

This project has been approved by Iowa DNR Flood Plain Construction Permit No. 2024-0662FP-01.

Index of Sheets	
No.	Description
Sheets	Bridge Plan
A.1	Title Sheet
A.2	Location Map Sheet
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PLANS OF PROPOSED IMPROVEMENT ON THE

PRIMARY ROAD SYSTEM

STORY COUNTY

Bridge Replacement - PPCB

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

Refer to the Plan Sheets for list of applicable specifications.

Value Engineering Saves. Refer to Article 1105.13 of the Specifications.



Revisions

	TOTAL
	38
PROJECT IDENTIFICATION NUMBER	
19-85-030-020	
PROJECT NUMBER	
BRF-030-5(311)--38-85	
R.O.W. PROJECT NUMBER	
PROJECT DIRECTORY NUMBER	
8503002019	

Design Data Urban		
2024 AADT	16,400	V.P.D.
TRUCKS	8	%
Includes Westbound 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.

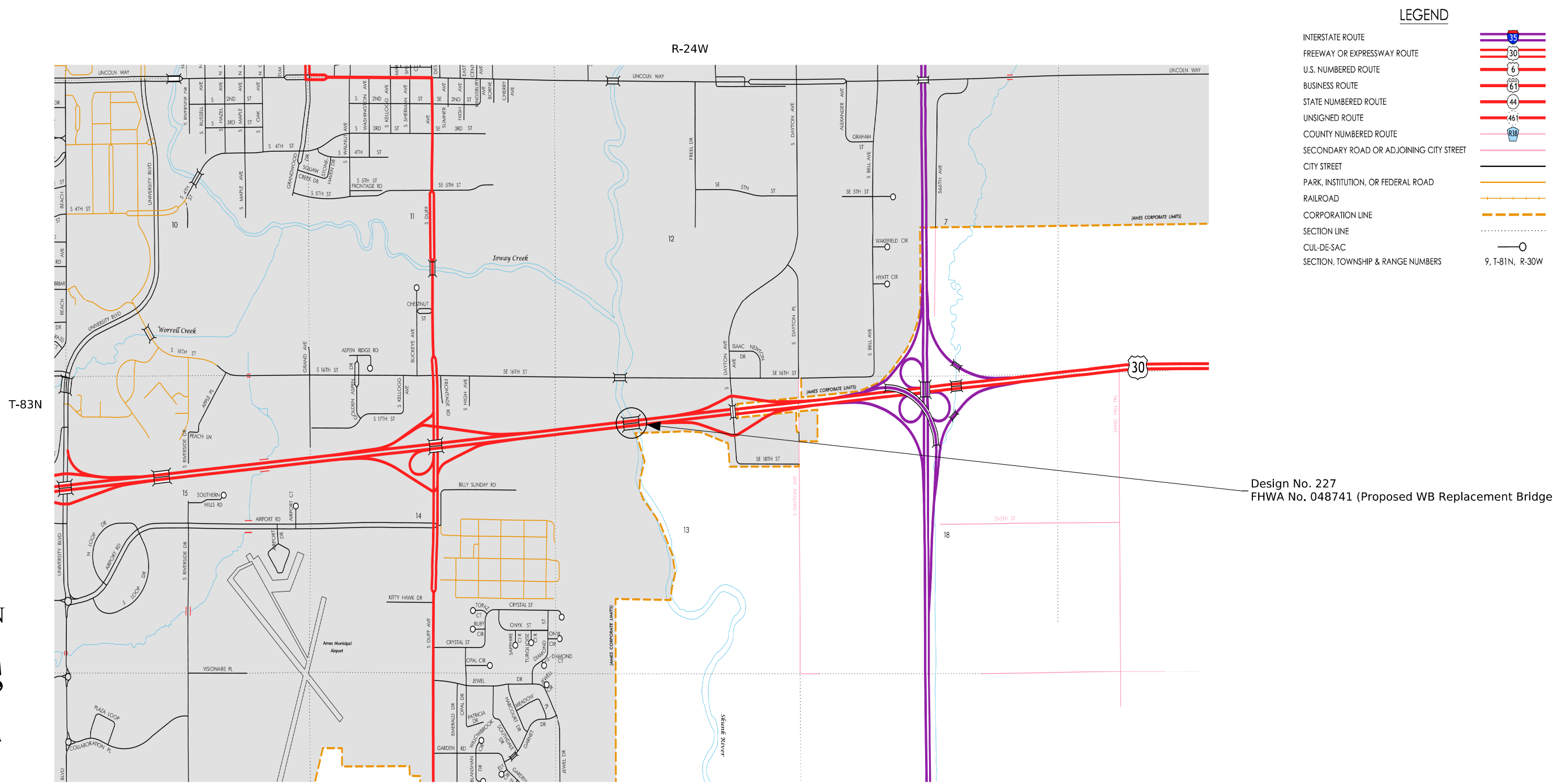
Signature Joshua J. Opheim Date 7-6-2026

Printed or Typed Name Joshua J. Opheim

My license renewal date is December 31, 2026

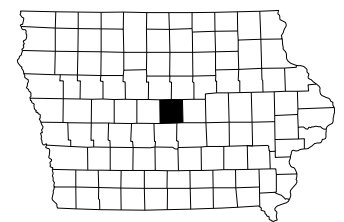
Pages or sheets covered by this seal: A.1-A.2 & V.1-V.34

Iowa DOT Bridges and Structures
Consultant Coordinator Contact:
Lili Yang



Part of City of Ames Location Map

Not To Scale



ESTIMATED BRIDGE QUANTITIES				
ITEM NO.	ITEM CODE	ITEM	UNIT	TOTAL
1	2104-2710020	EXCAVATION, CLASS 10, CHANNEL	CY	1128.4
2	2401-6745625	REMOVAL OF EXISTING BRIDGE	LS	1
3	2402-2720000	EXCAVATION, CLASS 20	CY	388
4	2402-2721000	EXCAVATION, CLASS 21	CY	874
5	2403-0100010	STRUCTURAL CONCRETE (BRIDGE)	CY	656.5
6	2403-1000005	FIBER REINFORCEMENT FOR STRUCTURAL CONCRETE	CY	807.3
7	2403-1000010	TRIAL BATCH AND TEST PLACEMENT (FIBER REINFORCED CONCRETE)	LS	1
8	2403-7000210	HIGH PERFORMANCE STRUCTURAL CONCRETE	CY	807.3
9	2404-7775000	REINFORCING STEEL	LB	98422
10	2404-7775005	REINFORCING STEEL, EPOXY COATED	LB	254181
11	2404-7775009	REINFORCING STEEL, STAINLESS STEEL	LB	7052
12	2407-0563080	BEAMS, PRETENSIONED PRESTRESSED CONCRETE, BTC80	EACH	14
13	2414-6424110	CONCRETE BARRIER RAILING	LF	806
14	2501-0201057	PILES, STEEL, HP 10 X 57	LF	1870
15	2501-0201473	PILES, STEEL, HP 14 X 73	LF	5130
16	2501-6335010	PREBORED HOLES	LF	220
17	2507-2638650	BRIDGE WING ARMORING - EROSION STONE	SY	24.4
18	2507-3250005	ENGINEERING FABRIC	SY	1245.2
19	2507-6800061	REVETMENT, CLASS E	TON	1692.6
20	2526-8285040	CONSTRUCTION SURVEY, LOCATION SURVEY	LS	1
21	2533-4980005	MOBILIZATION	LS	1
DESIGN NO. 227-STORY Alternate AA Option 1				
22	2407-0563105	BEAMS, PRETENSIONED PRESTRESSED CONCRETE, BTC105	EACH	2
23	2408-7800000	STRUCTURAL STEEL	LB	20586
24	2599-9999005	('EACH' ITEM) Remove and Reinstall Existing PPC Beams	EACH	12
DESIGN NO. 227-STORY Alternate AA Option 2				
25	2407-0563105	BEAMS, PRETENSIONED PRESTRESSED CONCRETE, BTC105	EACH	14
26	2408-7800000	STRUCTURAL STEEL	LB	20294

ESTIMATE REFERENCE INFORMATION		
ITEM NO.	ITEM CODE	ITEM DESCRIPTION
1	2104-2710020	EXCAVATION, CLASS 10, CHANNEL --
2	2401-6745625	REMOVAL OF EXISTING BRIDGE Includes removal of existing Westbound bridge and existing median detour bridge (except 12 pretensioned prestressed BTC105 beams). See additional plan notes on design sheet 3. Contractor to add the following information when submitting the Iowa DNR "Notification of Demolition" form: Name of Asbestos Inspector: Brad Azeltine Date Inspected: 12/15/2021 IA License Number: IA DOT Inspector Phone: 515-239-1938 Procedure used to detect the presence of asbestos materials: Polarized Light Microscopy (PLM)
3	2402-2720000	EXCAVATION, CLASS 20 --
4	2402-2721000	EXCAVATION, CLASS 21 --
5	2403-0100010	STRUCTURAL CONCRETE (BRIDGE) Includes all resilient joint filler required. Includes furnishing and placing subdrain (including excavation), floodable backfill, porous backfill, geotextile fabric, water flooding, and subdrain outlet at abutments. Includes furnishing and placing 3 inch diameter PVC plastic pipe and expanding foam in the abutment wings. Includes splash basins under deck drains (6 locations).
6	2403-1000005	FIBER REINFORCEMENT FOR STRUCTURAL CONCRETE Refer to Developmental Specifications for Fiber Reinforcement for Structural Concrete for additional information. Polypropylene fibers shall be included in the bridge deck, abutment and pier diaphragms, and wing extensions.
7	2403-1000010	TRIAL BATCH AND TEST PLACEMENT (FIBER REINFORCED CONCRETE) Refer to Developmental Specifications for Fiber Reinforcement for Structural Concrete for additional information. Polypropylene fibers shall be included in the bridge deck, abutment and pier diaphragms, and wing extensions.
8	2403-7000210	HIGH PERFORMANCE STRUCTURAL CONCRETE This bid item includes the concrete for the slab, abutment & pier diaphragms, and wing extensions. Refer to the Developmental Specification for High Performance Concrete for Structures for additional information.

ESTIMATE REFERENCE INFORMATION		
ITEM NO.	ITEM CODE	ITEM DESCRIPTION
9	2404-7775000	REINFORCING STEEL --
10	2404-7775005	REINFORCING STEEL, EPOXY COATED --
11	2404-7775009	REINFORCING STEEL, STAINLESS STEEL --
12	2407-0563080	BEAMS, PRETENSIONED PRESTRESSED CONCRETE, BTC80 Includes pier and abutment bearing material. See Materials IM 570 Appendix I for allowable bearing substitutes at integral abutments. Includes anchored curved sole plates at piers. Includes Contractor filling out beam numbers by location and beam seat elevations in "PPC Beam Data Spreadsheet" and forwarding electronic spreadsheet to the Engineer.
13	2414-6424110	CONCRETE BARRIER RAILING Includes material and labor associated with providing and installing the rigid steel conduit, junction boxes and fittings. Includes 810 LF of 2" diameter rigid steel conduit. If placement of concrete is done by the slipforming method, Class BR concrete is required. Cast-in-place barrier rails shall use Class C mix. Price bid for this item shall include the cost of cast-in-place forms if required for placement of the concrete.
14	2501-0201057	PILES, STEEL, HP 10 X 57 Includes furnishing and installing steel pile points.
15	2501-0201473	PILES, STEEL, HP 14 X 73 Includes furnishing and installing steel pile points.
16	2501-6335010	PREBORED HOLES --
17	2507-2638650	BRIDGE WING ARMORING - EROSION STONE Includes furnishing and placing engineering fabric, erosion stone, and all required excavating, shaping and compacting for wing armorng.
18	2507-3250005	ENGINEERING FABRIC Engineering fabric shall be material as specified for embankment erosion control in accordance with Article 4196.01,B,3, of the Standard Specifications.
19	2507-6800061	REVETMENT, CLASS E Estimated at 1.5 ton/cu yd. Class E revetment shall meet requirements of Article 4130. Broken Concrete and granite is not allowed.
20	2526-8285040	CONSTRUCTION SURVEY, LOCATION SURVEY --
21	2533-4980005	MOBILIZATION --
22, 25	2407-0563105	BEAMS, PRETENSIONED PRESTRESSED CONCRETE, BTC105 Includes laminated and plain neoprene bearing pads under new beams. Includes anchored curved sole plates as shown on design sheet 25. Nonstandard stirrup lengths are used for these beams. Includes Contractor filling out beam numbers by location and beam seat elevations in "PPC Beam Data Spreadsheet" and forwarding electronic spreadsheet to the Engineer.
23, 26	2408-7800000	STRUCTURAL STEEL Includes pier bearing plates per details on design sheet 25. Includes 16 drains at 106 lb each. Includes steel intermediate diaphragms. If Alternate AA Option 2 is bid, masonry plates at Pier 2 will be omitted and substituted with 1" plain neoprene pads.
24	2599-9999005	('EACH' ITEM) Remove and Reinstall Existing PPC Beams Includes removal, cleaning and surface preparation of the top flange, stockpiling, and erection/installation of the existing salvaged BTC105 beams from the median detour bridge. Includes providing new laminated and plain neoprene bearing pads under the re-installed beams per details on design sheet 25. Existing masonry plate/pintle plate bearings, neoprene pads, and steel diaphragms shall not be re-used and will become the property of the Contractor. Measurement and payment will be the contract unit price for each beam by count incorporated into the final structure. Payment will be full compensation for handling, blocking and bracing for storage, erection, and any repairs needed due to damage. Includes Contractor filling out beam numbers by location and beam seat elevations in "PPC Beam Data Spreadsheet" and forwarding electronic spreadsheet to the Engineer.

Roadway quantities are included in the tied Road Plans, Project No. NHSX-030-5(310)--3H-85.

Design For 20° Skew (R.A.)

376'-0" x 60'-0" Pretensioned
Prestressed Concrete Beam Bridge

81'-0" End Spans2 - 107'-0" Interior Spans

Estimated Bridge Quantities

STA. 1301+02.00 (WB US 30)Turn-in Date: August, 2026

Story County

IOWA DEPARTMENT OF TRANSPORTATION

Design No. 227Design Sheet No. 1 of 34FHWA No. 048741

General Notes:

This design is for the replacement of the existing 320'-0" x 30'-0" continuous welded plate girder bridge on WB US 30 over the South Skunk River, Design No. 3061 with a year of construction of 1964. Electronic plans of the existing WB bridge are available to the Contractor as part of the e-files supplied with the Contract Documents.

The lump sum bid for "Removal of Existing Bridge" shall include removal of the existing 320'-0" x 30'-0" continuous welded plate girder (two girder with floor beam/substringer system) bridge with concrete deck, concrete wall piers, and concrete high wall abutments. Also includes removal of the existing 314'-8" x 30'-0" median detour bridge with concrete deck, pile bent piers, and exposed sheet pile abutments. Existing BTC105 beams in the median bridge shall be salvaged for incorporation into the proposed Westbound US 30 bridge. Stockpile beams on-site at a location approved by the Engineer. Beam storage requirements shall be in accordance with Article 2407.03, K, of the Standard Specifications. Removals shall be in accordance with Section 2401, of the Standard Specifications.

This bridge is designed for HL-93 loading, plus 20 lbs. per square foot of roadway for future wearing surface.

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.

Guardrail will not be installed in this project, but it will be installed in tied project associated with this contract, Project No. NHSX-030-5(310)--3H-85.

These bridge plans label all reinforcing steel with english notation (5a1 is ⅝ 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

The Westbound road will be closed to traffic during construction. See traffic control plan note on this sheet.

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.

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.

The Bridge Contractor shall prebore holes for abutment piles. Holes shall be bored to the elevations shown on the "Longitudinal Section Along Centerline Roadway" on Design Sheet No. 4. Piles shall be driven through the holes to at least the specified design bearing.

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 abutment berm slope excavation is not a part of this project, but it will be included in tied Road Plans, Project No. NHSX-030-5(310)--3H-85. The berm excavation shall be completed before abutment piles are driven.

Class 20 excavation quantities are based on the assumption that the new berm slope excavation is completed prior to starting construction of the abutments and piers.

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.

Concrete barrier rails placed using the slipform method will require the use of a Class BR Concrete in accordance with Article 2513.03, A, 2, of the Standard Specifications. Cast-in-place barrier rails shall use Class C mix. Class D Concrete is not permitted for concrete barrier rails (cast-in-place or slipformed method).

Longitudinal grooving will not be a part of this project, but will be included in tied Road Plans, Project No. NHSX-030-5(310)--3H-85.

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.



Scrape samples were taken on this bridge to get an indication of the existence of and level of total lead and total chromium. 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.

Scrape Sample Results					
Date Sampled	Sampled Item	Total Pb	Total Cr	TCLP Pb	TLCP Cr
12/15/2021	Abutment Bearing	<47.9	112	----	----
11/29/2012	Girder	73.1	225	<0.010	<0.030
6/17/2009	Abutment Bearing	53	137	----	----

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 progress during the same period of time will include, but is not limited to, construction of the following projects:

PCC Pavement - Grade & New NHSX-030-5(310)--3H-85
RCB Culvert New - Triple Box NHSX-030-5(312)--3H-85
RCB Culvert New - Triple Box NHSX-030-5(313)--3H-85
Traffic Signs NHSX-030-5(314)--3H-85
Lighting NHSX-030-5(315)--3H-85

Bridge Deck Dimension Table			
No.	Item	Unit	Quantity
1	Deck Length	L.F.	379.2
2	Deck Width	L.F.	63.2
3	Deck Area	S.F.	23,952

1.

Deck length is measured from face-to-face of paving notches along the centerline of the roadway.
2.

Deck widths are measured from out-to-out of deck perpendicular to the centerline of roadway.
3.

Deck area is to be based on the face-to-face paving notch distance and out-to-out deck dimensions.

Specifications:

Design: AASHTO LRFD 10th Ed, Series of 2024, 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.

Developmental Specifications for High Performance Concrete for Structures

Developmental Specifications for Fiber Reinforcement for Structural Concrete

Design Stresses:

Design stresses for the following materials are in accordance with the AASHTO LRFD Bridge Design Specifications, 10th Ed, Series of 2024, 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 No. 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
784	Overlay & Retrofit Rail
405	Rail End Sections
425	Temporary Bridge (Median)
126	Bridge Replacement (EB)
227	Bridge Replacement (WB)

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	(311)_Story_Design227_IntermediateDiaphragms.pdf	No
2	Deck Drains	(311)_Story_Design227_DeckDrains.pdf	No
3	Steel Bearing Plates	(311)_Story_Design227_Bearings.pdf	No
4	Deck Removal Plan	(311)_Story_Design227_DeckRemoval.pdf	No
No.	Calculation Description	Calculation File Name Convention For Submittal	Certified by Iowa P.E. (Yes/No)

Deck and Beam Removal Notes (Median Detour Bridge):

It is the intent of these plans to re-use the existing BTC105 prestressed concrete beams from the existing median detour bridge (Design No. 425). The Contractor is to use extreme care when removing the deck concrete above the prestressed beam locations to avoid damaging the top flange of the beams. Prior to commencing any deck removal work, the Contractor shall submit a demolition plan to the Engineer for approval. The Contractor shall notify the Engineer at the start of deck removal work in order to demonstrate the removal procedure on a small portion of the deck while the inspector is present. Damage may require the Contractor to modify the removal process prior to approval to proceed.

Once the deck concrete over the beam is removed, the top surface of the beam along the entire span shall be cleaned by sandblasting or other approved methods to provide a suitable bond between the beam and concrete deck in accordance with Article 2403.03, I, of the Standard Specifications. The existing steel stirrups extending out of the beams shall be carefully exposed and cleaned. The Contractor shall exercise care not to damage these stirrups during the concrete deck removal operation. Damage to the stirrup epoxy coating will require patching/repairs using an approved coating patch per Materials I.M. 451.03B. Replacement of damaged shear stirrups will be as directed by the Engineer and repaired at no cost to the State. Acceptable methods may include the following:

- Minor gouges: grind smooth
- Bends: UAC except if cracks or tears
- Cracks, tears or major gouges: replace as directed by the Engineer

Concrete damage to the beams may require structural concrete repairs. Repairs to the beams shall be completed according to Section 2426 of the Standard Specifications and as directed by Engineer.

All costs associated with beam removals, cleaning, repairs, and stockpiling is included the lump sum bid item "Remove and Reinstall Existing PPC Beams". If beam damage is severe or involves an extensive area, as determined by the Engineer, the beam shall be replaced in-kind. Cost of beam replacement will be the sole responsibility of the Contractor at no additional cost to the State. Any damaged beams which are not to be reused, shall become the property of the Contractor.

Traffic Control Plan:

The Westbound roadway will be closed to thru traffic. Refer to the Traffic Control Plan included in the tied Road Plans, Project No. NHSX-030-5(310)--3H-85.

404 Permit information and the Pollution Prevention Plan are included in the tied Road Plans, Project No. NHSX-030-5(310)--3H-85.

Design For 20° Skew (R.A.)

376'-0" x 60'-0" Pretensioned Prestressed Concrete Beam Bridge

81'-0" End Spans2 - 107'-0" Interior Spans

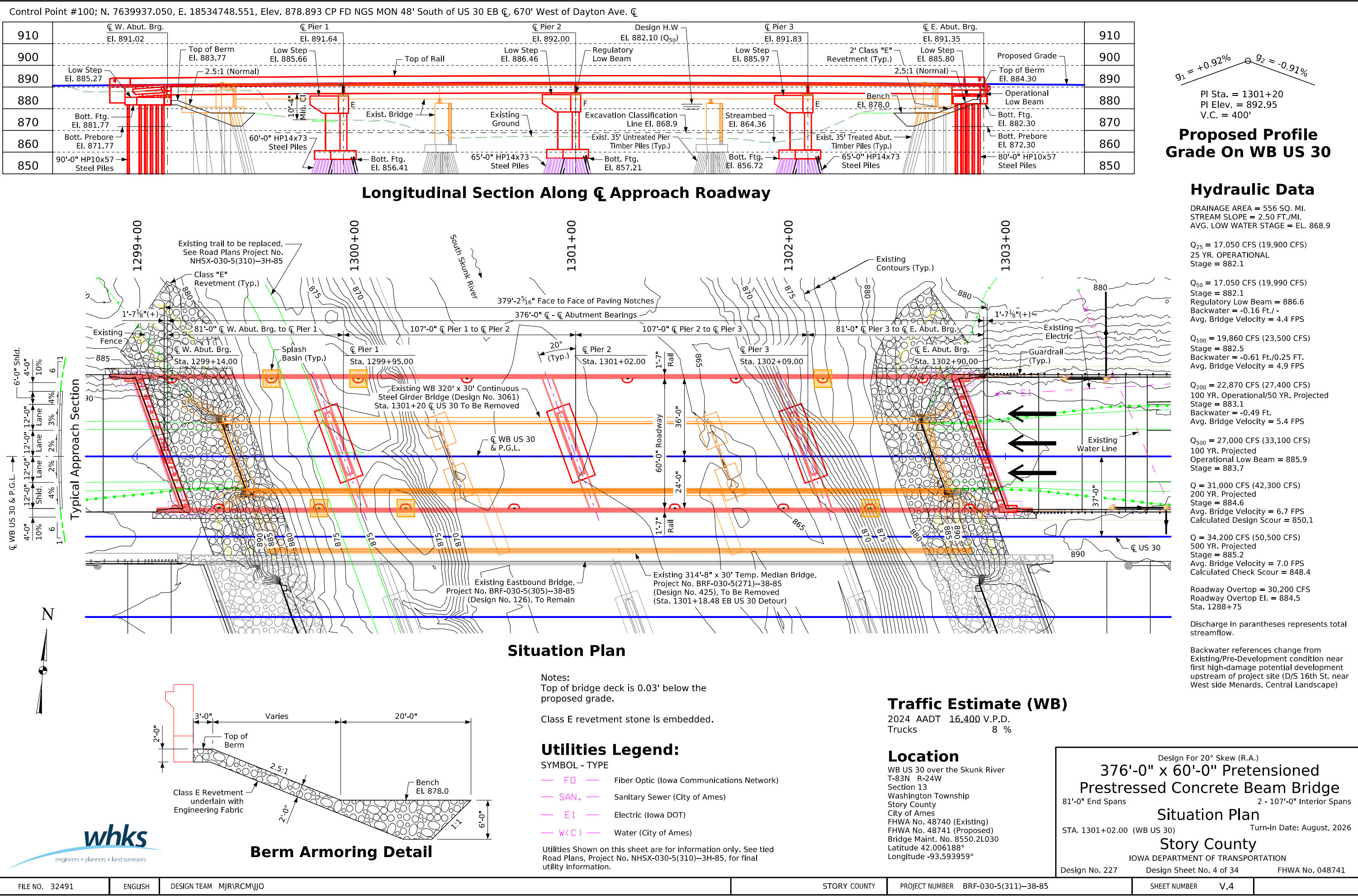
General Notes

STA. 1301+02.00 (WB US 30)Turn-in Date: August, 2026

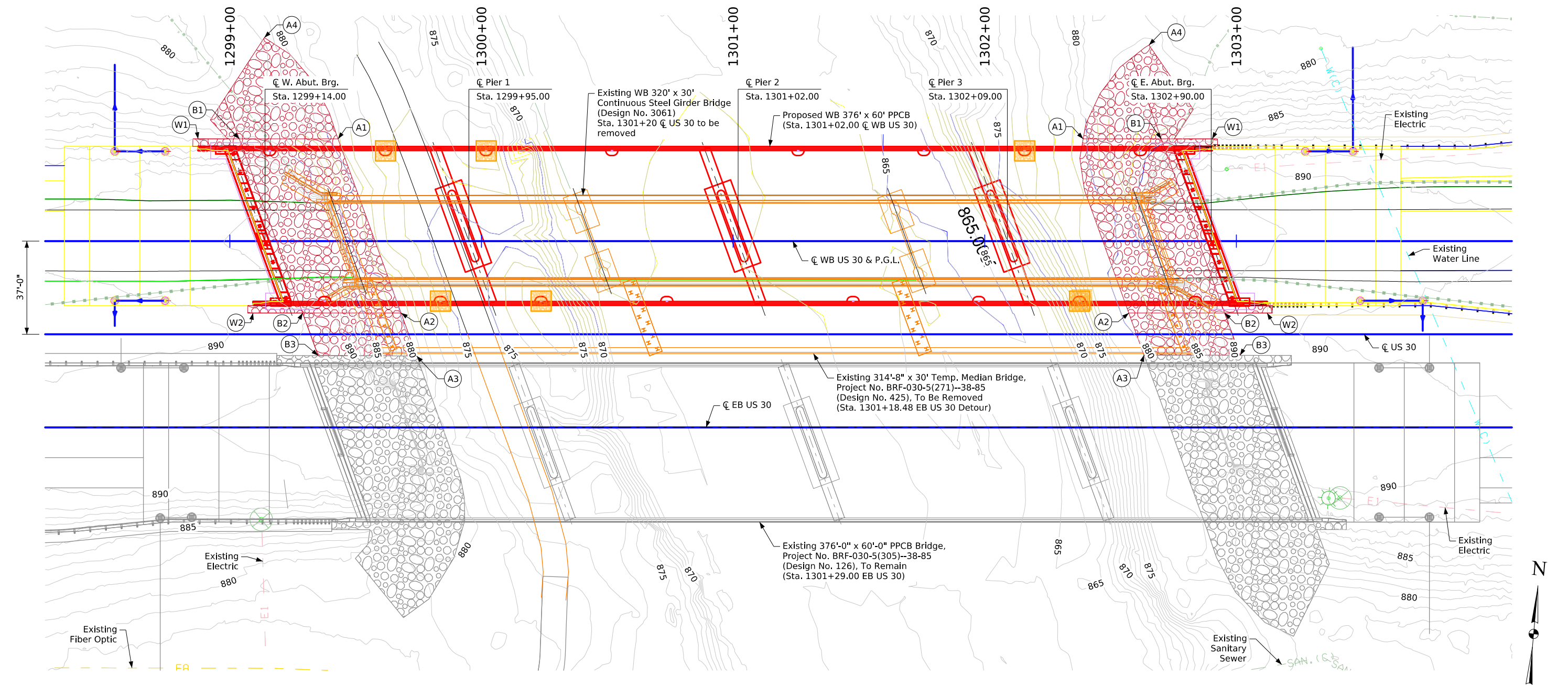
Story County

IOWA DEPARTMENT OF TRANSPORTATION

Design No. 227Design Sheet No. 3 of 34FHWA No. 048741



Control Point #100; N. 7639937.050, E. 18534748.551, Elev. 878.893 CP FD NGS MON 48' South of US 30 EB CL, 670' West of Dayton Ave. CL



Site Plan

8' x 8' Splash Basin under deck drains as shown

Berm Slope Location Table

Points	West Abutment			East Abutment		
	Station	Offset	Elev.	Station	Offset	Elev.
A1	1299+43.02	40.58' Lt.	878.00	1302+39.08	40.58' Lt.	878.00
A2	1299+68.03	28.58' Rt.	878.00	1302+57.26	28.58' Rt.	878.00
A3	1299+73.54	45.4' Rt.	878.00	1302+65.25	45.4' Rt.	878.00
A4	1299+13.73	80.8' Lt.	878.00	1302+65.25	77.83' Lt.	878.00
B1	1299+04.02	40.58' Lt.	883.77	1302+70.46	40.58' Lt.	884.30
B2	1299+29.16	28.58' Rt.	883.77	1302+95.61	28.58' Rt.	884.30
B3	1299+35.38	45.4' Rt.	884.34	1303+01.81	45.4' Rt.	883.74
W1	1298+87.40	40.58' Lt.	889.70	1302+90.40	40.58' Lt.	890.27
W2	1299+09.24	28.58' Rt.	890.38	1303+12.24	28.58' Rt.	890.57

Berm slope elevations reflect the grading surface.
Stations and offsets are based on the centerline of WB US 30.

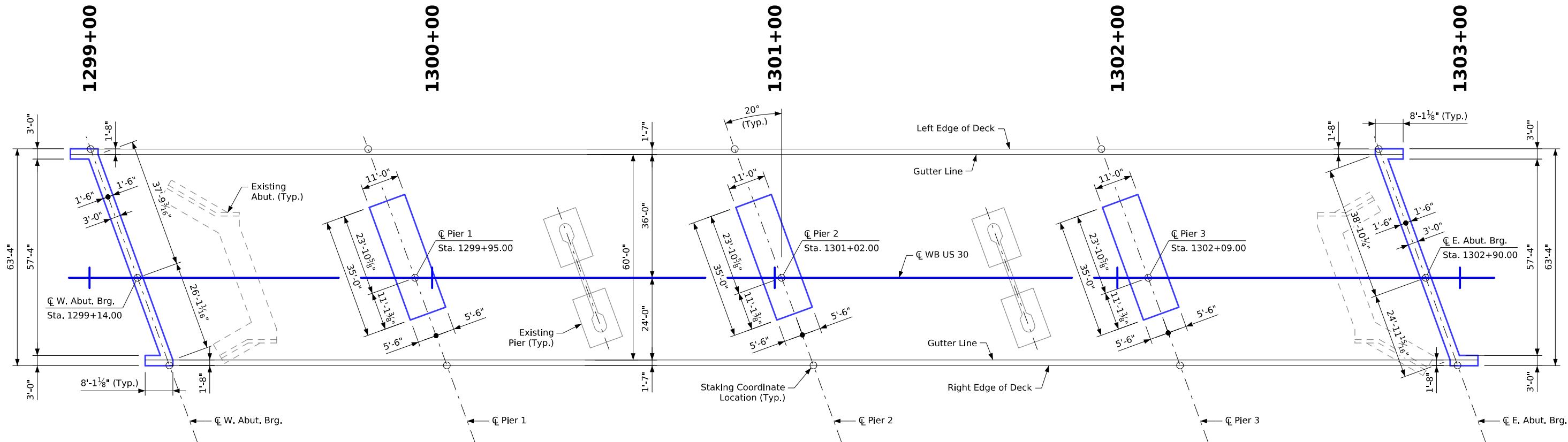
Estimated Berm Armoring Quantities

Location	Revetment Class E (Ton)	Engineering Fabric (SY)	Excavation Class 10, Channel (CY)
West Berm	845.6	620.7	563.7
East Berm	847	624.5	564.7
Totals	1,692.6	1,245.2	1,128.4

Excavation quantities are calculated from grading surface.

Design For 20° Skew (R.A.)
**376'-0" x 60'-0" Pretensioned
Prestressed Concrete Beam Bridge**
81'-0" End Spans 2 - 107'-0" Interior Spans
Site Plan
STA. 1301+02.00 (WB US 30) Turn-in Date: August, 2026
Story County
IOWA DEPARTMENT OF TRANSPORTATION
Design No. 227 Design Sheet No. 5 of 34 FHWA No. 048741





Staking Diagram

Substructure Removal Note:

Existing abutments and abutment piles shall be completely removed to the bottom of proposed grading of bridge berms (including revetment core out). Existing piles outside these limits which do not interfere with new construction may be left in place.

Existing piers shall be removed 1 ft. below stream bed per Standard Specifications Article 2401.03, C.

Bridge Staking Coordinates					
Location	☐ W. Abut. Brg.	☐ Pier 1	☐ Pier 2	☐ Pier 3	☐ E. Abut. Brg.
Left Edge of Deck	E=18532960.943 N=7639925.536	E=18533041.574 N=7639933.255	E=18533148.087 N=7639943.452	E=18533254.600 N=7639953.648	E=18533335.232 N=7639961.368
☐ Approach Roadway	E=18532978.141 N=7639889.427	E=18533058.773 N=7639897.146	E=18533165.286 N=7639907.343	E=18533271.799 N=7639917.540	E=18533352.430 N=7639925.259
Right Edge of Deck	E=18532989.849 N=7639864.848	E=18533070.480 N=7639872.567	E=18533176.993 N=7639882.763	E=18533283.506 N=7639892.960	E=18533364.137 N=7639900.679

Note:
An electronic file containing the bridge coordinate data is available as a part of the e-Files supplied with the contract documents. The Contractor shall verify these coordinates with the project horizontal control information provided in the road plans.



Design For 20° Skew (R.A.)

376'-0" x 60'-0" Prestensioned
Prestressed Concrete Beam Bridge

81'-0" End Spans2 - 107'-0" Interior Spans

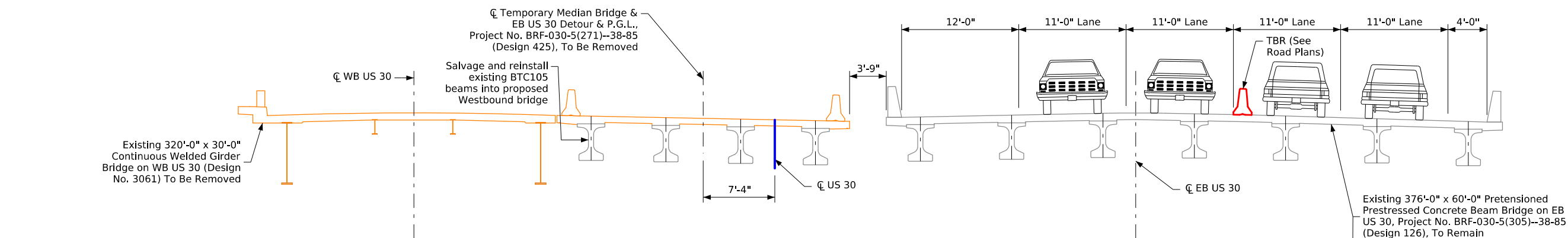
Staking Diagram

STA. 1301+02.00 (WB US 30)Turn-in Date: August, 2026

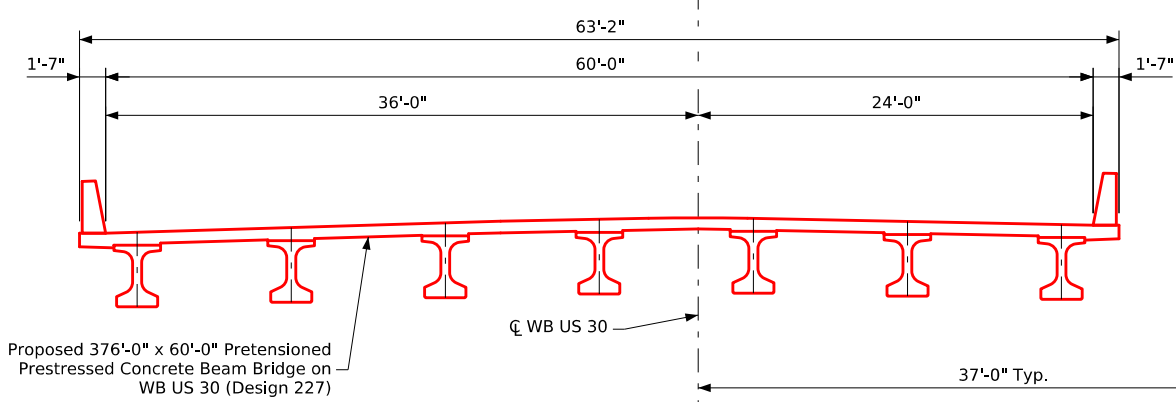
Story County

IOWA DEPARTMENT OF TRANSPORTATION

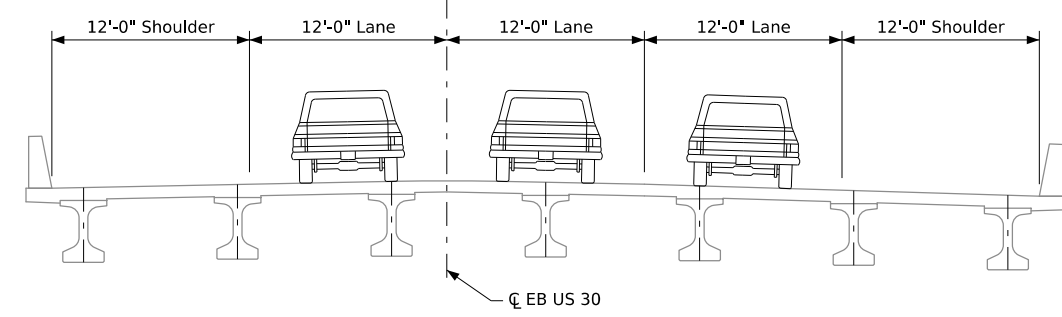
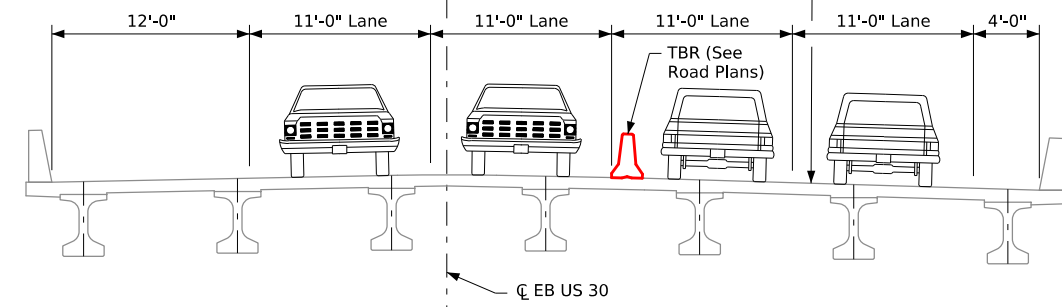
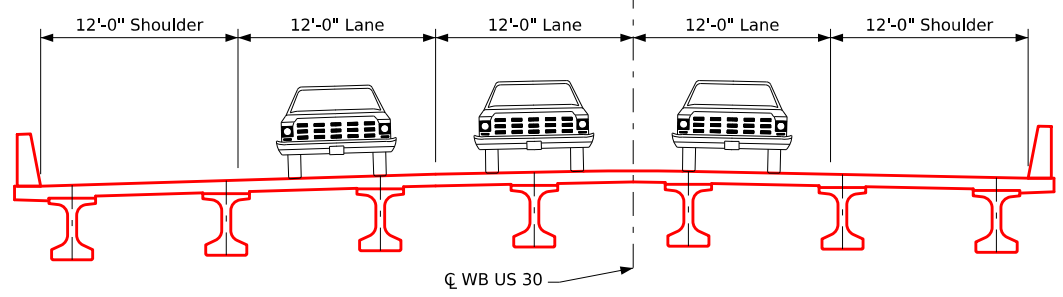
Design No. 227Design Sheet No. 6 of 34FHWA No. 048741



Westbound & Median Bridge Removal



Westbound Bridge Construction

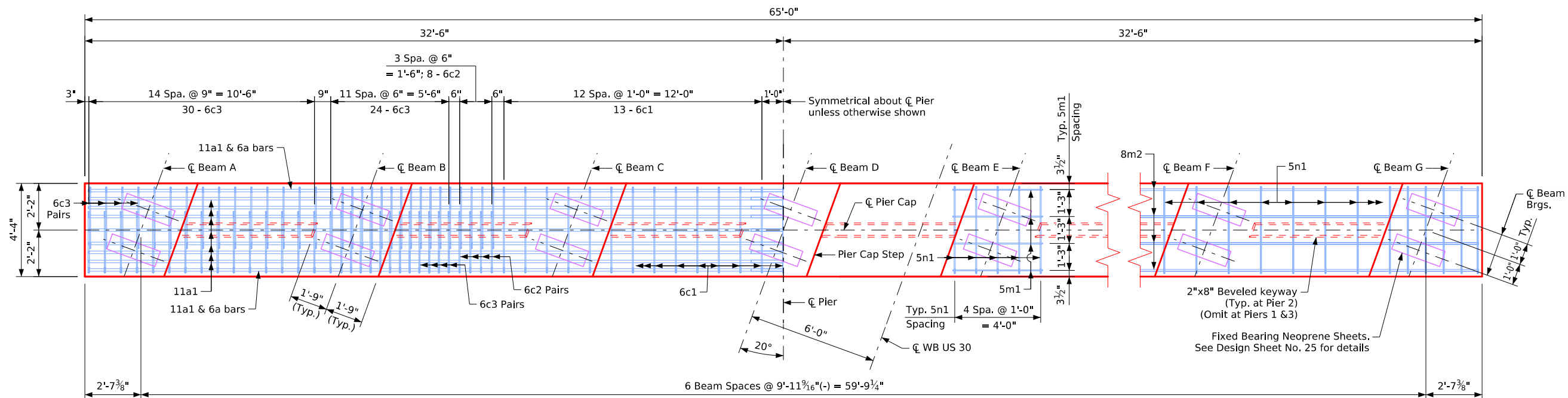


Final Bridge Cross Section

Note: See Roadway Plans for Traffic Control and Staging, Project No. NHSX-030-5(310)--3H-85.

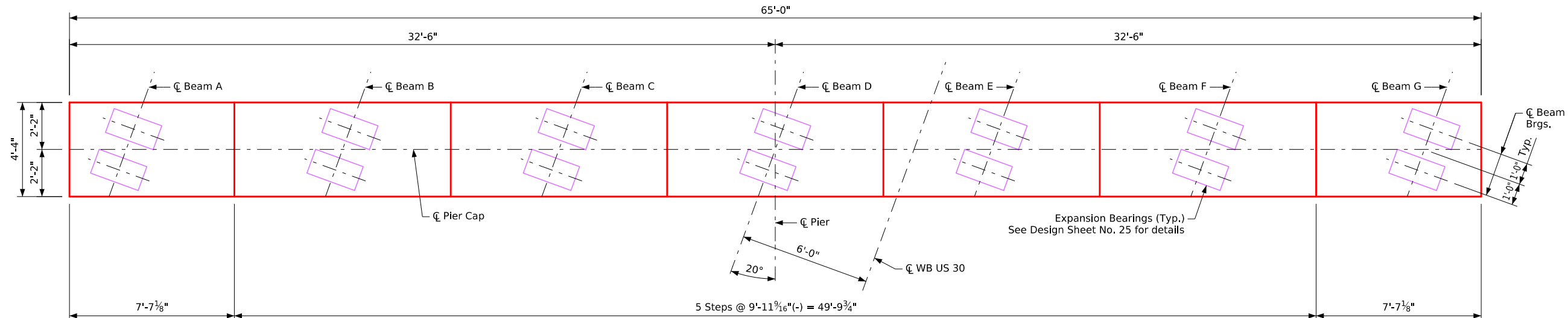
Design For 20° Skew (R.A.)
376'-0" x 60'-0" Pretensioned Prestressed Concrete Beam Bridge
81'-0" End Spans 2 - 107'-0" Interior Spans
Staging Plan
STA. 1301+02.00 (WB US 30) Turn-in Date: August, 2026
Story County
IOWA DEPARTMENT OF TRANSPORTATION
Design No. 227 Design Sheet No. 7 of 34 FHWA No. 048741





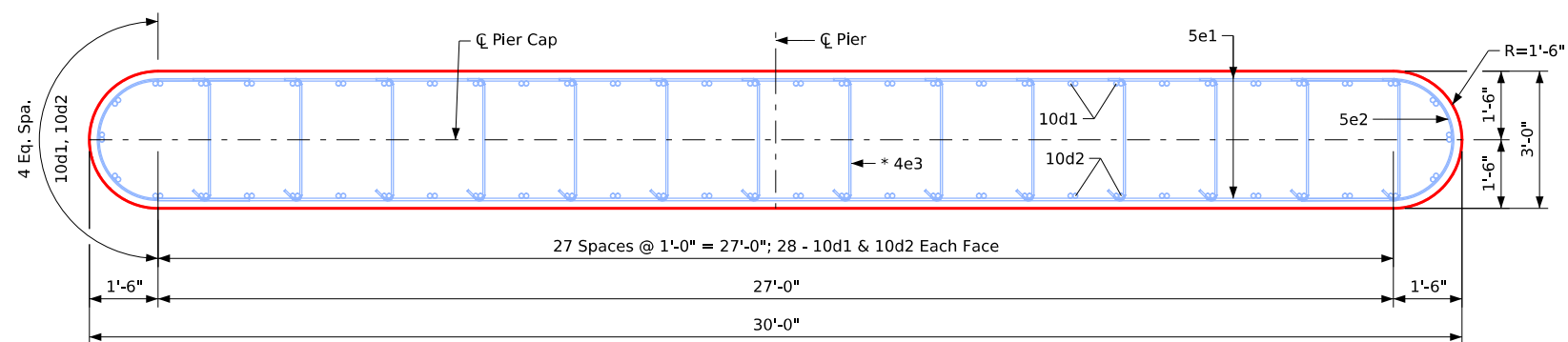
Pier Cap Plan

(Pier 2 shown, Piers 1 & 3 reinforcement similar)



Pier 1 & 3 Cap Plan

(See Pier Cap Plan for reinforcement)



Section C-C

(See Design Sheet No. 8 for Section C-C Location)

* Alternate hooked ends of 4e3 at each level along the column height.

Design For 20° Skew (R.A.)

376'-0" x 60'-0" Prestressed Concrete Beam Bridge

81'-0" End Spans 2 - 107'-0" Interior Spans

Pier Details

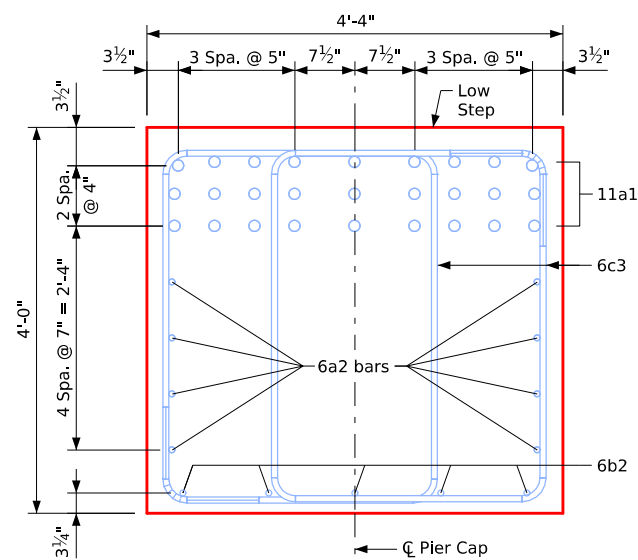
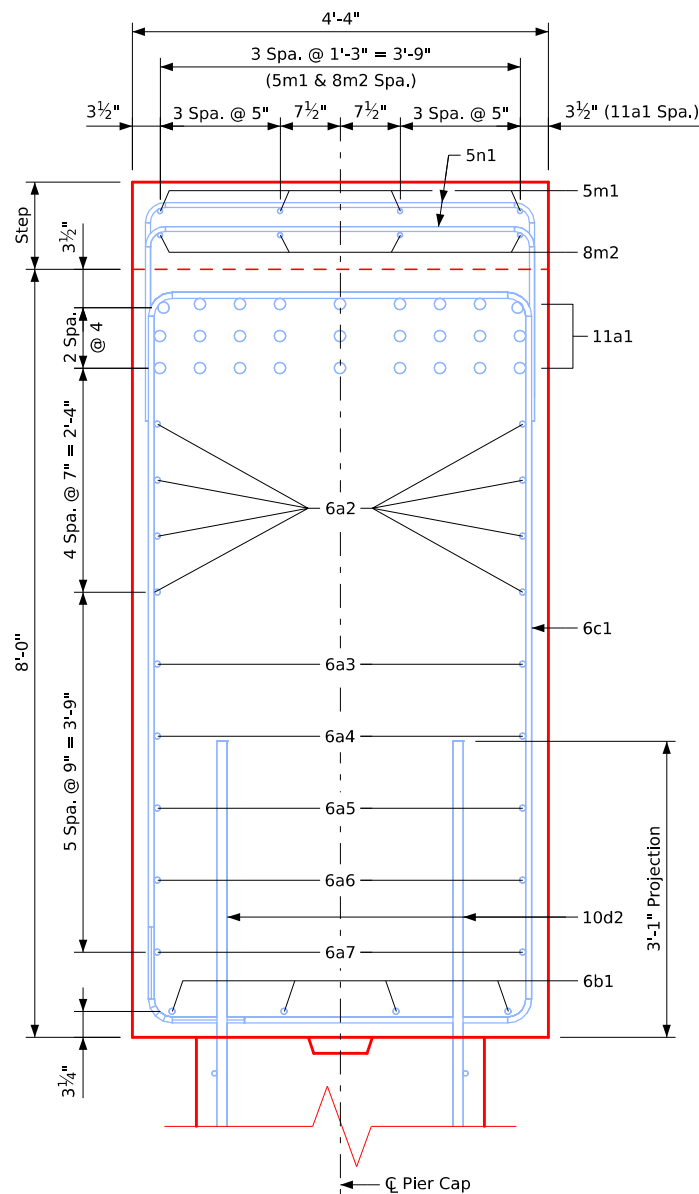
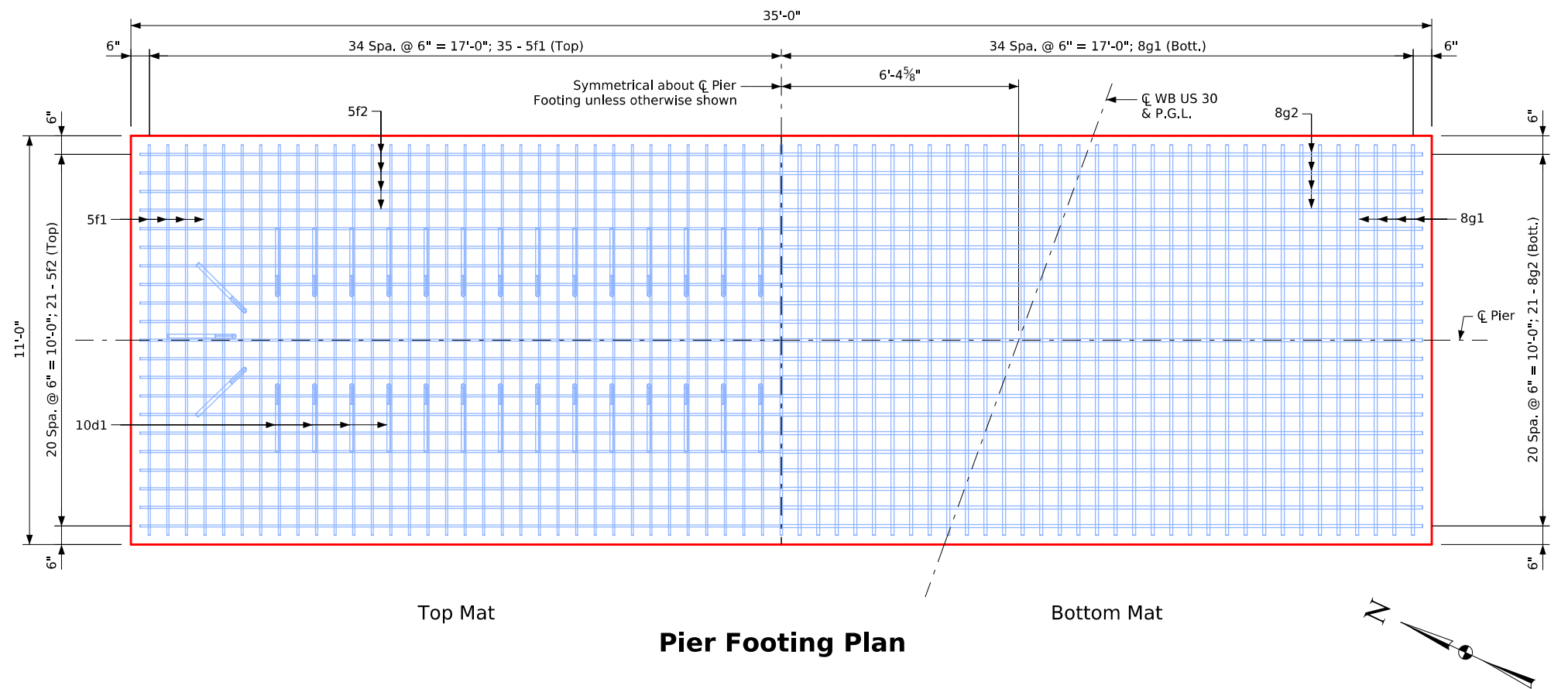
STA. 1301+02.00 (WB US 30) Turn-in Date: August, 2026

Story County

IOWA DEPARTMENT OF TRANSPORTATION

Design No. 227 Design Sheet No. 9 of 34 FHWA No. 048741





Note:
See Design Sheet No. 8 for Section A-A and B-B locations.

Design For 20° Skew (R.A.)
376'-0" x 60'-0" Prestressed Concrete Beam Bridge
81'-0" End Spans 2 - 107'-0" Interior Spans
Pier Details
STA. 1301+02.00 (WB US 30) Turn-in Date: August, 2026
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Pier Pile Driving Notes:

Pier 1:
The contract length of 60 feet for the pier 1 piles is based on a non-cohesive soil classification, a total factored axial load per pile (Pu) of 274 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 a start elevation at the bottom of footing. Design scour (200 year) was assumed to affect the upper 6 feet of embedded pile length and cause 18 kips of driving resistance.

The required nominal axial bearing resistance for pier 1 piles is 221 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 27 feet. Construction control requires a WEAP analysis with bearing graph.

Pier 2:
The contract length of 65 feet for the Pier 2 piles is based on a non-cohesive soil classification, a total factored axial load per pile (Pu) of 274 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 a start elevation at the bottom of footing. Design scour (200 year) was assumed to affect the upper 7 feet of embedded pile length and cause 15 kips of driving resistance.

The required nominal axial bearing resistance for Pier 2 piles is 219 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 27 feet. Construction control requires a WEAP analysis with bearing graph.

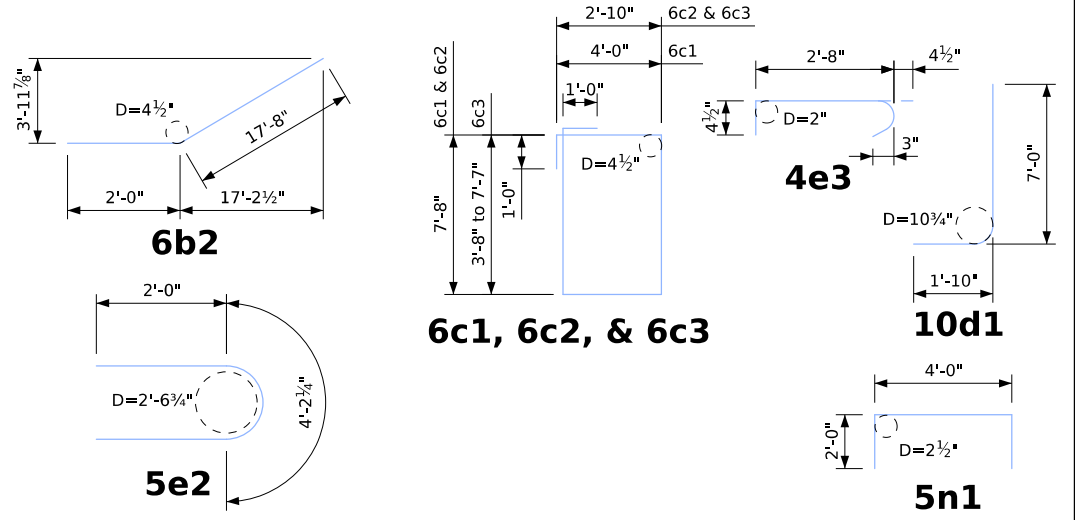
Pier 3:
The contract length of 65 feet for the Pier 3 piles is based on a non-cohesive soil classification, a total factored axial load per pile (Pu) of 274 kips, and a geotechnical resistance factor (Phi) of 0.55 for soil and 0.7 for rock end bearing.

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 a start elevation at the bottom of footing. Design scour (200 year) was assumed to affect the upper 7 feet of embedded pile length and cause 14 kips of driving resistance.

The required nominal axial bearing resistance for Pier 3 piles is 217 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 27 feet. Construction control requires a WEAP analysis with bearing graph.



Bent Bar Details



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

Pier Notes:

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

Forms for all pier caps may be removed with the approval of the Engineer when the following two conditions have been met:

- Pier cap concrete has been in place for a minimum of 2 calendar days excluding days that the concrete surface is subjected to temperatures at or below 40°F and
- The pier cap concrete compressive strength is at least 2500 PSI.

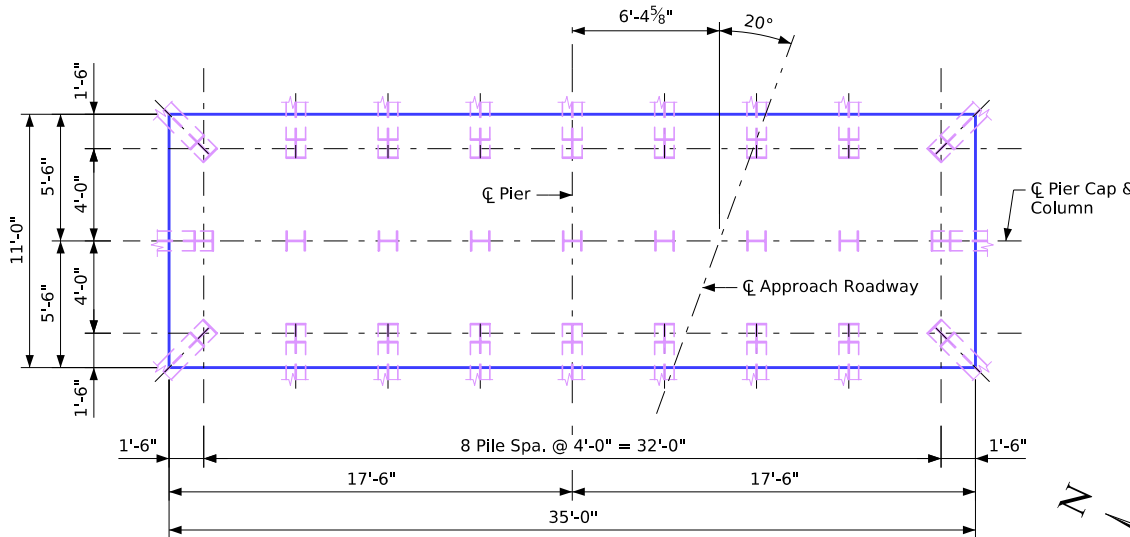
Minimum concrete compressive strength of 2500 PSI shall be verified by flexural strength according to Materials I.M. 316 with a minimum flexural strength of 450 PSI or by the maturity method according to Materials I.M. 383. Curing of pier cap concrete shall be in accordance with the Standard Specifications. Pier cap concrete shall be subjected to exterior loads in accordance with Article 2403.03, N, 2 of the Standard Specifications.

Chamfer all corners ¾" unless noted otherwise.

Construction joints at top and bottom of pier walls are to be formed with a 3" x 10" x 25'-0" dressed and beveled strip.

All battered piles shall be trimmed to a horizontal line to aid in the placement of reinforcing.

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



Pier Pile Plan

Note:
Dimensions shown are at bottom of footing. Batter piles 4:1 in the direction shown. 27 - HP14x73 steel bearing piling required.

Reinforcing Bar List - One Pier

Non-Coated Reinforcing	Bar	Location	Shape	No.	Length	Weight
	11a1	Cap, Longitudinal, Top		54	33'-10"	9,707
	6a2	Cap, Longitudinal, Sides		16	33'-4"	801
	6a3	Cap, Longitudinal, Sides		4	32'-7"	196
	6a4	Cap, Longitudinal, Sides		4	29'-4"	176
	6a5	Cap, Longitudinal, Sides		4	26'-1"	157
	6a6	Cap, Longitudinal, Sides		4	22'-11"	138
	6a7	Cap, Longitudinal, Sides		2	37'-3"	112
	6b1	Cap, Longitudinal, Bottom		4	30'-2"	181
	6b2	Cap, Longitudinal, Bottom		8	19'-8"	236
	6c1	Cap, Hoops		27	25'-4"	1,027
	6c2	Cap, Hoops		16	23'-0"	553
	6c3	Cap, Hoops, Cantilever		108	Varies	3,069
	10d1	Footing to Column Dowels		62	8'-10"	2,357
	10d2	Column, Vertical		62	20'-4"	5,425
	5e1	Column, Horizontal		38	27'-0"	1,070
	5e2	Column, Horizontal, Ends		38	8'-2"	324
	4e3	Column, Ties		266	3'-5"	607
	5f1	Footing, Top, Transverse		69	10'-8"	768
	5f2	Footing, Top, Longitudinal		21	34'-8"	759
	8g1	Footing, Bottom, Transverse		69	10'-8"	1,965
	8g2	Footing, Bottom, Longitudinal		21	34'-8"	1,944
	5m1	Cap, Steps, Longitudinal, Under Beams		20	4'-2"	87
	8m2	Cap, Steps, Longitudinal		8	26'-5"	564
	5n1	Cap, Steps, Transverse		61	8'-0"	509
	Non-Coated Reinforcing Steel – Total (Lbs.)					32,732

Concrete Placement Quantites

Location	Quantity
Cap - Pier 1	78.7
Cap - Pier 2	78.9
Cap - Pier 3	77.7
Column - 3 @ 56.3 CY	168.9
Footing - 3 @ 57.0 CY	171.0
Total (cu. yds.)	575.2

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

Design For 20° Skew (R.A.)

376'-0" x 60'-0" Pretensioned
Prestressed Concrete Beam Bridge

81'-0" End Spans2 - 107'-0" Interior Spans

Pier Details & Pier Pile Driving Notes

STA. 1301+02.00 (WB US 30)Turn-in Date: August, 2026

Story County

IOWA DEPARTMENT OF TRANSPORTATION

Design No. 227Design Sheet No. 11 of 34FHWA No. 048741

Point	West Abutment	East Abutment
Elev. A (Low Step)	885.27	885.80
Elev. B	885.58	886.06
Elev. C	885.89	886.31
Elev. D	886.14	886.51
Elev. E	886.23	886.53
Elev. F	886.07	886.32
Elev. G	885.92	886.11
Bottom Footing Elev.	881.77	882.30

Step	West Abutment	East Abutment
a	3¾"	3⅞"
b	3¾"	3⅞"
c	3"	2⅞"
d	1"	⅝"
e	1⅞"	2⅞"
f	1⅞"	2⅞"

Location	Quantity
West Abutment Footing	35.4
East Abutment Footing	33.9
Total (Cu. Yds.)	69.3

Part S

Note: Shift 8g1 bars in F.F. as necessary to miss beams. Place 8g3 bars parallel to longit. steel.

Abutment Notes:

Minimum clear distance from face of concrete reinforcing bar to be 2" unless otherwise specified.

63'-10 $\frac{3}{16}$ "

9'-11 $\frac{1}{16}$ "

5 Beam Spaces @ 9'-11 $\frac{1}{16}$ " (-) = 49'-9 $\frac{1}{16}$ "

2'-7"

2'-3"

1'-2 $\frac{1}{2}$ "

5 Spa. @ 1'-3 $\frac{3}{16}$ " = 6'-4 $\frac{3}{16}$ "

1'-4"

8g1

5d2 & 5d3

5k1

8g1

5d5

8g1

6g4

5d8

8f5

5p2

Gutter Line

5d6 (Min. Lap at ϕ = 2'-5")

5d7 (Min. Lap at ϕ = 2'-5")

5k2

8g3

5h5

5h7

3'-0"

3"

2 Sp. @ 8"

4'-10 $\frac{7}{8}$ "

6'-6"

4 Spa. @ 1'-0" = 4'-0"

5-6g4 Each Face

6"

3'-4"

(Typ.)

Spacing for:
 55 - 8g1 B.F.
 43 - 8g1 F.F.
 51 - 8g3 B.F.
 51 - 5k1 & 5k2 B.F.

Section A-A

[illegible]

Note: Concrete Quantities are included on the Summary Quantities sheet.

11 - HP 10x57 steel bearing piling required at each abutment. For abutment pile driving notes, see Design Sheet No. 18.

Barrier rail not shown in details.

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

If necessary to prevent damage to the end of the bridge deck and backwall from construction equipment, an appropriate method of protection approved by the Engineer shall be provided by the bridge Contractor at no extra cost to the State.

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

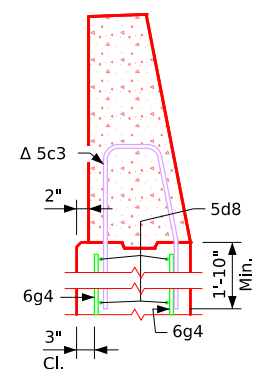
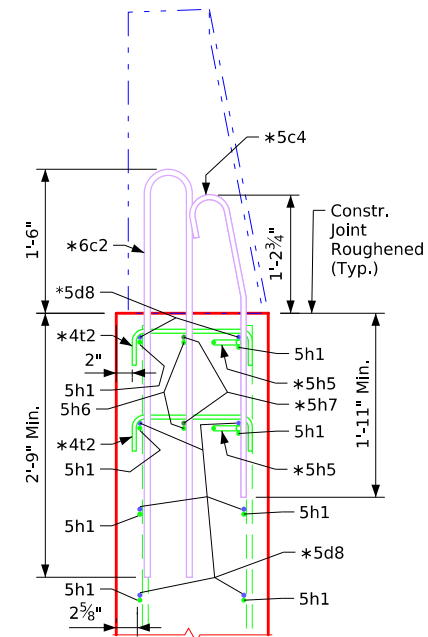
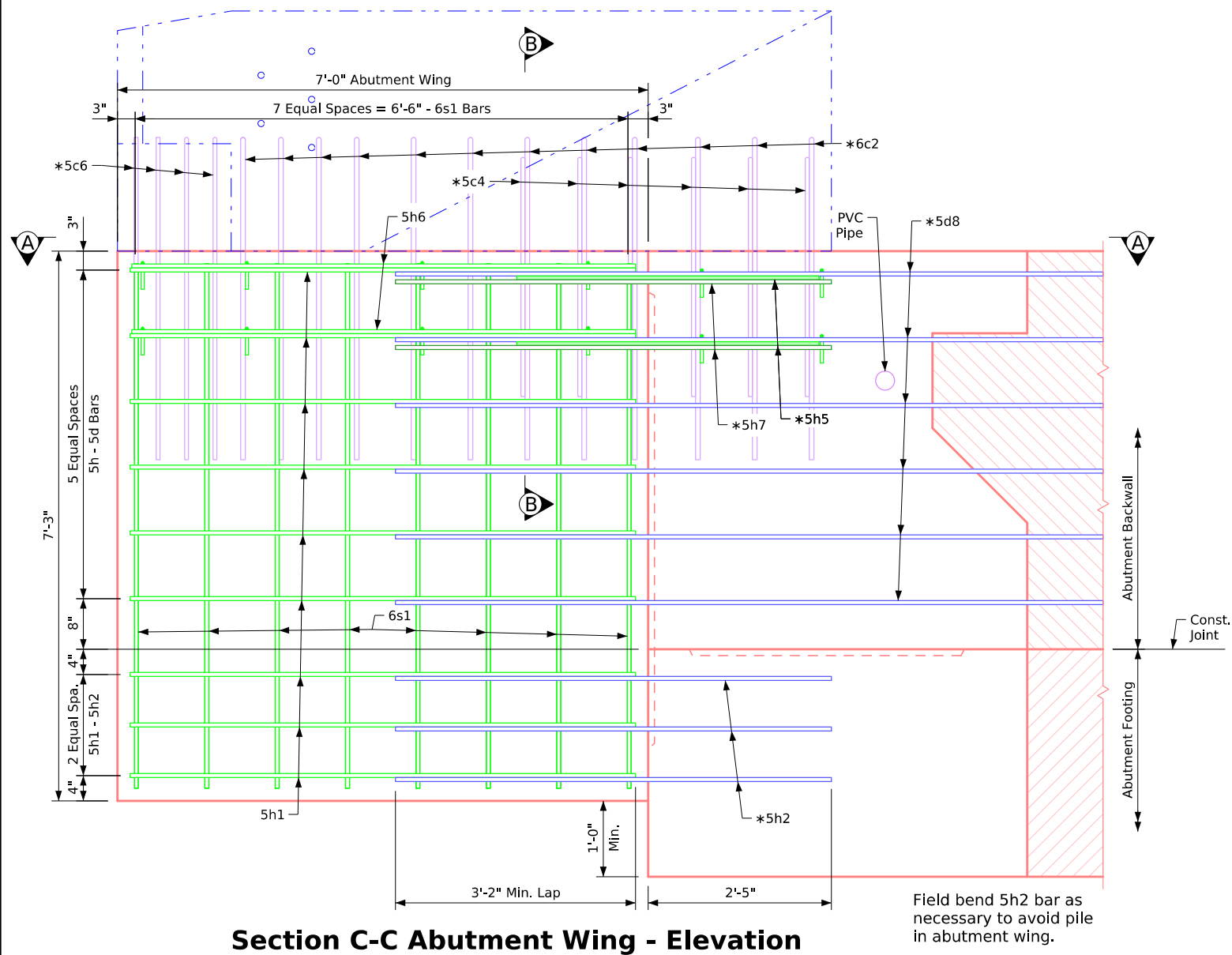
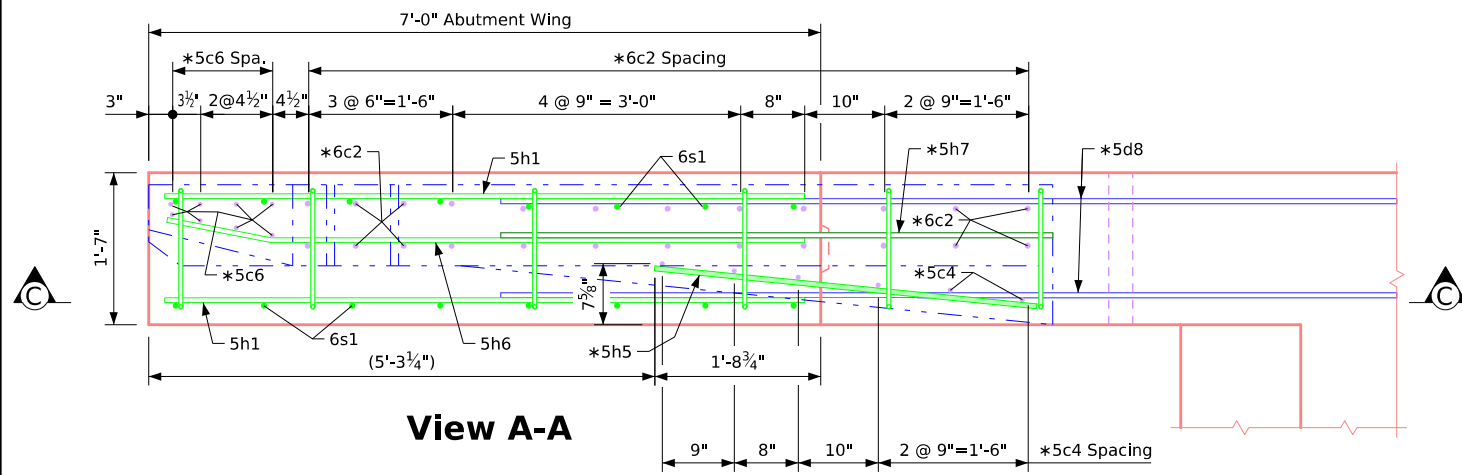


Figure 1: Elevation of a concrete wall with a low step. The diagram shows a cross-section of a wall with a low step. The wall is 3'-6" high. The low step is 4'-1 13/16" high. The wall is divided into sections by vertical lines labeled Elev. A, Elev. B, Elev. C, Elev. D, Elev. E, and Elev. F. The low step is labeled "Low Step" and "Elev. A (Low Step)". The wall is labeled "Concrete Wall" and "Concrete Wall".

FILE NO. 32491	ENGLISH	DESIGN TEAM MJR\RCM\JJO	STORY COUNTY	PROJECT NUMBER BRF-030-5(311)--38-85	SHEET NUMBER V.12
2:39:08 PM	7/13/2026	bbarker	pw:\projectwise.dot.int.lan\PWMain\Documents\Projects\8503002019\Bridge\311 Bridge Replacement-PPCB\BRG 85030311 WHKS 227 048741.dgn		

Revised 08-2024: Removed improperly placed bar label 6c1 in "Section B-B" details.
Revised 06-2025: Changed 5h6 bar length and quantity (was 6'-0" and 3 bars). Upd
MiscellaneousBridges.dgn - 2112 - This Sheet Re-Issued 11-2023. Sheet Format Upd



Section B-B

*Barrier rail end section bars to be placed with abutment wing and abutment.

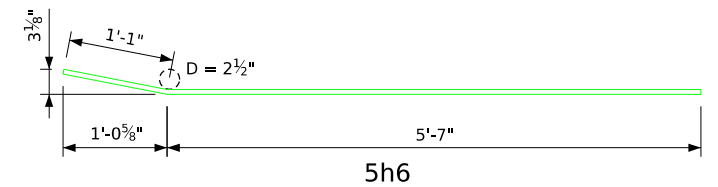
See Barrier Rail End Section Sheet
on Design Sheet No. 28-29 for
details of reinforcing bars 6c2, 5c4,
5c6 and 4t2.

See Abutment Details Sheet on Design Sheet No. 12 for details of reinforcing bars 5d, 5h2, 5h5 and 5h7.

Reinforcing Bar List - One Abut. Wing

[illegible]

Epoxy Reinforcing Total Weight (lbs.)	305
---------------------------------------	-----



Bent Bar Details

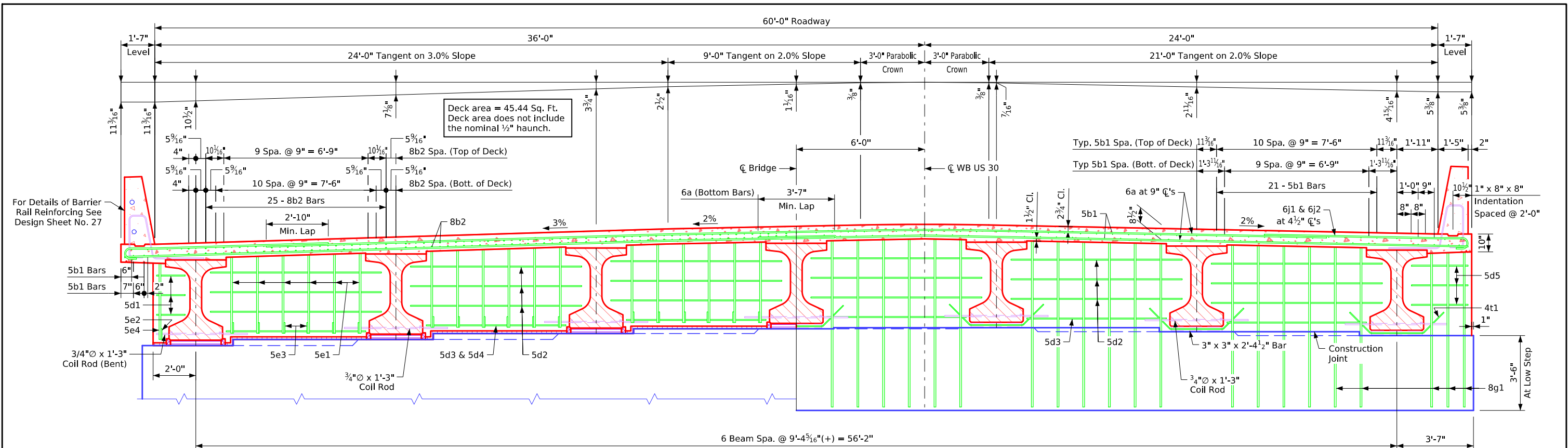
Note: All Dimensions are out to out. D = Pin Diameter

Concrete Placement Summary

Section	Total
One Abutment Wing	3.0
Total (cu. yds.)	3.0

Note: Concrete and reinforcing steel quantities are included on the Summary Quantities Sheet.

Design For 20° Skew (R.A.)
**376'-0" x 60'-0" Pretensioned
Prestressed Concrete Beam Bridge**
81'-0" End Spans 2 - 107'-0" Interior Spans
Abutment Wing Details
STA. 1301+02.00 (WB US 30) Turn-in Date: August, 2026
Story County
IOWA DEPARTMENT OF TRANSPORTATION
Design No. 227 Design Sheet No. 13 of 34 FHWA No. 048741



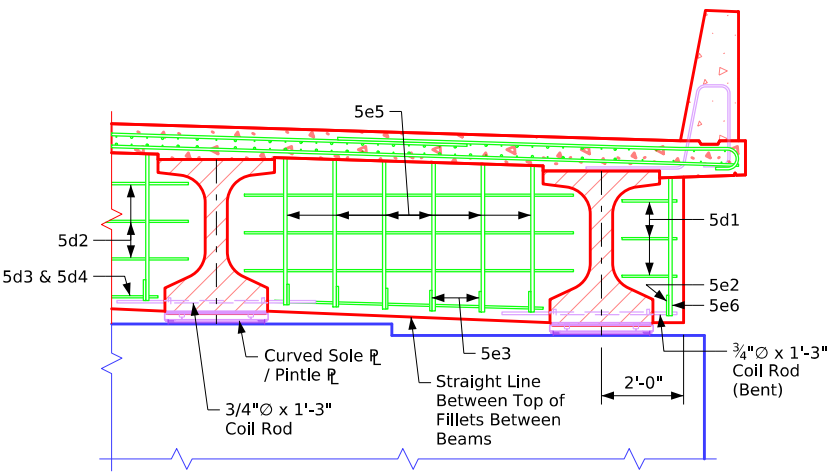
Half Section Near Fixed Pier 2
Looking East

Half Section Near Abutment
Looking East

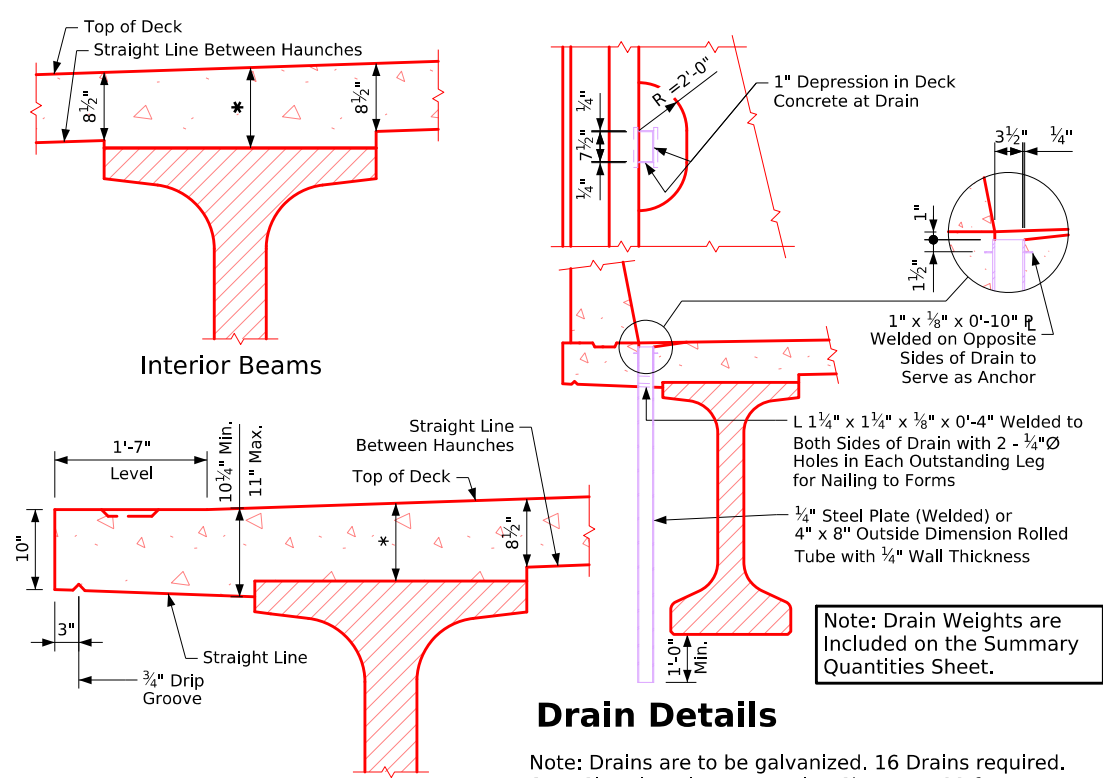
Note: For details of
Intermediate Diaphragm
see Design Sheet No. 26.

Superstructure Notes:

The bridge deck as shown includes 3/4" integral wearing surface.
The pier and abutment diaphragm concrete is to be placed monolithically with the bridge deck.
Cost of all resilient joint filler material is to be included in the price bid for "Structural Concrete (Bridge)".
All beams are to be set vertical.
Forms for the deck and barrier rail 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 and diaphragm reinforcing is to be wired in place and adequately supported before concrete is placed.
Top transverse reinforcing steel is to be parallel to and 2 3/4" clear below top of deck. Bottom transverse reinforcing steel is to be parallel to and 1 1/2" clear above bottom of 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.
Top transverse deck reinforcing may be spliced at one location midway between beams (min. lap = 2'-10").
Payment for reinforcing bars shall be based on no splices, and no allowance shall be made for the additional length of bar required for the use of splices.
Cost for bearing material is to be included in the price bid for "Prestressed Concrete Beams".



Half Section Near Expansion Piers 1 & 3



Drain Details

Note: Drains are to be galvanized. 16 Drains required. See "Situation Plan" on Design Sheet No. 33 for location. Weight of drains is included in the quantity for "Structural Steel". Weight is based on rolled tube.

Data for One Drain

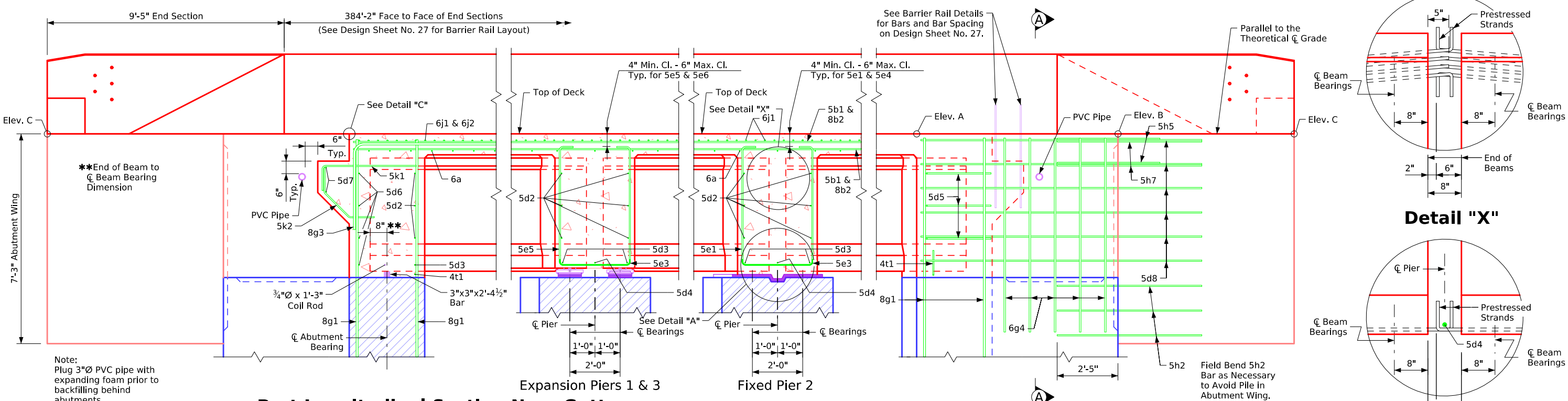
Beam Size	BTC
Drain Weight (lbs.)	106
Drain Length (ft.)	5'-6 3/4"

Typical Deck and Haunch Detail

* For Deck Thickness Over Beams See "Haunch And Camber Details" on Design Sheet No. 20.

Design For 20° Skew (R.A.)
376'-0" x 60'-0" Prestressed Concrete Beam Bridge
81'-0" End Spans 2 - 107'-0" Interior Spans
Transverse Section
STA. 1301+02.00 (WB US 30) Turn-in Date: August, 2026
Story County
IOWA DEPARTMENT OF TRANSPORTATION
Design No. 227 Design Sheet No. 14 of 34 FHWA No. 048741

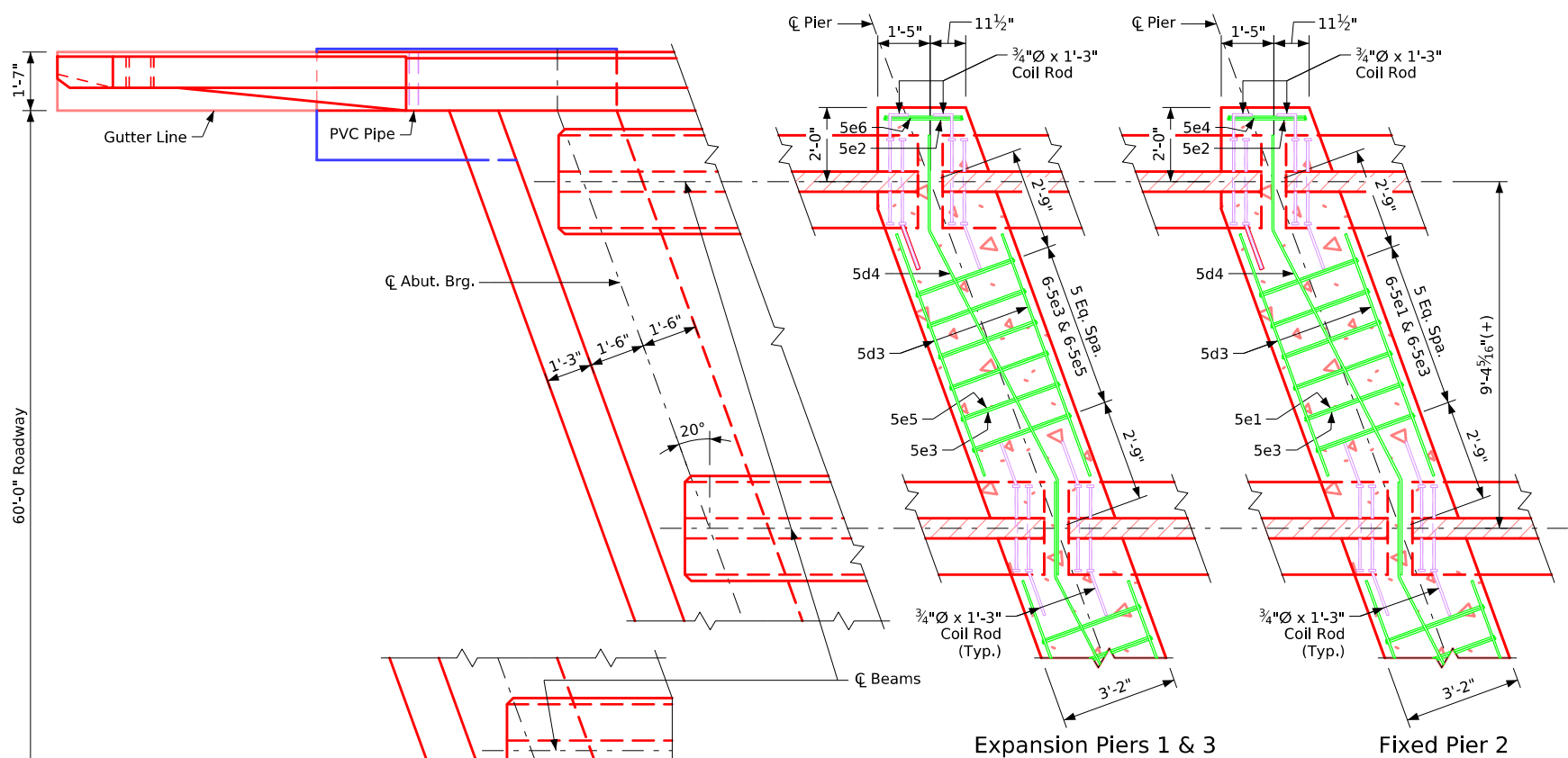
Control Point #100: N. 7639937.050, E. 18534748.551, Elev. 878.893 CP FD NGS MON 48' South of US 30 EB CL, 670' West of Dayton Ave. CL



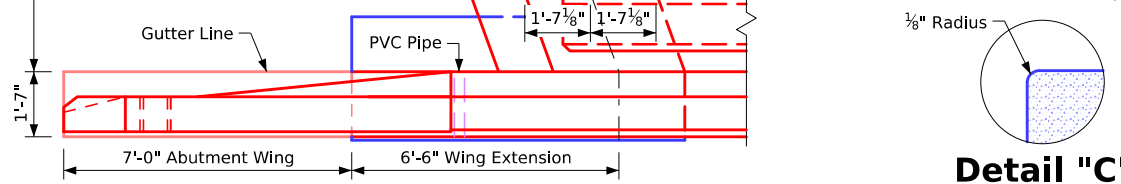
Part Longitudinal Section Near Gutter

(For details of Intermediate Diaphragm see Design Sheet No. 26)

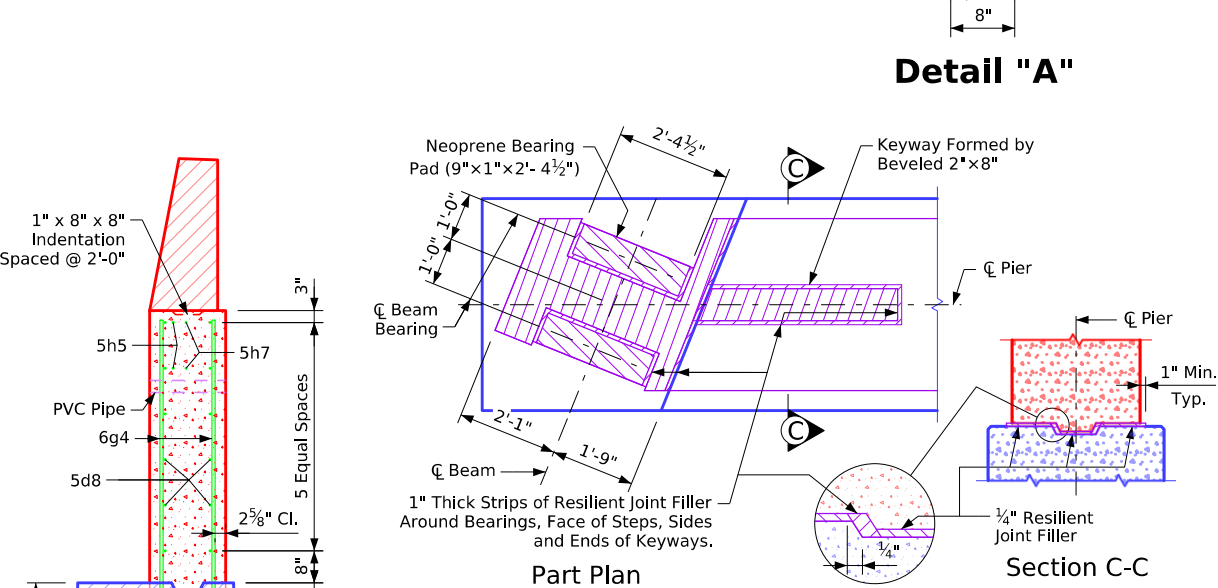
Part End View at Abutment



Part Section at Piers



Detail "C"



Top of Fixed Pier 2 Details

Note: Refer to Design Sheet 25 for additional bearing details at existing beams with embedded sole PL and masonry PL bearings.

Table of Wingwall Elevations				
Location	Dim "C"	Elev. A	Elev. B	Elev. C
N.W. Corner	10'3/4"	889.99	889.91	889.85
S.W. Corner	1'-6'3/8"	890.67	890.60	890.53
N.E. Corner	11'1/8"	890.53	890.47	890.42
S.E. Corner	1'-2'3/4"	890.85	890.78	890.72

Design For 20° Skew (R.A.)

376'-0" x 60'-0" Prestressed Concrete Beam Bridge

81'-0" End Spans2 - 107'-0" Interior Spans

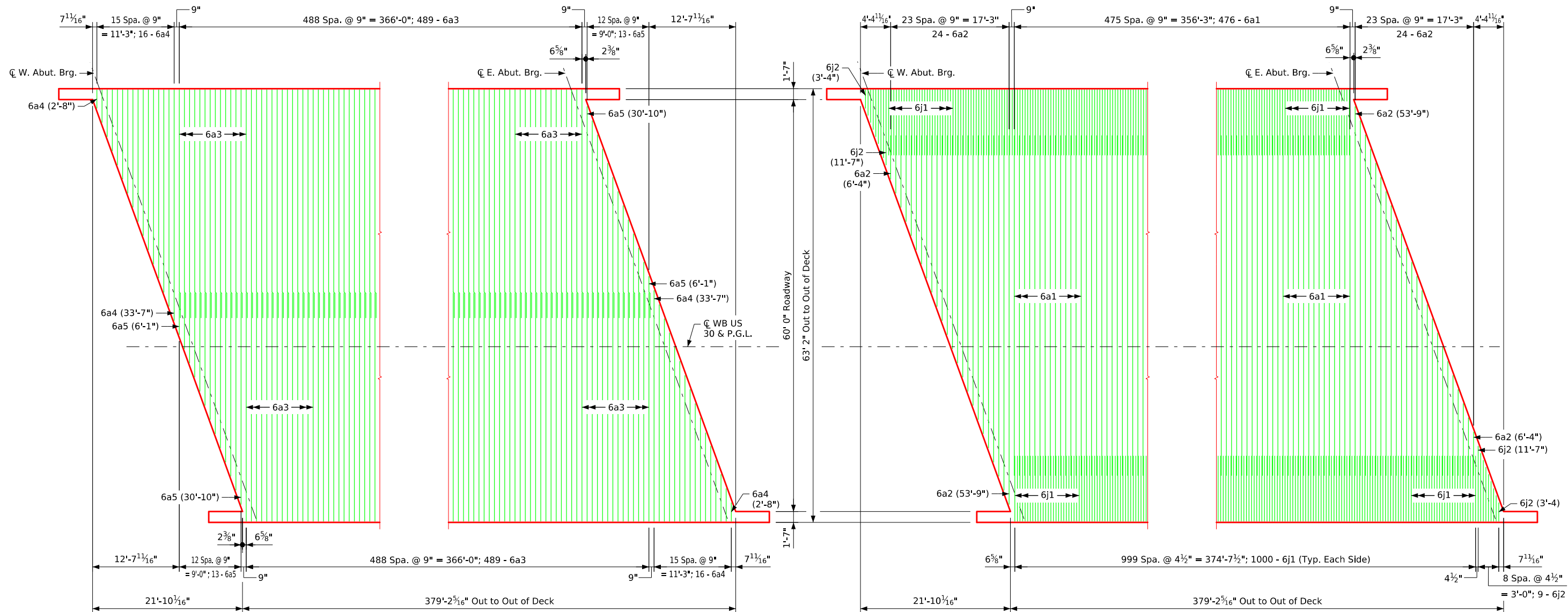
Longitudinal Section

STA. 1301+02.00 (WB US 30)Turn-in Date: August, 2026

Story County

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Design No. 227Design Sheet No. 15 of 34FHWA No. 048741

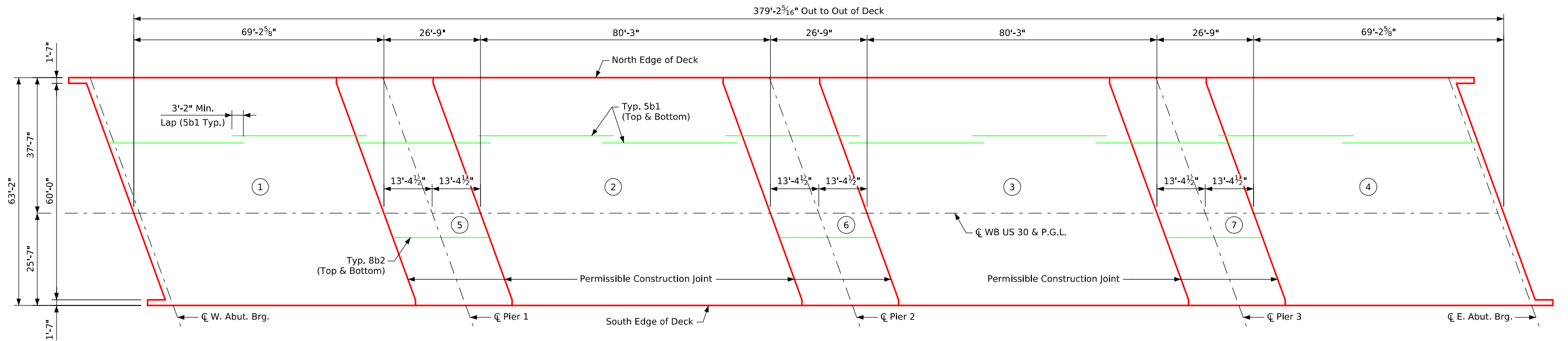


Deck Bottom Transverse Reinforcing Layout

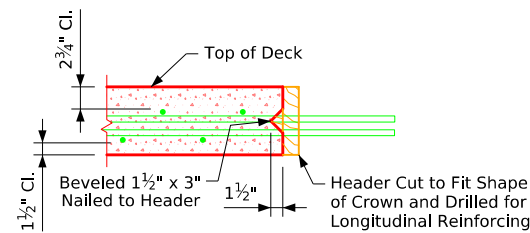
Deck Top Transverse Reinforcing Layout



Design For 20° Skew (R.A.)
376'-0" x 60'-0" Prestressed
Prestressed Concrete Beam Bridge
81'-0" End Spans 2 - 107'-0" Interior Spans
Deck Reinforcing Layout
STA. 1301+02.00 (WB US 30) Turn-in Date: August, 2026
Story County
IOWA DEPARTMENT OF TRANSPORTATION
Design No. 227 Design Sheet No. 16 of 34 FHWA No. 048741



Longitudinal Reinforcing Layout & Concrete Placement Diagram



Permissible Transverse Deck Construction Joint

Note:
Concrete deck shall be placed in one of the two sections and sequences indicated:
Option 1: Seven sections in the following sequence 1-2-3-4-5-6-7
Option 2: Three sections in the following sequence (1+5+2)-(3+7+4)-6

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 section 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.



Design For 20° Skew (R.A.)
**376'-0" x 60'-0" Pretensioned
Prestressed Concrete Beam Bridge**
81'-0" End Spans 2 - 107'-0" Interior Spans
Deck Reinforcing Layout
STA. 1301+02.00 (WB US 30) Turn-in Date: August, 2026
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The diagrams illustrate various pipe configurations with the following labels and dimensions:

- 5e1:** Horizontal pipe, D=2½", 2'-10" x 4'-0".
- 5e4:** Horizontal pipe, D=2½", 2'-1" x 4'-0".
- 5e5:** Horizontal pipe, D=2½", 2'-10" x 3'-10".
- 5e6:** Horizontal pipe, D=2½", 2'-1" x 3'-10".
- 5p1, 5p2, & 5p4:** Vertical pipe, D=2½", 2'-2" x 2'-7" (5p1), 2'-8" (5p2), 2'-9" (5p4).
- 5e2 & 5e3:** Horizontal pipe, D=2½", 2'-1" (5e2), 2'-10" (5e3).
- 5d1:** Horizontal pipe, D=2½", 2'-1" x 1'-4" (vertical offset), 5'13/16" (horizontal offset).
- 8g3:** Horizontal pipe, D=8", 12'-0" x 3'-9" (vertical offset).
- 5d4:** Horizontal pipe, D=2½", 2'-6" x 6'-8 13/16" (diagonal offset), 2'-6" (horizontal offset).
- 5d5:** Horizontal pipe, D=2½", 1'-5" x 1'-4" (diagonal offset), 6" (vertical offset), 5'13/16" (horizontal offset).
- 5k1:** Horizontal pipe, D=2½", 3'-9" x 1'-0" (vertical offset).
- 5k2:** Horizontal pipe, D=2½", 1'-0" x 1'-5" (diagonal offset), 1'-0" (horizontal offset).
- 5d6:** Horizontal pipe, D=2½", 33'-2" x 1'-4" (diagonal offset), 5'13/16" (vertical offset).
- 8f1:** Horizontal pipe, D=6", 34'-5" x 1'-4 15/16" (diagonal offset), 6 3/16" (vertical offset).
- 8f3, 8f4, & 8f5:** Horizontal pipe, D=6", 7'-9" (8f3), 6'-0" (8f4), 5'-6" (8f5).
- 4t1:** Horizontal pipe, D=2", 11 13/16" x 1'-4 1/2" (diagonal offset), 11 13/16" (vertical offset), 4'-10 3/8" (horizontal offset).
- 6p3:** Horizontal pipe, D=4 1/2", 2'-7 7/8" x 3'-0" (diagonal offset), 2'-7 7/8" (vertical offset), 3'-8 3/4" (horizontal offset).
- 6j1 & 6j2:** Horizontal pipe, D=4 1/2", 9'-6" x 8" (vertical offset), 8" (horizontal offset).



Section 1, Deck & West Abut. Diaph. + Wing Extension	155.3
Section 2, Deck	140.7
Section 3, Deck	140.7
Section 4, Deck & East Abut. Diaph. + Wing Extension	155.3
Section 5, Deck & Pier 1 Diaph.	71.4
Section 6, Deck & Pier 2 Diaph.	72.5
Section 7, Deck & Pier 3 Diaph.	71.4
Total High Performance Structural Concrete (CY)	807.3 (F)

(F) Indicates Fiber Reinforcement is required.

West Abutment:
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 (P_u) of 181 kips, and a geotechnical resistance factor (Φ) 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 (Φ) of 0.55 for soil and 0.7 for rock end bearing. Piles are assumed to be driven from a start elevation at the bottom of prebore hole.

The required nominal axial bearing resistance for West Abutment piles is 149 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.

The contract length of 80 feet for the East Abutment piles is based on a non-cohesive soil classification, a total factored axial load per pile (P_u) of 181 kips, and a geotechnical resistance factor (Φ) 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 (Φ) of 0.55 for soil and 0.7 for rock end bearing. Piles are assumed to be driven from a start elevation at the bottom of prebore hole.

The required nominal axial bearing resistance for East Abutment piles is 144 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.

Bar	Location	Shape	No.	Length	Weight
6a1	Deck, Transv. Top		476	49'-6"	35,390
6a2	Deck, Transv. Top Ends		48	Varies	2,166
6a3	Deck, Transv. Bott.		978	33'-3"	48,843
6a4	Deck, Transv. Bott. Ends		32	Varies	871
6a5	Deck, Transv. Bott. Ends		26	Varies	721
5b1	Deck Longit. Top & Bott.		1,639	37'-4"	63,820
8b2	Deck Longit. Top & Bott. at Piers		462	26'-9"	32,997
5d1	Pier Diaph. Ends		18	4'-10"	91
5d2	Pier & Abut. Diaph. Longit.		144	9'-0"	1,352
5d3	Pier & Abut. Diaph. Longit.		48	6'-11"	346
5d4	Pier Diaph. Longit.		18	12'-7"	236
5d5	Abut. Diaph. Ends		12	5'-5"	68
5d6	Abut. Diaph. Longit. B.F.		16	34'-7"	577
5d7	Paving Notch Longit.		8	34'-8"	289
5d8	Abut. Diaph. Wing Longit.		48	10'-8"	534
5e1	Pier Diaph. Hoops Fixed Pier		36	11'-10"	444
5e2	Pier Diaph. Tie Ends		6	3'-2"	20
5e3	Pier Diaph Ties		108	3'-11"	441
5e4	Pier Diaph. Hoops Fixed Pier Ends		2	11'-1"	23
5e5	Pier Diaph. Hoops Expansion Pier		72	11'-6"	864
5e6	Pier Diaph. Hoops Expansion Pier Ends		4	10'-9"	45
8f1	Abut. Footing Longit. Both F.		36	35'-11"	3,452
8f3	Abut. Extension Longit.		16	10'-3"	438
8f4	Abut. Extension Longit.		8	8'-6"	182
8f5	Abut. Extension Longit.		8	8'-0"	171
8g1	Abut. Vert. Both F.		196	7'-9"	4,056
8g3	Abut. Diaph. Vert. B.F.		102	15'-9"	4,289
6g4	Abut. Diaph. Wing Ext. Vert.		40	6'-9"	406
5h2	Abut. to Wing Anchor		24	5'-9"	144
5h5	Abut. to Wing Anchor		8	4'-0"	33
5h7	Abut. to Wing Anchor		8	5'-9"	48
6j1	Top of Deck Transv. (At Rail)		2,000	10'-2"	30,541
6j2	Top of Deck Transv. Ends (at Rail)		18	VARIES	202
5k1	Paving Notch		102	4'-9"	505
5k2	Paving Notch		102	3'-5"	363
5p1	Abut. Hoops		232	10'-6"	2,541
5p2	Abut. Extension Hoops		24	10'-8"	267
6p3	Abut. Bott. at Piles		36	6'-8"	360
5p4	Abut Hoops At Ends		8	10'-10"	90
4t1	Under Beams at Abutments		14	5'-8"	53

Coated

Design For 20° Skew (R.A.)

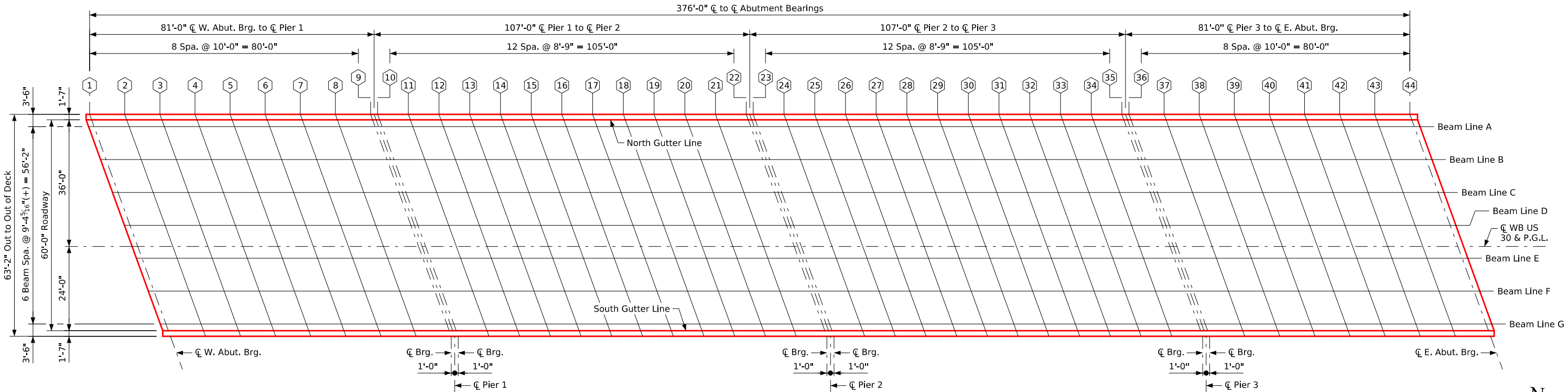
Superstructure Details & Abut. Pile Driving Note

STA. 1301+02.00 (WB US 30) Turn-in Date: August, 2026

IOWA DEPARTMENT OF TRANSPORTATION

Design No. 227 Design Sheet No. 18 of 34 FHWA No. 048741

Control Point #100: 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



Deck Elevation Plan

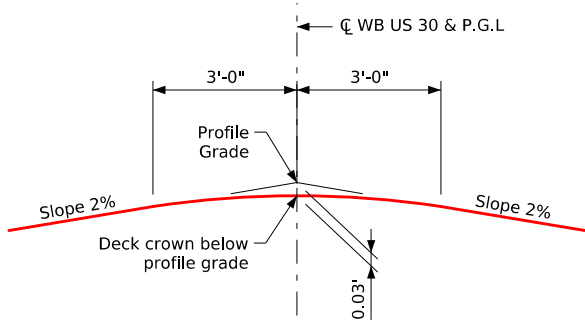
Top of Deck Elevations

Location	☐ 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		
North Gutter Line	889.97	890.07	890.16	890.25	890.33	890.41	890.49	890.56	890.63	890.64	890.69	890.74	890.79	890.83	890.87	890.91	890.94	890.97	890.99	891.02	891.03	891.05	891.05		
Beam Line A	890.04	890.13	890.22	890.31	890.40	890.48	890.55	890.62	890.69	890.70	890.75	890.80	890.85	890.89	890.93	890.97	891.00	891.03	891.05	891.08	891.09	891.11	891.11		
Beam Line B	890.35	890.44	890.53	890.62	890.70	890.78	890.86	890.93	890.99	891.00	891.05	891.10	891.15	891.19	891.23	891.26	891.29	891.32	891.34	891.36	891.38	891.39	891.40		
Beam Line C	890.66	890.75	890.84	890.93	891.01	891.09	891.16	891.23	891.29	891.30	891.35	891.40	891.44	891.48	891.52	891.55	891.58	891.61	891.63	891.65	891.67	891.68	891.68		
Beam Line D	890.91	891.01	891.10	891.18	891.26	891.33	891.41	891.47	891.53	891.54	891.59	891.64	891.68	891.72	891.76	891.79	891.82	891.84	891.86	891.88	891.89	891.90	891.91		
☐ Roadway & WB US 30 P.G.L.	891.02	891.12	891.20	891.29	891.37	891.44	891.51	891.58	891.64	891.65	891.70	891.74	891.78	891.82	891.85	891.88	891.91	891.94	891.96	891.97	891.99	892.00	892.00		
Beam Line E	891.00	891.09	891.18	891.26	891.34	891.41	891.48	891.55	891.61	891.62	891.66	891.71	891.75	891.79	891.82	891.85	891.88	891.90	891.92	891.94	891.95	891.96	891.96		
Beam Line F	890.84	890.93	891.02	891.10	891.18	891.25	891.32	891.38	891.44	891.45	891.50	891.54	891.58	891.61	891.65	891.67	891.70	891.72	891.74	891.76	891.77	891.78	891.78		
Beam Line G	890.69	890.78	890.86	890.94	891.01	891.09	891.15	891.21	891.27	891.28	891.33	891.37	891.40	891.44	891.47	891.50	891.52	891.54	891.56	891.57	891.58	891.59	891.59		
South Gutter Line	890.65	890.74	890.83	890.91	890.98	891.05	891.12	891.18	891.23	891.25	891.29	891.33	891.37	891.40	891.43	891.46	891.49	891.51	891.52	891.54	891.55	891.55	891.55		

Top of Deck Elevations

Location	C Pier 3 Bearings												C E. Abut. Brg.										
	Line 24	Line 25	Line 26	Line 27	Line 28	Line 29	Line 30	Line 31	Line 32	Line 33	Line 34	Line 35	Line 36	Line 37	Line 38	Line 39	Line 40	Line 41	Line 42	Line 43	Line 44		
North Gutter Line	891.06	891.07	891.07	891.07	891.07	891.06	891.05	891.04	891.02	891.00	890.98	890.95	890.94	890.91	890.87	890.82	890.77	890.71	890.65	890.59	890.52		
Beam Line A	891.12	891.13	891.13	891.13	891.13	891.12	891.11	891.10	891.08	891.06	891.03	891.01	891.00	890.96	890.92	890.87	890.82	890.77	890.71	890.64	890.57		
Beam Line B	891.41	891.41	891.41	891.41	891.41	891.40	891.39	891.37	891.35	891.33	891.30	891.27	891.27	891.23	891.19	891.14	891.08	891.03	890.97	890.90	890.83		
Beam Line C	891.69	891.69	891.69	891.69	891.68	891.68	891.66	891.65	891.62	891.60	891.57	891.54	891.54	891.50	891.45	891.40	891.35	891.29	891.22	891.16	891.08		
Beam Line D	891.91	891.91	891.91	891.91	891.90	891.89	891.88	891.86	891.84	891.81	891.78	891.75	891.74	891.70	891.65	891.60	891.55	891.49	891.42	891.35	891.28		
C Roadway & WB US 30 P.G.L.	892.00	892.01	892.00	892.00	891.99	891.98	891.96	891.94	891.92	891.89	891.87	891.83	891.82	891.78	891.73	891.68	891.62	891.56	891.50	891.43	891.35		
Beam Line E	891.97	891.97	891.97	891.96	891.95	891.94	891.92	891.90	891.88	891.85	891.82	891.79	891.78	891.74	891.69	891.64	891.58	891.52	891.45	891.38	891.31		
Beam Line F	891.78	891.78	891.78	891.77	891.76	891.75	891.73	891.71	891.68	891.66	891.62	891.59	891.58	891.54	891.49	891.43	891.37	891.31	891.24	891.17	891.09		
Beam Line G	891.59	891.59	891.59	891.58	891.57	891.55	891.53	891.51	891.49	891.46	891.42	891.39	891.38	891.33	891.28	891.22	891.16	891.10	891.03	890.96	890.88		
South Gutter Line	891.56	891.55	891.55	891.54	891.53	891.51	891.49	891.47	891.44	891.42	891.38	891.35	891.34	891.29	891.24	891.18	891.12	891.06	890.99	890.91	890.83		

Note:
Hexagonal numbers correspond to the line numbers shown in Top of Deck Elevations Table.



Crown Template
No Scale

Design For 20° Skew (R.A.)

376'-0" x 60'-0" Pretensioned
Prestressed Concrete Beam Bridge

81'-0" End Spans2 - 107'-0" Interior Spans

Top of Deck Elevations

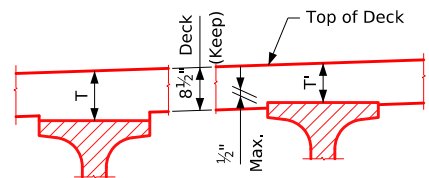
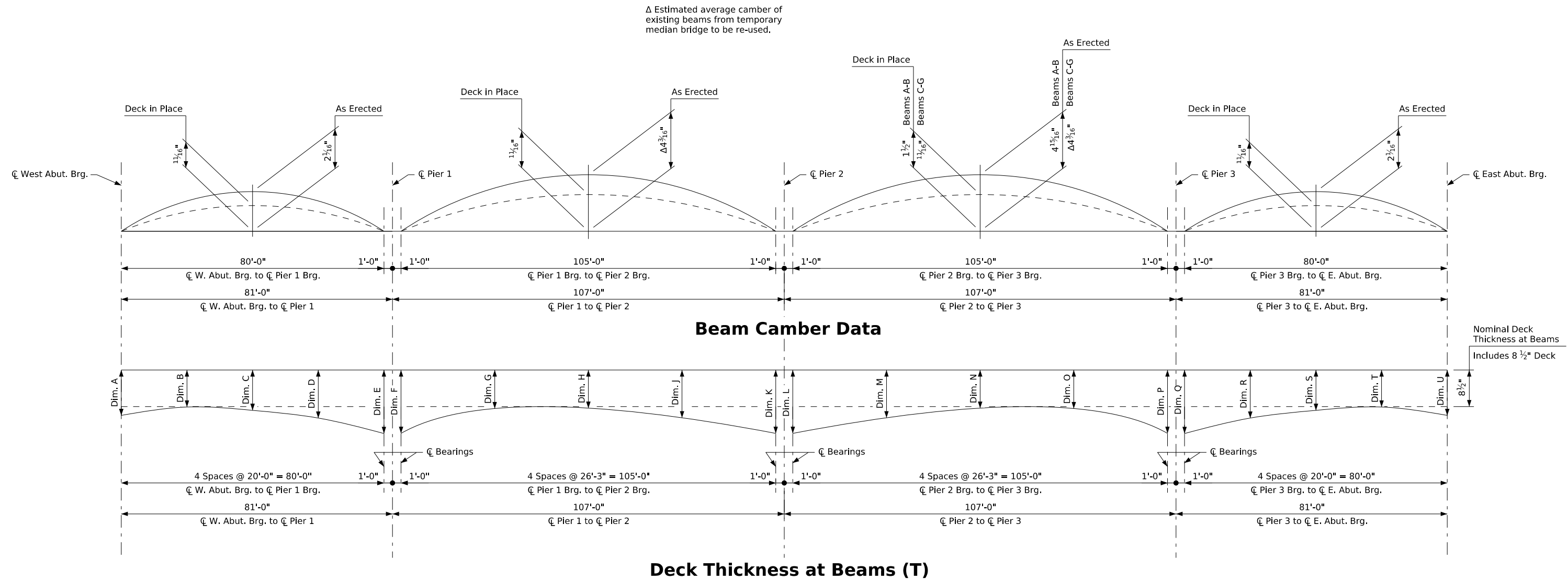
STA. 1301+02.00 (WB US 30)Turn-in Date: August, 2026

Story County

IOWA DEPARTMENT OF TRANSPORTATION

Design No. 227Design Sheet No. 19 of 34FHWA No. 048741





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.

Deck Thickness at Beams																				
Beam Line	℄ W. Abut. Brg.					℄ Pier 1 Bearings						℄ Pier 2 Bearings						℄ Pier 3 Bearings		℄ E. Abut. Brg.
	Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Dim. F	Dim. G	Dim. H	Dim. J	Dim. K	Dim. L	Dim. M	Dim. N	Dim. O	Dim. P	Dim. Q	Dim. R	Dim. S	Dim. T	Dim. U
A	9 1/4	9 1/16	9 1/8	9 5/16	9 11/16	9 13/16	9 11/16	9 13/16	9 11/16	9 3/4	9 3/4	9 1/16	9 1/16	9 1/8	9 13/16	9 11/16	9 3/8	9 3/16	9 1/8	9 1/4
B	9 1/4	9 1/16	9 3/16	9 5/16	9 11/16	9 13/16	9 11/16	9 13/16	9 11/16	9 3/4	9 3/4	9 1/16	9 1/16	9 1/8	9 13/16	9 11/16	9 5/16	9 3/16	9 1/8	9 1/4
C-G	9 1/4	9 1/16	9 1/16	9 1/8	9 7/16	9 9/16	9 1/2	9 11/16	9 5/8	9 3/4	9 3/4	9 5/8	9 11/16	9 1/2	9 9/16	9 7/16	9 1/8	9 1/16	9 1/16	9 1/4



Design For 20° Skew (R.A.)

376'-0" x 60'-0" Pretensioned
Prestressed Concrete Beam Bridge

81'-0" End Spans2 - 107'-0" Interior Spans

Deck Thickness Details

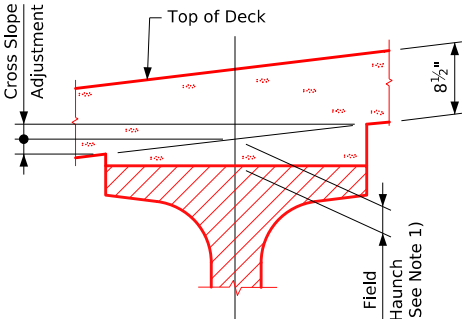
STA. 1301+02.00 (WB US 30)Turn-in Date: August, 2026

Story County

IOWA DEPARTMENT OF TRANSPORTATION

Design No. 227Design Sheet No. 20 of 34FHWA No. 048741

Table of Beam Line Deck Haunch Elevations																							
Beam Line	ȡ W. Abut. Brg.								ȡ Pier 1 Bearings													ȡ 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
A	889.33	889.47	889.59	889.71	889.80	889.87	889.92	889.96	889.98	889.99	890.12	890.24	890.35	890.43	890.50	890.55	890.57	890.57	890.55	890.51	890.46	890.40	890.40
B	889.64	889.78	889.90	890.02	890.11	890.18	890.23	890.26	890.28	890.29	890.42	890.54	890.64	890.73	890.80	890.84	890.86	890.86	890.84	890.80	890.75	890.69	890.69
C	889.95	890.09	890.22	890.33	890.42	890.48	890.53	890.56	890.58	890.60	890.72	890.84	890.94	891.03	891.09	891.13	891.15	891.15	891.13	891.09	891.03	890.97	890.97
D	890.21	890.34	890.47	890.57	890.66	890.73	890.78	890.81	890.82	890.84	890.96	891.08	891.18	891.26	891.33	891.37	891.39	891.38	891.36	891.32	891.26	891.20	891.20
E	890.29	890.43	890.55	890.66	890.74	890.81	890.85	890.88	890.90	890.91	891.03	891.15	891.25	891.33	891.39	891.43	891.45	891.44	891.42	891.38	891.32	891.25	891.25
F	890.13	890.27	890.39	890.49	890.58	890.64	890.69	890.71	890.73	890.74	890.86	890.98	891.07	891.16	891.22	891.26	891.27	891.26	891.24	891.19	891.13	891.07	891.07
G	889.98	890.11	890.23	890.33	890.42	890.48	890.52	890.55	890.56	890.57	890.69	890.80	890.90	890.98	891.04	891.08	891.09	891.09	891.06	891.01	890.95	890.88	890.88



Haunch Detail

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

Table of Beam Line Deck Haunch Elevations																						
Beam Line												⌀ Pier 3 Bearings										⌀ E. Abut. Brg.
	Line 24	Line 25	Line 26	Line 27	Line 28	Line 29	Line 30	Line 31	Line 32	Line 33	Line 34	Line 35	Line 36	Line 37	Line 38	Line 39	Line 40	Line 41	Line 42	Line 43	Line 44	
A	890.49	890.57	890.63	890.67	890.70	890.70	890.68	890.64	890.58	890.50	890.40	890.30	890.29	890.30	890.29	890.27	890.23	890.16	890.08	889.98	889.86	
B	890.77	890.85	890.91	890.95	890.98	890.98	890.96	890.91	890.85	890.77	890.67	890.57	890.56	890.56	890.56	890.53	890.49	890.42	890.34	890.23	890.12	
C	891.06	891.13	891.19	891.23	891.26	891.26	891.23	891.19	891.12	891.04	890.94	890.83	890.83	890.83	890.82	890.80	890.75	890.68	890.60	890.49	890.38	
D	891.28	891.35	891.41	891.45	891.47	891.47	891.45	891.40	891.33	891.25	891.15	891.04	891.03	891.04	891.03	891.00	890.95	890.88	890.79	890.69	890.57	
E	891.33	891.41	891.46	891.50	891.52	891.52	891.49	891.45	891.38	891.29	891.19	891.08	891.07	891.07	891.06	891.03	890.98	890.91	890.82	890.72	890.60	
F	891.15	891.22	891.27	891.31	891.33	891.33	891.30	891.25	891.18	891.09	890.99	890.88	890.87	890.87	890.86	890.83	890.78	890.70	890.61	890.50	890.38	
G	890.96	891.03	891.08	891.12	891.14	891.13	891.10	891.05	890.98	890.89	890.79	890.68	890.67	890.67	890.65	890.62	890.57	890.49	890.40	890.29	890.17	

Miscellaneous Data Table																									
	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
Anticipated Deflection Due to Deck (in.)	All		0	1/2	15/16	1 1/4	1 5/16	1 1/4	15/16	1/2	0	0	15/16	1 3/4	2 7/16	3	3 3/8	3 7/16	3 3/8	3	2 7/16	1 3/4	15/16	0	0
Cross Slope Adjustments (in.)	A-C		±1/2"																						
	D-G		±5/16"																						
Allowable Field Haunch (in. & ft.)	Max.	All	2 1/2" (0.208)									3" (0.25)	2 1/2" (0.208)											3" (0.25)	
	Min.	A-C	0"																						
		D-G	-3/16" (-0.013)																						

Miscellaneous Data Table																								
	Beam Line													☞ Pier 3 Bearings										☞ E. Abut. Brg.
			Line 24	Line 25	Line 26	Line 27	Line 28	Line 29	Line 30	Line 31	Line 32	Line 33	Line 34	Line 35	Line 36	Line 37	Line 38	Line 39	Line 40	Line 41	Line 42	Line 43	Line 44	
Anticipated Deflection Due to Deck (in.)	All		15/16	1 3/4	2 7/16	3	3 3/8	3 7/16	3 3/8	3	2 7/16	1 3/4	15/16	0	0	1/2	15/16	1 1/4	1 5/16	1 1/4	15/16	1/2	0	
Cross Slope Adjustments (in.)	A-C		±1/2"																					
	D-G		±5/16"																					
Allowable Field Haunch (in. & ft.)	Max.	All	2 1/2" (0.208)											3" (0.25)	2 1/2" (0.208)									
	Min.	A-C	0"																					
		D-G	-3/16" (-0.013)																					

Note 1:
To calculate field haunch required at each location, survey the beam tops consistent with the spacings shown on the "Deck Elevation Plan". 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.

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.



Design For 20° Skew (R.A.)

376'-0" x 60'-0" Pretensioned
Prestressed Concrete Beam Bridge

81'-0" End Spans2 - 107'-0" Interior Spans

Deck Haunch Data

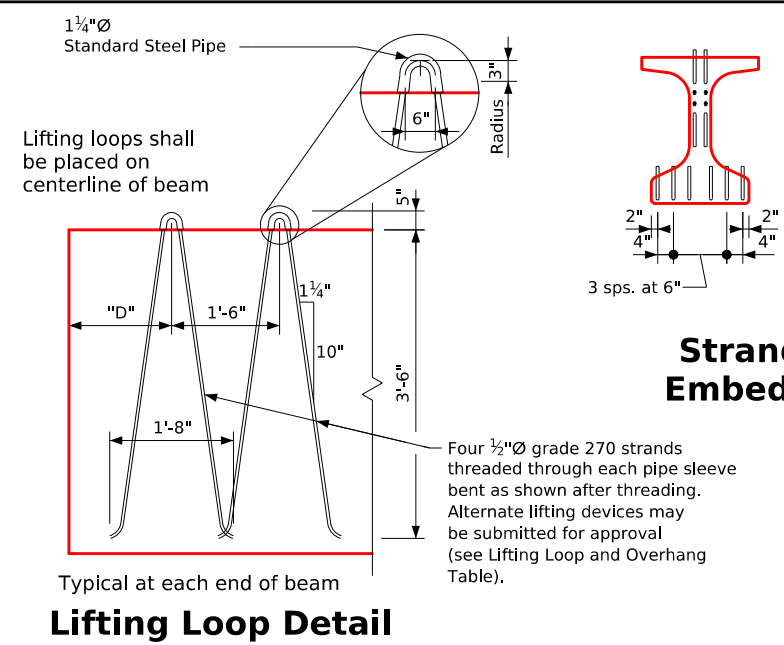
STA. 1301+02.00 (WB US 30)Turn-in Date: August, 2026

Story County

IOWA DEPARTMENT OF TRANSPORTATION

Design No. 227Design Sheet No. 21 of 34FHWA No. 048741

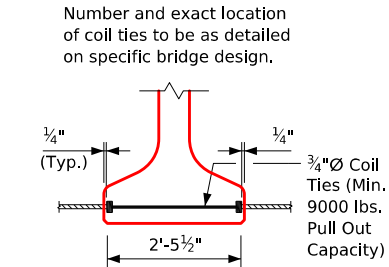
Correction 12-13: Coil Tie Detail was Changed to Reflect the Distance Between Coil Tie Anchors Embedded
Revised 10-2024: Revised "At Release" and "After Losses" Camber Values for BTC85 to BTC115,
Issued 05-04,
Beams.dgn - 4700 - This Sheet Re-Issued 04-2024. Sheet Format Update.



Lifting Loop And Overhang Table

Beams	Lifting Loops Each End	# of Strands Per Loop	D	Beam Overhang (ft.)
BTC80	2	4	1'-3"	11
BTC105	2	4	6'-3"	12

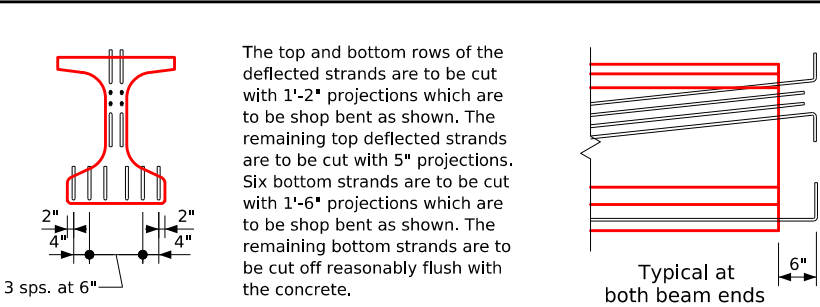
Lifting loops shall carry loads equally.



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 BTC105 beam ends shall be extended

Reinforcing Bar List						
Beam		BTC80		BTC105		
Bar Shape		No.	Length	No.	Length	
ΔΔ ΔΔ* *	5a1		12	24'-0"	12	36'-6"
	5a2		6	40'-0"	6	40'-0"
	5b1		61	9'-2"	85	9'-2"
	6b3		36	5'-0"	40	5'-0"
	6b4		16	4'-4"	24	4'-4"
	4c1		103	2'-7"	139	2'-7"
	4d1		83	6'-5"	107	6'-5"
	4e1		26	3'-2"	26	3'-2"
	4h1		6	8'-0"	6	8'-0"



Strand Projection at Beam Ends When Embedded in Concrete End Diaphragms

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.

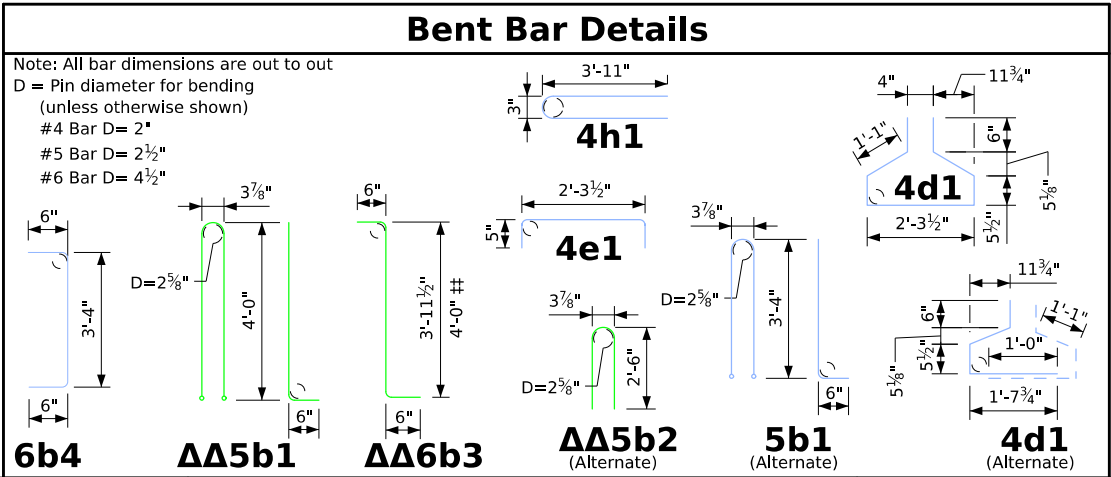
Specifications:

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.

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.



BTC Beam Data

BTC Beam	Span Length ℄-℄ Bearing	Overall Beam Length (L)	Concrete Strength		Strand Size Dia. (in.)	Number of Strands		Total Initial Prestress ③ (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 (elastic) Δ _I		Time ② (plastic) Δ _T					Maximum Spacing	
												Steel Diaphragm		Steel Diaphragm					HL-93 Loading	
																			Steel Diaphragm	
BTC80	80'-0"	81'-4"	6.00	7.00	0.60"	20	4	1021	18.8	1.11"	2.04"	1.11"	0.28"	9'-3"	29.3	14.5	2114			
BTC105	105'-0"	106'-4"	7.50	8.50	0.60"	34	8	1786	25.8	3.10"	4.96"	3.04"	0.76"	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 (8.5") and haunch (1.5") weight of:
1.04 kips/ft. for 9'-3" beam spacing
And one steel diaphragm (0.500 kips) at ℄ 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 ℄ of span, Δ_D , due to weight of deck and diaphragms for detailing purpose:
(A) Δ_D=Δ_I + Δ_T for simple span.
(B) Δ_D=Δ_I + ¾Δ_T for end spans of continuous bridge.
(C) Δ_D=Δ_I + ½Δ_T for interior spans of continuous bridge.
- ③ Total initial prestress is based on 72.6% f's, f's= 270 ksi. and As= 0.217 in.².
- ④ Calculated design cambers are based on multipliers developed from research in Iowa.

Standard BTC80 and BTC105 beam design for spacing greater than 9'-3" was verified using LEAP Bridge Concrete.

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

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.
The portions of the prestressed beams that are to be embedded in the abutment and pier diaphragms 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 BTC105 beams 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.
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.
New BTC105 beams shall be placed where shown on Design Sheet No. 25.
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.

Design For 20° Skew (R.A.)

**376'-0" x 60'-0" Pretensioned
Prestressed Concrete Beam Bridge**

81'-0" End Spans 2 - 107'-0" Interior Spans

BTC Beam - Data Details

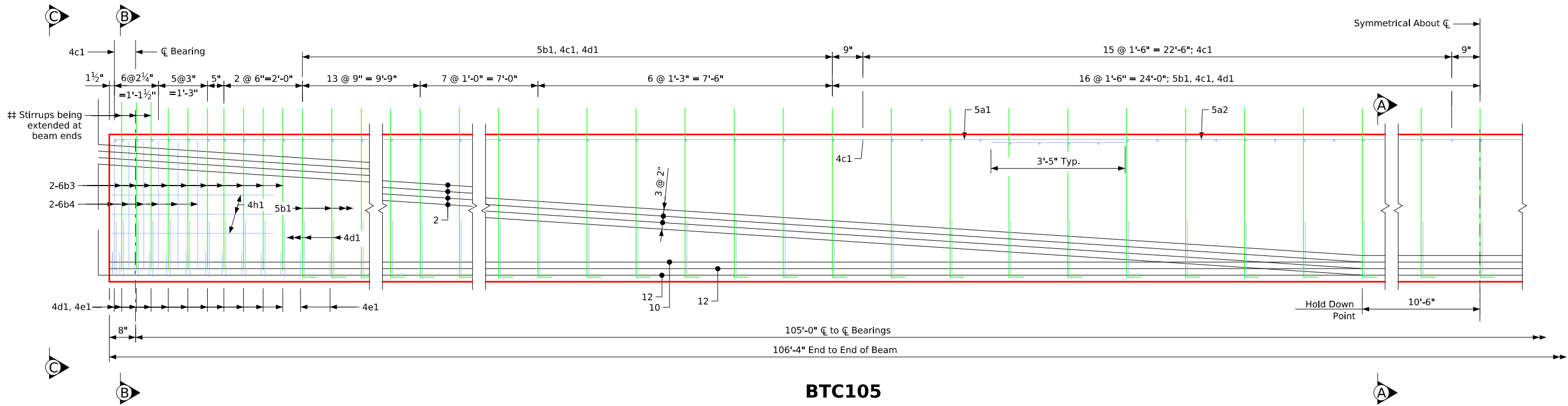
STA. 1301+02.00 (WB US 30) Turn-in Date: August, 2026

Story County

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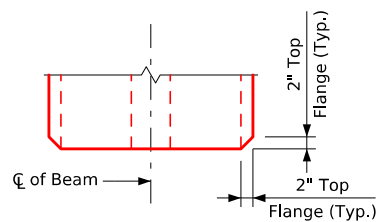
Design No. 227 Design Sheet No. 22 of 34 FHWA No. 048741

Revision 10-07: 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.



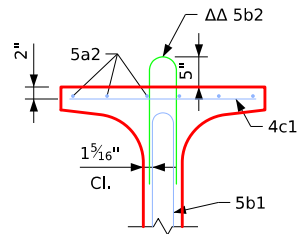
BTC105

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.



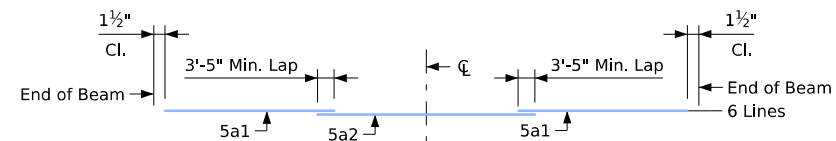
Section A-A (Alternate)

See Alternate Bar Note on Design Sheet No. 22.

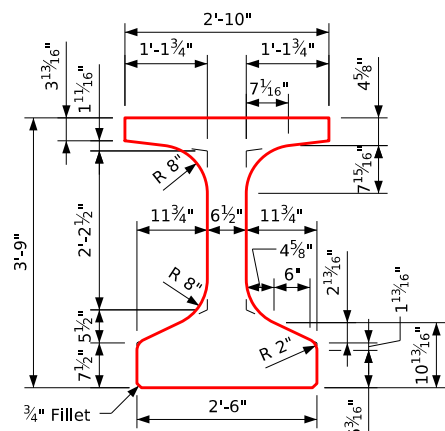
Area = 691.8 in.²
 $\bar{y}_b = 20.74$ in.
 $I = 178,971$ in.⁴

Beam Section Properties

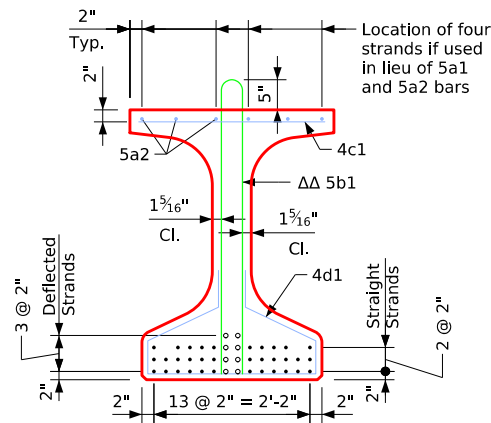
6b3 stirrups located at beam ends shall be extended as dimensioned below.



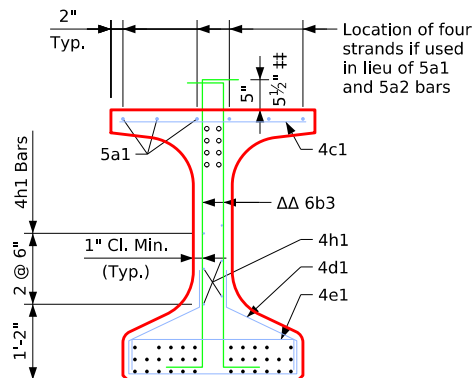
Top Flange Longitudinal Bar Layout



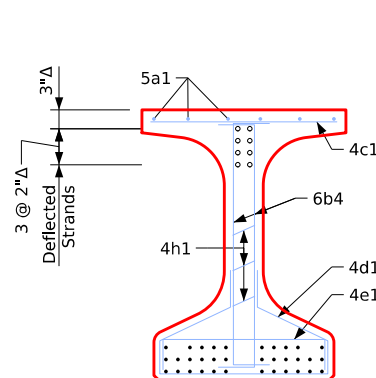
BTC Beam Cross Section



Section A-A



Section B-B

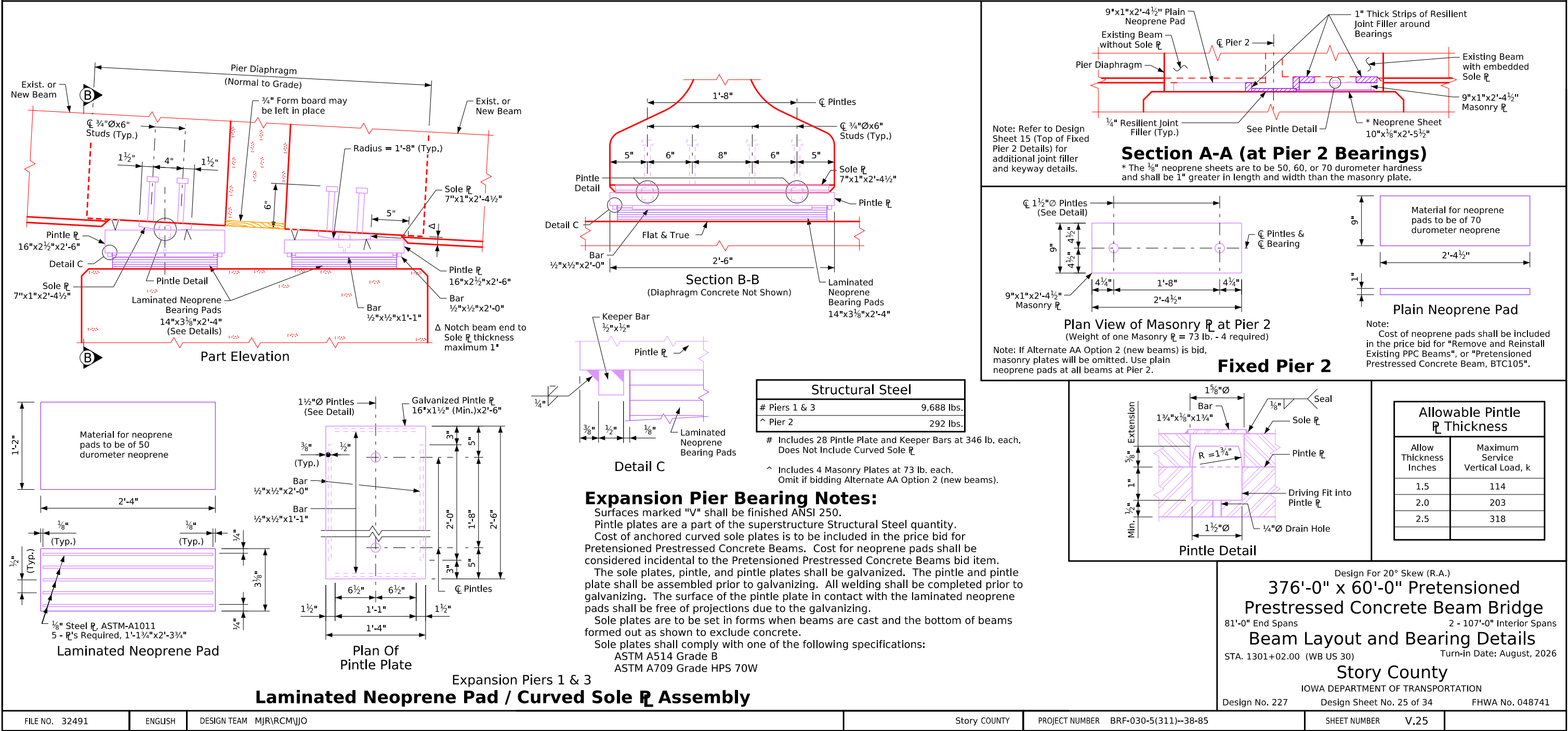
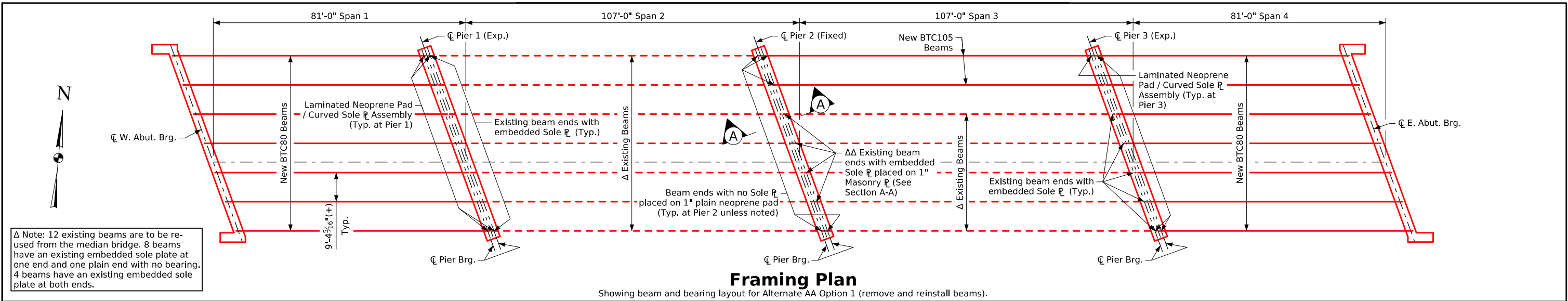


View C-C

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

Design For 20° Skew (R.A.)
376'-0" x 60'-0" Prestressed Concrete Beam Bridge
81'-0" End Spans 2 - 107'-0" Interior Spans
BTC105 Beam Details
STA. 1301+02.00 (WB US 30) Turn-in Date: August, 2026
Story County
IOWA DEPARTMENT OF TRANSPORTATION
Design No. 227 Design Sheet No. 24 of 34 FHWA No. 048741

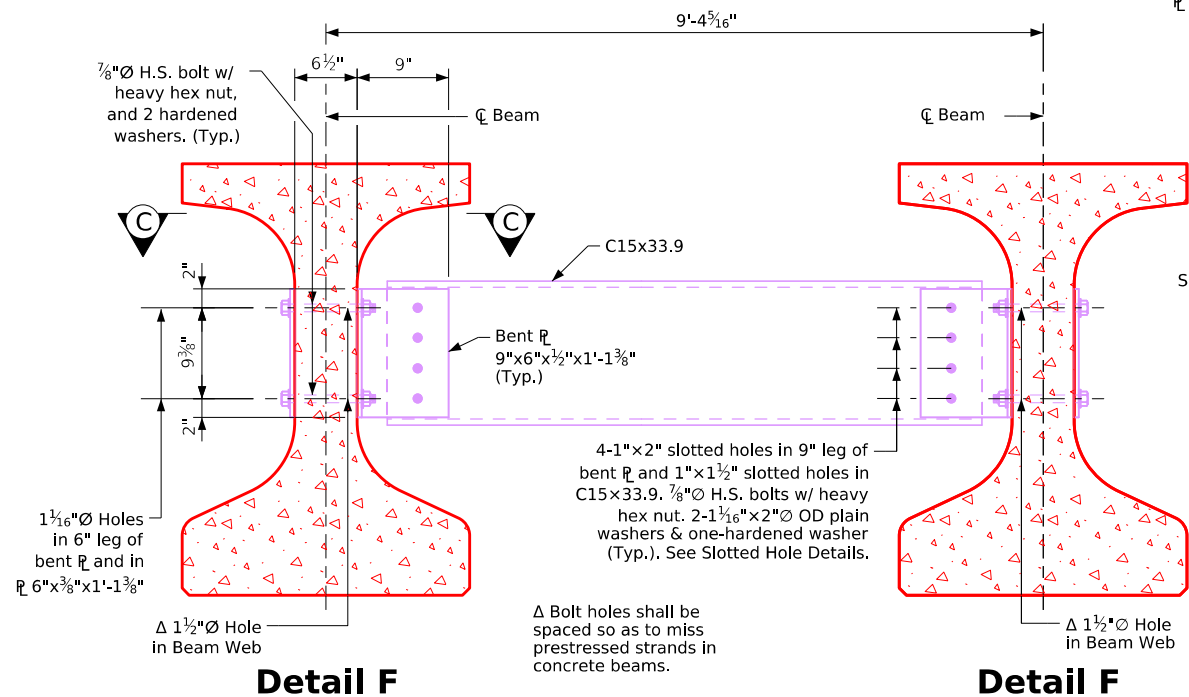
FILE NO. 32491	ENGLISH	DESIGN TEAM MJR/RCM/VJO	Bulb Tee "C" Beam - 105'-0" Span	Standard Sheet 4716	STORY COUNTY	PROJECT NUMBER BRF-030-5(311)--38-85	SHEET NUMBER V.24
2:39:12 PM	7/13/2026	bbarker	pw:\projectwise.dot.int\lan:PWMMain\Documents\Projects\8503002019\Bridge\311_Bridge Replacement-PPCB\BRG_85030311_WHKS_227_048741.dgn				



Bulb Tee "C" Beam Intermediate Diaphragm Structural Steel			
One Beam Connection (Detail "F")			Weight
		No. of Beam Connections	
Two - $\frac{7}{8}" \varnothing \times 9\frac{1}{4}"$ H.S. Bolts with Nuts & Washers = 4.8 Lbs.		48	230
One Detail "F"	One - Backing $\overline{P}$ $6" \times \frac{3}{8}" \times 1'-1\frac{3}{8}"$ = 8.5 Lbs.	48	408
	One - Bent $\overline{P}$ $9" \times 6" \times \frac{1}{2}" \times 1'-1\frac{3}{8}"$ = 28.5 Lbs.	48	1,368
One Diaphragm			
		Number of Diaphragms	
Eight - $\frac{7}{8}" \varnothing \times 2\frac{3}{4}"$ H.S. Bolts with Nuts & Washers = 10.3 Lbs.		24	247
	Length of Member		
One - C15 x 33.9 = 33.9 Lbs./Ft. (End Spans)	$8'-2\frac{1}{2}"$	12	3,324
One - C15 x 33.9 = 33.9 Lbs./Ft. (Interior Spans)	$8'-2\frac{5}{16}"$	12	3,333
Intermediate Diaphragm Structural Steel - Total (Lbs.)			8,910

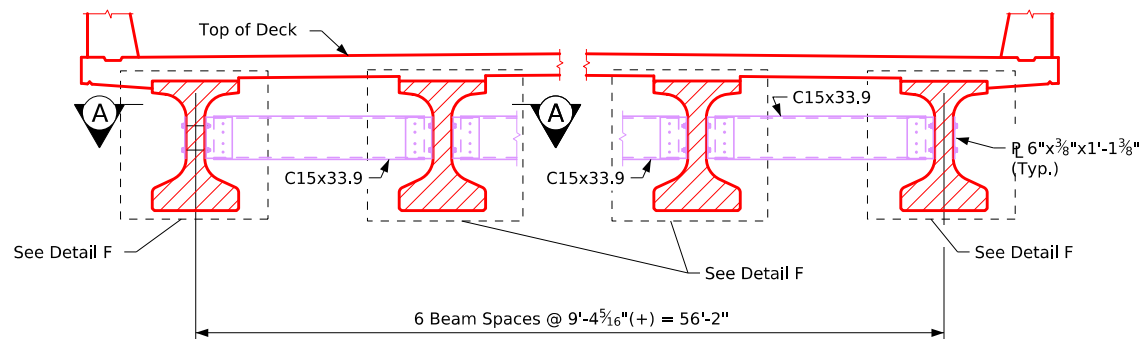
STRUCTURAL STEEL	
Weight	8,910 lbs.

NOTE: Structural Steel weight
is included on the Summary
Quantities Sheet.

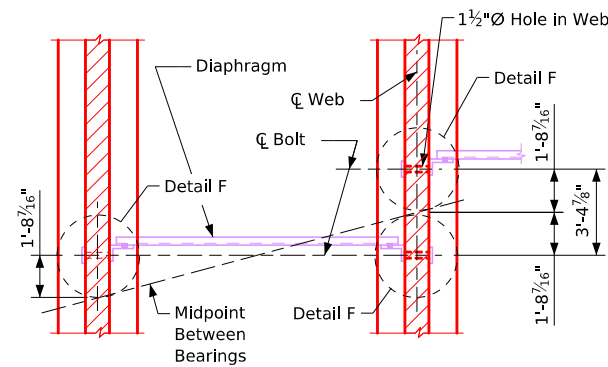


Detail F

Section Showing Intermediate Diaphragms

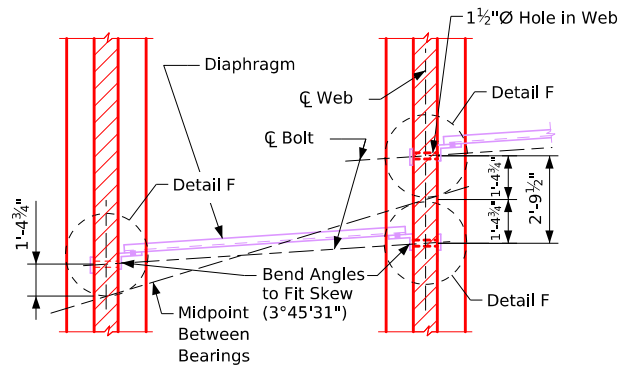


Section Showing Intermediate Diaphragms



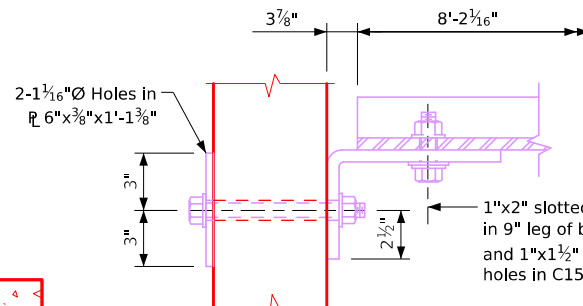
Part Section A-A

Spans 1 & 4 (BTC80 Beams)
Spans 2 & 3 (Alternate AA Option 2 - new BTC105 Beams)



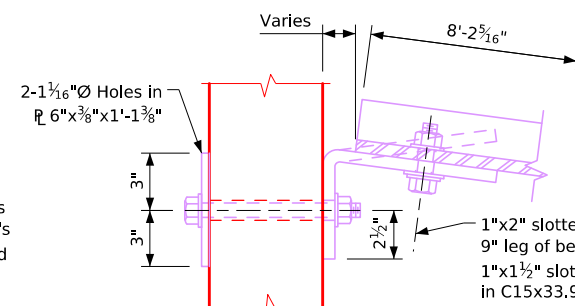
Part Section A-A

Spans 2 & 3 (Alternate AA Option 1 - remove and reinstall BTC105 Beams)



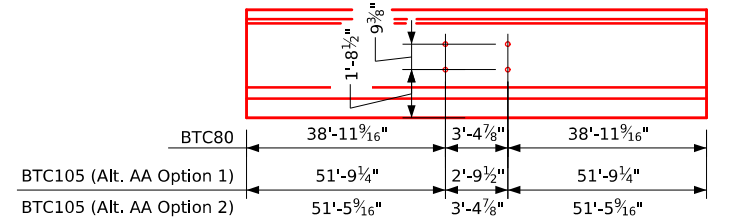
Section C-C

Spans 1 & 4 (BTC80 Beams)
Spans 2 & 3 (Alternate AA Option 2 - new BTC105 Beams)



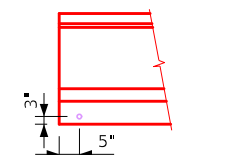
Section C-C

Spans 2 & 3 (Alternate AA Option 1 - remove and reinstall BTC105 Beams)

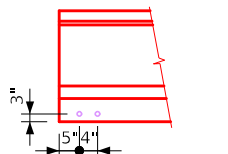


Intermediate Diaphragm Bolt Hole Locations

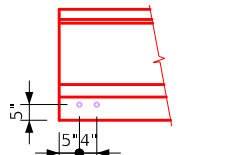
Note: Only 1 set of holes required at exterior beams



Integral Abutment

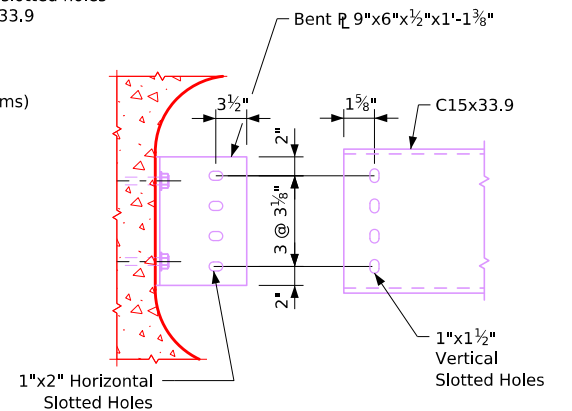


Fixed Pier 2



Expansion Piers 1 & 3

Beam Coil Tie Locations



Slotted Hole Details

Design For 20° Skew (R.A.)

376'-0" x 60'-0" Pretensioned Prestressed Concrete Beam Bridge

81'-0" End Spans2 - 107'-0" Interior Spans

Intermediate Diaphragm Details

STA. 1301+02.00 (WB US 30)Turn-in Date: August, 2026

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IOWA DEPARTMENT OF TRANSPORTATION

Design No. 227Design Sheet No. 26 of 34FHWA No. 048741

Notes:

All diaphragm materials, including bolts, nuts and washers shall be galvanized.

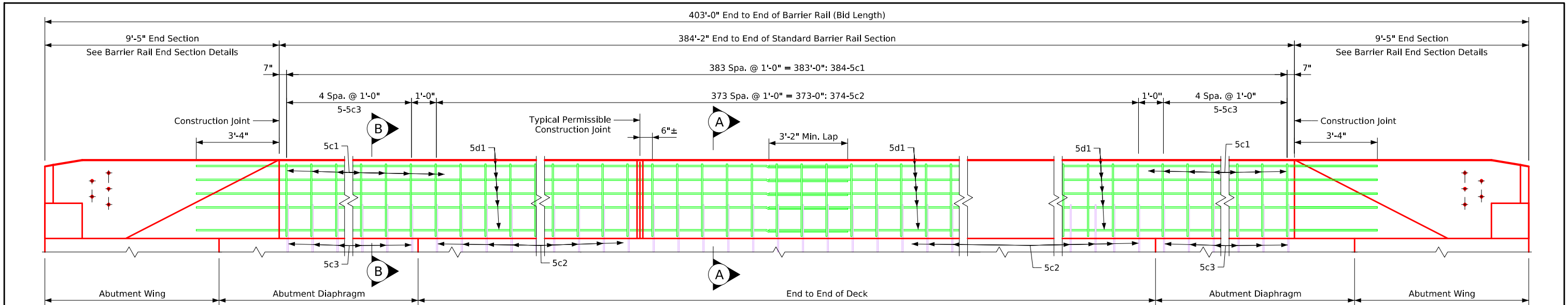
Shop drawings of the steel diaphragms showing layout and details of the diaphragms shall be submitted for approval.

All costs for furnishing and installing steel intermediate diaphragms shall be included in the price bid for Structural Steel.

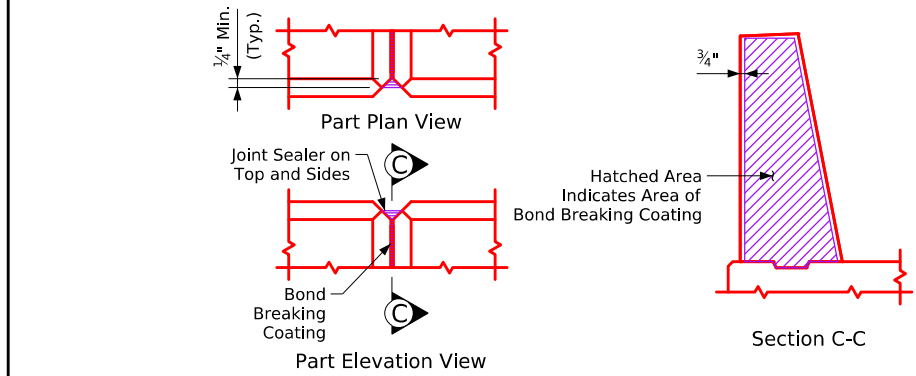
The 1½"Ø holes for the 7/8"Ø H.S. bolts shall be cast into the web. Drilling is not allowed.

The 7/8" Ø 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 deck concrete.



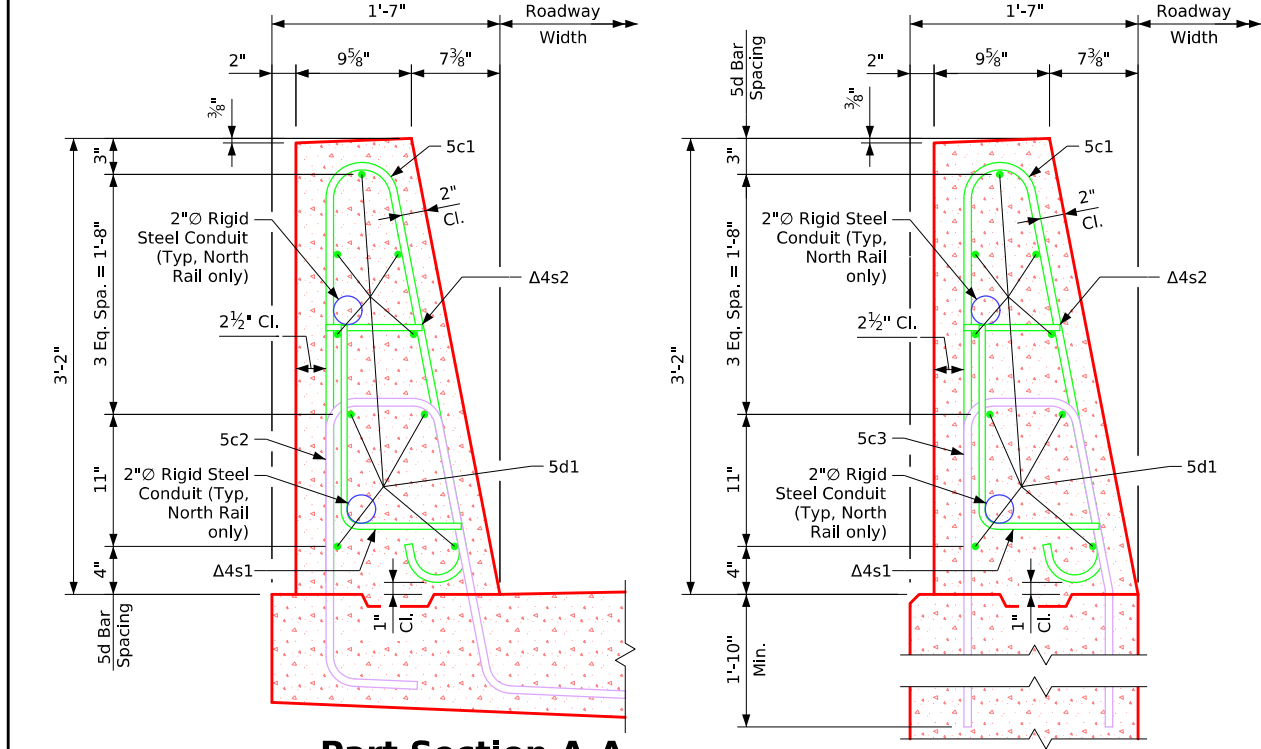
Elevation of Barrier Rail



Barrier Rail Joint Details

Concrete Placement Summary		
Section		Total
Standard Section 768'-4" at 0.13 Cu. Yd. per Ft.		99.9
Total (cu. yd.)		99.9
Concrete Barrier Rail Quantities		
Item	Unit	Quantity
Concrete Barrier Railing	L.F.	806.0

Epoxy Coated Reinf. Steel - Two Rails						
Section	Bar	Location	Shape	No.	Length	Weight
Standard Sections	5c1	Rail, Vertical		768	6'-8"	5,340
	5d1	Rail, Longitudinal		198	38'-5"	7,934
Epoxy Reinf. Total Weight (lbs.)						13,274
Stainless Steel Reinf. Steel - Two Rails						
Section	Bar	Location	Shape	No.	Length	Weight
Standard Sections	5c2	Rail, Vertical		748	7'-8"	5,981
	5c3	Rail, Vertical		20	7'-5"	155
Stainless Steel Reinf. Total Weight (lbs.)						6,136



Part Section A-A

Part Section B-B

Barrier Rail Notes:

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

The permissible construction joints are to be placed between vertical bars at a minimum spacing of 20 feet. Construction joint contact surfaces are to be coated with an approved bond breaker.

Cost of the joint sealer and bond breaker shall be considered incidental to other construction.

All barrier rail reinforcing steel is to be either epoxy coated or stainless steel as shown. The stainless steel reinforcing steel shall be deformed bar grade 60 meeting the requirements of Construction and Materials I.M. 452.

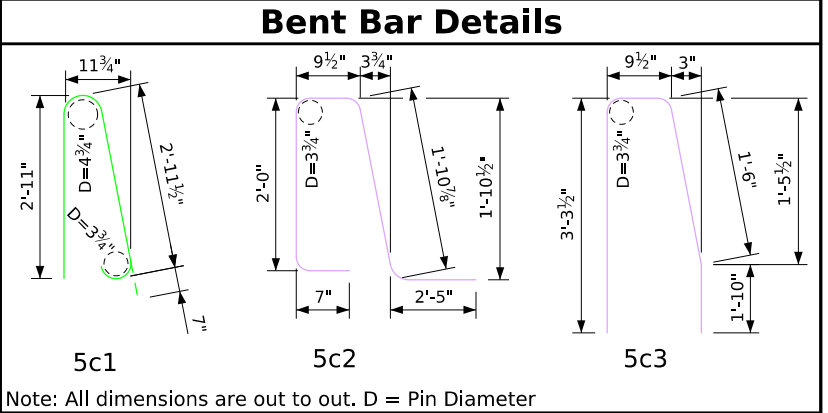
The concrete barrier rail is to be bid on a lineal foot basis. The number of linear feet of barrier rail installed will be paid for at the contract price per lineal foot based on plan quantities. Price bid for concrete barrier railing shall be full compensation for furnishing all material, excluding reinforcing steel, and all of the equipment and labor required to erect the rail in accordance with these plans and current specifications. The rigid steel conduit, junction boxes and fittings including labor and any additional work to do the installation is considered incidental to the cost of the railing.

The joint sealer shall be light gray nonsag latex caulking sealer marketed for outdoor use. No testing or certification is required.

Top of the barrier rail is to be parallel to the theoretical $\bar{C}$ grade.

All exposed corners on the top of the barrier and all other corners 90° or sharper to be filleted with a $\frac{3}{4}$ " dressed and beveled strip.

Cross sectional area of the Standard Sections of the barrier rail = 3.50 square feet.



Note: Reinforcing steel quantities are included on the Summary Quantities Sheet.

Design For 20° Skew (R.A.)

376'-0" x 60'-0" Prestensioned

Prestressed Concrete Beam Bridge

81'-0" End Spans 2 - 107'-0" Interior Spans

Barrier Rail Details

STA. 1301+02.00 (WB US 30) Turn-in Date: August, 2026

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Technical drawing of a gutter cross-section. The drawing shows a gutter with a 9'-5" End Section. Key dimensions include a total width of 1'-7" and a depth of 1'-7". The gutter is divided into sections: 4", 1'-2", 1'-9", and 6'-2". The gutter is labeled with "Standard Rail", "Construction Joint", and "Gutter Line". The drawing also shows "Ø 1"Ø Holes" and various vertical dimensions: 1 1/2", 7 3/8", 3", 4 1/2", 5 5/8", 7 3/8", 2", 9 5/8", and 1'-7".

Technical drawing of a wing wall cross-section. The drawing includes the following dimensions and labels:

- Overall Dimensions:**
 - Top width: 9'-5" End Section
 - Right height: 3'-2"
- Vertical Dimensions (Left Side):**
 - Top to first step: 2'-10⁷/₈"
 - First step to second step: 1'-5"
 - Second step to third step: 2'-0"
 - Third step to top: 1'-6¹/₂"
- Horizontal Dimensions (Top):**
 - From left face to first hole center: 1'-10³/₄"
 - Between first and second hole centers: 8"
 - From left face to second hole center: 1'-2"
 - From left face to third hole center: 4"
- Structural Details:**
 - Three holes labeled "Ø 1"Ø Holes".
 - Vertical centerline labeled "Vertical".
 - Sloped face labeled "Slope Face of Wall".
 - Top edge labeled "Top of Wing".
 - Bottom section labeled "Wing" and "Abutment".
- Other Dimensions:**
 - Vertical distance between hole centers: 7⁵/₈" (twice).
 - Horizontal distance from left face to start of slope: 1'-6"
 - Horizontal distance from start of slope to end of wing: 1'-9"
 - Horizontal distance from end of wing to abutment face: 6'-2"

9'-5" End Section

12 - 6c1 & 6c2

3 1/2" 2 @ 4 1/2" = 9" 5" 3 Spa. @ 6" = 1'-6" 8 Spa. @ 9" = 6'-0" 2" Cl.

2" Cl.

A B C D

5d4 5d2, 5d3, 5d5 5d1, 5d5

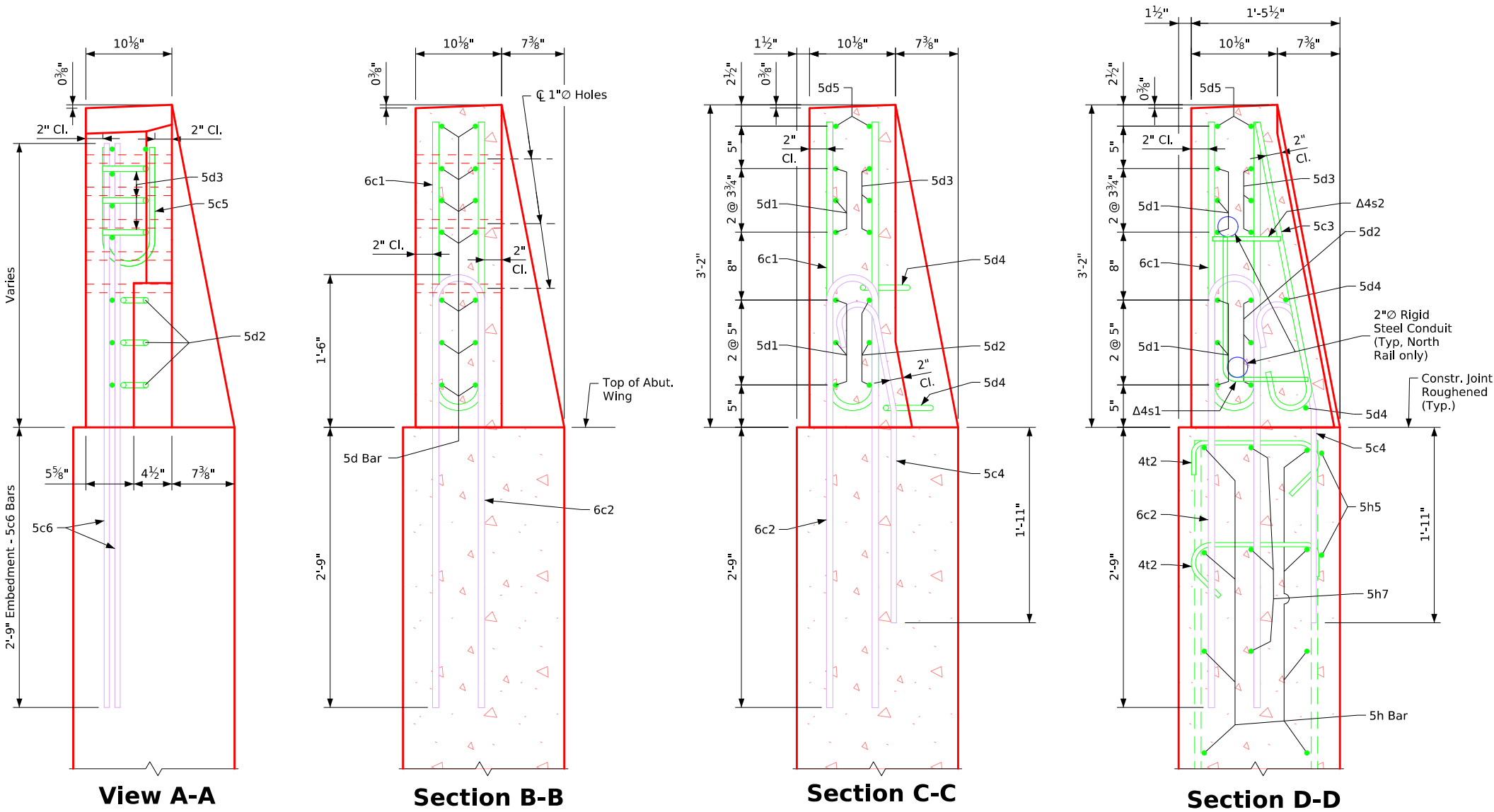
4 - 5c6 (Both Faces) 1" Ø Holes 2 @ 9" = 1'-6" 3 - 5c3 5 Spa. @ 9" = 3'-9" 6 - 5c4 3 13/16"

F A B C D F

Figure 1: Reinforcement details for the deck slab. The diagram shows a cross-section of a 9'-5" wide deck slab. The top portion is a 2'-10 5/8" thick slab with a 2'-9 1/16" thick concrete layer. The bottom portion is a 2'-10 5/8" thick slab. The reinforcement includes 5d1 (Back Face), 5d3 (Traffic Face), 5c1, 5c3, 5d5, 5d4 (Traffic Face), 5d1 (Back Face), 5d2 (Traffic Face), 5c6 (5'-6 1/2" Both Faces), 5c6 (5'-7" Both Faces), 5c6 (5'-7 3/4" Both Faces), 5c6 (5'-8 1/2" Both Faces), 5c4 (Traffic Face), 4t2 (Typ.), 5h1, 5h6, 6c2, 5h5, and 5h7. The diagram also shows 1" diameter holes and construction details.

Design For 20° Skew (R.A.)
**376'-0" x 60'-0" Pretensioned
Prestressed Concrete Beam Bridge**
81'-0" End Spans 2 - 107'-0" Interior Spans
Barrier Rail End Section
STA. 1301+02.00 (WB US 30) Turn-in Date: August, 2026
Story County
IOWA DEPARTMENT OF TRANSPORTATION
Design No. 227 Design Sheet No. 28 of 34 FHWA No. 048741

DeckRailBridges.dgn - 1017S-2 - This Sheet Issued 05-2024. Revised to Single Slope Barrier Shape. Additional Sheet for Clarity. (Sheet Number was Originally 1017S).



Abutment wing bars in View A-A and Sections B-B & C-C are not shown for clarity.

Notes: 4t2 placement - 3 bars each at top two rows of 5h bars in abutment wing and abutment wing extension.
Construction joint between top of abutment wing and abutment wing extension with barrier rail is roughened concrete.
The 6c2, 5c4, 5c6, and 4t2 bars are to be placed with the abutment wing and abutment wing extension. The details for placement are shown on the Abutment Wing Sheet and Abutment Wing Extension Sheet.
Dashed lines below the top of wing are the abutment wing reinforcing steel.
See Abutment Wing Sheet and Abutment Wing Extension Sheet for placement.
For Plan and Elevation see Design Sheet No. 28.

Δ Note: 4s1 & 4s2 conduit support bar details and quantities are on Design Sheet No. 31.

Epoxy Coated Reinforcing Steel - One End Section

Bar	Location	Shape	No.	Length	Weight
6c1	Rail, Vertical		12	5'-11"	107
5c3	Rail, Vertical (Traffic Face)		3	3'-5"	11
5c5	Rail, Vertical (End)		4	Varies	14
5d1	Rail, Horizontal (Back Face)		6	9'-1"	57
5d2	Rail, Horizontal (Traffic Face)		3	9'-1"	28
5d3	Rail, Horizontal (Traffic Face)		3	9'-7"	30
5d4	Rail, Horizontal (Traffic Face)		2	6'-3"	13
5d5	Rail, Horizontal (Top)		2	9'-1"	19
4t2	Rail, Abutment Wing Tie Bars		6	2'-0"	8
Epoxy Reinforcing Total Weight (lbs.)					287

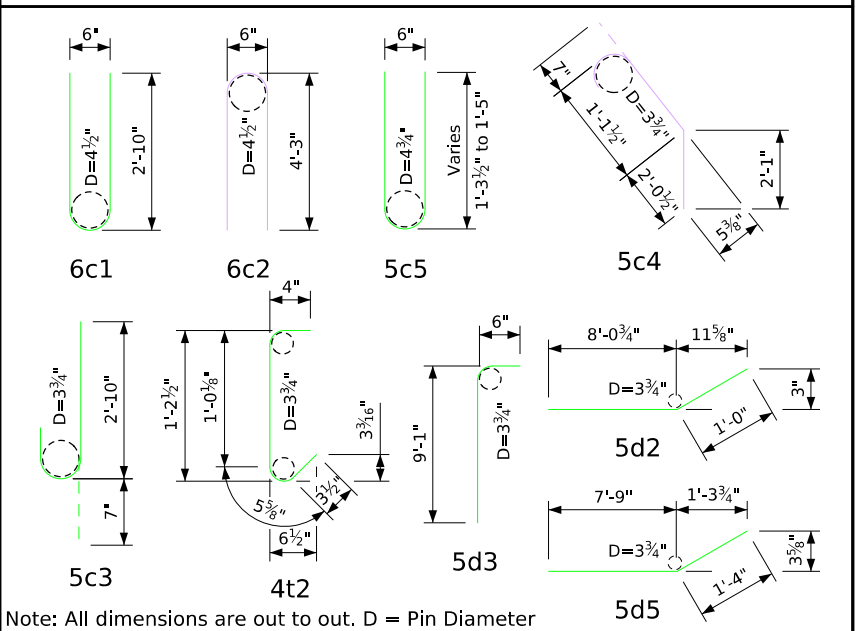
Stainless Steel Reinforcing Steel - One End Section

Bar	Location	Shape	No.	Length	Weight
6c2	Rail, Vertical		12	8'-9"	158
5c4	Rail, Vertical (Traffic Face)		6	3'-10"	24
5c6	Rail, Vertical (End)		8	Varies	47
Stainless Steel Reinforcing Total Weight (lbs.)					229

Concrete Placement Summary

Section	Total
Barrier Rail, One End Section	1.0 cu. yd.

Bent Bar Details

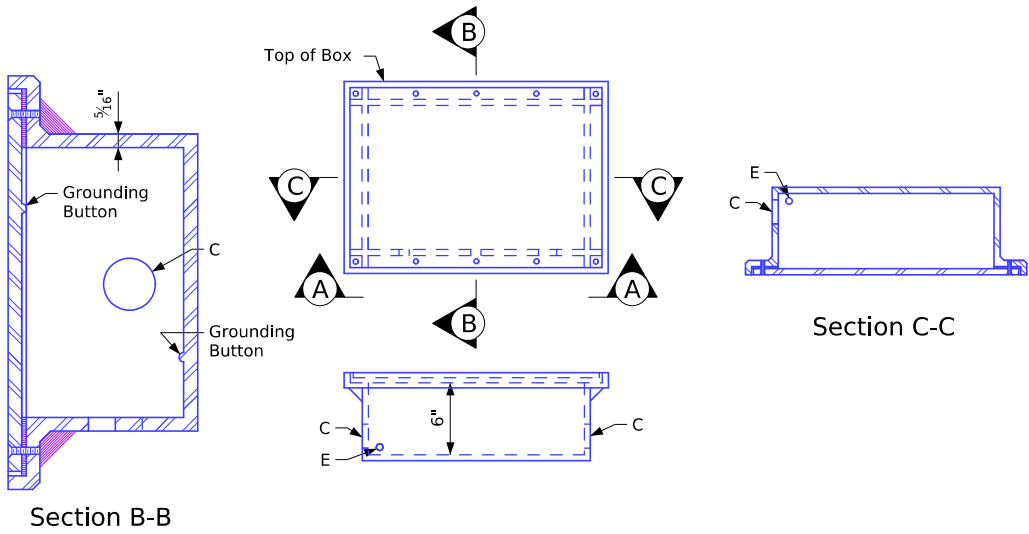


Note: Reinforcing steel quantities are included on the Summary Quantities Sheet.

Design For 20° Skew (R.A.)
376'-0" x 60'-0" Prestressed Concrete Beam Bridge
81'-0" End Spans 2 - 107'-0" Interior Spans
Barrier Rail End Section
STA. 1301+02.00 (WB US 30) Turn-in Date: August, 2026
Story County
IOWA DEPARTMENT OF TRANSPORTATION
Design No. 227 Design Sheet No. 29 of 34 FHWA No. 048741

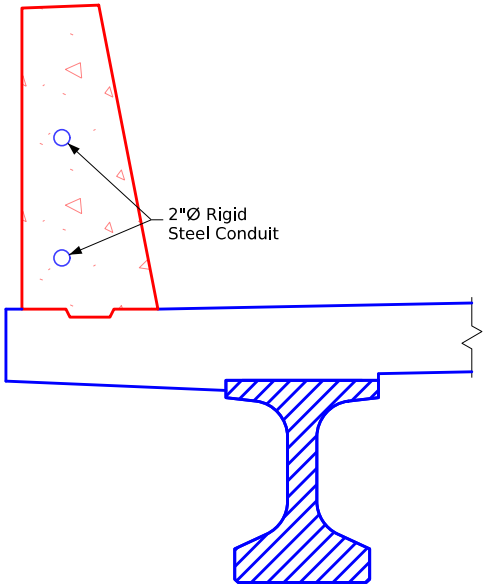
Bossed For	Hole	For Conduit Size
5 Threads	C	2" Ø Rigid Steel
None	E	½" Ø Rigid Steel

Note: The grounding buttons are to be blind drilled and tapped for ⅜"Ø x 0'-0¾" bolts.



View A-A
LI-104 Junction Box
Watertight, Cast Iron - Flush Mount

Note: For location of conduits, see lighting layout details in these plans.



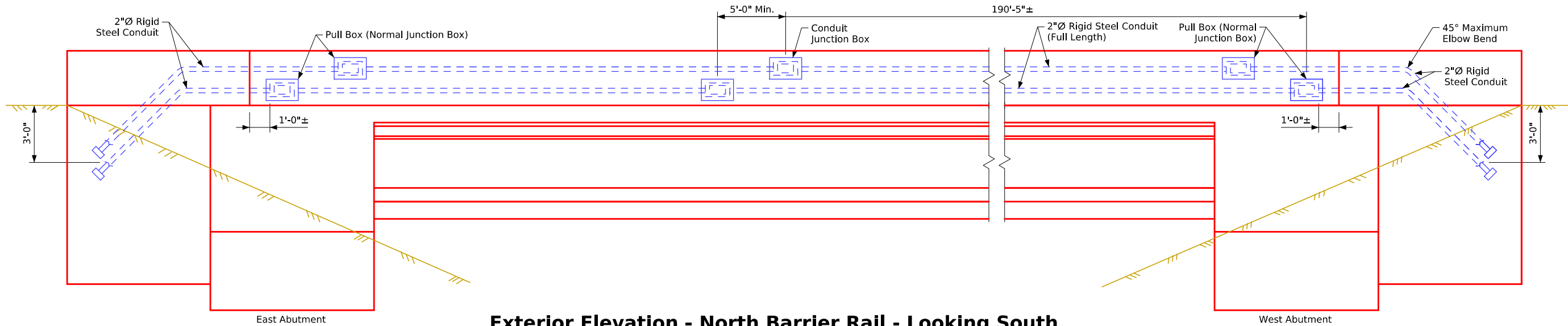
Typical Section thru Outside Rail

Conduit Notes:
See LI-104 Standard Road Plan for additional information on junction boxes. Construction shall conform to the current Iowa D.O.T. Standard and Supplemental Specifications and Special Provisions. Conduit installation shall be in accordance with Article 2523.03, N, of the Standard Specifications. All "C" entrance holes in junction boxes shall be drilled and tapped for the specified conduit size. All other holes shall have a concrete - tight slip fit. Conduit ends shall not protrude into junction box more than ¼". Drain pipe end shall be flush with inside surface of box. Grounding buttons shall be located approximately 3" from the inside surface of the box wall, and not closer than 3" to the edge of any hole in the box floor. Holes for drain pipe shall be placed in the low corner of the box, with a minimum clearance of 1" between the edge of the hole and the inside surface of the box wall. Typical details are shown on this sheet. The rigid steel conduit, junction boxes and fittings including labor and any additional work to do the installation is considered incidental to the cost of the railing. All reinforcing steel is to be epoxy coated and grade 60. Stainless-steel reinforcement shall not be allowed to be in contact with the uncoated reinforcement, bare metal forming hardware, or to galvanized attachments or galvanized conduit.

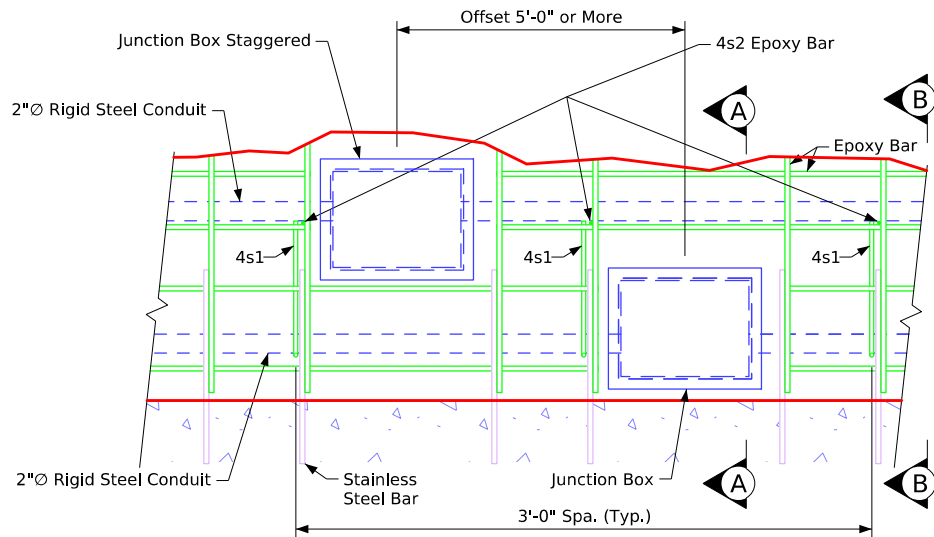
Design For 20° Skew (R.A.)
376'-0" x 60'-0" Prestressed
Prestressed Concrete Beam Bridge
81'-0" End Spans 2 - 107'-0" Interior Spans
Conduit Details
STA. 1301+02.00 (WB US 30) Turn-in Date: August, 2026
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Revised 09-16: Added Standard Specifications 4185.02,B,2 in Lighting Notes. Changed Bar Mark from "x" to "p".
Redrawn 09-08-88.
DeckRailBridges.dgn - 1030As1 -This Sheet Re-Issued 05-2024. Sheet Format Update.

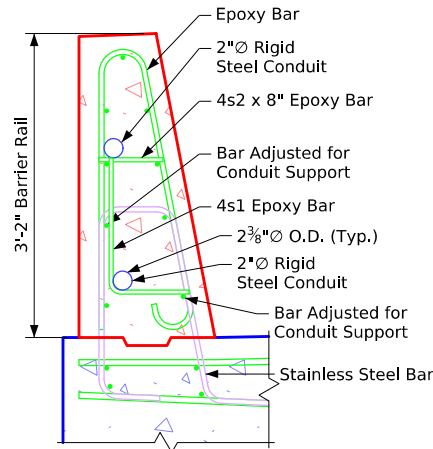
Revised 09-16: Added Conduit Support Rail Detail to Keep Conduit Isolated from the Stainless Steel Reinforcing.
Issued 09-03: DeckRailBridges.dgn - 1030As2 -This Sheet Re-Issued 05-2024. Sheet Format Update.



Exterior Elevation - North Barrier Rail - Looking South
(Place conduits in North Barrier Rail only)

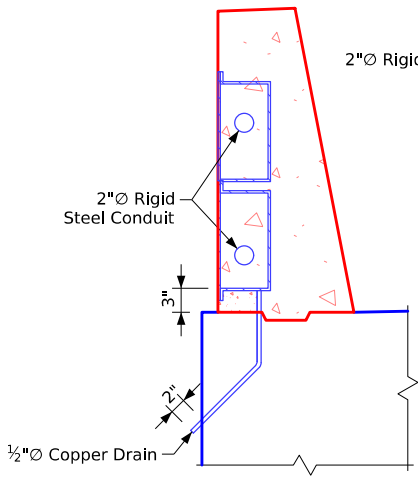


Conduit Support - Rail Elev. Detail
Two Junction Box Detail - Adjust reinforcing to clear junction box.

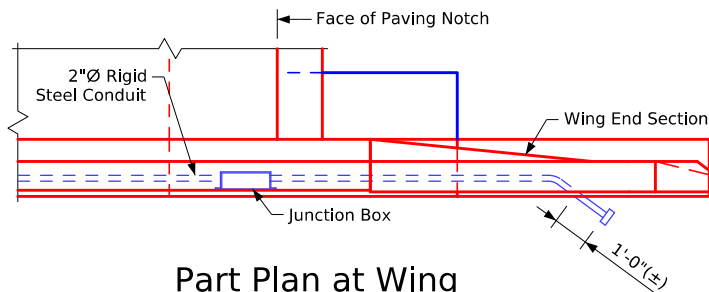


Section B-B - Conduit Support

Only used in rail with conduit, use 3'-0" spacing. Galvanized conduit shall not come into contact with the stainless steel reinforcing.



**Section A-A
Thru Junction Box**



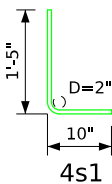
Part Plan at Wing

Epoxy Coated Reinf. Steel - One Rail

Bar	Location	Shape	No.	Length	Weight
4s1	Rail Conduit		133	2'-3"	200
4s2	Rail Conduit		133	0'-8"	60

Epoxy Reinforcing Total Weight (lbs.) 260

Bent Bar Details

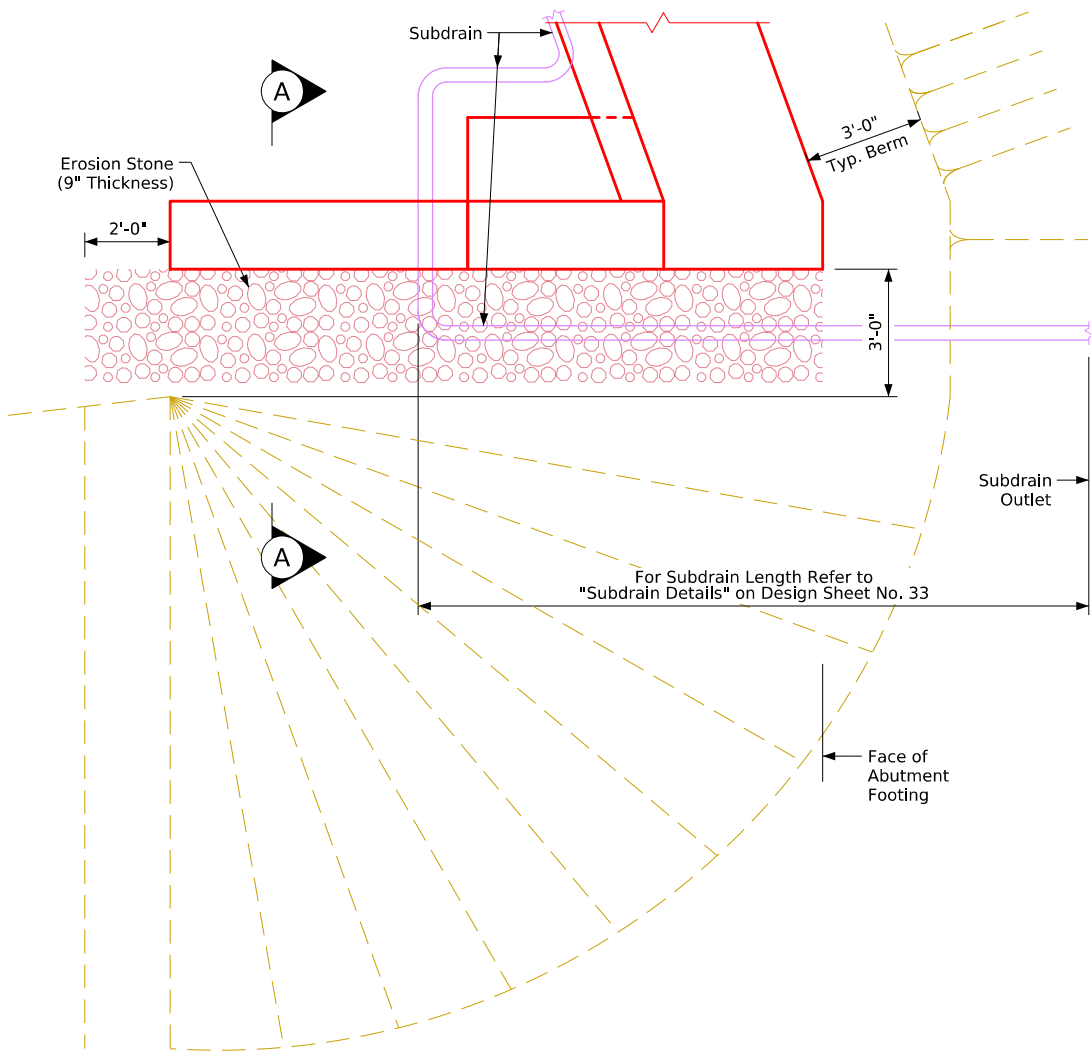


Note: All Dimensions are out to out. D = Pin Diameter

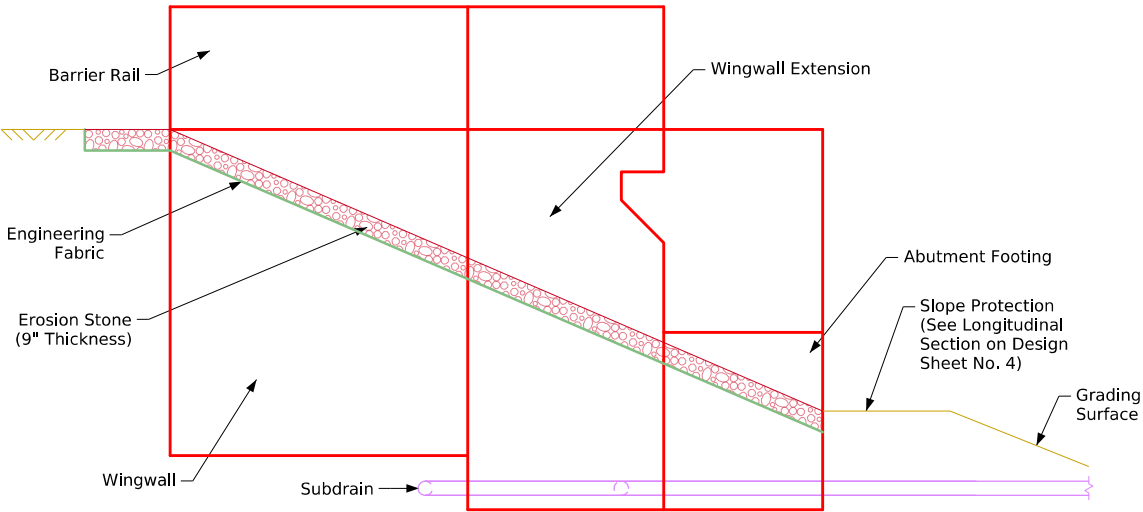
Note: Reinforcing steel quantities are included on the Summary Quantities Sheet.

Design For 20° Skew (R.A.)
**376'-0" x 60'-0" Prestensioned
Prestressed Concrete Beam Bridge**
81'-0" End Spans 2 - 107'-0" Interior Spans
Conduit Details
STA. 1301+02.00 (WB US 30) Turn-in Date: August, 2026
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Revised 06-14 - Added 2 Feet of Length of Erosion Stone in Front of the Bridge Wing.
Revised 09-2023: Changed direction of Section Director Arrows "A-A" to match what section view "Section A-A" is showing.
ForeSlopeProtectionBridges.dgn - 1005A - This Sheet Issued 06-02.
ForeSlopeProtectionBridges.dgn - 1005A - This Sheet Issued 07-23.

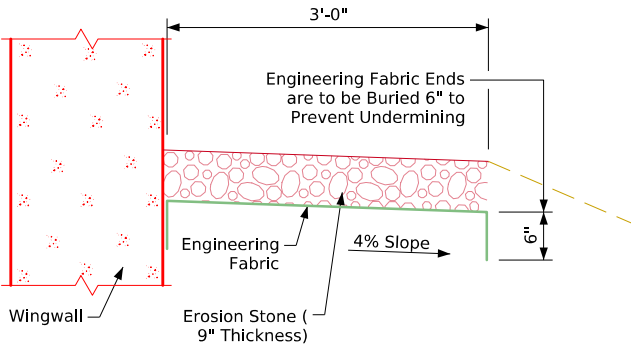


Top View of Wing Armoring



Profile View of Wing Armoring

A Check Shall be Made at the Subdrain Outlet to Insure that it is Draining Properly During the Backfill Flooding Process.



Section A-A

General Notes:

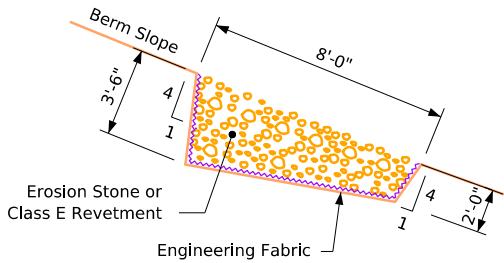
Erosion stone shall be placed along the sides of the wings and abutment footing as shown in Section A-A. This is typical at each corner of the bridge. The erosion stone at these locations shall be underlaid with engineering fabric in accordance with Article 4196.01, B, 3, of the Standard Specifications.

The erosion stone shall be in accordance with Section 4130, of the Standard Specifications. Material passing the 3 inch screen but 100% retained on a 1 inch screen may be used as choke stone.

The erosion stone shall be deposited, spread, consolidated and shaped by mechanical or hand methods that will provide uniform 9 inch depth and density and provide uniform surface appearance.

Payment for the bridge wing armoring will be bid per square yard. Cost will include engineering fabric, erosion stone, excavation, shaping, and compaction to dimensions shown in these plans. Bid item shall be "Bridge Wing Armoring - Erosion Stone".

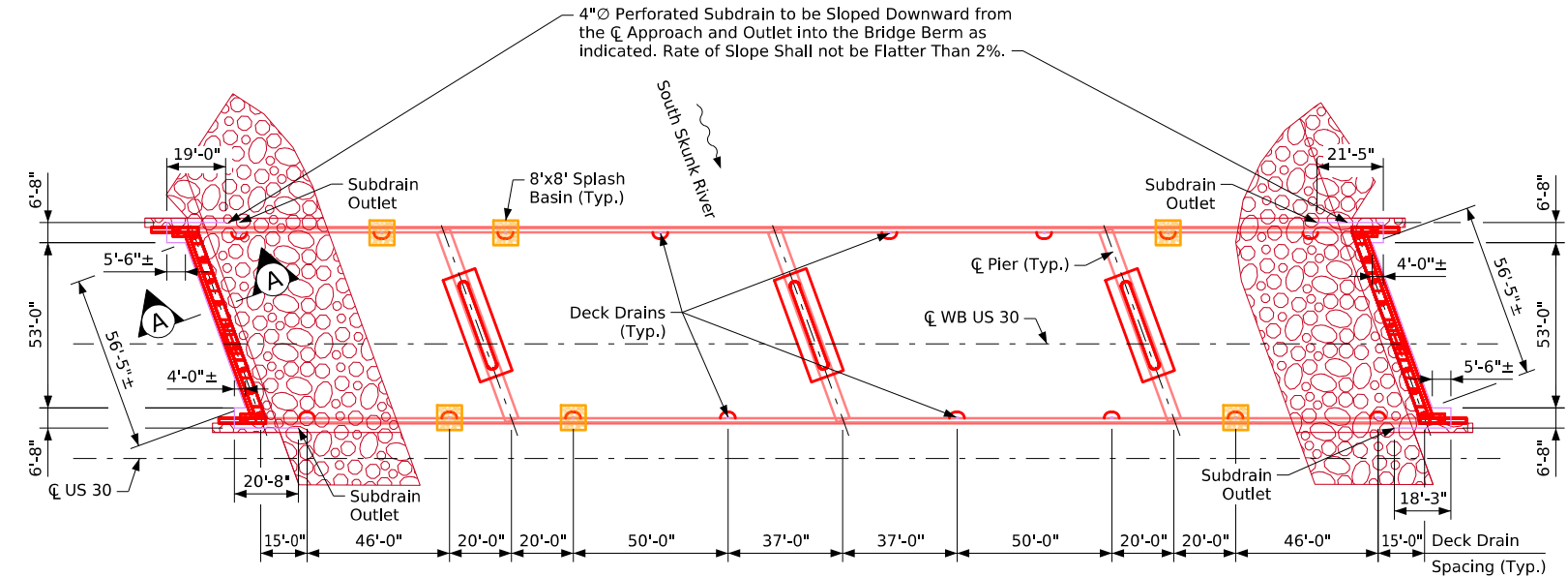
Design For 20° Skew (R.A.)
**376'-0" x 60'-0" Pretensioned
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81'-0" End Spans 2 - 107'-0" Interior Spans
Bridge Wing Armoring
STA. 1301+02.00 (WB US 30) Turn-in Date: August, 2026
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Splash Basin Under Bridge Drain
Typical Section for Berm Slopes

Splash Basin Notes:

The cost of furnishing and placing splash basins (including excavation, erosion stone, or Class E revetment, and engineering fabric) is to be included in the price bid for "Structural Concrete (Bridge)". No extra payment will be made. Total number of splash basins = 6.



Situation Plan

Showing Deck Drain and Subdrain Locations

Note: See Design Sheet No. 34 for Section A-A.

Subdrain Notes:

This plan sheet shows details for placing all subdrains and subdrain outlets required for this structure.

The subdrains shall be 4"Ø and shall be in accordance with Article 4143.01, B, of the Standard Specifications.

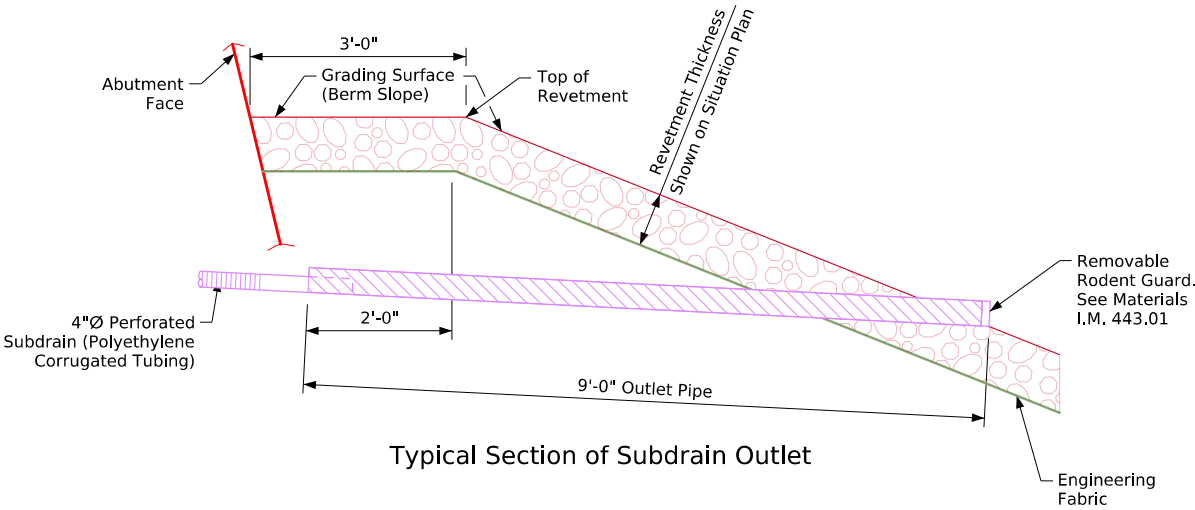
The subdrain outlet shall consist of a length of pipe with a removable rodent guard as detailed on this sheet. The length of the outlet pipe shall be determined by the revetment and it's placement location. The Contractor is to insure the outlet pipe is adequately strong enough and will not be damaged when revetment is placed. A check will be made at the subdrain outlet to insure that the subdrain is not damaged and is draining properly during the backfill flooding process. If a metal outlet pipe is used, it shall be 6"Ø and coupled to the 4"Ø subdrain in one of the two following ways.

-Use an inside fit reducer coupler (coupler must be inserted a minimum of 1'-0" into the metal outlet pipe).

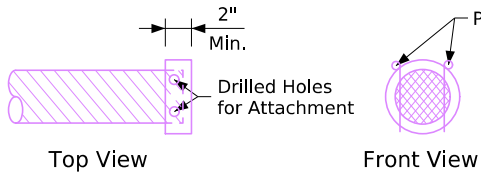
-Insert 1'-0" of the 4"Ø subdrain into the 6"Ø metal outlet pipe, then fully seal the entire opening with grout.

The cost of furnishing and placing subdrain (including excavation), granular backfill, porous backfill, and subdrain outlet is to be included in the price bid for "Structural Concrete (Bridge)". No extra payment will be made.

The dimensions shown for the proposed subdrains are based on the proposed grading layout of bridge berms. The dimensions shown are for estimating only. Required lengths and general locations of subdrains are subject to change due to field adjustments of the grading layout.



Typical Section of Subdrain Outlet



Top View Front View

Removable Rodent Guard Details

Revetment Stone (Embedded) Outlet Details

Subdrain Outlet Elevations

Location	North Wing	South Wing
West Abutment	881.24	881.46
East Abutment	881.72	882.04

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Subdrain Details

STA. 1301+02.00 (WB US 30)Turn-in Date: August, 2026

Story County

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Bridge

Approach Pavement

2'-2"

1'-6"

Abutment Wing

Top Slope of Geotextile Fabric

2'-2" (Typ.)

Top Slope of Geotextile Fabric

CL Abut. Brg.

CL Approach Roadway

Note: Shaded Area Shows Limits of Geotextile Fabric.

Toe of Slope & Limit of Bottom of Trench for Excavation

Back Face of Abutment

2'-2" (Typ.)

4"Ø subdrain

2'-2" (Typ.)

1'-6"

2'-2"

Abutment Wing

Top Slope of Geotextile Fabric

47'-0" Limits of Top Slope of Geotextile Fabric Along Abutment Fabric Along Abut.

53'-0" Limits of Bottom of Trench Along Wing Extension Footings

60'-0" Inside Face to Inside Face of Abutment Wings

Abutment Plan with Wing Extensions
(East Abutment Shown, West Abutment Similar)

The base of the excavation subgrade behind the abutment is to be graded with a 4% slope away from the abutment footing and a 2% cross slope in the direction of the subdrain outlet. This excavation shaping is to be done prior to beginning installation of the geotextile and backfill material.

After the subgrade has been shaped, the geotextile fabric shall be installed in accordance with the details shown. The fabric is intended to be installed in the base of the excavation and extended vertically up the abutment backwall, abutment wing walls, and excavation face to a height that will be approximately 1 to 2 ft higher than the height of the porous backfill placement as shown in the "Backfill Details" on this sheet. The strips of the fabric placed shall overlap approximately 1 ft and shall be pinned in place. The fabric shall be attached to the abutment by using lath folded in the fabric and secured to the concrete with shallow concrete nails. The fabric placed against the excavation face shall be pinned.

When the fabric is in place, the subdrain shall be installed directly on the fabric at the toe of the rear excavation slope. A slot will need to be cut in the fabric at the point where the subdrain exits the fabric near the end of the abutment wing wall.

Porous backfill is then placed and leveled, no compaction is required.

The remaining work involves backfilling with floodable backfill, surface flooding, and vibratory compaction. The floodable backfill material shall be in accordance with the Standard Specifications. The floodable backfill shall be placed in individual lifts, surface flooded, and compacted with vibratory compaction to ensure full consolidation. Limit the loose lifts to no more than 2 ft of thickness.

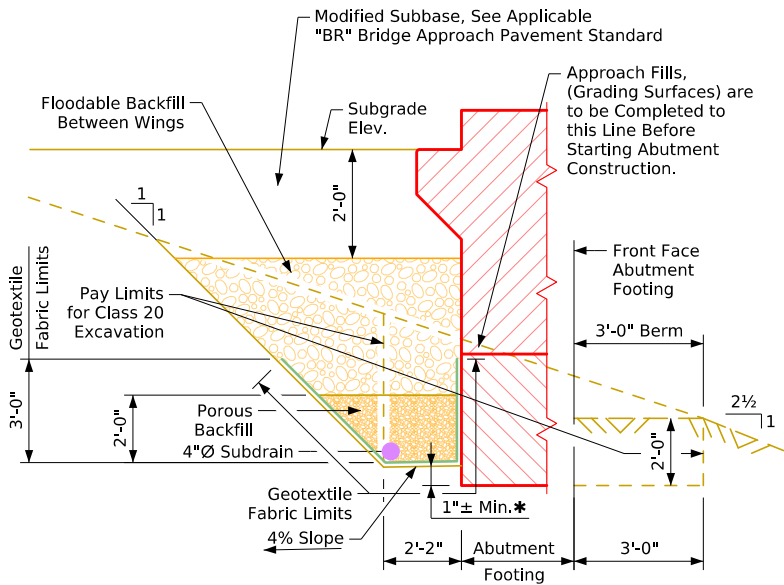
Start surface flooding for each floodable backfill lift at the high point of the subdrain and progress to the low point where the subdrain exits the fabric. To ensure uniform surface flooding, water running full in a 2"Ø hose should be sprayed in successive 6 ft to 8 ft increments for 5 minutes within each increment.

Floodable backfill lift placement, flooding, and compaction shall progress until the required full thickness of the abutment backfill has been completed.

Water required for flooding, subdrains, porous backfill, floodable backfill, and geotextile fabric furnished at the bridge abutments will not be measured separately for payment.

The cost of water required for flooding, subdrains, porous backfill, floodable backfill, and geotextile fabric furnished at the bridge abutments shall be included in the contract unit price bid for "Structural Concrete (Bridge)".

The geotextile 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 1 ft in length, shingle fashion with up slope lap piece on top and stapled for continuity.



Section A-A

Backfill Details

Note: Geotextile Fabric will be Attached to Face of Abutment Footing and Wings.

* Dimension Varies Due to 2% Subdrain Slope.

Note:
For Details not Shown on this Sheet which are
Pertinent to this Structure See Subdrain Details
Sheet on Design Sheet No. 33.

Design For 20° Skew (R.A.)

**376'-0" x 60'-0" Pretensioned
Prestressed Concrete Beam Bridge**

81'-0" End Spans2 - 107'-0" Interior Spans

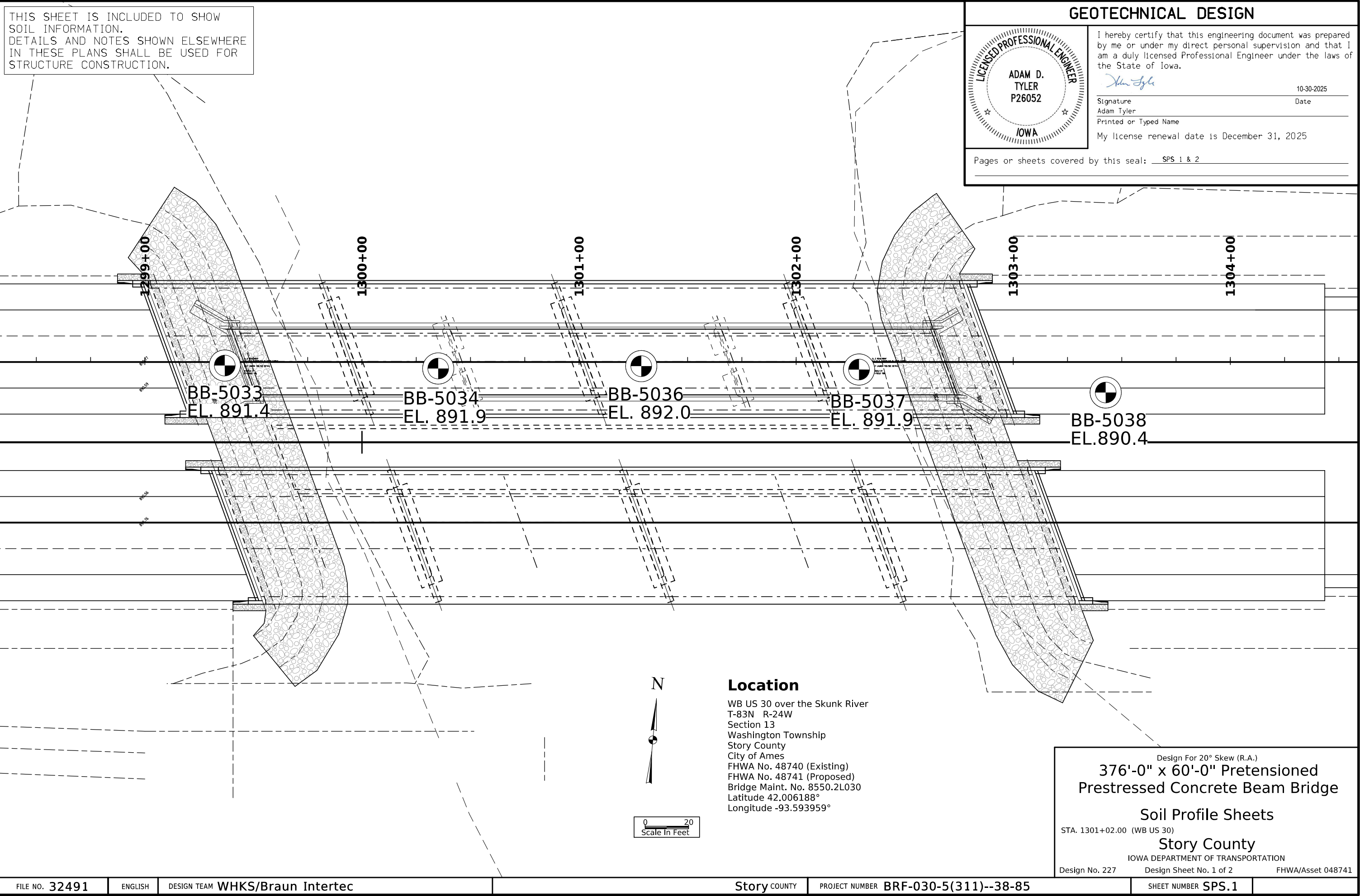
Abutment Backfill Details

STA. 1301+02.00 (WB US 30)Turn-in Date: August, 2026

Story County

IOWA DEPARTMENT OF TRANSPORTATION

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THIS SHEET IS INCLUDED TO SHOW
SOIL INFORMATION.
DETAILS AND NOTES SHOWN ELSEWHERE
IN THESE PLANS SHALL BE USED FOR
STRUCTURE CONSTRUCTION.

[illegible]

BB-5038	
LAYER	THICKNESS
A	1.0'
B	3.0'
C	2.0'
D	2.5'
E	9.5'
F	5.0'
G	27.0'
H	16.5'
I	1.5'
J	10.0'
K	20.6'

 SOIL REMEDIATION AREA
 LIMESTONE (LS.)
 BROKEN & WEATHERED LS.
 SANDSTONE
 SHALE
 SANDY SOIL

BB-5037
LT.34

8:56:51 AM 10/30/2025 Drivers pw:\\projectwise.dot.int.lan:PWMMain\\Documents\\Projects\\8503002019\\Soils\\SPS\\WB Bridge\\dsnOpenRoads2D.dgn