anticipated; however, utility verifications will be required.

9. Are railroad facilities or rights of way affected? Yes _____ No X

10. Were any previously unidentified sites with hazardous waste and/or material found?
Yes _____ None Evident X

11. Are RAP displacements required? Yes _____ No X

No. of single family _____ No. of business/nonprofit _____
No. of multi-family _____ No. of farms _____

Based on Draft/Final Relocation Impact Statement/Study dated N/A
it is anticipated that sufficient replacement housing (will/will not) be available without Last Resort Housing.

12. Are there material borrow and/or disposal sites required?
Yes _____ No X

13. Are there potential relinquishments and/or abandonments?
Yes _____ No X

14. Are there any existing and/or potential airspace sites?
Yes _____ No X

15. Indicate the anticipated Right of Way schedule and lead time requirements. (Discuss if district proposes less than PMCS lead time and/or if significant pressures for project advancement are anticipated.)

Right of Way Lead Time will require a minimum of 12 months after we receive first appraisal maps, utility conflict maps, and the necessary environmental clearance and freeway agreements have been approved and obtained. Additionally a minimum of 9 months will be required after receiving the last appraisal map to Right of way for certification.

16. Is it anticipated that Caltrans will perform all Right of Way work?
Yes X No _____

Evaluation Prepared By:

Right of Way: _____ Date 1/20/11
Jason Verduzco

Reviewed By:

RW Project Coordinator: _____ Date 1-21-11
Cindy Vincelli

I have personally reviewed this Right of Way Data Sheet and all supporting information. I certify that the probable Highest and Best Use, estimated values, escalation rates, and assumptions are reasonable and proper, subject to the limiting conditions set forth, and I find this Data Sheet to be complete and current.

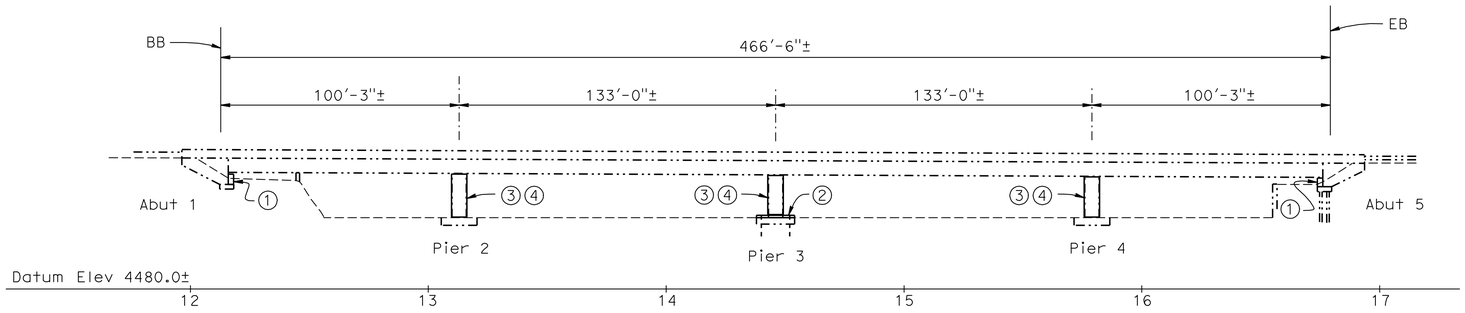
Lisa Harvey
LISA HARVEY,
Senior Right of Way Agent
Project Delivery Branch
Redding

1-27-11
Date

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION - DIVISION OF STRUCTURES

DIST	COUNTY	ROUTE	POST MILE
02	Plu	89	30.0

To get to the Caltrans web site, go to: http://www.dot.ca.gov



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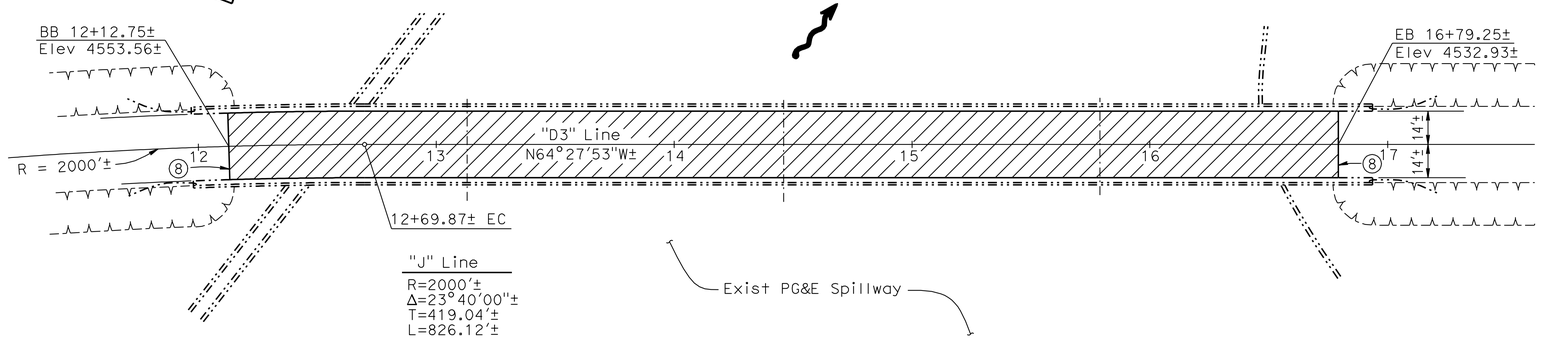
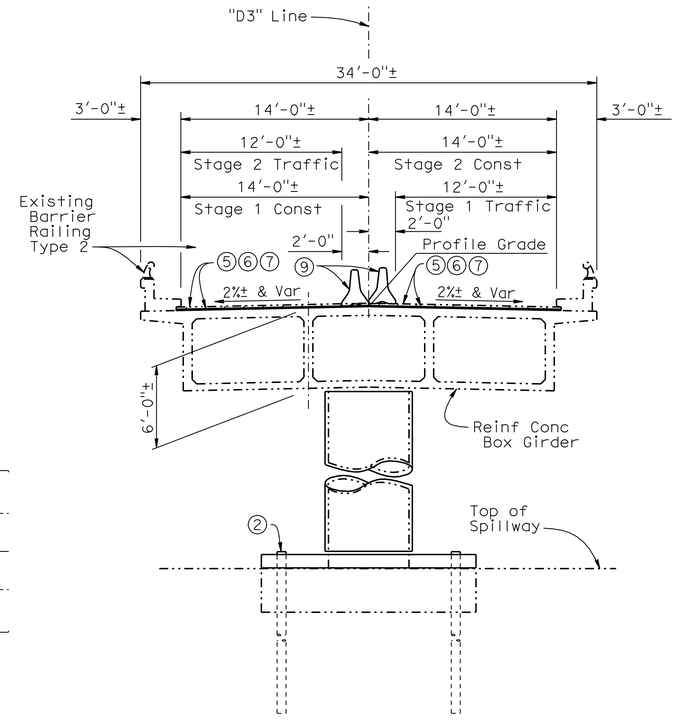


PLAN
1" = 60'



TYPICAL SECTION
3/32" = 1'-0"

Assumptions:

1. One way traffic control will be required
2. Work in the spillway is assumed allowed by the permitting agency

Legend:

▨ - Indicates existing AC removal, remove unsound deck concrete, chloride removal, clean & prepare bridge deck, place Polyester Concrete Overlay

① Construct Abutment catcher blocks

② Construct Footings Retrofit w/Tiedown Anchors

③ Install Class F Column Retrofit

④ Paint "Br. No. 09-0044"

⑤ Remove exist 3" ± AC overlay protection system

⑥ Deck chloride removal using Electrochemical Chloride Extraction (ECE) process by Vector Corrosion Technologies (sole source, proprietary)

⑦ Place 1" Polyester Concrete Overlay

⑧ Install Joint Seal (MR = 1½")

⑨ Temporary Railing (Type K)

DATE OF ESTIMATE	6-12-08
BRIDGE REMOVAL	=
STRUCTURE DEPTH	= 6'-0
LENGTH	= 466'-6"
WIDTH	= 34'-0"
AREA	= 15,861□'
COST/ □_ INCLUDING 10% MOBILIZATION & 25% CONTINGENCY	= $100/SF
TOTAL COST	= $1,587,000

ALTERNATIVE 1

DESIGNED BY Jose M Aquino	DATE 6-5-08	STRUCTURE DESIGN BRANCH 3
DRAWN BY Nancy C Gwynn	DATE 6-5-08	
CHECKED BY	DATE	
APPROVED	DATE	

EARTHQUAKE RETROFIT/DECK REHAB PROJECT

PLANNING STUDY

LAKE ALMANOR SPILLWAY BR.

BRIDGE NO. 09-0044	CU 02
SCALE: as noted	EA 0E180K

USERNAME => ngwynn DATE PLOTTED => 23-JUN-2008 TIME PLOTTED => 09:29

STRUCTURES DESIGN ADVANCE PLANNING STUDY SHEET (ENGLISH) (REV. 10/25/05)

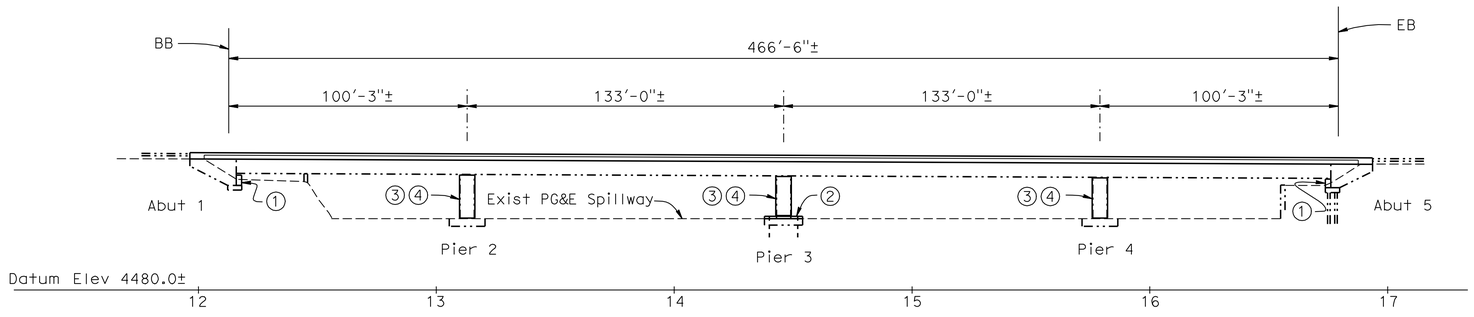
FILE => 09-0044-plsty01.dgn

ATTACHMENT C

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION - DIVISION OF STRUCTURES

DIST	COUNTY	ROUTE	POST MILE
02	Plu	89	30.0

To get to the Caltrans web site, go to: http://www.dot.ca.gov



ELEVATION
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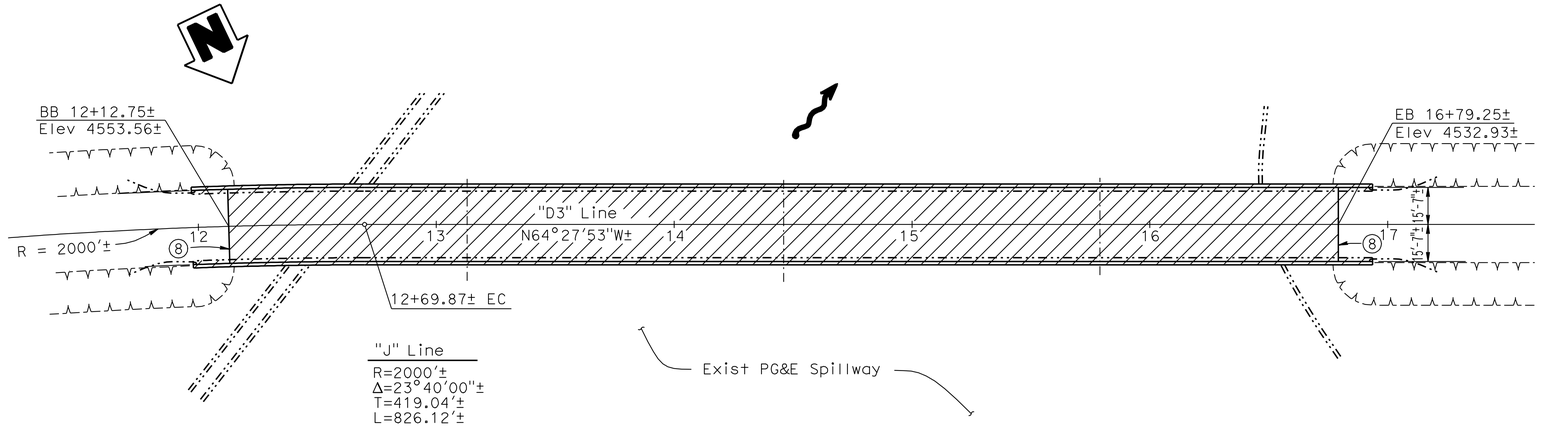
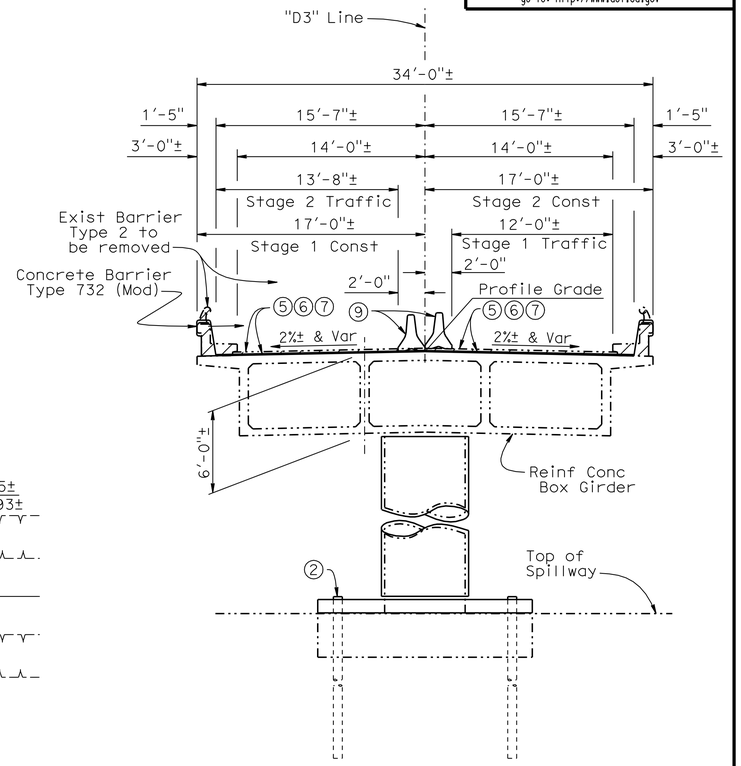


PLAN
1" = 60'



TYPICAL SECTION
3/32" = 1'-0"

Assumptions:

1. One way traffic control will be required
2. Work in the spillway is assumed allowed by the permitting agency

Legend:

▨ - Indicates existing Barrier Rail and AC removal, remove unsound deck concrete, deck chloride removal, clean & prepare bridge deck, place Polyester Concrete Overlay

① Construct Abutment catcher blocks
② Construct Footings Retrofit w/Tiedown Anchors
③ Install Class F Column Retrofit
④ Paint "Br. No. 09-0044"
⑤ Remove exist 3" ± AC overlay protection system
⑥ Deck chloride removal using Electrochemical Chloride Extraction (ECE) process by Vector Corrosion Technologies (sole source, proprietary)
⑦ Place 1" Polyester Concrete Overlay
⑧ Install Joint Seal (MR = 1½")
⑨ Temporary Railing (Type K)

DATE OF ESTIMATE	6-12-08
BRIDGE REMOVAL	= $14,500
STRUCTURE DEPTH	= 6'-0
LENGTH	= 466'-6"
WIDTH	= 34'-0"
AREA	= 15,861 SF
COST/ □_ INCLUDING 10% MOBILIZATION & 25% CONTINGENCY	= $116/SF
TOTAL COST	= $1,859,000

ALTERNATIVE 2

DESIGNED BY Jose M Aquino	DATE 6-5-08
DRAWN BY Nancy C Gwynn	DATE 6-5-08
CHECKED BY	DATE
APPROVED	DATE

STRUCTURE DESIGN BRANCH 3

EARTHQUAKE RETROFIT/DECK REHAB PROJECT

PLANNING STUDY

LAKE ALMANOR SPILLWAY BR.

BRIDGE NO. 09-0044	CU 02
SCALE: as noted	EA 0E180K

USERNAME => ngwynn DATE PLOTTED => 23-JUN-2008 TIME PLOTTED => 09:30

STRUCTURES DESIGN ADVANCE PLANNING STUDY SHEET (ENGLISH) (REV. 10/25/05)

FILE => 09-0044-pisty02.dgn

ATTACHMENT C

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION - DIVISION OF STRUCTURES

DIST	COUNTY	ROUTE	POST MILE
02	Plu	89	30.0

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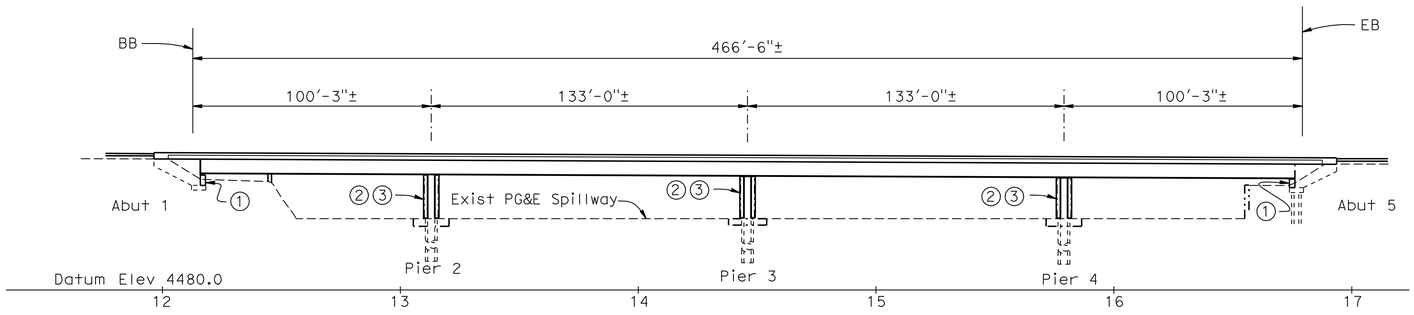
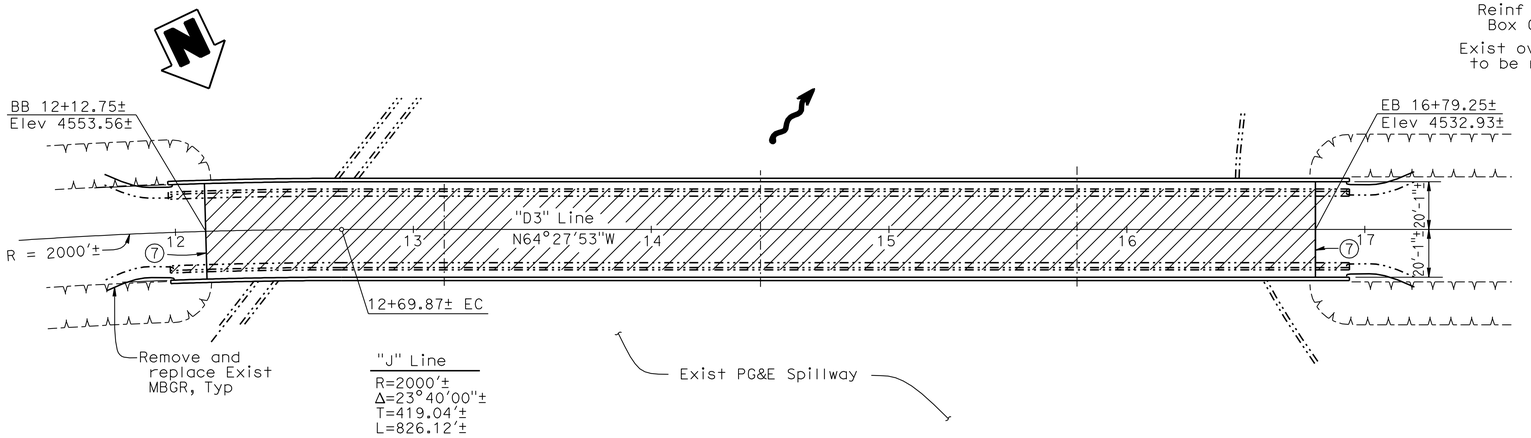
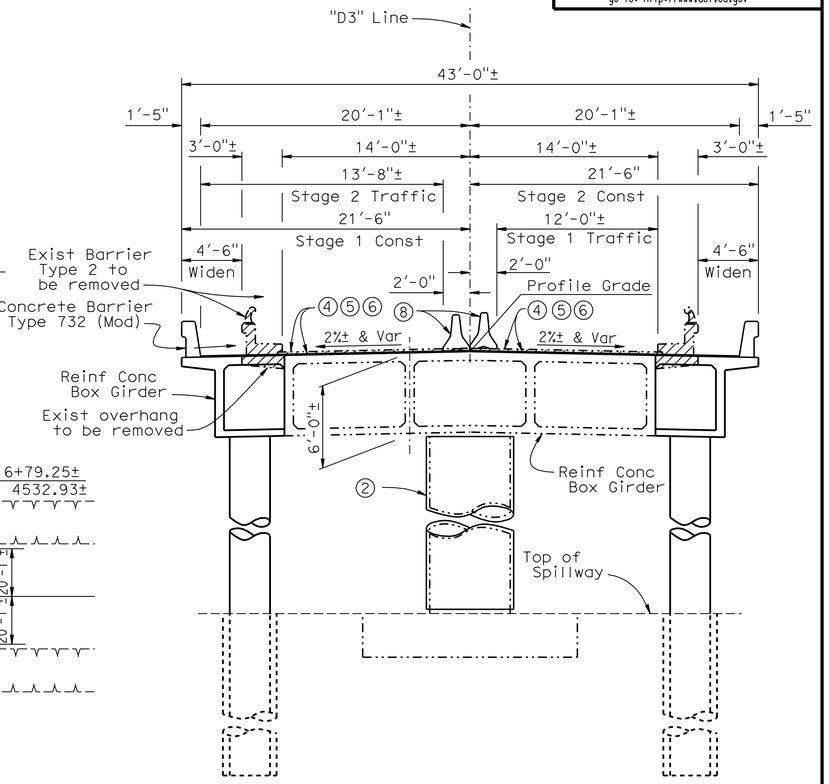


ELEVATION
1" = 30'



PLAN
1" = 60'



TYPICAL SECTION
3/32" = 1'-0"

Assumptions:

1. One way traffic control will be required
2. 3' ø CIDH Rock Socket is assumed as new foundation. No preliminary geology recommendation was prepared for this Alternative
3. Work in the spillway is assumed allowed by the permitting agency (including new foundation work)

Legend:

▨ - Indicates existing Barrier Rail and AC & bridge removal, remove unsound deck concrete, deck chloride removal, clean & prepare bridge deck, place Polyester Concrete Overlay

① Construct Abutment catcher blocks
② Install Class F Column Retrofit
③ Paint "Br. No. 09-0044"
④ Remove exist 3" ± AC overlay
⑤ Deck chloride removal using Electrochemical Chloride Extraction (ECE) process by Vector Corrosion Technologies (sole source, proprietary)
⑥ Place 1" Polyester Concrete Overlay
⑦ Install Joint Seal (MR = 1½")
⑧ Temporary Railing (Type K)

DATE OF ESTIMATE	6-12-08
BRIDGE REMOVAL	= $70,520
STRUCTURE DEPTH	= 6'-0
LENGTH	= 466'-6"
WIDTH	= 43'-0"
AREA	= 20,060 □'
COST/ □_ INCLUDING 10% MOBILIZATION & 25% CONTINGENCY	= $168/SF
TOTAL COST	= $3,446,000

ALTERNATIVE 3

EARTHQUAKE RETROFIT/DECK REHAB/WIDEN

PLANNING STUDY

LAKE ALMANOR SPILLWAY BR.

DESIGNED BY Jose M Aquino	DATE 6-5-08
DRAWN BY Nancy C Gwynn	DATE 6-5-08
CHECKED BY	DATE
APPROVED	DATE

STRUCTURE DESIGN BRANCH 3

BRIDGE NO. 09-0044	CU 02
SCALE: as noted	EA 0E180K

USERNAME => ngwynn DATE PLOTTED => 23-JUN-2008 TIME PLOTTED => 09:30

STRUCTURES DESIGN ADVANCE PLANNING STUDY SHEET (ENGLISH) (REV. 10/25/05)

FILE => 09-0044-pisty03.dgn

ATTACHMENT C

PRELIMINARY ENVIRONMENTAL ANALYSIS REPORT

1. Project Information

District	County	Route	PM	EA
02	PLU	89	30.0	0E1800
Project Title: Lake Almanor Spillway Bridge Deck Rehabilitation and Seismic Retrofit				
Project Manager Eric Orr			Phone # 225-3439	
Project Engineer Glenn Hammond			Phone # 225-3001	
Environmental Office Chief/Manager Ed Espinoza			Phone # 225-3308	
PEAR Preparer Chris Quiney			Phone # 225-3174	

2. Project Description

Need and Purpose

The Lake Almanor Spillway Bridge [Bridge No. 09-0044] was constructed in 1963. The bridge spans a concrete spillway contiguous with an earthen dam, which controls outflows from Lake Almanor to the North Fork Feather River. Deck coring and chaining on the spillway bridge deck confirmed chloride contamination and potential deterioration of the steel reinforced Portland cement concrete deck. Additionally, the bridge does not meet modern seismic standards and lacks standard shoulder width.

The purpose of the project is to rehabilitate the bridge deck, including mitigation of chloride contamination, and retrofit the bridge foundation to comply with modern seismic standards.

Description of work

The proposed project would require access to the area beneath the bridge. Access would be gained from the northeast corner of the bridge via an existing dirt road that connects to SR 89. A section of RSP would be removed from the northern bank of the spillway to provide access from the dirt road to the concrete spillway. A small amount of fill and grading would be required to construct the temporary access road. The access road would be removed following construction and the RSP would be replaced on the spillway bank.

Seismic retrofit work would include foundation strengthening and installation of concrete catcher blocks at the abutments. The three bridge piers are founded on spread footings, which extend approximately three feet below the surface of the concrete spillway. Foundation strengthening would include enlarging the pier columns with additional reinforcing steel and concrete.

The deck rehabilitation process would entail removal (grinding) of the existing AC surfacing and repairing unsound PCC. It is anticipated that an electro-chemical process would be employed to extract the chloride ions from the deck and simultaneously restore the alkaline properties of the PCC. The deck drains would be blocked to retain water and low voltage electrical leads would

ATTACHMENT D

be installed on the bridge deck. The deck would be saturated with water and covered with tarps to minimize evaporation. Once the chloride extraction process was complete, the deck would be cleaned and a new polyester concrete surface would be applied along with new joint seals and traffic striping. The deck rehabilitation may be performed as a half-width construction operation, allowing one lane to remain open for traffic. Another option would be to close the entire bridge to traffic for several weeks during the deck rehabilitation process and utilize SR 147 as a traffic detour route.

Additional shoulder width could be attained by upgrading the existing bridge barrier rail to modern highway design standards. Upgrading the railing would provide approximately 1.5 feet of additional shoulder width on each side of the bridge. Options to widen the deck are discussed in the following Alternatives section.

All work would be confined to the State highway right-of-way or easement. A temporary construction easement may be necessary from PG&E for staging and access onto the spillway. Utility conflicts have not been identified. It is assumed that the project would not require utility relocations. It is anticipated that small volumes of AC, PCC, dirt, and old bridge railing would require disposal off site. The disposal of excess material should adhere to Caltrans' disposal site guidelines (September 2001). If disposal material volumes exceed 5,000 cubic yards, a pre-designated optional disposal site should be identified by the Project Engineer.

Alternatives
Four project alternatives are under consideration:

Alternative 1
Alternative 1 would rehabilitate the bridge deck and seismically retrofit the structure. Rehabilitation of the bridge deck would entail grinding the existing AC from the deck, extracting chloride ions from the PCC through an electro-chemical process, placement of a new polyester AC surface, replacing deck joint seals, and placement of new striping. The seismic retrofit would include installation of concrete catcher blocks beneath the deck at each abutment. Additional reinforcing steel and concrete would be added to the existing pier columns to increase the strength of the piers. Steel tie-down anchors would be installed at the foundation of pier 3. This would entail drilling holes through the footing, and possibly around the perimeter of the footing, to the depth of bedrock. The tie-down anchors, 4-8-inches in diameter, would then be installed in the holes and secured to the footing.

Alternative 2
Alternative 2 includes rehabilitation of the bridge deck, seismic retrofit, and replacement of the existing bridge barrier rail. The bridge deck rehabilitation and seismic retrofit work would be the same as described for Alternative 1. Existing bridge railing would be replaced with modern bridge railing. The new bridge railing would be approximately half the width of the existing railing resulting in an additional 1.5 foot of shoulder width on each side of the bridge.

Alternative 3
Alternative 3 includes rehabilitation and widening of the bridge deck, seismic retrofit, and replacement of the bridge barrier rail. This alternative would widen the bridge from 34 feet to 43 feet for an increase in shoulder width. Six additional large diameter concrete piles would be required to support the wider deck. The seismic retrofit would include installation of concrete catcher blocks at the abutments and strengthening of the existing pier columns.

ATTACHMENT D

Alternative 4

Alternative 4 is the "no-build" alternative, which proposes no action to correct the deficiencies. Routine maintenance would continue. With this alternative, chloride concentrations and deterioration of the deck would increase, resulting in potential future traffic restrictions or bridge closure. In addition, the bridge would continue to be susceptible to damage from seismic activity.

ATTACHMENT D

3. Anticipated Environmental Approval

Check the anticipated environmental determination or document for the proposed project in the table below.

CEQA		NEPA	
Environmental Determination			
Statutory Exemption	☐		
Categorical Exemption	☐	Categorical Exclusion	☒
Environmental Document			
Initial Study or Focused Initial Study with Negative Declaration or Mitigated ND	☒	Environmental Assessment with Finding of No Significant Impact	☐
Environmental Impact Report	☐	Environmental Impact Statement	☐
CEQA Lead Agency (if determined):		Caltrans	
Estimated length of time (months) to obtain environmental approval:		24 months	
Estimated person hours to complete identified tasks:		1,664	

4. Special Environmental Considerations

An active osprey nest was noted within approximately 200 yards of the spillway bridge during a June 2009 site visit. The nest site has a history of use and it is likely that osprey will continue to use the site in subsequent years. Osprey conduct nesting activities from approximately February 15 through August 15. If nesting occurs in close proximity of the bridge, usually within 0.25 mile and in direct line of sight during this period, coordination with the California Department of Fish and Game and biological monitoring may be required. Potential adverse effects upon nesting osprey can be avoided by scheduling work during the non-nesting period, August 15 through February 15.

The earthen dam (Canyondam CA-PLU-1638) is a historic property, i.e., a resource in or determined eligible for listing in the National Register of Historic Places (NRHP). It could not be determined within the PEAR level of analysis whether or not the spillway is considered part of the dam or a contributive element relative to the NRHP eligibility determination. For purposes of the PEAR, the spillway will be considered part of Canyondam, i.e., a historic property. In addition, the area surrounding and beneath the concrete spillway is a traditional cultural property (TCP), which, for purposes of a recent Federal Energy Regulatory Commission (FERC) re-licensing application by PG&E was assumed eligible for the NRHP. For purposes of the PEAR, the TCP will be assumed eligible for the NRHP.

Consultation with the State Office of Historic Preservation (SHPO) would be required to determine if the proposed bridge project would result in an adverse effect to historic properties. Based on the scope of work for each alternative, it is presumed that implementation of Alternatives 1 and 2 could avoid an adverse effect determination to Canyondam (CA-PLU-1638) and Alternative 3, which enlarges the bridge's footprint on the concrete spillway, has the greatest potential to result in a determination of adverse effect. The TCP has not been formally evaluated for NRHP eligibility. Extensive consultation would be required with various Maidu groups to determine what effect, if any, the proposed bridge project would have on the TCP. For purposes of the PEAR, it is assumed that the TCP would be assumed eligible for inclusion in the NRHP

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for the bridge project and that the potential of an adverse effect would be similar to those for Canyondam. If historic properties were affected as a result of the proposed transportation project, consultation and possibly an evaluation pursuant to Section 4(f) of the Department of Transportation Act could be required. Alternative 4 would not affect any historic properties.

5. Anticipated Environmental Commitments

Cliff swallows routinely nest on the spillway bridge along the soffit and against pier columns. Avoidance of swallows or installation of swallow exclusion netting will be required from approximately April 1 through August 15. The contractor should be able to perform the work with his own forces for less than $10,000 per season. The cost of monitoring could be substantial if performed by a specialty subcontractor. $20,000 has been included in Attachment C (Environmental Commitments Cost Estimate) for two years of swallow exclusion by the contractor.

Based on records of historic osprey nest sites and a cursory field visit, it is likely that an osprey or other raptor will be nesting in close proximity to the spillway bridge and within direct line of site during the year of construction. Osprey are engaged in nesting activities from approximately February 15 through August 15. If nesting osprey could not be avoided by working outside of this nesting period, depending on the nest location, it may be necessary to coordinate with the Department of Fish and Game and have a biologist monitor nesting activity during construction.

Historic properties exist within the project limits, which could potentially be affected by the proposed work. It is anticipated that bridge construction activities that result in ground disturbance (Alternatives 1, 2, and 3) would require monitoring by an Archaeologist or Native American. One hundred hours are included in the resource estimate (Attachment B) for monitoring. This cost is also included in Attachment C (Environmental Commitments Cost Estimate) at $9,000. With the implementation of Alternative 3, which is presumed to have the greatest potential to result in an adverse effect to historic properties, additional resourcing and commitments could be required to mitigate an adverse effect, i.e., a Memorandum of Agreement (MOA), preparation of a Section 4(f) Evaluation, and compensatory mitigation.

6. Permits and Approvals

The full pool elevation of Lake Almanor is 4,494 feet above sea level, which is six feet below the spillway crest elevation (4,500 feet). Placement of fill below the full pool elevation would require a Section 404 permit from the U.S. Army Corps of Engineers (USACE) and Water Quality Certification from the California Regional Water Quality Control Board (CRWQCB). The proposed construction access road, as depicted on the ESL map, could be below the full pool elevation and therefore require a permit. Placement of temporary and permanent fills below the full pool elevation should be avoided if possible. If it were necessary to construct a temporary access road below the full pool elevation, the action may qualify for a non-reporting Nationwide Permit 14 (Linear Transportation Projects), which would reduce the permit acquisition timeframe from one year to approximately four months. This timeframe would begin once a complete description, quantities, and plans for the fill were received from Design. It is unlikely that a Streambed/lakebed Alteration Agreement from the California Department of Fish and Game (CDFG) would be necessary unless work would occur on the shore of Lake Almanor. The estimated cost for regulatory permits is included in Attachment C.

7. Level of Effort: Risks and Assumptions

If work occurs during the osprey nesting period and it is expected that an osprey or other raptor will be nesting in close proximity, it may be necessary to coordinate with the CDFG. It is likely that CDFG would require a qualified biologist to monitor the osprey's behavior during construction. There is a risk that construction activities could cause enough stress that the osprey would abandon its eggs or young. If monitoring determined that nest abandonment was imminent, CDFG could request the contractor to modify activities or cease work.

Implementation of Alternative 4 would not affect historic properties. It is presumed that Alternatives 1 and 2 would have a relatively lower potential to result in a finding of adverse effect to historic properties. Alternative 3, which enlarges the bridge's footprint on the concrete spillway, is presumed to have a greater chance of resulting in a finding of adverse effect. The resource estimate (Attachment B) assumes that an adverse effect determination could be avoided. However, these assumptions cannot be validated until SHPO is provided a complete project description and Finding of Effects Report.

If it were determined through consultation with SHPO and other parties that historic properties would not be affected by the bridge project, it is estimated that Section 106 compliance could be achieved in 18 months. If historic properties could not be avoided during project construction and an adverse effect determination was made, Section 106 compliance could take up to 36 months to complete. This would include preparation of a Memorandum of Agreement (MOA) describing proposed actions to compensate for adverse effects. Additionally, if historic properties were affected as a result of the proposed transportation project, consultation and possibly an evaluation pursuant to Section 4(f) of the Department of Transportation Act could be required. Mitigation for adverse effects would incur additional project costs. Section 4(f) involvement, depending on the type and extent of impact to historic properties, would require additional resources and up to 24 months to complete once the adverse effect determination was made (A total of 36 months from the date a complete ESR is received). For purposes of this PEAR, it is assumed that impacts to historic properties could be avoided and that Section 4(f) involvement would be minimal (de minimus) at most, in which case the project could be delivered within 24 months. It is estimated that implementation of Alternative 3 would result in a finding of adverse effect and moderate Section 4(f) involvement. It is anticipated that an archaeological or Native American monitor would be required for Alternatives 1, 2, and 3.

8. PEAR Technical Summaries

8.1 Land Use: Surrounding land use is recreational, hydro-electric generation, and irrigation. These properties are administered by Plumas National Forest, Pacific Gas and Electric Company, and the Western Canal Water District respectively. It would be necessary for Caltrans' Right of Way Office to determine property ownership and boundaries and obtain the necessary rights of entry (easements) for construction. There are public campgrounds and day use recreation areas in the project vicinity. Based on the ESL mapping provided with the ESR, the campgrounds and day use areas will not be affected.

8.2 Growth: The proposed project would not induce growth.

8.3 Farmlands/Timberlands: Farmland and timberland will not be affected.

8.4 Community Impacts: The project would not result in community impacts. However, the electro-chemical process of extracting chlorides from the bridge deck could require a short-

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term closure of the bridge, in which case a detour would be necessary. If a detour such as State Route 147 were necessary for a duration of more than several days, it would be prudent to conduct a public outreach program. Closure of the highway for any period would require coordination with emergency agencies and provisions for emergency access.

8.5 Visual/Aesthetics: See 8.17

8.6 Cultural Resources: The project area is considered highly sensitive for historic and prehistoric resources. The spillway bridge (Bridge No. 09-0044) is not eligible for listing in the National Register of Historic Places (NRHP). The earthen dam (Canyondam CA-PLU-1638) has been determined eligible for listing in the NRHP. It could not be determined within the PEAR level of analysis whether or not the spillway is considered part of the dam or a contributive element relative to the NRHP eligibility determination. For purposes of the PEAR, the spillway will be considered part of Canyondam, i.e., a historic property. In addition to Canyondam, the area surrounding and beneath the concrete spillway is a traditional cultural property (TCP), which, for purposes of a recent Federal Energy Regulatory Commission (FERC) re-licensing application by PG&E was assumed eligible for the NRHP. A complete cultural resources evaluation of Alternatives 1 through 3 will be required once the project is programmed. The evaluation will include records and database searches, coordination with various agencies, organizations, and individuals, including Native Americans, and field surveys. If previously unidentified cultural materials are unearthed during construction, it is Caltrans' policy that work be halted in the area until a qualified archaeologist can assess the significance of the find.

8.7 Hydrology and Floodplain: The bridge spans a reservoir spillway. No permanent fills or structures will be placed below the full pool elevation (4,494 feet) of Lake Almanor.

8.8 Water Quality and Storm Water Runoff: Work will take place within and directly over the spillway, which is directly connected to Lake Almanor and the North Fork Feather River. Renovation work, equipment operation, and chloride extraction operations have the potential to discharge solids and liquids to the spillway. Project special provisions, including implementation of a Water Pollution Control Program or Storm Water Pollution Prevention Plan, must address potential water quality and storm water issues.

8.9 Geology, Soils, Seismic and Topography: Coordination with PG&E would be necessary to ensure that the project would not affect the integrity of the earthen dam or the spillway.

8.10 Paleontology: Paleontological resources are not present within the work area. Ground disturbance would be confined to the earthen dam and concrete spillway.

8.11 Hazardous Waste/Materials: An Initial Site Assessment (ISA) was prepared on August 9, 2004 (ISA No. 04-2014) when the project was initially programmed. The ISA indicates that shims between the concrete bridge railing and the attached tubular steel steel rail typically contains asbestos containing material (ACM) and would need to be removed and properly disposed under the direction of a certified asbestos contractor. The contractor should be made aware of the possible presence of ACM even if the shims will not be disturbed. The asbestos National Emissions Standards for Hazardous Air Pollutants (NESHAP), 40 CFR Part 61, Subpart M, requires written notification to the California Air Resources Board and the U.S. Environmental Protection Agency of demolition or renovation. The notification is required for demolition even if there is no asbestos present or disturbed. An explanation of the NESHAP program and the appropriate forms can be

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found at http://www.arb.ca.gov/enf/asbestosform.htm. In addition, thermoplastic paint may contain lead of varying concentrations depending upon color, type and year of manufacture; the removal of any stripe/marking , concurrent with the removal of existing AC, will require a lead compliance plan. If yellow thermoplastic will be removed *as a separate operation,* SSPs to address hazardous waste (CCR Title 22) regulatory requirements will be required. The North Region Hazardous Waste Office will provide assistance with the preparation of the appropriate special provisions (15-300 Remove Stripe) and any needed approvals upon request.

8.12 Air Quality: The NESHAP, 40 CFR Part 61, Subpart M, requires written notification to the California Air Resources Board and the U.S. Environmental Protection Agency of the demolition or renovation of structures.

8.13 Noise and Vibration: There are no human sensitive receptors in proximity of the proposed project. This PEAR assumes that no pile driving will occur. There are no anticipated noise/vibration issues for human sensitive receptors. See 8.15 for potential biological impacts related to noise and vibration.

8.14 Energy and Climate Change: Based on the project description, there would be no adverse effects related to energy use or climate change.

8.15 Biological Environment: A cursory field review in June 2009 found cliff swallows nesting on the spillway bridge, along the soffit and against pier columns, and an active osprey nest within 200 yards of the bridge. Avoidance of swallows or installation of a swallow exclusion device, such as netting, will be required from approximately April 1 through August 15. Avoidance of raptors (osprey) will be required from approximately February 15 through August 15. A biological monitor may be required if raptors are nesting nearby during construction. Placement of fill below the full pool elevation of Lake Almanor would require a permit from the USACE and CRWQCB. A complete biological evaluation of Alternatives 1 through 3 will be required once the project is programmed. The evaluation will include records and database searches, coordination with various agencies, and field surveys.

8.16 Cumulative Impacts: There are no known past, present, or future projects in the area that would affect like environmental factors and result in a cumulatively significant impact.

8.17 Context Sensitive Solutions: Aesthetics should be considered if the existing bridge will be altered, e.g., changes in bridge rail, deck widening, or installation of additional piers. The Offices of Structures Design and Landscape Architecture could provide input on context sensitive solutions relative to bridge modifications.

9. Summary Statement for PSR or PSR-PDS

CEQA/NEPA Compliance

Based on the project information provided with the ESR and the results of preliminary environmental scoping, it is anticipated that the project would qualify for an Initial Study/Negative Declaration and Categorical Exclusion for compliance with the California Environmental Quality Act (CEQA) and National Environmental Policy act (NEPA) respectively. The timeframe for providing CEQA/NEPA compliance is estimated at 24 to 36 months from the date a complete Environmental Study Request (ESR) is received, depending on which alternative is implemented. It is presumed that Alternatives 1 and 2 would be less likely than Alternative 3 to result in an adverse effect to historic properties.

Attachment A includes a list of technical studies and permits applicable to the proposed undertaking. An estimate of support resources is included in Attachment B.

Cultural Resources

A cursory review of cultural resource records indicates that the earthen dam (Canyondam CA-PLU-1638) is a historic property eligible for listing in the NRHP. Additional effort beyond the scope of the PEAR would be necessary at this stage to determine whether the concrete spillway was considered an integral part of the dam or a contributive element relative to the NRHP eligibility determination. At least one additional cultural property is known to exist within the project limits. The area beneath and surrounding the spillway is a traditional cultural property that was assumed eligible for the NRHP for a recent PG&E FERC re-licensing application.

If it were determined through consultation with SHPO and other parties that historic properties would not be affected by the bridge project, it is estimated that Section 106 compliance could be achieved in 18 months. If historic properties could not be avoided during project construction and an adverse effect determination was made, Section 106 compliance could take up to 36 months to complete. This would include preparation of a Memorandum of Agreement (MOA) describing proposed actions to compensate for adverse effects. Additionally, if historic properties were affected as a result of the proposed transportation project, consultation and possibly an evaluation pursuant to Section 4(f) of the Department of Transportation Act could be required. Mitigation for adverse effects would incur additional project costs. Section 4(f) involvement, depending on the type and extent of impact to historic properties, would require additional resources and up to 24 months to complete once the adverse effect determination was made (A total of 36 months from the date a complete ESR is received). For purposes of this PEAR, it is assumed that impacts to historic properties could be avoided and that Section 4(f) involvement would be minimal (de minimus) at most, in which case the project could be delivered within 24 months. Based on the scope of work for each alternative, it is presumed that implementation of Alternatives 1 and 2 could avoid an adverse effect determination to historic properties and Alternative 3, which enlarges the bridge's footprint on the concrete spillway, has the greatest potential to result in a determination

of adverse effect. It is anticipated that an archaeological or Native American monitor would be required for Alternatives 1, 2, and 3.

A complete cultural resources evaluation will be required once the project is programmed. The cultural resources evaluation will include record searches, consultation with agencies and individuals, and field surveys. If previously unidentified cultural materials are unearthed during construction, it is Caltrans' policy that work be halted in the area until a qualified archaeologist can assess the significance of the find.

Hazardous Waste

An Initial Site Assessment (ISA) for hazardous waste indicates that shims between the concrete bridge railing and the attached tubular steel rail typically contains asbestos containing material (ACM) and would need to be removed and properly disposed under the direction of a certified asbestos contractor. The contractor should be made aware of the possible presence of ACM even if the shims will not be disturbed. The asbestos National Emissions Standards for Hazardous Air Pollutants (NESHAP), 40 CFR Part 61, Subpart M, requires written notification to the California Air Resources Board and the U.S. Environmental Protection Agency of demolition or renovation. The notification is required for demolition even if there is no asbestos present or disturbed. An explanation of the NESHAP program and the appropriate forms can be found at http://www.arb.ca.gov/enf/asbestosform.htm. In addition, thermoplastic paint may contain lead of varying concentrations depending upon color, type and year of manufacture; the removal of any stripe/marking , concurrent with the removal of existing AC, will require a lead compliance plan. If yellow thermoplastic will be removed *as a separate operation,* SSPs to address hazardous waste (CCR Title 22) regulatory requirements will be required. The North Region Hazardous Waste Office will provide assistance with the preparation of the appropriate special provisions (15-300 Remove Stripe) and any needed approvals upon request.

Biological Resources

An active osprey nest was noted within approximately 200 yards of the spillway bridge during a June 2009 site visit. The nest site has a history of use and it is likely that osprey will continue to use the site in subsequent years. Osprey conduct nesting activities from approximately February 15 through August 15. If nesting occurs in close proximity of the bridge, usually within 0.25 mile and in direct line of sight during this period, coordination with the California Department of Fish and Game and biological monitoring may be required. Potential adverse effects upon nesting osprey can be avoided by scheduling work during the non-nesting period, August 15 through February 15.

Cliff swallows routinely nest on the spillway bridge along the soffit and against pier columns. Avoidance of swallows or installation of swallow exclusion netting will be required from approximately April 1 through August 15.

The estimated cost to install swallow netting and monitor during the nesting period can vary significantly depending on whether the work is performed by the prime contractor or a specialty subcontractor. The contractor should be able to perform the work with his

own forces for less than $10,000 per season. The cost of monitoring could be substantial if performed by a specialty subcontractor.

A complete biological evaluation will be necessary once the project is programmed for PA&ED. The evaluation will consist of a review of species records and databases, consultation with resource agencies and organizations, and field reviews of the project site. Sufficient time should be built into the project schedule to allow field surveys during the appropriate season for plant and animal identification, i.e., April through September.

Context Sensitive Solutions

Context sensitive solutions relative to aesthetics should be considered if bridge barrier railing is replaced (Alternative 1) or the deck is widened and additional piles are installed (Alternative 3). Context sensitive solutions would ensure that bridge modifications are appropriate for the surrounding environment and communities.

Permits

Regulatory permits would be required for the placement of fill below the full pool elevation of Lake Almanor, which is six feet below the elevation of the spillway crest. A temporary construction access road to the spillway is proposed at the northeast quadrant of the bridge. If the road can be constructed above the full pool elevation, regulatory permits will not be necessary. If the construction access road would be below the full pool elevation, a non-reporting Nationwide Permit 14 (Linear Transportation Projects) from the USACE and Water Quality Certification from the CRWQCB. These permits would be obtained by the Environmental Planning Office. An encroachment permit and/or Special Use Permit may be needed from Pacific Gas and Electric Co. and Plumas National Forest respectively. Caltrans' Right of Way Office would obtain or assist the Project Engineer in obtaining these permits.

10. Disclaimer

This Preliminary Environmental Analysis Report (PEAR) provides information to support programming of the proposed project. It is not an environmental determination or document. Preliminary analysis, determinations, and estimates of mitigation costs are based on the project description provided in the Project Study Report (PSR). The estimates and conclusions in the PEAR are approximate and are based on cursory analyses of probable effects. A reevaluation of the PEAR will be needed for changes in project scope or alternatives, or in environmental laws, regulations, or guidelines.

11. List of Preparers

Cultural Resources specialist Elizabeth Bennett	Date: 06-26-09
Biologist Keith Pelfrey	Date: 06-15-09
Community Impacts specialist	Date:
Noise and Vibration specialist	Date:
Air Quality specialist	Date:
Paleontology specialist/liaison	Date:
Water Quality specialist	Date:
Hydrology and Floodplain specialist	Date:
Hazardous Waste/Materials specialist Tom Graves	Date: 05-28-09
Visual/Aesthetics specialist	Date:
Energy and Climate Change specialist	Date:
Other:	Date:
PEAR Preparer Chris Quiney, Environmental Coordinator	Date: 06-29-09

12. Review and Approval

I confirm that environmental cost, scope, and schedule have been satisfactorily completed and that the PEAR meets all Caltrans requirements. Also, if the project is scoped as an EA or EIS, I verify that the HQ DEA Coordinator has concurred in the Class of Action.

Environmental Branch Chief — Date: 6/29/09

Project Manager — Date: 7-1-09

REQUIRED ATTACHMENTS:
Attachment A: PEAR Environmental Studies Checklist
Attachment B: Estimated Resources by WBS Code
Attachment C: PEAR Environmental Commitments Cost Estimate (Standard PSR)

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Attachment A: PEAR Environmental Studies Checklist

Rev. 11/08

Environmental Studies for PA&ED Checklist					
	Not anticipated	Memo to file	Report required	Risk* L M H	Comments
Land Use	☒	☐	☐	L	
Growth	☒	☐	☐	L	
Farmlands/Timberlands	☒	☐	☐	L	
Community Impacts	☒	☐	☐	L	
Community Character and Cohesion	☒	☐	☐	L	
Relocations	☒	☐	☐	L	
Environmental Justice	☒	☐	☐	L	
Utilities/Emergency Services	☐	☒	☐	L	
Visual/Aesthetics	☐	☒	☐	L	
Cultural Resources:	☐	☐	☐	L	
Archaeological Survey Report	☐	☐	☒	L	
Historic Resources Evaluation Report	☒	☐	☐	L	
Historic Property Survey Report	☐	☐	☒	L	
Historic Resource Compliance Report	☒	☐	☐	L	
Section 106 / PRC 5024 & 5024.5	☒	☐	☐	L	
Native American Coordination	☐	☐	☒	L	document tcp
Finding of Effect	☒	☐	☒	L	
Data Recovery Plan	☒	☐	☐	L	
Memorandum of Agreement	☐	☐	☒	L	
Other:	☒	☐	☐	L	
Hydrology and Floodplain	☒	☐	☐	L	
Water Quality and Stormwater Runoff	☐	☒	☐	L	
Geology, Soils, Seismic and Topography	☒	☐	☐	L	
Paleontology	☒	☐	☐	L	
PER	☒	☐	☐	L	
PMP	☒	☐	☐	L	
Hazardous Waste/Materials:	☐	☒	☐	L	
ISA (Additional)	☐	☒	☐	L	
PSI	☐	☐	☐	L	
Other:	☐	☐	☐	L	
Air Quality	☐	☒	☐	L	
Noise and Vibration	☐	☒	☐	L	
Energy and Climate Change	☐	☒	☐	L	
Biological Environment	☐	☐	☐	L	
Natural Environment Study	☐	☒	☐	L	
Section 7:	☒	☐	☐	L	
Formal	☒	☐	☐	L	
Informal	☐	☒	☐	L	
No effect	☒	☐	☐	L	
Section 10	☒	☐	☐	L	
USFWS Consultation	☒	☐	☐	L	
NMFS Consultation	☒	☐	☐	L	
Species of Concern (CNPS, USFS, BLM, S, F)	☐	☒	☐	L	

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Environmental Studies for PA&ED Checklist					
	Not anticipated	Memo to file	Report required	Risk* L M H	Comments
Wetlands & Other Waters/Delineation	☒	☐	☐	L	
404(b)(1) Alternatives Analysis	☒	☐	☐	L	
Invasive Species	☐	☒	☐	L	
Wild & Scenic River Consistency	☒	☐	☐	L	
Coastal Management Plan	☒	☐	☐	L	
HMMP	☒	☐	☐	L	
DFG Consistency Determination	☒	☐	☐	L	
2081	☒	☐	☐	L	
Other: MBTA	☐	☒	☐	L	swallows
Cumulative Impacts	☒	☐	☐	L	
Context Sensitive Solutions	☐	☒	☐	L	aesthetics
Section 4(f) Evaluation	☐	☒	☐	L	
Permits:					
401 Certification Coordination	☐	☒	☐	L	
404 Permit Coordination, IP, NWP, or LOP	☐	☒	☐	L	
1602 Agreement Coordination	☒	☐	☐	L	
Local Coastal Development Permit Coordination	☒	☐	☐	L	
State Coastal Development Permit Coordination	☒	☐	☐	L	
NPDES Coordination	☒	☐	☐	L	
US Coast Guard (Section 10)	☒	☐	☐	L	
TRPA	☒	☐	☐	L	
BCDC	☒	☐	☐	L	

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ATTACHMENT B - Resources by WBS Code

EA: 0E1800

Description: Lake Almanor Spillway Seismic Retrofit and Deck Rehab

WBS current 11/2008

Assigned Unit	Senior	Coord	Biology	Cultural	Haz Waste	NR Enviro	Storm Water	Noise/Air	Paleo	Sup Svcs	Total	Begin Date	End Date	Duration (days)
100.05.05 – Project Init. & Plng.	2										2			0
100.05.10 – PID Cmpnt Exec. & Ctrl.											0			0
100.05.15 – PID Cmpnt Closeout											0			0
100.10.05 – PA&ED Cmpnt Init. & Plng.	3	4				4					11			0
100.10.10 – PA&ED Cmpnt Exec. & Ctrl.											0			0
100.10.15 – PA&ED Cmpnt Closeout											0			0
100.10.20 – Project Shelving (PA&ED)											0			0
100.10.25 – Project Unshelving (PA&ED)											0			0
100.10.30 – Updd Admtv Rec during PA&ED											0			0
100.10.35 – Execd Coop Agre for PA&ED Process											0			0
100.15.05 – PS&E Cmpnt Init. & Plng.	3	4									7			0
100.15.10 – PS&E Cmpnt Exec. & Ctrl.											0			0
100.15.15 – PS&E Cmpnt Closeout											0			0
100.15.20 – Project Shelving (PS&E)											0			0
100.15.25 – Project Unshelving (PS&E)											0			0
100.15.30 – Updd Admtv Rec during PS&E											0			0
100.15.35 – Execd Coop Agre for PS&E Process											0			0
100.20.05 – Const. Cmpnt Init. & Plng.											0			0
100.20.10 – Const. Cmpnt Exec. & Ctrl.											0			0
100.20.15 – Const. Cmpnt Closeout											0			0
100.20.20 – Project Shelving (Construction)											0			0
100.20.25 – Project Unshelving (Construction)											0			0
100.20.30 – Updd Admtv Rec during Const											0			0
100.20.35 – Execd Coop Agre for Const Process											0			0
100.25.05 – R/W Cmpnt Init. & Plng.											0			0
100.25.10 – R/W Cmpnt Exec. & Ctrl.											0			0
100.25.15 – R/W Cmpnt Closeout											0			0
100.25.20 – Project Shelving (Right of Way)											0			0
100.25.25 – Project Unshelving (Right of Way)											0			0
100.25.30 – Updd Admtv Rec during R/W											0			0
100.25.35 – Execd Coop Agre for R/W Process											0			0
100.25.50 – Execd Coop Agre for R/W Rlmnt											0			0
Total Project Management	8	8	0	0	0	4	0	0	0	0	20			
160.05.05 – Approvd PID Review											0			0
160.05.10 – Geotechnical Information Review											0			0
160.05.20 – Traffic Data & Forecasts Review											0			0
160.05.30 – Project Scope Review											0			0
160.10.20 – Value Analysis											0			0
160.10.25 – Hydraulics/Hydro Study											0			0
160.10.30 – Hwy Planting Des Concepts											0			0
160.15.20 – Draft Project Report											0			0
160.15.25 – Draft PR Circ, Rev & App											0			0
160.30.05 – Maps for ESR											0			0
160.30.10 – Surveys/Maps for Env Studies											0			0
160.30.15 – Prop Access Rights for Env/Eng Studies											0			0
160.40 – NEPA Delegation											0			0
Total Prelim Eng Studies	0	0	0	0	0	0	0	0	0	0	0			

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Assigned Unit	Senior	Coord	Biology	Cultural	Haz Waste	Socio-Economic	Storm Water	Noise/Air	Paleo	Sup Svcs	Total	Begin Date	End Date	Duration (days)
Perform Environmental Studies and Prepare Draft Environmental Document														
165.05.05 – Project Information Review											0			0
165.05.10 – Pub & Agency Scoping		8									8			0
165.05.15 – Alts for Further Study											0			0
165.10.15 – CIA, Land Use & Growth											0			0
165.10.25 – Noise Study											0			0
165.10.30 – Air Quality Study											0			0
165.10.35 – Water Quality Studies											0			0
165.10.40 – Energy/Climate Change Studies											0			0
165.10.45 – Sum Geotech Report											0			0
165.10.50 – Preliminary Site Investigation HW					20						20			0
165.10.55 – Draft R/W Relocation Impact Eval											0			0
165.10.65 – Paleontology Study											0			0
165.10.70 – Wild & Scenic River Coordination											0			0
165.10.75 – Envir Commitments Record		6									6			0
165.10.99 - Other Env Studies											0			0
165.15.05 – Biological Assessment											0			0
165.15.10 – Wetlands Study											0			0
165.15.15 – Resource Agency Coord			20								20			0
165.15.20 – NES Report			100								100			0
165.15.99 – Other Biological Studies			80								80			0
165.20.05 – Archaeology Survey											0			0
165.20.05.05 – APE Map				12							12			0
165.20.05.10 – NA Consultation				60							60			0
165.20.05.15 – Records & Literature Search				16							16			0
165.20.05.20 – Field Survey				32							32			0
165.20.05.25 – ASR				60							60			0
165.20.05.99 – Other Archy Survey Products											0			0
165.20.10 – Extended Phase I Archy Studies											0			0
165.20.10.05 – Native American Consultation											0			0
165.20.10.10 – Extended Phase I Proposal											0			0
165.20.10.15 – XP1 Field Investigation											0			0
165.20.10.20 – XP1 Materials Analysis											0			0
165.20.10.25 – Extended Phase I Report											0			0
165.20.10.99 – Other Phase I Archy Products											0			0
165.20.15 – Phase II Archy Studies											0			0
165.20.15.05 – NA Consultation											0			0
165.20.15.10 – Phase II Proposal											0			0
165.20.15.15 – Field Investigation											0			0
165.20.15.20 – Materials Analysis											0			0
165.20.15.25 – Phase II Report											0			0
165.20.15.99 – Other Phase II Archy Products											0			0
165.20.20 – Hist & Architectural Studies											0			0
165.20.20.05 – Prelim APE/Study Area Maps - Archl											0			0
165.20.20.10 – Hist Res Eval Rpt - Archy											0			0
165.20.20.15 – Hist Res Eval Rpt - Archl											0			0
165.20.20.20 – Bridge Evaluation											0			0
165.20.20.99 – Other H & A Study Products											0			0
165.20.25 – Cultural Res Comp Docs											0			0
165.20.25.05 – Final APE Maps				12							12			0
165.20.25.10 – PRC 5024.5 Consult											0			0
165.20.25.15 – HPSR/HRCR				60							60			0
165.20.25.20 – Finding of Effect				80							80			0
165.20.25.25 – Archy Data Recovery Pln											0			0
165.20.25.30 – MOA											0			0
165.20.25.99 – Other Cult Res Comp Products											0			0
165.25.05 – Draft ED Analysis											0			0
165.25.10 – 4(f) Evaluation	6	40		10							56			0
165.25.15 – CE/CE Determination											0			0
165.25.20 – Env Quality Control & Other Reviews	4	8	4	4	2	4					26			0
165.25.25 – Approval to Circ Resolution											0			0

ATTACHMENT D

Assigned Unit	Senior	Coord	Biology	Cultural	Haz Waste	Socio-Economic	Storm Water	Noise/Air	Paleo	Sup Svcs	Total	Begin Date	End Date	Duration (days)
165.25.30 – Env Coordination	2	200									202			0
165.25.99 – Other DED Products											0			0
165.30 – NEPA Delegation		4									4			0
Total Env Studies & Prep DED	12	266	204	346	22	4	0	0	0	0	854			
170.05 - Required Permits (list)											0			0
170.10.05 - US Army Corps 404 Permit											0			0
170.10.10 - US Forest Service Permit(s)											0			0
170.10.15 - US Coast Guard Permit											0			0
170.10.20 - DFG 1600 Agreement(s)											0			0
170.10.25 - Coastal Zone Development Permit											0			0
170.10.30 - Local Agency Concurrence/Permit											0			0
170.10.40 - Waste Discharge (NPDES) Permit(s)											0			0
170.10.45 - US Fish & Wildlife Service Approval											0			0
170.10.50 - RWQCB 401 Permit											0			0
170.10.60 - Updated ECR											0			0
170.10.95 - Other Permits											0			0
170.45 - MOU from TERO Office											0			0
170.55 - NEPA Delegation											0			0
Total Permits, Agreements & Route Adoptions	0	0	0	0	0	0	0	0	0	0	0			
175.05.05 – Master Dist & Invitation Lists		25									25			0
175.05.10 – Notices Pub Hear & DED Avail		60									60			0
175.05.15 – DED Pub & Circulation		60									60			0
175.05.20 – Fed Consistency Det (Coastal)											0			0
175.05.99 – Other DED Circulation Products											0			0
175.10.05 – Need for Pub Hearing Determination											0			0
175.10.10 – Pub Hearing Logistics											0			0
175.10.15 – Displays for Pub Hearing											0			0
175.10.20 – 2nd Notice Pub Hear & Avail											0			0
175.10.25 – Map Display & Hearing Plan											0			0
175.10.30 – Display Pub Hear Maps											0			0
175.10.35 – Public Hearing											0			0
175.10.40 – Record of Public Hearing											0			0
175.10.99 – Other Pub Hearing Products											0			0
175.15 – Responses to Pub Hear Comments											0			0
175.20 – Project Preferred Alternative											0			0
175.25 – NEPA Delegation		4				4					8			0
Total DED & Preferred Alt	0	149	0	0	0	4	0	0	0	0	153			
180.05.10 – Approved Project Rep											0			0
180.05.15 – Updated Stormwater Data Report											0			0
180.10.05 – Approved FED											0			0
180.10.05.05 – Draft FED Review	8	100	4	4	2	4					122			0
180.10.05.10 – Revised Draft FED		10									10			0
180.10.05.15 – Section 4(f) Evaluation											0			0
180.10.05.20 – Findings Report											0			0
180.10.05.25 – Statement of Overriding Consid											0			0
180.10.05.30 – CEQA Certification											0			0
180.10.05.35 – FHWA and Approval											0			0
180.10.05.40 – Section 106 Cons & MOA											0			0
180.10.05.45 – Section 7 Consultation											0			0
180.10.05.50 – Final Section 4(f) Statement											0			0
180.10.05.55 – Floodplain Only PAF											0			0
180.10.05.60 –Wetlands Only PAF											0			0
180.10.05.65 – Sect 404 Permit Compliance											0			0
180.10.05.70 – Mitigation Measures											0			0
180.10.10 – Public Dist & Resp to Comments	4	100									104			0

ATTACHMENT D

Assigned Unit	Senior	Coord	Biology	Cultural	Haz Waste	Socio-Economic	Storm Water	Noise/Air	Paleo	Sup Svcs	Total	Begin Date	End Date	Duration (days)
180.10.15 – Final R/W Relo Impact Document											0			0
180.10.99 – Other FED Products											0			0
180.15.05 – ROD (NEPA)											0			0
180.15.10 – NOD (CEQA)	2	6									8			0
180.15.20 – Env Commitments Record		8									8			0
180.15.99 – Other Complete ED Products											0			0
180.20 – NEPA Delegation		4									4			0
Total App PR & FED	14	228	4	4	2	4	0	0	0	0	256			
[redacted]														
185.05.05 – Project Concept Review for PS&E											0			0
185.05.10 – Updated Project Info for PS&E dev											0			0
Total Update for PS&E	0	0	0	0	0	0	0	0	0	0	0			
[redacted]														
195.40.25 – Property Maint & Rehab (non-rental)											0			0
195.40.35 – Transfer of Prop to Clear Status											0			0
195.45.05 – Excess Lands Inventory											0			0
195.45.20 – Prop Disp Units less than $15 K											0			0
195.45.25 – Prop Disp Units $15 K -$500 K											0			0
195.45.30 – Prop Disp Units over $500 K											0			0
Total ROW & Excess Land	0	0	0	0	0	0	0	0	0	0	0			
[redacted]														
200.15 – Approved Utility Relocation Plan											0			0
200.20 – Utility Relocation Package											0			0
Total Coordinate Utilities	0	0	0	0	0	0	0	0	0	0	0			
[redacted]														
205.10.05 - US Army Corps 404 Permit		60	40								100			0
205.10.10 - US Forest Service Permit(s)											0			0
205.10.15 - US Coast Guard Permit											0			0
205.10.20 - DFG 1600 Agreement											0			0
205.10.25 - Coastal Development Permit											0			0
205.10.30 - Local Agency Concurrence/Permit											0			0
205.10.40 - Waste Discharge (NPDES) permit											0			0
205.10.45 - US Fish & Wildlife Service Approval											0			0
205.10.50 - RWQCB 401 Permit		60									60			0
205.10.60 - Updated ECR											0			0
205.10.95 - Other Permits											0			0
205.20.05 – Draft Fwy Agreement											0			0
205.20.10 – Draft Fwy Agree Review											0			0
205.20.15 – Final Fwy Agree											0			0
205.20.20 – Executed Fwy Agreement											0			0
205.40.10 - New Connections & Route Adopt Sbtl											0			0
205.55 - NEPA Delegation											0			0
Total Permits, Agreements, and Route Adoptions	0	120	40	0	0	0	0	0	0	0	160			

ATTACHMENT D

Assigned Unit	Senior	Coord	Biology	Cultural	Haz Waste	Socio-Economic	Storm Water	Noise/Air	Paleo	Sup Svcs	Total	Begin Date	End Date	Duration (days)
225.55.20 – Right of Way Clearance											0			0
Total Right of Way Interests	0	0	0	0	0	0	0	0	0	0	0			
230.05.45 – Noise Barrier Plans											0			0
230.10.05 – Hwy Planting Plans											0			0
230.10.15 – Plant List											0			0
230.35.10 – Hwy Planting Specs											0			0
230.35.35 – Water Pollution Ctrl Specs		2									2			0
230.35.40 – Erosion Control Specs											0			0
230.60 – Updated Proj Info for PS&E Package											0			0
230.60.05 - Updated Storm Water Data Report											0			0
230.60.10 – Other Reviews/Updates Proj Info											0			0
230.90 – NEPA Delegation		2									2			0
Total Prepare Draft PS&E	0	4	0	0	0	0	0	0	0	0	4			
235.05.05 – Hist Structures Mitig											0			0
235.05.10 – Archy & Cult Mitigation											0			0
235.05.15 – Biological Mitigation											0			0
235.05.20 – Env Mitigation R/W work											0			0
235.05.25 – Paleontology Mitigation											0			0
235.05.99 - Other Env Mitigation Products											0			0
235.10.10 – Haz Waste Sites Survey											0			0
235.10.15 – Detailed HW Sites Investigation											0			0
235.15 – HW Management Plan											0			0
235.20 – HW PS&E					40						40			0
235.25 – HW Clean-up											0			0
235.30 – Certification of Sufficiency (HW)											0			0
235.35 – Long Term Mitigation Monitoring			8	100							108			0
235.40 – Updated ECR											0			0
235.45 – NEPA Delegation			2								2			0
Total Mitigation & HW Clean-up	0	0	10	100	40	0	0	0	0	0	148			
240.70 – Site Ready for Subsurface Exploration											0			0
Total Geotechnical Permit	0	0	0	0	0	0	0	0	0	0	0			
255.05 – Circ & Rev Draft Dist PS&E		6	2	1	2						11			0
255.10.25 - Updated Technical Reports											0			0
255.15 – Env Reevaluation											0			0
255.20.05 - Rev Plans for Stds Comp											0			0
255.40 - Res Engs Pending File											0			0
255.45 – NEPA Delegation		2									2			0
Total PS&E	0	8	2	1	2	0	0	0	0	0	13			

ATTACHMENT D

Assigned Unit	Senior	Coord	Biology	Cultural	Haz Wastes	Socio-Economic	Storm Water	Noise/Air	Paleo	Sup Svcs	Total	Begin Date	End Date	Duration (days)
[illegible]														
260.75 - Env Cert at RTL		2									2			0
Total Prepare Contract Documents	0	2	0	0	0	0	0	0	0	0	2			
[illegible]														
270.20.50 – Technical Support		4	40	8							52			0
270.55 – Final Inspect & Accept Rec											0			0
270.70 – Update ECR											0			0
270.75 – Permit Renewal & Extension											0			0
270.80 – Long-Term Mitigation Contract											0			0
Total Const Engineering	0	4	40	8	0	0	0	0	0	0	52			
[illegible]														
285.05.05 - Need for CCO Determination											0			0
285.10.15 – Other Func Support											0			0
Total CCOs	0	0	0	0	0	0	0	0	0	0	0			
[illegible]														
290.35 – Provide Technical Support											0			0
Total Contract Claims	0	0	0	0	0	0	0	0	0	0	0			
[illegible]														
295.35 – Cert of Env Compliance		2									2			0
295.40 – Long-Term Mitigation Contract											0			0
Total Final Construction	0	2	0	0	0	0	0	0	0	0	2			
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			

ATTACHMENT D

Attachment C: PEAR Environmental Commitments Cost Estimate

Standard PSR Only

(Prepare a separate form for each viable alternative described in the Project Study Report)

PART 1 PROJECT INFORMATION *rev. 11/08*

District-County-Route-Post Mile 02-PLU-89-30.0	EA: 0E1800
Project Description: Lake Almanor Spillway Bridge Seismic Retrofit and Deck Rehabiliation	
Form completed by (Name/District Office): Chris Quiney, NR Environmental	
Project Manager: Eric Orr	Phone Number: 225-3439
Date:	

PART 2 PERMITS AND AGREEMENTS

	Permits and Agreements **($$)**
☐ Fish and Game 1602 Agreement	
☐ Coastal Development Permit	
☐ State Lands Agreement	
☒ Section 401 Water Quality Certification	1,000
☒ Section 404 Permit – Nationwide (U.S. Army Corps)	0
☐ Section 404 Permit – Individual (U.S. Army Corps)	
☐ Section 10 Navigable Waters Permit (U.S. Army Corps)	
☐ Section 9 Permit (U.S. Coast Guard)	
☐ Other:	
Total (enter zeros if no cost)	1000

ATTACHMENT D

PART 3. ENVIRONMENTAL COMMITMENTS FOR PERMANENT IMPACTS

To complete the following information:

- Report costs in $1,000s.
- Include all costs to complete the commitment:
  - Capital outlay and staff support. Refer to Estimated Resources by WBS Code. For example, if you estimated 80 hours for biological monitoring (WBS 235.35 Long Term Mitigation Monitoring), convert those hours to a dollar amount for this entry. For current conversion rates from PY to dollars, see the Project Manager.
  - Cost of right of way or easements.
  - If compensatory mitigation is anticipated (for wetlands, for example), insert a range for purchasing credits in a mitigation bank.
  - Long-term monitoring and reporting
  - Any follow-up maintenance
  - Use current costs; the Project Manager will add an appropriate escalation factor.
  - This is an estimating tool, so a range is not only acceptable, but advisable.

Environmental Commitments Alternative 1-4		
	Estimated Cost in $1,000's	Notes
Noise abatement or mitigation		
Special landscaping		
Archaeological resources		
Biological resources	20000	Swallow netting
Historical resources	9000	Monitor
Scenic resources		
Wetland/riparian resources		
Res./bus. relocations		
Other:		
Total (enter zeros if no cost)	29000	

District - Cty - Rte	02-PLU-089
PM	29.96
E.A.	02-0e180k
EFIS	02 0000 0022 K

PRELIMINARY COST ESTIMATE SUMMARY

Type of Estimate: **Preliminary Estimate**

Program Code: 110

Description: Lake Almanor Spillway Bridge Rehabilitation, Alternative #1

Limits: K.P. (P.M.) PM 30.0

Proposed Improvement (Scope) : AC removal, chloride extraction and deck repair, seismic retrofit which includes pier jackets, catcher blocks and foundation pinning, polyester overlay, upgrade approach rail. (Perpetuate exist bridge rail and overall deck width.)

Alternative 1

Description of Work

Roadway Items:	$665,000
Phase 9 Task Orders:	$29,000
Structure Items:	$1,587,000
Subtotal Construction Capital Estimate:	$2,281,000
Right of Way Capital Estimate:	$9,000
Total Project Capital Estimate: (rounded to 3 significant figures)	**$2,290,000**

Reviewed by Project Engineer : _____
Glenn Hammond, P.E.

Reviewed by Project Manager : _____
Eric Orr, P.E.

Phone No: (530) 225 - 3546 05/31/11

ATTACHMENT E

I ROADWAY ITEMS

Section 1: Earthwork

	Quantity	Unit	Unit Price	Unit Cost	Section Cost
Roadway Excavation	180	yd^3	$40	$7,200	
Access Ramp Excavation	85	yd^3	$50	$4,250	
Clearing & Grubbing	0	acre	$0	$0	
Develop Water Supply	1	ls	$10,000	$10,000	
Remove Surfacing	1,500	yd^2	$8	$12,000	

Total Earthwork: **$33,000**

Section 2: Roadway Structural Section

	Quantity	Unit	Unit Price	Unit Cost	Section Cost
Asphalt Concrete	175	ton	$150	$26,250	
Aggregate Base	0	yd^3	$45	$0	
PCCP	0	yd^3	$200	$0	
ATPB	0	yd^3	$90	$0	
AC Dike	0	yd	$25	$0	

Total Roadway Structural Section: **$26,000**

Section 3: Drainage

	Quantity	Unit	Unit Price	Unit Cost	Section Cost
Drainage items	0	ls	$0	$0	

Total Drainage Items: **$0**

Section 4: Specialty Items

	Quantity	Unit	Unit Price	Unit Cost	Section Cost
Approach Railing & Guardrails	380	ft	$70	$26,600	
Structure Excavation	20	yd^3	$100	$2,000	
Structure Backfill	15	yd^3	$100	$1,500	
Pedestrian Rail Fencing	0	ft	$16	$0	
Detailed Site Investigation (Hazardous Waste)	1	ls	$3,000	$3,000	
Erosion Control	1	ls	$5,000	$5,000	
Bird monitoring	1	ls	$20,000	$20,000	
landscape	0	ls	$3,000	$0	

Total Specialty Items **$58,000**

ATTACHMENT E

I. ROADWAY ITEMS (CONTINUED)

Section 5: Traffic Items

	Quantity	Unit	Unit Price	Unit Cost	Section Cost
P. Changeable Msg Sign	4	ea	$6,000	$24,000	
Remove Approach Rails	120	ft	$30	$3,600	
Temp Traffic Signal System	1	ea	$120,000	$120,000	
Replace Approach Rails	4	ea	$7,500	$30,000	
Crash Cushion	1	ls	$10,000	$10,000	
Construction Area Signs	1	ls	$12,000	$12,000	
Paint Striping	2,400	ft	$1.00	$2,400	
Permanent Roadsigns	0	ea	$500	$0	
TMP or other Measure(s)	1	ls	$5,000	$5,000	
Temporary Rail (Type K)	1,000	ft	$40	$40,000	
Traffic Control	20	days	$1,600	$32,000	

Total Traffic Items: **$279,000**

SUBTOTAL ITEMS 1 - 5 : **$396,000**

Section 6, Minor Items:

(subtotal of sections 1 - 5) x (5% - 10%) = $396,000 x 10%

Total Minor Items: **$40,000**

Section 7, Roadway Mobilization:

(subtotal of sections 1 - 6) x (0% - 10%) = $436,000 x 10%

Total Roadway Mobilization: **$44,000**

Section 8, Roadway Additions:

Supplementals				
(subtotal of sections 1 - 6) x (5% - 10%) =	$436,000	x	5%	$21,800
Construction Environmental	$5,000	x	ls	$5,000
Stormwater Management Plan	$10,000	x	ls	$10,000
Temporary Erosion Control & NPDES				
(subtotal of sections 1-5) x (1% - 7%) =	$396,000	x	5%	$19,800
Maintenance of Erosion Control & NPDES				
(subtotal of sections 1-5) x (1% - 7%) =	$396,000	x	5%	$19,800
(subtotal of Construction Environmental) =				$54,600
Contingencies				
(subtotal of sections 1 - 6) x (20% - 30%) =	$436,000	x	25%	$109,000

Total Roadway Additions: **$185,000**

Total Roadway Items: **$665,000**

(TOTAL OF SECTIONS 1 - 8)

ATTACHMENT E

Section 9, Phase 9Task Orders* :

Swallow Netting (prior to const.)	1	ea	$20,000	$20,000	
Historical Resources Monitoring	1	ea	$9,000	$9,000	
			Total Task Orders:		**$29,000**

*Geotechnical Exploration and Study estimate in SUPPORT COSTS ($10,000).

II. STRUCTURES ITEMS:

Structure Name	Almanor Spillway Bridge		
Remove Existing Structures	$0		
Structure Type	CIP / BG		
Width ft (out to out)	34'		
Span Length ft	467'		
Total Area sq ft	15,900		
Footing Type (pile / spread)	spread		
Cost Per Sq. ft (incl. 10% mobilization and 25% contingency)	$100		
Total Cost of Structure	$1,587,138	$1,587,138	
	Subtotal Structure Items:		
	Total Structures Items:		**$1,587,000**

III. Right of Way

Acquisition, including excess lands and damages.	1.5	acres	$6,000	$9,000	
Utility Relocation	0	LS	$0	$0	
Relocation Assistance (RAP)					
Clearance/Demolition	1	LS	$0	$0	
Title and Escrow Fees	1	LS	$0	$0	
CONSTRUCTION CONTRACT WORK					
			Total Right of Way:		**$9,000**

Estimate Prepared by Glenn Hammond Phone number (530) 225-3001 Date: 31-May-11

ATTACHMENT E

District - Cty - Rte	02-PLU-089
PM	29.96
E.A.	02-0e180k
EFIS	02 0000 0022 K

PRELIMINARY COST ESTIMATE SUMMARY

Type of Estimate: **Preliminary Estimate**

Program Code: 110

Description: Lake Almanor Spillway bridge rehab, Alternative #2.

Limits: K.P. (P.M.) PM 30.0

Proposed Improvement (Scope) : AC removal, chloride extraction and deck repair, seismic retrofit which includes pier jackets, foundation pinning, catcher blocks, polyester overlay.
Upgrade bridge rails, new approach rails and conform grind/ inlay bridge approaches (Perpetuate exist deck width)

Alternative 2

Description of Work

Roadway Items:	$693,000
Phase 9 Task Orders	$29,000
Structure Items:	$1,859,000
Subtotal Construction Capital Estimate:	$2,581,000
Right of Way Capital Estimate:	$9,000
Total Project Capital Estimate: (rounded to 3 significant figures)	**$2,590,000**

Reviewed by Project Engineer : _____
Glenn Hammond, P.E.

Reviewed by Project Manager : _____
, P.E.

Phone No: (530) 225 - 3546 05/31/11

ATTACHMENT E

I ROADWAY ITEMS

Section 1: Earthwork

	Quantity	Unit	Unit Price	Unit Cost	Section Cost
Roadway Excavation	180	yd^3	$40	$7,200	
Access Road	85	yd^3	$40	$3,400	
Grading to flatten parcels	0	yd^3		$0	
Clearing & Grubbing	0	acre	$0	$0	
Develop Water Supply	1	ls	$10,000	$10,000	
Remove Surfacing	1,500	yd^2	$4	$6,000	

Total Earthwork: **$27,000**

Section 2: Roadway Structural Section

	Quantity	Unit	Unit Price	Unit Cost	Section Cost
Asphalt Concrete	175	ton	$150	$26,250	
Aggregate Base	0	yd^3	$45	$0	
PCCP	0	yd^3	$200	$0	
ATPB	0	yd^3	$90	$0	
AC Dike	0	yd	$25	$0	

Total Roadway Section: **$26,000**

Section 3: Drainage

	Quantity	Unit	Unit Price	Unit Cost	Section Cost
Drainage items	0	ls	$0	$0	

Total Drainage Items: **$0**

Section 4: Specialty Items

	Quantity	Unit	Unit Price	Unit Cost	Section Cost
Approach Railing & Guardrails	380	ft	$70	$26,600	
TYPE 6B Retaining Structures		yd^2	$500	$0	
Structure Excavation	20	yd^3	$100	$2,000	
Structure Backfill	15	yd^3	$100	$1,500	
Pedestrian Fencing	940	ft	$16	$15,040	
Detailed Site Investigation (Hazardous Waste)	1	ls	$3,000	$3,000	
Erosion Control	1	ls	$5,000	$5,000	
Landscape	0	ls	$3,000	$0	

Total Specialty Items **$53,000**

ATTACHMENT E

I. ROADWAY ITEMS (CONTINUED)

Section 5: Traffic Items

	Quantity	Unit	Unit Price	Item Cost
P. Changeable Msg Sign	4	ea	$7,000	$28,000
Remove Approach Rails	120	ft	$30	$3,600
Temp Traffic Signals System	1	ea	$120,000	$120,000
Replace Approach Rails	4	ea	$7,500	$30,000
Crash Cushion	1	ls	$10,000	$10,000
Construction Area Signs	1	ls	$12,000	$12,000
Paint Striping	2,400	ft	$1.00	$2,400
Permanent Roadsigns	2	ea	$500	$1,000
TMP or other Measure(s)	1	ls	$5,000	$5,000
Temporary Rail (Type K)	1,000	ft	$40	$40,000
Traffic Control	25	days	$1,600	$40,000

Total Traffic Items: **$292,000**

SUBTOTAL ITEMS 1 - 5 : **$398,000**

Section 6, Minor Items:

(subtotal of sections 1 - 5) x (5% - 10%) = $398,000 x 10%

Total Minor Items: **$40,000**

Section 7, Roadway Mobilization:

(subtotal of sections 1 - 6) x (0% - 10%) = $438,000 x 10%

Total Roadway Mobilization: **$44,000**

Section 8, Roadway Additions:

Supplementals				
(subtotal of sections 1 - 6) x (5% - 10%) =	$438,000	x	5%	$21,900
Construction Environmental	$30,000	x	ls	$30,000
Stormwater Management Plan	$10,000	x	ls	$10,000
Temporary Erosion Control & NPDES				
(subtotal of sections 1-5) x (1% - 7%) =	$398,000	x	5%	$19,900
Maintenance of Erosion Control & NPDES				
(subtotal of sections 1-5) x (1% - 7%) =	$398,000	x	5%	$19,900
(subtotal of Construction Environmental) =				$79,800
Contingencies				
(subtotal of sections 1 - 6) x (20% - 30%) =	$438,000	x	25%	$109,500

Total Roadway Additions: **$211,000**

Total Roadway Items: **$693,000**

(TOTAL OF SECTIONS 1 - 8)

ATTACHMENT E

Section 9, Phase 9 Task Orders* :

Swallow Netting (prior to const.)	1	ea	$20,000	$20,000	
Historical Resources Monitoring	1	ea	$9,000	$9,000	
			Total Task Orders:		**$29,000**

*Geotechnical Exploration and Study estimate in SUPPORT COSTS ($10,000).

II. STRUCTURES ITEMS:

Overcrossing Name	Almanor Spillway Bridge		
Remove Existing Structures	$14,500		
Structure Type	CIP / BG		
Width ft (out to out)	34		
Span Length ft	467		
Total Area sq ft	15,900		
Footing Type (pile / spread)	spread		
Cost Per Sq. ft (incl. 10% mobilization and 25% contingency and removal of existing)	$116		
Total Cost of Structure	#########	$1,858,900	
		Subtotal Structure Items:	
		Total Structures Items:	**$1,859,000**

III. Right of Way

Acquisition, including excess lands and damages.	1.5	acres	$6,000	$9,000	
Utility Relocation	1	LS	$0	$0	
Relocation Assistance (RAP)					
Clearance/Demolition	1	LS	$0	$0	
Title and Escrow Fees	1	LS	$0	$0	
CONSTRUCTION CONTRACT WORK					
			Total Right of Way:		**$9,000**

Estimate Prepared by Glenn Hammond Phone number (530) 225-3001 Date: 31-May-11

ATTACHMENT E

District - Cty - Rte	02-PLU-089
PM	29.96
E.A.	02-0e180k
EFIS	02 0000 0022 K

PRELIMINARY COST ESTIMATE SUMMARY

Type of Estimate: Preliminary Estimate

Program Code: 110

Description: Lake Almanor Spillway bridge rehab, Alternative #3

Limits: K.P. (P.M.) PM 30.0

Proposed Improvement (Scope) : AC removal, chloride extraction and deck repair, replace joints, upgrade approach rails siesmic retrofit including pier jackets, foundation pinning and catcher blocks, remove rails and widen deck on each side to 43' (gross), polyester overlay, widen approaches and conform pavment inlay.

Alternative 3

Description of Work

Roadway Items:	$765,000
Phase 9 Task Orders	$29,000
Structure Items:	$3,446,000
Subtotal Construction Capital Estimate:	$4,240,000
Right of Way Capital Estimate:	$9,000
Total Project Capital Estimate: (rounded to 3 significant figures)	**$4,250,000**

Reviewed by Project Engineer : _____
Glenn Hammond, P.E.

Reviewed by Project Manager : _____
Eric Orr, P.E.

Phone No: (530) 225 - 3439 05/31/11

ATTACHMENT E

I ROADWAY ITEMS

Section 1: Earthwork

	Quantity	Unit	Unit Price	Unit Cost	Section Cost
Roadway Excavation	400	yd^3	$35	$14,000	
Access Ramp	85	yd^3	$50	$4,250	
Grading to flatten parcels	0	yd^3		$0	
Clearing & Grubbing	0	acre	$0	$0	
Develop Water Supply	1	ls	$10,000	$10,000	
Remove Surfacing	1,500	yd^2	$4	$6,000	

Total Earthwork: **$34,000**

Section 2: Roadway Structural Section

	Quantity	Unit	Unit Price	Unit Cost	Section Cost
Asphalt Concrete	220	ton	$150	$33,000	
Aggregate Base	90	yd^3	$45	$4,050	
PCCP	0	yd^3	$200	$0	
ATPB	0	yd^3	$90	$0	
AC Dike	0	yd	$25	$0	

Total Roadway Structural Section: **$37,000**

Section 3: Drainage

	Quantity	Unit	Unit Price	Unit Cost	Section Cost
Drainage items	0	ls	$0	$0	

Total Bridge Items: **$0**

Section 4: Specialty Items

	Quantity	Unit	Unit Price	Unit Cost	Section Cost
Approach Railing & Guardrails	380	ft	$70	$26,600	
Structure Excavation	40	yd^3	$100	$4,000	
Structure Backfill	50	yd^3	$100	$5,000	
Pedestrian Fencing	940	ft	$16	$15,040	
Detailed Site Investigation (Hazardous Waste)	1	ls	$3,000	$3,000	
Erosion Control	1	ls	$5,000	$5,000	
landscape	0	ls	$3,000	$0	

Total Specialty Items **$59,000**

ATTACHMENT E

I. ROADWAY ITEMS (CONTINUED)

Section 5: Traffic Items

	Quantity	Unit	Unit Price	Unit Cost	Section Cost
Changeable Msg Sign	4	ea	$8,000	$32,000	
Remove Approach Rails	120	ft	$30	$3,600	
Temp Traffic Signals	1	ea	$120,000	$120,000	
Replace Appraoch Rails	4	ea	$7,500	$30,000	
Crash Cushion	1	ls	$10,000	$10,000	
Construction Area Signs	1	ls	$12,000	$12,000	
Thermoplastic Striping	2,500	ft	$1.00	$2,500	
Permanent Roadsigns	2	ea	$500	$1,000	
TMP or other Measure(s)	1	ls	$5,000	$5,000	
Temporary Rail (Type K)	1,000	ft	$40	$40,000	
Traffic Control	35	days	$1,600	$56,000	

Total Traffic Items: **$312,000**

SUBTOTAL ITEMS 1 - 5 : **$442,000**

Section 6, Minor Items:

(subtotal of sections 1 - 5) x (5% - 10%) = $442,000 x 10%

Total Minor Items: **$44,000**

Section 7, Roadway Mobilization:

(subtotal of sections 1 - 6) x (0% - 10%) = $486,000 x 10%

Total Roadway Mobilization: **$49,000**

Section 8, Roadway Additions:

Supplementals				
(subtotal of sections 1 - 6) x (5% - 10%) =	$486,000	x	5%	$24,300
Construction Environmental	$30,000	x	ls	$30,000
Stormwater Management Plan	$10,000	x	ls	$10,000
Temporary Erosion Control & NPDES				
(subtotal of sections 1-5) x (1% - 7%) =	$442,000	x	5%	$22,100
Maintenance of Erosion Control & NPDES				
(subtotal of sections 1-5) x (1% - 7%) =	$442,000	x	5%	$22,100
(subtotal of Construction Environmental) =				$84,200
Contingencies				
(subtotal of sections 1 - 6) x (20% - 30%) =	$486,000	x	25%	$121,500

Total Roadway Additions: **$230,000**

Total Roadway Items: **$765,000**

(TOTAL OF SECTIONS 1 - 8)

ATTACHMENT E

Section 9, Phase 9Task Orders* :

Swallow Netting (prior to const.)	1	ea	$20,000	$20,000
Historical Resources Monitoring	1	ea	$9,000	$9,000

Total Task Orders: **$29,000**

*Geotechnical Exploration and Study estimate in SUPPORT COSTS ($10,000).

II. STRUCTURES ITEMS:

Overcrossing Name	Almanor Spillway Bridge	
Remove Existing Structures	$70,520	
Structure Type	CIP / BG	
Width ft (out to out)	43	
Span Length ft	467	
Total Area sq ft	20,060	
Footing Type (pile / spread)	spread	
Cost Per Sq. ft (incl. 10% mobilizatior and 25% contingency and removal of existing)	$168	
Total Cost of Structure	$3,375,095	$3,445,615

Subtotal Structure Items:

Total Structures Items: **$3,446,000**

III. Right of Way

Acquisition, including excess lands and damages.	1.5	acres	$6,000	$9,000
Utility Relocation	1	LS	$0	$0
Relocation Assistance (RAP)				
Clearance/Demolition	1	LS	$0	$0
Title and Escrow Fees	1	LS	$0	$0
CONSTRUCTION CONTRACT WORK				

Total Right of Way: **$9,000**

Estimate Prepared by Glenn Hammon Phone number (530) 225-3001 Date: 31-May-11

ATTACHMENT E

District - Cty - Rte	02-PLU-089
PM	29.96
E.A.	02-0e180k
EFIS	02 0000 0022 K

PRELIMINARY COST ESTIMATE SUMMARY

Type of Estimate: Preliminary Estimate

Program Code: 110

Description: Lake Almanor Spillway bridge rehab, Alternative #4

Limits: K.P. (P.M.)

Proposed Improvement (Scope) : Replace bridge on parallel alignment, remove old bridge

Alternative 4

Description of Work

Roadway Items:	$959,000
Structure Items:	$6,863,000
Subtotal Construction Capital Estimate:	$7,822,000
Phase 9 Task Orders	$30,000
Right of Way Acquisitions:	$21,000
Right of Way Capital Estimate:	$51,000

Total Project Capital Estimate: (rounded to 3 significant figures) **$7,870,000**

Reviewed by Project Engineer : _____
Glenn Hammond, P.E.

Reviewed by Project Manager : _____
Eric Orr, P.E.

Phone No: (530) 225 - 3439 05/31/11

ATTACHMENT E

I ROADWAY ITEMS

Section 1: Earthwork

	Quantity	Unit	Unit Price	Unit Cost	Section Cost
Roadway Excavation	2,000	yd^3	$35	$70,000	
Access Ramp	85	yd^3	$50	$4,250	
Grading to flatten parcels	0	yd^3		$0	
Clearing & Grubbing	1	acre	$20,000	$20,000	
Develop Water Supply	1	ls	$10,000	$10,000	
Remove Surfacing		yd^2	$4	$0	

Total Earthwork: **$104,000**

Section 2: Roadway Structural Section

	Quantity	Unit	Unit Price	Unit Cost	Section Cost
Asphalt Concrete	900	ton	$150	$135,000	
Aggregate Base	900	yd^3	$45	$40,500	
PCCP	0	yd^3	$200	$0	
ATPB	0	yd^3	$90	$0	
AC Dike	0	yd	$25	$0	

Total Roadway Structural Section: **$176,000**

Section 3: Drainage

	Quantity	Unit	Unit Price	Unit Cost	Section Cost
Drainage items	0	ls	$0	$0	

Total Bridge Items: **$0**

Section 4: Specialty Items

	Quantity	Unit	Unit Price	Unit Cost	Section Cost
Approach Railing & Guardrails	380	ft	$70	$26,600	
Structure Excavation	400	yd^3	$100	$40,000	
Structure Backfill	300	yd^3	$100	$30,000	
Pedestrian Fencing	0	ft	$16	$0	
Detailed Site Investigation (Hazardous Waste)	1	ls	$3,000	$3,000	
Erosion Control	1	ls	$15,000	$15,000	
landscape	1	ls	$3,000	$3,000	

Total Specialty Items **$118,000**

ATTACHMENT E

I. ROADWAY ITEMS (CONTINUED)

Section 5: Traffic Items

	Quantity	Unit	Unit Price	Unit Cost	Section Cost
Changeable Msg Sign	4	ea	$8,000	$32,000	
Remove Approach Rails	120	ft	$30	$3,600	
Temp Traffic Signals	0	ea	$120,000	$0	
Replace Approach Rails	4	ea	$7,500	$30,000	
Crash Cushion	1	ls	$10,000	$10,000	
Construction Area Signs	1	ls	$12,000	$12,000	
Thermoplastic Striping	2,500	ft	$1.00	$2,500	
Permanent Road signs	2	ea	$500	$1,000	
TMP or other Measure(s)	1	ls	$5,000	$5,000	
Temporary Rail (Type K)	200	ft	$50	$10,000	
Traffic Control	35	days	$1,600	$56,000	

Total Traffic Items: **$162,000**

SUBTOTAL ITEMS 1 - 5 : **$560,000**

Section 6, Minor Items:

(subtotal of sections 1 - 5) x (5% - 10%) = $560,000 x 10%

Total Minor Items: **$56,000**

Section 7, Roadway Mobilization:

(subtotal of sections 1 - 6) x (0% - 10%) = $616,000 x 10%

Total Roadway Mobilization: **$62,000**

Section 8, Roadway Additions:

Supplementals				
(subtotal of sections 1 - 6) x (5% - 10%) =	$616,000	x	5%	$30,800
Construction Environmental	$30,000	x	ls	$30,000
Stormwater Management Plan	$10,000	x	ls	$10,000
Temporary Erosion Control & NPDES				
(subtotal of sections 1-5) x (1% - 7%) =	$560,000	x	5%	$28,000
Maintenance of Erosion Control & NPDES				
(subtotal of sections 1-5) x (1% - 7%) =	$560,000	x	5%	$28,000
(subtotal of Construction Environmental) =				$96,000
Contingencies				
(subtotal of sections 1 - 6) x (20% - 30%) =	$616,000	x	25%	$154,000

Total Roadway Additions: **$281,000**

Total Roadway Items: **$959,000**

(TOTAL OF SECTIONS 1 - 8)

ATTACHMENT E

Section 9, Phase 9 Task Orders* :

Swallow Netting (prior to const.)	1	ea	$20,000	$20,000	
Permits	1	ea	$1,000	$1,000	
Historical Resources Monitoring	1	ea	$9,000	$9,000	
		Total Task Orders:			**$30,000**

*Geotechnical Exploration and Study estimate in SUPPORT COSTS ($10,000).

II. STRUCTURES ITEMS:

Overcrossing Name	Almanor Spillway Bridge			
Remove Existing Structures	$218,000			
Structure Type	CIP / BG			
Width ft (out to out)	43			
Span Length ft	467			
Total Area sq ft	20,060			
Footing Type (pile / spread)	spread			
Cost Per Sq. ft (incl. 10% mobilizatio and 25% contingency and removal of existing)	$331			
Total Cost of Structure	$6,645,000		$6,863,000	
	Subtotal Structure Items:			
	Total Structures Items:			**$6,863,000**

III. Right of Way

Acquisition, including excess lands and damages.	1.9	acres	$11,400	$21,204	
Utility Relocation	1	LS	$0	$0	
Relocation Assistance (RAP)					
Clearance/Demolition	1	LS	$0	$0	
Title and Escrow Fees	1	LS	$0	$0	
CONSTRUCTION CONTRACT WORK					
		Total Right of Way:			**$21,000**

Estimate Prepared by Glenn Hammon Phone number (530) 225-3001 Date: 31-May-11

ATTACHMENT E

STATE OF CALIFORNIA-DEPARTMENT OF TRANSPORTATION

TRANSPORTATION MANAGEMENT PLAN DATA SHEET

To: Glenn Hammond, PE
Advance Planning, MS-4

Date: April 8, 2009

File: PLU-89-PM 29.97
EA: 02-0E180K

From: Department of Transportation
District 2 - Office of Traffic Management

Work: Seismic Retrofit - Lake Almanor Spillway Bridge

1. POLICY

The Caltrans Deputy Directive titled "Transportation Management Plans" (DD-60) establishes the current policy for mitigating traffic impacts resulting from construction, maintenance, encroachment permit, planned emergency restoration, locally or specially funded, or other activities. The directive states that Transportation Management Plans (TMPs) and contingency plans shall be completed for all work activities on the State highway system. **The purpose of this Transportation Management Plan Data Sheet is to ensure all anticipated TMP costs are included in the Project Initiation Document (PID).**

2. SCOPE OF WORK

This SHOPP project will seismically retrofit and rehabilitate the deck of the Lake Almanor Spillway bridge (09-0044) on SR 89 in Plumas County. Three alternatives are under consideration:

Alternative 1: Removal of existing 3" AC deck surface; repair of unsound concrete; place deck chloride extraction system (temporary installation); placement of a 1" polyester overlay; construct abutment catcher block; construct footings and retrofit with tiedown anchors; installation of column retrofit; paint structure; and installation of joint seals.

Alternative 2: Same as alternative 1, except bridge railings would also be upgraded, providing 4-ft wide shoulders when completed. (This is the preferred alternative).

Alternative 3: Deck operations same as alternative 1, however the deck would also be widened by 9-ft using reinforced concrete box girders. New column bents would be paired with the existing single column bents to accommodate the widened superstructure. This alternative would provide 8-ft wide shoulder when complete.

Between 140 and 170 working days is estimated, depending on the alternative chosen (two construction seasons). Construction is scheduled to occur between May 1, 2013 and October 30, 2014.

3. FACILITY

ROADWAY: SR 89 is 2-lane conventional highway that lies on the west side of Lake Almanor, in an area popular for camping, boating, vacation rentals, and other recreational uses. At the project location, the roadway profile is flat however it lies atop an earthen dam. Alignment is tangent with good sight distance. One 12-ft wide lane and 4 ft paved shoulder is provided for each direction of travel. The regulatory speed limit is 65 mph.

STRUCTURE: The Lake Almanor Spillway Bridge (09-0044) is 467 ft long and 33.7 ft wide. The raised curb railings are 2 ft wide. The structure provides one 12-ft wide paved lane with a 2-ft paved shoulder for each direction of travel (shoulders are narrower than the roadway).

TRAFFIC VOLUME DATA: The 2007 AADT is 1,150 vph (both directions). Counts taken from TMS #P81 (just north of the SR 89/147 Jct) in May 2007 indicate a weekday peak of 102 vph (one direction) and a weekend peak of 80 vph (one direction). Trucks comprise 17% of traffic volumes.

CENSUS LOOPS: Although there are profile loops on each side of the SR 147 Jct, they are outside of the limits of project; thus no impacts are expected.

ITS FIELD ELEMENTS: There are no ITS field elements within the project limits.

ATTACHMENT F

4. TRAFFIC IMPACTS

TRAFFIC: Std Plan T-13 lane closures required for pre- and post-construction operations such as removing AC deck surfacing, placing/removing K-rail, paving, striping, etc. These operations will be carried out during typical 10-12 hour workshifts. Based on the projected traffic volumes for this segment of SR 89 and the expected short closure length (0.25 mile or less), a Std Plan T-13 lane closure during daytime hours will create minimal delays of 5-minutes or less.

All 3 alternatives will be completed using 2-stage construction with K-rail that will reduce the roadway to one lane for 6-8 months. The only differences to traffic impacts between alternatives is the horizontal clearance provided during stage construction, as follows:

Alternative	Stage 1 HC (ft)	Stage 2 HC (ft)	WDs
1	12.0	12.0	140
2	12.0	13.6	150
3	12.0	18.1	170

Once K-rail is placed, the roadway will be reduced to a single lane and traffic will be controlled by a temporary signal system. This configuration will be in-place even when operations are not in progress, i.e., night-times, weekends, and designated legal holidays. The temporary signal system is timed to hold traffic no longer than 3-minutes. During typical weekdays and weekends, the signal system should be able to clear the queue within each signal cycle, and motorists should expereience less than 4-minutes delays traveling through the closure. However, on designated legal holiday weekends when traffic volumes are elevated, the longer queues will not be cleared within a single 4-minute cycle; motorists may need to wait 2 to 3 signal cycles (adding 6-9 additional minutes) before traveling through the closure.

TRUCKS: SR 89 is part of the STAA National Network, able to accommodate the following: California Legal Trucks (the most common trucks) up to 8.5 ft wide, Annual permits trucks up to 12 ft wide are common and, Single Trip permit trucks between 12 ft and 16 ft in width occur several times a week. For all alternatives, during Stage 1 construction, the temporary horizontal clearance will be reduced to 12-ft (face of K-rail to face of bridge railing). Thus, trucks wider than California Legal trucks will be restricted and likely detoured to SR 395 for 3-4 months. During Stage 2 construction, Alternatives 1 and 2 would continue to require truck restrictions, while Alternative 3 could provide up to 18-ft of horizontal clearance and not require restrictions. (NOTE: SR 147 cannot be used as a detour since it is approved only for California legal trucks or smaller).

PEDESTRIANS & BICYCLES: Pedestrians are allowed on SR 89 but few are expected. It is more common to observe bicyclists traveling around Lake Almanor. During Std Plan T-13 lane closures, pedestrians will be able to use the 2-ft shoulder and 2-ft raised curb bridge rail to travel past the workzone during operations. Bicyclists will travel past the workzone using the 2-ft lane or the lane open to traffic (same as existing conditons). During weekends and designated legal holidays (when highest bicycle use is expected) no Std Plan T-13 lane closures will be in effect. However, for all 3 Alternatives during Stage 1, only a single 12-ft wide paved lane will be provided, and no separate pedestrian pathway or bike path can be provided. Placing pedestrians and bicyclists within a traffic lane with no escape route is problematic. Only Alternative 3 during Stage 2 can provide a wider shoulder (buffer) that can be used by pedestrians and bicyclists.

SPECIAL EVENTS: This segment of SR 89 is part of the Annual Mile-High bike ride sponsored by the Chester Chamber of Commerce. This event usually occurs the 2nd or 3rd Saturday in June; thus an increased number of bicyclists will be traveling through the signalized, K-railed single lane closure during this event.

OTHER CONSIDERATIONS: The project is located in snow country. Since it is ikely that this project will require two construction seasons to complete, the single lane with K-rail configuraiton will be present during the snow season. The limited horizontal clearance confined with K-rail and bridge railing would make snow removal operations difficult.

5. TRAFFIC IMPACT MITIGATION

CLOSURES:

- Std Plan T-13 - Lane closures on 2-lane conventional highways are not allowed during times when the traffic volumes are high enough to create queues too large to clear in a standard traffic control cycle. Based on expected traffic volumes, Std Plan T-13 lane closures will be allowed anytime except after 3:00 p.m. Fridays, weekends, and designated legal holidays. Closure length restriction is not required since this is a spot location.
- Stage Construction - Due to the duration of stage construction (likely 2 seasons), it is not possible to avoid a K-railed lane closure during designated legal holidays when traffic volumes are elevated. One option to be considered is to adjust signal timing, or to require the Contractor to provide flaggers, to increased traffic volumes during these weekends. Further, to allow impact to snow removal operations, the TMP *may* require that the K-rail be removed and the full width of the roadway be provided between October 1 and March 31.

TRUCKS: Per Closure Requirements and Conditions SSP-220, the RE is required to notify HQ Transportation Permits of the reduced lane and shoulder width that will occur during stage construction so that trucks wider than California legal are detoured to an alternate route.

BICYCLISTS AND PEDESTRIANS: It is recommended that a separate phase be added to the signal timing that allows pedestrains and bicyclists to pass through the closure without contending with vehicles, trucks, and RVs.

SPECIAL EVENTS: Similar to holiday mitigation above, providing flaggers during the annual bike event may be more flexible (and therefore more efficient) in getting bicyclists and motorists through the closure with minimal delay. Additional special events may be identified and included during TMP preparation.

CORRIDOR: For this project, the corridor is considered to be SR 89 between the Greenville Wye and the SR 36 Jct near Chester, for which the D2 DTM has established a 30 minute maximum corridor delay limit. Generally, closures on 2-lane highways should not be spaced closer than 5.0 miles to allow queues to disperse between closures. Based on current workplan schedules, there are no other projects scheduled for construction on this corridor in 2013, thus the maximum corridor delay limit will not be exceeded nor are any traffic control conflicts noted. The corridor will continue to be reviewed as the construction season approaches.

PORTABLE CHANGEABLE MESSAGE SIGNS (PCMSs): Because stage construction will reduce the roadway to a single lane with limited horizontal clearance for a period of several months(including nighttimes and weekends), PCMSs are recommended for this project. For each approach direction, one PCMS shall be placed in advance of the first traffic control system sign.

TMP PUBLIC INFORMATION CAMPAIGN: The **PE** should include funds to allow the **RE and D2 PIO** to develop and issue advance notification of planned construction and traffic control (i.e., long-term lane closure and expected delays) to the local media (news, radio, and newsprint).

WORKER SAFETY MEDIA CAMPAIGNS - Worker safety media campaigns have been shown to reduce work zone vehicle collisions. Reducing work zone collisions will increase public and worker safety and reduce incident related congestion. With safety and reliability being the Departments number 1 and 2 goals respectively, it is appropriate for construction funding be set aside for worker safety media advertisements

COST: In addition to typical traffic control system costs associated with Std Plan closures, the following should be included in the project estimate:

- PCMSs: Include one for each approach direction
- ADDITIONAL FLAGGERS: Include costs to provide 2 flaggers during holiday weekends and special events
- WORKER SAFETY MEDIA CAMPAIGN: Include $500 in item #066063-Transportation Management Plan Public Information for worker safety media campaigns.
- TMP PUBLIC INFORMATION: Include $1,500 in item #066063-Transportation Management Plan Public Information for preparation of project-specific information to be distributed to the public, local media, and the Chester Chamber of Commerce.

TMP: The TMP for this project will summarize the traditional traffic handling practices and other traffic mitigation strategies that will be implemented during construction that will include, but is not limited to: 2 week pre-notification of closures (Lane Closure Schedule), DTM evaluation of cumulative traffic corridor delays for multiple projects, California Highway Information Network (CHIN), Road Work Information Bulletin (RIB), Local Agency contacts, Permanent Changeable Message Sign (CMS) locations, permanent and portable Highway Advisory Radio (HAR) locations, CHP Commander contacts, incident response (accident, natural event) contacts, contingency plans, and maintenance contacts. **A TMP for this project is required and should be requested when the design is complete enough to determine specific traffic impacts but early enough to make design changes/additions required for traffic mitigation.**

Jan Meyer, ATP prepared this TMP Data Sheet. I have personally reviewed this TMP Data Sheet and all supporting information. I certify that the assumptions are reasonable and proper subject to the limiting conditions set forth and I find the Data Sheet complete and current.

Clint Burkenpas
Chief, Office of Traffic Management
District 2
530-225-3245

4/8/09
Date

ATTACHMENT F