City of Carroll

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MEMO TO: Mike Pogge-Weaver, City Manager

FROM: Jack Wardell, Director of Parks and Recreation JW

DATE: August 18, 2021

SUBJECT: Graham Park Pedestrian Bridges – Condition Observation and Repair Recommendations Report - 2021

- Report

Chris Marvin and Daniel Jensen with Shive Hattery will be present to review the Condition Observation and Repair Recommendations report. The report consisted of

1. A site visit to visually inspect pedestrian bridges for visible deterioration and deficiencies such as railings or accessibility concerns.

2. A letter to the City documenting their review and findings. It includes photos and discuss observations noted along with general recommendations for corrective action if needed.

RECOMMENDATION: For the Mayor and City Council consideration and acceptance of the report and give City staff direction on the next steps for the project.

Graham Park Pedestrian Bridges

Condition Observation And Repair Recommendations

Shive-Hattery Project Number 4193010

SHIVEHATTERY
ARCHITECTURE + ENGINEERING

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EXECUTIVE SUMMARY

SCOPE OF WORK PERFORMED

The City of Carroll has requested structural evaluation services for two existing pedestrian bridges located in Graham Park. Shive-Hattery observed the existing condition of both pedestrian bridges and recommended corrective action.

The site visit was conducted on February 18th, 2021 by Shive-Hattery:

Chris Marvin, Shive-Hattery

APPLICABLE AND DESIGN GUIDELINES

Per the state adopted codes, the Codes enforced at the time of this report that have bearing on the structures are:

Iowa DOT – LRFD Bridge Design Manual
AASHTO – LRFD Guide Specifications For The Design Of Pedestrian Bridges

Design Criteria:

Pedestrian Live Load = 90 psf

SHIVE-HATTERY'S OBSERVATIONS

South Bridge:

- The north stone column at the east abutment appears to be leaning back towards the walkway. See photo 1 in the appendix.
- The railing on both sides of the bridge can be easily moved by a person pushing on it and does not provide any protection to a pedestrian falling. The railings are not OSHA or AASHTO compliant. See photo 2 in the appendix.
- Most of the wooden planks that make up the walking surface appeared to be in good condition. Two planks were found to have holes worn into them, but the rest appeared to be in good condition. See photo 3 in the appendix.
- The approach slabs appeared to be in decent condition. They were snow covered at the time of the visit. They float and are not anchored, which can create a slip/trip hazard at the abutment. The lip at the east abutment was measured to be about 1 3/8" during the site visit. See photo 4 in the appendix.
- The main beams appeared to be in good condition. There were no signs of decay or conditions that would cause deterioration. See photo 5 in the appendix.
- The crossmembers between the beams appeared to be in decent condition in some places and poor condition in others. The crossmembers in the middle of the bridge span appeared to be in acceptable condition. The crossmembers near the west abutment are starting to show signs of deterioration and the crossmembers near the east abutment are showing significant deterioration. See photo 6 in the appendix.

- The abutment walls appeared to be in good condition and there was no visible rotting. The abutment crossbeams also appeared to be in good condition. The ends of the beams had a small amount of rotting but was not of significant concern. See photo 7 in the appendix.

- Three of the 4 wooden piles are showing some age but appeared to be in decent condition. The north pile at the east abutment is has significant hollowing. See photo 8 in the appendix.

- The slope below the west abutment is steep and difficult to stand on. It was probably about 1:1. The slope along the east abutment was much shallower and easier to stand on. See photo 9 in the appendix.

North Bridge:

- The columns at the west abutment both appear to be leaning inwards towards the walkway. See photo 10 in the appendix.

- The railing on both sides of the bridge can be easily moved by a person pushing on it and does not provide much protection to a pedestrian falling. The railings are not OSHA or AASHTO compliant. See photo 11 in the appendix.

- Most of the wooden planks that make up the walking surface appeared to be in good condition. A couple planks are starting to show some wear and tear but nothing significant. See photo 12 in the appendix.

- The approach slabs appeared to be in decent condition. They were snow covered at the time of the visit. They float and are not anchored, which can create a slip/trip hazard at the abutment. See photo 13 in the appendix.

- The main beam along the north side of the bridge appeared to be in good condition with surface rust that has not affected the integrity of the beam. The main beam along the south side of the bridge was also rusty and has a large deflection in the middle. A smart level showed a cross slope of 4.1% which is out of ADA compliance. See photo 14 in the appendix.

- The crossmembers between the main beams appeared to be in decent condition. They are rusty, but they are in solid condition. See photo 15 in the appendix.

- The abutment walls appeared to be in good condition with no visible rotting. They are starting to show some wear and tear. The crossbeams were rusty but not rusted through and appeared to be in good condition. See photo 16 in the appendix.

- The wooden piles all are showing some age, but they all appeared to be in decent condition with no visible deterioration at the time of the visit. See photo 17 in the appendix.

- The slope below both abutments is very steep and nearly impossible to stand on. They are most likely steeper than 1:1. See photo 18 in the appendix.

SHIVE-HATTERY'S RECOMMENDATIONS

Summary:

After a review of the bridge structures, it is apparent that some action should be considered by the City to correct structural and safety deficiencies of the two bridges. Generally, there are a few options discussed below that could be explored by the City:

1. Repair the existing structures and bring up to OSHA/AASHTO compliance. This option is further detailed below for each bridge and would be recommended if the existing bridges have historical significance or value and the City is interested in maintaining the aging structures.

2. Demolition and reconstruction of one or both bridges. Due to some potentially large cost associated with repairs (namely the leaning stone columns/foundations repairs and railing replacement), it could be explored to remove the existing structures and replace one or both with a modern bridge. This would present the opportunity to modernize the structures and widen the bridges for two-way traffic and bring them up to code compliance. A modern bridge could be designed to mimic the feel of the historical bridge structures if desired.

3. Both bridges could be removed and not replaced. This option does not seem favorable due to the higher volume use of the bridges associated with stadium activity, however, it could be explored.

South Bridge:

1. Take down the north stone column at east abutment, investigate if the foundation was built below the frost line and if the foundation has rotated/moved, the column can then be rebuilt after confirming the foundation integrity or repairing/reconstructing the foundation to ensure its stability

2. Remove and replace both railings with OSHA/AASHTO compliant railings

3. Replace planks that have holes in them

4. Dowel new slabs into adjacent column foundations to prevent vertical movement

5. Remove and replace deteriorating crossmembers

6. Add new pile directly adjacent to rotting pile and extend abutment crossbeam over top of new pile

7. Armor slope at west abutment with riprap to prevent further slope erosion, this is proposed as part of the stream stabilization and armoring project

North Bridge:

1. Take down stone columns at west abutment, investigate if foundations go down to frost and if the foundations have rotated/moved, the columns can then be rebuilt after confirming the foundation integrity or repairing/reconstructing the foundation to ensure its stability

2. Remove and replace both railings with OSHA/AASHTO compliant railings

3. Dowel new slabs into adjacent column foundations to prevent vertical movement
4. Remove rust and paint existing main beam along north side of bridge
5. Remove and replace existing main beam along south side of bridge
6. Remove rust and paint existing crossmembers between main beams
7. Remove rust and paint existing crossbeams at the abutments
8. Armor slopes at both abutments with riprap to prevent further slope erosion, this is proposed as part of the stream stabilization and armoring project

Shive-Hattery, Inc.

Chris Marvin, EI
Shive-Hattery, Inc.

Alex Brase, PE
Shive-Hattery, Inc.

APPENDIX

South Bridge Photos

Photo 1: Looking west from east abutment, leaning column near side on right

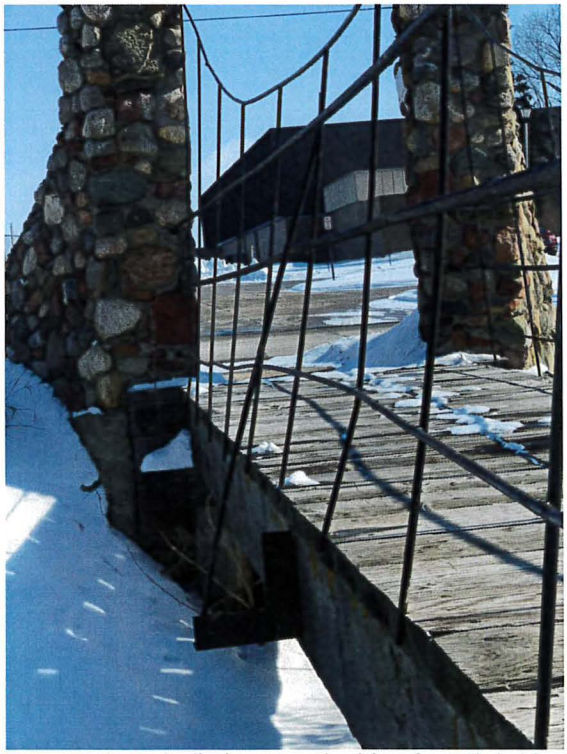

Photo 2: Guardrail along north side of south bridge

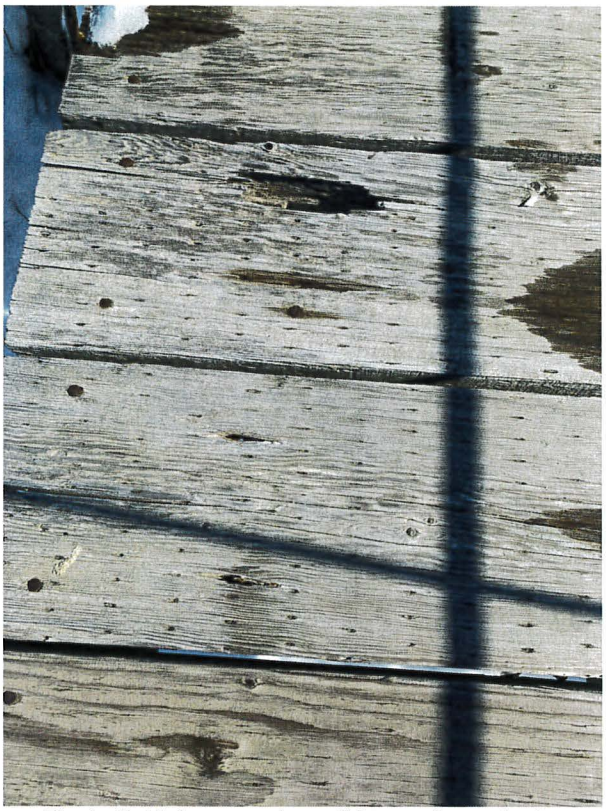

Photo 3: Holes worn in walking surface planks

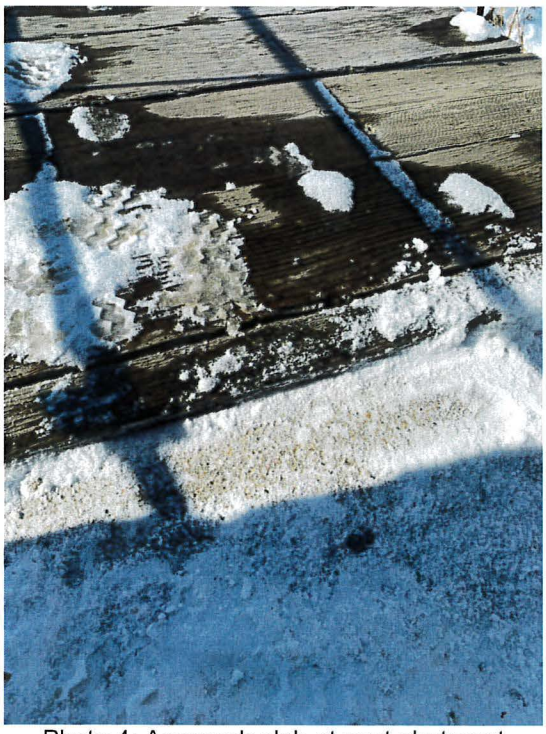

Photo 4: Approach slab at east abutment

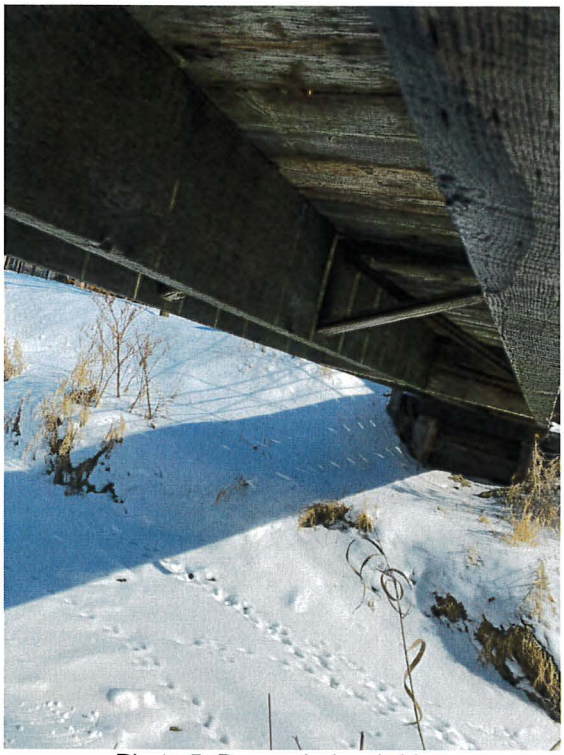

Photo 5: Beams below bridge

Photo 6: Beam crossmembers in poor condition near east abutment

Photo 7: West abutment wall and crossbeam

Photo 8: North wood pile hollowing out at east abutment

Photo 9: Slope below west abutment is about 1:1

North Bridge Photos

Photo 10: Leaning columns at west abutment

Photo 11: Guardrail along bridge

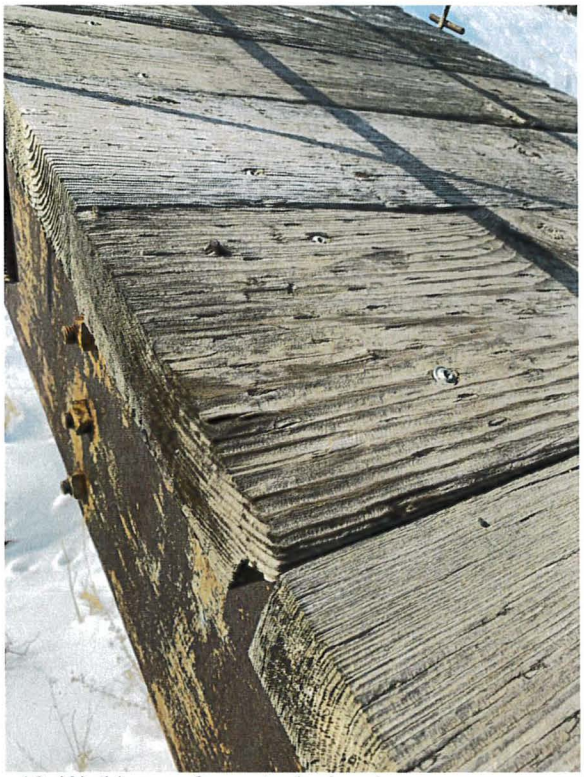

Photo 12: Walking surface plank showing some wear and tear

Photo 13: Approach slab at east abutment

Photo 14: Main beam along south side of bridge

Photo 15: Crossmembers at underside of bridge

Photo 16: East abutment

Photo 17: North pier at east abutment

Photo 18: Slope below both abutments is steeper than 1:1