Chapter 4
Alternatives

4.1 Alternatives Overview

CEQA requires that an EIR include a reasonable range of feasible alternatives to the proposed Project that meet most or all project objectives while reducing or avoiding one or more significant impacts of the project. According to State CEQA Guidelines Section 15126.6(f), the range of alternatives required in an EIR is governed by a "rule of reason" that requires an EIR to set forth only those alternatives necessary to allow a reasoned choice. An EIR need not consider every conceivable alternative to a project. Instead, the discussion of alternatives must "focus on alternatives to the project or its location which are capable of avoiding or substantially lessening any significant effects of the project." Where a potential alternative is examined but not chosen as one of alternatives, the State CEQA Guidelines require that an EIR briefly discuss the reasons the alternative was dismissed. An EIR is not required to consider alternatives which are infeasible. In addition to a range of alternatives, an EIR must discuss the "No-Project Alternative," which describes the reasonably foreseeable probable future conditions if the project is not approved (State CEQA Guidelines Section 15126.6).

The lead agency must consider the alternatives discussed in an EIR before acting on a project. The agency is not required to adopt an alternative that may have environmental advantages over the project if specific economic, social, or other conditions make the alternative infeasible (PRC § 21002).

This chapter describes the alternatives to the Mt. Murphy Road Bridge Replacement Project and compares the anticipated environmental impacts of the alternatives to those of the proposed Project, analyzed in Chapter 3, *Impact Analysis*, Sections 3.1 through 3.13.

4.2 Alternatives Development

4.2.1 Mt. Murphy Road Bridge Structural Analysis and Rehabilitation Feasibility Technical Memorandum, 2014

Under the direction of the El Dorado County Board of Supervisors (BOS), the first step of this project was to consider rehabilitation of the existing bridge at Mt. Murphy Road prior to spending resources on development and consideration of replacement solutions. The 2014 feasibility study analyzed the viability of rehabilitating the existing Mt. Murphy Bridge to meet safe design standards (CH2MHill 2014). Three rehabilitation alternatives (Cases) were evaluated in the 2014 study:

- Case A – Evaluate rehabilitation of existing bridge to support existing dead load plus full HL-93 live load.

- Case B – Evaluate addition of 4-foot-wide sidewalks on each side of the existing bridge in addition to one lane of HL-93 live load. Case B involves replacing the existing floorbeams with longer and deeper floorbeam sections to support the additional superstructure width required to accommodate sidewalks on each side of the bridge.
- Case C – Evaluate converting the existing bridge to a pedestrian only structure. Case C addresses rehabilitating the existing structure to support 90 psf pedestrian loading and constructing a new crossing for motorized travel.

The 2014 feasibility study also analyzed the existing bridge for the posted live load trucks and maximum truck size that the bridge can accept without significant changes to the existing members. This was identified as Case D in the 2014 feasibility study. Table 4-1 below summarizes the evaluation of the rehabilitation alternatives (excluding Case D) studied in the 2014 technical memo.

Table 4-1. Rehabilitation Evaluation Summary

Analysis Case	Description of Rehabilitation Alternative	Estimate	Pros & Cons	Design Exceptions Required
Case A	Rehabilitate existing structure to support 1-lane of HL-93 live load.	$6,500,000	**Pros:** 1) Keeps the charm of a one lane bridge 2) Load postings removed. **Cons:** 1) Rehabilitation cost likely will not be approved for HBP funding, requires significant County funds 2) Bridge closed during retrofit construction or expensive temporary bridge required 3) Long-term maintenance cost will be substantial compared to a new bridge 4) Approximately $700/SF of existing bridge deck 5) Bridge still subject to delays due to one way traffic. 6) Loses historical value since a majority of the truss needs to be replaced.	1) Sub-standard approach roadway and bridge widths 2) No safe passage for pedestrians 3) Sub-standard vertical clearance 4) Metal railing on truss would likely need to be designed for lower crash level due to width limitations.
Case B	Construct pedestrian walkways adjacent to existing bridge. Rehabilitate existing structure to support 1-lane of HL-93 live load	$14,200,000	**Pros:** 1) Preserves charm of a one lane bridge 2) Provides safer passage for pedestrian traffic.	1) Sub-standard bridge width, single lane with no shoulders

Analysis Case	Description of Rehabilitation Alternative	Estimate	Pros & Cons	Design Exceptions Required
	and the adjacent walkways attached to the existing structure.		3) Load postings removed **Cons:** 1) HBP funding requires design exceptions and is not guaranteed. 2) Bridge closed during retrofit construction or expensive temporary bridge required 3) Approximately $1,550/SF of existing bridge deck 4) Loses historical value since a majority of the truss needs to be replaced. 5) Long-term maintenance cost will be substantial compared to a new bridge	2) Sub-standard vertical clearance 3) Metal railing on truss would likely need to be designed for lower crash level due to width limitations.
Case D	Rehabilitate existing structure for support of pedestrian loading only and light maintenance vehicle. Bridge replacement to be constructed on new alignment.	$1,700,00	**Pros:** 1) Preserve existing historic structure for other uses 2) Provide safe passage for pedestrians and two-way vehicular traffic 3) Lower maintenance and inspection costs compared to the rehabilitation options 4) Approximately $555/SF for new 45'-6" wide bridge deck is lowest cost of all alternatives **Cons:** 1) Cost for rehabilitation of existing bridge not supported by the HBP 2) Requires more right of way than other alternatives	

Replacement or rehabilitation of the existing bridge will be funded through the HBP. Caltrans has indicated that the HBP will not approve funding for rehabilitation of bridge structural deficiencies unless all the functional obsolescence issues are addressed. Since Mt. Murphy Road Bridge is

eligible for the National Register of Historic Places, according to FHWA criteria, a vulnerability assessment of the existing structure and preliminary rehabilitation cost estimates were developed to assess the feasibility of rehabilitation versus bridge replacement.

Comparison of cost estimates to rehabilitate the existing Mt. Murphy Road Bridge structure indicates that rehabilitation for full truck loadings is feasible. However, the $6,500,000 cost to rehabilitate only the structural deficiencies of the existing bridge would have to be borne entirely by the County without any Federal participation. Widening the existing bridge for pedestrians for $14,200,000 is also feasible but is very expensive and requires that several difficult design exceptions be obtained from Caltrans. HBP funding for widening the existing bridge is also not certain and it is possible that the County would have to pay all or part of the widening costs. The rehabilitation options A – C would replace the majority of the existing truss bridge. The $554 cost per square foot of bridge deck for the replacement illustrates that replacement is three times as efficient as retrofitting and widening the existing bridge. The 2014 feasibility study recommended that the existing Mt. Murphy Bridge be replaced with a new structure (CH2MHill 2014).

4.2.2 Mt. Murphy Road Bridge Project Alternatives Analysis Report, 2015

The 2015 Alternatives Analysis Report discusses alternatives considered for the Mt. Murphy Bridge Replacement Project and details the process of filtering these alternatives to determine which alternative should be carried forward for further investigation in the environmental document.

An alternative analysis process was designed to include project stakeholders and members of the public to develop methods for evaluating alternatives and developing alternative solutions. Public involvement was conducted through a series of Stakeholder Advisory Committee (SAC) and Project Development Team (PDT) meetings.

The role and responsibility of the SAC was to provide community input from the early stages of project development to help formulate and shape the method for evaluating solutions and to help develop these solutions for consideration. Each representative was asked to keep their organization or neighborhood informed of the Project progress and report back other input from their groups. Members of the SAC included representatives from:

- American River Conservancy
- Coloma/Lotus Chamber of Commerce
- El Dorado County Chamber of Commerce (first meeting only – then passed on to Howard Penn)
- El Dorado County Historical Society
- Gold Trail Grange #452
- Coloma Heights Neighborhood Association
- Compass2Truth
- Coloma Resort
- Camp Lotus
- Scott Road Resident
- Coloma Lotus News
- Raft California
- Mt. Murphy Road

- Garden Valley Ranch Estates (near Mt. Murphy Road)

Public involvement was a critical activity for this phase of the project. Both the SAC and the PDT were instrumental in developing the criteria and the alternatives that were evaluated. Understanding the concerns and issues of the public allowed the design team to be responsive to those needs and help the County to develop a set of alternatives to be considered. This phase of the project included three SAC meetings and three PDT meetings held on the dates shown in Table 4-2.

Table 4-2. Meeting Dates and Locations

Meeting	Date	Location
SAC Meeting #1	April 8, 2014	Grange, Coloma
PDT Meeting #1	May 15, 2014	County Offices, Placerville
SAC Meeting #2	May 28, 2014	Grange, Coloma
PDT Meeting #2	August 22, 2014	County Offices, Placerville
PDT Meeting #3	September 16, 2014	County Offices, Placerville
SAC Meeting #3	September 24, 2014	Grange, Coloma

In addition, the County held a general public meeting in February 2013 to collect feedback on the rehabilitation or replacement of the existing bridge. That feedback was included with the feedback provided by the SAC during the course of this phase of the project.

Development of Project criteria is required in order to plan and design alternatives that meet all Federal, State and County standards, and to address the range of values and interests of all the stakeholders affected by the Project. Two sets of criteria were established for this Project. Table 4-3 presents the technical design requirements the Project must meet in order for the participating agencies to approve the Project. Table 4-4 presents the criteria developed from what the community said was important for the Project to achieve. The two sets of criteria were used to evaluate the Project alternatives.

Table 4-3. Technical Design Criteria

Design Element	Design Criteria	Design Criteria Source
Roadway Work		
Lane Width (ft) Shoulder (ft)	10’ min. for ADT<500, 12’ min for ADT>500 4’ min for ADT<2500	El Dorado County DOT* (AASHTO** Table 5-5 Page 5-6) El Dorado County Plan*** RS-21
Sidewalk (ft)	6’ min. on both sides (4 to 8 ft; 6 to 10 ft if adjacent to curb)	El Dorado County Std Plan RS-20 (AASHTO Page 4-56)
Bike Lane (ft)	0’ for shared roadway	HDM Index 1002.1(1)
Bridge Work		
Design Live Load	HL-93 Loading	AASHTO
Freeboard for 100-yr flood	Must Pass Flow	Caltrans/FHWA
Freeboard for 50-yr flood	2’ min	Caltrans/FHWA
Sidewalk Width for Bridge	4’-8’	ASHSTO Geometric Guidelines, p4-56 (4’-8’), Caltrans HDM Index 208.4

Design Element	Design Criteria	Design Criteria Source
		(6'min, 8' preferred)
Lane Width on Bridge	10' min for ADT<500, 12' min for ADT>500	12' is typical lane in AASHTO and HDM, width is restricted to what is available
Bike Lane on Bridge	0' for shared roadway	AASHTO Guide for Development of Bicycle Facilities HDM Index 1002.1(1)

Notes:

* All references to AASHTO are intended to refer to "A Policy on Geometric Design of Highways and Streets" (AASHTO, 2011)

** All references to El Dorado County DOT are intended to refer to "Design and Improvement Standards Manual", City of El Dorado Department of Transportation, 1990

*** All references to El Dorado County Plan are intended to refer to "El Dorado County Standard Plans", City of El Dorado Department of Transportation, 2011

Table 4-4. Screening Criteria Developed by PDT based on SAC recommendations.

	Criteria	Performance Measures
Historic and Cultural		
H1	Minimize physical impacts to cultural/historic landmarks within the Mt. Murphy corridor.	Number of physical encroachments altering cultural/historic integrity of Mt. Murphy corridor. 5=no cultural/historic impacts, 3=fewer than 3 cultural/historic impacts, 1=more than 3 cultural/historic impacts.
H2	Minimize physical impacts to American River recreation use (baby beaches) in Mt. Murphy corridor.	Number of physical encroachments altering recreation use along the Mt. Murphy corridor. 5=improvements/no impact to recreation use, 3=less than 2 rafting or beach access points disturbed, 1=less than 4 rafting access points disturbed.
H3	Minimize physical impacts to State Park.	Number of physical encroachments altering the park/recreation use of the State Park. 5=no impact to park/recreation use, 3=less than 1/2 acre of the park disturbed, 1=more than 1 acre of the park disturbed.
Community Character		
CC1	Maximize blending of bridge into existing setting.	Location blends into existing setting. 5=enhances setting, 3=no change to existing setting, 1=negative impact to existing setting.
CC2	Minimize disturbance to local vehicular circulation/mobility.	Maintain the existing circulation for vehicular travel. 5=enhances circulation, 3=no change to existing travel, 1=negative impact to existing circulation.
CC3	Maximize connectivity to walkways and trails for non- motorized travel.	Improves the ability of non-motorized travel to circulate in the corridor. 5=improves existing circulation, 3=no change to existing circulation, 1=negative impact to circulation.
Access and Operations		
A1	Minimize impacts to peak-season congestion along State Route 49 (SR 49) through the State Park.	Alternative minimizes queuing and back up on bridge and approaches. 5=yes, 1=no.
A2	Minimize impacts to existing driveways.	Number of driveways affected. 5=no impacts and improvements to existing driveways, 3= driveway

	Criteria	Performance Measures
		modification, 1=relocation of driveway access.
Construction		
C1	Minimize distance of detour route.	Number of miles of detour. 5=no detour required, 1=greater than 5- mile detour required.
C2	Minimize noise/vibrations during construction to protect historic buildings	Proximity of construction to historic building. 5=>1,000 ft, 3=100 ft to 1,000 ft, 1=0 ft to 100 ft.
C3	Minimize construction activity close to residents and businesses.	Proximity of construction to residential/business areas. 5=>1,000 ft, 3=100 ft to 1,000 ft, 1=0 ft to 100 ft.
C4	Minimize construction duration.	Location of bridge determines phasing and construction time. 5=location requires no phasing minimizes construction duration, 3=minimal phasing/construction duration, 1=significant phasing and increase to construction duration.
	Average Rating for Category	
Safety		
S1	Improve safety for motorized transportation crossing the river (bridge and approaches).	Safety characteristics defined as speed, sight distance, turning radius, lane width, and barrier protection. 5=significantly improves safety for all design characteristics, 3=moderately improves safety, 1=does not address safety characteristics.
S2	Maximize safety for non-motorized transportation crossing the river (bridge and approaches).	Separation from motorized travel, connectivity to existing pedestrian facilities. 5=full separation from motorized travel with direct connection to existing bike/pedestrian facilities, 3=partial/minimal separation from motorized travel, 1=no change from existing condition.
S3	Improve opportunities for emergency response access.	Directness to and from Mt. Murphy Road and SR 49, minimal risk of waiting at bridge to cross. 5=emergency access significantly improved, 3=emergency access minimally improved, 1=no improvement for emergency access.
S4	Minimize safety hazards for river users.	Clearance from structures/foundations for those using river and beach areas and location in river related to current and depth. 5=improves safety for users, 3=no change from current condition for users, 1=increases hazards for users.
Environmental Resources		
E1	Minimize impacts to viewshed from the bridge (focus on location and not bridge type).	Number of impacts to viewshed: 5= no major change in current viewshed, 3=impacts in one or two viewshed areas that can be addressed, 1=major impacts that significantly alter the existing viewshed.
E2	Minimize impacts to viewshed of the bridge (focus on location and not bridge type).	Number of impacts to viewshed: 5= no major change in current viewshed, 3=impacts in one or two viewshed areas that can be addressed, 1=major impacts that significantly alter the existing viewshed.
E3	Minimize impacts to wildlife habitat (turtle, eagle, river corridor wildlife).	Number of impacts to wildlife habitats: 5= no major impacts/improves habitat, 3=impacts in one or two habitats that can be addressed, 1=major impacts that cannot be or are difficult to address.
Right-of-Way		

	Criteria	Performance Measures
R1	Minimize impacts to private land owners.	Number of parcels required for ROW (partial acquisitions included). 5=less than 3, 3=3-5, 1= more than 5.

At the second SAC meeting, the participants worked in small groups to develop and discuss possible alignments for a new crossing of the South Fork American River in Coloma within the Mt. Murphy Bridge corridor. Following the meeting, the PDT met to refine the alternative alignments suggested by the SAC. The PDT developed several additional alternatives.

State Park, Caltrans, and EDCTC were provided the alternatives for review and comment. The State Park provided comments on the proposed alternatives and offered additional alignment alternatives. Caltrans and EDCTC did not suggest any additional alignment locations.

Below is a brief description of the conceptual layouts (planning-level design) for each proposed alignment alternative shown on Figure 4-1.

4.2.2.1 Alignment Alternatives (2015)

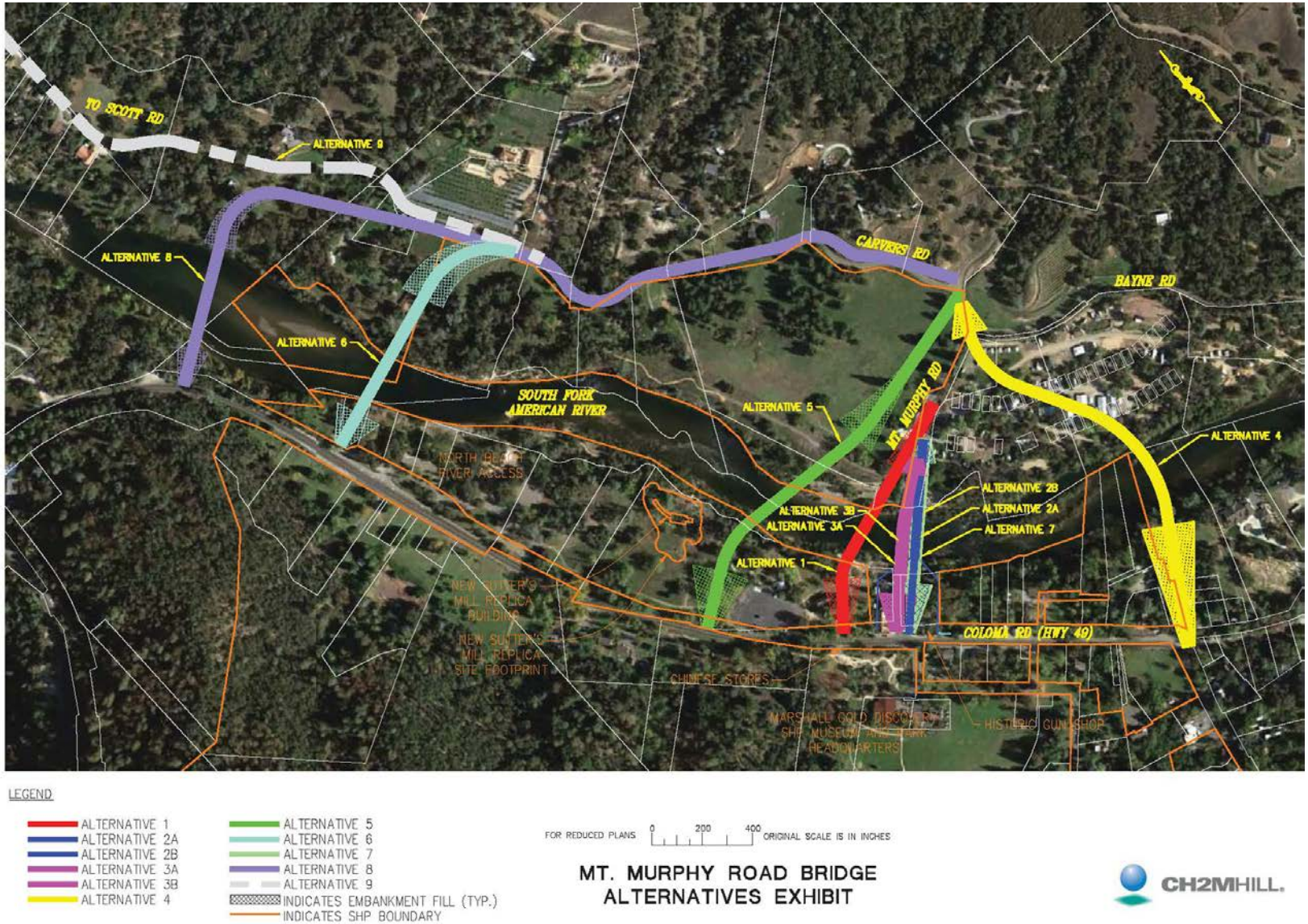
Alternative 1: This alignment would construct a new intersection with SR 49 and would cross the river at a skew and connect to Mt. Murphy Road just past the entrance to Coloma Resort. The southern approach for this alternative would pass through the existing location of the reconstructed Sutter's Mill. This alignment would require acquisition of State Park property. The existing bridge would be removed after construction of the new bridge unless non-HBP funding could be found to maintain the existing bridge for pedestrian use.

Alternative 2A: Alternative 2A assumes replacement on the existing alignment of the Mt. Murphy Road Bridge. This alignment would require widening and safety improvements to the existing SR 49 intersection. The existing bridge would be removed once the temporary bridge is in place. This alternative requires removal of the Grange building and construction of a temporary bridge on the downstream side of the existing alignment to maintain traffic during construction to avoid a lengthy detour route. A replacement Grange building would be constructed elsewhere to be determined at a later date.

Alternative 2B: Alternative 2B is a minimum width version of Alternative 2A and was generated based on standard minimum lane, shoulder, and sidewalk widths to minimize the bridge and roadway width and associated impacts to existing facilities. This alignment would require widening and safety improvements to the existing SR 49 intersection. The pedestrian walkways would be separated from the bridge at the southern approach and supported on smaller pedestrian bridges so that it does not affect the Grange building or Bekeart's Gun Shop.

Alternative 3A: The alternative starts from SR 49 immediately adjacent to the east side of the existing Grange building and would attempt to maintain a minimum width parking lot driveway between Mt Murphy Road and the Grange building using a combination of fill slopes and earth-retaining structures. The alignment would require a slight shift and safety improvements to the existing SR 49 intersection. The bridge would cross the river parallel to the existing bridge and connect with Mt. Murphy Road at the entrance to Coloma Resort. The existing bridge would be removed and a replacement Grange building would be constructed elsewhere to be determined at a later date.

Figure 4-1. Alternatives Exhibit from Alternatives Analysis Report



Alternative 3B: Alternative 3B is the minimum width version of Alternative 3A. This alternative would provide more space for the adjacent Grange building and Bekeart's Gun Shop than Alternative 3A.

Alternative 4: This is an is an upstream alignment alternative. This alignment would create a four-way intersection at SR 49 and would impact multiple parcels on both sides of the river, as well as the Coloma Resort property. The alignment would be curved to stay out of the State Park boundary. The alternative would require fill slopes and earth-retaining structures to mitigate impacts to property access and use. The existing bridge would be removed after construction of the new bridge unless non-HBP funding can be found to maintain the existing bridge for pedestrian use.

Alternative 5: Alternative 5 is a downstream alignment starting from SR 49 and would include a new intersection with SR 49 adjacent to the parking lot for the reconstructed Sutter's Mill. The new bridge would cross the river and turn north in order to tie into the intersection at Carvers Road and Mt. Murphy Road. This alternative would require:

- Re-alignment of the adjacent river trail to allow for construction of a new roadway along the north side of the river, and
- Construction of a new roadway along the north side of the SFAR and parallel to Mt. Murphy Road before connecting at the intersection of Carvers Road and Mt. Murphy Road. This alternative would require property acquisition from the State Park on both sides of the SFAR.

This alternative would avoid impacts to the reconstructed Sutter's Mill. The existing bridge would be removed after construction of the new bridge unless non-HBP funding can be found to maintain the existing bridge for pedestrian use.

Alternative 6: Alternative 6 is a downstream alignment starting from SR 49 adjacent to North Beach. This alternative would include a new intersection with SR 49, cross the SFAR and the Levee Trail before connecting to Carvers Road. A segment of Carvers Road from where the bridge connects on the north side of the SFAR to the intersection with Mt. Murphy Road would require significant geometric improvements. This alternative would be designed to avoid physical impacts to the North Beach SFAR access and picnic areas, but requires property acquisition from the State Park on both sides of the SFAR. The existing bridge would be removed after construction of the new bridge unless non-HBP funding can be found to maintain the existing bridge for pedestrian use.

Alternative 7: Alternative 7 consists of bridge replacement on existing alignment and assumes a staged construction approach to maintaining traffic. This alternative would require widening and safety improvements to the existing SR 49 intersection. The existing bridge would carry traffic during construction of a portion of the new bridge in Stage 1. In Stage 2, traffic would be shifted from the existing bridge to the portion of new bridge constructed in Stage 1 prior to removal of the existing bridge and construction of the remaining portion of new bridge. This alternative would encroach on the existing driveway for the Grange and a new driveway on the opposite side of the Grange would be needed.

Alternative 8: Alternative 8 is a downstream alternative that is completely outside of the State Park boundary. This alternative extends Carvers Road west before turning south, crossing perpendicular to the river, and connects to SR 49. The purpose of this alternative is to provide a

river crossing downstream of the North Beach river access and picnic areas and outside the State Park boundary, however this alternative has the longest span and requires extensive improvements to Carvers Road with numerous ROW impacts. The existing bridge would be removed after construction of the new bridge unless non-HBP funding can be found to maintain the existing bridge for pedestrian use.

Alternative 9: Alternative 9 is a no-bridge-replacement alternative. This alternative involves connecting Carvers Road and Scott Road. The two roads do not currently connect and neither meet current design standards for two lane roads. This alternative would provide another connection to Marshall Road from Mt. Murphy Road. This option was investigated during the bridge replacement feasibility study phase of the Project as an option to avoid replacement of the existing Mt. Murphy Road Bridge. The existing bridge would be removed after construction of Scott Road extension unless non-HBP funding can be found to maintain the existing bridge for pedestrian use.

The PDT assigned a score of 1 to 5 to each criterion (in each category) based on the performance measure defined for a particular criterion. The score for each category is the sum of the scores for all criteria within each category with best possible score being 110 (Table 4-5).

Table 4-5. Mt. Murphy Road Screening Criteria from Alternatives Analysis Report

Criteria	Alt 1	Alt 2A	Alt 2B	Alt 3A	Alt 3B	Alt 4	Alt 5	Alt 6	Alt 7	Alt 8	Alt 9
Historic and Cultural	7.0	6.0	6.0	9.0	9.0	11.0	7.0	13.0	8.0	15.0	15.0
Community Character	11.0	14.0	13.0	14.0	14.0	8.0	8.0	7.0	14.0	5.0	4.0
Access and Operations	2.0	4.0	6.0	6.0	6.0	6.0	6.0	7.0	4.0	8.0	6.0
Construction	14.0	10.0	10.0	13.0	13.0	12.0	16.0	15.0	9.0	14.0	12.0
Safety	15.0	15.0	12.0	15.0	12.0	12.0	15.0	17.0	15.0	14.0	8.0
Environmental Resources	11.0	15.0	15.0	15.0	15.0	5.0	9.0	6.0	15.0	3.0	3.0
ROW	7.0	9.0	9.0	7.0	7.0	6.0	7.0	4.0	9.0	6.0	6.0
Project Alternative Estimate	3.0	3.0	3.0	3.0	3.0	1.0	3.0	3.0	3.0	3.0	1.0
TOTAL SCORE (Perfect Score = 110)	**70.0**	**76.0**	**74.0**	**82.0**	**79.0**	**61.0**	**71.0**	**72.0**	**77.0**	**68.0**	**55.0**

The scores and results were presented and discussed with the SAC at the final meeting. Alternatives 1, 4, 5, 8, and 9 were lower performing alternatives and for more than one reason scored very poorly against the criteria. Based on these results, the PDT recommended that those alternatives be dropped from further consideration.

During further discussion, the members of the SAC commented that Alternatives 2, 3, and 7 should be the same corridor and Alternatives 1 and 5 should be included as a corridor. There was concern that Alternatives 1, 5, and 6 were only one point different in total score and should be considered further. The County presented this recommendation to the SAC at the third and final meeting and agreed to include the following corridors in the next phase of the project:

- Corridor 1: Existing alignment Alternatives 2A, 2B, and 7
- Corridor 2: Alternatives 3A and 3B

- Corridor 3: Alternative 6

Following the identification of the three corridors (in some cases, groupings of alternatives within one general corridor) for further investigation, the PDT developed preferred alignments for the three selected corridors so a more focused study of environmental issues and costs could be performed. Figure 4-2 shows each corridor that was selected for further development and the following sections provide a description and design detail on the three corridors.

4.2.2.2 Corridors

Corridor 1: Corridor 1 provides an alternative that replaces the existing bridge on a similar alignment. This corridor has several options for constructing a new bridge on the same alignment or immediately adjacent using different construction methods.

Construction would be completed in stages using the existing bridge to maintain traffic during construction. Stage 1 would construct one-half of the new bridge upstream or downstream of the existing bridge while maintaining traffic using the existing bridge. Stage 2 would shift traffic to the constructed portion of the new bridge, remove the existing bridge, and construct the remainder. Stage 3 would connect the portions of the new bridge constructed in Stages 1 and 2 prior to opening the full width of the bridge to traffic. During Stage 2 construction, there is an option to remove the existing bridge from the current location and place the existing steel truss span at an alternate location (to be determined) to preserve a portion of the existing structure.

This alignment would require widening and safety improvements to the existing SR 49 intersection. The proposed alignment would encroach on the existing driveway for the Grange and a new driveway on the opposite side of the Grange would need to be provided.

Corridor 2: Corridor 2 is located downstream starting from SR 49 and would include a new intersection with SR 49 adjacent to the parking lot for the reconstructed Sutter's Mill. The new bridge would cross the river and turn north in order to tie into the intersection at Carvers Road and Mt. Murphy Road. This corridor would require:

- re-alignment of the adjacent river trail to allow for construction of a new roadway along the north side of the SFAR, and
- construction of a new roadway along the north side of the SFAR and parallel to Mt. Murphy Road before connecting at the intersection of Carvers Road and Mt. Murphy Road.

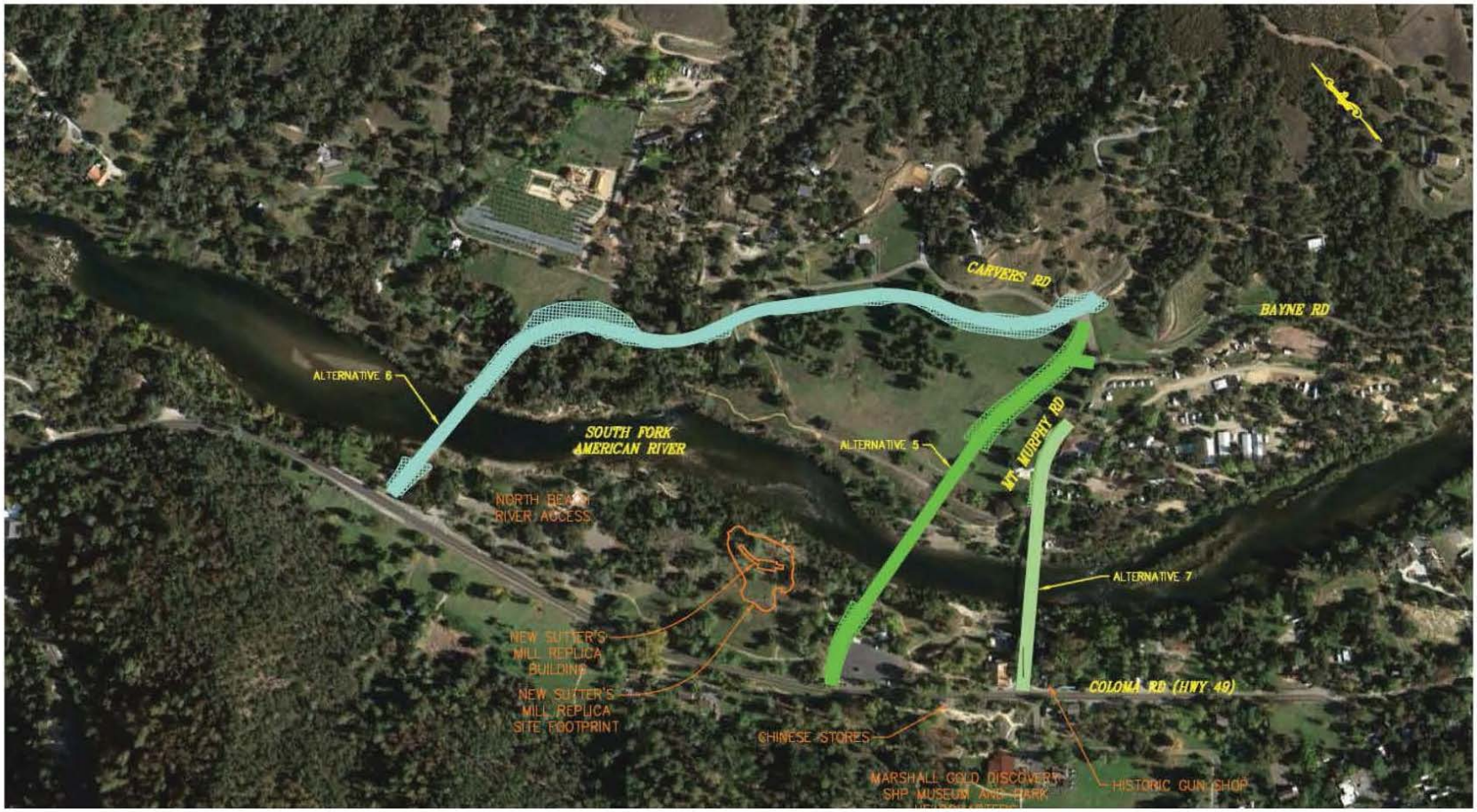
ROW would be required from the State Park on both sides of the SFAR. This corridor would avoid physical impacts to the reconstructed Sutter's Mill. This corridor crosses the Gold Discovery Loop Trail and the pedestrian paths between the parking lot and the reconstructed Sutter's Mill. The existing bridge would be removed after construction of the new bridge unless non-HBP funding can be found to maintain the existing bridge for pedestrian use.

During the majority of construction traffic would be maintained along existing Mt. Murphy Road and bridge. The new intersection of Bayne Road/Mt. Murphy Road would be designed in such a way that construction can occur with no impacts to traffic. The cul-de-sac construction at SR 49, Bayne Road, Old Mt. Murphy Road, and Carvers Road would require minor, intermittent, traffic-control measures.

Figure 4-2. Alignment Corridors

Mt. Murphy

Corridor 1: On Exising Alginment (Alt 7)
Corridor 2: Downstream Existing (Alt 5)
Corridor 3: Downstream North Beach (Alt 6)



Corridor 3: This alignment would include a new intersection with SR 49 meeting State and local safety standards, and cross the SFAR and the Levee Trail before connecting to Carvers Road. A segment of Carvers Road from where the bridge connects on the north side of the SFAR to the intersection with Mt. Murphy Road would require significant geometric improvements. This alternative would be designed to avoid physical impacts to the North Beach river access and picnic areas, but would require ROW from the State Park on both the south and north side of the SFAR, as well as from private parcels also on the north side of the SFAR. On the north side of the SFAR, existing Carvers Road would be re-aligned to intersect with the new alignment of Mt. Murphy Road to accommodate challenges with steep grades along Carvers Road. The existing bridge would be removed after construction of the new bridge unless non-HBP funding can be found to maintain the existing bridge for pedestrian use.

During the majority of construction traffic would be maintained along existing Carvers Road and Mt. Murphy Road and bridge. The realignment of Mt. Murphy Road would use a portion of the existing Carvers Road alignment. Mt. Murphy Road would likely be built in two phases, with construction of a portion of the northbound lane and southbound lane and shoulder being constructed first. Grade adjustments of approximately 1 to 3 feet are anticipated, which would facilitate a two-phase construction approach. A minimum 20-foot width would be constructed in the first phase to allow traffic to be shifted and the remainder of Mt. Murphy Road constructed in the second phase. The new intersection of Carvers Road/Mt. Murphy Road can be designed in such a way that construction will largely occur with no impacts to traffic. Due to expected grade adjustments at the Old Mt. Murphy Road/Mt. Murphy Road intersection, this construction would likely require a temporary detour of the intersection. Bayne Road, Old Mt. Murphy Road, and Carvers Road would require minor, intermittent, traffic-control measures.

The 2015 Alternatives Analysis Report conclude by recommending that Corridors 1, 2, and 3 be advanced for further design and analysis to determine specific impacts and mitigation, evaluating the most economical bridge type and consider bridge aesthetics that satisfy the interests of the community and stakeholders, and to determine a preferred alternative for environmental clearance and to carry forward into final design.

4.2.3 Alternatives Feasibility Study, 2016

In 2016 the County prepared the Alternatives Feasibility Study as a technical study of the alternatives (corridors) considered for evaluation in the environmental process of the Mt. Murphy Bridge Replacement Project (Project). The study focuses on the feasibility (viability) of the alternatives as it pertains to funding, design practices, right-of-way impacts, environmental impacts, and cultural/historical impacts as compared to the Project objectives of:

Objective 1:

To replace a structurally deficient and functionally obsolete bridge and reconstruct the roadway approaches to satisfy good design practices and improve safety for users of the facility.

This objective includes the following elements:

a. Objective 1a: Effectiveness of the proposed solution to satisfy

good design practices in a solution consistent with the project funding requirements [Highway Bridge Program (HBP)].

b. Objective 1b: Construction cost and schedule effectiveness of the proposed solution.
c. Objective 1c: Feasibility of the proposed solution as it pertains to right-of-way impacts.

Objective 2:

Protect natural resources, including native oak trees, and the South Fork of the American River by selecting alignments that directly avoid or minimize impacts to these features to the extent feasible while producing environmental benefits where achievable.

Objective 3:

Protect cultural and historical resources and preserve the historic community identity by selecting alignments that directly avoid or minimize impacts to these features to the extent feasible while producing benefits where achievable.

The 2016 Alternatives Feasibility Study provides a detailed evaluation of Corridors 1, 2, and 3 to determine whether it is reasonable to include all corridors as part of a range of alternatives. Corridors 1, 2, and 3 as shown on Figure 4-1 described above are compared to the Project objectives.

4.2.3.1 Corridor 1

- Objective 1a
    - Corridor 1 would replace the structurally deficient and functionally obsolete Mt. Murphy Bridge with a solution that satisfies good design practices by utilizing the existing roadway alignment to minimize the required limits of work. The improvements proposed in Corridor 1 replace the Mt. Murphy Bridge with a solution that adheres to current design standards without extensive roadway approach improvements required by utilizing the existing alignment and satisfying good design practices. Additionally, the proposed solution of Corridor 1 contains improvements above the highwater mark (hydraulic required improvements), and contains minimal retaining walls or roadway structures to construct.
    - Corridor 1 would enhance safety for users of the facility without requiring additional improvements along the roadway approaches or tie-ins. Since Corridor 1 optimizes use of the existing alignment, impacts to adjacent infrastructure (such as trails, adjacent roadway, residents, etc.) as a consequence of improving the bridge facility can be minimized without compromising performance or safety of the proposed alignment.
    - Corridor 1 provides a solution that meets the requirements of HBP funding. The HBP program funding the project focuses expenditures on bridge improvements and as such, provides standards for roadway limits funded by the program. For an off-system roadway (similar to Mt. Murphy) the program stipulates a 400 ft limit for roadway approach improvements on either side of the bridge (800 ft total), or the minimum necessary to make the facility operable and consistent with current design standards. Corridor 1 provides a solution that adheres to these

requirements with roadway approach limits of less than 400 ft on either side of the bridge (approximately 150 ft approach on the South and 350 ft approach on the North). Additionally, the HBP program also stipulates goals on program expenses, based on Federal Highway Administration (FHWA) guidelines, towards roadway improvements (not to exceed 10% construction costs) and no improvements performed on state highways. For Corridor 1 estimated roadway expenditures are below 10% total construction costs and negligible impacts are anticipated to occur on State SR 49 as the proposed alternative utilizes the existing roadway and Mt. Murphy Road intersection infrastructure.

- Corridor 1 provides an effective and efficient solution that minimizes permanent impacts to residents that depend upon this bridge for access. Since Corridor 1 minimizes the required improvements to replace the existing bridge by utilizing the existing alignment, the construction schedule and costs can be minimized. Furthermore, by performing two-stage construction, residents can continue to utilize the existing alignment through construction. Once complete, the final configuration will also require minimal changes to conform to the proposed bridge.

- Objective 1b
  - Corridor 1 provides a solution that minimizes cost and schedule impacts. The improvements proposed in Corridor 1 replace the Mt. Murphy Bridge with a solution that minimizes costs and schedule.

- Objective 1c
  - Corridor 1 provides a solution that minimizes right-of-way (ROW) impacts. The improvements proposed in Corridor 1 replace the Mt. Murphy Bridge with a solution that has a minimal impact to ROW in both temporary and permanent acquisitions. Additionally, the ROW impacts associated with Corridor 1 minimize the impact areas in Caltrans ROW and State Parks land.

- Objective 2
  - Corridor 1 appears to have minimal impact areas, especially impacts to natural habitat or sensitive areas (i.e., Waters of the United States, WOUS). Since Corridor 1 utilizes the existing roadway alignment, most improvements will be performed in an existing developed area (roadway or adjacent shoulder), with very few features impacting natural habitat. This is also further illustrated by the minimal area of improvements required to replace the bridge. Corridor 1 has the least disturbance either permanent or temporary, tree and habitat removal areas, fills in WOUS, permit complexities during construction, and environmental costs (i.e., mitigation fees, tree removal, monitoring, etc.) of the three alternatives.
  - Corridor 1 appears have a minimal temporary or permanent impact to air quality. Since the limits of work and project improvements are minimized by utilizing the existing alignment, construction schedules should also be minimized. Similarly, detours or extensive staging efforts would be mitigated through the use of 2-stage construction. This would result in a minimal temporary or permanent impact to air quality as final traffic configurations will remain in their existing patterns. Furthermore, temporary impacts would be mitigated by the minimal grading and large equipment operations needed to construct Corridor 1. Since post project

alignment is also consistent with existing conditions, travel paths and emissions should also be unimpacted.

- Corridor 1 appears to have a minimal impact area in the floodway (high water mark). Since most of the proposed improvements in Corridor 1 appear to be located above the approximate highwater mark (with the exception of one (1) Pier 2), the impacts and work areas in the approximate floodway are limited and will likely be performed without significant access or impact to these sensitive areas.
- Corridor 1 appears to have a minimal impact on viewshed, traffic, bicycle, and pedestrian circulation. Since Corridor 1 utilizes the existing alignment, the viewshed, both for bridge users and travelers along SR 49 or Marshall Gold Discovery Park, as well as the existing traffic, bicycle, and pedestrian circulation performance, will be relatively unimpacted in the post project condition.

- Objective 3
  - Corridor 1 appears to avoid or minimize impacts to existing cultural and/or historical resources. Since Corridor 1 utilizes the existing roadway alignment, most improvements will be performed in an existing developed area, and is aligned with the bridge in the 1857 map. These improvements appear to avoid cultural and/or historical resources to neighboring buildings and sites. However, the existing Mt. Murphy Bridge will require removal and replacement.
  - Corridor 1 can be constructed without temporary or permanent disturbance to adjacent cultural and/or historical resources by implementing monitoring and vibration requirements during construction. Construction activities can be mitigated to help ensure vibration amplitudes are maintained within acceptable ranges. As described in the Project Vibration Study, most construction activities would not pose a threat to nearby cultural and/or historical resources. The Vibration Study recommends that vibratory pile driving and vibratory rollers be avoided. The use of vibratory pile drilling and vibratory rollers during construction of Corridor 1 (as based upon site soil conditions assumed and proximity to the closest nearby cultural resource), is anticipated to potentially generate vibration amplitude at the threshold for damages to old masonry structures. This finding can be mitigated by the structure and footing design (i.e., spread footing, drilled piles, etc.) and by requiring the contractor to perform extensive site investigation and monitoring during construction. These monitoring efforts may include placing monitoring devices nearby adjacent sensitive site locations (i.e., cultural resources) and imposing vibration amplitude requirements below damage thresholds. Alternatively, if during additional site investigations it is determined that maintaining the vibration amplitude below damaging thresholds cannot be reasonable accomplished, other design approaches with less invasive vibratory means of construction may be considered to help ensure safety of nearby cultural resources. Additionally, after construction improvements are complete, vibration considerations associated with nearby large truck traffic should not be of concern as the vibration amplitude for these trucks appears to be below the threshold that damages would occur for the site.
  - Corridor 1 does not appear to impact future potential realignments of SR 49 (i.e., "Coloma Bypass") based on ADT and traffic analysis. The "State Route 49

Realignment Study" performed by the El Dorado County Transportation Commission discusses the "Coloma Bypass" as an alternative not selected or analyzed based upon its inability to meet key project goals and have a far greater impact on resources (including environmental impacts). The study identifies the need to replace Mt. Murphy Bridge as an opportunity to fund one of the two bridges proposed in the alignment. This alternative has also been identified by State Parks as a preferred solution for realignment of State Route 49. The findings associated with the elimination of the "Coloma Bypass" as an alternative to consider in the potential realignment of SR 49 is also consistent with the Transportation Concept Report (TCR) for SR 49 performed by Caltrans. Based on ADT and traffic analysis the traffic volumes of Mt. Murphy Road are negligible compared to State Route 49; therefore, realignments of State Route 49 should be considered separate from Mt. Murphy Road Bridge Replacement.

Traffic counts performed along SR 49 and Mt. Murphy Road indicate that the majority of travelers along SR 49 are not users of Mt. Murphy Road. These findings are based on traffic studies (and traffic counts) performed by Caltrans and El Dorado County within the area for both peak weekday and peak weekend hours. The results indicate that approximately 5% to 7% of the traffic along SR 49 accesses Mt. Murphy Road during the peak hours of the weekday. This number increases slightly to approximately 13% to 22% during weekends, however, all cases appear to indicate that the travelers along Mt. Murphy Road only constitute a small fraction of the traffic utilizing SR 49. These findings also appear to be consistent when evaluating future growth (over the next 20 years), utilizing growth rates similar to those predicted by Caltrans in the traffic study prepared for the SR 49 Bridge Improvements performed in Coloma. As a consequence of these findings, it may be concluded that future potential realignment of SR 49 should be regarded separately from the Mt. Murphy Bridge Project.

4.2.3.2 Corridor 2

- Objective 1a
    - Corridor 2 would replace the structurally deficient and functionally obsolete Mt. Murphy Bridge with a solution that requires extended roadway approach improvements to include realignment of Bayne Road intersection and a new intersection at SR 49 and Mt. Murphy Road. While the improvements proposed in Corridor 2 include a bridge structure of similar geometrics to Corridor 1, the extensive roadway improvements may be deemed beyond those necessary to satisfy the best practices for design and outside the funding limits of the HBP program. The new alignment and intersection reconstructions are anticipated to exceed the 400 ft approach limits (800 ft total) of the HBP program funding the project. For Corridor 2, the approach roadway improvements are anticipated to amount to around 1,325 ft total and exceed the 10% roadway funding expenditures for the HBP program. It should also be noted that although a new intersection at Mt. Murphy Road and SR 49 is required, the solution of Corridor 2 is anticipated to need from very few to negligible improvements along SR 49 to accommodate the proposed intersection.

- Corridor 2 would improve safety for users of the bridge and intersection facilities with limited permanent impact to residents that depend upon the bridge for access. The proposed Corridor 2 improvements include replacing the existing bridge with a new bridge facility and approaches that meet current design standards and operational needs, thereby improving the safety of the facility's users. Furthermore, since these improvements would be constructed off-alignment, very few traffic closures or detours are anticipated.
- Corridor 2 utilizes good design practice in a solution that is substantially above the high-water mark and flood plain, and an alignment that while longer than the 800 ft length prescribed by the HBP program does not appear to require extensive retaining wall and roadway structures to construct.

- Objective 1b
  - The improvements proposed in Corridor 2 replace the Mt. Murphy Bridge with a solution that minimizes schedule; however, requires considerable roadway and bridge costs to construct. Corridor 2 requires over a $1 million more roadway construction costs and has the largest bridge and overall construction costs of the three alternatives. It should be noted, however, that cost savings may be seen in reducing the bridge and roadway widths (from 46 ft total width, 12 ft travel lanes, 5 ft shoulders, 6 ft sidewalks) to a geometry similar to Corridor 1 (32 ft total width, 12 ft travel lanes, 4 ft sidewalks).
- Objective 1c
  - The improvements proposed in Corridor 2 replace the Mt. Murphy Bridge with a new alignment solution that requires extensive ROW acquisition from State Parks to include substantial impact to Marshall Gold Discovery State Historic Park (MGDSHP).
- Objective 2
  - Corridor 2 appears to have considerable impact to natural habitat and some sensitive areas adjacent to and within floodplains or WOUS. Since Corridor 2 utilizes a new alignment in substantially undeveloped locations, the temporary and permanent disturbance areas are considerable. Moreover, these disturbance areas also include locations of sensitive habitat within and/ or adjacent to the floodplain. It is anticipated that Corridor 2 will have considerable tree and habitat removal areas, higher costs and schedule implications associated with the work activities, and permit complexities occurring in these areas.
  - Corridor 2 would likely have a potential temporary and permanent impact to air quality. Since Corridor 2 involves more grading and large equipment operations, and a proposed new alignment with a longer final travel path for vehicles, it is anticipated that the temporary and permanent impacts result in higher emissions and a greater impact to air quality.
  - Corridor 2 appears to have a potential impact on viewshed, as well as traffic, bicycle, and pedestrian circulation. Since Corridor 2 involves an "off-alignment" solution with an extended approach roadway, it should be anticipated that bicycle and pedestrian facilities will likely require some modification and extension to enhance circulation and continuity. It also appears the viewshed will be impacted

due to new bridge alignment as it is in close proximity to the old bridge infrastructure. Furthermore, the viewshed will likely be impacted by the approach roadway improvements along the natural, undeveloped areas of the South Fork of the American River.

- Objective 3
    - Corridor 2 appears to have the greatest direct impacts to existing cultural and/or historical resources. Since Corridor 2 involves a new proposed alignment in predominately undeveloped areas through the center of MGDSHP, it is likely to have the largest direct impact to existing cultural and historical resources. There is also a likely temporary and permanent impact Corridor 2 will have on recreational resources to include the rafting community and trail users as a result of impacts to the parking area adjacent the original Sutter Mill replica and impacts to Gold Discovery Loop Trail.
    - Corridor 2 does not appear to impact future potential realignments of SR 49 as Mt. Murphy Road provides negligible contribution to traffic along SR 49. The "State Route 49 Realignment Study" performed by the El Dorado County Transportation Commission discusses the "Coloma Bypass" as an alternative not selected or analyzed based upon its inability to meet key project goals and have a far greater impact on resources (including environmental impacts). The study identifies the need to replace Mt. Murphy Bridge as an opportunity to fund one of the two bridges proposed in the alignment. The findings associated with the elimination of the "Coloma Bypass" as an alternative to consider in the potential realignment of SR 49 is also consistent with the Transportation Concept Report (TCR) for SR 49 performed by Caltrans (for additional details refer to Appendix J). Based on ADT and traffic analysis, however, the traffic volumes of Mt. Murphy Road are negligible compared to SR 49; therefore, realignments of SR 49 should be considered separate from Mt. Murphy Road.

4.2.3.3 Corridor 3

- Objective 1a
    - While the improvements proposed in Corridor 3 include a bridge structure of a lesser span than the other alternatives, the roadway improvements of the proposed alignment are substantial. These improvements include extensive reconstruction of SR 49 of over 1,100 ft, to accommodate the new Mt. Murphy Road intersection which would require funding from other sources outside the HBP program. Similarly, the HBP program establishes approach roadway limits of 400 ft either side, or 800 ft total, for the project, which will be far exceeded with nearly a half mile (approximately 2,600 ft) of new, County roadway alignment, not including the approximately 1,122 ft of SR 49 that would require improvements Highway 49 improvements. Moreover, these improvements also greatly exceed the FHWA guidelines established for roadway expenditures in the HBP program which are not to exceed 10%. Corridor 3 roadway costs are estimated at $3.4 million for construction only for Mt. Murphy Road and approximately 1.2 million for the needed to raise SR 49 to conform with the new bridge. The Corridor 3 roadway costs are further amplified by the retaining wall improvements, drainage

improvements, and other roadway approach infrastructure required to accommodate the proposed alignment. By comparison the total Corridor 1 cost estimate is approximately $0.7 million

- Corridor 3 would require extensive structure and roadway improvements within the floodway. Corridor 3 lies predominately in a floodway and as a result has environmental impacts, hydraulic impacts, and requires grade correction to meet design standards.
- Corridor 3 provides a solution with temporary and permanent impacts to residents that depend upon the bridge for access. While Corridor 3 is an off-alignment alternative that can be constructed with very few traffic closures and detours on Mt. Murphy Road, the proposed changes along Carver Road and SR 49 are substantial and are anticipated to greatly impact users during construction. After project completion, the new alignment will also impact residents by extending travel paths and impacting circulation.

- Objective 1b
  - Corridor 3 proposes a solution with significant roadway costs (over 6 times the roadway costs of Corridor 1) to include approximately $1.2 million in SR 49 improvements that cannot be funded by the HBP program. Additionally, Corridor 3 is anticipated to have a longer construction schedule to perform the improvements. As a result, Corridor 3 contains a significant overall construction cost and schedule, with a relatively small bridge, and substantial roadway improvements.
- Objective 1c
  - Corridor 3 provides a solution with significant right-of-way (ROW) impacts. The improvements proposed in Corridor 3 utilize a new alignment with significant acquisition. The highest temporary and permanent ROW impacts of the three alternatives that requires State Parks, other private property owners, and extensive work to be completed on State Highway (Caltrans) ROW (See Appendix E).
- Objective 2
  - Corridor 3 appears to have significant impact areas especially to natural habitat and sensitive locations. Since the alignment utilized for Corridor 3 includes an extensive length of roadway approach improvements in undeveloped areas and is substantially along the South Fork of the American River, significant disturbance areas are anticipated. A significant amount of the alignment is also located within the floodway of the SFAR, further impacting sensitive habitat.
  - Corridor 3 appears to have the largest impact areas and activities within the floodway. Corridor 3 requires construction of both permanent and temporary improvements located within the floodway, impacting WOUS, including permanent placements of fill. Since access (i.e., temporary roads and staging areas) must be constructed for the piers and new alignment of the approach roadway, the impact areas within the floodway include temporary and permanent impacts. Additionally, extensive improvements are required for the new alignment along Carvers Road that include construction of retaining walls and roadway alignments

along the SFAR. These work areas within waterways and floodways will likely result in an extended construction schedule as work activities will not be permitted through the defined winter season.

- Corridor 3 appears to have the largest potential temporary and permanent impact to air quality. Since Corridor 3 involves the largest alignment changes and most extensive approach roadway improvements, it will also have the longest travel distances and highest increases in vehicle emissions for motorists after construction completes. Additionally, as a result of the extensive roadway improvements, Corridor 3 will likely have the longest construction schedule and require the highest usage of large equipment for grading and excavation. As a result of these increases in construction duration, equipment utilization, and extended traffic control operations, especially for improvements along SR 49, it is anticipated that Corridor 3 will also have the highest temporary emissions during construction of the Project.
- Corridor 3 appears to have the largest potential for temporary and permanent impacts on natural and sensitive habitat. Corridor 3 contains the largest apparent temporary and permanent impacts to natural habitat to include upland oak areas, riparian areas, and within the floodway. This is largely a consequence of a proposed new alignment through an undeveloped and predominately floodway area within the 100-year high water mark. Furthermore, Corridor 3 also has the largest overall improvement and disturbance areas.
- Corridor 3 appears to have the largest impact on viewshed, as well as traffic, bicycle, and pedestrian circulation. The proposed alignment for Corridor 3 includes an extended approach roadway that parallels the SFAR and results in a substantial area of development along the river. The resulting viewshed of travelers along SR 49 or from Marshall Gold Discovery Park will likely be impacted by the new roadway approach along the opposing river bank. This new alignment will likely also extend travel paths for residents and users of Mt. Murphy Road as well as interrupt the bicycle and pedestrian circulation that the current alignment accommodates.

- <u>Objective 3</u>
  - Corridor 3 appears to avoid most cultural/ historical resource impacts to Marshall Gold Discovery Park; however, it also appears to have an impact on recreational activities. Corridor 3 is located outside the limits of Marshall Gold Discovery Park; thereby avoiding most cultural/ historical resource impacts. The alignment may also impact recreational resources. The Corridor 3 alignment appears to directly impact an existing parking lot and portion of a picnic area frequently inhabited by rafters and recreational river users.
  - Corridor 3 appears to provide a solution consistent with the State Parks General Plan for a realignment of State Route 49 with a "Coloma Bypass.'' The "State Route 49 Realignment Study" performed by the El Dorado County Transportation Commission discusses the "Coloma Bypass" as an alternative not selected or analyzed based upon its inability to meet key project goals and have a far greater impact on resources (including environmental impacts). The study identifies the need to replace Mt. Murphy Bridge as an opportunity to fund one of the two

bridges proposed in the alignment. The findings associated with the elimination of the "Coloma Bypass" as an alternative to consider in the potential realignment of SR 49 is also consistent with the Transportation Concept Report (TCR) for SR 49 performed by Caltrans. Corridor 3 would be consistent with this "Coloma Bypass" alternative.

The 2016 Alternatives Feasibility Study concludes the following regarding the 3 corridor alternatives:

- Corridor 1 appears to clearly meet all project objectives, to include:
  - Supports Project Purpose and Need (project feasibility) to include:
    - Effectiveness at satisfying good design practices and meeting the project funding requirements (Objective 1a)
    - Construction cost and schedule effectiveness (Objective 1b)
    - Minimize right-of-way impacts (Objective 1c)
  - Protects natural and environmental resources by avoiding or minimizing impacts (Objective 2)
  - Protects cultural and historical resources by avoiding or minimizing impacts (Objective 3). Note that the removal of the existing Mt. Murphy Bridge is likely to be required for all alternative Corridors and may require mitigation.
- Corridor 2 Infeasibility: Corridor 2 is deemed infeasible due to the likely significance of cultural/ historical resource impacts. Corridor 2 not only has a considerable impact to environmental habitat, but also an apparent significant impact to cultural/ historical resources located in Marshall Gold Discovery Park. The Corridor 2 proposed alignment appears to impact park resources and natural lands in the center of Marshall Gold Discovery Park. There are a number of sensitive and significant cultural resources within the area of the alignment that would likely result in a direct and unacceptable impact, deeming Corridor 2 infeasible.
- Corridor 3 Infeasibility: Corridor 3 is infeasible due to the likely significance of the environmental impacts and extensive roadway and SR 49 improvements required (i.e., exceeds HBP funding limitations). Corridor 3 has significant impacts to environmental habitat but is also located predominately in the floodway. As a result, Corridor 3 has substantial temporary and permanent impacts. Additionally, Corridor 3 includes extensive roadway improvements to include significant grading, retaining walls, and reconstruction of SR 49 to accommodate the proposed new Mt. Murphy Road intersection. The anticipated cost impacts associated with the roadway improvements are beyond the apparent HBP and FHWA funding guidelines and requirements and SR 49 improvements will require funding from other sources outside the HBP program. As a result of the extensive environmental and right-of-way impacts, and the significant and likely unfunded roadway infrastructure improvements required, the proposed Corridor 3 solution is infeasible as an engineering solution for bridge replacement.

4.2.4 Structure Type Alternative Analysis Work Plan, 2017

The 2017 Structure Type Alternative Analysis Work Plan presents the fundamental constraints and key considerations that affect the evaluation of the replacement structure type. Based on this information, structure types that warrant further investigation at the advanced planning study level

were determined. The Work Plan provides a concise justification for the selection of each structure type to investigate, as well as the rationale for eliminating other structure types. Table 4-6 compares 9 structure types to the key Project considerations.

Based on the information presented in Table 4-6, three main-span structure types are recommended for further investigation during the advanced planning study. These structure types include a CIP concrete box girder bridge, a steel I-girder bridge with a composite concrete deck, and a steel truss bridge that is similar to the existing structure. The selected bridge types capture a wide range of structural function, economy, and aesthetic flexibility. The rationale for selecting these structure types is discussed below.

4.2.4.1 CIP Concrete Box Girder Bridge

The CIP concrete box girder bridge alternative offers flexibility to build the bridge in one or two construction stages. The staged construction approach will require two construction seasons, two columns at each support, and the one-time relocation of a water line. However, staged construction allows the public to utilize the existing structure during the first construction stage. In addition, the existing structure can support movement of small to medium sized construction equipment across the river, which may otherwise be challenging due to the geometric and serviceability conditions of the alternate access road.

Alternatively, the structure can be built in one stage during a single construction season. Single stage construction would require that the existing water line be relocated at least twice. The construction duration would likely extend into the wet season. The single stage option requires that a temporary bridge be installed to maintain public traffic during construction so that the existing structure can be removed. The single stage option would have larger environmental and ROW impacts to accommodate the temporary bridge. The impact footprint for the temporary bridge and approaches places construction much closer to the Bekeart's Gun Shop as well as crossing the SFAR, a sensitive resource. Installation and rental of a temporary bridge will likely be a significant cost to the project. Relocating the truss-span of the existing structure away from the final alignment and utilizing it as part of the temporary bridge may be feasible.

Table 4-6. Comparison Matrix for Structure Types Considered

Consideration	Structure Type							
	BOX				GIRDERS		OTHER STRUCTURE TYPES	
	CIP Box	CIP Segmental	Pre-Cast Segmental	Steel Box	Precast Concrete Girder	Steel Girder	Steel Truss	Steel Tied Arch
Construction Staging	*Single Stage -Requires temp bridge -Relocate waterline twice for one construction stage *Two Stages -Requires two columns -No temp bridge required - Relocate waterline once prior to start construction	*Single Stage -Requires temp bridge -Relocate waterline twice for one construction stage	*Single Stage -Requires temp bridge -Relocate waterline twice for one construction stage	*Single Stage -Requires temp bridge -Relocate waterline twice for one construction stage *Two Stages -Requires two columns -No temp bridge required - Relocate waterline once prior to start construction	*Single Stage -Requires temp bridge -Relocate waterline twice for one construction stage *Two Stages -Requires two columns -No temp bridge required - Relocate waterline once prior to start construction	*Single Stage -Requires temp bridge -Relocate waterline twice for one construction stage *Two Stages -Requires two columns -No temp bridge required - Relocate waterline once prior to start construction	*Single Stage -Requires temp bridge -Relocate waterline twice for one construction stage	*Single Stage -Requires temp bridge -Relocate waterline twice for one construction stage
Construction Duration	*Single Stage -One season possible (see Note 1) *Two Stage -Two seasons required	*One season possible (see Note 1)	*One season possible (see Note 1)	*Single Stage -One season possible (see Note 1) *Two Stages -Two seasons may be required	*Single Stage -One season possible (see Note 1) *Two Stages -One season may be possible	*Single Stage -One season possible (see Note 1) *Two Stages -One season may be possible	*Likely two seasons required	*Likely two seasons required
Falsework	*Required *Max falsework opening approx 90' *Falsework clearance over river	*Not Required	*Not Required	*Not Required	*Not required if girder launched *Temporary tower required if girders spliced in place	*Not Required	*Required *Max falsework opening approx 90' *Falsework clearance over river	*Not Required
Construction Trestle	*Partial length trestles -Crane access to north side of river -Construction equip on exist/temp bridge -25'-30' wide trestle required *Full length trestle	*Partial length trestles -Crane access to north side of river -Construction equip on temp bridge -25'-30' wide trestle required	*Partial length trestles -Crane access to north side of river -Construction equip on temp bridge -25'-30'	*Partial length trestles -Crane access to north side of river -Construction equip on exist/temp bridge -25'-30' wide	*Partial length trestles -Crane access to north side of river -Construction equip on exist/temp bridge -25'-30' wide trestle required	*Partial length trestles -Crane access to north side of river -Construction equip on exist/temp bridge -25'-30' wide trestle required *Full length trestle (optional) -No construction	*Partial length trestles -Crane access to north side of river -Construction equip on exist/temp bridge -25'-30' wide trestle required *Full length trestle	*Partial length trestles -Crane access to north side of river -Construction equip on temp bridge -25'-30' wide trestle required *Full length trestle (arch built off alignment)

Consideration	Structure Type							
	BOX				GIRDERS		OTHER STRUCTURE TYPES	
	CIP Box	CIP Segmental	Pre-Cast Segmental	Steel Box	Precast Concrete Girder	Steel Girder	Steel Truss	Steel Tied Arch
	-No construction equip on exist/temp bridge with pedestrians -Approx 15' wide trestle		wide trestle required	trestle required *Full length trestle -No construction equip on exist/temp bridge with pedestrians -Approx 15' wide trestle		equip on exist/temp bridge with pedestrians -Approx 15' wide trestle	-No construction equip on exist/temp bridge with pedestrians -Approx 15' wide trestle	-No construction equip on temp bridge -Approx 15' wide trestle
Belvedere	*Possible	*Possible with section variation	*Possible post installation	*Possible	*Possible	*Possible	*Not feasible on main span	*Not feasible on main span
Aesthetics Features	*Can haunch soffit *Decorative railing possible	*Can haunch soffit *Decorative railing possible	*Can haunch soffit *Decorative railing possible	*Cannot haunch soffit if launched *Can haunch soffit if lifted by crane *Weathering steel would fit historic environ *Decorative railing possible	*Not haunched *Less aesthetic flexibility *Decorative railing possible	*Cannot haunch soffit if launched *Can haunch soffit if lifted by crane *Weathering steel would fit historic environ *Decorative railing possible	*Maintains historic appeal *Weathering steel would fit historic environ *Decorative railing possible	*Maintains historic appeal *Weathering steel would fit historic environ *Decorative railing possible
Maintenance	*Low Maintenance -Biennial inspection -Occasional joint replacement -Deck rehab as needed	*Low Maintenance -Biennial inspection -Occasional joint replacement -Deck rehab as needed	*Low Maintenance -Biennial inspection -Occasional joint replacement -Deck rehab as needed	*Low Maintenance -Biennial inspection -Occasional joint replacement -Deck rehab as needed -Weathering steel low maintenance	*Low Maintenance -Biennial inspection -Occasional joint replacement -Deck rehab as needed	*Low Maintenance -Biennial inspection -Occasional joint replacement -Deck rehab as needed -Weathering steel low maintenance	*Medium Maintenance -Complex/Fracture critical inspections -Occasional joint replacement -Deck rehab as needed -Weathering steel low maintenance	*Medium Maintenance -Complex/Fracture critical inspections -Occasional joint replacement -Deck rehab as needed -Weathering steel low maintenance
Utility Relocations	*Water Line -Relocate once if two construction stages -Relocate twice if one construction stage *Overhead Electric	*Water Line -Relocate twice for one construction stage *Overhead Electric -Relocate once	*Water Line -Relocate twice for one construction stage *Overhead Electric -Relocate	*Water Line -Relocate once if two construction stages -Relocate twice if one construction	*Water Line -Relocate once if two construction stages -Relocate twice if one construction stage *Overhead Electric	*Water Line -Relocate once if two construction stages -Relocate twice if one construction stage *Overhead Electric -Relocate once prior to start construction	*Water Line -Relocated twice (truss built on alignment) *Overhead Electric -Relocate once prior to start construction	*Water Line -Relocated twice (arch built on alignment) *Overhead Electric -Relocate once prior to start construction

Consideration	Structure Type							
	BOX				GIRDERS		OTHER STRUCTURE TYPES	
	CIP Box	CIP Segmental	Pre-Cast Segmental	Steel Box	Precast Concrete Girder	Steel Girder	Steel Truss	Steel Tied Arch
	-Relocate once prior to start construction	prior to start construction	once prior to start construction	stage *Overhead Electric -Relocate once prior to start construction	-Relocate once prior to start construction			
Special Construction Considerations or Risks	*None *Increased local contractor familiarity	*Requires form traveler *Reduced local contractor familiarity	*Requires crane or gantry system *Reduced local contractor familiarity	*Transportation constraints require field splicing for main span (feasible) *Reduced local contractor familiarity	*Transportation constraints require field splicing for main span (complex) *Launching main span girders is complex operation *Splicing girders without launching requires large crane(s) & temporary river support	*Transportation constraints require field splicing for main span (simple) *Launching main span girders is complex operation *Splicing girders without launching requires large crane(s) or temporary river support *Increased local contractor familiarity	*Involved field assembly	*Requires back stays with temporary towers or counterweight (built on alignment) *Involved field assembly
Relative Approx. Cost	*$$	*$$$	*$$$	*$$$	*$$$	*$$	*$$$$	*$$$$ (See Note 4)

Notes

1) Single season construction duration would allow work on the new bridge to continue using the trestle during the wet season between river banks.

2) For alternatives that require a temporary bridge, it may be feasible to relocate and utilize the existing structure main span depending on clearance and load limitations and construction equipment weights (TBD).

3) For alternatives that require a full-length trestle or a temporary support in the river mid-channel, a geotechnical exploration will likely be required near the center of the channel.

4) The cost of the tied arch is considered a fatal flaw. Even though the cost of the truss is similar to the tied arch, the truss is still considered a potential structure type due to its ability to possibly offset historic mitigation needs.

Falsework columns are required in the river to construct the CIP concrete box girder bridge alternative. Falsework beams can span up to approximately 90-feet, thereby minimizing the number of temporary supports and impact to the river bed. Falsework can be designed to provide adequate clearance above the river for freeboard and recreational users.

A full-length or partial-length trestle(s) may be constructed downstream of the bridge depending on contractor preference. A full-length trestle is more expensive, though would offer increased access, facilitate movement of larger construction equipment to the north side of the river, and increase safety by segregating movement of construction equipment over the river from the public.

A CIP concrete box girder structure type can accommodate a variety of aesthetic features, including belvederes and a haunched soffit. Additional aesthetic treatments that are relatively inexpensive include installing decorative railing and using form liners to create a textured surface or formwork with intentional lines and shadow effects.

The CIP concrete box girder bridge structure type provides a low maintenance structure that requires a minimal level of repair during its service life (i.e., biennial inspections, occasional joint replacement, and deck rehabilitation as needed).

Local contractors are extremely familiar with building CIP concrete box girder bridges and this structure type provides a relatively economical solution for spanning over the river, whether the superstructure is prestressed or conventionally reinforced. Caltrans used this same structure type for the SR 49 bridge over the South Fork American River downstream in Lotus, which supports the feasibility of its application at the Mt. Murphy bridge site.

The CIP concrete box girder bridge alternative provides stage construction flexibility, allows use of the existing bridge during construction, does not require a full-length trestle, offers relatively inexpensive aesthetic possibilities, requires a minimal amount of maintenance, and provides an economical structure that is familiar to local contractors.

4.2.4.2 Steel I-Girder Bridge with Composite Concrete Deck

The steel I-girder bridge alternative offers flexibility to build the bridge in one or two construction stages. The staged construction approach will require two construction seasons, two columns at each support, and the one-time relocation of a water line. Staged construction allows the public to utilize the existing structure during the first construction stage. In addition, the existing bridge accommodates small to medium sized construction equipment across the river, which may otherwise be challenging due to the geometric and serviceability conditions of the alternate access road.

While a steel I-girder structure could be built in one stage during a single, long construction season, construction would extend into the wet season. The temporary bridge would either be installed in the wet season or removed in the wet season in order to maintain public traffic while the existing structure is removed. Installation and rental of a temporary bridge will likely be a significant cost to the project. Single stage construction requires that the water line is relocated twice. Relocating the truss-span of the existing structure away from the final alignment and utilizing it as part of the temporary bridge may be feasible.

Falsework columns are not required in the river to construct the steel girder bridge alternative. This minimizes impacts to the SFAR bed and aquatic recreational users. Full length girders cannot

be delivered to the project site. Partial length girder must be spliced in the field which requires a larger staging or laydown yards to accommodate the steel members than other alternatives. The contractor could construct a temporary mid-channel support tower in the SFAR if the contractor elects to splice the steel girders after lifting the girders into the final position. If a temporary mid-channel tower is not used, the contractor would splice the girders on site and launch the girders into the final position or the contractor could use a full- length trestle to splice the girders and lift the girders with larger cranes. Fewer contractors have experience with the complex procedure of launching girders.

A full-length or partial-length trestle(s) may be constructed depending on contractor preference. A full- length trestle is more expensive, though would offer increased access, facilitate movement of larger construction equipment to the north side of the river, and increase safety by segregating movement of construction equipment over the river from the public. The full-length trestle option is more likely if the contractor elects to splice the girders on the trestle or if the contractor chooses to construct a temporary tower to support the steel girders prior to splicing.

This structure type can accommodate a variety of aesthetic features, including belvederes and haunched girders. The inclusion of these features will impact the bridge design. The steel girders must be designed for the eccentric overhang loading from the belvederes. In addition, the girders cannot be launched if the bottom of the girder is haunched. Haunched girders require either a temporary splicing tower and/or a full-length trestle. Additional aesthetic treatments that are relatively inexpensive include providing weathering steel to promote a rustic appearance, installing decorative railing, and using form liners or formwork to create textured surfaces or intentional lines along the concrete deck overhang.

The steel girder bridge alternative provides a low maintenance structure that requires a minimal level of repair during its service life (i.e., biennial inspections, occasional joint replacement, and deck rehabilitation as needed) as long as the steel girders and diaphragms are fabricated from weathering steel which does not require painting maintenance.

Local contractors are familiar with building steel girder bridges and this structure type provides a relatively economical solution for spanning over the river.

The steel girder bridge alternative provides stage construction flexibility and allows use of the existing bridge during construction. This bridge type does not necessarily require a full-length trestle, does not require falsework, offers relatively inexpensive aesthetic possibilities (although not as aesthetically flexible as the CIP concrete box girder), requires a minimal amount of maintenance if weathering steel utilized, and provides an economical structure that is familiar to local contractors. For these reasons, this structure type warrants further investigation during the advanced planning study.

4.2.4.3 Steel Truss Bridge with Concrete Deck

The steel truss bridge alternative must be erected in one stage, likely over two construction seasons. The water line would be relocated twice. The single construction stage requires the existing structure be removed and a temporary bridge installed to maintain public traffic during construction. Installation and rental of a temporary bridge will likely be a significant cost to the project. Relocating the truss-span of the existing structure away from the final alignment and utilizing it as part of the temporary bridge may be feasible.

Falsework columns are required in the SFAR to construct the steel truss bridge alternative. Falsework beams can span up to approximately 90-feet, thereby minimizing the number of temporary supports and impact to the river bed. Falsework can be designed to provide adequate clearance above the river for freeboard and recreational users.

A full-length or partial-length trestle(s) may be constructed depending on contractor preference. A full-length trestle is more expensive, though would offer increased access, facilitate movement of larger construction equipment to the north side of the river, and increase safety by segregating movement of construction equipment over the river from the public.

This structure type provides the ability to replace the existing 'bridge with a similar structure that maintains the truss-type bridge appearance. In addition, the steel truss members can be fabricated from weathering steel to promote a rustic presence with minimal impact to the cost of the bridge. Including other aesthetic features such as belvederes is not feasible for this structure type as the sidewalk must fit between the trusses. Additional aesthetic treatments that are relatively inexpensive include decorative railing or textured deck surfaces.

The steel truss bridge alternative requires an elevated level maintenance and repair during its service life. The steel truss is a fracture critical structure that requires special inspection. Occasional joint replacement and deck rehabilitation will be needed. The steel truss can be fabricated from weathering steel, thereby avoiding maintenance cost of repainting steel members.

Local contractors are familiar with building steel structures, though truss type bridges are not common. This structure type will likely cost more than the other alternatives.

The steel truss bridge alternative does not necessarily require a full-length trestle, provides a similar truss-type main-span of the existing structure, and requires a medium level of maintenance. This structure type warrants further investigation during the advanced planning study to encompass a wide range of structure types and project solutions.

4.2.4.4 Other Structure Types Not Selected

Five other main-span structure types listed in Table 4-6 were not recommended for further investigation. These structure types include CIP and precast concrete box girder bridges segmentally erected, a steel box girder bridge, a precast concrete girder bridge, and a steel tied arch bridge. As shown in Table 4-6 and described below, there are a variety of reasons that these structure types are not recommended for further investigation.

Local contractors are generally not familiar CIP and precast concrete box girder bridges erected by segmental construction. The cost and complexity of the segmental erection operations, which require specialized equipment such as form travelers and gantry cranes, creates a significant cost and constructability risk.

Steel box girders are heavier than the steel I-girder option discussed above. They require larger cranes or more complex launching procedures than the I-girders and may not be as efficient if the bridge is constructed in two stages. Local contractors are generally not familiar with this type of structure. Consequently, there is a significant cost and constructability risk associated with this type of structure.

Use of precast concrete girders is governed by the size of girder that can be transported to the project site, limited by the length and weight of the girder or girder pieces. Delivering a girder that

can clear span the river channel is not feasible. The girders would have to be delivered in segments and spliced in the field. Field splicing concrete girders would require large cranes and a mid-channel temporary tower to support the girders during splicing, or a full-length trestle. Alternatively, launching the girders after splicing will impact the girder design due to temporary loading conditions on the girders during launching. In addition, launching the girders is a complex operation and local contractors are generally not familiar with this operation, which creates a significant risk associated with constructing this type of structure.

Steel tied arch structures are fracture critical and thus require an elevated level of inspection. A belvedere located along the main span is not feasible for this structure type. Construction of a steel tied arch bridge will likely take two construction seasons and requires a back-stay with temporary towers or counterweights. The erection procedure is complex and local contractors are generally not familiar with this operation. Consequently, there is a significant cost and constructability risk associated with this type of structure.

4.2.5 Structure Advanced Planning Study (APS), 2018

The primary objective of the APS for the Mt. Murphy Road Bridge project is to consider potential structure types for the replacement bridge and ultimately select and further develop a preferred alternative that will be carried into final design. The design criteria that governed the development of the structure type evaluation for the Mt. Murphy Road Bridge is listed below.

Hydraulic Criteria: The hydraulic requirements applied in the APS for the Mt. Murphy Road Bridge were developed in the Location Hydraulic Study. This design flow was measured from a 1997 flood event, which exceeded the 100-year return flood with an estimated 90,000 cfs flood profile. The design flow from 1997 event is the maximum flood on record and controls the hydraulic design of the bridge. Hydraulic modeling compared the flood water surface elevations for the existing structure, a 365-foot 3- span structure, a 445-foot 3-span structure, and a 545-foot 3-span structure. The results of this study found that the 445-foot structure had the least change when compared with existing conditions. The goal of the hydraulic modeling was to confirm that the proposed bridge would have little to no impact on the water surface elevations for the design flood event when compared to the existing structure, which performed adequately during the design flood event.

Geotechnical Criteria: A geotechnical investigation was carried out between December 6 and December 13, 2017. The work included five soil borings to depths ranging from 11.5 feet to 80.2 feet below ground surface, and one asphalt coring to a depth of 2.0 feet below ground surface. The Caltrans Online Acceleration Response Spectra (ARS) Tool was employed, in conjunction with the soil profile information from the Log of Test Borings, to generate a design ARS curve for the Mt. Murphy Road Bridge.

As discussed above, the 2017 Structure Type Alternative Analysis Work Plan (CH2M 2017) identified eight potential structure types that were initially considered with respect to key project considerations and recommended three structure types for further investigation. These structure types include a CIP concrete box girder, built-up steel plate girders with composite concrete deck, and a steel truss with concrete deck and steel girder approach spans. The CIP concrete box girder and the steel plate girder alternatives may be constructed in one or two construction stages, while the steel truss alternative must be erected in a single stage since there are only two main truss members. The bridge span configuration and overall substructure approach are consistent for all three structure alternatives. The following narrative summarizes the analysis performed for the

selected alternatives to confirm feasibility of each structure type and ultimately select a preferred structure type.

Structure type alternatives are assessed by comparing the relative impact of each structure type on a variety of project considerations, such as construction staging, construction schedule, construction cost, Right-of- Way impact, environmental impacts, and other project constraints. A comprehensive discussion for each of the more complex considerations is presented below and summarized in Table 4-7 for each alternative.

4.2.5.1 Construction Staging

The CIP concrete box girder and the steel plate girder alternatives may be constructed in one or two construction stages, while the steel truss option must be constructed in a single-stage since there are only two main truss members.

The single-stage construction approach requires installation of a temporary bridge upstream of the existing structure to maintain traffic during construction of the new bridge along the existing alignment. The span configuration used for the temporary bridge is similar to the existing structure. The temporary bridge must be installed prior to removal of the existing bridge and is needed for both vehicular and pedestrian traffic. The existing water line on the bridge must be temporarily relocated away from the existing structure, perhaps supported by the temporary bridge, prior to removal of the existing bridge. After construction of the replacement structure is complete, the temporary bridge can then be disassembled and removed from the project site.

The two-stage construction method allows the existing bridge to remain in service until the first stage of the new structure is built on the downstream side of the project. The existing bridge is then removed, and the second stage of the replacement bridge is constructed on the upstream side of the first stage structure. The water line does not need relocated multiple times since the water line may be relocated from the existing structure to the inside of the first stage of the replacement bridge at the end of stage one construction.

Both construction methods allow the overhead electrical line on the downstream side of the bridge to be relocated once prior to commencing construction. The construction staging approach impacts a variety of other project considerations, including but not limited to construction duration and public safety.

4.2.5.2 Constructability Considerations

Contractor Familiarity

Numerous CIP concrete box girder bridges have recently been built in the region and local contractors are very familiar with constructing this structure type. There are a number of steel plate girder bridges in California, though new structures of this type are seldom constructed in the state, so contractors are considered to be moderately familiar with this construction technique. Local contractors are experienced with installing prefabricated steel trusses but are less familiar with construction of large steel truss bridges on site.

Table 4-7. Structure Type Comparative Assessment Summary

Consideration		Structure Type: CIP Box Girder – Single Stage Construction	CIP Box Girder – Two Stage Construction	Steel Girder – Single Stage Construction	Steel Girder – Two Stage Construction	Steel Truss – Single Stage Construction
Construction Staging		*Requires temp bridge *Requires two water line relocations	*Requires two columns *No temp bridge required	*Requires temp bridge *Requires two water line relocations	*Requires two columns *No temp bridge required	*Requires temp bridge *Requires two water line relocations
Construction	Special Construction Considerations	*None *Increased local contractor familiarity	*None *Increased local contractor familiarity	*Transportation constraints require field splicing for main span *Launching main span girders is complex operation (increased cost) *Splicing girders without launching requires large crane(s) or temporary support *Splicing increases construction costs due to increased labor efforts *Moderate local contractor familiarity	*Transportation constraints require field splicing for main span *Launching main span girders is complex operation (increased cost) *Splicing girders without launching requires large crane(s) or temporary river support *Splicing increases construction costs due to increased labor efforts *Moderate local contractor familiarity	*Involved field assembly (increased cost)
Construction	Falsework	*Required *Max falsework opening approx 90' *Falsework clearance over river	*Required *Max falsework opening approx 90' *Falsework clearance over river	*Not Required	*Not Required	*Required *Max falsework opening approx 90' *Falsework clearance over river
Construction	Construction Trestle	*Full length trestle -No construction equip on exist/temp bridge with pedestrians -Approx 15' wide trestle -Need clearance for aquatic recreation *Partial length trestles (optional, but unlikely) -Crane access to north side of river -Construction equip on exist/temp bridge -25'-30' wide trestle required	*Full length trestle -No construction equip on exist/temp bridge with pedestrians -Approx 15' wide trestle -Need clearance for aquatic recreation *Partial length trestles (optional, but unlikely) -Crane access to north side of river -Construction equip on exist/temp bridge -25'-30' wide trestle required	*Full length trestle -No construction equip on exist/temp bridge with pedestrians -Approx 15' wide trestle -Need clearance for aquatic recreation *Partial length trestles (optional, but unlikely) -Crane access to north side of river -Construction equip on exist/temp bridge -25'-30' wide trestle required	*Full length trestle -No construction equip on exist/temp bridge with pedestrians -Approx 15' wide trestle -Need clearance for aquatic recreation *Partial length trestles (optional, but unlikely) -Crane access to north side of river -Construction equip on exist/temp bridge -25'-30' wide trestle required	*Full length trestle -No construction equip on exist/temp bridge with pedestrians -Approx 15' wide trestle -Need clearance for aquatic recreation *Partial length trestles (optional, but unlikely) -Crane access to north side of river -Construction equip on exist/temp bridge -25'-30' wide trestle required
Schedule		*Two seasons likely (see Note 1)	*Two seasons required	*Two seasons likely (see Note 1)	*Two seasons likely	*Two seasons required
Aesthetics	Features	*Can haunch soffit *Decorative railing, lighting, plaque, and entry portal possible	*Can haunch soffit *Decorative railing, lighting, plaque, and entry portal possible	*Cannot haunch soffit if launched *Can haunch soffit if lifted by crane *Weathering steel would fit historic environment *Decorative railing, lighting, plaque, and entry portal possible	*Cannot haunch soffit if launched *Can haunch soffit if lifted by crane *Weathering steel would fit historic environment *Decorative railing, lighting, plaque, and entry portal possible	*Maintains historic appeal *Weathering steel would fit historic environ *Decorative railing, lighting, plaque, and entry portal possible
Aesthetics	Vista Points	*Possible at ends and at piers	*Possible at ends and at piers	*Possible at ends and at piers	Possible at ends and at piers	*Not feasible at piers, only at ends
Traffic Management and Equipment Access		*Full length trestle requires no special considerations: -Construction equipment uses trestle	*Full length trestle requires no special considerations: -Construction equipment uses trestle	*Full length trestle requires no special considerations: -Construction equipment uses trestle	*Full length trestle requires no special considerations: -Construction equipment uses trestle	*Full length trestle requires no special considerations: -Construction equipment uses trestle -Traffic and Peds use temp bridge

Consideration	Structure Type				
	CIP Box Girder		Steel Girder		Steel Truss
	Single Stage Construction	Two Stage Construction	Single Stage Construction	Two Stage Construction	Single Stage Construction
	-Traffic and Peds use temp bridge *Partial length trestle requires: -A temp bridge that accommodates construction equipment -Separation between pedestrians and vehicles *Use of existing bridge as temp bridge would require a closure	-Traffic and Peds use temp bridge *Partial length trestle requires: -A temp bridge that separates pedestrians	-Traffic and Peds use temp bridge *Partial length trestle requires: -A temp bridge that accommodates construction equipment -Separation between pedestrians and vehicles *Use of existing bridge as temp bridge would require a closure	-Traffic and Peds use temp bridge *Partial length trestle requires: -A temp bridge that separates pedestrians	*Partial length trestle requires: -A temp bridge that accommodates construction equipment -Separation between pedestrians and vehicles *Use of existing bridge as temp bridge would require a closure
Maintenance	*Low Maintenance -Biennial inspection -Occasional joint replacement -Deck rehab as needed	*Low Maintenance -Biennial inspection -Occasional joint replacement -Deck rehab as needed	*Low Maintenance -Biennial inspection -Occasional joint replacement -Deck rehab as needed -Weathering steel low maintenance	*Low Maintenance -Biennial inspection -Occasional joint replacement -Deck rehab as needed -Weathering steel low maintenance	*Medium Maintenance -Complex/Fracture critical inspections -Occasional joint replacement -Deck rehab as needed -Weathering steel low maintenance
Utility Relocations	*Water Line -Relocate twice *Overhead Electric -Relocate once prior to start construction	*Water Line -Relocate once *Overhead Electric -Relocate once prior to start construction	*Water Line -Relocate twice *Overhead Electric -Relocate once prior to start construction	*Water Line -Relocate once *Overhead Electric -Relocate once prior to start construction	*Water Line -Relocated twice (truss built on alignment) *Overhead Electric -Relocate once prior to start construction
Special Construction Considerations or Risks with Cost Impacts	*None *Increased local contractor familiarity	*None *Increased local contractor familiarity	*Transportation constraints require field splicing for main span *Launching main span girders is complex operation (increased cost) *Splicing girders without launching requires large crane(s) or temporary support *Splicing increases construction costs due to increased labor efforts *Moderate local contractor familiarity	*Transportation constraints require field splicing for main span *Launching main span girders is complex operation (increased cost) *Splicing girders without launching requires large crane(s) or temporary river support *Splicing increases construction costs due to increased labor efforts *Moderate local contractor familiarity	*Involved field assembly (increased cost)
Environmental Impacts	*Slightly larger footprint than 2-stage alts due to temp. piers	*2-stage alt has smallest footprint	*Slightly larger footprint than 2-stage alts due to temp. piers	*2-stage alt has smallest footprint	*Slightly larger footprint than 2-stage alts due to temporary piers
ROW Impacts	*Permanent impacts minimal and will add little cost to project *Temporary impacts from: -Construction trestles -Temporary Bridge	*Permanent impacts minimal and will add little cost to project *Temporary impacts from: -Construction trestles	*Permanent impacts minimal and will add little cost to project *Temporary impacts from: -Construction trestles -Temporary Bridge	*Permanent impacts minimal and will add little cost to project *Temporary impacts from: -Construction trestles	*Permanent impacts minimal and will add little cost to project *Temporary impacts from: -Construction trestles -Temporary Bridge
Approx. Bridge Construction Cost[3]	*$8,900,000	*$10,000,000	*$11,400,000	*$10,700,000	*$12,700,000

Notes

1) Single construction stage will decrease construction duration relative to other options.
2) For alternatives that require a temporary bridge, it may be feasible to relocate and utilize the existing structure main span depending on clearance and load limitations and construction equipment weights (TBD).
3) Construction costs are for the bridge only and do not incorporate environmental, right-of-way, roadway, or aesthetics costs. These costs are similar for all options.

The steel truss alternative involves the most labor-intensive erection procedures due to the numerous connections required between truss members. Stage construction of structures to maintain traffic during bridge replacement is a common practice.

Falsework

The CIP concrete box girder alternative would require the use of falsework to construct the superstructure. The minimum falsework opening over the SFAR necessary to accommodate recreational use of the river is approximately 30 feet. This constraint is based on the requirements used for the nearby SR 49 Bridge. Falsework can be designed to provide sufficient clear opening and adequate clearance above the river for freeboard and recreational users.

Any single stage alternative is likely to have higher temporary impacts to the river bed as a consequence of installing a temporary bridge (with temporary approaches) to accommodate traffic. Temporary towers may be necessary in the river to support the girders during field splicing. Field splicing of the girders is required due to limitations in girder lengths that can be delivered to the project site given the access road geometrics. The contractor may eliminate the need for temporary towers by splicing the girders on site prior to erection. This approach can be accomplished by either splicing the girders on the ground and lifting the girders into the final position with a large crane or bracing the girders on the bridge supports and splicing the final girder segments while held in place by a crane. Alternatively, the girders could be launched into place, although this approach involves complex procedures and equipment not familiar to many contractors.

Falsework columns may be required in the river to construct the steel truss bridge alternative. Falsework beams can span a maximum of approximately 90 feet, thereby minimizing the number of temporary supports and consequential impact to the river bed. Falsework can be designed to provide sufficient clear opening and adequate clearance above the river for freeboard and recreational users.

Construction Trestle

The contractor would utilize a construction trestle in the water to facilitate building all three structure types. The trestle would likely be located downstream of the existing bridge for the single-stage approach. For the two-stage scenario, a trestle is needed downstream of the new bridge for the first stage and upstream of the bridge for the second stage to avoid lifting materials with cranes, supported on the trestle, over live traffic. The trestle can provide a span length of 30 feet to accommodate recreational use of the river. A full-length trestle that spans across the river is expected for all three alternatives due to the following:

- The trestle must extend from the river banks to at least the pier locations or falsework bents.
- A full-length trestle improves contractor access and allows movement of large construction equipment to each side of the river. Without a full-length trestle, transporting a crane to the north side of the river may be challenging. Access alternatives include Carvers Road, Bayne Road, Mt. Murphy Road, and the existing bridge. Carvers Road ends at a locked private gate. There is no public road connection from Carvers Road to Scott Road, which would allow access to Marshall Road. Mt. Murphy Road turns into a narrow, single lane road between

Carvers Road and Marshall Road to the north. Bayne Road is a narrow road with many sharp turns between Mt. Murphy Road and SR 193. The existing bridge has vehicular load and height limitations that would likely require the crane be disassembled for transport across the bridge.

- Removing construction traffic from the existing bridge offers a significant safety benefit. Given the substantial pedestrian traffic, with many children, and mixed lane use by vehicular traffic and pedestrians, contractor traffic on the existing bridge would increase the risk of accidents with pedestrians. The additional risk of injury outweighs the increased cost of the full-length trestle.

Removal of the full-length trestle deck prior to the wet season will be necessary to eliminate the potential for flooding impacts should debris get caught on the trestle. Implementation of a partial length trestle is less likely but might remain in-place during the wet season. If a partial length trestle was selected, the above issues associated with construction traffic and access to the north side of the river would need addressed.

4.2.5.3 Construction Schedule

Construction is anticipated to begin in 2024 or later after completion of design. Both the single-stage and two-stage construction options are anticipated to take two years to complete. A description of the anticipated construction schedule is discussed below for each option.

Single-Stage Construction

The single-stage approach requires installation of a temporary bridge to maintain traffic during demolition of the existing structure and construction and of the replacement bridge. It is anticipated that single-stage construction will require nearly two construction seasons. The first construction season would involve erecting the temporary bridge (i.e., building the temporary foundations, constructing the temporary approaches, and installing the temporary bridge), rerouting traffic onto the temporary bridge, building the construction trestle, demolishing the existing bridge and foundations, and beginning work on the replacement bridge substructure and approaches. At the end of the first season, the contractor must remove the trestle decking to prevent the decking from impacting hydraulic performance of the channel during the winter season. The second construction season would then consist of reinstalling the trestle deck, completing structure approaches and retaining walls, and finishing construction of the new bridge. The temporary bridge and construction trestle would then be removed, and vegetation restored.

It is expected that construction of the steel truss alternative will require the longest construction duration to assemble and install the truss, while the steel I-girder option can be erected in the least amount of time since only minimal falsework is necessary.

Two-Stage Construction

The two-stage approach would require two construction seasons and involve similar activities as described for the single-stage approach with the exception of the temporary bridge. The first construction season would consist of erecting the downstream trestle, building the first stage of the replacement bridge, constructing the downstream retaining walls along the approaches, and

demolishing part of the existing structure. At the end of the first season, the contractor will remove the downstream trestle. In addition, the contractor must realign the pedestrian path along the first stage of the bridge prior to demolition of the existing structure. The second construction season would then involve installing the upstream trestle, demolishing the remaining portion of the existing structure, building the second stage of the replacement bridge, and completing structure approaches and retaining walls. The second trestle can then be removed, and vegetation restored.

4.2.5.4 Traffic Management

The on-alignment replacement provides a unique challenge because the current bridge is the only direct access to the north bank of the river and the closest alternative route is Marshall Road, a 9-mile round trip detour that takes around 22 minutes to drive. This requires that the new bridge be constructed in a manner that minimizes impact to the users of the bridge. Additionally, impacts to SFAR users will be minimized in order for recreational activities to continue unencumbered. A description of the traffic management component for the single and two stage options is discussed below.

Single-Stage Construction

The single-stage construction approach requires installation of a temporary bridge to maintain traffic since the new structure is constructed along the existing roadway alignment. Implementing a roadway detour is not a viable option due to increased travel distance and impacts to response times for emergency responders. Installation of a full-length construction trestle downstream of the new bridge is anticipated (see above discussion for details). A full-length trestle will separate construction vehicles and equipment from public traffic, including pedestrians, and will therefore improve safety. If the contractor utilizes a partial length trestle, however, the temporary bridge must provide access for both construction work and public traffic. In either case, the temporary bridge can provide either one or two traffic lanes and separation between vehicular and pedestrian traffic. It may be possible to relocate the existing bridge and utilize the structure as the main span of the temporary bridge, though this would restrict the travel way width and potentially necessitate temporary traffic signals at each end of the approaches. After construction of the replacement structure is complete, traffic is shifted to the final configuration.

Two-Stage Construction

The two-stage construction approach allows the existing bridge to remain in service during the first stage of construction until traffic can be shifted to the first stage structure. The first stage of the replacement structure provides a 14-foot-wide travel way for both vehicular and pedestrian traffic, similar to the existing conditions. A temporary bridge is only necessary if the contractor elects to use a partial- length trestle in order to maintain separation between construction traffic and pedestrians, thereby mitigating risk of pedestrian injury. In this case, the temporary bridge could provide a pedestrian path and potentially an additional traffic lane to segregate construction traffic or provide one lane of traffic in each direction. In the second stage, the existing bridge is then removed, and the second stage of the replacement bridge is built. After the second stage of construction is complete, traffic is shifted to the final configuration.

4.2.5.5 Maintenance Considerations

All three structure types are assumed to have a minimum service life of 75 years. However, the different structure types have varying degrees of maintenance requirements and costs as described below.

CIP Concrete Box Girder

The CIP concrete box girder bridge alternative provides a low maintenance structure that requires a minimal level of repair during its service life. Maintenance efforts consist of biennial inspections, occasional joint replacement, and deck rehabilitation as needed.

Steel Plate Girder

The steel I-girder bridge alternative provides a low maintenance structure that requires a minimal level of repair during its service life. This assumes that the steel girders and diaphragms are fabricated from weathering steel and painting maintenance is not required. Maintenance efforts include biennial inspections, occasional joint replacement, and deck rehabilitation as needed. Inspection efforts on this structure type are slightly more time intensive than the inspection time for box girders since all welds and bolted connections must be visually inspected.

Steel Truss

The steel truss bridge alternative requires more intensive levels of structure maintenance and repair during its service life. The steel truss is a fracture critical structure that requires special inspection that involves significant effort to carefully inspect all tension elements and connections. Special inspection therefore requires use of specialized inspection equipment, such as a snooper truck. Common to the other two bridge types, occasional joint replacement and deck rehabilitation is needed. The steel truss can be fabricated from weathering steel, thereby avoiding maintenance costs associated with occasional painting of steel members.

4.2.5.6 Environmental Impacts

All the studied bridge alternatives are the same width, share the same alignment, and have the same staging areas. The physical construction footprint and associated environmental impacts are similar for all bridge types with the main difference being realized between the single-stage and two-stage alternatives.

Because the single-stage alternative triggers the need for a temporary bridge built upstream of the existing bridge, temporary piers will need to be constructed. These temporary piers will include some fill above the new footing for scour protection and will cause an increased temporary disturbance area when compared with the two-stage option. When considering the necessary approach roadway impacts for the temporary bridge under the single-stage alternative, additional impact considerations include:

- Temporary impacts along SR49 at the Mt. Murphy Road intersection associated with the temporary intersection configuration.

- Additional staging area needed to deploy prefabricated temporary bridge solutions.
- Potential for increased impacts from the construction footprint moving closer to Bekeart's and additional construction activities be within the sensitive river.
- Potential for increased sub-surface vibration impacts near sensitive resources areas (i.e., behind Beakerts) from the temporary bridge.
- Potential need for increased cultural monitoring near sensitive resources areas (i.e., behind Beakerts) from the temporary bridge.

Table 4-8 highlights the areas of impact for both construction options.

Table 4-8. Preliminary Impact Areas

Type of Disturbance		Area of Impact (acres)	
		Single-stage	Two-stage
Portion in Developed Areas	Permanent Disturbance	0.92	0.92
	Temporary Disturbance	1.40	1.40
	Additional Potential	1.68	1.68
Portion in Undeveloped Areas	Permanent Disturbance	0.10	0.10
	Temporary Disturbance	0.81	0.81
	Additional Potential	2.59	2.59
Fills w/in Waters of the United States	Permanent Disturbance	0.002	0.002
	Temporary Disturbance	0.001	N/A

Note: 1) Areas of impacts are approximate and may vary during final design.

4.2.5.7 Right-of-Way Impacts

Permanent Impacts

Both the single-stage and two-stage construction scenarios requires a small amount of right-of-way acquisition on three of the four corners between the intersection of Mt. Murphy Road and the SFAR. The permanent right-of-way impacts affect the following parcels:

- Parcel APN 006-191-02: A small portion of State Park land located along the south approach on the upstream side of the bridge.
- Parcel APN 06-164-02: A small portion of the Grange's property located along the south approach on the downstream side of the bridge.
- Parcel APN 06-163-02: A small portion of the State Park land located along the north approach on the downstream side of the bridge.

These permanent impacts are minimal and will likely add very little cost to the project relative to the overall cost of constructing the replacement bridge.

Temporary Impacts

The single- stage construction approach requires a temporary bridge in addition to a construction trestle. The temporary bridge would be located upstream of the new bridge and therefore requires temporary construction easements for access to land owned by the State Park and the Coloma Resort. At the State Park, the gold panning stations would need to be temporarily relocated. At the Coloma Resort some utilities may need to be relocated and one to two cabins may need to be relocated. The upstream location may require additional mitigation measures due to the proximity of potential cultural and historic resources situated along the south side of the river near the historic Bekeart's Gun Shop. The construction trestle located downstream of the new bridge and requires temporary construction easements for access to land owned by the Grange and the State Park.

The two-stage construction method requires a construction trestle on both the downstream and upstream side of the new bridge for the first and second stages. The construction trestles require access to the same properties as the single-stage approach. Although the overall ROW impact areas are similar between the two stage and single stage alternatives, the ROW coordination costs are estimated to be more for the single stage alternative due to the effects of the temporary bridge and temporary bridge approaches (i.e. shifting traffic closer to Beakerts and the Resort). The single stage alternative a more detailed traffic handling plan and the use of temporary traffic signal for the duration of construction.

4.2.5.8 Bridge Aesthetics

There are multiple opportunities for the application of aesthetic treatments to the new bridge structure. The most straightforward aesthetic treatments utilize specific variations to the shape of each structure type to mimic the surrounding environment. Other aesthetic treatment opportunities are realized through concrete treatments, material selection (e.g., weathering steel), decorative railings, entry portals, vista points, and historic plaque displays.

The Project Section 4(f) Evaluation document considers the removal of the existing bridge as a loss of a historic resource. In addition, the removal of the bridge is considered to impact the visual character of the area. To mitigate these impacts, several aesthetic treatments may be used in conjunction to provide a new bridge that pays homage to the old truss and suspension bridge while re-using some of the existing elements of the bridge. Below is a discussion of the various aesthetic options available.

Bridge Shape

The shape of the bridge and its supporting elements is a key factor in the aesthetic potential of the bridge. The existing Mt. Murphy Road Bridge has very simple lines and geometric forms. The overall appearance is angular and relies heavily on straight lines. The shape of the CIP box girder alternative can be designed to resemble the aesthetic theme of the existing structure by utilizing vertical exterior webs, rectangular or trapezoidal shaped pier caps, and rectangular or square shaped columns. In addition, a constant depth box girder with a straight soffit can be used to imitate the simplistic lines of the existing bridge, though this approach sacrifices the economy of more slender box girders with parabolic soffits.

The shape of steel I-girder can also be designed to complement the aesthetic nature of the existing structure by utilizing constant depth girders, which provide straight superstructure lines and the cleanest architectural appearance. While a haunched girder is typically employed to add aesthetic appeal, the haunch would make the bridge appear significantly more modern than the existing structure.

The shape and functional design of the steel truss inherently offer a direct representation of the existing structure. For the steel truss alternative, the approaches would consist of steel plate girders that could be haunched or constant depth.

Concrete Treatments

The Mt. Murphy Road Bridge had timber approaches prior to 1931. The current piers and concrete approaches were cast using board forms and not plywood. This board form construction method would imprint grain patterns into the concrete, giving it a rustic look that is reminiscent of timber.

A relatively inexpensive and effective aesthetic treatment for concrete surfaces involves using form liners or stamps to create textured surfaces that mimic other materials or produce shadows and patterns. Concrete surfaces can also be stained or integrally dyed to add even more detail. Sidewalks and railings could utilize a combination of integral dyes, form liners, stamping, and staining to achieve a wood look that would be representative of the bridge's past. Form liners that mimic board forming could be used to make new bridge piers similar to the historic ones. The use of form liners and colored concrete are being evaluated for potential use in the concrete retaining walls associated with the roadway approaches (i.e., near the Grange Hall, vista/ plaza point, Coloma Resort, etc.). The County will include the use of texturing and stamping of the proposed crosswalks. Finally, form liners could be used to add architectural interest to the CIP concrete box girder bridge option.

Weathering Steel

Weathering steel is a special steel alloy developed to eliminate the need for painting steel structures. This alloy allows the steel to produce a stable micro-layer of rust on the surface to form a protective coating that inhibits further corrosion. The protective layer on the surface can develop and regenerate continuously when subjected to inclement weather. This material can be used for both the steel I girder bridge and steel truss alternatives to achieve a historic or rustic appearance and allow the bridge to blend in with the natural setting.

Decorative Railing

Decorative railing is offered in a variety of shapes and materials, including steel railing, concrete railing, and a mixture of steel and concrete railing. Concrete surfaces could utilize form liners and/or concrete staining and dyes to achieve the desired appearance. Steel railing can be used in conjunction with concrete barriers to provide additional railing height for pedestrian safety. The steel railing may be fabricated from new structural steel or salvaged material from the existing bridge.

If new steel is selected and a weathered appearance is desired, the steel can be galvanized and then treated with a coloring agent. Weathering steel is not desirable when located directly above finished

concrete since the micro-layer of rust can bleed and stain the concrete during inclement weather. The coloring agent, such as Natina®, is a product used to give galvanized steel a weathered appearance without compromising the protective layer of galvanizing. This product is recommended on steel railing located above concrete since it does not leach color and is not susceptible to fading. An alternative to application of a coloring agent is painting the steel or using galvanized steel. Painted or galvanized steel, however, produce a modern appearance and require a regular maintenance cycle to maintain the finish.

Some bridge replacement projects have re-used portions of an old historic bridge to fabricate handrails for the new bridge. For example, the Folsom Truss Bridge utilized the original truss eye-bars as handrails on the bridge approach. For the new Mt. Murphy Road Bridge, such re-used steel components could be installed along the approaches to the bridge on the inside face of the sidewalk. (**Note:** A pedestrian handrail between the roadway and sidewalk was considered but is no longer included based on feedback from Caltrans on the Type Selection report.

Entry Portal

Another aesthetic opportunity is to add entry portals to the bridge that reflect its history. The current bridge provides a framed view for users as they cross the bridge and provides aesthetic interest from the sides of the bridge. The bridge that stood at this site prior to the current one was a timber suspension bridge. The suspension bridge gave users a framed view and added aesthetic interest when viewed from the side. Entry portals could be provided at the bridge approaches or piers to replicate the aesthetic that users of the bridge have historically had.

An entry portal could be constructed of steel or timber to frame views similar to those that past bridges have afforded. Steel from the existing bridge could be salvaged during demolition and incorporated into the entry portals. The entry portal can provide a standalone architectural feature or can be utilized in conjunction with other aesthetic treatments provided the overall architectural goals are achieved without over-decorating the bridge.

Vista Points

Mt. Murphy Road Bridge is located in a picturesque valley and affords its users sweeping views, especially when crossing the bridge on foot. The bridge sees a high volume of pedestrians at certain times of the year due to school field trips and interpretive programs hosted by the State Park. Many users of the Coloma Resort visit the State Park Visitor Center and cross the bridge on foot. A sidewalk will provide users safe access across the bridge, and vista points would add a place for them to stop and enjoy the view without impeding traffic.

Vista points could be located at each end of the bridge as plazas. These vista points would provide a place to take in the view while also providing a unique opportunity for the State Park to incorporate stops on the bridge as part of their interpretive programs.

Historic Plaque Display

There are two existing plaques embedded in the barrier rail on the southern approaches and two plaques bolted to the truss that describe the history of the bridge. These plaques should be salvaged for future use. It is possible that the plaques could be worked into the new bridge. They could stand

alone or could be incorporated into a story board that documents the history of the bridges that have stood there. The plaques/story boards can be located at vista points. In addition, the State Park has an interest in using the new bridge as an opportunity to for interpretive walks. Additional historical plaques could be added at vista points as part of a future effort between the County and State Parks.

4.2.5.9 Construction Cost

Cost estimates for each of the alternatives were prepared using a contractor-style, production-based approach. This approach does not use unit costs, instead it is based on crew sizes, production rates, equipment rates, and supply and material costs. The results of the production-based estimates were converted into unit costs for summary purposes.

The following is captured in the cost estimates:

- Estimates include 20% contingency and cost escalation assuming mid-construction year of 2021.
- All alternatives include a full-length trestle to service the bridge construction. For the two-stage alternatives, the trestle is constructed twice, once per stage, so that cranes are not lifting material over the stage open to traffic.
- The two-stage alternatives include a temporary pedestrian walkway during the second stage. This temporary walkway is supported off the edge of the stage one construction.
- The one-stage alternatives include the cost of a full-length temporary bridge.
- Other construction costs
- Environmental costs
- ROW costs

Table 4-9 provides cost estimates that include ROW and environmental costs for the single and two stage CIP alternatives. Figures 4-3 and 4-4 provide a graphical breakdown of the cost differences between the CIP Box Girder (Two-Stage) and CIP Box Girder (Single-Stage) alternatives.

Table 4-9. Alternatives Estimated Costs

	CIP Box Girder (Two-Stage)		CIP Box Girder (Single-Stage)	
Cost	Cost	Percent of Project Cost	Cost	Percent of Project Cost
Roadway	$1,136,250	9.0%	$1,136,250	9.0%
Signals & Temporary Approach	$390,000	3.1%	$912,813	7.2%
Temporary Bridge	$0	0.0%	$1,607,405	12.7%
Bridge, Retaining wall + Barrier	$10,625,919	84.1%	$8,392,476	66.4%
Right of Way	$200,064.20	1.6%	$240,064.20	1.9%
Environmental	$282,000.00	2.2%	$351,000.00	2.8%
Total	**$12,634,233**	**100%**	**$12,640,008**	**100%**

Figure 4-3. CIP Box Girder (Two-Stage) Cost Breakdown

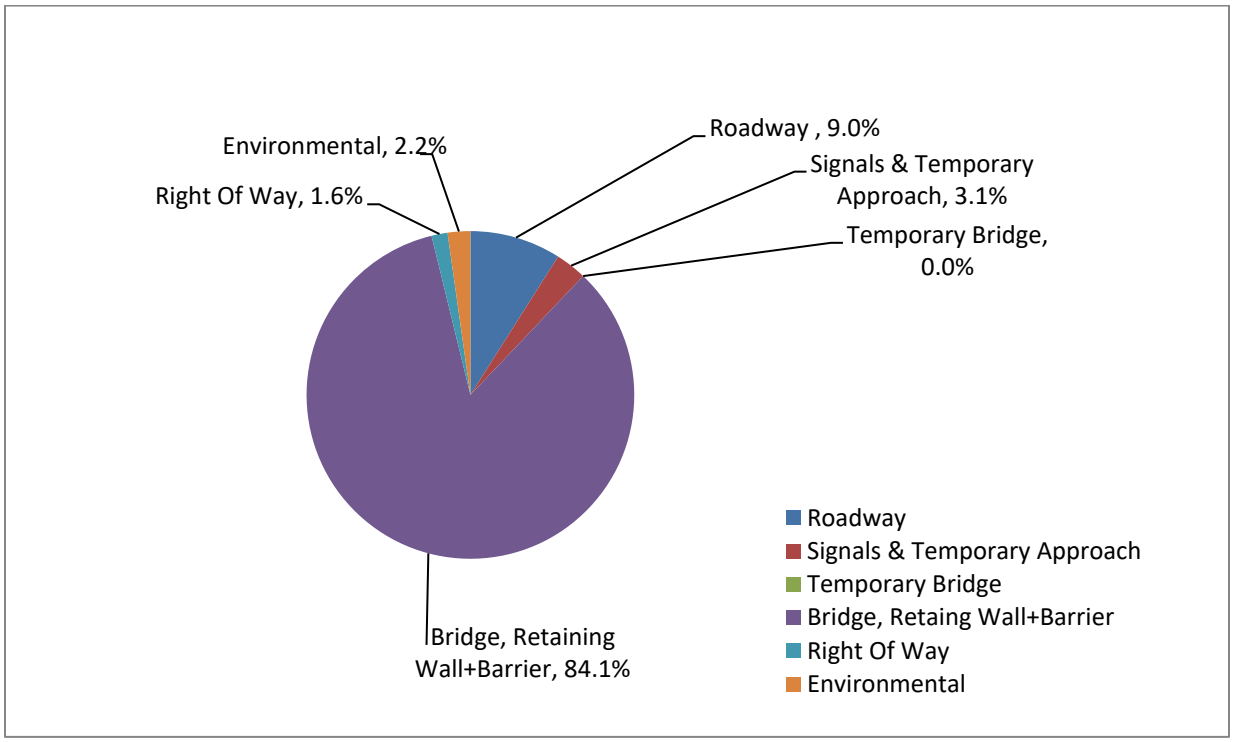
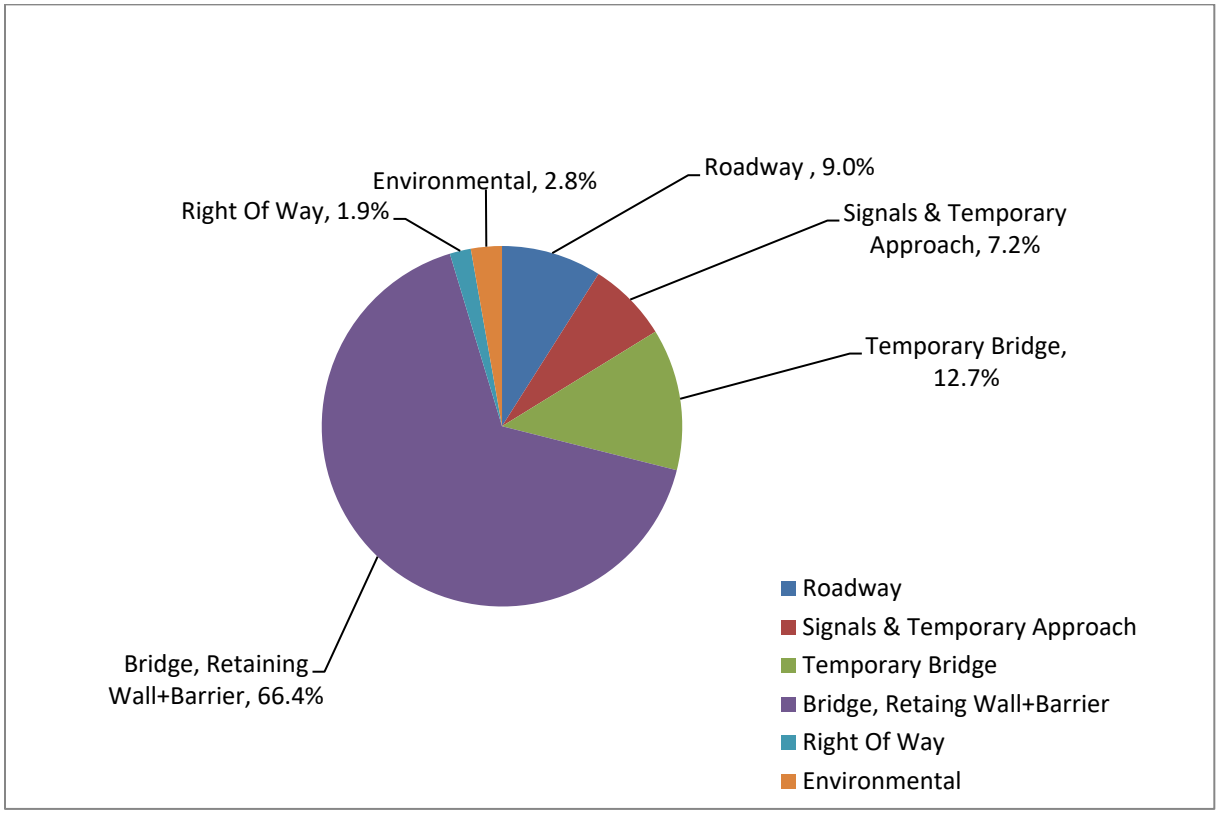


Figure 4-4. CIP Box Girder (Single Stage) Cost Breakdown



4.2.5.10 Preferred Structure Type

Table 4-10 below briefly lists the advantages and disadvantages of the three structure types evaluated in the APS. The CIP concrete box girder is the preferred structure type as it has the largest number of advantages when compared to the other structure type options. This structure type is adaptable to staged construction, is the least expensive to construct, has low maintenance costs, and is a widely known construction method amongst local contractors.

Table 4-10. Summary of Structure Type Advantages and Disadvantages

Structure Type	Advantages	Disadvantages
CIP Concrete Box Girder	• Most familiar structure type for local contractors. • Least expensive alternative. • May be stage constructed. • Moderate schedule required to construct. • Low maintenance.	• Requires falsework.
Steel Plate Girder	• Moderately priced alternative. • May be stage constructed. • Likely the shortest construction schedule. • Low maintenance.	• Not a common structure for local contractors. • Requires field splicing of girders. • Requires larger staging and laydown areas • Slightly longer inspection times
Steel Truss	• Mimics the aesthetics of the existing truss.	• Least familiar structure type for local contractors. • Complicated construction methodology. • Most expensive alternative. • Must be constructed in one stage. • Requires falsework. • Most schedule required to construct. • Higher maintenance.

4.3 Alternatives Analysis

After the extensive screening process described in section 4.2 above the County determined that in addition to the proposed Project, the single stage CIP concrete box girder build alternatives would fulfill the CEQA requirements of meeting many of the project objectives, would be feasible, and reduce or eliminate project impacts. In addition, a No-Project Alternative must be considered in an EIR. Therefore, the following alternatives are evaluated in comparison with the proposed Project.

- No-Project Alternative
- CIP Concrete Box girder, Single Stage Construction

The alternatives analyzed are further described below. The impacts of each alternative are qualitatively compared to the impacts of the proposed Project in terms of impact type and severity.

4.3.1 No-Project Alternative

4.3.1.1 Description

Section 15126.6(e)(2) of the State CEQA Guidelines requires an EIR to include an analysis of the No-Project Alternative. Evaluation of the No-Project Alternative allows decision makers to compare the impacts of approving the proposed Project with the impacts of not approving the proposed Project. The No-Project Alternative assumes that the proposed Project would not be implemented but does not necessarily preclude use or development of the Project site. Rather, the No-Project Alternative evaluated in this Draft EIR considers "what would be reasonably expected to occur in the foreseeable future if the proposed Project were not approved, based on current plans and consistent with available infrastructure and community services" (State CEQA Guidelines § 15126.6 [e][2]).

For this Draft EIR, the No-Project Alternative assumes that the existing bridge would remain and continue to be maintained. As discussed in Chapter 2, Project Description the existing narrow one lane structure with no shoulders or sidewalks is shown on the Caltrans local bridge list with a sufficiency rating of 2 out of 100 (Caltrans, 2016). The bridges low sufficiency rating is the result of structural deficiencies as well as the functional deficiencies. The existing bridge was posted for reduced load capacity with 14 tons for a two-axle vehicle, 21 tons for a three-axle vehicle, and 27 tons for a four-axle vehicle. Vehicles, pedestrians, and bicycles must share a single, narrow, travel lane which creates safety conflicts. In September 2021, a pickup truck crash on the bridge caused another emergency closure. In October 2021, the bridge was reopened with further reduced posted weight limits. Two-axle vehicles which exceed 12 tons and three-axle vehicles which exceed 19 tons are prohibited from using the bridge. The weight limits are a further reduction from the previously posted limits of 14 tons and 21 tons for two- and three-axle vehicles, respectively. The four-axle truck (originally posted at 27 tons) has been removed from the posting. Under the No-Project Alternative these issues would continue.

4.3.1.2 Impact Analysis

Aesthetics

The No-Project Alternative would result in no impacts on aesthetics because the existing bridge would remain. No construction-related removal of the existing bridge structure or vegetation would occur and the views from State Hwy 49 and Mt. Murphy Road would remain unchanged. No new bridge structure would be introduced to the visual setting. State Hwy 49 is listed as by Caltrans as "*eligible state scenic highway-not officially designated*" and the 2004 El Dorado County General Plan EIR identifies the historic townsite of Coloma (MGDSHP) as a scenic resource. The No-Project Alternative would not result in impacts on scenic vistas or resources because no new bridge or other improvements would be made. Impacts would be less than the proposed Project.

Agricultural and Forestry

The No-Project Alternative would not impact agricultural resources in the study area. No agricultural or timber resources occur in the Project area. Impacts would be similar to the proposed Project.

Air Quality

The No-Project Alternative would not result in impacts on air quality. Construction related short-term construction emissions would not be generated and there would be no potential to exceed EDCAQMD's thresholds or expose sensitive receptors to substantial pollutant concentrations. No change in traffic volume or circulation would occur and as a result, no change in operational emissions would occur. Since the existing bridge would not be demolished, there would be no potential for exposure to structural asbestos, lead-based paint, or nuisance odors. Impacts would be less than the proposed Project.

Biological Resources

Under the No-Project Alternative, annual maintenance activities could potentially result in temporary disturbances to nesting migratory birds and minor vegetation management. However, no ground disturbance or loss of habitat or wetlands would occur. Impacts would be less than the proposed Project.

Cultural Resources

The Project occurs in the boundary of the MGDSHP which is listed as a National Historic Landmark (NHL) and listed in the National Register of Historic Places (NRHP). The NHL and NRHP property is the Coloma Historic District. The Mt. Murphy Road Bridge, on El Dorado County right-of-way, has been determined to be individually eligible for listing in the NRHP and California Register of Historic Places (CRHP). The No-Project Alternative would not result in impacts to the Coloma Historic District, MGDSHP, or Mt. Murphy Road Bridge. The potential to disturb or destroy buried archaeological resources or previously unknown human remains would remain unchanged. Operation and maintenance of the existing bridge and roads would not affect previously identified historical resources. Impacts would be less than the proposed Project. Because there would be no ground-disturbing construction activities, the No-Project Alternative would not impact paleontological resources.

Tribal Cultural Resources

The County contacted the California Native American Heritage Commission (Commission), which provided a list of Native groups with interest in, or traditional ties to, the project area. The County then sent certified letters to all of the tribes on the list, including the Shingle Springs Rancheria, the United Auburn Indian Community (UAIC), the Ione Band of Miwok, the Nashville-El Dorado Miwok, the T'si-Akim Maidu, Colfax-Todds Valley, and the Washoe Tribe of Nevada and California. Only the Shingle Springs Rancheria, Colfax-Todds Valley, and the UAIC have requested to consult on the project. At the request of these groups, a meeting was held at the project site on September 7, 2017, attended by representatives of Shingle Springs Rancheria and UAIC. Consultation between the County and the tribes is on-going and will continue throughout the project development process. To date no tribal cultural resources have been identified. The No-Project Alternative would not impact tribal cultural resources as none have been identified to date. Impacts would be similar to the proposed Project.

Energy

Under the No-Project Alternative no construction-related increase in fuel consumption would occur. As with to the proposed Project, there would be no change in demand for electric power or other energy sources and no inefficient or wasteful use of energy resources would occur. Impacts would be less than the proposed Project.

Geology and Soils

Under the No-Project Alternative, there would be no immediate impacts related to geologic hazards, such as those associated with fault rupture, strong ground shaking, and soil erosion, because the project would not be built. Impacts would be less than the proposed Project.

Greenhouse Gas Emissions

The No-Project Alternative would not result in increased GHG emissions compared to baseline conditions. Short-term construction emissions would not be generated and there would be no potential to exceed regional significance thresholds of CO_2e. Unlike the proposed Project, the no project alternative would not have the likely benefit to local air quality because the two-lane bridge eliminates the idling/ que time that currently happens with the one lane bridge as vehicles wait to allow on-coming traffic to cross the bridge. There would be no change in traffic conditions and as a result, no potential benefit on operational GHG emissions. Impacts would be slightly greater than the proposed Project.

Hazards and Hazardous Materials

There would be no construction activity under the No-Project Alternative, which would preclude construction related use and potential accidental release of hazardous materials. The No-Project Alternative would not introduce new fire hazards or risk to people and structures in the Project area. The Project Initial Site Assessment/Preliminary Site Investigation reports that following Recognized Environmental Conditions (RECs) in the Project area (WRECO 2019).

- Former orchards (prior to 1962) NE and SE of the bridge (lead, arsenic, pesticides);
- Historic gold mines upstream (to the south) of the bridge (arsenic);
- Leaded paint and asbestos on structural elements of the bridge; and
- Aerially deposited lead risk (ADL)

Impacts under the No Project Alternative would mostly be less than the proposed Project.

Hydrology/Water Quality

Under the No-Project Alternative no impacts to hydrology and water quality would occur. No grading or other ground disturbance would occur and there would be no potential for temporary increases in sediment loads and pollutants to the SFAR or degradation of water quality. There would be no increase in the use of chemicals or pollutants associated with construction activities

and as a result, no increase in hazardous materials in stormwater and no change in flow rates and drainage patterns of stormwater runoff. Impacts would be less than the proposed Project.

Land Use, Planning, Population, and Housing

The No-Project Alternative would not result changes to land use in the study area and would not divide an established community. No temporary or permanent easements of private lands for transportation uses would be needed. The No-Project Alternative would be inconsistent with the SACOG MTP/SCS which identifies the proposed project (ELD19339) as one that would be implemented. Impacts would be less than the proposed Project. The No-Project Alternative would result in not induce population growth or displace people or housing. Impacts would be similar to the proposed Project.

Mineral Resources

The No-Project Alternative would not result changes the availability of a known mineral resource. Impacts would be similar to the proposed Project.

Noise and Vibration

The No-Project Alternative would result in no new noise or vibration related impacts. Short-term construction noise would not be generated and there would be no potential to exceed the County construction noise thresholds. Impacts would be less than the proposed Project.

Public Services, Utilities, and Service Systems

Public services would not be affected under the No Project Alternative. Like the proposed Project the No Project Alternative would not require the provisioning of new or physically altered governmental facilities. Unlike the No Project Alternative, the proposed Project would require the acquisition small portions of the ROW from the SR49 and from the MGDSHP. Impacts on the State Park lands during construction of the proposed Project include a temporary use of a portion of the park where the Bekeart's Gun Shop is located. These activities may result in temporary relocation of some mobile picnic tables and shelters where gold panning activities take place. Impacts would be less than the proposed Project.

Utilities would not be affected under the No Project Alternative. No utility or communications infrastructure relocations or associated activities including vegetation trimming or removal would occur. No construction-related increase in fuel consumption would occur. Impacts would be less than the proposed Project.

Recreation

The No-Project Alternative would result in no impacts on recreation. Operations of the MGDSHP and the Coloma Resort would be unaffected. As discussed in the recreation section above (section 3.16) impacts to recreational uses are not environmental impacts covered by CEQA. The proposed Project would not "increase the use of existing . . . recreational facilities" and thus cause or accelerate "physical deterioration of the facility"; or (2) would "require the construction or expansion of

recreational facilities" that might have an "adverse physical effect on the environment." Impacts to recreational uses are not environmental impacts covered by CEQA. Impacts would be the similar to the proposed Project.

Traffic and Circulation

The No-Project Alternative would not result in any construction-related traffic or circulation impacts on traffic in the Project area. Under this alternative the current functional and operational deficiencies would continue, and the existing narrow single lane bridge would retain its posted reduced load capacity. No sidewalks would be constructed, and pedestrian vehicle conflicts would continue and potentially become worse with predicted increase in MGDSHP visitors. Compared to the proposed Project, traffic and circulation conditions would be worse under the No-Project Alternative.

Wildfire

The No-Project Alternative would retain the current functional and operational deficiencies and the existing bridge would retain its posted reduced load capacity. As the existing bridge ages increased maintenance may be needed and the potential need for closures would increase.

4.3.2 CIP Concrete Box girder, Single Stage Construction

4.3.2.1 Description

The existing functionally and operationally deficient bridge would be replaced with a CIP concrete box girder bridge constructed in one phase. The total replacement bridge length is 445 ft and is composed of two 130 ft end spans and one 185 ft main span. Piers for the replacement bridge would consist of reinforced concrete pier walls. Abutments would consist of CIP concrete seat type abutments supported on CIDH piles. The lane configuration provides two 11 ft lanes, two 2 ft shoulders, an 8 ft sidewalk on the upstream side of the bridge and Caltrans Type 85 barriers. The structure width necessary to accommodate the roadway layout and barriers is 38 ft. Construction is anticipated to begin in 2024 or later. The single-stage construction option is anticipated to take two years to complete.

The single-stage approach requires installation of a temporary bridge to maintain traffic during demolition of the existing structure and construction and of the replacement bridge. It is anticipated that single-stage construction will require nearly two construction seasons. The first construction season likely involves erecting the temporary bridge (i.e., building the temporary foundations, constructing the temporary approaches, and installing the temporary bridge), rerouting traffic onto the temporary bridge, building the construction trestle, demolishing the existing bridge and foundations, and beginning work on the replacement bridge substructure and approaches. At the end of the first season, the contractor must remove the trestle decking to prevent the decking from impacting hydraulic performance of the channel during the winter season. The second construction season would then consist of reinstalling the trestle deck, completing structure approaches and retaining walls, and finishing construction of the new bridge. The temporary bridge and construction trestle would then be removed, and vegetation restored.

The single-stage construction approach requires installation of a temporary bridge to maintain traffic since the new structure is constructed along the existing roadway alignment. Implementing a roadway detour is not a viable option given the increased costs and impacts to improvements needed to make a safe connection to Marshall Road, and due to increased travel distance and impacts to response times for emergency responders. Installation of a full-length construction trestle downstream of the new bridge is anticipated. A full-length trestle will separate construction vehicles and equipment from public traffic, including pedestrians, and will therefore improve safety. If the contractor utilizes a partial length trestle, however, the temporary bridge must provide access for both construction work and public traffic. In either case, the temporary bridge can provide either one or two traffic lanes and separation between vehicular and pedestrian traffic. It may be possible to relocate the existing bridge and utilize the structure as the main span of the temporary bridge, though this would restrict the travel way width and potentially necessitate temporary traffic signals at each end of the approaches. After construction of the replacement structure is complete, traffic is shifted to the final configuration.

The CIP concrete box girder alternative will require the use of falsework to construct the superstructure. Falsework beams can span up to approximately 90 ft, thereby minimizing the number of temporary supports and impact to the SFAR. The minimum falsework opening over the South Fork of the American River necessary to accommodate recreational use of the river is approximately 30 ft. Falsework can be designed to provide sufficient clear opening and adequate clearance above the river for freeboard and recreational users.

Replacement of the existing bridge on the existing alignment requires minor improvements to the existing SR 49 intersection. Intersection improvements would include conforming the new approaches to the intersection, repaving, and restriping. Cut and fill depths for the roadway improvements would range from approximately 2-20 ft of fill in the areas of the new bridge approaches to 3-4 ft of cut where retaining walls would be constructed to support the reconstructed approach roadway.

Construction of the replacement bridge on alignment would require both permanent right-of-way and temporary construction easements.

4.3.2.2 Impact Analysis

Aesthetics

The CIP concrete box girder, single stage construction alternative (single stage alternative) would have similar impacts as the proposed Project. The primary difference being the single stage alternative requires the placement of a temporary bridge on the upstream side of the existing bridge to maintain traffic during demolition of the existing structure and construction and of the replacement bridge. The single stage alternative may have a greater temporary impact area due to placement of the temporary bridge. Installation of the temporary bridge may require more tree removal than the proposed Project.

State Hwy 49 is listed as by Caltrans as "*eligible state scenic highway-not officially designated*" and the 2004 El Dorado County General Plan EIR identifies the historic townsite of Coloma (Marshall Gold Discovery State Historic Park) as a scenic resource. The required improvements to the State Hwy 49 and Mt. Murphy Road are the same between the single stage alternative and the proposed Project.

The existing bridge is individually eligible for listing in the NRHP and California Register of Historic Places (CRHP). Both the single stage alternative and the proposed Project will remove the existing bridge historic structure. The aesthetic treatments being contemplated to mitigate the loss of the existing bridge are the same for the single stage alternative and the proposed Project.

This alternative would have a slightly greater aesthetic impact than the proposed Project due to the temporary bridge.

Agricultural and Forestry

No agricultural or timber resources occur in the Project area. Impacts would be the same as the proposed Project.

Air Quality

The types of air quality impacts under the single stage alternative would be similar to those of the proposed Project. There would be no difference in operational emissions between the single stage alternative and the proposed Project. The installation and removal of the temporary bridge under the single stage alternative would likely result in higher short-term criteria pollutant emission levels that the proposed Project. The new bridge will likely have a benefit to local air quality by because the two-lane bridge eliminates the idling/ que time that currently happens with the one lane bridge as vehicles wait to allow on-coming traffic to cross the bridge.

Because the overall Project area is the same under the single stage alternative and proposed Project, removal of the existing bridge would have similar impacts related to exposure to, structural asbestos, lead-based paint, and nuisance odors would be the same as the proposed Project. Similar to the proposed Project, the single stage alternative would be required to comply with Caltrans Standard Specifications 14-9 to control fugitive dust.

The Project site is located in an area of moderate potential occurrence of naturally occurring asbestos (NOA). The single stage alternative and the proposed Project would implement the same measure to reduce this impact including:

- Notify the Air Pollution Control District (APCD) at least 15 days before starting work in areas containing NOA.
- Comply with the California Air Resources Board (ARB) 2002-07-29 Asbestos Airborne Toxics Control Measure (ATCM) for Construction, Grading, Quarrying, and Surface Mining Operations, and
- California Code of Regulations (CCR), Title 17, Section 93105 (d)(1)(A), and
- Caltrans Standard Specification 14-11.10, Naturally Occurring Asbestos (2018)

The single stage alternative would have slightly greater impacts to air quality than the proposed Project.

Biological Resources

The Project area does not provide habitat for any federal-listed or federal-proposed wildlife or plants. The Project area provides suitable habitat for Foothill yellow-legged frog, which is listed as a

state candidate threatened species, as well as several other special-status species including western pond turtle, pallid bat, Townsend's big-eared bat, burrowing owl, American peregrine falcon, bald eagle, and other birds-of-prey and migratory birds. Impacts and mitigation to these species is the same for both the single stage alternative and the proposed Project.

The single stage alternative may have a greater temporary impact area due to placement of the temporary bridge. Installation of the temporary bridge may require more vegetation removal, including native trees, than the proposed Project. The single stage alternative requires placement of the temporary bridge footings within the SFAR. The proposed Project does not include this impact. The remaining impacts are similar between the single stage alternative and the proposed Project. The single stage alternative would have slightly greater impacts to biological resources than the proposed Project.

Cultural Resources

The Project occurs almost entirely within the Marshall Gold Discovery State Historic Park (MGDSHP) which is listed as a National Historic Landmark (NHL) and listed in the National Register of Historic Places (NRHP). The NHL and NRHP property is the Coloma Historic District. Also, the Mt. Murphy Road Bridge, on El Dorado County right-of-way, has been determined to be individually eligible for listing in the NRHP and CRHP.

The single stage alternative and the proposed Project would both have a significant impact to a historical resource as a result of removal of the Mt. Murphy Road Bridge which is individually eligible for listing on the NRHP and CRHP. The single stage alternative is likely to have a greater potential for ground and vibrational impacts associated the temporary bridge and the alignment of the temporary road, which will be closer to Bekeart's than the two stage alternative. The potential to disturb or destroy buried archaeological resources or previously unknown human remains is the same between the single stage alternative and the proposed Project.

Tribal Cultural Resources

The County contacted the California Native American Heritage Commission (Commission), which provided a list of Native groups with interest in, or traditional ties to, the project area. The County then sent certified letters to all of the tribes on the list, including the Shingle Springs Rancheria, the United Auburn Indian Community (UAIC), the Ione Band of Miwok, the Nashville-El Dorado Miwok, the T'si-Akim Maidu, and the Washoe Tribe of Nevada and California. Only the Shingle Springs Rancheria and the UAIC have requested to consult on the project. At the request of these groups, a meeting was held at the project site on September 7, 2017, attended by representatives of both groups. Consultation between the County and the tribes is on-going and will continue throughout the project development process. To date no tribal cultural resources have been identified. The single stage alternative and the proposed Project would not impact tribal cultural resources as none have been identified to date. Impacts would be similar to the proposed Project.

Energy

The energy use associated with construction and operation of the single stage alternative would be similar to the proposed Project but of a slightly greater magnitude. Installation and removal of the temporary bridge under the single stage alternative would result in the higher level of fuel

consumption than the proposed Project which does not include a temporary bridge. This increased energy use would be short-term and there would not be a long-term continuous increased use of fuel, electricity, or other energy source. The single stage alternative would not conflict with applicable state or local energy legislation, policies, or standards and would not be considered wasteful, inefficient, or unnecessary. As with to the proposed Project, there would be no change in demand for electric power or other energy sources and no inefficient or wasteful use of energy resources would occur.

Geology and Soils

Impacts on geology and soils under the single stage alternative would be similar to those under the proposed Project. The single stage alternative is likely to cause greater potential ground and vibrational impacts associated with installation of the temporary bridge and road approaches. No portion of western El Dorado County occurs in a Seismic Hazard Zone (i.e., regulatory zones that encompass areas prone to liquefaction and earthquake-induced landslides). Consequently, the Project site is not considered to be at risk from liquefaction hazards or earthquake-induced landslides.

Paleontological remains are found in sedimentary rock formations. El Dorado County's geology is predominantly igneous (volcanic) in nature and the type of sedimentary deposits where such remains might be present are virtually nonexistent (El Dorado County 2004). While paleontological finds could occur in river and stream gravel deposits within the county, this possibility would not be expected and is remote (El Dorado County 2004). The historic disturbance of the soils in the Project area from gold mining activities further reduces the possibility of paleontological finds.

Greenhouse Gas Emissions

GHG impacts under the single stage alternative would be similar to those under the proposed Project. Impacts from the single stage alternative would be of a slightly greater magnitude than the proposed Project because of the additional construction activities needs to install and remove the temporary bridge structure. The new bridge will likely have a benefit to local air quality by because the two-lane bridge eliminates the idling/ que time that currently happens with the one lane bridge as vehicles wait to allow on-coming traffic to cross the bridge.

Hazards and Hazardous Materials

Impacts under the single stage alternative would be similar to those under the proposed Project. Impacts. Small amounts of hazardous materials would be transported and used during construction activities of the single stage alternative or the proposed Project (i.e., equipment maintenance, fuel, solvents, and roadway resurfacing, and re-striping materials). Hazardous materials would only be used during construction of the Project, and any hazardous material uses would be required to comply with all applicable local, state, and federal standards associated with the handling, transport, and storage of hazardous materials. Use of hazardous materials in accordance with applicable standards ensures that any exposure of the public to hazard materials would have a less-than-significant impact. Neither the single stage alternative or the proposed Project would introduce new fire hazards or risk to people and structures in the Project area.

The Project Initial Site Assessment/Preliminary Site Investigation (ISA/ PSI) reports that following Recognized Environmental Conditions (RECs) in the Project area (WRECO 2019).

- Former orchards (prior to 1962) NE and SE of the bridge (lead, arsenic, pesticides);
- Historic gold mines upstream (to the south) of the bridge (arsenic);
- Leaded paint and asbestos on structural elements of the bridge; and
- Aerially deposited lead risk (ADL)

The hazards and hazardous material avoidance and minimization measures for the proposed Project would apply equally to the single stage alternative. Impacts would be similar to the proposed Project.

Hydrology/Water Quality

The types of hydrology and water quality impacts resulting from the single stage alternative would be similar to those under the proposed Project, but of a slightly greater magnitude. Installation and removal of temporary bridge needed under the single stage alternative would require more construction activity, compared to the proposed Project, which would result in the greater potential for temporary increases in sediment loads and pollutants to the SFAR and degradation of water quality. The temporary bridge needed under the single stage alternative may also result in temporary changes in flow rates and patterns in the SFAR. Construction BMPs and federal, state, and local regulations would apply to this alternative addressing hydrological and water quality impacts. However, the potential for impacts is greater for the single stage alternative compared to the proposed Project.

Land Use, Planning, Population, and Housing

As with the proposed Project, the single stage alternative would not result in a physical division of an established community and would improve the safety and efficiency of the roadway. The single stage alternative would also be consistent with policies adopted for the purposes of avoiding or minimizing impacts on environmental resources. No habitat conservation plan or natural community conservation plan covers the Project area.

Similar to the proposed Project the single stage alternative would not induce population growth or displace people or housing. Impacts would be similar to the proposed Project.

Mineral Resources

The Project is the replacement of an existing bridge. The bridge will not affect the availability of or ability to extract known mineral resources, including placer gold mining. Per El Dorado County General Plan Conservation and Open Space Element figure CO-1 (Important Mineral Resource Area) no important mineral resource areas as defined by the California Geological Survey occur in the Project area (El Dorado County 2004). Neither the single stage alternative or the proposed Project would impact mineral resources.

Noise and Vibration

Impacts under the single stage alternative would be similar to those under the proposed Project. The single stage alternative is likely to have a greater potential for ground and vibrational impacts associated with installation of the temporary bridge when compared to the proposed Project. Impacts would be slightly more than the proposed Project.

Public Services, Utilities, and Service Systems

Neither the single stage alternative or the proposed Project would require the provisioning of new or physically altered governmental facilities. Both alternatives would require the acquisition small portions of the ROW from the SR49 and from the MGDSHP. Impacts on the State Park lands during construction include a temporary use of a portion of the park where the Bekeart's Gun Shop is located. These activities may result in temporary relocation of some mobile picnic tables and shelters where gold panning activities take place. Both alternatives would also include implementation of a traffic management plan that would reduce potential effects on access, including for emergency service responders, to less than significant.

The single stage alternative requires the waterline carried beneath the existing bridge be relocated multiple times. The purposed Project only requires relocation of the waterline once. Both the single stage alternative and the purposed Project will require the relocation of overhead utility lines. Like the proposed Project the single stage alternative is not a land development project and no new or expanded water or wastewater treatment facilities or storm water drainage facilities would be needed. Under the single stage alternative some utilities at the Coloma Resort may need to be relocated and one to two cabins may need to be relocated.

Both the single stage alternative and the Proposed Project would underground the existing overhead utilities in the immediate vicinity of the bridge. Undergrounding of the utilities would reduce potential fire hazards improve the overall aesthetic of the area.

Impacts would be slightly greater than the proposed Project.

Recreation

Impacts to recreational uses are not environmental impacts covered by CEQA. As CEQA Appendix G, "Environmental Checklist Form," illustrates, CEQA considers whether a project (1) would "increase the use of existing . . . recreational facilities" and thus cause or accelerate "physical deterioration of the facility"; or (2) would "require the construction or expansion of recreational facilities" that might have an "adverse physical effect on the environment." Simply put, CEQA considers the impacts to the physical environment from recreation, not the social effects from a project's impacts to recreation. Neither the single stage alternative or the proposed Project would "increase the use of existing . . . recreational facilities" and thus cause or accelerate "physical deterioration of the facility"; or (2) would "require the construction or expansion of recreational facilities" that might have an "adverse physical effect on the environment.". Impacts would be similar to the proposed Project.

Traffic and Circulation

Both the single stage alternative and the proposed Project would correct the functional and operational deficiencies by replacing the existing narrow single lane bridge. The temporary bridge required under the single stage alternative would affect circulation within the Coloma Resort for a greater duration than the proposed Project due to the presence of the temporary bridge for the duration of construction. Impacts would be slightly greater than the proposed Project.

Wildfire

Both the single stage alternative and the proposed Project would improve access across the SFAR for emergency vehicles. Construction activities associated with each alternative have similar potential to create sparks or ignite a fire. Impacts are similar between the single stage alternative and the Proposed project.

4.4 Environmentally Superior Alternative

CEQA requires an EIR to examine a range of feasible alternatives to a proposed project. State CEQA Guidelines Section 15126.6(e)(2) requires that an EIR identify which of those alternatives is the environmentally superior alternative. The *environmentally superior alternative* is considered to be the alternative to the proposed project that has the least environmental impact, compared to the proposed project. If, in the course of identifying the environmentally superior alternative, the No-Project Alternative is found to be the environmentally superior alternative, then Section 15126.6(e)(2) of the State CEQA Guidelines further requires that an EIR identify which among the other alternatives is the environmentally superior alternative. Consequently, although the No-Project Alternative is evaluated and presented for comparison purposes, determination of the environmentally superior alternative in this chapter primarily reflects the differences in impacts among the remaining alternatives. Determination of the environmentally superior alternative uses the impact evaluations of the proposed Project and of each alternative in a comparative process. The impacts of each alternative are identified and compared to those of the proposed Project. The type and relative magnitude of each alternative's impacts are evaluated, and the alternative found to have the least impact, as compared to the others, is determined to be the environmentally superior alternative.

Table 4-11 provides a comparison of the level of impacts under the alternatives considered in this Draft EIR as compared to the proposed Project. In some instances, the potential effects of the build alternatives would be similar/ same, meaning that the overall outcome of implementing the proposed Project compared to one of the build alternatives would generally result in the same type and magnitude of effects on a specific resource even though the location of the alternatives differ in some ways from the proposed Project.

As shown in Table 4-11, the No-Project Alternative is environmentally superior because it does not result in ground disturbance, loss of habitat, or other temporary and permanent construction impacts. The State CEQA Guidelines require that, if the No-Project Alternative is identified as environmentally superior, the EIR must identify an environmentally superior alternative among the other alternatives (Section 15126.6[e][2]). Of the remaining alternatives, the proposed Project is

determined to be the environmentally superior alternative because it would have lesser impact than the single stage alternative.

Table 4-11. Comparison of Environmental Impacts of Alternatives to the Proposed Project.

Resource Topic	Proposed Project	No-Project Alternative	Single Stage Alternative
Aesthetics			
Scenic vistas	Less Than Significant (LTS)	Less	Similar
Scenic resources	No Impact	Similar	Similar
Degrade visual character or quality	LTS with Mitigation	Less	Similar/Greater
New source of light or glare	LTS	Less	Same
Agricultural and Forestry Resources			
Convert farmland	No Impact	Same	Same
Williamson Act	No Impact	Same	Same
Rezone of Forest land	No Impact	Same	Same
Loss of Forest land	LTS	Less	Same
Other changes	No Impact	Same	Same
Air Quality			
Air quality plan conflict	No Impact	Same	Same
Cumulatively considerable net increase in criteria pollutant	LTS	Less	Similar
Objectionable odors	LTS with Mitigation	Less	Similar
Biological Resources			
Special-status species	LTS with Mitigation	Less	Similar
Sensitive natural communities	LTS with Mitigation	Less	Greater
Wetlands	LTS with Mitigation	Less	Similar
Wildlife movement and migration	LTS	Less	Same
Local policies and ordinances	No Impact	Same	Same
Habitat conservation plan	No Impact	Same	Same
Cultural Resources			
Historical resources	Significant Unavoidable Impact	Less (impacts are significant)	Greater (impacts are significant)
Archaeological resources	LTS with Mitigation	Less	Similar
Human remains	LTS	Similar	Similar
Tribal Cultural Resources	LTS	Similar	Similar

Resource Topic	Proposed Project	No-Project Alternative	Single Stage Alternative
Energy			
Wasteful, inefficient, or unnecessary consumption	LTS	Less	Similar
Conflict with renewable energy or energy efficiency plan	LTS	Less	Similar
Geology and Soils			
Seismicity	LTS	Same	Same
Soil erosion	LTS	Lesser	Same
Unstable geologic unit	LTS with Mitigation	Less	Same
Expansive soils	LTS	Lesser	Same
Septic tanks or alternative waste water disposal	No Impact	Similar	Similar
Greenhouse Gas Emissions			
Greenhouse gas emissions	LTS	Lesser	Greater
Greenhouse gas plan conflict	LTS	Lesser	Same
Hazards and Hazardous Materials			
Use, transport or disposal	LTS	Lesser	Same
Accidental release	LTS with Mitigation	Lesser	Same
Release within 0.25 mile of school	No Impact	Same	Same
Government Code Section 65962.5	No Impact	Same	Same
Emergency response plan	LTS	Greater	Same
Result in excessive noise	LTS	Same	Same
Risk of loss from wildland fires	LTS with Mitigation	Lesser	Similar
Hydrology/Water Quality			
Water quality standard violations	LTS with Mitigation	Lesser	Similar/Greater
Decrease groundwater supplies	LTS	Same	Same
Alter drainage and result in erosion	LTS	Lesser	Similar/Greater
Increase rate of runoff	LTS	Lesser	Similar/Greater
Exceed capacity of stormwater drainage systems	LTS	Lesser	Similar/Greater
Risk release of pollutants due to project inundation	No Impact	Same	Same
Conflict with water quality control plan	LTS	Lesser	Similar/Greater
Land Use, Planning, Population, and Housing			
Divide a community	No impact	Same	Same
Conflict with land use plan	No impact	Same	Same
Induce population growth	No Impact	Same	Same

Resource Topic	Proposed Project	No-Project Alternative	Single Stage Alternative
Displace housing and people	No Impact	Same	Same
Mineral Resources			
Loss of availability of a known mineral resource	No impact	Same	Same
Loss of availability of a known mineral resource recovery site	No impact	Same	Same
Noise and Vibration			
Substantial permanent or temporary increase in noise	LTS	Lesser	Greater
Groundborne vibration/noise	LTS with Mitigation	Lesser	Greater
Within two miles of a public airport	No impact	Same	Same
Public Services & Utilities and Service Systems			
New/expanded facilities	LTS	Lesser	Similar
Relocation or construction of new utilities	LTS	Lesser	Similar
Sufficient water supplies	LTS	Lesser	Same
Adequate wastewater treatment capacity	No impact	Same	Same
Landfill capacity	LTS	Lesser	Same
Regulations related to solid waste	No impact	Same	Same
Recreation			
Increase use of existing parks	No impacts	Same	Same
Include recreational facilities	No Impacts	Similar	Similar
Traffic and Circulation			
Conflict with transportation program or plan	No impact	Greater	Same
CEQA Guidelines section 15064.3	LTS	Same	Same
Design hazards	No impact	Greater	Similar
Emergency access	LTS	Greater	Greater
Parking capacity	LTS	Greater	Similar
Wildfire			
Impair emergency response or evacuation plan	LTS	Greater	Same
Exacerbate wildfire risks	LTS with mitigation	Lesser	Same
Installation or maintenance of associated infrastructure	No Impact	Same	Same
Downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability	No Impact	Same	Same

4.5 Alternatives Considered but Eliminated from Further Analysis

Section 4.2 provides a detailed accounting of the process that was undertaken by the County to evaluate various alternatives. El Dorado County initially evaluated the feasibility of rehabilitating the existing Mt. Murphy Bridge to meet safe design standards. The rehabilitation evaluation considered four alternatives. The County concluded that the rehabilitation would require the replacement of the majority of the over one-hundred year old steel truss bridge. The County concluded that a full bridge replacement was three times as efficient, in terms of cost, as retrofitting and widening the bridge.

The County next developed an alternative analysis report with extensive community input. Over a dozen organizations and neighborhood groups participated. Eleven alternatives were considered. Five alternatives were variations on replace on existing alignment. Five alternatives were new bridge crossings further upstream or downstream of the current alignment. One alternative was a no-bridge-replacement that would have extended Carvers Road to Scott Road. Using the process described in Section 4.2, *Alternatives Development*, the eleven alternatives were assessed against the screening criteria. The screening criteria included historical and cultural, community character, access and operations, construction, safety, environmental resources, and right-of-way. Through the screening, five alignments were dropped and the remaining six alternatives were grouped into three corridors.

The first corridor included three options for constructing on or immediately adjacent to the current alignment. The second corridor would realign Mt. Murphy Road and move the bridge between the reconstructed Sutter's Mill and the parking lot adjacent to Sutter's Mill. The third corridor would realign Carver Road and construct a bridge approximately 2,600 ft downstream. In 2016, an Alternatives Feasibility Study looked at the three corridors based on funding and costs, design practices, right-of-way impacts, environmental impacts, and cultural/historic impacts. Corridor 1 appeared to clearly meet all project objectives. Corridor 2 was rejected as infeasible due to the significance of cultural/ historical resource impacts to the Marshall Gold Discovery State Historic Park and the park resources including the rafting community and trail users. Corridor 3 was rejected as infeasible due to the magnitude of environmental impacts, significant right-of-way acquisition, and extensive improvements needed to County roads and SR 49, which would not be funded through the Highway Bridge Program.

4.5.1 References

CH2MHILL. 7 January 2014. Technical Memorandum, Mt. Murphy Road Bridge Structural Analysis and Rehabilitation Feasibility. Prepared for County of El Dorado Community Development Agency - Department of Transportation.

CH2MHILL. January 2015. Alternative Analysis Report, Mt. Murphy Road Bridge Project. Prepared for County of El Dorado Community Development Agency - Department of Transportation.

County of El Dorado Community Development Agency - Department of Transportation. September 2016. Alternatives Feasibility Study, Mt. Murphy Road Bridge Replacement Project 5925 (090) 25C0004.

CH2MHILL. February 2017. Mt. Murphy Road Bridge Structure Type Alternative Analysis Work Plan. Prepared for County of El Dorado Community Development Agency - Department of Transportation.

Chapter 5
Other CEQA Considerations

5.1 Overview

This chapter includes the following discussions and analyses required by CEQA.

- Cumulative impacts.
- Growth-inducing impacts.
- Significant and unavoidable environmental impacts.
- Significant irreversible environmental impacts.
- Mitigation measures with the potential for environmental effects.

5.2 Cumulative Impacts

Per the State CEQA Guidelines cumulative impacts refers to two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts. The individual effects may be changes resulting from a single project or a number of separate projects. The cumulative impact from several projects is the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time State CEQA Guidelines § 15355).

For the purpose of this EIR, significant cumulative impacts would occur if impacts related to the implementation of the Project, combined with related environmental impacts resulting from implementation of the adopted County General Plan, build-out of land and installation of infrastructure consistent with the General Plan Land Use Map and Circulation Map, as well as maintenance and upgrades to existing infrastructure, would result in an adverse significant effect. For an impact to be considered cumulative, these incremental impacts and potential incremental impacts must be related to the types of impacts caused by the Project and evaluated in Chapter 3, *Impact Analysis*.

5.2.1 Analysis

Based on an analysis of all resource areas for cumulative impacts it was determined that the proposed Project would not contribute to a cumulative impact in the resource areas listed below because either:

(1) the resource is in generally good health and the Project would result in beneficial impacts, no impacts, or minor impacts that would be fully mitigated (to a less-than-significant level under CEQA; or

(2) the resource is regulated in such a way that by implementing mitigation measures to fully compensate for the loss of the resource, and by obtaining the necessary permits and following the required regulations for impact avoidance or minimization and compensating for impacts, a significant contribution to a cumulative impact would not occur.

Based on the analysis the contribution to a cumulative impact on the following resources would not be considerable.

- Aesthetics
- Agricultural and Forestry Resources
- Air Quality
- Biological Resources
- Tribal Cultural Resources
- Energy
- Geology and Soils
- Greenhouse Gas Emissions
- Hazards and Hazardous Materials
- Hydrology, Water Quality, and Water Resources
- Land Use, Planning, Population, and Housing
- Mineral Resources
- Noise
- Public Services, Utilities, and Service Systems
- Recreation
- Transportation
- Wildfire

5.2.1.1 Cultural Resources

Development of related projects can affect historical resources if such projects adversely alter and/or demolish historical resources that may be interrelated, such as historical resources that are part of a historic district. The geographic area that could be affected by implementation of the proposed project in combination with other projects varies depending on the type of environmental resource being considered. The geographic scope of cumulative impact analysis for cultural resources is the boundary of the approximately 300-acre Coloma Historic District within the MGDSHP.

The Mt. Murphy Road Bridge has been determined to be individually eligible for listing in the NRHP and CRHR, with a period of significance from 1915 through the 1930s. It is also a contributing resource of the Coloma Historic District. Research for this Project determined that the Coloma Historic District, which has a period of significance of 1849 to 1948, includes 37 contributing built-environment resources, including: 21 buildings and structures (including the Murphy Road Bridge),

13 ruins, two cemeteries, and one historical marker. The Coloma Historic District also includes 19 non-contributing buildings and structures.

The MGDSHP General Plan (1979) guides the management and development within the park, including the Coloma Historic District. The MGDSHP General Plan emphasizes the preservation of the historical and archeological integrity of the zone of primary cultural interest, which includes the Project location. The MGDSHP General Plan discusses various classes of related projects that would occur in the Coloma Historic District. Classes of related project include historical interpretation, preservation, restoration, and reconstruction, recreational uses, and operational facilities.

The Mt. Murphy Road Bridge is the only contributing resource of its type in the Coloma Historic District. A review of the MGDSHP General Plan and coordination with Parks staff has determined that no known related projects exist that would have impacts similar. The Project when combine with the classes of future projects discussed in the MGDSHP would not be expected to contribute to a cumulative impact or which compound or increase other environmental impacts.

5.3 Growth-Inducing Impacts

Factors that influence land use and development in an area may include population and economic growth, desirability of locations, the costs and availability of developable land, physical and regulatory constraints, transportation, and the costs of sewer, water, and other utility services. This section addresses potential growth in the study area and larger region and the extent to which the proposed Project may contribute to that growth.

Transportation agencies play a role in land use changes by providing infrastructure that can improve mobility and/or open up access to new locations. New development generates travel to and from that location, and this additional travel creates demand for new transportation facilities. The relationship between transportation and land use and the degree to which one influences the other is a topic of ongoing debate.

5.3.1 Existing Conditions

Table 5-1 lists historical and projected populations for El Dorado County and California. El Dorado County is projected to grow at a rate similar to California's in the 25-year period from 2010 to 2035 (CH2M Hill 2019).

Table 5-1. Population Projections

Area	2010	2015	2035	Change in Population 2010 to 2035	Average Annual Growth (2010 to 2035)
El Dorado County	179,053	182,093	214,008	20%	0.8%
California	37,333,583	39,059,809	45,521,334	22%	0.9%

5.3.2 Impacts

5.3.2.1 Methodology

The proposed Project does not include construction of new housing that could directly induce population growth, nor does it include displacement of existing housing or people that would necessitate the construction of replacement housing elsewhere. The impact analysis focuses on the potential of the proposed Project to indirectly result in growth-inducing impacts and does so by answering the following questions.

- To what extent would travel times, travel cost, or accessibility to employment, shopping, or other destinations be changed? Would this change affect travel behavior, trip patterns, or the attractiveness of some areas to development over others?
- To what extent would change in accessibility affect growth or land use change—its location, rate, type, or amount?
- To what extent would resources of concern be affected by this growth or land use change?

5.3.2.2 Impact Discussion

- To what extent would travel times, travel cost, or accessibility to employment, shopping, or other destinations be changed? Would this change affect travel behavior, trip patterns, or the attractiveness of some areas to development over others?

Implementation of the proposed Project would replace a one lane fracture critical bridge to improve safety and movement for vehicles, pedestrians, and bicyclists across the SFAR in the community of Coloma. The existing narrow, one-lane bridge provides the only direct access across the SFAR in Coloma. Local residents living north of the SFAR use the existing bridge daily to commute to work, school, shopping, or elsewhere.

On 25 September 1980, the County posted reduced the vehicle load capacity on the bridge of 14 tons for a two-axle vehicle, 21 tons for a three-axle vehicle, and 27 tons for a four-axle vehicle. In September 2021, a pickup truck crash on the bridge caused another emergency closure. In October 2021, the bridge was reopened with further reduced posted weight limits. Two-axle vehicles which exceed 12 tons and three-axle vehicles which exceed 19 tons are prohibited from using the bridge. The weight limits are a further reduction from the previously posted limits of 14 tons and 21 tons for two- and three-axle vehicles, respectively. The four-axle truck (originally posted at 27 tons) has been removed from the posting. Because the current bridge has one lane and load limits and, the Project would increase accessibility in that it would provide a new two lane structure with sufficient weight-carrying capacity to support standard highway trucks. The Project would not provide access to new locations that are currently unreachable.

Because Mt. Murphy Road is an existing roadway connecting the Coloma area with the Garden Valley area, the Project would not provide access to undeveloped areas. Rather, it would involve replacing and realigning a nonstandard bridge structure. Therefore, accessibility to employment, shopping, or other destinations is not expected to change.

- To what extent would the change in accessibility affect growth or land use change—its location, rate, type, or amount?

The Project would provide standard bridge and approach widths over the SFAR to accommodate one travel lane in each direction. The Project would not create additional capacity on other sections of Mt. Murphy Road. In a rural area, the introduction of new roadways is capable of exerting growth pressure. However, this Project proposes to replace the existing structure with a new structure the meets current standards and would not provide access to undeveloped areas. The Project would exert little to no growth pressure. The Project could reduce commute and trip times for those traveling over the bridge by removing the yield-sign control on the northside of the SFAR opposite Coloma. The reduced travel times would not be substantial and are unlikely to have an overall effect on employment and residential location decisions such that growth would occur.

- To what extent would resources of concern be affected by this growth or land use change?

Project-related growth is not reasonably foreseeable. Although the proposed Project would reduce the amount of maintenance-related closures, remove existing operational traffic and roadway deficiencies, and accommodate additional standard truck traffic relative to existing conditions, the Project would neither connect to undeveloped areas nor would it affect the underlying zoning in the area. The only land use change would be the incorporation of right-of-way for the bridge structure and abutments. Based on the analysis above, the proposed Project would not induce growth. No additional analysis related to growth is necessary.

5.4 Significant and Unavoidable Impacts

As summarized in Table S-1, all impacts that would result from the proposed Project, excluding Cultural Resources, are either less than significant or significant but reduced to less-than-significant levels after the implementation of mitigation measures. Significant and unavoidable impacts to cultural resources are summarized below.

The Mt. Murphy Road Bridge (Bridge 25C0004) was determined eligible for listing in the National Register of Historic Places (NRHP) as part of the Caltrans Historic Bridge Inventory in 1987 and again in the Inventory Update in 2003. The criteria for the NRHP are nearly identical to the California Register of Historical Resources (CRHR). The bridge today appears substantially as it did in the 1980s and in 2003 and for that reason appears to retain its status as eligible for listing in the NRHP and NRHP. It is also a contributing element of the Coloma Historic District because it retains its historic integrity to the period of significance for the district and because the bridge has long been an integral part of the transportation network of the community.

Public Resource Codes (PRC) section 21084.1 states in part "*A project that may cause a substantial adverse change in the significance of an historical resource is a project that may have a significant effect on the environment. For purposes of this section, an historical resource is a resource listed in, or determined to be eligible for listing in, the California Register of Historical Resources…*" PRC section 5020.1(q) defines a 'substantial adverse change' to an historical resource as "*Substantial adverse change includes demolition, destruction, relocation, or alteration such that the significance of an historical resource would be impaired (PRC § 5020.1(q)).*" The Project will remove and replace the Mt. Murphy Road Bridge which has been determined eligible for listing in the CRHR. Per PRC section 21084.1 the Project will result in a '*substantial adverse change in the significance of an*

historical resource' by removing the bridge and therefore the Project will have a significant effect on the environment.

Mitigation of significant impacts must lessen or eliminate the physical impact that the project will have on the historical resource. This is often accomplished through redesign of a project to eliminate objectionable or damaging aspects of the project. The County has committed to implementation of measures CULT-1 to CULT-7 to reduce impacts. The demolition of a historic structure cannot be mitigated to less than significant. Even with the implementation of measures CULT-1 to CULT-7, this is a significant unavoidable impact.

5.5 Significant Irreversible Environmental Impacts

The 2020 State CEQA Guidelines Section 15126.2(d) requires the evaluation and discussion in certain EIRs of significant irreversible changes that would be caused by a proposed project. State CEQA Guidelines Section 15127 (Limitations on Discussions of Environmental Impact) of the State CEQA Guidelines states:

> 'The information required by Section 15126.2(d) concerning irreversible changes, need be included only in EIRs prepared in connection with any of the following activities:
>
> (a) The adoption, amendment, or enactment of a plan, policy, or ordinance of a public agency;
>
> (b) The adoption by a Local Agency Formation Commission (LAFCO of a resolution making determinations; or
>
> (c) A project which will be subject to the requirement for preparing an environmental impact statement pursuant to the requirements of the National Environmental Policy Act of 1969, 42 U.S.C. 4321–4347."

Implementation of the proposed Project would replace a one lane fracture critical bridge to improve safety and movement for vehicles, pedestrians, and bicyclists across the SFAR in the community of Coloma. The Project does not include any of the activities listed in State CEQA Guidelines Section 15127 that would require the evaluation and discussion of significant irreversible environmental impacts. The Project is not a plan policy or ordinance, does not include LAFCO approvals, and does not require the preparation of and NEPA environmental impact statement. No further evaluation or documentation is required.

5.6 Mitigation Measures with the Potential for Environmental Effects under CEQA

Section 15126.4(a)(1)(D) of the CEQA Guidelines provides that, "[i]f a mitigation measure would cause one or more significant effects in addition to those that would be caused by the project as proposed, the effects of the mitigation measure shall be discussed but in less detail than the significant effects of the project as proposed." For each impact considered significant in this EIR, mitigation measures have been designed that would reduce the severity of the impact.

Mitigation to reduce the significant impacts to less-than-significant levels are identified in the impact analysis in Chapter 3. None of the measures have the potential to themselves result in significant impacts. The measures are preventative in nature or involve compensation or other non-physical elements and do not require construction activities and/or ground disturbance.

5.7 References

CH2M Hill, Inc. 2019. Mt. Murphy Road Bridge Project, Community Impact Assessment.

Chapter 6
Report Preparers

6.1 El Dorado County, Department of Transportation—CEQA Lead Agency

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6.2 Jacobs CH2M

Leslie Bonneau	Project Manager, Vice President
Robbie Coomes, P.E.	Bridge Engineer

6.3 SWCA Environmental Consultants

Jeffery Little	Project Manager, Vice President