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FINAL PROJECT CONCEPT STATEMENT

IA 144 Bridge over Devils Fork 1.3 miles N. of Dana

Greene County
BRF-144-3(16)--38-37
PIN: 12-37-144-010
Maint. No.3724.8S144
FHWA No. 25760

Highway Division
Office of Design

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

June 10, 2013

I. STUDY AREA

A. Project Description

This project involves the replacement of the IA 144 bridge (Maint. No 3724.8S144) over Devils Fork, 1.3 miles north of Dana.

The two alternatives considered were:

1. Replace with a continuous concrete slab bridge.
2. Replace with a RCB utilizing the flowable mortar method.

Alternative 2 is the preferred alternative. The RCB alternative provides reduced future maintenance needs, minimizes the impact to traffic during construction, and eliminates the need for guardrail. Traffic will be maintained at all times. However, it will be necessary to reduce traffic to one lane with the use of flaggers during the removal of the bridge rail and guardrail and when the flowable mortar is placed.

B. Need for Project

This is a 40' x 30' steel beam bridge which was constructed in 1948 and overlaid in 1983. The bridge is classified as structurally deficient due to substructure condition. Section losses were found at the steel shell piles of the bridge. The abutments have areas of severe scale, hollows and spalls with exposed steel. The sliding plates of bearings are severely rusted and there are bent anchor bars. Both the top and bottom of the deck have several damp areas, hollows, and areas of severe scale with exposed steel. The deck drain extensions are broken. Unmeasured section losses were found at the ends of beams. As the overall structure is severely deteriorated and the age of the bridge is over 60 years old, structural repair would not be an economical solution.

Therefore, the bridge should be replaced. Scour countermeasures were placed in 2010. They consisted of 6" ABM mats with erosion stone collars.



Looking west

Looking east

C. Present Facility

The existing structure is a 40' x 30' I-beam bridge constructed in 1948.

IA 144 in the project area is 22' wide PCC pavement with 4' wide granular shoulders and 3:1 foreslopes, constructed in 1956. HMA resurfacing was accomplished in 1978 and 2004.

D. Traffic Estimates

The 2017 and 2037 average daily traffic estimates are 700 ADT with 33% trucks and 800 ADT with 34% trucks, respectively.

E. Sufficiency Ratings

IA 144 is classified as an access route and is a maintenance service level C road. The federal bridge sufficiency rating is 61.

F. Access Control

Access rights will not be acquired for this project.

G. Crash History

During the five-year study period from January 1, 2007 through December 31, 2011, there were no crashes at the bridge site.

II. PROJECT CONCEPT

A. Feasible Alternatives

Alternative #1 - Replace with a bridge

Replace the existing 40' x 30', I-beam bridge with a 140' x 40', continuous concrete slab bridge.

The typical cross section adjacent to the bridge will consist of a 22 ft. roadway (22 ft. wide pavement) with 9 ft. effective shoulders and 6:1/3:1 foreslopes.

This bridge will be constructed on the existing vertical and 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 bridge. Construct 2 bridge end drains on the south end of the bridge.

The revetment currently in place around the existing bridge may be salvaged for placement around the new bridge. The ABM mats under the erosion stone or revetment shall be removed.

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

It appears that no 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	\$ 462,000
Bridge Removal	11,000
Revetment	75,000
Mobilization - 10%	55,000
M & C - 15%	<u>91,000</u>
Bridge Costs	\$ 694,000

Roadway Items	
Bridge Approaches	\$68,900
Removal of Pavement	1,600
Granular Shoulder	500
Class 10 Roadway and Borrow	11,400
Excavation Class 13 Waste	1,000

Guardrail (Includes Removal)	22,600
Paved Shoulders for Guardrail	17,800
Class 10 for Guardrail Blisters	14,200
Bridge End Drains	5,800
Clearing and Grubbing	2,600
Seeding and Fertilizing	1,200
Erosion Control	5,000
Right of Way	2,000
Wetland Mitigation	50,000
Traffic Control - 5%	10,100
Mobilization - 5%	10,100
M & C - 30%	67,400
Roadway costs	\$ 292,000
Project Total	\$986,200

Alternative #2 - Replace with a culvert utilizing the flowable mortar method

Replace the existing 40' x 30' bridge with a twin 10' x 8' x 120' reinforced concrete box culvert utilizing the flowable mortar method. The typical cross section will consist of 22 ft. roadway (22 ft. wide pavement) with 9 ft. effective shoulders and 6:1/3:1 foreslopes. The pavement width plus the shoulder will then provide a 40' top width.

The new RCB can be built under the existing bridge without disturbing the bridge. After the culvert has been constructed, flooded granular backfill and flowable mortar will be used to fill the void between the RCB and bridge deck. Once the new 6:1/3:1 foreslopes have been placed adjacent to the bridge, the existing concrete bridge barrier, curb, and guardrail can be removed.

Apply erosion control and rural seeding and fertilizing to all disturbed areas. Class E revetment will be placed at the ends of the RCB. Revetment that is currently in place may be salvaged by the contractor for use around the inlet and outlet of the RCB. Erosion stone in place around each abutment may be used as a base underneath the culvert during construction. The ABM mats under the erosion stone or revetment shall be removed.

Right of way will be required for this project.

Traffic will be maintained at all times. However, it will be necessary to reduce traffic down to one lane via the use of flaggers during the removal of the bridge rail, guardrail and placement of the flowable mortar.

	<u>Estimated Cost</u>
Bridge Items	
New Culvert	\$ 190,000
Revetment	75,000
Mobilization - 10%	27,000
M & C - 15%	<u>44,000</u>
Bridge Total	\$ 336,000
Roadway Items	
Class 13 waste	\$ 1,000
Floodable backfill	8,500
Flowable mortar	64,400
Class 10, roadway & borrow	10,200
Granular Shoulders	1,100
Erosion Control	5,000
Guardrail removal	1,000
Right of Way	2,000
Remove Handrail	3,500
Seeding and Fertilizing	1,200
Wetland Mitigation	50,000
Traffic Control @ 5%	7,400
Mobilization @ 5%	7,400
M&C @ 30%	<u>48,700</u>
Roadway Total	\$ 211,000
Project Total	\$ 547,000

B. Detour Analysis

IA 144 will be closed and an offsite detour will be utilized for alternative #1. It is anticipated the detour will be in place for approximately 120 days. The detour would follow County Road E-26 west to County Road P-33, then north on County Road P33 to County Road E18 then east to the junction of IA 144. Out of distance travel is 4 miles. The total distance user cost is anticipated to be \$136,000. The cost for county road maintenance will be \$4,800 as calculated by the Gas Tax Method. Detour signing costs will be \$10,000.

There will be no off-site detour for alternative #2. Traffic will be maintained at all times. However, it will be necessary to reduce traffic down to one lane via the use of flaggers during the removal of the bridge rail, guardrail and placement of the flowable mortar.

C. Recommendations

It is recommended that the present structure be replaced, as described in Alternative No. 2.

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.

D. ADA Accommodations

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

E. Special Considerations

Right of Way will be required for this project.

Soils Design has done a preliminary review of the proposed project using as-built information, and noted no major concerns.

Once the Office of Location and Environment has completed their review, comments will be incorporated into the final concept statement.

Survey should include low floor elevations of all buildings just upstream of bridge.

F. Program Status

Site data has been developed by the Office of Design. This project is listed in the 2013-2017 Iowa Transportation Improvement Program, with \$500,000 for replacement in FY 2017. Costs for this project may be eligible for bridge replacement funds. A schedule of events will be developed following approval of the Project Concept.

KKP: glk

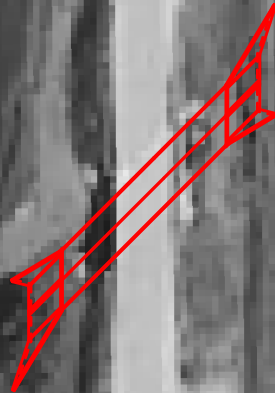
Bridge over Devils Fork
1.3 miles N. of Dana

Proposed 10' x 8' x 120' RCB

Existing 40' x 30' I-Beam Bridge

Alternative #2

BRF-144-3(16)--38-37



IA 144

Bridge over Devils Fork
1.3 miles N. of Dana

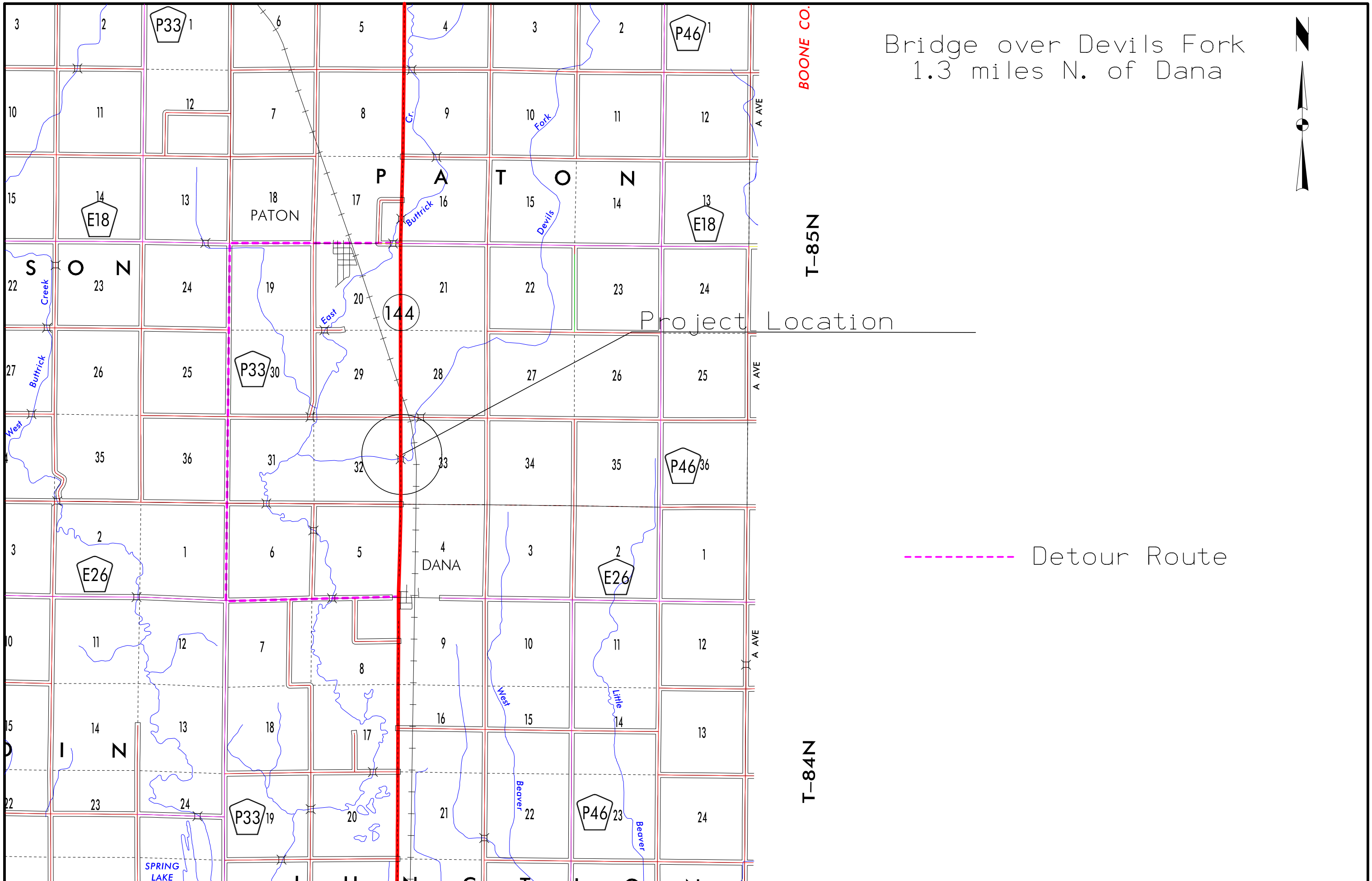
Proposed 140' x 40' CCS Bridge
Existing 40' x 30' I-Beam Bridge

Alternative #1

BRF-144-3(16)--38-37



IA 144



Bridge over Devils Fork
1.3 miles N. of Dana



Project Location

----- Detour Route