April 29, 2022

To: Crystal River Country Estates Property Owners

Re: Information packet – Bridge inspection/maintenance results.

Pages:

#2 through #3 …….. 8/8-14/20 email: Ben Wilson Project Manager, Colorado West Regulatory Section U.S. Army Corps of Engineers.

#4 through #8 …….. 3/29-31/20 email: Ben Wilson Project Manager, Colorado West Regulatory Section U.S. Army Corps of Engineers.

#9 through #10 …….. 9/10/21: Observation of existing bridge abutments – Kumar & Associates

#11 through #22 …….. 12/6/21: SGM – Structural engineering bridge report.

#23 through #25 …….. 2/22/22 email: Scour Protection – Mueller Construction Services, Inc.

#26 through #28 …….. 3/25/22: SGM Crystal River Country Estates POA – Bridge Scour Repair Engineering Services

Dear Property Owner:

The annual 2022 POA meeting will be scheduled toward the end of May. At the 2021 annual meeting the membership voted to spend up to $5,000.00 to have the bridge and adjacent banks inspected. The enclosed communications, inspection results, recommendations and some options of how we might proceed ended up costing $3,000.00. The information should be reviewed prior to the meeting to facilitate discussion. Any work, if approved, needs to be completed at low runoff, sometime between October/November. At present, there are no defects to the bridge structure itself. The old abutments are stable, non-supporting, and were left in place to act as riprap and to protect the new abutments. The east side abutment and adjacent river bank is taking the most wear and is the focus of any work that will be needed.

Briefly, the scope of work would entail pumping concrete along the footer of the old east abutment to fill in what the river has washed out since 1968. The riprap also needs shoring up on both sides of the old abutment. The cost estimate is anywhere from $15,000.00 to $60,000.00, depending on which “menu” of work the POA members decide on. If the POA decides to keep within the original footprint of the abutment and riprap, the work is considered “maintenance” and only requires two types of permits: one from the Colorado West Regulatory Section U.S. Army Corps of Engineers and one from Pitkin County. The permit from the Army Corps is free, there will be a cost of course from Pitkin County, to be determined. If we go beyond the footprint, there will additional costs for hydrologists, environmental, floodplain, and filing fees for both the Army Corps and Pitkin County.

There is also the option of the “do nothing” approach as one of the alternatives offered by Kumar & Associates, pages 10/11. The worst case is the old abutment would eventually wash out and a new concrete barrier would need to be poured to protect the new abutment(s). The upside to that scenario would be the ability to slightly widen the east-bank river constriction, reducing river turbulence. A benefit cost analysis was not done for that option.

Thank you

8/8-14/20 email: Ben Wilson Project Manager, Colorado West Regulatory Section U.S. Army Corps of Engineers.

CLASSIFICATION: UNCLASSIFIED

-----Original Message-----
From: westwind [mailto:westwind@sopris.net]
Sent: Saturday, August 8, 2020 10:15 PM
To: Wilson, Benjamin R CIV USARMY CESPK (USA) <Benjamin.R.Wilson@usace.army.mil>
Subject: [Non-DoD Source] Ray Pojman - Crystal River

Dear Ben:

Thanks for the information regarding maintenance on existing structures in waterways, the Crystal River in this case. As I explained our bridge was replaced in 1985 as the old one failed. The old abutments were left in place and the new pylons were installed behind them to keep construction out and away from touching the river. Since then, the concrete that's been protecting the "wings" of the original abutments started to fail, pulling away leaving a large void. This spring we were in the process of having SGM Engineering give us an estimate of what it would cost to have the bridge replace for insurance purposes when covid 19 took hold. As a result of Pitkin County regulations, we could not have a POA meeting and therefore couldn't vote on the $1,500.00 to $3,500.00 cost to SGM. However, in the process we discovered the old mix of concrete and rip-rap protecting the wings of the old abutments were in danger of being washed away by the 2020 spring runoff. If that were to happen it would leave the old abutments exposed and the old riprap in the river. Looking things over we decided to stabilize it with ten cubic yards of concrete and used rocks as forms to keep the concrete from seeping out and around the old riprap. The east side was just a matter of filling the gap but on the west side the old structure had broken in half and was in danger of sliding in the river. There we needed to fill in the gap from underneath and above and could still use another five cubic yards. The day after we poured runoff started and by the end of the week the Crystal came almost to the top of the new concrete block.

In the past whenever we did any work to protect our roads/bridge along the Crystal it's been our understanding so long as we do not "create" new/additional structure into the river then placing riprap or in this case concrete to protect property is permissible. There was some concern that our latest endeavor could cost us up to 100K in fines which seems somewhat extreme given the circumstances. After our phone conversation it was good to hear that the actions, we took were appropriate for our circumstances. We were also wondering does the Army Corp of Engineers have sole jurisdiction for the Crystal or can anyone else claim a legal interest? The State of Colorado, Pitkin County, the water court, environmental groups, etc.?

Thanks again Ben for taking the time to review our situation and you are welcome to come by any time to take a good, hands-on look. We are pretty remote and can stay at a yelling distance.

Take care,
Ray Pojman

CLASSIFICATION: UNCLASSIFIED

Subject: RE: [Non-DoD Source] Ray Pojman - Crystal River (UNCLASSIFIED)
Date: Fri, 14 Aug 2020 14:41:46 +0000
From: Wilson, Benjamin R CIV USARMY CESPK (USA) <Benjamin.R.Wilson@usace.army.mil>
To: westwind <westwind@sopris.net>

Ray,
Thank you for the information. As discussed, a Corps permit is needed for the placement of fill material into a water of the U.S., unless the work is otherwise exempt. In this case, it appears that the work you described was completed to maintain the existing structure as it was previously designed. For Corps purposes, work is considered maintenance if the size, scope, and character of the portions of the structure within waters of the U.S. are not altered (ie., apples for apples). Therefore, I believe that the work meets to requirements of the attached Maintenance Exemption and no permit was/is needed for the work.

I believe that the County would be the only other entity that may require approvals for this type of work but I am not familiar with each County's regulations.

Respectfully,

Ben Wilson
Project Manager, Colorado West Regulatory Section
U.S. Army Corps of Engineers
400 Rood Avenue, Room 224
Grand Junction, Colorado 81501
PH: (970) 243-1199, #1012
FAX: (970) 241-2358
Benjamin.R.Wilson@usace.army.mil

In response to COVID-19, Regulatory Division staff are teleworking from home or other approved location. We will do our best to administer the Regulatory Program in an effective and efficient manner. Priority will be given to health and safety activities and essential infrastructure. Action on your permit application or other request may be delayed during this emergency. We appreciate your patience over the next several weeks.

Let us know how we're doing. Please complete the survey at:
http://corpsmapu.usace.army.mil/cm_apex/f?p=regulatory_survey

3/29-31/20 email: Ben Wilson Project Manager, Colorado West Regulatory Section U.S. Army Corps of Engineers.

-----Original Message-----
From: Ray Pojman <westwind@sopris.net>
Sent: Tuesday, March 29, 2022 7:00 PM
To: Wilson, Benjamin R CIV USARMY CESPA (USA) <Benjamin.R.Wilson@usace.army.mil>
Subject: [Non-DoD Source] Ray Pojman - Crystal River Country Estates - bridge maintenance

Hi Ben:

Thanks for your time on the phone this afternoon. The synopsis is that the bridge was replaced in 1986 with the old abutments being left in place to protect the new abutments. Basically, they are acting as riprap, [6'] beyond the new abutments. That east side has a slight cut bank of about [5] degrees and since 1968 the river has eroded down [2'] along the old abutment footer. Also, either side of the old abutment wing walls need to have the riprap shored up and/or replaced, up and downstream to a distance of 15' 20' and then grouted back to the wing walls as was originally designed.

The plan would be:

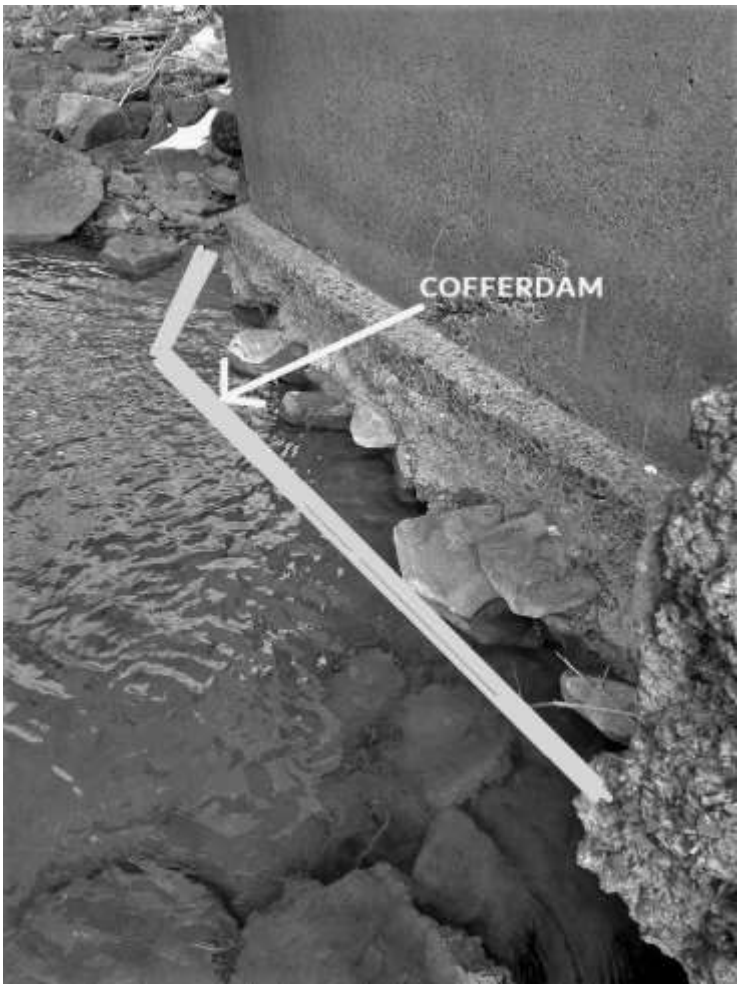
A) To place a coffer dam and then fill in the river bottom with concrete where it eroded out, to the original height of the footer. Estimated volume is [7] cubic yards. Contractor, Mueller Construction, indicated they would use sand bags as the coffer dam, at low flow in the fall.

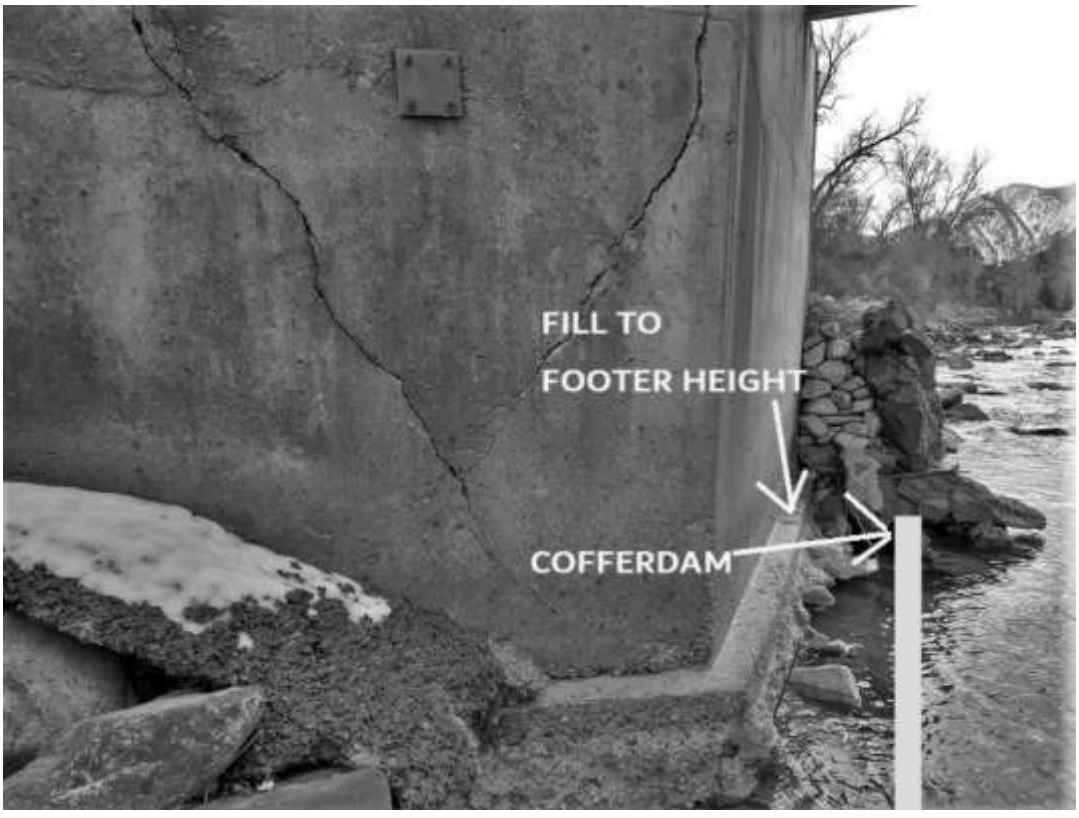
B) At the same time riprap will replace what was washed away along the wings of the old abutment and then grouted in place. Beyond 15'-20' from there, riprap will shore up the existing bank for another 30' if possible, without grouting it.

The west side is somewhat of a point bar so the erosion issue is not as immediate. At some point it will need to be shored up however.

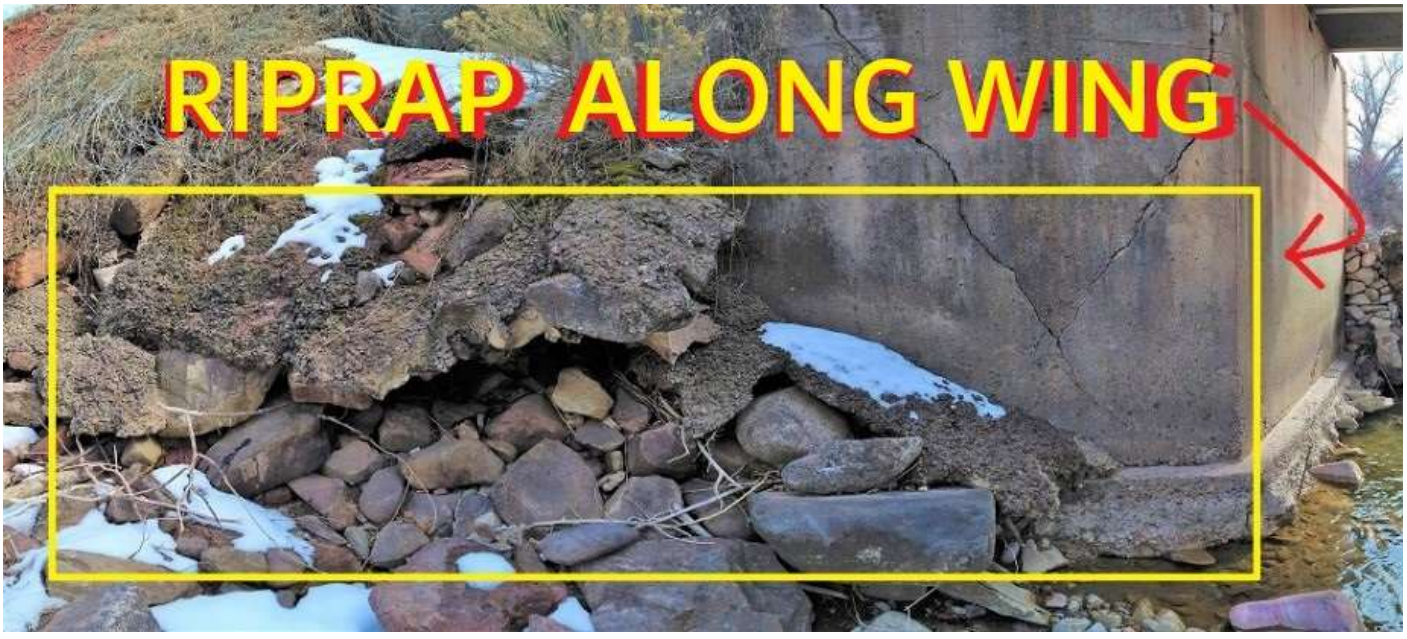
Sincerely,

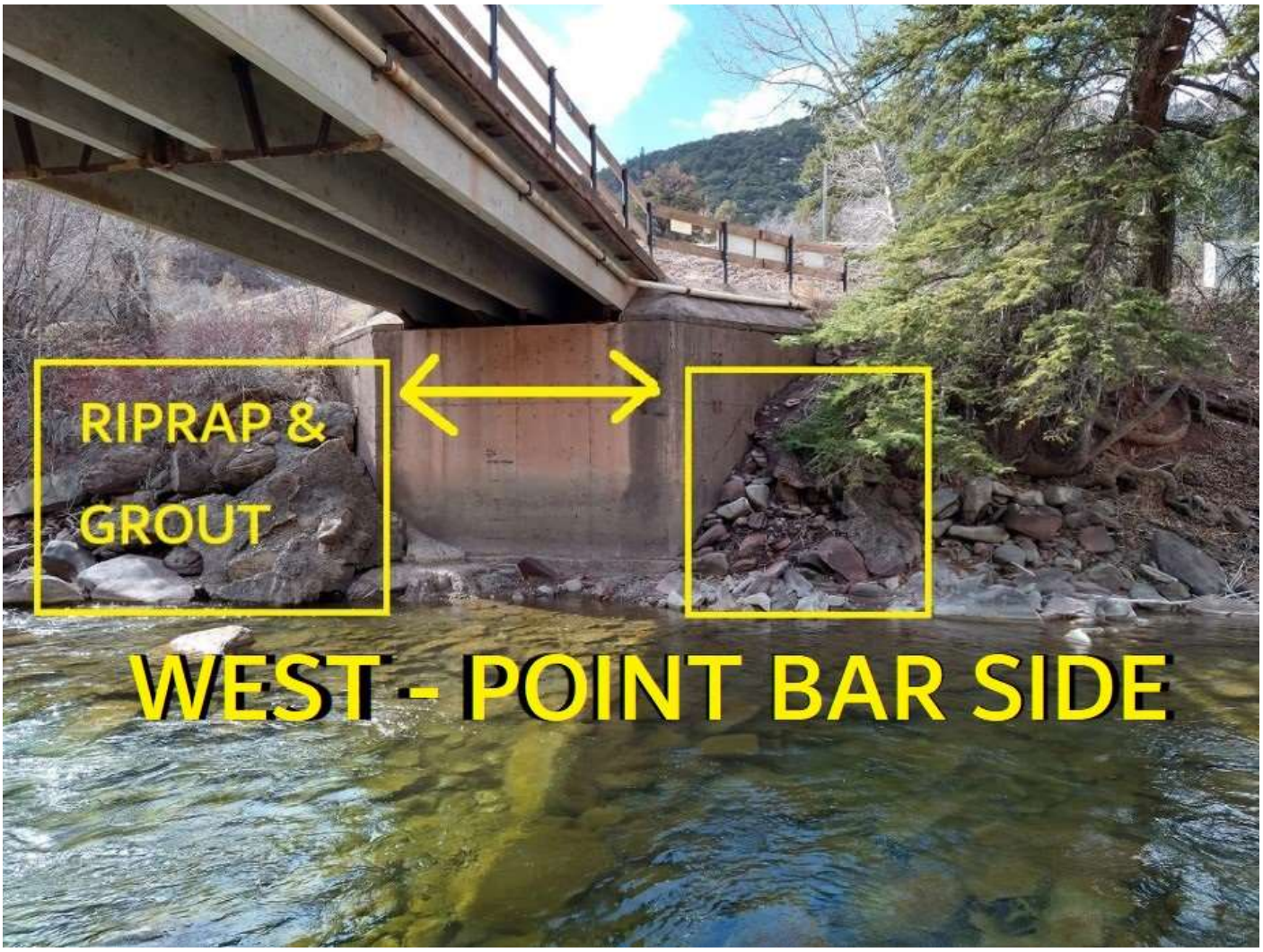
Ray Pojman
Crystal River Country Estates.


COFFERDAM


FILL TO
FOOTER HEIGHT
COFFERDAM


ORIGINAL HEIGHT OF GROUTED
ROCK-CONCRETE MIX


RIPRAP ALONG WING



Subject: RE: Ray Pojman - Crystal River Country Estates - bridge maintenance
Date: Thu, 31 Mar 2022 22:03:40 +0000
From: Wilson, Benjamin R CIV USARMY CESPA (USA) <Benjamin.R.Wilson@usace.army.mil>
To: Ray Pojman <westwind@sopris.net>

Thanks, Ray.

As discussed, a Corps permit is needed for the placement of materials into the stream or adjacent wetlands. However, maintenance (including replacement of materials) of an existing structure does not require a Corps permit if the size, scope, and character of the original structure is maintained. We often must use best professionally judgment to estimate what was part of the original construction. In my opinion, it is apparent that replacing the concrete footers would be considered maintenance and a Corps permit is not required. I would need to know when the grouted boulders were placed along the wingwalls to investigate if the use of grouted boulders would also be considered maintenance. It is also not apparent if the area you wish you placed grouted boulders expands beyond what was previously present. Can you please clarify?

The placement of any new materials would require a Corps permit. In this case, additional rip rap may be needed. NWP 13 is readily available for use if the riprap does not include grout or concrete. Based on my understanding, the additional riprap outside of the abutment wingwalls will not involve concrete or grout but there may be

additional grouted riprap along wingwalls. You will need to submit an application for Corps review if concrete or grout is involved in aspects of the project that are not considered maintenance. During that process you will need to prove that alternative natural designs are not practicable in terms of cost, logistics, and technology.

The temporary placement of sand bag cofferdams will require use of Nationwide Permit (NWP) 33- Temporary Access. In this case, NWP 33 is readily available for use without the need to submit a preconstruction notification (i.e., application) to the Corps. NWP 18 would also apply to project without the need to notify the Corps.

Regardless if portions of the project are exempt due to maintenance and others are not, there are readily available NWPs available if the project does not involve grouted riprap. I've attached the applicable NWPs. I've also attached the Colorado Regional Conditions that describe requirements related to the use of concrete or grout. I can provide you with another review after you provide clarification regarding the timing and spatial extent of the previously existing grouted riprap.

Benjamin Wilson
Project Manager, NW Colorado Branch
Albuquerque District, U.S. Army Corps of Engineers
400 Rood Avenue, Room 224
Grand Junction, Colorado 81501
PH: (970) 243-1199, #1012
FAX: (970) 241-2358
Benjamin.R.Wilson@usace.army.mil

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Kumar & Associates, Inc.®
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and Environmental Scientists

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September 10, 2021

Crystal River Country Estates
c/o Ray Pojman, VP
170 Crystal Circle
Carbondale, Colorado 81623
westwind@sopris.net

Project No. 21-7-734

Subject: Observation of Existing Bridge Abutments, Crystal River Country Estates, Pitkin County, Colorado

Dear Ray:

As requested, the undersigned representative of Kumar & Associates observed the existing conditions at the bridge abutments and river banks in the area of the existing bridge on September 8, 2021 for stability conditions. The findings of our observations and recommendations for the abutment support are presented in this report. The services were performed in accordance with our agreement for professional engineering services to Crystal River Country Estates dated September 8, 2021. We understand that our evaluation will be used as a basis for planning possible future grouting/stabilization of the existing boulders, particularly at the eastern abutment.

Existing Bridge: The existing one-lane bridge was built in 1984 to replace the previous bridge. We understand that the previous bridge abutments were left in place and the new precast concrete "twin tee" bridge is supported on driven piles located about 6 to 8 feet behind the existing bridge abutments. The overall condition of the concrete bridge deck appears to be very good considering that it is 35+ years old. The connections of the twin tee beams with the supporting piles were not visible and there are no reported concerns with the bridge or the pile supports.

Abutment Conditions: We understand that there are concerns with the stability of the boulders placed around the base of the existing bridge abutments. The bridge abutment walls consist of cast-in-place concrete with what appears to be a footing exposed just above the current, relatively low water level. The western abutment appears to currently be somewhat more protected as the river appears to be shallower on that side.

The eastern abutment has experienced some boulder movement and was recently grouted in the early spring by dumping about 10 cubic yards of redi-mix concrete to fill up the gaps between the bridge abutment and the boulders and try to stabilize the boulders protecting the upstream side of the eastern abutment. The deeper side of the Crystal River is currently closer to the eastern abutment resulting in more risk of undermining on that side of the river. There are significant cracks in the eastern abutment wall.

Evaluation: The recent grouting appears to have been helpful in keeping the existing boulders in place on the upstream side of the eastern abutment. The grout was simply poured from above onto the boulders, so the penetration into possible voids around the base of the upper boulders and around underlying boulders was likely less effective. The turbulent flow of the river, (particularly during spring runoff and large storm events) through the relatively constricted stream channel between the bridge abutments will continue to erode the boulder rip rap placed to protect the bridge abutments. The eastern abutment will need more stabilization than the western one. Possible stabilization methods are presented below:

1) The "Do Nothing" Option: The recent grouting has bought some time but river flood forces are powerful and it is likely that each flood event will continue to undermine the existing boulders. This time should be used for planning and gathering information on potential costs for a more extensive grouting program and placement of additional boulder rip-rap.
2) More extensive grouting from near river level into the voids around the existing boulders protecting both the upstream and downstream sides of the eastern abutment. It should be possible to at least partially grout below the water level back from the edge of the stream during low water times of year.
3) Additional rip-rap placement which should also be grouted. To the extent possible, the new rip-rap should be placed to minimize narrowing of the existing stream channel.
4) It would be prudent to engage an expert in stream channel flow to provide recommendations for long-term stabilization of the abutments and stream banks in the bridge area.

The recommendations submitted in this letter are based on our observation of the conditions exposed at the bridge. Access to the water level at the bridge abutments was nor possible due to the steep slopes and our observations were from road level.

If you have any questions or need further assistance, please call our office.

Sincerely,

Kumar & Associates, Inc.

Daniel E. Hardin, P.E.

Reviewed by:

COLORADO REGISTERED STEVEN L. PAWLAK 15222 PROFESSIONAL ENGINEER 9/17/21

Steven L. Pawlak, P.E.

DEH/kac

SGM

MEMORANDUM

TO: **Ray Pojman, Crystal River Country Estates HOA**

FROM: **Marijean Frymoyer, PE**

DATE: **December 6, 2021**

SUBJECT: **Crystal River Country Estates HOA (Bridge #8)**

SGM completed an inspection and assessment of the Crystal River Country Estates HOA bridge over the Crystal River in Pitkin County. The inspection was performed on November 30, 2022. The primary goal of this work is to assess the condition of the original bridge abutments and to provide recommendations for repairs. Also, a general inspection of all bridge components was completed.

This memorandum includes general descriptions, measurements, and photographs recorded during the inspection and descriptions of any specific damage, deformation, or deterioration observed. No structural analysis to determine the load carrying capacity of the bridge was completed. This memorandum does not reflect the full extent of notes, data, and photographs obtained during the inspection. This additional information can be provided upon request.

Each bridge element is rated using the condition states described below:

- **Good**-Like new condition with only minor defects.
- **Fair**-Primary structural elements are sound but may have minor deterioration such as initial section loss, deterioration, spalling, cracking, or scour.
- **Poor**-Advanced section loss, deterioration, spalling, cracking, or scour.
- **Severe**-Loss of section, deterioration, spalling, cracking or scour have seriously affected the structural element and reduced its capacity. Structural analysis of the component should be completed to determine the strength or serviceability of the element and bridge restriction or closure should be considered.

The as-built conditions for the bridge were based on our observations and the construction drawings from Schmueser & Associates Engineers & Constructors dated 4/4/85. These will be referred to as the “construction drawings” in this memorandum.

Bridge Description

The bridge was built in 1985. It is a single span prestressed concrete girder bridge with girder length of 60 feet. The out-to-out deck width is 14’-0”. There is a timber railing with steel posts embedded into the deck. The bridge is supported on concrete abutments with spread footings.

The bridge components constructed in 1985 are referred to as the "new" components in this memorandum.

The concrete abutment, footings, and wingwalls from the 1960s bridge were left in place. The bridge components constructed in the 1960s are referred to as the "old" components in this memorandum. The new abutments were installed approximately 6 feet behind the old abutments. Based on our review of the original drawings, experience with bridges of this type, and our engineering judgment, we have provided our recommendations for the old abutments based on the following assumptions:

- The old abutments do not appear to provide vertical support to the girders. The new girders are designed to span from new abutment to new abutment without intermediate support provided by the old abutment.
- The old abutments were left in place for scour protection.
- The old abutments and backfill placed between the old abutment walls and the new abutment walls are intended to provide resistance for overturning and sliding of the new abutments. This assumption was made for the following reasons:
    - The new abutment footing width is less than typical. The ratio of the footing width to abutment height for vehicular bridges is typically 50-80%. On this bridge, that ratio is 35%.
    - Footings for abutments designed to resist overturning loads are offset so that the width behind the wall stem is more than that in front of the wall stem. In this case, the stem is centered on the footing.
- The old abutments are connected to the new superstructure to provide lateral resistance.
- **Failure of the old abutment would result in inadequate scour protection for the new abutment and could result in an unstable condition for the new abutment.**

Deck and Railing Condition

The deck consists of 6" deep reinforced concrete that is fully supported by the top flange of the prestressed girders. **The deck is in good condition.** The railing consists of horizontal timber rails and steel pipe posts. While this is not a crash tested design, **the railing is in fair condition.**

Reference Photo 1.

Superstructure Condition

The superstructure consists of two double Tee prestressed concrete girders. Note there are metal plates between the bottom of the webs and the old concrete abutments. The purpose of these plates is not clear, however we assume it is to provide lateral support to the top of the old abutment wall. The length of girder between the old abutment and new abutment is not visible for inspection. **The girders are in good condition.**

Based on the construction drawings, the total Design Gross Vehicle Weight is 56,000 lbs. (28 Tons). The load carrying capacity has not been independently computed as part of this inspection or memorandum. **The bridge is posted for a 30 Ton weight limit which is 7% higher than what it is designed for.**

Reference Photo 11.

New Substructure Condition

Based on the plans referenced above, the new substructure consists of concrete spread footing abutments. The new abutments were installed 6 feet behind the old concrete abutment. **The new abutments are not visible for inspection and therefore its condition cannot be assessed.**

Old Substructure Condition

The old abutments and wingwalls consist of unreinforced concrete. The old wingwalls have a metal plate with 4 rebars sticking out, presumably to restrain the walls from rotating out. **The old concrete abutment and wingwalls are in poor condition.** The following defects were noted in the old concrete abutment and wingwalls:

- East Abutment:
  - Footing is exposed and undermined near center of the bridge. The most significant scour location measured 30" from the top of the footing to the creek groundline
  - Abutment wall has ¼" wide horizontal crack at ~mid height
  - Corner between abutment wall and SE wingwall has 1" wide vertical crack, full height, note it appears that this was previously filled with grout
  - Southeast Wingwall has 2" wide crack, full height, the portion of wingwall on the south side of the crack is offset ~1/4" towards the river
  - Southwest Wingwall has ¼" wide diagonal cracks, full height
- West Abutment:
  - Footing is exposed up to 11"
  - Abutment wall has hairline vertical and diagonal cracks throughout
  - Abutment wall has 6" diameter rock pocket
  - Southwest Wingwall has ¼" wide diagonal crack

Reference Photos 6-12.

Channel Condition

The Crystal River is generally straight upstream of the bridge and the channel consists of medium to large cobbles. The old bridge abutments create a constriction in the channel which increases the flow velocity and the scour potential. Currently the channel is deeper near the east abutment. There is rip rap located along the four wingwalls and on the banks upstream and downstream of the bridge. The rip rap at the SE wingwall was filled with concrete in the spring of 2021. The rip rap at the SW and NE wingwalls were previously grouted. There is no rip rap in front of the old abutments. **Additional protection is required in front of the abutments to prevent further undermining.**

Reference Photos 2-5 and 11-13.

Recommendations

The following repair, maintenance and monitoring items are recommended maximize the remaining lifespan:

- Monitor width of cracks in the old abutments and wingwalls to determine if there is continued movement. If crack growth continues, repairs should be developed to stabilize, strengthen and/or replace the walls.
- Monitor scour at old abutment footing and condition of rip rap in front of old wingwalls (especially after high flow events).
- Extend the bottom of the old abutment footings and/or provide rip rap in front of the old abutment footings and across the channel below the bridge. Prior to repairs, a hydraulic analysis of the stream channel should be performed to determine proper sizing and extents of rip rap.
- An alternative design could be evaluated that would remove the old abutments to widen the channel and eliminate the constriction of the waterway. This design would need to confirm that the new girders as not being supported on the old abutments. The capacity of the new abutments would need to be evaluated and would probably require some retrofit due to the removal of the horizontal restraint provided by soil retained by the old abutments.
- Extend grout at the SE corner riprap to the bottom of the rip rap, filling in all voids.
- Review bridge records to determine appropriate load posting sign weight limit.
- Note that any construction within the floodplain or wetland boundary may require a Pitkin County Floodplain Development Permit, USACE Section 404 Permit, or other relevant state and federal permits.

Limitations

The conclusions above are based on the information and observations available to us at this time. This report is based upon our site observations and our experience with projects of this

type. Unseen defects or conditions may exist that could affect the structural integrity of the bridge observed. We believe this work was conducted to the standard of care ordinarily practiced by other engineers in this area at this time. No warranty is made, express or implied.

Thank you for the opportunity to work with you on this project. Please do not hesitate to call me at 970-880-9502 if you have any questions or comments.

Respectfully Submitted:

SGM, Inc.

Marijean Frymoyer, PE
Structural Engineer

Mark Frymoyer, PE (Reviewed)
Structural Engineer

CC: Project File

I:\2021\2021-703-CRCEHOAbrdigeasse\001\E-Reports\SGM\ 2021.11.30_CrystalRiverEstatesBridgeInspection

Attachments:

Inspection Photos
Construction Drawings

Photo 1: Bridge Deck, Looking West (Towards State HWY 133)

Photo 2: Southeast Wingwall and Riprap (Upstream Side)

Photo 3: Northeast Wingwall and Riprap (Downstream Side)

Photo 4: Southwest Wingwall and Riprap (Upstream Side)

Photo 5: Northwest Wingwall and Riprap (Downstream Side)

Photo 6: 2" Open Diagonal Crack in Southeast Wingwall

Photo 7: 1" Open Vertical Crack at corner of Southeast Wingwall and Abutment

Photo 8: ¼" Horizontal Crack in East Abutment

Photo 9: ¼" Horizontal Crack in East Abutment

Photo 10: ¼" Diagonal Cracks in Northeast Wingwall

Photo 11: East Abutment Original Bridge Footing Exposed and Undermined

Photo 12: West Abutment Original Bridge Footing Exposed

Photo 13: Grouted Riprap at Southeast Wingwall

2/22/22 email: Scour Protection – Mueller Construction Services, Inc.

Subject:
Scour Protection at Bridge Abutment
From:
Joe Mueller <jmueller@muellerconstruction.net>
Date:
2/22/2022, 4:34 PM
To:
"westwind@sopris.net" <westwind@sopris.net>

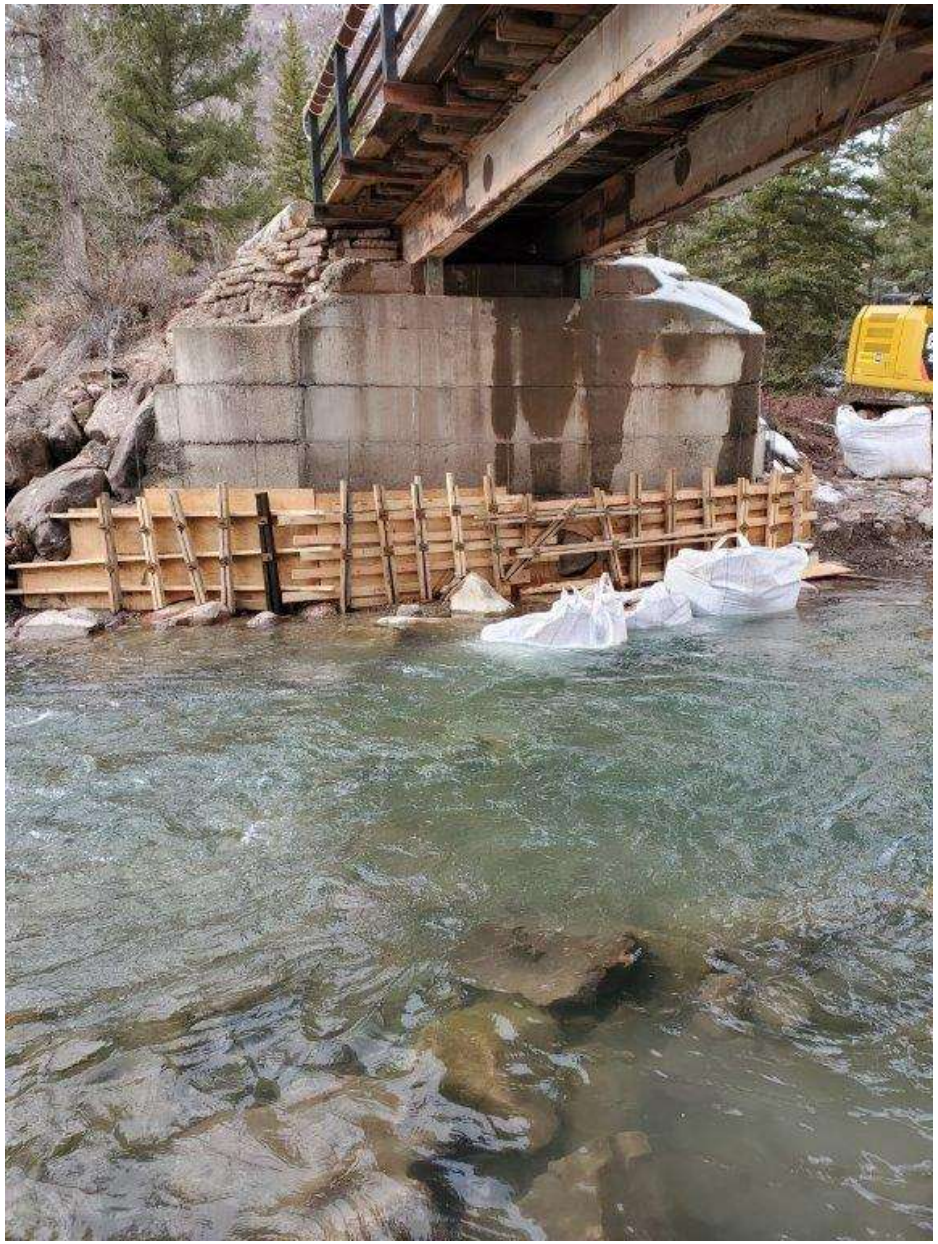
Ray – It was a pleasure meeting you today. You should be proud of the system that you helped create! Attached are pictures of scour protection we installed at the Wildin Bridge for Pitkin County last year. Your bridge will have similar but not likely as tall.

Sincerely,

Joe Mueller

Joe Mueller
President
Mueller Construction Services, Inc.
6520 CR 335
New Castle, CO 81647
Office 970-230-9353
Mobile 970-319-9514
Fax 970-230-9725
jmueller@muellerconstruction.net

MUELLER
CONSTRUCTION



March 25, 2022

Ray Pojman
Phone: (970) 963-1205
westwind@sopris.net

Delivered via email to: westwind@sopris.net

RE: Crystal River Country Estates POA – Bridge Scour Repair Engineering Services

Dear Mr. Pojman:

Per your request we have submitted the following scope of services to provide the necessary engineering documentation to complete an engineered scour repair for the existing bridge over the Crystal River.

Last November, SGM completed an inspection of the existing bridge abutments and provided recommendations for repairs. Recommendations were provided to extend the bottom of the original bridge footings and to install properly designed rip rap around the abutments to prevent further scour.

The construction activities within the floodplain will require submittal of County and Federal permits. SGM will provide documentation necessary to complete the permits. The County permit with be submitted/processed by Crystal River Estates. The federal permits/notifications will be submitted by SGM.

The scope of services and estimated fee are included below. The work will be performed on an hourly basis with a total estimated fee of $21,200.

Survey

Task 1: Bridge and River Survey
SGM will provide a topography and improvements survey for the bridge and within 10 feet of the bridge on all sides. This survey will include the limits of existing riprap, bridge abutments, girder soffits and underneath topography for the full width of the river under the bridge.

Task 2: GIS and Lidar Set Up
The survey data at the bridge site will be tied into LiDAR topography and GIS property boundaries within 300 feet of the bridge.

We propose to perform the hydraulics work on an hourly basis with estimated fee of: $3,600

Hydraulics Study and Scour Repair Plan

Task 1: Hydrology and Hydraulic Study
SGM will review hydrologic data available for use in floodplain modeling and mapping of the Crystal River through the project site. A hydraulic analysis will be prepared to determine the extents of the 100-year floodplain elevations for the existing and proposed conditions to evaluate the effects of the proposed improvements to the bridge abutments and scour protection measures. Existing hydrologic and hydraulic studies previously performed by others will be evaluated and utilized as applicable in the development of

the Crystal River floodplain analysis through the project site. This analysis will utilize the most current existing topographic data provided in the survey base map developed by SGM, and the proposed surfaces prepared by SGM engineering staff. A report of the analysis methods and results will be prepared for the use of floodplain development permitting through Pitkin County.

Estimated Fee: $5,500

Task 2: Scour Protection Analysis
SGM will prepare calculations to size rip-rap scour protection for the bridge abutments based on velocities obtained from the floodplain analysis. This task includes analysis of existing and proposed conditions, coordination with structural design and preparation of a narrative to summarize calculations and installation methods for scour protection measures along the bridge abutments.

Estimated Fee: $1,500

Task 3: Permit and Construction Plan Preparation
SGM will prepare the various submittal documents and construction plans to accompany the floodplain development permit application for submittal to Pitkin County. This task will include coordination with the client and their representatives, the structural and environmental engineers for accurate representation of improvements and wetland encroachments, and County staff for compilation of the various reports, plans, and exhibits to address submittal checklist items needed for permit submittal application. SGM will also coordinate with the client and/or their representative to address County review comments as needed throughout the review process. It is assumed that the client will provide permit processing services separately (for the County permit).

Estimated Fee: $5,000

We propose to perform the hydraulics work on an hourly basis with estimated fee of: $12,000

Environmental/Permitting

Per your request, this proposal provides a schedule and fee estimate for a section 404 permit application suitable for submittal to the U.S. Army Corps of Engineers (USACE).

Task 1: Wetland Pre-construction Notification/Permitting
SGM understands the proposed work includes repairs to the existing Crystal River Estates bridge. SGM will delineate any wetlands in waters of the U.S. in the project area, and when a project plan is available, SGM will develop a delineation report and permit application for submittal to the USACE for compliance requirements under Section 404 of the CWA, which would include preparation of a Nationwide Permit and completion of a Pre-Construction Notification, as needed.

Estimated Fee: $1,100

Task 2: Nationwide Permit 3 or 14
For activities with less than 0.5 acres of permanent wetland fill, Nationwide Permit 14 – Linear Transportation Project, or Nationwide Permit 3 - Maintenance, would likely be a suitable permitting vehicle. At this time, we are assuming an NWP-14 would suffice. As the bridge has seen maintenance activities in the past 50 years, an archaeological survey would not be necessary.

Estimated Fee: $1,000

We propose to perform this work on an hourly basis with an estimated fee of: $2,100

Bridge

This scope of work includes providing a concrete repair detail to extend the original bridge abutment footing. Plans will be stamped by a Colorado Professional Engineer.

A limited amount of constructions services will be provided to support the construction process and provide a final site visit to document the repaired conditions as needed for permits.

Bridge engineer will also provide project management coordination between the Client and the other disciplines.

We propose to perform this work on an hourly basis with estimated fees of: $3,500

Exclusions

Crystal River Estates (POA) will submit permit documents to the County. They will also contract and coordinate with the Contractor performing the work. POA will be responsible for advertising project to local Contractors and providing any necessary general conditions and contract documents.

No analysis of existing bridge will be performed. No utility locates. This will be the responsibility of the Contractor. This will not trigger the SUE law.

Thank you for the opportunity to provide these services. Please feel free to contact me if I may provide further information or detail.

Sincerely,

SGM

Marijean Frymoyer, Senior Engineer, PE