

The Draft Project Concept Statement was sent out for review and comment with concerns to be resolved by Tuesday, May 26, 2015. Comments received during the review period have been considered and resolved.

This project is recommended for construction in FY 2020. The Office of Bridges and Structures will coordinate plan preparation with assistance from the Office of Design.

KKP: als

Attach.

cc:

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FINAL PROJECT CONCEPT STATEMENT

IA 1 Bridges in
Johnson County

BRF-001-5(104)--38-52

PIN: 13-52-001-030

Old Woman's Creek (Maint. No. 5278.9S001, FHWA 31690)

Old Man's Creek Overflow (New bridge proposed)

BRF-001-5(110)--38-52

PIN: 15-52-001-020

Old Man's Creek (Maint. No. 5278.0S001, FHWA 31680)

Highway Division
Office of Design

Kevin K. Patel, P.E.
515-239-1540

June 11, 2015

I. STUDY AREA

A. Project Description

This project involves the replacement of IA 1 bridges over Old Woman's Creek (Maint. 5278.9S001, FHWA 31690) and Old Man's Creek (Maint. 5278.0S001, FHWA 31680). The Old Woman's Creek bridge (#5278.9S001) is 0.6 miles south of County Road F52 and the Old Man's Creek bridge (#5278.0S001) is 1.5 miles south of County Road F52. An additional bridge is proposed for the Old Man's Creek Overflow, 0.8 miles south of County Road F52. The vertical profile of IA 1 will also be raised in the area of the bridges, requiring a total of 1,916 ft. of pavement reconstruction.

Three alternatives were considered:

1. Construct three new bridges at Old Woman's Creek, Old Man's Creek Overflow, and Old Man's Creek. The vertical profile will be raised, requiring a total of 1,916 ft. of roadway reconstruction. Traffic will be maintained utilizing an off-site detour. The estimated cost for this alternative is \$5,759,100, which includes \$50,000 for county road maintenance if county roads are selected as the official detour.
2. Construct three new bridges at Old Woman's Creek, Old Man's Creek Overflow, and Old Man's Creek. The vertical profile will be raised, requiring a total of 1,916 ft. of roadway reconstruction. Traffic will be maintained utilizing two-lane runarounds at each location. The estimated cost for this alternative is \$8,861,600.

3. Construct three new bridges at Old Woman's Creek, Old Man's Creek Overflow, and Old Man's Creek. The vertical profile will be raised, requiring a total of 1,916 ft. of roadway reconstruction. Traffic will be maintained utilizing staged construction at the bridges for Old Woman's Creek and Old Man's Creek. A runaround will maintain traffic at the Old Man's Creek Overflow bridge. The estimated cost for this alternative is \$9,597,200.

Alternative 1 is preferred because of the availability of an acceptable detour route and an estimated cost savings of \$3,102,500 over the other alternatives.

Alternative 2 is the second choice if the district staff prefers not to detour traffic.

Alternative 3 was dismissed because the staged bridge construction alternatives provide for two lane traffic in the first stage, but only one lane at a time in the second stage. Average daily traffic volume on IA 1 is estimated at 7,100 vpd which requires two lanes to be open at all times in order to avoid traffic backups.

B. Need for Project

The Old Woman's Creek Bridge (5278.9S001) is a 65 ft. x 30 ft. steel girder bridge which was constructed in 1949 and overlaid in 1990. The bridge is classified as "functional obsolete" due to the narrow deck width. The bottom of the deck has a few spalled areas with exposed rebar. The top of the deck has cracks and hollow and spalled areas. The overlay is at the end of its service life. The abutments have cracks with leaching and staining, large scaled areas, and large PC patched areas. The bridge was originally designed for H20 trucks and its capacity is not adequate for HS20 trucks. Provided with the age and the condition of the structure, deck replacement in conjunction with bridge widening and strengthening would not be an economical and practical option; therefore, the structure should be replaced.



Old Woman's Creek

Old Man's Creek Bridge (5278.0S001) is a 185 ft. x 26 ft. steel bridge which was constructed in 1949 and overlaid in 1986. The bridge is classified as "functional obsolete" due to the inadequate width. The deck, deck overlay, superstructure and substructure are all at the end of their service life and deteriorations are found in all the structural components. The structure was designed for H20 load and needs to be strengthened to HS20. The bridge widening in conjunction with bridge strengthening and bridge repair would not be cost effective; therefore, the bridge should be replaced.

In order to reduce the water surface elevation to obtain an Iowa DNR permit, a new overflow bridge will be constructed on IA 1. This bridge will be referred to as the Old Man's Creek Overflow. Although the water surface levels will be reduced with the construction of this bridge, ponding and flowage easement will still be required in order to obtain compliance with Iowa DNR low damage potential criteria. It is estimated that based upon the 50 year event, flowage easements totaling approximately 257 acres will be required. The proposed improvements to IA 1 remove the home just south west of Old Woman's Creek from the 100 year floodplain. The DNR high damage criteria were not met; however, considering the high damage potential structure was a garage on this property, this was considered reasonable. A secondary benefit of the overflow bridge is reduction of IA 1 flood closure from a 25 yr. frequency to a 100 yr.+ frequency.

C. Present Facility

The existing structure over Old Woman's Creek is a 65 ft. x 30 ft. steel beam bridge constructed in 1949. The existing structure over Old Man's Creek is a 185 ft. x 26 ft. steel beam bridge also constructed in 1949.

IA 1 in the project area is 28' wide PCC pavement with 8 ft. wide partially paved shoulders and 3:1 foreslopes, constructed in 1951. HMA resurfacing was accomplished in 1990 and microsurfacing was accomplished in 1999. HMA shoulders were paved in 2014.

D. Traffic Estimates

The 2018 and 2038 average daily traffic estimates are 7,100 ADT with 7% trucks and 8,200 ADT with 7% trucks, respectively.

E. Sufficiency Ratings

IA 1 is classified as an "area development" route and is a maintenance service level "B" road. The federal bridge sufficiency rating for Old Woman's Creek bridge (5278.9S001) is 38.8. The federal bridge sufficiency rating for Old Man's Creek bridge (5278.0S001) is 59.7.

F. Access Control

Access rights will not be acquired for this project.

G. Crash History

During the five-year study period from January 1, 2009 through December 31, 2013, there were 2 crashes, both property damage only, at the Old Man's Creek Bridge. There were no reported crashes at the Old Woman's Creek Bridge.

II. PROJECT CONCEPT

- A. Alternative 1: Replace the bridges at Old Woman's Creek and Old Man's Creek. Construct a new structure at Old Man's Creek Overflow. Raise the vertical profile on IA 1 which requires 1,916 ft. of roadway reconstruction. Maintain traffic utilizing an off-site detour.

At Old Woman's Creek, replace the existing 65 ft. x 30 ft. bridge with a 135 ft. x 44 ft. prestressed beam bridge. At Old Man's Creek Overflow, construct a new 150 ft. x 44 ft. continuous concrete slab bridge at MP 78.7. At Old Man's Creek, replace the existing 185 ft. x 26 ft. bridge with a 299 ft. x 44 ft. prestressed beam bridge.

The vertical profile will be raised at Old Woman's Creek approximately 0.9 ft. which will require 665 ft. of roadway reconstruction. At Old Man's Creek Overflow, the vertical profile will be raised approximately 0.7 ft. requiring 450 ft. of roadway reconstruction. And the vertical profile at Old Man's Creek will be raised approximately 1.6 ft. which will require 801 ft. of roadway reconstruction.

The typical cross section adjacent to the bridge will consist of a 24 ft. roadway (28 ft. wide pavement) with 10 ft. effective shoulders (2 ft. outside pavement, 4 ft. additional pavement and 4 ft. granular) and 6:1/3:1 foreslopes. The new pavement will be 9.5 in. thick PCC pavement on 12 in. of modified subbase.

All three bridges will be constructed on the existing horizontal alignment. Construct new bridge approaches. Replace the existing guardrail with new guardrail and pave the shoulders 20 ft. beyond the ends of the guardrail. Class 10 will be necessary to flatten the existing foreslopes and to construct the new guardrail blisters. Place class E revetment for slope protection under the bridges. Construct bridge end drains on each end of the bridges. Longitudinal subdrains and outlets shall be placed the entire length of the reconstruction.

Apply erosion control and rural seeding and fertilizing to all disturbed areas.

Right of way will be required for this project. Additionally, it is estimated that based upon the 50 year event, flowage easements totaling approximately 257 acres will be required.

Traffic will be maintained utilizing an off-site detour for approximately 120 calendar days. The detour route will be detailed in section B of this concept. \$50,000 is included in this preliminary cost estimate to maintain county roads that may be used as detour routes. The contractor will be required to maintain access to the properties between Old Woman's Creek and Old Man's Overflow at all times.

Bridge Items	<u>Estimated Costs</u>
New Bridges	\$ 2,341,500
Bridge Removals	54,900
Revetment	107,400
Coffer dam (Old Man's Creek)	75,000
Mobilization - 10%	257,900
M & C - 20%	<u>567,300</u>
Bridge Costs	\$ 3,404,000

Roadway Items	
Bridge Approaches	\$ 255,300
Removal of Pavement	41,500
Excavation Class 13 Waste	37,000
Pavement	218,700
Modified subbase	58,800
Embankment in place, contractor furnished	116,500
Paved shoulder	46,200
Granular shoulder	11,600
Guardrail (Includes Removal)	68,900
Paved Shoulders for Guardrail	77,400
Class 10 for Guardrail Blisters	36,000
Bridge End Drains	39,700
Longitudinal subdrains and outlets	32,100
Clearing and Grubbing	9,500
Erosion Control	15,000
Wetland Mitigation	150,000
Traffic Control - 5%	60,700
Mobilization - 5%	60,700
Flowage easements	411,000
Right of Way	15,000
County Road Maintenance, Patching	50,000

M & C - 30%	<u>543,500</u>
Roadway costs	\$ 2,355,100
 Project Total	 \$ 5,759,100

Alternative 2: Replace the bridges at Old Woman's Creek and Old Man's Creek. Construct a new structure at Old Man's Creek Overflow. Raise the vertical profile on IA 1 which requires 1,916 ft. of roadway reconstruction. Maintain traffic utilizing on-site detours (runarounds).

This alternative is similar to alternative 1; however, in lieu of detouring traffic, traffic will be maintained by 3 on-site two-lane runarounds during construction. The runarounds will consist of a 24' wide pavement with 3' paved shoulders and 3:1 foreslopes. The runaround for Old Woman's Creek will be approximately 1,390 ft. long north of the existing bridge. The runaround for Old Man's Creek Overflow will be approximately 1,090 ft. long south of the existing roadway. The runaround for Old Man's Creek will be approximately 1,850 ft. long north of the existing bridge. See attached for placement details.

Right of way will be required for this project. A temporary easement will be required to construct two-lane runarounds at each bridge location. Additionally, it is estimated that based upon the 50 year event, flowage easements totaling approximately 257 acres will be required.

Bridge Items	<u>Estimated Costs</u>
New Bridges	\$ 2,341,500
Bridge Removals	54,900
Revetment	134,000
Coffer dam (Old Man's Creek)	75,000
Temporary bridges (Old Woman's Creek and Old Man's Creek)	715,200
Mobilization - 10%	332,100
M & C - 20%	<u>730,500</u>
Bridge Costs	\$ 4,383,200

Roadway Items	
3 on-site detours (runarounds)	\$ 1,508,200
Bridge Approaches	255,300
Removal of Pavement	41,500
Excavation Class 13 Waste	37,000
Pavement	218,700
Modified subbase	58,800

Embankment in place, contractor furnished	116,500
Paved shoulder	46,200
Granular shoulder	11,600
Guardrail (Includes Removal)	68,900
Paved Shoulders for Guardrail	77,400
Class 10 for Guardrail Blisters	36,000
Bridge End Drains	39,700
Longitudinal subdrains and outlets	32,100
Clearing and Grubbing	9,500
Temporary floodlighting	22,100
Erosion Control	15,000
Wetland Mitigation	150,000
Traffic Control - 5%	137,200
Mobilization - 5%	137,200
Flowage easements	411,000
Right of Way	15,000
M & C - 30%	<u>1,033,500</u>
Roadway costs	\$ 4,478,400
Project Total	\$ 8,861,600

Alternative 3: Replace the bridges at Old Woman’s Creek and Old Man’s Creek. Construct a new structure at Old Man’s Creek Overflow. Raise the vertical profile on IA 1 which requires 1,916 ft. of roadway reconstruction.

This alternative is also similar to alternative 1; however, traffic will be maintained by staged construction at Old Woman’s Creek and Old Man’s Creek, and a runaround at Old Man’s Creek Overflow.

Right of way will be required for this project. A temporary easement will be required for the two-lane on-site runaround at Old Man’s Creek Overflow bridge. Additionally, it is estimated that based upon the 50 year event, flowage easements totaling approximately 257 acres will be required.

Traffic will be maintained utilizing staged construction at Old Woman’s Creek and Old Man’s Creek. Approximately 2,600 ft. of pavement for staging and 59 ft. wide bridges would be required for the staging alternative. A runaround would be constructed at Old Man’s Creek Overflow on the north side of IA 1. The staging alternative provides two lanes of traffic in the first stage, but only one lane at a time in the second stage. Average daily traffic volume on IA 1 is estimated at 7,100 vpd which requires two lanes to be open at all time to avoid traffic backups.

	<u>Estimated Costs</u>
Bridge Items	
New Bridges	\$ 2,913,600
Staged construction	397,300
Bridge Removals	54,900
Revetment	103,900
Coffer dam (Old Man's Creek)	75,000
Mobilization - 10%	354,500
M & C - 20%	<u>779,800</u>
Bridge Costs	\$ 4,679,000
Roadway Items	
On-site detour (runaround at Old Man's Creek Overflow)	\$ 380,000
Bridge Approaches	277,700
Removal of Pavement	59,800
Excavation Class 13 Waste	72,800
Pavement	218,700
Modified subbase	58,800
Pavement for staging	261,900
Special backfill	19,600
Embankment in place, contractor furnished	170,100
Paved shoulder	26,900
Granular shoulder	6,700
Guardrail (Includes Removal)	68,900
Paved Shoulders for Guardrail	77,400
Class 10 for Guardrail Blisters	36,000
Bridge End Drains	39,700
Longitudinal subdrains and outlets	32,100
Clearing and Grubbing	9,500
Temporary floodlighting	22,100
Temporary traffic signals	17,300
Pilot car	161,500
Flaggers	215,500
Erosion Control	15,000
Wetland Mitigation	150,000
Staged bridges – 30%	719,400
Traffic Control - 5%	119,900
Mobilization - 5%	119,900
Flowage easements	411,000
Right of Way	15,000
M & C - 30%	<u>1,135,000</u>
Roadway costs	\$ 4,918,200
Project Total	\$ 9,597,200

B. Detour Analysis

An off-site detour is proposed for Alternative 1. There are two options being considered. The detour options will be further discussed at a public meeting before the detour selection is made. \$50,000 is included in this preliminary cost estimate to maintain county roads that may be used as detour routes.

1. Detour option #1 uses county roads for IA 1 traffic. 7.4 miles of IA 1 will be closed for approximately 120 calendar days. The detour would follow Co. Rd. W62 west for approximately 1.7 miles, then the detour would turn north on Orval Yoder Turnpike for approximately 2.7 miles. The detour then turns east on Co. Rd. F52 (Black Diamond Road) approximately 6.3 miles to rejoin IA 1. Out of distance travel is approximately 5.2 miles. The total distance user cost is anticipated to be \$1,002,000. The cost for county road maintenance will be \$171,400 as calculated by the Gas Tax Method. Because of the traffic volumes on IA 1, an additional \$50,000 is included for county road patching. Detour signing costs will be \$10,000.
2. Detour option #2 uses state highways for the IA 1 traffic. Using this detour, IA 1 will be closed for 14.5 miles for approximately 120 calendar days. The detour would follow U.S. 218 south for approximately 10.5 miles, then the detour would turn west and follow IA 22 approximately 9 miles to rejoin IA 1. Out of distance travel would be approximately 5 miles; however, there would be no cost for county road maintenance as no county roads would be used. The total distance user cost is anticipated to be \$911,000. Detour signing costs will be \$10,000.

For alternative 2, two-lane on-site runarounds are proposed at each bridge location. See attached for placement. Including the temporary bridges, the estimated cost for all three runarounds is \$2,223,400 plus miscellaneous and contingencies costs.

Alternative 3 proposes staged construction. In order to stage these bridges, approximately 1,780 ft. of temporary pavement would be required and the bridge widths would be increased from 44 ft. to 59 ft. Additionally, a runaround would be required at the Old Man's Creek Overflow bridge. Two lanes of traffic would be provided during the first stage but only one lane at a time in the second stage. The average daily traffic on IA 1 in this area is 7,100 vpd, which requires two lanes to be open at all times in order to avoid traffic backups. Additionally, a pilot car and flaggers would be required 24/7 for the entire length of the project for approximately 150 calendar days. This alternative is dismissed due to these factors.

C. Recommendations

Alternative 1 is recommended because of the availability of an acceptable detour route and an estimated cost savings of \$3,102,500 over the other alternatives.

D. Construction Sequence

It is anticipated that all work on this project will be awarded to one prime contractor. The Office of Bridges and Structures will coordinate the plan preparation with assistance from the Office of Design.

E. ADA Accommodations

There are no bike paths or sidewalks adjacent to IA 1; therefore, no ADA accommodations are planned in conjunction with this project.

F. Accelerated Bridge Construction Analysis

An initial first stage accelerated bridge construction (ABC) rating score of 55 was calculated for the Old Woman's Creek Bridge. Typically, in order to be considered a good candidate for accelerated bridge construction an ABC score greater than 50 is required.

However, there are several factors associated with this project that limit the advantages of using ABC. The first factor to be considered is the two residential properties between Old Woman's Creek Bridge and the proposed new structure for Old Man's Creek Overflow. The contractor would need to maintain access to these properties at all times. Secondly, the proposed structure to replace Old Man's Creek Bridge is a 299 ft. bridge with tee piers. The construction of tee piers would need to be accomplished using conventional construction techniques thus increasing the time of construction over what is typically estimated for ABC construction. Lastly, the total project cost utilizing ABC is estimated to exceed the total project cost for alternative 2 due to doubling of the bridge costs over conventional construction (project cost estimated at \$9.2M with ABC vs. \$8.3M for alternative 2). Alternative 2 maintains two-way traffic throughout the project duration whereas ABC would probably require a 5 to 6 week closure.

Therefore based on the factors above, acceleration bridge construction was dismissed from further consideration.

G. Special Considerations

Right of Way will be required for this project. Temporary easements would also be required for Alternatives 2 and 3. Additionally, it is estimated that based upon the 50 year event, flowage easements totaling approximately 257 acres will be required.

The Office of Location and Environment has reviewed this project and has determined that a Section 404 Permit will be required. The work will be covered by a Nationwide Permit, provided that there is less than 0.5 acres of wetland impact at each location.

H. Program Status

Site data has been developed by the Office of Design. Project BRF-001-5(104)--38-52 is listed in the 2015-2019 Iowa Transportation Improvement Program, with \$975,000 programmed for replacement in FY 2018. Project BRF-001-5(110)--38-52 is not listed in the 2015-2019 Iowa Transportation Improvement Program. It is proposed to move the projects to FY 2020. Costs for this project may be eligible for bridge replacement funds. A schedule of events will be developed following approval of the Project Concept.

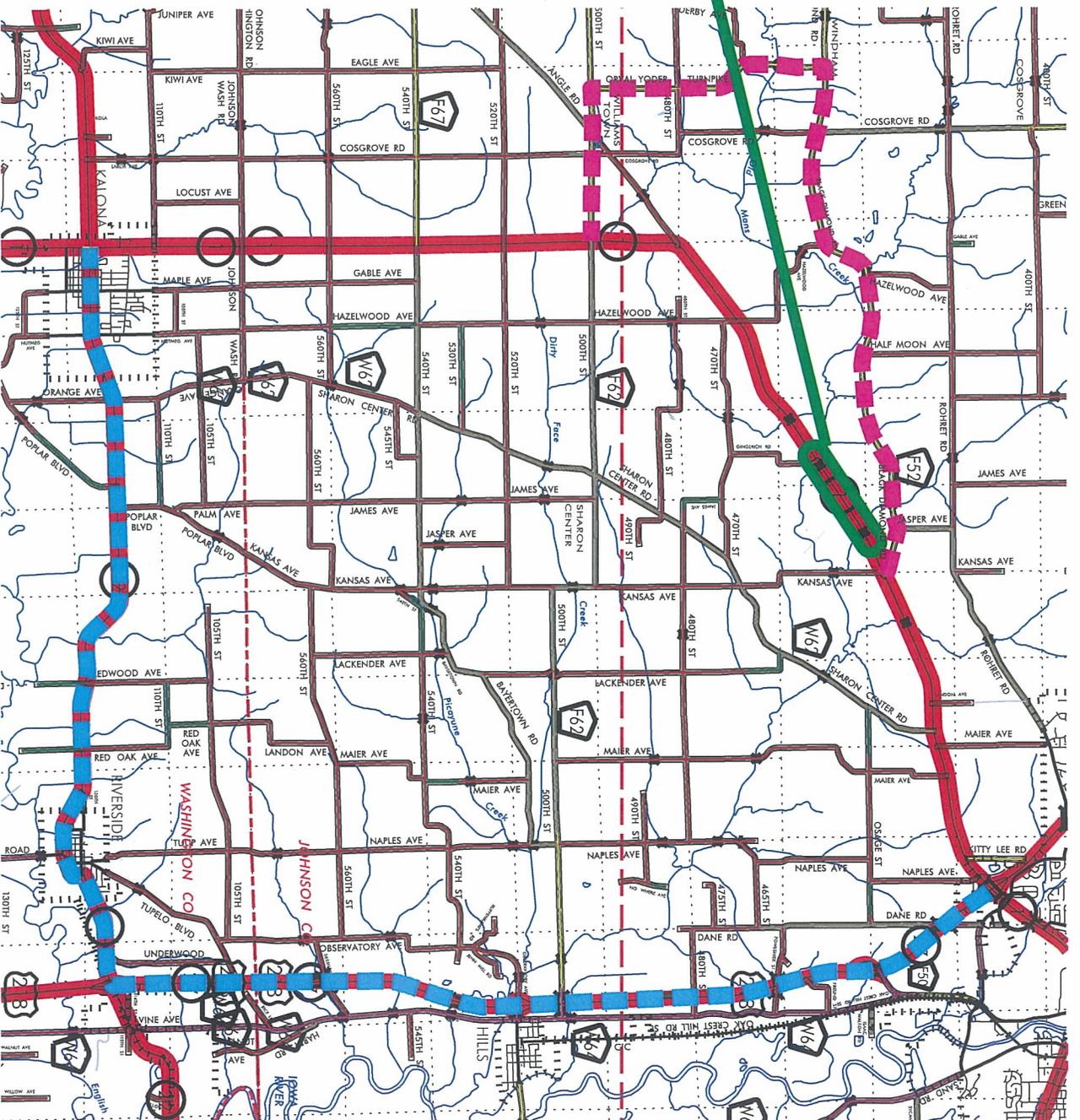
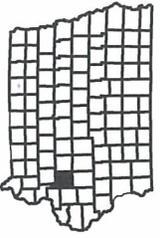
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JOHNSON COUNTY

IA 1

Bridges over
 Old Woman's Creek
 0.6 mi. S of Co. Rd. F52,
 Old Man's Creek Overflow
 0.8 mi. S of Co. Rd. F52,
 Old Man's Creek
 1.5 mi. S of Co. Rd. F52

- Detour #1
- Detour #2



JOHNSON CO. IA 1
Bridge replacements

BRF-001-5(104)--38-52
PIN: 13-52-001-030

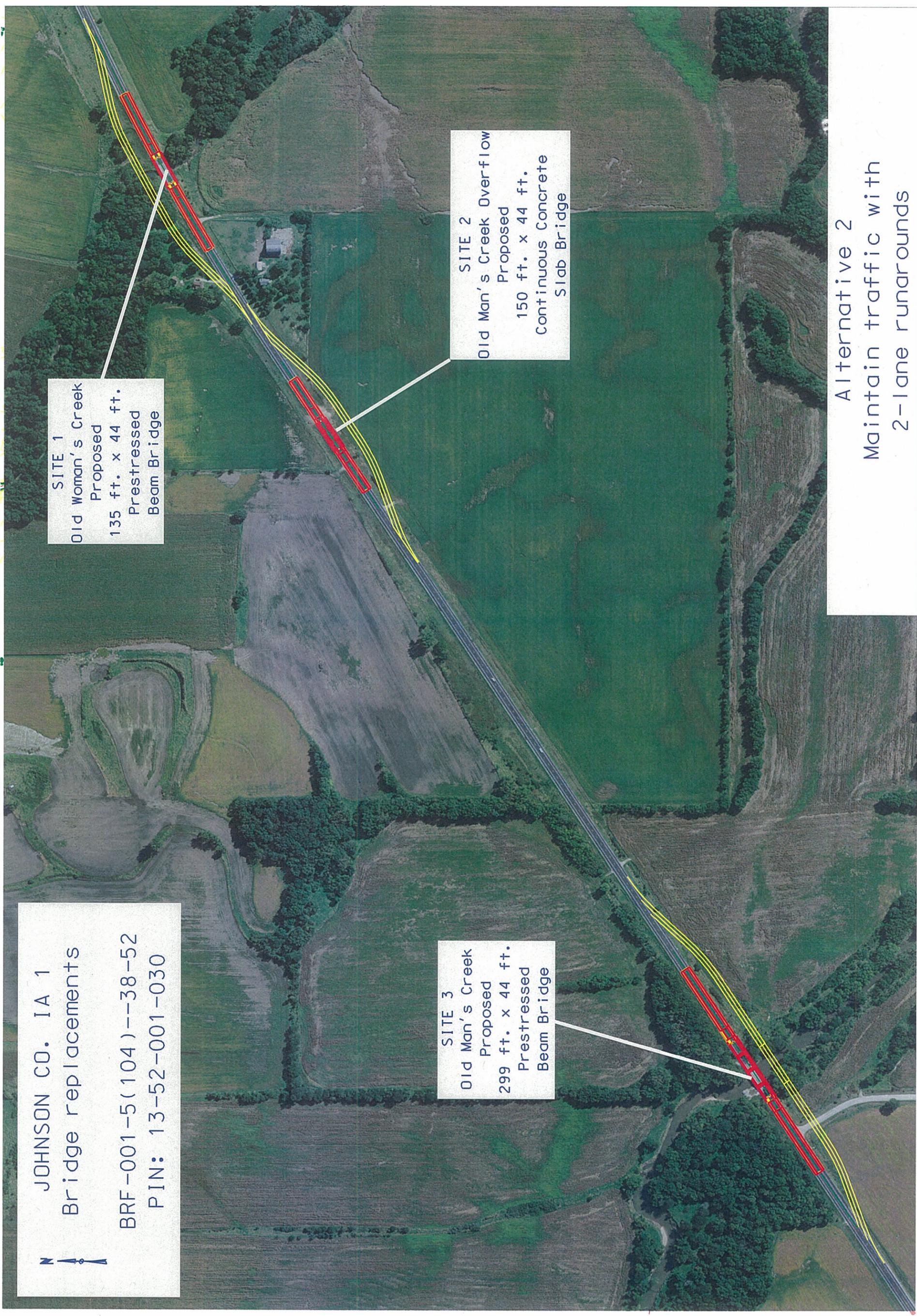


SITE 1
Old Woman's Creek
Proposed
135 ft. x 44 ft.
Prestressed
Beam Bridge

SITE 3
Old Man's Creek
Proposed
299 ft. x 44 ft.
Prestressed
Beam Bridge

SITE 2
Old Man's Creek Overflow
Proposed
150 ft. x 44 ft.
Continuous Concrete
Slab Bridge

Alternative 2
Maintain traffic with
2-lane runarounds



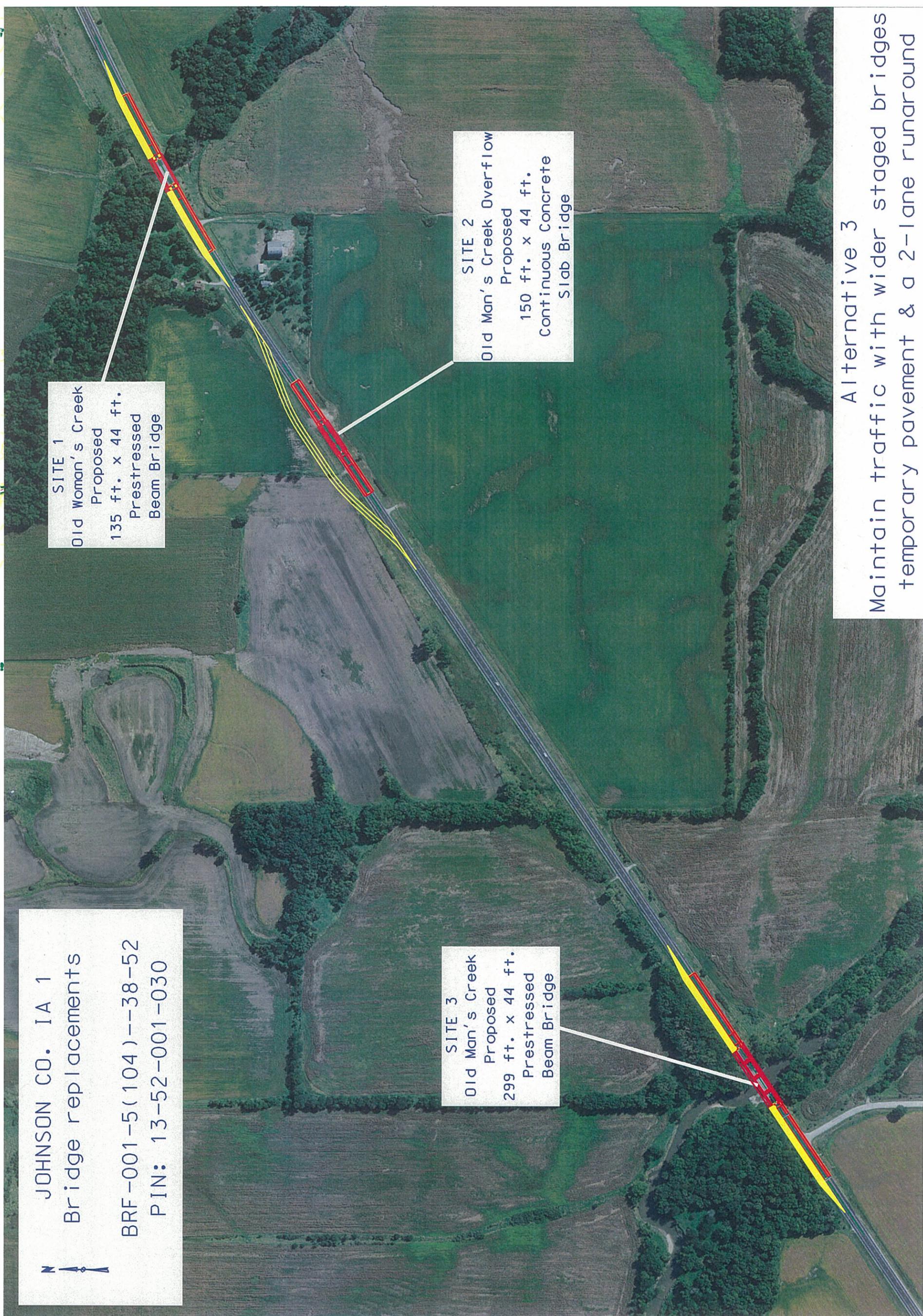


JOHNSON CO. IA 1
Bridge replacements
BRF-001-5(104)--38-52
PIN: 13-52-001-030

SITE 1
Old Woman's Creek
Proposed
135 ft. x 44 ft.
Prestressed
Beam Bridge

SITE 3
Old Man's Creek
Proposed
299 ft. x 44 ft.
Prestressed
Beam Bridge

SITE 2
Old Man's Creek Overflow
Proposed
150 ft. x 44 ft.
Continuous Concrete
Slab Bridge



Alternative 3
Maintain traffic with wider staged bridges
temporary pavement & a 2-lane runaround