

IOWA DEPARTMENT OF TRANSPORTATION

TO OFFICE:	District 6	DATE:	August 11, 2015
ATTENTION:	Jim Schnoebelen	PROJECT:	Johnson County BRF-001-5(112)--38-52 PIN: 15-52-001-030
FROM:	Kevin K. Patel		
OFFICE:	Design		
SUBJECT:	Project Concept Statement; (Final, D0)		

This project involves the replacement of the IA 1 bridge (Maint. No. 5280.0S001) over a small natural stream, 0.6 miles north of County Road F52.

A concept review was held on September 10, 2014. Those present included Doug McDonald, Newman Abuissa, Roger Walton, Steve Flockart and Tim Zeimet from the District 6 Office; Bill Kaufman from the Office of Bridges and Structures; Mark Sloppy from the Office of Location and Environment; and Kevin Patel and Gary Krelow from the Office of Design.

The two alternatives considered were:

1. Replace the bridge with a twin 10 ft. x 12 ft. x 124 ft. reinforced concrete box culvert using the flowable mortar method of construction. The preliminary estimated cost for this alternative is \$979,300.
2. Replace the bridge with a twin 10 ft. x 12 ft. x 165 ft. reinforced concrete box culvert and raise the vertical profile to meet the stopping sight distance and vertical curve length criteria. In order to meet these criteria, a grade raise of approximately 7.5 ft. is required, resulting in 1,530 ft. of roadway reconstruction. Traffic will be maintained using a two-lane runaround. The preliminary cost estimated cost for this alternative is \$3,224,900.

Alternative 1 is the preferred alternative due to cost savings, ease of construction and convenience for the traveling public. The existing stopping sight distance and vertical curve length are below 60 mph design speed criteria; however, it appears that safety has not been adversely affected by the existing vertical alignment. As the intent of this project is to replace the bridge and no safety or operational problems appear to exist, it is proposed that the existing vertical profile be used as constructed. A design exception will therefore be required.

The Draft Project Concept Statement was sent out for review and comment with concerns to be resolved by Wednesday, August 5, 2015. Comments received during the review period have been considered and resolved.

KKP: als
Attach.
cc:

J. F. Adam
D. L. Maifield
N. M. Miller
G. A. Novey
A. Abu-Hawash
M. J. Sankey
D. R. Tebben
A. Poole
M. E. Khoda
J.W. Laaser-Webb
E. C. Wright
C. L. Cutler
A. F. Gourley
R. R. Walton
M. J. Donovan
M. E. Ross

M. J. Kennerly
S. J. Megivern
C. C. Poole
D. R. Claman
J. S. McClain
R. A. Younie
B. D. Hofer
D. L. Newell
S. J. Gent
W.A. Sorenson
K. A. Yanna
D. L. Rick
N. M. Abuissa
S. W. Flockhart
V. A. Brewer

K. D. Nicholson
A. A. Welch
N. L. McDonald
P. Lu
M. A. Swenson
Z. T. Bitting
J. N. Garton
B. E. Azeltine
T. D. Crouch
D. E. Sprengeler
D. McDonald
J. J. Tjaden
T. M. Storey
M. Sloppy
FHWA

FINAL PROJECT CONCEPT STATEMENT

IA 1 Bridge over a small natural stream, 0.6 miles north of County Road F52

Johnson County
BRF-001-5(112)--38-52
PIN: 15-52-001-030
Maint. No. 5280.0S001
FHWA No. 31700

Highway Division
Office of Design

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

August 11, 2015

I. STUDY AREA

A. Project Description

This project involves the replacement of the IA 1 bridge (Maint. No. 5280.0S001) over a small natural stream, 0.6 miles north of County Road F52.

The two alternatives being considered are:

1. Replace the bridge with a twin 10 ft. x 12 ft. x 124 ft. reinforced concrete box culvert using the flowable mortar method of construction. The preliminary estimated cost for this alternative is \$979,300.
2. Replace the bridge with a twin 10 ft. x 12 ft. x 165 ft. reinforced concrete box culvert and raise the vertical profile to meet the stopping sight distance and vertical curve length criteria. In order to meet these criteria, a grade raise of approximately 7.5 ft. is required, resulting in 1,530 ft. of roadway reconstruction. Traffic will be maintained using a two-lane runaround. The preliminary cost estimated cost for this alternative is \$3,224,900.

Alternative 1 is the preferred alternative due to cost savings, ease of construction and convenience for the traveling public. The existing stopping sight distance and vertical curve length are below 60 mph design speed criteria; however, it appears that safety has not been adversely affected by the existing vertical alignment. As the intent of this project is to replace the bridge and no safety or operational problems appear to exist, it is proposed that the existing vertical profile be used as constructed. A design exception will therefore be required.

B. Need for Project

This is a 120 ft. x 26 ft. steel beam bridge which was constructed in 1949 and overlaid in 1979. The bridge is classified as functional obsolete (FO) due to the narrow deck. All bridge components, including the overlay, are at the end of their service life. Different levels of deteriorations spread all over the bridge. The bridge was designed for H20 load and need to be strengthened to satisfy current highway traffic requirement. Provided the age and size of the structure, bridge repair in conjunction with bridge strengthening would not be cost effective; therefore, the bridge should be replaced.



C. Present Facility

The existing structure is a 120 ft. x 26 ft. steel beam bridge constructed in 1949.

IA 1 in the project area is 28 ft. 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 8% 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 is 50.8.

F. Access Control

Access rights will not be acquired for this project.

G. Crash History

During the five-year study period from January 1, 2010 through December 31, 2014, there were 2 crashes near the project location. One crash resulting in a minor injury and the other was property damage only.

II. PROJECT CONCEPT

A. Feasible Alternatives

Alternative #1 - Replace with a culvert utilizing the flowable mortar method on the existing profile

Replace the existing 120 ft. x 26 ft. steel beam bridge with a twin 10 ft. x 12 ft. x 124 ft. reinforced concrete box utilizing the flowable mortar method of construction. The typical cross section will consist of a 24 ft. roadway (28 ft. wide pavement) with 10 ft. effective shoulders (2 ft. outside pavement, 4 ft. additional paved and 4 ft. granular) and 6:1/3:1 foreslopes. The vertical and horizontal alignments will be used as constructed.

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. New shoulders and 6:1/3:1 foreslopes will be added allowing the bridge rail and guardrail to be removed.

The stopping sight distance and vertical curve length of the existing profile are both below the 60 mph design speed criteria. However, the five year accident history has shown there have been two accidents at the project site and the vertical profile does not appear to be a factor in these crashes. As the intent of this project is to replace the bridge, it is proposed that the existing vertical profile be used as constructed. In order to achieve a 60 mph design criteria, a stopping sight distance of 570 ft. is required. This would require an approximate 7.5 ft. grade raise, resulting in 1,530 ft. of roadway reconstruction, as shown in Alternative 2. The existing stopping sight distance available is approximately 328 ft. A design exception will therefore be required for the vertical curve length and stopping sight distance.

There may be compressible soils under the existing bridge which will require removal prior to construction of the new RCB. The compressible soil should be removed to a depth of 5 ft. under the RCB. The soil should then be replaced with 5 ft. of special backfill which will extend from headwall to headwall and provide a working platform for construction of the RCB. A clay plug will be placed under the RCB aprons to prevent piping.

Class E revetment will be placed at the ends of the RCB. 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 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.

Bridge Items	<u>Estimated Cost</u>
New Culvert	\$ 429,500
Revetment	42,900
Mobilization - 10%	47,200
M & C - 20%	<u>103,900</u>
Bridge Total	\$ 623,500
Roadway Items	
Embankment in place, contractor furnished	\$ 56,800
Floodable backfill	16,000
Flowable mortar	80,400
Excavation Unsuitable Material (under RCB)	6,200
Special Backfill (under RCB)	19,800
Paved shoulders	3,800
Granular shoulders	1,200
Guardrail removal	2,700
Clearing and Grubbing	2,400
Erosion control	5,000
Wetland Mitigation	50,000
Traffic Control @ 5%	12,200
Mobilization @ 5%	12,200
Right of Way	5,000
M&C @ 30%	<u>82,100</u>
Roadway Total	\$ 355,800
Project Total	\$ 979,300

Alternative #2 - Replace with a culvert using flowable mortar method and replace 1,530 ft. of IA 1 to raise profile

Replace the existing 120 ft. x 26 ft. steel beam bridge with a twin 10 ft. x 12 ft. x 165 ft. reinforced concrete box culvert placed at a 10 degree left ahead skew. Additionally, alternative 2 proposes to raise the vertical profile to meet the criteria for stopping sight distance and vertical curve length. To meet the 60 mph design criteria, a grade raise of approximately 7.5 ft. is required resulting in 1,530 ft. of roadway reconstruction. The

RCB can be constructed under the existing bridge using the flowable mortar method of construction; however, during the roadway reconstruction, a two-lane runaround will be required to maintain traffic.

The typical cross section will consist of a 24 ft. roadway (28 ft. wide pavement) with 10 ft. effective shoulders (2 ft. outside pavement, 4 ft. additional paved and 4 ft. granular) and 6:1/3:1 foreslopes.

There may be compressible soils under the existing bridge which will require removal prior to construction of the new RCB. The compressible soil should be removed to a depth of 5 ft. under the RCB. The soil should then be replaced with 5 ft. of special backfill which will extend from headwall to headwall and provide a working platform for construction of the RCB. A clay plug will be placed under the RCB aprons to prevent piping.

Class E revetment will be placed at the ends of the RCB. Apply erosion control and rural seeding and fertilizing to all disturbed areas.

Right of way will be required for this project.

During the roadway reconstruction, traffic will be maintained via a two-lane runaround south of existing IA 1. The runaround will consist of a 22 ft. wide pavement with 3 ft. paved shoulders and 3:1 foreslopes. The runaround will be approximately 2,200 ft. long. A temporary easement will be required to construct the runaround. A temporary entrance will also be constructed for residents of Phebe Lane, just northeast of the bridge.

Bridge Items	<u>Estimated Costs</u>
New Culvert	\$ 620,800
Revetment	42,900
Mobilization - 10%	66,400
M & C - 20%	<u>146,000</u>
Bridge Costs	\$ 876,100

Roadway Items	
Paved 2 lane runaround	\$ 776,000
Embankment in place, contractor furnished	149,500
Floodable backfill	16,000
Flowable mortar	80,400
Removal of Pavement	33,100
Class 13 waste	34,700
PCC Pavement	280,000
Special Backfill, under roadway	41,500
Modified Subbase	38,600

Paved Shoulder	48,500
Granular Shoulder	15,900
Excavation Unsuitable Material (under RCB)	8,300
Special Backfill (under RCB)	26,300
Longitudinal subdrains and outlets	21,100
Temporary floodlighting	8,000
Guardrail Removal	2,700
Clearing and Grubbing	2,400
Erosion Control	5,000
Wetland Mitigation	50,000
Traffic Control - 5%	81,900
Mobilization - 5%	81,900
Right of Way	5,000
M & C - 30%	<u>542,000</u>
Roadway Costs	\$ 2,348,800
Project Total	\$3,224,900

B. Detour Analysis

There will be no off-site detour. For alternative 1, traffic will be maintained using the flowable mortar method of construction. For alternative 2, a two-lane runaround will be constructed just north of the existing roadway.

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.

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. Special Considerations

An accelerated bridge construction (ABC) alternative was not proposed due to this site's suitability for the flowable mortar method of construction.

Right of Way will be required for this project. Temporary easements would also be required for Alternative 2.

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.

This project will be let in the same letting as three other bridge projects along IA 1 in Johnson County:

BRF-001-5(104)--38-52 Old Woman's Creek and Old Man's Creek Overflow, 0.6 and 0.8 miles south of County Road F52

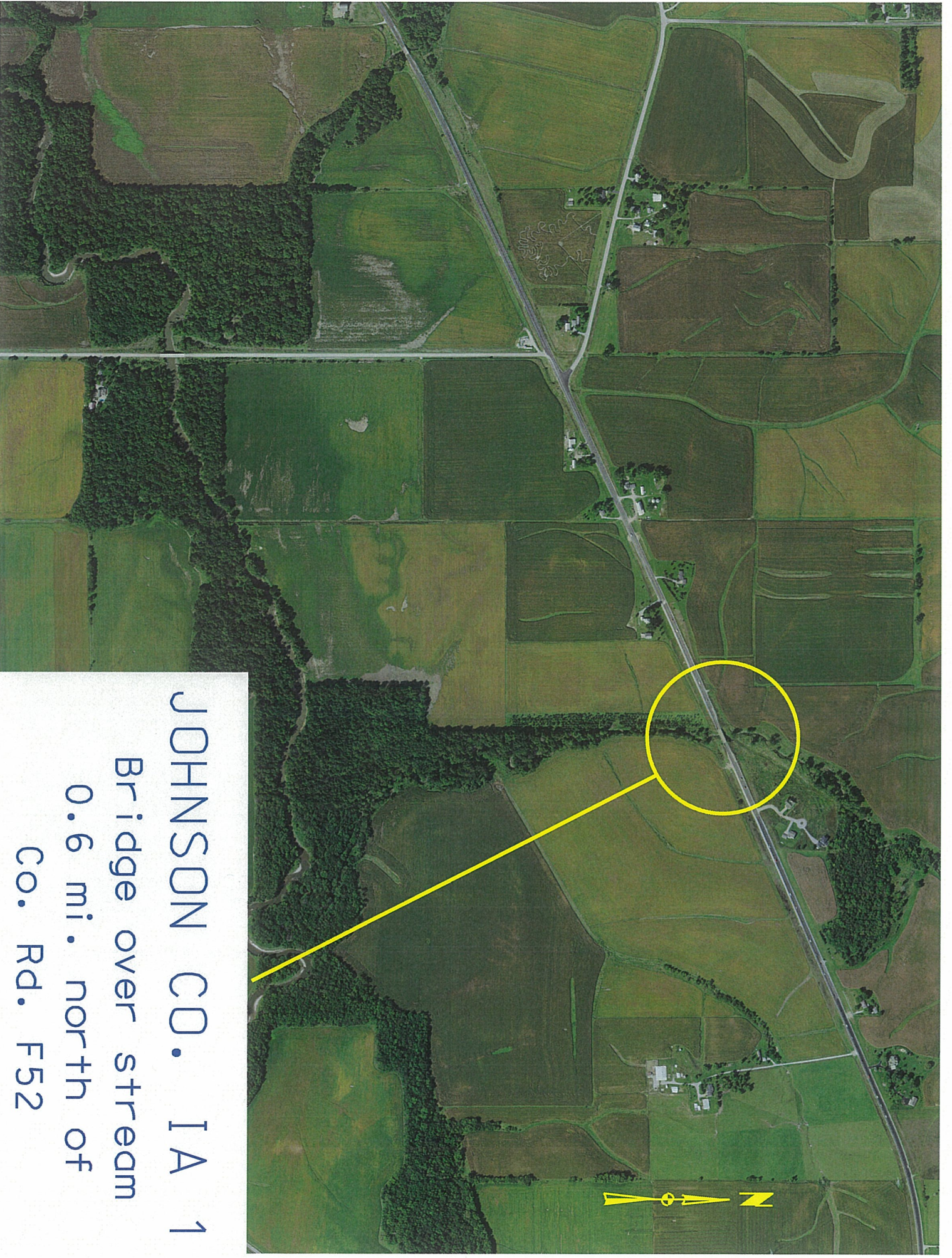
BRF-001-5(110)--38-52 Old Man's Creek, 1.5 miles south of County Road F52

BRF-001-5(108)--38-52 a stream 2.1 miles south of County Road F52

F. Program Status

Site data has been developed by the Office of Design. This project is listed in the 2016-2020 Iowa Transportation Improvement Program, with \$1,025,000 programmed for replacement in FY2020. Costs for this project may be eligible for bridge replacement funds. A schedule of events will be developed following approval of the Project Concept.

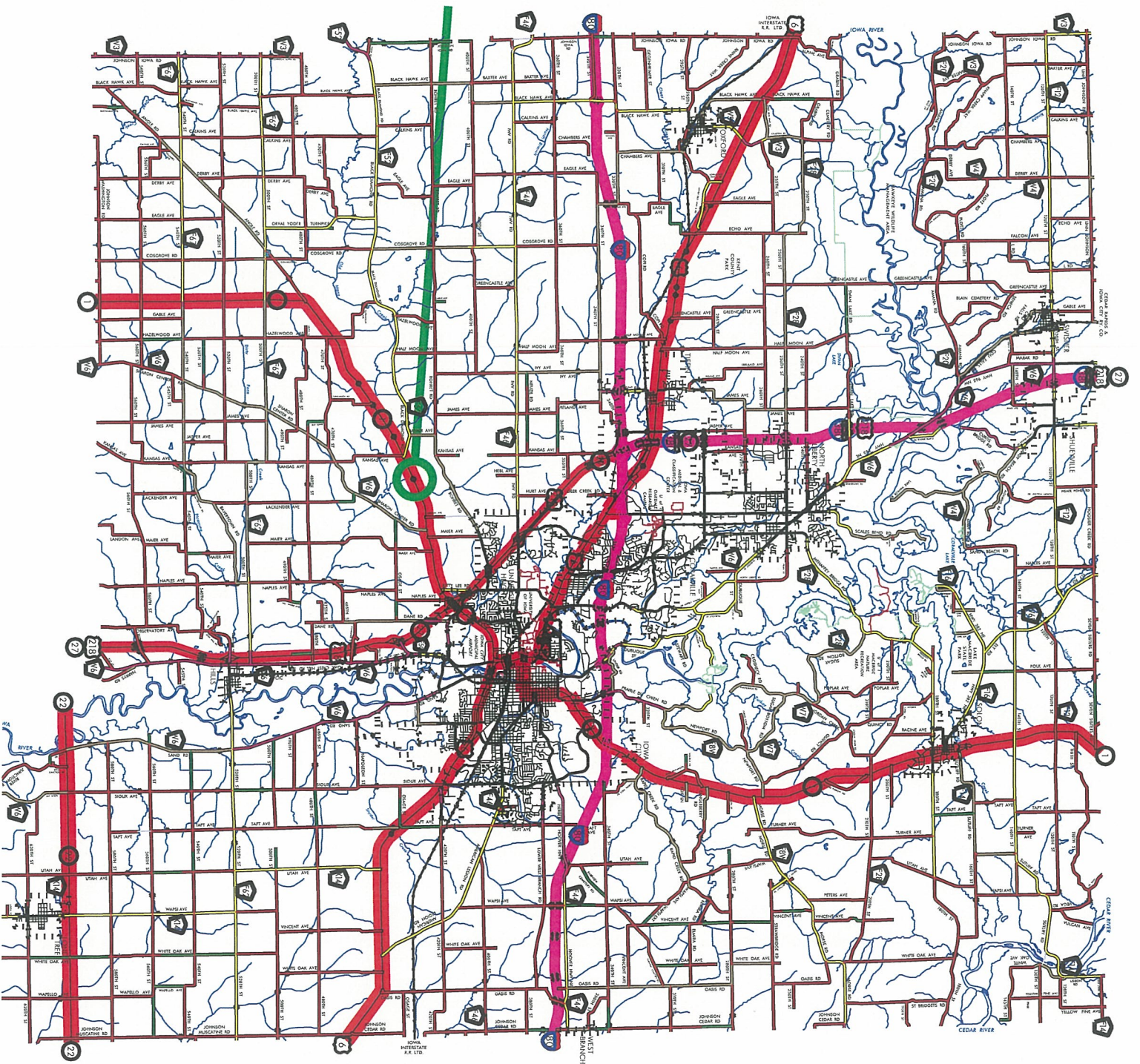
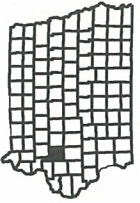
KKP: als



JOHNSON CO. IA 1
Bridge over stream
0.6 mi. north of
Co. Rd. F52

JOHNSON COUNTY IA 1

#5277.3S001
FHWA #31700



JOHNSON CO. - IA 1
 BRF-001-5(112)38--52
 ALT. 2 PLAN & PROFILE

