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PLANS OF PROPOSED IMPROVEMENT ON THE PRIMARY ROAD SYSTEM STORY COUNTY Reconstruction - Bridge Widening

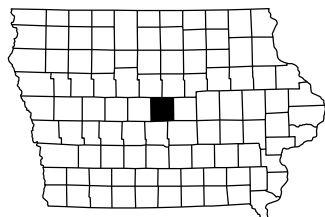
US 30 over South Skunk River
1.2 Miles W. of I-35 (Median)

Refer to the Plan Sheets for list of applicable specifications.

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



	TOTAL
	32
PROJECT IDENTIFICATION NUMBER	
19-85-030-020	
CONTRACT ID NUMBER	
PROJECT NUMBER	
BRF-030-5(271)--38-85	
R.O.W. PROJECT NUMBER	
PROJECT DIRECTORY NUMBER	
8503002019	



Design Data Urban

2022 AADT	15,600 V.P.D.
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TRUCKS	8 %
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Includes Eastbound Traffic Only

Index Of Seals

Sheet No.	Name	Type
A.1	Joshua J. Opheim	Structural Design
SPS.1	Adam Tyler	Geotechnical Design

Structural Design

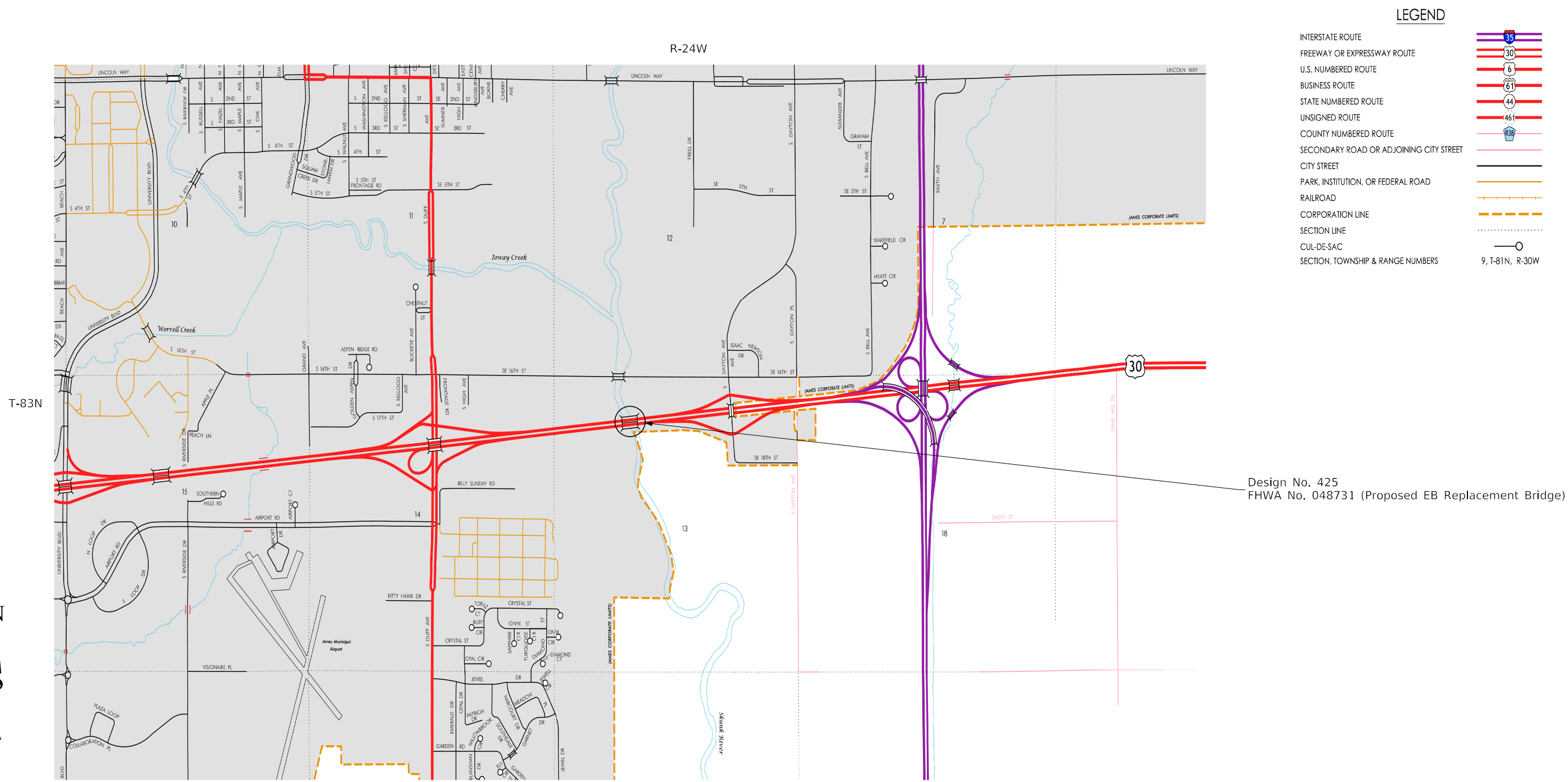
I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly licensed Professional Engineer under the laws of the State of Iowa.

Signature Joshua J. Opheim Date 9/12/2024

Printed or Typed Name

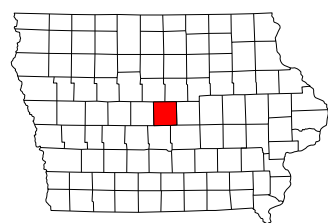
My license renewal date is December 31, 2024

Pages or sheets covered by this seal: A.1-A.2 & V.1-V.28



Part of City of Ames Location Map

Not To Scale



ESTIMATED BRIDGE QUANTITIES					
ITEM NO.	ITEM CODE	ITEM	UNIT	DIVISION 1	AS-BUILT QTY.
1	2401-6750001	REMOVALS, AS PER PLAN	LS	1.00	
2	2402-0425030	GRANULAR BACKFILL	TON	169.0	
3	2402-2720000	EXCAVATION, CLASS 20	CY	26.9	
4	2403-0100010	STRUCTURAL CONCRETE (BRIDGE)	CY	325.6	
5	2404-7775000	REINFORCING STEEL	LB	74,702	
6	2407-0563105	BEAMS, PRETENSIONED PRESTRESSED CONCRETE, BTC105	EACH	12	
7	2408-7800000	STRUCTURAL STEEL	LB	14,644	
8	2412-0000100	LONGITUDINAL GROOVING IN CONCRETE, BRIDGE DECK	SY	800.3	
9	2501-0201057	PILES, STEEL, HP 10 X 57	LF	990	
10	2501-0201473	PILES, STEEL, HP 14 X 73	LF	2,035	
11	2501-5775000	PILES, STEEL SHEET	SF	2,160	
12	2501-8400172	TEMPORARY SHORING	LS	1.00	
13	2526-8285000	CONSTRUCTION SURVEY	LS	1.00	
14	2533-4980005	MOBILIZATION	LS	1.00	
15	2599-9999010	EXISTING BRIDGE MONITORING	LS	1.00	

ESTIMATE REFERENCE INFORMATION		
ITEM NO.	ITEM CODE	DESCRIPTION
1	2401-6750001	REMOVALS, AS PER PLAN
		Includes all work for removal and off-site disposal of the south deck overhang, curb, and rail and portions of the abutments (wings, backwall, and maskwall) of the existing WB bridge. Removal of scheduled items shall be in accordance with Section 2401, of the Standard Specifications. Any damage to material not to be removed shall be the responsibility of the Contractor and repaired at no extra cost to the state.
2	2402-0425031	GRANULAR BACKFILL
		Estimated at 1.7 ton/cu yd. Includes cost of furnishing and installing engineering fabric, subdrain (including excavation), and subdrain outlet.
3	2402-2720000	EXCAVATION, CLASS 20
		Includes excavation necessary to construct minimum bench in existing berm at abutments.
4	2403-0100010	STRUCTURAL CONCRETE (BRIDGE)
		Includes all resilient joint filler required.
5	2404-7775000	REINFORCING STEEL
		Includes setting bars as dowels in existing WB abutment backwall and wings.
6	2407-0563105	BEAMS, PRETENSIONED PRESTRESSED CONCRETE, BTC105
		Includes abutment bearing material. Includes anchored curved sole plates at piers. Nonstandard stirrup lengths are used at the beam ends. Includes Contractor filling out beam numbers by location and beam seat elevations in "PPC Beam Data Spreadsheet" and forwarding electronic spreadsheet to the Engineer.
7	2408-7800000	STRUCTURAL STEEL
		Includes pier bearing material. Includes intermediate diaphragms and abutment and pier diaphragms.
8	2412-0000100	LONGITUDINAL GROOVING IN CONCRETE, BRIDGE DECK
		--
9	2501-0201057	PILES, STEEL, HP 10 X 57
		Includes furnishing and installing steel pile points.
10	2501-0201473	PILES, STEEL, HP 14 X 73
		Includes furnishing and installing steel pile points.
11	2501-5775000	PILES, STEEL SHEET
		Includes furnishing and field welding steel channel cap.
12	2501-8400172	TEMPORARY SHORING
		Item is for shoring adjacent to traffic for partial removal of existing WB deck and abutments. Item may be deleted if not necessary based on traffic staging plan.
13	2526-8285000	CONSTRUCTION SURVEY
		All alignment, stationing, connecting dimensions, and elevations used in the new details in these plans were developed based on the existing bridge plans. The Bridge Contractor shall field verify these details before starting construction.
14	2533-4980005	MOBILIZATION
		--
15	2599-9999010	EXISTING BRIDGE MONITORING
		Item is for instrumentation and monitoring of the existing US 30 bridges during foundation construction of the median bridge. See Special Provisions for Existing Bridge Monitoring.



Roadway quantities are included in the tied Road Plans, Project No. NHSX-030-5(302)--3H-85.

Design For 20° Skew (R.A.)

314'-8" x 30'-0" Pretensioned
Prestressed Concrete Beam Bridge

103'-10" End Spans107'-0" Interior Span

Estimated Bridge Quantities

STA. 1301+18.48 EB US 30 DetourTurn-in Date: August 2024

Story County

IOWA DEPARTMENT OF TRANSPORTATION

Design No. 425Design Sheet No.1 of 28FHWA No. 48731

General Notes:

This design is for the construction of a 314'-8" x 30'-0" Pretensioned Prestressed Concrete Beam Temporary Median Bridge on US 30 over the South Skunk River in the City of Ames, Iowa. Electronic plans of the existing W.B. bridge are available to the Contractor as part of the e-files supplied with the Contract Documents.

“Removals, As Per Plan” include all costs associated with removing portions of the existing abutment (wings, backwall, maskwall) and south deck overhang, curb, and rail of the existing W.B. bridge. Removals shall be in accordance with Section 2401, of the Standard Specifications. Any damage to other portions of the existing structure not noted for removal shall be repaired at no extra cost to the State.

The Bridge Contractor is to provide a method of removal that will prevent feather edging at the bottom of the existing slab. Care shall be taken when exposing existing reinforcing so the bond to existing concrete is not broken at the concrete break lines.

This bridge is designed for HL-93 loading. No future wearing surface load is included.

The City and utility companies whose facilities are shown on the plans or known to be within the construction limits shall be notified by the bridge Contractor of the construction starting date.

Faint lines on plans indicate the existing structure.

All alignment, stationing, connection dimensions, and elevations used in the new details in these plans were developed based on the existing bridge plans. The Bridge Contractor shall field verify these details before starting construction.

These bridge plans label all reinforcing steel with English notation (5# is 5 # inch diameter bar). English reinforcing steel received in the field may display the following "Bar Designation". The "Bar Designation" is the stamped impression on the reinforcing bars, and is equivalent to the bar diameter in millimeters.

English Size	3	4	5	6	7	8	9	10	11
Bar Designation	10	13	16	19	22	25	29	32	36

All reinforcing bars and bars noted as dowels supplied for this structure shall be deformed reinforcement unless otherwise noted or shown.

Minimum clear distance from face of concrete to near reinforcing bar is to be 2" unless otherwise noted or shown.

It shall be the bridge Contractor’s responsibility to provide sites for excess excavated material. No payment for overhaul will be allowed for material hauled to these sites.

Cast in-one-piece steel pile points are required for the abutment and pier piles in accordance with Article 4167.02 of the current Standard Specifications and Materials I.M. 468.

The Contractor shall be responsible for ensuring stability of prestressed concrete beams during erection and construction up through the concrete bridge deck reaching its full 28-day strength. The Contractor shall provide sufficient temporary anchor bracing at beam ends and temporary intermediate bracing as needed to ensure prestressed beam stability. Partially or fully installed permanent bracing as shown in these design plans shall not be assumed sufficient to brace prestressed beams during erection and construction. Temporary bracing shall not be welded to prestressed beam stirrups.

Keyway dimensions shown on the plans are based on nominal dimensions unless stated otherwise. In addition, the bevel used on the keyway shall be limited to a maximum of 10 degrees from vertical.

Testing for asbestos was performed on the existing WB bridge, no asbestos was detected in the samples tested. In the event asbestos is encountered during construction, cease work and notify the Owner.

The Contractor shall provide temporary shoring (sheet pile) as necessary to prevent the earth under the existing WB US 30 traffic lane, from sloughing in during construction. All costs for material, equipment, and labor shall be paid for under the "Temporary Shoring" bid item. This bid item may be deleted if temporary shoring is not necessary based on the traffic staging plan. All material used for shoring shall remain the property of the Contractor. Shoring is to be removed only after backfilling has been completed. The Contractor shall submit shoring plans for review. In addition to the requirements noted above, Article 1107.07 of the Standard Specifications still applies.



A scrape sample was taken from the existing WB bridge to get an indication of the existence of and level of total lead and total chromium. Analysis of total lead on this sample was 47.9 (abutment bearing) and 73.1 (girder) parts per million (ppm). Analysis of total chromium on this sample was 112 (abutment bearing) and 225 (girder) ppm. These analyses show the existence of these two toxic constituents. Levels indicated by these tests could create conditions above regulatory limits for health and safety requirements. No other constituents were analyzed. The Bidder should not rely on the Iowa DOT's testing and analysis for any purpose other than as an indication of the existence of these two toxic constituents.

The Bridge Contractor shall dress up the slopes around the existing wings which are disturbed during construction. This work shall be considered incidental and no extra payment will be made.

During construction of this project, the Bridge Contractor will be required to coordinate operations with those of other Contractors working within the same area. Other work in progresss during the same period of time will include, but is not limited to, construction of the following projects:

NHSX-030-5(302)--3H-85	Grade & Pave (Median)
NHSX-030-5(303)--3H-85	Traffic Signs
ITS-030-5(320)--25-85	ITS Infrastructure
ITS-030-5(325)--25-85	IWZ

Bridge Deck Dimensions Table			
No.	Item	Unit	Quantity
1	Deck Length	L.F.	324.8
2	Deck Width	L.F.	30.0
3	Deck Area	S.F.	9,744

1. Deck length is measured from face-to-face of paving notches along the **C** of the roadway.
2. Deck width is measured from out-to-out of deck perpendicular to the **C** of the roadway.
3. Deck area is to be based on the face-to-face paving notch distance and out-to-out deck dimensions.

The Contractor's attention is drawn to the non-standard beam details including pier and abutment steel diaphragm bolt holes and differing pier and abutment bearings. Beam coil ties shall be installed for future use. The beams will be removed and reinstalled in the future Westbound bridge replacement project.

404 Permit information and the Pollution Prevention Plan are included in the tied road plans, Project No. NHSX-030-5(302)--3H-85.

Traffic Control Plan

This structure is being constructed on a temporary detour alignment and will not be open to traffic until after completion of construction. Refer to the Traffic Control Plan inlcuded in the tied road plans, Project No. NHSX-030-5(302)--3H-85.

Specifications:

Design:
AASHTO LRFD 8th Ed, Series of 2017, except as noted in the current Iowa Bridge Design Manual.

Construction:
Iowa Department of Transportation Standard Specifications for Highway and Bridge Construction Series 2023, plus applicable General Supplemental Specifications, Developmental Specifications, Supplemental Specifications and Special Provisions shall apply to construction work on this project, including:
Special Provisions for Existing Bridge Monitoring

Design Stresses:
Design stresses for the following materials are in accordance with the AASHTO LRFD Bridge Design Specifications, 8th Ed, Series of 2017, except as noted in the current Iowa Bridge Design Manual.

Reinforcing steel in accordance with AASHTO LRFD Section 5, Grade 60 for epoxy coated and non-coated, and Grade 60 or 75 for stainless.

Concrete in accordance with AASHTO LRFD Section 5, f'c = 4.0 ksi, except prestressed beam concrete as noted.

Prestressed concrete beams, see beam details on Design Sheet 22.

Structural steel in accordance with AASHTO LRFD Section 6. ASTM A709 Grade 36 and Grade 50 (AASHTO M270 Grade 36 and Grade 50).

Design History at this Site	
(Includes this Design)	
Des. No.	Type of Work
3061	Original Design
781	Bridge Repairs
684	Overlay & Retrofit Rail
405	Rail End Sections
425	Temporary Bridge

Working Drawing and Calculation Submittals			
Working drawings and calculations shall be submitted for the following items shown in the table below. (Note additional working drawings and calculations may be required in accordance with Article 1105.03 of the Standard Specifications.)			
Submittal requirements for working drawings and calculations shall be in accordance with 1105.03 of the Standard Specifications for Highway and Bridge Construction of the Iowa Department of Transportation. The absence of a certification requirement for a submittal does not relieve the Contractor of the responsibility to attain certification.			
Calculation submittals in this table which are associated with working drawing submittals shall be submitted on the same day. Review time for calculation submittals shall be of the same duration as and run concurrently with review time for associated working drawings. The calculation submittals listed in the table are not meant to be an exhaustive list and do not relieve the Contractor from providing additional calculation submittals if requested by the Engineer.			
No.	Working Drawing Description	Working Drawing File Name Convention For Submittal	Certified by Iowa P.E. (Yes/No)
1	Intermediate Diaphragms	(271)_Story_Design425_IntermediateDiaphragms.pdf	No
2	Pier & Abutment Diaphragms	(271)_Story_Design425_Pier&AbutmentDiaphragms.pdf	No
3	Temporary Shoring	(271)_Story_Design425_TemporaryShoring.pdf	No
4	Instrumentation & Monitoring Plan	(271)_Story_Design425_MonitoringPlan.pdf	No
--			
No.	Calculation Description	Calculation File Name Convention For Submittal	Certified by Iowa P.E. (Yes/No)
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Design For 20° Skew (R.A.)

314'-8" x 30'-0" Pretensioned Prestressed Concrete Beam Bridge

103'-10" End Spans107'-0" Interior Span

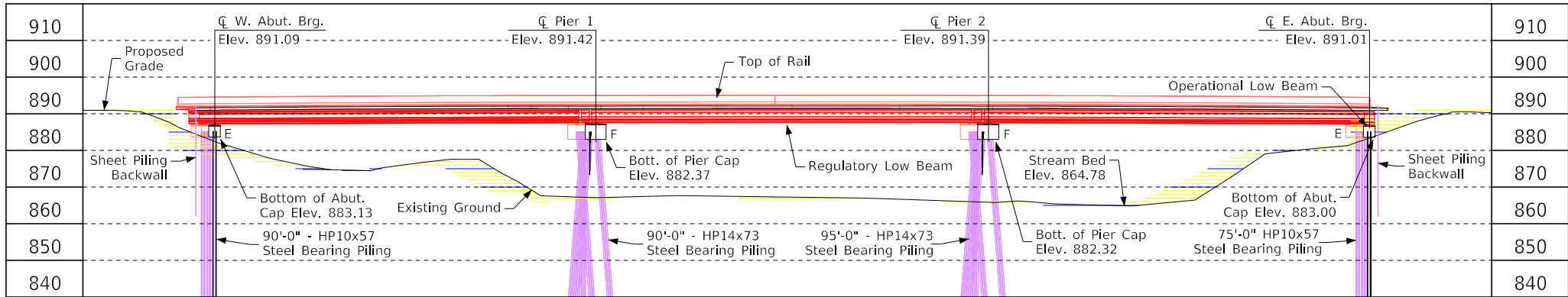
General Notes

STA. 1301+18.48 EB US 30 DetourTurn-In Date: August 2024

Story County

IOWA DEPARTMENT OF TRANSPORTATION

Design No. 425Design Sheet No.3 of 28FHWA No. 48731



Longitudinal Section Along CL Approach Roadway

$g_1 = +0.79\%$ $g_2 = -0.85\%$
PI Sta. = 1301+19.15
PI Elev. = 892.48
V.C. = 500.00'

Proposed Profile
Grade On EB US 30 Detour

Hydraulic Data

(Provided for information only)

Drainage area = 556 SQ. MI.
Stream slope = 2.50 FT./MI.
Avg. low water stage = el. 868.9

$Q_{25} = 17,050$ CFS (19,900 CFS)
25 YR. Operational
Stage = 882.1

$Q_{50} = 17,050$ CFS (19,990 CFS)
Stage = 882.1
Regulatory Low beam = 886.8
Backwater = -0.16 Ft./ -
Avg. bridge velocity = 4.4 FPS

$Q_{100} = 19,860$ CFS (23,500 CFS)
Stage = 882.5
Backwater = -0.61 Ft./0.25 FT.
Avg. bridge velocity = 4.9 FPS

$Q_{200} = 22,870$ CFS (27,400 CFS)
100 YR. Operational/50 YR. projected
Stage = 883.1
Backwater = -0.49 Ft.
Avg. bridge velocity = 5.4 FPS

$Q_{500} = 27,000$ CFS (33,100 CFS)
100 YR. Projected
Operational low beam = 886.21
Stage = 883.7

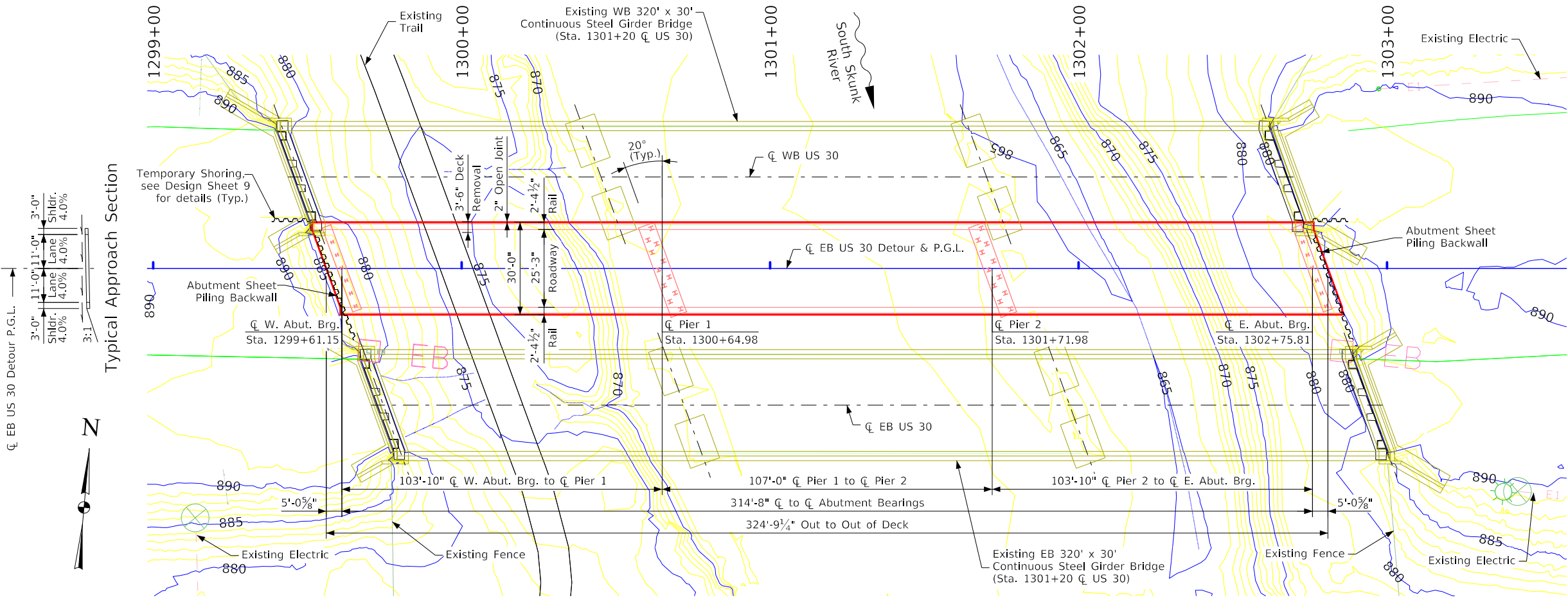
$Q = 31,000$ CFS (42,300 CFS)
200 YR. Projected
Stage = 884.6
Avg. bridge velocity = 6.7 FPS
Calculated design scour = 850.1

$Q = 34,200$ CFS (50,500 CFS)
500 YR. Projected
Stage = 885.2
Avg. bridge velocity = 7.0 FPS
Calculated check scour = 848.4

Roadway overtop = 30,200 CFS
Roadway overtop El. = 884.5
Sta. 1288+75

Discharge in parentheses represents total streamflow.

Backwater references change from existing/pre-development condition near first high-damage potential development upstream of project site (d/s 16th st. near west side menards, central landscape).



Utilities Legend:

SYMBOL - TYPE

- E1 Electric (Iowa DOT)
- F0 Fiber Optic (Iowa Comm. Network)
- SAN Sanitary Sewer (City of Ames)

Utilities Shown on this sheet are for information only. See road design sheets for final utility information.

Location

US 30 over the Skunk River
Temporary Bridge
T-83N R-24W
Section 13
Washington Township
Story County
City of Ames
FHWA No. 48730 (existing Eastbound)
FHWA No. 48731 (proposed Eastbound)
Latitude 42.006021°
Longitude -93.595166°

Traffic Estimate

2021 AADT 15,550 V.P.D.
2025 AADT 18,671 V.P.D.
Trucks 7 %

Situation Plan

Note:
The temporary bridge (Design No. 425) is being designed and built on the EB US 30 Detour alignment, see Median Grade and Pave Project No. NHSX-030-5(302)--3H-85 for additional details.

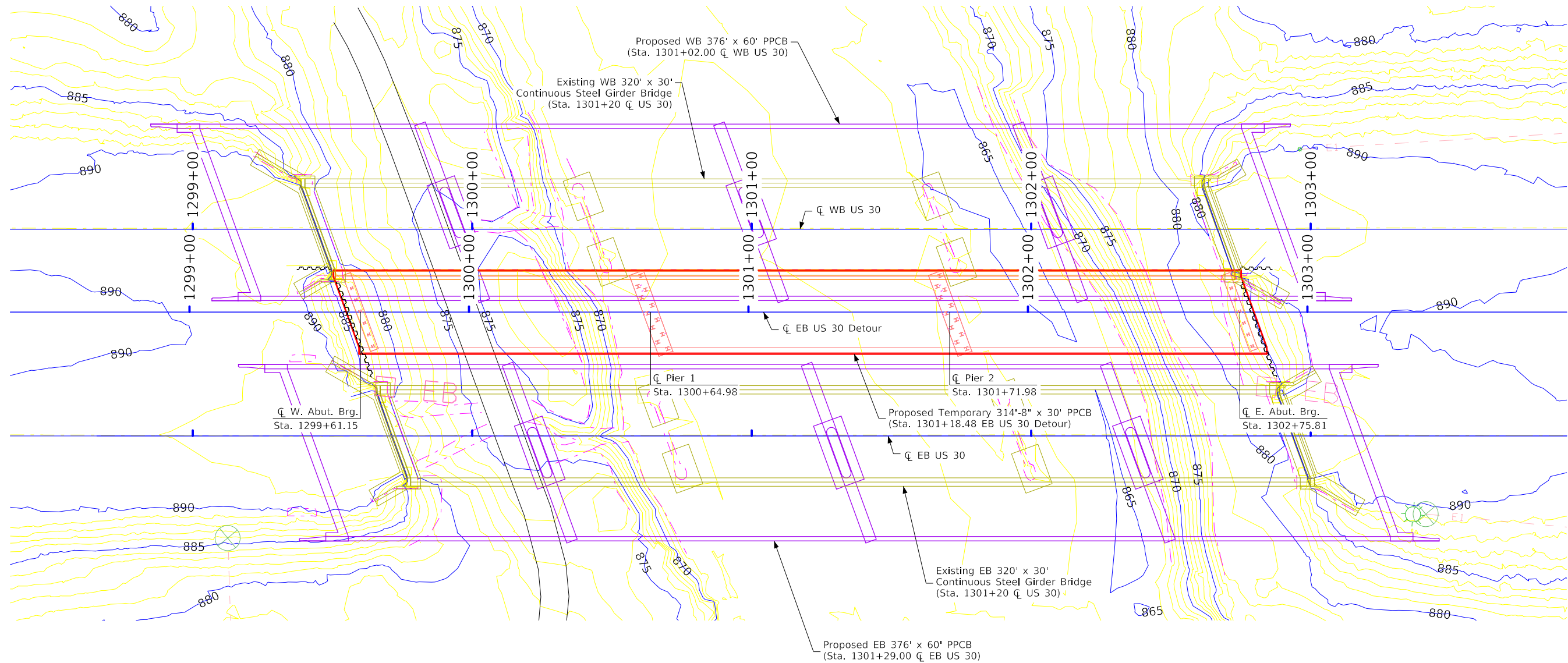
Design For 20° Skew (R.A.)
314'-8" x 30'-0" Prestressed Concrete Beam Bridge
103'-10" End Spans 107'-0" Interior Span

Situation Plan

STA. 1301+18.48 EB US 30 Detour Turn-in Date: August 2024

Story County

IOWA DEPARTMENT OF TRANSPORTATION
Design No. 425 Design Sheet No.4 of 28 FHWA No. 48731



Site Plan



Design For 20° Skew (R.A.)

314'-8" x 30'-0" Prestensioned Prestressed Concrete Beam Bridge

103'-10" End Spans 107'-0" Interior Span

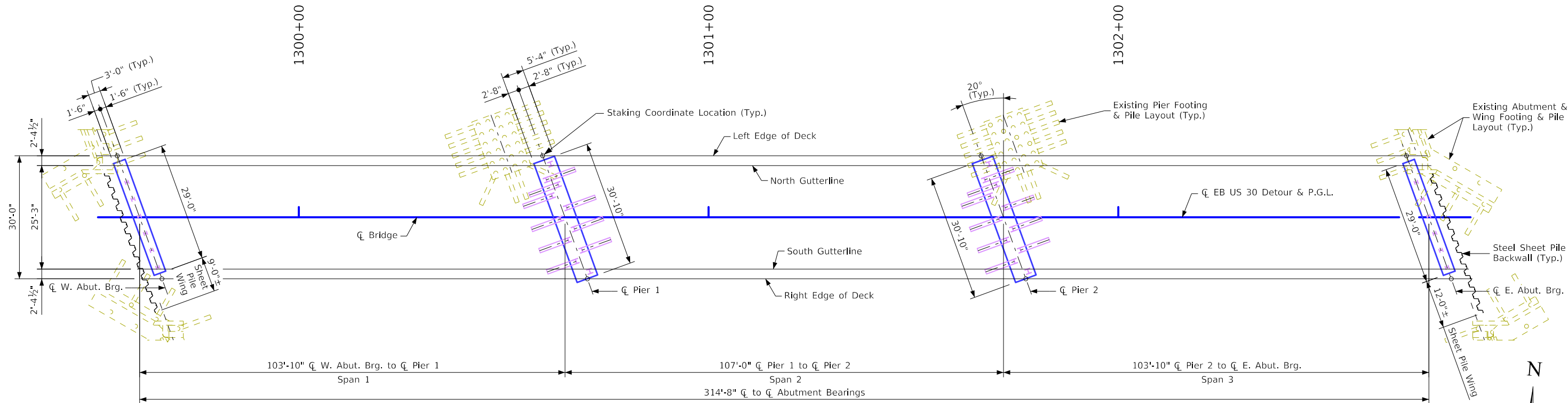
Site Plan

STA. 1301+18.48 EB US 30 Detour Turn-in Date: August 2024

Story County

IOWA DEPARTMENT OF TRANSPORTATION

Design No. 425 Design Sheet No. 5 of 28 FHWA No. 48731



Design For 20° Skew (R.A.)

**314'-8" x 30'-0" Pretensioned
Prestressed Concrete Beam Bridge**

103'-10" End Spans 107'-0" Interior Span

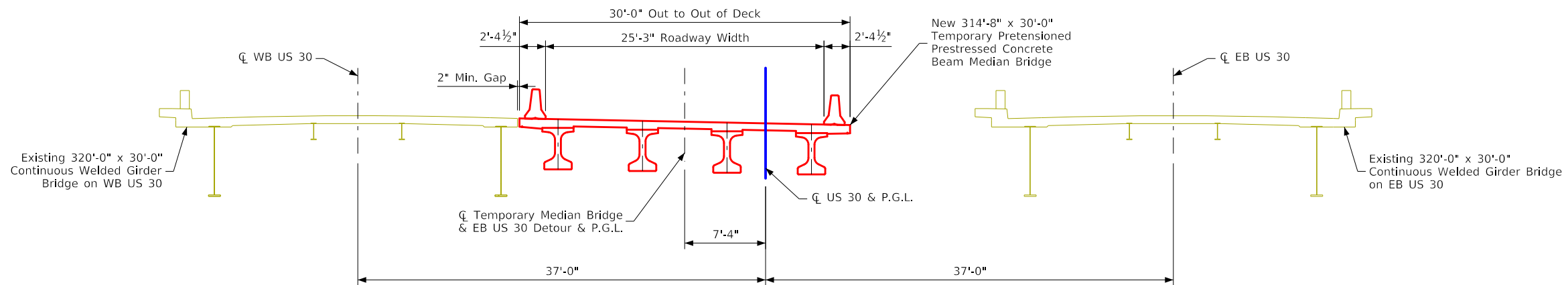
Staking Diagram

STA. 1301+18.48 EB US 30 Detour Turn-in Date: August 2024

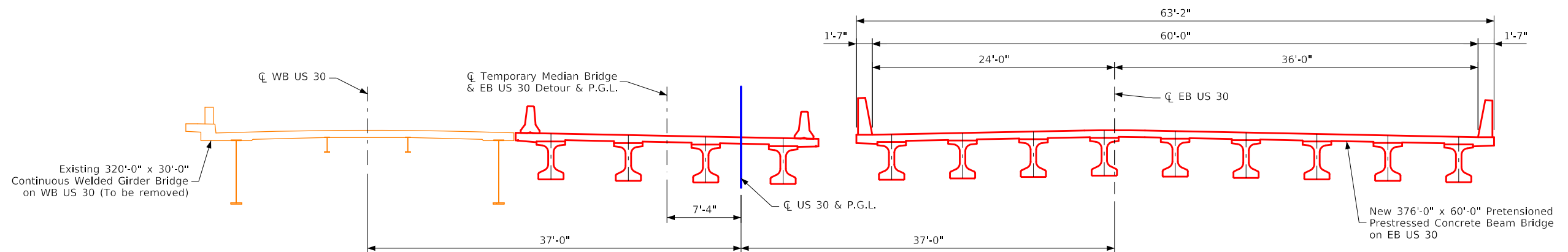
Story County

IOWA DEPARTMENT OF TRANSPORTATION

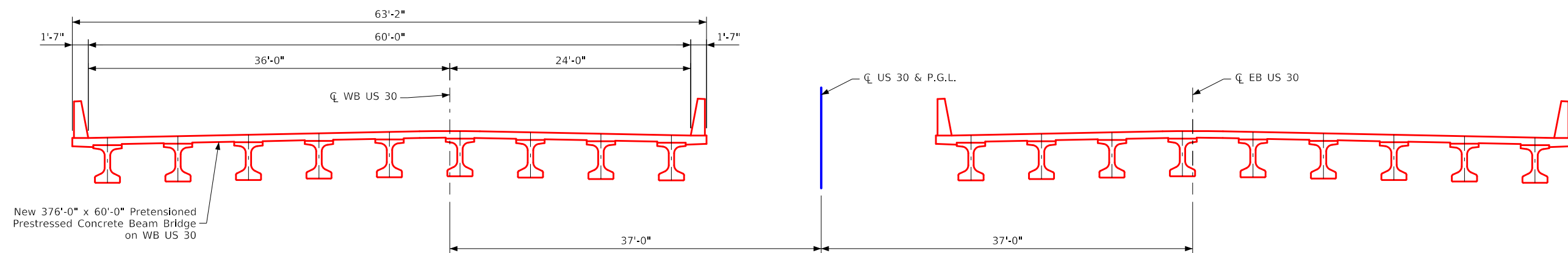
Design No. 425 Design Sheet No. 6 of 28 FHWA No. 48731



Year 1 - WB Bridge Partial Removal & Detour Bridge Construction



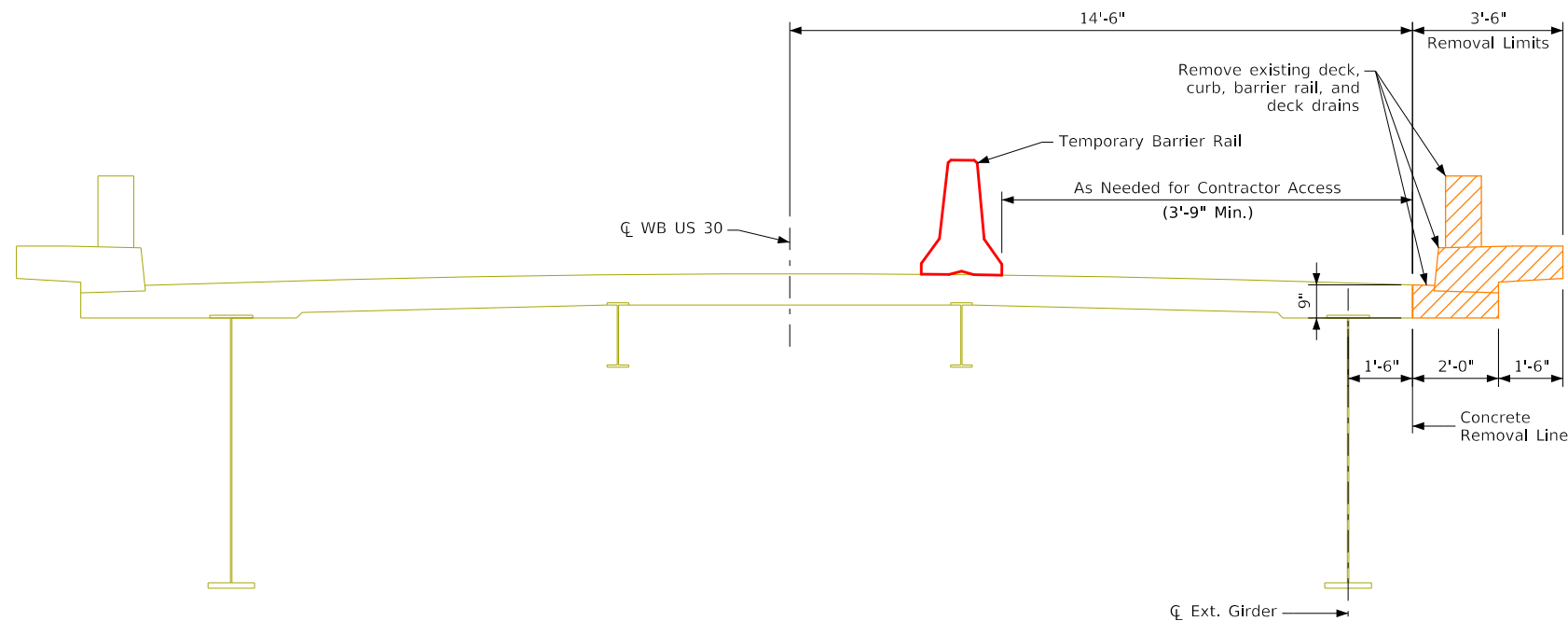
Year 2 - New EB Bridge Construction



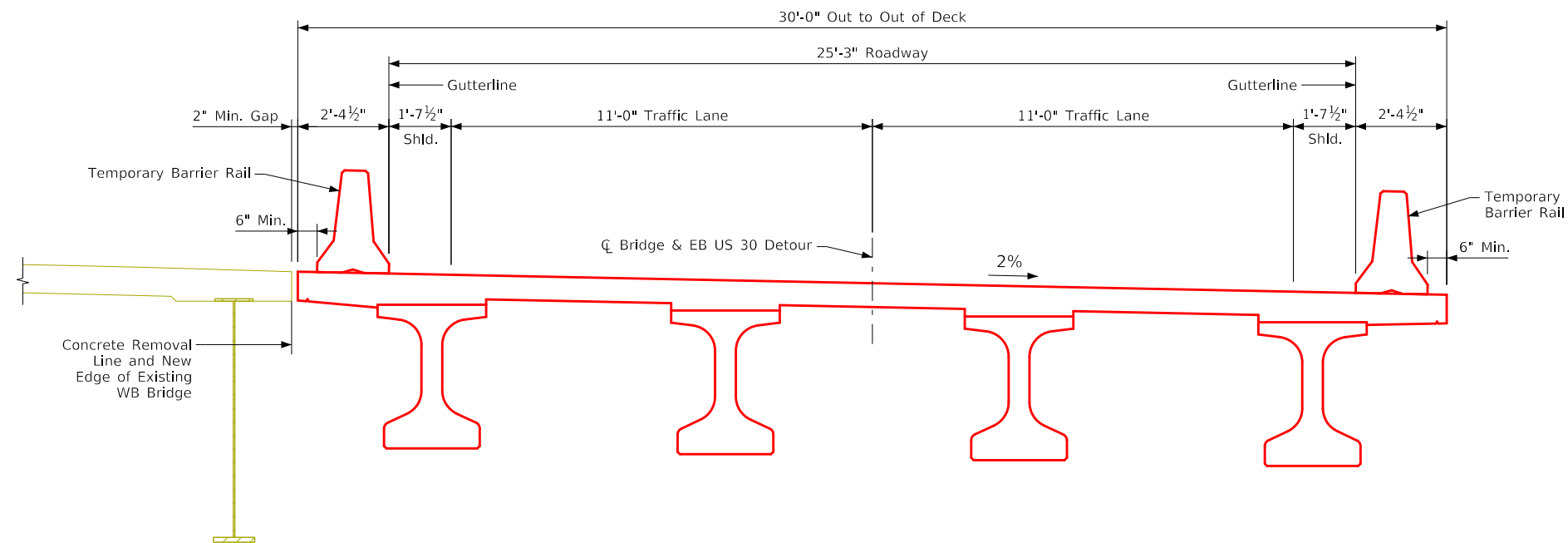
Year 3 - New WB Bridge Construction

Design For 20° Skew (R.A.)
**314'-8" x 30'-0" Pretensioned
Prestressed Concrete Beam Bridge**
103'-10" End Spans 107'-0" Interior Span
Project Staging Plan
STA. 1301+18.48 EB US 30 Detour Turn-in Date: August 2024
Story County
IOWA DEPARTMENT OF TRANSPORTATION
Design No. 425 Design Sheet No. 7 of 28 FHWA No. 48731





Existing WB Bridge Removal (Year 1 - Stage 1)
(Looking East)



Eastbound Detour Bridge Construction (Year 1 - Stages 1-3)
(Looking East)

Existing Bridge Removal Notes:

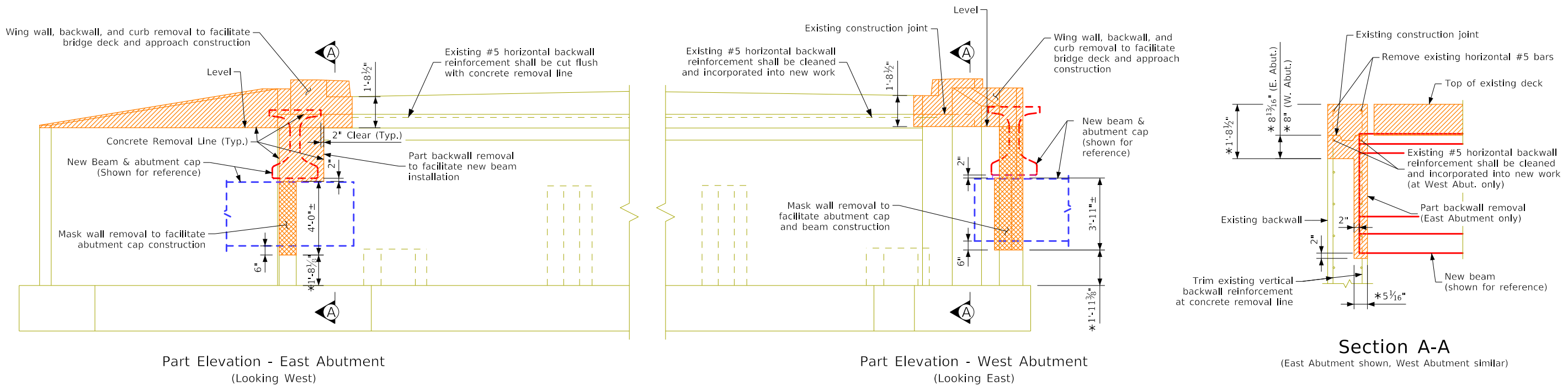
The Contractor shall remove the south deck overhang, curb, rail, and deck drains as detailed on this sheet to facilitate construction of the temporary median bridge. Deck removal shall be performed with a full-depth sawcut and include removal of transverse reinforcing. The Contractor shall locate the edge of girder top flange near the piers to ensure the full-depth sawcut will not damage the top flange. Expected minimum clearance between the edge of flange and concrete removal line is 4 inches.

Removals shall be in accordance with Section 2401, of the Standard Specifications. Any damage to other portions of the existing structure not noted for removal shall be the responsibility of the bridge Contractor and shall be repaired at no additional cost to the State.



Design For 20° Skew (R.A.)		
314'-8" x 30'-0" Pretensioned		
Prestressed Concrete Beam Bridge		
103'-10" End Spans	107'-0" Interior Span	
Removal & Staging Details		
STA. 1301+18.48 EB US 30 Detour	Turn-In Date: August 2024	
Story County		
IOWA DEPARTMENT OF TRANSPORTATION		
Design No. 425	Design Sheet No.8 of 28	FHWA No. 48731

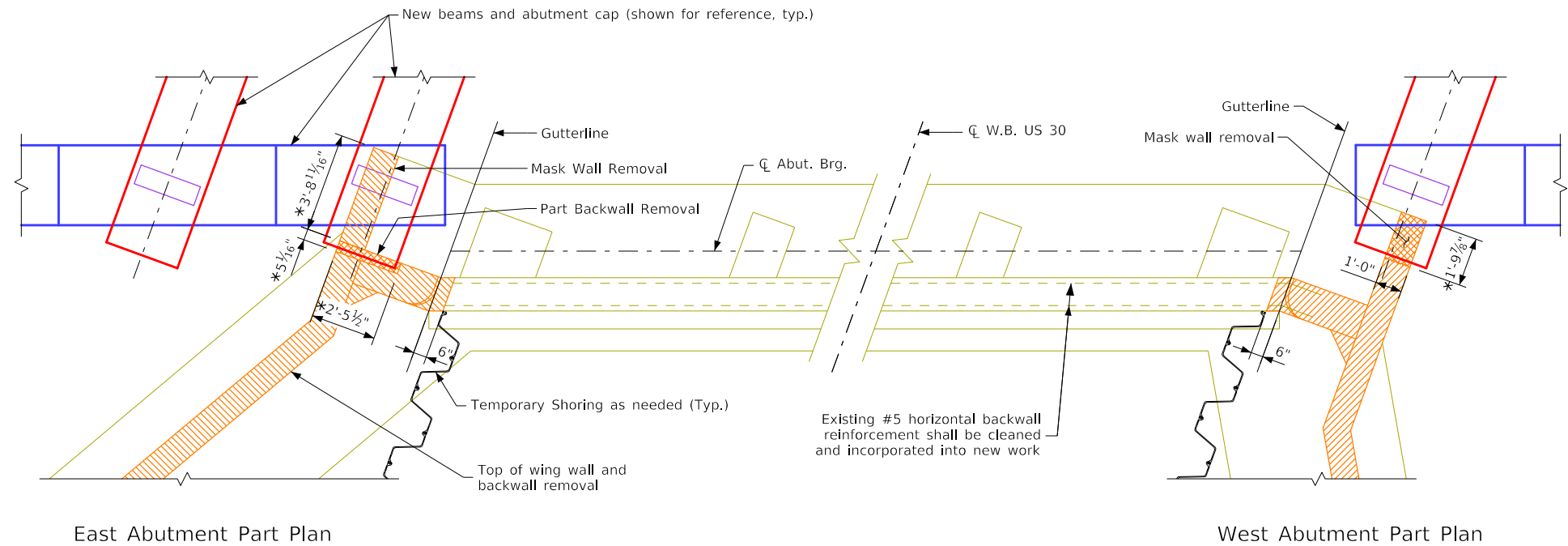
FILE NO. 32491	ENGLISH	DESIGN TEAM MJR\BJF\RCM\UJO	Story COUNTY	PROJECT NUMBER BRF-030-5(271)--38-85	SHEET NUMBER V.8
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Existing WB Bridge Abutment Removals - Rear Elevation View

Note: All existing reinforcement in the backwall, wing wall, and mask wall shall be trimmed at concrete removal lines, except where noted.

* Dimensions based on existing plans. Contractor shall be responsible for verifying with field measurements.



Existing WB Bridge Abutment Removals - Plan View

Design For 20° Skew (R.A.)

314'-8" x 30'-0" Prestressed Concrete Beam Bridge

103'-10" End Spans 107'-0" Interior Span

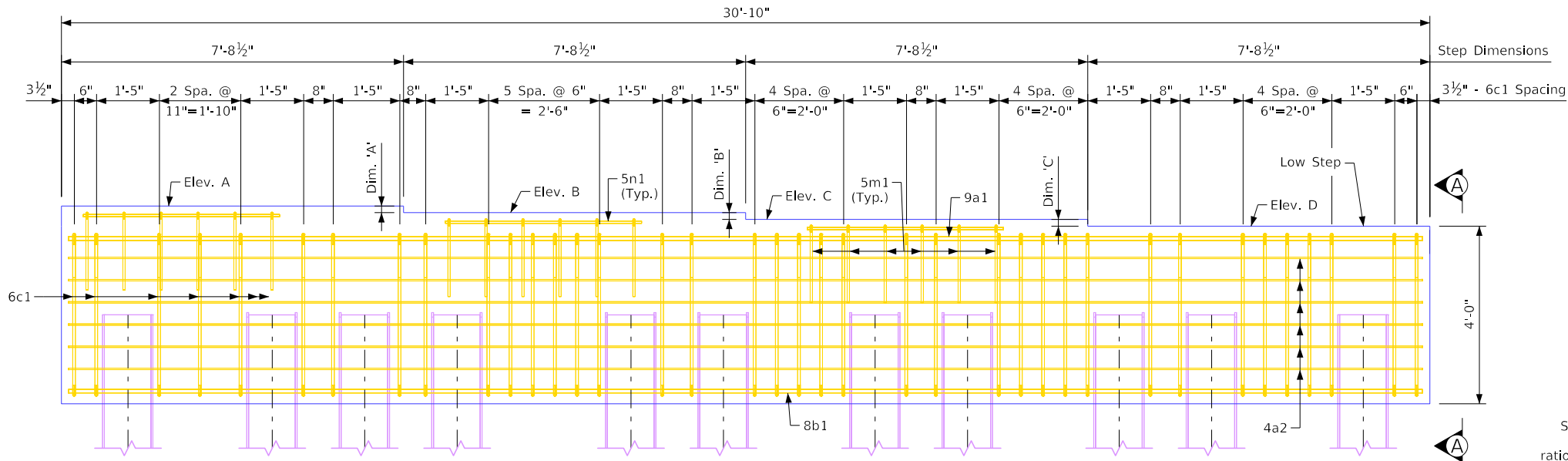
Abutment Removal Details

STA. 1301+18.48 EB US 30 Detour Turn-in Date: August 2024

Story County

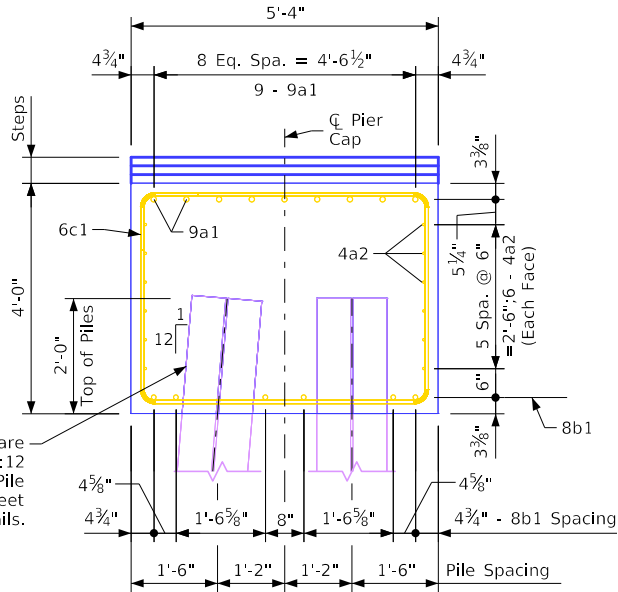
IOWA DEPARTMENT OF TRANSPORTATION

Design No. 425 Design Sheet No.9 of 28 FHWA No. 48731

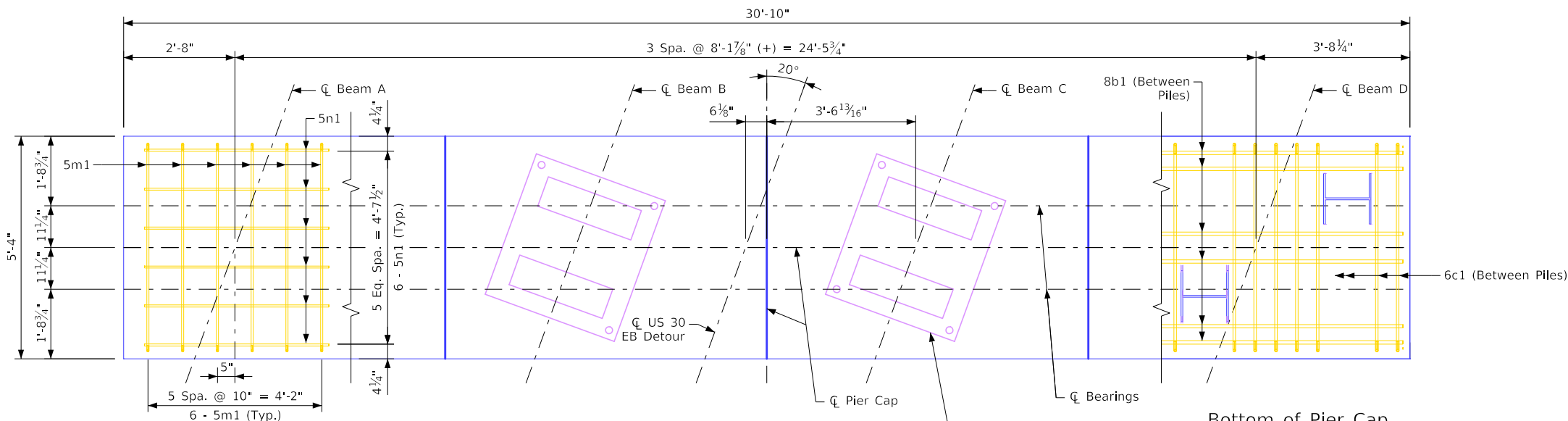


Pier Elevation
(Looking East)

Pile Cap Bar Spacing and Tolerance Note:
Bar spacing and locations for 6c1 and 8b1 bars may need adjustment in the field due to final pile locations. For the 6c1 bars, a bar shall be shifted to the other side of the encroaching pile. For the 8b1 bars, there shall be 2 bars on each side of each pile. Adjust spacing of 6c1 and 8b1 bars as necessary with a minimum spacing of 3¼" on center.



Section A-A



Pier Cap Plan

Elevation Table

Elevation	Pier 1	Pier 2
A	886.81	886.80
B	886.66	886.64
C	886.52	886.48
D	886.37	886.32
Bott. Pier Cap	882.37	882.32

Step Dimensions

Dimension	Pier 1	Pier 2
Dim. 'A'	1 13/16"	1 7/8"
Dim. 'B'	1 13/16"	1 5/16"
Dim. 'C'	1 13/16"	1 5/16"

Design For 20° Skew (R.A.)
314'-8" x 30'-0" Prestressed Concrete Beam Bridge
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Pier Details

STA. 1301+18.48 EB US 30 Detour Turn-in Date: August 2024

Story County

IOWA DEPARTMENT OF TRANSPORTATION

Design No. 425 Design Sheet No.10 of 28 FHWA No. 48731

Pier Notes:

Minimum clear distance from face of concrete to near reinforcing bar is to be 2” unless otherwise noted or shown.

Steel pile points are required for the steel H-piles at the piers.

Chamfer all corners³/₄" unless noted otherwise.

Pier pile locations and batter were designed to avoid existing Westbound pier footing piles. Pile locations may be adjusted to the extent possible as described by the Pile Cap Bar Spacing and Tolerance Note on Design Sheet 10. Contact the Engineer if pile adjustment greater than 6 inches is needed or if conflicts occur which prevent pile driving to the minimum required bearing and embedment.

Pier 1 Pile Notes:

The contract length of 90 feet for the Pier 1 piles is based on a non-cohesive soil classification, a total factored axial load per pile (Pu) of 245 kips, and a geotechnical resistance factor (phi) of 0.55 for soil and 0.7 for rock end bearing.

The nominal axial bearing resistance for construction control was determined from a non-cohesive soil classification and a geotechnical resistance factor (phi) of 0.55 for soil and 0.7 for rock end bearing. Piles are assumed to be driven from start elevation 868.0. Design scour (200-Year) was assumed to affect the upper 18 feet of embedded pile length and cause 64 kips of driving resistance.

The required nominal axial bearing resistance for Pier 1 piles is 235 tons at end of drive or retap. The pile contract length shall be driven as per plan unless piles reach refusal. In no case shall a pile be embedded less than 45 feet. Construction control requires a WEAP analysis with bearing graph.

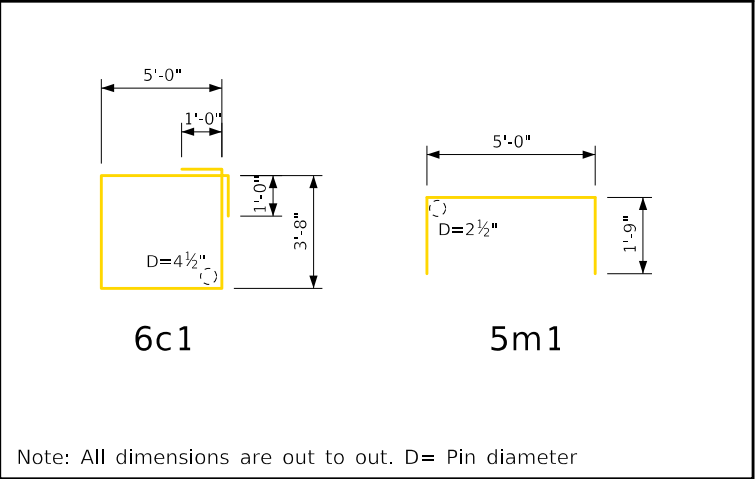
Pier 2 Pile Notes:

The contract length of 95 feet for the Pier 2 piles is based on a non-cohesive soil classification, a total factored axial load per pile (Pu) of 245 kips, and a geotechnical resistance factor (phi) of 0.55 for soil and 0.7 for rock end bearing.

The nominal axial bearing resistance for construction control was determined from a non-cohesive soil classification and a geotechnical resistance factor (phi) of 0.55 for soil and 0.7 for rock end bearing. Piles are assumed to be driven from start elevation 862.8. Design scour (200-Year) was assumed to affect the upper 13 feet of embedded pile length and cause 46 kips of driving resistance.

The required nominal axial bearing resistance for Pier 2 piles is 225 tons at end of drive or retap. The pile contract length shall be driven as per plan unless piles reach refusal. In no case shall a pile be embedded less than 45 feet. Construction control requires a WEAP analysis with bearing graph.

Bent Bar Detail



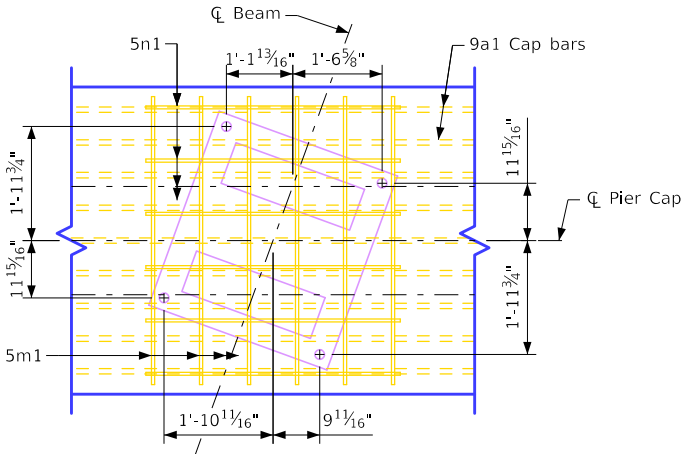
Non-Coated Reinforcing Steel
Bar List – One Pier

Bar	Location	Shape	No.	Length	Weight
9a1	Pier Cap, Longitudinal, Top		9	30'-6"	933
4a2	Pier Cap, Longitudinal, Sides		12	30'-6"	244
8b1	Pier Cap, Longitudinal, Bottom		6	30'-6"	489
6c1	Pier Cap, Transverse, Stirrups		38	19'-4"	1,103
5m1	Pier Cap Step, Transverse		18	8'-6"	160
5n1	Pier Cap Step, Longitudinal		18	4'-5"	83
Non-Coated Reinforcing Steel – Total (lbs.)					3,012

Concrete Placement Quantities

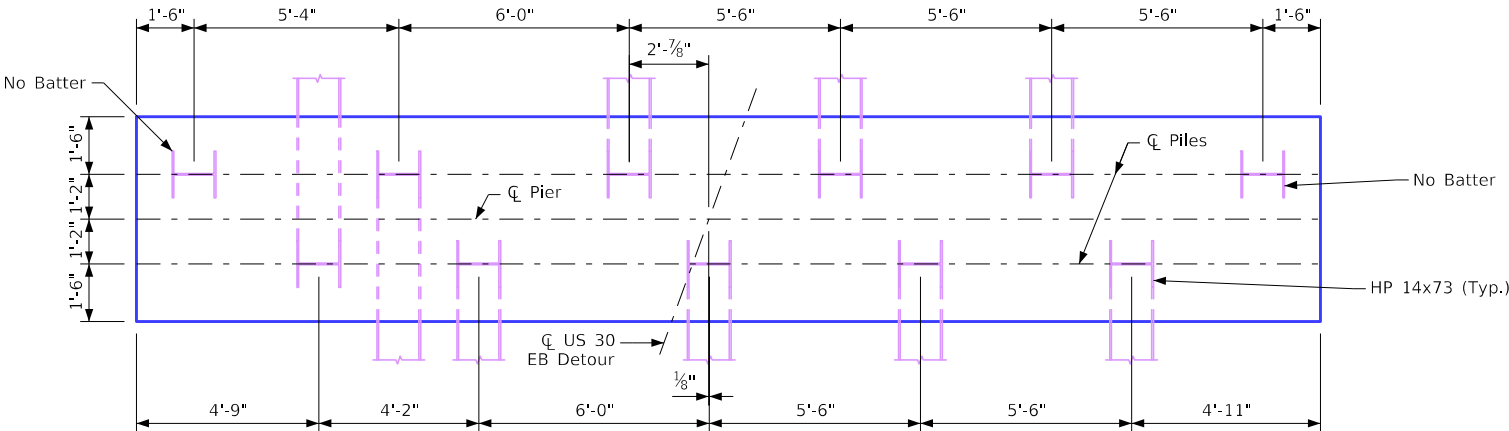
Location	Quantity
Pier 1 Cap	25.7
Pier 2 Cap	25.8
Total (cu. yds.)	51.5

Note: Concrete and reinforcing steel quantities are included on the summary quantities sheet.



Anchor Bolt Layout

Anchor bolts shall be set in drilled holes per Article 2405.03, H, 2 of the Standard Specifications.



Pier Pile Layout

Pile spacing shown are at bottom of pile cap.
Batter piles 12:1 in the direction shown.
11 - HP14x73 steel piles required at each pier.
Existing piles not shown for clarity.



Design For 20° Skew (R.A.)

314'-8" x 30'-0" Prestensioned
Prestressed Concrete Beam Bridge

103'-10" End Spans107'-0" Interior Span

Pier Details

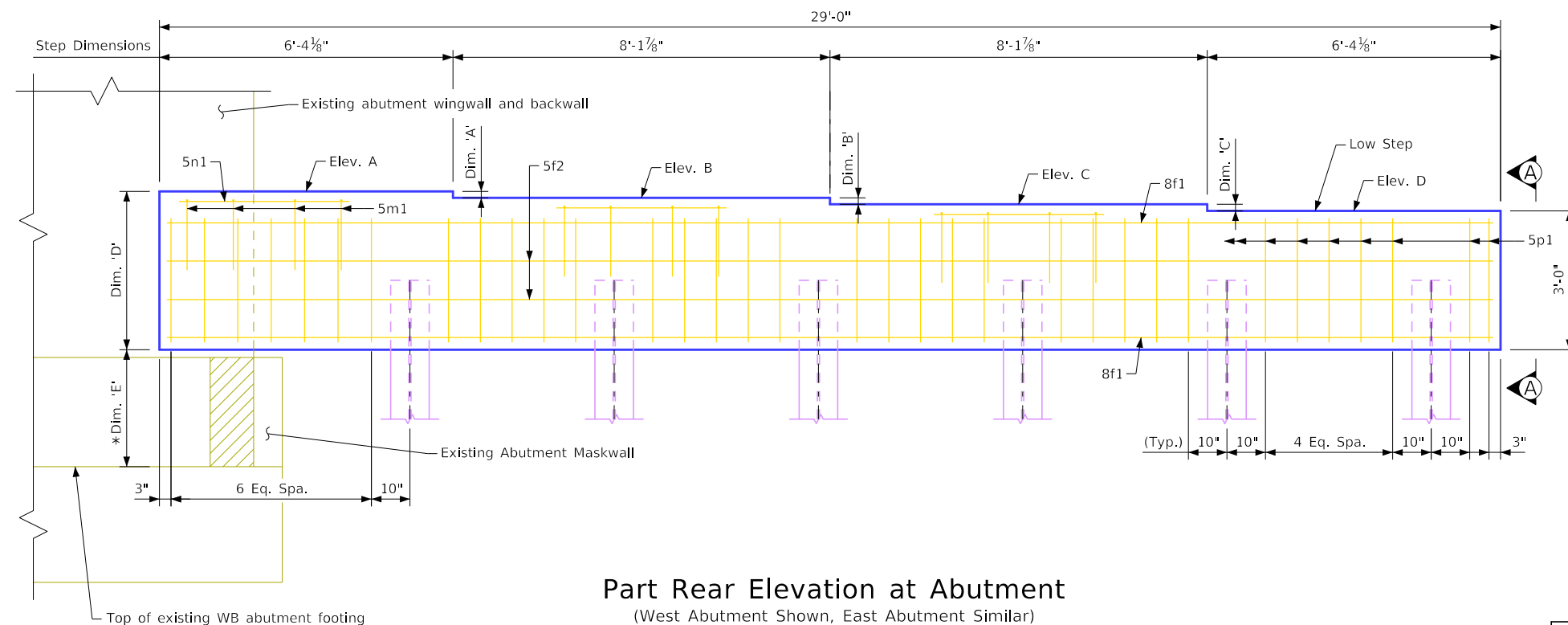
STA. 1301+18.48 EB US 30 DetourTurn-in Date: August 2024

Story County

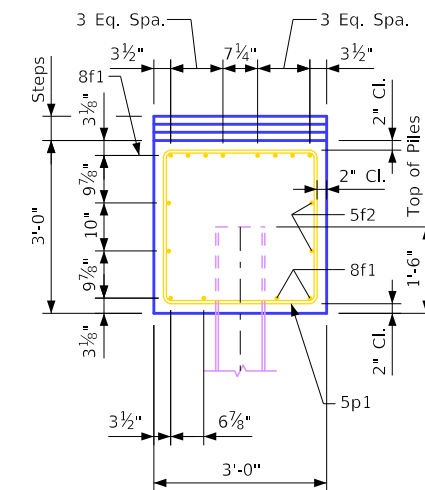
IOWA DEPARTMENT OF TRANSPORTATION

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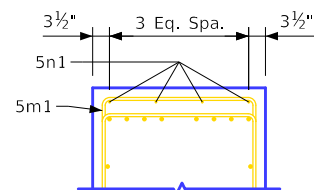
Control Point: N. 7639937.050, E. 18534748.551, Elev. 878.893 CP FD NGS MON 48' South of US 30 EB C, 670' West of Dayton Ave. C



Part Rear Elevation at Abutment
(West Abutment Shown, East Abutment Similar)
(Looking East)
(Sheet Pile Back Wall and Wing Wall not shown)



Section A-A

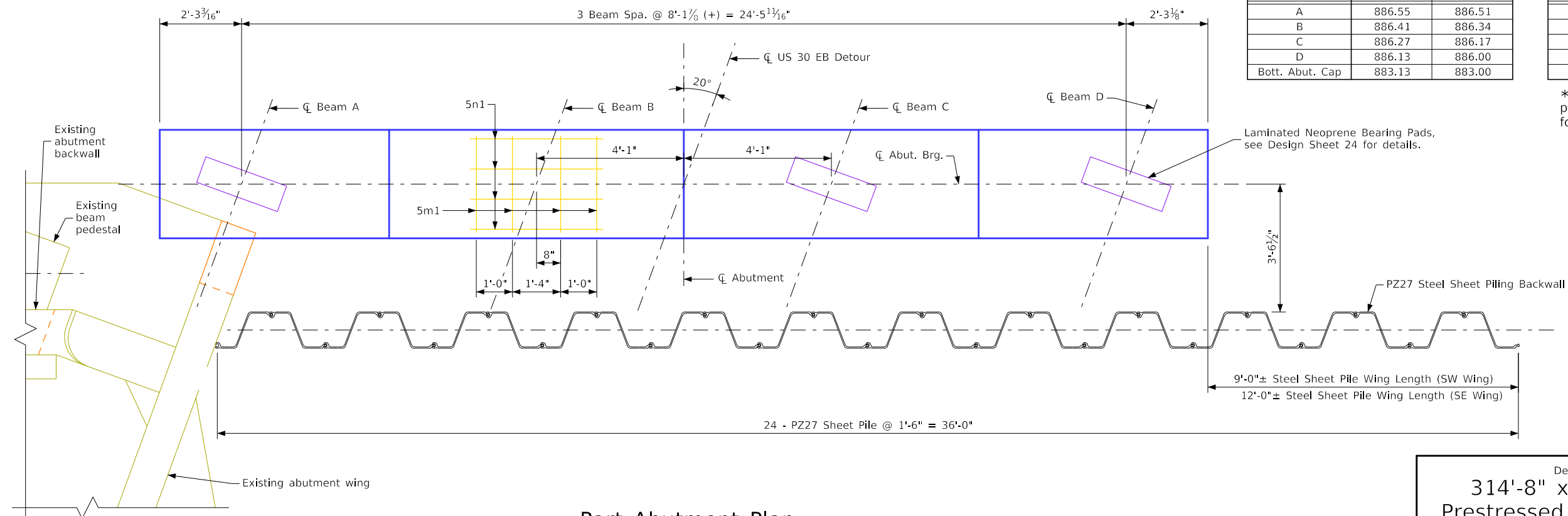


5m1 & 5n1 Bar Layout

Elevation Table		
Elevation	W. Abut.	E. Abut.
A	886.55	886.51
B	886.41	886.34
C	886.27	886.17
D	886.13	886.00
Bott. Abut. Cap	883.13	883.00

Dimension Table		
Dimension	W. Abut.	E. Abut.
Dim. 'A'	11 $\frac{11}{16}$ "	2"
Dim. 'B'	1 $\frac{11}{16}$ "	2"
Dim. 'C'	11 $\frac{11}{16}$ "	2"
Dim. 'D'	3'-5"	3'-6 $\frac{11}{16}$ "
*Dim. 'E'	2'-5 $\frac{3}{8}$ " $\pm$	2'-2 $\frac{11}{16}$ " $\pm$

* Dim. 'E' based on original bridge plans. Contractor shall be responsible for verifying with field measurements.

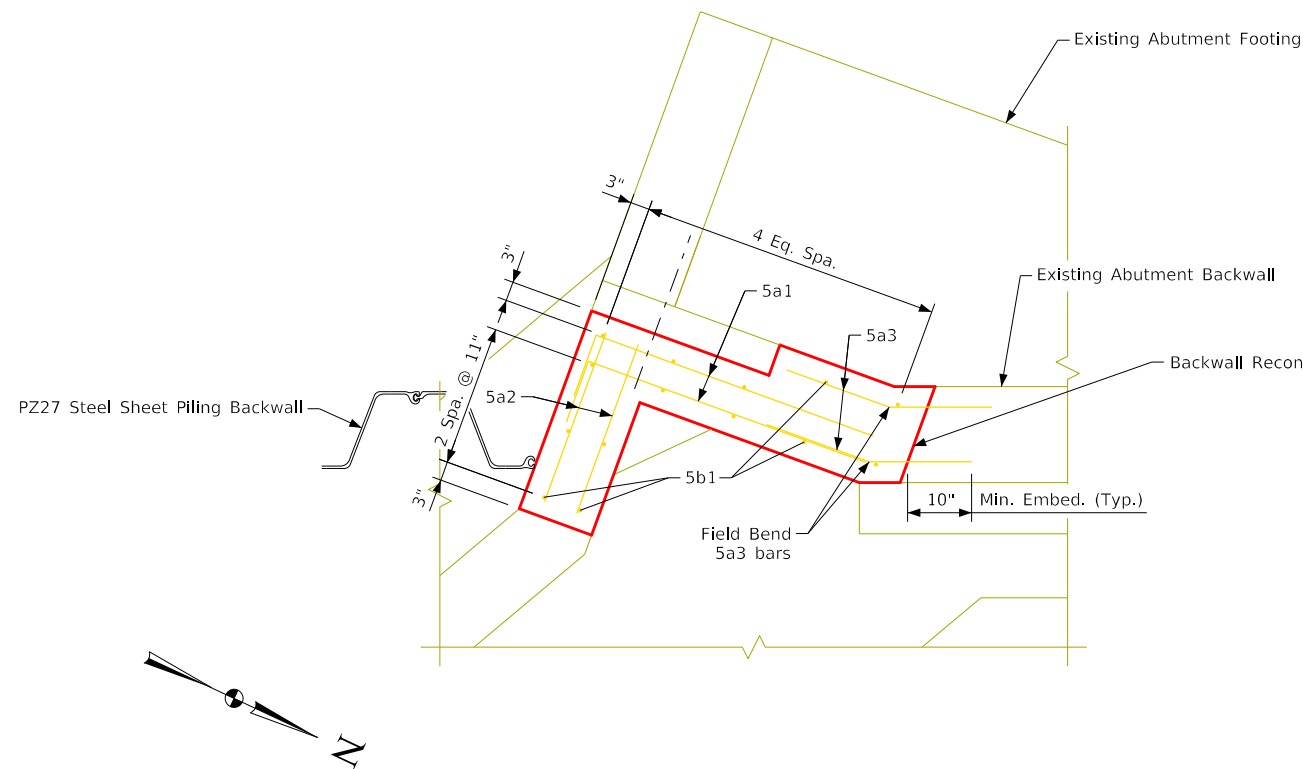


Part Abutment Plan

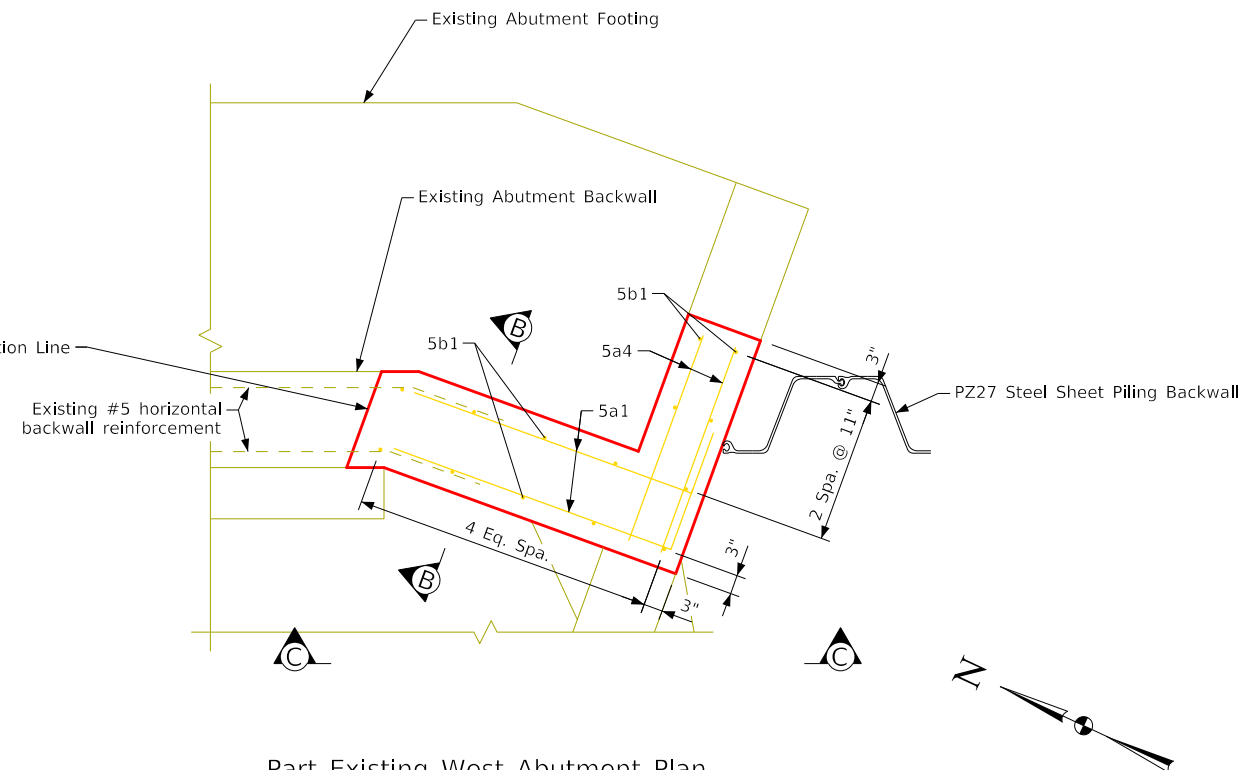
(West Abutment Shown, East Abutment Similar)

Note: Refer to Design Sheet 28 for additional sheet pile details.

Design For 20° Skew (R.A.)
314'-8" x 30'-0" Pretensioned
Prestressed Concrete Beam Bridge
103'-10" End Spans 107'-0" Interior Span
Abutment Details
STA. 1301+18.48 EB US 30 Detour Turn-in Date: August 2024
Story County
IOWA DEPARTMENT OF TRANSPORTATION
Design No. 425 Design Sheet No.12 of 28 FHWA No. 48731

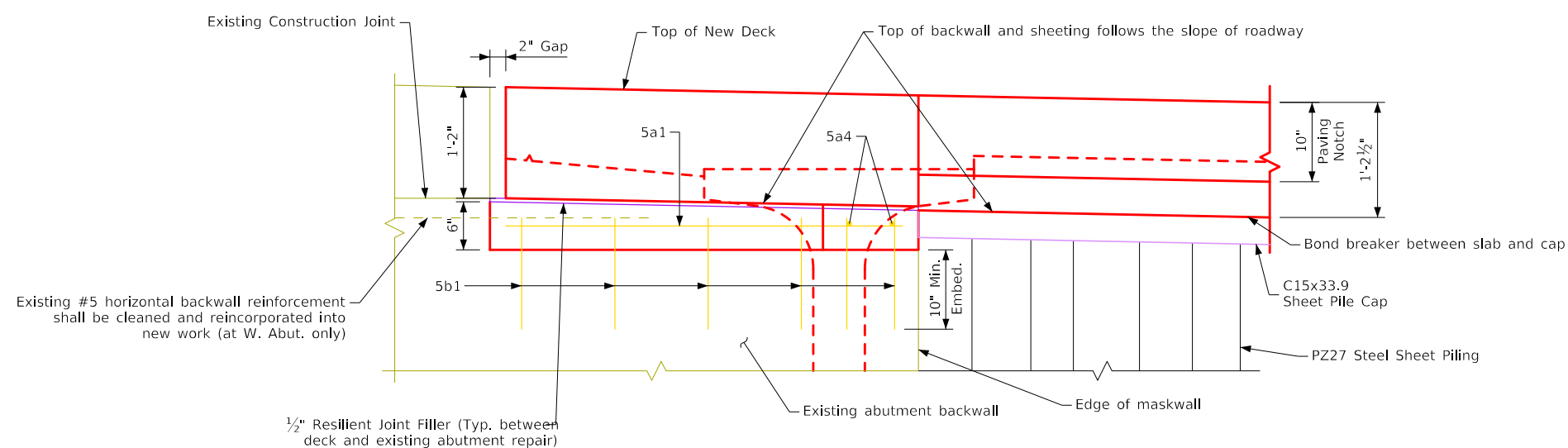


Part Existing East Abutment Plan

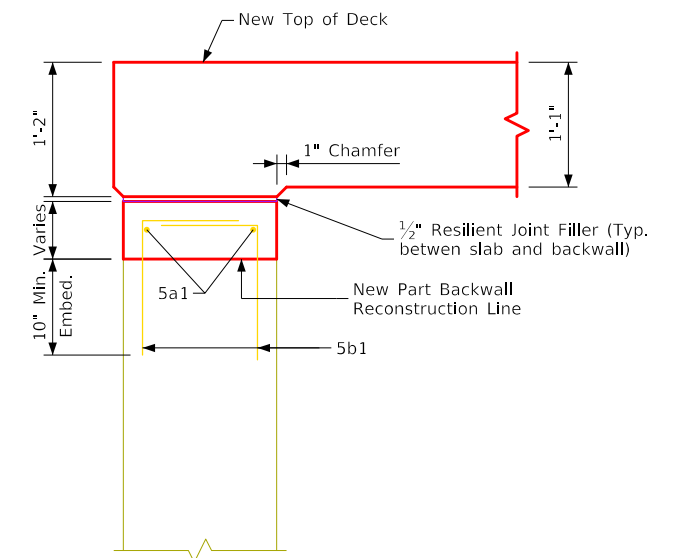


Part Existing West Abutment Plan

Existing Abutment Backwall Reconstruction (New Abutment Cap and Beam not shown for clarity)



Section C-C
(Shown at W. Abut., E. Abut. similar)
(New Beam and Deck shown)



Section B-B
(Shown at W. Abut., E. Abut. similar)

Notes:
Refer to Design Sheet 28 for additional sheet pile details.

Refer to Design Sheet 14 for abutment notes.

Design For 20° Skew (R.A.)

314'-8" x 30'-0" Prestressed Concrete Beam Bridge

103'-10" End Spans 107'-0" Interior Span

Abutment Details

STA. 1301+18.48 EB US 30 Detour Turn-in Date: August 2024

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Abutment Notes:

Minimum clear distance from face of concrete to near reinforcing bar is to be 2” unless otherwise noted or shown.

Chamfer all corners ¾" unless noted otherwise.

Steel pile points are required for the steel H-piles at the abutments.

The tops of the existing abutment backwalls and maskwalls as shown shall be constructed using Structural Concrete Class C. Promptly after the concrete has been placed and vibrated as provided in Articles 2403.03, C, and 2403.03, D, of the Standard Specifications, it shall be hand finished to provide a smooth surface with the proper crown. The Contractor may elect to use formwork which is marked or trimmed to the correct elevation and crown to provide the limits for the hand finishing.

Sheet piling shall be installed and backfill shall be placed before installing HP bearing piling. Refer to Design Sheet 28 for additional details.

Proposed abutment piles may conflict with existing abutment wing piles. It is anticipated that H-piles can be driven through the existing timber piles, if necessary. Contact the Engineer if pile adjustment greater than 6 inches is needed or if conflicts occur which prevent pile driving to the minimum required bearing and embedment.

West Abutment Pile Notes:

The contract length of 90 feet for the West Abutment piles is based on a non-cohesive soil classification, a total factored axial load per pile (Pu) of 268 kips, and a geotechnical resistance factor (phi) of 0.55 for soil and 0.7 for rock end bearing. To account for soil consolidation under the new fill, the factored axial load includes a factored downdrag load of 8 kips.

The nominal axial bearing resistance for construction control was determined from a non-cohesive soil classification and a geotechnical resistance factor (phi) of 0.55 for soil and 0.7 for rock end bearing. Piles are assumed to be driven from start elevation of 879.0.

The required nominal axial bearing resistance for West Abutment piles is 213 tons at end of drive or retap. The pile contract length shall be driven as per plan unless piles reach refusal. Construction control requires a WEAP analysis with bearing graph.

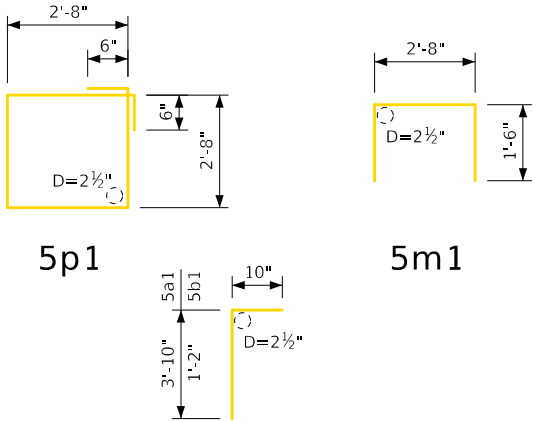
East Abutment Pile Notes:

The contract length of 75 feet for the East Abutment piles is based on a non-cohesive soil classification, a total factored axial load per pile (Pu) of 275 kips, and a geotechnical resistance factor (phi) of 0.55 for soil and 0.7 for rock end bearing. To account for soil consolidation under the new fill, the factored axial load includes a factored downdrag load of 15 kips.

The nominal axial bearing resistance for construction control was determined from a non-cohesive soil classification and a geotechnical resistance factor (phi) of 0.55 for soil and 0.7 for rock end bearing. Piles are assumed to be driven from start elevation of 879.0.

The required nominal axial bearing resistance for East Abutment piles is 217 tons at end of drive or retap. The pile contract length shall be driven as per plan unless piles reach refusal. Construction control requires a WEAP analysis with bearing graph.

Bent Bar Detail



Note: All dimensions are out to out. D= Pin diameter

Dowel Setting Note:

The 5b1 and 5a3 bars shall be set as dowels in drilled holes. Holes are to be 10" deep. The dowels shall be installed in accordance with the Manufacturer's recommendations. Either of the following systems may be used as a bonding agent for vertical dowels, but only System "A" may be used for horizontal dowels:

- A. Polymer grout system in accordance with Article 2301.03, E, of the Standard Specifications.
- B. Hydraulic cement grout systems. Drilled holes are to be 2 times the dowel diameter and are to be blown clean with compressed air immediately prior to placing grout. The hydraulic cement grout shall be one of those approved in Materials I.M. 491.13 and shall be used in accordance with the Manufacturer's recommendations.

Non-Coated Reinforcing Steel Bar List
New Abutment Cap – One Abut.

Bar	Location	Shape	No.	Length	Weight
8f1	Abutment Footing, Longitudinal		12	28'-8"	918
5f2	Abutment Footing, Longitudinal		4	28'-8"	120
5p1	Abutment Footing, Transverse, Stirrups		34	11'-8"	414
5m1	Abutment Footing, Under Beams		12	5'-8"	71
5n1	Abutment Footing, Under Beams		12	3'-8"	46
Non-Coated Reinforcing Steel – Total (lbs.)					1,569

Non-Coated Reinforcing Steel Bar List
Existing Abut. Reconstruction - Both Abuts.

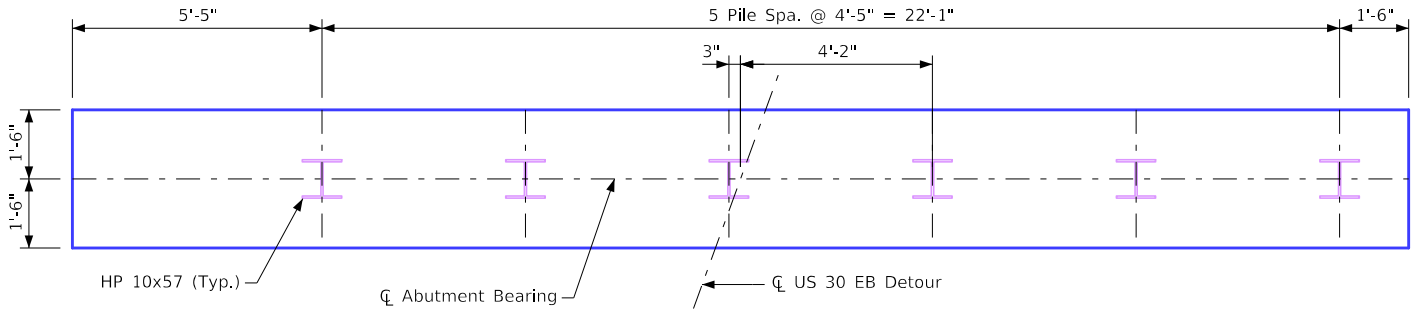
Bar	Location	Shape	No.	Length	Weight
5a1	Existing Backwall, Horiz., Both Abuts.		4	4'-8"	19
5a2	Existing Wing Wall, Horiz., E. Abut.		2	2'-4"	5
5a3	Existing Wing Wall, Horiz., Dowel, E. Abut.		2	2'-9"	6
5a4	Existing Mask Wall, Horiz., W. Abut.		2	2'-10"	6
5b1	Existing Backwall, Vert., Dowel, Both Abuts.		28	2'-0"	58
Non-Coated Reinforcing Steel – Total (lbs.)					94

Concrete Placement Quantities

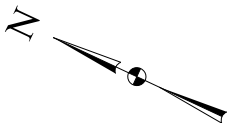
Location	Quantity
West Abutment Footing	10.4
East Abutment Footing	10.5
Existing West Abutment Reconstruction	0.1
Existing East Abutment Reconstruction	0.1
Total (cu. yds.)	21.1

Note: Concrete and reinforcing steel quantities are included on the summary quantities sheet.

Note: Refer to Design Sheet 28 for sheet pile quantities.



Abutment Pile Layout
6 - HP10x57 Steel Piles Required at Each Abutment



Design For 20° Skew (R.A.)

**314'-8" x 30'-0" Prestensioned
Prestressed Concrete Beam Bridge**

103'-10" End Spans 107'-0" Interior Span

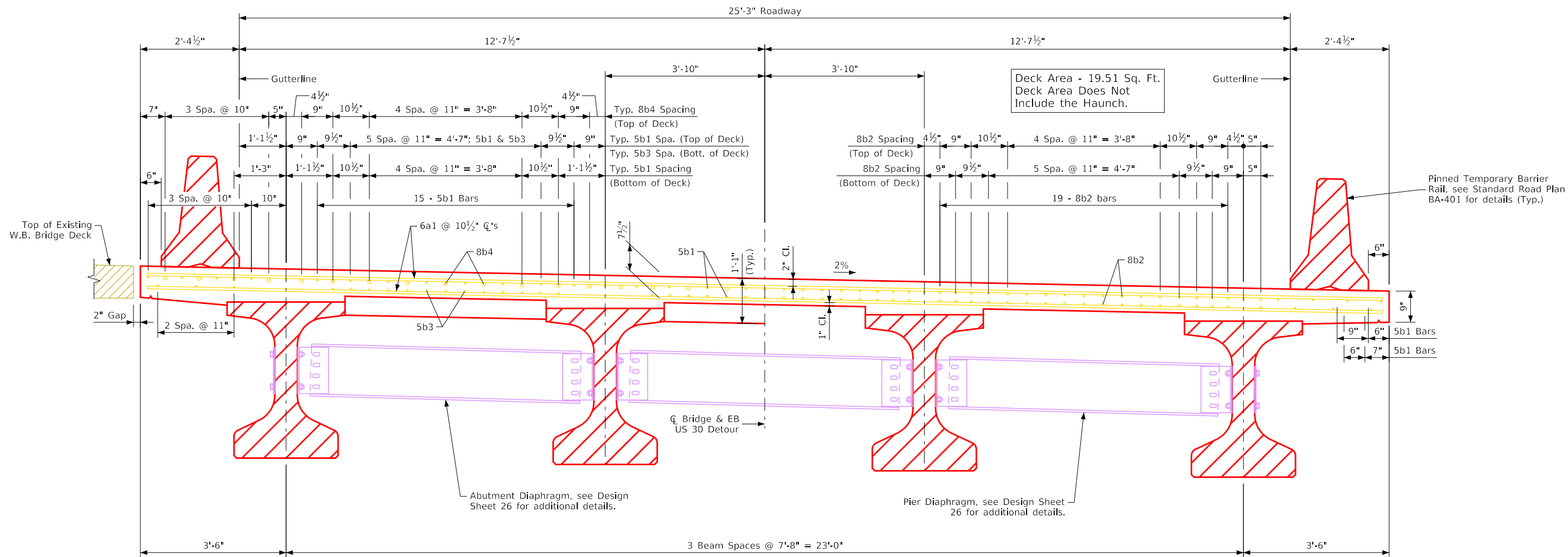
Abutment Details

STA. 1301+18.48 EB US 30 Detour Turn-in Date: August 2024

Story County

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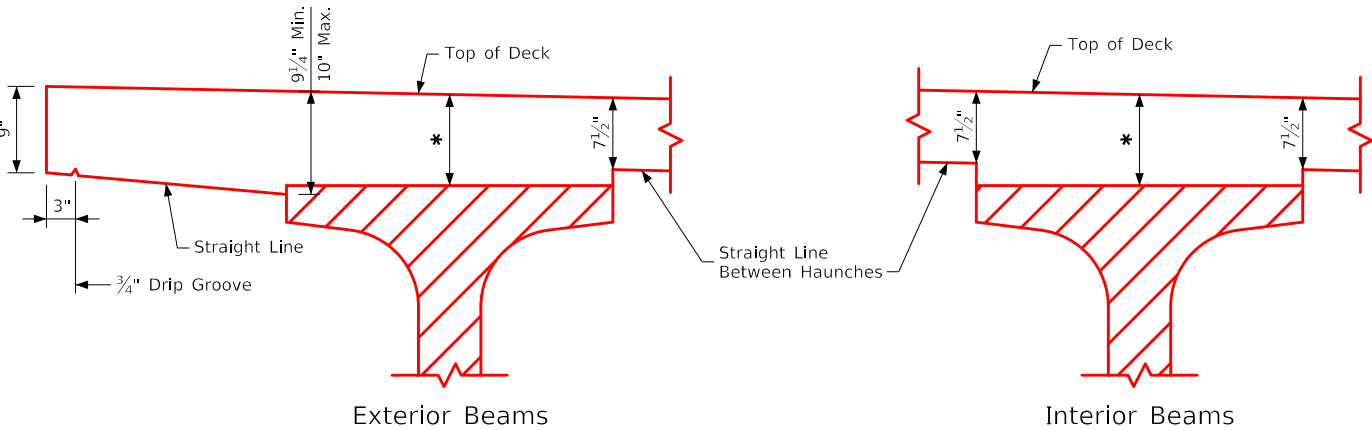
Design No. 425 Design Sheet No.14 of 28 FHWA No. 48731



Half Section Near Abutment
Looking East

Half Section Near Pier
Looking East

Note: For details of Intermediate Diaphragms see Design Sheet 25.



Typical Deck and
Haunch Detail

* For Deck Thickness Over Beams See
"Haunch And Camber Details" on
Design Sheet 20.

Superstructure Notes:

All beams are to be set vertical.

Forms for the deck are to be supported by the prestressed concrete beams.

Clear distance from face of concrete to near reinforcing bar shall be 2" unless otherwise noted or shown.

All deck reinforcing is to be wired in place and adequately supported before concrete is placed.

Top transverse reinforcing is to be parallel to and 2" clear below the top of deck. Bottom transverse reinforcing steel is to be parallel to and 1" clear above bottom of the deck. Top and bottom reinforcing steel is to be supported by individual bar chairs spaced at not more than 3'-0" centers longitudinally and transversely, or by continuous rows of bar high chairs or deck bolsters spaced 4'-0" apart. I.M. 451.01 requirements shall apply for bar chairs, bar high chairs, and deck bolsters.

Design For 20° Skew (R.A.)

**314'-8" x 30'-0" Prestensioned
Prestressed Concrete Beam Bridge**

103'-10" End Spans 107'-0" Interior Span

Transverse Section

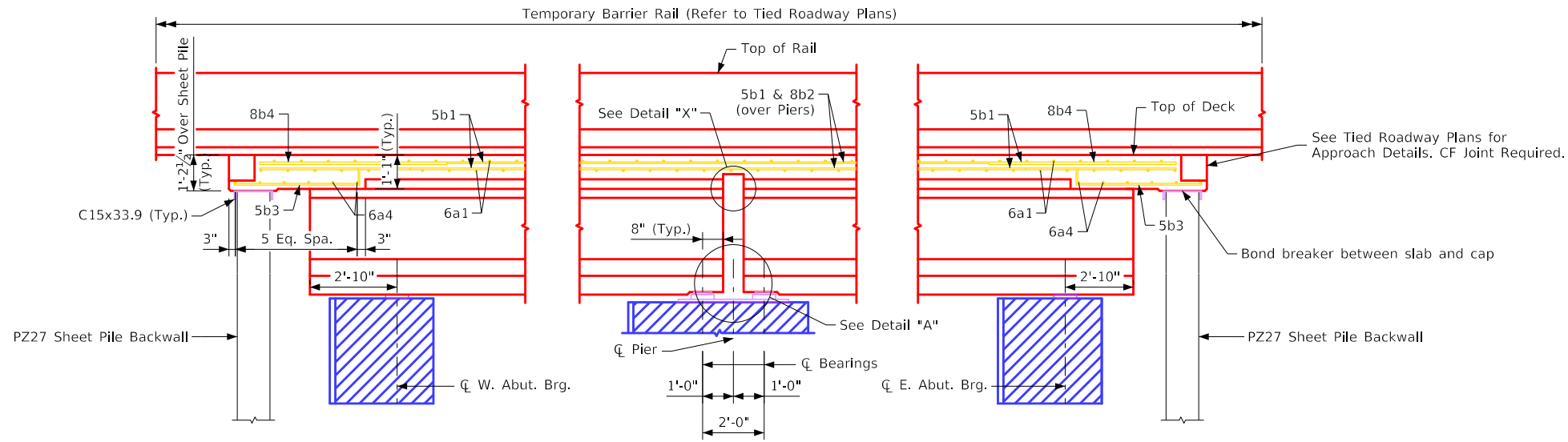
STA. 1301+18.48 EB US 30 Detour Turn-in Date: August 2024

Story County

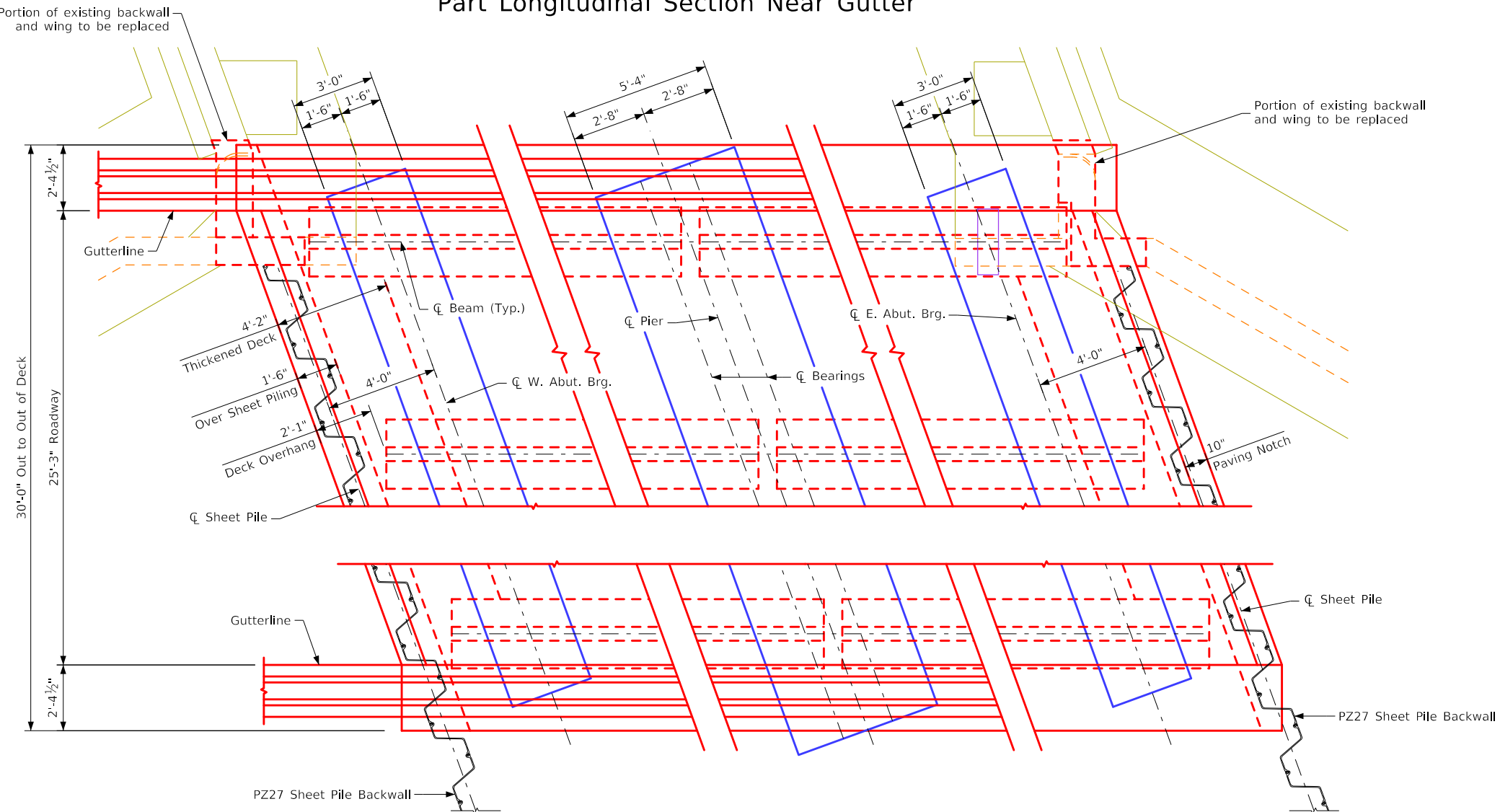
IOWA DEPARTMENT OF TRANSPORTATION

Design No. 425 Design Sheet No.15 of 28 FHWA No. 48731

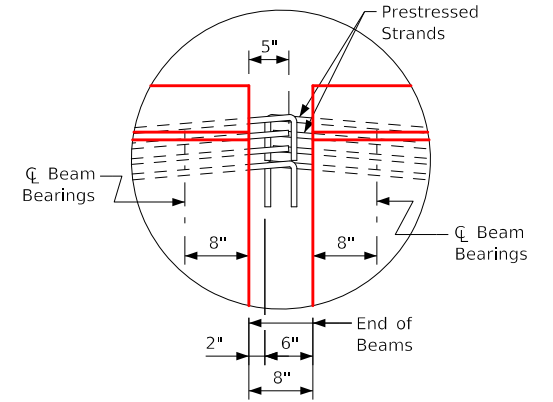




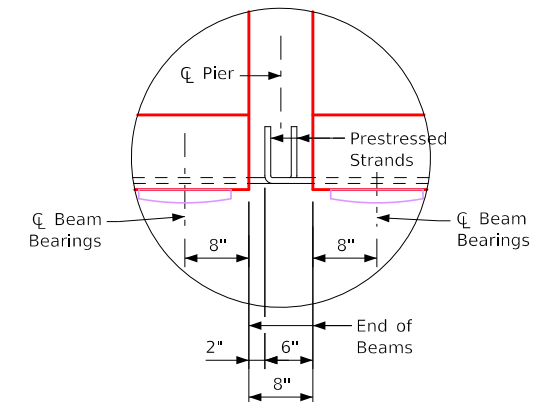
Part Longitudinal Section Near Gutter



Part Plan View



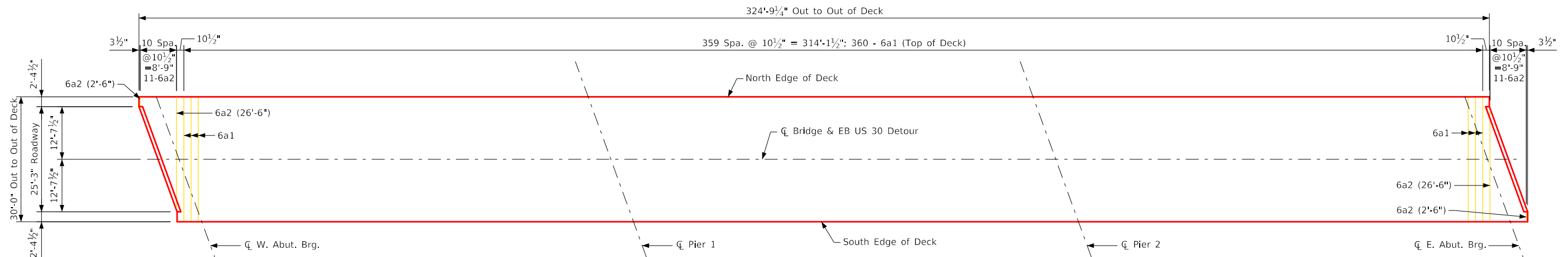
Detail "X"



Detail "A"

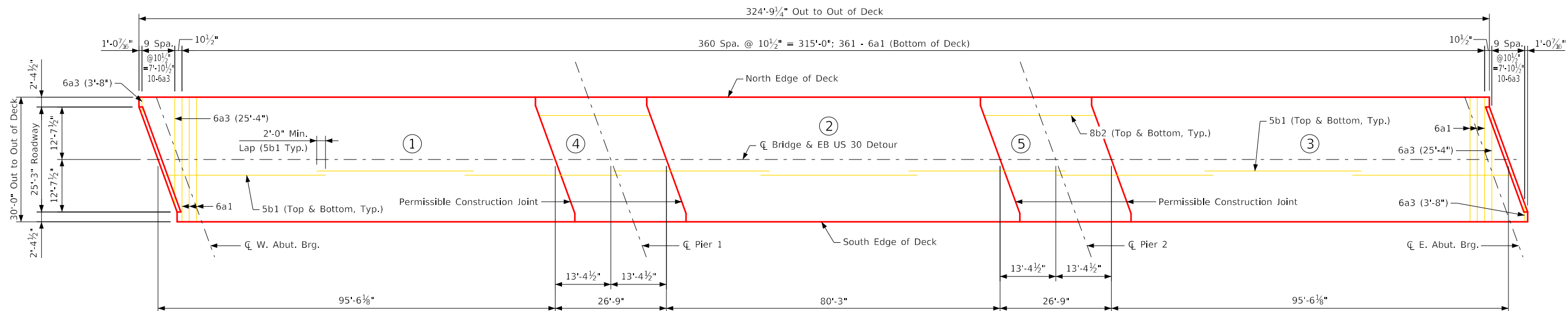
Note: Refer to Design Sheet 28 for additional sheet pile details.

Design For 20° Skew (R.A.)
**314'-8" x 30'-0" Pretensioned
 Prestressed Concrete Beam Bridge**
 103'-10" End Spans 107'-0" Interior Span
Longitudinal Section
 STA. 1301+18.48 EB US 30 Detour Turn-in Date: August 2024
Story County
 IOWA DEPARTMENT OF TRANSPORTATION
 Design No. 425 Design Sheet No.16 of 28 FHWA No. 48731



Note:
Shift or trim top transverse bars
as needed at approach paving
block out. Trim top longitudinal
bars or adjust lap splice to fit.

Deck Top Transverse Reinforcing Layout



Deck Bottom Transverse & Longitudinal Reinforcing Layout & Concrete Placement Diagram

Note: Concrete deck shall be placed in sections and sequences indicated. An approved alternate procedure is to place the concrete deck in one continuous pour beginning at one end of the bridge. Alternate procedures for placing deck concrete may be submitted for approval together with a statement of the proposed method and evidence that the Contractor possesses the necessary equipment and facilities to accomplish the required results. The bridge Engineer shall review any alternate procedures. The cost of any additional analysis and plan modifications shall be paid for by the Contractor. The Engineer shall determine if a retarding admixture is required to maintain plasticity of the concrete deck during placement.

Deck concrete sections shall cure for a minimum of 48 hours and shall achieve a minimum strength of 75% of the 28 day deck concrete strength prior to removing deck headers and beginning an adjacent pour.

Note:
See Design Sheet 18 for details of additional Top & Bott.
Longitudinal and Bott. Transverse bars at abutments.

Design For 20° Skew (R.A.)

314'-8" x 30'-0" Prestressed Concrete Beam Bridge

103'-10" End Spans 107'-0" Interior Span

Deck Reinforcing Layout

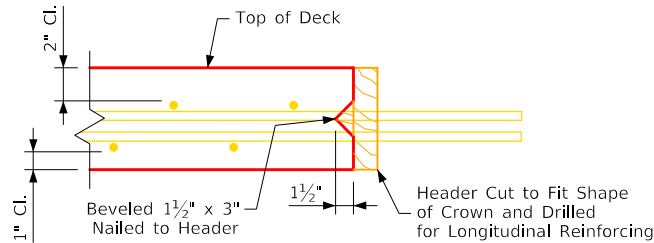
STA. 1301+18.48 EB US 30 Detour Turn-in Date: August 2024

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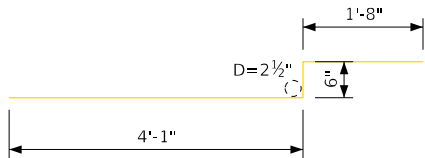
Design No. 425 Design Sheet No.17 of 28 FHWA No. 48731





Permissible Transverse Deck Construction Joint

Bent Bar Detail



5b3

Note: All dimensions are out to out. D= Pin diameter

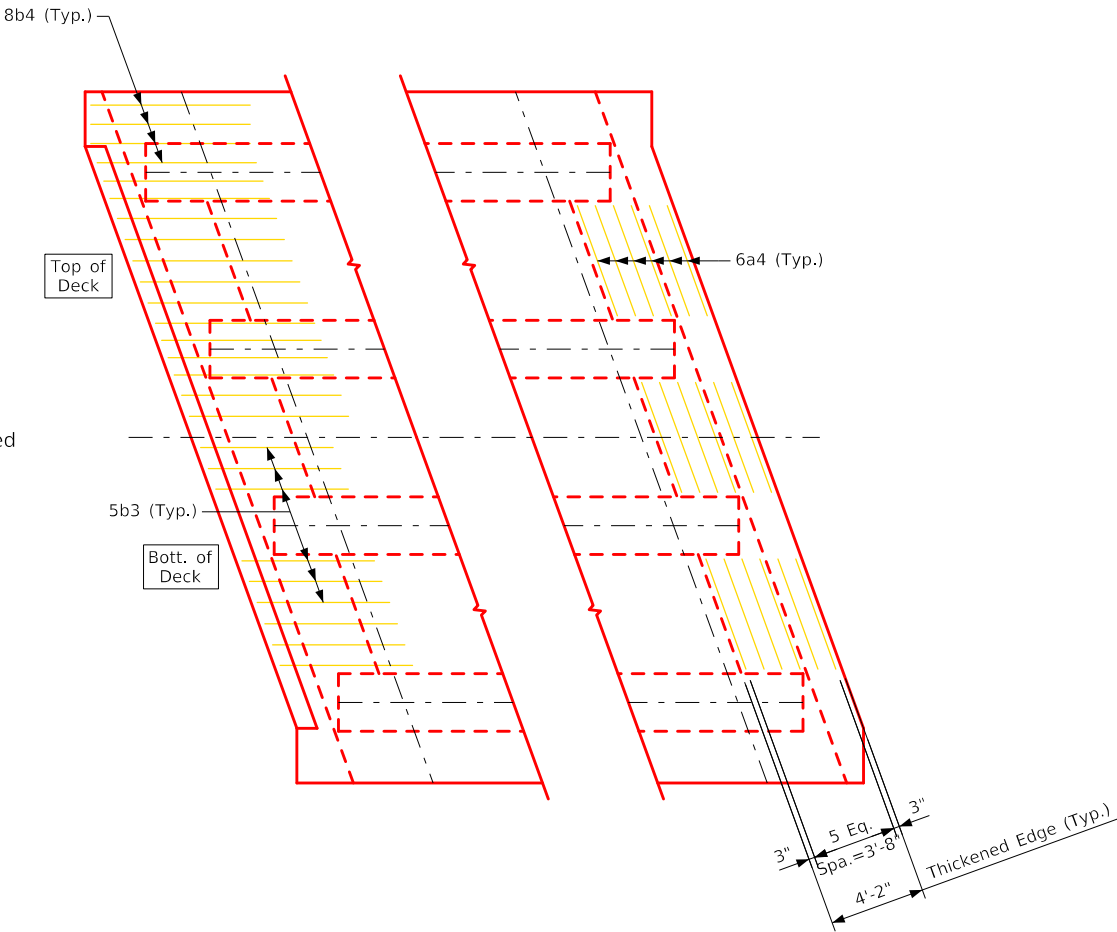
Non-Coated Reinforcing Steel Bar List - Deck

Bar	Location	Shape	No.	Length	Weight
6a1	Deck, Transverse, Top & Bottom		721	29'-8"	32,127
6a2	Deck Ends, Transverse, Top		22	VARIES	479
6a3	Deck Ends, Transverse, Bottom		20	VARIES	436
6a4	Deck Ends, Transverse, Btw. Beams, Bott.		36	4'-9"	257
5b1	Deck, Longitudinal, Top & Bottom		567	37'-10"	22,374
8b2	Deck, Longitudinal at Piers, Top & Bottom		122	26'-4"	8,578
5b3	Deck, Longitudinal at Abutments, Bottom		36	6'-3"	235
8b4	Deck, Longitudinal at Abutments, Top		52	6'-11"	960
Non-Coated Reinforcing Steel - Total (lbs.)					65,446

Concrete Placement Quantities

Location	Quantity
Deck & Haunches - Section 1	74.8
Deck & Haunches - Section 2	62.1
Deck & Haunches - Section 3	74.8
Deck & Haunches - Section 4	20.6
Deck & Haunches - Section 5	20.6
Total (cu. yds.)	253.0

Note: Concrete and reinforcing steel quantities are included on the summary quantities sheet.



Longitudinal Bars (Top & Bott. of Deck) Transverse Bars (Bott. of Deck)

Deck Transverse & Longitudinal Reinforcing Layout at Abutments

Note: See Design Sheet 15 for 5b3 and 8b4 spacing.



Design For 20° Skew (R.A.)

314'-8" x 30'-0" Prestensioned
Prestressed Concrete Beam Bridge

103'-10" End Spans107'-0" Interior Span

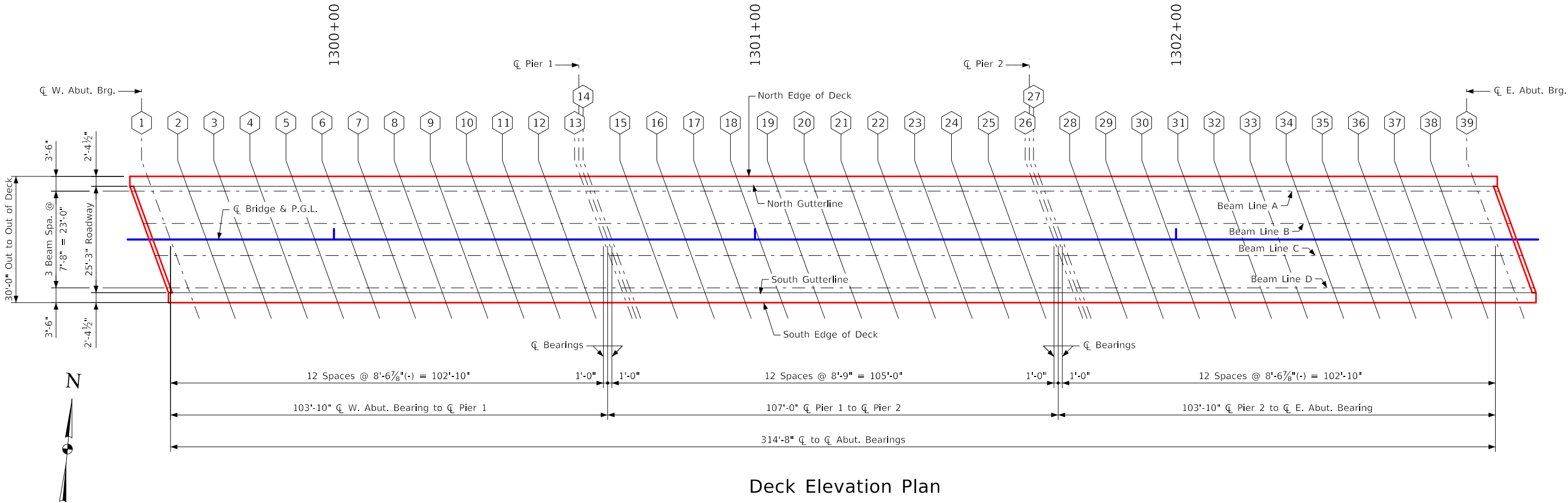
Superstructure Details

STA. 1301+18.48 EB US 30 DetourTurn-in Date: August 2024

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Deck Elevation Plan

Top of Deck Elevations																											
Location	CL W. Abut. Brg.												CL Pier 1 Bearings													CL Pier 2 Bearings	
	Line 1	Line 2	Line 3	Line 4	Line 5	Line 6	Line 7	Line 8	Line 9	Line 10	Line 11	Line 12	Line 13	Line 14	Line 15	Line 16	Line 17	Line 18	Line 19	Line 20	Line 21	Line 22	Line 23	Line 24	Line 25	Line 26	Line 27
North Edge of Deck	891.37	891.41	891.45	891.49	891.52	891.55	891.58	891.61	891.64	891.66	891.68	891.70	891.71	891.72	891.73	891.74	891.75	891.75	891.76	891.76	891.75	891.75	891.74	891.73	891.72	891.71	891.70
North Gutterline	891.32	891.36	891.40	891.44	891.48	891.51	891.54	891.57	891.59	891.62	891.63	891.65	891.67	891.67	891.68	891.69	891.70	891.71	891.71	891.71	891.71	891.70	891.69	891.68	891.67	891.66	891.65
Beam Line A	891.30	891.34	891.38	891.42	891.46	891.49	891.52	891.54	891.57	891.59	891.61	891.63	891.65	891.65	891.66	891.67	891.68	891.68	891.69	891.69	891.68	891.68	891.67	891.66	891.65	891.63	891.63
Beam Line B	891.16	891.20	891.24	891.28	891.31	891.34	891.37	891.40	891.42	891.45	891.46	891.48	891.50	891.50	891.51	891.52	891.53	891.53	891.53	891.53	891.53	891.52	891.51	891.50	891.49	891.47	891.47
CL Bridge & US 30 Detour P.G.L.	891.09	891.13	891.17	891.21	891.24	891.27	891.30	891.33	891.35	891.37	891.39	891.41	891.42	891.42	891.44	891.44	891.45	891.46	891.46	891.46	891.45	891.45	891.44	891.43	891.41	891.40	891.39
Beam Line C	891.02	891.06	891.10	891.14	891.17	891.20	891.23	891.25	891.28	891.30	891.32	891.33	891.35	891.35	891.36	891.37	891.38	891.38	891.38	891.38	891.37	891.37	891.36	891.35	891.33	891.32	891.31
Beam Line D	890.88	890.92	890.96	890.99	891.03	891.06	891.08	891.11	891.13	891.15	891.17	891.18	891.20	891.20	891.21	891.22	891.22	891.23	891.23	891.22	891.22	891.21	891.20	891.19	891.17	891.16	891.15
South Gutterline	890.86	890.90	890.94	890.97	891.01	891.04	891.06	891.09	891.11	891.13	891.15	891.16	891.18	891.18	891.19	891.20	891.20	891.20	891.20	891.20	891.19	891.19	891.18	891.17	891.15	891.13	891.13
South Edge of Deck	890.82	890.86	890.89	890.93	890.96	890.99	891.02	891.04	891.06	891.08	891.10	891.12	891.13	891.13	891.14	891.15	891.15	891.16	891.16	891.16	891.15	891.15	891.14	891.13	891.12	891.10	891.08

Top of Deck Elevations													
Location													CL E. Abut. Brg.
	Line 28	Line 29	Line 30	Line 31	Line 32	Line 33	Line 34	Line 35	Line 36	Line 37	Line 38	Line 39	
North Edge of Deck	891.68	891.66	891.64	891.62	891.59	891.56	891.53	891.50	891.46	891.42	891.38	891.33	
North Gutterline	891.64	891.62	891.59	891.57	891.54	891.51	891.48	891.44	891.41	891.37	891.33	891.28	
Beam Line A	891.61	891.59	891.57	891.54	891.52	891.49	891.45	891.42	891.38	891.34	891.30	891.26	
Beam Line B	891.45	891.43	891.41	891.38	891.35	891.32	891.29	891.26	891.22	891.18	891.13	891.09	
CL Bridge & US 30 Detour P.G.L.	891.37	891.35	891.33	891.30	891.27	891.24	891.21	891.17	891.13	891.09	891.05	891.01	
Beam Line C	891.29	891.27	891.25	891.22	891.19	891.16	891.13	891.09	891.05	891.01	890.97	890.92	
Beam Line D	891.13	891.11	891.08	891.06	891.03	891.00	890.96	890.92	890.88	890.84	890.80	890.75	
South Gutterline	891.11	891.09	891.06	891.03	891.00	890.97	890.94	890.90	890.86	890.82	890.77	890.73	
South Edge of Deck	891.06	891.04	891.01	890.98	890.95	890.92	890.89	890.85	890.81	890.77	890.72	890.68	

Note:
Hexagonal numbers correspond to the line numbers shown on this sheet.

Design For 20° Skew (R.A.)

314'-8" x 30'-0" Pretensioned
Prestressed Concrete Beam Bridge

103'-10" End Spans107'-0" Interior Span

Deck Elevations

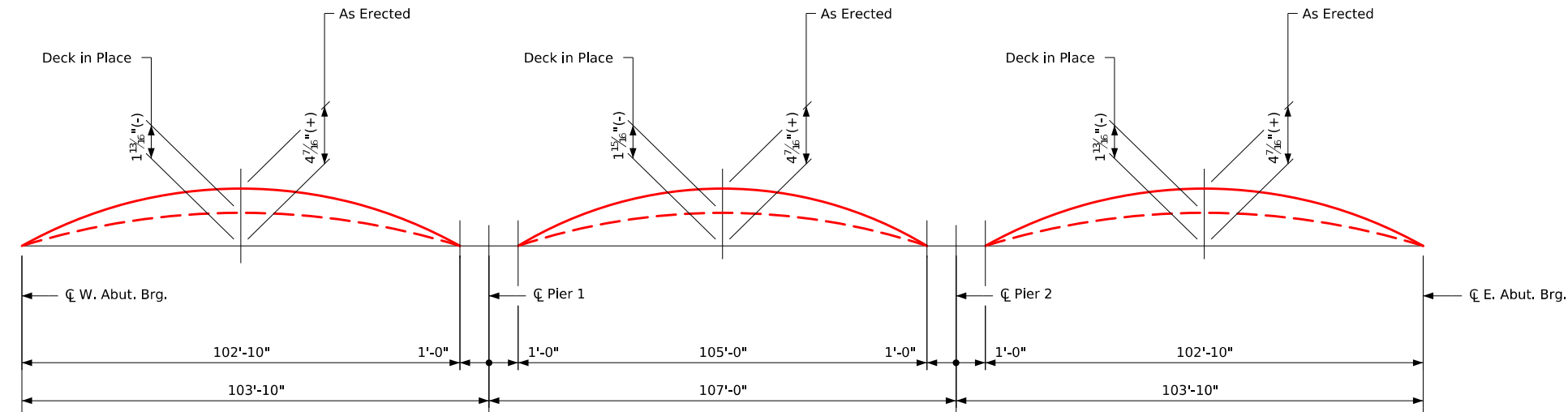
STA. 1301+18.48 EB US 30 DetourTurn-in Date: August 2024

Story County

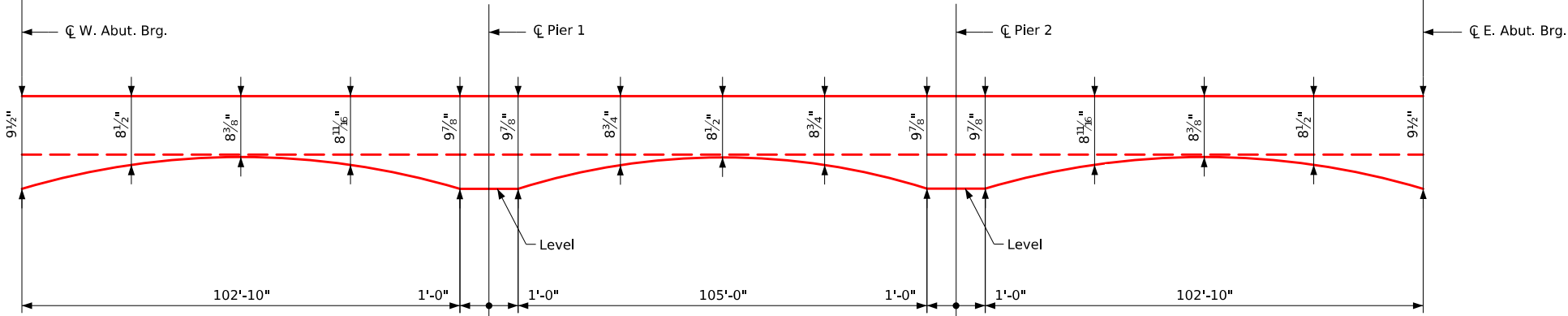
IOWA DEPARTMENT OF TRANSPORTATION

Design No. 425Design Sheet No.19 of 28FHWA No. 48731

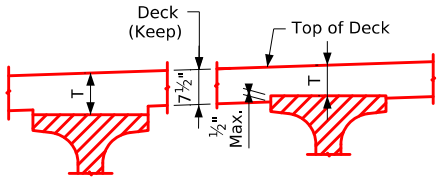




Beam Camber Data



Deck Thickness at Beams (T)



Deck Thickness Details

Note: The deck thickness (T) at beams is based on the anticipated beam camber and deflections. These values are used by the Designer to set beam elevations and estimate concrete quantities. Refer to the haunch data details sheet for additional information to aid the Contractor in setting the field haunches required for construction.



Design For 20° Skew (R.A.)

314'-8" x 30'-0" Pretensioned
Prestressed Concrete Beam Bridge

103'-10" End Spans107'-0" Interior Span

Deck Thickness Details

STA. 1301+18.48 (EB US 30 Detour)Turn-in Date: August 2024

Story County

IOWA DEPARTMENT OF TRANSPORTATION

Design No. 425Design Sheet No. 20 of 28FHWA No. 48731

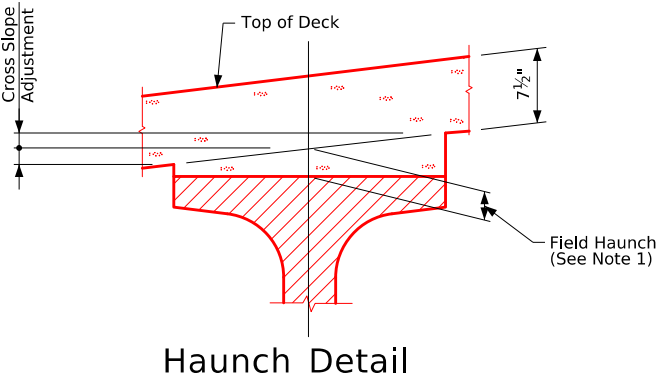
Table of Beam Line Deck Haunch Elevations																											
Beam Line	☐ W. Abut. Brg.												☐ Pier 1 Bearings													☐ Pier 2 Bearings	
	Line 1	Line 2	Line 3	Line 4	Line 5	Line 6	Line 7	Line 8	Line 9	Line 10	Line 11	Line 12	Line 13	Line 14	Line 15	Line 16	Line 17	Line 18	Line 19	Line 20	Line 21	Line 22	Line 23	Line 24	Line 25	Line 26	Line 27
A	890.68	890.78	890.87	890.95	891.02	891.07	891.11	891.13	891.14	891.12	891.10	891.06	891.02	891.02	891.09	891.15	891.20	891.24	891.26	891.27	891.26	891.23	891.19	891.14	891.08	891.01	891.00
B	890.54	890.64	890.73	890.81	890.88	890.93	890.97	890.99	890.99	890.98	890.95	890.91	890.87	890.87	890.94	891.00	891.05	891.09	891.11	891.12	891.11	891.08	891.04	890.98	890.92	890.85	890.85
C	890.40	890.50	890.59	890.67	890.74	890.79	890.82	890.84	890.84	890.83	890.80	890.77	890.72	890.72	890.79	890.85	890.90	890.93	890.96	890.96	890.95	890.92	890.88	890.83	890.76	890.69	890.69
D	890.26	890.36	890.45	890.53	890.59	890.64	890.68	890.70	890.70	890.68	890.66	890.62	890.57	890.58	890.64	890.70	890.75	890.78	890.80	890.81	890.80	890.77	890.73	890.67	890.60	890.53	890.53

Table of Beam Line Deck Haunch Elevations												
Beam Line												☐ E. Abut. Brg.
	Line 28	Line 29	Line 30	Line 31	Line 32	Line 33	Line 34	Line 35	Line 36	Line 37	Line 38	Line 39
A	891.04	891.08	891.10	891.11	891.10	891.08	891.04	890.99	890.92	890.83	890.74	890.63
B	890.89	890.92	890.94	890.95	890.94	890.92	890.88	890.82	890.75	890.66	890.57	890.46
C	890.73	890.76	890.78	890.79	890.78	890.75	890.71	890.66	890.58	890.50	890.40	890.30
D	890.57	890.60	890.62	890.62	890.62	890.59	890.55	890.49	890.42	890.33	890.23	890.13

Miscellaneous Data Table																															
	Beam Line		C W. Abut. Brg.												C Pier 1 Bearings													C Pier 2 Bearings			
				Line 1	Line 2	Line 3	Line 4	Line 5	Line 6	Line 7	Line 8	Line 9	Line 10	Line 11	Line 12	Line 13	Line 14	Line 15	Line 16	Line 17	Line 18	Line 19	Line 20	Line 21	Line 22	Line 23	Line 24	Line 25	Line 26	Line 27	
Anticipated Deflection Due to Deck (in.)	All		0	11/16	1 5/16	1 7/8	2 5/16	2 9/16	2 5/8	2 9/16	2 5/16	1 7/8	1 5/16	11/16	0	0	11/16	1 1/4	1 13/16	2 3/16	2 7/16	2 1/2	2 7/16	2 3/16	1 13/16	1 1/4	11/16	0	0		
Cross Slope Adjustments (in.)	All													+/- 5/16 (+/- 0.026)																	
Allowable Field Haunch (in. & ft.)	Max.	All	2 1/2 (0.208)											3 (0.25)		2 1/2 (0.208)											3 (0.25)				
	Min.	All	0											1/2 (0.042)		0											1/2 (0.042)				

Miscellaneous Data Table														
	Beam Line													☐ E. Abut. Brg.
			Line 28	Line 29	Line 30	Line 31	Line 32	Line 33	Line 34	Line 35	Line 36	Line 37	Line 38	Line 39
Anticipated Deflection Due to Deck (in.)	All		11/16	1 5/16	1 7/8	2 5/16	2 9/16	2 5/8	2 9/16	2 5/16	1 7/8	1 5/16	11/16	0
Cross Slope Adjustments (in.)	All		+/- 5/16 (+/- 0.026)											
Allowable Field Haunch (in. & ft.)	Max.	All	2 1/2 (0.208)											
	Min.	All	0											

Note: Haunch locations are at the same location as the encircled letters and numbers shown on deck elevations sheet.



Note: Bridge seat elevations are set based on theoretical camber and beam deflections. These bridge seats will provide a theoretical beam haunch within design parameters. Field haunches are determined using surveyed top of beam elevations and "Beam Line Haunch Elevation" data. Allowable maximum and minimum "Field Haunch" values are given in inches and decimals of feet in the "Miscellaneous Data" table. "Cross slope adjustment" values will aid the Contractor in determining actual formed haunch dimensions at the edges of the top flange.

Note 1: To calculate field haunch required at each location, survey the beam tops consistent with the spacings shown on the "Top of Deck Elevations Layout". Subtract the surveyed beam shot from the "Beam Line Haunch Elevation". This value will be the haunch needed (see "Field Haunch" in haunch detail). The "Beam Line Haunch Elevation" includes adjustments for deck thicknesses and anticipated deflections. No additional calculations are required. If the field haunch exceeds the maximums and minimums shown in inches and decimals of feet in the miscellaneous data table, adjustments to the grade or additional haunch reinforcement will be required.

Design For 20° Skew (R.A.)

314'-8" x 30'-0" Pretensioned
Prestressed Concrete Beam Bridge

103'-10" End Spans107'-0" Interior Span

Deck Haunch Data

STA. 1301+18.48 (EB US 30 Detour)Turn-in Date: August 2024

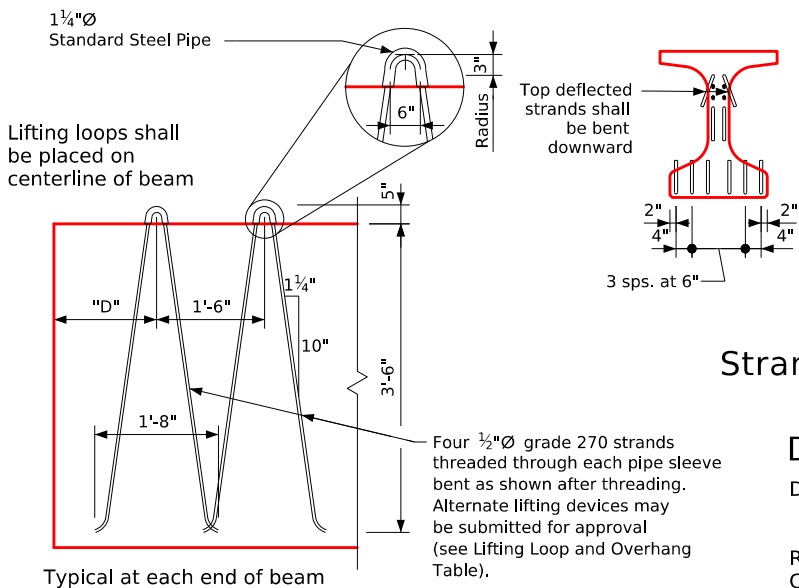
Story County

IOWA DEPARTMENT OF TRANSPORTATION

Design No. 425Design Sheet No. 21 of 28FHWA No. 48731

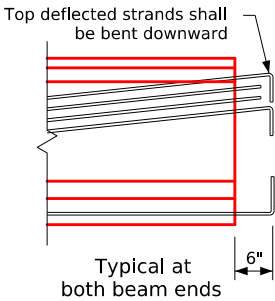
1/4 inch.

Correction 12-13: Coil Tie Detail was Changed to Reflect the Distance Between Coil Tie Anchors Embedded Issued 05-04, Beams.dgn - 4700 - This Sheet Re-Issued 04-2024. Sheet Format Update.



Lifting Loop Detail

The top and bottom rows of the deflected strands are to be cut with 1'-2" projections which are to be shop bent as shown. The remaining top deflected strands are to be cut with 5" projections. Six bottom strands are to be cut with 1'-6" projections which are to be shop bent as shown. The remaining bottom strands are to be cut off reasonably flush with the concrete.



Strand Projection at Beam Ends

Design Stresses:

Design stresses for the following materials are to be in accordance with AASHTO LRFD Bridge Design Specifications, Series of 2017.
Reinforcing steel in accordance with Section 5, Grade 60.
Concrete in accordance with Section 5.
Prestressing steel in accordance with Section 5, Grade 270.

Specifications:

Construction: Standard Specifications of the Iowa Department of Transportation, current series, with current applicable special provisions and supplemental specifications.
Design: AASHTO LRFD, Series of 2017 with minor modifications.

BTC Beam Data

BTC Beam	Span Length i-j Bearing	Overall Beam Length (L)	Concrete Strength		Strand Size Dia. (in.)	Number of Strands		Total Initial Prestress (kips)	Hold Down Force (kips)	Camber (in.) ⑥		Deflection (in.) Δ _D		Permissible	Weight (tons)	Concrete (cu. yd.)	Reinforcing Steel (weight-lb.)
			f'ci (ksi.)	f'c (ksi.)		Straight	Deflected			At Release	After Losses	Immediate ①	Time ②	Maximum Spacing			
												(elastic) Δ _I	(plastic) Δ _T	HL-93 Loading			
												Steel Diaphragm	Steel Diaphragm	Steel Diaphragm			

BTC105	105'-0"	106'-4"	7.50	8.50	0.60"	34	8	1786	25.8	2.77"	4.44"	2.22"	0.56"	9'-3"	38.3	18.9	2762
--------	---------	---------	------	------	-------	----	---	------	------	-------	-------	-------	-------	-------	------	------	------

- ① Deflections at mid-span due to weight of deck and diaphragm. The deflections shown are for a deck (7.5") and haunch (1.5") weight of:
0.77 kips/ft. for 7'-8" beam spacing
And one steel diaphragm (0.500 kips) at i of span. For different deck and diaphragm weights, deflections will be directly proportional.
- ② Deflections due to the combined effect of creep due to weight of deck and shrinkage of deck.
Total beam deflections at $\frac{L}{4}$ of span, Δ_D , due to weight of deck and diaphragms for detailing purpose:
(A) $\Delta_D = \Delta_I + \Delta_T$ for simple span.
(B) $\Delta_D = \Delta_I + \frac{3}{4}\Delta_T$ for end spans of continuous bridge.
(C) $\Delta_D = \Delta_I + \frac{1}{2}\Delta_T$ for interior spans of continous bridge.
- ③ Total initial prestress is based on 72.6% f's, f's= 270 ksi. and As= 0.217 in.².
- ⑥ Calculated design cambers are based on multipliers developed from research in Iowa.

Beam Notes:

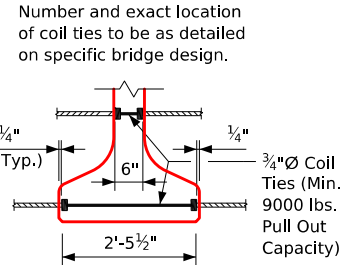
These beams are designed for AASHTO live loads as indicated in above table with an allowance of 20 lbs. per square foot of roadway for future wearing surface.
All PPC beams shall use high performance concrete ('HPC') in accordance with the Standard Specifications.
Hold down points for deflected strands may be moved toward ends of beam a distance of 0.05 L maximum at producer's option.
All prestressing strands except lifting loop strands shall be 0.60 in. nominal diameter (nominal steel area = 0.217 in.²) and conform to ASTM A416 Grade 270 Low Relaxation Strands. Minimum strand breaking strength shall be 58.6 kips.
Tops of beams are to be struck off level and finished as per Materials I.M.570.
Bearings shall be as detailed on other design sheets.
Beams to be used in bridges made continuous by the poured in place deck, are to be at least 28 days old before the deck is placed unless a shorter curing time is approved by the Bridge Engineer.
Prestressed beams shall be roughened for a distance of 10" from the beam end by sandblasting or other approved methods to provide suitable bond between the beam and the diaphragm in accordance with Article 2403.03, I, of the Standard Specifications.
All beams are to be increased in length to compensate for elastic shortening, creep and shrinkage.
For transporting, the allowable overhang is shown in the "Lifting Loop and Overhang Table".
The contractor shall assure the lateral stability of the BTC105beams during handling, transporting and erection by providing temporary bracing as needed.
Holes must be cast in the web to accommodate the steel diaphragm attachments as detailed on the Steel Diaphragm Detail Sheet.
If sole plate is required for bearing, sole plate is to be set in forms when beam is cast and formed out below to exclude concrete as detailed on the Bearing Sheet.
Minimum concrete f'c (at 28 days) and minimum f'ci at release are located in the BTC Beam Data Table above.
Four 0.60 in. diameter strands stressed to not more than 5000 lbs. each may be used in lieu of bars 5a1 and 5a2 in the top flange.

Note:
For modified stirrup extensions see "Bent Bar Details" this sheet and BTC105 Beam Details sheet for dimensions and locations.

Alternate Bar Notes:

Alternate bars shown in Bent Bar Details may be used in lieu of reinforcing bars shown in bar list. No additional payment shall be made for use of alternate bars.

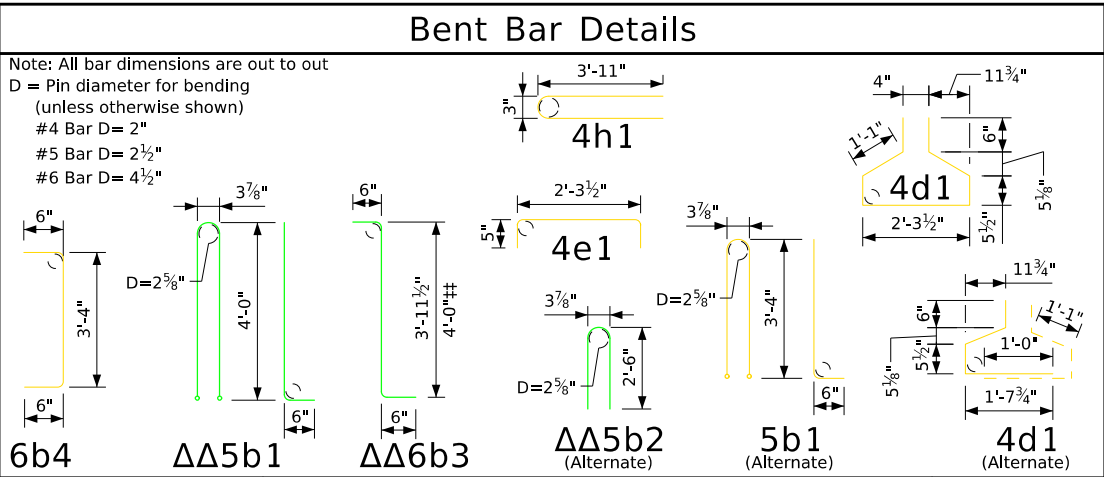
Note: All mild reinforcing steel can be epoxy coated at Contractor's option without modification to bar length or details at no additional cost to the State.



Coil Tie Detail

ΔΔ 5b1 and 6b3 bars to be epoxy coated
* 6b3 and 6b4 bars to be used in pairs
6b3 stirrups located at beam ends shall be extended

Bar List		
Beam	BTC105	
Bar Shape	No.	Length
5a1	12	36'-6"
5a2	6	40'-0"
5b1	85	9'-2"
6b3	40	5'-0"
6b4	24	4'-4"
4c1	139	2'-7"
4d1	107	6'-5"
4e1	26	3'-2"
4h1	6	8'-0"



Design For 20° Skew (R.A.)

314'-8" x 30'-0" Prestensioned
Prestressed Concrete Beam Bridge

103'-10" End Spans107'-0" Interior Span

Beam Details

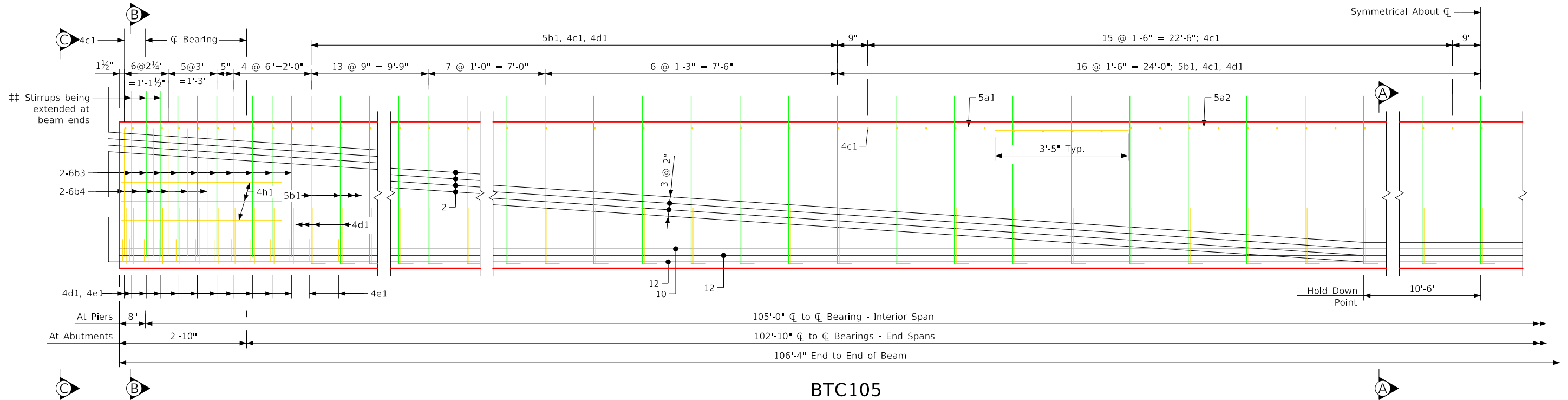
STA. 1301+18.48 (EB US 30 Detour)Turn-in Date: August 2024

Story County

IOWA DEPARTMENT OF TRANSPORTATION

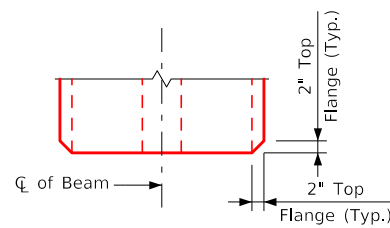
Design No. 425Design Sheet No. 22 of 28FHWA No. 48731

Revision 10-07: 5b2 bar deleted. 5b1 Bar Lengthened to Extend 5 Inches Above Beam Top. Alternate Section A-A Added.
Issued 05-04.
Beams.dgn - 4716 - This Sheet Re-Issued 04-2024. Sheet Format Update.



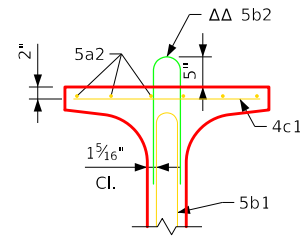
BTC105

Note: Beam stirrup extensions are non-standard for PPC beam ends.



Top View

The top flange beam corners are to be chamfered 2" as shown at both ends of the beam.



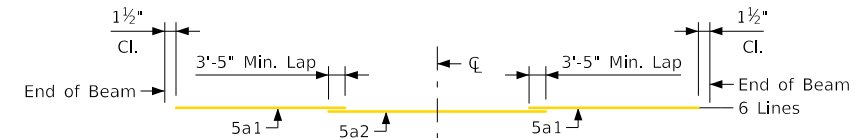
Section A-A (Alternate)

See Alternate Bar Note on Design Sheet 22.

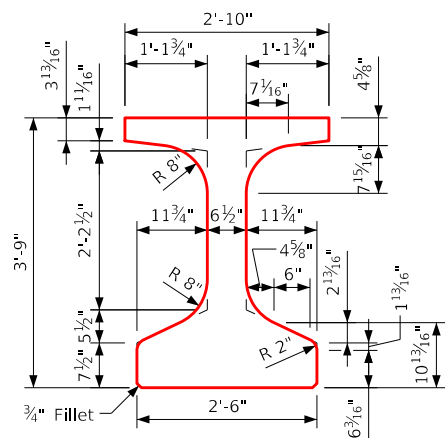
$$\begin{aligned} \text{Area} &= 691.8 \text{ in.}^2 \\ \bar{y}_b &= 20.74 \text{ in.} \\ I &= 178,971 \text{ in.}^4 \end{aligned}$$

Beam Section Properties

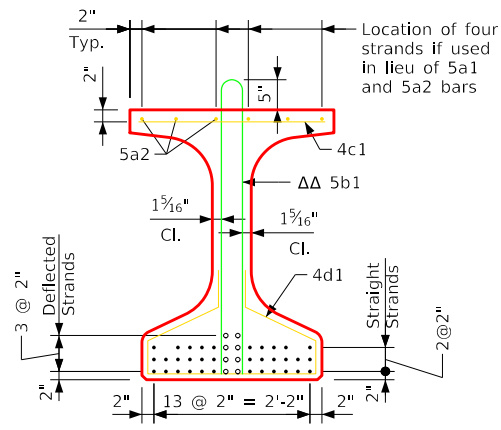
6b3 stirrups located at beam ends shall be extended as dimensioned below.



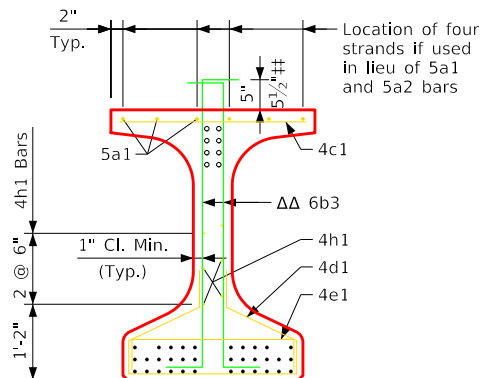
Top Flange Longitudinal Bar Layout



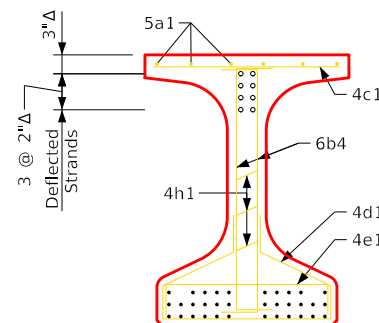
BTC Beam Cross Section



Section A-A



Section B-B

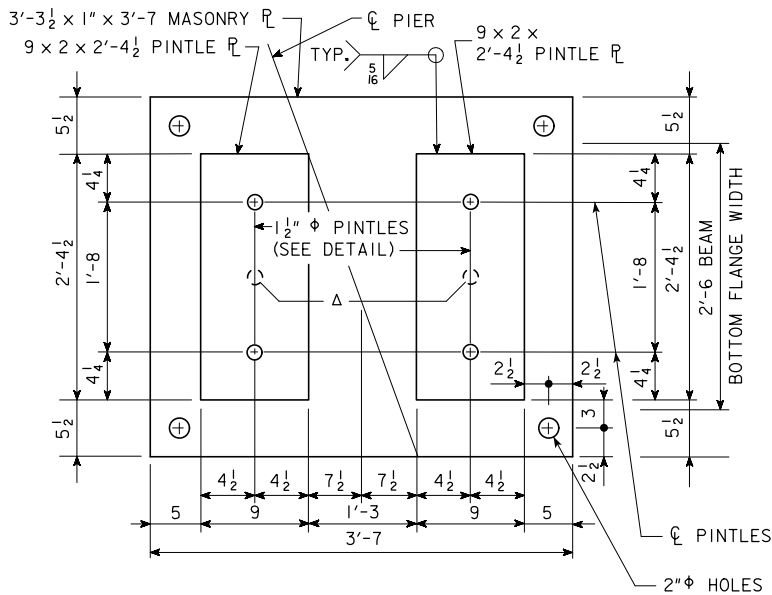
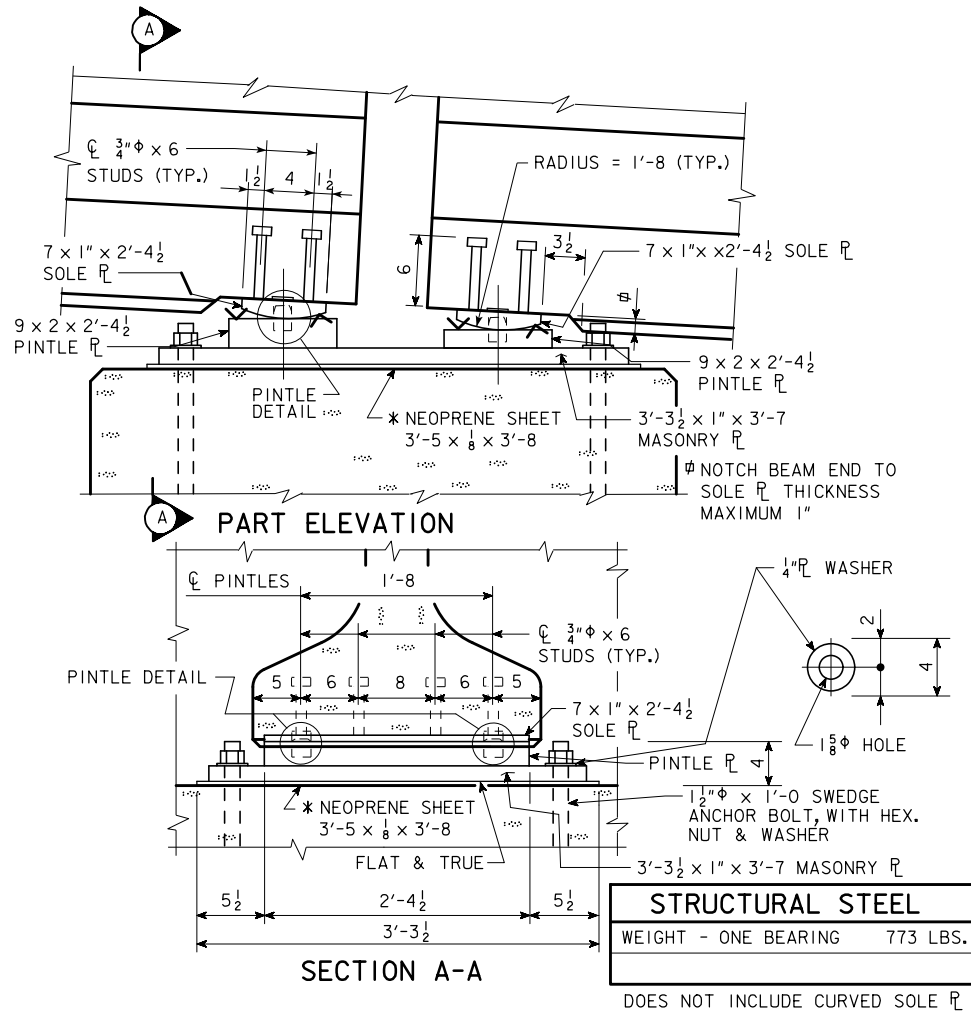


View C-C

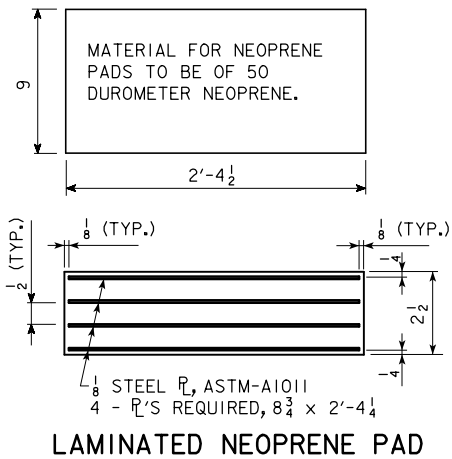
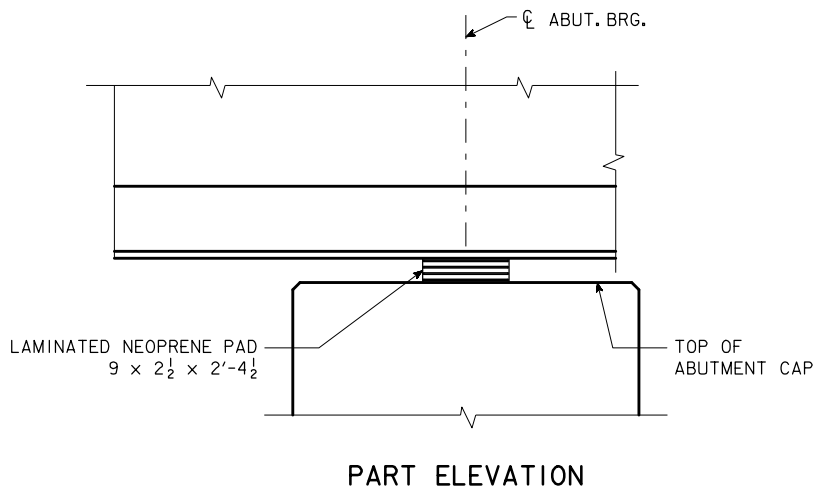
° Deflected Strands
Δ Dimensions at End of Beam
ΔΔ Epoxy Coated Bars

Design For 20° Skew (R.A.)
314'-8" x 30'-0" Pretensioned
Prestressed Concrete Beam Bridge
103'-10" End Spans 107'-0" Interior Span
BTC105 Beam Details
STA. 1301+18.48 EB US 30 Detour Turn-in Date: August 2024
Story County
IOWA DEPARTMENT OF TRANSPORTATION
Design No. 425 Design Sheet No.23 of 28 FHWA No. 48731

CORRECTION 04-14 - ADDED WEIGHT TABLE & TITLES/DESCRIPTIONS TO AGREE WITH SUMMARY QUANTITY SHEET. ADDED NOTE REFERRING TO SUMMARY QUANTITIES SHEET.
ENGLISHBEAMS.DGN - 454IH - THIS SHEET ISSUED 03-08.



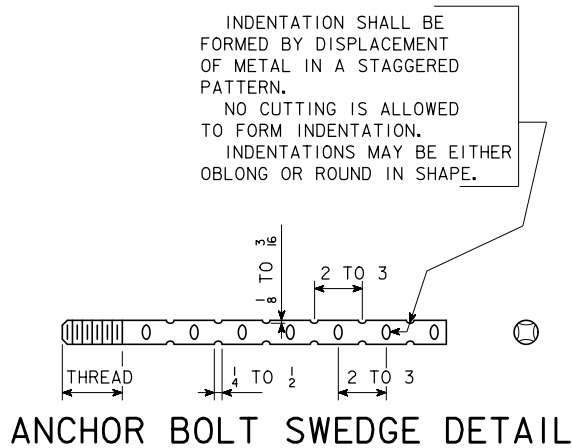
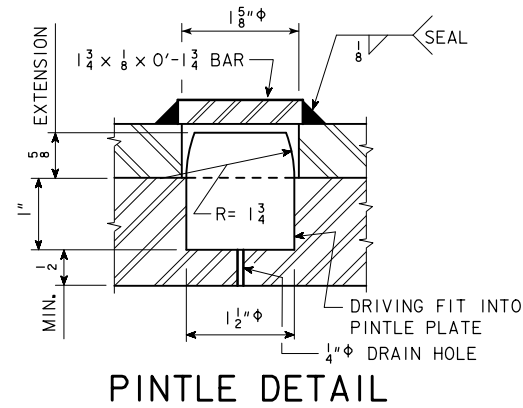
FIXED PIER
MASONRY PLATE / CURVED SOLE PLATE ASSEMBLY



EXPANSION BEARING AT ABUTMENT

FIXED PIER BEARING NOTES:

SURFACES MARKED "V" SHALL BE FINISHED ANSI 250.
MASONRY PLATES ARE TO BE SET ON A 1/8" NEOPRENE SHEET.
PINTLE PLATES, AND MASONRY PLATES ARE A PART OF THE SUPERSTRUCTURE STRUCTURAL STEEL QUANTITY. COST OF NEOPRENE SHEETS SHALL BE CONSIDERED INCIDENTAL TO THE STRUCTURAL STEEL BID ITEM.
COST OF ANCHORED CURVED SOLE PLATES IS TO BE INCLUDED IN THE PRICE BID FOR PRETENSIONED PRESTRESSED CONCRETE BEAMS.
THE SOLE PLATES, PINTLE PLATES, AND MASONRY PLATES SHALL BE GALVANIZED. ALL WELDING SHALL BE COMPLETED PRIOR TO GALVANIZING. THE SURFACE OF THE PINTLE PLATE IN CONTACT WITH THE MASONRY PLATE SHALL BE FREE OF PROJECTIONS DUE TO GALVANIZING.
SOLE PLATES ARE TO BE SET IN FORMS WHEN BEAMS ARE CAST AND THE BOTTOM OF BEAMS FORMED OUT AS SHOWN TO EXCLUDE CONCRETE.
SOLE PLATES SHALL COMPLY WITH ONE OF THE FOLLOWING :
ASTM A514 GRADE B
ASTM A709 GRADE HPS 70W

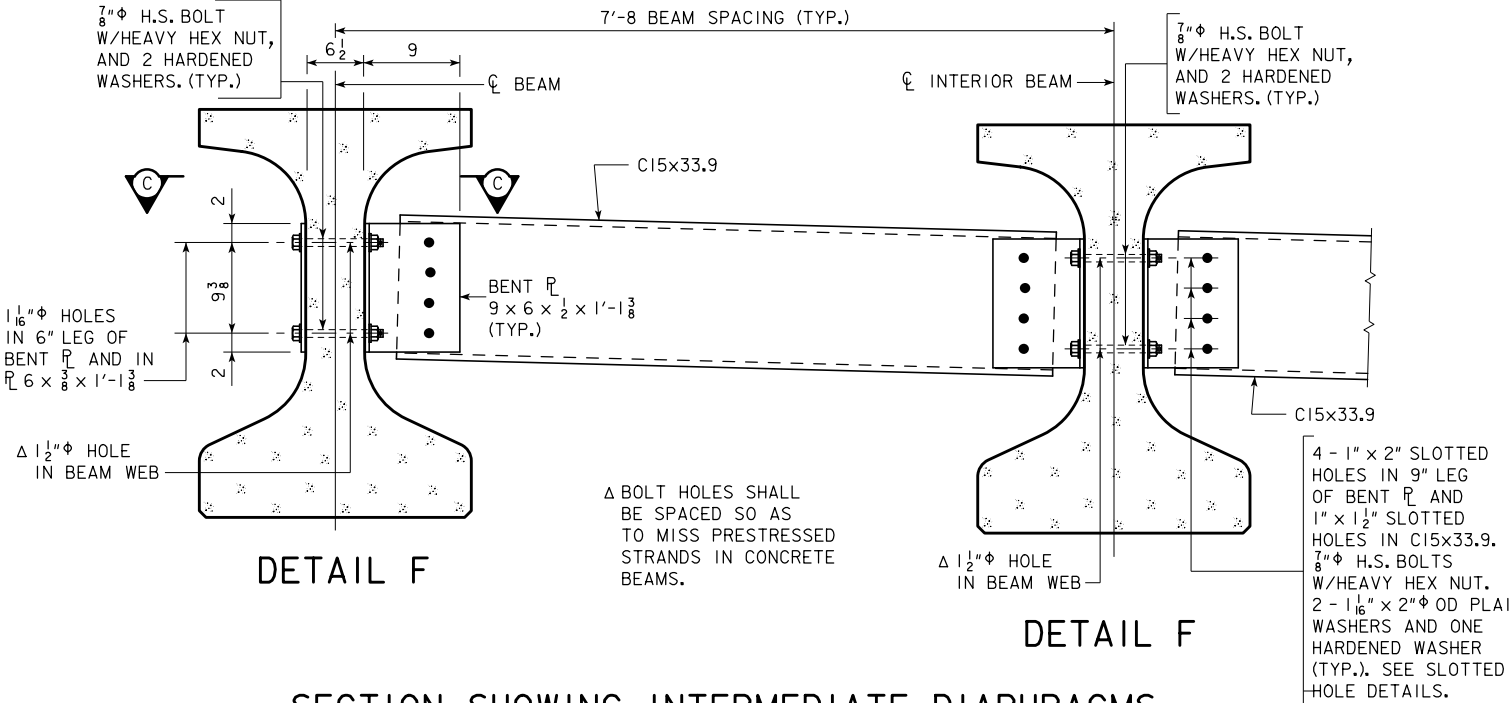


* THE 1/8 INCH NEOPRENE SHEETS ARE TO BE 50, 60, OR 70 DUROMETER HARDNESS AND SHALL BE 1 INCH GREATER IN LENGTH THAN THE BOTTOM SURFACE OF THE MASONRY PLATES OR STEEL BEARINGS.

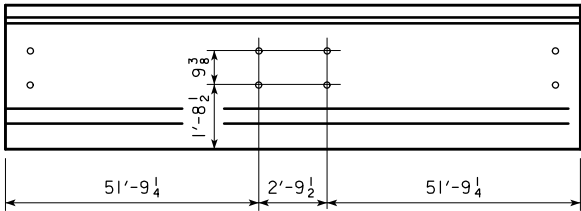
NOTE: STRUCTURAL STEEL WEIGHT IS INCLUDED ON THE SUMMARY QUANTITIES SHEET.

Design For 20° Skew (R.A.)
**314'-8" x 30'-0" Pretensioned
Prestressed Concrete Beam Bridge**
103'-10" End Spans 107'-0" Interior Span
Bearing Details
STA. 1301+18.48 EB US 30 Detour Turn-in Date: August 2024
Story County
IOWA DEPARTMENT OF TRANSPORTATION
Design No. 425 Design Sheet No24 of 28 FHWA No. 48731

ENGLISHBEAMS.DGN - 1036-1-BTC - THIS SHEET ISSUED 06-14, SHEET 1 OF 2, ENGLISHBEAMS.DGN - 1036-2-BTC - THIS SHEET ISSUED 06-14, SHEET 2 OF 2.



SECTION SHOWING INTERMEDIATE DIAPHRAGMS
AT EXTERIOR BAY



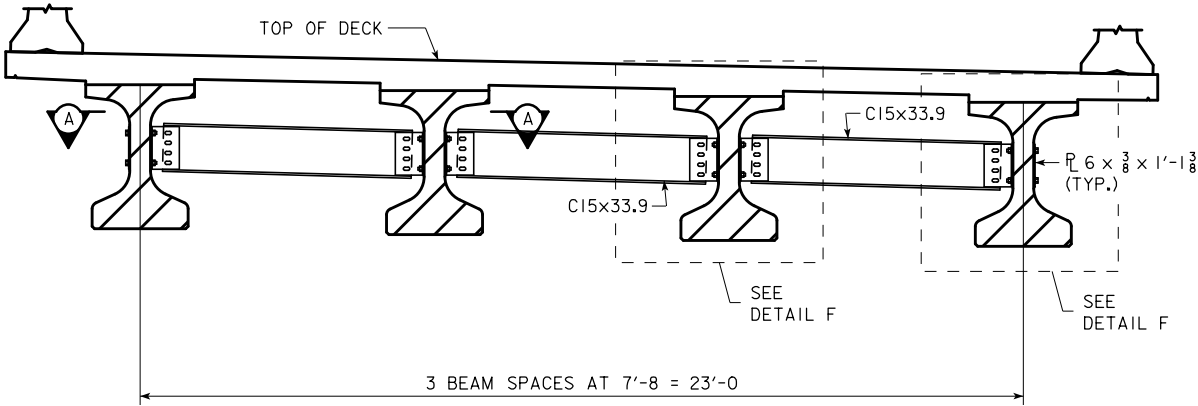
INTERMEDIATE DIAPHRAGM
BOLT HOLE LOCATIONS

NOTE: SEE DESIGN SHEET 26 FOR ABUTMENT
AND PIER DIAPHRAGM BOLT HOLE LOCATIONS.

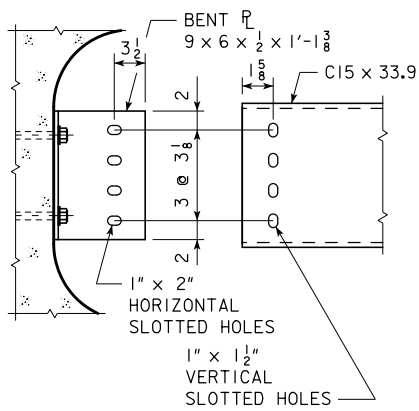
BULB TEE "C" BEAM INTERMEDIATE DIAPHRAGM STRUCTURAL STEEL			
ONE BEAM CONNECTION (DETAIL "F")			WEIGHT
		NO. OF BEAM CONNECTIONS	
2 - 7/8" x 9 1/4" H.S. BOLTS WITH NUTS & WASHERS = 4.8 LBS.		18	86
ONE DETAIL "F"	1 - BACKING PL 6 x 3/8 x 1'-1 3/8 = 8.5 LBS.	18	153
	1 - BENT PL 9 x 6 x 1/2 x 1'-1 3/8 = 28.5 LBS.	18	513
ONE DIAPHRAGM			
		NUMBER OF DIAPHRAGMS	
8 - 7/8" x 2 3/4" H.S. BOLTS WITH NUTS & WASHERS = 10.3 LBS.		9	93
1 - C15 x 33.9 = 33.9 LBS./FT.	LENGTH OF MEMBER 6'-5 3/4	9	1,977
INTERMEDIATE DIAPHRAGM STRUCTURAL STEEL - TOTAL (LBS.)			2,822

STRUCTURAL STEEL	
WEIGHT	2,822 LBS.

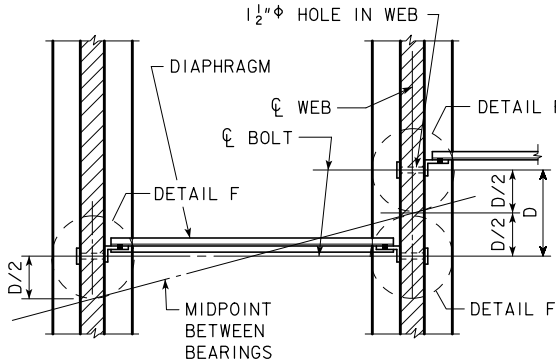
NOTE: STRUCTURAL STEEL WEIGHT
IS INCLUDED ON THE
SUMMARY QUANTITIES SHEET.



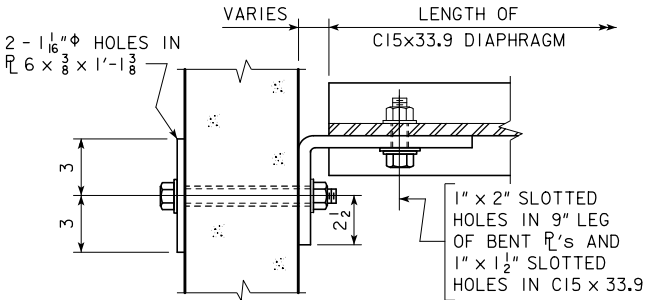
SECTION SHOWING INTERMEDIATE DIAPHRAGM



SLOTTED HOLE DETAILS



PART SECTION A-A



SECTION C-C

NOTES:

ALL DIAPHRAGM MATERIALS, INCLUDING BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED.
SHOP DRAWINGS OF THE STEEL DIAPHRAGMS SHOWING LAYOUT AND DETAILS OF THE DIAPHRAGMS SHALL BE SUBMITTED FOR APPROVAL.
ALL COSTS FOR FURNISHING AND INSTALLING STEEL INTERMEDIATE DIAPHRAGMS SHALL BE INCLUDED IN THE PRICE BID FOR STRUCTURAL STEEL.
THE 1 1/2" HOLES FOR THE 7/8" H.S. BOLTS SHALL BE CAST INTO THE WEB. DRILLING IS NOT ALLOWED.
THE 7/8" H.S. BOLTS THROUGH THE WEB SHALL HAVE A THREAD LENGTH OF 3" MIN. AND 4" MAX. AND SHALL MEET THE REQUIREMENTS OF ASTM A449.
ALL BOLTS ARE TO BE TIGHTENED PRIOR TO PLACING BRIDGE FLOOR CONCRETE.

Design For 20° Skew (R.A.)

314'-8" x 30'-0" Prestensioned
Prestressed Concrete Beam Bridge

103'-10" End Spans107'-0" Interior Span

Intermediate Diaphragm Details

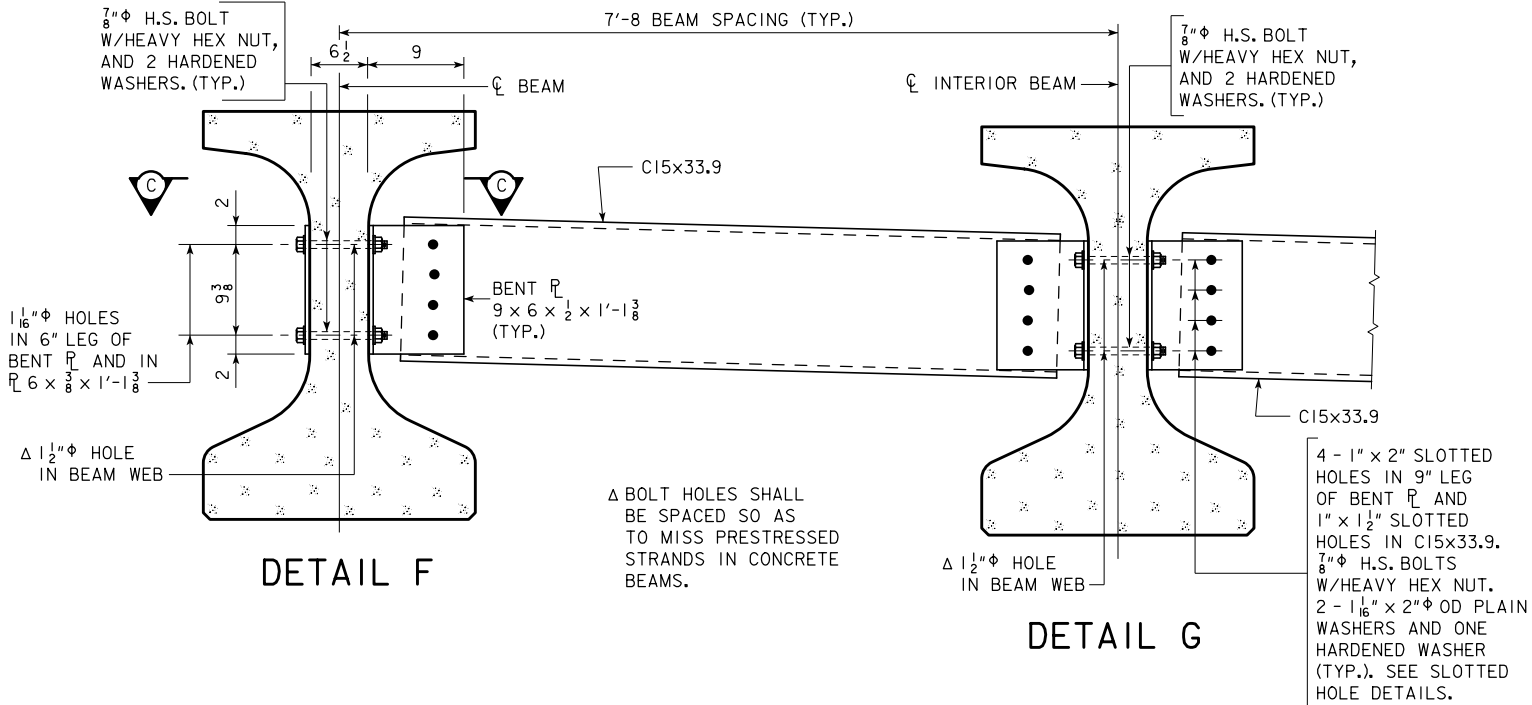
STA. 1301+18.48 EB US 30 DetourTurn-in Date: August 2024

Story County

IOWA DEPARTMENT OF TRANSPORTATION

Design No. 425Design Sheet No25 of 28FHWA No. 48731

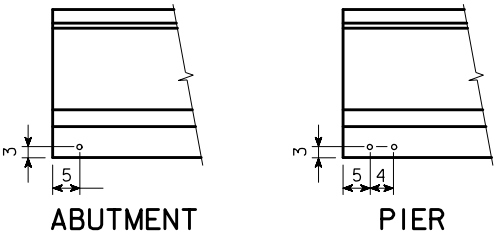
ENGLISHBEAMS.DGN - 1036-1-BTC - THIS SHEET ISSUED 06-14, SHEET 1 OF 2.
ENGLISHBEAMS.DGN - 1036-2-BTC - THIS SHEET ISSUED 06-14, SHEET 2 OF 2.



DETAIL F

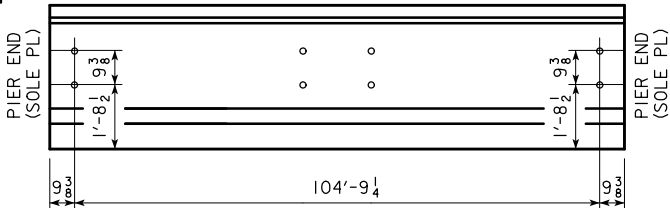
DETAIL G

SECTION SHOWING ABUTMENT & PIER DIAPHRAGMS AT EXTERIOR BAY



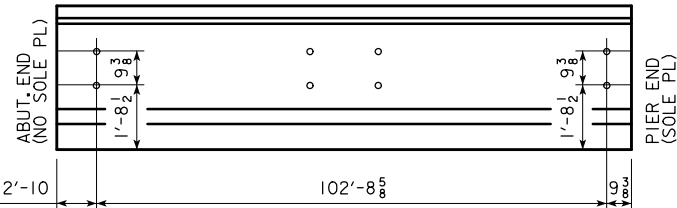
BEAM COIL TIE LOCATIONS

NOTE: COIL TIE INSERTS ARE TO BE PROTECTED DURING IN-SERVICE CONDITIONS TO ALLOW FUTURE USE IN WESTBOUND PERMANENT BRIDGE.



INTERIOR SPAN PIER DIAPHRAGM BOLT HOLE LOCATIONS

NOTE: SEE DESIGN SHEET 25 FOR INTERMEDIATE DIAPHRAGM BOLT HOLE LOCATIONS.

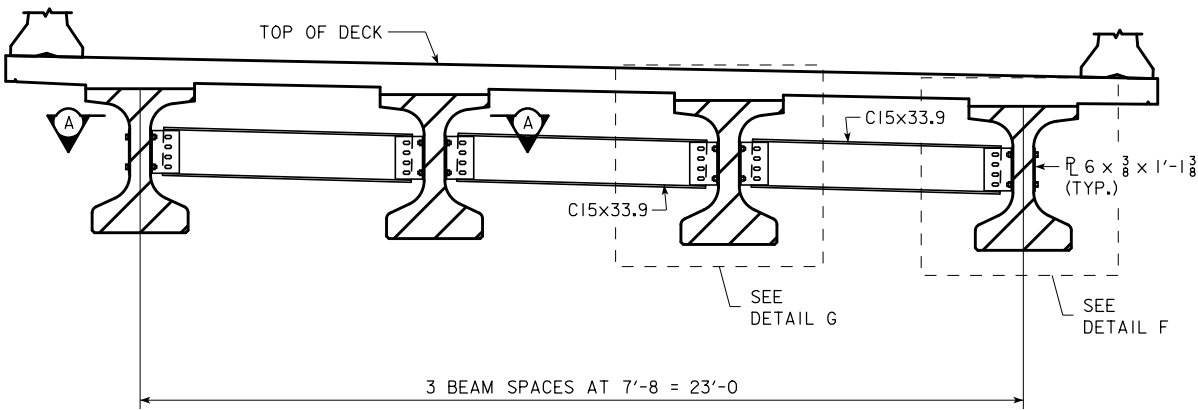


END SPAN ABUT./PIER DIAPHRAGM BOLT HOLE LOCATIONS

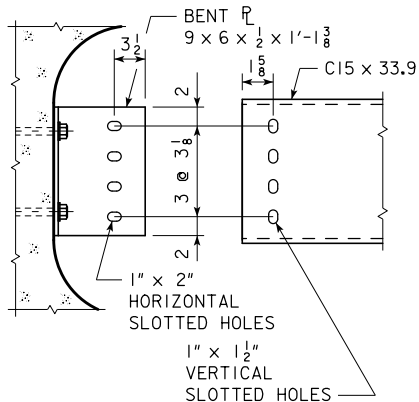
STRUCTURAL STEEL

WEIGHT 5,638 LBS.

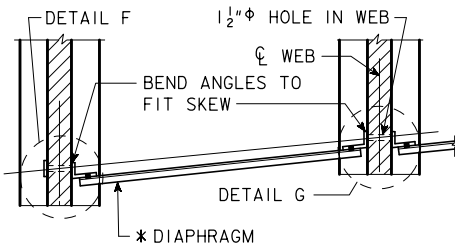
NOTE: STRUCTURAL STEEL WEIGHT IS INCLUDED ON THE SUMMARY QUANTITIES SHEET.



SECTION SHOWING ABUTMENT & PIER DIAPHRAGM



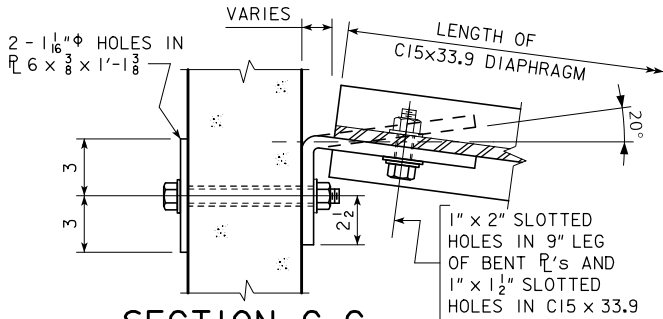
SLOTTED HOLE DETAILS



PART SECTION A-A
(ABUTMENT SHOWN, PIER IS SIMILAR)

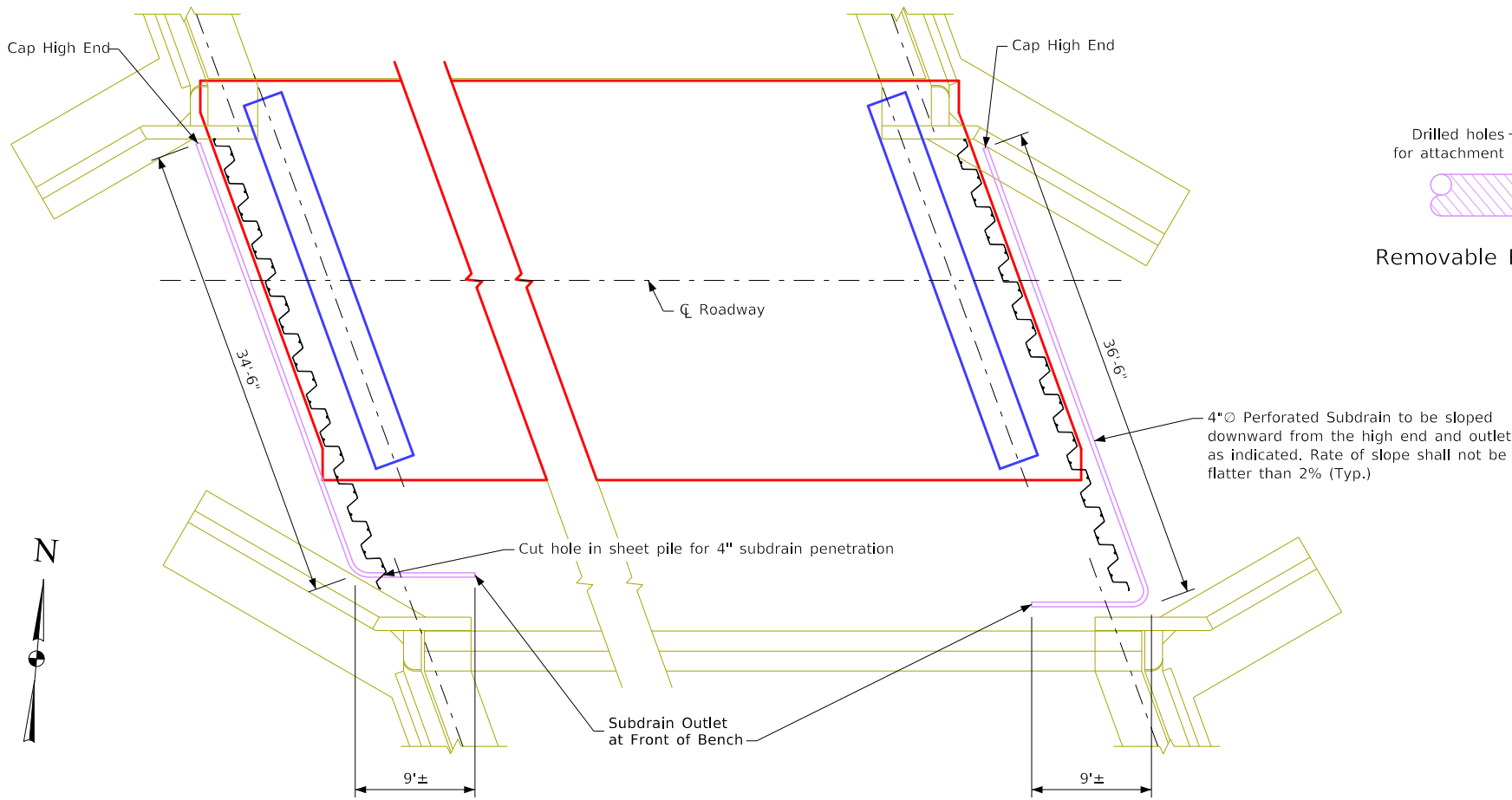
NOTES:

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THE 7/8" H.S. BOLTS THROUGH THE WEB SHALL HAVE A THREAD LENGTH OF 3" MIN. AND 4" MAX. AND SHALL MEET THE REQUIREMENTS OF ASTM A449.
ALL BOLTS ARE TO BE TIGHTENED PRIOR TO PLACING BRIDGE FLOOR CONCRETE.

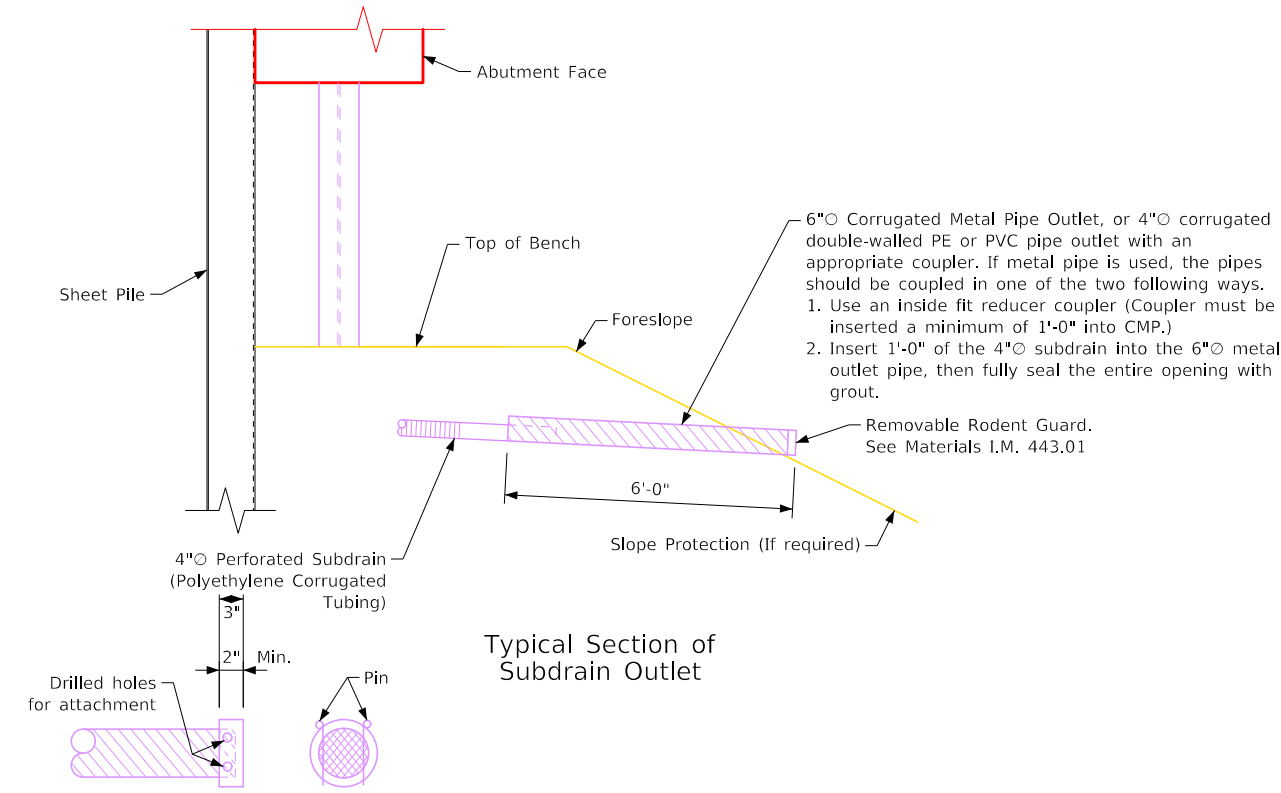


SECTION C-C

Design For 20° Skew (R.A.)
314'-8" x 30'-0" Pretensioned Prestressed Concrete Beam Bridge
103'-10" End Spans 107'-0" Interior Span
Abutment/Pier Diaphragm Details
STA. 1301+18.48 EB US 30 Detour Turn-in Date: August 2024
Story County
IOWA DEPARTMENT OF TRANSPORTATION
Design No. 425 Design Sheet No26 of 28 FHWA No. 48731



Situation Plan
Showing Subdrain Locations



Removable Rodent Guard Details

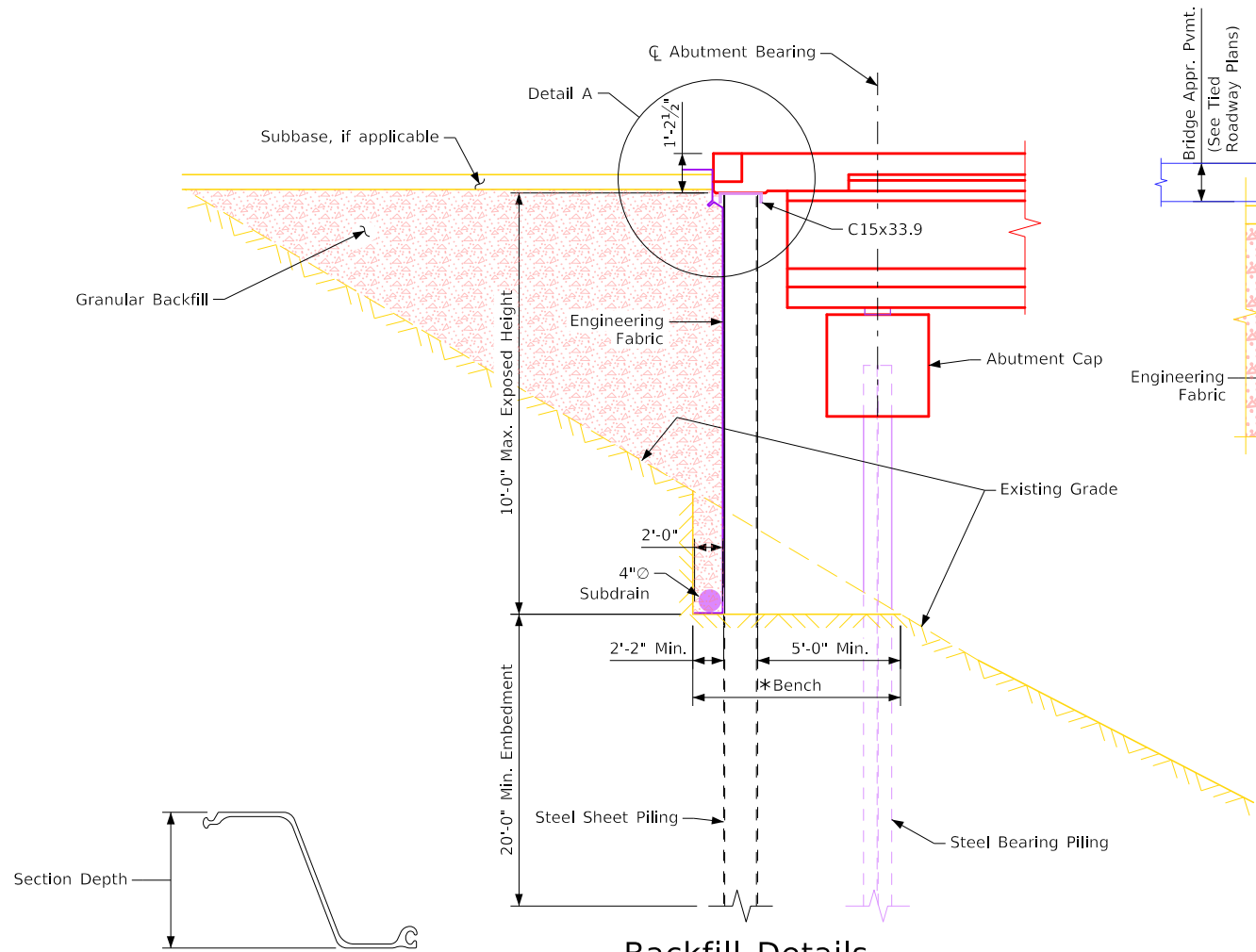
Outlet Details

Notes:
The subdrain outlet shall consist of a 6'-0" length of pipe with a removable rodent guard as detailed on this sheet.

Subdrain outlet shall extend to the end of the bench. See Design Sheet 28 for additional details of bench.



Design For 20° Skew (R.A.)
**314'-8" x 30'-0" Prestensioned
Prestressed Concrete Beam Bridge**
103'-10" End Spans 107'-0" Interior Span
Subdrain Details
STA. 1301+18.48 EB US 30 Detour Turn-in Date: August 2024
Story County
IOWA DEPARTMENT OF TRANSPORTATION
Design No. 425 Design Sheet No. 27 of 28 FHWA No. 48731



Backfill Details
(Typical Section thru Abutment)

Steel Sheet Piling Notes:

The sheet pile material shall meet the requirements for ASTM A328/A328M or ASTM A572/A572M Grade 50 steel for strength and weldability. Other sheet pile may be used in place of the one detailed, but the minimum section properties shown below shall be achieved.

Section Length	See Typical Section on this sheet
Max. Section Depth	12 in.
Min. Section Thickness	0.375 in.
Elastic Section Modulus	30.2 in. ³ / ft.

Sheet piles shall be driven to full penetration.

The pay quantity will be based on the sheet pile wall dimensions shown.

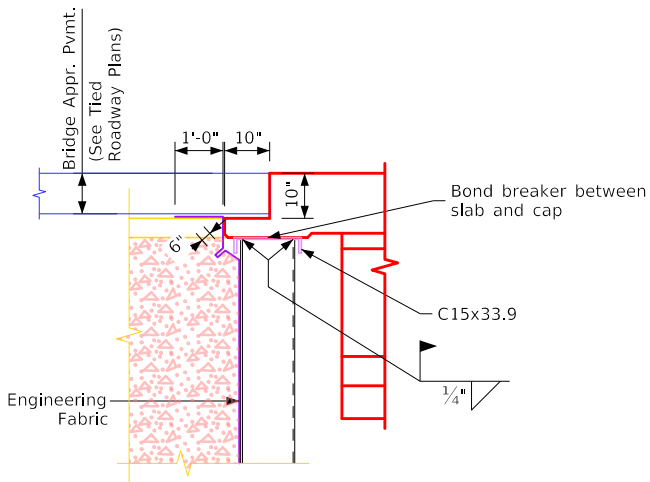
Steel channels shall conform to ASTM A709, Grade 36.

Field welding shall meet the requirements of Materials I.M. 558.

Sheeting adjacent to the mask wall of the existing abutments may interfere with existing abutment footings. The Contractor shall be responsible for the stability and strength of the shoring for sheet piles not driven to minimum embedment depth during construction and service of the bridge.

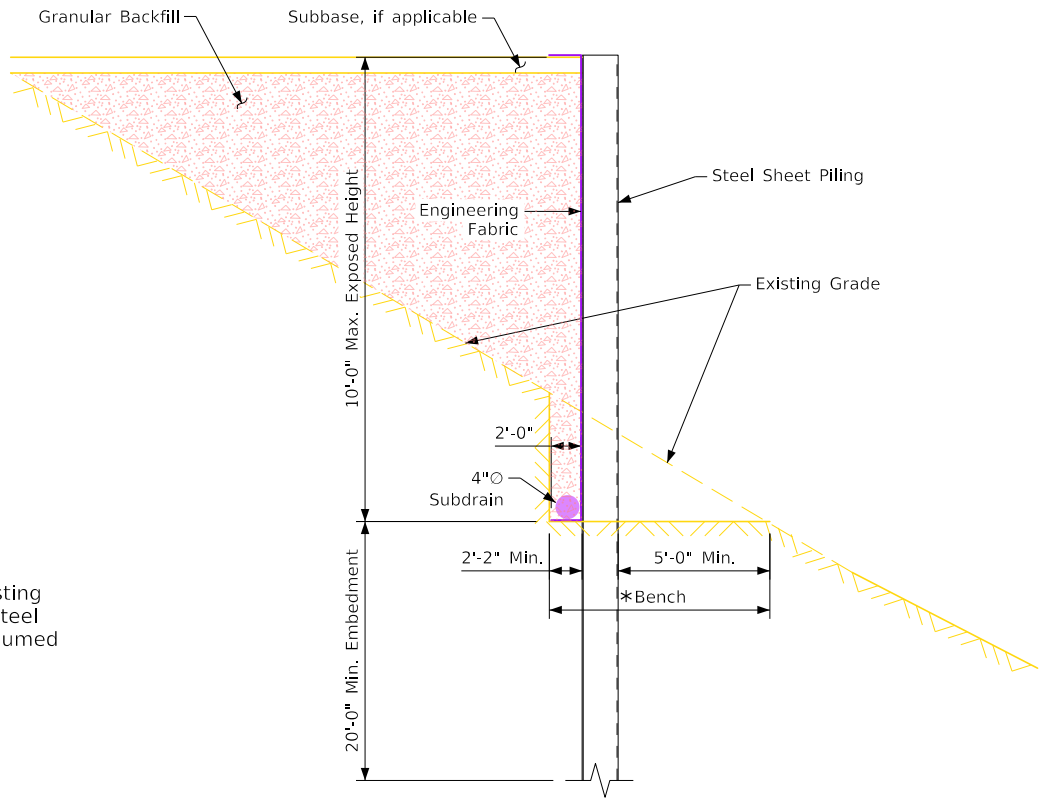
Step down top of sheet piling as necessary to meet existing grade on south side of both abutments.

Sheet piling shall be installed and backfill shall be placed before installing steel bearing piling.



Detail A

* Note: Construct a level bench in existing slope as necessary for sheet pile and steel bearing pile installation. 8'-0" width assumed for Class 20 excavation quantity.



Backfill Details
(Section thru Wing)

Engineering Fabric Notes:

Engineering fabric is to be placed full height and length of sheet piling and extend 2'-0" minimum past joints between the new and existing abutment elements. Provide a 6" fold at joints to allow for sheet piling and thermal deck movement.

The engineering fabric shall be in accordance with Article 4196.01,B,6 of the Standard Specifications. If the engineering fabric is lapped, the laps shall be a minimum of one foot in length, shingle fashion and stapled for continuity.

The intended purpose of the engineering fabric is to prevent the backfill from spilling between sheet piling, existing mask wall, existing abutment backwall, and deck. The Contractor shall ensure all gaps are sealed to retain the backfill to the satisfaction of the Engineer.

Cost of furnishing and installing engineering fabric shall be incidental to the bid item "Granular Backfill".

Abutment Backfill Notes:

The granular backfill shall consist of Iowa DOT Gradation No. 1 (4110-PCC Fine Aggregate).

The cost of furnishing and placing subdrains (including excavation), subdrain outlets, and engineering fabric shall be included in the contract unit price bid for "Granular Backfill". No extra payment will be made.

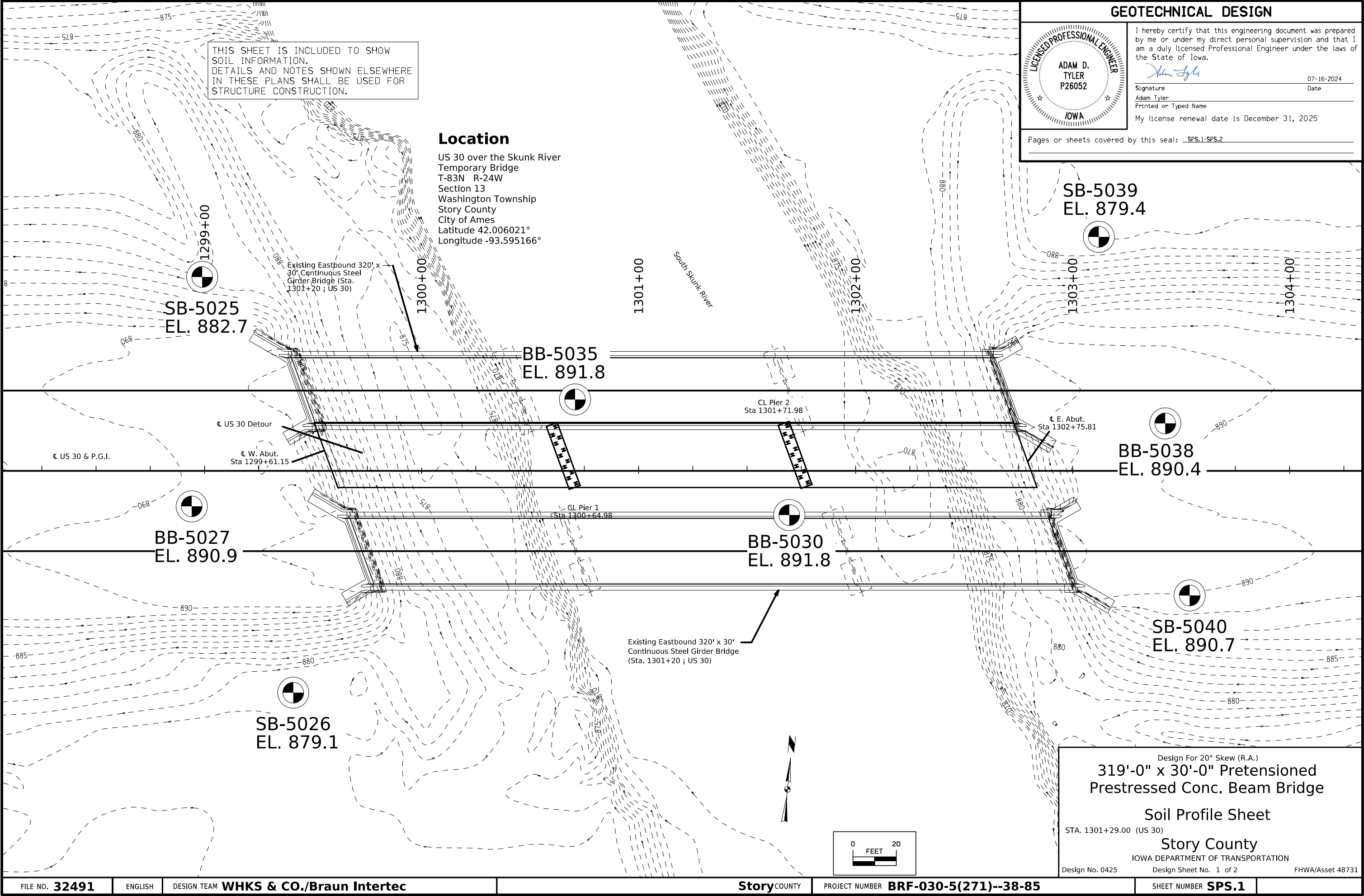
Note:
See Subdrain Details sheet for details not shown on this sheet which are pertinent to this structure.

Steel Sheet Pile Quantities

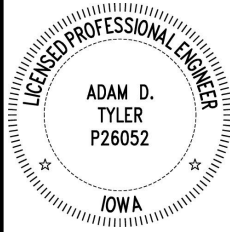
Location	Quantity
West Abutment Backwall & Wing Wall	1,080
East Abutment Backwall & Wing Wall	1,080
Total (sq. ft.)	2,160

Design For 20° Skew (R.A.)
**314'-8" x 30'-0" Pretensioned
Prestressed Concrete Beam Bridge**
103'-10" End Spans 107'-0" Interior Span
Sheet Pile and Backfill Details
STA. 1301+18.48 EB US 30 Detour Turn-in Date: August 2024
Story County
IOWA DEPARTMENT OF TRANSPORTATION
Design No. 425 Design Sheet No28 of 28 FHWA No. 48731





GEOTECHNICAL 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.

Signature: *Adam Tyler* Date: 07-16-2024
Adam Tyler
Printed or Typed Name
My license renewal date is December 31, 2025

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

Story COUNTY

PROJECT NUMBER BRF-030-5(271)--38-85

SHEET NUMBER SPS.1

