BRIDGE REPLACEMENT
BRFN-003-5(83)--39-12

LETTING DATE 01/17/2024

BUTLER Co.

INDEX OF SHEETS

IOWA DOT

Highway Division

PLANS OF PROPOSED IMPROVEMENT ON THE

PRIMARY ROAD SYSTEM

BUTLER COUNTY

BRIDGE REPLACEMENT

HARTGRAVE CREEK OVERFLOW
0.5 MI W
OF CO RD T16

SCALES: As Noted

Refer to the Proposal Form for list of applicable specifications.

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

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REVISIONS

TOTAL
PROJECT IDENTIFICATION NUMBER
19-12-003-010
PROJECT NUMBER
BRFN-003-5(83)--19-12
R.O.W. PROJECT NUMBER

Attendees:

Jacob Page, Iowa DOT
Jim Ellis, Iowa DOT
Ron Reichter, Iowa DOT
Kevin Smith, Iowa DOT
Bill Kaufman
Joe Brown, City of Dumont
Tanner Clevenger, WHKS
Dave Little, WHKS
Chase Holien, WHKS

MILEAGE SUMMARY

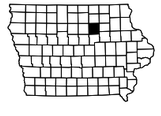
105-1
09-27-94

Div.	Location	Lin. Ft.	Miles
1	IA Highway 3		
	Sta. 93+45.38 to 108+39.97	1494.59	0.283
	Sta. 119+03.27 to 119+89.64	86.37	0.016
	Subtract Bridge Sta. 119+28.37 to Sta. 119+64.64	36.27	0.007
	Total Length	1544.69	0.292

TABULATION OF TEMPLATE QUANTITIES

ALTERNATIVE 1	CUT	FILL	F+30%	BALANCE	-
CEDAR AVE.					
200·73.16	0	21505	27957		27957
220·83.13					
CLOSURE DIKE					
900·00.00	573	11004	14305		41689
907·07.05					

ALTERNATIVE 2	CUT	FILL	F+30%	BALANCE	-
CEDAR AVE.					
200·73.16	0	24041	31253		31253
220·83.13					
CLOSURE DIKE					
900·00.00	0	15014	19518		50771
907·07.05					
IA 3					
93·45.38	286	0	0		50485
119·89.64					



DESIGN DATA RURAL

2019 AADT	2000	V.P.D.
2039 AADT	2100	V.P.D.
20-- DHV	--	V.P.H.
TRUCKS	19	%
Total Design ESALs	--	

Project Location Map on Sheet A.2

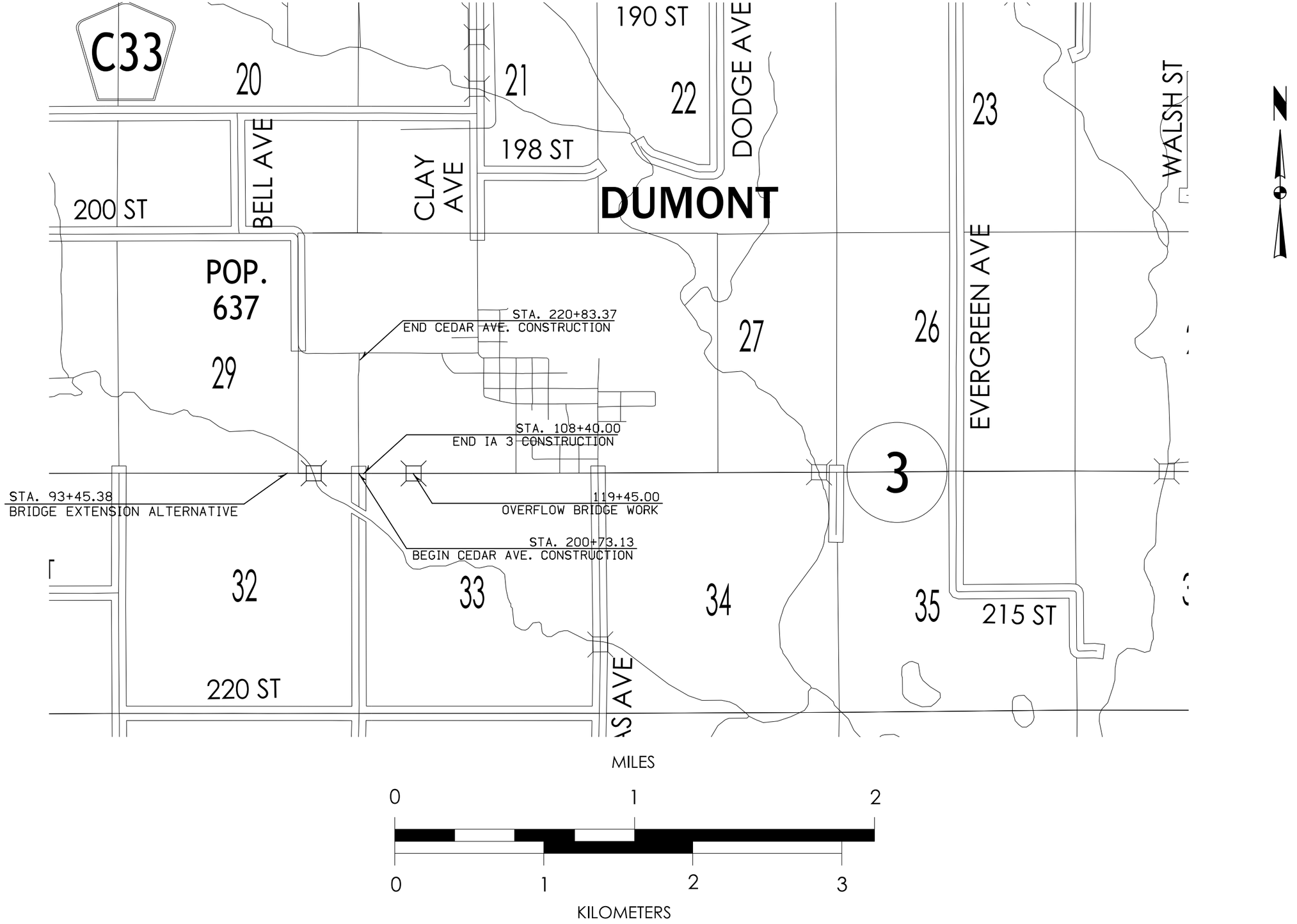
PRELIMINARY PLANS

Subject to change by final design.

D0/D2 PLAN – Date: 12/21/2021

FILE NO.	ENGLISH	DESIGN TEAM WHKS & CO.	BUTLER COUNTY	PROJECT NUMBER BRFN-003-5(83)--39-12	SHEET NUMBER A.1

4:00:15 PM 12/8/2021 tclevenger K:\9371 Iowa DOT On-Call 307BA\00-307BA-Base-IA 3 Over Hartgrave Creek\Roadway\CADD Files\Sheet Files\12003010a01.sht



FILE NO.	ENGLISH	DESIGN TEAM WHKS & CO.	BUTLER COUNTY	PROJECT NUMBER BRFN-003-5(83)--39-12	SHEET NUMBER A.2

4:00:16 PM 12/8/2021 tclevenger K:\9371 Iowa DOT On-Call 307BA\00-307BA-Base-IA 3 Over Hartgrave Creek\Roadway\CADD Files\Sheet Files\12003010a01.sht

DRAFT PROJECT CONCEPT STATEMENT

Hartgraves Creek Overflow 0.5 MI W of Co. Rd. T16
Butler County
BRFN-003-5(83)--39-12
PIN 19-12-003-010
Maint. No. 1294.1S003
FHWA No. 16490

WHKS & Company
S. Scott Sweet, P.E.
641-423-8271

December 7, 2021

I. STUDY AREA

A. Project Description

This project involves the replacement of the IA 3 overflow bridge at Hartgraves Creek, reconstruction of Cedar Avenue and other related hydraulic and drainage improvements, as follows:

As part of Project BRFN-003-5(83)--39-12:

1. Replace existing IA 3 bridge over the Hartgraves Creek overflow (Maint # 1294.1S003) with a culvert and flapgate. Close existing bridge via flowable mortar.
2. Add flow capacity west of Cedar Avenue. Two alternatives are:
   A. Extend existing IA 3 bridge at Hartgraves Creek (Maint #1293.7S003). Proposed bridge will be a 443' x 40' prestressed precast concrete beam (PPCB) bridge, resulting from a 168' extension of the existing bridge.
   B. Construct a triple 12' x 10' x 290' reinforced concrete box (RCB) culvert diagonally (flowing NW to SE) under the intersection of IA 3 and Cedar Avenue.
3. Raise the grade of Cedar Avenue north of IA 3.
4. Construct a closure dike in the NW quadrant of the IA 3 and Cedar Avenue intersection.
5. Address twin 72" reinforced concrete pipes (RCPs) at MP 193.8 (approx. Sta 107+00), crossing IA 3 immediately west of Cedar Avenue.
6. Purchase flowage easements, approximately 100 acres, in the NW quadrant of the IA 3 and Cedar Avenue intersection.

Outside of project BRFN-003-5(83)- -39-12:

7. Retrofit closure structures to the outlets of existing 10' x 3' RCBs at MP 194.5 and 194.6. City of Dumont will be responsible for retrofitting, maintaining, and operating the closure structures.
8. Raise the grade of IA 3 by HMA overlay near the intersection with T16 (Main Street); work to be accomplished by the Iowa DOT under a separate project.
9. Remedial grading to lower embankment on Cedar Avenue, approximately 1000 feet south of IA 3; work accomplished by Butler County in 2019. As part of this project, this work site will be surveyed to facilitate improved hydraulic modeling.
10. Development of pumping capabilities by the City of Dumont to drain areas north of IA 3 during major flood events.

The above improvements were collectively identified as Option 2, among five total options documented in an e-mail from William Kaufman to Nickolas Humpal dated November 18, 2019. Option 2 was selected based on coordination between the City of Dumont, Butler County, District 2, and the Bridges and Structures Bureau. The other options considered will not be addressed in this concept statement. These improvements have been modified by updated hydraulic modeling following completion of preliminary survey, to include the added alternative to build a triple RCB in lieu of extending the bridge.

Traffic will be maintained via off-site detour.

B. Need for Project

This project provides for the mitigation of regulatory requirements in conjunction with the replacement of the Hartgraves Creek overflow bridge, in addition to providing the City of Dumont up to a 500-yr flood protection level and improving the IA 3 level of service (LOS) to 50 years.

C. Present Facility

The existing Hartgraves Creek overflow structure (Maint # 1294.1S003, FHWA 16490) is a 35' x 30' concrete slab bridge, 0 degrees skew, originally constructed in 1957.

The existing Hartgraves Creek bridge (Maint #1293.7S003, FHWA 16481) is a 275' x 40' PCCB bridge, 20 degrees skew right-ahead, originally constructed in 1984.

IA 3 in the project area is a 24-ft wide 10" x 7" x 10" Portland cement concrete (PCC) pavement with 8 ft. wide granular shoulders and 3:1 foreslopes, constructed in 1928. Hot-mix asphalt (HMA) resurfacing was accomplished in 1961 (3"), 1985 (3"), and 2004 (4"). In 2004, the shoulders were retrofitted to provide a 4 ft. paved and 4-foot granular surface.

D. Traffic Estimates

The 2019 and 2039 average daily traffic estimates are 2,000 annual daily traffic (ADT) with 19% trucks and 2,100 ADT with 19% trucks, respectively.

E. Sufficiency Ratings

IA 3 is classified as an "Area development" route, a maintenance service level "B" roadway, and a National Highway System route.

F. Access Rights

Access rights will not be acquired for this project.

G. Crash History

During the study period from January 1, 2016 through December 31, 2020, there was only one crash in the IA 3 corridor from the Hartgrave Creek bridge to east of the T-16 intersection in Dumont. This crash occurred at the intersection of IA 3 and Cedar Avenue, was animal-related, and resulted in property damage only.

II. PROJECT CONCEPT

A. Feasible Alternatives

There are two alternatives being considered to increase the flow capacity of the main channel of Hartgraves Creek: 1) Adding a 168' extension to the west end of the existing Hartgraves Creek bridge and 2) constructing a triple RCB diagonally under the intersection of IA 3 and Cedar Avenue.

District staff prefers the bridge be removed and a pipe installed

Improvements common to both alternatives include:

- The Hartgraves Creek Overflow bridge (Sta 119+46.4, Maint # 1294.1S003) will be replaced with a 42" RCP culvert and flap gate to prevent floodwaters on the south side of IA 3 from inundating the north side and potentially impacting the town. Bridge rails and curbs will be removed, and the existing bridge will be remediated using the flowable mortar method. The city will be responsible for the operation and maintenance of the flap gate.

Removals, as per plan	= $20,000
Culvert, Concrete Pipe, 42 in dia x 60 ft	= $10,000
Aprons, Concrete, 42" dia, w/ safety grate, 1 each	= $4,000
Gate, Outlet Control, Flap, 42 in.	= $10,000
Manhole, SW-402 Modified	= $8,000
Flowable Mortar, 167 CY	= $27,000
	$80,000

- Deck Overlay of the Existing Hartgraves Creek (main channel) bridge. This work is currently proposed for both alternatives. Under Alternative 2, if the triple RCB is built using precast construction, there may not be sufficient time to complete the deck overlay while IA 3 is under detour.

Bridge will not be overlaid with the preferred alternative

	Alt 1 – Extend Bridge	Alt 2 – Triple RCB
Bridge Overlay (443'x 40')	= $302,000	= $0
Bridge Overlay (275'x 40')	= $0	= $253,000
Bridge Approaches	= $98,000	= $98,000
Approach Guardrail	= $25,000	= $ 25,000
Traffic Control	= $50,000	= $50,000
	$302,000	$253,000

- A closure dike will be constructed north of IA 3, from the Hartgraves Creek bridge waterway and tying into the Cedar Avenue embankment north of IA 3. The dike will be built to a top elevation of 985.00 if the Hartgraves Creek bridge is extended, or 985.50 if the triple RCB is built. Top width of the dike is proposed at 20 feet, with slopes of 2.5:1 on the upstream side, and a flatter but variable slope on the side facing IA 3. Over-excavation of the existing ground underlying the closure dike is proposed, assumed to a depth of 3 feet below the existing ground surface, to remove organic soils.

  Constructed at the lower elevation in Alternative 1, a "sausage" consisting of erosion stone wrapped in engineering fabric is proposed on the downstream side of the embankment to reduce potential for erosion if ever overtopped by floodwaters. The "sausage" would be generally square in-section, measuring approximately 3.5 ft x 3.5 feet with one upper corner clipped off by the foreslope. The sausage will be covered by approximately 6-inches of soil. See typical section in

concept plans. The sausage is not recommended for the higher dike elevation of Alternative 2, due to the additional freeboard provided.

	Alt 1 – Extend Bridge	Alt 2 – Triple RCB
Overexcavation	= $35,000	= $30,000
Embankment-in-place	= $111,000	= $140,000
Erosion Stone (sausage)	= $17,000	= $ 0
Engineering Fabric (sausage)	= $5,000	= $ 0
Seeding/Fert./Temp Erosion Control	= $8,000	= $8,000
	$176,000	$178,000

- Cedar Avenue, north of IA 3, is to have its profile grade raised over approximately 1500 feet for its embankment to serve as a dike. The hydraulic analysis calls for a minimum elevation of 985.00 feet if the Hartgraves Creek bridge is extended, and an elevation of 985.50 feet if the triple RCB is constructed. It is proposed that the grade be built six-inches higher for either alternative to address potential future grade changes as the county road surface is maintained.

  Over-excavation of the existing roadway embankment, assumed to a depth of 3 feet below the existing profile, is proposed to remove any existing layers of granular materials. As discussed above, a revetment core "sausage" is recommended for the eastern foreslope of Cedar Avenue for the lower top elevation of Alternative 1, and not recommended at the higher top elevation of Alternative 2.

	Alt 1 – Extend Bridge	Alt 2 – Triple RCB
Overexcavation	= $73,000	= $79,000
Embankment-in-place	= $230,000	= $254,000
Erosion Stone (sausage)	= $19,000	= $ 0
Engineering Fabric (sausage)	= $9,000	= $ 0
Granular Surfacing	= $21,000	= $21,000
Seeding/Fert./Temp Erosion Control	= $10,000	= $10,000
	$362,000	$364,000

- Flowage easements are required, estimated at 100 acres in the NW quadrant of the IA 3/Cedar Avenue intersection, as either alternative will increase the 100-year flood elevation above the pre-development condition under Iowa Department of Natural Resources (DNR) criteria,

Flowage Easement (100 ac. X $1000)	= $100,000

- Note: Over-excavated soils would be wasted and suitable soils for raising the county road embankment and construction of the closure dike would be obtained from borrow.

Alternative 1: Extend existing Hartgraves Creek Bridge

- Extend the existing Hartgraves Creek bridge by 168 feet on the west end.

Bridge - 168' x 43' o/o slab @ $150.00/sf	= $ 1,084,000
Expose Exist. W. Abut. – LS	= $20,000
Revetment (Berm)	= $ 30,000
	$1,134,000

- Plug and abandon existing 72" dia. RCPs at Sta. 107+00 (approximately).
  - Remove and Waste 72" Aprons = $1,000
  - Flowable Mortar, 176 CY = $28,000
  - Misc. Items: = $3,000
  - $32,000

- Build 24" RCP under Cedar Avenue at Sta. 201+40 (approx.) for local drainage.
  - Culvert, 24" RCP, 60 LF = $6,000
  - Aprons, Concrete, 24" dia, two each = $3,000
  - Excavation, Class 20, 450 CY = $4,000
  - Granular Surfacing, Class A Crushed Stone = $1,000
  - $14,000

Alternative 2: Construct triple RCB

- Construct triple 12' x 10' x 290' RCB culvert, diagonally under intersection of IA 3 and Cedar Avenue, flowing from NW to SE. Includes local reconstruction of IA 3 pavement due to culvert construction.
  - Precast RCB, 12' x 8', 870 feet total = $957,000
  - Precast RCB 12' x 8', end section, 6 total = $150,000
  - Excavation, Class 20 = $90,000
  - Pavement Reconstruction = $40,000
  - $ 1,237,000

- Remove and waste existing twin 72" RCPs under IA 3, assuming 130 lin. ft of pipe and 4 aprons. Excavation incidental to the excavation for the triple RCB.
  - Removals, as per plan: = $5,000

- Intake(s) for local drainage, outletting into the triple RCB. Details to be determined at Field Exam.
  - = $10,000

B. Detour Analysis

IA 3 will be closed during construction and an offsite detour will be utilized. It is anticipated that the detour will be in place for approximately 120 days. The detour would follow S56 from IA 3 north to C23, then east on C23 from S56 to T16, and then south on T16 from C23 to IA 3, passing through the communities of Hansell, Aredale, and Dumont. Total detour length is 19.38 miles. Out-of-distance travel is 12.72 miles. The out-of-distance user cost per day of detour is $6,583. For a 120-day detour duration, estimated user costs are $789,987.

Estimated detour compensation to local governments using the Gas-Tax Method:

- Franklin County, per day of closure $190.65, for 120-day closure $22,878
- Butler County, per day $136.99, for 120-day closure $16,439
- City of Dumont, per day $21.49, for 120-day closure $2,578
- Aredale and Hansell are both below 100 citizens in population, so it's assumed that roadway maintenance will be the responsibility of their respective counties, and no detour compensation is due to these communities.

Detour signing costs are estimated to be $15,000. Roadway maintenance costs of $40,000 are estimated for the designated detour route prior to the project.

Total cost of 120-day detour, including signing, roadway maintenance, out-of-distance travel, and gas-tax method compensation costs is estimated to be $886,833.

An IA 3 on-site detour isn't feasible. Immediately SE of the existing bridge is a small pond that would physically make an on-site detour on the south side infeasible. (See Special Considerations below for further discussion of this site). On the north side, any on-site detour would potentially conflict with construction of the proposed closure dike, though this conflict could be addressed by constructing the dike after the bridge had been lengthened and the on-site detour removed. Due to the length of the Hartgraves Creek bridge, it may take a temporary bridge to convey the flows of any significant event during construction. For these reasons, WHKS has not evaluated an on-site detour during the development of this concept.

Cedar Avenue will also need to be detoured during construction of the grade raise. There are two field accesses and one residential/farm access on Cedar Avenue between IA 3 and W. Broadway Street to the north. Opening of Cedar Avenue during other times of the project should be determined during the Concept Review/Field Exam.

C. Recommendations

Improvement	Alt 1 - Extend Bridge	Alt 2 - Triple RCB
Remediate Hartgraves Creek Overflow Bridge	$80,000	$80,000
Deck Overlay of Hartgraves Creek Bridge (Main Channel)	$302,000	$253,000
Build Closure Dike	$176,000	$178,000
Raise Cedar Avenue Grade	$362,000	$364,000
Flowage Easements	$100,000	$100,000
Extend Hartgraves Creek Bridge (Main Channel)	$1,134,000	$0
Plug/Abandon Existing twin 72" RCP	$32,000	$0
Build 24" RCP for local drainage under Cedar Avenue	$14,000	$0
Construct Triple RCB (Precast)	$0	$1,237,000
Remove/Waste Existing twin 72" RCP	$0	$5,000
Intake for Local Drainage	$0	$10,000
Subtotal	$2,200,000	$2,227,000
Mobilization @ 10%	$220,000	$222,700
Misc and Contingency @ 20%	$440,000	$445,400
Subtotal	$660,000	$668,100
Project Total	$2,860,000	$2,895,100

Estimated costs have been based on average Iowa DOT Awarded Contact Prices for FY 2021; the prices have not been inflated to year of programming.

It is recommended to proceed with the feasible alternatives as described above:
XXXXXXXXXX

District 2 staff prefers the Triple RCB alternative

Total cost is estimated at $XXXXXX.

D. Construction Sequence

Considerations:

- Should any large rainfall events occur during construction, there is a flood mitigation benefit to increasing the hydraulic capacity of Hartgraves Creek west of Cedar Avenue before the flow capacity is reduced under the Hartgraves Creek overflow bridge.
- Raising the grade of Cedar Avenue will effectively close off the Hartgraves Creek overflow channel, funneling excess flows through the main channel.

The desired sequence of operations will vary somewhat between alternatives.

For Alternative 1: Bridge Extension

- Phase 1: Complete major work activities associated with extending the Hartgraves Creek main channel bridge and associated work: grading of waterway, bridge waterway revetment, major pier shoring removed.
- As Phase 1 is completed, the remaining work activities may proceed: deck overlay, grading of the closure dike, raising Cedar Avenue, plugging twin 72-inch RCPs, flowable mortar remediation of the overflow bridge and placement with a RCP culvert w/flapgate.

For Alternative 2: Triple RCB

- Phase 1: Complete major activities associated with the Triple RCB: grading of closure dike, removal of twin 72" RCPs, raising IA 3 at the Cedar Avenue intersection.
- As Phase 1 is completed, the remaining work activities may proceed: raising Cedar Avenue, flowable mortar remediation of the overflow bridge and placement with a RCP culvert w/flapgate, etc. If the Hartgraves Creek bridge (main channel) is to have a deck overlay completed, this work will likely extend over both phases with a separate work zone developed to accommodate traffic through the deck overlay.

It is anticipated that all work on this project will be awarded to one prime contractor.

E. ADA Accommodations

There are no bike paths or sidewalks adjacent to IA 3; therefore, no ADA accommodations are planned in conjunction with this project.

F. Special Considerations

Right of Way, temporary easements, and flowage easements will be required for this project.

Project Agreements will be required with Butler County and with the City of Dumont.

Detour Agreements will be required with Butler and Franklin Counties, and the City of Dumont.

An IaDNR Floodplain Development Permit will be required.

DOT could consider options, such as pre-casting the triple RCB, tight contract periods, contract incentives, etc., to reduce the travel impacts and costs associated with the lengthy detour.

Immediately, southeast of the Hartgraves Creek bridge (main channel) is a Butler County Park, South Fork Park, raising potential 4F issues if impacted by construction. The park's address is listed as 21045 Cedar Avenue. There is a park access from Cedar Avenue south of IA 3, and the park has no apparent direct access from IA 3. Cedar Avenue dead-ends immediately south of the park as there is no existing bridge over Hartgraves Creek. Access to the park may be reasonably maintained under Alternative 1 (bridge extension), as it should be possible to maintain local access over the Hartgraves Creek overflow bridge during its flowable mortar remediation and the main channel bridge extension work will not extend into the IA 3/Cedar Avenue intersection. Alternative 2 involves a triple RCB being constructed through the IA 3/Cedar Avenue intersection, so access to the park would be closed off during the time of culvert construction unless a temporary park access could be routed around the southern end of the triple RCB. If short-term closure of the park access is reasonable, this may be mitigated through pre-casting the triple RCB.

This park is a small fishing hole with a small number of people using it; this likely will not matter when it comes to Section 4(f) issues

F: Program Status

This project is listed in the 2022-2026 Iowa Transportation Improvement Program, funded in the amounts of $5,000 for right-of-way in FY 2023 and $1,059,000 for construction in FY 2024. A schedule of events will be developed following approval of the Project Concept.

SSS:dll

KEYPOINT WATER SURFACE
100 YR. HARTGRAVE CK. (HC) EVENT

	h3	h73	h63	h61A	h61
PRE-DEV	986.11	979.34	976.01	977.20	976.54
EXISTING	986.13	980.15	976.42	976.72	976.64
OPTION 1	986.38	984.44	975.80	977.08	976.52
OPTION 2	986.25	983.82	975.80	977.08	976.52

0 ENGLISH 600
SCALE IN FEET

N

DUMONT

(A) FLOWAGE EASEMENT

(A) FLOWAGE EASEMENT

(A) FLOWAGE EASEMENT

h3
U/S MODEL
BOUNDARY

HARTGRAVE CREEK

CEDAR AVE.

Roadway Grade Raise
Top Elev = 985.5 if Alt 1
Top Elev = 986.00 if Alt 2

Proposed
Closure Dike,
Top Elev =
985.00 if Alt 1
985.50 if Alt 2

h73

Alternative 2
Proposed Triple 12'
x 8' x 290' RCB

BRIDGE MP 193.7
275'-0 X 40'-0 PPCB
I293.7S003

BRIDGE MP 194.1
33'-0 X 30'-0 SLAB
I294.1S003

IA 3

CR T16

INUNDATION REFLECTS
WATER SURFACE
S. IA 3 MP 194.5

RCB CR
8' X 4'

h63

RCB MP 194.5
RCB MP 194.6
10' X 3'

(B) BEGIN OVERLAY
500 YR. WS

(B) END OVERLAY
500 YR. WS

Alternative 1
PROPOSED BRIDGE
443'-0 X 40'-0 PPCB
168' EXTENSION OF
EXISTING BRIDGE

RCP
TW 72"

Alt 1 -
Plug/Abandon
Alt 2 - Remove

Bridge Closure via
flowable mortar,
proposed 42" RCP w/
flapgate

(B) HMA overlay by DOT under separate project

h61A

h61

RESIDENCE / BLDGS. L415HC
HIGH DAMAGE IMPACT
EXIST (+) 0.36'

(B) (D) RCB GATE CLOSURE
LIFT OR FLAP GATE

To be done by City

BLDGS. EAST h61
PROPOSED 100 YR. WS
LOWER THAN EXISTING

(C) Done by County in 2019

REMEDIAL GRADING
EMBANKMENT REMOVAL

⊗ WATER SURFACE KEY POINT LOCATION

NOTES:

INUNDATION LIMITS AND WATER SURFACE CONTOURS SHOWN FOR PROPOSED 100 YR. HARTGRAVE CK. (HC) EVENT.
CONTOUR INTERVAL 0.2 FT

IA 3 50 YR. LEVEL OF SERVICE (LOS) FOR ETW INUNDATION PROVIDED WITH OVERLAY AT MP 194.5 (DUMONT) NOTED BELOW.

(A) FLOWAGE EASEMENT FOR INCREASE IN WATER SURFACE >1.50 FT. FROM PRE-DEVELOPMENT CONDITION FOR 100 YR. EVENT (IADNR LOW DAMAGE POTENTIAL).

(B) OVERLAY PROTECTIVE FOR DEVELOPMENT N. OF IA 3. REQUIRED TO BLOCK WATER LEVEL S. OF IA 3 AS FOLLOWS:
100 YR. 500 LF 0.8 FT. MAX. DEPTH
500 YR. 1,400 LF 1.2 FT. MAX. DEPTH
OVERLAY REQD. FOR IA 3 50 YR. LOS MP 194.5 SIMILAR TO 100 YR. LIMITS ABOVE.

(C) MINIMAL WATER SURFACE REDUCTION (<0.1 FT.) RELATIVE TO

(D) PROTECTIVE FOR DEVELOPMENT N. OF IA 3. NOT REQUIRED FOR IA 3 LOS.

(E) BARRIER AS REQUIRED TO BLOCK W>E FLOW ALONG IA 3 SHLDR. FROM IA 3 OVERTOP TO WEST. ESTIMATED BARRIER EXTENT:
100 YR - 30' LEN X 0.4' MAX. D.
500 YR - 50' LEN X 1.0' MAX. D

Modified from Original Document

CONCEPT DETAILS FOR
IA 3 OVER HARTGRAVE CREEK (OVERFLOW) - BRIDGE REPLACEMENT
SITE PLAN -
BUTLER COUNTY
IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
DESIGN SHEET NO. ____ OF ____ FILE NO. _____ DESIGN NO. _____

DESIGN TEAM	BUTLER COUNTY	PROJECT NUMBER BRFN-003-5(83)--39-12	SHEET NUMBER 2 OF 4

FILE NO.	ENGLISH	DESIGN TEAM WHKS & CO.	BUTLER COUNTY	PROJECT NUMBER BRFN-003-5(83)--39-12	SHEET NUMBER A.7

4:00:23 PM 12/8/2021 tclevenger K:\9371 Iowa DOT On-Call 307BA\00-307BA-Base-IA 3 Over Hartgrave Creek\Roadway\CADD Files\Sheet Files\12003010a01.sht

Roadway	IA 3		
PIN Number	19-12-003-010	Submittal Date	
Project Number	BRFN-003-5(83)--39-12		Approval Date
District	District 2	Assistant District Engineer	
County	BUTLER	or	
Route	IA 3	Office Director	
Location	Hartgraves Creek Overflow, 0.5 MI W of CO RD T16		
Work Type	Bridge Replacement		
Segment Manager			
Designer	WHKS & Co		

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%	n/a
Design lane width (ft)		12	12	12
Full depth paved width (ft)		12	12	14
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	3:1
	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	2.5:1
Transverse Slopes	w/ drainage structures	8:1	6:1	n/a
	w/o drainage structures	10:1	6:1	10:1
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	n/a
	Bridge length > 200 ft	design lane widths + effective shoulder widths	design lane width + 4' right and left of the design lane widths	n/a
Bridge width—existing*		design lane widths + no less than 2 ft left and right	design lane widths + 2 ft. offset left and right	40'
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	

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

Design year ADT = 2100

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				
On roadways approaching urban areas (due to increased bike traffic)	10	10	Design year ADT > 2000 vpd	8	0*	10' effective/6' paved
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:

Roadway	Cedar Avenue		
PIN Number	19-12-003-010	Submittal Date	
Project Number	BRFN-003-5(83)- -39-12	Revison Date	
District	District 2		
County	Butler		
Route	Cedar Avenue		
Location	from intersection with IA 3 North to W. Broadway Street		
Work Type	Grading with Granular surfacing		
Segment Manager			
Designer	WHKS & Co		
Design year ADT =	50		

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

Secondary Roads

Design Elements		Project value	Local Systems I.M. 3.210 value	Remarks
Design speed (mph)		40	40	(1)
Design lane width (ft.)		20 or match existing if greater	20	(2)
Shoulder width (ft.)		n/a	n/a	
Bridge width - new (ft.)		n/a	n/a	
Bridge width - existing (ft.)		n/a	n/a	
Maximum super elevation rate (%)		n/a	n/a	
Minimum radius (ft.)		n/a	n/a	
Stopping sight distance (ft.)		305	305	(3)
Vertical curve length (ft.)		120 ft	in feet, 3 x design speed in MPH	(4)
Minimum rate of vertical curvature (K)	Crest	n/a	n/a	
	Sag	64	64	(5)
Minimum gradient (%)		0	Not found	(6)
Maximum gradient (%)		6	6	
Foreslope		3:1	2:1	(7)
Backslope		n/a	n/a	(8)
Traverse slopes		n/a	n/a	
Clearzone		the greater of foreslope width or 6 ft.	6	(9)

Notes:
(1) Design Speed per IM 3.210, p.5, Table: *AASHTO Guidelines for Rural Local Roads*, for roadways under 400 ADT and in level terrain.
(2) This criterion is understood to be the top width of the granular surfacing. Project value = 20 ft selected from IM 3.210, p.4, Table: *Design Aids for Rural Local Roads* , for roadways between 250 and 50 ADT. Need to confirm granular surfacing width in field on Concept Review
(3) Stopping Sight Distance per IM 3.210, p.5, Table: AASHTO Guidelines for Rural Local Roads, for roadways under 400 ADT and in level terrain.
(4) Formula for min curve length from Iowa DOT Design Manual 2B-1, p. 4.
(5) Min K value from Iowa DOT Design manual 6.01, Table 6, for design speed = 40 mph.
(6) Portion of Cedar Avenue will be built to a fixed elevation to serve as a levee/dike. Expect portion of alignment will be at 0% longutidinal grade due to this function.
(7) Proposing 3:1 foreslope. Assume 3:1 is more more stable for long-term occasional use as a levee than a 2:1. Max fill height to meet intended elev 985.00 for roadway top will be in range of 13 feet. Per IM 3.240, Clear Zone Guidelines, Table 2, longutidinal barriers should be considered for foreslopes of 2:1 with fill heights in this range. For 3:1 foreslopes, barriers not normally considered.
(8) Expecting that the Cedar Avenue portions to be rebuilt will be designed for a no-ditch condition
(9) Per IM 3.240, Discussion on Very-Low Volume Roads, p. 3. Reasonable guideline for this project to provide a clear zone out to the base of the 3:1 foreslope.

FIELD EXAM NOTES

Overexcavation trench assumed under dike, 3-feet deep by 20 feet wide, to remove organic soil under proposed dike and ensure good compaction/density of dike materials. Concur with overexcvation? Concur with width and depth?

DOT Staff concurs

Overexcavation of existing county road embankment is assumed, 3 feet deep, for purpose of removing existing granular layers. Concur?

DOT Staff concurs

All overexcavation soils proposed to be wasted off project site. Concur?

DOT Staff concurs

Soils for Cedar Avenue grade raise, and for construction of closure dike assumed to be obtained via contractor borrow. Concur?

DOT Staff concurs

For both alternatives, it's been assumed that the top elevation of Cedar Avenue would be 0.5 ft above the hydraulically designed elevation of the closure dike. The additional height is to provide a factor of safety in the elevation of Cedar Avenue for county maintenance of a granular-surfaced road. Concur? DOT Staff concurs

Per a follow-up e-mail from Bill Kaufman:
Dike - 985.0
Cedar Ave. - 985.5

Hartgraves Creek Bridge extension project includes a deck overlay of the existing bridge. Does the overly get done if the bridge isn't extended?

This will be addressed at a later date; WHKS sent DOT staff a memo with more information - DOT staff do not want to overlay the bridge, with the preferred alternative (triple RCB)

If deck overlay is done, does the bridge railing get replaced? Height of railing ok? Cracking and shot-crete repairs visible.

This will be addressed at a later date; WHKS sent DOT staff a memo with more information - No longer applicable

Hartgraves Creek overflow bridge is built on a timber foundation, now 60 years old. IA 3 will be under detour and there are no intervening accesses between this bridge and other project work sites. Want to remove this bridge entirely instead of flowable mortar closure? May have 4F implications for maintaining access to South Fork Park.

WHKS was directed to proceed with the bridge removal

Consider "dip" in vertical alignment for tie-in at north end of Cedar Avenue near entrances. May need small dike west of Cedar Avenue in this area.

It was decided to add the dike, a few hundred feet in length, at the same elevation as the closure dike

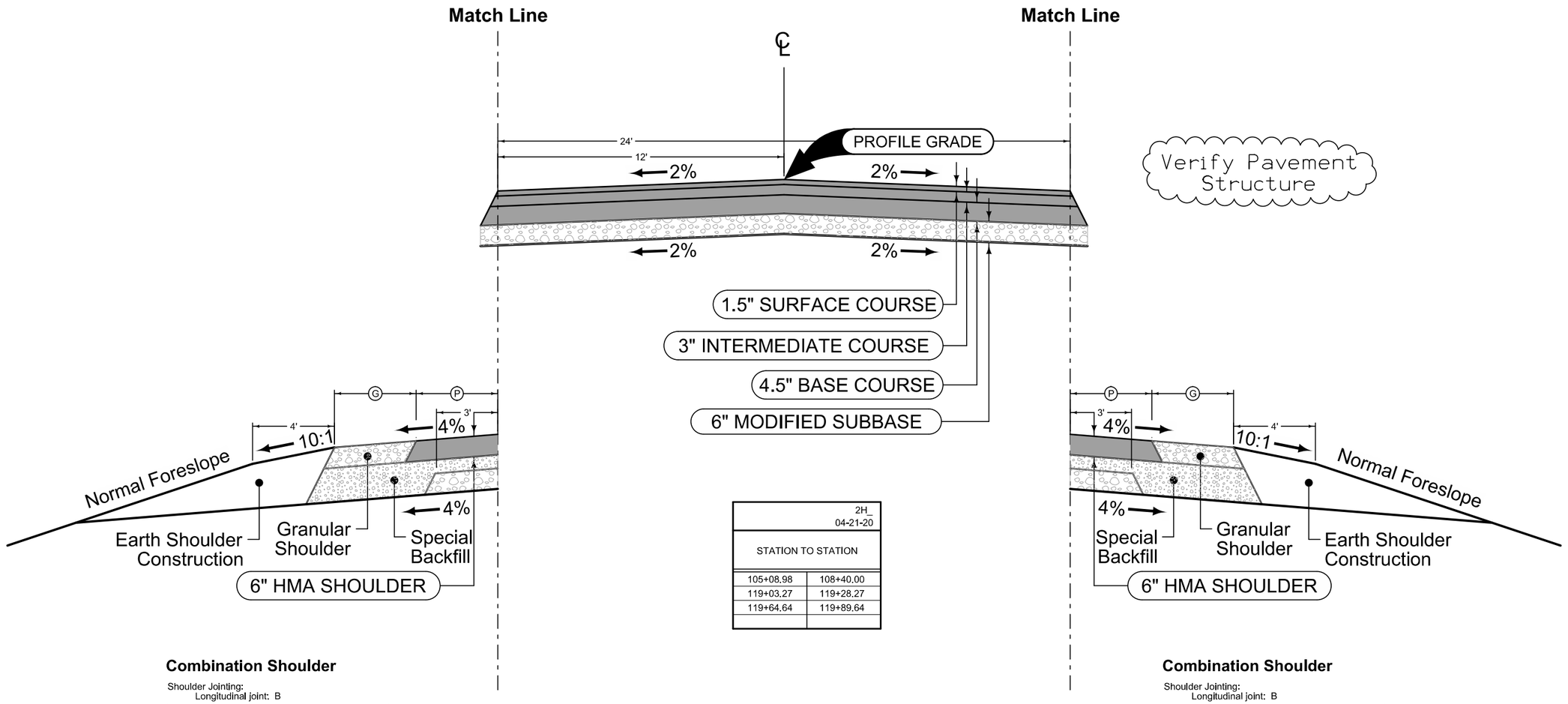
Flowage easements were estimated at $1,000/acre in the concept, but have been paid at $2,000/acre recently

For the pipe that is replacing the overflow bridge, the plans and concept show a 42 inch pipe. The pipe should be as small as possible, but no smaller than 24 inches.

If the bridge alternate is selected, the bridge will be overlaid
If the culvert alternate is selected, the Bureau of Bridges and Structures will review and determine is the bridge will be overlaid - District staff prefer the triple RCB alternative, and the Bureau of Bridges and Structures declined to overlay the bridge

A brief discussion took place on which alternate those on the call preferred. Bill Kaufman provided the following:
The Box Culvert is preferred from a hydraulic standpoint, as it performs better than the bridge widening alternate.
The Box Culvert provides about 1/2 the probability of impacts as a result of a flood.
Due to the issues presented from the lengthy detour, the RCB could be built using pre-cast segments to keep the duration of the road closure to a minimum.
This option does present Section 4(f) impacts due to the park on the south side of the road. OLE will need to be engaged if this alternate is selected.
For these options, the group slightly preferred the box culvert option.

IA 3 (To Be Used if Box Culvert Option is Selected)



2H_ 04-21-20	
STATION TO STATION	
105+08.98	108+40.00
119+03.27	119+28.27
119+64.64	119+89.64

Combination Shoulder

Shoulder Jointing:
Longitudinal joint: B

2_C_ 04-21-20			
STATION TO STATION		(P) Feet	(G) Feet
105+08.98	106+24.00	6	7
108+10.00	108+40.00	6	7

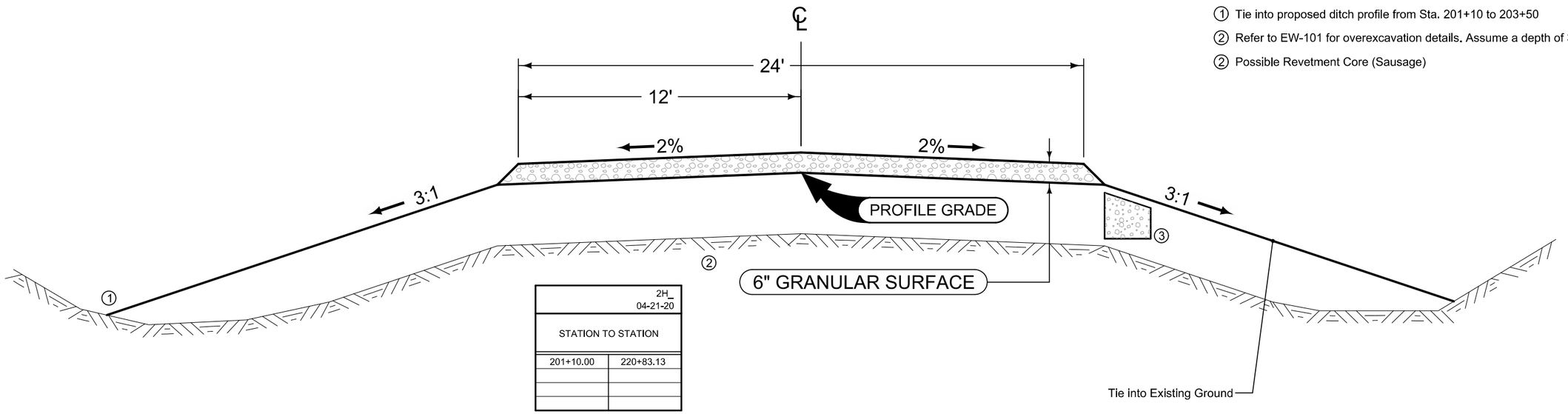
Update Paved Shoulder width to 6' or match existing 4'?

Combination Shoulder

Shoulder Jointing:
Longitudinal joint: B

2_C_ 04-21-20			
STATION TO STATION		(P) Feet	(G) Feet
105+08.98	106+70.55	6	4
108+10.00	108+40.00	6	4

Cedar Ave.



2H_ 04-21-20	
STATION TO STATION	
201+10.00	220+83.13

Notes:

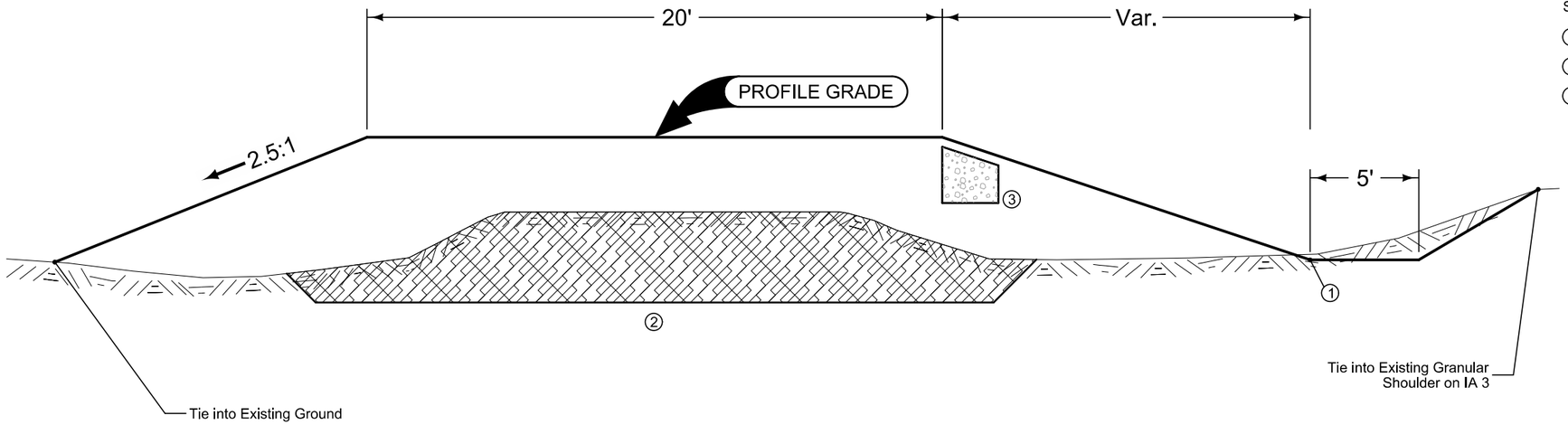
Section shown looking North

① Tie into proposed ditch profile from Sta. 201+10 to 203+50

② Refer to EW-101 for overexcavation details. Assume a depth of 3'.

② Possible Revetment Core (Sausage)

Dike (Atlernative 1) Sta. 300+58 to 308+19



Notes:

Section shown looking East

① Tie into proposed ditch profile from Sta. 300+58 to 308+19.

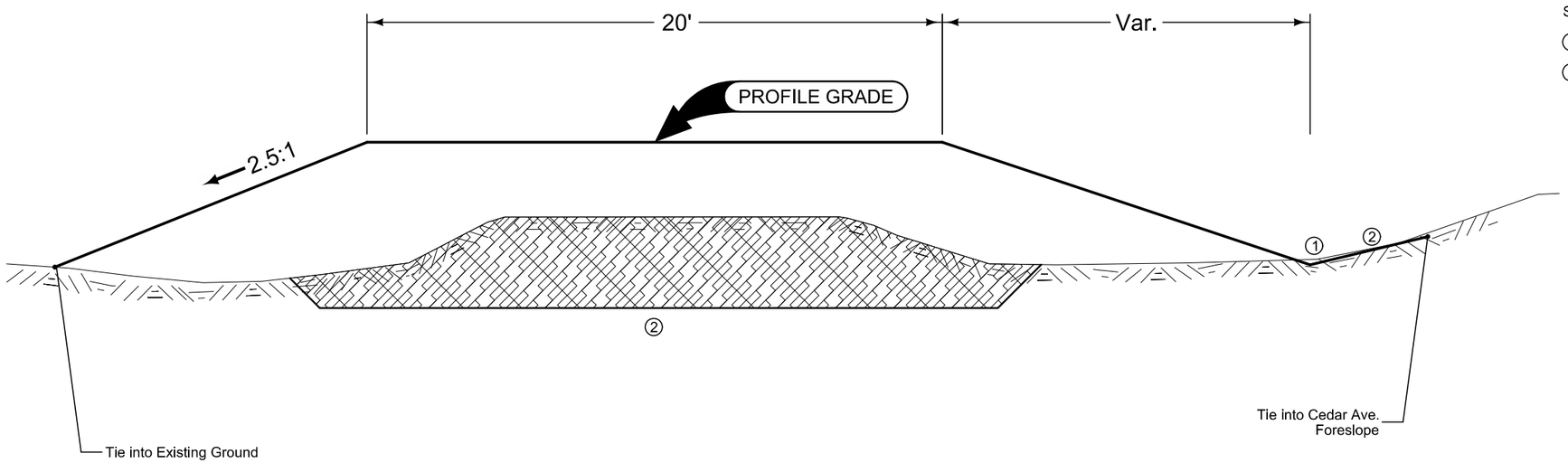
② Refer to EW-101 for overexcavation details. Assume a depth of 3'.

② Possible Revetment Core (Sausage)

FILE NO.	ENGLISH	DESIGN TEAM WHKS & CO.	GRUNDY COUNTY	PROJECT NUMBER MB-034-5(506)236--77-44	SHEET NUMBER B.2

3:29:28 PM 12/8/2021 tclevenger K:\9371 Iowa DOT On-Call 307BA\00-307BA-Base-IA 3 Over Hartgrave Creek\Roadway\CADD Files\Sheet Files\12003010b01.sht

Dike (Alternative 1) Sta. 308+19 to 308+95



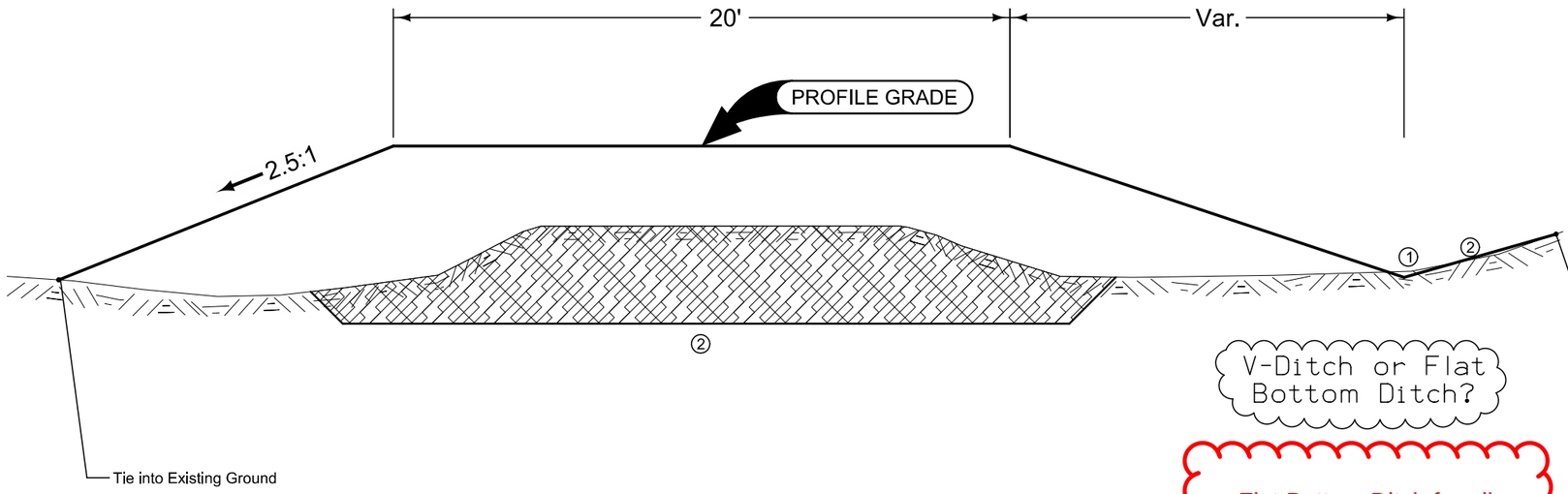
Notes:

Section shown looking East

① Tie into proposed ditch profile from Sta. 308+19 to 308+95.

② Refer to Cedar Ave. Typical on Sheet B.2 for foreslope details from Sta. 308+30 to 308+95.

Dike (Alternative 2)



Notes:

Section shown looking East

① Tie into proposed ditch profile from Sta. 201+14 to 203+50

② Refer to Cedar Ave. Typical on Sheet B.2 for foreslope details from Sta. 906+20.64 to 906+87.02

SURVEY SYMBOLS

- SIGN — SI Sign
- SHR Shrub
- LUM Luminaire
- TDC Tree Deciduous
- SIGN — SL Speed Limit Sign
- TEV Evergeen Tree
- TA — TA Tower Anchor
- Flg — FLG Flag Poles
- TSG Traffic Signal
- STP Stump
- WEL Well
- IN Storm Sewer Intake
- MIS Miscellaneous
- MM — MM Mile Marker Post
- FP — FP Filler Pipe
- TSL Traffic Signal and Luminare
- BB — BB Billboard
- LC Lot Corner
- GP — GP Guard Post (Less Than 4 Posts)
- PIP Pipe Culvert
- OUT Tile Outlet
- MH Utility Access (Manhole)
- LIN Miscellaneous Line
- HDG Hedge Row
- FCL Chain Link and Security Fence
- BLD Building or Foundation
- FWD Wood Fence
- RET Retaining Walls
- FW Wire Fence
- CUL Culvert
- Tile — TIL Tile Line
- EP Edge of Paved Roads (ML or SR)
- CU Back of Curb
- GU Gutter In Front of Curb
- SWK Sidewalk
- SNP Unpaved Shoulder
- D Centerline Draw or Stream (Down)
- DU Centerline Draw or Stream (Up)
- SH Paved Shoulder
- CON Concrete or A/C Slab
- ENP Edge Paved Entrance & Park Lot
- ENT Centerline BL of Entrance
- EG Edge of Gravel Road
- CP Control Point
- TP — TPD Telephone Pedestal
- GV — GV Gas Valve
- PPA Power Pole Co. 1
- WV — WV Water Valve
- FHD Fire Hydrants
- TR Telephone Riser Pole
- EB — EB Electrical Box
- UB — UB Utility Box
- PR Electic Riser Pole

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
Gray, Light	(48)	Proposed PCC Pavement Shading
Gray, Dark	(112)	Proposed HMA Shoulder Shading
Gray, Medium	(80)	Proposed Granular Shoulder/Roadway Shading
Brown, Light	(236)	Proposed Guardrail Blister Grading

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

- Reference Point — Survey Line
- Station — 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)

FILE NO.	ENGLISH	DESIGN TEAM WHKS & CO.	BUTLER COUNTY	PROJECT NUMBER BRFN-003-5(83)--39-12	SHEET NUMBER D.1

3:50:41 PM 12/8/2021 tberry K:\9371 Iowa DOT On-Call 307BA\00-307BA-Base-IA 3 Over Hartgrave Creek\Roadway\CADD Files\Sheet Files\12003010d01.sht

TP

TA

TA

Sta. 97+51.65
Existing 278'x40' PC Girder Bridge
Over Hartgraves Creek
Maint #1293.7S003

92

93

94

95

96

97

98

IA 3

Reshape granular shoulder
if necessary

Construct Paved Shoulders.
See Detail 7156 on Sheet B.2.

Install Steel Beam Guardrail.
See Standard Road Plan BA-250.

Remove Pavement and Construct
New Bridge Approach Section.
See SRP BR-203 for Details.

Extend bridge 168'
to the West.

Overlay Bridge Deck

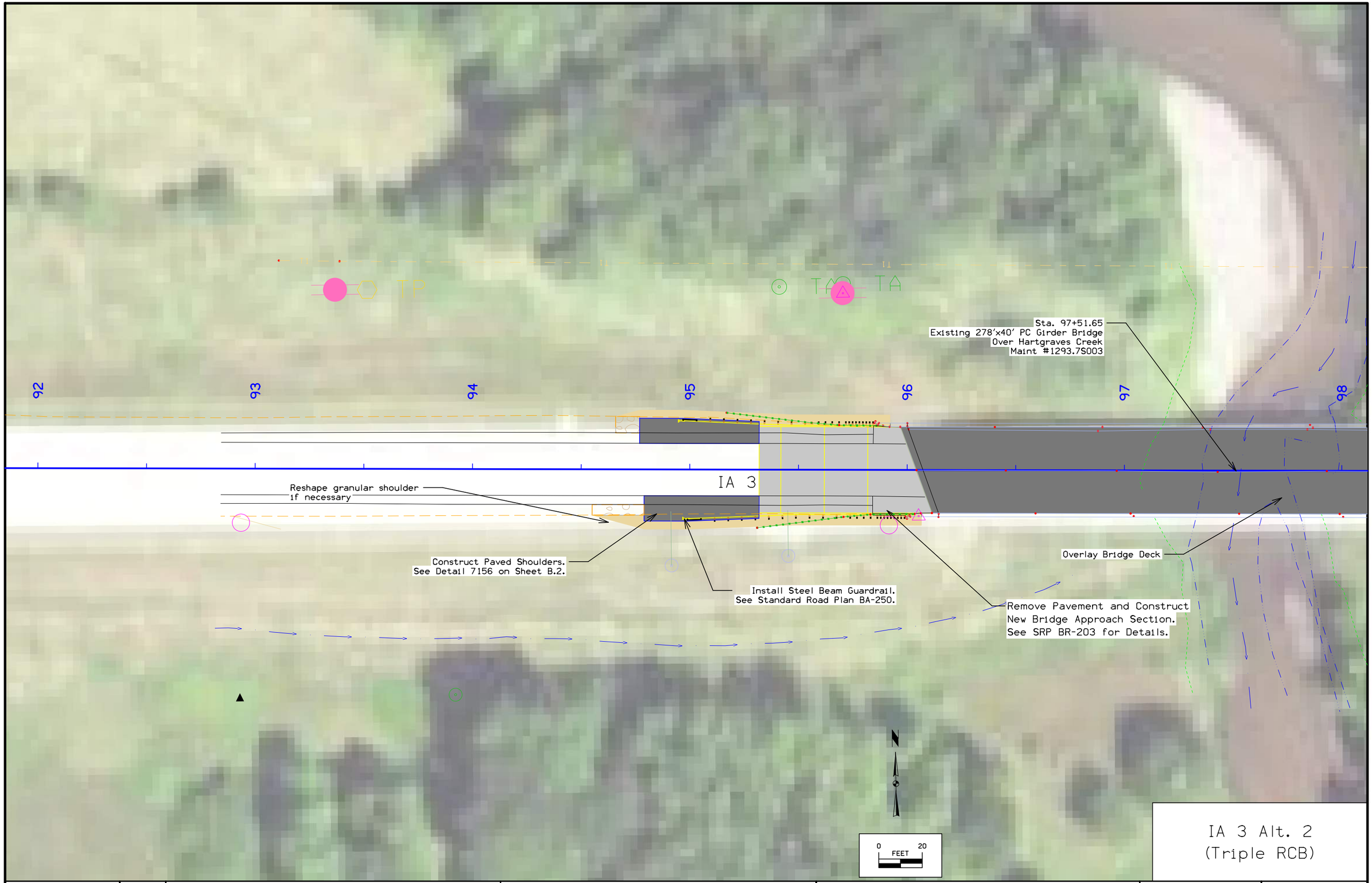
N

0 FEET 20

IA 3 Alt. 1
(Bridge Extension)

FILE NO.	ENGLISH	DESIGN TEAM WHKS & CO.	BUTLER COUNTY	PROJECT NUMBER BRFN-003-5(83)--39-12	SHEET NUMBER D.2

3:50:41 PM 12/8/2021 tberry K:\9371 Iowa DOT On-Call 307BA\00-307BA-Base-IA 3 Over Hartgrave Creek\Roadway\CADD Files\Sheet Files\12003010d01.sht



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3:50:43 PM 12/8/2021 tberry K:\9371 Iowa DOT On-Call 307BA\00-307BA-Base-IA 3 Over Hartgrave Creek\Roadway\CADD Files\Sheet Files\12003010d01.sht

Sta. 97+51.65
Existing 278'x40' PC Girder Bridge
Over Hartgraves Creek
Maint #1293.7S003

Remove Pavement and Construct
New Bridge Approach Section.
See SRP BR-203 for Details.

POT Sta 900+00.00

Sta 901+61.93
PI

97
98
99
100
101
102
901
902

IA 3

Reshape granular shoulder
if necessary

Construct Paved Shoulders.
See Detail 7156 on Sheet B.2.

Install Steel Beam Guardrail.
See Standard Road Plan BA-250.

Overlay Bridge Deck

0 FEET 20

IA 3
(Both Alternatives)

FILE NO.	ENGLISH	DESIGN TEAM	COUNTY	PROJECT NUMBER	SHEET NUMBER D.4

3:50:44 PM 12/8/2021 tberry K:\9371 Iowa DOT On-Call 307BA\00-307BA-Base-IA 3 Over Hartgrave Creek\Roadway\CADD Files\Sheet Files\12003010d01.sht

Relocate Utility Pole.

Relocate Utility Pole.

Relocate Utility Pole.

105 106 107 108 109 110

Sta 107+35.65

PI

POT Sta 208+00.00

208

Remove and Replace Pavement

IA 3

Construct 2 SW-512 24" Beehive Intakes to collect water between road and dike. Water will drain into side of box culvert.

Remove Twin 72"x83' Concrete Pipes; Plug & Abandon if Al. 1 (Bridge Extension) is selected.

Install Triple 12x10x290' Barrel Box Culvert

CEDAR AVE.

SIGN

SIGN

TA

TA

N

0 FEET 20

IA 3 Alt. 1
(Triple RCB)

Begin Construction
Station 105+09.00

982.14

-0.527%

VPI +83.550
Elv 981.75

+0.000%

+0.000%

VPI +70.000
Elv 981.75

-1.317%

VPI +19.270
Elv 981.10

980.96

-0.700%

End Construction
Station 108+39.97

988 986 984 982 980 978 976 974 972 970

105 +20 +40 +60 +80 106 +20 +40 +60 +80 107 +20 +40 +60 +80 108 +20 +40 +60 +80

982.24 982.14 982.13 982.08 982.03 982.03 981.93 981.98 981.82 981.93 981.72 981.87 981.61 981.82 981.51 981.77 981.42 981.75 981.35 981.75 981.29 981.75 981.22 981.75 981.15 981.75 981.11 981.75 981.10 981.75 981.09 981.75 981.08 981.75 981.07 981.75 981.06 981.75 981.06 981.75 981.10 981.75 981.14 981.75 981.17 981.75 981.21 981.75 981.23 981.75 981.21 981.75 981.19 981.75 981.17 981.62 981.16 981.49 981.14 981.35 981.11 981.22 981.07 981.11 981.03 981.03 980.99 980.96 980.96

FILE NO.	ENGLISH	DESIGN TEAM WHKS & CO.	BUTLER COUNTY	PROJECT NUMBER BRFN-003-5(83)--39-12	SHEET NUMBER D.5

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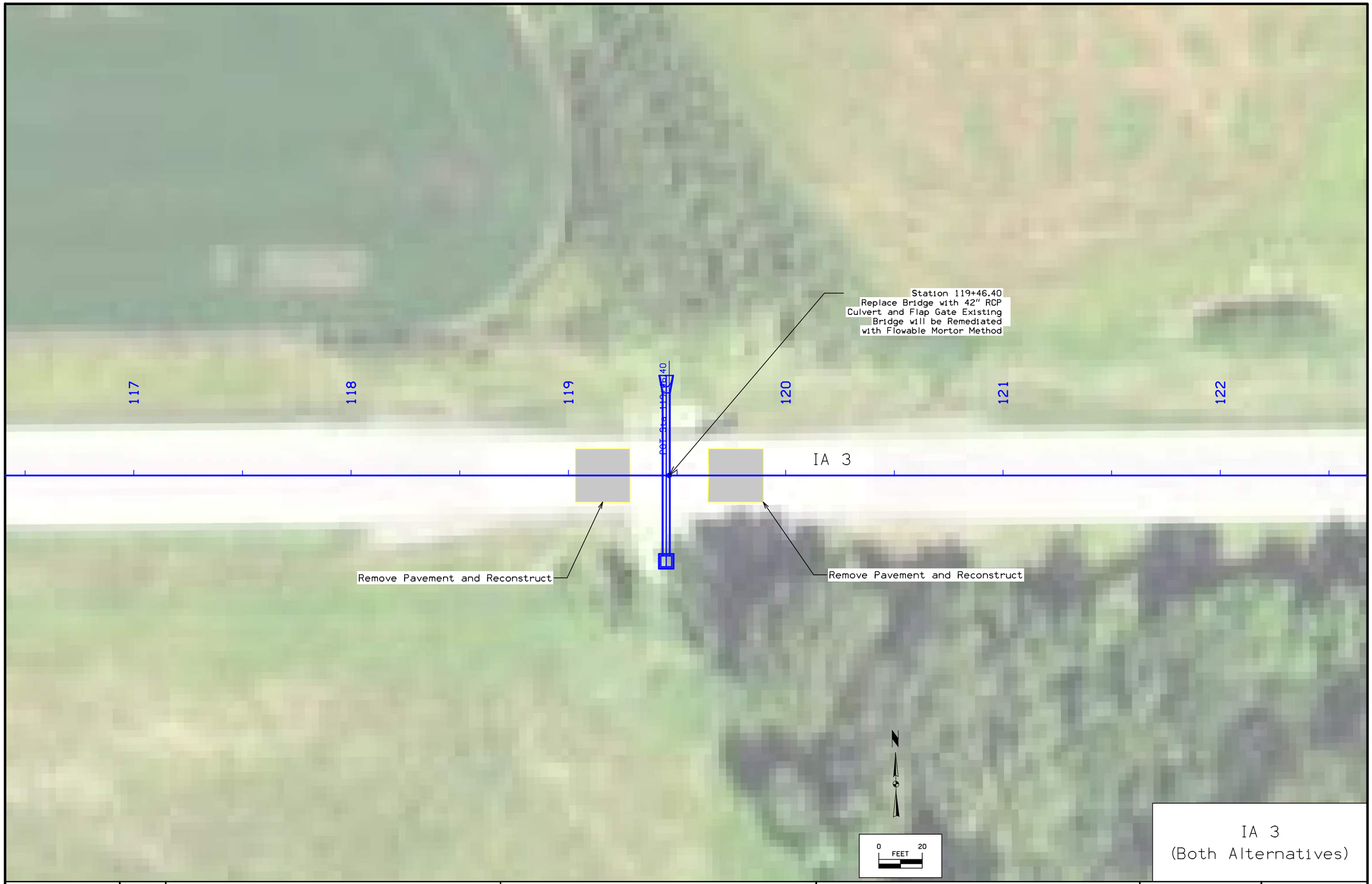


IA 3
(Both Alternatives)

FILE NO.	ENGLISH	DESIGN TEAM WHKS & CO.	BUTLER COUNTY	PROJECT NUMBER BRFN-003-5(83)--39-12	SHEET NUMBER D.6

3:53:07 PM 12/8/2021 tberry K:\9371 Iowa DOT On-Call 307BA\00-307BA-Base-IA 3 Over Hartgrave Creek\Roadway\CADD Files\Sheet Files\12003010d01.sht

Remove Twin 72"x83' Concrete Pipes for Alt. 2 (Triple RCB); Plug & Abandon for Alt. 1 (Bridge Extension).

Install 24"x54' RCP if Alt. 1 (Bridge Extension) is selected.

POT Sta 200+00.00

PI Sta 107+35.65

POT Sta 907+27.09

Cedar Ave.

IA 3

Relocate Utility Pole

Relocate Utility Pole

Relocate Utility Pole

0 FEET 20

Cedar Ave. Alt. 2 (Triple RCB)

980.65

Begin Construction Station 200+73.41

+0.547%

+1.100%

+1.100%

+3.054%

+0.000%

VPI +40.000
Elv 981.02
K = 217
Len 120.00 ft

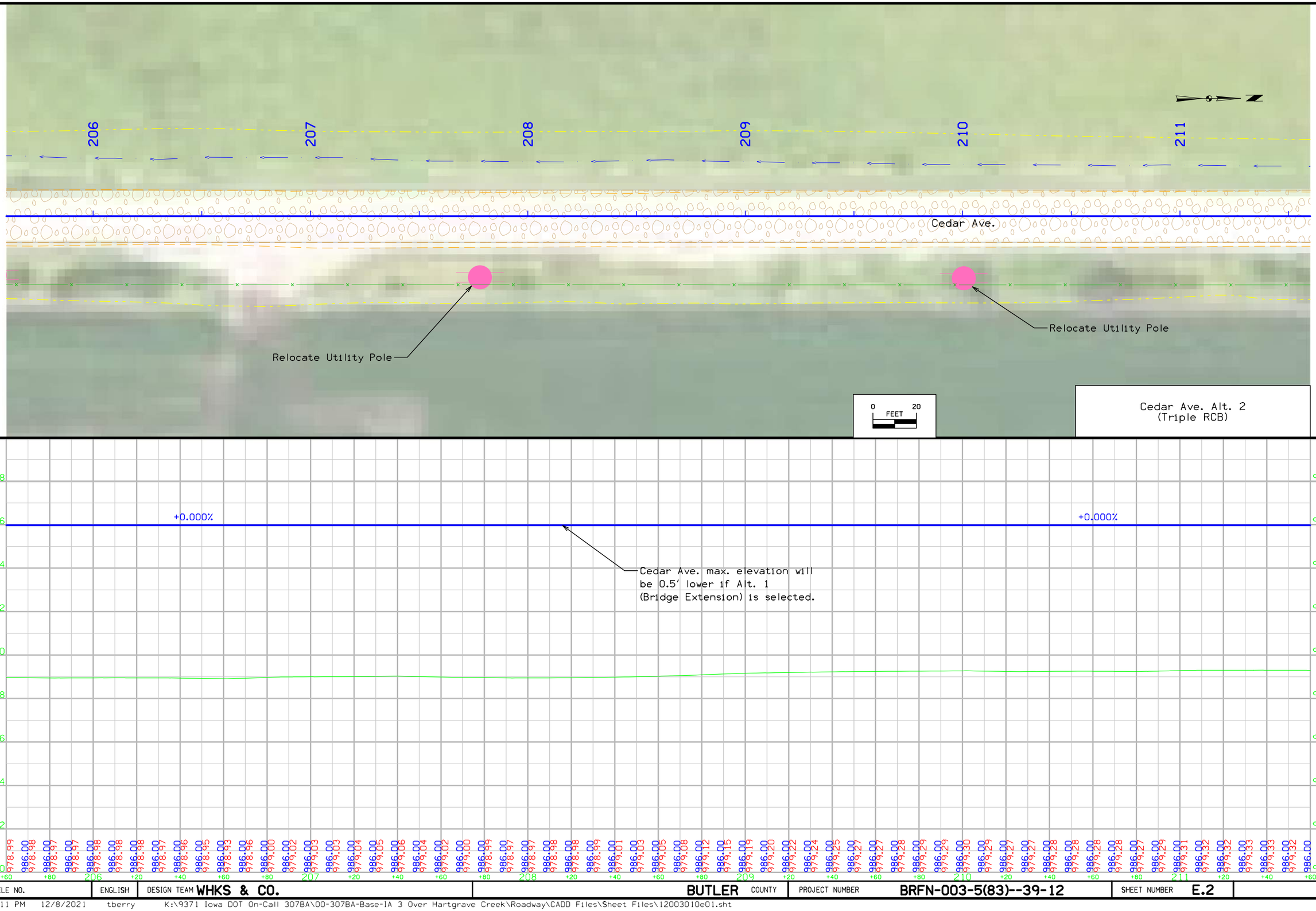
VPI +60.000
Elv 982.34
K = 61
Len 120.00 ft

VPI +80.000
Elv 986.00
SSD = 278'
K = 39
Len 120.00 ft

Cedar Ave. max. elevation will be 0.5' lower if Alt. 1 (Bridge Extension) is selected.

FILE NO.	ENGLISH	DESIGN TEAM WHKS & CO.	BUTLER COUNTY	PROJECT NUMBER BRFN-003-5(83)--39-12	SHEET NUMBER E.1

3:04:08 PM 12/8/2021 tberry K:\9371 Iowa DOT On-Call 307BA\00-307BA-Base-IA 3 Over Hartgrave Creek\Roadway\CADD Files\Sheet Files\12003010e01.sht



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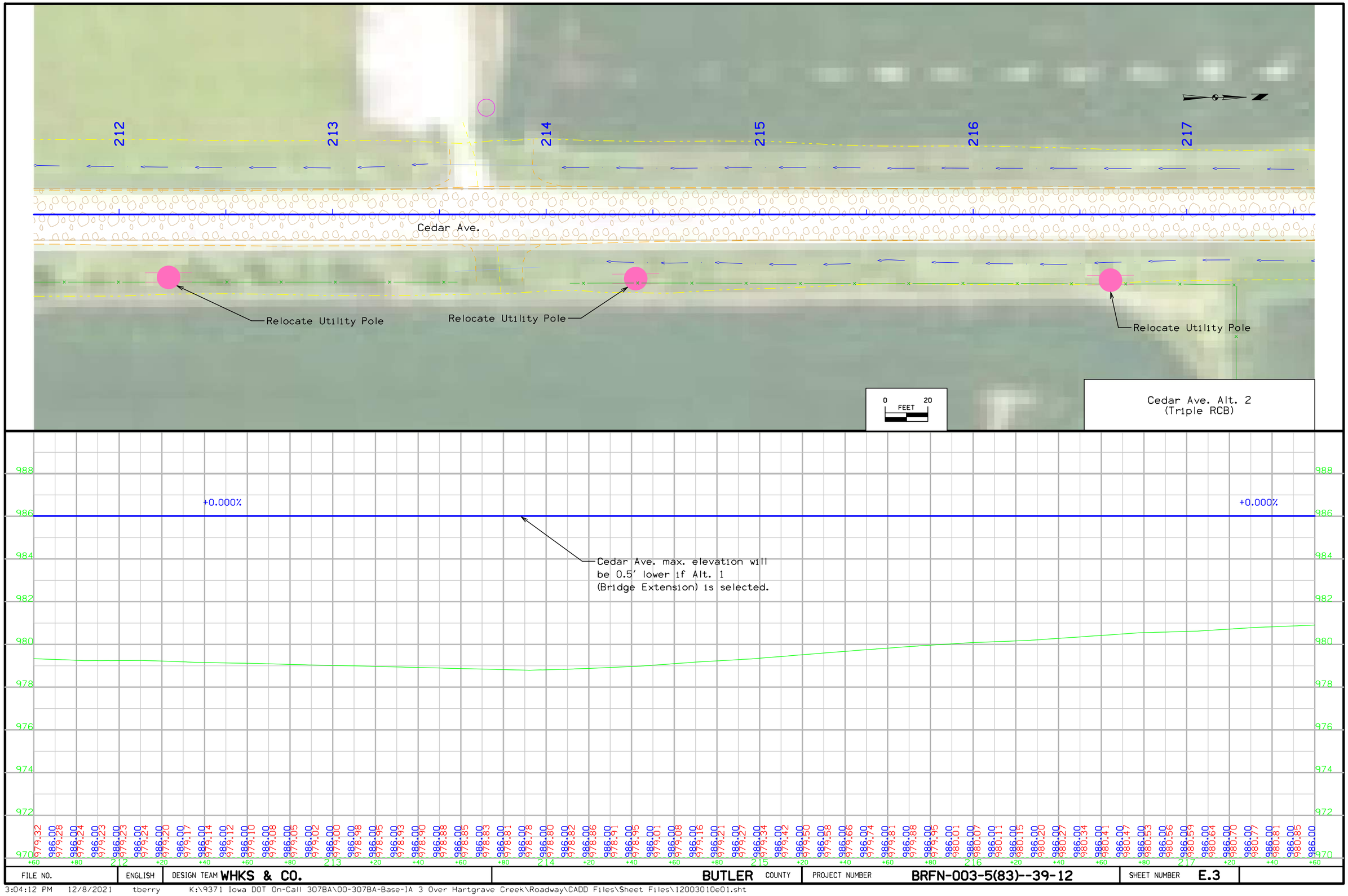

FILE NO.	ENGLISH	DESIGN TEAM WHKS & CO.	BUTLER COUNTY	PROJECT NUMBER BRFN-003-5(83)--39-12	SHEET NUMBER E.3

3:04:12 PM 12/8/2021 tberry K:\9371 Iowa DOT On-Call 307BA\00-307BA-Base-IA 3 Over Hartgrave Creek\Roadway\CADD Files\Sheet Files\12003010e01.sht

Driveway

Cedar Ave.

PI Sta 220+57.91

PT Sta 222+01.63

PC Sta 219+14.14

Curve Data
Δ = 2° 20′ 18.09″ (RT)
T = 143.76
L = 287.49
R = 7,044.20
E = 1.47

Relocate Utility Pole

2 Driveways

Add a dike on the west side of road;
same top elevation as the closure dike;

0 20 FEET

Cedar Ave. Alt. 2
(Triple RCB)

VPI +63.650
Elv 986.00
SSD = 764′
K = 127
Len 120.00 ft

985.57

-0.943%

+1.400%

Cedar Ave. max. elevation will be 0.5′ lower if Alt.1 (Bridge Extension) is selected.

End Construction
Station 220+83.14

Look into moving this VPI south to limit impacts to both driveways

VPI +13.135
Elv 984.59
K = 51
Len 120.00 ft

FILE NO.	ENGLISH	DESIGN TEAM WHKS & CO.	BUTLER COUNTY	PROJECT NUMBER BRFN-003-5(83)--39-12	SHEET NUMBER E.4

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Lot Corner

Relocate Utility Pole

V-Ditch or Flat Bottom Ditch?

Flat Bottom Ditch

Relocate Utility Pole

Relocate Utility Pole

Relocate Utility Pole

PI Sta 901+61.93

PI Sta 904+41.66

POT Sta 900+00.00

100 101 102 103 104 105 106

902 903 904

28:1 18:1 13:1 30:1

IA 3

0 FEET 20

Dike Alt. 2
(Triple RCB)

986.19

985.51

-0.858%

+0.000%

-0.963%

VPI +80.000
Elv 985.50

Begin Dike Construction.
Station 900+00.00

Dike top elevation will be 0.5' lower if Alt. 1 (Bridge Extension) is selected.

Ditch Profile

In an effort to eliminate drainage intakes, try to shallow ditch to bring the ditch grade over the box to the east; Install a beehive intake and pipe across Cedar Ave. - No pipes installed into RCB

988 986 984 982 980 978 976 974 972 970

900 +20 +40 +60 +80 901 +20 +40 +60 +80 902 +20 +40 +60 +80 903 +20 +40 +60 +80 904 +20 +40 +60 +80

FILE NO.	ENGLISH	DESIGN TEAM WHKS & CO.	BUTLER COUNTY	PROJECT NUMBER BRFN-003-5(83)--39-12	SHEET NUMBER E.5

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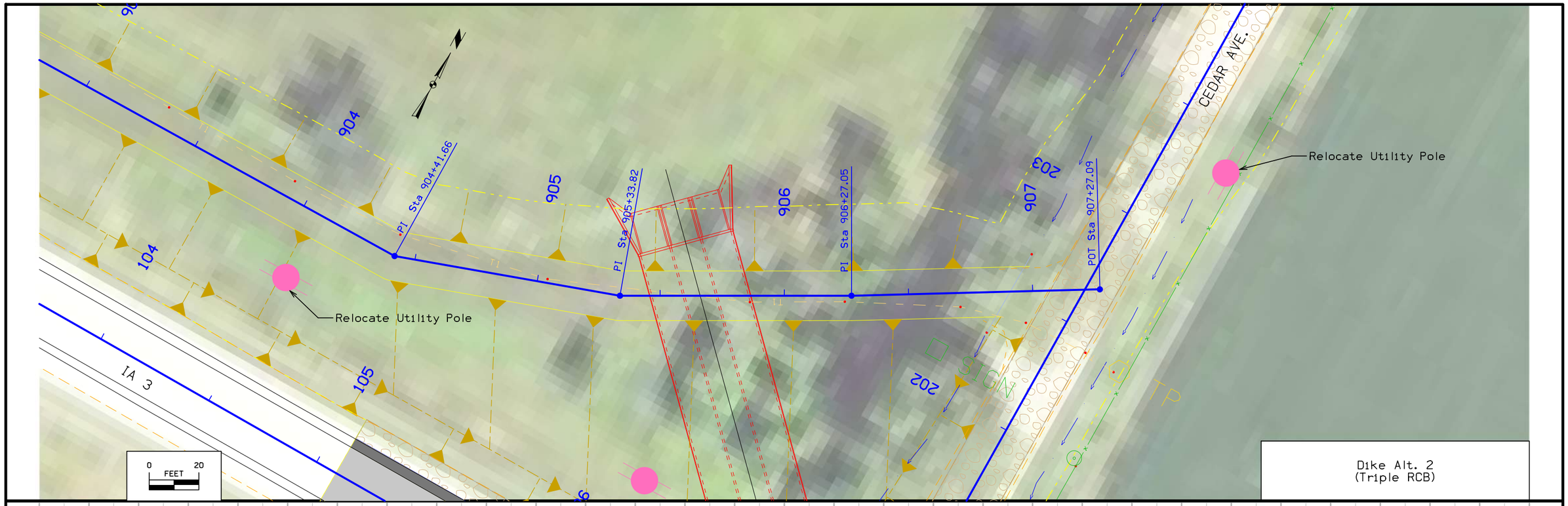

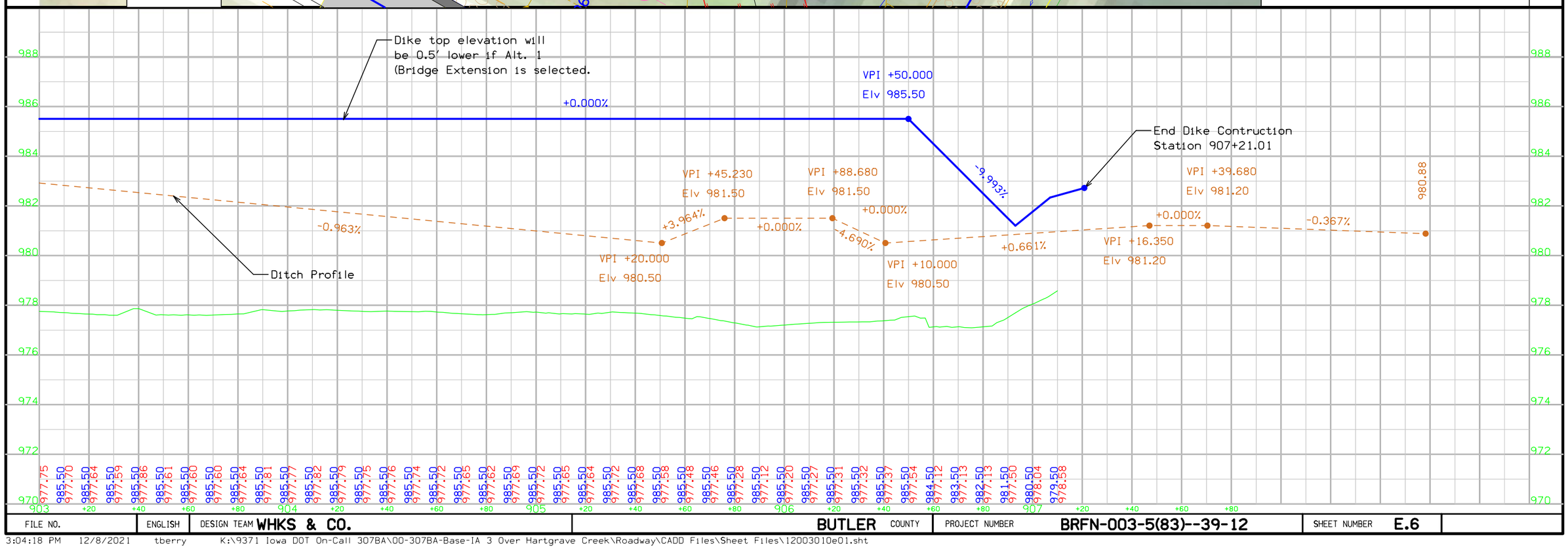

FILE NO.	ENGLISH	DESIGN TEAM WHKS & CO.	BUTLER COUNTY	PROJECT NUMBER BRFN-003-5(83)--39-12	SHEET NUMBER E.6

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Survey Information

Butler County
BRFN-003-5(83)—39-12
Hartgraves Creek Overflow 0.5 mi W of Co Rd T16
Bridge-Unspecified
PIN 19-12-003-010
Sap-588.3

General Information

Measurement units for this survey are US survey feet. This survey is for proposed reconstruction of Iowa Hwy 3 bridge over Hartgraves Creek overflow. Project datum and control information is provided by Design Survey Office. This project is a Full DTM. This survey request was for the Iowa 3 corridor only.

Vertical Control

Vertical datum for this survey is NAVD88 (Computed using Geoid12B). GRS80 Ellipsoidal Height was computed at project control Pts. 105, 171, CP1, CP2, J29, and K29 by conducting three concurrent six-hour static observations. Additional benchmarks were placed throughout the project using a GNSS Base-Rover setup relative to Pt. CP1 and Pt. CP2. Two observations with a minimum of four-hours between were collected and used in a weighted average.

This survey observed 2 NGS Control Monuments with published NAVD88 heights to compare to local ground control:

NGS 2nd. order class 0 benchmark designated J 29 has a published Elev. Of 990.71
Survey Elev. = 990.65

NGS 2nd. order class 0 benchmark designated K 29 has a published Elev. Of 990.54
Survey Elev. = 990.47

This survey observed 2 local area county Control Monuments with published NAVD88 heights to compare to local ground control:

Butler County GPS Control Pt 98-105 has a published Elev. of 998.77
Survey Elev. = 998.74

Butler County GPS Control Pt 171 has a published Elev. of 971.90
Survey Elev. = 971.83

Horizontal Control

The project coordinate system for this survey is Iowa RCS Zone 5 (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. Coordinates were determined by conducting three concurrent six-hour static observations at project control Pts. 105, 171, CP1, CP2, J29, and K29. Additional control points were placed throughout the project using a GNSS Base-Rover setup relative to Pt. CP1 and Pt. CP2. Two observations with a minimum of four-hours between were collected and used in a weighted average.

Alignment Information

The horizontal alignment for this survey is a retrace of As-built Plans Project No. FN-502. Survey stationing was equated to the plan PI at Sta. 107+41.72 and run ahead without equation throughout the survey.

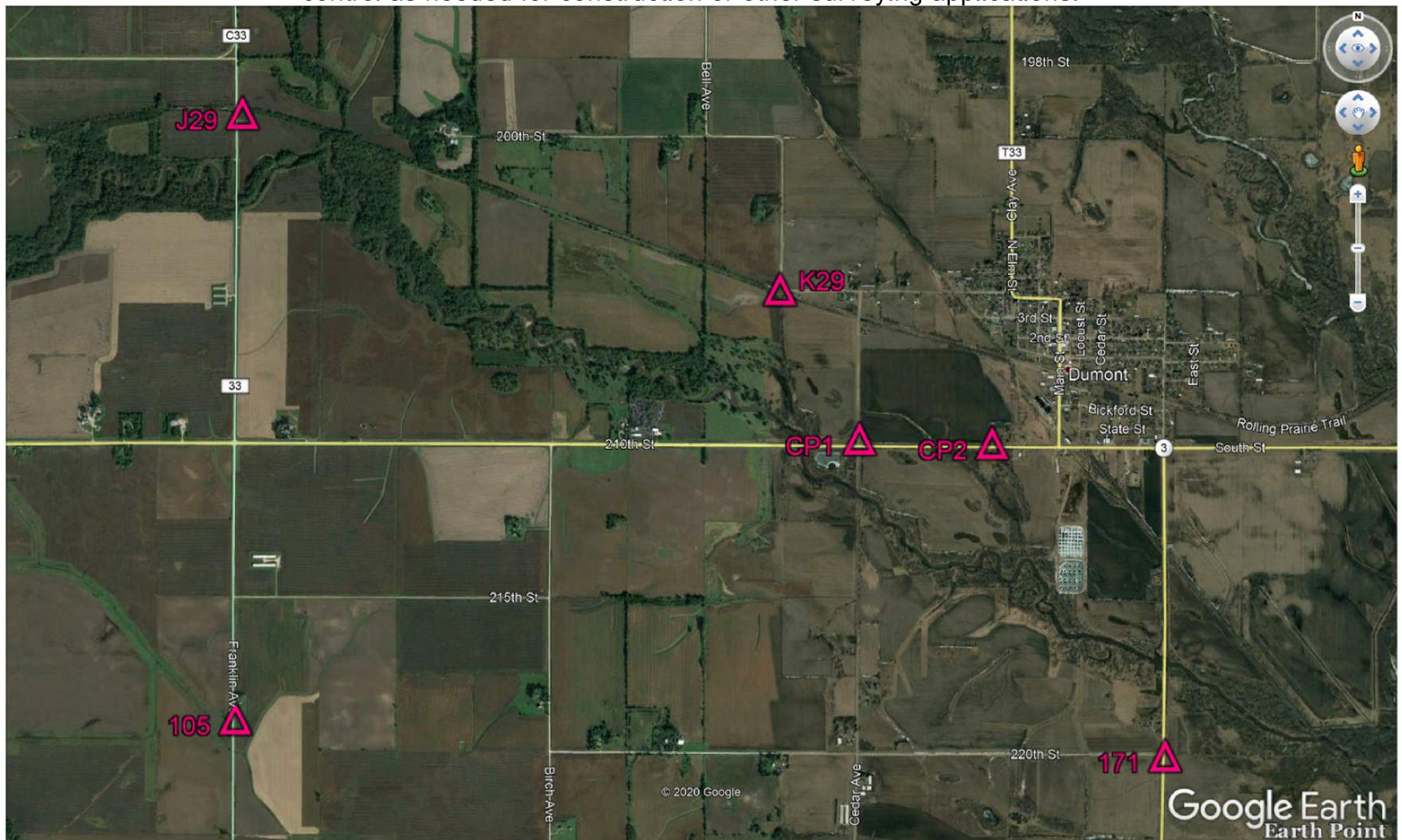
Survey stationing relates to as built plan stationing as follows:

PI Sta. 107+41.72 As-built Plans Project No. FN-502
Survey PI Sta. 107+41.72

PI Sta. 160+08.92 As-built Plans Project No. FN-502
Survey PI Sta. 160+10.44

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 5

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

FILE NO.	ENGLISH	DESIGN TEAM WHKS & CO.	BUTLER COUNTY	PROJECT NUMBER BRFN-003-5(83)--39-12	SHEET NUMBER G.2

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HORIZONTAL AND VERTICAL PROJECT CONTROL COORDINATE LISTING

HORIZ. DATUM: NAD83(2011) EPOCH 2010.00

VERT. DATUM: NAVD88

Ia. Regional Coordinate System Zone 5

Project Control Marks are Benchmarks

Point Name	North Coordinate	East Coordinate	Elevation	Feature Code-Monument Description
CP1	8935600.139	15302339.89	977.01	CP FND IDOT ROW RAIL DRILLED HOLE IN BALL_RAIL IS 107 FT N OF CTR IA HWY 3_38 FT E OF CTR CEDAR AVE_512 FT S OF CTR FIELD ENT
CP2	8935506.222	15304635.7	976.92	CP FND IDOT ROW RAIL DRILLED HOLE IN BALL_RAIL IS 60 FT N OF CTR IA HWY 3_304 FT W OF CTR DRIVE ENT_85 FT ENE OF POW POLE
J29	8941284.354	15291757.55	990.65	CP FND USC&GS BM J29_MON IS 50 FT S OF CTR ROLLING PRAIRIE TRAIL_101 FT E OF CTR FRANKLIN AVE_157 FT NE OF CTR OF FLD ENT
K29	8938176.729	15300994.8	990.47	CP FND USC&GS BM K29_MON IS 48 FT N OF CTR ROLLING PRAIRIE TRAIL_107 FT S OF CTR CEDAR AVE_16 FT E OF ROW RAIL
105	8930888.341	15291547.78	998.74	CP FND BUTLER CO GPS CNTRL POINT 98-105 SOUTH 0.9MI OF IOWA HWY 3 AND EAST 42FT OF FRANKLIN AVE
171	8930104.231	15307574.09	971.83	CP FND BUTLER CO GPS CNTRL POINT 171 IN SE QUAD OF DOUGLAS AVE AND 220TH ST 34FT EAST OF PVMNT EDGE AND 33FT SOUTH OF ENTRANCE_171 REPLACES BUTLER CO GPS CNTRL POINT 98-113

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)
MLOO3W																			
Point 21		54+54.30	8,935,565.055	15,297,028.290															
Point 22		107+36.65	8,935,479.194	15,302,308.942															
Point 23		119+46.40	8,935,461.975	15,303,519.570															
Point 24		160+06.40	8,935,404.237	15,307,579.159															
MLCEDAR																			
Point MLCEDAR1		200+00.00	8,935,427.937	15,302,308.819															
MLCEDAR_3								219+14.14	8,937,342.014	15,302,324.867	220+57.91	8,937,485.773	15,302,326.072	222+01.63	8,937,629.363	15,302,333.142			
MLDIKEBOX																			
MLDIKEBOX1		900+00.00	8,935,514.937	15,301,629.424															
MLDIKEBOX3		901+61.93	8,935,571.501	15,301,781.155															
MLDIKEBOX5		904+41.66	8,935,570.849	15,302,060.887															
MLDIKEBOX7		905+33.82	8,935,600.512	15,302,148.137															
MLDIKEBOX9		906+27.05	8,935,645.378	15,302,229.863															
MLDIKEBOX10		907+27.09	8,935,695.759	15,302,316.288															

SPIRAL OR CIRCULAR CURVE DATA

101-17
04-19-11

Name	Location	Δ_{scs}	Horizontal Alignment Data													Remarks
			Spiral Data								Curve Data					
			θs	Ls	Ts	Es	Xc	Yc	L.T.	S.T.	Δ_c	T	L	R	E	
MLCEDAR_3											2° 20′ 18.1″ RT	143.764′	287.468′	7,044.195′	1.467′	

Iowa Department of Natural Resources

Iowa Department of Natural Resources

Triple RCB Culvert

Bridge Extension

IA 3

Existing Bridge

Iowa Department of Natural Resources

Butler County

0 100
FEET

All Alternatives Shown

FILE NO.	ENGLISH	DESIGN TEAM WHKS & CO.	BUTLER COUNTY	PROJECT NUMBER BRFN-003-5(83)--39-12	SHEET NUMBER H.1

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David J. Schuster

74

49

50

20

IA 3

Overflow Bridge to be Removed
for Both Alternatives

31

32

33

30

Cedar Ave.

NW CORNER
SEC 33-92-18
FOUND SURVEY MARK NAIL/
IDOT WSR NEAR ℄

Parking Lot for Public
Hunting in the area

Iowa Department of Natural Resources

0 100
FEET

All Alternatives
Shown

PART OF

FILE NO.	ENGLISH	DESIGN TEAM WHKS & CO.	BUTLER COUNTY	PROJECT NUMBER BRFN-003-5(83)--39-12	SHEET NUMBER H.2

10:34:38 AM 12/8/2021 tberry K:\9371 Iowa DOT On-Call 307BA\00-307BA-Base-IA 3 Over Hartgrave Creek\Roadway\CADD Files\Sheet Files\12003010h01.sht

SE $^{1}/_{4}$ SE $^{1}/_{4}$
SEC 29-92-18
FOUND $^{1}/_{2}$ REBAR
CENTER OF CEDAR AVE

Dennis & Janice Peterson

Parking Lot for Public land in the area

Iowa Department of Natural Resources

Cedar Ave.

Raise Profile Grade of County Road

Bryce R Borneman

David J. Schuster

Justin D Buseman

0 100
FEET

All Alternatives Shown

FILE NO.	ENGLISH	DESIGN TEAM WHKS & CO.	BUTLER COUNTY	PROJECT NUMBER BRFN-003-5(83)--39-12	SHEET NUMBER HE.1

10:34:39 AM 12/8/2021 tberry K:\9371 Iowa DOT On-Call 307BA\00-307BA-Base-IA 3 Over Hartgrave Creek\Roadway\CADD Files\Sheet Files\12003010h01.sht

108-23A
08-01-08

TRAFFIC CONTROL PLAN

This project will utilize a full road closure utilizing the Standard Road Plans listed in Tab. 105-4 on Sheet C.X during construction. EB & WB traffic on IA 3 will be detoured around the project. The detour route is as follows:

EB Detour: Traffic will travel North on Timber Ave. (6.2 miles West of the project) from IA 3 to 190th St. for 4.5 miles. Then travel East to Tulip Ave. for 0.5 miles. Then travel North to County Road C23 for 2 miles. Then travel East to Clay Ave. for 6 miles. Then travel South to Broadway St. in Dumont for 5.6 miles. Then travel East to Main St. for 0.1 miles. Then travel South to IA 3 for 0.5 miles. Total detour length is 19.2 miles. Refer to Detour Route Details on Sheet J.2 for details and sign locations.

WB Detour: Traffic will travel North on Main St. from IA 3 to Broadway St. in Dumont for 0.5 miles. Then travel West to Clay Ave. for 0.1 miles. Then travel North to County Road C23 for 5.6 miles. Then travel West to Tulip Ave. for 6 miles. Then travel South to 190th St. for 2 miles. Then travel West to Timber Ave. for 0.5 miles. Then travel South to IA 3 for 4.5 miles (6.2 miles West of the project). Total detour length is 19.2 miles. Refer to Detour Route Details on Sheet J.2 for details and sign locations.

Installation, maintenance, and removal of detour signage shall be the responsibility of the Contractor.

Project Location

Detour Route

Franklin County

Butler County

POP. 1172

CHAPIN

POP. 74

AREDALE

POP. 4461

HAMPTON

POP. 98

HANSELL

DUMONT

BRISTOW

PILOT ROCK

HAMPTON MUNICIPAL AIRPORT

West Fork Cedar River

Hargrave Creek

ROSS

WESTFORK

BENNEZETTE

COLD

OTTINGHAM

PITTSFORD

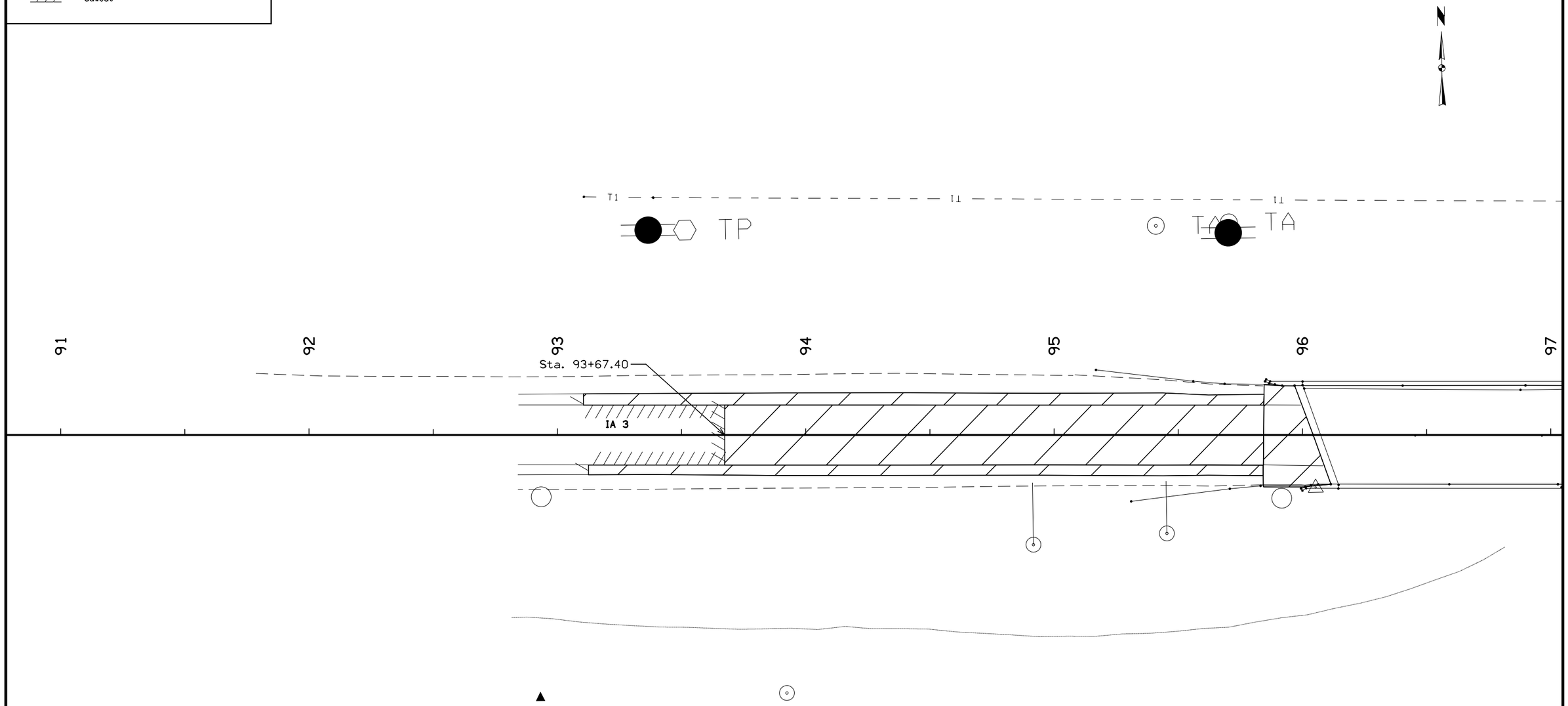
POPE

FILE NO.	ENGLISH	DESIGN TEAM WHKS & CO.	BUTLER COUNTY	PROJECT NUMBER BRFN-003-5(83)--39-12	SHEET NUMBER J.2

10:03:36 AM 12/8/2021 tberry K:\9371 Iowa DOT On-Call 307BA\00-307BA-Base-IA 3 Over Hartgrave Creek\Roadway\CADD Files\Sheet Files\12003010j01.sht

PAVEMENT REMOVAL

Sawcut



0 FEET 20

Removal Plans Alt. 1
(Bridge Extension)

FILE NO.	ENGLISH	DESIGN TEAM WHKS & CO.	BUTLER COUNTY	PROJECT NUMBER BRFN-003-5(83)--39-12	SHEET NUMBER U.1	

9:59:00 AM 12/8/2021 tberry K:\9371 Iowa DOT On-Call 307BA\00-307BA-Base-IA 3 Over Hartgrave Creek\Roadway\CADD Files\Sheet Files\12003010u01.sht

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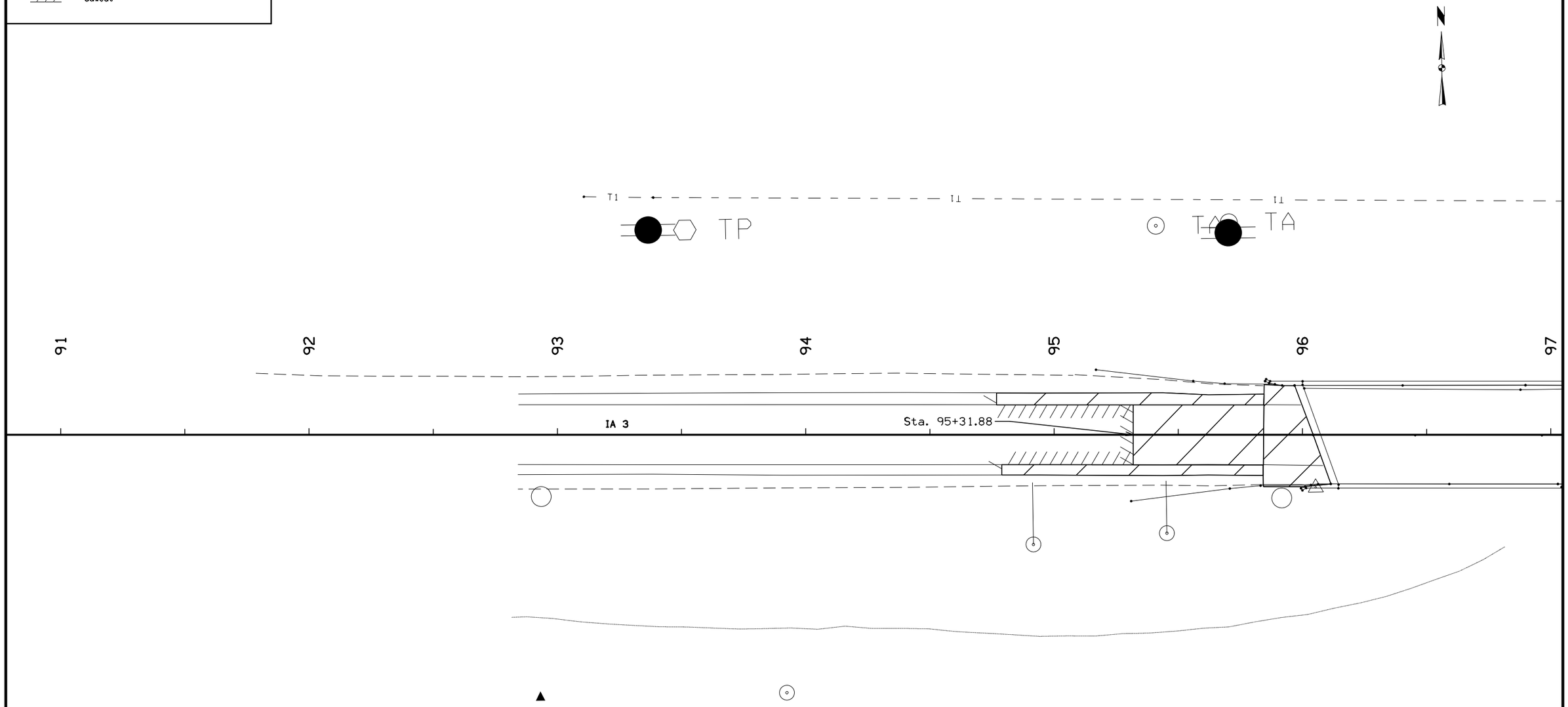

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Removal Plans Alt. 2
(Triple RCB)

FILE NO.	ENGLISH	DESIGN TEAM WHKS & CO.	BUTLER COUNTY	PROJECT NUMBER BRFN-003-5(83)--39-12	SHEET NUMBER U.1

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PAVEMENT REMOVAL

Sawcut

TP

TA

TA

Station 99+92.35

IA 3

Pot Sta 901+61.93

Pot Sta 900+00.00

902

106

97

98

99

100

101

102

103

T1

0 FEET 20

Removal Plans
Both Alternatives

FILE NO.	ENGLISH	DESIGN TEAM WHKS & CO.	BUTLER COUNTY	PROJECT NUMBER BRFN-003-5(83)--39-12	SHEET NUMBER U.2

9:59:02 AM 12/8/2021 tberry K:\9371 Iowa DOT On-Call 307BA\00-307BA-Base-IA 3 Over Hartgrave Creek\Roadway\CADD Files\Sheet Files\12003010u01.sht

PAVEMENT REMOVAL

Sawcut

Remove Twin 72"x83' Concrete Pipes

Sta. 105+09.00

Sta. 108+39.97

PI Sta 904+41.66

PI Sta 905+32.82

PI Sta 107+35.65

POT Sta 200+00.00

SIGN

SIGN

SIGN

TA

TA

IA 3

0 FEET 20

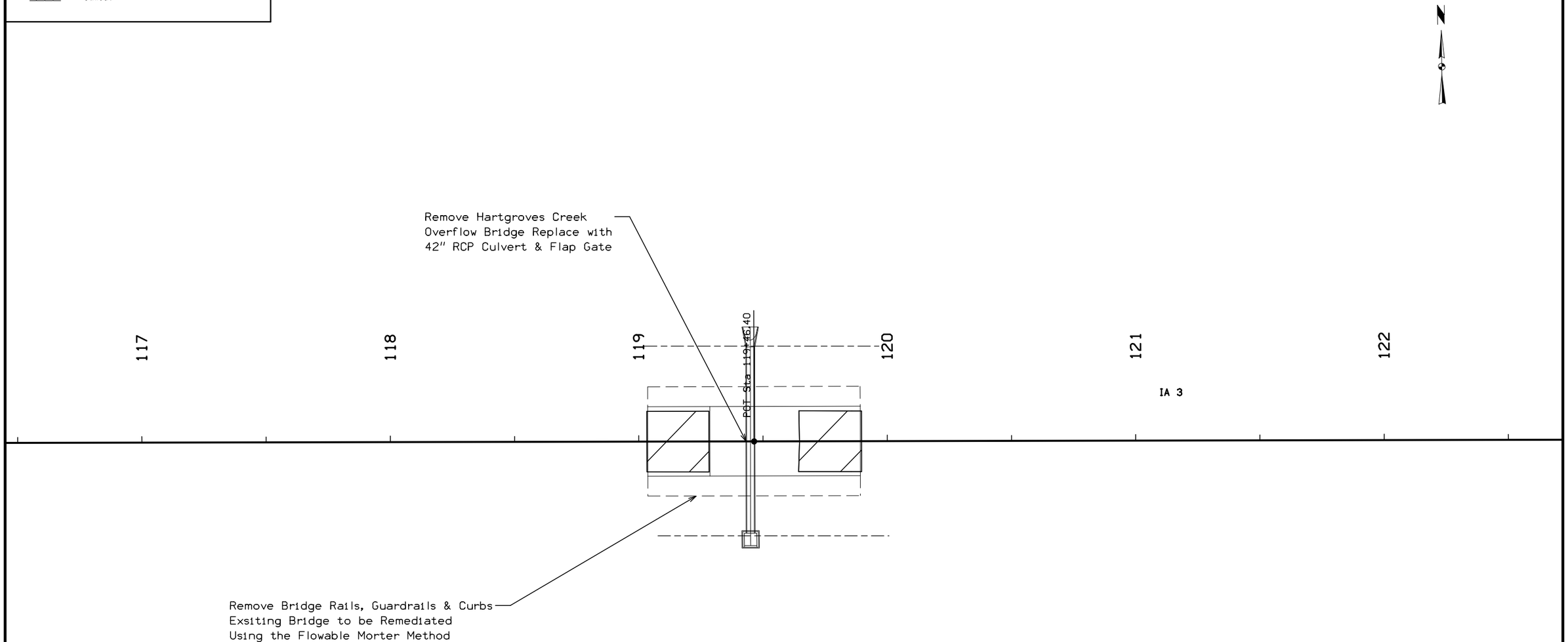
Removal Plans Alt. 2
(Triple RCB)

FILE NO.	ENGLISH	DESIGN TEAM WHKS & CO.	BUTLER COUNTY	PROJECT NUMBER BRFN-003-5(83)--39-12	SHEET NUMBER U.4

9:59:04 AM 12/8/2021 tberry K:\9371 Iowa DOT On-Call 307BA\00-307BA-Base-IA 3 Over Hartgrave Creek\Roadway\CADD Files\Sheet Files\12003010u01.sht

PAVEMENT REMOVAL

Sawcut



0 FEET 20

Removal Plans
(Both Alternatives)

FILE NO.	ENGLISH	DESIGN TEAM WHKS & CO.	BUTLER COUNTY	PROJECT NUMBER BRFN-003-5(83)--39-12	SHEET NUMBER U.5

9:59:06 AM 12/8/2021 tberry K:\9371 Iowa DOT On-Call 307BA\00-307BA-Base-IA 3 Over Hartgrave Creek\Roadway\CADD Files\Sheet Files\12003010u01.sht

Raise Profile Grade
of County Road

CEDAR AVE.

Closure Dike

Bridge Extension

Existing Bridge

Closure Dike

IA 3

Plug and Abandon
Twin 72" RCPs

0 FEET 50

Plan View Alt. 1
(Bridge Extension)

FILE NO.	ENGLISH	DESIGN TEAM WHKS & CO.	BUTLER COUNTY	PROJECT NUMBER BRFN-003-5(83)--39-12	SHEET NUMBER U.6

9:56:38 AM 12/8/2021 tberry K:\9371 Iowa DOT On-Call 307BA\00-307BA-Base-IA 3 Over Hartgrave Creek\Roadway\CADD Files\Sheet Files\12003010u01.sht

Raose Profile Grade of County Road

Is anything needed for stream mitigation in this area? It appeared the stream has not been meandering recently

Closure Dike

Existing Bridge

Culvert for Local Drainage

CEDAR AVE.

IA 3

Remove Twin 72" RCPs

This parking lot would likely need to be relocated with this alternate

N

0 50 FEET

Plan View Alt. 2 (Triple RCB)

FILE NO.	ENGLISH	DESIGN TEAM WHKS & CO.	BUTLER COUNTY	PROJECT NUMBER BRFN-003-5(83)--39-12	SHEET NUMBER U.7

9:56:41 AM 12/8/2021 tberry K:\9371 Iowa DOT On-Call 307BA\00-307BA-Base-IA 3 Over Hartgrave Creek\Roadway\CADD Files\Sheet Files\12003010u01.sht