# CONDITION ASSESSMENT AND IMPROVEMENT FEASIBILITY EVALUATION

FOR THE

# MILLIKEN CREEK BRIDGE AT TRANCAS STREET

BRIDGE No. 21C0051

Prepared for Napa County





Prepared by



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July 29, 2014

BCA JOB # 2014138

#### **PROJECT BACKGROUND:**

BCA has investigated the potential repair alternatives for the existing Milliken Creek Bridge (Bridge No. 21C-0051) in the County of Napa. The Milliken Creek Bridge is a historic earth-filled, five-span, arch stonemasonry bridge over Milliken Creek that was recently closed to traffic in 2014 due to vehicle crash damage to the bridge railing and spandrel wall at the end of Span 5. The bridge previously accommodated 1 lane of eastbound, one-way traffic providing a right-turn connection from Trancas Street onto southbound Silverado Trail (SR 121) just south of the Monticello Road and Silverado Trail intersection. Traffic is currently being detoured to the Monticello Road and Silverado Trail intersection just north of the Milliken Creek Bridge, where traffic is allowed to make a right turn onto southbound Silverado Trail. This was an alternative right-turn connection prior to Millken Creek Bridge closing to vehicular traffic. As of 2012 with the one-way, single lane bridge configuration, the bridge had an Average Daily Traffic (ADT) count of 3000.

BCA reviewed the following relevant documents, which are in the Appendix, to determine the various potential bridge repair project alternatives:

- As-Built Drawings
- Caltrans Bridge Inspection Reports dated 2012
- Structure Inventory and Appraisal Reports dated 2012
- Scour Evaluation and Plan of Action Report
- USDI National Park Service National Register of Historic Places Continuation Sheet
- Department of Parks and Recreation Primary Record

#### EXISITNG BRIDGE DESCRIPTION AND HISTORY



The bridge has a total length of 169 feet, a total width of 24 feet, and a width between stone railings (including the single lane and striped shoulders) of 19.7 feet. The structure is composed of 5 stonemasonry arch spans supported on concrete spread. Spans 1, 2 and 5 are 20 feet long and Spans 3 and 4 are 40 feet long (See Appendix for As-built Plans). According to the National Register of Historic Places Continuation Sheet, the bridge is constructed of locally quarried pitch-faced

ashlar. Three components comprise the stonemasonry portion of the bridge: arches, walls, and railings. The arches were constructed using the true-arch style, where the stones comprising the arches were quarried with precise trapezoid dimensions to be placed radially to form the arch. An alternate stonemasonry arch construction of that period that would not be acceptable in-kind construction consisted of the corbel arch method which laid the stone blocks horizontally on each other with a slight corbel offset to form the arch. The spandrel walls consist of horizontally laid block. The railing above the deck is capped with flat coping stones. Soil is used to fill the void above

the arches to increase dead load to prevent tension in the arch and to distribute any vertical load to the arches.

The State Department of Transportation began surveying stone masonry bridges in 1986 as part of an effort to identify all of California's historic bridges. An assessment of a stonemasonry bridge's integrity of design, materials and workmanship qualified it to be eligible for the National Register of Historic Places. Nearly 75% of the 95 stone masonry bridges surveyed have been severely altered over the years as of 2004. The Milliken Creek Bridge was determined eligible and is listed in the National Register for the following reasons:

- The bridge has retained a high degree of integrity of design, materials, and workmanship, and it represents a rare type and method of construction, masonry, in California.
- The bridge is remnant of Napa County's bridgebuilding program at the turn of the 20th century.
- The bridge was built in 1908 by one of the county's best known stone masons of the period, H.W. Wing.



• It is one of the two or three longest unaltered stone masonry bridges and is the only fivespan stonemasonry arch bridge in California

The latest Structure Inventory and Appraisal Report dated 2012 for the Milliken Creek Bridge indicates a bridge Sufficiency Rating (SR) of 50.7 and labels it as Functionally Obsolete (FO) due to a Deck Geometry code of 2 because the width between stone railings is too narrow for the 3000 ADT for a one-lane, one-way bridge. Per Chapter 6 of the Local Assistance Program Guidelines, a bridge is considered FO if the Deck Geometry code receives a rating of 3 or less.

## **PROJECT FUNDING OPTIONS**

BCA has evaluated the potential of available funds that could supplement County funds for this project. The primary funding available for bridge rehabilitation to local agencies include the Federal Highway Bridge Program (HBP) and Caltrans Toll Bridge Credit policy. The Federal Highway Bridge Program (HBP) funds are separated into two sub-programs; the Highway Bridge Replacement and Rehabilitation Program (HBRRP) and the Bridge Preventive Maintenance Program (BPMP), both of which cover 88.53% of the project cost.

In order to qualify for HBRRP funds, the bridge must be rated Structurally Deficient or FO, with an  $SR \leq 80$ . Since the Milliken Creek Bridge is FO and has a SR between 50 and 80, it is on the Eligible Bridge List (EBL) and qualifies for rehabilitation using HBRRP funds. The bridge is not automatically eligible for HBRRP bridge replacement funds without proper justification since the SR is greater than 50. However, because the bridge is listed on the National Registrar of Historic Structures, demolition and replacement of this bridge would be an unlikely project alternative.

Without justification and approval from the Caltrans DLAE, the bridge is not eligible for BPMP funds since it is listed on the EBL as the goal of the BPMP is to provide preventative maintenance on structures that are in good condition.

Bridges generally located on small rural roads that are not listed on the Federal Aid System are also eligible to have the local agency (non-federal) 11.47% share match requirement funded by the Caltrans Toll Bridge Credits. This structure is listed on the Federal Aid System and therefore not eligible for the supplemental Toll Credit Funding to cover the County's required matching HBRRP fund percentage.

Under the HBRRP, there are also two program funding allocation provisions specifically for standalone projects involving Barrier Railing Replacement and Scour Countermeasure. However, additional HBRRP funds under these two program funding allocation provisions are not applicable for this type of required improvements. The intent of the stand-alone barrier railing replacement provisional funding is to upgrade the safety of the bridge barrier systems, not to repair damaged barriers. Similarly, additional HBRRP funds would not be available under the scour countermeasure provision if the bridge is already being rehabilitated or replaced and the scope of work not limited to the scour countermeasures as a stand-alone project.

## EXISTNG BRIDGE FIELD INSPECTION AND CONDITION ASSESSMENT

BCA performed a site visit on July 8, 2014 to assess the bridge damage and existing structural condition, as well as the surrounding site conditions that may affect the various proposed alternatives. The following items were noted during the site visit.





• The structural damage from the accident is limited to the railing and spandrel wall near the accident area at right side of the fifth arch of the southeast segment of the bridge. The stone arch supporting the vertical vehicular loading near the accident area appears to be unaffected.





• Approximately 15 feet of the bridge railing beyond Span 5 on each side of the bridge appears to have been previously reconstructed with reinforced concrete. The reinforced concrete railing near the accident area was pushed a few inches away from the bridge deck.





• There is a longitudinal crack and potholes in the mortar finish on the underside of the Spans 1 and 4 arches. These cracks appear to be superficial cracking of the mortar finish possibly due to minor settling of the stonemasonry arch after construction. The potholes also appear to be from poor quality control of the original construction.





• Scour was observed at Piers 1, 2 and 4. The footing of Pier 4 is exposed on the Span 4 side for its entire length. Undermining of the footing was not observed.





• There is an existing underground PG&E gas line along the south side of the bridge that appears to run beneath the creek that may impact Alternatives 2 and 4.

#### ENVIRONMENTAL CLEARANCE:

In spite of the potentially limited repairs required to address the above noted issues, due to the historic nature of the existing structure, required improvements of this structure may require significant environmental clearance and mitigation effort. Improvements to a historic structure will require an Environmental Impact Assessment to identify the historic nature of the structure and predict any (positive or negative) cultural consequences caused by the proposed improvements.

Consultation with a historic consultant, and if HBP funds used, close coordination with State Historic Preservation Officer (SHPO) will be required to identify and corroborate the historic relevance and nature of the bridge, level of impact from the improvements, and effectiveness of any mitigation measures proposed on the project.

The project funding source and the results of the Environmental Impact Assessment will dictate the required type of environmental clearance documents required. California Environmental Quality Act (CEQA) clearance will always be required for this project. National Environmental Policy Act (NEPA) clearance and Section 106 consultation under the National Historic Preservation Act (NHPA) with SHPO will only be required if the project involves Federal land, permits, licenses, or funding. Because of the historic nature of the bridge, the project will likely require an Environmental Impact Assessment (Social/Cultural Study) and will not qualify for a Categorical Exemption / Categorical Exclusion (CE/CE) for any of the alternatives. Project alternatives resulting with adverse FOEs will require a full EIR/EIS and likely extend the design schedule significantly.

## **PROJECT ALTERNATIVES:**

BCA has identified four project alternatives for the Milliken Creek Bridge:

- 1. **Railing & Spandrel Wall Repair Project** Only repair the damaged railing and spandrel wall with County funds. The estimated project cost is roughly \$500,000, 100% paid by County funds:
  - County would not receive any federal HBP funding and would need to cover 100% of the project cost.
  - The required CEQA clearance documents must be prepared by the County.
  - The repair must comply with the Secretary of Interior's Standards for Rehabilitation. The repair construction methods will most likely have to be in-kind construction to maintain its historical significance.
  - Compliance with NEPA and Section 106 is not required since federal land, licensing, permits or funding are not involved.
  - The bridge remains FO and is still listed on the EBL since the ADT and the width between stone railings remain the same.
  - Existing scour at Piers 1, 2 and 4 will not be mitigated and the current Scour Plan of Action inspections are still required incurring annual maintenance cost to the County.
  - This alternative is less complicated and the project schedule will be much faster than the other alternatives.
  - No outside funding source appears to be available but should be investigated further.
- 2. Milliken Creek Bridge Widening Project (HBP) Widen/Rehabilitate the Milliken Creek Bridge to strengthen the bridge to current code standards, remove it from the EBL and concurrently repair the damaged railing and spandrel wall. The estimated project cost is roughly \$2,100,000 of which approximately \$1,860,000 will be covered by the HBRRP and \$240,000 will need to be covered by local County matching funds:

- The widening/rehabilitation must comply with the Secretary of Interior's Standards for Rehabilitation. Widen the original structure with similar stonemasonry arch construction and repair the damaged railing and spandrel wall with in-kind construction to minimize any impact to the bridge's historical significance.
- HBRRP funds are available to cover 88.53% of the widening/rehabilitation project cost. The remaining 11.47% of the realignment project cost will be covered by the County.
- HBP guidelines would require strengthening the original construction and upgrading the bridge geometrics to current design code standards which may require constructing a reinforced concrete shell over the stonemasonry arches beneath the earth backfill and roadway paving in addition to the widening.
- This considerable alteration to the original structure will likely trigger an adverse Finding of Effect and require full EIR/EIS environmental clearance documents.
- Mitigate the existing scour at Piers 1, 2 and 4 with the project improvements. The existing Scour Plan of Action inspections will no longer be required minimizing annual maintenance costs.
- Compliance with NEPA and Section 106 is required since federal funding is involved. Consulting with the SHPO for historical compliance is required.
- The required NEPA/CEQA clearance documents must be prepared by the County.
- The adjacent PG&E gas line may need to be relocated.
- The bridge will not be FO anymore and will be removed from the EBL.
- This is a relatively complicated project alternative with potentially the longest project design schedule (up to several years) to clear the required environmental documents. Construction to fix the damaged railing and spandrel wall will be held-up (potentially years) until the project goes to construction.
- 3. Monticello Road Bridge Widening & Intersection Improvement Project (HBP) -Repair the Milliken Creek Bridge for pedestrian and bicycle use only and permanently close Milliken Creek Bridge to vehicular traffic by permanently rerouting traffic onto Monticello Road by adding an additional EB lane between Silverado Trail intersections along Monticello Road. The additional EB lane will require Monticello Road Bridge to be widened and potentially require a signalized intersection improvement at Monticello Road with South Silverado Trail intersection. *(See Exhibit 1 below for a conceptual sketch of the anticipated improvements to Monticello Road.)* The estimated project cost is roughly \$1,500,000 of which approximately \$1,328,000 will be covered by the HBRRP and \$172,000 will need to be covered by local County matching funds.



- To accommodate the additional ADT on Monticello Road after closing Trancas Street Bridge to vehicular traffic, two EB lanes on the segment of Monticello Road between the Silverado Trail intersections is anticipated to be required. This alternative would also need to include the widening of Monticello Road Bridge and potentially signalization of the South Silverado Trail intersection.
- The historic Milliken Creek Bridge will be rededicated for pedestrian and bicycle use only.
- The damage to the Milliken Creek Bridge railing and spandrel wall will be repaired. The repair must comply with the Secretary of Interior's Standards for Rehabilitation. The Milliken Creek Bridge repair is anticipated to be in-kind construction to minimize historical impact and maintain its historical significance.
- Mitigate the existing scour at Piers 1, 2 and 4 with the project improvements. The existing Scour Plan of Action inspections will no longer be required minimizing annual maintenance costs.
- HBRRP funds are available to cover 88.53% of the realignment project cost. The remaining 11.47% of the realignment project cost will be covered by the County.
- HBP funding guidelines will allow for the estimated cost of demolition of a historic bridge to be applied to repairing or retrofitting the historic bridge if an alternative alignment is used to remove the bridge from the EBL. Rehabilitation efforts could include repair of the damaged railing and spandrel wall and mitigating scour at the piers.
- Removing vehicular traffic from the bridge will remove it from EBL and theoretically should qualify the realignment project for HBP funds. However, because the required improvements are not on the Milliken Creek Bridge, HBP funding for this project concept will need to be confirmed with the Caltrans District Local Assistance Engineer (DLAE). Interpretation of the HBP guidelines and requirements varies greatly between DLAEs of different districts.
- Compliance with NEPA and Section 106 is required since federal funding is involved. Consulting with the SHPO for historical compliance is required.
- The required NEPA/CEQA clearance documents must be submitted by the County.
- This is a relatively complicated project alternative with a relatively long project design schedule.
- 4. **Milliken Creek Bridge Realignment Project (HBP)** Construct a new bridge on a new alignment directly adjacent to the existing Milliken Creek Bridge. Repair the historic bridge for pedestrian and bicycle use only and permanently close existing bridge to vehicular traffic. The estimated project cost is roughly \$1,900,000 of which approximately \$1,683,000 will be covered by the HBRRP and \$217,000 will need to be covered by local County matching funds.
  - New bridge is anticipated to be a cast-in-place, prestressed slab bridge. The historic Milliken Creek Bridge will be rededicated for pedestrian and bicycle use only.
  - The damage to the Milliken Creek Bridge railing and spandrel wall will be repaired. The repair must comply with the Secretary of Interior's Standards for Rehabilitation. The

Milliken Creek Bridge repair is anticipated to be in-kind construction to minimize historical impact and maintain its historical significance.

- Mitigate the existing scour at Piers 1, 2 and 4 with the project improvements. The existing Scour Plan of Action inspections will no longer be required minimizing annual maintenance costs.
- Removing vehicular traffic from the bridge will remove it from EBL and qualify the realignment project for HBP funds. HBRRP funds are available to cover 88.53% of the new bridge project cost. The remaining 11.47% of the new bridge project cost will be covered by the County.
- HBP funding guidelines will allow for the estimated cost of demolition of a historic bridge to be applied to repairing or retrofitting the historic bridge if an alternative alignment is used to remove the bridge from the EBL. Rehabilitation efforts could include repair of the damaged railing and spandrel wall and mitigating scour at the piers.
- Compliance with NEPA and Section 106 is required since federal funding is involved. Consulting with the SHPO for historical compliance is required.
- The required NEPA/CEQA clearance documents must be submitted by the County.
- The adjacent PG&E gas line may need to be relocated.
- This is a relatively complicated project alternative with a relatively long project design schedule.
- This is alternative is the most expensive, but a significant portion of the project cost will be covered by HBP funds.

	Project Alternative		Soft	Hard Costs	Total		
No.	Description	Design	Envr Clr	СМ	Envr Mit/Mon	Construction	Project Cost
1	Railing & Spandrel Wall Repair	\$80,000	\$80,000	\$100,000	\$50,000	\$150,000	\$500,000
2	M illiken Creek Bridge Widening (HBP)	\$150,000	\$350,000	\$200,000	\$150,000	\$1,200,000	\$2,100,000
3	Monticello Road Bridge Widening (HBP)	\$200,000	\$100,000	\$200,000	\$100,000	\$1,030,000	\$1,700,000
4	M illiken Creek Bridge Realignment (HBP)	\$200,000	\$100,000	\$200,000	\$100,000	\$1,530,000	\$2,200,000

PROJECT ALTERNATIVE SUMMARY												
Project Alternative		Total	Funding Source		Historic	EBL	Project Schedule					
No.	Description	Project Cost	НВР	County	Significance	Status	Design	Constr				
1	Railing & Spandrel Wall Repair	\$500,000	\$0	\$500,000	No FOE	on	12-18 mo.	6-12 mo.				
2	Milliken Creek Bridge Widening (HBP)	\$2,100,000	\$1,860,000	\$240,000	Adverse FOE	off	60-96 mo.	12-18 mo.				
3	Monticello Road Bridge Widening (HBP)	\$1,700,000	\$1,506,000	\$194,000 *	No FOE	off	24-30 mo.	18-24 mo.				
4	Milliken Creek Bridge Realignment (HBP)	\$2,200,000	\$1,948,000	\$252,000 *	No FOE	off	18-24 mo.	18-24 mo.				
*	County portion for Alt 3 & 4 may increase by the differnce if Milliken Crk Bridge rehab cost is greater than demo cost											

#### CONCLUSION / RECOMMENDATIONS:

Depending on the County's overall goals, schedule, and available budget, the County may opt to evaluate Alternative 1 or Alternative 3 further. If the County elects to pursue Alternative 3, the HBP project funding eligibility for this project improvement concept will need to be confirmed with the Caltrans DLAE for Napa County. If the Caltrans DLAE does not agree that Alternative 3 improvements comply with the HBP funding guidelines, Alternative 4 may become a better option than Alternative 3 for the County.

Out of the four project alternatives, Alternative 2 seems to be the least attractive. With Alternative 2, the project is not only complicated, very long and expensive, but it is also likely that widening the bridge would trigger a Finding of Adverse Effect and negatively impact its historical significance, despite using in-kind construction methods. Because the historic significance of this bridge considers the fact that this bridge is one of the longest unaltered stone masonry bridges in California, widening and strengthening the bridge is required to remove it from the EBL and would be considered a significant alteration.

Alternative 1 will have the smallest total project cost and the fastest project construction schedule. However, there are no outside funding sources identified for Alternative 1, and the entire project would need to be covered by County funds. Furthermore, Alternative 1 would not remove the bridge from the EBL as this alternative does not address the existing Functionally Obsolete condition of the narrow bridge width or existing scour at Piers 1, 2 and 4. The repairs would likely qualify for CEQA CE and this alternative does not require NEPA clearance or Section 106 consultation.

Alternative 3 enables the County to effectively repair the damaged railing and spandrel wall concurrently with an HBP funded project. However, this alternative is a larger project and would take longer to complete. Although the total project cost will be significantly more than Alternative 1, HBP funding will be available and the County's matching portion will only be 11.47% of the overall project cost. However, if the rehabilitation cost of Milliken Creek Bridge exceeds the estimated demolition cost, the County would be responsible for the difference in these costs. Depending on the required roadway and intersection improvements, the County's 11.47% portion is anticipated to be less than the County's cost with Alternative 1. Alternative 3 would permanently shift vehicular traffic onto Monticello Road, widen Monticello Road Bridge, repair the damaged railing and spandrel wall at Milliken Creek Bridge to be used for pedestrian and bicycle traffic only, rectify the existing scour at Piers 1, 2, and 4, and remove this bridge from the EBL while preserving its historic significance. Since HBP funds will be used, the required environmental documents would involve both CEQA and NEPA clearance, and Section 106 consultation. However, preliminary engineering to better assess the cost and feasibility of Alternative 3 was not part of the scope of this evaluation and is recommended. Conformance with HBP funding guidelines of the conceptual improvements will also need to be confirmed with the Caltrans DLAE.

If the County elects to permanently convert Milliken Creek Bridge to only carry pedestrian and bicycle traffic and Alternative 3 is determined to not be in conformance with HBP funding guidelines

by the Caltrans DLAE, the County may opt to evaluate Alternative 4. Out of all of the alternatives, this alternative appears to be the most expensive project. However, the repairs to the existing bridge would be incorporated into an HBP funded project and HBRRP funds would cover 88.53% of the project cost, similar to Alternative 3. The bridge would also be removed from the EBL while preserving its historic significance. Since HBP funds will be used, the required environmental documents would involve both CEQA and NEPA clearance, and Section 106.

This condition evaluation and improvement feasibility evaluation was performed under the supervision of the undersigned Registered Engineer.

Should you have any questions, please do not hesitate to call.

Sincerely,

BIGGS CARDOSA ASSOCIATES, INC.

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Ronald L. Oen, PE Associate

