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FINAL PROJECT CONCEPT STATEMENT

IA 78 Bridge over DME RR, 8.8 miles east of IA 149.

Keokuk County
BRFN-078-1(20)--39-54
PIN: 17-54-078-010
Maint. No. 5408.8S078
FHWA No. 32690

Highway Division
Office of Design

John Bartholomew, P.E.
515-239-1540

April 4, 2019

I. STUDY AREA

A. Project Description

This project involves the replacement of the IA 78 bridge (Maint. No 5408.8S078) over the DME Railroad, 8.8 miles east of IA 149.

The two alternatives considered were:

1. Replace bridge with a 402 ft. x 40 ft. continuous welded girder bridge, using an off-site detour. The estimated cost for this alternative is **\$7,658,000**.
2. Replace bridge with 362 ft. x 40 ft. continuous welded girder bridge, using an off-site detour. The estimated cost for this alternative is **\$6,354,800**.

Alternative No. 1 is the preferred alternative because of its less complex structure. It will also require less retainment due to the longer bridge. While the overall bridge length for Alternative No. 2 is shorter, the integral pier cap adds complexity to the design and construction that is not required for Alternative No. 1.

B. Need for Project

This is a 292 ft. X 26 ft. continuous I-beam bridge that was built in 1948. It is a fracture critical structure. An overlay was added in 1994 with epoxy injections in 2014, and the deck contains numerous cracks with leaching and staining. The steel beams have severe corrosion and section loss and need painting. The substructure is rated 5 and the abutment backwalls are broken and deteriorated needing repair. Due to the overall condition of the bridge and its age, replacement is recommended.



looking southwest



looking east

C. Present Facility

The existing structure is a 292 ft. x 26 ft. continuous I-beam bridge constructed in 1948.

IA 78 in the project area is 24 ft. wide HMA pavement with approximately 4 ft. wide granular shoulders and 3:1 foreslopes, constructed in 1949. HMA resurfacing was accomplished in 1966 and 1980, 4.5 inches and 3 inches respectively. Cold in place resurfacing was accomplished in 2001 with 3 inches of CIP and 3.5 inches of HMA.

D. Traffic Estimates

The 2022 construction year and 2042 design year average daily traffic estimates are 1,700 ADT with 15% trucks and 1,800 ADT with 15% trucks, respectively.

E. Sufficiency Ratings

IA 78 is classified as an “area development” route and is a maintenance service level “C” road. The federal bridge sufficiency rating is 42.6.

F. Access Control

Access rights will not be acquired for this project.

G. Crash History

During the five-year study period from January 1, 2014 through December 31, 2018, there was 1 personal injury crash.

II. PROJECT CONCEPT

A. Feasible Alternatives

Alternative #1 - Replace with a 402 ft. x 40 ft. continuous welded girder bridge, using an off-site detour.

The existing 292 ft. x 26 ft., continuous I-beam bridge will be replaced with a 3 span, 402 ft. x 40 ft., continuous welded girder bridge.

The typical cross section adjacent to the bridge will consist of a 24 ft. roadway with 8 ft. shoulders (4 ft. paved, 4 ft. granular) and 4:1 foreslopes.

The existing grade will need to be raised a minimum of 4.5 ft. which will require approximately 2,600 ft. of roadway reconstruction. New bridge approaches will be constructed. The existing guardrail will be replaced and updated with new guardrail and the shoulders will be paved 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. Macadam will be placed under the bridge for slope protection. New bridge end drains will be constructed on the east end of the bridge.

Six entrances are located within the reconstruction limits, three on the west side of the bridge and three on the east side of the bridge. The entrances will need to be raised to tie in with the new roadway alignment.

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

Right of Way will be required for this project.

Traffic will be maintained by an off-site detour.

Bridge Items	<u>Estimated Costs</u>
New Bridge	\$ 2,465,000
Bridge Removal	95,000
Extended Wings	40,000

Mobilization - 10%	260,000
M & C - 20%	<u>572,000</u>
Bridge Costs	\$3,432,000
Roadway Items	
Bridge Approaches	\$76,100
Removal of Pavement	69,300
PCC Pavement	397,900
Paved Shoulder	43,100
Modified Subbase	102,000
Granular Shoulder	18,000
Embankment in place, contractor furnished	653,400
Excavation Class 10 Waste	715,500
Excavation Class 13 Waste	26,600
Roadway Pipe	50,700
Subdrains and Subdrain Outlets	74,000
Entrance Pipe	20,400
Driveway Stone	1,900
Guardrail (Includes Removal)	12,700
Paved Shoulders for Guardrail	32,400
Class 10 for Guardrail Blisters	30,300
Bridge End Drains	6,100
Clearing and Grubbing	6,800
Seeding and Fertilizing	4,500
Erosion Control	50,000
Right of Way	15,000
Traffic Control - 5%	200,500
Mobilization - 5%	200,500
M & C - 30%	1,203,300
Railroad Insurance	10,000
Railroad Flagging	180,000
Detour Preparation	<u>25,000</u>
Roadway costs	\$4,226,000
Project Total	\$7,658,000

Alternative #2 - Replace with a 362 ft. x 40 ft. continuous welded girder bridge, using an off-site detour.

The existing 292 ft. x 26 ft., continuous I-beam bridge will be replaced with a 4 span, 362 ft. x 40 ft., continuous welded girder bridge.

The typical cross section adjacent to the bridge will consist of a 24 ft. roadway with 8 ft. shoulders (4 ft. paved, 4 ft. granular) and 4:1 foreslopes.

The existing grade will need to be raised a minimum of 2 ft. which will require approximately 2,350 ft. of roadway reconstruction. New bridge approaches will be constructed. The existing guardrail will be replaced and updated with new guardrail and the shoulders will be paved 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. Macadam will be placed under the bridge for slope protection. New bridge end drains will be constructed on the east end of the bridge.

Five entrances are located within the reconstruction limits, two on the west side of the bridge and three on the east side of the bridge. The entrances will need to be raised to tie in with the new roadway alignment.

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

Right of Way will be required for this project.

Traffic will be maintained by an off-site detour.

Bridge Items	<u>Estimated Costs</u>
New Bridge	\$ 2,205,000
Bridge Removal	95,000
Retaining Walls	80,000
Mobilization - 10%	238,000
M & C - 20%	<u>524,000</u>
Bridge Costs	\$3,142,000

Roadway Items	
Bridge Approaches	\$76,100
Removal of Pavement	63,500
PCC Pavement	356,200
Paved Shoulder	39,000
Modified Subbase	93,100
Granular Shoulder	16,400
Embankment in place, contractor furnished	426,800
Excavation Class 10 Waste	408,700
Excavation Class 13 Waste	24,800
Roadway Pipe	50,700
Subdrain and Subdrain Outlets	67,300
Entrance Pipe	17,200
Driveway Stone	1,500

Guardrail (Includes Removal)	12,700
Paved Shoulders for Guardrail	32,400
Class 10 for Guardrail Blisters	30,300
Bridge End Drains	6,100
Clearing and Grubbing	6,800
Seeding and Fertilizing	4,100
Erosion Control	50,000
Right of Way	15,000
Traffic Control - 5%	149,900
Mobilization - 5%	149,900
M & C - 30%	899,300
Railroad Insurance	10,000
Railroad Flagging	180,000
Detour Preparation	<u>25,000</u>
Roadway costs	\$ 3,212,800
Project Total	\$6,354,800

B. Detour Analysis

IA 78 will be closed and an offsite detour will be utilized. It is anticipated the detour will be in place for approximately 180 days. The detour would follow County Road V63 south approximately 3 miles. At the junction with County Road H17, the detour will turn east approximately 6.1 miles to the junction with IA 1 and then north approximately 3.1 miles to the junction with IA 78. Out of distance travel is 6.0 miles. The total distance user cost is anticipated to be \$447,600. The cost for county road maintenance will be \$26,200 as calculated by the Gas Tax Method. Detour signing costs will be \$10,000. The District Office has requested an extra \$25,000 for detour preparation.

<..\Cost-estimates\detour info & cost\Detour cost + Gas Tax Method.xls>

C. Recommendations

It is recommended that the present structure be replaced, as described in Alternative No. 1.

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.

The contractor is required to provide access to the entrances within the reconstruction limits at all times.

E. ADA Accommodations

There are no bike paths or sidewalks adjacent to IA 78; therefore, no ADA accommodations are planned in conjunction with this project.

F. Special Considerations

The ABC Rating Score of 42 is less or more than the first stage filter threshold of 50, therefore this bridge will not undergo further ABC evaluation.

A design exception may be needed for the profile grade of 4.2% using a 60 mph design speed.

No bike path or sidewalk will be required as part of this project.

Additional survey requests include, left and right top of rail profile shots every 100 ft. for 1000 ft. in both directions from RR crossing location at IA 78.

Right of Way will be required for this project.

The Railroad Crossing Number is 375837M. There are 20 trains per day on these tracks (12 daytime trains and 9 night trains). Railroad flaggers will be needed for approximately 120 working days.

The Office of Location and Environment has reviewed this project and based on preliminary desktop observations, has determined that a Section 404 Permit will be required. It is expected that the work will be covered by Nationwide Permit 14.

G. Program Status

Site data has been developed by the Office of Design. This project is listed in the 2019-2023 Iowa Transportation Improvement Program, with \$3,000,000 programmed for replacement in FY 2022. Costs for this project may be eligible for bridge replacement funds. A schedule of events will be developed following approval of the Project Concept.

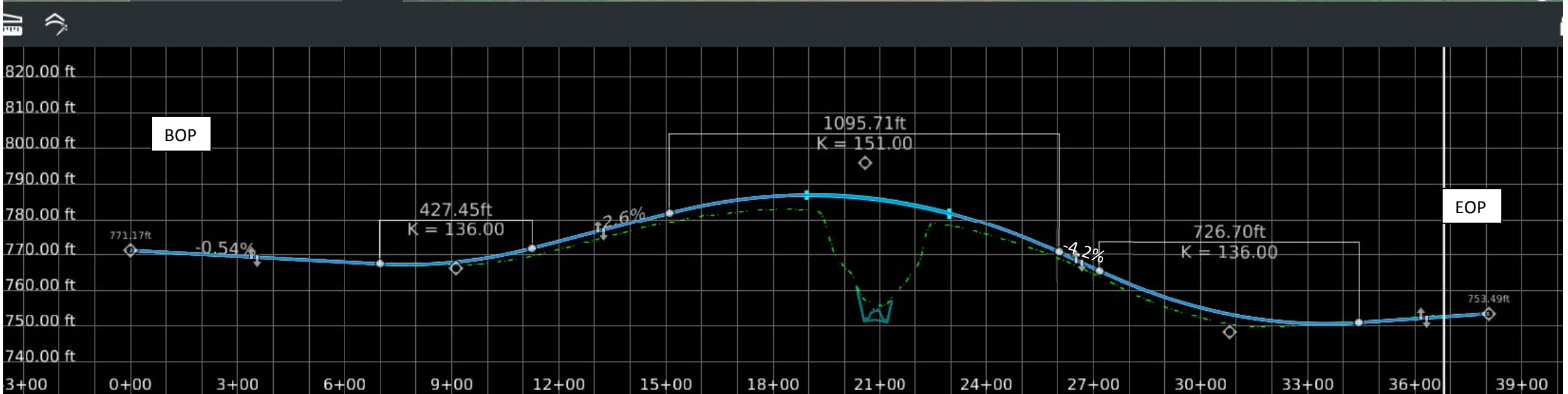
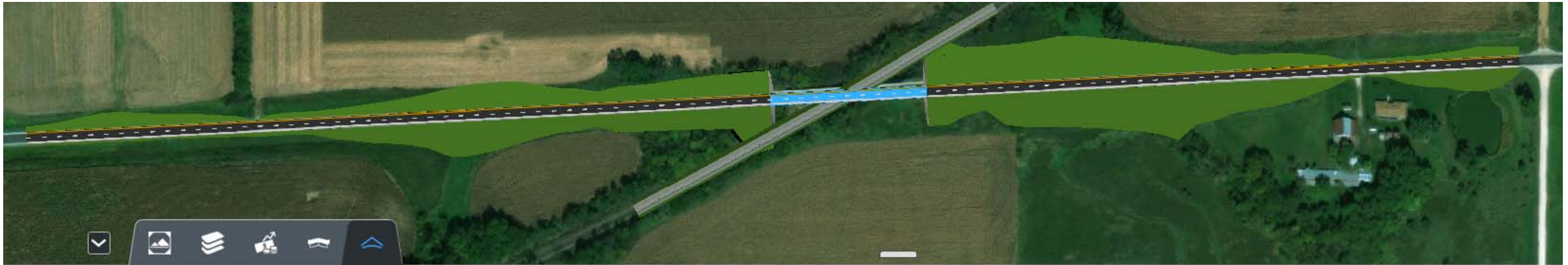
JEB: hsr

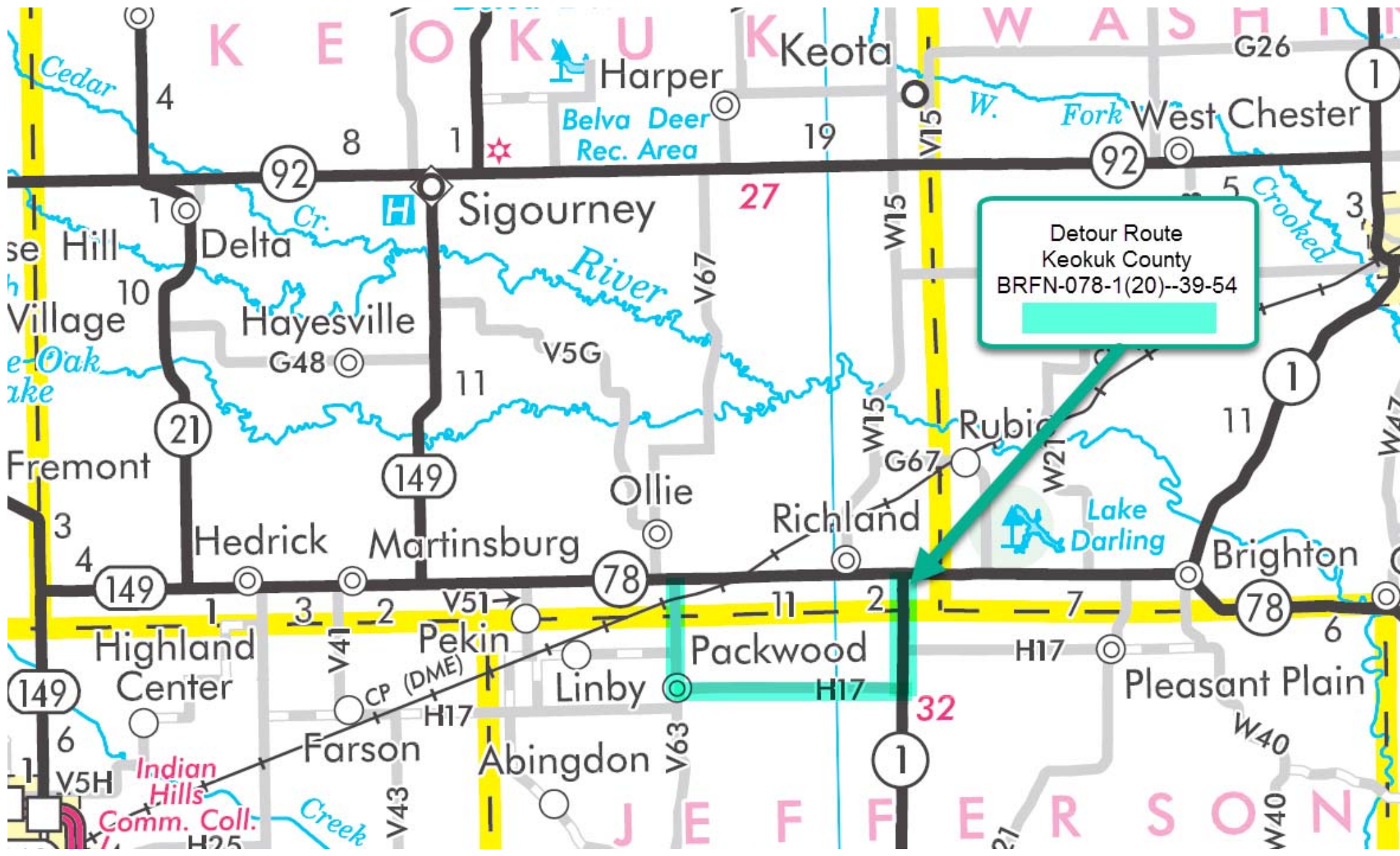
Keokuk County
PIN: 17-54-078-010
Project Number: BRFN-078-1(20)--39-54
Location: DME RR 8.8 mi E of IA 149
FHWA No.: 32690
Maint. No.: 5408.8S078



EXISTING BRIDGE
292 ft. x 26 ft.
Continuous I-beam Bridge

PROPOSED BRIDGE
402 ft. x 40 ft.
Continuous Welded Girder Bridge





Detour Route
Keokuk County
BRFN-078-1(20)--39-54

Utilities

Alliant Energy
ATTN: Mary Montgomery
PO Box 351
Cedar Rapids, IA 52406-9874
marymontgomery@alliantenergy.com
(319) 786-4768

Farmers & Merchants Mutual
ATTN: Ron Mast
210 W Main St.
Wayland, IA 52654
ronmast@farmtel.com
(319) 256-2736

T.I.P Rural Electric Cooperative
ATTN: Larry Boesenberg
612 W Des Moines St.
Brooklyn, IA 52211-0534
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(641) 522-9221

Wapello Rural Water Association
ATTN: Krista Huffman
534 Shaul Ave.
Ottumwa, IA 52501
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Windstream Communications
ATTN: Joy Matthews
11101 Anderson Dr. Suite 100
Little Rock, AR 72212
WCI.OSP.Permits@Windstream.com
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Bridge Office Attachment for Concept Statement

Date: March 25, 2019
By: Patricia Schwarz
Location: DME RR 8.8 Miles East of Iowa 149

County: Keokuk
Project No.: BRFN-078-1(20)--39-54
Pin No.: 17-54-078-010

1. Regulatory/Coordination
 - a. Iowa DNR Flood Plain permit = No
 - b. Iowa DNR Sovereign Lands permit = No
 - c. Local Record of Coordination = No
 - d. Flood Insurance Study = No
 - e. Drainage District = No
 - f. Corps of Engineers Section 408 = No
 - g. Railroad = Yes Coordinate through Iowa DOT Office of Rail
2. Hydrologic/Hydraulic Analysis/RIDB Dataset
 - a. RR Ditch drainage - From LiDAR, it does not appear that RR ditch drainage is carried through under the bridge. Verify whether there are any RR ditch drainage needs.
3. Structure/Roadway Layout Considerations
 - a. The proposed bridge layout is based on vertical and horizontal clearances for the existing track.
 - b. We request a 4.5-foot roadway profile grade raise at the track crossing location (Station 463+42.23).
 - c. T-piers are proposed, however, consideration shall be given to other pier types.
 - d. Due to the RR being in a cut section, the applicability of our policy under 3.4.2.4 to set the berm at top of Rail elevation at 26' from centerline track should be verified.
 - e. Proposed barrier rail height over the RR ROW is 44 inches per the District's recommendation.
4. Special construction issues
 - a. Foundation/timber piling conflicts are anticipated at Pier 1.
 - b. Soil retainment or longer wings will likely be needed to obtain satisfactory slopes at the SW & NE corners.
5. Special survey = Yes, see below.
6. Aesthetic enhancements = No.
7. Other
 - a. Traffic proposed to be placed on an off-site detour.

Special Survey:

Left and Right top of rail profile shots every 100' for 1000' in both directions from RR crossing location at IA 78.