FINAL FEASIBILITY STUDY REPORT

Bucks Bar Road Bridge
at North Fork Cosumnes River

Bridge No. 25C-0003

El Dorado County, California

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This 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.

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DOKKEN ENGINEERING

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1. INTRODUCTION

The purpose of this study is to evaluate the condition of the existing Bucks Bar Road Bridge in El Dorado County. The El Dorado County Department of Transportation (DOT) successfully applied for a Highway Bridge Program (HBP) grant to widen or replace the existing 1940 era structure to meet current needs for a two-lane structure. The existing structure has a width of 18.5 feet between barrier faces, requiring southbound vehicles to yield to northbound travelers until the bridge is clear. Traffic counts performed in May 2007 indicate the bridge carries 4200 vehicles per day.

This study presents the findings of engineering evaluations performed on the existing bridge and presents 4 alternatives, including both widening the existing bridge and replacement options. Studies prepared and discussed herein include the following:

- Existing Bridge Condition Assessment
- Draft Location Hydraulic Study
- Geologic Memorandum and Foundation Evaluation Report
- Evaluation of Existing Bridge Capacity
- Preliminary Environmental Study Form (PES Form)

A public meeting was held on January 6, 2010 to obtain input from the citizens on the topics of replacement versus widening, temporary detour and structure type. This report concludes with a recommendation to replace the existing bridge with a new 2 lane concrete bridge.

2. BACKGROUND

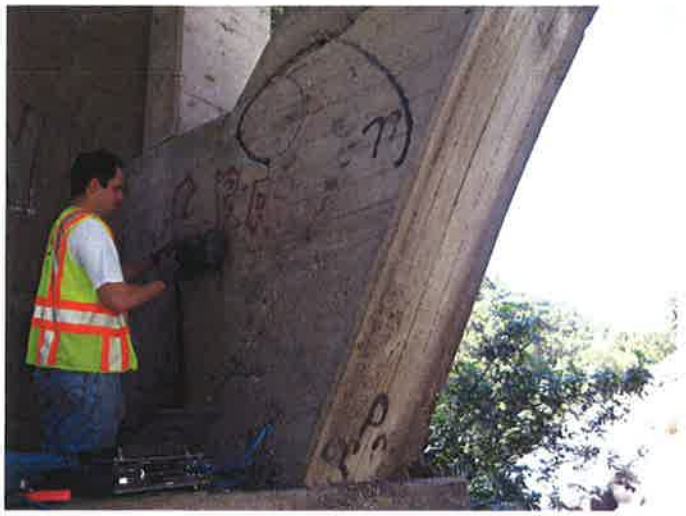
The HBP program provides aid to the States, Counties and Cities across the United States to upgrade, rehabilitate and replace bridges that have become either obsolete or are suffering from deterioration. The Bucks Bar Road Bridge became eligible for the HBP program based upon the narrow width not being able to accommodate two lanes of traffic. The Bridge Inspection Report completed by Caltrans on August 16, 2001 indicated the bridge is "functionally obsolete" because of the bridge roadway width.

Once a project has been accepted as eligible, the owner's first task is to establish the best course of action to modify or replace the structure to address the concern(s). For Bucks Bar Road Bridge, any actions selected by the DOT must address the narrow roadway width on the bridge. The purpose of this feasibility study is to provide the County DOT with sufficient information to select between widening or replacement alternatives for the bridge based upon hydraulics, life cycle cost, capacity of the existing structure, and public sentiment for the old bridge.

3. FIELD WORK COMPLETED

A formal Field Review Meeting was held with Caltrans and El Dorado County personnel on June 29, 2009. The purpose of the field review was to comply with Caltrans desires to review the site during the development of the Preliminary Environmental Study (PES) Form. A sign in form of the attendees, minutes of the meeting and approved PES form are available in the project files.

Testing to identify the reinforcement spacing, depth and existence and concrete strength of the existing bridge was performed on July 1, 2009. Several locations of the existing bridge were scanned to establish the existence, depth and spacing of the reinforcement. Locations scanned included the deck, arch ribs, spandrels, abutment stems and two retaining wall faces. A report of scan results is included in the Existing Bridge Condition Assessment, Attachment A.



Concrete and rock cores were taken from 6 locations on July 1, 2009. Two cores were taken from the bedrock adjacent to the north abutment and approach. These cores tested at 14,930 and 18,200 psi. The bridge deck core tested to 3,760 psi. Two final cores were taken in the south abutment and tested to 3,950 psi. A summary of the coring and testing results is included in Attachment A and summarized in the Table 1 below.

Table 1 - Coring Results

LOCATION	COMPRESSIVE STRENGTHS	COMMENTS
Rock Core	No. C1 14,930 psi	Lab Test No. 3
Rock Core	No. C2 18,200 psi	Lab Test No. 4
Bridge Deck (NW Deck)	No. C3 3,760 psi	Lab Test No. 2
Bridge Deck (SW Deck)	No. C4	Core fractured during removal
South Abutment Wingwall	No. C5 3,950 psi	Lab Test No. 1
South Abutment	No. C6	Core encountered a large cobble

4. ALTERNATIVES STUDIED

This feasibility study developed alternatives to widen Bucks Bar Bridge or to replace it with a bridge that meets currents standards and accommodates two lanes of traffic.

Widening Alternatives – Two alternatives were considered for widening the bridge. Alternative 1 is widening with a parallel arch structure, identical in shape and form to the existing bridge. A planning study of this alternative is included as Attachment B. The second widening alternative considered was a box girder bridge. We considered both a single span and a three span box girder bridge configuration.

The box girder widenings both detract from the aesthetics of the existing structure and compound the hydraulic constriction with the addition of vertical columns. The single span box girder widening would have to be built higher and with separation from the existing bridge to accommodate the necessary structure depth. This would complicate the roadway approaches with a split profile and detract from the existing structure aesthetics. The three span box girder widening could be connected to the existing arch bridge, however the placement of the vertical piers will add to the hydraulic constriction in the channel. For these

reasons, the box-girder bridge widening alternatives were not further developed into planning study sheets.

Replacement Alternatives – Three concrete replacement alternatives (Alts 2 through 4) were developed with varying degrees of aesthetics. All of the replacement options are 3 span configurations, gracefully accommodating the river between Piers 2 and 3. Planning Study Sheets detailing these configurations are included in Attachment B.

Alternative 2 – Box Girder Bridge with Aesthetic Shaped Vertical Piers. The pier would flare near the top (for aesthetics) and could include a variety of aesthetic treatments in the recess between two lobed ends (rounded pier noses).

Alternative 3 – Box Girder Bridge with slant leg piers forming a cathedral arch and haunched bridge spans.

Alternative 4 – Three rib concrete arch bridge with concrete slab bridge deck.

4.1 Foundation Considerations

From field investigations, only a few surficial boulders were observed on the eastside of the north abutment. The eastside of the south abutment and approach is composed of large boulders and soil overlying massive bedrock. For the foundation preparation, the bedrock should be exposed by removal of all loose rock (boulders) and any vegetation to create a platform to base the proposed bridge substructure. A Geographic Memorandum and Foundation Evaluation Report dated August 20, 2009 is included as Attachment C.

The existing bridge is founded on massive granite formations. At the south abutment, the arch ribs are connected at the base to a cast-in-place concrete thrust block which bears directly on fractured and unfractured bedrock. The arch ribs and thrust block at the north abutment connect directly to unfractured bedrock. If the alternative to widen the existing structure is selected, the stream rock pillar area supporting the north thrust block is recommended to be replaced with reinforced concrete dowelled into the bedrock.

Any replacement structures are recommended to be founded on spread footings with drill and bond rock dowel attachments to the underlying granite.

4.2 Shoulder Width Considerations

An increase of the shoulder width from 5 feet to 8 feet was made with the publishing of the final study. The shoulder width of 5 feet was initially pursued due to the alignment and shoulder limitations on the adjacent sections of Bucks Bar Road, however rural bridge replacements are often constructed to the full 8 foot standard shoulder width. The roadway alignment and bridge general plan should be revised to 8 foot shoulders as a first order of work in the next phase of this project.

5. EXISTING BRIDGE EVALUATION

5.1 Existing Bridge Condition Assessment

Bridge maintenance and inspection reports by the State indicate the bridge is in fair condition, with minor spalling and some exposed reinforcement along the arches. The Bridge Inspection Report completed by Caltrans August 16, 2001 indicates the bridge is "functionally obsolete" because of the bridge roadway width. In general, the supporting maintenance and inspection information is consistent with our field observations included in Attachment A.

Scanning detected no top reinforcement in the deck slab and confirmed the abutments are unreinforced concrete greater than 18 inches thick. In addition, bars not shown on the as-builts were identified on the interior face of the arch rib extending past the connection to the thrust block. No rebar was found in any of the south abutment walls up to the effective scanning depth of the equipment (18 inches).

Concrete coring was conducted by PC Exploration. Compression tests of the core samples were performed by Geocon Consultants, with strengths of 3,760 psi and 3950 psi, typical (ranging to high) for this vintage of concrete.

In general, the bridge is in very good condition given it is 69 years old. While radar scanning and concrete cores have put the original design drawings in question in some respects, they provided valuable insight into the as-built details and condition of the bridge. This condition assessment concludes that the concrete quality, robust structure type, and service load details of this bridge make it eligible for widening.

5.2 Existing Bridge Live Load Evaluation

The bridge superstructure was analyzed for live loading based upon the as-built plans and findings of the in-situ scanning. Calculations were prepared to compare the cracking moment capacity of the deck section to the demand extracted from the WinBDS model. The deck was analyzed with WinBDS model and determined to be capable of handling HS-20 live loading and widening.

5.3 Existing Bridge Seismic Resistance

The Acceleration Response Spectra (ARS) curve which most closely matches the project site soil profile and fault configuration is for soil type B, magnitude 6.5±0.25 with spectral acceleration of 0.4g. The curve was modified for the near source fault per Caltrans SDC version 1.4 for the seismic analysis. A multi-modal spectral analysis has been conducted on the existing structure. Even though the demands were determined to be moderate, certain elements of the existing structure are required to be retrofitted if the widening alternative is chosen due to inadequate reinforcement and rebar cover. The widening structure or replacement structure will be analyzed and engineered to withstand the seismic demand accordingly.

The following elements are recommended for strengthening and/or repair should the widening be selected. An exhibit depicting the retrofit strategy is included as Attachment D.

- Arch Rib Strengthening
- Spandrel Column Strengthening
- North Thrust Block Foundation Repair
- Various Spall Repairs

6. ANALYSIS OF ALTERNATIVES

6.1 Hydraulic Performance

A Draft Location Hydraulic Study (LHS) was developed by WRECO to estimate the 50-and 100-year design flows at the site, analyses the hydraulics of the existing bridge configuration and evaluate the hydraulics of a three-span bridge replacement. A copy of the complete October 2009 Draft LHS is included as Attachment E.

WRECO evaluated the hydrology of the North Fork Cosumnes River watershed by several methods and found the Generalized Extreme Value (GEV) method to be the most appropriate. According to the Flood Insurance Rate Map supplied by the Federal Emergency Management Agency an estimated 10-acre 100-year floodplain lies between the bridge and 1000 ft upstream of the structure. No floodplain was identified downstream of the project site. Based on implementation of the GEV statistical model and data gathered by the USGS gauge stations at Camp Creek and North Fork Cosumnes River, a 100-year event flow was estimated to be 36,000 cfs. The 50-year event flow was estimated to be 26,000 cfs.

Field surveyed cross section data was input into an HEC-HMS model to examine the hydraulic characteristics of the 100-year and 50-year flows at the bridge. The resulting water surface elevations are presented in Table 2 for the widening and replacement alternatives. The results estimate no freeboard between water the water surface elevation and the existing bridge soffit elevation of 1653.6 feet for the 100-year event. However, the 50-year flow meets the minimum 2-foot clear requirement for the existing bridge. A hydraulic jump phenomenon is observed immediately downstream of the bridge.

A bridge replacement alternative (Attachment 2) was analyzed to verify the constriction caused by the existing Bucks Bar Road Bridge. The replacement bridge was assumed to be a three-span cast-in-place box girder supported on aesthetically enhanced piers each side of the river channel. This configuration, whether vertical pier or slant leg pier, was felt to provide a good comparison to the existing bridge hydraulics.

The bridge replacement removes the flow constriction caused by the existing retained approach fills leading to the arch span. These existing approach fills will be removed for any replacement alternative. In general, analysis of the replacement alternative revealed the following benefits:

- The flow constriction at the bridge was reduced
- Velocity through the bridge dropped from 26 feet per second to 13
- The upstream water surface elevation dropped 6 feet
- The hydraulic jump downstream of the bridge was eliminated

The upstream soffit elevation of the new structure will be at least 1.4 feet higher than the existing, such that the minimum requirements are met for both 50-year and 100-year storm events. This slight increase in the profile also helps increase the stopping sight distance for the roadway. During design, it is suggested that the profile be elevated such that the soffit of the new bridge accommodates 2 feet of clearance to the 100 year water surface elevation. This is proposed to accommodate the heavy debris flows that can occur on this river.

Table 2 - Water Surface Elevations

	BRIDGE UPSTREAM FACE (FT)	BRIDGE DOWNSTREAM FACE (FT)
Widening Alternative 1 50-year Storm Event	1648.1	1646.8
Widening Alternative 1 100-year Storm Event	1654.2	1648.4
Replacement 3-Span, Alt 2 50-year Storm Event	1651.0	1650.3
Replacement 3-Span, Alt 2 100-year Storm Event	1655.2	1654.3

Under the current stream flow constriction, an upstream backwater condition is created during the high flow events, and natural scouring processes in the stream cannot occur. Any of the replacement alternatives will improve the stream hydraulics by opening up the channel section for increased flow and the natural hydrologic routine will be restored.

The Final LHS and Design Hydraulic Report will be prepared as part of the PS&E work effort after a project alternative has been selected.

6.2 Design Exceptions and Design Speed

The existing bridge and approach roadways provide a design speed of 16 miles per hour (mph) based upon vertical stopping sight distance. In addition, the existing profile has several grade breaks over the maximum recommended half percent change in grade that is recommended. The profile is depicted on the Bridge Replacement Alternative Exhibit in Attachment F.

The design speed for the horizontal alignment is 20 mph based upon the radius and superelevation of the existing roadway. The radii of the two curves entering and exiting the bridge are both approximately 150 ft, with the bridge being on a tangent. The existing bridge cross section is flat, without a normal crown section. Through multiple sight visits, most drivers "round" the tangent portion of the bridge in order to maintain speed.

The existing horizontal curve in conjunction with the vertical curve is affecting sight distance for the travelers coming onto the bridge. Therefore, the widening alternative does not meet current AASHTO sight distance standards due to the necessity of matching the widening bridge profile to the existing one.

The roadway approaches for the replacement alternative achieve a geometric design speed of 30 mph, based upon the roadway radius, and improve the design speed for stopping sight distance determined from the vertical profile to 25 mph. An exception for stopping sight distance and design speed will be prepared for either alternative selected. Justification for the exception will be the design speed of the adjacent sections of Bucks Bar Road, where design speeds drop below 20 mph.

For the bridge replacement alternatives, the design will meet the current AASHTO LRFD standards.

6.3 Maintenance and Longevity Considerations

The expected design of the widening alternative is approximately 50 years based on the condition of the concrete. The expected design life of the replacement alternative is 100 years. The average daily traffic on Bucks Bar Road is 4200 vehicle per day and is expected to increase to 8300 vehicle per day by year 2015. This demand appears to be moderate and will not affect the service life of the structures significantly.

While the existing structure may be retrofitted and strengthened to meet current seismic design requirements, it will not be able to sustain a maximum credible event without major damage. This damage will require immediate repairs to re-open the bridge and may result in the bridge being load restricted or even replaced at that time. The existing structure does not successfully pass the 100 year storm event and is prone to having drift, such as fallen trees and debris, getting stuck in the structures' spandrels and arch, requiring maintenance to remove and inspect for damage. The new structure will be able to resist greater magnitude seismic events without significant damage or closure and on its new proposed profile will pass major storm flows and drift successfully.

To obtain the service life estimates reported above, periodic maintenance of either alternative will be necessary. Should the active repairs of concrete spalls on the existing structure not be maintained with the same diligence as the County has been performing, the above service life would be shortened. The presence of moisture from to the North Fork Cosumnes River and freezing temperatures during winter months will continue to have adverse impacts on the bridge materials. Regular maintenance and repair practices have been performed on the existing structure thus far, prolonging its service life and making widening a feasible alternative. The same periodic repair and rehabilitation practices are recommended for the widening or the replacement structure such that material damage is prevented.

6.4 Environmental

A Preliminary Environmental Study (PES) Form was prepared by Dokken Engineering to obtain concurrence on the study requirements for either a widening or replacement alternative. The PES form was approved by Caltrans in October 2009 and is included for reference as Attachment G. There is not expected to be a significant difference in the environmental impacts of the replacement compared to the widening because the project footprint, area of disturbance, type of work, and construction duration is similar under each scenario.

No impacts to water resources within the project area are anticipated with inclusion and implementation of avoidance measures. The project must comply with the National Pollution Discharge Elimination System (NPDES) requirements from the Regional Water Quality Control Board (RWQCB), in accordance with the NPDES general construction activity storm water discharge permit. Likewise, compliance with Section 401 of the Clean Water Act will ultimately be necessary.

The California Natural Diversity Database indicates that California red-legged frog (*Rana draytonii)*, a USFWS Threatened Species; northwestern pond turtle (*Actinemys marmorata marmorata)*, a CDFG Species of Special Concern; foothill yellow-legged frog (*Rana Boylii)*; are in the El Dorado Quadrangle (CDFG [2008], **http://www.dfg.ca.gov/biogeodata/cnddb/mapsanddata.asp**). Further study will be required to document avoidance measures if suitable habitat for sensitive species is found within the project area. A Natural Environment Study (NES) will be conducted to determine if the project will adversely affect species or critical habitat and to evaluate the project's potential to adversely affect protected species.

The vegetation on and adjacent to the site provides suitable habitat for a number of raptor and migratory bird species. All raptor species are protected from "take" pursuant to the California Fish and Game Code Section 3503.5. Nesting raptors and migratory birds are protected by the Migratory Bird Treaty Act (MBTA). Under the MBTA, taking, killing, or possessing migratory birds, their eggs, or their nests is unlawful. The District Local Assistance Environmental Coordinator will be consulted when determining the level of analysis that will be necessary. A Natural Environment Study will be prepared in accordance with guidance set forth in the Caltrans Standard Environmental Reference, Chapter 14, Biological Resources.

Potential wetland habitat occurs within and adjacent to the project limits. A wetland delineation will be prepared and verification of the jurisdictional delineation will be required to determine the exact boundary of any waters (based on the Army Corps of Engineers three-parameter definition (33 CFR 323.2(c)), and to quantify potential project-related impacts on waters of the US and State.

6.5 Historic Value

Based on its age, integrity and significance, the existing Bucks Bar Road Bridge is not eligible for the National Register of Historical Places.

6.6 Right of Way

The Countywide parcel mapping was overlaid on the aerial photograph taken especially for this project. The approximate parcel lines were aligned to best fit the aerial photograph and topographic survey shots that were taken. This unreconciled right of way base map was used to show proposed acquisition areas necessary for either a widening or replacement alternative. Right of way impact exhibits for the widening and replacement alternatives are included in Attachment H.

Table 3 presents a comparison of the estimated right of way impacts for 5 foot shoulders and the minimum increased profile. The primary difference in the right of way impact is that the replacement alternative raises the profile 1.4 feet and therefore requires reconstruction of one of the two driveways to APN 093-131-12.

Table 3 - Right of Way Impacts

	APN 093-131-12	APN 093—131-34
Widening (Alt 1)	Fee Acquisition of 1290 Sqft	Fee Acquisition of 1300 Sqft
Replacement (Alts 2-4)	Fee Acquisition of 1290 Sqft + Driveway Impact	Fee Acquisition of 1300 Sqft

A preliminary estimate of the right-of-way to acquire is 0.06 acres on the upstream side of the bridge. The right-of-way difference between alternatives appears insignificant in the first two rows of the table. These right of way impacts are based on 5 foot shoulders as well as standard hydraulic clearances. As the shoulder widths are increased to 8 feet and the bridge soffit is raised 2 feet above the 100 year water surface elevation, the right of way requirements from these two parcels will be increased.

6.7 Construction + Right of Way Estimates

Construction and Right of Way project estimates for the four studied alternatives are presented in the tables below. The least cost is Alternative 1 (Table 4 below), widening of the arch bridge at $1.75 million. The various replacement alternatives range from $2.3 to $2.9 million, as shown in Table 5 below. The project estimates include roadway approach construction, bridge removals, mobilization, water pollution control, driveway reconstruction and a 25% contingency. The estimates are shown in more detail in Attachment I.

Table 4 – Construction and ROW Cost – Spandrel Arch Widen

DESCRIPTION	COST ALTERNATIVE 1
Retrofit & Rehabilitation	$200,000
Bridge Widening	$630,000
Roadway Approaches & Site Work	$550,000
Right of Way	$30,000
Contingencies (25%)	$340,000
TOTAL	$1,750,000

Table 5 – Construction and ROW Cost – Box Girder Replacement

DESCRIPTION	COST ALTERNATIVE 2	COST ALTERNATIVE 3	COST ALTERNATIVE 4
Bridge Removal	$150,000	$150,000	$150,000
Bridge Replacement	$1,080,000	$1,300,000	$1,520,000
Mobil, Approaches & Site Work	$600,000	$630,000	$650,000
Right of Way	$20,000	$20,000	$20,000
Contingencies (25%)	$460,000	$520,000	$580,000
TOTAL	$2,310,000	$2,620,000	$2,920,000

6.8 Traffic Impact during Construction & Staging

A temporary road closure and detour are proposed for either the widening or replacement alternatives. For the widening, the detour is proposed due to the lack of a suitable staging area, worker safety and quicker completion of the project. For the replacement, a temporary road closure addresses a lack of suitable staging, keeps the alignment close to the existing and allows the contractor to complete the entire project in one construction season.

The detour, shown in Attachment J, causes the greatest inconvenience to residents of Bucks Bar Road between the river and Somerset. The detour will direct them south to Mt. Aukum Road and then northeasterly 3.5 miles to Pleasant Valley Road. For travelers from Somerset going to Placerville or Highway 50 via State Route 49 or Missouri Flat Road, the detour will add approximately 3.6 miles to their trip or 5 minutes.

Fire and emergency services exist on either side of the river, one near the intersection of Pleasant Valley Road and Leisure Lane and the other in Somerset. Therefore, the roadway closure will have no impact on emergency response times for residents of the area.

If construction were staged to allow the bridge to remain open, the project construction would require two summer seasons, because there are not enough working days to complete both halves of the bridge in one season. The work season at this site will be constrained by permits allowing work in the river from May 1 to October 15 only.

6.9 Public Sentiment & Public Informational Meeting

Currently there is no active public controversy over this project. The Bucks Bar Bridge is used by many drivers, and implementation of this project would provide a 2-lane bridge instead of the existing 1-lane bridge. This improvement would increase safety and operation of the transportation facility and is expected to be generally supported by the public. During 6 hours of traffic control on July 1, 2009, there was no mention or particular concern for preservation of the existing arch bridge mentioned among the passing motorists. Public sentiment was however, very strong in favor of getting a second lane to remove the yield control in the southbound direction.

A public informational meeting was held on January 6, 2010 from 5 to 7 pm to assess public sentiment for the existing bridge and accept public input on the alternatives and the study findings. The meeting was held at the Pioneer Park Community Center in Somerset and was attended by 54 citizens. The meeting included a half hour presentation from Transportation Department Engineers Dustin Harrington and Matt Smeltzer and County Supervisor Ray Nutting followed by a half an hour of public questions. Informal discussions, centered around large poster exhibits, occurred before and after the presentation.

Overall, the public discussions indicated broad support for building a simple new bridge to address the narrow roadway and flooding potential. The aesthetics of the new bridge was not a concern. The most controversial portion of the presentation was regarding the potential full closure of the bridge during construction. The major concerns expressed were regarding loss of local business and temporary loss of evacuation routes during a large-scale emergency, such as a wild fire. Longer commute times for local residents and emergency response access were not major issues.

Following the meeting, the County received 4 formal comments, included in Attachment K. One comment supported replacement of the bridge utilizing the detour. One comment requested the existing bridge be widened, and two comments were simply pleased that a project to address this narrow crossing was being planned.

7. SUMMARY AND RECOMMENDATIONS

From an engineering standpoint and best value approach, the technical evaluations suggest the Bucks Bar Road Bridge should be replaced. This is based on the replacement alternative providing a safer roadway approach, better hydraulics, longer solution and best overall value. Replacements are generally deemed a better value over rehabilitation when the replacement cost is less than 2 times the rehabilitation cost. Table 7 summarizes the engineering findings.

Table 7 - Alternative Comparison

CONSIDERATION	WIDENING AND REHABILITATION	REPLACEMENT
Hydraulics	River flow is restricted at the existing bridge	Meets all criteria and eliminates constriction point in the canyon Lowers water surface elevation above the bridge and restores natural river behavior
Aesthetics	The existing arch configuration is preserved and widened.	A variety of options are presented in Attachment B.
Maintenance	Essential to continue periodic maintenance. Likelihood of major maintenance in response to major seismic event higher than replacement.	Reduced periodic maintenance
Cost	Lower initial cost	Lower life cycle cost
Public Sentiment	Not preferred alternative	Preferred alternative

Recommendations:

Bridge – It is recommended to replace the existing 1940 bridge with a new 3 span cast-in-place concrete box girder bridge. The new bridge will be founded on concrete piers rising from either side of the river. The recommended bridge would be 42'-10" wide and 136 feet long. The recommended replacement bridge is included in Attachment B as Alternative 2.

Detour – DOT recommends a temporary full closure of Bucks Bar Road at the river so that the replacement bridge can be constructed in one season and facilitate staging for the Contractor. Signage should be provided for the Mt. Aukum Road Detour and the Fire Council should be notified for a fire safety plan during the detour. Due to public concerns, this issue warrants further analysis and public discussion.

Hydraulics - Due to high debris flows in this mountainous river canyon, consideration should be given to raising the final design profile to accommodate 3 feet of clearance between the bridge soffit and 100 year water surface elevation.

Project – Proceed to design and environmental clearance with project alternative 2 with the revisions recommended above.

ATTACHMENTS

A. Existing Bridge Condition Assessment, August 20, 2009
B. Bridge Planning Studies
C. Geologic Memorandum & Foundation Evaluation Report, August 20, 2009
D. Evaluation of Existing Bridge Capacity, August 20, 2009
E. Draft Location Hydraulic Study, October, 2009
F. Project Alternative Roadway Exhibits, November 2009
G. Approved PES Form
H. Right of Way Exhibits
I. Estimates
J. Proposed Detour
K. January 6, 2010 Public Meeting Comments