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Date: 31 October 2017

Subject: Raging River Quarry Bridge Inspection
BergerABAM Job No. A18.0095.00

From: Nick Colson, PE

To: Mr. John Priebe
Raging River Quarry, LLC
3132 NE Harrison St.
Issaquah, WA 98029

Cc: Scott Branlund, PE, SE; Matt Perry

Dear Mr. Priebe,

This letter report summarizes our inspection of the bridge at the Raging River Quarry between Preston and Fall City, Washington.

SITE VISIT

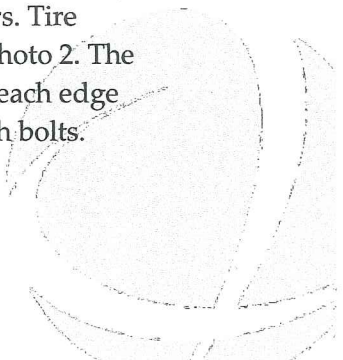
On 3 October 2017, BergerABAM personnel Nicholas Colson, PE, and Matt Perry performed a structural inspection of the Raging River Quarry Bridge. Nicholas Colson's Washington State bridge inspector identification number is G1216. Matt Perry's is G1217. The bridge was previously inspected by BergerABAM on 1 August 2007 with a condition survey report and load rating submitted.

The Raging River Quarry Bridge (Photo 1) is located on the west side of the Preston – Fall City Road and provides access to the quarry site. The bridge is a simple span, two-girder steel bridge with a timber deck. The overall deck length is approximately 63'-4"; overall deck width is approximately 14'-0". The span is approximately 61 feet.

INSPECTION FINDINGS

Timber Deck

The deck consists of treated 8x12 timbers bearing on the girder flanges perpendicular to the bridge longitudinal axis. The deck timbers do not appear to be fastened to the girders. Tire travel lanes are fabricated from four 3x12s laid side-by-side at each wheel line; see Photo 2. The travel-lane planks are spiked to the timber deck at each plank end. Curbs located at each edge of the deck are fabricated from 8x12 timbers that are fastened to the deck planks with bolts.



The deck planks, travel-lane planks, and the curb members were sounded with a hammer. The results indicate that the last few inches of four of the travel lane planks, two of the transverse cross members (Photo 3), and one section of curb timber (Photo 4) are experiencing dry rot. The dry rot in the curb section is up to seven inches deep, while in the two transverse deck timbers the dry rot is up to four inches deep.

The east end of the northern curb is not secure to the deck planks and is loose. Many of the curb bolts on both the north and south side of the bridge are missing nuts and washers below deck. We recommend the curbs be fastened securely to the deck planks with washers and nuts below deck.

Steel Girders

Measurements of the girder flanges and web indicate that they are most likely a W30x172 made between 1953 and 1970. A manufacturer's logo rolled into the web of one of the girders identifies it as being made by the United States Steel Company. Cover plates have been added to the top and bottom flanges to increase the load-carrying capacity of the girders. Web stiffeners have been added to the girders to increase their shear and bearing capacity (Photo 4). We were informed during the current inspection that the girders had previously been used for another structure and were purchased used from the state of Washington.

Diaphragms fabricated from various sizes of steel angles have been attached to the girders at four locations (Photo 5).

The girders appear to be placed directly on the concrete abutment; no bearings were visible.

Although the paint system is failing and corrosion has occurred, the section loss due to corrosion is minor at this time, with little to no change since the previous inspection in 2007, and does not affect the load-carrying capacity of the structure.

Abutments

The abutments appear to be 12-inch-thick, cast-in-place concrete spread footings (Photo 4). It is unlikely that the abutments are pile-supported because the abutment slab is too thin to provide adequate pile attachment. The abutment back wall is made of 12-inch timbers supported on the footing and bearing against the ends of the girders. Both abutments appear in good condition based on the visible portions.

Riprap Bank Armor

Armor rock at the east abutment is providing adequate protection (Photos 6, 7 and 8). Armor rock at the west abutment directly beneath the structure was previously noted as displaced during the 2007 inspection, and now appears stable and has been supplemented by the addition of quarry spalls.

When comparing the 2007 photos to the present conditions, it appears as though some individual pieces of armor rock are in slightly different locations. However, this likely occurred during placement of the quarry spalls as at least one large rock moved up slope rather than down slope, which indicates the repositioning of some armor rock was needed.

RECOMMENDATIONS

Our recommendations made following the 2007 inspection included replacement of timber deck elements and placement of additional armor rock adjacent to the west abutment. These repairs were performed, with replacement of the majority of the deck timbers in 2015, as well as the addition of the quarry spalls at the west abutment.

The one curb section and two transverse deck timbers currently observed with dry rot should be replaced during the next routine maintenance, or earlier if their condition worsens. Attachment of the east end of the northern curb timber should also be corrected, and missing washers and nuts below deck should be installed.

The load rating performed during the 2007 condition inspection considered several truck loading types from the American Association of State Highway and Transportation Officials (AASHTO) Bridge Design Manual, 2002. Based on the current condition inspection, this load rating is still applicable.

Inspection of the bridge should occur on a 24-month cycle, since the two-girder configuration lacks load-path redundancy.

Sincerely,

Nicholas Colson, PE
Project Engineer

Matt Perry
Senior Construction Specialist



Scott Branlund, PE, SE
Senior Project Manager

Photos



Photo 1 – Overall view of the bridge looking upstream. Preston-Fall City Road is to the left; the quarry to the right.



Photo 2 – Overall view of the bridge deck looking to the east toward Preston-Fall City Road.



Photo 3 – Dry rot damage in transverse timber deck member



Photo 4 – Dry rot damage in timber curb member



Photo 5 – West end of the bridge. Note the web stiffeners welded to the girder, the lack of bearings, the concrete spread footing, and the timber back wall.



Photo 6 – Diaphragms made from steel angles. Note the cover plate welded to the bottom flange of the girders. Also note the good condition and distribution of the armor rock at the east abutment.



Photo 4 – Armor rock protection at the upstream side of the east abutment is in good condition.



Photo 5 – View of the west abutment. Note the quarry spalls which have been added since the previous inspection.



Photo 6 –View of the armor rock at the upstream side of the west abutment. The riprap is in good condition.