SHIVEHATTERY
ARCHITECTURE + ENGINEERING

IOWA DEPARTMENT OF TRANSPORTATION

TO OFFICE: District 5

DATE: November 8, 2019

ATTENTION: Jim Armstrong

PROJECT: Keokuk County
BRFN-078-1(22)--39-54
PIN: 18-54-078-010

FROM: Jenifer Bates

OFFICE: Shive-Hattery

SUBJECT: Project Concept Statement; (Final Approval D0)

This project involves the replacement of the IA 78 bridge (Maint. No. 5406.0S078) over Richland Creek 5.8 mi E of IA 149.

A concept review was held on August 27, 2019. Those present included Mark Van Dyke from the District 5 Office; Steve Seivert, Brandon Walls, and Brandy Beavers from the Iowa DOT; and Jenifer Bates, Joe Appel, and Mark Harpole from Shive-Hattery.

One alternative was considered:

1. Replace existing bridge with a twin 12' x 10' x 88' reinforced concrete box (RCB) placed at a fifteen degree right ahead skew using staged construction and having an estimated cost of $909,700.

Alternative 1 is the preferred alternative due to it being a best fit of the existing stream. A bridge was not considered due to more maintenance and guardrail installation to maintain. Culverts are usually preferred over bridges when hydraulically adequate and site conditions allow for a culvert.

Traffic will be maintained via staged construction with traffic reduced to one lane via the use of temporary traffic signals.

The Draft Project Concept Statement was sent out for review and comment with concerns to be resolved by Thursday, October 24, 2019. Comments received during the review period have been considered and resolved.

This project is recommended for construction in FY 2023. The Bridges and Structures Bureau will coordinate plan preparation with assistance from the Design Bureau and Shive-Hattery.

Cc:

C. Purcell	M. J. Kennerly	K. D. Nicholson
S. J. Megivern	J. S. Nelson	B. Walls
M. Nop	M. A. Swenson	R. A. Younie
D. R. Tebben	K. Brink	D. L. Newell
J. W. Laaser-Webb	W. A. Sorenson	D. E. Sprengeler
E. C. Wright	M. E. Ross	A. A. Welch
N. M. Miller	C. C. Poole	M. J. Sankey
B. E. Azeltine	B. D. Hofer	T. D. Crouch
S. J. Gent	S. Anderson	P. C. Keen
J. Selmer	K. K. Patel	S. Godbold
D. R. Claman	J. Hauber	A. Abu-Hawash
M. E. Khoda	K. Olson	S. Neubauer
M. Van Dyke	J. R. Webb	B. Beavers
A. J. Klein	J. R. Phillips	J. Garton
J. Woodcock	B. M. Clancy	M. Claeys
H. Torres-Cacho	J. Bartholomew	D. Upton

SH Project #4192660

SHIVEHATTERY
ARCHITECTURE + ENGINEERING

FINAL PROJECT CONCEPT STATEMENT

IA 78 Bridge over Richland Creek 5.8 mi E of IA 149

Keokuk County
Proj. BRFN-078-1(22)--39-54
PIN: 18-54-078-010
Maint. No. 5406.0S078
FHWA No. 32680

Jenifer J. Bates, P.E.
515-223-8104

November 8, 2019

I. STUDY AREA

A. Project Description

This project involves the replacement of the IA 78 bridge (Maint. No. 5406.0S078) over Richland Creek 5.8 mi E of IA 149.

One alternative was considered:

1. Replace existing bridge with a twin 12' x 10' x 88' reinforced concrete box (RCB) placed at a fifteen degree right ahead skew using staged construction.

Alternative 1 is the preferred alternative due to it being a best fit of the existing stream. A bridge was not considered due to more maintenance and guardrail installation to maintain. Culverts are usually preferred over bridges when hydraulically adequate and site conditions allow for a culvert.

Traffic will be maintained via staged construction with traffic reduced to one lane via the use of temporary traffic signals.

The preliminary project cost is $909,700.

B. Need for Project

This is a 42' x 23.8' Steel Girder Bridge constructed in 1938 and overlaid in 1992. The current overlay is near the end of its useful life and the bottom of the deck has several hollow areas and spalls with exposed steel. There is measured section loss on the beams and the abutment bearings have severe corrosion. The bridge was designed for live loads below current standards. Due to the extent of these deficiencies to the deck, superstructure and substructure, the bridge should be replaced instead of repaired.

C. Present Facility

The existing structure is a 40’ x 24’ I-Beam 15° skew bridge constructed in 1939. Deck repair overlay accomplished in 1991.

IA 73 in the project area is 34’ wide asphalt pavement with 4’ wide granular shoulders and 3:1 foreslopes, constructed in 1939. ACC resurfacing with paved shoulders was accomplished in 1991.

D. Traffic Estimates

The 2022 construction year and 2042 design year average daily traffic estimates are 1,700 ADT with 19% trucks and 1,900 ADT with 19% trucks, respectively.

E. Sufficiency Ratings

IA 78 is classified as an Area Development route and is a maintenance service level C roadway. The federal bridge sufficiency rating is 53.6.

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 one personal property crash.

II. PROJECT CONCEPT

A. Feasible Alternatives

Alternative #1 - Replace with an RCB using staged construction

The existing 40’ x 24’ I-Beam 15° skew bridge will be replaced with a twin 12’ x 10’ x 88’ reinforced concrete box (RCB) placed at a fifteen degree right ahead skew.

The typical cross section will consist of a 24’ roadway with 8’ effective shoulders (4’ paved and 4’ granular) and 6:1/3.5:1 foreslopes.

The roadway will be constructed on the existing horizontal alignment. There will be a 3 in. grade raise to obtain the 2 ft. minimum fill height at the edge of shoulder. See attached drawing. The flow line of the box will be buried 1’ below the existing flow line in the channel. This will allow the bottom of the box to silt in and provide a natural bottom for fish passage. The existing ditches will need to be relocated to meet the inlet and outlet flowlines of the new RCB. Class E revetment will be placed at the ends of the RCB.

Due to the existing bridge width, during both stages 1 and 2, an 11’ wide traffic lane will be maintained. As noted in chapter 9B-9 of the Design Manual, as a 14’ 6” lane width is not provided, special signing must be placed in advanced of the work zone area.

The removal of the existing bridge and bridge approach pavement will require approximately 135 ft. of new 11 in. HMA pavement over 12 in. of modified subbase, including the installation of subdrains. The 3” grade raise can be accomplished with this 135 ft. section so no additional pavement beyond will be required.

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

It appears that right of way may be required for this project.

One lane of traffic in each direction will be maintained via staged construction utilizing temporary traffic signals. There is a gravel sideroad (260th Ave) on the southeast side of the bridge that will need to be considered and addressed with the traffic control signal set up. There are two houses present along this sideroad and there are multiple routes back to the highway if the sideroad needs to be closed at the intersection with IA 78.

Culvert Items	Estimated Cost
New Culvert	$159,300
Headwalls	$88,300
Staging (10%)	$24,800
Temporary Sheet Pile	$20,600
Bridge Removal	$8,600
Revetment	$8,100
Engineering Fabric	$800
Mobilization - 10%	$31,100
Contingency - 20%	$62,200
Culvert Total	**$403,800**
Roadway Items	
Clear & Grubb	$30,000
Special Backfill	$22,100
Embankment in place, contractor furnished	$49,500
Excavation, Class 10	$1,100
Modified Subbase	$6,400
Granular Shoulders	$4,000
HMA Paved Shoulder	$10,200
HMA Pavement	$19,500
Flooded backfill	$8,800
Roadway Removals	$5,000
Temporary Pavement	$54,000
Temporary Concrete Barrier Rail	$16,000
Temporary Traffic Signal	$22,500
Temporary Crash Cushion	$9,000
Guardrail removal	$2,200
Erosion Control	$50,000
Right of Way	$50,000
Traffic Control - 5%	$18,200
Mobilization - 5%	$18,200
M & C - 30%	$109,200
Roadway costs	**$505,900**
Project Total	**$909,700**

Other Alternatives Considered

A detour option was discussed at the site concept review, but it was not favorable due to the out-of-travel distance of 20 miles. Flowable mortar method clearance requirements are not met due to not having any vertical clearance.

B. Detour Analysis

There will be no off-site detour. Traffic will be maintained via staged construction with traffic reduced to one lane via the use of temporary traffic signals. One lane of traffic in each direction will be maintained via staged construction utilizing temporary traffic signals. There is a gravel sideroad (260th Ave) on the southeast side of the bridge that will need to be

considered and addressed with the traffic control signal set up. There are two houses present along this sideroad and there are multiple routes back to the highway if the sideroad needs to be closed at the intersection with IA 78.

To be able to evaluate the costs of the alternatives, a detour cost was still calculated. It is anticipated the detour would be in place for approximately 75 days. It was anticipated the detour would follow IA 149 north to the junction with County Road V5G to 1st Street, then south on 1st Street to the junction with IA 78. Out of distance travel is 20.4 miles. The total distance user cost was anticipated to be $425,000. The cost for county road maintenance would be $28,100 as calculated by the Gas Tax Method. Detour signing costs would be $10,000.

C. Recommendations

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

D. Construction Sequence

It is anticipated all work on this project will be awarded to one prime contractor. The Bridges and Structures Bureau will coordinate the plan preparation with the assistance of the Design Bureau and Shive-Hattery.

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

This will not be a traffic critical project.

The ABC Rating Score of 48 is less than the first stage filter threshold of 50, therefore no further evaluation is considered.

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

Right of Way appears to be required for this project.

The Location and Environment Bureau 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.

F. Program Status

Site data has been developed by Shive-Hattery. This project is listed in the 2020-2024 Iowa Transportation Improvement Program, with $575,000 programmed for replacement in FY 2023. Costs for this project may be eligible for bridge replacement funds. A schedule of events will be developed following approval of the Project Concept.

Following page has a map of the county showing the location of the project area and the anticipated detour route.

Attachment A - Utilities

ATTACHMENT A

Jenifer J. Bates

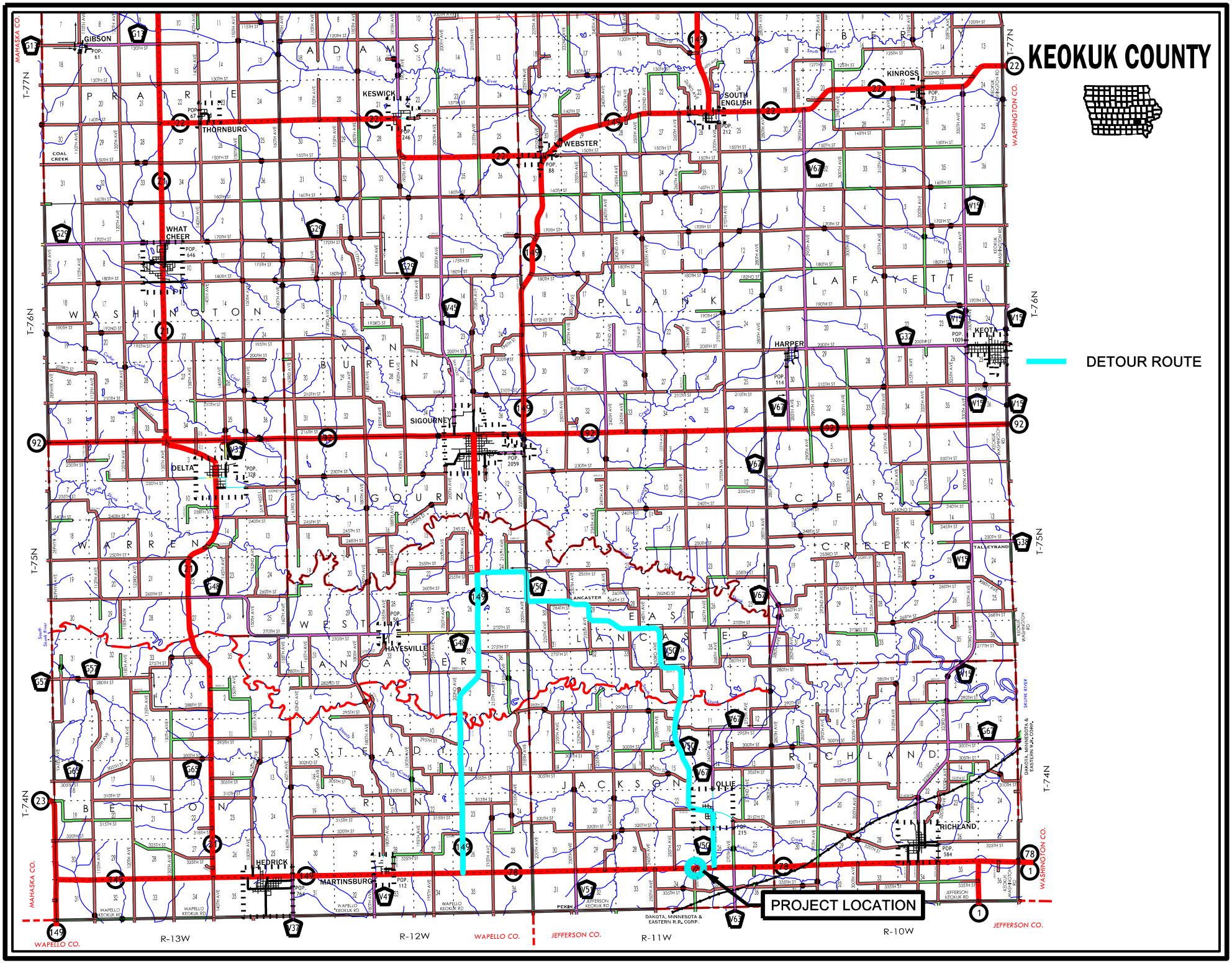
From: ia@occinc.com
Sent: Tuesday, April 30, 2019 2:53 PM
To: Sutherland, Nels
Subject: Design Information Results for Ticket # 551903098

(ASE) ALLIANT ENERGY
Contact Name : Laura Barr
Contact Phone : 3192861315
Contact Email : locate_IPL@alliantenergy.com
Locate Requested: N

(FMT) FARMERS & MERCHANTS MUTUAL TEL
Contact Name : Ron Mast
Contact Phone : 3198507902
Contact Email : ronmast@farmtel.com
Locate Requested: N

(WAP) WAPELLO RURAL WATER ASSOCIATIO
Contact Name : Kathy Alex or Donnie Johnston
Contact Phone : 6416828351
Contact Email : onecall@wrh2o.com
Locate Requested: N

(WINIA) WINDSTREAM COMMUNICATIONS
Contact Name : LOCATE DESK
Contact Phone : 8002891901
Contact Email : LOCATE.DESK@WINDSTREAM.COM
Locate Requested: N


KEOKUK COUNTY
DETOUR ROUTE
PROJECT LOCATION
GIBSON
POP. 61
KESWICK
POP. 246
THORNBURG
POP. 67
WEBSTER
POP. 88
SOUTH ENGLISH
POP. 212
KINROSS
POP. 73
WHAT CHEER
POP. 646
HARPER
POP. 114
KEOTA
POP. 1009
SIGOURNEY
POP. 2059
DELTA
POP. 328
HAYESVILLE
POP. 264
MARTINSBURG
POP. 112
HEDRICK
POP. 264
RICHLAND
POP. 584
OLLIE
POP. 215
TALLEYRAND
LANCASTER
PEKIN
COAL CREEK
ADAMS
PRAIRIE
WASHINGTON
BURREN
PLANK
LAFAYETTE
WARREN
SIGOURNEY
CLEAR CREEK
WEST LANCASTER
EAST LANCASTER
STEAD
RICHLAND
JACKSON
BENTON
T-77N
T-76N
T-75N
T-74N
R-13W
R-12W
R-11W
R-10W
MAHASKA CO.
WAPELLO CO.
JEFFERSON CO.
WASHINGTON CO.
DAKOTA, MINNESOTA & EASTERN R.R. CORP.
SKUNK RIVER

Sect. No.27

Jackson TWP.
T-74N R-11W
SEC. 26

Sta.318+34
Skew 15 LT AH
40'X20' I Beam Bridge
Design No. 5137
DA=2675 AC. H (From Plan)

Sta.323+39
Skew 0.00
6.0'x6.0'x59.0' RCB
DA=120 AC - H (From Plan)

REPLACE PAVEMENT

8' SHOULDER (4' GRAN, 4' PAVED)

POT Sta 309+85.90

EXISTING ROW

EXISTING ROW

EXISTING ROW

EXISTING ROW

APPROX. SEC. LINE

APPROX. SEC. LINE

APPROX. SEC. LINE

APPROX. SEC. LINE

15"X23' RCP

0 FEET 50

3" Grade Raise

732.45

731.71

-0.779%

-0.404%

VPI +25.000
Elv 732.04
K = 267
Len 100.00 ft

732.43 732.24 732.09 731.95 731.84 731.74

760 755 750 745 740 735 730 725 720 715 710 705 700 695

Lt

Rt

310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325

FILE NO.	ENGLISH	DESIGN TEAM Shive-Hattery	KEOKUK COUNTY	PROJECT NUMBER BRF-078-1(22)--39-54	SHEET NUMBER D.1

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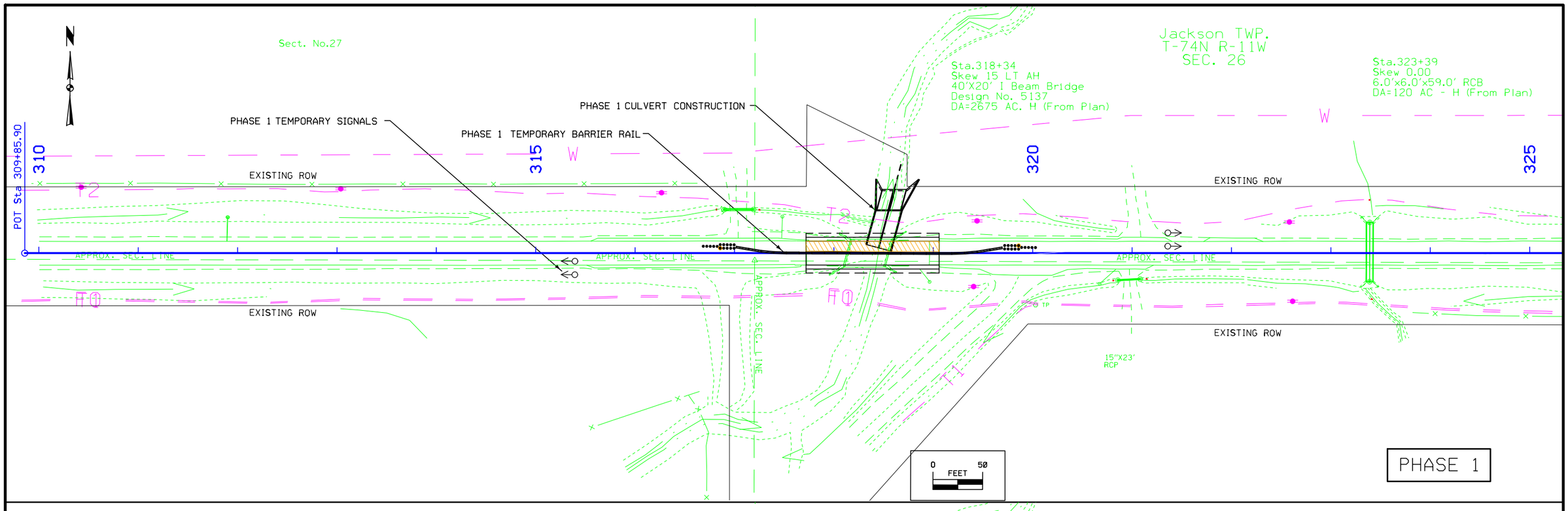

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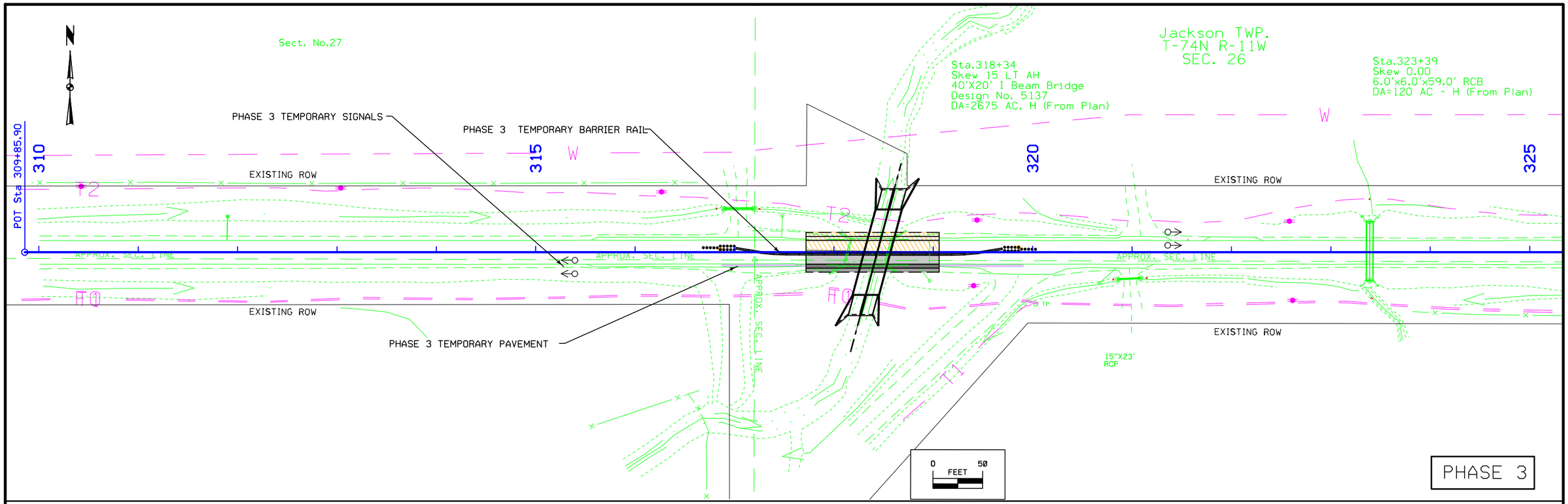

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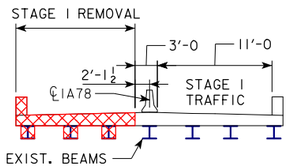
BENCH MARK NO.

750		750
740		740
730		730
720		720
710		710
700		700



SECTION

LONGITUDINAL SECTION ALONG ℄ CULVERT

SITUATION PLAN

TYPICAL CHANNEL PROTECTION

NOTES:

1. EXISTING 40'-0 x 24'-0 I-BEAM BRIDGE DESIGN NO. 5137.
2. DRAINAGE THROUGH EXISTING CULVERT/CHANNEL MUST BE MAINTAINED THROUGHOUT CONSTRUCTION.
3. FLOW LINE OF CULVERT NOMINALLY BURIED 1.0 FOOT.
4. BURIED AND OVERHEAD UTILITIES TO BE RELOCATED TEMPORARILY OR PERMANENTLY AS REQUIRED FOR CONSTRUCTION.

HYDRAULIC DATA

DRAINAGE AREA = 3.95 ACRES
Q_{50} = 1,960 CFS
HW ELEV. = 729.10
STREAM SLOPE = 27.60 FT./MI.
Q_{100} = 2,350 CFS, HW ELEV.= 730.30
Q_{500} = 3,320 CFS, HW ELEV.= 732.30

UTILITIES LEGEND:

SYMBOL - TYPE
-or-
NO KNOWN UTILITIES
-or-
UTILITY SURVEY NOT CONDUCTED

UTILITIES SHOWN ON THIS SHEET ARE FOR INFORMATION ONLY, SEE ROAD DESIGN SHEETS FOR FINAL UTILITY INFORMATION.

LOCATION

IA 78 OVER RICHLAND CREEK
5.8 MI E OF IA 149
T-74N R-11W
SECTION 26
JACKSON TOWNSHIP
KEOKUK COUNTY
FHWA NO. ?
BRIDGE MAINT. NO. ?
LATITUDE 41.177545°
LONGITUDE -92.101334°

TRAFFIC ESTIMATE

2022	AADT	1,700	V.P.D.
2042	AADT	1,900	V.P.D.
2042	DHV	200	V.P.H.
TRUCKS		19	%

DESIGN FOR 15° SKEW L.A.

TWIN 12'-0 X 10'-0 X 88'-0 CAST IN PLACE CONCRETE CULVERT

SITUATION PLAN

STATION 318+43.62 OCTOBER 2019

KEOKUK COUNTY

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION

DESIGN SHEET NO. ____ OF 1 FILE NO. ? DESIGN NO. ?

DESIGN TEAM SHIVE-HATTERY | KEOKUK COUNTY | PROJECT NUMBER BRFN-078-1(22)--39-54 | SHEET NUMBER V.1

BRIDGE REPLACEMENT
BRFN-078-1(22)--39-54

LETTING DATE
11-01-2022

KEOKUK Co.

INDEX OF SHEETS	
No.	DESCRIPTION
A Sheets	**Title Sheets**
* A.1	Title Sheet
* A.2	Location Map Sheet
A.3 - 4	Design Criteria (Temporary)
A.5 - 7	Concept Statement (Temporary)
B Sheets	**Typical Cross Sections and Details**
B.1 - 2	Typical Cross Sections and Details
C Sheets	**Quantities and General Information**
C.1	Project Description
C.1	Estimated Project Quantities
C.1	Estimate Reference Information
C.1	Standard Road Plans
D Sheets	**Mainline Plan and Profile Sheets**
* D.1	Plan & Profile Legend & Symbol Information Sheet
* D.2	IA 78
G Sheets	**Survey Sheets**
G.1 - 3	Reference Ties and Bench Marks
G.4	Horizontal Control Tab. & Super for all Alignments
J Sheets	**Traffic Control and Staging Sheets**
J.1	Traffic Control Plan
J.1	Staging Notes Stage
* J.2 - 3	Staging and Traffic Control Sheets
V Sheets	**Bridge and Culvert Situation Plans**
V.1	Bridge and Culvert Situation Plans
W Sheets	**Mainline Cross Sections**
W.1	Cross Sections Legend & Symbol Information Sheet
W.2 - 4	Mainline Cross Sections
	* Color Plan Sheets

IOWA DOT

Highway Division

PLANS OF PROPOSED IMPROVEMENT ON THE

PRIMARY ROAD SYSTEM

KEOKUK COUNTY

BRIDGE REPLACEMENT

IA 78 Over Richland Creek, 5.8 Miles E of IA 149

SCALES: As Noted

Refer to the Proposal Form for list of applicable specifications.

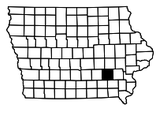
Value Engineering Saves. Refer to Article 1105.14 of the Specifications.

IOWA ONE CALL
1-800-292-8989
www.iowaonecall.com
811 Know what's below. Call before you dig.

REVISIONS

TOTAL
24
PROJECT IDENTIFICATION NUMBER
18-54-078-010
PROJECT NUMBER
BRFN-078-1(22)--39-54
R.O.W. PROJECT NUMBER
STPN-078-1(23)--2J-54

For Project Location Map
Refer to Sheet No. A.02



DESIGN DATA RURAL		
2022 AADT	1,700	V.P.D.
2042 AADT	1,900	V.P.D.
2042 DHV	200	V.P.H.
TRUCKS	19	%
Total Design ESALs	--	

INDEX OF SEALS		
SHEET NO.	NAME	TYPE
A.1	Michael J. Janechek	Primary Signature Block
V.1	Phillip M. Harpole	Hydraulic Design

D3 PLAN – August 21, 2020
D5 PLAN – December 18, 2020
D4 PLAN – September 21, 2022

PRELIMINARY PLANS

Subject to change by final design.

D2 PLAN – July 10, 2020

FILE NO. 31706	ENGLISH	DESIGN TEAM Iowa DOT \ Shive-Hattery	KEOKUK COUNTY	PROJECT NUMBER BRFN-078-1(22)--39-54	SHEET NUMBER A.1

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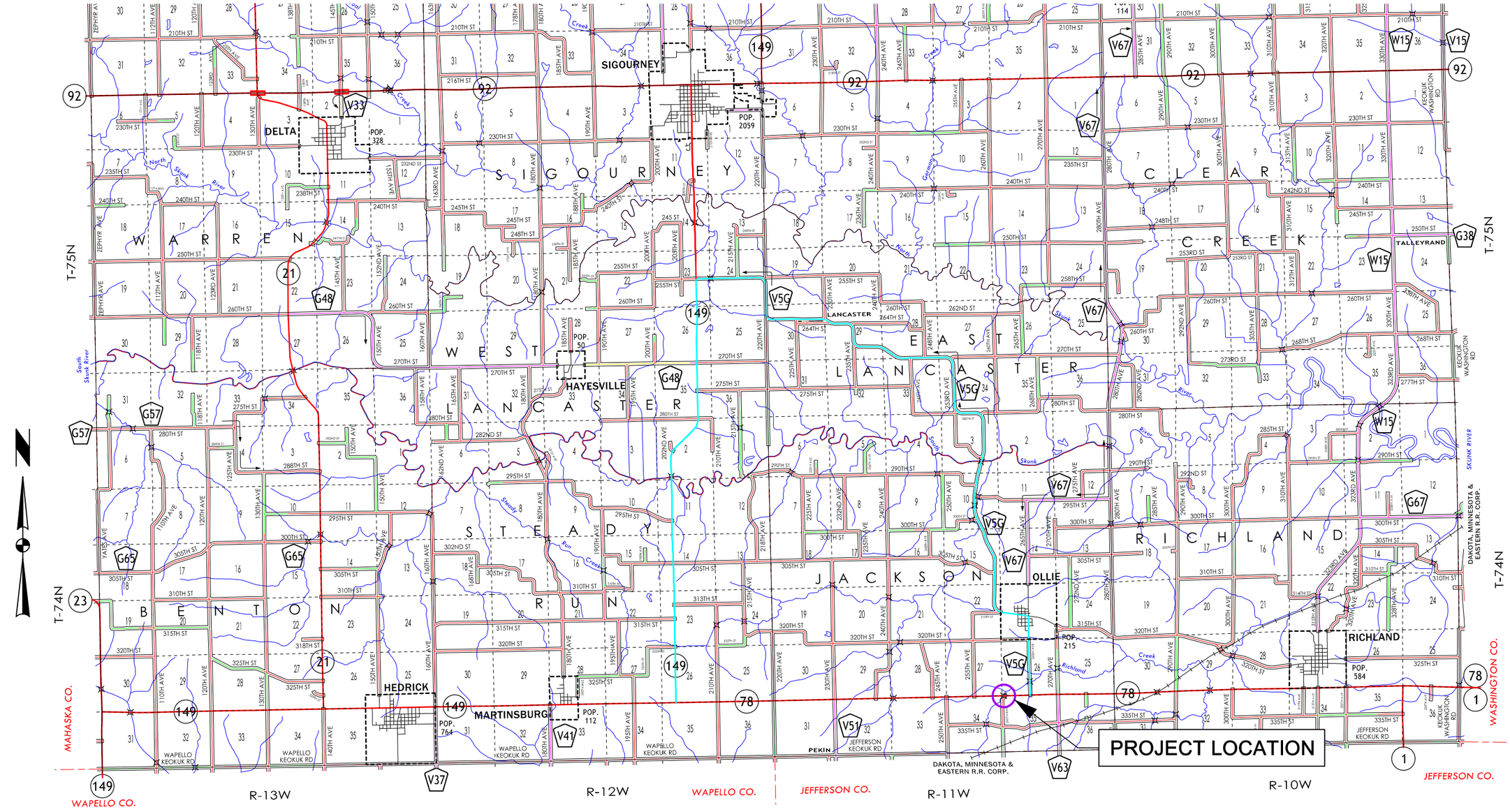

LOCATION MAP SCALE
0 1 2 3
Miles

FILE NO. 31706	ENGLISH	DESIGN TEAM Iowa DOT \ Shive-Hattery	KEOKUK COUNTY	PROJECT NUMBER BRFN-078-1(22)--39-54	SHEET NUMBER A.2

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Roadway	**IA 78**			
PIN Number	18-54-078-010		**Submittal Date**	10/18/19
Project Number	BRFN-078-1(22)--39-54			**Approval Date**
District	District 5	**Assistant District Engineer**	Mark Van Dyke	
County	KEOKUK		**or**	
Route	IA 78	**Office Director**		
Location	Bridge over Richland Creek 5.8 mi E of IA 149			
Work Type	Bridge Replacement			
Segment Manager	Kevin Patel			
Designer				

Design Manual Section 1C-1
Last Updated: 04-29-19

Rural Two-Lane Highways (Rural Arterials)

Design Element		Preferred	Acceptable	Project Values
Design speed (mph)		60	50	60
Maximum superelevation rate (Refer to Section 2A-2)		6%	8%	6%
Design lane width (ft)		12	12	12
Full depth paved width (ft)		12	12	12
Right turn lane (ft)		12	10	N/A
Climbing Lane (ft)		12	12	N/A
Left turn lane (ft)		12	10	N/A
Pavement cross-slope (on tangent sections)	Through lanes	2%	1.5% minimum, 2% maximum	2%
	Auxiliary and turn lanes	3%	3% maximum	N/A
	Crown break at centerline	4%	4% maximum	N/A
Shoulder cross-slope (on tangent sections)		4%	Shoulder cross-slope cannot be less than the adjacent lane, 6% max for paved or granular shoulders, 8% max for earth shoulders	4%
Curb type (Refer to Section 3C-2)	Design speed = 50 or 55 mph	6-inch sloped	6-inch standard	N/A
	Design speed ≥ 60 mph	4-inch sloped	6-inch sloped	N/A
Foreslope (For fill areas greater than 40 ft, contact the Soils Design Section for assistance)	Adjacent to shoulder	10:1 for 4' then 6:1	3:1	6:1
	Beyond standard ditch depth and design clear zone	3.5:1	3:1	3.5:1
	Curbed roadways	2%	not steeper than 3:1	N/A
Backslope (For cut areas greater than 25 feet, contact the Soils Design Section for assistance with backslope benches.)		3:1	2.5:1	3:1
Transverse Slopes	w/ drainage structures	8:1	6:1	N/A
	w/o drainage structures	10:1	6:1	N/A
Ditches (Refer to Section 3G-1)	Outside ditch (depth x width) (ft)	5 x 10	--	5 x 10
Bridge width—new*	Bridge length ≤ 200 ft	design lane widths + effective shoulder widths	design lane widths + effective shoulder widths	40'
	Bridge length > 200 ft	design lane widths + effective shoulder widths	design lane width + 4' right and left of the design lane widths	40'
Bridge width—existing*		design lane widths + no less than 2 ft left and right	design lane widths + 2 ft. offset left and right	N/A
Vertical clearance (ft) (above lanes, shoulders and 25 feet left and right of the center of railroad tracks)	Over primary	16.5	16	N/A
	Over non-primary	16.5 at interchange locations, 15 at all other locations	14	N/A
	Over railroad	23.3	23.3	N/A
	Sign trusses and pedestrian bridges	17.5	17	N/A
Structural Capacity		Contact Office of Bridges and Structures	Contact Office of Bridges and Structures	
Level of Service		B	B	B

*FHWA notification via email is required if acceptable critera is not met on the NHS system (No formal design exeption is required)

LISTING OF PROJECT REVISIONS

Date	Sheet No.	Description of Revisions

Design year ADT = 1900

Design Manual Section 1C-1
Last Updated: 04-29-19

Effective Shoulder Width and Type for Two-Lane Highways

Preferred (values shown in feet)			Acceptable (values shown in feet)			Project Values
	Rural Roadways	Urban Roadways		Rural Roadways	Urban Roadways	
Turn lanes with shoulders	6	6	Turn lanes with shoulders	6	0	N/A
Turn lanes with curbs	6	See Section 3C-2	Turn lanes with curbs	6	0	N/A
	Effective Shoulder Width	Paved Width		Effective Shoulder Width	Paved Width	
Climbing Lanes	6	4	Climbing Lanes	4	0	N/A
Two-Lane Highways	Effective Shoulder Width	Paved Width	Two-Lane Highways	Effective Shoulder Width	Paved Width	
Routes where bicycles are to be accommodated	10	10	Design year ADT > 2000 vpd	8	0*	Effective = 8' Paved = 4'
On roadways approaching urban areas (due to increased bike traffic)	10	10				
On all curves with a superelevation rate of 7.0% or greater	10	10				
On roadways with design year ADT > 5000	10	6	Design year ADT between 400 - 2000 vpd	6	0*	
On all other NHS	10	6				
On non-NHS routes with design year ADT > 3000	10	6	Design year ADT < 400 vpd	4	0*	
On non-NHS routes with design year ADT < 3000	8	0*				

*Requires safety edge-Refer to Section 3C-6

Curbs should be located beyond the outer edge of the effective shoulder width in rural areas

Refer to Section 3C-2 for curb offsets in urban areas

Notes:

As per direction by District at site visit, use 4' paved shoulder and 4' granular shoulder (still an 8' effective shoulder width). This will tie in with what's out there today.

Roadway Design Speed (mph) = 60

Design Manual Section 1C-1
Last Updated: 04-29-19

Design Criteria for High Speed Roadways

Design Element			Preferred Criteria, Design Speed, mph						Acceptable Criteria, Design Speed, mph						Project Values
			50	55	60	65	70	75	50	55	60	65	70	75	
Stopping sight distance (ft) (Refer to Section 6D-1)			425	495	570	645	730	820	425	495	570	645	730	820	570
Minimum horizontal curve radius (ft) (Refer to Sections 2A-2 and 2A-3)	Method 5 superelevation and side friction distribution	e_{max} = 6%	833	1060	1330	1660	2040	2500	833	1060	1330	1660	2040	2500	1330
		e_{max} = 8%	--	--	--	--	--	--	758	960	1200	1480	1810	2210	N/A
Minimum vertical curve length (ft) (Refer to Section 2B-1)			150	165	180	195	210	225	150	165	180	195	210	225	180
Minimum rate of vertical curvature (K) (Refer to Section 2B-1)	crest vertical curves		84	114	151	193	247	312	84	114	151	193	247	312	151
	sag vertical curves	roadways without fixed-source lighting	96	115	136	157	181	206	96	115	136	157	181	206	136
		roadways with fixed-source lighting	96	115	136	157	181	206	54	66	78	91	106	121	136
Minimum gradient (%)	(Refer to Section 2B-1)		0.5						0.3% with a curb, 0.0% without a curb						0.5
Maximum gradient (%)	(Refer to Section 2B-1)	Urban roadways	4		3				7	6	6	--	--	--	
		Rural roadways							5	5	4	4	4	4	3
		Interstates							5	5	4	4	4	4	
Clear zone			See "Preferred Clear Zone" table in Section 8A-2						See "Acceptable Clear Zone" table in Section 8A-2						30

SHIVEHATTERY
ARCHITECTURE + ENGINEERING

IOWA DEPARTMENT OF TRANSPORTATION

TO OFFICE: District 5

DATE: November 8, 2019

ATTENTION: Jim Armstrong

PROJECT: Keokuk County
BRFN-078-1(22)--39-54
PIN: 18-54-078-010

FROM: Jenifer Bates

OFFICE: Shive-Hattery

SUBJECT: Project Concept Statement; (Final Approval D0)

This project involves the replacement of the IA 78 bridge (Maint. No. 5406.0S078) over Richland Creek 5.8 mi E of IA 149.

A concept review was held on August 27, 2019. Those present included Mark Van Dyke from the District 5 Office; Steve Seivert, Brandon Walls, and Brandy Beavers from the Iowa DOT; and Jenifer Bates, Joe Appel, and Mark Harpole from Shive-Hattery.

One alternative was considered:
1. Replace existing bridge with a twin 12' x 10' x 88' reinforced concrete box (RCB) placed at a fifteen degree right ahead skew using staged construction and having an estimated cost of $909,700.

Alternative 1 is the preferred alternative due to it being a best fit of the existing stream. A bridge was not considered due to more maintenance and guardrail installation to maintain. Culverts are usually preferred over bridges when hydraulically adequate and site conditions allow for a culvert.

Traffic will be maintained via staged construction with traffic reduced to one lane via the use of temporary traffic signals.

The Draft Project Concept Statement was sent out for review and comment with concerns to be resolved by Thursday, October 24, 2019. Comments received during the review period have been considered and resolved.

This project is recommended for construction in FY 2023. The Bridges and Structures Bureau will coordinate plan preparation with assistance from the Design Bureau and Shive-Hattery.

Cc:

C. Purcell	M. J. Kennerly	K. D. Nicholson
S. J. Megivern	J. S. Nelson	B. Walls
M. Nop	M. A. Swenson	R. A. Younie
D. R. Tebben	K. Brink	D. L. Newell
J. W. Laaser-Webb	W. A. Sorenson	D. E. Sprengeler
E. C. Wright	M. E. Ross	A. A. Welch
N. M. Miller	C. C. Poole	M. J. Sankey
B. E. Azeltine	B. D. Hofer	T. D. Crouch
S. J. Gent	S. Anderson	P. C. Keen
J. Selmer	K. K. Patel	S. Godbold
D. R. Claman	J. Hauber	A. Abu-Hawash
M. E. Khoda	K. Olson	S. Neubauer
M. Van Dyke	J. R. Webb	B. Beavers
A. J. Klein	J. R. Phillips	J. Garton
J. Woodcock	B. M. Clancy	M. Claeys
H. Torres-Cacho	J. Bartholomew	D. Upton

SH Project #4192660

SHIVEHATTERY
ARCHITECTURE + ENGINEERING

FINAL PROJECT CONCEPT STATEMENT

IA 78 Bridge over Richland Creek 5.8 mi E of IA 149

Keokuk County
Proj. BRFN-078-1(22)--39-54
PIN: 18-54-078-010
Maint. No. 5406.0S078
FHWA No. 32680

Jenifer J. Bates, P.E.
515-223-8104

November 8, 2019

I. STUDY AREA

A. Project Description

This project involves the replacement of the IA 78 bridge (Maint. No. 5406.0S078) over Richland Creek 5.8 mi E of IA 149.

One alternative was considered:

1. Replace existing bridge with a twin 12' x 10' x 88' reinforced concrete box (RCB) placed at a fifteen degree right ahead skew using staged construction.

Alternative 1 is the preferred alternative due to it being a best fit of the existing stream. A bridge was not considered due to more maintenance and guardrail installation to maintain. Culverts are usually preferred over bridges when hydraulically adequate and site conditions allow for a culvert.

Traffic will be maintained via staged construction with traffic reduced to one lane via the use of temporary traffic signals.

The preliminary project cost is $909,700.

B. Need for Project

This is a 42' x 23.8' Steel Girder Bridge constructed in 1938 and overlaid in 1992. The current overlay is near the end of its useful life and the bottom of the deck has several hollow areas and spalls with exposed steel. There is measured section loss on the beams and the abutment bearings have severe corrosion. The bridge was designed for live loads below current standards. Due to the extent of these deficiencies to the deck, superstructure and substructure, the bridge should be replaced instead of repaired.

SH Project #4192660

Shive-Hattery | 4125 Westown Parkway | Suite 100 | West Des Moines, IA 50266 | 515.223.8104 | shive-hattery.com

C. Present Facility

The existing structure is a 40' x 24' I-Beam 15° skew bridge constructed in 1939. Deck repair overlay accomplished in 1991.

IA 73 in the project area is 34' wide asphalt pavement with 4' wide granular shoulders and 3:1 foreslopes, constructed in 1939. ACC resurfacing with paved shoulders was accomplished in 1991.

D. Traffic Estimates

The 2022 construction year and 2042 design year average daily traffic estimates are 1,700 ADT with 19% trucks and 1,900 ADT with 19% trucks, respectively.

E. Sufficiency Ratings

IA 78 is classified as an Area Development route and is a maintenance service level C roadway. The federal bridge sufficiency rating is 53.6.

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 one personal property crash.

II. PROJECT CONCEPT

A. Feasible Alternatives

Alternative #1 - Replace with an RCB using staged construction

The existing 40' x 24' I-Beam 15° skew bridge will be replaced with a twin 12' x 10' x 88' reinforced concrete box (RCB) placed at a fifteen degree right ahead skew.

The typical cross section will consist of a 24' roadway with 8' effective shoulders (4' paved and 4' granular) and 6:1/3.5:1 foreslopes.

The roadway will be constructed on the existing horizontal alignment. There will be a 3 in. grade raise to obtain the 2 ft. minimum fill height at the edge of shoulder. See attached drawing. The flow line of the box will be buried 1' below the existing flow line in the channel. This will allow the bottom of the box to silt in and provide a natural bottom for fish passage. The existing ditches will need to be relocated to meet the inlet and outlet flowlines of the new RCB. Class E revetment will be placed at the ends of the RCB.

Due to the existing bridge width, during both stages 1 and 2, an 11' wide traffic lane will be maintained. As noted in chapter 9B-9 of the Design Manual, as a 14' 6" lane width is not provided, special signing must be placed in advanced of the work zone area.

The removal of the existing bridge and bridge approach pavement will require approximately 135 ft. of new 11 in. HMA pavement over 12 in. of modified subbase, including the installation of subdrains. The 3" grade raise can be accomplished with this 135 ft. section so no additional pavement beyond will be required.

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

It appears that right of way may be required for this project.

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One lane of traffic in each direction will be maintained via staged construction utilizing temporary traffic signals. There is a gravel sideroad (260th Ave) on the southeast side of the bridge that will need to be considered and addressed with the traffic control signal set up. There are two houses present along this sideroad and there are multiple routes back to the highway if the sideroad needs to be closed at the intersection with IA 78.

Culvert Items	Estimated Cost
New Culvert	$159,300
Headwalls	$88,300
Staging (10%)	$24,800
Temporary Sheet Pile	$20,600
Bridge Removal	$8,600
Revetment	$8,100
Engineering Fabric	$800
Mobilization - 10%	$31,100
Contingency - 20%	$62,200
Culvert Total	**$403,800**
Roadway Items	
Clear & Grubb	$30,000
Special Backfill	$22,100
Embankment in place, contractor furnished	$49,500
Excavation, Class 10	$1,100
Modified Subbase	$6,400
Granular Shoulders	$4,000
HMA Paved Shoulder	$10,200
HMA Pavement	$19,500
Flooded backfill	$8,800
Roadway Removals	$5,000
Temporary Pavement	$54,000
Temporary Concrete Barrier Rail	$16,000
Temporary Traffic Signal	$22,500
Temporary Crash Cushion	$9,000
Guardrail removal	$2,200
Erosion Control	$50,000
Right of Way	$50,000
Traffic Control - 5%	$18,200
Mobilization - 5%	$18,200
M & C - 30%	$109,200
Roadway costs	**$505,900**
Project Total	**$909,700**

Other Alternatives Considered

A detour option was discussed at the site concept review, but it was not favorable due to the out-of-travel distance of 20 miles. Flowable mortar method clearance requirements are not met due to not having any vertical clearance.

B. Detour Analysis

There will be no off-site detour. Traffic will be maintained via staged construction with traffic reduced to one lane via the use of temporary traffic signals. One lane of traffic in each direction will be maintained via staged construction utilizing temporary traffic signals. There is a gravel sideroad (260th Ave) on the southeast side of the bridge that will need to be

SHIVEHATTERY
ARCHITECTURE + ENGINEERING

considered and addressed with the traffic control signal set up. There are two houses present along this sideroad and there are multiple routes back to the highway if the sideroad needs to be closed at the intersection with IA 78.

To be able to evaluate the costs of the alternatives, a detour cost was still calculated. It is anticipated the detour would be in place for approximately 75 days. It was anticipated the detour would follow IA 149 north to the junction with County Road V5G to 1st Street, then south on 1st Street to the junction with IA 78. Out of distance travel is 20.4 miles. The total distance user cost was anticipated to be $425,000. The cost for county road maintenance would be $28,100 as calculated by the Gas Tax Method. Detour signing costs would be $10,000.

C. Recommendations

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

D. Construction Sequence

It is anticipated all work on this project will be awarded to one prime contractor. The Bridges and Structures Bureau will coordinate the plan preparation with the assistance of the Design Bureau and Shive-Hattery.

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

This will not be a traffic critical project.

The ABC Rating Score of 48 is less than the first stage filter threshold of 50, therefore no further evaluation is considered.

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

Right of Way appears to be required for this project.

The Location and Environment Bureau 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.

F. Program Status

Site data has been developed by Shive-Hattery. This project is listed in the 2020-2024 Iowa Transportation Improvement Program, with $575,000 programmed for replacement in FY 2023. Costs for this project may be eligible for bridge replacement funds. A schedule of events will be developed following approval of the Project Concept.

Following page has a map of the county showing the location of the project area and the anticipated detour route.

Attachment A - Utilities

SHIVEHATTERY
ARCHITECTURE + ENGINEERING

ATTACHMENT A

Jenifer J. Bates

From: ia@occinc.com
Sent: Tuesday, April 30, 2019 2:53 PM
To: Sutherland, Nels
Subject: Design Information Results for Ticket # 551903098

(ASE) ALLIANT ENERGY
Contact Name : Laura Barr
Contact Phone : 3192861315
Contact Email : locate_IPL@alliantenergy.com
Locate Requested: N

(FMT) FARMERS & MERCHANTS MUTUAL TEL
Contact Name : Ron Mast
Contact Phone : 3198507902
Contact Email : ronmast@farmtel.com
Locate Requested: N

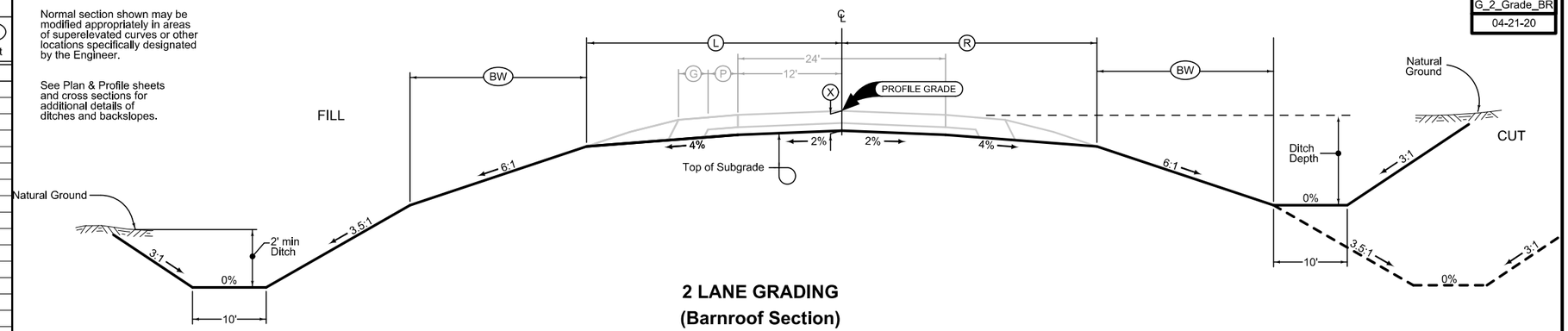
(WAP) WAPELLO RURAL WATER ASSOCIATIO
Contact Name : Kathy Alex or Donnie Johnston
Contact Phone : 6416828351
Contact Email : onecall@wrh2o.com
Locate Requested: N

(WINIA) WINDSTREAM COMMUNICATIONS
Contact Name : LOCATE DESK
Contact Phone : 8002891901
Contact Email : LOCATE.DESK@WINDSTREAM.COM
Locate Requested: N

LOCATION			DIMENSIONS			
ROAD IDENTIFICATION	STATION TO STATION		(L) Feet	(R) Feet	(X) Inches	(BW) Feet
IA 78	317+71.92	319+05.78	24.5	24.5	23	6.5

Normal section shown may be modified appropriately in areas of superelevated curves or other locations specifically designated by the Engineer.

See Plan & Profile sheets and cross sections for additional details of ditches and backslopes.



2 LANE GRADING
(Barnroof Section)

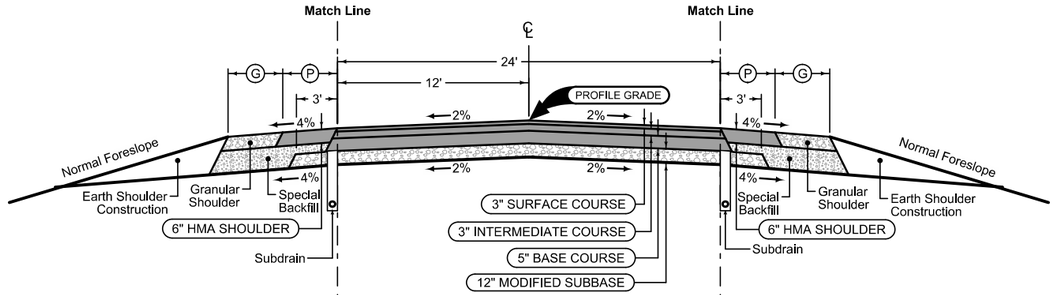
FILE NO. 31706	ENGLISH	DESIGN TEAM Iowa DOT \ Shive-Hattery	KEOKUK COUNTY	PROJECT NUMBER BRFN-078-1(22)--39-54	SHEET NUMBER B.1

10:36:37 PM 6/3/2020 mjanechek pw:\\projectwise.dot.int.lan:PWMain\Documents\Projects\5407801018\Design\SHT_54078022_B1.dgn

Combination Shoulder

Shoulder Jointing:
Longitudinal joint: B

2_C_ 04-21-20			
STATION TO STATION		(P) Feet	(G) Feet
317+71.92	319+05.78	4	4



2H_ 04-21-20	
STATION TO STATION	
317+71.92	319+05.78

Combination Shoulder

Shoulder Jointing:
Longitudinal joint: B

2_C_ 04-21-20			
STATION TO STATION		(P) Feet	(G) Feet
317+71.92	319+05.78	4	4

See Tab 100-24 or 100-25 for pavement quantities.

See Tab 112-9 for shoulder quantities.

IA 78

100-1D
10-18-05

PROJECT DESCRIPTION

This project involves the replacement of the IA 78 bridge over Richland Creek, 5.8 miles east of IA 149 with a twin 12'x 10' RCB culvert.

100-0A
10-28-97

ESTIMATED ROADWAY QUANTITIES
(1 DIVISION PROJECT)

Item No.	Item Code	Item	Unit	Total	As Built Qty.

105-4
10-18-11

STANDARD ROAD PLANS

The following Standard Road Plans apply to construction work on this project.

Number	Date	Title
DR-303	10-17-17	Subdrains (Longitudinal)
DR-305	04-17-18	Subdrain Outlets (standard Subdrain, Pressure Release and Special)
EC-201	10-16-18	Silt Fence
EC-202	10-21-14	Floating Silt Curtain
EC-204	04-18-17	Perimeter and Slope Sediment Control Devices
EC-301	10-18-16	Rock Erosion Control (REC)
EW-101	10-17-17	Embankment and Rebuilding Embankments
EW-102	10-20-15	Allowable Placement of Unsuitable Soil in Embankments
PM-110	10-16-18	Line Types
PM-420	04-19-11	Two-Lane Roadway with no Turn Lanes (One-Way Stop Condition)
PV-101	10-16-18	Joints
TC-1	04-16-13	Work Not Affecting Traffic (Two-Lane or Multi-Lane)
TC-81	10-15-19	Restricted Width Signing (Less than 14.5')
TC-202	04-21-15	Work Within 15 ft of Traveled Way
TC-217	10-18-16	Lane Closure with Signals and TBR

SURVEY SYMBOLS

NO SURVEY SYMBOLS PRESENT IN SURVEY G-SHEET FILE, WILL BE REQUESTED AT D2

UTILITY LEGEND

PLAN VIEW COLOR LEGEND OF PLAN AND PROFILE SHEETS

LINEWORK	Design Color No.	
Green	(2)	Existing Topographic Features and Labels
Blue	(1)	Proposed Alignment, Stationing, Tic Marks, and Alignment Annotation
Magenta	(5)	Existing Utilities
SHADING	**Design Color No.**	
Yellow	(4)	Highlight for Critical Notes or Features
Red	(3)	Delineates Restricted Areas
Lavender	(9)	Temporary Pavement Shading
Gray, Light	(48)	Proposed Pavement Shading
Gray, Med	(80)	Proposed Granular Shading
Gray, Dark	(112)	Proposed Grade and Pave Shading "In conjunction with a paving project"
Brown, Light	(236)	Grading Shading
Tan	(8)	Proposed Sidewalk Shading
Blue, Light	(230)	Proposed Sidewalk Landing Shading
Pink	(11)	Proposed Sidewalk Ramp Shading

PROFILE VIEW COLOR LEGEND OF PLAN AND PROFILE SHEETS

LINEWORK	Design Color No.	
Green	(2)	Existing Ground Line Profile
Blue	(1)	Proposed Profile and Annotation
Magenta	(5)	Existing Utilities
Blue, Light	(230)	Proposed Ditch Grades, Left
Black	(0)	Proposed Ditch Grades, Median
Rust	(14)	Proposed Ditch Grades, Right

Reference Point
Station
Survey Line
Section Corner
Ground Line Intercept
Saw Cut
Guardrail
Trench Drain
HighTension Cable Guardrail
Sheet Pile
Pavement Removal
Clearing & Grubbing Area

RIGHT-OF-WAY LEGEND

Proposed Right-of-Way
Existing Right of Way
Existing and Proposed Right-of-Way
Easement and Existing Right-of-Way
Easement (Temporary)
Easement
C/A Access Control
Property Line

PLAN AND PROFILE LEGEND AND SYMBOL INFORMATION SHEET

(COVERS SHEET SERIES D, E, F, & K)

FILE NO. 31706	ENGLISH	DESIGN TEAM Iowa DOT \ Shive-Hattery	KEOKUK COUNTY	PROJECT NUMBER BRFN-078-1(22)--39-54	SHEET NUMBER D.1

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Sect. No.27

Jackson TWP.
T-74N R-11W
SEC. 26

Sta.318+34
Skew 15 LT AH
40'X20' I Beam Bridge
Design No. 5137
DA=2675 AC. H (From Plan)

REMOVE
Build TWIN 12'x10' RCB
Skew 15 RA
Des No. 123

Sta.323+39
Skew 0.00
6.0'x6.0'x59.0' RCB
DA=120 AC - H (From Plan)

POT Sta 309+85.90

BEGIN TEMP PAVING
STA 315+53.16

FULL DEPTH HMA

BEGIN ROADWAY
STA 317+71.92

END ROADWAY
319+05.78

END TEMP PAVING LIMIT
STA 321+56.00

EXISTING ROW

APPROX. SEC. LINE

BEGIN TEMP PAVING
STA 316+86.92

15"X23'
RCP

END TEMP PAVING
STA 319+90.95

0 50
FEET

3" Grade Raise

732.45

731.71

-0.779%

-0.404%

VPI +25.000
Elv 732.04
K = 267
Len 100.00 ft

732.43 732.24 732.09 731.95 731.84 731.74

760 755 750 745 740 735 730 725 720 715 710 705 700 695

Lt
Rt

310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325

FILE NO. 31706	ENGLISH	DESIGN TEAM Iowa DOT \ Shive-Hattery	KEOKUK COUNTY	PROJECT NUMBER BRFN-078-1(22)--39-54	SHEET NUMBER D.2

10:37:47 PM 6/3/2020 mjanechek pw:\\projectwise.dot.int.lan:PWMain\Documents\Projects\5407801018\Design\SHT_54078122_D2.dgn

County: Keokuk
SAP 684.2
PIN: 18-54-078-010
Project Number: BRFN-078-1(22)--39-54
Location: Richland Creek 5.8 mi E of IA 149
Type of Work: Bridge-Unspecified
Project Directory: 5407801018

Party Personnel

Nels Sutherland- Party Chief
Myron Fox- Assistant Survey Party Chief

Date(s) of Survey

Begin Date 04/15/2019
End Date 06/03/2019

General Information

Measurement units for this survey are US survey feet. This survey is for proposed bridge reconstruction over Richland Creek on Hwy78. Project datum and control information is provided by Design Survey Office. This project is a Partial DTM with Photo control.

Vertical Control

Vertical datum for this survey is NAVD88 (Computed using Geoid12B). Benchmarks were placed throughout the project using post processed static observations relative to IaRTN Base Network. A minimum of 6hrs of data was simultaneously collected on each of the primary control points.

Horizontal Control

The project coordinate system for this survey is IaRCS Zone 13 (U.S. Survey Feet). This survey control is relative to IaRTN reference stations. IaRTN Reference Station coordinates are relative to the National Reference Station network datum: NAD83 (2011) for Epoch 2010.00.

Point Name	North Coordinate	East Coordinate	Elevation	Feature Code- Monument Description
300	6737919.11	23447351.41	783.26	FENO1 FENO MON W/BRASS DISC 4IN BELOW SURFACE 940FT E OF INTERSECTION 255TH AVE AND HWY78 THEN S 43FT FROM CL HWY78.
301	6737907.56	23449312.64	731.5	CP FROM INTERSECTION OF 260TH AVE AND HWY78 S 59FT AND 1FT FROM FENCE LINE 4X4 CM
307	6737927.43	23458309.94	778.15	CP 0.76 MILES E OF INTERSECTION V63 AND HWY78 THEN S 57FT FROM CL HWY78 4X4 CM
308	6737901.79	23459664.62	775.52	CP 1.02 MILES E OF INTERSECTION V63 AND HWY78 THEN S 60FT FROM CL HWY78 4X4 CM
302	6738032.31	23450386.92	759.02	CP 0.25 MILES W OF INTERSECTION V5G AND HWY78 THEN N 64FT FROM CL HWY78 4X4 CM
306	6737926.19	23456983.14	770.79	CP 0.51 MILES E OF INTERSECTION V63 AND HWY78 THEN S 63FT FROM CL HWY78 4X4 CM
310	6737962.38	23462990.91	769.02	FENO2 0.42 MILES W OF INTERSECTION 290TH AVE AND HWY78 THEN S 62FT FROM CL HWY78 FENO MONUMENT W/BRASS DISC 4IN BELOW SURFACE
312	6738052.56	23466012.46	744.99	CP 577FT E OF INTERSECTION 290TH AVE AND HWY78 THEN S 64FT FROM CL HWY78 4X4 CM

Alignment Information

The horizontal alignment for this survey is a retrace of As-built Plans No. 879. Survey stationing was equated to the plan POT at Sta 309+85.9 and ahead without equation throughout the survey.

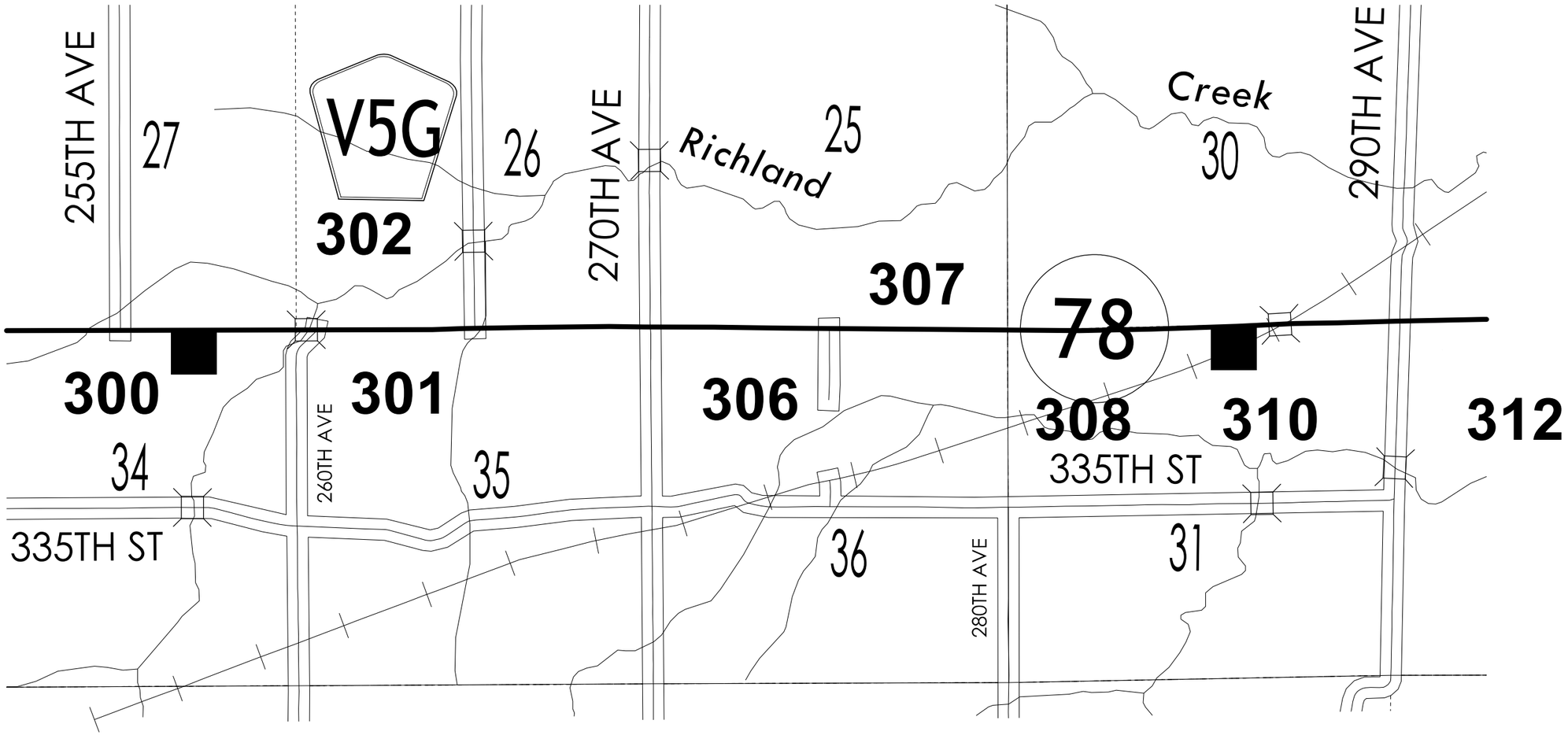
Survey stationing relates to as built plan stationing as follows:

POT Sta. 309+85.9 As-built Plans Project No. 879
Survey POT Sta. 309+85.9

POT Sta 330+32.9 Project No. 879
Survey POT Sta 330+32.67

CONTROL POINT VICINITY MAP

This map is a guide to the vicinity of the primary project control points
Primary control is for use with RTK base stations and for RTN validation.
Future surveys will use primary project control to establish temporary control as needed for construction or other surveying applications.



HORIZ. DATUM: NAD83(2011) EPOCH 2010.00
VERT. DATUM: NAVD88
Ia. Regional Coordinate System Zone 13

Coordinate listing from next sheet will be used with IaRTN for monument recovery. No other reference ties are given.

HORIZONTAL AND VERTICAL PROJECT CONTROL COORDINATE LISTING

HORIZ. DATUM: NAD83(2011) EPOCH 2010.00

VERT. DATUM: NAVD88

Ia. Regional Coordinate System Zone 13

Point Name	North Coordinate	East Coordinate	Elevation	Feature Code- Monument Description
300	6737919.11	23447351.41	783.26	FENO1 FENO MON W/BRASS DISC 4IN BELOW SURFACE 940FT E OF INTERSECTION 255TH AVE AND HWY78 THEN S 43FT FROM CL HWY78.
301	6737907.56	23449312.64	731.5	CP FROM INTERSECTION OF 260TH AVE AND HWY78 S 59FT AND 1FT FROM FENCE LINE 4X4 CM
307	6737927.43	23458309.94	778.15	CP 0.76 MILES E OF INTERSECTION V63 AND HWY78 THEN S 57FT FROM CL HWY78 4X4 CM
308	6737901.79	23459664.62	775.52	CP 1.02 MILES E OF INTERSECTION V63 AND HWY78 THEN S 60FT FROM CL HWY78 4X4 CM
302	6738032.31	23450386.92	759.02	CP 0.25 MILES W OF INTERSECTION V5G AND HWY78 THEN N 64FT FROM CL HWY78 4X4 CM
306	6737926.19	23456983.14	770.79	CP 0.51 MILES E OF INTERSECTION V63 AND HWY78 THEN S 63FT FROM CL HWY78 4X4 CM
310	6737962.38	23462990.91	769.02	FENO2 0.42 MILES W OF INTERSECTION 290TH AVE AND HWY78 THEN S 62FT FROM CL HWY78 FENO MONUMENT W/BRASS DISC 4IN BELOW SURFACE
312	6738052.56	23466012.46	744.99	CP 577FT E OF INTERSECTION 290TH AVE AND HWY78 THEN S 64FT FROM CL HWY78 4X4 CM

ALIGNMENT COORDINATES

101-16
10-20-09

Name	Location	Point on Tangent			Begin Spiral			Begin Curve			Simple Curve PI or Master PI of SCS			End Curve			End Spiral		
		Station	Coordinates		Station	Coordinates		Station	Coordinates		Station	Coordinates		Station	Coordinates		Station	Coordinates	
			Y (Northing)	X (Easting)		Y (Northing)	X (Easting)		Y (Northing)	X (Easting)		Y (Northing)	X (Easting)		Y (Northing)	X (Easting)		Y (Northing)	X (Easting)
ML0781		309+85.90	6,737,963.82	23,448,303.95															
ML0782		330+32.67	6,737,968.41	23,450,350.71															

FILE NO. 31706	ENGLISH	DESIGN TEAM Iowa DOT \ Shive-Hattery	KEOKUK COUNTY	PROJECT NUMBER BRFN-078-1(22)--39-54	SHEET NUMBER G.4

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108-26A
08-01-08

STAGING NOTES

Stage 1:
Remove north portion of roadway and place north half of culvert with traffic shifted to EB lane using temporary signals. Place temporary pavement for Stage 2.

Stage 2:
Remove and replace south half of the roadway and complete culvert with traffic shifted to WB lane using temporary signals.

Stage 3:
Remove temporary pavement used in Stage 2. Complete north half of roadway shoulder and grading work. Reopen to normal traffic after completion of stage 3.

108-23A
08-01-08

TRAFFIC CONTROL PLAN

1) While bridge and approaches are being removed and replaced by standard pavement and a box culvert, traffic shall be maintained by staged construction with temporary signals allowing one lane of traffic at all times.

2) Contractor shall furnish, install, maintain, and remove road closure signage and barricades. These functions are included in the Traffic Control Bid Item.

3) 260th St on the east end of the project shall be closed at IA 78.

108-25
10-21-14

511 TRAVEL RESTRICTIONS

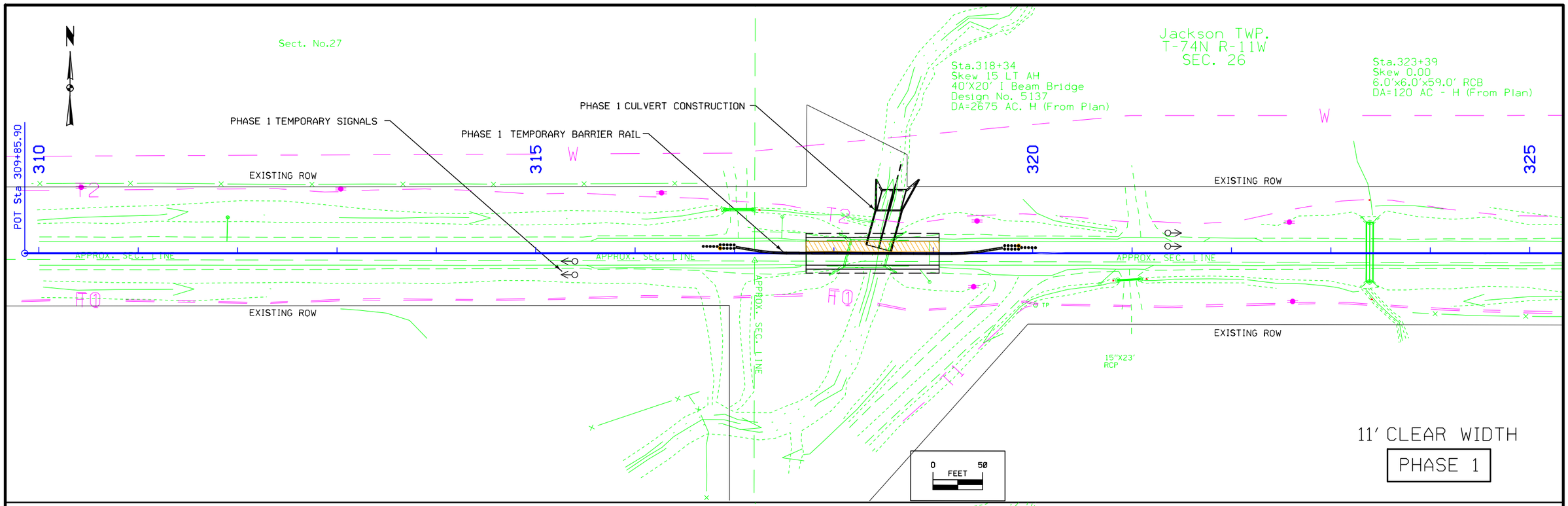
Route	Direction	County	Location Description	Feature Crossed	Object Type	Maint. Bridge No., Structure ID, or FHWA No.	Type of Restriction	Existing Measurement	Construction Measurement	Construction Measurement as Signed	Projected As Built Measurement	Remarks
IA 78	Both	Keokuk	Richland Creek (5.8 Mi E of IA 149)	Bridge (River)			Width					

111-01
04-17-12

COORDINATED OPERATIONS

Other work in progress during the same period of time will include the construction of the projects listed. Coordinate operations with those of other contractors working within the same area.

Project	Type of Work
None Provided	



FILE NO. 31706	ENGLISH	DESIGN TEAM Iowa DOT / Shive-Hattery	KEOKUK COUNTY	PROJECT NUMBER BRFN-078-1(22)--39-54	SHEET NUMBER J.2

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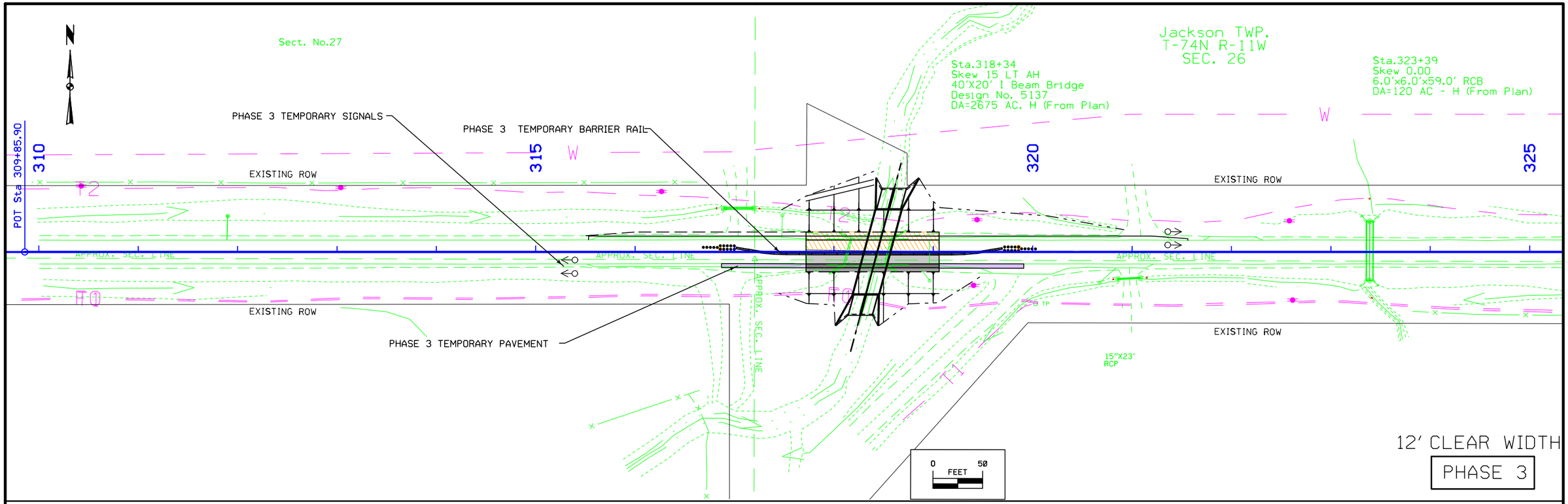

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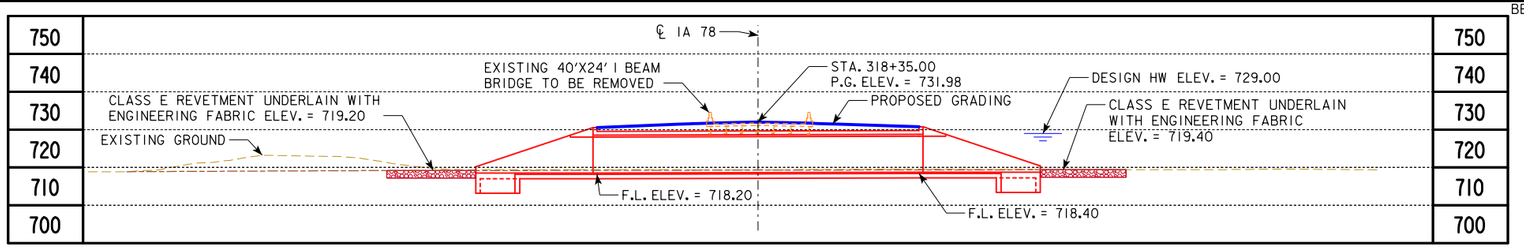
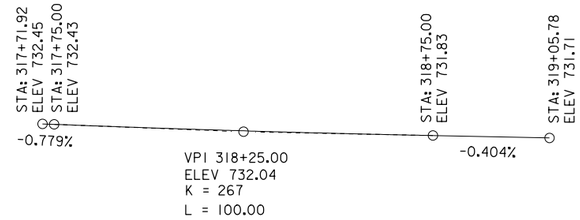
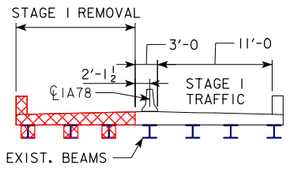


BENCH MARK NO. FENOI FENO MON W/BRASS DISC 4IN BELOW SURFACE 940FT E OF INTERSECTION 255TH AVE AND HWY78 THEN S 43FT FROM CL HWY78. ELEV 783.26

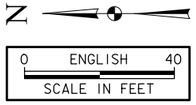


PROPOSED PROFILE GRADE IA 78



SECTION

LONGITUDINAL SECTION ALONG ℄ CULVERT



TYPICAL CHANNEL PROTECTION

TYPICAL APPROACH SECTION

SITUATION PLAN

NOTES:

1. EXISTING 40'-0 x 24'-0 I-BEAM BRIDGE DESIGN NO. 5137.
2. DRAINAGE THROUGH EXISTING CULVERT/CHANNEL MUST BE MAINTAINED THROUGHOUT CONSTRUCTION.
3. FLOW LINE OF CULVERT NOMINALLY BURIED 1.0 FOOT.
4. BURIED AND OVERHEAD UTILITIES TO BE RELOCATED TEMPORARILY OR PERMANENTLY AS REQUIRED FOR CONSTRUCTION.

HYDRAULIC DATA

DRAINAGE AREA = 3.95 ACRES
Q_{50} = 1,960 CFS
HW ELEV. = 729.00
STREAM SLOPE = 27.60 FT./MI.
Q_{100} = 2,350 CFS, HW ELEV.= 730.20
Q_{500} = 3,320 CFS, HW ELEV.= 732.30

UTILITIES LEGEND:

— W — —	WAPELLO RUAL WATER LINE
— FO — —	WINDSTREAM FIBER OPTIC LINE
— T — —	WINDSTREAM TELEPHONE LINE
— T2 — —	FARMERS & ELA MERCHANTS MUTUAL TELEPHONE LINE

UTILITIES SHOWN ON THIS SHEET ARE FOR INFORMATION ONLY, SEE ROAD DESIGN SHEETS FOR FINAL UTILITY INFORMATION.

LOCATION

IA 78 OVER RICHLAND CREEK
5.8 MI E OF IA 149
T-74N R-11W
SECTION 26
JACKSON TOWNSHIP
KEOKUK COUNTY
FHWA NO.
BRIDGE MAINT. NO. 5406.0S078
LATITUDE 41.177545°
LONGITUDE -92.101334°

TRAFFIC ESTIMATE

2022	AADT	1,700	V.P.D.
2042	AADT	1,900	V.P.D.
2042	DHV	200	V.P.H.
TRUCKS		19	%

PRELIMINARY

DESIGN FOR 15° SKEW L.A.

TWIN 12'-0 X 10'-0 X 88'-0 CAST IN PLACE CONCRETE CULVERT

SITUATION PLAN

STATION 318+43.62 JUNE 2020

KEOKUK COUNTY

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION

DESIGN SHEET NO. 1 OF 2 FILE NO. ? DESIGN NO. ?

DESIGN TEAM SHIVE-HATTERY | KEOKUK COUNTY | PROJECT NUMBER BRFN-078-1(22)--39-54 | SHEET NUMBER V.1

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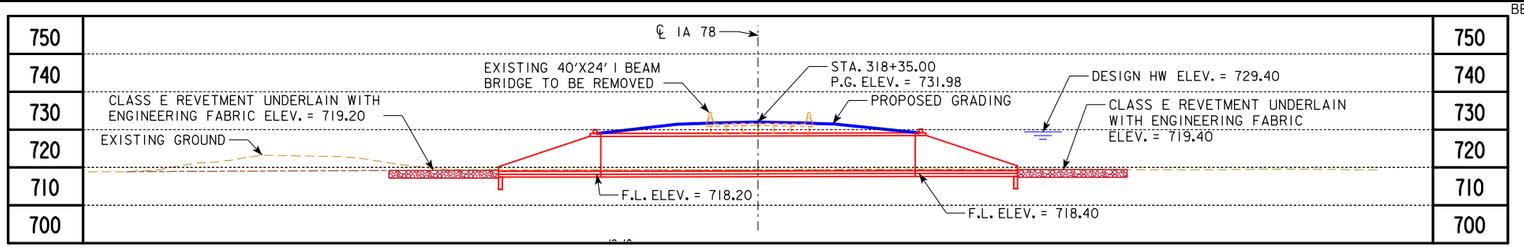

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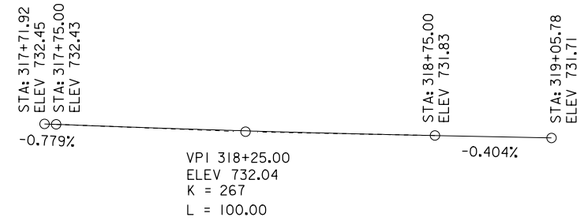
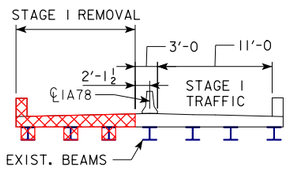
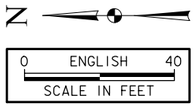


PROPOSED PROFILE GRADE IA 78



SECTION

LONGITUDINAL SECTION ALONG ℄ CULVERT



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TYPICAL APPROACH SECTION

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DESIGN FOR 15° SKEW L.A.

TWIN 12'-0 X 10'-0 X 88'-0 PRECAST CONCRETE CULVERT

SITUATION PLAN

STATION 318+43.62 JUNE 2020

KEOKUK COUNTY

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION

DESIGN SHEET NO. 2 OF 2 FILE NO. ? DESIGN NO. ?

DESIGN TEAM SHIVE-HATTERY | KEOKUK COUNTY | PROJECT NUMBER BRFN-078-1(22)--39-54 | SHEET NUMBER V.2

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LINE STYLE LEGEND OF CROSS SECTION SHEETS (ROAD)

- Existing Ground Line
- Proposed Template
- Proposed Topsoil Placement
- Additional Topsoil Removal
- Subgrade Treatment
- Granular Shoulder
- Pavement
- Existing Pipe\RCB
- Proposed Pipe\RCB
- Proposed Dike
- All Elements Associated with Proposed Entrances

LINE STYLE LEGEND OF CROSS SECTION SHEETS (SOILS)

- Topsoil (Class 10)
- Slope Dressing Only
- Class 10 Materials
- Select Loams And Clay-Loams
- Select Sand
- Unsuitable Type A Disposal
- Unsuitable Type B Disposal
- Unsuitable Type C Disposal
- Shale
- Waste
- Broken and Weathered Rock
- Solid Rock
- Boulders

Note: All layer lines and descriptions identify layers above the line.

Note: Vertical or near vertical lines connecting soil layers at edges of cross sections are only for the purpose of calculating template quantities and do not depict soil stratification.

SYMBOL LEGEND OF CROSS SECTION SHEETS

Existing ROW — Existing Right-of-Way Limit

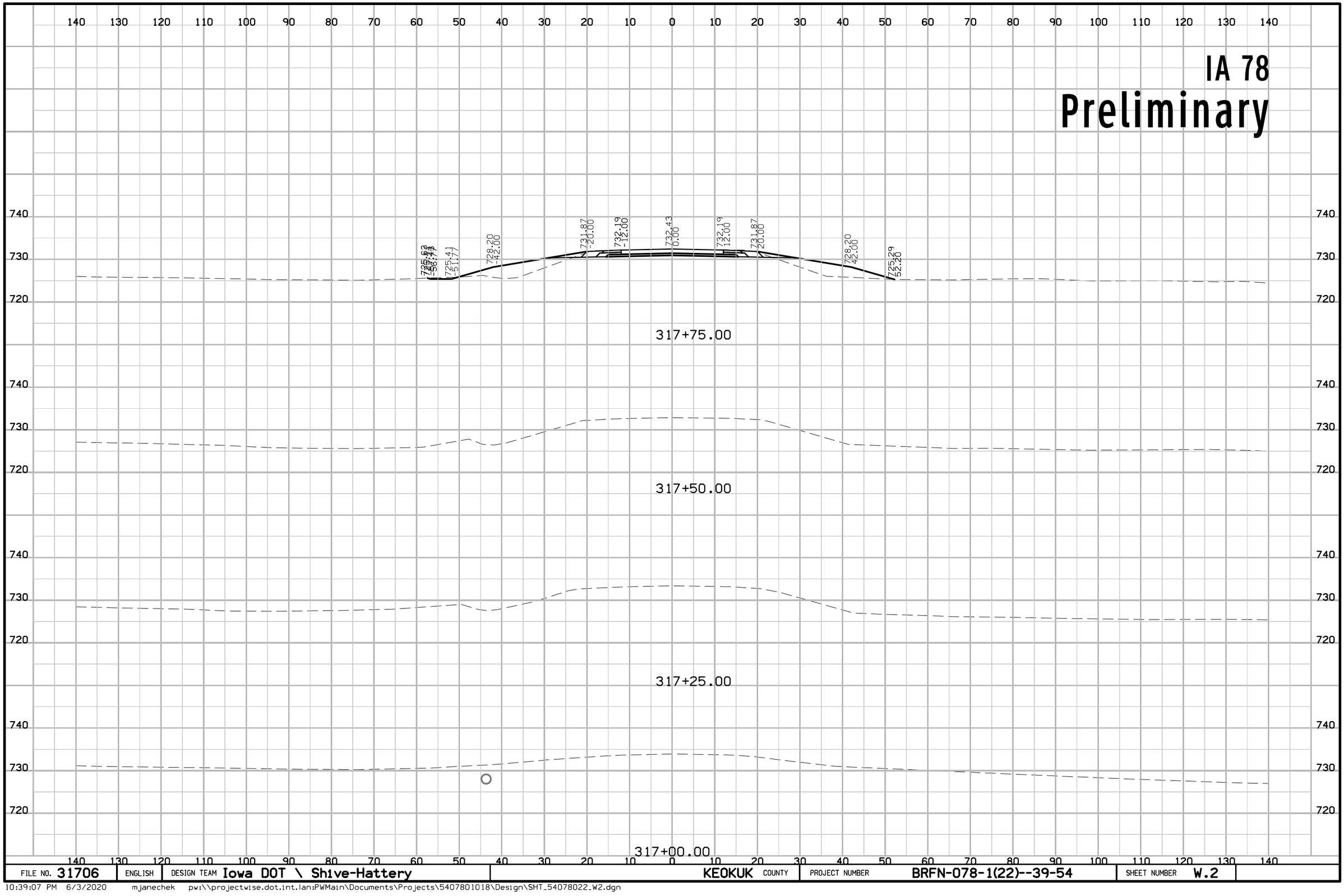
Proposed ROW — Proposed Right-of-Way Limit

Temporary ROW — Temporary Right-of-Way Limit

CROSS SECTION LEGEND AND SYMBOL INFORMATION SHEET

(COVERS SHEET SERIES W, X, Y, & Z)

IA 78
Preliminary



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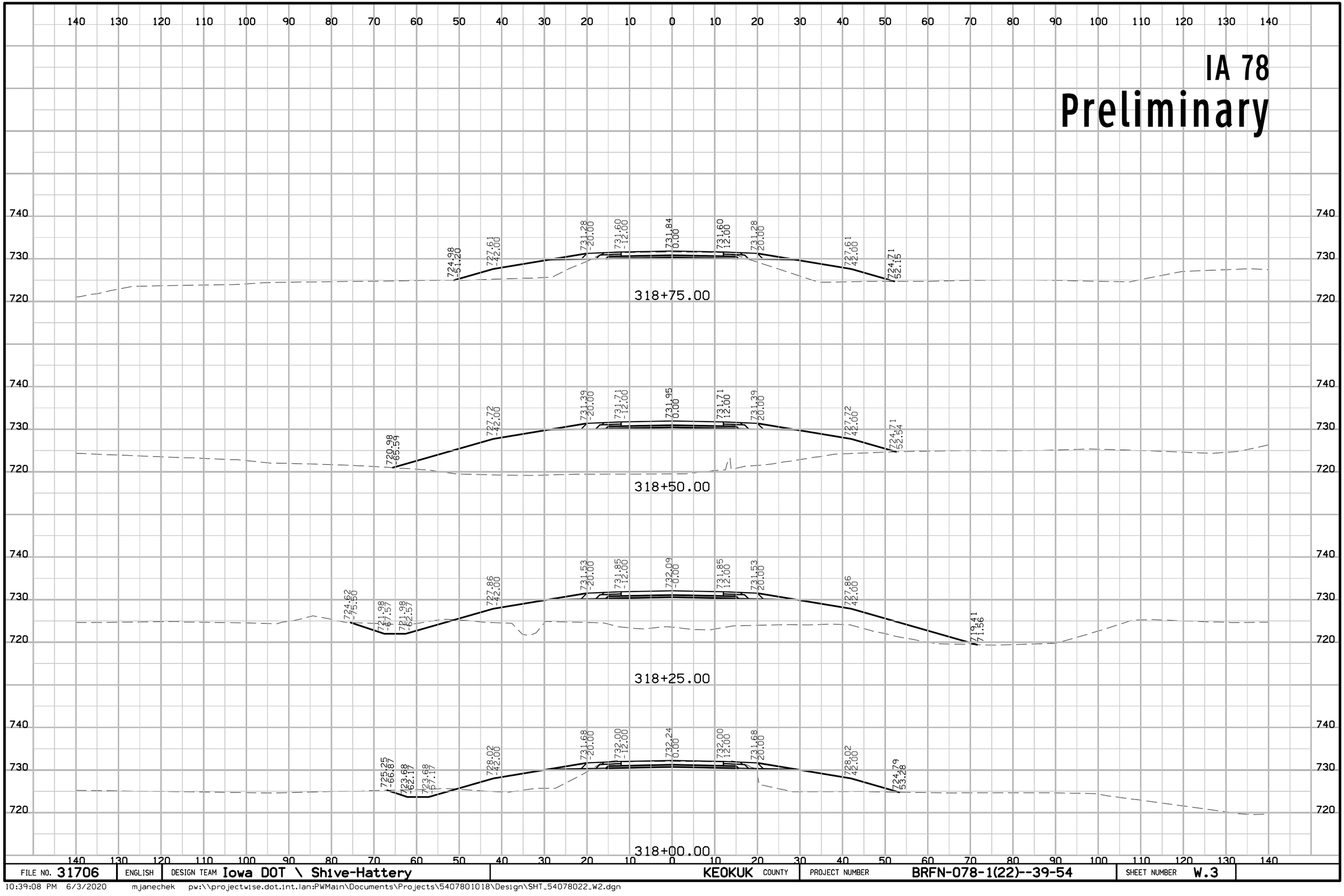
IA 78
Preliminary



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IA 78

Preliminary

140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140

740
730
720

319+75.00

319+50.00

319+25.00

319+00.00

727.51
42.00

731.18
20.00

731.50
12.00

731.74
0.00

731.50
12.00

731.18
20.00

727.51
42.00

724.78
51.55

FILE NO. 31706	ENGLISH	DESIGN TEAM Iowa DOT \ Shive-Hattery	KEOKUK COUNTY	PROJECT NUMBER BRFN-078-1(22)--39-54	SHEET NUMBER W.4

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