BRIDGE REPLACEMENT

BRFN-218-7(239)--39-07

LETTING DATE 11/21/2023

BLACKHAWK COUNTY

INDEX OF SHEETS	
No.	DESCRIPTION
A Sheets	**Title Sheets**
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A.3 - 7	Project Concept
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B Sheets	**Typical Cross Sections and Details**
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D Sheets	**Mainline Plan and Profile Sheets**
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J Sheets	**Traffic Control and Staging Sheets**
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J.1	Staging Notes Stage
J.1	511 Travel Restrictions
* J.2	Staging Typical Sheet
	* Color Plan Sheets

~~V Sheets~~ Bridge Sheets
V.1-2 Prelim TSL
~~X~~ Sheets Cross Sections
~~X~~.1-2 Mainline Cross Sections

SCHEDULE

BO	1/29/2021	✓
D1	6/18/2021	✓
D2	8/20/2021	
B1	12/17/2021	
D5	1/14/2022	

Two words

IOWA DOT

Highway Division

PLANS OF PROPOSED IMPROVEMENT ON THE

PRIMARY ROAD SYSTEM

BLACKHAWK COUNTY

BRIDGE REPLACEMENT

Replacement of the US 218 Bridge Over Mud Creek, ~~8.4 mi. South of the junction with I-380.~~

0.9 mi. North of Co. Rd. D46

SCALES: As Noted

Refer to the Proposal Form for list of applicable specifications.

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

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

NO MILEAGE SUMMARY

REVISIONS

TOTAL
PROJECT IDENTIFICATION NUMBER
BRFN-218-7(239)--39-07
PROJECT NUMBER
19-07-218-010
R.O.W. PROJECT NUMBER

ATTENDEES

Nick Humpal - IDOT
Jim Ellis - IDOT
Kevin Smith - IDOT
Barry Thede - IDOT
Jake Shaw - WHKS
Scott Sweet - WHKS

For Project Location Map Refer to Sheet A.2

2017 AADT 3800

DESIGN DATA RURAL		
2018 AADT	3670	V.P.D.
2038 AADT	4260	V.P.D.
20-- DHV	--	V.P.H.
TRUCKS	6	%
Total Design ESALs	--	

INDEX OF SEALS		
SHEET NO.	NAME	TYPE
A.1	Tanner John Clevenger	Primary Signature Block
X	X	X

LICENSED PROFESSIONAL ENGINEER TANNER J. CLEVENGER 25740 IOWA

I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly licensed Professional Engineer under the laws of the State of Iowa.

Signature Tanner John Clevenger Date

Printed or Typed Name

My license renewal date is December 31, 2022

Pages or sheets covered by this seal: A.1-A.9, B.1-B.2, D.1-D.3, J.1-J.2.

FIELD EXAM

FIELD EXAM HELD 8/12/2021

Design No. 224
File No. 31941

FILE NO. 31941	ENGLISH	DESIGN TEAM WHKS & CO.	BLACKHAWK COUNTY	PROJECT NUMBER BRFN-218-7(239)--39-07	SHEET NUMBER A.1

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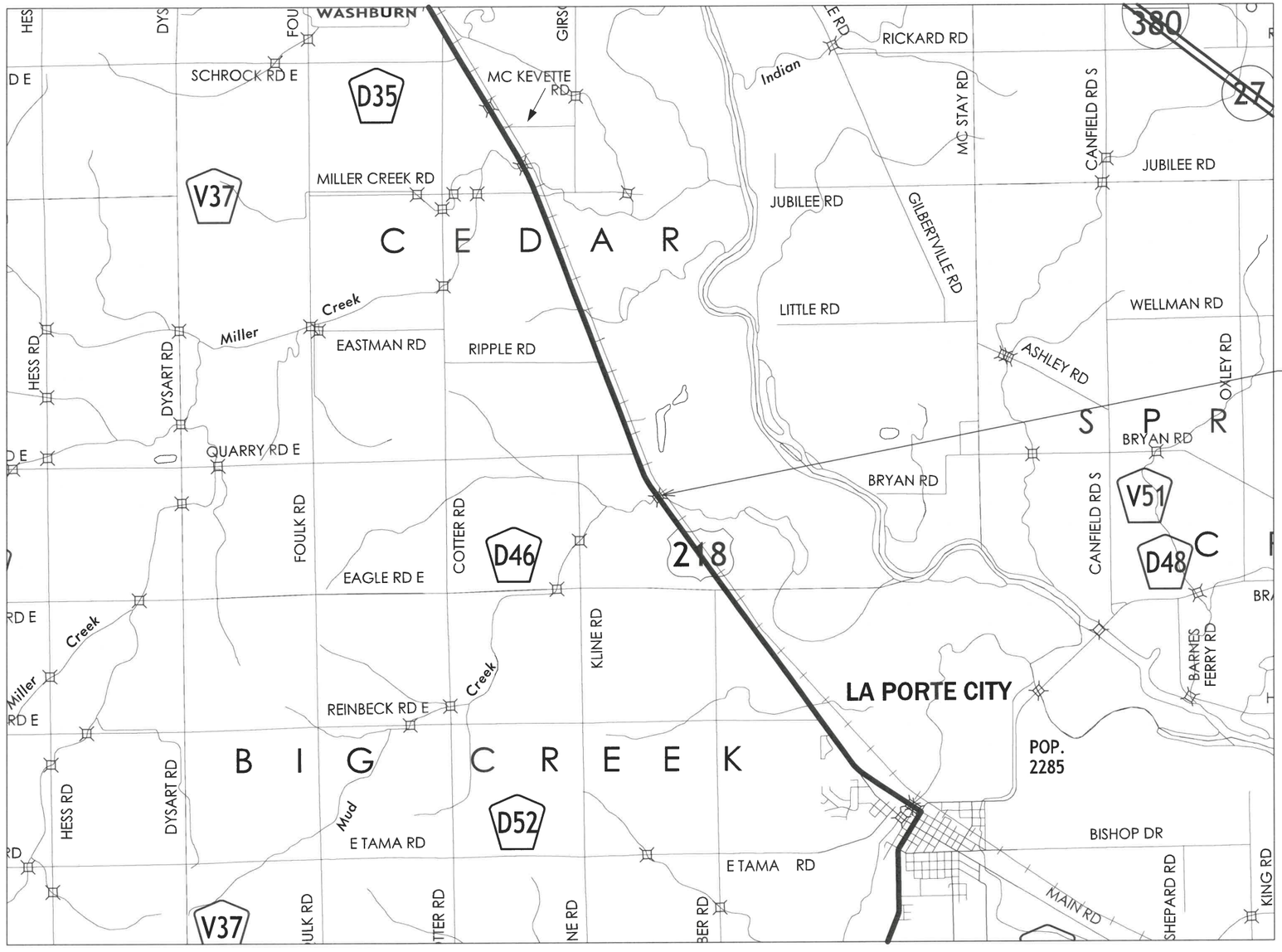

No Comments

Design No. 224
File No. 31941

FILE NO. 31941	ENGLISH	DESIGN TEAM WHKS & CO.	BLACKHAWK COUNTY	PROJECT NUMBER BRFN-218-7(239)--39-07	SHEET NUMBER A.2

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4-96

IOWA DEPARTMENT OF TRANSPORTATION

To Bridges and Structures Bureau

Attention Dave Mulholland, P.E.

From WHKS & Co.

Subject Project Concept Statement (B0)

Date March 17, 2021

Ref No. Black Hawk County
BRFN-218-7(239)--39-07
PIN 19-07-218-010
Design No. 224
File No. 31941
FHWA No. 014800

Project Information: This project involves the removal and replacement of the US 218 bridge over Mud Creek in Black Hawk County. The bridge is a 110' x 28' Continuous Concrete Slab Bridge built in 1952 (Des. 1051).

Site Visit: A site visit took place on 7/23/2020 by Jaremy Kotta, Tanner Clevenger, and Calvin Martin of WHKS. Others in attendance include Kevin Smith and Jacob Page of the District.

Discussion: The bridge was originally programmed and concepted for a bridge deck overlay project. At the District 2 annual needs meeting on 11/4/2020 it was decided to replace the bridge with a Triple 12' x 10' Reinforced Box Culvert. A final concept dated 11/23/2020 was prepared with a development estimate of $1,222,000 for the RCB culvert replacement. Upon further review, it was determined to re-concept the project for a bridge replacement utilizing a Continuous Concrete Slab Bridge to reduce ROW and Railroad impacts and allow the option for staged construction.

This project is currently programmed to be let on 11/21/2023 at a cost of $450,000. The Bridges and Structures Bureau will coordinate plan preparation with assistance from the Design Bureau. WHKS will obtain survey, perform hydraulic analysis, and perform preliminary design through the D5 event.

The Project Concept Statement is attached.

JJS/SSS

Distributed to:
Jon Ranney, District 2
Nick Humpal, District 2
Randy Taylor, District 2
Roy Gelhaus, District 2
Kevin Smith, District 2
Roger Burns, District 2
Charlie Purcell, Project Delivery
Dave Lorenzen, Systems Operations
Michael Kennerly, Design
Kent Nicholson, Design
Stuart Nielson, Design
Dan Harness, Design
Dung Ta, Design
Shawn Majors, Program Management
Mark A Swenson, Project Scheduling
Jeremey Vortherms, Project Management

DeeAnn Newell, Location and Environment
Mary Kay Solberg, Location and Environment
Brad Azeltine, Location and Environment
Valerie Brewer, Location and Environment
Terri Abbett, Location and Environment
Brandon Walls, Location and Environment
Brennan Dolan, Location and Environment
Kenneth Brink, Location and Environment
James Nelson, Bridges and Structures
Mike Nop, Bridges and Structures
David Evans, Bridges and Structures
Scott Neubauer, Bridges and Structures
David Claman, Bridges and Structures
Ronald Meyer, Bridges and Structures
Josh Opheim, WHKS & Co.
Curtis Carter, Construction and Materials
Jesse Peterson, Construction and Materials
Kelly Popp, Document Services
Clayton Burke, Construction and Materials
Dan Sprengeler, Traffic and Safety
Willy Sorenson, Traffic and Safety

Reviewed - No Comments

Design No. 224
File No. 31941

DRAFT PROJECT CONCEPT STATEMENT

US 218 over Mud Creek
Black Hawk County
BRFN-218-7(239)--39-07
PIN 19-07-218-010
Maint. No. 0770.1S218
Design No. 224
File No. 31941
FHWA No. 014800
Project Directory No. 0721801019

Submitted by: WHKS & Co.
Date March 17, 2021

I. STUDY AREA

A. Project Description
This project involves the removal and replacement of the US 218 bridge over Mud Creek in Black Hawk County. The bridge is a 110' x 28' Continuous Concrete Slab Bridge located 0.9 miles north of County Road D46.

B. Existing Bridge Condition
The bridge location map and asset information can be viewed in SIIMS using the following link:
https://siims.iowadot.gov/InspectTech/bridgedetail.aspx?type=0&as_id=70611

The bridge was constructed in 1952 (Des. No. 1051).

The curbs are 3'-5 wide and 10" tall at the gutterline. The cast in place retrofit barrier rails are 10" wide, 2'-10 above the gutterline and were installed in 2001 (Des. No. 401). The end sections are 2'-10 above the gutterline. Both the barrier rails and end sections meet current standards. Numerous PC patches were performed on the curbs in 1996, but many have begun to fail. There are additional sections of the curb that have deteriorated and spalled exposing reinforcing.

The deck is PC concrete with no previous overlay. The top of the deck has full depth longitudinal cracks and PC concrete patches that have begun to fail. The bottom of the deck has numerous longitudinal and diagonal cracks with leaching and considerable map cracking.

Both ends of the bridge have CF joints and have been completely covered by asphalt. The asphalt covering the joints is considerably deteriorated.

Both abutments have areas of severe deterioration, delamination, heavy leaching and section loss. PC concrete patches were placed on both west wing walls in 1996 and are starting to fail. The east corner of the SE abutment has minor undermining. The berm at both corners of both abutments has been eroded away.

C. Existing Roadway Conditions
The existing highway is a 2-lane, 28-foot wide roadway with 3' granular shoulders, posted at 55 mph.

The NW HMA approach is in poor condition. The pressure relief joint is located 153.5' NW of the bridge. The SE HMA approach is in poor condition. The pressure relief joint is located 105' SE of the bridge.

There are steel guardrails located at all four of the bridge's corners. All guardrails fail to meet current height standards.

D. Traffic Estimates
The 2016 ADT is 3,940 vehicles per day with 7% of those being trucks.

E. Additional Information
An asbestos inspection was completed in 2019 and none was found.

II. PROJECT CONCEPT

A. Hydrologic and Hydraulic Analysis
Backwater and freeboard will be analyzed to meet the State of Iowa allowable criteria. The drainage area does not meet the size threshold for requiring an Iowa DNR floodplains permit. Drainage area will be obtained using StreamStats.

The crossing is in a FEMA Zone A FIS area. Bridge sizing and configuration to be based upon the 50-year and 100-year discharges. Standard State of Iowa allowable criteria include 3-ft freeboard and 1.5-ft backwater for the 100-yr, however, such criteria are for drainage area of bridges at or above 100 sq. miles.

Record of Coordination Floodplain Development form will be completed. LOMR or CLOMR is not anticipated.

B. Construction Staging and Traffic Control
This project is not considered a Traffic Critical Project.

Two options were developed for traffic control as requested by the Iowa DOT.

Option 1 will involve a detour route around the project. The proposed detour route would be Westerly along Schrock Road (D35), then Southerly along Dysart Road (V37), then Easterly along East Eagle Road (D46) back to US 218. This is an approximate 10.3-mile detour.

Option 2 will involve staged construction where US 218 will be reduced to one lane and will alternate traffic directions using temporary traffic signals. The first stage of construction will require narrow width signage but no shoulder strengthening as the existing bridge is not wide enough to necessitate it. The second stage will not require narrow width signage but will require shoulder strengthening as the wider bridge half will allow for a larger lane width. WHKS has conferred with Tim Crouch, Traffic and Safety Bureau, on the feasibility of

Reviewed - No comments

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File No. 31941

staged construction. It is their opinion that the staged construction is feasible for the duration of the project and traffic volumes.

C. Proposed Structure

The proposed structure is a 40' wide 3 span Continuous Concrete Slab Bridge. The bridge length for this Concept is assumed to be 120'. Final bridge length will be determined during the design process.

It is anticipated that the structure will use integral abutments and pile bent piers. The bridge length and span configurations will be designed to avoid conflicts with the existing foundations where possible.

It is anticipated that if Option 2 staged construction is utilized, mechanical splices will be required for the transverse slab reinforcing bars due to minimal clearance between the existing and proposed structures.

Both approach panels will be removed and replaced for 70' at each end of the bridge. Standard approach panels will be utilized. Existing guardrail will be replaced to meet current standards. The existing pressure relief joints will be patched.

No change in roadway alignment or cross section is anticipated. The vertical profile may be adjusted slightly within the limits of approach replacement. The proposed bridge depth will be similar to existing, so no grade raise is anticipated.

A slight channel shift of Mud Creek may be required to center the channel within the bridge.

Design exceptions are not anticipated.

D. Survey

Establish a GPS network to existing control and establish new horizontal and vertical control as needed in US Survey feet. Perform static GPS observations on Blackhawk County Control Monuments. Establish approximately four supplemental control points along the project limits, 2 of which are to be FENO Monuments.

Horizontal control will be established using NGS, OPUS and IARTN observations along with County GIS/GPS control, if available, utilizing the Iowa Regional Coordinate System (IaRCS) Zone 2. Vertical control will be tied to NAVD 88 referenced to recovered as-built bench marks.

Topographic survey of US 218 roadway beginning 500 feet south of the bridge and ending 500 feet north of the bridge, out 200 feet left and right. Initiate Iowa One-Call Request System for Quality Level C or D utility locations and shoot existing utilities. Drainage way surveys 1320 feet upstream and downstream from centerline survey.

Bridge survey on US 218, downstream railroad and pedestrian trail bridges locating the dimensions and elevations of bridge abutments, piers, top of bridge wings, deck shots and bridge openings.

Link to preliminary survey limits: US 218 MM 170.18.kmz

Right of way survey (T1 and T2) to be completed by Iowa DOT.

E. Aesthetics

No aesthetics will be incorporated on the bridge.

F. Construction

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

G. Right of Way

It is anticipated that Right of Way is required for this project. District will provide existing property information. ROW Bureau will provide any required right of way acquisition.

H. Anticipated Cost Option 1 (Detour)

BRIDGE ESTIMATE:				
Item	**Quantity**	**Unit**	**Rate**	**Amount**
Removal of Existing Bridge	1	LS	$60,000	$60,000
120' x 40' Continuous Concrete Slab Bridge	1	LS	$590,000	$590,000
Revetment/Channel Shift	1	LS	$20,000	$20,000
Mobilization	1	LS	10.00%	$67,000
	Base Cost:			$737,000
	Contingency:		20%	$147,400
	3 Years Inflation:		4.5%	$124,847
	BRIDGE TOTAL:			**$1,009,247**
ROADWAY ESTIMATE:				
Item	**Quantity**	**Unit**	**Rate**	**Amount**
Embankment-In-Place	9900	CY	$15	$148,500
Class 10, Roadway & Borrow	420	CY	$40	$16,800
Class 13, Excavation	80	CY	$15	$1,200
Paved Shoulder, HMA, 9 IN.	390	SY	$65	$25,350
Special Backfill	130	TON	$50	$6,500
Patches, Full Depth Finish, By Area	30	SY	$160	$4,800
Patches, Full Depth Finish, By Count	2	EACH	$160	$320
Subbase (Patches)	30	SY	$25	$750
Removal of Steel Beam Guardrail	480	LF	$10	$4,800
Steel Beam Guardrail	250	LF	$25	$6,250
Steel Beam Guardrail, BTS Section	4	EACH	$2,000	$8,000
Steel Beam Guardrail, Bolted End Anchor	4	EACH	$275	$1,100
Steel Beam Guardrail, End Terminal	4	EACH	$2,500	$10,000
Bridge Approach, 12 IN.	205	SY	$225	$46,125
Longitudinal Grooving	510	SY	$7	$3,570
Removal of Pavement	440	SY	$15	$6,600
Painted Pavement Markings	6	STA	$80	$480
Traffic Control	1	LS	$5,000	$5,000
Slope Sediment Control Device, 20 IN.	1000	LF	$5	$5,000
Removal of Slope Sediment Control Device	1000	LF	$1	$1,000
Railroad Insurance	1	LS	$10,000	$10,000
Additional Roadway Items	1	LS	10.00%	$31,215
Mobilization	1	LS	10.00%	$31,215

Base Cost:		$374,574
Contingency:	20%	$74,915
3 Years Inflation:	4.5%	$63,453
ROADWAY TOTAL:		**$512,941**
PROJECT TOTAL:		**$1,522,189**

I. Anticipated Cost Option 2 (Staged)

BRIDGE ESTIMATE:				
Item	**Quantity**	**Unit**	**Rate**	**Amount**
Removal of Existing Bridge	1	LS	$60,000	$60,000
120' x 40' Continuous Concrete Slab Bridge	1	LS	$590,000	$590,000
Revetment/Channel Shift	1	LS	$20,000	$20,000
Staging (10%)	1	LS	$67,000	$67,000
Mobilization	1	LS	10.00%	$73,700
	Base Cost:			$810,700
	Contingency:		20%	$162,140
	3 Years Inflation:		4.5%	$137,332
	BRIDGE TOTAL:			**$1,110,172**
ROADWAY ESTIMATE:				
Item	**Quantity**	**Unit**	**Rate**	**Amount**
Embankment-In-Place	9900	CY	$17	$168,300
Class 10, Roadway & Borrow	420	CY	$44	$18,480
Class 13, Excavation	80	CY	$17	$1,360
Paved Shoulder, HMA, 9 IN.	390	SY	$72	$28,080
Special Backfill	130	TON	$55	$7,150
Patches, Full Depth Finish, By Area	30	SY	$175	$5,250
Patches, Full Depth Finish, By Count	2	EACH	$175	$350
Subbase (Patches)	30	SY	$28	$840
Removal of Steel Beam Guardrail	480	LF	$11	$5,280
Steel Beam Guardrail	250	LF	$30	$7,500
Steel Beam Guardrail, BTS Section	4	EACH	$2,200	$8,800
Steel Beam Guardrail, Bolted End Anchor	4	EACH	$300	$1,200
Steel Beam Guardrail, End Terminal	4	EACH	$2,750	$11,000
Bridge Approach, 12 IN.	205	LF	$250	$51,250

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Longitudinal Grooving	510	SY	$7	$3,570
Removal of Pavement	440	SY	$17	$7,480
Painted Pavement Markings	24	STA	$70	$1,680
Temporary Barrier Rail	960	LF	$15	$14,400
Crash Cushions	4	EACH	$1,250	$5,000
Temp. Traffic Signals	2	EACH	$3,500	$7,000
Traffic Control	1	LS	$5,000	$5,000
Slope Sediment Control Device, 20 IN.	1000	LF	$5	$5,000
Removal of Slope Sediment Control Device	1000	LF	$1	$1,000
Railroad Insurance	1	LS	$10,000	$10,000
Additional Roadway Items	1	LS	10.00%	$37,497
Mobilization	1	LS	10.00%	$37,497
	Base Cost:			$449,964
	Contingency:		20%	$89,993
	3 Years Inflation:		4.5%	$76,224
	ROADWAY TOTAL:			**$616,180**
	PROJECT TOTAL:			**$1,726,352**

J. Program Status
The project is programmed for FY 2024 at a cost of $450,000.

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FIELD EXAM NOTES

1. Update Title Sheet
2. Cost increase because of change from RCB to Bridge
3. No new items but review (see notes on plans)
   - Flumes
   - Bridge Location
   - Bridge Type
   - Pier Encasement
4. Profile grade and horizontal alignment are good.
5. Drainage
   - Flumes
   - No impacts to ditching
6. Traffic Management
   - Staged with TC-217
   - Reviewed with Traffic Safety Bureau
7. No Drives or Entrances in project limits
8. No sight distance concerns
9. Soils
   - Minimal fill for guardrail blisters
   - Contractor furnished.

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FIELD EXAM NOTES

10. No special erosion control features.
11. No obstacles for shielding or steep embankments.
12. Disposal of guardrail and other materials to contractor
13. No visible tile lines
14. No fencing requirement
15. No lighting
16. Right-of-Way
    - It appears that the current design does not affect right-of-way.
17. See all plan sheets for additional comments related to these notes.

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FILE NO. 31941	ENGLISH	DESIGN TEAM WHKS & CO.	BLACKHAWK COUNTY	PROJECT NUMBER BRFN-218-7(239)--39-07	SHEET NUMBER A.9

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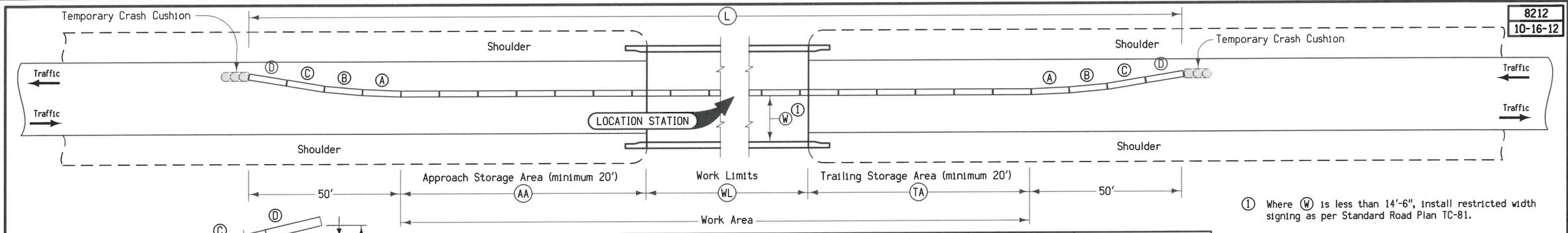
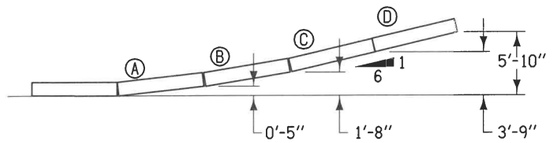


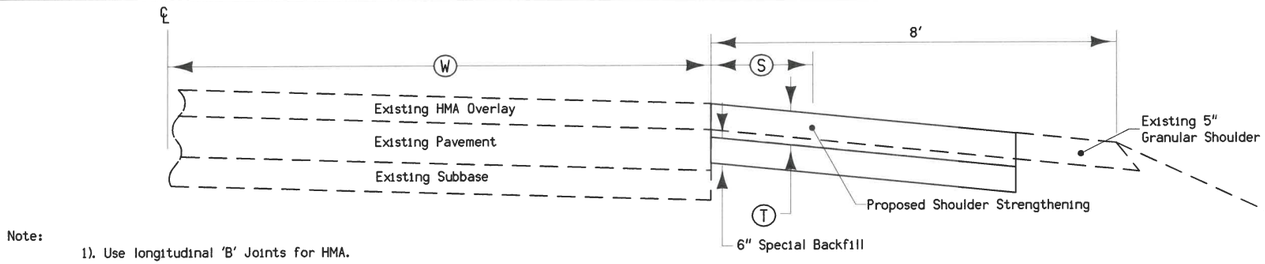


BARRIER OFFSETS FOR FLARE SECTIONS

① Where Ⓦ is less than 14'-6", install restricted width signing as per Standard Road Plan TC-81.

Station	Side	Ⓐⓐ	ⓌⓁ	ⓉⒶ	Ⓛ	Anchored	Ⓦ①	Remarks
		Feet	Feet	Feet	Feet	X	Ft-Inches	
232+08.00	Lt	20.00	273.00	26.75	419.75	X	10'-6"	Stage 1 EB 33 Sections
232+08.00	Rt	26.75	273.00	20.00	419.75		11'-6"	Stage 1 WB 33 Sections

TEMPORARY CONCRETE BARRIER LAYOUT for Two-Way Traffic



Note:

1). Use longitudinal 'B' Joints for HMA.

2). Use longitudinal 'BT-2' or 'BT-3' Joints for PCC.
Use transverse 'C' Joints for PCC.

Outside Shoulders (Stage 2)

SHOULDER STRENGTHENING ALTERNATIVES

Location		Pavement Alternates		Existing Pavement	Width of Strengthening	6" Special Backfill	Shoulder Strengthening	Remarks
		HMA	PCC					
Station To Station		ⓉⒶ	ⓉⓅ	Ⓦ	Ⓢ			
		Inches	Inches	Feet	Feet	Tons	SY	
356+43.46	360+57.34	8	8	14	6	XX.X	XX.X	Stage 2 Rt
362+27.29	363+61.02	8	8	14	6	X.X	XX.X	Stage 2 Rt
						XXXX	XXXX	Total

Reviewed - No comments

Design No. 224
File No. 31941

FILE NO. 31941	ENGLISH	DESIGN TEAM WHKS & CO.	BLACKHAWK COUNTY	PROJECT NUMBER BRFN-218-7(239)--39-07	SHEET NUMBER B.1

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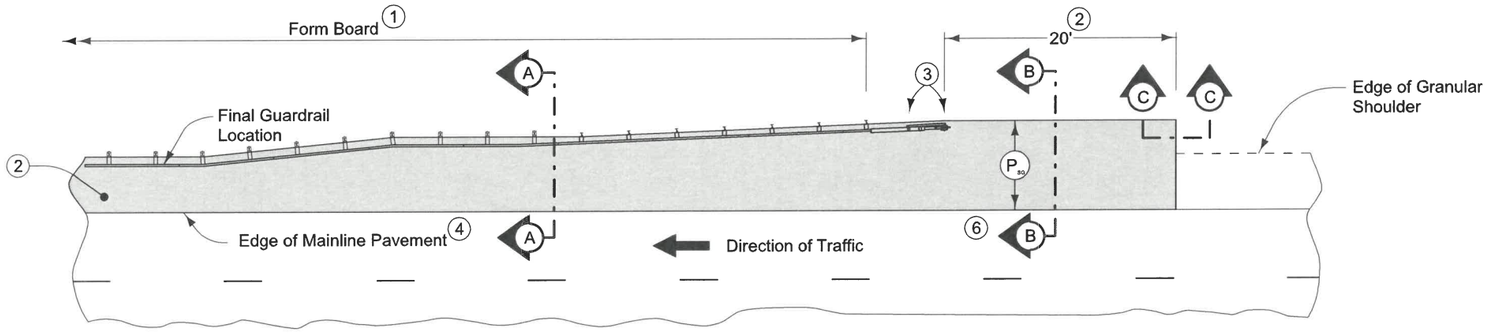
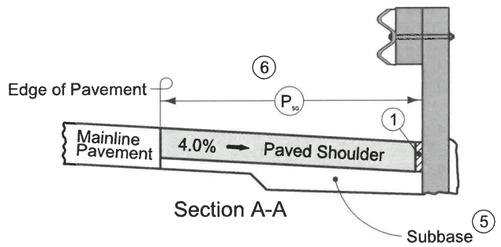
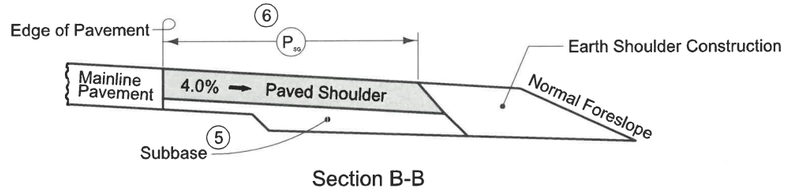
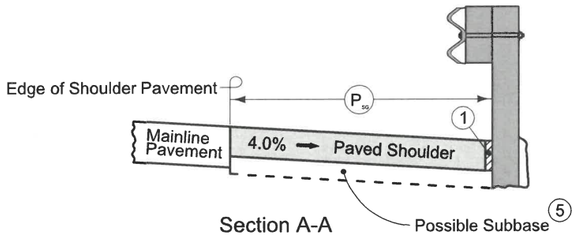


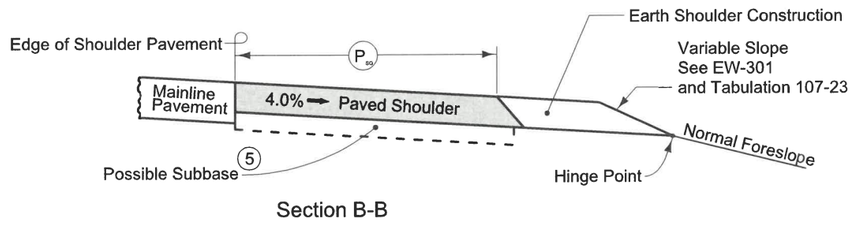
PLAN VIEW





NEW CONSTRUCTION





EXISTING SHOULDER

9" HMA Paved Shoulder at guardrail. 8" PCC may be substituted with the following jointing layout:

Match mainline pavement joint spacing. When mainline pavement is 8" or greater in thickness, place additional transverse 'C' joints in shoulder at mid-panel of the mainline pavement. Place longitudinal 'C' joint at P/2 from edge of mainline pavement when P is greater than 10' wide. Terminate longitudinal joint at transverse joint less than 10' in length.

Compaction of HMA is required to face of guardrail post. Hand compaction will be allowed under guardrail. Removal and reinstallation of guardrail will be allowed with no additional payment.

Refer to Tabulation 112-9 for shoulder quantities.

(1) PCC option only: When guardrail posts are installed prior to construction of PCC paved shoulder, fasten form board to the face of guardrail posts for the length shown.

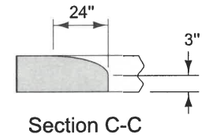
(2) Continue paved shoulder 20 feet beyond the center of the first post.

(3) Shoulder may be notched for first 2 posts or post sleeves may be installed through pavement. Do not drive posts through pavement.

(4) 'KT-1 joint for PCC shoulder.
'B' joint for HMA shoulder.

(5) Refer to other details in the plan.

(6) P is based on 8" block is used for BA-205 and BA-225 end terminals and P will need to be reduced by 4 inches when BA-205 and BA-225 are specified.



Section C-C
Roll down at granular shoulder or earth.

PAVED SHOULDER AT GUARDRAIL
(GRANULAR SHOULDER ADJACENT TO MAINLINE)

Reviewed - No Comments

Design No. 224
File No. 31941

FILE NO. 31941	ENGLISH	DESIGN TEAM WHKS & CO.	BLACKHAWK COUNTY	PROJECT NUMBER BRFN-218-7(239)--39-07	SHEET NUMBER B.2

8:21:10 AM 7/27/2021 tclevenger C:\Users\tclevenger\WHKS & CO\9100.07 - US 218 over Mud Creek - General\Design\CADD Files\Sheet Files\SHT_07218239b01.sht

SURVEY SYMBOLS

- SI Sign
- SHR Shrub
- LUM Luminaire
- TDC Tree Deciduous
- SL Speed Limit Sign
- TEV Evergeen Tree
- TA Tower Anchor
- FLG Flag Poles
- TSG Traffic Signal
- STP Stump
- WEL Well
- IN Storm Sewer Intake
- MIS Miscellaneous
- MM Mile Marker Post
- FP Filler Pipe
- TSL Traffic Signal and Luminare
- BB Billboard
- LC Lot Corner
- 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
- 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
- TPD Telephone Pedestal
- GV Gas Valve
- PPA Power Pole Co. 1
- WV Water Valve
- FHD Fire Hydrants
- TR Telephone Riser Pole
- EB Electrical Box
- 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
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 / 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)

Design No. 224
File No. 31941

FILE NO. 31941	ENGLISH	DESIGN TEAM WHKS & CO.	BLACKHAWK COUNTY	PROJECT NUMBER BRFN-218-7(239)--39-07	SHEET NUMBER D.1

9:09:50 AM 7/27/2021 tclevenger C:\Users\tclevenger\WHKS & CO\9100.07 - US 218 over Mud Creek - General\Design\CADD Files\Sheet Files\SHT_07218239d01.sht

Ted K. Mahood
Linda K. Mahood

Douglas G. Harting

STA 229+69.65
BEGIN PROJECT

STA 234+46.85
END PROJECT

230 231 232 233 234 235

US 218

MUD CREEK

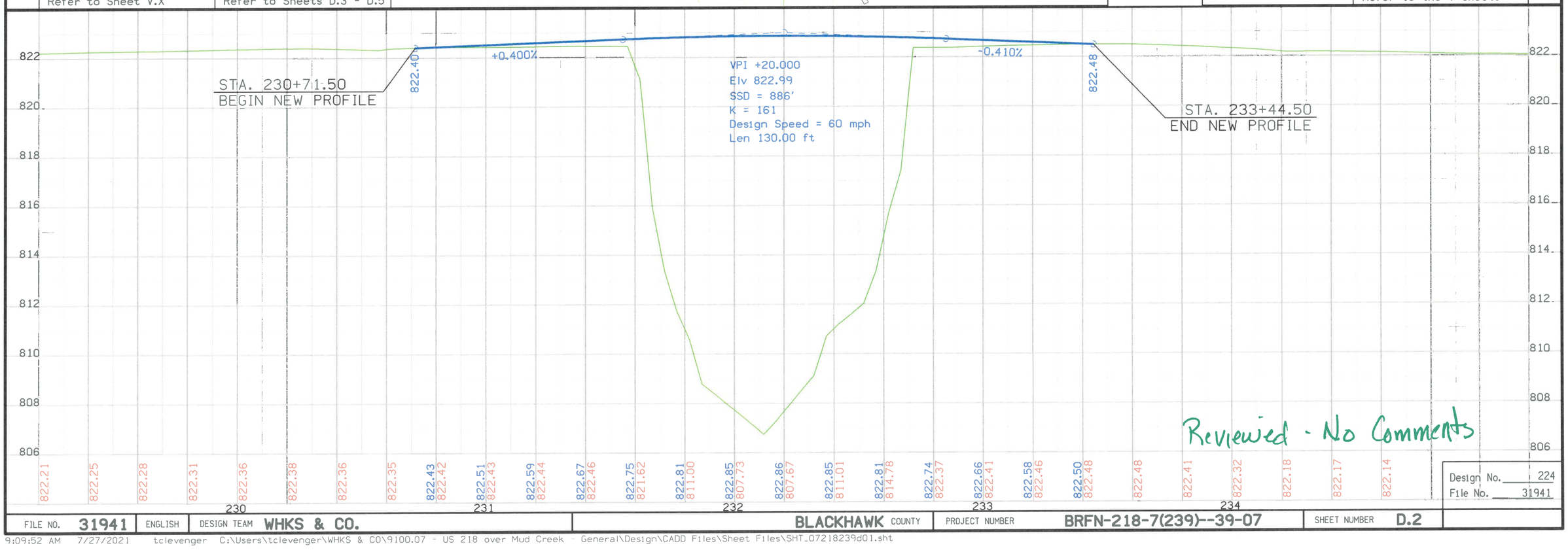
IOWA NORTHERN RAILROAD COMPANY

0 FEET 20

For Bridge Situation Plan Refer to Sheet V.X

For Staging Details Refer to Sheets D.3 - D.5

For Berm Grading Info. Refer to the V Sheets



Reviewed - No Comments

Design No. 224
File No. 31941

FILE NO. 31941	ENGLISH	DESIGN TEAM WHKS & CO.	BLACKHAWK COUNTY	PROJECT NUMBER BRFN-218-7(239)--39-07	SHEET NUMBER D.2

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227 228 229 230 231 232

US 218

Construct Shoulder Strengthening

Shoulder strengthening Required for Stage 3 construction. (Wider bridge)

LEGEND

- Pavement Removal
- Proposed Shoulder Pavement
- Proposed PCC Approach Pavement
- Previously Constructed Pavement

0 FEET 20

Stage 1 Construction

232 233 234 235 236 237

US 218

PC Sta 236+00.74

Construct Shoulder Strengthenging

0 FEET 20

Stage 1 Construction

Design No. 224
File No. 31941

FILE NO. 31941	ENGLISH	DESIGN TEAM WHKS & CO.	BLACKHAWK COUNTY	PROJECT NUMBER BRFN-218-7(239)--39-07	SHEET NUMBER D.3

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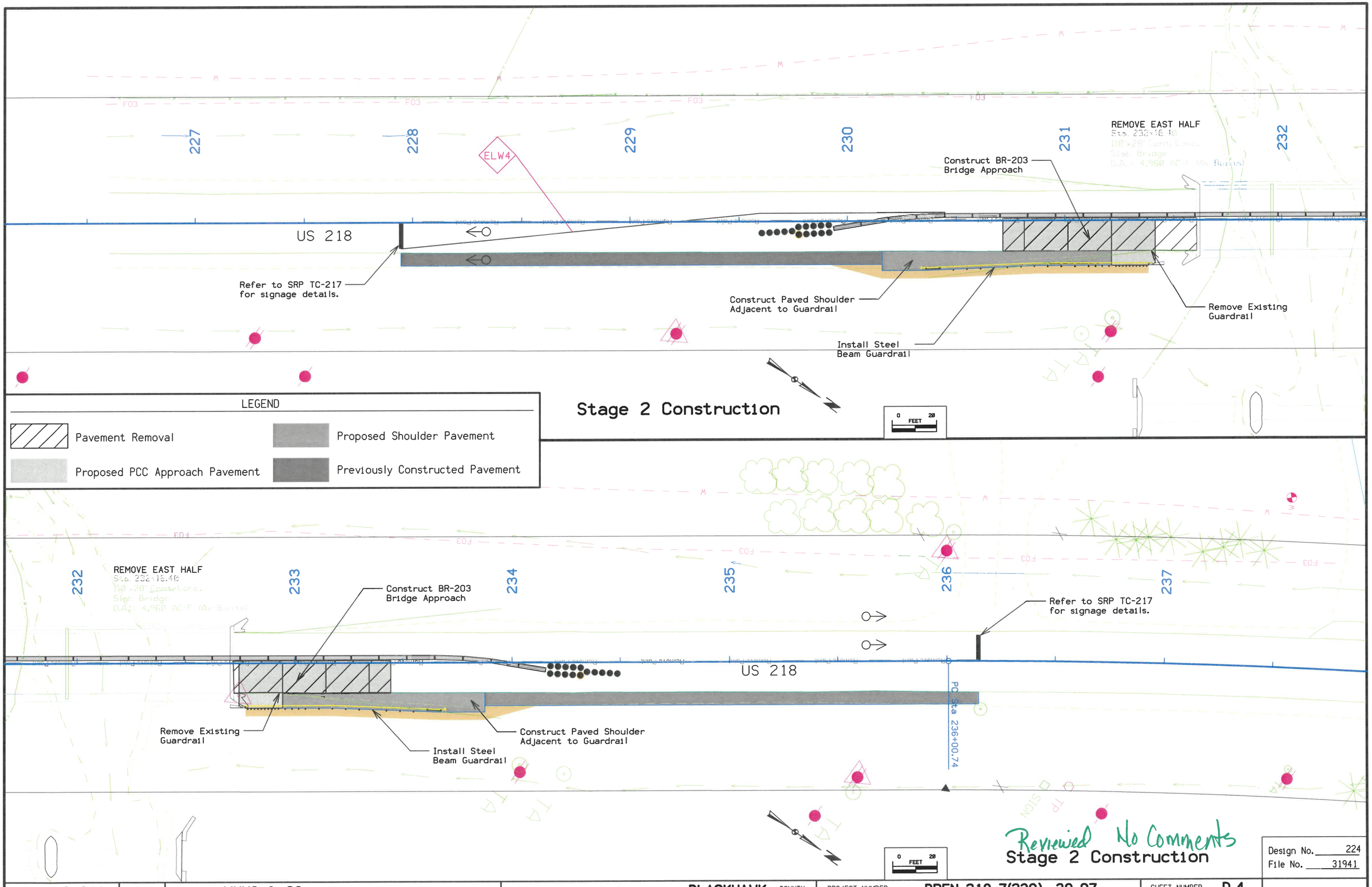

Design No. 224
File No. 31941

FILE NO. 31941	ENGLISH	DESIGN TEAM WHKS & CO.	BLACKHAWK COUNTY	PROJECT NUMBER BRFN-218-7(239)--39-07	SHEET NUMBER D.4

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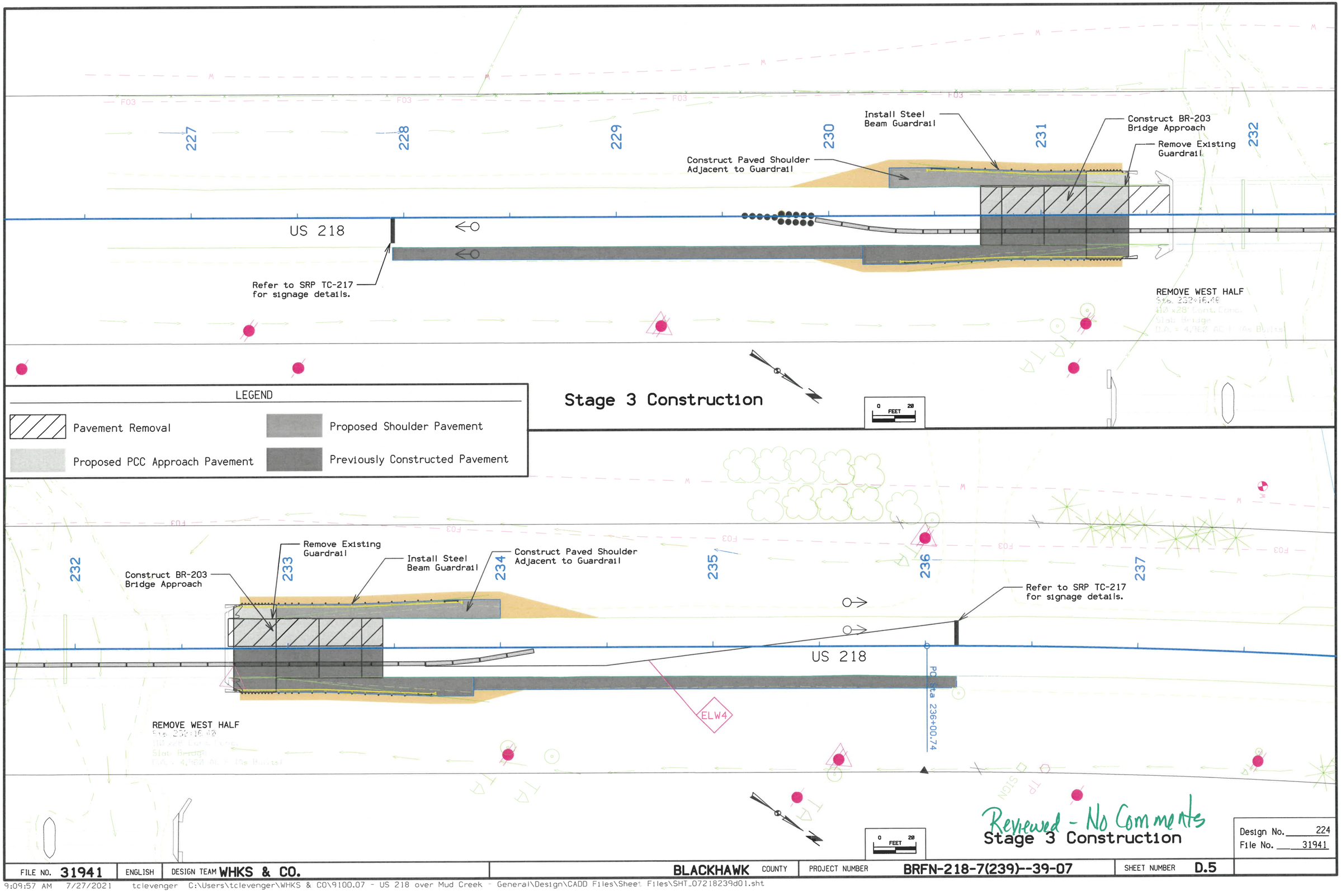

FILE NO. 31941	ENGLISH	DESIGN TEAM WHKS & CO.	BLACKHAWK COUNTY	PROJECT NUMBER BRFN-218-7(239)--39-07	SHEET NUMBER D.5

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108-23A
08-01-08

TRAFFIC CONTROL PLAN

One lane of traffic shall be maintained at all times on US 218 utilitzing Standard Road Plans listed in Tab. 105-4 on Sheet C.X. See staging notes for additional details.

111-01
04-17-12

COORDINATED OPERATIONS

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

Project	Type of Work
None.	

108-26A
08-01-08

STAGING NOTES

STAGE 1:

Traffic Control:
Utilize Standard Road Plans listed in Tab. 105-4 on Seet C.X.

Construction:
Construct shoulder strengthening as noted on Sheet D.3.

STAGE 2

Traffic Control:
Traffic will be reduced to one lane with all traffic traveling on the West side of the bridge using Temporary Barrier Rail and a lane closure with signals in accordance with Standard Road Plans listed on Sheet C.X.

Construction:
Remove the East half of the bridge, East guardrail, and necessary pavement in order to construct the East portion of the bridge and East half of the bridge approach. Install new guardrail and paved shoulder adjacent to guardrail.

STAGE 3

Traffic Control:
Traffic will be reduced to one lane with all traffic traveling on the East side of the bridge using Temporary Barrier Rail and a lane closure with signals in accordance with Standard Road Plans listed on Sheet C.X.

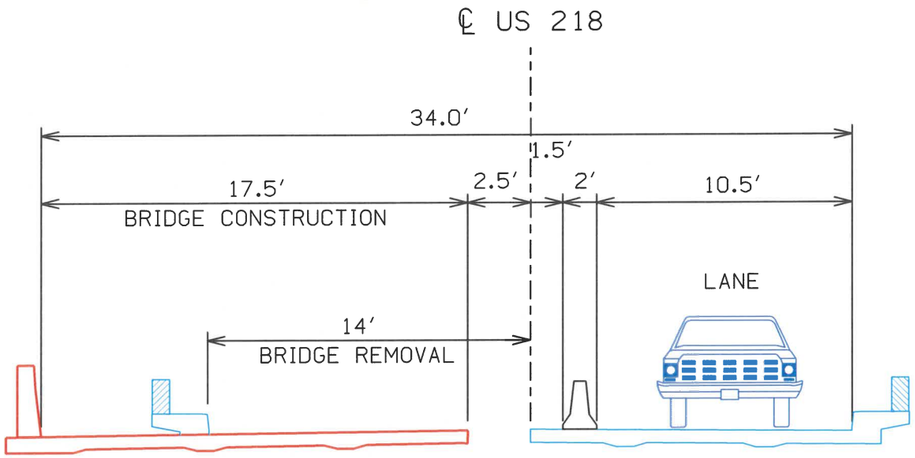
Construction:
Remove the West half of the bridge, West guardrail, and necessary pavement in order to construct the West portion of the bridge and West half of the bridge approach. Install new guardrail and paved shoulder adjacent to guardrail.

108-25
10-21-14

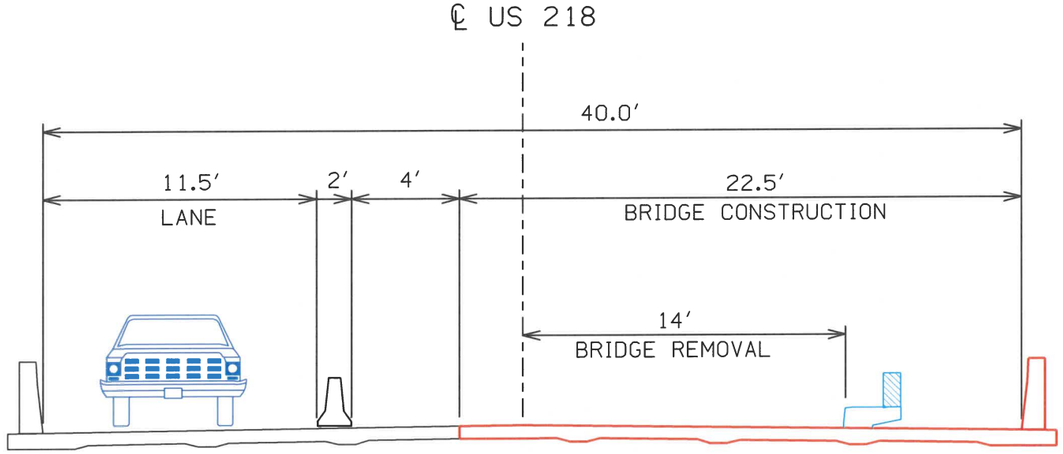
511 TRAVEL RESTRICTIONS

Route	Direction	County	Location Description	Feature Crossed	Object Type	Maint. Bridge No., Structure ID, or FHWA No.	Type of Restriction	Existing Measurement	Construction Measurement	Construction Measurement as Signed	Projected As Built Measurement	Remarks
US 218	NB/SB	Blackhawk	US 218 over Mud Creek	Bridge	Traffic Control Device		Horizontal	28'-0"	10'-6"	9'-6"	34'-0"	Stage 2
US 218	NB/SB	Blackhawk	US 218 over Mud Creek	Bridge	Traffic Control Device		Horizontal	34'-0"	11'-0"	10'-0"	40'-0"	Stage 3
US 218	NB/SB	Blackhawk	US 218 over Mud Creek	Bridge	Temporary Signal		Vertical		15'-0"			Stage 2
US 218	NB/SB	Blackhawk	US 218 over Mud Creek	Bridge	Temporary Signal		Vertical		15'-0"			Stage 3

Reviewed - No comments



US 218
STAGE ~~1~~ 2
(LOCATING ~~UP~~ STATION)
DOWN



US 218
STAGE ~~2~~ 3
(LOCATING ~~UP~~ STATION)
DOWN

PLAN VIEW PATTERN AND SYMBOL LEGEND OF TRAFFIC CONTROL AND STAGING SHEETS

●	Channelizing Device		Crash Cushion (Temp or Perm)
×	Drum		Traffic Signal
	Arrow Board		Flagger
	Speed Feedback Sign		Temporary Floodlighting
♦	Channelizer Marker		Traffic Sign
△	Concrete Barrier Marker		Type III Barricade
	Temporary Barrier Rail		Type A Warning Light
	Work Zone		Direction of Traffic
	Pavement Removal		Safety Closure
	Sand Barrel Layout	xxxxxxxxxx xxxxxxxxxx xxxxxxxxxx	Portable Dynamic Message Sign

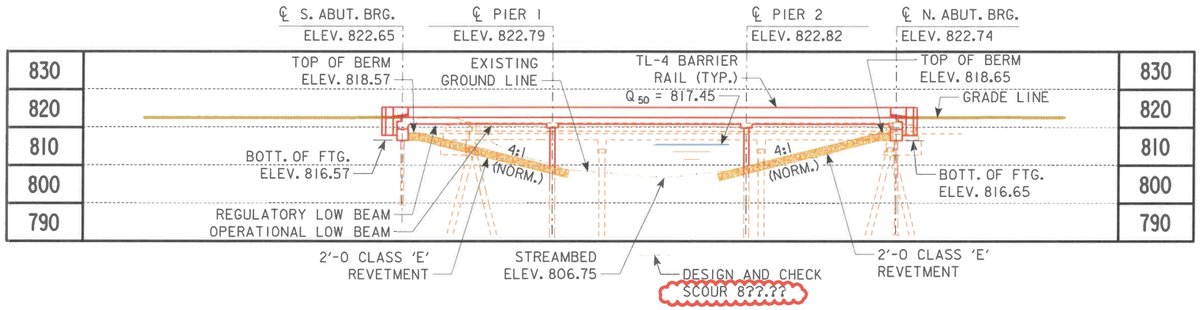
NOTE: Device spacing according to Standard Road Plans unless specifically dimensioned.

PLAN VIEW COLOR LEGEND OF TRAFFIC CONTROL AND STAGING SHEETS

LINEWORK	Design Color No.	
Green	(2)	Existing Topographic Features and Labels
Magenta	(5)	Pavement Marking Call Outs
Blue	(1)	Proposed Alignment, Stationing, Tic Marks, and Alignment Annotation
Yellow	(4)	Pavement Markings, Yellow
Off White	(254)	Pavement Markings, White
Violet	(15)	Temporary barrier rail, Unpinned
Flush Orange	(228)	Temporary barrier rail, Pinned
SHADING	**Design Color No.**	
Green, Light	(225)	Existing Pavement Shading
Gray, Light	(48)	Previously Constructed Pavement Shading
Gray, Med	(80)	Proposed Granular Surface Shading
Gray, Med	(80)	Previously Constructed Granular Surface Shading
Blue, Light	(230)	Proposed Pavement Shading
Lavender	(9)	Temporary Pavement Shading
Brown, Light	(236)	Proposed Grading Limits Shading
Pink, Dark	(13)	Proposed MSE or CIP Wall Shading
Red	(3)	Proposed Bridge Shading and Sign Trusses
Black w/Gray, Light Fill	(0,48)	Previously Constructed Structure

Design No. 224
File No. 31941

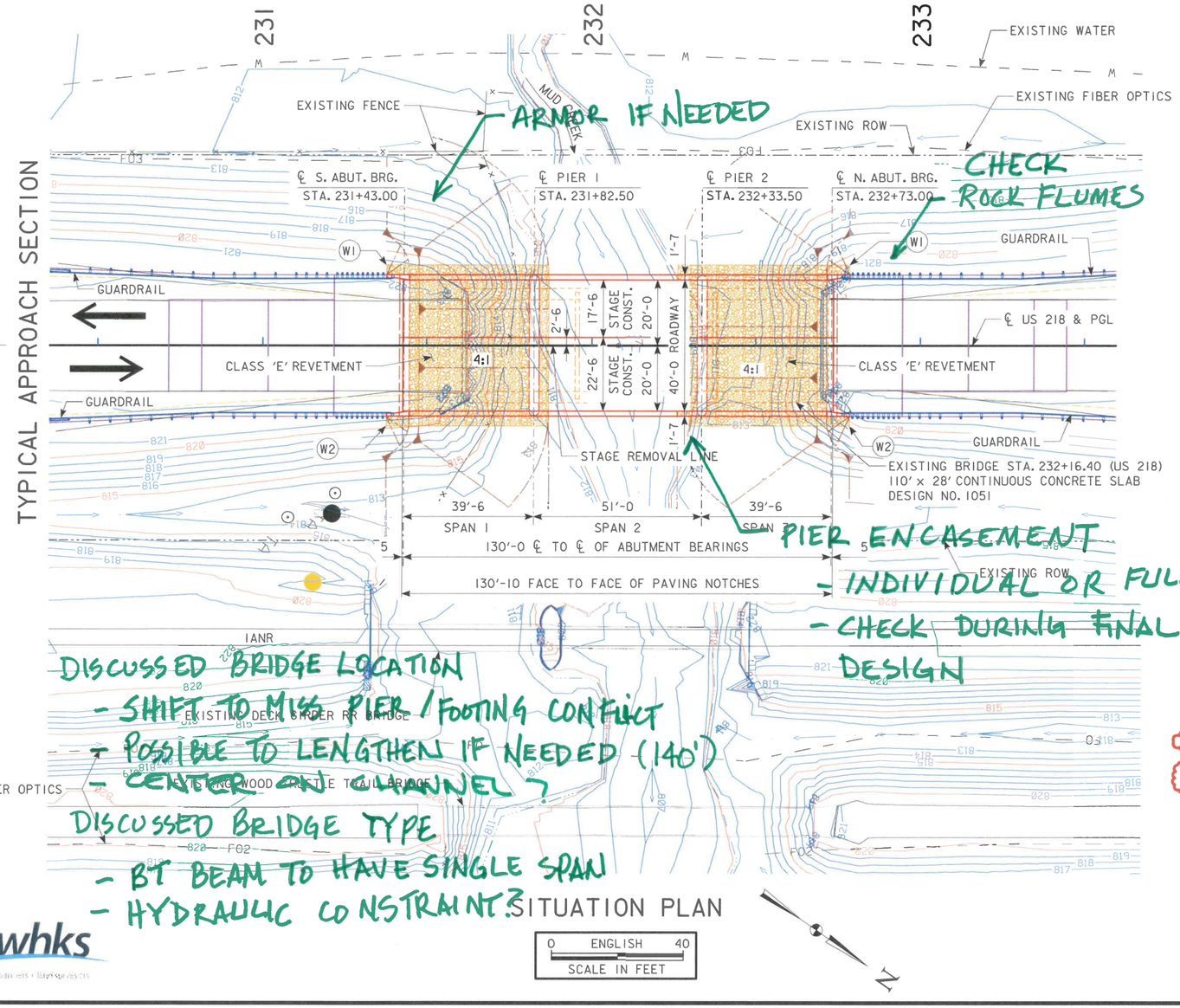
BENCH MARK: 229+20.94, 51.785' RT. NO. 503 PLACED IN POWER POLE SE OF BRIDGE
ELEV. 816.907



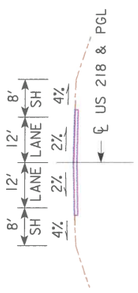
LONGITUDINAL SECTION ALONG ℄ APPROACH ROADWAY

VPC STA = 230+71.5
VPC ELEV = 822.40
VPT STA = 233+44.5
VPT ELEV = 822.48
+0.40%
-0.41%
VPI STA = 232+20
VPI ELEV = 822.99
LVC = 130'

PROPOSED PROFILE
GRADE ON US 218



TYPICAL APPROACH SECTION



SITUATION PLAN

0 ENGLISH 40
SCALE IN FEET

N

UTILITIES LEGEND:

WATER	W
FIBER OPTICS	FO
FIBER OPTICS	FO2
FIBER OPTICS	FO3
TELEPHONE	
POWER POLE	

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

NOTES:

THE DESIGN IS FOR THE REPLACEMENT OF THE EXISTING 110' x 28' CONTINUOUS CONCRETE SLAB BRIDGE, DESIGN NO. 1051, FHWA NO. 14800, MAINT. NO. 0770.IS218

TOP OF BRIDGE DECK AT CENTERLINE ROADWAY IS 0.03' BELOW THE PROFILE GRADE TO ACCOUNT FOR DECK CROSS SLOPE AND PARABOLIC CROWN.

CLASS 'E' REVETMENT IS EMBEDDED.

TL-4 BRIDGE RAILING PROPOSED.

PIER TYPE - INDIVIDUALLY ENCASED PILE BENT.

STANDARD BRIDGE INDEX NO. J40.

BERM SLOPES TO BE CONFIRMED DURING FINAL DESIGN.

HYDRAULIC DATA

DISCHARGES FROM
USGS REPORT 2015-5055 FOR DRAINAGE AREAS BETWEEN 2 AND 20 SQ. MI.
REFERENCING USGS REPORT 2013-5086
BASED ON DRAINAGE AREA.

THE STAGE AND BACKWATER VALUES SHOWN BELOW INCLUDE BACKWATER FROM THE ADJACENT DOWNSTREAM BRIDGES, THERBY INCREASING THE STAGE ELEVATIONS AND DECREASING THE BACKWATER AMOUNTS FOR THE PROPOSED BRIDGE.

DRAINAGE AREA (D.A.) = 8.9 SQ MI
(D.A.) MAIN CHANNEL SLOPE = 24.2 FT/MI
SITE STREAM SLOPE = 10.5 FT/MI. (0.20%)
AVE. LOW WATER STAGE = 811.2
REGULATORY LOW BEAM = 820.66
OPERATIONAL LOW BEAM = 820.49
ROADWAY OVERTOPPING EL. = 822.0
ROADWAY OVERTOPPING STA. = 227+32

Q25 = 2,640 CFS
STAGE = 816.62
BACKWATER = 0.18 FT
AVE. BRIDGE VELOCITY = 4.5 FT/S

Q50 (DESIGN) = 3,330 CFS
STAGE (DESIGN) = 817.45
BACKWATER = 0.21 FT
AVE. BRIDGE VELOCITY = 4.9 FT/S

Q100 = 4,060 CFS
STAGE = 818.38
BACKWATER = 0.23 FT
AVE. BRIDGE VELOCITY = 5.2 FT/S

Q200 = 4,810 CFS
STAGE = 819.39
BACKWATER = 0.23 FT
AVE. BRIDGE VELOCITY = 5.3 FT/S
DESIGN SCOUR = TBD

Q500 = 5,840 CFS
STAGE = 820.92
BACKWATER = 0.36 FT
AVE. BRIDGE VELOCITY = 5.5 FT/S
CALCULATED CHECK SCOUR = TBD

EXTREME HW STAGE =
DATE =

LOCATION

US 218 OVER MUDD CREEK
T-87N R-12W
SECTION 15
CEDAR TOWNSHIP
BLACK HAWK COUNTY
FHWA NO. 014800
BRIDGE MAINT. NO. 0770.IS218
LATITUDE 42.351080
LONGITUDE -92.228522

TRAFFIC ESTIMATE

2018 AADT	3670	V.P.D.
2038 AADT	4260	V.P.D.
TRUCKS	6	%

HYDRAULIC DESIGN

I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly licensed Professional Engineer under the laws of the State of Iowa.

Brian J. Birkland 17375 LICENSED PROFESSIONAL ENGINEER IOWA

Signature Date

Brian J. Birkland
Printed or Typed Name

My license renewal date is December 31, 2022

Pages or sheets covered by this seal: SHEETS V.1 - V.2

PRELIMINARY
NOT FOR CONSTRUCTION

PRELIMINARY

DESIGN FOR 0° SKEW

130'-0 X 40'-0 CONTIN. CONCRETE SLAB BRIDGE

39'-6 END SPANS 51'-0 INTERIOR SPAN

SITUATION PLAN

STA. 232+08 (US 218) DECEMBER, 2021

BLACK HAWK COUNTY

IOWA DOT - TRANSPORTATION DEVELOPMENT DIVISION

DESIGN SHEET NO. 1 OF 2 FILE NO. 31941 DESIGN NO. 224

whks
engineers + planners + land surveyors

DESIGN TEAM BB/LG/JS	BLACK HAWK COUNTY	PROJECT NUMBER BRFN-218-7(239)--39-07	SHEET NUMBER V.1

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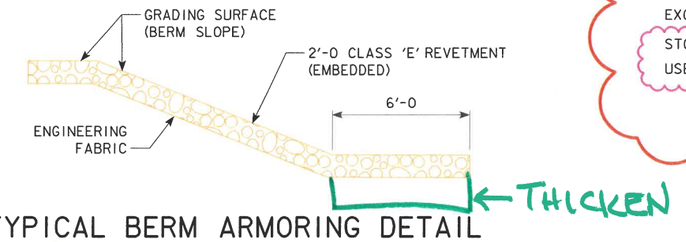
ESTIMATED BERM ARMORING QUANTITIES

LOCATION	REVETMENT CL. ?? (TON)	EROSION STONE (TON)	ENGINEERING FABRIC (SY)	EXCAVATION (CY)
BERM LINING - XX	XX	XX	XX	XX
BERM LINING - XX	XX	XX	XX	XX
TOTALS	XX	XX	XX	XX

EXCAVATION QUANTITY CALCULATED FROM GRADING SURFACE.

STONE TOE - XX	XX	--	XX	XX

USE WHEN QUANTITY EQUALS OR EXCEEDS QUANTITY UNDER THE BRIDGE.



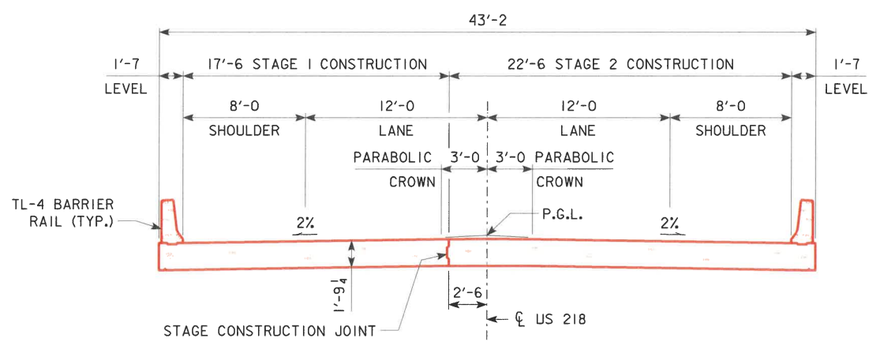
TYPICAL BERM ARMORING DETAIL

BERM SLOPE LOCATION TABLE

POINTS	---- ABUTMENT			---- ABUTMENT		
	STATION	OFFSET	ELEV.	STATION	OFFSET	ELEV.
A1	XXXX+XX.XX	XX.XX' XX	XXX.XX	XXXX+XX.XX	XX.XX' XX	XXX.XX
A2	XXXX+XX.XX	XX.XX' XX	XXX.XX	XXXX+XX.XX	XX.XX' XX	XXX.XX
B1	XXXX+XX.XX	XX.XX' XX	XXX.XX	XXXX+XX.XX	XX.XX' XX	XXX.XX
B2	XXXX+XX.XX	XX.XX' XX	XXX.XX	XXXX+XX.XX	XX.XX' XX	XXX.XX
W1	XXXX+XX.XX	XX.XX' XX	XXX.XX	XXXX+XX.XX	XX.XX' XX	XXX.XX
W2	XXXX+XX.XX	XX.XX' XX	XXX.XX	XXXX+XX.XX	XX.XX' XX	XXX.XX

BERM SLOPE ELEVATIONS REFLECT THE GRADING SURFACE

LT. or RT.



TYPICAL BRIDGE SECTION
(LOOKING UP STATION)

whks
engineers + planners + land surveyors

PRELIMINARY

DESIGN FOR 0° SKEW

130'-0 X 40'-0 CONTIN. CONCRETE SLAB BRIDGE

39'-6 END SPANS 51'-0 INTERIOR SPAN

SITUATION PLAN

STA. 232+08 (US 218) DECEMBER, 2021

BLACK HAWK COUNTY

IOWA DOT - TRANSPORTATION DEVELOPMENT DIVISION

DESIGN SHEET NO. 2 OF 2 FILE NO. 31941 DESIGN NO. 224

DESIGN TEAM BB/LG/JS	BLACK HAWK COUNTY	PROJECT NUMBER BRFN-218-7(239)--39-07	SHEET NUMBER V.2

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ML218

SLOPES BEHIND GUARD RAIL
STEEPEN TO MINIMIZE IMPACTS
TO DITCH AND R/W

233+00.00

231+00.00

230+50.00

230+16.07

FILE NO.	ENGLISH	DESIGN TEAM		COUNTY	PROJECT NUMBER	SHEET NUMBER
31941		WHKS & CO.		BLACKHAWK	BRFN-218-7(239)--39-07	X.1

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ML218

70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70

820
815

Existing ROW

10:1 10:1 4% 4% 10:1 4:1

233+99.93

233+87.43

233+50.00

FILE NO.	ENGLISH	DESIGN TEAM WHKS & CO.	CASS COUNTY	PROJECT NUMBER MBIN-080-4(503)57--0M-15	SHEET NUMBER X.2	

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