

IOWA DEPARTMENT OF TRANSPORTATION

TO OFFICE: District 3

DATE: April 5, 2011

ATTENTION: Tony G. Lazarowicz

PROJECT: Sac County
STP-196-1(20)--2C-81
BRF-196-1(15)--38-81
PIN: 09-81-196-010

FROM: Kevin K. Patel

OFFICE: Design

SUBJECT: 2-Lane Reconstruction and Bridge Replacement Concept - **FINAL**

DATE OF BRIDGE CONCEPT REVIEW: July 1, 2009; **PARTICIPANTS:** Tony Lazarowicz, Dwight Rorholm, Mike Kruger, Greg Mize, Russ Lucht and Darwin Bishop from the District 3 Office; Patricia Schwarz from the Office of Bridges and Structures; Colin Greenan from the Office of Location and Environment; Gerry Ambroson from Local Systems and Kevin Patel and Jean Borton from the Office of Design.

DATE OF ROADWAY REVIEW: August 31, 2010; **PARTICIPANTS:** Tony Lazarowicz, Shane Tymkowicz, Mike Kruger and Darwin Bishop from the District 3 Office; Kevin Muxfeldt from the Office of Bridges and Structures; Colin Greenan from the Office of Location and Environment and Kevin Patel and Jean Borton from the Office of Design.



South end of project looking north



Raccoon River Bridge

PROJECT DATA

ROUTE: IA 196, From U.S. 71 north to approximately 0.8 miles south of U.S. 20

LENGTH: 7.1 miles

Section 1: From U.S. 71 north to approximately 1,000 ft. north of the Raccoon River Bridge (Approximately 1.4 miles).

Section 2: North of the Raccoon River Bridge north to approximately 0.8 miles south of U.S. 20 (Approximately 5.7 miles).

PLANNING CLASSIFICATION: Access Route

MAINTENANCE SERVICE LEVEL: C

SUFFICIENCY RATING: 93

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TRAFFIC: 2011 --- 1,200 ADT with 32% trucks
2031 --- 2,400 ADT with 22% trucks
PRESENT PAVEMENT SURFACE: HMA;
PRESENT PAVEMENT WIDTH: 24 ft.
PRESENT SHOULDER WIDTH: 9 ft.
TYPE: Granular

PAVEMENT HISTORY:

ORIGINAL PAVEMENT: 1/2 in. Type B Asphalt Cement Concrete with 4 in. rolled stone base
AGGREGATE SOURCE: Ft. Dodge Mine
YEAR CONSTRUCTED: 1948
RESURFACED: 1968 0.5 in. Type B Asphalt Cement Concrete with 4 in. Type B asphalt cement concrete base
RESURFACED: 1998, 1.5 in. Type A Asphalt Cement Concrete with 3 in. Type B Asphalt Cement Concrete

EXISTING CONDITIONS AND CAUSES OF DISTRESS:

IA 196 is a 24 ft. wide HMA pavement with 9 ft. granular shoulders. The existing roadway surface is not exhibiting major signs of distress; however, it is anticipated that given the existing pavement structure that rehabilitation or reconstruction will be required relatively soon.

Land use in the area is generally agricultural with a small portion of government land. The government land consists of wildlife management area adjacent to IA 196. Impacts to this land should be minimized or avoided if possible although, the FHWA has determined that this land is not subject to Section 4(f).

BRIDGE INFORMATION

This is a 26' x 160.8' steel beam bridge which was built in 1923, reconstructed in 1948, and overlaid in 1990.

The bridge is structurally deficient due to the condition of the substructure. The overlay is reaching the end of its service life and a second overlay may not be practical due to the condition of the original deck. The curbs have severe deterioration that will require complete curb and rail replacement in the near future. Due to the overall condition of the bridge and the deficiency of the substructure, this bridge needs to be replaced. The federal bridge sufficiency rating is 26.

SAFETY CONSIDERATION:

During the five-year study period from January 1, 2005 through December 31, 2009, there were twelve crashes including, one fatal crash, six possible/unknown personal injury crashes, and five property damage crashes. The crash rate is 77/HMVM which is lower than the rural Iowa crash rates of 99/HMVM.

FEASIBLE ALTERNATES:

ALTERNATIVE 1: ON EXISTING ALIGNMENT

This reconstruction project on IA 196 extends from the U.S. 71 intersection north to approximately 0.8 miles south of the existing U.S. 20, a distance of approximately 7.13 miles. The new cross section will provide 28 ft. wide PCC pavement, 9 inches thick with 6 inches of granular subbase and 2.5 ft. of select clay for subgrade treatment. The shoulders will be 8 ft. wide, partially paved (4 ft. paved and 4 ft. granular) and 6:1/3.5:1 foreslopes. Rumble strips will be placed in the outside 2 ft. of the roadway surface and on the centerline. Longitudinal subdrains will be installed along one side of the new roadway. This roadway will be reconstructed utilizing the existing horizontal alignment. The vertical alignment will be improved to meet current design criteria. This roadway will be closed during construction and traffic will be required to use an off-site detour. The contractor will need to maintain access for local residents.

The intersection at existing IA 196, U.S. 71 and 330th Street will be redesigned to eliminate the curve on U.S. 71. The traffic flow at the intersection will be revised to provide a north-south free flow movement, thus requiring the existing east/west traffic to come to a stop condition. Two temporary runarounds will be required in order to maintain U.S. 71 traffic during reconstruction of the intersection. The existing lighting at this intersection will be removed and relocated.

The existing utility poles located along the west ROW line appear to require relocation based upon the proposed typical section.

ROW will be required on this project to accommodate the wider cross section. This includes impacts to the wildlife management area located south and west of the Raccoon River Bridge.

Access rights will be acquired as part of this project.

The existing culverts and RCB's will be replaced. This includes the replacement of a slab bridge at Sta. 780+45 which will be replaced with a 12'x 12' RCB culvert.

The existing 160.8' x 26' continuous I-beam bridge over the Raccoon River will be replaced with a 244' x 44' prestressed pretensioned concrete beam bridge. The vertical profile at the bridge will be raised approximately 1.7 ft in order to raise the low beam elevation higher than the current roadway overtopping elevation. The existing bridge approaches will be replaced and new guardrail and paved shoulders installed. The Raccoon River bridge will be replaced during the construction of Section 1 (which extends from the U.S. 71 intersection to approximately 1120 ft. north of the Raccoon River).

ESTIMATED COST - ALT. 1:

This project has been split into 2 sections, sections 1 and section 2. The cost estimate for section 1 includes work that is considered to be BRF eligible for the replacement of the Raccoon Bridge.

BRF-196-1(15)--38-81 Bridge Section 1: (On Existing Horizontal Alignment)

Bridge Costs

New Bridge	\$ 986,800
Bridge Removal	40,000
Cofferdams	50,000
Revetment	40,000
Mobilization - 10%	111,700
M & C - 15%	<u>184,300</u>
Alt. 1 Bridge Total	\$ 1,412,800

Roadway Costs

New Pavement	178,000
Granular Subbase	32,300
Paved Shoulders	44,800
Granular Shoulders	18,300
Bridge Approaches	71,500
Removal of Pavement	27,800
Selected Backfill	25,100
Class 10 Roadway and Borrow	91,700
Excavation Class 13 Waste	23,400
Guardrail (Includes Removal)	28,300
Paved Shoulders for Guardrail	18,400
Class 10 for Guardrail Blisters	7,400
Longitudinal Subdrains and Outlets	26,200
Milled Shoulder and Centerline Rumble Strips	4,200

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Replacing Light Poles	3,900
Clearing and Grubbing	8,300
Seeding and Fertilizing	5,200
Right of Way	19,500
Traffic Control - 5%	31,500
Mobilization - 5%	31,500
M & C - 30%	<u>208,000</u>
Alt. 1 BRF Roadway Total	\$ 901,400

Total for Alt. 1 BRF-196-1(15)--38-81 **\$2,314,200**

STP-196-1(20)--2C-81 Section 1: (On Existing Horizontal Alignment)

New Pavement	\$519,400
Granular Subbase	94,200
Paved Shoulders	112,700
Granular Shoulders	51,700
Pavement Removal	74,500
Selected Backfill	73,200
Class 10 Roadway and Borrow	858,700
Excavation Class 13 Waste	62,800
Roadway Pipes	202,700
Longitudinal Subdrain and Outlets	76,100
Milled Shoulder and Centerline Rumble Strips	5,500
Granular Surface on Side Roads	17,200
Class 10 Roadway and Borrow for Side Roads	1,000
Replacing Light Poles	3,900
Clearing and Grubbing	16,700
Seeding and Fertilizing	15,500
Right of Way	117,000
Temporary Runarounds	500,000
Traffic Control - 5%	140,100
Mobilization - 5%	140,100
M & C - 30%	<u>924,900</u>
Sec. 1 Roadway Total	\$4,007,900

TOTAL ALT. 1 SECTION 1 **\$6,322,100**

STP-196-1(20)--2C-81 Sec. 2:

New Pavement	\$3,364,600
Granular Subbase	610,500
Paved Shoulders	763,900
Granular Shoulders	309,800
Pavement Removal	461,100
Selected Backfill	474,100
Class 10 Roadway and Borrow	812,400
Excavation Class 13 Waste	388,300
Roadway Pipes and Culverts	378,200
Longitudinal Subdrain and Outlets	493,200
Milled Shoulder and Centerline Rumble Strips	36,800
New pavement on Side Roads	56,600
Granular Subbase on Side Roads	10,200
Granular Surface on Side Roads	12,500
Class 10 Roadway and Borrow for Side Roads	3,300
Clearing and Grubbing	16,700
Seeding and Fertilizing	31,000
Right of Way	195,000
Traffic Control - 5%	420,900
Mobilization - 5%	420,900
M & C - 30%	<u>2,778,000</u>
Alt. 1 Sec. 2 Roadway Total	\$12,038,000
Project Total for Alt. 1 STP-196-1(20)--2C-81	\$16,045,900
TOTAL COST FOR ALT. 1	\$18,360,100

ALTERNATIVE 2: (REVISED HORIZONTAL ALIGNMENT)

Alternative 2 is similar to alternative 1; however, the horizontal alignment will be shifted approximately 40 ft. to the east of the existing horizontal alignment for approximately 4,200 ft. at the south end of the project. This offset is to avoid encroachment to the wildlife management area on the west side of IA 196 approximately 3,180 ft. north of the intersection of U.S. 71. The remainder of the project will revert back to the existing horizontal alignment similar to what is shown in alternative 1. The new Raccoon River Bridge will also be placed on the revised horizontal alignment with the 40 ft. offset. The bridge will be replaced during the construction of Section 1 (which extends from the U.S. 71 intersection to approximately 1820 ft. north of the Raccoon River). It appears that the shift in the alignment will result in the total take of one residence located at Sta.542+00 on the east side of the roadway.

IA 196 will be closed during construction and an offsite detour will be utilized.

ESTIMATED COST - ALT. 2:

This project has been split into 2 sections, sections 1 and section 2. The cost estimate for section 1 includes work that is considered to be BRF eligible for the replacement of the Raccoon Bridge.

BRF-196-1(15)--38-81 Bridge (Horizontal Alignment 40' Offset)

Bridge Costs

New Bridge	\$ 986,800
Bridge Removal	40,000
Cofferdams	50,000
Revetment	40,000
Mobilization - 10%	111,700
M & C - 15%	<u>184,300</u>
Alt. 2 Bridge Total	\$ 1,412,800

Roadway Costs

New Pavement	178,000
Granular Subbase	32,300
Paved Shoulders	44,800
Granular Shoulders	18,300
Bridge Approaches	71,500
Removal of Pavement	27,800
Selected Backfill	25,100
Class 10 Roadway and Borrow	147,100
Excavation Class 13 Waste	23,400
Guardrail (Includes Removal)	28,300
Paved Shoulders for Guardrail	18,400
Class 10 for Guardrail Blisters	7,400
Longitudinal Subdrains and Outlets	26,200
Milled Shoulder and Centerline Rumble Strips	4,200
Clearing and Grubbing	8,300
Seeding and Fertilizing	5,200
Right of Way	19,500
Traffic Control - 5%	34,300
Mobilization - 5%	34,300
M & C - 30%	<u>226,300</u>
Alt. 2 BRF Roadway Total	980,700

Total for Alt. 2 BRF-196-1(15)--38-81 **\$2,393,500**

STP-196-1(20)--2C-81 Sec. 1: (Horizontal Alignment 40' Offset)

New Pavement	\$596,500
Granular Subbase	108,200
Paved Shoulders	130,200
Granular Shoulders	58,900
Pavement Removal	85,100
Selected Backfill	84,000
Class 10 Roadway and Borrow	892,600
Excavation Class 13 Waste	71,700
Roadway Pipes	202,700
Longitudinal Subdrain and Outlets	87,600
Milled Shoulder and Centerline Rumble Strips	6,500
Granular Surface on Side Roads	17,200
Class 10 Roadway and Borrow for Side Roads	1,000
Replacing Light Poles	3,900
Clearing and Grubbing	16,700
Seeding and Fertilizing	15,500
Right of Way	117,000
Property Acquisition	150,000
Temporary Runarounds	500,000
Traffic Control - 5%	157,300
Mobilization - 5%	157,300
M & C - 30%	<u>1,038,000</u>
Alt. 2 Sec 1 Roadway Total	\$4,497,900
TOTAL ALT. 2 SECTION 1	\$6,891,400

STP-196-1(20)--2C-81 Sec. 2:

New Pavement	\$3,287,500
Granular Subbase	596,500
Paved Shoulders	746,400
Granular Shoulders	302,700
Pavement Removal	450,500
Selected Backfill	463,200
Class 10 Roadway and Borrow	825,800
Excavation Class 13 Waste	379,400
Roadway Pipes & Culverts	378,200
Longitudinal Subdrain and Outlets	481,900
Milled Shoulder and Centerline Rumble Strips	35,800
New pavement on Side Roads	56,600
Granular Subbase on Side Roads	10,200
Granular Surface on Side Roads	12,500

Class 10 Roadway and Borrow for Side Roads	3,300
Clearing and Grubbing	16,700
Seeding and Fertilizing	31,000
Right of Way	195,000
Traffic Control - 5%	413,700
Mobilization - 5%	413,700
M & C - 30%	<u>2,730,200</u>
Alt. 2 Sec. 2 Roadway Total	\$11,830,800
Project Total for Alt. 2 STP-196-1(20)--2C-81	\$16,328,700
TOTAL COST FOR ALT. 2	\$18,722,200

DETOUR ANALYSIS:

IA 196 will be closed and an off-site detour route will be required for approximately 10 months. The route would follow U.S. 71 east then turn north on to County Road M54, and returning west on existing U.S. 20. Out of distance travel is 6 miles. The total distance user cost is anticipated to be \$696,000. The cost for county road maintenance will be \$48,000 as calculated by the Gas Tax Method. Detour signing costs will be \$10,000.

RECOMMENDATIONS:

The recommended method of rehabilitation for this project is Alternative 1 with the bridge and the roadway on the existing roadway centerline. The total cost for this alternative is \$18,404,600, with \$6,327,700 for Section one (\$2,314,200 BRF funding) and \$12,076,900 for Section two.

Right of way will be required.

SPECIAL CONSIDERATION:

It is anticipated that IA 196 will become U.S. 71 in the future; therefore, the proposed roadway typical section was based upon meeting NHS criteria.

In order to minimize the disruption to IA 196 traffic and avoid multiple years of road closures and off site detours it may be advantageous to coordinate the replacement of the Raccoon River Bridge and associated roadway reconstruction with the Cedar Creek Bridge replacement just south of existing U.S. 20.

Based on information provided at the Bridge and Roadway Concept Reviews, the Office of Location and Environment has determined that a Section 404 Permit will be required for both the two lane reconstruction and the bridge replacement over the North Raccoon River. It is expected that the work will be covered by Nationwide Permit #14. Wetland mitigation will be required as preliminary impacts appear to be greater than 0.1 acre (but less than 0.5 acre which would require an individual permit). Stream mitigation will not be required. If borrows are identified, further review by this office may be required.

The project occurs in the designated critical habitat of the Topeka shiner and any work in stream channels will require consultation with the U.S. Fish and Wildlife Service. Standard Note 281-6, Topeka shiner Best Management Practices should be included in the plans. As stated in Standard Note 281-6, no project activity is to be conducted within the streams between the dates of May 15 and July 31, inclusive.

A preliminary wetlands review (WOO) will be completed within 30 days after the Final Concept has been completed.

FUNDS PROGRAMMED:

The Raccoon River bridge replacement project is in the 2011-2015 program listed at \$1,180,000 in 2014 as a bridge replacement. The pavement reconstruction project is not yet shown in the 2011-2015 program. A schedule of events for plan development will be determined following approval of the Project Concept.

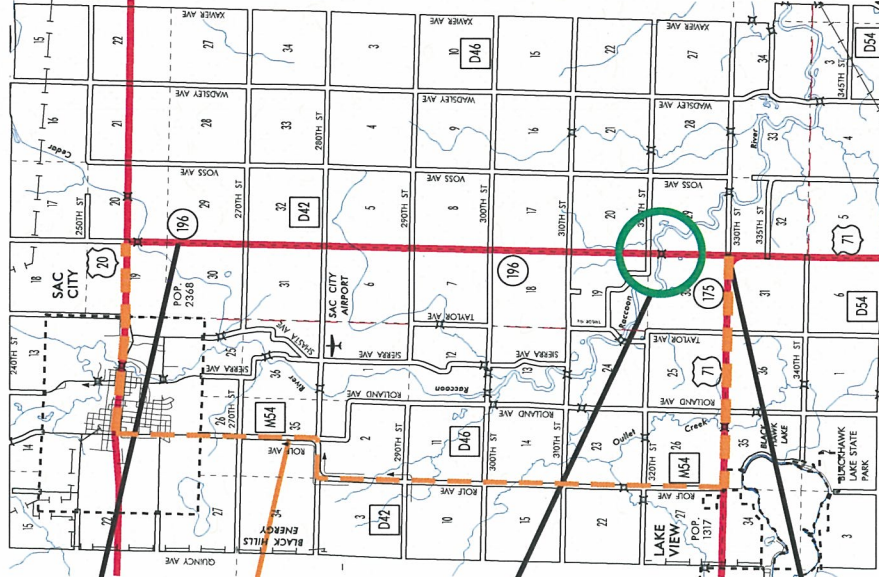
KKP:

cc:

J. F. Adam	M. J. Dillavou	M. J. Kennerly
K. D. Nicholson	D. E. Ohman	C. B. Brakke
F. W. Todey	R. L. Stanley	A. A. Welch
N. L. McDonald	G. A. Novey	J. C. Reutter
B. J. Dolan	N. M. Miller	E. C. Wright
T. D. Crouch	M. J. Sankey	M. A. Swenson
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D. L. Bishop	T. E. Huju	D. S. Schultz
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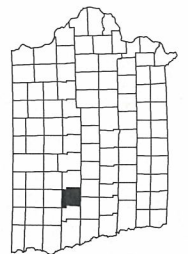
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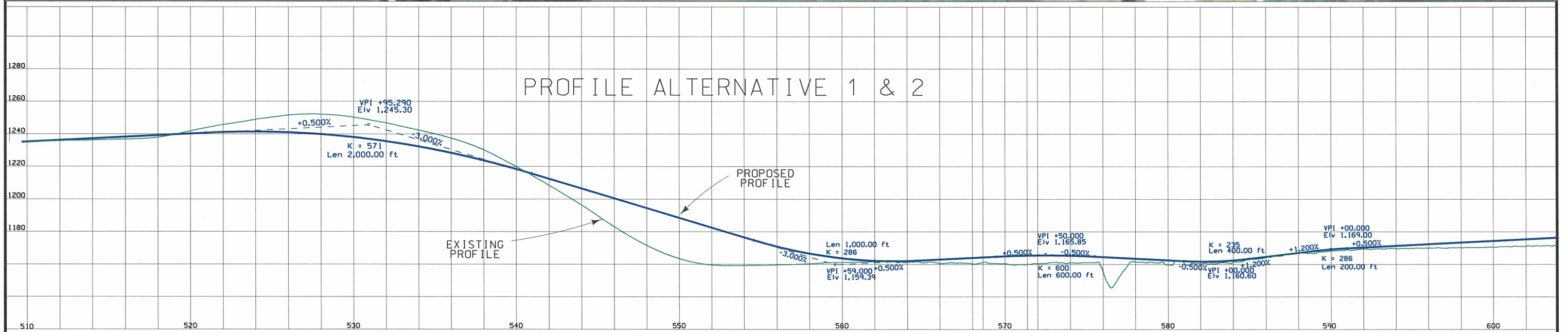
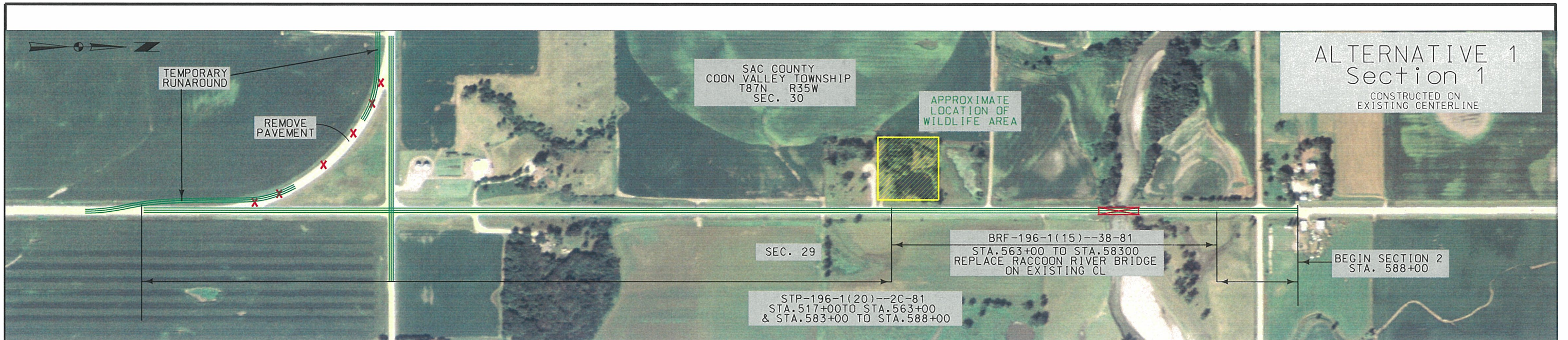
DETOUR

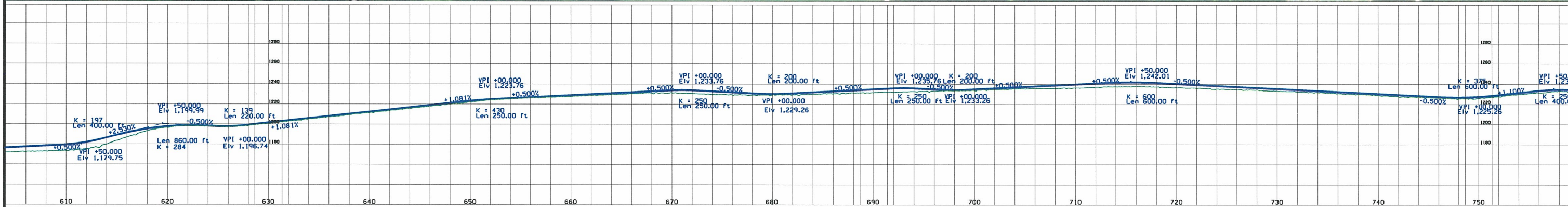
BEGIN PROJECT

STA 576 + 78.80
 FHWA 46730
 MAINT. NO. 8101.1S196
 DESIGN 248
 BRF-196-1(15)-38-81



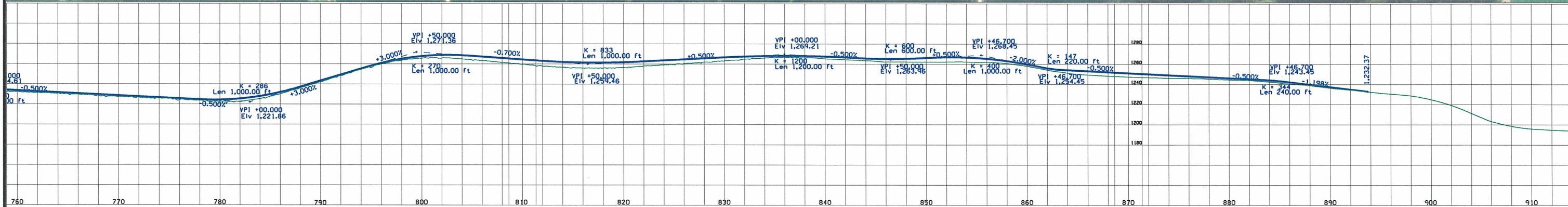
IA 196
 FROM U.S. 71 NORTH TO APPROX.
 0.8 MILES SOUTH OF EXISTING U.S.20
 STP-196-1(20)-2C-81
 PIN: 09-81-196-010





ALTERNATIVE 1
 STA. 588+00 STA. 893+71.7
 ALTERNATIVE 2
 STA. 595+00 TO STA. 893+71.7

RECONSTRUCTED ON
 EXISTING HORIZONTAL ALIGNMENT



END SECTION 2
 STA. 893+71.7