

**IOWA DEPARTMENT OF TRANSPORTATION**

**TO OFFICE:** District 1                                 **DATE:** May 23, 2013  
**ATTENTION:** Scott Dockstader                         **REF. :** Marshall County  
**FROM:** Kevin K. Patel   BRFN-96-1(6)--39-64  
**OFFICE:** Design   PIN: 11-64-096-010  
**SUBJECT:** Field Exam

A field exam was held on Tuesday, May 14, 2013, to review the proposed plan for replacing a bridge over Devil's Run Creek on IA 96, approximately 1.8 miles east of County Road T-29.

Those present for the field exam included Tony Gustafson, Jesse Tibodeau and Joel Ibarra from District 1; Chris King from the Office of Bridges and Structures; Ryan Miller, Dave Maach, Mike Thiel, and Kevin Patel from the Office of Design and Mark Sloppy from the Office of Location and Environment.

IA 96 is functionally classified as an access route and is a maintenance service level "C" roadway with a sufficiency rating of 63. The 2015 and 2035 ADT is 1,900 vpd and 2,400 vpd respectively with 13 % truck traffic. The bridge has a sufficiency rating of 64.

The proposed project will construct a twin 12' x 10' x 88' RCB under the 40' long x 30' wide I-beam bridge using the flowable mortar method. The void between the RCB and bridge will then be filled with flooded backfill and flowable mortar. Class 10 embankment for the shoulders and foreslopes will then be placed adjacent to the bridge allowing the existing concrete bridge barrier rail and guardrail to be removed.

Four PCC patches, two each side of the bridge, will be required. These patches will be placed via the use of temporary traffic signals. The location of the advanced warning signs for the temporary traffic control signals should be reviewed to ensure there is adequate sight distance for motorists due the crest vertical curves adjacent to the bridge. While the temporary signals are present the contractor should utilize the traffic control set up for removing the concrete bridge barrier rail.

The typical section will provide a 28' roadway with 8' granular shoulders with 6:1/3:1 foreslopes.

Rip-rap splash basin will be required at the inlet and outlet ends of the RCB.

A contractor furnished borrow will be used.

No bid item for a field lab, field office or construction survey was requested. No clearing and grubbing will be required; however, a bid item should be included for fence removal. A bid item for tile exploration (two times the project length) should be included in the plans. The existing guardrail (85 ft. per corner) will be removed and should be delivered

to the Marshalltown Maintenance Garage.

There are utilities that will need to be relocated. This includes a waterline under the inlet end of the proposed RCB.

Right of way will be required to construct and maintain the project.

No plans are included in this submittal; however plan sheets may be viewed as pdf files at W:\Projects\6409601011\Design\Design Events\D2\D2\_64096006\_Plan.pdf.

This project is currently scheduled for a February 2015 letting. The final concept cost estimate for this project was \$652,200. The current cost estimate is now approximately \$611,900 (the cost estimate for the RCB items is \$367,000 and the roadway costs are \$244,900).

KKP:mk

cc: T. J. Gustafson	M. J. Sankey	S. J. Gent
M. J. Kennerly	D. A. Widick	W. Sorenson
D. L. Maifield	T. L. Gettings	E.C. Wright
M. Sloppy	J. P. Rost	K. D. Nicholson
R. L. Stanley	S. C. Marler	E. J. Ranney
T. Crouch	L.C. Funnell	D. R. Tebben
M. D. Masteller	D. Matulac	Y. Jia
M. A. Swenson	C. B. Brakke	J. W. Smith
N. L. McDonald	D. A. Popp	B. Bradley
G. A. Novey	D. R. Claman	J. McCollough
J. Vortherms	B. Hofer	C. King
M. Carlson	R. Miller	D. Maach
M. Thiel	J. Lavine	J. Tibodeau
J. Ibarra		

**MARSHALL CO.** RCB Culvert New - Twin Box BRFN-096-1(6)--39-64 LETTING DATE 2/17/2015



Iowa Department of Transportation  
**Highway Division**

PLANS OF PROPOSED IMPROVEMENT ON THE

PRIMARY ROAD SYSTEM  
**MARSHALL COUNTY**  
 RCB Culvert New - Twin Box

1.8 Miles East of County Rd. T-29

SCALES: As Noted

Refer to the Proposal Form for list of applicable specifications.

Value Engineering Saves. Refer to Article 1105.15 of the Specifications.

**NO MILEAGE SUMMARY**

*No T & E species*



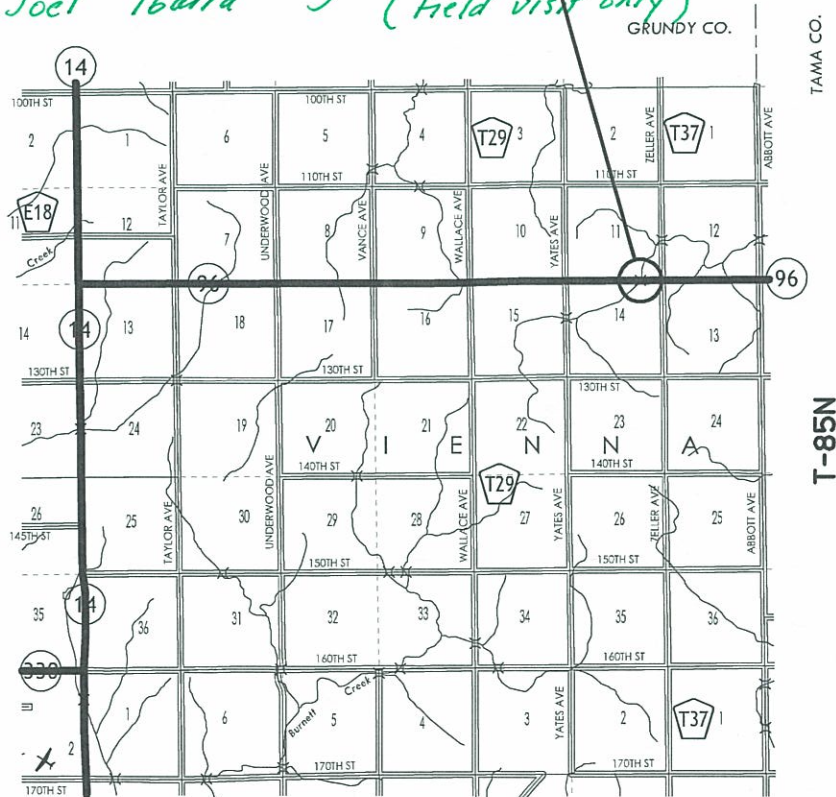
*DMM  
5.22.13*

*Ryan Miller  
Dave Maach  
Mike Thiel  
Kevin Patel* } Design

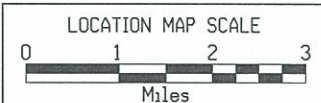
*Tony Gustafson - District Office  
Mark Sloppy - OLE  
Chris King - Prelim Bridge*

**PROJECT LOCATION**

*Jesse Tibodeau } Marshalltown RCE Office  
Joel Ibarra } (field visit only)*



R-17W



EARTHWORK		
Location	Cut Yrds	Fill Yrds
Left	400	787
Right	781	822
Total	1181	1609
Difference		428
Culvert		-705
Grand Total	277	
Flowable Mortar		471
Granular Backfill		667

Does not Include Shrink Factor

INDEX OF SHEETS	
NO.	TITLE
A.1	Title Sheet
A.2-8	Project Concept Statement
A.9-11	Design Criteria
B.1-2	Typical Cross Sections
C.1	Quantities
D.1	Plan & Profile Legend Sheet
D.2	Plan & Profile Sheet
D.3	Plan Sheet
G.1-2	Reference Ties & Bench Marks
J.1	Traffic Control Sheet
V.1	R.C.B. Situation Plan Sheet
W.1-3	Mainline Cross Section Sheets

PROJECT SCHEDULE	
EVENT	DATE
D2	5/14/13
D3	6/14/13
B1	8/16/13
D5	9/6/13
D4	10/21/14
L5	2/17/15

For Project Location Map Refer to Sheet A.8

DESIGN DATA RURAL			
2015 AADT	1,900	V.P.D.	
2035 AADT	2,400	V.P.D.	
20-- DHV	--	V.P.H.	
TRUCKS	13 %		
Total Design ESALs	--		

INDEX OF SEALS		
SHEET NO.	NAME	TYPE
A.1	Yanxiao Jia	Primary Signature Block

**PRELIMINARY PLANS**

Subject to change by final design.

**D2 PLAN-Date:5/14/13**

IOWA DEPARTMENT OF TRANSPORTATION

**TO OFFICE:** District 1  
**DATE:** August 27, 2012  
**ATTENTION:** Scott A. Dockstader  
**PROJECT:** Marshall County  
BRF-096-1(6)--38-64  
**FROM:** Kevin K. Patel  
PIN: 11-64-096-010  
**OFFICE:** Design  
**SUBJECT:** Project Concept Statement; (Final Approval, D0)

This project involves the replacement of the IA 96 Bridge (Maint. No 6405.8S096) over Devils Run Creek, 1.8 miles east of County Road T-29.

A concept review was held on May 16, 2012. Those present included Tony Gustafson from the District 1 Office; Steve Seivert from the Office of Bridges and Structures; and Kevin Patel and Amy Schleier from the Office of Design.

The Draft Project Concept Statement was sent out for review and comment with concerns to be resolved by Friday, August 3, 2012. Comments received during the review period have been considered and resolved.

The approved project is estimated to cost \$652,200. There will be no off-site detour for this project. The RCB will be constructed using the flowable mortar method, therefore there should be very little impact to traffic during construction with the exception of when the bridge rail and guardrail is removed and the flowable mortar is placed. During this time traffic will be reduced down to one lane via the use of flaggers. Flaggers also will be used when traffic is reduced down to one lane for placement of the PCC patches. This project is recommended for construction in FY 2016. The Office of Bridges and Structures will coordinate plan preparation with assistance from the Office of Design.

KKP: glk:mk  
Attach.

cc:

J. F. Adam  
M. J. Kennerly  
R. L. Stanley  
A. A. Welch  
P. Lu  
B. J. Dolan  
T. D. Crouch  
J. W. Smith  
D. E. Sprengeler  
S. P. Anderson  
S. C. Marler  
E. J. Ranney  
D. L. Bishop  
M. L. Wright  
M. E. Khoda

J. R. Selmer  
K. D. Nicholson  
M. D. Masteller  
N. L. McDonald  
D. R. Claman  
N. M. Miller  
M. J. Sankey  
R. A. Younie  
J. Vortherms  
B. D. Hofer  
L. C. Funnell  
D. R. Tebben  
T. E. Huju  
FHWA

M. J. Dillavou  
D. L. Maifield  
D. L. Maifield  
G. A. Novey  
B. C. Worrel  
E. C. Wright  
M. A. Swenson  
S. J. Gent  
C. C. Poole  
J. P. Rost  
D. L. Newell  
S. W. Tymkowicz  
D. S. Schultz  
D. E. Manley

FINAL PROJECT CONCEPT STATEMENT

Bridge over Devils Run Creek,  
on IA 96, 1.8 miles east of County Road T-29

Marshall County  
BRF-096-1(6)--38-64  
PIN: 11-64-096-010  
Maint. No. 6405.8S096  
FHWA No. 35470

Highway Division  
Office of Design

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

August 27, 2012

I. STUDY AREA

A. Project Description

This project involves the replacement of the IA 96 bridge (Maint No. 6405.8S096) over Devils Run Creek, 1.8 miles east of County Road T-29.

Two alternatives were developed for consideration;

1. Replace the existing bridge with a new 59'-2" x 44' pretensioned prestressed concrete beam bridge. Traffic will be detoured offsite - \$724,300.
2. Place a twin 12' x 9' x 90' RCB under the bridge utilizing the flowable mortar method - \$666,200.

Alternative No. 2 has been selected for this project. The RCB alternative provides reduced future maintenance needs, minimizes the impact to traffic during construction, and eliminates the need for guardrail. Traffic will be maintained at all times. However, it will be necessary to reduce traffic to one lane with the use of flaggers during the removal of the bridge rail and guardrail and when the flowable mortar is placed. Flaggers will also be used when traffic is reduced down to one lane for placement of the PCC patches. This project is programmed with \$812,000 in FY 2016.

B. Need for Project

The concrete of this structure is severely deteriorated. In addition to the large area of cracks on the top of the deck, large hollows and severely scaled areas were found at the bottom of the deck, curb and abutment caps. Severe rust areas were found on the exposed surfaces of sliding steel plates. Adding another overlay can not improve the condition of the deck bottom and the substructure. The deck replacement in conjunction with substructure repair will not be an economical option for the simple structure. Therefore the bridge should be replaced.



Looking west



Looking east

C. Present Facility

The existing structure is a 40' x 30' single span rolled steel I-beam bridge constructed in 1948 and was overlaid with low-slump concrete in 1996.

IA 96 in the project area is 27 ft. to 30 ft. wide, PCC pavement with granular shoulders that vary between 2' to 9' wide and 3:1 foreslopes, constructed in 1948. HMA resurfacing was accomplished in 1975 and 1996. IA 96 outside the project area is 22 ft. wide, 10"-7"-10" PCC pavement.

D. Traffic Estimates

The 2015 and 2035 average daily traffic estimates are 1,900 ADT with 13% trucks and 2,400 ADT with 13% trucks, respectively.

E. Sufficiency Ratings

IA 96 is classified as an access route and is a maintenance service level "C" road with a sufficiency rating of 63. The federal bridge sufficiency rating is 64

F. Access Control

Access rights will not be acquired for this project.

G. Crash History

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

II. PROJECT CONCEPT

A. Feasible Alternatives

Alternative #1 - Replace with a bridge

Replace the existing 40' x 30' bridge with a 59'2" x 44' pretensioned prestressed concrete beam bridge. The typical cross section adjacent to the bridge will consist of a 24 ft. roadway (28 ft. wide pavement) with 10 ft. effective shoulders (2 ft. outside pavement and 8 ft. granular) and 6:1/3.5:1 foreslopes.

This bridge will be constructed on the existing vertical and horizontal alignment. Construct new bridge approaches. Replace the existing guardrail with new guardrail and pave the shoulders 20 ft. beyond the ends of the guardrail. Class 10 will be necessary to flatten the existing foreslopes and to construct the new guardrail blisters. Place class E revetment for slope protection under the bridge. Construct 2 bridge end drains on west end of the bridge.

While constructing the 70' bridge approach section on the west side, extend the reconstruction 10' to replace a section of deteriorated pavement.

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

It appears that no right of way will be required for this alternative.

Traffic will be maintained by an off-site detour.

**Bridge Costs**

New Bridge	\$ 234,000
Bridge Removal	14,000
Revetment	75,000
Mobilization - 10%	33,000
M & C - 15%	<u>54,000</u>
<b>Bridge Total</b>	<b>\$ 410,000</b>

**Roadway Costs**

Bridge Approaches	65,700
Full Depth PCC Patches	25,300
Removal of Pavement	2,400
Class 10 Roadway and Borrow	4,000
Guardrail (Includes Removal)	11,900
Paved Shoulders for Guardrail	18,400
Class 10 for Guardrail Blisters	10,800
Bridge End Drains	14,000
Clearing and Grubbing	1,000
Seeding and Fertilizing	1,000
Erosion Control	5,000
Right of Way	15,000
Wetland Mitigation	50,000
Traffic Control - 5%	11,200
Mobilization - 5%	11,200
M & C - 30%	<u>67,400</u>
<b>Roadway Total</b>	<b>\$ 314,300</b>

<b>Project Total</b>	<b>\$724,300</b>
----------------------	------------------

Alternative #2 - Replace with a twin RCB

Replace the existing 40' x 30' bridge with a twin 12' x 9' x 90' reinforced concrete box placed at a 10 degree left ahead skew. The typical cross section will consist of a 28 ft. roadway with 8 ft. granular shoulders and 6:1/3.5:1 foreslopes. The flow line of the box will be buried allowing the bottom of the box to silt in and provide a natural bottom for fish passage. Class E revetment will be place at the ends of the RCB.

The new RCB can be built under the existing bridge without disturbing the bridge. However, it appears that compressible soils are present under the existing bridge which will require removal prior to construction of the new RCB. The compressible soils

should be removed to a depth of 5' below the existing groundline and replaced with special backfill. After the culvert has been constructed, flooded granular backfill and flowable mortar will be used as backfill material. A second application of flowable mortar may also be required to ensure that contact is maintained between the bottom of the bridge deck and top of the flowable mortar layer.

The existing 20' PCC patches adjacent to the bridge will be used as constructed; however, due to the poor condition of the pavement adjacent to this a 75' PCC patch east of the bridge and a 100' PCC patch west of the bridge will be required. These patches will be constructed one lane at a time via the use of flaggers.

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

It appears the utility line on the south side of the roadway will require relocation.

Right of way will be required for this alternative.

Traffic will be maintained via the use of flaggers during removal of the bridge rail and guardrail, and placement of the flowable mortar.

**Bridge Costs**

New RCB	\$ 212,000
Revetment	75,000
Mobilization - 10%	31,000
M & C - 15%	<u>49,000</u>
<b>Bridge Total</b>	<b>\$ 367,000</b>

**Roadway Costs**

Removal of Pavement	2,600
PCC Pavement (Full Depth Patch)	50,500
Modified Subbase	8,200
Flooded Backfill	3,600
Flowable Mortar	21,600
Removal of Existing Handrail	25,300
Special Backfill (Backfill of Core-Out)	7,500
Granular Shoulder	4,900
Class 10 Roadway and Borrow	6,000
Guardrail Removal	1,500
Clearing and Grubbing	1,000
Seeding and Fertilizing	1,000
Erosion Control	5,000
Right of Way	15,000
Wetland Mitigation	50,000
Traffic Control - 5%	10,200

Mobilization - 5%	10,200
M & C - 30%	<u>61,100</u>
<b>Roadway Total</b>	<b>\$ 285,200</b>
<b>Project Total</b>	<b>\$652,200</b>

B. Detour Analysis

For Alternative #1, IA 96 will be closed and an offsite detour will be utilized. It is anticipated the detour will be in place for approximately 180 days. The detour will follow south on County Road T-29 6 miles, east on County Road E-27 6 miles, and north on County Road T-47 for 6 miles. The total out-of-distance user cost is anticipated to be \$908,000. The cost for county road maintenance will be \$33,300 as calculated by the Gas Tax Method. Detour signing costs will be \$10,000. Out-of-distance travel is 12 miles.

There will be no off-site detour for Alternative #2. The RCB will be constructed using the flowable mortar method, therefore there should be very little impact to traffic during construction with the exception of when the bridge rail and guardrail is removed and the flowable mortar is placed. During this time traffic will be reduced down to one lane via the use of flaggers. Flaggers also will be used when traffic is reduced down to one lane for placement of the PCC patches.

C. Recommendations

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

D. Construction Sequence

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

E. Special Considerations

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

It appears Right of Way will be required for this project.

The Office of Location and Environment has reviewed this project and the following concerns were noted.

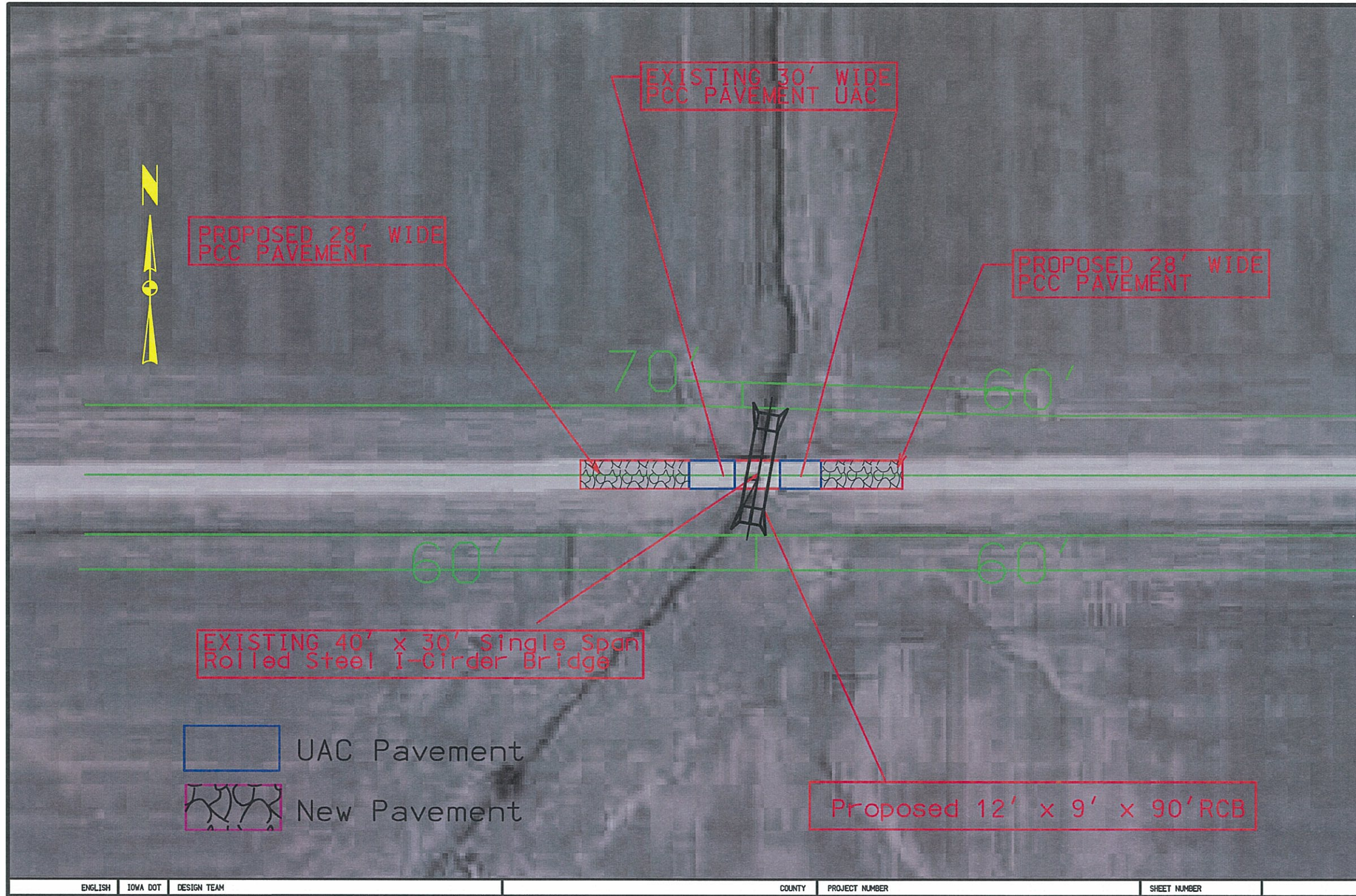
Devils Run has a defined bed and bank, an ordinary high water mark, and actively sorts sediment. The stream is a jurisdictional water of the U.S. and will be regulated by the Army Corps of Engineers. Replacement of this bridge will require a 404 Permit unless no work occurs within the channel. The stream is significantly downcut and only very minor wetland areas are present on lower stream terraces. Wetland mitigation will not be required due to lack of wetlands present in the project area.

South of IA 96, the channel of Devils Run is significantly skewed to the southwest. If a channel relocation is required for the project, 404 authorization for the project will have to occur under Regional Permit 7 or else an individual permit will be needed for the project. In either case, some form of stream mitigation will be required. If possible, construction of a new bridge or culvert should minimize channel realignment in order to fit under the Regional Permit 7 limitations. Regional Permit 7 limits include a total length of relocation of 500 feet of stream channel including no more than 300 feet in either the upstream or downstream direction. In addition, the new structure should be constructed to be fish passable. To be fish passable, the new culvert will need to be buried up to an additional 6 inches.

F. Program Status

Site data has been developed by the Office of Design. This project is listed in the 2013-2017 Iowa Transportation Improvement Program, with \$15,000 programmed for right of way in FY 2015, and \$812,000 for replacement in FY 2016. 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: jmb:glk

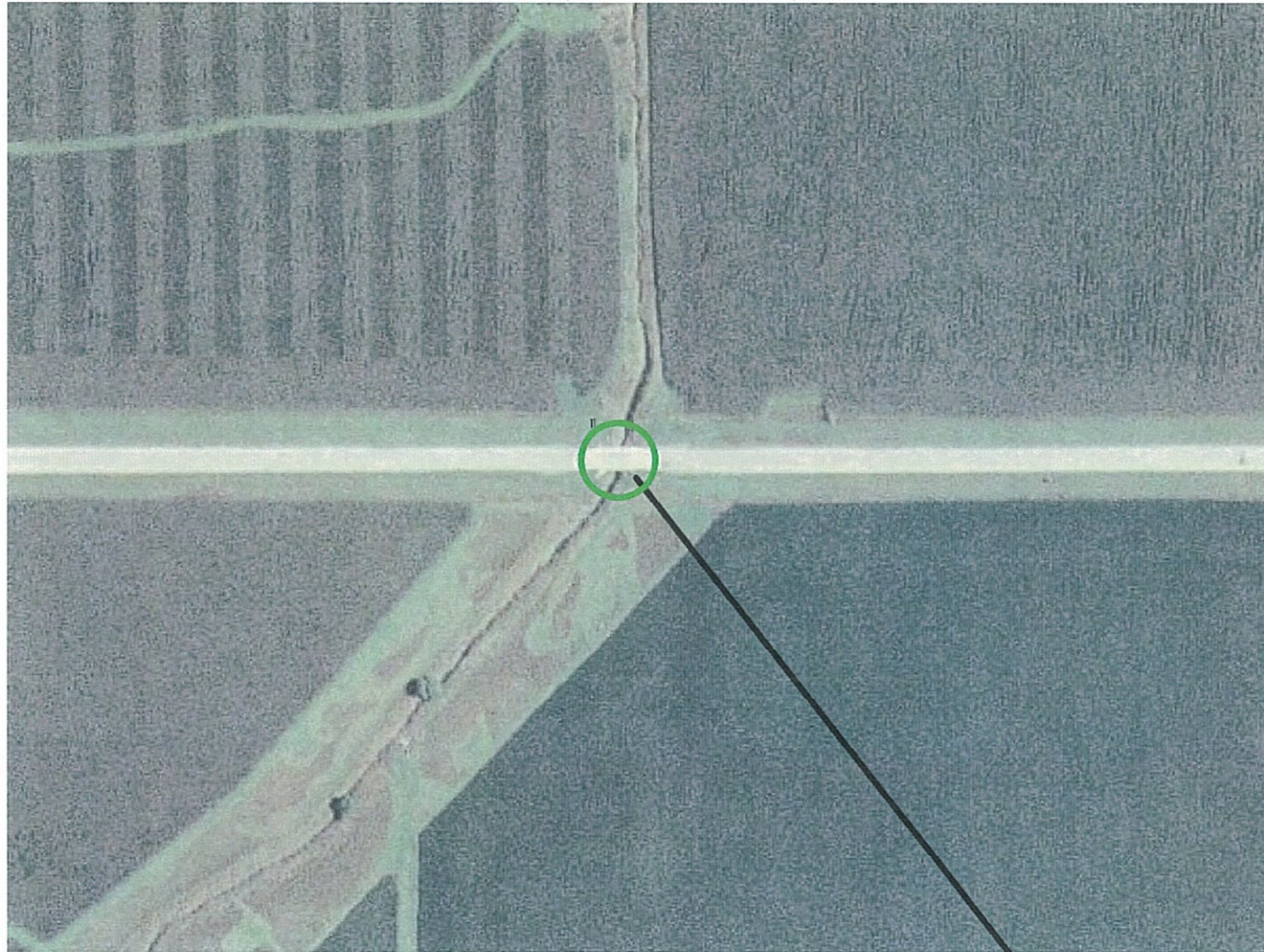


ENGLISH	IOWA DOT	DESIGN TEAM	COUNTY	PROJECT NUMBER	SHEET NUMBER
9:56:37 AM	8/27/2012	gkret12			

W:\Projects\6409601011\Concept\Draft\Final.plan.sht



# MARSHALL COUNTY



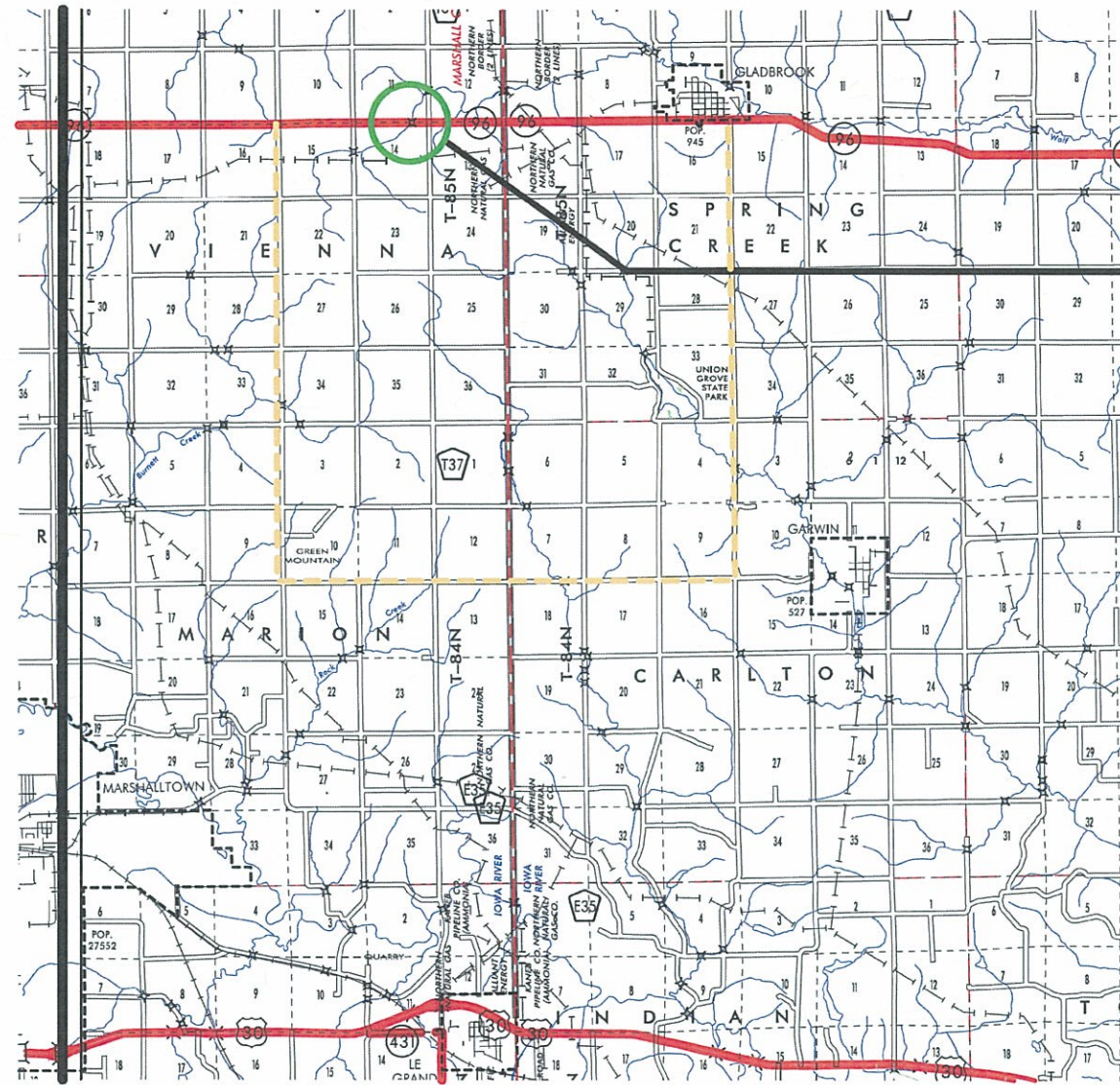
STA 306+75  
FHWA 35470  
MAINT.NO. 6405.8S096  
DESIGN 147

IA 96 OVER DEVILS RUN CREEK  
1.8 MI. EAST OF CO. RD. T-29  
BRF-096-1(6)-38-64  
PIN: 11-64-096-010

ENGLISH	IOWA DOT	DESIGN TEAM	COUNTY	PROJECT NUMBER	SHEET NUMBER
3:31:13 PM	7/19/2012	gkret12			
W:\Projects\6409601011\Concept\Draft\WorkingDraft_Plan.sht					

# MARSHALL COUNTY

# TAMA COUNTY



STA 306+75  
 FHWA 35470  
 MAINT.NO. 6405.8S096  
 DESIGN 147

-----  
 Detour Route  
 Alternative #1 Only



IA 96 OVER DEVILS RUN CREEK  
 1.8 MI. EAST OF CO. RD. T-29  
 BRF-096-1(6)-38-64  
 PIN: 11-64-096-010



ENGLISH	IOWA DOT	DESIGN TEAM	COUNTY	PROJECT NUMBER	SHEET NUMBER
3:31:14 PM	7/19/2012	gkret12	W:\Projects\6409601011\Concept\Draft\WorkingDraft_Plan.sht		

Project Number: BRF-096-1(6)-38-64  
 Route: IA 96  
 Date of Information:

*DM*

Date of Base Design Manual Information: 7/29/2011

Design Element		Acceptable Values	Preferred Values	Project Values	Comments
		Rural Two-Lane Highways	Rural Two-Lane Highways		
design speed (mph)		Cannot be less than the posted speed limit		60	
full depth paved width (ft)	outside lane	12	14	14	
	inside lane(s)				
design lane width (ft)		11	12	12	
auxiliary-lane width (ft) (includes turn lanes)		10	12	n/a	
parking-lane width (ft)				n/a	
pavement cross-slope (%)		1.5% minimum, 3% maximum	2%. However, when adjacent lanes slope in the same direction, increase slope by 0.5% per lane up to 3%	2%	
effective shoulder width and type (see Section 3C-4)		See Shoulder Tables	See Shoulder Tables	10 ft.	
shoulder cross-slope (%)		not less than the adjacent lane, 2 to 6% for paved, 4 to 6% for granular, 6 to 8% for earth	4	4%	
foreslope (see Roadway Typical Cross Sections)	adjacent to shoulder	3:1	10:1 for 4' then 6:1	6:1	
	beyond standard ditch depth and design clearzone	3:1	3.5:1	3:1	
	Curbed roadways	1% for 12' behind curbs, then not steeper than 3:	4% toward roadway for 12', then not steeper than 4:1	n/a	
normal outside ditch (depth x width) (ft)		--	5 x 10	5 x 10	
normal median ditch depth (ft)		--	--	--	
normal median width (ft) (if applicable)		--	--	--	
Backslope (For cut areas greater than 25 feet, contact the Soils Design Section for assistance with backslope benches.)		2.5:1	3:1	3:1	
bridge width—new (ft)		design lane widths + effective shoulder widths	design lane widths + effective shoulder widths or curb to curb street width	44 ft.	
bridge width—for Use as Constructed bridges (ft)		design lane widths + 2 ft offset each side		n/a	
transverse slopes	w/ drainage structures	6:1	8:1		
	w/o drainage structures	6:1	10:1		
	at sideroads	6:1	6:1		
Vertical clearance (ft) (above lanes & shoulders)(see Section 8A-2)	Over primary	16	16.5	n/a	
	over non-primary	14	16.5 at interchange locations, 15 at all other locations	n/a	
	over railroad	23.3	23.3	n/a	
	sign truss	17	17.5	n/a	
Structural Capacity		Contact Office of Bridges and Structures	--		
Level of Service		B	--		

*DMM*

		Project Number: BRF-096-1(6)-38-64 Route: IA 96 Date of Information: 0 Date of Base Design: 7/29/2011 Manual Information:			
last update: 7/29/2011		Acceptable Values	Preferred Values	Project Values	Comments
Design Element		Design Speed, mph (Preferred design speed is 5mph over posted speed limit and a minimum of 70mph for Interstates)	Design Speed, mph (Preferred design speed is 5mph over posted speed limit and a minimum of 70mph for Interstates)		
			60	60	60
Stopping sight distance (ft) (see Section 6D-1)		570	570	570	
Minimum horizontal curve radius (ft)	e <sub>max</sub> = 4%	--	--		
	e <sub>max</sub> = 6%	1330	1330	n/a	
	e <sub>max</sub> = 8%	1200			
Minimum vertical curve length (ft)		180	180	180	
Minimum rate of vertical curvature (K)	crest	151	245	151	
	sag	136	136	136	
Minimum gradient (%)		0.3% with a curb, 0.0% without a curb	0.5	0.5%	
Maximum gradient (%) on ramps			4%	n/a	
	Upgrades	5		n/a	
	Downgrades	Equal to the maximum upgrade		n/a	
Maximum gradient (%) on roadways other than ramps		4	3	3%	
Clearzone		See "Acceptable Clear Zone" table in Section 8A-2	See "Preferred Clear Zone" table in Section 8A-2	30	
Curb type		4" Sloped is  6" Sloped for all other routes	4" Sloped is maximum height for interstate routes, 6" Sloped for all other routes 6" Sloped for all other routes	n/a	

Last Updated: 7/29/2011

<b>Acceptable Shoulder widths for Two-Lane Highways (values shown in feet)</b>			
<b>Auxiliary Lanes (includes turn lanes)</b>		<b>4</b>	
<b>Two-Lane Highways</b>		Effective Shoulder	Paved
Design Year Traffic in Vehicles / Day	under 400	4	2
	400-2000	6	2
	over 2000	8	2

<b>Acceptable Shoulder widths for Expressways / Freeways (values shown in feet)</b>					
<b>Auxiliary Lanes (includes turn lanes)</b>		<b>4</b>			
		Outside		Median Side	
		Effective Shoulder	Paved	Effective Shoulder	Paved
<b>Expressways / Freeways</b>		8	0	4	4

<b>Acceptable Shoulder widths for Interstates (values shown in feet)</b>					
		Interstate			
		Outside		Median Side	
		Effective Shoulder	Paved	Effective Shoulder	Paved
<b>Auxiliary Lanes</b>		6	6	--	
<b>Interstates with 6 or more lanes</b>					
	Design year truck traffic equal to or less than 250 DDHV	10	full width	10	full width
	Design year truck traffic exceeds 250 DDHV	12	full width	12	full width
<b>Interstates with 4 lanes</b>					
	Design year truck traffic equal to or less than 250 DDHV	10	full width	4	full width
	Design year truck traffic exceeds 250 DDHV	12	full width	4	full width

# FIELD EXAM NOTES

# OTHER ITEMS

## A DISTRICT TO PROVIDE...

1. Names of Affected State/County/Local Events.

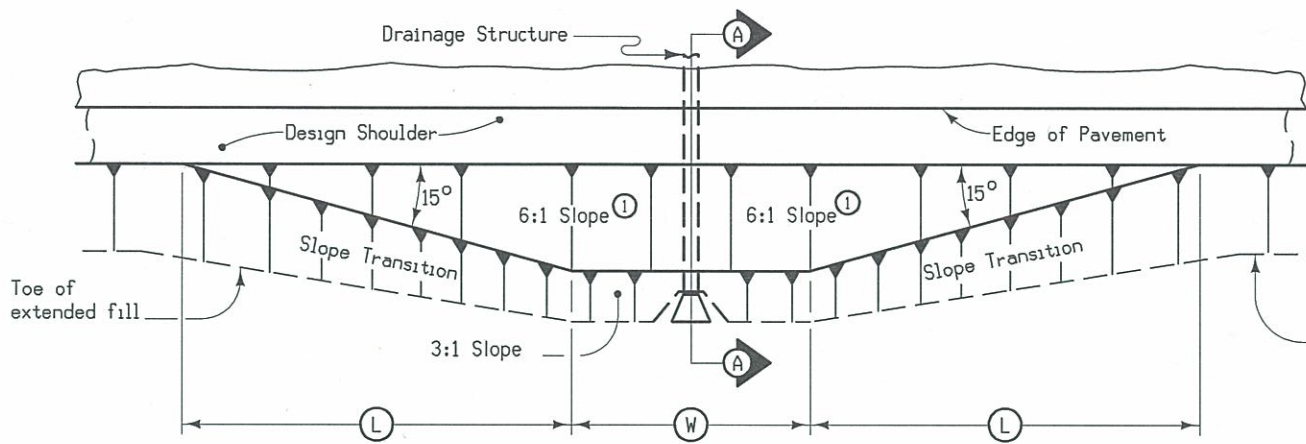
*No*

## B DISCUSS/REVIEW WITH DISTRICT...

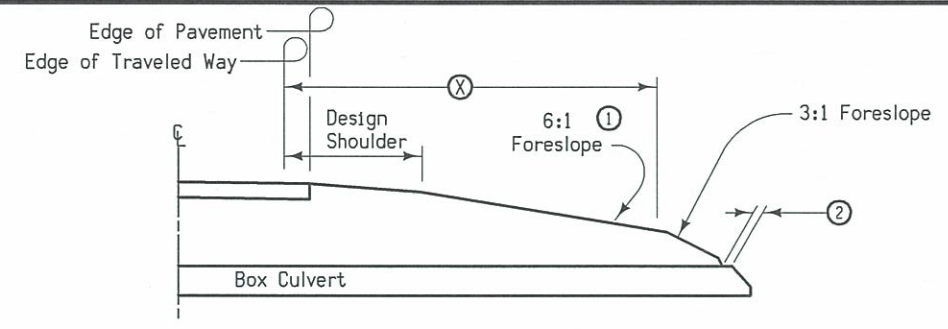
1. Field Lab?..... (Y)  (N)
2. Field Office?..... (Y)  (N)
3. Construction Survey?..... (Y)  (N)
4. .... (Y) (N)

## C DISCUSS/REVIEW IN FIELD...

1. Clearing and Grubbing?..... (Y)  (N)  
*Fence removal*
2. Tile Exploration?.....  (Y) (N)  
*x 2*
3. Length of Guardrail. *Requested*
4. Disposition of Old Guardrail. *Rail delivered to Marshalltown Garage (No posts) 85 ft/corner*
5. Anything to be done about bridge approach Bumps *No*



PLAN VIEW



SECTION A-A

STRUCTURE LOCATION		(W)	(L)	(X)
STATION	SIDE	Feet	Feet	Feet
307+74.5	Lt.	67.9	67.9	30
307+74.5	Rt.	67.9	64.5	30

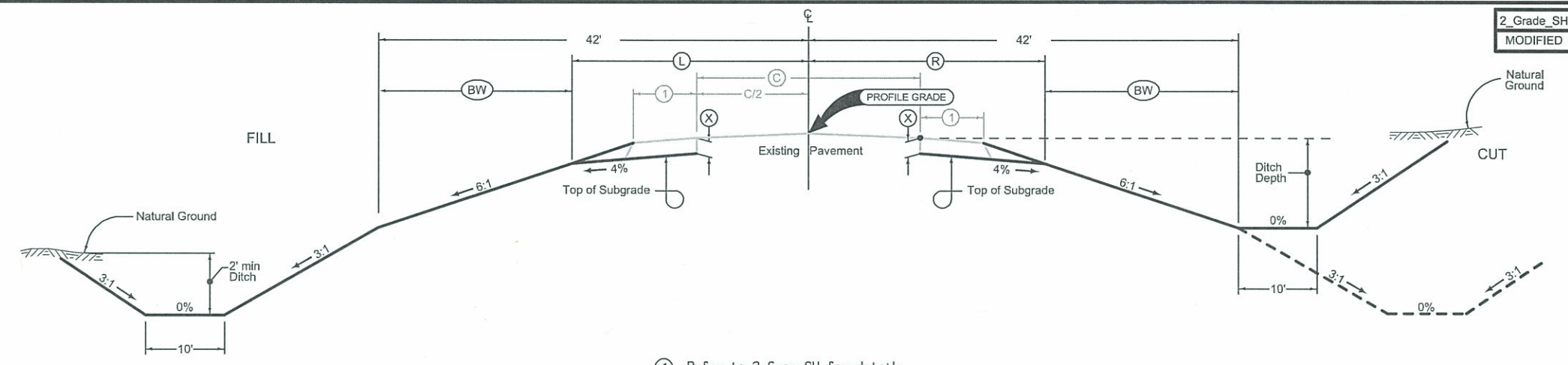
Notes:  
 At locations where an extended or newly constructed drainage structure extends beyond the normal foreslope cover, the foreslope shall be flattened as indicated so as to cover the structure. Minimum earth cover is 6".  
 (1) 6:1 Maximum - Slope may be flatter.  
 (2) 6" Minimum for pipe installations or to top of headwall on R.C.B.  
 (W) = Pipe or R.C.B. width plus 20 feet each side.

DETAILS OF  
BARNROOF FORESLOPE  
AT DRAINAGE STRUCTURE

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

See Plan & Profile sheets and Cross Sections for additional details of ditches and backslopes.

LOCATION		DIMENSIONS				
ROAD IDENTIFICATION	STATION TO STATION	(L) or (R) Feet	(X) Inches	(BW) Feet	(C) Feet	
IA 96	306+32.81 - 307+15.31	25.9	6	16.1	30	
IA 96	307+15.31 - 307+16.17	25.9	6	16.1	28	



SHOULDER GRADING  
(Barnroof Section)

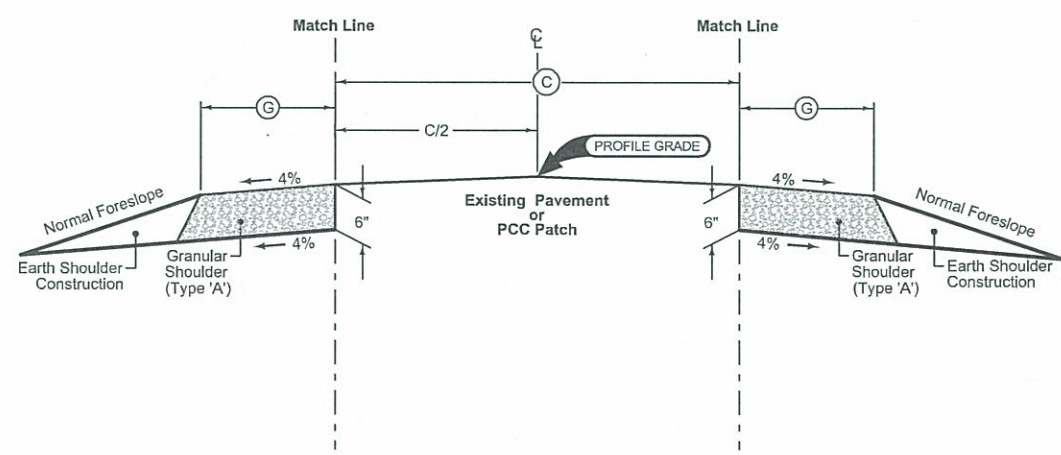
(1) Refer to 2 Gran SH for details

Granular Shoulder

2\_G\_10-19-10

STATION TO STATION		(G) Feet	(C) Feet
305+32.50	306+32.50	8 min	28
306+32.50	307+15.31	7	30
307+15.31	307+90.31	8 min	28

NOTE: Refer to Cross Sections for additional information.



Granular Shoulder

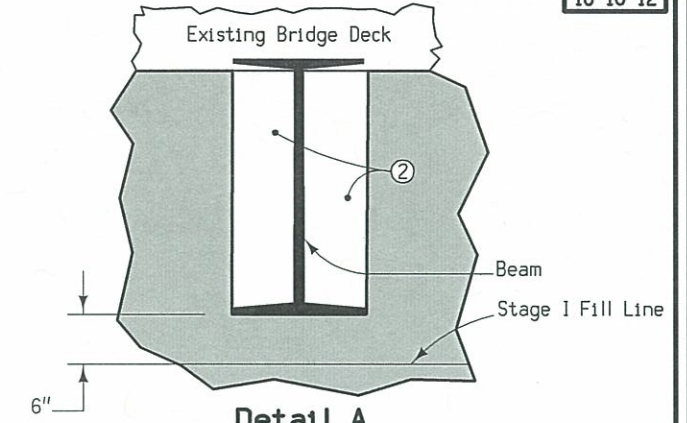
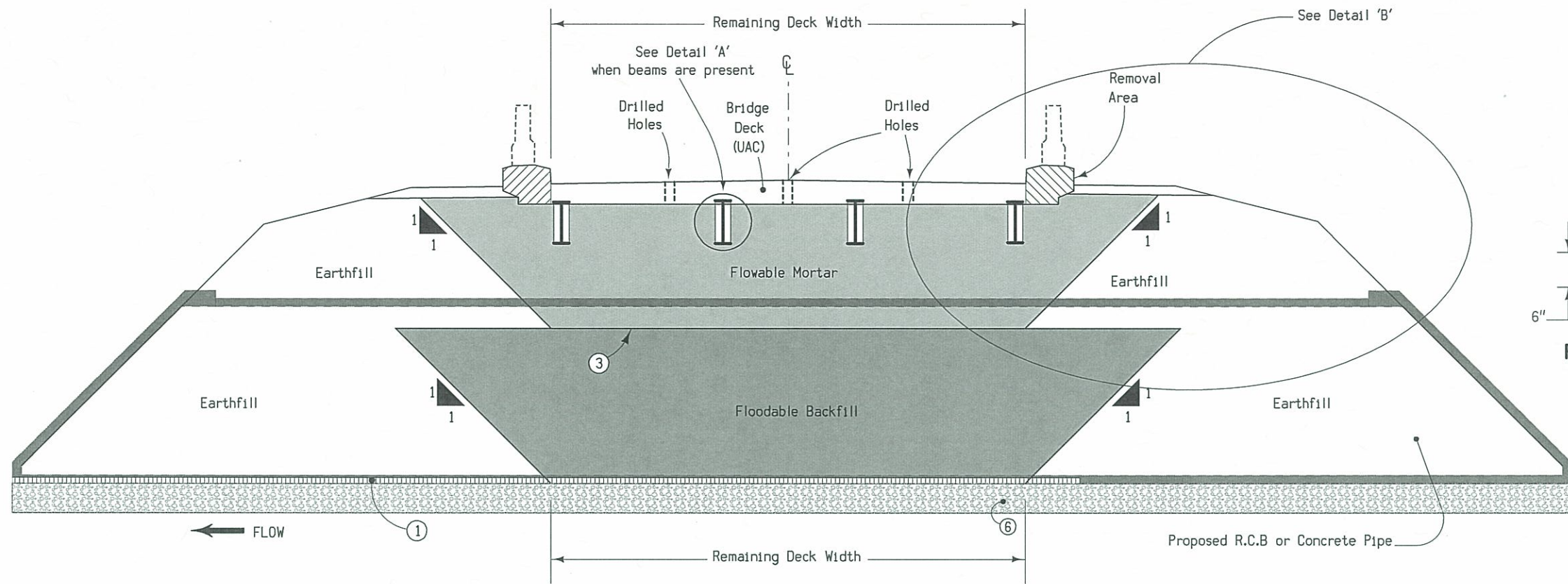
2\_G\_10-19-10

STATION TO STATION		(G) Feet	(C) Feet
305+32.50	306+32.50	8 min	28
306+32.50	307+15.31	7	30
307+15.31	307+90.31	8 min	28

NOTE: Refer to Cross Sections for additional information.

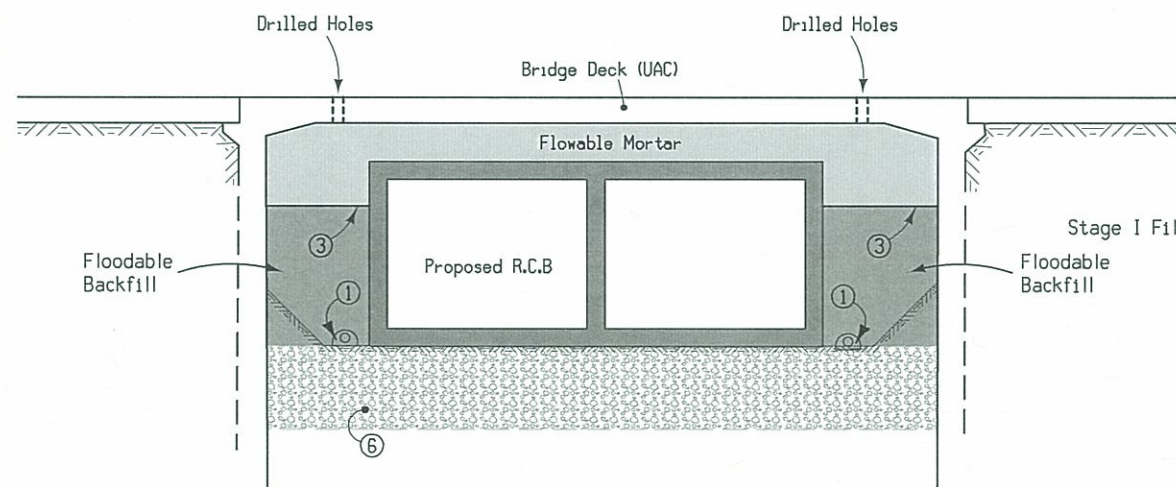
See Tab 112-9 for shoulder quantities.

IA. 96 SHOULDER RECONSTRUCTION

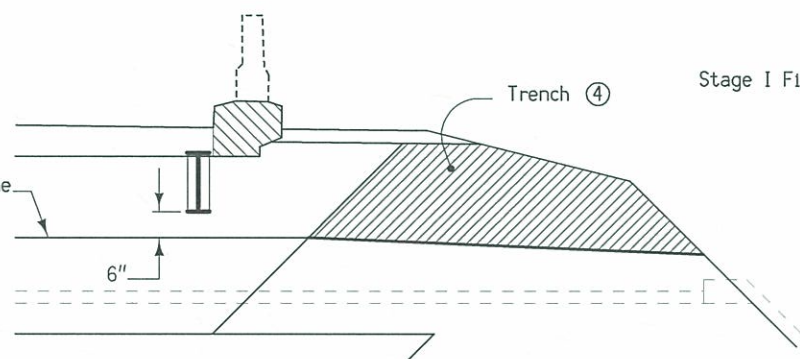


**Detail A**  
Flange Filler Material Area  
when beams are present

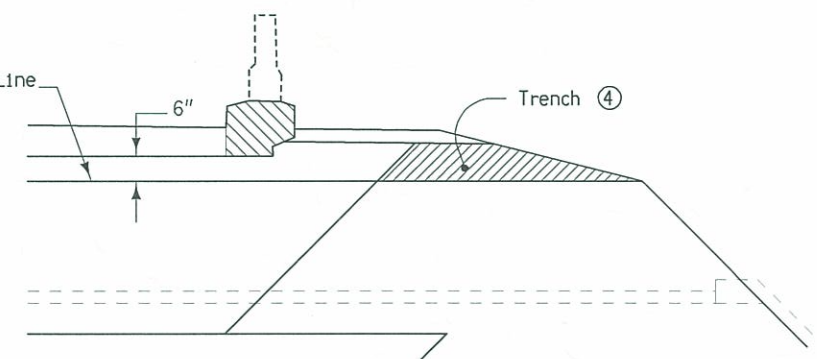
*show plan view  
of flowable mortar  
holes*



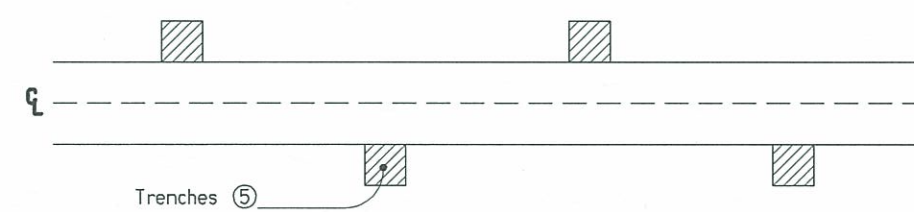
**Section at Centerline**



**Detail B (Beam Bridge)**



**Detail B (Slab Bridge)**



**Trench Layout**

- ① 4" Subdrain at flowline elevation of culvert with 4" cover of porous backfill.
- ② Place Flange Filler Material to fill pocket area between flanges to prevent flowable mortar from building up. Flange Filler Material is incidental to flowable mortar.
- ③ Fill void with the maximum amount of Floodable Backfill possible. Distance from Floodable Backfill to bridge beams (when present) or bridge deck shall not exceed 5'.
- ④ Cut trenches in the soil plug to provide drainage for the flowable mortar. Backfill the trenches with open graded crushed stone, gravel, or recycled PCC to allow water to drain. Backfill material is incidental to flowable mortar.
- ⑤ Place trenches at 20' spacing with a minimum of two trenches on each side of the roadway.
- ⑥ Remove 5' of compressible soils, and replace with 4' of granular materials for the length of the RCB.

**FILL FOR CULVERT USED  
IN BRIDGE REPLACEMENTS**

Denotes pay limits for flowable mortar  
Denotes pay limits for flooded backfill



**EXISTING PAVEMENT**

No.	Location					Year	Type	Project Number	Surface		Base		Subbase		Removal		Coarse Aggregate			Reinforcement	Remarks	
	County	Route	Dir. of Travel	Begin Milepost	End Milepost				Type	Depth	Type	Depth	Type	Depth	Type	Depth	Source	Type	Durability Class			Type
	Marshall	96		0	7.04	1996		STPN-96-1(3)--27-64	AAC	1.5	AAC	1.5					FERGUSON	C. LST.			Info. Based on 2012 Milepost Book	
						1975		FN-96-1(1)--21-64	BAC	2							LE GRAND	C. LST.				
						1948		F-766(2)	PC7	7							ALDEN	C. LST.	I			

**FULL-DEPTH PATCHES**

Refer to Standard Roads Plans RR-1, RR-2, RR-4, RR-18, and RR-26

Count	Location		Dimension			PCC Patches			HMA Patches	Composite HMA	Subbase Patches	Subbase Patch w/ 'EF' Joint	Patch Subdrain	'CD' Joints	'CT' Joints	'EF' Joints	Anchor Lugs Removal	Remarks
	Station or Milepost	Lane	Length	Width	Patch Thickness	With Dowels	Without Dowels	C R C										
						RR-4	RR-2	RR-18										
						SY	SY	SY										
1	305+32.50	Both	100.0	28.0	12.0													2800 SY 104 CY
2	307+15.30	Both	75.0	28.0	12.0													2100 SY 78 CY
																		4900 SY 182 CY

*Discuss Patch Thickness and need for subbase material*

### SURVEY SYMBOLS

- GDL Guard Rail Steel
- FW Wire Fence
- PPA Power Pole Co. 1
- SI Sign
- SNP Unpaved Shoulder
- RIP Rip-Rap
- BNK Stream Bank
- DU Centerline Draw or Stream (Up)
- D Centerline Draw or Stream (Down)
- ENU Edge Unpaved Entrance & Parking
- ENT Centerline BL of Entrance
- EW Edge of Water
- WLA Underground Water Line Co. 1

### UTILITY LEGEND

- Unknown
- Central Iowa Water Assoc. (QLD)  
Windstream Communications of Iowa
  
- Central Iowa Water Association  
Jim LaPlant  
CEO/Manager  
1351 Iowa Speedway Drive  
Newton, IA 50208-8245  
641-792-7011  
jlaplant@ciawa.com
  
- Windstream Communications of Iowa  
Dale Graff  
Engineer  
614 W Street So  
Box 330  
Grinnell, IA 50112-0330  
641-990-3297  
dale.a.graff@windstream.com

### 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

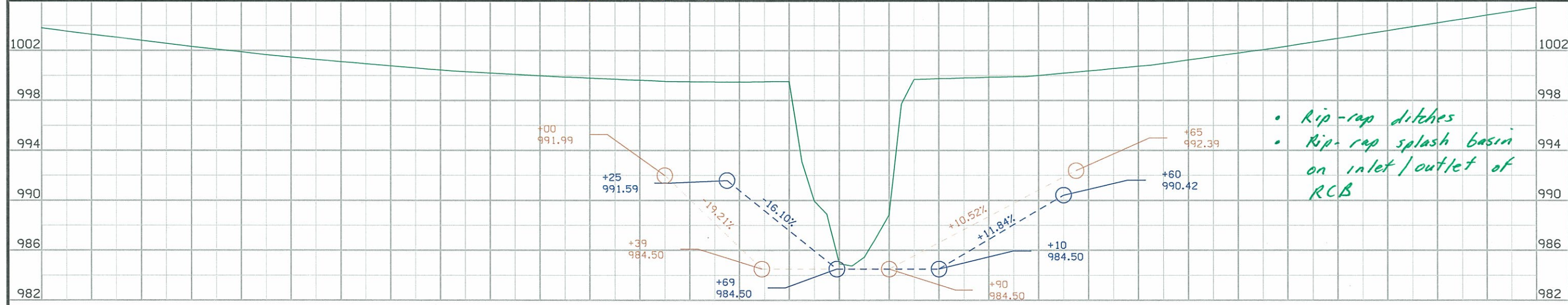
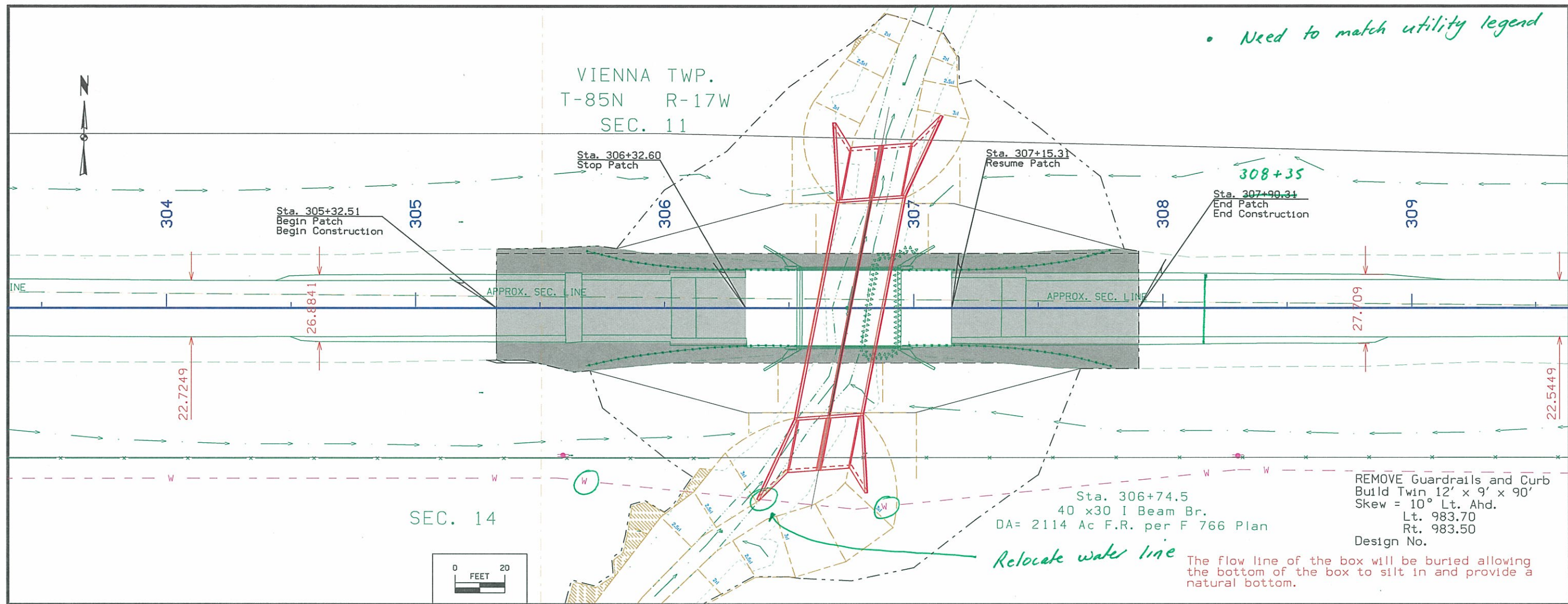
### RIGHT-OF-WAY LEGEND

- 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)

• Need to match utility legend



• Rip-rap ditches  
• Rip-rap splash basin on inlet/outlet of RCB

+40	+60	+80	304	+20	+40	+60	+80	305	+20	+40	+60	+80	306	+20	+40	+60	+80	307	+20	+40	+60	+80	308	+20	+40	+60	+80	309	+20	+40
C	ENGLISH	IOWA DOT	DESIGN TEAM	Jia\Maach\Thiel		MARSHALL COUNTY		PROJECT NUMBER	BRFN-096-1(6)--39-64		SHEET NUMBER	D.2																		



305

305+32.50

305+80.70

Remove & Replace  
100' of pavement

306+48.28  
LT 42.0000

306+32.50

307+16.17  
LT 42.0000

Remove & Replace  
75' of pavement

307+84.47  
LT 23.6986

307+15.31

307+90.31

APPROX. SEC. LINE

305+70.04  
RT 25.1819

307+66.93  
RT 24.2548

306+32.81  
RT 42.0000

307+00.70  
RT 42.0000

Sta. 306+74.5  
40 x30 I Beam Br.  
DA= 2114 Ac F.R. per F 766 Plan

EC. 14

## Survey Information

### General Information

Measurement units for this survey are US survey feet. This survey is for a proposed RCB to replace the existing bridge.

### Vertical Control

Vertical datum for this survey is NAVD88 computed using Geoid 09. Orthometric Height was computed at project Pt. 100, by averaging a minimum of five laRTN observations with appropriate time spans between and applying Geoid 09. The vertical uncertainty these observations were 0.024 ft. at 95% confidence level (2 sigma). Additional benchmarks were placed throughout the project using a GNSS Base-Rover setup relative to Pt. 100.

Computed NAVD88 datum was compared to published NAVD88 by observations made to NGS control marker designated Y 10 located 3.3 miles ENE of the project location. Computed datum and published datum are the same.

Survey elev. Of Y 10=957.08  
Published elev. Of Y 10 = 957.08

1947 As built project plan F766 datum appears to be an assumed project specific datum that is unrelated to NGVD29 and NAVD88.

Low steel plan elev. = 1062.59  
Survey Low steel elev. = 996.41 (-66.18)

West end Br. Floor plan=1065.50  
Survey West end Br. Floor = 999.52 (-65.98)

### Horizontal Control

The project coordinate system for this survey is Modified Iowa State Plane North Zone (U.S. Survey Feet). This survey control is relative to laRTN reference stations. laRTN Reference Station coordinates are relative to the National Reference Station network datum: NAD83 (1996CORS) for Epoch 2002.00. Coordinates at Pt. 100 were determined by averaging a minimum of five laRTN observations with appropriate time spans between. The horizontal uncertainty of these observations was less than 0.05 ft. at 95% confidence level (2 sigma). The coordinate system was modified by scaling about Pt. 100 by a 1/combined scale factor of 1.000063

### Alignment Information

The horizontal alignment for this survey is a retrace of As-built Plans No. F766. Survey stationing was equated to the plan at Sta. 292+26.75 and run ahead without equation throughout the survey.

Survey Stationing relates to plan stationing as follows:

N Quarter Corner Sec. 14  
Sta. 292+26.75~15.95 LT As-built Plans Project No. F-766  
=Survey Sta. 292+26.75~15.95 LT

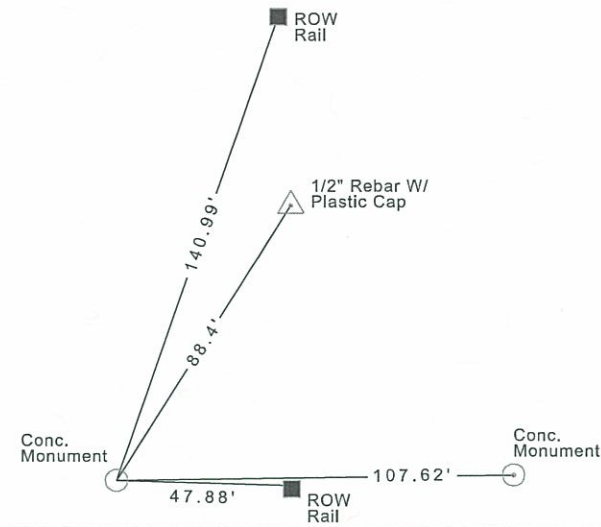
Center Bridge Sta 306+75 Project No. F-766  
=Survey Center Bridge Sta. 306+74.5

NE Corner Sec. 14  
Sta. 318+74.6~6.8 RT As-built Plans Project No. F-766  
=Survey Sta. 318+74.51~6.8 RT

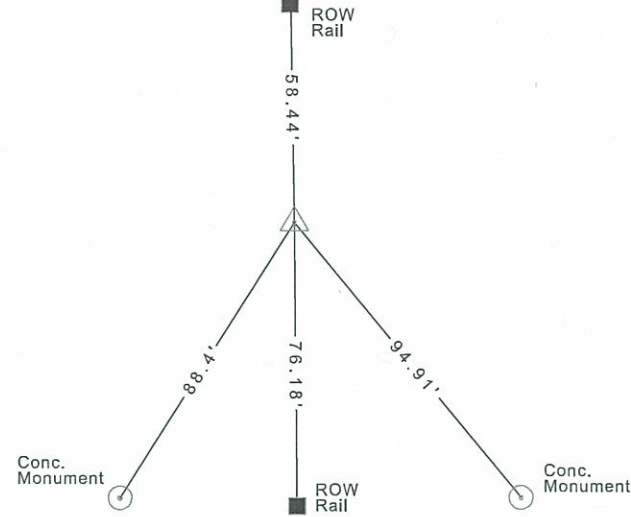
## VERTICAL CONTROL

Point	North	East	Elevation	Station	Offset	Feature	Description
500	3529916.513	5113361.289	1001.890	0+00.00	-16.245	BM	500 FOUND DOT BUTTON NW WING POST BRIDGE
501	3529884.632	5113411.463	1002.182	0+00.00	16.018	BM	501 FOUND DOT BUTTON SE WING POST BRIDGE

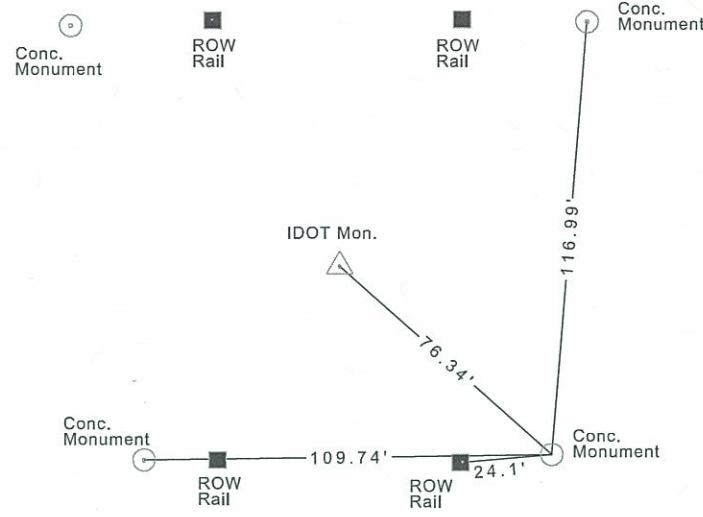
CP STA 291+81.87  
 CP 100 FD CONC. MON.  
 N=3529830.599, E=5111891.814, Z=1019.405



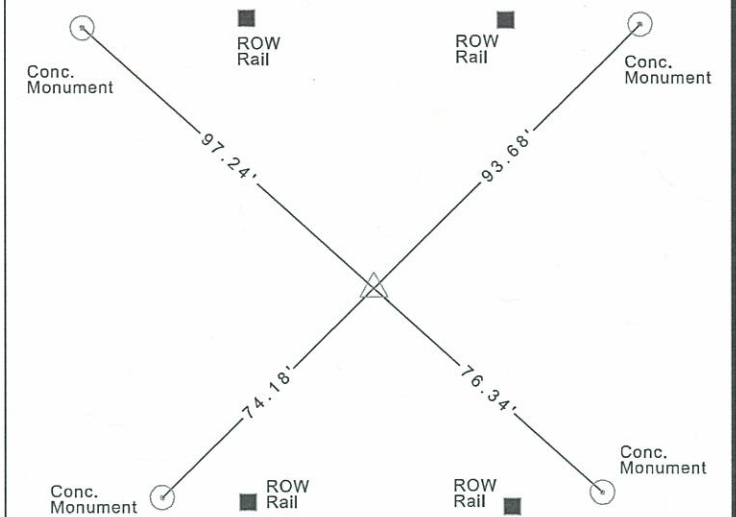
S.C.R. STA 292+26.75  
 CP 300 FD 1/2\"/>



CP STA 319+31.54  
 CP 101 FD CONC. MON.  
 N=3529852.062, E=5114643.852, Z=1008.494



S.C.R. STA 318+74.51  
 SCR 301 FD IDOT. MON.  
 N=3529902.805, E=5114586.821, Z=1014.120



### TRAFFIC CONTROL PLAN

Traffic will be maintained with one lane in each direction, with the exception of reducing traffic to one lane via flaggers during the following activities:

- 1) Removal and Patching of roadway.
- 2) Removal of Guardrails.
- 3) Placement of flowable mortar through the bridge deck.

*staging*

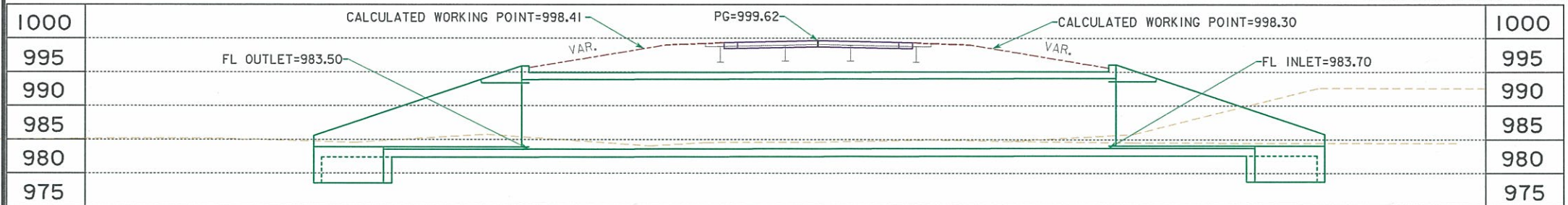
1.

2.

3.

4. Place temp traffic signal, place patches, remove bridge rail

Will need flaggers for drilling holes in deck & pumping Flowable mortar



ESTIMATED PROFILE GRADE ON IA 96

PI STA 305+00.00 VC = 300'  
PI ELEV 999.18

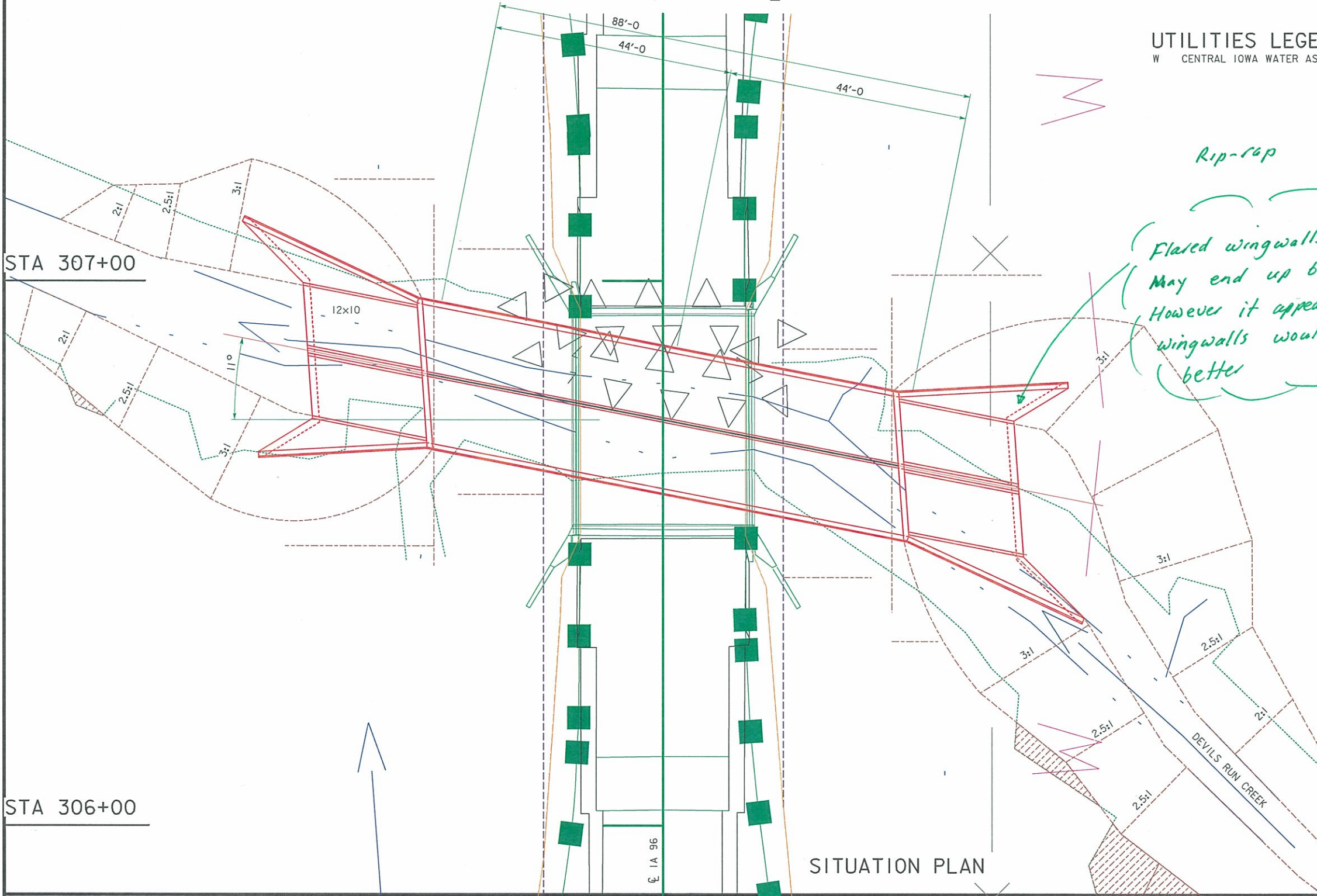
PROFILE GRADE LINE (PGL) IS AT  $\phi$  OF LANES.  
U.A.C. EXISTING GRADE.

LONGITUDINAL SECTION ALONG  $\phi$  CULVERT

UTILITIES LEGEND:  
W CENTRAL IOWA WATER ASSOC.

TRAFFIC ESTIMATE

2015 A.A.D.T. = 1900 VPD  
2035 A.A.D.T. = 2400 VPD  
20?? D.H.V. = ? VPH  
% TRUCKS = 13 %  
TOTAL DESIGN ESAL's = ?



*Rip-rap*

*(Flared wingwalls shown  
May end up being parallel?  
However it appears flared  
wingwalls would fit  
better)*

*No flood plain  
permit < 100 sq  
mile rural area*

HYDRAULIC DATA

DRAINAGE AREA= 3.3 MI<sup>2</sup>  
STREAM SLOPE= 9.24 FT./MI.

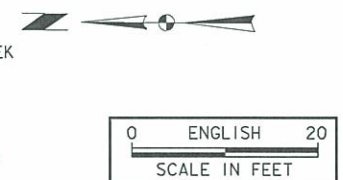
Q<sub>50</sub>= 1920 CFS  
HEADWATER= 995.77  
AVG. OUTLET VELOCITY= 8.42 FT/SEC

Q<sub>100</sub>= 2316 CFS  
HEADWATER= 996.94  
AVG. OUTLET VELOCITY= 10.16 FT/SEC

Q<sub>500</sub>= 3110 CFS  
Q OVERTOPPING= 3074.09 CFS  
ROADWAY OVERTOP ELEV.= 999.50

LOCATION

IA 96 OVER DEVILS RUN CREEK  
T-85N R-17W  
SECTION 11/14  
VIENNA TOWNSHIP  
MARSHALL COUNTY  
BRIDGE MAINT. NO. 6405.8S096  
LATITUDE ?  
LONGITUDE ?



DESIGN FOR 11° LA SKEW

**TWIN 12' x 10' x 88' REINFORCED CONCRETE BOX CULVERT**

WITH 15° HEADWALLS

SITUATION PLAN

STATION: 306+74.50

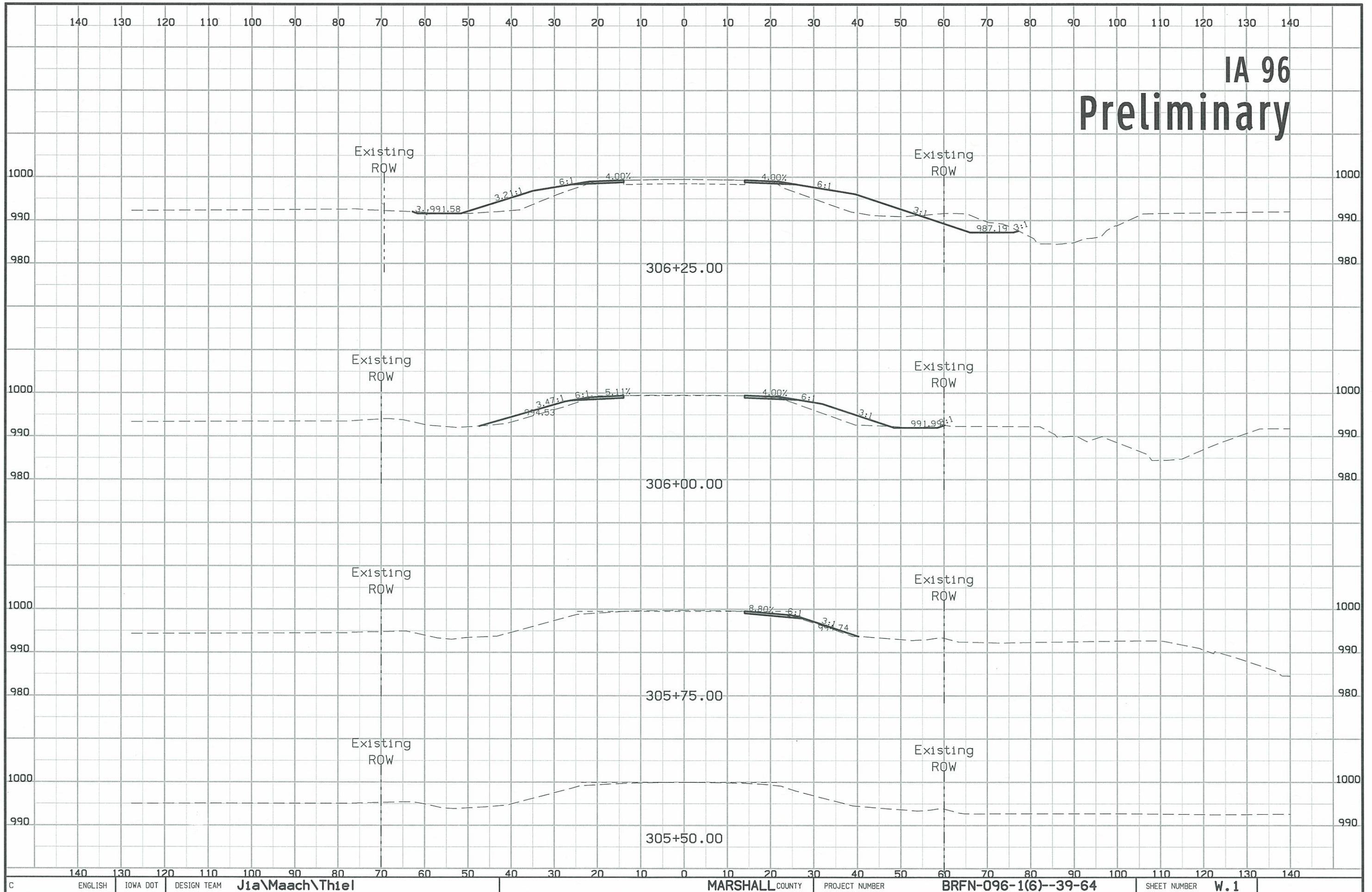
**MARSHALL COUNTY**

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION

DESIGN SHEET NO. \_\_\_ OF \_\_\_ FILE NO. \_\_\_ DESIGN NO. \_\_\_

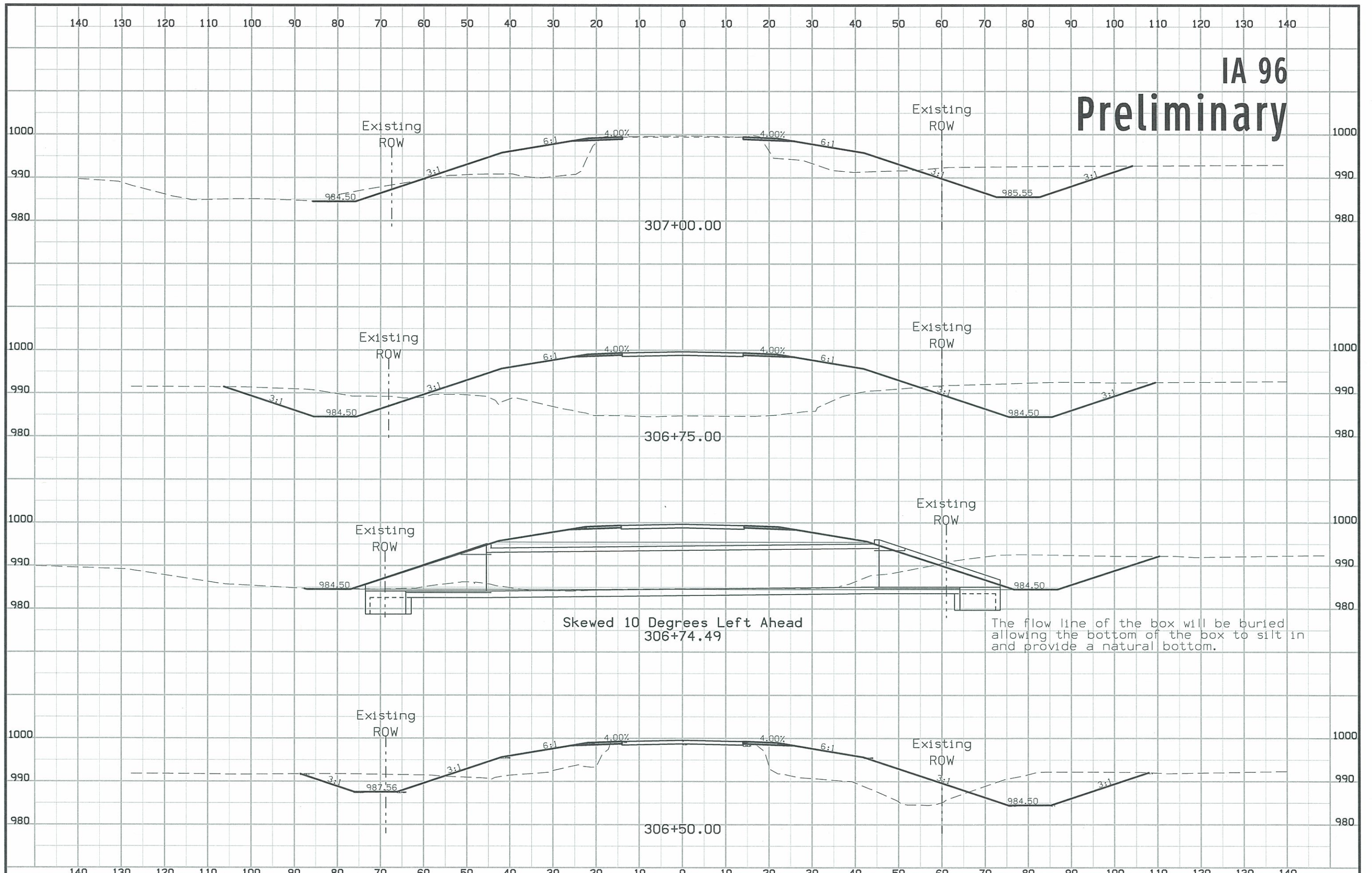


# IA 96 Preliminary



IA 96

Preliminary



# IA 96 Preliminary

