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APPENDIX F – STRUCTURE PLAN EXAMPLE DETIALS

The following structure sheets represent the general sheets, details, and notes typically used to provide a complete set of plans for the listed structure types. Please note that for each project and structure, the required sheets to complete the work may not be shown in this reference, and sheets shown may not be needed. It is the responsibility of the design engineer to recognize the complexity of the work and make the appropriate adjustments to the sheets and details considering variances in structure details, constructability, and project requirements.

It is important to note that the information contained in this Appendix is for reference only and should not be considered "Standards". If there are any concerns or specific questions regarding applicability of these examples, please contact the Office of Bridge Design for guidance or clarification.

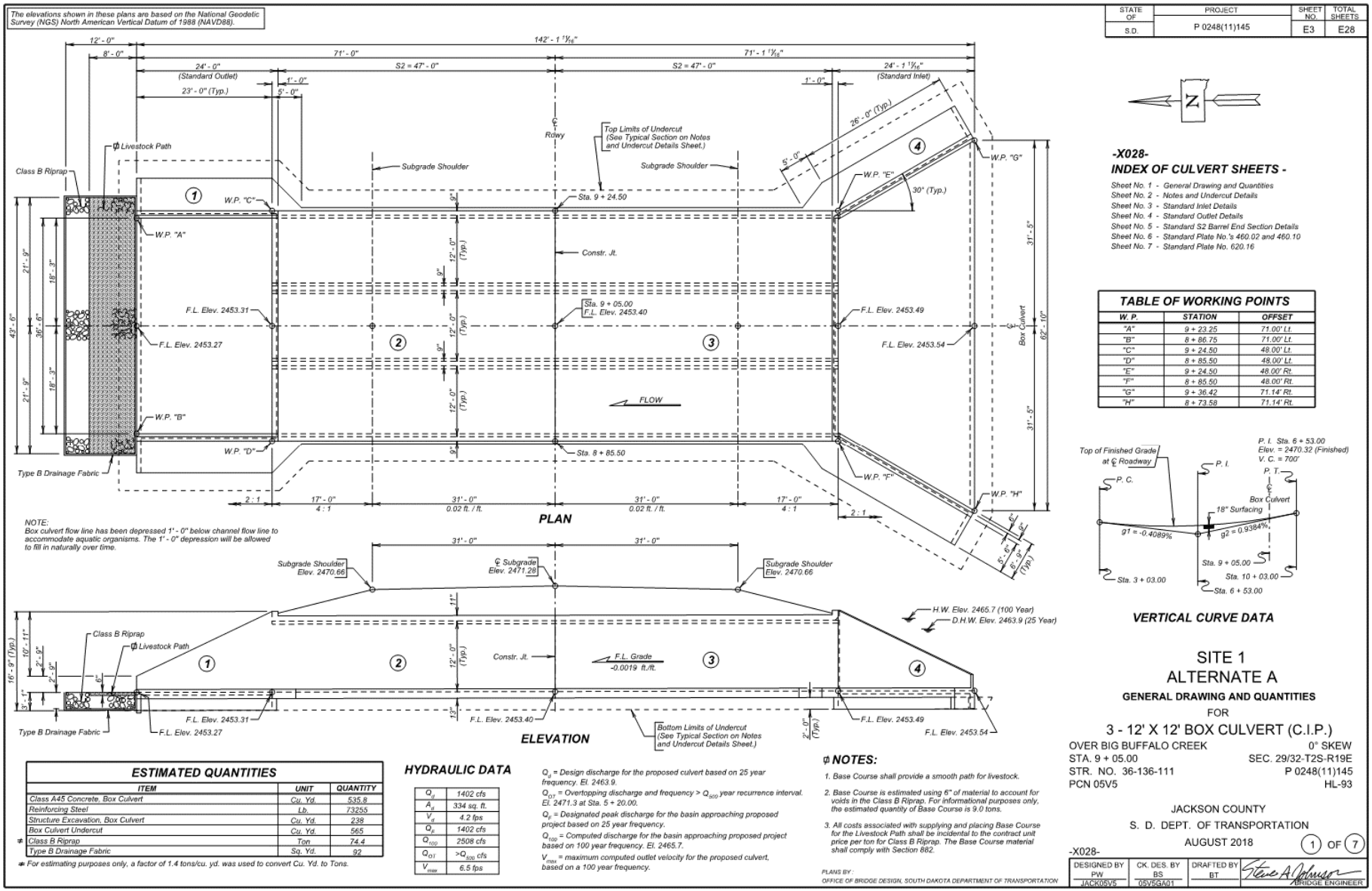
The Department will strive to provide the most current and up to date examples and details for each structure type in this Appendix. However, with the nature and evolution of the design process, construction process, and new technologies there will undoubtedly be new details that will need to be incorporated within these example sheets. As projects are completed and let the Department will strive to update the applicable example sheets in a timely manner.

F.1. Box Culvert Plans

Box culverts that fall within the requirements specified in Section 4 of this Manual will be bid both as a Cast in Place and Precast box culverts, and details for both shall be shown as outlined in F.1.1and F.1.2.

F.1.1. Square Cast-In-Place Box Culvert Plans

F.1.1.1. GENERAL DRAWING AND QUANTITIES



F.1.1.2. NOTES AND UNDERCUT DETAILS

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P 0248(11)145	E4	E28

SPECIFICATIONS

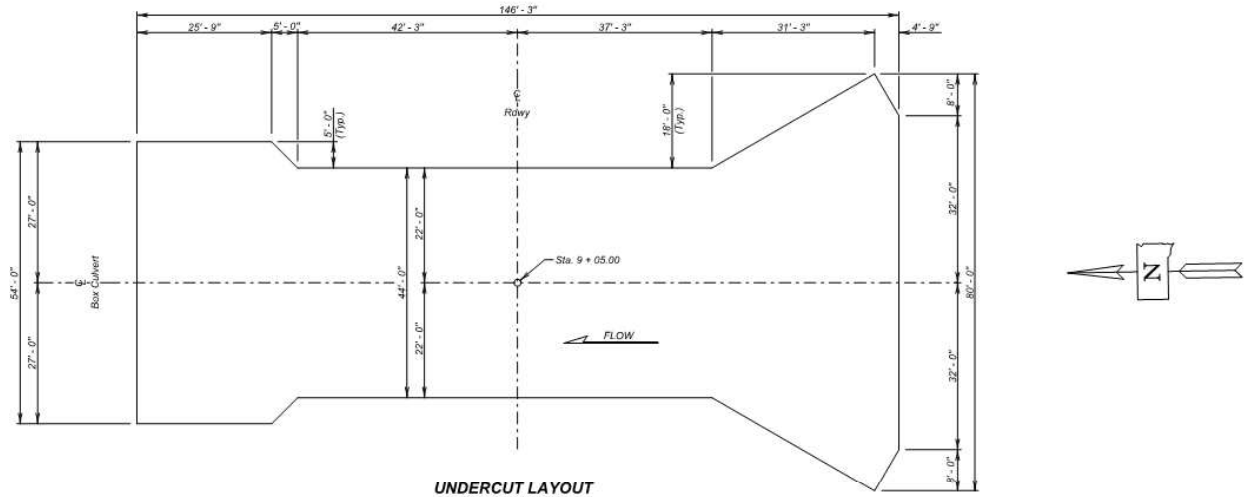
1. Design Specifications: AASHTO LRFD Bridge Design Specifications, 2017 Edition.
2. Construction Specifications: South Dakota Standard Specifications for Roads and Bridges, 2015 Edition and required Provisions, Supplemental Specifications, and Special Provisions as included in the Proposal.

GENERAL NOTES

1. Design Live Load: HL-93 and construction load consisting of two 7' - 6" gage axles spaced 30 ft. apart with gross axle weight (each axle) = 95,850 lbs. The construction load shall not be applied until a minimum of 4 ft. of fill has been placed over the Box Culvert. Other construction loads in excess of legal load must be submitted thru proper channels to the Office of Bridge Design for analysis.
2. The design of the barrel section is based on a minimum fill height of 2 foot and includes all subsequent fill heights up to and including the maximum fill height of 10 ft. (S2).
3. Design Material Strengths: Concrete f'c = 4500 p.s.i.
   Reinforcing Steel fy = 60000 p.s.i.
4. All concrete shall be Class A45 conforming to Section 460, except as noted.
5. All reinforcing steel shall conform to ASTM A615 Grade 60.
6. All exposed edges shall be chamfered ¾ inch.
7. Use 1 inch clear cover on all reinforcing steel EXCEPT as shown.
8. The Contractor shall imprint on the structure the date of construction as specified and detailed on Standard Plate No. 460.02.
9. Care shall be taken to establish Working Points (W.P.) as shown on the wings.
10. Circled numbers in PLAN and ELEVATION views on the General Drawing are section I.D. Numbers (see SDDOT Materials Manual).
11. Cost of Preformed Expansion Joint Filler used in apron construction shall be incidental to the other contract items.
12. Compaction of earth embankment and box culvert backfill material shall be governed by the Specified Density method.
13. Dewatering will be required to construct the box culvert.

SUBSURFACE INVESTIGATION (October 2018)

Station	Offset	Elevation	Material Description	Groundwater Elevation
8+34	9.5 ft Rt.	2472.3 – 2471.3	Asphalt surfacing	2451.8
		2471.3 – 2468.3	Brown gravel	
		2468.3 – 2466.3	Brown silt clay	
		2466.3 – 2446.3	Light brown/buff silt clay	
		2446.3 – 2441.8	Gray clay	
9+85	10.0 ft Lt.	2473.6 – 2472.6	Asphalt surfacing	Caved 2438.6
		2472.6 – 2468.6	Brown gravel	
		2468.6 – 2466.6	Brown silt clay	
		2466.6 – 2447.6	Light brown/buff clay silt	
		2450.6 – 2447.6	Buff clay sand	
		2447.6 – 2444.6	Gray clay	

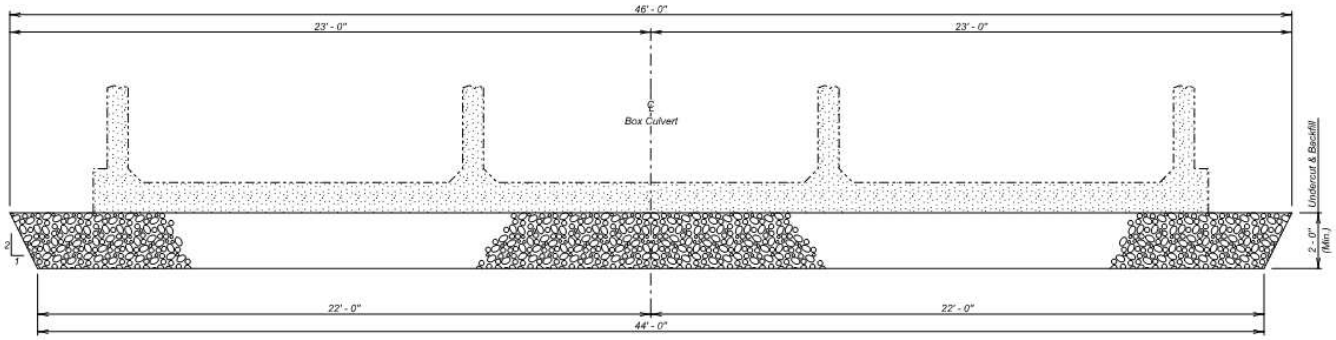


UNDERCUT LAYOUT
(Bottom Dimensions)

ESTIMATED QUANTITIES

ITEM	UNIT	QUANTITY
Box Culvert Undercut	Cu. Yd.	565

For payment, quantity is based on plan shown undercut dimensions and will not be measured unless the Engineer orders a change.



TYPICAL SECTION
(For Limits of Undercut)

SITE 1
ALTERNATE A
NOTES AND UNDERCUT DETAILS
FOR
3 - 12' X 12' BOX CULVERT (C.I.P.)

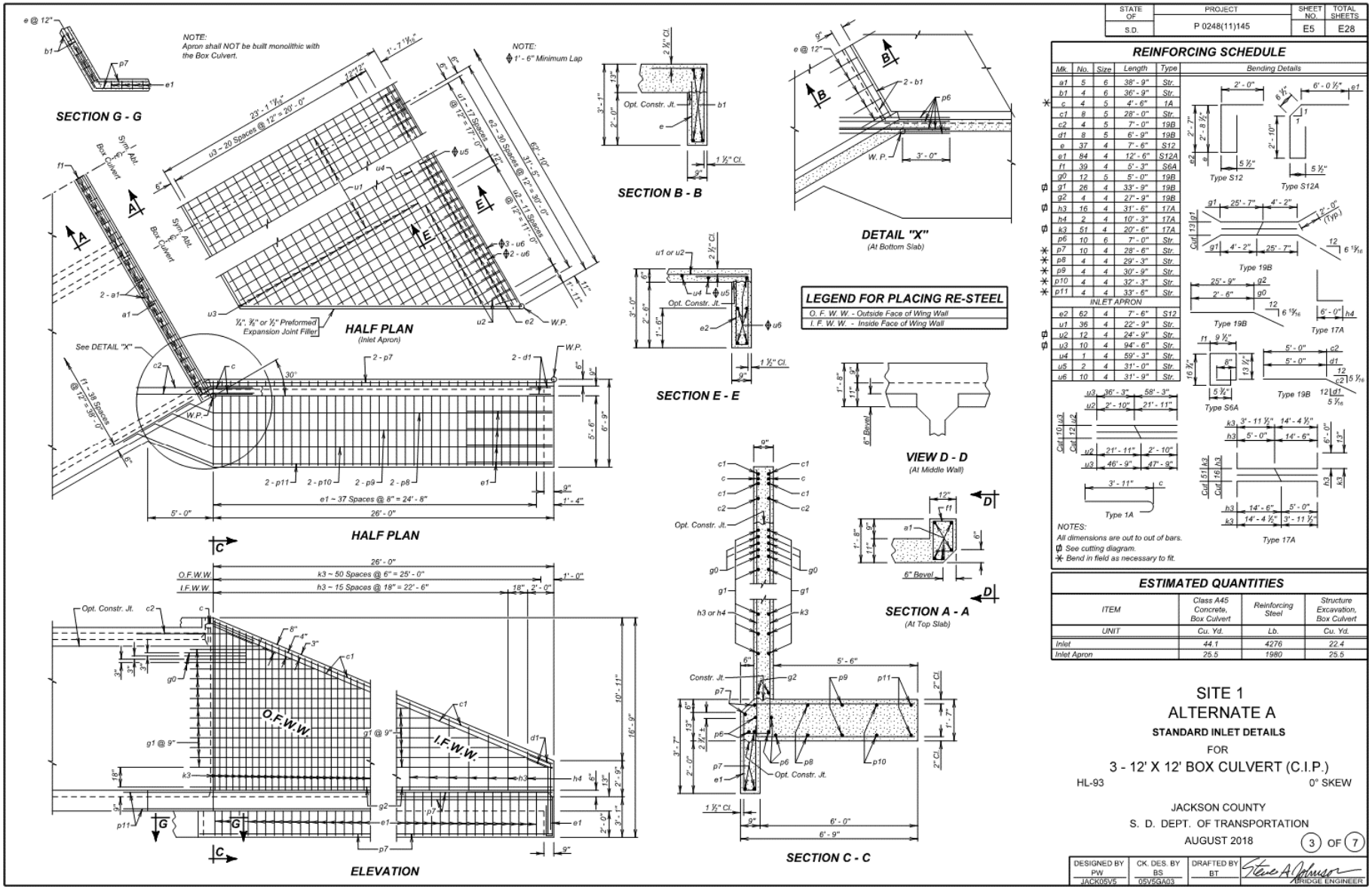
OVER BIG BUFFALO CREEK — 0° SKEW
STA. 9 + 05.00 — SEC. 29/32-T2S-R19E
STR. NO. 36-136-111 — P 0248(11)145
HL-93

JACKSON COUNTY
S. D. DEPT. OF TRANSPORTATION
AUGUST 2018

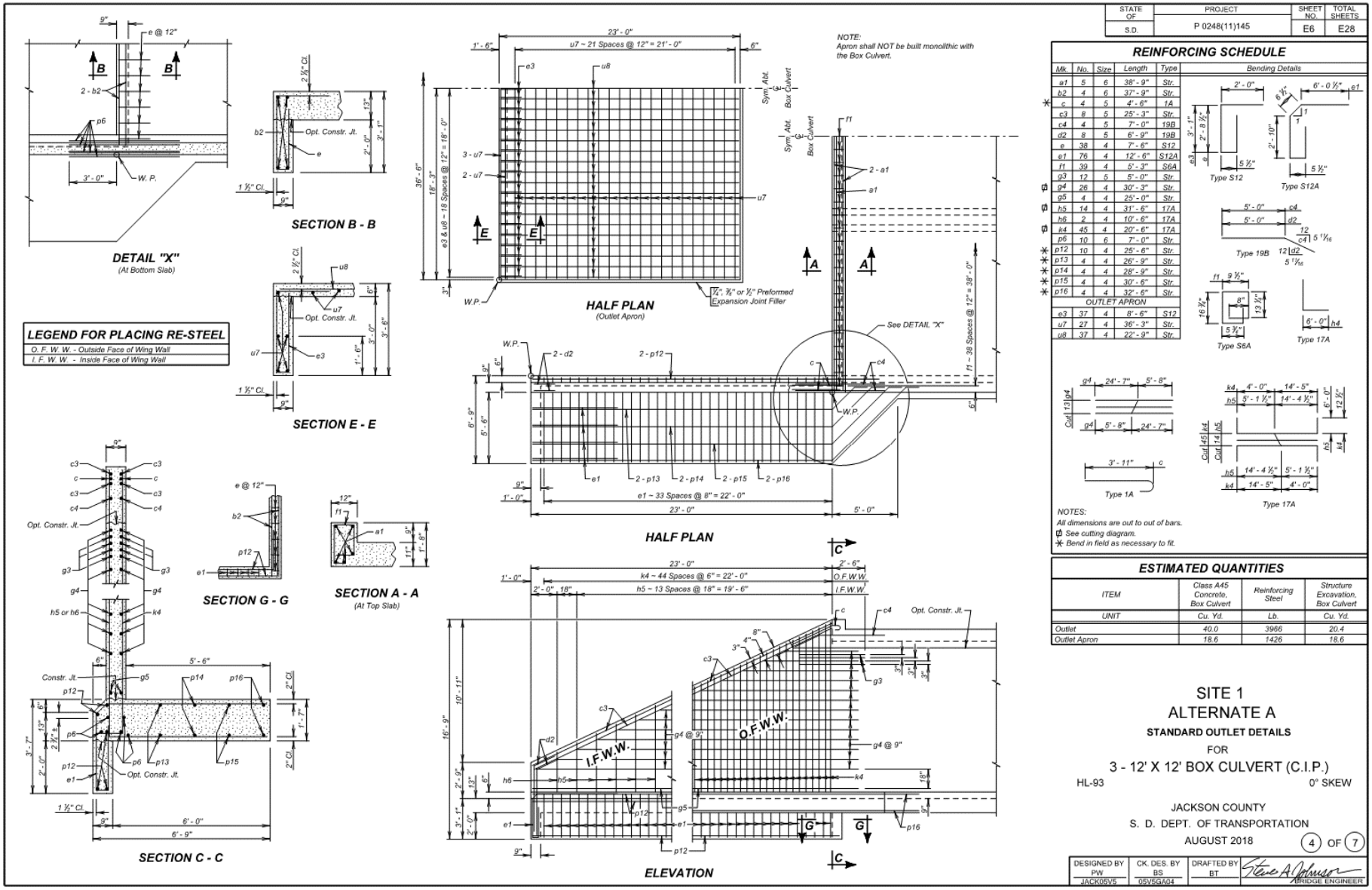
2 OF 7

DESIGNED BY	CK. DES. BY	DRAFTED BY	
PW	BS	BT	BRIDGE ENGINEER
JACK05V5	05V5GA02		

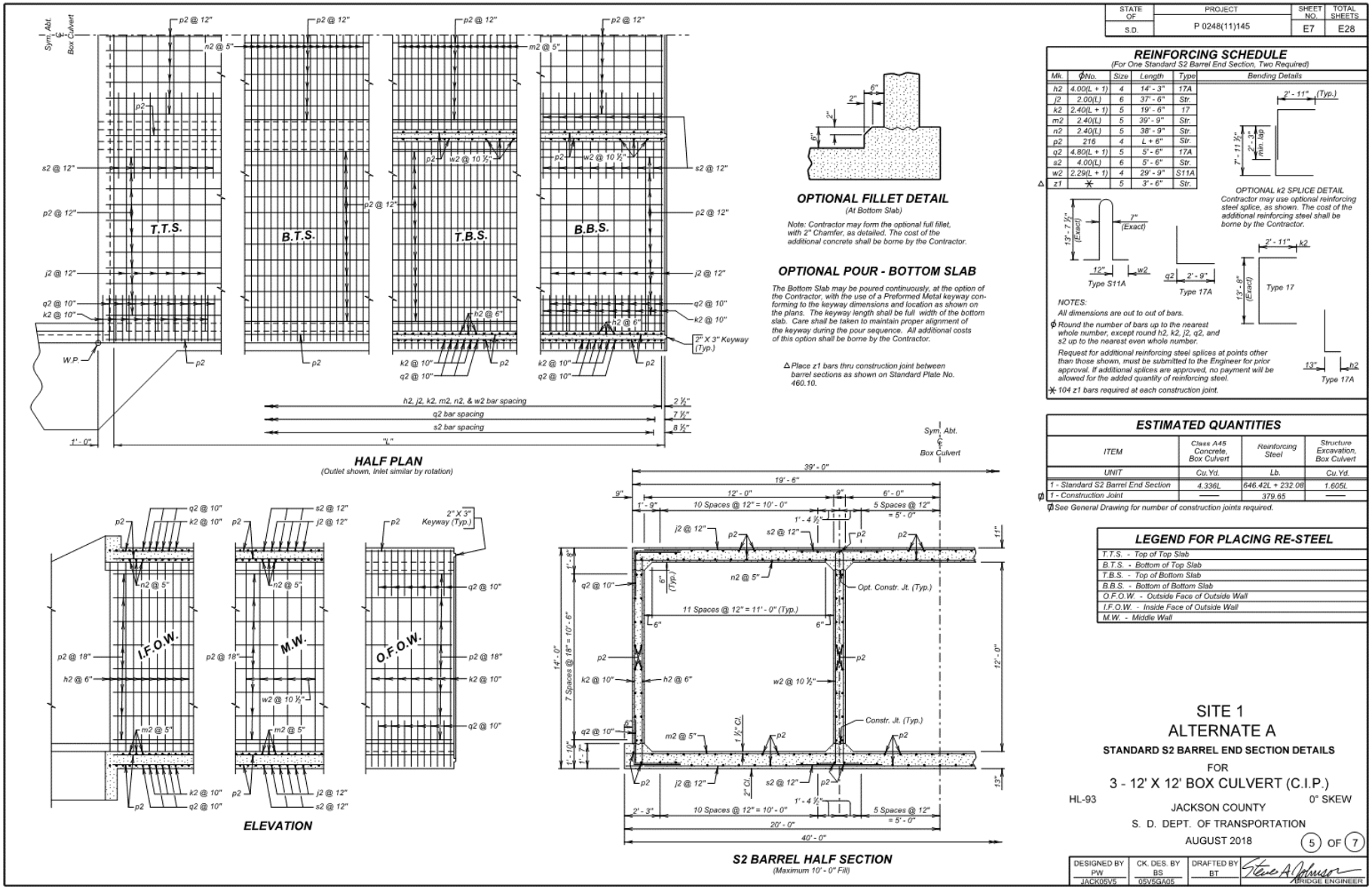
F.1.1.3. INLET DETAILS



F.1.1.4. OUTLET DETAILS

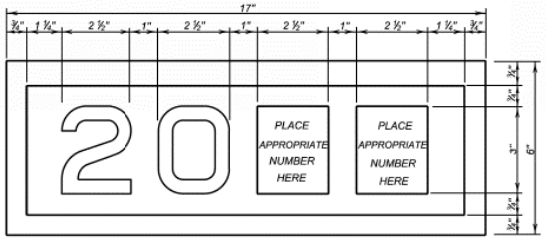


F.1.1.5. BARREL SECTION DETAILS



F.1.1.6. DETAILS OF STANDARD PLATES No's 460.02 & 460.10

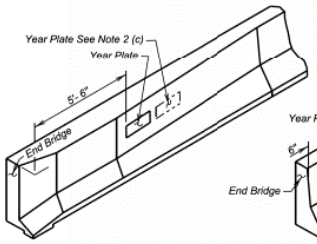
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P 0248(11)145	E8	E28



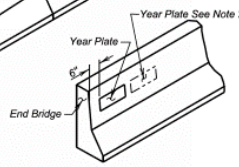
YEAR PLATE DETAILS

GENERAL NOTES:

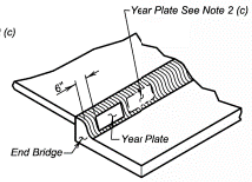
1. Year plates of the general dimensions shown shall be constructed on all box culverts and bridges. The year plates shall be constructed in reverse and attached to the forms in such a manner that the finished imprint in the concrete does not exceed one-half (½) inch in depth.
2. Year plates shall be located on structure (s) as follows:
   a. On cast-in-place box culverts the year plates shall be four and one - half (4 ½) inches below the top of the upstream parapet wall and centered laterally on the upstream face. On precast box culverts the year plate shall be centered laterally on the upstream face of the top slab. Where an extended interior wall interferes with this location, the year plate shall be centered in an adjacent barrel.
   b. On bridges with six (6) inch curbs or "Jersey" shaped barriers with no endblocks, the year plate shall be centered vertically on the curb face approximately six (6) inches from the end of the bridge, or as designated by the Engineer. On bridges with "Jersey" shaped barrier endblocks, the year plate shall be centered on the upper sloped portion of the barrier approximately 5'- 6" from the end of the bridge, or as designated by the Engineer. There shall be one year plate at each end of the bridge on opposite sides.
   c. When the plans specify that both the original date of construction and the date of reconstruction are to be shown, one date shall be placed as listed above and the other located adjacent to it. Both year plates shall be shown at each end of the bridge on opposite sides.
3. There will be no separate measurement or payment made for year plates on box culverts and bridges. All costs for this work shall be incidental to other contract items.



JERSEY BARRIER
(With Endblock)



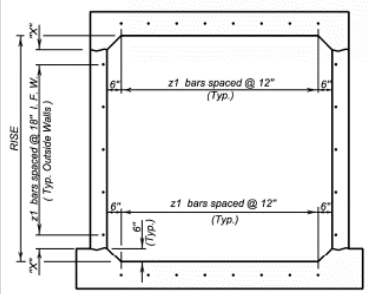
JERSEY BARRIER



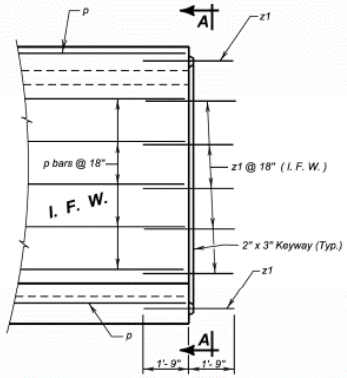
TYPE B CURB

June 26, 2012

Published Date: 2nd Qtr. 2019	SDDOT	YEAR PLATE DETAILS	PLATE NUMBER 460.02 Sheet 1 Of 1



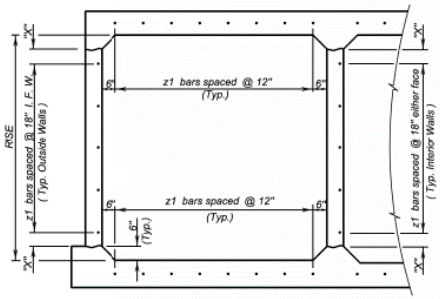
TYPICAL SINGLE BARREL VIEW A - A



ELEVATION

LEGEND FOR PLACING RE-STEEL
I. F. W. - Inside Face Wall

RISE	"X"
3'- 0"	3"
4'- 0"	9"
5'- 0"	6"
6'- 0"	3"
7'- 0"	9"
8'- 0"	6"
9'- 0"	3"
10'- 0"	9"
11'- 0"	6"
12'- 0"	3"



TYPICAL MULTIPLE BARREL VIEW A - A

GENERAL NOTES:

1. z1 bars shall be placed in the middle of the 2" X 3" keyway in the top and bottom slabs. z1 bars shall be lapped with the longitudinal p bars in the inside face of the wall for outside walls and in either face for interior walls. z1 bars are listed and included elsewhere in plans.
2. Drainage Fabric Protection shall be placed in accordance with Section 422, or Section 560, whichever is applicable.

June 26, 2012

Published Date: 2nd Qtr. 2019	SDDOT	BOX CULVERT BARREL TIE REINFORCEMENT	PLATE NUMBER 460.10 Sheet 1 of 1

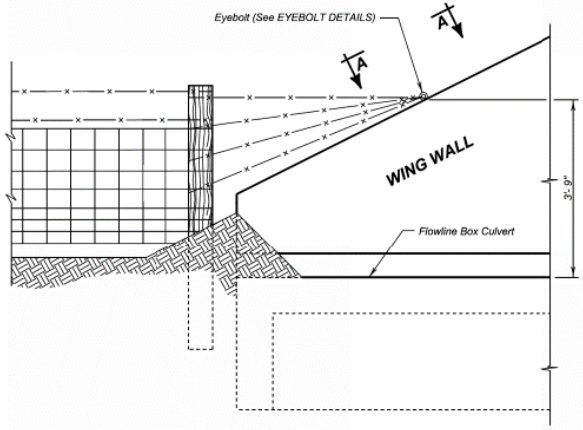
SITE 1
ALTERNATE A

3 - 12' X 12' BOX CULVERT (C.I.P.)
STR. NO. 36-136-111
AUGUST 2018

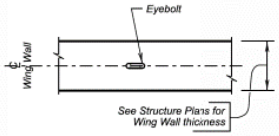
6 OF 7

F.1.1.7. DETAILS OF STANDARD PLATE NO. 620.16

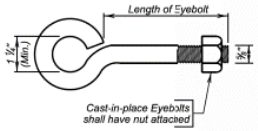
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P 0248(11)145	E9	E28



DETAIL FOR FENCE ANCHORS



VIEW A - A



EYEBOLT DETAILS

GENERAL NOTES:

1. The fence and post details shown are for illustrative purpose only. The fence shall be as specified elsewhere in the plans.
2. Eyebolts shall be placed on all of the box culvert wing walls.
3. Eyebolts shall be ⅝ inch diameter and shall conform to ASTM A307.
4. Eyebolts, nuts, and concrete inserts shall be galvanized in accordance with AASHTO M232 (ASTM A153). Concrete inserts of corrosion resistant material need not be galvanized.
5. Cast-in-place eyebolts shall have a nut attached, be 4 ½ inches (Min.) in length and shall be embedded such that the eye of the bolt is flush with the concrete surface. (See Eyebolt Details) As an alternate, cast-in-place concrete inserts, capable of developing the full strength of the ⅝ inch diameter threaded eyebolt, may be used and shall be set in the concrete in accordance with the manufacturer's recommendations. The eyebolt shall be of sufficient length to develop its full strength. The eye of the eyebolt shall be flush with the concrete surface.
6. The cost for furnishing and installing eyebolts and/or concrete inserts shall be incidental to various contract items.

December 23, 2012

Published Date: 2nd Qtr. 2019	SDDOT	FENCE ANCHORS FOR BOX CULVERT WING WALLS	PLATE NUMBER 620.16 Sheet 1 of 1

SITE 1
ALTERNATE A

3 - 12' X 12' BOX CULVERT (C.I.P.)
STR. NO. 36-136-111
AUGUST 2018

7 OF 7

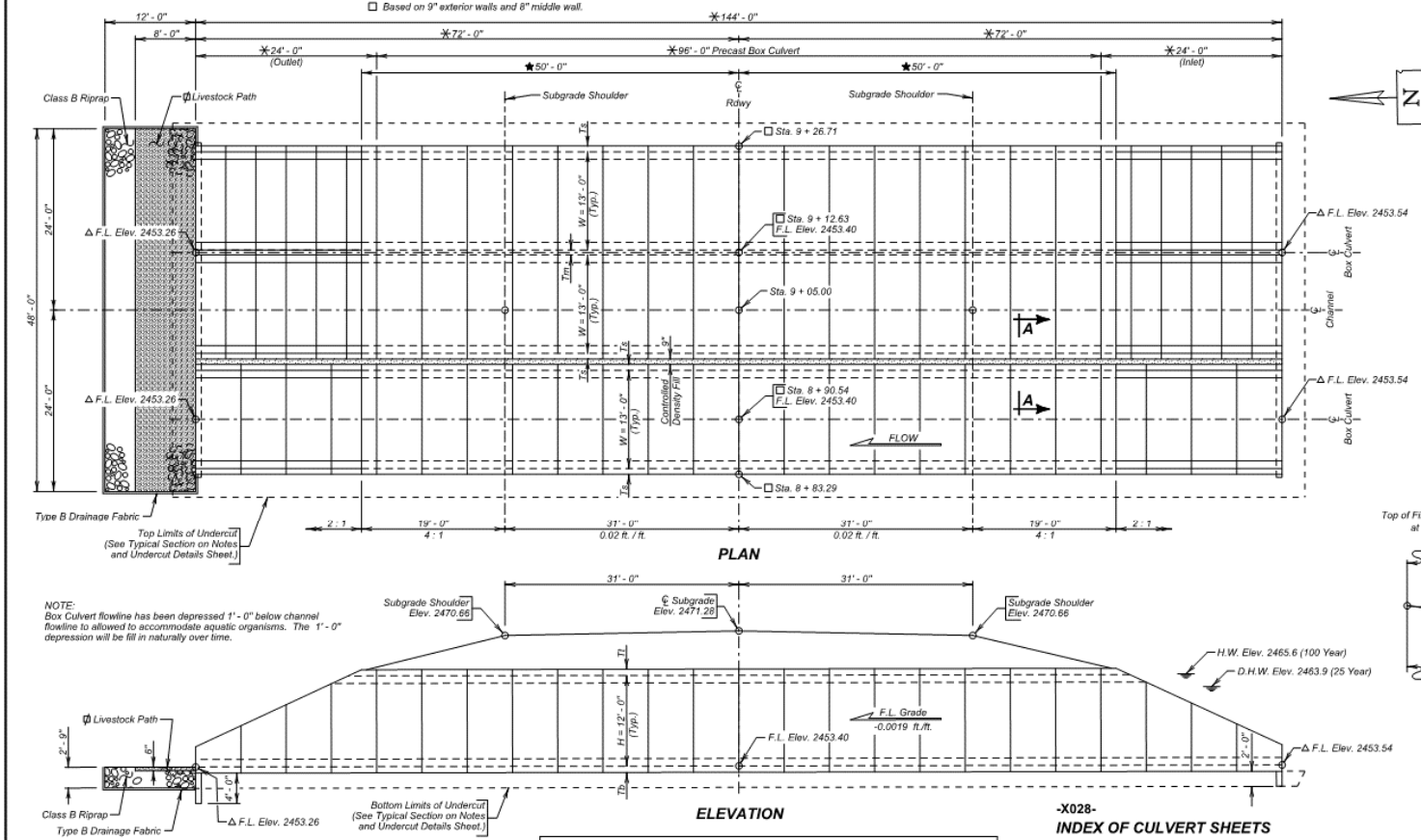
F.1.2. Precast Box Culvert Plans

F.1.2.1. GENERAL DRAWING AND QUANTITIES

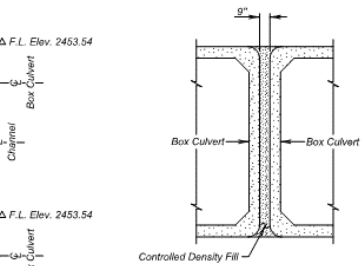
The elevations shown in these plans are based on the National Geodetic Survey (NGS) North American Vertical Datum of 1988 (NAVD88).

✳ Dimension may vary with fabricator and/or installation. See Shop Plans for actual installation length.
★ Minimum distance to satisfy fill slope.
△ Based on dimensions shown.
□ Based on 9" exterior walls and 8" middle wall.

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P 0248(11)145	E10	E28



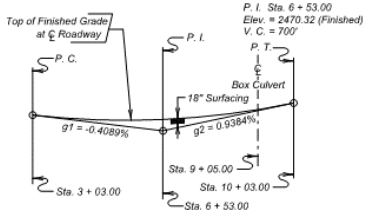
PLAN



SECTION A - A

LEGEND

W = Width of Opening
H = Height of Opening
Tt = Thickness of Top Slab
Tb = Thickness of Bottom Slab
Ts = Thickness of Side Wall
Tm = Thickness of Middle Wall



VERTICAL CURVE DATA

NOTE:
Box Culvert flowline has been depressed 1' - 0" below channel flowline to allowed to accommodate aquatic organisms. The 1' - 0" depression will be fill in naturally over time.

ELEVATION

HYDRAULIC DATA

Q_d	1402 cfs
A_d	359 sq. ft.
V_d	3.9 fps
Q_P	1402 cfs
Q_{100}	2508 cfs
Q_{OT}	$>Q_{500}$ cfs
V_{max}	6.1 fps

Q_d = Design discharge for the proposed culvert based on 25 year frequency. El. 2463.9.
Q_{OT} = Overtopping discharge and frequency > Q_{500} year recurrence interval. El. 2471.3 at Sta. 5 + 20.00.
Q_P = Designated peak discharge for the basin approaching proposed project based on 25 year frequency.
Q_{100} = Computed discharge for the basin approaching proposed project based on 100 year frequency. El. 2465.6.
V_{max} = maximum computed outlet velocity for the proposed culvert, based on a 100 year frequency.

ESTIMATED QUANTITIES

	ITEM	UNIT	QUANTITY
∮	Structure Excavation, Box Culvert	Cu. Yd.	200
	Box Culvert Undercut	Cu. Yd.	536
#	Class B Riprap	Ton	82.1
	Type B Drainage Fabric	Sq. Yd.	101
	Controlled Density Fill	Cu. Yd.	48.5
	13' X 12' Precast Concrete Box Culvert, Furnish	Ft.	96
	13' X 12' Precast Concrete Box Culvert, Install	Ft.	96
	13' X 12' Precast Concrete Box Culvert End Section, Furnish	Each	2
	13' X 12' Precast Concrete Box Culvert End Section, Install	Each	2
	2 - 13' X 12' Precast Concrete Box Culvert, Furnish	Ft.	96
	2 - 13' X 12' Precast Concrete Box Culvert, Install	Ft.	96
	2 - 13' X 12' Precast Concrete Box Culvert End Section, Furnish	Each	2
	2 - 13' X 12' Precast Concrete Box Culvert End Section, Install	Each	2

∮ Quantity is based on 10" bottom slab, 10" top slab and 9" exterior walls and 8" middle wall.
For estimating purposes only, a factor of 1.4 tons/cu. yd. was used to convert Cu. Yd. to Tons.

-X028-
INDEX OF CULVERT SHEETS

Sheet No. 1 - General Drawing and Quantities
Sheet No. 2 - Notes and Undercut Details
Sheet No. 3 - Details of Standard Plate No's. 460.02 & 560.01
Sheet No. 4 - Details of Standard Plate No's. 560.10 & 560.11
Sheet No. 5 - Details of Standard Plate No's. 560.20 & 560.21
Sheet No. 6 - Details of Standard Plate No. 620.16

∮ NOTES:

1. Base Course shall provide a smooth path for livestock.
2. Base Course is estimated using 6" of material to account for voids in the Class B Riprap. For informational purposes only, the estimated quantity of Base Course is 10.0 tons.
3. All costs associated with supplying and placing Base Course for the Livestock Path shall be incidental to the contract unit price per ton for Class B Riprap. The Base Course material shall comply with Section 882.

PLANS BY :
OFFICE OF BRIDGE DESIGN, SOUTH DAKOTA DEPARTMENT OF TRANSPORTATION

SITE 1
ALTERNATE B
GENERAL DRAWING AND QUANTITIES
FOR
3 - 13' X 12' BOX CULVERT (PRECAST)
OVER BIG BUFFALO CREEK 0° SKEW
STA. 9 + 05.00 SEC. 29/32-T2S-R19E
STR. NO. 36-136-111 P 0248(11)145
PCN 05V5 HL-93

JACKSON COUNTY
S. D. DEPT. OF TRANSPORTATION
AUGUST 2018 1 OF 6

-X028-

DESIGNED BY	CK. DES. BY	DRAFTED BY	
PW JACK05V5	BS 05V5GA08	BT	BRIDGE ENGINEER

F.1.2.2. NOTES AND UNDERCUT DETAILS

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P 0248(11)145	E11	E28

SPECIFICATIONS

Use South Dakota Standard Specifications for Roads and Bridges, 2015 Edition and Required Provisions, Supplemental Specifications and Special Provisions as included in the Proposal.

GENERAL NOTES

Design shall be in accordance with Section 560 of the South Dakota Specifications with the following criteria:

1. Box culvert and box culvert end section design shall conform to the AASHTO LRFD Bridge Design Specifications, 2017 Edition.
2. Design Live Load: HL-93 and construction loading consisting of one 7'-6" gage axle with gross weight = 95,850 lbs. The construction load shall not be applied until a minimum of 4 ft. of fill has been placed over the Box Culvert. If other construction loads in excess of legal load are anticipated by the Contractor, the Contractor shall submit a design analysis for the anticipated construction loading, through the proper channels, to the Office of Bridge Design for approval.
3. The box culvert shall be load rated in accordance with the AASHTO Manual for Bridge Evaluation, 2018 Edition with latest Interim Revisions using the LRFR method. The rating shall include evaluation of the Design HL-93 truck at both Inventory and Operating levels and a Legal Load rating for the three SD legal trucks (Type 3, 3S2 and 3-2) as well as the notional rating load and four specialized hauling vehicles. The structure shall also be evaluated for the emergency vehicles, EV2 and EV3, at the legal load rating level. All sections of the box culvert shall rate at HL-93 or better (Inventory Level). The three SD Legal Loads, the notional rating load, the four specialized hauling vehicles, and two emergency vehicles shall rate greater than 1.0 at legal load rating level. Submit Load Rating calculations with the Design and Check Design calculations or shop plans, as appropriate.
4. The design of the barrel sections shall be based on a minimum fill height of 2 feet and include all subsequent fill heights up to and including the maximum fill height of 10 ft. over the box culvert.
5. Minimum inside corner fillet shall be 6 in.
6. Minimum precast barrel section length shall be 4 ft.
7. Lift holes shall be plugged with an approved nonshrinkable grout.
8. The Fabricator shall imprint on the structure the date of construction as specified and detailed on Standard Plate No. 460.02.
9. Alternate end section details will be allowed, subject to the approval of the Bridge Construction Engineer. No additional payment will be made for any change in the barrel/end section configuration.
10. Installation of the precast sections shall be in accordance with the final approved shop plans.
11. Compaction of earth embankment and box culvert backfill shall be governed by the Specified Density method.
12. Adjust cutoff wall shown on Standard Plates No. 560.10, 560.11, 560.20, and 560.21 to extend the full width of the end sections (out-to-out) plus 9 inch spacing.
13. Care shall be taken when moving sections, handling holes shall be used with approved equipment. Pulling or pushing sections on the ground will not be allowed to transport sections.
14. Dewatering will be required to construct the box culvert.

SUBSURFACE INVESTIGATION (October 2018)

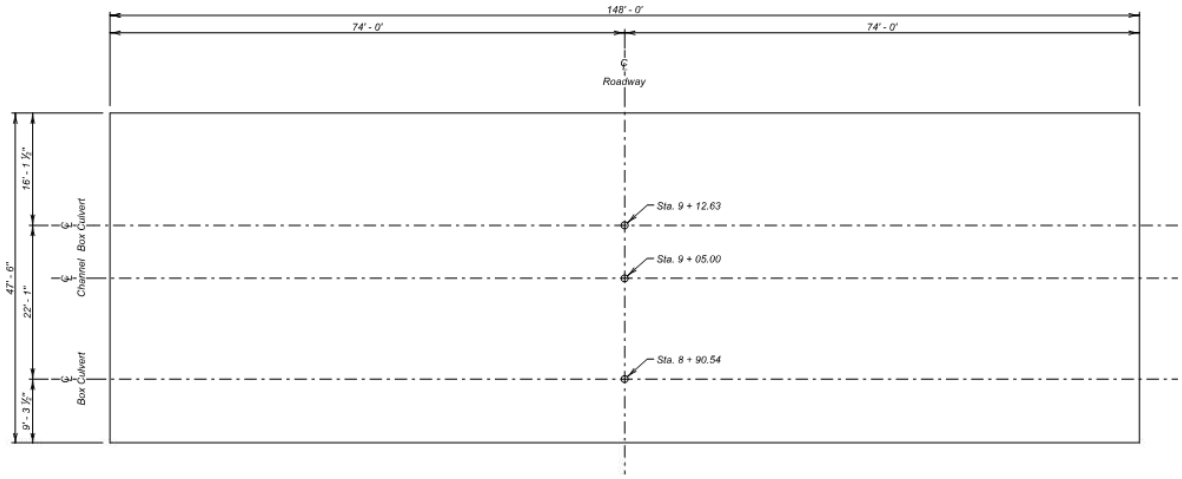
Station	Offset	Elevation	Material Description	Groundwater Elevation
8+34	9.5 ft Rt.	2472.3 – 2471.3	Asphalt surfacing	2451.8
		2471.3 – 2468.3	Brown gravel	
		2468.3 – 2466.3	Brown silt clay	
		2466.3 – 2446.3	Light brown/buff silt cay	
		2446.3 – 2441.8	Gray clay	
9+85	10.0 ft Lt.	2473.6 – 2472.6	Asphalt surfacing	Caved 2438.6
		2472.6 – 2468.6	Brown gravel	
		2468.6 – 2466.6	Brown silt clay	
		2466.6 – 2447.6	Light brown/buff clay silt	
		2450.6 – 2447.6	Buff clay sand	
		2447.6 – 2444.6	Gray clay	

DESIGN MIX OF CONCRETE

1. Mix shall be as per fabricator's design, however minimum compressive strength shall not be less than 4500 p.s.i. at 28 days.
2. Type II cement is required.

SHOP PLANS

The fabricator shall submit shop plans in accordance with the specifications. Include design and check design, if applicable, with initial submittal.

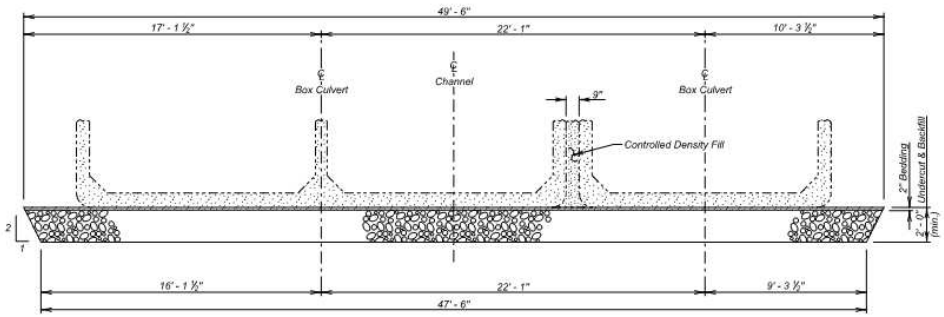


UNDERCUT LAYOUT
(Bottom Dimensions)

ESTIMATED QUANTITIES

ITEM	UNIT	QUANTITY
₽ Box Culvert Undercut	Cu. Yd.	536

₽ For payment, quantity is based on plan shown undercut dimensions and will not be measured unless the Engineer orders a change.



TYPICAL SECTION
(For Limits of Undercut)

SITE 1
ALTERNATE B

NOTES & UNDERCUT DETAILS

FOR

3 - 13' X 12' BOX CULVERT (PRECAST)

OVER BIG BUFFALO CREEK — 0° SKEW
STA. 9 + 05.00 — SEC. 29/32-T2S-R19E
STR. NO. 36-136-111 — P 0248(11)145
HL-93

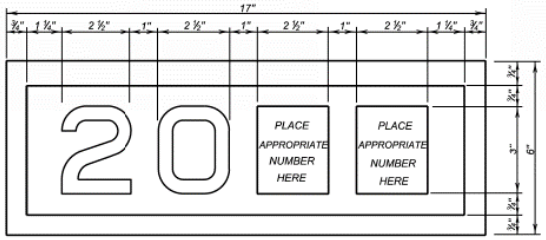
JACKSON COUNTY
S. D. DEPT. OF TRANSPORTATION
AUGUST 2018

2 OF 6

DESIGNED BY	CK. DES. BY	DRAFTED BY	
PW	BS	BT	BRIDGE ENGINEER
JACK05V5	05V5GA09		

F.1.2.3. DETAILS OF STANDARD PLATES No's 460.02 & 560.01

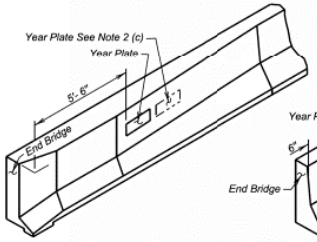
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P 0248(11)145	E12	E28



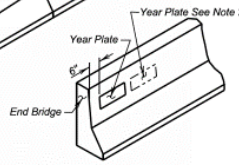
YEAR PLATE DETAILS

GENERAL NOTES:

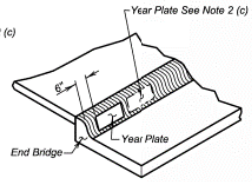
1. Year plates of the general dimensions shown shall be constructed on all box culverts and bridges. The year plates shall be constructed in reverse and attached to the forms in such a manner that the finished imprint in the concrete does not exceed one-half (½) inch in depth.
2. Year plates shall be located on structure (s) as follows:
   a. On cast-in-place box culverts the year plates shall be four and one - half (4 ½) inches below the top of the upstream parapet wall and centered laterally on the upstream face. On precast box culverts the year plate shall be centered laterally on the upstream face of the top slab. Where an extended interior wall interferes with this location, the year plate shall be centered in an adjacent barrel.
   b. On bridges with six (6) inch curbs or "Jersey" shaped barriers with no endblocks, the year plate shall be centered vertically on the curb face approximately six (6) inches from the end of the bridge, or as designated by the Engineer. On bridges with "Jersey" shaped barrier endblocks, the year plate shall be centered on the upper sloped portion of the barrier approximately 5'- 6" from the end of the bridge, or as designated by the Engineer. There shall be one year plate at each end of the bridge on opposite sides.
   c. When the plans specify that both the original date of construction and the date of reconstruction are to be shown, one date shall be placed as listed above and the other located adjacent to it. Both year plates shall be shown at each end of the bridge on opposite sides.
3. There will be no separate measurement or payment made for year plates on box culverts and bridges. All costs for this work shall be incidental to other contract items.



JERSEY BARRIER
(With Endblock)



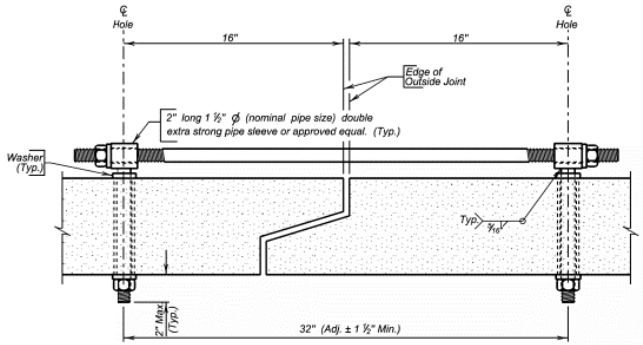
JERSEY BARRIER



TYPE B CURB

June 26, 2012

Published Date: 2nd Qtr. 2019	SDDOT	YEAR PLATE DETAILS	PLATE NUMBER 460.02 Sheet 1 Of 1



TIE BOLT ASSEMBLY

GENERAL NOTES:

1. All holes for tie bolts shall be cast-in-place,16 inches from outside edge of joint. Cast in inserts or sleeves, if used, shall be made of a corrosion resistant material.
2. Ties shall be 1 inch ø and conform to the requirements of ASTM A36, ASTM A307, or ASTM F1554, Gr. 36. Nuts shall be heavy hex in conformance with ASTM A563. Washers shall conform to ASTM F436, Type 1. The welded pipe sleeve shall conform to ASTM A53, Grade B.
3. Welding and weld inspection shall be in conformance with AWS/ANSI D1.1 - (Current Year) Structural Welding Code - Steel.
4. Tie Bolt Assembly shall be galvanized in accordance with ASTM A153 or ASTM F2329 as applicable.
5. Tie Bolt Assembly details may vary from that shown, but alternate tie bolt assemblies are subject to testing to demonstrate equal strength. Submit details, through proper channels, to the Office of Bridge Design for approval.
6. All costs for furnishing and installing the precast box culvert tie bolt assembly shall be incidental to the contract unit price per Foot for "Precast Concrete Box Culvert, Furnish".

March 21, 2016

Published Date: 2nd Qtr. 2019	SDDOT	PRECAST BOX CULVERT TIE BOLT ASSEMBLY DETAILS	PLATE NUMBER 560.01 Sheet 1 of 1

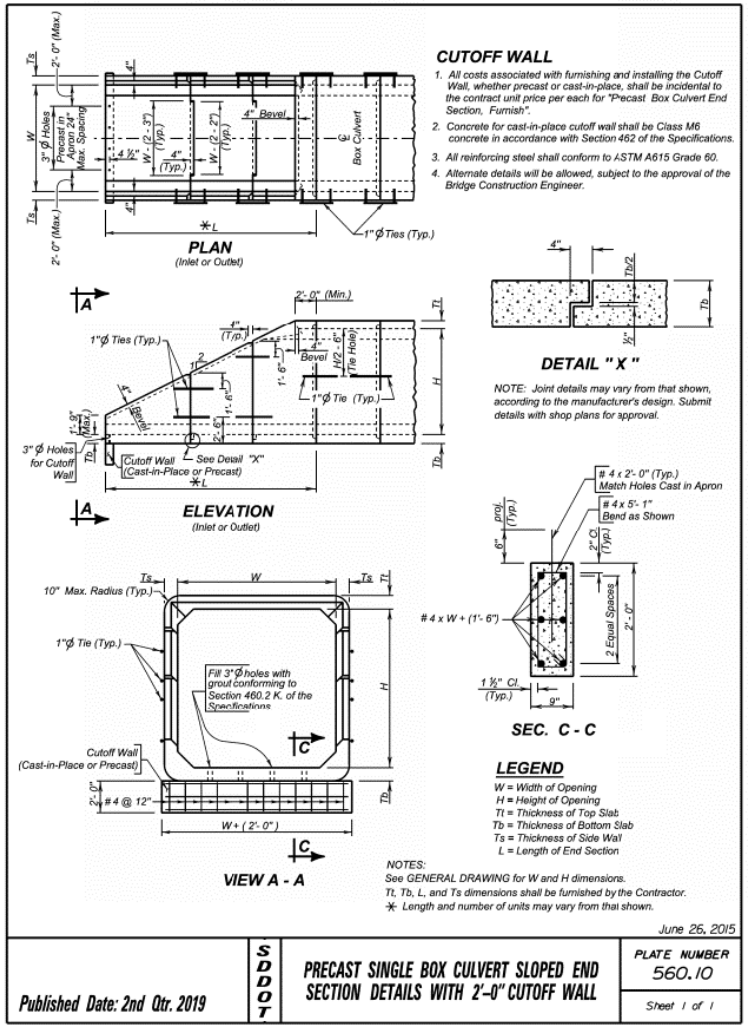
SITE 1
ALTERNATE B

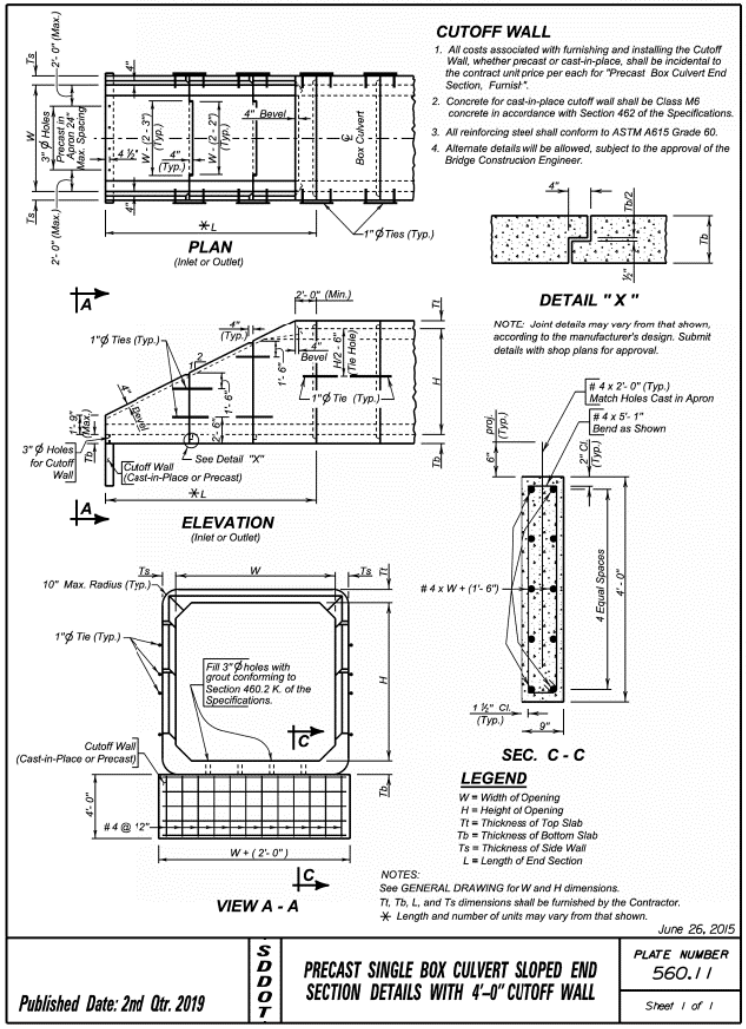
3 - 13' X 12' BOX CULVERT (PRECAST)
STR. NO. 36-136-111
AUGUST 2018

3 OF 6

F.1.2.4. DETAILS OF STANDARD PLATES No's 560.10 & 560.11

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P 0248(11)145	E13	E28



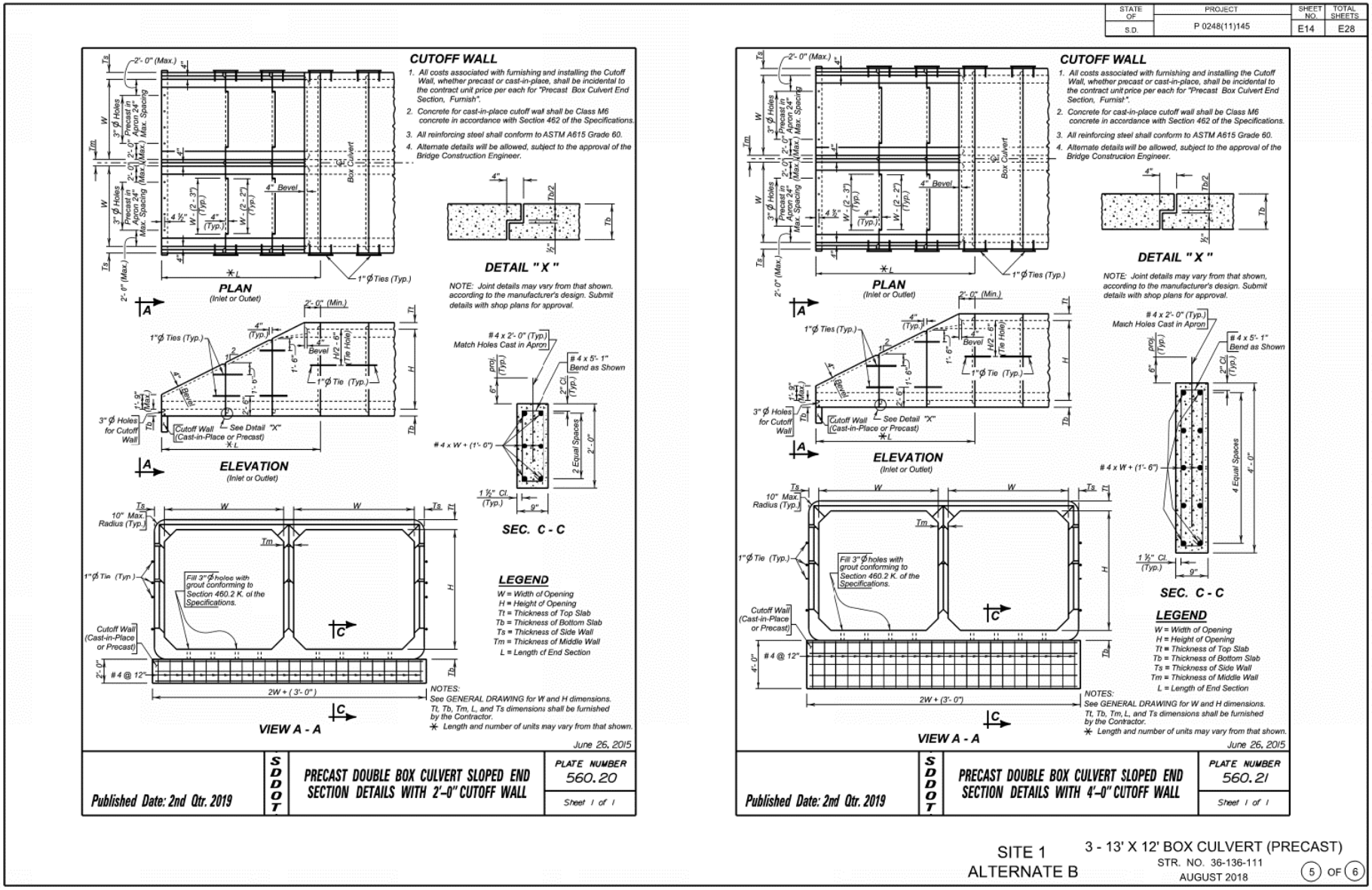


SITE 1
ALTERNATE B

3 - 13' X 12' BOX CULVERT (PRECAST)
STR. NO. 36-136-111
AUGUST 2018

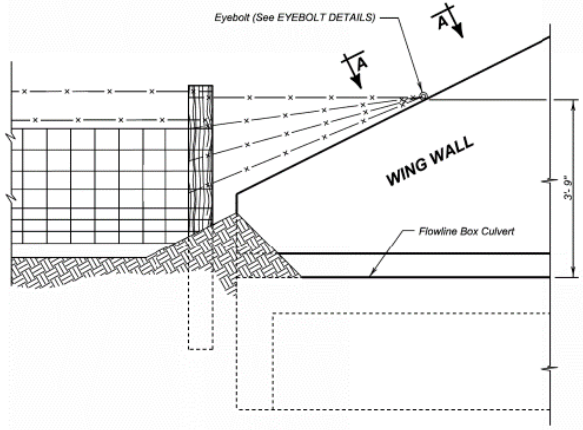
4 OF 6

F.1.2.5. DETAILS OF STANDARD PLATES No's 560.20 & 560.21



F.1.2.6. DETAILS OF STANDARD PLATES No 620.16

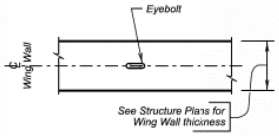
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P 0248(11)145	E15	E28



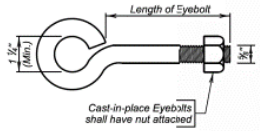
DETAIL FOR FENCE ANCHORS

GENERAL NOTES:

1. The fence and post details shown are for illustrative purpose only. The fence shall be as specified elsewhere in the plans.
2. Eyebolts shall be placed on all of the box culvert wing walls.
3. Eyebolts shall be ⅝ inch diameter and shall conform to ASTM A307.
4. Eyebolts, nuts, and concrete inserts shall be galvanized in accordance with AASHTO M232 (ASTM A153). Concrete inserts of corrosion resistant material need not be galvanized.
5. Cast-in-place eyebolts shall have a nut attached, be 4 ½ inches (Min.) in length and shall be embedded such that the eye of the bolt is flush with the concrete surface. (See Eyebolt Details) As an alternate, cast-in-place concrete inserts, capable of developing the full strength of the ⅝ inch diameter threaded eyebolt, may be used and shall be set in the concrete in accordance with the manufacturer's recommendations. The eyebolt shall be of sufficient length to develop its full strength. The eye of the eyebolt shall be flush with the concrete surface.
6. The cost for furnishing and installing eyebolts and/or concrete inserts shall be incidental to various contract items.



VIEW A - A



EYEBOLT DETAILS

December 23, 2012

Published Date: 2nd Qtr. 2019	SDDOT	FENCE ANCHORS FOR BOX CULVERT WING WALLS	PLATE NUMBER 620.16 Sheet 1 of 1

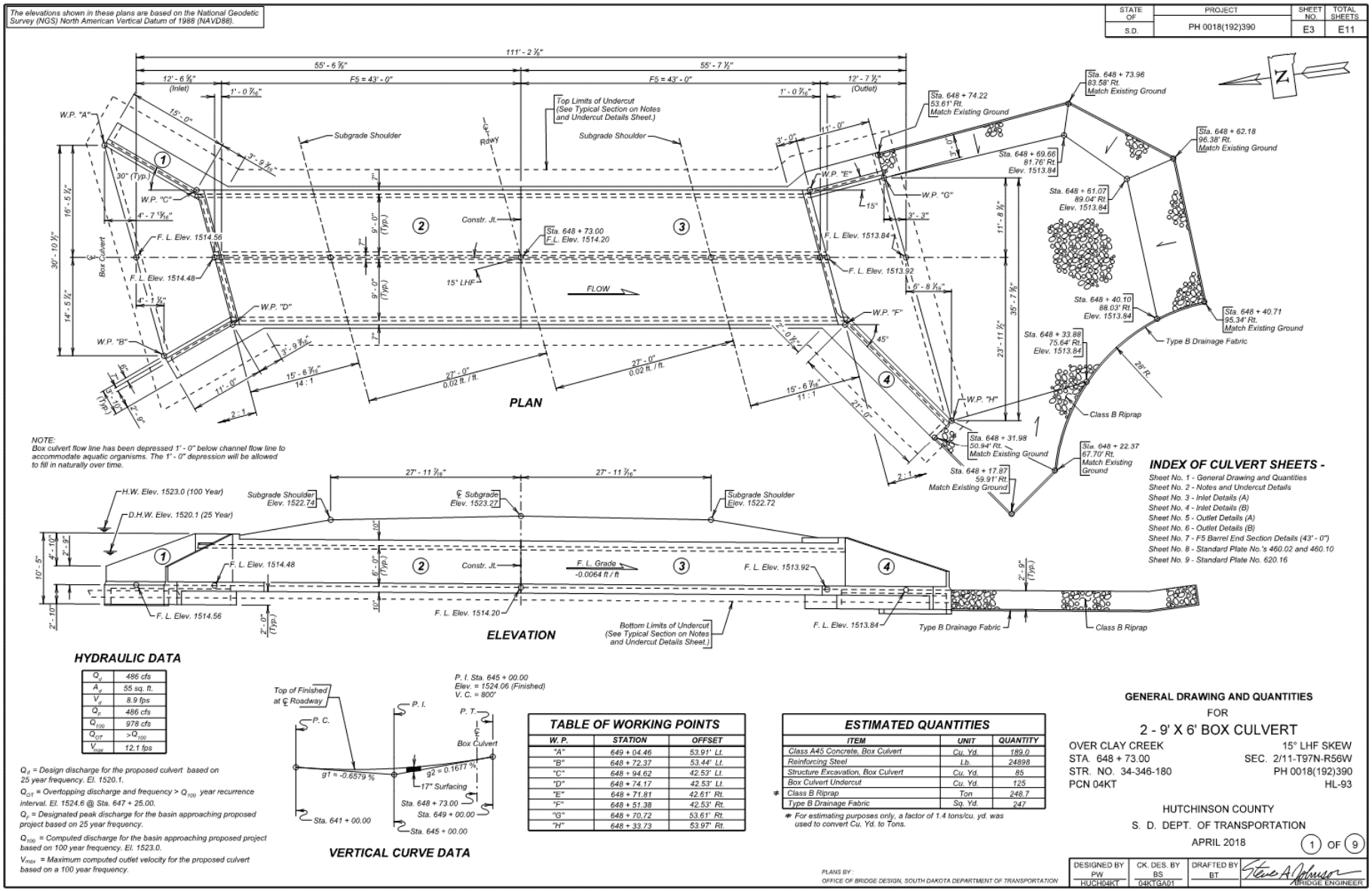
SITE 1
ALTERNATE B

3 - 13' X 12' BOX CULVERT (PRECAST)
STR. NO. 36-136-111
AUGUST 2018

6 OF 6

F.1.3. Skewed Cast-In-Place Box Culvert Plans

F.1.3.1. GENERAL DRAWING AND QUANTITIES



F.1.3.2. NOTES AND UNDERCUT DETAILS

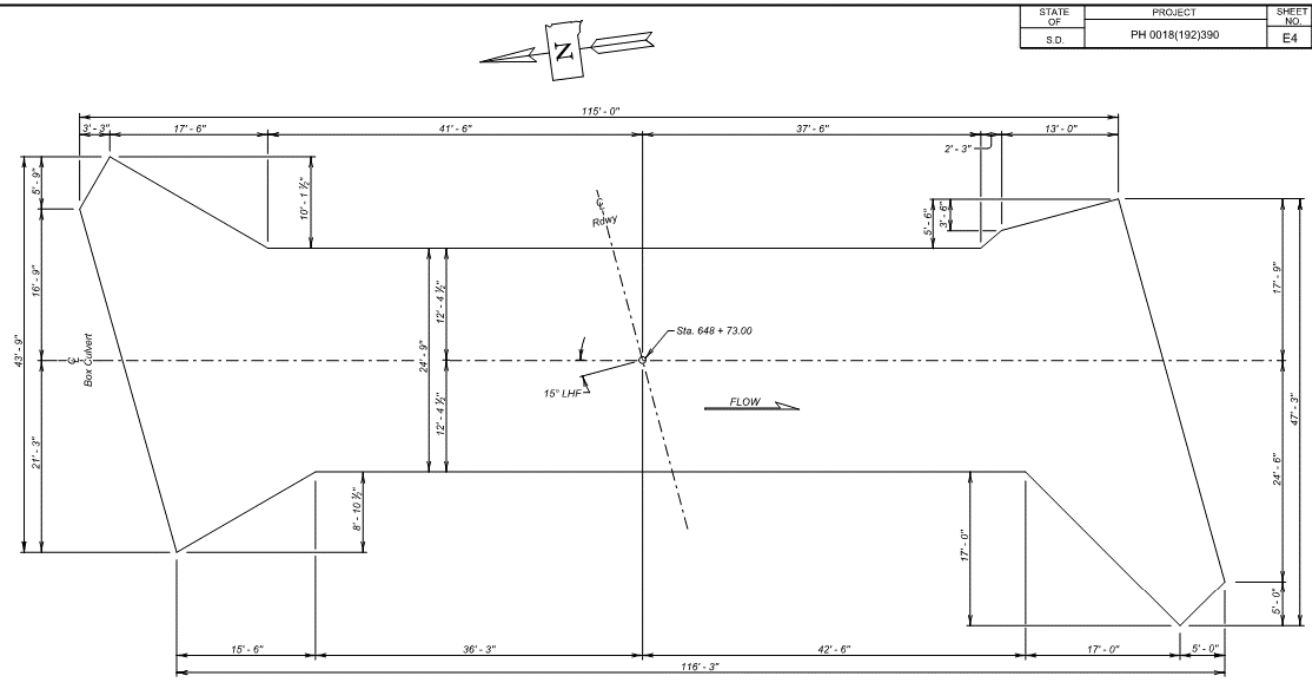
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	PH 0018(192)390	E4	E11

SPECIFICATIONS

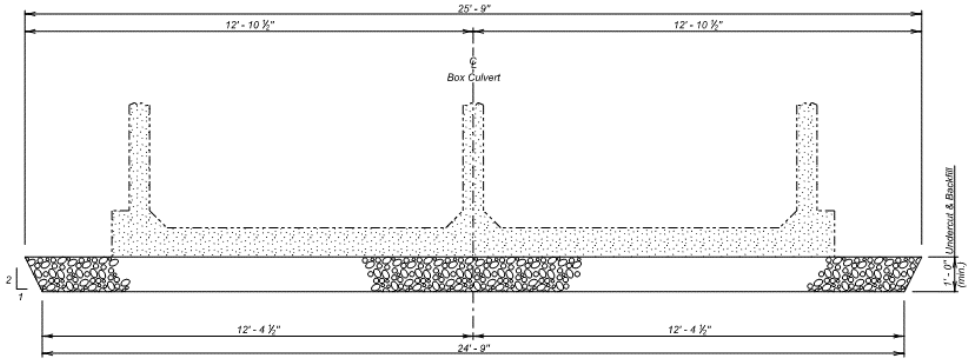
1. Design Specifications: AASHTO LRFD Bridge Design Specifications, 2017 Edition.
2. Construction Specifications: South Dakota Standard Specifications for Roads and Bridges, 2015 Edition and required Provisions, Supplemental Specifications, and Special Provisions as included in the Proposal.

GENERAL NOTES

1. Design Live Load: HL-93 and construction load consisting of one 7" - 6" gage axle with gross weight = 95,850 lbs. The construction load will not be applied until a minimum of 4 ft. of fill has been placed over the Box Culvert. Other construction loads in excess of legal load must be submitted thru proper channels to the Office of Bridge Design for analysis.
2. The design of the barrel section is based on a minimum fill height of 2 feet and includes all subsequent fill heights up to and including the maximum fill height of 5 ft. (F5).
3. Design Material Strengths: Concrete f'c = 4500 p.s.i.
   Reinforcing Steel fy = 60000 p.s.i.
4. All concrete will be Class A45 conforming to Section 460, except as noted.
5. All reinforcing steel will conform to ASTM A615 Grade 60.
6. All lap splices shown are contact lap splices unless noted otherwise.
7. All exposed edges will be chamfered ⅞ inch unless noted otherwise in the plans.
8. Use 1 inch clear cover on all reinforcing steel EXCEPT as shown.
9. The Contractor will imprint on the structure the date of construction as specified and detailed on Standard Plate No. 460.02.
10. Care will be taken to establish Working Points (W.P.) as shown on the wings.
11. Circled numbers in PLAN and ELEVATION views on the General Drawing are section I.D. Numbers (see SDDOT Materials Manual).
12. Cost of Preformed Expansion Joint Filler used in apron construction will be incidental to the other contract items.
13. Soils below the bottom of the proposed box culvert consist of brown silt clay with sand stringers. Groundwater was encountered in the borings at an elevation of 1516.1 during the subsurface investigation conducted in October 2017.
14. Dewatering will be required for construction of the box culvert.



UNDERCUT LAYOUT
(Bottom Dimensions)



TYPICAL SECTION
(For Limits of Undercut)

ESTIMATED QUANTITIES

ITEM	UNIT	QUANTITY
¶ Box Culvert Undercut	Cu. Yd.	125

¶ For payment, quantity is based on plan shown undercut dimensions and will not be measured unless the Engineer orders a change.

NOTES AND UNDERCUT DETAILS
FOR
2 - 9' X 6' BOX CULVERT

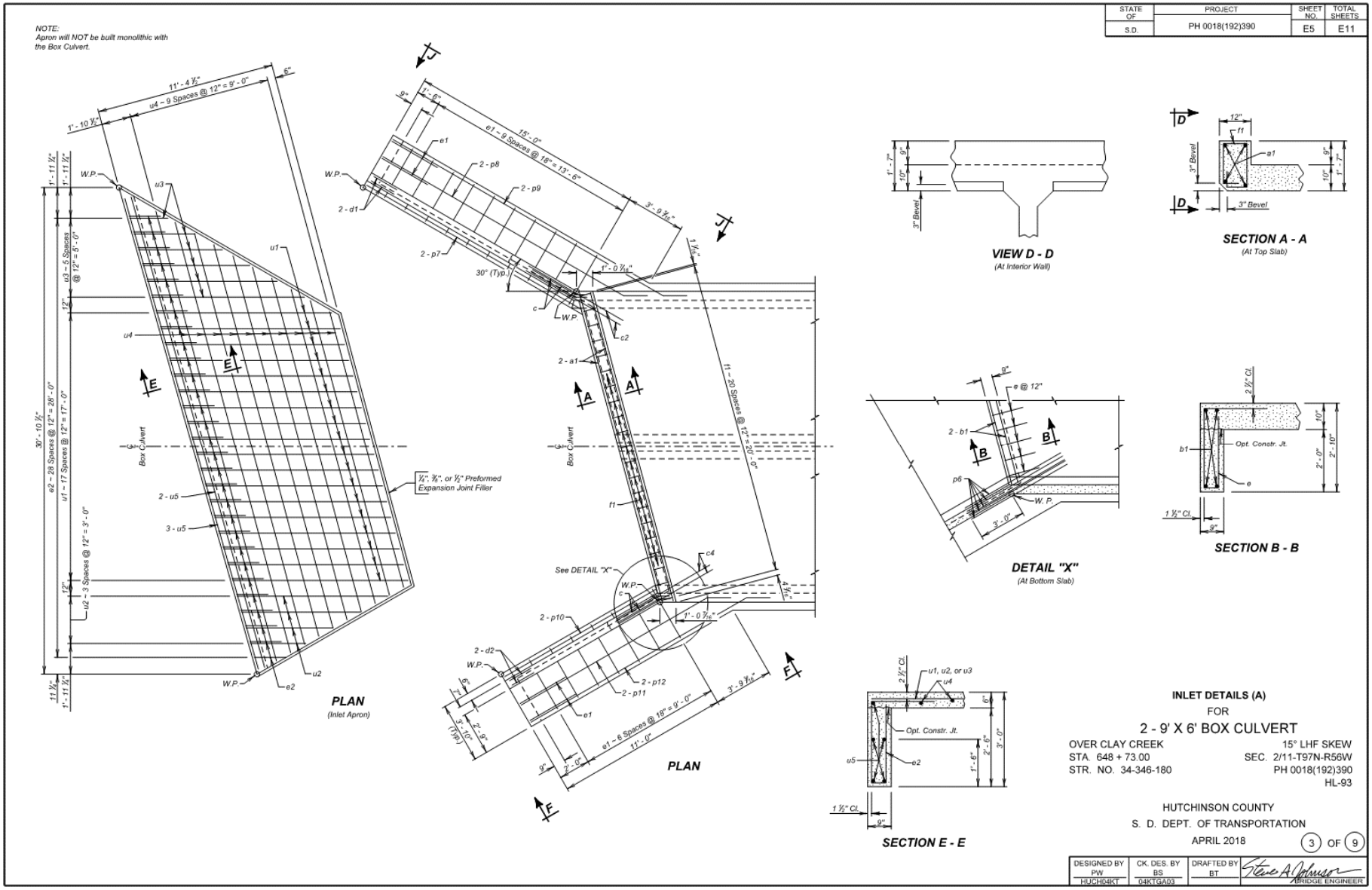
OVER CLAY CREEK — 15° LHFSKEW
STA. 648 + 73.00 — SEC. 2/11-T97N-R56W
STR. NO. 34-346-180 — PH 0018(192)390
HL-93

HUTCHINSON COUNTY
S. D. DEPT. OF TRANSPORTATION
APRIL 2018

2 OF 9

DESIGNED BY	CK. DES. BY	DRAFTED BY	
PW	BS	BT	Steve A Johnson BRIDGE ENGINEER
HUCH04KT	04KTGA02		

F.1.3.3. INLET DETAILS (A)

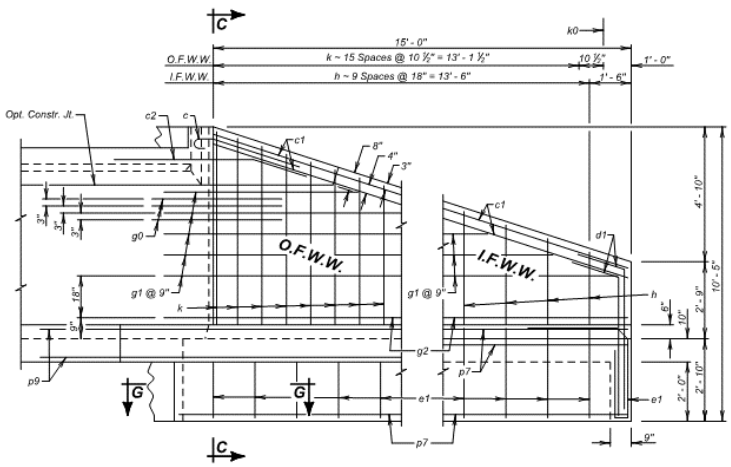


F.1.3.4. INLET DETAILS (B)

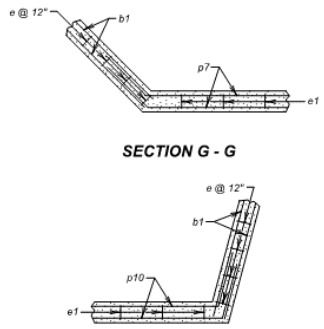
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	PH 0018(192)390	E6	E11

LEGEND FOR PLACING RE-STEEL

O. F. W. W. - Outside Face of Wing Wall
I. F. W. W. - Inside Face of Wing Wall

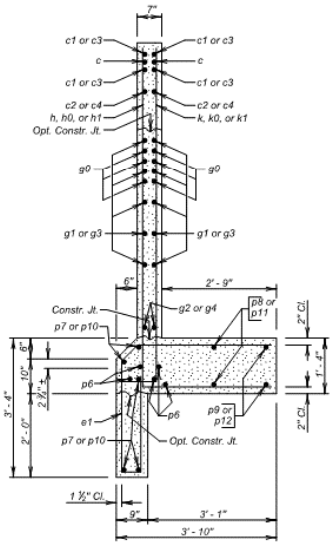


VIEW J - J

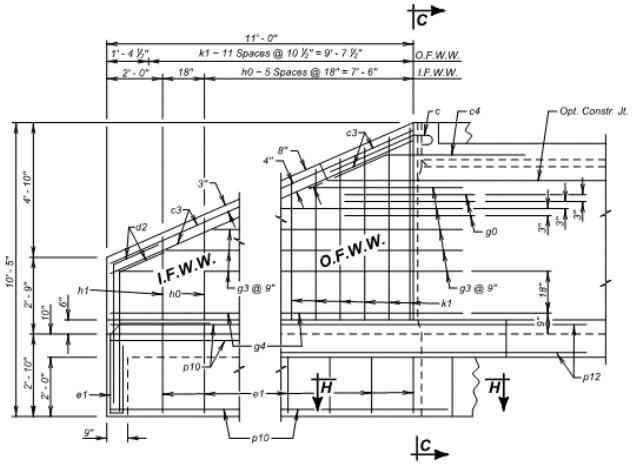


SECTION G - G

SECTION H - H



SECTION C - C

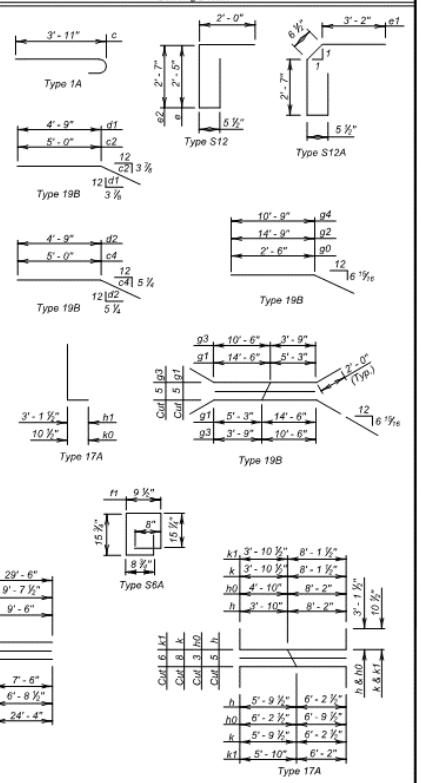


VIEW F - F

REINFORCING SCHEDULE

Mk.	No.	Size	Length	Type
a1	4	6	20' - 3"	Str.
b1	4	6	18' - 6"	Str.
c	4	5	4' - 6"	1A
c1	4	5	15' - 9"	Str.
c2	2	5	7' - 0"	19B
c3	4	5	12' - 0"	Str.
c4	2	5	7' - 0"	19B
d1	4	5	6' - 6"	19B
d2	4	5	6' - 6"	19B
e	19	4	7' - 3"	S12
e1	21	4	9' - 3"	S12A
f1	21	4	5' - 6"	S6A
g0	12	5	5' - 0"	19B
g1	5	4	23' - 9"	19B
g2	2	4	16' - 9"	19B
g3	5	4	18' - 3"	19B
g4	2	4	12' - 9"	19B
h	5	4	18' - 3"	17A
h0	3	4	19' - 3"	17A
h1	1	4	7' - 3"	17A
k	8	4	13' - 9"	17A
k0	1	4	4' - 6"	17A
k1	6	4	13' - 9"	17A
p6	10	6	7' - 0"	Str.
p7	5	4	17' - 6"	Str.
p8	2	4	19' - 3"	Str.
p9	2	4	21' - 3"	Str.
p10	5	4	13' - 6"	Str.
p11	2	4	15' - 3"	Str.
p12	2	4	17' - 3"	Str.
INLET APRON				
e2	29	4	7' - 6"	S12
u1	18	4	11' - 0"	Str.
u2	2	4	13' - 0"	Str.
u3	3	4	12' - 0"	Str.
u4	5	4	47' - 6"	Str.
u5	5	4	31' - 0"	Str.

Bending Details



NOTES:
All dimensions are out to out of bars.
Ø See cutting diagram.
✳ Bend in field as necessary to fit.

ESTIMATED QUANTITIES

ITEM	Class A45 Concrete, Box Culvert	Reinforcing Steel	Structure Excavation, Box Culvert
UNIT	Cu. Yd.	Lb.	Cu. Yd.
Inlet	13.1	1534	6.9
Inlet Apron	7.4	581	7.4

INLET DETAILS (B)
FOR
2 - 9' X 6' BOX CULVERT

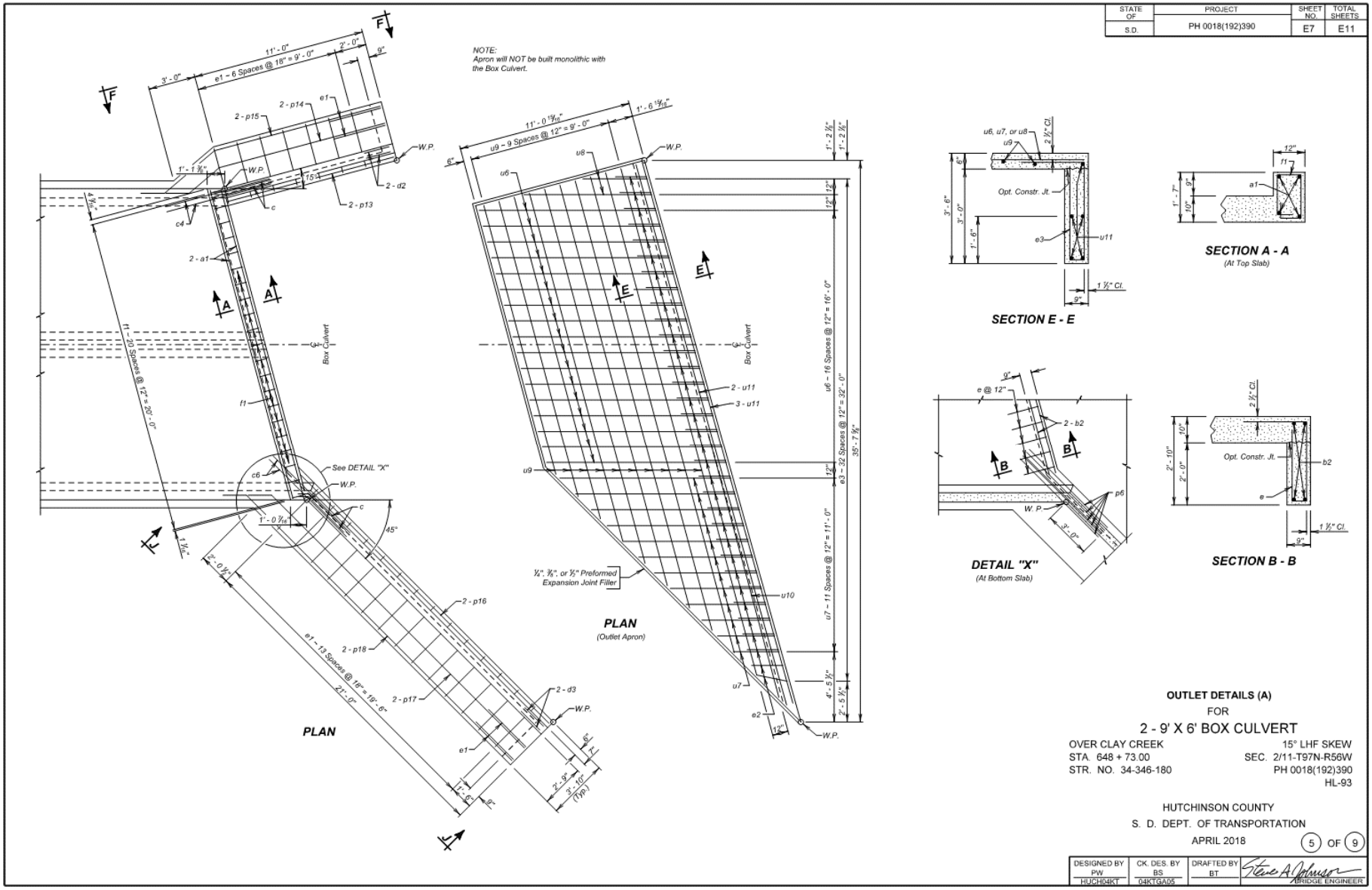
OVER CLAY CREEK — 15° LHF SKEW
STA. 648 + 73.00 — SEC. 2/11-T97N-R56W
STR. NO. 34-346-180 — PH 0018(192)390
HL-93

HUTCHINSON COUNTY
S. D. DEPT. OF TRANSPORTATION
APRIL 2018

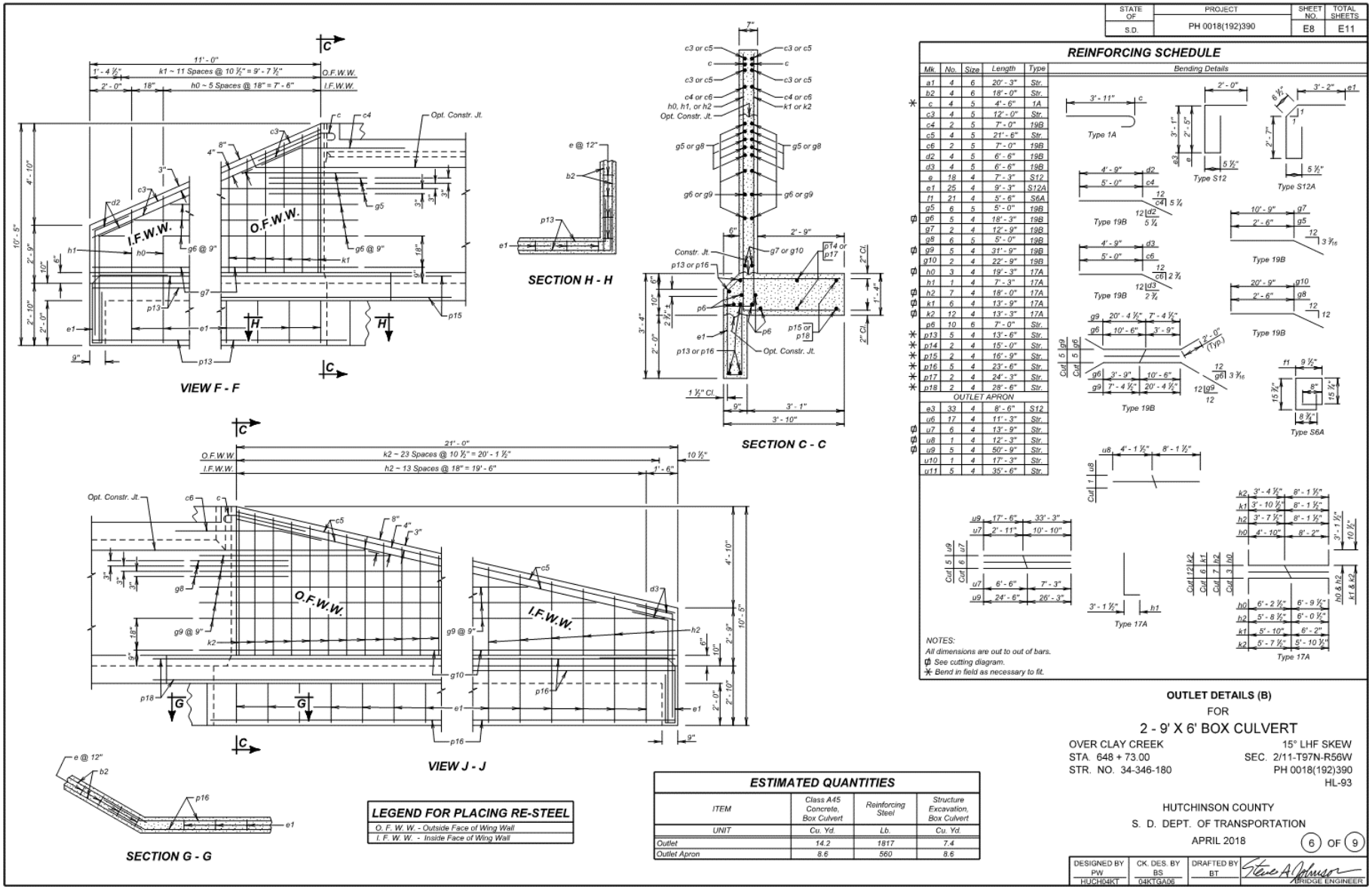
4 OF 9

DESIGNED BY	CK. DES. BY	DRAFTED BY	
PW	BS	BT	BRIDGE ENGINEER
HUCH04KT	04KTGA04		

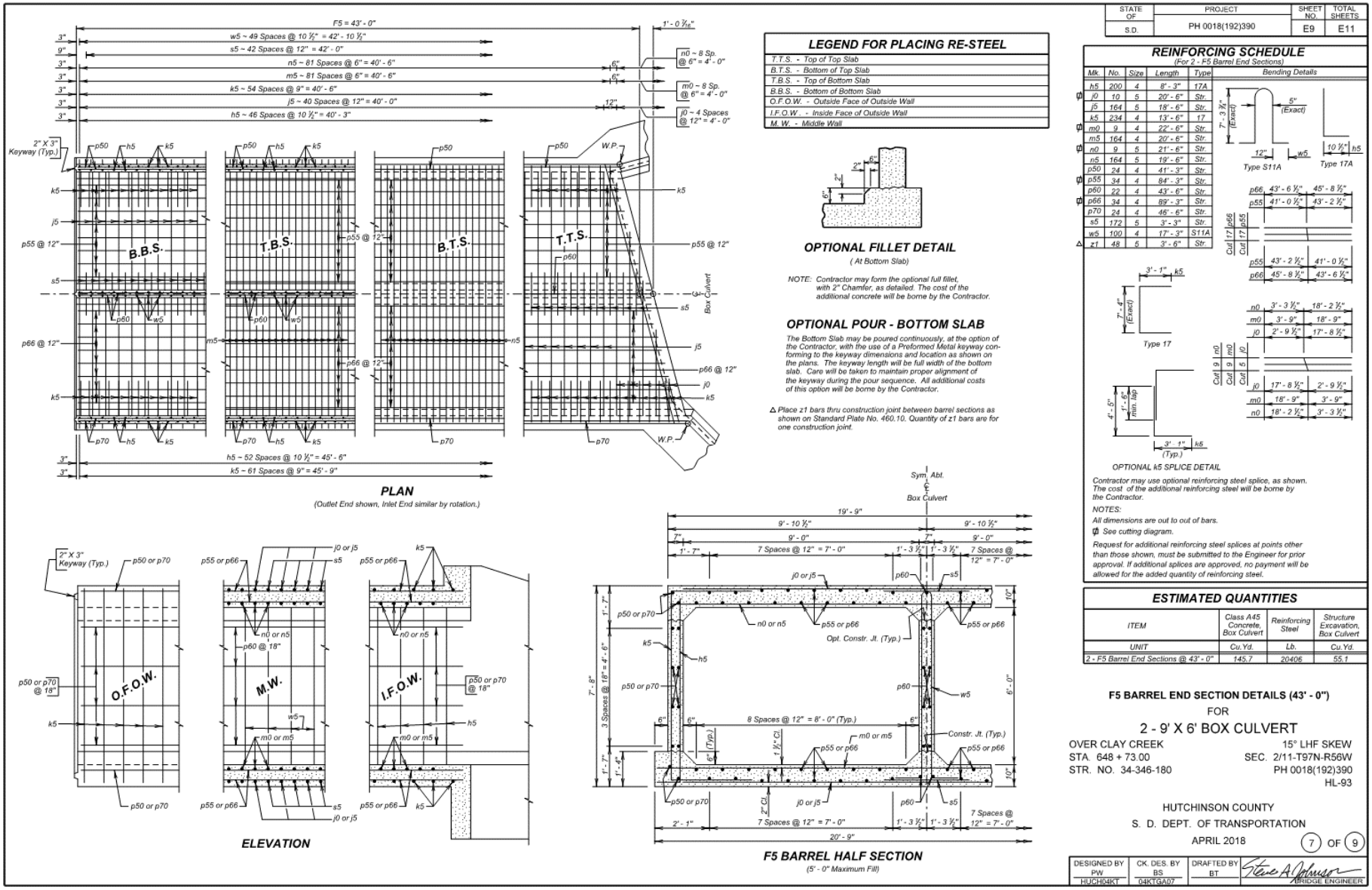
F.1.3.5. OUTLET DETAILS (A)



F.1.3.6. OUTLET DETAILS (B)

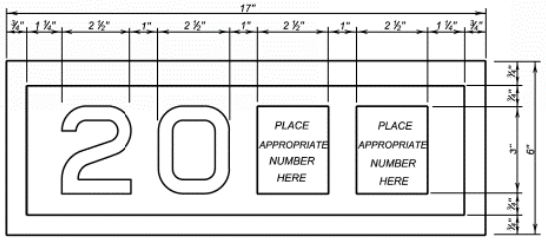


F.1.3.7. BARREL SECTION DETAILS



F.1.3.8. DETAILS OF STANDARD PLATES No's 460.02 & 460.10

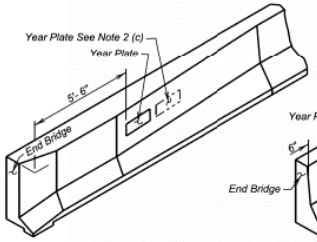
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P 0248(11)145	E8	E28



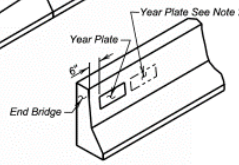
YEAR PLATE DETAILS

GENERAL NOTES:

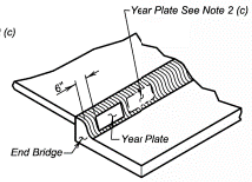
1. Year plates of the general dimensions shown shall be constructed on all box culverts and bridges. The year plates shall be constructed in reverse and attached to the forms in such a manner that the finished imprint in the concrete does not exceed one-half (½) inch in depth.
2. Year plates shall be located on structure (s) as follows:
   a. On cast-in-place box culverts the year plates shall be four and one - half (4 ½) inches below the top of the upstream parapet wall and centered laterally on the upstream face. On precast box culverts the year plate shall be centered laterally on the upstream face of the top slab. Where an extended interior wall interferes with this location, the year plate shall be centered in an adjacent barrel.
   b. On bridges with six (6) inch curbs or "Jersey" shaped barriers with no endblocks, the year plate shall be centered vertically on the curb face approximately six (6) inches from the end of the bridge, or as designated by the Engineer. On bridges with "Jersey" shaped barrier endblocks, the year plate shall be centered on the upper sloped portion of the barrier approximately 5'- 6" from the end of the bridge, or as designated by the Engineer. There shall be one year plate at each end of the bridge on opposite sides.
   c. When the plans specify that both the original date of construction and the date of reconstruction are to be shown, one date shall be placed as listed above and the other located adjacent to it. Both year plates shall be shown at each end of the bridge on opposite sides.
3. There will be no separate measurement or payment made for year plates on box culverts and bridges. All costs for this work shall be incidental to other contract items.



JERSEY BARRIER
(With Endblock)



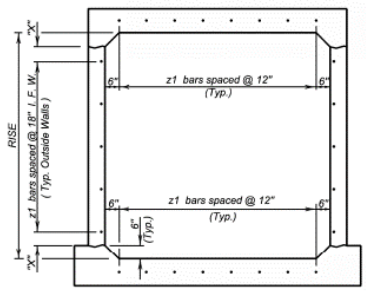
JERSEY BARRIER



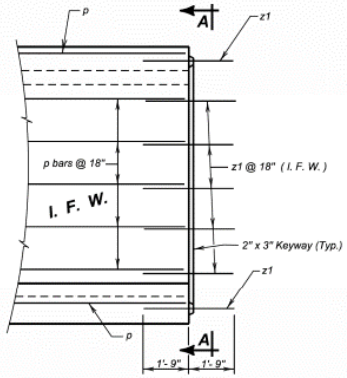
TYPE B CURB

June 26, 2012

Published Date: 2nd Qtr. 2019	SDDOT	YEAR PLATE DETAILS	PLATE NUMBER 460.02 Sheet 1 Of 1



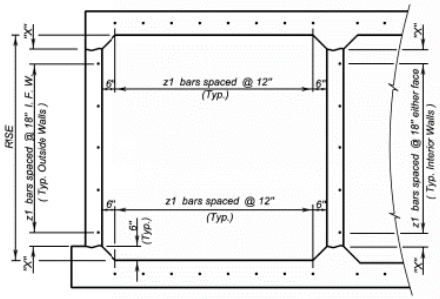
TYPICAL SINGLE BARREL VIEW A - A



ELEVATION

LEGEND FOR PLACING RE-STEEL
I. F. W. - Inside Face Wall

RISE	"X"
3'- 0"	3"
4'- 0"	9"
5'- 0"	6"
6'- 0"	3"
7'- 0"	9"
8'- 0"	6"
9'- 0"	3"
10'- 0"	9"
11'- 0"	6"
12'- 0"	3"



TYPICAL MULTIPLE BARREL VIEW A - A

GENERAL NOTES:

1. z1 bars shall be placed in the middle of the 2" X 3" keyway in the top and bottom slabs. z1 bars shall be lapped with the longitudinal p bars in the inside face of the wall for outside walls and in either face for interior walls. z1 bars are listed and included elsewhere in plans.
2. Drainage Fabric Protection shall be placed in accordance with Section 422, or Section 560, whichever is applicable.

June 26, 2012

Published Date: 2nd Qtr. 2019	SDDOT	BOX CULVERT BARREL TIE REINFORCEMENT	PLATE NUMBER 460.10 Sheet 1 of 1

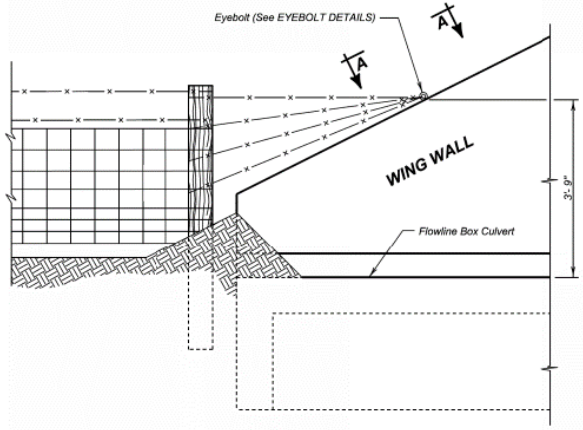
SITE 1
ALTERNATE A

3 - 12' X 12' BOX CULVERT (C.I.P.)
STR. NO. 36-136-111
AUGUST 2018

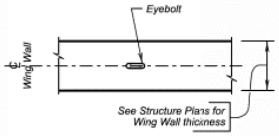
6 OF 7

F.1.3.9. DETAILS OF STANDARD PLATE NO. 620.16

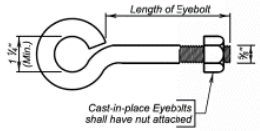
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	PH 0018(192)390	E11	E11



DETAIL FOR FENCE ANCHORS



VIEW A - A



EYEBOLT DETAILS

GENERAL NOTES:

1. The fence and post details shown are for illustrative purpose only. The fence shall be as specified elsewhere in the plans.
2. Eyebolts shall be placed on all of the box culvert wing walls.
3. Eyebolts shall be ⅝ inch diameter and shall conform to ASTM A307.
4. Eyebolts, nuts, and concrete inserts shall be galvanized in accordance with AASHTO M232 (ASTM A153). Concrete inserts of corrosion resistant material need not be galvanized.
5. Cast-in-place eyebolts shall have a nut attached, be 4 ½ inches (Min.) in length and shall be embedded such that the eye of the bolt is flush with the concrete surface. (See Eyebolt Details) As an alternate, cast-in-place concrete inserts, capable of developing the full strength of the ⅝ inch diameter threaded eyebolt, may be used and shall be set in the concrete in accordance with the manufacturer's recommendations. The eyebolt shall be of sufficient length to develop its full strength. The eye of the eyebolt shall be flush with the concrete surface.
6. The cost for furnishing and installing eyebolts and/or concrete inserts shall be incidental to various contract items.

December 23, 2012

Published Date: 3rd Qtr. 2020	SDDOT	FENCE ANCHORS FOR BOX CULVERT WING WALLS	PLATE NUMBER 620.16 Sheet 1 of 1

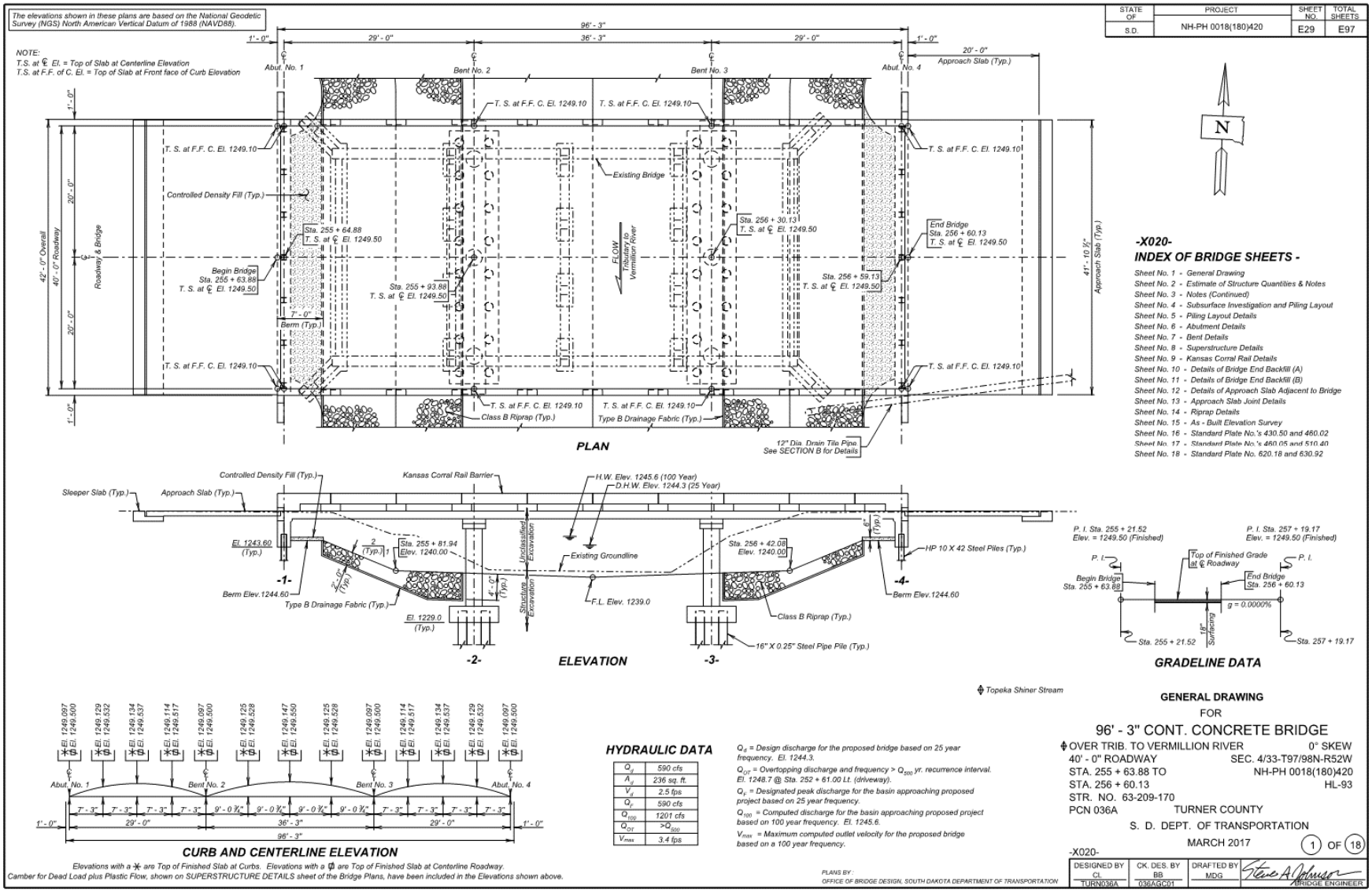
2 - 9' X 6' BOX CULVERT
STR. NO. 34-346-180
APRIL 2018

9 OF 9

F.2. Bridge Plans

F.2.1. Square Continuous Concrete Bridge Plans

F.2.2. GENERAL DRAWING



F.2.2.1. ESTIMATE OF STRUCTURE QUANTITIES & NOTES

Revised 08/15/2017

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	NH-PH 0018(180)420	E30	E97

ESTIMATE OF STRUCTURE QUANTITIES

DESCRIPTION	QUANTITY	UNIT	REMARKS
Bridge Elevation Survey	Lump Sum	LS	
Concrete Penetrating Sealer	431.3	SqYd	See Special Provision
Incidental Work, Structure	Lump Sum	LS	
Membrane Sealant Expansion Joint	83.8	Ft	
Structure Excavation, Bridge	464	CuYd	
Bridge End Embankment	412	CuYd	
Granular Bridge End Backfill	68.1	CuYd	
Approach Slab Underdrain Excavation	3.0	CuYd	
Precast Concrete Headwall for Drain	4	Each	
Class A45 Concrete, Bridge Deck	199.8	CuYd	
Class A45 Concrete, Bridge	121.8	CuYd	
Concrete Approach Slab for Bridge	190.6	SqYd	
Concrete Approach Sleeper Slab for Bridge	41.9	SqYd	
Controlled Density Fill	7.5	CuYd	
Reinforcing Steel	12,722	Lb	
Epoxy Coated Reinforcing Steel	63,346	Lb	
Extract Pile	16.0	Each	
Preboring Pile	100	Ft	
HP 10x42 Steel Test Pile, Furnish and Drive	190	Ft	
HP 10x42 Steel Bearing Pile, Furnish and Drive	1,080	Ft	
16"x0.25" Steel Pipe Test Pile, Furnish and Drive	160	Ft	
16"x0.25" Steel Pipe Bearing Pile, Furnish and Drive	2,250	Ft	
4" Underdrain Pipe	264	Ft	
Porous Backfill	30.9	Ton	
Class B Riprap	798.0	Ton	
Type B Drainage Fabric	845	SqYd	

SPECIFICATIONS FOR BRIDGE

1. Design Specifications: AASHTO LRFD Bridge Design Specifications, 2014 Edition with 2015 and 2016 interims.
2. Construction Specifications: South Dakota Standard Specifications for Roads and Bridges, 2015 Edition and required provisions, supplemental specifications, and special provisions as included in the proposal.

BRIDGE DESIGN LOADING

1. AASHTO HL-93.
2. Dead Load includes 22 psf for future wearing surface on the roadway.

DESIGN MATERIAL STRENGTHS

Concrete	f'c = 4,500 psi
Reinforcing Steel	fy = 60,000 psi
Piling (ASTM A572 Grade 50)	fy = 50,000 psi
Piling (ASTM A252 Grade 2)	fy = 35,000 psi

GENERAL CONSTRUCTION

1. All mild reinforcing steel shall conform to ASTM A615, Grade 60.
2. All exposed concrete corners and edges shall be chamfered 3/4" unless noted otherwise.
3. Use 2" clear cover on all reinforcing steel except as shown.
4. Contractor shall imprint on the structure the date of new construction as specified and detailed on Standard Plate No. 460.02.
5. Barrier Curbs and End blocks shall be built normal to the grade.
6. Request for construction joints or re-steel splices at points other than those shown, must be submitted to the Engineer for prior approval. If additional splices are approved, no payment will be allowed for the added quantity of re-steel.
7. The elevation of the bridge deck is 16" above subgrade elevation.

INCIDENTAL WORK, STRUCTURE

1. In place centerline Sta. 255+72.21 to centerline Sta. 256+43.21 is a 71.0' 4 span continuous concrete bridge with a 30'-0" clear roadway. The superstructure consists of a reinforced concrete slab with concrete pigeon hole railing faced with steel W-beam continuous across the bridge. The deck has been overlaid with 2 inches of asphalt. The substructure consists of 3 column reinforced concrete bents and reinforced concrete vertical abutments, all of which are supported on timber piling.
2. Break down and remove the existing bridge, and approach/sleeper slabs if applicable, to 1 foot below finished groundline, or as required to construct the new structure in accordance with Section 110 of the Specifications. All portions of the existing bridge shall be removed and disposed of by the Contractor on a site obtained by the Contractor and approved by the Engineer in accordance with the Environmental Commitments found in Section A
3. During demolition of the structure, efforts shall be taken to prevent material from falling into the creek. Under no circumstances is asphalt allowed to fall into the creek.
4. The foregoing is a general description of the in-place bridge and should not be construed to be complete in all details. Before preparing the bid it shall be the responsibility of the Contractor to make a visual inspection of the structure to verify the extent of the work and materials involved. If desired by the Contractor, a copy of the original construction plans may be obtained through the Office of Bridge Design.
5. It is anticipated that at least sixteen (16) existing timber piles will interfere with piling for this new structure. Any existing timber pile that interferes with piling for the new structure shall be extracted. Payment for the extracting piling shall be contract unit price per each for Extract Pile and shall be full compensation for extracting piling including materials, labor, and equipment necessary or incidental to the satisfactory completion of this work.

DESIGN MIX OF CONCRETE

1. All structural concrete shall be Class A45 unless otherwise indicated.
2. Type II cement is required.

ABUTMENTS

1. Pre-boring piling at each abutment is required to whichever is greater, ten feet or to natural ground
2. The HP 10x42 Piling were designed using a factored bearing resistance of 55 tons per pile. Piling shall develop a field verified nominal bearing resistance of 137 tons per pile.
3. The contractor shall have sufficient pile splice material on hand before pile driving is started. See Standard Plate No. 510.40.
4. Piles shall not be driven out of position by more than three inches in the direction normal to the abutment centerline. A pile-driving template shall be used to insure this accuracy.
5. One test pile shall be driven at each abutment and will become part of the pile group.
6. Each finished abutment shall include a Bridge Survey Marker. See Standard Plate No. 460.05.

PILE DRIVING

1. A driveability analysis was performed using the wave equation analysis program (GRLWEAP). A list of acceptable hammers is provided below. The hammers listed were found to produce acceptable driving stresses. Pile hammers not listed will require evaluation and approval prior to use from the Geotechnical Engineering Activity.

   Delmag D25-32 Delmag D30-32 SPI D-30 APE D30-32

2. If design bearing is not obtained during pile driving operations the contractor shall perform a delayed bearing test. If bearing is still not obtained, the Geotechnical Engineering Activity shall be contacted prior to driving any piling below elevation 1155 ft.

ESTIMATE OF STRUCTURE QUANTITIES AND NOTES
FOR
96' - 3" CONT. CONCRETE BRIDGE

STR. NO. 63-209-170
MARCH 2017

2 OF 18

DESIGNED BY	CK. DES. BY	DRAFTED BY	
CL TURN036A	BB 036AGC02	MDG	BRIDGE ENGINEER

F.2.2.2. NOTES (CONTINUED)

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	NH-PH 0018(180)420	E31	E97

BENTS

1. Pipe piles shall conform to ASTM A252, Grade 2. Pipe piles shall be furnished, driven and spliced in accordance with Section 510 of the Specifications.
2. A two component coal tar epoxy paint shall be applied to the piles.
3. The 16"x0.25" Pipe Piling were designed using a factored bearing resistance of 70 tons per pile. Piling shall develop a field verified nominal bearing resistance of 175 tons per pile.
4. The Contractor shall have sufficient pile splice material on hand before pile driving is started.
5. The maximum horizontal out of position tolerance at the cutoff elevation is three (3) inches.
6. Piles shall be driven closed end. The cost of the bottom end plate and welding of the same to the pile shall be incidental to the contract unit price per foot for 16" x 0.25" Steel Pipe Bearing Pile, Furnish and Drive and 16" x 0.25" Steel Pipe Test Pile, Furnish and Drive.
7. After the piles are driven, steel pipe piles shall be filled with coarse dry sand to elevation of bottom of footing. The sand shall be compacted to prevent bridging. All costs associated with filling the steel pipe piles with sand shall be incidental to the contract unit price per foot for 16" x 0.25" Steel Pipe Bearing Pile, Furnish and Drive and 16" x 0.25" Steel Pipe Test Pile, Furnish and Drive.
8. It is anticipated that cofferdams will be necessary. Cofferdams shall be designed and constructed in accordance with Section 423 of the Specifications.

SUPERSTRUCTURE

1. Preplanned construction joints may be used in accordance with Section 460.3 of the Specifications. Contact the Office of Bridge Design for joint configuration and allowable location. Emergency slab construction joints shall be as shown with the superstructure details. If an emergency slab joint is used, contact the Office of Bridge Design before proceeding with deck pour.
2. The deck-finishing machine shall be adjusted and operated in such a manner that the roller screed or screeds are parallel with the centerline of the bridge and the finish machine is parallel to the skew of the bridge. Concrete placement in front of the finish machine shall be kept parallel to the machine.
3. Barrier curbs shall be poured after all the slab has been poured. Superstructure falsework shall not be removed until bridge deck concrete, including barrier curbs, has attained a strength of 2400 psi.
4. Concrete corral rail shall be poured after all the slab has been poured. Corral rail shall not be placed until the bridge deck concrete has attained a strength of 1200 psi when controlled by tests, or 36 to 48 hours when controlled by time. When controlled by time, it is exclusive of hours when the air temperature is below 40 degrees F. The bridge deck, including corral rail, shall have attained a strength of at least 4500 psi and all false work shall have been removed before application of highway or construction live loads.
5. The bridge deck must be placed and finished continuously at a minimum rate of 20 ft. of deck per hour measured along centerline roadway. If concrete cannot be placed and finished at this rate, the Engineer shall order a header installed and operations stopped. Notify the Bridge Construction Engineer if deck pour operations are stopped. Operations may resume only when the Engineer is satisfied that a minimum rate of 24 ft. of deck per hour can be achieved and the concrete in the previous pour has attained a minimum compressive strength of 2000 psi.
6. Snap ties, if used in barrier curb formwork, shall be epoxy coated. The epoxy coating shall be inert in concrete and compatible with the coating applied to the new epoxy coated reinforcing steel.
7. See Special Provision for Concrete Penetrating Sealer.

CLASS B COMMERCIAL TEXTURE FINISH

1. A Class B commercial texture finish shall be applied to the following areas:

   a) **Barrier Rail:** all exposed surfaces (front, top and back).
   b) **Slab:** edge of slab.

2. The Class B commercial texture finish shall be applied in accordance with Section 460.3 L.1.c of the Specifications.
3. Where the Class B commercial texture finish is to be applied, concrete curing shall be accomplished with cotton or burlap mats and polyethylene sheeting. Curing shall continue for not less than seven days after placing concrete before the commercial texture finish is applied. The commercial texture finish shall be applied in accordance with the manufacturer's recommendations. The commercial texture finish itself does not require a specific cure except for drying.

AS - BUILT ELEVATION SURVEY

The Contractor shall be responsible for recording the As-built deck elevations and bridge survey marker elevations at the locations shown in the Table of As-Built Elevations shown in the plans. All costs associated with obtaining the elevations including all equipment, labor and any incidentals required shall be incidental to the contract lump sum price for Bridge Elevation Survey.

APPROACH SLABS

1. Sleeper slab riser shall be cast with the approach slab or cast after the approach slab is placed. Care shall be taken to ensure the correct grade is maintained across the joint.
2. The portion of the sleeper slab below the construction joint may be precast. If the bottom portion of the sleeper slab is precast, the Contractor shall submit proposed lifting and setting plans to the Bridge Construction Engineer for approval. In addition, if reinforcing or other details differ from those shown in the plans, the Contractor shall submit proposed alternate details for approval.
3. The use of an approved finishing machine will be required during placement of Class A45 Concrete for the approach slabs. Concrete placement in front of the machine shall be kept parallel to the screed.
4. The concrete in the approach slab shall be tined normal to centerline roadway.
5. Concrete Approach Sleeper Slab for Bridge, whether cast-in-place or precast, will be paid for at the contract unit price per square yard. This payment shall be full compensation for all excavation, furnishing, hauling, and placing all materials including concrete and reinforcing steel; for disposal of all excavated material and surplus materials; and for labor, tools, equipment and any incidentals necessary to complete this item of work.
6. Concrete Approach Slab for Bridge will be paid for at the contract unit price per square yard. This payment shall be full compensation for all excavation, furnishing, hauling and placing all materials including concrete, asphalt paint or 6 mil polyethylene sheeting, elastic joint sealer and reinforcing steel; for disposal of all excavated material and surplus materials and for labor, tools, equipment and any incidentals necessary to complete this item of work.

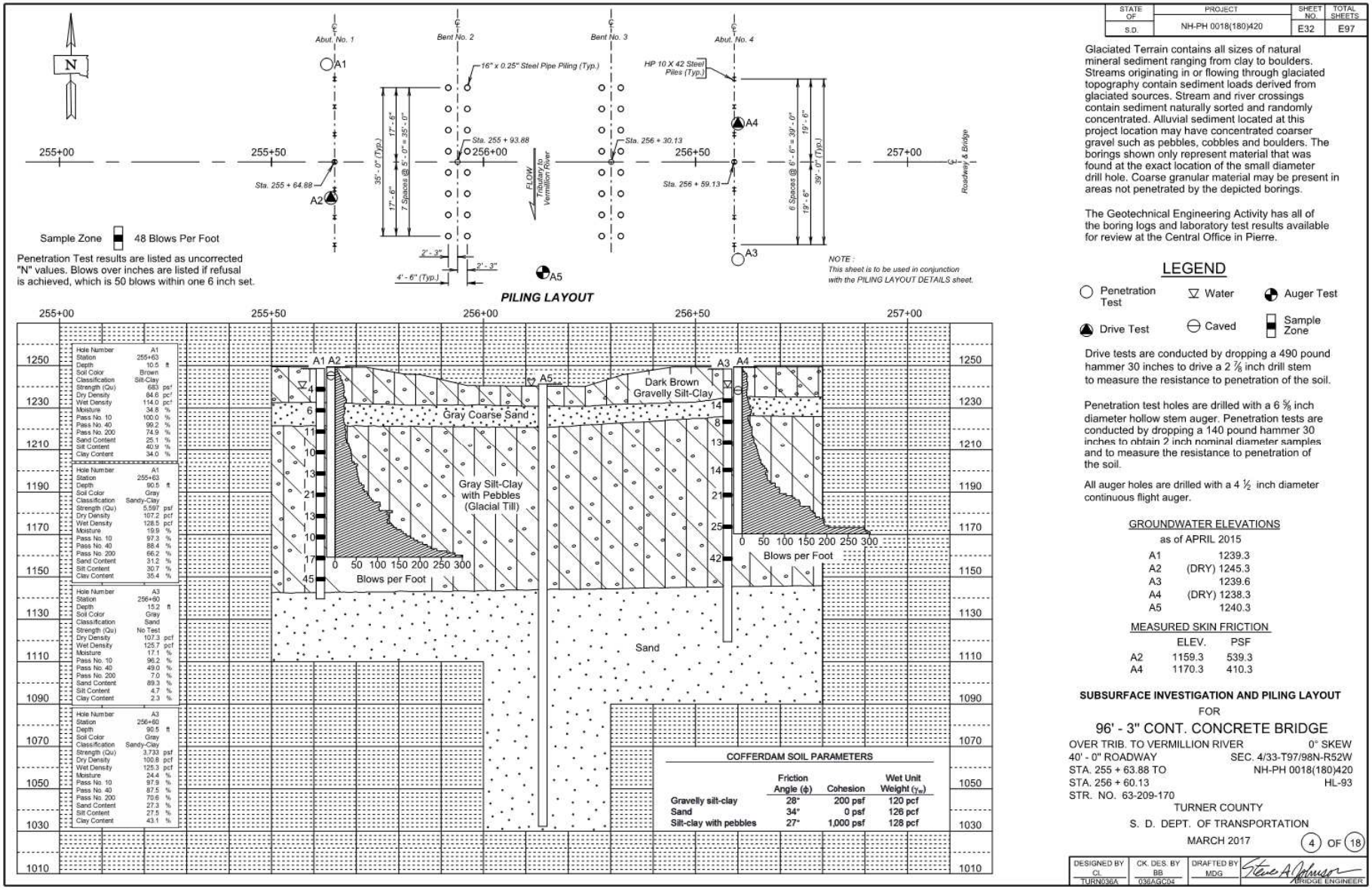
NOTES (CONTINUED)
FOR
96' - 3" CONT. CONCRETE BRIDGE

STR. NO. 63-209-170
MARCH 2017

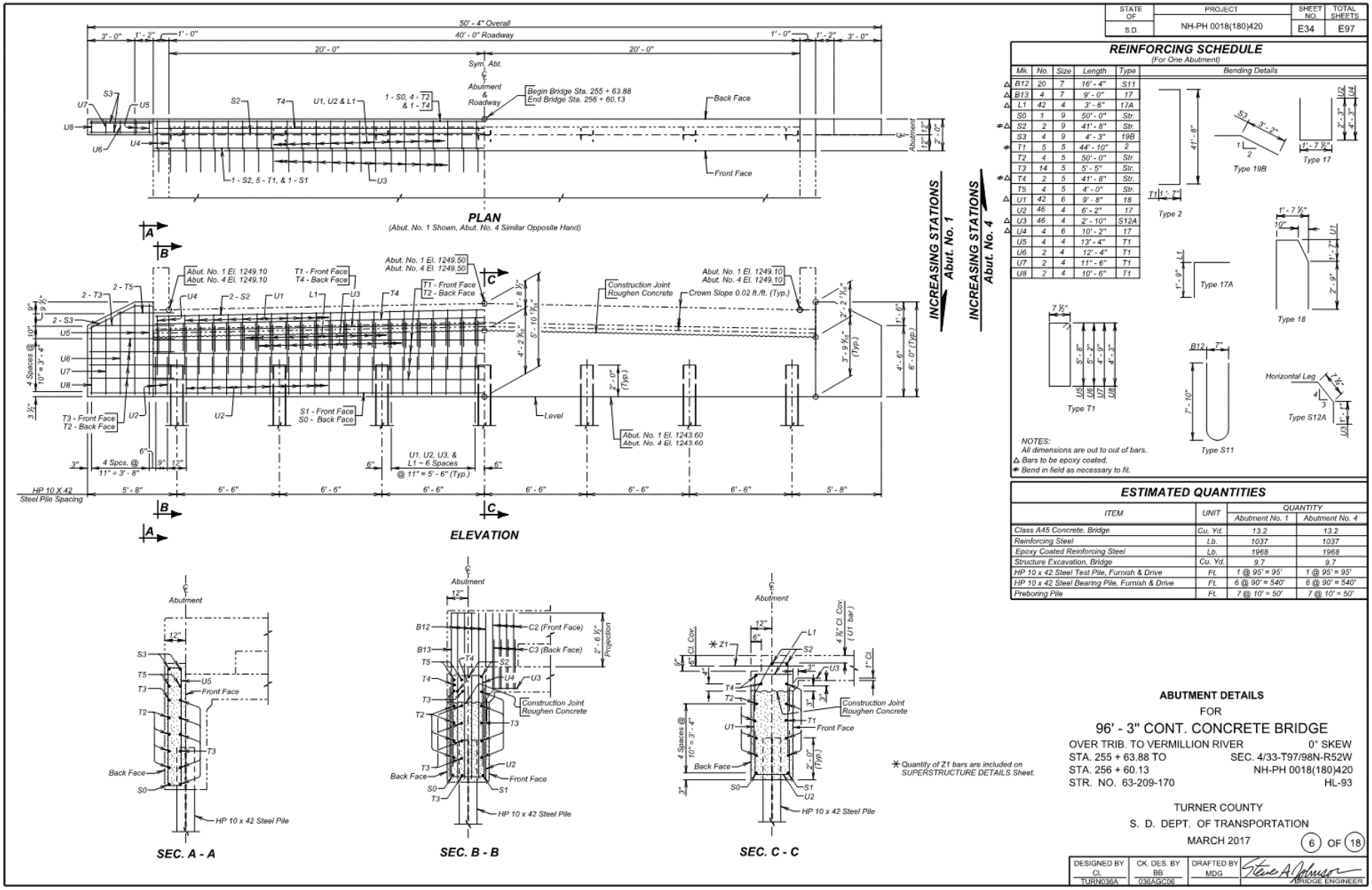
3 OF 18

DESIGNED BY	CK. DES. BY	DRAFTED BY	
CL	BB	MDG	Steve A Johnson BRIDGE ENGINEER
TURN036A	036AGC03		

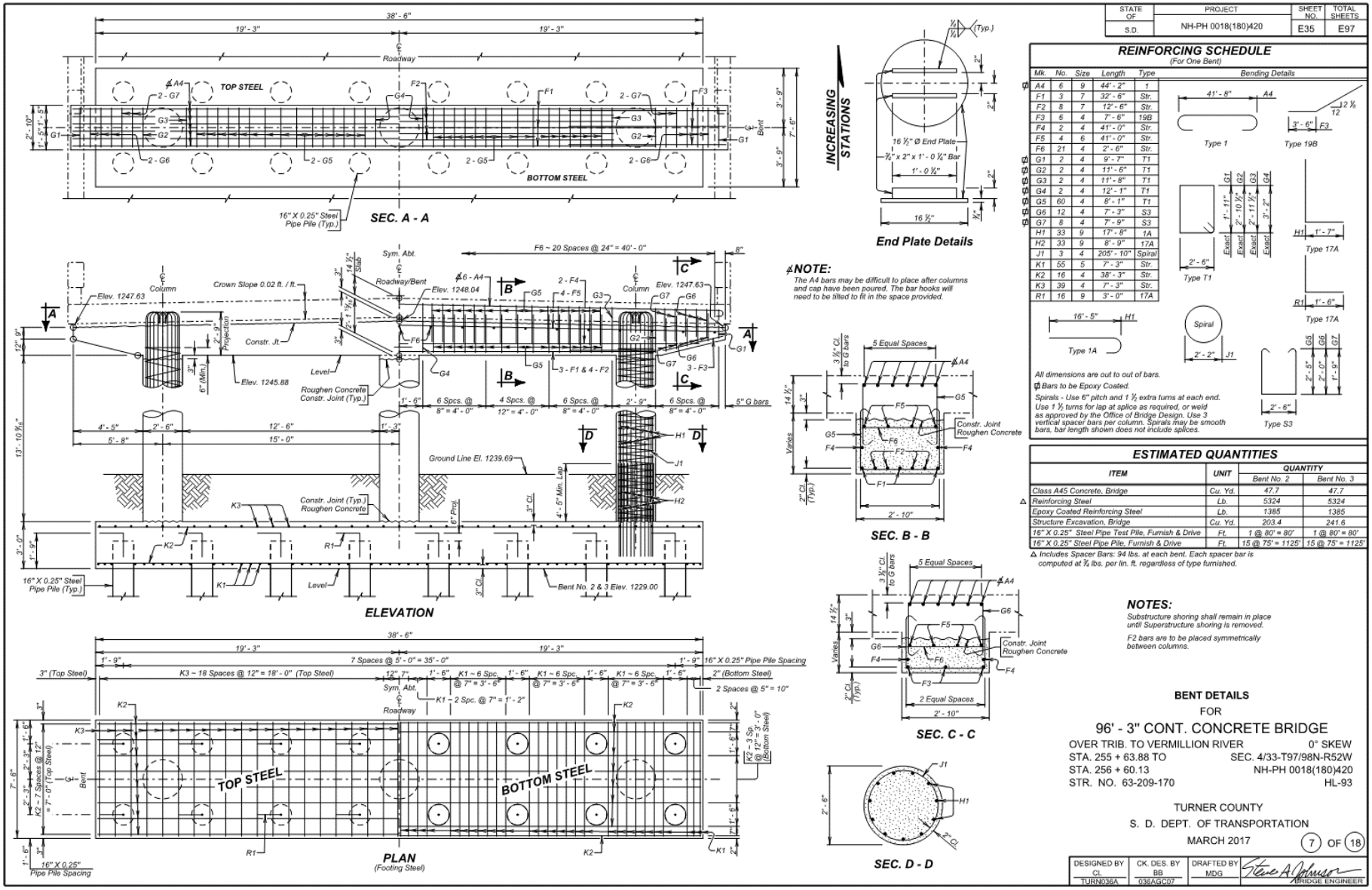
F.2.2.3. SUBSURFACE INVESTIGATION AND PILING LAYOUT



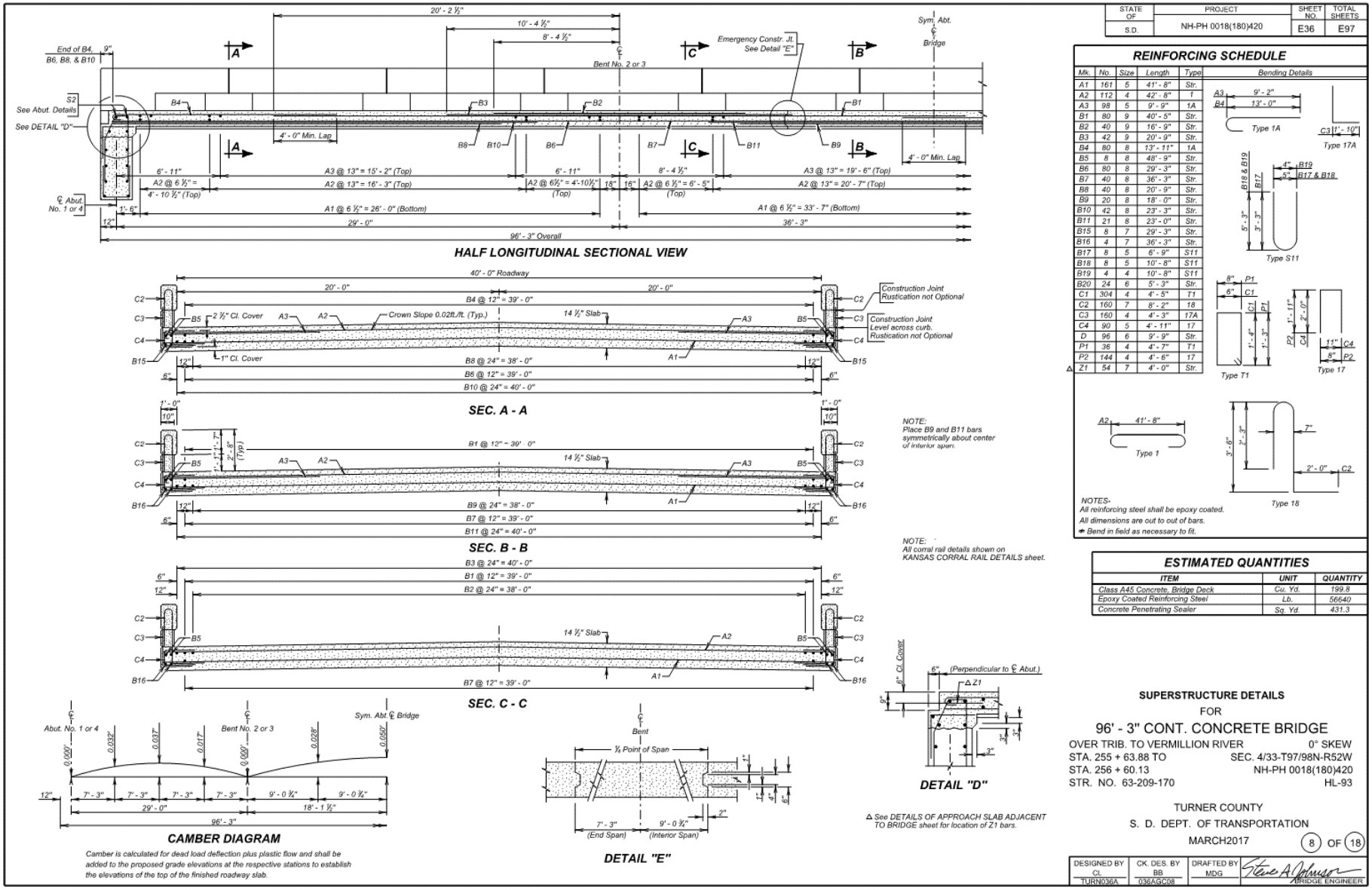
F.2.2.4. ABUTMENT DETAILS



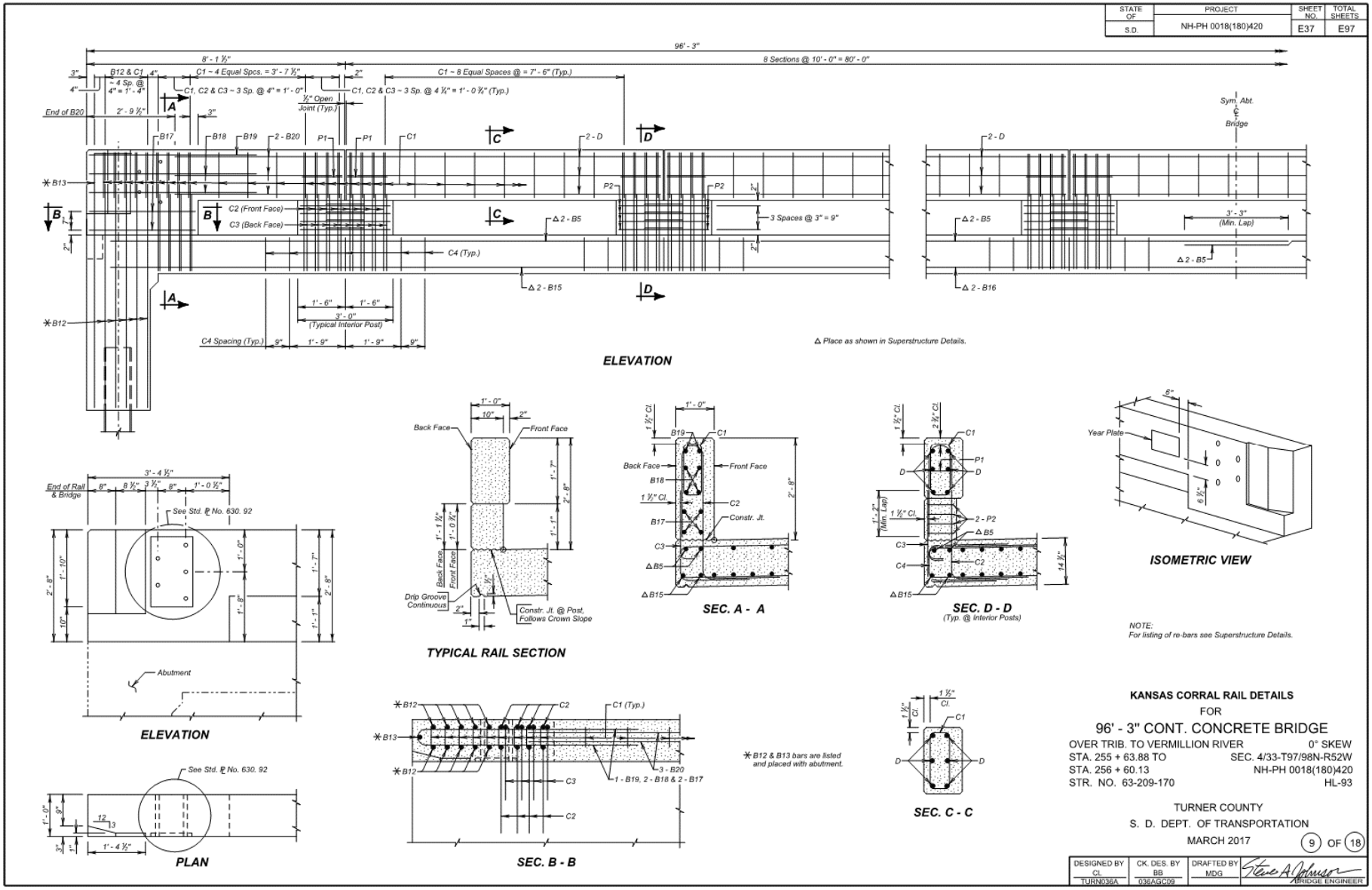
F.2.2.5. BENT DETAILS



F.2.2.6. SUPERSTRUCTURE DETAILS

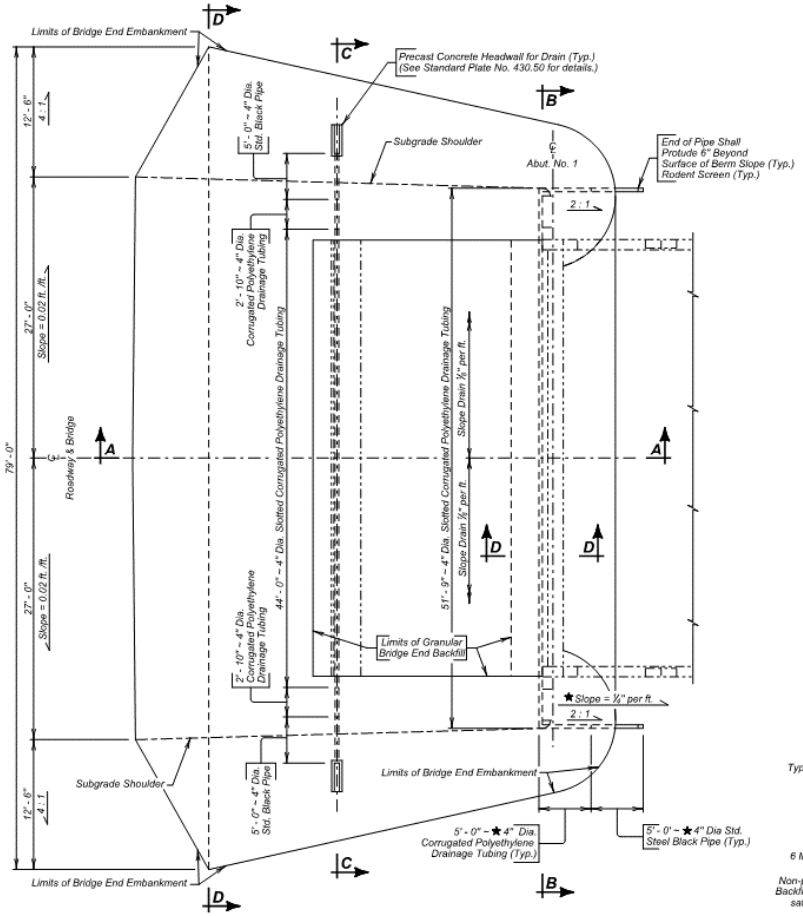


F.2.2.7. END BLOCK, BARRIER CURB, AND DRAIN DETAILS

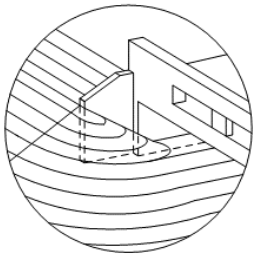


F.2.2.8. DETAILS OF BRIDGE END BACKFILL (A)

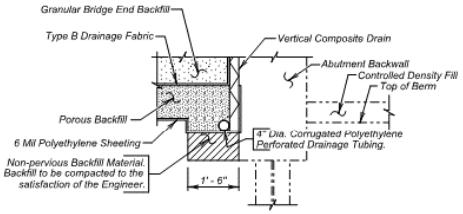
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	NH-PH 0018(180)420	E38	E97



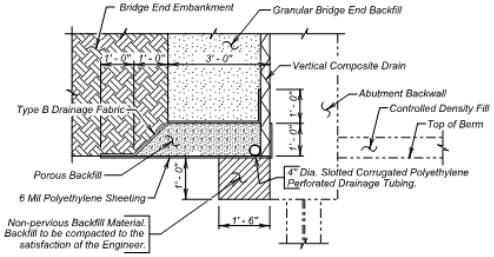
PLAN
(Bridge End Backfill shown adjacent to Abut. No. 1
Abut. No. 4 similar opposite hand except as shown.)



SPILL CONE DETAIL AT EMBANKMENT



SEC. D - D



DETAIL "X"

ESTIMATED QUANTITIES
(For Two Abutments)

	ITEM	UNIT	QUANTITY
	Granular Bridge End Backfill	Cu. Yd.	68.1
∡	Bridge End Embankment	Cu. Yd.	412.0
⌀	Porous Backfill	Ton	30.9
	4" Underdrain Pipe	Ft.	264
⌖	Approach Slab Underdrain Excavation	Cu. Yd.	3.0
	Precast Concrete Headwall for Drain	Each	4

1. 192 ft. 4" dia. Slotted Corrugated Polyethylene Drainage Tubing.
2. 32 ft. 4" dia. Corrugated Polyethylene Drainage Tubing.
3. 331 sq. ft. Vertical Composite Drain
4. 40 ft. 4" dia. Std. Black Pipe with Rodent Screens.

Items 1 thru 4 are approximate quantities contained in the 4" Underdrain Pipe and are for information only.

5. 3420 sq. ft. 6 mil Polyethylene Sheeting, not including laps.
6. 264 sq. yd. Type B Drainage Fabric.

Items 5 and 6 are approximate quantities contained in the Granular Bridge End Backfill and are for information only.

⌀ For estimating purposes only, a factor of 1.89 tons/cu. yd. was used to convert cu. yds. to tons.

∡ Shrinkage Factor of 1.25 Used.

⌖ Quantity based on a 12" wide trench.

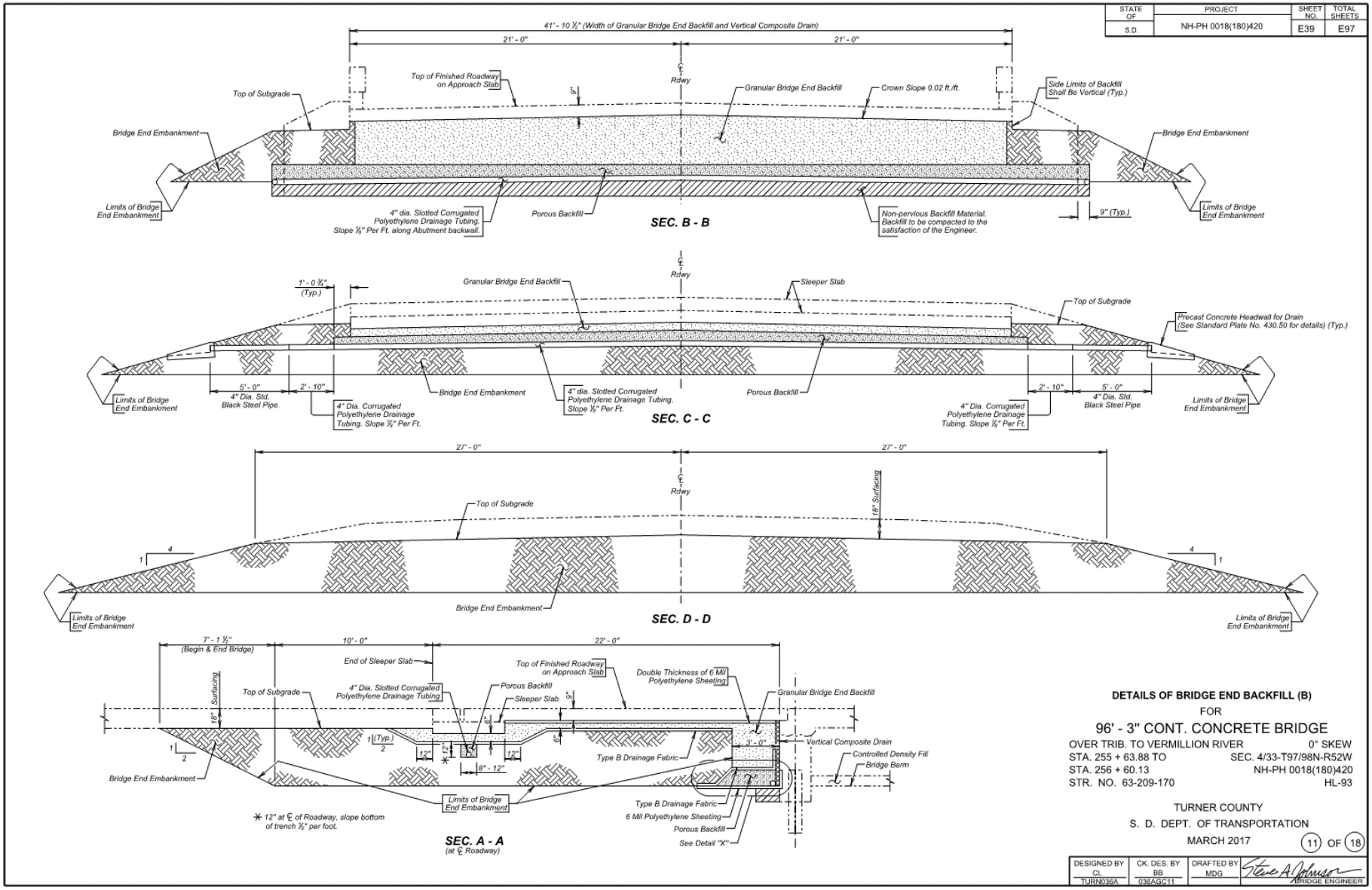
DETAILS OF BRIDGE END BACKFILL (A)
FOR
96' - 3" CONT. CONCRETE BRIDGE
OVER TRIB. TO VERMILLION RIVER 0° SKEW
STA. 255 + 63.88 TO SEC. 4/33-T97/98N-R52W
STA. 256 + 60.13 NH-PH 0018(180)420
STR. NO. 63-209-170 HL-93

TURNER COUNTY
S. D. DEPT. OF TRANSPORTATION
MARCH 2017

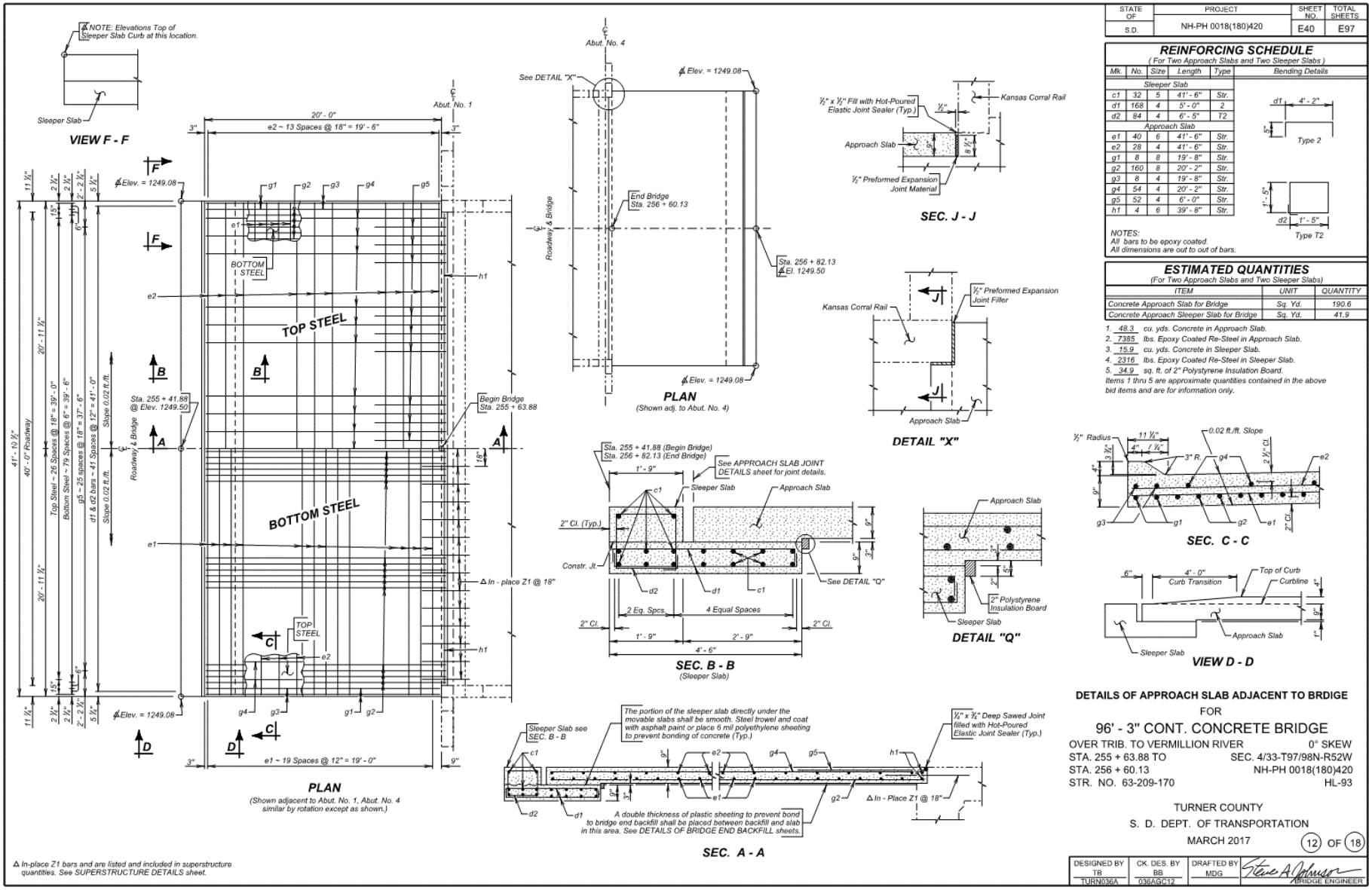
10 OF 18

DESIGNED BY	CK. DES. BY	DRAFTED BY	
CL	BB	MDG	BRIDGE ENGINEER
TURN036A	036AGC10		

F.2.2.9. DETAILS OF BRIDGE END BACKFILL (B)

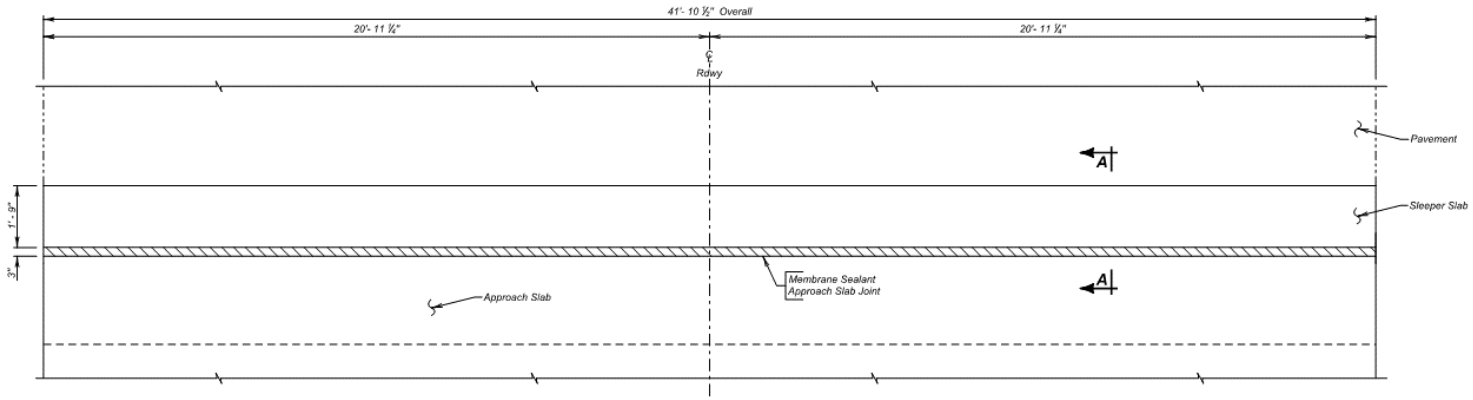


F.2.2.10. DETAILS OF APPROACH SLAB ADJACENT TO BRIDGE



F.2.2.11. APPROACH SLAB JOINT DETAILS

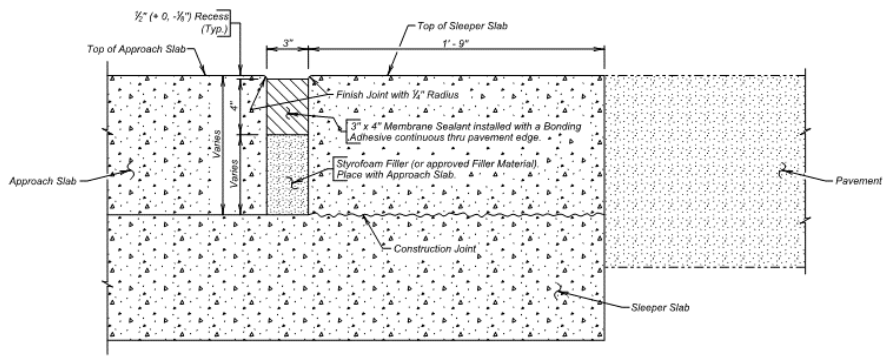
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	NH-PH 0018(180)420	E41	E97



PLAN OF APPROACH SLAB JOINT

GENERAL NOTES

1. The membrane sealant shall be on the approved product list for Membrane Sealant Expansion Joints.
2. The manufacturer shall supply the membrane sealant in packaging that precompresses the membrane sealant. The precompressed dimension shall be as recommended by the sealant manufacturer to provide a water tight seal throughout a joint movement range of + 25% (minimum) from the specified joint opening dimension. In no case shall the precompressed dimension exceed 75% of the joint opening width. The foam sealant shall be slowly self expanding to permit workers ample time to install the membrane sealant before the membrane sealant exceeds the joint opening width.
3. The membrane sealant shall be supplied in pieces 5 feet in length or longer. The foam sealant shall be ultra-violet and ozone resistant.
4. The bonding adhesive used to attach the membrane sealant to the adjacent concrete shall be approved by the membrane sealant manufacturer.
5. Adhesive used to join adjacent pieces of the membrane sealant shall be as recommended by the manufacturer.
6. If styrofoam filler material is used in the construction, it shall be closed cell and water-tight as approved by the Engineer.
7. The minimum ambient air temperature at the time of joint installation and adhesive curing shall be 40° F.
8. A technical representative of the membrane sealant manufacturer shall be present at the jobsite during installation. The technical representative shall be knowledgeable in the correct procedures for the preparation and installation of the joint material to insure the contractor installs the joint to the manufacturers recommendations.
9. Concrete surfaces that will be in contact with the membrane sealant shall be thoroughly cleaned by abrasive blasting to remove all laitance and contaminants (such as oil, curing compounds, etc.) from the concrete surface. At a minimum two passes of abrasive blasting with the nozzle held at an angle to within 1 to 2 inches of the concrete surface will be required. Cleaning of the concrete surfaces with solvents, wire brushing, or grinding shall not be permitted.
10. After abrasive blasting, but immediately prior to membrane joint installation, the entire joint contact surface shall be air blasted. The air compressor used for joint cleaning shall be equipped with trap devices capable of providing moisture-free and oil-free air at a recommended pressure of 90 psi. To obtain complete bonding with the adhesive, the adjacent concrete surfaces must be dry and clean. The contact surfaces for the joint shall be visually inspected by the Engineer immediately prior to joint installation to verify the surface is dry and clean.
11. Individual spliced sections shall be installed as per the manufacturers' recommendations. The membrane joint sealant manufacturer shall submit a detailed installation procedure to the Engineer at least 5 days prior to joint installation for his review.
12. Traffic shall not be allowed on the joint for a minimum of 3 hours unless otherwise directed by the Engineer.
13. Use plywood or other material to protect concrete adjacent to the joint from spalling before any equipment is moved across the joint. Any spall areas will be repaired at the Contractor's expense by breaking out and replacing adjacent concrete, as approved by the Engineer.
14. The Membrane Sealant Expansion Joint will be measured in feet to the nearest one-tenth foot, complete in place. Measurement will be made of the overall horizontal length. The Membrane Sealant Expansion Joint will be paid for at the contract unit price per foot complete in place. Payment for this item shall be full compensation for furnishing all the required materials in place, including labor, equipment and incidentals necessary to complete the work in accordance with the plans and the foregoing specifications.



SEC. A - A

ESTIMATED QUANTITIES
(For Two Approach Slabs)

ITEM	UNIT	QUANTITY
Membrane Sealant Expansion Joint	Ft.	83.8

APPROACH SLAB JOINT DETAILS
FOR
96' - 3" CONT. CONCRETE BRIDGE

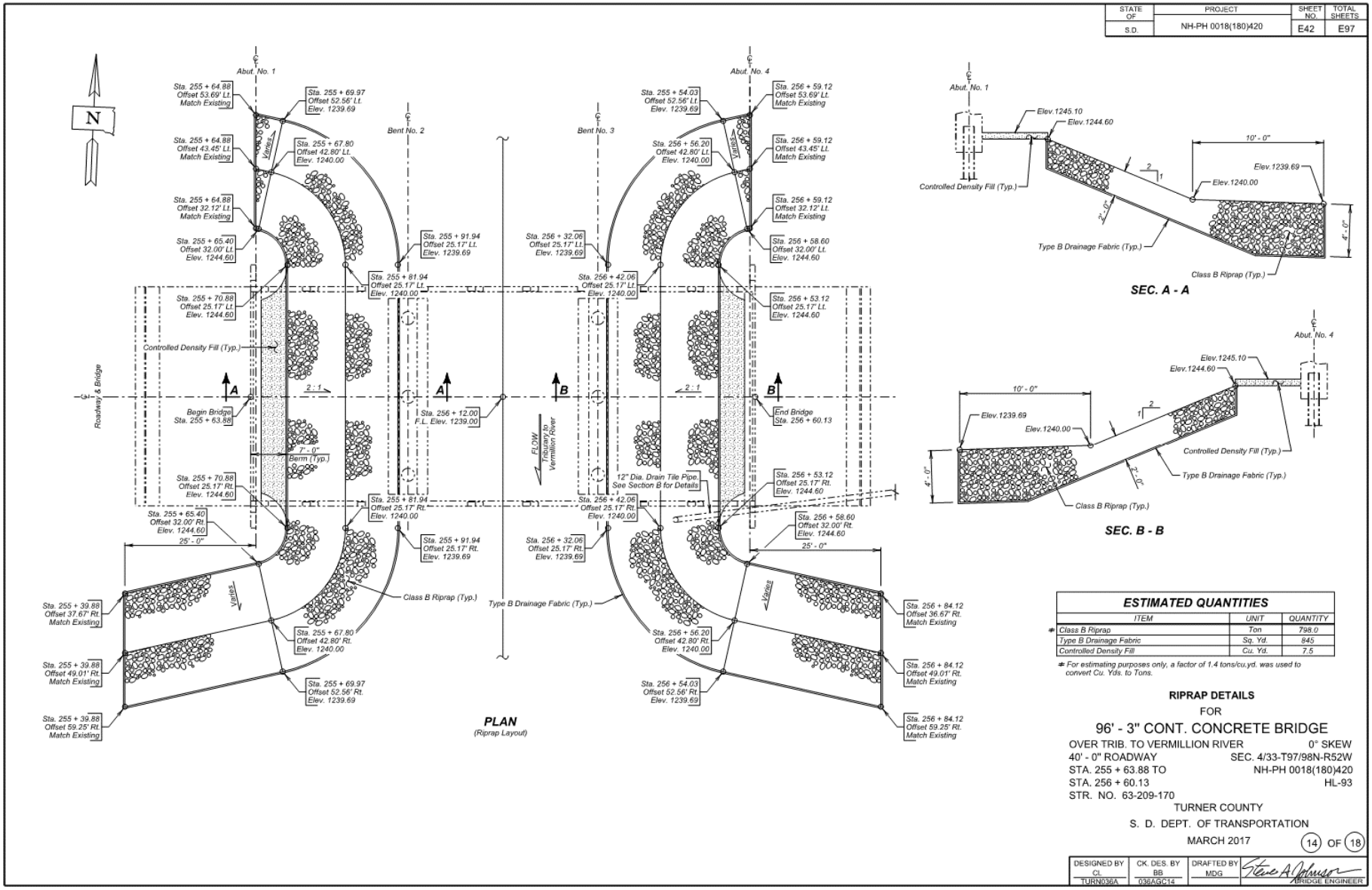
OVER TRIB. TO VERMILLION RIVER — 0° SKEW
STA. 255 + 63.88 TO — SEC. 4/33-T97/98N-R52W
STA. 256 + 60.13 — NH-PH 0018(180)420
STR. NO. 63-209-170 — HL-93

TURNER COUNTY
S. D. DEPT. OF TRANSPORTATION
MARCH 2017

13 OF 18

DESIGNED BY	CK. DES. BY	DRAFTED BY	
CL	BB	MDG	BRIDGE ENGINEER
TURN036A	036AGC13		

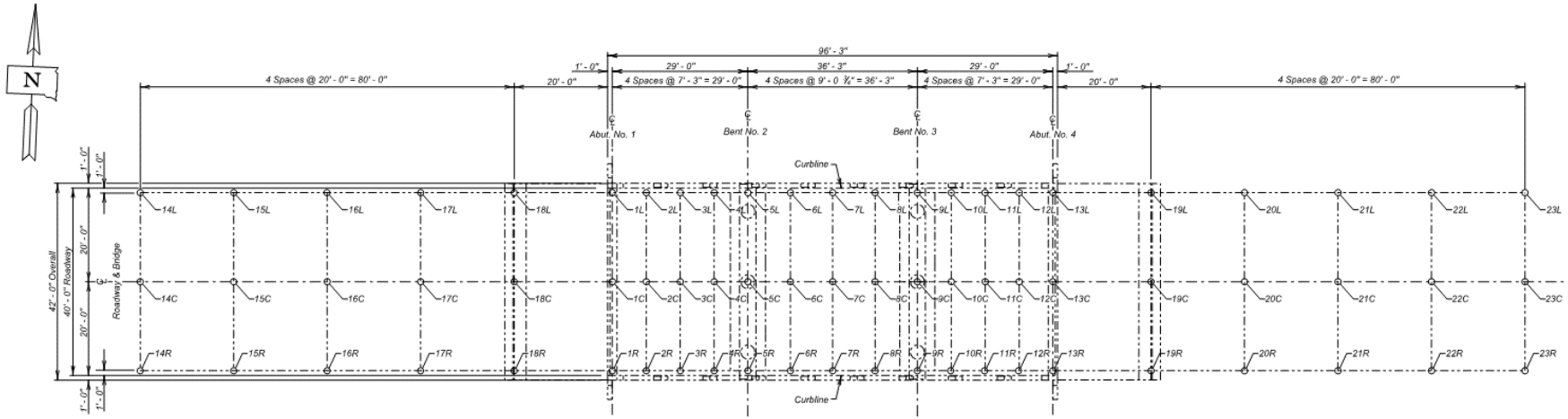
F.2.2.12. RIPRAP DETAILS



F.2.2.13. AS-BUILT ELEVATION SURVEY

The elevations shown in these plans are based on the National Geodetic Survey (NGS) North American Vertical Datum of 1988 (NAVD88).

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	NH-PH 0018(180)420	E43	E97



PLAN

Table of As-Built Elevations - Bridge Deck					
Location	Elevation	Location	Elevation	Location	Elevation
1L		1C		1R	
2L		2C		2R	
3L		3C		3R	
4L		4C		4R	
5L		5C		5R	
6L		6C		6R	
7L		7C		7R	
8L		8C		8R	
9L		9C		9R	
10L		10C		10R	
11L		11C		11R	
12L		12C		12R	
13L		13C		13R	

Table of As-Built Elevations - Approach Roadway					
Location	Elevation	Location	Elevation	Location	Elevation
14L		14C		14R	
15L		15C		15R	
16L		16C		16R	
17L		17C		17R	
18L		18C		18R	
19L		19C		19R	
20L		20C		20R	
21L		21C		21R	
22L		22C		22R	
23L		23C		23R	

Table of Elevations - Bridge Survey Markers		
Location	Station - Offset	Elevation
Begin Bridge		
End Bridge		

NOTE -
The Contractor shall be responsible for producing the As - Built Elevation Survey soon after construction is complete and before the bridge is opened to traffic.
The As - Built Elevations of the Bridge shall be taken and recorded at the locations shown by the tables on this sheet. The completed tables shall be given to the Engineer who will forward a copy to the Office of Bridge Design and the Region Office.

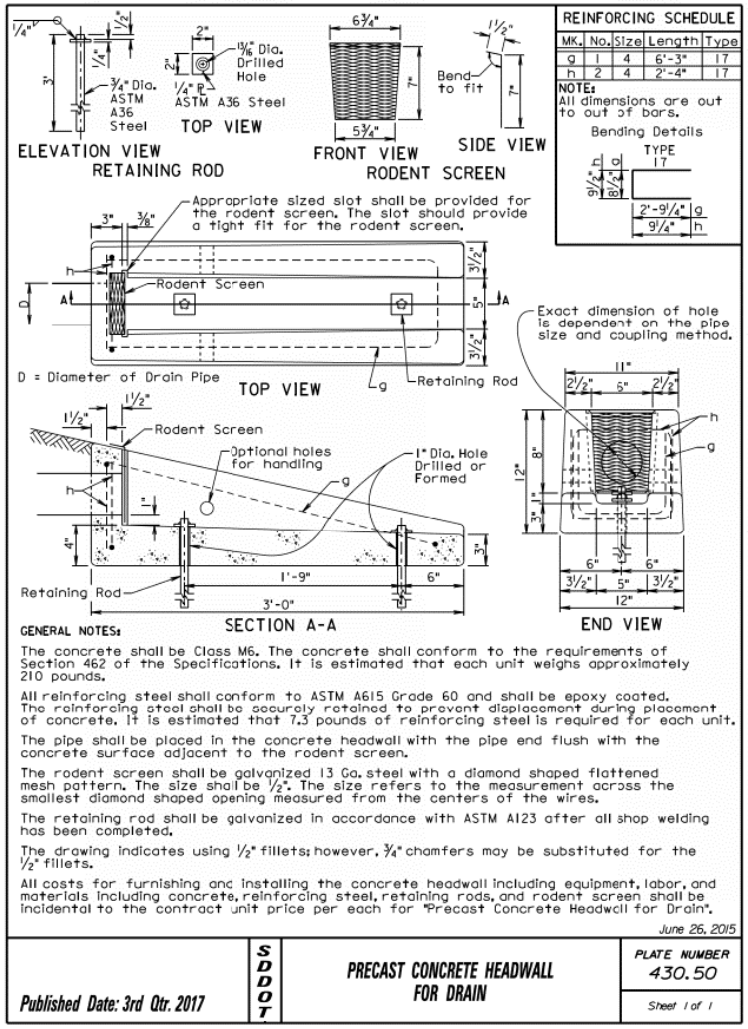
ESTIMATED QUANTITIES		
ITEM	UNIT	QUANTITY
Bridge Elevation Survey	L. S.	Lump Sum

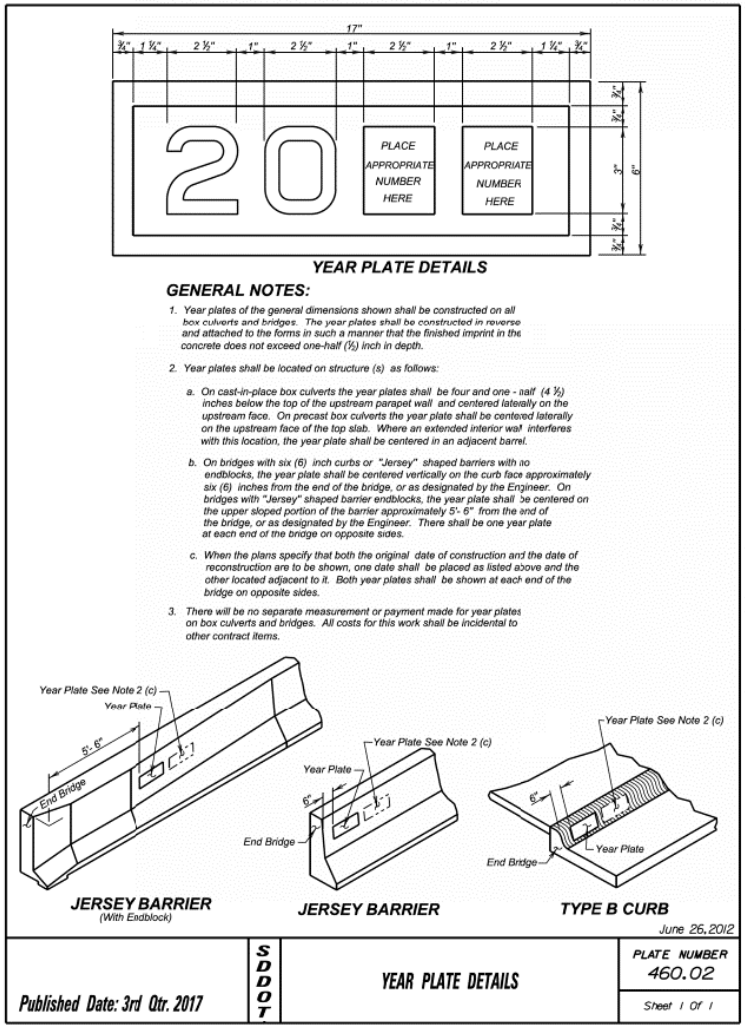
AS-BUILT ELEVATION SURVEY
FOR
96' - 3" CONT. CONCRETE BRIDGE
OVER TRIB. TO VERMILLION RIVER 0° SKEW
40' - 0" ROADWAY SEC. 4/33-T97/98N-R52W
STA. 255 + 63.88 TO NH-PH 0018(180)420
STA. 256 + 60.13 HL-93
STR. NO. 63-209-170
TURNER COUNTY
S. D. DEPT. OF TRANSPORTATION
MARCH 2017
15 OF 18

DESIGNED BY	CK. DES. BY	DRAFTED BY	
CL	BB	MDG	BRIDGE ENGINEER
TURN036A	036AGC015		

F.2.2.14. DETAILS OF STANDARD PLATE NO's 430.5 & 460.02

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	NH-PH 0018(180)420	E44	E97





96' - 3" CONT. CONCRETE BRIDGE
STR. NO. 63-209-170
MARCH 2017

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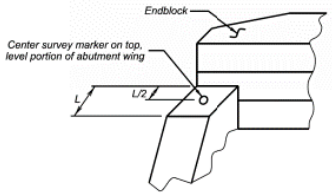
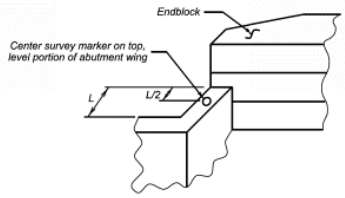
F.2.2.15. DETAILS OF STANDARD PLATE NO's 460.05 & 510.40

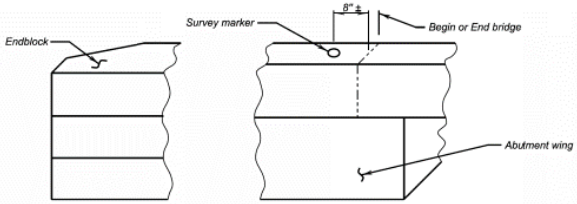
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	NH-PH 0018(180)420	E45	E97



ABUTMENT WITH "STRAIGHT" WINGS



ABUTMENT WITH "SWEPT BACK" WINGS



ABUTMENT WITH "SWEPT BACK" WINGS

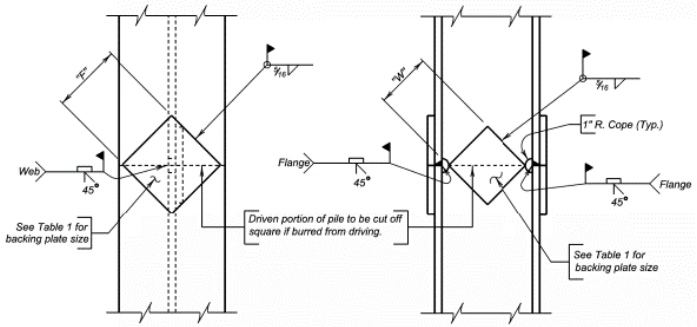
(Endblock on top of wings)

GENERAL NOTES:

1. Survey markers shall be located at each abutment on the same side of the bridge as the year plate. Place survey markers on abutment wings as shown. Two survey markers will be required at each bridge.
2. Survey markers shall be of a type intended for installation in concrete, be made of solid brass or bronze, have a domed top and be either a 3" top diameter (with a ¾" X 2" long ribbed shank), or a US Army Corps of Engineers Type C Disc with a 3 ½" top diameter.
3. There will be no separate measurement or payment made for survey markers. All costs for this work shall be incidental to the other contract items.

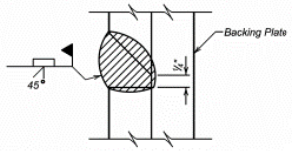
June 26, 2012

Published Date: 3rd Qtr. 2017 | SDDOT | BRIDGE SURVEY MARKER | PLATE NUMBER 460.05 | Sheet 1 of 1



NOTE:
Prepare joint surfaces lower end of upper section on the ground and weld on backing plates; then place upper section on lower section and weld.

COMPLETE JOINT PENETRATION WELD DETAIL



GENERAL NOTES:

1. Steel for backing plates shall conform to ASTM A709 Grade 50.
2. Welding and weld inspection shall be in conformance with AWS D1.5 (Current Year) Bridge Welding Code - Steel.
3. Welder must be certified and registered with the SDDOT.
4. Backing plate shall at a minimum be as thick as the web of the pile being spliced.
5. Web must be coped with 1 inch radius.
6. Submit Welding Procedure Specification (WPS) to Bridge Construction Engineer for approval prior to pile driving.

TABLE 1
(BACKING PLATES)

PILE	10"	12"	14"
"F" FLANGE	6 ½"	8"	10"
"W" WEB	4 ¾"	6 ¼"	7 ½"

December 23, 2012

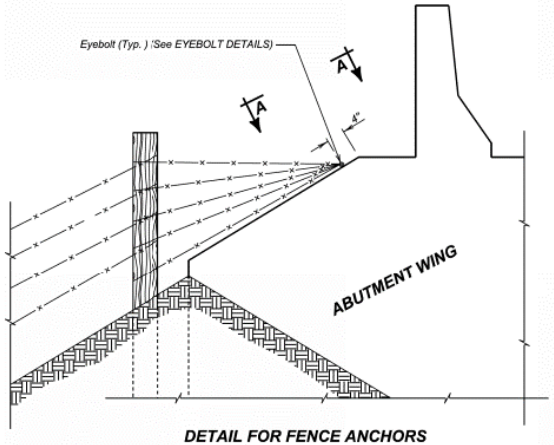
Published Date: 3rd Qtr. 2017 | SDDOT | STEEL PILE SPLICE DETAILS | PLATE NUMBER 510.40 | Sheet 1 of 1

96' - 3" CONT. CONCRETE BRIDGE
STR. NO. 63-209-170
MARCH 2017

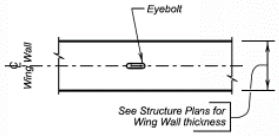
17 OF 18

F.2.2.16. DETAILS OF STANDARD PLATE NO. 620.18 & 630.92

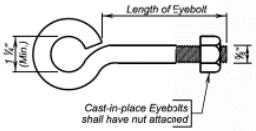
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	NH-PH 0018(180)420	E46	E97



DETAIL FOR FENCE ANCHORS



VIEW A - A



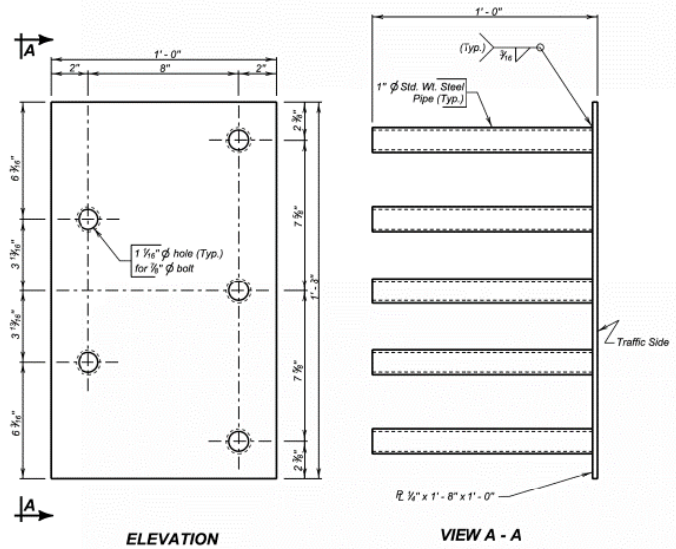
EYEBOLT DETAILS

GENERAL NOTES:

1. The fence and post details shown are for illustrative purpose only. The fence shall be as specified elsewhere in the plans.
2. Eyebolts shall be placed on all of the bridge abutment wings.
3. Eyebolts shall be ⅝ inch diameter and shall conform to ASTM A307.
4. Eyebolts, nuts, and concrete inserts shall be galvanized in accordance with AASHTO M232 (ASTM A153). Concrete inserts of corrosion resistant material need not be galvanized.
5. Cast-in-place eyebolts shall have a nut attached, be 4 ½ inches (Min.) in length and shall be embedded such that the eye of the bolt is flush with the concrete surface. (See Eyebolt Details) As an alternate, cast-in-place concrete inserts, capable of developing the full strength of the ⅝ inch diameter threaded eyebolt, may be used and shall be set in the concrete in accordance with the manufacturer's recommendations. The eyebolt shall be of sufficient length to develop its full strength. The eye of the eyebolt shall be flush with the concrete surface.
6. The cost for furnishing and installing eyebolts and/or concrete inserts shall be incidental to various contract items.

December 23, 2012

Published Date: 3rd Qtr. 2017	SDDOT	FENCE ANCHORS FOR BRIDGE ABUTMENT WINGS (WINGS 6' AND SHORTER)	PLATE NUMBER 620.18 Sheet 1 of 1



ELEVATION

VIEW A - A

GENERAL NOTES:

1. Steel plate for the insert assembly shall conform to ASTM A709 Grade 36. The steel pipes shall conform to ASTM A53 or ASTM A500 Grade B.
2. Welding and weld inspection shall be in conformance with AWS D1.1 - (Current Year) Structural Welding Code - Steel.
3. After fabrication, galvanize in accordance with AASHTO M111 (ASTM A123).
4. Bolts, nuts, and washers shall be provided with each assembly. Bolts shall be galvanized and conform to the requirements of ASTM A307, A325, or A449. Plain washers shall be galvanized and conform to ASTM F844.
5. Bolt heads shall be placed on the traffic side of the endblock. Bolt projection at the back side of the insert shall not exceed 1 inch beyond the nut.
6. The cost of the 5 bolt insert plate assembly complete in place including welding and galvanizing shall be incidental to the contract unit price per Cubic Yard for " Class A45 Concrete, Miscellaneous ", " Class A45 Concrete, Bridge Deck ", or " Class A45 Concrete, Bridge Repair ", as applicable.

December 23, 2013

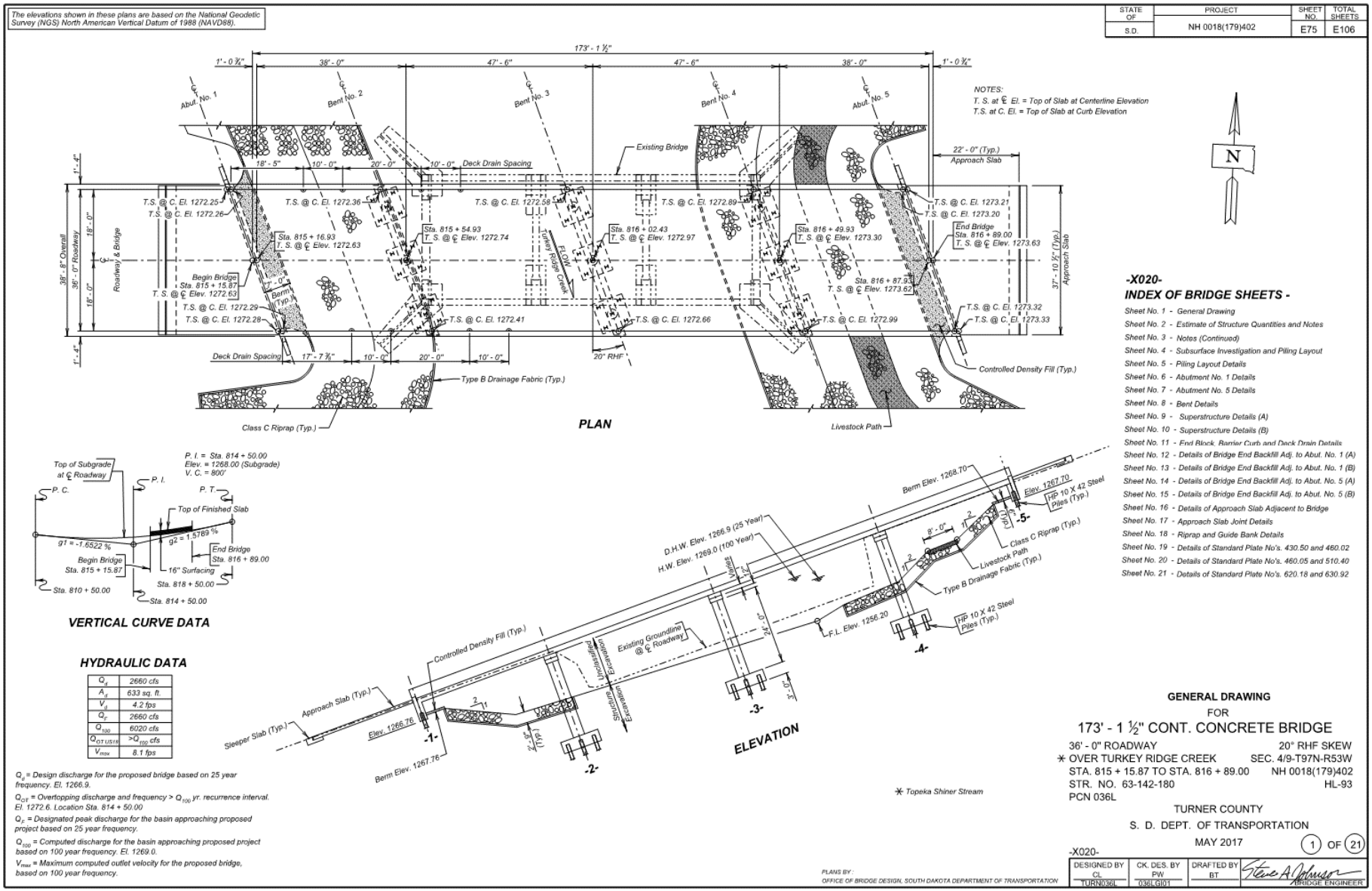
Published Date: 3rd Qtr. 2017	SDDOT	5 BOLT INSERT PLATE ASSEMBLY	PLATE NUMBER 630.92 Sheet 1 of 1

96' - 3" CONT. CONCRETE BRIDGE
STR. NO. 63-209-170
MARCH 2017

18 OF 18

F.2.3. Skewed Continuous Concrete Bridge Plans

F.2.3.1. GENERAL DRAWING



F.2.3.2. ESTIMATE OF STRUCTURE QUANTITIES & NOTES

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	NH 0018(179)402	E76	E106

ESTIMATE OF STRUCTURE QUANTITIES

DESCRIPTION	QUANTITY	UNIT	REMARKS
Concrete Penetrating Sealer	689	SqYd	See Special Provision
Incidental Work, Structure	Lump Sum	LS	
Base Course	74.0	Ton	
Membrane Sealant Expansion Joint	75.8	Ft	
Structure Excavation, Bridge	1,059	CuYd	
Bridge End Embankment	730	CuYd	
Granular Bridge End Backfill	64.8	CuYd	
Approach Slab Underdrain Excavation	3.0	CuYd	
Precast Concrete Headwall for Drain	4	Each	
Class A45 Concrete, Bridge Deck	407.4	CuYd	
Class A45 Concrete, Bridge	155.4	CuYd	
Concrete Approach Slab for Bridge	189.4	SqYd	
Concrete Approach Sleeper Slab for Bridge	37.9	SqYd	
Deck Drain, Slab Bridge	8	Each	
Controlled Density Fill	7.6	CuYd	
Reinforcing Steel	23,876	Lb	
Epoxy Coated Reinforcing Steel	109,035	Lb	
Extract Pile	20	Each	
Preboring Pile	100	Ft	
HP 10x42 Steel Test Pile, Furnish and Drive	465	Ft	
HP 10x42 Steel Bearing Pile, Furnish and Drive	4,160	Ft	
4" Underdrain Pipe	260	Ft	
Porous Backfill	29.6	Ton	
Class C Riprap	2,941.5	Ton	
Type B Drainage Fabric	2,762	SqYd	

SPECIFICATIONS FOR BRIDGE

1. Design Specifications: AASHTO LRFD Bridge Design Specifications, 2014 Edition with 2015 and 2016 interims.
2. Construction Specifications: South Dakota Standard Specifications for Roads and Bridges, 2015 Edition and required provisions, supplemental specifications, and special provisions as included in the proposal.

BRIDGE DESIGN LOADING

1. AASHTO HL-93.
2. Dead Load includes 22 psf for future wearing surface on the roadway.

DESIGN MATERIAL STRENGTHS

Concrete	f'c = 4,500 psi
Reinforcing Steel	fy = 60,000 psi
Piling (ASTM A572 Grade 50)	fy = 50,000 psi

GENERAL CONSTRUCTION

1. All mild reinforcing steel shall conform to ASTM A615, Grade 60.
2. All exposed concrete corners and edges shall be chamfered 3/4" unless noted otherwise.
3. Use 2" clear cover on all reinforcing steel except as shown.
4. Contractor shall imprint on the structure the date of new construction as specified and detailed on Standard Plate No. 460.02.
5. Barrier Curbs and End blocks shall be built normal to the grade.
6. Request for construction joints or re-steel splices at points other than those shown, must be submitted to the Engineer for prior approval. If additional splices are approved, no payment will be allowed for the added quantity of re-steel.
7. The elevation of the bridge deck is 16" above subgrade elevation.

INCIDENTAL WORK, STRUCTURE

1. In place centerline Sta. 815+59.41 to centerline Sta. 816+44.06 is a 86.0' 3 span I-beam viaduct bridge with a 30'-0" clear roadway. The superstructure consists of a reinforced concrete slab with concrete pigeon hole railing faced with steel W-beam continuous across the bridge. The deck has been overlaid with 1.5 inches of asphalt. The substructure consists of 2 column reinforced concrete bents and reinforced concrete vertical abutments, all of which are supported on steel and timber piling.
2. Break down and remove the existing bridge, and approach/sleeper slabs if applicable, to 1 foot below finished groundline, or as required to construct the new structure in accordance with Section 110 of the Specifications. All portions of the existing bridge shall be removed and disposed of by the Contractor on a site obtained by the Contractor and approved by the Engineer in accordance with the Environmental Commitments found in Section A
3. During demolition of the structure, efforts shall be taken to prevent material from falling into the creek. Under no circumstances is asphalt allowed to fall into the creek.
4. The foregoing is a general description of the in-place bridge and should not be construed to be complete in all details. Before preparing the bid it shall be the responsibility of the Contractor to make a visual inspection of the structure to verify the extent of the work and materials involved. If desired by the Contractor, a copy of the original construction plans may be obtained through the Office of Bridge Design.
5. It is anticipated that at least thirteen (13) timber piles and seven (7) steel piles will interfere with piling for this new structure. Any existing pile that interferes with piling for the new structure shall be extracted. Payment for the extracting piling shall be contract unit price per each for Extract Pile and shall be full compensation for extracting piling including materials, labor, and equipment necessary or incidental to the satisfactory completion of this work.

DESIGN MIX OF CONCRETE

1. All structural concrete shall be Class A45 unless otherwise indicated.
2. Type II cement is required.

ABUTMENTS

1. Pre-boring piling at each abutment is required to whichever is greater, ten feet or to natural ground
2. The HP 10x42 Piling were designed using a factored bearing resistance of 77 tons per pile. Piling shall develop a field verified nominal bearing resistance of 192 tons per pile.
3. The contractor shall have sufficient pile splice material on hand before pile driving is started. See Standard Plate No. 510.40.
4. Piles shall not be driven out of position by more than three inches in the direction normal to the abutment centerline. A pile-driving template shall be used to insure this accuracy.
5. One test pile shall be driven at each abutment and will become part of the pile group.
6. Each finished abutment shall include a Bridge Survey Marker. See Standard Plate No. 460.05.

PILE DRIVING

1. A drivability analysis was performed using the wave equation analysis program (GRLWEAP). The following pile hammers were evaluated and found to produce acceptable driving stresses:

   Delmag D25-32 Delmag D30-32

   SPI D-30 APE D30-32 APE D30-52

2. Pile hammers not listed will require evaluation and approval prior to use from the Geotechnical Engineering Activity.

NOTICE - LEAD BASED PAINT

Be advised that the paint on the steel surfaces of the existing structure contains lead. The Contractor should plan his/her operations accordingly, and inform his/her employees of the hazards of lead exposure.

ESTIMATE OF STRUCTURE QUANTITIES AND NOTES
FOR
173' - 1 ½" CONT. CONCRETE BRIDGE

STR. NO. 63-142-180
MAY 2017

2 OF 21

DESIGNED BY	CK. DES. BY	DRAFTED BY	
CL TURN036L	PW 036LGH02	BT	BRIDGE ENGINEER

F.2.3.3. NOTES (CONTINUED)

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	NH 0018(179)402	E77	E106

BENTS

1. The HP 10x42 Piling were designed using a factored bearing resistance of 77 tons per pile. Piling shall develop a field verified nominal bearing resistance of 192 tons per pile.
2. One test pile shall be driven at each bent and will become part of the pile group.
3. The contractor shall have sufficient pile splice material on hand before pile driving is started. See Plate No. 510.40
4. Spiral reinforcement may be fabricated from cold drawn wire conforming to ASTM A1064 or hot rolled plain or deformed bars conforming to the strength requirements of ASTM A615, Grade 60.
5. Due to the nature of the subsurface conditions, cofferdams may be required to construct the bents. Soil parameters for the design of the cofferdams are located on the Subsurface Investigation and Piling Layout sheet. Cofferdams shall be designed and constructed in accordance with Section 423 of the Specifications.

SUPERSTRUCTURE

1. Preplanned construction joints may be used in accordance with Section 460.3 of the Specifications. Contact the Office of Bridge Design for joint configuration and allowable location. Emergency slab construction joints shall be as shown with the superstructure details. If an emergency slab joint is used, contact the Office of Bridge Design before proceeding with deck pour.
2. The deck-finishing machine shall be adjusted and operated in such a manner that the roller screed or screeds are parallel with the centerline of the bridge and the finish machine is parallel to the skew of the bridge. Concrete placement in front of the finish machine shall be kept parallel to the machine.
3. Barrier curbs shall be poured after all the slab has been poured. Superstructure falsework shall not be removed until bridge deck concrete, including barrier curbs, has attained a strength of 2400 psi.
4. The bridge deck must be placed and finished continuously at a minimum rate of 47 ft. of deck per hour measured along centerline roadway. If concrete cannot be placed and finished at this rate, the Engineer shall order a header installed and operations stopped. Notify the Bridge Construction Engineer if deck pour operations are stopped. Operations may resume only when the Engineer is satisfied that a minimum rate of 47 ft. of deck per hour can be achieved and the concrete in the previous pour has attained a minimum compressive strength of 2000 psi.
5. Snap ties, if used in barrier curb formwork, shall be epoxy coated. The epoxy coating shall be inert in concrete and compatible with the coating applied to the new epoxy coated reinforcing steel.

CLASS A45 CONCRETE, BRIDGE DECK

1. Concrete used in the bridge deck slab and barrier curbs shall be in accordance with the requirements for bridge deck concrete as specified in Section 460.3A of the Specifications.
2. See Special Provision for Concrete Penetrating Sealer.

CLASS B COMMERCIAL TEXTURE FINISH

1. A Class B commercial texture finish shall be applied to the following areas:

   a) **Barrier Rail:** all exposed surfaces (front, top and back).
   b) **Slab:** edge of slab.

2. The Class B commercial texture finish shall be applied in accordance with Section 460.3 L.1.c of the Specifications.
3. Where the Class B commercial texture finish is to be applied, concrete curing shall be accomplished with cotton or burlap mats and polyethylene sheeting. Curing shall continue for not less than seven days after placing concrete before the commercial texture finish is applied. The commercial texture finish shall be applied in accordance with the manufacturer's recommendations. The commercial texture finish itself does not require a specific cure except for drying.

APPROACH SLABS

1. Sleeper slab riser shall be cast with the approach slab or cast after the approach slab is placed. Care shall be taken to ensure the correct grade is maintained across the joint.
2. The portion of the sleeper slab below the construction joint may be precast. If the bottom portion of the sleeper slab is precast, the Contractor shall submit proposed lifting and setting plans to the Bridge Construction Engineer for approval. In addition, if reinforcing or other details differ from those shown in the plans, the Contractor shall submit proposed alternate details for approval.
3. The use of an approved finishing machine will be required during placement of Class A45 Concrete for the approach slabs. Concrete placement in front of the machine shall be kept parallel to the screed.
4. The concrete in the approach slab shall be tined normal to centerline roadway.
5. Concrete Approach Sleeper Slab for Bridge, whether cast-in-place or precast, will be paid for at the contract unit price per square yard. This payment shall be full compensation for all excavation, furnishing, hauling, and placing all materials including concrete and reinforcing steel; for disposal of all excavated material and surplus materials; and for labor, tools, equipment and any incidentals necessary to complete this item of work.
6. Concrete Approach Slab for Bridge will be paid for at the contract unit price per square yard. This payment shall be full compensation for all excavation, furnishing, hauling and placing all materials including concrete, asphalt paint or 6 mil polyethylene sheeting, elastic joint sealer and reinforcing steel; for disposal of all excavated material and surplus materials and for labor, tools, equipment and any incidentals necessary to complete this item of work.

DECK DRAINS

1. Deck Drains shall be 4" diameter by 1' – 7" Schedule 40 Polyvinyl Chloride (PVC) Plastic Pipe conforming to the requirements of ASTM D1785.
2. A 4 1/2 inch diameter by 2 inch PVC Plastic Pipe Sleeve conforming to the requirements of ASTM D1785 shall be attached to the 4" diameter PVC Pipe, as shown in the plans, with a solvent cement conforming to ASTM D2564.
3. Payment for Deck Drains shall be at the contract unit price per each for Deck Drain, Slab Bridge, and shall be full compensation for furnishing, fabricating and installing the deck drains in accordance with the Plans and Specifications.
4. The location of the deck drains may be adjusted slightly to clear transverse slab steel.

FALSEWORK

1. The Contractor shall be required to include with the Falsework Plans, details for the construction of an adequate "Walk-Way" including railing.
2. The maximum falsework deflection allowed is ¼ inch.

NOTES (CONTINUED)
FOR
173' - 1 ½" CONT. CONCRETE BRIDGE

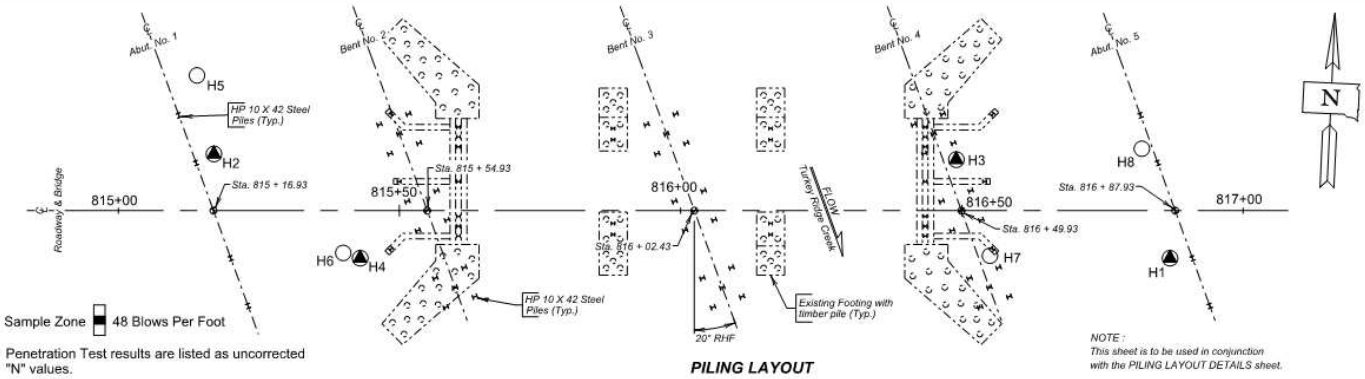
STR. NO. 63-142-180
MAY 2017

3 OF 21

DESIGNED BY	CK. DES. BY	DRAFTED BY	
CL	PW	BT	BRIDGE ENGINEER
TURN036L	036LGH03		

F.2.3.4. SUBSURFACE INVESTIGATION AND PILING LAYOUT

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	NH 0018(179)402	E78	E106



Sample Zone ■ 48 Blows Per Foot

Penetration Test results are listed as uncorrected "N" values.

PILING LAYOUT

NOTE :
This sheet is to be used in conjunction with the PILING LAYOUT DETAILS sheet.

COFFERDAM SOIL PARAMETERS

	Friction Angle (ϕ)	Cohesion	Wet Unit Weight (γ_w)
Silt-clay with sand	30°	100 psf	118 pcf
Sand	34°	0 psf	125 pcf
Sand-clay with pebbles	26°	1,100 psf	129 pcf

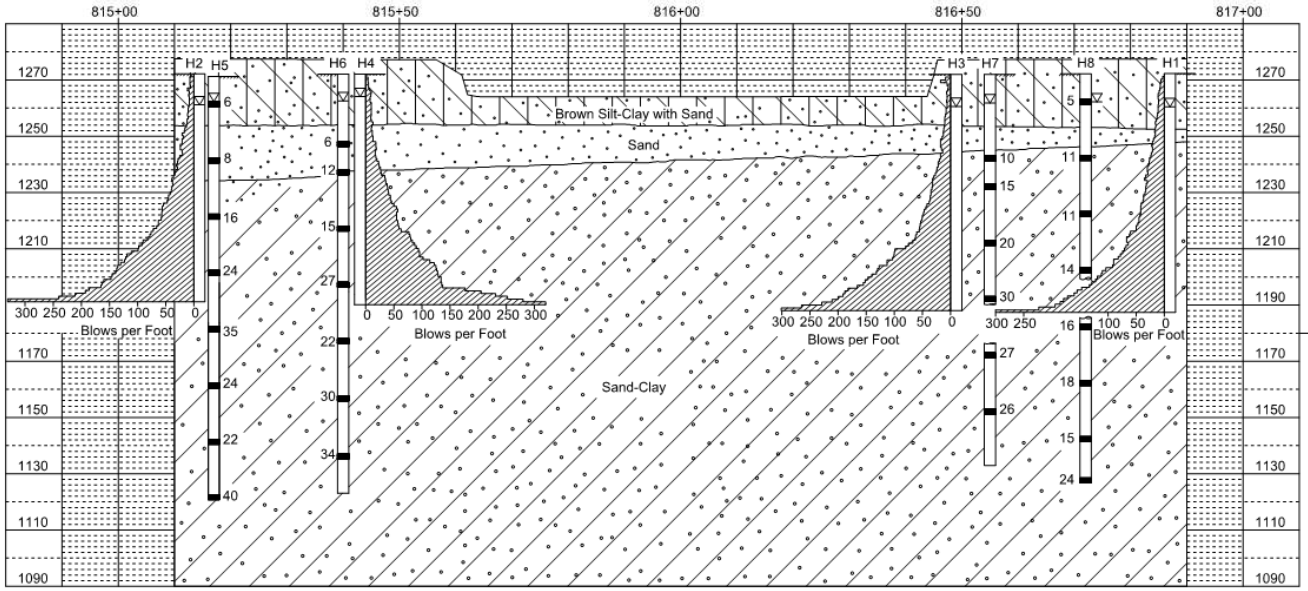
Hole Number	H5	
Station	815+14	
Depth	110.5	±
Soil Color	Gray	
Classification	Sandy Clay	
Strength (Qu)	4,908	psf
Dry Density	107.7	pcf
Wet Density	130.0	pcf
Moisture	20.7	%
Pass No. 10	92.9	%
Pass No. 40	83.9	%
Pass No. 200	65.6	%
Sand Content	27.3	%
Silt Content	29.9	%
Clay Content	25.7	%

Hole Number	H6	
Station	815+40	
Depth	25.5	±
Soil Color	Gray	
Classification	Sand	
Strength (Qu)	No Test	
Dry Density		pcf
Wet Density		pcf
Moisture	16.5	%
Pass No. 10	91.2	%
Pass No. 40	30.1	%
Pass No. 200	8.4	%
Sand Content	82.8	%
Silt Content	4.4	%
Clay Content	4.0	%

Hole Number	H6	
Station	815+40	
Depth	55.2	±
Soil Color	Gray	
Classification	Silt-Clay	
Strength (Qu)	4,273	psf
Dry Density	102.2	pcf
Wet Density	126.3	pcf
Moisture	23.6	%
Pass No. 10	97.0	%
Pass No. 40	30.1	%
Pass No. 200	8.4	%
Sand Content	24.2	%
Silt Content	23.9	%
Clay Content	48.9	%

Hole Number	H7	
Station	816+55	
Depth	100.2	±
Soil Color	Gray	
Classification	Sandy Clay	
Strength (Qu)	4,931	psf
Dry Density	111.4	pcf
Wet Density	132.2	pcf
Moisture	18.6	%
Pass No. 10	95.6	%
Pass No. 40	85.7	%
Pass No. 200	62.3	%
Sand Content	33.4	%
Silt Content	29.4	%
Clay Content	32.9	%

Hole Number	H8	
Station	816+82	
Depth	10.5	±
Soil Color	Brown	
Classification	Sandy Silt	
Strength (Qu)	955	psf
Dry Density	97.0	pcf
Wet Density	120.1	pcf
Moisture	23.8	%
Pass No. 10	100.0	%
Pass No. 40	99.2	%
Pass No. 200	60.9	%
Sand Content	39.1	%
Silt Content	40.5	%
Clay Content	20.4	%



Glaciated Terrain contains all sizes of natural mineral sediment ranging from clay to boulders. Streams originating in or flowing through glaciated topography contain sediment loads derived from glaciated sources. Stream and river crossings contain sediment naturally sorted and randomly concentrated. Alluvial sediment located at this project location may have concentrated coarser gravel such as pebbles, cobbles and boulders. The borings shown only represent material that was found at the exact location of the small diameter drill hole. Coarse granular material may be present in areas not penetrated by the depicted borings.

The Geotechnical Engineering Activity has all of the boring logs and laboratory test results available for review at the Central Office in Pierre.

LEGEND

○ Penetration Test
▲ Drive Test
▽ Water
■ Sample Zone

Drive tests are conducted by dropping a 490 pound hammer 30 inches to drive a 2 ⅞ inch drill stem to measure the resistance to penetration of the soil.

Penetration test holes are drilled with a 6 ⅝ inch diameter hollow stem auger. Penetration tests are conducted by dropping a 140 pound hammer 30 inches to obtain 2 inch nominal diameter samples and to measure the resistance to penetration of the soil.

GROUNDWATER ELEVATIONS
as of FEBRUARY 2016

H1	1260.5
H2	1261.2
H3	1260.6
H4	1264.1
H5	1261.7
H6	1262.6
H7	1261.8
H8	1262.2

MEASURED SKIN FRICTION

	ELEV.	PSF
H1	1187.4	541
H2	1191.2	670
H3	1188.0	636
H4	1226.1	506
H4	1190.1	792

SUBSURFACE INVESTIGATION AND PILING LAYOUT
FOR
173' - 1 ½" CONT. CONCRETE BRIDGE

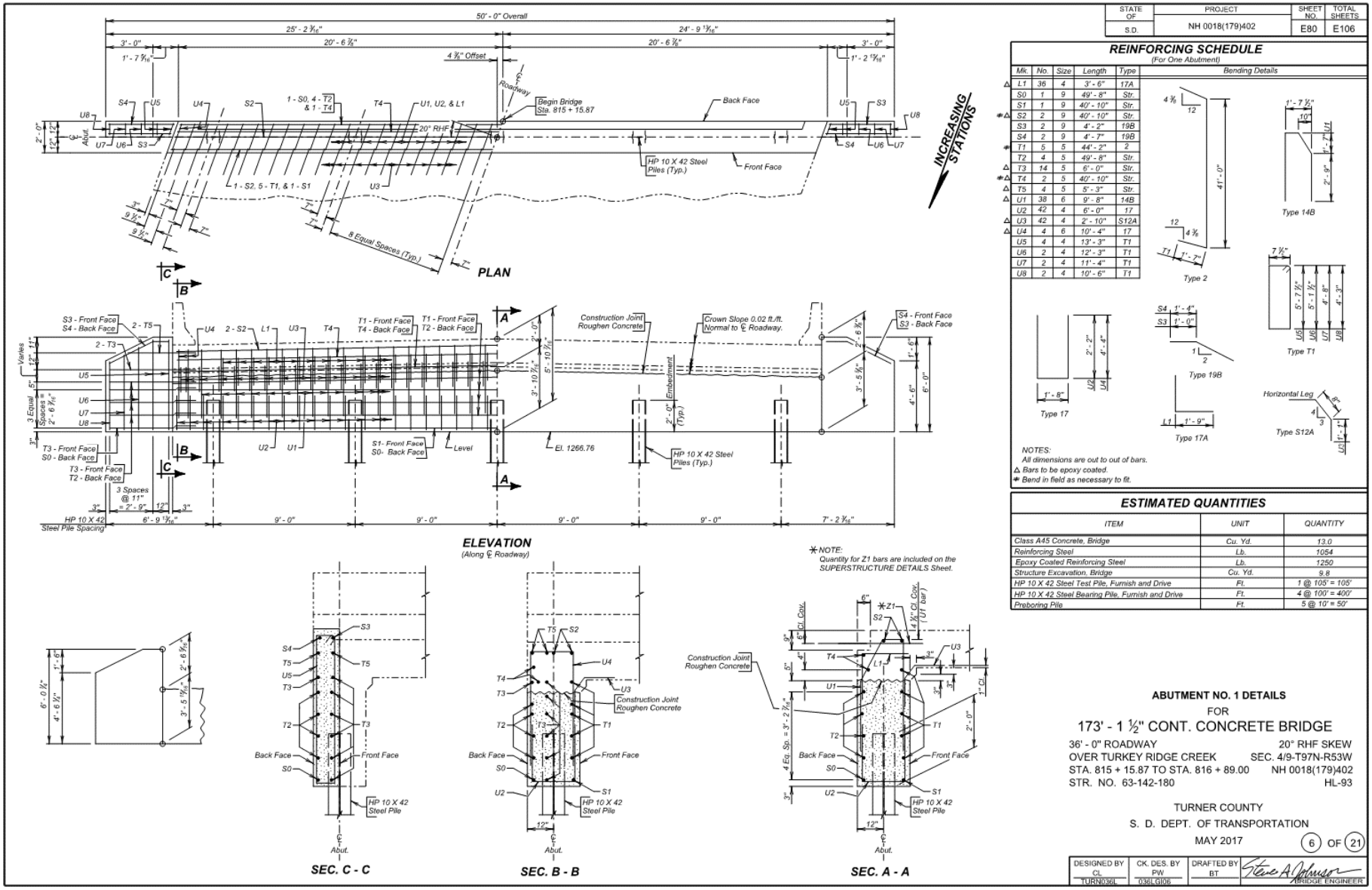
36' - 0" ROADWAY — 20° RHF SKEW
OVER TURKEY RIDGE CREEK — SEC. 4/9-T97N-R53W
STA. 815 + 15.87 TO STA. 816 + 89.00 — NH 0018(179)402
STR. NO. 63-142-180 — HL-93

TURNER COUNTY
S. D. DEPT. OF TRANSPORTATION
MAY 2017

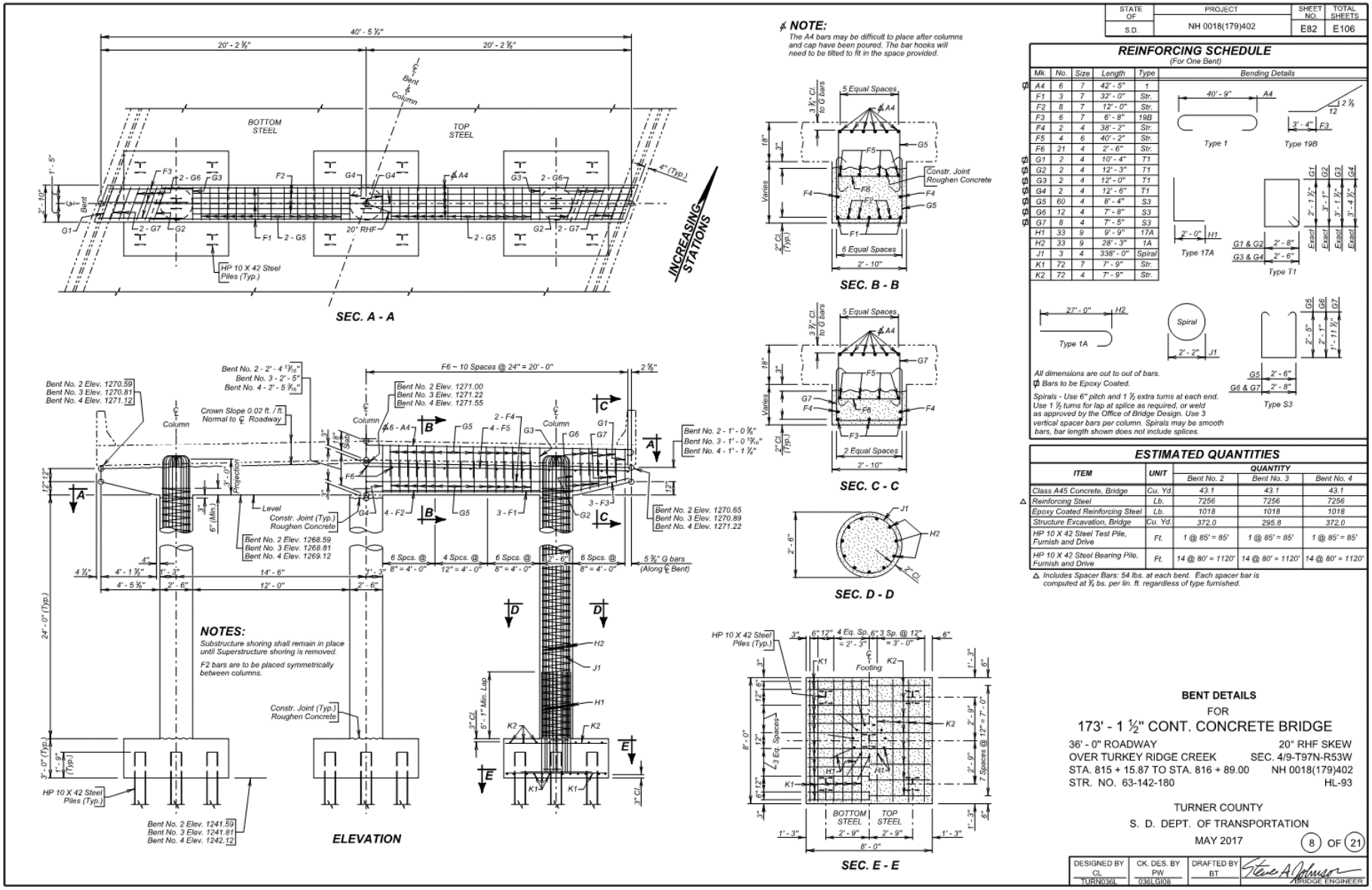
4 OF 21

DESIGNED BY	CK. DES. BY	DRAFTED BY	
CL	PW	BT	BRIDGE ENGINEER
TURN036L	036LG04		

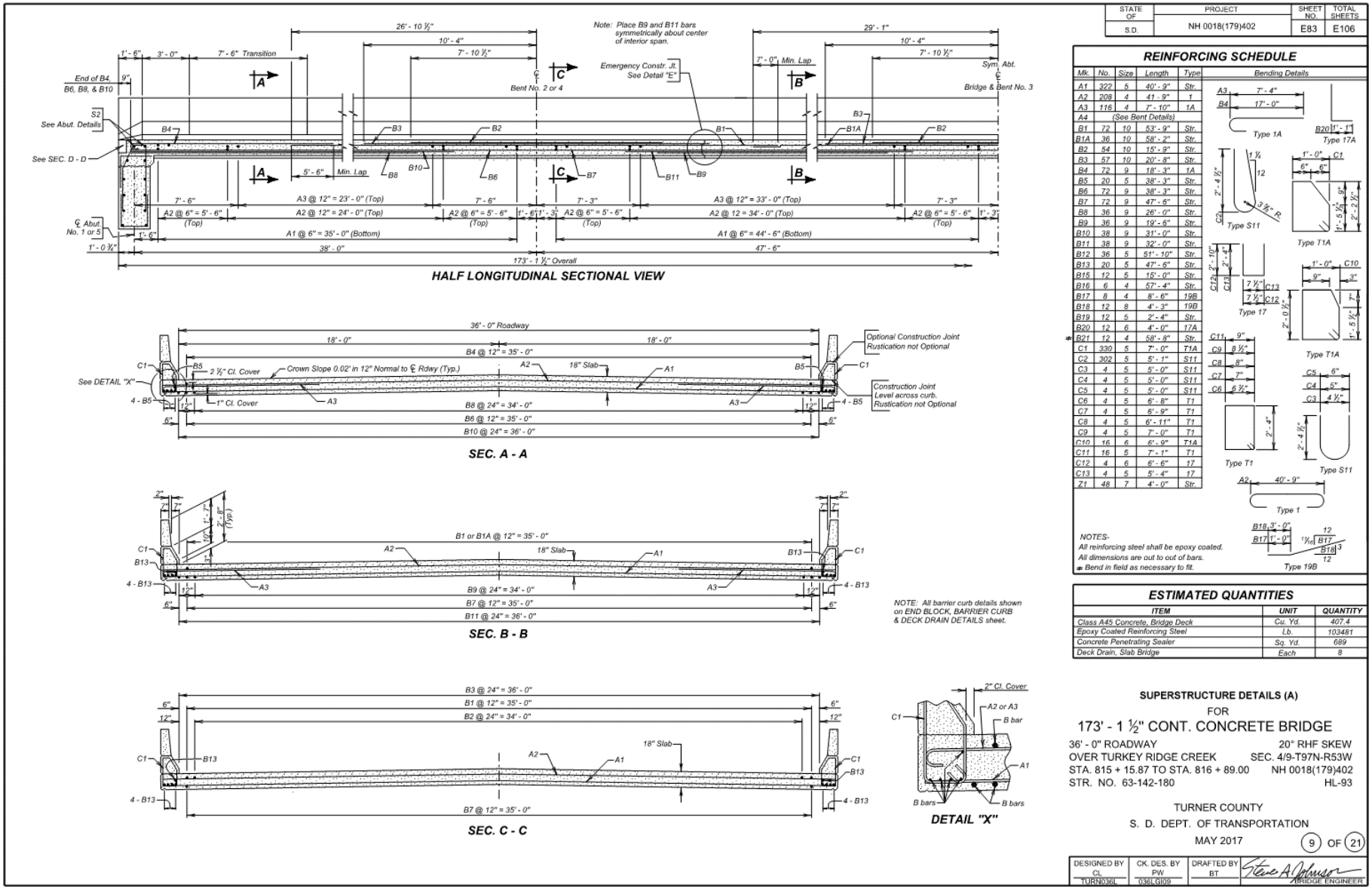
F.2.3.5. ABUTMENT DETAILS



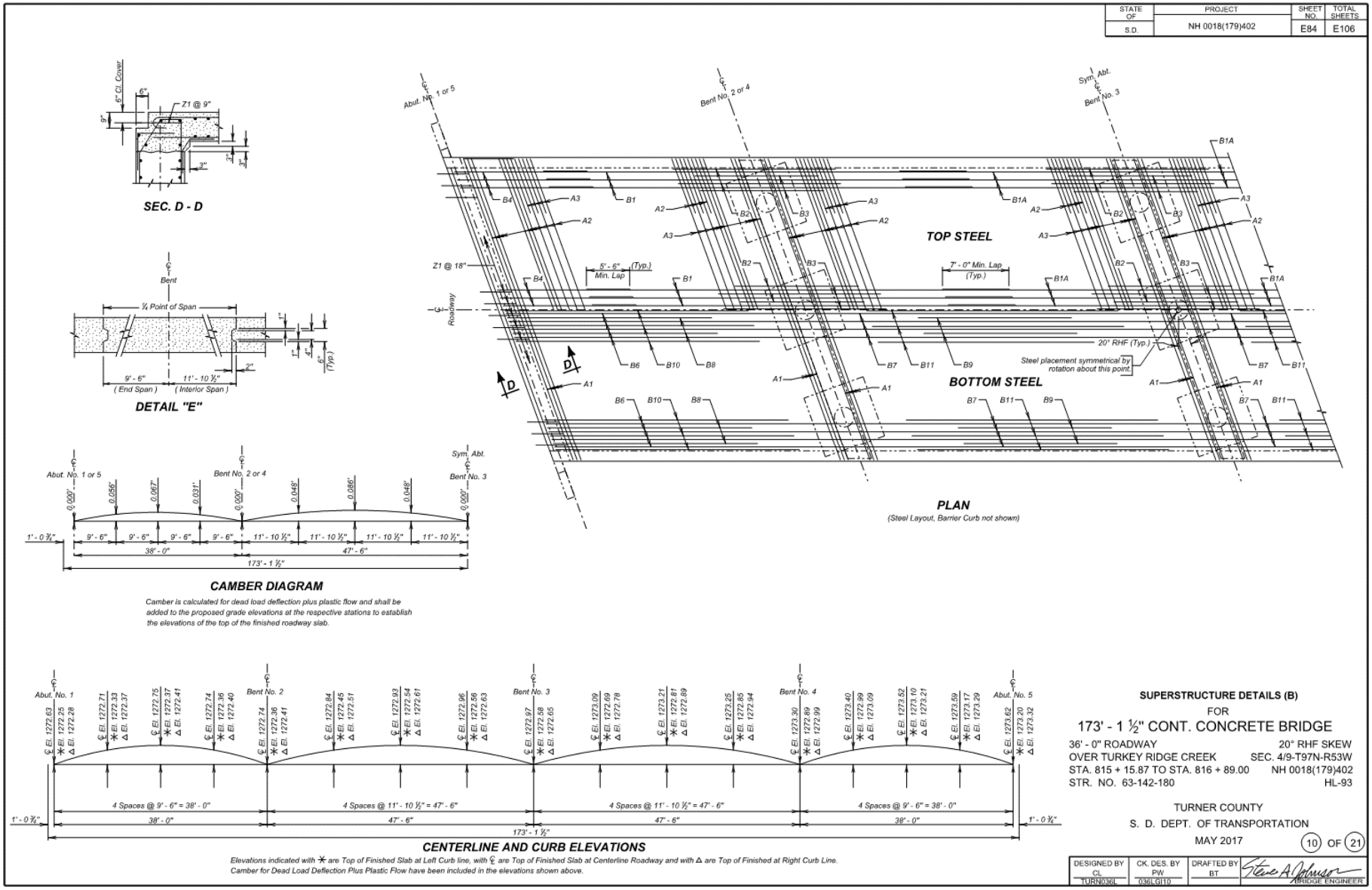
F.2.3.6. BENT DETAILS



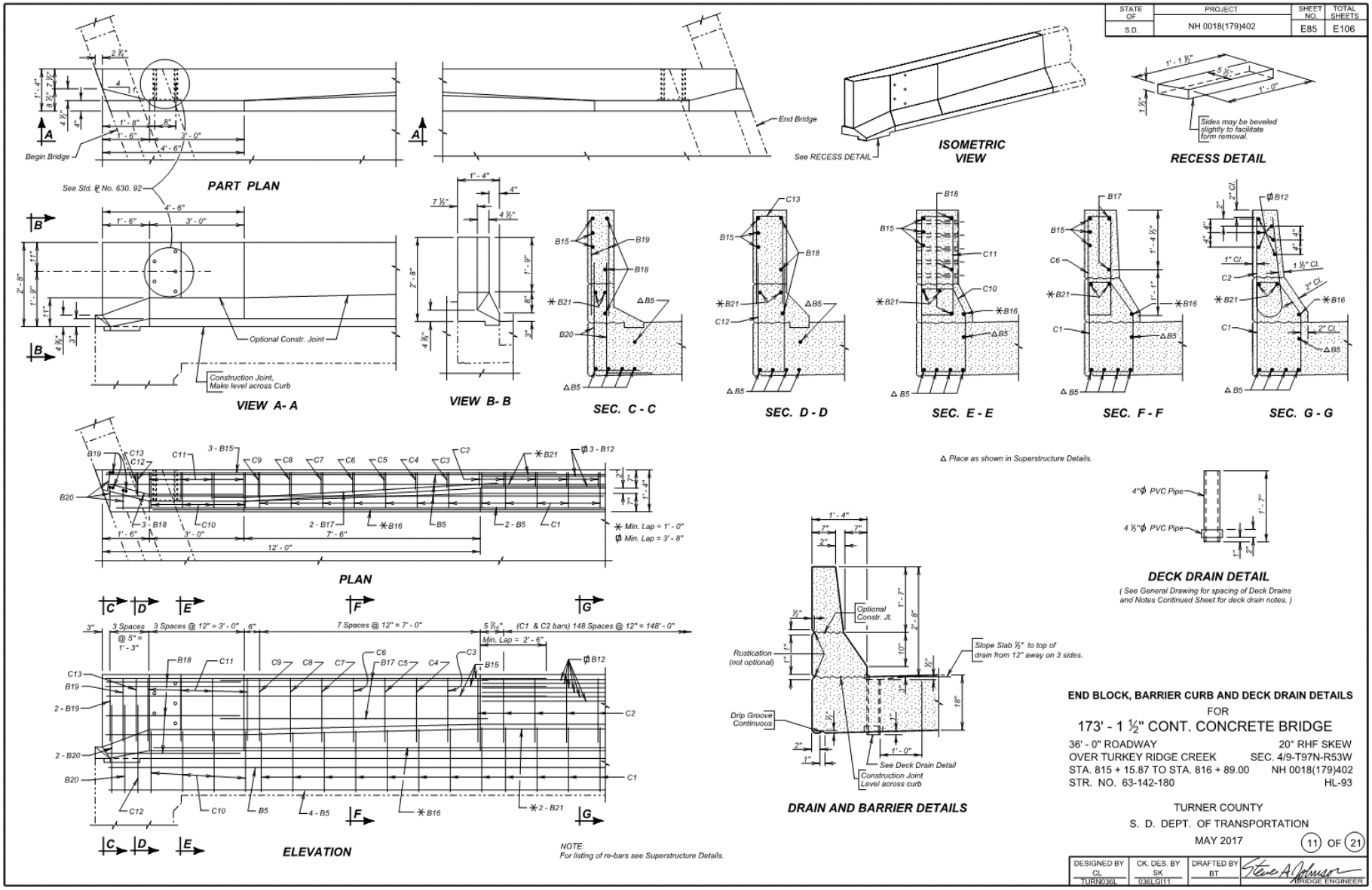
F.2.3.7. SUPERSTRUCTURE DETAILS (A)



F.2.3.8. SUPERSTRUCTURE DETAILS (B)

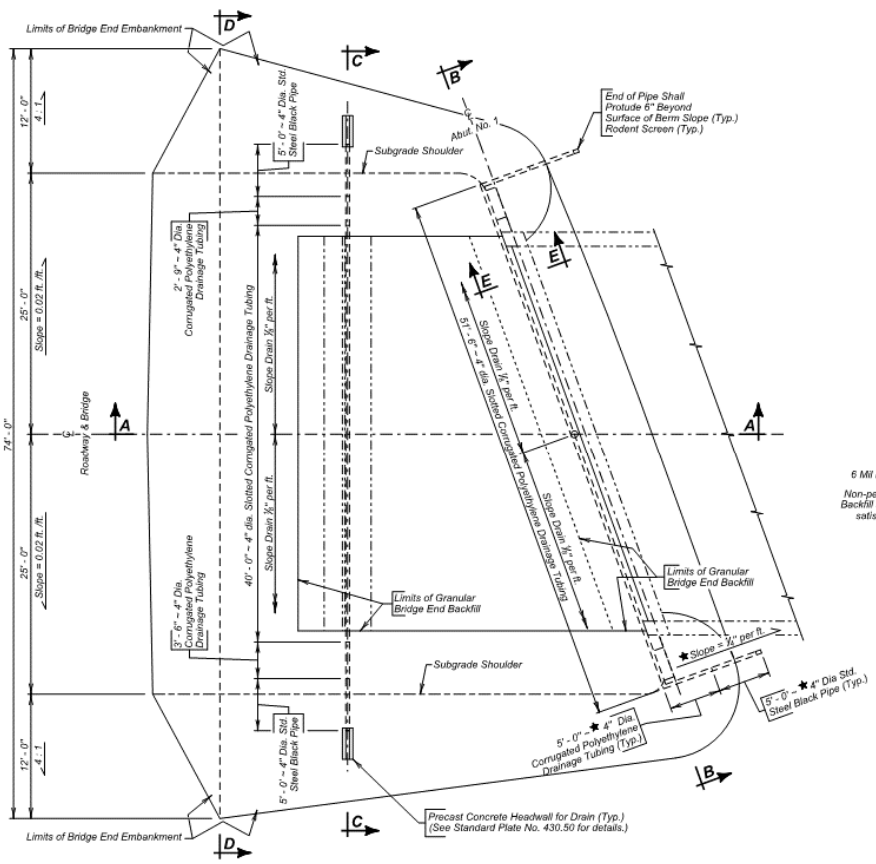


F.2.3.9. END BLOCK, BARRIER CURB, AND DRAIN DETAILS



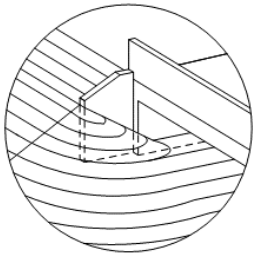
F.2.3.10. DETAILS OF BRIDGE END BACKFILL (A)

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	NH 0018(179)402	E86	E106

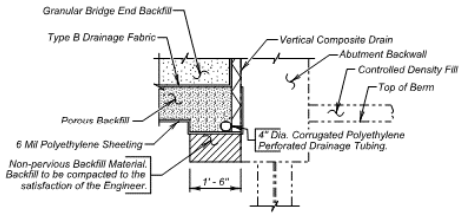


PLAN

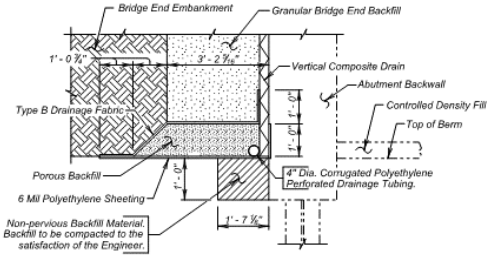
(Bridge End Backfill shown adjacent to Abut. No. 1)



SPILL CONE DETAIL AT EMBANKMENT



SEC. E - E



DETAIL "X"

ESTIMATED QUANTITIES
(For One Abutment)

ITEM	UNIT	QUANTITY
Granular Bridge End Backfill	Cu. Yd.	32.7
Bridge End Embankment	Cu. Yd.	349
Porous Backfill	Ton	14.8
4" Underdrain Pipe	Ft.	129
Approach Slab Underdrain Excavation	Cu. Yd.	1.5
Precast Concrete Headwall for Drain	Each	2

1. 92 ft. 4" dia. Slotted Corrugated Polyethylene Drainage Tubing.
2. 17 ft. 4" dia. Corrugated Polyethylene Drainage Tubing.
3. 163 sq. ft. Vertical Composite Drain
4. 20 ft. 4" dia. Std. Black Pipe with Rodent Screens.

Items 1 thru 4 are approximate quantities contained in the 4" Underdrain Pipe and are for information only.

5. 1869 sq. ft. 6 mil Polyethylene Sheeting, not including laps.
6. 142 sq. yd. Type B Drainage Fabric.

Items 5 and 6 are approximate quantities contained in the Granular Bridge End Backfill and are for information only.

For estimating purposes only, a factor of 1.89 tons/cu. yd. was used to convert cu. yds. to tons.

Shrinkage Factor of 1.25 Used.

Quantity based on a 12" wide trench.

DETAILS OF BRIDGE END BACKFILL ADJACENT TO ABUTMENT NO. 1 (A)
FOR
173' - 1 ½" CONT. CONCRETE BRIDGE

36' - 0" ROADWAY — 20° RHF SKEW
OVER TURKEY RIDGE CREEK — SEC. 4/9-T97N-R53W
STA. 815 + 15.87 TO STA. 816 + 89.00 — NH 0018(179)402
STR. NO. 63-142-180 — HL-93

TURNER COUNTY
S. D. DEPT. OF TRANSPORTATION
MAY 2017

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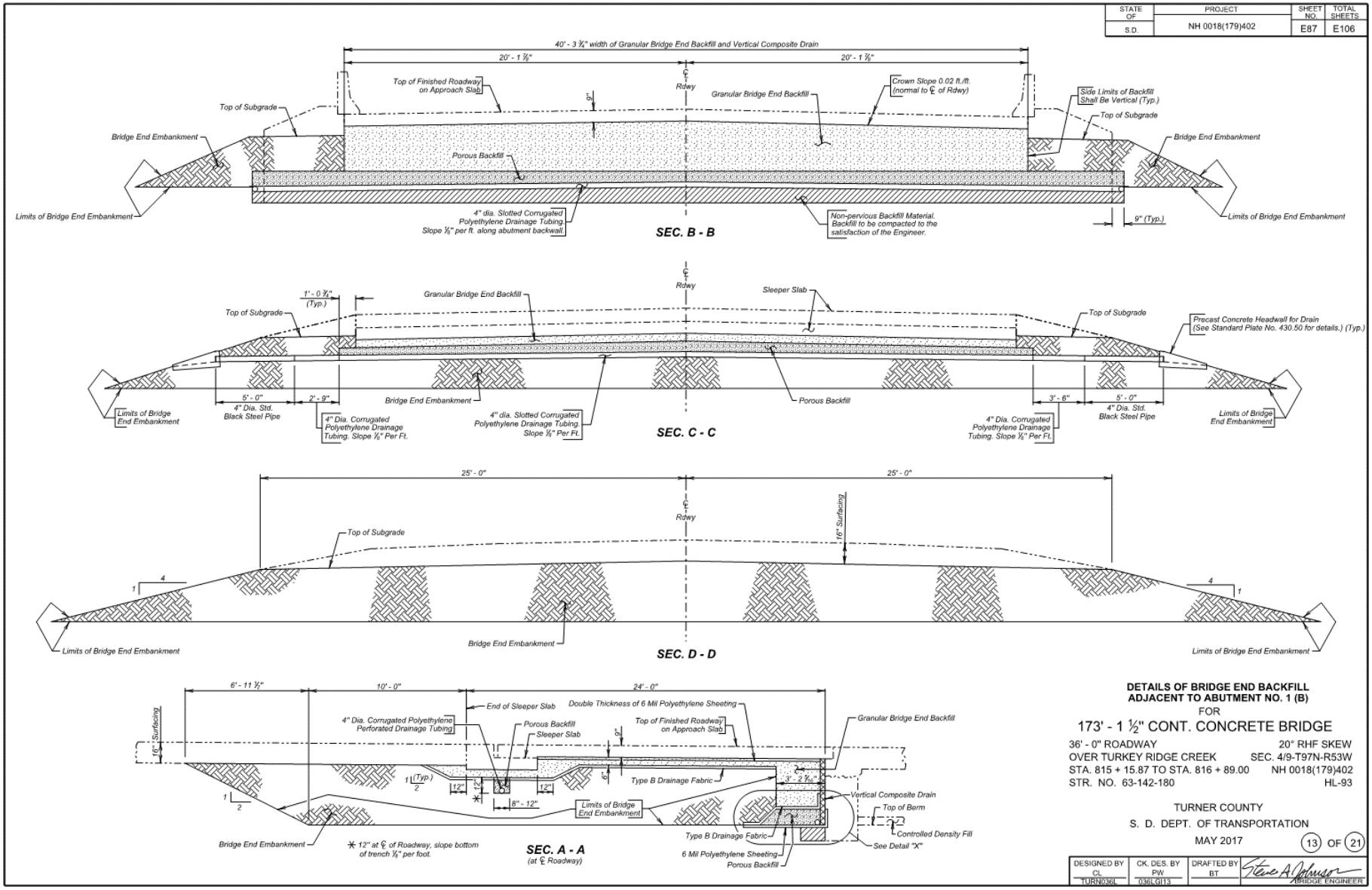
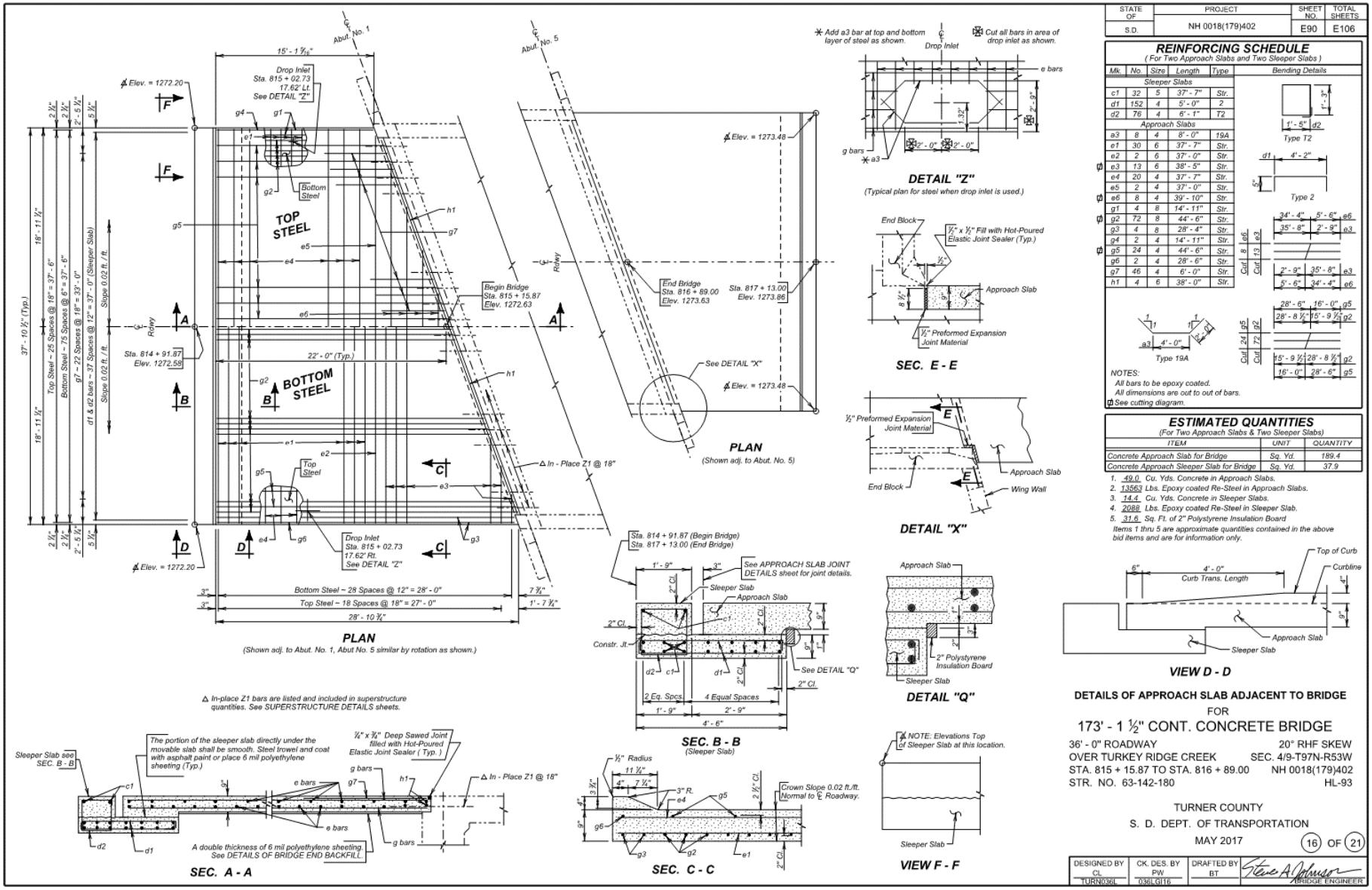
DESIGNED BY	CK. DES. BY	DRAFTED BY	
CL	PW	BT	BRIDGE ENGINEER
TURN036L	036LGI12		

F.2.3.11. DETAILS OF BRIDGE END BACKFILL (B)

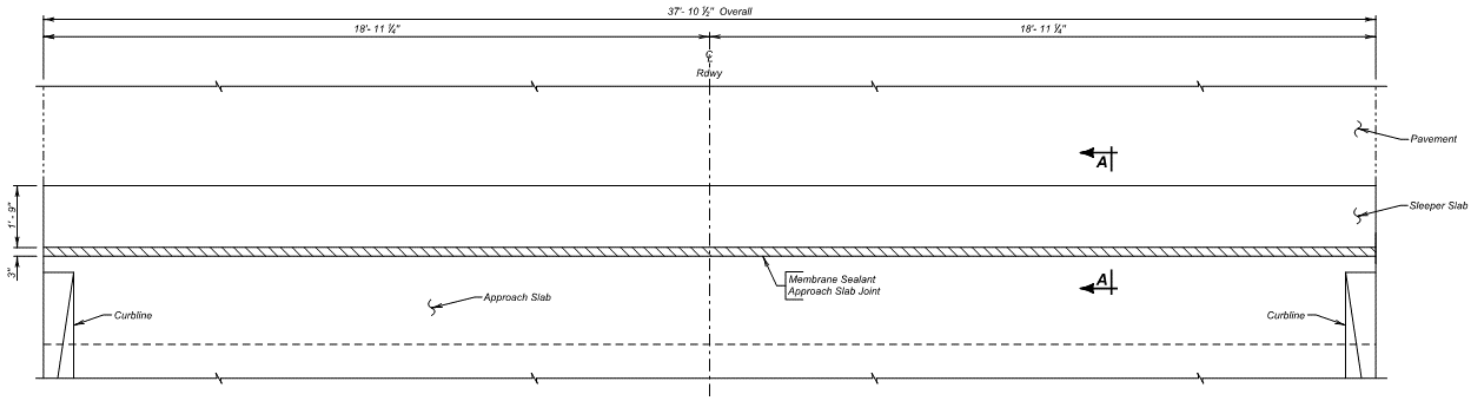


F.2.3.12. DETAILS OF APPROACH SLAB ADJACENT TO BRIDGE



F.2.3.13. APPROACH SLAB JOINT DETAILS

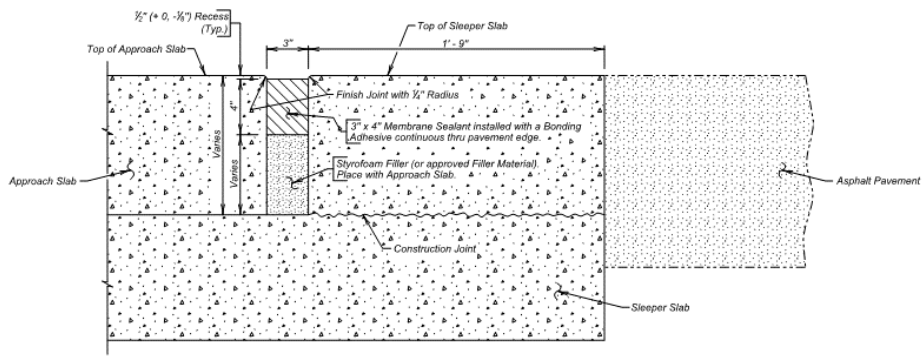
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	NH 0018(179)402	E91	E106



PLAN OF APPROACH SLAB JOINT

GENERAL NOTES

1. The Membrane Sealant shall be on the approved product list for Membrane Sealant Expansion Joints.
2. The manufacturer shall supply the membrane sealant in packaging that precompresses the membrane sealant. The precompressed dimension shall be as recommended by the sealant manufacturer to provide a water tight seal throughout a joint movement range of + 25% (minimum) from the specified joint opening dimension. In no case shall the precompressed dimension exceed 75% of the joint opening width. The foam sealant shall be slowly self expanding to permit workers ample time to install the membrane sealant before the membrane sealant exceeds the joint opening width.
3. The membrane sealant shall be supplied in pieces 5 feet in length or longer. The foam sealant shall be ultra-violet and ozone resistant.
4. The bonding adhesive used to attach the membrane sealant to the adjacent concrete shall be approved by the membrane sealant manufacturer.
5. Adhesive used to join adjacent pieces of the membrane sealant shall be as recommended by the manufacturer.
6. If Styrofoam filler material is used in the construction, it shall be closed cell and water-tight as approved by the Engineer.
7. The minimum ambient air temperature at the time of joint installation and adhesive curing shall be 40° F.
8. A technical representative of the membrane sealant manufacturer shall be present at the jobsite during installation. The technical representative shall be knowledgeable in the correct procedures for the preparation and installation of the joint material to insure the Contractor installs the joint to the Manufacturers recommendations.
9. Concrete surfaces that will be in contact with the membrane sealant shall be thoroughly cleaned by abrasive blasting to remove all laitance and contaminants (such as oil, curing compounds, etc.) from the concrete surface. At a minimum two passes of abrasive blasting with the nozzle held at an angle to within 1 to 2 inches of the concrete surface will be required. Cleaning of the concrete surfaces with solvents, wire brushing, or grinding shall not be permitted.
10. After abrasive blasting, but immediately prior to membrane joint installation, the entire joint contact surface shall be air blasted. The air compressor used for joint cleaning shall be equipped with trap devices capable of providing moisture-free and oil-free air at a recommended pressure of 90 psi. To obtain complete bonding with the adhesive, the adjacent concrete surfaces must be dry and clean. The contact surfaces for the joint shall be visually inspected by the Engineer immediately prior to joint installation to verify the surface is dry and clean.
11. Individual spliced sections shall be installed as per the manufacturers' recommendations. The membrane joint sealant manufacturer shall submit a detailed installation procedure to the Engineer at least 5 days prior to joint installation for his review.
12. Traffic shall not be allowed on the joint for a minimum of 3 hours unless otherwise directed by the Engineer.
13. Use plywood or other material to protect concrete adjacent to the joint from spalling before any equipment is moved across the joint. Any spall areas will be repaired at the Contractor's expense by breaking out and replacing adjacent concrete, as approved by the Engineer.
14. The Membrane Sealant Expansion Joint will be measured in feet to the nearest one-tenth foot, complete in place. Measurement will be made of the overall horizontal length. The Membrane Sealant Expansion Joint will be paid for at the contract unit price per foot complete in place. Payment for this item shall be full compensation for furnishing all the required materials in place, including labor, equipment and incidentals necessary to complete the work in accordance with the plans and the foregoing specifications.



SEC. A - A

ESTIMATED QUANTITIES
(For Two Approach Slabs)

ITEM	UNIT	QUANTITY
Membrane Sealant Expansion Joint	Ft.	75.8

APPROACH SLAB JOINT DETAILS
FOR
173' - 1 ½" CONT. CONCRETE BRIDGE

36' - 0" ROADWAY — 20° RHF SKEW
OVER TURKEY RIDGE CREEK — SEC. 4/9-T97N-R53W
STA. 815 + 15.87 TO STA. 816 + 89.00 — NH 0018(179)402
STR. NO. 63-142-180 — HL-93

TURNER COUNTY
S. D. DEPT. OF TRANSPORTATION
MAY 2017

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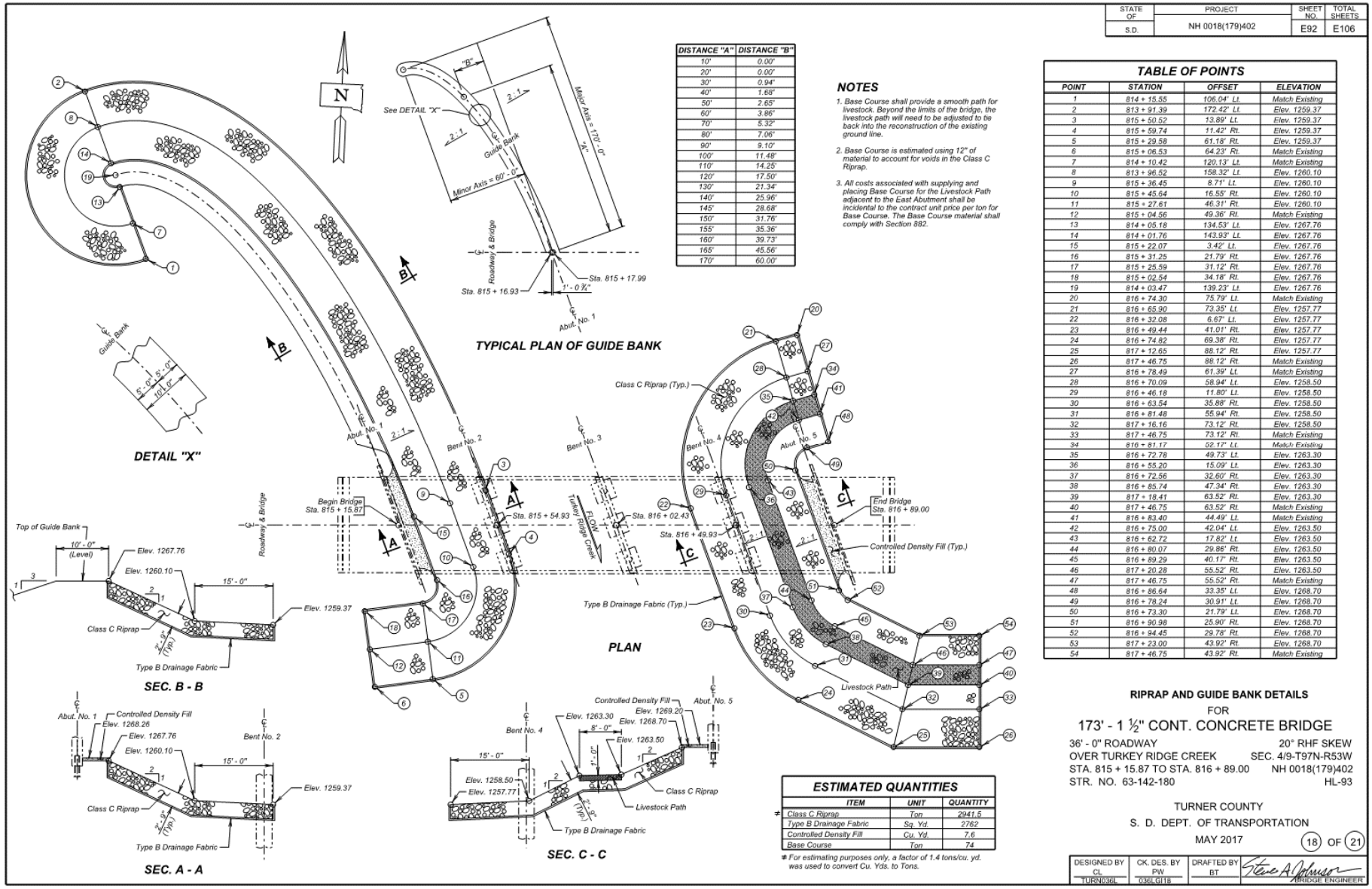
DESIGNED BY	CK. DES. BY	DRAFTED BY	
CL	PW	BT	BRIDGE ENGINEER
TURN036L	036LGI17		

F.2.3.14. RIPRAP DETAILS



DISTANCE "A"	DISTANCE "B"
10'	0.00'
20'	0.00'
30'	0.94'
40'	1.68'
50'	2.65'
60'	3.86'
70'	5.32'
80'	7.06'
90'	9.10'
100'	11.48'
110'	14.25'
120'	17.50'
130'	21.34'
140'	25.96'
145'	28.68'
150'	31.76'
155'	35.36'
160'	39.73'
165'	45.56'
170'	60.00'

NOTES

1. Base Course shall provide a smooth path for livestock. Beyond the limits of the bridge, the livestock path will need to be adjusted to tie back into the reconstruction of the existing ground line.
2. Base Course is estimated using 12" of material to account for voids in the Class C Riprap.
3. All costs associated with supplying and placing Base Course for the Livestock Path adjacent to the East Abutment shall be incidental to the contract unit price per ton for Base Course. The Base Course material shall comply with Section 882.

TABLE OF POINTS

POINT	STATION	OFFSET	ELEVATION
1	814 + 15.55	106.04' Lt.	Match Existing
2	813 + 91.39	172.42' Lt.	Elev. 1259.37
3	815 + 50.52	13.89' Lt.	Elev. 1259.37
4	815 + 59.74	11.42' Rt.	Elev. 1259.37
5	815 + 29.58	61.18' Rt.	Elev. 1259.37
6	815 + 06.53	64.23' Rt.	Match Existing
7	814 + 10.42	120.13' Lt.	Match Existing
8	813 + 96.52	158.32' Lt.	Elev. 1260.10
9	815 + 36.45	8.71' Lt.	Elev. 1260.10
10	815 + 45.64	16.55' Rt.	Elev. 1260.10
11	815 + 27.61	46.31' Rt.	Elev. 1260.10
12	815 + 04.56	49.36' Rt.	Match Existing
13	814 + 05.18	134.53' Lt.	Elev. 1267.76
14	814 + 01.76	143.93' Lt.	Elev. 1267.76
15	815 + 22.07	3.42' Lt.	Elev. 1267.76
16	815 + 31.25	21.79' Rt.	Elev. 1267.76
17	815 + 25.59	31.12' Rt.	Elev. 1267.76
18	815 + 02.54	34.18' Rt.	Elev. 1267.76
19	814 + 03.47	139.23' Lt.	Elev. 1267.76
20	816 + 74.30	75.79' Lt.	Match Existing
21	816 + 65.90	73.35' Lt.	Elev. 1257.77
22	816 + 32.08	6.67' Lt.	Elev. 1257.77
23	816 + 49.44	41.01' Rt.	Elev. 1257.77
24	816 + 74.82	69.38' Rt.	Elev. 1257.77
25	817 + 12.65	88.12' Rt.	Elev. 1257.77
26	817 + 46.75	88.12' Rt.	Match Existing
27	816 + 78.49	61.39' Lt.	Match Existing
28	816 + 70.09	58.94' Lt.	Elev. 1258.50
29	816 + 46.18	11.80' Lt.	Elev. 1258.50
30	816 + 63.54	35.88' Rt.	Elev. 1258.50
31	816 + 81.48	55.94' Rt.	Elev. 1258.50
32	817 + 16.16	73.12' Rt.	Elev. 1258.50
33	817 + 46.75	73.12' Rt.	Match Existing
34	816 + 81.17	02.17' Lt.	Match Existing
35	816 + 72.78	49.73' Lt.	Elev. 1263.30
36	816 + 55.20	15.09' Lt.	Elev. 1263.30
37	816 + 72.56	32.60' Rt.	Elev. 1263.30
38	816 + 85.74	47.34' Rt.	Elev. 1263.30
39	817 + 18.41	63.52' Rt.	Elev. 1263.30
40	817 + 46.75	63.52' Rt.	Match Existing
41	816 + 83.40	44.49' Lt.	Match Existing
42	816 + 75.00	42.04' Lt.	Elev. 1263.50
43	816 + 62.72	17.82' Lt.	Elev. 1263.50
44	816 + 80.07	29.86' Rt.	Elev. 1263.50
45	816 + 89.29	40.17' Rt.	Elev. 1263.50
46	817 + 20.28	55.52' Rt.	Elev. 1263.50
47	817 + 46.75	55.52' Rt.	Match Existing
48	816 + 86.64	33.35' Lt.	Elev. 1268.70
49	816 + 78.24	30.91' Lt.	Elev. 1268.70
50	816 + 73.30	21.79' Lt.	Elev. 1268.70
51	816 + 90.98	25.90' Rt.	Elev. 1268.70
52	816 + 94.45	29.78' Rt.	Elev. 1268.70
53	817 + 23.00	43.92' Rt.	Elev. 1268.70
54	817 + 46.78	43.92' Rt.	Match Existing

ESTIMATED QUANTITIES

ITEM	UNIT	QUANTITY
# Class C Riprap	Ton	2941.5
Type B Drainage Fabric	Sq. Yd.	2762
Controlled Density Fill	Cu. Yd.	7.6
Base Course	Ton	74

For estimating purposes only, a factor of 1.4 tons/cu. yd. was used to convert Cu. Yds. to Tons.

RIPRAP AND GUIDE BANK DETAILS
FOR
173' - 1 ½" CONT. CONCRETE BRIDGE

36' - 0" ROADWAY — 20° RHF SKEW
OVER TURKEY RIDGE CREEK — SEC. 4/9-T97N-R53W
STA. 815 + 15.87 TO STA. 816 + 89.00 — NH 0018(179)402
STR. NO. 63-142-180 — HL-93

TURNER COUNTY
S. D. DEPT. OF TRANSPORTATION
MAY 2017

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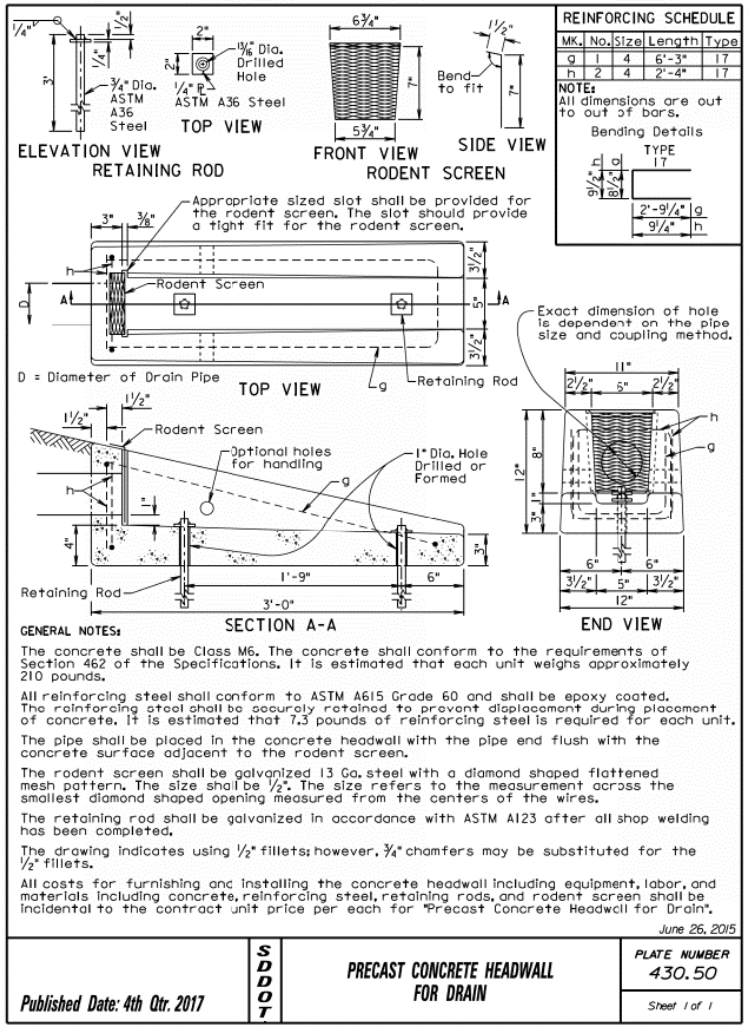
DESIGNED BY CL TURN036L | CK. DES. BY PW 036LGI18 | DRAFTED BY BT | BRIDGE ENGINEER

F.2.3.15. DETAILS OF STANDARD PLATE NO's 430.5 & 460.02

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	NH 0018(179)402	E93	E106



GENERAL NOTES:

The concrete shall be Class M6. The concrete shall conform to the requirements of Section 462 of the Specifications. It is estimated that each unit weighs approximately 210 pounds.

All reinforcing steel shall conform to ASTM A615 Grade 60 and shall be epoxy coated. The reinforcing steel shall be securely retained to prevent displacement during placement of concrete. It is estimated that 7.3 pounds of reinforcing steel is required for each unit.

The pipe shall be placed in the concrete headwall with the pipe end flush with the concrete surface adjacent to the rodent screen.

The rodent screen shall be galvanized 13 Ga. steel with a diamond shaped flattened mesh pattern. The size shall be ½". The size refers to the measurement across the smallest diamond shaped opening measured from the centers of the wires.

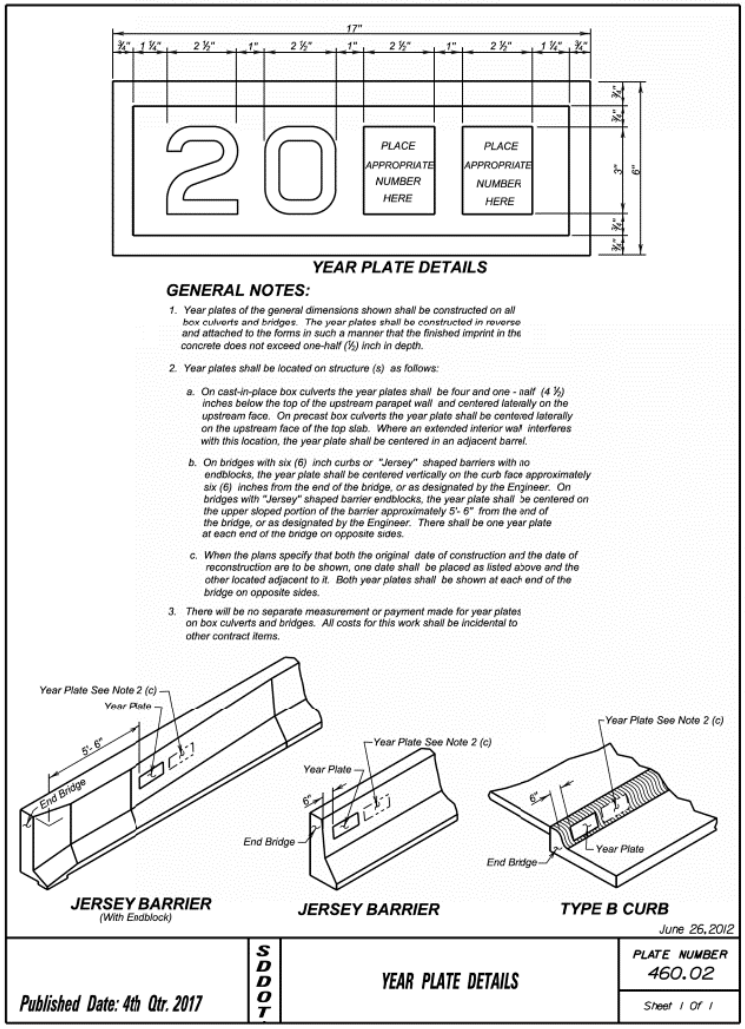
The retaining rod shall be galvanized in accordance with ASTM A123 after all shop welding has been completed.

The drawing indicates using ½" fillets; however, ¾" chamfers may be substituted for the ½" fillets.

All costs for furnishing and installing the concrete headwall including equipment, labor, and materials including concrete, reinforcing steel, retaining rods, and rodent screen shall be incidental to the contract unit price per each for "Precast Concrete Headwall for Drain".

June 26, 2015

Published Date: 4th Qtr. 2017	SDDOT	PRECAST CONCRETE HEADWALL FOR DRAIN	PLATE NUMBER 430.50 Sheet 1 of 1



June 26, 2012

Published Date: 4th Qtr. 2017	SDDOT	YEAR PLATE DETAILS	PLATE NUMBER 460.02 Sheet 1 Of 1

173' - 1 ½" CONT. CONCRETE BRIDGE
STR. NO. 63-142-180
MAY 2017

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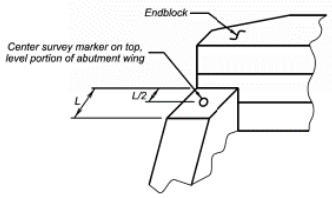
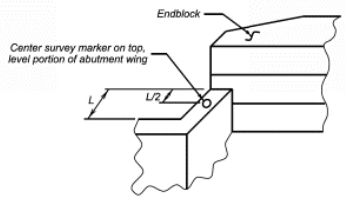
F.2.3.16. DETAILS OF STANDARD PLATE NO's 460.05 & 510.40

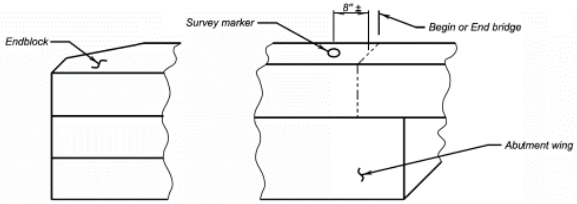
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	NH 0018(179)402	E94	E106



ABUTMENT WITH "STRAIGHT" WINGS



ABUTMENT WITH "SWEPT BACK" WINGS



ABUTMENT WITH "SWEPT BACK" WINGS

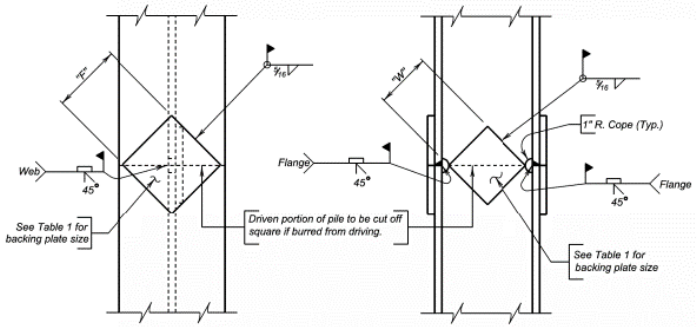
(Endblock on top of wings)

GENERAL NOTES:

1. Survey markers shall be located at each abutment on the same side of the bridge as the year plate. Place survey markers on abutment wings as shown. Two survey markers will be required at each bridge.
2. Survey markers shall be of a type intended for installation in concrete, be made of solid brass or bronze, have a domed top and be either a 3" top diameter (with a ¾" X 2" long ribbed shank), or a US Army Corps of Engineers Type C Disc with a 3 ½" top diameter.
3. There will be no separate measurement or payment made for survey markers. All costs for this work shall be incidental to the other contract items.

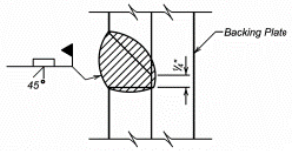
June 26, 2012

Published Date: 4th Qtr. 2017 | SDDOT | BRIDGE SURVEY MARKER | PLATE NUMBER 460.05 | Sheet 1 of 1



NOTE:
Prepare joint surfaces lower end of upper section on the ground and weld on backing plates; then place upper section on lower section and weld.

COMPLETE JOINT PENETRATION WELD DETAIL



GENERAL NOTES:

1. Steel for backing plates shall conform to ASTM A709 Grade 50.
2. Welding and weld inspection shall be in conformance with AWS D1.5 (Current Year) Bridge Welding Code - Steel.
3. Welder must be certified and registered with the SDDOT.
4. Backing plate shall at a minimum be as thick as the web of the pile being spliced.
5. Web must be coped with 1 inch radius.
6. Submit Welding Procedure Specification (WPS) to Bridge Construction Engineer for approval prior to pile driving.

TABLE 1
(BACKING PLATES)

PILE	10"	12"	14"
"F" FLANGE	6 ½"	8"	10"
"W" WEB	4 ¾"	6 ¼"	7 ½"

December 23, 2012

Published Date: 4th Qtr. 2017 | SDDOT | STEEL PILE SPLICE DETAILS | PLATE NUMBER 510.40 | Sheet 1 of 1

173' - 1 ½" CONT. CONCRETE BRIDGE
STR. NO. 63-142-180
MAY 2017

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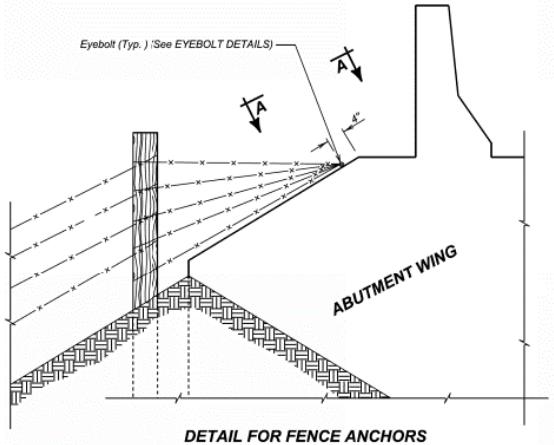
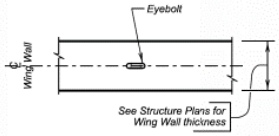
F.2.3.17. DETAILS OF STANDARD PLATE NO. 620.18 & 630.92

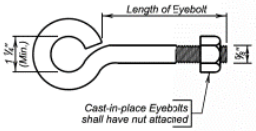
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	NH 0018(179)402	E95	E106



DETAIL FOR FENCE ANCHORS



VIEW A - A



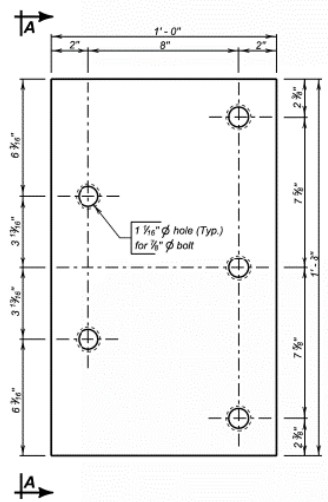
EYEBOLT DETAILS

GENERAL NOTES:

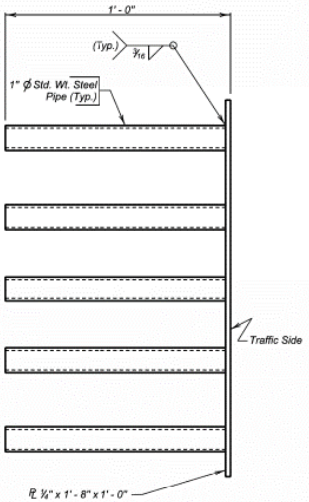
1. The fence and post details shown are for illustrative purpose only. The fence shall be as specified elsewhere in the plans.
2. Eyebolts shall be placed on all of the bridge abutment wings.
3. Eyebolts shall be ⅝ inch diameter and shall conform to ASTM A307.
4. Eyebolts, nuts, and concrete inserts shall be galvanized in accordance with AASHTO M232 (ASTM A153). Concrete inserts of corrosion resistant material need not be galvanized.
5. Cast-in-place eyebolts shall have a nut attached, be 4 ½ inches (Min.) in length and shall be embedded such that the eye of the bolt is flush with the concrete surface. (See Eyebolt Details) As an alternate, cast-in-place concrete inserts, capable of developing the full strength of the ⅝ inch diameter threaded eyebolt, may be used and shall be set in the concrete in accordance with the manufacturer's recommendations. The eyebolt shall be of sufficient length to develop its full strength. The eye of the eyebolt shall be flush with the concrete surface.
6. The cost for furnishing and installing eyebolts and/or concrete inserts shall be incidental to various contract items.

December 23, 2012

Published Date: 4th Qtr. 2017	SDDOT	FENCE ANCHORS FOR BRIDGE ABUTMENT WINGS (WINGS 6' AND SHORTER)	PLATE NUMBER 620.18 Sheet 1 of 1



ELEVATION



VIEW A - A

GENERAL NOTES:

1. Steel plate for the insert assembly shall conform to ASTM A709 Grade 36. The steel pipes shall conform to ASTM A53 or ASTM A500 Grade B.
2. Welding and weld inspection shall be in conformance with AWS D1.1 - (Current Year) Structural Welding Code - Steel.
3. After fabrication, galvanize in accordance with AASHTO M111 (ASTM A123).
4. Bolts, nuts, and washers shall be provided with each assembly. Bolts shall be galvanized and conform to the requirements of ASTM A307, A325, or A449. Plain washers shall be galvanized and conform to ASTM F844.
5. Bolt heads shall be placed on the traffic side of the endblock. Bolt projection at the back side of the insert shall not exceed 1 inch beyond the nut.
6. The cost of the 5 bolt insert plate assembly complete in place including welding and galvanizing shall be incidental to the contract unit price per Cubic Yard for " Class A45 Concrete, Miscellaneous ", " Class A45 Concrete, Bridge Deck ", or " Class A45 Concrete, Bridge Repair ", as applicable.

December 23, 2013

Published Date: 4th Qtr. 2017	SDDOT	5 BOLT INSERT PLATE ASSEMBLY	PLATE NUMBER 630.92 Sheet 1 of 1

173' - 1 ½" CONT. CONCRETE BRIDGE
STR. NO. 63-142-180
MAY 2017

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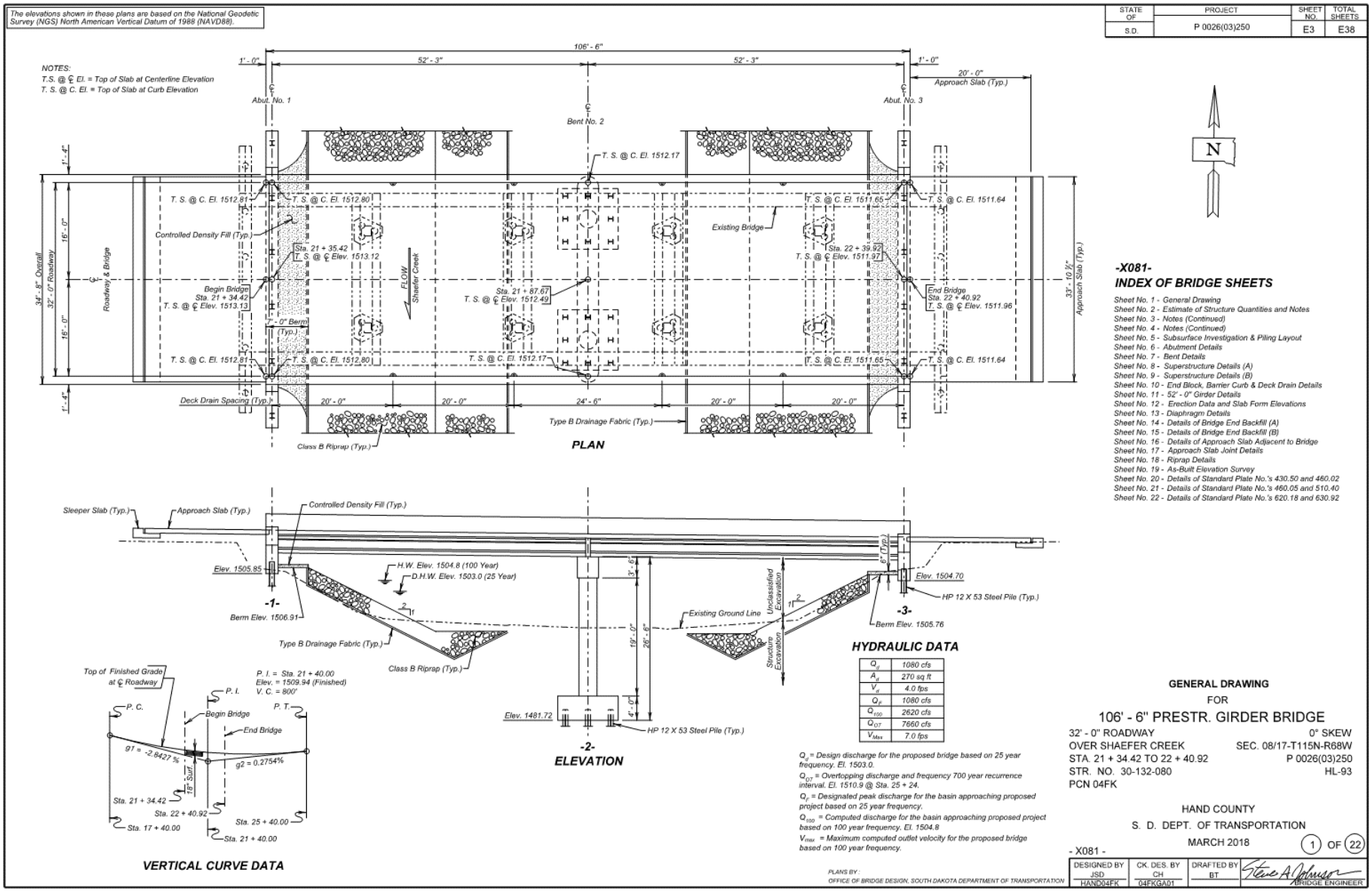
F.2.4. Square Prestressed Girder Bridge Plans

F.2.4.1. GENERAL DRAWING



F.2.4.2. ESTIMATE OF STRUCTURE QUANTITIES & NOTES

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P 0026(03)250 P 0020(130)295	E4	E38

ESTIMATE OF STRUCTURE QUANTITIES

DESCRIPTION	QUANTITY	UNIT	REMARKS
Bridge Elevation Survey	Lump Sum	LS	
Concrete Penetrating Sealer	375.1	SqYd	See Special Provision
Incidental Work, Structure	Lump Sum	LS	
Structural Steel, Miscellaneous	Lump Sum	LS	
Membrane Sealant Expansion Joint	67.8	Ft	
Structure Excavation, Bridge	213	CuYd	
Bridge End Embankment	287	CuYd	
Granular Bridge End Backfill	62.8	CuYd	
Approach Slab Underdrain Excavation	6.0	CuYd	
Precast Concrete Headwall for Drain	4	Each	
Class A45 Concrete, Bridge Deck	126.8	CuYd	
Class A45 Concrete, Bridge	100.0	CuYd	
Concrete Approach Slab for Bridge	154.1	SqYd	
Concrete Approach Sleeper Slab for Bridge	33.9	SqYd	
Deck Drain, Girder Bridge	8	Each	
Controlled Density Fill	7.2	CuYd	
Reinforcing Steel	16,292	Lb	
Epoxy Coated Reinforcing Steel	26,002	Lb	
No. 14 Rebar Splice	28	Each	
Preboring Pile	120	Ft	
HP 12x53 Steel Test Pile, Furnish and Drive	290	Ft	
HP 12x53 Steel Bearing Pile, Furnish and Drive	2,175	Ft	
36" Minnesota Shape Prestressed Concrete Beam	416	Ft	
4" Underdrain Pipe	252	Ft	
Porous Backfill	30.0	Ton	
Class B Riprap	868.2	Ton	
Type B Drainage Fabric	894	SqYd	

SPECIFICATIONS FOR BRIDGE

1. Design Specifications: AASHTO LRFD Bridge Design Specifications, 2017 Edition.
2. Construction Specifications: South Dakota Standard Specifications for Roads and Bridges, 2015 Edition and required provisions, supplemental specifications, and special provisions as included in the proposal.

BRIDGE DESIGN LOADING

1. AASHTO HL-93.
2. Dead Load includes 22 psf for future wearing surface on the roadway.

DESIGN MATERIAL STRENGTHS*

Concrete	$f'c$ = 4,500 psi
Reinforcing Steel	$f'y$ = 60,000 psi
Piling (ASTM A572 Grade 50)	$f'y$ = 50,000 psi

*For prestressed beams, see notes regarding Prestressed Girders.

GENERAL CONSTRUCTION

1. All mild reinforcing steel shall conform to ASTM A615, Grade 60.
2. All exposed concrete corners and edges shall be chamfered 3/4" unless noted otherwise.
3. Use 2" clear cover on all reinforcing steel except as shown.
4. Contractor shall imprint on the structure the date of new construction as specified and detailed on Standard Plate No. 460.02.
5. Barrier Curbs and End blocks shall be built normal to the grade.
6. Request for construction joints or resteel splices at points other than those shown, must be submitted to the Engineer for prior approval. If additional splices are approved, no payment will be allowed for the added quantity of resteel.
7. The elevation of the bridge deck is 18" above subgrade elevation.

INCIDENTAL WORK, STRUCTURE

1. In place centerline Sta. 21+31.00 to centerline Sta. 22+46.00 is a 117'-0" 5 span continuous concrete bridge with a 24'-0" clear roadway. The superstructure consists of a reinforced concrete slab with W-Beam railing. The deck has been overlaid with 1.5 inches of Latex Modified Concrete. The substructure consists of 2 column reinforced concrete bents and reinforced concrete vertical abutments, all of which are supported on timber piling.
2. Break down and remove the existing bridge, including the concrete slope protection, timber piles and approach/sleeper slabs if applicable, to 1 foot below finished groundline, or as required to construct the new structure in accordance with Section 110 of the Specifications. All portions of the existing bridges shall be removed and disposed of by the Contractor on a site obtained by the Contractor and approved by the Engineer in accordance with the COMMITMENT H: WASTE DISPOSAL SITE notes found in Section A.
3. The foregoing is a general description of the in-place bridge and should not be construed to be complete in all details. Before preparing the bid it shall be the responsibility of the Contractor to make a visual inspection of the structure to verify the extent of the work and materials involved. If desired by the Contractor, a copy of the original construction plans may be obtained through the Office of Bridge Design.

DESIGN MIX OF CONCRETE

1. All structural concrete shall be Class A45 unless otherwise indicated.
2. Type II cement is required, except Type III may be used for the prestressed beams.
3. Grout design mix shall be as specified in Section 460.2 K of the Specifications. A compressive strength of 2000 psi shall be attained by the grout prior to erection of any beams. Chamfer edges of grout pads ¾". The quantity of grout is included in and shall be paid for at the contract unit price per cubic yard for Class A45 Concrete, Bridge.

ABUTMENTS

1. Preboring piling at abutments is required to whichever is greater, ten feet or to natural ground.
2. The HP 12x53 Piling were designed using a factored bearing resistance of 98 tons per pile. Piling shall develop a field verified nominal bearing resistance of 245 tons per pile.
3. One test pile shall be driven at each abutment and will become part of the pile group.
4. The Contractor shall have sufficient pile splice material on hand before driving is started. See Standard Plate No. 510.40.
5. Piles shall not be driven out of position by more than three inches in the direction normal to the abutment centerline. A pile driving template shall be used to insure this accuracy.
6. Abutment backwalls above the construction joint may be cast separately from the deck slab. The concrete used for the backwalls and wings shall be Class A45 Concrete, Bridge. All abutment and bridge deck concrete shall have attained design strength prior to backfilling.
7. Each finished abutment shall include a Bridge Survey Marker. See Standard Plate No. 460.05.

ABUTMENT BACKWALL COATING

The material for waterproofing the abutment backwall shall be one of the products from the approved products list. The acceptable abutment backwall coating suppliers are listed on the approved products list at the following Internet address:

http://apps.sd.gov/applications/HC60ApprovedProducts/ProductList.aspx

The cost of furnishing and applying the coating shall be incidental to the contract unit price per cubic yard for Class A45 Concrete, Bridge.

ESTIMATE OF STRUCTURE QUANTITIES AND NOTES
FOR
106' - 6" PRESTR. GIRDER BRIDGE

STR. NO. 30-132-080
MARCH 2018

2 OF 22

DESIGNED BY	CK. DES. BY	DRAFTED BY	
JSD	CH	BT	Steve A Johnson BRIDGE ENGINEER
HAND04FK	04FKGA02		

F.2.4.3. NOTES (CONTINUED)

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P 0026(03)250 P 0020(130)295	E5	E38

BENT

1. The HP 12x53 Piling were designed using a factored bearing resistance of 98 tons per pile. Piling shall develop a field verified nominal bearing resistance of 245 tons per pile.
2. One test pile shall be driven at the bent and will become part of the pile group.
3. The Contractor shall have sufficient pile splice material on hand before pile driving is started. See Plate No. 510.40.
4. Spiral reinforcement may be fabricated from cold drawn wire conforming to ASTM A1064 or hot rolled plain or deformed bars conforming to the strength requirements of ASTM A615, Grade 60.

COFFERDAMS

1. It is anticipated that cofferdams will be necessary. Cofferdams shall be designed and constructed in accordance with Section 423 of the Specifications.
2. The design of the Cofferdam must be done by Professional Engineers registered in South Dakota. Sealed calculations of both the original design and design check, performed by different engineers, shall be submitted with the cofferdam plans. The cofferdam plans, design, and design check shall be submitted to the Office of Bridge Design a minimum of 15 days prior to Cofferdam construction.

PRESTRESSED GIRDERS

1. Minimum concrete compressive strength f'c = 6000 psi at 28 days for all girders, f'ci = 5000 psi for all Girders.
2. All mild reinforcing steel shall be deformed bars conforming to ASTM A615, Grade 60.
3. Individual tendons in all pretensioned sections shall consist of seven wire uncoated Type 270K Strands having a nominal diameter of 0.6" and a minimum ultimate strength of 58600 lbs. per cable. An initial tensile force of 43500 lbs. shall be applied to all 0.6" cables in all girders. All prestressing steel shall conform to AASHTO M203. (low lax strands).
4. All prestressed girders within a span shall be cast within an 8 day period. If not, the newest girder shall be at least 6 weeks old before the deck slab is poured. The girders shall be poured in all steel forms.
5. Prestressed concrete girders shall always be lifted by the devices provided in the top flanges near the ends of the girders. Types of lifting devices other than those shown on the plans may be used provided they are approved by the Office of Bridge Design. The design of the lifting devices shall be the responsibility of the Fabricator.
6. Each beam shall be marked showing structure number, casting date, and beam number. Marking shall be on the face of the beam near the end and so located that they will be exposed after the diaphragms have been cast. Facia beams shall be marked on an inside face. All markings shall be stenciled and clearly legible. For beam designations and locations, see superstructure layout plan and Erection Data sheet.
7. The physical properties of the elastomeric bearing pads shall conform to the requirements of Section 18.2 of the AASHTO LFRD Bridge Construction Specification and the AASHTO Materials Specification M251. The elastomeric bearing pads shall conform to Grade 60 (durometer). The cost of the pads shall be incidental to the contract unit price per cubic yard for Class A45 Concrete, Bridge. Certification that pads are 60 durometer and meet the requirements of AASHTO LFRD Bridge Construction Specification Section 18.2 and AASHTO Materials Specification M251 shall be furnished to the Engineer with the shop drawings. No laminated bearing pads will be allowed.
8. All exposed corners shall be chamfered 3/4" or rounded to 3/4" radius.
9. Dead Load of girder taken as effective at transfer. Cut strands, except those extended and bent, flush with end of girder and coat end of strands with mortar.
10. The Contractor shall be responsible for ensuring that transportation stresses, handling and erection do not cause damage to the girders.
11. Furnish and Install Inserts for T8 Rebars as shown in the plans. All costs involved shall be incidental to the contract unit price per foot of girder.

SUPERSTRUCTURE

1. Girder lifting hooks shall be cut off before placement of concrete deck slab.
2. The diaphragms at the bent shall be poured integrally with the deck slab. Placement of diaphragms at the bent shall not slow down the rate of deck concrete placement and finishing. The Contractor shall place the concrete for the specified diaphragm ahead of the deck concrete in such a manner that advancement of the deck concrete reaches the diaphragm just as placement of concrete in the diaphragm is complete.
3. The deck-finishing machine shall be adjusted and operated in such a manner that the roller screed or screeds are parallel with the centerline of the bridge and the finish machine is parallel to the skew of the bridge. Concrete placement in front of the finish machine shall be kept parallel to the machine.
4. The bridge deck must be placed and finished continuously at a minimum rate of 43 ft. of deck per hour measured along Centerline Roadway. This rate is exclusive of concrete placed in the diaphragms. (See note 2 above.) If concrete cannot be placed and finished at this rate, the Engineer shall order a header installed and operations stopped. Notify the Bridge Construction Engineer if deck pour operations are stopped. Operations may resume only when the Engineer is satisfied that a rate of 43 ft. of deck per hour can be achieved and the concrete in the previous pour has attained a minimum compressive strength of 2000 psi.
5. Snap ties, if used in the barrier curb formwork, shall be epoxy coated. The epoxy coating shall be inert in concrete and compatible with the coating applied to the new epoxy coated reinforcing steel.
6. See Special Provision for Concrete Penetrating Sealer.

FALL PROTECTION

1. The Contractor shall install a Fall Protection System conforming to OSHA Regulations. When working on the girders prior to decking installation, a Horizontal Lifeline – or other OSHA approved system shall be installed. The Contractor shall have one Personal Fall Arrest System (PFAS) available for use by a Department Inspector. The PFAS shall be compatible with the installed Fall Protection System.
2. Modifications to any bridge components used to accommodate the Fall Protection System shall be shown on the Falsework Plans and/or the appropriate Shop Plans. Field welding to bridge components will not be allowed. Field placed concrete inserts or drilled-in anchor bolts will be allowed if approved by the Engineer. All costs associated with providing the Fall Protection System shall be incidental to the other contract items.

USGS STREAM GAGE

A USGS gauging station is located on the existing bridge and will be removed or relocated by the USGS. The Contractor shall coordinate the removal or relocation of this station with the USGS. A minimum of two weeks notice shall be given to the USGS prior to any work involving the stream gauging station. Contact the U.S. Geological Survey, Water Resource Division, Huron Programs Office, 111 Kansas Avenue SE, Huron, SD 57350. Nathan Stevens (605)352-4241.

NOTES (CONTINUED)
FOR
106' - 6" PRESTR. GIRDER BRIDGE

STR. NO. 30-132-080
MARCH 2018

3 OF 22

DESIGNED BY	CK. DES. BY	DRAFTED BY	
JSD HAND04FK	CH 04FKGA03	BT	BRIDGE ENGINEER

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P 0026(03)250 P 0020(130)295	E6	E38

DECK DRAIN, GIRDER BRIDGE

1. Deck Drains shall be 4" diameter x 4' - 1" Schedule 40, Acrylonitrile Butadine-Styrene (ABS) Plastic Pipe conforming to the requirements of ASTM - D2661 or Schedule 40 ABS Plastic Pipe conforming to the requirements of ASTM - F628.

2. The 4 1/2" diameter by 1" ABS Plastic Pipe Sleeves can be made from a 4-inch diameter (ABS) Pipe Coupler. They shall be attached to the 4-inch diameter (ABS) Plastic Pipe as shown in the plans with a solvent cement conforming to ASTM-D2235.

3. The 1/2 inch diameter U-bolts, nuts and washers shall conform to ASTM A307 and shall be galvanized in accordance with ASTM F2329.

4. Steel for the bent plates and washers shall conform to ASTM A709, Grade 36 and shall be galvanized in accordance with ASTM A123. Washers shall be plate washers or a continuous bar at least 5/16" thick with standard holes and shall have a size sufficient to completely cover the slot after installation.

5. The 1/2 inch diameter bolts and nuts shall conform to ASTM A307 and shall be galvanized in accordance with ASTM F2329.

7. The deck drain to girder connection as shown allows the deck drain location to be adjusted slightly to clear transverse slab steel.

7. After the deck drains have been installed, the ABS plastic pipe and attaching hardware shall be painted with Aluminum Filled Epoxy Mastic Primer, gray in color, conforming to Section 411 of the Specifications. Prior to paint application, the ABS plastic pipe shall be sanded to produce a roughened surface sufficient for paint adhesion.

8. Payment for deck drains shall be at the contract unit price per each for Deck Drains, Girder Bridge, and shall be full compensation for furnishing, fabricating, installing and painting the deck drains and all attaching hardware in accordance with the plans and specifications.

PILING DRIVING

1. A drivability analysis was performed using the wave equation analysis program (GRLWEAP). The following pile hammers were evaluated and found to produce acceptable driving stresses:

Delmag D25-32	APE D30-52
Delmag D30-32	SPI D30

2. Pile hammers not listed will require evaluation and approval prior to use from the Geotechnical Engineering Activity.

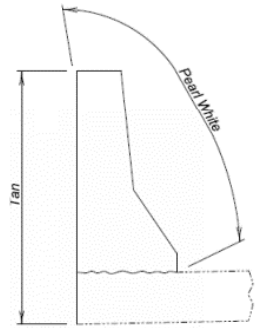
CLASS B COMMERCIAL TEXTURE FINISH

1. A Class B commercial texture finish shall be applied to the following areas:

   a. **Barrier Rail:** all exposed surfaces (front, top and back).
   b. **Slab:** edge of slab.

2. The Class B commercial texture finish shall be applied in accordance with Section 460.3 L.1.c of the Specifications.

3. Where the Class B commercial texture finish is to be applied, concrete curing shall be accomplished with cotton or burlap mats and polyethylene sheeting. Curing shall continue for not less than seven days after placing concrete before the commercial texture finish is applied. The commercial texture finish shall be applied in accordance with the manufacturer's recommendations. The commercial texture finish itself does not require a specific cure except for drying.



APPROACH SLABS

1. Sleeper slab riser shall be cast with the approach slab or cast after the approach slab is placed. Care shall be taken to ensure the correct grade is maintained across the joint.

2. The portion of the sleeper slab below the construction joint may be precast. If the bottom portion of the sleeper slab is precast, the Contractor shall submit proposed lifting and setting plans to the Bridge Construction Engineer for approval. In addition, if reinforcing or other details differ from those shown in the plans, the Contractor shall submit proposed alternate details for approval.

3. The use of an approved finishing machine will be required during placement of Class A45 Concrete for the approach slabs. Concrete placement in front of the machine shall be kept parallel to the screed.

4. The concrete in the approach slab shall be tined normal to centerline roadway.

5. Concrete Approach Sleeper Slab for Bridge, whether cast-in-place or precast, will be paid for at the contract unit price per square yard. This payment shall be full compensation for all excavation, furnishing, hauling, and placing all materials including concrete and reinforcing steel; for disposal of all excavated material and surplus materials; and for labor, tools, equipment and any incidentals necessary to complete this item of work.

6. Concrete Approach Slab for Bridge will be paid for at the contract unit price per square yard. This payment shall be full compensation for all excavation, furnishing, hauling and placing all materials including concrete, asphalt paint or 6 mil polyethylene sheeting, elastic joint sealer and reinforcing steel; for disposal of all excavated material and surplus materials and for labor, tools, equipment and any incidentals necessary to complete this item of work.

AS - BUILT ELEVATION SURVEY

The Contractor shall be responsible for recording the As-built deck elevations and bridge survey marker elevations at the locations shown in the Table of As-Built Elevations shown in the plans. All costs associated with obtaining the elevations including all equipment, labor and any incidentals required shall be incidental to the contract lump sum price for Bridge Elevation Survey.

NOTES (CONTINUED)
FOR
106' - 6" PRESTR. GIRDER BRIDGE

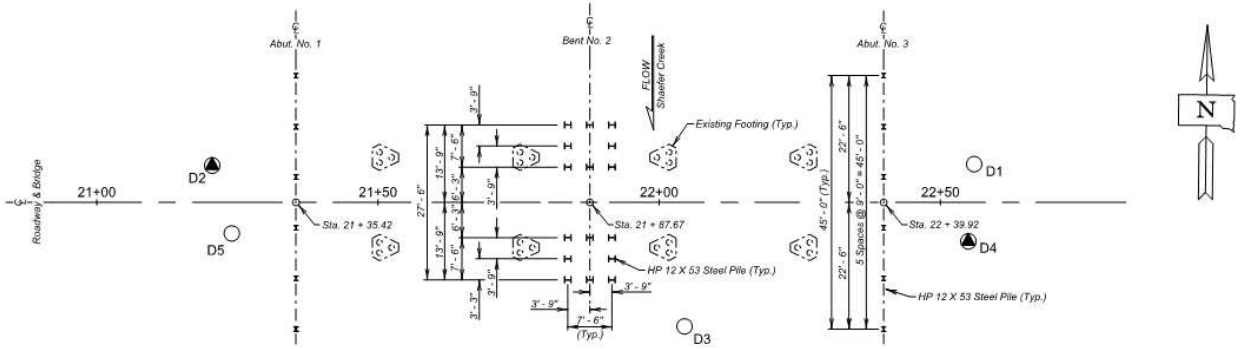
STR. NO. 30-132-080
MARCH 2018

4 OF 22

DESIGNED BY	CK. DES. BY	DRAFTED BY	
JSD HAND04FK	CH 04FKGA04	BT	Steve A Johnson BRIDGE ENGINEER

F.2.4.4. SUBSURFACE INVESTIGATION AND PILING LAYOUT

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P 0026(03)250 P 0020(130)295	E7	E38



PILING LAYOUT

Glaciated Terrain contains all sizes of natural mineral sediment ranging from clay to boulders. Streams originating in or flowing through glaciated topography contain sediment loads derived from glaciated sources. Stream and river crossings contain sediment naturally sorted and randomly concentrated. Alluvial sediment located at this project location may have concentrated coarser gravel such as pebbles, cobbles and boulders. The borings shown only represent material that was found at the exact location of the small diameter drill hole. Coarse granular material may be present in areas not penetrated by the depicted borings.

The Geotechnical Engineering Activity has all of the boring logs and laboratory test results available for review at the Central Office in Pierre.

LEGEND

- Penetration Test
- Drive Test
- Water
- Caved
- Sample Zone

Penetration test holes are drilled with a 6⅝ inch diameter hollow stem auger. Penetration tests are conducted by dropping a 140 pound hammer 30 inches to obtain 2 inch nominal diameter samples and to measure the resistance to penetration of the soil. Penetration test results are listed as uncorrected "N" values in blows per foot.

Drive test are conducted by dropping a 490 pound hammer 30 inches to drive a 2 ⅞ inch drill stem to measure the resistance to penetration of the soil.

COFFERDAM SOIL PARAMETERS

	Friction Angle (ϕ)	Cohesion (c)	Wet Unit Weight (γ_w)
Silt-Clay with Gravel	28°	100 psf	120 pcf
Clay-Sand	33°	250 psf	129 pcf
Clay-Silt with Sand	16°	1,980 psf	125 pcf

Hole Number	D1	
Station	22+56	
Depth	20.2	ft
Soil Color	Mottled Brown	
Classification	Clay-Silt	
Strength (Qu)	3,597	psf
Dry Density	102.8	pcf
Wet Density	125.9	pcf
Moisture	22.5	%
Pass No. 10	98.6	%
Pass No. 40	91.8	%
Pass No. 200	66.4	%
Sand Content	32.2	%
Silt Content	39.4	%
Clay Content	27.0	%

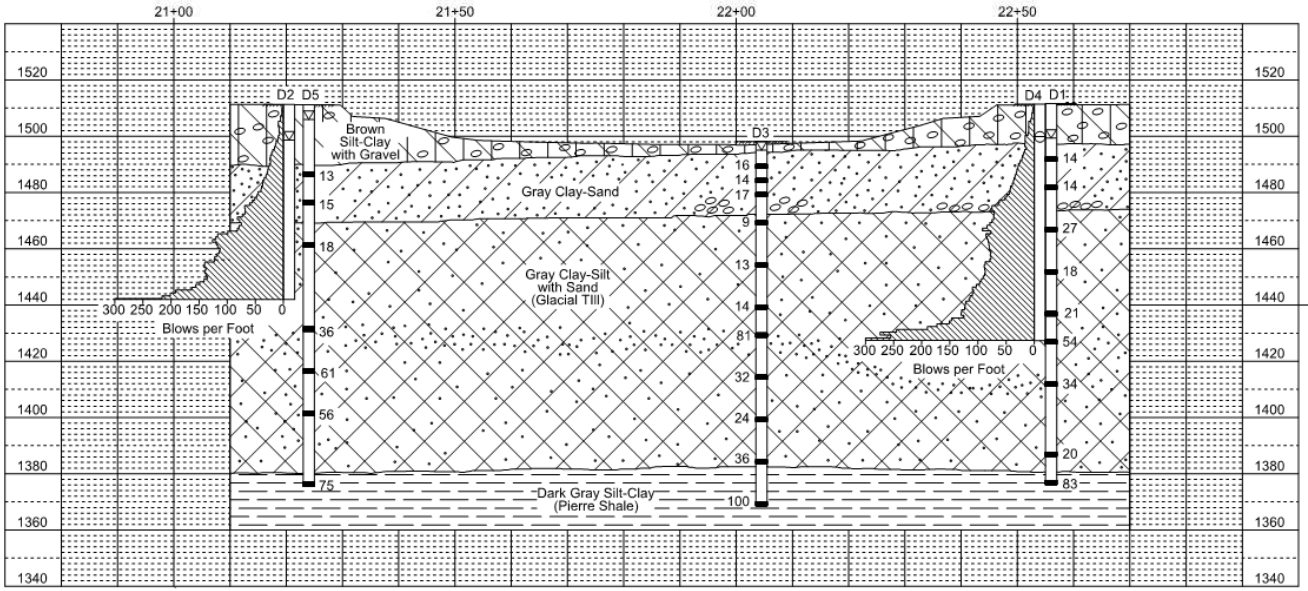
Hole Number	D1	
Station	22+56	
Depth	60.2	ft
Soil Color	Dark Gray	
Classification	Sandy Clay	
Strength (Qu)	3,527	psf
Dry Density	101.4	pcf
Wet Density	125.0	pcf
Moisture	23.2	%
Pass No. 10	97.8	%
Pass No. 40	89.2	%
Pass No. 200	70.0	%
Sand Content	27.8	%
Silt Content	37.9	%
Clay Content	32.1	%

Hole Number	D3	
Station	22+4.5	
Depth	14.2	ft
Soil Color	Gray	
Classification	Silty Sand	
Strength (Qu)	701	psf
Dry Density	102.3	pcf
Wet Density	125.0	pcf
Moisture	22.2	%
Pass No. 10	97.3	%
Pass No. 40	93.1	%
Pass No. 200	49.8	%
Sand Content	47.5	%
Silt Content	31.1	%
Clay Content	18.7	%

Hole Number	D3	
Station	22+4.5	
Depth	69.5	ft
Soil Color	Dark Gray	
Classification	Silty Sand	
Strength (Qu)	2,744	psf
Dry Density	105.6	pcf
Wet Density	126.8	pcf
Moisture	19.7	%
Pass No. 10	87.3	%
Pass No. 40	49.9	%
Pass No. 200	36.0	%
Sand Content	41.3	%
Silt Content	18.4	%
Clay Content	17.6	%

Hole Number	D5	
Station	21+24	
Depth	25.5	ft
Soil Color	Dark Gray	
Classification	Sandy Clay	
Strength (Qu)	1,632	psf
Dry Density	108.3	pcf
Wet Density	129.7	pcf
Moisture	19.7	%
Pass No. 10	98.0	%
Pass No. 40	89.2	%
Pass No. 200	61.5	%
Sand Content	36.4	%
Silt Content	41.2	%
Clay Content	20.4	%

Hole Number	D5	
Station	21+24	
Depth	79.5	ft
Soil Color	Gray	
Classification	Sand	
Strength (Qu)	No Test	psf
Dry Density	NA	pcf
Wet Density	NA	pcf
Moisture	23.2	%
Pass No. 10	98.8	%
Pass No. 40	78.5	%
Pass No. 200	18.8	%
Sand Content	80.0	%
Silt Content	15.4	%
Clay Content	3.4	%



GROUNDWATER ELEVATIONS

JULY 2017

D2		1498.6

AUGUST 2017

D1		1499.3
D3		1497.2
D4	(DRY)	1499.8
D5		1506.0

MEASURED SKIN FRICTION

	ELEV.	PSF
D2	1441.9	487
D4	1445.3	397
D4	1427.5	1,514

SUBSURFACE INVESTIGATION & PILING LAYOUT

FOR

106' - 6" PRESTR. GIRDER BRIDGE

32' - 0" ROADWAY — 0° SKEW
OVER SHAEFER CREEK — SEC. 08/17-T115N-R68W
STA. 21 + 34.42 TO 22 + 40.92 — P 0026(03)250
STR. NO. 30-132-080 — HL-93

HAND COUNTY

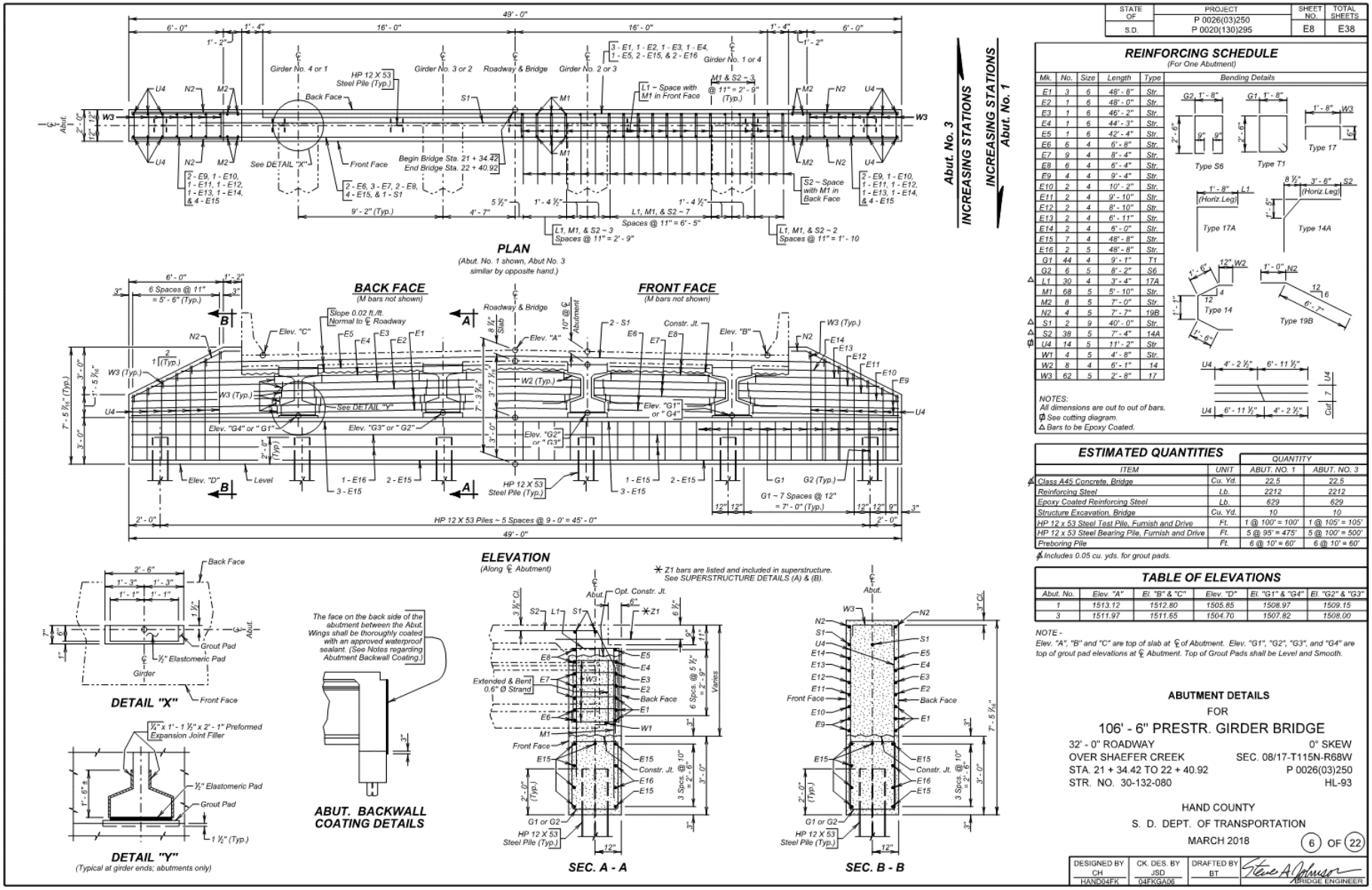
S. D. DEPT. OF TRANSPORTATION

MARCH 2018

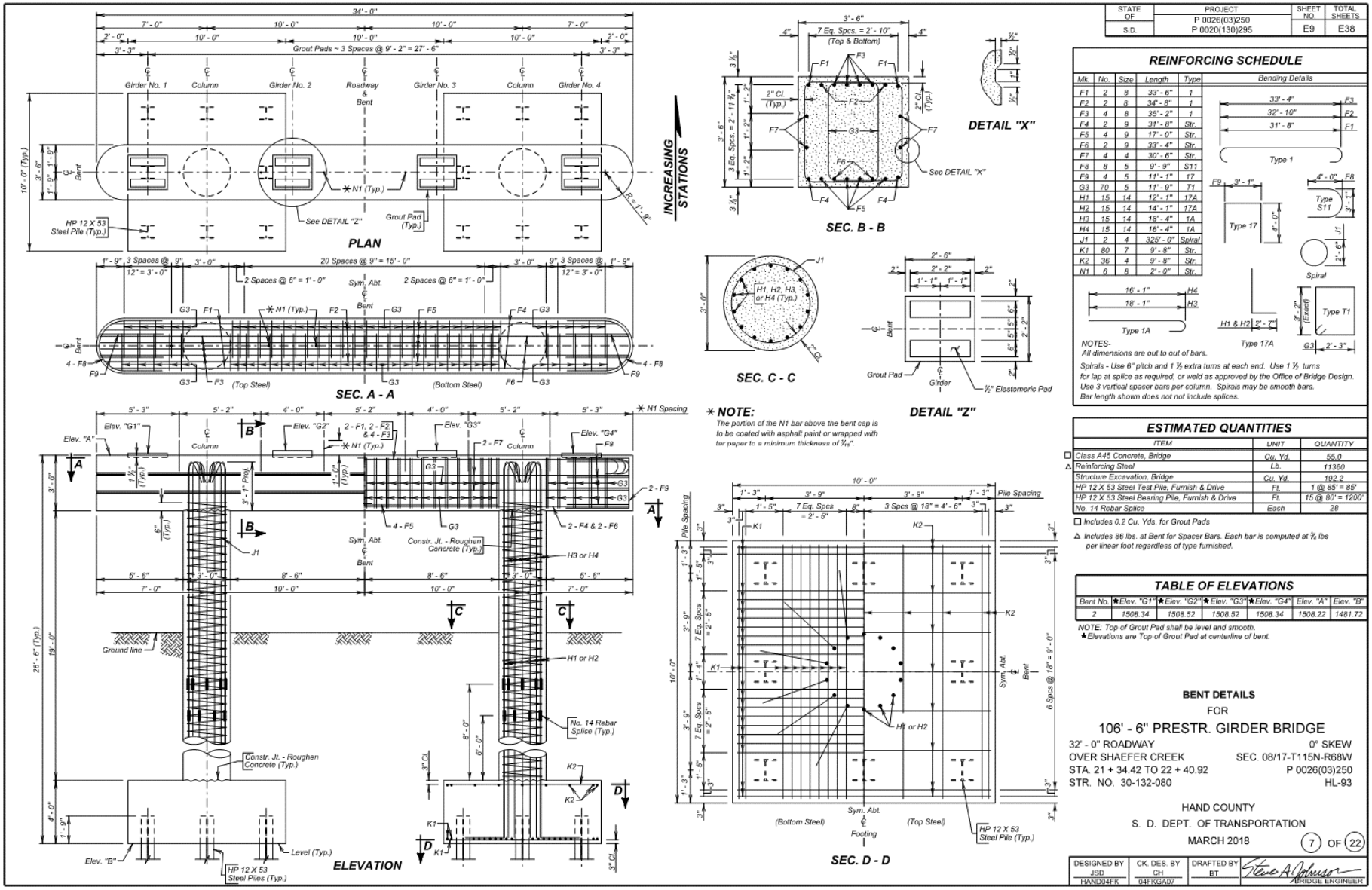
5 OF 22

DESIGNED BY	CK. DES. BY	DRAFTED BY	
JSD HAND04FK	CH 04FKGA05	BT/HK	Steve A. Johnson BRIDGE ENGINEER

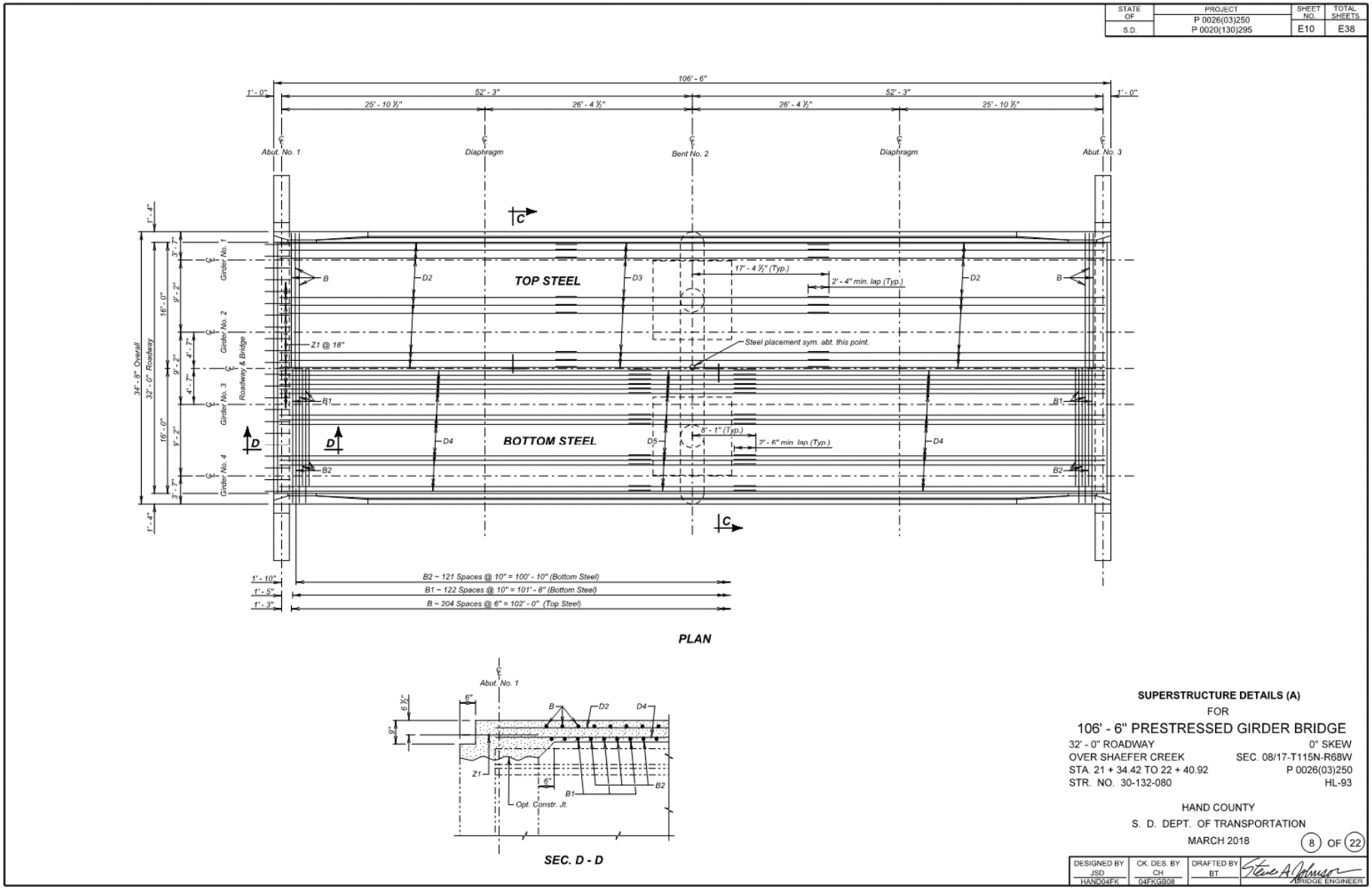
F.2.4.5. ABUTMENT DETAILS



F.2.4.6. BENT DETAILS



F.2.4.7. SUPERSTRUCTURE DETAILS (A)



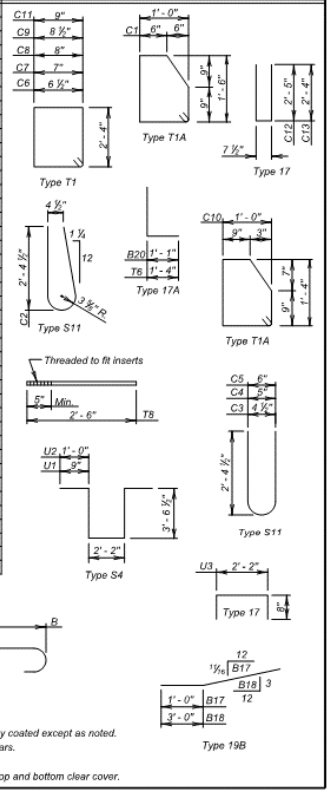
F.2.4.8. SUPERSTRUCTURE DETAILS (B)

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P 0026(03)250 P 0020(130)295	E11	E38

REINFORCING SCHEDULE

Mk.	No.	Size	Length	Type
⚠ B	205	5	35' - 6"	1
B1	123	4	34' - 4"	Str.
B2	122	4	30' - 0"	Str.
B15	12	5	14' - 6"	Str.
B16	8	4	52' - 3"	Str.
B17	8	4	8' - 6"	19B
B18	12	8	4' - 3"	19B
B19	12	5	2' - 4"	Str.
B20	12	6	3' - 6"	17A
C1	198	5	5' - 7"	T1A
C2	170	5	5' - 1"	S11
C3	4	5	5' - 0"	S11
C4	4	5	5' - 0"	S11
C5	4	5	5' - 0"	S11
C6	4	5	6' - 8"	T1
C7	4	5	6' - 9"	T1
C8	4	5	6' - 11"	T1
C9	4	5	7' - 0"	T1
C10	16	6	5' - 11"	T1A
C11	16	5	7' - 1"	T1
C12	4	6	5' - 6"	17
C13	4	5	5' - 4"	17
D	8	4	54' - 3"	Str.
D0	8	5	54' - 6"	Str.
D1	24	4	42' - 3"	Str.
D2	66	4	37' - 9"	Str.
D3	33	6	34' - 9"	Str.
D4	80	4	47' - 2"	Str.
D5	40	5	16' - 2"	Str.
✳ T1	6	6	6' - 8"	Str.
✳ T2	12	5	8' - 4"	Str.
✳ T3	6	5	6' - 4"	Str.
✳ T4	4	5	5' - 0"	Str.
✳ T5	3	5	30' - 8"	Str.
✳ T6	16	5	5' - 3"	17A
✳ T7	4	5	2' - 11"	Str.
✳ T8	12	6	2' - 6"	Str.
U1	15	4	10' - 9"	S4
U2	8	6	11' - 3"	S4
✳ U3	18	4	3' - 6"	17
Z1	44	7	4' - 0"	Str.

Bending Details



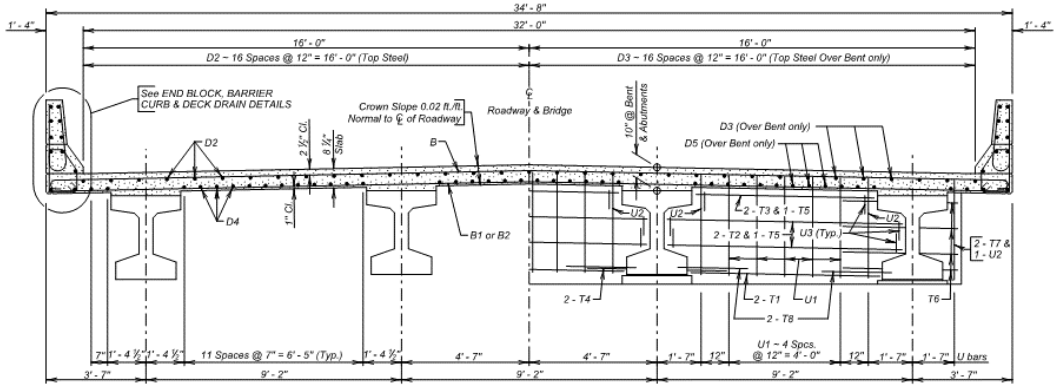
NOTES -
All reinforcing steel shall be epoxy coated except as noted.
All dimensions are out to out of bars.
✳ Bars not to be epoxy coated.
⚠ Tip bars as required to maintain top and bottom clear cover.

ESTIMATED QUANTITIES

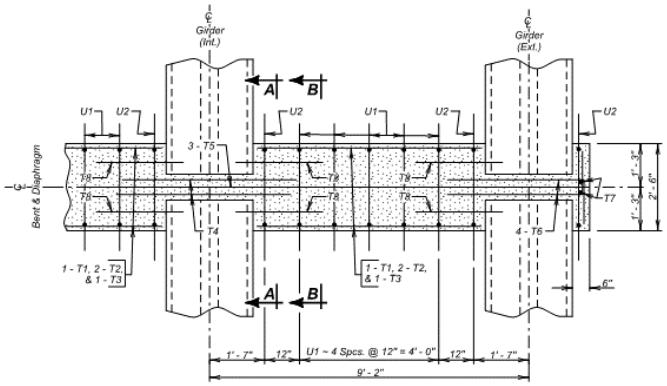
	ITEM	UNIT	QUANTITY
★	Class A45 Concrete, Bridge Deck	Cu.Yd.	126.8
⌀	Epoxy Coated Reinforcing Steel	Lb.	24744
⌀	Reinforcing Steel	Lb.	508
	36" Minnesota Shape Prestressed Concrete Beam	Ft.	416
	Concrete Penetrating Sealer	Sq.Yd.	375.1

⌀ Includes quantities for Bent Diaphragm, Barrier Curbs, and Slab.
★ Includes quantities for Bent Diaphragm, Barrier Curbs, Slab, and Haunch. (Average depth of 1 ½" used for Haunch Quantity.) Concrete Quantity for Barrier Curbs is 0.0842 Cu.Yd. / Ft. and for End blocks is 1.1659 Cu.Yd. each.

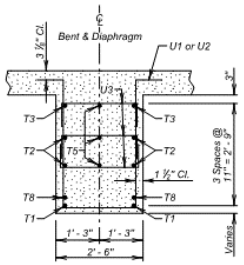
NOTE -
Concrete shall be placed in the space under the beams at Bent 2 (within the diaphragm width) during the diaphragm pour. If upon form removal the space is not completely filled and consolidated, the contractor shall grout in the remaining voids.



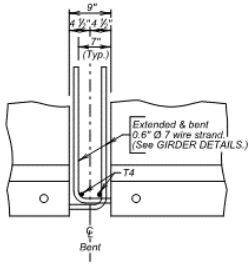
SEC. C - C
(Midspan diaphragm not shown in this section, see DIAPHRAGM DETAILS.)



BENT DIAPHRAGMS
(Slab Not Shown)



SEC. B - B
(Girders Not Shown)



SEC. A - A
(Showing extended and bent strand detail and T4 bar placement at Bent. T6 similar at exterior girder.)

SUPERSTRUCTURE DETAILS (B)
FOR
106' - 6" PRESTRESSED GIRDER BRIDGE
32' - 0" ROADWAY — 0° SKEW
OVER SHAEFER CREEK — SEC. 08/17-T115N-R68W
STA. 21 + 34.42 TO 22 + 40.92 — P 0026(03)250
STR. NO. 30-132-080 — HL-93

HAND COUNTY
S. D. DEPT. OF TRANSPORTATION
MARCH 2018

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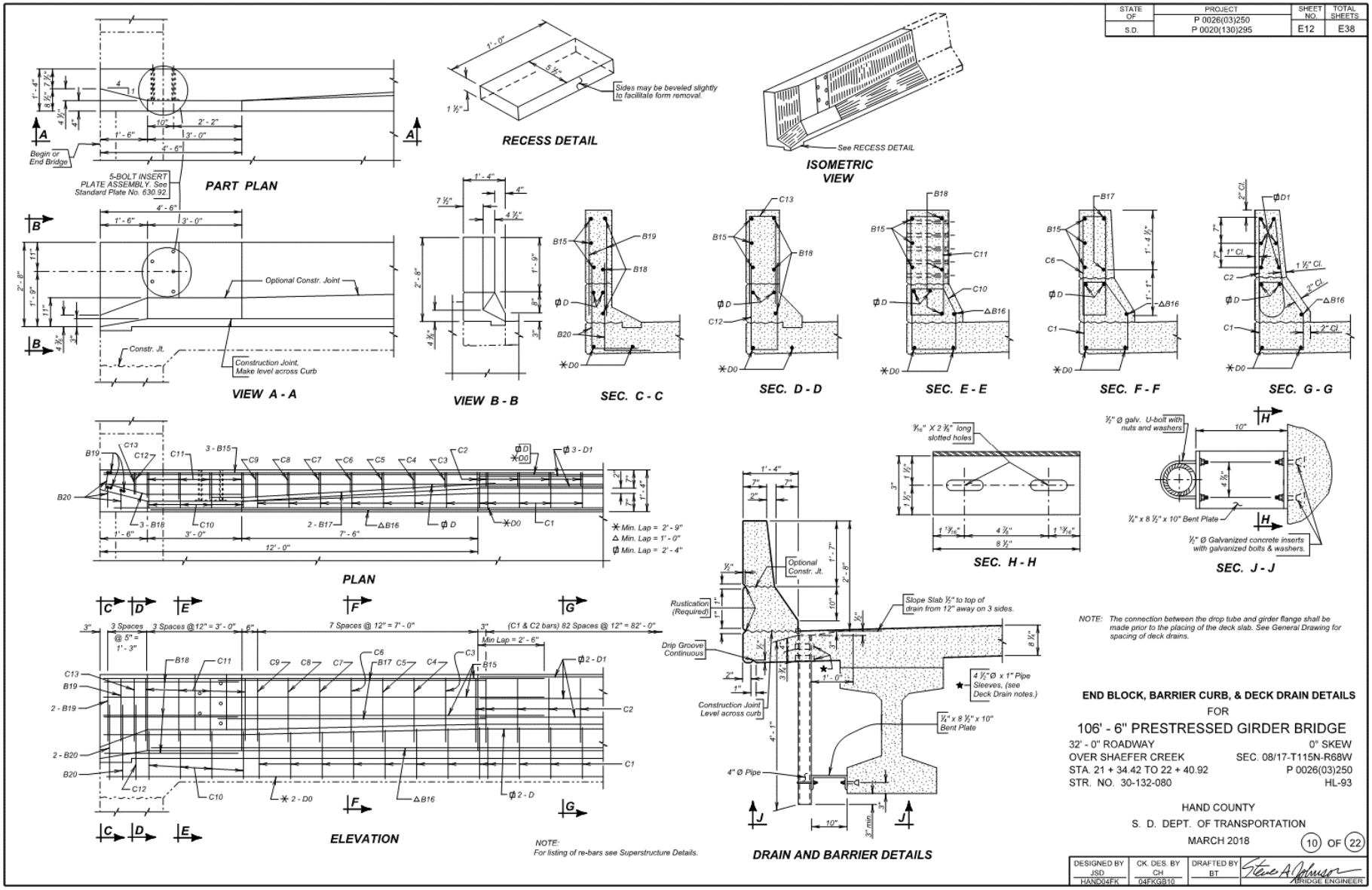
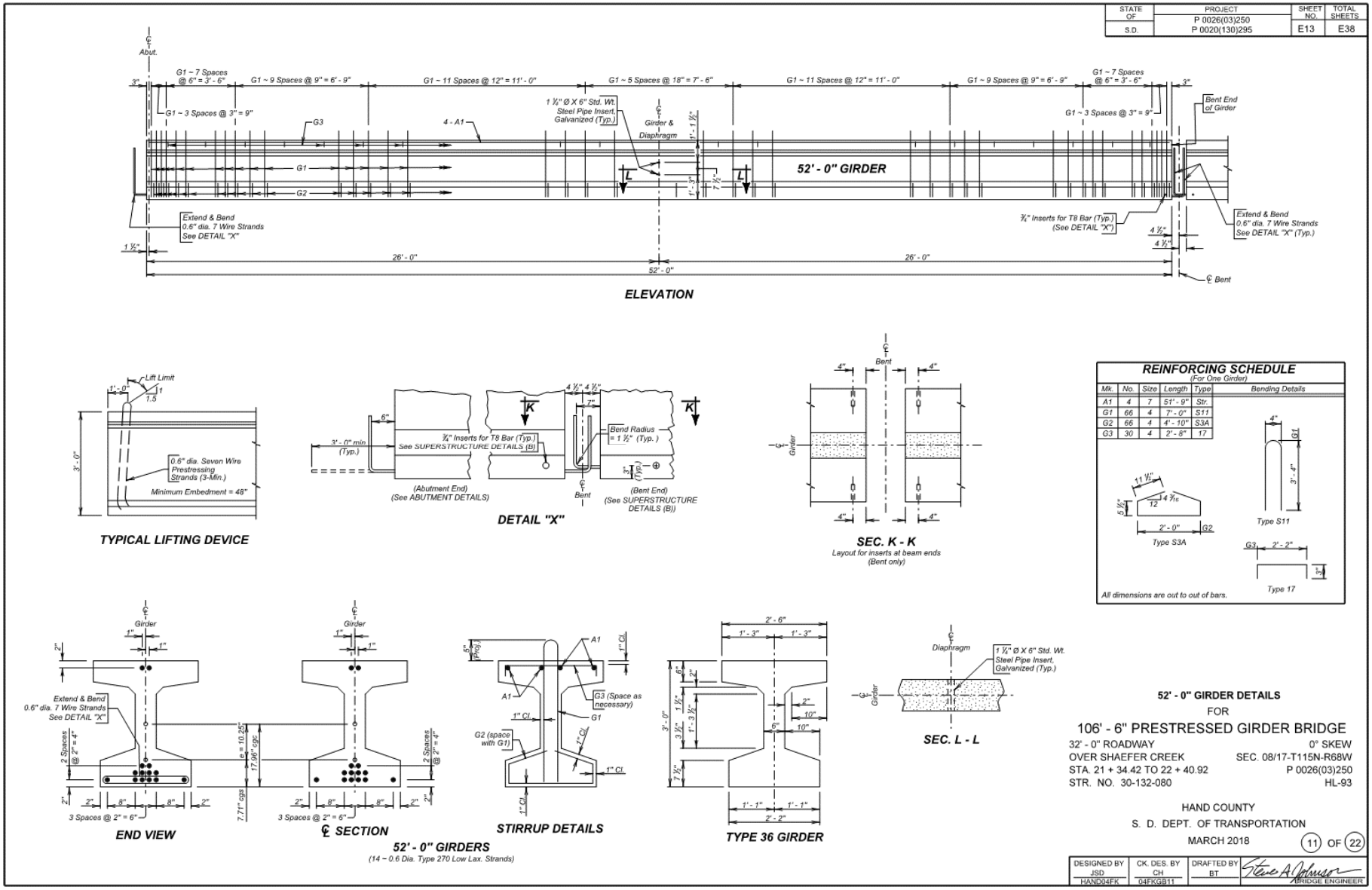
DESIGNED BY	CK. DES. BY	DRAFTED BY	
JSD HAND04FK	CH 04FKGB09	BT	BRIDGE ENGINEER

F.2.4.9. END BLOCK, BARRIER CURB, AND DRAIN DETAILS

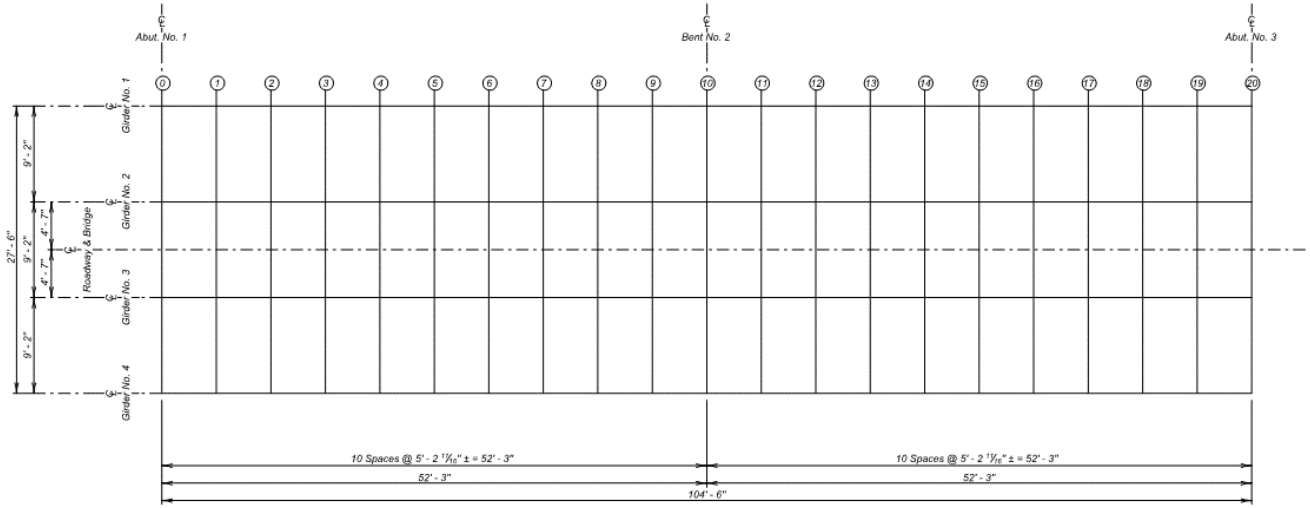


F.2.4.10. GIRDER DETAILS

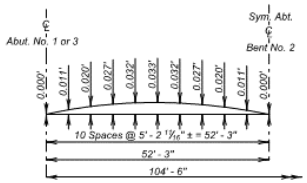


F.2.4.11. ERECTION DATA AND SLAB FORM ELEVATIONS

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P 0026(03)250 P 0020(130)295	E14	E38

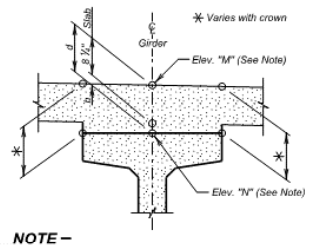


GIRDER LAYOUT



CAMBER DIAGRAM

The Camber shown is the amount which has been added to the theoretical slab elevations to get slab elevations shown in the table of Slab Form Elevations and Calculations. Camber shown is for D. L. of slab, traffic barrier, and haunch, but does not include D. L. of beams.



NOTE –

The table contains the information necessary to determine the depth of concrete over the girders at points shown. Calculations may be carried in the spaces provided. Elev. "M" is the design elevation of the top of slab before any concrete has been poured. This elevation includes correction for camber and dead load deflection. Elev. "N" is a field measured elevation taken on top of girders at the points shown with the girders in their positions. This elevation must be taken after erection is completed, but prior to placing any of the concrete. Girders shall not be supported between bearings when elevations are taken.

NOTE –

Based on a "d" of 10" at the ℄ of each abutment and 10" at the ℄ of the Bent (see SEC. C - C on SUPERSTRUCTURE DETAILS (B), it is anticipated that the midspan haunch dimension "h" over the ℄ of each girder will be 1 ½". If when computing the dimensions in the table, it is found that any dimension "h" is less than zero or greater than 4" the Office of Bridge Design of the South Dakota Dept. of Transportation shall be notified immediately. After the "Table of Slab Form Elevations and Calculations" has been completely filled out and approved for deck forming, a copy shall be forwarded to the Office of Bridge Design for review and analysis for the purpose of securing information relative to camber growth in the beams. This information is necessary for preparing plans for future structures of this type.

TABLE OF SLAB FORM ELEVATIONS AND CALCULATIONS

		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Girder 1	Elev. "M"	1512.842	1512.786	1512.728	1512.570	1512.611	1512.549	1512.485	1512.419	1512.352	1512.284	1512.215	1512.170	1512.123	1512.075	1512.027	1511.975	1511.922	1511.867	1511.811	1511.753	1511.695
	(-) Elev. "N"																					
	(=) d																					
	(-) 0.688																					
	(=) h																					
Girder 2	Elev. "M"	1513.026	1512.969	1512.912	1512.953	1512.794	1512.732	1512.669	1512.603	1512.536	1512.468	1512.399	1512.353	1512.306	1512.259	1512.210	1512.158	1512.106	1512.050	1511.994	1511.937	1511.878
	(-) Elev. "N"																					
	(=) d																					
	(-) 0.688																					
	(=) h																					
Girder 3	Elev. "M"	1513.026	1512.969	1512.912	1512.953	1512.794	1512.732	1512.669	1512.603	1512.536	1512.468	1512.399	1512.353	1512.306	1512.259	1512.210	1512.158	1512.106	1512.050	1511.994	1511.937	1511.878
	(-) Elev. "N"																					
	(=) d																					
	(-) 0.688																					
	(=) h																					
Girder 4	Elev. "M"	1512.842	1512.786	1512.728	1512.570	1512.611	1512.549	1512.485	1512.419	1512.352	1512.284	1512.215	1512.170	1512.123	1512.075	1512.027	1511.975	1511.922	1511.867	1511.811	1511.753	1511.695
	(-) Elev. "N"																					
	(=) d																					
	(-) 0.688																					
	(=) h																					

ERECTION DATA AND SLAB FORM ELEVATIONS

FOR

106' - 6" PRESTRESSED GIRDER BRIDGE

32' - 0" ROADWAY — 0° SKEW
OVER SHAEFER CREEK — SEC. 08/17-T115N-R68W
STA. 21 + 34.42 TO 22 + 40.92 — P 0026(03)250
STR. NO. 30-132-080 — HL-93

HAND COUNTY
S. D. DEPT. OF TRANSPORTATION
MARCH 2018

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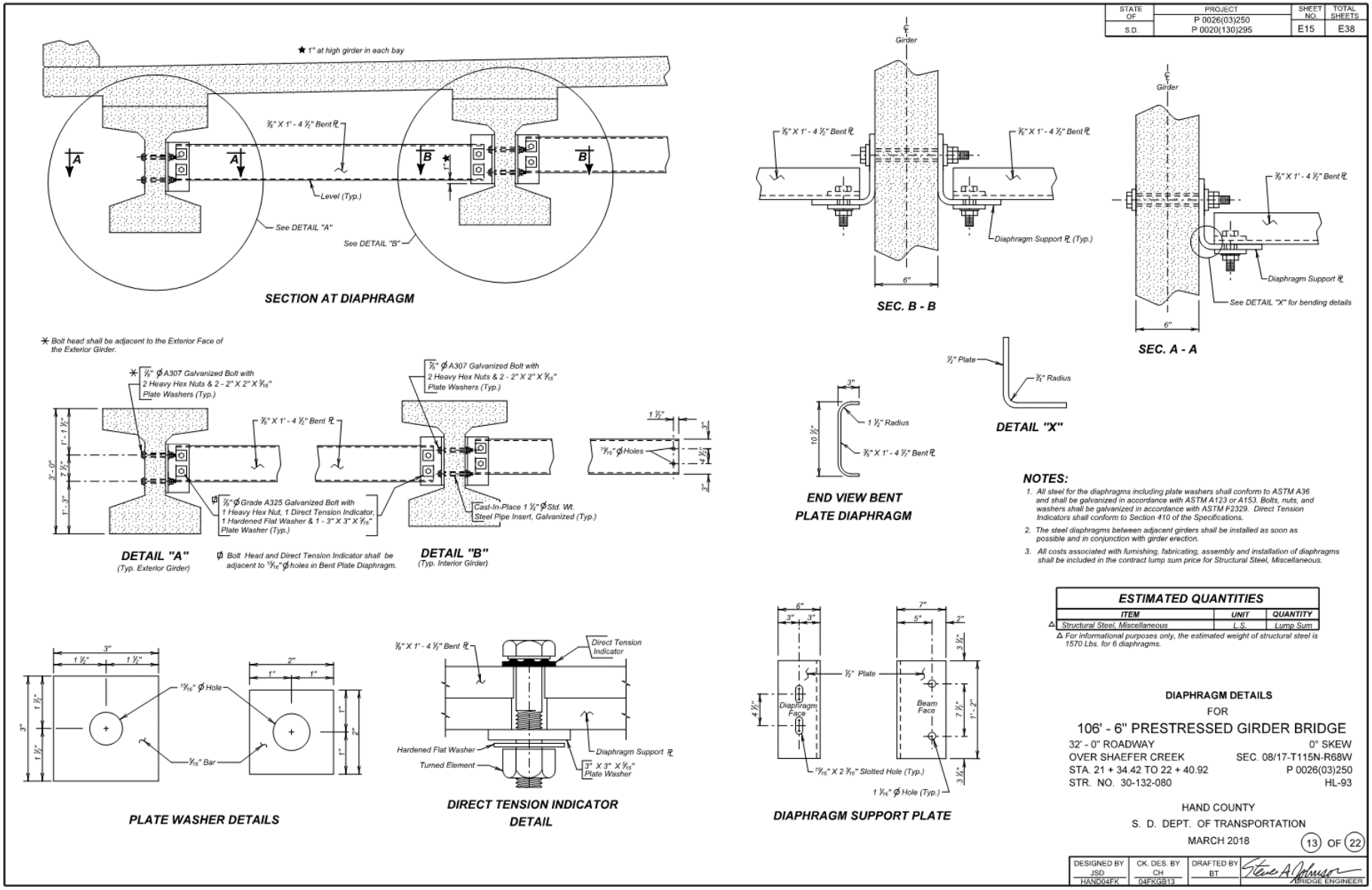
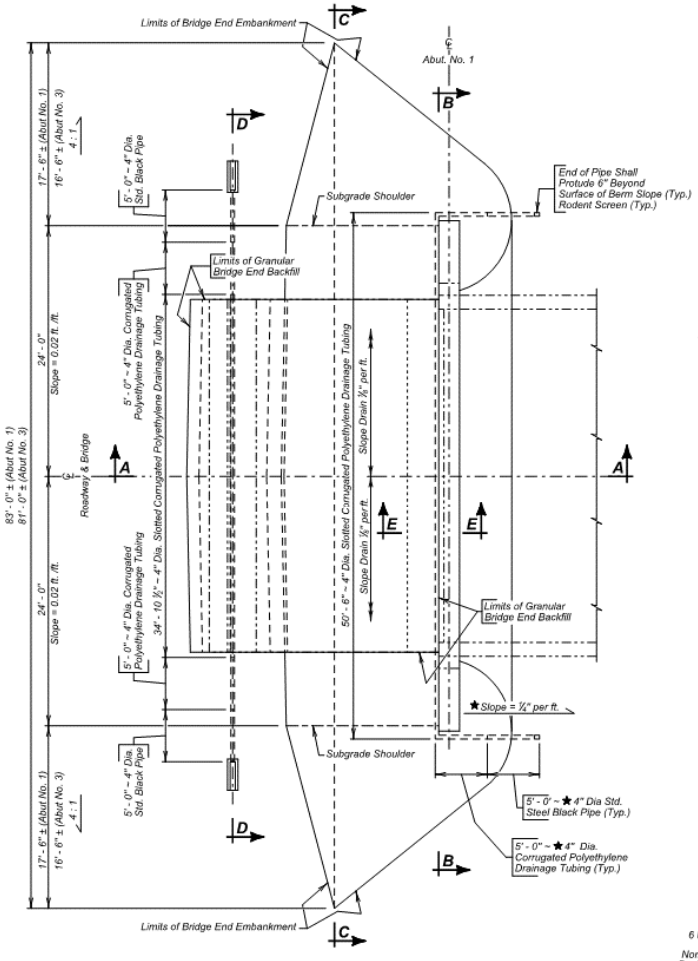
DESIGNED BY	CK. DES. BY	DRAFTED BY	
JSD HAND04FK	CH 04FKGB12	BT	BRIDGE ENGINEER

F.2.4.12. DIAPHRAGM DETAILS

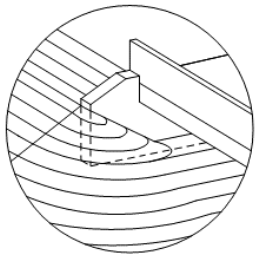


F.2.4.13. DETAILS OF BRIDGE END BACKFILL (A)

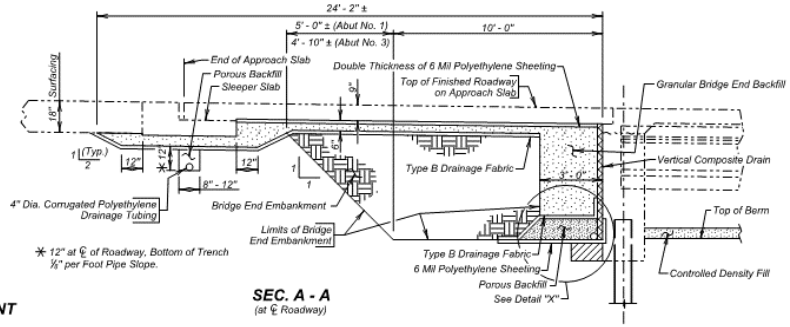
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P 0026(03)250 P 0020(130)295	E16	E38



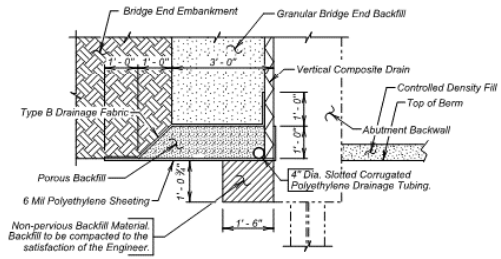
PLAN
(Bridge End Backfill shown adjacent to Abut. No. 1
Abut. No. 3 similar opposite hand except as shown.)



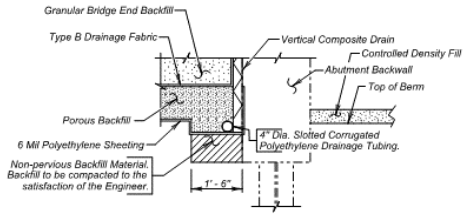
SPILL CONE DETAIL AT EMBANKMENT



SEC. A - A
(at ℄ Roadway)



DETAIL "X"



SEC. E - E

ESTIMATED QUANTITIES		QUANTITY	
ITEM	UNIT	ABUT. NO. 1	ABUT. NO. 3
Granular Bridge End Backfill	Cu. Yd.	31.4	31.4
✱ Bridge End Embankment	Cu. Yd.	148	139
✱ ✱ Porous Backfill	Ton	15.0	15.0
4" Underdrain Pipe	Ft.	126	126
✱ Approach Slab Underdrain Excavation	Cu. Yd.	3.0	3.0
Precast Concrete Headwall for Drain	Each	2	2

	ABUT. NO. 1	ABUT. NO. 3
1. 4" dia. Slotted Corrugated Polyethylene Drainage Tubing.	86 Ft.	86 Ft.
2. 4" dia. Corrugated Polyethylene Drainage Tubing.	20 Ft.	20 Ft.
3. 4" dia. Std. Black Steel Pipe with Rodent Screens.	20 Ft.	20 Ft.
4. Vertical Composite Drain.	185 Sq. Ft.	185 Sq. Ft.

Items 1 thru 4 are approximate quantities contained in the 4" Underdrain for information only.

5. 6 mil Polyethylene Sheeting, not including laps.	1387 Sq. Ft.	1387 Sq. Ft.
6. Type B Drainage Fabric.	116 Sq. Yd.	116 Sq. Yd.

Items 5 and 6 are approximate quantities contained in the Granular Bridge End Backfill and are for information only.

✱ For estimating purposes only, a factor of 1.89 tons/cu. yd. was used to convert cu. yds. to tons.

✱ Shrinkage Factor of 1.25 Used.

✱ Quantity based on a 12" wide trench.

DETAILS OF BRIDGE END BACKFILL (A)
FOR
106' - 6" PRESTRESSED GIRDER BRIDGE

32' - 0" ROADWAY — 0° SKEW
OVER SHAEFER CREEK — SEC. 08/17-T115N-R68W
STA. 21 + 34.42 TO 22 + 40.92 — P 0026(03)250
STR. NO. 30-132-080 — HL-93

HAND COUNTY
S. D. DEPT. OF TRANSPORTATION
MARCH 2018

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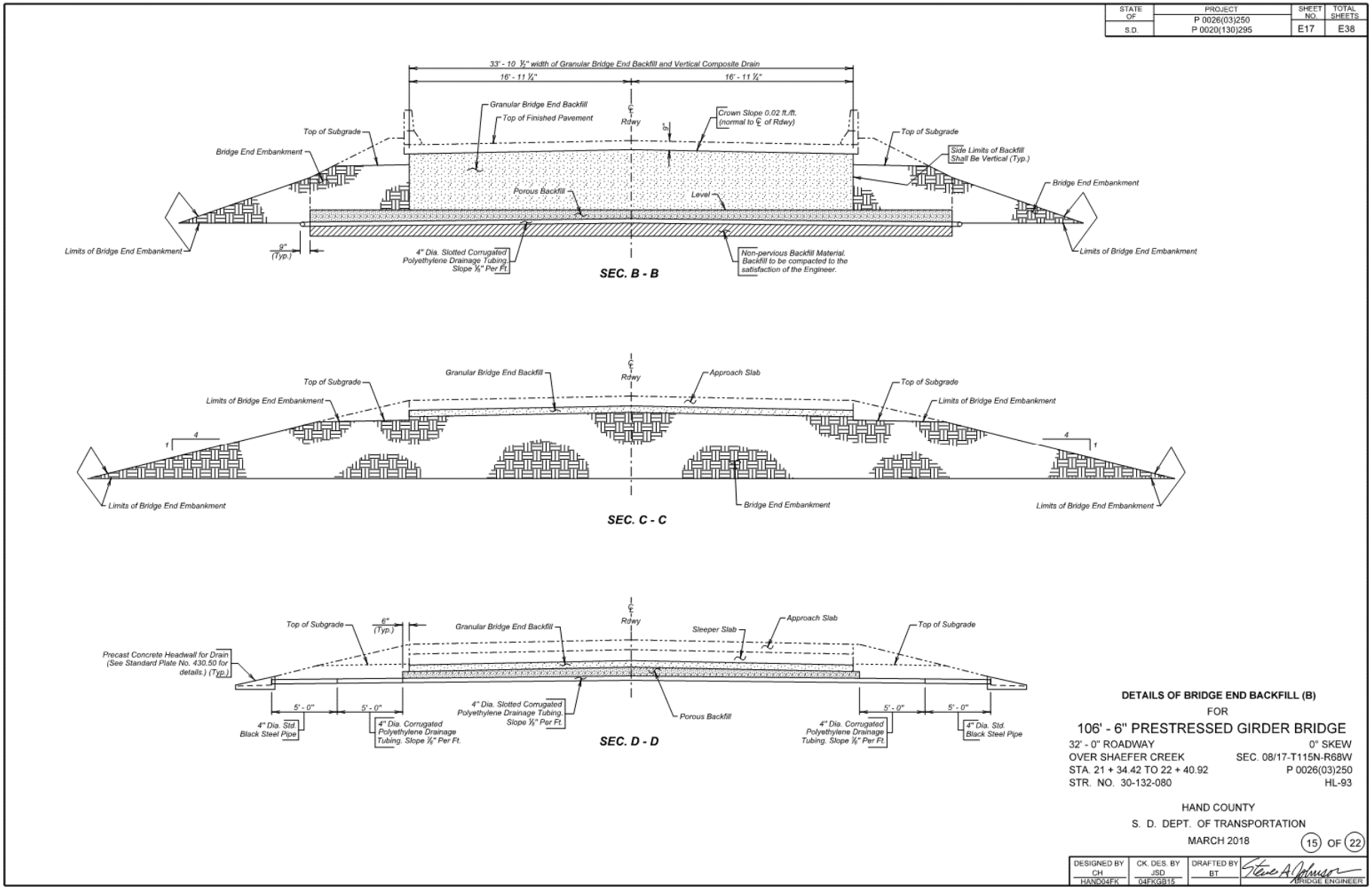
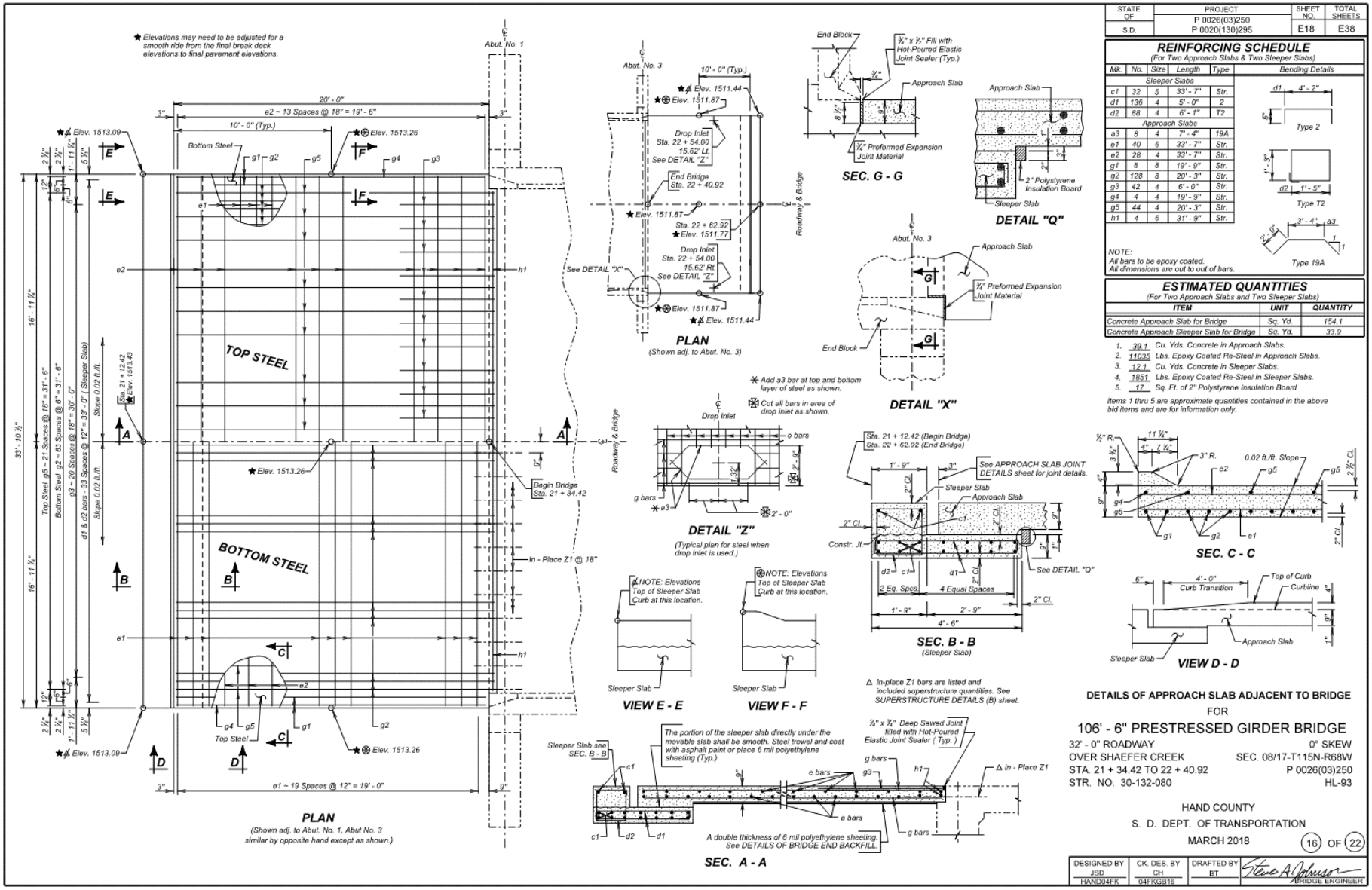
DESIGNED BY	CK. DES. BY	DRAFTED BY	
CH HAND04FK	JSD 04FKGB14	BT	BRIDGE ENGINEER

F.2.4.14. DETAILS OF BRIDGE END BACKFILL (B)

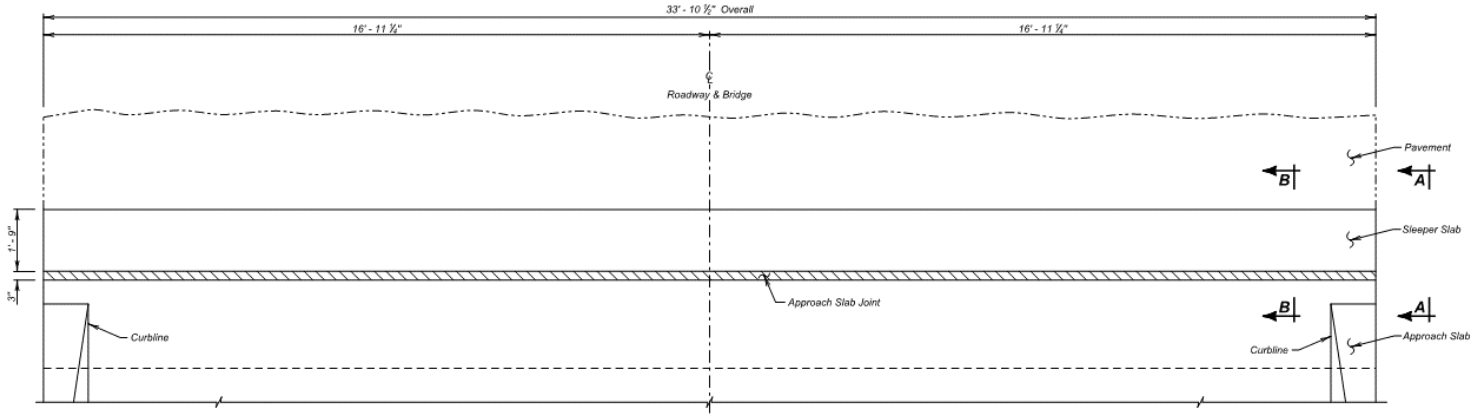


F.2.4.15. DETAILS OF APPROACH SLAB ADJACENT TO BRIDGE



F.2.4.16. APPROACH SLAB JOINT DETAILS

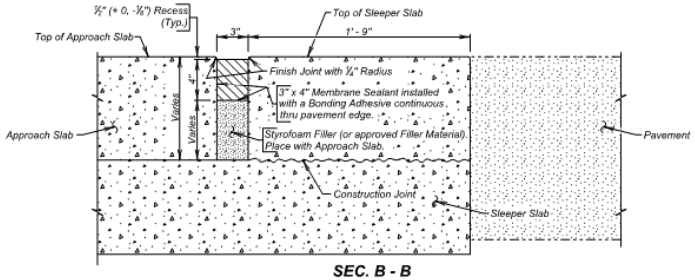
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P 0026(03)250 P 0020(130)295	E19	E38



PLAN

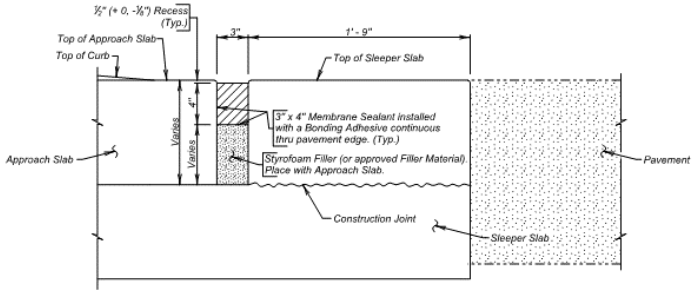
GENERAL NOTES

1. The Membrane Sealant shall be on the approved product list for Membrane Sealant Expansion Joints.
2. The manufacturer shall supply the membrane sealant in packaging that precompresses the membrane sealant. The precompressed dimension shall be as recommended by the sealant manufacturer, however, in no case shall the precompressed dimension exceed 75% of the joint opening width. The foam sealant shall be slowly self expanding to permit workers ample time to install the membrane sealant before the membrane sealant exceeds the joint opening width.
3. The membrane sealant shall provide a water tight seal throughout a joint movement range of + 25% (minimum) from the specified joint opening dimension.
4. The membrane sealant shall be supplied in pieces a minimum of 5 feet in length. The foam sealant shall be ultra-violet and ozone resistant.
5. The bonding adhesive used to attach the membrane sealant to the adjacent concrete shall be approved by the membrane sealant manufacturer.
6. Adhesive used to join adjacent pieces of the membrane sealant shall be as recommended by the manufacturer.
7. If styrofoam filler material is used in the construction, it shall be closed cell and water-tight as approved by the Engineer.
8. The minimum ambient air temperature at the time of joint installation and adhesive curing shall be 40° F.
9. A technical representative of the membrane sealant manufacturer shall be present at the jobsite during installation. The technical representative shall be knowledgeable in the correct procedures for the preparation and installation of the joint material to ensure the Contractor installs the joint to the manufacturer's recommendations.
10. Surfaces that will be in contact with the membrane sealant shall be thoroughly cleaned by abrasive blasting to remove all laitance and contaminants (such as oil, curing compounds, etc.) from the surface. At a minimum, two passes of abrasive blasting with the nozzle held at an angle to within 1 to 2 inches of the surface will be required. Cleaning of the surfaces with solvents, wire brushing, or grinding shall not be permitted.
11. After abrasive blasting, but immediately prior to membrane joint installation, the entire joint contact surface shall be air blasted. The air compressor used for joint cleaning shall be equipped with trap devices capable of providing moisture-free and oil-free air at a recommended pressure of 90 psi. To obtain complete bonding with the adhesive, the adjacent surfaces must be dry and clean. The contact surfaces for the joint shall be visually inspected by the Engineer immediately prior to joint installation to verify the surface is dry and clean.
12. Individual spliced sections shall be installed as per the manufacturer's recommendations. The membrane joint sealant manufacturer shall submit a detailed installation procedure to the Engineer at least 5 days prior to joint installation for his review.
13. Traffic shall not be allowed on the joint until the bonding adhesive has had time to cure, as recommended by the manufacturer.
14. Use plywood or other material to protect concrete adjacent to the joint from spalling before any equipment is moved across the joint. Any spall areas will be repaired at the Contractor's expense by breaking out and replacing adjacent concrete, as approved by the Engineer.
15. The Membrane Sealant Expansion Joint will be measured in feet to the nearest one-tenth foot, complete in place. Measurement will be made of the overall horizontal length. The Membrane Sealant Expansion Joint will be paid for at the contract unit price per foot complete in place. Payment for this item shall be full compensation for furnishing all the required materials in place, including labor, equipment and incidentals necessary to complete the work in accordance with the plans and the foregoing specifications.



SEC. B - B

ESTIMATED QUANTITIES (For Two Approach Slabs)		
ITEM	UNIT	QUANTITY
Membrane Sealant Expansion Joint	Ft.	67.8



VIEW A - A

APPROACH SLAB JOINT DETAILS
FOR
106' - 6" PRESTRESSED GIRDER BRIDGE

32' - 0" ROADWAY — 0° SKEW
OVER SHAEFER CREEK — SEC. 08/17-T115N-R68W
STA. 21 + 34.42 TO 22 + 40.92 — P 0026(03)250
STR. NO. 30-132-080 — HL-93

HAND COUNTY
S. D. DEPT. OF TRANSPORTATION
MARCH 2018

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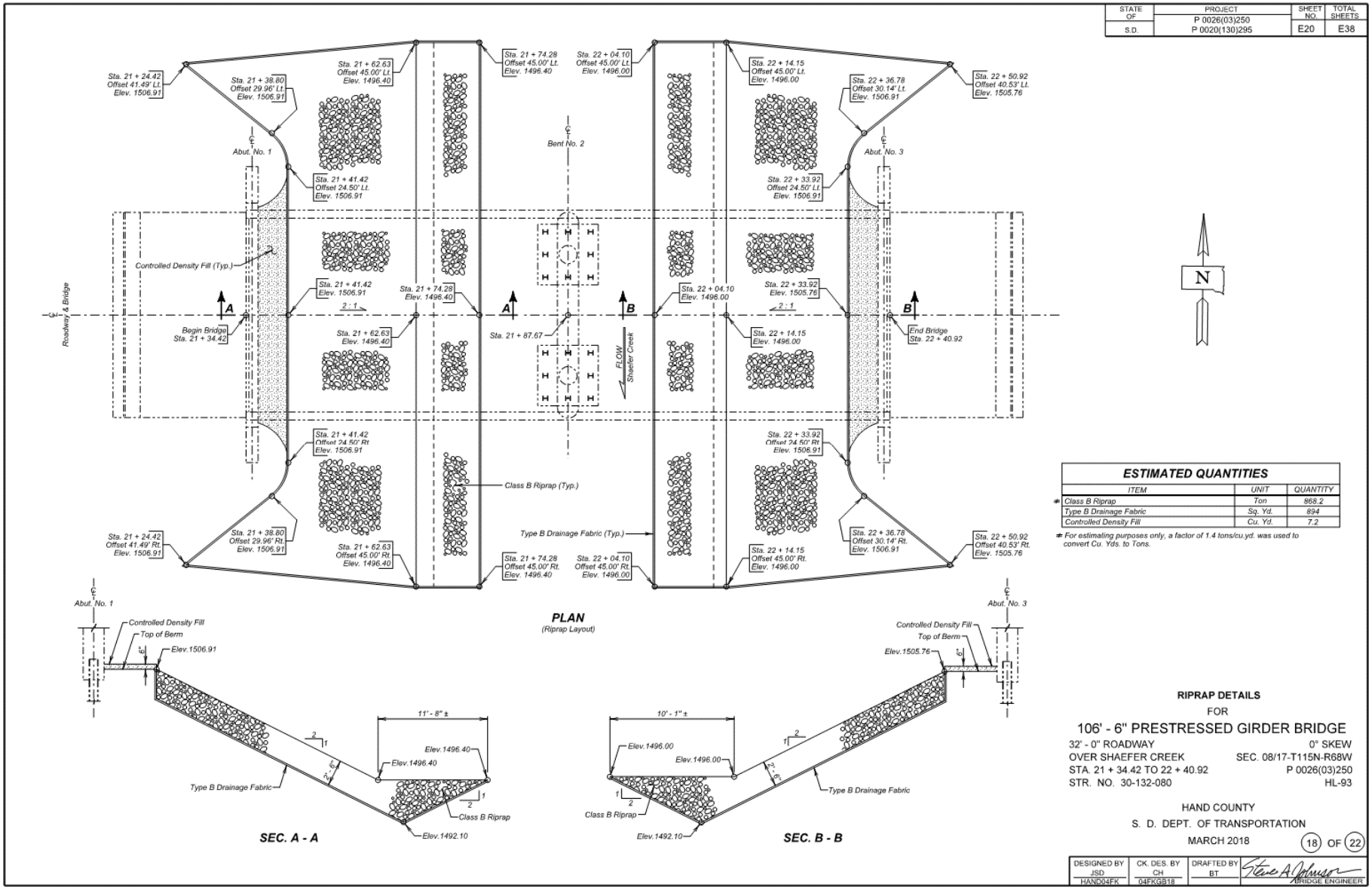
DESIGNED BY	CK. DES. BY	DRAFTED BY	
JSD HAND04FK	CH 04FKGB17	BT	BRIDGE ENGINEER

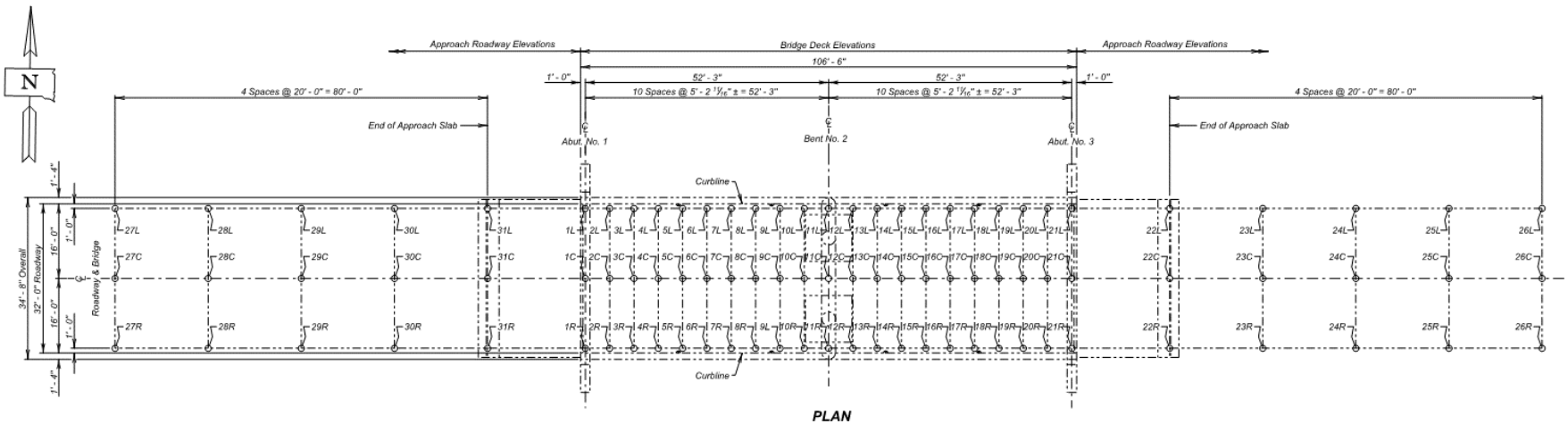
F.2.4.17. RIPRAP DETAILS



F.2.4.18. AS-BUILT ELEVATION SURVEY

The elevations shown in these plans are based on the National Geodetic Survey (NGS) North American Vertical Datum of 1988 (NAVD88).

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P 0026(03)250 P 0020(130)295	E21	E38



PLAN

Table of As-Built Elevations - Bridge Deck					
Location	Elevation	Location	Elevation	Location	Elevation
1L		1C		1R	
2L		2C		2R	
3L		3C		3R	
4L		4C		4R	
5L		5C		5R	
6L		6C		6R	
7L		7C		7R	
8L		8C		8R	
9L		9C		9R	
10L		10C		10R	
11L		11C		11R	
12L		12C		12R	
13L		13C		13R	
14L		14C		14R	
15L		15C		15R	
16L		16C		16R	
17L		17C		17R	
18L		18C		18R	
19L		19C		19R	
20L		20C		20R	
21L		21C		21R	

Table of As-Built Elevations - Approach Roadway					
Location	Elevation	Location	Elevation	Location	Elevation
22L		22C		22R	
23L		23C		23R	
24L		24C		24R	
25L		25C		25R	
26L		26C		26R	
27L		27C		27R	
28L		28C		28R	
29L		29C		29R	
30L		30C		30R	
31L		31C		31R	

Elevations - Bridge Survey Markers		
Location	Station - Offset	Elevation
Begin Bridge		
End Bridge		

ESTIMATED QUANTITIES		
ITEM	UNIT	QUANTITY
Bridge Elevation Survey	L. S.	Lump Sum

NOTE -
The Contractor shall be responsible for producing the As - Built Elevation Survey soon after construction is complete and before the bridge is opened to traffic. The As - Built Elevations of the Bridge shall be taken and recorded at the locations shown by the table on this sheet. The completed table shall be given to the Engineer who will forward a copy to the Office of Bridge Design and the Region Office.

AS - BUILT ELEVATION SURVEY
FOR
106' - 6" PRESTRESSED GIRDER BRIDGE

32' - 0" ROADWAY — 0° SKEW
OVER SHAEFER CREEK — SEC. 08/17-T115N-R68W
STA. 21 + 34.42 TO 22 + 40.92 — P 0026(03)250
STR. NO. 30-132-080 — HL-93

HAND COUNTY
S. D. DEPT. OF TRANSPORTATION
MARCH 2018

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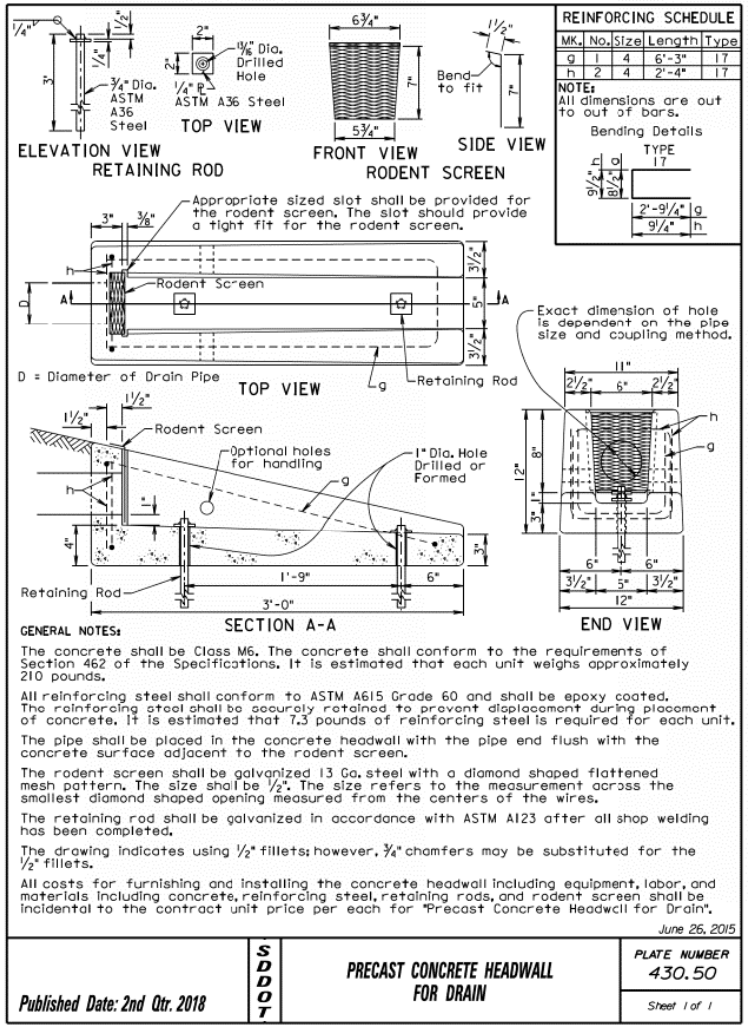
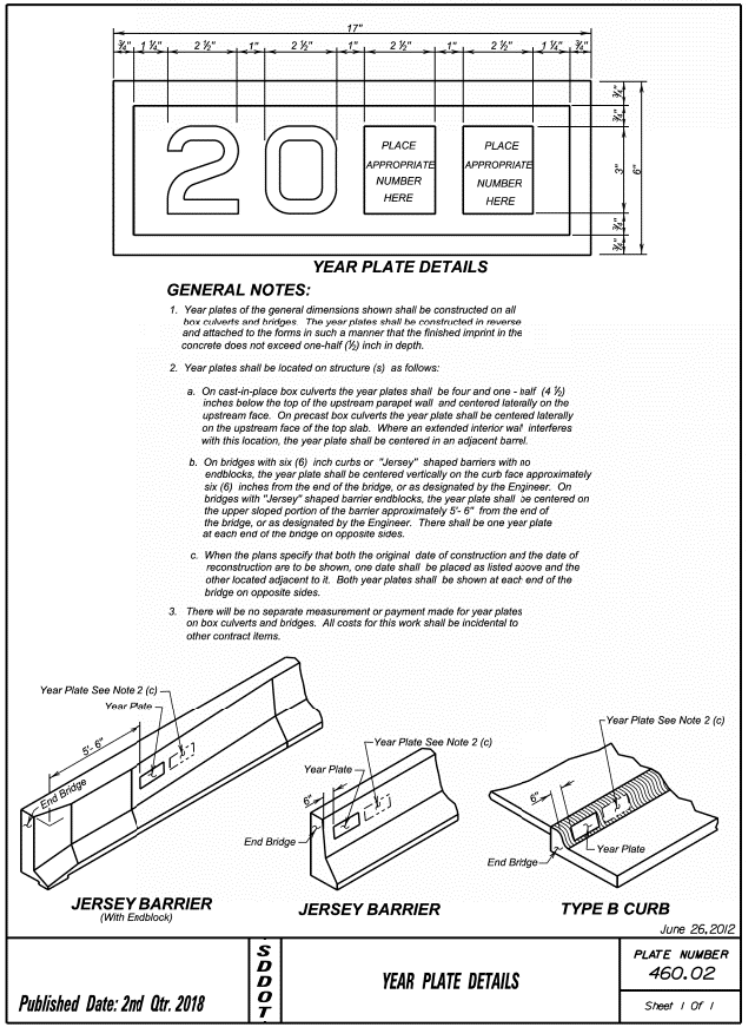
DESIGNED BY	CK. DES. BY	DRAFTED BY	
JSD HAND04FK	CH 04FKGB19	BT	BRIDGE ENGINEER

F.2.4.19. DETAILS OF STANDARD PLATE NO's 430.50 & 460.02

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P 0026(03)250 P 0020(130)295	E22	E38

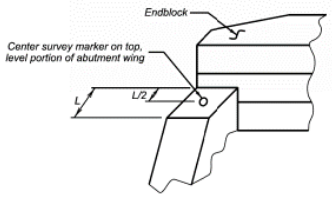




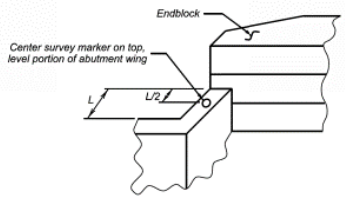
106' - 6" PRESTR. GIRDER BRIDGE
STR. NO. 30-132-080
MARCH 2018

F.2.4.20. DETAILS OF STANDARD PLATE NO's 460.05 & 510.40

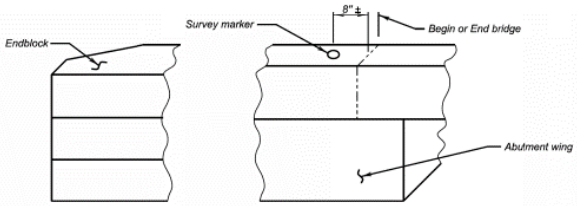
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P 0026(03)250 P 0020(130)295	E23	E38



ABUTMENT WITH "STRAIGHT" WINGS



ABUTMENT WITH "SWEPT BACK" WINGS



ABUTMENT WITH "SWEPT BACK" WINGS

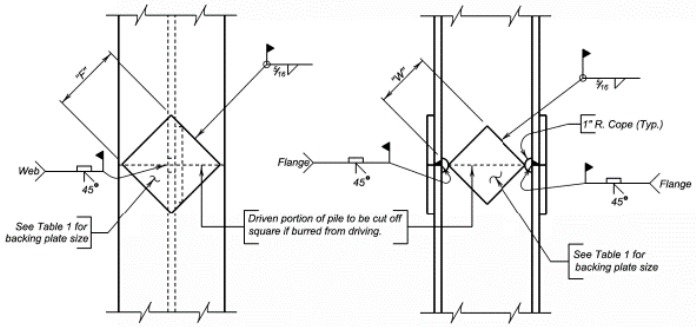
(Endblock on top of wings)

GENERAL NOTES:

1. Survey markers shall be located at each abutment on the same side of the bridge as the year plate. Place survey markers on abutment wings as shown. Two survey markers will be required at each bridge.
2. Survey markers shall be of a type intended for installation in concrete, be made of solid brass or bronze, have a domed top and be either a 3" top diameter (with a ¾" X 2" long ribbed shank), or a US Army Corps of Engineers Type C Disc with a 3 ½" top diameter.
3. There will be no separate measurement or payment made for survey markers. All costs for this work shall be incidental to the other contract items.

June 26, 2012

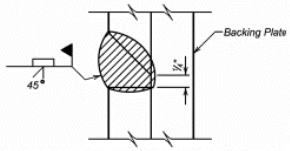
Published Date: 2nd Qtr. 2018	SDDOT	BRIDGE SURVEY MARKER	PLATE NUMBER 460.05 Sheet 1 of 1



NOTE:

Prepare joint surfaces lower end of upper section on the ground and weld on backing plates; then place upper section on lower section and weld.

COMPLETE JOINT PENETRATION WELD DETAIL



GENERAL NOTES:

1. Steel for backing plates shall conform to ASTM A709 Grade 50.
2. Welding and weld inspection shall be in conformance with AWS D1.5 (Current Year) Bridge Welding Code - Steel.
3. Welder must be certified and registered with the SDDOT.
4. Backing plate shall at a minimum be as thick as the web of the pile being spliced.
5. Web must be coped with 1 inch radius.
6. Submit Welding Procedure Specification (WPS) to Bridge Construction Engineer for approval prior to pile driving.

TABLE 1
(BACKING PLATES)

PILE	10"	12"	14"
"F" FLANGE	6 ½"	8"	10"
"W" WEB	4 ¾"	6 ¾"	7 ½"

December 23, 2012

Published Date: 2nd Qtr. 2018	SDDOT	STEEL PILE SPLICE DETAILS	PLATE NUMBER 510.40 Sheet 1 of 1

106' - 6" PRESTR. GIRDER BRIDGE
STR. NO. 30-132-080
MARCH 2018

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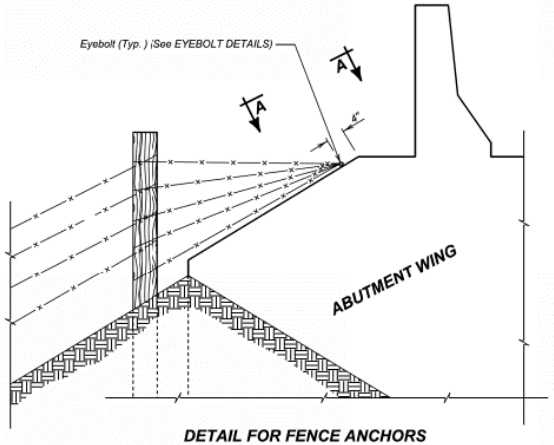
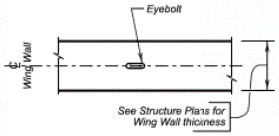
F.2.4.21. DETAILS OF STANDARD PLATE NO's 620.19 & 630.92

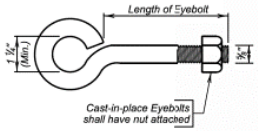
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P 0026(03)250 P 0020(130)295	E24	E38



DETAIL FOR FENCE ANCHORS



VIEW A - A



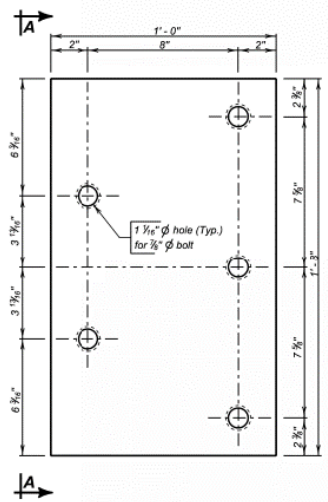
EYEBOLT DETAILS

GENERAL NOTES:

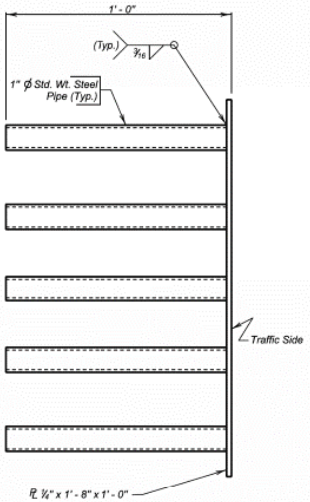
1. The fence and post details shown are for illustrative purpose only. The fence shall be as specified elsewhere in the plans.
2. Eyebolts shall be placed on all of the bridge abutment wings.
3. Eyebolts shall be ⅝ inch diameter and shall conform to ASTM A307.
4. Eyebolts, nuts, and concrete inserts shall be galvanized in accordance with AASHTO M232 (ASTM A153). Concrete inserts of corrosion resistant material need not be galvanized.
5. Cast-in-place eyebolts shall have a nut attached, be 4 ½ inches (Min.) in length and shall be embedded such that the eye of the bolt is flush with the concrete surface. (See Eyebolt Details) As an alternate, cast-in-place concrete inserts, capable of developing the full strength of the ⅝ inch diameter threaded eyebolt, may be used and shall be set in the concrete in accordance with the manufacturer's recommendations. The eyebolt shall be of sufficient length to develop its full strength. The eye of the eyebolt shall be flush with the concrete surface.
6. The cost for furnishing and installing eyebolts and/or concrete inserts shall be incidental to various contract items.

December 23, 2012

Published Date: 2nd Qtr. 2018	SDDOT	FENCE ANCHORS FOR BRIDGE ABUTMENT WINGS (WINGS 6' AND SHORTER)	PLATE NUMBER 620.18 Sheet 1 of 1



ELEVATION



VIEW A - A

GENERAL NOTES:

1. Steel plate for the insert assembly shall conform to ASTM A709 Grade 36. The steel pipes shall conform to ASTM A53 or ASTM A500 Grade B.
2. Welding and weld inspection shall be in conformance with AWS D1.1 - (Current Year) Structural Welding Code - Steel.
3. After fabrication, galvanize in accordance with AASHTO M111 (ASTM A123).
4. Bolts, nuts, and washers shall be provided with each assembly. Bolts shall be galvanized and conform to the requirements of ASTM A307, A325, or A449. Plain washers shall be galvanized and conform to ASTM F844.
5. Bolt heads shall be placed on the traffic side of the endblock. Bolt projection at the back side of the insert shall not exceed 1 inch beyond the nut.
6. The cost of the 5 bolt insert plate assembly complete in place including welding and galvanizing shall be incidental to the contract unit price per Cubic Yard for " Class A45 Concrete, Miscellaneous ", " Class A45 Concrete, Bridge Deck ", or " Class A45 Concrete, Bridge Repair ", as applicable.

December 23, 2013

Published Date: 2nd Qtr. 2018	SDDOT	5 BOLT INSERT PLATE ASSEMBLY	PLATE NUMBER 630.92 Sheet 1 of 1

106' - 6" PRESTR. GIRDER BRIDGE
STR. NO. 30-132-080
MARCH 2018

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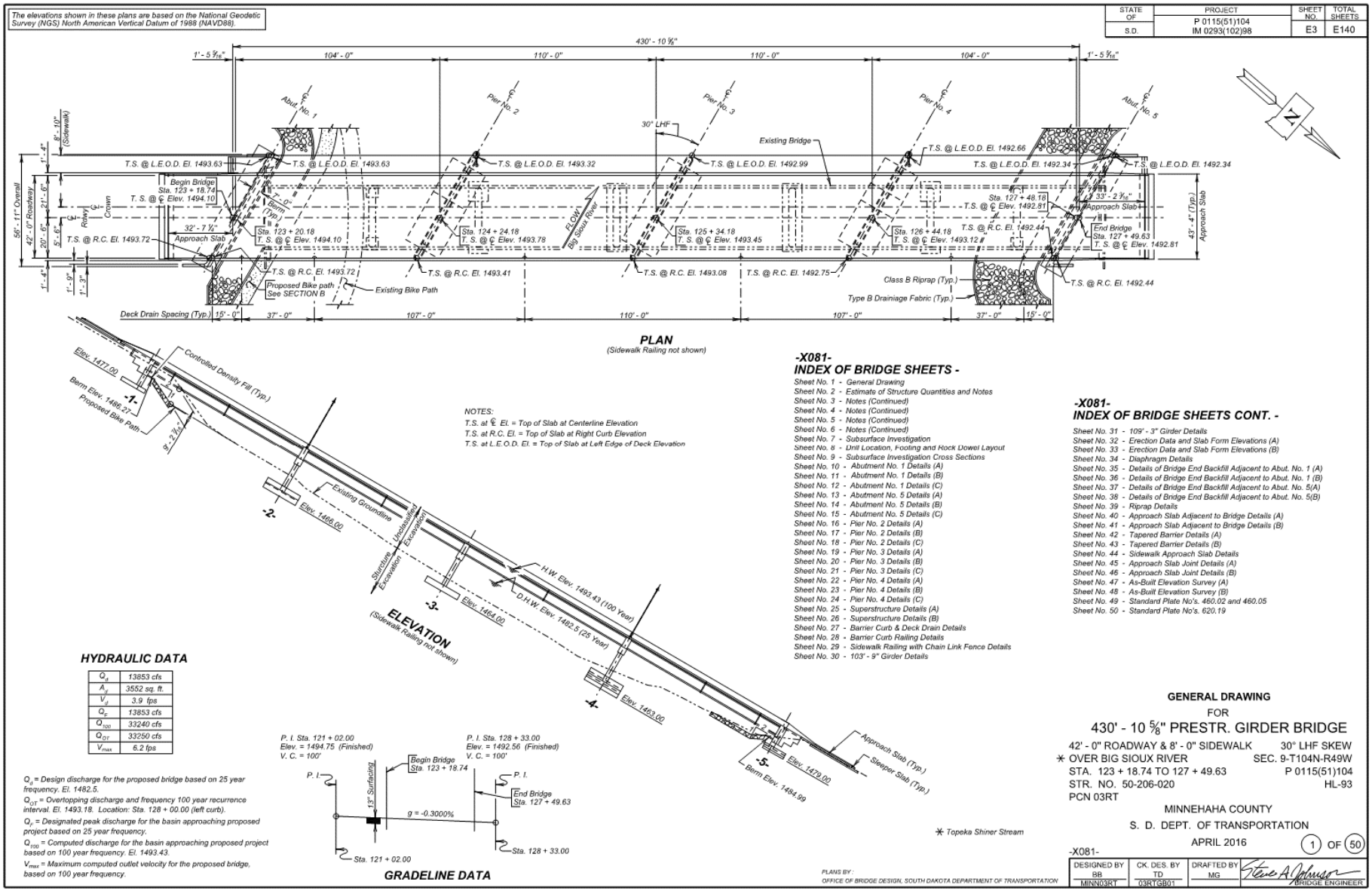
F.2.5. Skewed Prestressed Girder Bridge Plans

F.2.5.1. GENERAL DRAWING



F.2.5.2. ESTIMATE OF STRUCTURE QUANTITIES & NOTES

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P 0115(51)104 IM 0293(102)98	E4	E140

ESTIMATE OF STRUCTURE QUANTITIES

DESCRIPTION	QUANTITY	UNIT	REMARKS
Bridge Elevation Survey	Lump Sum	LS	
Concrete Penetrating Sealer	2417.2	SqYd	See Special Provision
Incidental Work, Structure	Lump Sum	LS	
Base Course	3278.6	Ton	
Structural Steel, Miscellaneous	Lump Sum	LS	
Membrane Sealant Expansion Joint	104	Ft	
Structure Excavation, Bridge	1541	Cu Yd	
Bridge End Embankment	1215	Cu Yd	
Granular Bridge End Backfill	145.6	Cu Yd	
Class A45 Concrete, Bridge Deck	809.0	Cu Yd	
Class A45 Concrete, Bridge	837.3	Cu Yd	
Concrete Approach Slab for Bridge	325.0	Sq Yd	
Concrete Approach Sleeper Slab for Bridge	69.9	Sq Yd	
Install Dowel in Concrete	648	Ea.	
Install Dowel in Rock	277.5	Ft	
Deck Drain, Girder Bridge	6	Ea.	
Controlled Density Fill	9.3	Cu Yd	
Steel Pedestrian Railing on Sidewalk	452.7	Ft	
Steel Pedestrian Railing on Concrete Barrier	429.0	Ft	
Reinforcing Steel	145060.0	Lb	
Epoxy Coated Reinforcing Steel	179694.0	Lb	
No. 4 Rebar Splice	14	Ea.	
No. 7 Rebar Splice	112	Ea.	
54" Minnesota Shape Prestressed Concrete Beam	2982	Ft	
Chain Link Fence for Bridge Sidewalk	453	Ft	
6" reinforced Concrete Sidewalk	302	Sq Ft	
4" Underdrain Pipe	213	Ft	
Porous Backfill	32.6	Ton	
Class B Riprap	850.8	Ton	
Type B Drainage Fabric	1073	Sq Yd	
Geogrid Reinforcement	1640	Sq Yd	
Waterproofing Membrane for Structure	248	Sq Ft	

SPECIFICATIONS FOR BRIDGE

1. Design Specifications: AASHTO LRFD Bridge Design Specifications, 2014 Edition with 2015 and 2016 interims.
2. Construction Specifications: South Dakota Standard Specifications for Roads and Bridges, 2015 Edition and required provisions, supplemental specifications, and special provisions as included in the proposal.

BRIDGE DESIGN LOADING

1. AASHTO HL-93.
2. Dead Load includes 22 psf for future wearing surface on the roadway.

DESIGN MATERIAL STRENGTHS*

Concrete $f'c$ = 4,500 psi
Reinforcing Steel f_y = 60,000 psi

*For prestressed beams, see notes regarding Prestressed Girders.

GENERAL CONSTRUCTION

1. All mild reinforcing steel shall conform to ASTM A615, Grade 60.
2. All exposed concrete corners and edges shall be chamfered 3/4" unless noted otherwise.
3. Use 2" clear cover on all reinforcing steel except as shown.
4. Contractor shall imprint on the structure the date of new construction as specified and detailed on Standard Plate No. 460.02.
5. Barrier Curbs shall be built normal to the grade.
6. Request for construction joints or resteel splices at points other than those shown, must be submitted to the Engineer for prior approval. If additional splices are approved, no payment will be allowed for the added quantity of resteel.
7. The elevation of the bridge deck is 13" above subgrade elevation.

INCIDENTAL WORK, STRUCTURE

1. In place centerline Sta. 123+35.00 to centerline Sta. 127+62.50 is a 427.5' 7 span I-Beam Viaduct bridge with a 30'-0" clear roadway. The superstructure consists of a Steel I-Beams supporting a reinforced concrete slab with steel channel railing faced with steel Thrie beam continuous across the bridge. The deck has been overlaid with 0.37 inches of rubberized asphalt chip seal. The substructure consists of six 2 column reinforced concrete bents with web walls and reinforced concrete sill type abutments on 6 concrete columns, all of which are supported on spread footings on rock.
2. Break down and remove the existing bridge, and approach/sleeper slabs if applicable, to the top of rock elevation, or as required to construct the new structure in accordance with Section 110 of the Specifications. All portions of the existing bridge shall be removed and disposed of by the Contractor on a site obtained by the Contractor and approved by the Engineer in accordance with the Environmental Commitments found in Section A.
3. During demolition of the structure, efforts shall be taken to prevent material from falling into the river. Under no circumstances is asphalt allowed to fall into the river.
4. The foregoing is a general description of the in-place bridge and should not be construed to be complete in all details. Before preparing the bid it shall be the responsibility of the Contractor to make a visual inspection of the structure to verify the extent of the work and materials involved. If desired by the Contractor, a copy of the original construction plans may be obtained through the Office of Bridge Design.

NOTICE - LEAD BASED PAINT

Be advised that the paint on the steel surfaces of the existing structure contains lead. The Contractor should plan his/her operations accordingly, and inform his/her employees of the hazards of lead exposure.

DESIGN MIX OF CONCRETE

1. All structural concrete shall be Class A45 unless otherwise indicated.
2. Type II cement is required, except Type III may be used for the prestressed beams.
3. Grout design mix shall be as specified in Section 460.2 K of the Specifications. A compressive strength of 2000 psi shall be attained by the grout prior to erection of any beams. Chamfer edges of grout pads ¾". The quantity of grout is included in and shall be paid for at the contract unit price per cubic yard for Class A45 Concrete, Bridge.

ABUTMENTS

1. The bridge ends shall not be backfilled beyond the expansion joint until the deck concrete has attained a strength of 1200 psi when controlled by test, or 36 to 48 hours, and determined by the Engineer when controlled by time.
2. Backfill placed around the abutment backwalls shall be placed adjacent to both sides (front and back face) to approximately the same elevation at the same time to the berm elevation. Both abutments shall be backfilled simultaneously.
3. Abutments shall not be cast until slab form elevations have been completed and approved by the Bridge Construction Engineer.

ABUTMENT BACKWALL COATING

The material for waterproofing the abutment backwall shall be one of the products from the approved products list. The acceptable abutment backwall coating suppliers are listed on the approved products list at the following Internet address:

http://apps.sd.gov/applications/HC6CApprovedProducts/ProductList.aspx

The cost of furnishing and applying the coating shall be incidental to the contract unit price per cubic yard for Class A45 Concrete, Bridge.

ESTIMATE OF STRUCTURE QUANTITIES AND NOTES
FOR
430' - 10 ⅝" PRESTR. GIRDER BRIDGE

STR. NO. 50-206-020
APRIL 2016

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DESIGNED BY	CK. DES. BY	DRAFTED BY	
BB MINN03RT	TD 03RTGB02	BT	BRIDGE ENGINEER

F.2.5.3. NOTES (CONTINUED)

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P 0115(51)104 IM 0293(102)98	E5	E140

WATERPROOFING MEMBRANE

1. A 24" wide waterproofing membrane shall be used to seal the abutment backwall at the locations shown in the plans.

2. The waterproofing membrane shall consist of two layers of rubberized mastic, a backing layer of woven polypropylene and an outside layer of impervious polyethylene similar to Mar Mac Seal Wrap or an approved equal. Mar Mac Seal Wrap is manufactured by the following company:

   Mar Mac Construction Products Co., Inc.
   PO Box 447 McBee SC 29101
   Lee Murph Customer Service
   Phone: (877) 962-7622
   Company Phone: (843) 335-5814
   Fax: (843) 335-5909
   Website: www.marmac.com

3. The materials for the waterproofing membrane shall meet the following properties:

   a. Rubberized Mastic:

	Minimum	Maximum
Ash-inert matter, %	80	15
Volatiles, %	0.1	2
Softening Temp., min, F	175	-
Specific gravity	0.95	1.05
Penetration, dmm	60	90
Flow, mm	10	10

   b. Reinforcing Mesh Element:

Tensile strength min, lb., in.	D1682 Warp 75 Fill 75
Elongation at break, min, %	Warp 20 Fill 20

   c. Polyethylene Backing:

Tensile strength, min, psi	4000	D882, Method A
Elongation at break, min %	100	D882, Method A
Tear resistance, min psi	1500	D624, Die C
Water absorption, max %	0.01	D570

4. Field measurement for Waterproofing Membrane for Structure will not be made. The plan quantity will be the quantity accepted for payment.

5. Waterproofing Membrane for Structure shall be paid for at the contract unit price per square foot. Payment shall be full compensation for labor, equipment, materials and incidentals for furnishing and installing the waterproofing membrane.

SPREAD FOOTING ON ROCK AT ABUTMENTS AND PIERS

1. The rock surface shall be cleaned of all soil and debris prior to placing rock dowels and reinforcing steel for the spread footing. Cleaning shall be accomplished by water washing and/or air jetting. Material washed from the rock surface shall be directed into a sump or low area and physically removed from the exposed rock surface. The Geotechnical Engineer shall be contacted, once the rock has been cleaned, so that the rock may be inspected for condition and soundness.

2. If upon inspection, the Geotechnical Engineer determines that the material at the plan shown footing elevation is unsuitable for foundation support or if sound bedrock is encountered at an elevation other than the plan shown footing elevation, the Engineer shall order the footing elevation changed to an elevation approved by the Geotechnical Engineer. If the footing elevations are changed, the Office of Bridge Design shall be contacted prior to proceeding with construction to determine if a redesign of the substructure unit is required. If a redesign is required, a maximum of 5 working days may be required to perform this design. Any costs associated to delays within the 5 working day period for redesign shall be borne by the contractor at no additional cost to the State.

3. If the footing elevations are lowered due to bedrock conditions, the excavation below the plan shown footing elevation ordered by the Engineer will be paid for at the contract unit price per cubic yard for Structure Excavation, Bridge. The additional concrete and reinforcing steel required for construction will be paid for at the contract unit price per cubic yard for Class A45 Concrete, Bridge and contract unit price per pound for Reinforcing Steel, respectively.

4. The cost of cleaning the rock shall be included in the contract unit price per cubic yard for Structure Excavation, Bridge. Payment shall be considered full compensation for all materials, labor equipment and incidentals necessary to satisfactorily complete the work.

5. Due to the possibility of variance in the final elevations for the footings, the reinforcing steel in the abutments and piers shall not be ordered until final footing elevations have been approved by the Geotechnical Engineer.

COFFERDAMS

1. It is anticipated that cofferdams will be necessary at pier locations. Cofferdams shall be designed and constructed in accordance with Section 423 of the Specifications. Due to the irregular surface of the bedrock, additional effort will be required to seal the cofferdam.

2. The design of the Cofferdam must be done by Professional Engineers registered in South Dakota. Sealed calculations of both the original design and design check, performed by different engineers, shall be submitted with the cofferdam plans. The cofferdam plans, design, and check design shall be submitted to the Office of Bridge Design a minimum of 15 days prior to Cofferdam construction.

ROCK DOWELS

1. The steel dowels shall be deformed bars conforming to ASTM A615 Grade 60.

2. Following the engineering evaluation of the foundation rock, the Engineer may order the number of dowels and/or spacing to be increased or decreased in accordance with the Geotechnical Engineer's recommendations. Increases or decreases in quantity shall be at the contract unit price per foot for Install Dowel in Rock.

3. The steel dowel for use with the item Install Dowel in Rock is included in the Reinforcing Schedule and shall be paid for at the contract unit price per pound for Reinforcing Steel.

4. Dowel bond material shall be a fast set polyester resin rock anchoring system in a 40 mm (minimum) capsule from one of the following manufacturers: Dywidag Systems International (Fasloc), Minova (Lokset), Williams Form Engineering Corp. The resin shall be suitable for bonding steel dowel bars to rock in the existing moisture conditions. The diameter of the hole, drilled into the rock, shall be a maximum of 3/8 inch larger than the diameter of the steel dowel, or as specified by the dowel bond material manufacturer. The drilled holes shall be blown out with compressed air using a device that will reach the bottom of the hole to ensure that all debris or loose material has been removed prior to epoxy injection. The Contractor shall submit dowel bonding material product data and installation plan to the Engineer for approval.

5. Install Dowel in Rock shall not be measured unless a change is ordered. Payment shall be for the lineal foot of embedment into the rock, and shall be considered full compensation for all materials, labor, equipment and incidentals necessary to satisfactorily complete the work.

NOTES (CONTINUED)
FOR
430' - 10 5/8" PRESTR. GIRDER BRIDGE

STR. NO. 50-206-020
APRIL 2016

3 OF 50

DESIGNED BY	CK. DES. BY	DRAFTED BY	
BB MINN03RT	TD 03RTGB03	BT	Steve A Johnson BRIDGE ENGINEER

F.2.5.4. NOTES (CONTINUED)

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P 0115(51)104 IM 0293(102)98	E6	E140

2" RIGID GALVANIZED STEEL CONDUIT

1. Anchor rods and bolting pattern for luminaire REL2 and REL3 to be mounted on Pier 2 and Pier 4 of the bridge shall be obtained and supplied by the Contractor to the Bridge Contractor as indicated in Section L of the plans. Payment for installing the anchor rods shall be incidental to the contract unit price per cubic yard for Class A45 Concrete, Bridge Deck
2. The 2" rigid galvanized steel conduit for Luminaire REL2 and REL3 shall be placed under the Bridge Deck and over the Pier by the Bridge Contractor as shown in the plans

SUPERSTRUCTURE

1. Girder lifting hooks shall be cut off before placement of concrete deck slab.
2. The diaphragms at the piers shall be poured integrally with the deck slab. Placement of diaphragms at the piers shall not slow down the rate of deck concrete placement and finishing. The Contractor shall place the concrete for the specified diaphragms ahead of the deck concrete in such a manner that advancement of the deck concrete reaches the diaphragm just as placement of concrete in the diaphragm is complete.
3. The deck-finishing machine shall be adjusted and operated in such a manner that the roller screed or screeds are parallel with the centerline of the bridge and the finish machine is parallel to the skew of the bridge. Concrete placement in front of the finish machine shall be kept parallel to the machine.
4. The bridge deck must be placed and finished continuously at a minimum rate of 55 ft. of deck per hour measured along Centerline Roadway. This rate is exclusive of concrete placed in the diaphragms. (See note 2 above.) If concrete cannot be placed and finished at this rate, the Engineer shall order a header installed and operations stopped. Notify the Bridge Construction Engineer if deck pour operations are stopped. Operations may resume only when the Engineer is satisfied that a rate of 55 ft. of deck per hour can be achieved and the concrete in the previous pour has attained a minimum compressive strength of 2000 psi.
5. Snap ties, if used in the barrier curb formwork, shall be epoxy coated. The epoxy coating shall be inert in concrete and compatible with the coating applied to the new epoxy coated reinforcing steel.
6. See Special Provision for Concrete Penetrating Sealer
7. The ¼" diameter concrete inserts for conduit clamps shall be commercially available inserts threaded for use with a galvanized ¼" diameter A307 bolt. The insets shall be capable of developing the strength of A307 bolt and shall be galvanized or stainless steel. The cost of furnishing and installing the inserts and the 2" diameter galvanized conduit in the barrier curb shall be incidental to the contract unit price per cubic yard for class A45 Concrete, Bridge Deck.

PRESTRESSED GIRDERS

3. Minimum concrete compressive strength f'c = 8500 psi at 28 days for all girders, f'ci = 7000 psi for all Girders.
4. All mild reinforcing steel shall be deformed bars conforming to ASTM A615, Grade 60.
5. Individual tendons in all pretensioned sections shall consist of seven wire uncoated Type 270K Strands having a nominal diameter of 0.6" and a minimum ultimate strength of 58600 lbs. per cable. An initial tensile force of 43500 lbs. shall be applied to all 0.6" cables in all girders. All prestressing steel shall conform to AASHTO M203. (low lax strands).
6. All prestressed girders within a span shall be cast within an 8 day period. If not, the newest girder shall be at least 6 weeks old before the deck slab is poured. The girders shall be poured in all steel forms.
7. Prestressed concrete girders shall always be lifted by the devices provided in the top flanges near the ends of the girders. Types of lifting devices other than those shown on the plans may be used provided they are approved by the Office of Bridge Design. The design of the lifting devices shall be the responsibility of the Fabricator.
8. Each beam shall be marked showing structure number, casting date, and beam number. Marking shall be on the face of the beam near the end and so located that they will be exposed after the diaphragms have been cast. Facia beams shall be marked on an inside face. All markings shall be stenciled and clearly legible. For beam designations and locations, see Erection Data and Slab Form Elevations (A) sheet.
9. The physical properties of the elastomeric bearing pads shall conform to the requirements of Section 18.2 of the AASHTO LFRD Bridge Construction Specification and the AASHTO Materials Specification M251. The elastomeric bearing pads shall conform to Grade 60 (durometer). The cost of the pads shall be incidental to the contract unit price per cubic yard for Class A45 Concrete, Bridge. Certification that pads are 60 durometer and meet the requirements of AASHTO LFRD Bridge Construction Specification Section 18.2 and AASHTO Materials Specification M251 shall be furnished to the Engineer with the shop drawings. No laminated bearing pads will be allowed.
10. All exposed corners shall be chamfered 3/4" or rounded to 3/4" radius.
11. Dead Load of girder taken as effective at transfer. Cut strands, except those extended and bent, flush with end of girder and coat end of strands with mortar.
12. The Contractor shall be responsible for ensuring that transportation stresses, handling and erection do not cause damage to the girders.
13. Furnish and Install Inserts for T8 Rebars as shown in the plans. All costs involved shall be incidental to the contract unit price per foot of girder.

DECK DRAINS

1. Deck Drains shall be 4" diameter x 5'-8" Fiberglass Pipe conforming to the requirements of ASTM - D2996.
2. The Fiberglass Pipe Sleeve can be made from a 4 inch diameter Fiberglass Pipe Fitting. It shall be attached to the 4 inch diameter Fiberglass Pipe, as shown in the plans, per the manufacturer's recommendation.
3. All fiberglass pipe and pipe fittings shall be handled and installed according to the guidelines and procedures recommended by the manufacturer. Pipe, pipe fittings, and adhesive must be from the same manufacturer.
4. Use fiberglass wear pads to protect against contact with supports or U-bolts.
5. The 1/2 inch diameter U-bolts, nuts and washers shall conform to ASTM A307 Grade 36 and shall be galvanized in accordance with ASTM F2329.
6. The deck drain to girder connection as shown in the plans allows the deck drain location to be adjusted slightly to clear transverse slab steel.
7. All fiberglass pipes and pipe fittings shall use pigmented resin throughout the wall. The color shall be an approved gray (Federal Standard 595B Color 26622).
8. Steel for the bent plates and washers shall conform to ASTM A709 Grade 36 and shall be galvanized in accordance with ASTM A123. Washers shall be plate washers or a continuous bar at least 5/16" thick with standard holes and shall have a size sufficient to completely cover the slot after installation.
9. The ½ inch diameter bolts and nuts shall conform to ASTM A307 and shall be galvanized in accordance with ASTM F2329 or ASTM A153 as applicable.
10. The ½ inch diameter concrete inserts shall be capable of developing the strength of the A307 bolts and shall be galvanized.
11. Maintain 2" clear cover between the back of the concrete inserts and the adjacent girder web.
12. Payment for deck drains shall be at the contract unit price per each for Deck Drain, Girder Bridge, and shall be full compensation for furnishing, fabricating, and installing the deck drains and all attaching hardware in accordance with the plans and specifications.

NOTES (CONTINUED)
FOR
430' - 10 ⅝" PRESTR. GIRDER BRIDGE

STR. NO. 50-206-020
APRIL 2016

4 OF 50

DESIGNED BY	CK. DES. BY	DRAFTED BY	
BB MINN03RT	TD 03RTGB04	BT	Steve A Johnson BRIDGE ENGINEER

F.2.5.5. NOTES (CONTINUED)

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P 0115(51)104 IM 0293(102)98	E7	E140

BOLT TESTING

The certified mill test reports for all bolts used on the project shall include the test results for all of the testing specified in Section 972.2 D of the Specifications. Some of these tests are supplemental tests that must be requested at the time the bolts are ordered. It is the responsibility of the Contractor to notify the bolt supplier of these requirements.

FALSEWORK

The Contractor shall be required to include with the Falsework Plans, details for the construction of an adequate "Walk-Way" including railing.

FALL PROTECTION

1. The Contractor shall install a Fall Protection System conforming to OSHA Regulations. When working on the girders prior to decking installation, a Horizontal Lifeline – or other OSHA approved system shall be installed. The Contractor shall have one Personal Fall Arrest System (PFAS) available for use by a Department Inspector. The PFAS shall be compatible with the installed Fall Protection System.

2. Modifications to any bridge components used to accommodate the Fall Protection System shall be shown on the Falsework Plans and/or the appropriate Shop Plans. Field welding to bridge components will not be allowed. Field placed concrete inserts or drilled-in anchor bolts will be allowed if approved by the Engineer. All costs associated with providing the Fall Protection System shall be incidental to the other contract items.

CLASS B COMMERCIAL TEXTURE FINISH

1. A Class B commercial texture finish shall be applied to the following areas:

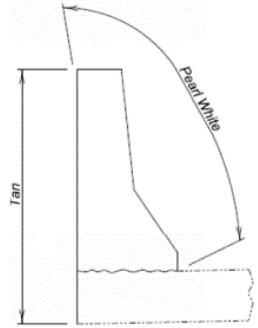
   a. ***Abutments:** all exposed surfaces to an elevation 1-foot below finished ground line.
   b. **Barrier Rail:** all exposed surfaces (**front, **top and *back).
   c. ***Slab:** edge of slab.
   d. ***Girder:** Outside face of facia girders.
   e. ***Piers:** All exposed surfaces.

   * Color shall be tan
   ** Color shall be Pearl White

2. The Class B commercial texture finish shall be applied in accordance with Section 460.3 L.1.c of the Specifications.

3. Where the Class B commercial texture finish is to be applied, concrete curing shall be accomplished with cotton or burlap mats and polyethylene sheeting. Curing shall continue for not less than seven days after placing concrete before the commercial texture finish is applied. The commercial texture finish shall be applied in accordance with the manufacturer's recommendations. The commercial texture finish itself does not require a specific cure except for drying.

4. The cost of the Class B Commercial Texture Finish applied to the fascia girders shall be incidental to the contract unit price per cubic yard for Class A45 Concrete, Bridge Deck.



STEEL RAILING - SIDEWALK

1. All rail and chain link fence posts shall be built vertical.

2. All structural steel parts for railing shall conform to ASTM A500, Grade B. Material less than ¼" thick may be ASTM A1011, Grade 36. Rail post base plates shall conform to ASTM A709, Grade 36.

3. All anchor bolts and nuts for railing shall conform to ASTM A307. Washers shall conform to ASTM F436 and all components shall be galvanized in accordance with ASTM A153 or ASTM F2329, as applicable. The bolts shall be hex head "structural" type with heavy hex nuts and round washers.

4. All anchor bolts shall be tightened to a torque of 120 ft.-lbs. (approximated without the use of a calibrated torque wrench).

5. The non-shrink grout used to fill the recess beneath the rail post base plates shall be a commercially available non-shrink grout containing no metallic particles and capable of attaining a 28 day compressive strength of 3000 psi. The non-shrink grout shall be mixed according to the manufacturer's recommendations. The cost of furnishing and placing the non-shrink grout shall be incidental to the contract unit price per foot for Steel Pedestrian Railing on Sidewalk.

6. All steel railing shall be painted in accordance with Section 411 of the Specifications and the color shall be an approved brown (Federal Standard 595B Color 30045).

7. Welding & Weld Inspection shall be done in accordance with the current edition of AWS D1.1 Structural Welding Code-Steel.

8. The costs of structural steel, welding, weld inspection, painting and galvanizing shall be incidental to the contract unit price per foot for Steel Pedestrian Railing on Sidewalk and Steel Pedestrian Railing on Concrete Barrier.

CHAIN LINK FENCE

1. The chain link fence fabric and supports shall conform to Section 930 of the Specifications as modified by the following notes.

2. The chain link fence fabric, wire ties and miscellaneous hardware shall be galvanized and conform to AASHTO M181. The fence fabric shall be Type IV 9 gauge wire woven in a 2 inch diamond mesh. Knuckled selvage shall be used on the top and bottom of the fence fabric.

3. A brown (Federal Standard 595B Color 30045) thermally extruded polyvinyl coating shall be applied to the fence fabric, wire ties and all miscellaneous hardware.

4. The item Chain Link Fence for Bridge Sidewalk shall be paid for by the linear foot. This payment shall be full compensation for furnishing all material, labor, tools and equipment necessary or incidental to the construction of the chain link fence including chain link fence fabric, wire ties, miscellaneous hardware, painting and welding, all to satisfactorily complete this work.

NOTES (CONTINUED)
FOR
430' - 10 ⅝" PRESTR. GIRDER BRIDGE

STR. NO. 50-206-020
APRIL 2016

5 OF 50

DESIGNED BY	CK. DES. BY	DRAFTED BY	
BB MINN03RT	TD 03RTGB05	BT	BRIDGE ENGINEER

F.2.5.6. NOTES (CONTINUED)

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P 0115(51)104 IM 0293(102)98	E8	E140

APPROACH SLABS

1. Sleeper slab riser shall be cast with the approach slab or cast after the approach slab is placed. Care shall be taken to ensure the correct grade is maintained across the joint.

2. The portion of the sleeper slab below the construction joint may be precast. If the bottom portion of the sleeper slab is precast, the Contractor shall submit proposed lifting and setting plans to the Bridge Construction Engineer for approval. In addition, if reinforcing or other details differ from those shown in the plans, the Contractor shall submit proposed alternate details for approval.

3. The use of an approved finishing machine will be required during placement of Class A45 Concrete for the approach slabs. Concrete placement in front of the machine shall be kept parallel to the screed.

4. The concrete in the approach slab shall be tined normal or parallel to centerline roadway.

5. Concrete Approach Sleeper Slab for Bridge, whether cast-in-place or precast, will be paid for at the contract unit price per square yard. This payment shall be full compensation for all excavation, furnishing, hauling, and placing all materials including concrete and reinforcing steel; for disposal of all excavated material and surplus materials; and for labor, tools, equipment and any incidentals necessary to complete this item of work.

6. Concrete Approach Slab for Bridge will be paid for at the contract unit price per square yard. This payment shall be full compensation for all excavation, furnishing, hauling and placing all materials including concrete, asphalt paint or 4 mil polyethylene sheeting, elastic joint sealer and reinforcing steel; for disposal of all excavated material and surplus materials and for labor, tools, equipment and any incidentals necessary to complete this item of work.

AS - BUILT ELEVATION SURVEY

The Contractor shall be responsible for recording the As-built deck elevations and bridge survey marker elevations at the locations shown in the Table of As-Built Elevations shown in the plans. All costs associated with obtaining the elevations including all equipment, labor and any incidentals required shall be incidental to the contract lump sum price for Bridge Elevation Survey.

SIDEWALK APPROACH SLABS

1. The reinforced concrete sidewalks adjacent to the bridge shall be paid for at the contract unit price per square foot for 6" Reinforced Concrete Sidewalk. This payment will be full compensation for all excavation, furnishing, hauling and placing all materials including concrete, epoxy coated reinforcing steel, asphalt paint or 4 mil polyethylene sheeting, hot poured elastic joint sealer; for disposal of all excavated and surplus materials; and for all labor, tools, equipment and incidentals necessary to complete this item of work.

2. The top of the sidewalk shall transition from the end of the bridge to the top of approach slab curb at the sidewalk expansion device.

3. All costs involved in furnishing and placing the sidewalk sleeper slabs shall be included in the contract unit price per square foot for 6" Reinforced Concrete Sidewalk.

INSTALLING DOWELS FOR BARRIER CURBS

1. The epoxy resin mixture shall be of a type of bonding steel to hardened concrete and shall conform to AASHTO M235 Type IV (Equivalent to ASTM C881 Type IV).

2. The bridge deck shall have been wet cured for a minimum of 7 days prior to starting any drilling operations. The diameter of the drilled holes shall not be less than 1/8 inch greater, nor more than 3/8 inch greater than the diameter of the dowels or as per Manufacturer's recommendations. Use compressed air or other techniques to insure that the hole is free of any loose material before epoxy resin is applied.

4. Holes drilled in the existing concrete shall be true and normal or as shown in the plans. Care shall be taken not to damage the existing reinforcing steel or spall the bottom of the bridge deck during drilling operations. It is likely that some of the existing reinforcing steel shown in the plans may have been placed out of position during construction. Therefore, prior to the start of drilling any holes, an effort will be made by Department forces to mark on the concrete surface, where practical, any locations of in-place reinforcing steel. In spite of this precaution, the Contractor can still expect to encounter reinforcing steel which will require shifting of the dowel spacing, as approved by the Engineer, to miss the existing reinforcing steel.

5. No loads shall be applied to the epoxy grouted dowel bars until the epoxy resin has had sufficient time to cure as specified by the epoxy resin Manufacturer.

6. Mix the epoxy resin as recommended by the Manufacturer and apply an injection method as approved by the Engineer. Fill the holes from the bottom up 1/3 to ½ full of epoxy, or as recommended by the manufacturer, prior to insertion of the steel bar. Rotate the steel bar during installation to eliminate void and ensure complete bonding of the bar. Insertion of the bars by the dipping method will not be allowed.

5. Embed dowels 6 ¼ inches into the existing concrete.

6. The cost of epoxy resin, dowels (C and CO bars), drilling, installation and other incidental items shall be incidental to the contract unit price each for Install Dowel in Concrete.

REINFORCED GRANULAR EMBANKMENT

1. The geogrid will be a biaxial grid of single layer construction. Vibratory welded, integrally formed, or woven and coated geogrids will be acceptable. Grids with laser welded grid junctions will not be allowed. The geogrid will be certified by the supplier to meet the following specification prior to installation:

Property	Test	MARV
Wide Width Strip Tensile Strength (Ultimate)	ASTM D 6637 Method B	850lb/ft MD and XD

2. Geogrid will be paid for at the contract unit price per square yard for Geogrid Reinforcement. Payment quantities will be based on area covered plus 15%. Overlaps are accounted for by the additional 15%. Payment will be full compensation for furnishing and installing the geogrid only.

3. Granular Material will conform to the specification for Base Course in Section 882 of the Specifications. Granular Material will be paid for at the contract unit price per ton for Base Course. Payment will be full compensation for furnishing and placing this material.

4. The geogrid shall be placed on a level surface and overlapped a minimum of 2 feet.

5. The geogrid will be placed as taut as possible with minimal wrinkles. Placement will be done so that subsequent granular cover material does not shove, wrinkle or distort the in place geogrid. The overlaps will be shingled in a manner that assures granular material will not be forced under the geogrid during backfilling operations. The geogrid may be held in place with small piles of granular material or staples.

6. Base course will be dumped at least 20 feet behind the leading edge of the backfill and pushed into place with a loader or dozer from the covered areas to the uncovered areas. No traffic will be allowed on the uncovered geogrid.

7. The base course and adjacent soil embankment shall be built simultaneously in horizontal layers. Base course shall be placed in 6 inch maximum lifts and compacted to 97 percent of maximum standard proctor dry density using a smooth face vibratory roller or vibratory plate compactor. Each layer of granular material shall be thoroughly watered prior to and during compaction.

8. Density tests within the berm limits shall consist of tests conducted both in the soil embankment and the base course according to the modified zone requirements below:

Zone	Depth (ft.)	Min. required tests
1	0-1	1
2	1-3	1
3	3-5	1
4	5 to Bottom	1 per 3 vertical feet

9. The zone requirement will be in force at both bridge berms.

NOTES (CONTINUED)
FOR
430' - 10 ⅝" PRESTR. GIRDER BRIDGE

STR. NO. 50-206-020
APRIL 2016

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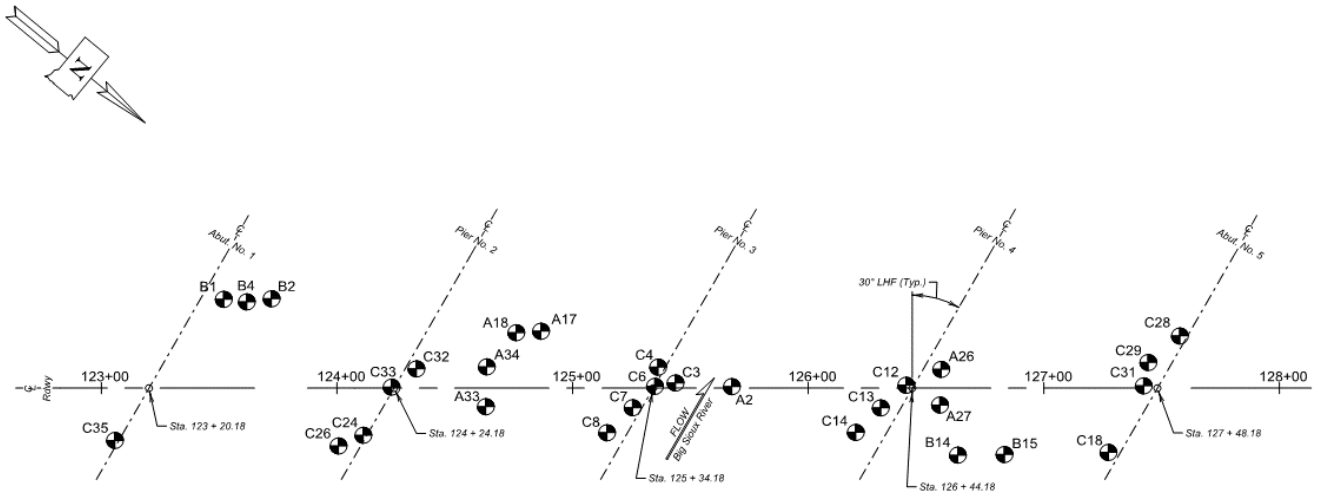
DESIGNED BY	CK. DES. BY	DRAFTED BY	
BB MINN03RT	TD 03RTGB06	BT	BRIDGE ENGINEER

F.2.5.7. SUBSURFACE INVESTIGATION

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P 0115(51)104 IM 0293(102)98	E9	E140



PLAN

Sioux Quartzite is pink to red, hard silica cemented sandstone. It is jointed, bedded, and cross-bedded with thin red to purple pipestone shales and coarse conglomerate. Layers of poorly cemented sands may also be present. The surface of the quartzite is not flat. It may vary several feet vertically in a short horizontal distance.

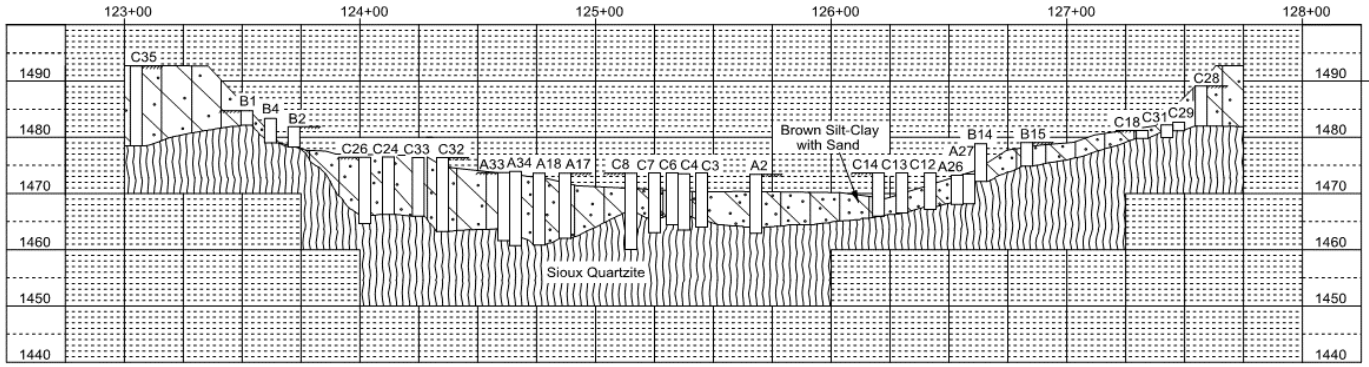
The Geotechnical Engineering Activity has on file all of the boring logs for this project. These logs and additional results of laboratory test, if any, are available for review at the Central Office in Pierre.

LEGEND

Auger Test

All auger holes are drilled with a 4½ inch diameter or 2½ inch diameter continuous flight auger.

Boreholes from Station 124+40 to Station 126+60 were conducted through ice. The water table elevation at the time of investigation was approximately 1473.7. Borings conducted outside of this station range were dry at the time of investigation.



SUBSURFACE INVESTIGATION
FOR
430' - 10 5/8" PRESTR. GIRDER BRIDGE

42' - 0" ROADWAY & 8' - 0" SIDEWALK — 30° LHF SKEW
OVER BIG SIOUX RIVER — SEC. 9-T104N-R49W
STA. 123 + 18.74 TO 127 + 49.63 — P 0115(51)104
STR. NO. 50-206-020 — HL-93

MINNEHAHA COUNTY
S. D. DEPT. OF TRANSPORTATION
APRIL 2016

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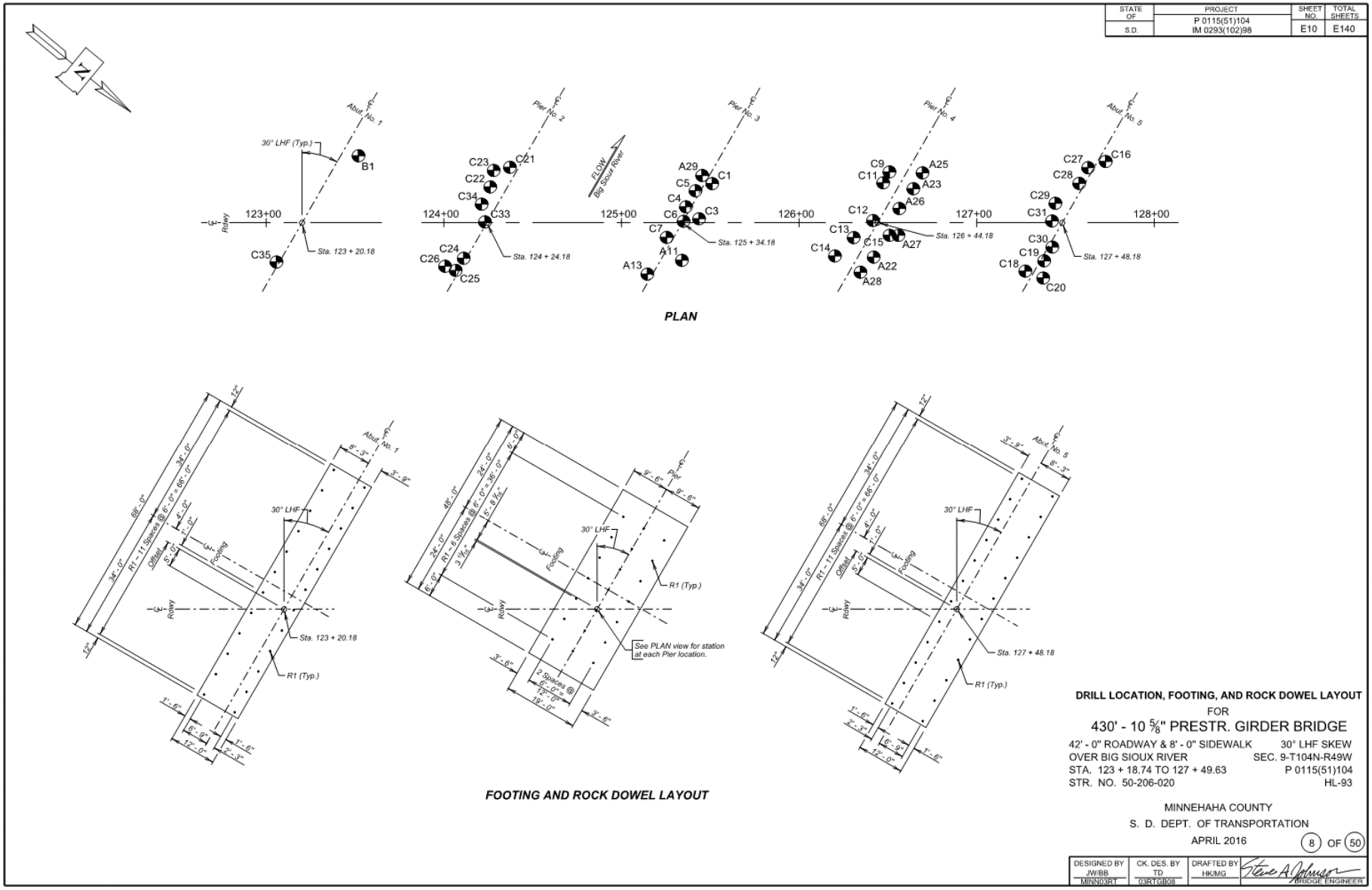
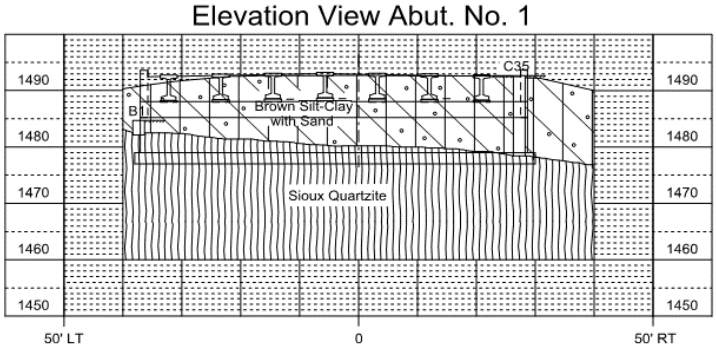
DESIGNED BY	CK. DES. BY	DRAFTED BY	
JW/BB	TD	HK/MG	BRIDGE ENGINEER
MINN03RT	03RTGB07		

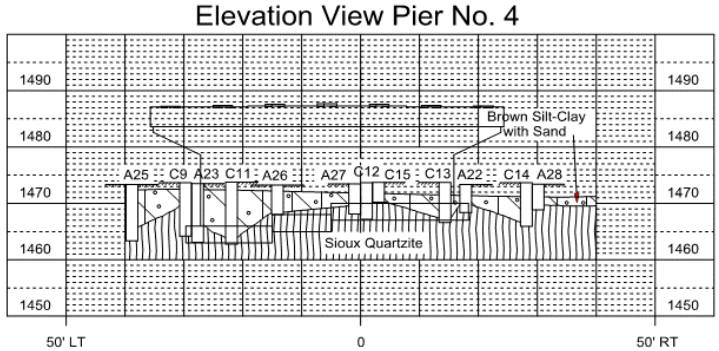
F.2.5.8. DRILL LOCATION, FOOTING, AND ROCK DOWEL LAYOUT

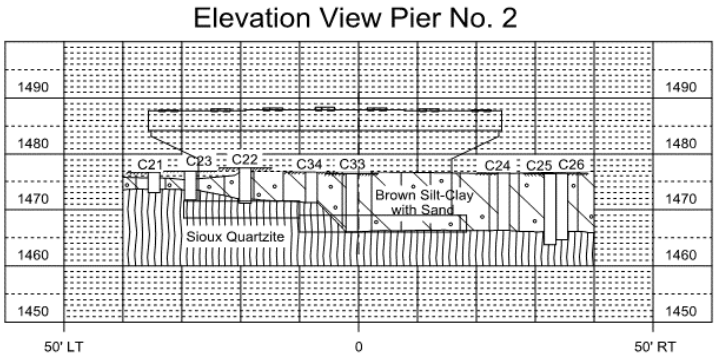


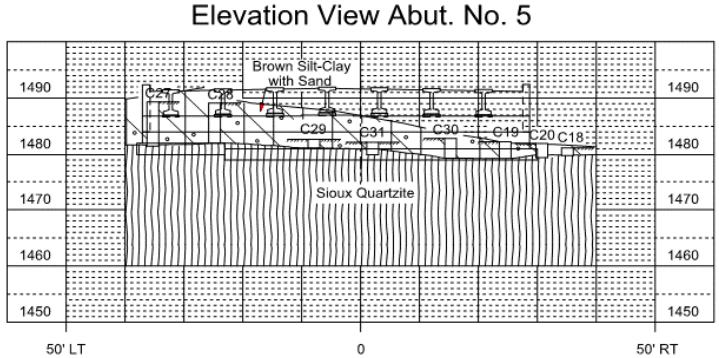
F.2.5.9. SUBSURCAE INVESTIGATION CROSS SECTIONS

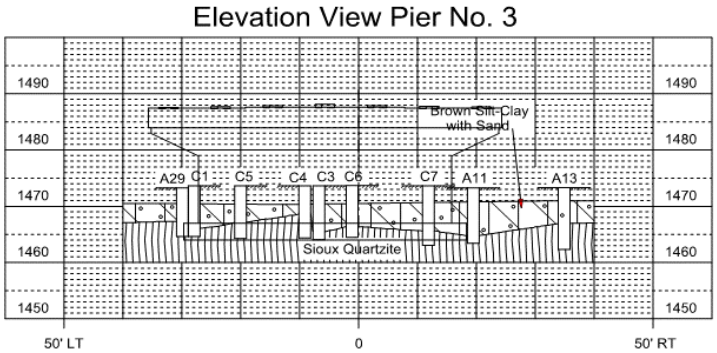
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P 0115(51)104 IM 0293(102)98	E11	E140











Elevation views are cross sections along centerline of the proposed substructures.

Boreholes depicted in elevation views for Pier No. 3 and Pier No. 4 were conducted through ice. The water table elevation at the time of investigation was approximately 1473.7. Borings conducted for Abut. No 1, Pier No. 2, and Abut. No. 5 were dry at the time of investigation.

SUBSURFACE INVESTIGATION CROSS SECTIONS

FOR

430' - 10 5/8" PRESTR. GIRDER BRIDGE

42' - 0" ROADWAY & 8' - 0" SIDEWALK 30° LHF SKEW
OVER BIG SIOUX RIVER SEC. 9-T104N-R49W
STA. 123 + 18.74 TO 127 + 49.63 P 0115(51)104
STR. NO. 50-206-020 HL-93

MINNEHAHA COUNTY

S. D. DEPT. OF TRANSPORTATION

APRIL 2016

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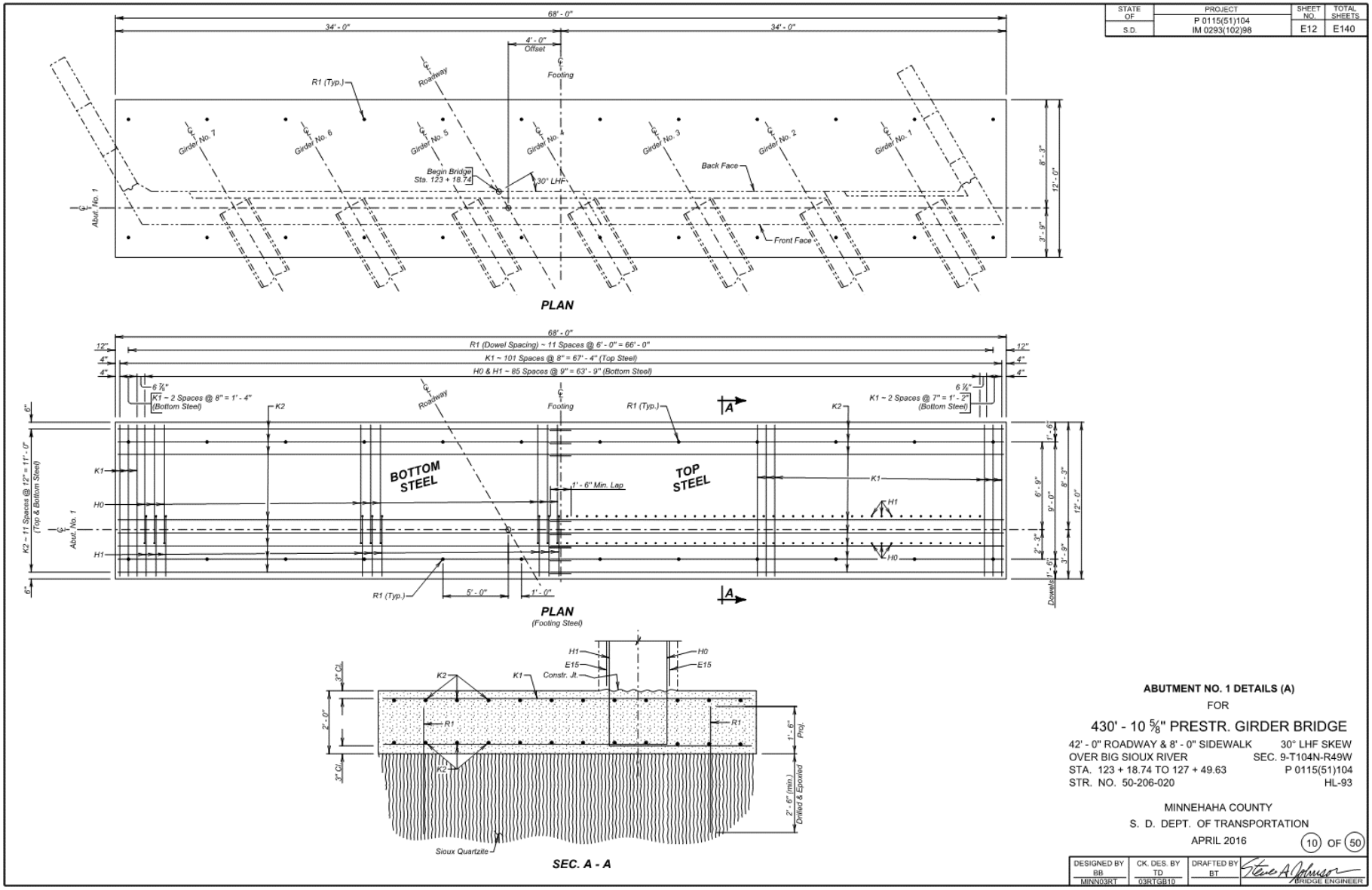
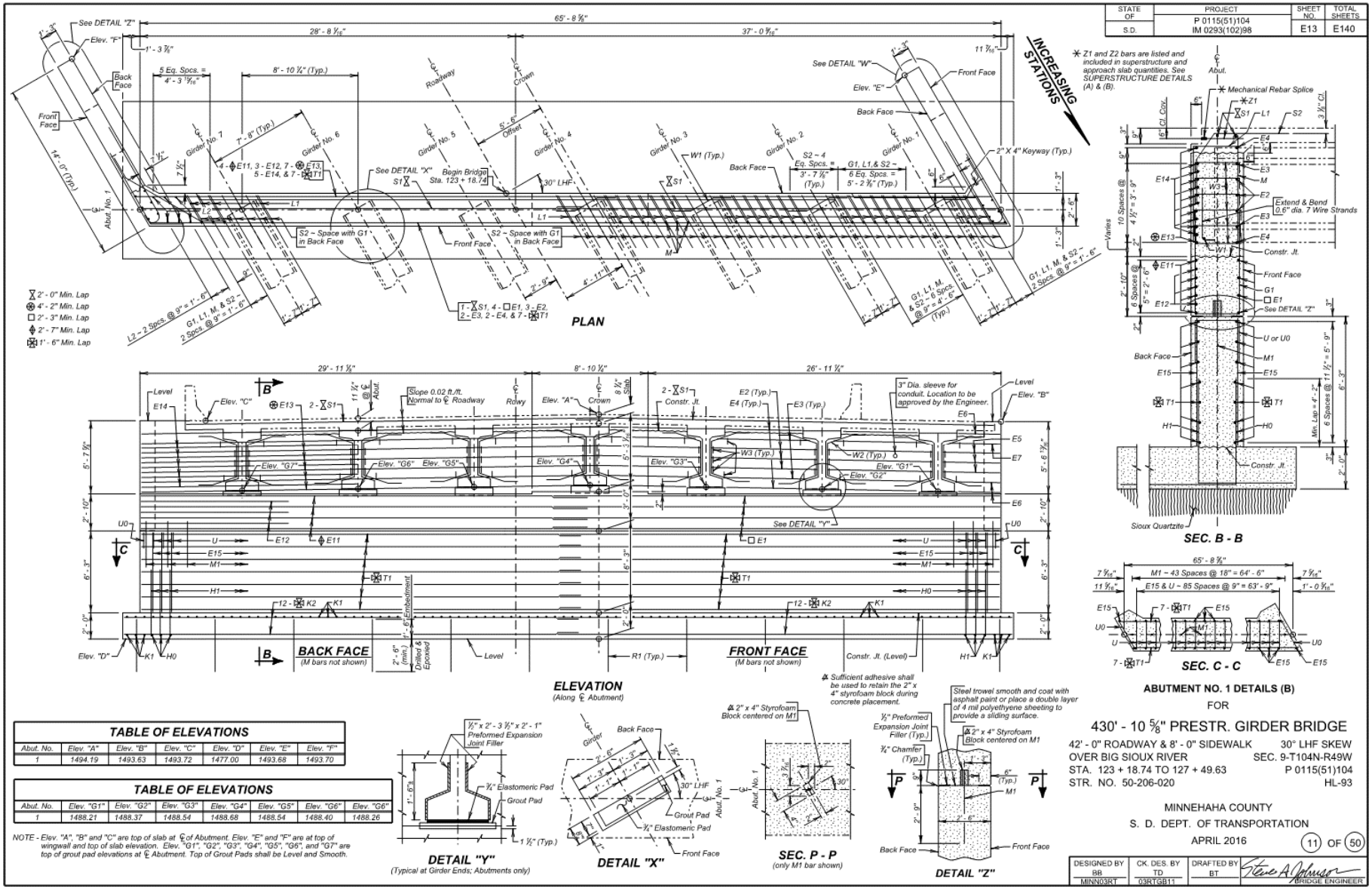
DESIGNED BY	CK. DES. BY	DRAFTED BY	
JW/BB MINN03RT	TD 03RTGB09	HK/MG	BRIDGE ENGINEER

F.2.5.10. ABUTMENT DETAILS (A)

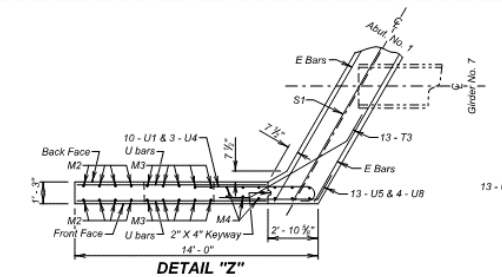


F.2.5.11. ABUTMENT DETAILS (B)

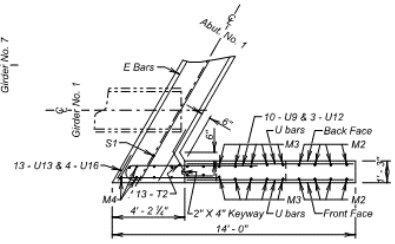


F.2.5.12. ABUTMENT DETAILS (C)

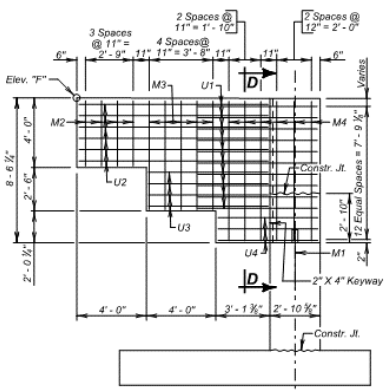
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P 0115(51)104 IM 0293(102)98	E14	E140



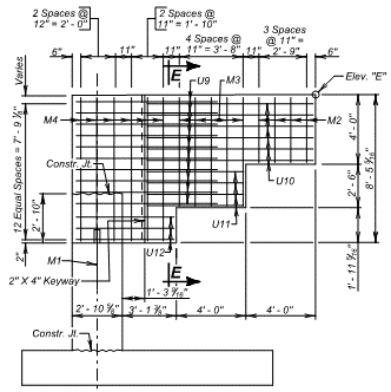
DETAIL "Z"



DETAIL "W"



ELEVATION - BACK FACE

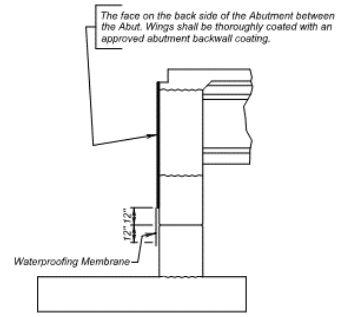


ELEVATION - BACK FACE

ESTIMATED QUANTITIES		
ITEM	UNIT	QUANTITY
ϕ Class A45 Concrete, Bridge	Cu. Yd.	149.0
Reinforcing Steel	Lb.	23615
Epoxy Coated Reinforcing Steel	Lb.	1460
Structure Excavation, Bridge	Cu. Yd.	365.6
Install Dowel in Rock	Ft.	60
Waterproofing Membrane	Sq. Ft.	124

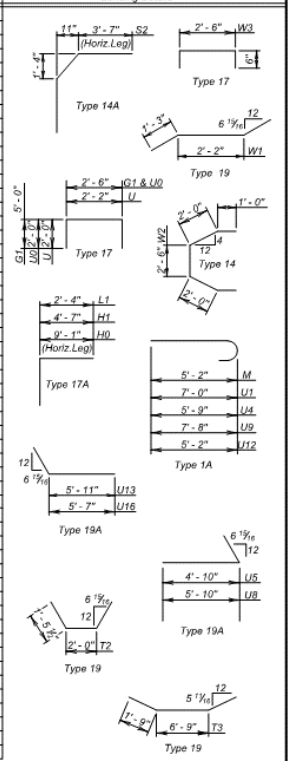
ϕ Includes 0.2 cu. yds. for grout pads.

NOTE:
Concrete shall be placed in the space under the beams (within the backwall width) during the pour. Care shall be taken to get the concrete vibrated into this area. If upon form removal the space is not completely filled and consolidated, the contractor shall grout the remaining voids.

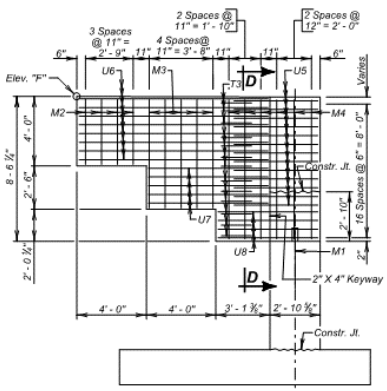


ABUTMENT BACKWALL COATING AND WATERPROOFING MEMBRANE DETAILS

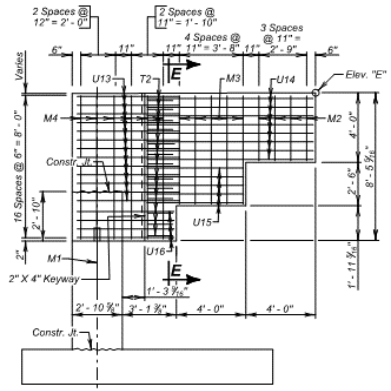
REINFORCING SCHEDULE					
Mk.	No.	Size	Length	Type	Bending Details
E1	8	6	33' - 11"	Str.	
E2	18	6	8' - 1"	Str.	
E3	12	6	6' - 3"	Str.	
E4	12	6	5' - 9"	Str.	
E5	3	6	4' - 4"	Str.	
E6	3	6	3' - 2"	Str.	
E7	1	6	3' - 9"	Str.	
E8	3	6	7' - 3"	Str.	
E9	2	6	6' - 4"	Str.	
E10	2	6	6' - 2"	Str.	
E11	8	7	34' - 1"	Str.	
E12	3	7	11' - 3"	Str.	
E13	14	9	34' - 11"	Str.	
E14	5	10	16' - 6"	Str.	
E15	174	9	6' - 1"	Str.	
G1	51	5	12' - 5"	17	
H0	88	9	15' - 0"	17A	
H1	88	9	10' - 6"	17A	
K1	108	7	11' - 10"	Str.	
K2	24	4	34' - 8"	Str.	
Δ L1	48	4	6' - 11"	17A	
L2	6	5	4' - 11"	Str.	
Δ M	48	5	5' - 8"	1A	
M1	44	7	3' - 6"	Str.	
M2	16	5	3' - 9"	Str.	
M3	20	5	6' - 3"	Str.	
M4	24	5	8' - 2"	Str.	
R1	24	11	4' - 0"	Str.	
Δ S1	4	9	31' - 10"	Str.	
Δ S2	69	5	7' - 3"	14A	
T1	28	4	33' - 8"	Str.	
T2	13	6	4' - 11"	19	
T3	13	6	10' - 3"	19	
U	86	5	6' - 2"	17	
U0	2	5	7' - 2"	17	
U1	10	9	8' - 3"	1A	
U2	6	9	11' - 0"	Str.	
U3	4	9	7' - 0"	Str.	
U4	3	9	7' - 0"	1A	
U5	13	5	6' - 1"	19A	
U6	8	5	11' - 0"	Str.	
U7	5	5	7' - 0"	Str.	
U8	4	5	7' - 1"	19A	
U9	10	9	8' - 11"	1A	
U10	6	9	9' - 8"	Str.	
U11	4	9	5' - 8"	Str.	
U12	3	9	6' - 5"	1A	
U13	13	5	7' - 2"	19A	
U14	8	5	9' - 8"	Str.	
U15	5	5	5' - 8"	Str.	
U16	4	5	6' - 10"	19A	
W1	7	5	4' - 8"	19	
W2	14	4	8' - 6"	14	
W3	84	5	3' - 6"	17	



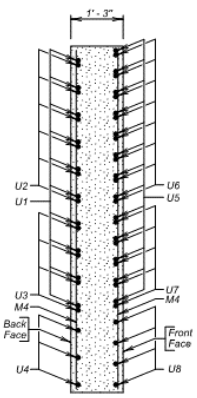
NOTE:
All dimensions are out to out of bars.
Δ Bars to be Epoxy Coated.



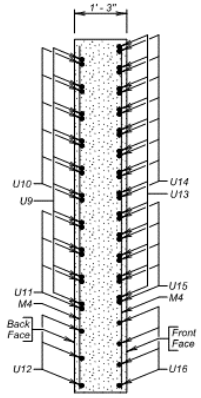
ELEVATION - FRONT FACE



ELEVATION - FRONT FACE



SEC. D - D



SEC. E - E

ABUTMENT NO. 1 DETAILS (C)

FOR

430' - 10 5/8" PRESTR. GIRDER BRIDGE

42' - 0" ROADWAY & 8' - 0" SIDEWALK 30° LHF SKEW
OVER BIG SIOUX RIVER SEC. 9-T104N-R49W
STA. 123 + 18.74 TO 127 + 49.63 P 0115(51)104
STR. NO. 50-206-020 HL-93

MINNEHAHA COUNTY
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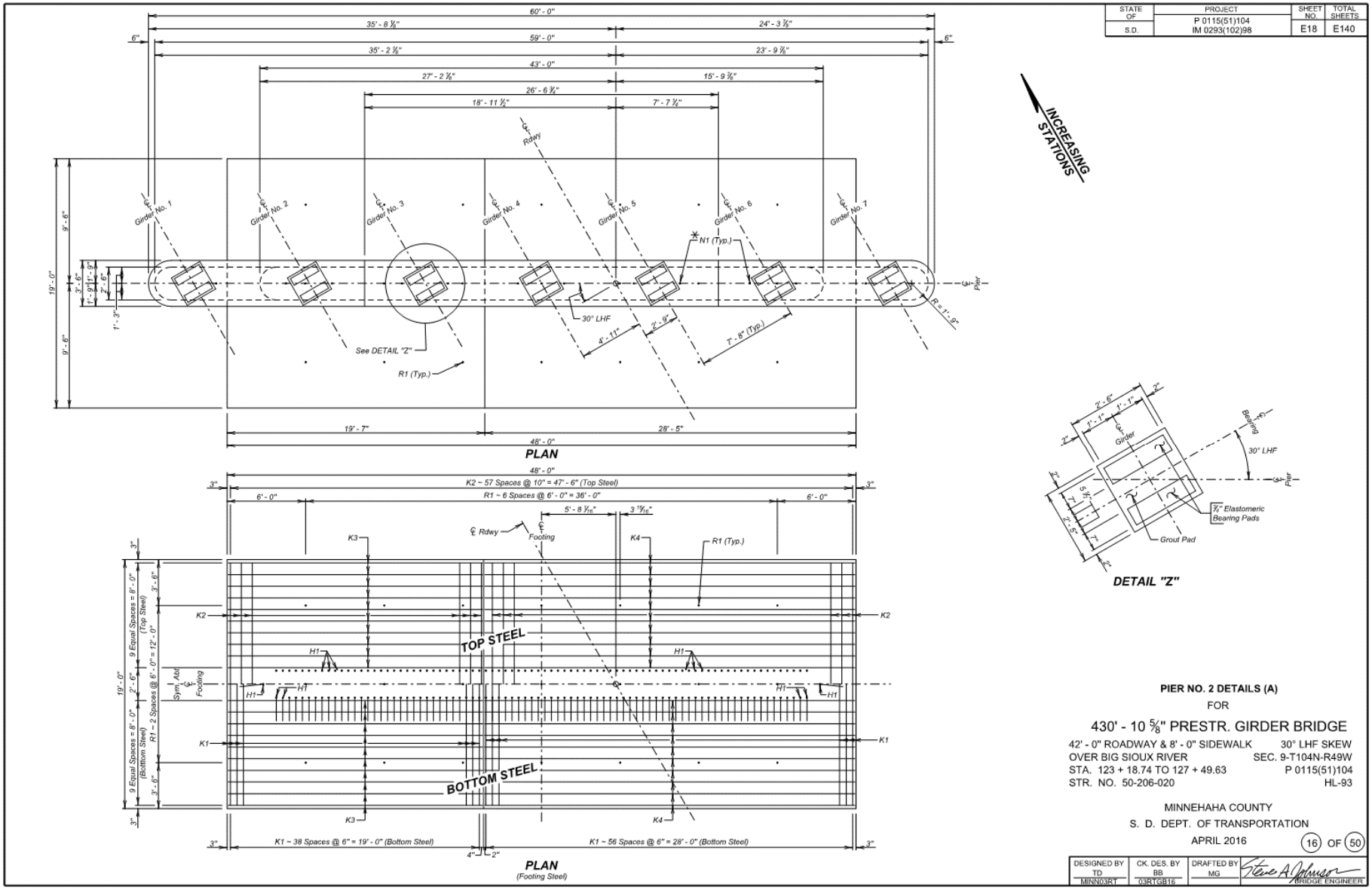
APRIL 2016

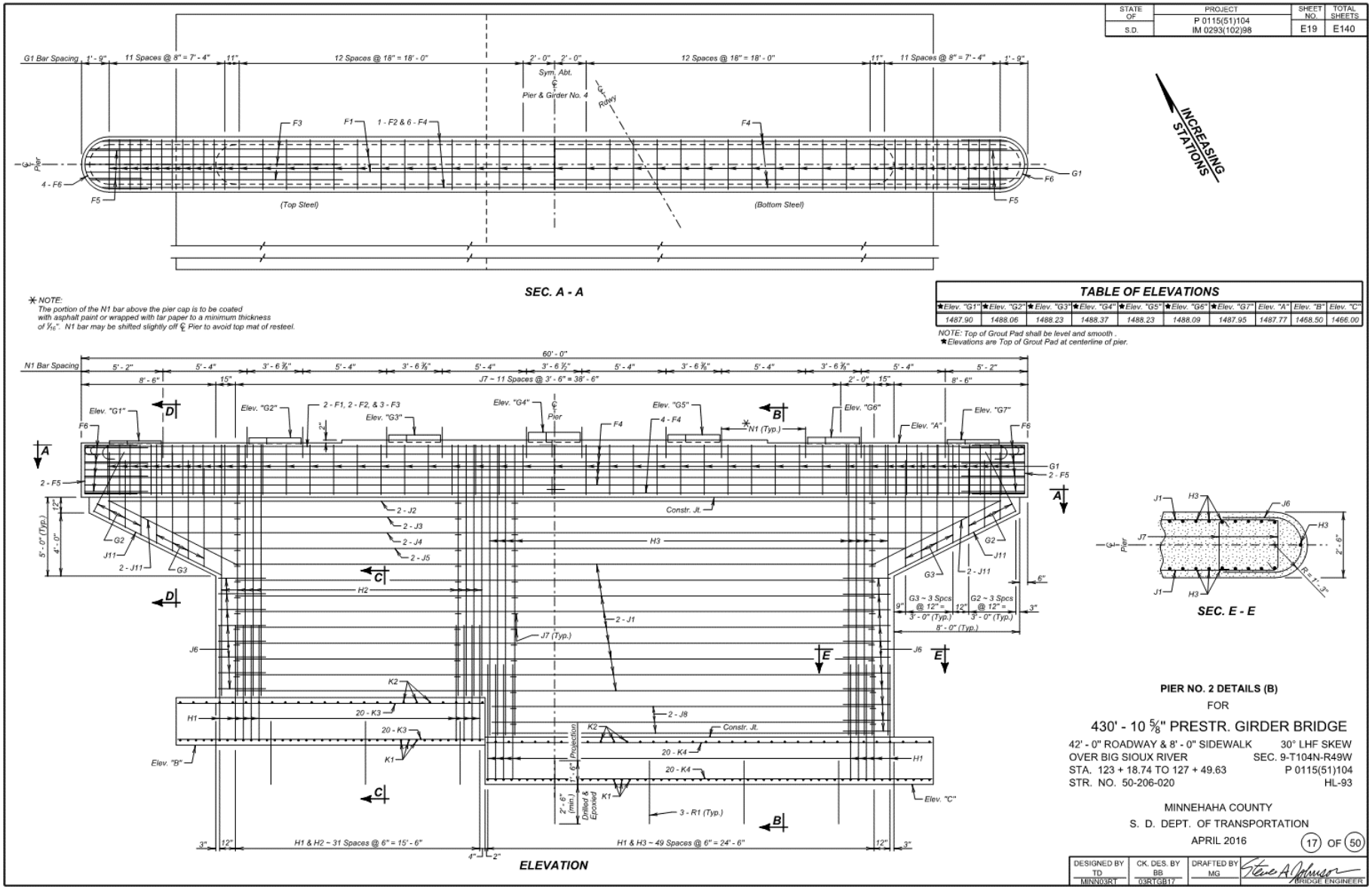
12 OF 50

DESIGNED BY	CK. DES. BY	DRAFTED BY	
BB MINN03RT	TD 03RTGB12	BT	BRIDGE ENGINEER

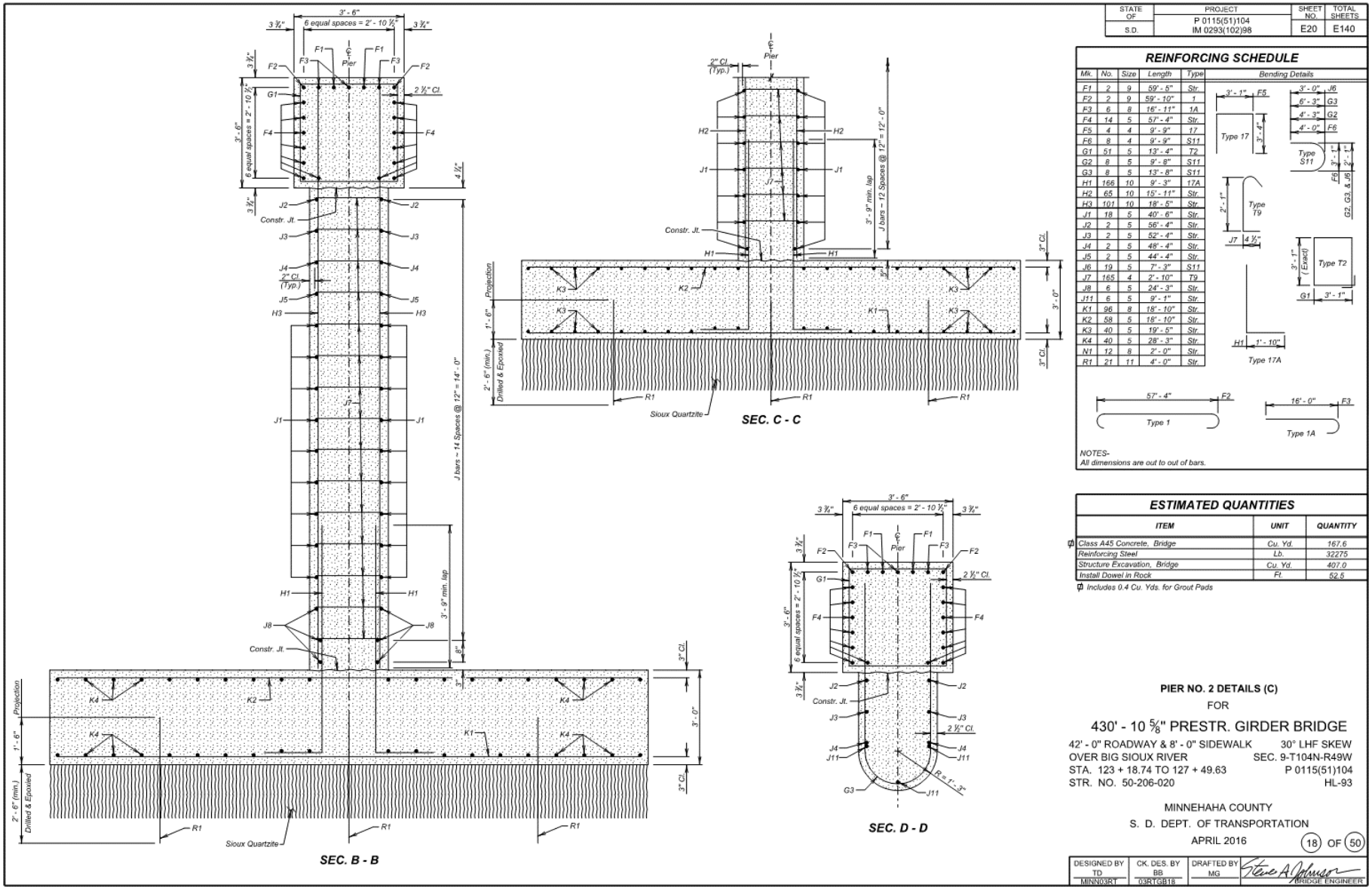
F.2.5.13. PIER DETIALS (A)



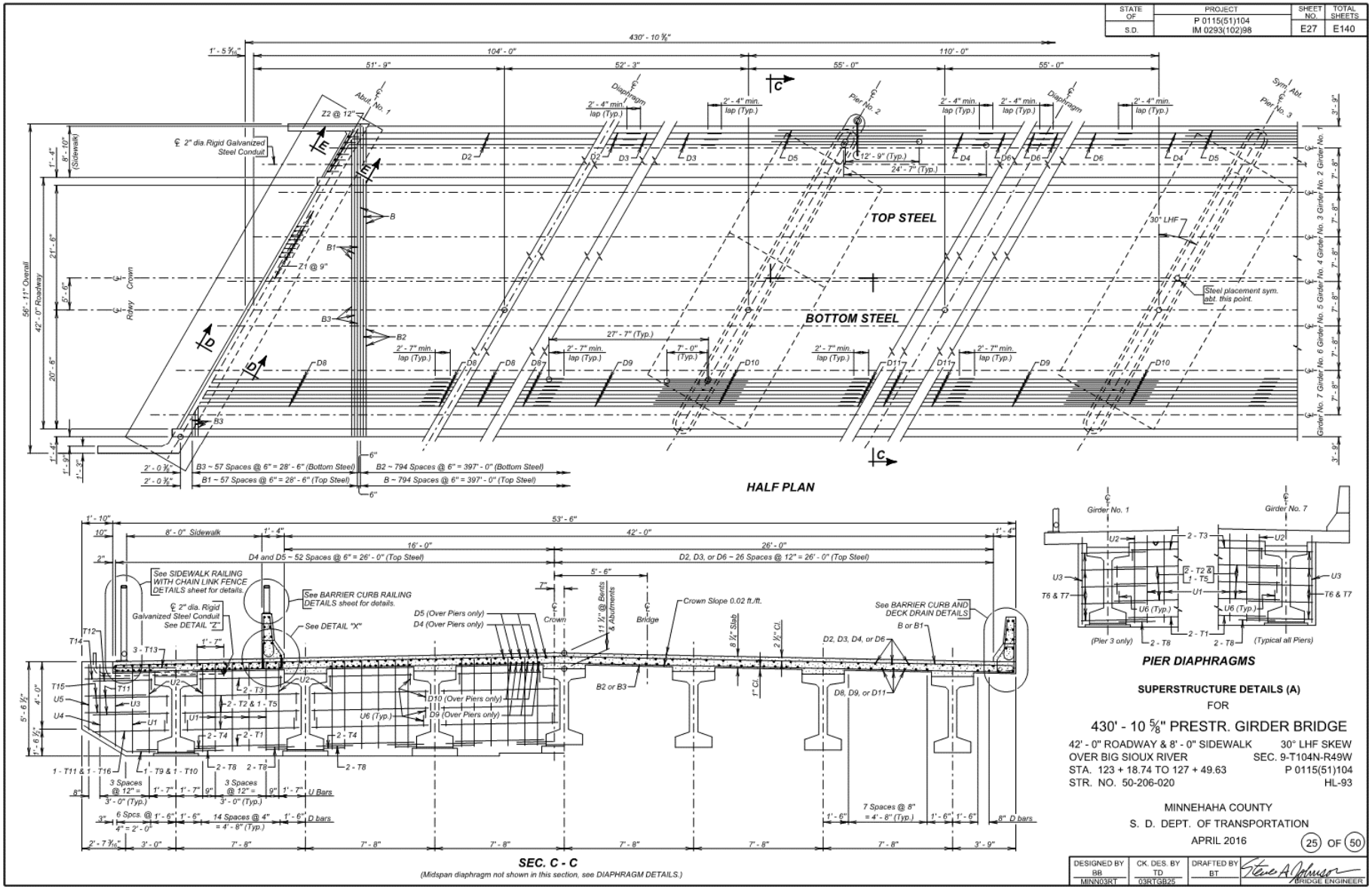
F.2.5.14. PIER DETIALS (B)



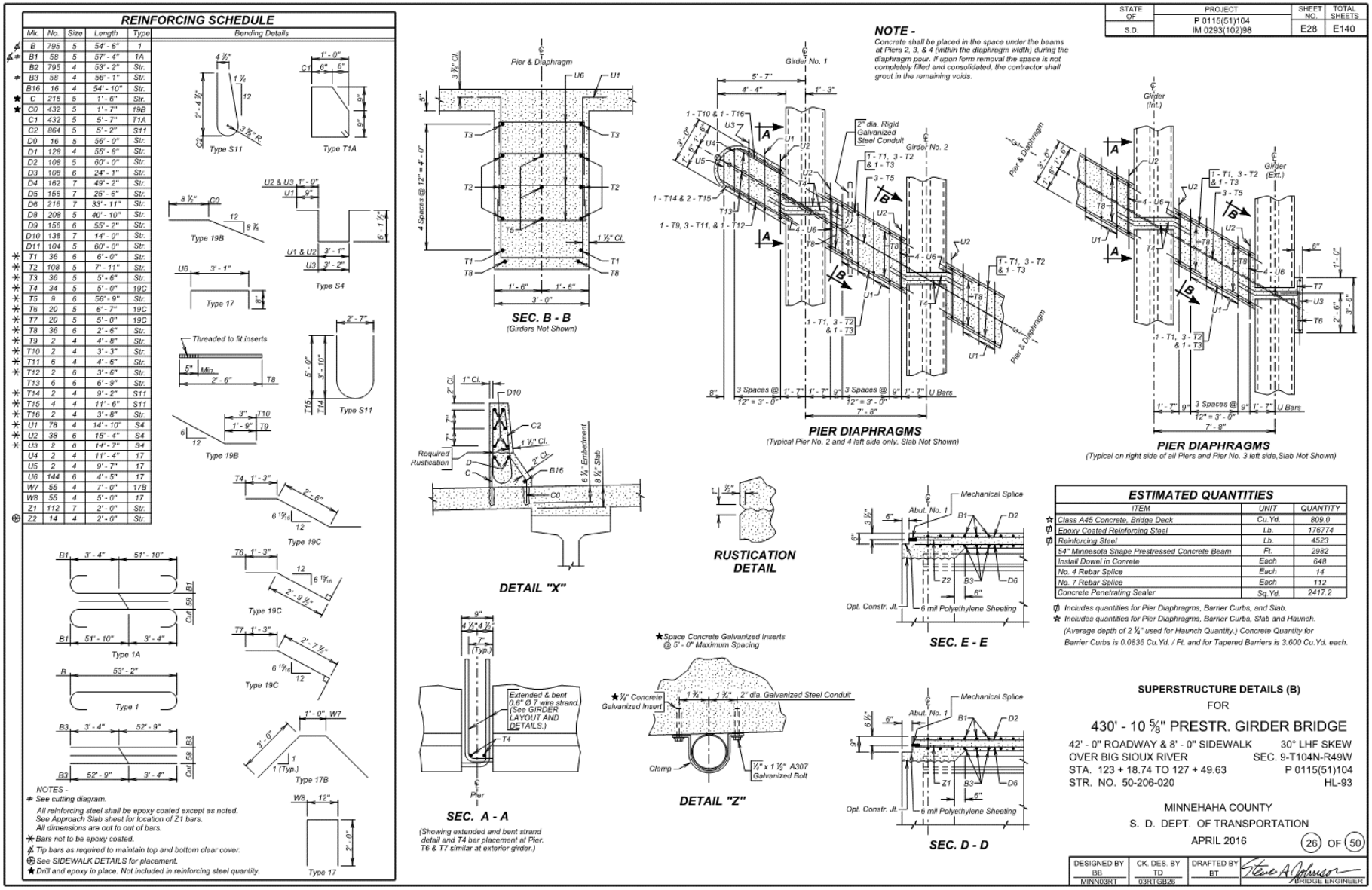
F.2.5.15. PIER DETIALS (C)



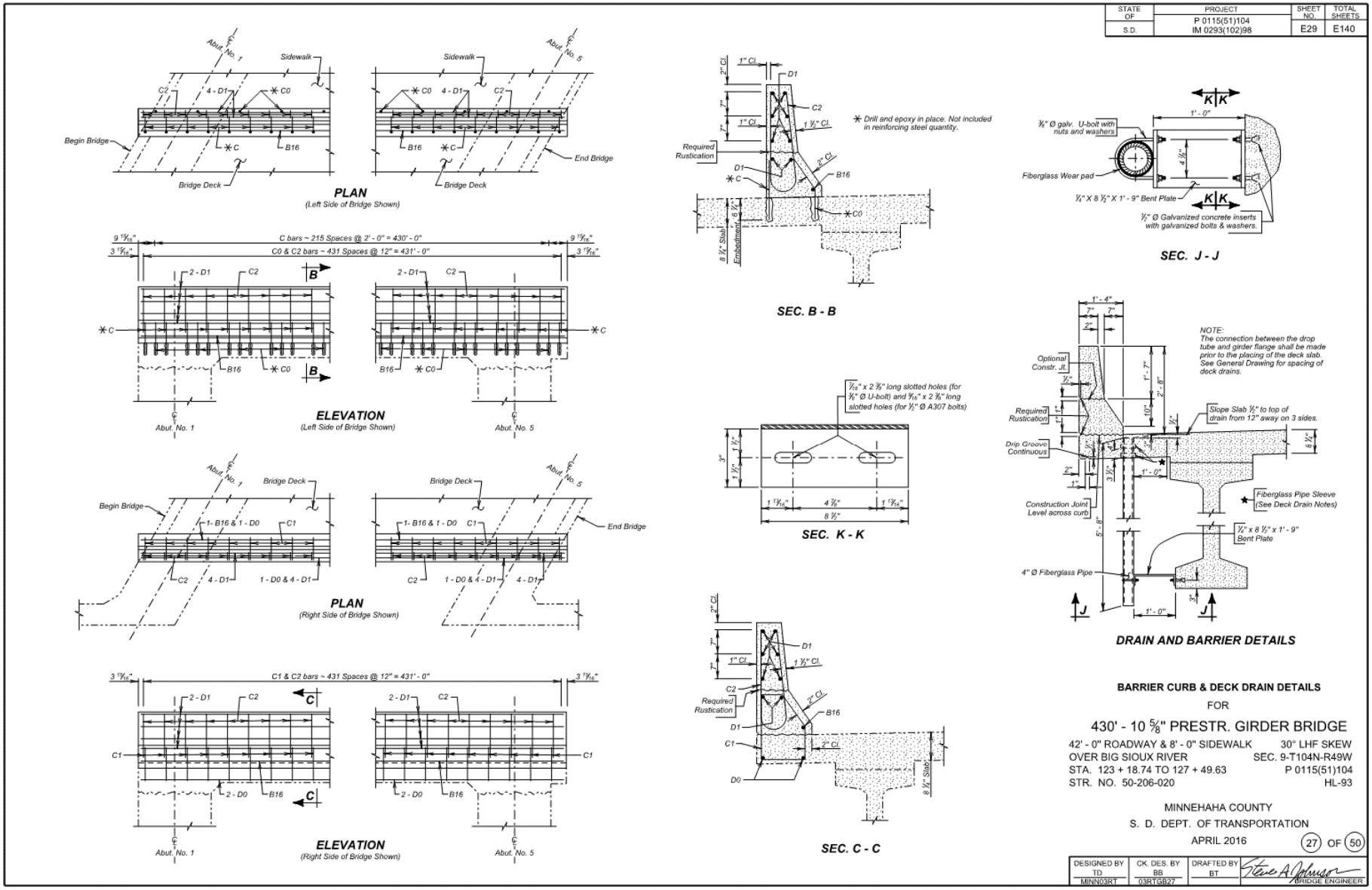
F.2.5.16. SUPERSTRUCTURE DETAILS (A)



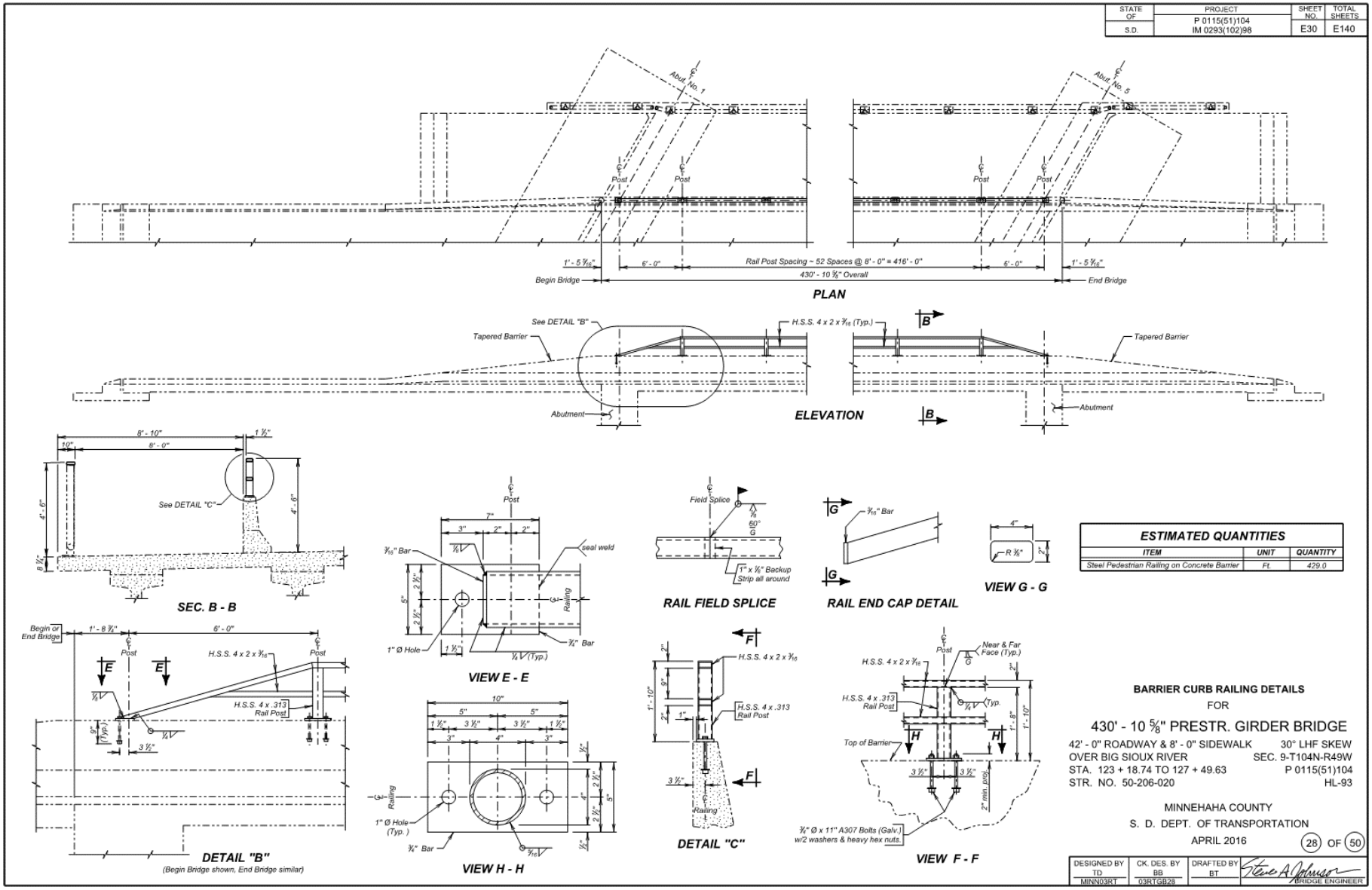
F.2.5.17. SUPERSTRUCTURE DETAILS (B)



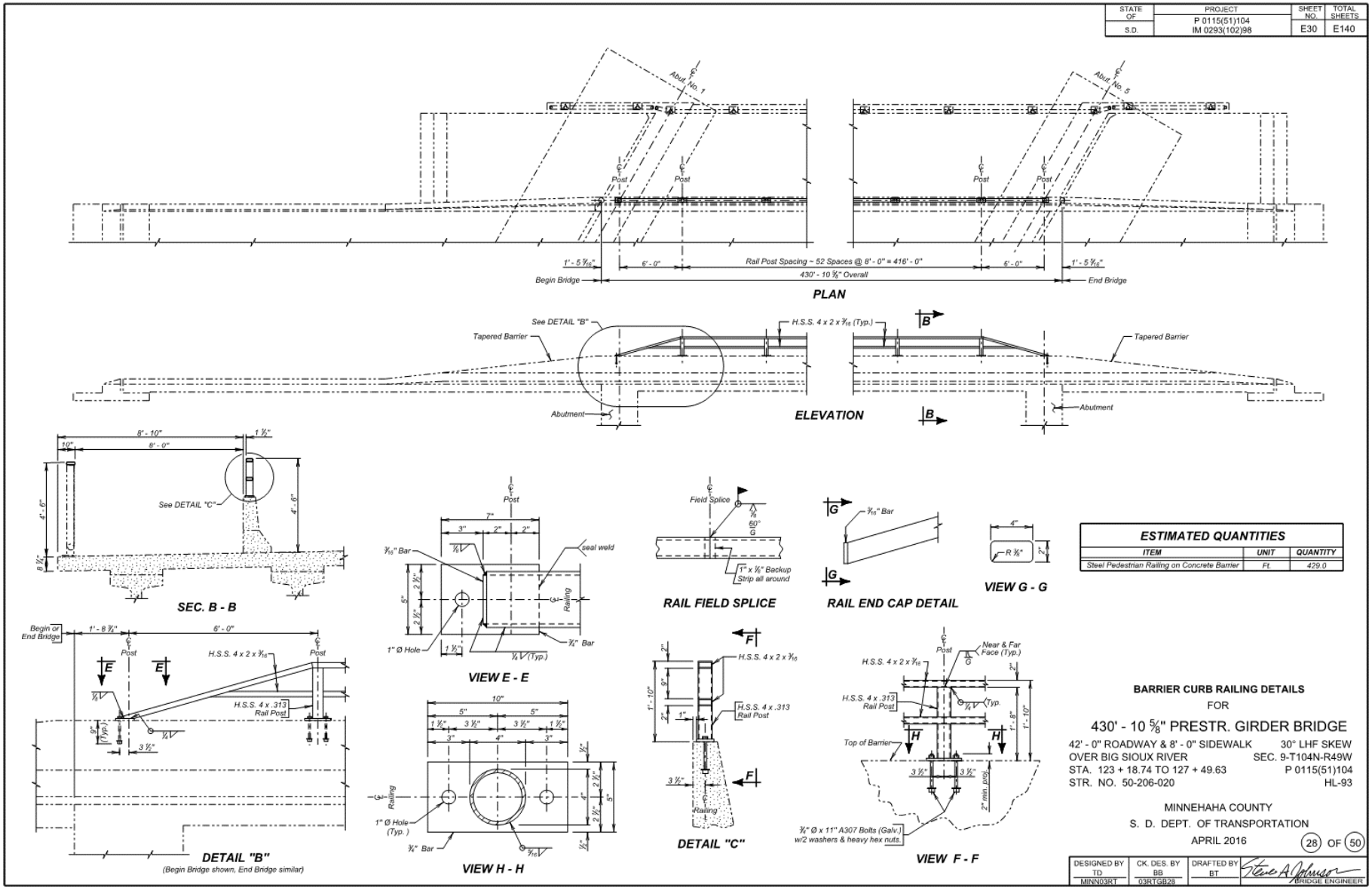
F.2.5.18. BARRIER CURB, AND DRAIN DETAILS



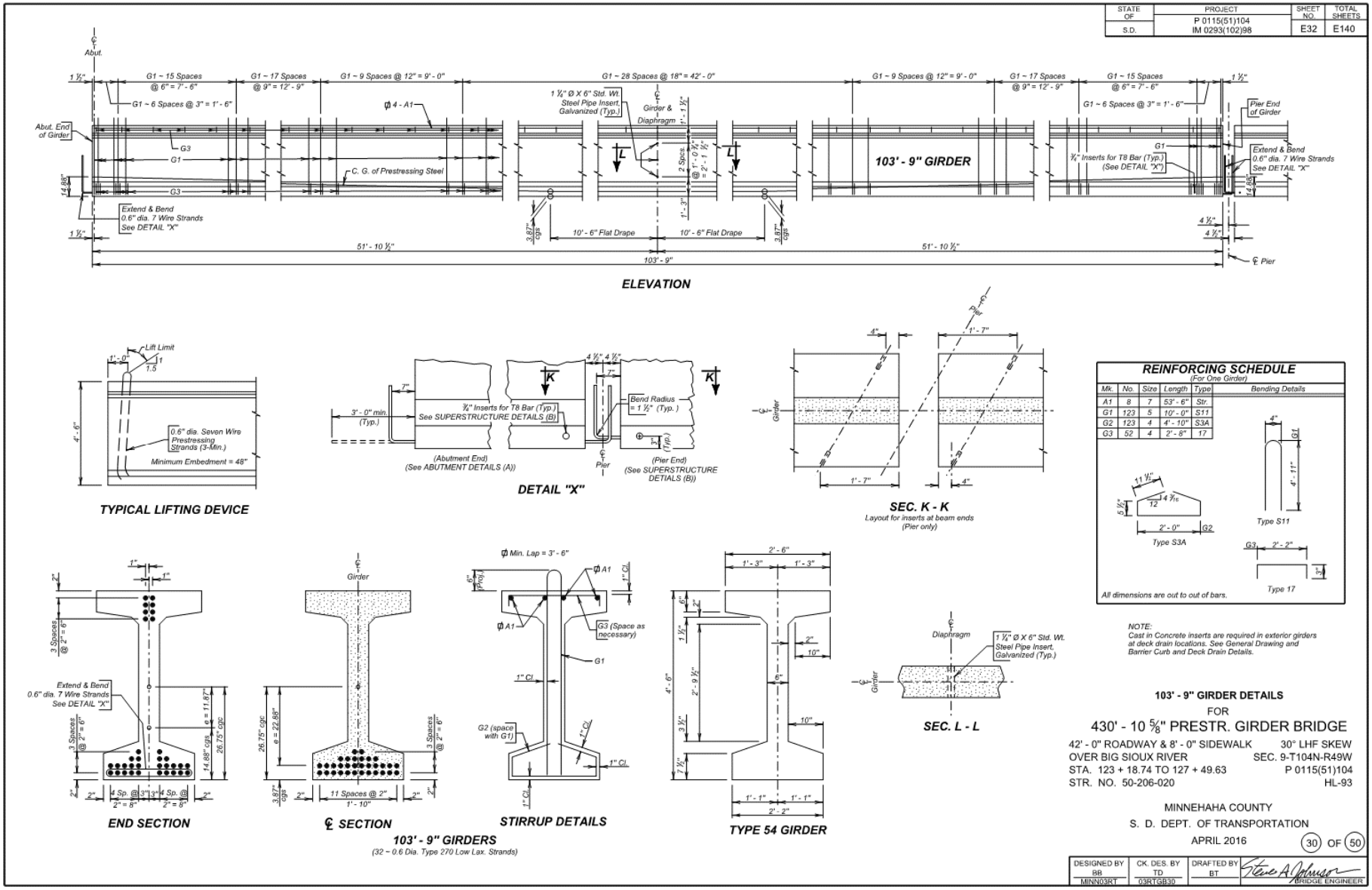
F.2.5.19. BARRIER CURB RAILING DETIALS



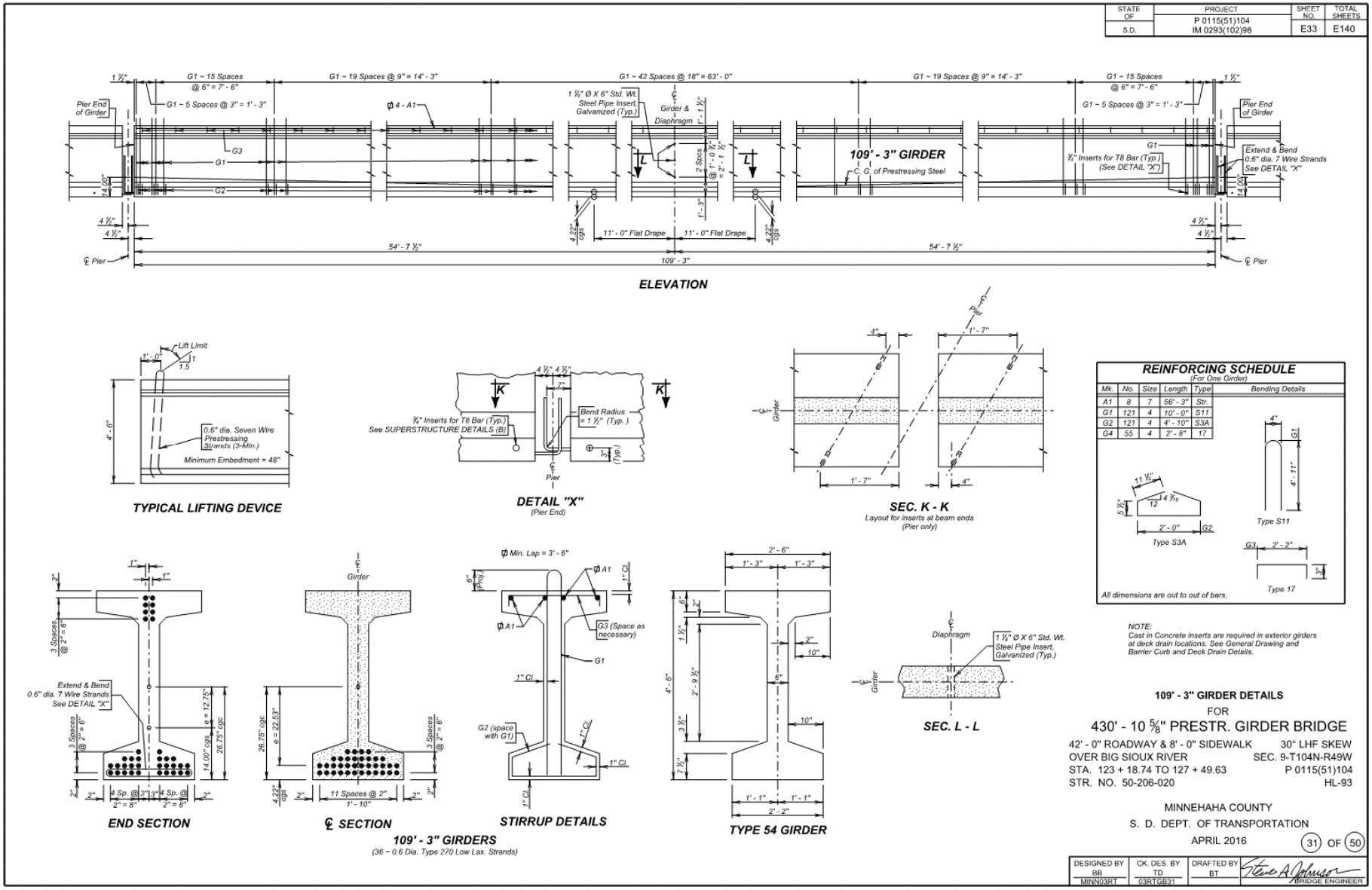
F.2.5.20. SIDEWALK RAILING WITH CHIAN LINK FENCE DETIALS



F.2.5.21. GIRDER DETAILS

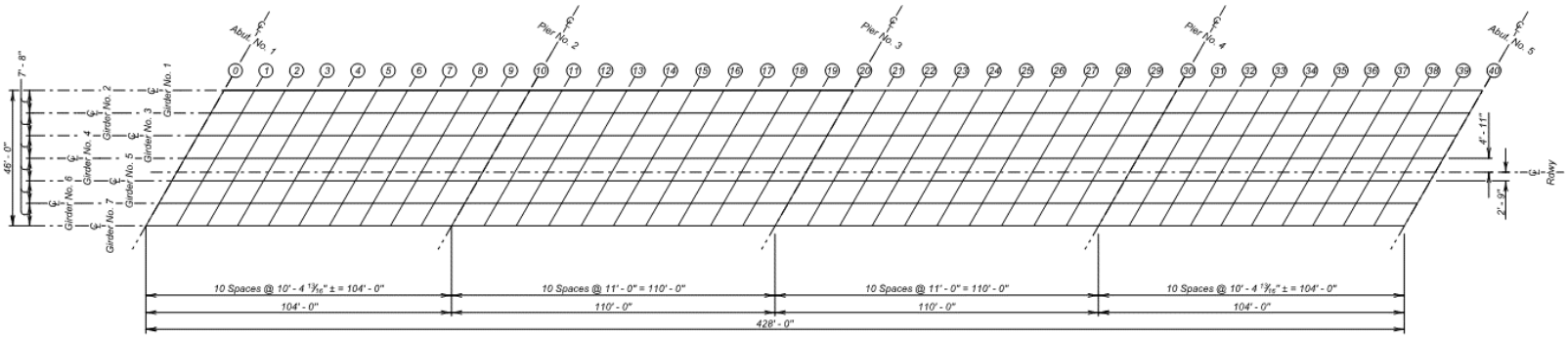


F.2.5.22. GIRDER DETIALS

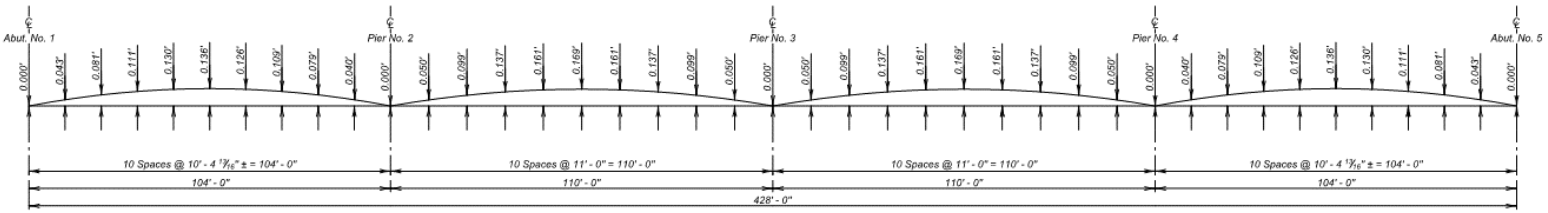


F.2.5.23. ERECTION DATA AND SLAB FORMELEVATIONS (A)

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P 0115(51)104 IM 0293(102)98	E34	E140



GIRDER LAYOUT



CAMBER DIAGRAM

The Camber shown is the amount which has been added to the theoretical slab elevations to get slab elevations shown in the table of Slab Form Elevations and Calculations. Camber shown is for D. L. of slab, traffic barrier, and haunch, but does not include D. L. of beams.

ERECTION DATA AND SLAB FORM ELEVATIONS (A)

FOR

430' - 10 5/8" PRESTR. GIRDER BRIDGE

42' - 0" ROADWAY & 8' - 0" SIDEWALK — 30° LHF SKEW
OVER BIG SIOUX RIVER — SEC. 9-T104N-R49W
STA. 123 + 18.74 TO 127 + 49.63 — P 0115(51)104
STR. NO. 50-206-020 — HL-93

MINNEHAHA COUNTY
S. D. DEPT. OF TRANSPORTATION
APRIL 2016

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DESIGNED BY	CK. DES. BY	DRAFTED BY	
BB MINN03RT	TD 03RTGB32	BT	BRIDGE ENGINEER

F.2.5.24. ERECTION DATA AND SLAB FORMELEVATIONS (B)

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P 0115(51)104 IM 0293(102)98	E35	E140

TABLE OF SLAB FORM ELEVATIONS AND CALCULATIONS

		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Girder No. 1	Elev. "M"	1493.709	1493.721	1493.727	1493.726	1493.714	1493.689	1493.648	1493.599	1493.538	1493.468	1493.397	1493.414	1493.430	1493.435	1493.426	1493.401	1493.360	1493.303	1493.232	1493.150	1493.067
	(-) Elev."N"																					
	(=) d																					
	(-) 0. 688'																					
	(=) h																					
Girder No. 2	Elev. "M"	1493.875	1493.887	1493.894	1493.893	1493.881	1493.855	1493.814	1493.766	1493.705	1493.635	1493.563	1493.580	1493.596	1493.601	1493.592	1493.567	1493.526	1493.469	1493.398	1493.316	1493.233
	(-) Elev."N"																					
	(=) d																					
	(-) 0. 688'																					
	(=) h																					
Girder No. 3	Elev. "M"	1494.042	1494.054	1494.061	1494.059	1494.047	1494.022	1493.981	1493.933	1493.871	1493.801	1493.730	1493.747	1493.763	1493.768	1493.759	1493.734	1493.693	1493.636	1493.565	1493.483	1493.400
	(-) Elev."N"																					
	(=) d																					
	(-) 0. 688'																					
	(=) h																					
Girder No. 4	Elev. "M"	1494.185	1494.197	1494.204	1494.203	1494.190	1494.165	1494.124	1494.076	1494.015	1493.944	1493.873	1493.890	1493.906	1493.911	1493.902	1493.877	1493.836	1493.779	1493.708	1493.626	1493.543
	(-) Elev."N"																					
	(=) d																					
	(-) 0. 688'																					
	(=) h																					
Girder No. 5	Elev. "M"	1494.045	1494.057	1494.064	1494.063	1494.050	1494.025	1493.984	1493.936	1493.875	1493.804	1493.733	1493.750	1493.766	1493.771	1493.762	1493.737	1493.696	1493.639	1493.568	1493.486	1493.403
	(-) Elev."N"																					
	(=) d																					
	(-) 0. 688'																					
	(=) h																					
Girder No. 6	Elev. "M"	1493.905	1493.917	1493.924	1493.923	1493.910	1493.885	1493.844	1493.796	1493.735	1493.664	1493.593	1493.610	1493.626	1493.631	1493.622	1493.597	1493.556	1493.499	1493.428	1493.346	1493.263
	(-) Elev."N"																					
	(=) d																					
	(-) 0. 688'																					
	(=) h																					
Girder No. 7	Elev. "M"	1493.765	1493.777	1493.784	1493.783	1493.770	1493.745	1493.704	1493.656	1493.595	1493.524	1493.453	1493.470	1493.486	1493.491	1493.482	1493.457	1493.416	1493.359	1493.288	1493.206	1493.123
	(-) Elev."N"																					
	(=) d																					
	(-) 0. 688'																					
	(=) h																					

TABLE OF SLAB FORM ELEVATIONS AND CALCULATIONS

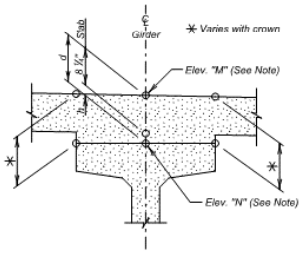
		21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Girder No. 1	Elev. "M"	1493.084	1493.100	1493.105	1493.096	1493.071	1493.030	1492.973	1492.902	1492.820	1492.737	1492.746	1492.753	1492.752	1492.738	1492.717	1492.680	1492.629	1492.568	1492.499	1492.425
	(-) Elev."N"																				
	(=) d																				
	(-) 0. 688'																				
	(=) h																				
Girder No. 2	Elev. "M"	1493.250	1493.266	1493.271	1493.262	1493.237	1493.196	1493.139	1493.068	1492.986	1492.903	1492.912	1492.920	1492.919	1492.905	1492.883	1492.846	1492.796	1492.735	1492.666	1492.591
	(-) Elev."N"																				
	(=) d																				
	(-) 0. 688'																				
	(=) h																				
Girder No. 3	Elev. "M"	1493.417	1493.433	1493.438	1493.429	1493.404	1493.363	1493.306	1493.235	1493.153	1493.070	1493.079	1493.087	1493.085	1493.071	1493.050	1493.013	1492.963	1492.901	1492.832	1492.758
	(-) Elev."N"																				
	(=) d																				
	(-) 0. 688'																				
	(=) h																				
Girder No. 4	Elev. "M"	1493.560	1493.576	1493.581	1493.572	1493.547	1493.506	1493.449	1493.378	1493.296	1493.213	1493.222	1493.230	1493.229	1493.214	1493.193	1493.156	1493.106	1493.045	1492.975	1492.901
	(-) Elev."N"																				
	(=) d																				
	(-) 0. 688'																				
	(=) h																				
Girder No. 5	Elev. "M"	1493.420	1493.436	1493.441	1493.432	1493.407	1493.366	1493.309	1493.238	1493.156	1493.073	1493.082	1493.090	1493.089	1493.074	1493.053	1493.016	1492.966	1492.905	1492.835	1492.761
	(-) Elev."N"																				
	(=) d																				
	(-) 0. 688'																				
	(=) h																				
Girder No. 6	Elev. "M"	1493.280	1493.296	1493.301	1493.292	1493.267	1493.226	1493.169	1493.098	1493.016	1492.933	1492.942	1492.950	1492.949	1492.934	1492.913	1492.876	1492.826	1492.765	1492.695	1492.621
	(-) Elev."N"																				
	(=) d																				
	(-) 0. 688'																				
	(=) h																				
Girder No. 7	Elev. "M"	1493.140	1493.156	1493.161	1493.152	1493.127	1493.086	1493.029	1492.958	1492.876	1492.793	1492.802	1492.810	1492.809	1492.794	1492.773	1492.736	1492.686	1492.625	1492.555	1492.481
	(-) Elev."N"																				
	(=) d																				
	(-) 0. 688'																				
	(=) h																				

NOTE —

Based on a "d" of 11 ¼" at the ℄ of each abutment and 11 ½" at the ℄ of the Piers (see SEC. C - C on SUPERSTRUCTURE DETAILS (A), it is anticipated that the midspan haunch dimension "h" over the ℄ of each girder will be 1 ½". If when computing the dimensions in the table, it is found that any dimension "h" is less than zero or greater than 4" the Office of Bridge Design of the South Dakota Dept. of Transportation shall be notified immediately. After the "Table of Slab Form Elevations and Calculations" has been completely filled out and approved for deck forming, a copy shall be forwarded to the Office of Bridge Design for review and analysis for the purpose of securing information relative to camber growth in the beams. This information is necessary for preparing plans for future structures of this type.

NOTE —

The table contains the information necessary to determine the depth of concrete over the girders at points shown. Calculations may be carried in the spaces provided. Elev. "M" is the design elevation of the top of slab before any concrete has been poured. This elevation includes correction for camber and dead load deflection. Elev. "N" is a field measured elevation taken on top of girders at the points shown with the girders in their positions. This elevation must be taken after erection is completed, but prior to placing any of the concrete. Girders shall not be supported between bearings when elevations are taken.



ERECTION DATA AND SLAB FORM ELEVATIONS (B)

FOR

430' - 10 ⅝" PRESTR. GIRDER BRIDGE

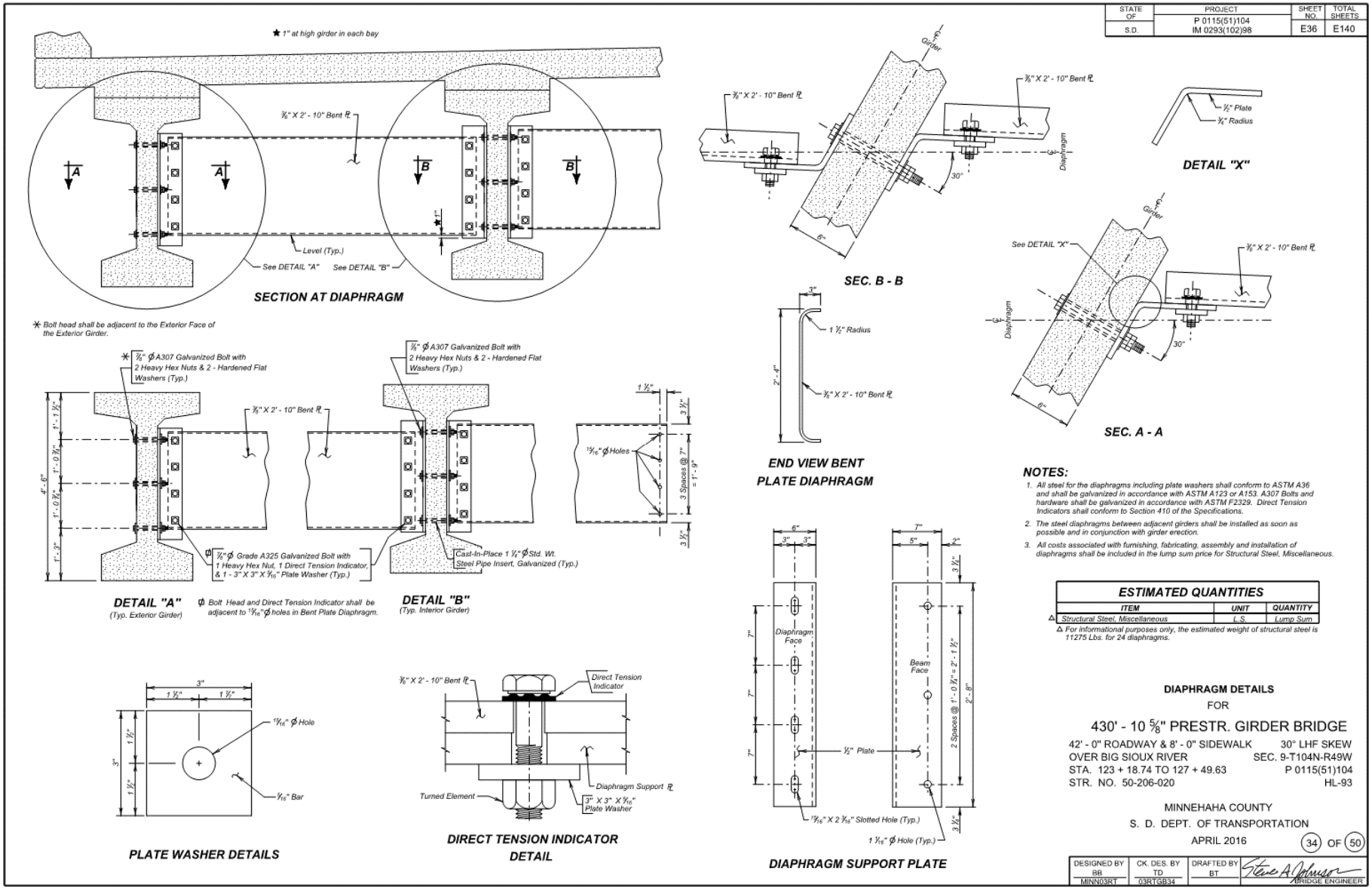
42' - 0" ROADWAY & 8' - 0" SIDEWALK 30° LHF SKEW
OVER BIG SIOUX RIVER SEC. 9-T104N-R49W
STA. 123 + 18.74 TO 127 + 49.63 P 0115(51)104
STR. NO. 50-206-020 HL-93

MINNEHAHA COUNTY
S. D. DEPT. OF TRANSPORTATION
APRIL 2016

33 OF 50

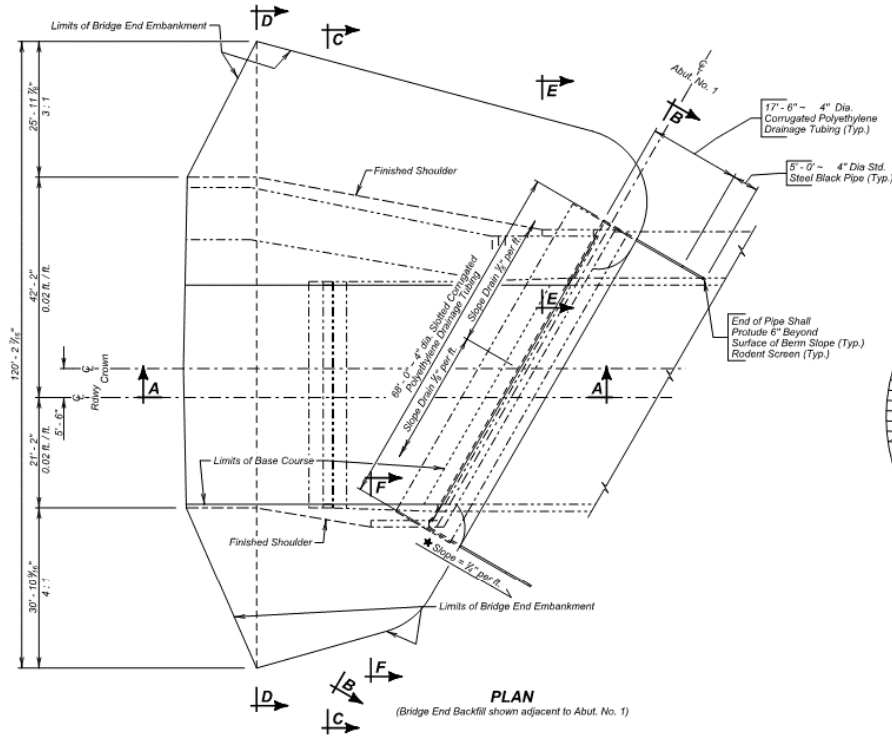
DESIGNED BY	CK. DES. BY	DRAFTED BY	
BB	TD	BT	BRIDGE ENGINEER
MINN03RT	03RTGB33		

F.2.5.25. DIAPHRAGM DETAILS

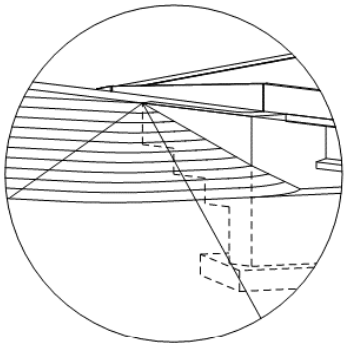


F.2.5.26. DETAILS OF BRIDGE END BACKFILL (A)

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P 0115(51)104 IM 0293(102)98	E37	E140



PLAN
(Bridge End Backfill shown adjacent to Abut. No. 1)



SPILL CONE DETAIL AT EMBANKMENT

ESTIMATED QUANTITIES

	ITEM	UNIT	QUANTITY
	Granular Bridge End Backfill	Cu. Yd.	81.5
♣	Bridge End Embankment	Cu. Yd.	704.9
♦	Base Course	Ton	1832.2
♦	Porous Backfill	Ton	16.3
	4" Underdrain Pipe	Ft.	113
♦	Geogrid Reinforcement	Sq. Yd.	843

1. 68 ft. 4" dia. Slotted Corrugated Polyethylene Drainage Tubing.
2. 35 ft. 4" dia. Corrugated Polyethylene Drainage Tubing.
3. 603 sq. ft. Vertical Composite Drain
4. 10 ft. 4" dia. Std. Black Pipe with Rodent Screens.

Items 1 thru 4 are approximate quantities contained in the 4" Underdrain Pipe and are for information only.

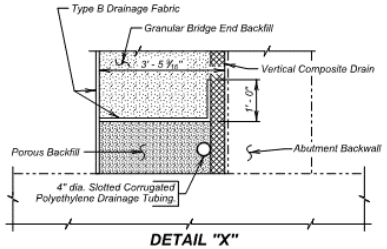
5. 2869 sq. ft. 6 mil Polyethylene Sheeting, not including laps.
6. 334 sq. yd. Type B Drainage Fabric.

Items 5 and 6 are approximate quantities contained in the Granular Bridge End Backfill and are for information only.

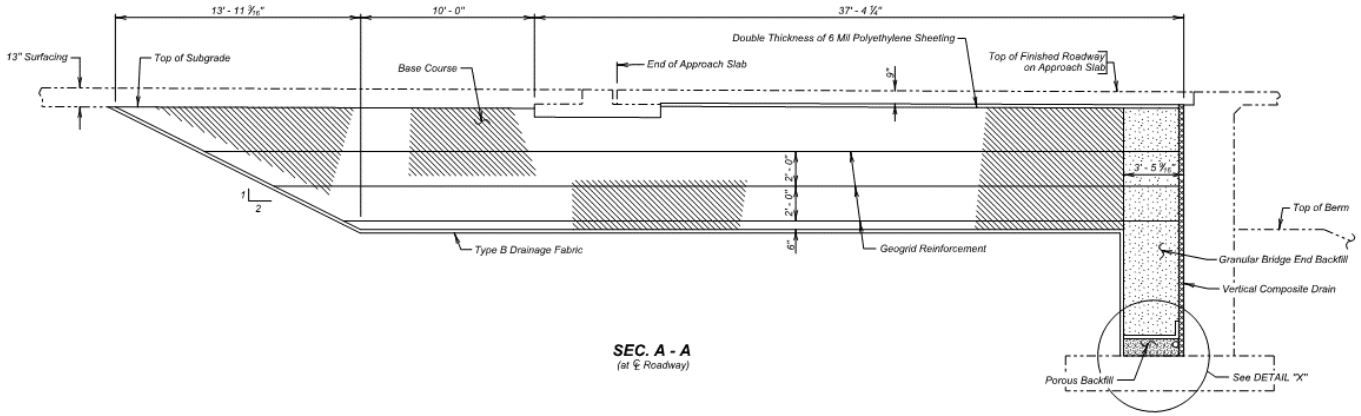
♦ For estimating purposes only, a factor of 1.89 tons/cu. yd. was used to convert cu. yds. to tons.

♣ Shrinkage Factor of 1.25 Used.

♦ Payment quanities will be based on area covered plus 15% to account for overlaps.



DETAIL "X"



SEC. A - A
(at ℄ Roadway)

DETAILS OF BRIDGE END BACKFILL ADJACENT TO ABUTMENT NO. 1 (A)
FOR

430' - 10 5/8" PRESTR. GIRDER BRIDGE

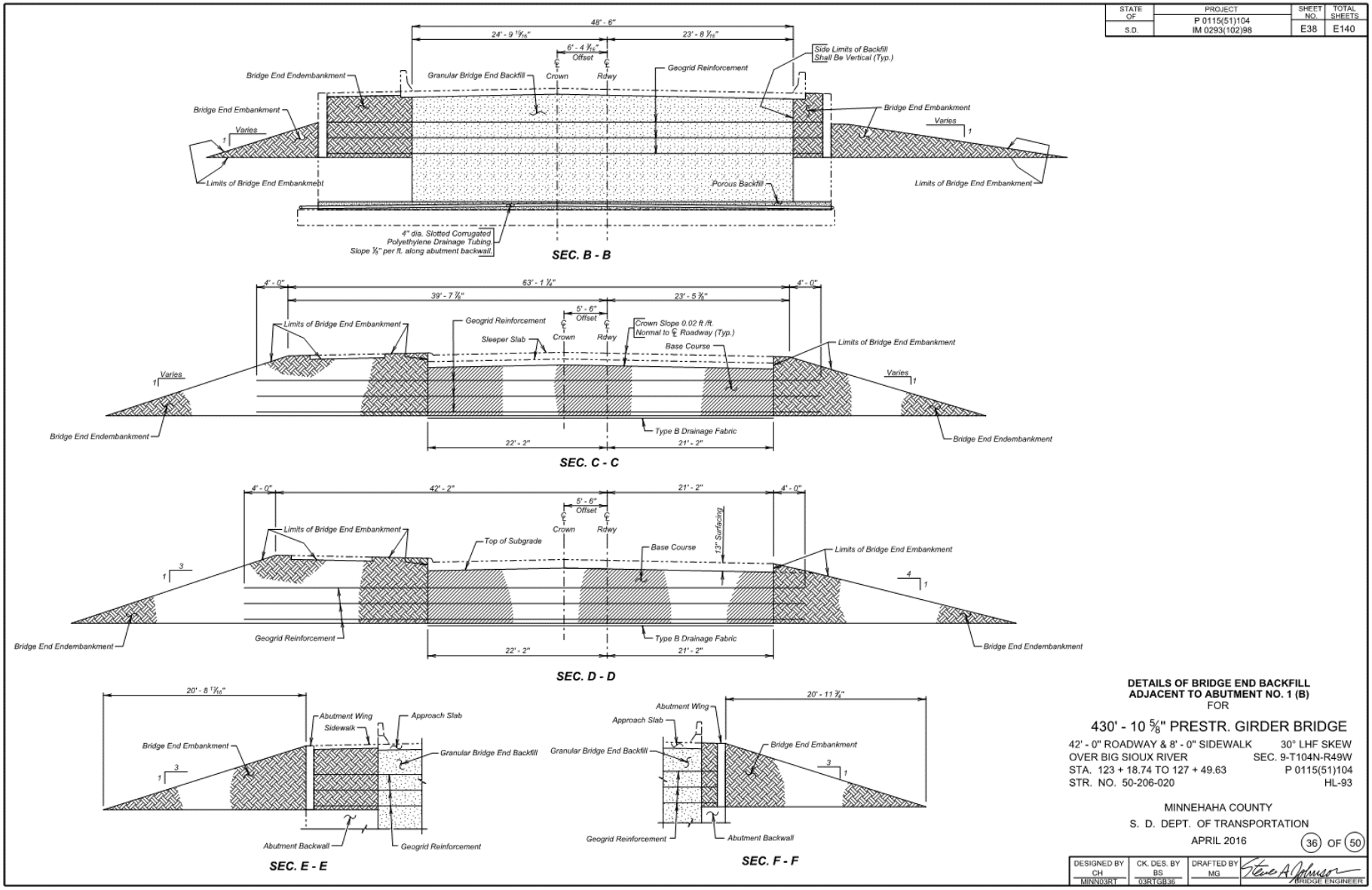
42' - 0" ROADWAY & 8' - 0" SIDEWALK 30° LHF SKEW
OVER BIG SIOUX RIVER SEC. 9-T104N-R49W
STA. 123 + 18.74 TO 127 + 49.63 P 0115(51)104
STR. NO. 50-206-020 HL-93

MINNEHAHA COUNTY
S. D. DEPT. OF TRANSPORTATION
APRIL 2016

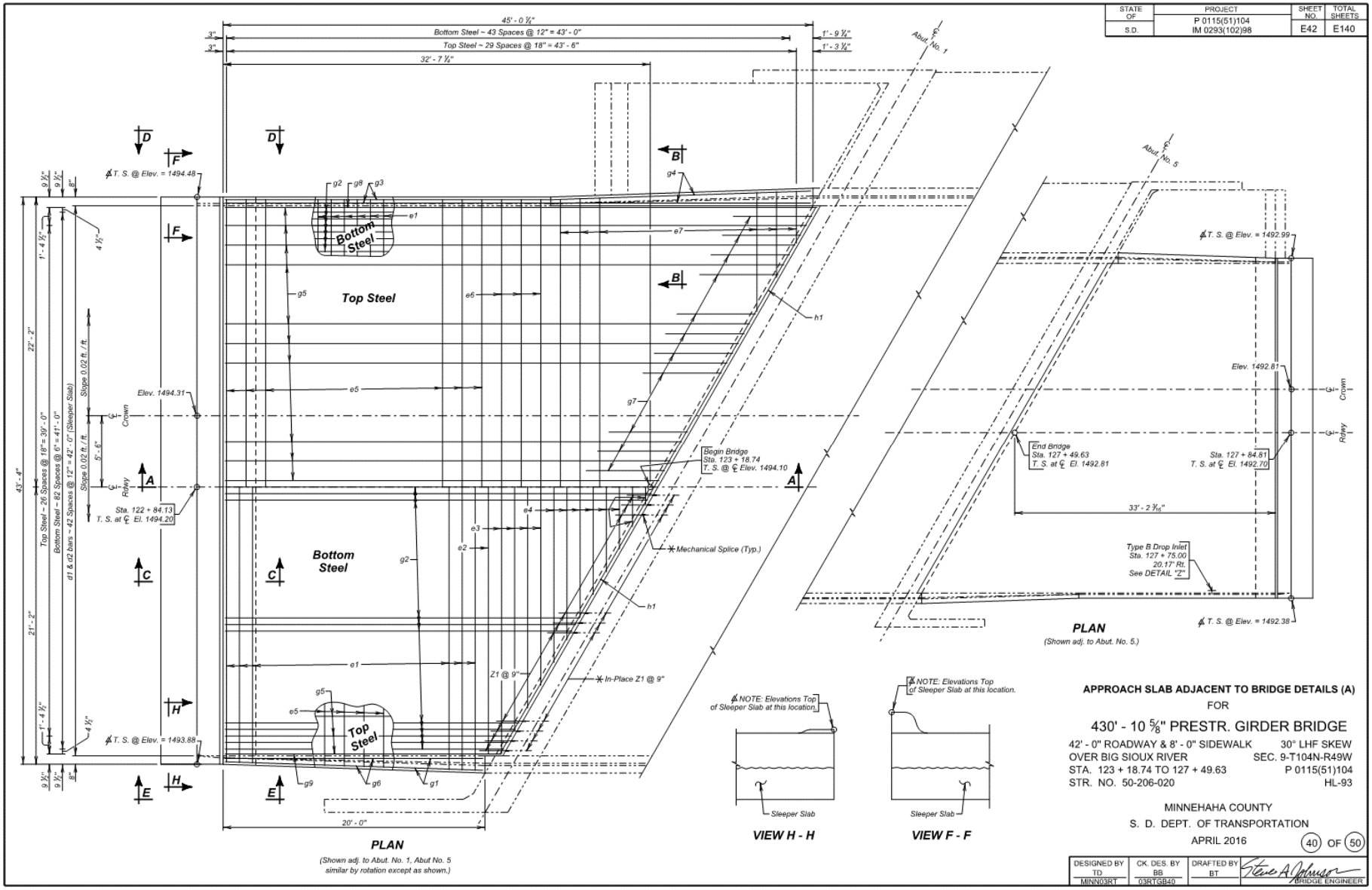
35 OF 50

DESIGNED BY	CK. DES. BY	DRAFTED BY	
CH MINN03RT	BS 03RTGB35	MG	BRIDGE ENGINEER

F.2.5.27. DETAILS OF BRIDGE END BACKFILL (B)

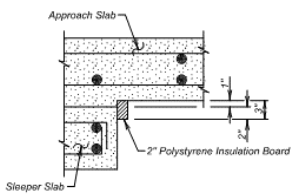


F.2.5.28. DETAILS OF APPROACH SLAB ADJACENT TO BRIDGE (A)

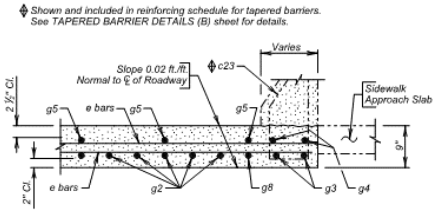


F.2.5.29. DETAILS OF APPROACH SLAB ADJACENT TO BRIDGE (B)

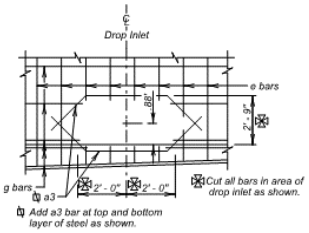
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P 0115(51)104 IM 0293(102)98	E43	E140



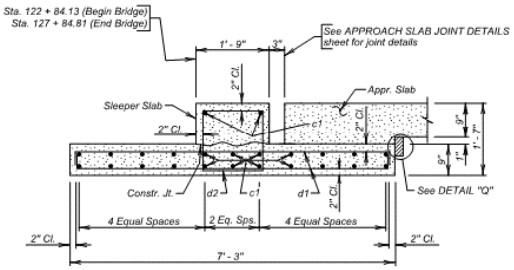
DETAIL "Q"



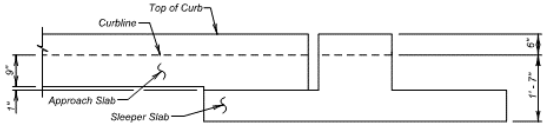
SEC. B - B



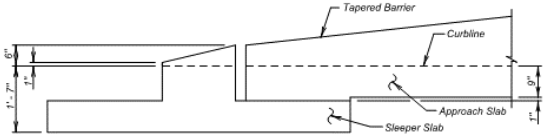
DETAIL "Z"
(Typical plan for steel when drop inlet is used.)



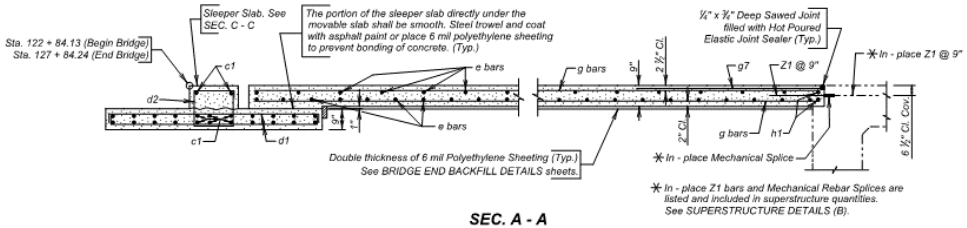
SEC. C - C
(Sleeper Slab)



VIEW D - D



VIEW E - E

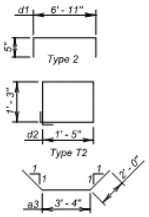


SEC. A - A

REINFORCING SCHEDULE
(For Two Approach Slabs & Two Sleeper Slabs)

	Mk.	No.	Size	Length	Type
	Sleeper Slabs				
	c1	48	5	43' - 0"	Str.
	d1	172	4	7' - 9"	2
	d2	86	4	6' - 1"	T2
	Approach Slabs				
	a3	2	4	7' - 4"	19A
△	e1	20	6	86' - 7"	Str.
	e2	2	6	42' - 4"	Str.
△	e3	4	6	79' - 4"	Str.
△	e4	19	6	40' - 3"	Str.
△	e5	14	4	86' - 7"	Str.
△	e6	3	4	79' - 4"	Str.
△	e7	13	4	38' - 5"	Str.
	g1	4	8	19' - 8"	Str.
△	g2	83	8	66' - 3"	Str.
	g3	4	8	44' - 8"	Str.
	g4	4	4	44' - 8"	Str.
△	g5	29	4	66' - 2"	Str.
	g6	4	4	19' - 8"	Str.
	g7	56	4	6' - 0"	Str.
	g8	2	8	45' - 2"	Str.
	g9	2	8	21' - 0"	Str.
	h1	4	6	48' - 1"	Str.
	Z1	112	7	2' - 0"	Str.

Bending Details



45 - 1 ½"	21' - 0 ½"	g5
44 - 11 ½"	21' - 3 ½"	g2
34' - 6"	3' - 11"	e7
35' - 5"	4' - 10"	e4
42' - 3"	37' - 1"	e3 or e6
43' - 7"	43' - 0"	e1 or e5

Cut 129 g5 | Cut 83 g2 | Cut 13 e7 | Cut 3 e6 | Cut 14 e5 | Cut 19 e4 | Cut 4 e3 | Cut 20 e1

43' - 0"	43' - 7"	e1 or e5
37' - 1"	42' - 3"	e3 or e6
4' - 10"	35' - 5"	e4
3' - 11"	34' - 6"	e7
21' - 3 ½"	44 - 11 ½"	g2
21' - 0 ½"	45 - 1 ½"	g5

NOTE:
All bars to be epoxy coated.
All dimensions are out to out of bars.
△ See cutting diagram.

ESTIMATED QUANTITIES
(For Two Approach Slabs & Two Sleeper Slabs)

ITEM	UNIT	QUANTITY
Concrete Approach Slab for Bridge	Sq. Yd.	325.0
Concrete Approach Sleeper Slab for Bridge	Sq. Yd.	69.9

1. 81.9 Cu. Yds. Concrete in Approach Slabs.
2. 23355 Lbs. Epoxy Coated Re-Steel in Approach Slabs.
3. 21.6 Sq. Ft. of Polystyrene Insulation Board.
4. 22.0 Cu. Yds. Concrete in Sleeper Slabs.
5. 3393 Lbs. Epoxy Coated Re-Steel in Sleeper Slabs.
6. 3.8 Cu. Yds. Concrete in Tapered Barriers.
7. 1071 Lbs. Epoxy Coated Re-Steel in Tapered Barriers.

Items 1 thru 7 are approximate quantities contained in the above bid items and are for information only.

APPROACH SLAB ADJACENT TO BRIDGE DETAILS (B)
FOR
430' - 10 ⅝" PRESTR. GIRDER BRIDGE

42' - 0" ROADWAY & 8' - 0" SIDEWALK 30° LHF SKEW
OVER BIG SIOUX RIVER SEC. 9-T104N-R49W
STA. 123 + 18.74 TO 127 + 49.63 P 0115(51)104
STR. NO. 50-206-020 HL-93

MINNEHAHA COUNTY
S. D. DEPT. OF TRANSPORTATION
APRIL 2016

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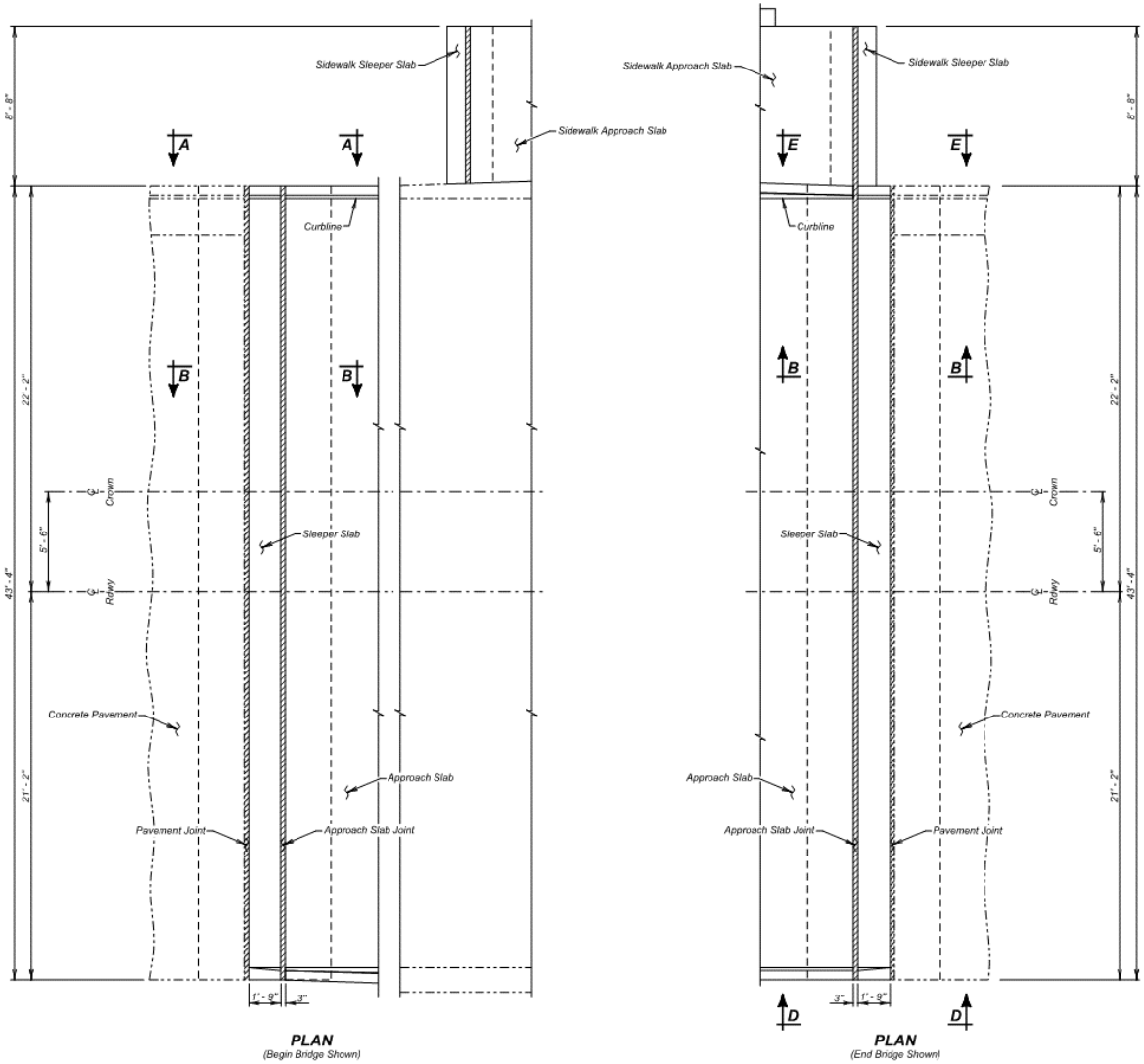
DESIGNED BY	CK. DES. BY	DRAFTED BY	
TD MINN03RT	BB 03RTGB41	BT	BRIDGE ENGINEER

F.2.5.30. APPROACH SLAB JOINT DETAILS

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
	P 0115(51)104 IM 0293(102)98	E47	E140



GENERAL NOTES

1. The Membrane Sealant shall be on the approved product list for Membrane Sealant Expansion Joints.
2. The manufacturer shall supply the membrane sealant in packaging that precompresses the membrane sealant. The precompressed dimension shall be as recommended by the sealant manufacturer, however, in no case shall the precompressed dimension exceed 75% of the joint opening width. The foam sealant shall be slowly self expanding to permit workers ample time to install the membrane sealant before the membrane sealant exceeds the joint opening width.
3. The membrane sealant shall provide a water tight seal throughout a joint movement range of + 25% (minimum) from the specified joint opening dimension.
4. The membrane sealant shall be supplied in pieces a minimum of 5 feet in length. The foam sealant shall be ultra-violet and ozone resistant.
5. The bonding adhesive used to attach the membrane sealant to the adjacent concrete shall be approved by the membrane sealant manufacturer.
6. Adhesive used to join adjacent pieces of the membrane sealant shall be as recommended by the manufacturer.
7. If styrofoam filler material is used in the construction, it shall be closed cell and water-tight as approved by the Engineer.
8. The minimum ambient air temperature at the time of joint installation and adhesive curing shall be 40° F.
9. A technical representative of the membrane sealant manufacturer shall be present at the jobsite during installation. The technical representative shall be knowledgeable in the correct procedures for the preparation and installation of the joint material to ensure the Contractor installs the joint to the manufacturers' recommendations.
10. Surfaces that will be in contact with the membrane sealant shall be thoroughly cleaned by abrasive blasting to remove all laitance and contaminants (such as oil, curing compounds, etc.) from the surface. At a minimum, two passes of abrasive blasting with the nozzle held at an angle to within 1 to 2 inches of the surface will be required. Cleaning of the surfaces with solvents, wire brushing, or grinding shall not be permitted.
11. After abrasive blasting, but immediately prior to membrane joint installation, the entire joint contact surface shall be air blasted. The air compressor used for joint cleaning shall be equipped with trap devices capable of providing moisture-free and oil-free air at a recommended pressure of 90 psi. To obtain complete bonding with the adhesive, the adjacent surfaces must be dry and clean. The contact surfaces for the joint shall be visually inspected by the Engineer immediately prior to joint installation to verify the surface is dry and clean.
12. Individual spliced sections shall be installed as per the manufacturers' recommendations. The membrane joint sealant manufacturer shall submit a detailed installation procedure to the Engineer at least 5 days prior to joint installation for his review.
13. Traffic shall not be allowed on the joint until the bonding adhesive has had time to cure, as recommended by the manufacturer.
14. Use plywood or other material to protect concrete adjacent to the joint from spalling before any equipment is moved across the joint. Any spall areas will be repaired at the Contractor's expense by breaking out and replacing adjacent concrete, as approved by the Engineer.
15. The Membrane Sealant Expansion Joint will be measured in feet to the nearest one-tenth foot, complete in place. Measurement will be made of the overall horizontal length. The Membrane Sealant Expansion Joint will be paid for at the contract unit price per foot complete in place. Payment for this item shall be full compensation for furnishing all the required materials in place, including labor, equipment and incidentals necessary to complete the work in accordance with the plans and the foregoing specifications.

APPROACH SLAB JOINT DETAILS (A)

FOR

430' - 10 5/8" PRESTR. GIRDER BRIDGE

42' - 0" ROADWAY & 8' - 0" SIDEWALK — 30° LHF SKEW
OVER BIG SIOUX RIVER — SEC. 9-T104N-R49W
STA. 123 + 18.74 TO 127 + 49.63 — P 0115(51)104
STR. NO. 50-206-020 — HL-93

MINNEHAHA COUNTY
S. D. DEPT. OF TRANSPORTATION
APRIL 2016

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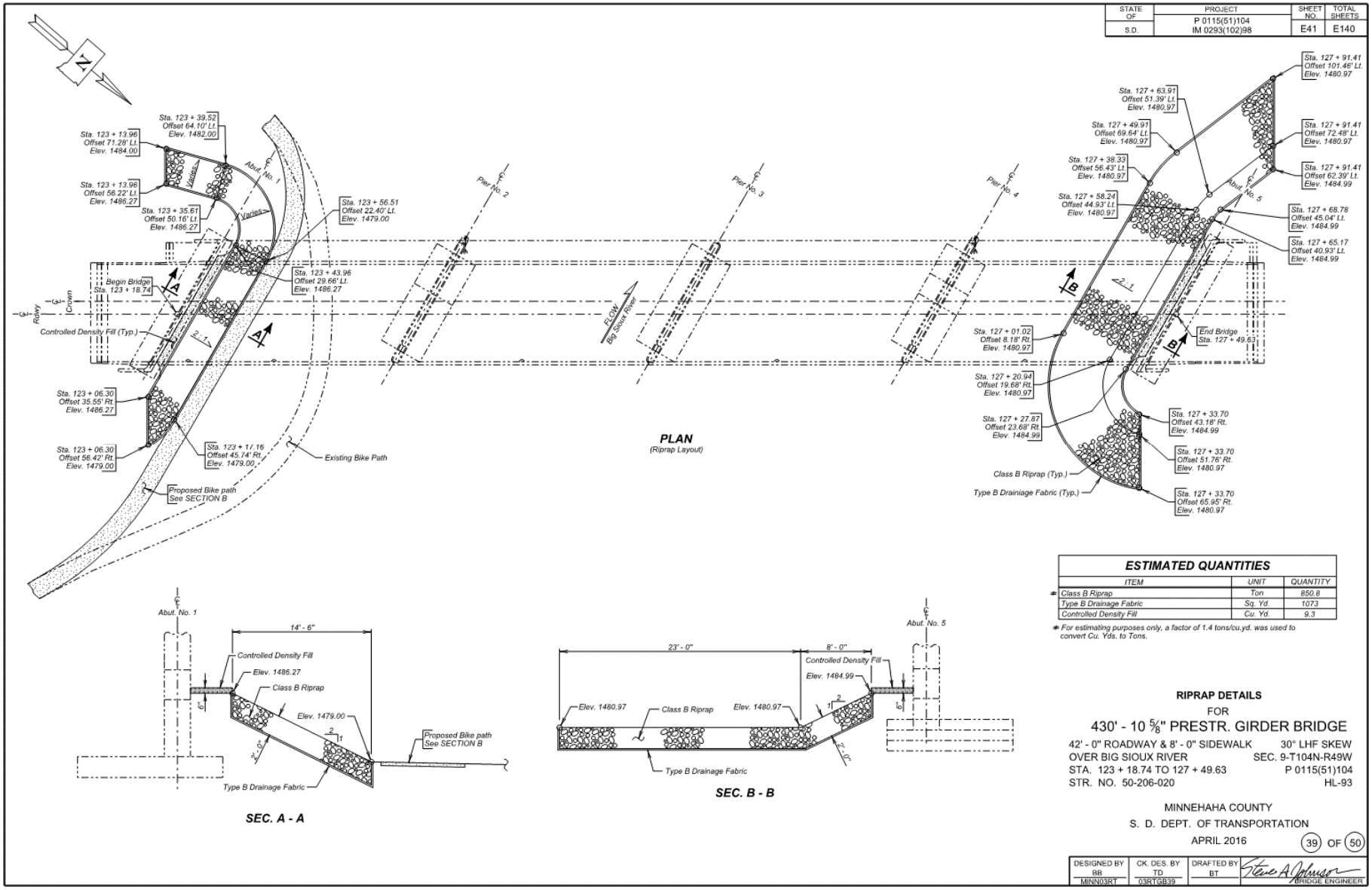
DESIGNED BY	CK. DES. BY	DRAFTED BY	
TD MINN03RT	BB 03RTGB45	BT	BRIDGE ENGINEER

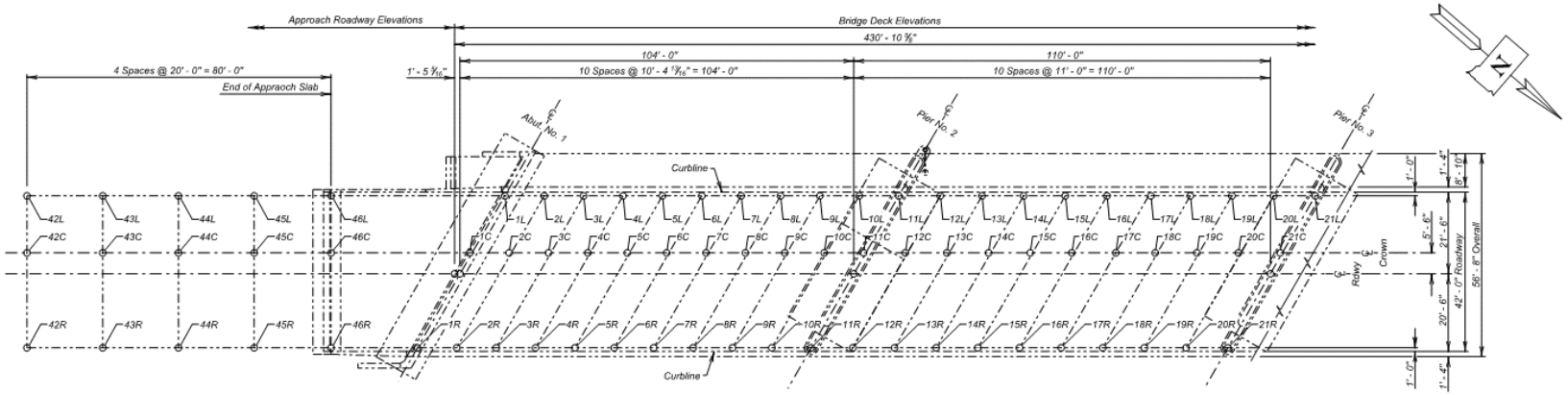
F.2.5.31. RIPRAP DETAILS



F.2.5.32. AS-BUILT ELEVATION SURVEY(A)

The elevations shown in these plans are based on the National Geodetic Survey (NGS) North American Vertical Datum of 1988 (NAVD88).

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P 0115(51)104 IM 0293(102)98	E49	E140



PLAN

Table of As-Built Elevations - Bridge Deck					
Location	Elevation	Location	Elevation	Location	Elevation
1L		1C		1R	
2L		2C		2R	
3L		3C		3R	
4L		4C		4R	
5L		5C		5R	
6L		6C		6R	
7L		7C		7R	
8L		8C		8R	
9L		9C		9R	
10L		10C		10R	
11L		11C		11R	
12L		12C		12R	
13L		13C		13R	
14L		14C		14R	
15L		15C		15R	
16L		16C		16R	
17L		17C		17R	
18L		18C		18R	
19L		19C		19R	
20L		20C		20R	
21L		21C		21R	

Table of As-Built Elevations - Approach Roadway					
Location	Elevation	Location	Elevation	Location	Elevation
42L		42C		42R	
43L		43C		43R	
44L		44C		44R	
45L		45C		45R	
46L		46C		46R	

Elevations - Bridge Survey Markers		
Location	Station - Offset	Elevation
Begin Bridge		

NOTE -
The Contractor shall be responsible for producing the As - Built Elevation Survey soon after construction is complete and before the bridge is opened to traffic. The As - Built Elevations of the Bridge shall be taken and recorded at the locations shown by the table on this sheet. The completed table shall be given to the Engineer who will forward a copy to the Office of Bridge Design and the Region Office.

AS - BUILT ELEVATION SURVEY (A)
FOR
430' - 10 5/8" PRESTR. GIRDER BRIDGE

42' - 0" ROADWAY & 8' - 0" SIDEWALK — 30° LHF SKEW
OVER BIG SIOUX RIVER — SEC. 9-T104N-R49W
STA. 123 + 18.74 TO 127 + 49.63 — P 0115(51)104
STR. NO. 50-206-020 — HL-93

MINNEHAHA COUNTY
S. D. DEPT. OF TRANSPORTATION
APRIL 2016

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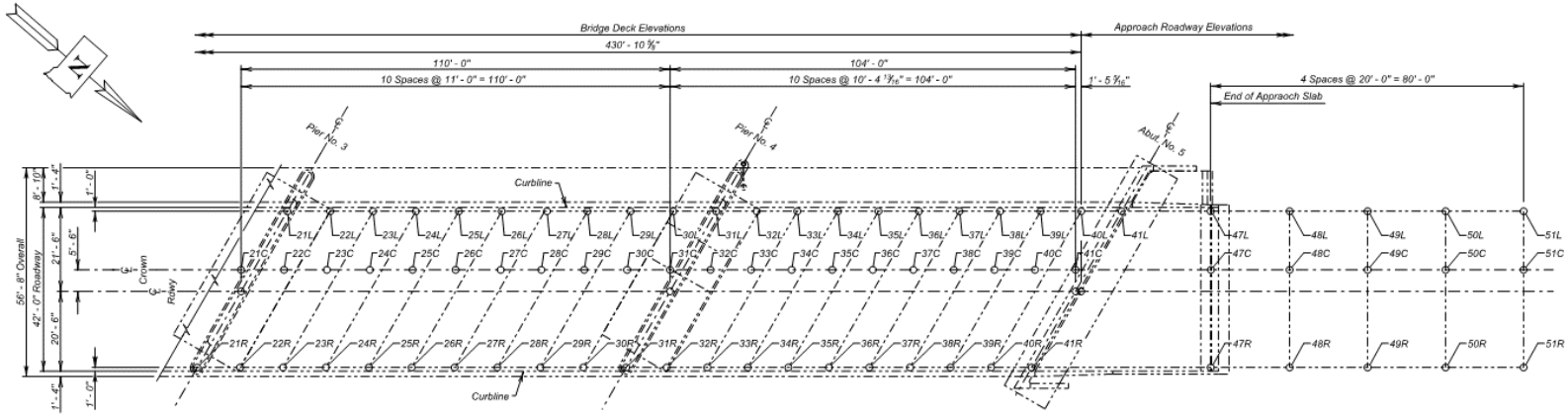
DESIGNED BY	CK. DES. BY	DRAFTED BY	
TD MINN03RT	BB 03RTGB47	BT	BRIDGE ENGINEER

F.2.5.33. AS-BUILT ELEVATION SURVEY(B)

The elevations shown in these plans are based on the National Geodetic Survey (NGS) North American Vertical Datum of 1988 (NAVD88).

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P 0115(51)104 IM 0293(102)98	E50	E140



PLAN

Table of As-Built Elevations - Bridge Deck					
Location	Elevation	Location	Elevation	Location	Elevation
21L		21C		21R	
22L		22C		22R	
23L		23C		23R	
24L		24C		24R	
25L		25C		25R	
26L		26C		26R	
27L		27C		27R	
28L		28C		28R	
29L		29C		29R	
30L		30C		30R	
31L		31C		31R	
32L		32C		32R	
33L		33C		33R	
34L		34C		34R	
35L		35C		35R	
36L		36C		36R	
37L		37C		37R	
38L		38C		38R	
39L		39C		39R	
40L		40C		40R	
41L		41C		41R	

Table of As-Built Elevations - Approach Roadway					
Location	Elevation	Location	Elevation	Location	Elevation
47L		47C		47R	
48L		48C		48R	
49L		49C		49R	
50L		50C		50R	
51L		51C		51R	

Elevations - Bridge Survey Markers		
Location	Station - Offset	Elevation
End Bridge		

ESTIMATED QUANTITIES		
ITEM	UNIT	QUANTITY
Bridge Elevation Survey	L. S.	Lump Sum

AS - BUILT ELEVATION SURVEY (B)

FOR

430' - 10 5/8" PRESTR. GIRDER BRIDGE

42' - 0" ROADWAY & 8' - 0" SIDEWALK 30° LHF SKEW
OVER BIG SIOUX RIVER SEC. 9-T104N-R49W
STA. 123 + 18.74 TO 127 + 49.63 P 0115(51)104
STR. NO. 50-206-020 HL-93

MINNEHAHA COUNTY

S. D. DEPT. OF TRANSPORTATION

APRIL 2016

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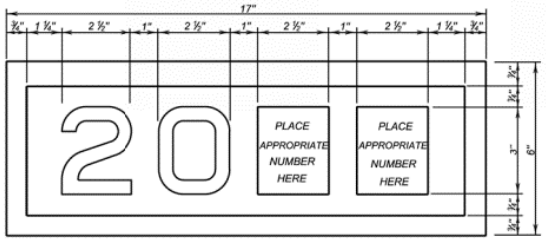
DESIGNED BY	CK. DES. BY	DRAFTED BY	
TD MINN03RT	BB 03RTGB48	BT	BRIDGE ENGINEER

F.2.5.34. DETAILS OF STANDARD PLATE NO's 460.02 & 460.05

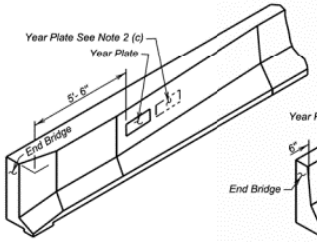
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P 0115(51)104 IM 0293(102)98	E51	E140



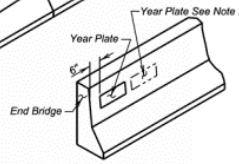
YEAR PLATE DETAILS

GENERAL NOTES:

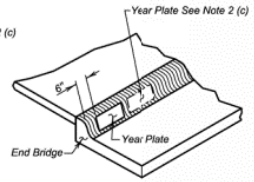
1. Year plates of the general dimensions shown shall be constructed on all box culverts and bridges. The year plates shall be constructed in reverse and attached to the forms in such a manner that the finished imprint in the concrete does not exceed one-half (½) inch in depth.
2. Year plates shall be located on structure (s) as follows:
   a. On cast-in-place box culverts the year plates shall be four and one - half (4 ½) inches below the top of the upstream parapet wall and centered laterally on the upstream face. On precast box culverts the year plate shall be centered laterally on the upstream face of the top slab. Where an extended interior wall interferes with this location, the year plate shall be centered in an adjacent barrel.
   b. On bridges with six (6) inch curbs or "Jersey" shaped barriers with no endblocks, the year plate shall be centered vertically on the curb face approximately six (6) inches from the end of the bridge, or as designated by the Engineer. On bridges with "Jersey" shaped barrier endblocks, the year plate shall be centered on the upper sloped portion of the barrier approximately 5'- 6" from the end of the bridge, or as designated by the Engineer. There shall be one year plate at each end of the bridge on opposite sides.
   c. When the plans specify that both the original date of construction and the date of reconstruction are to be shown, one date shall be placed as listed above and the other located adjacent to it. Both year plates shall be shown at each end of the bridge on opposite sides.
3. There will be no separate measurement or payment made for year plates on box culverts and bridges. All costs for this work shall be incidental to other contract items.



JERSEY BARRIER
(With Endblock)



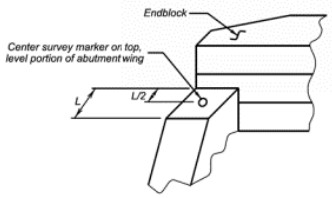
JERSEY BARRIER



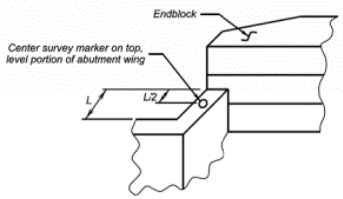
TYPE B CURB

June 26, 2012

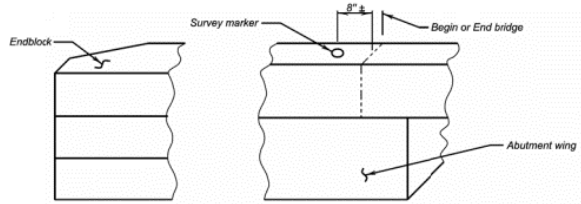
Published Date: 3rd Qtr. 2016	SDDOT	YEAR PLATE DETAILS	PLATE NUMBER 460.02 Sheet 1 Of 1



ABUTMENT WITH "STRAIGHT" WINGS



ABUTMENT WITH "SWEPT BACK" WINGS



ABUTMENT WITH "SWEPT BACK" WINGS
(Endblock on top of wings)

GENERAL NOTES:

1. Survey markers shall be located at each abutment on the same side of the bridge as the year plate. Place survey markers on abutment wings as shown. Two survey markers will be required at each bridge.
2. Survey markers shall be of a type intended for installation in concrete, be made of solid brass or bronze, have a domed top and be either a 3" top diameter (with a ¾" X 2" long ribbed shank), or a US Army Corps of Engineers Type C Disc with a 3 ½" top diameter.
3. There will be no separate measurement or payment made for survey markers. All costs for this work shall be incidental to the other contract items.

June 26, 2012

Published Date: 3rd Qtr. 2016	SDDOT	BRIDGE SURVEY MARKER	PLATE NUMBER 460.05 Sheet 1 of 1

430' - 10 ⅝" PRESTR. GIRDER BRIDGE
STR. NO. 50-206-020
APRIL 2016

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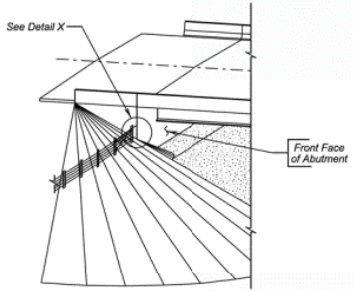
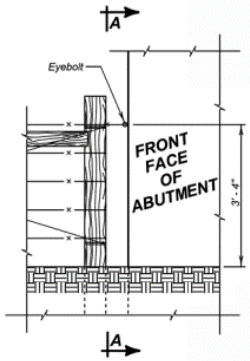
F.2.5.35. DETAILS OF STANDARD PLATE NO's 620.19

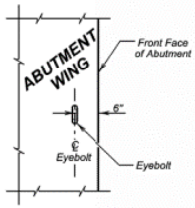
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P 0115(51)104 IM 0293(102)98	E52	E140



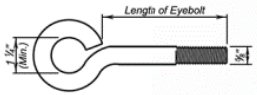
DETAILS FOR FENCE ANCHORS



DETAIL "X"



VIEW A - A



EYEBOLT DETAILS

GENERAL NOTES:

1. The fence and post details shown are for illustrative purpose only. The fence shall be as specified elsewhere in the plans.
2. Eyebolts shall be placed on all of the bridge abutment wings.
3. Eyebolts shall be ⅝ inch diameter and shall conform to ASTM A307.
4. Eyebolts shall be galvanized in accordance with AASHTO M232 (ASTM A153).
5. Eyebolts shall be installed after abutment wings are backfilled and berm construction is complete. Drill-in and epoxy eyebolts into abutment such that the eye of the bolt is flush with the concrete surface.
6. The epoxy resin mixture shall be of a type for bonding steel to hardened concrete and shall conform to AASHTO M235 Type IV, Grade 3 (Equivalent to ASTM C881, Type IV, Grade 3).
7. The diameter of the drilled holes shall not be less than ⅛ inch greater, nor more than ⅜ inch greater than the diameter of the eyebolts or as per Manufacturer's recommendations. The drilled holes shall be blown out with compressed air using a device that will reach the back of the hole to be sure that all debris or loose material has been removed prior to epoxy injection.
8. Mix epoxy resin as recommended by the Manufacturer and apply by an injection method as approved by the Engineer. Beginning at the back of the drilled holes, fill the holes ½ to ⅔ full of epoxy, or as recommended by the Manufacturer, prior to insertion of the eyebolts. Care shall be taken to prevent epoxy from flowing out of the horizontal holes prior to eyebolt insertion. Rotate the eyebolt during installation to eliminate voids and ensure complete bonding of the bolt. Insertion of the eyebolts by the dipping or painting method will not be allowed.
9. Loads shall not be applied to the epoxy grouted eyebolts until the epoxy resin has had sufficient time to cure as specified by the epoxy resin manufacturer.
10. The cost for furnishing and installing the eyebolts shall be incidental to various contract items.

December 23, 2012

Published Date: 3rd Qtr. 2016	SDDOT	FENCE ANCHORS FOR BRIDGE ABUTMENTS (SWEPT BACK WINGS)	PLATE NUMBER 620.19 Sheet 1 of 1

430' - 10 ⅝" PRESTR. GIRDER BRIDGE
STR. NO. 50-206-020
APRIL 2016

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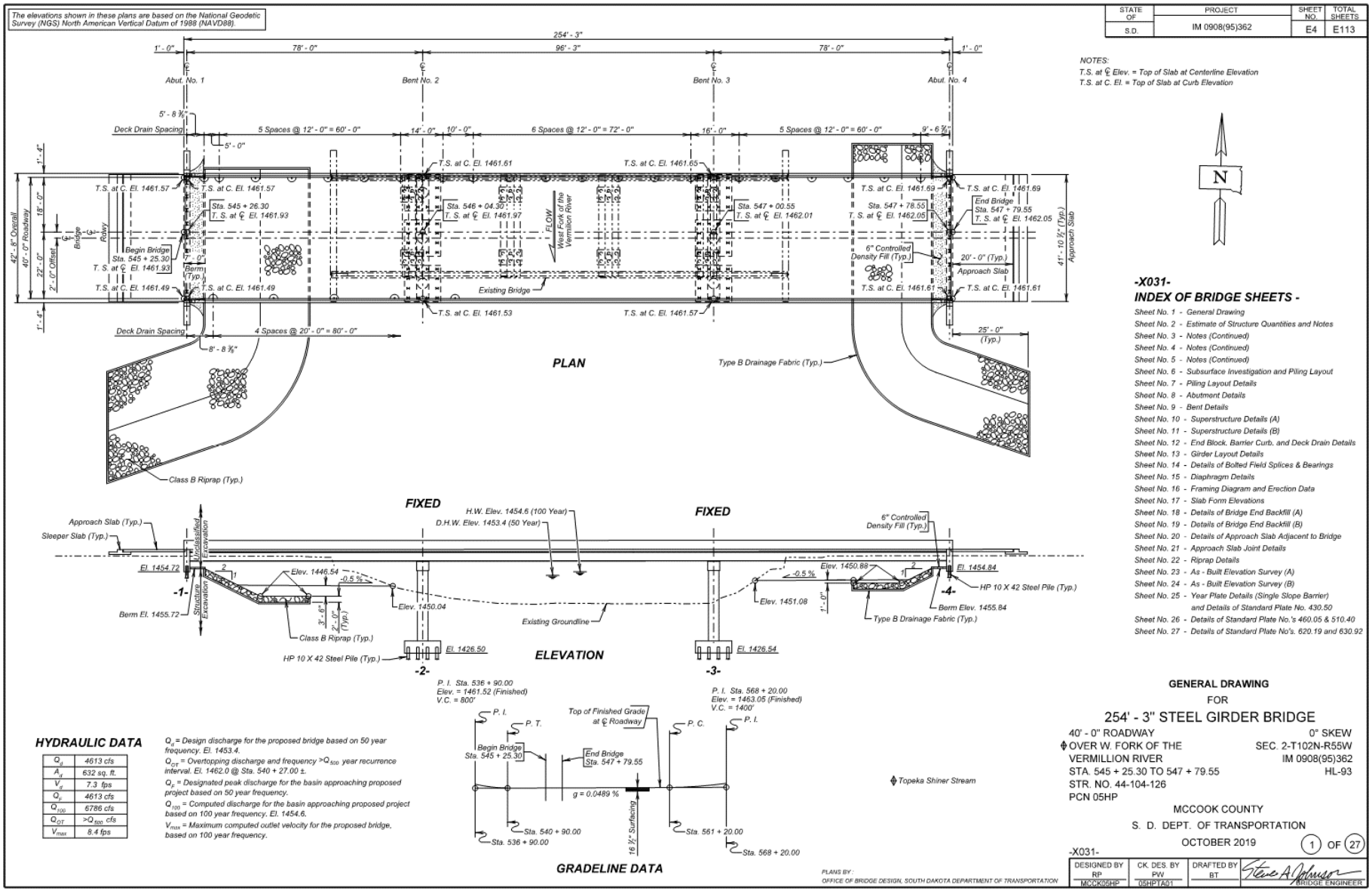
F.2.6. Square Steel Girder Bridge

F.2.6.1. GENERAL DRAWING



F.2.6.2. ESTIMATE OF STRUCTURE QUANTITIES & NOTES

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	IM 0909(80)397	E5	E113

ESTIMATE OF STRUCTURE QUANTITIES

DESCRIPTION	QUANTITY	UNIT	REMARKS
Bridge Elevation Survey	Lump Sum	LS	
Concrete Penetrating Sealer	1,130	SqYd	See Special Provision
Incidental Work, Structure	Lump Sum	LS	
Structural Steel	Lump Sum	LS	
Membrane Sealant Expansion Joint	83.8	Ft	
Structure Excavation, Bridge	1,041	CuYd	
Bridge End Embankment	1,134	CuYd	
Granular Bridge End Backfill	88.2	CuYd	
Approach Slab Underdrain Excavation	3.2	CuYd	
Precast Concrete Headwall for Drain	4	Each	
Class A45 Concrete, Bridge Deck	347.6	CuYd	
Class A45 Concrete, Bridge	275.2	CuYd	
Concrete Approach Slab for Bridge	190.6	SqYd	
Concrete Approach Sleeper Slab for Bridge	67.5	SqYd	
Deck Drain, Girder Bridge	26	Each	
Control Density Fill	10.6	Cu Yd	
Reinforcing Steel	36,086	Lb	
Epoxy Coated Reinforcing Steel	2,622	Lb	
Stainless Reinforcing Steel	79,033	Lb	See Special Provision
Extract pile	12	Each	
Preboring Pile	180	Ft	
HP 10x42 Steel Test Pile, Furnish and Drive	380	Ft	
HP 10x42 Steel Bearing Pile, Furnish and Drive	6,930	Ft	
4" Underdrain Pipe	292	Ft	
Porous Backfill	34.6	Ton	
Class B Riprap	791.1	Ton	
Overburden Excavation for Riprap	410	CuYd	
Type B Drainage Fabric	953	SqYd	

SPECIFICATIONS FOR BRIDGE

1. Design Specifications: AASHTO LRFD Bridge Design Specifications, 8th Edition.
2. Construction Specifications: South Dakota Standard Specifications for Roads and Bridges, 2015 Edition and required Provisions, Supplemental Specifications and Special Provisions as included in the Proposal.
3. All welding and welding inspections will be in conformance with the latest edition of AASHTO/AWS D1.5/D1.5M Bridge Welding Code unless noted otherwise in the plans.

BRIDGE DESIGN LOADING

1. AASHTO HL-93.
2. Dead Load includes 22 psf for future wearing surface on the roadway.

DESIGN MATERIAL STRENGTHS

Class A45 Concrete	f'_c = 4,500 psi
Reinforcing Steel (ASTM A615, Gr. 60)	f_y = 60,000 psi
Piling (ASTM A572 Grade 50)	f_y = 50,000 psi
Structural Steel (ASTM A709 Gr. 50WT2)	f_y = 50,000 psi

GENERAL CONSTRUCTION

1. All lap splices shown are contact lap splices unless noted otherwise.
2. All exposed concrete corners and edges will be chamfered 3/4-inch unless noted otherwise.
3. Use 2-inch clear cover on all reinforcing steel except as shown.
4. Contractor will imprint on the structure the date of new construction as specified and detailed on Year Plate Details (Single Slope Barrier).
5. Barrier curbs and end blocks will be built perpendicular to the roadway grade line.
6. Request for construction joints or reinforcing steel splices at points other than those shown, must be submitted to the Engineer for prior approval. If additional splices are approved, no payment will be allowed for the added quantity of reinforcing steel.
7. Bridge berms will be constructed to the plans template prior to any pile driving or construction of abutment footings. See Standard Plate 120.10. Berm slopes will not be disturbed after construction. Any alterations to the berm or slopes after berm construction will be submitted to the Bridge Construction Engineer for approval. Allow 30 days for review of proposals.
8. The elevation of the bridge deck is 16 inches above subgrade elevation.

INCIDENTAL WORK, STRUCTURE

1. In place centerline Sta. 545+74.25 to Sta. 547+25.75 is a 151'-6" span Continuous Concrete Bridge with a 30'-0" clear roadway. The superstructure consists of a reinforced 12 1/2" concrete slab (17" over the bents) with concrete rectangular block on curb barriers the length of bridge. The deck has been overlaid with 2 inches of concrete. The substructure consists of 2 column reinforced concrete bents and reinforced concrete integral type abutments, all of which are supported on timber piling.
2. Break down and remove the existing bridge and approach/sleeper slabs if applicable, to 1-foot below finished groundline, or as required to construct the new structure in accordance with Section 110 of the Construction Specifications. All portions of the existing bridge will not be salvaged for future highway related use. The existing bridge will be removed and disposed of by the Contractor. An appropriate site will be as described in the Environmental Commitments Notes in the plans.
3. The foregoing is a general description of the in-place bridge and should not be construed to be complete in all details. Before preparing the bid, it will be the responsibility of the Contractor to make a visual inspection of the structure to verify the extent of the work and materials involved. If desired by the Contractor, a copy of the original construction plans may be obtained through the Office of Bridge Design.

ABUTMENTS

1. Preboring piling at each abutment is required to whichever is greater, ten feet or to natural ground.
2. The HP 10x42 Piling were designed using a factored bearing resistance of 77 tons per pile. Piling will develop a field verified nominal bearing resistance of 192 tons per pile.
3. One test pile will be driven at each abutment and will become part of the pile group.
4. The contractor will have sufficient pile splice material on hand before pile driving is started. See Standard Plate 510.40.
5. Piles will not be driven out of position by more than three inches in the direction normal to the abutment centerline. A pile-driving template will be used to ensure this accuracy.
6. Each finished abutment will include a Bridge Survey Marker. See Standard Plate 460.05.

ESTIMATE OF STRUCTURE QUANTITIES AND NOTES
FOR
254' - 3" STEEL GIRDER BRIDGE

STR. NO. 44-104-126
OCTOBER 2019

2 OF 27

DESIGNED BY	CK. DES. BY	DRAFTED BY	
RP	PW	BT	BRIDGE ENGINEER
MCCK05HP	05HPTA02		

F.2.6.3. NOTES (CONTINUED)

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	IM 0909(80)397	E6	E113

PILE DRIVING

1. A drivability analysis was performed using the wave equation analysis program (GRLWEAP). The pile hammers listed below were evaluated and found to produce acceptable driving stresses.

   Delmag D25-32 Delmag D30-32 APE D30-32
   Pileco D25-32 APE D30-52

2. Pile hammers not listed will require evaluation and approval prior to use from the Geotechnical Engineering Activity. Request for evaluation of hammers not listed will be submitted a minimum of 5 business days prior to installation of piles.

CONNECTION OF GIRDER TO PILE

1. Cut off piling at the elevations shown in the plans and weld bearing plates to the piling. Adjust as necessary to make bearing plates level, and to permit proper position of the girders. If piles are driven out of position to the extent that bearing plates will not fit, the Contractor will submit the method of correction to the Engineer for approval. Piles will not be pulled into position.

2. All girder erection will be complete with the splices fully bolted and diaphragms in place, before welding girders to bearing plates. (Diaphragms need not be secured with more than temporary bolting, prior to the pile to girder connections.)

3. An alternate connection, capable of transmitting a direct load of 8000 lbs. to the pile and developing 30,000 lbs. horizontal force, may be submitted to the Office of Bridge Design for prior approval.

4. This connection will not be made when the temperature is greater than 70° F or less than 30° F.

5. Steel for the bearing plates will conform to ASTM A709 Gr. 50.

6. Payment for furnishing and installing the bearing plates will be incidental to the contract lump sum price for Structural Steel.

POURING OF ABUTMENT CONCRETE

1. Abutment concrete will be placed, as directed by the Engineer, at a time when a relatively stable temperature can be expected. A relatively stable temperature is defined as an air temperature deviation of not more than 30° F within 12 hours of completing the abutment pour from the air temperature at the time when the abutment concrete is placed.

2. The forms will be secured to the girders in such a manner that they will be free to move longitudinally with the expansion or contraction of the girder.

3. The girders will be braced near the abutments in such a manner that their lateral movement or rotation will be prevented during the placing of concrete. The Contractor will include details for this bracing with the falsework plans.

BENTS

1. All Swedge Bolts will be 1 1/2-inch diameter x 2'-6" F1554, Grade 55 bolts with heavy hex nut and cut washer (listed with structural steel in Superstructure quantities). A minimum of 20% of the embedded bolt surface will be covered with deformations whose radial dimensions are 15 to 20% of the bolt diameter.

2. The HP 10x42 Piling were designed using a factored bearing resistance of 77 tons per pile. Piling will develop a field verified nominal bearing resistance of 192 tons per pile.

3. One test pile will be driven at each bent and will become part of the pile group.

4. The contractor will have sufficient pile splice material on hand before pile driving is started. See Standard Plate 510.40

5. Spiral reinforcement may be fabricated from cold drawn wire conforming to ASTM A1064 or hot rolled plain or deformed bars conforming to the strength requirements of ASTM A615, Grade 60.

6. It is anticipated that cofferdams will be necessary. Cofferdams will be designed and constructed in accordance with Section 423 of the Construction Specifications

SUPERSTRUCTURE

1. Structural steel will conform to ASTM A709 Gr. 50WT2. Angles in the diaphragms will conform to ASTM A588 Grade 50. Shear connectors will conform to Section 7.3 Type B of the Bridge Welding Code.

2. Bolts, nuts and washers will conform to ASTM F3125, Grade A325, Type 3.

3. Shear Connectors will be field welded to the girders in accordance with the Shear Connector Field Installation Special Provision.

4. All butt-welded girder splices will be ultrasonically inspected.

5. The cost of welding and weld inspection will be incidental to the contract lump sum price for Structural Steel.

6. Structural steel used in all girder web plates, girder flanges, and girder splice plates will comply with the Charpy-V-Notch toughness requirements set forth in Section 970 of the Construction Specifications. Material greater than 1 1/2 inches in thickness will require frequency (P) testing in lieu of heat lot (H) testing. See Girder Layout for location of tension and stress reversal areas of girder flanges.

7. The use of an approved deck finishing machine will be required during placement of bridge deck concrete. The deck finishing machine will be adjusted and operated in such a manner that the screed or screeds are parallel with the centerline of the bridge. The finish machine and concrete placement will be parallel to the skew of the bridge.

8. The concrete bridge deck will be placed and finished at a minimum rate of 48 feet of deck per hour measured along centerline roadway. If concrete cannot be placed and finished at this rate, the Engineer will order a header installed and operations stopped. If a header is required sometime during the pour operation, its location will be at or as near as possible to the three-quarter point of the span. Notify the Bridge Construction Engineer if deck pour operations are stopped. Operations may resume only when the Engineer is satisfied that a rate of 48 feet per hour can be maintained and the concrete has attained a minimum compressive strength of 2000 psi.

9. All structural steel surfaces of the superstructure will be blast cleaned to a commercial finish, in accordance with SSPC SP6, at the fabricator. Abrasives used for blast cleaning will be clean dry sand, steel shot, mineral grit or manufactured grit. Fins, tears, slivers, and burred or sharp edges will be removed by grinding and then re-blasted to achieve the specified finish.

10. If the substructure units are not protected from precipitation running off of the girders during construction, the concrete surfaces may become stained. If staining of the substructure units does occur, it will be removed to the satisfaction of the Engineer. The Contractor will absorb all costs associated with removal of any stains.

11. Snap ties, if used in the barrier curb formwork, will be corrosion resistant. The corrosion resistant ties will be inert in concrete and compatible with the reinforcing steel.

12. The Contractor is required to submit detailed plan showing the proposed girder erection. The girder erection plan will be stamped by a Professional Engineer registered in South Dakota. The plan must be submitted 30 days prior to the start of work for approval by the Office of Bridge Design. The plan will include, but not be limited to, complete sequencing details, splice bolt up procedures, girder pick point locations, temporary shoring details and temporary bracing details.

13. All single girder segments will be adequately braced or held in position until the adjacent girder segment is placed and all diaphragms between the segments are fully installed and bolts fully tightened. Single girder segments will not be allowed to remain in place beyond the end of a work shift without connection to an adjacent girder segment with all diaphragms between the segments fully connected.

14. See Special Provision for Concrete Penetrating Sealer.

NOTES (CONTINUED)
FOR
254' - 3" STEEL GIRDER BRIDGE

STR. NO. 44-104-126
OCTOBER 2019

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DESIGNED BY	CK. DES. BY	DRAFTED BY	
RP	PW	BT	BRIDGE ENGINEER
MCCK05HP	05HPTA03		

F.2.6.4. NOTES (CONTINUED)

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	IM 0909(80)397	E7	E113

DESIGN MIX OF CONCRETE

1. All structural concrete will be Class A45 Concrete unless otherwise indicated.
2. Type II cement conforming to Section 750 is required except, Type III cement is required in the abutments. Type III cement will contain a maximum 8% Tricalcium Aluminate (C_3A) and a maximum 0.6% Alkalis ($Na_2O + O.658K_2O$).
3. Grout design mix will be as specified in Section 460.2 K of the Construction Specifications. A compressive strength of 2000 psi will be attained by the grout prior to erection of any beams. Chamfer edges of grout pads 3/4-inch. The quantity of grout is included in and will be paid for at the contract unit price per cubic yard for Class A45 Concrete, Bridge.

BEARINGS

1. All steel for the bearings will conform to ASTM A709, Gr. 50.
2. The pre-formed fabric pads will be composed of multiple layers of 8-ounce cotton duck impregnated and bonded with high quality natural rubber or of equivalent and equally suitable materials compressed into resilient pads of uniform thickness, after compression and vulcanization. The finished pads will withstand compression loads perpendicular to the plane of the laminations of not less than 10,000 psi without detrimental reduction in thickness or extrusion.
3. The bearing plates will be shop painted with 3 mils of inorganic zinc primer in accordance with Section 411 of the Construction Specifications. No top coat of polyurethane will be applied.
4. Tolerances and surface finish for Rocker Plates will be as follows:

Convex Radius Dimension	+0.000-inch to -0.010inch
Surface Finish, Machined Surfaces	125 RMS or Better
Surface Finish, Other Surfaces	230 RMS or Better

5. Payment for furnishing and installing the bearings, including the pre-formed fabric pads under the bearing plates and painting, will be incidental to the lump sum price for Structural Steel.

FIELD BOLTED GIRDER SPLICES

1. Steel for splices and filler plates will conform to ASTM A709 Gr. 50WT2.
2. Bolts in flange splices will be placed with the heads down.
3. Bolts in web splice of exterior girders will be placed with heads on exterior face of girders.
4. All bolts will be fully tightened prior to removing temporary supports.

WELDING AND WELD INSPECTION

Main members referred to in Section 6.7 Nondestructive Testing of the Bridge Welding Code are identified as follows: Girder webs, girder flanges, and bearing stiffeners. Ultrasonic testing of groove welds will be used in lieu of radiography. See girder layout for locations of tension and stress reversal areas of the girder flanges.

DECK DRAINS

1. Deck Drains will be 4-inch diameter x 4'- 2" Fiberglass Pipe conforming to the requirements of ASTM - D2996.
2. The Fiberglass Pipe Sleeves can be made from a 4-inch diameter Fiberglass Pipe Fitting. They will be attached to the 4-inch diameter Fiberglass Pipe, as shown in the plans, per the manufacturer's recommendation.
3. All fiberglass pipe and pipe fittings will be handled and installed according to the guidelines and procedures recommended by the manufacturer. Pipe and pipe fittings must be from the same manufacturer.
4. Use fiberglass wear pads to protect against contact with supports or U-bolts.
5. The 1/2-inch diameter U-bolts, nuts and washers will conform to ASTM A307 and will be galvanized in accordance with ASTM F2329 then painted in accordance with Section 411 of the Construction Specifications. The top coat will be an approved brown (AMS STD 595 Color 30045)
6. Steel for the bent plates and washers will conform to ASTM A588, Grade 50 and will be painted in accordance with Section 411 of the Construction Specifications. The top coat will be an approved brown (AMS STD 595 Color 30045)
7. Washers will be plate washers or a continuous bar at least 5/16-inch thick with standard holes and completely cover the slot after installation.
8. The 1/2-inch diameter bolts and nuts will conform to ASTM F3125, Gr. A325.
9. The deck drains to girder connection as shown in the plans allows the deck drain location to be adjusted slightly to clear transverse slab reinforcement.
10. All fiberglass pipes and pipe fittings will use pigmented resin throughout the wall. The color will be an approved brown (AMS STD 595 Color 30045).
11. Payment for deck drains will be at the contract unit price per each for Deck Drains, Girder Bridge, and will be full compensation for furnishing, fabricating, and installing the deck drains and all attaching hardware in accordance with the plans and specifications.

BOLT TESTING

The certified mill test reports for all bolts used on the project will include the test results for all the testing specified in section 972.2 D of the Construction Specifications. Some of these tests are supplemental tests that must be requested at the time the bolts are ordered. It is the responsibility of the Contractor to notify the bolt supplier of these requirements.

SHEAR STUD CONNECTOR

1. Prior to the welding of the studs to the girders, the top surface of the girders that are to have studs welded on will be clean of all dirt, rust, and any other foreign matter.
2. The shear connector that will be attached to the girder will be 7/8-inch diameter x 5 inches long and will conform to ASTM 108, Gr. 1015, 1018, or 1020. The connector will meet the following minimum mechanical property requirements for Type B studs,

Tensile	60 ksi
Yield Strength	60 ksi
Elongation	20%
Reduction of Area	50%

3. The shear connector will be installed in accordance with the Special Provision for Stud Shear Connector Field Installation (Incidental).

FALL PROTECTION

1. The Contractor will install a Fall Protection System conforming to OSHA Regulations. When working on the girders prior to decking installation, a Horizontal Lifeline – or other OSHA approved system will be installed. The Contractor will have one Personal Fall Arrest System (PFAS) available for use by a Department Inspector. The PFAS will be compatible with the installed Fall Protection System.
2. Modifications to any bridge components used to accommodate the Fall Protection System will be shown on the Falsework Plans and/or the appropriate Shop Plans. Field welding to bridge components will not be allowed. Field placed concrete inserts or drilled-in anchor bolts will be allowed if approved by the Engineer. All costs associated with providing the Fall Protection System will be incidental to the other contract items.

NOTES (CONTINUED)
FOR
254' - 3" STEEL GIRDER BRIDGE

STR. NO. 44-104-126
OCTOBER 2019

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DESIGNED BY	CK. DES. BY	DRAFTED BY	
RP	PW	BT	BRIDGE ENGINEER
MCCK05HP	05HPTA04		

F.2.6.5. NOTES (CONTINUED)

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	IM 0909(80)397	E8	E113

APPROACH SLABS

1. Sleeper slab riser will be cast with or later than the approach slab. Care will be taken to ensure the correct grade is maintained across the top of the sleeper slab riser.

2. The portion of the sleeper slab below the construction joint may be precast. If the bottom portion of the sleeper slab is precast. The Contractor will submit proposed lifting and setting plans to the Bridge Construction Engineer for approval. In addition, if reinforcing or other details differ from those shown in the plans, the Contractor will submit proposed alternate details for approval.

3. The use of an approved finishing machine will be required during placement of Class A45 Concrete for the approach slabs. Concrete placement in front of the machine will be kept parallel to the screed.

4. Concrete Approach Sleeper Slab for Bridge will be paid for at the contract unit price per square yard. This payment will be full compensation for all excavation, furnishing, hauling, and placing all materials including concrete and reinforcing steel; for disposal of all excavated material, and surplus materials; and for labor, tools, equipment and any incidentals necessary to complete this item of work.

5. Concrete Approach Slab for Bridge will be paid for at the contract unit price per square yard. This payment will be full compensation for all excavation, furnishing, hauling and placing all materials including concrete, asphalt paint or 6 mil polyethylene sheeting, elastic joint sealer and reinforcing steel; for disposal of all excavated material and surplus materials and for labor, tools, equipment and any incidentals necessary to complete this item of work.

AS - BUILT ELEVATION SURVEY

The Contractor will be responsible for producing an as-built elevation survey soon after construction is completed but, before the bridge is opened to traffic. The Contractor will be responsible for the recording the as-built elevation in the plans. The completed table will be given to the Engineer in the Office of Bridge Design and the Region Bridge Maintenance Engineer. The elevations will be based on the National Geodetic Survey (NGS) North American Vertical Datum of 1988 (NAVD88). The Engineer will provide the Contractor with a description, elevation, and location of the nearest benchmark that has a NAVD88 established elevation for the Contractor's use. The benchmark shown in the plans has not been tied to the NAVD88. The Contractor will be responsible for establishing a NAVD88 elevation for the benchmark provided in the plans. All cost associated with obtaining the NAVD88 elevations at the locations shown in the table and for the benchmark shown in the plans, including all equipment, labor, and any incidentals required will be incidental to the contractor lump sum price for Bridge Elevation Survey.

CHANNEL WORK

In order to assure the Hydraulic capacity of the bridge, the finished ground under the bridge will be shaped to match the upstream channel and flood plain. The existing low water channel will be maintained as near as practical to the existing location. Bridge berms will be built as shown on the General Drawing sheet.

APPROACH SLAB UNDERDRAIN SYSTEM

1. An underdrain system will be placed underneath the sleeper slabs and behind the abutments as shown in the plans in accordance with Section 435 of the Construction Specifications.

2. The 4-inch diameter Perforated PVC Drain Pipe will be SDR 35 Solvent Weld PVC Pipe conforming to ASTM D3034 and ASTM F758. The 4-inch diameter PVC Outlet Pipe will be Schedule 40 PVC Pipe conforming to ASTM D1785 designated as PVC 1120, PVC 1220, or PVC 2120. Pipe sections will be connected using a PVC Solvent Cement conforming to ASTM D2564. The Drain Sleeve shall conform to ASTM D6707.

3. Care will be taken to ensure that the 4-inch diameter Perforated PVC Drain Pipe and the 4-inch diameter PVC Outlet Pipe are not damaged during construction. Sufficient cover material will be placed over the pipes before compaction equipment is allowed over the underdrain system. Any damaged pipes will be replaced by the Contractor at no additional cost to the Department.

4. All labor, tools, equipment, and any incidentals necessary for the Installation of 4-inch diameter Perforated PVC Drain Pipe, 4-inch diameter PVC Outlet Pipe, SDR Solvent Weld PVC Coupling, and PVC Cement will be incidental to the contract unit price per foot for 4" Underdrain Pipe.

CLASS B COMMERCIAL TEXTURE FINISH

1. A Class B commercial texture finish will be applied to the following areas:

   a. **Barrier Rail:** all exposed surfaces (front, top and back).
   b. **Slab:** edge of slab.

2. The Class B commercial texture finish will be applied in accordance with Section 460.3 L.1.c and Section 460.3 M.1 of the Construction Specifications.

OVERBURDEN EXCAVATION FOR RIPRAP

1. This work shall consist of removal and replacement of material between the limits of the finished groundline and the top of the riprap.

2. Excavation will be completed in the dry.

3. After the riprap is placed, the material removed will be replaced and the finished groundline reestablished. Material will be placed in maximum 1' – 0" lifts and compacted.

4. Compaction effort will produce a surface that does not pump, rut, or otherwise displace when traveled over with construction equipment to the satisfaction of the Engineer. Material may be added to excavated material to facilitate compaction and handling. Importing, stockpiling, blending, and/or wasting of materials will be incidental to the contract unit price for Overburden Excavation for Riprap.

5. Payment for Overburden Excavation for Riprap will be at the contract unit and will be full compensation for labor, equipment, tools, and incidentals, including furnishing, installing, and removal of any temporary works necessary to complete the work. Payment will be for plans quantity unless measurement is ordered by the Engineer.

6. It is anticipated that this work will require the use of a cofferdam and dewatering.

NOTES (CONTINUED)
FOR
254' - 3" STEEL GIRDER BRIDGE

STR. NO. 44-104-126
OCTOBER 2019

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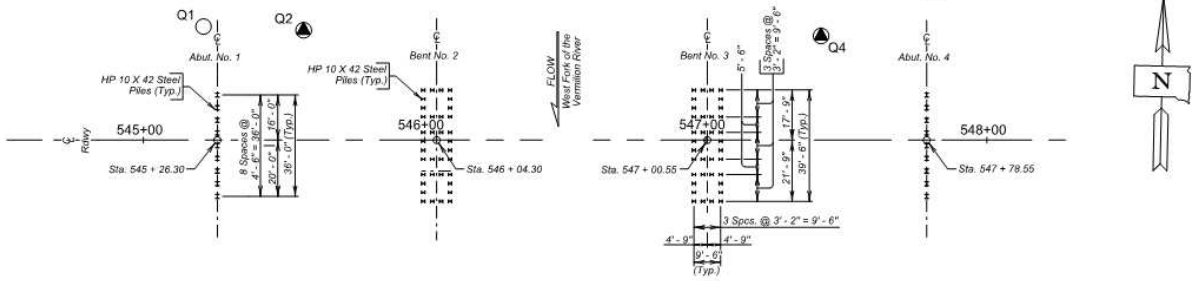
DESIGNED BY	CK. DES. BY	DRAFTED BY	
RP	PW	BT	Steve A Johnson
MCCK05HP	05HPTA05		BRIDGE ENGINEER

F.2.6.6. SUBSURFACE INVESTIGATION AND PILING LAYOUT

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	IM 0908(95)362	E9	E113



PILING LAYOUT

NOTE:
This sheet is to be used in conjunction with the PILING LAYOUT DETAILS sheet.

Average inplace timber piling lengths.

COFFERDAM SOIL PARAMETERS

	Friction Angle (ϕ)	Cohesion (c)	Wet Unit Weight (γ_w)
Silt Clay	20°	250 psf	125 pcf
Sand and Gravel	34°	0 psf	120 pcf
Clay Silt (Glacial Till)	24°	2,300 psf	130 pcf

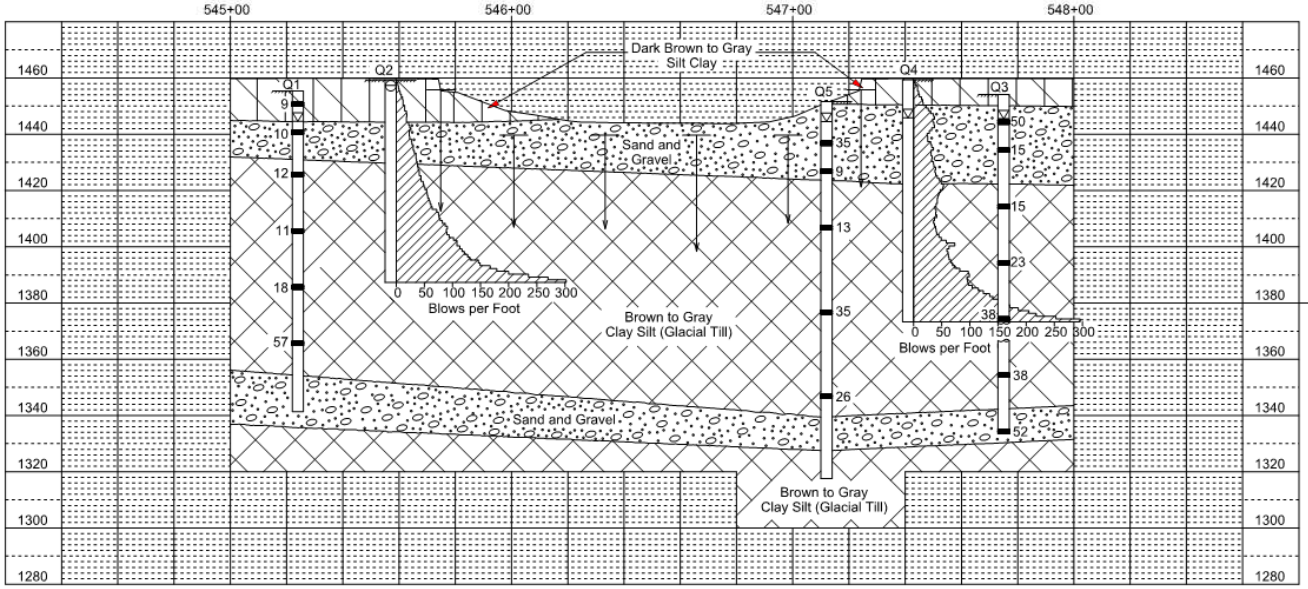
Hole Number	Q1
Station	545+24
Depth	15.2 ft
Soil Color	Brown
Classification	Sand
Strength (Qu)	No Test psf
Dry Density	94.4 pcf
Wet Density	117.9 pcf
Moisture	24.9 %
Pass No. 10	95.1 %
Pass No. 40	47.4 %
Pass No. 200	11.2 %
Sand Content	83.9 %
Silt Content	0.7 %
Clay Content	10.5 %

Hole Number	Q1
Station	545+24
Depth	70.2 ft
Soil Color	Dark Gray
Classification	Clay Silt
Strength (Qu)	4,285 psf
Dry Density	108.7 pcf
Wet Density	130.2 pcf
Moisture	19.2 %
Pass No. 10	97.2 %
Pass No. 40	91.5 %
Pass No. 200	68.4 %
Sand Content	28.8 %
Silt Content	38.3 %
Clay Content	30.1 %

Hole Number	Q3
Station	547+75
Depth	60.2 ft
Soil Color	Dark Gray
Classification	Clay Silt
Strength (Qu)	4,882 psf
Dry Density	109.7 pcf
Wet Density	130.9 pcf
Moisture	19.2 %
Pass No. 10	96.9 %
Pass No. 40	90.1 %
Pass No. 200	67.5 %
Sand Content	29.4 %
Silt Content	39.2 %
Clay Content	28.3 %

Hole Number	Q5
Station	547+12
Depth	15.5 ft
Soil Color	Brown
Classification	Sandy Gravel
Strength (Qu)	No Test psf
Dry Density	102.7 pcf
Wet Density	115.9 pcf
Moisture	12.9 %
Pass No. 10	44.7 %
Pass No. 40	14.1 %
Pass No. 200	5.6 %
Sand Content	39.1 %
Silt Content	2.4 %
Clay Content	3.2 %

Hole Number	Q5
Station	547+12
Depth	105.5 ft
Soil Color	Dark Gray
Classification	Sandy Clay
Strength (Qu)	4,910 psf
Dry Density	104.9 pcf
Wet Density	127.8 pcf
Moisture	21.9 %
Pass No. 10	96.4 %
Pass No. 40	89.8 %
Pass No. 200	69.7 %
Sand Content	26.7 %
Silt Content	35.8 %
Clay Content	33.9 %



Glaciated Terrain contains all sizes of natural mineral sediment ranging from clay to boulders. Streams originating in or flowing through glaciated topography contain sediment loads derived from glaciated sources. Stream and river crossings contain sediment naturally sorted and randomly concentrated. Alluvial sediment located at this project location may have concentrated coarser gravel such as pebbles, cobbles and boulders. The borings shown only represent material that was found at the exact location of the small diameter drill hole. Coarse granular material may be present in areas not penetrated by the depicted borings.

The Geotechnical Engineering Activity has all of the boring logs and laboratory test results available for review at the Central Office in Pierre.

LEGEND

Penetration Test
Drive Test
Water
Caved
Sample Zone

Drive tests are conducted by dropping a 490 pound hammer 30 inches to drive a 2 ⅞ inch drill stem to measure the resistance to penetration of the soil.

Penetration test holes are drilled with a 6 ⅝ inch diameter hollow stem auger. Penetration tests are conducted by dropping a 140 pound hammer 30 inches to obtain 2 inch nominal diameter samples and to measure the resistance to penetration of the soil.

GROUNDWATER ELEVATIONS
SEPTEMBER 2019

Q1		1444.6
Q2	(DRY)	1458.3
Q3		1445.5
Q4		1445.8
Q5		1444.5

MEASURED SKIN FRICTION

	ELEV.	PSF
Q2	1387.3	448
Q4	1373.3	366

SUBSURFACE INVESTIGATION & PILING LAYOUT DETAILS
FOR
254' - 3" STEEL GIRDER BRIDGE

40' - 0" ROADWAY OVER W. FORK OF THE VERMILLION RIVER
STA. 545 + 25.30 TO 547 + 79.55
STR. NO. 44-104-126

0° SKEW
SEC. 2-T102N-R55W
IM 0908(95)362
HL-93

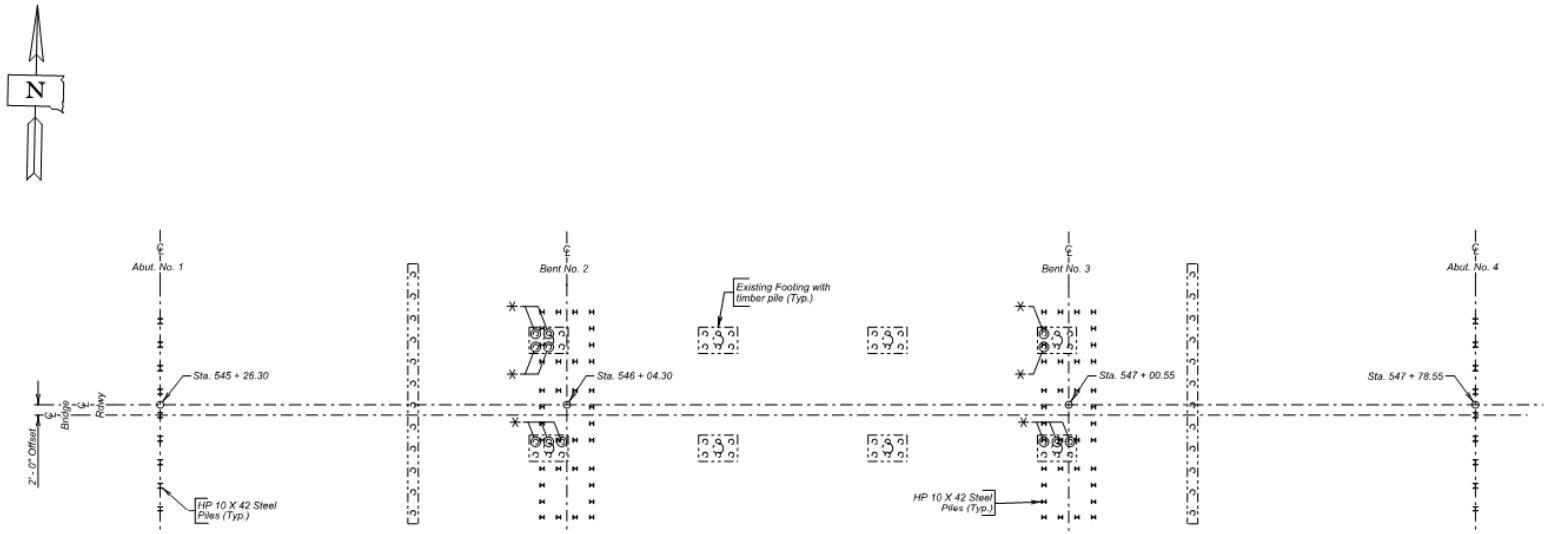
MCCOOK COUNTY
S. D. DEPT. OF TRANSPORTATION
OCTOBER 2019

6 OF 27

DESIGNED BY	CK. DES. BY	DRAFTED BY	
RP	PW	BT	Steve A Johnson BRIDGE ENGINEER
MCCK05HP	05HPTA06		

F.2.6.7. PILING LAYOUT DETAILS

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	IM 0908(95)362	E10	E113



PILING LAYOUT

NOTE:
✳ Existing timber pile to be extracted.

NOTE :
This sheet is to be used in conjunction with the
SUBSURFACE INVESTIGATION AND PILING LAYOUT sheet.

ESTIMATED QUANTITIES

ITEM	UNIT	QUANTITY
Extract Pile	Each	12

PILING LAYOUT DETAILS
FOR
254' - 3" STEEL GIRDER BRIDGE

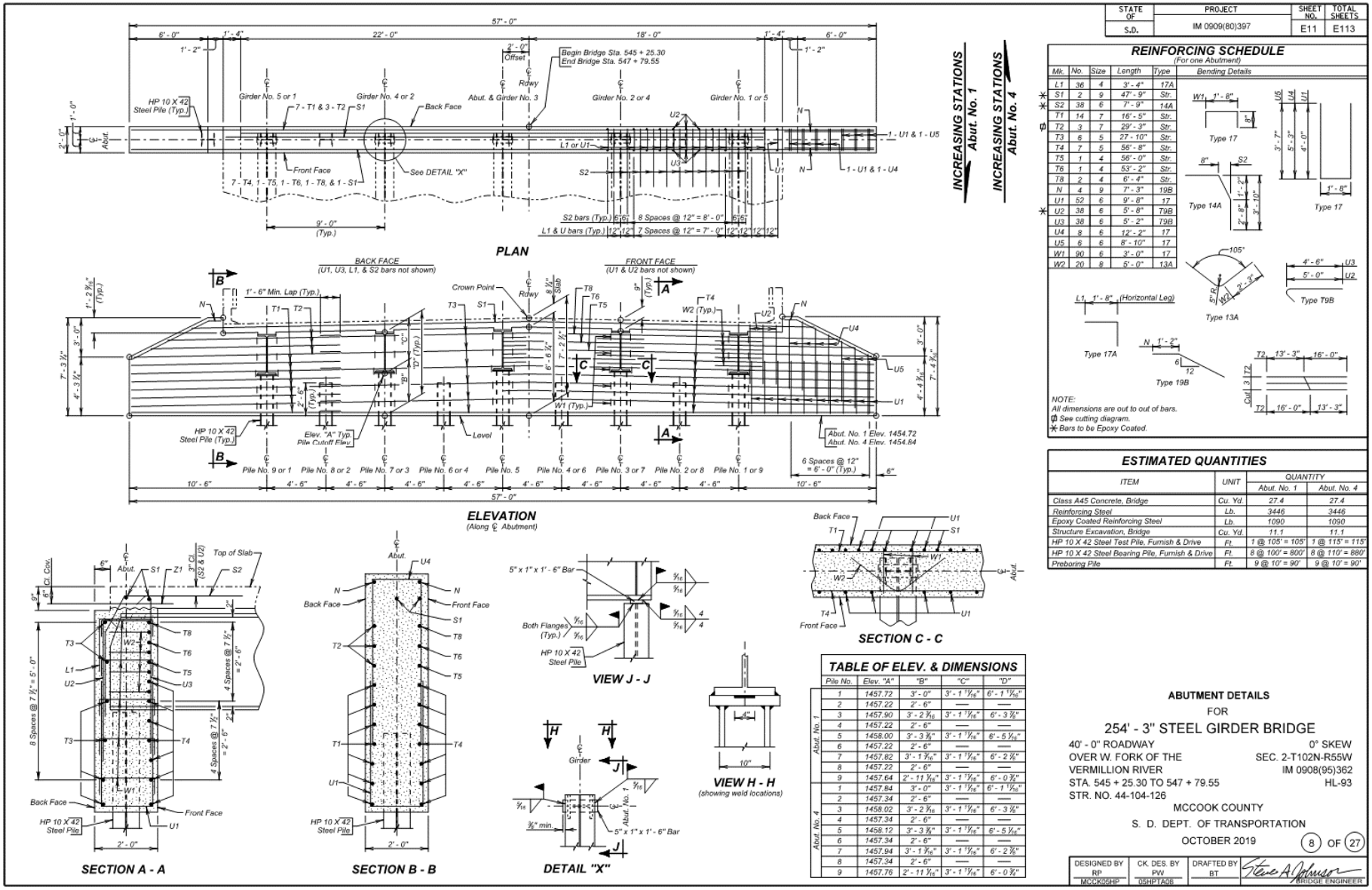
40' - 0" ROADWAY — 0° SKEW
OVER W. FORK OF THE — SEC. 2-T102N-R55W
VERMILLION RIVER — IM 0908(95)362
STA. 545 + 25.30 TO 547 + 79.55 — HL-93
STR. NO. 44-104-126

MCCOOK COUNTY
S. D. DEPT. OF TRANSPORTATION
OCTOBER 2019

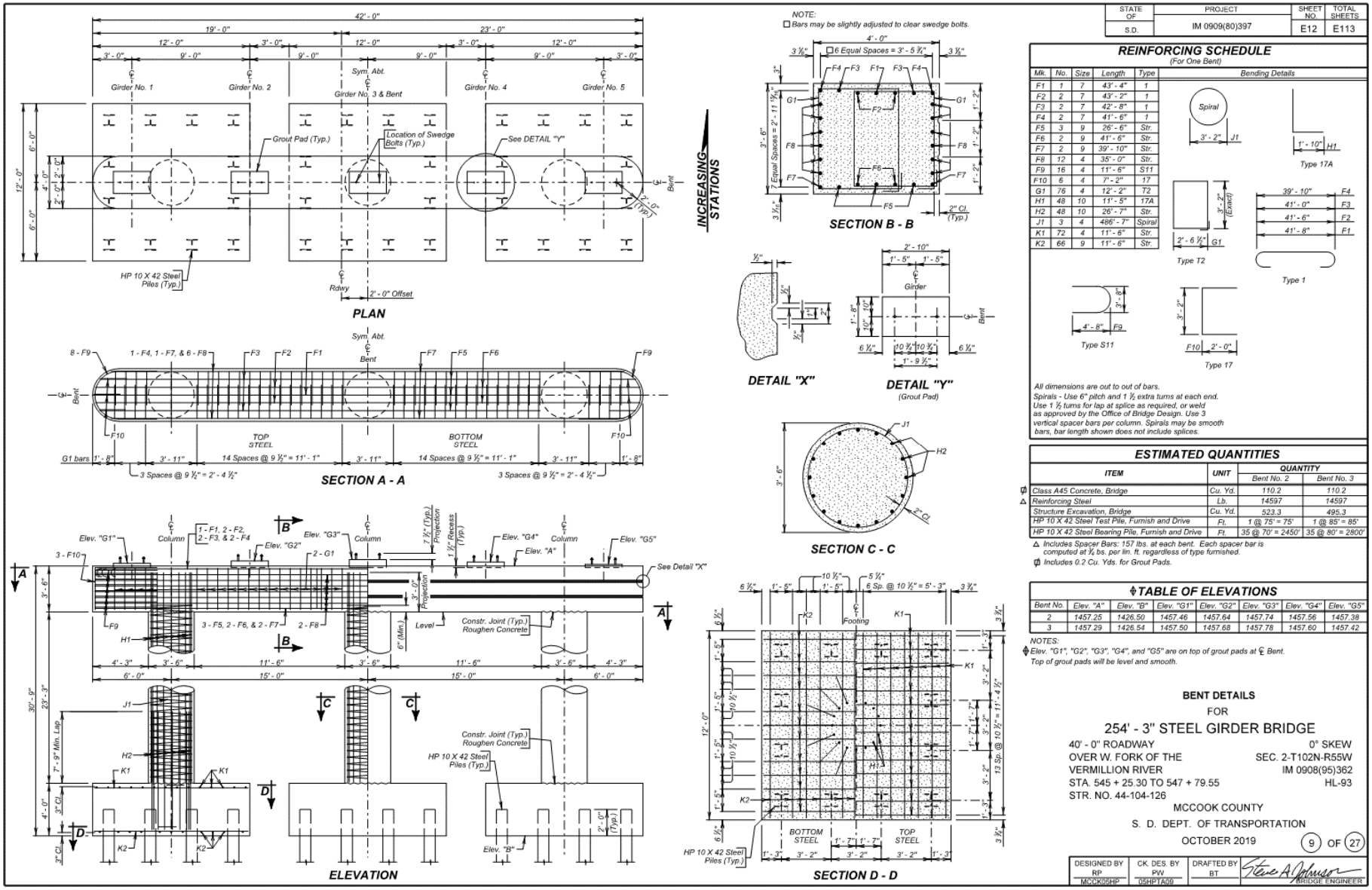
7 OF 27

DESIGNED BY	CK. DES. BY	DRAFTED BY	
RP	PW	BT	BRIDGE ENGINEER
MCCK05HP	05HPTA07		

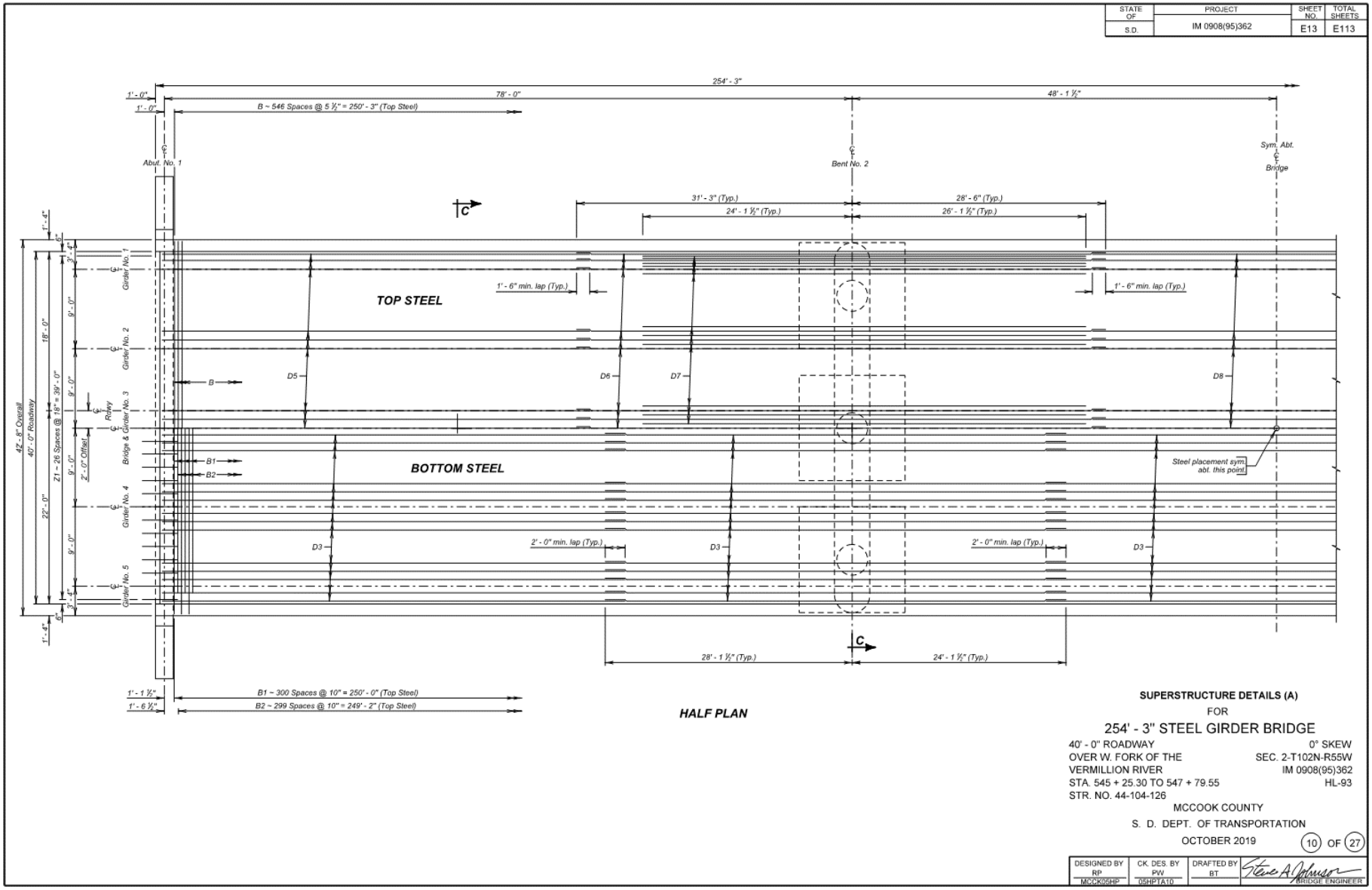
F.2.6.8. ABUTMENT DETAILS



F.2.6.9. BENT DETAILS

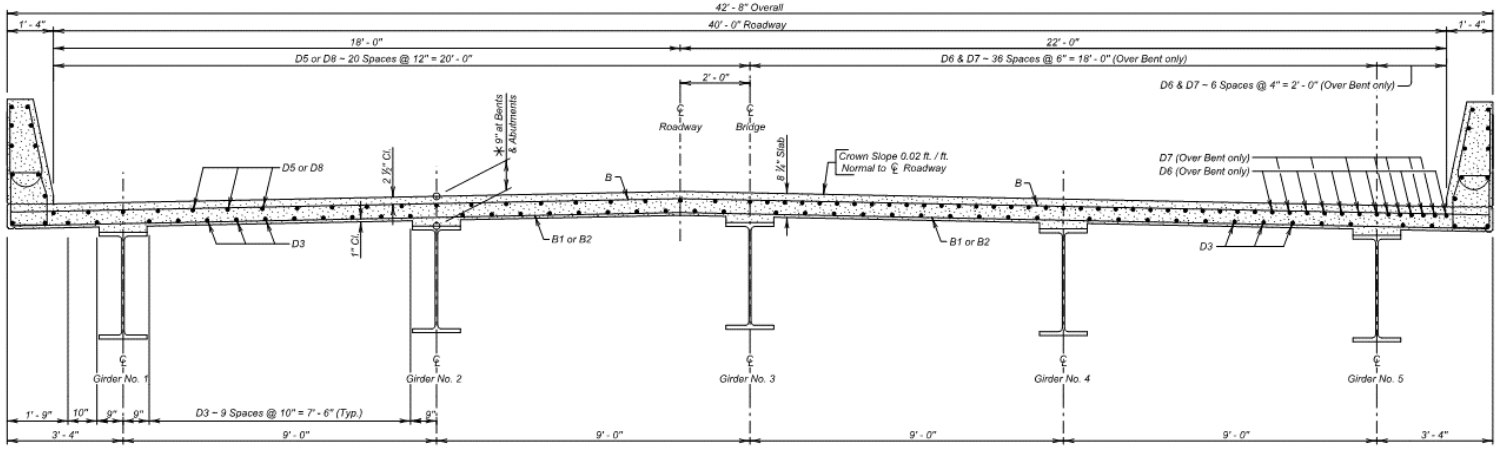


F.2.6.10. SUPERSTRUCTURE DETAILS (A)



F.2.6.11. SUPERSTRUCTURE DETAILS (B)

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	IM 0908(95)362	E14	E113



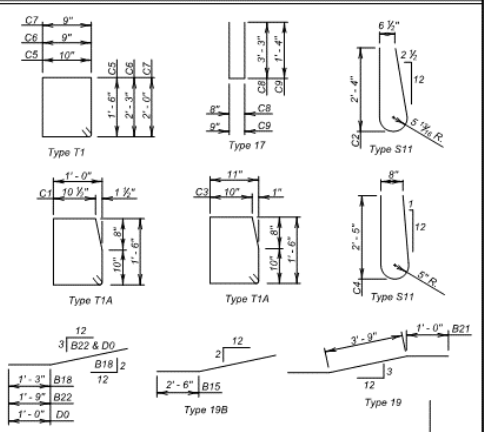
SECTION C - C

✳ Dimensions are at ℄ bearing: at other points along the girders this dimension shall be computed as shown on the Slab Form Elevations & Erection Data sheet.

REINFORCING SCHEDULE

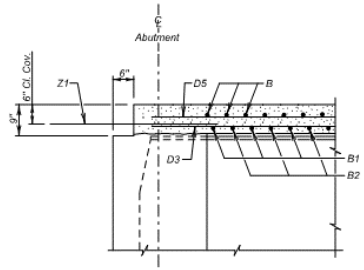
	Mk.	No.	Size	Length	Type
□	B	547	5	43' - 6"	1
	B1	301	4	42' - 4"	Str.
	B2	300	4	37' - 6"	Str.
	B15	12	5	9' - 6"	19B
	B16	10	4	49' - 3"	Str.
✳	B17	8	4	5' - 8"	Str.
	B18	12	8	3' - 0"	19B
	B19	12	5	2' - 0"	Str.
	B20	12	6	3' - 6"	17A
	B21	4	4	5' - 9"	19
	B22	4	4	3' - 3"	19B
	C1	486	5	5' - 10"	T1A
	C2	490	5	5' - 3"	S11
	C3	4	5	5' - 8"	T1A
	C4	8	5	5' - 3"	S11
	C5	8	5	5' - 7"	T1
	C6	12	6	7' - 4"	T1
	C7	12	5	6' - 5"	T1
	C8	4	6	7' - 3"	17
	C9	4	5	3' - 5"	17
	D	20	4	52' - 0"	Str.
	D0	4	4	2' - 6"	19B
	D2	60	4	49' - 3"	Str.
	D3	240	5	52' - 3"	Str.
	D5	86	5	48' - 9"	Str.
	D6	86	6	59' - 9"	Str.
	D7	84	6	50' - 3"	Str.
	D8	43	4	42' - 7"	Str.
ϕ	Z1	54	7	4' - 0"	Str.

Bending Details



NOTES-
All reinforcing steel will be stainless steel unless otherwise noted.
✳ Bend in field as necessary to fit.
ϕ Bars to be epoxy coated.
□ Tip bars as required to maintain top and bottom clear cover.
All dimensions are out to out of bars.

NOTE :
Barrier curb details are shown on END BLOCK, BARRIER CURB, & DECK DRAIN DETAILS sheet.



SECTION B - B

ESTIMATED QUANTITIES

	ITEM	UNIT	QUANTITY
★	Class A45 Concrete, Bridge Deck	Cu. Yd.	347.6
	Stainless Reinforcing Steel	Lb.	79033
	Epoxy Coated Reinforcing Steel	Lb.	442
△	Structural Steel	Lump Sum	Lump Sum
	Concrete Penetrating Sealer	Sq. Yd.	1130
	Deck Drain Girder Bridge	Each	26

★ Concrete quantity for Barrier Curb is 0.1184 Cu. Yd. per foot and for End Block is 0.7184 Cu. Yd. each.

△ For informational purposes only, the estimated weight of the structural steel is 348189 pounds.

SUPERSTRUCTURE DETAILS (B)
FOR
254' - 3" STEEL GIRDER BRIDGE

40' - 0" ROADWAY — 0° SKEW
OVER W. FORK OF THE VERMILLION RIVER — SEC. 2-T102N-R55W
STA. 545 + 25.30 TO 547 + 79.55 — IM 0908(95)362
STR. NO. 44-104-126 — HL-93

MCCOOK COUNTY
S. D. DEPT. OF TRANSPORTATION
OCTOBER 2019

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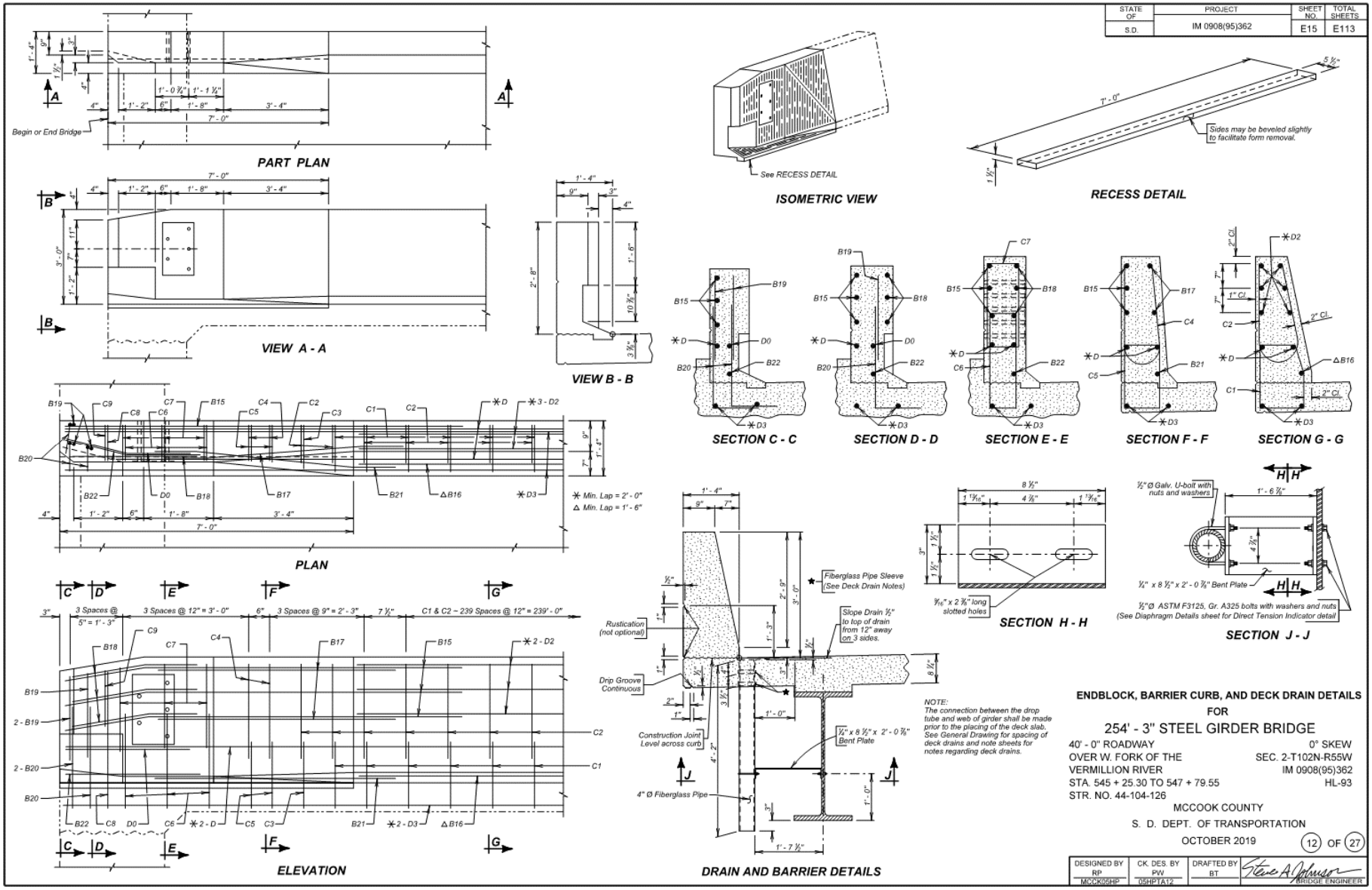
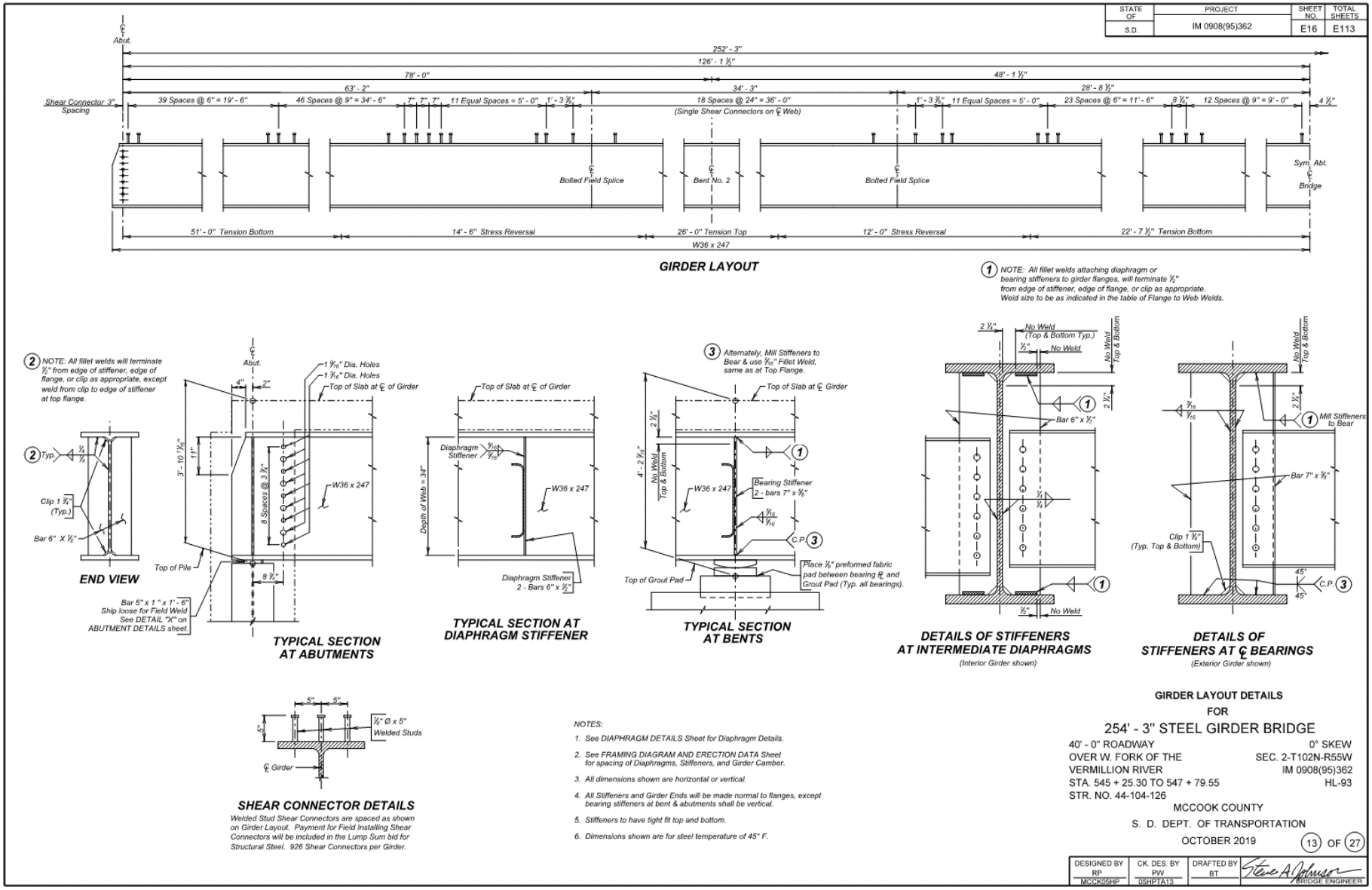
DESIGNED BY	CK. DES. BY	DRAFTED BY	
RP	PW	BT	BRIDGE ENGINEER
MCCK05HP	05HPTA11		

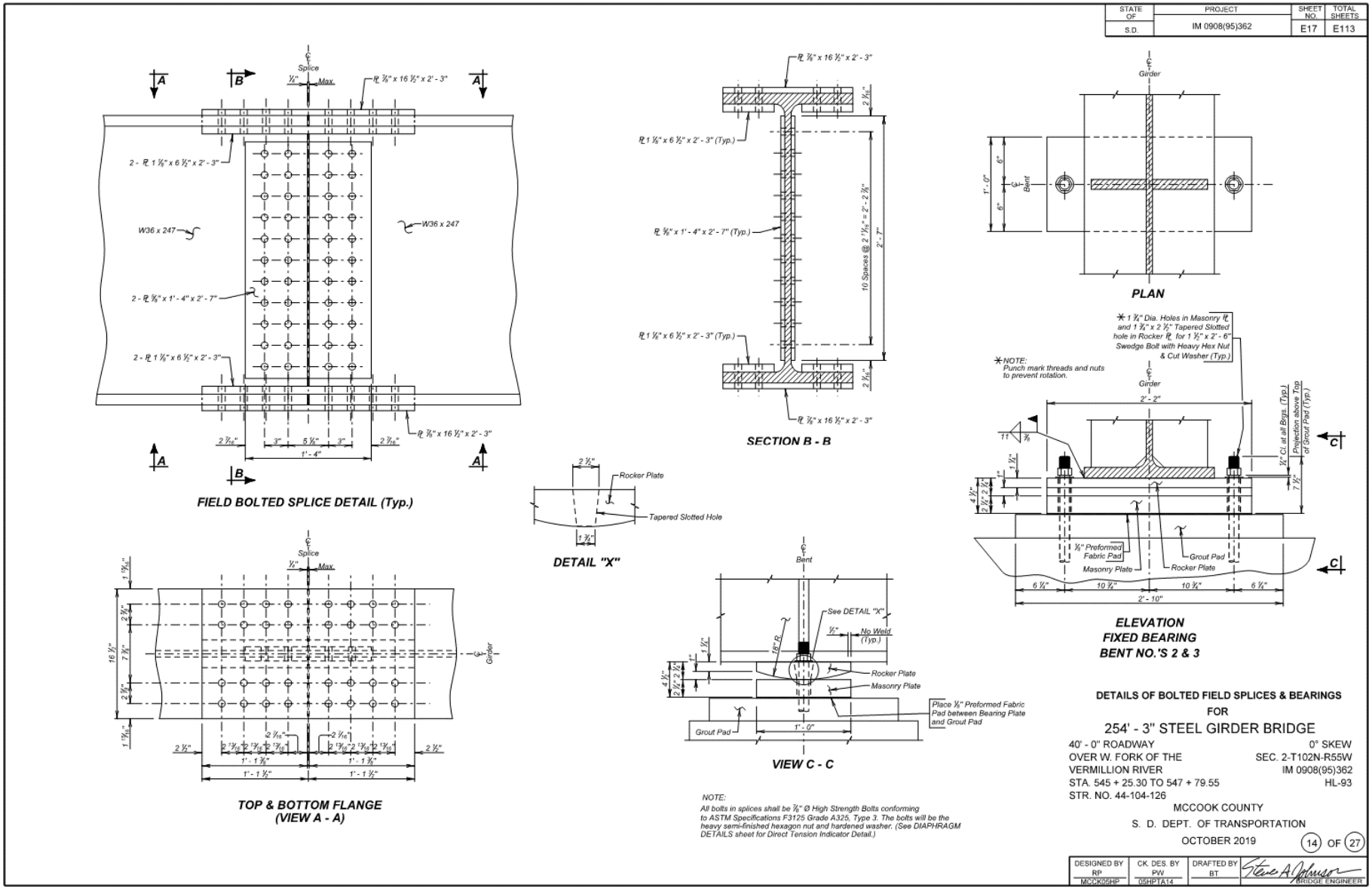
F.2.6.12. END BLOCK. BARRIER CURB. & DRAIN DETAILS



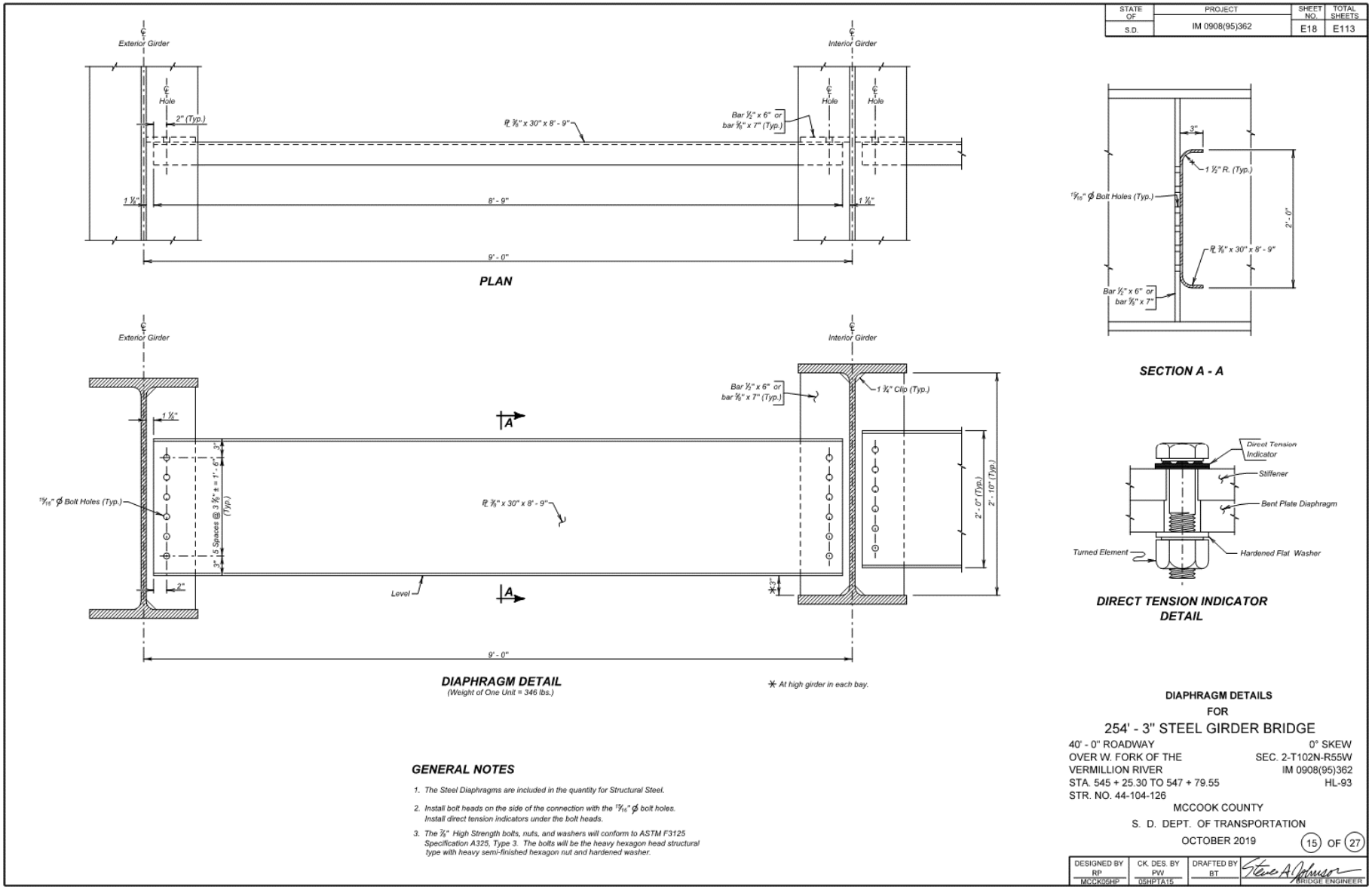
F.2.6.13. GIRDER LAYOUT AND DETAILS



F.2.6.14. DETAILS OF BOLTED FIELD SPLICES & BEARINGS

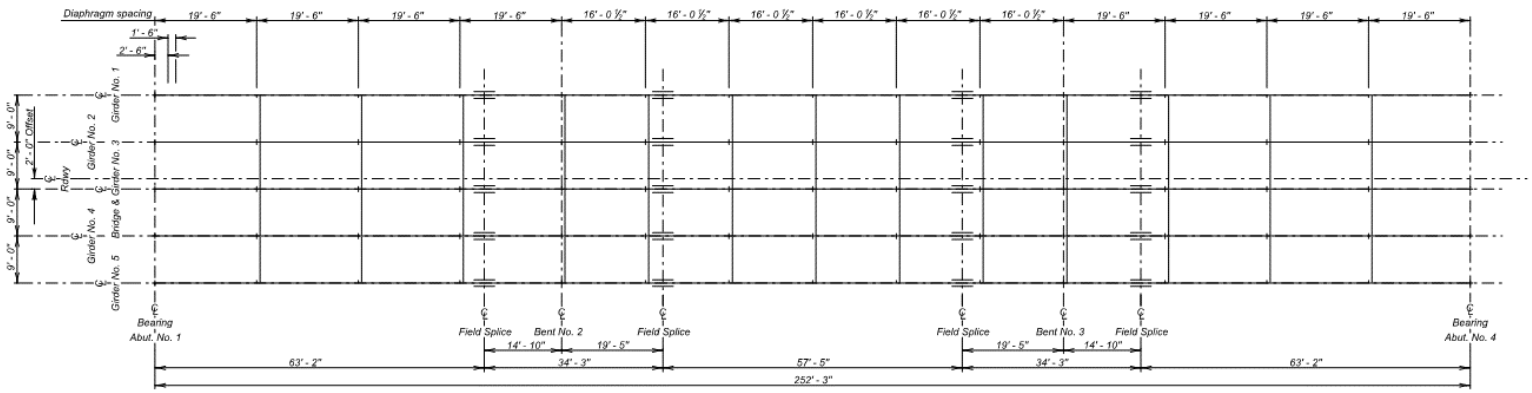


F.2.6.15. DIAPHRAGM DETAILS



F.2.6.16. FRAMING DIAGRAM AND ERECTION DETAILS

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	IM 0908(95)362	E19	E113

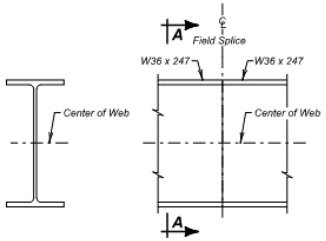


FRAMING DIAGRAM

ϕ GIRDER ERECTION ELEVATIONS AND SLOPES

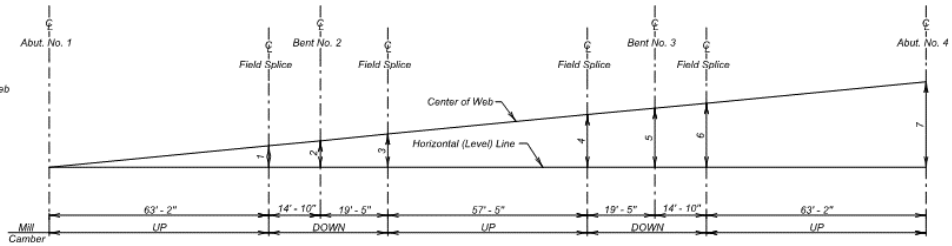
Girder No.	ELEVATIONS (Top of Girder) "A"	"B"	"C"	"D"	"E"	"F"	"G"	"H"	SLOPES (%) a
1	1460.859	1460.890	1460.897	1460.907	1460.935	1460.944	1460.951	1460.982	0.0489
2	1461.039	1461.070	1461.077	1461.087	1461.115	1461.124	1461.131	1461.162	0.0489
3	1461.139	1461.170	1461.177	1461.187	1461.215	1461.224	1461.231	1461.262	0.0489
4	1460.959	1460.990	1460.997	1461.007	1461.035	1461.044	1461.051	1461.082	0.0489
5	1460.779	1460.810	1460.817	1460.827	1460.855	1460.864	1460.871	1460.902	0.0489

ϕ NOTE-
These elevations and slopes occur at a time after girder erection is completed but prior to any placement of concrete. Slopes shown are an imaginary straight line between points at beam ends and are (+) towards increasing stations.

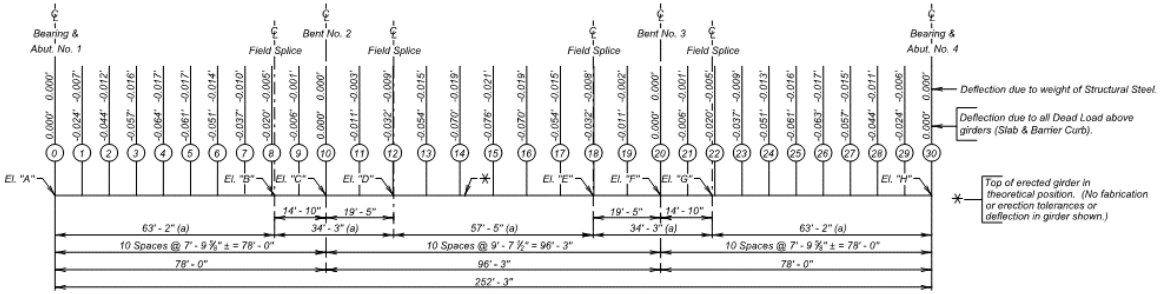


SECTION A - A

COMMON LINE LOCATION DETAIL



BLOCKING DIAGRAM



GIRDER ERECTION DIAGRAM

BLOCKING ORDINATES

LOCATION	ORDINATE
1	0.031'
2	0.038'
3	0.048'
4	0.076'
5	0.085'
6	0.092'
7	0.123'

NOTE :
This sheet is to be used in conjunction with SLAB FORM ELEVATIONS sheet.

FRAMING DIAGRAM AND ERECTION DATA
FOR
254' - 3" STEEL GIRDER BRIDGE

40' - 0" ROADWAY OVER W. FORK OF THE VERMILLION RIVER
STA. 545 + 25.30 TO 547 + 79.55
STR. NO. 44-104-126

0° SKEW
SEC. 2-T102N-R55W
IM 0908(95)362
HL-93

MCCOOK COUNTY
S. D. DEPT. OF TRANSPORTATION
OCTOBER 2019

16 OF 27

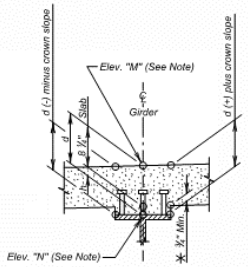
DESIGNED BY	CK. DES. BY	DRAFTED BY	
RP MCCK05HP	PW 05HPTA16	BT	BRIDGE ENGINEER

F.2.6.17. SLAB FORM ELEVATIONS

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	IM 0908(95)362	E20	E113

TABLE OF SLAB FORM ELEVATIONS AND CALCULATIONS

		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Girder No. 1	Elev. "M"	1461.613	1461.640	1461.664	1461.681	1461.691	1461.692	1461.687	1461.676	1461.663	1461.651	1461.650	1461.665	1461.691	1461.718	1461.738	1461.749	1461.747	1461.736	1461.719	1461.702	1461.696
	(-) Elev. "N"																					
	(=) d																					
	(-) 0.688'																					
	(=) h																					
Girder No. 2	Elev. "M"	1461.793	1461.820	1461.844	1461.861	1461.871	1461.872	1461.867	1461.856	1461.843	1461.831	1461.830	1461.845	1461.871	1461.898	1461.918	1461.929	1461.927	1461.916	1461.899	1461.882	1461.876
	(-) Elev. "N"																					
	(=) d																					
	(-) 0.688'																					
	(=) h																					
Girder No. 3	Elev. "M"	1461.893	1461.920	1461.944	1461.961	1461.971	1461.972	1461.967	1461.956	1461.943	1461.931	1461.930	1461.945	1461.971	1461.998	1462.018	1462.029	1462.027	1462.016	1461.999	1461.982	1461.976
	(-) Elev. "N"																					
	(=) d																					
	(-) 0.688'																					
	(=) h																					
Girder No. 4	Elev. "M"	1461.713	1461.740	1461.764	1461.781	1461.791	1461.792	1461.787	1461.776	1461.763	1461.751	1461.750	1461.765	1461.791	1461.818	1461.838	1461.849	1461.847	1461.836	1461.819	1461.802	1461.796
	(-) Elev. "N"																					
	(=) d																					
	(-) 0.688'																					
	(=) h																					
Girder No. 5	Elev. "M"	1461.533	1461.560	1461.584	1461.601	1461.611	1461.612	1461.607	1461.596	1461.583	1461.571	1461.570	1461.585	1461.611	1461.638	1461.658	1461.669	1461.667	1461.656	1461.639	1461.622	1461.616
	(-) Elev. "N"																					
	(=) d																					
	(-) 0.688'																					
	(=) h																					



✳ If during construction, it is found that this dimension will be exceeded or is less than zero, corrective measures must be taken as approved by the Engineer.

TABLE OF SLAB FORM ELEVATIONS AND CALCULATIONS

		21	22	23	24	25	26	27	28	29	30
Girder No. 1	Elev. "M"	1461.705	1461.723	1461.744	1461.762	1461.776	1461.782	1461.779	1461.769	1461.753	1461.733
	(-) Elev. "N"										
	(=) d										
	(-) 0.688'										
	(=) h										
Girder No. 2	Elev. "M"	1461.885	1461.903	1461.924	1461.942	1461.956	1461.962	1461.959	1461.949	1461.933	1461.913
	(-) Elev. "N"										
	(=) d										
	(-) 0.688'										
	(=) h										
Girder No. 3	Elev. "M"	1461.985	1462.003	1462.024	1462.042	1462.056	1462.062	1462.059	1462.049	1462.033	1462.013
	(-) Elev. "N"										
	(=) d										
	(-) 0.688'										
	(=) h										
Girder No. 4	Elev. "M"	1461.805	1461.823	1461.844	1461.862	1461.876	1461.882	1461.879	1461.869	1461.853	1461.833
	(-) Elev. "N"										
	(=) d										
	(-) 0.688'										
	(=) h										
Girder No. 5	Elev. "M"	1461.625	1461.643	1461.664	1461.682	1461.696	1461.702	1461.699	1461.689	1461.673	1461.653
	(-) Elev. "N"										
	(=) d										
	(-) 0.688'										
	(=) h										

NOTES:

This Table contains the necessary information to determine the depth of concrete, in feet, over the girders at the points shown. All calculations can be carried out in the space provided. Elevation "M" is theoretical top of slab elevation before any concrete has been poured. This elevation includes correction for deflection due to Dead Load above girders. Elevation "N" is a field measured elevation taken on top of girders at points shown. This elevation must be taken after girder erection is complete, but prior to placing any of the slab concrete. Girders will not be supported by construction shoring while elevations are taken.

This sheet is to be used in conjunction with FRAMING DIAGRAM AND ERECTION DATA Sheet.

SLAB FORM ELEVATIONS
FOR
254' - 3" STEEL GIRDER BRIDGE

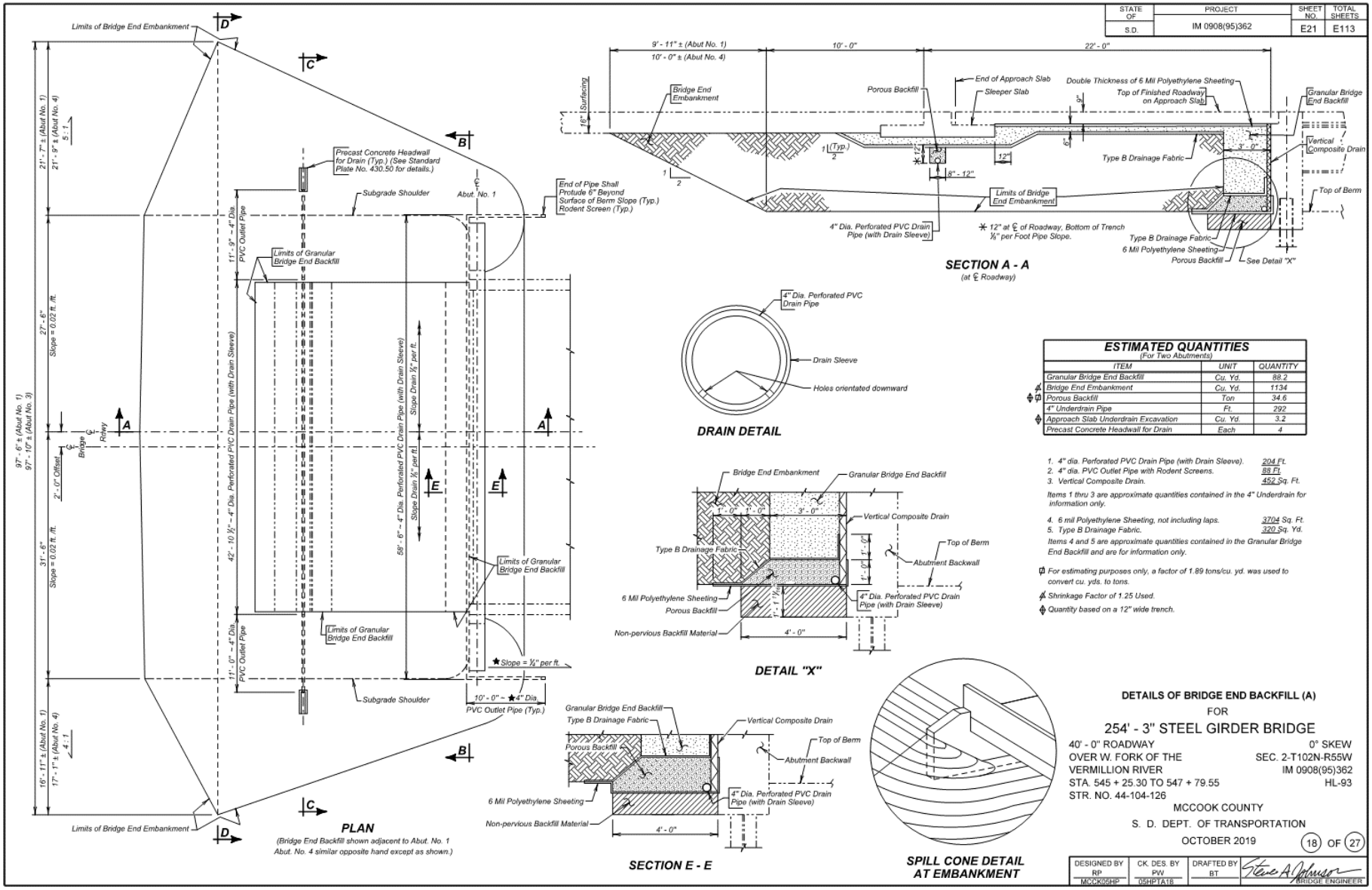
40' - 0" ROADWAY — 0° SKEW
OVER W. FORK OF THE — SEC. 2-T102N-R55W
VERMILLION RIVER — IM 0908(95)362
STA. 545 + 25.30 TO 547 + 79.55 — HL-93
STR. NO. 44-104-126

MCCOOK COUNTY
S. D. DEPT. OF TRANSPORTATION
OCTOBER 2019

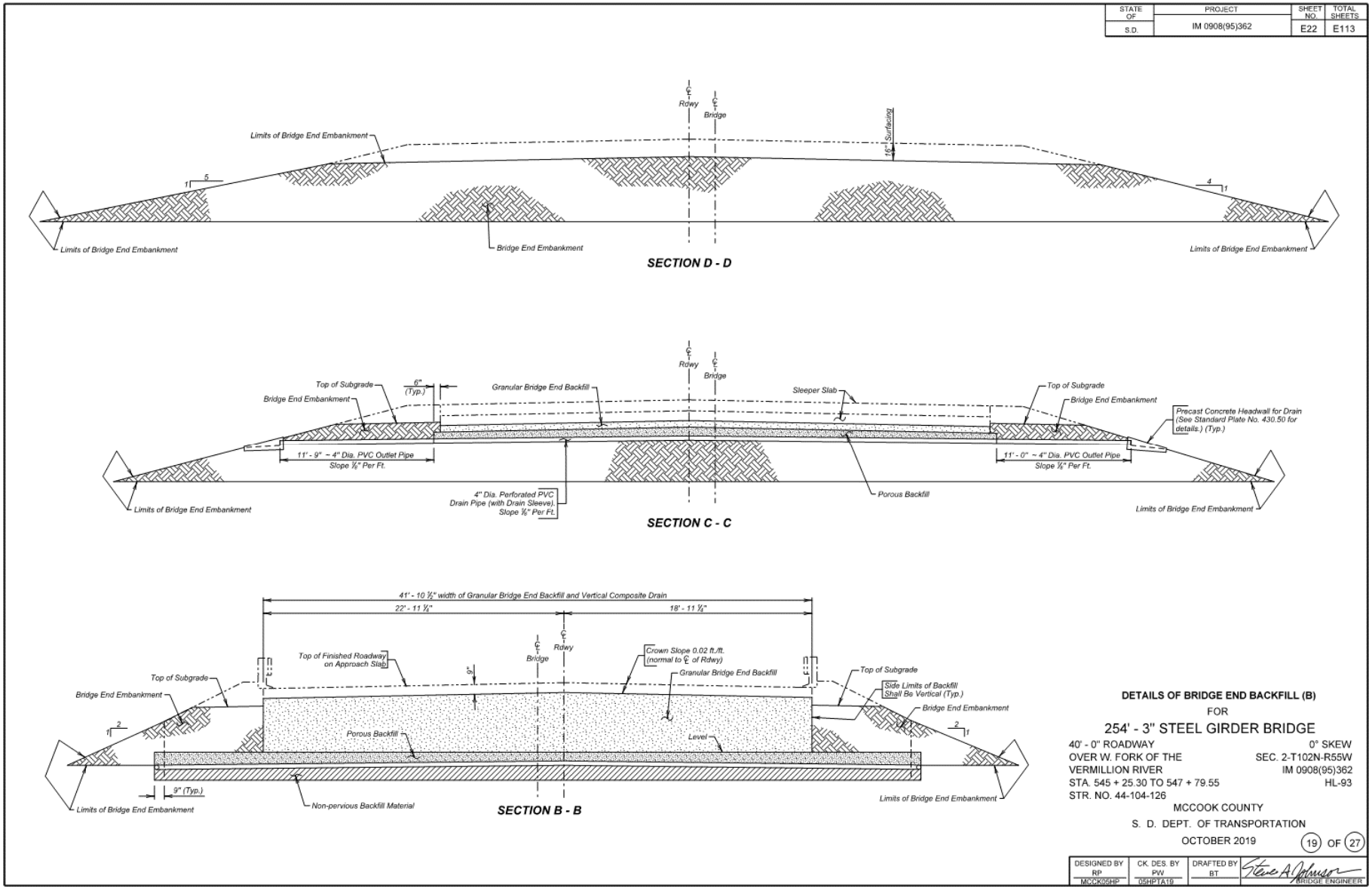
17 OF 27

DESIGNED BY	CK. DES. BY	DRAFTED BY	
RP	PW	BT	BRIDGE ENGINEER
MCCK05HP	05HPTA17		

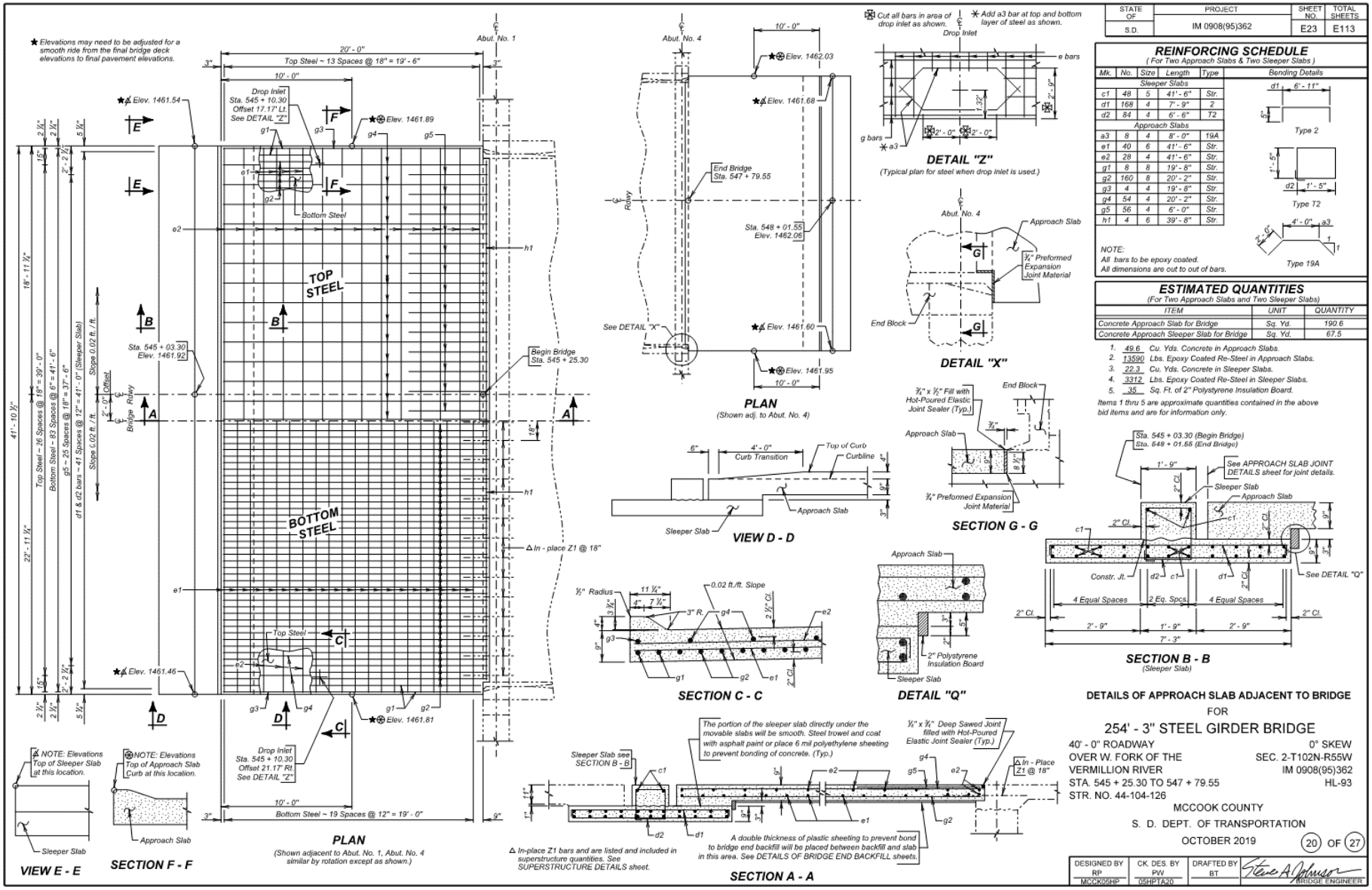
F.2.6.18. DETAILS OF BRIDGE END BACKFILL (A)



F.2.6.19. DETAILS OF BRIDGE END BACKFILL (A)

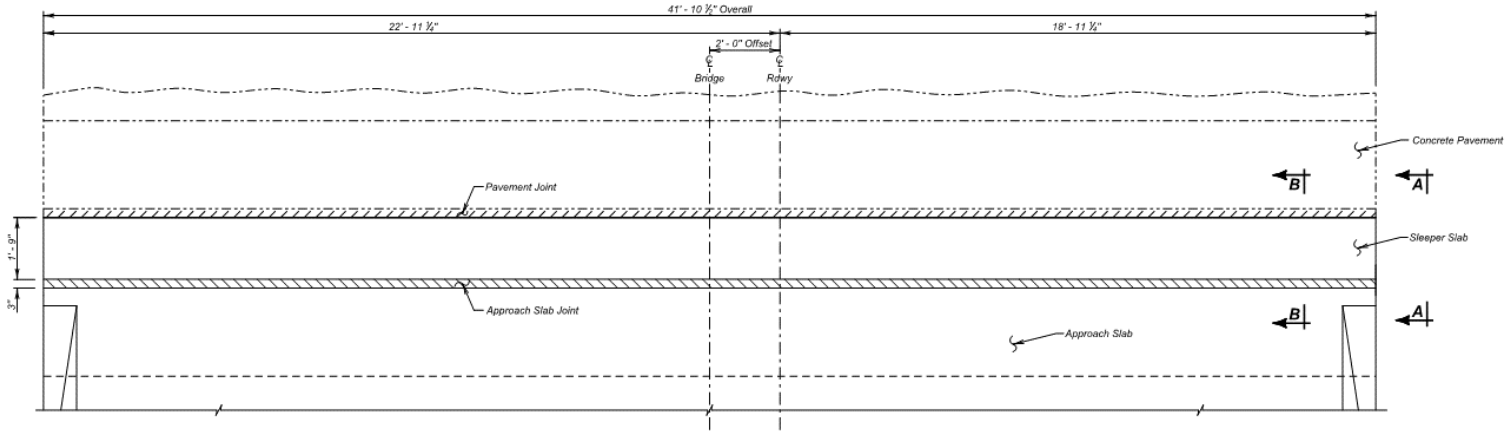


F.2.6.20. DETAILS OF APPROACH SLAB ADJACENT TO BRIDGE



F.2.6.21. APPROACH SLAB JOINT DETAILS

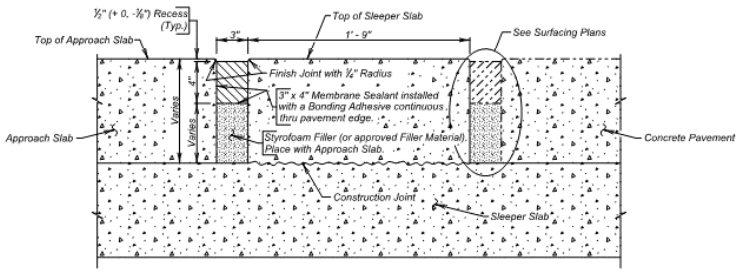
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	IM 0908(95)362	E24	E113



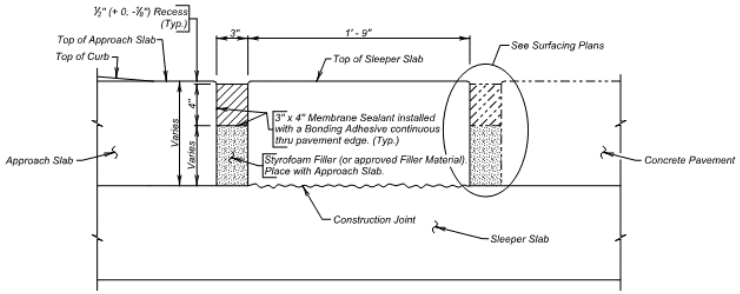
PLAN

GENERAL NOTES

1. The membrane sealant will be on the approved product list for membrane sealant expansion joints.
2. The manufacturer will supply the membrane sealant in packaging that precompresses the membrane sealant. The precompressed dimension will be as recommended by the sealant manufacturer to provide a water tight seal throughout a joint movement range of + 25% (minimum) from the specified joint opening dimension. In no case will the precompressed dimension exceed 75% of the joint opening width. The foam sealant will be slowly self expanding to permit workers ample time to install the membrane sealant before the membrane sealant exceeds the joint opening width.
3. The membrane sealant will be supplied in pieces 5 feet in length or longer. The foam sealant will be ultra-violet and ozone resistant.
4. The bonding adhesive used to attach the membrane sealant to the adjacent concrete will be approved by the membrane sealant manufacturer.
5. Adhesive used to join adjacent pieces of the membrane sealant will be as recommended by the manufacturer.
6. If styrofoam filler material is used in the construction, it will be closed cell and water-tight as approved by the Engineer.
7. The minimum ambient air temperature at the time of joint installation and adhesive curing will be 40° F.
8. A technical representative of the membrane sealant manufacturer will be present at the jobsite during installation. The technical representative will be knowledgeable in the correct procedures for the preparation and installation of the joint material to insure the Contractor installs the joint to the Manufacturers recommendations.
9. Concrete surfaces that will be in contact with the membrane sealant will be thoroughly cleaned by abrasive blasting to remove all laitance and contaminants (such as oil, curing compounds, etc.) from the concrete surface. At a minimum two passes of abrasive blasting with the nozzle held at an angle to within 1 to 2 inches of the concrete surface will be required. Cleaning of the concrete surfaces with solvents, wire brushing, or grinding will not be permitted.
10. After abrasive blasting, but immediately prior to membrane joint installation, the entire joint contact surface will be air blasted. The air compressor used for joint cleaning will be equipped with trap devices capable of providing moisture-free and oil-free air at a recommended pressure of 90 psi. To obtain complete bonding with the adhesive, the adjacent concrete surfaces must be dry and clean. The contact surfaces for the joint will be visually inspected by the Engineer immediately prior to joint installation to verify the surface is dry and clean.
11. Individual spliced sections will be installed as per the manufacturers' recommendations. The membrane joint sealant manufacturer will submit a detailed installation procedure to the Engineer at least 5 days prior to joint installation for his review.
12. Traffic will not be allowed on the joint until the bonding adhesive has had time to cure, as recommended by the manufacturer.
13. Use plywood or other material to protect concrete adjacent to the joint from spalling before any equipment is moved across the joint. Any spall areas will be repaired at the Contractor's expense by breaking out and replacing adjacent concrete, as approved by the Engineer.
14. The membrane sealant expansion joint will be measured in feet to the nearest one-tenth foot, complete in place. Measurement will be made of the overall horizontal length. The membrane sealant expansion joint will be paid for at the contract unit price per foot complete in place. Payment for this item will be full compensation for furnishing all the required materials in place, including labor, equipment and incidentals necessary to complete the work in accordance with the plans and the foregoing specifications.
15. The membrane sealant expansion joint will be installed prior to winter. Housing and heating may be required to meet manufacturer's requirements.



SECTION B - B



VIEW A - A

ESTIMATED QUANTITIES
(For Two Approach Slabs)

ITEM	UNIT	QUANTITY
Membrane Sealant Expansion Joint	Ft.	83.8

APPROACH SLAB JOINT DETAILS
FOR
254' - 3" STEEL GIRDER BRIDGE

40' - 0" ROADWAY OVER W. FORK OF THE VERMILLION RIVER
STA. 545 + 25.30 TO 547 + 79.55
STR. NO. 44-104-126

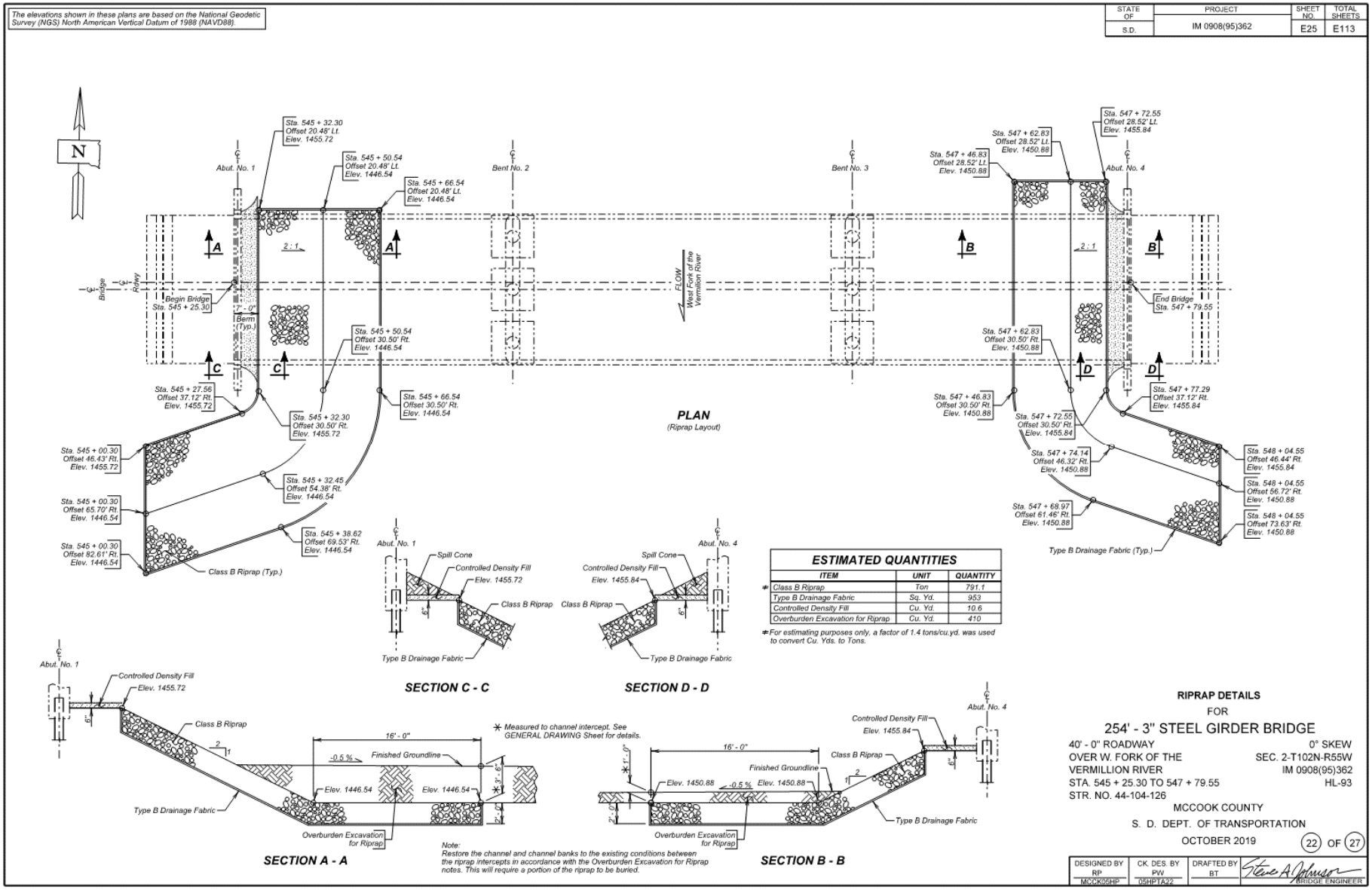
0° SKEW
SEC. 2-T102N-R55W
IM 0908(95)362
HL-93

MCCOOK COUNTY
S. D. DEPT. OF TRANSPORTATION
OCTOBER 2019

21 OF 27

DESIGNED BY	CK. DES. BY	DRAFTED BY	
RP MCCK05HP	PW 05HPTA21	BT	BRIDGE ENGINEER

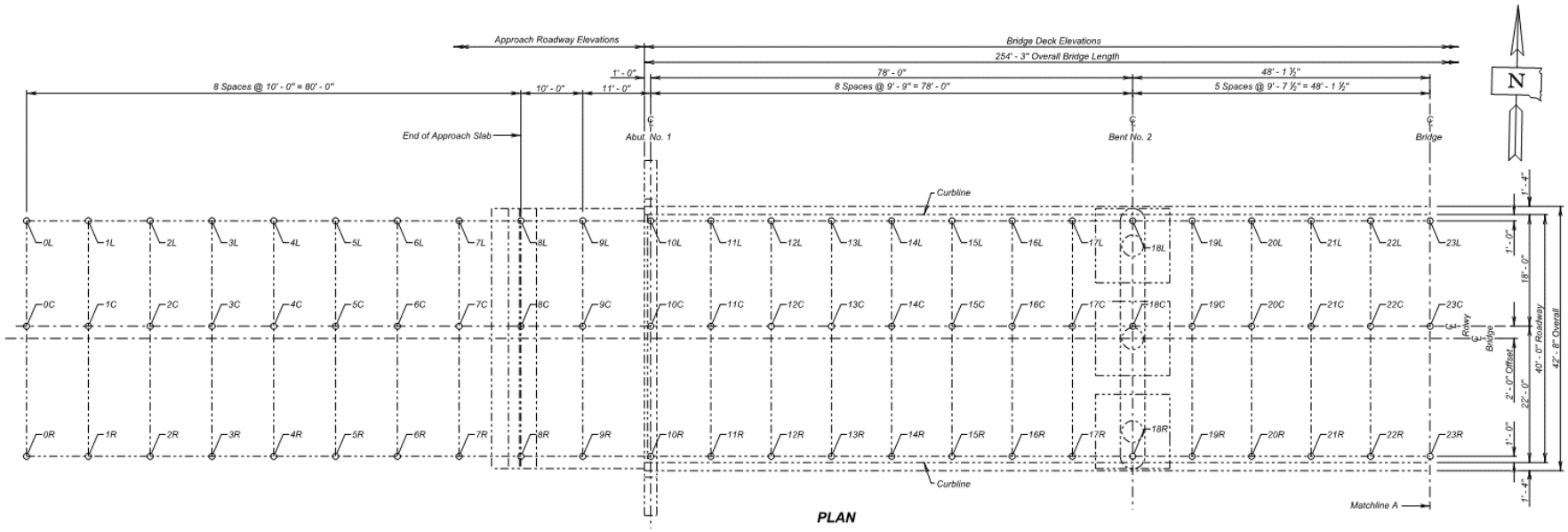
F.2.6.22. RIPRAP DETAILS



F.2.6.23. AS BUILT ELEVATION SURVEY (A)

The elevations shown in these plans are based on the National Geodetic Survey (NGS) North American Vertical Datum of 1988 (NAVD88).

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	IM 0908(95)362	E26	E113



PLAN

Table of As-Built Elevations - Approach Roadway					
Location	Elevation	Location	Elevation	Location	Elevation
0L		0C		0R	
1L		1C		1R	
2L		2C		2R	
3L		3C		3R	
4L		4C		4R	
5L		5C		5R	
6L		6C		6R	
7L		7C		7R	
8L		8C		8R	
9L		9C		9R	

Table of As-Built Elevations - Bridge Deck					
Location	Elevation	Location	Elevation	Location	Elevation
10L		10C		10R	
11L		11C		11R	
12L		12C		12R	
13L		13C		13R	
14L		14C		14R	
15L		15C		15R	
16L		16C		16R	
17L		17C		17R	
18L		18C		18R	
19L		19C		19R	
20L		20C		20R	
21L		21C		21R	
22L		22C		22R	
23L		23C		23R	

Elevations - Bridge Survey Markers		
Location	Station - Offset	Elevation
Begin Bridge		

ESTIMATED QUANTITIES		
ITEM	UNIT	QUANTITY
Bridge Elevation Survey	L. S.	Lump Sum

NOTE -
The Contractor will be responsible for producing the As - Built Elevation Survey soon after construction is complete and before the bridge is opened to traffic. The As - Built Elevations of the Bridge will be taken and recorded at the locations shown by the table on this sheet. The completed table will be given to the Engineer who will forward a copy to the Office of Bridge Design and the Region Office.

AS - BUILT ELEVATION SURVEY (A)
FOR
254' - 3" STEEL GIRDER BRIDGE

40' - 0" ROADWAY
OVER W. FORK OF THE
VERMILLION RIVER
STA. 545 + 25.30 TO 547 + 79.55
STR. NO. 44-104-126

0° SKEW
SEC. 2-T102N-R55W
IM 0908(95)362
HL-93

MCCOOK COUNTY
S. D. DEPT. OF TRANSPORTATION
OCTOBER 2019

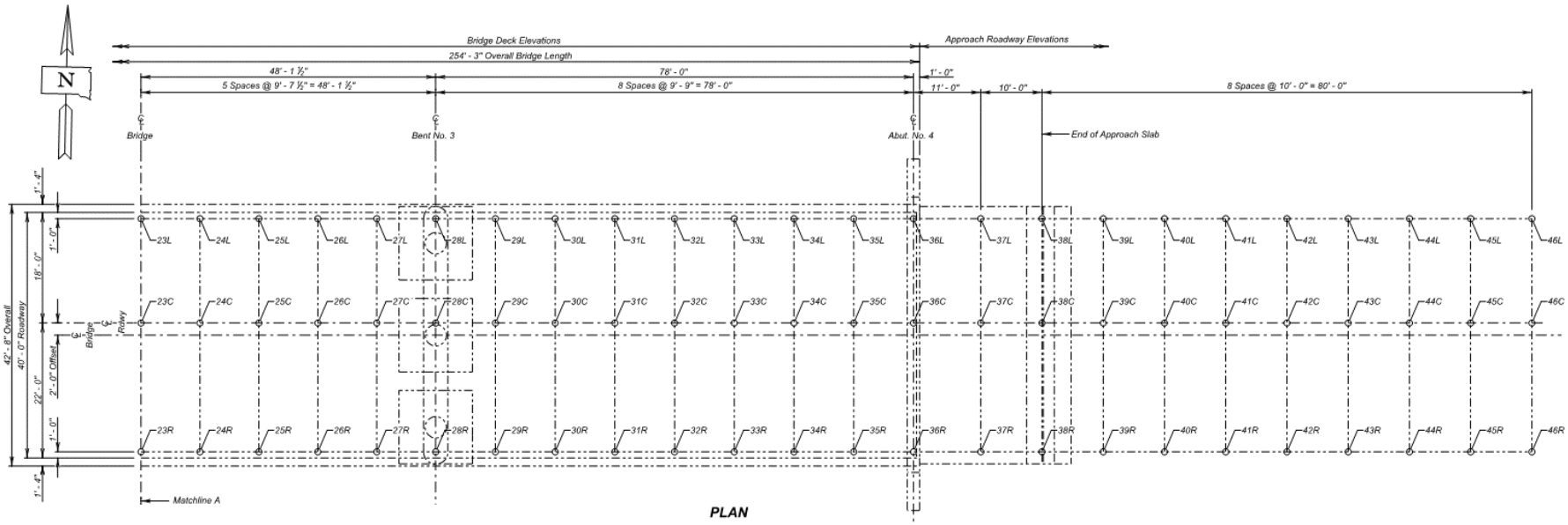
23 OF 27

DESIGNED BY	CK. DES. BY	DRAFTED BY	
RP	PW	BT	BRIDGE ENGINEER
MCCK05HP	05HPTA23		

F.2.6.24. AS BUILT ELEVATION SURVEY (B)

The elevations shown in these plans are based on the National Geodetic Survey (NGS) North American Vertical Datum of 1988 (NAVD88).

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	IM 0908(95)362	E27	E113



PLAN

Table of As-Built Elevations - Bridge Deck					
Location	Elevation	Location	Elevation	Location	Elevation
23L		23C		23R	
24L		24C		24R	
25L		25C		25R	
26L		26C		26R	
27L		27C		27R	
28L		28C		28R	
29L		29C		29R	
30L		30C		30R	
31L		31C		31R	
32L		32C		32R	
33L		33C		33R	
34L		34C		34R	
35L		35C		35R	
36L		36C		36R	

Table of As-Built Elevations - Approach Roadway					
Location	Elevation	Location	Elevation	Location	Elevation
37L		37C		37R	
38L		38C		38R	
39L		39C		39R	
40L		40C		40R	
41L		41C		41R	
42L		42C		42R	
43L		43C		43R	
44L		44C		44R	
45L		45C		45R	
46L		46C		46R	

Elevations - Bridge Survey Markers		
Location	Station - Offset	Elevation
End Bridge		

AS - BUILT ELEVATION SURVEY (B)

FOR

254' - 3" STEEL GIRDER BRIDGE

40' - 0" ROADWAY — 0° SKEW
OVER W. FORK OF THE — SEC. 2-T102N-R55W
VERMILLION RIVER — IM 0908(95)362
STA. 545 + 25.30 TO 547 + 79.55 — HL-93
STR. NO. 44-104-126

MCCOOK COUNTY

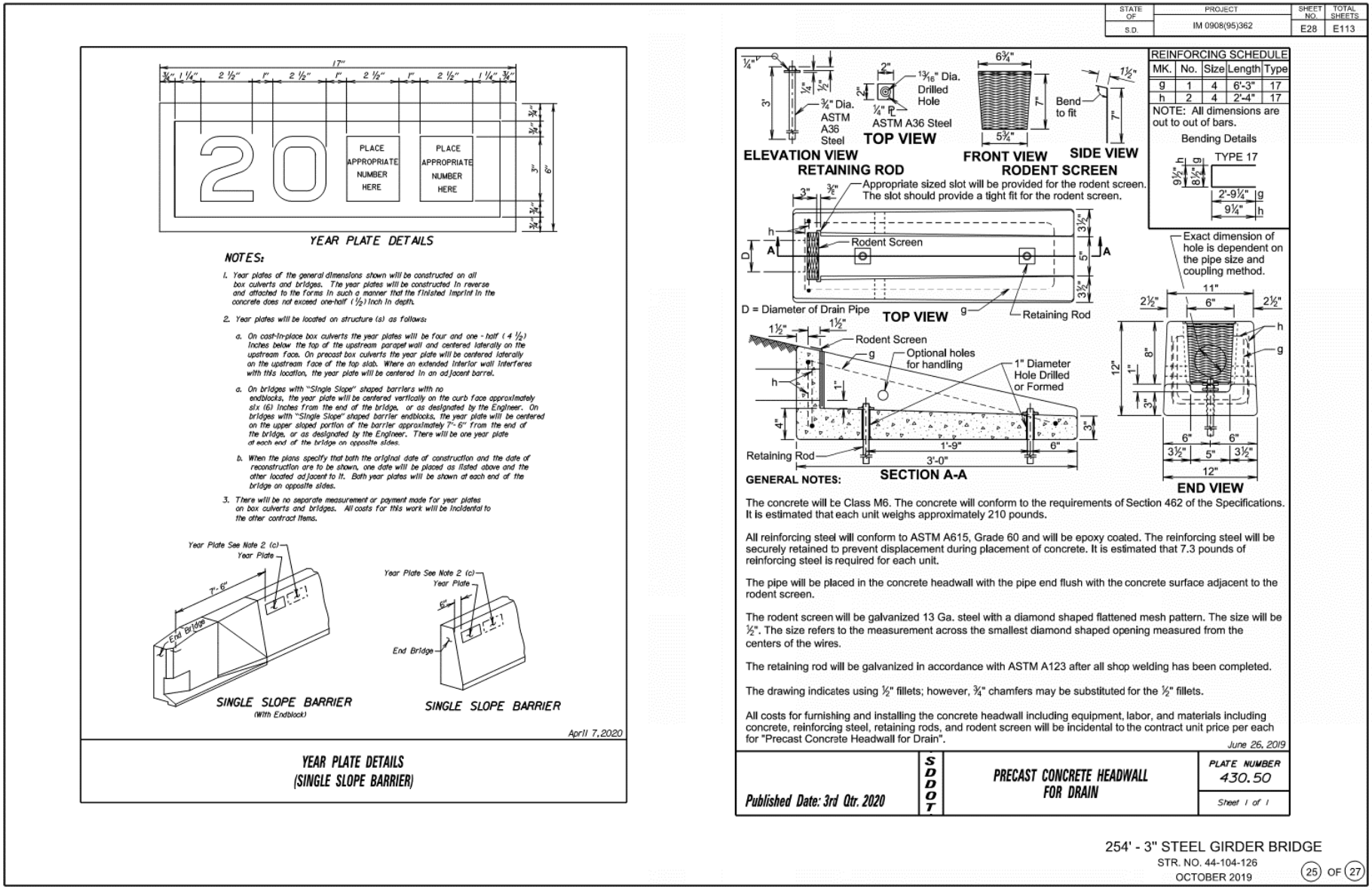
S. D. DEPT. OF TRANSPORTATION

OCTOBER 2019

24 OF 27

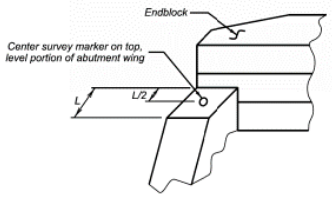
DESIGNED BY	CK. DES. BY	DRAFTED BY	
RP	PW	BT	BRIDGE ENGINEER
MCCK05HP	05HPTA24		

F.2.6.25. DETAILS OF STANDARD PLATE NO's 430.50

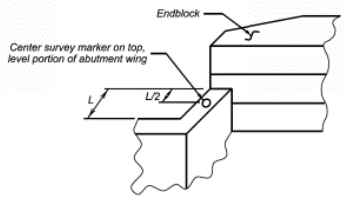


F.2.6.26. DETAILS OF STANDARD PLATE NO's 460.05 & 510.40

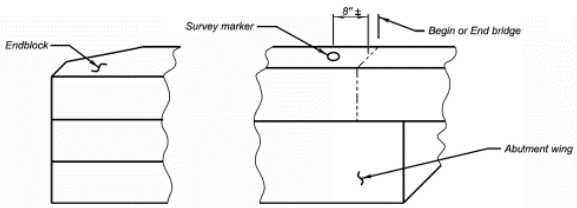
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	IM 0908(95)362	E29	E113



ABUTMENT WITH "STRAIGHT" WINGS



ABUTMENT WITH "SWEPT BACK" WINGS



ABUTMENT WITH "SWEPT BACK" WINGS

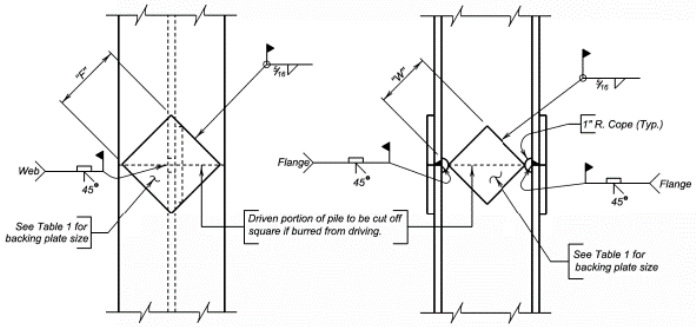
(Endblock on top of wings)

GENERAL NOTES:

1. Survey markers shall be located at each abutment on the same side of the bridge as the year plate. Place survey markers on abutment wings as shown. Two survey markers will be required at each bridge.
2. Survey markers shall be of a type intended for installation in concrete, be made of solid brass or bronze, have a domed top and be either a 3" top diameter (with a ¾" X 2" long ribbed shank), or a US Army Corps of Engineers Type C Disc with a 3 ½" top diameter.
3. There will be no separate measurement or payment made for survey markers. All costs for this work shall be incidental to the other contract items.

June 26, 2012

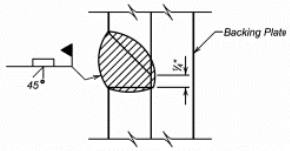
Published Date: 3rd Qtr. 2020 | SDDOT | BRIDGE SURVEY MARKER | PLATE NUMBER 460.05 | Sheet 1 of 1



NOTE:

Prepare joint surfaces lower end of upper section on the ground and weld on backing plates; then place upper section on lower section and weld.

COMPLETE JOINT PENETRATION WELD DETAIL



GENERAL NOTES:

1. Steel for backing plates shall conform to ASTM A709 Grade 50.
2. Welding and weld inspection shall be in conformance with AWS D1.5 (Current Year) Bridge Welding Code - Steel.
3. Welder must be certified and registered with the SDDOT.
4. Backing plate shall at a minimum be as thick as the web of the pile being spliced.
5. Web must be coped with 1 inch radius.
6. Submit Welding Procedure Specification (WPS) to Bridge Construction Engineer for approval prior to pile driving.

TABLE 1
(BACKING PLATES)

PILE	10"	12"	14"
"F" FLANGE	6 ½"	8"	10"
"W" WEB	4 ¾"	6 ¾"	7 ½"

December 23, 2012

Published Date: 3rd Qtr. 2020 | SDDOT | STEEL PILE SPLICE DETAILS | PLATE NUMBER 510.40 | Sheet 1 of 1

254' - 3" STEEL GIRDER BRIDGE
STR. NO. 44-104-126
OCTOBER 2019

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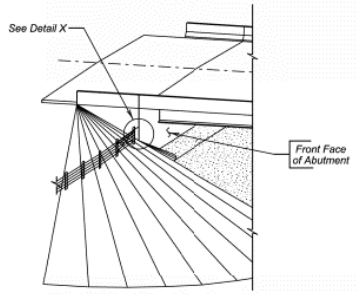
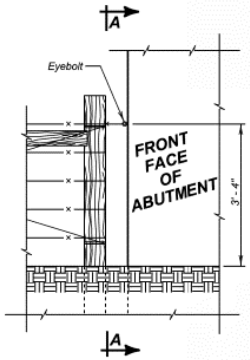
F.2.6.27. DETAILS OF STANDARD PLATE NO 620.19 & 630.92

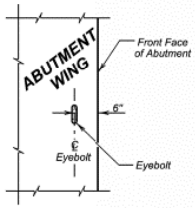
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	IM 0908(95)362	E30	E113



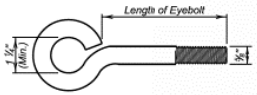
DETAILS FOR FENCE ANCHORS



DETAIL "X"



VIEW A - A



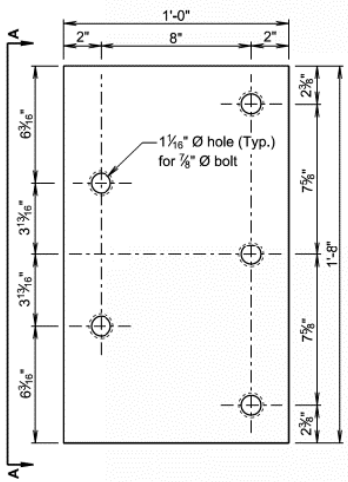
EYEBOLT DETAILS

GENERAL NOTES:

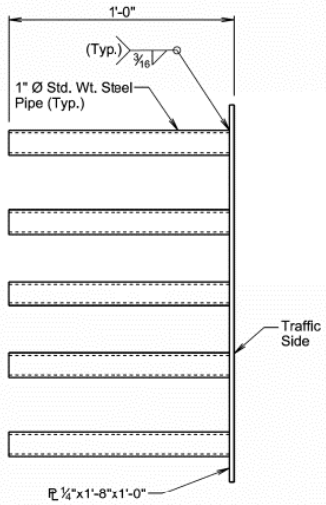
1. The fence and post details shown are for illustrative purpose only. The fence shall be as specified elsewhere in the plans.
2. Eyebolts shall be placed on all of the bridge abutment wings.
3. Eyebolts shall be ⅞ inch diameter and shall conform to ASTM A307.
4. Eyebolts shall be galvanized in accordance with AASHTO M232 (ASTM A153).
5. Eyebolts shall be installed after abutment wings are backfilled and berm construction is complete. Drill-in and epoxy eyebolts into abutment such that the eye of the bolt is flush with the concrete surface.
6. The epoxy resin mixture shall be of a type for bonding steel to hardened concrete and shall conform to AASHTO M235 Type IV, Grade 3 (Equivalent to ASTM C881, Type IV, Grade 3).
7. The diameter of the drilled holes shall not be less than ⅛ inch greater, nor more than ⅜ inch greater than the diameter of the eyebolts or as per Manufacturer's recommendations. The drilled holes shall be blown out with compressed air using a device that will reach the back of the hole to be sure that all debris or loose material has been removed prior to epoxy injection.
8. Mix epoxy resin as recommended by the Manufacturer and apply by an injection method as approved by the Engineer. Beginning at the back of the drilled holes, fill the holes ½ to ⅔ full of epoxy, or as recommended by the Manufacturer, prior to insertion of the eyebolts. Care shall be taken to prevent epoxy from flowing out of the horizontal holes prior to eyebolt insertion. Rotate the eyebolt during installation to eliminate voids and ensure complete bonding of the bolt. Insertion of the eyebolts by the dipping or painting method will not be allowed.
9. Loads shall not be applied to the epoxy grouted eyebolts until the epoxy resin has had sufficient time to cure as specified by the epoxy resin manufacturer.
10. The cost for furnishing and installing the eyebolts shall be incidental to various contract items.

December 23, 2012

Published Date: 3rd Qtr. 2020	SDDOT	FENCE ANCHORS FOR BRIDGE ABUTMENTS (SWEPT BACK WINGS)	PLATE NUMBER 620.19 Sheet 1 of 1



ELEVATION VIEW



VIEW A - A

GENERAL NOTES:

Steel plate for the insert assembly will conform to ASTM A709, Grade 36. The steel pipes will conform to ASTM A53 or ASTM A500, Grade B.

Welding and weld inspection will be in conformance with AWS D1.1 - (Current Year) Structural Welding Code - Steel.

After fabrication, galvanize in accordance with AASHTO M111 (ASTM A123).

Bolts, nuts, and washers will be provided with each assembly. Bolts will be galvanized and conform to the requirements of ASTM A307, A325, or A449. Plain washers will be galvanized and conform to ASTM F844.

Bolt heads will be placed on the traffic side of the endblock. Bolt projection at the back side of the insert will not exceed 1 inch beyond the nut.

The cost of the 5 bolt insert plate assembly complete in place including welding and galvanizing will be incidental to the contract unit price per cubic yard for "Class A45 Concrete, Miscellaneous", "Class A45 Concrete, Bridge Deck", or "Class A45 Concrete, Bridge Repair", as applicable.

September 14, 2019

Published Date: 3rd Qtr. 2020	SDDOT	5 BOLT INSERT PLATE ASSEMBLY	PLATE NUMBER 630.92 Sheet 1 of 1

254' - 3" STEEL GIRDER BRIDGE
STR. NO. 44-104-126
OCTOBER 2019

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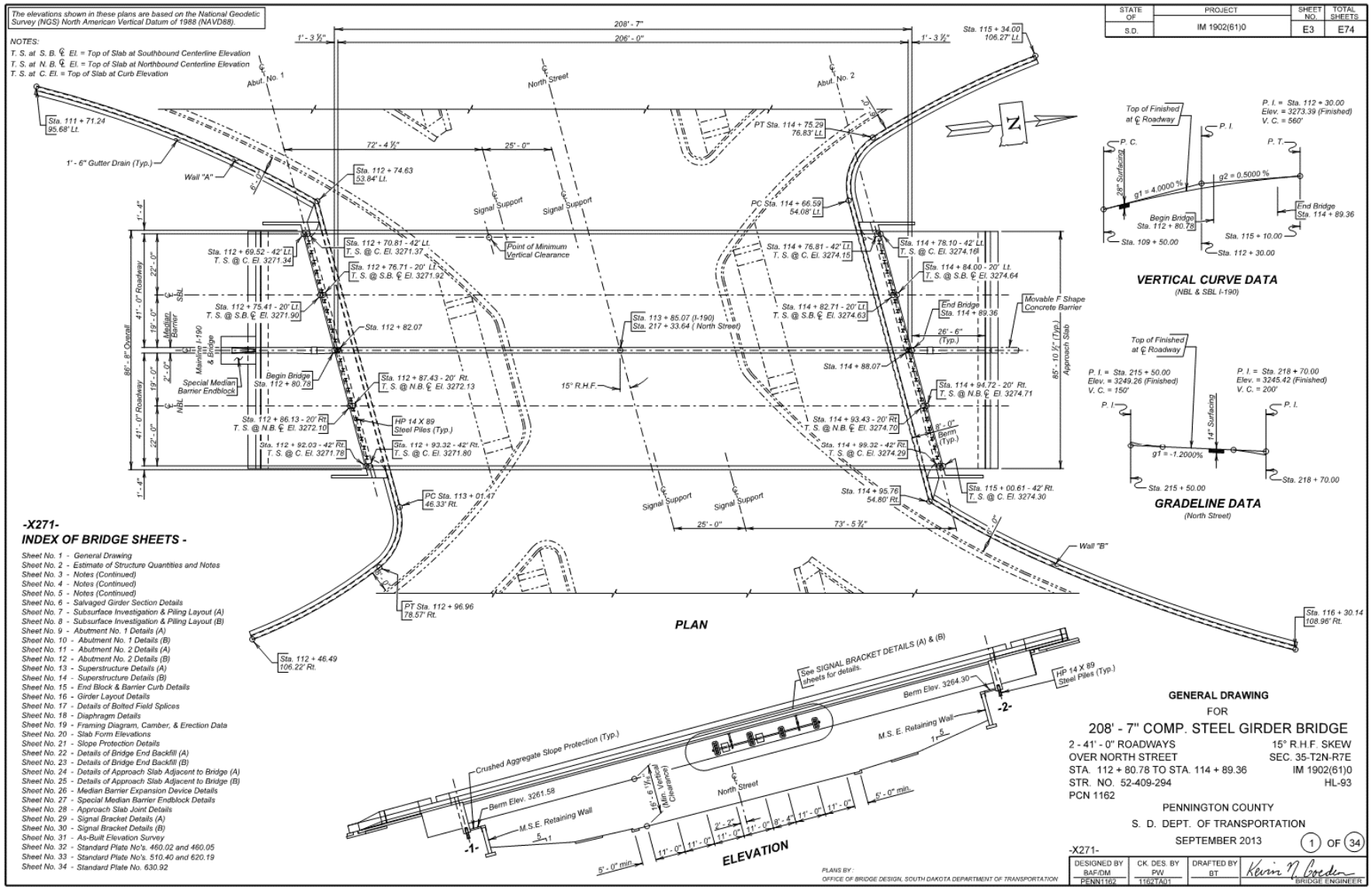
F.2.7. Skewed Steel Girder Bridge

F.2.7.1. GENERAL DRAWING



F.2.7.2. ESTIMATE OF STRUCTURE QUANTITIES & NOTES

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	IM 1902(61)0	E4	E74

Revised June 9, 2015 PW

ESTIMATE OF STRUCTURE QUANTITIES

DESCRIPTION	QUANTITY	UNIT	REMARKS
Bridge Elevation Survey	Lump Sum	LS	
Concrete Penetrating Sealer	1,891	SqYd	See Special Provision
Incidental Work, Structure	Lump Sum	LS	
Base Course	5,123	Ton	
Structural Steel	Lump Sum	LS	See Special Provision
Membrane Sealant Expansion Joint	171.8	Ft	
Granular Bridge End Backfill	204	Cu Yd	
Class A45 Concrete, Bridge Deck	513.7	Cu Yd	See Special Provision
Class A45 Concrete, Bridge	211.5	Cu Yd	
Concrete Approach Slab for Bridge	515.4	SqYd	
Concrete Approach Sleeper Slab for Bridge	138.4	SqYd	
Reinforcing Steel	16,486	Lb	
Epoxy Coated Reinforcing Steel	1,148	Lb	
No. 7 Rebar Splice	224	Ea.	
HP 14x89 Steel Test Pile, Furnish and Drive	126	Ft	
HP 14x89 Steel Bearing Pile, Furnish and Drive	2,477	Ft	
Bridge Berm Slope Protection, Crushed Aggregate	168	Sq Yd	
Geogrid Reinforcement	4,271	Sq Yd	
Install Dowell in Concrete	18	Ea	
Bridge Painting	Lump Sum	L.S.	
ALTERNATE A			
Stainless Reinforcing Steel	98,807	Lb	See Special Provision
ALTERNATE B			
Zinc and Epoxy Dual Coated Reinforcing Steel	98,807	Lb	

SPECIFICATIONS FOR BRIDGE

1. Design Specifications: AASHTO LRFD Bridge Design Specifications, 2012 Edition with 2013 interims.
2. Construction Specifications: South Dakota Standard Specifications for Roads and Bridges, 2004 Edition and required provisions, supplemental specifications and special provisions as included in the proposal.

BRIDGE DESIGN LOADING

1. AASHTO HL-93.
2. Dead Load includes 22 psf for future wearing surface on the roadway.

DESIGN MATERIAL STRENGTHS

Concrete	f'c = 4,500 psi
Reinforcing Steel	fy = 60,000 psi
Piling (ASTM A572 Grade 50)	fy = 50,000 psi
Structural Steel (ASTM A709 Gr. 50WT2)	fy = 50,000 psi
Structural Steel (ASTM A709 Gr. 36T2)	fy = 36,000 psi

GENERAL CONSTRUCTION

1. All mild reinforcing steel shall conform to ASTM A615, Grade 60.
2. All exposed concrete corners and edges shall be chamfered 3/4" unless noted otherwise.
3. Use 2" clear cover on all reinforcing steel except as shown.
4. Contractor shall imprint on the structure the date of new construction as specified and detailed on Standard Plate No. 460.02.
5. Barrier Curbs and End blocks shall be built normal to the grace.
6. Request for construction joints or resteel splices at points other than those shown, must be submitted to the Engineer for prior approval. If additional splices are approved, no payment will be allowed for the added quantity of resteel.
7. The elevation of the bridge deck is 28" above subgrade elevation.

INCIDENTAL WORK, STRUCTURE

1. In place centerline Sta. 112+29.57 - 83.59' Rt. to centerline Sta. 116+47.75 - 71.44' Rt. and in place centerline Sta. 112+24.26 - 123.22' Rt. to centerline Sta. 116+16.81 - 114.38' Rt. are a 421' 7 span and a 394' 6-span continuous steel girder bridge with 30'-0" clear roadway; the superstructures consist of 6" reinforced concrete slabs supported on 4 lines of girders. Steel channel rail faced with steel W-beam guardrail runs the length of the bridges. The decks have been overlaid with 2 inches of low slump dense concrete. The substructures consists of 2 column reinforced concrete bents and reinforced concrete vertical abutments, all of which are supported on timber piling.
2. Break down and remove the existing bridges, including the concrete slope protection and approach/sleeper slabs if applicable, to 1 foot below finished groundline, or as required to construct the new structure in accordance with Section 110 of the Specifications. All portions of the existing bridges not salvaged for future highway related use shall be removed and disposed of by the Contractor on a site obtained by the Contractor and approved by the Engineer in accordance with the COMMITMENT H: WASTE DISPOSAL SITE found in Section A.
3. The existing guardrail and posts shall be salvaged for future highway related use. The salvaged guardrail and posts shall be stockpiled at the SDDOT Rapid City Area South Maintenance Yard at 5801 South Highway 79 in Rapid City, SD. Coordinate delivery with Maintenance Supervisor Bob Smith, (605) 394-1646. Care shall be taken during the dismantling, transporting, and stockpiling operations not to damage the structural properties of the salvaged items.
4. A 6 ft. section of girder shall be salvaged from the existing southbound structure from the eastern exterior girder. The portion to be salvaged is located approximately 40' - 7 1/4" south of Bent No. 2. The salvaged section shall be centered about the bolted splice repair at the location. The salvaged girder section shall be stockpiled at the SDDOT Rapid City Area South Maintenance Yard at 5801 South Highway 79 in Rapid City, SD. Coordinate delivery with Maintenance Supervisor Bob Smith, (605) 394-1646. Care shall be taken during the dismantling, transporting and stockpiling operations not to damage the structural properties of the salvaged items.
5. The foregoing is a general description of the in-place bridges and should not be construed to be complete in all details. Before preparing the bid it shall be the responsibility of the Contractor to make a visual inspection of the structures to verify the extent of the work and materials involved. If desired by the Contractor, a copy of the original construction plans may be obtained through the Office of Bridge Design.

NOTICE - LEAD BASED PAINT

Be advised that the paint on the steel surfaces of the existing structure contains lead. The Contractor should plan his/her operations accordingly, and inform his/her employees of the hazards of lead exposure.

DESIGN MIX OF CONCRETE

1. All structural concrete shall be Class A45 unless otherwise indicated.
2. Type II cement conforming to Section 750 is required except, Type III cement is required in the abutments. Type III cement shall contain a maximum 8% Tricalcium Aluminate (C_3A) and a maximum 0.6% Alkalies ($Na_2O + O.658K_2O$).
3. Coarse aggregate to be used in concrete shall consist of either crushed quartzite or other crushed ledge rock. If crushed ledge rock other than quartzite is to be used, it shall be from a source approved by the Engineer.
4. Grout design mix shall be as specified in Section 460.3 S. of the Specifications. A compressive strength of 2000 psi shall be attained by the grout prior to erection of any beams. Chamfer edges of grout pads ¾". The quantity of grout is included in and shall be paid for at the contract unit price per cubic yard for Class A45 Concrete, Bridge.

ABUTMENTS

1. The HP 14x89 Piling were designed using a factored bearing resistance of 165 tons per pile. Piling shall develop a field verified nominal bearing resistance of 412 tons per pile.
2. One test pile shall be driven at each abutment and will become part of the pile group.
3. The contractor shall have sufficient pile splice material on hand before pile driving is started. See Standard Plate No. 510.40.
4. Piles shall not be driven out of position by more than two inches in the direction parallel to the girder centerline. A pile-driving template shall be used to insure this accuracy.
5. Each finished abutment shall include a Bridge Survey Marker. See Standard Plate No. 460.05
6. Abutment wings shall not be cast until after the deck has been poured.

ESTIMATE OF STRUCTURE QUANTITIES AND NOTES
FOR
208' - 7" COMP. STEEL GIRDER BRIDGE

STR. NO. 52-409-294
SEPTEMBER 2013

2 OF 34

DESIGNED BY	CK. DES. BY	DRAFTED BY	
PW PENN1162	DM 1162TA02	BT	Kevin N. Boeden BRIDGE ENGINEER

F.2.7.3. NOTES (CONTINUED)

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	IM 1902(61)0	E5	E74

ABUTMENTS (CONTINUED)

7. All piling within the Granular MSE Backfill limits shall be encased with a 24" minimum inside diameter steel casing. The steel casing shall be of sufficient strength to withstand all forces, including those from earth pressure and shall be approved by the Engineer. The pile shall be encased the entire height of the backfill to an elevation of 3 inches below the bottom of abutment. See MSE Retaining Wall plans for measurement and payment of casing.

8. The Contractor shall drive the pile and then place the casings. The Contractor shall take the necessary precautions to prevent displacement of the casings during placement and compaction of the backfill. Backfill material within 3 ft. of the casing shall be placed in small lifts and compacted in such a manner that the required density is achieved, without causing displacement or damage to the steel casing. The Contractor shall coordinate casing installation with the MSE wall installation.

9. After the piles are driven, the steel casings installed and the backfill placed, the steel casings shall be filled with coarse dry sand to a depth of 6 feet from the top of the casing. The sand shall be compacted to prevent bridging. The top 6 feet of the casing shall be filled with natural bentonite slurry. The slurry shall consist of a polymer free sodium bentonite designed for sealing wells and bore holes. The bentonite material shall be a granular bentonite with ¼" or larger particles. The bentonite particles shall be poured directly into the casing and hydrated with water in 2 ft. lifts. The quantity of water used shall be determined according to the manufacturer's recommendations for a solution of approximately 20% solics.

10. After filling the casings with bentonite, the top of each casing shall be covered and sealed with a layer of plywood covered with a minimum of 2-inch thick polystyrene, as approved by the Engineer.

11. All costs associated with filling the steel casings with sand and bentonite slurry shall be incidental to the contract unit price per foot for the steel pile.

CONNECTION OF GIRDER TO PILE

1. Cut off pile at elevation shown in the plans and weld bearing plate to pile. Adjust as necessary to make bearing plate level, and to permit proper position of girder. If piles are driven out of position to the extent that bearing plates will not fit, the Contractor shall submit his method of correction to the Engineer for approval. Piles shall not be pulled into position.

2. All girder erection shall be complete with the splices fully bolted and diaphragms in place, before welding girders to bearing plates. (Diaphragms need not be secured with more than temporary bolting, prior to pile to girder connection).

3. An alternate connection, capable of transmitting a direct load of 8000 lbs. to the pile and developing 30,000 lbs. horizontal force, may be submitted to the Office of Bridge Design for prior approval.

4. This connection shall not be made when the temperature is greater than 70 degrees F or less than 30 degrees F.

5. Steel for the bearing plates shall conform to ASTM A709 Gr. 50.

6. Payment for furnishing and installing the bearing plates shall be incidental to the contract lump sum price for Structural Steel.

PLACEMENT OF ABUTMENT CONCRETE

1. Abutment concrete shall be placed, as directed by the Engineer, at a time when a relatively stable temperature can be expected. A relatively stable temperature is defined as an air temperature deviation of not more than 30 degrees F within 12 hours of completing the abutment pour from the air temperature at the time when the abutment concrete is placed.

2. The forms shall be secured to the girders in such a manner that they will be free to move longitudinally with the expansion or contraction of the girder.

3. The girders shall be braced near the abutments in such a manner that their lateral movement or rotation will be prevented during the placing of concrete. Include details for this bracing with the falsework plans.

SUPERSTRUCTURE

1. Structural Steel shall conform to ASTM A709 Gr. 50WT2. Angles in the diaphragms shall conform to ASTM A588 Grade 50. Shear connectors shall conform to Section 7.3 Type B of the AASHTO/AWS D1.5 Bridge Welding Code.

2. Bolts, nuts, and washers shall conform to ASTM A325 Type 3.

3. Shear Connectors shall be field welded to the girders in accordance with the Shear Connector Field Installation Special Provision.

4. All butt welded girder splices shall be ultrasonically inspected. See notes regarding Welding and Weld inspection.

5. Cost of welding and weld inspection shall be included in the contract lump sum price for Structural Steel.

6. The exterior face and bottom of the bottom flange of the exterior girders shall be painted in accordance with Section 411 of the Specifications. The top coat shall be an approved brown (Federal Standard 595B Color 30045) to match the weathering color of the steel.

7. See Diaphragm Details for notes concerning diaphragms.

8. Structural Steel used in all girder web plates, girder flanges, and girder splice plates shall comply with the Charpy-V-Notch toughness requirements set forth in Section 971 of the Specifications. Material greater than 1 1/2 inches in thickness shall require frequency (P) testing in lieu of heat lot (H) testing. See Girder Layout for location of tension and stress reversal areas of girder flanges.

9. The deck-finishing machine shall be adjusted and operated in such a manner that the roller screed or screeds are parallel with the centerline of the bridge and the finish machine is parallel to the skew of the bridge. Concrete placement in front of the finish machine shall be kept parallel to the skew of the bridge to equally distribute loads to the girders.

10. The concrete bridge deck shall be placed and finished at a minimum rate of 90 ft. of deck per hour measured along centerline roadway. If concrete cannot be placed and finished at this rate, the Engineer shall order a header installed and operations stopped. If a header is required sometime during the pour operation, its location shall be at or as near as possible to the three quarter point of the span. Notify the Bridge Construction Engineer if deck pour operations are stopped. Operations may resume only when the Engineer is satisfied that a rate of 90 ft. per hour can be maintained and the concrete has attained a minimum compressive strength of 2000 psi.

11. Dead Load camber shall be cut into the girder webs. Do not induce or correct camber in plate girders by local heating without prior approval from the Engineer.

12. All structural steel surfaces of the superstructure shall be blast cleaned to a commercial finish, in accordance with SSPC SP6, at the fabricator's shop. Abrasives used for blast cleaning shall be clean dry sand, steel shot, mineral grit, or manufactured grit. Fins, tears, slivers, and burred or sharp edges shall be removed by grinding and then re-blasted to achieve the specified finish.

13. Snap ties, if used in the barrier curb formwork, shall be epoxy coated. The epoxy coating shall be inert in concrete. If Alternate B is chosen, the epoxy coating shall be compatible with the coating applied to the new Zinc and Epoxy Dual Coated Reinforcing Steel.

14. The Contractor shall submit a detailed girder erection plan 30 days prior to girder erection. The plan shall include complete sequencing details, splice bolt up procedures, girder pick point locations, temporary shoring details, and temporary bracing details. The girder erection plan shall be stamped by a Professional Engineer registered in South Dakota.

15. All single girder segments shall be adequately braced or held in position until the adjacent girder segment is placed and all diaphragms between the segments are fully connected. Single girder segments will not be allowed to remain in place beyond the end of a work shift without connection to an adjacent girder segment with all diaphragms between the segments fully connected. At no time will a single girder segment be allowed over traffic.

16. If Alternative A is chosen for reinforcing steel, see Special Provision for Stainless Reinforcing Steel. If Alternative B is chosen, reinforcing steel shall conform to ASTM 1055. Mixing of reinforcing types will not be allowed.

NOTES (CONTINUED)
FOR
208' - 7" COMP. STEEL GIRDER BRIDGE

STR. NO. 52-409-294
SEPTEMBER 2013

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DESIGNED BY	CK. DES. BY	DRAFTED BY	
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F.2.7.4. NOTES (CONTINUED)

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	IM 1902(61)0	E6	E74

SHOP PLANS

Shop plans shall be required as specified by the Specifications. Shop plans must be submitted electronically in Adobe PDF. Send shop plan submittals to the Office of Bridge Design.

CLASS A45 CONCRETE, BRIDGE DECK

1. Concrete used in the bridge deck slab and barrier curbs shall be in accordance with the requirements for bridge deck concrete as specified in Section 460.3 A. of the Specifications. In addition, the concrete used in the bridge deck and barrier curbs shall have Class F Modified Fly Ash substituted for a portion of the cement in accordance with Section 605 of the Specifications. The amount of cement to be replaced shall be 20 percent by weight. The ratio of substitution of fly ash to cement shall be 1:1 by weight.

2. The bridge deck concrete, excluding the barrier curbs, shall be placed and cured in accordance with the Special Provision for Bridge Deck Curing and Finishing.

3. See Special Provision for Concrete Penetrating Sealer.

FIELD BOLTED GIRDER SPLICES

1. Steel for splice and filler plates shall conform to ASTM A709 Gr. 50WT2.

2. Bolts in flange splices shall be placed with the heads down.

3. Bolts in web splice of exterior girders shall be placed with heads on exterior face of girders.

4. All bolts shall be fully tightened prior to removing temporary supports.

WELDING AND WELD INSPECTION

Main members referred to in Section 6.7 Nondestructive Testing of Bridge Welding Code are identified as follows: Girder webs, girder flanges, and bearing stiffeners. Ultrasonic testing of groove welds shall be used in lieu of radiography. See Girder Layout for stress categories and their locations along the girder.

FALSEWORK

The Contractor shall be required to include with the Falsework Plans, details for the construction of an adequate "Walk-Way" including railing.

FALL PROTECTION

1. The Contractor shall install a Fall Protection System conforming to OSHA Regulations. When working on the girders prior to decking installation, a Horizontal Lifeline – or other OSHA approved system shall be installed. The Contractor shall have one Personal Fall Arrest System (PFAS) available for use by a Department Inspector. The PFAS shall be compatible with the installed Fall Protection System.

2. Modifications to any bridge components used to accommodate the Fall Protection System shall be shown on the Falsework Plans and/or the appropriate Shop Plans. Field welding to bridge components will not be allowed. Field placed concrete inserts or drilled-in anchor bolts will be allowed if approved by the Engineer. All costs associated with providing the Fall Protection System shall be incidental to the other contract items.

CLASS B COMMERCIAL TEXTURE FINISH

1. A Class B commercial texture finish shall be applied to the following areas:

   a) ***Abutments:** all exposed surfaces to an elevation 1-foot below finished ground line.
   b) **Barrier Rail:** all exposed surfaces (**front, **top and *back).
   c) ***Slab:** edge of slab.

   * Color shall be Tammscoat Adobe or an approved tan.
   ** Color shall be "Pearl Gray" Federal Standard No. 26622.

2. The Class B commercial texture finish shall be applied in accordance with Section 460.3M.1.c of the Specifications.

3. Where the Class B commercial texture finish is to be applied, concrete curing shall be accomplished with cotton or burlap mats and polyethylene sheeting. Curing shall continue for not less than seven days after placing concrete before the commercial texture finish is applied. The commercial texture finish shall be applied in accordance with the manufacturer's recommendations. The commercial texture finish itself does not require a specific cure except for drying.

SIGNAL BRACKETS

1. Steel for plates and bars shall conform to ASTM A709 Gr. 36. Shear connectors shall conform to Section 7.3 Type B of the ANSI/AASHTO/AWS D1.5-02 Bridge Welding Code. Pipe shall conform to ASTM A53 Grade B.

2. Brackets and/or bracket components shall be painted in accordance with Section 411 of the Specifications. The finish coat of paint color shall be brown as approved by the Engineer and shall match the color of the exterior girders.

3. Payment for painting, furnishing, and installing the signal brackets shall be incidental to the contract lump sum price for Structural Steel.

PILE DRIVING

1. A drivability analysis was performed using the wave equation analysis program (GRLWEAP). The following pile hammers were evaluated and found to produce acceptable driving stresses at the highest fuel setting:

   Delmag D-30-32 SPI D-30

   The following hammers were evaluated and found to produce acceptable driving stresses at the second fuel setting:

   Delmag D-46-32

   If during actual driving operations an adequate hammer drop to obtain design bearing is not achieved, contact the Geotechnical Engineering Activity prior to increasing the fuel setting.

3. Pile hammers not listed will require evaluation and approval prior to use from the Geotechnical Engineering Activity.

SDDOT's LRFD PILE DRIVING EQUATIONS

To determine the field verified nominal pile bearing resistance of driven piles the SDDOT uses the formulas below for timber, concrete, steel H-piling and shell type piles.

For single action steam or air hammers and open cylinder top diesel hammers:

$$Q\,(\text{drive}) = \frac{10.5WH}{S + 0.1} \times \frac{W}{W + M}$$

Where:

Q = the field verified nominal pile bearing resistance in tons.
W = the weight of the ram of an energy hammer in tons.
H = the height of free fall of the hammer or ram in feet.
M = the weight in tons of the driven mass and shall include the weight of the pile, the weight of the driving cap, and the weight of the anvil, if used.
E = the energy per blow in foot-tons.
S = the average penetration in inches of the pile per blow for the last 10 blows for energy hammers.

AS - BUILT ELEVATION SURVEY

The Contractor shall be responsible for recording the As-Built deck elevations and bridge survey marker elevations at the locations shown in the Table of As-Built Elevations shown in the plans. All costs associated with obtaining the elevations including all equipment, labor, and any incidentals required shall be incidental to the contract lump sum price for Bridge Elevation Survey.

BOLT TESTING

The certified mill test reports for all bolts used on the project shall include the test results for all of the testing specified in section 972.2. D. of the Specifications. Some of these tests are supplemental tests that must be requested at the time the bolts are ordered. It is the responsibility of the Contractor to notify the bolt supplier of these requirements.

NOTES (CONTINUED)
FOR
208' - 7" COMP. STEEL GIRDER BRIDGE

STR. NO. 52-409-294
SEPTEMBER 2013

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DESIGNED BY	CK. DES. BY	DRAFTED BY	
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F.2.7.5. NOTES (CONTINUED)

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	IM 1902(61)0	E7	E74

Revised June 9, 2015 PW

REINFORCED GRANULAR EMBANKMENT

1. The geogrid will be a biaxial grid of single layer construction. Vibratory welded, integrally formed or woven and coated geogrids will be acceptable. Grids with laser welded grid junctions will not be allowed. The geogrid will be certified by the supplier to meet the following specification prior to installation:

Property	Test	MARV
Wide Width Strip Tensile Strength (Ultimate)	ASTM D 6637 Method B	850lb/ft MD and XD

2. Geogrid will be paid for at the contract unit price per square yard for Geogrid Reinforcement. Payment quantities will be based on area covered plus 15%. Overlaps are accounted for by the additional 15%. Payment will be full compensation for furnishing and installing the geogrid only. Granular backfill materials will be paid for under a different bid item.
3. Granular Material will conform to the specification for Aggregate Base Course in Section 882 of the Specifications. Granular Material will be paid for at the contract unit price per cubic yard for Aggregate Base Course. Payment will be full compensation for furnishing and placing this material.
4. The geogrid shall be placed on a level surface and overlapped a minimum of 2 feet.
5. The geogrid will be placed as taut as possible with minimal wrinkles. Placement will be done so that subsequent granular cover material does not shove, wrinkle or distort the in place geogrid. The overlaps will be shingled in a manner that assures granular material will not be forced under the geogrid during backfilling operations. The geogrid may be held in place with small piles of granular material or staples.
6. Aggregate base course will be dumped at least 20 feet behind the leading edge of the backfill and pushed into place with a loader or dozer from the covered areas to the uncovered areas. No traffic will be allowed on the uncovered geogrid.
7. The aggregate base course and adjacent soil embankment shall be built simultaneously in horizontal layers. Aggregate base course shall be placed in 6 inch maximum lifts and compacted to 97 percent of maximum standard proctor dry density using a smooth face vibratory roller or vibratory plate compactor. Each layer of granular material shall be thoroughly watered prior to and during compaction.
8. Density tests within the berm limits shall consist of tests conducted both in the soil embankment and the granular bridge end backfill according to the modified zone requirements below:

Zone	Depth (ft.)	Min. required tests
1	0-1	1
2	1-3	1
3	3-5	1
4	5 to Bottom	1 per 3 vertical feet

9. The zone requirement will be in force for all phases of staged construction. For example, if the berm on the west side of centerline is constructed separately from the east side, testing by zone will be required on both sides of centerline.

APPROACH SLABS

1. Sleeper slab riser shall be cast with the approach slab or cast after the approach slab is placed. Care shall be taken to ensure the correct grade is maintained across the joint.
2. The use of an approved finishing machine will be required during placement of Class A45 Concrete for the approach slabs. Concrete placement in front of the machine shall be kept parallel to the screed.
3. The concrete in the approach slab shall be tined normal to centerline roadway.
4. Concrete Approach Sleeper Slab for Bridge will be paid for at the contract unit price per square yard. This payment shall be full compensation for all excavation, furnishing, hauling, and placing all materials including concrete and reinforcing steel; for disposal of all excavated material and surplus materials; and for labor, tools, equipment, and any incidentals necessary to complete this item of work.
5. Concrete Approach Slab for Bridge will be paid for at the contract unit price per square yard. This payment shall be full compensation for all excavation, furnishing, hauling, and placing all materials including concrete, asphalt paint or 4 mil polyethylene sheeting, elastic joint sealer, and reinforcing steel; for disposal of all excavated material and surplus materials and for labor, tools, equipment, and any incidentals necessary to complete this item of work.

BARRIER EXPANSION DEVICES

1. Steel for plates and bars shall conform to ASTM A709 Gr. 36. The end welded deformed bar anchors shall conform to ASTM A496.
2. All steel components shall be galvanized after shop welding in accordance with AASHTO M111 (ASTM A123).
3. The plain ferrule inserts in the expansion device shall be ¾" dia. commercially available regular steel inserts to be positioned by welding onto the plate of the expansion device as shown on these plans.
4. The bolts used to attach the sliding plates to the expansion device shall be ¾" dia., Group 2, Type 316 stainless steel socket countersunk head flat screws furnished with a thread type compatible with the thread type in the plain ferrule inserts of the expansion joints. All bolts are to be coated with a liquid thread locking material that is intended to allow for future removal.
5. Payment for furnishing and installing the barrier expansion joints shall be incidental to the contract lump sum price for Structural Steel.

CRUSHED AGGREGATE SLOPE PROTECTION

1. This work shall consist of paving the bridge berm slopes with crushed aggregate slope protection for control and prevention of berm erosion.
2. The aggregate used in the crushed aggregate slope protection shall conform to the requirements of Section 820 of the Specifications for coarse aggregate for Class A Concrete (size no. 1).
3. The asphalt material used in the crushed aggregate slope protection shall be either Asphalt Type MC-70 or MC-250, or emulsified Asphalt Type RS-1, RS-2, CRS-1 or CRS-2 meeting the requirements of Section 890 of the Specifications and AASHTO M81, AASHTO M140, and AASHTO M208 respectively.
4. The surface upon which the slope protection is to be placed shall be smooth, uniform, and free from foreign material. The top surface of the slope protection shall conform to the dimensions, elevations, and slopes shown in the plans.
5. The crushed aggregate shall be shaped and compacted to provide a stable, smooth, and uniform surface.
6. The asphalt material shall be applied at a rate sufficient to assure penetration and binding of the aggregate in the upper 2 inches of the slope protection. (Estimated Rate = 1.3 gallons per square yard.) The surfaces of the adjacent structure shall be protected from spattering or discoloration from the asphalt material.
7. Payment for crushed aggregate slope protection shall be at the contract unit price per square yard for Bridge Berm Slope Protection, Crushed Aggregate and shall be full compensation for slope paving, including furnishing all materials, labor, and equipment necessary or incidental to the satisfactory completion of this work. Payment will be for plans quantity.

NOTES (CONTINUED)
FOR
208' - 7" COMP. STEEL GIRDER BRIDGE

STR. NO. 52-409-294
SEPTEMBER 2013

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DESIGNED BY	CK. DES. BY	DRAFTED BY	
PW	DM	BT	Kevin N. Boeden BRIDGE ENGINEER
PENN1162	1162TA05		

F.2.7.6. SUBSURFACE INVESTIGATION AND PILING LAYOUT

Hole Number	1	
Station	112+72	
Depth	45	ft
Soil Color	Gray	
Classification	Sand Clay	
Strength (Q_u)	4,034	psf
Dry Density	98.4	pcf
Wet Density	121.8	pcf
Moisture	23.8	%
Pass No. 10	99.1	%
Pass No. 40	99.1	%
Pass No. 200	66.2	%
Sand Content	32.9	%
Silt Content	30.3	%
Clay Content	35.9	%

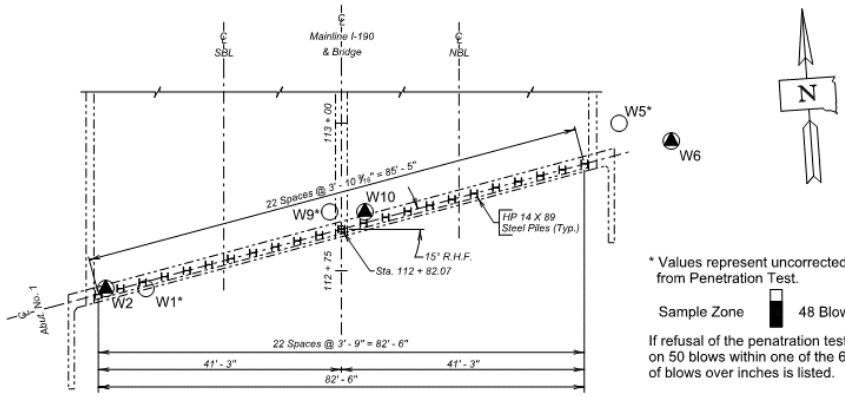
Hole Number	5	
Station	113+00	
Depth	60.5	ft
Soil Color	Gray	
Classification	Silt Clay	
Strength (Q_u)	8,723	psf
Dry Density	97.9	pcf
Wet Density	119.6	pcf
Moisture	22.2	%
Pass No. 10	98.6	%
Pass No. 40	98.6	%
Pass No. 200	76.9	%
Sand Content	21.7	%
Silt Content	33.3	%
Clay Content	43.6	%

Hole Number	5	
Station	113+00	
Depth	18	ft
Soil Color	Brown/Gray	
Classification	Sand Clay	
Strength (Q_u)	2,149	psf
Dry Density	102.3	pcf
Wet Density	122.3	pcf
Moisture	19.5	%
Pass No. 10	83.4	%
Pass No. 40	76.6	%
Pass No. 200	67.9	%
Sand Content	15.5	%
Silt Content	22.7	%
Clay Content	45.2	%

Hole Number	6	
Station	112+97	
Depth	32	ft
Soil Color	Gray	
Classification	Clay	
Strength (Q_u)	28,110	psf
Dry Density	118.9	pcf
Wet Density	136.0	pcf
Moisture	14.4	%
Pass No. 10	99.2	%
Pass No. 40	99.2	%
Pass No. 200	98.2	%
Sand Content	1.1	%
Silt Content	34.5	%
Clay Content	63.7	%

Hole Number	9	
Station	112+85	
Depth	13	ft
Soil Color	Brown	
Classification	Clay	
Strength (Q_u)	8,328	psf
Dry Density	104.6	pcf
Wet Density	123.6	pcf
Moisture	18.4	%
Pass No. 10	98.6	%
Pass No. 40	96.7	%
Pass No. 200	85.9	%
Sand Content	12.7	%
Silt Content	32.4	%
Clay Content	53.4	%

Hole Number	9	
Station	112+85	
Depth	20.17	ft
Soil Color	Brown	
Classification	Clay	
Strength (Q_u)	3,843	psf
Dry Density	95.0	pcf
Wet Density	118.2	pcf
Moisture	24.4	%
Pass No. 10	98.2	%
Pass No. 40	94.1	%
Pass No. 200	90.6	%
Sand Content	7.6	%
Silt Content	25.6	%
Clay Content	65.0	%



PILING LAYOUT

* Values represent uncorrected "N" values from Penetration Test.

Sample Zone 48 Blows Per Foot

If refusal of the penatration test was achieved based on 50 blows within one of the 6 inch sets. The number of blows over inches is listed.

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Mowry Shale is a marine shale with a textural classification that varies from silt-clay to clay-silt. Color varies from gray to black. Bentonite zones may be encountered throughout. Nonweathered Mowry Shale is considered to be "Soft Rock".

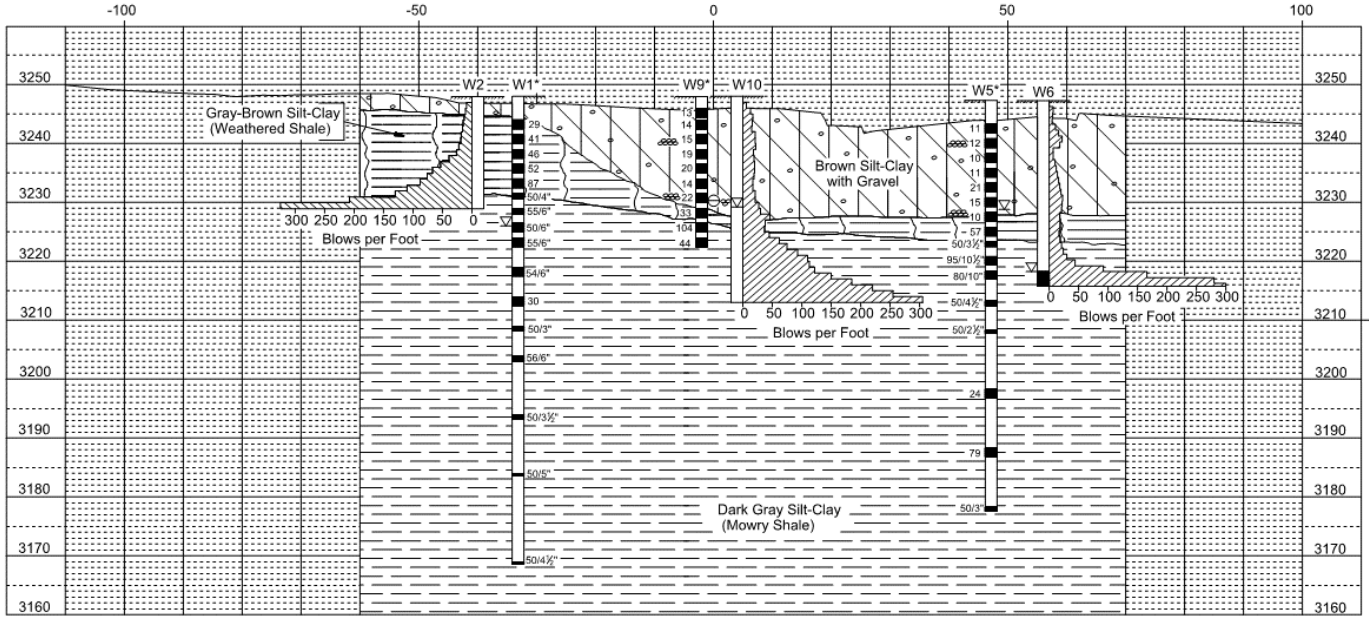
The Geotechnical Engineering Activity has on file all of the boring logs for this project. These logs and additional results of laboratory test, if any, are available for review at the Central Office in Pierre.

LEGEND

- Penetration Test
- Drive Test
- Water
- Caved
- Sample Zone

Drive test are conducted by dropping a 490 pound hammer 30 inches to drive a 2 7/8 inch drill stem with attached retractable plug sampler for taking samples and to measure the resistance to penetration of the soil.

Penetration test holes are drilled with a 6 5/8 inch diameter hollow stem auger. Penetration tests are conducted by dropping a 140 pound hammer 30 inches to obtain 2 inch nominal diameter samples and to measure the resistance to penetration of the soil.



GROUND WATER ELEVATIONS

as of FEBRUARY 2013

W1	3226.0
W2	DRY
W5	3228.8
W6	3218.2
W9	(DRY) 3230.5
W10	3229.3

MEASURED SKIN FRICTION

	ELEV.	PSF
W2	3228.9	3111
W6	3215.8	1445
W10	3213.1	1255

SUBSURFACE INVESTIGATION AND PILING LAYOUT (A)

FOR ABUTMENT NO. 1

208' - 7" COMP. STEEL GIRDER BRIDGE

2 - 41' - 0" ROADWAYS — 15° R.H.F. SKEW

OVER NORTH STREET — SEC. 35-T2N-R7E

STA. 112 + 80.78 TO STA. 114 + 89.36 — IM 1902(61)0

STR. NO. 52-409-294 — HL-93

PENNINGTON COUNTY

S. D. DEPT. OF TRANSPORTATION

SEPTEMBER 2013

7 OF 34

DESIGNED BY	CK. DES. BY	DRAFTED BY	
PW	DM	BT/JL	Kevin N. Boeden BRIDGE ENGINEER
PENN1162	1162TA07		

F.2.7.7. ABUTMENT DETAILS (A)

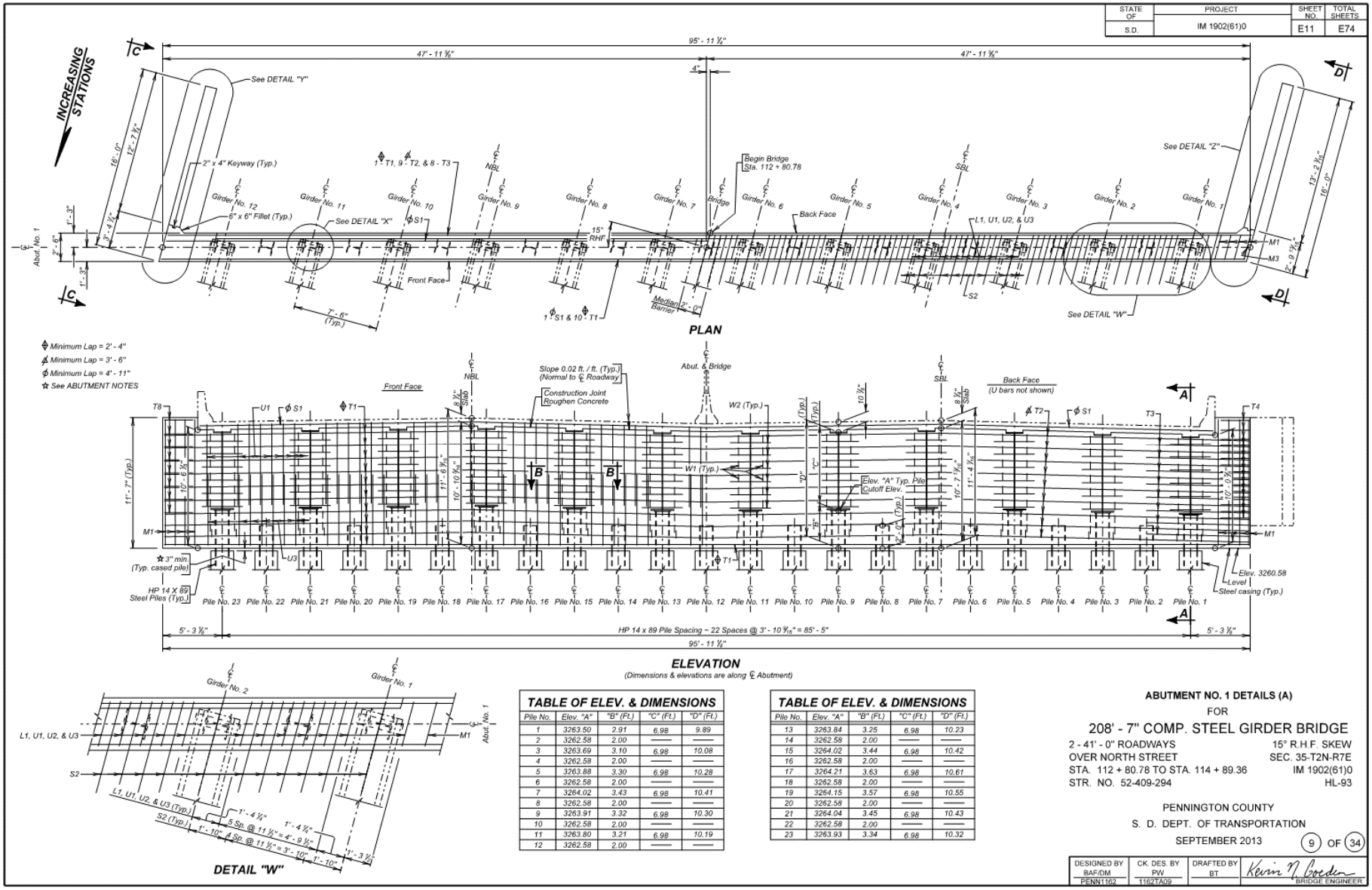


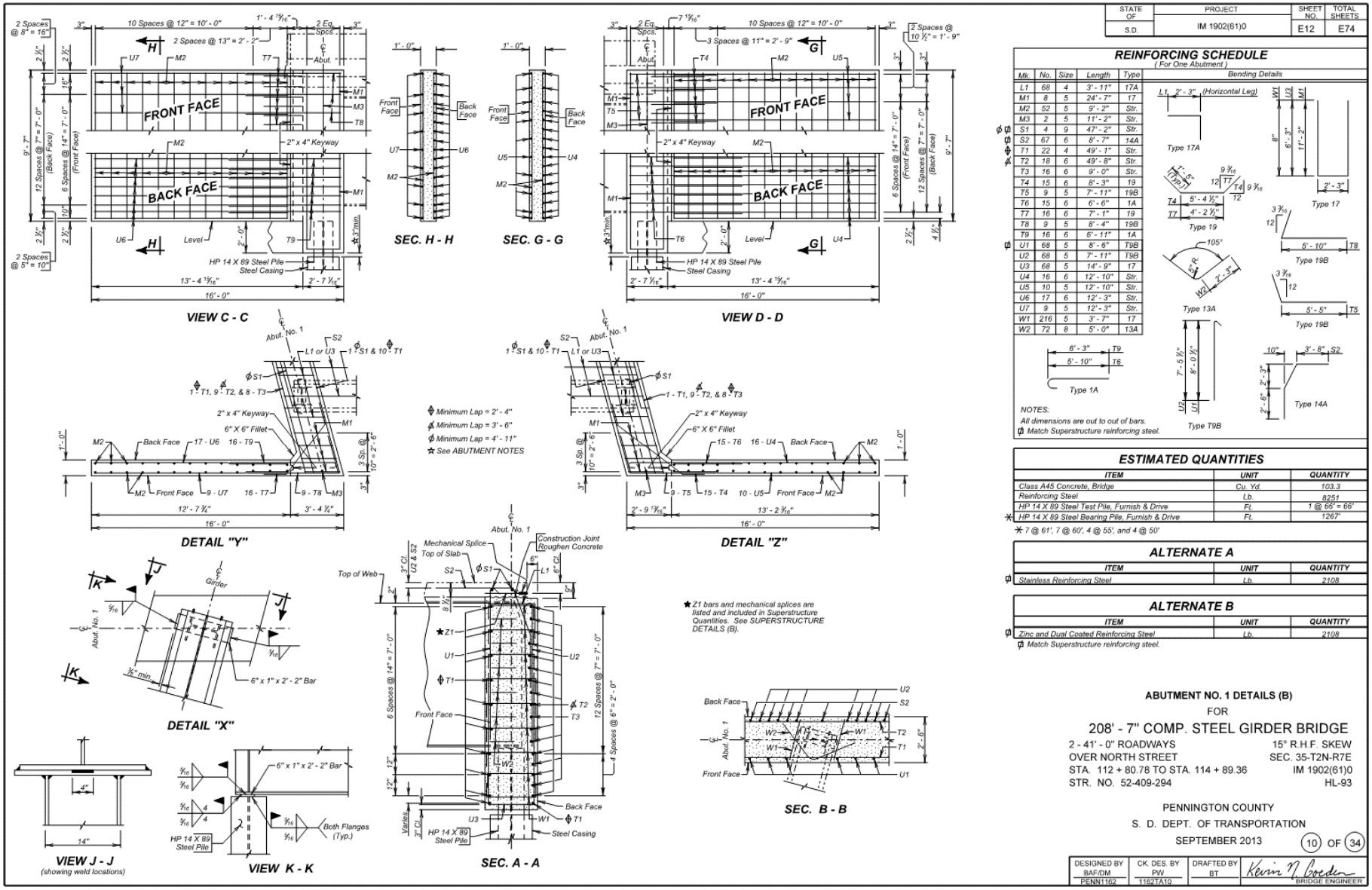
TABLE OF ELEV. & DIMENSIONS

Pile No.	Elev. "A"	"B" (Ft.)	"C" (Ft.)	"D" (Ft.)
1	3263.50	2.91	6.98	9.89
2	3262.58	2.00	—	—
3	3263.69	3.10	6.98	10.08
4	3262.58	2.00	—	—
5	3263.88	3.30	6.98	10.28
6	3262.58	2.00	—	—
7	3264.02	3.43	6.98	10.41
8	3262.58	2.00	—	—
9	3263.91	3.32	6.98	10.30
10	3262.58	2.00	—	—
11	3263.80	3.21	6.98	10.19
12	3262.58	2.00	—	—

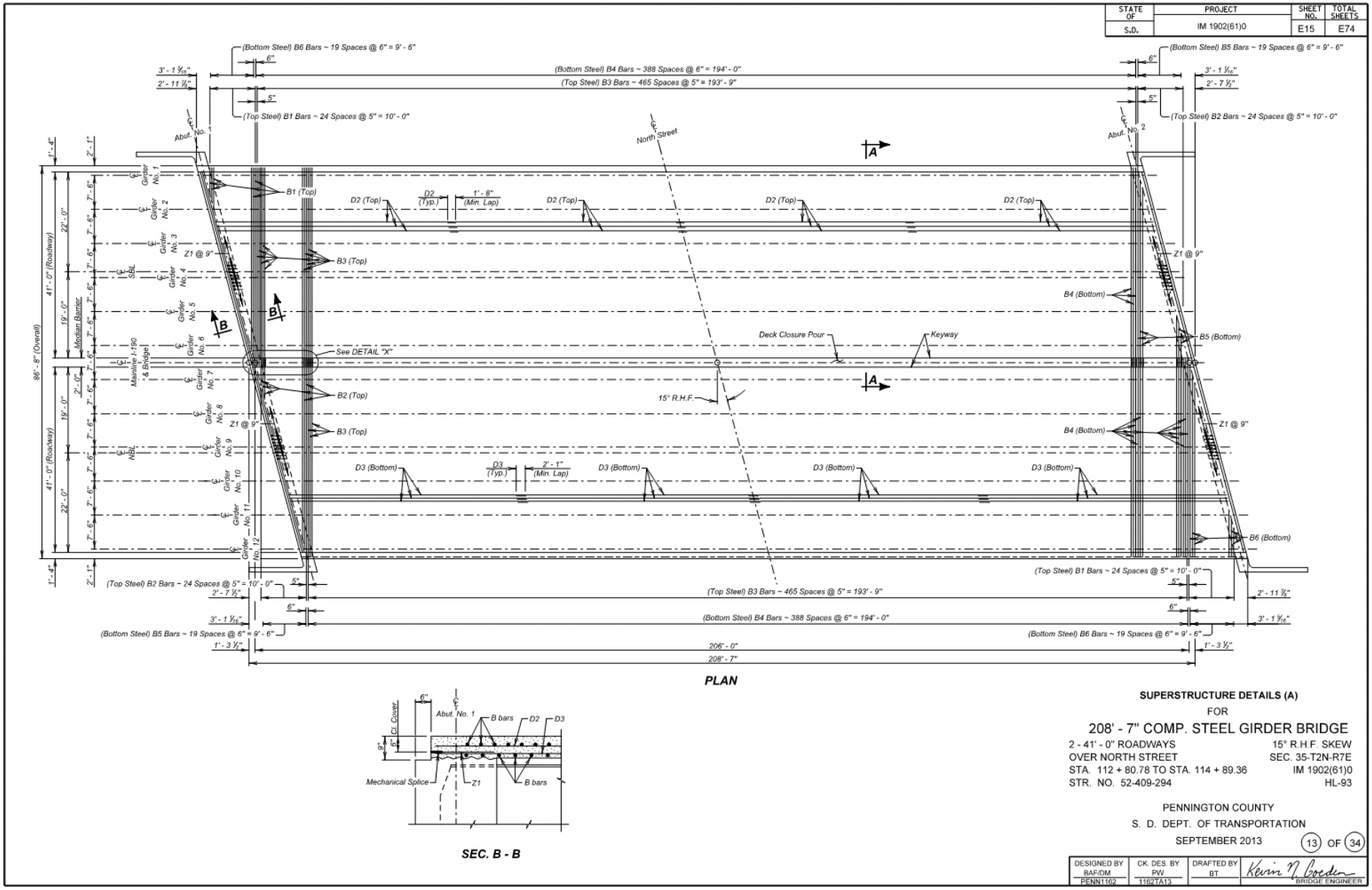
TABLE OF ELEV. & DIMENSIONS

Pile No.	Elev. "A"	"B" (Ft.)	"C" (Ft.)	"D" (Ft.)
13	3263.84	3.25	6.98	10.23
14	3262.58	2.00	—	—
15	3264.02	3.44	6.98	10.42
16	3262.58	2.00	—	—
17	3264.21	3.63	6.98	10.61
18	3262.58	2.00	—	—
19	3264.15	3.57	6.98	10.55
20	3262.58	2.00	—	—
21	3264.04	3.45	6.98	10.43
22	3262.58	2.00	—	—
23	3263.93	3.34	6.98	10.32

F.2.7.8. ABUTMENT DETAILS (B)

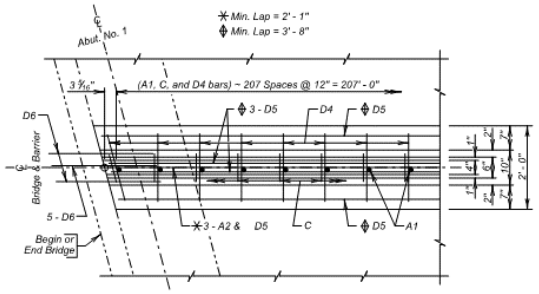


F.2.7.9. SUPERSTRUCTURE DETAILS (A)

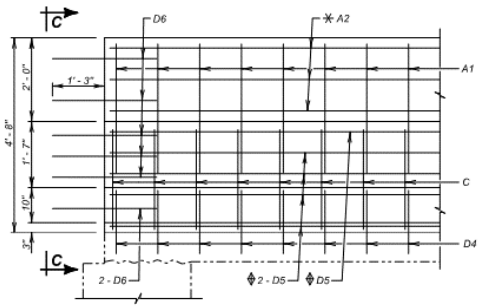


F.2.7.10. SUPERSTRUCTURE DETAILS (B)

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	IM 1902(61)0	E16	E74



PLAN DETAIL "X" (MEDIAN BARRIER)



ELEVATION DETAIL "X" (MEDIAN BARRIER)

ESTIMATED QUANTITIES

ITEM	UNIT	QUANTITY
Class A45 Concrete, Bridge Deck	Cu. Yd.	513.7
Bridge Painting	Lump Sum	Lump Sum
Structural Steel	Lump Sum	Lump Sum
Concrete Penetrating Sealer	Sq. Yd.	1891
No. 7 Rebar Splice	Each	224

ALTERNATE A

ITEM	UNIT	QUANTITY
Stainless Reinforcing Steel	Lb.	94591

ALTERNATE B

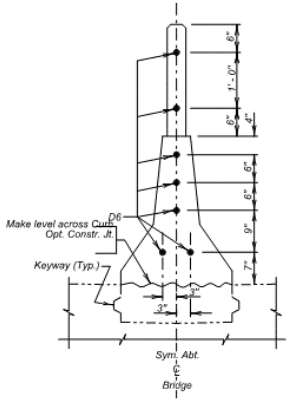
ITEM	UNIT	QUANTITY
Zinc and Dual Coated Reinforcing Steel	Lb.	94591

For informational purposes only the estimated weight of the structural steel is 1055654 pounds.

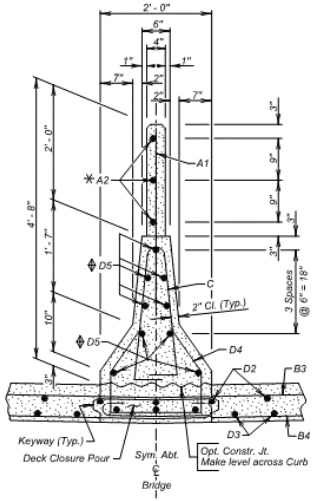
Apply to bridge deck between barrier curbs.

Includes quantities for Barrier Curb, Slab, Haunch, End Block, and Median Barrier & Glare Screen.
Concrete for Barrier Curbs is 0.0842 cu. yd / ft.
Concrete for Median Barrier & Glare Screen is 0.1260 cu. yd / ft.
Concrete for 12' End Block is 1.1580 cu. yd / ft.

For informational purposes only the estimated area to be painted is 3550 sq. ft.



VIEW C - C

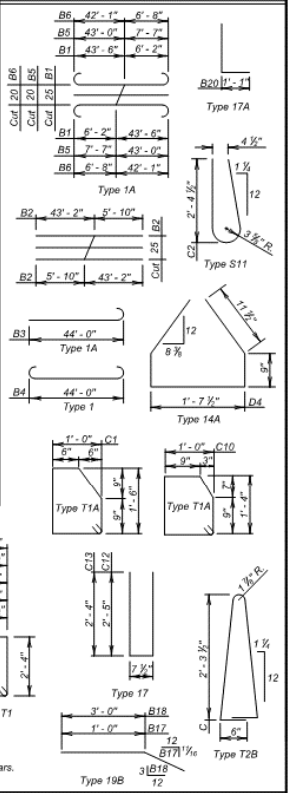


DETAIL "Y"

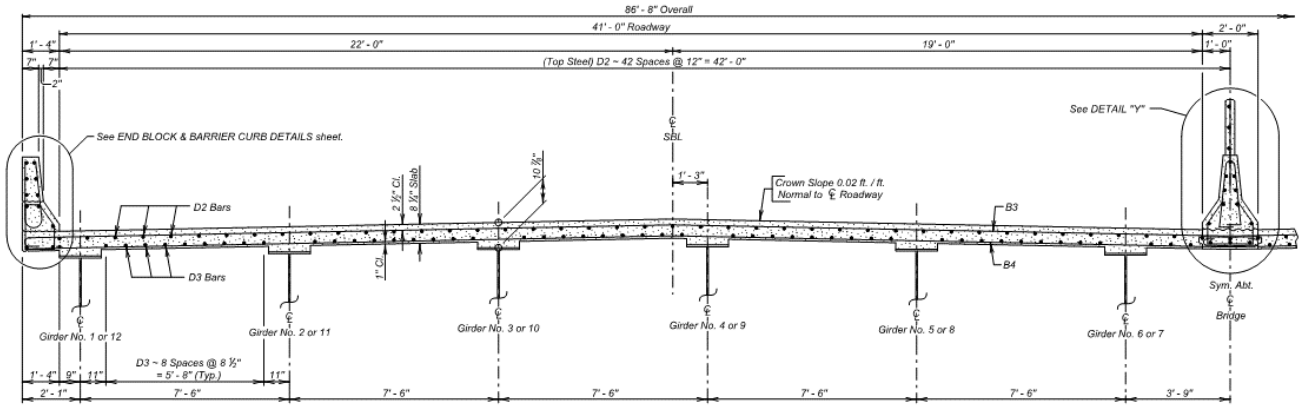
REINFORCING SCHEDULE

Mk.	No.	Size	Length	Type
A1	208	4	3' - 1"	Str.
A2	12	4	53' - 5"	Str.
B1	25	4	50' - 8"	1A
B2	25	4	49' - 0"	Str.
B3	932	4	44' - 6"	1A
B4	778	4	45' - 0"	1
B5	20	4	51' - 7"	1A
B6	20	4	49' - 9"	1A
B15	12	5	14' - 6"	Str.
B16	8	4	52' - 11"	Str.
B17	8	4	8' - 6"	19B
B18	12	8	4' - 3"	19B
B19	12	5	2' - 4"	Str.
B20	12	6	3' - 6"	17A
C	208	5	5' - 10"	T2B
C1	400	5	5' - 7"	T1A
C2	372	5	5' - 1"	S11
C3	4	5	5' - 0"	S11
C4	4	5	5' - 0"	S11
C5	4	5	5' - 0"	S11
C6	4	5	6' - 8"	T1
C7	4	5	6' - 9"	T1
C8	4	5	6' - 11"	T1
C9	4	5	7' - 0"	T1
C10	16	6	5' - 9"	T1A
C11	16	5	7' - 1"	T1
C12	4	6	5' - 6"	17
C13	4	5	5' - 4"	17
D0	16	4	54' - 4"	Str.
D1	48	4	48' - 4"	Str.
D2	340	4	53' - 3"	Str.
D3	404	4	53' - 7"	Str.
D4	208	5	5' - 1"	14A
D5	36	5	54' - 9"	Str.
D6	14	7	2' - 6"	Str.
Z1	224	7	2' - 0"	Str.

Bending Details



NOTES:
All dimensions are out to out of bars.
See cutting diagram.



SEC. A - A

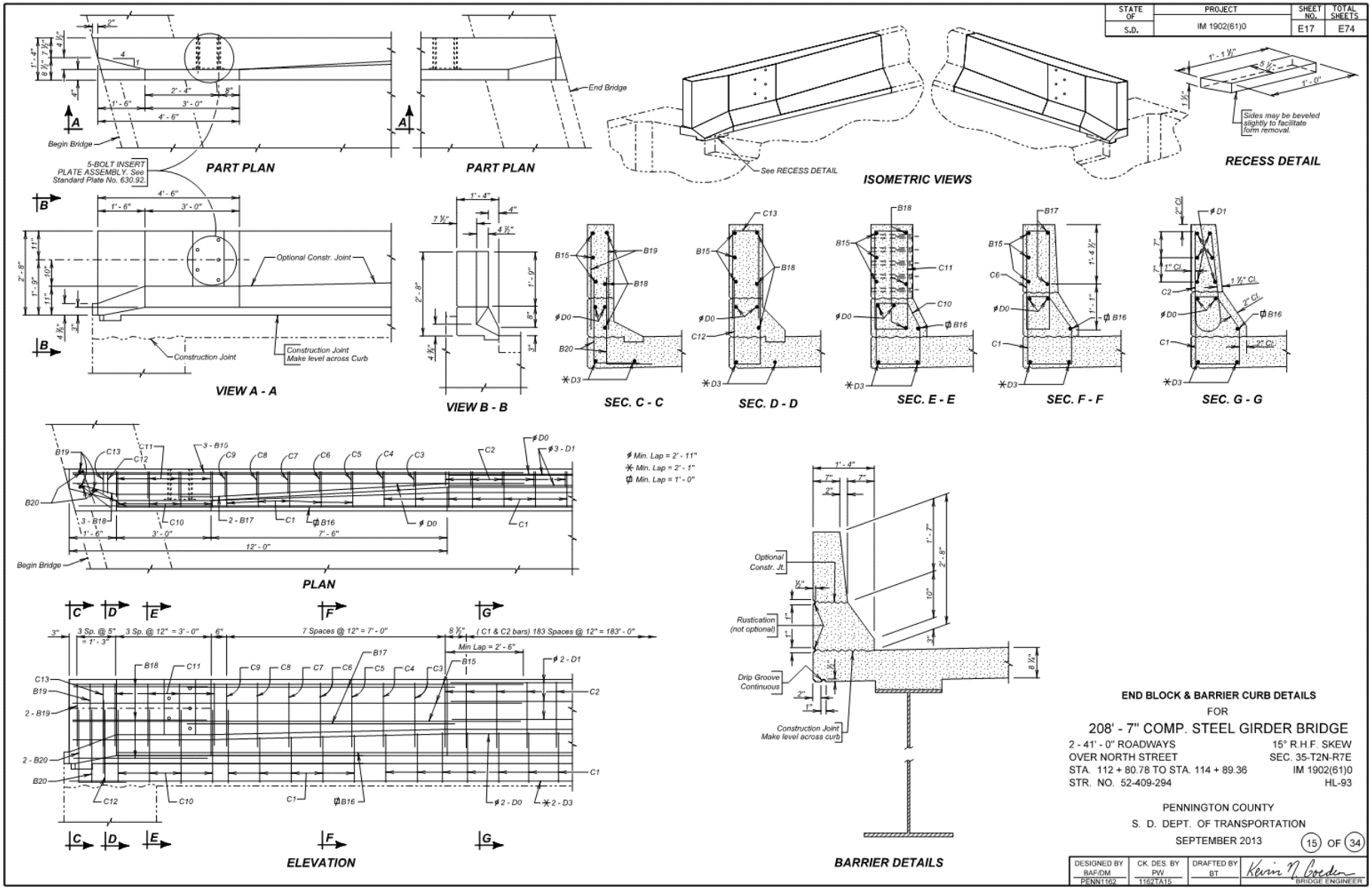
SUPERSTRUCTURE DETAILS (B)
FOR
208' - 7" COMP. STEEL GIRDER BRIDGE

2 - 41' - 0" ROADWAYS — 15° R.H.F. SKEW
OVER NORTH STREET — SEC. 35-T2N-R7E
STA. 112 + 80.78 TO STA. 114 + 89.36 — IM 1902(61)0
STR. NO. 52-409-294 — HL-93

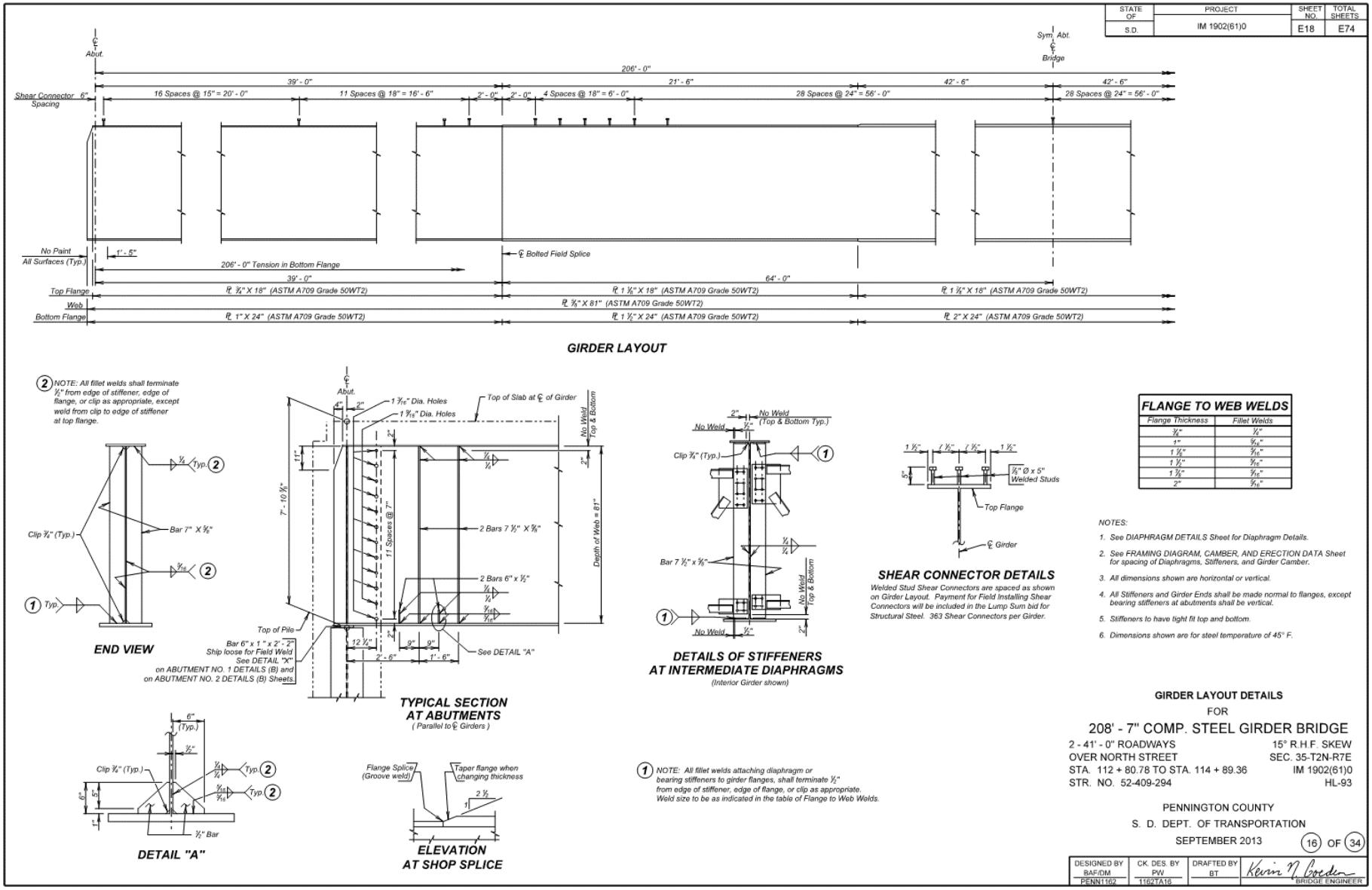
PENNINGTON COUNTY
S. D. DEPT. OF TRANSPORTATION
SEPTEMBER 2013

DESIGNED BY	CK. DES. BY	DRAFTED BY	
BAF/DM PENN1162	PW 1162TA14	BT	Kevin N. Boeden BRIDGE ENGINEER

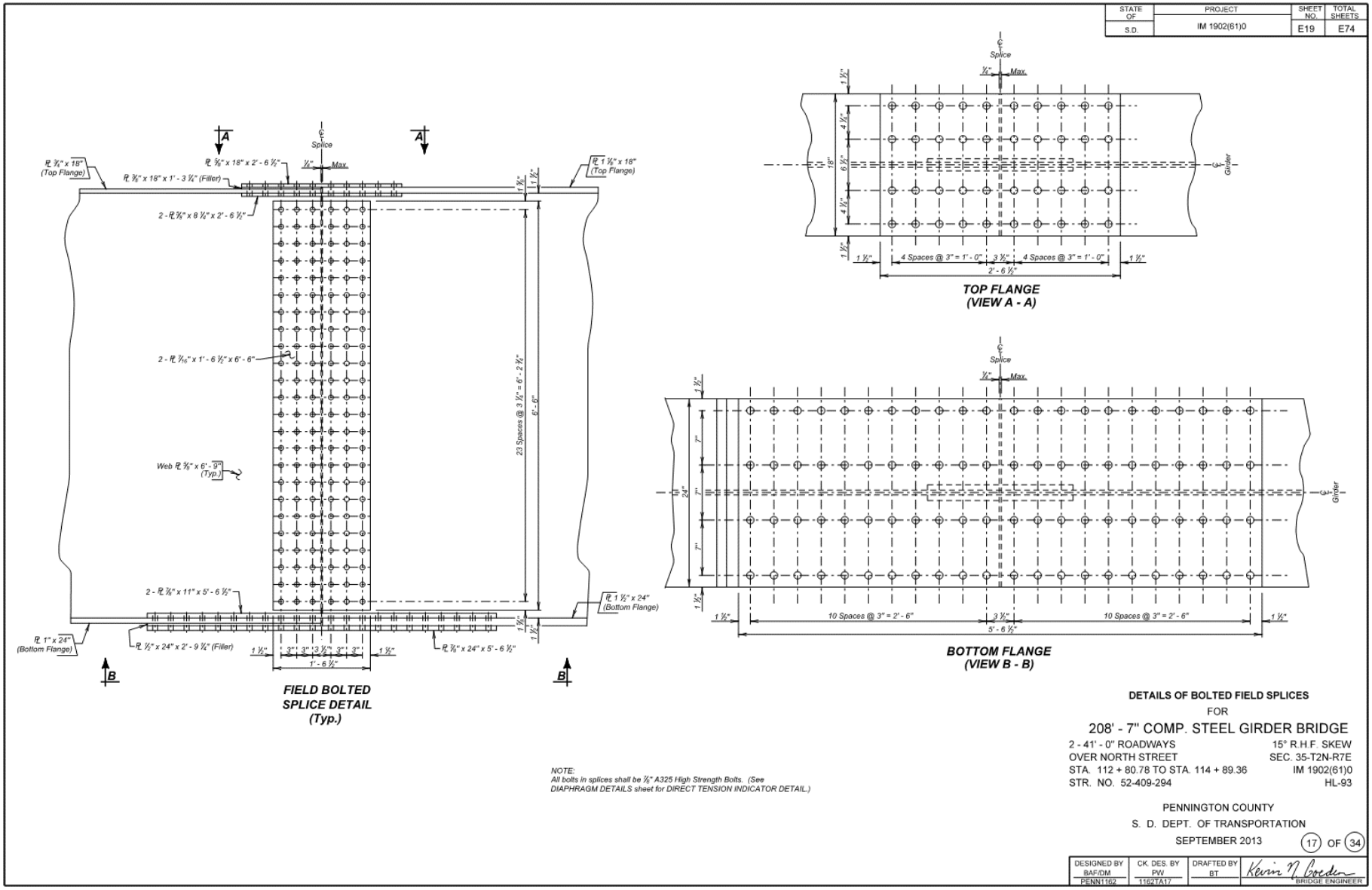
F.2.7.11. END BLOCK. BARRIER CURB. & DRAIN DETAILS



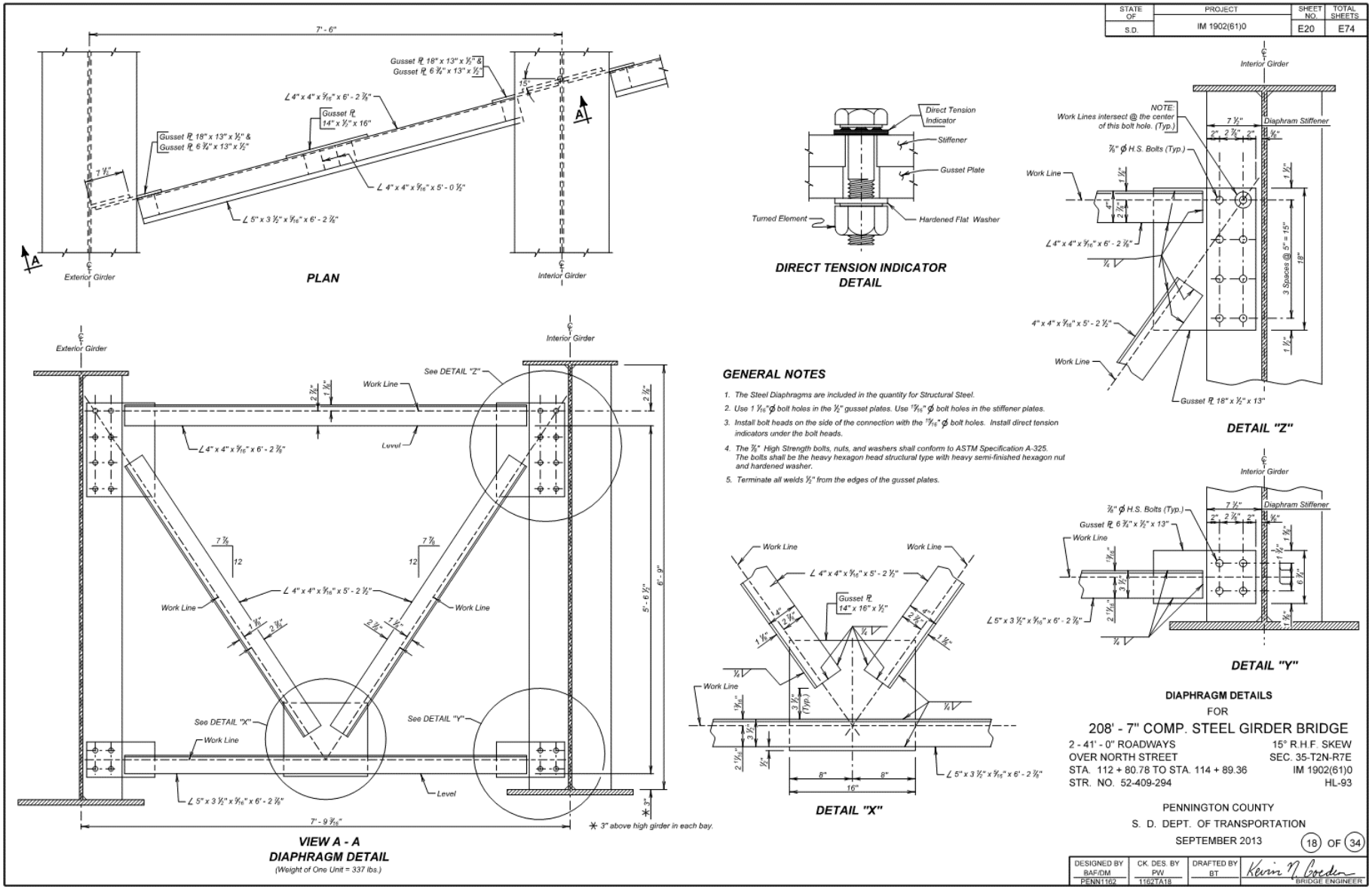
F.2.7.12. GIRDER LAYOUT AND DETAILS



F.2.7.13. DETAILS OF BOLTED FIELD SPLICES

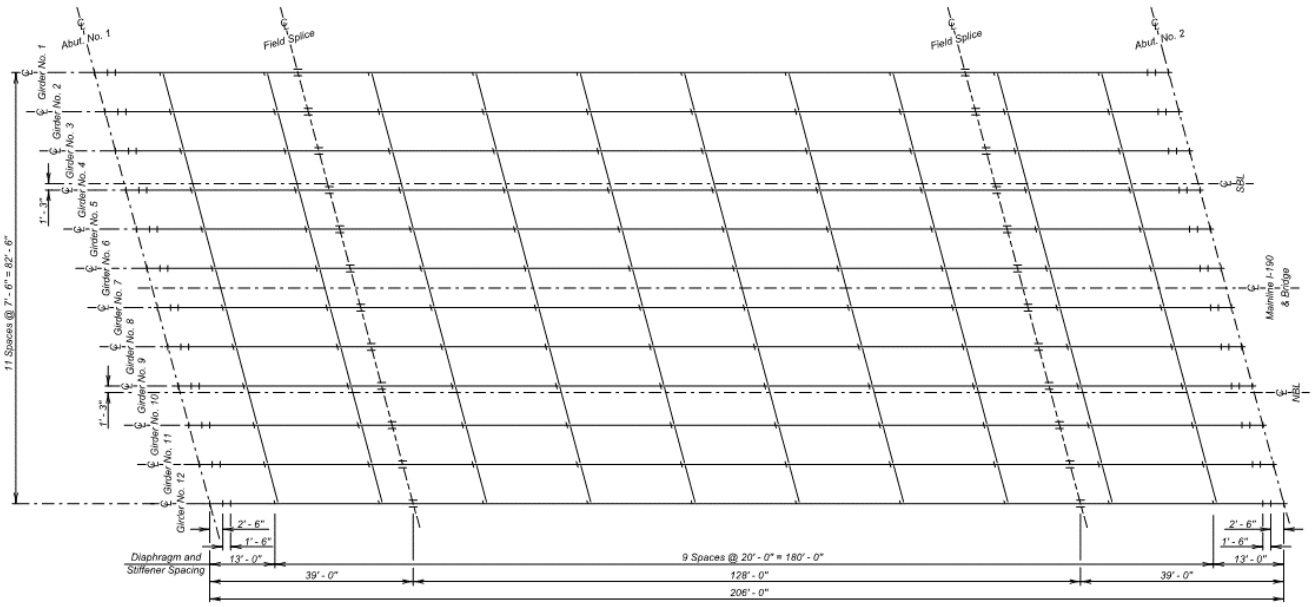


F.2.7.14. DIAPHRAGM DETAILS



F.2.7.15. FRAMING DIAGRAM AND ERECTION DETAILS

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	IM 1902(61)0	E21	E74



FRAMING DIAGRAM

ϕ These elevations occur at a time after girder erection is completed but prior to any placement of concrete.

ϕ GIRDER ERECTION ELEVATIONS

Girder No.	ELEVATIONS (Top of Girder) "A"	"B"	"C"	"D"
1	3270.479	3271.670	3273.400	3273.260
2	3270.669	3271.885	3273.567	3273.424
3	3270.859	3272.040	3273.736	3273.588
4	3270.998	3272.175	3273.855	3273.701
5	3270.887	3272.059	3273.723	3273.565
6	3270.776	3271.944	3273.591	3273.428
7	3270.815	3271.977	3273.609	3273.440
8	3271.003	3272.161	3273.776	3273.603
9	3271.192	3272.344	3273.943	3273.765
10	3271.129	3272.277	3273.860	3273.677
11	3271.017	3272.160	3273.727	3273.539
12	3270.904	3272.042	3273.593	3273.401

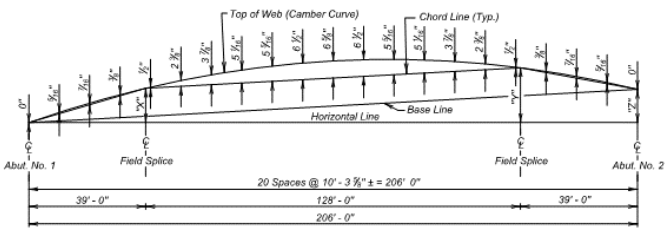
ϕ These slopes occur at a time after girder erection is completed but prior to any placement of concrete. Slopes shown are an imaginary straight line between points (top of web) at beam ends and are (+) towards increasing stations.

ϕ GIRDER ERECTION SLOPES

Girder No.	SLOPES (%) a	b	c
1	2.975	1.352	-0.276
2	2.962	1.337	- 0.288
3	2.950	1.325	- 0.301
4	2.938	1.312	- 0.314
5	2.926	1.300	- 0.326
6	2.913	1.287	- 0.339
7	2.900	1.275	- 0.351
8	2.887	1.262	- 0.364
9	2.875	1.249	- 0.376
10	2.862	1.237	- 0.389
11	2.850	1.224	- 0.401
12	2.837	1.212	- 0.414

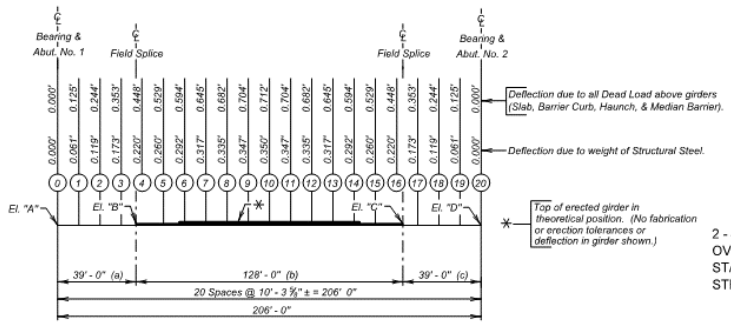
CAMBER DIMENSIONS

Girder No.	"X"	"Y"	"Z"
1	1.370'	3.100'	2.781'
2	1.365'	3.077'	2.755'
3	1.360'	3.056'	2.729'
4	1.355'	3.035'	2.703'
5	1.350'	3.014'	2.677'
6	1.346'	2.993'	2.651'
7	1.340'	2.972'	2.626'
8	1.336'	2.951'	2.600'
9	1.331'	2.930	2.574'
10	1.326'	2.909'	2.548'
11	1.321'	2.888'	2.522'
12	1.316'	2.867'	2.496'



CAMBER CUTTING DIAGRAM
(Cut camber into webs of all girders as shown)

Camber Diagram shown is for beams in unloaded position and provides for all dead load deflections.
Baselines are straight lines from ℄ Bearing to ℄ Bearing at top of web.
Chord lines are straight lines between ends of beam segments at top of web.



GIRDER ERECTION DIAGRAM

FRAMING DIAGRAM, CAMBER, & ERECTION DATA
FOR
208' - 7" COMP. STEEL GIRDER BRIDGE
2 - 41' - 0" ROADWAYS — 15° R.H.F. SKEW
OVER NORTH STREET — SEC. 35-T2N-R7E
STA. 112 + 80.78 TO STA. 114 + 89.36 — IM 1902(61)0
STR. NO. 52-409-294 — HL-93

PENNINGTON COUNTY
S. D. DEPT. OF TRANSPORTATION
SEPTEMBER 2013

19 OF 34

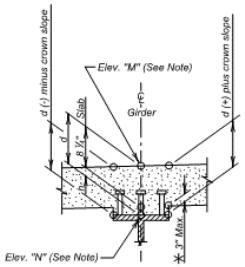
DESIGNED BY	CK. DES. BY	DRAFTED BY	
BAF/DM PENN1162	PW 1162TA19	BT	Kevin N. Boeden BRIDGE ENGINEER

F.2.7.16. SLAB FORM ELEVATIONS

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	IM 1902(61)0	E22	E74

TABLE OF SLAB FORM ELEVATIONS AND CALCULATIONS

		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Girder No. 1	Elev. "M"	3271.385	3271.713	3272.028	3272.327	3272.605	3272.861	3273.095	3273.309	3273.501	3273.673	3273.823	3273.951	3274.058	3274.143	3274.208	3274.252	3274.273	3274.273	3274.253	3274.215	3274.166
	(-) Elev. "N"																					
	(=) d																					
	(-) 0. 688'																					
	(=) h																					
Girder No. 2	Elev. "M"	3271.575	3271.901	3272.215	3272.513	3272.789	3273.045	3273.278	3273.489	3273.681	3273.851	3274.000	3274.127	3274.232	3274.316	3274.380	3274.422	3274.442	3274.441	3274.419	3274.381	3274.330
	(-) Elev. "N"																					
	(=) d																					
	(-) 0. 688'																					
	(=) h																					
Girder No. 3	Elev. "M"	3271.765	3272.090	3272.402	3272.696	3272.974	3273.228	3273.460	3273.670	3273.860	3274.029	3274.177	3274.302	3274.406	3274.489	3274.551	3274.592	3274.611	3274.609	3274.586	3274.546	3274.494
	(-) Elev. "N"																					
	(=) d																					
	(-) 0. 688'																					
	(=) h																					
Girder No. 4	Elev. "M"	3271.904	3272.228	3272.539	3272.834	3273.108	3273.361	3273.591	3273.801	3273.989	3274.157	3274.303	3274.427	3274.530	3274.611	3274.672	3274.712	3274.730	3274.726	3274.702	3274.661	3274.608
	(-) Elev. "N"																					
	(=) d																					
	(-) 0. 688'																					
	(=) h																					
Girder No. 5	Elev. "M"	3271.794	3272.116	3272.426	3272.719	3272.992	3273.243	3273.473	3273.681	3273.868	3274.035	3274.179	3274.302	3274.404	3274.484	3274.544	3274.582	3274.598	3274.593	3274.568	3274.525	3274.471
	(-) Elev. "N"																					
	(=) d																					
	(-) 0. 688'																					
	(=) h																					
Girder No. 6	Elev. "M"	3271.683	3272.003	3272.312	3272.604	3272.876	3273.126	3273.354	3273.560	3273.747	3273.912	3274.055	3274.177	3274.277	3274.356	3274.414	3274.452	3274.467	3274.460	3274.433	3274.390	3274.334
	(-) Elev. "N"																					
	(=) d																					
	(-) 0. 688'																					
	(=) h																					
Girder No. 7	Elev. "M"	3271.721	3272.041	3272.348	3272.639	3272.909	3273.158	3273.385	3273.590	3273.775	3273.939	3274.081	3274.201	3274.300	3274.378	3274.435	3274.471	3274.485	3274.477	3274.449	3274.404	3274.347
	(-) Elev. "N"																					
	(=) d																					
	(-) 0. 688'																					
	(=) h																					
Girder No. 8	Elev. "M"	3271.910	3272.228	3272.534	3272.824	3273.093	3273.340	3273.565	3273.770	3273.953	3274.116	3274.257	3274.376	3274.473	3274.549	3274.605	3274.640	3274.651	3274.643	3274.614	3274.568	3274.509
	(-) Elev. "N"																					
	(=) d																					
	(-) 0. 688'																					
	(=) h																					
Girder No. 9	Elev. "M"	3272.098	3272.415	3272.720	3273.008	3273.276	3273.522	3273.746	3273.949	3274.131	3274.292	3274.432	3274.550	3274.646	3274.721	3274.775	3274.809	3274.820	3274.810	3274.779	3274.731	3274.672
	(-) Elev. "N"																					
	(=) d																					
	(-) 0. 688'																					
	(=) h																					
Girder No. 10	Elev. "M"	3272.036	3272.351	3272.655	3272.942	3273.208	3273.453	3273.676	3273.877	3274.059	3274.219	3274.357	3274.473	3274.568	3274.642	3274.695	3274.727	3274.737	3274.725	3274.693	3274.644	3274.584
	(-) Elev. "N"																					
	(=) d																					
	(-) 0. 688'																					
	(=) h																					
Girder No. 11	Elev. "M"	3271.923	3272.238	3272.540	3272.826	3273.091	3273.334	3273.556	3273.756	3273.936	3274.094	3274.232	3274.347	3274.440	3274.513	3274.565	3274.595	3274.604	3274.591	3274.558	3274.508	3274.445
	(-) Elev. "N"																					
	(=) d																					
	(-) 0. 688'																					
	(=) h																					
Girder No. 12	Elev. "M"	3271.811	3272.124	3272.425	3272.709	3272.973	3273.215	3273.436	3273.634	3273.813	3273.970	3274.106	3274.220	3274.312	3274.383	3274.434	3274.463	3274.471	3274.457	3274.422	3274.370	3274.307
	(-) Elev. "N"																					
	(=) d																					
	(-) 0. 688'																					
	(=) h																					



* If during construction, it is found that this dimension will be exceeded or is less than zero, corrective measures must be taken as approved by the Engineer.

NOTES:

This Table contains the necessary information to determine the depth of concrete, in feet, over the girders at the points shown. All calculations can be carried out in the space provided.
Elevation "M" is theoretical top of slab elevation before any concrete has been poured.
This elevation includes correction for deflection due to Dead Load above girders.
Elevation "N" is a field measured elevation taken on top of girders at points shown. This elevation must be taken after girder erection is complete, but prior to placing any of the slab concrete. Girders shall not be supported by construction shoring while elevations are taken.

This sheet is to be used in conjunction with FRAMING DIAGRAM, CAMBER, & ERECTION DATA Sheet.

SLAB FORM ELEVATIONS
FOR
208' - 7" COMP. STEEL GIRDER BRIDGE

2 - 41' - 0" ROADWAYS — 15° R.H.F. SKEW
OVER NORTH STREET — SEC. 35-T2N-R7E
STA. 112 + 80.78 TO STA. 114 + 89.36 — IM 1902(61)0
STR. NO. 52-409-294 — HL-93

PENNINGTON COUNTY
S. D. DEPT. OF TRANSPORTATION
SEPTEMBER 2013

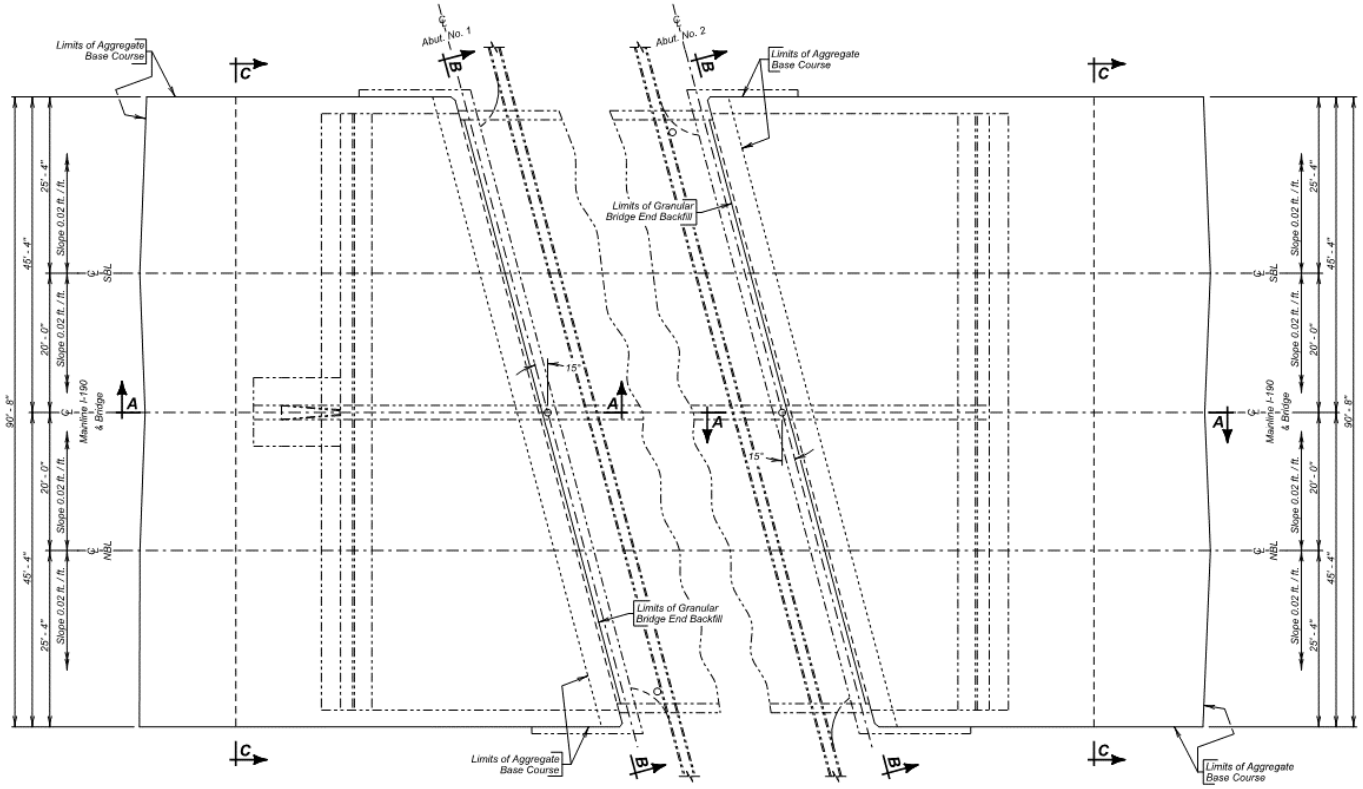
20 OF 34

DESIGNED BY	CK. DES. BY	DRAFTED BY	
BAF/DM	PW	BT	Kevin N. Boeden
PENN1162	1162TA20		BRIDGE ENGINEER

F.2.7.17. DETAILS OF BRIDGE END BACKFILL (A)

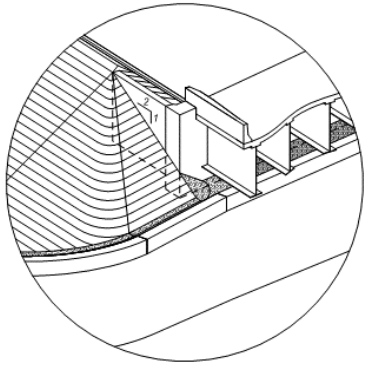
Revised June 9, 2015 PW

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	IM 1902(61)0	E24	E74



PLAN
(Shown adjacent to Abut. No. 1)

PLAN
(Shown adjacent to Abut. No. 2)



SPILL CONE DETAIL AT EMBANKMENT

ESTIMATED QUANTITIES
(For Two Abutments)

	ITEM	UNIT	QUANTITY
	Geogrid Reinforcement	Sq. Yd.	4271
☆	Base Course	Ton	5123
	Granular Bridge End Backfill	Cu. Yd.	204

1. 1776 sq. ft. Vertical Composite Drain
2. 1269 sq. yd. Type B Drainage Fabric.
3. 8713 sq. ft. 6 mil Polyethylene Sheeting, not including laps.

Items 1 and 3 are approximate quantities contained in the Granular Bridge End Backfill and are for information only.

☆ For estimating purposes only, a factor of 1.89 tons/cu. yd. was used to convert cu. yds. to tons.

DETAILS OF BRIDGE END BACKFILL (A)
FOR
208' - 7" COMP. STEEL GIRDER BRIDGE

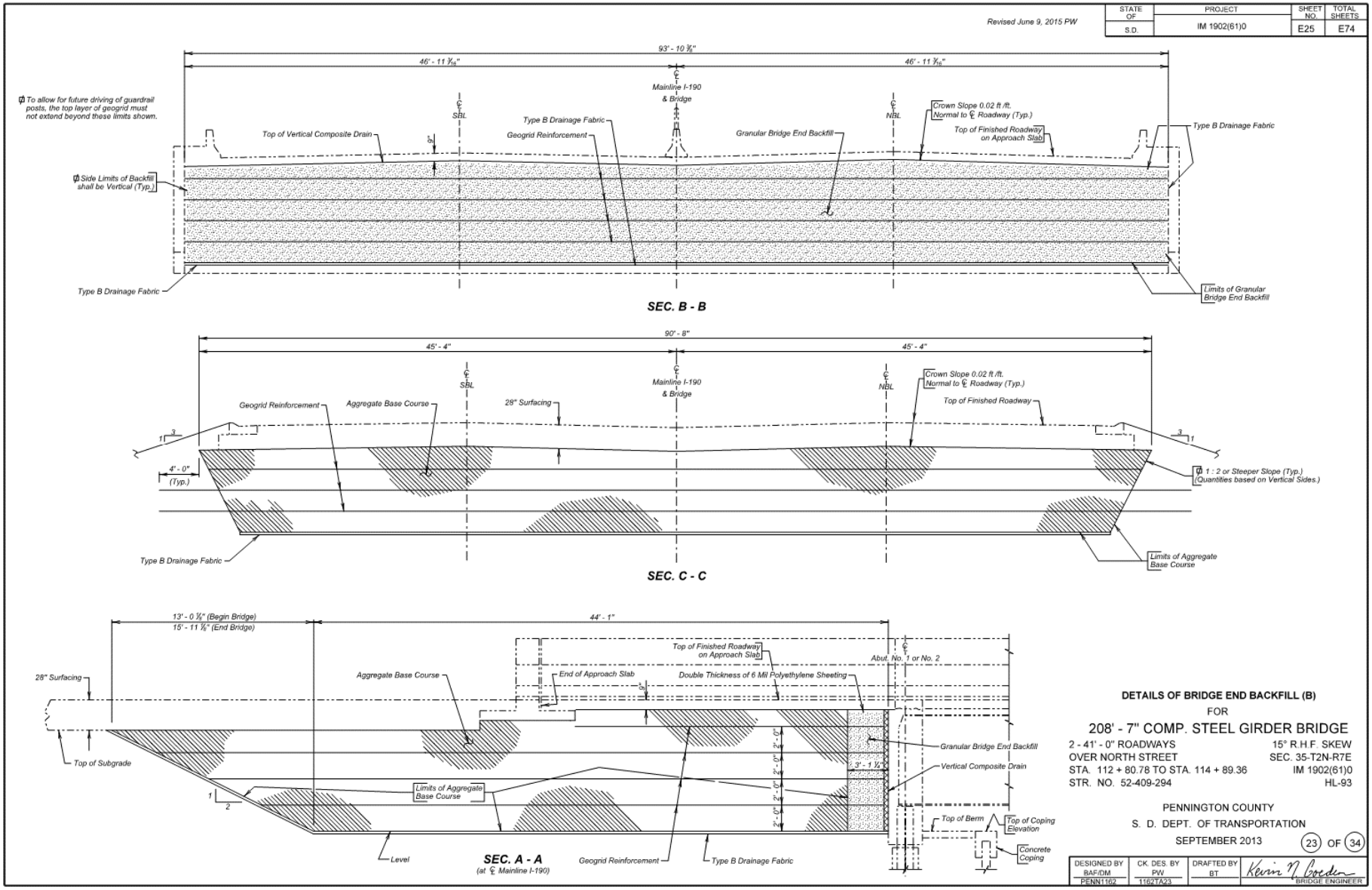
2 - 41' - 0" ROADWAYS — 15° R.H.F. SKEW
OVER NORTH STREET — SEC. 35-T2N-R7E
STA. 112 + 80.78 TO STA. 114 + 89.36 — IM 1902(61)0
STR. NO. 52-409-294 — HL-93

PENNINGTON COUNTY
S. D. DEPT. OF TRANSPORTATION
SEPTEMBER 2013

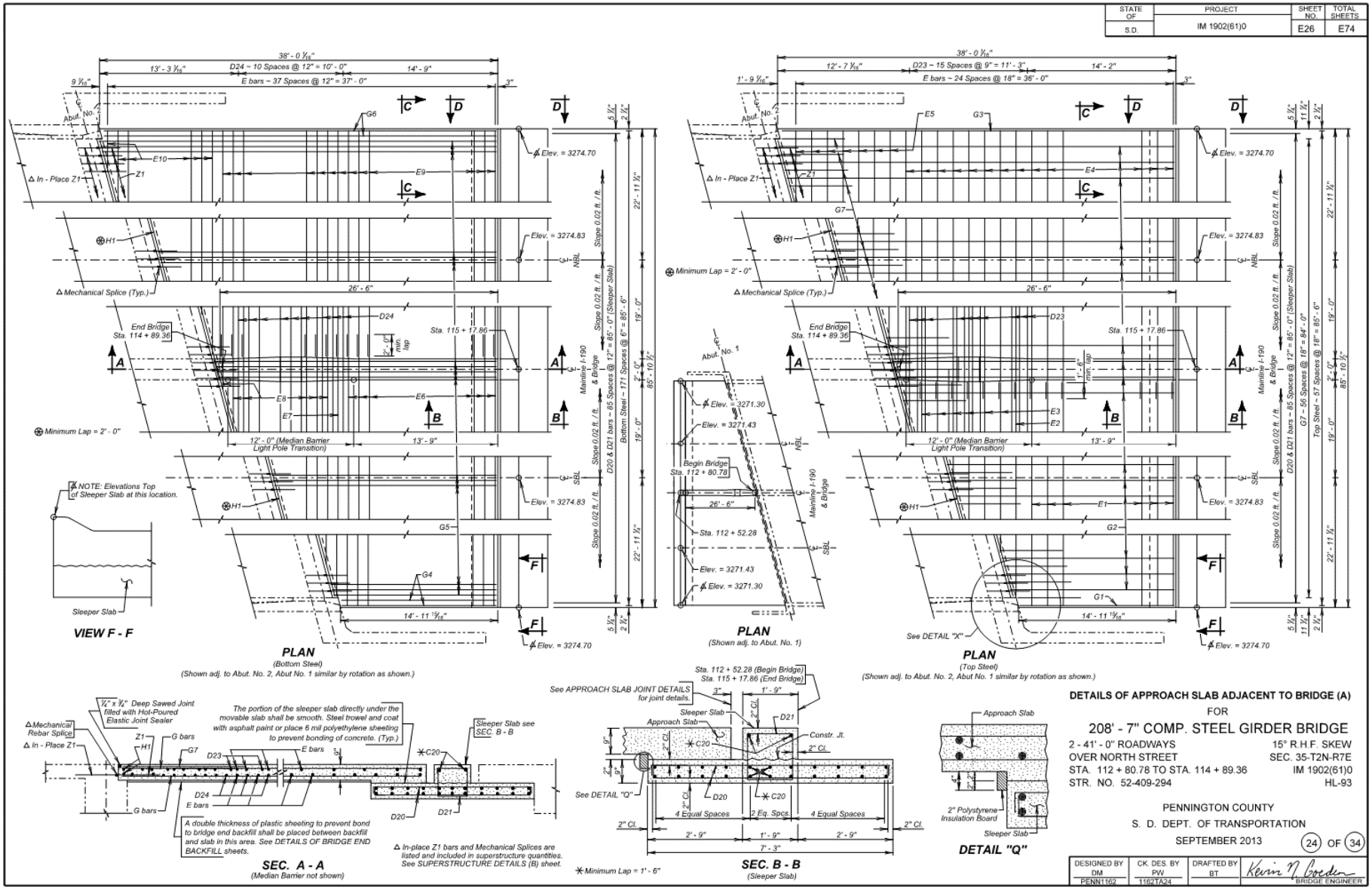
22 OF 34

DESIGNED BY	CK. DES. BY	DRAFTED BY	
BAF/DM	PW	BT	Kevin N. Cooden
PENN1162	1162TA22		BRIDGE ENGINEER

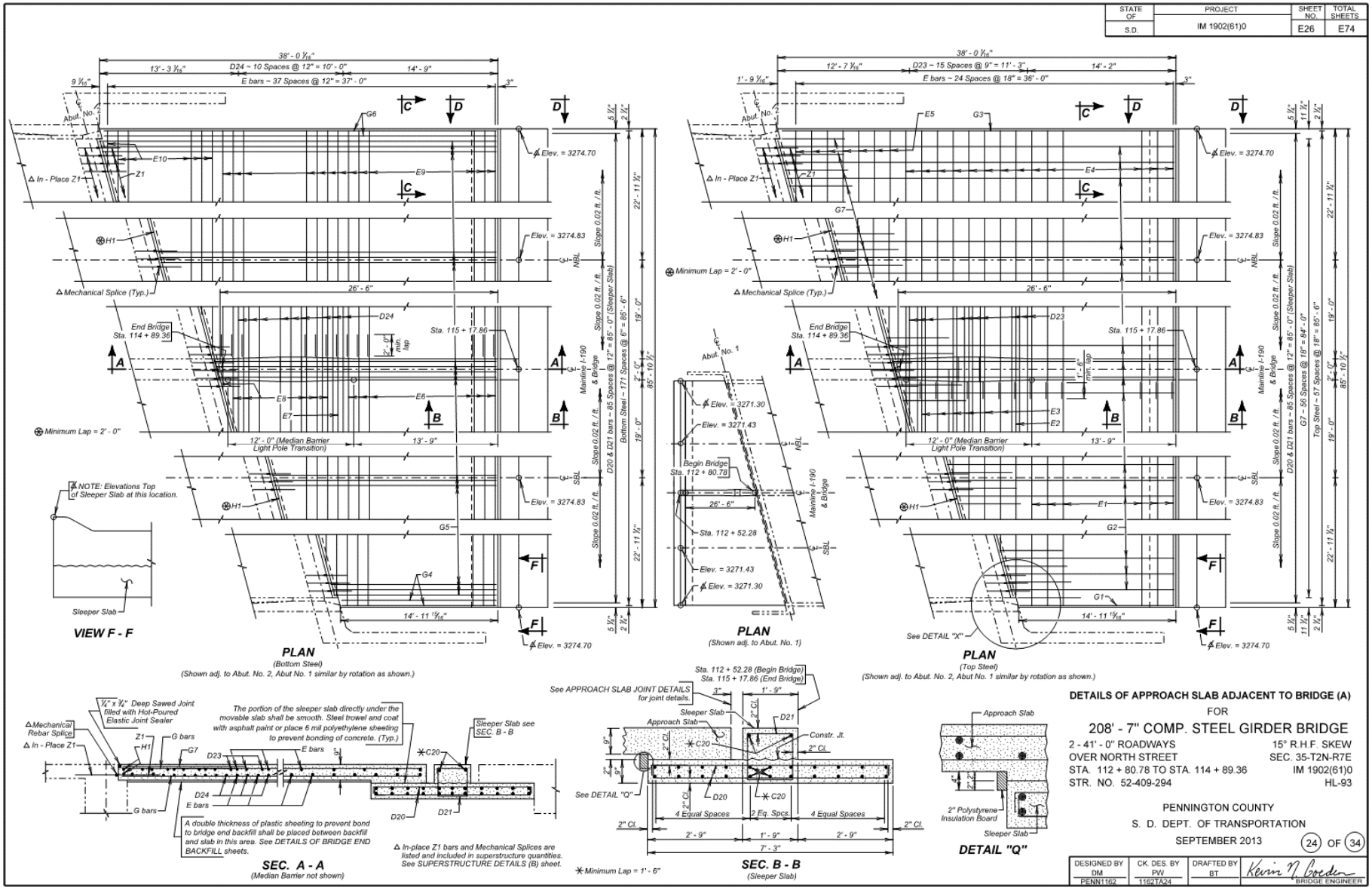
F.2.7.18. DETAILS OF BRIDGE END BACKFILL (B)



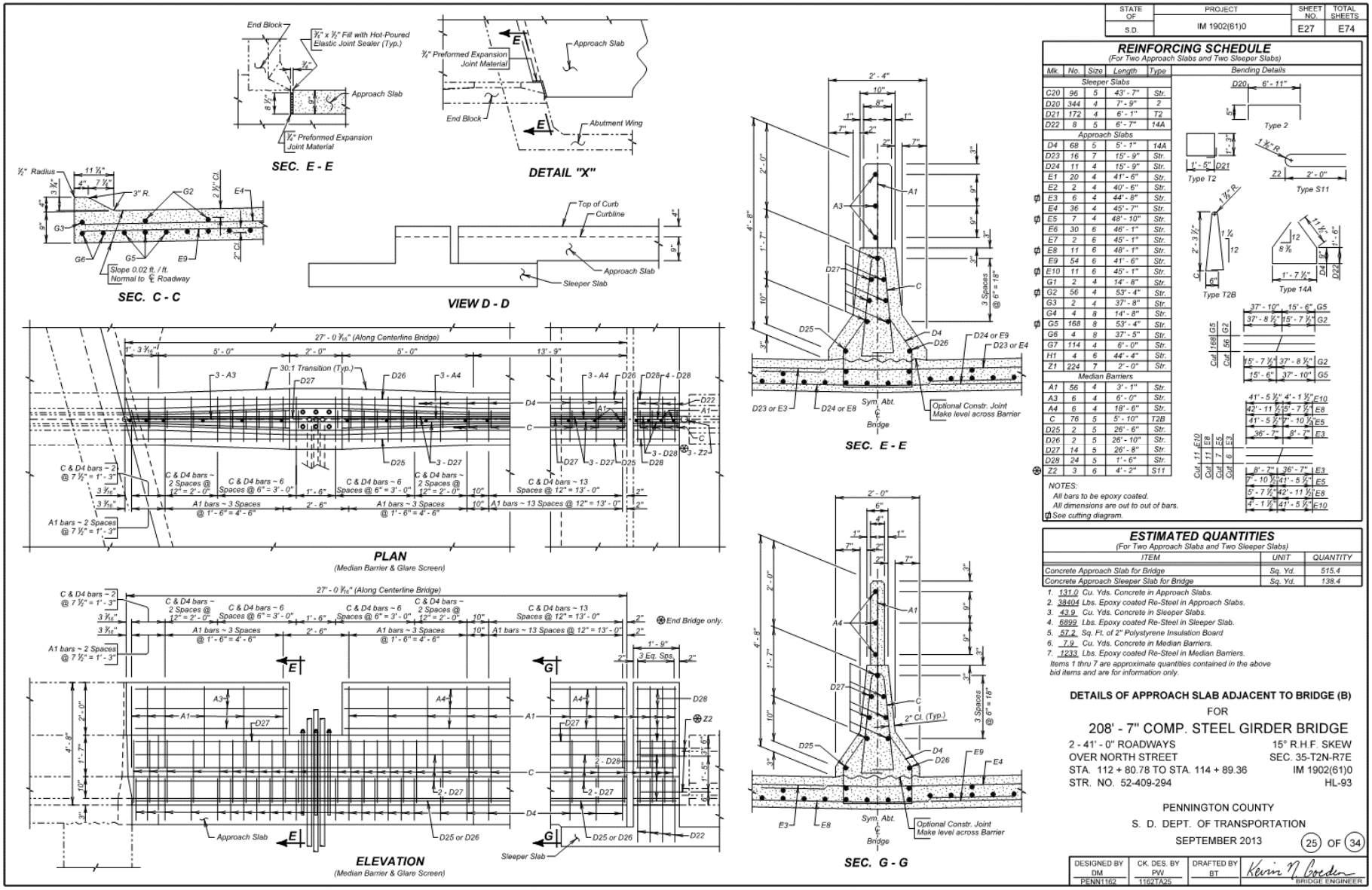
F.2.7.19. DETAILS OF APPROACH SLAB ADJACENT TO BRIDGE (A)



F.2.7.20. DETAILS OF APPROACH SLAB ADJACENT TO BRIDGE (B)



F.2.7.21. APPROACH SLAB JOINT DETAILS



F.2.7.22. AS BUILT ELEVATION SURVEY

The elevations shown in these plans are based on the National Geodetic Survey (NGS) North American Vertical Datum of 1988 (NAVD88).

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	IM 1902(61)0	E33	E74

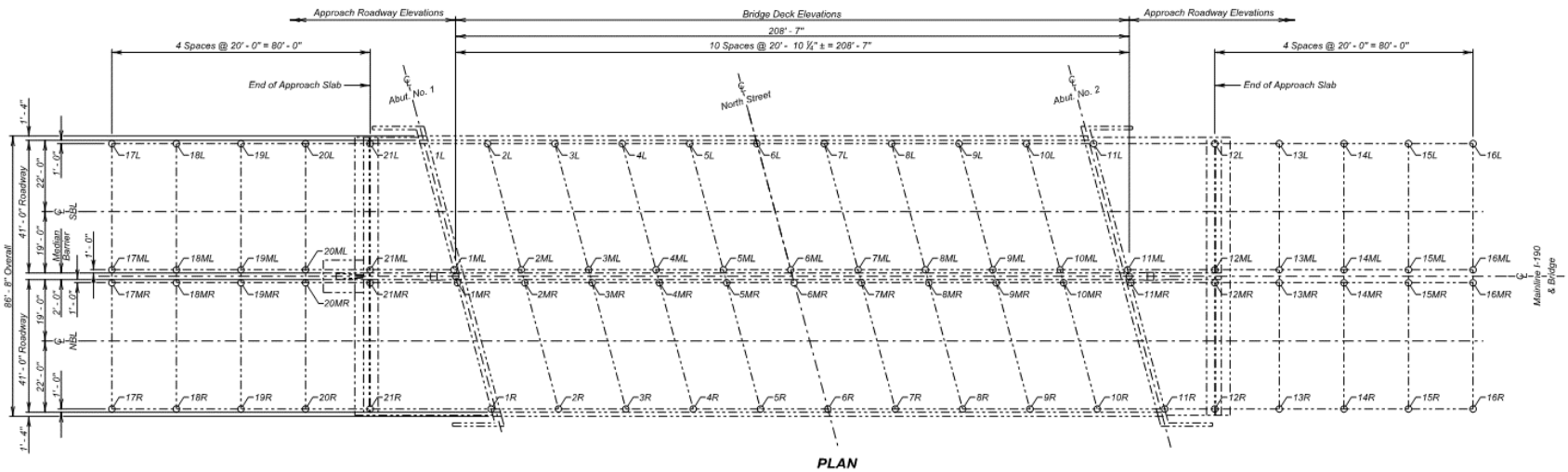


Table of As-Built Elevations - Bridge Deck

Location	Elevation	Location	Elevation	Location	Elevation	Location	Elevation
1L		1ML		1MR		1R	
2L		2ML		2MR		2R	
3L		3ML		3MR		3R	
4L		4ML		4MR		4R	
5L		5ML		5MR		5R	
6L		6ML		6MR		6R	
7L		7ML		7MR		7R	
8L		8ML		8MR		8R	
9L		9ML		9MR		9R	
10L		10ML		10MR		10R	
11L		11ML		11MR		11R	

Table of As-Built Elevations - Approach Roadway

Location	Elevation	Location	Elevation	Location	Elevation	Location	Elevation
12L		12ML		12MR		12R	
13L		13ML		13MR		13R	
14L		14ML		14MR		14R	
15L		15ML		15MR		15R	
16L		16ML		16MR		16R	
17L		17ML		17MR		17R	
18L		18ML		18MR		18R	
19L		19ML		19MR		19R	
20L		20ML		20MR		20R	
21L		21ML		21MR		21R	

NOTE:

The Contractor shall be responsible for producing the As-Built Elevation Survey soon after construction is complete and before the bridge is opened to traffic. The As-Built Elevations of the Bridge shall be taken and recorded at the locations shown by the table on this sheet. The completed table shall be given to the Engineer who will forward a copy to the Office of Bridge Design and the Region Office.

ESTIMATED QUANTITIES

ITEM	UNIT	QUANTITY
Bridge Elevation Survey	L.S.	Lump Sum

ELEVATION - BRIDGE SURVEY MARKER

LOCATION	STATION - OFFSET	ELEVATION
Begin Bridge		
End Bridge		

AS-BUILT ELEVATION SURVEY
FOR
208' - 7" COMP. STEEL GIRDER BRIDGE

2 - 41' - 0" ROADWAYS — 15° R.H.F. SKEW
OVER NORTH STREET — SEC. 35-T2N-R7E
STA. 112 + 80.78 TO STA. 114 + 89.36 — IM 1902(61)0
STR. NO. 52-409-294 — HL-93

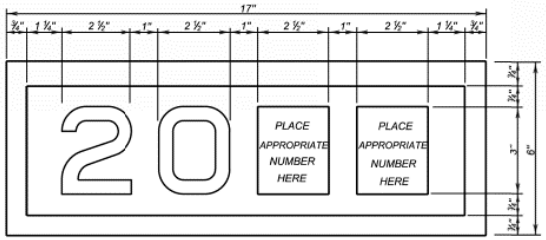
PENNINGTON COUNTY
S. D. DEPT. OF TRANSPORTATION
SEPTEMBER 2013

31 OF 34

DESIGNED BY	CK. DES. BY	DRAFTED BY	
DM	PW	BT	Kevin N. Boeden
PENN1162	1162TA31		BRIDGE ENGINEER

F.2.7.23. DETAILS OF STANDARD PLATE NO's 460.02 & 460.05

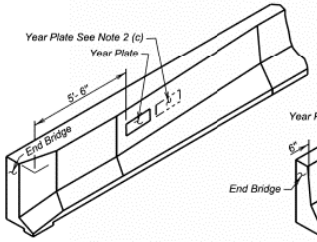
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	IM 1902(61)0	E34	E74



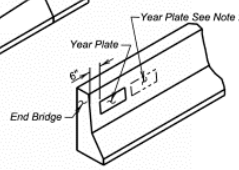
YEAR PLATE DETAILS

GENERAL NOTES:

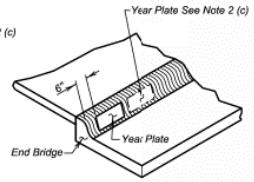
1. Year plates of the general dimensions shown shall be constructed on all box culverts and bridges. The year plates shall be constructed in reverse and attached to the forms in such a manner that the finished imprint in the concrete does not exceed one-half (½) inch in depth.
2. Year plates shall be located on structure (s) as follows:
   a. On cast-in-place box culverts the year plates shall be four and one - half (4 ½) inches below the top of the upstream parapet wall and centered laterally on the upstream face. On precast box culverts the year plate shall be centered laterally on the upstream face of the top slab. Where an extended interior wall interferes with this location, the year plate shall be centered in an adjacent barrel.
   b. On bridges with six (6) inch curbs or "Jersey" shaped barriers with no endblocks, the year plate shall be centered vertically on the curb face approximately six (6) inches from the end of the bridge, or as designated by the Engineer. On bridges with "Jersey" shaped barrier endblocks, the year plate shall be centered on the upper sloped portion of the barrier approximately 5'- 6" from the end of the bridge, or as designated by the Engineer. There shall be one year plate at each end of the bridge on opposite sides.
   c. When the plans specify that both the original date of construction and the date of reconstruction are to be shown, one date shall be placed as listed above and the other located adjacent to it. Both year plates shall be shown at each end of the bridge on opposite sides.
3. There will be no separate measurement or payment made for year plates on box culverts and bridges. All costs for this work shall be incidental to other contract items.



JERSEY BARRIER
(With Endblock)



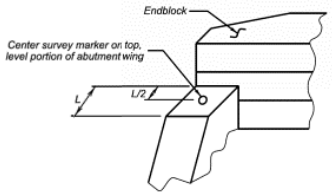
JERSEY BARRIER



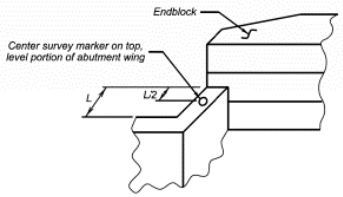
TYPE B CURB

June 26, 2012

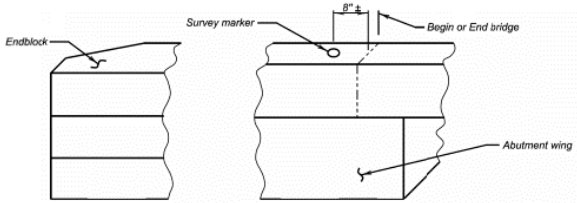
Published Date: 2nd Qtr. 2015	SDDOT	YEAR PLATE DETAILS	PLATE NUMBER 460.02 Sheet 1 Of 1



ABUTMENT WITH "STRAIGHT" WINGS



ABUTMENT WITH "SWEPT BACK" WINGS



ABUTMENT WITH "SWEPT BACK" WINGS
(Endblock on top of wings)

GENERAL NOTES:

1. Survey markers shall be located at each abutment on the same side of the bridge as the year plate. Place survey markers on abutment wings as shown. Two survey markers will be required at each bridge.
2. Survey markers shall be of a type intended for installation in concrete, be made of solid brass or bronze, have a domed top and be either a 3" top diameter (with a ¾" X 2" long ribbed shank), or a US Army Corps of Engineers Type C Disc with a 3 ½" top diameter.
3. There will be no separate measurement or payment made for survey markers. All costs for this work shall be incidental to the other contract items.

June 26, 2012

Published Date: 2nd Qtr. 2015	SDDOT	BRIDGE SURVEY MARKER	PLATE NUMBER 460.05 Sheet 1 of 1

208' - 7" COMP. STEEL GIRDER BRIDGE
STR. NO. 52-409-294
SEPTEMBER 2013

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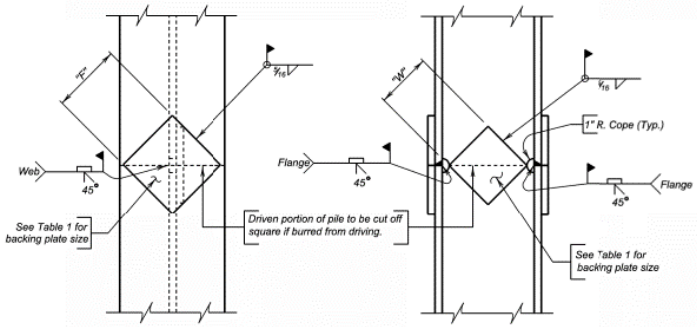
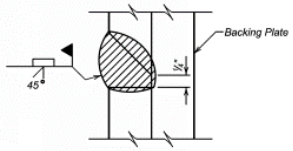
F.2.7.24. DETAILS OF STANDARD PLATE NO's 510.40 & 620.19

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	IM 1902(61)0	E35	E74



NOTE:
Prepare joint surfaces lower end of upper section on the ground and weld on backing plates; then place upper section on lower section and weld.

COMPLETE JOINT PENETRATION WELD DETAIL



GENERAL NOTES:

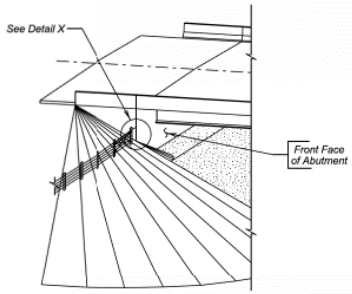
1. Steel for backing plates shall conform to ASTM A709 Grade 50.
2. Welding and weld inspection shall be in conformance with AWS D1.5 (Current Year) Bridge Welding Code - Steel.
3. Welder must be certified and registered with the SDDOT.
4. Backing plate shall at a minimum be as thick as the web of the pile being spliced.
5. Web must be coped with 1 inch radius.
6. Submit Welding Procedure Specification (WPS) to Bridge Construction Engineer for approval prior to pile driving.

TABLE 1
(BACKING PLATES)

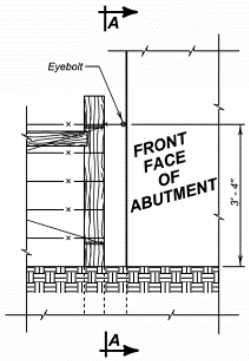
PILE	10"	12"	14"
"F" FLANGE	6 ½"	8"	10"
"W" WEB	4 ¾"	6 ¼"	7 ½"

December 23, 2012

Published Date: 2nd Qtr. 2015 | SDDOT | STEEL PILE SPLICE DETAILS | PLATE NUMBER 510.40 | Sheet 1 of 1



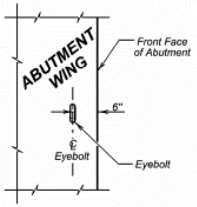
DETAILS FOR FENCE ANCHORS



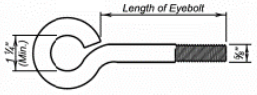
DETAIL "X"

GENERAL NOTES:

1. The fence and post details shown are for illustrative purpose only. The fence shall be as specified elsewhere in the plans.
2. Eyebolts shall be placed on all of the bridge abutment wings.
3. Eyebolts shall be ⅝ inch diameter and shall conform to ASTM A307.
4. Eyebolts shall be galvanized in accordance with AASHTO M232 (ASTM A153).
5. Eyebolts shall be installed after abutment wings are backfilled and berm construction is complete. Drill-in and epoxy eyebolts into abutment such that the eye of the bolt is flush with the concrete surface.
6. The epoxy resin mixture shall be of a type for bonding steel to hardened concrete and shall conform to AASHTO M235 Type IV, Grade 3 (Equivalent to ASTM C881, Type IV, Grade 3).
7. The diameter of the drilled holes shall not be less than ⅛ inch greater, nor more than ⅜ inch greater than the diameter of the eyebolts or as per Manufacturer's recommendations. The drilled holes shall be blown out with compressed air using a device that will reach the back of the hole to be sure that all debris or loose material has been removed prior to epoxy injection.
8. Mix epoxy resin as recommended by the Manufacturer and apply by an injection method as approved by the Engineer. Beginning at the back of the drilled holes, fill the holes ½ to ⅔ full of epoxy, or as recommended by the Manufacturer, prior to insertion of the eyebolts. Care shall be taken to prevent epoxy from flowing out of the horizontal holes prior to eyebolt insertion. Rotate the eyebolt during installation to eliminate voids and ensure complete bonding of the bolt. Insertion of the eyebolts by the dipping or painting method will not be allowed.
9. Loads shall not be applied to the epoxy grouted eyebolts until the epoxy resin has had sufficient time to cure as specified by the epoxy resin manufacturer.
10. The cost for furnishing and installing the eyebolts shall be incidental to various contract items.



VIEW A - A



EYEBOLT DETAILS

December 23, 2012

Published Date: 2nd Qtr. 2015 | SDDOT | FENCE ANCHORS FOR BRIDGE ABUTMENTS (SWEPT BACK WINGS) | PLATE NUMBER 620.19 | Sheet 1 of 1

208' - 7" COMP. STEEL GIRDER BRIDGE
STR. NO. 52-409-294
SEPTEMBER 2013

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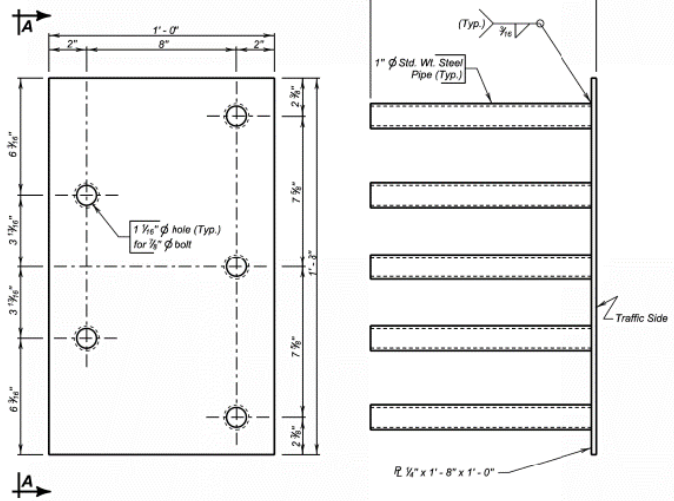
F.2.7.25. DETAILS OF STANDARD PLATE NO 630.92

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	IM 1902(61)0	E36	E74



ELEVATION

VIEW A - A

GENERAL NOTES:

1. Steel plate for the insert assembly shall conform to ASTM A709 Grade 36. The steel pipes shall conform to ASTM A53 or ASTM A500 Grade B.
2. Welding and weld inspection shall be in conformance with AWS D1.1 - (Current Year) Structural Welding Code - Steel.
3. After fabrication, galvanize in accordance with AASHTO M111 (ASTM A123).
4. Bolts, nuts, and washers shall be provided with each assembly. Bolts shall be galvanized and conform to the requirements of ASTM A307, A325, or A449. Plain washers shall be galvanized and conform to ASTM F844.
5. Bolt heads shall be placed on the traffic side of the endblock. Bolt projection at the back side of the insert shall not exceed 1 inch beyond the nut.
6. The cost of the 5 bolt insert plate assembly complete in place including welding and galvanizing shall be incidental to the contract unit price per Cubic Yard for " Class A45 Concrete, Miscellaneous ", " Class A45 Concrete, Bridge Deck ", or " Class A45 Concrete, Bridge Repair ", as applicable.

December 23, 2013

Published Date: 2nd Qtr. 2015	SDDOT	5 BOLT INSERT PLATE ASSEMBLY	PLATE NUMBER 630.92 Sheet 1 of 1

208' - 7" COMP. STEEL GIRDER BRIDGE
STR. NO. 52-409-294
SEPTEMBER 2013

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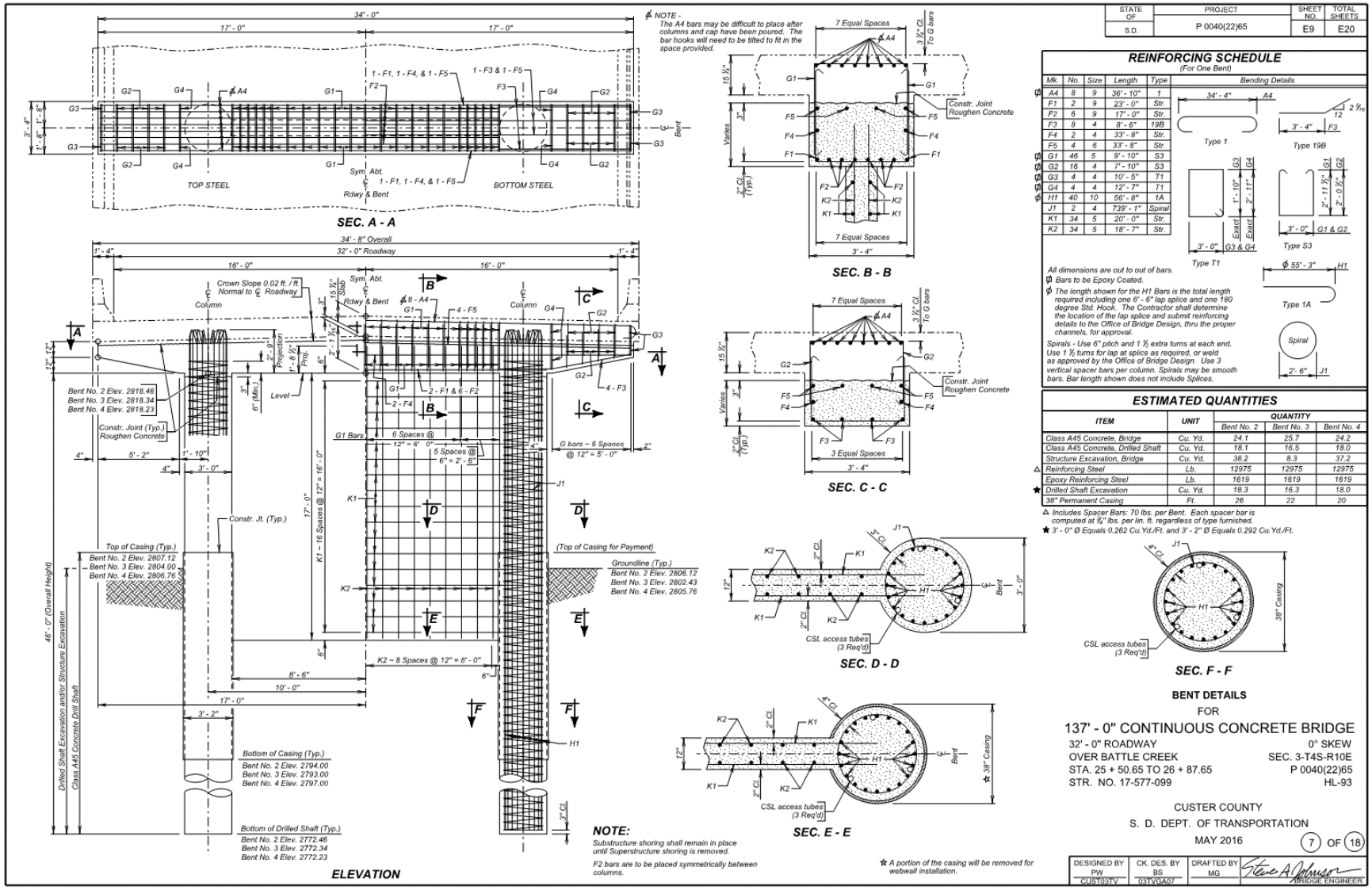
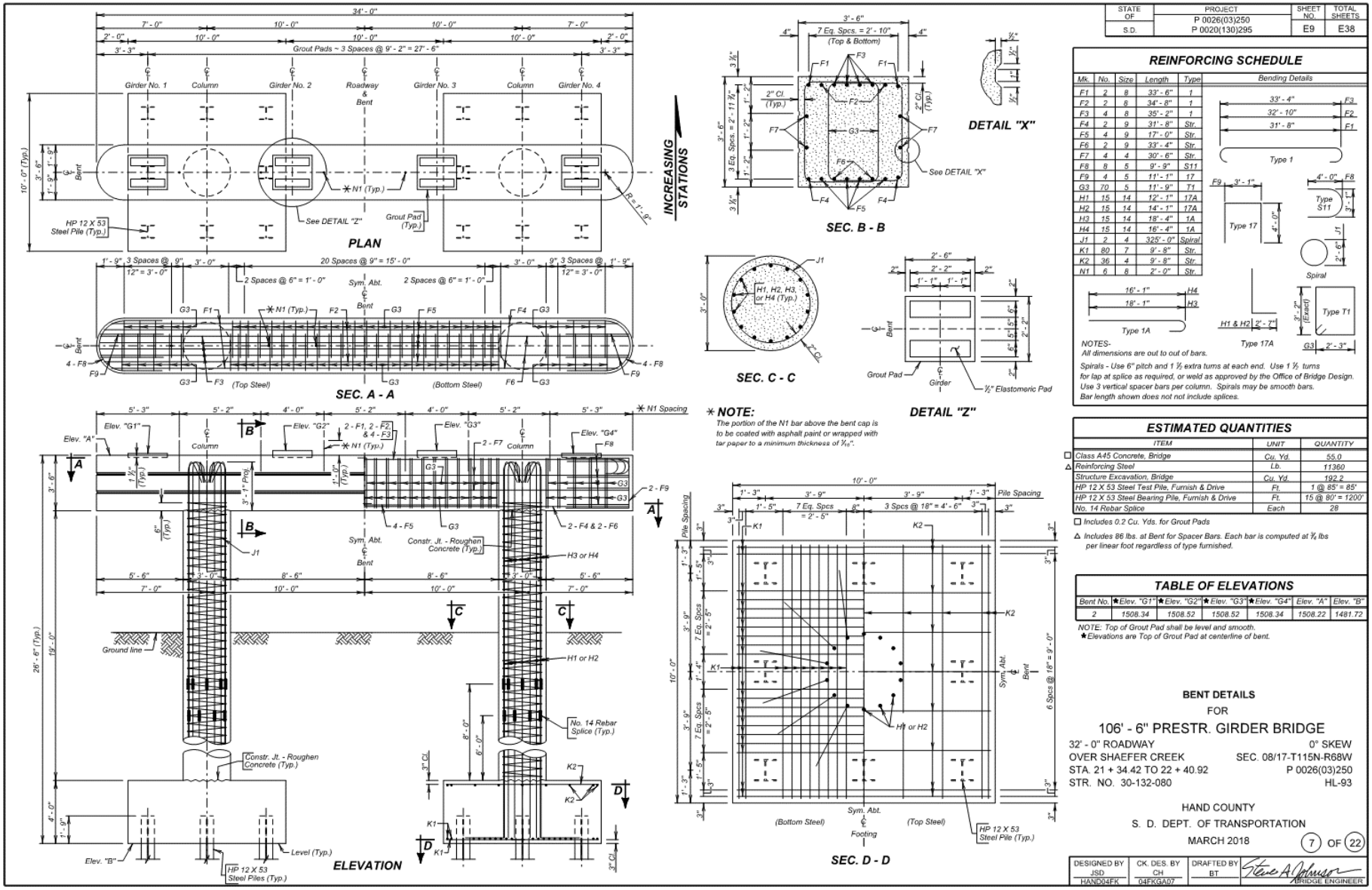
F.2.8. Alternate Substructure Configurations

F.2.8.1. Bents

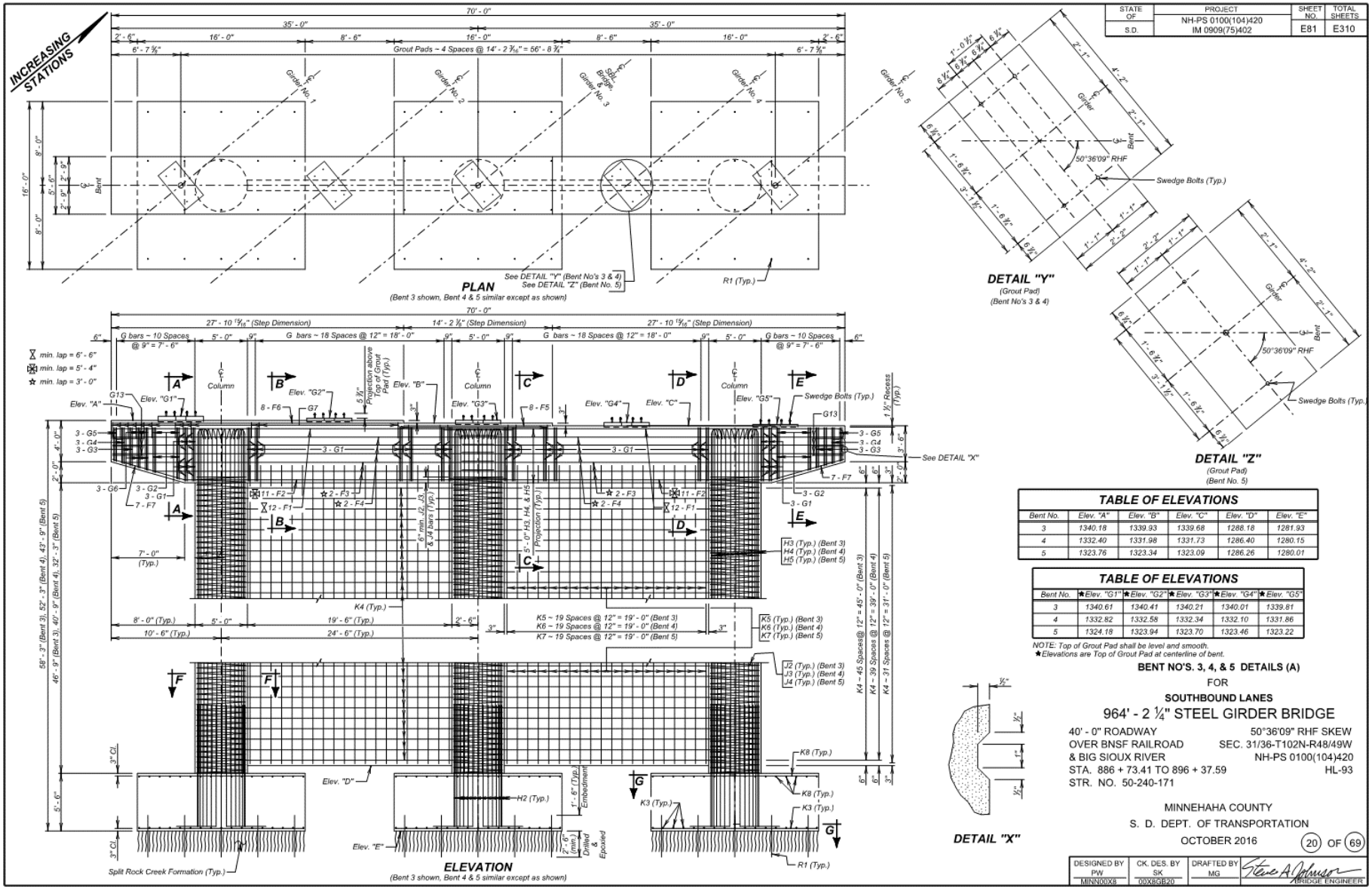
F.2.8.2. Bent founded on drilled shafts with web wall



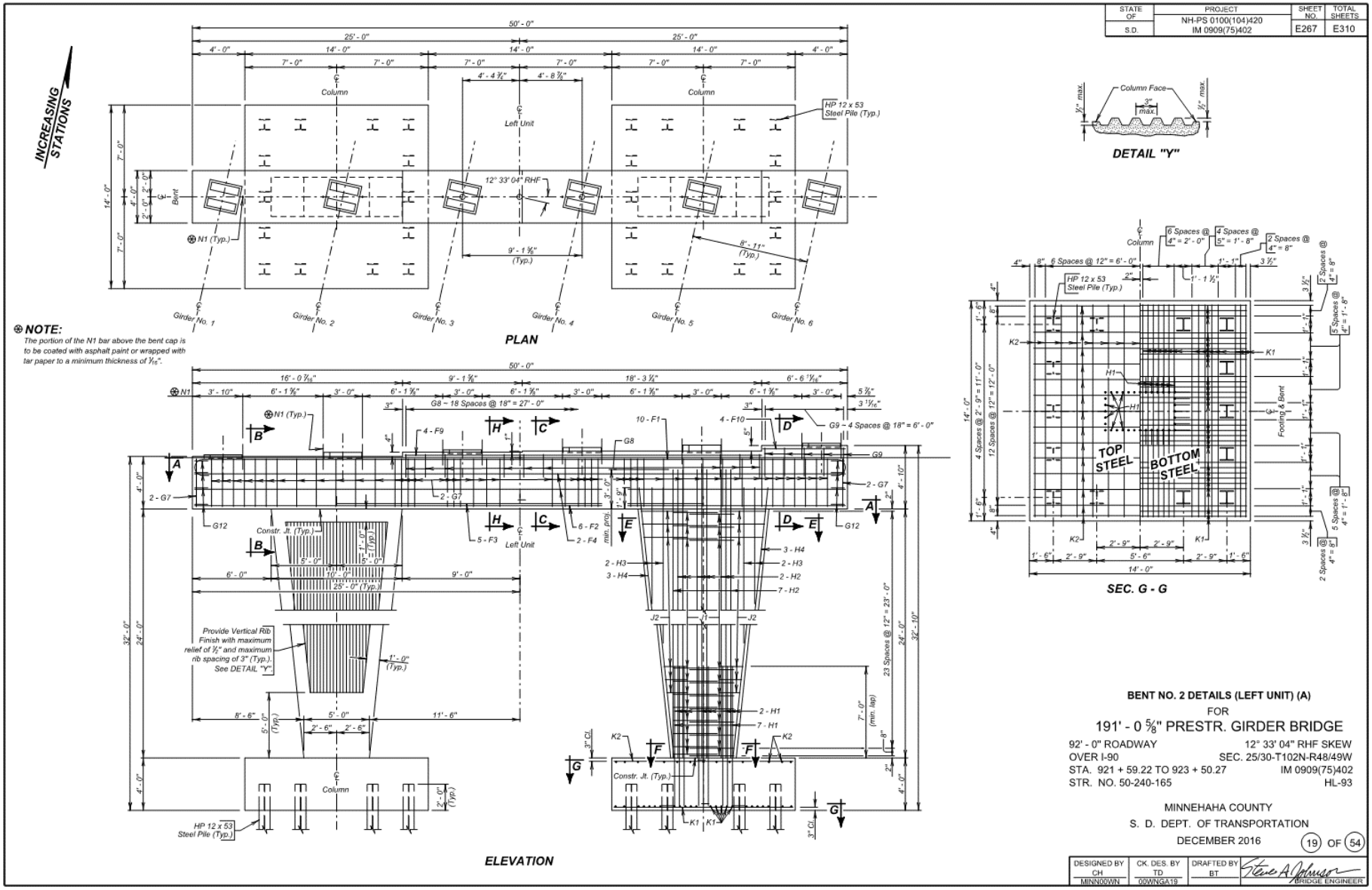
F.2.8.2.1. Bent founded on pile founded footings



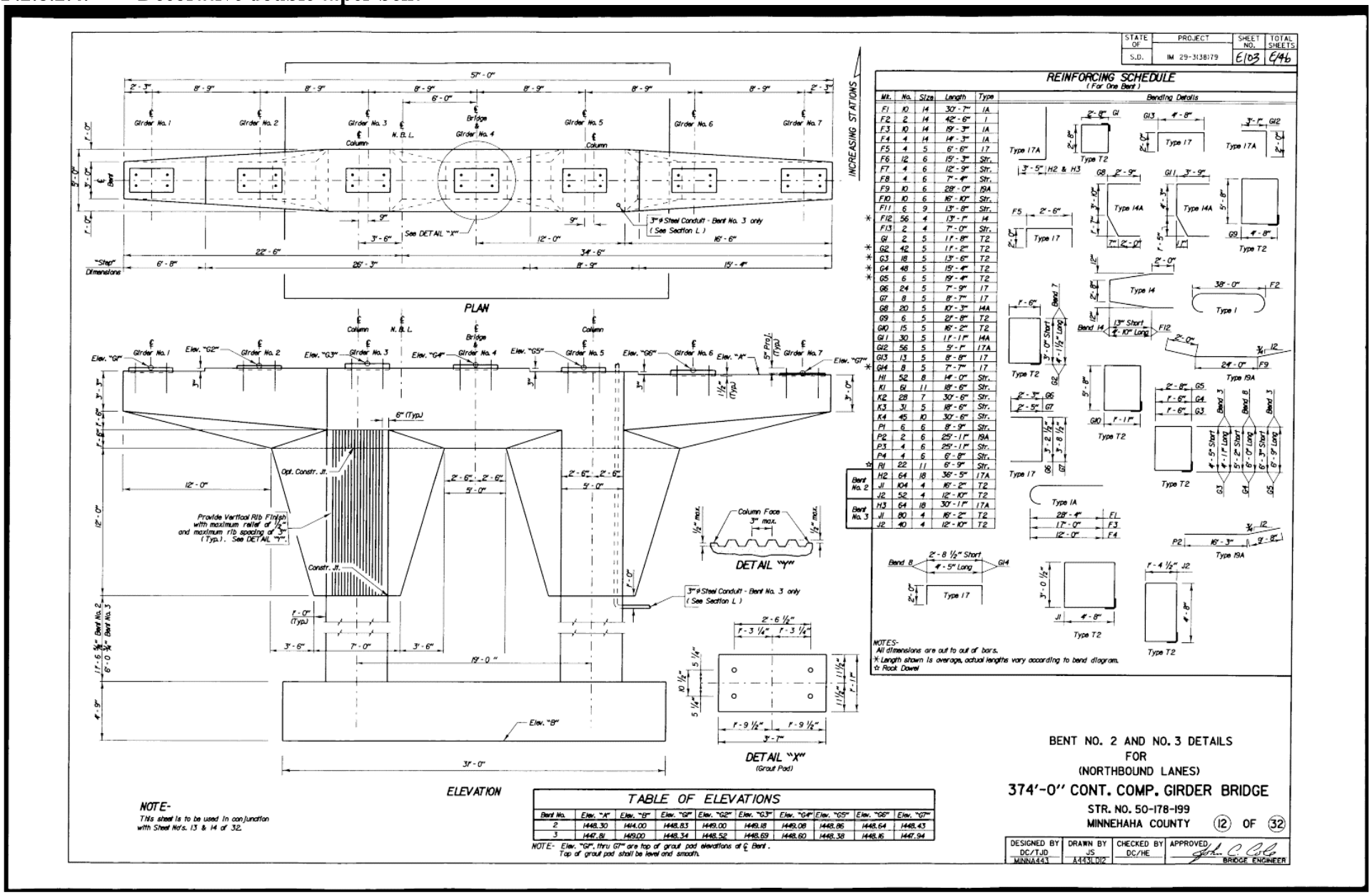
F.2.8.2.2. Bent founded on spread footings on rock



F.2.8.2.3. Decorative trapezoidal bent

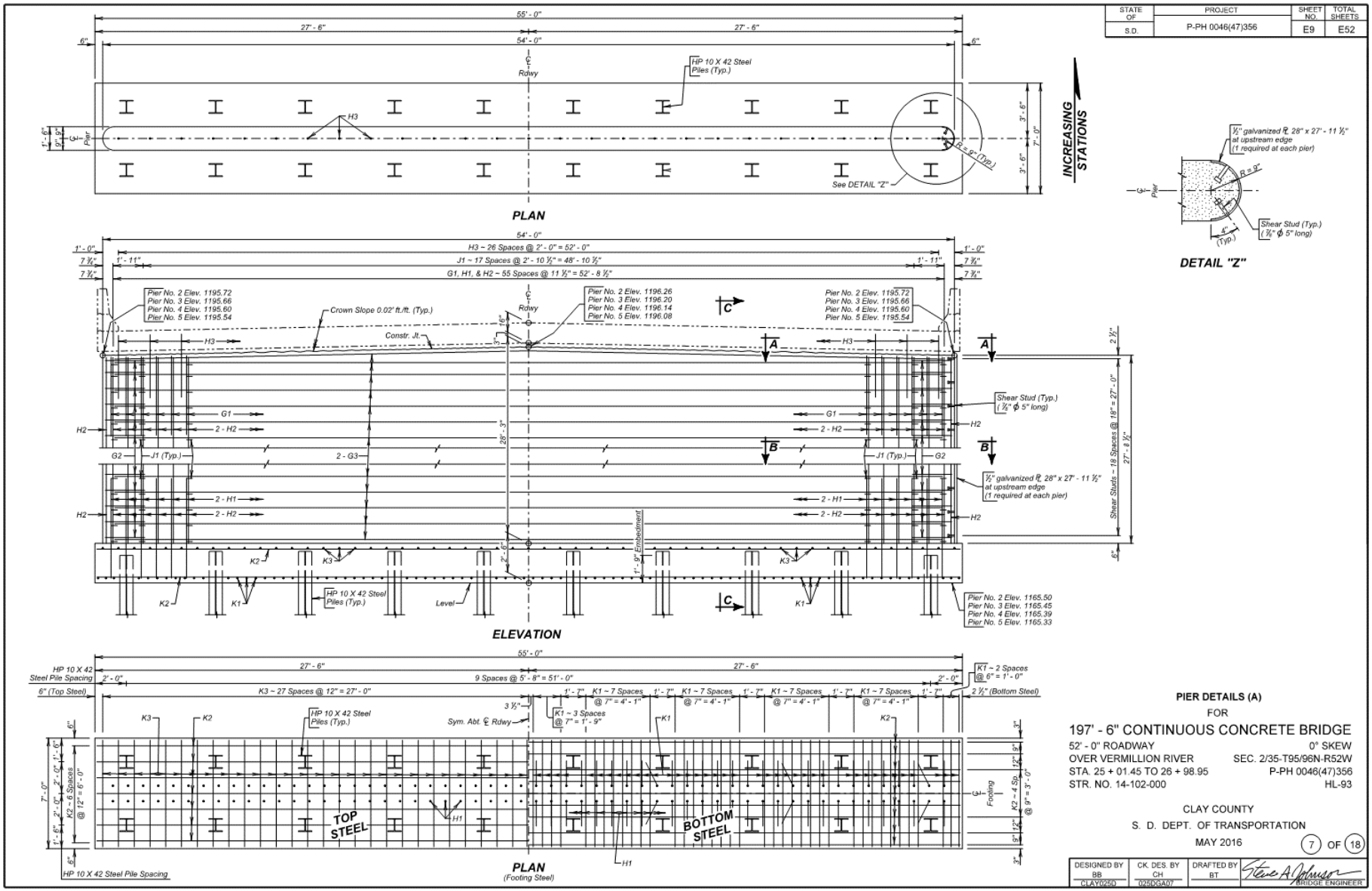


F.2.8.2.4. Decorative double taper bent



F.2.8.3. Piers

F.2.8.3.1. Straight pier wall (A)



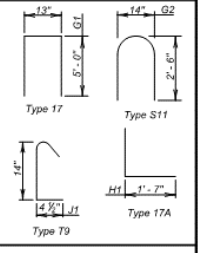
F.2.8.3.2. Straight pier wall (B)

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-PH 0046(47)356	E10	E52

REINFORCING SCHEDULE
(For One Pier - 4 Required)

Mk.	No.	Size	Length	Type
G1	56	9	11' - 1"	17
G2	58	4	5' - 8"	S11
G3	58	4	52' - 8"	Str
⊕ H1	112	9	7' - 9"	17A
H2	114	9	27' - 7"	Str
△ H3	27	7	4' - 0"	Str
J1	580	4	1' - 11"	T9
K1	78	6	6' - 9"	Str
K2	16	4	54' - 10"	Str
K3	55	4	6' - 9"	Str

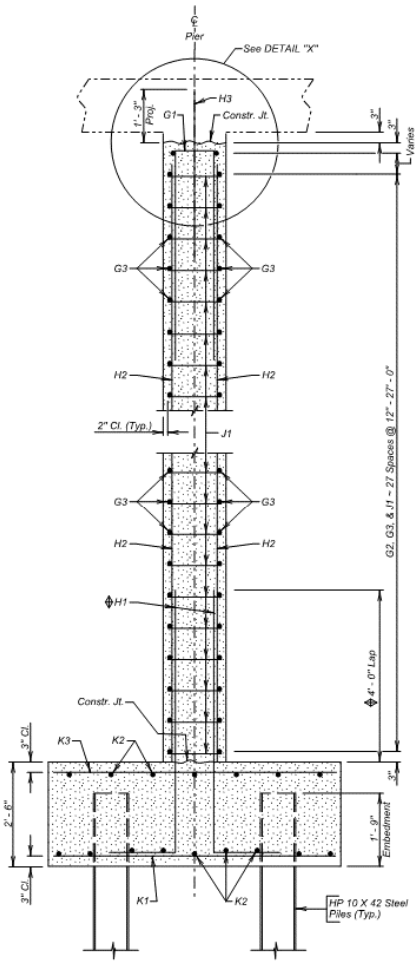
Bending Details



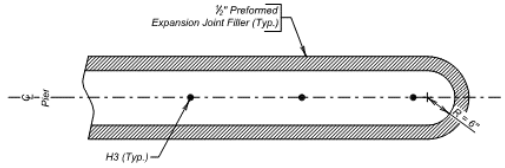
NOTE:
All dimensions are out to out of bars.
△ Bars to be epoxy coated.
⊕ 4' - 0" lap shown, minimum 3' - 9" required.

ESTIMATED QUANTITIES

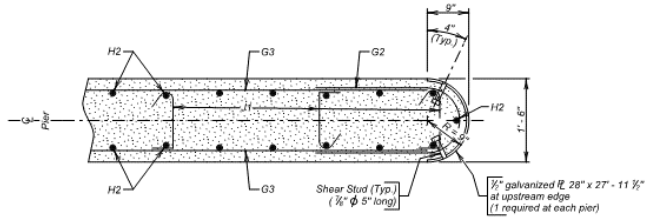
ITEM	UNIT	QUANTITY			
		Pier No. 2	Pier No. 3	Pier No. 4	Pier No. 5
Class A45 Concrete, Bridge	Cu. Yd.	119.6	119.6	119.6	119.6
Reinforcing Steel	Lb.	20380	20380	20380	20380
Epoxy Coated Reinforcing Steel	Lb.	221	221	221	221
Structure Excavation, Bridge	Cu. Yd.	287.2	316.4	317.7	319.0
HP 10 X 42 Steel Test Pile, Furnish and Drive	Ft.	1 @ 145' = 145'	1 @ 145' = 145'	1 @ 145' = 145'	1 @ 145' = 145'
HP 10 X 42 Steel Bearing Pile, Furnish and Drive	Ft.	19 @ 140' = 2660'	19 @ 140' = 2660'	19 @ 140' = 2660'	19 @ 140' = 2660'



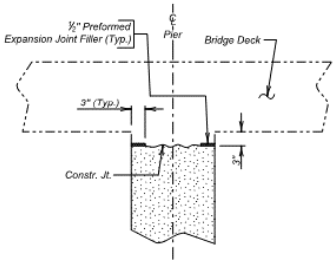
SEC. C - C



VIEW A - A
(Resteel and Bridge Deck not shown)



SEC. B - B



DETAIL "X"
(Resteel not shown)

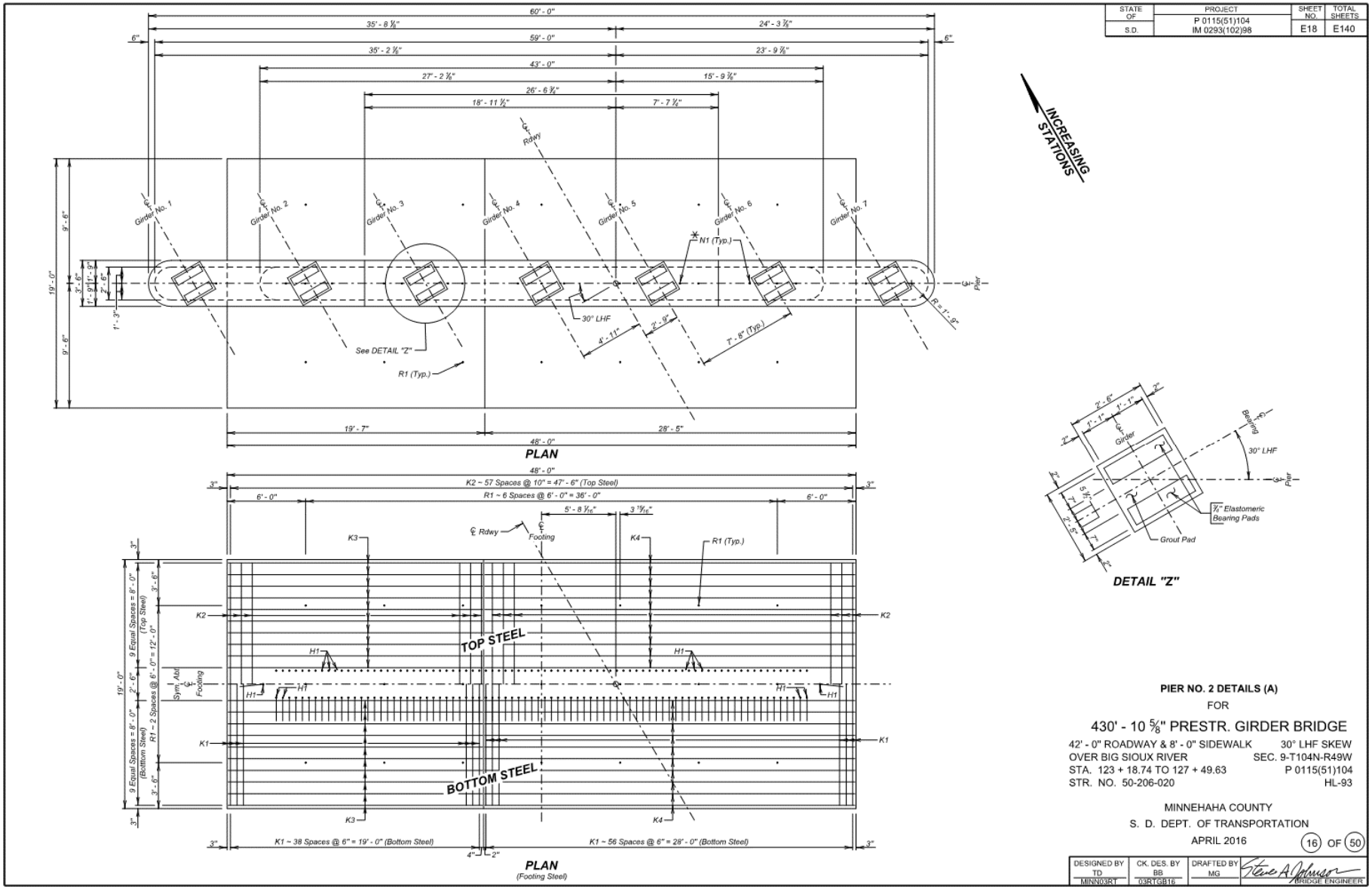
PIER DETAILS (B)
FOR
197' - 6" CONTINUOUS CONCRETE BRIDGE
52' - 0" ROADWAY — 0° SKEW
OVER VERMILLION RIVER — SEC. 2/35-T95/96N-R52W
STA. 25 + 01.45 TO 26 + 98.95 — P-PH 0046(47)356
STR. NO. 14-102-000 — HL-93

CLAY COUNTY
S. D. DEPT. OF TRANSPORTATION
MAY 2016

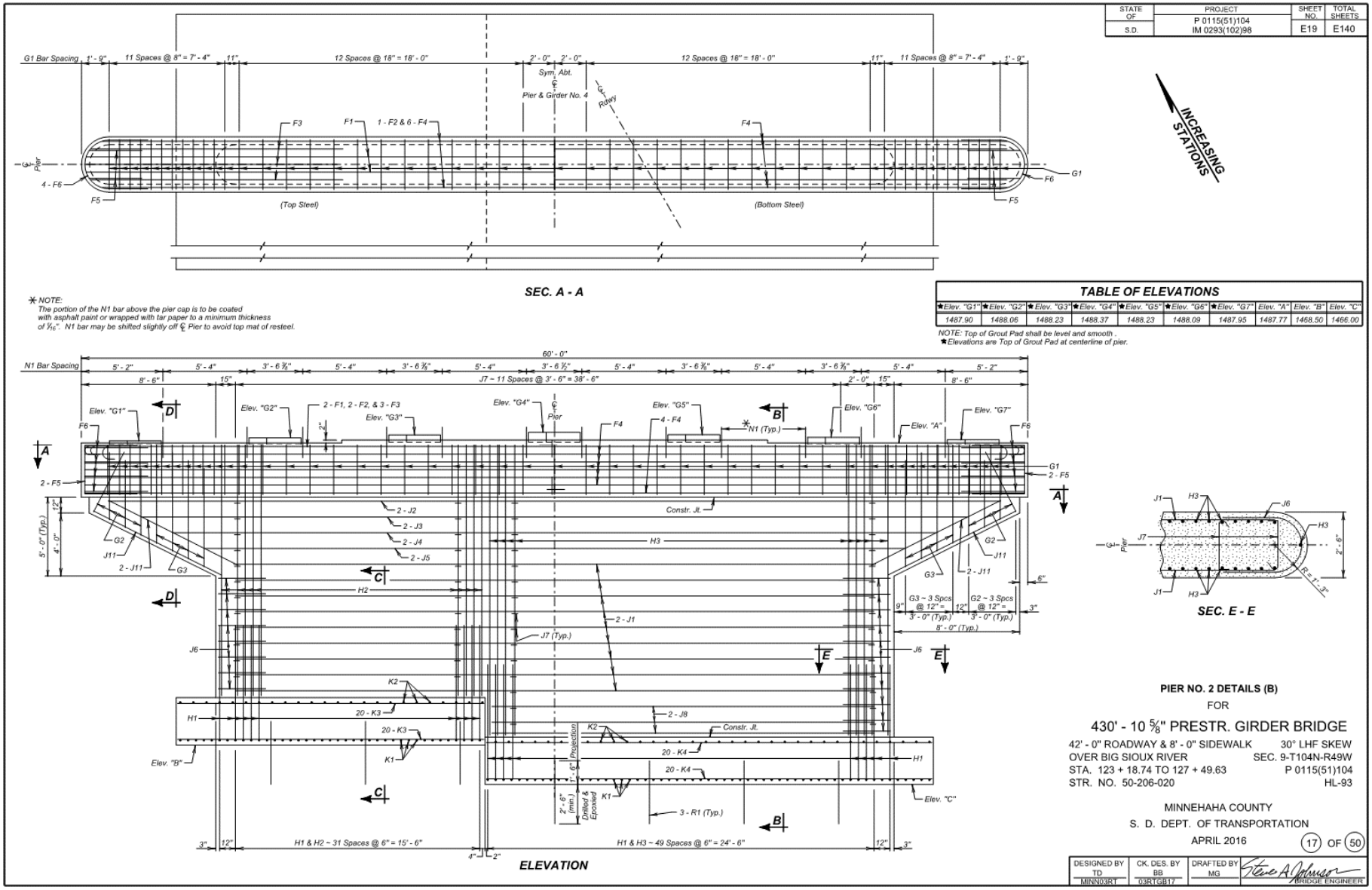
8 OF 18

DESIGNED BY	CK. DES. BY	DRAFTED BY	
BB	CH	BT	BRIDGE ENGINEER
CLAY025D	025DGA08		

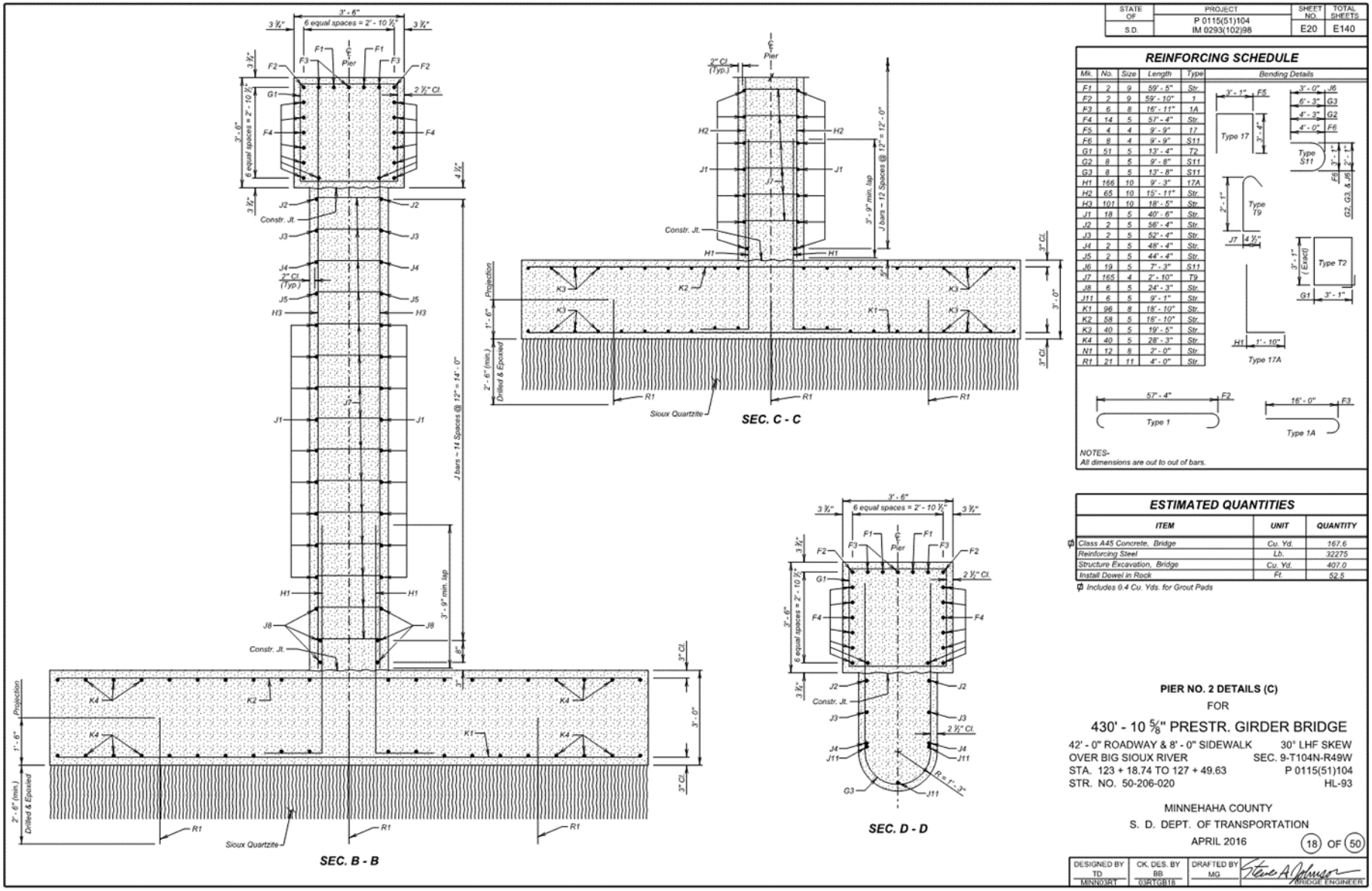
F.2.8.3.3. Straight pier wall with cantilevers (A)



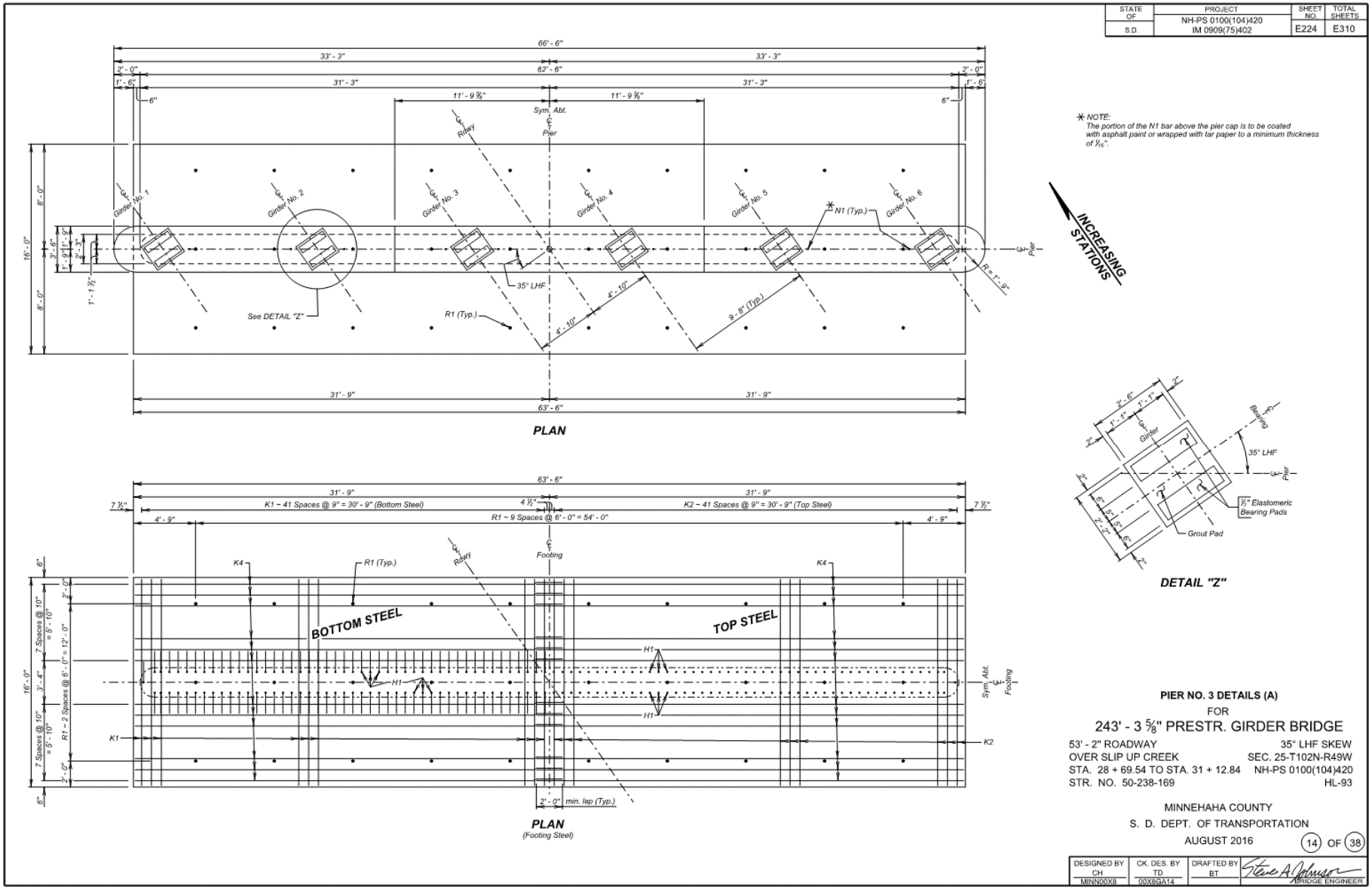
F.2.8.3.4. Straight pier wall with cantilevers (B)



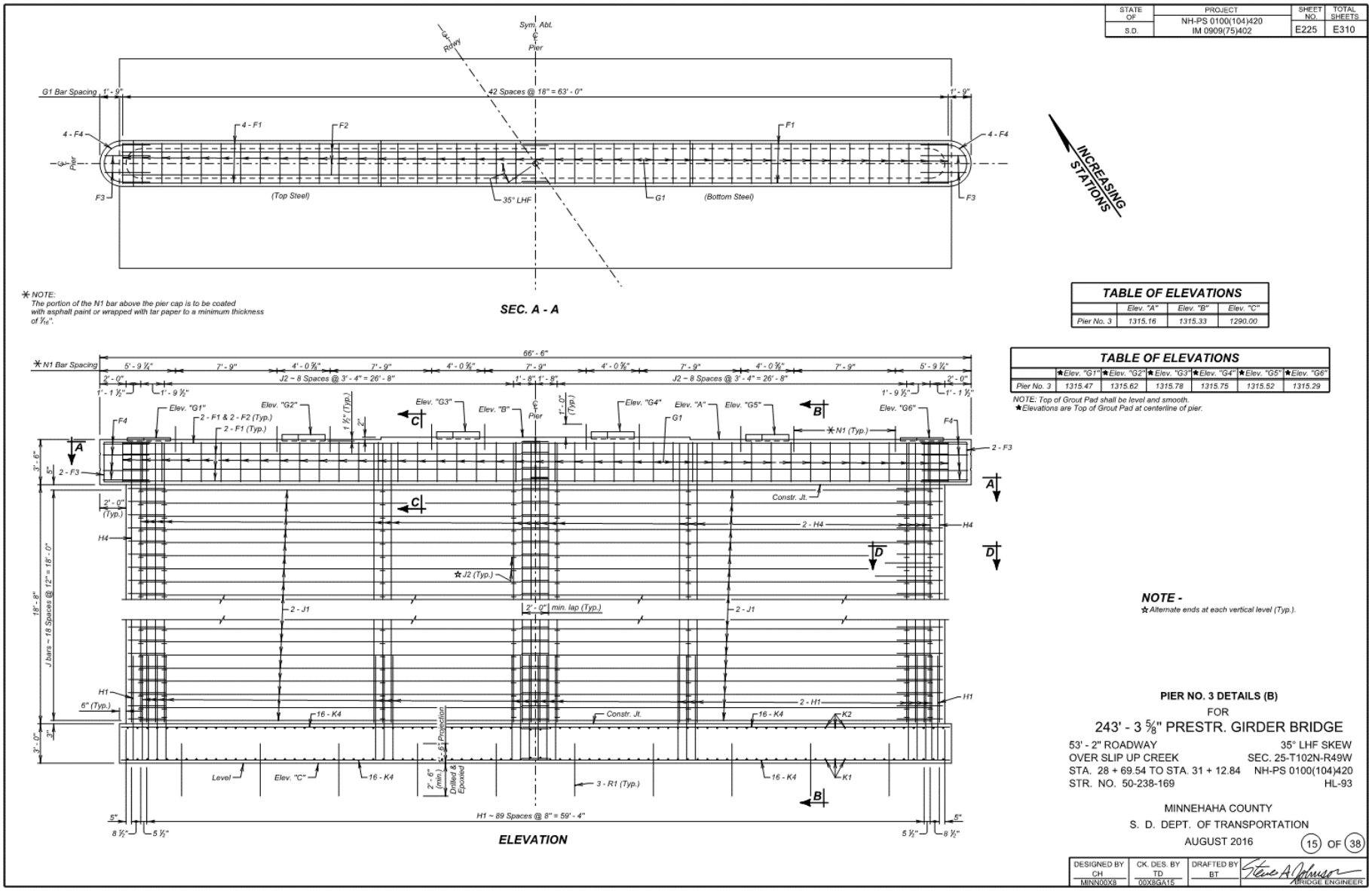
F.2.8.3.5. Straight pier wall with cantilevers (C)



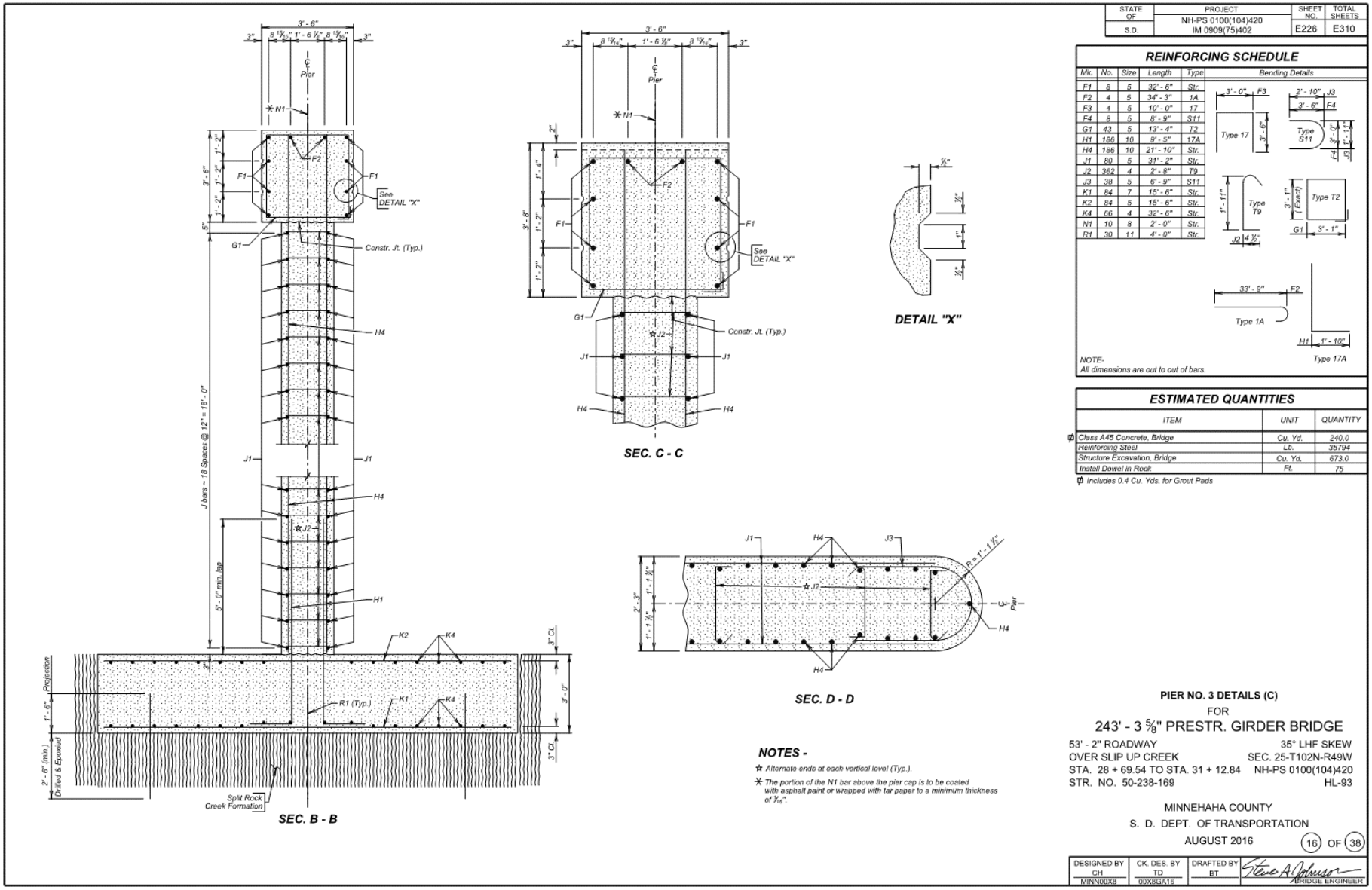
F.2.8.3.6. Pier wall with cap (A)



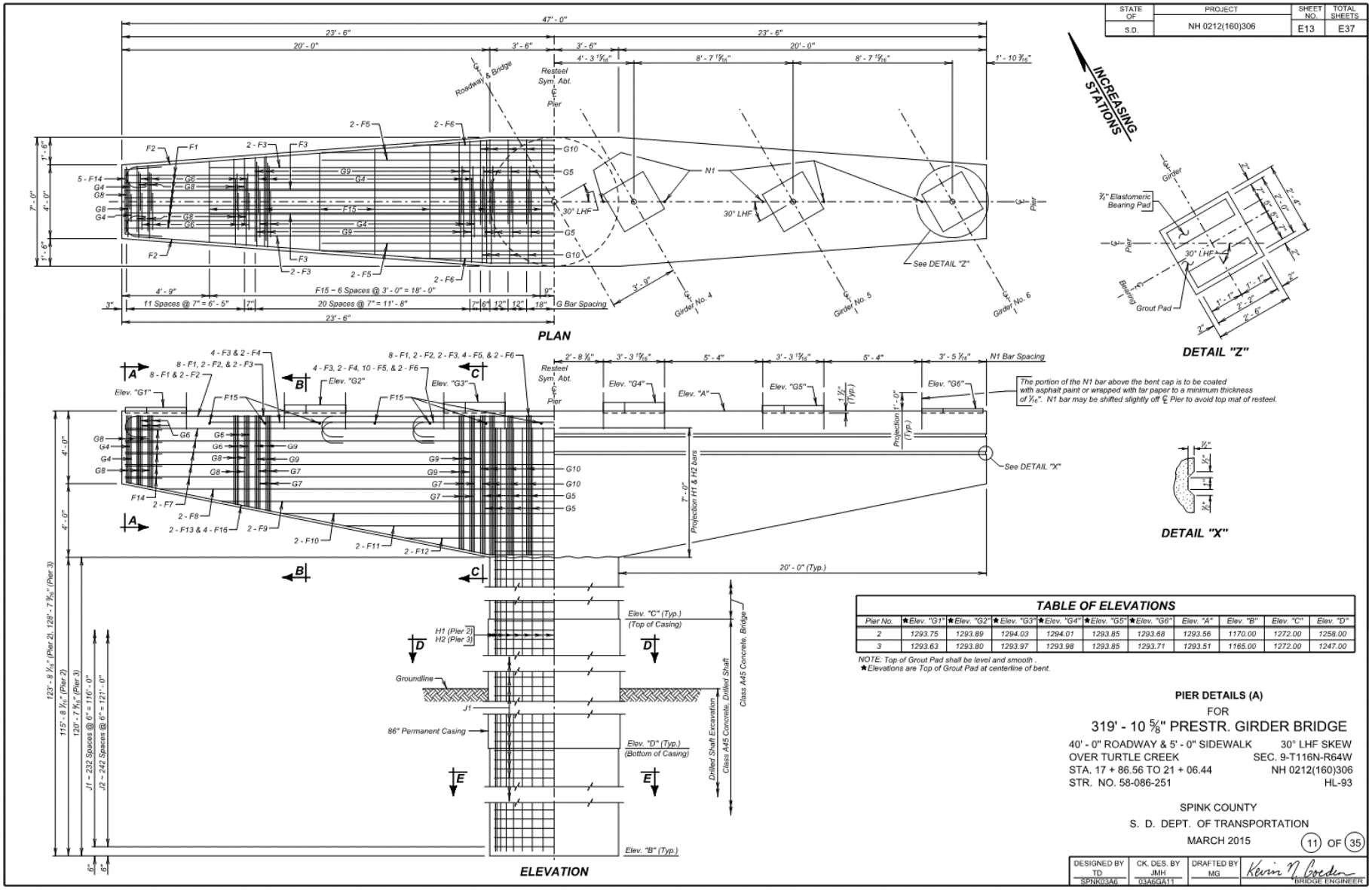
F.2.8.3.7. Pier wall with cap (B)



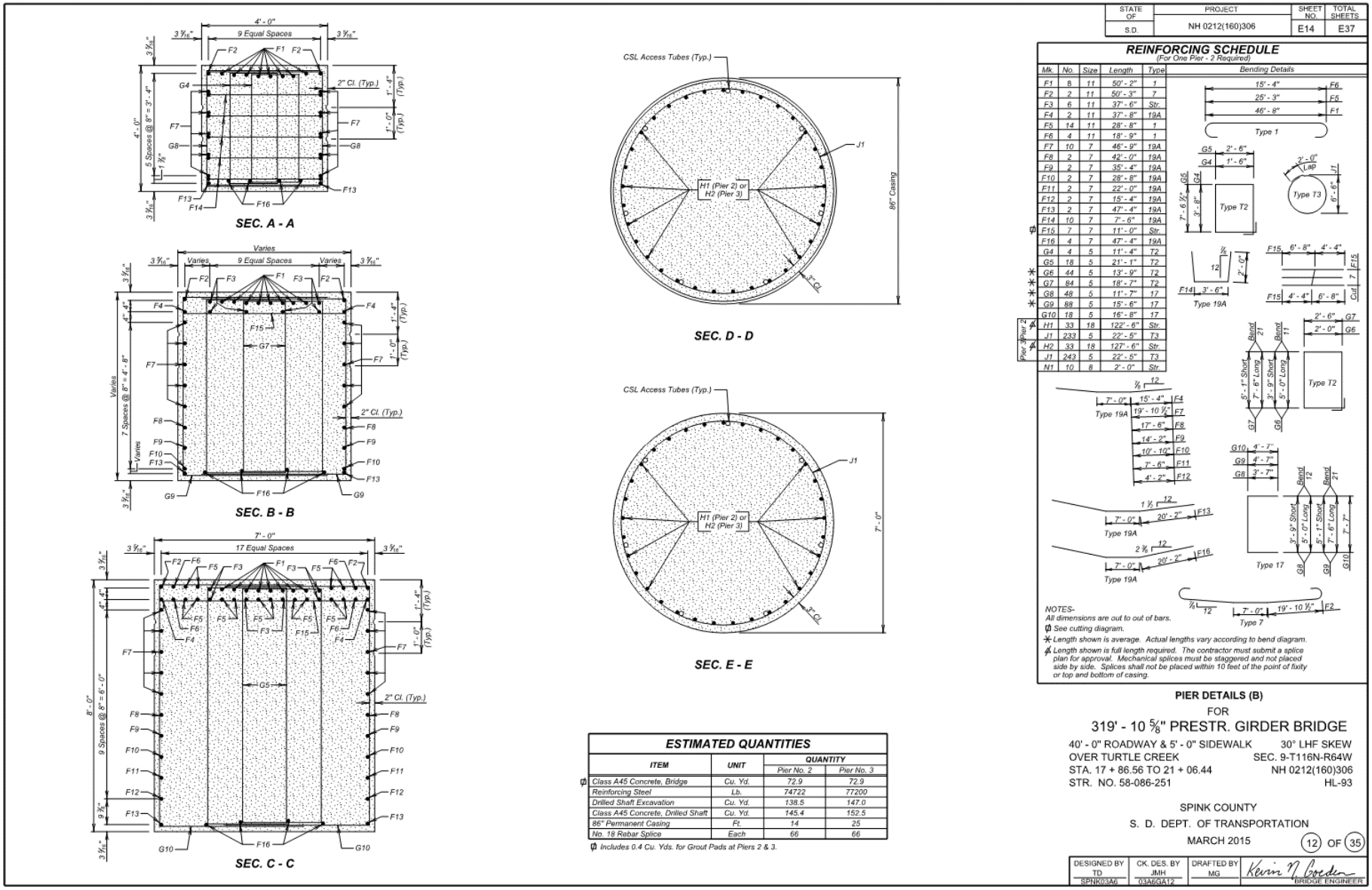
F.2.8.3.8. Pier wall with cap (C)



F.2.8.3.9. Hammerhead pier (A)



F.2.8.3.10. Hammerhead pier (B)

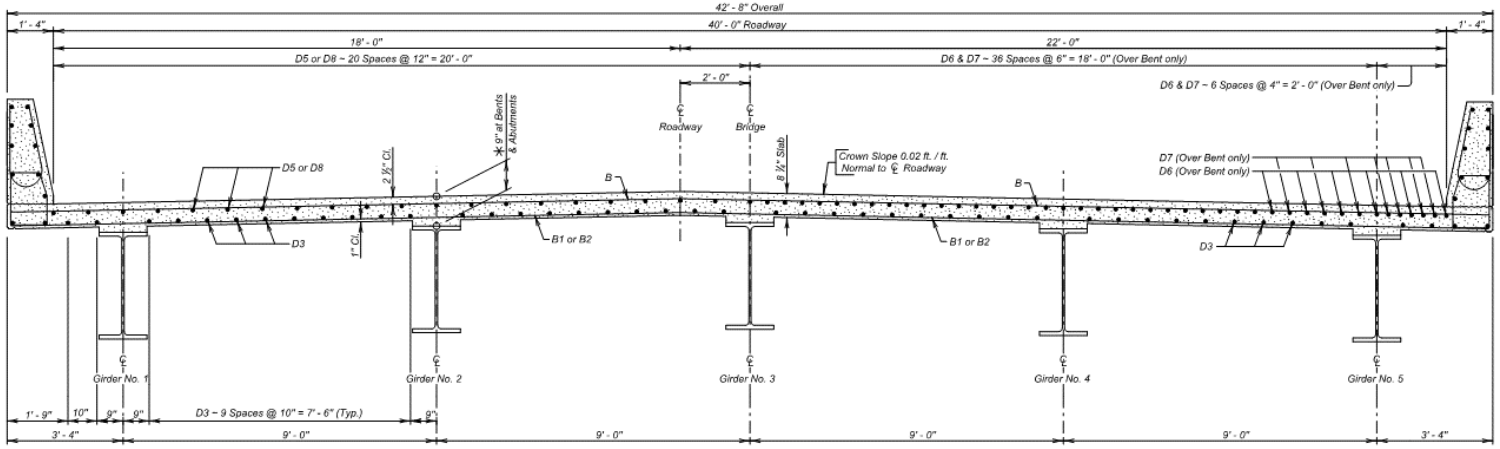


F.2.9. New Details

This section contains details that will become the new standard to be used on all structures. Many of the example sets of plans provided above may not incorporate these details but as applicable projects are completed and let through the Department, new projects will be inserted into this document and the details below be removed from this location. Please note that these details are in their first phases of development and construction and are subject to revisions and alterations.

F.2.9.1. Single Slope Concrete Barrier Reinforcing Details

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	IM 0908(95)362	E14	E113



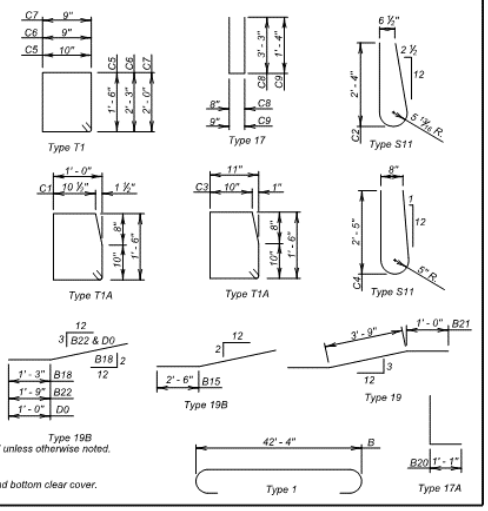
SECTION C - C

✳ Dimensions are at ℄ bearing: at other points along the girders this dimension shall be computed as shown on the Slab Form Elevations & Erection Data sheet.

REINFORCING SCHEDULE

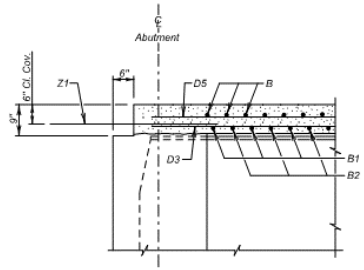
	Mk.	No.	Size	Length	Type
□	B	547	5	43' - 6"	1
	B1	301	4	42' - 4"	Str.
	B2	300	4	37' - 6"	Str.
	B15	12	5	9' - 6"	19B
	B16	10	4	49' - 3"	Str.
✳	B17	8	4	5' - 8"	Str.
	B18	12	8	3' - 0"	19B
	B19	12	5	2' - 0"	Str.
	B20	12	6	3' - 6"	17A
	B21	4	4	5' - 9"	19
	B22	4	4	3' - 3"	19B
	C1	486	5	5' - 10"	T1A
	C2	490	5	5' - 3"	S11
	C3	4	5	5' - 8"	T1A
	C4	8	5	5' - 3"	S11
	C5	8	5	5' - 7"	T1
	C6	12	6	7' - 4"	T1
	C7	12	5	6' - 5"	T1
	C8	4	6	7' - 3"	17
	C9	4	5	3' - 5"	17
	D	20	4	52' - 0"	Str.
	D0	4	4	2' - 6"	19B
	D2	60	4	49' - 3"	Str.
	D3	240	5	52' - 3"	Str.
	D5	86	5	48' - 9"	Str.
	D6	86	6	59' - 9"	Str.
	D7	84	6	50' - 3"	Str.
	D8	43	4	42' - 7"	Str.
ϕ	Z1	54	7	4' - 0"	Str.

Bending Details



NOTES-
All reinforcing steel will be stainless steel unless otherwise noted.
✳ Bend in field as necessary to fit.
ϕ Bars to be epoxy coated.
□ Tip bars as required to maintain top and bottom clear cover.
All dimensions are out to out of bars.

NOTE :
Barrier curb details are shown on END BLOCK, BARRIER CURB, & DECK DRAIN DETAILS sheet.



SECTION B - B

ESTIMATED QUANTITIES

	ITEM	UNIT	QUANTITY
★	Class A45 Concrete, Bridge Deck	Cu. Yd.	347.6
	Stainless Reinforcing Steel	Lb.	79033
	Epoxy Coated Reinforcing Steel	Lb.	442
△	Structural Steel	Lump Sum	Lump Sum
	Concrete Penetrating Sealer	Sq. Yd.	1130
	Deck Drain Girder Bridge	Each	26

★ Concrete quantity for Barrier Curb is 0.1184 Cu. Yd. per foot and for End Block is 0.7184 Cu. Yd. each.

△ For informational purposes only, the estimated weight of the structural steel is 348189 pounds.

SUPERSTRUCTURE DETAILS (B)
FOR
254' - 3" STEEL GIRDER BRIDGE

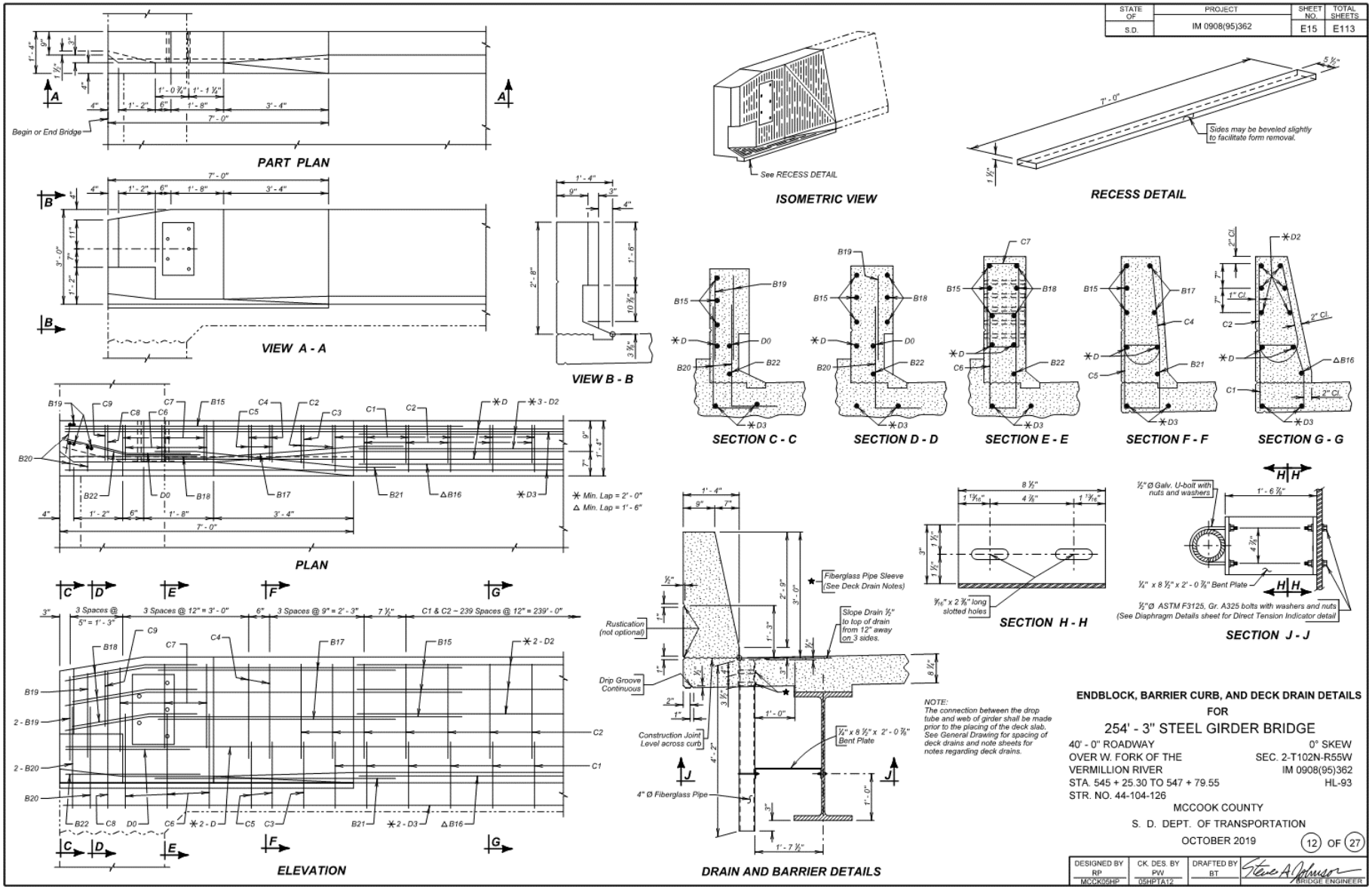
40' - 0" ROADWAY — 0° SKEW
OVER W. FORK OF THE VERMILLION RIVER — SEC. 2-T102N-R55W
STA. 545 + 25.30 TO 547 + 79.55 — IM 0908(95)362
STR. NO. 44-104-126 — HL-93

MCCOOK COUNTY
S. D. DEPT. OF TRANSPORTATION
OCTOBER 2019

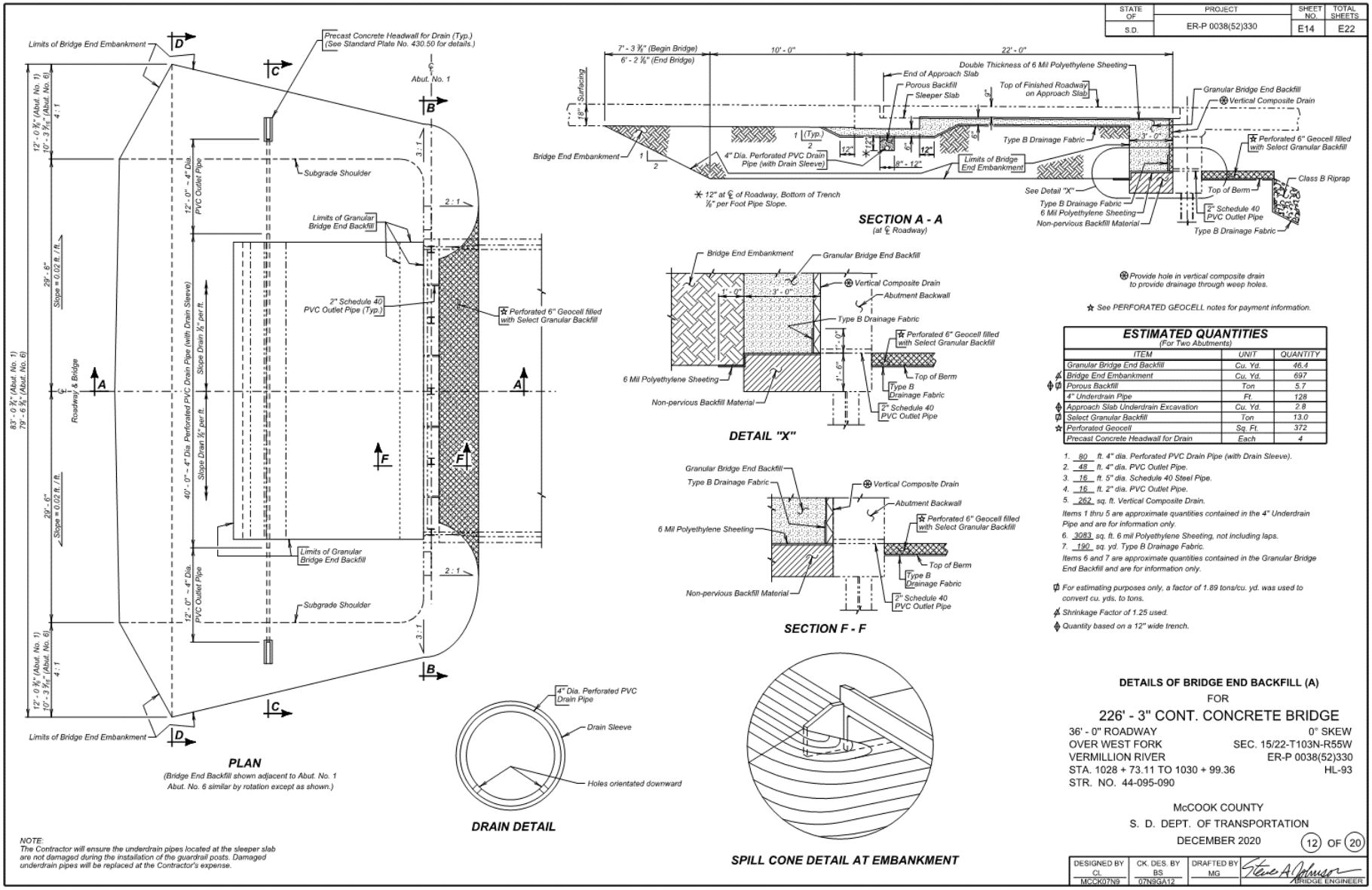
11 OF 27

DESIGNED BY	CK. DES. BY	DRAFTED BY	
RP	PW	BT	BRIDGE ENGINEER
MCCK05HP	05HPTA11		

F.2.9.2. Single Slope Concrete Endblock and Barrier Details



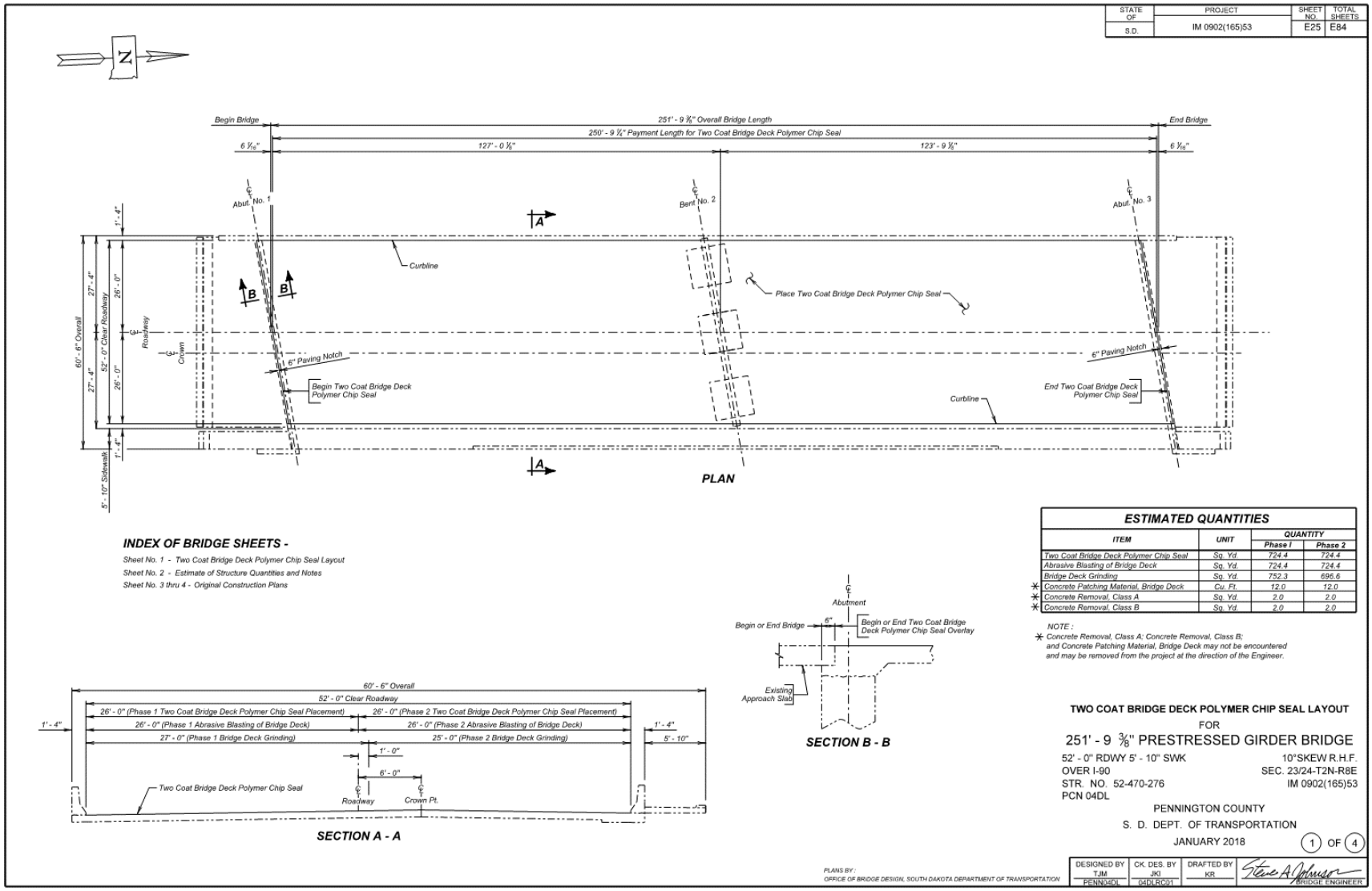
F.2.9.3. Bridge End Backfill and Underdrain Details



F.3. Rehabilitation Plans

F.3.1. Two Coat Polymer Chip Seal

F.3.1.1. Layout for Upgrading



F.3.1.2. Estimate of Structure Quantities and Notes

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	IM 0902(165)53	E26	E84

ESTIMATE OF STRUCTURE QUANTITIES

ITEM NO.	DESCRIPTION	QUANTITY	UNIT
491E0005	Two Coat Bridge Deck Polymer Chip Seal	1448.8	SqYd
491E0110	Abrasive Blasting of Bridge Deck	1448.8	SqYd
491E0120	Bridge Deck Grinding	1448.8	SqYd
491E0130	Concrete Removal, Class A	4.0	SqYd
491E0140	Concrete Removal, Class B	4.0	SqYd
491E0172	Concrete Patching Material, Bridge Deck	24.0	CuFt

SPECIFICATIONS

Construction Specifications: South Dakota Standard Specifications for Roads and Bridges, 2015 Edition and Required Provisions, Supplemental Specifications and Special Provisions as included in the Proposal.

DETAILS AND DIMENSIONS OF EXISTING BRIDGE

All details and dimensions of the existing bridge, contained in these plans, are based on the original construction plans and shop plans and are provided as information only. It is the Contractor's responsibility to inspect and verify the actual field conditions and any necessary as-built dimensions affecting the satisfactory completion of the work required for this project.

SCOPE OF BRIDGE WORK & SEQUENCE OF OPERATIONS

All work on this structure shall be accomplished with the traffic control shown in the plans. Alternate sequence of operations may be submitted by the Contractor for approval by the Engineer two weeks prior to the pre-construction meeting.

1. Perform bridge deck grinding for the first phase of construction.
2. Repair the bridge deck by removing all loose and delaminated concrete from the bridge deck surface for the first phase of construction.
3. Clean the bridge deck surface with abrasive blasting for the first phase of construction.
4. Place the Two Coat r Bridge Deck Polymer Chip Seal for the first phase of construction.
5. Switch traffic and repeat steps 1 through 4 for the second phase of construction.

BRIDGE DECK GRINDING

The Contractor will have the option of grinding the entire deck surface during phase one. Any additional costs incurred for grinding the entire deck surface such as additional traffic control or cleaning shall be at no additional cost to the Department.

CONCRETE PATCHING MATERIAL

In lieu of the 48 hour wet cure, the contractor may use a wax based curing compound after 4 hours of wet cure. The wax based curing compound shall be white pigmented and shall be applied to the patch until the entire surface is white. After the 48 hour cure period, the curing compound shall be completely sand blasted off and the surface of the patch shall be allowed to air dry for a minimum of 48 hours before application of the polymer chip seal.

ESTIMATE OF STRUCTURE QUANTITIES AND NOTES
FOR
251' - 9 3/8" PRESTRESSED GIRDER BRIDGE

STR. NO. 52-470-276
APRIL 2018

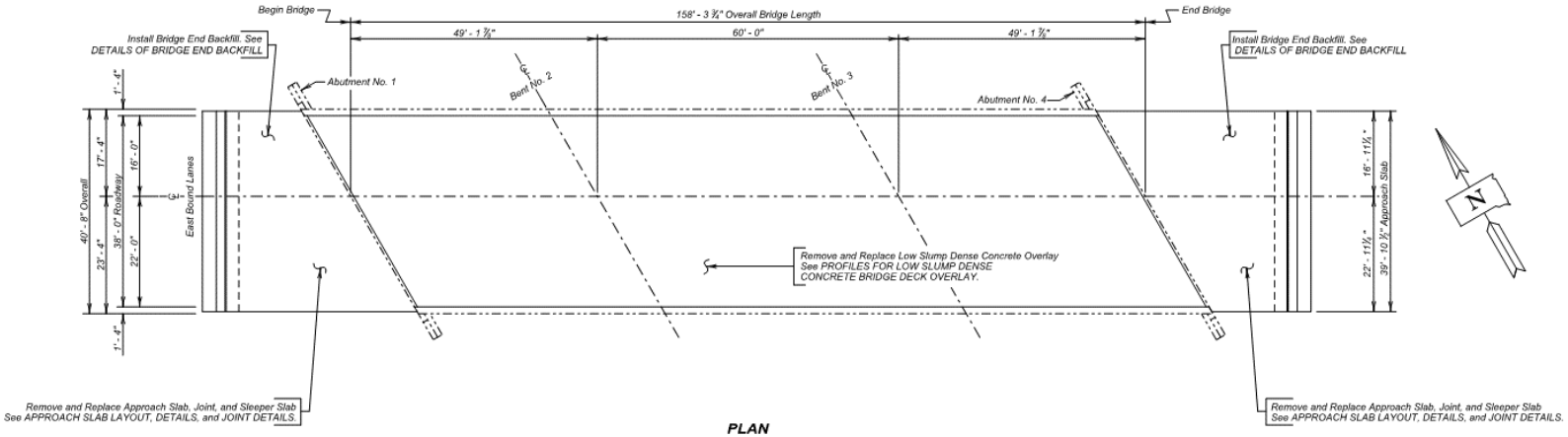
2 OF 4

DESIGNED BY	CK. DES. BY	DRAFTED BY	
TJM PENN04DL	JKI 04DLMC02	TJM	BRIDGE ENGINEER

F.3.2. Low Slump Dense Concrete Overlay

F.3.2.1. Layout for Upgrading

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	IM 0904(62)210	E57	E101



PLAN

INDEX OF BRIDGE SHEETS -

Sheet No. 1 - Layout for Upgrading
Sheet No. 2 - Estimate of Structure Quantities and Notes
Sheet No. 3 - Notes (Continued)
Sheet No. 4 - Notes (Continued)
Sheet No. 5 - Deck Delamination Details
Sheet No. 6 - Profiles for Low Slump Dense Concrete Bridge Deck Overlay (A)
Sheet No. 7 - Profiles for Low Slump Dense Concrete Bridge Deck Overlay (B)
Sheet No. 8 - Profiles for Low Slump Dense Concrete Bridge Deck Overlay (C)
Sheet No. 9 - Details of Bridge End Backfill (A)
Sheet No. 10 - Details of Bridge End Backfill (B)
Sheet No. 11 - Approach Slab Layout
Sheet No. 12 - Approach Slab Details (A)
Sheet No. 13 - Approach Slab Details (B)
Sheet No. 14 - Approach Slab Details (C)
Sheet No. 15 - Approach Slab Joint Details
Sheet No. 16 - As Built Survey (A)
Sheet No. 17 - As Built Survey (B)
Sheet No. 18 - As Built Survey (C)
Sheet No. 19 - Standard Plate 430.50
Sheet No. 20 thru 23 - Original Construction Plans

(EAST BOUND LANES)
LAYOUT FOR UPGRADING
FOR
158' - 3 ¾" CONT. COMP. GIRDER BRIDGE

38' - 0" ROADWAY — 30° SKEW R.H.F.
OVER COUNTY ROAD — SEC. 14/15-T105N-R78W
STR. NO. 43-100-202 — IM 0904(62)210
PCN 067N

LYMAN COUNTY
S. D. DEPT. OF TRANSPORTATION
NOVEMBER 2018

1 OF 23

PLANS BY :
OFFICE OF BRIDGE DESIGN, SOUTH DAKOTA DEPARTMENT OF TRANSPORTATION

DESIGNED BY	CK. DES. BY	DRAFTED BY	
TJM	JKI	TJM	Steve A Johnson
LYMN067N	067NMF01		BRIDGE ENGINEER

F.3.2.2. Estimate of Structure Quantities and Notes

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	IM 0904(62)210	E58	E101

ESTIMATE OF STRUCTURE QUANTITIES

ITEM NO.	DESCRIPTION	QUANTITY	UNIT
009E3310	Bridge Elevation Survey	Lump Sum	LS
110E0010	Remove Concrete Bridge Approach Slab	304.1	SqYd
120E0010	Unclassified Excavation	222	CuYd
410E2600	Membrane Sealant Expansion Joint	79.8	Ft
430E0200	Bridge End Embankment	148	CuYd
430E0300	Granular Bridge End Backfill	93.1	CuYd
430E0510	Approach Slab Underdrain Excavation	8.6	CuYd
430E0700	Precast Concrete Headwall for Drain	4	Each
460E0150	Concrete Approach Slab for Bridge	239.8	SqYd
460E0160	Concrete Approach Sleeper Slab for Bridge	64.8	SqYd
480E0504	No. 4 Rebar Splice	36	Each
480E0505	No. 5 Rebar Splice	48	Each
480E0506	No. 6 Rebar Splice	58	Each
550E0010	Low Slump Dense Concrete Bridge Deck Overlay	56	CuYd
550E0100	Concrete Removal Type 1A	663.6	SqYd
550E0105	Concrete Removal Type 2A	165.9	SqYd
550E0110	Concrete Removal Type 1B	124.2	SqYd
550E0120	Concrete Removal Type 1C	62.2	SqYd
550E0130	Concrete Removal Type 1D	62.2	SqYd
550E0140	Concrete Removal Type B	20.0	Ft
550E0200	Class A45 Concrete Fill	11.6	CuYd
550E0500	Finishing and Curing	663.6	SqYd
680E0040	4" Underdrain Pipe	326	Ft
680E2500	Porous Backfill	28.2	Ton

SPECIFICATIONS

1. Design Specifications: AASHTO Standard Specifications for Highway Bridges 17th Edition using Working Stress Design.
2. Construction Specifications: South Dakota Standard Specifications for Roads and Bridges, 2015 Edition and Required Provisions, Supplemental Specifications, and Special Provisions as included in the Proposal.

DETAILS AND DIMENSIONS OF EXISTING BRIDGE

All details and dimensions of the existing bridge, contained in these plans, are based on the original construction plans and shop plans. It is the Contractor's responsibility to inspect and verify the actual field conditions and any necessary as-built dimensions affecting the satisfactory completion of the work required for this project.

SCOPE OF BRIDGE WORK & SEQUENCE OF OPERATIONS

All work on this structure shall be accomplished with the traffic control shown elsewhere in the plans. Alternate sequence of operations may be submitted by the contractor for approval by the engineer a minimum of two weeks prior to the preconstruction meeting.

1. Accomplish all Concrete Removal Type 1A, 1B, 1C, 1D, 2A, and B and place Class A45 Concrete Fill to the satisfaction of the Engineer for the first phase of construction.
2. Place a Low Slump Dense Concrete Bridge Deck Overlay to the elevations shown in the plans on the bridge deck for the first phase of construction.
3. Remove the existing approach and sleeper slabs for the first phase of construction.
4. Excavate required area for placement of bridge end backfill for the first phase of construction.
5. Place bridge end backfill as shown for the first phase of construction.
6. Replace approach slabs and sleeper slabs to the correct grade for the first phase of construction.
7. Replace sleeper slab joints with approved Membrane Sealant Expansion Joint for the first phase of construction.
8. Switch traffic and repeat steps 1 through 7 for the second phase of construction.

GENERAL CONSTRUCTION - BRIDGE

1. All mild reinforcing steel shall conform to ASTM A615, Grade 60.
2. All exposed concrete corners and edges shall be chamfered 3/4" unless noted otherwise in the plans. Match existing chamfer if the existing chamfer differs.
3. Use 2" clear cover on all reinforcing steel except as shown otherwise.
4. Request for construction joints or reinforcing steel splices at points other than those shown, must be submitted to the Engineer for prior approval. If additional splices are approved, no payment will be allowed for the added quantity of reinforcing steel.
5. Surfaces of fresh concrete at construction joints shall be rough floated sufficiently to consolidate the surface. All construction joints shall be cleaned of surface laitance, curing compounds and other foreign materials prior to placing fresh concrete against the joint.
6. The type of vibratory screed shall be approved by the Engineer.

DESIGN MIX OF CONCRETE

1. Class A45 Concrete shall be used for the contract items Concrete Approach Slab for Bridge and Concrete Approach Sleeper Slab for Bridge.
2. The type of cement, concrete strength requirements, aggregate requirements, slump and air requirements for the contract items Concrete Approach Sleeper Slab for Bridge and Concrete Approach Slab for Bridge shall conform to the requirements of Section 460 of the Construction Specifications.

REMOVAL OF CONCRETE BRIDGE APPROACH SLAB

1. The existing concrete approach and sleeper slabs adjacent to the structure shall be completely removed by the Contractor.
2. The crushed concrete and reinforcing steel from the removal shall be disposed of by the Contractor at an approved site. An appropriate site will be as described in the Environmental Commitment notes in this set of plans.
3. The quantity provided for Remove Concrete Bridge Approach Slab is computed using the plan area for the sleeper slab and the plan area for the approach slab determined separately.
4. All labor, tools, equipment, and any incidentals necessary for removal and disposal of the existing approach slabs, sleeper slabs, and polymer modified growth joint shall be incidental to the contract unit price per square yard for Remove Concrete Bridge Approach Slab.

APPROACH SLABS

1. Bridge end backfill shall be constructed in accordance with Section 430 of the Construction Specifications.
2. Excavation required for the placement of Granular Bridge End Backfill, Porous Backfill, Bridge End Embankment, and Non-Pervious Backfill and removal of existing backfill drain pipe shall be per the contract unit price per cubic yard of Unclassified Excavation as shown on the plan sheets. Measurement will not be made for Unclassified Excavation. Plans quantity shall be used for payment. No excavation quantity shall be included with Remove Concrete Bridge Approach Slab.
3. Excavation for placement of the underdrain system running under the sleeper slab shall be per Approach Slab Underdrain Excavation and shall be in in accordance with Section 435 of the Construction Specifications.
4. The top of approach slab elevations shall be established during construction and shall be subject to the approval of the Engineer. Care shall be taken to provide a smooth transition from the bridge deck elevations to the new pavement elevations established in the field so as to prevent any dips or bumps in the areas of the bridge ends or ends of the new approach slabs. The maximum rate of grade transition through the approach slab shall be 1/8 inch per 10 feet.

ESTIMATE OF STRUCTURE QUANTITIES AND NOTES
FOR
158' - 3 ¾" CONT. COMP. GIRDER BRIDGE

STR. NO. 43-100-202
NOVEMBER 2018

2 OF 23

DESIGNED BY	CK. DES. BY	DRAFTED BY	
TJM	JKI	TJM	Steve A Johnson BRIDGE ENGINEER
LYMN067N	067NMF02		

F.3.2.3. Notes (Continued)

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	IM 0904(62)210	E59	E101

APPROACH SLABS (CONTINUED)

5. Sleeper slab riser shall be cast with or later than the Approach Slab. Care shall be taken to ensure the correct grade is maintained across the joint.

6. The use of a vibratory screed will be required during placement of Class A45 Concrete for the approach slabs. Concrete placement in front of the screed shall be kept parallel to the screed.

7. The concrete in the approach slab shall be tined perpendicular or parallel to the centerline of the roadway.

8. The new approach slabs and sleeper slabs shall have a surface finish as specified in Section 460.3 L.4 of the Construction Specifications.

9. The concrete approach slabs shall be cured in accordance with Section 460.3 M of the Construction Specifications. The minimum 7-day cure time requirement shall be waived. The approach slabs shall be cured until a minimum compressive strength of 4,000 psi is reached.

10. Concrete Approach Sleeper Slab for Bridge will be paid for at the contract unit price per square yard. This payment shall be full compensation for furnishing, hauling, and placing all materials including: concrete, concrete anchors, and reinforcing steel; for disposal of all surplus materials; and for labor, tools, equipment, and any incidentals necessary to complete this item of work.

11. Concrete Approach Slab for Bridge will be paid for at the contract unit price per square yard. This payment shall be full compensation for furnishing, hauling and placing all materials including: Gravel Cushion, concrete, elastic joint sealer and reinforcing steel; for disposal of all surplus materials and for labor, tools, equipment, and any incidentals necessary to complete this item of work.

12. Non-pervious backfill material shall be incidental to the contract unit price per cubic yard for Bridge End Embankment. This payment shall be full compensation for furnishing, hauling, and placing all materials; labor; tools; equipment; and any incidentals necessary to complete this item of work.

LOW SLUMP DENSE CONCRETE BRIDGE DECK OVERLAY

1. The preparation for resurfacing consists of Concrete Removal Type 1A and 2A on the entire bridge deck and Type 1B, Type 1C, Type 1D, and Type B on the deck surface as detailed on the plan sheets. Such removal shall be in conformance with these plans and Section 550 of the Construction Specifications.

2. Concrete Removal Type 1A shall consist of removing the existing concrete overlay to a depth of 2.25 inches. There are some specific areas, identified on the Deck Profile plan sheets that require removal in excess of 2.25 inches.

3. Extreme care shall be taken during Removal Types 1B, 1C, 1D, and B to ensure that the existing reinforcing steel is not damaged. In the event reinforcing steel damage inadvertently occurs, the Bridge Construction Engineer shall be immediately notified. Any damaged reinforcing steel shall be repaired by the Contractor, as approved by the Engineer, at no additional cost to the Department.

4. Removal Types 2A, 1B, 1C, 1D, and B and Class A45 Concrete Fill may not be encountered and may be omitted from the project as determined by the Engineer.

5. Concrete Removal Type 1C, Concrete Removal Type 1D, and Class A45 Concrete Fill are not anticipated to exceed the plan shown quantities. If the Engineer determines that Concrete Removal Type 1C, Concrete Removal Type 1D, and/or Class A45 Concrete Fill in excess of the plan quantity shown is necessary, payment for the additional quantity shall conform with Section 550.5 of the Construction Specifications.

6. The coarse aggregate in the existing bridge deck is a natural aggregate. The coarse aggregate in the low slump bridge deck overlay shall be limestone in accordance with Section 820 of the Construction Specifications. No other type of course aggregate will be allowed.

7. Concrete used in the Low Slump Dense Concrete Bridge Deck Overlay shall meet the requirements of Section 550 of the Construction Specifications. Class A45 Concrete Fill shall meet the requirements of Section 460 of the Construction Specifications. In addition, both the Low Slump Dense Concrete Bridge Deck Overlay and Class A45 Concrete Fill shall conform to the following Alkali Silica Reactivity (ASR) requirements:

   a. Fine aggregates from sources that have not been tested by the Department shall be submitted to the Department's Materials and Surfacing Central Materials Laboratory for ASR testing 30 days prior to performing the concrete mix design.

   b. When a fine aggregate supplier changes location within the pit, the fine aggregate from the new location in the pit shall be submitted for testing.

   c. When more than one source of fine aggregate is blended to meet the gradation specifications, the expansion value of the blended sands will be used. Blended sources will be treated as a new source and it shall be the responsibility of the Contractor to submit the blended samples for testing 30 days prior to performing the concrete mix design.

   d. ASR testing shall be performed in accordance with ASTM C1260, except that the gradation of the material used for testing shall be as produced from the source. The fine aggregate shall only be sampled at the source by a Department Representative or in the presence of a Department Representative.

   e. The Department will use the running average of the last three known expansion test results or less for determining acceptability of the source. Additional testing, when requested by the Contractor, will be performed by the Department at the Contractor's expense.

   f. A list of known fine aggregate sources and the average corresponding 14-day expansion values as of August 2018 is provided in Table 1.

Table 1 Fine Aggregate Sources August 2018

Source	Location	Expansion Value
Bachman	Winner, SD	0.335*
Bitterman	Delmont, SD	0.316*
Concrete Materials	Corson, SD	0.146
Concrete Materials - Vallek Pit	Yankton, SD	0.410**
Croell	Hot Springs, SD	0.089
Croell	Wasta, SD	0.212
Emme Sand & Gravel	Oneil, NE	0.217
Fisher S&G - Mickelson Pit	E of Nisland, SD	0.129
Fisher S&G - Vallery Pit	Nisland, SD	0.110
Fisher S&G	Rapid City, SD	0.092
Fisher S&G	Spearfish, SD	0.053
Fisher S&G	Wasta, SD	0.159
Fuchs	Pickstown, SD	0.275*
Higman	Hudson, SD	0.187
Jensen	Herried, SD	0.276*
L.G. Everist	Akron, IA	0.257*
L.G. Everist	Brookings, SD	0.326*
L.G. Everist	Hawarden, IA	0.166
L.G. Everist	Summit, SD	0.179
Morris	Blunt, SD	0.192
Morris - Richards Pit	Onida, SD	0.188
Morris - Shawn's Pit	E of Sturgis, SD	0.186
Myrl & Roys - Ode Pit	E Sioux Falls, SD	0.214
Myrl & Roys - Nelson Pit	NE Sioux Falls, SD	0.156
Northern Concrete Agg.	Rauville, SD	0.113
Northern Concrete Agg.	Luverne, MN	0.133

Table 1 is continued on the next page.

NOTES (CONTINUED)
FOR
158' - 3 ¾" CONT. COMP. GIRDER BRIDGE

STR. NO. 43-100-202
NOVEMBER 2018

DESIGNED BY	CK. DES. BY	DRAFTED BY	
TJM	JKI	TJM	Steve A Johnson BRIDGE ENGINEER
LYMN067N	067NMF03		

F.3.2.4. Notes (Continued)

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	IM 0904(62)210	E60	E101

LOW SLUMP DENSE CONCRETE BRIDGE DECK OVERLAY (CONTINUED)

Table 1 (Continued)

Source	Location	Expansion Value
Opperman - Gunvordahl Pit	Burke, SD	0.363*
Opperman - Cahoy Pit	Herrick, SD	0.307*
Opperman - Jones Pit	Burke, SD	0.321*
Opperman - Randall Pit	Pickstown, SD	0.239
Pete Lien & Sons	Creston, SD	0.158
Pete Lien & Sons	Oral, SD	0.129
Pete Lien & Sons	Wasta, SD	0.226
Simon Materials - Beltline Pit	Scottsbluff, NE	0.299*
Thorpe Pit	Britton, SD	0.098
Wagner Building Supplies	Pickstown (Wagner), SD	0.251*
Winter Brothers-Whitehead Pit	Brookings, SD	0.197

*These sources are 0.250 or greater.
**These sources are greater than 0.400.

g. The values in Table 1 are intended for use in bidding. If a pit, previously tested by SDDOT, with a test value less than 0.250 is discovered after letting to be 0.250 or greater, then the Department will accept financial responsibility if higher costs are incurred due to a higher required percentage of fly ash and/or a higher amount of Lithium Nitrate is added to the concrete mix.

h. Based on course aggregate composition and expansion test results, the Contractor shall use Table 2 to determine the percentage of cement to be replaced with Class F Modified Fly Ash (in accordance with Section 605 of the Construction Specifications) and/or the specified rate of Lithium Nitrate (30% solution by weight) to be provided in the concrete mix for the Low Slump Dense Concrete Bridge Deck Overlay and Class A45 Concrete Fill. Fine aggregate with a 14-day expansion value of 0.400 or greater shall not be used.

Table 2 Cement Replacement

Course Aggregate	Fine Aggregate	Cement Type	Fly Ash	Lithium Nitrate
Limestone or Granite	< 0.250%	Type I or II	-----	2.0 gallon/cubic yard
		Type I or II	20% Min.	-----
Limestone or Granite	≥ 0.250%	Type I or II	-----	3.0 gallon/cubic yard
		Type I or II	25%	-----
Quartzite	< 0.250%	Type I or II	-----	3.0 gallon/cubic yard
		Type I or II	25%	-----
Quartzite	≥ 0.250%	Type I or II	-----	3.5 gallon/cubic yard
		Type I or II	25%	1.5 gallon/cubic yard
		Type I or II	30%	-----

i. Grout for bonding new concrete to old concrete shall meet the requirements of Section 550 of the Construction Specifications. In addition, the grout mix shall contain 1 1/2 gallons of Lithium Nitrate per cubic yard or 20% to 25% of the cement replaced with fly ash.

j. All material, labor, equipment, and incidental costs to meet ASR requirements shall be included in the contract unit price for Low Slump Dense Concrete Bridge Deck Overlay or Class A45 Concrete Fill.

8. Suppliers of Lithium Nitrate are listed below:

a. BASF Construction Chemical
23700 Chagrin Boulevard
Beachwood, Ohio 44122
1-612-961-8575
website: www.master-builders-solutions.basf.us/en-us

b. FMC Corporation
2801 Yorkmont Road, Suite 300
Charlotte, North Carolina 28208
1-704-868-5300
website: www.fmclithium.com

9. No traffic will be allowed to operate on the scarified portion of the bridge deck. If it appears that the entire Low Slump Dense Concrete Bridge Deck Overlay cannot be completed prior to winter, the Removal Type 1A, 1B, 1C, 1D, and B shall not be done until work resumes in the spring. In the event, scarification has been started and due to unforeseen circumstances, it becomes impossible to complete the placement of the overlay on the entire surface of the structure prior to winter the Office of Bridge Design shall be notified. Recommendations for handling winter traffic will then be made. These recommendations may include, but are not limited to, filling extra depth removal areas with Class A45 Concrete, placing an asphalt overlay on the uncompleted area so that the entire roadway width may be opened to traffic, removal of the asphalt overlay when work is resumed and scarifying an additional 1/4" of depth on the bridge deck. The cost of this work, including asphalt overlay, scarification, Class A45 Concrete, extra low slump dense concrete and all other items incidental to this work, shall be at the expense of the Contractor.

10. It will be necessary for the Contractor to shape the surface of the Low Slump Dense Concrete Bridge Deck Overlay within one foot of the curb as detailed in the plans to ensure that water drains off the ends of the bridge.

AS - BUILT ELEVATION SURVEY

The Contractor shall be responsible for recording the as-built deck elevations at the locations shown by the table of as-built elevations shown in the plans. The elevations to be recorded in these tables shall be based on the National Geodetic Survey (NGS) North American Vertical Datum of 1988 (NAVD88). The Engineer shall provide the Contractor with a description, elevation and location of the nearest benchmark that has a NAVD88 established elevation for the Contractor's use. The benchmark shown in the plans has not been tied to the NAVD88. The Contractor shall be responsible for establishing a NAVD88 elevation for the benchmark provided in the plans. All costs associated with obtaining the NAVD88 elevations at the locations shown in the table and for the benchmark shown in the plans, including all equipment, labor and any incidentals required shall be incidental to the contract lump sum price for Bridge Elevation Survey.

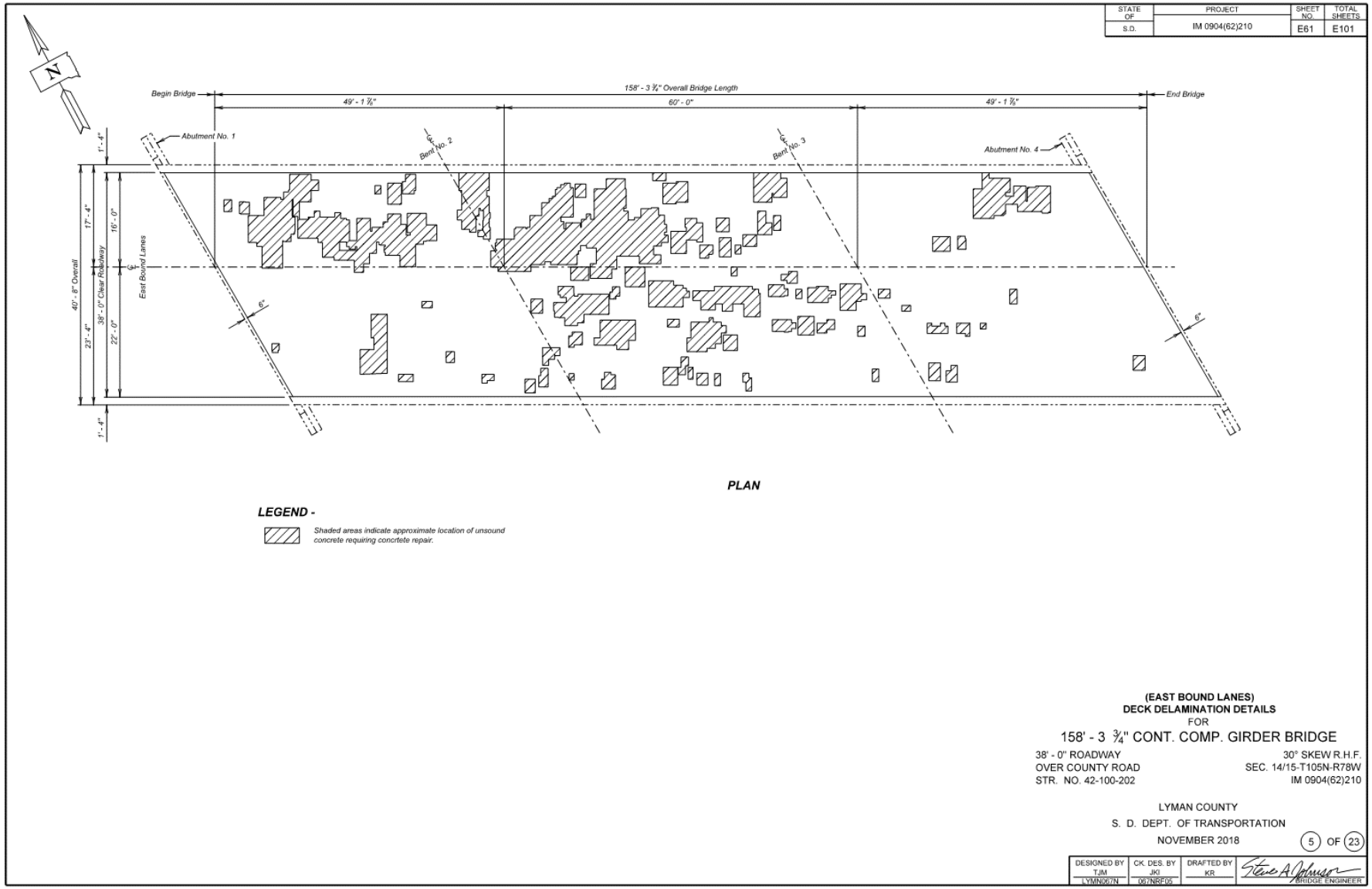
NOTES (CONTINUED)
FOR
158' - 3 ¾" CONT. COMP. GIRDER BRIDGE

STR. NO. 43-100-202
NOVEMBER 2018

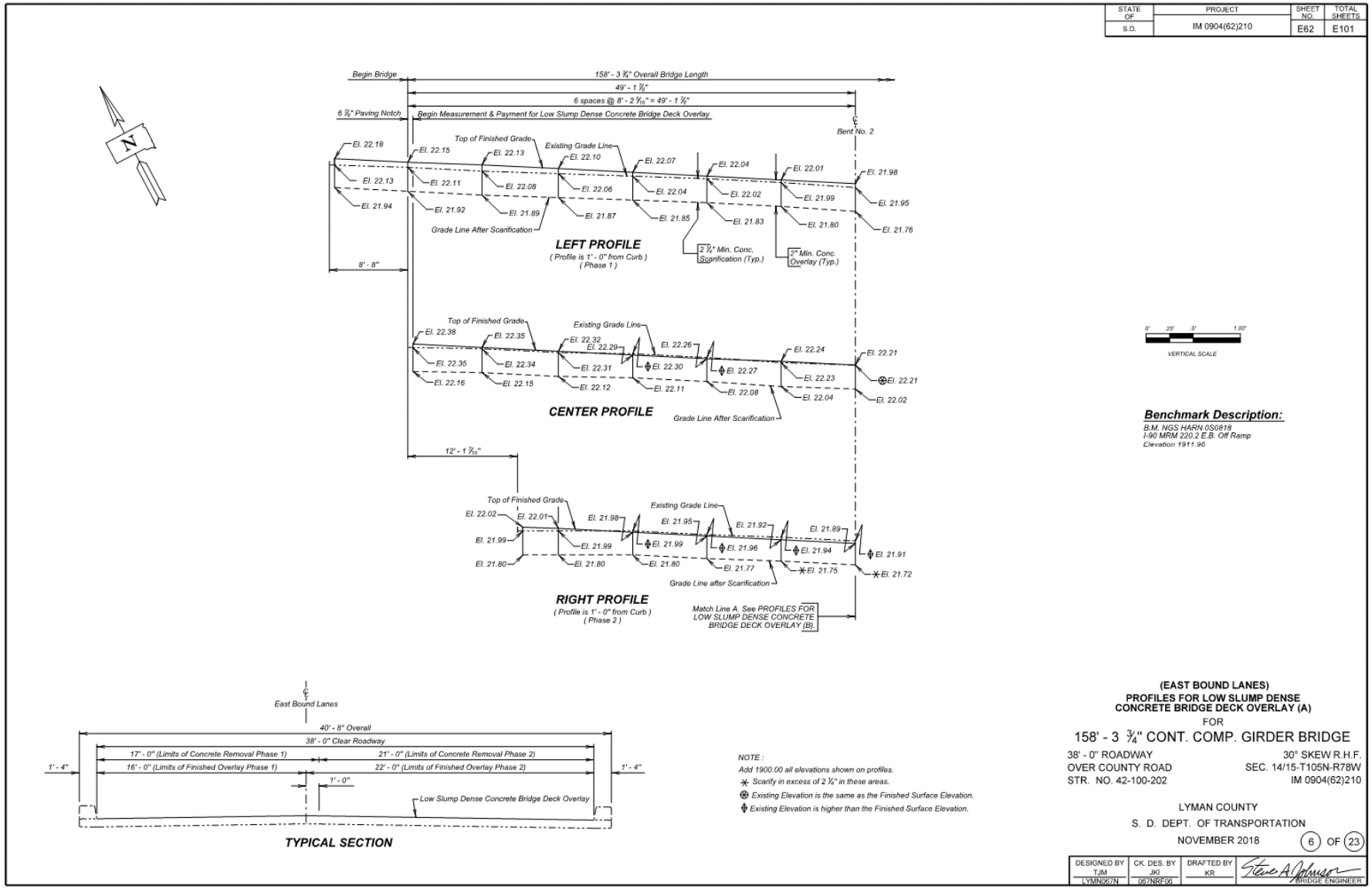
4 OF 23

DESIGNED BY	CK. DES. BY	DRAFTED BY	
TJM	JKI	TJM	Steve A Johnson BRIDGE ENGINEER
LYMN067N	067NMF04		

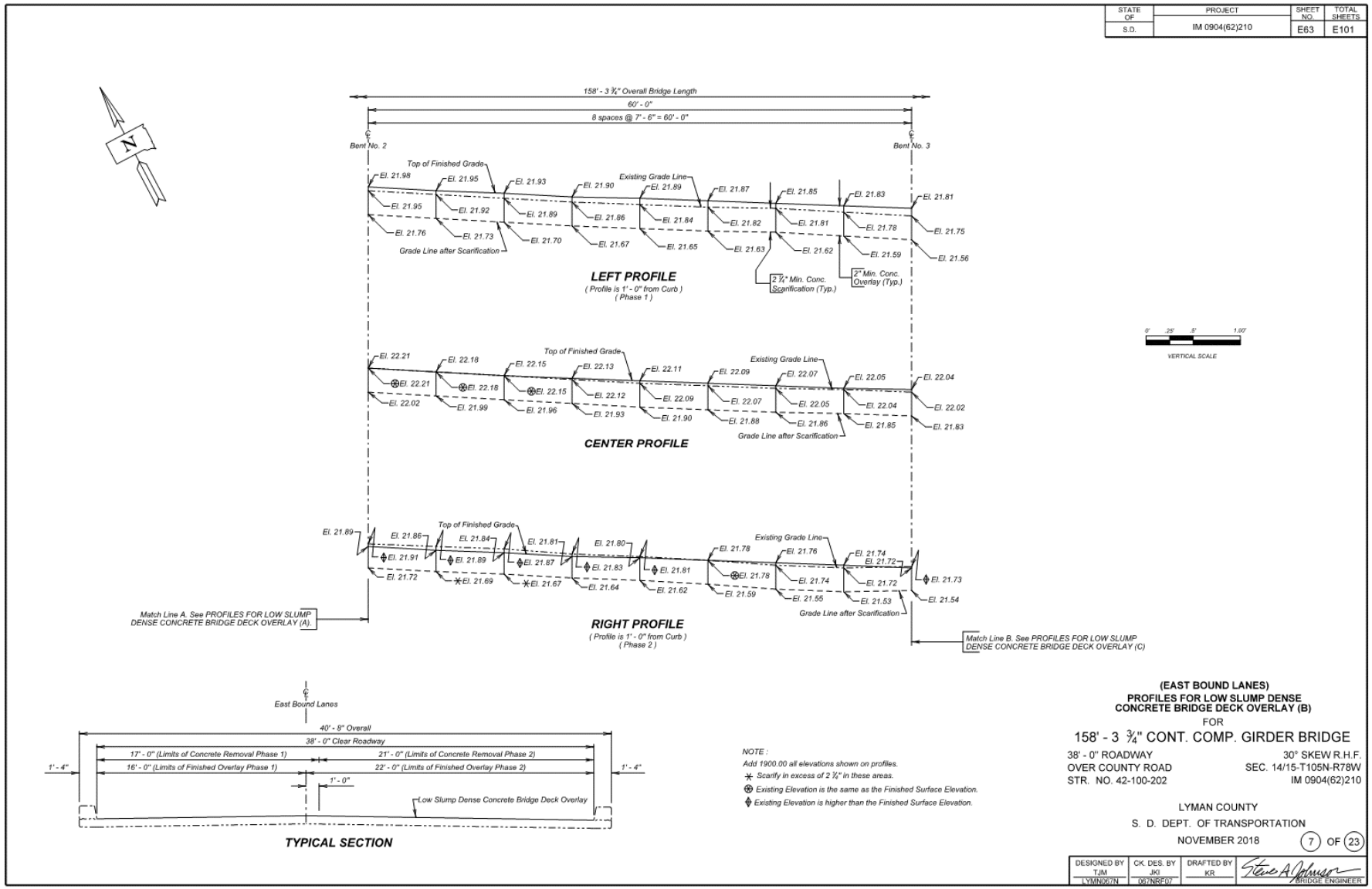
F.3.2.5. Deck Delamination Details



F.3.2.6. Profiles for Low Slump Dense Concrete Bridge Deck Overlay (A)

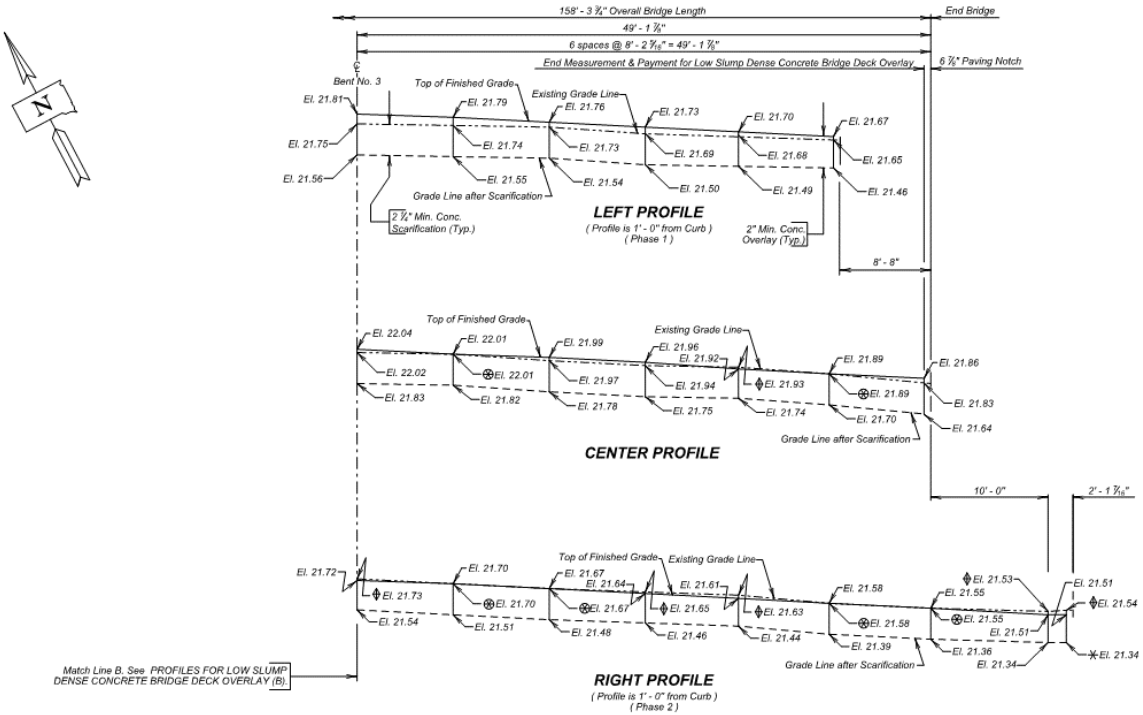


F.3.2.7. Profiles for Low Slump Dense Concrete Bridge Deck Overlay (B)



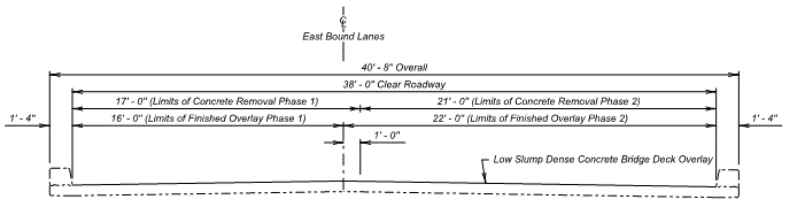
F.3.2.8. Profiles for Low Slump Dense Concrete Bridge Deck Overlay (C)

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	IM 0904(62)210	E64	E101



ESTIMATED QUANTITIES

ITEM	UNIT	QUANTITY Phase I	QUANTITY Phase 2
Low Slump Dense Concrete Bridge Deck Overlay	CuYd	25	31
Concrete Removal Type 1A	SqYd	296.9	366.7
Concrete Removal Type 2A	SqYd	74.2	91.7
Concrete Removal Type 1B	SqYd	52.3	71.9
Concrete Removal Type 1C	SqYd	26.2	36.0
Concrete Removal Type 1D	SqYd	26.2	36.0
Concrete Removal Type B	Ft	10.0	10.0
Class A45 Concrete Fill	CuYd	4.9	6.7
Finishing and Curing	SqYd	279.4	384.2



TYPICAL SECTION

NOTE :
Add 1900.00 all elevations shown on profiles.
✳ Scarify in excess of 2 ¾" in these areas.
⊗ Existing Elevation is the same as the Finished Surface Elevation.
⊕ Existing Elevation is higher than the Finished Surface Elevation.

(EAST BOUND LANES)
PROFILES FOR LOW SLUMP DENSE CONCRETE BRIDGE DECK OVERLAY (C)
FOR
158' - 3 ¾" CONT. COMP. GIRDER BRIDGE

38' - 0" ROADWAY — 30° SKEW R.H.F.
OVER COUNTY ROAD — SEC. 14/15-T105N-R78W
STR. NO. 42-100-202 — IM 0904(62)210

LYMAN COUNTY
S. D. DEPT. OF TRANSPORTATION
NOVEMBER 2018

8 OF 23

DESIGNED BY	CK. DES. BY	DRAFTED BY	
TJM	JKI	KR	Steve A Johnson
LYMN067N	067NRF08		BRIDGE ENGINEER

F.3.2.9. As Built Survey (A)

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	IM 0904(62)210	E72	E101

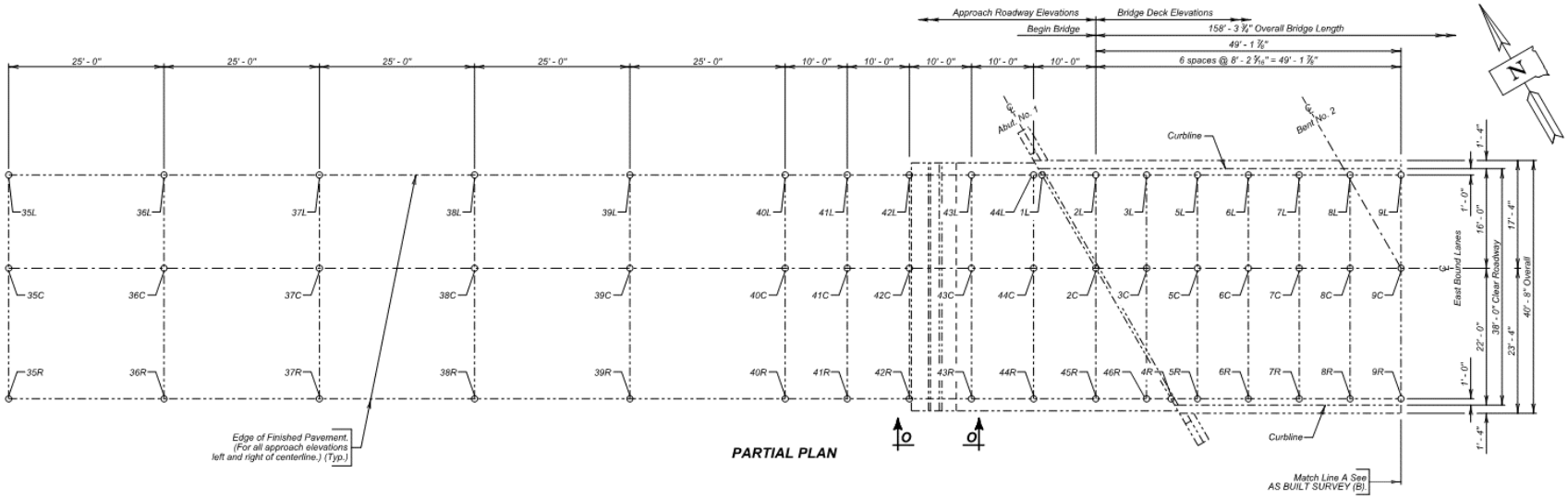


Table of Elevations - Approach Roadway

Location	Elevation	Location	Elevation	Location	Elevation
35L		35C		35R	
36L		36C		36R	
37L		37C		37R	
38L		38C		38R	
39L		39C		39R	
40L		40C		40R	
41L		41C		41R	
42L		42C		42R	
43L		43C		43R	
44L		44C		44R	
				45R	
				46R	

Table of Elevations - Bridge Deck Elevations

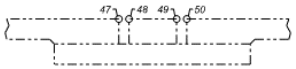
Location	Elevation	Location	Elevation	Location	Elevation
1L					
2L		2C			
3L		3C			
				4R	
5L		5C		5R	
6L		6C		6R	
7L		7C		7R	
8L		8C		8R	
9L		9C		9R	

Benchmark Description	
Benchmark Elevation	

NOTE:
The Elevations of the overlay shall be based on the National Geodetic Survey North American Vertical Datum of 1988 and shall be taken and recorded at the locations shown by the table on this sheet.

Table of Elevations - Approach Slab Joints (See SECTION O - O)

Location	Elevation	Location	Elevation	Location	Elevation
47L		47C		47R	
48L		48C		48R	
49L		49C		49R	
50L		50C		50R	



SECTION O - O

AS BUILT SURVEY (A)
FOR
158' - 3 ¾" CONT. COMP. GIRDER BRIDGE

38' - 0" ROADWAY
OVER COUNTY ROAD
STR. NO. 43-100-202

30° SKEW R.H.F.
SEC. 14/15-T105N-R78W
IM 0904(62)210

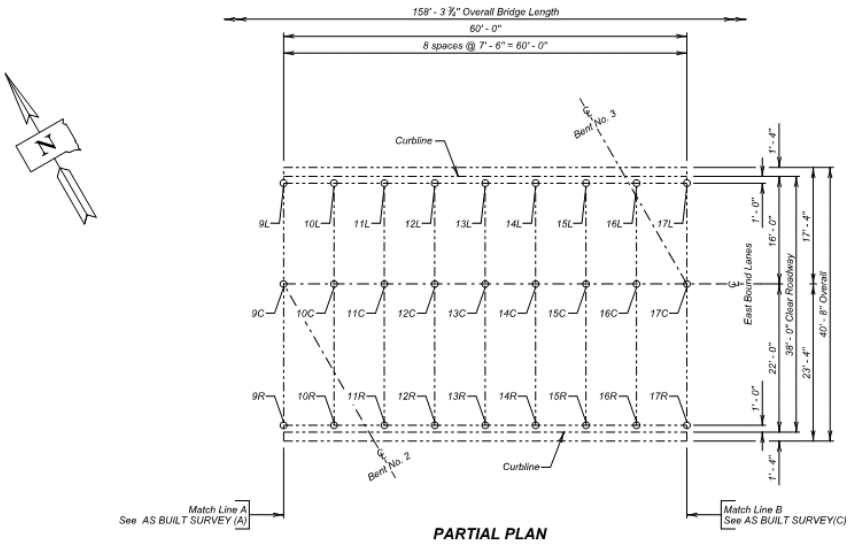
LYMAN COUNTY
S. D. DEPT. OF TRANSPORTATION
NOVEMBER 2018

16 OF 23

DESIGNED BY	CK. DES. BY	DRAFTED BY	
TJM LYMN067N	JKI 067NRF16	KR	Steve A Johnson BRIDGE ENGINEER

F.3.2.10. As Built Survey (B)

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	IM 0904(62)210	E73	E101



PARTIAL PLAN

Table of Elevations - Bridge Deck Elevations					
Location	*Elevation*	*Location*	*Elevation*	*Location*	*Elevation*
9L		*9C*		*9R*	
10L		*10C*		*10R*	
11L		*11C*		*11R*	
12L		*12C*		*12R*	
13L		*13C*		*13R*	
14L		*14C*		*14R*	
15L		*15C*		*15R*	
16L		*16C*		*16R*	
17L		*17C*		*17R*	

NOTE:

The Elevations of the overlay shall be based on the National Geodetic Survey North American Vertical Datum of 1988 and shall be taken and recorded at the locations shown by the table on this sheet.

Benchmark Description	
Benchmark Elevation	

AS BUILT SURVEY (B)

FOR

158' - 3 ¾" CONT. COMP. GIRDER BRIDGE

38' - 0" ROADWAY — 30° SKEW R.H.F.
OVER COUNTY ROAD — SEC. 14/15-T105N-R78W
STR. NO. 43-100-202 — IM 0904(62)210

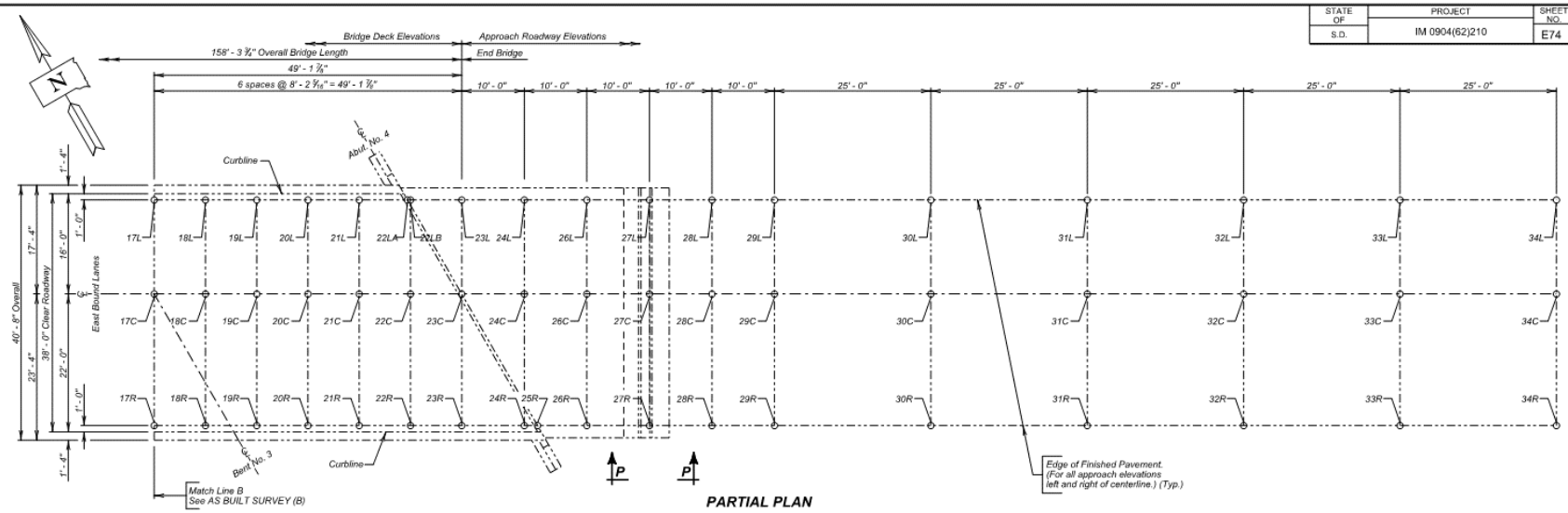
LYMAN COUNTY
S. D. DEPT. OF TRANSPORTATION
NOVEMBER 2018

17 OF 23

DESIGNED BY	CK. DES. BY	DRAFTED BY	
TJM LYMN067N	JKI 067NRF17	KR	BRIDGE ENGINEER

F.3.2.11. As Built Survey (C)

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	IM 0904(62)210	E74	E101



PARTIAL PLAN

NOTE:
The Elevations of the overlay shall be based on the National Geodetic Survey North American Vertical Datum of 1988 and shall be taken and recorded at the locations shown by the table on this sheet.

Benchmark Description	
Benchmark Elevation	

Table of Elevations - Bridge Deck Elevations

Location	Elevation	Location	Elevation	Location	Elevation
17L		17C		17R	
18L		18C		18R	
19L		19C		19R	
20L		20C		20R	
21L		21C		21R	
✳ 22LA		22C		22R	
✳ 22LB		23C		23R	
				24R	
				25R	

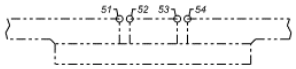
✳ Point 22LA is located at the end of the bridge. Point 22LB follows the spacing pattern at the centerline of lanes. These locations are approximatly 5½" apart.

Table of Elevations - Approach Roadway

Location	Elevation	Location	Elevation	Location	Elevation
23L					
24L		24C			
26L		26C		26R	
27L		27C		27R	
28L		28C		28R	
29L		29C		29R	
30L		30C		30R	
31L		31C		31R	
32L		32C		32R	
33L		33C		33R	
34L		34C		34R	

Table of Elevations - Approach Slab Joints (See SECTION P - P)

Location	Elevation	Location	Elevation	Location	Elevation
51L		51C		51R	
52L		52C		52R	
53L		53C		53R	
54L		54C		54R	



SECTION P - P

AS BUILT SURVEY (C)
FOR
158' - 3 3/4" CONT. COMP. GIRDER BRIDGE

38' - 0" ROADWAY
OVER COUNTY ROAD
STR. NO. 43-100-202

30° SKEW R.H.F.
SEC. 14/15-T105N-R78W
IM 0904(62)210

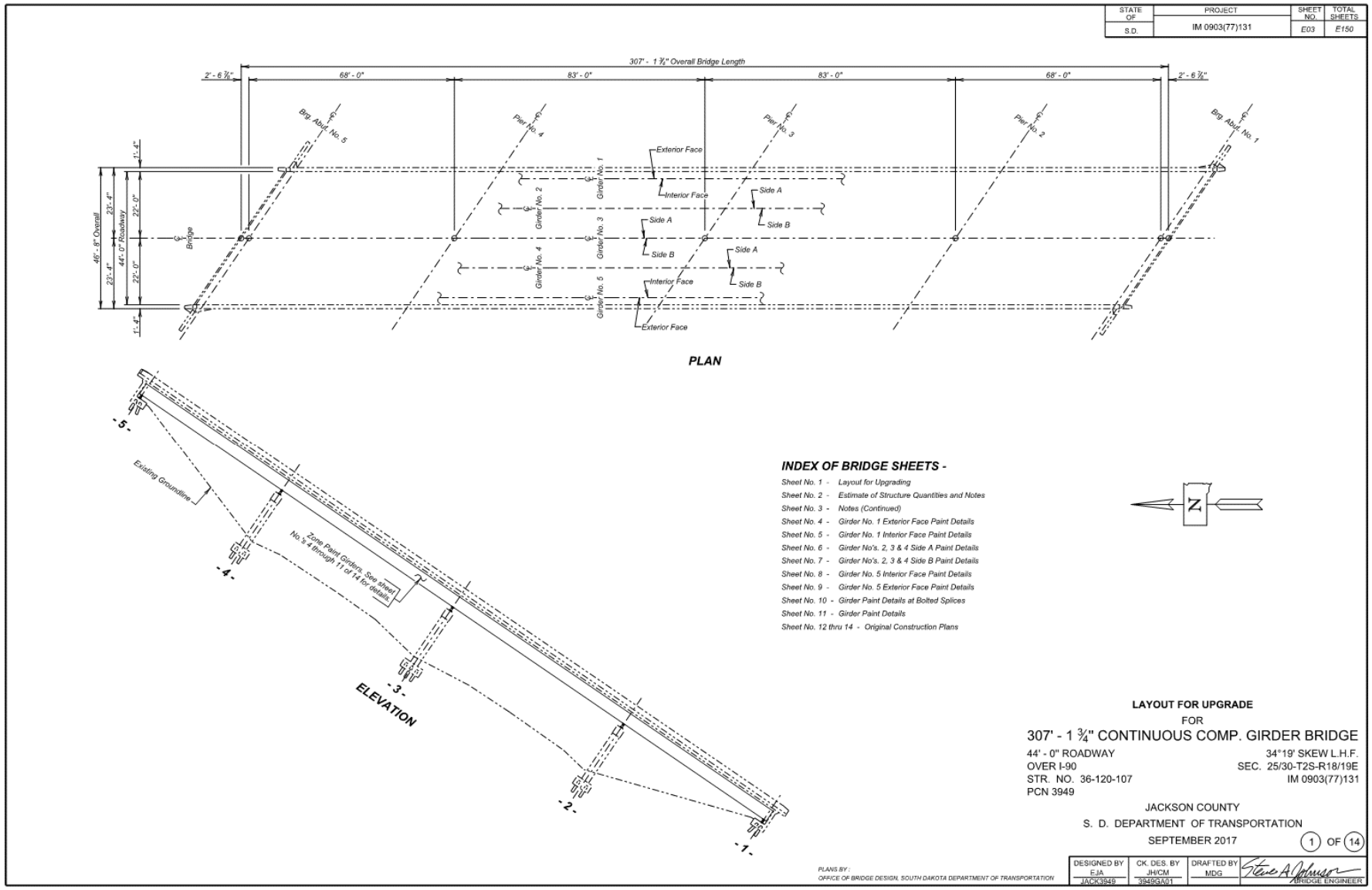
LYMAN COUNTY
S. D. DEPT. OF TRANSPORTATION
NOVEMBER 2018

18 OF 23

DESIGNED BY	CK. DES. BY	DRAFTED BY	
TJM	JKI	KR	Steve A Johnson
LYMN067N	067NRF18		BRIDGE ENGINEER

F.3.3. Zone Painting

F.3.3.1. Layout for Upgrade



F.3.3.2. Estimate of Quantities and Notes

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	IM 0903(77)131	E04	E150

ESTIMATE OF STRUCTURE QUANTITIES

ITEM NO.	DESCRIPTION	QUANTITY	UNIT
412E0120	Bridge Repainting, Class II	Lump Sum	LS
412E0400	Rust Penetrating Sealer	Lump Sum	LS
412E0500	Paint Residue Containment	Lump Sum	LS

SPECIFICATIONS

Construction Specifications: South Dakota Standard Specifications for Roads and Bridges, 2015 Edition and Required Provisions, Supplemental Specifications and Special Provisions as included in the Proposal.

DETAILS AND DIMENSIONS OF EXISTING BRIDGE

All details and dimensions of the existing bridge, contained in these plans, are based on the original construction plans and shop plans and are provided as information only. It is the Contractor's responsibility to inspect and verify the actual field conditions and any necessary as-built dimensions affecting the satisfactory completion of the work required for this project.

NOTICE - LEAD BASED PAINT

Be advised that the paint on the steel surfaces of the existing structure is a paint containing lead. The Contractor should plan his/her operations accordingly, and inform his/her employees of the hazards of lead exposure.

SCOPE OF BRIDGE WORK & SEQUENCE OF OPERATIONS

All work on this structure shall be accomplished with the traffic control shown in the plans.

Clean and paint portions of the existing girders and all of the bearings as shown by these plans.

PAINT RESIDUE REMOVAL AND CONTAINMENT

Paint Residue Removal and Containment shall be performed in accordance with Section 412 of the Construction Specifications, Bridge Repainting Class II.

APPLICATION OF RUST PENETRATING SEALER TO PACK RUST AREAS

1. Pack rust areas within the areas defined for painting in the Bridge Repainting Class II notes shall be treated with a rust penetrating sealer. The rust penetrating sealer shall be applied after the area has been cleaned and prepared for painting as specified in the Bridge Repainting, Class II notes but prior to the application of the final paint system. Pack rust areas are those defined as joints in connecting plates and/or crevice areas (locations noted as apply rust inhibitor on the plan sheets).

2. The rust penetrating sealer supplied shall be one of the following:

   Pre-Prime 167
   Penetrating Sealer
   International
   South Dakota Area Manager: Kevin Perego
   Telephone: 636-207-8897
   Cell: 314-540-8925
   Website: www.international-pc.com

   Wasser MC-PrepBond 2.8
   Wasser Corporation
   4118 B Place NW Suite B
   Auburn, WA 98001
   Telephone: 800-627-2968
   Website: www.wassercoatings.com

   Time-Lock MoPoxY PRE-PREP
   Rust Penetrating Sealer 41-AF-2
   BLP Mobile Paints
   P.O. Box 717
   Theodore, Alabama 36590-0717
   Telephone: 251-443-6110
   Website: www.blpmobilepaint.com

   Rust Bullet Standard Formula
   Rust Bullet, LLC
   300 Brinkby Avenue, Suite 200
   Reno, NV 89509
   Telephone: 800-245-1600
   Website: www.rustbullet.com

   MACROPOXY 5000
   Sherwin Williams Company
   Greg Larson
   Cell: 612-220-6299
   Website: www.sherwin-williams.com

   The rust penetrating sealer shall be applied in accordance with the recommendations of the manufacturer and approved by the Engineer.

3. Prior to application of the rust penetrating sealer, remove all loose pack rust from the joint or crevice areas and remove as much pack rust as practical to a level below the steel members between which the rust is packed.

4. Stripe coat (brush apply) the rust penetrating sealer in the pack rust areas. Do not apply the remainder of the paint system specified in Section 412 of the Construction specifications until the area has cured for the amount of time specified by the manufacturer of the rust penetrating sealer.

5. For informational purposes, 245 square feet of structural steel will require rust penetrating sealer.

6. The cost of furnishing and applying the rust penetrating sealer and all other items incidental to the application of this sealer shall be included in the contract lump sum price for "Rust Penetrating Sealer".

BOLTED SPLICE PLATE SEALANT

1. The sides of all bolted splice plates shall be sealed using a Polyurethane Sealant.

2. The Polyurethane Sealant shall meet the following requirements. The sealant shall be a single component, moisture cure, non-sag, smooth formulation, gun-grade elastomeric sealant. The sealant shall meet the requirements for ASTM C-920, Type S, Grade NS, Class 25, Use-A.

3. Contact surfaces shall be cleaned in accordance with the manufacturer's recommendations. The Contractor shall supply the Engineer with written instructions regarding the manufacturer's recommended surface treatment for the in-place surface condition at least 48 hours before application for review and acceptance.

4. The Polyurethane Sealant shall be applied and tooled as recommended by the manufacturer. Product data sheets and Material safety data sheets shall be supplied to the Engineer at least one week prior to installation. In no case shall the thickness of the material be less than ¼". Feathering of the joint material shall not be allowed. Adjacent surfaces shall be masked to avoid application of the material outside the limits of the final seal. Application surfaces shall be clean and free of material contaminants. Application shall not be allowed on a wet or damp surface.

ESTIMATE OF STRUCTURE QUANTITIES AND NOTES
FOR
307' - 1¾" CONT. COMP. GIRDER BRIDGE

STR. NO. 36-120-107
SEPTEMBER 2017

2 OF 14

DESIGNED BY	CK. DES. BY	DRAFTED BY	
EJA	JH/CM	MDG	Steve A Johnson BRIDGE ENGINEER
JACK3949	3949GA02		

F.3.3.3. Notes (Continued)

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	IM 0903(77)131	E05	E150

BOLTED SPLICE PLATE SEALANT (CONTINUED)

5. Polyurethane Sealant shall be installed and allowed to cure prior to the application of any field applied paint.

6. For informational purposes only the sealant will be applied on 978 linear feet.

7. Polyurethane Sealant for Structure shall be included in the contract lump sum price for "Bridge Repainting, Class II." Payment will be full compensation for labor, equipment, materials and incidentals for furnishing, preparing surfaces for application and installing the Polyurethane Sealant.

BRIDGE REPAINTING, CLASS II

1. Portions of the existing girders, diaphragms, bolted splices and bearings shall be painted as shown by these plans and in accordance with the requirements for Bridge Repainting, Class II in Section 412 of the Construction Specifications except as modified by these notes.

2. The entire surface to be painted shall be cleaned to a condition equivalent to the SSPC-SP6 in lieu of the cleaning level specified in Section 412 of the Construction Specifications.

3. After blast cleaning the surfaces to be painted, remove any trace of blast products, dust or dirt from all surfaces including pockets and corners as approved by the Engineer.

4. The color of the top coat shall be an approved green (Federal Standard 595B Color 24108). The prime coat and the top coat shall sharply contrast.

5. For informational purposes, 13740 square feet of structural steel will require painting. For the locations requiring paint on the bridge, See sheets 4 through 28 of 34 of the plans.

COORDINATION WITH RAILROAD

1. During construction, the Contractor shall not interfere with the operating railroad train movements. Construction activity must not take place within 25 ft. of the centerline track when train movements are occurring through the construction site and construction equipment shall be removed from this zone prior to arrival of any train. See Special Provision for Working on Railroad Company Property.

2. See Special Provision Regarding Railroad Insurance Requirements.

3. The Contractor is to contact Heath Haden (General Manager):

   Dakota Southern Railroad, PO Box 213,
   White Lake, South Dakota, 57383

   Cell phone: 573-253-0904

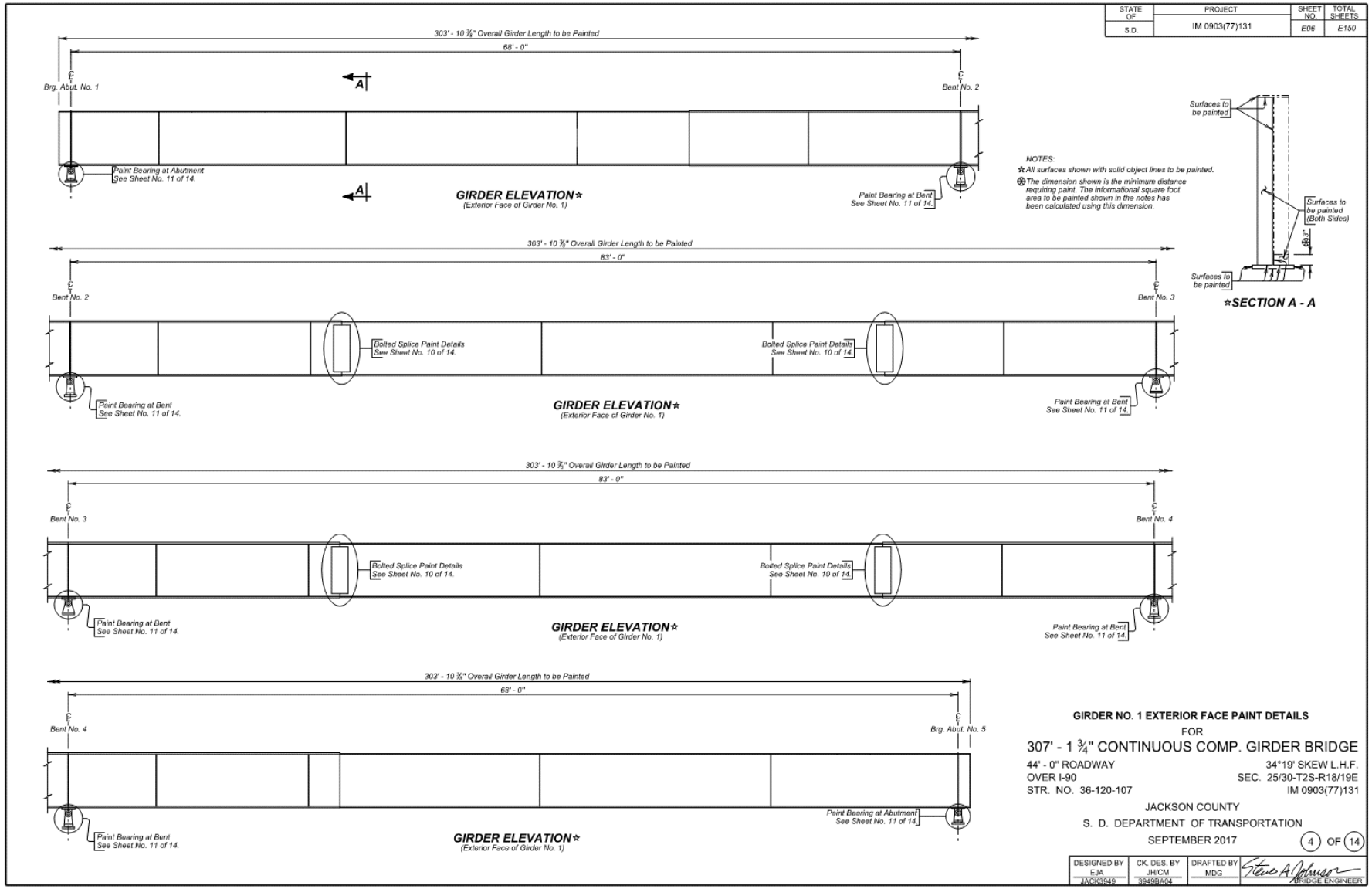
NOTES (CONTINUED)
FOR
307' - 1¾" CONT. COMP. GIRDER BRIDGE

STR. NO. 36-120-107
SEPTEMBER 2017

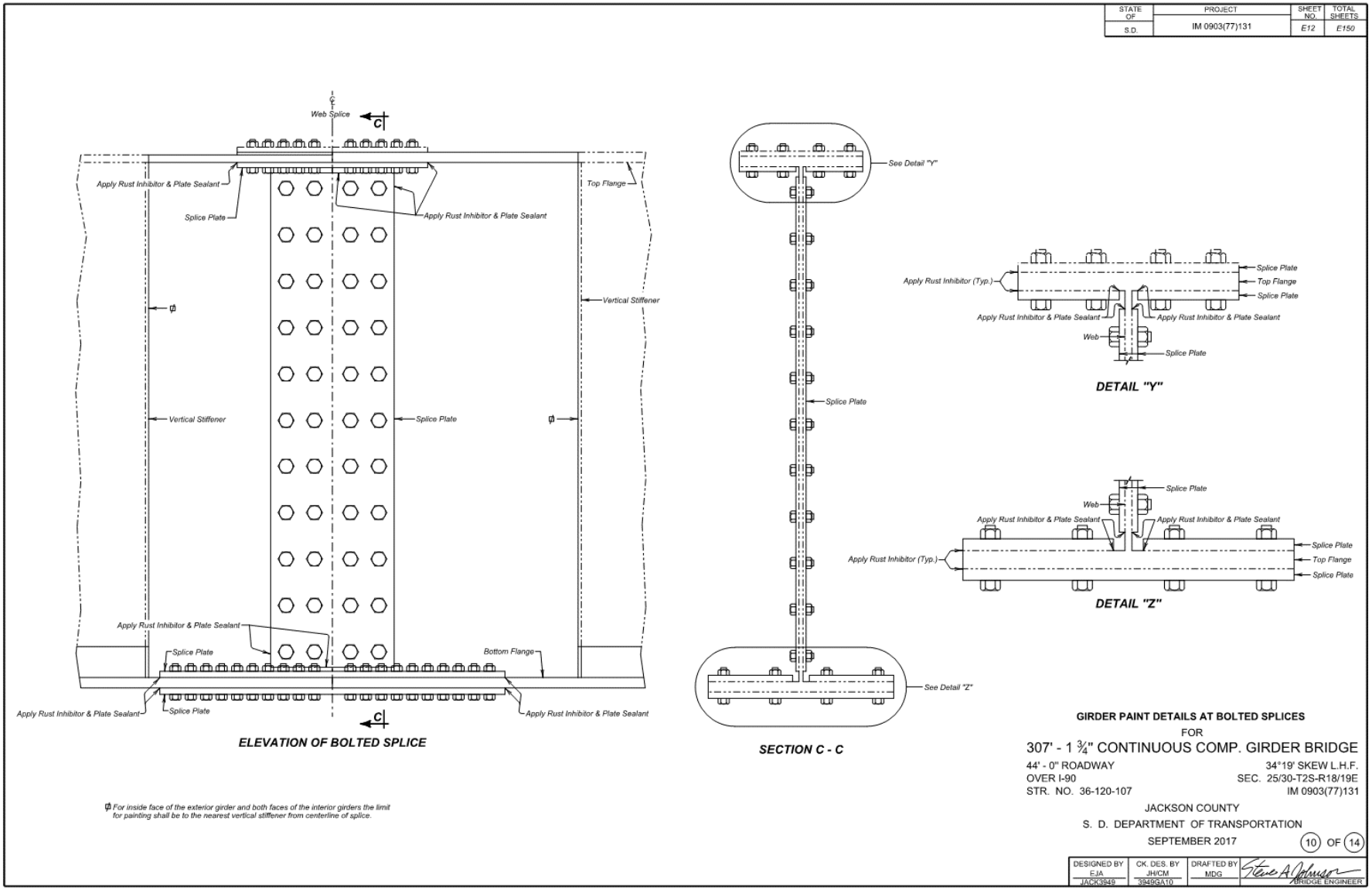
3 OF 14

DESIGNED BY	CK. DES. BY	DRAFTED BY	
EJA JACK3949	JH/CM 3949GA03	MDG	Steve A Johnson BRIDGE ENGINEER

F.3.3.4. Girder Paint Detials

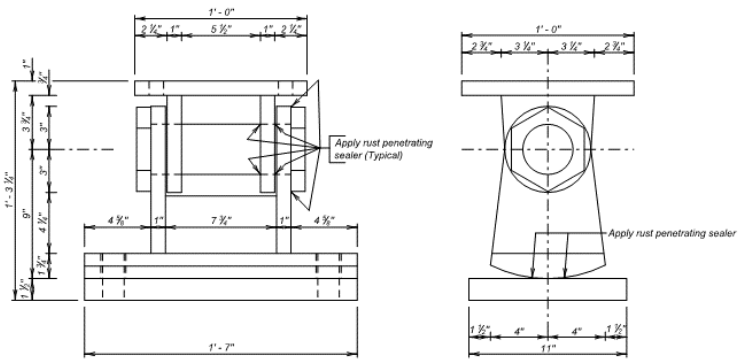


F.3.3.5. Bolted Splice Paint Detials

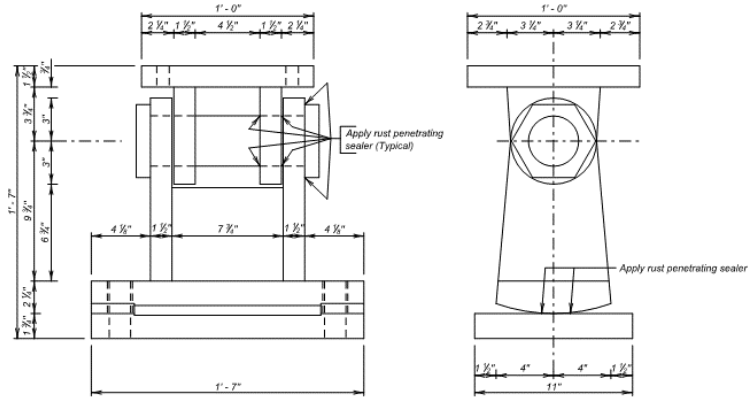


F.3.3.6. Bearing Paint Details

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	IM 0903(77)131	E13	E150

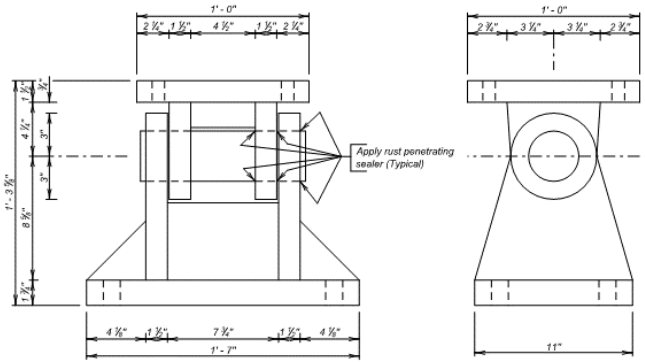


END EXPANSION SHOE
(Paint all visible surfaces of each bearing)



INTERIOR EXPANSION SHOE
(Paint all visible surfaces of each bearing)

Note: Apply rust penetrating sealer to pack rust areas of all bearings.



INTERIOR FIXED SHOE

ESTIMATED QUANTITIES

	ITEM	UNIT	QUANTITY
Δ	Bridge Repainting, Class II	LS	Lump Sum
	Rust Penetrating Sealer	LS	Lump Sum
	Paint Residue Containment	LS	Lump Sum

Items 1 thru 3 are approximate quantities contained in the "ESTIMATED QUANTITIES" table bid items and are for information only.

Δ 1. Area of structural steel to be painted 9769 ft²
2. Rust Penetrating Sealer 154 ft²
Δ 3. Bolted Splice Plate Sealant 599 ft

BRIDGE BEARING PAINT DETAILS
FOR
307' - 1 ¾" CONTINUOUS COMP. GIRDER BRIDGE

44' - 0" ROADWAY — 34°19' SKEW L.H.F.
OVER I-90 — SEC. 25/30-T2S-R18/19E
STR. NO. 36-120-107 — IM 0903(77)131

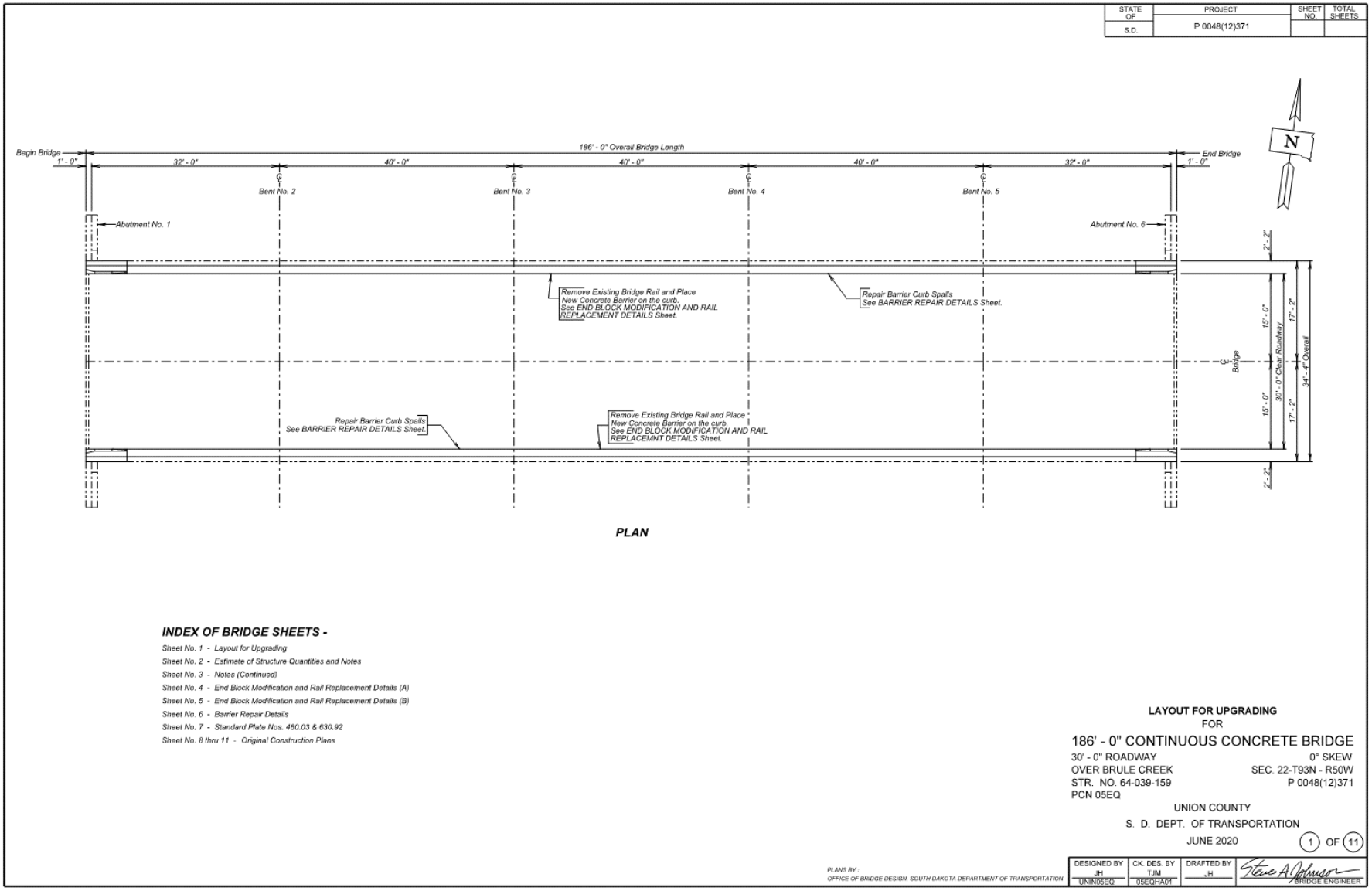
JACKSON COUNTY
S. D. DEPARTMENT OF TRANSPORTATION
SEPTEMBER 2017

11 OF 14

DESIGNED BY	CK. DES. BY	DRAFTED BY	
EJA	JH/CM	MDG	BRIDGE ENGINEER
JACK3949	3949GA12		

F.3.4. Rail Retrofit

F.3.4.1. Layout for Upgrade



F.3.4.2. Estimate of Structure Quantifies and Notes

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P 0048(12)371		

ESTIMATE OF STRUCTURE QUANTITIES

ITEM NO.	DESCRIPTION	QUANTITY	UNIT
110E0020	Remove Bridge Railing	372	Ft
460E0070	Class A45 Concrete, Bridge Repair	31.4	CuYd
460E0300	Breakout Structural Concrete	6.4	CuYd
460E0380	Install Dowel in Concrete	358	Each
480E0200	Epoxy Coated Reinforcing Steel	2054	Lb
480E5000	Galvanic Anode	188	Each

SPECIFICATIONS

1. Design Specifications: AASHTO Standard Specifications for Highway Bridges 17th Edition using Working Stress Design.
2. Construction Specifications: South Dakota Standard Specifications for Roads and Bridges, 2015 Edition and Required Provisions, Supplemental Specifications, and Special Provisions as included in the Proposal.

DETAILS AND DIMENSIONS OF EXISTING BRIDGE

All details and dimensions of the existing bridge, contained in these plans, are based on the original construction plans and shop plans and are provided as information only. It is the Contractor's responsibility to inspect and verify the actual field conditions and any necessary as-built dimensions affecting the satisfactory completion of the work required for this project.

SCOPE OF BRIDGE WORK & SEQUENCE OF OPERATIONS

All work on this structure will be accomplished with the traffic control shown in the plans. Alternate sequence of operations may be submitted by the Contractor for approval by the Engineer a minimum of two weeks prior to the pre-construction meeting.

1. Modify the existing bridge rail, for the first phase of construction, by removing the steel rail and placing a concrete bridge rail on top of the existing bridge curb. Place new end blocks at the bridge ends to allow for the attachment of thrie beam approach railing.
2. Breakout and repair barrier curb for the first phase of construction.
3. Apply Commercial Texture Finish to the newly constructed barrier and endblock surfaces as outlined in the plans for the first phase of construction.
4. Switch traffic and repeat steps 1 through 3 for the second phase of construction.

GENERAL CONSTRUCTION - BRIDGE

1. All reinforcing steel will conform to ASTM A615, Grade 60.
2. All exposed concrete corners and edges will be chamfered ¾-inch unless noted otherwise in the plans. Match existing chamfer if the existing chamfer differs.
3. Use 2-inch clear cover on all reinforcing steel except as shown otherwise.
4. The Contractor will imprint two year-plates on the structure. The plates will consist of the year of the existing bridge construction and the year of the new construction and will be located as specified and detailed on Standard Plate No. 460.03.
5. Barrier curbs and end blocks will be built normal to the grade.
6. Requests for construction joints or reinforcing steel splices at points other than those shown, must be submitted to the Engineer for prior approval. If additional splices are approved, no payment will be allowed for the added quantity of reinforcing steel.
7. Snap ties, if used in the barrier curb formwork, will be corrosion resistant. The corrosion resistant ties will be inert in concrete and compatible with reinforcing steel.
8. All lap splices are contact lap splices unless noted otherwise.

REMOVAL OF EXISTING BRIDGE RAIL

1. The existing rail, spacer blocks, w-beam rail, and rail posts on the bridge will be completely removed by the Contractor and disposed of in accordance with the Environmental Commitments. If the Contractor elects to salvage the rail and rail posts for his own use, they must be removed from view of the ROW to the satisfaction of the Engineer prior to project completion.
2. The existing rail anchor bolts protruding from the concrete will be cut off and ground flush with the concrete surface as approved by the Engineer. The exposed ends will be coated with a zinc-rich galvanizing paint in conformance with ASTM A780.
3. The bridge railing to be removed consists of the steel rail, wood spacer blocks, w-beam rail, and any hardware attaching the railing to the bridge. Payment limits for this item will be as shown by the plans. The cost of all labor, tools, materials, and incidentals necessary to cut and remove the steel rail, cut off the anchor bolts, and paint their exposed ends will be incidental to the contract price per foot for Remove Bridge Railing.

CONCRETE BREAKOUT

1. The existing curbs will be broken out to the limits shown on the plans. Breakout limits will be defined with a 3/4" deep sawcut (unless specified otherwise in these plans), where practical, as approved by the Engineer. Reinforcing steel that is exposed and is scheduled for use in the new construction will be cleaned and straightened to the satisfaction of the Engineer. Care will be taken not to damage the existing reinforcing steel that is to be reused in the new construction during concrete breakout. Any reinforcing steel that is damaged during concrete breakout will be replaced or repaired, as approved by the Engineer, by the Contractor at no cost to the Department.
2. All broken out concrete, discarded reinforcing bars and expansion devices will be disposed of by the Contractor. Any disposal of discarded material will be in accordance with the Construction Specifications.
3. During concrete removal operations, no broken out concrete will be allowed to fall into Brule Creek.
4. The contract unit price per cubic yard for Breakout Structural Concrete will include breaking out concrete, cleaning, straightening reinforcing steel, and disposal of all broken out material.

CURB REPAIR CONCRETE

Concrete for the curb repair will be an approved A45 Concrete Mix Design mixed and proportioned in accordance with Section 460 of the construction specifications with the following modifications: the course aggregate gradation will be in accordance with Section 820 of the Construction Specifications and the size #3 will be substituted in lieu of sizes #1 and #15.

ESTIMATE OF STRUCTURE QUANTITIES AND NOTES
FOR
186' - 0" CONTINUOUS CONCRETE BRIDGE

STR. NO. 64-039-159
JUNE 2020

2 OF 11

DESIGNED BY	CK. DES. BY	DRAFTED BY	
JH	TJM	JH	Steve A Johnson BRIDGE ENGINEER
UNIN05EQ	05EQHA02		

F.3.4.3. Notes (Continued)

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P 0048(12)371		

INSTALLING DOWELS IN CONCRETE

1. Holes drilled in the existing concrete will be true and normal or as shown in the plans. Drilling holes using a core drill will not be allowed. Care will be taken not to damage the existing reinforcing steel. It is likely that some of the existing reinforcing steel shown in the original construction plans may have been placed out of position during original construction. Therefore, prior to the start of drilling any holes in the concrete, an effort will be made by Department forces to mark on the concrete surface where practical any locations of the in-place reinforcing steel. In spite of this precaution, the Contractor can still expect to encounter and have to drill through reinforcing steel or shift the dowel spacing as approved by the Engineer to miss the existing reinforcing steel. If the Contractor shifts the dowel spacing, the unused drill holes will be completely filled with the epoxy resin as approved by the Engineer.

2. The epoxy resin mixture will be of a type for bonding steel to hardened concrete and will conform to AASHTO M235 Type IV (Equivalent to ASTM C881, Type IV). Grade 1, 2 or 3 may be used for vertical dowels.

3. The diameter of the drilled holes will not be less than 1/8 inch greater, nor more than 3/8 inch greater than the diameter of the dowels or as per the Manufacturer's recommendations. The drilled holes will be blown out with compressed air using a device that will reach the back of the hole to ensure that all debris or loose material has been removed prior to epoxy injection.

4. Mix epoxy resin as recommended by the Manufacturer and apply by an injection method as approved by the Engineer. Beginning at the back of the drilled holes, fill the holes 1/3 to 1/2 full of epoxy, or as recommended by the Manufacturer, prior to insertion of the steel bar. Rotate the steel bar during installation to eliminate voids and ensure complete bonding of the bar. Insertion of the bars by the dipping or painting method will not be allowed.

5. No loads will be applied to the epoxy grouted dowel bars until the epoxy resin has had sufficient time to cure as specified by the epoxy resin manufacturer.

6. Dowel bars will be deformed bars conforming to ASTM A615 Grade 60.

7. The cost of epoxy resin, dowels, installation and other incidental items will be incidental to the contract unit price per each for Install Dowel in Concrete.

SURFACE FINISH

1. All of the surfaces visible to the traveling public on the new concrete barriers on curb and end blocks will be given a Class B Commercial Texture Finish in accordance with Section 460.3 L.1.c. of the Construction Specifications. Visible surfaces include the front face, top, and back face of the barrier on curb, front face of curb section to barrier and all faces of the end blocks.

2. The concrete surfaces requiring the application of the Commercial Texture Finish will be prepared in accordance with the manufacturer's recommendations. The Contractor will submit a product data sheet, or an approved equal, documenting all pertinent information with regard to preparation of the concrete surfaces, materials and equipment required, mixing requirements, and application procedures to the Engineer in advance of the application of the Commercial Texture Finish for review and approval.

3. For informational purposes the amount of surface area requiring the Class B Commercial Texture Finish is 748 square feet for Phase 1 and 748 square feet for Phase 2.

4. Any damage to the commercial texture finish during the construction including abrasion from traffic due to the traffic control will be repaired by the Contractor, as approved by the Engineer, at no expense to the Department.

5. The cost of the commercial texture finish will be included in the contract unit price per cubic yard for Class A45 Concrete, Bridge Repair. This payment will be full compensation for furnishing all materials, labor, tools and equipment necessary or incidental to the application of this finish.

GALVANIC ANODE

1. The Contractor will furnish and place galvanic anodes in the concrete repair areas specified in this plan set.

2. The galvanic anodes will be supplied as one of the following:

   a. Galvashield XP2
   Vector Corrosion Technologies
   65114 140th Ave.
   Wabasha, MN 55981
   Phone: (507) 259-2481
   Website: www.vector-corrosion.com

   b. Sentinel Silver
   Euclid Chemical Company
   19218 Redwood Road
   Cleveland, OH 44110
   Phone: (800) 321-7628
   Website: www.euclidchemical.com

   c. Sika FerroGard 670
   Sika Corporation US
   201 Polito Avenue
   Lyndhurst, NJ 07071
   Phone: (800) 933-7452
   Website: http://usa.sika.com

3. The anodes will be placed in accordance with manufacturer's recommendations and as approved by the Engineer. The anodes have not been shown on the drawings. The Contractor will provide shop drawings of the galvanic anode installation including locations of the individual anodes to the Office of Bridge Design.

4. The anodes will be placed with a minimum ¾" cover and will be set in embedding mortar per the manufacturer's recommendations. The anodes will be fully encased in the concrete repair material. Where adequate cover does not exist, a concrete pocket will be chipped out behind the anode to provide sufficient cover. The Contractor may need to chip around the reinforcing bar locally at the anode installation to make the electrical connection. The reinforcing steel at the connection location will be cleaned per the manufacturer's recommendations to provide sufficient electrical connection and mechanical bond.

5. The electrical continuity of the connections and reinforcing steel will be confirmed per the manufacturer's recommendations.

6. In area of concrete repair where anodes are placed, the epoxy coating on the reinforcing steel will not require touch up.

7. The Contractor will provide manufacturer's product literature and installation instructions to the Engineer 10 days prior to installation.

8. All costs associated with placing anodes including labor, equipment, materials and incidentals will be included in the contract unit price per each for Galvanic Anode.

9. The Contractor has the option of providing galvanic strip anodes in place of the Galvanic Anodes for the curb repair. The galvanic strip anodes will conform to the same requirements listed above for Galvanic Anode. The use of galvanic strip anodes in place of Galvanic Anodes will be at no additional cost to the Department. The galvanic strip anodes will be supplied as the following or an approved equivalent as approved by the Office of Bridge Design:

   Galvanode DAS
   Vector Corrosion Technologies
   65114 140th Ave.
   Wabasha, MN 55981
   Phone: (507) 259-2481
   Website: www.vector-corrosion.com

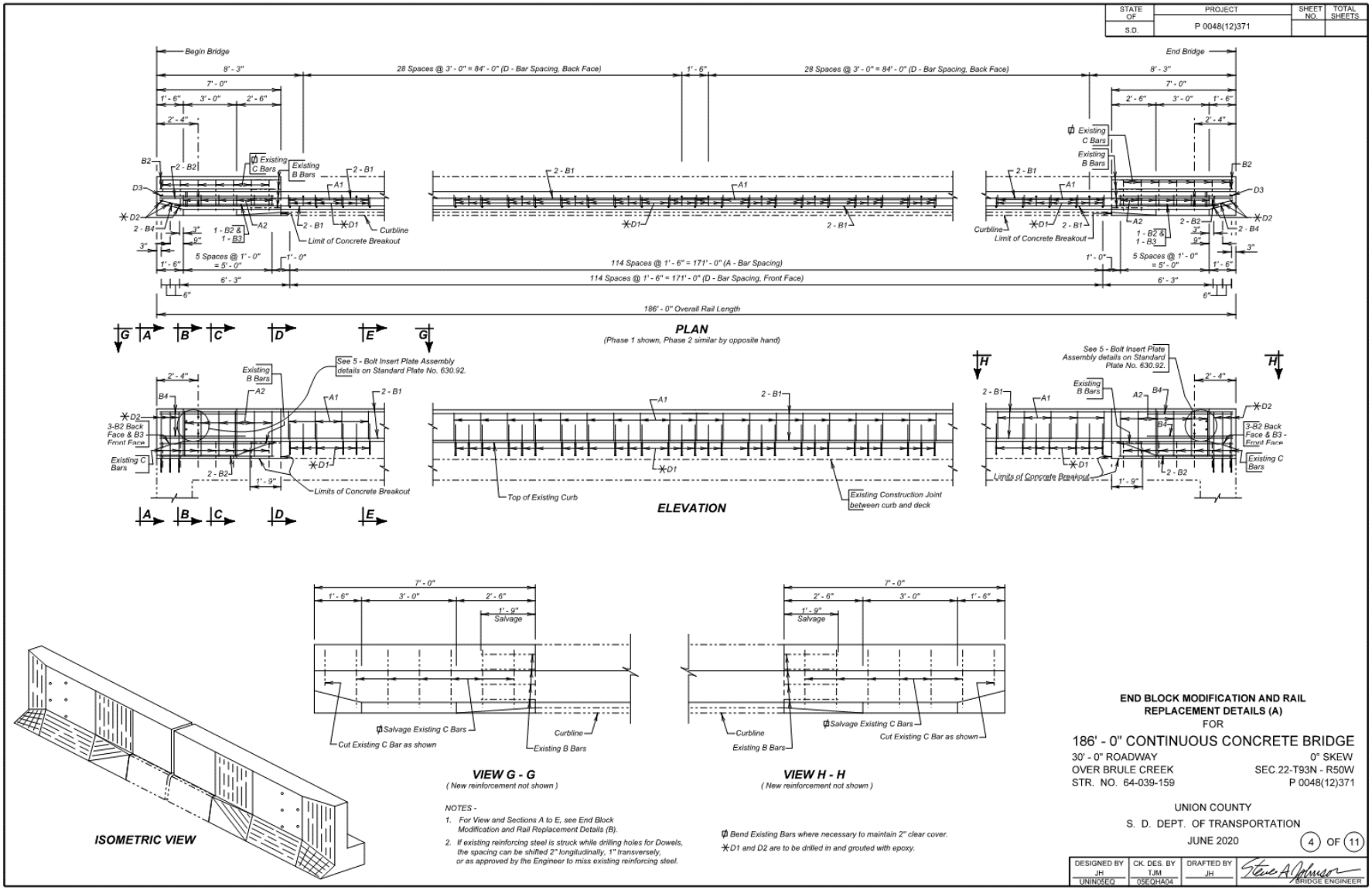
NOTES (CONTINUED)
FOR
186' - 0" CONTINUOUS CONCRETE BRIDGE

STR. NO. 64-039-159
JUNE 2020

3 OF 11

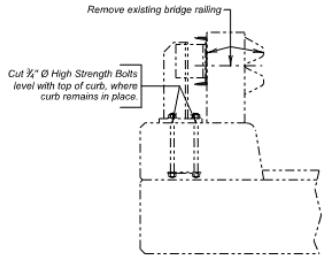
DESIGNED BY	CK. DES. BY	DRAFTED BY	
JH	TJM	JH	Steve A Johnson
UNIN05EQ	05EQTIA03		BRIDGE ENGINEER

F.3.4.4. End Block Modification and Rail Replacement Details (A)

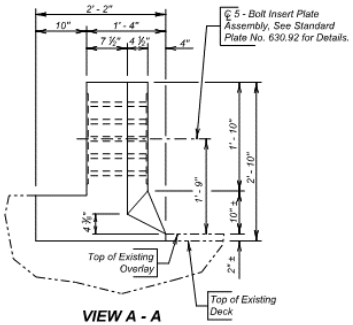


F.3.4.5. End Block Modification and Rail Replacement Details (A)

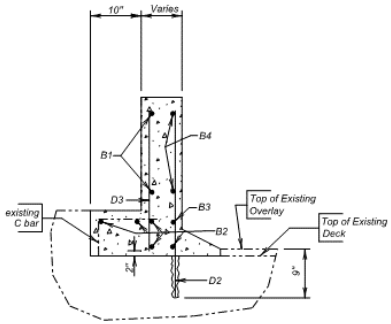
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P 0048(12)371		



EXISTING CURB & RAIL



VIEW A - A

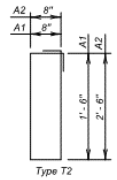


SECTION B - B

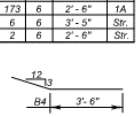
REINFORCING SCHEDULE

	Mk.	No.	Size	Length	Type
Phase 1	A1	115	4	5' - 1"	T2
	A2	12	4	7' - 1"	T2
	B1	16	4	47' - 5"	Str.
	B2	10	4	6' - 8"	Str.
	B3	2	4	5' - 10"	Str.
	B4	4	4	4' - 10"	19A
	△D1	173	6	2' - 6"	1A
	△D2	6	6	3' - 5"	Str.
	D3	2	6	2' - 6"	Str.
Phase 2	A1	115	4	5' - 1"	T2
	A2	12	4	7' - 1"	T2
	B1	16	4	47' - 5"	Str.
	B2	10	4	6' - 8"	Str.
	B3	2	4	5' - 10"	Str.
	B4	4	4	4' - 10"	19A
	△D1	173	6	2' - 6"	1A
	△D2	6	6	3' - 5"	Str.
	D3	2	6	2' - 6"	Str.

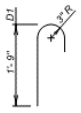
Bending Details



Type T2



Type 19A



Type 1A

NOTES :
△ Dowels
All bars are epoxy coated.
All dimensions are out to out of bars.

Min Lap 1' - 3"

Bend existing C bars where necessary to maintain 2" clear cover.

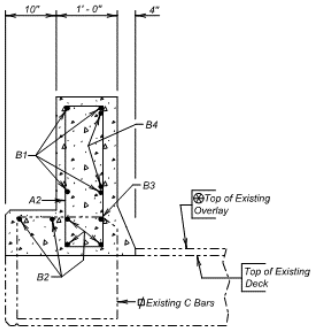
Repair existing overlay with barrier concrete as required.

ESTIMATED QUANTITIES

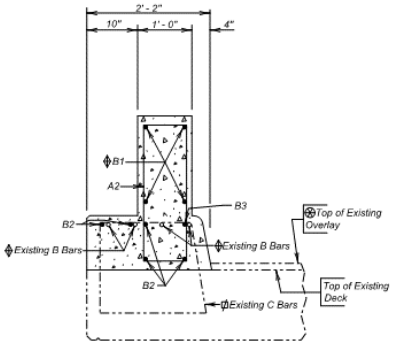
ITEM	UNIT	QUANTITY PHASE I	QUANTITY PHASE 2
Remove Bridge Railing	Ft.	186	186
Class A45 Concrete, Bridge Repair	Cu.Yd.	13.6	13.6
Breakout Structural Concrete	Cu.Yd.	1.1	1.1
Install Dowel in Concrete	Each	179	179
Epoxy Coated Reinforcing Steel	Lb.	1027	1027
Galvanic Anode	Each	8	8

Does not include the following quantities for D1 & D2 bars as these are incidental to the contract unit price per each for Install Dowel in Concrete.

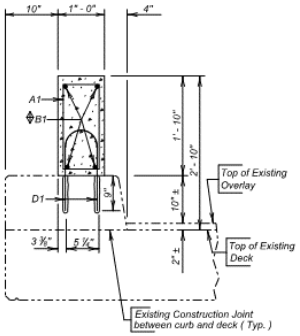
PHASE I	PHASE 2
680 Lb.	680 Lb.



SECTION C - C



SECTION D - D



SECTION E - E

END BLOCK MODIFICATION AND RAIL REPLACEMENT DETAILS (B)
FOR
186' - 0" CONTINUOUS CONCRETE BRIDGE
30' - 0" ROADWAY 0° SKEW
OVER BRULE CREEK SEC 22-T93N - R50W
STR. NO. 64-039-159 P 0048(12)371

UNION COUNTY
S. D. DEPT. OF TRANSPORTATION
JUNE 2020 5 OF 11

DESIGNED BY	CK. DES. BY	DRAFTED BY	
JH	TJM	JH	Steve A Johnson
UNIN05EQ	05EQHA05		BRIDGE ENGINEER