

BRIDGE REPLACEMENT - PPCB
BRF-169-1(43)--38-80
12-15-2020

RINGGOLD COUNTY - DESIGN NO. 121

LEGEND

INTERSTATE HIGHWAY	
PRIMARY HIGHWAY-DIVIDED	
PRIMARY HIGHWAY	
PORTLAND CEMENT CONCRETE ROAD	
ASPHALT ROAD	
BITUMINOUS ROAD	
GRAVEL ROAD	
EARTHEN ROAD	
INTERSTATE HIGHWAY	
UNITED STATES HIGHWAY	
STATE HIGHWAY	
COUNTY HIGHWAY	
RAILROAD	
PIPELINE	
AIRPORT	
HYDROLOGY	
BRIDGE	
STATE BOUNDARY	
COUNTY BOUNDARY	
CORPORATE BOUNDARY	
TOWNSHIP LINE	
SECTION LINE	
ROAD NAMES	
UNINCORPORATED PLACE	



PLANS OF PROPOSED IMPROVEMENTS ON THE

PRIMARY ROAD SYSTEM

RINGGOLD COUNTY

BRIDGE REPLACEMENT - PPCB

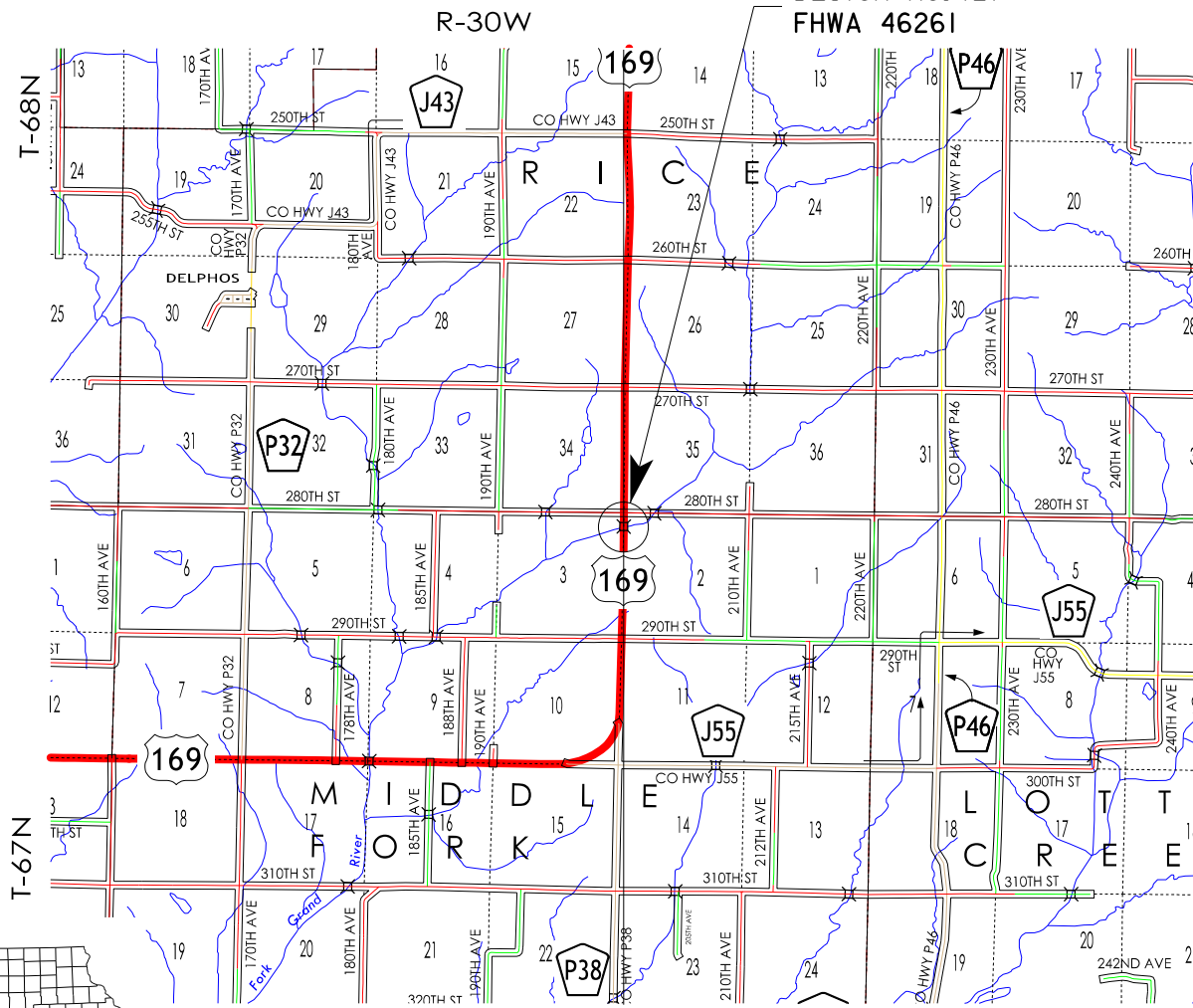
US 169 OVER THE MIDDLE

FORK GRAND RIVER

5.3 MI.S.OF IA 2

THE IOWA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR HIGHWAY AND BRIDGE CONSTRUCTION, SERIES 2015, PLUS APPLICABLE GENERAL SUPPLEMENTAL SPECIFICATIONS, DEVELOPMENTAL SPECIFICATIONS, SUPPLEMENTAL SPECIFICATIONS AND SPECIAL PROVISIONS SHALL APPLY TO CONSTRUCTION WORK ON THIS PROJECT.

DESIGN NO. 121
FHWA 46261



LOCATION MAP

PROJECT DIRECTORY NAME: 8016901015

REVISIONS



1-800-292-8989

www.iowaonecall.com



ALL WORKING DRAWINGS, INCLUDING SHOP DRAWINGS AND FALSEWORK DRAWINGS, SHALL BE SUBMITTED THROUGH THE PROJECT WEBSITE AND WILL BE REVIEWED BY:

HR GREEN, INC.
5525 MERLE HAY ROAD, SUITE 200
JOHNSTON, IA 50131

STANDARD ROAD PLANS

STANDARD ROAD PLANS ARE LISTED
ON SHEET NUMBER C.2

DESIGN DATA RURAL

2019	AADT	510	V.P.D.
2041	AADT	520	V.P.D.
20--	DHV	-	V.P.H.
TRUCKS		15	%
Total			
Design	ESALS	-	

INDEX OF SEALS

SHEET NO.	NAME	TYPE
1	STANLEY T. STALLSMITH	STRUCTURAL DESIGN
6	PATRICIA G. SCHWARZ	HYDRAULIC DESIGN
SPS.1	DAVID J. HEER	GEOTECHNICAL DESIGN
A.1	PAUL W. FLATTERY	ROADWAY DESIGN
CS.1	DAVID J. HEER	GEOTECHNICAL DESIGN
RC.1	SEANA GODBOLD	LANDSCAPE 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 Stanley T. Stallsmith Date 09-30-2020
Printed or Typed Name Stanley T. Stallsmith

My license renewal date is December 31, 2020

Pages or sheets covered by this seal: SHEETS 1 THRU 21 OF 68

DESIGN TEAM IOWA DOT / HR GREEN, INC.

ENGLISH

IOWA DOT * BRIDGES AND STRUCTURES BUREAU

FILE NO. 31650

RINGGOLD COUNTY

PROJECT NUMBER BRF-169-1(43)--38-80

SHEET NUMBER 1

ESTIMATED BRIDGE QUANTITIES					
ITEM NO.	ITEM CODE	ITEM	UNIT	TOTAL	AS BUILT QUANTITY
1	2104-2710020	EXCAVATION, CLASS 10, CHANNEL	C.Y.	1,671.3	
2	2401-6745625	REMOVAL OF EXISTING BRIDGE	L.S.	1.00	
3	2402-2720000	EXCAVATION, CLASS 20	C.Y.	126	
4	2403-0100010	STRUCTURAL CONCRETE (BRIDGE)	C.Y.	262.1	
5	2404-7775000	REINFORCING STEEL	LB.	246	
6	2404-7775005	REINFORCING STEEL, EPOXY COATED	LB.	58,080	
7	2404-7775009	REINFORCING STEEL, STAINLESS STEEL	LB.	2,643	
8	2407-0564135	BEAMS, PRETENSIONED PRESTRESSED CONCRETE, BTDI35	EACH	5	
9	2408-7800000	STRUCTURAL STEEL	LB.	3,470	
10	2414-6424110	CONCRETE BARRIER RAILING	L.F.	324.0	
11	2501-0201274	PILE, STEEL, HP 12x74	L.F.	1,740	
12	2501-6335010	PREBORED HOLES	L.F.	240	
13	2507-2638650	BRIDGE WING ARMORING - EROSION STONE	S.Y.	24.6	
14	2507-3250005	ENGINEERING FABRIC	S.Y.	2,608.2	
15	2507-6800061	REVETMENT, CLASS E	TON	2,618.4	
16	2507-8029000	EROSION STONE	TON	55.3	
17	2526-8285000	CONSTRUCTION SURVEY	L.S.	1.00	
18	2533-4980005	MOBILIZATION	L.S.	1.00	

ITEM NO.	ESTIMATE REFERENCE INFORMATION
4	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.
8	INCLUDES ABUTMENT BEARING MATERIAL AND COIL TIES. INCLUDES CONTRACTOR FILLING OUT BEAM NUMBERS BY LOCATION AND BEAM SEAT ELEVATIONS IN "PPC BEAM DATA SPREADSHEET" AND FORWARDING ELECTRONIC SPREADSHEET TO THE ENGINEER.
9	INCLUDES 6 DRAINS AT 120 LB. EACH.
10	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.
11	INCLUDES FURNISHING AND INSTALLING STEEL PILE POINTS.
13	INCLUDES FURNISHING AND PLACING ENGINEERING FABRIC, EROSION STONE, AND ALL REQUIRED EXCAVATING, SHAPING AND COMPACTING FOR WING ARMORING.
14	ENGINEERING FABRIC SHALL BE MATERIAL AS SPECIFIED FOR EMBANKMENT EROSION CONTROL IN ACCORDANCE WITH ARTICLE 4196.01,B,3, OF THE STANDARD SPECIFICATIONS.
15, 16	ESTIMATED AT 1.6 TON/CU. YD.

ROADWAY QUANTITIES SHOWN ELSEWHERE IN THESE PLANS.

INDEX OF SHEETS	
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DESIGN FOR 0° SKEW

135'-0 x 40'-0 PRETENSIONED
PRESTRESSED CONCRETE BEAM BRIDGE

135'-0 SINGLE SPAN (BTD BEAM TYPE)

ESTIMATED QUANTITIES

STATION 523+53.00 (US 169)OCTOBER, 2020

RINGGOLD COUNTY

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION

DESIGN SHEET NO. 1 OF 20 FILE NO. 31650 DESIGN NO. 121

SUMMARY OF CONCRETE QUANTITIES

LOCATION	STRUCTURAL CONCRETE (BRIDGE)
SOUTH ABUTMENT FOOTING	21.6
NORTH ABUTMENT FOOTING	21.6
ABUTMENT WINGS	9.2
BRIDGE DECK & ABUTMENT DIAPHRAGMS	209.7
TOTAL (CU. YDS.)	262.1

SUMMARY OF REINFORCING QUANTITIES

LOCATION	NON-COATED REINFORCING STEEL	STAINLESS REINFORCING STEEL	EPOXY COATED REINFORCING STEEL
BRIDGE DECK & ABUTMENT FOOTINGS **	246	-	51,282
BARRIER RAIL	-	1,875	4,718
BARRIER RAIL END SECTION	-	768	1,064
ABUTMENT WINGS	-	-	1,016
** INCLUDES ABUTMENT DIAPHRAGMS			
TOTAL (LBS.)	246	2,643	58,080

SUMMARY OF EXCAVATION

LOCATION	CLASS 20 EXCAVATION
SOUTH ABUTMENT	63
NORTH ABUTMENT	63
TOTAL (CU. YDS.)	126

SUMMARY OF BEARINGS

[illegible]

SUMMARY OF FOUNDATIONS

LOCATION	SUBSTRUCTURE TYPE	FOUNDATION TYPE	NUMBER	LENGTH (LIN. FT.)	TOTAL (LIN. FT.)
SOUTH ABUTMENT	INTEGRAL ABUT.	HPI2x74	12	75	900
NORTH ABUTMENT	INTEGRAL ABUT.	HPI2x74	12	70	840
TOTAL HPI2x74 (LIN. FT.)					1,740

SUMMARY OF STRUCTURAL STEEL

LOCATION	TOTAL (LBS.)
INTERMEDIATE DIAPHRAGMS	2,750
DECK DRAINS	720
TOTAL (LBS.)	3,470

SUMMARY OF BARRIER RAIL

LOCATION	CONCRETE BARRIER RAILING
WEST RAIL	162.0
EAST RAIL	162.0
TOTAL (LIN. FT.)	324.0



DESIGN FOR 0° SKEW

135'-0 x 40'-0 PRETENSIONED
PRESTRESSED CONCRETE BEAM BRIDGE

135'-0 SINGLE SPAN (BTD BEAM TYPE)

SUMMARY OF ITEMIZED QUANTITIES

STATION 523+53.00 (US 169) OCTOBER, 2020

RINGGOLD COUNTY

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION

DESIGN SHEET NO. 2 OF 20 FILE NO. 31650 DESIGN NO. 121

GENERAL NOTES:

IT IS THE INTENT OF THIS DESIGN TO CONSTRUCT A 135'-0 x 40'-0 PRETENSIONED PRESTRESSED CONCRETE BEAM REPLACEMENT BRIDGE, SKEWED 0°, ON US 169 OVER THE MIDDLE FORK GRAND RIVER.

THIS DESIGN IS FOR THE REPLACEMENT OF THE EXISTING 60'-4 x 30' STEEL I-BEAM BRIDGE, DESIGN NO. 685I, WITH A YEAR OF CONSTRUCTION OF 1952. ELECTRONIC PLANS OF THE EXISTING STRUCTURE 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 STEEL I-BEAM BRIDGE AND THE ARTICULATING BLOCK MAT INSTALLED UNDER DESIGN NO. 312.

REMOVALS SHALL BE IN ACCORDANCE WITH SECTION 240I, OF THE STANDARD SPECIFICATIONS.

FAINT LINES ON PLANS INDICATE THE EXISTING STRUCTURE.

THE 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.

THIS BRIDGE IS DESIGNED FOR HL-93 LOADING, PLUS 20 LBS. PER SQUARE FOOT OF ROADWAY FOR FUTURE WEARING SURFACE.

ALL REINFORCING BARS AND BARS NOTED AS DOWELS SUPPLIED FOR THIS STRUCTURE SHALL BE DEFORMED REINFORCEMENT UNLESS OTHERWISE NOTED OR SHOWN.

THESE BRIDGE PLANS LABEL ALL REINFORCING STEEL WITH ENGLISH NOTATION (5dI IS 5/8 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 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 4. PILES SHALL BE DRIVEN THROUGH THE HOLES TO AT LEAST THE SPECIFIED DESIGN BEARING.

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.

GUARDRAIL IS INCLUDED ELSEWHERE IN THESE PLANS.

ROADWAY EXCAVATION IS INCLUDED ELSEWHERE IN THESE PLANS. EXCAVATION QUANTITIES ARE BASED ON THE ASSUMPTION THAT ABUTMENT FILLS ARE IN PLACE PRIOR TO STARTING CONSTRUCTION.

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.

THE APPROACH FILLS AND GRADING OF THE CHANNEL TO THE GRADING SURFACE ARE SHOWN ELSEWHERE IN THESE PLANS, BUT ARE TO BE IN PLACE BEFORE ABUTMENT PILES ARE DRIVEN. THE BRIDGE CONTRACTOR IS TO LEVEL OFF AND SHAPE THE BERMS TO THE ELEVATIONS AND DIMENSIONS SHOWN. DRESSING OF SLOPES OUTSIDE THE BRIDGE AREA NOT DISTURBED BY THE BRIDGE CONTRACTOR SHALL BE PAID FOR AS EXTRA WORK.

CONCRETE BARRIER RAILS PLACED USING 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).

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.



CAST IN-ONE-PIECE STEEL PILE POINTS ARE REQUIRED FOR THE NORTH AND SOUTH ABUTMENT PILES IN ACCORDANCE WITH ARTICLE 4167.02 OF THE CURRENT STANDARD SPECIFICATIONS AND MATERIALS IM 468.

THE BRIDGE CONTRACTOR IS TO CLEAR AND/OR SHAPE THE CHANNEL WITHIN THE APPROXIMATE LIMITS OF THE AREAS AS SHOWN ON THE "SITUATION PLAN" AND "LONGITUDINAL SECTION ALONG CENTERLINE ROADWAY" ON DESIGN SHEET 4.

CLASS 20 EXCAVATION QUANTITIES ARE BASED ON THE ASSUMPTION THAT THE CHANNEL EXCAVATION IS COMPLETED TO THE GRADING SURFACE AS PART OF THE ROADWAY EXCAVATION SHOWN ELSEWHERE IN THESE PLANS PRIOR TO STARTING CONSTRUCTION OF THE ABUTMENTS.

SCRAPE SAMPLES WERE TAKEN FROM THE ABUTMENT BEARING, BEAM, AND RAILING OF THIS BRIDGE TO GET AN INDICATION OF THE EXISTENCE OF AND LEVEL OF TOTAL LEAD AND TOTAL CHROMIUM. ANALYSIS OF TOTAL LEAD ON THESE SAMPLES WERE 130 (ABUTMENT BEARING), 110 (BEAM) AND 230 (RAILING) PARTS PER MILLION (PPM). ANALYSIS OF TOTAL CHROMIUM ON THESE SAMPLES WERE 270 (ABUTMENT BEARING), 130 (BEAM) AND 39 (RAILING) PPM. THESE ANALYSES SHOWN 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.

AT THE CONTRACTORS OPTION TRANSPARENT STAY-IN-PLACE DECK FORMS MAY BE USED FOR THIS PROJECT. THE STAY-IN-PLACE FORMS SHALL HAVE A MINIMUM AVERAGE TRANSPARENCY OF 70%. ALL STRUCTURAL STEEL MEMBERS USED IN THE FORM ASSEMBLY (INCLUDING COLD-FORMED AND ROLLED) SHALL BE CORROSION PROTECTED. THE FORM ASSEMBLY SHALL HAVE A MAXIMUM UNIT WEIGHT OF 3.5 PSF OVER THE FULL FORM PANEL AREA. SHOP DRAWINGS AND CALCULATIONS SHALL BE SUBMITTED FOR THE ENGINEER'S REVIEW. THE TRANSPARENT STAY-IN-PLACE FORM MATERIAL AND INSTALLATION COST SHALL BE INCLUDED IN THE PAY ITEM FOR STRUCTURAL CONCRETE (BRIDGE), WITH NO ADDITIONAL COST TO THE STATE.

SPECIFICATIONS:

DESIGN: AASHTO LRFD 8th Ed, SERIES OF 2017, EXCEPT AS NOTED IN THE CURRENT IOWA BRIDGE DESIGN MANUAL.

CONSTRUCTION: IOWA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR HIGHWAY AND BRIDGE CONSTRUCTION, SERIES 2015, PLUS APPLICABLE GENERAL SUPPLEMENTAL SPECIFICATIONS, DEVELOPMENTAL SPECIFICATIONS, SUPPLEMENTAL SPECIFICATIONS AND SPECIAL PROVISIONS SHALL APPLY TO CONSTRUCTION WORK ON THIS PROJECT.

DESIGN STRESSES:

DESIGN STRESSES FOR THE FOLLOWING MATERIALS ARE IN ACCORDANCE WITH THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 8th Ed, SERIES OF 2017, EXCEPT AS NOTED IN THE CURRENT IOWA BRIDGE DESIGN MANUAL.

REINFORCING STEEL IN ACCORDANCE WITH AASHTO LRFD SECTION 5, GRADE 60, FOR EPOXY COATED AND NON-COATED, AND GRADE 60 OR 75 FOR STAINLESS.

CONCRETE IN ACCORDANCE WITH AASHTO LRFD SECTION 5, f'c = 4.0 KSI, EXCEPT PRESTRESSED BEAM CONCRETE AS NOTED.

PRESTRESSED CONCRETE BEAMS, SEE DESIGN SHEET 14.

BRIDGE DECK CONCRETE f'c = 4.0 KSI

STRUCTURAL STEEL IN ACCORDANCE WITH AASHTO LRFD SECTION 6. ASTM A709 GRADE 36, GRADE 50 AND GRADE 50W (AASHTO M270 GRADE 36, GRADE 50 AND GRADE 50W).

DESIGN HISTORY AT THIS SITE	
DES. NO.	TYPE OF WORK
4929	ORIGINAL DESIGN
685I	RECONSTRUCTION
187	DECK REPAIR
399	RETROFIT BARRIER RAIL
312	SCOUR COUNTERMEASURE

NOTE:
POLLUTION PREVENTION PLAN IS SHOWN ELSEWHERE IN THESE PLANS

TRAFFIC CONTROL PLAN
NOTE: THE ROADWAY WILL BE CLOSED TO THRU TRAFFIC FOR THE DURATION OF THE PROJECT. REFER TO THE TRAFFIC CONTROL PLANS SHOWN ELSEWHERE IN THESE PLANS.

BRIDGE DECK DIMENSIONS TABLE

NO.	ITEM	UNIT	QUANTITY
1	DECK LENGTH	L.F.	138.0
2	MINIMUM DECK WIDTH	L.F.	43.2
3	MAXIMUM DECK WIDTH	L.F.	43.2
4	DECK AREA	S.F.	5962

- 1. DECK LENGTH IS MEASURED FROM FACE-TO-FACE OF PAVING NOTCHES ALONG THE CENTERLINE OF ROADWAY.
- 2, 3. DECK WIDTHS ARE MEASURED FROM OUT-TO-OUT OF DECK PERPENDICULAR TO THE CENTERLINE OF ROADWAY.
- 4. DECK AREA IS TO BE BASED ON THE FACE-TO-FACE PAVING NOTCH DISTANCE AND OUT-TO-OUT DECK DIMENSIONS.

DESIGN FOR 0° SKEW

135'-0 x 40'-0 PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGE

135'-0 SINGLE SPAN (BTD BEAM TYPE)

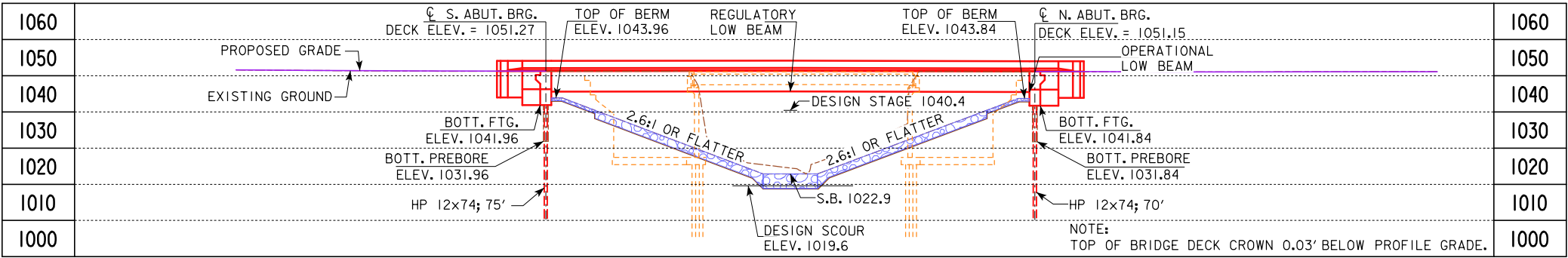
GENERAL NOTES

STATION 523+53.00 (US 169) OCTOBER, 2020

RINGGOLD COUNTY

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION

DESIGN SHEET NO. 3 OF 20 FILE NO. 31650 DESIGN NO. 121



LONGITUDINAL SECTION ALONG CL APPROACH ROADWAY

GI = +0.200% G2 = -0.400%

VPI STA = 523+55.00 VC = 150.00'
VPI ELEV = 1051.44

PROPOSED PROFILE
GRADE US 169

HYDRAULIC DATA

DRAINAGE AREA = 16.2 SQ. MI.
STREAM SLOPE = 8.3 FT./MI.
AVG. LOW WATER STAGE = 1024.0

Q₅₀ = 4870 CFS
STAGE = 1040.4
REGULATORY LOW BEAM = 1045.70
BACKWATER = 0.7 FT.
AVG. BRIDGE VELOCITY = 4.2 FPS

Q₁₀₀ = 5830 CFS
STAGE = 1041.0
OPERATIONAL LOW BEAM = 1045.59
BACKWATER = 0.9 FT.

Q₂₀₀ = 6780 CFS
STAGE = 1041.5
CALCULATED DESIGN SCOUR = 1019.2

Q₅₀₀ = 8000 CFS
STAGE = 1042.0
CALCULATED CHECK SCOUR = 1019.2

ROADWAY OVERTOP 1051.05
STA. 524+69.07

UTILITIES LEGEND:

FOI - FIBER OPTIC
WLI - WATER LINE
● - POWER POLE
SEE ROAD SHEETS FOR INFORMATION
ON FINAL UTILITIES.

TRAFFIC ESTIMATE

2019 AADT	510	V.P.D.
2041 AADT	520	V.P.D.
20__ DHV	-	V.P.H.
TRUCKS	15	%
TOTAL		
DESIGN ESALs	-	

LOCATION

US 169 OVER MIDDLE FORK GRAND RIVER
T-67N R-30W
SECTION 2 AND 3
MIDDLE FORK TOWNSHIP
RINGGOLD COUNTY
FHWA NO. 46261
BRIDGE MAINT. NO. 8009.8S169
LATITUDE 40.637453°
LONGITUDE -94.280981°

BRIDGE COORDINATES

LOCATION	CL S. ABUT. BRG.	CL N. ABUT. BRG.
WEST EDGE OF DECK	E=22352602.878 N=6098648.442	E=22352604.058 N=6098783.437
CL APPROACH ROADWAY	E=22352624.460 N=6098648.254	E=22352625.640 N=6098783.249
EAST EDGE OF DECK	E=22352646.043 N=6098648.065	E=22352647.223 N=6098783.060

NOTE: AN ELECTRONIC FILE CONTAINING THE BRIDGE COORDINATE DATA IS AVAILABLE AS 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 0° SKEW

135'-0 x 40'-0 PRETENSIONED
PRESTRESSED CONCRETE BEAM BRIDGE
135'-0 SINGLE SPAN (BTD BEAM TYPE)

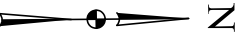
SITUATION PLAN

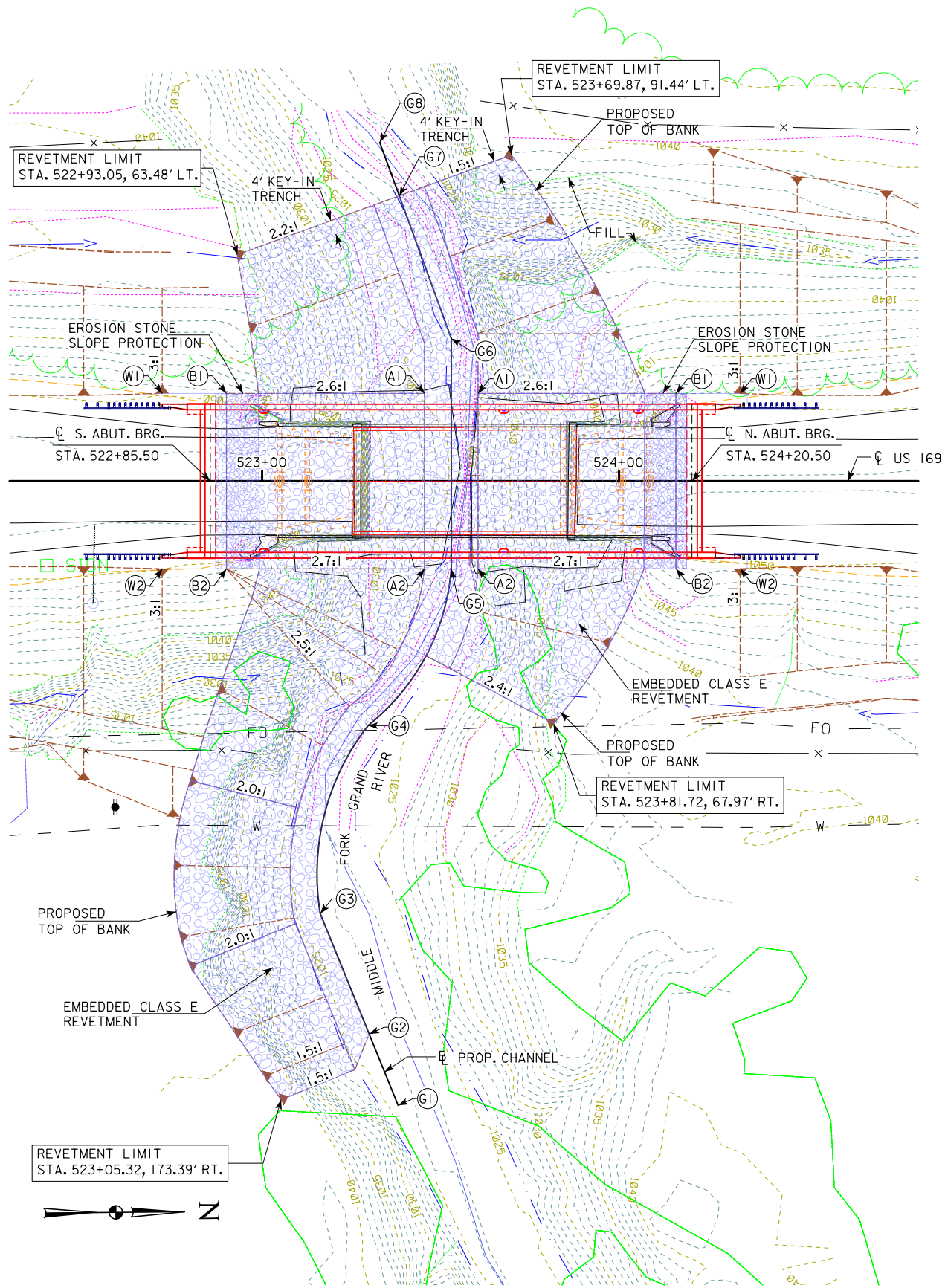
STATION 523+53.00 (US 169) OCTOBER, 2020
RINGGOLD COUNTY
IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
DESIGN SHEET NO. 4 OF 20 FILE NO. 31650 DESIGN NO. 121

NOTES:
1. REMOVE EXISTING 60'-4 X 30' I-BEAM BRIDGE (DESIGN NO. 6851) AND ARTICULATING BLOCK MAT INSTALLED UNDER DESIGN 312.

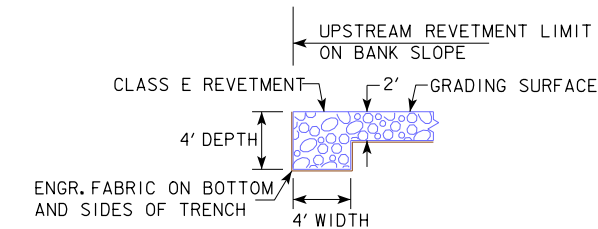


SITUATION PLAN

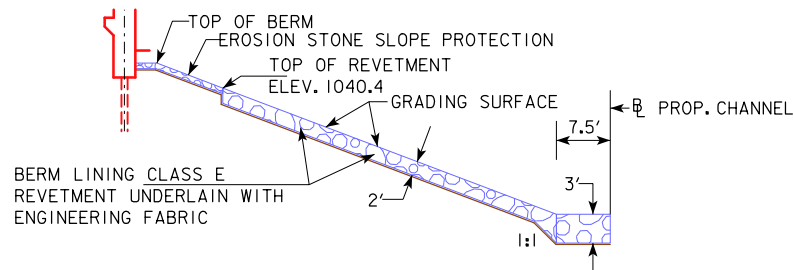




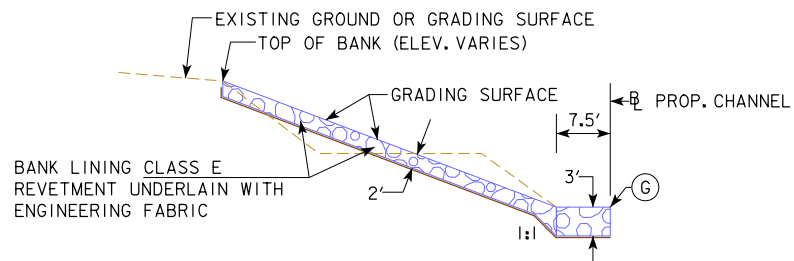
SITE PLAN



SECTION THRU KEY-IN IN TRENCH



SECTION THRU EMBEDDED REVETMENT BERM



SECTION THRU EMBEDDED REVETMENT BANK

BENCH MARK NO.80-001 6099188.13 22352605.60 1049.93 FENO 80-001, SET FENO MONUMENT 6 INCHES DEEP IN THE WEST SHOULDER OF HWY 169, 100 FEET SOUTH OF THE INTERSECTION OF HWY 169 & 280 ST., 86.5 FEET SOUTH EAST OF THE TOP CENTER EDGE OF THE OUTLET HDWL OF A 6.0 X 4.0 RCB, 79 FEET EAST OF A CONC MONUMENT, 45 FEET SOUTH OF A DELINIATOR POST, 12 FEET EAST OF A PK NAIL IN THE WEST EDGE OF A/C SLAB, 36 FEET WEST OF A PK NAIL IN THE EAST EDGE OF A/C SLAB.

ESTIMATED BERM ARMORING QUANTITIES				
LOCATION	REVTMENT CL. E (TON)	EROSION STONE (TON)	ENGINEERING FABRIC (SY)	EXCAVATION (CY)
BERM LINING - SOUTH ABUTMENT & BANK	1614.2	28.0	1582.5	1026.6
BERM LINING - NORTH ABUTMENT & BANK	1004.2	27.3	1025.7	644.7
TOTALS	2618.4	55.3	2608.2	1671.3

EXCAVATION QUANTITY CALCULATED FROM GRADING SURFACE.

BERM SLOPE LOCATION TABLE						
POINTS	SOUTH ABUTMENT			NORTH ABUTMENT		
	STATION	OFFSET	ELEV.	STATION	OFFSET	ELEV.
A1	523+45.50	24.58' LT	1022.60	523+60.50	24.58' LT	1022.60
A2	523+45.50	24.58' RT	1023.19	523+60.50	24.58' RT	1023.19
B1	522+90.00	24.58' LT	1043.96	524+16.00	24.58' LT	1043.84
B2	522+90.00	24.58' RT	1043.96	524+16.00	24.58' RT	1043.84
W1	522+72.00	24.58' LT	1050.72	524+34.00	24.58' LT	1050.57
W2	522+72.00	24.58' RT	1050.72	524+34.00	24.58' RT	1050.57

BERM SLOPE ELEVATIONS REFLECT THE GRADING SURFACE

GRADING CONTROL POINTS ALONG PROPOSED CHANNEL:
G1 = 523+38.15, 175' RT, ELEV. MATCH EXISTING
G2 = 523+30.03, 155.00' RT, ELEV. 1024.00
G3 = 523+16.32, 121.25' RT, ELEV. 1023.90
G4 = 523+29.68, 68.56' RT, ELEV. 1023.25
G5 = 523+53.00, 24.58' RT, ELEV. 1023.19
G6 = 523+53.00, 40.00' LT, ELEV. 1022.05
G7 = 523+38.44, 80.00' LT, ELEV. 1021.59
G8 = 523+32.98, 95.00' LT, ELEV. MATCH EXISTING

HYDRAULIC DESIGN

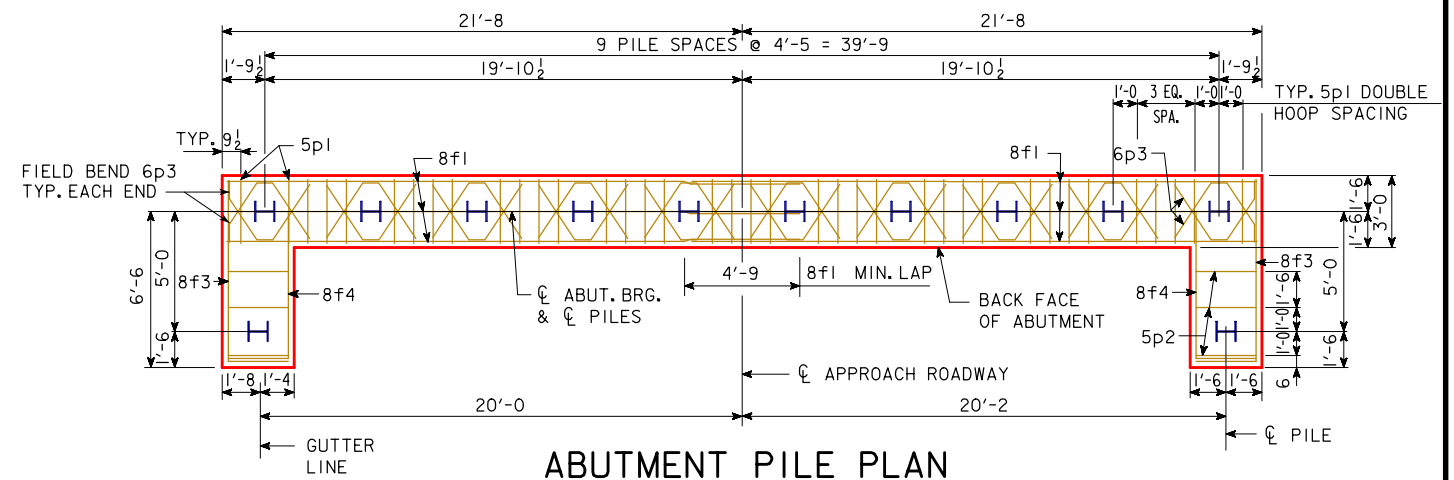
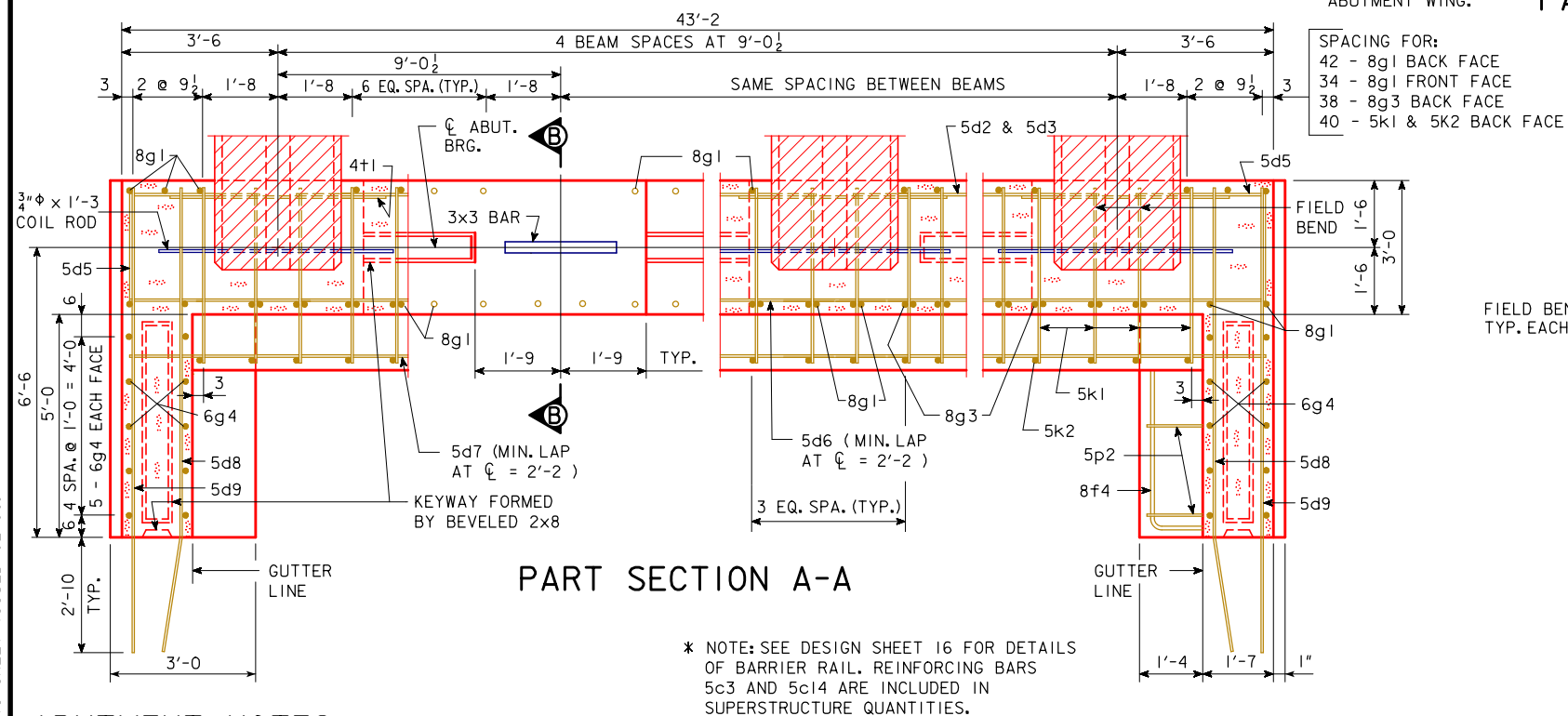
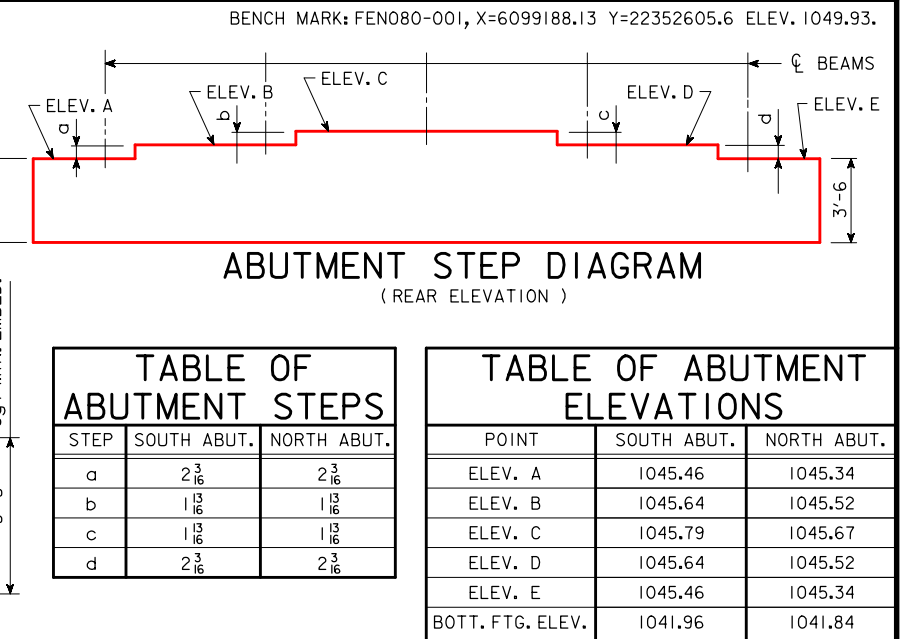
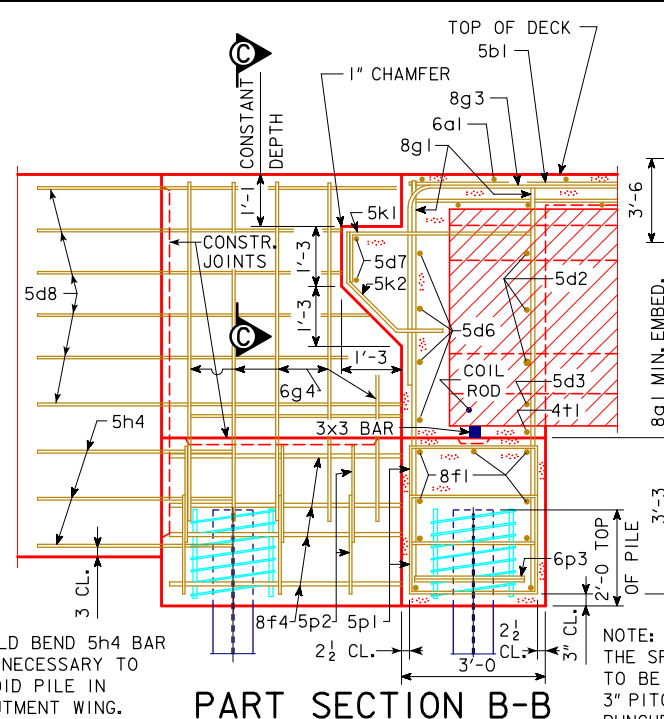
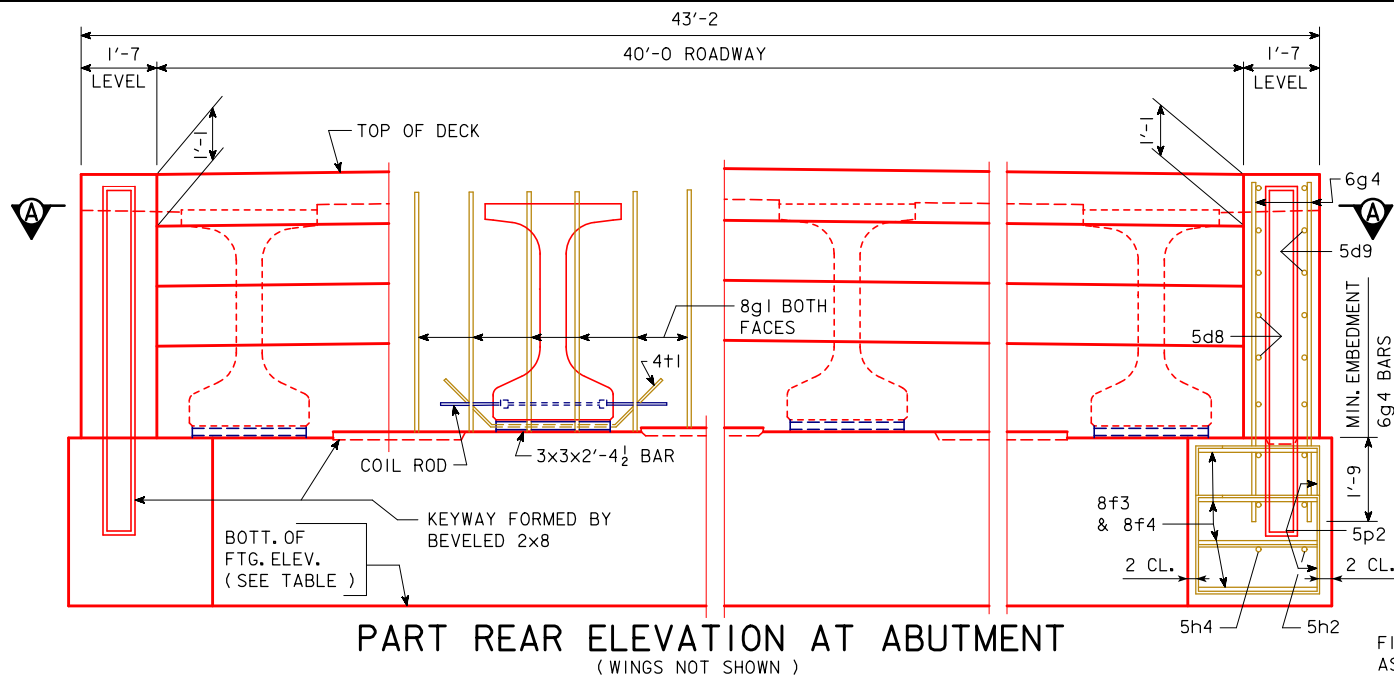
I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly licensed Professional Engineer under the laws of the State of Iowa.

Patricia G. Schwarz 1-11-19
Signature Date
Patricia G. Schwarz
Printed or Typed Name
My license renewal date is December 31, 2020

Pages or sheets covered by this seal: SHEETS 5 THRU 6 OF 68

DESIGN FOR 0° SKEW
135'-0 x 40'-0 PRETENSIONED
PRESTRESSED CONCRETE BEAM BRIDGE
135'-0 SINGLE SPAN (BTD BEAM TYPE)
SITUATION PLAN-SITE
STATION 523+53.00 (US 169) OCTOBER, 2020
RINGGOLD COUNTY
IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
DESIGN SHEET NO. 5 OF 20 FILE NO. 31650 DESIGN NO. 121

CORRECTION 04-14 - ADDED CONCRETE QUANTITY TABLE & REFERRAL NOTE
ENGLISHBTINTEGRALBRIDGES.DGN - 2085-BTCD - THIS SHEET ISSUED 02-08.



ABUTMENT NOTES:

MINIMUM CLEAR DISTANCE FROM FACE OF CONCRETE TO NEAR REINFORCING BAR IS TO BE 2" UNLESS OTHERWISE NOTED OR SHOWN.

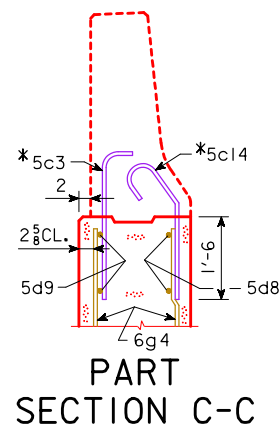
IF NECESSARY TO PREVENT DAMAGE TO THE END OF THE BRIDGE DECK OR BACKWALL FROM CONSTRUCTION EQUIPMENT, AN APPROPRIATE METHOD OF PROTECTION APPROVED BY THE ENGINEER SHALL BE PROVIDED BY THE BRIDGE CONTRACTOR AT NO EXTRA COST TO THE STATE.

STEEL PILE POINTS ARE REQUIRED FOR THE STEEL H-PILES AT THE ABUTMENTS.

THE CONTRACT LENGTH OF 75 FEET FOR THE SOUTH ABUTMENT AND 70 FEET FOR THE NORTH ABUTMENT PILES IS BASED ON A COHESIVE SOIL CLASSIFICATION, A TOTAL FACTORED AXIAL LOAD PER PILE (PU) OF 226 KIPS FOR SOUTH ABUTMENT AND 202 KIPS FOR NORTH ABUTMENT, AND A GEOTECHNICAL RESISTANCE FACTOR (PHI) OF 0.65 FOR SOIL AND 0.7 FOR ROCK END BEARING. TO ACCOUNT FOR SOIL CONSOLIDATION UNDER THE NEW FILL, THE FACTORED AXIAL LOAD INCLUDES A FACTORED DOWDRAG OF 50 KIPS FOR SOUTH ABUTMENT AND 26 KIPS FOR NORTH ABUTMENT.

THE NOMINAL AXIAL BEARING RESISTANCE FOR CONSTRUCTION CONTROL WAS DETERMINED FROM A COHESIVE SOIL CLASSIFICATION AND A GEOTECHNICAL RESISTANCE FACTOR (PHI) OF 0.65 FOR SOIL AND 0.7 FOR ROCK END BEARING. PILES ARE ASSUMED TO BE DRIVEN FROM A START ELEVATION AT THE BOTTOM OF PREBORE.

THE REQUIRED NOMINAL AXIAL BEARING RESISTANCE FOR SOUTH ABUTMENT PILES IS 191 TONS AND FOR NORTH ABUTMENT PILES IS 161 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.



ABUTMENT CONCRETE QUANTITY	
LOCATION	QUANTITY
SOUTH ABUTMENT FOOTING	21.6
NORTH ABUTMENT FOOTING	21.6
TOTAL (CU. YDS.)	43.2

NOTE: CONCRETE QUANTITIES ARE INCLUDED ON THE SUMMARY QUANTITIES SHEET.

NOTE: 12 - HP 12x74 STEEL BEARING PILING REQUIRED AT EACH ABUTMENT.

NOTE: BARRIER RAIL NOT SHOWN IN DETAILS.

DESIGN FOR 0° SKEW

135'-0 x 40'-0 PRETENSIONED
PRESTRESSED CONCRETE BEAM BRIDGE

135'-0 SINGLE SPAN (BTD BEAM TYPE)

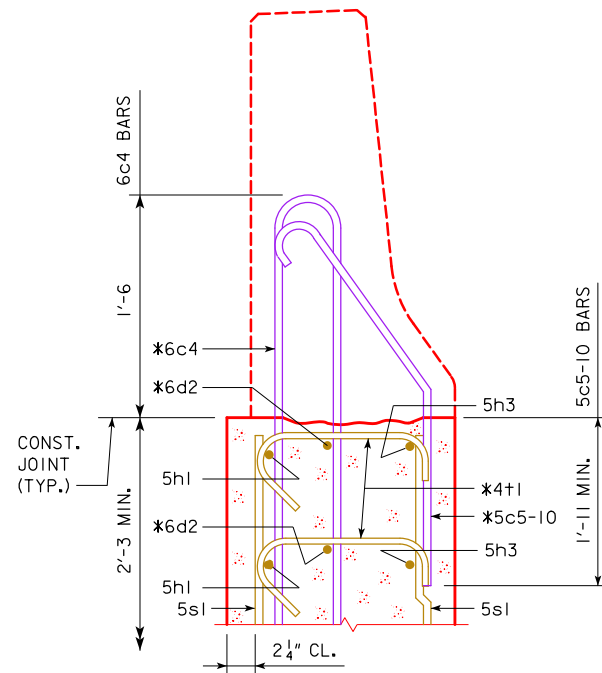
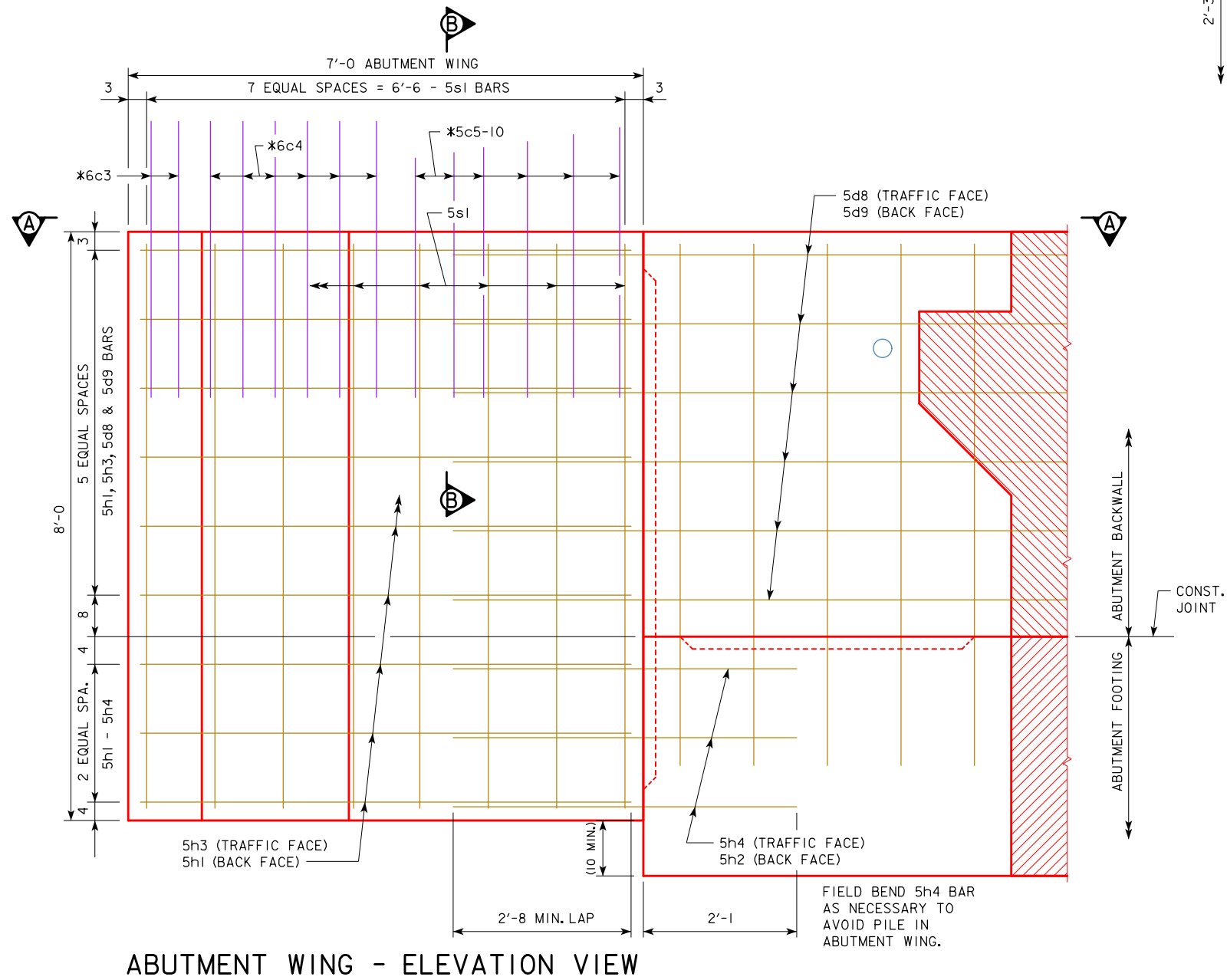
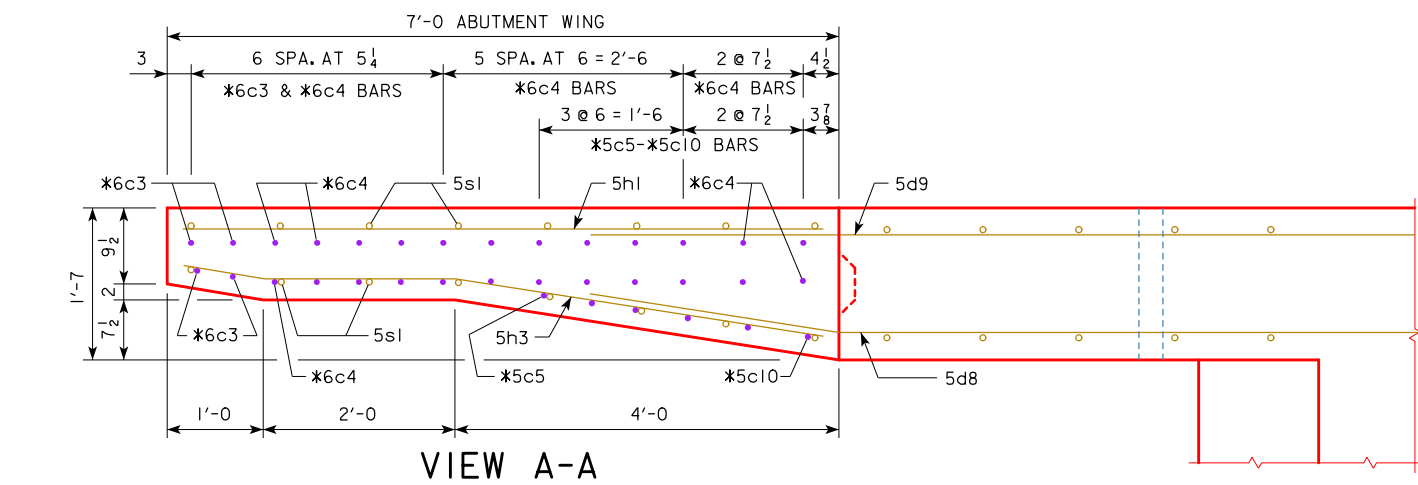
ABUTMENT FOOTING DETAILS

STATION 523+53.00 (US 169) OCTOBER, 2020

RINGGOLD COUNTY

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION

DESIGN SHEET NO. 6 OF 20 FILE NO. 31650 DESIGN NO. 121






SECTION B-B

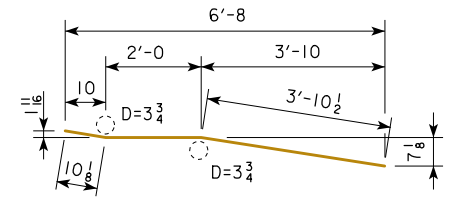
* BARRIER RAIL END SECTION
BARS TO BE PLACED WITH
ABUTMENT WING.

SEE BARRIER RAIL END SECTION
SHEET IN THESE PLANS FOR
DETAILS OF REINFORCING BARS
6c3, 6c4, 5c5-10, 6d2 & 4t1.

REINFORCING BAR LIST - ONE ABUT. WING

BAR	LOCATION	SHAPE	NO.	LENGTH	WEIGHT
5h1	HORIZONTAL BACK FACE		9	6'-8	63
5h3	HORIZONTAL TRAFFIC FACE		9	6'-9	63
5s1	VERTICAL BOTH FACES		16	7'-8	128

REINFORCING STEEL EPOXY COATED - TOTAL (LBS.)	254
---	-----



5h3

NOTE: ALL DIMENSIONS ARE OUT TO OUT. D = PIN DIAMETER.

BENT BAR DETAILS

CONCRETE PLACEMENT SUMMARY

CONCRETE	TOTAL
ONE ABUTMENT WING	2.3
TOTAL (CU. YDS.)	2.3

NOTE:

CONCRETE AND REINFORCING STEEL QUANTITIES ARE INCLUDED ON THE SUMMARY QUANTITIES SHEET.

DESIGN FOR 0° SKEW

135'-0 x 40'-0 PRETENSIONED
PRESTRESSED CONCRETE BEAM BRIDGE
135'-0 SINGLE SPAN (BTD BEAM TYPE)

135'-0 SINGLE SPAN (BTD BEAM TYPE)
ABUTMENT WING DETAILS

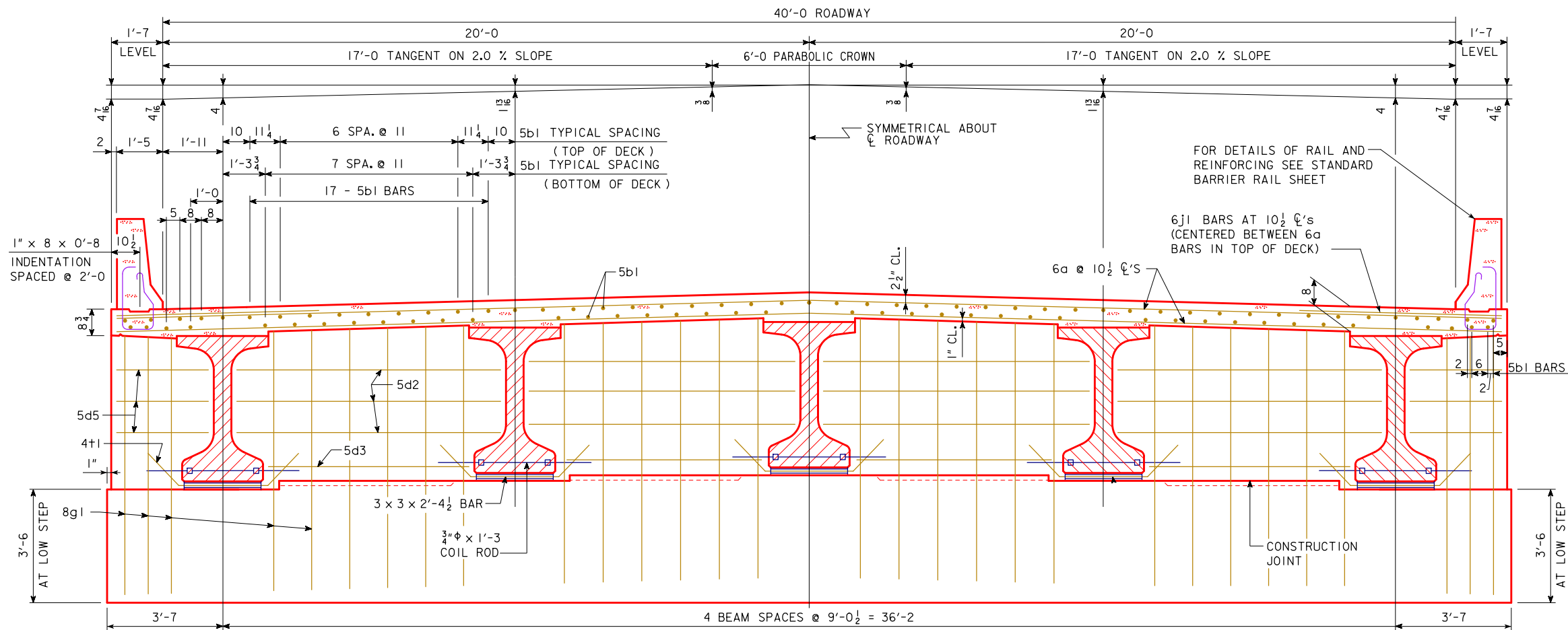
STATION 523+53.00 (US 169)

OCTOBER, 2020 |

RINGGOLD COUNTY

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
DESIGN SHEET NO. 7 OF 20 FILE NO. 31650 DESIGN NO. 121

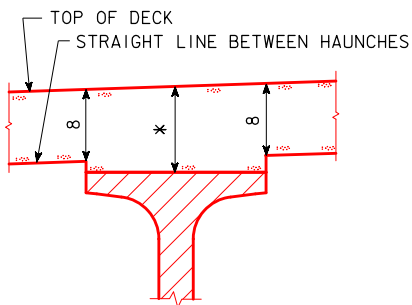
CORRECTION 04-14 - ADDED REFERRAL NOTE TO SUMMARY QUANTITIES SHEET FOR THE DRAIN WEIGHT. NOTE ABOUT CHOICE OF EPOXY OR STAINLESS STEEL DECK TO BARRIER RAIL BARS. ENGLISHBTINTEGRALBRIDGES.DGN - 4385-BTD-5 - THIS SHEET ISSUED 02-08.



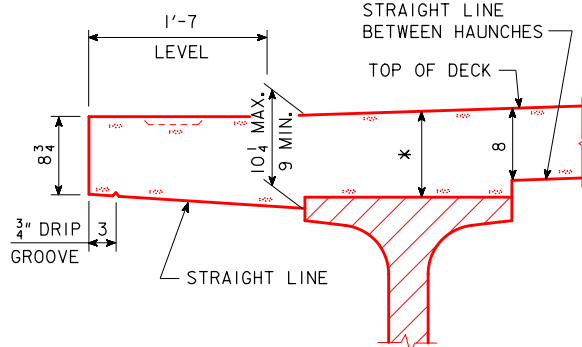
SECTION NEAR ABUTMENT

SUPERSTRUCTURE NOTES:

THE BRIDGE DECK AS SHOWN INCLUDES 1/2" INTEGRAL WEARING SURFACE.
THE ABUTMENT DIAPHRAGM CONCRETE IS TO BE PLACED MONOLITHICALLY WITH THE BRIDGE DECK.
COST OF ALL PREFORMED EXPANSION 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 INCHES 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 1/2" CLEAR BELOW TOP OF DECK. BOTTOM TRANSVERSE REINFORCING STEEL IS TO BE PARALLEL TO AND 1" 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.
COST OF BEARING MATERIAL IS TO BE INCLUDED IN THE PRICE BID FOR "PRETENSIONED PRESTRESSED CONCRETE BEAMS".
TRANSVERSE DECK REINFORCING MAY BE SPLICED WITH ONE LAP LOCATED AS FOLLOWS:
TOP BAR - LAP MIDWAY BETWEEN BEAMS (MIN. LAP = 1'-10").
BOTTOM BARS - LAP OVER BEAMS (MIN. LAP = 1'-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.

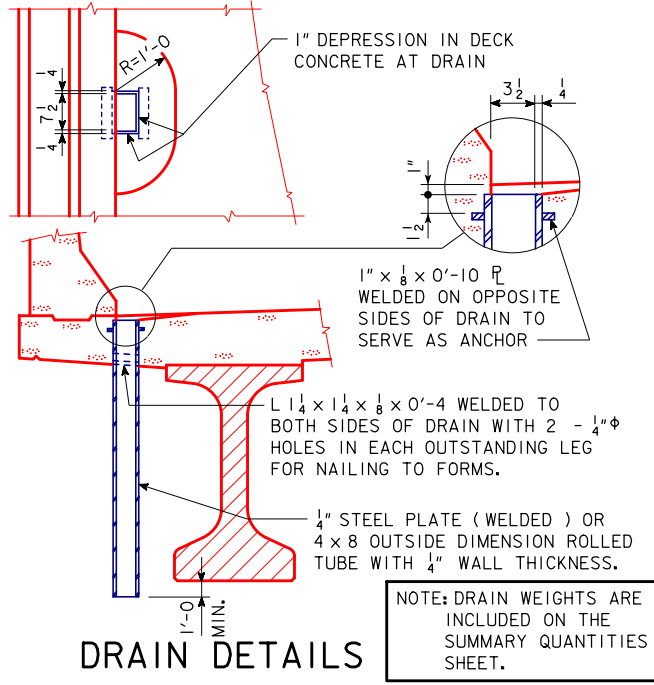


INTERIOR BEAMS



EXTERIOR BEAMS
TYPICAL DECK AND
HAUNCH DETAIL

* FOR DECK THICKNESS OVER BEAMS SEE HAUNCH AND CAMBER DETAILS ON DESIGN SHEET 12.



DRAIN DETAILS

NOTE:
DRAINS ARE TO BE GALVANIZED. 6 DRAINS REQUIRED.
SEE DRAIN LOCATION TABLE ON THIS SHEET. WEIGHT OF DRAINS IS INCLUDED IN THE QUANTITY FOR "STRUCTURAL STEEL".
WEIGHT IS BASED ON ROLLED TUBE.

DATA FOR ONE DRAIN	
BEAM SIZE	BTD
DRAIN WEIGHT (LBS.)	120
DRAIN LENGTH (FT.)	6'-2 3/4

DRAIN LOCATION		
DRAIN NO.	STATION	OFFSET
1	523+00.50	LT.
2	523+00.50	RT.
3	523+67.50	LT.
4	523+67.50	RT.
5	524+05.50	RT.
6	524+05.50	LT.

NOTE:
FOR DETAILS OF INTERMEDIATE DIAPHRAGMS SEE DESIGN SHEET 13.

DESIGN FOR 0° SKEW
**135'-0" x 40'-0" PRETENSIONED
PRESTRESSED CONCRETE BEAM BRIDGE**
135'-0" SINGLE SPAN (BTD BEAM TYPE)
BRIDGE DECK CROSS SECTION
STATION 523+53.00 (US 169) OCTOBER, 2020
RINGGOLD COUNTY
IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
DESIGN SHEET NO. 8 OF 20 FILE NO. 31650 DESIGN NO. 121

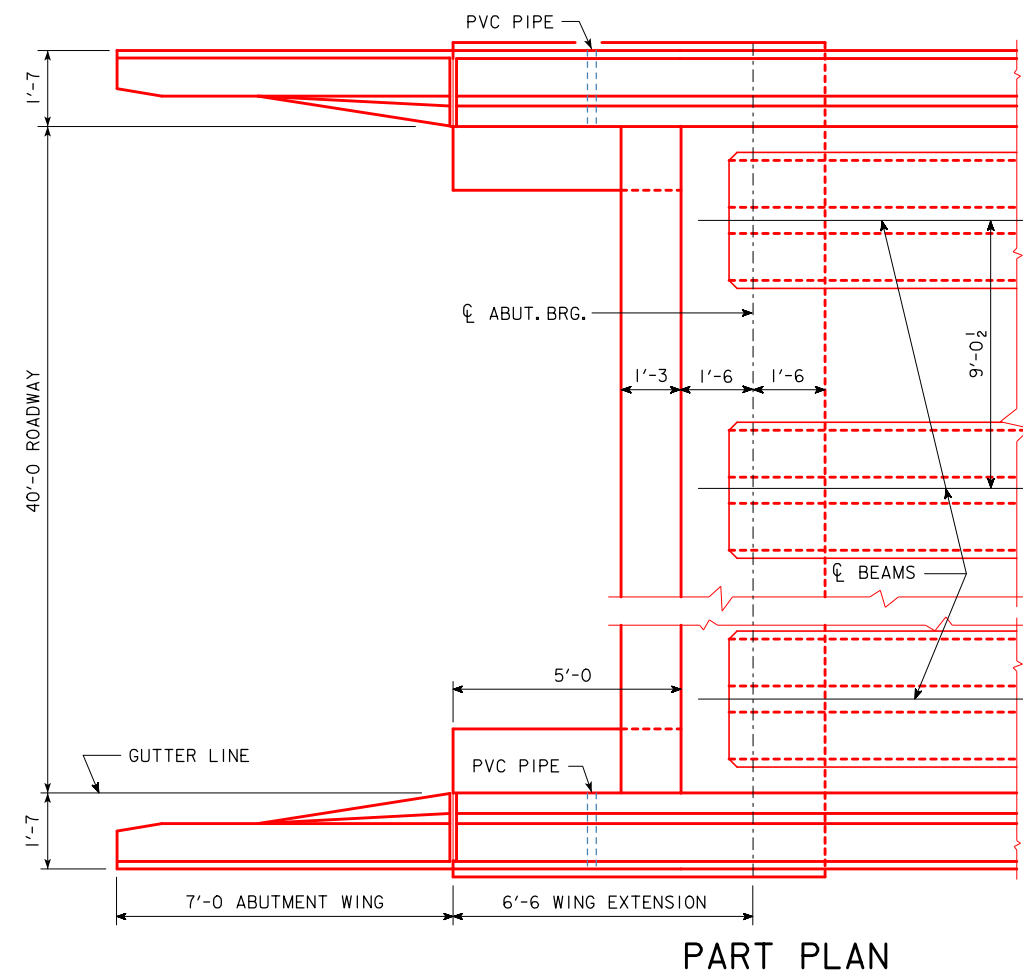
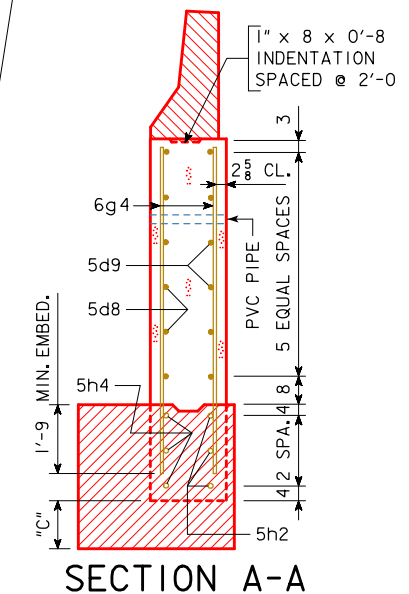
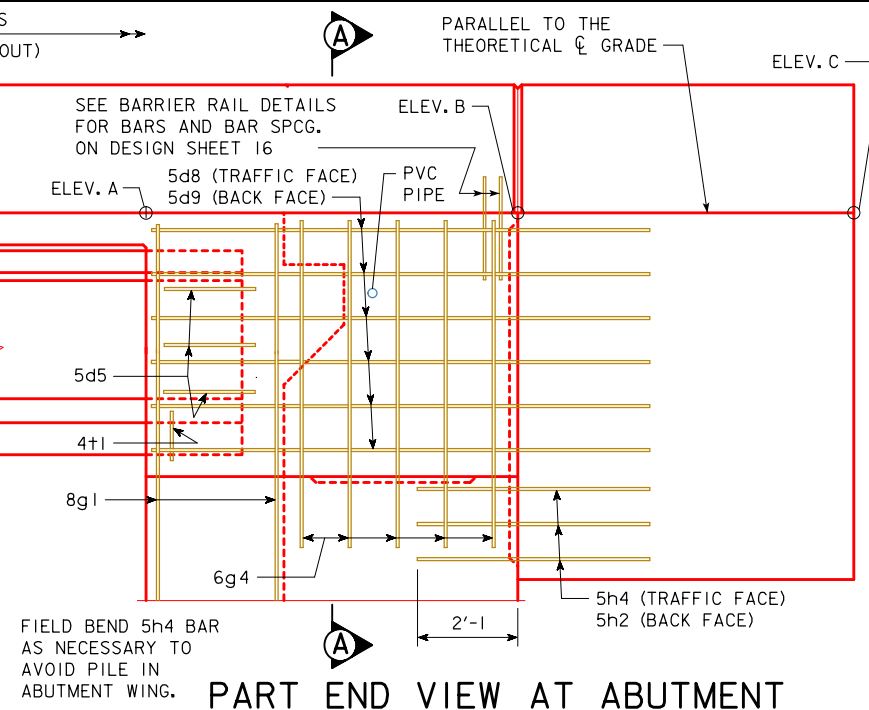
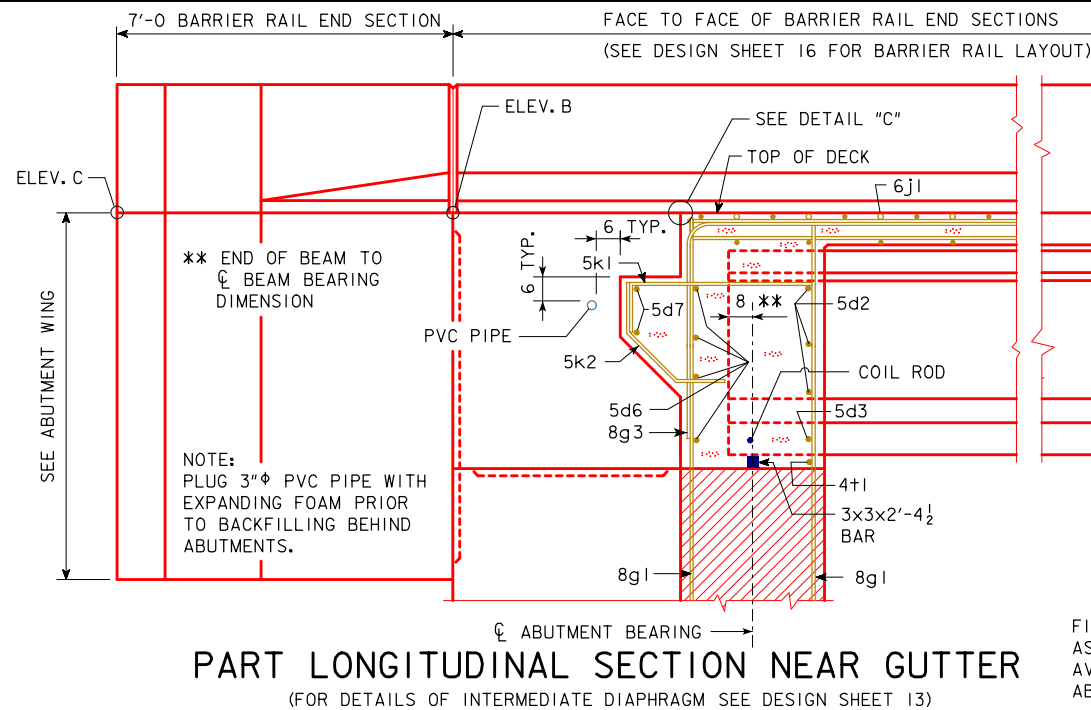
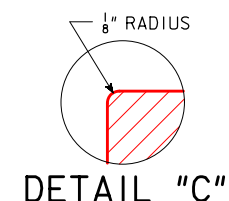


TABLE OF WINGWALL ELEVATIONS				
LOCATION	DIM "C"	ELEV. A	ELEV. B	ELEV. C
S.W. CORNER	0'-11 1/8	1050.90	1050.89	1050.86
N.W. CORNER	0'-10 7/8	1050.78	1050.75	1050.71
S.E. CORNER	0'-11 1/8	1050.90	1050.89	1050.86
N.E. CORNER	0'-10 7/8	1050.78	1050.75	1050.71



DESIGN FOR 0° SKEW

**135'-0 x 40'-0 PRETENSIONED
PRESTRESSED CONCRETE BEAM BRIDGE**

135'-0 SINGLE SPAN (BTD BEAM TYPE)

ABUTMENT DIAPHRAGM DETAILS

STATION 523+53.00 (US 169) OCTOBER, 2020

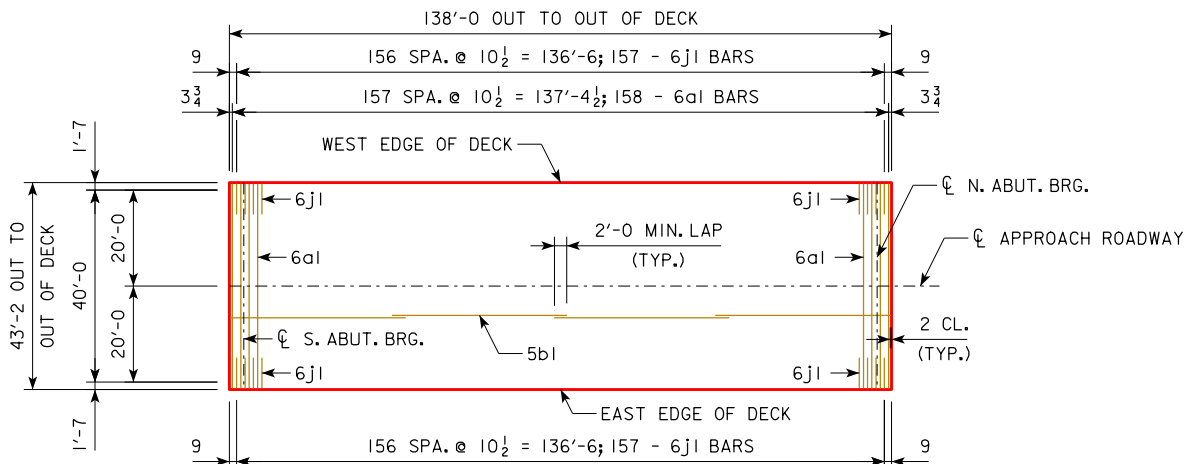
RINGGOLD COUNTY

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION

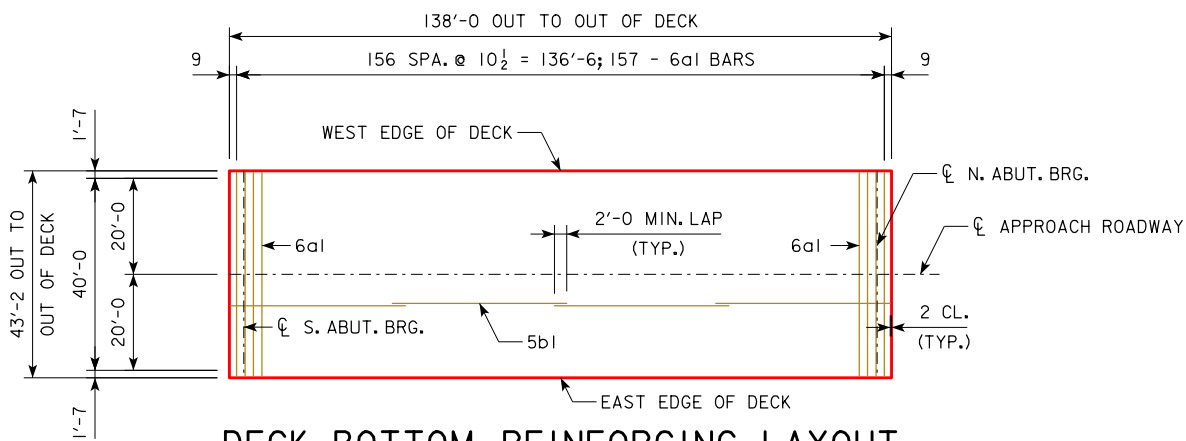
DESIGN SHEET NO. 9 OF 20 FILE NO. 31650 DESIGN NO. 121

REVISED 01-12 - ADDED FIELD BEND 5h4 BAR TO AVOID PILE IN ABUTMENT WING NOTE.
ENGLISHBTINTEGRALBRIDGES.DGN - 4507-BTCD - THIS SHEET ISSUED 02-08.

REVISED 07-2015 - CHANGED CONCRETE PLACEMENT NOTE TO ACCOUNT FOR THE POSSIBLE ADDITION OF A RETARDING ADMIXTURE TO THE CONCRETE.
ENGLISHBTRINTEGRALBRIDGES.DGN - 4518-BTCD - THIS SHEET ISSUED 02-08.

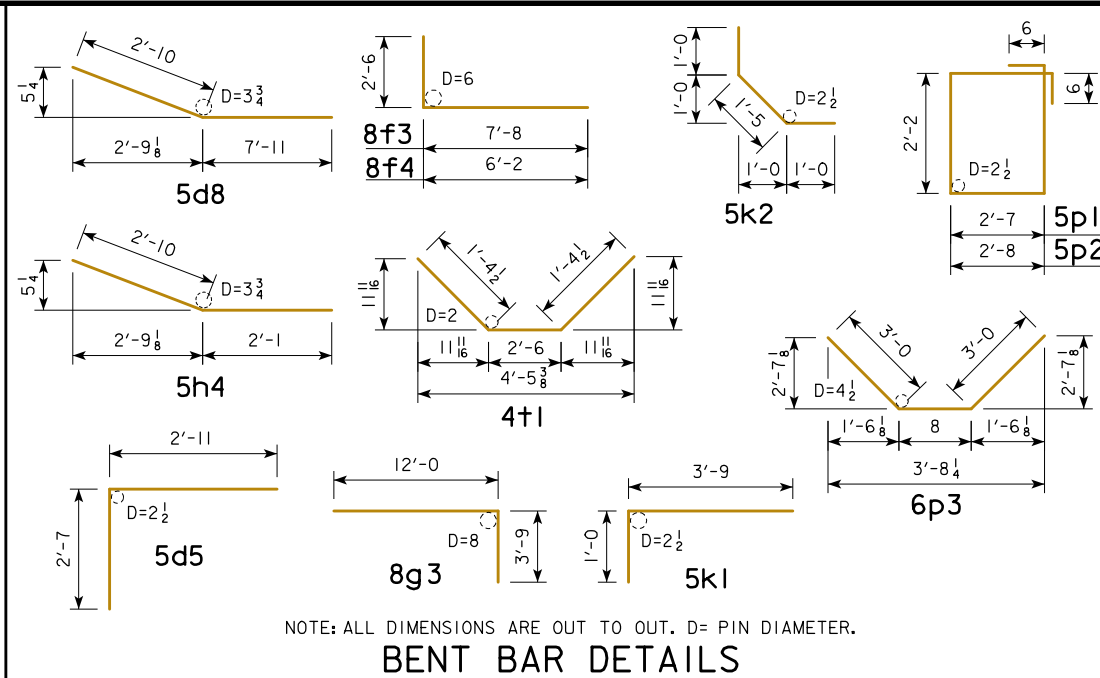


DECK TOP REINFORCING LAYOUT



DECK BOTTOM REINFORCING LAYOUT
AND CONCRETE PLACEMENT DIAGRAM

NOTE: THE INTENT IS FOR THE CONCRETE DECK DECK AND DIAPHRAGMS TO BE PLACED IN ONE SECTION. 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. FOR APPROVED ALTERNATE PROCEDURES THE ENGINEER SHALL DETERMINE IF A RETARDING ADMIXTURE IS REQUIRED TO MAINTAIN PLACITICITY OF THE CONCRETE DECK DURING PLACEMENT.



CONCRETE PLACEMENT QUANTITIES

LOCATION	QUANTITY
SECTION 1, DECK & ABUTMENT DIAPHRAGMS	209.7
TOTAL (CU. YDS.)	209.7

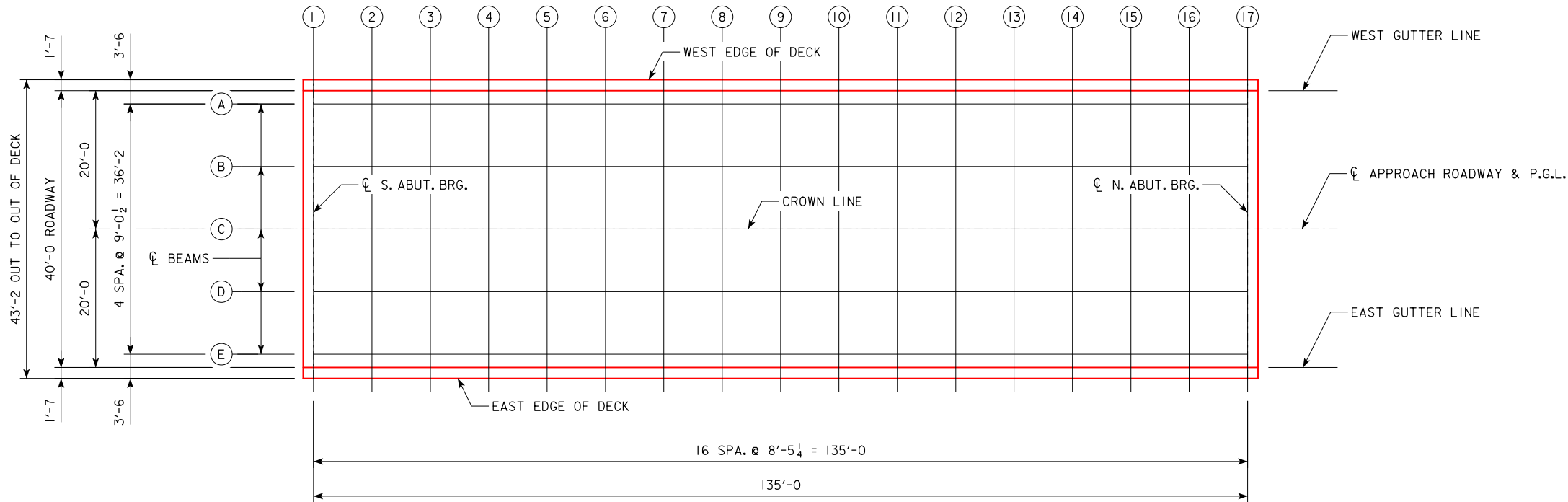
NOTE:
CONCRETE AND REINFORCING STEEL QUANTITIES ARE INCLUDED
ON THE SUMMARY QUANTITIES SHEET.

REINFORCING BAR LIST

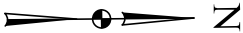
BAR	LOCATION	SHAPE	NO.	LENGTH	WEIGHT
6a1	DECK TRANSV. TOP & BOTT.		315	42'-10	20,266
5b1	DECK LONGIT. TOP & BOTT.		356	35'-11	13,336
5d2	ABUT. DIAPH. LONGIT.		24	8'-2	204
5d3	ABUT. DIAPH. LONGIT.		8	6'-2	51
5d5	ABUT. DIAPH. ENDS		12	5'-6	69
5d6	ABUT. DIAPH. LONGIT. B.F.		16	22'-6	375
5d7	PAVING NOTCH LONGIT.		8	22'-6	188
5d8	ABUT. DIAPH. WING EXT. LONGIT.		24	10'-9	269
5d9	ABUT. DIAPH. WING EXT. LONGIT.		24	10'-8	267
8f1	ABUT. FOOTING LONGIT. BOTH F.		36	23'-11	2,299
8f3	ABUT. EXTENSION LONGIT.		16	10'-2	434
8f4	ABUT. EXTENSION LONGIT.		16	8'-8	370
8g1	ABUT. VERT. BOTH F.		152	8'-5	3,416
8g3	ABUT. DIAPH. VERT. B.F.		76	15'-9	3,196
6g4	ABUT. DIAPH. WING EXT. VERT.		40	7'-0	421
5h2	ABUT. TO WING ANCHOR		12	4'-11	62
5h4	ABUT. TO WING ANCHOR		12	4'-11	62
6j1	TOP OF DECK TRANSV. (AT RAIL)		314	6'-3	2,948
5k1	PAVING NOTCH		80	4'-9	396
5k2	PAVING NOTCH		80	3'-5	285
5p1	ABUT. HOOPS		152	10'-6	1,665
5p2	ABUT. EXTENSION HOOPS		24	10'-8	267
6p3	ABUT. BOTT. AT PILES		40	6'-8	401
4+1	UNDER BEAMS AT ABUTMENTS		10	5'-3	35
REINFORCING STEEL - EPOXY COATED - TOTAL (LBS.)					51,282
#2	PILE SPIRAL		24	38'-6	154
	SPIRAL SPACER, L 7/8 x 7/8 x 1/8 x 0.70		72	1'-10	92
REINFORCING STEEL - NON-COATED - TOTAL (LBS.)					246

DESIGN FOR 0° SKEW
135'-0 x 40'-0 PRETENSIONED
PRESTRESSED CONCRETE BEAM BRIDGE
135'-0 SINGLE SPAN (BTD BEAM TYPE)
DECK, ABUT. & DIAPH. QUANTITIES
STATION 523+53.00 (US 169) OCTOBER, 2020
RINGGOLD COUNTY
IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
DESIGN SHEET NO. 10 OF 20 FILE NO. 31650 DESIGN NO. 121

TABLE OF TOP OF DECK ELEVATION																	
LOCATION	S. ABUT. ℄ BRG.	SPAN 1															N. ABUT. ℄ BRG.
	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
WEST GUTTER LINE	1050.90	1050.91	1050.92	1050.93	1050.94	1050.94	1050.94	1050.94	1050.93	1050.92	1050.91	1050.89	1050.88	1050.86	1050.83	1050.81	1050.78
BEAM LINE A	1050.94	1050.95	1050.96	1050.97	1050.98	1050.98	1050.98	1050.97	1050.97	1050.96	1050.95	1050.93	1050.91	1050.89	1050.87	1050.84	1050.81
BEAM LINE B	1051.12	1051.13	1051.14	1051.15	1051.16	1051.16	1051.16	1051.15	1051.15	1051.14	1051.13	1051.11	1051.09	1051.07	1051.05	1051.02	1051.00
BEAM LINE C & CROWN	1051.27	1051.28	1051.29	1051.30	1051.31	1051.31	1051.31	1051.31	1051.30	1051.29	1051.28	1051.26	1051.25	1051.23	1051.20	1051.18	1051.15
BEAM LINE D	1051.12	1051.13	1051.14	1051.15	1051.16	1051.16	1051.16	1051.15	1051.15	1051.14	1051.13	1051.11	1051.09	1051.07	1051.05	1051.02	1051.00
BEAM LINE E	1050.94	1050.95	1050.96	1050.97	1050.98	1050.98	1050.98	1050.97	1050.97	1050.96	1050.95	1050.93	1050.91	1050.89	1050.87	1050.84	1050.81
EAST GUTTER LINE	1050.90	1050.91	1050.92	1050.93	1050.94	1050.94	1050.94	1050.94	1050.93	1050.92	1050.91	1050.89	1050.88	1050.86	1050.83	1050.81	1050.78



TOP OF DECK ELEVATIONS



DESIGN FOR 0° SKEW

135'-0 x 40'-0 PRETENSIONED
PRESTRESSED CONCRETE BEAM BRIDGE

135'-0 SINGLE SPAN (BTD BEAM TYPE)

TOP OF DECK ELEVATIONS

STATION 523+53.00 (US 169)

OCTOBER, 2020

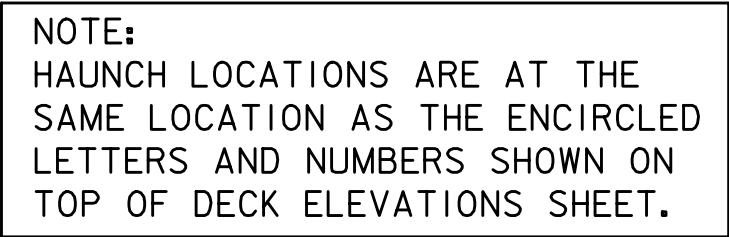
RINGGOLD COUNTY

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION

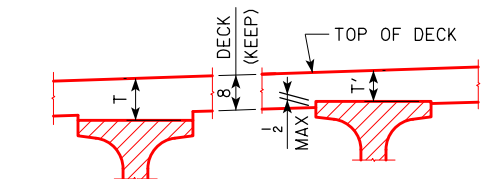
DESIGN SHEET NO. 11 OF 20 FILE NO. 31650 DESIGN NO. 121



MISCELLANEOUS DATA TABLE																		
	BEAM LINE	S. ABUT. C. BRG.	SPAN 1															N. ABUT. C. BRG.
		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
ANTICIPATED DEFLECTION DUE TO DECK (IN.)	A-E	0	1 $\frac{1}{8}$	2 $\frac{1}{4}$	3 $\frac{1}{8}$	4	4 $\frac{3}{4}$	5 $\frac{1}{4}$	5 $\frac{1}{2}$	5 $\frac{5}{8}$	5 $\frac{1}{2}$	5 $\frac{1}{4}$	4 $\frac{3}{4}$	4	3 $\frac{1}{8}$	2 $\frac{1}{4}$	1 $\frac{1}{8}$	0
CROSS SLOPE ADJUSTMENTS (IN.)	ALL	5 $\frac{1}{16}$																
MAX. ALLOWABLE FIELD HAUNCH (IN. & FT.)	ALL	2 $\frac{1}{2}$ (0.208)																
MIN. ALLOWABLE FIELD HAUNCH (IN. & FT.)	ALL	-3 $\frac{1}{16}$ (-0.016)																



NOTE 1:
TO CALCULATE FIELD HAUNCH REQUIRED AT EACH LOCATION, SURVEY THE BEAM TOPS
CONSISTENT WITH THE SPACINGS SHOWN ON THE "TOP OF DECK ELEVATIONS LAYOUT".
SUBTRACT THE SURVEYED BEAM SHOT FROM THE "BEAM LINE HAUNCH ELEVATION".
THIS VALUE WILL BE THE HAUNCH NEEDED (SEE "FIELD HAUNCH" IN HAUNCH DETAIL).
THE "BEAM LINE HAUNCH ELEVATION" INCLUDES ADJUSTMENTS FOR DECK THICKNESSES
AND ANTICIPATED DEFLECTIONS. NO ADDITIONAL CALCULATIONS ARE REQUIRED. IF
THE FIELD HAUNCH EXCEEDS THE MAXIMUMS AND MINIMUMS SHOWN IN INCHES AND
DECIMALS OF FEET IN THE MISCELLANEOUS DATA TABLE, ADJUSTMENTS TO THE GRADE
OR ADDITIONAL HAUNCH REINFORCEMENT WILL BE REQUIRED.



NOTE: THE DECK THICKNESS (T) AT BEAMS IS BASED ON THE ANTICIPATED BEAM CAMBER AND DEFLECTIONS. THESE VALUES ARE USED BY THE DESIGNER TO SET BEAM ELEVATIONS AND ESTIMATE CONCRETE QUANTITIES. REFER TO THE HAUNCH DATA DETAILS SHEET FOR ADDITIONAL INFORMATION TO AID THE CONTRACTOR IN SETTING THE FIELD HAUNCHES REQUIRED FOR CONSTRUCTION.

DESIGN TEAM IOWA DOT / HR GREEN, INC.	MODIFIED STANDARD SHEET 1065	RINGGOLD COUNTY	PROJECT NUMBER BRF-I69-I(43)--38-80	SHEET NUMBER	3
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DESIGN TEAM IOWA DOT / HR GREEN, INC.

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



2 - $1\frac{1}{16}" \Phi$ HOLES IN
 $6 \times \frac{3}{8} \times 1'-1\frac{3}{8}"$

$3\frac{7}{8}"(+)$ LENGTH OF C15x33.9
 DIAPHRAGM

3" 3" 2"

1" x 2" SLOTTED HOLES IN 9" LEG OF BENT PL'S AND 1" x $1\frac{1}{2}"$ SLOTTED HOLES C15 x 33.9

SECTION C-C

ALL DIAPHRAGM MATERIALS, INCLUDING BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED.

SHOP DRAWINGS OF THE STEEL DIAPHRAGMS SHOWING LAYOUT AND DETAILS OF THE DIAPHRAGMS SHALL BE SUBMITTED FOR APPROVAL.

ALL COSTS FOR FURNISHING AND INSTALLING STEEL INTERMEDIATE DIAPHRAGMS SHALL BE INCLUDED IN THE PRICE BID FOR STRUCTURAL STEEL.

THE 1 1/2" ϕ HOLES FOR THE 7/8" ϕ H.S. BOLTS SHALL BE CAST INTO THE WEB. DRILLING IS NOT ALLOWED.

THE 7/8" ϕ H.S. BOLTS THROUGH THE WEB SHALL HAVE A THREAD LENGTH OF 3" MIN. AND 4" MAX. AND SHALL MEET THE REQUIREMENTS OF ASTM A449.

ALL BOLTS ARE TO BE TIGHTENED PRIOR TO PLACING BRIDGE FLOOR CONCRETE WITH THE FOLLOWING EXCEPTION: BOLTS IN DIAPHRAGMS LOCATED UNDER LONGITUDINAL BRIDGE FLOOR CONSTRUCTION JOINTS SHALL NOT BE TIGHTENED UNTIL STAGE TWO OF THE BRIDGE FLOOR HAS BEEN PLACED.



DETAIL C

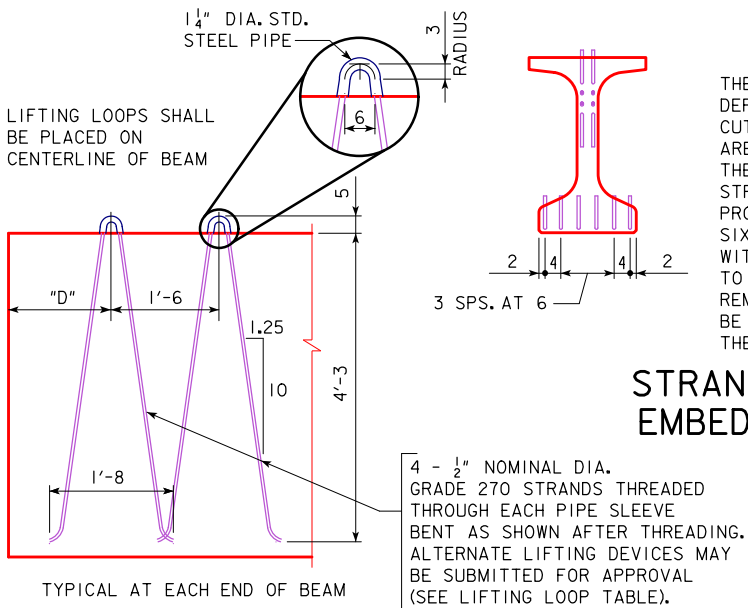
MODIFIED STANDARD SHEET 1036-I-BTD

RINGGOLD COUNTY

PROJECT NUMBER BRF-169-1(43)--38-80

SHEET NUMBER | 4

CORRECTION 12-13 - COIL TIE DETAIL WAS CHANGED TO REFLECT THE DISTANCE BETWEEN COIL TIE ANCHORS EMBEDDED 4 1/4 INCH. ENGLISHBEAMS.DGN 4748SI - THIS SHEET ISSUED 05-04.



LIFTING LOOP DETAIL

LIFTING LOOP AND OVERHANG TABLE

BEAM	LIFTING LOOPS EACH END	# OF STRANDS PER LOOP	D	BEAM OVERHANG (FT)
BTDI35	2	4	9'-3	16

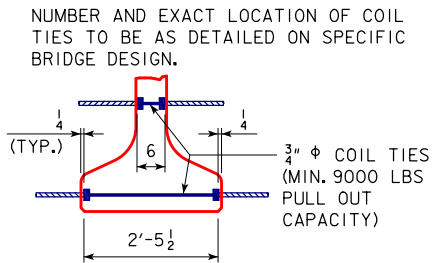
LIFTING LOOPS SHALL CARRY LOADS EQUALLY.

DESIGN STRESSES:

DESIGN STRESSES FOR THE FOLLOWING MATERIALS ARE TO BE IN ACCORDANCE WITH AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR HIGHWAY BRIDGES, SERIES OF 2007. 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: A.A.S.H.T.O. LRFD, SERIES OF 2007, WITH MINOR MODIFICATIONS.



COIL TIE DETAIL

ΔΔ 5b1 AND 6b3 BARS TO BE EPOXY COATED
* 6b3 AND 6b4 BARS TO BE USED IN PAIRS

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.

REINFORCING BAR LIST				BENT BAR DETAILS			
BEAM		BTDI35		NOTE: ALL BAR DIMENSIONS ARE OUT TO OUT D = PIN DIAMETER FOR BENDING (UNLESS OTHERWISE SHOWN)			
BAR	SHAPE	NO.	LENGTH				
5a1		12	31'-4	#4 BAR D= 2"			
5a2		12	40'-0	#5 BAR D= 2 1/2"			
ΔΔ 5b1		111	10'-8	#6 BAR D= 4 1/2"			
ΔΔ * 6b3		36	5'-9				
* 6b4		24	5'-1				
4c1		175	2'-7				
4d1		131	6'-5				
4e1		26	3'-2				
4h1		6	8'-0				

BTDI35 BEAM DATA

BTD BEAM	SPAN LENGTH ℓ-ℓ BEARING	OVERALL BEAM LENGTH (L)	CONCRETE STRENGTH		STRAND SIZE DIA. (in)	NO. OF STRAND		TOTAL INITIAL PRESTRESS kips ③	HOLD DOWN FORCE-kips	CAMBER (in)		DEFLECTION (in) Δ ₀		PERMISSIBLE MAXIMUM SPACING	WEIGHT (TONS)	CONCRETE (CU YD.)	REINFORCING STEEL (WEIGHT-LBS)	
			f'ci (ksi)	f'c (ksi)		STRAIGHT	DEFLECTED					IMMEDIATE (ELASTIC) Δ _i	TIME (PLASTIC) Δ _T					HL-93 LOADING
										STEEL DIAPHRAGM	STEEL DIAPHRAGM			STEEL DIAPHRAGM				

BTDI35	135'-0	136'-4	8.00	9.00	0.60	42	12	2297	29.5	3.57	6.27	4.51	1.13	9'-0 1/2	53.2	26.2	3572
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BEAM NOTES:

THIS BEAM IS 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 in²) 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 IM570.

BEARINGS SHALL BE AS DETAILED ON OTHER DESIGN SHEETS.

BEAM TO BE USED IN BRIDGES MADE CONTINUOUS BY THE POURED IN PLACE FLOOR, ARE TO BE AT LEAST 28 DAYS OLD BEFORE THE FLOOR IS PLACED UNLESS A SHORTER CURING TIME IS APPROVED BY THE BRIDGE ENGINEER.

THE PORTIONS OF THE PRESTRESSED BEAM 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 BEAM DURING HANDLING, TRANSPORTING AND ERECTION BY PROVIDING TEMPORARY BRACING AS NEEDED.

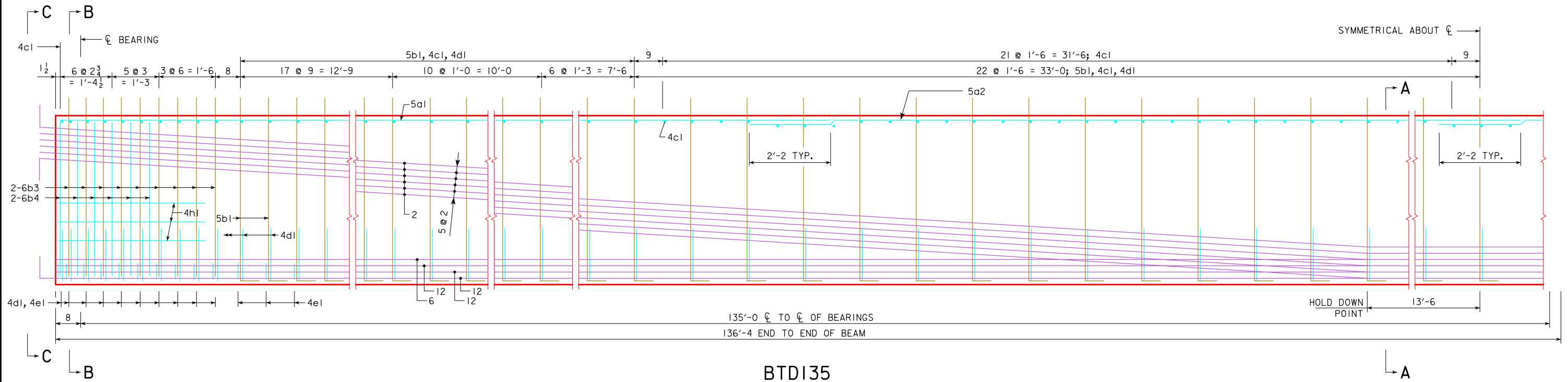
HOLES MUST BE CAST IN THE WEB TO ACCOMMODATE THE STEEL DIAPHRAGM ATTACHMENTS AS DETAILED ON THE STEEL DIAPHRAGM DETAIL SHEET.

MINIMUM CONCRETE f'c (AT 28 DAYS) AND MINIMUM f'ci AT RELEASE ARE LOCATED IN THE BTDI35 BEAM DATA TABLE ABOVE.

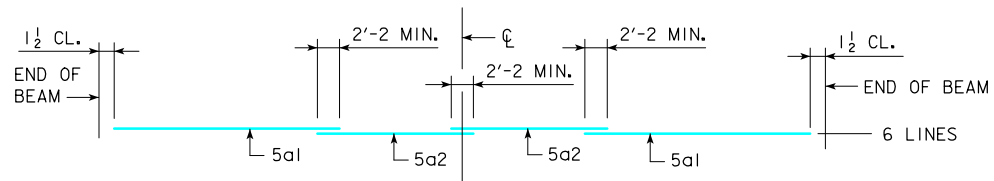
FOUR 0.60 IN. DIAMETER STRANDS STRESSED TO NOT MORE THAN 5000 lbs. EACH MAY BE USED IN LIEU OF BARS 5a1 AND 5a2 IN THE TOP FLANGE.

DESIGN FOR 0° SKEW
**135'-0 x 40'-0 PRETENSIONED
PRESTRESSED CONCRETE BEAM BRIDGE**
135'-0 SINGLE SPAN (BTD BEAM TYPE)
BTDI35 BEAM DETAILS
STATION 523+53.00 (US 169) OCTOBER, 2020
RINGGOLD COUNTY
IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
DESIGN SHEET NO. 14 OF 20 FILE NO. 31650 DESIGN NO. 121

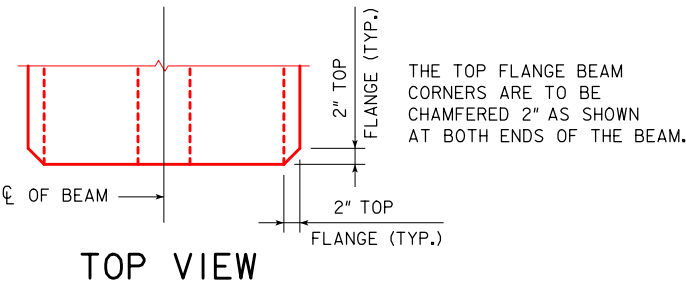
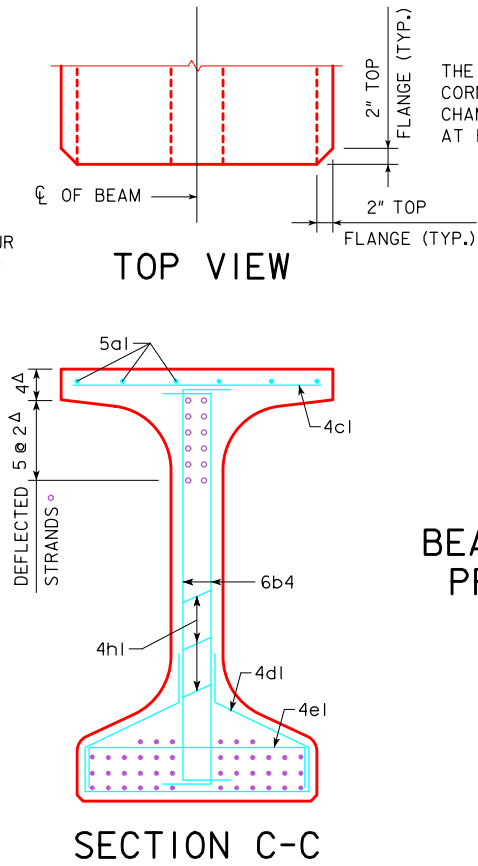
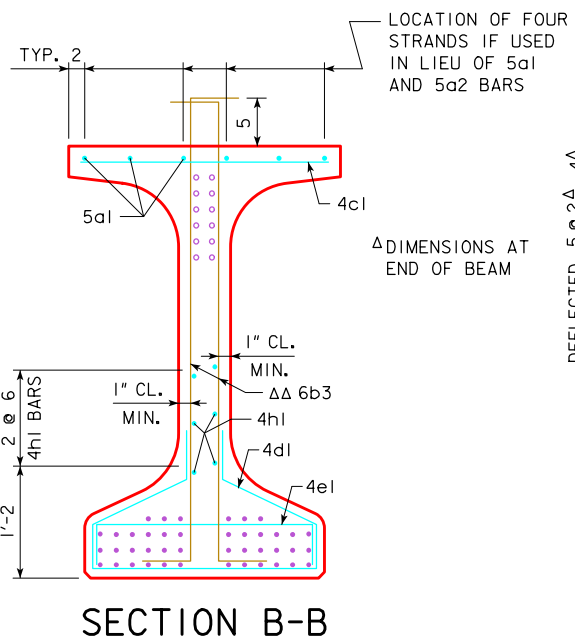
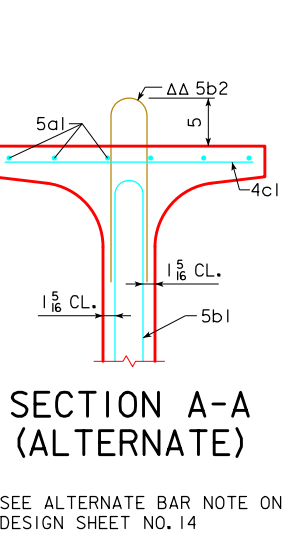
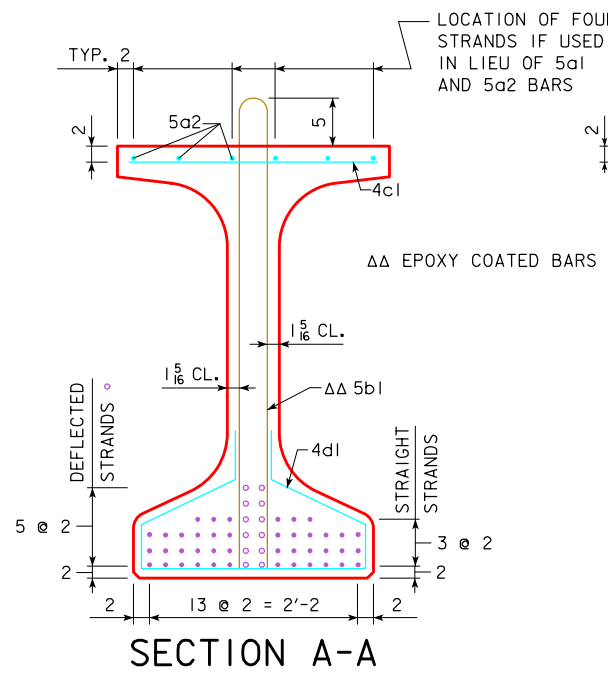
REVISED 10-07 - 5b2 BAR DELETED, 5b1 BAR LENGTHENED TO EXTEND 5 INCHES ABOVE BEAM TOP.
ENGLISHBEAMS.DGN 4748S2 - THIS SHEET ISSUED 05-04.



BTDI35

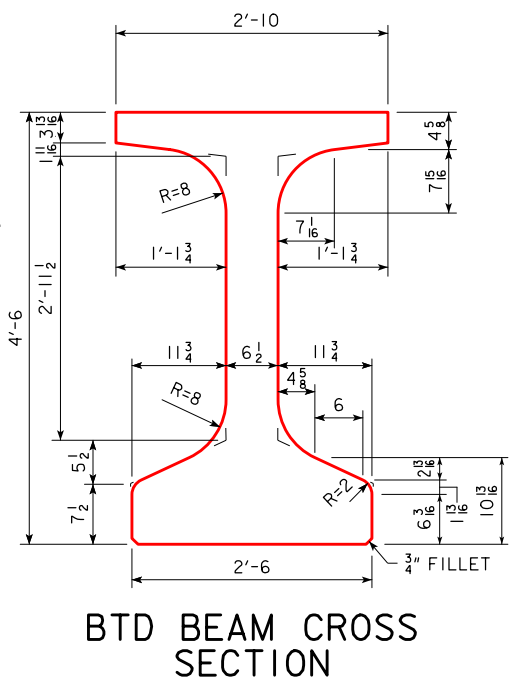


TOP FLANGE LONGITUDINAL BAR LAYOUT



BEAM SECTION PROPERTIES

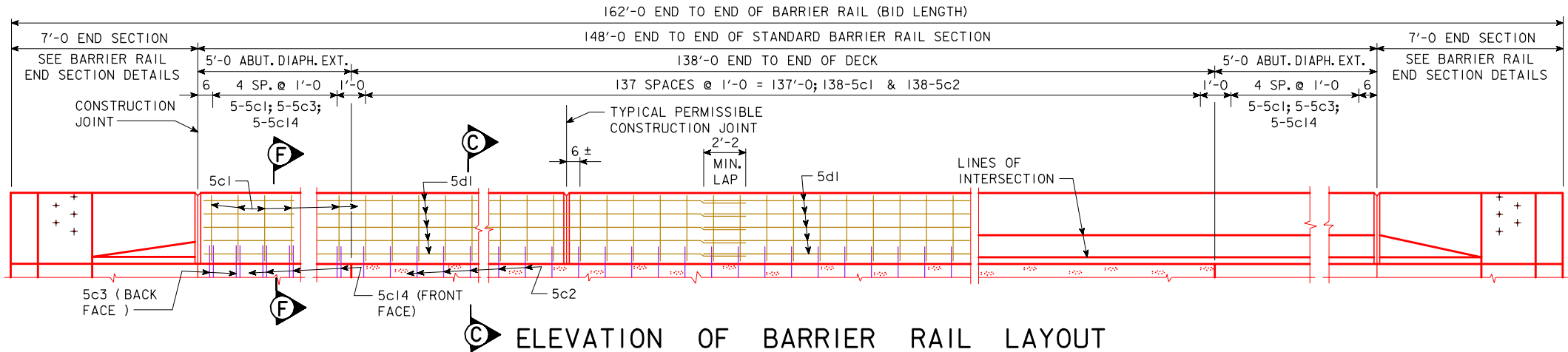
AREA = 748.8 in²
y_b = 24.64 in
I = 285,860 in⁴



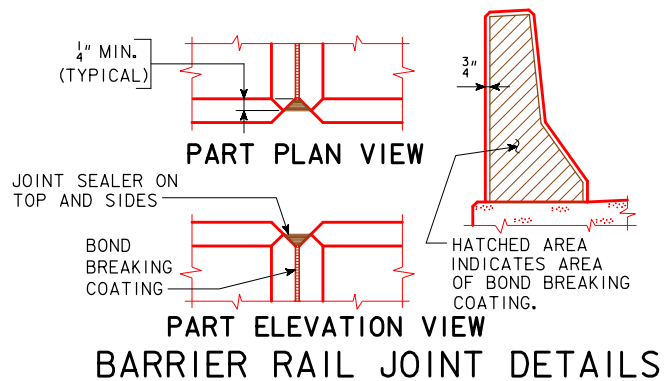
DESIGN FOR 0° SKEW

135'-0 x 40'-0 PRETENSIONED
PRESTRESSED CONCRETE BEAM BRIDGE
135'-0 SINGLE SPAN (BTD BEAM TYPE)
BTDI35 BEAM DETAILS
STATION 523+53.00 (US 169)
RINGGOLD COUNTY
OCTOBER, 2020
IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
DESIGN SHEET NO. 15 OF 20 FILE NO. 31650 DESIGN NO. 121

ENGLISHDECKRAILBRIDGES.DGN 1020SC - THIS SHEET ISSUED 04-14 - ADDED STAINLESS STEEL REINFORCING BAR LIST AND CHANGED 5c2, 5c3, 5c14 BARS TO STAINLESS STEEL..



ELEVATION OF BARRIER RAIL LAYOUT



NOTE: REINFORCING STEEL QUANTITIES ARE INCLUDED ON THE SUMMARY QUANTITIES SHEET.

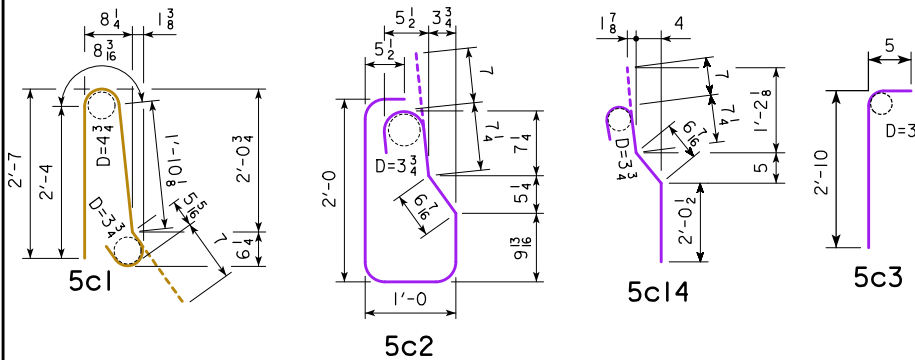
EPOXY COATED REINF. STEEL - TWO RAILS

SECTION	BAR	LOCATION	SHAPE	NO.	LENGTH	WEIGHT
STANDARD SECTIONS	5c1	RAIL, VERTICAL		296	5'-11	1,827
	5d1	RAIL, LONGITUDINAL		72	38'-6	2,891
EPOXY STEEL TOTAL (LBS.)						4,718

STAINLESS STEEL REINF. STEEL - TWO RAILS

SECTION	BAR	LOCATION	SHAPE	NO.	LENGTH	WEIGHT
STANDARD SECTIONS	5c2	RAIL, VERTICAL		276	6'-0	1,727
	5c3	RAIL, VERTICAL		20	3'-3	68
	5c14	RAIL, VERTICAL		20	3'-10	80
STAINLESS STEEL TOTAL (LBS.)						1,875

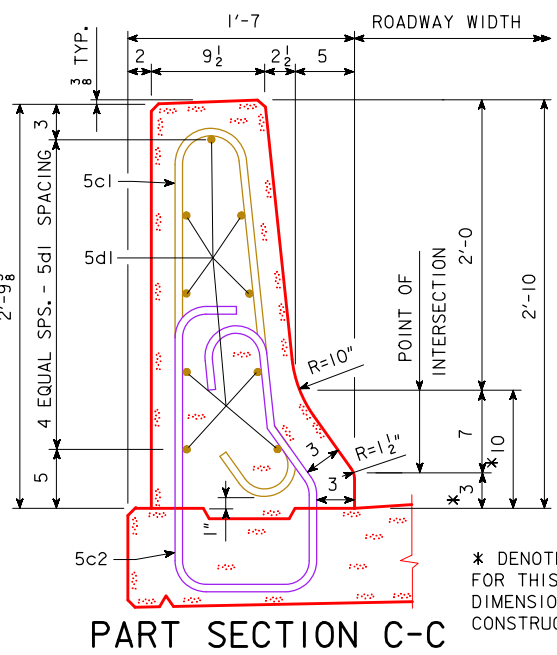
BENT BAR DETAILS



NOTE: ALL DIMENSIONS ARE OUT TO OUT. D = PIN DIAMETER.

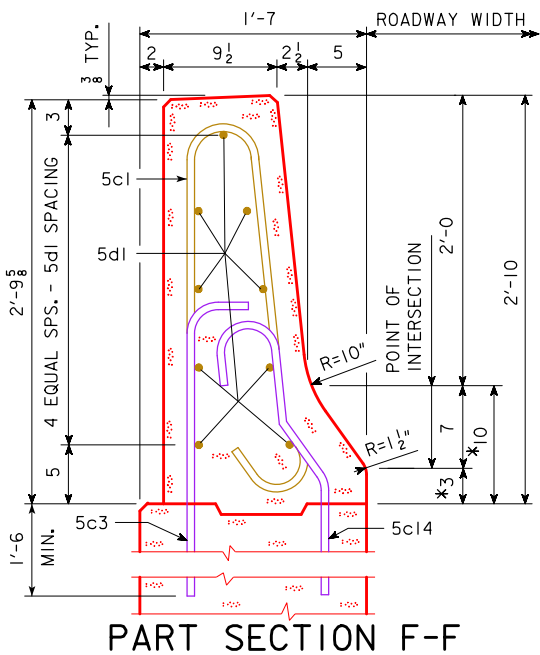
BARRIER RAIL NOTES:

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 MATERIALS I.M. 452.
THE CONCRETE BARRIER RAIL IS TO BE BID ON A LINEAL FOOT BASIS. THE NUMBER OF LINEAL 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. IF CONDUIT IS REQUIRED IN THIS PLAN 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 GRADE.
CROSS SECTIONAL AREA OF THE STANDARD SECTION OF THE BARRIER RAIL = 2.84 SQUARE FEET.



PART SECTION C-C

* DENOTES THE MAXIMUM VALUE FOR THIS DIMENSION. THIS DIMENSION MAY VARY DUE TO CONSTRUCTION INACCURACIES.



PART SECTION F-F

CONCRETE PLACEMENT SUMMARY

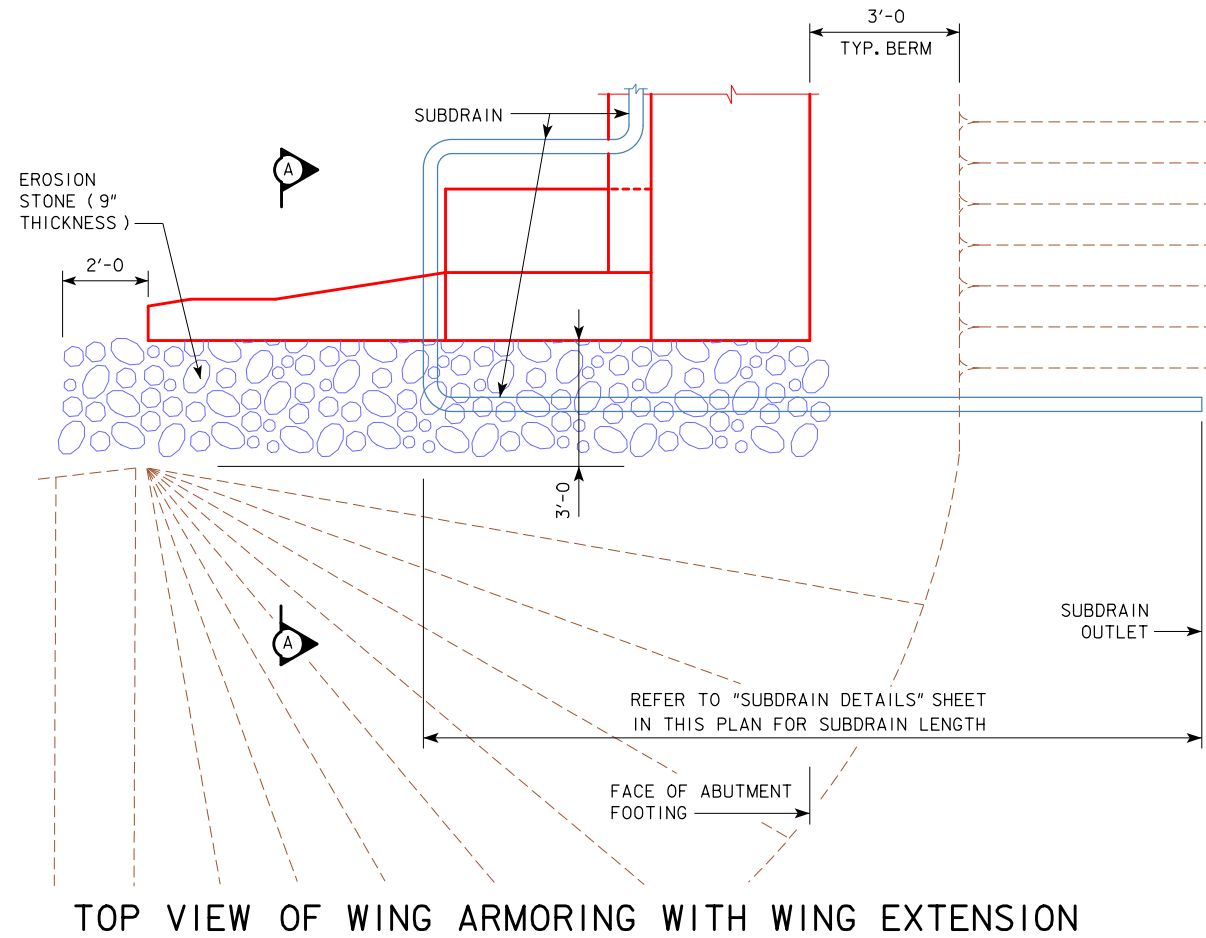
SECTION		TOTAL
STANDARD SECTION (WEST)	148.00 @ 0.1052 CU. YD. PER FT.	15.6
STANDARD SECTION (EAST)	148.00 @ 0.1052 CU. YD. PER FT.	15.6
TOTAL (CU. YD.)		31.2

CONCRETE BARRIER RAIL QUANTITIES

ITEM	UNIT	QUANTITY
CONCRETE BARRIER RAILING, WEST RAIL	L.F.	162.0
CONCRETE BARRIER RAILING, EAST RAIL	L.F.	162.0
TOTAL		324.0

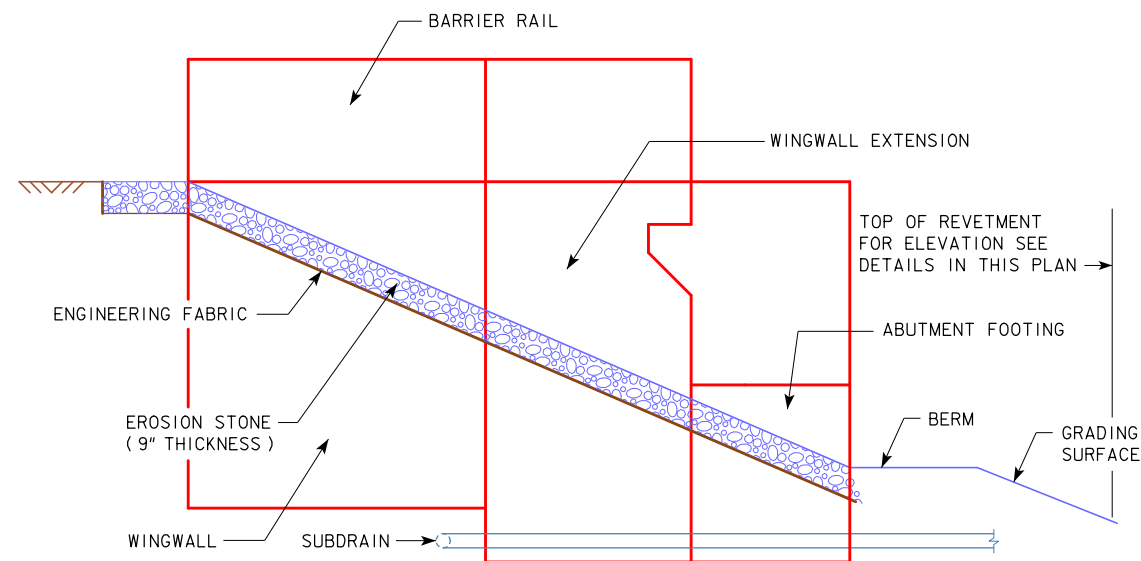
DESIGN FOR 0° SKEW
135'-0 x 40'-0 PRETENSIONED
PRESTRESSED CONCRETE BEAM BRIDGE
135'-0 SINGLE SPAN (BTD BEAM TYPE)
BARRIER RAIL DETAILS
STATION 523+53.00 (US 169) OCTOBER, 2020
RINGGOLD COUNTY
IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
DESIGN SHEET NO. 16 OF 20 FILE NO. 31650 DESIGN NO. 121

REVISED 06-14 - ADDED 2 FEET OF LENGTH OF EROSION STONE IN FRONT OF THE BRIDGE WING.
ENGLISHFORSLOPEPROTECTIONBRIDGES.DGN 1005A - THIS SHEET ISSUED 06-02.

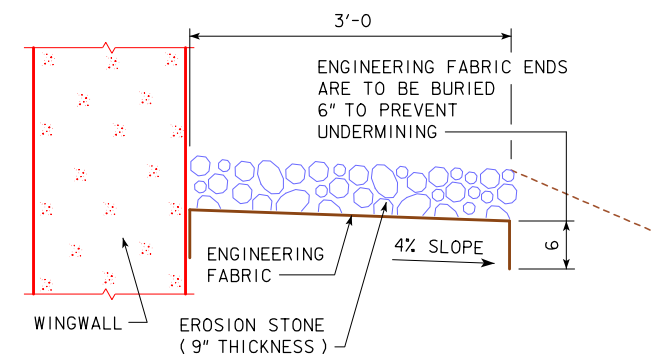


TOP VIEW OF WING ARMORING WITH WING EXTENSION

A CHECK SHALL BE MADE AT THE SUBDRAIN OUTLET TO INSURE THAT IT IS DRAINING PROPERLY DURING THE BACKFILL FLOODING PROCESS.



PROFILE VIEW OF WING ARMORING WITH WING EXTENSION
(INTEGRAL ABUTMENT WITH WING EXTENSIONS)



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 UNLESS OTHERWISE NOTED IN THE PLANS. THE EROSION STONE AT THESE LOCATIONS SHALL BE UNDERLAYED 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" 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 0° SKEW	
135'-0 x 40'-0 PRETENSIONED	
PRESTRESSED CONCRETE BEAM BRIDGE	
135'-0 SINGLE SPAN	(BTD BEAM TYPE)
BRIDGE WING ARMORING	
STATION 523+53.00 (US 169)	OCTOBER, 2020
RINGGOLD COUNTY	
IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION	
DESIGN SHEET NO. 18 OF 20	FILE NO. 31650 DESIGN NO. 121

SUBDRAIN NOTES :

THIS PLAN SHEET SHOWS DETAILS FOR PLACING ALL SUBDRAINS AND SUBDRAIN OUTLETS REQUIRED FOR THIS STRUCTURE.

THE SUBDRAINS SHALL BE 4" IN DIAMETER 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 INCHES IN DIAMETER AND COUPLED TO THE 4 INCH DIAMETER SUBDRAIN IN ONE OF THE TWO FOLLOWING WAYS.

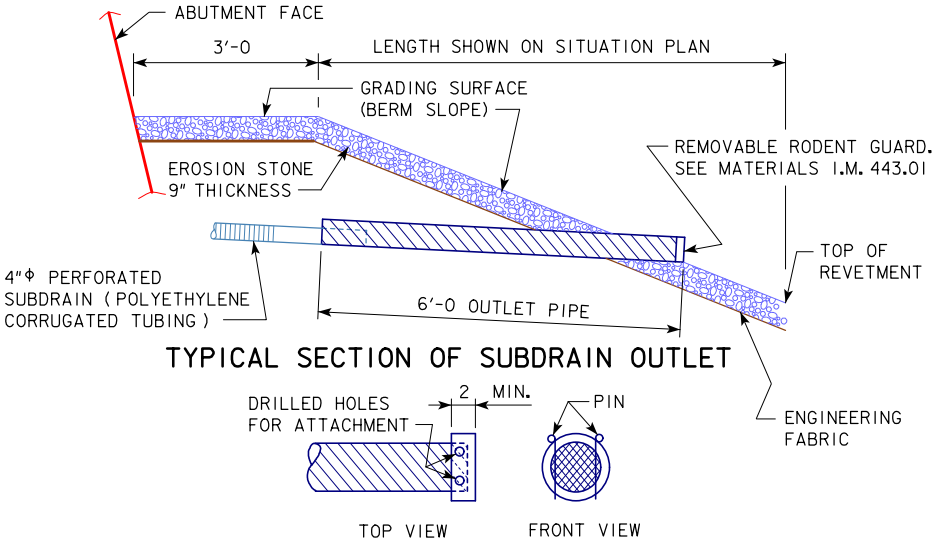
- 1. USE AN INSIDE FIT REDUCER COUPLER (COUPLER MUST BE INSERTED A MINIMUM OF 1'-0 INTO THE METAL OUTLET PIPE).
- 2. INSERT 1'-0 OF THE 4" SUBDRAIN INTO THE 6" METAL OUTLET PIPE, THEN FULLY SEAL THE ENTIRE OPENING WITH GROUT.

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.

SUBDRAIN OUTLET ELEVATIONS

LOCATION	ELEVATION
SOUTH ABUTMENT	1041.55
NORTH ABUTMENT	1041.42



REMOVABLE RODENT GUARD DETAILS
EROSION STONE (EMBEDDED) OUTLET DETAILS

SITUATION PLAN
SHOWING SUBDRAIN LOCATIONS

NOTE:
SECTION A-A IS SHOWN ON ABUTMENT
BACKFILL DETAILS SHEET.

DESIGN FOR 0° SKEW

135'-0 x 40'-0 PRETENSIONED
PRESTRESSED CONCRETE BEAM BRIDGE

135'-0 SINGLE SPAN (BTD BEAM TYPE)

SUBDRAIN DETAILS

STATION 523+53.00 (US 169)

OCTOBER, 2020

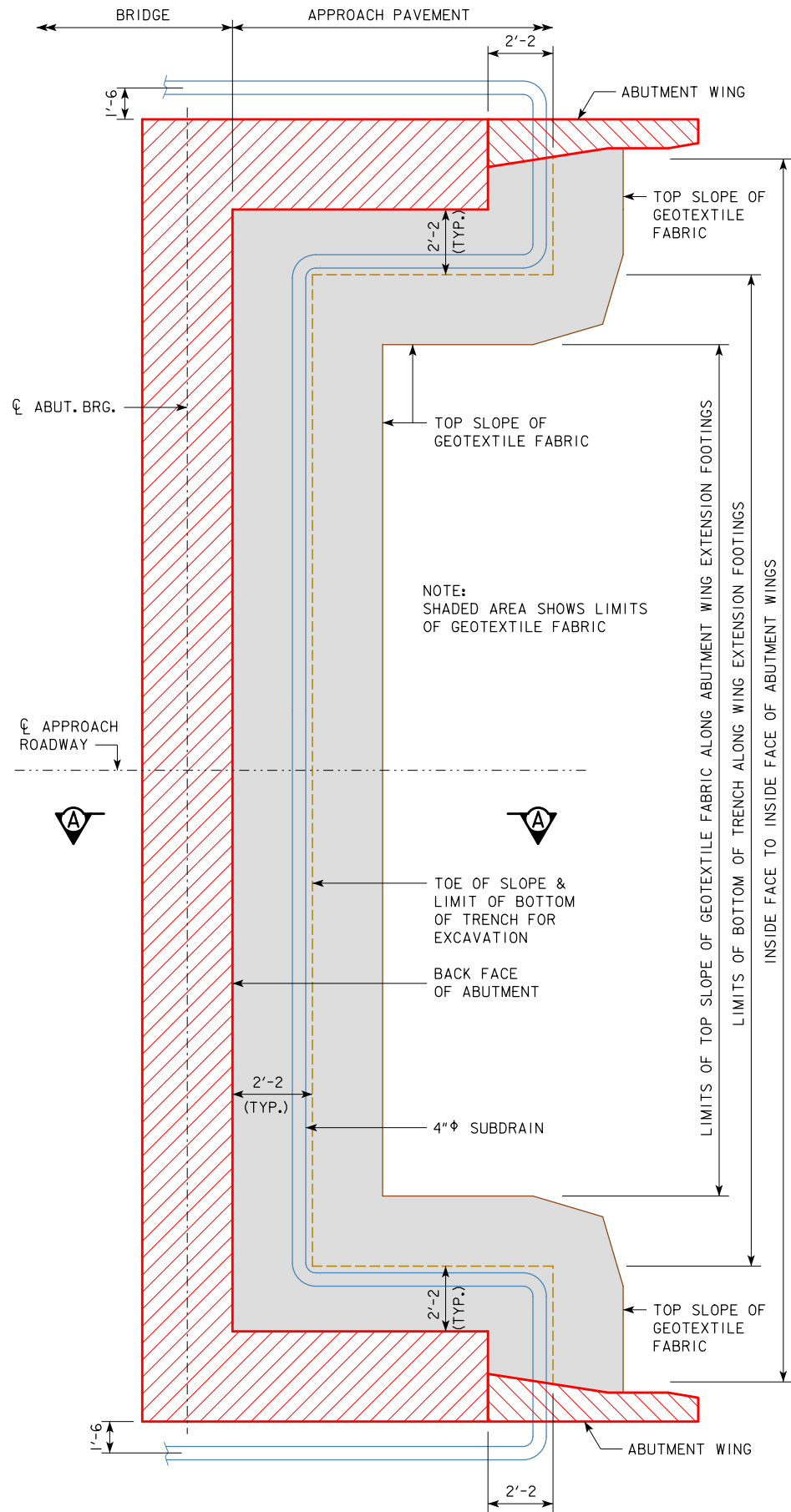
RINGGOLD COUNTY

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION

DESIGN SHEET NO. 19 OF 20 FILE NO. 31650 DESIGN NO. 121

REVISED 10-14 - TWO ADDITIONAL FORESLOPE PROTECTION DETAILS WERE ADDED OUTSIDE OF THE BORDER TO SHOW REVETMENT UP TO BACK OF ABUTMENT FOOTING.
ENGLISH FORESLOPE PROTECTION BRIDGES.DGN 1007C - THIS SHEET ISSUED 06-02 FOR WATER CROSSINGS.

REVISED 09-14 - THE TECHNICAL DATA INFORMATION TABLE WAS REMOVED AND IS LOCATED IN THE STANDARD SPECIFICATIONS. CHANGED SURFACE FLOODING TIME TO 5 MINUTE INCREMENTS.
REVISED 09-2016 - CHANGED THE BRIDGE APPROACH PAVEMENT STANDARD TO "BR" (WAS "RK").
ENGLISHFORSLOPEPROTECTIONBRIDGES.DGN - 1007E - THIS SHEET ISSUED 08-07.



ABUTMENT PLAN WITH WING EXTENSIONS

ABUTMENT BACKFILL PROCESS:

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 FOOT 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 FOOT 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 FEET 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-INCH DIAMETER HOSE SHOULD BE SPRAYED IN SUCCESSIVE 6-FOOT TO 8-FOOT 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.

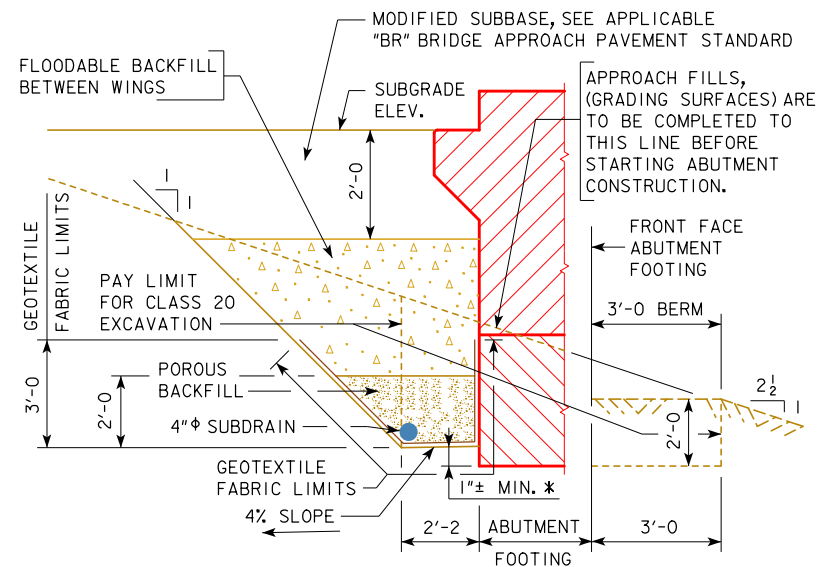
WATER REQUIRED FOR FLOODING, SUBDRAINS, POROUS BACKFILL, FLOODABLE BACKFILL, AND GEOTEXTILE FABRIC FURNISHED AT THE BRIDGE ABUTMENTS WILL NOT BE MEASURED SEPARATELY FOR PAYMENT.

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.

NOTE:

SUBDRAIN SHALL SLOPE DOWNWARD 2% FROM ϕ APPROACH ROADWAY WHEN OUTLETTING BOTH SIDES OF THE ABUTMENT.

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 ONE FOOT IN LENGTH, SHINGLE FASHION WITH UP SLOPE LAP PIECE ON TOP AND STAPLED FOR CONTINUITY.



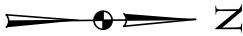
SECTION A-A
BACKFILL DETAILS

NOTE: GEOTEXTILE FABRIC WILL BE ATTACHED TO FACE OF ABUTMENT FOOTING AND WINGS.

* DIMENSION VARIES DUE TO 2% SUBDRAIN SLOPE.

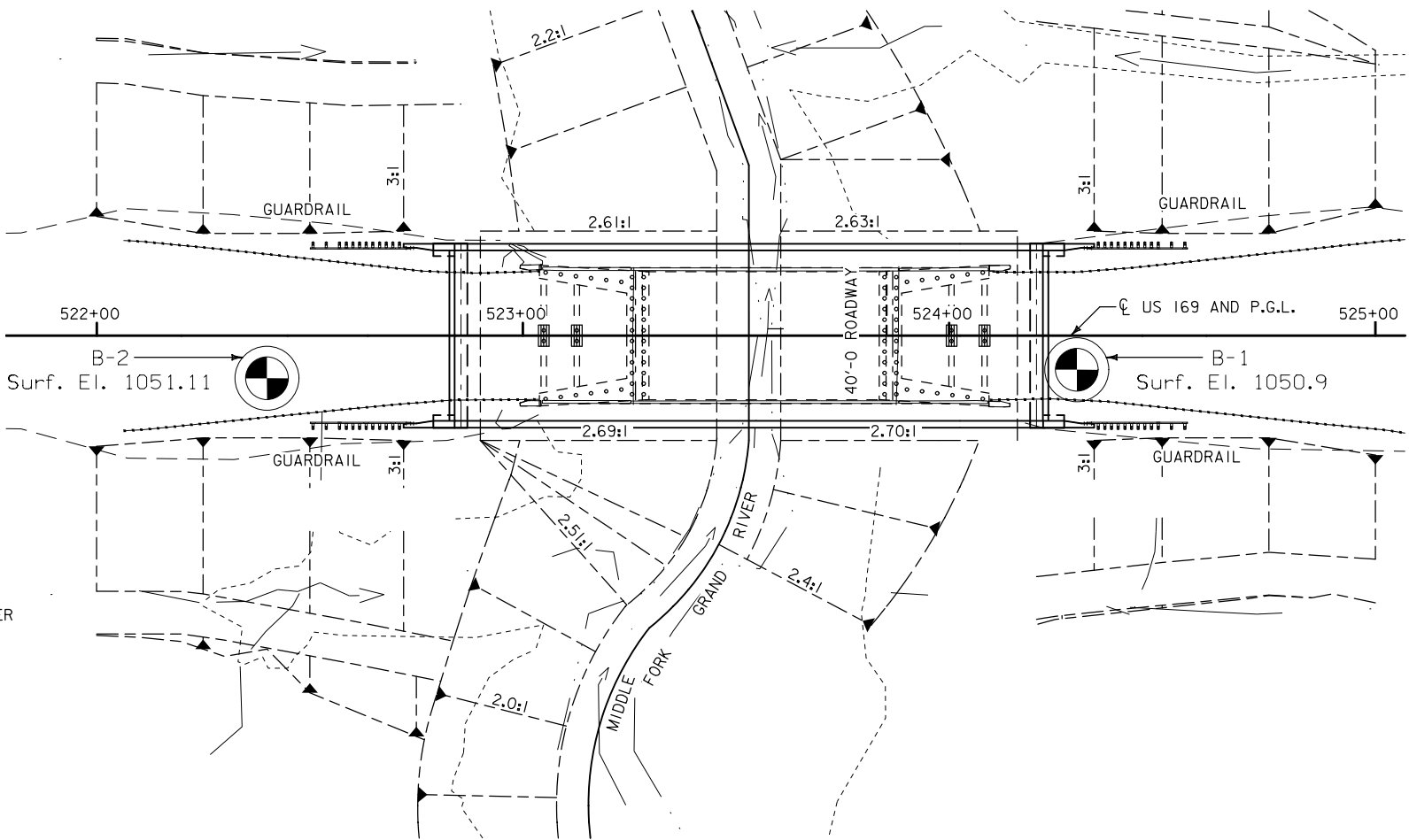
NOTE:
SEE SUBDRAIN DETAILS SHEET FOR DETAILS NOT SHOWN ON THIS SHEET WHICH ARE PERTINENT TO THIS STRUCTURE.

DESIGN FOR 0° SKEW
**135'-0 x 40'-0 PRETENSIONED
PRESTRESSED CONCRETE BEAM BRIDGE**
135'-0 SINGLE SPAN (BTD BEAM TYPE)
ABUTMENT BACKWALL DETAIL
STATION 523+53.00 (US 169) OCTOBER, 2020
RINGGOLD COUNTY
IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
DESIGN SHEET NO. 20 OF 20 FILE NO. 31650 DESIGN NO. 121



LOCATION

US 169 OVER MIDDLE FORK GRAND RIVER
T-67N R-30W
SECTION 2 AND 3
MIDDLE FORK TOWNSHIP
RINGGOLD COUNTY
FHWA NO. 46261
BRIDGE MAINT. NO. 8009.8S169
LATITUDE 40.637453°
LONGITUDE -94.280981°



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

GEOTECHNICAL DESIGN



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

Signature David J. Heer Date 8-13-2020
David J. Heer
Printed or Typed Name

My license renewal date is December 31, 2020.

Pages or sheets covered by this seal: SPS.1

DESIGN FOR 0° SKEW
135'-0 x 40'-0 PRETENSIONED PRESTRESSED
CONCRETE BEAM BRIDGE

135'-0 SINGLE SPAN (BTD BEAM TYPE)

SOIL PROFILE SHEET

STATION 523+53.00 (US 169)

RINGGOLD COUNTY

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
DESIGN SHEET NO. 1 OF 1 FILE NO. 31650 DESIGN NO. 121

Water Level Observations (Ft.)

Boring No.	Date Drilled	While Drilling	Immediately after Drilling	After Drilling
B-1	02/26/2019	25.0	12.0	9.5 @ 04/28/2019
B-2	02/28/2019	27.0	15.0	--

SHELBY TUBE CORE DATA

CORE NO.	B-1-B2	B-1-C2	B-2-B1	B-2-B3	B-2-B7
DEPTH IN FEET	7.0-9.0	22.0-24.0	1.0-3.0	7.0-9.0	22.0-24.0
CLASSIFICATION (AASHTO)	A-7-6(20)	A-6(21)	--	--	A-7-6(21)
COEFF. CONSOL. (SQ. FT. / DAY)	1.066	0.030	--	--	0.261
TRIAxIAL COMPRESSION	--	--	--	--	--
COHESION - PSF	--	--	--	--	--
FRICTION COEFF.	--	--	--	--	--
MOISTURE CONTENT %	--	--	23.0	28.4	--
DRY DENSITY - PCF	--	--	103.2	92.2	--
CU-CONSOLIDATED UNDRAINED					
UU-UNCONSOLIDATED UNDRAINED					
UC-UNCONFINED COMPRESSION (c=1/2 Qu)					

1060

1050

1040

1030

1020

1010

1000

990

980

970

960

PROPOSED GRADE

EXISTING GROUND

B-2-B1

B2

14

B-2-B3

B4

13

B5

7

H₂O

B6

6

B-2-B7

B8

6

C1

2

C2

3

D1

13

E1

4

F1

8

G1

24

G2

30

G3

30

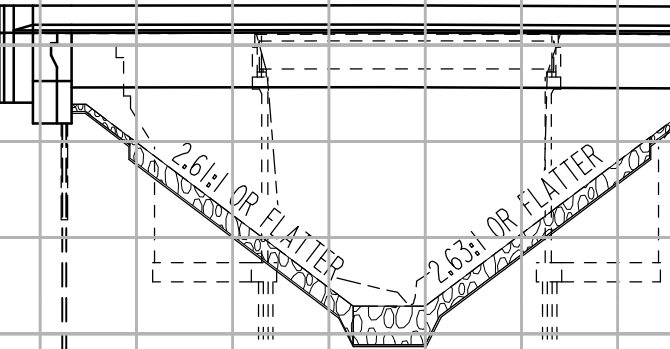
G4

100/5"

G5

100/5"

B-2
STA. 522+40
RT. 10



B1

9

B3

H₂O

B4

11

C1

4

C3

2

C4

2

C5

5

C6

5

D1

6

E1

29

F1

35

G1

40

H1

26

I1

47

I2

101

I3

100/5"

B-1
STA. 524+30
RT. 8

A - Asphalt (±8")

B - Lean Clay, Very Dark Gray, Stiff, (Alluvium)

C - Lean Clay, Gray, Soft, (Alluvium)

D - Fine to Coarse Sand, Gray, Loose, (Alluvium)

E - Fine to Coarse Sand, Gray, Medium Dense, (Alluvium)

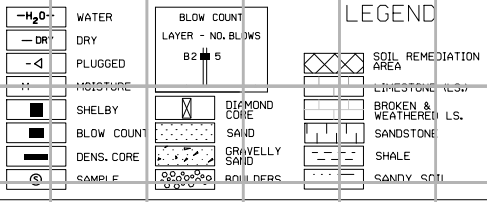
F - Fine to Coarse Sand, Gray, Dense, (Alluvium)

G - Fine to Coarse Sand, Gray, Dense (Glacial Outwash)

H - Sandy Lean Clay, Trace Gravel, Gray, Very Stiff (Glacial Till)

I - Lean Clay, Reddish Brown, Hard, (Residual Shale)

- Becomes Very Hard at 69.0'



B-1	
Layer	Thickness
A	0.7
B	18.3
C	25.0
D	5.0
E	5.0
F	3.0
G	2.0
H	5.0
I	7.5

B-2	
Layer	Thickness
A	0.7
B	28.3
C	10.0
D	5.0
E	10.0
F	5.0
G	18.5

FILE NO. 31650

ENGLISH

DESIGN TEAM

MEGIVERN \ DELL \ GORJACKOVSKI

RINGGOLD COUNTY

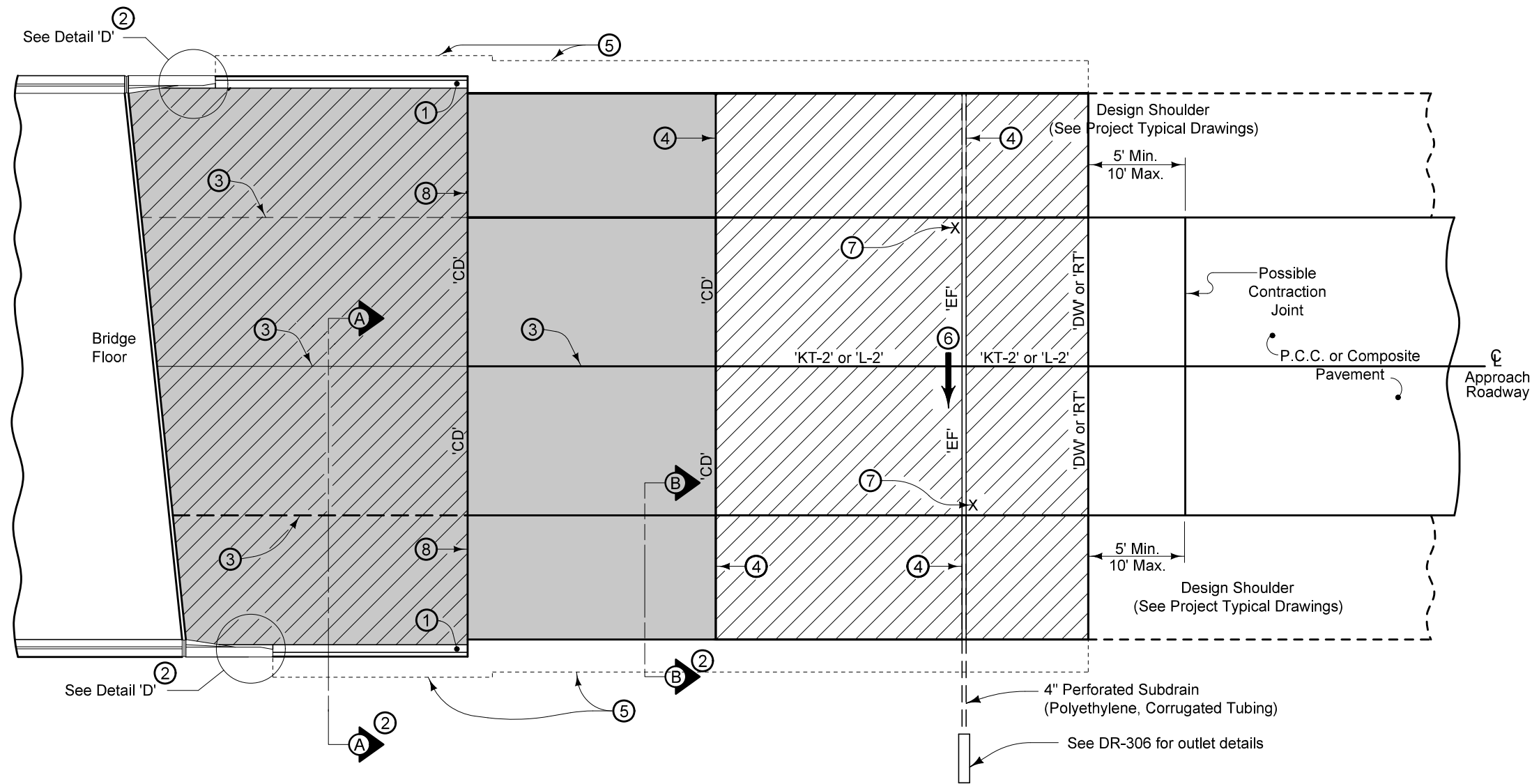
PROJECT NUMBER

BRF-169-1(43)--38-80

SHEET NUMBER SPS.1

For joint details, see PV-101.

- ① Build 4 inch Sloped Curb to end of Double Reinforced Section.
- ② See BR-203M
- ③ Longitudinal Joint (PV-101):
Single Pour - Saw cut joint per Detail B .
Two Pours - Use 'KS-1' joint (Single Reinforced Section).
Use 'KS-2' joint (Double Reinforced Section).
- ④ Extend 'CD' and 'EF' joints where PCC Shoulder.
- ⑤ Polymer Grid and excavation limits of Modified Subbase 2 feet outside of pavement edge. See BR-203M.
- ⑥ Slope subdrain to drain.
- ⑦ Place an "X" in the plastic concrete near the 'EF' joint at the outside edge of pavement.
- ⑧ Place 'RD' Joint where PCC shoulder. Place 'B' joint otherwise.



Pay limits for contract item include the following areas:

- Double Reinforced Section
- Single Reinforced Section
- Non-Reinforced Section

MODIFIED
STANDARD ROAD PLAN

REVISION	
1	20-12-18
BR-211M	
SHEET 1 of 1	

MODIFICATIONS: Changed DR-304 to DR-306.

APPROVED BY DESIGN METHODS ENGINEER

BRIDGE APPROACH
(ABUTTING PCC OR
COMPOSITE PAVEMENT)

FILE NO. **31650**

ENGLISH

DESIGN TEAM **Flattery \ Bell \ Schinstock**

RINGGOLD

COUNTY

PROJECT NUMBER

BRF-169-1(43)--38-80

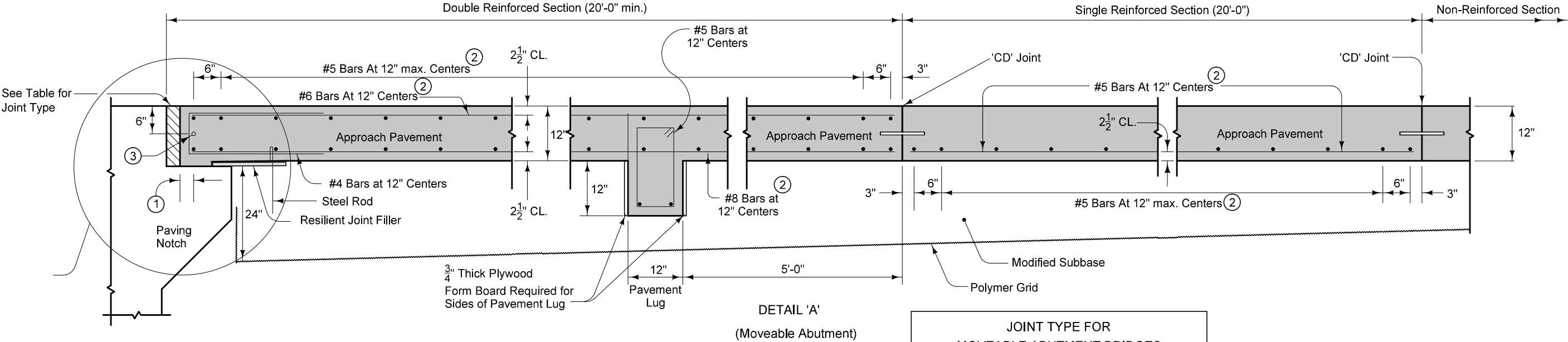
SHEET NUMBER

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10:28:07 AM 8/12/2020

mjack

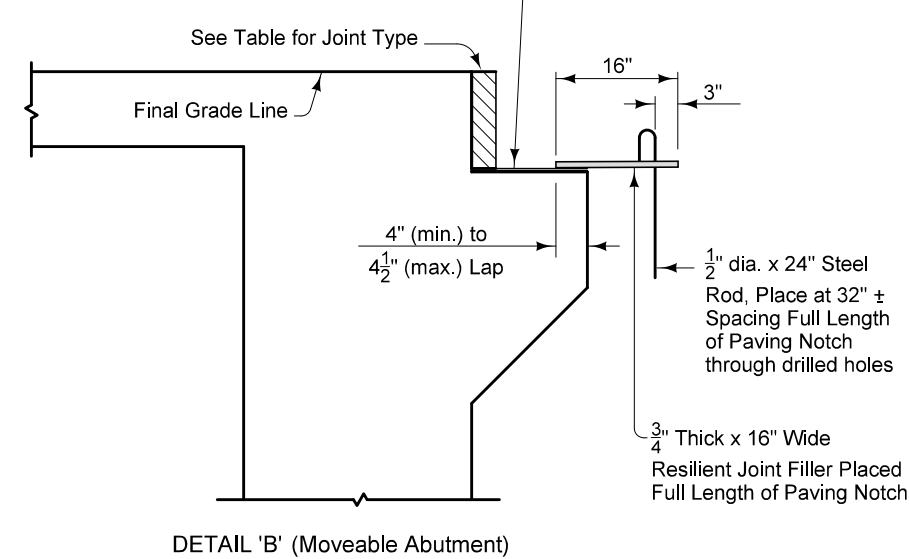
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DETAIL 'A'
(Moveable Abutment)

JOINT TYPE FOR MOVEABLE ABUTMENT BRIDGES		
Joint	Maximum Bridge Length	
	Concrete Beam or Slab	Steel Girder
CF-1	370'	250'
CF-2	465'	320'
CF-3	575'	400'

Debond paving notch with two layers of 30#
asphaltic felt paper full length of paving notch



- ① 2" min. to 2 1/2" max. clear to bent bar.
- ② Minimum lap length: #5 Bars - 18"
#6 Bars - 27"
#8 Bars - 48"
- ③ If bridge is skewed, place additional
#5 bar parallel to skewed face.

For joint details, refer to PV-101.

For curb details, see Detail 'G'.

All transverse bars are #5.

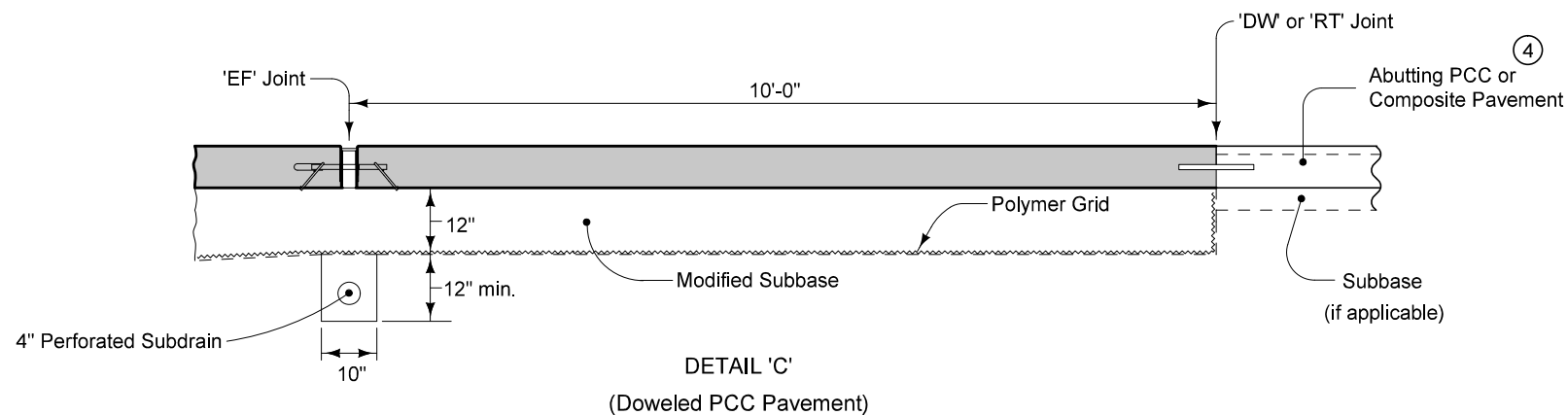
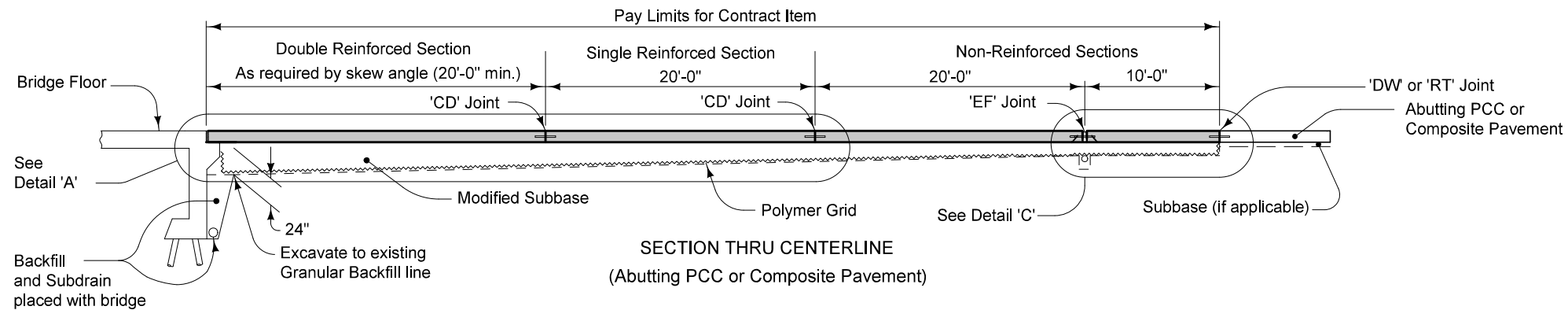
Possible Contract Item:
Bridge Approach, BR-203

Possible Tabulation:
112-6

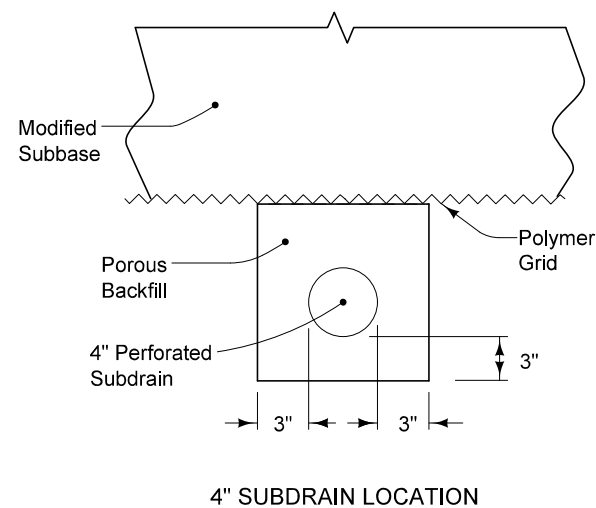
MODIFIED
STANDARD ROAD PLAN

BR-203M
SHEET 1 of 3

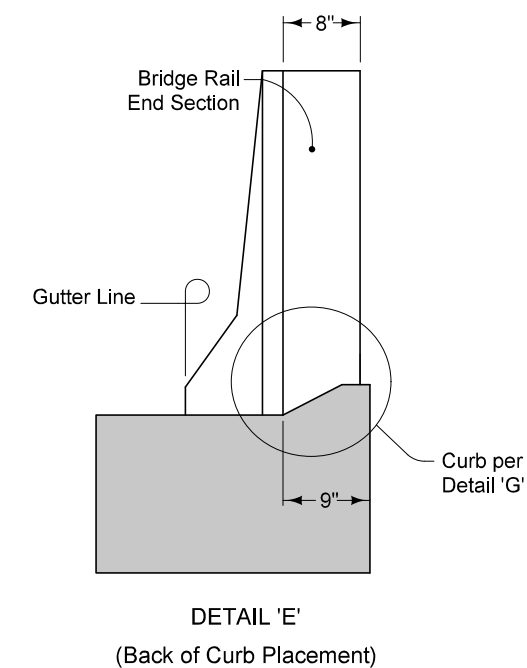
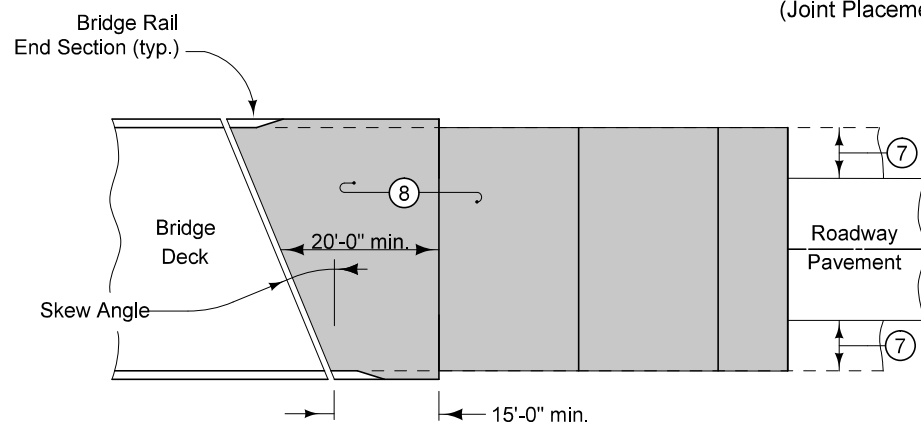
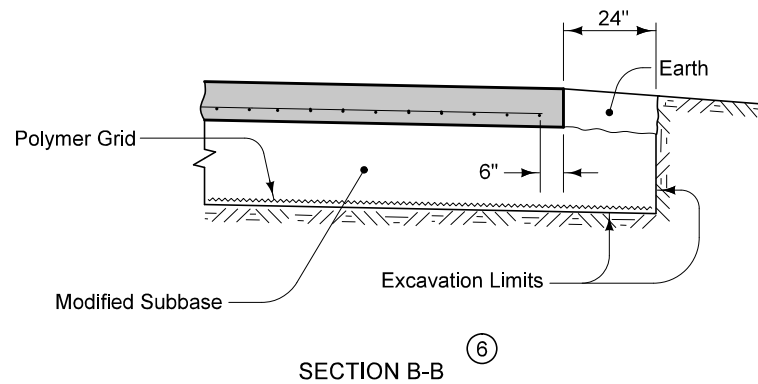
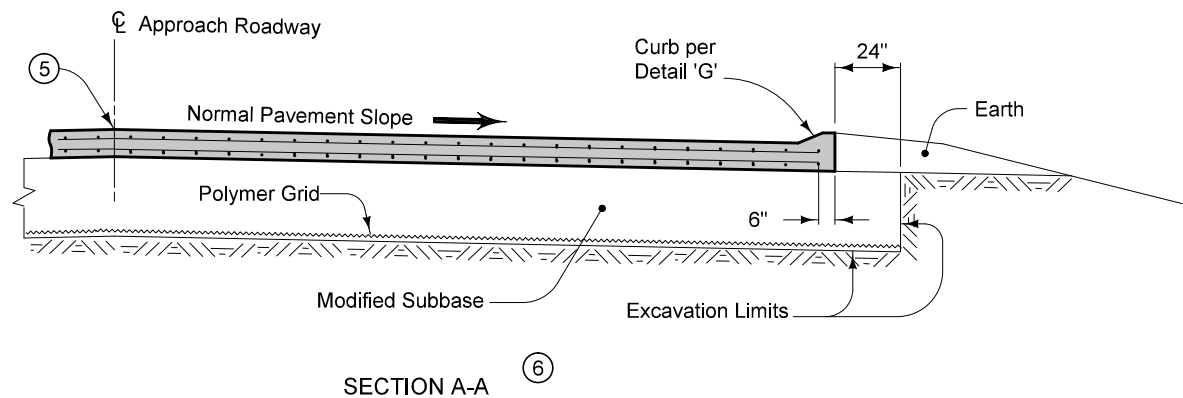
DOUBLE REINFORCED 12" APPROACH



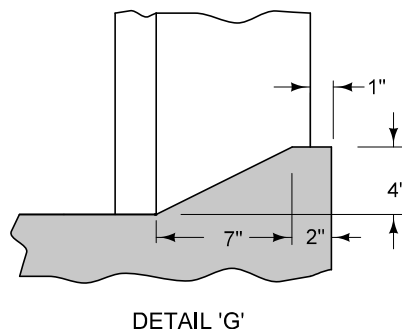
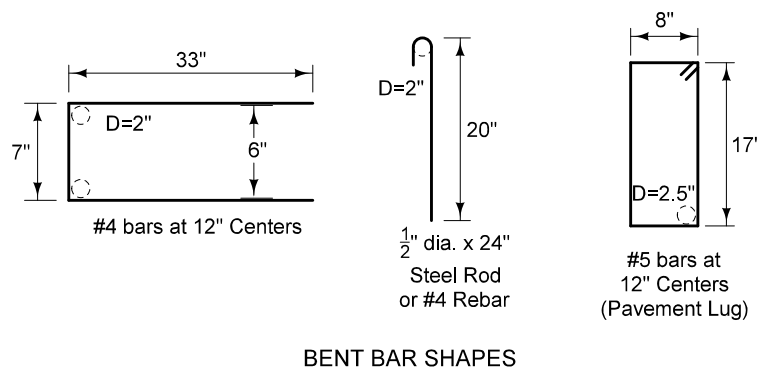
④ If abutting pavement (PCC or HMA) is not in place, refer to BR-213.



MODIFIED STANDARD ROAD PLAN	
	BR-203M
	SHEET 2 of 3
DOUBLE REINFORCED 12" APPROACH	



- ⑤ Longitudinal Joint (PV-101):
Single pour - Saw cut joint per Detail B.
Two pours - Use 'KS-2' joint.
 - ⑥ Refer to BR-211M.
 - ⑦ Design shoulder width.
 - ⑧ Reinforced bridge approach section.
 - ⑨ Expansion joint at end of Bridge Rail End Section: Place joint filler the full depth of the bridge approach pavement. In areas with curb, place full depth of pavement plus curb and shape material to fit the shape of the curb per Section B-B of PV-101. Seal joint per Detail F of PV-101.
- Fixed Abutment Bridges: Type 'E' joint.
 - Moveable Abutment Bridges: Flexible Foam Expansion Joint Filler complying with Section 4136 of the Standard Specifications. Minimum filler width is the abutment 'CF' joint width. Joint length as required to completely fill from back side of curb to front face of bridge wing.



MODIFIED
STANDARD ROAD PLAN

BR-203M

SHEET 3 of 3

DOUBLE REINFORCED 12" APPROACH