FINAL PROJECT CONCEPT STATEMENT

Interchange Flood Protection
I-29/I-680 Loveland Interchange

Pottawattamie County
Project No.: IMN-029-4(101)71--0E-78
PIN: 13-78-029-020

Highway Division
Office of Bridges and Structures

Dave Claman, P.E.
515-239-1487

August 21, 2013

I. Project Description

The site is located on the east side of the I-29/I-680 Loveland Interchange, 4 mi. south of Missouri Valley. The site is located in the Missouri River/Boyer River floodplain. Refer to attachment sheet 1 for the project location.

The project will make improvements to minimize reconfiguration required to allow access from I-680 to I-29 north to remain open during a flood event equal to or exceeding the June 2011 Missouri River event. Improvements will also be made to minimize the impact of a Boyer River levee breach upstream of I-29 on I-680.

II. Need For Project

During the June 2011 Missouri River flood extensive work had to be performed for access from I-680 to I-29 north of the interchange to remain open. The local drainage configuration used made the travel way susceptible to inundation from local rainfall events. The planned improvements will allow the connection to I-29 north to remain open for a Missouri River flood event 2 ft. higher than the 2011 event. At a flood level 2 ft. higher than in 2011 inundation of I-29 at locations north of the interchange will occur.

Following installation of planned improvements reconfiguration for a Missouri River flood will only require plugging of three pipes and installation of a portable pump. The reconfigured drainage system will be less susceptible to roadway inundation from local rainfall events. Refer to attachment sheet 3 for reconfiguration required for a Missouri River flood following improvements.

The interchange area is also susceptible to floods as a result of levee breach along the Boyer River. If the east bank Boyer River levee is breached in the three miles upstream of I-29 the

flood flow will cross over I-680 just east of I-29. A secondary threat to I-680 during a Boyer River levee breach is possible scour damage to two bridges east of the railroad overhead bridge. The Boyer River levee is subject to overtop for approximately a 20 yr. flood event. Refer to attachment sheets 1 and 2 for flood flow paths and critical elevations.

Following installation of planned improvements rapid inundation of I-680 as a result of a Boyer River levee breach will not occur. The two I-680 bridges that will carry Boyer River overflow will no longer be susceptible to scour.

III. Project Concept

A. Option A - Missouri River Flood Protection

Improvements to permit relatively rapid reconfiguration to maintain access to I-29 north during a Missouri River flood event 2 ft. higher than the 2011 event. Improvements consist of construction of dikes, lining of existing culverts, culvert extensions, and installation of new culverts. Refer to attachment sheets 4 and 5, components A-J, for improvements required.

Construction of dike (F) provides protection for both Missouri and Boyer River events. With this dike in place rapid inundation of I-680 from a Boyer River levee breach is mitigated.

The estimated project cost for is as follows:

Bridge Items		Est. Cost
Excavation	11,800 CY @ $8/CY	$ 94,400
Reinforced Concrete Pipe - 24”	370 LF @ $60/LF	$ 22,200
Reinforced Concrete Pipe - 30”	32 LF @ $120/LF	$ 3,900
Reinforced Concrete Pipe - 48”	146 LF @ $150/LF	$ 21,900
Reinforced Concrete Pipe Apron - 24”	2 EA @ $1,100/EA	$ 2,200
Reinforced Concrete Pipe Apron - 30”	4 EA @ $1,300/EA	$ 5,200
Reinforced Concrete Pipe Apron - 48”	2 EA @ $2,500/EA	$ 5,000
Line Pipe - 24”	402 LF @ $30/LF	$ 12,100
Line Pipe - 48”	380 LF @ $70/LF	$ 26,600
Median Drain	1 EA @ $10,000/EA	$ 10,000
	Subtotal	$ 204,000
Additional Items (50%)		$ 96,000
	Subtotal Bridge Costs	$ 300,000

Mobilization (10%)		$ 30,000
		=======
	Base Bridge Cost Option A	$ 330,000
Misc. and Contingency (B0) (30%)		$ 100,000
		=======
	Total Bridge Cost Option A	$ 430,000

Roadway Items		Est. Cost
Traffic Control (10% of Bridge Subtotal)		$ 30,000
Mobilization (10%)		$ 3,000
		=======
	Base Road Cost Option A	$ 33,000
Misc. and Contingency (B0) (30%)		$ 10,000
		=======
	Total Road Cost Option A	$ 43,000
	Total Project Cost Option A	$ 473,000

B. Option B - Missouri River/Boyer River Flood Protection

In addition to Option A improvements, improvements to provide protection for a Boyer River levee breach event for I-680 east of the railroad overhead bridge. Improvements in addition to Option A consist of expansion of an existing dike and revetment lining of two existing bridges. Refer to attachment sheets 4 and 5, components K-L, for improvements required.

The estimated project cost for is as follows:

Bridge Items		Est. Cost
Option A Items		$ 300,000
Excavation	2,200 CY @ $8/CY	$ 18,000
Articulating Block Mat - 6”	1,850 SY @ $65/SY	$ 121,000
Grout for Articulating Block Mat	333 CY @ $285CY	$ 95,000
		=======
	Subtotal Bridge Costs	$ 534,000
Mobilization (10%)		$ 53,000
		=======
	Base Bridge Cost Option B	$ 587,000
Misc. and Contingency (B0) (30%)		$ 176,000
		=======
	Total Bridge Cost Option B	$ 763,000

Roadway Items		Est. Cost
Traffic Control (10% of Bridge Subtotal)		$ 54,000
Mobilization (10%)		$ 5,000
		=======
	Base Road Cost Option B	$ 59,000
Misc. and Contingency (B0) (30%)		$ 18,000
		=======
	Total Road Cost Option B	$ 77,000
	Total Project Cost Option B	$ 840,000

IV. Recommendation

The project will provide protection/mitigation for the potential closure of I-680 and I-29 north from future Missouri River/Boyer River events. Option B is recommended.

V. Special Considerations

Permanent right-of-way will be required for this project to allow for construction of these improvements.

The Bridge Office will provide plan development with assistance from the Design Office.

A detailed topographic survey is required for the project. Refer to the survey limits attachment. Completed survey may be a combination of existing Lidar and new field collected data.

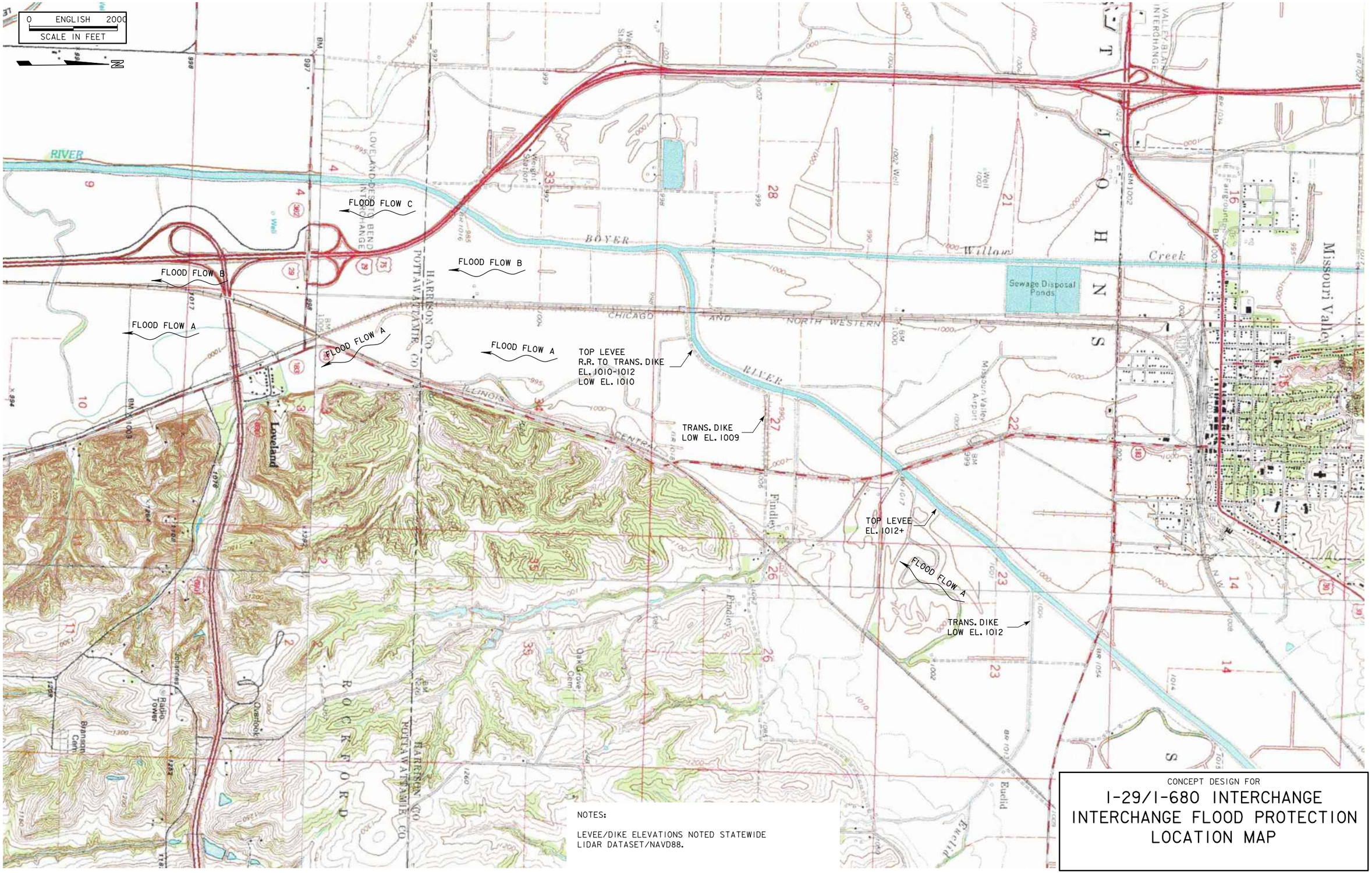
Proposed letting for FY 2016.

VI. Funds Programmed

This project is currently listed in the 2014-2018 Highway Program for $607,000 for construction in FY 2016 and $20,000 for ROW in FY 2016.

Revisions:

None



CONCEPT DESIGN FOR

I-29/I-680 INTERCHANGE INTERCHANGE FLOOD PROTECTION LOCATION MAP

DESIGN TEAM	DESIGN NO.	FILE NO.	DESIGN SHEET NO.	OF	POTTAWATTAMIE COUNTY	PROJECT NUMBER IMN-029-4(101)71-0E-78	SHEET NUMBER 1 OF 5

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NOTES:

PHOTOGRAPHY DATE 2010.

ELEVATIONS STATEWIDE LIDAR DATASET/NAVD88.

CONCEPT DESIGN FOR

I-29/I-680 INTERCHANGE
INTERCHANGE FLOOD PROTECTION
SITE / BASIN MAP

DESIGN TEAM	DESIGN NO.	FILE NO.	DESIGN SHEET NO.	OF	POTTAWATTAMIE COUNTY	PROJECT NUMBER IMN-029-4(101)71-0E-78	SHEET NUMBER 2 OF 5

0 ENGLISH 300
SCALE IN FEET

N

DRAINAGE BREAK DITCH
EL. 999.0
SANDBAG CLOSURE TO
EL. 1001.0

FLOOD FLOW C

EXIST. 30" RCP

I-680 E.B.

EXIST. 24" RCP

LOW ETW EL. 998.0

DRAINAGE BREAK EL. 999.4
SANDBAG CLOSURE TO
EL. 1001.0

Ⓐ EXIST. 24" RCP
BLOCK DURING FLOOD

I-29 S.B.

EXISTING 24" STEEL PIPE

LOW CROWN I-29
EL. 1002.2

EXIST. 24" RCP

OPEN TO
RIVER

RAMP B

PROPOSED MEDIAN
DRAIN

I-29 N.B.

RAMP D

EXISTING 24" RCP

Ⓑ PUMP LOCATION - PUMP
ACROSS DIKE FROM
NORTH TO SOUTH

FLOOD FLOW B

Ⓐ EXIST. 24" RCP
BLOCK DURING FLOOD

EXISTING 24" STEEL PIPE

PROPOSED DIKE

PROPOSED DIKE

Ⓓ DRAINAGE

LOW ETW RAMP D
EL. 996.3

EXISTING 48" RCP
PROPOSED EXTENSION
LEAVE OPEN

ALTERNATE PUMP LOCATION Ⓑ

EXIST. 30" RCP

EXISTING LOW ROAD
EL. 998.0

EXIST. 24" RCP
PROPOSED ABANDONMENT

Ⓐ PROPOSED 24" RCP
BLOCK DURING FLOOD

FLOOD FLOW B

EXIST. 24" RCP

OPEN TO
RIVER

EXISTING LOW ROAD
EL. 998.0

FLOOD FLOW A

PROPOSED DIKE RECONSTRUCTION
BRIDGE WATERWAY REVETMENT

LOW ROAD IN TUNNEL
EL. 999.0±

FLOOD FLOW A

I-680 E.B.

I-680 W.B.

NOTES:

ELEVATIONS STATEWIDE LIDAR DATASET/NAVD88.

AERIAL PHOTOGRAPHY 2007.

MISSOURI RIVER FLOOD OPERATION:

MAX. WATER LEVEL EL. 996.7 (6/30/11)

PROTECTION TO EL. 999.0 WITH 2 FT. FREEBOARD

ASSUMES I-29 CLOSED TO SOUTH

Ⓐ PIPE OUTLET BLOCK, 3 REQD.

Ⓑ PUMP, INTERIOR DRAINAGE

Ⓒ CLOSURE AS REQUIRED BASED ON ANTICIPATED RIVER LEVEL.

Ⓓ INTERIOR DRAINAGE FROM EAST WILL FLOW TO WEST IN MEDIAN DITCH TO MEDIAN DRAIN

CONCEPT DESIGN FOR

I-29/I-680 INTERCHANGE
INTERCHANGE FLOOD PROTECTION
MISSOURI RIVER FLOOD OPERATION

DESIGN TEAM	DESIGN NO.	FILE NO.	DESIGN SHEET NO.	OF	POTTAWATTAMIE COUNTY	PROJECT NUMBER IMN-029-4(101)71-0E-78	SHEET NUMBER 3 OF 5

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0 ENGLISH 100
SCALE IN FEET

N

I-29 S.B.

RAMP D

DITCH WEST TO EAST
TO DRAIN, 20' WIDTH

DIKE / POND (F)

SLEEVE (A)
30" RCP/APRON

EXTEND 48" RCP (D)

EXIST. 24" RCP
PLUG AND ABANDON (I)

EXISTING 24"
STEEL PIPE

LINE FULL
LENGTH 24" STL. (H)

SLEEVE (A)
30" RCP/APRON

LOW EDGE TRAVEL WAY
RT. - EL. 996.3
LT. - EL. 997.0

I-680 W.B.

EXISTING
24" RCP

MEDIAN DRAIN (B)

EXISTING
24" RCP

I-680 E.B.

BRIDGE 7813.1X680

EXIST. 48" RCP

LINE FULL
LENGTH 48" RCP (C)

EXTEND 48" RCP (D)

ALTERNATE 24" RCP
LOCATION (J)

INSTALL
24" RCP (J)

DIKE / DITCH (E)

EXISTING
24" RCP

RAILROAD

LINE FULL
LENGTH 24" STL. (H)

SLEEVE (A)
30" RCP/APRON

RAMP B

SLEEVE (A)
30" RCP/APRON

EXISTING 24"
STEEL PIPE

I-29 N.B.

NOTES:

ELEVATIONS STATEWIDE LIDAR DATASET/NAVD88.
LIDAR/NAVD88 ELEV. (+) 0.2 FT. = IARTN/NAVD88

AERIAL PHOTOGRAPHY 2007.

REFER TO SHEET 5 FOR COMPONENT NOTES.

CONCEPT DESIGN FOR

I-29/I-680 INTERCHANGE
INTERCHANGE FLOOD PROTECTION
PROPOSED IMPROVEMENTS

DESIGN TEAM	DESIGN NO.	FILE NO.	DESIGN SHEET NO.	OF	POTTAWATTAMIE COUNTY	PROJECT NUMBER IMN-029-4(101)71-0E-78	SHEET NUMBER 4 OF 5

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COMPONENTS:

(A) SLEEVE SECTION 30" RCP OVER 24" STEEL PIPE, PLACE APRON.

(B) INSTALL SW-513 AREA INTAKE, 48" X 48", OVER EXIST. 24" RCP. INTAKE ON TWO SIDES PERP. TO TRAFFIC. REMOVE 18" MEDIAN DRAIN.

(C) SUPPLEMENTAL GRADING OF GORE AREA. OFF-SITE DISPOSAL OF EXCAVATION FROM ER PROJECT.

(D) EXTEND 48" RCP 90 FT. UPSTREAM END, 56' DOWNSTREAM END. CLAY BACKFILL TO 3 FT. ABOVE PIPE AND ANTI-SEEP COLLARS BOTH ENDS.

(E) DIKE, TOP EL. 1001.0, TOP WIDTH 20 FT., 3:1 SLOPES. DITCH RCP OUTLET 8 FT. BTM. WIDTH TO EXIST. CHANNEL.

(F) DIKE, TOP EL. 1004.0, TOP WIDTH 12 FT., 3:1 SLOPES. DIKE TOP SET 2'± ABOVE I-29 OVERTOP ELEV. DETENTION POND BETWEEN ROAD/DIKE BTM. ELEV. AT 24" STEEL PIPE F.L.

(G) LINE FULL LENGTH OF EXTENDED 48" RCP. SEEPAGE CONTROL DURING MISSOURI RIVER FLOODING.

(H) LINE FULL LENGTH OF 24" STEEL PIPE. CORROSION PROTECTION.

(I) REMOVE WEST 100 FT. OF PIPE, BACKFILL EXCAVATION WITHIN 10 FT. OF PIPE END WITH CLAY.

(J) ALTERNATE LOCATION FOR 24" RCP MAY BE REQUIRED IF GROUND AT OUTLET IS TOO HIGH TO PERMIT ADEQUATE DRAINAGE.

(K) DIKE, TOP EL. 1005.0, TOP WIDTH 12 FT., 3:1 SLOPES. DIKE TOP SET SLIGHTLY ABOVE R.R. GRADE IN UPSTREAM FLOODPLAIN. APPROX. 3' GRADE INCREASE.

(L) BRIDGE BERM/WATERWAY LINING, 6" ABM. EXISTING BRIDGE BERMS UNLINED.

CONCEPT DESIGN FOR

I-29/I-680 INTERCHANGE
INTERCHANGE FLOOD PROTECTION
PROPOSED IMPROVEMENTS

DESIGN TEAM	DESIGN NO.	FILE NO.	DESIGN SHEET NO.	OF	POTTAWATTAMIE COUNTY	PROJECT NUMBER IMN-029-4(101)71-0E-78	SHEET NUMBER 5 OF 5

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Rockford TWP.
T-77N R-44W
Sec. 4

Sect. No. 3

1
DONALD D. &
BRENDA K. RIEF

869+35
℄441'±Ex.R/W

868+60
℄797'±R

868+60
℄780'

868+60
℄810'

868+35
℄760'

868+05
℄845'

867+96±Ex.R/W
℄880'

Sta. 4+54.97, 131.93 Lt.
24 X 106.56 Metal Pipe
Equalizer Pipe

Sta. 6+90.39
48 X 225.0 Conc Pipe
D.A. = 7.4 ac F

Sta. 9+95.05, 9.72 Lt.
24 X 2[illegible] Pipe
D.A. = 3.3 ac F

Sta. 16+00
Dual 61.5 X 39.0 Continuous
Conc Slab Bridges
DA= 617 AC H-F

Sta. 865+44.49
Dual 60' X 39.0 Variable Roadway
Prestressed Prestressed Bridges
Pre Beam Bridges.

E1 Sta 04+00.00 I 680
E1 Sta 865+74.15 (36.94 RT) I 29 MEDIAN

POT Sta 2900.00

4+30.87, 251.76 Lt.
43.0 Conc Pipe
= Median Only

Sta. 16+89.56, 0.33 Rt.
24 X 90.49 Conc Pipe W/ 15" CMP Inlet
D.A. = Median Only

Sta. 10+19.69
24 X 159.38 Conc Pipe
W/ 2 15" CMP Inlets
D.A. = 2.4 ac F

SE¼ SE¼
SEC 4

SW¼ SW¼
SEC. 3

864+20
℄685'

864+77±R/W Cor.
℄718'(R/W Cor.)

863+85
℄560'

863+35
℄461'±Ex.R/W

864+15
℄671'±R

Sta. 4+00.32
22.8 Conc Pipe
15" CMP Inlets
F

2
W. DAVID ROBERTS
TRUST

3R
CHICAGO CENTRAL &
PACIFIC RAILROAD

APPROX. SEC. LINE

SE COR.
SEC. 4-77-44

Right of Way Design Information
THIS SHEET INCLUDED FOR INFORMATION ONLY
ROW Team: LARSON /GROAT
ROW #: IMN-029-4(102)71--0E-78
Plan Date: 08-01-16
Color Legend:
Property Lines
Temporary Easement
Permanent Acquisition

	ROW DESIGN:	ENGLISH	IOWA DOT * OFFICE OF ROW	POTTAWATTAMIE	COUNTY	PROJECT NUMBER	IMN-029-4(102)71--0E-78	SHEET NUMBER H.1

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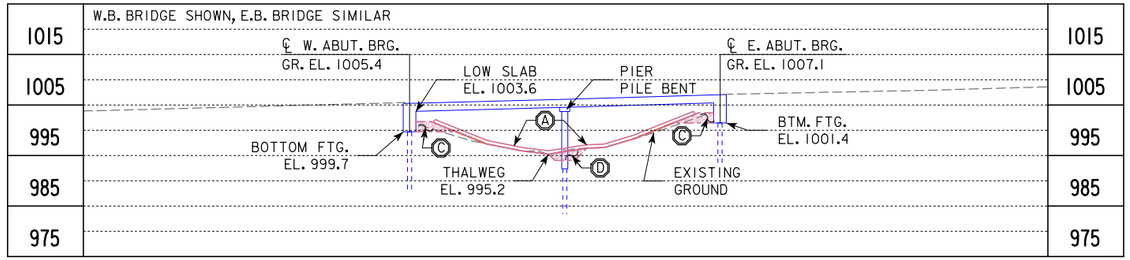
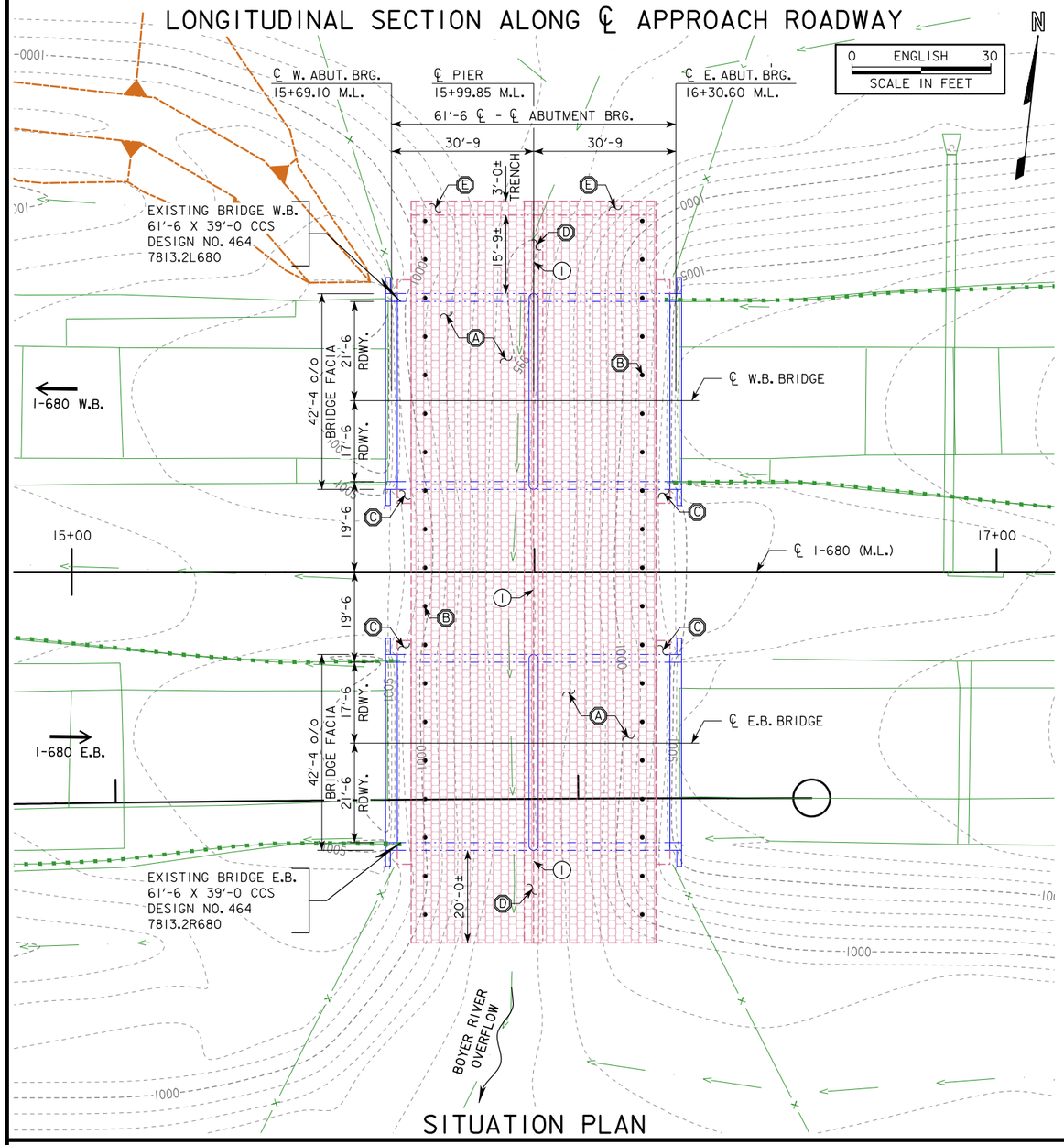


LONGITUDINAL SECTION ALONG ℄ APPROACH ROADWAY



SITUATION PLAN

BM NO. 502 STA. 16+31.2 M.L., 59.1' RT., IDOT BM S.E. WING WALL E.B. I-680 BRIDGE, EL. = 1009.36

REVETMENT LAYOUT NOTES:

Ⓐ 6" ARTICULATING BLOCK MAT (ABM) UNDERLAIN W/ ENGR. FABRIC. SIZE 160'-4 (MW) X 26'-9. TWO (2) REQD.

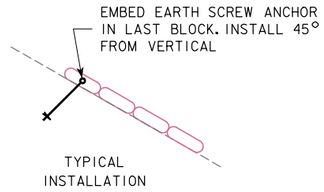
Ⓑ EARTH SCREW ANCHORS SPA. AT 8'-4±. NINETEEN (19) REQD. EA. MAT (A), THIRTY-EIGHT (38) TOTAL.

Ⓒ BERM WEDGE, EROSION STONE UNDERLAIN W/ ENGINEERING FABRIC. FULL WIDTH ABUTMENT TO 3'± BEYOND FACIA. REFER TO BERM WEDGE DETAIL THIS SHEET.

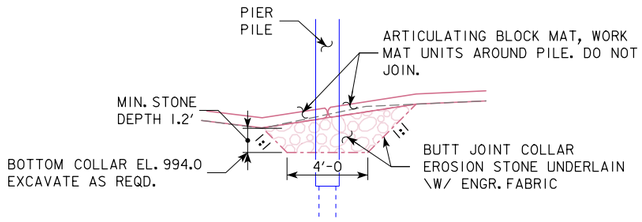
Ⓓ BUTT JOINT COLLAR, EROSION STONE UNDERLAIN W/ ENGINEERING FABRIC. FULL LENGTH OF ABM MAT (A) UNITS. REFER TO BUTT JOINT COLLAR DETAIL THIS SHEET.

Ⓔ TERMINAL TRENCH FULL WIDTH OF ABM.

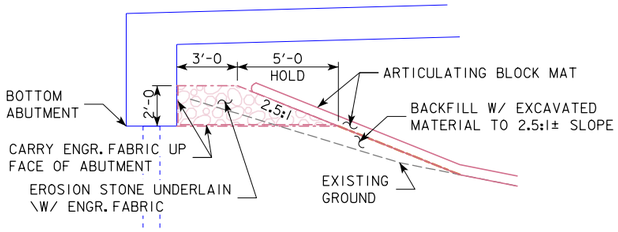
Ⓘ BUTT MAT (A) UNITS TOGETHER. DO NOT JOIN.



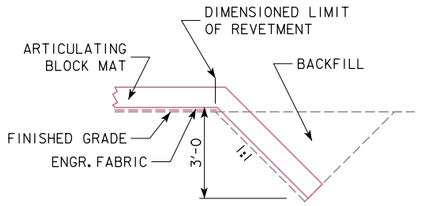
EARTH SCREW ANCHOR DETAIL



BUTT JOINT COLLAR DETAIL



BERM WEDGE DETAIL



SECTION THROUGH TERMINAL TRENCH

LOCATION

I-680 OVER BOYER RIVER OVERFLOW
T-77N R-44W
SECTION 3
ROCKFORD TOWNSHIP
POTTAWATTAMIE COUNTY
FHWA NO. 44290/44300
BRIDGE MAINT. NO. 7813.2R680/7813.L680
LATITUDE 41.494687°
LONGITUDE -95.895216°

DESIGN FOR REPAIRS TO 0° SKEW

DUAL 61'-6 X 39'-0 CONTINUOUS CONCRETE SLAB BRIDGES

30'-9 SPANS

SITUATION PLAN AND DETAILS

STATION: 16+00.00 JAN. 2018

POTTAWATTAMIE COUNTY

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION

DESIGN SHEET NO. 2 OF 2 FILE NO. 31351 DESIGN NO. 1218

DESIGN TEAM | POTTAWATTAMIE COUNTY | PROJECT NUMBER IMN-029-4(101)71--0E-78 | SHEET NUMBER V.02