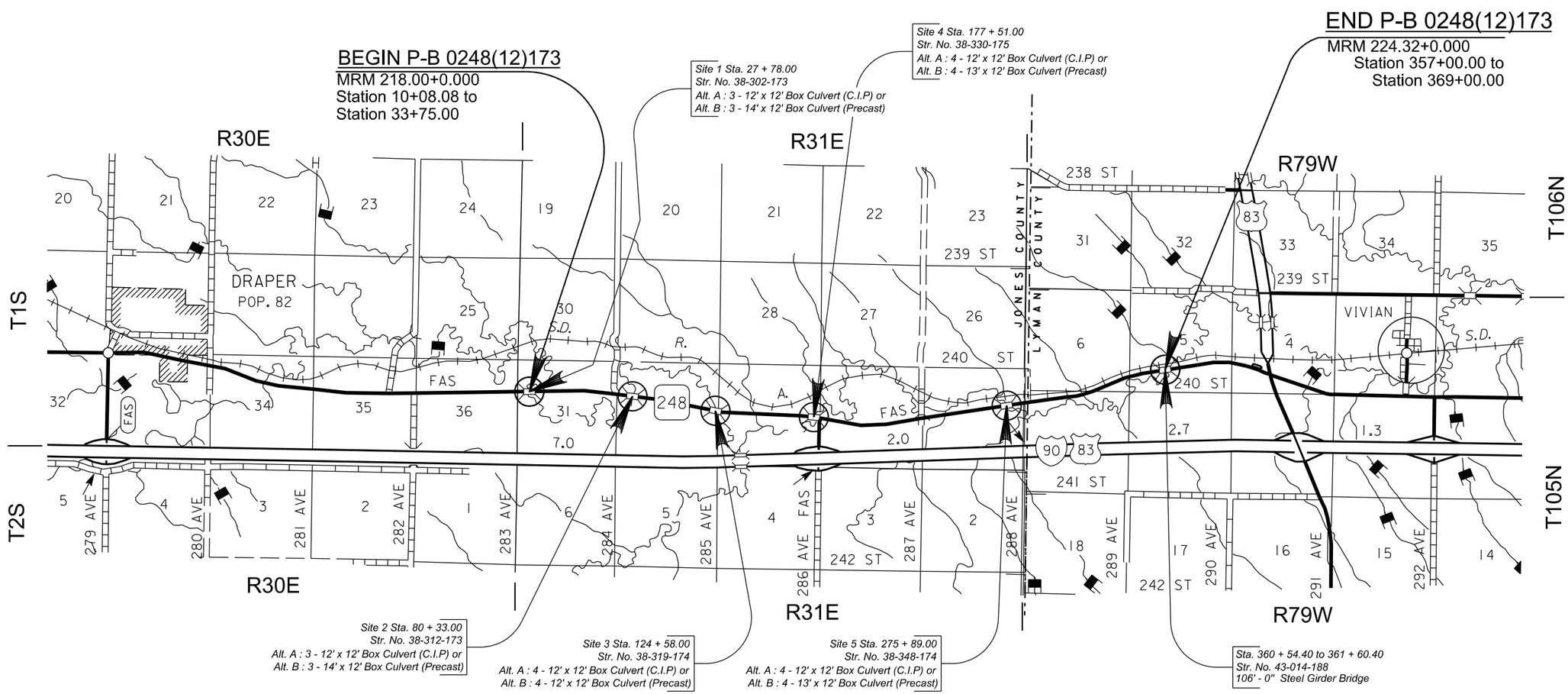
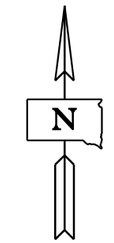
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E1	E99

Section E: Structure Plans

INDEX OF SHEETS -

Sheet E1	Layout Map and Index
Sheet E2 to E3	Estimate of Structure Quantities
Sheet E4 to E11	Str. No. 38-302-173 Site 1 Alt. A : 3 - 12' x 12' Box Culvert (C.I.P.)
Sheet E12 to E17	Str. No. 38-302-173 Site 1 Alt. B : 3 - 14' x 12' Box Culvert (Precast)
Sheet E18 to E25	Str. No. 38-312-173 Site 2 Alt. A : 3 - 12' x 12' Box Culvert (C.I.P.)
Sheet E26 to E31	Str. No. 38-312-173 Site 2 Alt. B : 3 - 14' x 12' Box Culvert (Precast)
Sheet E32 to E43	Str. No. 38-319-174 Site 3 Alt. A : 4 - 12' x 12' Box Culvert (C.I.P.)
Sheet E44 to E48	Str. No. 38-319-174 Site 3 Alt. B : 4 - 12' x 12' Box Culvert (Precast)
Sheet E49 to E56	Str. No. 38-330-175 Site 4 Alt. A : 4 - 12' x 12' Box Culvert (C.I.P.)
Sheet E57 to E61	Str. No. 38-330-175 Site 4 Alt. B : 4 - 13' x 12' Box Culvert (Precast)
Sheet E62 to E69	Str. No. 38-348-174 Site 5 Alt. A : 4 - 12' x 12' Box Culvert (C.I.P.)
Sheet E70 to E74	Str. No. 38-348-174 Site 5 Alt. B : 4 - 13' x 12' Box Culvert (Precast)
Sheet E75 to E99	Str. No. 43-014-188 106' - 0'' Steel Girder Bridge





SECTION E – ESTIMATE OF STRUCTURE QUANTITIES

Site 1
Str. No. 38-302-173

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
250E0030	Incidental Work, Structure	Lump Sum	LS

Site 1 – Alternate A
Str. No. 38-302-173

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
260E1010	Base Course	3.4	Ton
420E0200	Structure Excavation, Box Culvert	398	CuYd
421E0200	Box Culvert Undercut	800	CuYd
460E0120	Class A45 Concrete, Box Culvert	979.9	CuYd
480E0100	Reinforcing Steel	117,937	Lb
700E0210	Class B Riprap	74.4	Ton
831E0110	Type B Drainage Fabric	92	SqYd

Site 1 – Alternate B
Str. No. 38-302-173

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
260E1010	Base Course	3.4	Ton
420E0200	Structure Excavation, Box Culvert	309	CuYd
421E0200	Box Culvert Undercut	817	CuYd
464E0100	Controlled Density Fill	73.9	CuYd
560E0254	14'x12' Precast Concrete Box Culvert, Furnish	162.0	Ft
560E0255	14'x12' Precast Concrete Box Culvert, Install	162.0	Ft
560E1254	14'x12' Precast Concrete Box Culvert End Section, Furnish	2	Each
560E1255	14'x12' Precast Concrete Box Culvert End Section, Install	2	Each
560E2236	2-14'x12' Precast Concrete Box Culvert, Furnish	162.0	Ft
560E2237	2-14'x12' Precast Concrete Box Culvert, Install	162.0	Ft
560E3236	2-14'x12' Precast Concrete Box Culvert End Section, Furnish	2	Each
560E3237	2-14'x12' Precast Concrete Box Culvert End Section, Install	2	Each
700E0210	Class B Riprap	87.3	Ton
831E0110	Type B Drainage Fabric	107	SqYd

Site 2
Str. No. 38-312-173

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
250E0030	Incidental Work, Structure	Lump Sum	LS

Site 2 – Alternate A
Str. No. 38-312-173

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
260E1010	Base Course	3.4	Ton
420E0200	Structure Excavation, Box Culvert	391	CuYd
421E0200	Box Culvert Undercut	749	CuYd
460E0120	Class A45 Concrete, Box Culvert	925.7	CuYd
480E0100	Reinforcing Steel	109,943	Lb
700E0210	Class B Riprap	74.4	Ton
831E0110	Type B Drainage Fabric	92	SqYd

Site 2 – Alternate B
Str. No. 38-312-173

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
260E1010	Base Course	3.4	Ton
420E0200	Structure Excavation, Box Culvert	289	CuYd
421E0200	Box Culvert Undercut	767	CuYd
464E0100	Controlled Density Fill	74.4	CuYd
560E0254	14'x12' Precast Concrete Box Culvert, Furnish	148.0	Ft
560E0255	14'x12' Precast Concrete Box Culvert, Install	148.0	Ft
560E1254	14'x12' Precast Concrete Box Culvert End Section, Furnish	2	Each
560E1255	14'x12' Precast Concrete Box Culvert End Section, Install	2	Each
560E2236	2-14'x12' Precast Concrete Box Culvert, Furnish	148.0	Ft
560E2237	2-14'x12' Precast Concrete Box Culvert, Install	148.0	Ft
560E3236	2-14'x12' Precast Concrete Box Culvert End Section, Furnish	2	Each
560E3237	2-14'x12' Precast Concrete Box Culvert End Section, Install	2	Each
700E0210	Class B Riprap	87.3	Ton
831E0110	Type B Drainage Fabric	107	SqYd

Site 3
Str. No. 38-319-174

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
250E0030	Incidental Work, Structure	Lump Sum	LS

Site 3 – Alternate A
Str. No. 38-319-174

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
260E1010	Base Course	3.4	Ton
420E0200	Structure Excavation, Box Culvert	589	CuYd
421E0200	Box Culvert Undercut	1,101	CuYd
460E0120	Class A45 Concrete, Box Culvert	1,427.9	CuYd
480E0100	Reinforcing Steel	163,705	Lb
700E0210	Class B Riprap	96.3	Ton
831E0110	Type B Drainage Fabric	117	SqYd

Site 3 – Alternate B
Str. No. 38-319-174

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
260E1010	Base Course	3.7	Ton
420E0200	Structure Excavation, Box Culvert	377	CuYd
421E0200	Box Culvert Undercut	1,028	CuYd
464E0100	Controlled Density Fill	84.7	CuYd
560E2178	2-12'x12' Precast Concrete Box Culvert, Furnish	360.0	Ft
560E2179	2-12'x12' Precast Concrete Box Culvert, Install	360.0	Ft
560E3178	2-12'x12' Precast Concrete Box Culvert End Section, Furnish	4	Each
560E3179	2-12'x12' Precast Concrete Box Culvert End Section, Install	4	Each
700E0210	Class B Riprap	119.1	Ton
831E0110	Type B Drainage Fabric	139	SqYd

Site 4
Str. No. 38-330-175

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
250E0030	Incidental Work, Structure	Lump Sum	LS

Site 4 – Alternate A
Str. No. 38-330-175

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
260E1010	Base Course	3.4	Ton
420E0200	Structure Excavation, Box Culvert	287	CuYd
421E0200	Box Culvert Undercut	728	CuYd
460E0120	Class A45 Concrete, Box Culvert	690.3	CuYd
480E0100	Reinforcing Steel	88,754	Lb
700E0210	Class B Riprap	96.3	Ton
831E0110	Type B Drainage Fabric	117	SqYd

Site 4 – Alternate B
Str. No. 38-330-175

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
260E1010	Base Course	3.4	Ton
420E0200	Structure Excavation, Box Culvert	270	CuYd
421E0200	Box Culvert Undercut	707	CuYd
464E0100	Controlled Density Fill	50.0	CuYd
560E2202	2-13'x12' Precast Concrete Box Culvert, Furnish	200.0	Ft
560E2203	2-13'x12' Precast Concrete Box Culvert, Install	200.0	Ft
560E3202	2-13'x12' Precast Concrete Box Culvert End Section, Furnish	4	Each
560E3203	2-13'x12' Precast Concrete Box Culvert End Section, Install	4	Each
700E0210	Class B Riprap	105.7	Ton
831E0110	Type B Drainage Fabric	127	SqYd

Site 5
Str. No. 38-348-174

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
250E0030	Incidental Work, Structure	Lump Sum	LS

Site 5 – Alternate A
Str. No. 38-348-174

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
260E1010	Base Course	3.4	Ton
420E0200	Structure Excavation, Box Culvert	245	CuYd
421E0200	Box Culvert Undercut	652	CuYd
460E0120	Class A45 Concrete, Box Culvert	563.7	CuYd
480E0100	Reinforcing Steel	73,560	Lb
700E0210	Class B Riprap	96.3	Ton
831E0110	Type B Drainage Fabric	117	SqYd

Site 5 – Alternate B
Str. No. 38-348-174

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
260E1010	Base Course	3.4	Ton
420E0200	Structure Excavation, Box Culvert	235	CuYd
421E0200	Box Culvert Undercut	615	CuYd
464E0100	Controlled Density Fill	42.4	CuYd
560E2202	2-13'x12' Precast Concrete Box Culvert, Furnish	160.0	Ft
560E2203	2-13'x12' Precast Concrete Box Culvert, Install	160.0	Ft
560E3202	2-13'x12' Precast Concrete Box Culvert End Section, Furnish	4	Each
560E3203	2-13'x12' Precast Concrete Box Culvert End Section, Install	4	Each
700E0210	Class B Riprap	105.7	Ton
831E0110	Type B Drainage Fabric	128	SqYd

Str. No. 43-014-188

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
009E3310	Bridge Elevation Survey	Lump Sum	LS
120E7000	Select Granular Backfill	14.7	Ton
250E0030	Incidental Work, Structure	Lump Sum	LS
410E0020	Structural Steel	Lump Sum	LS
410E2600	Membrane Sealant Expansion Joint	75.8	Ft
420E0100	Structure Excavation, Bridge	24	CuYd
430E0200	Bridge End Embankment	1,910	CuYd
430E0300	Granular Bridge End Backfill	183.0	CuYd
430E0510	Approach Slab Underdrain Excavation	13.0	CuYd
430E0700	Precast Concrete Headwall for Drain	4	Each
460E0030	Class A45 Concrete, Bridge Deck	184.5	CuYd
460E0150	Concrete Approach Slab for Bridge	172.3	SqYd
460E0160	Concrete Approach Sleeper Slab for Bridge	37.9	SqYd
460E0230	Concrete Penetrating Sealer	424.0	SqYd
460E0500	Deck Drain, Girder Bridge	4	Each
480E0100	Reinforcing Steel	5,642	Lb
480E0200	Epoxy Coated Reinforcing Steel	2,119	Lb
480E0300	Stainless Reinforcing Steel	26,150	Lb
510E0300	Preboring Pile	180	Ft
510E3411	HP 12x63 Steel Test Pile, Furnish and Drive	90	Ft
510E3415	HP 12x63 Steel Bearing Pile, Furnish and Drive	640	Ft
680E0304	4" Perforated Dual Wall HDPE Pipe	78	Ft
680E0324	4" Dual Wall HDPE Pipe	70	Ft
680E2500	Porous Backfill	24.6	Ton
700E0210	Class B Riprap	1,635.0	Ton
700E1100	Overburden Excavation for Riprap	584	CuYd
734E0090	Perforated Geocell	419	SqFt
831E0110	Type B Drainage Fabric	1,903	SqYd

INCIDENTAL WORK, STRUCTURE

1. Incidental Work, Structure will consist of the removal of the following structures:

   Str. No. 38-302-173 In-place centerline Sta. 27+13.81 to centerline Sta. 28+71.81 is a 158'- 0'' 3-span I-Beam Viaduct bridge with a 30'-0" clear roadway. The superstructure consists of a reinforced concrete slab with concrete rectangular block on curb rail continuous across the bridge. The deck has been overlaid with 2 inches of low slump concrete. The substructure consists of 2 column reinforced concrete bents and reinforced concrete abutments, all of which are supported on treated timber piles.

   Str. No. 38-312-173 In-place centerline Sta. 79+69.89 to centerline Sta. 81+09.89 is a 140'- 0'' 3-span I-Beam Viaduct bridge with a 30'-0" clear roadway. The superstructure consists of a reinforced concrete slab with concrete rectangular block on curb rail continuous across the bridge. The deck has been overlaid with 2 inches of low slump concrete. The substructure consists of 2 column reinforced concrete bents and reinforced concrete abutments, all of which are supported on treated timber piles.

   Str. No. 38-319-174 In-place centerline Sta. 123+57.68 to centerline Sta. 125+15.68 is a 158'- 0'' 3-span I-Beam Viaduct bridge with a 30'-0" clear roadway. The superstructure consists of a reinforced concrete slab with concrete rectangular block on curb rail continuous across the bridge. The deck has been overlaid with 2 inches of low slump concrete. The substructure consists of 2 column reinforced concrete bents and reinforced concrete abutments, all of which are supported on treated timber piles.

   Str. No. 38-330-175 In-place centerline Sta. 176+72.17 to centerline Sta. 178+24.17 is a 152'- 0'' 3-span I-Beam Viaduct bridge with a 30'-0" clear roadway. The superstructure consists of a reinforced concrete slab with concrete rectangular block on curb rail continuous across the bridge. The deck has been overlaid with 2 inches of low slump concrete. The substructure consists of 2 column reinforced concrete bents and reinforced concrete abutments, all of which are supported on treated timber piles.

   Str. No. 38-348-174 In-place centerline Sta. 275+24.68 to centerline Sta. 276+70.68 is a 146'- 0'' 3-span I-Beam Viaduct bridge with a 30'-0" clear roadway. The superstructure consists of a reinforced concrete slab with concrete rectangular block on curb rail continuous across the bridge. The deck has been overlaid with 2 inches of low slump concrete. The substructure consists of 2 column reinforced concrete bents and reinforced concrete abutments, all of which are supported on treated timber piles.

2. Break down and remove the existing structures 1 foot below finished ground or as required to construct the new structures in accordance with Section 110 of the Specifications. All portions of the existing structures will 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 structures, efforts will be taken to prevent material from falling into the creek. Under no circumstances is asphalt allowed to fall into the creek.

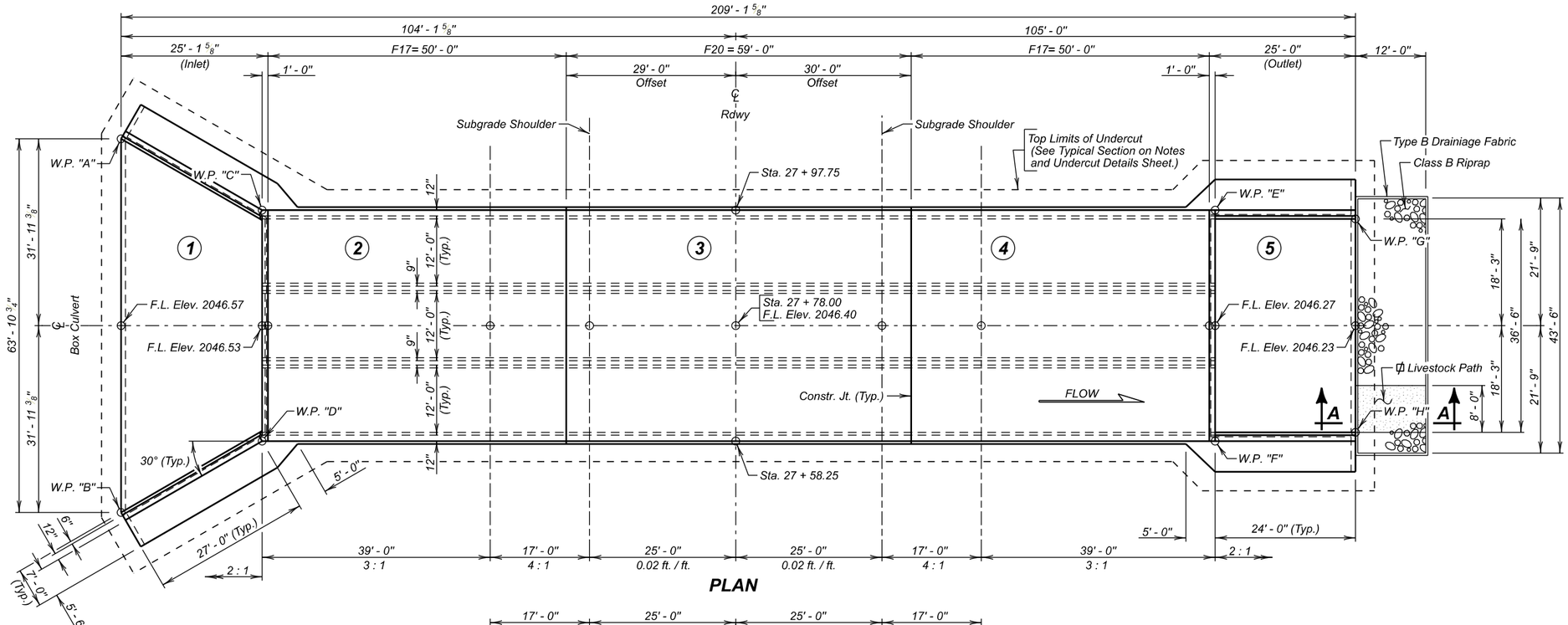
4. The foregoing is a general description of the in-place structures and should not be construed to be complete in all details. Before preparing the bid it will be the responsibility of the Contractor to make a visual inspection of the structures to verify the extent of the work and materials involved. If desired by the Contractor, a copy of the original construction plans may be obtained through the Office of Bridge Design.

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

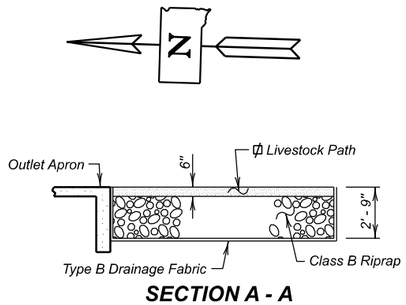
The elevations shown in these plans are based on the National Geodetic Survey (NGS) North American Vertical Datum of 1988 (NAVD88).

Revised August 31, 2026 JU

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E4	E99

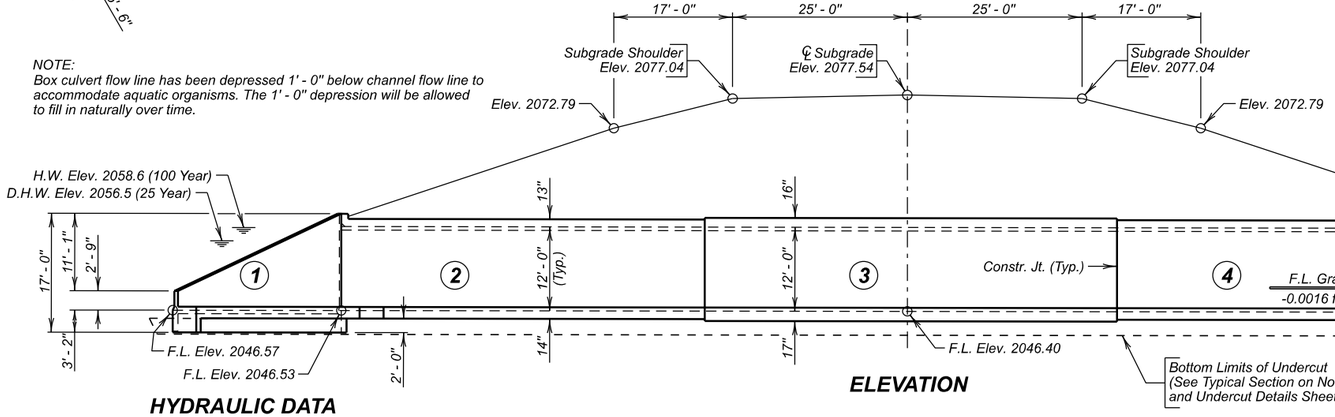


PLAN



SECTION A - A

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



ELEVATION

℄ NOTES:

1. Base Course will provide a smooth path for livestock.
2. Base Course is estimated using 6" of material to account for voids in the Class B Riprap.

HYDRAULIC DATA

Q_d	1205 cfs
A_d	335 sq ft
V_d	3.6 fps
Q_F	1205 cfs
Q_{100}	2160 cfs
Q_{OT}	>Q_{100}
V_{max}	5.5 fps

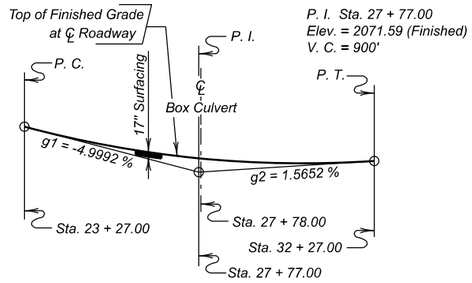
Q_d = Design discharge for the proposed culvert based on 25 year frequency. El. 2056.5.

Q_{OT} = Overtopping discharge and frequency > Q_{100} year recurrence interval. El. 2077.0 @ Sta. 30 + 00.00 ±.

Q_F = 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. 2058.6.

V_{max} = Maximum computed outlet velocity for the proposed culvert, based on 100 year frequency.



P. I. Sta. 27 + 77.00
Elev. = 2071.59 (Finished)
V. C. = 900'

VERTICAL CURVE DATA

ESTIMATED QUANTITIES

	ITEM	UNIT	QUANTITY
	Class A45 Concrete, Box Culvert	Cu. Yd.	979.9
	Reinforcing Steel	Lb.	117937
	Structure Excavation, Box Culvert	Cu. Yd.	398
	Box Culvert Undercut	Cu. Yd.	800
	Type B Drainage Fabric	Sq. Yd.	92
✳	Class B Riprap	Ton	74.4
⊛	Base Course	Ton	3.4

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

⊛ For estimating purposes only, a factor of 1.89 tons/cu. yd. was used to convert Cu. Yds. to Tons.

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

TABLE OF WORKING POINTS

W. P.	STATION	OFFSET
"A"	28 + 09.95	104.13' Lt.
"B"	27 + 46.05	104.13' Lt.
"C"	27 + 97.75	80.00' Lt.
"D"	27 + 58.25	80.00' Lt.
"E"	27 + 97.75	81.00' Rt.
"F"	27 + 58.25	81.00' Rt.
"G"	27 + 96.25	105.00' Rt.
"H"	27 + 59.75	105.00' Rt.

-X028-
INDEX OF CULVERT SHEETS-

Sheet No. 1 - General Drawing and Quantities
Sheet No. 2 - Notes and Undercut Details
Sheet No. 3 - Inlet Details
Sheet No. 4 - Outlet Details
Sheet No. 5 - F17Barrel End Section Details (50' - 0")
Sheet No. 6 - F20 Barrel Interior Section Details (59' - 0")
Sheet No. 7 - Details of Standard Plate No's 460.02 and 460.10
Sheet No. 8 - Details of Standard Plate No. 620.16

SITE 1
ALTERNATE A

GENERAL DRAWING AND QUANTITIES

FOR

3 - 12' X 12' BOX CULVERT (C.I.P.)

OVER MEDICINE CREEK — 0° SKEW
STA. 27 + 78.00 — SEC. 31-T1S-R31E
STR. NO. 38-302-173 — P-B 0248(12)173
PCN 06G7 — HL-93

JONES COUNTY

S. D. DEPT. OF TRANSPORTATION

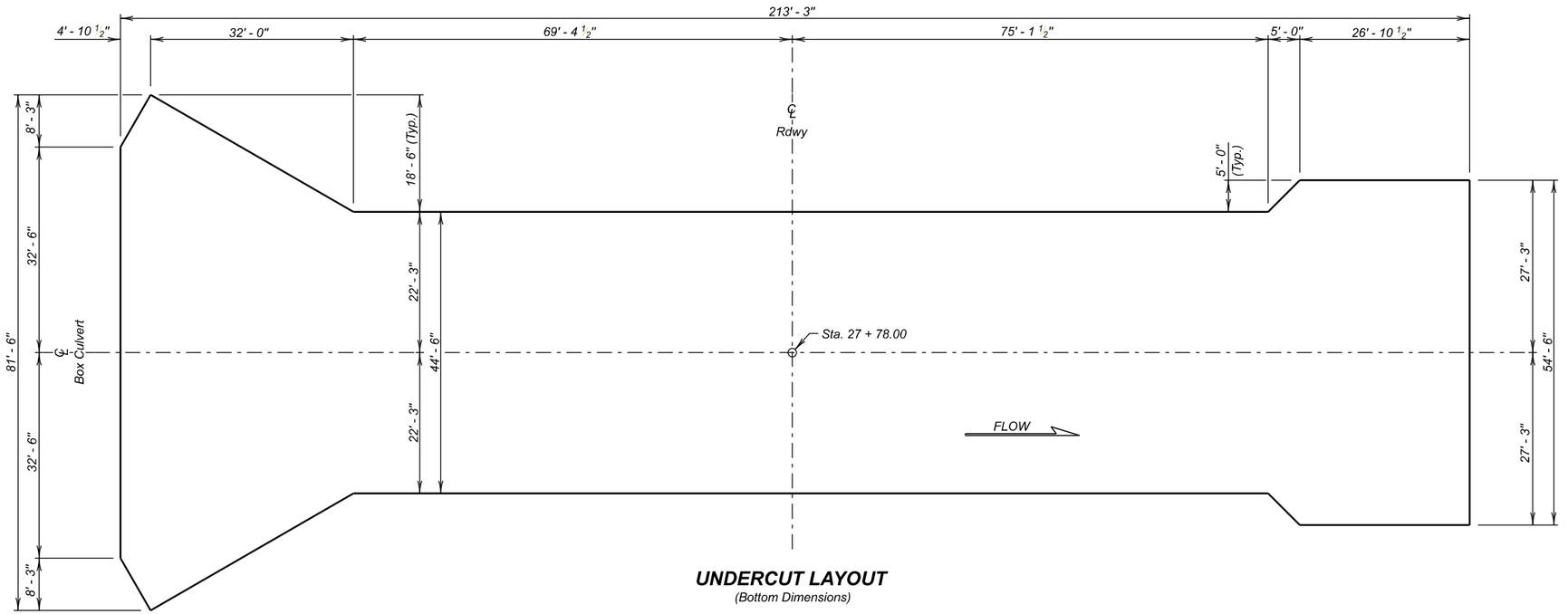
FEBRUARY 2024

1 OF 8

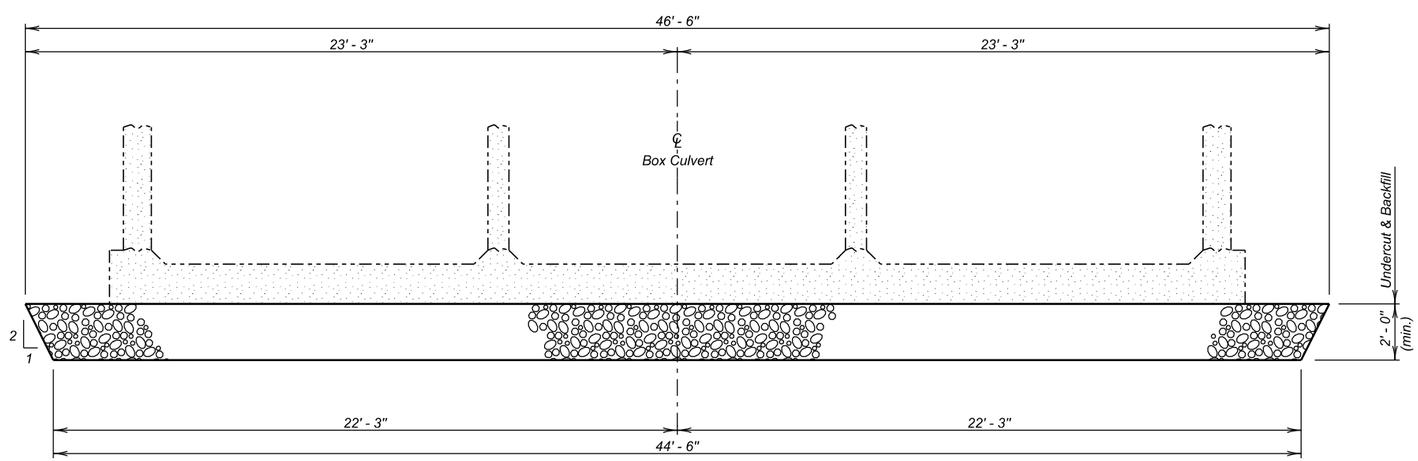
-X028-

DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU	ER	BT	BRIDGE ENGINEER
JONS06G7	06G7GA01		

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E5	E99



UNDERCUT LAYOUT
(Bottom Dimensions)



TYPICAL SECTION
(For Limits of Undercut)

SPECIFICATIONS

1. Design Specifications: AASHTO LRFD Bridge Design Specifications, 9th Edition.

2. Construction Specifications: South Dakota Standard Specifications for Roads and Bridges, 10-7-26 Version, Required Provisions, and Special Provisions as included in the Proposal. The Standard Specifications for Roads and Bridges are available for download and viewing at: https://dot.sd.gov/doing-business/contractors/standard-specifications

GENERAL NOTES

1. Design Live Load: HL-93 and construction loading consisting of one 7' - 6" gage axle with gross axle 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 17 ft. (F17) and 20 ft. (F20).

3. Design Material Strengths: Concrete $f'c$ = 4500 p.s.i.
   Reinforcing Steel fy = 60000 p.s.i.

4. High sulfate levels are likely to be encountered on this project. All concrete will be Class A45 Concrete, Box Culvert conforming to Section 460 of the Construction Specifications, with the following modifications: the type of cement will be either a type V or a type II with 20% to 25% Class F Modified Fly Ash substituted for cement in accordance with Section 605 of the Construction Specifications.

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 $^3/_4$ 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 RCBC consist of brown to gray clay. Groundwater was encountered in the borings at an elevation of 2049.7 feet during the subsurface investigation conducted in April 2023. Dewatering will be required during construction.

ESTIMATED QUANTITIES

	ITEM	UNIT	QUANTITY
⌀	Box Culvert Undercut	Cu. Yd.	800

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

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

OVER MEDICINE CREEK — 0° SKEW
STA. 27 + 78.00 — SEC. 31-T1S-R31E
STR. NO. 38-302-173 — P-B 0248(12)173
HL-93

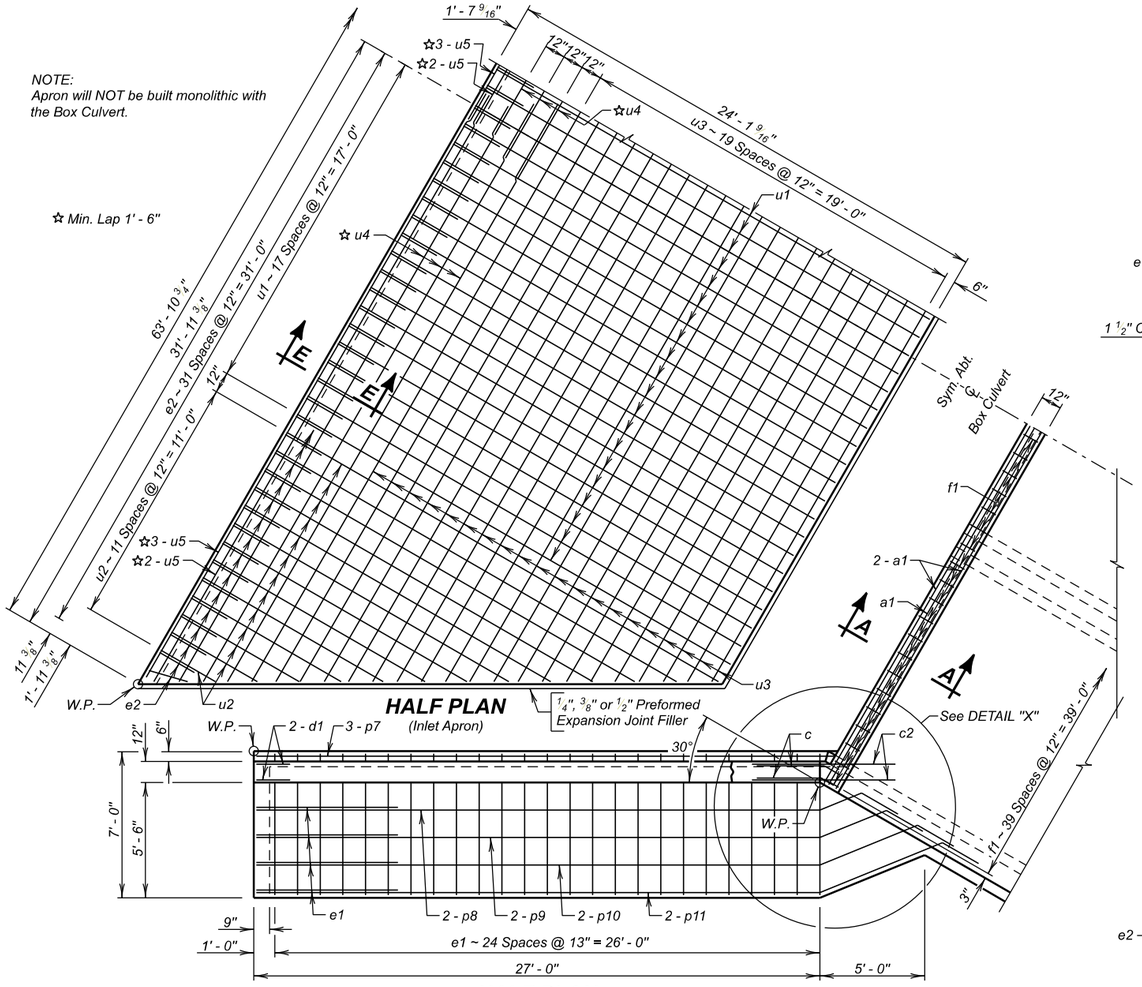
JONES COUNTY
S. D. DEPT. OF TRANSPORTATION
FEBRUARY 2024

DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU	ER	BT	Steve A Johnson BRIDGE ENGINEER
JONS06G7	06G7GA02		

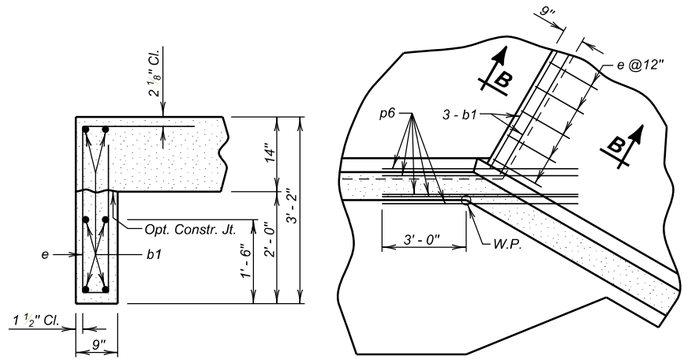
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E6	E99

NOTE:
Apron will NOT be built monolithic with the Box Culvert.

☆ Min. Lap 1' - 6"

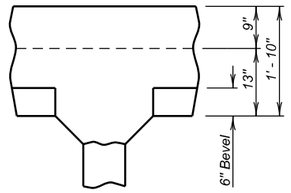


HALF PLAN
(Inlet Apron)

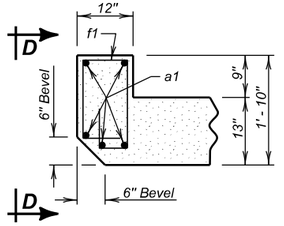


SECTION B - B

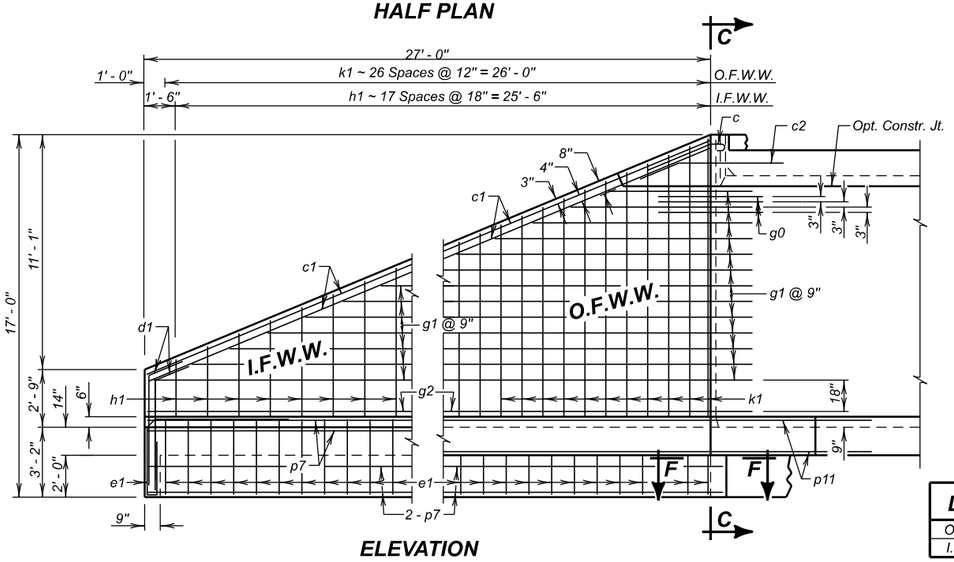
DETAIL "X"
(At Bottom Slab)



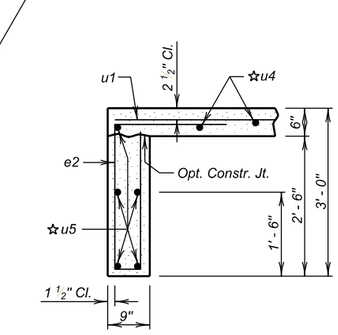
VIEW D - D
(At Interior Wall)



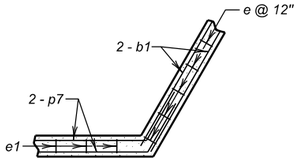
SECTION A - A
(At Top Slab)



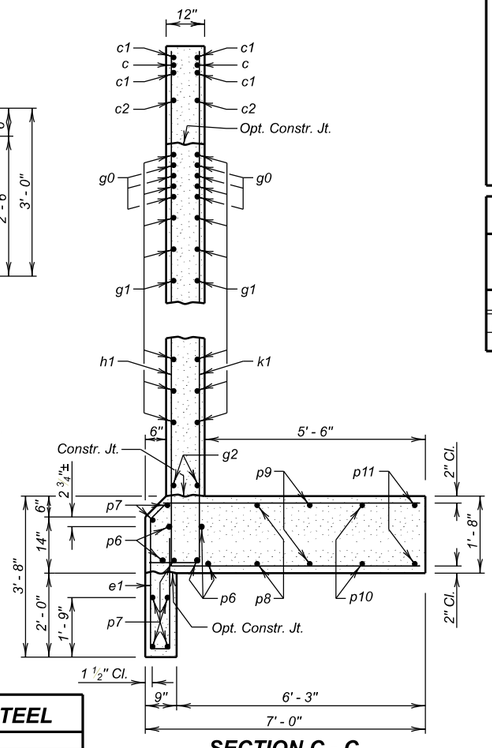
ELEVATION



SECTION E - E



SECTION F - F



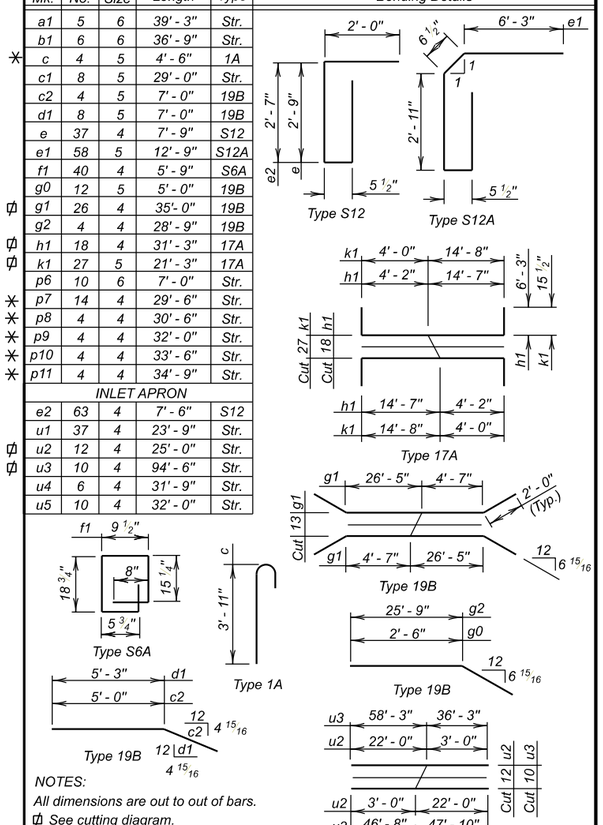
SECTION C - C

LEGEND FOR PLACING RE-STEEL

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

REINFORCING SCHEDULE

	Mk.	No.	Size	Length	Type	Bending Details
	a1	5	6	39' - 3"	Str.	
	b1	6	6	36' - 9"	Str.	
*	c	4	5	4' - 6"	1A	
	c1	8	5	29' - 0"	Str.	
	c2	4	5	7' - 0"	19B	
	d1	8	5	7' - 0"	19B	
	e	37	4	7' - 9"	S12	
	e1	58	5	12' - 9"	S12A	
	f1	40	4	5' - 9"	S6A	
	g0	12	5	5' - 0"	19B	
℄	g1	26	4	35' - 0"	19B	
	g2	4	4	28' - 9"	19B	
℄	h1	18	4	31' - 3"	17A	
℄	k1	27	5	21' - 3"	17A	
	p6	10	6	7' - 0"	Str.	
*	p7	14	4	29' - 6"	Str.	
*	p8	4	4	30' - 6"	Str.	
*	p9	4	4	32' - 0"	Str.	
*	p10	4	4	33' - 6"	Str.	
*	p11	4	4	34' - 9"	Str.	
	INLET APRON					
	e2	63	4	7' - 6"	S12	
	u1	37	4	23' - 9"	Str.	
	u2	12	4	25' - 0"	Str.	
	u3	10	4	94' - 6"	Str.	
	u4	6	4	31' - 9"	Str.	
	u5	10	4	32' - 0"	Str.	



NOTES:
All dimensions are out to out of bars.
℄ 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	52.3	4536	27.6
Inlet Apron	26.7	2075	26.7

SITE 1
ALTERNATE A

INLET DETAILS

FOR

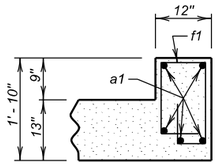
3 - 12' X 12' BOX CULVERT (C.I.P.)

OVER MEDICINE CREEK — 0° SKEW
STA. 27 + 78.00 — SEC. 31-T1S-R31E
STR. NO. 38-302-173 — P-B 0248(12)173
HL-93

JONES COUNTY
S. D. DEPT. OF TRANSPORTATION
FEBRUARY 2024

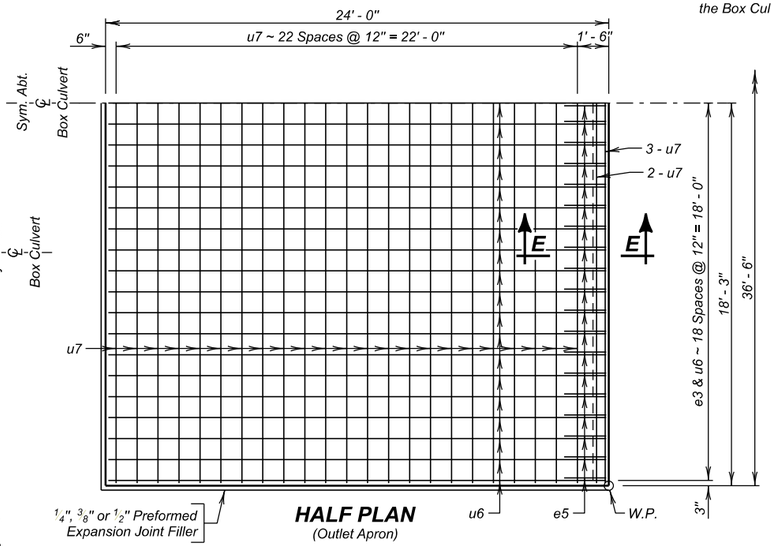
DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU	ER	BT	Steve A Johnson BRIDGE ENGINEER
JONS06G7	06G7GA03		

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E7	E99



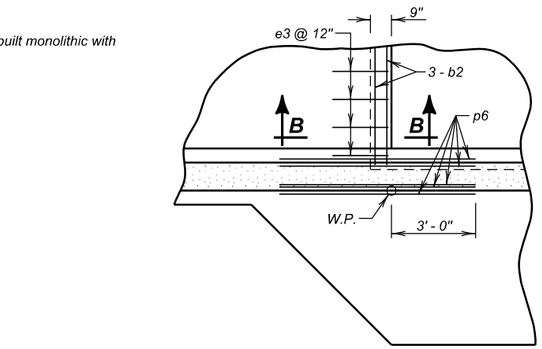
SECTION A - A
(At Top Slab)

NOTE:
Apron will NOT be built monolithic with the Box Culvert.

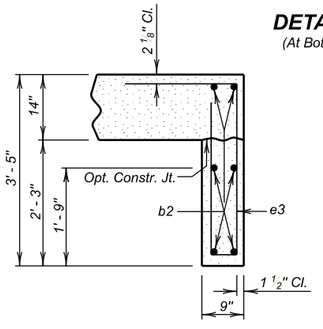


HALF PLAN
(Outlet Apron)

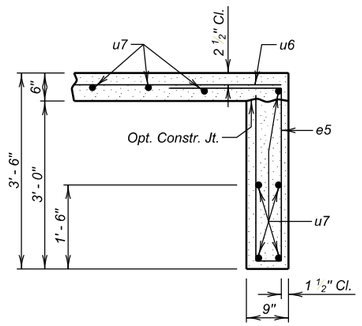
HALF PLAN



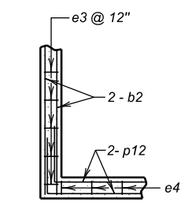
DETAIL "X"
(At Bottom Slab)



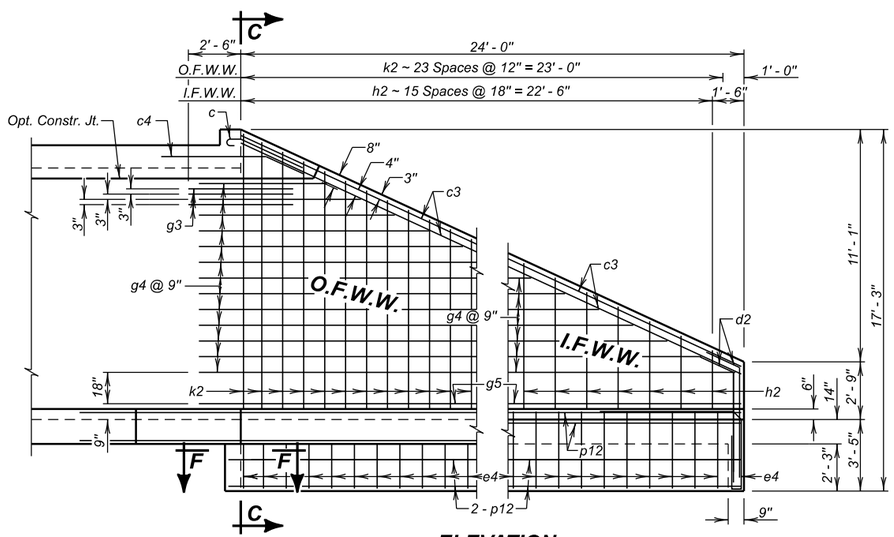
SECTION B - B



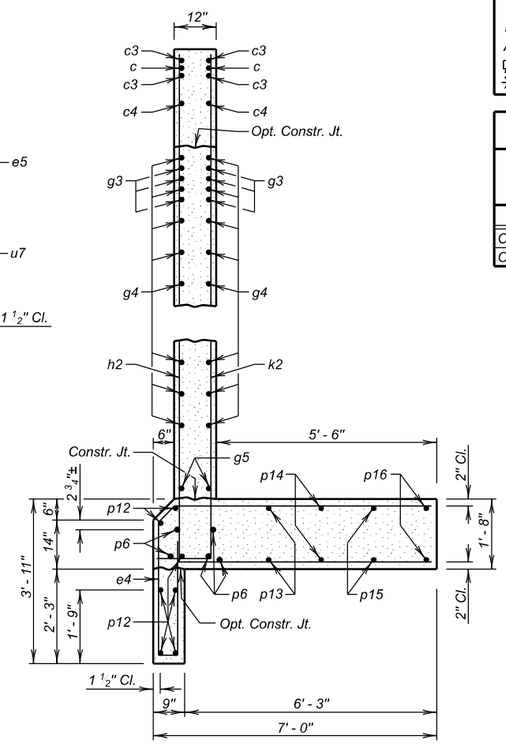
SECTION E - E



SECTION F - F



ELEVATION

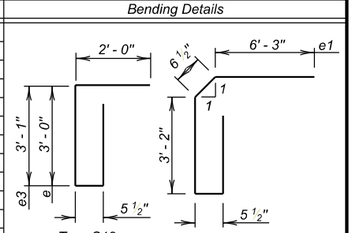


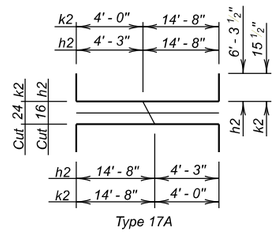
SECTION C - C

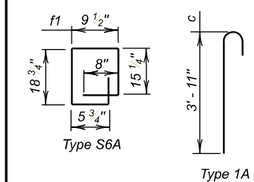
REINFORCING SCHEDULE

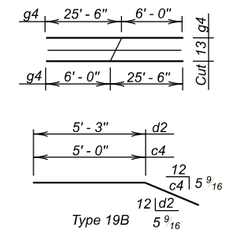
Mk.	No.	Size	Length	Type
a1	5	6	39' - 3"	Str.
b2	4	6	37' - 9"	Str.
c	4	5	4' - 6"	1A
c3	8	5	26' - 3"	Str.
c4	4	5	7' - 0"	19B
d2	8	5	7' - 3"	19B
e3	38	4	8' - 3"	S12
e4	52	5	13' - 3"	S12A
f1	40	4	5' - 6"	S6A
g3	12	5	5' - 0"	Str.
⌀ g4	26	4	31' - 6"	Str.
g5	4	4	25' - 9"	Str.
⌀ h2	16	4	31' - 6"	17A
⌀ k2	24	5	21' - 3"	17A
p6	10	6	7' - 0"	Str.
✳ p12	14	4	26' - 6"	Str.
✳ p13	4	4	28' - 0"	Str.
✳ p14	4	4	30' - 0"	Str.
✳ p15	4	4	31' - 9"	Str.
✳ p16	4	4	33' - 6"	Str.
OUTLET APRON				
e5	37	4	8' - 6"	S12
u6	37	4	23' - 9"	Str.
u7	28	4	36' - 3"	Str.

Bending Details









NOTES:
All dimensions are out to out of bars.
⌀ *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.
Outlet	48.5	4267	23.8
Outlet Apron	19.3	1475	19.3

LEGEND FOR PLACING RE-STEEL

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

SITE 1
ALTERNATE A

OUTLET DETAILS

FOR

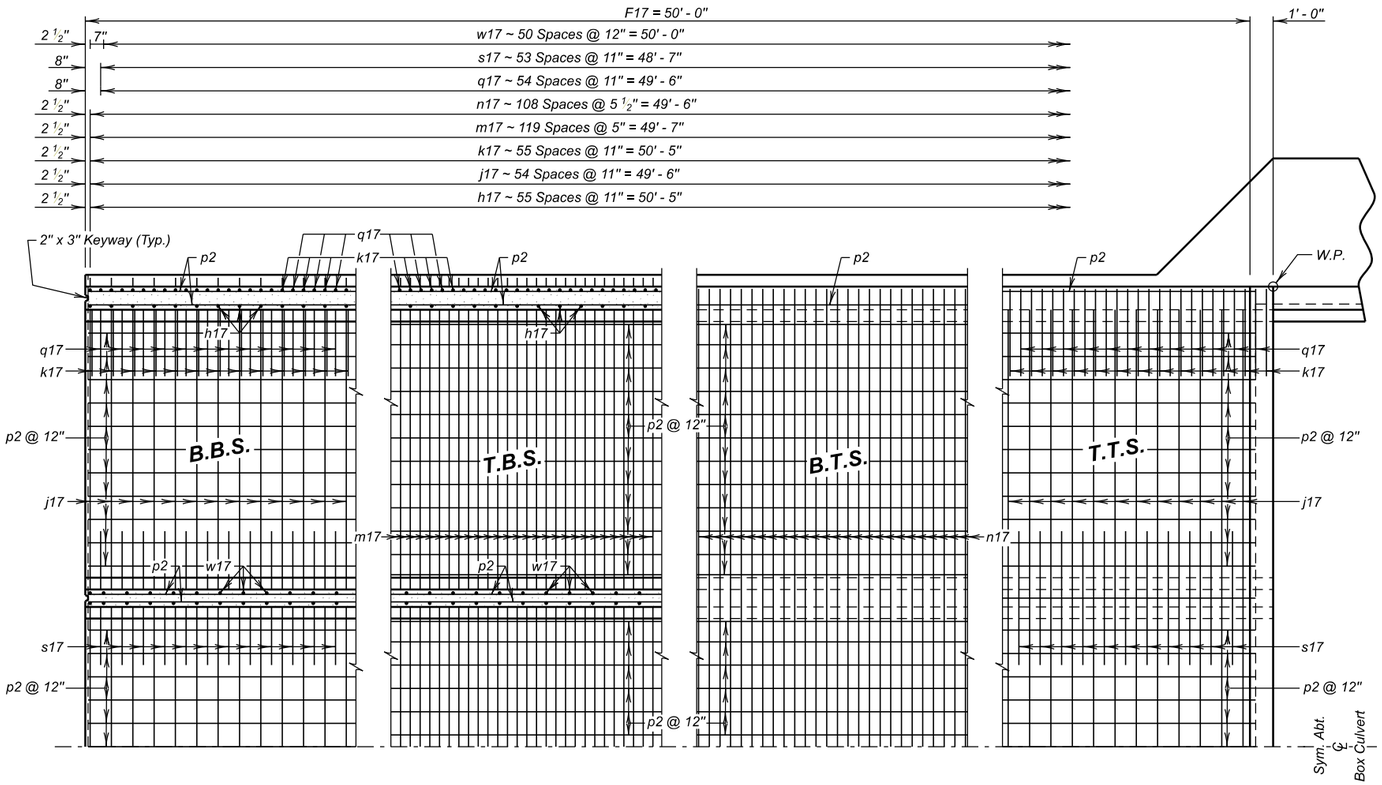
3 - 12' X 12' BOX CULVERT (C.I.P.)

OVER MEDICINE CREEK — 0° SKEW
STA. 27 + 78.00 — SEC. 31-T1S-R31E
STR. NO. 38-302-173 — P-B 0248(12)173
HL-93

JONES COUNTY
S. D. DEPT. OF TRANSPORTATION
FEBRUARY 2024

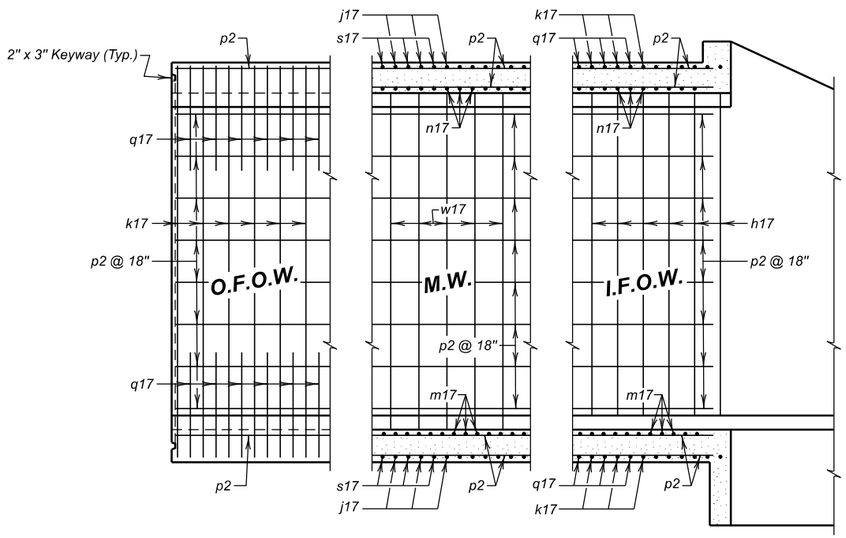
DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU	ER	BT	Steve A Johnson BRIDGE ENGINEER
JONS06G7	06G7GA04		

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E8	E99

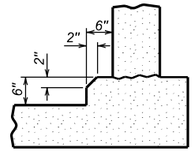


HALF PLAN

(Outlet End shown, Inlet similar by rotation)



ELEVATION



OPTIONAL FILLET DETAIL

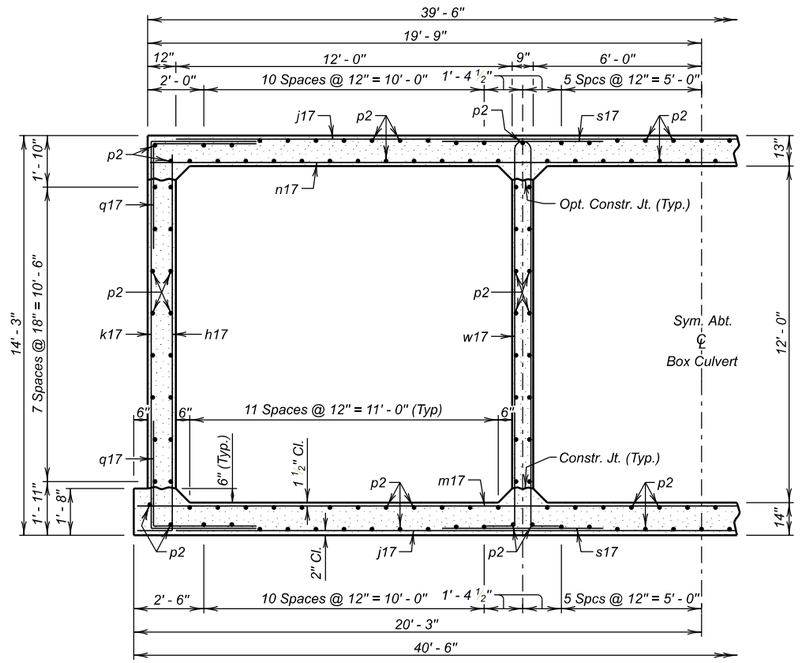
(At Bottom Slab)

NOTE:
Contractor may form the optional full fillet,with 2" Chamfer, as detailed. The cost of the additional concrete will be borne by the Contractor.

OPTIONAL POUR - BOTTOM SLAB

The Bottom Slab may be poured continuously, at the option of the Contractor, with the use of a Preformed Metal keyway conforming to the keyway dimensions and location as shown on the plans. The keyway length will be full width of the bottom slab. Care will be taken to maintain proper alignment of the keyway during the pour sequence. All additional costs of this option will be borne by the Contractor.

△ Place z1 bars thru construction joint between barrel sections as shown on Standard Plate No. 460.10. Quantity of z1 bars are for two construction joints.



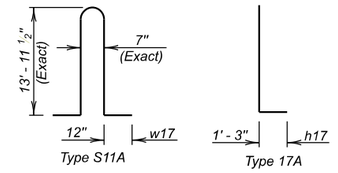
F17 BARREL HALF SECTION

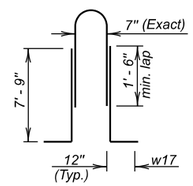
(17' - 0" Maximum Fill)

REINFORCING SCHEDULE

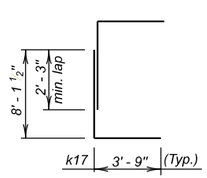
(For 2 - F17 Barrel End Sections)

Mk.	No.	Size	Length	Type	Bending Details
h17	224	5	14' - 9"	17A	
j17	220	6	37' - 6"	Str.	
k17	224	5	21' - 6"	17	
m17	240	5	40' - 3"	Str.	
n17	218	5	39' - 3"	Str.	
p2	432	4	50' - 3"	Str.	
q17	440	5	7' - 6"	17A	
s17	432	6	5' - 9"	Str.	
w17	208	4	30' - 6"	S11A	
△ z1	208	5	3' - 6"	Str.	

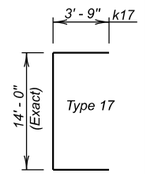




OPTIONAL w17 SPLICE DETAIL

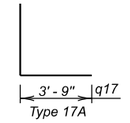


OPTIONAL k17 SPLICE DETAIL



Contractor may use optional reinforcing steel splices, as shown. The cost of the additional reinforcing steel will be borne by the Contractor.

NOTES:
All dimensions are out to out of bars.
Request for additional 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.



ESTIMATED QUANTITIES

ITEM	Class A45 Concrete, Box Culvert	Reinforcing Steel	Structure Excavation, Box Culvert
UNIT	Cu.Yd.	Lb.	Cu.Yd.
2 - F17 Barrel End Sections @ 50' - 0"	496.5	66497	175.0

LEGEND FOR PLACING RE-STEEL

T.T.S. - Top of Top Slab
B.T.S. - Bottom of Top Slab
T.B.S. - Top of Bottom Slab
B.B.S. - Bottom of Bottom Slab
O.F.O.W. - Outside Face of Outside Wall
I.F.O.W. - Inside Face of Outside Wall
M.W. - Middle Wall

SITE 1
ALTERNATE A

F17 BARREL END SECTION DETAILS (50' - 0")

FOR

3 - 12' X 12' BOX CULVERT (C.I.P.)

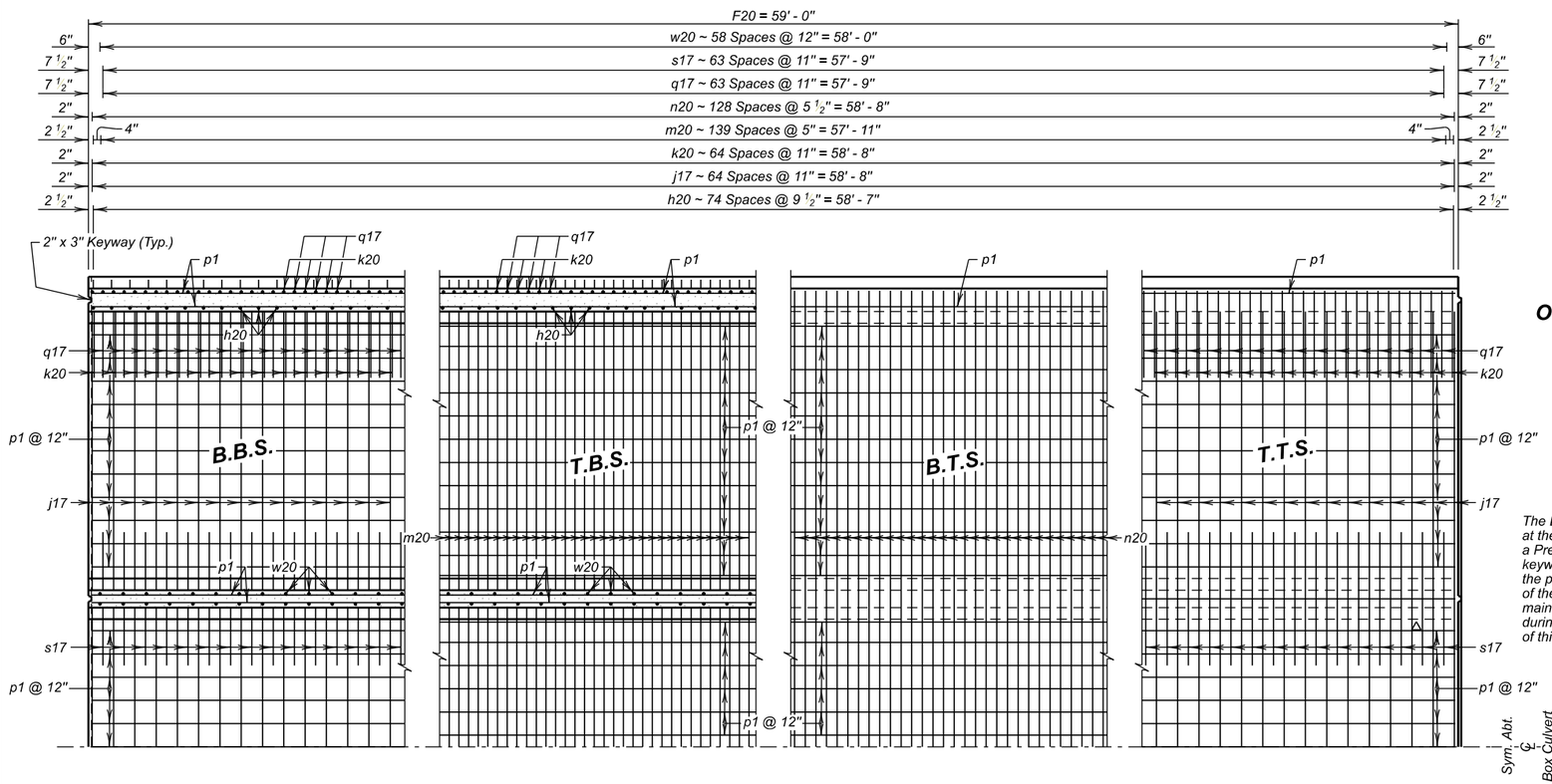
OVER MEDICINE CREEK — 0° SKEW
STA. 27 + 78.00 — SEC. 31-T1S-R31E
STR. NO. 38-302-173 — P-B 0248(12)173
HL-93

JONES COUNTY
S. D. DEPT. OF TRANSPORTATION
FEBRUARY 2024

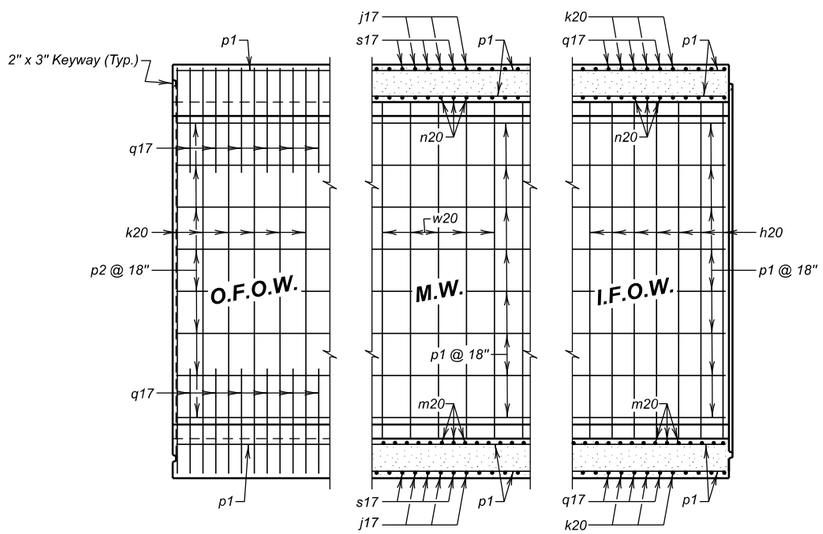
5 OF 8

DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU	ER	BT	Steve A Johnson BRIDGE ENGINEER
JONS06G7	06G7GA05		

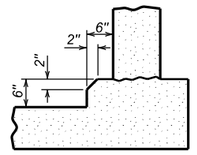
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E9	E99



HALF PLAN



ELEVATION



OPTIONAL FILLET DETAIL

(At Bottom Slab)

NOTE:
Contractor may form the optional full fillet,with 2" Chamfer, as detailed. The cost of the additional concrete will be borne by the Contractor.

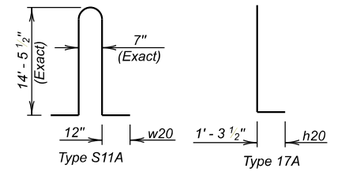
OPTIONAL POUR - BOTTOM SLAB

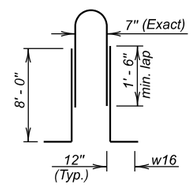
The Bottom Slab may be poured continuously, at the option of the Contractor, with the use of a Preformed Metal keyway conforming to the keyway dimensions and location as shown on the plans. The keyway length will be full width of the bottom slab. Care will be taken to maintain proper alignment of the keyway during the pour sequence. All additional costs of this option will be borne by the Contractor.

REINFORCING SCHEDULE

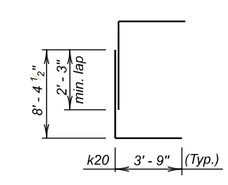
(For 1 - F20 Barrel Interior Section)

Mk.	No.	Size	Length	Type	Bending Details
h20	150	5	15' - 3"	17A	
j17	130	6	37' - 6"	Str.	
k20	130	5	22' - 0"	17	
m20	142	5	40' - 3"	Str.	
n20	129	5	39' - 3"	Str.	
p1	216	4	58' - 9"	Str.	
q17	256	5	7' - 6"	17A	
s17	256	6	5' - 9"	Str.	
w20	118	4	31' - 3"	S11A	

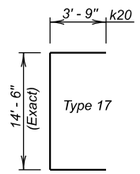




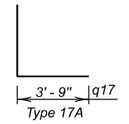
OPTIONAL w20 SPLICE DETAIL



OPTIONAL k20 SPLICE DETAIL



Contractor may use optional reinforcing steel splices, as shown. The cost of the additional reinforcing steel will be borne by the Contractor.



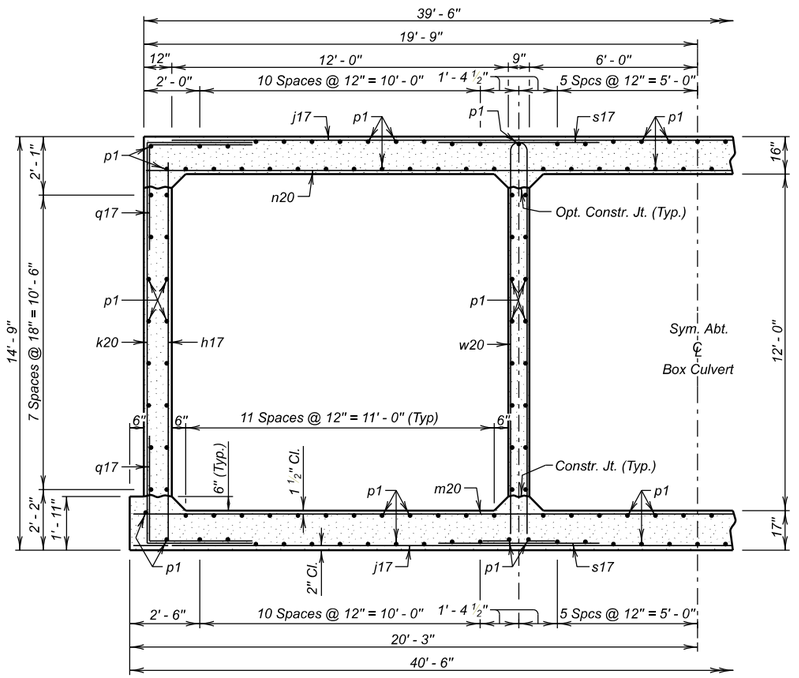
NOTES:
All dimensions are out to out of bars.
Request for additional reinforcing steel splices at points other than those shown, must be submitted to the Engineer for prior approval. If additional splices are approved, no payment will be allowed for the added quantity of reinforcing steel.

ESTIMATED QUANTITIES

ITEM	Class A45 Concrete, Box Culvert	Reinforcing Steel	Structure Excavation, Box Culvert
UNIT	Cu.Yd.	Lb.	Cu.Yd.
1 - F20 Barrel Interior Section @ 59' - 0"	336.6	39087	125.4

LEGEND FOR PLACING RE-STEEL

T.T.S. - Top of Top Slab
B.T.S. - Bottom of Top Slab
T.B.S. - Top of Bottom Slab
B.B.S. - Bottom of Bottom Slab
O.F.O.W. - Outside Face of Outside Wall
I.F.O.W. - Inside Face of Outside Wall
M.W. - Middle Wall



F20 BARREL HALF SECTION

(20' - 0" Maximum Fill)

SITE 1
ALTERNATE A

F20 BARREL INTERIOR SECTION DETAILS (58' - 0")

FOR

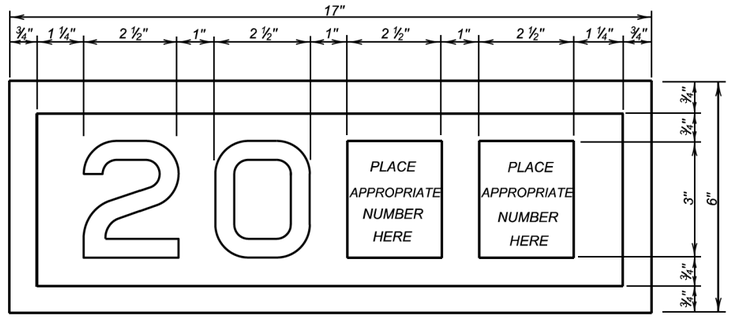
3 - 12' X 12' BOX CULVERT (C.I.P.)

OVER MEDICINE CREEK — 0° SKEW
STA. 27 + 78.00 — SEC. 31-T1S-R31E
STR. NO. 38-302-173 — P-B 0248(12)173
HL-93

JONES COUNTY
S. D. DEPT. OF TRANSPORTATION
FEBRUARY 2024

DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU	ER	BT	Steve A Johnson BRIDGE ENGINEER
JONS06G7	06G7GA06		

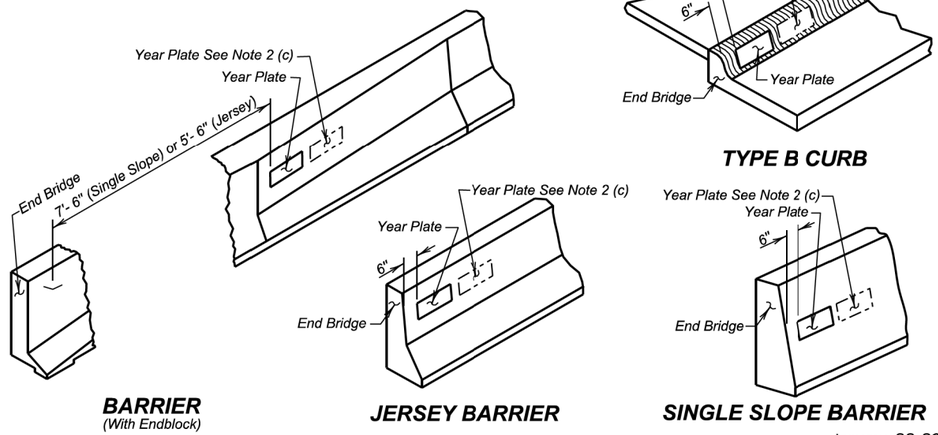
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E10	E99



YEAR PLATE DETAILS

GENERAL NOTES:

1. Year plates of the general dimensions shown will be constructed on all box culverts and bridges. The year plates will 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 (1/2) inch in depth.
2. Year plates will be located on structure(s) as follows:
   a. On cast-in-place box culverts the year plates will 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 will be centered laterally on the upstream face of the top slab. Where an extended interior wall interferes with this location, the year plate will be centered in an adjacent barrel.
   b. On bridges with six (6) inch curbs, "Jersey" shaped barriers with no endblocks, or "Single Slope" shaped barriers with no endblocks, the year plate will 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 barrier endblocks, the year plate will be centered on the upper sloped portion of the barrier approximately 5'- 6" for "Jersey" shaped barriers from the end of the bridge and 7'-6" for "Single Slope" shaped barriers from the end of bridge, or as designated by the Engineer. There will 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 will be placed as listed above and the other located adjacent to it. Both year plates will 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 will be incidental to other contract items.



BARRIER (With Endblock)

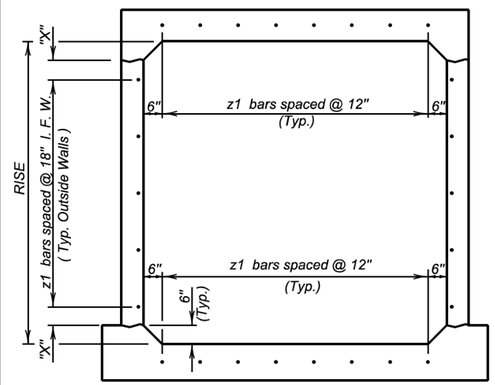
TYPE B CURB

JERSEY BARRIER

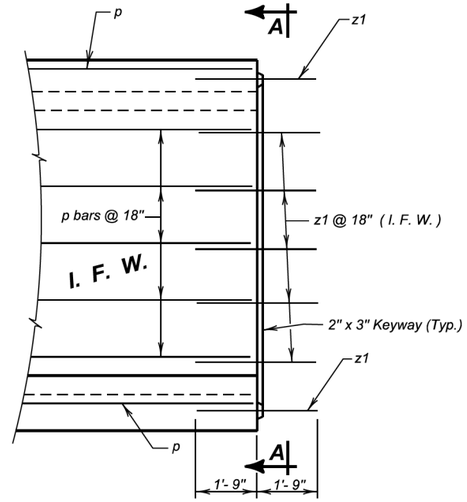
SINGLE SLOPE BARRIER

January 22, 2021

Published Date: 2027	SDDOT	YEAR PLATE DETAILS	PLATE NUMBER 460.02
			Sheet 1 Of 1

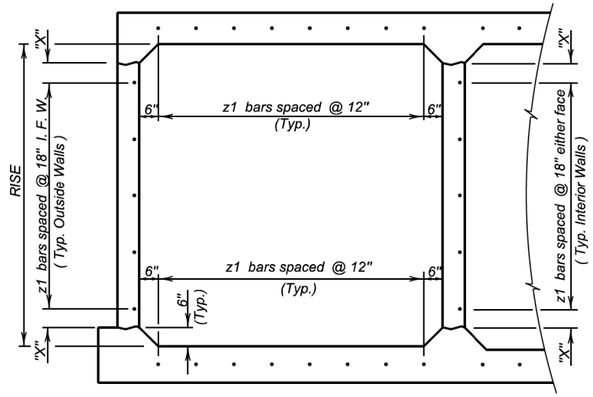


TYPICAL SINGLE BARREL VIEW A - A



ELEVATION

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



TYPICAL MULTIPLE BARREL VIEW A - A

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"
13'- 0"	9"
14'- 0"	6"

GENERAL NOTES:

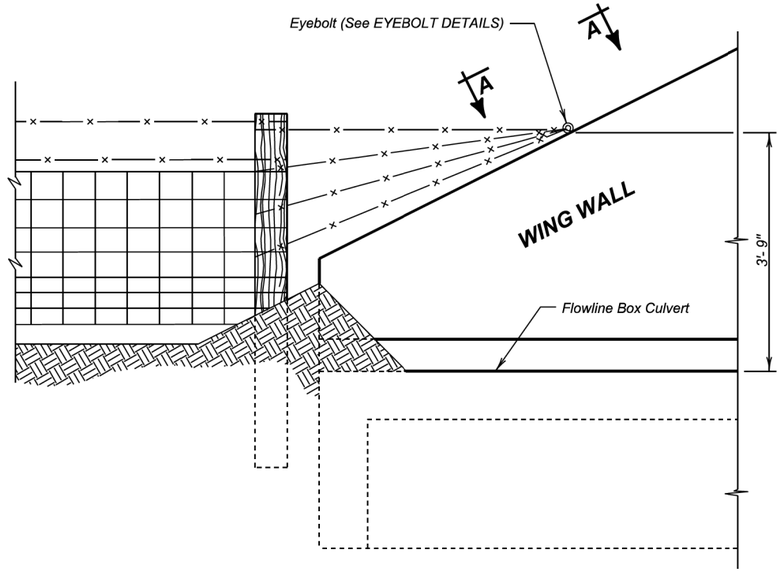
1. z1 bars will be placed in the middle of the 2" X 3" keyway in the top and bottom slabs. z1 bars will be lapped with the longitudinal p bars in the inside face of the wall for outside walls and in either face for interior walls. z1 bars are listed and included elsewhere in plans.
2. Drainage Fabric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

June 1, 2022

Published Date: 2027	SDDOT	BOX CULVERT BARREL TIE REINFORCEMENT	PLATE NUMBER 460.10
			Sheet 1 of 1

SITE 1
ALTERNATE A

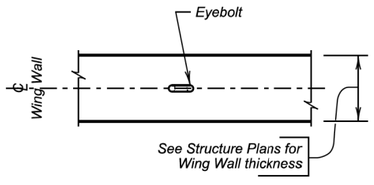
3 - 12' X 12' BOX CULVERT (C.I.P.)
STR. NO. 38-302-173
FEBRUARY 2024



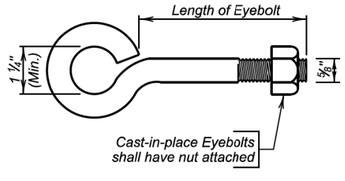
DETAIL FOR FENCE ANCHORS

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 ⅞ 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 ⅞ 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

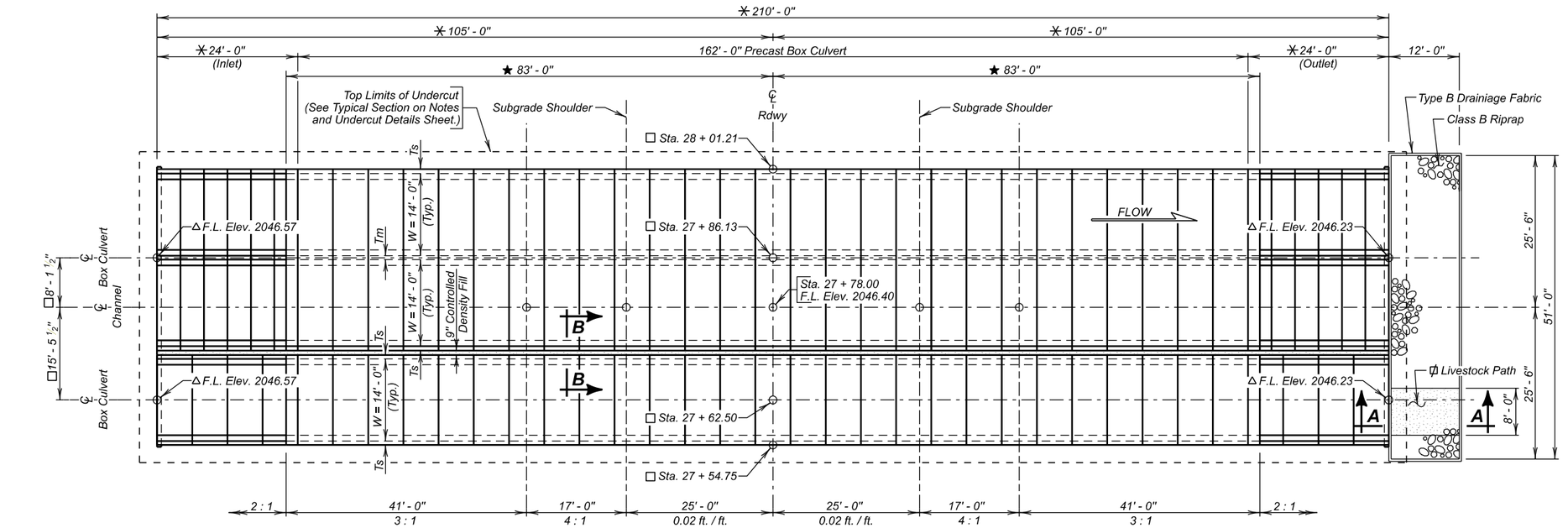
December 23,2012

Published Date: 2027	SDDOT	FENCE ANCHORS FOR BOX CULVERT WING WALLS	PLATE NUMBER 620.16 Sheet 1 of 1

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

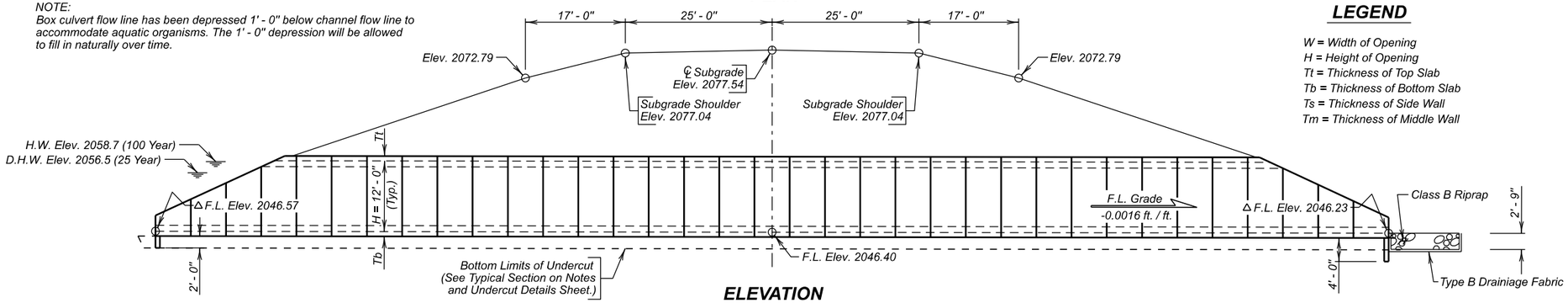
✳ Dimension may vary with installation and/or fabrication. See Shop Plans for actual installation length.
★ Minimum distance to satisfy fill slope.
△ Based on dimensions shown.
☐ Based on Ts = 9" and Tm = 8".

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E12	E99



PLAN

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



ELEVATION

HYDRAULIC DATA

Q_d	1205 cfs
A_d	377 sq ft
V_d	3.2 fps
Q_F	1205 cfs
Q_{100}	2160 cfs
Q_{OT}	>Q_{100}
V_{max}	4.8 fps

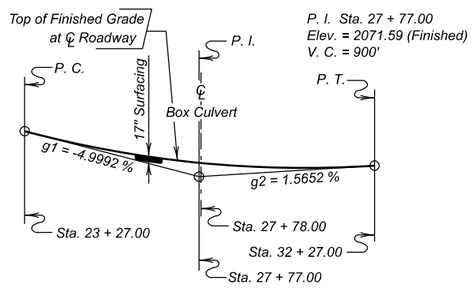
Q_d = Design discharge for the proposed culvert based on 25 year frequency. El. 2056.5.

Q_{OT} = Overtopping discharge and frequency > Q_{100} year recurrence interval. El. 2077.0 @ Sta. 30 + 00.00 ±.

Q_F = 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. 2058.7.

V_{max} = Maximum computed outlet velocity for the proposed culvert, based on 100 year frequency.



P. I. Sta. 27 + 77.00
Elev. = 2071.59 (Finished)
V. C. = 900'

VERTICAL CURVE DATA

LEGEND

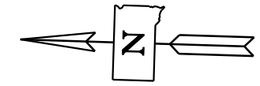
W = Width of Opening
H = Height of Opening
Tt = Thickness of Top Slab
Tb = Thickness of Bottom Slab
Ts = Thickness of Side Wall
Tm = Thickness of Middle Wall

ESTIMATED QUANTITIES

	ITEM	UNIT	QUANTITY
⩝	Structure Excavation, Box Culvert	Cu. Yd.	308.6
	Box Culvert Undercut	Cu. Yd.	817
	Controlled Density Fill	Cu. Yd.	73.9
≠	Class B Riprap	Ton	87.3
⊛	Base Course	Ton	3.4
	Type B Drainage Fabric	Sq. Yd.	107
	14' X 12' Precast Concrete Culvert, Furnish	Ft.	162
	14' X 12' Precast Concrete Culvert, Install	Ft.	162
	14' X 12' Precast Concrete Culvert End Section, Furnish	Each	2
	14' X 12' Precast Concrete Culvert End Section, Install	Each	2
	2 - 14' X 12' Precast Concrete Culvert, Furnish	Ft.	162
	2 - 14' X 12' Precast Concrete Culvert, Install	Ft.	162
	2 - 14' X 12' Precast Concrete Culvert End Section, Furnish	Each	2
	2 - 14' X 12' Precast Concrete Culvert End Section, Install	Each	2

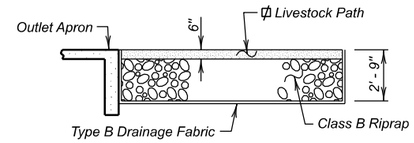
⩝ Quantity is based on 10" bottom slab, 10" top slab, 9" outside walls and 8" interior walls.
≠ For estimating purposes only, a factor of 1.4 tons/cu. yd. was used to convert Cu. Yd. to Tons.
⊛ For estimating purposes only, a factor of 1.89 tons/cu. yd. was used to convert Cu. Yds. to Tons.

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

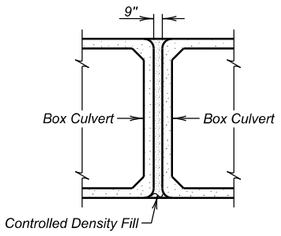


℄ NOTES:

1. Base Course will provide a smooth path for livestock.
2. Base Course is estimated using 6" of material to account for voids in the Class B Riprap.



SECTION A - A



SECTION B - B

-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

SITE 1
ALTERNATE B

GENERAL DRAWING AND QUANTITIES

FOR

3 - 14' X 12' BOX CULVERT (PRECAST)

OVER MEDICINE CREEK — 0° SKEW
STA. 27 + 78.00 — SEC. 31-T1S-R31E
STR. NO. 38-302-173 — P-B 0248(12)173
PCN 06G7 — HL-93

JONES COUNTY
S. D. DEPT. OF TRANSPORTATION
FEBRUARY 2024

-X028-

DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU	ER	BT	Steve A Johnson BRIDGE ENGINEER
JONS06G7	06G7GA09		

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E13	E99

SPECIFICATIONS

Use South Dakota Standard Specifications for Roads and Bridges, 10-7-26 Version, Required Provisions, and Special Provisions as included in the Proposal. The Standard Specifications for Roads and Bridges are available for download and viewing at: https://dot.sd.gov/doing-business/contractors/standard-specifications

GENERAL NOTES

Design will be in accordance with Section 560 of the Specifications with the following criteria:

1. *Box culvert and box culvert end section design will conform to the AASHTO LRFD Bridge Design Specifications, 9th Edition.*
2. *Design Live Load: HL-93 and construction loading consisting of one 7' - 6" gage axle with gross axle 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.*
3. *The box culvert will be load rated in accordance with the AASHTO Manual for Bridge Evaluation, 2018 Edition with the latest Interim Revisions using the LRFR method. The rating will include evaluation of the Design HL-93 truck at both Inventory and Operating levels and a Legal Load rating for three SD legal trucks (Type 3, 3S2 and 3-2) as well as the notional rating load and four specialized hauling vehicles. The structure will also be evaluated for the emergency vehicles, EV2 and EV3, at the legal load rating level. All sections of the box culvert will 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 will rate greater than 1.0 at legal load rating level. AASHTOWare Bridge Rating (BrR) is required to be used to rate the box culvert. Include the BrR rating model and a load rating summary table with load rating calculations. Submit load rating calculations with the design and independent check design calculations or shop plans, as appropriate.*
4. *The design of the barrel sections will be based on a minimum fill height of 2 foot and include all subsequent fill heights up to and including the maximum fill height of 20 ft. over the box culvert.*
5. *Minimum inside corner fillet will be 6 in.*
6. *Minimum precast barrel section length will be 6 - foot sections; however, no more than two 4 - foot sections are allowed in any one length of precast barrel.*
7. *Lift holes will be plugged with an approved nonshrinkable grout.*
8. *The Fabricator will 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 will be in accordance with the final approved shop plans.*
11. *Care will be taken when placing sections. Sections will be only moved using the lifting holes by approved equipment.*
12. *Soils below the bottom of the proposed RCBC consist of brown to gray clay. Groundwater was encountered in the borings at an elevation of 2049.7 feet during the subsurface investigation conducted in April 2023. Dewatering will be required during construction.*

DESIGN MIX OF CONCRETE

1. *Mix will be as per fabricator's design; however, a minimum compressive strength will not be less than 4500 p.s.i. at 28 days.*
2. *High sulfate levels are likely to be encountered on this project. All concrete will be Class A45 Concrete conforming to Section 460 of the Construction Specifications, with the following modifications: the type of cement will be either a Type V or Type II with 20 to 25% Class F Modified Fly Ash substituted for cement in accordance with Section 605 of the Construction Specifications. The Water/Cementitious material ratio will not exceed 0.45 as defined in Section 460.3 C.*

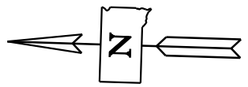
SHOP PLANS

The fabricator will submit shop plans in accordance with the Construction Specifications. Include design and independent check design, if applicable, with initial submittal.

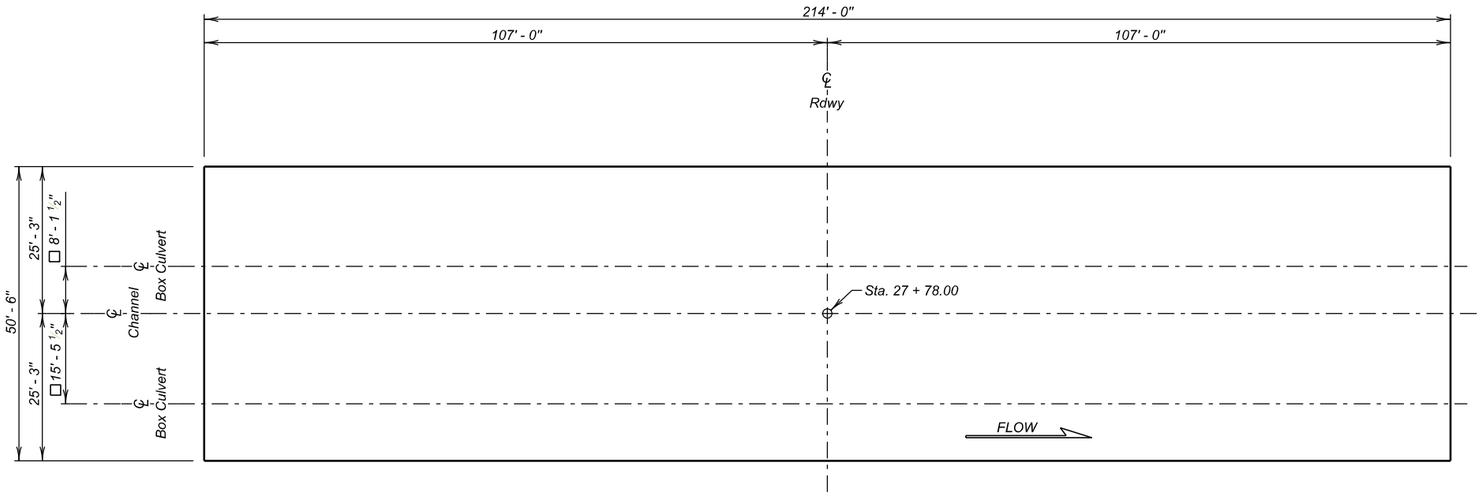
ESTIMATED QUANTITIES

ITEM	UNIT	QUANTITY
⌀ Box Culvert Undercut	Cu. Yd.	817

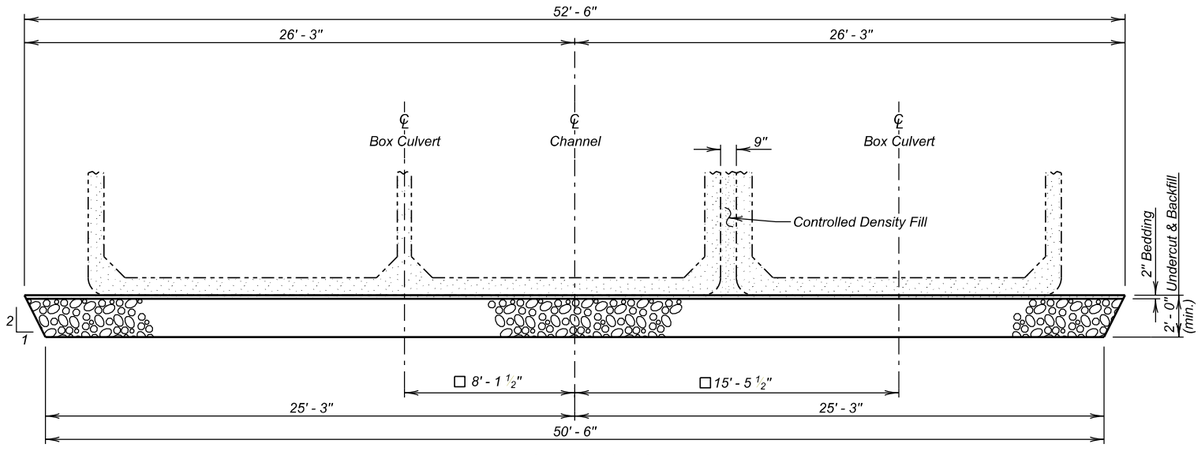
⌀ *For payment, quantity is based on plan shown undercut dimensions and will not be measured unless the Engineer orders a change.*



□ *Based on Ts = 9" and Tm = 8".*



UNDERCUT LAYOUT
(Bottom Dimensions)



TYPICAL SECTION
(For Limits of Undercut)

SITE 1
ALTERNATE B

NOTES AND UNDERCUT DETAILS

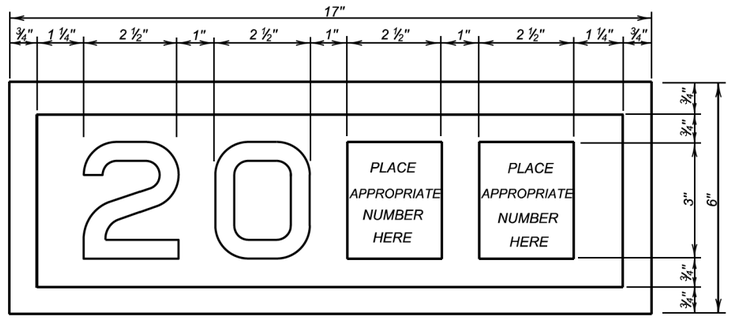
FOR

3 - 14' X 12' BOX CULVERT (PRECAST)

OVER MEDICINE CREEK — 0° SKEW
STA. 27 + 78.00 — SEC. 31-T1S-R31E
STR. NO. 38-302-173 — P-B 0248(12)173
HL-93

JONES COUNTY
S. D. DEPT. OF TRANSPORTATION
FEBRUARY 2024

DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU	ER	BT	Steve A Johnson BRIDGE ENGINEER
JONS06G7	06G7GA10		



YEAR PLATE DETAILS

GENERAL NOTES:

1. Year plates of the general dimensions shown will be constructed on all box culverts and bridges. The year plates will 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 (1/2) inch in deptn.

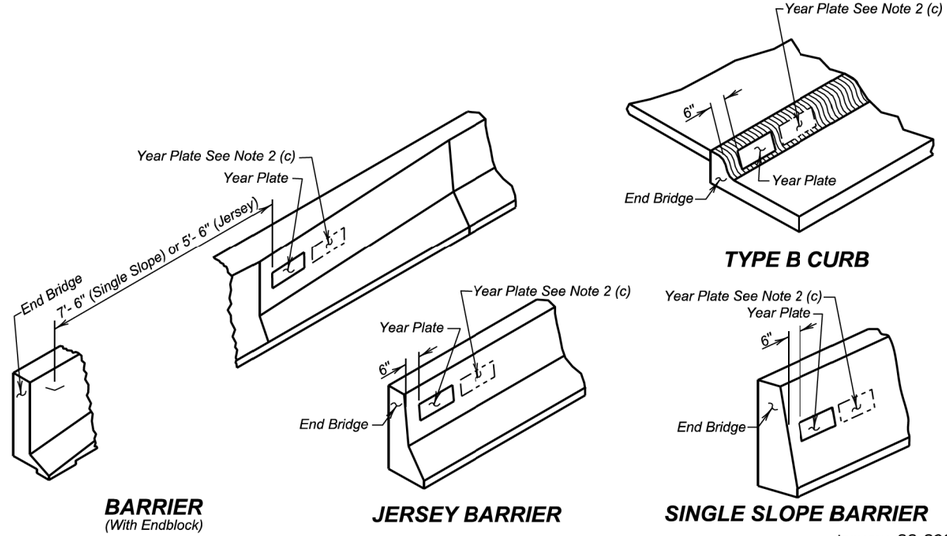
2. Year plates will be located on structure(s) as follows:

   a. On cast-in-place box culverts the year plates will 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 will be centered laterally on the upstream face of the top slab. Where an extended interior wall interferes with this location, the year plate will be centered in an adjacent barrel.

   b. On bridges with six (6) inch curbs, "Jersey" shaped barriers with no endblocks, or "Single Slope" shaped barriers with no endblocks, the year plate will 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 barrier endblocks, the year plate will be centered on the upper sloped portion of the barrier approximately 5'- 6" for "Jersey" shaped barriers from the end of the bridge and 7'-6" for "Single Slope" shaped barriers from the end of bridge, or as designated by the Engineer. There will be one year plate at each end of the bridge on opposite sides.

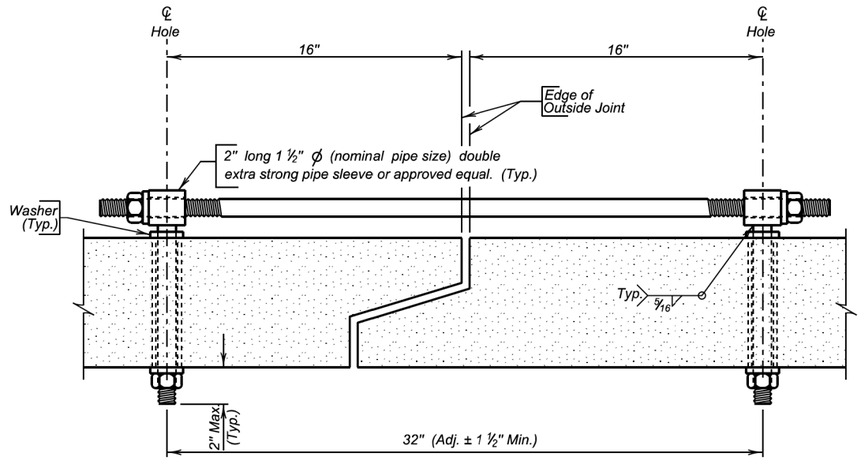
   c. When the plans specify that both the original date of construction and the date of reconstruction are to be shown, one date will be placed as listed above and the other located adjacent to it. Both year plates will be shown at each end of the bridge on opposite sides.

3. There will be no separate measurement or payment made for year plates on box culverts and bridges. All costs for this work will be incidental to other contract items.



January 22, 2021

Published Date: 2027	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 ∅ 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.

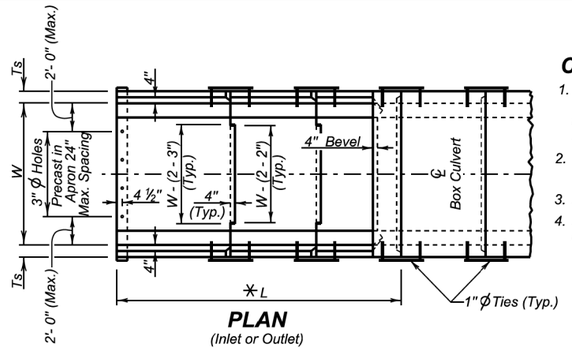
6. All costs for furnishing and installing the precast box culvert tie bolt assembly shall be incidental to the contract unit price per Foot for "Precast Concrete Box Culvert, Furnish".

March 21, 2016

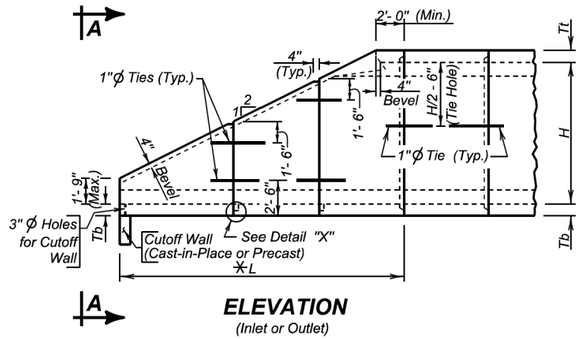
Published Date: 2027	SDDOT	PRECAST BOX CULVERT TIE BOLT ASSEMBLY DETAILS	PLATE NUMBER 560.01
			Sheet 1 of 1

SITE 2
ALTERNATE B

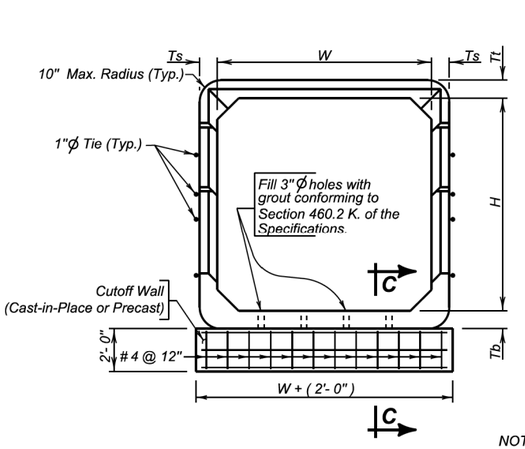
3 - 12' X 12' BOX CULVERT (PRECAST)
STR. NO. 38-302-173
FEBRUARY 2024



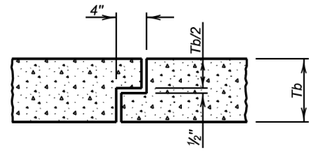
PLAN
(Inlet or Outlet)



ELEVATION
(Inlet or Outlet)

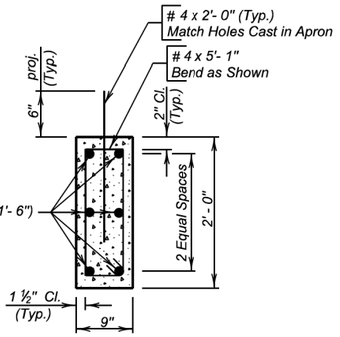


VIEW A - A



DETAIL " X "

NOTE: Joint details may vary from that shown, according to the manufacturer's design. Submit details with shop plans for approval.



SEC. C - C

LEGEND

W = Width of Opening
H = Height of Opening
Tt = Thickness of Top Slab
Tb = Thickness of Bottom Slab
Ts = Thickness of Side Wall
L = Length of End Section

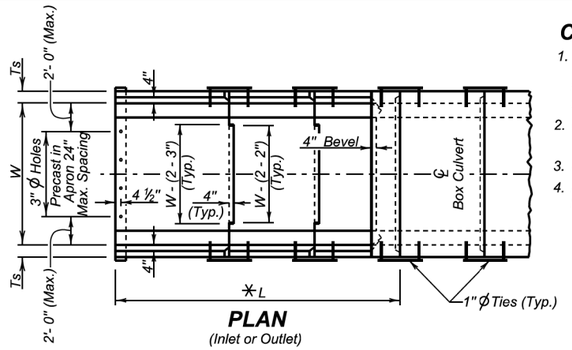
NOTES:
See GENERAL DRAWING for W and H dimensions.
Tt, Tb, L, and Ts dimensions shall be furnished by the Contractor.
⚹ Length and number of units may vary from that shown.

June 26, 2015

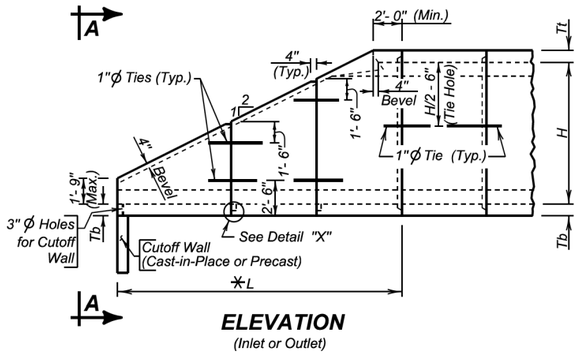
Published Date: 2027	SDDOT	PRECAST SINGLE BOX CULVERT SLOPED END SECTION DETAILS WITH 2'–0" CUTOFF WALL	PLATE NUMBER 560.10 Sheet 1 of 1

CUTOFF WALL

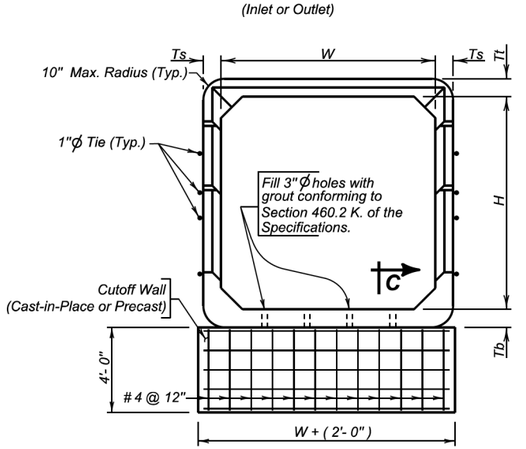
1. All costs associated with furnishing and installing the Cutoff Wall, whether precast or cast-in-place, shall be incidental to the contract unit price per each for "Precast Box Culvert End Section, Furnish".
2. Concrete for cast-in-place cutoff wall shall be Class M6 concrete in accordance with Section 462 of the Specifications.
3. All reinforcing steel shall conform to ASTM A615 Grade 60.
4. Alternate details will be allowed, subject to the approval of the Bridge Construction Engineer.



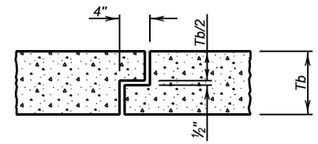
PLAN
(Inlet or Outlet)



ELEVATION
(Inlet or Outlet)

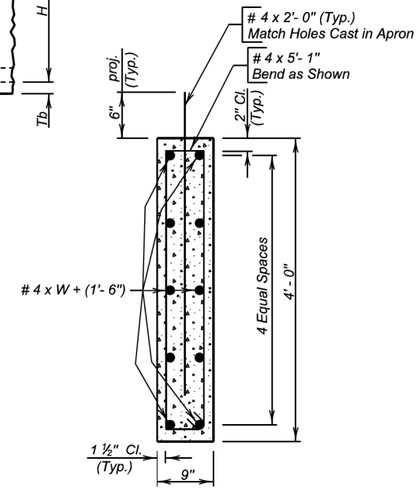


VIEW A - A



DETAIL " X "

NOTE: Joint details may vary from that shown, according to the manufacturer's design. Submit details with shop plans for approval.



SEC. C - C

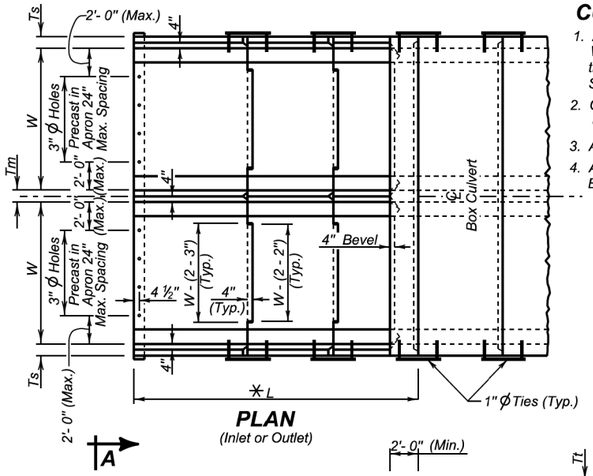
LEGEND

W = Width of Opening
H = Height of Opening
Tt = Thickness of Top Slab
Tb = Thickness of Bottom Slab
Ts = Thickness of Side Wall
L = Length of End Section

NOTES:
See GENERAL DRAWING for W and H dimensions.
Tt, Tb, L, and Ts dimensions shall be furnished by the Contractor.
⚹ Length and number of units may vary from that shown.

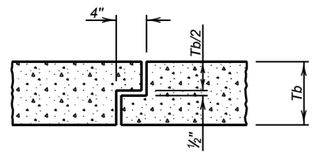
June 26, 2015

Published Date: 2027	SDDOT	PRECAST SINGLE BOX CULVERT SLOPED END SECTION DETAILS WITH 4'–0" CUTOFF WALL	PLATE NUMBER 560.11 Sheet 1 of 1



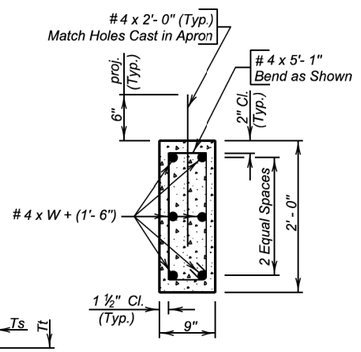
CUTOFF WALL

1. All costs associated with furnishing and installing the Cutoff Wall, whether precast or cast-in-place, shall be incidental to the contract unit price per each for "Precast Box Culvert End Section, Furnish".
2. Concrete for cast-in-place cutoff wall shall be Class M6 concrete in accordance with Section 462 of the Specifications.
3. All reinforcing steel shall conform to ASTM A615 Grade 60.
4. Alternate details will be allowed, subject to the approval of the Bridge Construction Engineer.



DETAIL " X "

NOTE: Joint details may vary from that shown, according to the manufacturer's design. Submit details with shop plans for approval.



SEC. C - C

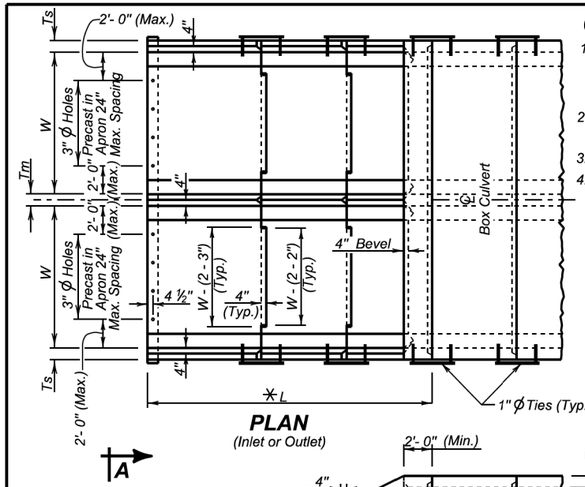
LEGEND

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
L = Length of End Section

NOTES:
See GENERAL DRAWING for W and H dimensions.
Tt, Tb, Tm, L, and Ts dimensions shall be furnished by the Contractor.
⁎ Length and number of units may vary from that shown.

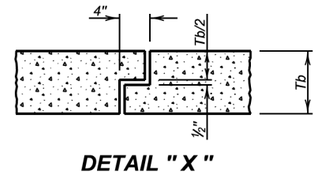
June 26, 2015

Published Date: 2027	SDDOT	PRECAST DOUBLE BOX CULVERT SLOPED END SECTION DETAILS WITH 2'–0" CUTOFF WALL	PLATE NUMBER 560.20
			Sheet 1 of 1



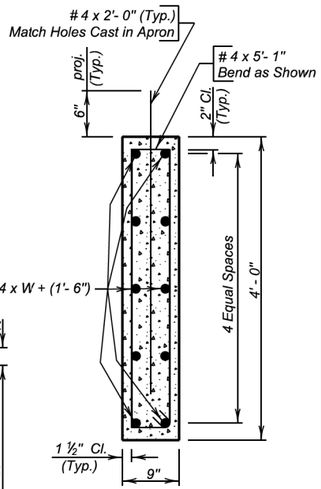
CUTOFF WALL

1. All costs associated with furnishing and installing the Cutoff Wall, whether precast or cast-in-place, shall be incidental to the contract unit price per each for "Precast Box Culvert End Section, Furnish".
2. Concrete for cast-in-place cutoff wall shall be Class M6 concrete in accordance with Section 462 of the Specifications.
3. All reinforcing steel shall conform to ASTM A615 Grade 60.
4. Alternate details will be allowed, subject to the approval of the Bridge Construction Engineer.



DETAIL " X "

NOTE: Joint details may vary from that shown, according to the manufacturer's design. Submit details with shop plans for approval.



SEC. C - C

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
L = Length of End Section

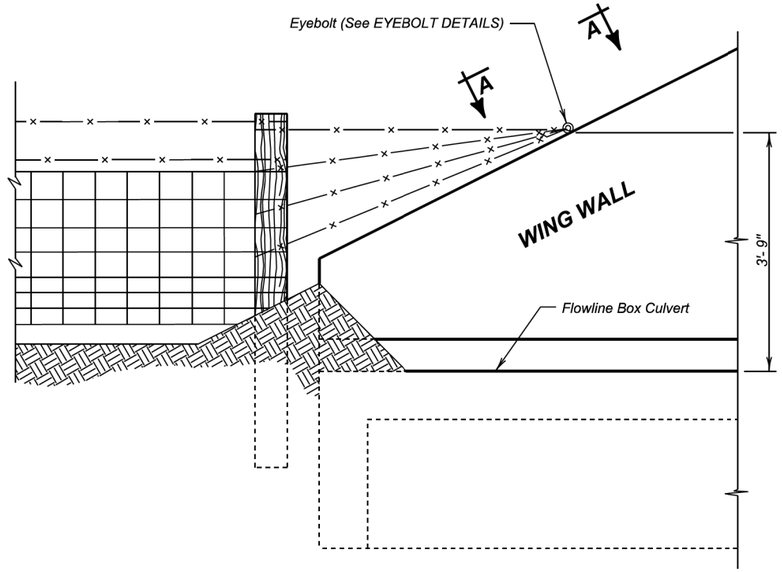
NOTES:
See GENERAL DRAWING for W and H dimensions.
Tt, Tb, Tm, L, and Ts dimensions shall be furnished by the Contractor.
⁎ Length and number of units may vary from that shown.

June 26, 2015

Published Date: 2027	SDDOT	PRECAST DOUBLE BOX CULVERT SLOPED END SECTION DETAILS WITH 4'–0" CUTOFF WALL	PLATE NUMBER 560.21
			Sheet 1 of 1

SITE 1
ALTERNATE B

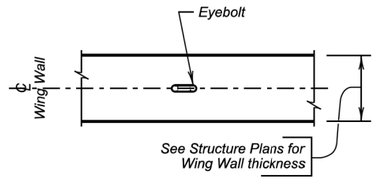
3 - 14' X 12' BOX CULVERT (PRECAST)
STR. NO. 38-302-173
FEBRUARY 2024



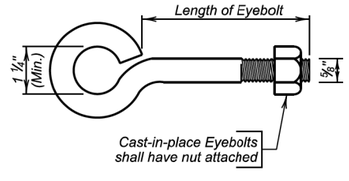
DETAIL FOR FENCE ANCHORS

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



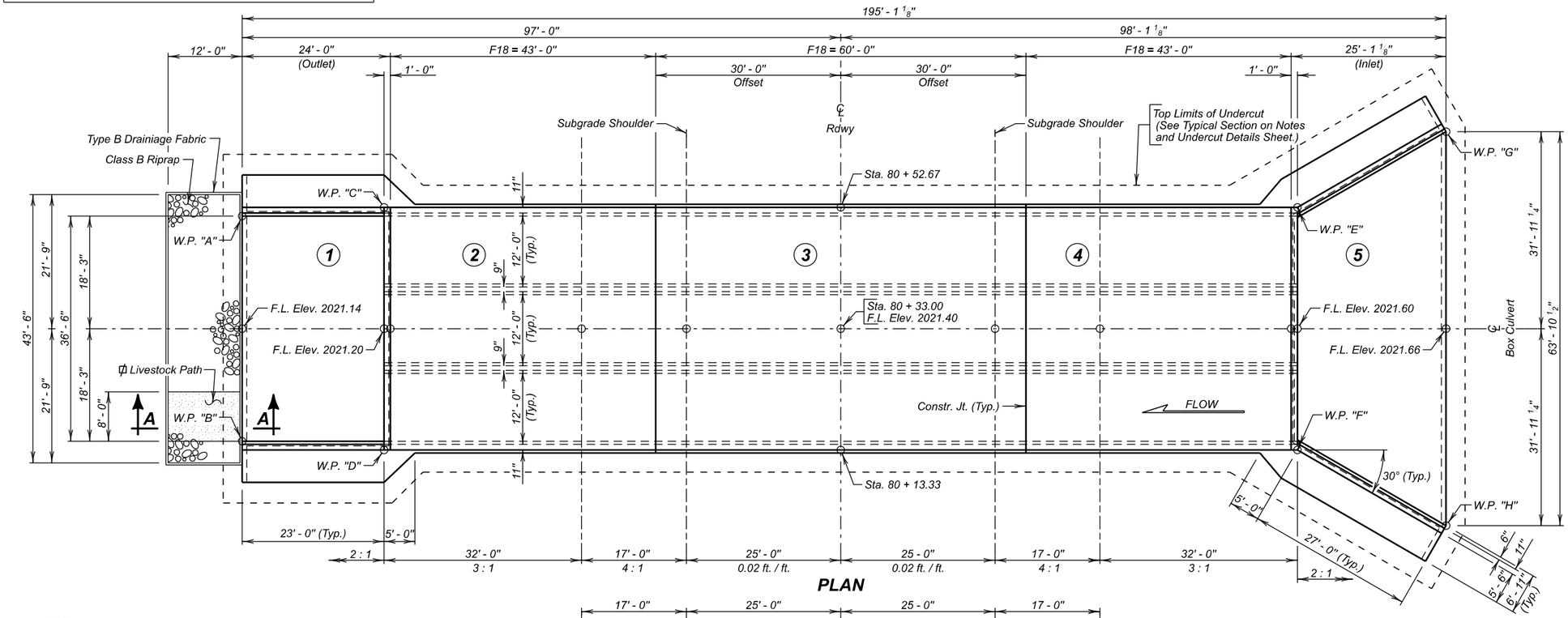
EYEBOLT DETAILS

December 23,2012

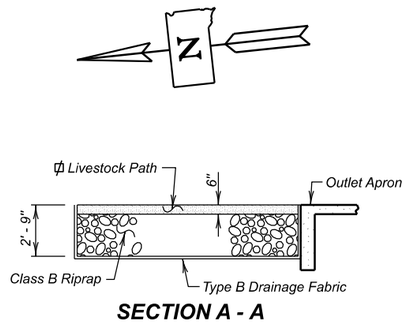
Published Date: 2027	SDDOT	FENCE ANCHORS FOR BOX CULVERT WING WALLS	PLATE NUMBER 620.16 Sheet 1 of 1

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-B 0248(12)173	E18	E99



PLAN

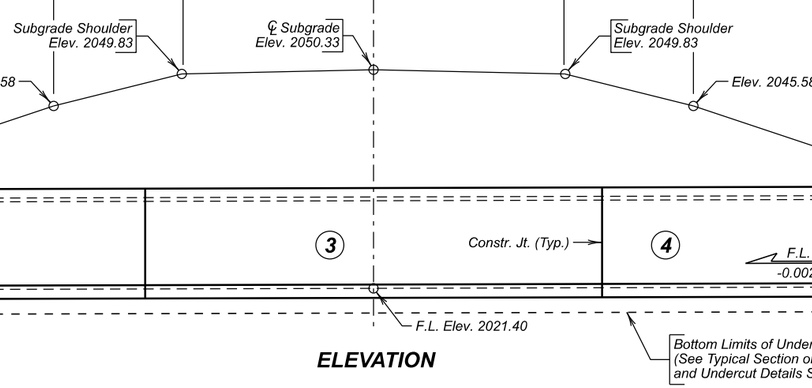


SECTION A - A

TABLE OF WORKING POINTS

W. P.	STATION	OFFSET
"A"	80 + 51.25	97.00' Lt.
"B"	80 + 14.75	97.00' Lt.
"C"	80 + 52.67	74.00' Lt.
"D"	80 + 13.33	74.00' Lt.
"E"	80 + 52.67	74.00' Rt.
"F"	80 + 13.33	74.00' Rt.
"G"	80 + 64.95	98.09' Rt.
"H"	80 + 01.05	98.09' Rt.

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



ELEVATION

℄ NOTES:

1. Base Course will provide a smooth path for livestock.
2. Base Course is estimated using 6" of material to account for voids in the Class B Riprap.

-X028-
INDEX OF CULVERT SHEETS-

Sheet No. 1 - General Drawing and Quantities
Sheet No. 2 - Notes and Undercut Details
Sheet No. 3 - Inlet Details
Sheet No. 4 - Outlet Details
Sheet No. 5 - F18 Barrel End Section Details (43' - 0")
Sheet No. 6 - F18 Barrel Interior Section Details (60' - 0")
Sheet No. 7 - Details of Standard Plate No's 460.02 and 460.10
Sheet No. 8 - Details of Standard Plate No. 620.16

HYDRAULIC DATA

Q_d	1250 cfs
A_d	284 sq ft
V_d	4.4 fps
Q_F	1250 cfs
Q_{100}	2238 cfs
Q_{OT}	>Q_{100}
V_{max}	7.0 fps

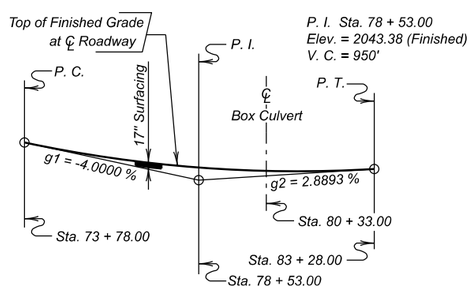
Q_d = Design discharge for the proposed culvert based on 25 year frequency. El. 2030.3.

Q_{OT} = Overtopping discharge and frequency > Q_{100} year recurrence interval. El. 2051.4 @ Sta. 79 + 49.00 ±.

Q_F = 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. 2032.1.

V_{max} = Maximum computed outlet velocity for the proposed culvert, based on 100 year frequency.



P. I. Sta. 78 + 53.00
Elev. = 2043.38 (Finished)
V. C. = 950'

VERTICAL CURVE DATA

ESTIMATED QUANTITIES

	ITEM	UNIT	QUANTITY
	Class A45 Concrete, Box Culvert	Cu. Yd.	925.7
	Reinforcing Steel	Lb.	109943
	Structure Excavation, Box Culvert	Cu. Yd.	391
	Box Culvert Undercut	Cu. Yd.	749
	Type B Drainage Fabric	Sq. Yd.	92
✳	Class B Riprap	Ton	74.4
⊛	Base Course	Ton	3.4

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

⊛ For estimating purposes only, a factor of 1.89 tons/cu. yd. was used to convert Cu. Yds. to Tons.

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

SITE 2
ALTERNATE A

GENERAL DRAWING AND QUANTITIES

FOR

3 - 12' X 12' BOX CULVERT (C.I.P.)

OVER MEDICINE CREEK — 0° SKEW
STA. 80 + 33.00 — SEC. 32-T1S-R31E
STR. NO. 38-312-173 — P-B 0248(12)173
PCN 06G7 — HL-93

JONES COUNTY

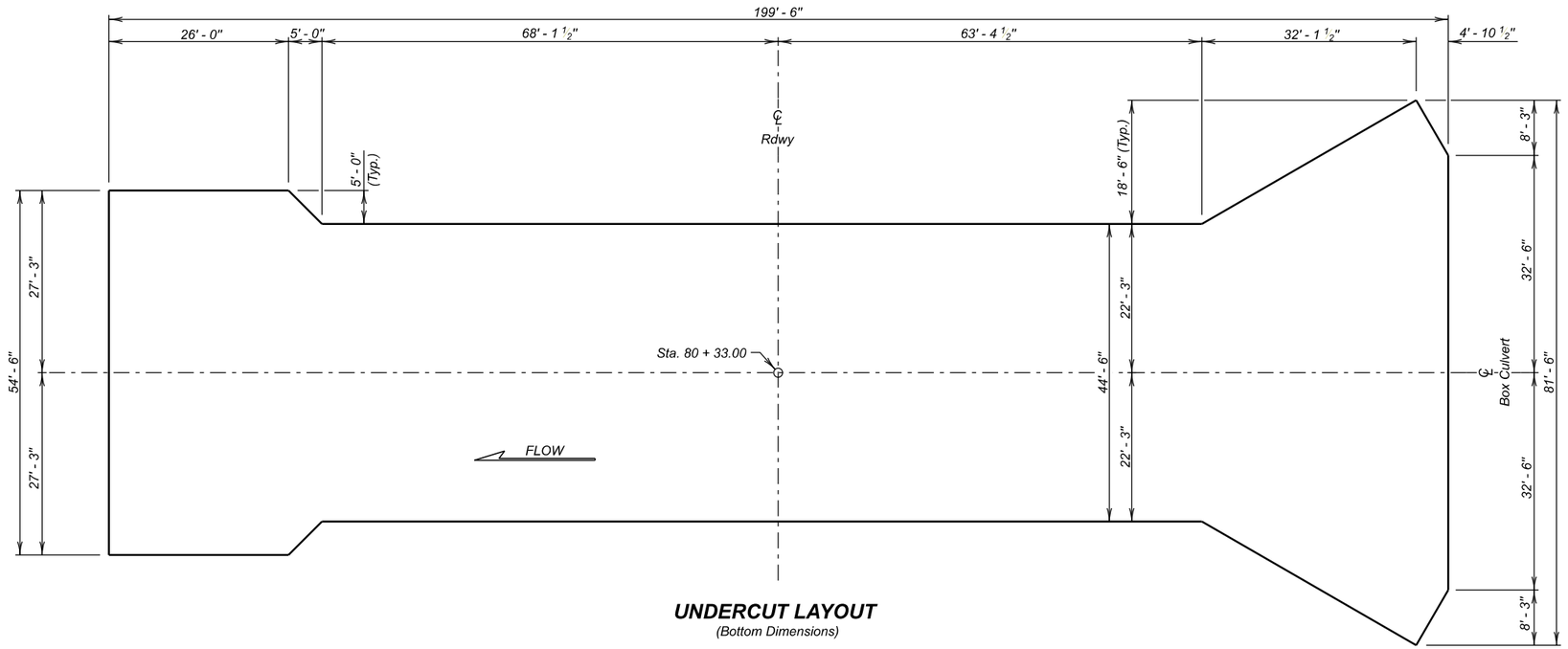
S. D. DEPT. OF TRANSPORTATION

FEBRUARY 2024

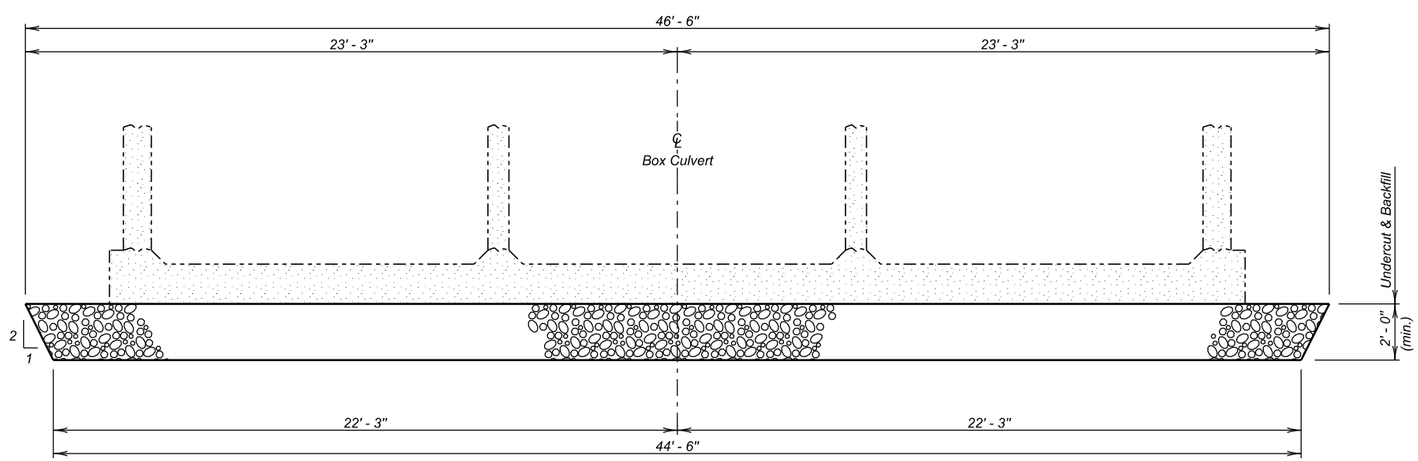
-X028-

DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU	ER	BT	Steve A Johnson BRIDGE ENGINEER
JONS06G7	06G7GB01		

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E19	E99



UNDERCUT LAYOUT
(Bottom Dimensions)



TYPICAL SECTION
(For Limits of Undercut)

SPECIFICATIONS

1. *Design Specifications: AASHTO LRFD Bridge Design Specifications, 9th Edition.*
2. *Construction Specifications: South Dakota Standard Specifications for Roads and Bridges, 10-7-26 Version, Required Provisions, and Special Provisions as included in the Proposal. The Standard Specifications for Roads and Bridges are available for download and viewing at: https://dot.sd.gov/doing-business/contractors/standard-specifications*

GENERAL NOTES

1. *Design Live Load: HL-93 and construction loading consisting of one 7' - 6" gage axle with gross axle 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 18 ft. (F18).*
3. *Design Material Strengths: Concrete $f'c$ = 4500 p.s.i.*
   Reinforcing Steel fy = 60000 p.s.i.
4. *High sulfate levels are likely to be encountered on this project. All concrete will be Class A45 Concrete, Box Culvert conforming to Section 460 of the Construction Specifications, with the following modifications: the type of cement will be either a type V or a type II with 20% to 25% Class F Modified Fly Ash substituted for cement in accordance with Section 605 of the Construction Specifications.*
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 $^3/_4$ 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 RCBC consist of brown to gray clay. Groundwater was encountered in the borings at an elevation of 2026.2 feet during the subsurface investigation conducted in April 2023. Dewatering will be required during construction.*

ESTIMATED QUANTITIES

ITEM	UNIT	QUANTITY
℄ Box Culvert Undercut	Cu. Yd.	749

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

SITE 2
ALTERNATE A

NOTES AND UNDERCUT DETAILS

FOR

3 - 12' X 12' BOX CULVERT (C.I.P.)

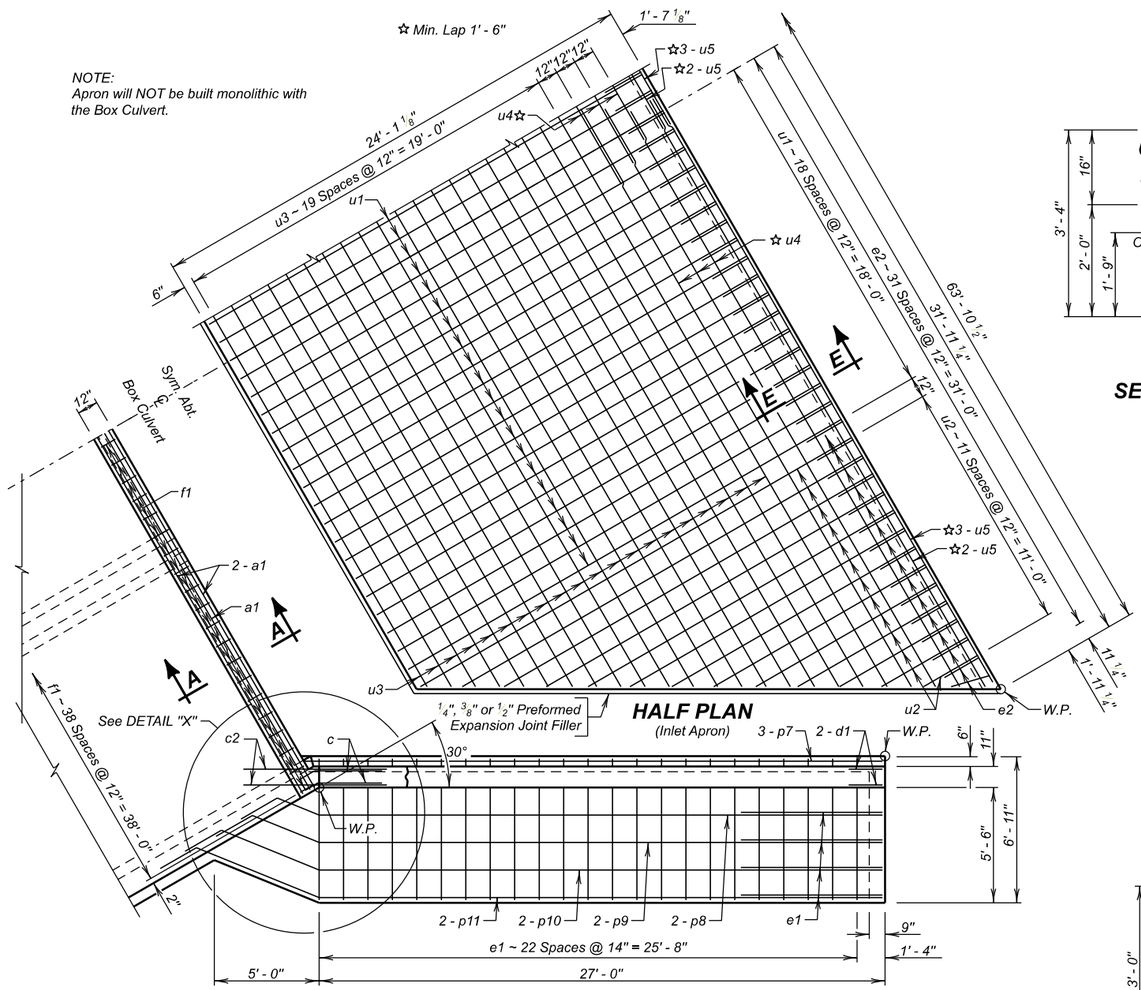
OVER MEDICINE CREEK — 0° SKEW
STA. 80 + 33.00 — SEC. 32-T1S-R31E
STR. NO. 38-312-173 — P-B 0248(12)173
HL-93

JONES COUNTY
S. D. DEPT. OF TRANSPORTATION
FEBRUARY 2024

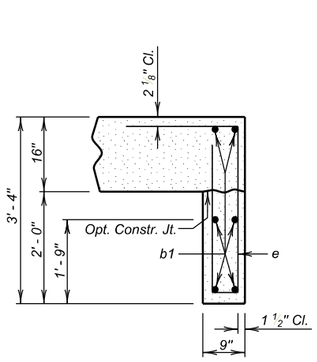
DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU	ER	BT	Steve A Johnson BRIDGE ENGINEER
JONS06G7	06G7GB02		

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E20	E99

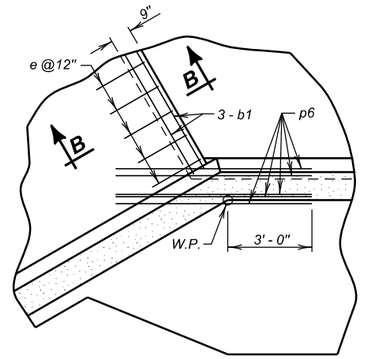
NOTE:
Apron will NOT be built monolithic with the Box Culvert.



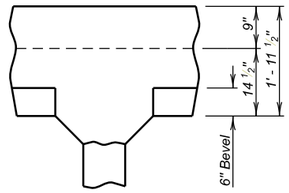
HALF PLAN



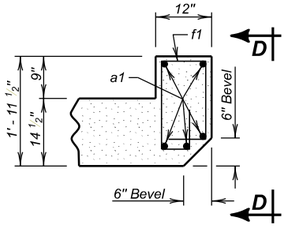
SECTION B - B



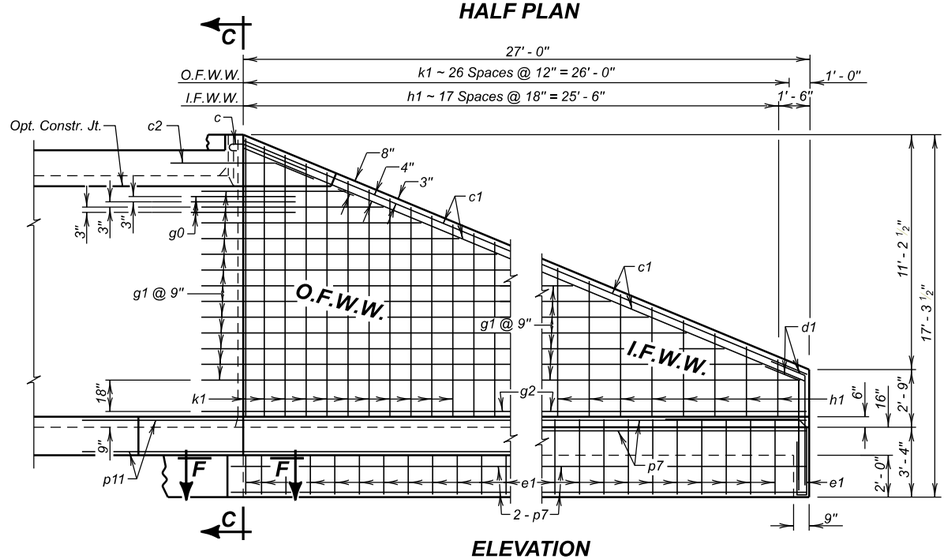
DETAIL "X"
(At Bottom Slab)



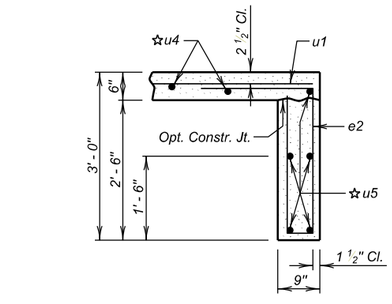
VIEW D - D
(At Interior Wall)



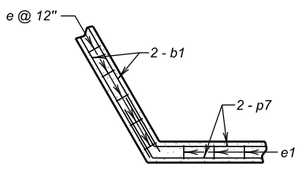
SECTION A - A
(At Top Slab)



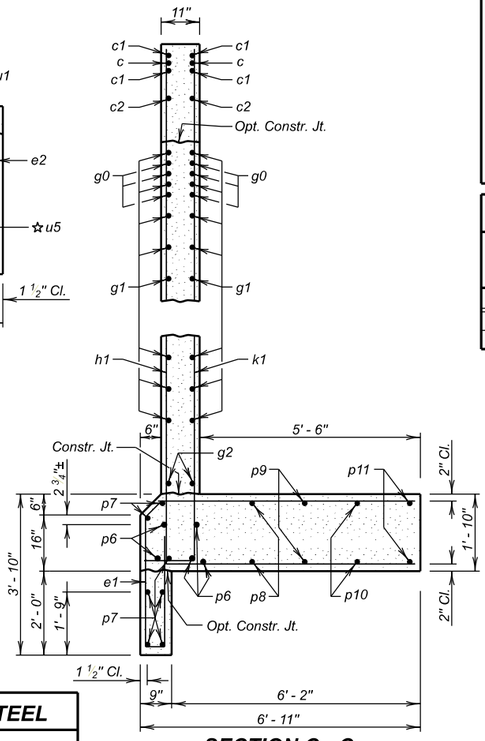
ELEVATION



SECTION E - E



SECTION F - F



SECTION C - C

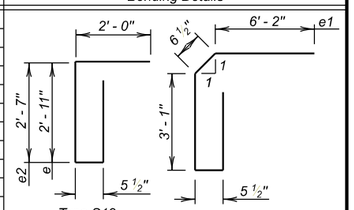
LEGEND FOR PLACING RE-STEEL

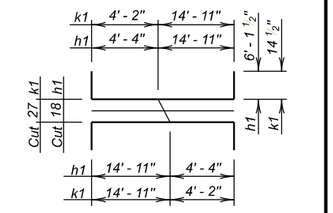
O. F. W. W. - Outside Face of Wing Wall
I. F. W. W. - Inside Face of Wing Wall

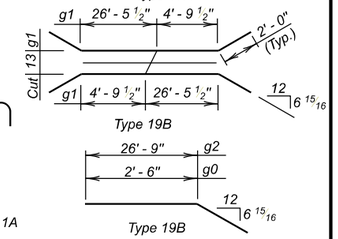
REINFORCING SCHEDULE

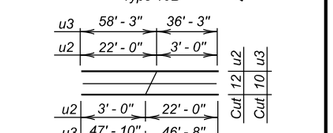
	Mk.	No.	Size	Length	Type
	a1	5	6	39' - 0"	Str.
	b1	6	6	36' - 9"	Str.
*	c	4	5	4' - 6"	1A
	c1	8	5	29' - 0"	Str.
	c2	4	5	7' - 0"	19B
	d1	8	5	7' - 0"	19B
	e	37	4	8' - 0"	S12
	e1	54	5	13' - 3"	S12A
	f1	39	4	5' - 9"	S6A
	g0	12	5	5' - 0"	19B
⌀	g1	26	4	35' - 3"	19B
	g2	4	4	28' - 9"	19B
⌀	h1	18	4	31' - 6"	17A
⌀	k1	27	5	21' - 6"	17A
	p6	10	6	7' - 0"	Str.
*	p7	14	4	29' - 6"	Str.
*	p8	4	4	30' - 6"	Str.
*	p9	4	4	32' - 0"	Str.
*	p10	4	4	33' - 6"	Str.
*	p11	4	4	34' - 9"	Str.
	INLET APRON				
	e2	63	4	7' - 6"	S12
	u1	37	4	23' - 9"	Str.
	u2	12	4	25' - 0"	Str.
	u3	10	4	94' - 6"	Str.
	u4	6	4	31' - 9"	Str.
	u5	10	4	32' - 0"	Str.

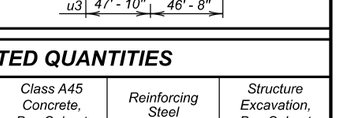
Bending Details

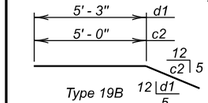


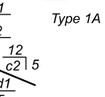


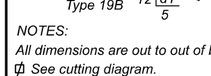












NOTES:
All dimensions are out to out of bars.
⌀ See cutting diagram.
* Bend in field as necessary to fit.

ESTIMATED QUANTITIES

ITEM	Class A45 Concrete, Box Culvert	Reinforcing Steel	Structure Excavation, Box Culvert
UNIT	Cu. Yd.	Lb.	Cu. Yd.
Inlet	53.6	4533	27.6
Inlet Apron	26.8	2076	26.8

SITE 2
ALTERNATE A

INLET DETAILS

FOR

3 - 12' X 12' BOX CULVERT (C.I.P.)

OVER MEDICINE CREEK — 0° SKEW
STA. 80 + 33.00 — SEC. 32-T1S-R31E
STR. NO. 38-312-173 — P-B 0248(12)173
HL-93

JONES COUNTY

S. D. DEPT. OF TRANSPORTATION

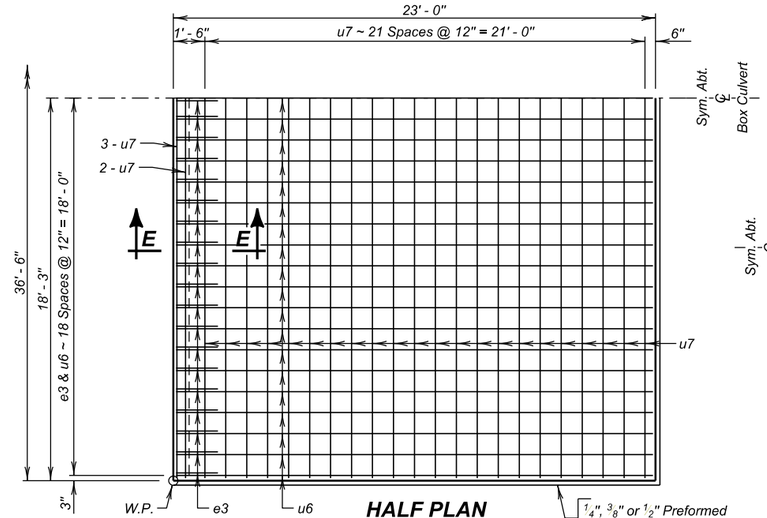
FEBRUARY 2024

3 OF 8

DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU	ER	BT	Steve A Johnson BRIDGE ENGINEER
JONS06G7	06G7GB03		

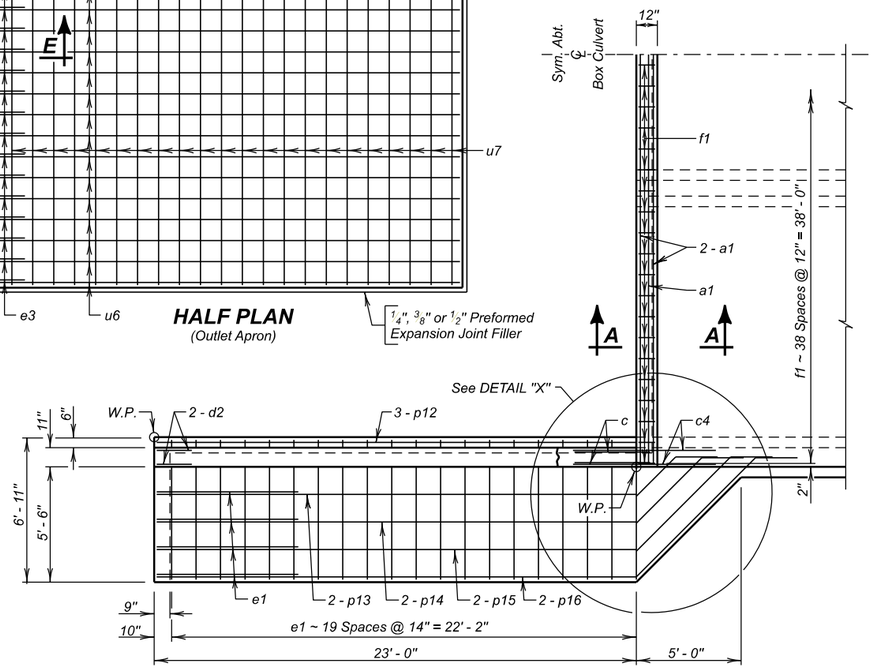
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E21	E99

NOTE:
Apron will NOT be built monolithic with the Box Culvert.

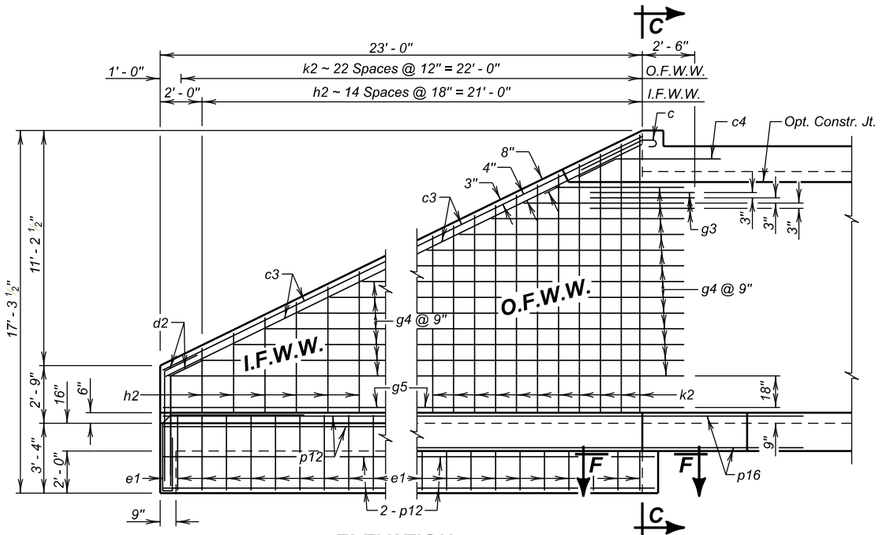


HALF PLAN
(Outlet Apron)

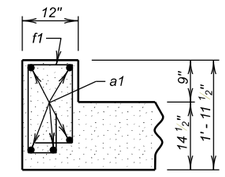
¼", ⅜" or ½" Preformed Expansion Joint Filler



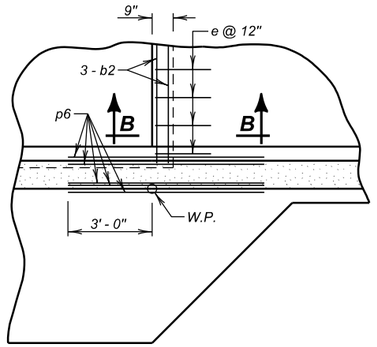
HALF PLAN



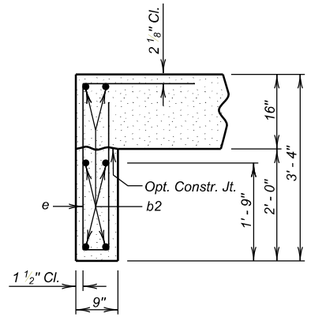
ELEVATION



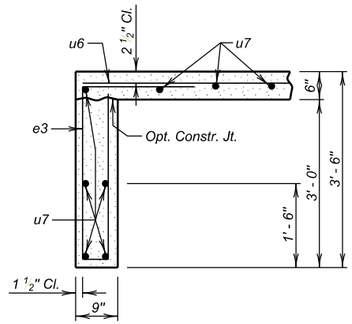
SECTION A - A
(At Top Slab)



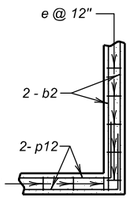
DETAIL "X"
(At Bottom Slab)



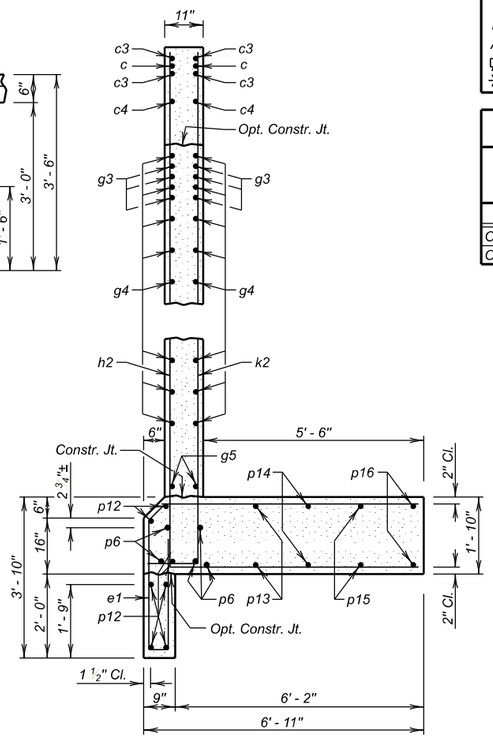
SECTION B - B



SECTION E - E



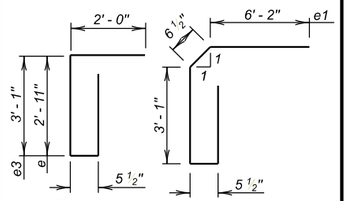
SECTION F - F

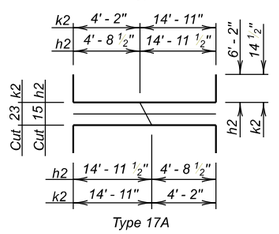


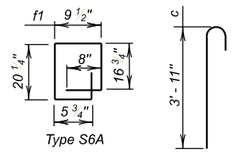
SECTION C - C

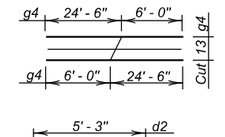
REINFORCING SCHEDULE

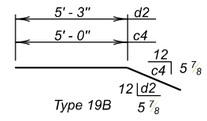
Mk.	No.	Size	Length	Type	Bending Details
a1	5	6	39' - 0"	Str.	
b2	6	6	37' - 9"	Str.	
c	4	5	4' - 6"	1A	
c3	8	5	25' - 6"	Str.	
c4	4	5	7' - 0"	19B	
d2	8	5	7' - 0"	19B	
e	38	4	8' - 0"	S12	
e1	48	5	13' - 3"	S12A	
f1	39	4	5' - 9"	S6A	
g3	12	5	5' - 0"	Str.	
⌀ g4	26	4	30' - 6"	Str.	
g5	4	4	24' - 9"	Str.	
⌀ h2	15	4	32' - 0"	17A	
⌀ k2	23	5	21' - 6"	17A	
p6	10	6	7' - 0"	Str.	
✳ p12	14	4	25' - 6"	Str.	
✳ p13	4	4	27' - 0"	Str.	
✳ p14	4	4	28' - 9"	Str.	
✳ p15	4	4	30' - 9"	Str.	
✳ p16	4	4	32' - 6"	Str.	
OUTLET APRON					
e3	37	4	8' - 6"	S12	
u6	37	4	22' - 9"	Str.	
u7	27	4	36' - 3"	Str.	











NOTES:
All dimensions are out to out of bars.
⌀ 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.
Outlet	47.1	4125	24.3
Outlet Apron	18.7	1427	18.7

LEGEND FOR PLACING RE-STEEL

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

SITE 2
ALTERNATE A

OUTLET DETAILS

FOR

3 - 12' X 12' BOX CULVERT (C.I.P.)

OVER MEDICINE CREEK
STA. 80 + 33.00
STR. NO. 38-312-173

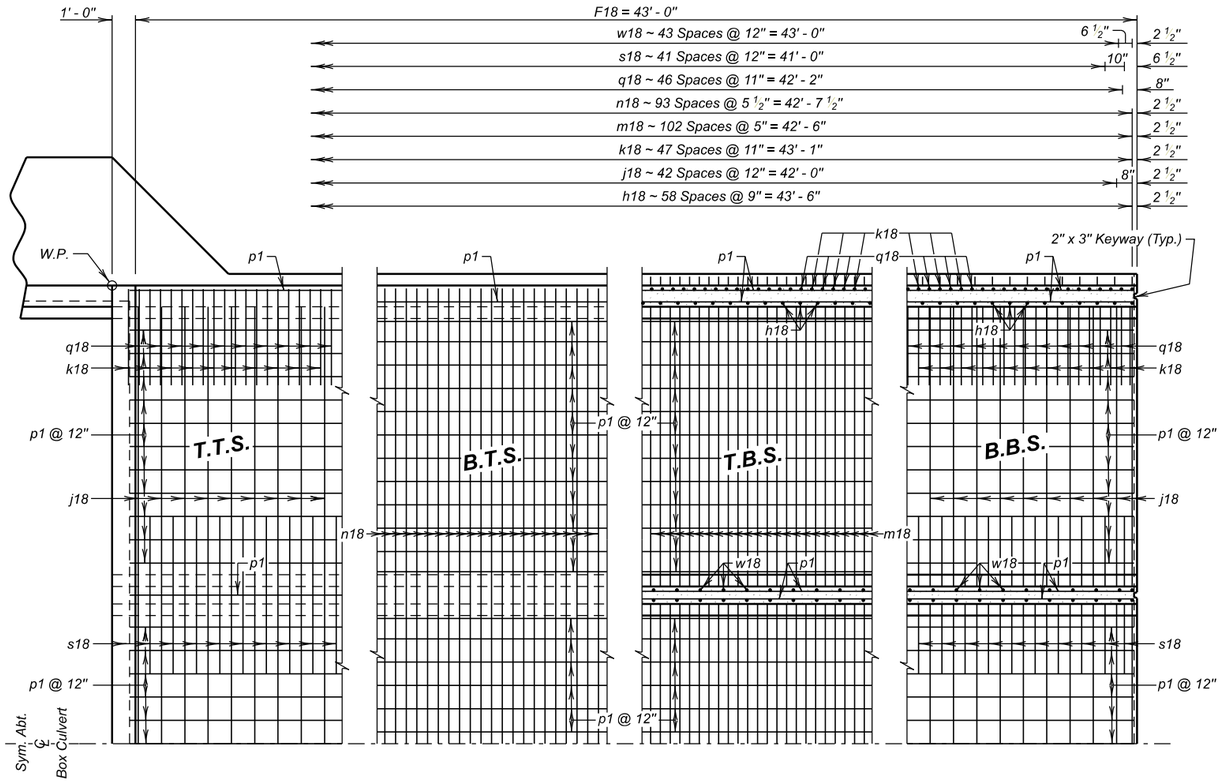
0° SKEW
SEC. 32-T1S-R31E
P-B 0248(12)173
HL-93

JONES COUNTY
S. D. DEPT. OF TRANSPORTATION
FEBRUARY 2024

4 OF 8

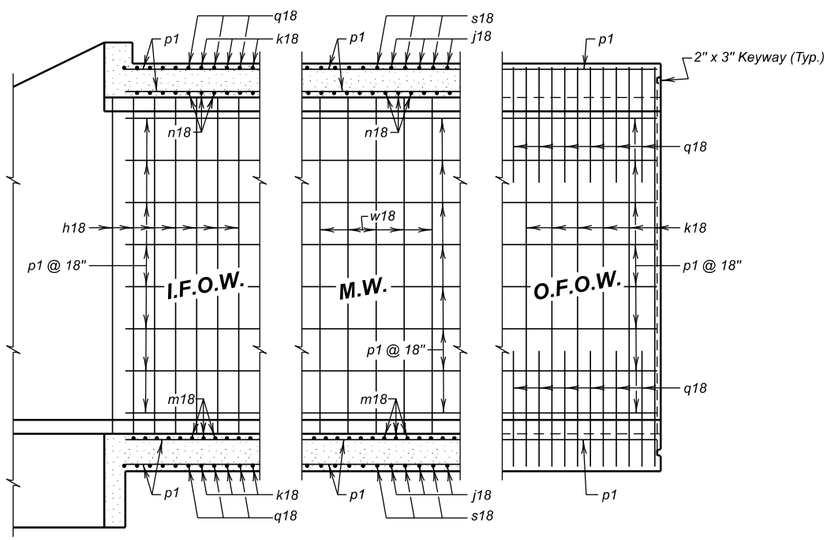
DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU	ER	BT	Steve A Johnson BRIDGE ENGINEER
JONS06G7	06G7GB04		

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E22	E99

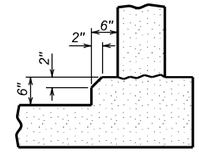


HALF PLAN

(Outlet End shown, Inlet similar by rotation)



ELEVATION



OPTIONAL FILLET DETAIL

(At Bottom Slab)

NOTE:
Contractor may form the optional full fillet,with 2" Chamfer, as detailed. The cost of the additional concrete will be borne by the Contractor.

OPTIONAL POUR - BOTTOM SLAB

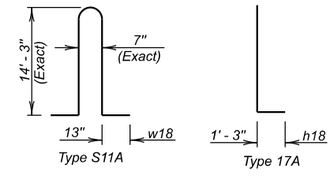
The Bottom Slab may be poured continuously, at the option of the Contractor, with the use of a Preformed Metal keyway conforming to the keyway dimensions and location as shown on the plans. The keyway length will be full width of the bottom slab. Care will be taken to maintain proper alignment of the keyway during the pour sequence. All additional costs of this option will be borne by the Contractor.

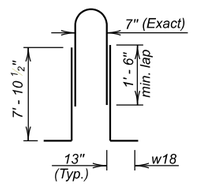
△ *Place z1 bars thru construction joint between barrel sections as shown on Standard Plate No. 460.10. Quantity of z1 bars are for two construction joints.*

REINFORCING SCHEDULE

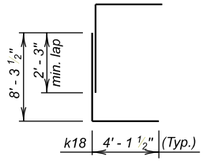
(For 2 - F18 Barrel End Sections)

Mk.	No.	Size	Length	Type	Bending Details
h18	236	5	15' - 0"	17A	
j18	176	6	37' - 6"	Str.	
k18	192	5	22' - 6"	17	
m18	206	5	40' - 0"	Str.	
n18	188	5	39' - 0"	Str.	
p1	432	4	43' - 3"	Str.	
q18	376	5	8' - 3"	17A	
s18	344	6	6' - 9"	Str.	
w18	180	4	31' - 0"	S11A	
△ z1	208	5	3' - 6"	Str.	

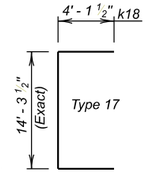




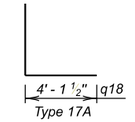
OPTIONAL w18 SPLICE DETAIL



OPTIONAL k18 SPLICE DETAIL



Contractor may use optional reinforcing steel splices, as shown. The cost of the additional reinforcing steel will be borne by the Contractor.



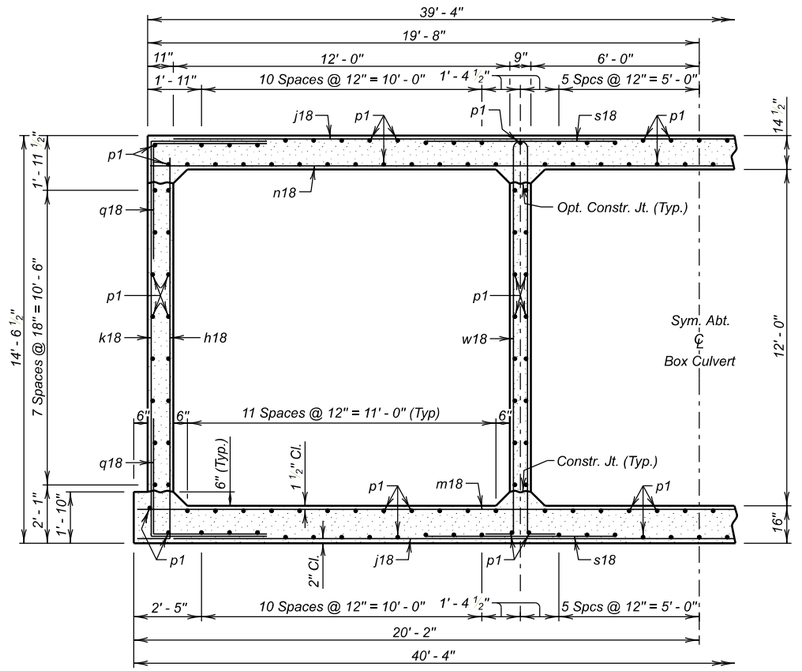
NOTES:
All dimensions are out to out of bars.
Request for additional reinforcing steel splices at points other than those shown, must be submitted to the Engineer for prior approval. If additional splices are approved, no payment will be allowed for the added quantity of reinforcing steel.

ESTIMATED QUANTITIES

ITEM	Class A45 Concrete, Box Culvert	Reinforcing Steel	Structure Excavation, Box Culvert
UNIT	Cu.Yd.	Lb.	Cu.Yd.
2 - F18 Barrel End Sections @ 43' - 0"	459.2	58043	172.7

LEGEND FOR PLACING RE-STEEL

T.T.S.	- Top of Top Slab
B.T.S.	- Bottom of Top Slab
T.B.S.	- Top of Bottom Slab
B.B.S.	- Bottom of Bottom Slab
O.F.O.W.	- Outside Face of Outside Wall
I.F.O.W.	- Inside Face of Outside Wall
M.W.	- Middle Wall



F18 BARREL HALF SECTION

(18' - 0" Maximum Fill)

SITE 2
ALTERNATE A

F18 BARREL END SECTION DETAILS (43' - 0")

FOR

3 - 12' X 12' BOX CULVERT (C.I.P.)

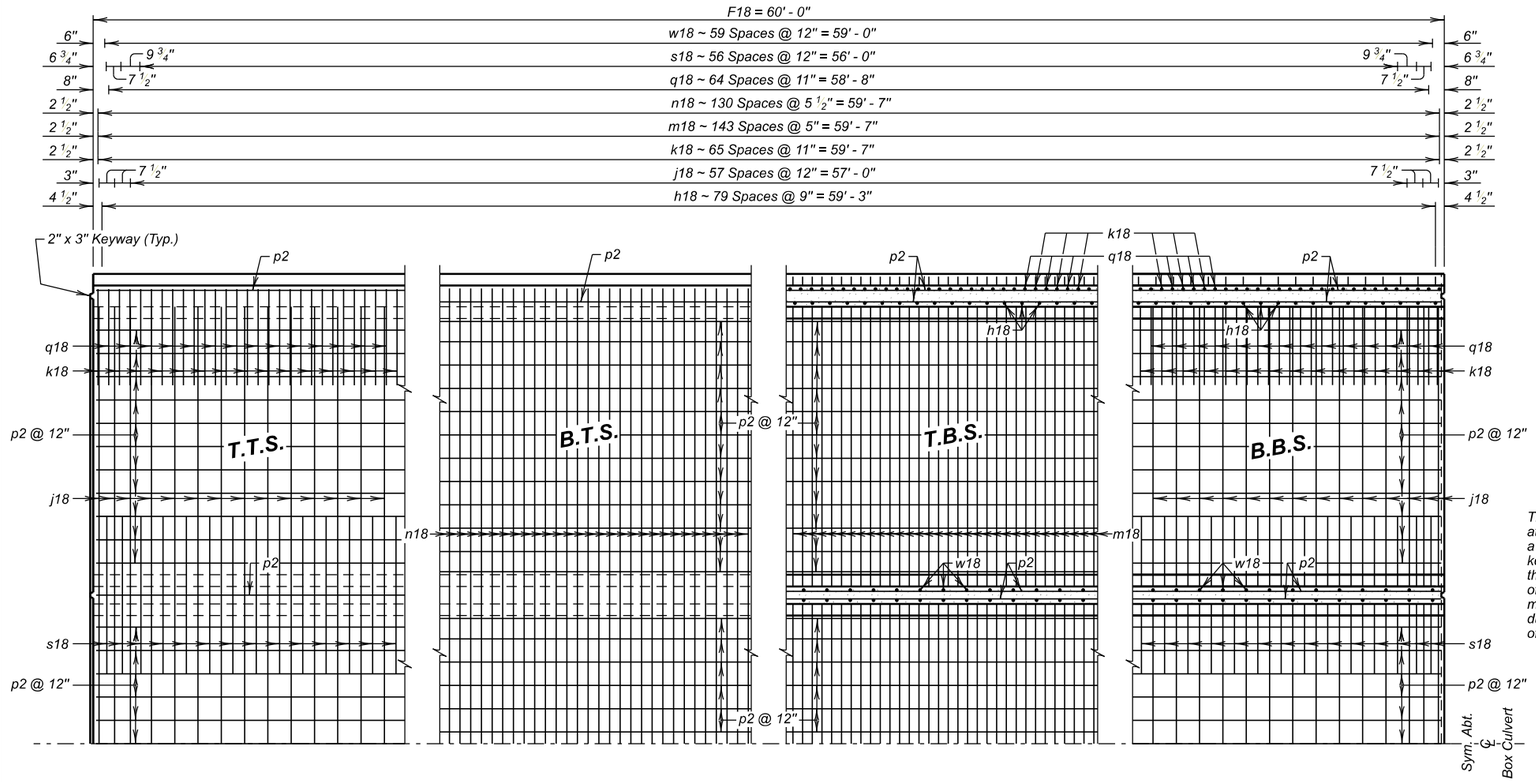
OVER MEDICINE CREEK — 0° SKEW
STA. 80 + 33.00 — SEC. 32-T1S-R31E
STR. NO. 38-312-173 — P-B 0248(12)173
HL-93

JONES COUNTY
S. D. DEPT. OF TRANSPORTATION
FEBRUARY 2024

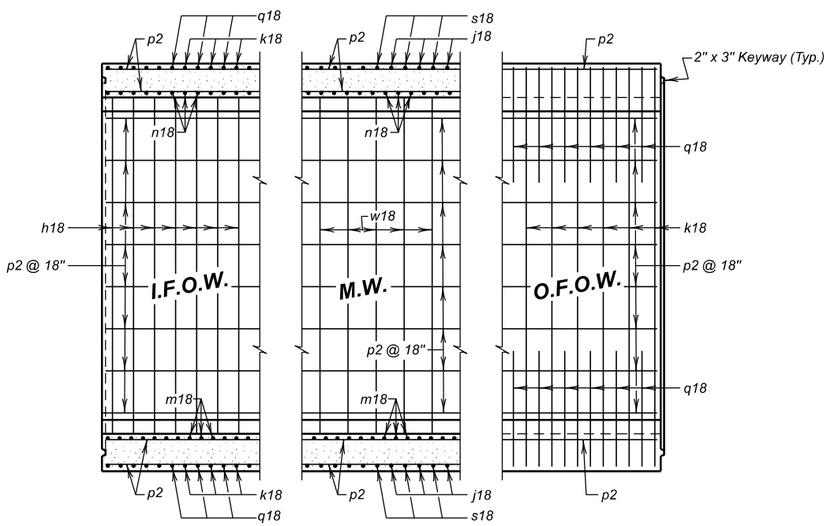
5 OF 8

DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU	ER	BT	Steve A Johnson BRIDGE ENGINEER
JONS06G7	06G7GB05		

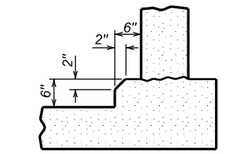
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E23	E99



HALF PLAN



ELEVATION



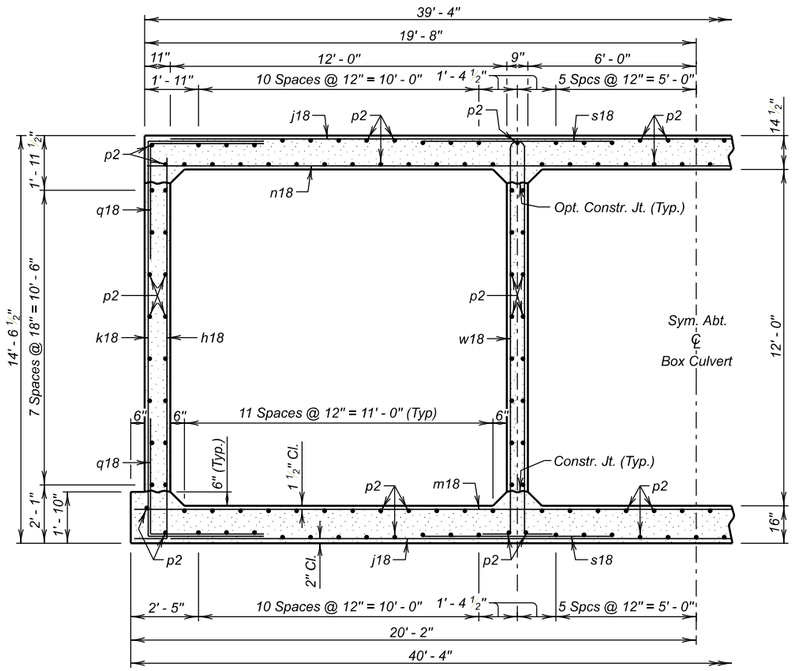
OPTIONAL FILLET DETAIL

(At Bottom Slab)

NOTE:
Contractor may form the optional full fillet,with 2" Chamfer, as detailed. The cost of the additional concrete will be borne by the Contractor.

OPTIONAL POUR - BOTTOM SLAB

The Bottom Slab may be poured continuously, at the option of the Contractor, with the use of a Preformed Metal keyway conforming to the keyway dimensions and location as shown on the plans. The keyway length will be full width of the bottom slab. Care will be taken to maintain proper alignment of the keyway during the pour sequence. All additional costs of this option will be borne by the Contractor.



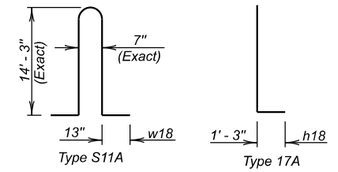
F18 BARREL HALF SECTION

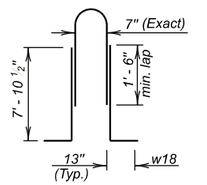
(18' - 0" Maximum Fill)

REINFORCING SCHEDULE

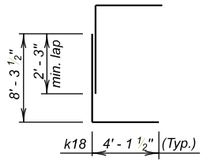
(For 1 - F18 Barrel Interior Section)

Mk.	No.	Size	Length	Type	Bending Details
h18	160	5	15' - 0"	17A	
j18	124	6	37' - 6"	Str.	
k18	132	5	22' - 6"	17	
m18	144	5	40' - 0"	Str.	
n18	131	5	39' - 0"	Str.	
p2	216	4	59' - 9"	Str.	
q18	260	5	8' - 3"	17A	
s18	244	6	6' - 9"	Str.	
w18	120	4	31' - 0"	S11A	

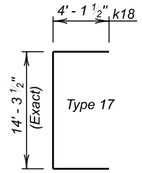




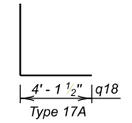
OPTIONAL w18 SPLICE DETAIL



OPTIONAL k18 SPLICE DETAIL



Contractor may use optional reinforcing steel splices, as shown. The cost of the additional reinforcing steel will be borne by the Contractor.



NOTES:
All dimensions are out to out of bars.
Request for additional 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.

ESTIMATED QUANTITIES

ITEM	Class A45 Concrete, Box Culvert	Reinforcing Steel	Structure Excavation, Box Culvert
UNIT	Cu.Yd.	Lb.	Cu.Yd.
1 - F18 Barrel Interior Section @ 60' - 0"	320.3	39739	120.5

LEGEND FOR PLACING RE-STEEL

T.T.S. - Top of Top Slab
B.T.S. - Bottom of Top Slab
T.B.S. - Top of Bottom Slab
B.B.S. - Bottom of Bottom Slab
O.F.O.W. - Outside Face of Outside Wall
I.F.O.W. - Inside Face of Outside Wall
M.W. - Middle Wall

SITE 2
ALTERNATE A

F18 BARREL INTERIOR SECTION DETAILS (60' - 0")

FOR

3 - 12' X 12' BOX CULVERT (C.I.P.)

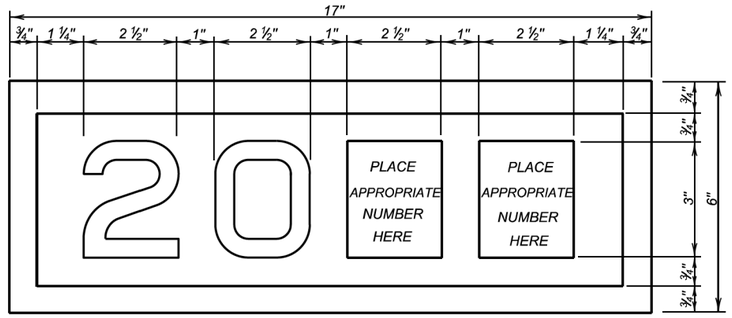
OVER MEDICINE CREEK — 0° SKEW
STA. 80 + 33.00 — SEC. 32-T1S-R31E
STR. NO. 38-312-173 — P-B 0248(12)173
HL-93

JONES COUNTY
S. D. DEPT. OF TRANSPORTATION
FEBRUARY 2024

6 OF 8

DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU	ER	BT	Steve A Johnson BRIDGE ENGINEER
JONS06G7	06G7GB06		

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E24	E99



YEAR PLATE DETAILS

GENERAL NOTES:

1. Year plates of the general dimensions shown will be constructed on all box culverts and bridges. The year plates will 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 (1/2) inch in depth.

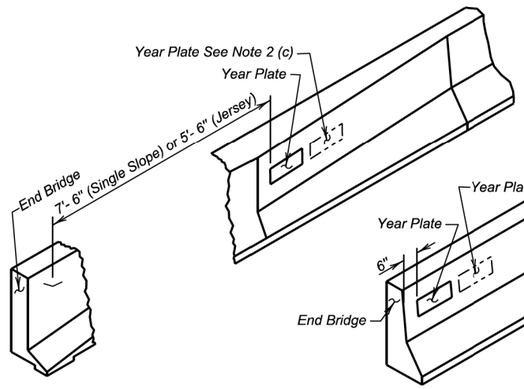
2. Year plates will be located on structure(s) as follows:

   a. On cast-in-place box culverts the year plates will 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 will be centered laterally on the upstream face of the top slab. Where an extended interior wall interferes with this location, the year plate will be centered in an adjacent barrel.

   b. On bridges with six (6) inch curbs, "Jersey" shaped barriers with no endblocks, or "Single Slope" shaped barriers with no endblocks, the year plate will 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 barrier endblocks, the year plate will be centered on the upper sloped portion of the barrier approximately 5'- 6" for "Jersey" shaped barriers from the end of the bridge and 7'-6" for "Single Slope" shaped barriers from the end of bridge, or as designated by the Engineer. There will be one year plate at each end of the bridge on opposite sides.

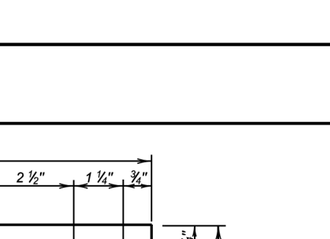
   c. When the plans specify that both the original date of construction and the date of reconstruction are to be shown, one date will be placed as listed above and the other located adjacent to it. Both year plates will be shown at each end of the bridge on opposite sides.

3. There will be no separate measurement or payment made for year plates on box culverts and bridges. All costs for this work will be incidental to other contract items.

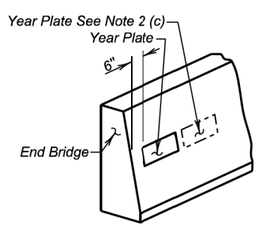


BARRIER
(With Endblock)

JERSEY BARRIER



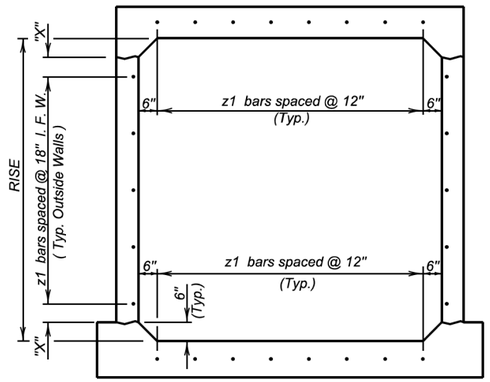
TYPE B CURB



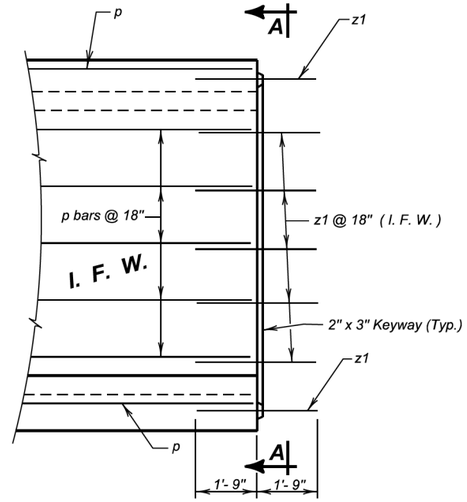
SINGLE SLOPE BARRIER

January 22, 2021

Published Date: 2027	SDDOT	YEAR PLATE DETAILS	PLATE NUMBER 460.02
			Sheet 1 Of 1

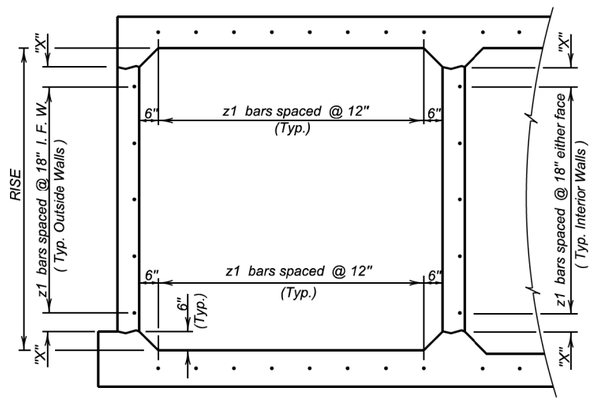


TYPICAL SINGLE BARREL VIEW A - A



ELEVATION

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



TYPICAL MULTIPLE BARREL VIEW A - A

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"
13'- 0"	9"
14'- 0"	6"

GENERAL NOTES:

1. z1 bars will be placed in the middle of the 2" X 3" keyway in the top and bottom slabs. z1 bars will 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.

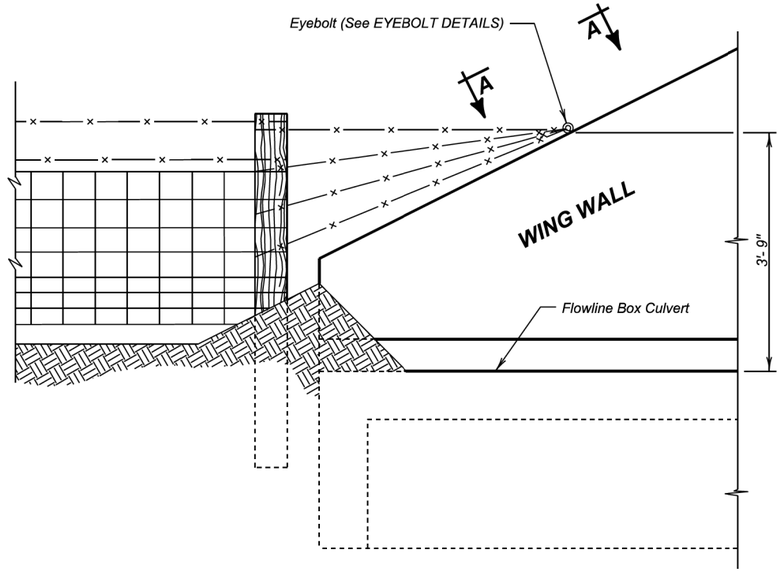
2. Drainage Fabric Protection will be placed in accordance with Section 422, or Section 560, whichever is applicable.

June 1, 2022

Published Date: 2027	SDDOT	BOX CULVERT BARREL TIE REINFORCEMENT	PLATE NUMBER 460.10
			Sheet 1 of 1

SITE 2
ALTERNATE A

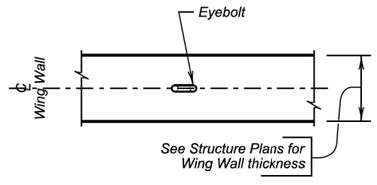
3 - 12' X 12' BOX CULVERT (C.I.P.)
STR. NO. 38-312-173
FEBRUARY 2024



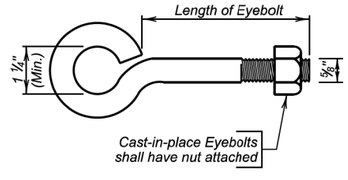
DETAIL FOR FENCE ANCHORS

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 ⅞ 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 ⅞ 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: 2027	SDDOT	FENCE ANCHORS FOR BOX CULVERT WING WALLS	PLATE NUMBER 620.16 Sheet 1 of 1

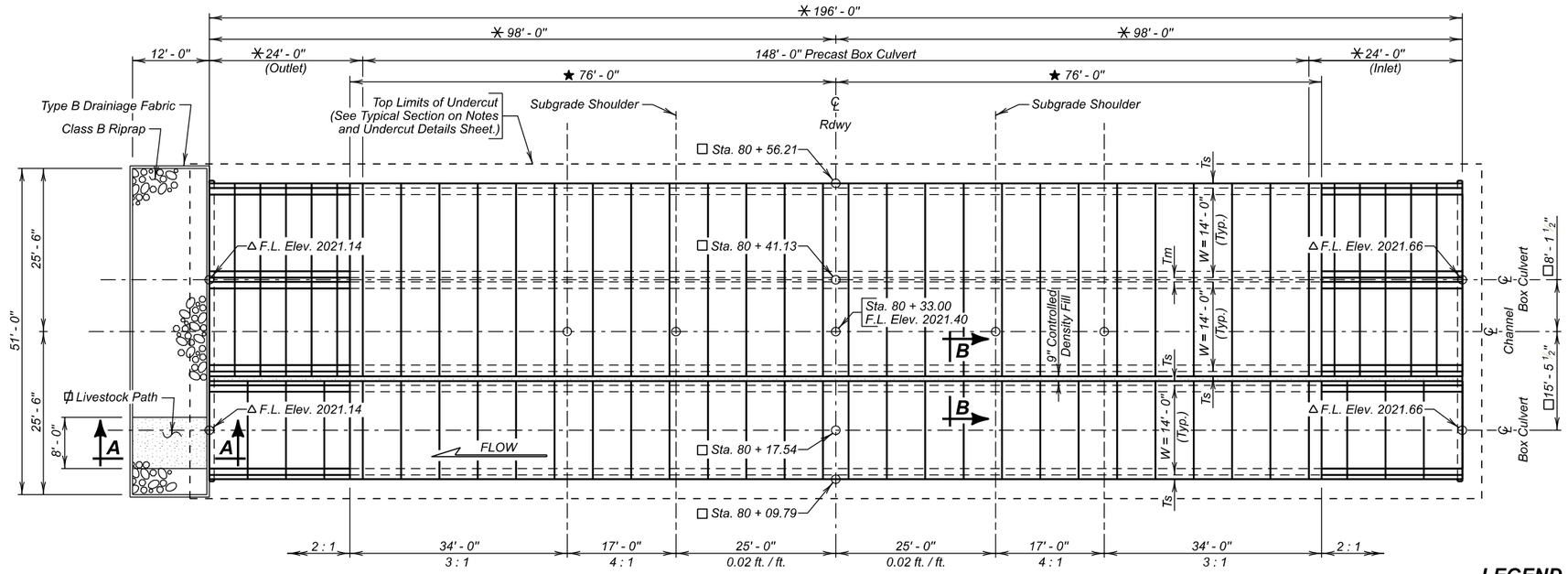
SITE 2
ALTERNATE A

3 - 12' X 12' BOX CULVERT (C.I.P.)
STR. NO. 38-312-173
FEBRUARY 2024

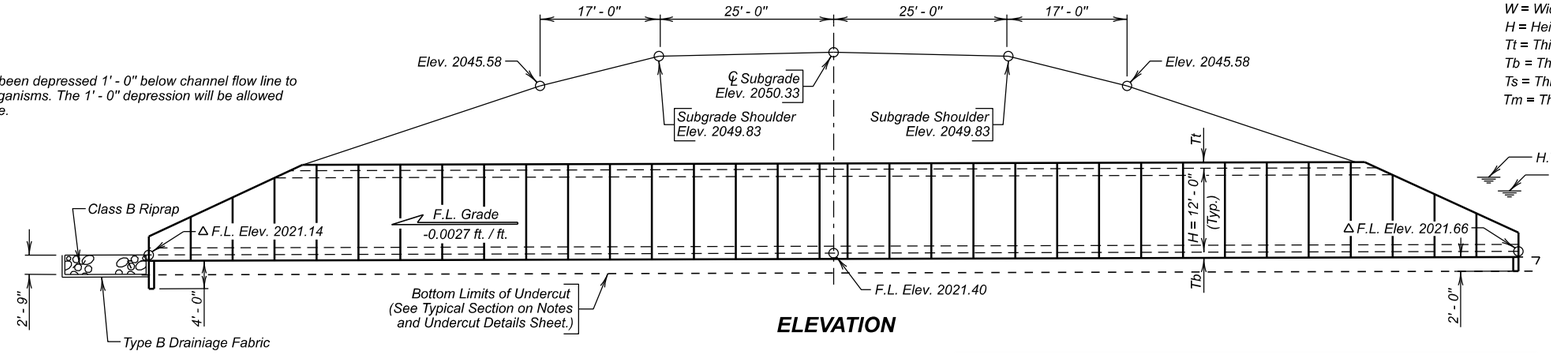
The elevations shown in these plans are based on the National Geodetic Survey (NGS) North American Vertical Datum of 1988 (NAVD88).

⚹ Dimension may vary with installation and/or fabrication. See Shop Plans for actual installation length.
★ Minimum distance to satisfy fill slope.
△ Based on dimensions shown.
☐ Based on Ts = 9" and Tm = 8".

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E26	E99



PLAN



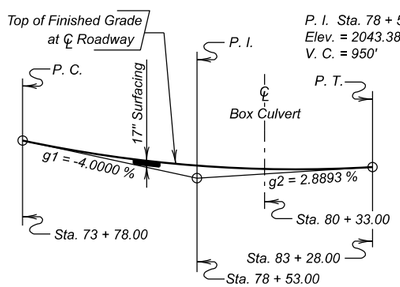
ELEVATION

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

HYDRAULIC DATA

Q_d	1250 cfs
A_d	321 sq ft
V_d	3.9 fps
Q_F	1250 cfs
Q_{100}	2238 cfs
Q_{OT}	>Q_{100}
V_{max}	6.2 fps

Q_d = Design discharge for the proposed culvert based on 25 year frequency. El. 2030.3.
Q_{OT} = Overtopping discharge and frequency > Q_{100} year recurrence interval. El. 2051.4 @ Sta. 79 + 49.00 ±.
Q_F = 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. 2032.1.
V_{max} = Maximum computed outlet velocity for the proposed culvert, based on 100 year frequency.



VERTICAL CURVE DATA

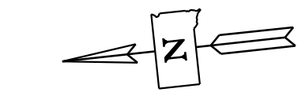
ESTIMATED QUANTITIES

	ITEM	UNIT	QUANTITY
∡	Structure Excavation, Box Culvert	Cu. Yd.	288.6
	Box Culvert Undercut	Cu. Yd.	767
	Controlled Density Fill	Cu. Yd.	74.4
≠	Class B Riprap	Ton	87.3
⊛	Base Course	Ton	3.4
	Type B Drainage Fabric	Sq. Yd.	107
	14' X 12' Precast Concrete Culvert, Furnish	Ft.	148
	14' X 12' Precast Concrete Culvert, Install	Ft.	148
	14' X 12' Precast Concrete Culvert End Section, Furnish	Each	2
	14' X 12' Precast Concrete Culvert End Section, Install	Each	2
	2 - 14' X 12' Precast Concrete Culvert, Furnish	Ft.	148
	2 - 14' X 12' Precast Concrete Culvert, Install	Ft.	148
	2 - 14' X 12' Precast Concrete Culvert End Section, Furnish	Each	2
	2 - 14' X 12' Precast Concrete Culvert End Section, Install	Each	2

∡ Quantity is based on 10" bottom slab, 10" top slab, 9" outside walls and 8" interior walls.
≠ For estimating purposes only, a factor of 1.4 tons/cu. yd. was used to convert Cu. Yd. to Tons.
⊛ For estimating purposes only, a factor of 1.89 tons/cu. yd. was used to convert Cu. Yds. to Tons.

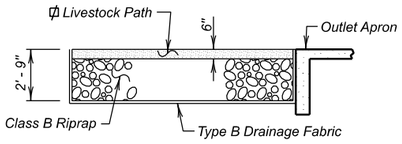
LEGEND

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

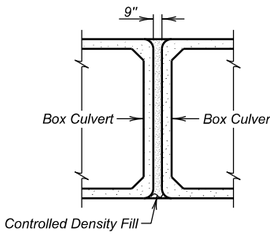


NOTES:

1. Base Course will provide a smooth path for livestock.
2. Base Course is estimated using 6" of material to account for voids in the Class B Riprap.



SECTION A - A



SECTION B - B

-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

SITE 2
ALTERNATE B

GENERAL DRAWING AND QUANTITIES

FOR

3 - 14' X 12' BOX CULVERT (PRECAST)

OVER MEDICINE CREEK — 0° SKEW
STA. 80 + 33.00 — SEC. 32-T1S-R31E
STR. NO. 38-312-173 — P-B 0248(12)173
PCN 06G7 — HL-93

JONES COUNTY
S. D. DEPT. OF TRANSPORTATION
FEBRUARY 2024

-X028-

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

DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU	ER	BT	Steve A Johnson BRIDGE ENGINEER
JONS06G7	06G7GB09		

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E27	E99

SPECIFICATIONS

Use South Dakota Standard Specifications for Roads and Bridges, 10-7-26 Version, Required Provisions, and Special Provisions as included in the Proposal. The Standard Specifications for Roads and Bridges are available for download and viewing at: https://dot.sd.gov/doing-business/contractors/standard-specifications

GENERAL NOTES

Design will be in accordance with Section 560 of the Specifications with the following criteria:

1. *Box culvert and box culvert end section design will conform to the AASHTO LRFD Bridge Design Specifications, 9th Edition.*
2. *Design Live Load: HL-93 and construction loading consisting of one 7' - 6" gage axle with gross axle 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.*
3. *The box culvert will be load rated in accordance with the AASHTO Manual for Bridge Evaluation, 2018 Edition with the latest Interim Revisions using the LRFR method. The rating will include evaluation of the Design HL-93 truck at both Inventory and Operating levels and a Legal Load rating for three SD legal trucks (Type 3, 3S2 and 3-2) as well as the notional rating load and four specialized hauling vehicles. The structure will also be evaluated for the emergency vehicles, EV2 and EV3, at the legal load rating level. All sections of the box culvert will 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 will rate greater than 1.0 at legal load rating level. AASHTOWare Bridge Rating (BrR) is required to be used to rate the box culvert. Include the BrR rating model and a load rating summary table with load rating calculations. Submit load rating calculations with the design and independent check design calculations or shop plans, as appropriate.*
4. *The design of the barrel sections will be based on a minimum fill height of 2 foot and include all subsequent fill heights up to and including the maximum fill height of 18 ft. over the box culvert.*
5. *Minimum inside corner fillet will be 6 in.*
6. *Minimum precast barrel section length will be 6 - foot sections; however, no more than two 4 - foot sections are allowed in any one length of precast barrel.*
7. *Lift holes will be plugged with an approved nonshrinkable grout.*
8. *The Fabricator will 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 will be in accordance with the final approved shop plans.*
11. *Care will be taken when placing sections. Sections will be only moved using the lifting holes by approved equipment.*
12. *Soils below the bottom of the proposed RCBC consist of brown to gray clay. Groundwater was encountered in the borings at an elevation of 2026.2 feet during the subsurface investigation conducted in April 2023. Dewatering will be required during construction.*

DESIGN MIX OF CONCRETE

1. *Mix will be as per fabricator's design; however, a minimum compressive strength will not be less than 4500 p.s.i. at 28 days.*
2. *High sulfate levels are likely to be encountered on this project. All concrete will be Class A45 Concrete conforming to Section 460 of the Construction Specifications, with the following modifications: the type of cement will be either a Type V or Type II with 20 to 25% Class F Modified Fly Ash substituted for cement in accordance with Section 605 of the Construction Specifications. The Water/Cementitious material ratio will not exceed 0.45 as defined in Section 460.3 C.*

SHOP PLANS

The fabricator will submit shop plans in accordance with the Construction Specifications. Include design and independent check design, if applicable, with initial submittal.

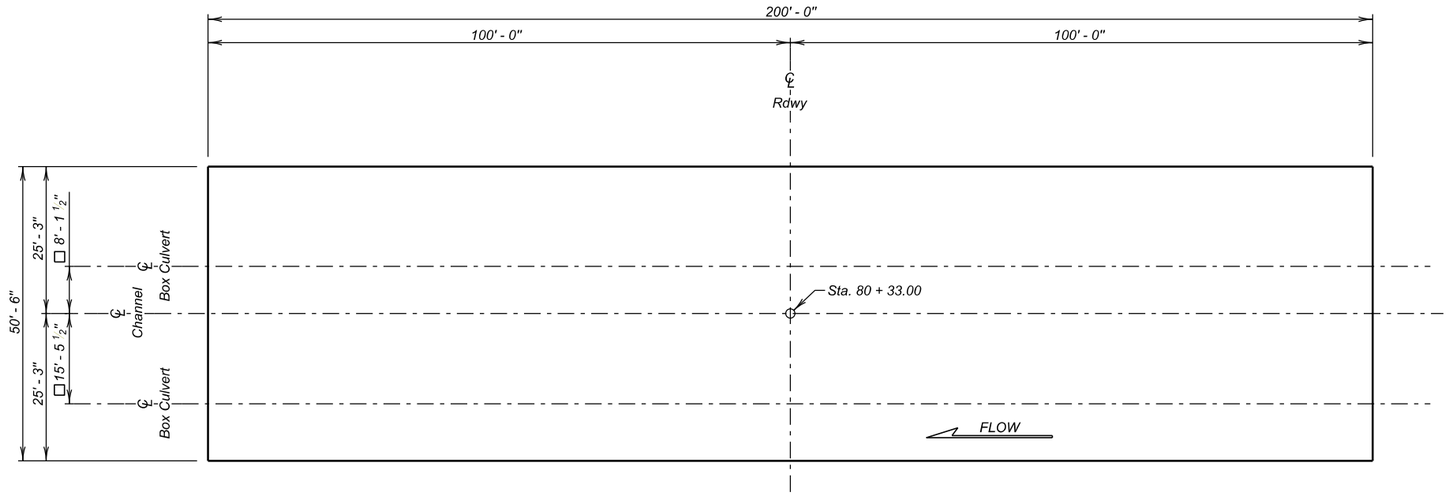
ESTIMATED QUANTITIES

ITEM	UNIT	QUANTITY
⌀ Box Culvert Undercut	Cu. Yd.	767

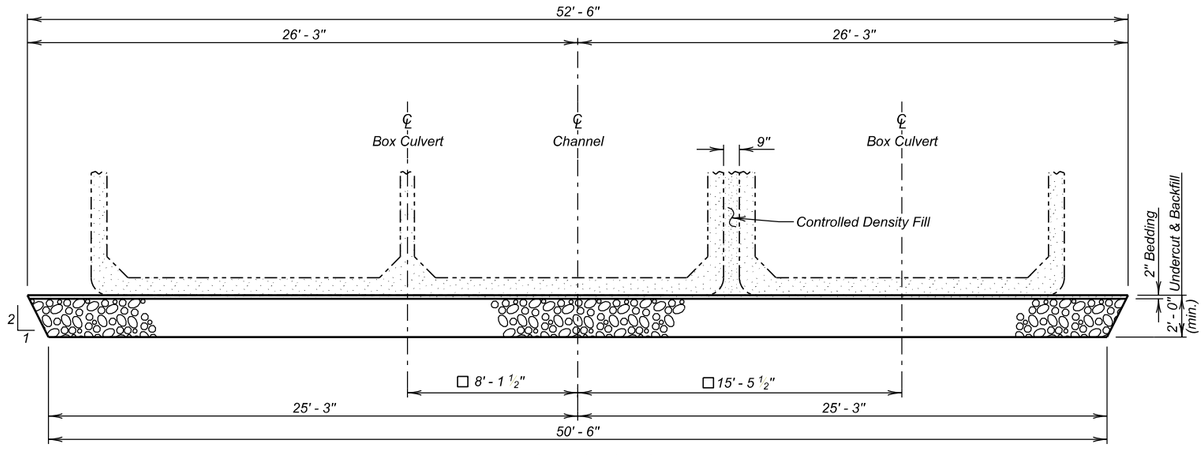
⌀ *For payment, quantity is based on plan shown undercut dimensions and will not be measured unless the Engineer orders a change.*

Z

□ *Based on Ts = 9" and Tm = 8".*



UNDERCUT LAYOUT
(Bottom Dimensions)



TYPICAL SECTION
(For Limits of Undercut)

SITE 2
ALTERNATE B

NOTES AND UNDERCUT DETAILS

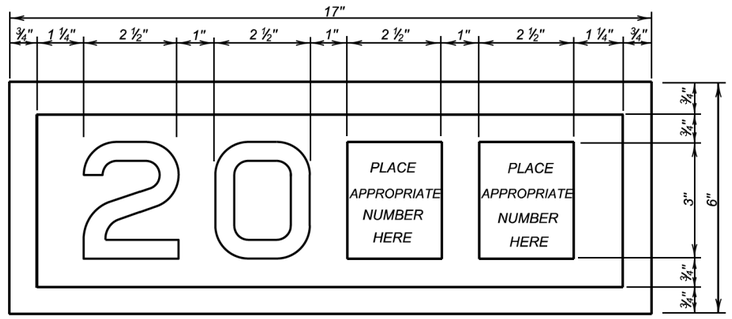
FOR

3 - 14' X 12' BOX CULVERT (PRECAST)

OVER MEDICINE CREEK — 0° SKEW
STA. 80 + 33.00 — SEC. 32-T1S-R31E
STR. NO. 38-312-173 — P-B 0248(12)173
HL-93

JONES COUNTY
S. D. DEPT. OF TRANSPORTATION
FEBRUARY 2024

DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU	ER	BT	Steve A Johnson BRIDGE ENGINEER
JONS06G7	06G7GB10		



YEAR PLATE DETAILS

GENERAL NOTES:

1. Year plates of the general dimensions shown will be constructed on all box culverts and bridges. The year plates will 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 (1/2) inch in deptn.

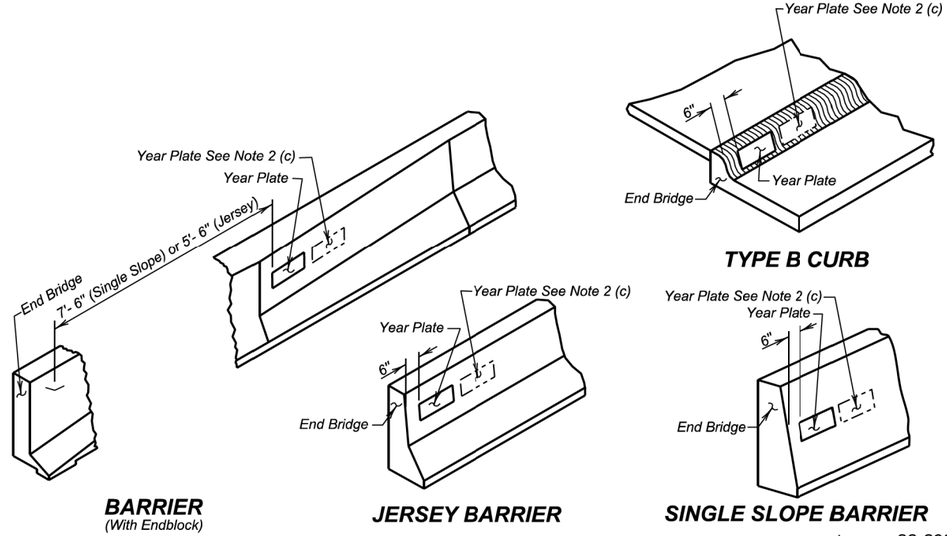
2. Year plates will be located on structure(s) as follows:

   a. On cast-in-place box culverts the year plates will 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 will be centered laterally on the upstream face of the top slab. Where an extended interior wall interferes with this location, the year plate will be centered in an adjacent barrel.

   b. On bridges with six (6) inch curbs, "Jersey" shaped barriers with no endblocks, or "Single Slope" shaped barriers with no endblocks, the year plate will 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 barrier endblocks, the year plate will be centered on the upper sloped portion of the barrier approximately 5'- 6" for "Jersey" shaped barriers from the end of the bridge and 7'-6" for "Single Slope" shaped barriers from the end of bridge, or as designated by the Engineer. There will be one year plate at each end of the bridge on opposite sides.

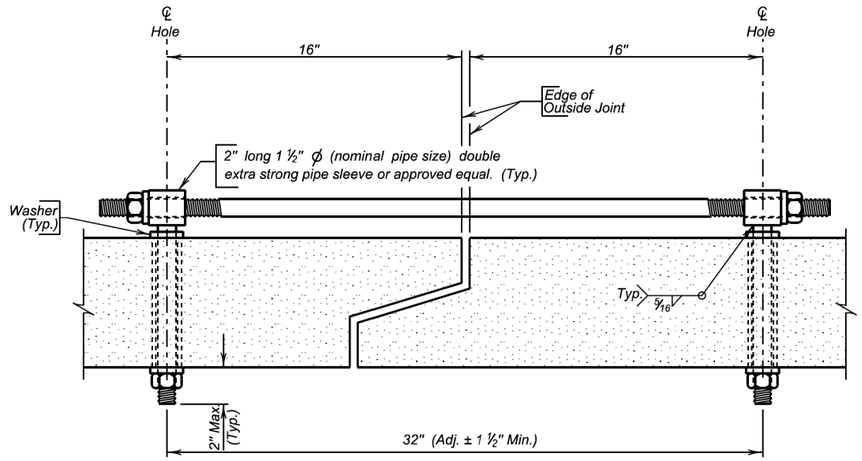
   c. When the plans specify that both the original date of construction and the date of reconstruction are to be shown, one date will be placed as listed above and the other located adjacent to it. Both year plates will be shown at each end of the bridge on opposite sides.

3. There will be no separate measurement or payment made for year plates on box culverts and bridges. All costs for this work will be incidental to other contract items.



January 22, 2021

Published Date: 2027	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 ϕ 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.

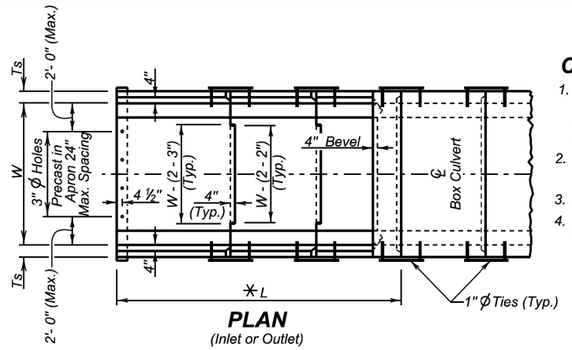
6. All costs for furnishing and installing the precast box culvert tie bolt assembly shall be incidental to the contract unit price per Foot for "Precast Concrete Box Culvert, Furnish".

March 21, 2016

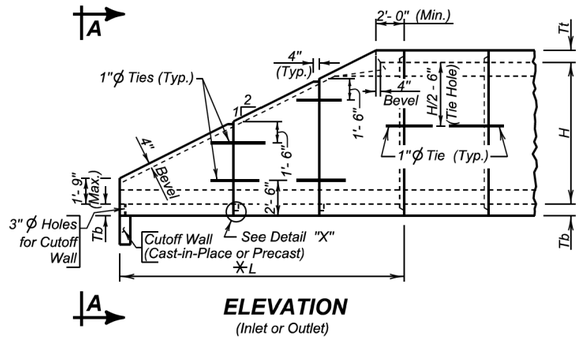
Published Date: 2027	SDDOT	PRECAST BOX CULVERT TIE BOLT ASSEMBLY DETAILS	PLATE NUMBER 560.01
			Sheet 1 of 1

SITE 2
ALTERNATE B

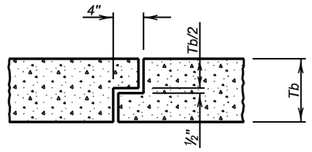
3 - 14' X 12' BOX CULVERT (PRECAST)
STR. NO. 38-312-173
FEBRUARY 2024



PLAN
(Inlet or Outlet)

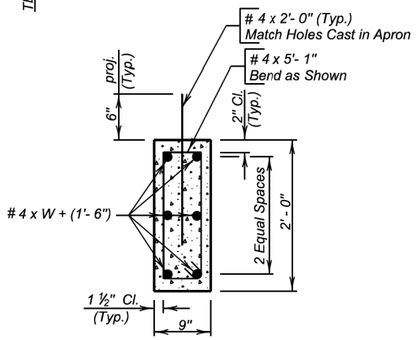


ELEVATION
(Inlet or Outlet)

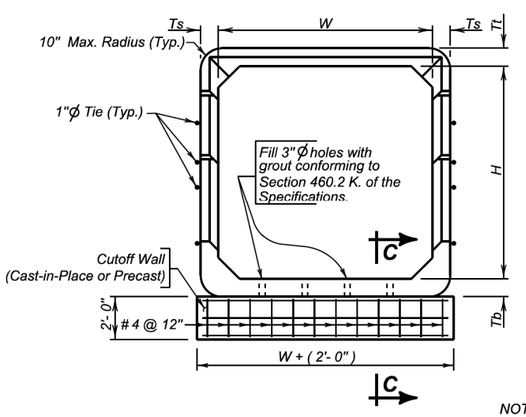


DETAIL "X"

NOTE: Joint details may vary from that shown, according to the manufacturer's design. Submit details with shop plans for approval.



SEC. C - C



VIEW A - A

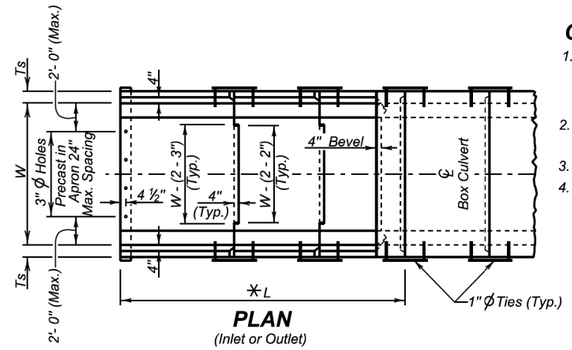
LEGEND

W = Width of Opening
H = Height of Opening
Tt = Thickness of Top Slab
Tb = Thickness of Bottom Slab
Ts = Thickness of Side Wall
L = Length of End Section

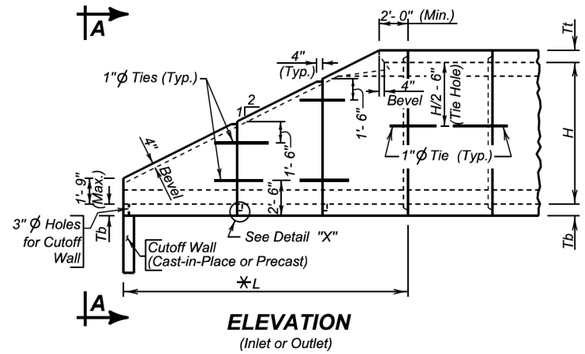
NOTES:
See GENERAL DRAWING for W and H dimensions.
Tt, Tb, L, and Ts dimensions shall be furnished by the Contractor.
⁎ Length and number of units may vary from that shown.

June 26, 2015

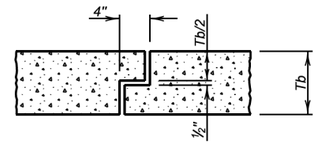
Published Date: 2027	SDDOT	PRECAST SINGLE BOX CULVERT SLOPED END SECTION DETAILS WITH 2'–0" CUTOFF WALL	PLATE NUMBER 560.10
			Sheet 1 of 1



PLAN
(Inlet or Outlet)

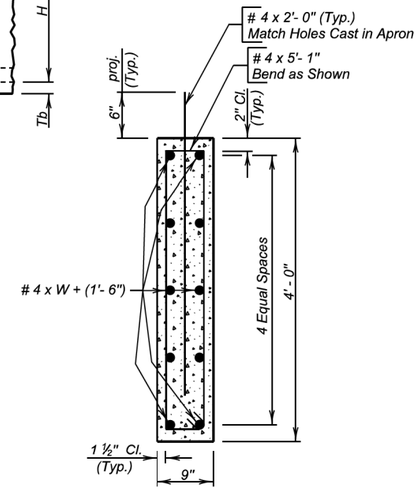


ELEVATION
(Inlet or Outlet)

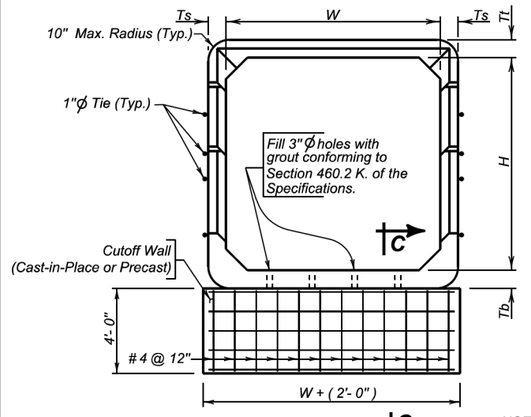


DETAIL "X"

NOTE: Joint details may vary from that shown, according to the manufacturer's design. Submit details with shop plans for approval.



SEC. C - C



VIEW A - A

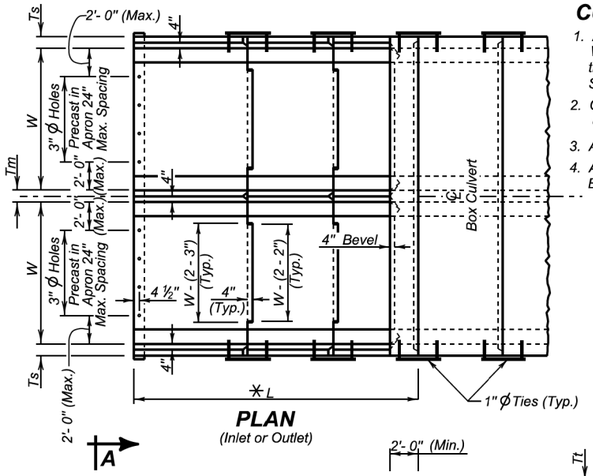
LEGEND

W = Width of Opening
H = Height of Opening
Tt = Thickness of Top Slab
Tb = Thickness of Bottom Slab
Ts = Thickness of Side Wall
L = Length of End Section

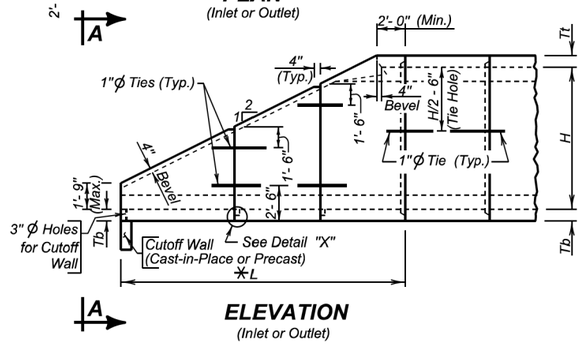
NOTES:
See GENERAL DRAWING for W and H dimensions.
Tt, Tb, L, and Ts dimensions shall be furnished by the Contractor.
⁎ Length and number of units may vary from that shown.

June 26, 2015

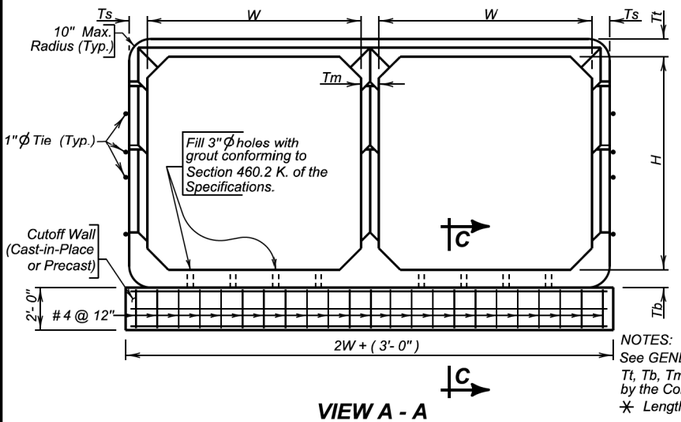
Published Date: 2027	SDDOT	PRECAST SINGLE BOX CULVERT SLOPED END SECTION DETAILS WITH 4'–0" CUTOFF WALL	PLATE NUMBER 560.11
			Sheet 1 of 1



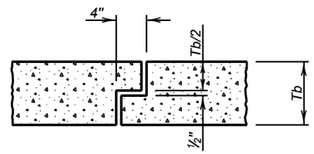
PLAN
(Inlet or Outlet)



ELEVATION
(Inlet or Outlet)

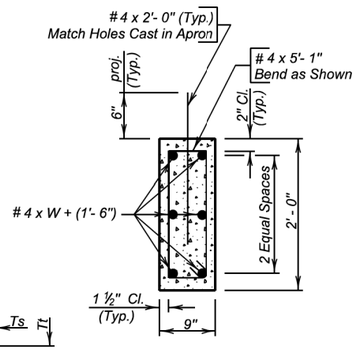


VIEW A - A



DETAIL " X "

NOTE: Joint details may vary from that shown, according to the manufacturer's design. Submit details with shop plans for approval.



SEC. C - C

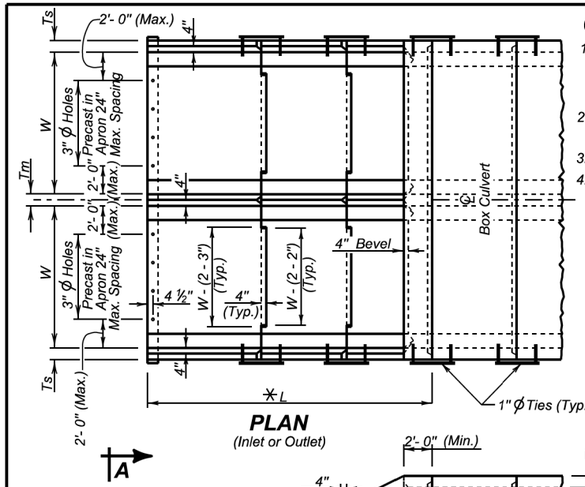
LEGEND

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
L = Length of End Section

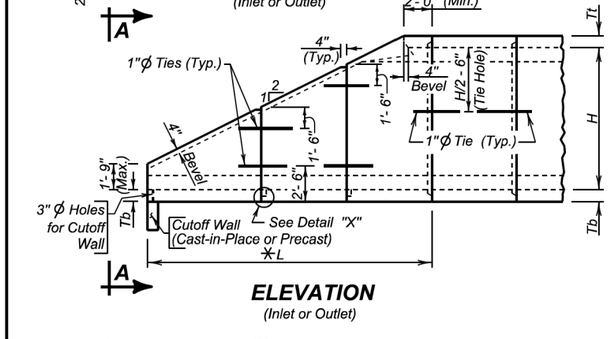
NOTES:
See GENERAL DRAWING for W and H dimensions.
Tt, Tb, Tm, L, and Ts dimensions shall be furnished by the Contractor.
⁎ Length and number of units may vary from that shown.

June 26, 2015

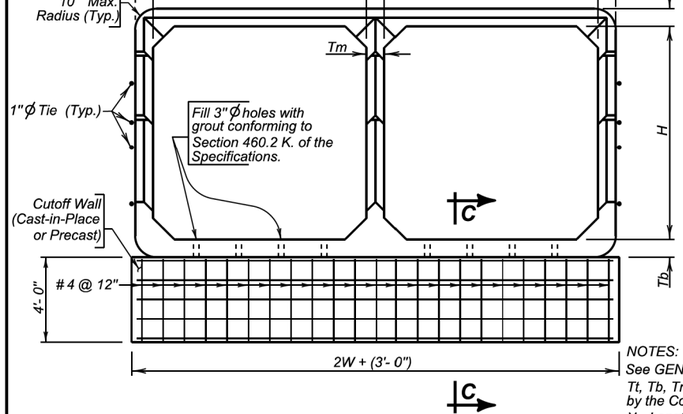
Published Date: 2027	SDDOT	PRECAST DOUBLE BOX CULVERT SLOPED END SECTION DETAILS WITH 2'–0" CUTOFF WALL	PLATE NUMBER 560.20
			Sheet 1 of 1



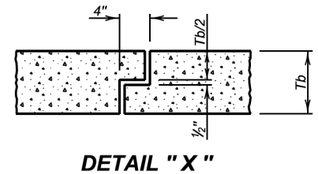
PLAN
(Inlet or Outlet)



ELEVATION
(Inlet or Outlet)

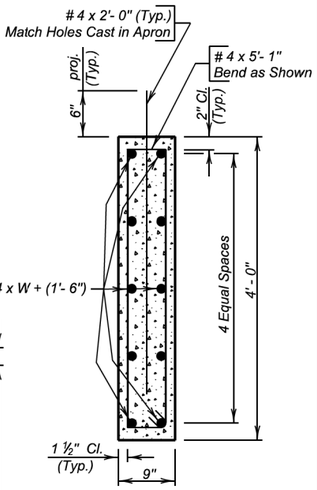


VIEW A - A



DETAIL " X "

NOTE: Joint details may vary from that shown, according to the manufacturer's design. Submit details with shop plans for approval.



SEC. C - C

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
L = Length of End Section

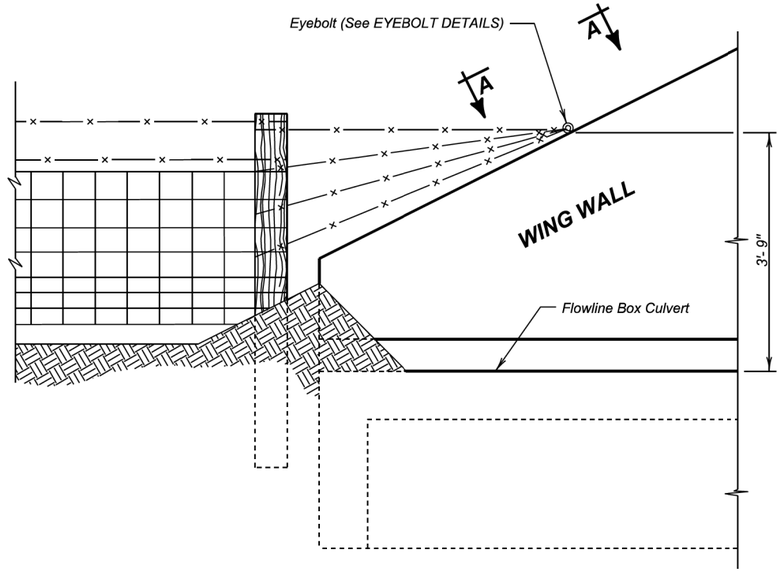
NOTES:
See GENERAL DRAWING for W and H dimensions.
Tt, Tb, Tm, L, and Ts dimensions shall be furnished by the Contractor.
⁎ Length and number of units may vary from that shown.

June 26, 2015

Published Date: 2027	SDDOT	PRECAST DOUBLE BOX CULVERT SLOPED END SECTION DETAILS WITH 4'–0" CUTOFF WALL	PLATE NUMBER 560.21
			Sheet 1 of 1

SITE 2
ALTERNATE B

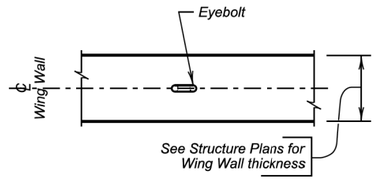
3 - 14' X 12' BOX CULVERT (PRECAST)
STR. NO. 38-312-173
FEBRUARY 2024



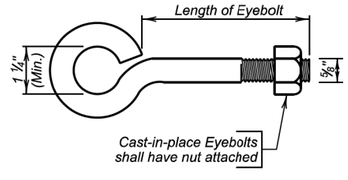
DETAIL FOR FENCE ANCHORS

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 ⅞ 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 ⅞ 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

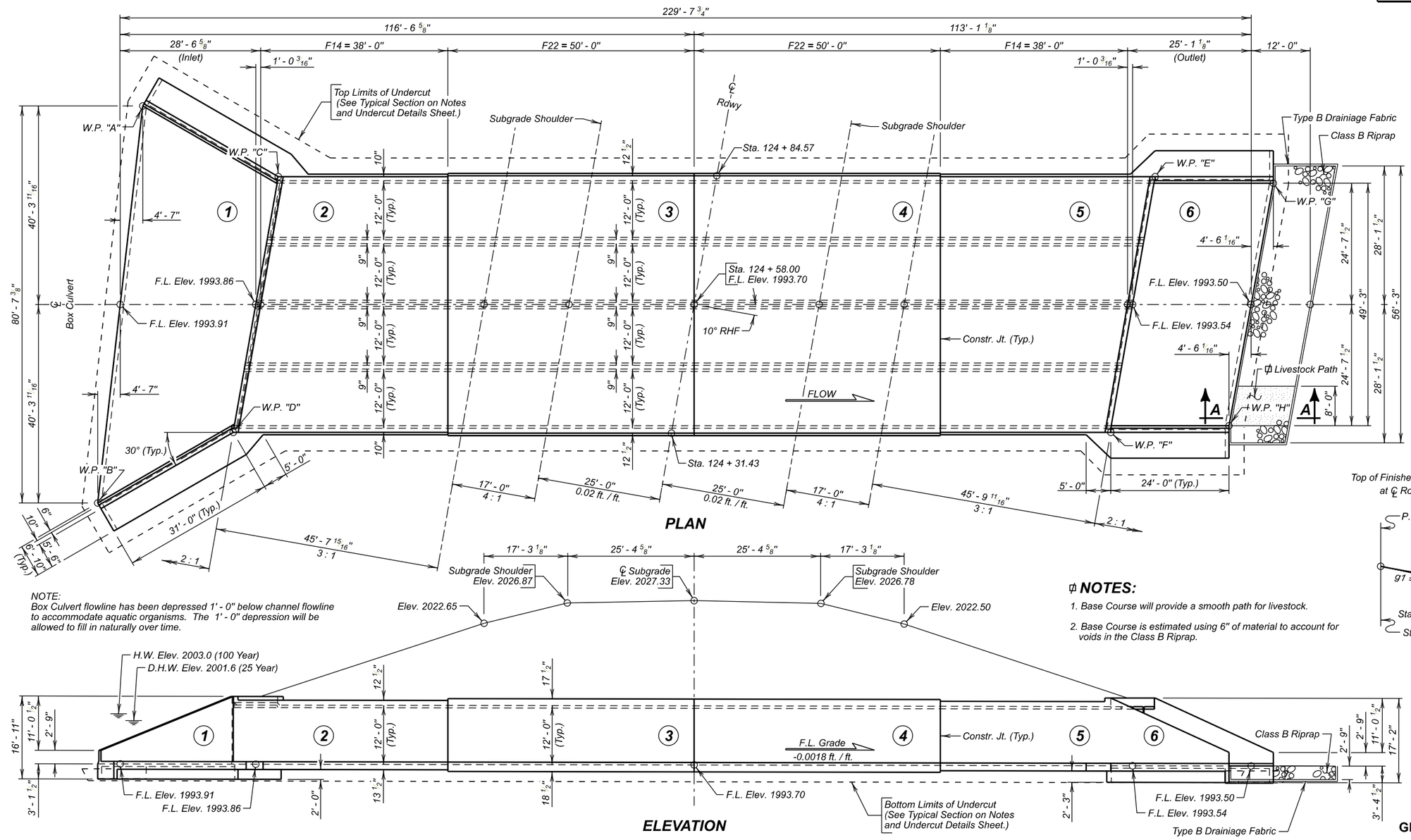
Published Date: 2027	SDDOT	FENCE ANCHORS FOR BOX CULVERT WING WALLS	PLATE NUMBER 620.16 Sheet 1 of 1

SITE 2
ALTERNATE B

3 - 14' X 12' BOX CULVERT (PRECAST)
STR. NO. 38-312-173
FEBRUARY 2024

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

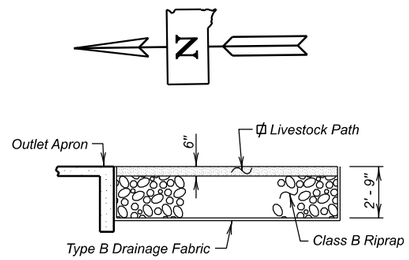
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E32	E99



PLAN

ELEVATION

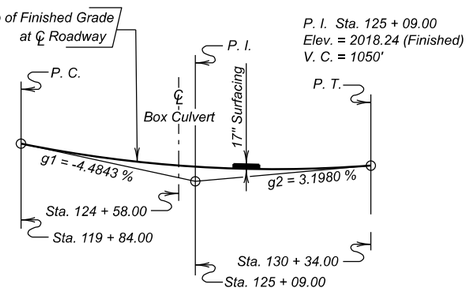
NOTE:
Box Culvert flowline has been depressed 1' - 0" below channel flowline to accommodate aquatic organisms. The 1' - 0" depression will be allowed to fill in naturally over time.



SECTION A - A

-X028-
INDEX OF CULVERT SHEETS-

Sheet No. 1 - General Drawing and Quantities
Sheet No. 2 - Notes and Undercut Details
Sheet No. 3 - Inlet Details (A)
Sheet No. 4 - Inlet Details (B)
Sheet No. 5 - Outlet Details (A)
Sheet No. 6 - Outlet Details (B)
Sheet No. 7 - F14 Barrel End Section Details (38' - 0") (A)
Sheet No. 8 - F14 Barrel End Section Details (38' - 0") (B)
Sheet No. 9 - F22 Barrel Interior Section Details (50' - 0") (A)
Sheet No. 10 - F22 Barrel Interior Section Details (50' - 0") (B)
Sheet No. 11 - Details of Standard Plate No's 460.02 and 460.10
Sheet No. 12 - Details of Standard Plate No. 620.16



P. I. Sta. 125 + 09.00
Elev. = 2018.24 (Finished)
V. C. = 1050'

VERTICAL CURVE DATA

℄ NOTES:

1. Base Course will provide a smooth path for livestock.
2. Base Course is estimated using 6" of material to account for voids in the Class B Riprap.

HYDRAULIC DATA

Q_d	1291 cfs
A_d	331 sq ft
V_d	3.9 fps
Q_E	1291 cfs
Q_{100}	2311 cfs
Q_{OT}	>Q_{100}
V_{max}	6.3 fps

Q_d = Design discharge for the proposed culvert based on 25 year frequency. El. 2001.6.

Q_{OT} = Overtopping discharge and frequency > Q_{100} year recurrence interval. El. 2028.0 @ Sta. 126 + 00.00 ±.

Q_E = 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. 2003.0.

V_{max} = Maximum computed outlet velocity for the proposed culvert, based on 100 year frequency.

TABLE OF WORKING POINTS

W. P.	STATION	OFFSET
"A"	124 + 78.25	117.25' Lt.
"B"	123 + 97.28	112.27' Lt.
"C"	124 + 68.90	87.66' Lt.
"D"	124 + 16.18	87.66' Lt.
"E"	124 + 99.82	87.66' Rt.
"F"	124 + 47.12	87.81' Rt.
"G"	125 + 02.67	111.53' Rt.
"H"	124 + 52.60	111.21' Rt.

ESTIMATED QUANTITIES

	ITEM	UNIT	QUANTITY
	Class A45 Concrete, Box Culvert	Cu. Yd.	1427.9
	Reinforcing Steel	Lb.	163705
	Structure Excavation, Box Culvert	Cu. Yd.	589
	Box Culvert Undercut	Cu. Yd.	1101
	Type B Drainage Fabric	Sq. Yd.	117
⚹	Class B Riprap	Ton	96.3
⊛	Base Course	Ton	3.4

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

⊛ For estimating purposes only, a factor of 1.89 tons/cu. yd. was used to convert Cu. Yds. to Tons.

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

SITE 3
ALTERNATE A

GENERAL DRAWING AND QUANTITIES

FOR

4 - 12' X 12' BOX CULVERT (C.I.P.)

OVER MEDICINE CREEK — 10° RHF SKEW
STA. 124 + 58.00 — SEC. 32-T1S-R31E
STR. NO. 38-319-174 — P-B 0248(12)173
PCN 06G7 — HL-93

JONES COUNTY

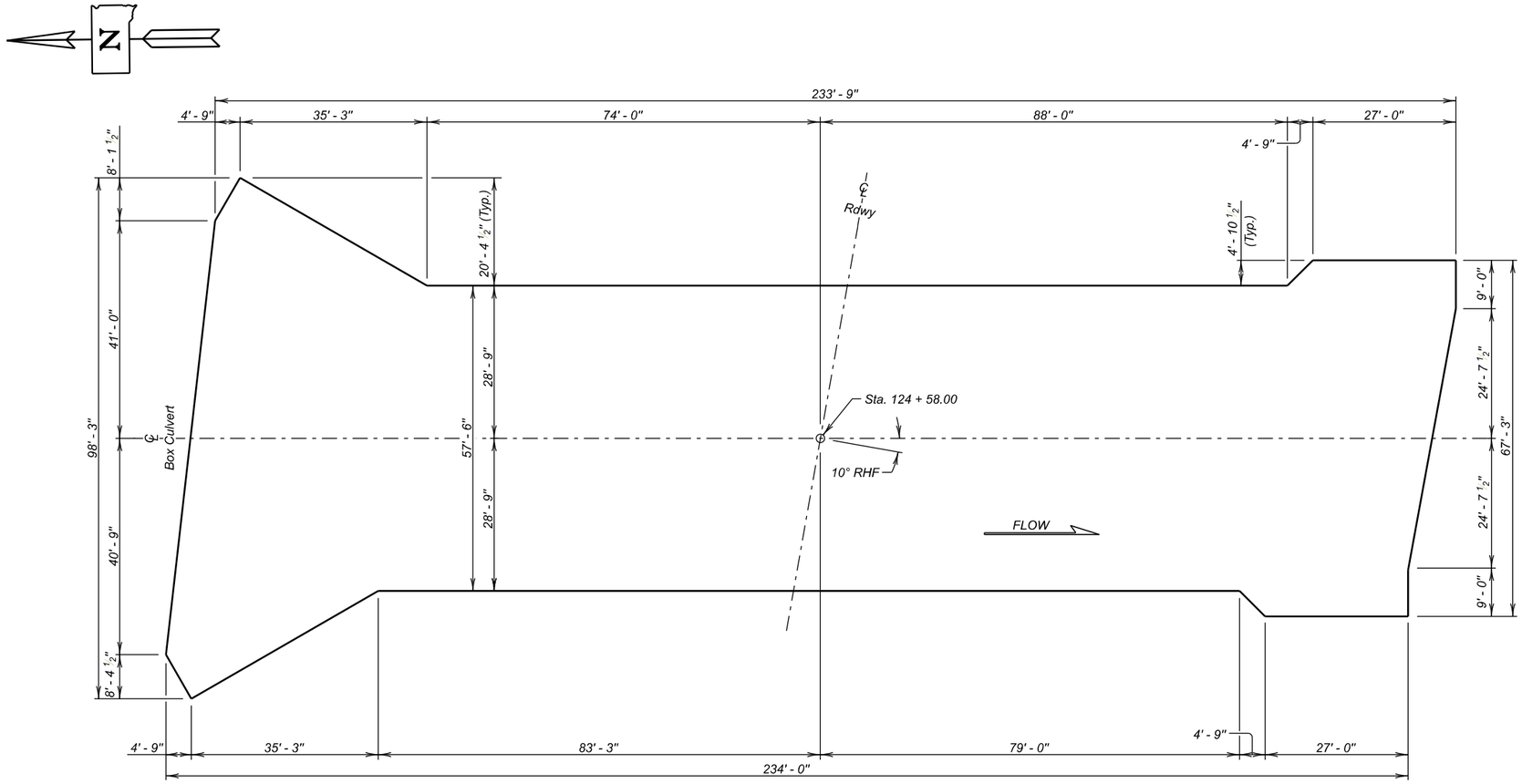
S. D. DEPT. OF TRANSPORTATION

JUNE 2024

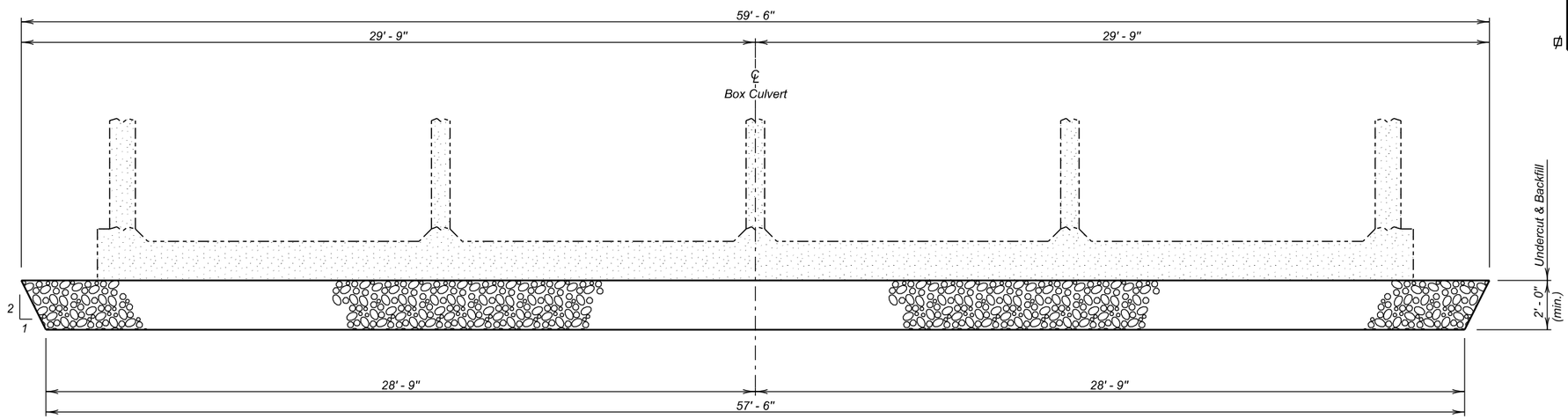
-X028-

DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU	ER	BT	Steve A Johnson BRIDGE ENGINEER
JONS06G7	06G7GC01		

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E33	E99



UNDERCUT LAYOUT
(Bottom Dimensions)



TYPICAL SECTION
(For Limits of Undercut)

SPECIFICATIONS

1. *Design Specifications: AASHTO LRFD Bridge Design Specifications, 9th Edition.*
2. *Construction Specifications: South Dakota Standard Specifications for Roads and Bridges, 10-7-26 Version, Required Provisions, and Special Provisions as included in the Proposal. The Standard Specifications for Roads and Bridges are available for download and viewing at: https://dot.sd.gov/doing-business/contractors/standard-specifications*

GENERAL NOTES

1. *Design Live Load: HL-93 and construction loading consisting of one 7' - 6" gage axle with gross axle 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 14 ft. (F14) and 22 ft. (F22).*
3. *Design Material Strengths: Concrete $f'c$ = 4500 p.s.i.*
   Reinforcing Steel fy = 60000 p.s.i.
4. *High sulfate levels are likely to be encountered on this project. All concrete will be Class A45 Concrete, Box Culvert conforming to Section 460 of the Construction Specifications, with the following modifications: the type of cement will be either a type V or a type II with 20% to 25% Class F Modified Fly Ash substituted for cement in accordance with Section 605 of the Construction Specifications.*
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 $^3/_4$ 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 RCBC consist of brown clay. Groundwater was encountered in the borings at an elevation of 1998.3 feet during the subsurface investigation conducted in June 2023. Dewatering will be required during construction.*

ESTIMATED QUANTITIES

	ITEM	UNIT	QUANTITY
℄	Box Culvert Undercut	Cu. Yd.	1101

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

SITE 3
ALTERNATE A

NOTES AND UNDERCUT DETAILS

FOR

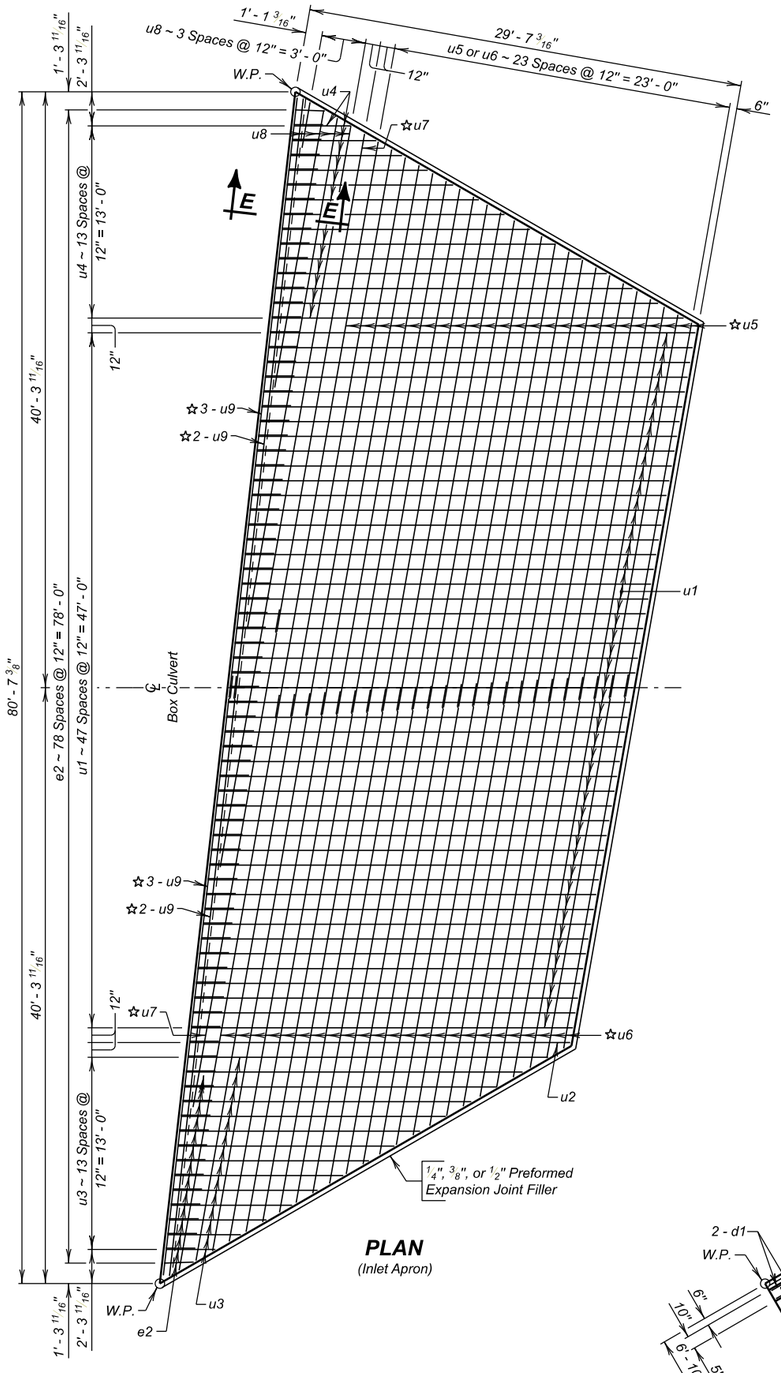
4 - 12' X 12' BOX CULVERT (C.I.P.)

OVER MEDICINE CREEK — 10° RHF SKEW
STA. 124 + 58.00 — SEC. 32-T1S-R31E
STR. NO. 38-319-174 — P-B 0248(12)173
HL-93

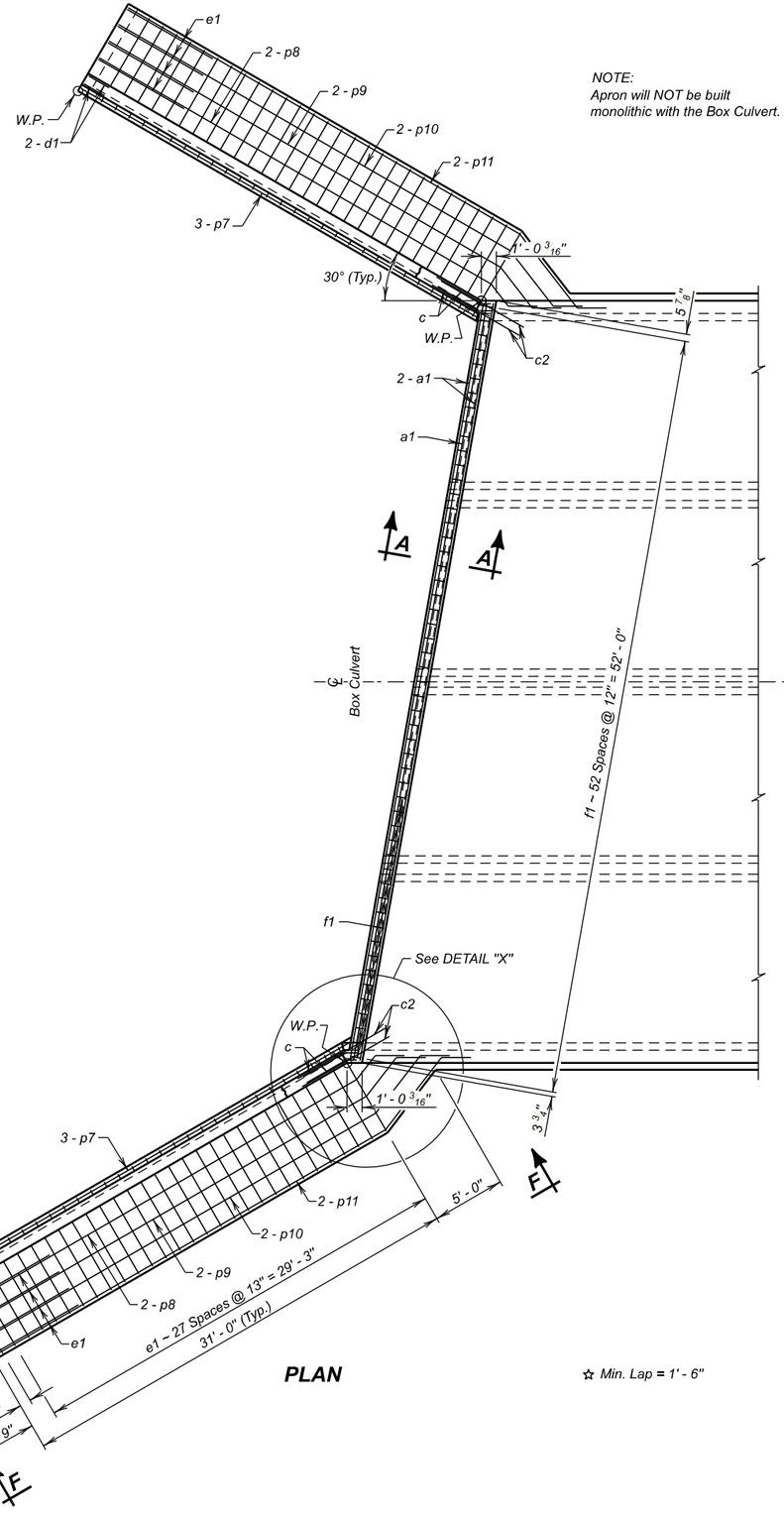
JONES COUNTY
S. D. DEPT. OF TRANSPORTATION
JUNE 2024

DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU	ER	BT	Steve A Johnson BRIDGE ENGINEER
JONS06G7	06G7GC02		

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E34	E99



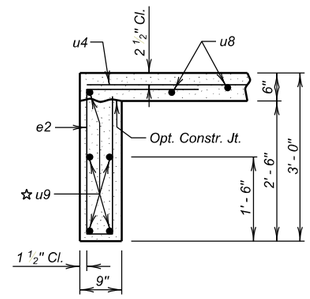
PLAN
(Inlet Apron)



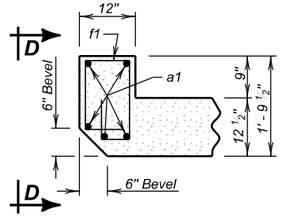
PLAN

☆ Min. Lap = 1' - 6"

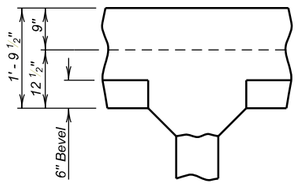
NOTE:
Apron will NOT be built monolithic with the Box Culvert.



SECTION E - E



SECTION A - A
(At Top Slab)



VIEW D - D
(At Interior Wall)

SITE 3
ALTERNATE A

INLET DETAILS (A)

FOR

4 - 12' X 12' BOX CULVERT (C.I.P.)

OVER MEDICINE CREEK
STA. 124 + 58.00
STR. NO. 38-319-174

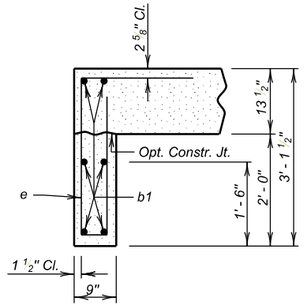
10° RHF SKEW
SEC. 32-T1S-R31E
P-B 0248(12)173
HL-93

JONES COUNTY
S. D. DEPT. OF TRANSPORTATION
JUNE 2023

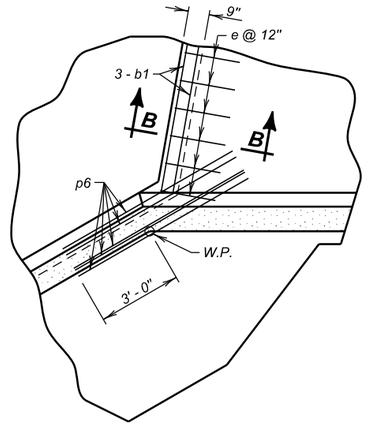
3 OF 12

DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU	ER	BT	Steve A Johnson BRIDGE ENGINEER
JONS06G7	06G7GC03		

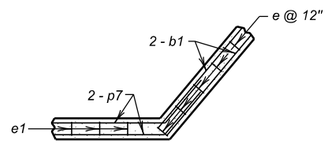
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E35	E99



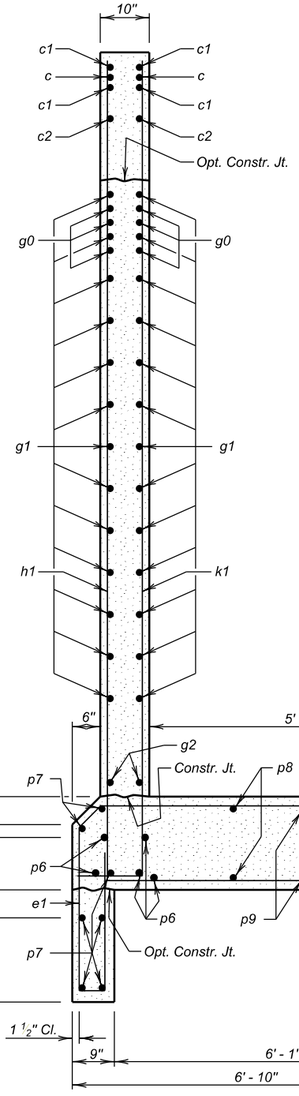
SECTION B - B



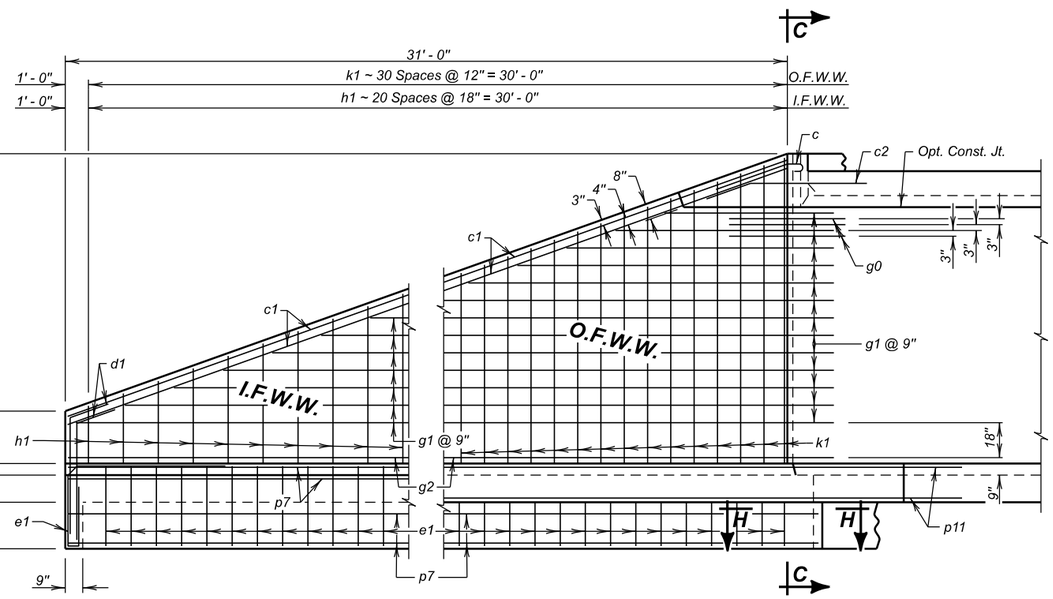
DETAIL "X"
(At Bottom Slab)



SECTION H - H



SECTION C - C



VIEW F - F

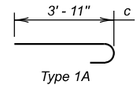
LEGEND FOR PLACING RE-STEEL

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

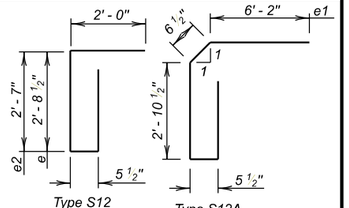
REINFORCING SCHEDULE

Mk.	No.	Size	Length	Type
a1	5	6	52' - 3"	Str.
b1	6	6	50' - 3"	Str.
c	4	5	4' - 6"	1A
c1	8	5	32' - 9"	Str.
c2	4	5	7' - 0"	19B
d1	8	5	6' - 9"	19B
e	51	4	7' - 6"	S12
e1	64	5	12' - 9"	S12A
f1	53	4	5' - 6"	S6A
g0	12	5	5' - 0"	19B
g1	26	4	39' - 9"	19B
g2	4	4	32' - 9"	19B
h1	21	4	30' - 6"	17A
k1	31	5	20' - 9"	17A
p6	10	6	7' - 0"	Str.
p7	14	4	33' - 6"	Str.
p8	4	4	34' - 6"	Str.
p9	4	4	36' - 0"	Str.
p10	4	4	37' - 3"	Str.
p11	4	4	38' - 9"	Str.
INLET APRON				
e2	79	4	7' - 6"	S12
u1	24	4	54' - 6"	Str.
u2	1	4	25' - 9"	Str.
u3	7	4	27' - 9"	Str.
u4	7	4	31' - 9"	Str.
u5	12	4	64' - 0"	Str.
u6	12	4	66' - 3"	Str.
u7	2	4	35' - 0"	Str.
u8	2	4	57' - 3"	Str.
u9	10	4	40' - 9"	Str.

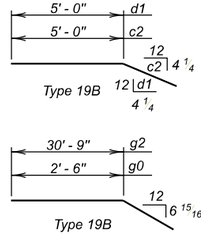
Bending Details



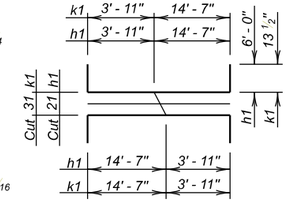
Type 1A



Type S12 Type S12A

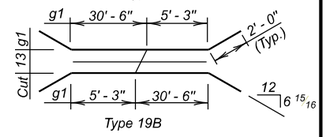


Type 19B

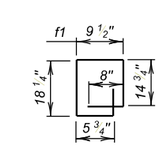


Type 17A

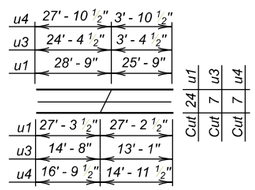
Type 19B

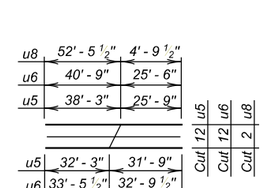


Type 19B



Type S6A





NOTES:
All dimensions are out to out of bars.
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	56.3	5273	28.0
Inlet Apron	38.7	3005	38.7

SITE 3
ALTERNATE A

INLET DETAILS (B)

FOR

4 - 12' X 12' BOX CULVERT (C.I.P.)

OVER MEDICINE CREEK
STA. 124 + 58.00
STR. NO. 38-319-174

10° RHF SKEW
SEC. 32-T1S-R31E
P-B 0248(12)173
HL-93

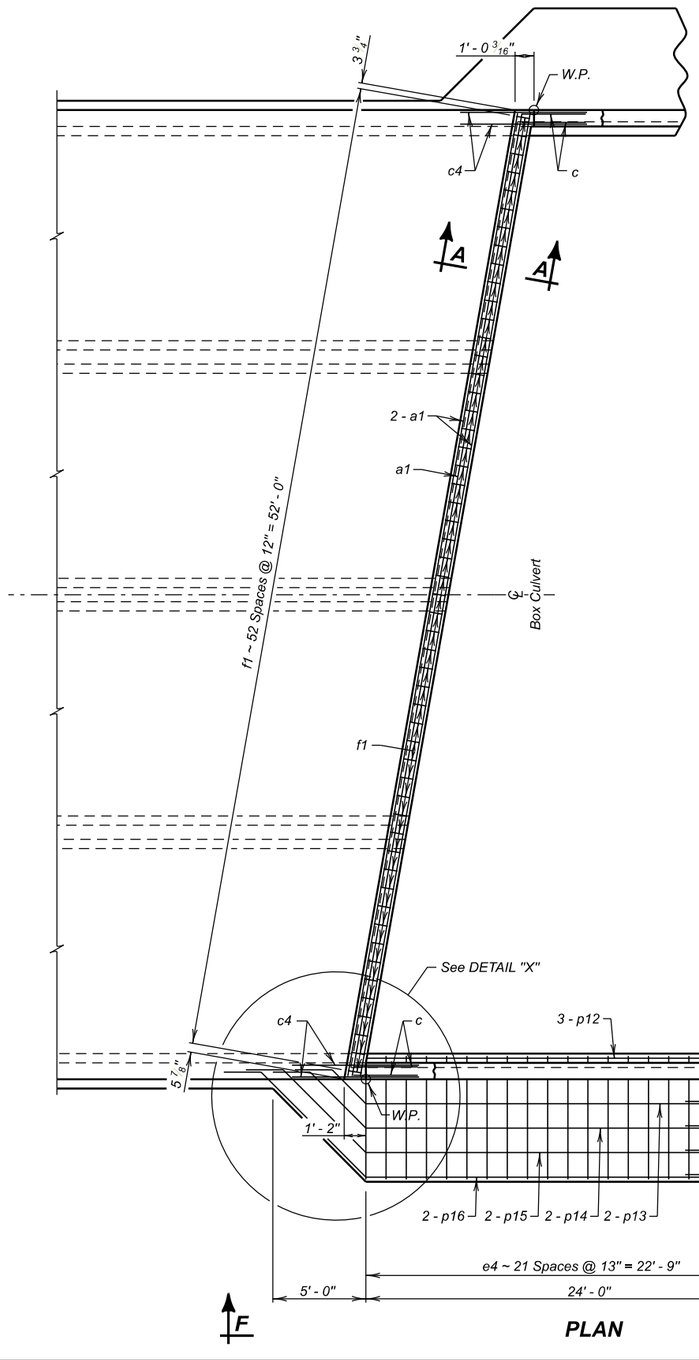
JONES COUNTY
S. D. DEPT. OF TRANSPORTATION
JUNE 2023

4 OF 12

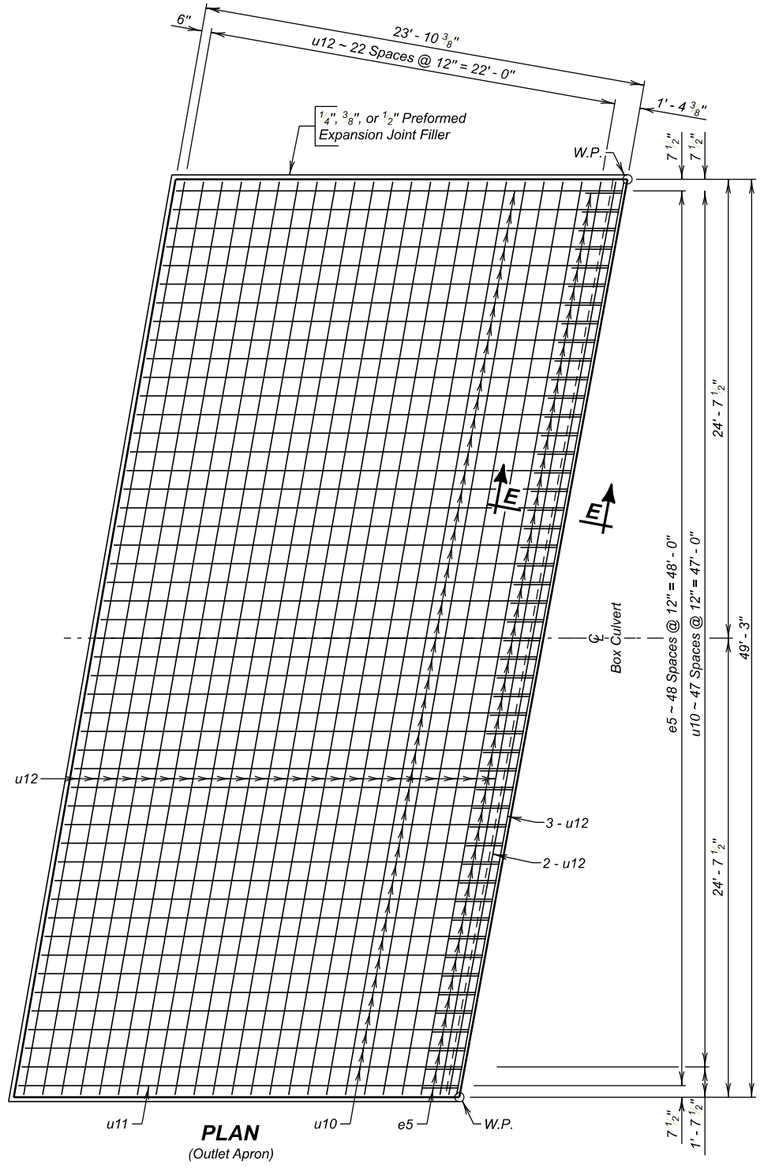
DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU	ER	BT	Steve A Johnson BRIDGE ENGINEER
JONS06G7	06G7GC04		

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E36	E99

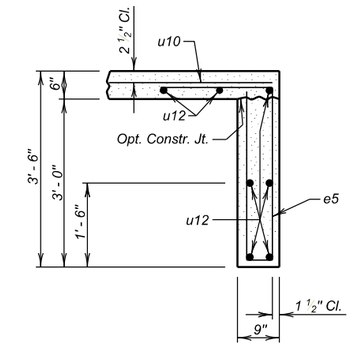
NOTE:
Apron will NOT be built monolithic with the Box Culvert.



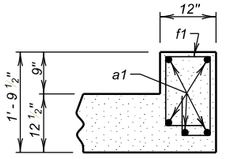
PLAN



PLAN
(Outlet Apron)



SECTION E - E



SECTION A - A
(At Top Slab)

SITE 3
ALTERNATE A

OUTLET DETAILS (A)

FOR

4 - 12' X 12' BOX CULVERT (C.I.P.)

OVER MEDICINE CREEK
STA. 124 + 58.00
STR. NO. 38-319-174

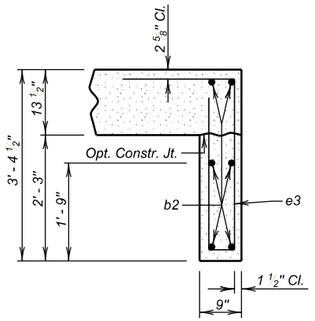
10° RHF SKEW
SEC. 32-T1S-R31E
P-B 0248(12)173
HL-93

JONES COUNTY
S. D. DEPT. OF TRANSPORTATION
JUNE 2024

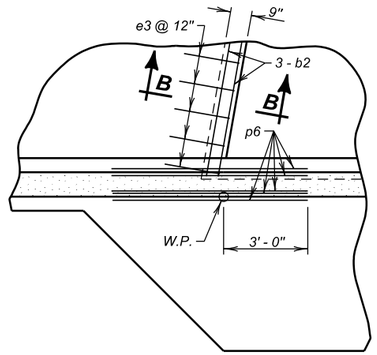
5 OF 12

DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU	ER	BT	Steven A Johnson BRIDGE ENGINEER
JONS06G7	06G7GC05		

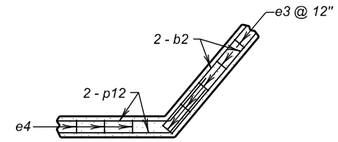
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E37	E99



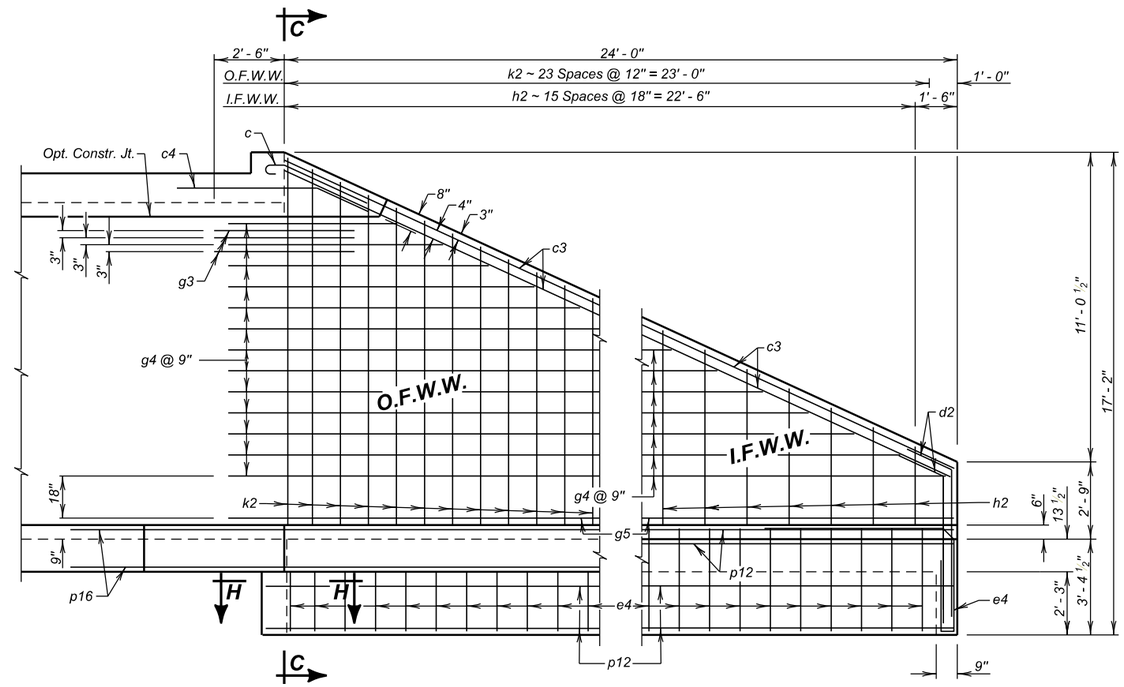
SECTION B - B



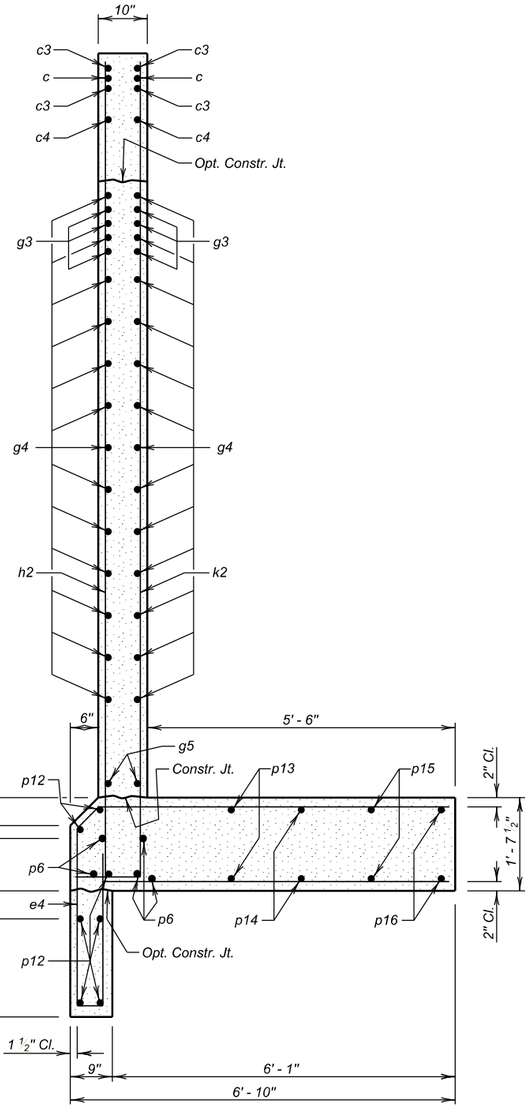
DETAIL "X"
(At Bottom Slab)



SECTION H - H



VIEW F - F

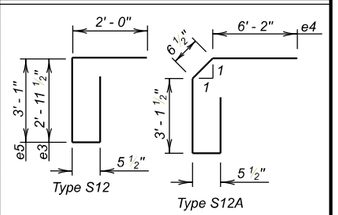


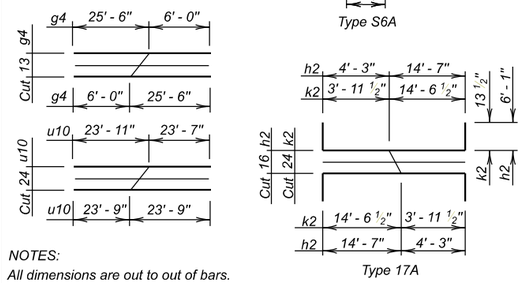
SECTION C - C

REINFORCING SCHEDULE

	Mk.	No.	Size	Length	Type
	a1	5	6	52' - 3"	Str.
	b2	6	6	51' - 3"	Str.
*	c	4	5	4' - 6"	1A
	c3	8	5	26' - 3"	Str.
	c4	4	5	7' - 0"	19B
	d2	8	5	7' - 0"	19B
	e3	52	4	8' - 0"	S12
	e4	52	4	13' - 3"	S12A
	f1	53	4	5' - 6"	S6A
	g3	12	5	5' - 0"	Str.
⌀	g4	26	4	31' - 6"	Str.
	g5	4	4	25' - 9"	Str.
⌀	h2	16	4	31' -0"	17A
⌀	k2	24	5	20' - 9"	17A
	p6	10	6	7' - 0"	Str.
*	p12	14	4	26' - 6"	Str.
*	p13	4	4	28' - 0"	Str.
*	p14	4	4	29' - 9"	Str.
*	p15	4	4	31' - 9"	Str.
*	p16	4	4	33' - 6"	Str.
	OUTLET APRON				
	e5	49	4	8' - 6"	S12
⌀	u10	24	4	47' - 6"	Str.
	u11	1	4	23' - 6"	Str.
	u12	28	4	49' - 9"	Str.

Bending Details





NOTES:
All dimensions are out to out of bars.
⌀ *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.
Outlet	47.2	4582	23.9
Outlet Apron	26.2	1986	26.2

LEGEND FOR PLACING RE-STEEL

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

SITE 3
ALTERNATE A

OUTLET DETAILS (B)

FOR

4 - 12' X 12' BOX CULVERT (C.I.P.)

OVER MEDICINE CREEK
STA. 124 + 58.00
STR. NO. 38-319-174

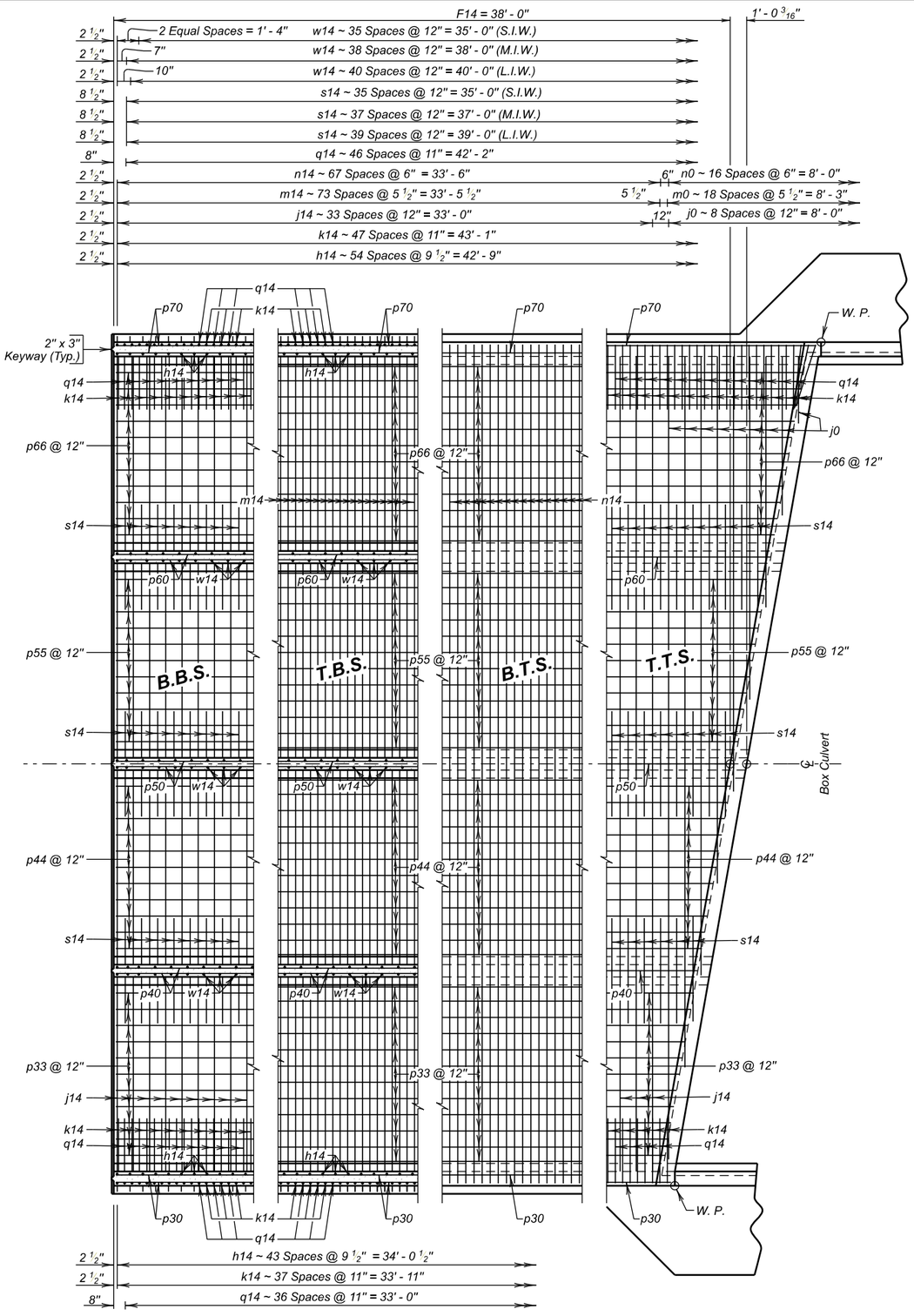
10° RHF SKEW
SEC. 32-T1S-R31E
P-B 0248(12)173
HL-93

JONES COUNTY
S. D. DEPT. OF TRANSPORTATION
JUNE 2024

6 OF 12

DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU	ER	BT	Steve A Johnson BRIDGE ENGINEER
JONS06G7	06G7GC06		

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E38	E99



PLAN

(Outlet End shown, Inlet similar by rotation)

LEGEND FOR PLACING RE-STEEL

T. T. S.	*- Top of Top Slab*
B. T. S.	*- Bottom of Top Slab*
T. B. S.	*- Top of Bottom Slab*
B. B. S.	*- Bottom of Bottom Slab*
S. I. W.	*- Short Interior Wall*
M. I. W.	*- Middle Interior Wall*
L. I. W.	*- Long Interior Wall*

SITE 3
ALTERNATE A

F14 BARREL END SECTION DETAILS (38' - 0") (A)

FOR

4 - 12' X 12' BOX CULVERT (C.I.P.)

OVER MEDICINE CREEK — 10° RHF SKEW
STA. 124 + 58.00 — SEC. 32-T1S-R31E
STR. NO. 38-319-174 — P-B 0248(12)173
HL-93

JONES COUNTY

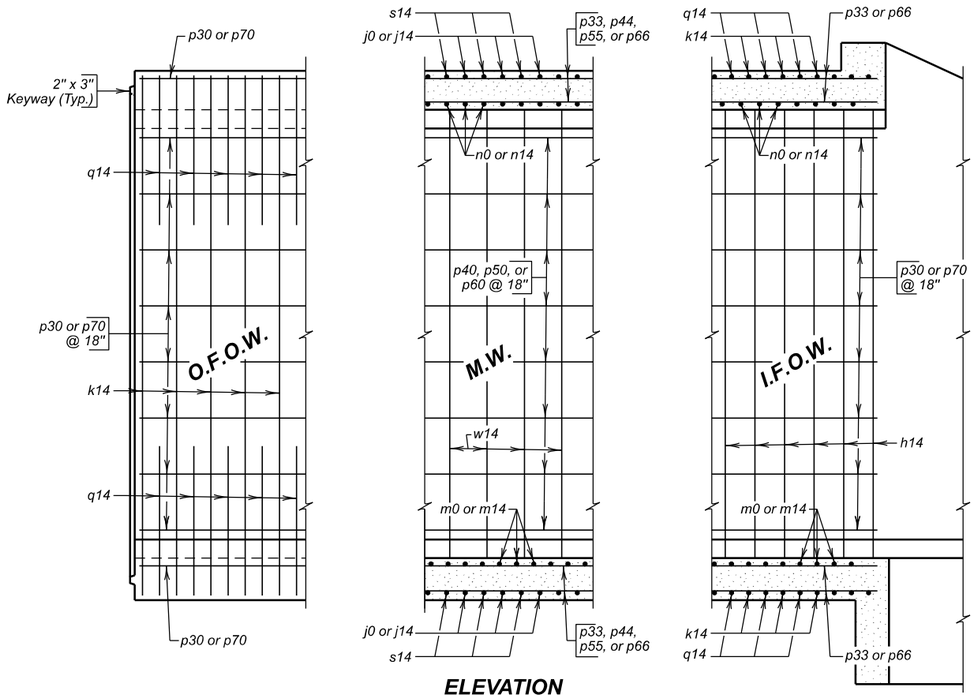
S. D. DEPT. OF TRANSPORTATION

JUNE 2024

7 OF 12

DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU	ER	BT	Steve A Johnson BRIDGE ENGINEER
JONS06G7	06G7GC07		

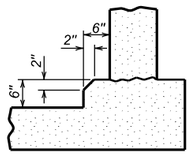
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E39	E99



ELEVATION

LEGEND FOR PLACING RE-STEEL

O. F. O. W.	- Outside Face of Outside Wall
I. F. O. W.	- Inside Face of Outside Wall
M. W.	- Middle Walls



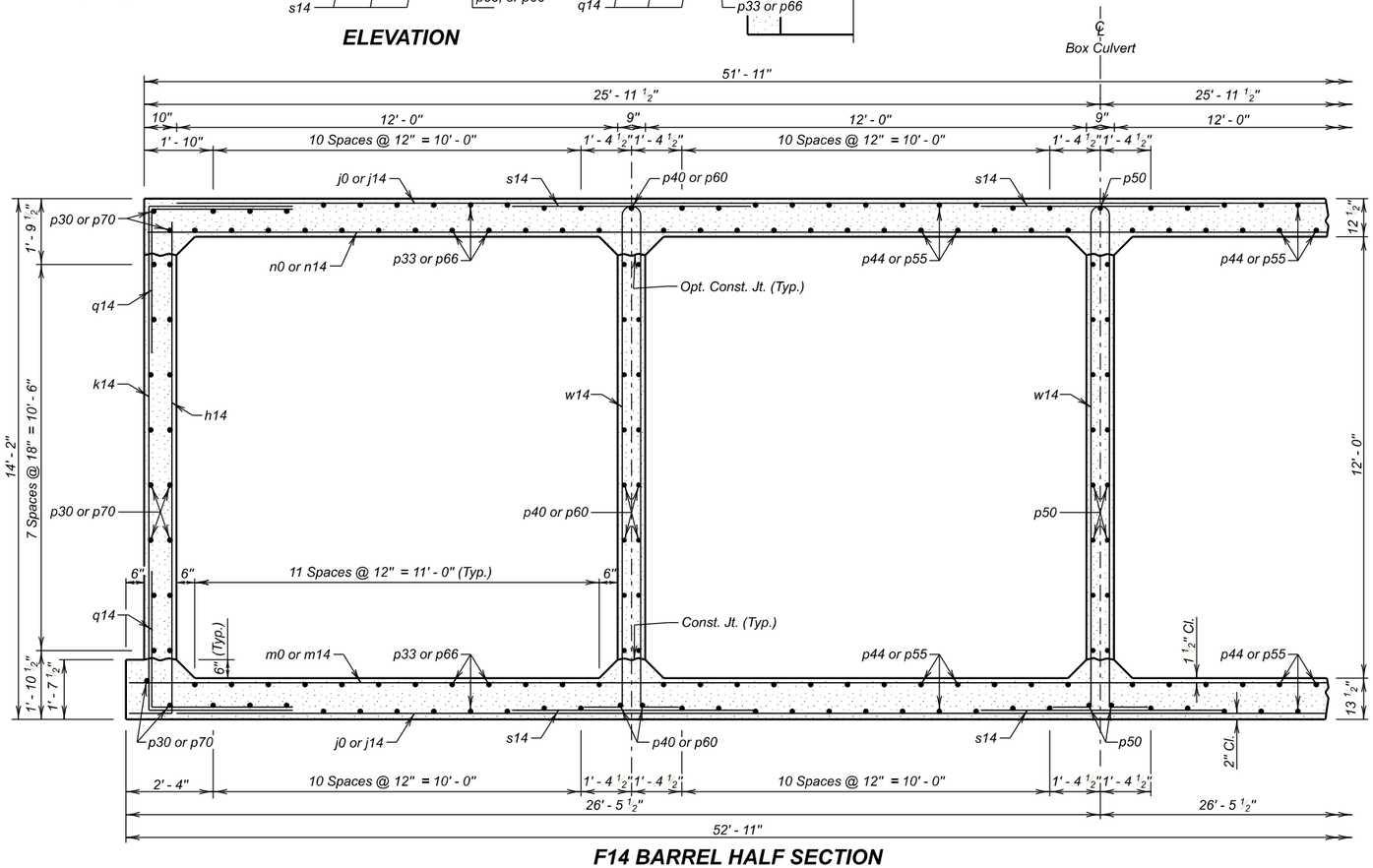
OPTIONAL FILLET DETAIL

(At Bottom Slab)

NOTE: Contractor may form the optional full fillet, with 2" Chamfer, as detected. The cost of the additional concrete will be borne by the Contractor.

OPTIONAL POUR - BOTTOM SLAB

The Bottom Slab may be poured continuously, at the option of the Contractor, with the use of a Preformed Metal keyway conforming to the keyway dimensions and location as shown on the plans. The keyway length will be full width of the bottom slab. Care will be taken to maintain proper alignment of the keyway during the pour sequence. All additional costs of this option will be borne by the Contractor.



F14 BARREL HALF SECTION

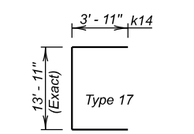
(14' - 0" Maximum Fill)

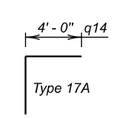
REINFORCING SCHEDULE

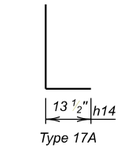
(For 2 - F14 Barrel End Sections @ 38' - 0")

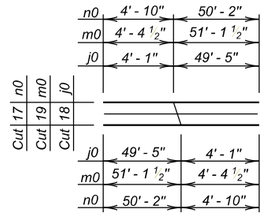
Mk.	No.	Size	Length	Type
h14	198	5	14' - 6"	17A
℄ j0	18	6	53' - 6"	Str.
j14	136	6	50' - 3"	Str.
k14	172	5	21' - 9"	17
℄ m0	19	5	55' - 6"	Str.
m14	148	5	52' - 6"	Str.
℄ n0	17	5	55' - 0"	Str.
n14	136	5	51' - 6"	Str.
p30	40	4	33' - 9"	Str.
℄ p33	46	4	69' - 9"	Str.
p40	38	4	36' - 0"	Str.
℄ p44	46	4	74' - 3"	Str.
p50	38	4	38' - 3"	Str.
℄ p55	46	4	78' - 9"	Str.
p60	38	4	40' - 6"	Str.
℄ p66	46	4	83' - 3"	Str.
p70	40	4	42' - 9"	Str.
q14	336	5	8' - 0"	17A
s14	456	6	6' - 6"	Str.
w14	240	4	30' - 3"	S11A

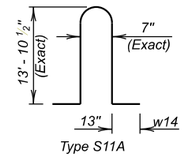
Bending Details

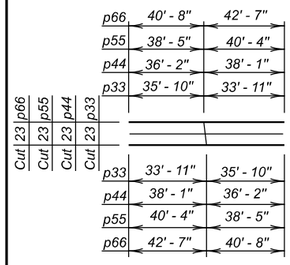


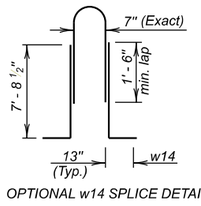




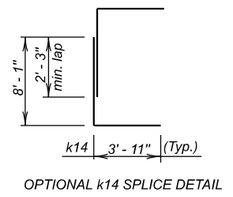








OPTIONAL w14 SPLICE DETAIL



OPTIONAL k14 SPLICE DETAIL

Contractor may use optional reinforcing steel splices, as shown. The cost of the additional reinforcing steel will be borne by the Contractor.

NOTES:

All dimensions are out to out of bars.

℄ *See cutting diagram.*

Request for additional 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.

ESTIMATED QUANTITIES

ITEM	Class A45 Concrete, Box Culvert	Reinforcing Steel	Structure Excavation, Box Culvert
UNIT	Cu.Yd.	Lb.	Cu.Yd.
2 - F14 Barrel End Sections @ 38' - 0"	460.7	62557	167.6

SITE 3
ALTERNATE A

F14 BARREL END SECTION DETAILS (38' - 0") (B)

FOR

4 - 12' X 12' BOX CULVERT (C.I.P.)

OVER MEDICINE CREEK — 10° RHF SKEW
STA. 124 + 58.00 — SEC. 32-T1S-R31E
STR. NO. 38-319-174 — P-B 0248(12)173
HL-93

JONES COUNTY

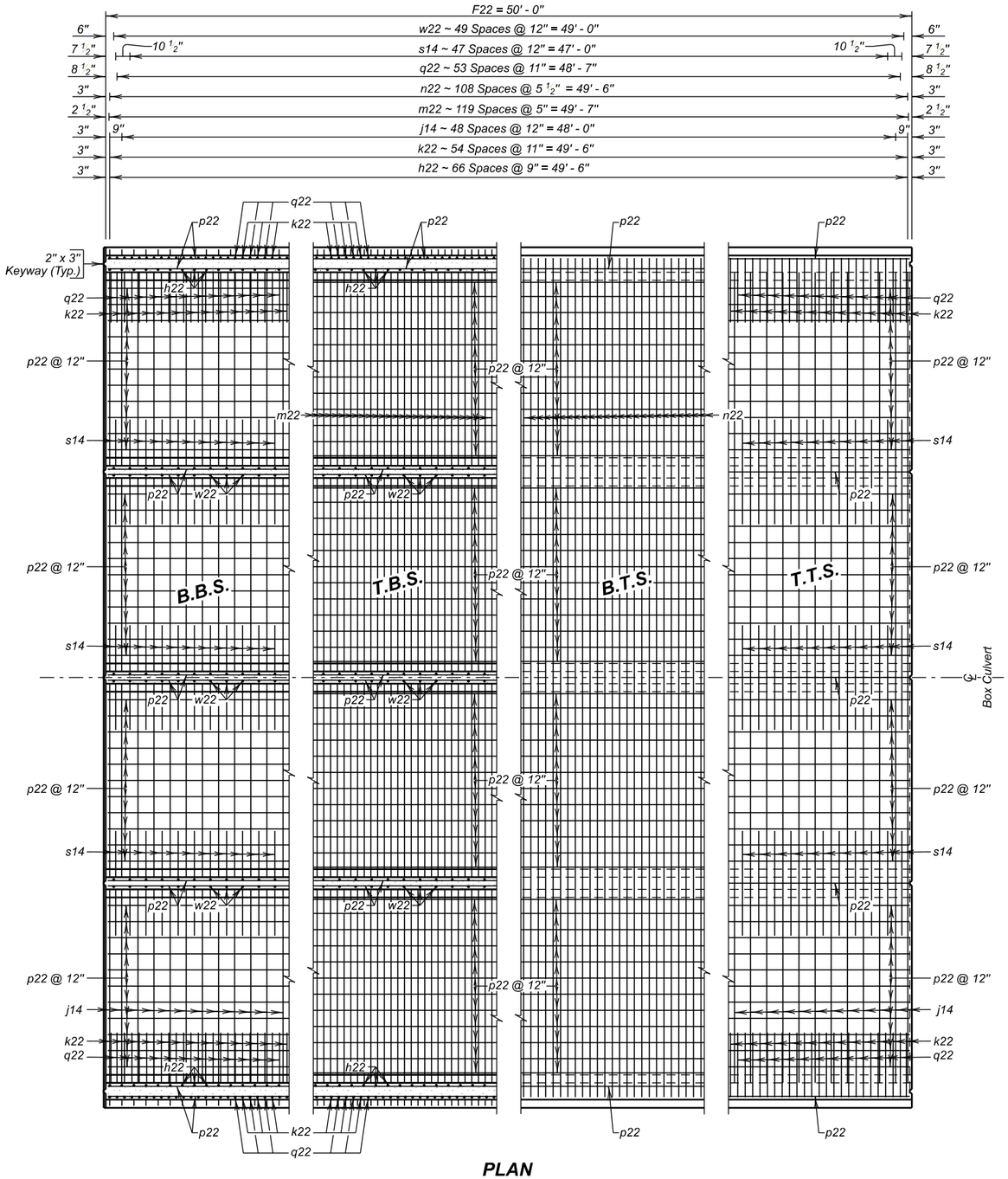
S. D. DEPT. OF TRANSPORTATION

JUNE 2024

8 OF 12

DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU	ER	BT	Steve A Johnson BRIDGE ENGINEER
JONS06G7	06G7GC08		

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E40	E99



PLAN

LEGEND FOR PLACING RE-STEEL

T. T. S.	- Top of Top Slab
B. T. S.	- Bottom of Top Slab
T. B. S.	- Top of Bottom Slab
B. B. S.	- Bottom of Bottom Slab

SITE 3
ALTERNATE A

F22 BARREL INTERIOR SECTION DETAILS (50' - 0") (A)

FOR

4 - 12' X 12' BOX CULVERT (C.I.P.)

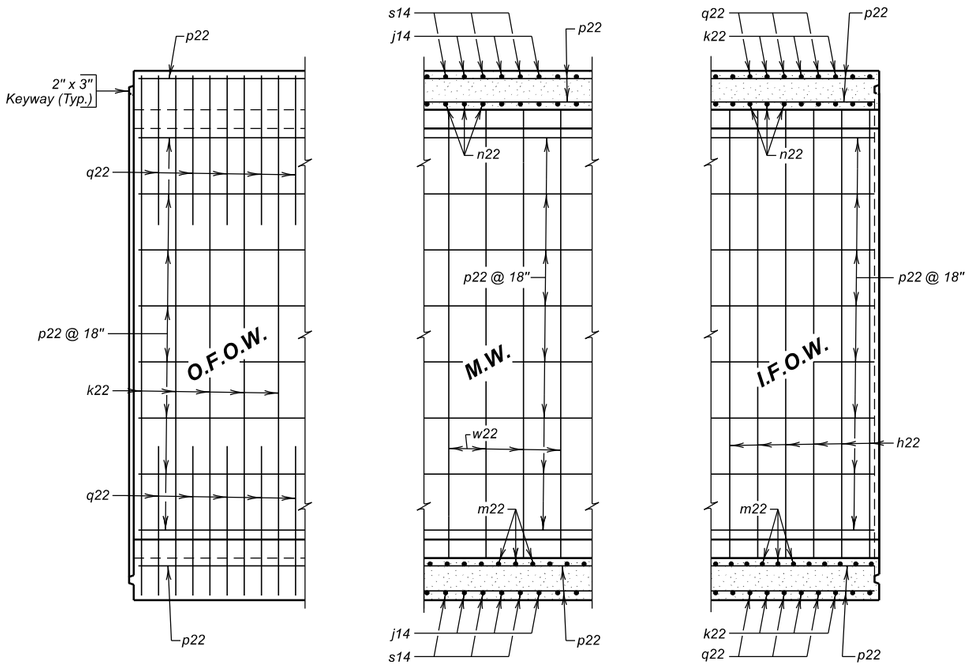
OVER MEDICINE CREEK — 10° RHF SKEW
STA. 124 + 58.00 — SEC. 32-T1S-R31E
STR. NO. 38-319-174 — P-B 0248(12)173
HL-93

JONES COUNTY
S. D. DEPT. OF TRANSPORTATION
JUNE 2024

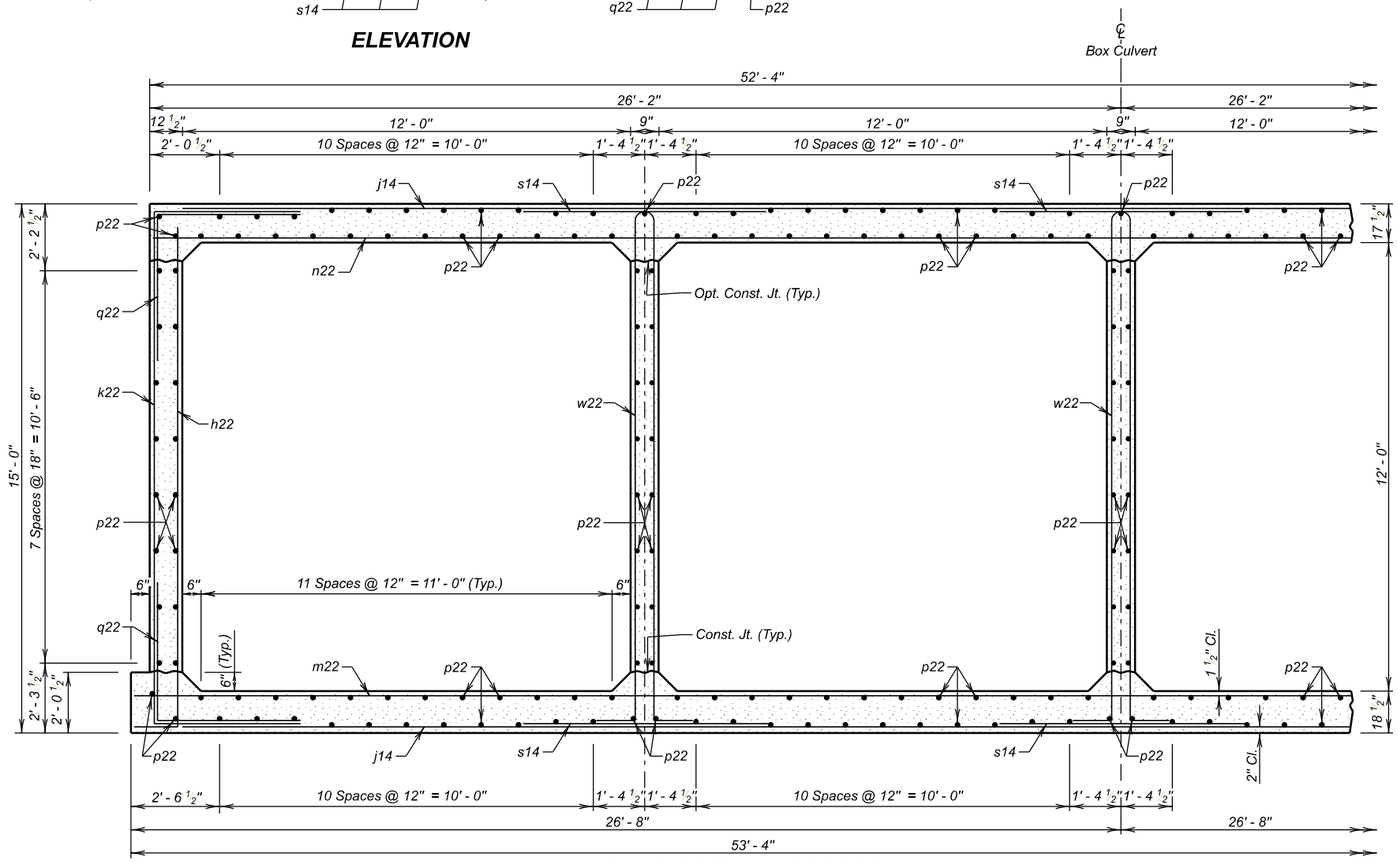
9 OF 12

DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU	ER	BT	BRIDGE ENGINEER
JONS06G7	06G7GC09		

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E41	E99



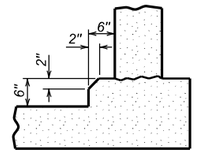
ELEVATION



F22 BARREL HALF SECTION

(22' - 0" Maximum Fill)

△ *Place z1 bars thru construction joint between barrel sections as shown on Standard Plate No. 460.10. Quantity of z1 bars is for three construction joints.*



OPTIONAL FILLET DETAIL

(At Bottom Slab)

NOTE: *Contractor may form the optional full fillet, with 2" Chamfer, as detailed. The cost of the additional concrete will be borne by the Contractor.*

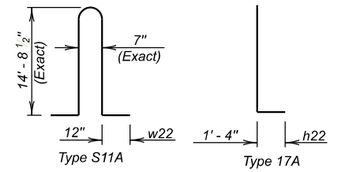
OPTIONAL POUR - BOTTOM SLAB

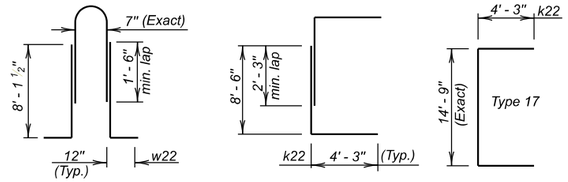
The Bottom Slab may be poured continuously, at the option of the Contractor, with the use of a Preformed Metal keyway conforming to the keyway dimensions and location as shown on the plans. The keyway length will be full width of the bottom slab. Care will be taken to maintain proper alignment of the keyway during the pour sequence. All additional costs of this option will be borne by the Contractor.

REINFORCING SCHEDULE

(For 2 - F22 Barrel Interior Sections @ 50' - 0")

Mk.	No.	Size	Length	Type	Bending Details
h22	268	5	15' - 3"	17A	
j14	204	6	50' - 3"	Str.	
k22	220	5	23' - 3"	17	
m22	240	5	53' - 0"	Str.	
n22	218	5	52' - 0"	Str.	
p22	562	4	49' - 9"	Str.	
q22	432	5	8' - 6"	17A	
s14	600	6	6' - 6"	Str.	
w22	300	4	31' - 9"	S11A	
△ z1	408	5	3' - 6"	Str.	





Contractor may use optional reinforcing steel splices, as shown. The cost of the additional reinforcing steel will be borne by the Contractor.



NOTES:

All dimensions are out to out of bars.

Request for additional 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.

ESTIMATED QUANTITIES

ITEM	Class A45 Concrete, Box Culvert	Reinforcing Steel	Structure Excavation, Box Culvert
UNIT	Cu.Yd.	Lb.	Cu.Yd.
2 - F22 Barrel Interior Section @ 50' - 0"	798.8	86302	304.5

LEGEND FOR PLACING RE-STEEL

O. F. O. W.	- Outside Face of Outside Wall
I. F. O. W.	- Inside Face of Outside Wall
M. W.	- Middle Walls

SITE 3
ALTERNATE A

F22 BARREL INTERIOR SECTION DETAILS (50' - 0") (B)

FOR

4 - 12' X 12' BOX CULVERT (C.I.P.)

OVER MEDICINE CREEK
STA. 124 + 58.00
STR. NO. 38-319-174

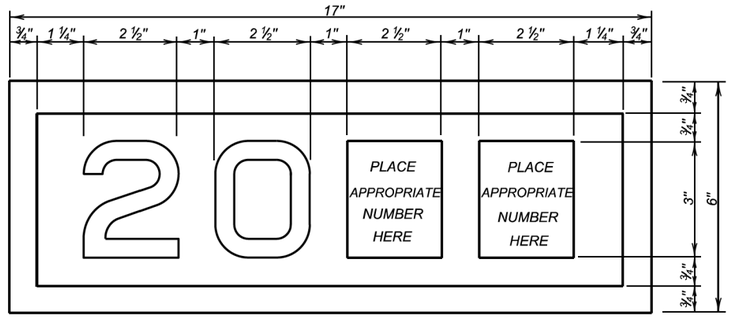
10° RHF SKEW
SEC. 32-T1S-R31E
P-B 0248(12)173
HL-93

JONES COUNTY
S. D. DEPT. OF TRANSPORTATION
JUNE 2024

10 OF 12

DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU	ER	BT	Steve A Johnson BRIDGE ENGINEER
JONS06G7	06G7GC10		

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E42	E99



YEAR PLATE DETAILS

GENERAL NOTES:

1. Year plates of the general dimensions shown will be constructed on all box culverts and bridges. The year plates will 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 (1/2) inch in depth.

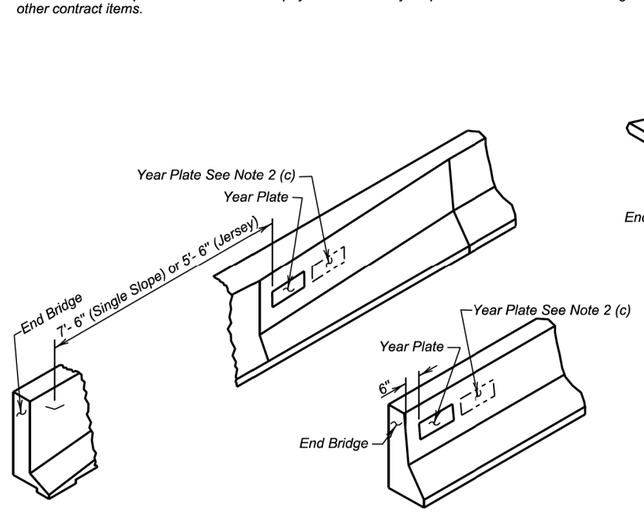
2. Year plates will be located on structure(s) as follows:

   a. On cast-in-place box culverts the year plates will 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 will be centered laterally on the upstream face of the top slab. Where an extended interior wall interferes with this location, the year plate will be centered in an adjacent barrel.

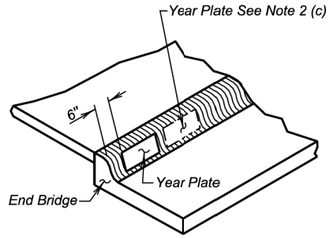
   b. On bridges with six (6) inch curbs, "Jersey" shaped barriers with no endblocks, or "Single Slope" shaped barriers with no endblocks, the year plate will be centered vertically on the curb face approximately six (6) inches from the end of the bridge, or as designated by the Engineer. On bridges with barrier endblocks, the year plate will be centered on the upper sloped portion of the barrier approximately 5'- 6" for "Jersey" shaped barriers from the end of the bridge and 7'-6" for "Single Slope" shaped barriers from the end of bridge, or as designated by the Engineer. There will 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 will be placed as listed above and the other located adjacent to it. Both year plates will 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 will be incidental to other contract items.

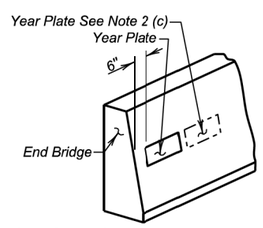


BARRIER
(With Endblock)



TYPE B CURB

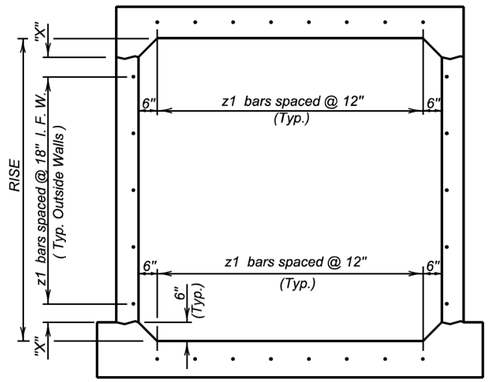
JERSEY BARRIER



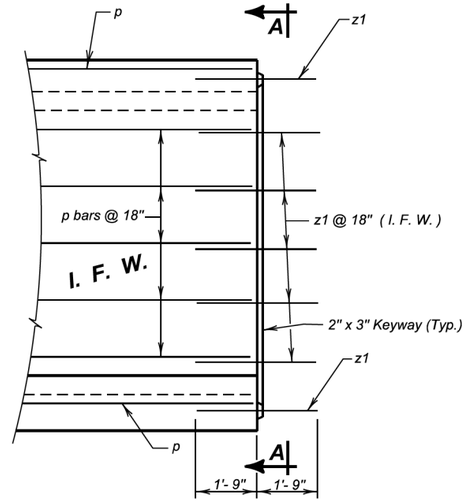
SINGLE SLOPE BARRIER

January 22, 2021

Published Date: 2027	SDDOT	YEAR PLATE DETAILS	PLATE NUMBER 460.02 Sheet 1 Of 1

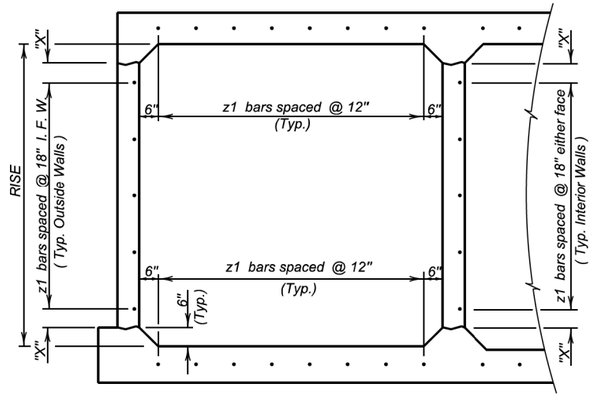


TYPICAL SINGLE BARREL VIEW A - A



ELEVATION

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



TYPICAL MULTIPLE BARREL VIEW A - A

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"
13'- 0"	9"
14'- 0"	6"

GENERAL NOTES:

1. z1 bars will be placed in the middle of the 2" X 3" keyway in the top and bottom slabs. z1 bars will 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.

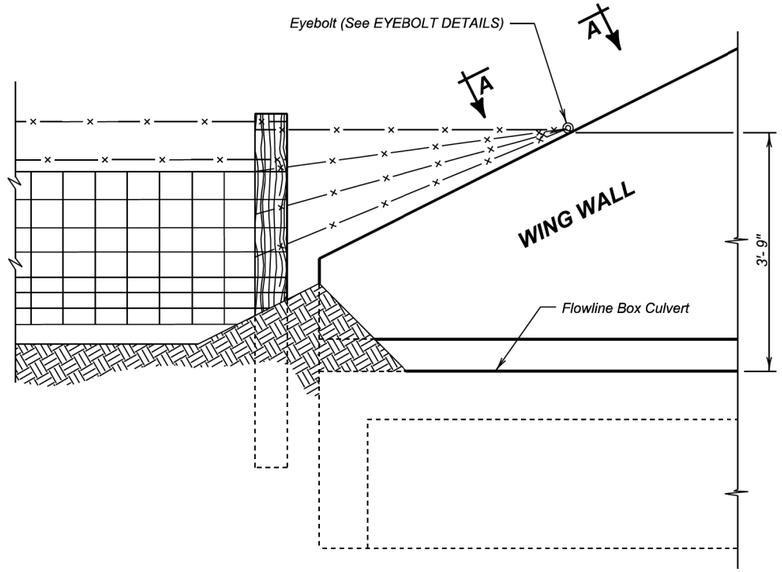
2. Drainage Fabric Protection will be placed in accordance with Section 422, or Section 560, whichever is applicable.

June 1, 2022

Published Date: 2027	SDDOT	BOX CULVERT BARREL TIE REINFORCEMENT	PLATE NUMBER 460.10 Sheet 1 of 1

SITE 3
ALTERNATE A

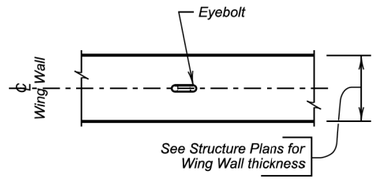
4 - 12' X 12' BOX CULVERT (C.I.P.)
STR. NO. 38-319-174
JUNE 2024



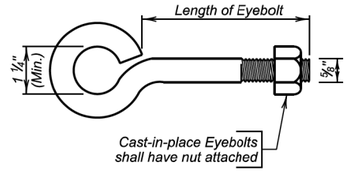
DETAIL FOR FENCE ANCHORS

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 ⅞ 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 ⅞ 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: 2027	SDDOT	FENCE ANCHORS FOR BOX CULVERT WING WALLS	PLATE NUMBER 620.16 Sheet 1 of 1

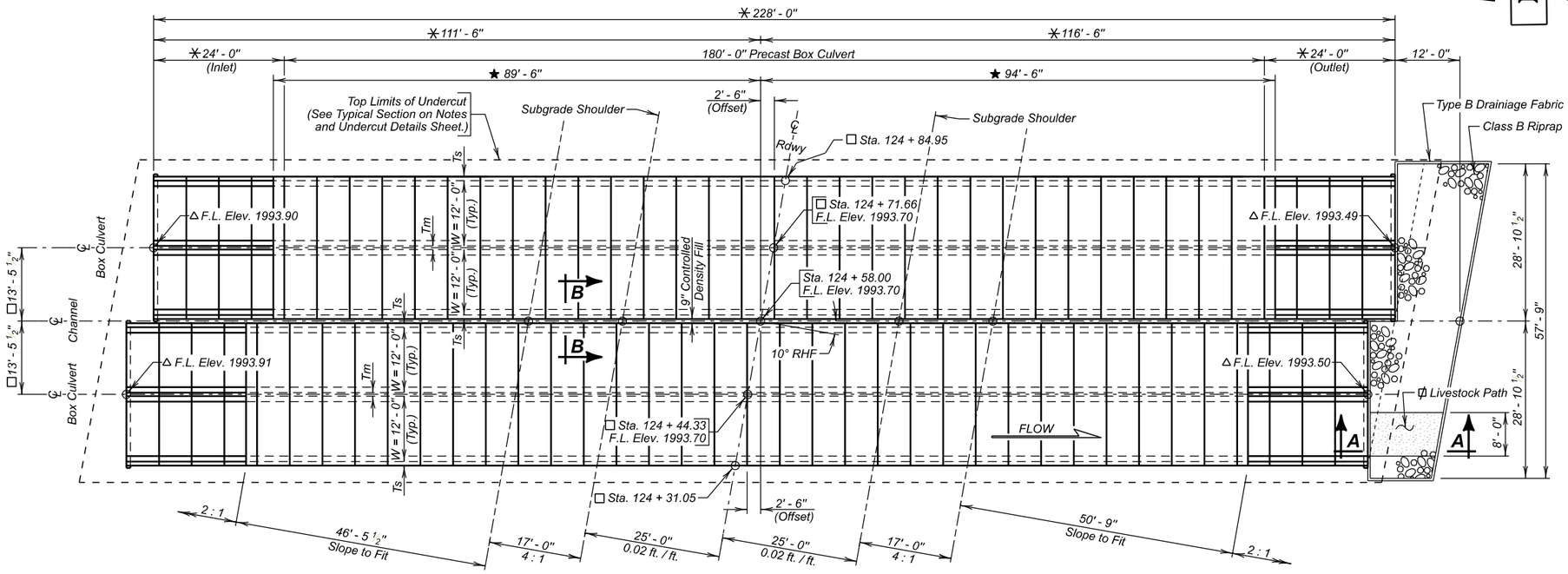
SITE 3
ALTERNATE A

4 - 12' X 12' BOX CULVERT (C.I.P.)
STR. NO. 38-319-174
JUNE 2024

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

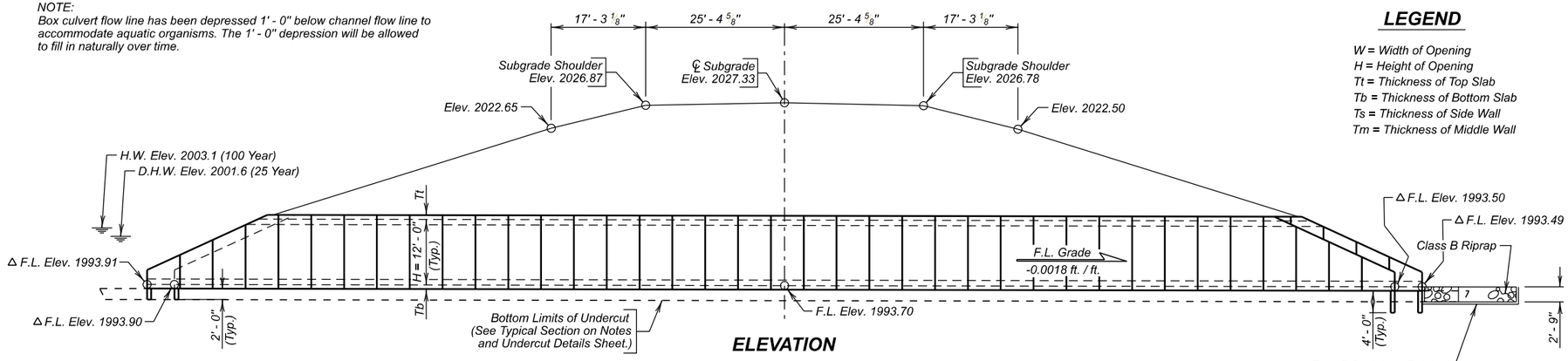
⚹ Dimension may vary with installation and/or fabrication. See Shop Plans for actual installation length.
★ Minimum distance to satisfy fill slope.
△ Based on dimensions shown.
☐ Based on Ts = 9" and Tm = 8".

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E44	E99



PLAN

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



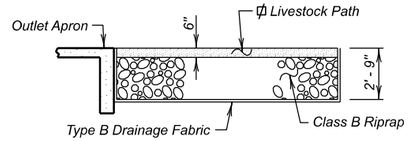
ELEVATION

LEGEND

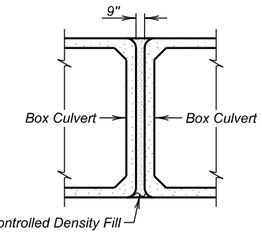
W = Width of Opening
H = Height of Opening
Tt = Thickness of Top Slab
Tb = Thickness of Bottom Slab
Ts = Thickness of Side Wall
Tm = Thickness of Middle Wall

℄ NOTES:

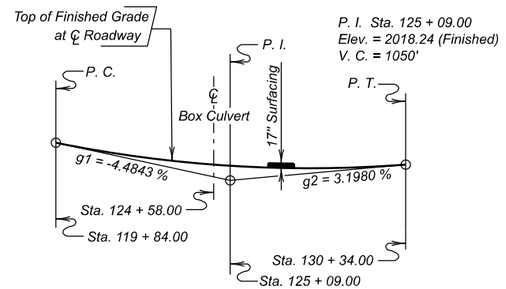
1. Base Course will provide a smooth path for livestock.
2. Base Course is estimated using 6" of material to account for voids in the Class B Riprap.



SECTION A - A



SECTION B - B



VERTICAL CURVE DATA

HYDRAULIC DATA

Q_d	1291 cfs
A_d	315 sq ft
V_d	4.1 fps
Q_F	1291 cfs
Q_{100}	2311 cfs
Q_{OT}	>Q_{100}
V_{max}	6.6 fps

Q_d = Design discharge for the proposed culvert based on 25 year frequency. El. 2001.6.
Q_{OT} = Overtopping discharge and frequency > Q_{100} year recurrence interval. El. 2028.0 @ Sta. 126 + 00.00 ±.
Q_F = 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. 2003.1.
V_{max} = Maximum computed outlet velocity for the proposed culvert, based on 100 year frequency.

ESTIMATED QUANTITIES

	ITEM	UNIT	QUANTITY
℄	Structure Excavation, Box Culvert	Cu. Yd.	377
	Box Culvert Undercut	Cu. Yd.	1028
	Controlled Density Fill	Cu. Yd.	84.7
≠	Class B Riprap	Ton	119.1
⊛	Base Course	Ton	3.7
	Type B Drainage Fabric	Sq. Yd.	139
	2 - 12' X 12' Precast Concrete Culvert, Furnish	Ft.	360
	2 - 12' X 12' Precast Concrete Culvert, Install	Ft.	360
	2 - 12' X 12' Precast Concrete Culvert End Section, Furnish	Each	4
	2 - 12' X 12' Precast Concrete Culvert End Section, Install	Each	4

℄ Quantity is based on 10" bottom slab, 10" top slab, 9" outside walls and 8" interior walls.
≠ For estimating purposes only, a factor of 1.4 tons/cu. yd. was used to convert Cu. Yd. to Tons.
⊛ For estimating purposes only, a factor of 1.89 tons/cu. yd. was used to convert Cu. Yds. 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 560.20 & 560.21
Sheet No. 5 - Details of Standard Plate No. 620.16

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

SITE 3
ALTERNATE B

GENERAL DRAWING AND QUANTITIES

FOR

4 - 12' X 12' BOX CULVERT (PRECAST)

OVER MEDICINE CREEK — 10° RHF SKEW
STA. 124 + 58.00 — SEC. 32-T1S-R31E
STR. NO. 38-319-174 — P-B 0248(12)173
PCN 06G7 — HL-93

JONES COUNTY
S. D. DEPT. OF TRANSPORTATION
JUNE 2024

-X028-

DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU	ER	BT	Steve A. Johnson BRIDGE ENGINEER
JONS06G7	06G7G13		

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E45	E99

SPECIFICATIONS

Use South Dakota Standard Specifications for Roads and Bridges, 10-7-26 Version, Required Provisions, and Special Provisions as included in the Proposal. The Standard Specifications for Roads and Bridges are available for download and viewing at: https://dot.sd.gov/doing-business/contractors/standard-specifications

GENERAL NOTES

Design will be in accordance with Section 560 of the Specifications with the following criteria:

1. *Box culvert and box culvert end section design will conform to the AASHTO LRFD Bridge Design Specifications, 9th Edition.*
2. *Design Live Load: HL-93 and construction loading consisting of one 7' - 6" gage axle with gross axle 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.*
3. *The box culvert will be load rated in accordance with the AASHTO Manual for Bridge Evaluation, 2018 Edition with the latest Interim Revisions using the LRFR method. The rating will include evaluation of the Design HL-93 truck at both Inventory and Operating levels and a Legal Load rating for three SD legal trucks (Type 3, 3S2 and 3-2) as well as the notional rating load and four specialized hauling vehicles. The structure will also be evaluated for the emergency vehicles, EV2 and EV3, at the legal load rating level. All sections of the box culvert will 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 will rate greater than 1.0 at legal load rating level. AASHTOWare Bridge Rating (BrR) is required to be used to rate the box culvert. Include the BrR rating model and a load rating summary table with load rating calculations. Submit load rating calculations with the design and independent check design calculations or shop plans, as appropriate.*
4. *The design of the barrel sections will be based on a minimum fill height of 2 foot and include all subsequent fill heights up to and including the maximum fill height of 23 ft. over the box culvert.*
5. *Minimum inside corner fillet will be 6 in.*
6. *Minimum precast barrel section length will be 6 - foot sections; however, no more than two 4 - foot sections are allowed in any one length of precast barrel.*
7. *Lift holes will be plugged with an approved nonshrinkable grout.*
8. *The Fabricator will 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 will be in accordance with the final approved shop plans.*
11. *Care will be taken when placing sections. Sections will be only moved using the lifting holes by approved equipment.*
12. *Soils below the bottom of the proposed RCBC consist of brown clay. Groundwater was encountered in the borings at an elevation of 1998.3 feet during the subsurface investigation conducted in June 2023. Dewatering will be required during construction.*

DESIGN MIX OF CONCRETE

1. *Mix will be as per fabricator's design; however, a minimum compressive strength will not be less than 4500 p.s.i. at 28 days.*
2. *High sulfate levels are likely to be encountered on this project. All concrete will be Class A45 Concrete conforming to Section 460 of the Construction Specifications, with the following modifications: the type of cement will be either a Type V or Type II with 20 to 25% Class F Modified Fly Ash substituted for cement in accordance with Section 605 of the Construction Specifications. The Water/Cementitious material ratio will not exceed 0.45 as defined in Section 460.3 C.*

SHOP PLANS

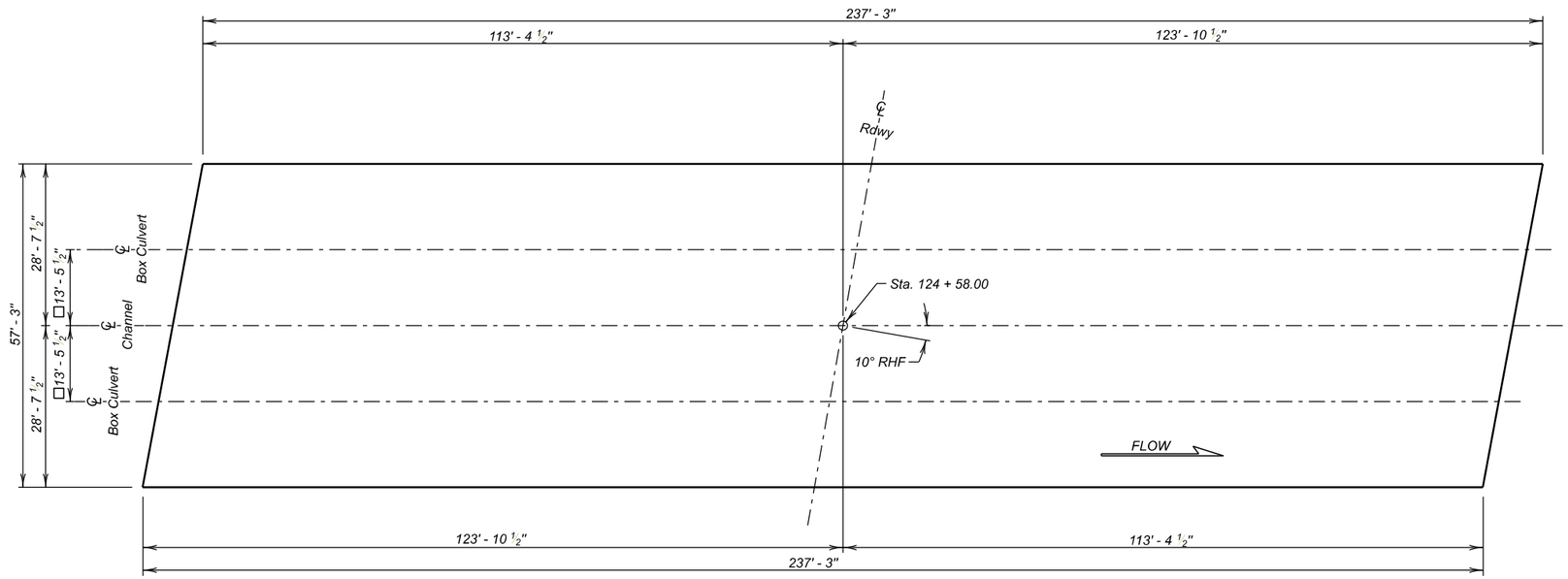
The fabricator will submit shop plans in accordance with the Construction Specifications. Include design and independent check design, if applicable, with initial submittal.

ESTIMATED QUANTITIES

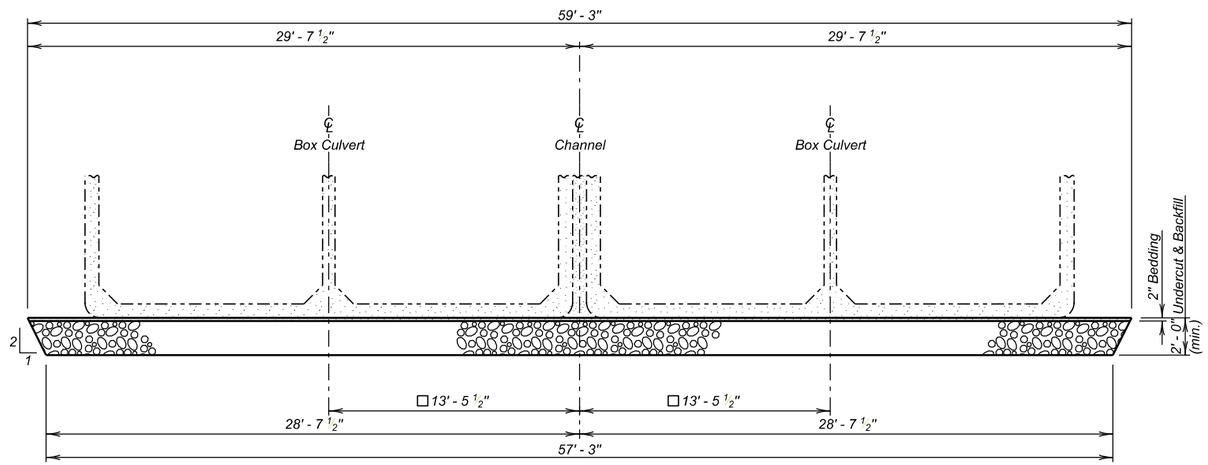
	ITEM	UNIT	QUANTITY
⌀	Box Culvert Undercut	Cu. Yd.	1028

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

□ *Based on Ts = 9" and Tm = 8".*



UNDERCUT LAYOUT
(Bottom Dimensions)



TYPICAL SECTION
(For Limits of Undercut)

SITE 3
ALTERNATE B

NOTES AND UNDERCUT DETAILS

FOR

4 - 12' X 12' BOX CULVERT (PRECAST)

OVER MEDICINE CREEK — 10° RHF SKEW
STA. 124 + 58.00 — SEC. 32-T1S-R31E
STR. NO. 38-319-174 — P-B 0248(12)173
HL-93

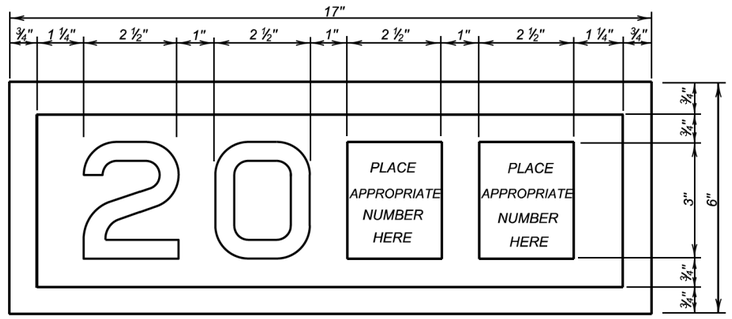
JONES COUNTY

S. D. DEPT. OF TRANSPORTATION

JUNE 2024

DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU	ER	BT	Steve A Johnson BRIDGE ENGINEER
JONS06G7	06G7G14		

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E46	E99



YEAR PLATE DETAILS

GENERAL NOTES:

1. Year plates of the general dimensions shown will be constructed on all box culverts and bridges. The year plates will 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 (1/2) inch in depth.

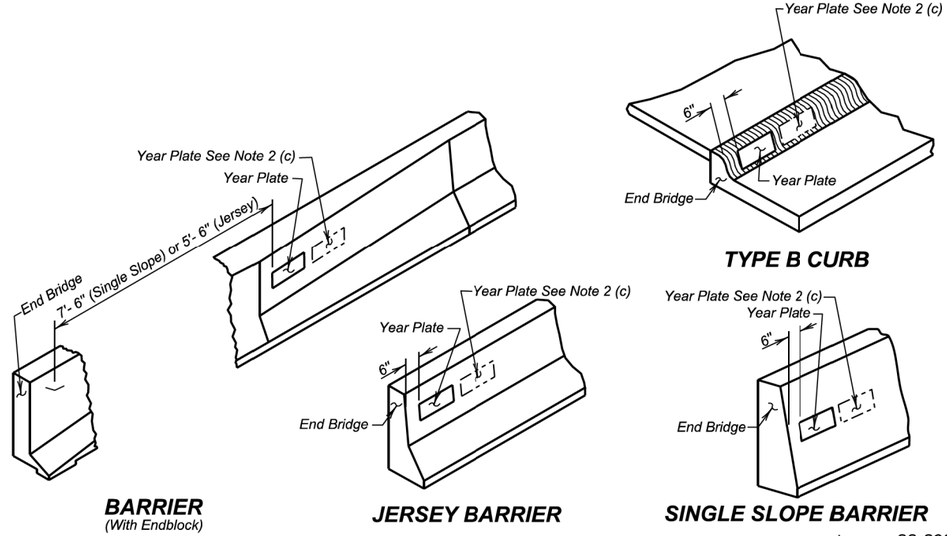
2. Year plates will be located on structure(s) as follows:

   a. On cast-in-place box culverts the year plates will 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 will be centered laterally on the upstream face of the top slab. Where an extended interior wall interferes with this location, the year plate will be centered in an adjacent barrel.

   b. On bridges with six (6) inch curbs, "Jersey" shaped barriers with no endblocks, or "Single Slope" shaped barriers with no endblocks, the year plate will 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 barrier endblocks, the year plate will be centered on the upper sloped portion of the barrier approximately 5'- 6" for "Jersey" shaped barriers from the end of the bridge and 7'-6" for "Single Slope" shaped barriers from the end of bridge, or as designated by the Engineer. There will be one year plate at each end of the bridge on opposite sides.

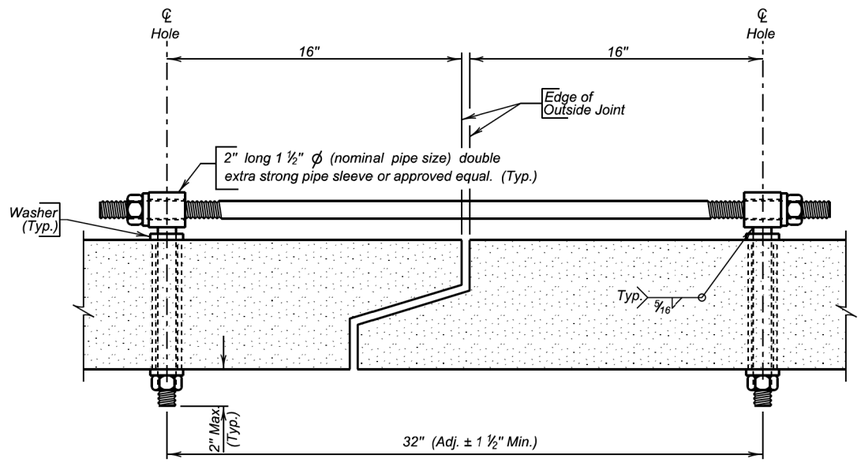
   c. When the plans specify that both the original date of construction and the date of reconstruction are to be shown, one date will be placed as listed above and the other located adjacent to it. Both year plates will be shown at each end of the bridge on opposite sides.

3. There will be no separate measurement or payment made for year plates on box culverts and bridges. All costs for this work will be incidental to other contract items.



January 22, 2021

Published Date: 2027	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 ∅ 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.

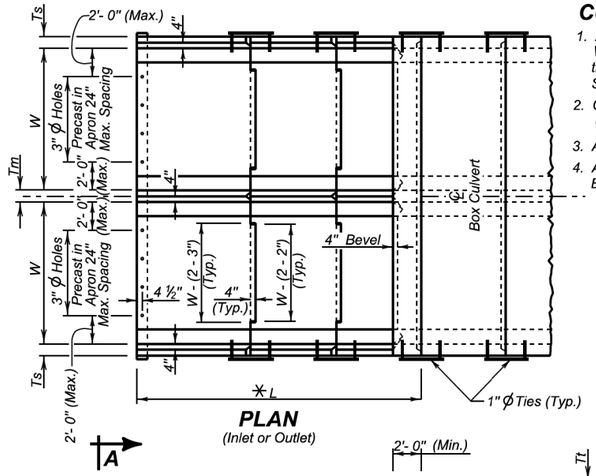
6. All costs for furnishing and installing the precast box culvert tie bolt assembly shall be incidental to the contract unit price per Foot for "Precast Concrete Box Culvert, Furnish".

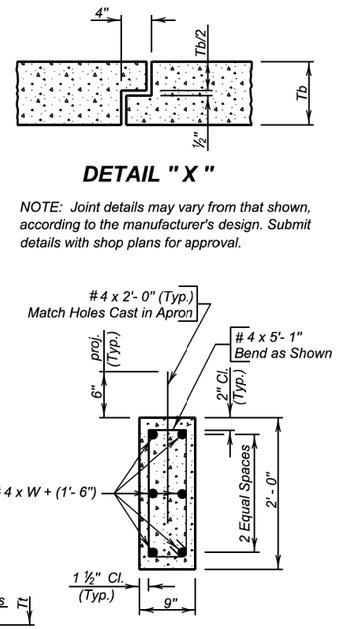
March 21, 2016

Published Date: 2027	SDDOT	PRECAST BOX CULVERT TIE BOLT ASSEMBLY DETAILS	PLATE NUMBER 560.01
			Sheet 1 of 1

SITE 3
ALTERNATE B

4 - 12' X 12' BOX CULVERT (PRECAST)
STR. NO. 38-319-174
JUNE 2024





CUTOFF WALL

1. *All costs associated with furnishing and installing the Cutoff Wall, whether precast or cast-in-place, shall be incidental to the contract unit price per each for "Precast Box Culvert End Section, Furnish".*
2. *Concrete for cast-in-place cutoff wall shall be Class M6 concrete in accordance with Section 462 of the Specifications.*
3. *All reinforcing steel shall conform to ASTM A615 Grade 60.*
4. *Alternate details will be allowed, subject to the approval of the Bridge Construction Engineer.*

NOTE: Joint details may vary from that shown, according to the manufacturer's design. Submit details with shop plans for approval.

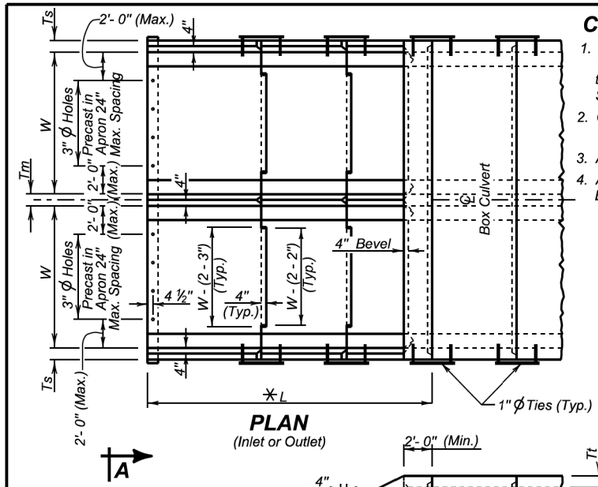
LEGEND

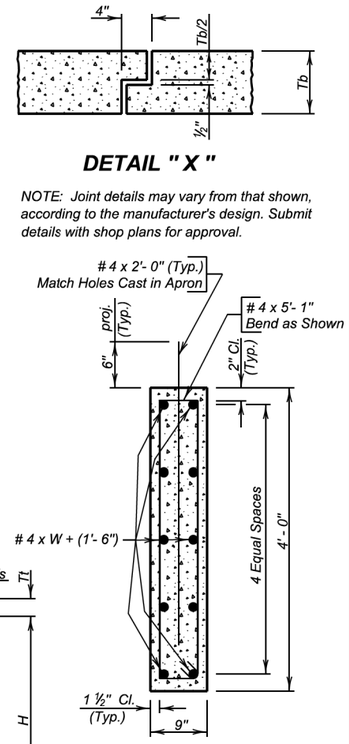
W = Width of Opening
H = Height of Opening
Tt = Thickness of Top Slab
Tb = Thickness of Bottom Slab
Ts = Thickness of Side Wall
Tm = Thickness of Middle Wall
L = Length of End Section

NOTES:
See GENERAL DRAWING for W and H dimensions.
Tt, Tb, Tm, L, and Ts dimensions shall be furnished by the Contractor.
⚹ Length and number of units may vary from that shown.

June 26, 2015

Published Date: 2027	SDDOT	PRECAST DOUBLE BOX CULVERT SLOPED END SECTION DETAILS WITH 2'–0" CUTOFF WALL	PLATE NUMBER 560.20
			Sheet 1 of 1





CUTOFF WALL

1. *All costs associated with furnishing and installing the Cutoff Wall, whether precast or cast-in-place, shall be incidental to the contract unit price per each for "Precast Box Culvert End Section, Furnish".*
2. *Concrete for cast-in-place cutoff wall shall be Class M6 concrete in accordance with Section 462 of the Specifications.*
3. *All reinforcing steel shall conform to ASTM A615 Grade 60.*
4. *Alternate details will be allowed, subject to the approval of the Bridge Construction Engineer.*

NOTE: Joint details may vary from that shown, according to the manufacturer's design. Submit details with shop plans for approval.

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
L = Length of End Section

NOTES:
See GENERAL DRAWING for W and H dimensions.
Tt, Tb, Tm, L, and Ts dimensions shall be furnished by the Contractor.
⚹ Length and number of units may vary from that shown.

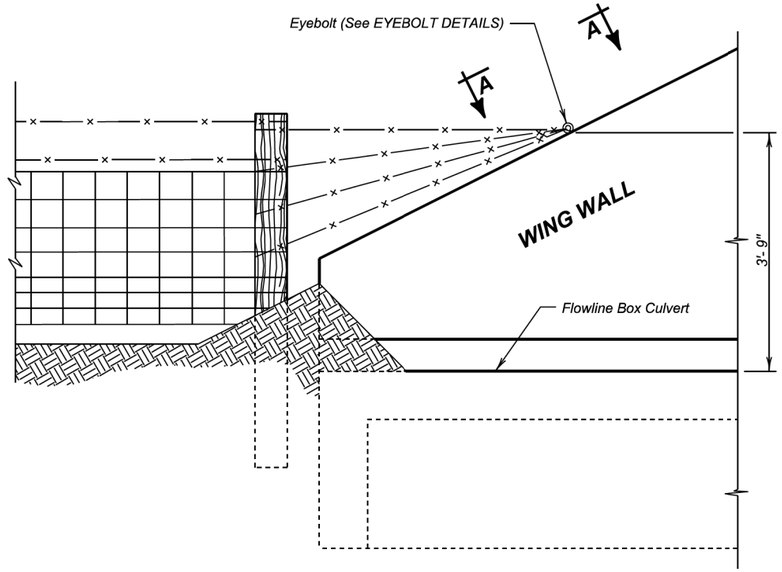
June 26, 2015

Published Date: 2027	SDDOT	PRECAST DOUBLE BOX CULVERT SLOPED END SECTION DETAILS WITH 4'–0" CUTOFF WALL	PLATE NUMBER 560.21
			Sheet 1 of 1

SITE 3
ALTERNATE B

4 - 12' X 12' BOX CULVERT (PRECAST)
STR. NO. 38-319-174
JUNE 2024

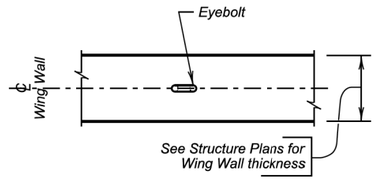
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E48	E99



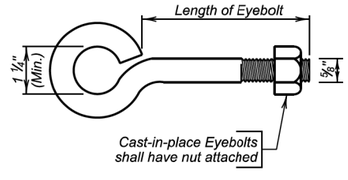
DETAIL FOR FENCE ANCHORS

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 ⅞ 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 ⅞ 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

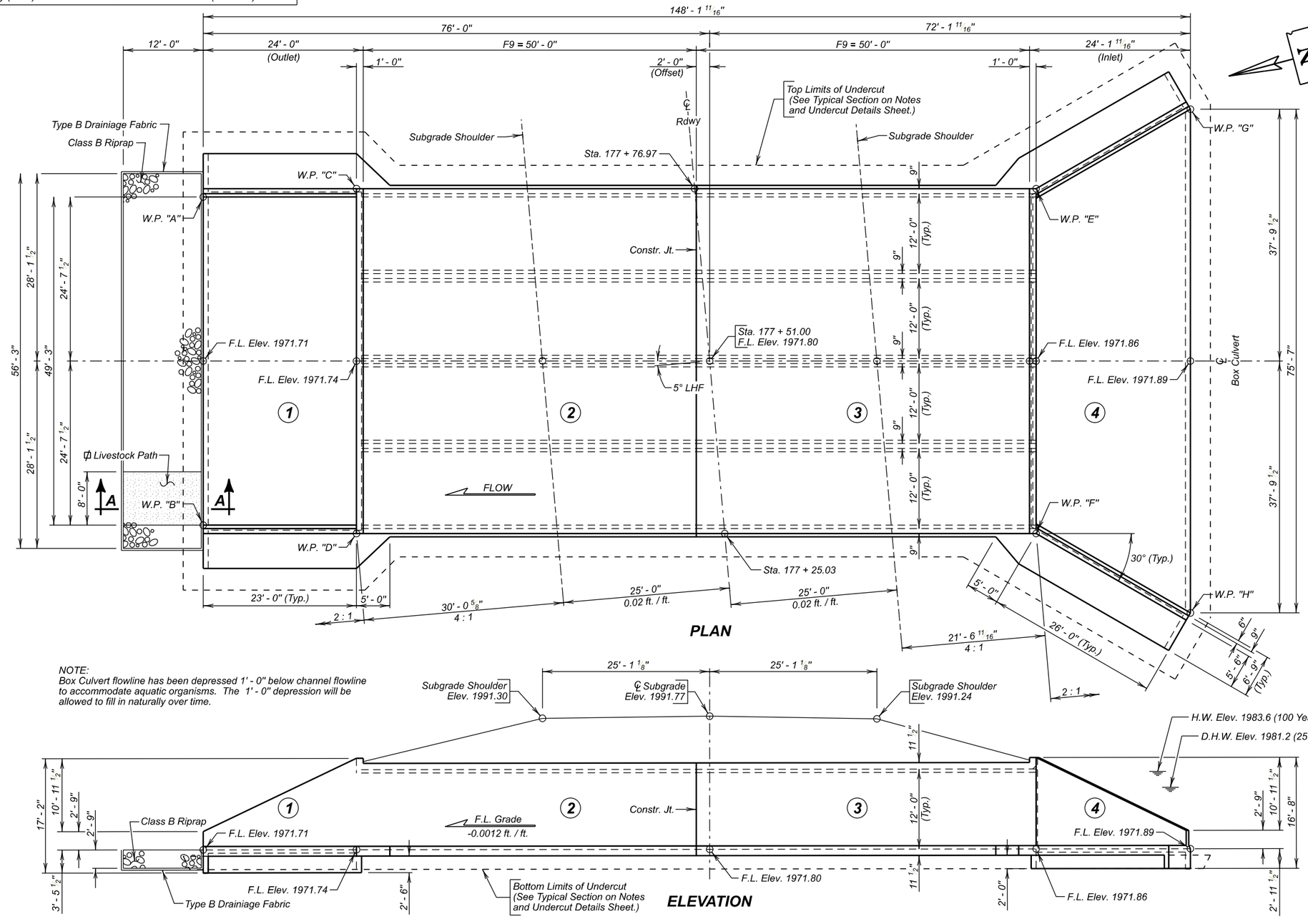
Published Date: 2027	SDDOT	FENCE ANCHORS FOR BOX CULVERT WING WALLS	PLATE NUMBER 620.16 Sheet 1 of 1

SITE 3
ALTERNATE B

4 - 12' X 12' BOX CULVERT (PRECAST)
STR. NO. 38-319-174
JUNE 2024

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-B 0248(12)173	E49	E99



PLAN

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

ELEVATION

HYDRAULIC DATA

Q_d	1751 cfs
A_d	407 sq ft
V_d	4.3 fps
Q_F	1751 cfs
Q_{100}	3123 cfs
Q_{OT}	$>Q_{100}$
V_{max}	6.4 fps

Q_d = Design discharge for the proposed culvert based on 25 year frequency. El. 1981.2.

Q_{OT} = Overtopping discharge and frequency > Q_{100} year recurrence interval. El. 1991.9 @ Sta. 175 + 59.00 ±.

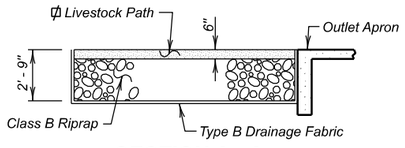
Q_F = Designated peak discharge for the basin approaching proposed project based on 25 year frequency.

Q_{100} = Computed discharge for the basin approaching proposed project based on 100 year frequency. El. 1983.6.

V_{max} = Maximum computed outlet velocity for the proposed culvert, based on 100 year frequency.

TABLE OF WORKING POINTS

W. P.	STATION	OFFSET
"A"	177 + 82.16	73.56' Lt.
"B"	177 + 33.09	77.86' Lt.
"C"	177 + 81.40	50.54' Lt.
"D"	177 + 29.84	55.05' Lt.
"E"	177 + 72.51	51.07' Rt.
"F"	177 + 20.95	46.56' Rt.
"G"	177 + 82.36	75.16' Rt.
"H"	177 + 07.06	68.57' Rt.



SECTION A - A

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

℄ NOTES:

1. Base Course will provide a smooth path for livestock.
2. Base Course is estimated using 6" of material to account for voids in the Class B Riprap.

ESTIMATED QUANTITIES

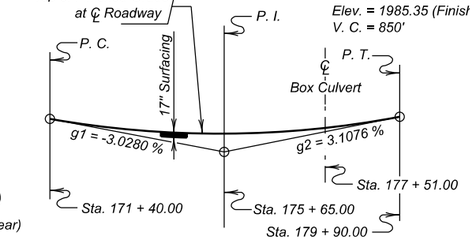
	ITEM	UNIT	QUANTITY
	Class A45 Concrete, Box Culvert	Cu. Yd.	690.3
	Reinforcing Steel	Lb.	88754
	Structure Excavation, Box Culvert	Cu. Yd.	287
	Box Culvert Undercut	Cu. Yd.	728
	Type B Drainage Fabric	Sq. Yd.	117
✳	Class B Riprap	Ton	96.3
⊛	Base Course	Ton	3.4

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

⊛ For estimating purposes only, a factor of 1.89 tons/cu. yd. was used to convert Cu. Yds. to Tons.

-X028-
INDEX OF CULVERT SHEETS -

Sheet No. 1 - General Drawing and Quantities
Sheet No. 2 - Notes and Undercut Details
Sheet No. 3 - Inlet Details
Sheet No. 4 - Outlet Details
Sheet No. 5 - F9 Barrel End Section Details (50' - 0") (A)
Sheet No. 6 - F9 Barrel End Section Details (50' - 0") (B)
Sheet No. 7 - Standard Plate No.'s 460.02 and 460.10
Sheet No. 8 - Standard Plate No. 620.16



VERTICAL CURVE DATA

SITE 4
ALTERNATE A

GENERAL DRAWING AND QUANTITIES

FOR

4 - 12' X 12' BOX CULVERT (C.I.P.)

OVER MEDICINE CREEK — 5° LHF SKEW
STA. 177 + 51.00 — SEC. 33-T1S-R31E
STR. NO. 38-330-175 — P-B 0248(12)173
PCN 06G7 — HL-93

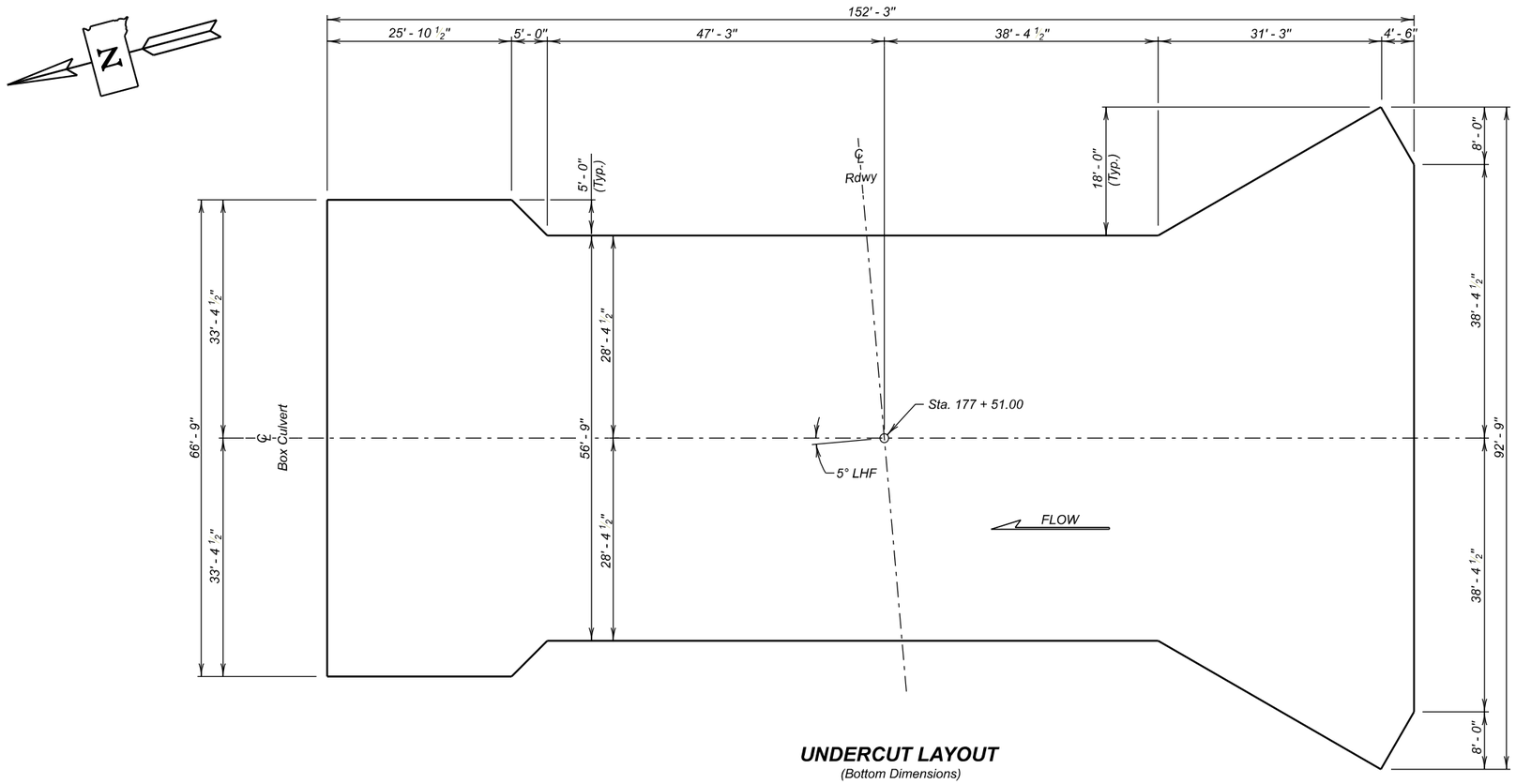
JONES COUNTY
S. D. DEPT. OF TRANSPORTATION
FEBRUARY 2024

1 OF 8

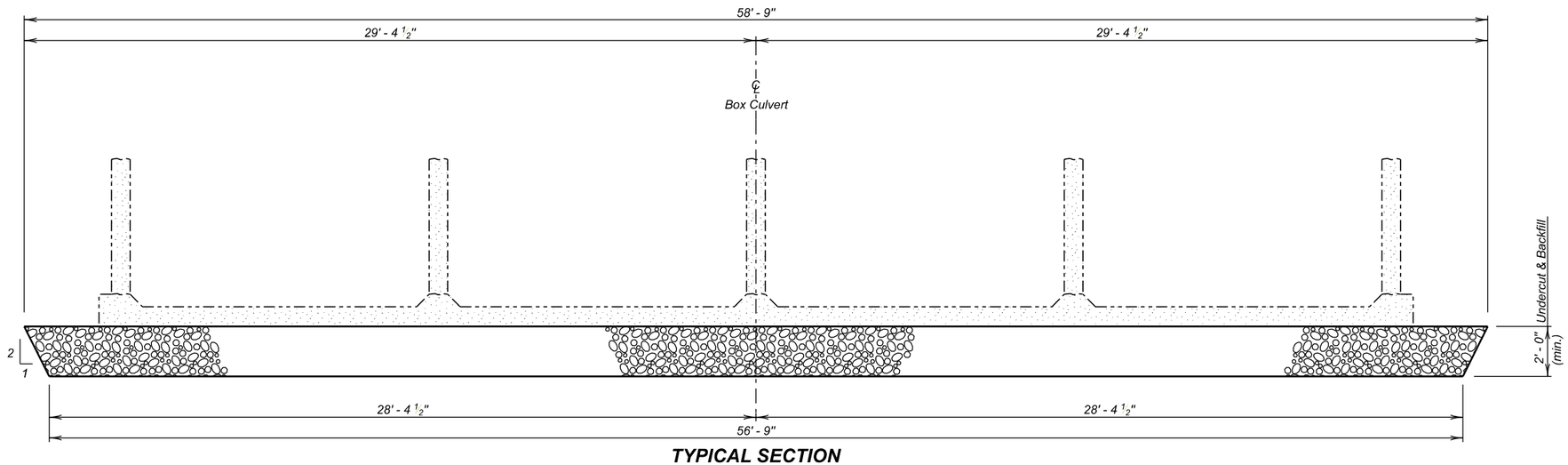
-X028-

DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU	ER	BT	Steve A. Johnson BRIDGE ENGINEER
JONS06G7	06G7GD01		

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E50	E99



UNDERCUT LAYOUT
(Bottom Dimensions)



TYPICAL SECTION
(For Limits of Undercut)

SPECIFICATIONS

1. *Design Specifications: AASHTO LRFD Bridge Design Specifications, 9th Edition.*
2. *Construction Specifications: South Dakota Standard Specifications for Roads and Bridges, 10-7-26 Version, Required Provisions, and Special Provisions as included in the Proposal. The Standard Specifications for Roads and Bridges are available for download and viewing at: https://dot.sd.gov/doing-business/contractors/standard-specifications*

GENERAL NOTES

1. *Design Live Load: HL-93 and construction loading consisting of one 7' - 6" gage axle with gross axle 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 9 ft. (F9).*
3. *Design Material Strengths: Concrete f'c = 4500 p.s.i.*
   Reinforcing Steel fy = 60000 p.s.i.
4. *High sulfate levels are likely to be encountered on this project. All concrete will be Class A45 Concrete, Box Culvert conforming to Section 460 of the Construction Specifications, with the following modifications: the type of cement will be either a type V or a type II with 20% to 25% Class F Modified Fly Ash substituted for cement in accordance with Section 605 of the Construction Specifications.*
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 3/4 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 RCBC consist of brown to gray clay overlying dark gray shale (elevation 1970.9 feet). Groundwater was encountered in the borings at an elevation of 1976.6 feet during the subsurface investigation conducted in June 2023. Dewatering will be required during construction.*

ESTIMATED QUANTITIES		
ITEM	*UNIT*	*QUANTITY*
℄ *Box Culvert Undercut*	*Cu. Yd.*	*728*

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

SITE 4
ALTERNATE A

NOTES AND UNDERCUT DETAILS

FOR

4 - 12' X 12' BOX CULVERT (C.I.P.)

OVER MEDICINE CREEK — 5° LHF SKEW
STA. 177 + 51.00 — SEC. 33-T1S-R31E
STR. NO. 38-330-175 — P-B 0248(12)173
HL-93

JONES COUNTY
S. D. DEPT. OF TRANSPORTATION
FEBRUARY 2024

DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU	ER	BT	Steve A Johnson BRIDGE ENGINEER
JONS06G7	06G7GD02		

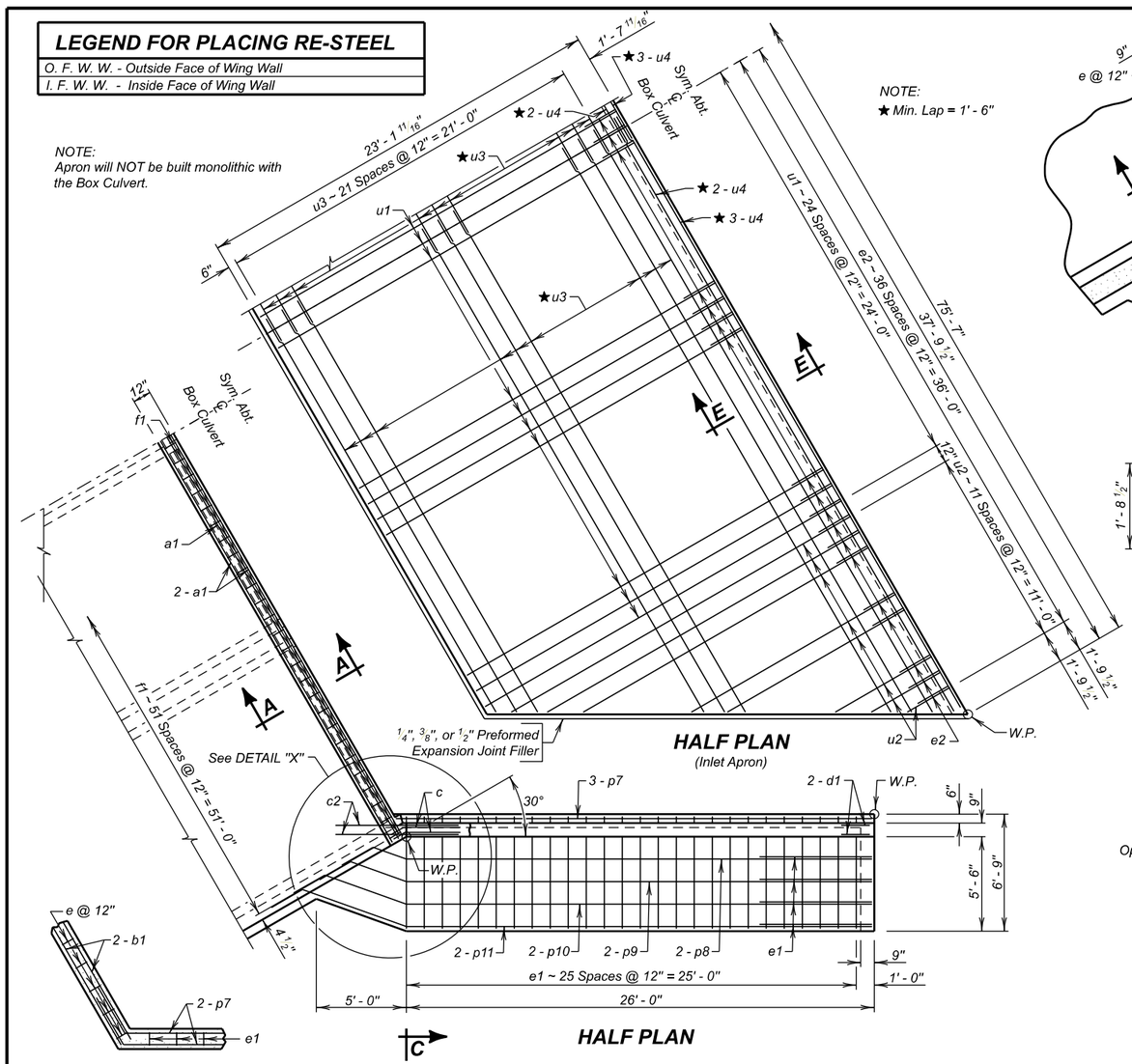
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E51	E99

LEGEND FOR PLACING RE-STEEL

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

NOTE:
Apron will NOT be built monolithic with the Box Culvert.

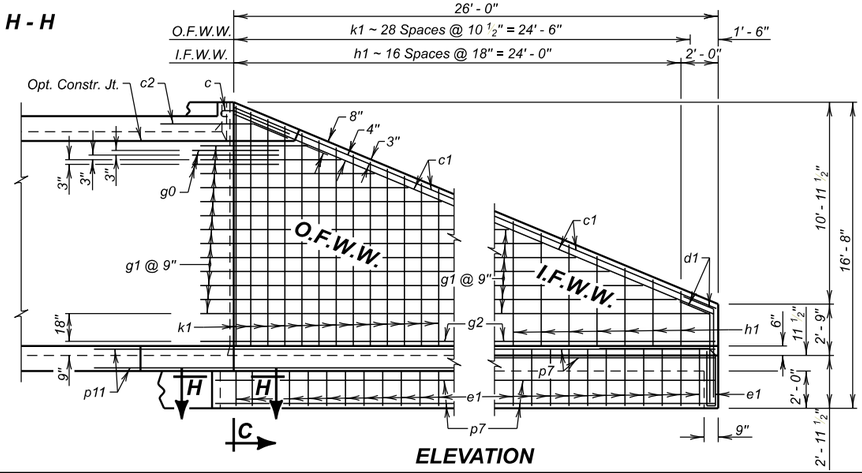
NOTE:
★ Min. Lap = 1' - 6"



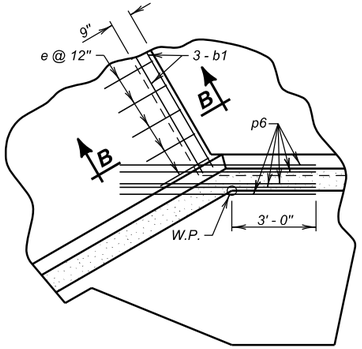
HALF PLAN
(Inlet Apron)

HALF PLAN

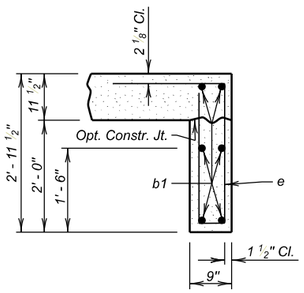
SECTION H - H



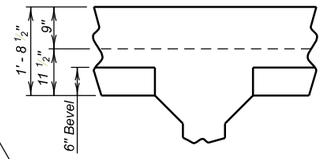
ELEVATION



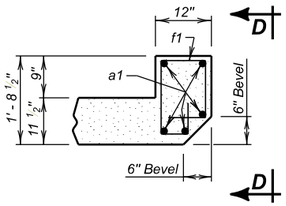
DETAIL "X"
(At Bottom Slab)



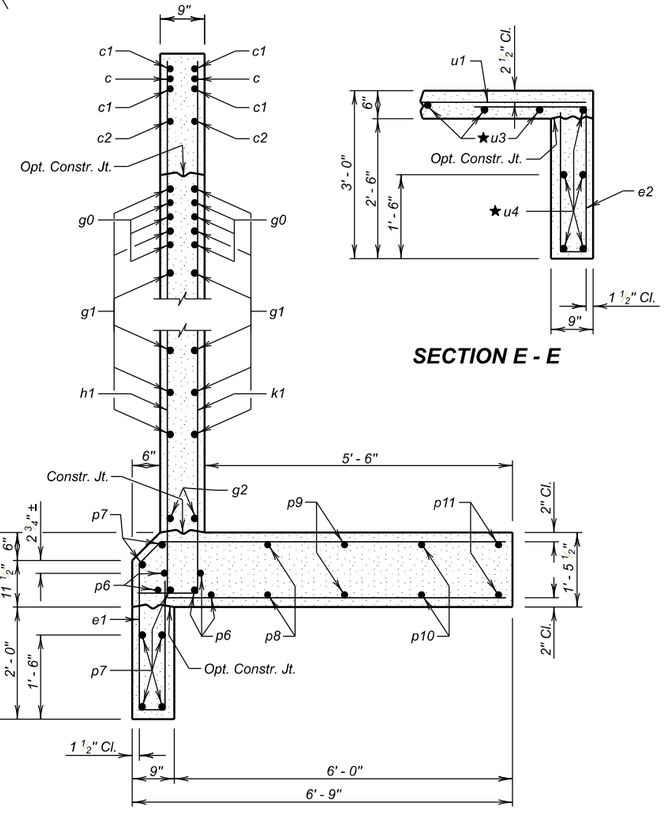
SECTION B - B



VIEW D - D
(At Interior Wall)



SECTION A - A
(At Top Slab)



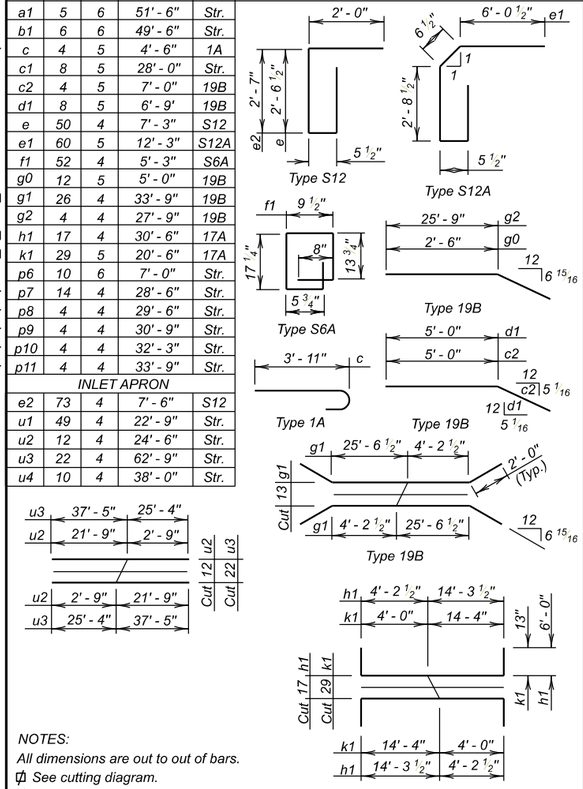
SECTION C - C

SECTION E - E

REINFORCING SCHEDULE

Mk.	No.	Size	Length	Type
a1	5	6	51' - 6"	Str.
b1	6	6	49' - 6"	Str.
c	4	5	4' - 6"	1A
c1	8	5	28' - 0"	Str.
c2	4	5	7' - 0"	19B
d1	8	5	6' - 9"	19B
e	50	4	7' - 3"	S12
e1	60	5	12' - 3"	S12A
f1	52	4	5' - 3"	S6A
g0	12	5	5' - 0"	19B
g1	26	4	33' - 9"	19B
g2	4	4	27' - 9"	19B
h1	17	4	30' - 6"	17A
k1	29	5	20' - 6"	17A
p6	10	6	7' - 0"	Str.
p7	14	4	28' - 6"	Str.
p8	4	4	29' - 6"	Str.
p9	4	4	30' - 9"	Str.
p10	4	4	32' - 3"	Str.
p11	4	4	33' - 9"	Str.
INLET APRON				
e2	73	4	7' - 6"	S12
u1	49	4	22' - 9"	Str.
u2	12	4	24' - 6"	Str.
u3	22	4	62' - 9"	Str.
u4	10	4	38' - 0"	Str.

Bending Details



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

u3	37' - 5"	25' - 4"		
u2	21' - 9"	2' - 9"		
u2	2' - 9"	21' - 9"	Cut 12	u2
u3	25' - 4"	37' - 5"	Cut 22	u3

ESTIMATED QUANTITIES

ITEM	Class A45 Concrete, Box Culvert	Reinforcing Steel	Structure Excavation, Box Culvert
UNIT	Cu. Yd.	Lb.	Cu. Yd.
Inlet	44.5	4760	21.6
Inlet Apron	31.8	2483	31.8

SITE 4
ALTERNATE A
INLET DETAILS
FOR
4 - 12' X 12' BOX CULVERT (C.I.P.)

OVER MEDICINE CREEK
STA. 177 + 51.00
STR. NO. 38-330-175

5° LHF SKEW
SEC. 33-T1S-R31E
P-B 0248(12)173
HL-93

JONES COUNTY
S. D. DEPT. OF TRANSPORTATION
FEBRUARY 2024

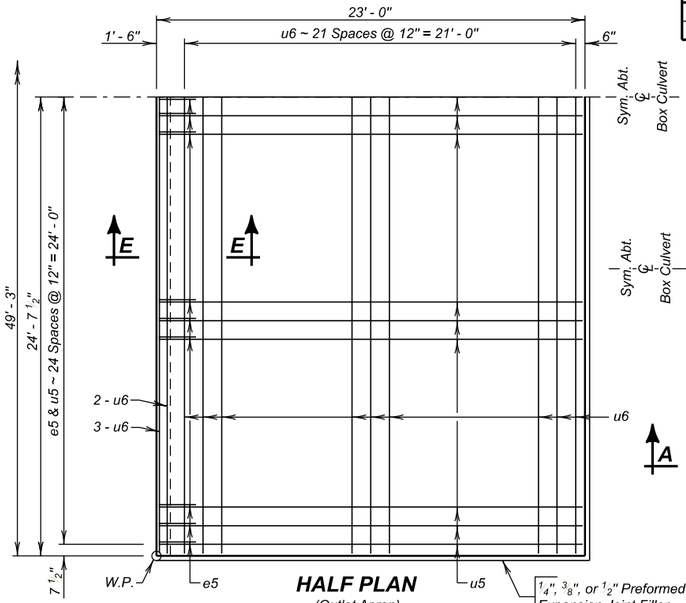
3 OF 8

DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU	ER	BT	Steven A Johnson BRIDGE ENGINEER
JONS06G7	06G7GD03		

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E52	E99

LEGEND FOR PLACING RE-STEEL

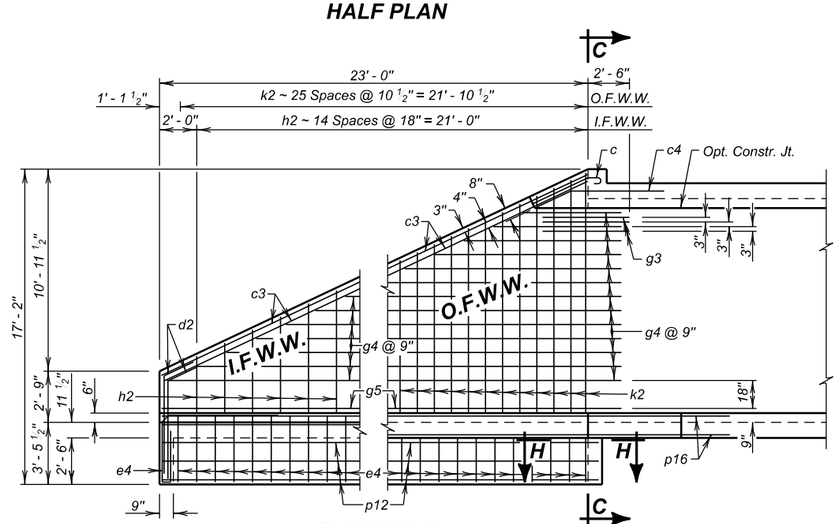
O. F. W. W. - Outside Face of Wing Wall
I. F. W. W. - Inside Face of Wing Wall



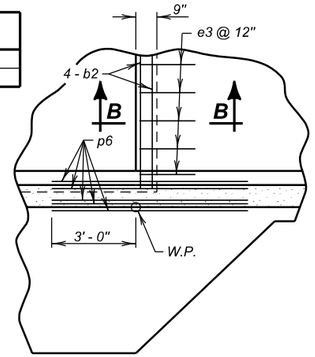
HALF PLAN
(Outlet Apron)

NOTE:
Apron will NOT be built monolithic with the Box Culvert.

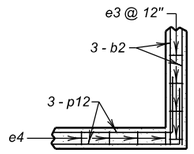
HALF PLAN



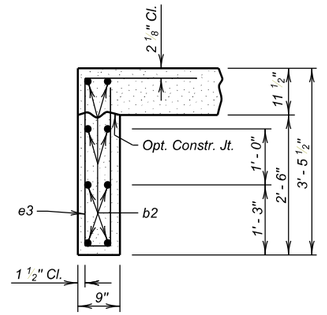
ELEVATION



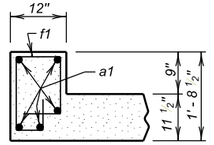
DETAIL "X"
(At Bottom Slab)



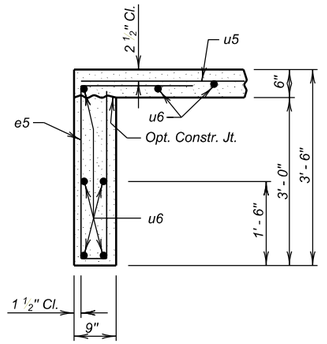
SECTION H - H



SECTION B - B



SECTION A - A
(At Top Slab)



SECTION E - E

SECTION C - C

REINFORCING SCHEDULE

	Mk.	No.	Size	Length	Type	Bending Details
	a1	5	6	51' - 6"	Str.	
	b2	8	6	50' - 6"	Str.	
*	c	4	5	4' - 6"	1A	
	c3	8	5	25' - 3"	Str.	
	c4	4	5	7' - 0"	19B	
	d2	8	5	7' - 3"	19B	
	e3	51	4	8' - 3"	S12	
	e4	54	5	13' - 3"	S12A	
	f1	52	4	5' - 3"	S6A	
	g3	12	5	5' - 0"	Str.	
⌀	g4	26	4	30' - 3"	Str.	
	g5	4	4	24' - 9"	Str.	
⌀	h2	15	4	30' - 6"	17A	
⌀	k2	26	5	20' - 3"	17A	
	p6	10	6	7' - 0"	Str.	
*	p12	18	4	25' - 6"	Str.	
*	p13	4	4	26' - 9"	Str.	
*	p14	4	4	28' - 9"	Str.	
*	p15	4	4	30' - 6"	Str.	
*	p16	4	4	32' - 6"	Str.	
	OUTLET APRON					
	e5	49	4	8' - 6"	S12	
	u5	49	4	22' - 9"	Str.	
	u6	27	4	49' - 0"	Str.	

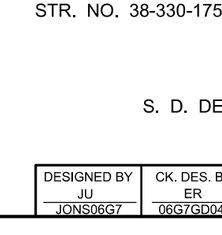
Type S12 — 2' - 0", 6' - 0 1/2", e4, 6 1/2", 1, 1, 3' - 1", 3' - 0 1/2", 3' - 2 1/2", e5, e3, 5 1/2", 5 1/2"

Type S12A

Type 19B — 5' - 0", c4, 5' - 6", d2, 12, c4, 5 11/16, 12, d2, 5 11/16

Type 1A — c, 3' - 11"

Type S6A — f1, 9 1/2", 8", 17 1/4", 13 3/4", 5 3/4"



Type 17A

NOTES:
All dimensions are out to out of bars.
⌀ 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.
Outlet	42.2	4760	21.3
Outlet Apron	25.0	1907	25.0

SITE 4
ALTERNATE A

OUTLET DETAILS

FOR

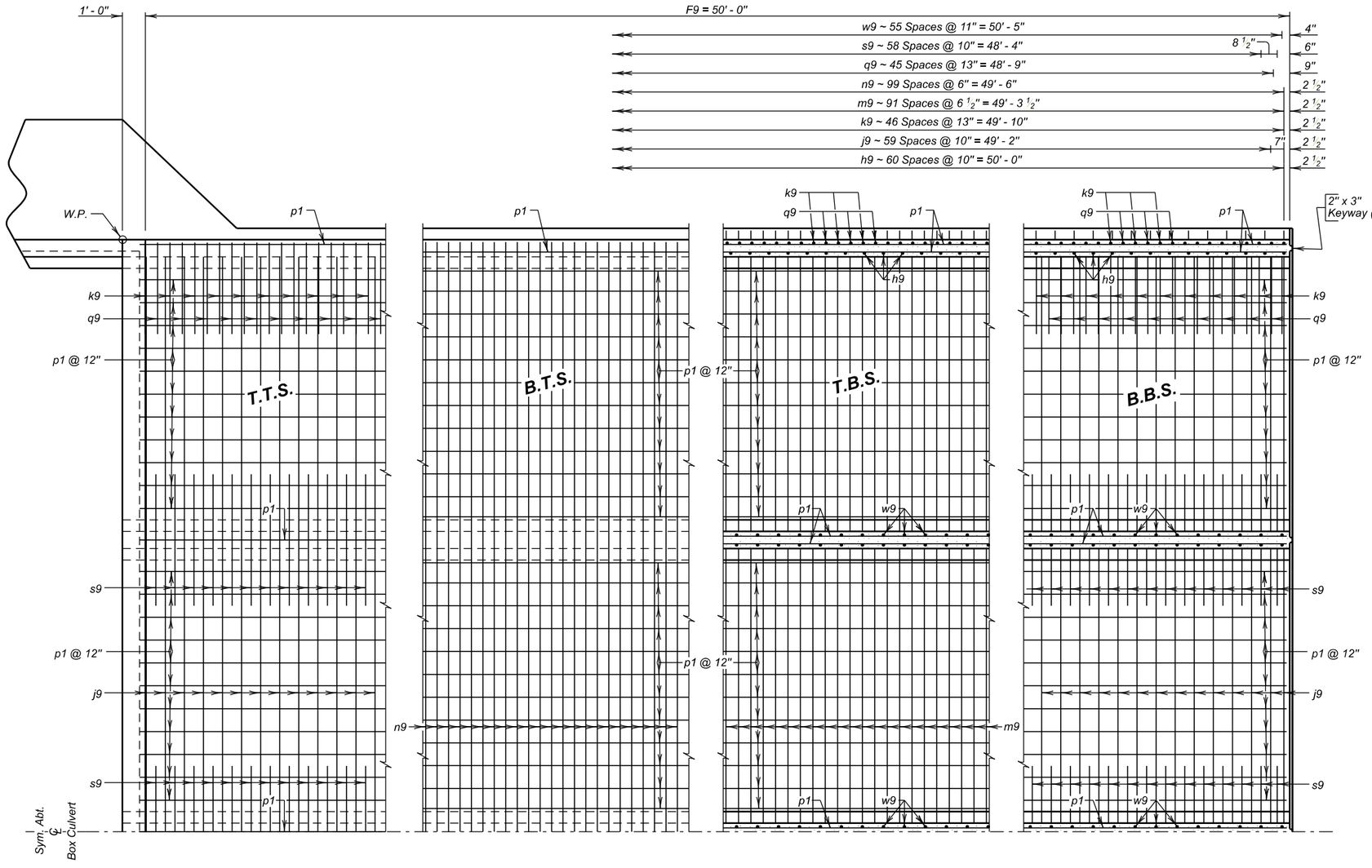
4 - 12' X 12' BOX CULVERT (C.I.P.)

OVER MEDICINE CREEK — 5° LHF SKEW
STA. 177 + 51.00 — SEC. 33-T1S-R31E
STR. NO. 38-330-175 — P-B 0248(12)173
HL-93

JONES COUNTY
S. D. DEPT. OF TRANSPORTATION
FEBRUARY 2024

DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU	ER	BT	Steve A Johnson BRIDGE ENGINEER
JONS06G7	06G7GD04		

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E53	E99



PLAN

(Outlet End shown, Inlet similar by rotation)

LEGEND FOR PLACING RE-STEEL

T.T.S. - Top of Top Slab
B.T.S. - Bottom of Top Slab
T.B.S. - Top of Bottom Slab
B.B.S. - Bottom of Bottom Slab

SITE 4
ALTERNATE A

F9 BARREL END SECTION DETAILS (50' - 0") (A)

FOR

4 - 12' X 12' BOX CULVERT (C.I.P.)

OVER MEDICINE CREEK
STA. 177 + 51.00
STR. NO. 38-330-175

5° LHF SKEW
SEC. 33-T1S-R31E
P-B 0248(12)173
HL-93

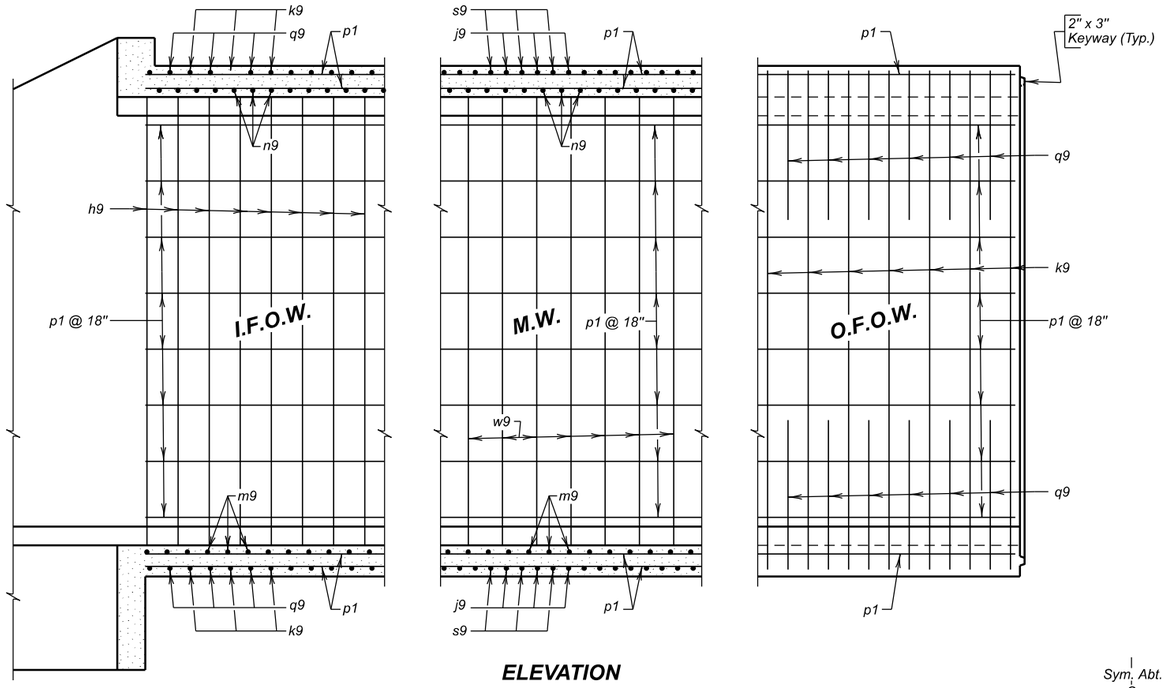
JONES COUNTY

S. D. DEPT. OF TRANSPORTATION

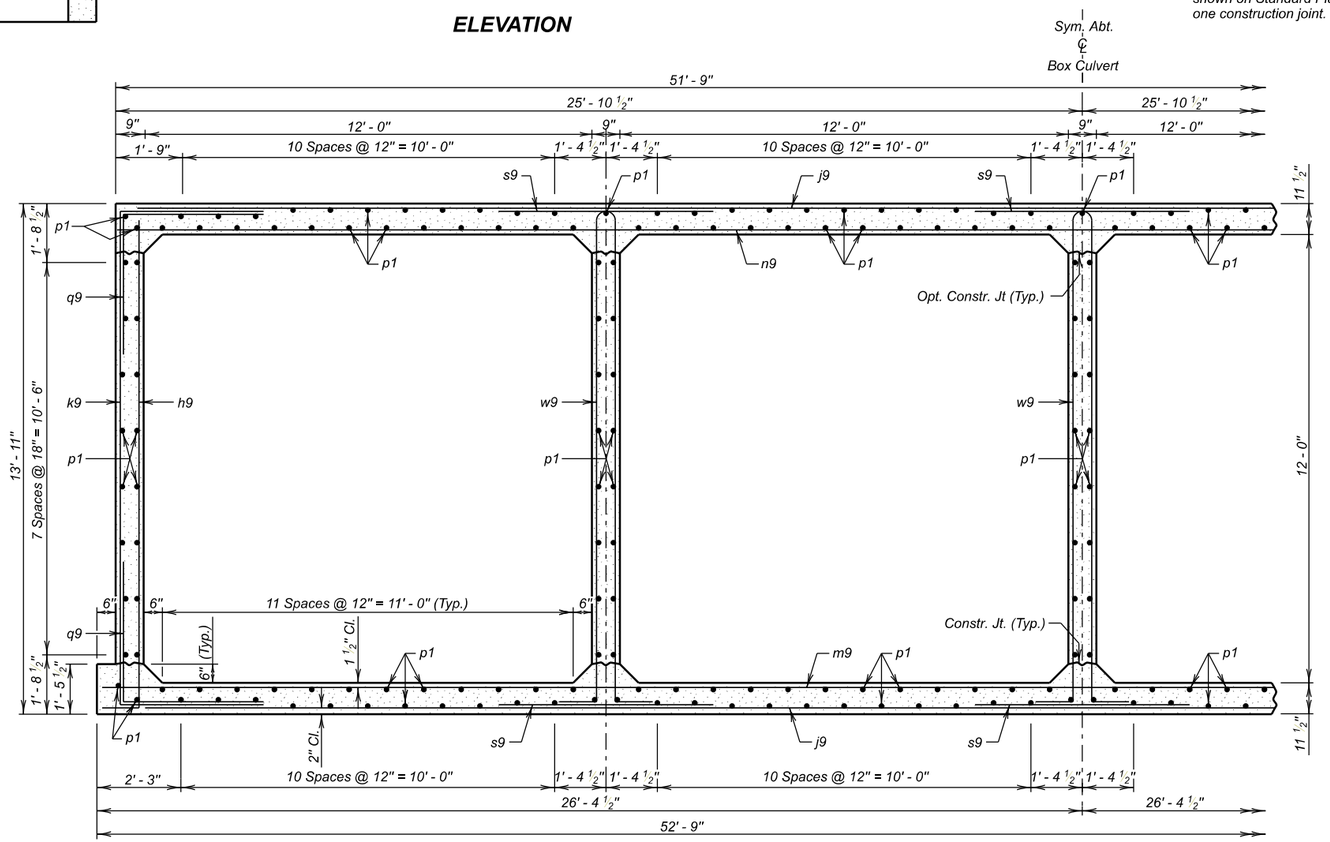
FEBRUARY 2024

DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU JONS06G7	ER 06G7GD05	BT	Steve A Johnson BRIDGE ENGINEER

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E54	E99



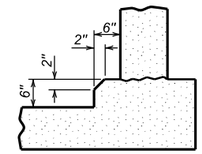
ELEVATION



F9 BARREL HALF SECTION
(9' - 0" Maximum Fill)

LEGEND FOR PLACING RE-STEEL

O.F.O.W. - Outside Face of Outside Wall
I.F.O.W. - Inside Face of Outside Wall
M. W. - Middle Wall



OPTIONAL FILLET DETAIL
(At Bottom Slab)

NOTE: Contractor may form the optional full fillet, with 2" Chamfer, as detailed. The cost of the additional concrete will be borne by the Contractor.

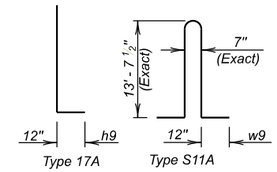
OPTIONAL POUR - BOTTOM SLAB

The Bottom Slab may be poured continuously, at the option of the Contractor, with the use of a Preformed Metal keyway conforming to the keyway dimensions and location as shown on the plans. The keyway length will be full width of the bottom slab. Care will be taken to maintain proper alignment of the keyway during the pour sequence. All additional costs of this option will be borne by the Contractor.

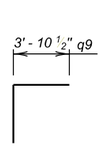
△ Place z1 bars thru construction joint between barrel sections as shown on Standard Plate No. 460.10. Quantity of z1 bars is for one construction joint.

REINFORCING SCHEDULE
(For 2 - F9 Barrel End Sections)

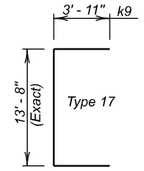
Mk.	No.	Size	Length	Type	Bending Details
h9	244	5	14' - 6"	17A	
j9	244	5	50' - 3"	Str.	
k9	188	5	21' - 6"	17	
m9	184	5	52' - 6"	Str.	
n9	200	5	51' - 6"	Str.	
p1	562	4	50' - 3"	Str.	
q9	368	5	7' - 9"	17A	
s9	720	5	5' - 9"	Str.	
w9	336	4	29' - 9"	S11A	
△ z1	136	5	3' - 6"	Str.	



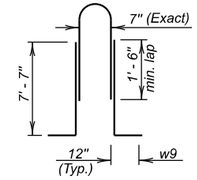
Type 17A Type S11A



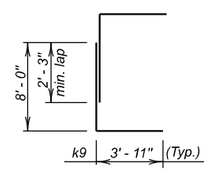
Type 17A



Type 17



OPTIONAL w9 SPLICE DETAIL



OPTIONAL k9 SPLICE DETAIL

Contractor may use optional reinforcing steel splices, as shown. The cost of the additional reinforcing steel will be borne by the Contractor.

NOTES:

All dimensions are out to out of bars.

Request for additional 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.

ESTIMATED QUANTITIES

ITEM	Class A45 Concrete, Box Culvert	Reinforcing Steel	Structure Excavation, Box Culvert
UNIT	Cu.Yd.	Lb.	Cu.Yd.
2 - F9 Barrel End Sections @ 50' - 0"	546.8	74844	187.2

SITE 4
ALTERNATE A

F9 BARREL END SECTION DETAILS (50' - 0") (B)

FOR

4 - 12' X 12' BOX CULVERT (C.I.P.)

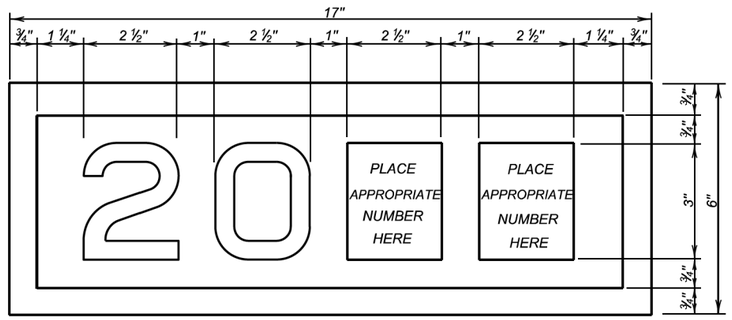
OVER MEDICINE CREEK
STA. 177 + 51.00
STR. NO. 38-330-175

5° LHF SKEW
SEC. 33-T1S-R31E
P-B 0248(12)173
HL-93

JONES COUNTY
S. D. DEPT. OF TRANSPORTATION
FEBRUARY 2024

6 OF 8

DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU	ER	BT	BRIDGE ENGINEER
JONS06G7	06G7GD06		



YEAR PLATE DETAILS

GENERAL NOTES:

1. Year plates of the general dimensions shown will be constructed on all box culverts and bridges. The year plates will 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 (1/2) inch in depth.

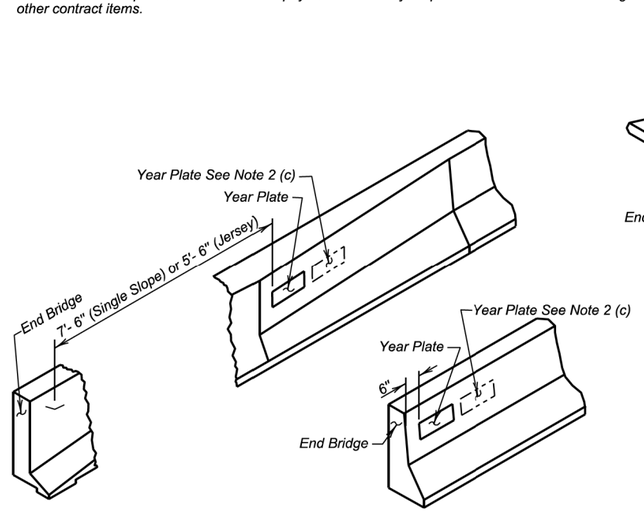
2. Year plates will be located on structure(s) as follows:

   a. On cast-in-place box culverts the year plates will 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 will be centered laterally on the upstream face of the top slab. Where an extended interior wall interferes with this location, the year plate will be centered in an adjacent barrel.

   b. On bridges with six (6) inch curbs, "Jersey" shaped barriers with no endblocks, or "Single Slope" shaped barriers with no endblocks, the year plate will 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 barrier endblocks, the year plate will be centered on the upper sloped portion of the barrier approximately 5'- 6" for "Jersey" shaped barriers from the end of the bridge and 7'-6" for "Single Slope" shaped barriers from the end of bridge, or as designated by the Engineer. There will be one year plate at each end of the bridge on opposite sides.

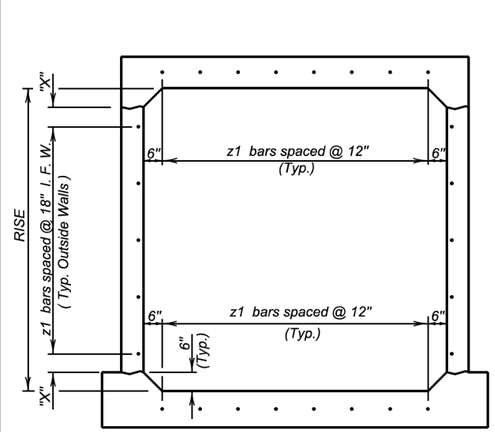
   c. When the plans specify that both the original date of construction and the date of reconstruction are to be shown, one date will be placed as listed above and the other located adjacent to it. Both year plates will be shown at each end of the bridge on opposite sides.

3. There will be no separate measurement or payment made for year plates on box culverts and bridges. All costs for this work will be incidental to other contract items.

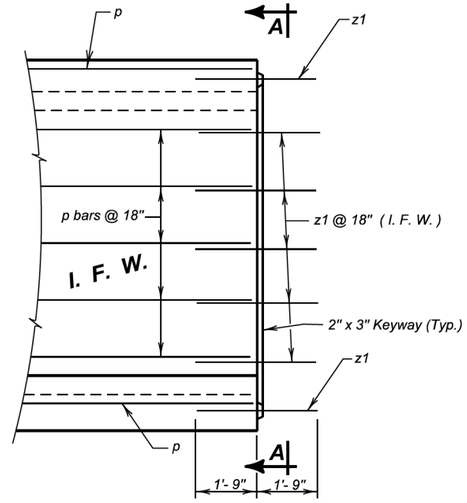


January 22, 2021

Published Date: 2027	SDDOT	YEAR PLATE DETAILS	PLATE NUMBER 460.02
			Sheet 1 Of 1



TYPICAL SINGLE BARREL VIEW A - A

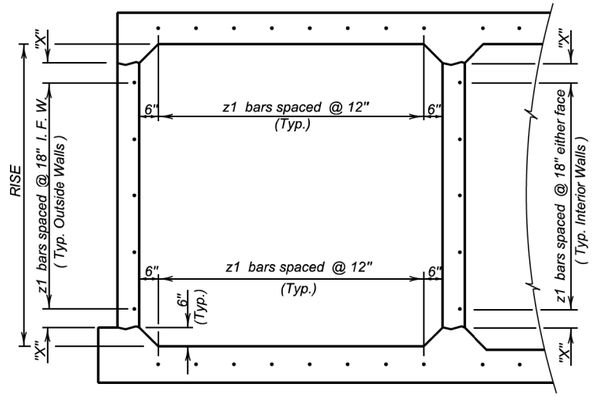


ELEVATION

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"
13'- 0"	9"
14'- 0"	6"



TYPICAL MULTIPLE BARREL VIEW A - A

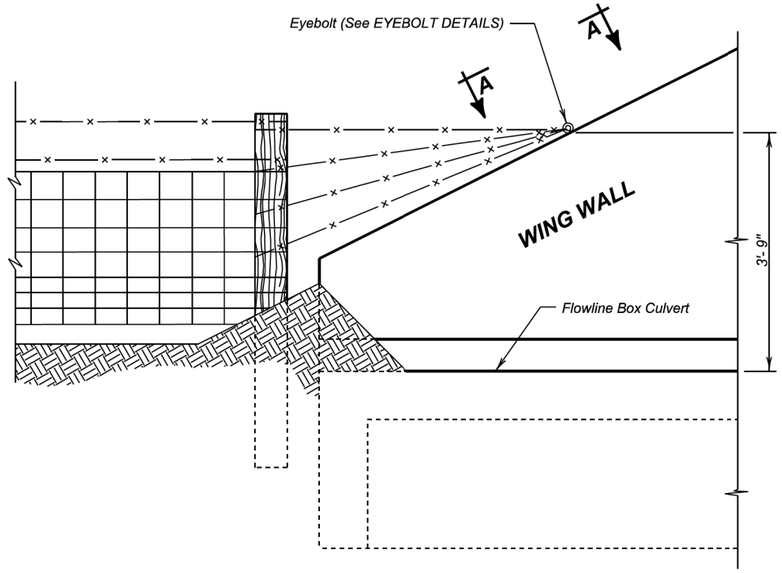
GENERAL NOTES:

1. z1 bars will be placed in the middle of the 2" X 3" keyway in the top and bottom slabs. z1 bars will 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 will be placed in accordance with Section 422, or Section 560, whichever is applicable.

June 1, 2022

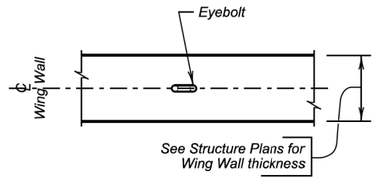
Published Date: 2027	SDDOT	BOX CULVERT BARREL TIE REINFORCEMENT	PLATE NUMBER 460.10
			Sheet 1 of 1



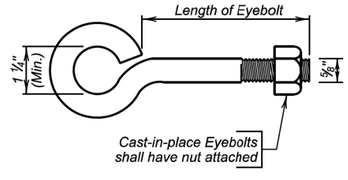
DETAIL FOR FENCE ANCHORS

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: 2027	SDDOT	FENCE ANCHORS FOR BOX CULVERT WING WALLS	PLATE NUMBER 620.16
			Sheet 1 of 1

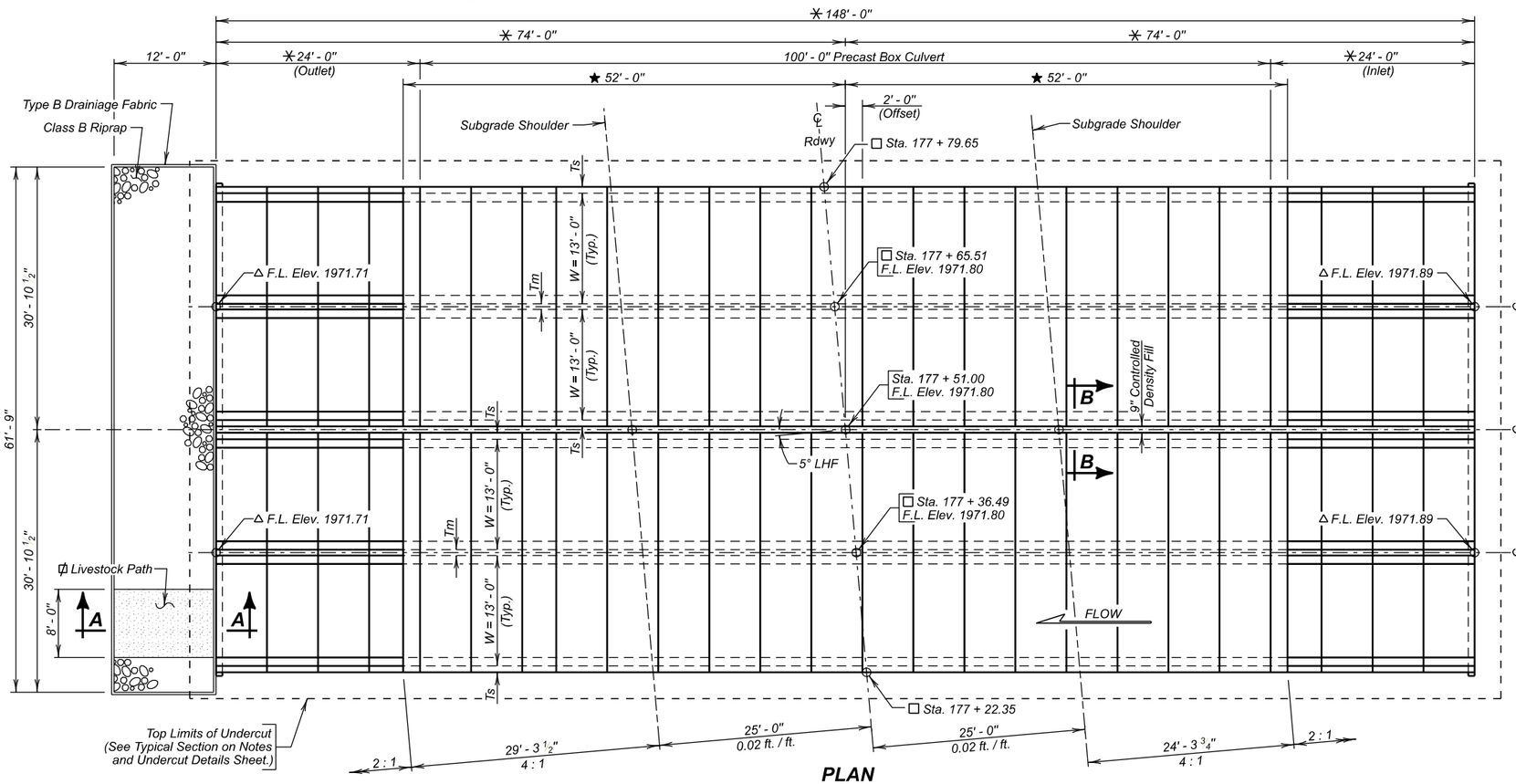
SITE 4
ALTERNATE A

4 - 12' X 12' BOX CULVERT (C.I.P.)
STR. NO. 38-330-175
FEBRUARY 2024

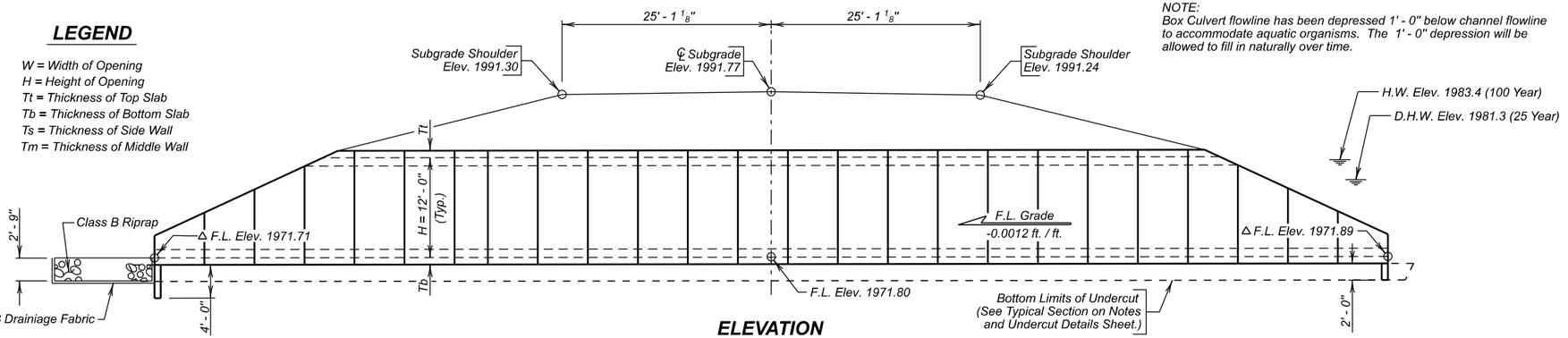
The elevations shown in these plans are based on the National Geodetic Survey (NGS) North American Vertical Datum of 1988 (NAVD88).

⚹ Dimension may vary with installation and/or fabrication. See Shop Plans for actual installation length.
★ Minimum distance to satisfy fill slope.
△ Based on dimensions shown.
☐ Based on Ts = 9" and Tm = 8".

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E57	E99



PLAN



ELEVATION

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

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

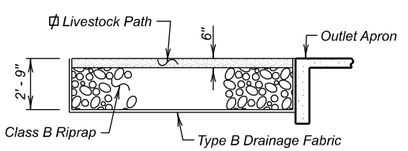
HYDRAULIC DATA

Q_d	1751 cfs
A_d	407 sq ft
V_d	4.2 fps
Q_F	1751 cfs
Q_{100}	3123 cfs
Q_{OT}	$>Q_{100}$
V_{max}	6.2 fps

Q_d = Design discharge for the proposed culvert based on 25 year frequency. El. 1981.3.
Q_{OT} = Overtopping discharge and frequency > Q_{100} year recurrence interval. El. 1991.9 @ Sta. 175 + 59.00 ±.
Q_F = 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. 1983.4.
V_{max} = Maximum computed outlet velocity for the proposed culvert, based on 100 year frequency.

-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 560.20 & 560.21
Sheet No. 5 - Details of Standard Plate No. 620.16

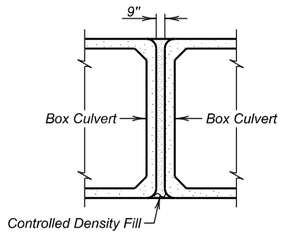


SECTION A - A



Ø NOTES:

1. Base Course will provide a smooth path for livestock.
2. Base Course is estimated using 6" of material to account for voids in the Class B Riprap.

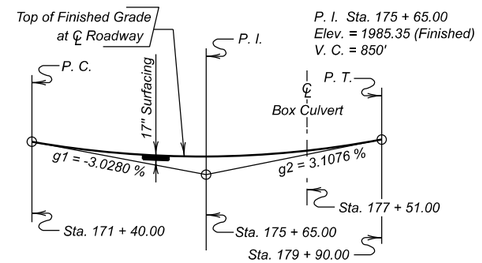


SECTION B - B

ESTIMATED QUANTITIES

	ITEM	UNIT	QUANTITY
⧄	Structure Excavation, Box Culvert	Cu. Yd.	270
	Box Culvert Undercut	Cu. Yd.	707
	Controlled Density Fill	Cu. Yd.	50.0
≠	Class B Riprap	Ton	105.7
⊛	Base Course	Ton	3.4
	Type B Drainage Fabric	Sq. Yd.	127
	2 - 13' X 12' Precast Concrete Culvert, Furnish	Ft.	200
	2 - 13' X 12' Precast Concrete Culvert, Install	Ft.	200
	2 - 13' X 12' Precast Concrete Culvert End Section, Furnish	Each	4
	2 - 13' X 12' Precast Concrete Culvert End Section, Install	Each	4

⧄ Quantity is based on 10" bottom slab, 10" top slab, 9" outside walls and 8" interior walls.
≠ For estimating purposes only, a factor of 1.4 tons/cu. yd. was used to convert Cu. Yd. to Tons.
⊛ For estimating purposes only, a factor of 1.89 tons/cu. yd. was used to convert Cu. Yds. to Tons.



P. I. Sta. 175 + 65.00
Elev. = 1985.35 (Finished)
V. C. = 850'

VERTICAL CURVE DATA

SITE 4
ALTERNATE B

GENERAL DRAWING AND QUANTITIES

FOR

4 - 13' X 12' BOX CULVERT (PRECAST)

OVER MEDICINE CREEK — 5° LHF SKEW
STA. 177 + 51.00 — SEC. 33-T1S-R31E
STR. NO. 38-330-175 — P-B 0248(12)173
PCN 06G7 — HL-93

JONES COUNTY
S. D. DEPT. OF TRANSPORTATION
FEBRUARY 2024

-X028-

DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU	ER	BT	Steve A Johnson BRIDGE ENGINEER
JONS06G7	06G7GD09		

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

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E58	E99

SPECIFICATIONS

Use South Dakota Standard Specifications for Roads and Bridges, 10-7-26 Version, Required Provisions, and Special Provisions as included in the Proposal. The Standard Specifications for Roads and Bridges are available for download and viewing at: https://dot.sd.gov/doing-business/contractors/standard-specifications

GENERAL NOTES

Design will be in accordance with Section 560 of the Specifications with the following criteria:

1. *Box culvert and box culvert end section design will conform to the AASHTO LRFD Bridge Design Specifications, 9th Edition.*
2. *Design Live Load: HL-93 and construction loading consisting of one 7' - 6" gage axle with gross axle 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.*
3. *The box culvert will be load rated in accordance with the AASHTO Manual for Bridge Evaluation, 2018 Edition with the latest Interim Revisions using the LRFR method. The rating will include evaluation of the Design HL-93 truck at both Inventory and Operating levels and a Legal Load rating for three SD legal trucks (Type 3, 3S2 and 3-2) as well as the notional rating load and four specialized hauling vehicles. The structure will also be evaluated for the emergency vehicles, EV2 and EV3, at the legal load rating level. All sections of the box culvert will 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 will rate greater than 1.0 at legal load rating level. AASHTOWare Bridge Rating (BrR) is required to be used to rate the box culvert. Include the BrR rating model and a load rating summary table with load rating calculations. Submit load rating calculations with the design and independent check design calculations or shop plans, as appropriate.*
4. *The design of the barrel sections will be based on a minimum fill height of 2 foot and include all subsequent fill heights up to and including the maximum fill height of 9 ft. over the box culvert.*
5. *Minimum inside corner fillet will be 6 in.*
6. *Minimum precast barrel section length will be 6 - foot sections; however, no more than two 4 - foot sections are allowed in any one length of precast barrel.*
7. *Lift holes will be plugged with an approved nonshrinkable grout.*
8. *The Fabricator will 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 will be in accordance with the final approved shop plans.*
11. *Care will be taken when placing sections. Sections will be only moved using the lifting holes by approved equipment.*
12. *Soils below the bottom of the proposed RCBC consist of brown to gray clay overlying dark gray shale (elevation 1970.9 feet). Groundwater was encountered in the borings at an elevation of 1976.6 feet during the subsurface investigation conducted in June 2023. Dewatering will be required during construction.*

DESIGN MIX OF CONCRETE

1. *Mix will be as per fabricator's design; however, a minimum compressive strength will not be less than 4500 p.s.i. at 28 days.*
2. *High sulfate levels are likely to be encountered on this project. All concrete will be Class A45 Concrete conforming to Section 460 of the Construction Specifications, with the following modifications: the type of cement will be either a Type V or Type II with 20 to 25% Class F Modified Fly Ash substituted for cement in accordance with Section 605 of the Construction Specifications. The Water/Cementitious material ratio will not exceed 0.45 as defined in Section 460.3 C.*

SHOP PLANS

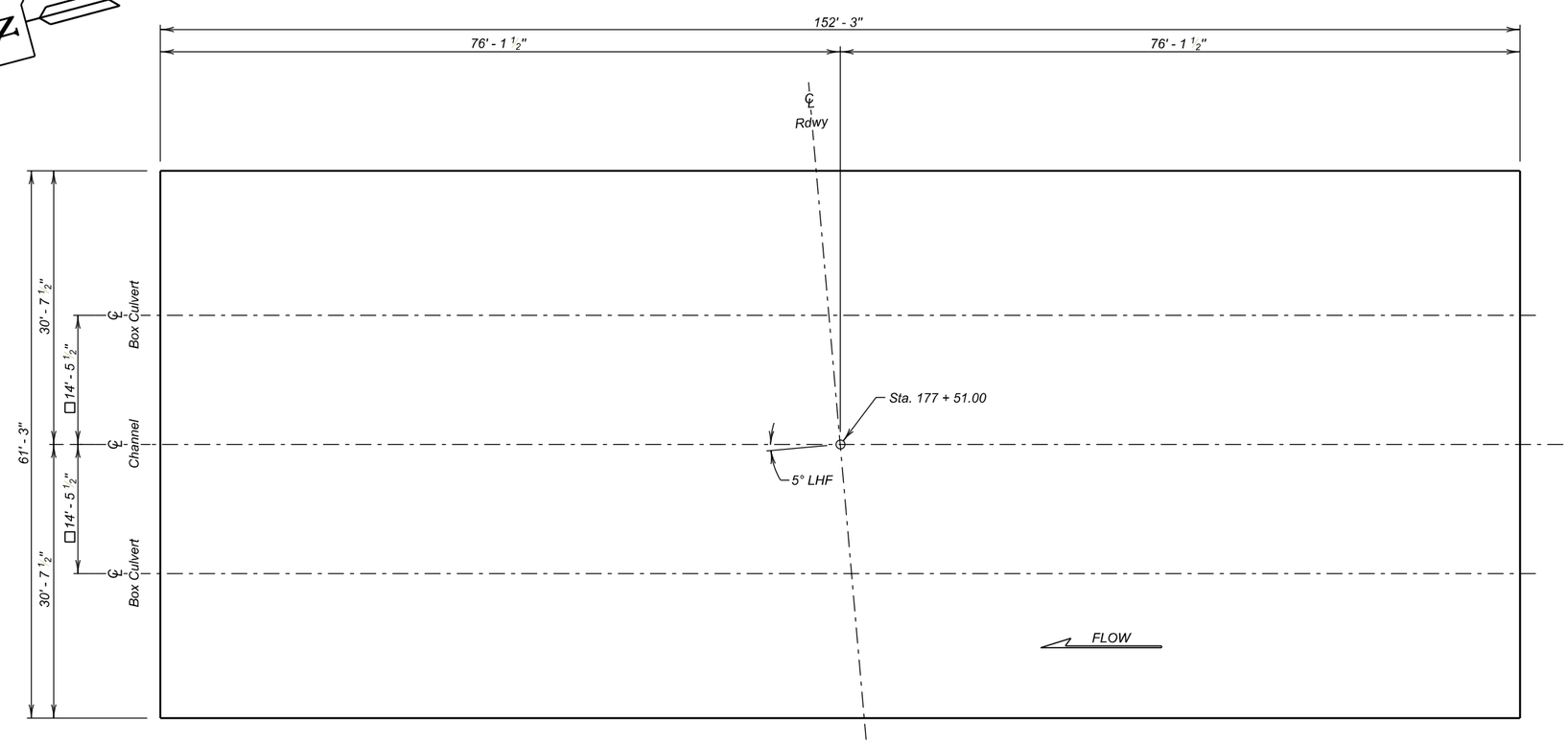
The fabricator will submit shop plans in accordance with the Construction Specifications. Include design and independent check design, if applicable, with initial submittal.

ESTIMATED QUANTITIES

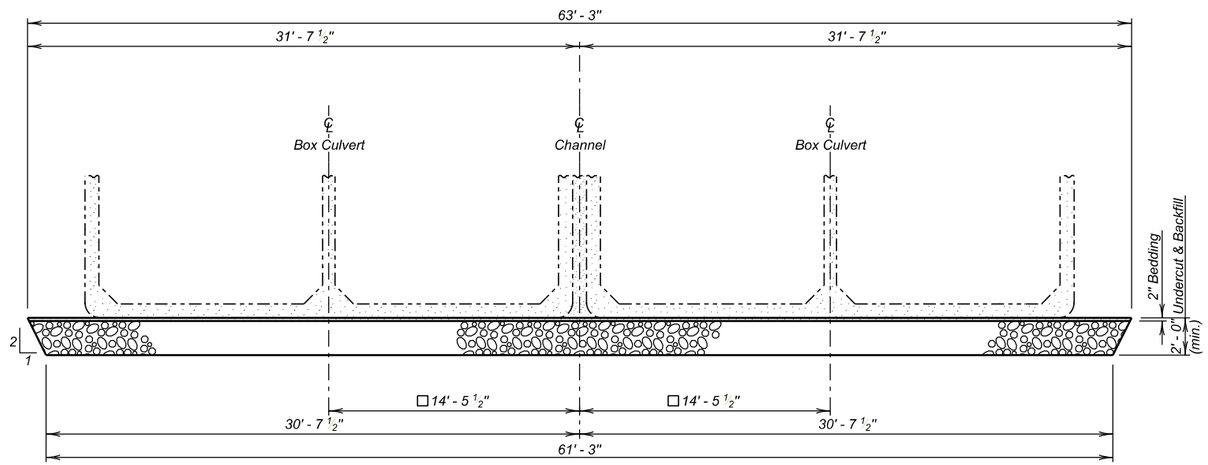
ITEM	UNIT	QUANTITY
⌀ Box Culvert Undercut	Cu. Yd.	707

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

□ *Based on Ts = 9" and Tm = 8".*



UNDERCUT LAYOUT
(Bottom Dimensions)



TYPICAL SECTION
(For Limits of Undercut)

SITE 4
ALTERNATE B

NOTES AND UNDERCUT DETAILS

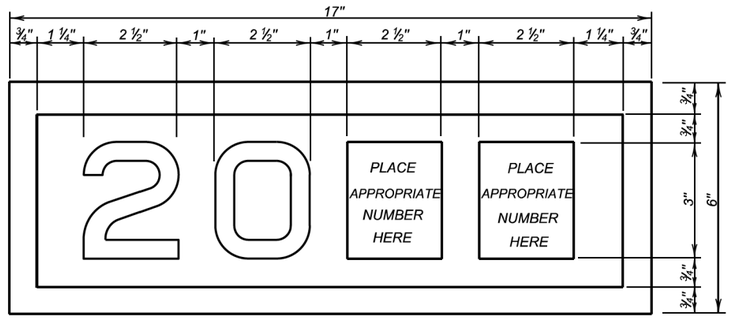
FOR

4 - 13' X 12' BOX CULVERT (PRECAST)

OVER MEDICINE CREEK — 5° LHF SKEW
STA. 177 + 51.00 — SEC. 33-T1S-R31E
STR. NO. 38-330-175 — P-B 0248(12)173
HL-93

JONES COUNTY
S. D. DEPT. OF TRANSPORTATION
FEBRUARY 2024

DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU	ER	BT	Steve A. Johnson BRIDGE ENGINEER
JONS06G7	06G7GD10		



YEAR PLATE DETAILS

GENERAL NOTES:

1. Year plates of the general dimensions shown will be constructed on all box culverts and bridges. The year plates will 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 (1/2) inch in deptn.

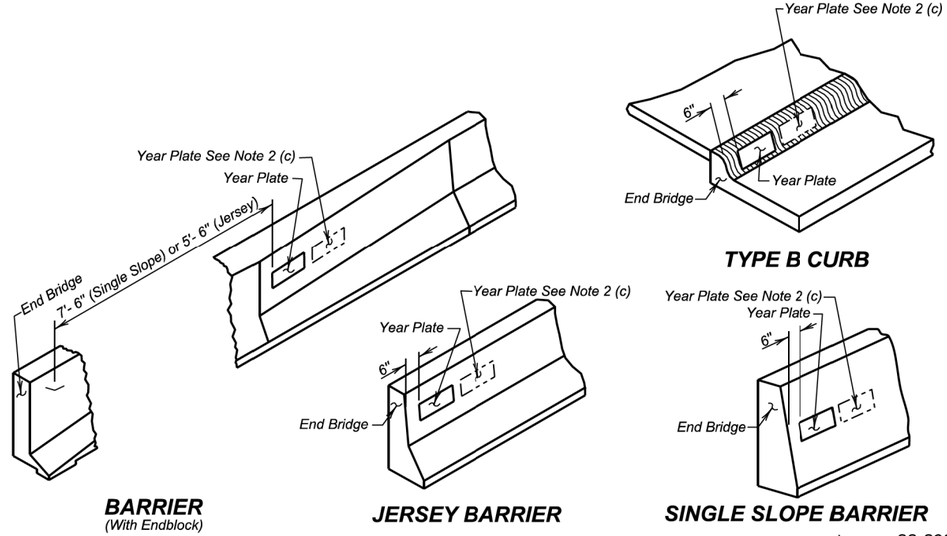
2. Year plates will be located on structure(s) as follows:

   a. On cast-in-place box culverts the year plates will 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 will be centered laterally on the upstream face of the top slab. Where an extended interior wall interferes with this location, the year plate will be centered in an adjacent barrel.

   b. On bridges with six (6) inch curbs, "Jersey" shaped barriers with no endblocks, or "Single Slope" shaped barriers with no endblocks, the year plate will 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 barrier endblocks, the year plate will be centered on the upper sloped portion of the barrier approximately 5'- 6" for "Jersey" shaped barriers from the end of the bridge and 7'-6" for "Single Slope" shaped barriers from the end of bridge, or as designated by the Engineer. There will be one year plate at each end of the bridge on opposite sides.

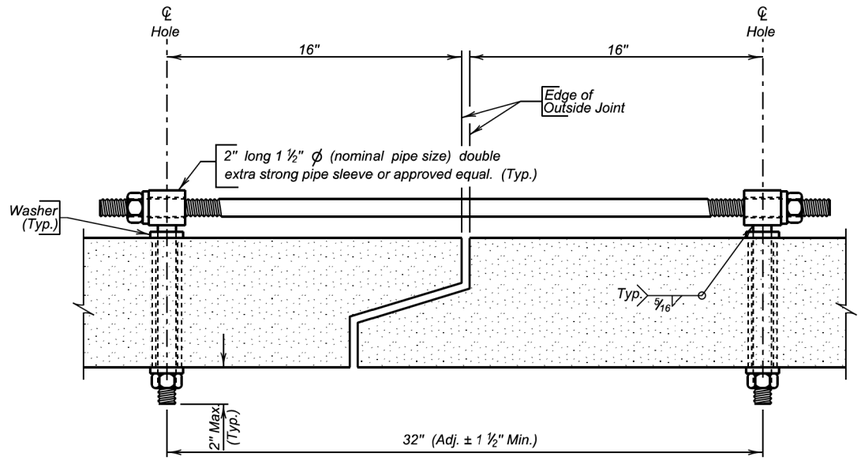
   c. When the plans specify that both the original date of construction and the date of reconstruction are to be shown, one date will be placed as listed above and the other located adjacent to it. Both year plates will be shown at each end of the bridge on opposite sides.

3. There will be no separate measurement or payment made for year plates on box culverts and bridges. All costs for this work will be incidental to other contract items.



January 22, 2021

Published Date: 2027	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 ∅ 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.

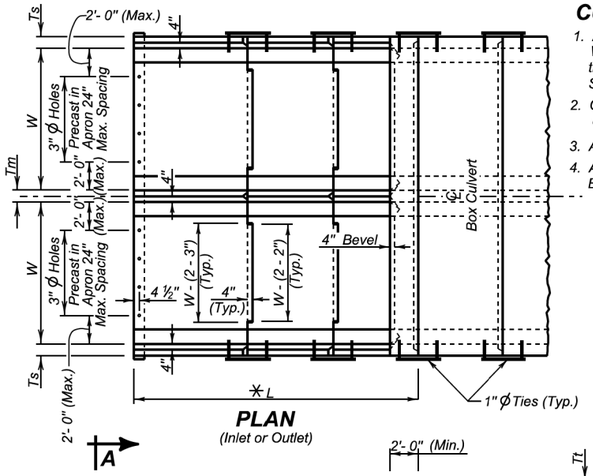
6. All costs for furnishing and installing the precast box culvert tie bolt assembly shall be incidental to the contract unit price per Foot for "Precast Concrete Box Culvert, Furnish".

March 21, 2016

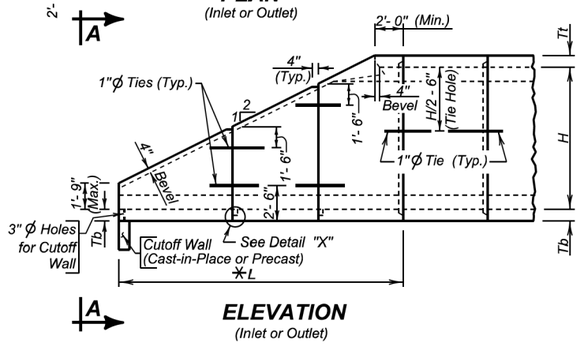
Published Date: 2027	SDDOT	PRECAST BOX CULVERT TIE BOLT ASSEMBLY DETAILS	PLATE NUMBER 560.01
			Sheet 1 of 1

SITE 4
ALTERNATE B

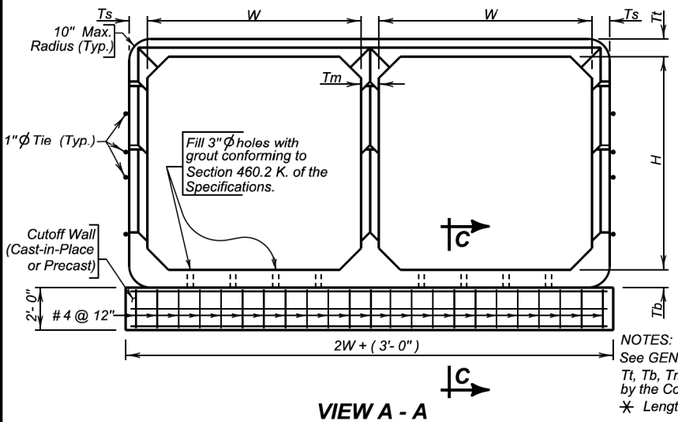
4 - 13' X 12' BOX CULVERT (PRECAST)
STR. NO. 38-330-175
FEBRUARY 2024



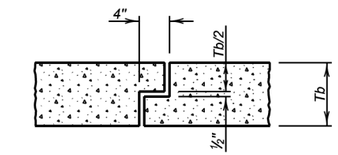
PLAN
(Inlet or Outlet)



ELEVATION
(Inlet or Outlet)

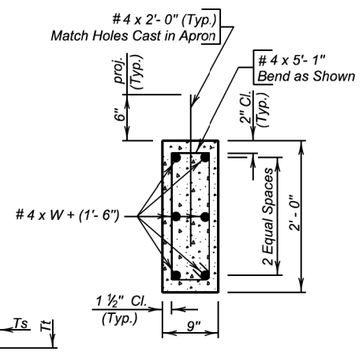


VIEW A - A



DETAIL " X "

NOTE: Joint details may vary from that shown, according to the manufacturer's design. Submit details with shop plans for approval.



SEC. C - C

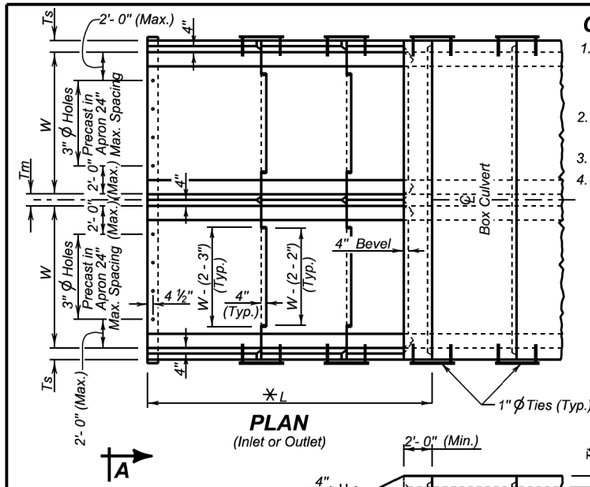
LEGEND

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
L = Length of End Section

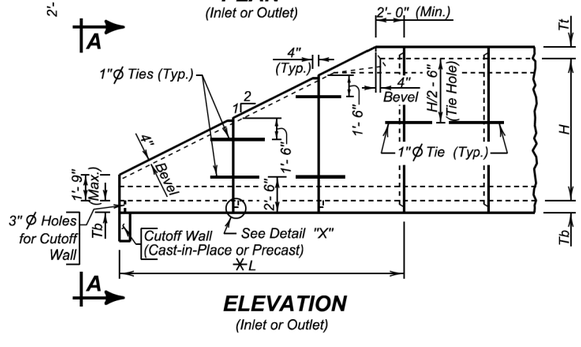
NOTES:
See GENERAL DRAWING for W and H dimensions.
Tt, Tb, Tm, L, and Ts dimensions shall be furnished by the Contractor.
✳ Length and number of units may vary from that shown.

June 26, 2015

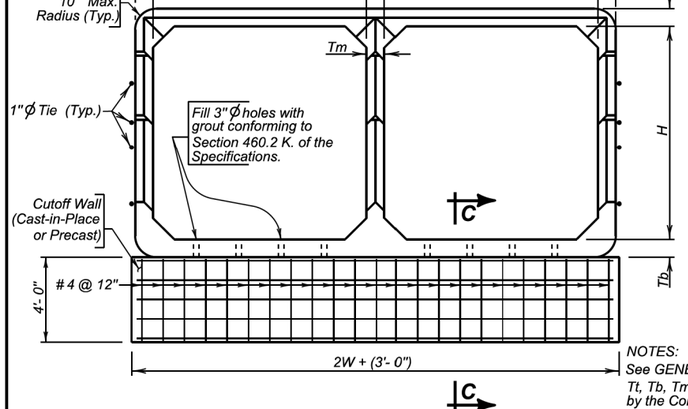
Published Date: 2027	SDDOT PRECAST DOUBLE BOX CULVERT SLOPED END SECTION DETAILS WITH 2'–0" CUTOFF WALL	PLATE NUMBER 560.20 Sheet 1 of 1



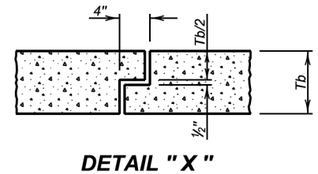
PLAN
(Inlet or Outlet)



ELEVATION
(Inlet or Outlet)

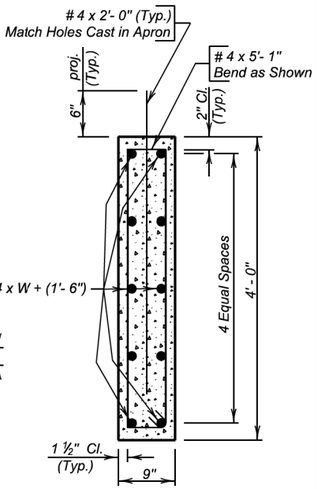


VIEW A - A



DETAIL " X "

NOTE: Joint details may vary from that shown, according to the manufacturer's design. Submit details with shop plans for approval.



SEC. C - C

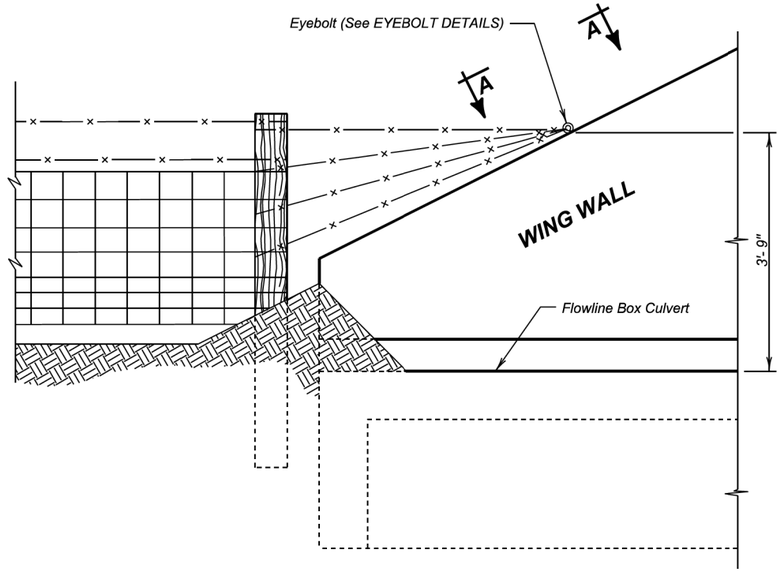
LEGEND

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
L = Length of End Section

NOTES:
See GENERAL DRAWING for W and H dimensions.
Tt, Tb, Tm, L, and Ts dimensions shall be furnished by the Contractor.
✳ Length and number of units may vary from that shown.

June 26, 2015

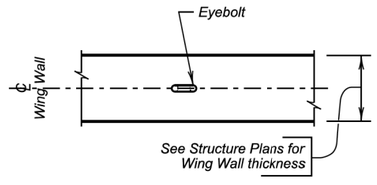
Published Date: 2027	SDDOT PRECAST DOUBLE BOX CULVERT SLOPED END SECTION DETAILS WITH 4'–0" CUTOFF WALL	PLATE NUMBER 560.21 Sheet 1 of 1



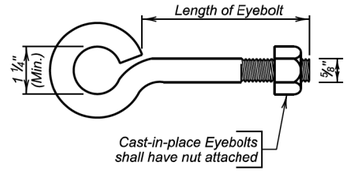
DETAIL FOR FENCE ANCHORS

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 ⅞ 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 ⅞ 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



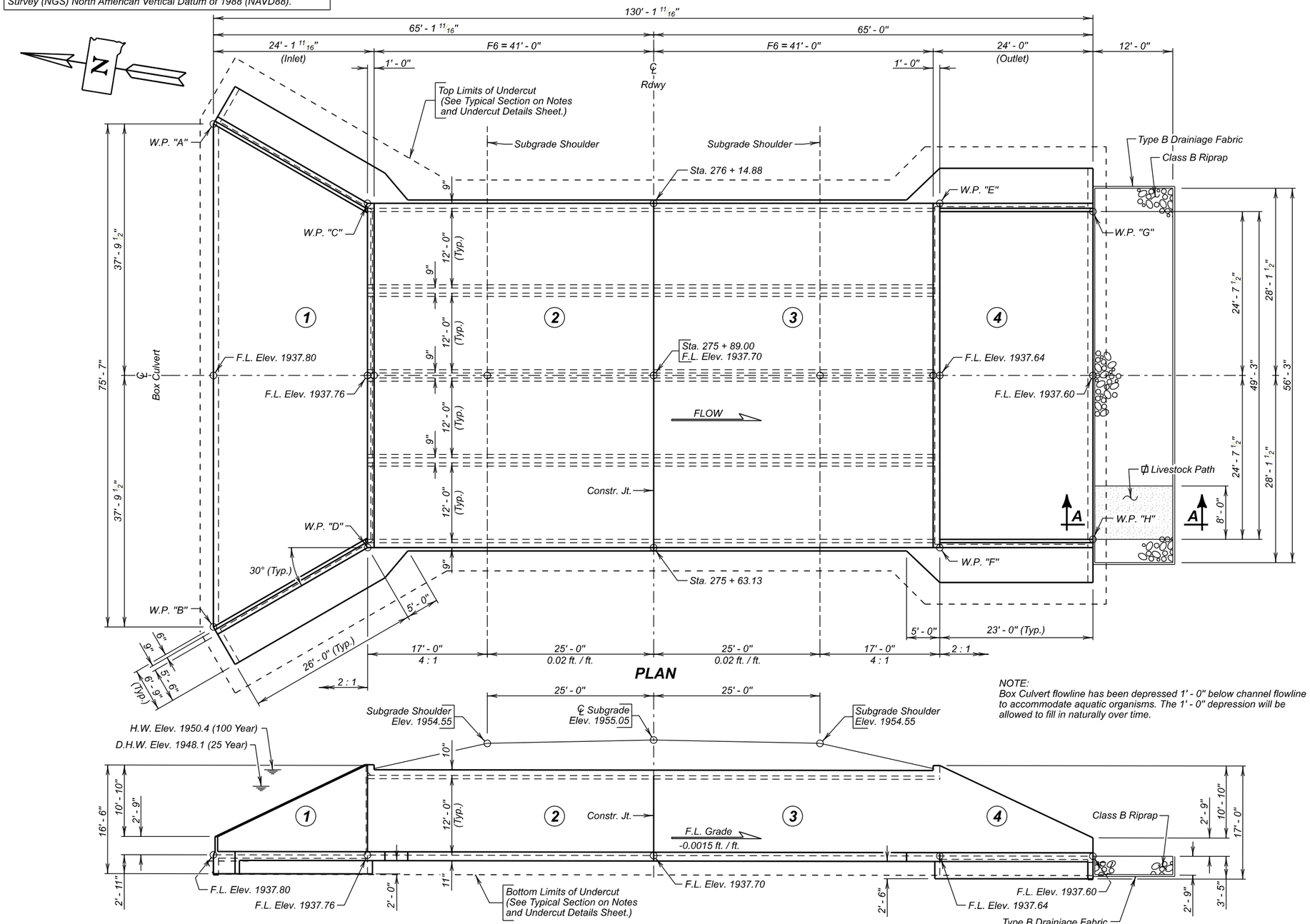
EYEBOLT DETAILS

December 23,2012

Published Date: 2027	SDDOT	FENCE ANCHORS FOR BOX CULVERT WING WALLS	PLATE NUMBER 620.16 Sheet 1 of 1

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-B 0248(12)173	E62	E99



PLAN

ELEVATION

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

TABLE OF WORKING POINTS

W. P.	STATION	OFFSET
"A"	276 + 26.79	65.14' Lt.
"B"	275 + 51.21	65.14' Lt.
"C"	276 + 14.88	42.00' Lt.
"D"	275 + 63.13	42.00' Lt.
"E"	276 + 14.88	42.00' Rt.
"F"	275 + 63.13	42.00' Rt.
"G"	276 + 13.63	65.00' Rt.
"H"	275 + 64.37	65.00' Rt.

HYDRAULIC DATA

Q_d	1987 cfs
A_d	432 sq ft
V_d	4.6 fps
Q_F	1987 cfs
Q_{100}	3539 cfs
Q_{OT}	$>Q_{100}$
V_{max}	6.7 fps

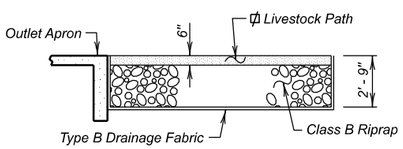
Q_d = Design discharge for the proposed culvert based on 25 year frequency. El. 1948.1.

Q_{OT} = Overtopping discharge and frequency > Q_{100} year recurrence interval. El. 1956.4 @ Sta. 275 + 02.00 ±.

Q_F = 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. 1950.4.

V_{max} = Maximum computed outlet velocity for the proposed culvert, based on 100 year frequency.



SECTION A - A

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

NOTES:

1. Base Course will provide a smooth path for livestock.
2. Base Course is estimated using 6" of material to account for voids in the Class B Riprap.

ESTIMATED QUANTITIES

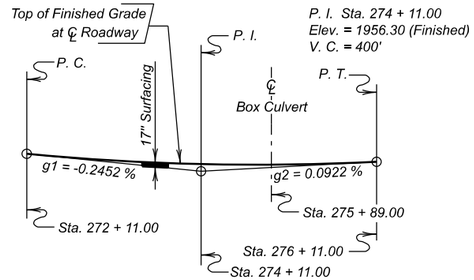
ITEM	UNIT	QUANTITY
Class A45 Concrete, Box Culvert	Cu. Yd.	563.7
Reinforcing Steel	Lb.	73560
Structure Excavation, Box Culvert	Cu. Yd.	245
Box Culvert Undercut	Cu. Yd.	652
Type B Drainage Fabric	Sq. Yd.	117
✳ Class B Riprap	Ton	96.3
⊛ Base Course	Ton	3.4

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

⊛ For estimating purposes only, a factor of 1.89 tons/cu. yd. was used to convert Cu. Yds. to Tons.

-X028-
INDEX OF CULVERT SHEETS -

Sheet No. 1 - General Drawing and Quantities
Sheet No. 2 - Notes and Undercut Details
Sheet No. 3 - Inlet Details
Sheet No. 4 - Outlet Details
Sheet No. 5 - F6 Barrel End Section Details (41' - 0") (A)
Sheet No. 6 - F6 Barrel End Section Details (41' - 0") (B)
Sheet No. 7 - Standard Plate No.'s 460.02 and 460.10
Sheet No. 8 - Standard Plate No. 620.16



VERTICAL CURVE DATA

SITE 5
ALTERNATE A

GENERAL DRAWING AND QUANTITIES

FOR

4 - 12' X 12' BOX CULVERT (C.I.P.)

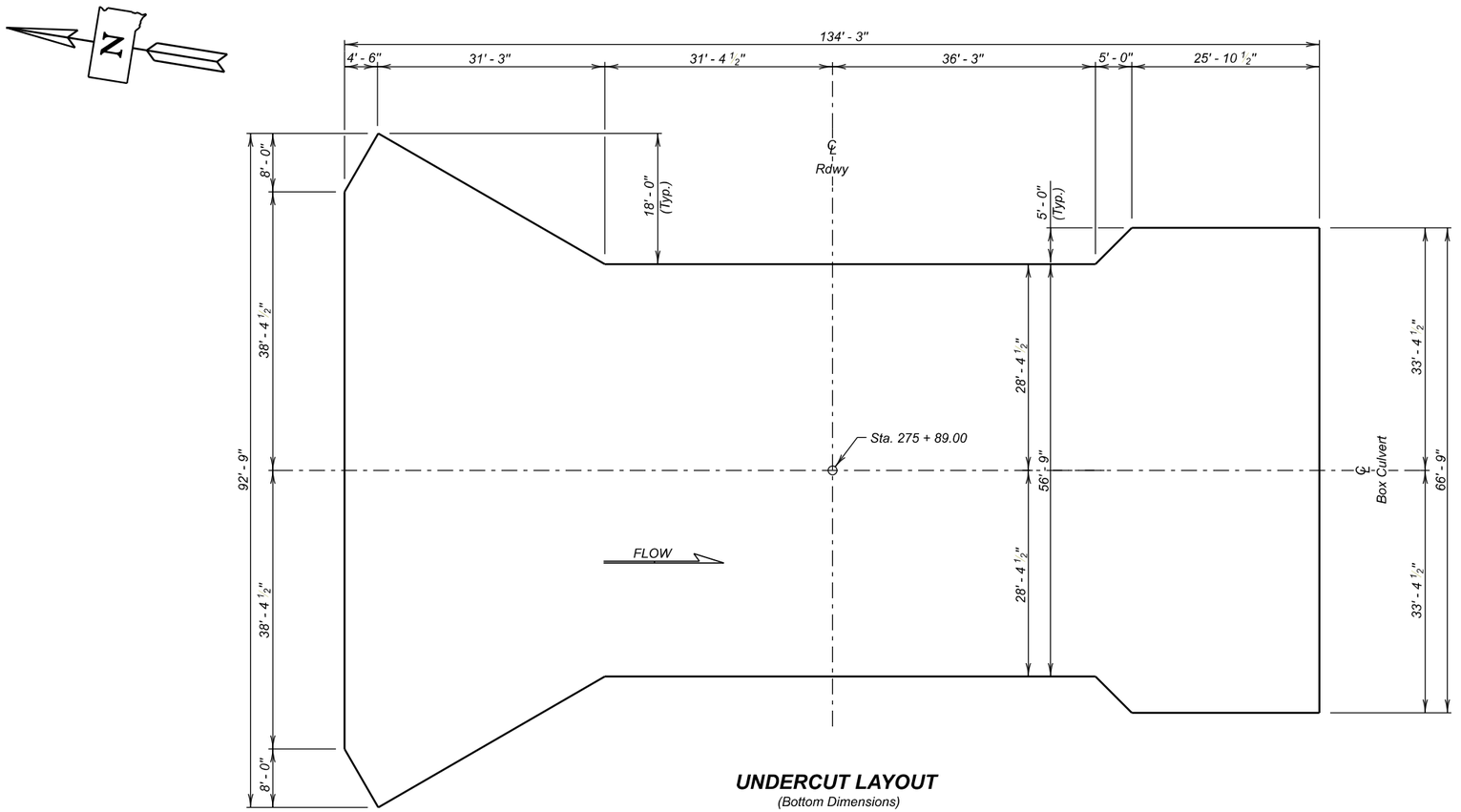
OVER MEDICINE CREEK — 0° SKEW
STA. 275 + 89.00 — SEC. 35-T1S-R31E
STR. NO. 38-348-174 — P-B 0248(12)173
PCN 06G7 — HL-93

JONES COUNTY
S. D. DEPT. OF TRANSPORTATION
FEBRUARY 2024

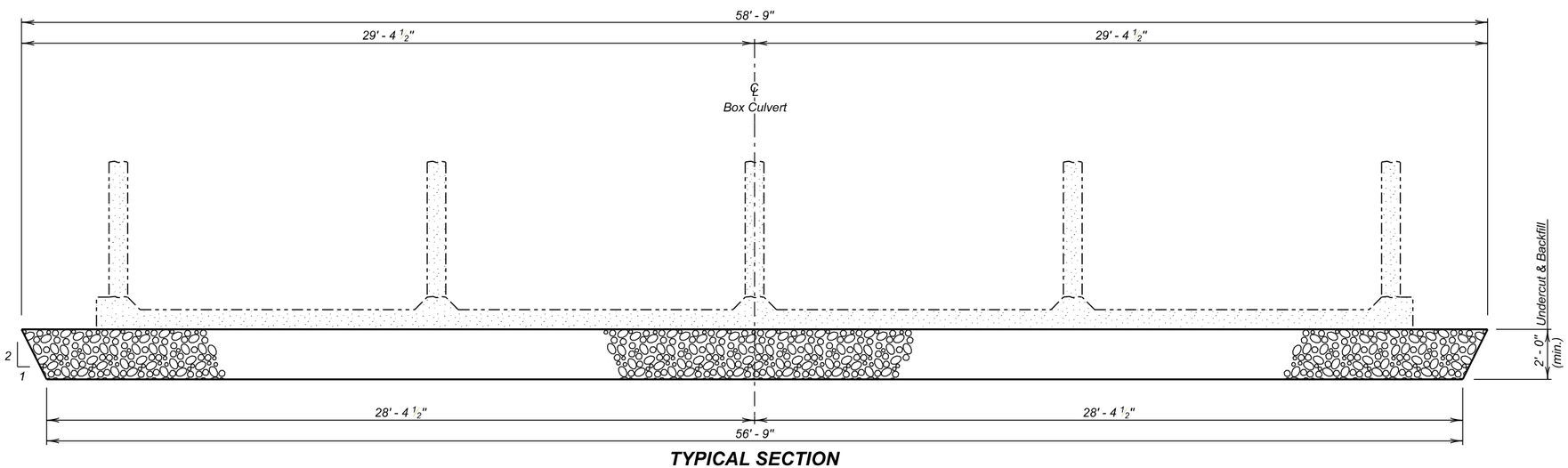
-X028-

DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU	ER	BT	Steve A. Johnson BRIDGE ENGINEER
JONS06G7	06G7GE01		

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E63	E99



UNDERCUT LAYOUT
(Bottom Dimensions)



TYPICAL SECTION
(For Limits of Undercut)

SPECIFICATIONS

1. Design Specifications: AASHTO LRFD Bridge Design Specifications, 9th Edition.
2. Construction Specifications: South Dakota Standard Specifications for Roads and Bridges, 10-7-26 Version, Required Provisions, and Special Provisions as included in the Proposal. The Standard Specifications for Roads and Bridges are available for download and viewing at: https://dot.sd.gov/doing-business/contractors/standard-specifications

GENERAL NOTES

1. Design Live Load: HL-93 and construction loading consisting of one 7' - 6" gage axle with gross axle 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 6 ft. (F6).
3. Design Material Strengths: Concrete $f'c$ = 4500 p.s.i.
   Reinforcing Steel fy = 60000 p.s.i.
4. High sulfate levels are likely to be encountered on this project. All concrete will be Class A45 Concrete, Box Culvert conforming to Section 460 of the Construction Specifications, with the following modifications: the type of cement will be either a type V or a type II with 20% to 25% Class F Modified Fly Ash substituted for cement in accordance with Section 605 of the Construction Specifications.
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 $^3/_4$ 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 RCBC consist of brown to gray clay. Groundwater was encountered in the borings at an elevation of 1943.3 feet during the subsurface investigation conducted in June 2023. Dewatering will be required during construction.

ESTIMATED QUANTITIES

ITEM	UNIT	QUANTITY
℄ Box Culvert Undercut	Cu. Yd.	652

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

SITE 5
ALTERNATE A

NOTES AND UNDERCUT DETAILS

FOR

4 - 12' X 12' BOX CULVERT (C.I.P.)

OVER MEDICINE CREEK — 0° SKEW
STA. 275 + 89.00 — SEC. 35-T1S-R31E
STR. NO. 38-348-174 — P-B 0248(12)173
HL-93

JONES COUNTY
S. D. DEPT. OF TRANSPORTATION
FEBRUARY 2024

DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU	ER	BT	Steve A. Johnson BRIDGE ENGINEER
JONS06G7	06G7GE02		

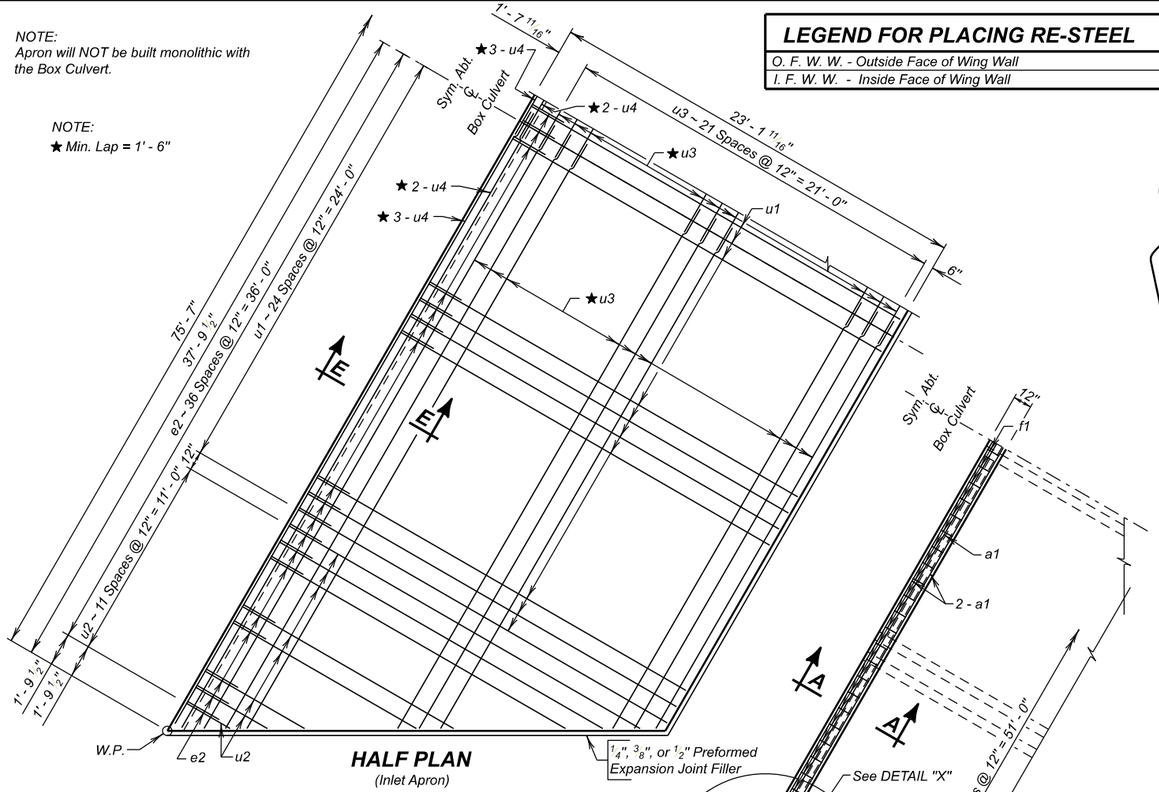
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E64	E99

NOTE:
Apron will NOT be built monolithic with the Box Culvert.

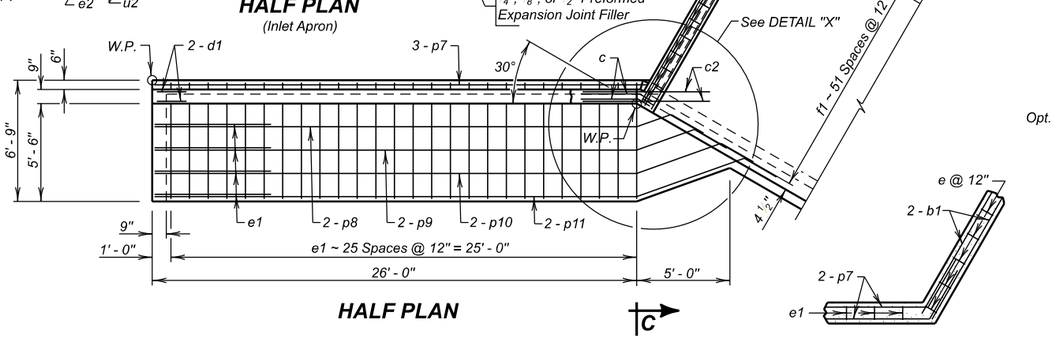
NOTE:
★ Min. Lap = 1' - 6"

LEGEND FOR PLACING RE-STEEL

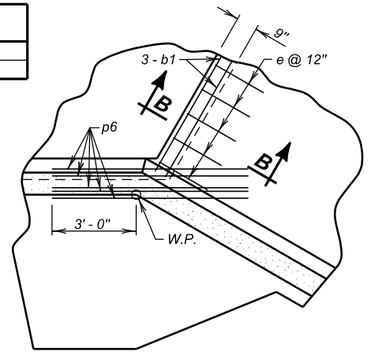
O. F. W. W. - Outside Face of Wing Wall
I. F. W. W. - Inside Face of Wing Wall



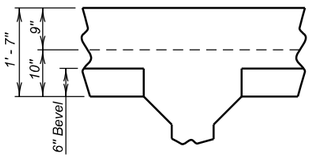
HALF PLAN
(Inlet Apron)



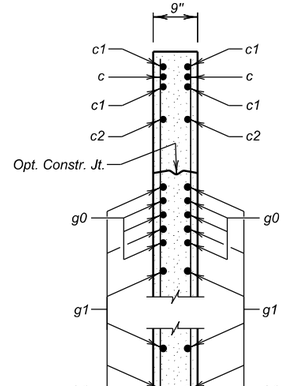
HALF PLAN



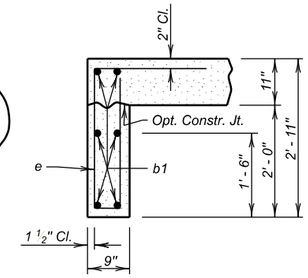
DETAIL "X"
(At Bottom Slab)



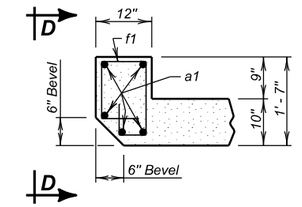
VIEW D - D
(At Interior Wall)



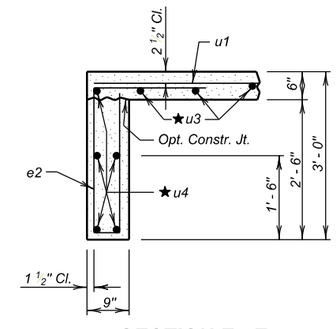
SECTION C - C



SECTION B - B

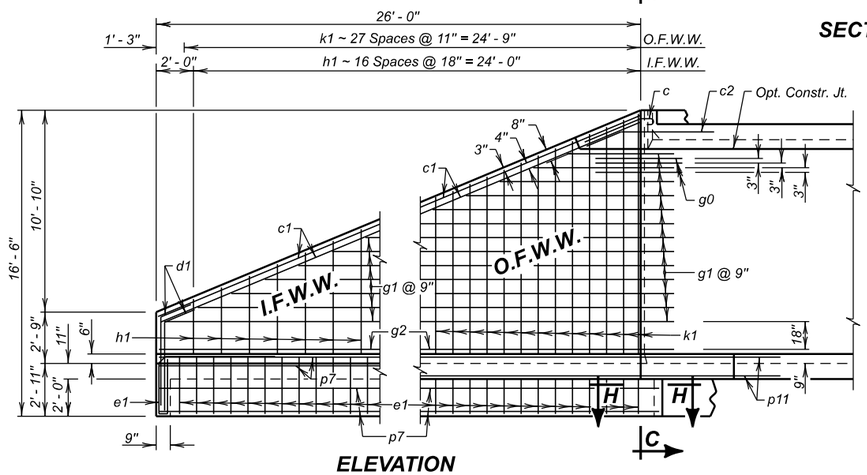


SECTION A - A
(At Top Slab)



SECTION E - E

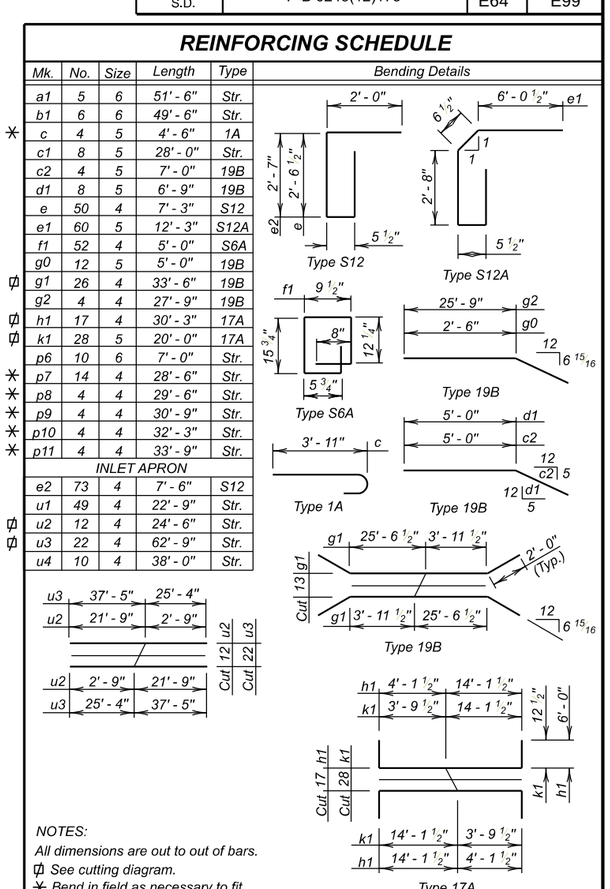
SECTION H - H



ELEVATION

REINFORCING SCHEDULE

Mk.	No.	Size	Length	Type	Bending Details
a1	5	6	51' - 6"	Str.	
b1	6	6	49' - 6"	Str.	
c	4	5	4' - 6"	1A	
c1	8	5	28' - 0"	Str.	
c2	4	5	7' - 0"	19B	
d1	8	5	6' - 9"	19B	
e	50	4	7' - 3"	S12	
e1	60	5	12' - 3"	S12A	
f1	52	4	5' - 0"	S6A	
g0	12	5	5' - 0"	19B	
g1	26	4	33' - 6"	19B	
g2	4	4	27' - 9"	19B	
h1	17	4	30' - 3"	17A	
k1	28	5	20' - 0"	17A	
p6	10	6	7' - 0"	Str.	
p7	14	4	28' - 6"	Str.	
p8	4	4	29' - 6"	Str.	
p9	4	4	30' - 9"	Str.	
p10	4	4	32' - 3"	Str.	
p11	4	4	33' - 9"	Str.	
INLET APRON					
e2	73	4	7' - 6"	S12	
u1	49	4	22' - 9"	Str.	
u2	12	4	24' - 6"	Str.	
u3	22	4	62' - 9"	Str.	
u4	10	4	38' - 0"	Str.	



NOTES:
All dimensions are out to out of bars.
ϕ 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	43.5	4708	21.0
Inlet Apron	31.8	2483	31.8

SITE 5
ALTERNATE A

INLET DETAILS

FOR

4 - 12' X 12' BOX CULVERT (C.I.P.)

OVER MEDICINE CREEK — 0° SKEW
STA. 275 + 89.00 — SEC. 35-T1S-R31E
STR. NO. 38-348-174 — P-B 0248(12)173
HL-93

JONES COUNTY
S. D. DEPT. OF TRANSPORTATION
FEBRUARY 2024

3 OF 8

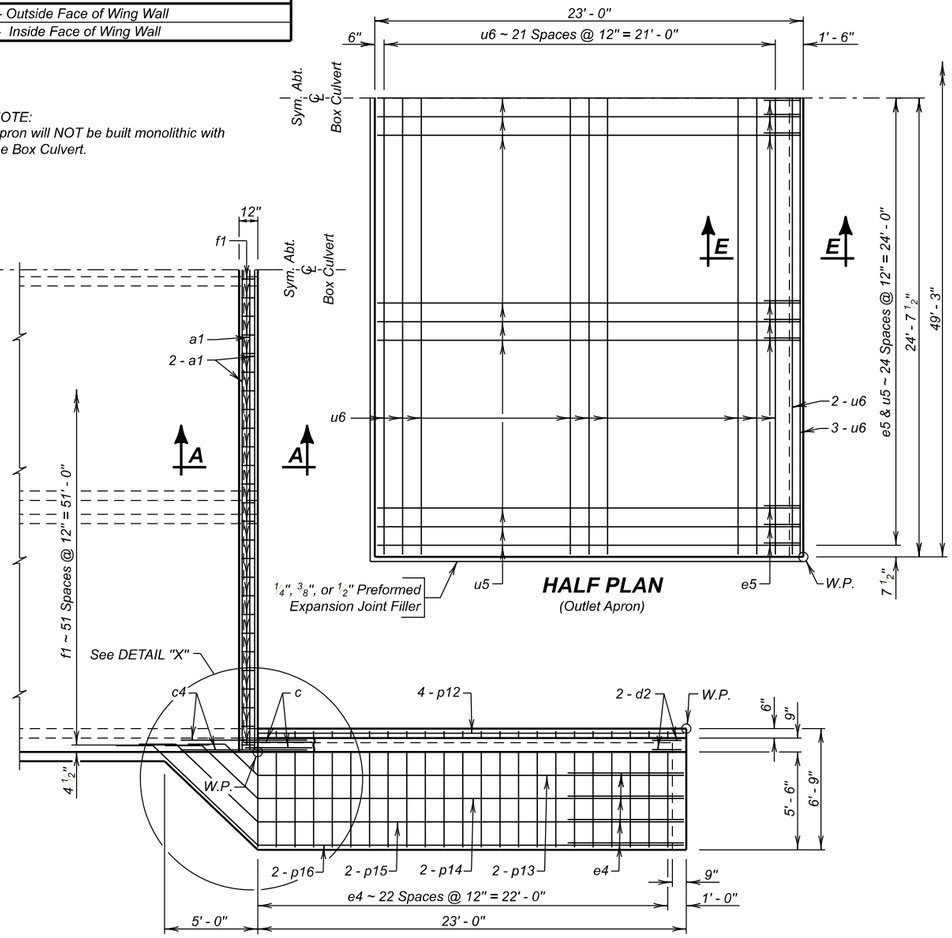
DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU	ER	BT	Steve A Johnson BRIDGE ENGINEER
JONS06G7	06G7GE03		

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E65	E99

LEGEND FOR PLACING RE-STEEL

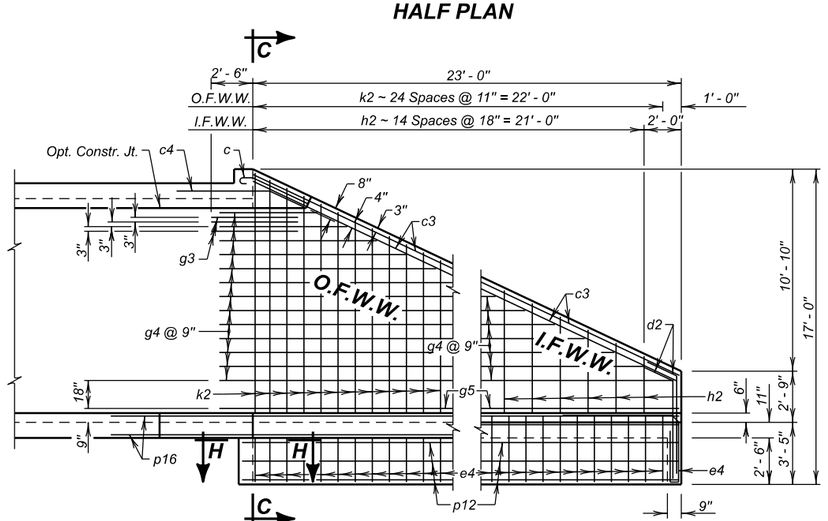
O. F. W. W. - Outside Face of Wing Wall
I. F. W. W. - Inside Face of Wing Wall

NOTE:
Apron will NOT be built monolithic with the Box Culvert.

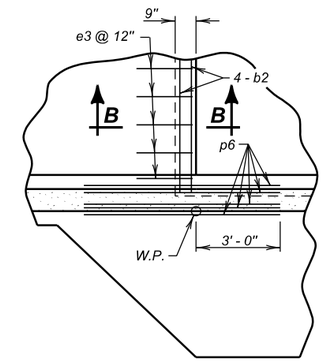


HALF PLAN
(Outlet Apron)

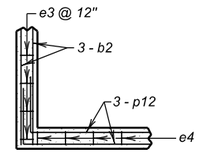
HALF PLAN



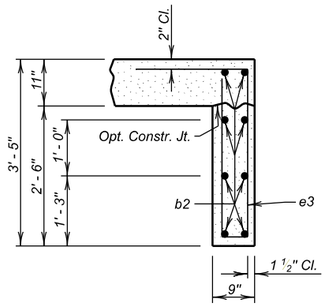
ELEVATION



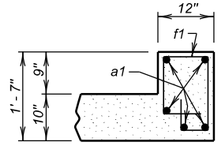
DETAIL "X"
(At Bottom Slab)



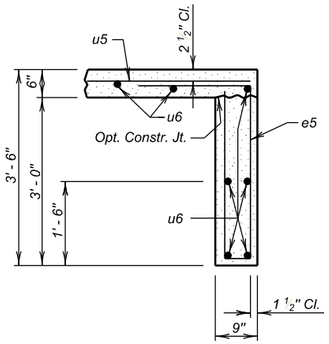
SECTION H - H



SECTION B - B



SECTION A - A
(At Top Slab)



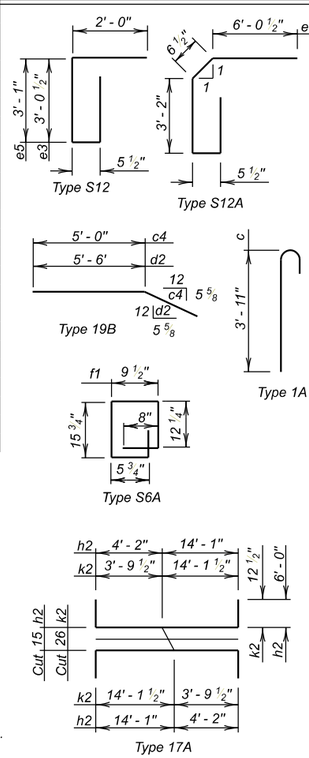
SECTION E - E

SECTION C - C

REINFORCING SCHEDULE

Mk.	No.	Size	Length	Type
a1	5	6	51' - 6"	Str.
b2	8	6	50' - 6"	Str.
c	4	5	4' - 6"	1A
c3	8	5	25' - 3"	Str.
c4	4	5	7' - 0"	19B
d2	8	5	7' - 3"	19B
e3	51	4	8' - 3"	S12
e4	54	5	13' - 3"	S12A
f1	52	4	5' - 0"	S6A
g3	12	5	5' - 0"	Str.
g4	26	4	30' - 0"	Str.
g5	4	4	24' - 9"	Str.
h2	15	4	30' - 3"	17A
k2	26	5	20' - 0"	17A
p6	10	6	7' - 0"	Str.
p12	18	4	25' - 6"	Str.
p13	4	4	26' - 9"	Str.
p14	4	4	28' - 9"	Str.
p15	4	4	30' - 6"	Str.
p16	4	4	32' - 6"	Str.
OUTLET APRON				
e5	49	4	8' - 6"	S12
u5	49	4	22' - 9"	Str.
u6	27	4	49' - 0"	Str.

Bending Details



NOTES:
All dimensions are out to out of bars.
⌀ 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.
Outlet	41.3	4737	20.7
Outlet Apron	25.0	1907	25.0

SITE 5
ALTERNATE A

OUTLET DETAILS

FOR

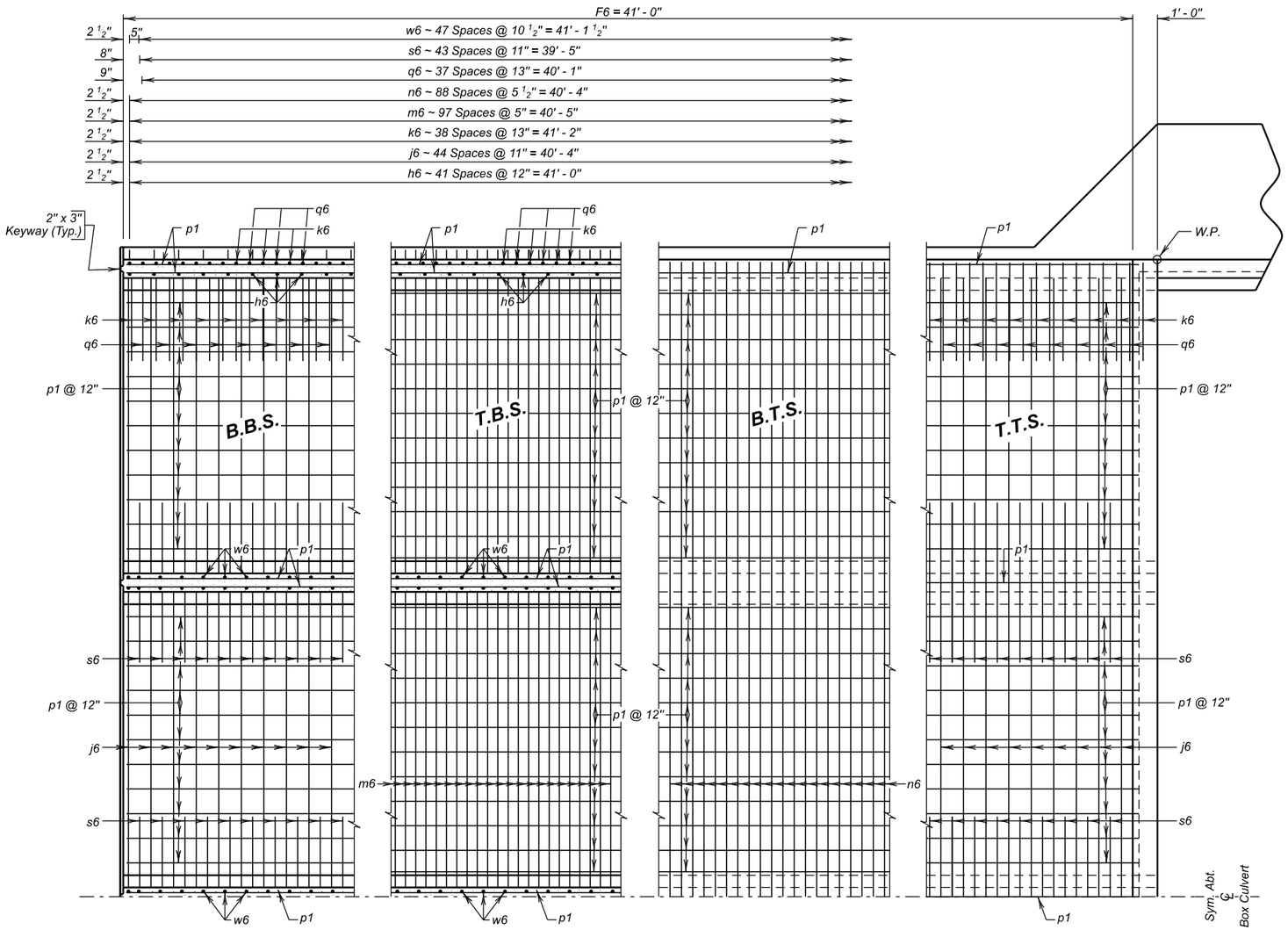
4 - 12' X 12' BOX CULVERT (C.I.P.)

OVER MEDICINE CREEK — 0° SKEW
STA. 275 + 89.00 — SEC. 35-T1S-R31E
STR. NO. 38-348-174 — P-B 0248(12)173
HL-93

JONES COUNTY
S. D. DEPT. OF TRANSPORTATION
FEBRUARY 2024

DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU	ER	BT	Steve A Johnson BRIDGE ENGINEER
JONS06G7	06G7GE04		

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E66	E99



PLAN

(Outlet End shown, Inlet similar by rotation)

LEGEND FOR PLACING RE-STEEL
T.T.S. - Top of Top Slab
B.T.S. - Bottom of Top Slab
T.B.S. - Top of Bottom Slab
B.B.S. - Bottom of Bottom Slab

SITE 5
ALTERNATE A

F6 BARREL END SECTION DETAILS (41' - 0") (A)

FOR

4 - 12' X 12' BOX CULVERT (C.I.P.)

OVER MEDICINE CREEK — 0° SKEW
STA. 275 + 89.00 — SEC. 35-T1S-R31E
STR. NO. 38-348-174 — P-B 0248(12)173
HL-93

JONES COUNTY

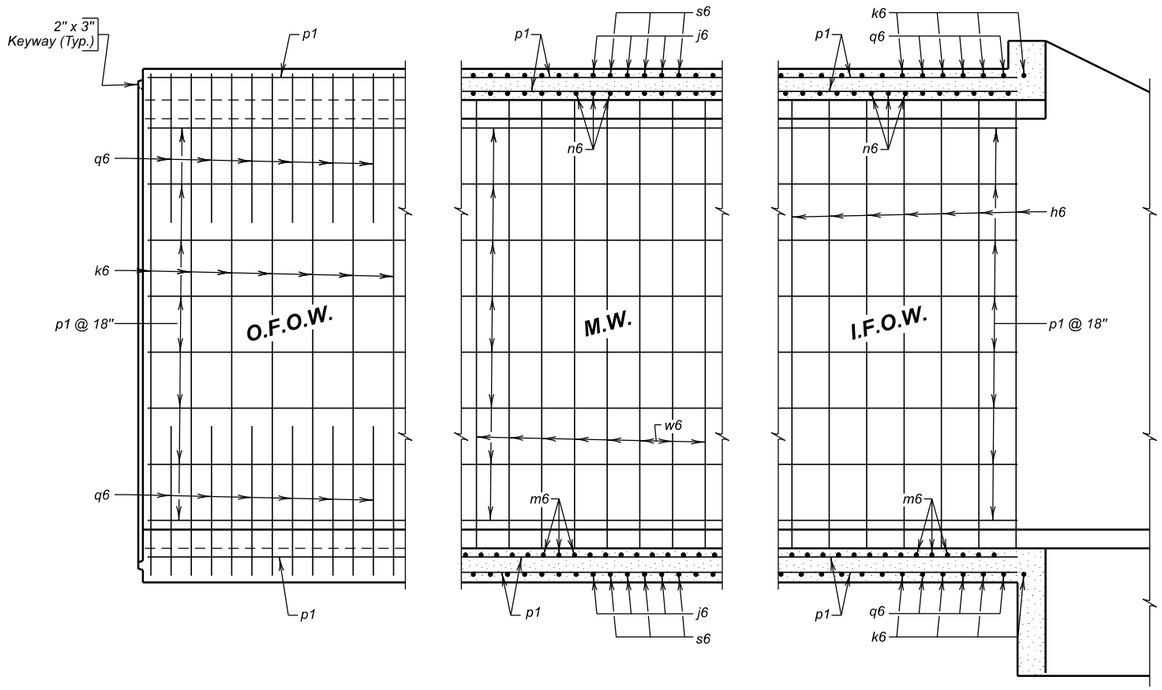
S. D. DEPT. OF TRANSPORTATION

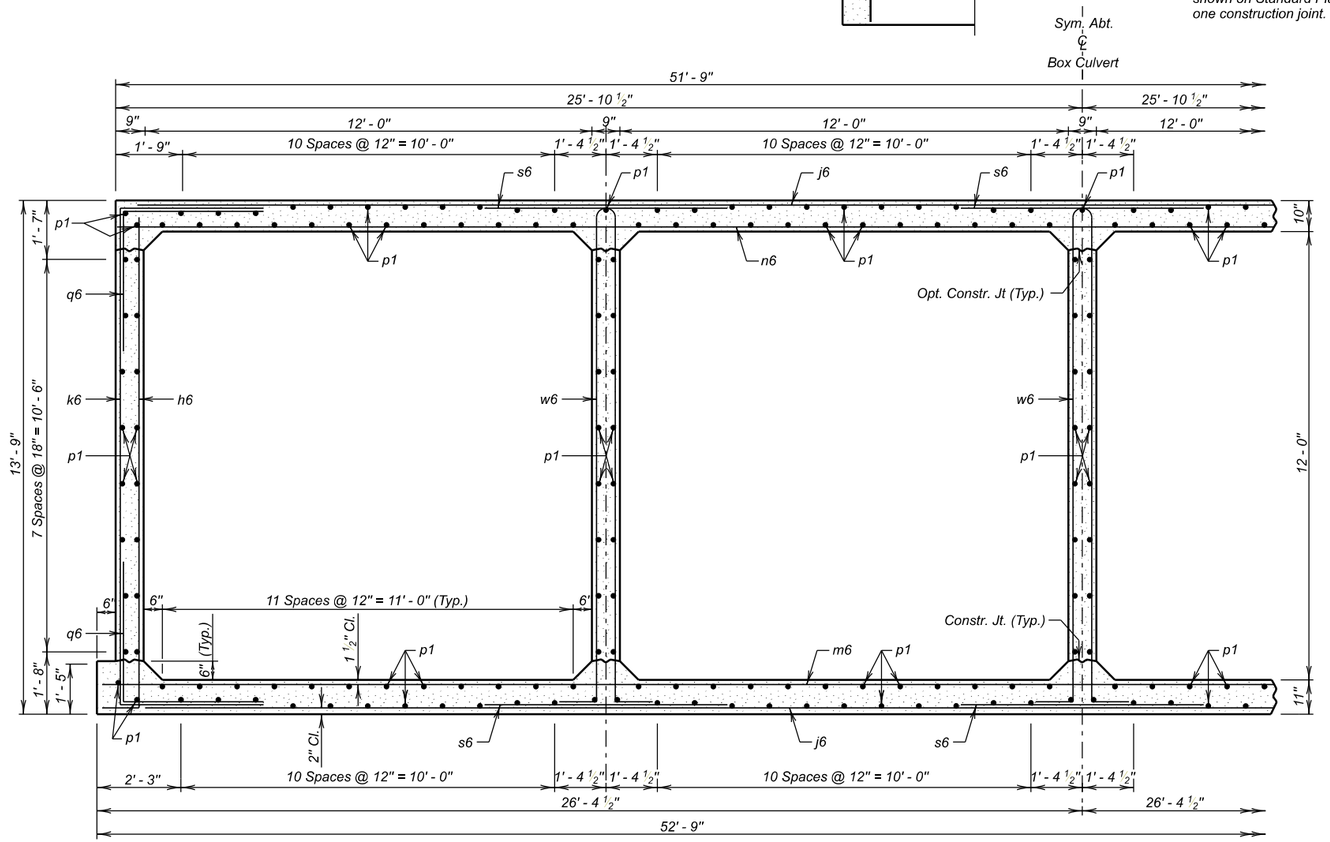
FEBRUARY 2024

5 OF 8

DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU	ER	BT	Steve A. Johnson BRIDGE ENGINEER
JONS06G7	06G7GE05		

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E67	E99



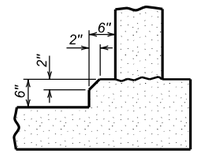


F6 BARREL HALF SECTION

(6' - 0" Maximum Fill)

LEGEND FOR PLACING RE-STEEL

O.F.O.W. - Outside Face of Outside Wall
I.F.O.W. - Inside Face of Outside Wall
M. W. - Middle Wall



OPTIONAL FILLET DETAIL

(At Bottom Slab)

NOTE: Contractor may form the optional full fillet, with 2" Chamfer, as detected. The cost of the additional concrete will be borne by the Contractor.

OPTIONAL POUR - BOTTOM SLAB

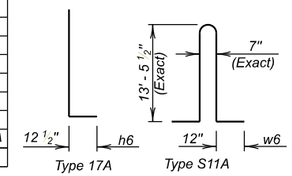
The Bottom Slab may be poured continuously, at the option of the Contractor, with the use of a Preformed Metal keyway conforming to the keyway dimensions and location as shown on the plans. The keyway length will be full width of the bottom slab. Care will be taken to maintain proper alignment of the keyway during the pour sequence. All additional costs of this option will be borne by the Contractor.

△ Place z1 bars thru construction joint between barrel sections as shown on Standard Plate No. 460.10. Quantity of z1 bars is for one construction joint.

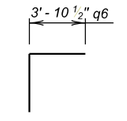
REINFORCING SCHEDULE

(For 2 - F6 Barrel End Sections)

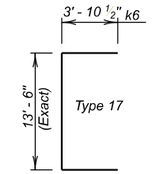
Mk.	No.	Size	Length	Type	Bending Details
h6	168	5	14' - 3"	17A	
j6	180	5	50' - 3"	Str.	
k6	156	5	21' - 3"	17	
m6	196	4	52' - 6"	Str.	
n6	178	5	51' - 6"	Str.	
p1	562	4	41' - 3"	Str.	
q6	304	5	7' - 9"	17A	
s6	528	5	6' - 9"	Str.	
w6	294	4	29' - 3"	S11A	
△ z1	136	5	3' - 6"	Str.	



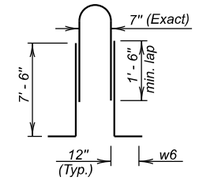
Type 17A Type S11A



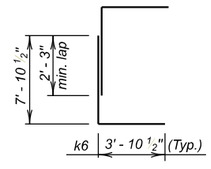
Type 17A



Type 17



OPTIONAL w6 SPLICE DETAIL



OPTIONAL k6 SPLICE DETAIL

Contractor may use optional reinforcing steel splices, as shown. The cost of the additional reinforcing steel will be borne by the Contractor.

NOTES:

All dimensions are out to out of bars.

Request for additional 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.

ESTIMATED QUANTITIES

ITEM	Class A45 Concrete, Box Culvert	Reinforcing Steel	Structure Excavation, Box Culvert
UNIT	Cu.Yd.	Lb.	Cu.Yd.
2 - F6 Barrel End Sections @ 41' - 0"	422.1	59725	146.9

SITE 5
ALTERNATE A

F6 BARREL END SECTION DETAILS (41' - 0") (B)

FOR

4 - 12' X 12' BOX CULVERT (C.I.P.)

OVER MEDICINE CREEK — 0° SKEW
STA. 275 + 89.00 — SEC. 35-T1S-R31E
STR. NO. 38-348-174 — P-B 0248(12)173
HL-93

JONES COUNTY

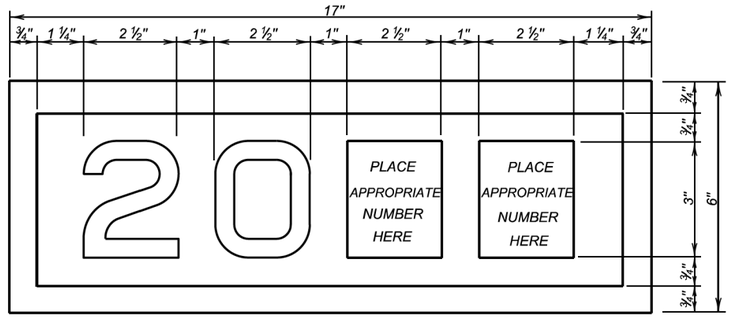
S. D. DEPT. OF TRANSPORTATION

FEBRUARY 2024

6 OF 8

DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU	ER	BT	BRIDGE ENGINEER
JONS06G7	06G7GE06		

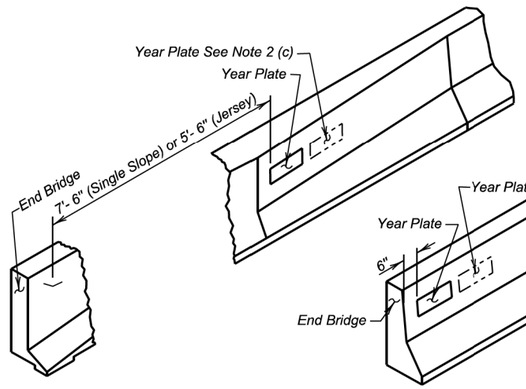
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E68	E99



YEAR PLATE DETAILS

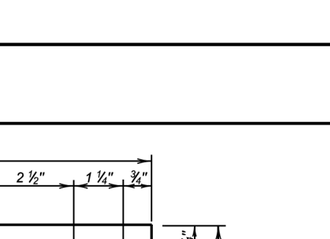
GENERAL NOTES:

1. Year plates of the general dimensions shown will be constructed on all box culverts and bridges. The year plates will 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 (1/2) inch in depth.
2. Year plates will be located on structure(s) as follows:
   a. On cast-in-place box culverts the year plates will 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 will be centered laterally on the upstream face of the top slab. Where an extended interior wall interferes with this location, the year plate will be centered in an adjacent barrel.
   b. On bridges with six (6) inch curbs, "Jersey" shaped barriers with no endblocks, or "Single Slope" shaped barriers with no endblocks, the year plate will 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 barrier endblocks, the year plate will be centered on the upper sloped portion of the barrier approximately 5'- 6" for "Jersey" shaped barriers from the end of the bridge and 7'-6" for "Single Slope" shaped barriers from the end of bridge, or as designated by the Engineer. There will 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 will be placed as listed above and the other located adjacent to it. Both year plates will 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 will be incidental to other contract items.

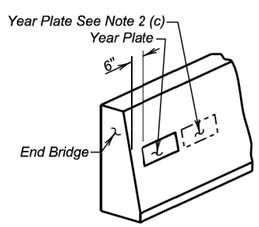


BARRIER
(With Endblock)

JERSEY BARRIER



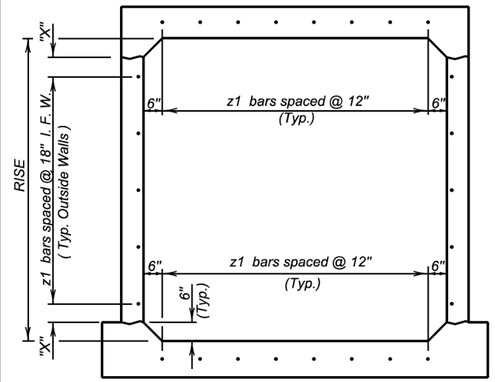
TYPE B CURB



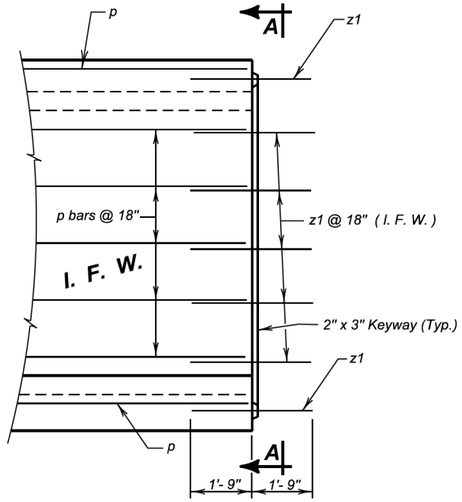
SINGLE SLOPE BARRIER

January 22, 2021

Published Date: 2027	SDDOT	YEAR PLATE DETAILS	PLATE NUMBER 460.02
			Sheet 1 Of 1

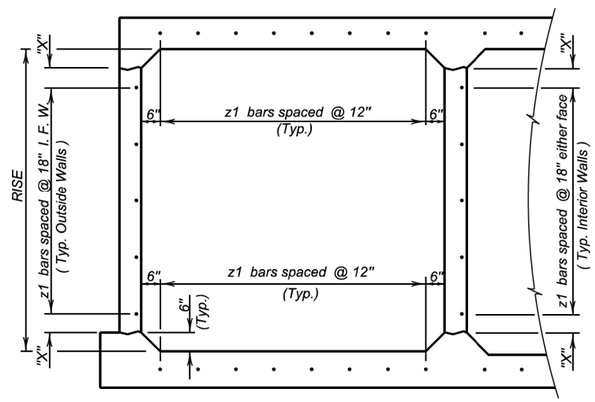


TYPICAL SINGLE BARREL VIEW A - A



ELEVATION

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



TYPICAL MULTIPLE BARREL VIEW A - A

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"
13'- 0"	9"
14'- 0"	6"

GENERAL NOTES:

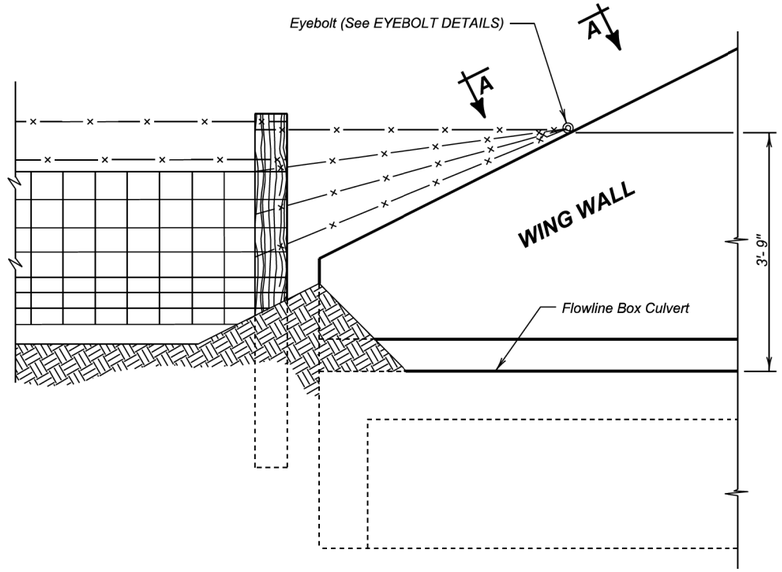
1. z1 bars will be placed in the middle of the 2" X 3" keyway in the top and bottom slabs. z1 bars will be lapped with the longitudinal p bars in the inside face of the wall for outside walls and in either face for interior walls. z1 bars are listed and included elsewhere in plans.
2. Drainage Fabric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

June 1, 2022

Published Date: 2027	SDDOT	BOX CULVERT BARREL TIE REINFORCEMENT	PLATE NUMBER 460.10
			Sheet 1 of 1

SITE 5
ALTERNATE A

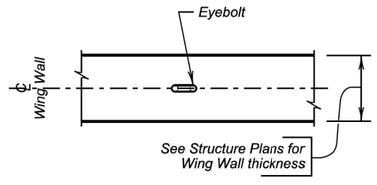
4 - 12' X 12' BOX CULVERT (C.I.P.)
STR. NO. 38-348-174
FEBRUARY 2024



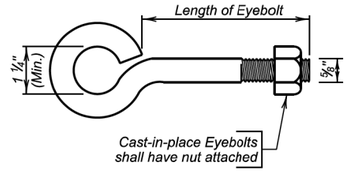
DETAIL FOR FENCE ANCHORS

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: 2027	SDDOT	FENCE ANCHORS FOR BOX CULVERT WING WALLS	PLATE NUMBER 620.16 Sheet 1 of 1

SITE 5
ALTERNATE A

4 - 12' X 12' BOX CULVERT (C.I.P.)
STR. NO. 38-348-174
FEBRUARY 2024

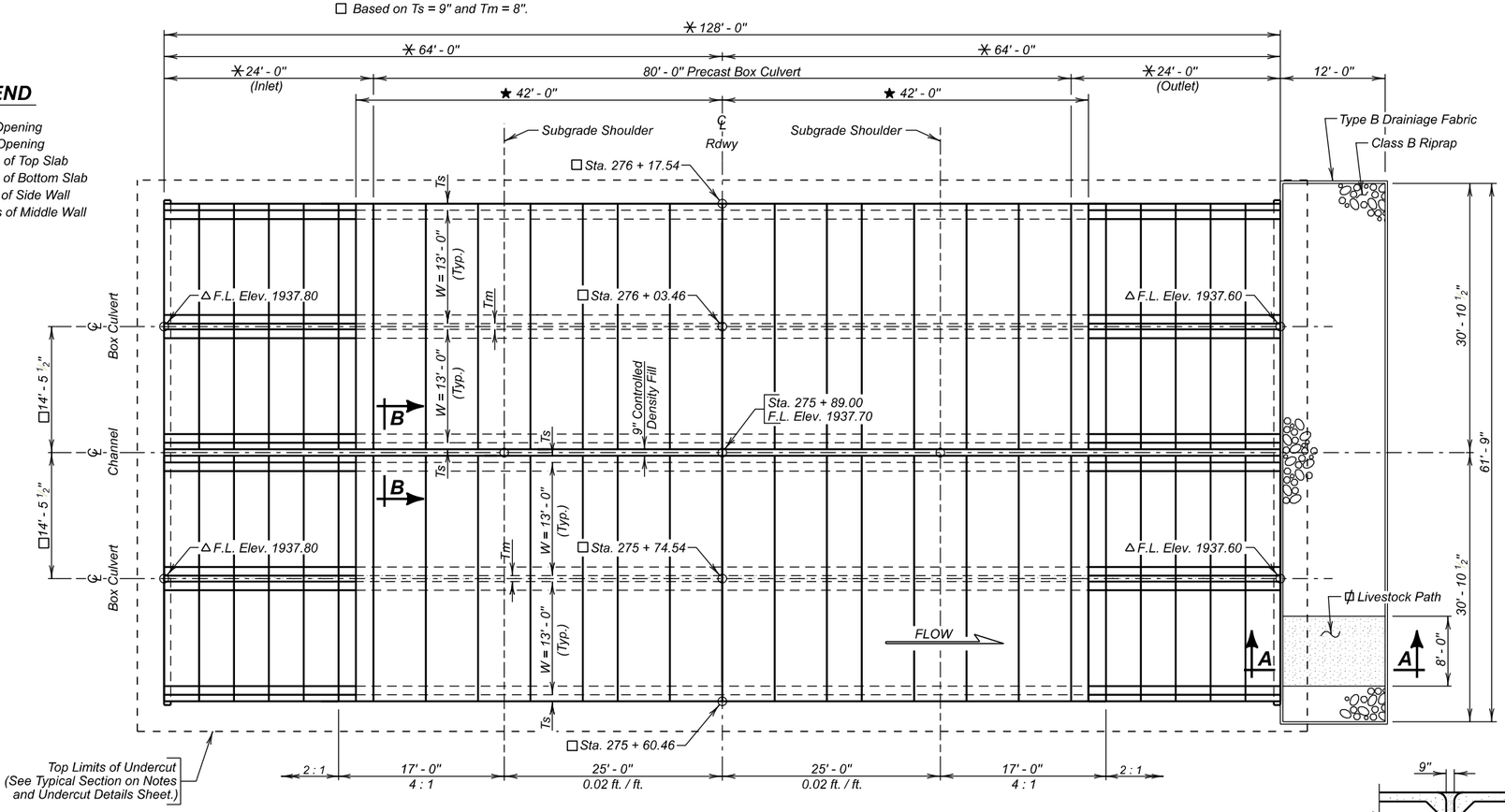
The elevations shown in these plans are based on the National Geodetic Survey (NGS) North American Vertical Datum of 1988 (NAVD88).

⚹ Dimension may vary with installation and/or fabrication. See Shop Plans for actual installation length.
★ Minimum distance to satisfy clear zone.
△ Based on dimensions shown.
☐ Based on Ts = 9" and Tm = 8".

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E70	E99

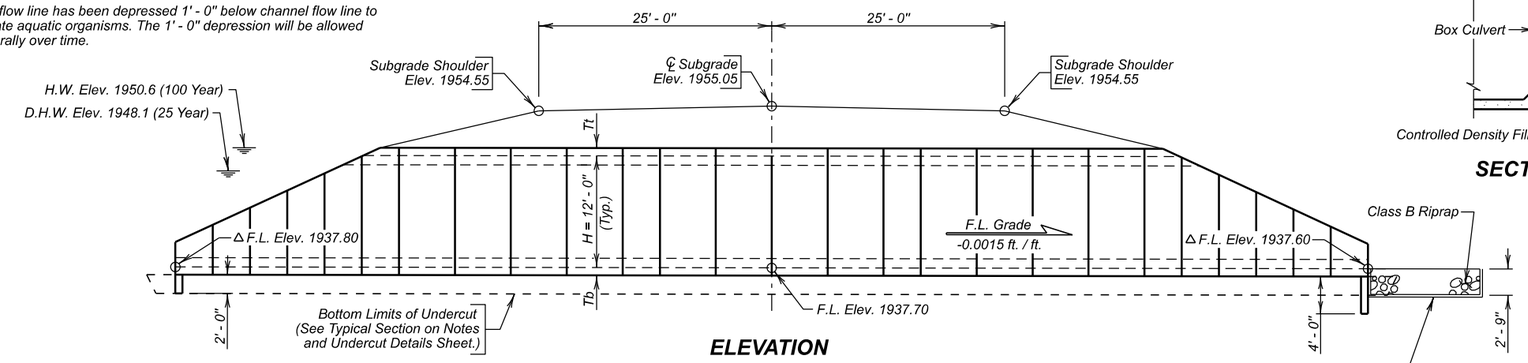
LEGEND

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

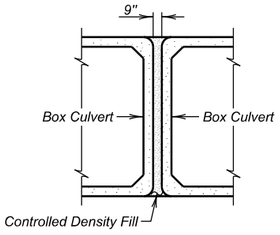


PLAN

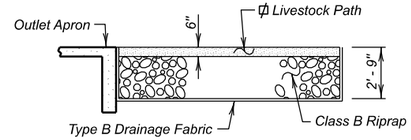
NOTE:
Box culvert flow line has been depressed 1' - 0" below channel flow line to accommodate aquatic organisms. The 1' - 0" depression will be allowed to fill in naturally over time.



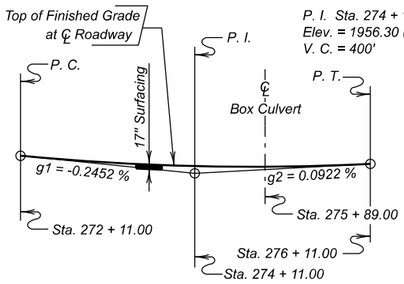
ELEVATION



SECTION B - B



SECTION A - A



P. I. Sta. 274 + 11.00
Elev. = 1956.30 (Finished)
V. C. = 400'

VERTICAL CURVE DATA

NOTES:

1. Base Course will provide a smooth path for livestock.
2. Base Course is estimated using 6" of material to account for voids in the Class B Riprap.

ESTIMATED QUANTITIES

	ITEM	UNIT	QUANTITY
∢	Structure Excavation, Box Culvert	Cu. Yd.	235
	Box Culvert Undercut	Cu. Yd.	615
	Controlled Density Fill	Cu. Yd.	42.4
≠	Class B Riprap	Ton	105.7
⊛	Base Course	Ton	3.4
	Type B Drainage Fabric	Sq. Yd.	128
	2 - 13' X 12' Precast Concrete Culvert, Furnish	Ft.	160
	2 - 13' X 12' Precast Concrete Culvert, Install	Ft.	160
	2 - 13' X 12' Precast Concrete Culvert End Section, Furnish	Each	4
	2 - 13' X 12' Precast Concrete Culvert End Section, Install	Each	4

∢ Quantity is based on 10" bottom slab, 10" top slab, 9" outside walls and 8" interior walls.
≠ For estimating purposes only, a factor of 1.4 tons/cu. yd. was used to convert Cu. Yd. to Tons.
⊛ For estimating purposes only, a factor of 1.89 tons/cu. yd. was used to convert Cu. Yds. to Tons.

HYDRAULIC DATA

Q_d	1987 cfs
A_d	462 sq ft
V_d	4.3 fps
Q_F	1987 cfs
Q_{100}	3539 cfs
Q_{OT}	$>Q_{100}$
V_{max}	6.4 fps

Q_d = Design discharge for the proposed culvert based on 25 year frequency. El. 1948.1.
Q_{OT} = Overtopping discharge and frequency > Q_{100} year recurrence interval. El. 1956.4 @ Sta. 275 + 02.00 ±.
Q_F = 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. 1950.6.
V_{max} = Maximum computed outlet velocity for the proposed culvert, based on 100 year frequency.

-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 560.20 & 560.21
Sheet No. 5 - Details of Standard Plate No. 620.16

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

SITE 5
ALTERNATE B

GENERAL DRAWING AND QUANTITIES

FOR

4 - 13' X 12' BOX CULVERT (PRECAST)

OVER MEDICINE CREEK — 0° SKEW
STA. 275 + 89.00 — SEC. 35-T1S-R31E
STR. NO. 38-348-174 — P-B 0248(12)173
PCN 06G7 — HL-93

JONES COUNTY
S. D. DEPT. OF TRANSPORTATION
FEBRUARY 2024

-X028-

DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU	ER	BT	Steve A Johnson BRIDGE ENGINEER
JONS06G7	06G7GE09		

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E71	E99

SPECIFICATIONS

Use South Dakota Standard Specifications for Roads and Bridges, 10-7-26 Version, Required Provisions, and Special Provisions as included in the Proposal. The Standard Specifications for Roads and Bridges are available for download and viewing at: https://dot.sd.gov/doing-business/contractors/standard-specifications

GENERAL NOTES

Design will be in accordance with Section 560 of the Specifications with the following criteria:

1. *Box culvert and box culvert end section design will conform to the AASHTO LRFD Bridge Design Specifications, 9th Edition.*
2. *Design Live Load: HL-93 and construction loading consisting of one 7' - 6" gage axle with gross axle 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.*
3. *The box culvert will be load rated in accordance with the AASHTO Manual for Bridge Evaluation, 2018 Edition with the latest Interim Revisions using the LRFR method. The rating will include evaluation of the Design HL-93 truck at both Inventory and Operating levels and a Legal Load rating for three SD legal trucks (Type 3, 3S2 and 3-2) as well as the notional rating load and four specialized hauling vehicles. The structure will also be evaluated for the emergency vehicles, EV2 and EV3, at the legal load rating level. All sections of the box culvert will 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 will rate greater than 1.0 at legal load rating level. AASHTOWare Bridge Rating (BrR) is required to be used to rate the box culvert. Include the BrR rating model and a load rating summary table with load rating calculations. Submit load rating calculations with the design and independent check design calculations or shop plans, as appropriate.*
4. *The design of the barrel sections will be based on a minimum fill height of 2 foot and include all subsequent fill heights up to and including the maximum fill height of 6 ft. over the box culvert.*
5. *Minimum inside corner fillet will be 6 in.*
6. *Minimum precast barrel section length will be 6 - foot sections; however, no more than two 4 - foot sections are allowed in any one length of precast barrel.*
7. *Lift holes will be plugged with an approved nonshrinkable grout.*
8. *The Fabricator will 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 will be in accordance with the final approved shop plans.*
11. *Care will be taken when placing sections. Sections will be only moved using the lifting holes by approved equipment.*
12. *Soils below the bottom of the proposed RCBC consist of brown to gray clay. Groundwater was encountered in the borings at an elevation of 1943.3 feet during the subsurface investigation conducted in June 2023. Dewatering will be required during construction.*

DESIGN MIX OF CONCRETE

1. *Mix will be as per fabricator's design; however, a minimum compressive strength will not be less than 4500 p.s.i. at 28 days.*
2. *High sulfate levels are likely to be encountered on this project. All concrete will be Class A45 Concrete conforming to Section 460 of the Construction Specifications, with the following modifications: the type of cement will be either a Type V or Type II with 20 to 25% Class F Modified Fly Ash substituted for cement in accordance with Section 605 of the Construction Specifications. The Water/Cementitious material ratio will not exceed 0.45 as defined in Section 460.3 C.*

SHOP PLANS

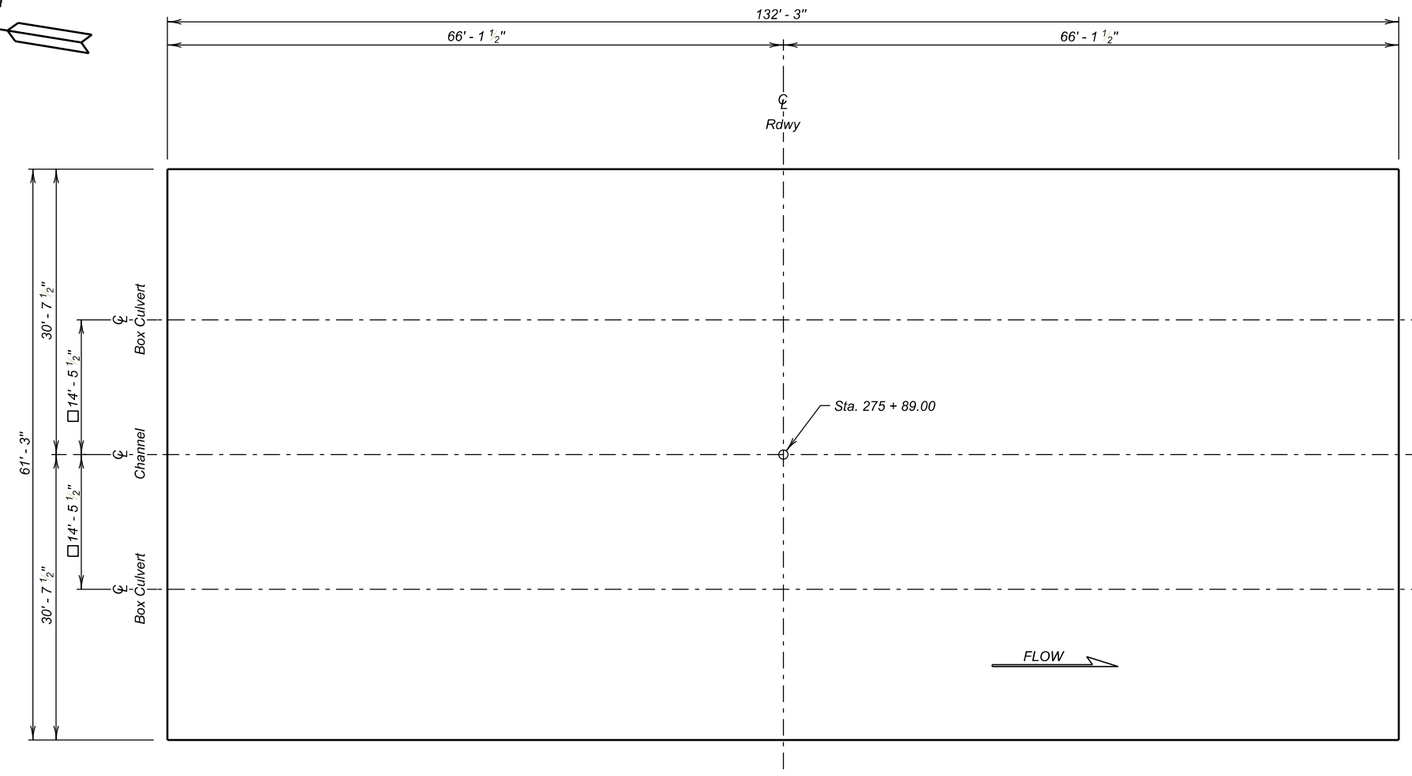
The fabricator will submit shop plans in accordance with the Construction Specifications. Include design and independent check design, if applicable, with initial submittal.

ESTIMATED QUANTITIES

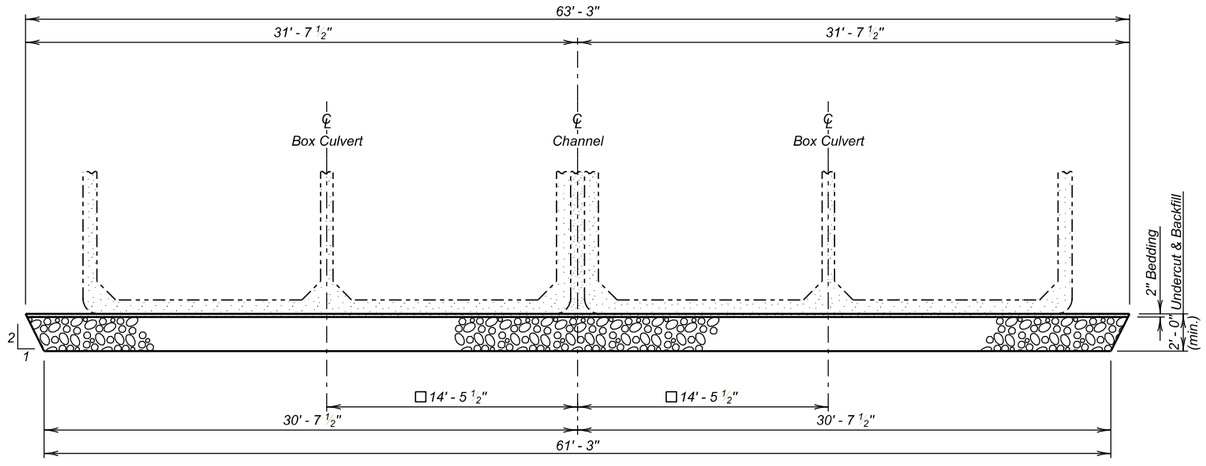
	ITEM	UNIT	QUANTITY
⌀	Box Culvert Undercut	Cu. Yd.	615

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

☐ *Based on Ts = 9" and Tm = 8".*



UNDERCUT LAYOUT
(Bottom Dimensions)



TYPICAL SECTION
(For Limits of Undercut)

SITE 5
ALTERNATE B

NOTES AND UNDERCUT DETAILS

FOR

4 - 13' X 12' BOX CULVERT (PRECAST)

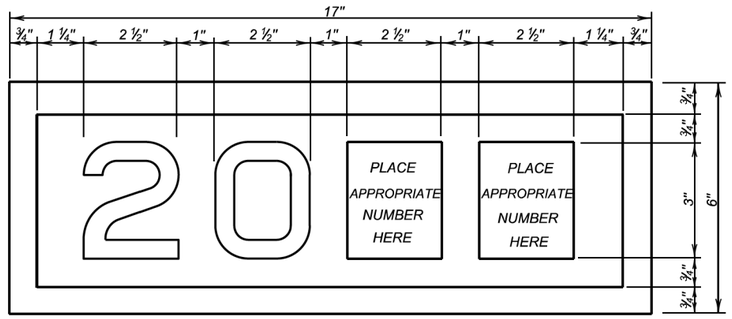
OVER MEDICINE CREEK — 0° SKEW
STA. 275 + 89.00 — SEC. 35-T1S-R31E
STR. NO. 38-348-174 — P-B 0248(12)173
HL-93

JONES COUNTY

S. D. DEPT. OF TRANSPORTATION

FEBRUARY 2024

DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU	ER	BT	Steve A Johnson BRIDGE ENGINEER
JONS06G7	06G7GE10		



YEAR PLATE DETAILS

GENERAL NOTES:

1. Year plates of the general dimensions shown will be constructed on all box culverts and bridges. The year plates will 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 (1/2) inch in deptn.

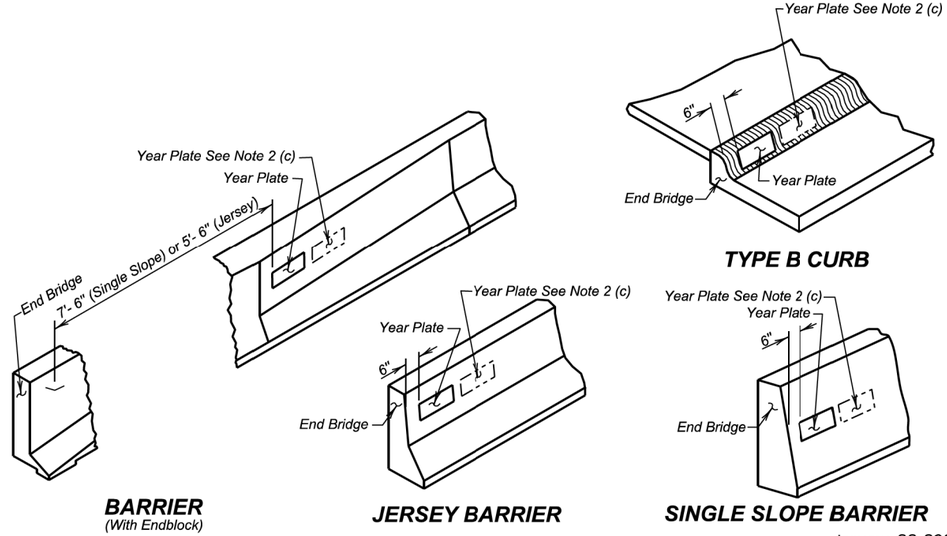
2. Year plates will be located on structure(s) as follows:

   a. On cast-in-place box culverts the year plates will 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 will be centered laterally on the upstream face of the top slab. Where an extended interior wall interferes with this location, the year plate will be centered in an adjacent barrel.

   b. On bridges with six (6) inch curbs, "Jersey" shaped barriers with no endblocks, or "Single Slope" shaped barriers with no endblocks, the year plate will 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 barrier endblocks, the year plate will be centered on the upper sloped portion of the barrier approximately 5'- 6" for "Jersey" shaped barriers from the end of the bridge and 7'-6" for "Single Slope" shaped barriers from the end of bridge, or as designated by the Engineer. There will be one year plate at each end of the bridge on opposite sides.

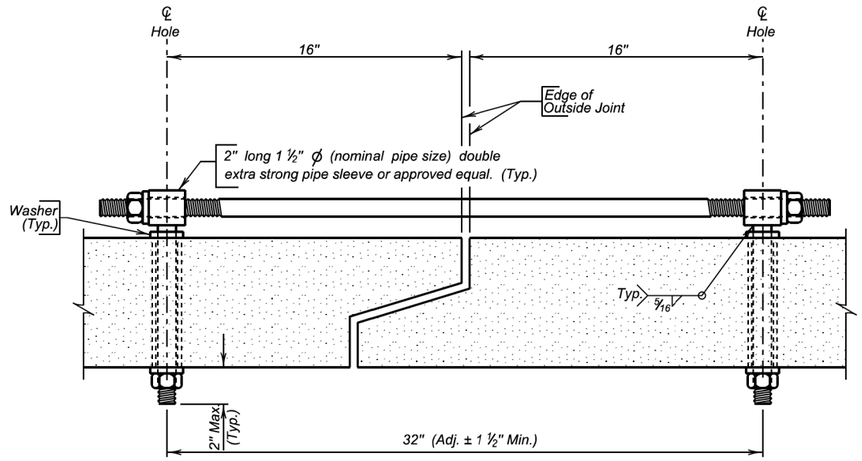
   c. When the plans specify that both the original date of construction and the date of reconstruction are to be shown, one date will be placed as listed above and the other located adjacent to it. Both year plates will be shown at each end of the bridge on opposite sides.

3. There will be no separate measurement or payment made for year plates on box culverts and bridges. All costs for this work will be incidental to other contract items.



January 22, 2021

Published Date: 2027	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 ∅ 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: 2027	SDDOT	PRECAST BOX CULVERT TIE BOLT ASSEMBLY DETAILS	PLATE NUMBER 560.01
			Sheet 1 of 1

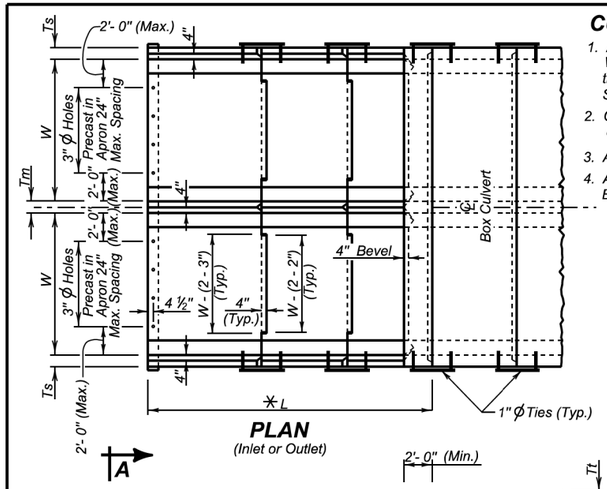
SITE 5
ALTERNATE B

4 - 13' X 12' BOX CULVERT (PRECAST)
STR. NO. 38-348-174
FEBRUARY 2024

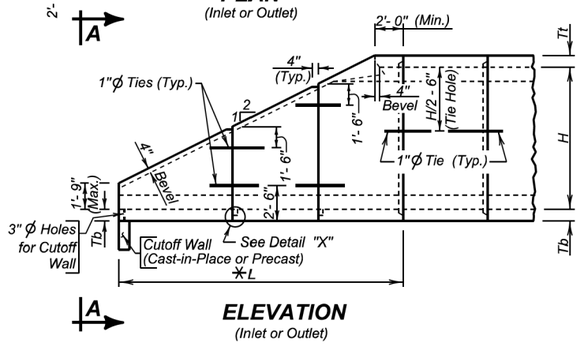
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E73	E99

CUTOFF WALL

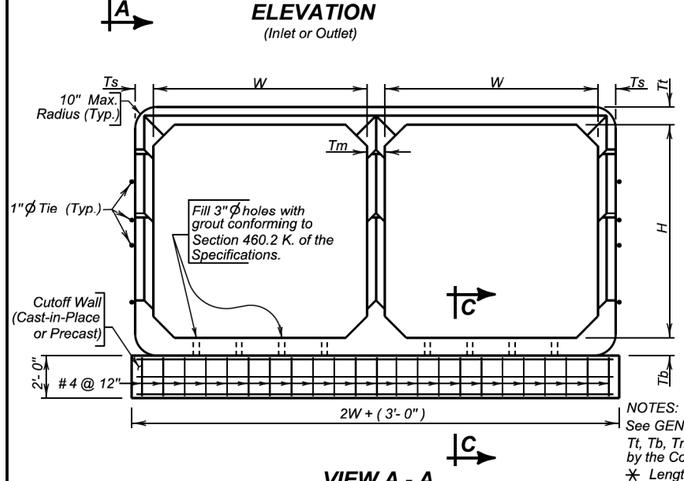
1. All costs associated with furnishing and installing the Cutoff Wall, whether precast or cast-in-place, shall be incidental to the contract unit price per each for "Precast Box Culvert End Section, Furnish".
2. Concrete for cast-in-place cutoff wall shall be Class M6 concrete in accordance with Section 462 of the Specifications.
3. All reinforcing steel shall conform to ASTM A615 Grade 60.
4. Alternate details will be allowed, subject to the approval of the Bridge Construction Engineer.



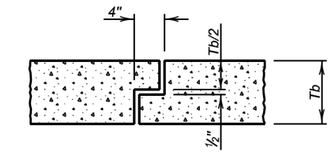
PLAN
(Inlet or Outlet)



ELEVATION
(Inlet or Outlet)

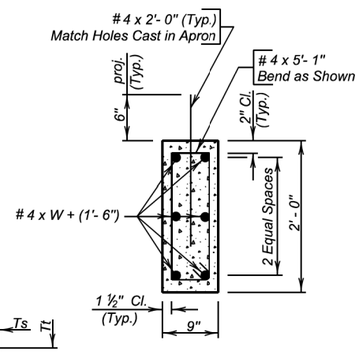


VIEW A - A



DETAIL "X"

NOTE: Joint details may vary from that shown, according to the manufacturer's design. Submit details with shop plans for approval.



SEC. C - C

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
L = Length of End Section

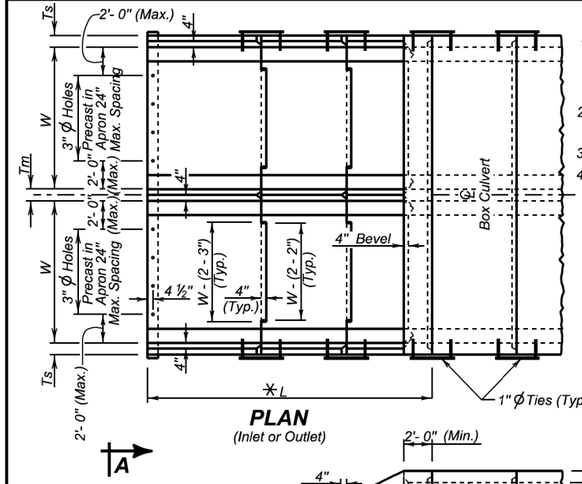
NOTES:
See GENERAL DRAWING for W and H dimensions.
Tt, Tb, Tm, L, and Ts dimensions shall be furnished by the Contractor.
⁎ Length and number of units may vary from that shown.

June 26, 2015

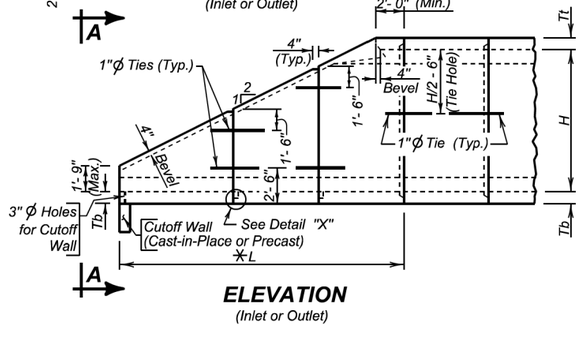
Published Date: 2027	SDDOT	PRECAST DOUBLE BOX CULVERT SLOPED END SECTION DETAILS WITH 2'–0" CUTOFF WALL	PLATE NUMBER 560.20 Sheet 1 of 1

CUTOFF WALL

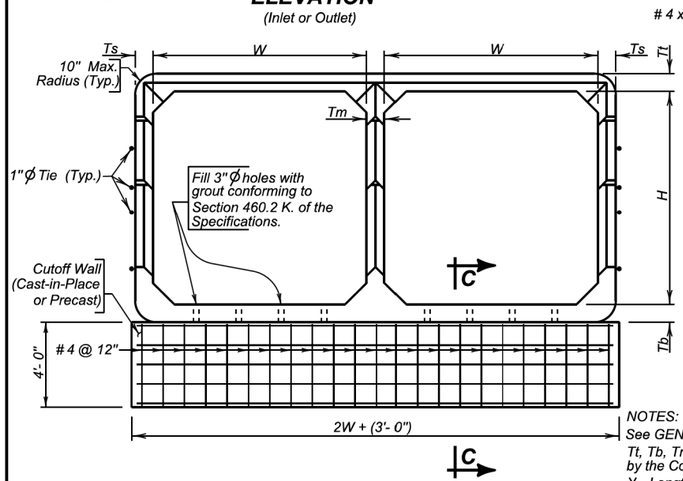
1. All costs associated with furnishing and installing the Cutoff Wall, whether precast or cast-in-place, shall be incidental to the contract unit price per each for "Precast Box Culvert End Section, Furnish".
2. Concrete for cast-in-place cutoff wall shall be Class M6 concrete in accordance with Section 462 of the Specifications.
3. All reinforcing steel shall conform to ASTM A615 Grade 60.
4. Alternate details will be allowed, subject to the approval of the Bridge Construction Engineer.



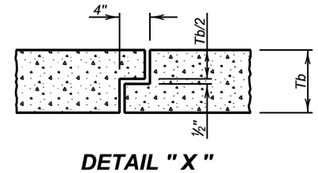
PLAN
(Inlet or Outlet)



ELEVATION
(Inlet or Outlet)

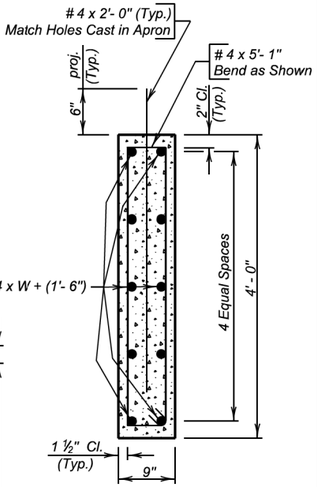


VIEW A - A



DETAIL "X"

NOTE: Joint details may vary from that shown, according to the manufacturer's design. Submit details with shop plans for approval.



SEC. C - C

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
L = Length of End Section

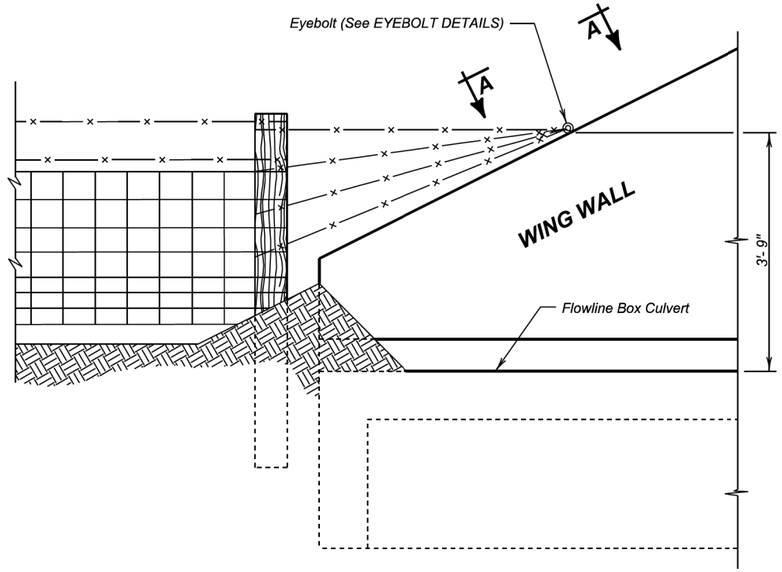
NOTES:
See GENERAL DRAWING for W and H dimensions.
Tt, Tb, Tm, L, and Ts dimensions shall be furnished by the Contractor.
⁎ Length and number of units may vary from that shown.

June 26, 2015

Published Date: 2027	SDDOT	PRECAST DOUBLE BOX CULVERT SLOPED END SECTION DETAILS WITH 4'–0" CUTOFF WALL	PLATE NUMBER 560.21 Sheet 1 of 1

SITE 5
ALTERNATE B

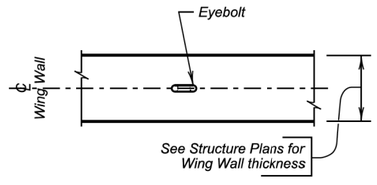
4 - 13' X 12' BOX CULVERT (PRECAST)
STR. NO. 38-348-174
FEBRUARY 2024



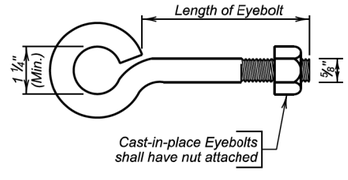
DETAIL FOR FENCE ANCHORS

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 ⅞ 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 ⅞ 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: 2027	SDDOT	FENCE ANCHORS FOR BOX CULVERT WING WALLS	PLATE NUMBER 620.16 Sheet 1 of 1

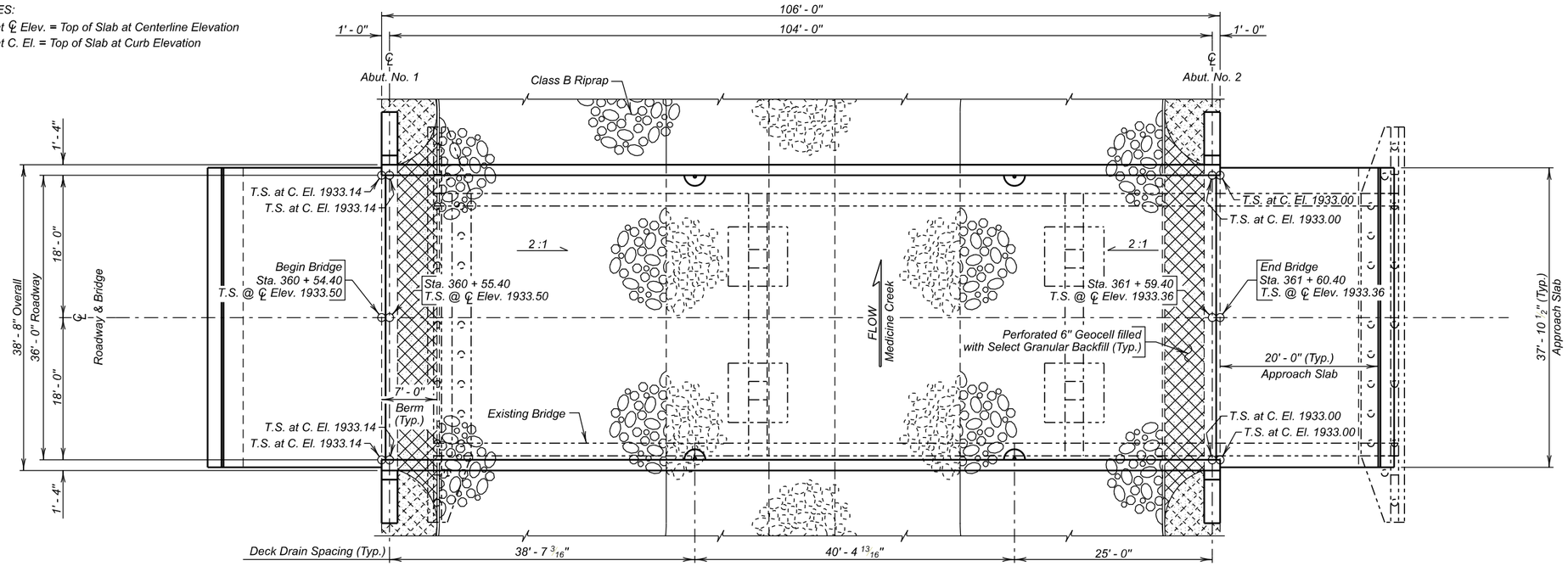
SITE 5
ALTERNATE B

4 - 13' X 12' BOX CULVERT (PRECAST)
STR. NO. 38-348-174
FEBRUARY 2024

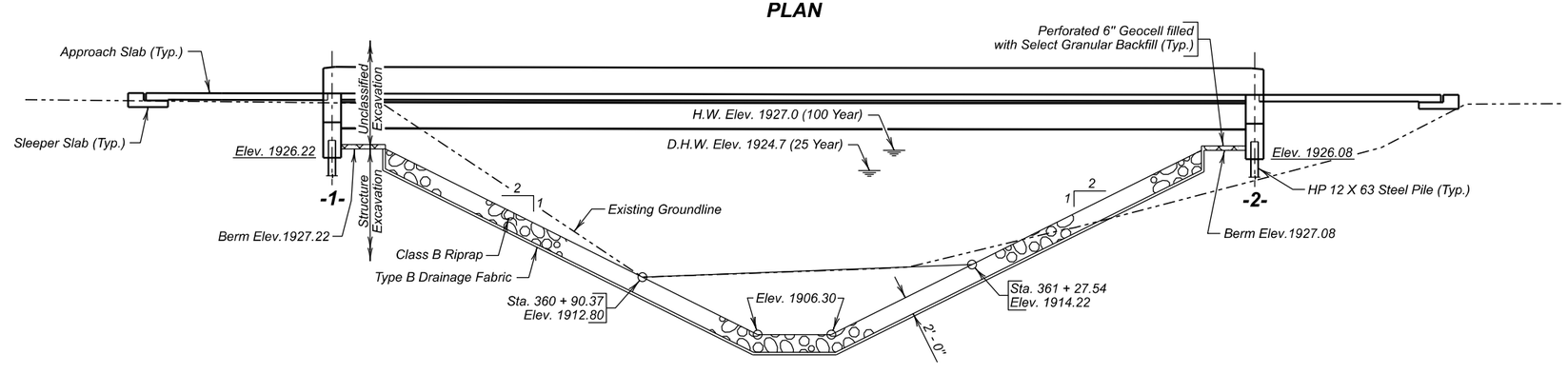
The elevations shown in these plans are based on the National Geodetic Survey (NGS) North American Vertical Datum of 1988 (NAVD88).

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E75	E99

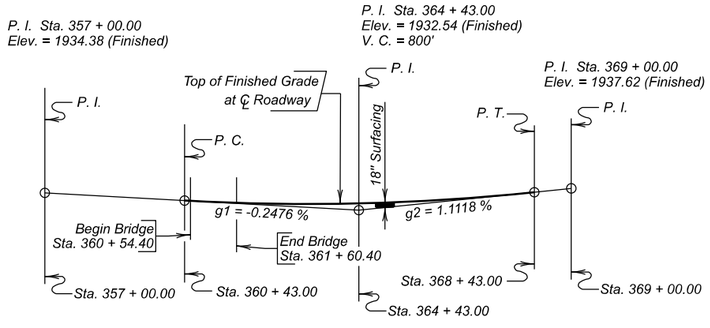
NOTES:
T.S. at ℄ Elev. = Top of Slab at Centerline Elevation
T.S. at C. El. = Top of Slab at Curb Elevation



PLAN



ELEVATION



VERTICAL CURVE DATA

HYDRAULIC DATA

Q_d	2208 cfs
A_d	630 sq. ft.
V_d	3.5 fps
Q_F	2208 cfs
Q_{100}	3927 cfs
Q_{OT}	$>Q_{100}$ cfs
V_{max}	5.1 fps

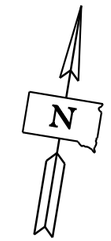
Q_d = Design discharge for the proposed bridge based on 25 year frequency. El. 1924.7.

Q_{OT} = Overtopping discharge and frequency > Q_{100} yr. recurrence interval. El. 1933.4 @ Sta. 361 + 89.00 ±.

Q_F = 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. 1927.0.

V_{max} = Maximum computed outlet velocity for the proposed bridge based on a 100 year frequency.



-X071-
INDEX OF BRIDGE SHEETS

Sheet No. 1 - General Drawing
Sheet No. 2 - Estimate of Structure Quantities and Notes
Sheet No. 3 - Notes (Continued)
Sheet No. 4 - Notes (Continued)
Sheet No. 5 - Notes (Continued)
Sheet No. 6 - Subsurface Investigation & Piling Layout
Sheet No. 7 - Abutment Details
Sheet No. 8 - Superstructure Details (A)
Sheet No. 9 - Superstructure Details (B)
Sheet No. 10 - End Block, Barrier Curb, & Deck Drain Details
Sheet No. 11 - Girder Layout Details
Sheet No. 12 - Diaphragm Details
Sheet No. 13 - Framing Diagram and Erection Data
Sheet No. 14 - Slab Form Elevations
Sheet No. 15 - Details of Bridge End Backfill Adj. To Abut. No. 1 (A)
Sheet No. 16 - Details of Bridge End Backfill Adj. To Abut. No. 1 (B)
Sheet No. 17 - Details of Bridge End Backfill Adj. To Abut. No. 2 (A)
Sheet No. 18 - Details of Bridge End Backfill Adj. To Abut. No. 2 (B)
Sheet No. 19 - Details of Approach Slab Adjacent to Bridge
Sheet No. 20 - Approach Slab Joint Details
Sheet No. 21 - Riprap Details
Sheet No. 22 - As - Built Elevation Survey
Sheet No. 23 - Details of Standard Plate No.'s 430.50 and 460.02
Sheet No. 24 - Details of Standard Plate No.'s 460.05 and 510.40
Sheet No. 25 - Details of Standard Plate No.'s 620.17 and 630.92

GENERAL DRAWING

FOR

106' - 0" STEEL GIRDER BRIDGE

36' - 0" ROADWAY — 0° SKEW
OVER MEDICINE CREEK — SEC. 5-T105N-R79W
STA. 360 + 54.40 TO 361 + 60.40 — P-B 0248(12)173
STR. NO. 43-014-188 — HL-93
PCN 06G7

LYMAN COUNTY

S. D. DEPT. OF TRANSPORTATION

MARCH 2024

-X071-

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

DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU	SK	BT	Steve A Johnson BRIDGE ENGINEER
LYMN06G7	06G7TF01		

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E76	E99

ESTIMATE OF STRUCTURE QUANTITIES

DESCRIPTION	QUANTITY	UNIT
Bridge Elevation Survey	Lump Sum	LS
Concrete Penetrating Sealer	424	SqYd
Select Granular Backfill	14.7	Ton
Incidental Work, Structure	Lump Sum	LS
Structural Steel	Lump Sum	LS
Membrane Sealant Expansion Joint	75.8	Ft
Structure Excavation, Bridge	24	Cu Yd
Bridge End Embankment	1910	Cu Yd
Granular Bridge End Backfill	183.0	Cu Yd
Approach Slab Underdrain Excavation	13.0	Cu Yd
Precast Concrete Headwall for Drain	4	Each
Class A45 Concrete, Bridge Deck	184.5	Cu Yd
Concrete Approach Slab for Bridge	172.3	Sq Yd
Concrete Approach Sleeper Slab for Bridge	37.9	Sq Yd
Deck Drain, Girder Bridge	4	each
Reinforcing Steel	5,642	Lb
Epoxy Coated Reinforcing Steel	2,119	Lb
Stainless Reinforcing Steel	26,150	Lb
Preboring Pile	180	Ft
HP 12x63 Steel Test Pile, Furnish and Drive	90	Ft
HP 12x63 Steel Bearing Pile, Furnish and Drive	640	Ft
4" Perforated Dual Wall HDPE Pipe	78	Ft
4" Dual Wall HDPE Pipe	70	Ft
Porous Backfill	24.6	Ton
Class B Riprap	1,635.0	Ton
Overburden Excavation for Riprap	584	Cu Yd
Type B Drainage Fabric	1,903	Sq Yd
Perforated Geocell	419	Sq Ft

SPECIFICATIONS FOR BRIDGE

1. Design Specifications: AASHTO LRFD Bridge Design Specifications, 10th Edition.

2. Construction Specifications: South Dakota Standard Specifications for Roads and Bridges, 10-7-26 Version, Required Provisions, and Special Provisions as included in the Proposal. The Standard Specifications for Roads and Bridges are available for download and viewing at: https://dot.sd.gov/doing-business/contractors/standard-specifications

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
Stainless Steel (ASTM 955, 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 otherwise on plans.

4. Contractor will imprint on the structure the date of new construction as specified and detailed on Standard Plate 460.02.

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 18 inches above subgrade elevation.

INCIDENTAL WORK, STRUCTURE

1. In place centerline Sta. 360+60.96 to Sta. 361+82.96 is a 122'-0" 3-span Steel I Beam Bridge with a 30'-0" clear roadway. The superstructure consists of a reinforced 8" concrete slab with thrie beam and concrete rail 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. 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.

NOTICE - LEAD BASED PAINT

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

ABUTMENTS

1. Preboring piling at each abutment is required to whichever is greater, ten feet or to natural ground.

2. The HP 12x63 Piling were designed using a factored bearing resistance of 116 tons per pile. Piling will develop a field verified nominal bearing resistance of 290 tons per pile.

3. One test pile will be driven at each abutment and will become part of the pile group. The test pile will be driven before any other pile and will be driven to the required field verified nominal bearing resistance or as directed by the Engineer prior to driving any portion of the bearing piles.

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.

7. Abutment backwalls and wings must be cast concurrently with the deck slab. The concrete used for the backwall and wings will be Class A45 Concrete, Bridge Deck. All abutment and bridge deck concrete will have attained design strength prior to backfilling.

ESTIMATE OF STRUCTURE QUANTITIES AND NOTES
FOR
106' - 0" STEEL GIRDER BRIDGE

STR. NO. 43-014-188

MARCH 2024

DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU	SK	BT	Steve A Johnson BRIDGE ENGINEER
LYMN06G7	06G7GF02		

PILE DRIVING

1. A drivability analysis was performed using the wave equation analysis program (GRLWEAP). A list of acceptable hammers is provided below. Based on initial analysis, the hammers listed will need to be operated no higher than the third fuel setting to prevent overstressing of the pile during driving operations. 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.

   Delmag D30-32 SPI D30 APE D30-32

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 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.

SUPERSTRUCTURE

1. Structural steel will conform to ASTM A709 Gr. 50WT2. Material less than 1/4-inch in thickness may be ASTM A1011 Grade 36. Steel for diaphragms and stiffeners may conform to ASTM A36W. 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. The shear connectors will be installed during fabrication. Any request to field install the shear connectors must be approved by the Office of Bridge Design

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

5. The top of the top flange will be shop painted, following the shear connector attachment, with 3 mils of inorganic zinc primer in accordance with Section 411 of the Construction Specifications. No top or mid coat of polyurethane will be applied.

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.

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. If the deck finish machine cannot match the exact skew of the bridge, the difference will need be approved by the Engineer.

8. The concrete bridge deck will be placed and finished at a minimum rate of 55 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 55 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 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 a detailed plan showing the proposed girder erection. The girder erection plan will be designed and stamped by a Professional Engineer registered with the State of 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 limited to, complete sequencing details, girder pick point locations, 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. Any concrete mortar that gets on all surfaces of all the superstructure components will be washed off or removed before it is dry.

SHOP PLANS

Shop plans will be required as specified by the Construction Specifications.

NOTES (CONTINUED)

FOR

106' - 0" STEEL GIRDER BRIDGE

STR. NO. 43-014-188

MARCH 2024

DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU	SK	BT	Steve A Johnson BRIDGE ENGINEER
LYMN06G7	06G7GF03		

DESIGN MIX OF CONCRETE

1. All structural concrete will be Class A45 Concrete unless otherwise indicated.

2. Type II cement conforming to Section 750 of the Construction Specifications is required in all concrete on the structure except in the abutments. Abutment concrete will use a Type III cement or an approved modified A45 mix. The modified mix will meet the requirements for A45 concrete specified in Section 460 of the Construction Specification with the following modifications: a high range water reducer is required at the manufactures' recommended dosage, the maximum concrete slump is 6 inches, the maximum water/cementitious material ratio will be at least 0.02 less than the A45 mix used in the rest of the substructure, and the minimum concrete temperature at time of placement will be 65 degrees Fahrenheit. If used, type III cement will contain a maximum 8% Tricalcium Aluminate (C_3A) and a maximum 0.6% Alkalis ($Na_2O + O.658K_2O$).

WELDING AND WELD INSPECTION

Main members referred to in Section 6.7 Nondestructive Testing of the Bridge Welding Code are identified as follows: 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.

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%

DECK DRAINS

1. Deck Drains will be 4-inch diameter x 4'- 11" 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.

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.

CLASS B COMMERCIAL TEXTURE FINISH

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

   Barrier: all exposed surfaces color will be:
   AMS – STD - 595 37875 Pearl White

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.

NOTES (CONTINUED)
FOR
106' - 0" STEEL GIRDER BRIDGE

STR. NO. 43-014-188
MARCH 2024

DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU	SK	BT	BRIDGE ENGINEER
LYMN06G7	06G7GF04		

APPROACH SLABS

1. Sleeper slab riser will be cast with the approach slab or cast after the approach slab is placed. Care will be taken to ensure the correct grade is maintained across the top pf 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, whether cast-in-place or precast, 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 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 slab and behind the abutments as shown in the plans in accordance with Section 435 of the Construction Specifications.

2. The 4-inch diameter dual wall HDPE Pipe and perforated dual wall HDPE pipe will conform to ASTM D3350 and AASHTO M252, Type S or SP.

3. Care will be taken to ensure that the 4-inch diameter Perforated dual wall HDPE Drain Pipe and the 4-inch diameter dual wall HDPE 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 Perforated HDPE Drain Pipe, 4-inch diameter HDPE outlet pipe, and 5-inch diameter schedule 40 steel pipe, will be incidental to the contract unit price per foot for 4" Perforated Dual Wall HDPE Pipe and 4" Dual Wall HDPE Pipe.

PERFORATED GEOCELL

1. Perforated Geocell will be from the following company or equivalent:

   Company: Agtec
   Phone: 1-818-724-7657
   Website: http://www.agtec.com

2. Perforated Geocell will be 6 inches tall with Type B Drainage Fabric underlying the perforated Geocell. Installation will adhere to the manufacturer's recommendation.

3. Perforated Geocell will be filled with the Select Granular Backfill in accordance with Section 850 of the Construction Specifications.

4. Perforated Geocell will be paid for at the contract unit price per square foot. Payment will be full compensation for furnishing and installing the Perforated Geocell.

5. Select Granular Backfill will be paid for at the contract unit price per ton of material furnished. Payment will be full compensation for furnishing, loading, hauling, and placing the Select Granular Backfill.

OVERBURDEN EXCAVATION FOR RIPRAP

1. This work will consist of the removal and replacement of material between the limits of the finished groundline and the top of the riprap. See Riprap Details sheet.

2. Excavation is to be completed after temporary diversion method is in place, if required, with minimal standing water to create the profile of slope protection specified in plans.

3. The removed material will be placed on top of the riprap to the natural ground, proposed groundline, or specified shape and elevations shown in plans. When overburden extends into the streambed it will form the channel bottom and profile as specified in plans. The finished ground under the bridge will be shaped to match the upstream and downstream channel and flood plain.

4. The overburden material will be placed on top of the riprap and have a maximum lift depth of 1' – 0" and compacted free of flowing water or standing water in excess or four inches above the riprap at the lowest elevation.

5. 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.

6. Payment for Overburden Excavation for Riprap will be at the contract unit price 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.

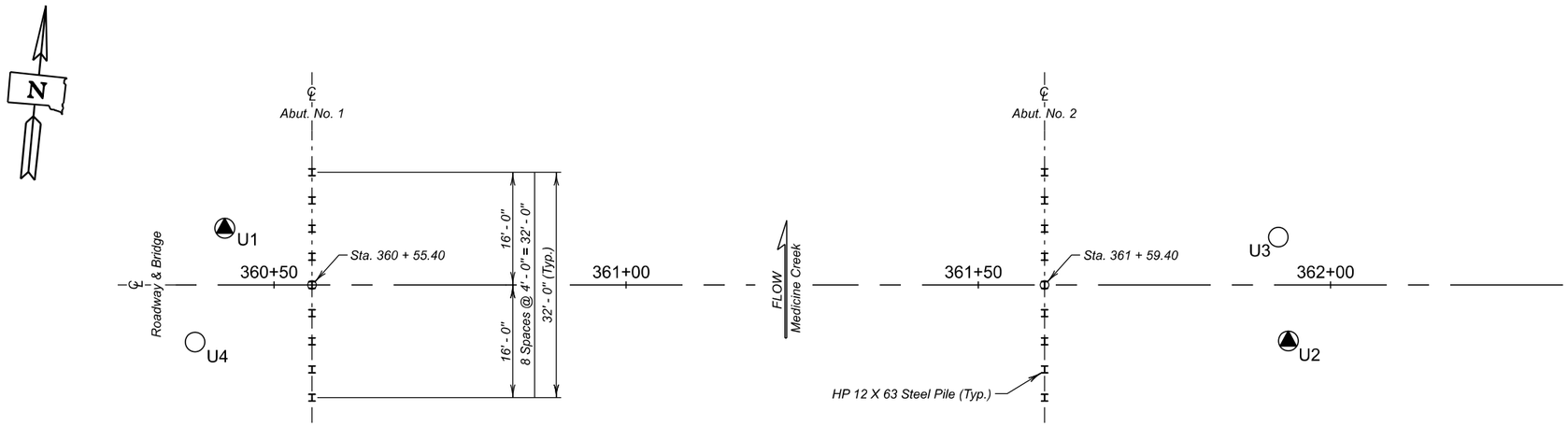
7. Before preparing the bid, it is the responsibility of the Contractor to verify existing conditions to determine if a temporary diversion method and/or dewatering will be required. If required, the Contractor must submit the temporary diversion method and/or dewatering for approval to the Construction Engineer 30 days prior to construction.

NOTES (CONTINUED)
FOR
106' - 0" STEEL GIRDER BRIDGE

STR. NO. 43-014-188
MARCH 2024

DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU	SK	BT	Steve A Johnson BRIDGE ENGINEER
LYMN06G7	06G7GF05		

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E80	E99



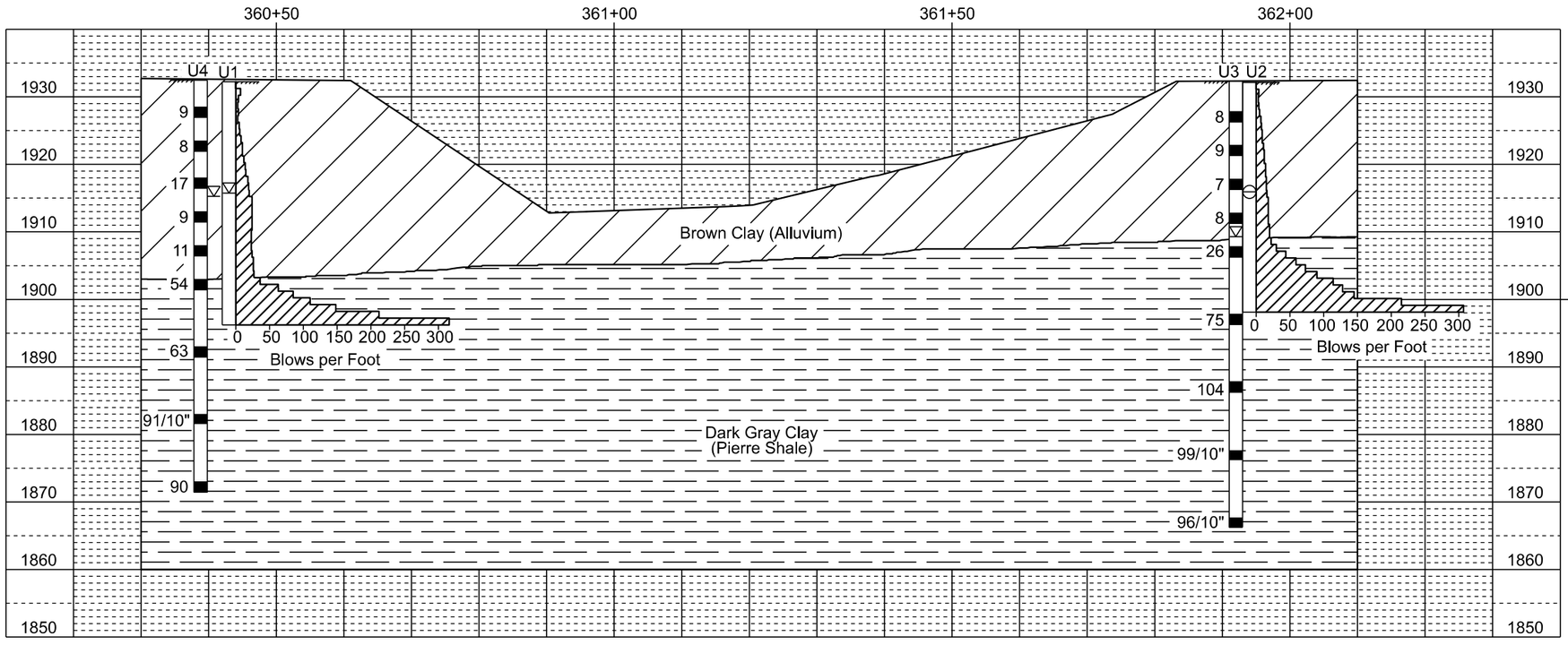
PILING LAYOUT

Hole Number	U4	
Station	360+39	
Depth	26	ft
Soil Color	Brown	
Classification	Clay	
Strength (Qu)	2,815	psf
Dry Density	85.7	pcf
Wet Density	115.4	pcf
Moisture	34.6	%
Pass No. 10	99.9	%
Pass No. 40	99.0	%
Pass No. 200	96.0	%
Sand Content	3.9	%
Silt Content	26.0	%
Clay Content	69.9	%

Hole Number	U4	
Station	360+39	
Depth	41	ft
Soil Color	Dark Gray	
Classification	Clay	
Strength (Qu)	16,080	psf
Dry Density	96.8	pcf
Wet Density	132.0	pcf
Moisture	36.3	%
Pass No. 10	100.0	%
Pass No. 40	100.0	%
Pass No. 200	98.8	%
Sand Content	1.2	%
Silt Content	26.8	%
Clay Content	72.0	%

Hole Number	U3	
Station	361+93	
Depth	16	ft
Soil Color	Brown	
Classification	Clay	
Strength (Qu)	1,466	psf
Dry Density	82.1	pcf
Wet Density	113.8	pcf
Moisture	38.5	%
Pass No. 10	100.0	%
Pass No. 40	99.5	%
Pass No. 200	95.6	%
Sand Content	4.4	%
Silt Content	30.6	%
Clay Content	65.0	%

Hole Number	U3	
Station	361+93	
Depth	36	ft
Soil Color	Dark Gray	
Classification	Clay	
Strength (Qu)	7,923	psf
Dry Density	93.5	pcf
Wet Density	115.1	pcf
Moisture	23.1	%
Pass No. 10	100.0	%
Pass No. 40	100.0	%
Pass No. 200	99.7	%
Sand Content	0.3	%
Silt Content	31.7	%
Clay Content	68.0	%



Pierre Shale is a marine shale with a textural classification that varies from silt clay to clay silt. Color varies from buff gray to black. The formation may contain concretion zones that are normally thin but occasionally are massive. These zones may be considered hard and dense. Thin zones may be present that are cemented resulting in claystone or siltstone seams. Bentonite zones may be encountered but are normally less than one half inch thick. Nonweathered Pierre Shale is considered to be "Soft Rock".

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 $2\frac{7}{8}$ inch drill stem to measure the resistance to penetration of the soil.

Penetration test holes are drilled with a $6\frac{5}{8}$ inch diameter hollow stem auger. Penetration tests are conducted by dropping a 140 pound hammer 30 inches to collect samples and measure the resistance to penetration of the soil. Samples are collected using a lined Modified California Sampler. Penetration test results are listed as uncorrected "N" values in blows per foot. Blows over inches are listed if refusal is achieved, which is 50 blows within one 6 inch set.

GROUNDWATER ELEVATIONS

NOVEMBER 2022

U1	1915.7
U2	(DRY) 1915.9

DECEMBER 2022

U3	1909.3
U4	1915.3

MEASURED SKIN FRICTION

	ELEV.	PSF
U1	1896.2	1499
U2	1898.1	1589

SUBSURFACE INVESTIGATION AND PILING LAYOUT

FOR

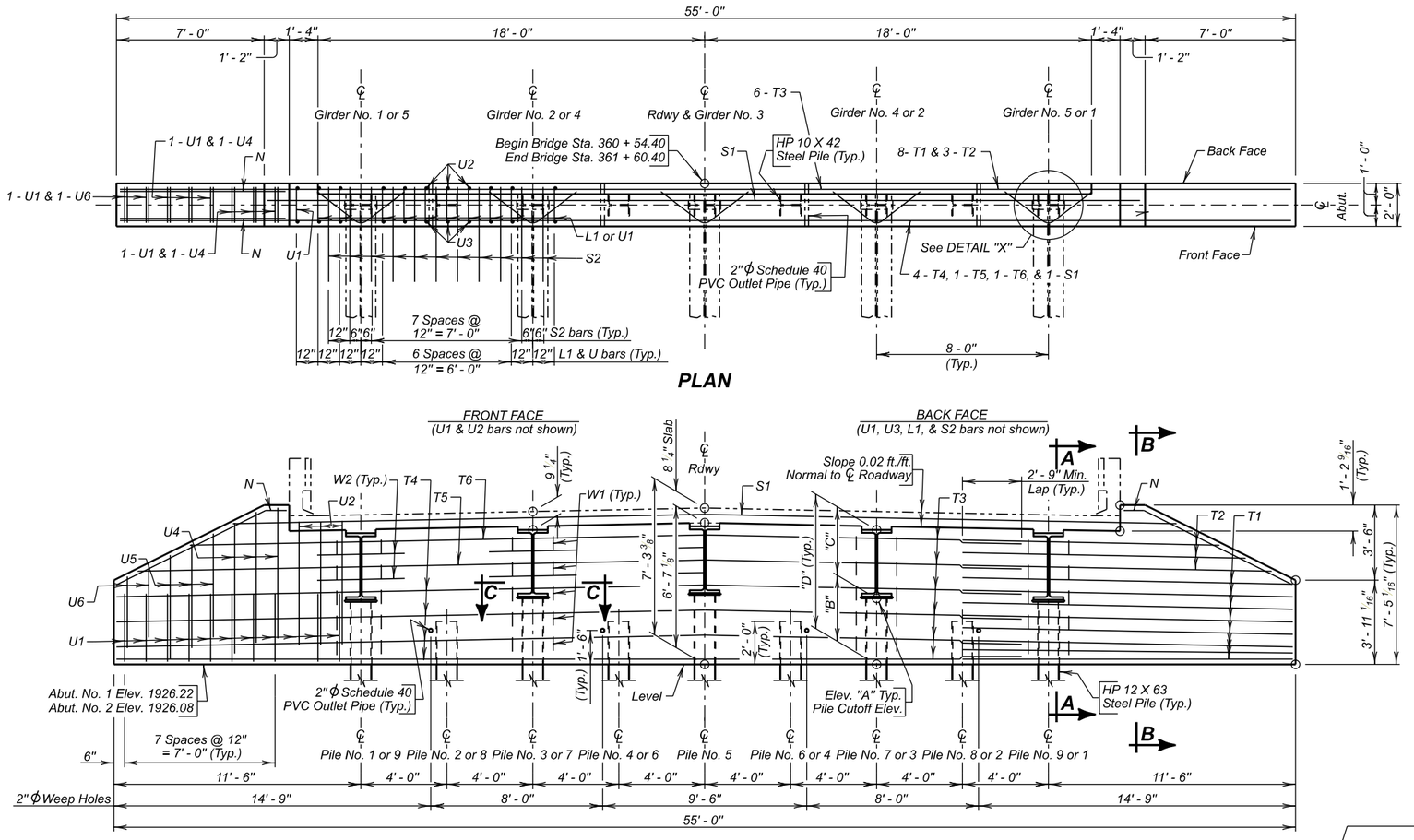
106' - 0" STEEL GIRDER BRIDGE

36' - 0" ROADWAY — 0° SKEW
OVER MEDICINE CREEK — SEC. 5-T105N-R79W
STA. 360 + 54.40 TO 361 + 60.40 — P-B 0248(12)173
STR. NO. 43-014-188 — HL-93

LYMAN COUNTY
S. D. DEPT. OF TRANSPORTATION
MARCH 2024

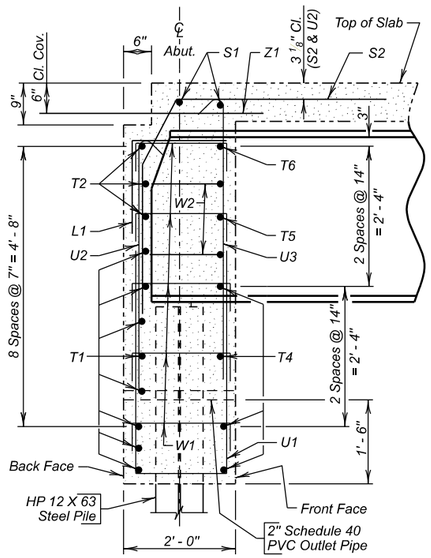
DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU	SK	BT	Steve A Johnson BRIDGE ENGINEER
LYMN06G7	067GTF06		

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E81	E99

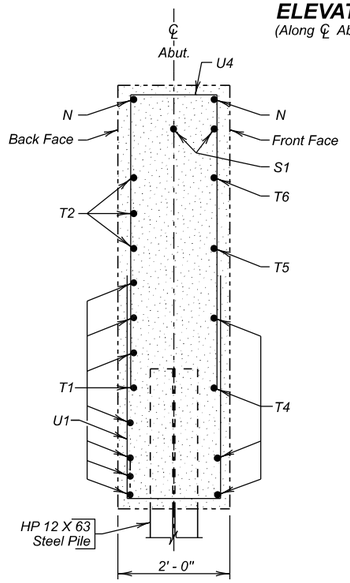


PLAN

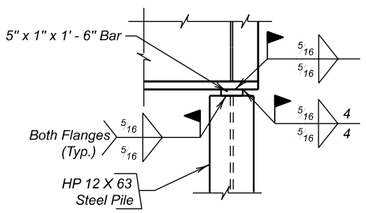
ELEVATION
(Along ℄ Abutment)



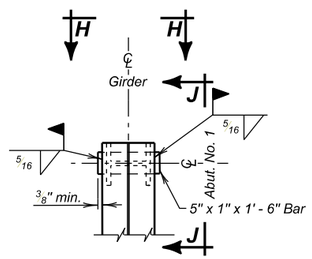
SECTION A - A



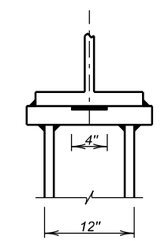
SECTION B - B



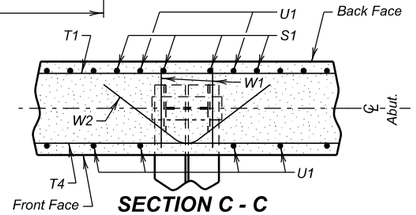
VIEW J - J



DETAIL "X"



VIEW H - H
(showing weld locations)



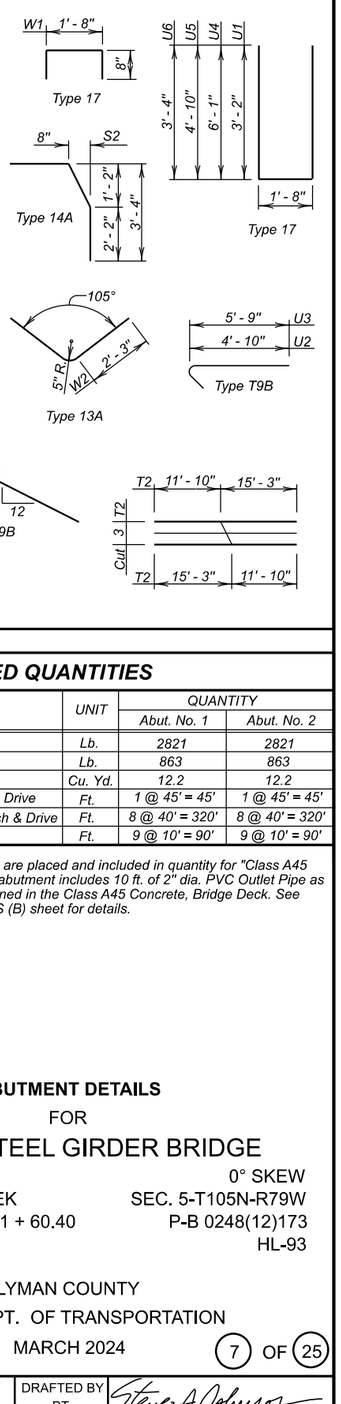
SECTION C - C

INCREASING STATIONS
Abut. No. 1

INCREASING STATIONS
Abut. No. 2

REINFORCING SCHEDULE
(For one Abutment)

Mk.	No.	Size	Length	Type
L1	32	4	3' - 4"	17A
✳ S1	2	9	44' - 0"	Str.
✳ S2	36	6	7' - 3"	14A
T1	16	7	15' - 4"	Str.
ϕ T2	3	7	27' - 1"	Str.
T3	6	6	29 - 6"	Str.
T4	4	6	54' - 8"	Str.
T5	1	6	52' - 3"	Str.
T6	1	6	47' - 9"	Str.
N	4	4	8' - 9"	19B
U1	46	5	8' - 0"	17
✳ U2	30	5	5' - 6"	T9B
U3	30	5	6' - 5"	T9B
U4	6	5	13' - 10"	17
U5	6	5	11' - 4"	17
U6	4	5	8 - 4"	17
W1	60	6	3' - 0"	17
W2	20	8	5' - 0"	13A



NOTE:
All dimensions are out to out of bars.
ϕ *See cutting diagram.*
✳ *Bars to be Epoxy Coated.*

ESTIMATED QUANTITIES

ITEM	UNIT	QUANTITY	
		Abut. No. 1	Abut. No. 2
Reinforcing Steel	Lb.	2821	2821
Epoxy Coated Reinforcing Steel	Lb.	863	863
Structure Excavation, Bridge	Cu. Yd.	12.2	12.2
HP 12 X 63 Steel Test Pile, Furnish & Drive	Ft.	1 @ 45' = 45'	1 @ 45' = 45'
HP 12 X 63 Steel Bearing Pile, Furnish & Drive	Ft.	8 @ 40' = 320'	8 @ 40' = 320'
Preboring Pile	Ft.	9 @ 10' = 90'	9 @ 10' = 90'

NOTE : Abutment backwalls and wings are placed and included in quantity for "Class A45 Concrete, Bridge Deck". Each abutment includes 10 ft. of 2" dia. PVC Outlet Pipe as an approximate quantity contained in the Class A45 Concrete, Bridge Deck. See SUPERSTRUCTURE DETAILS (B) sheet for details.

TABLE OF ELEV. & DIMENSIONS

	Pile No.	Elev. "A"	"B"	"C"	"D"
Abut. No. 1	1	1929.13	2' - 10 15/16"	3' - 2 5/16"	6' - 1 1/4"
	2	1928.22	2' - 0"	—	—
	3	1929.29	3' - 0 7/8"	3' - 2 5/16"	6' - 3 3/16"
	4	1928.22	2' - 0"	—	—
	5	1929.45	3' - 2 13/16"	3' - 2 5/16"	6' - 5 1/8"
	6	1928.22	2' - 0"	—	—
	7	1929.29	3' - 0 7/8"	3' - 2 5/16"	6' - 3 3/16"
	8	1928.22	2' - 0"	—	—
	9	1929.13	2' - 10 15/16"	3' - 2 5/16"	6' - 1 1/4"
Abut. No. 2	1	1928.99	2' - 10 15/16"	3' - 2 5/16"	6' - 1 1/4"
	2	1928.08	2' - 0"	—	—
	3	1929.15	3' - 0 7/8"	3' - 2 5/16"	6' - 3 3/16"
	4	1928.08	2' - 0"	—	—
	5	1929.31	3' - 2 13/16"	3' - 2 5/16"	6' - 5 1/8"
	6	1928.08	2' - 0"	—	—
	7	1929.15	3' - 0 7/8"	3' - 2 5/16"	6' - 3 3/16"
	8	1928.08	2' - 0"	—	—
	9	1928.99	2' - 10 15/16"	3' - 2 5/16"	6' - 1 1/4"

ABUTMENT DETAILS
FOR
106' - 0" STEEL GIRDER BRIDGE

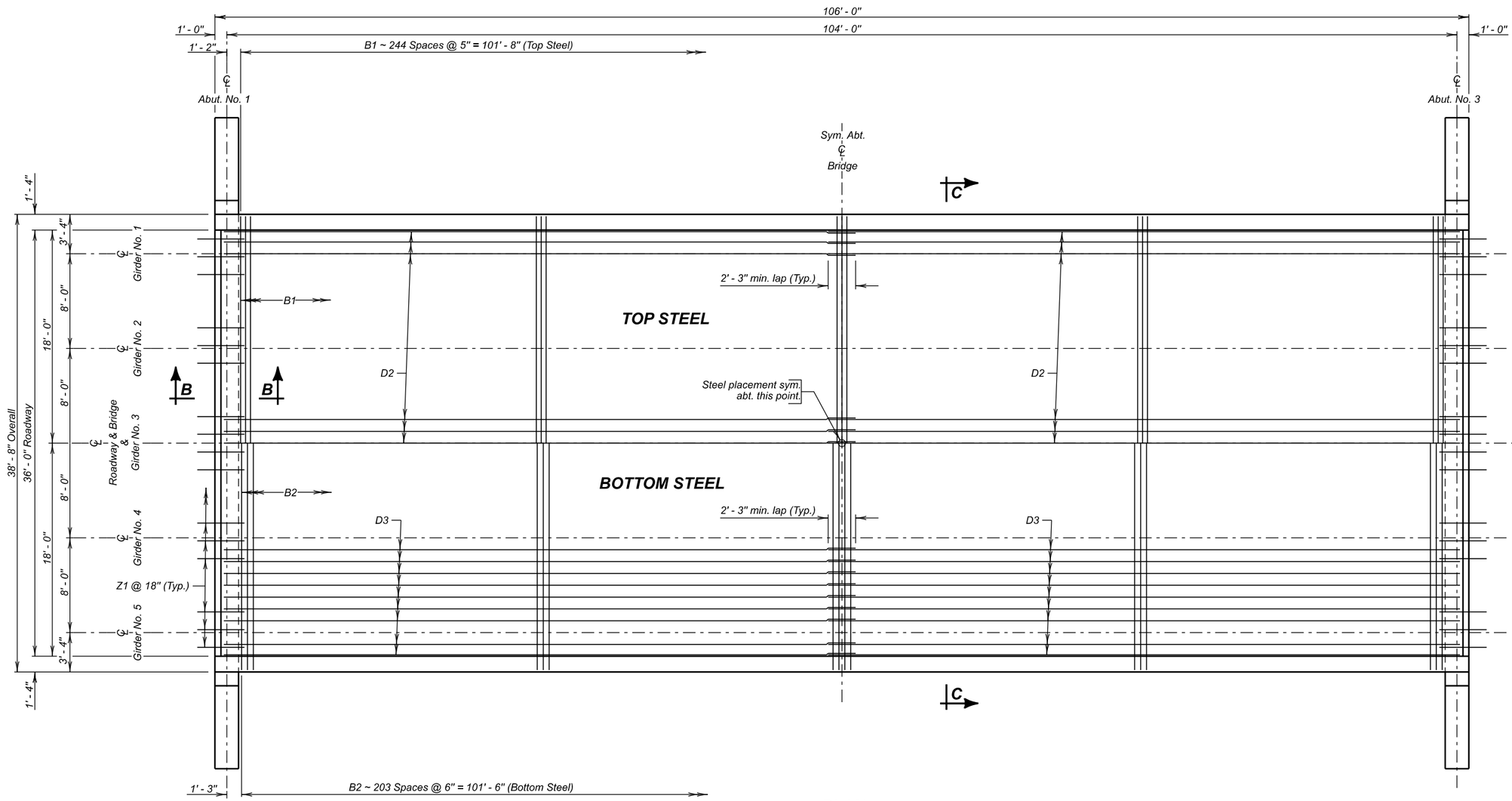
36' - 0" ROADWAY — 0° SKEW
OVER MEDICINE CREEK — SEC. 5-T105N-R79W
STA. 360 + 54.40 TO 361 + 60.40 — P-B 0248(12)173
STR. NO. 43-014-188 — HL-93

LYMAN COUNTY
S. D. DEPT. OF TRANSPORTATION
MARCH 2024

7 OF 25

DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU	SK	BT	Steve A Johnson BRIDGE ENGINEER
LYMN06G7	06G7TF07		

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E82	E99



PLAN

SUPERSTRUCTURE DETAILS (A)

FOR

106' - 0" STEEL GIRDER BRIDGE

36' - 0" ROADWAY	0° SKEW
OVER MEDICINE CREEK	SEC. 5-T105N-R79W
STA. 360 + 54.40 TO 361 + 60.40	P-B 0248(12)173
STR. NO. 43-014-188	HL-93

LYMAN COUNTY

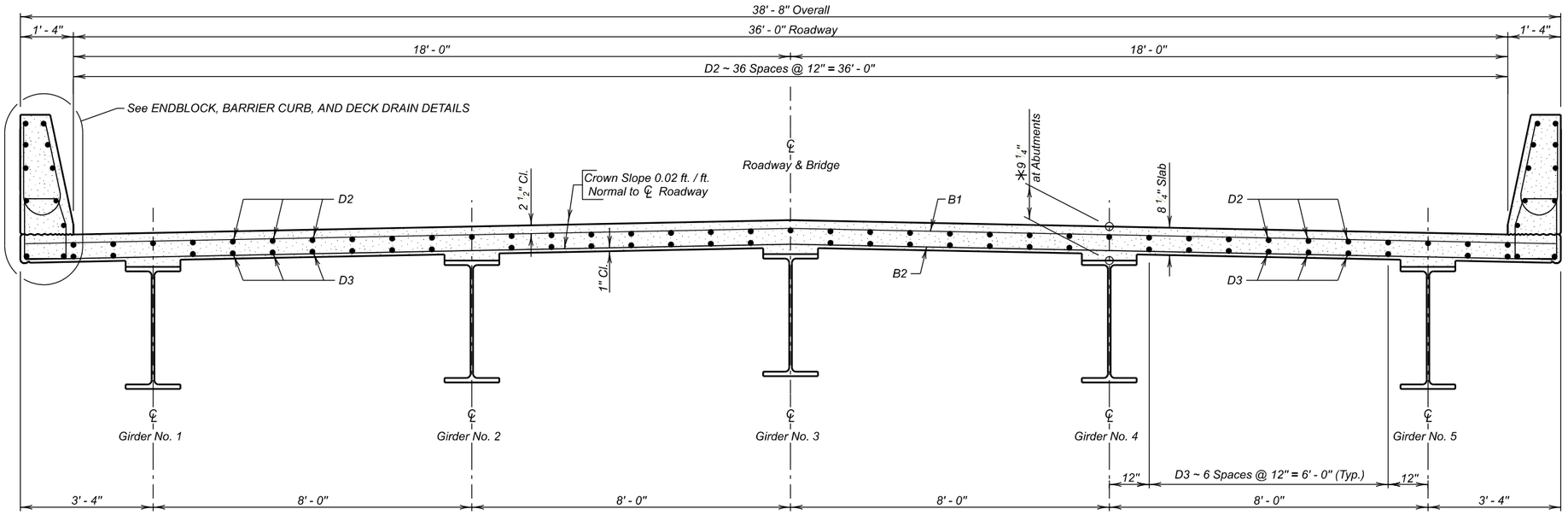
S. D. DEPT. OF TRANSPORTATION

MARCH 2024

8 OF 25

DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU	SK	BT	BRIDGE ENGINEER
LYMN06G7	06G7TF08		

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E83	E99



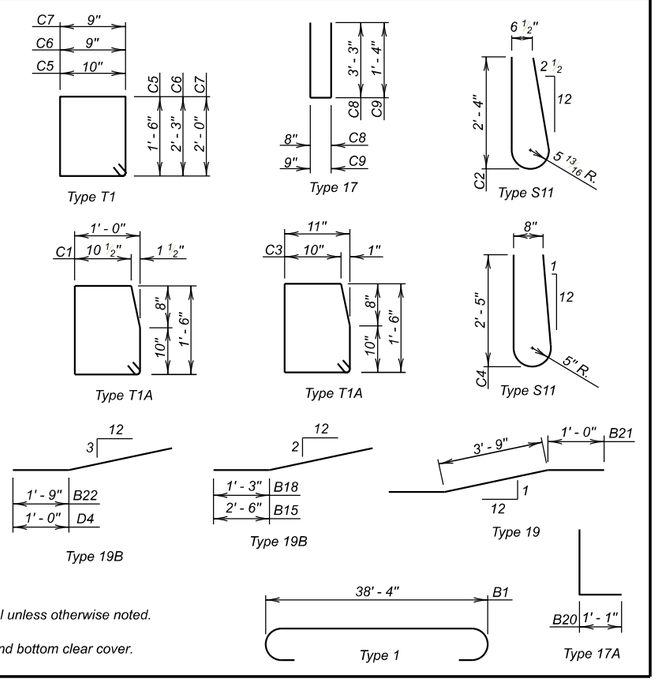
SECTION C - C

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

REINFORCING SCHEDULE

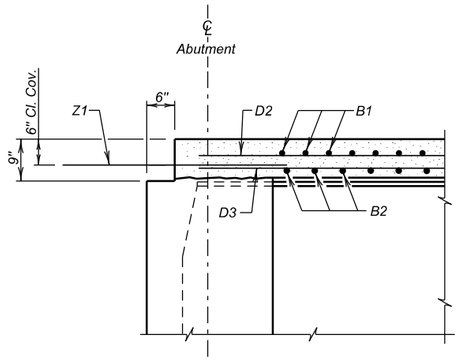
	Mk.	No.	Size	Length	Type
☐	B1	245	5	39' - 6"	1
	B2	204	4	38' - 4"	Str.
	B15	12	5	9' - 6"	19B
	B16	4	4	46' - 11"	Str.
✳	B17	8	4	5' - 8"	Str.
	B18	12	8	3' - 0"	19B
	B19	12	5	2' - 0"	Str.
	B20	12	6	3' - 6"	17A
	B21	4	4	5' - 9"	19
	B22	4	4	3' - 3"	19B
	C1	190	5	5' - 10"	T1A
	C2	194	5	5' - 3"	S11
	C3	4	5	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	8	4	54' - 0"	Str.
	D0	8	5	54' - 1"	Str.
	D1	24	4	47' - 2"	Str.
	D2	74	4	53' - 9"	Str.
	D3	64	5	53' - 9"	Str.
	D4	4	4	2' - 6"	19B
	Z1	48	7	4' - 0"	Str.

Bending Details



NOTES-
All reinforcing steel will be stainless steel unless otherwise noted.
✳ Bend in field as necessary to fit.
☐ 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.	184.5
	Stainless Reinforcing Steel	Lb.	26150
	Epoxy Coated Reinforcing Steel	Lb.	393
△	Structural Steel	Lump Sum	Lump Sum
	Concrete Penetrating Sealer	Sq. Yd.	424
	Deck Drain Girder Bridge	Each	4

★ *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 172416 pounds.*

SUPERSTRUCTURE DETAILS (B)

FOR

106' - 0" STEEL GIRDER BRIDGE

36' - 0" ROADWAY — 0° SKEW
OVER MEDICINE CREEK — SEC. 5-T105N-R79W
STA. 360 + 54.40 TO 361 + 60.40 — P-B 0248(12)173
STR. NO. 43-014-188 — HL-93

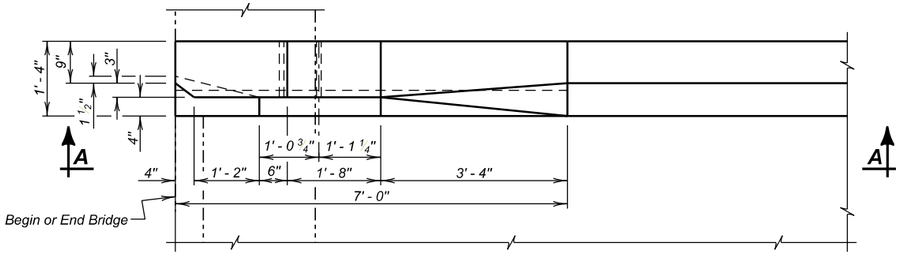
LYMAN COUNTY

S. D. DEPT. OF TRANSPORTATION

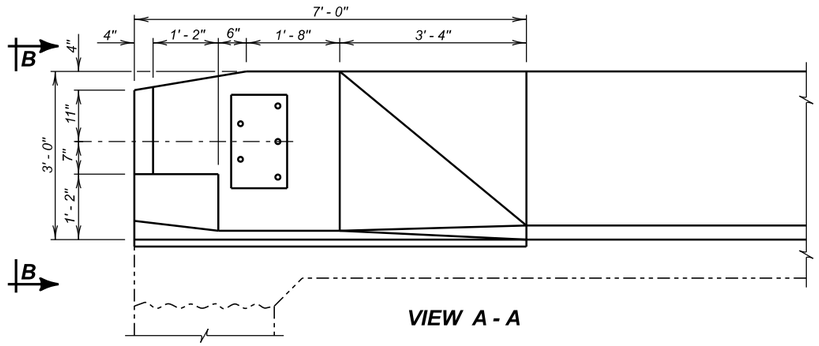
MARCH 2024

DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU	SK	BT	BRIDGE ENGINEER
LYMN06G7	06G7TF09		

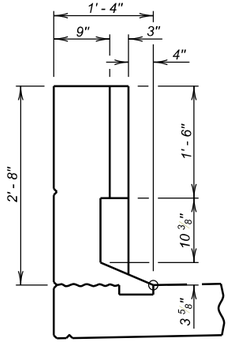
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E84	E99



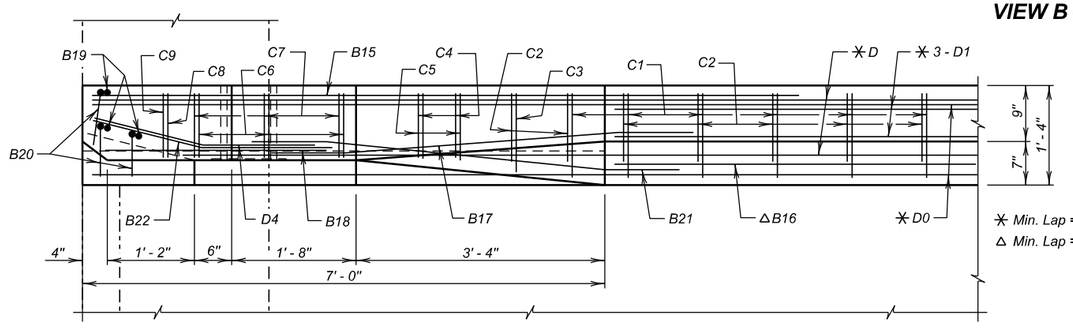
PART PLAN



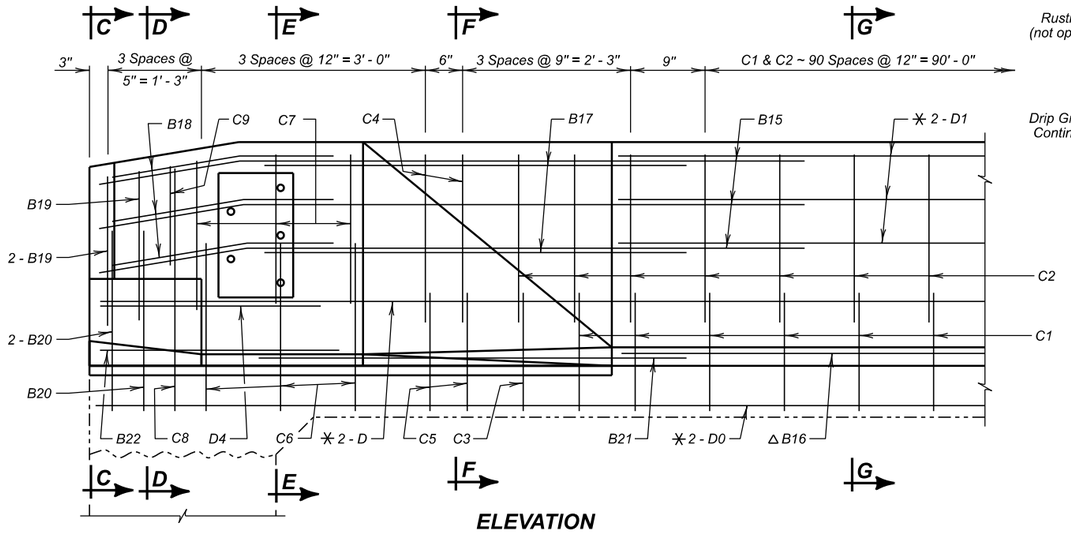
VIEW A - A



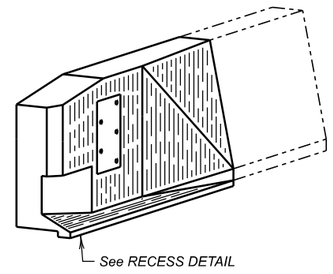
VIEW B - B



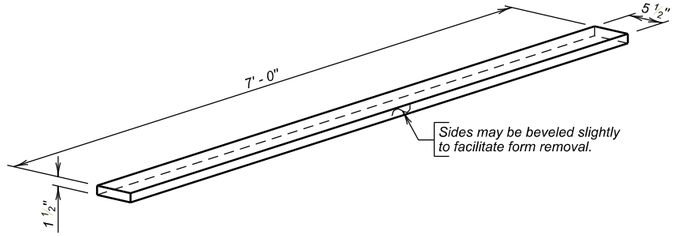
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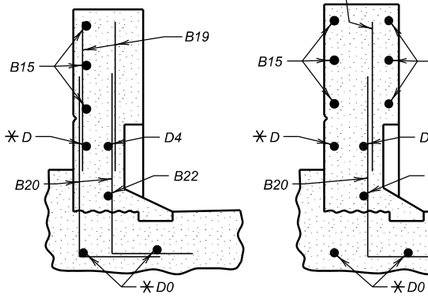
ELEVATION



ISOMETRIC VIEW

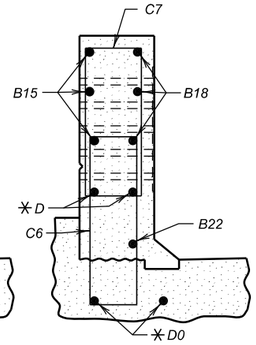


RECESS DETAIL

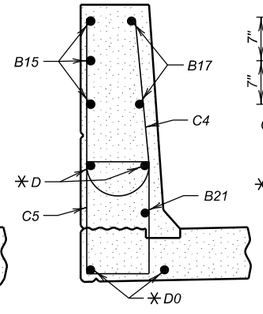


SECTION C - C

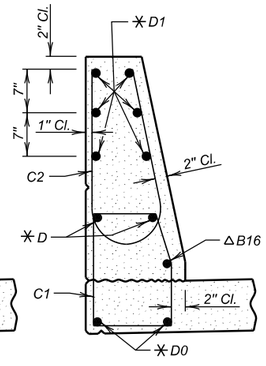
SECTION D - D



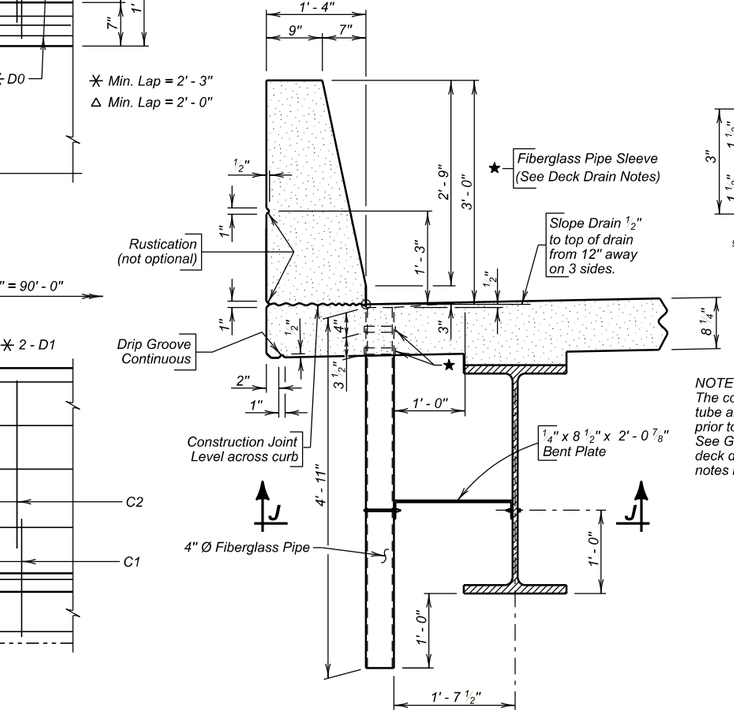
SECTION E - E



SECTION F - F

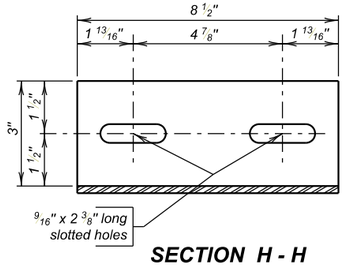


SECTION G - G

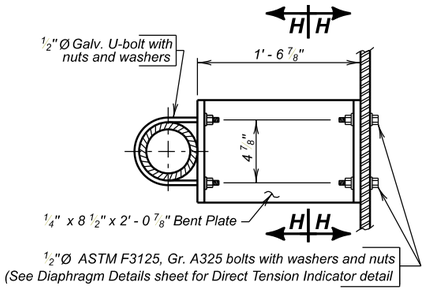


DRAIN AND BARRIER DETAILS

NOTE:
The connection between the drop tube and web of girder shall be made prior to the placing of the deck slab. See General Drawing for spacing of deck drains and note sheets for notes regarding deck drains.



SECTION H - H



SECTION J - J

ENDBLOCK, BARRIER CURB, AND DECK DRAIN DETAILS

FOR

106' - 0" STEEL GIRDER BRIDGE

36' - 0" ROADWAY	0° SKEW
OVER MEDICINE CREEK	SEC. 5-T105N-R79W
STA. 360 + 54.40 TO 361 + 60.40	P-B 0248(12)173
STR. NO. 43-014-188	HL-93

LYMAN COUNTY

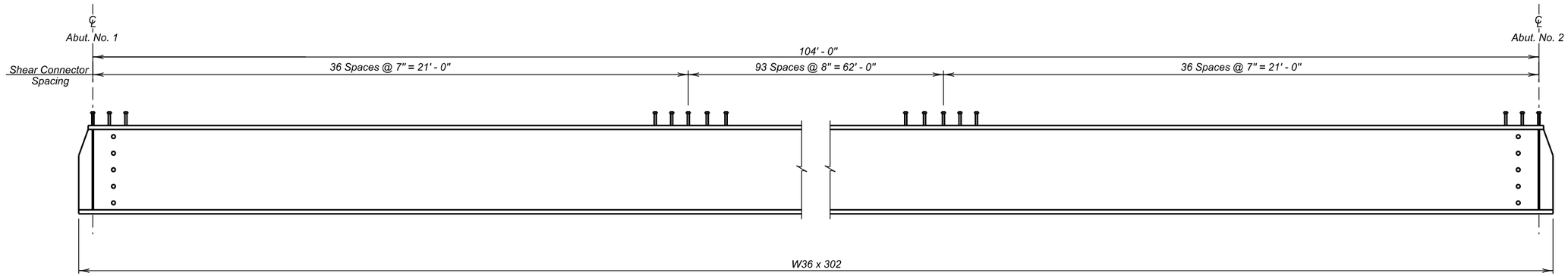
S. D. DEPT. OF TRANSPORTATION

MARCH 2024

10 OF 25

DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU	SK	BT	Steve A Johnson BRIDGE ENGINEER
LYMN06G7	06G7TF10		

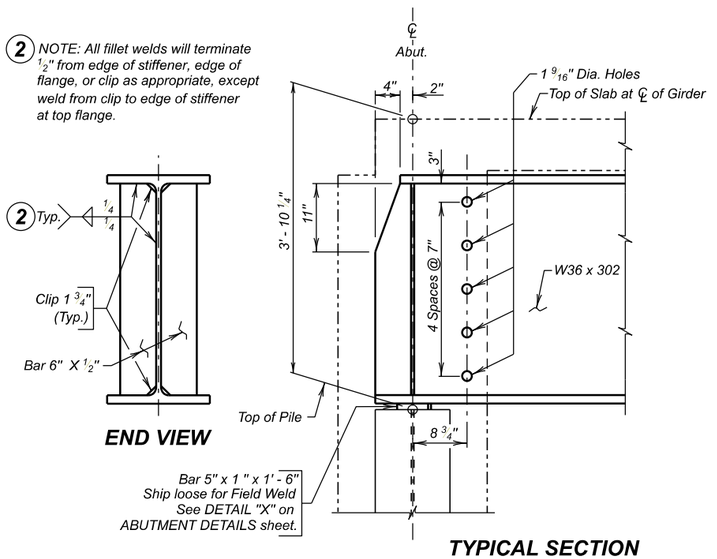
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E85	E99



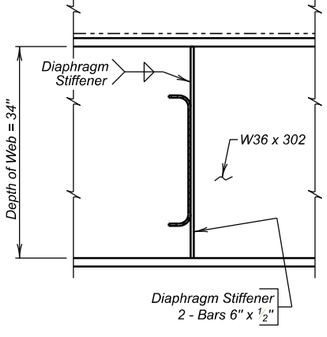
GIRDER LAYOUT

(1) NOTE: All fillet welds attaching diaphragm or bearing stiffeners to girder flanges, will terminate $\frac{1}{2}$" from edge of stiffener, edge of flange, or clip as appropriate.

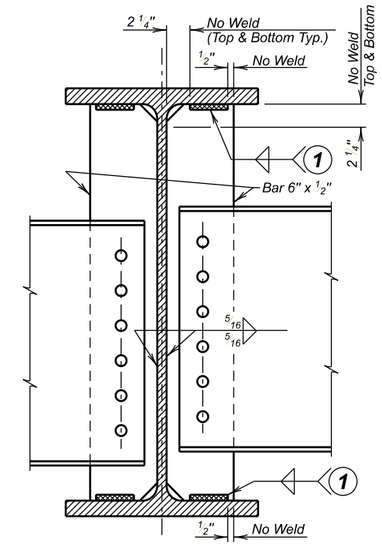
(2) NOTE: All fillet welds will terminate $\frac{1}{2}$" from edge of stiffener, edge of flange, or clip as appropriate, except weld from clip to edge of stiffener at top flange.



TYPICAL SECTION AT ABUTMENTS

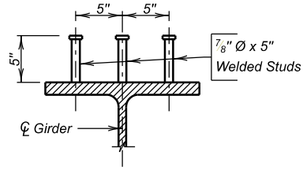


TYPICAL SECTION AT DIAPHRAGM STIFFENER



DETAILS OF STIFFENERS AT INTERMEDIATE DIAPHRAGMS

(Interior Girder shown)



SHEAR CONNECTOR DETAILS

Welded Stud Shear Connectors are spaced as shown on Girder Layout. Payment for Shop Installing Shear Connectors will be included in the Lump Sum bid for Structural Steel. 498 Shear Connectors per Girder.

NOTES:

1. See DIAPHRAGM DETAILS Sheet for Diaphragm Details.
2. See FRAMING DIAGRAM AND ERECTION DATA Sheet for spacing of Diaphragms, Stiffeners, and Girder Camber.
3. All dimensions shown are horizontal or vertical.
4. All Stiffeners and Girder Ends will be made normal to flanges, except bearing stiffeners at abutments shall be vertical.
5. Stiffeners to have tight fit top and bottom.
6. Dimensions shown are for steel temperature of 45° F.

GIRDER LAYOUT DETAILS

FOR

106' - 0" STEEL GIRDER BRIDGE

36' - 0" ROADWAY	0° SKEW
OVER MEDICINE CREEK	SEC. 5-T105N-R79W
STA. 360 + 54.40 TO 361 + 60.40	P-B 0248(12)173
STR. NO. 43-014-188	HL-93

LYMAN COUNTY

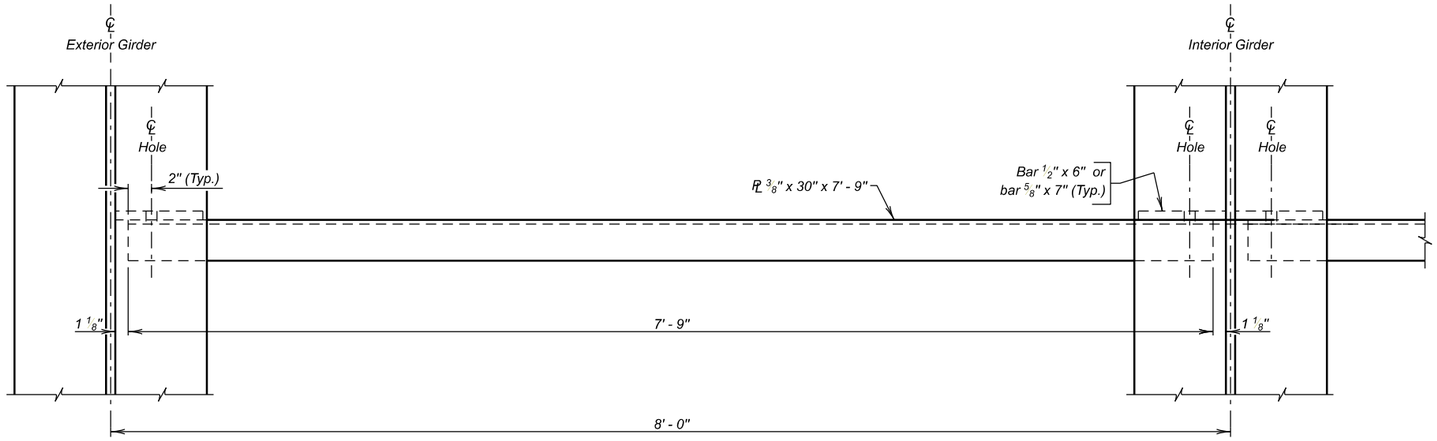
S. D. DEPT. OF TRANSPORTATION

MARCH 2024

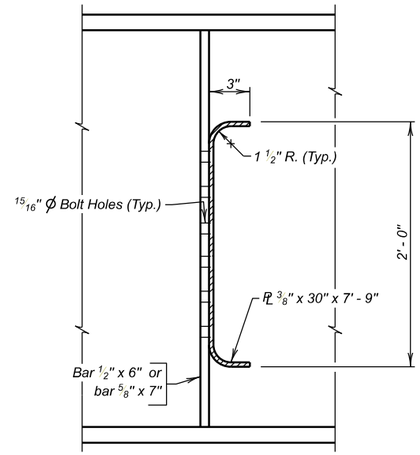
11 OF 25

DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU	SK	BT	BRIDGE ENGINEER
LYMN06G7	06G7TF11		

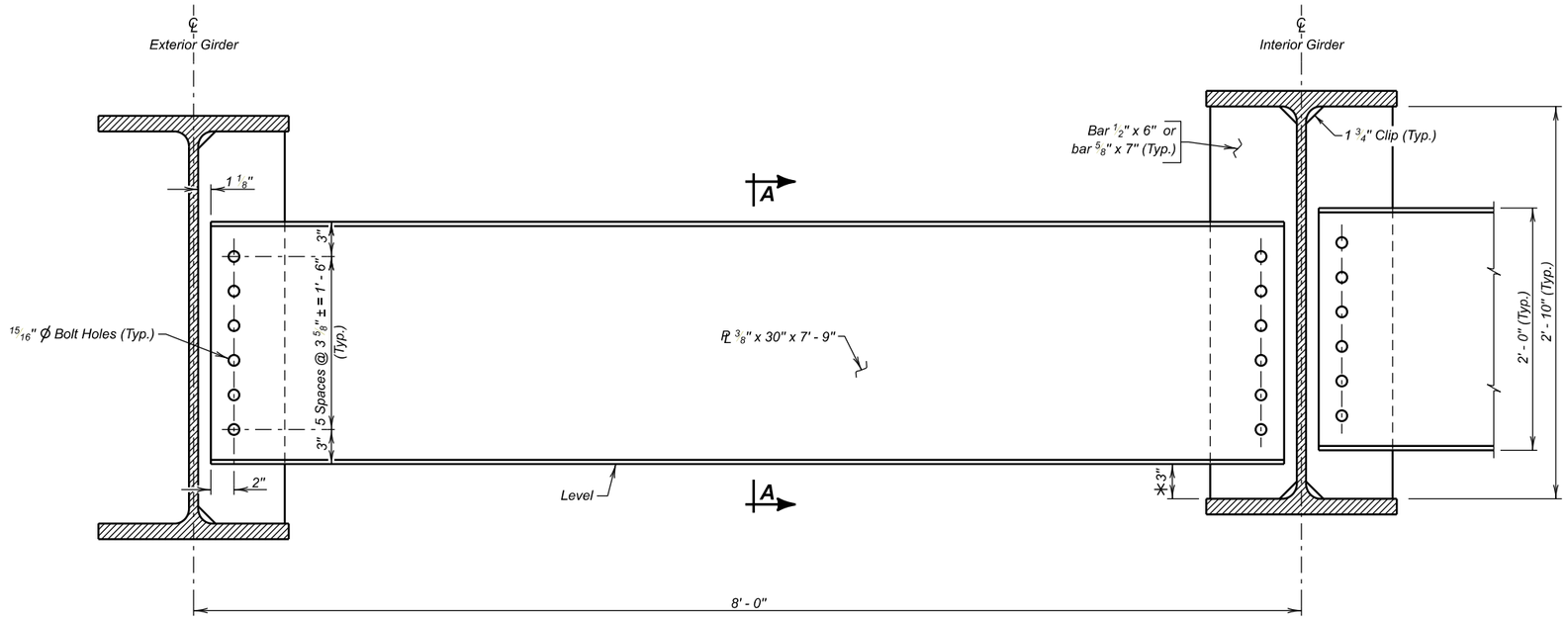
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E86	E99



PLAN

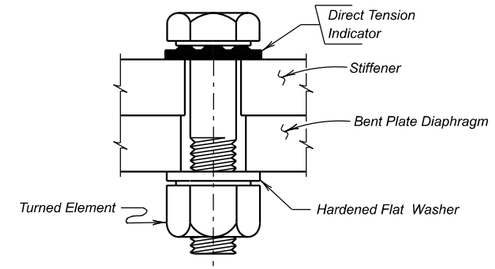


SECTION A - A



DIAPHRAGM DETAIL
(Weight of One Unit = 308 lbs.)

* *At high girder in each bay.*



DIRECT TENSION INDICATOR DETAIL

GENERAL NOTES

1. The Steel Diaphragms are included in the quantity for Structural Steel.
2. Install bolt heads on the side of the connection with the 15/16" Ø bolt holes. Install direct tension indicators under the bolt heads.
3. The 7/8" High Strength bolts, nuts, and washers will conform to ASTM F3125 A325, Type 3. The bolts will be the heavy hexagon head structural type with heavy semi-finished hexagon nut and hardened washer.

DIAPHRAGM DETAILS

FOR

106' - 0" STEEL GIRDER BRIDGE

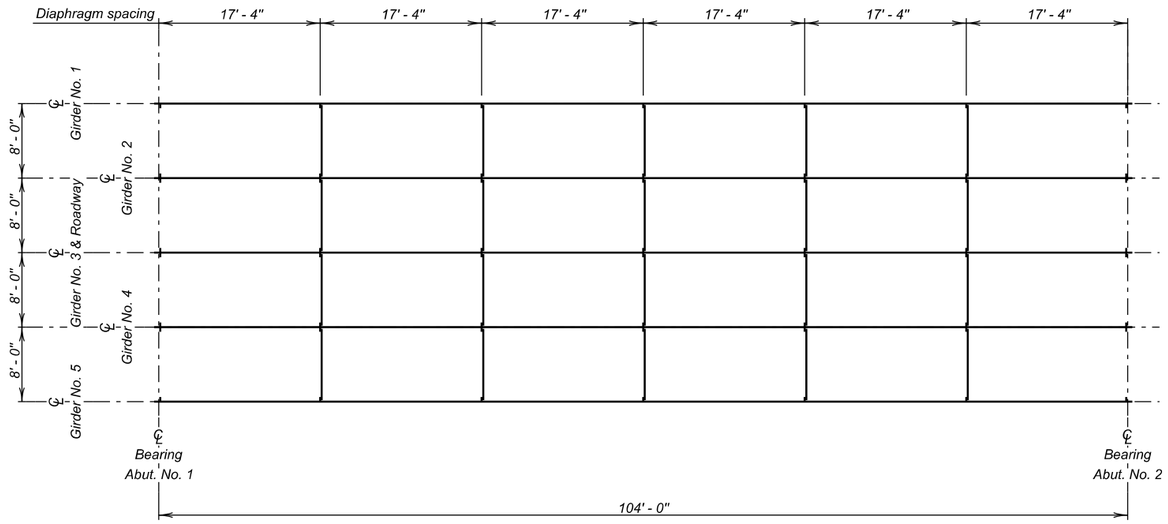
36' - 0" ROADWAY — 0° SKEW
OVER MEDICINE CREEK — SEC. 5-T105N-R79W
STA. 360 + 54.40 TO 361 + 60.40 — P-B 0248(12)173
STR. NO. 43-014-188 — HL-93

LYMAN COUNTY
S. D. DEPT. OF TRANSPORTATION
MARCH 2024

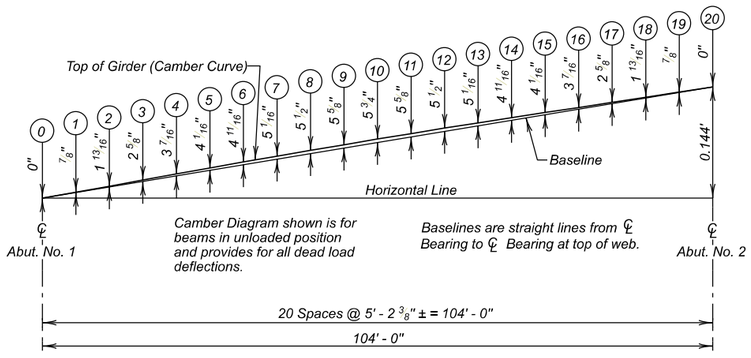
12 OF 25

DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU	SK	BT	Steve A Johnson BRIDGE ENGINEER
LYMN06G7	06G7TF12		

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E87	E99

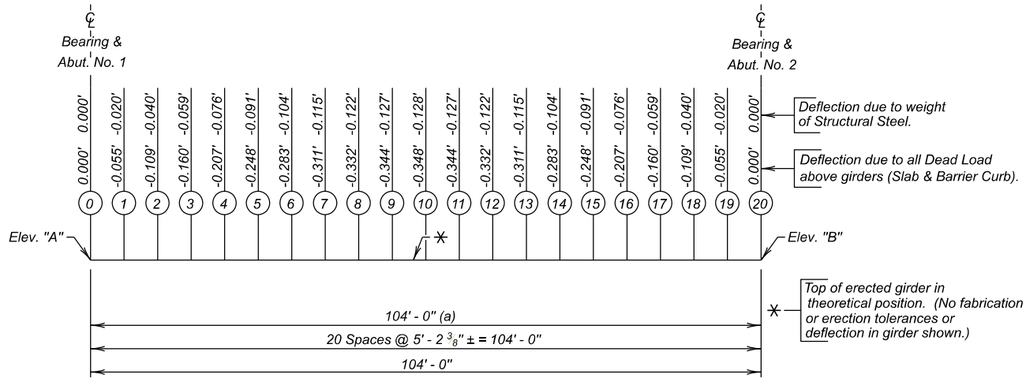


FRAMING DIAGRAM



CAMBER DIAGRAM

(Heat camber into all girders as shown)



GIRDER ERECTION DIAGRAM

℄ GIRDER ERECTION ELEVATIONS AND SLOPES

Girder No.	ELEVATIONS (Top of Girder) "A"	ELEVATIONS (Top of Girder) "B"	SLOPES (%) a
1	1932.327	1932.183	-0.1382
2	1932.487	1932.343	-0.1382
3	1932.647	1932.503	-0.1382
4	1932.487	1932.343	-0.1382
5	1932.327	1932.183	-0.1382

℄ *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.

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

FRAMING DIAGRAM AND ERECTION DATA

FOR

106' - 0" STEEL GIRDER BRIDGE

36' - 0" ROADWAY — 0° SKEW
OVER MEDICINE CREEK — SEC. 5-T105N-R79W
STA. 360 + 54.40 TO 361 + 60.40 — P-B 0248(12)173
STR. NO. 43-014-188 — HL-93

LYMAN COUNTY
S. D. DEPT. OF TRANSPORTATION
MARCH 2024

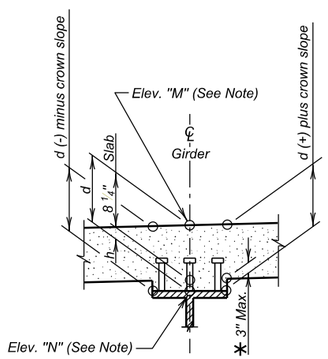
13 OF 25

DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU LYMN06G7	SK 06G7TF13	BT	Steve A Johnson BRIDGE ENGINEER

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E88	E99

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"	1933.181	1933.225	1933.268	1933.308	1933.344	1933.376	1933.402	1933.421	1933.433	1933.438	1933.434	1933.423	1933.404	1933.378	1933.344	1933.304	1933.258	1933.207	1933.153	1933.096	1933.037
	(-) Elev. "N"																					
	(=) d																					
	(-) 0.688																					
	(=) h																					
Girder No. 2	Elev. "M"	1933.341	1933.385	1933.428	1933.468	1933.504	1933.536	1933.562	1933.581	1933.593	1933.598	1933.594	1933.583	1933.564	1933.538	1933.504	1933.464	1933.418	1933.367	1933.313	1933.256	1933.197
	(-) Elev. "N"																					
	(=) d																					
	(-) 0.688																					
	(=) h																					
Girder No. 3	Elev. "M"	1933.501	1933.545	1933.588	1933.628	1933.664	1933.696	1933.722	1933.741	1933.753	1933.758	1933.754	1933.743	1933.724	1933.698	1933.664	1933.624	1933.578	1933.527	1933.473	1933.416	1933.357
	(-) Elev. "N"																					
	(=) d																					
	(-) 0.688																					
	(=) h																					
Girder No. 4	Elev. "M"	1933.341	1933.385	1933.428	1933.468	1933.504	1933.536	1933.562	1933.581	1933.593	1933.598	1933.594	1933.583	1933.564	1933.538	1933.504	1933.464	1933.418	1933.367	1933.313	1933.256	1933.197
	(-) Elev. "N"																					
	(=) d																					
	(-) 0.688																					
	(=) h																					
Girder No. 5	Elev. "M"	1933.181	1933.225	1933.268	1933.308	1933.344	1933.376	1933.402	1933.421	1933.433	1933.438	1933.434	1933.423	1933.404	1933.378	1933.344	1933.304	1933.258	1933.207	1933.153	1933.096	1933.037
	(-) 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 will 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

106' - 0" STEEL GIRDER BRIDGE

36' - 0" ROADWAY — 0° SKEW
OVER MEDICINE CREEK — SEC. 5-T105N-R79W
STA. 360 + 54.40 TO 361 + 60.40 — P-B 0248(12)173
STR. NO. 43-014-188 — HL-93

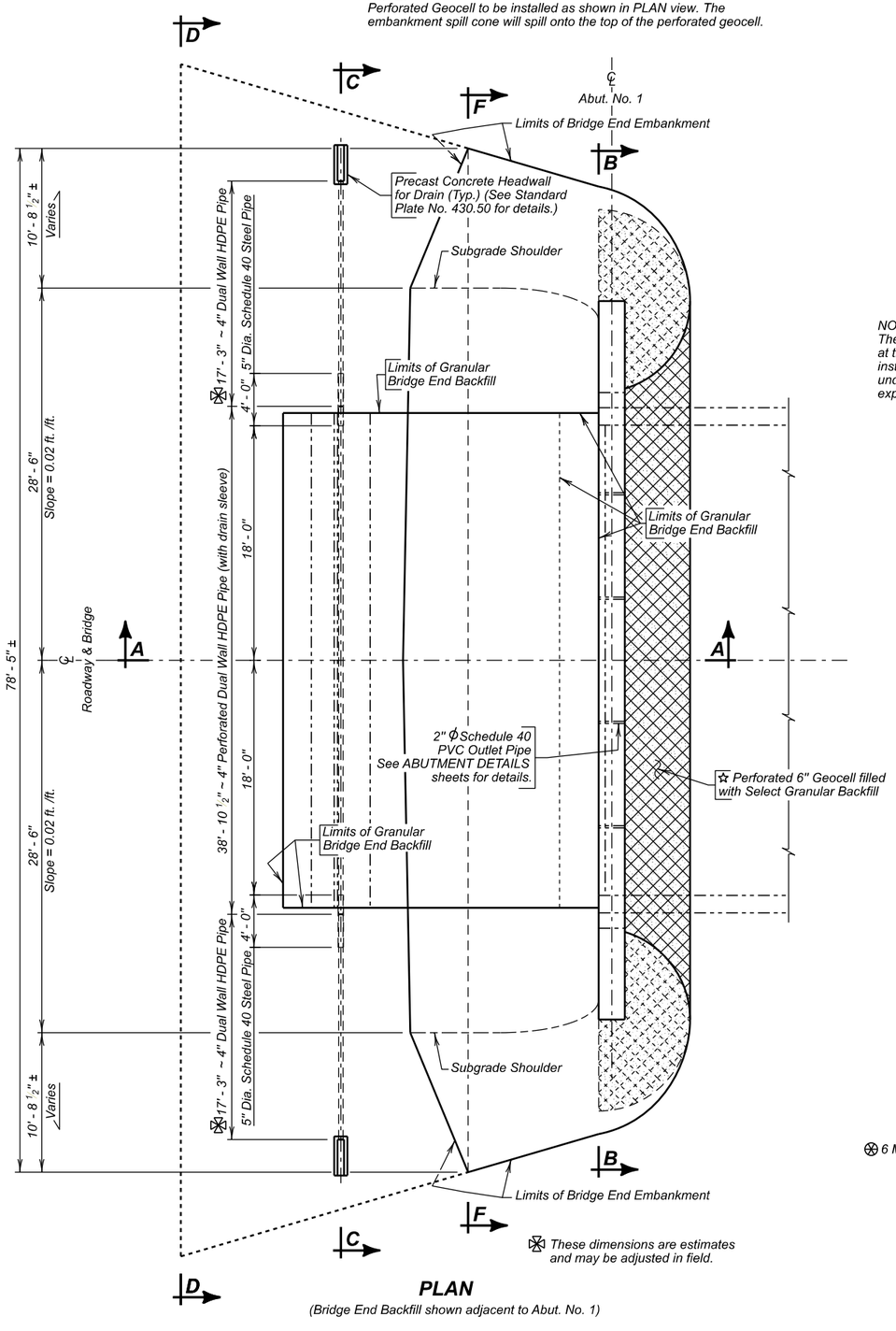
LYMAN COUNTY
S. D. DEPT. OF TRANSPORTATION
MARCH 2024

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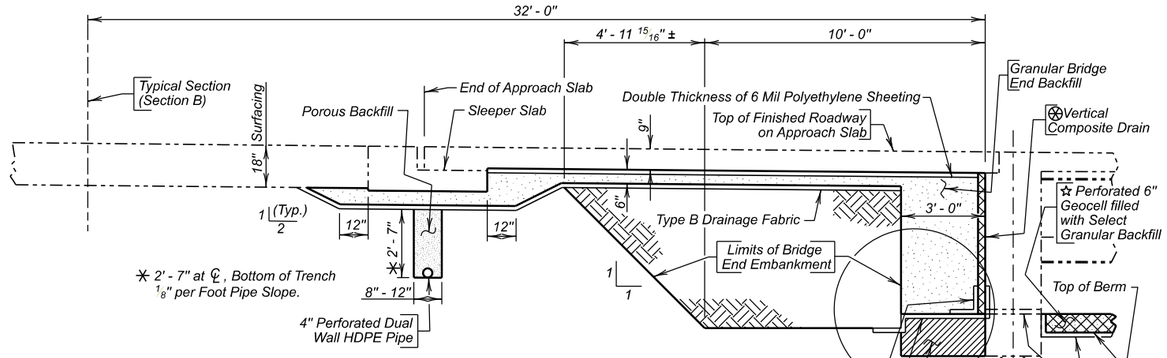
DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU	SK	BT	Steve A. Johnson BRIDGE ENGINEER
LYMN06G7	06G7TF14		

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E89	E99

NOTE:
Perforated Geocell to be installed as shown in PLAN view. The embankment spill cone will spill onto the top of the perforated geocell.



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

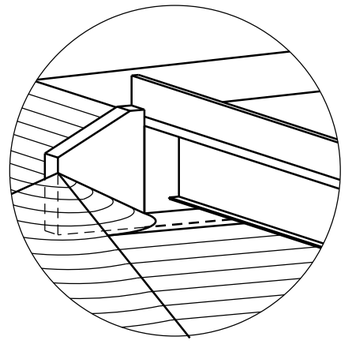


SECTION A - A
(at ℄ Roadway)

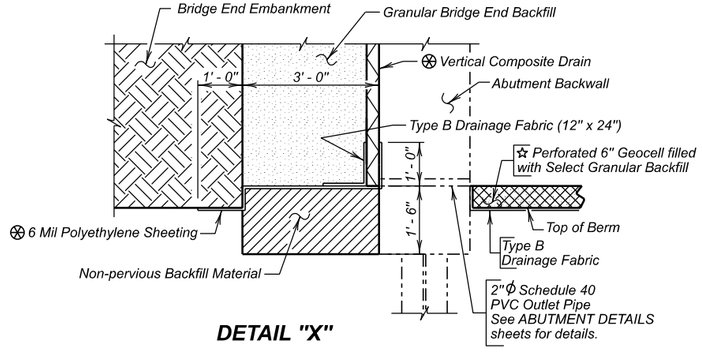
NOTE:
The Contractor will ensure the underdrain pipes located at the sleeper slab are not damaged during the installation of the guardrail posts. Damaged underdrain pipes will be replaced at the Contractor's expense.

Provide hole in vertical composite drain and 6 mil polyethylene sheeting to provide drainage through weep holes.

☆ See PERFORATED GEOCELL notes for payment information.



SPILL CONE DETAIL AT EMBANKMENT



DETAIL "X"

ESTIMATED QUANTITIES

ITEM	UNIT	QUANTITY
Granular Bridge End Backfill	Cu. Yd.	91.5
Bridge End Embankment	Cu. Yd.	400
Porous Backfill	Ton	12.3
4" Perforated Dual Wall HDPE Pipe	Ft.	39
4" Dual Wall HDPE Pipe	Ft.	35
Approach Slab Underdrain Excavation	Cu. Yd.	6.5
Precast Concrete Headwall for Drain	Each	2

1. 8 ft. 5" dia. Schedule 40 Steel Pipe.
Item 1 is the approximate quantity contained in the 4" Perforated Dual Wall HDPE Pipe and is for information only.
2. 555 sq. ft. Vertical Composite Drain.
3. 2910 sq. ft. 6 mil Polyethylene Sheeting, not including laps.
4. 164 sq. yd. Type B Drainage Fabric.
Items 2 thru 4 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
ADJ. TO ABUT. NO. 1 (A)
FOR
106' - 0" STEEL GIRDER BRIDGE

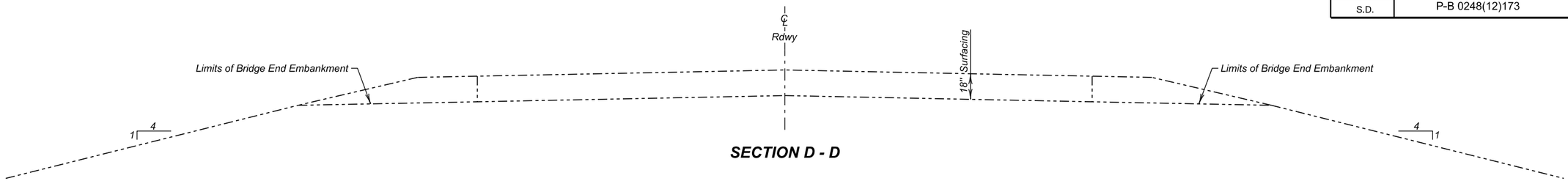
36' - 0" ROADWAY — 0° SKEW
OVER MEDICINE CREEK — SEC. 5-T105N-R79W
STA. 360 + 54.40 TO 361 + 60.40 — P-B 0248(12)173
STR. NO. 43-014-188 — HL-93

LYMAN COUNTY
S. D. DEPT. OF TRANSPORTATION
MARCH 2024

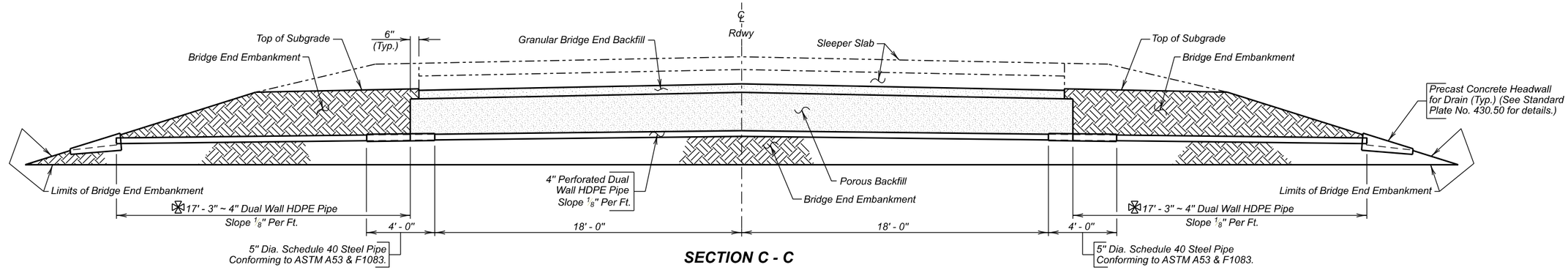
15 OF 25

DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU	SK	BT	Steve A Johnson BRIDGE ENGINEER
LYMN06G7	06G7TF15		

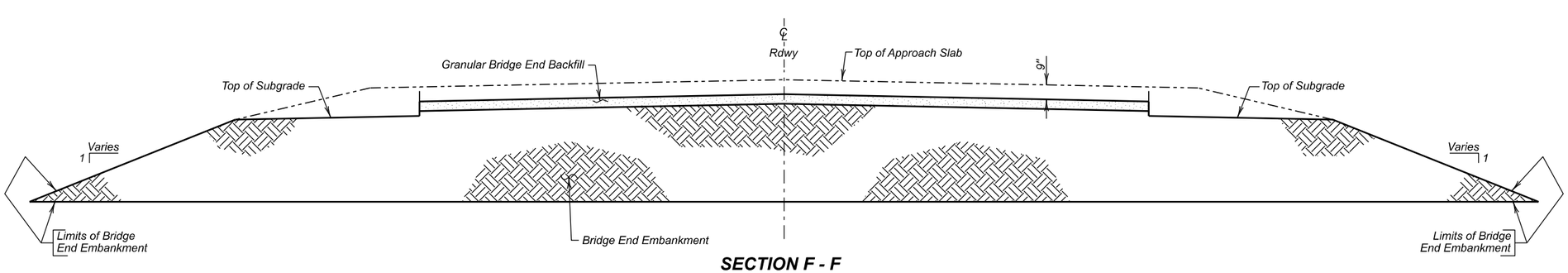
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E90	E99



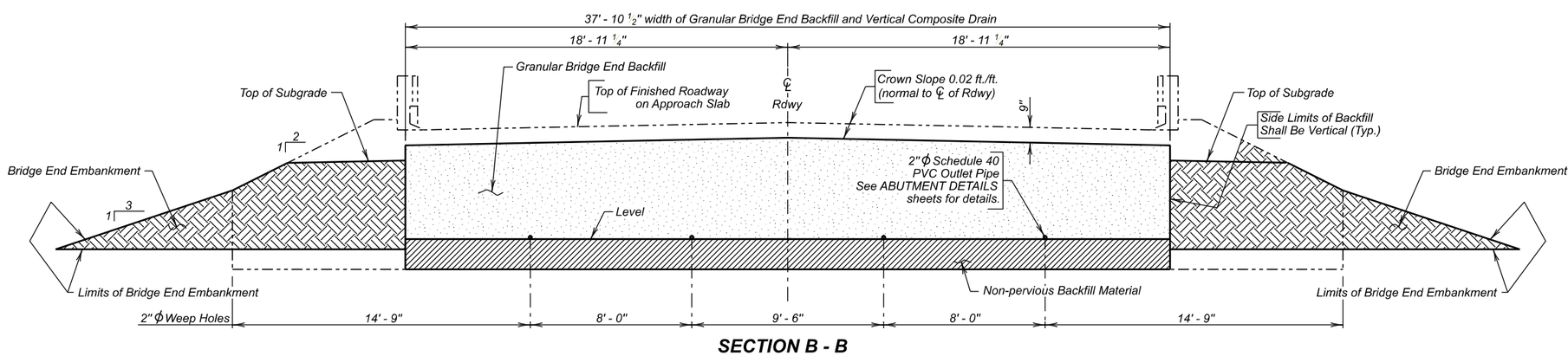
SECTION D - D



SECTION C - C



SECTION F - F



SECTION B - B

DETAILS OF BRIDGE END BACKFILL ADJ. TO ABUT. NO. 1 (A)
FOR
106' - 0" STEEL GIRDER BRIDGE

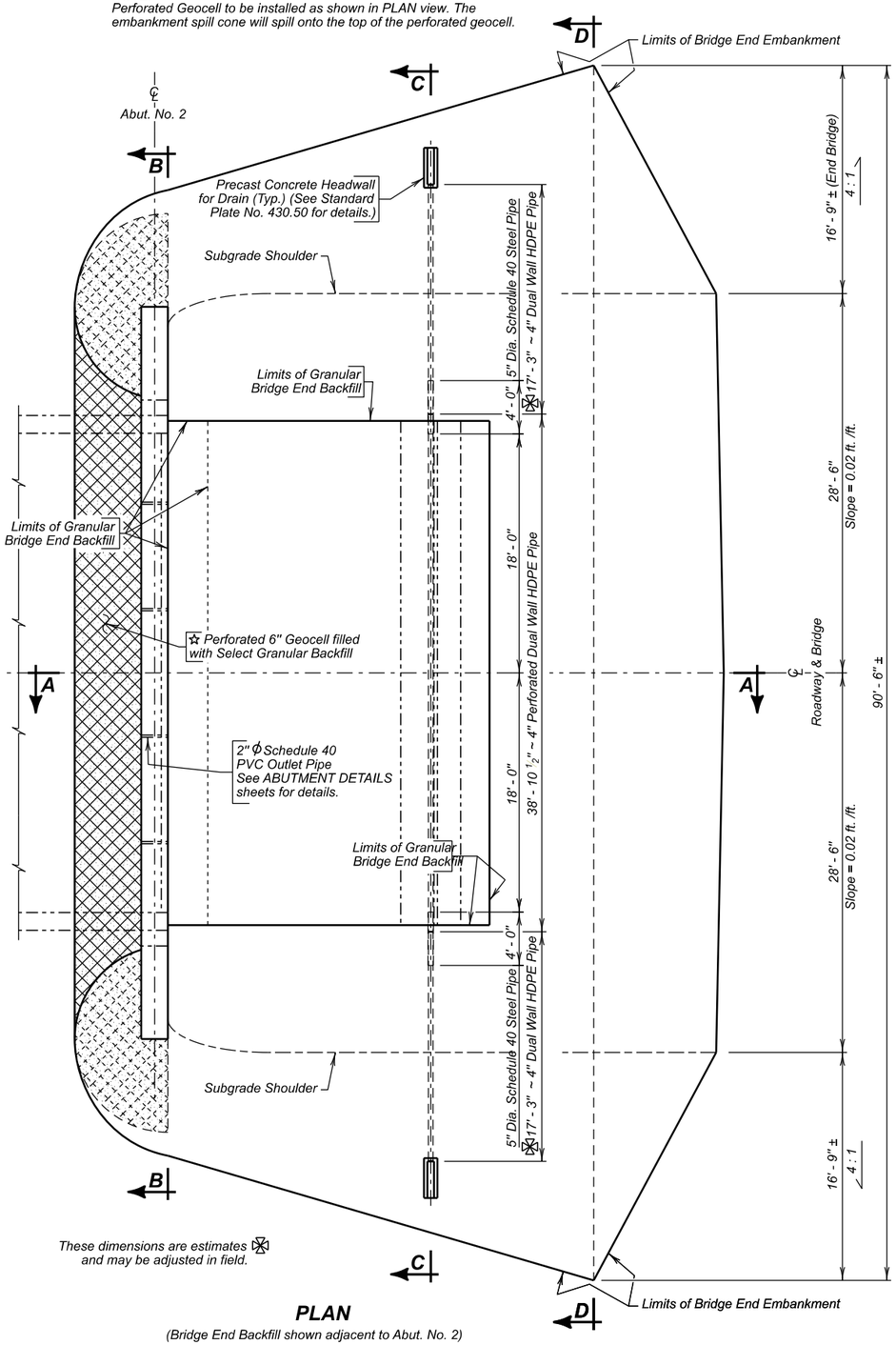
36' - 0" ROADWAY	0° SKEW
OVER MEDICINE CREEK	SEC. 5-T105N-R79W
STA. 360 + 54.40 TO 361 + 60.40	P-B 0248(12)173
STR. NO. 43-014-188	HL-93

LYMAN COUNTY
S. D. DEPT. OF TRANSPORTATION
MARCH 2024

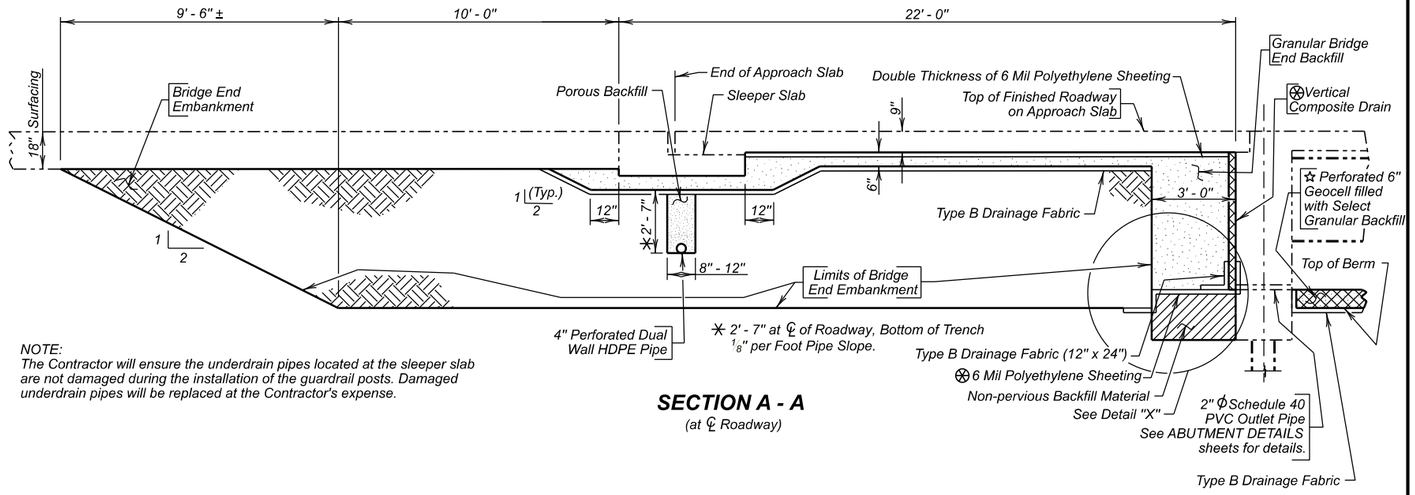
DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU	SK	BT	Steve A. Johnson BRIDGE ENGINEER
LYMN06G7	06G7TF16		

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E91	E99

NOTE:
Perforated Geocell to be installed as shown in PLAN view. The embankment spill cone will spill onto the top of the perforated geocell.

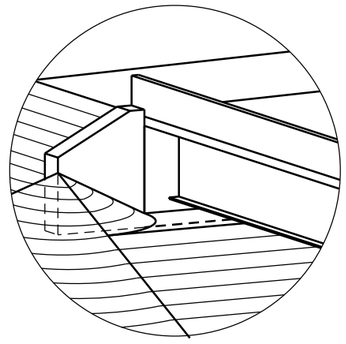


PLAN
(Bridge End Backfill shown adjacent to Abut. No. 2)

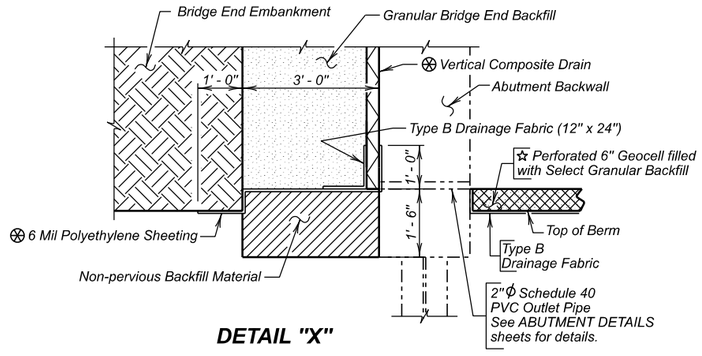


NOTE:
The Contractor will ensure the underdrain pipes located at the sleeper slab are not damaged during the installation of the guardrail posts. Damaged underdrain pipes will be replaced at the Contractor's expense.

SECTION A - A
(at ℄ Roadway)



SPILL CONE DETAIL AT EMBANKMENT



DETAIL "X"

⊛ Provide hole in vertical composite drain and 6 mil polyethylene sheeting to provide drainage through weep holes.

☆ See PERFORATED GEOCELL notes for payment information.

ESTIMATED QUANTITIES

ITEM	UNIT	QUANTITY
Granular Bridge End Backfill	Cu. Yd.	91.5
Bridge End Embankment	Cu. Yd.	1510
Porous Backfill	Ton	12.3
4" Perforated Dual Wall HDPE Pipe	Ft.	39
4" Dual Wall HDPE Pipe	Ft.	35
Approach Slab Underdrain Excavation	Cu. Yd.	6.5
Precast Concrete Headwall for Drain	Each	2

1. 8 ft. 5" dia. Schedule 40 Steel Pipe.
Item 1 is the approximate quantity contained in the 4" Perforated Dual Wall HDPE Pipe and is for information only.
2. 555 sq. ft. Vertical Composite Drain.
3. 2910 sq. ft. 6 mil Polyethylene Sheeting, not including laps.
4. 164 sq. yd. Type B Drainage Fabric.
Items 2 thru 4 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
ADJ. TO ABUT. NO. 2 (A)
FOR
106' - 0" STEEL GIRDER BRIDGE

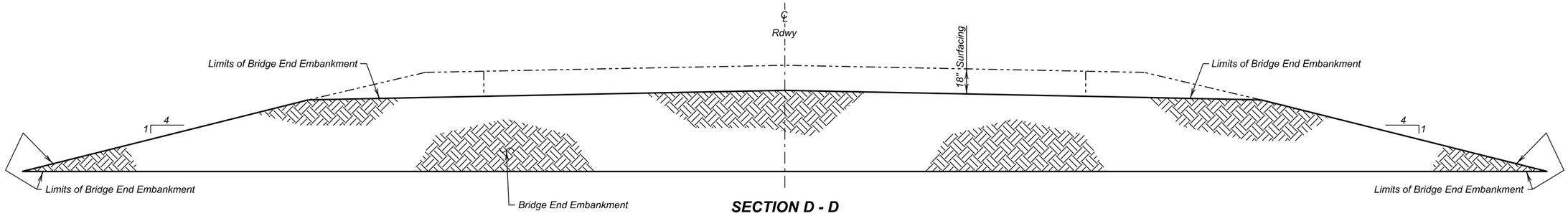
36' - 0" ROADWAY — 0° SKEW
OVER MEDICINE CREEK — SEC. 5-T105N-R79W
STA. 360 + 54.40 TO 361 + 60.40 — P-B 0248(12)173
STR. NO. 43-014-188 — HL-93

LYMAN COUNTY
S. D. DEPT. OF TRANSPORTATION
MARCH 2024

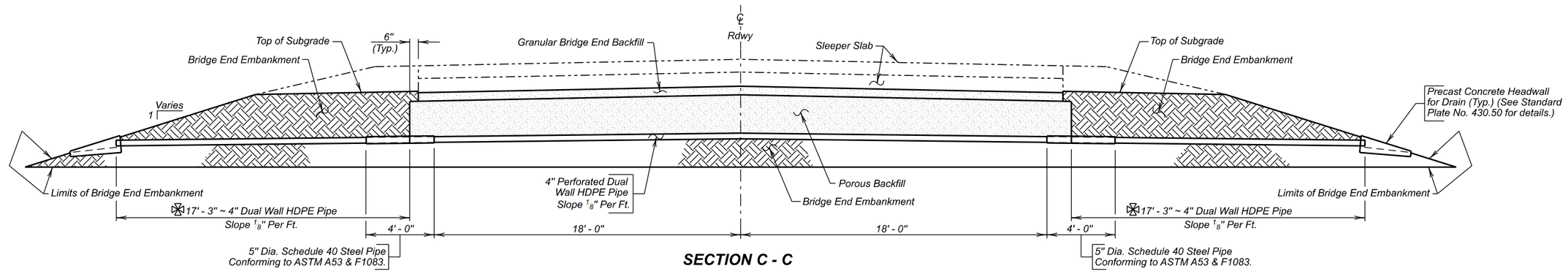
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DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU	SK	BT	Steve A Johnson BRIDGE ENGINEER
LYMN06G7	06G7TF17		

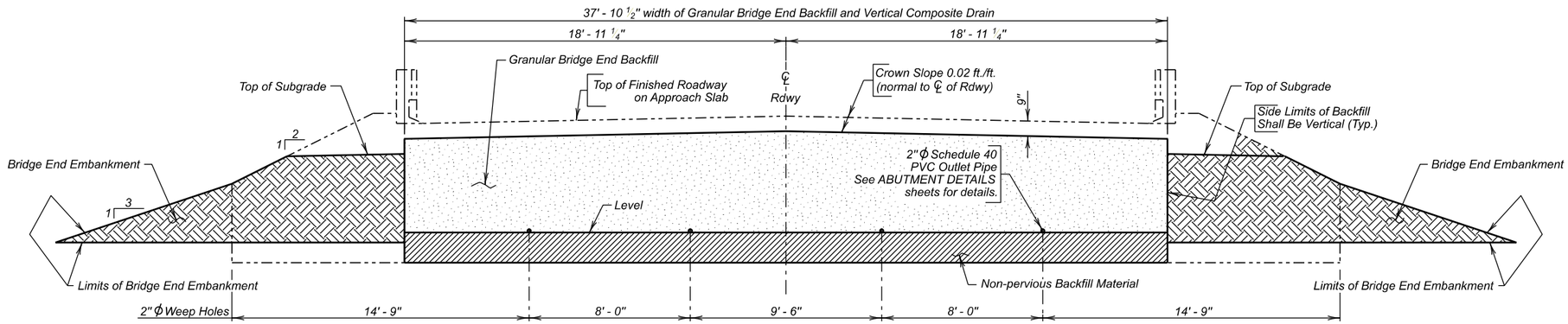
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E92	E99



SECTION D - D



SECTION C - C



SECTION B - B

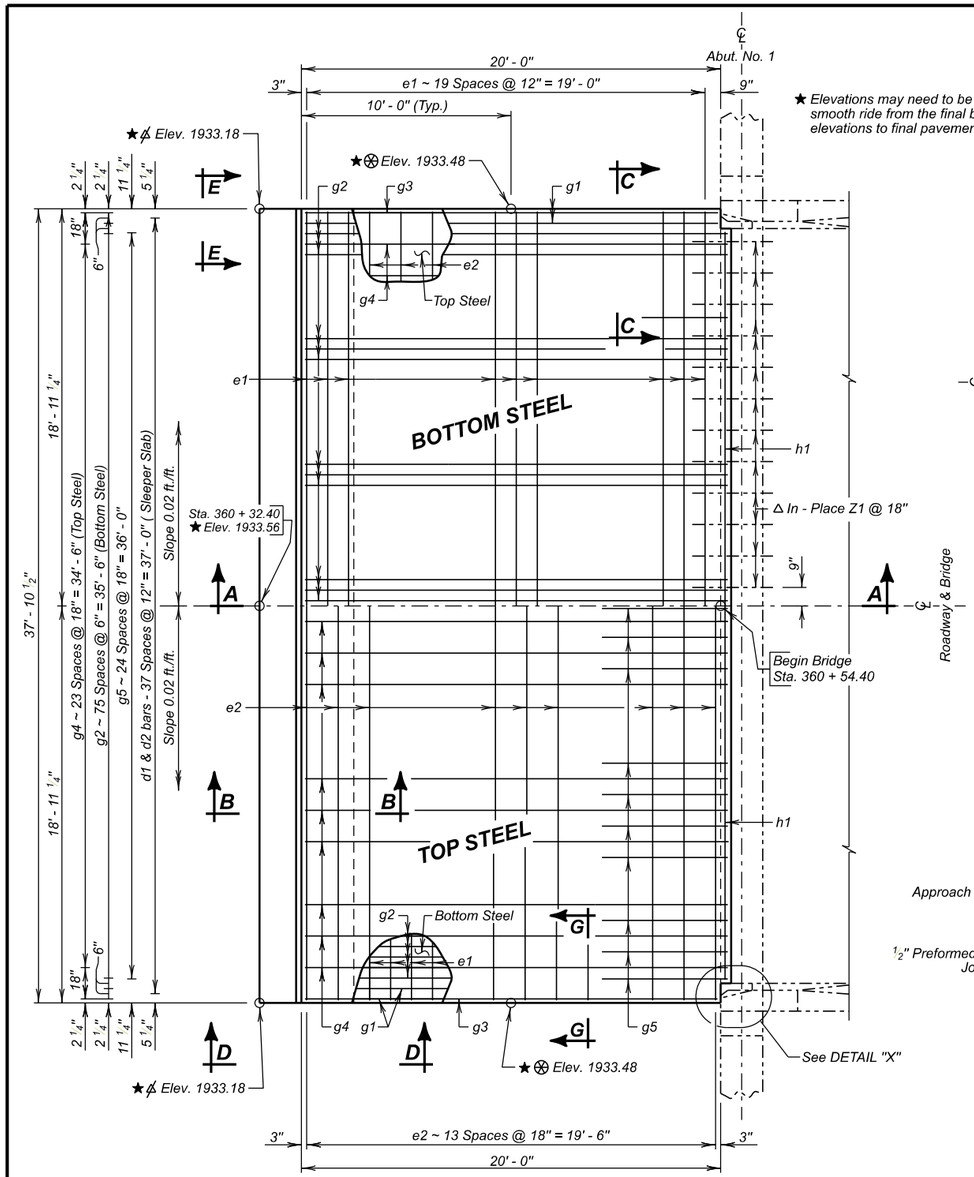
DETAILS OF BRIDGE END BACKFILL
ADJ. TO ABUT. NO. 2 (B)
FOR
106' - 0" STEEL GIRDER BRIDGE

36' - 0" ROADWAY — 0° SKEW
OVER MEDICINE CREEK — SEC. 5-T105N-R79W
STA. 360 + 54.40 TO 361 + 60.40 — P-B 0248(12)173
STR. NO. 43-014-188 — HL-93

LYMAN COUNTY
S. D. DEPT. OF TRANSPORTATION
MARCH 2024

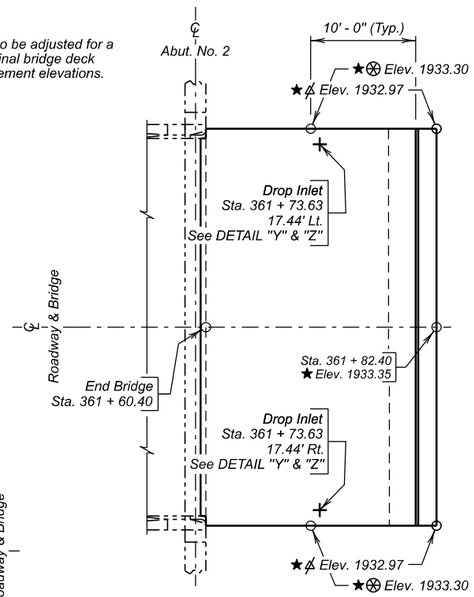
DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU	SK	BT	Steve A. Johnson BRIDGE ENGINEER
LYMN06G7	06G7TF18		

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E93	E99



PLAN
(Shown adj. to Abut. No. 1, Abut No. 2 similar opposite hand except as shown.)

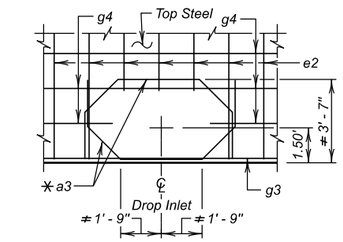
★ Elevations may need to be adjusted for a smooth ride from the final bridge deck elevations to final pavement elevations.



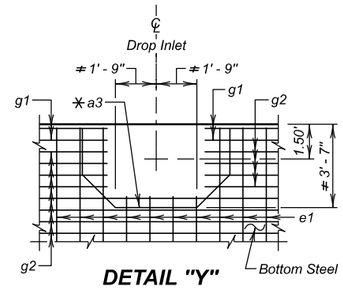
PLAN
(Shown adj. to Abut. No. 2)

⚹ Add a3 bar to bottom layer of steel as shown in DETAIL "Y" and top layer of steel as shown in DETAIL "Z".

≠ Cut all bars in area of drop inlet as shown in DETAIL "Y" and DETAIL "Z".



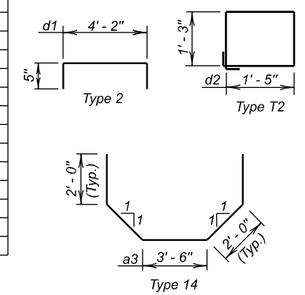
DETAIL "Z"
(Plan for Top Steel when drop inlet is used.)



DETAIL "Y"
(Plan for Bottom Steel when drop inlet is used.)

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

Mk.	No.	Size	Length	Type
Sleeper Slabs				
c1	32	5	37' - 7"	Str.
d1	152	4	5' - 0"	2
d2	76	4	6' - 1"	T2
Approach Slabs				
a3	6	4	11' - 6"	14
e1	40	6	37' - 7"	Str.
e2	28	4	37' - 7"	Str.
g1	8	8	19' - 8"	Str.
g2	144	8	20' - 2"	Str.
g3	4	4	19' - 8"	Str.
g4	48	4	20' - 2"	Str.
g5	50	4	6' - 0"	Str.
h1	4	6	35' - 8"	Str.



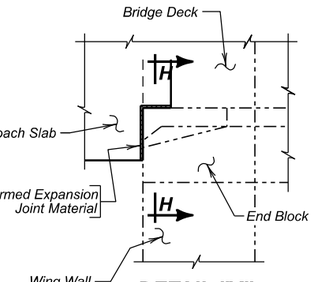
NOTE:
All bars to be epoxy coated.
All dimensions are out to out of bars.

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

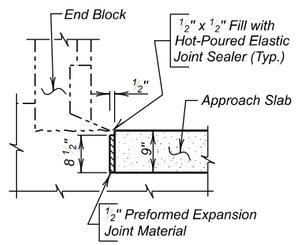
ITEM	UNIT	QUANTITY
Concrete Approach Slab for Bridge	Sq. Yd.	172.3
Concrete Approach Sleeper Slab for Bridge	Sq. Yd.	37.9

1. 44.2 Cu. Yds. Concrete in Approach Slabs.
2. 12680 Lbs. Epoxy Coated Re-Steel in Approach Slabs.
3. 13.6 Cu. Yds. Concrete in Sleeper Slabs.
4. 2071 Lbs. Epoxy Coated Re-Steel in Sleeper Slabs.
5. 19 Sq. Ft. of Polystryrene Insulation Board

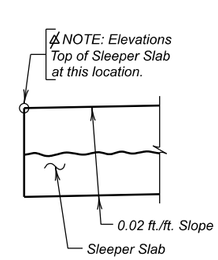
Items 1 thru 5 are approximate quantities contained in the above bid items and are for information only.



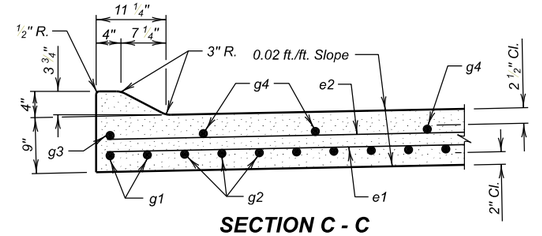
DETAIL "X"
(Typ. all corners)



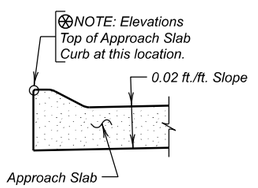
SECTION H - H



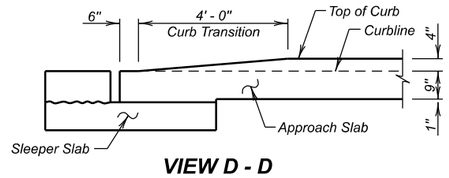
VIEW E - E



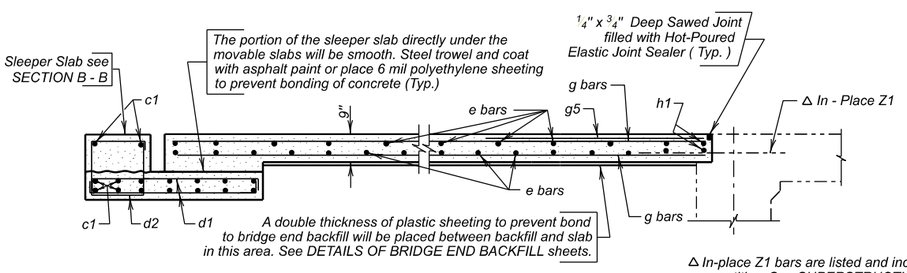
SECTION C - C



SECTION G - G
(Resteel not show)

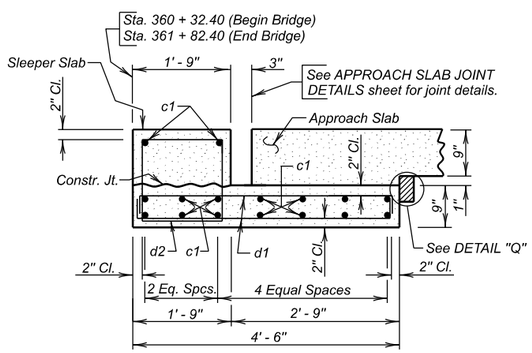


VIEW D - D

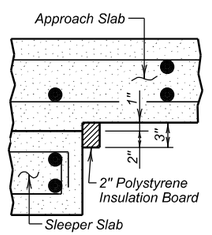


SECTION A - A

△ In-place Z1 bars are listed and included in superstructure quantities. See SUPERSTRUCTURE DETAILS sheet.



SECTION B - B
(Sleeper Slab)



DETAIL "Q"

Revised September 15, 2026 SK

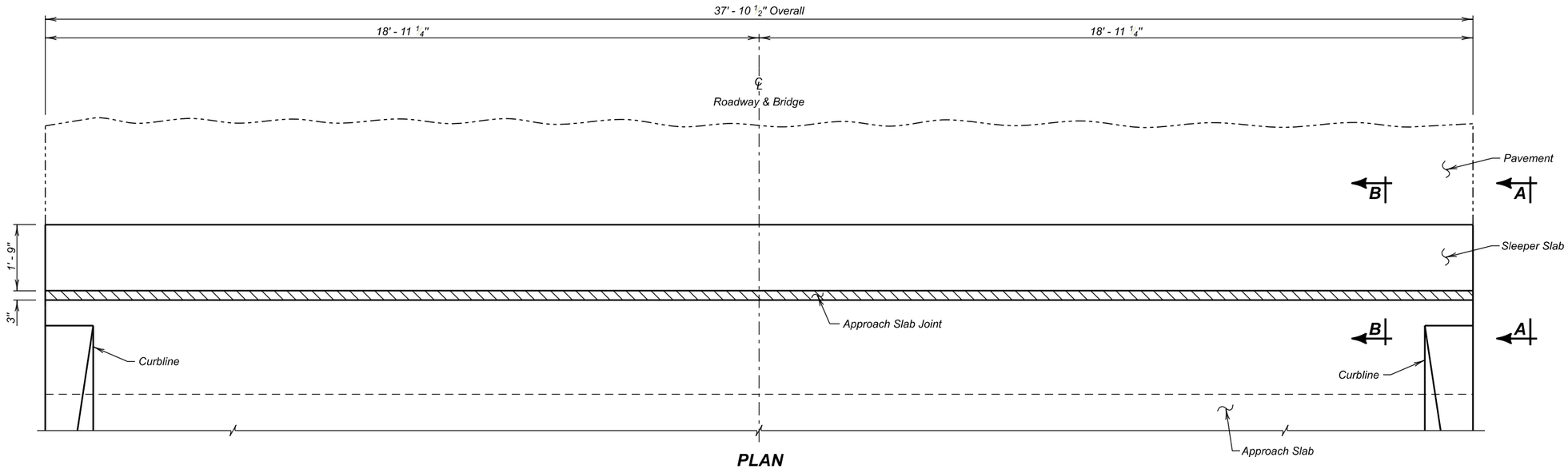
DETAILS OF APPROACH SLAB ADJACENT TO BRIDGE
FOR
106' - 0" STEEL GIRDER BRIDGE

36' - 0" ROADWAY — 0° SKEW
OVER MEDICINE CREEK — SEC. 5-T105N-R79W
STA. 360 + 54.40 TO 361 + 60.40 — P-B 0248(12)173
STR. NO. 43-014-188 — HL-93

LYMAN COUNTY
S. D. DEPT. OF TRANSPORTATION
MARCH 2024

DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU	SK	BT	Steve A. Johnson BRIDGE ENGINEER
LYMN06G7	06G7TF19		

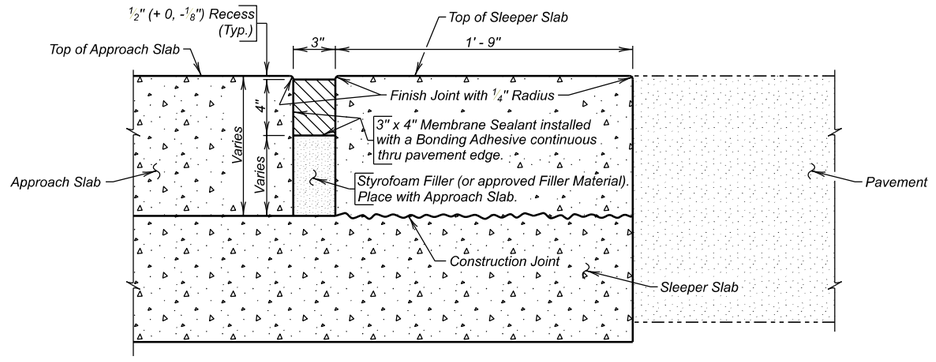
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E94	E99



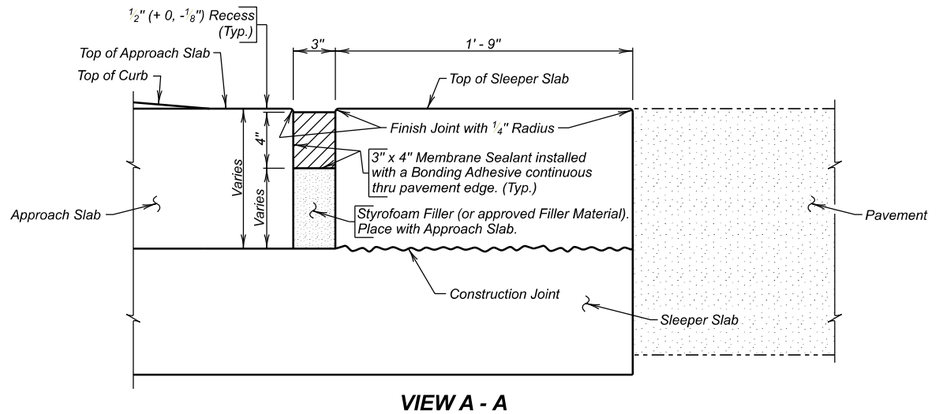
PLAN

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.



SECTION B - B



VIEW A - A

ESTIMATED QUANTITIES
(For Two Approach Slabs)

ITEM	UNIT	QUANTITY
Membrane Sealant Expansion Joint	Ft.	75.8

APPROACH SLAB JOINT DETAILS

FOR

106' - 0" STEEL GIRDER BRIDGE

36' - 0" ROADWAY	0° SKEW
OVER MEDICINE CREEK	SEC. 5-T105N-R79W
STA. 360 + 54.40 TO 361 + 60.40	P-B 0248(12)173
STR. NO. 43-014-188	HL-93

LYMAN COUNTY

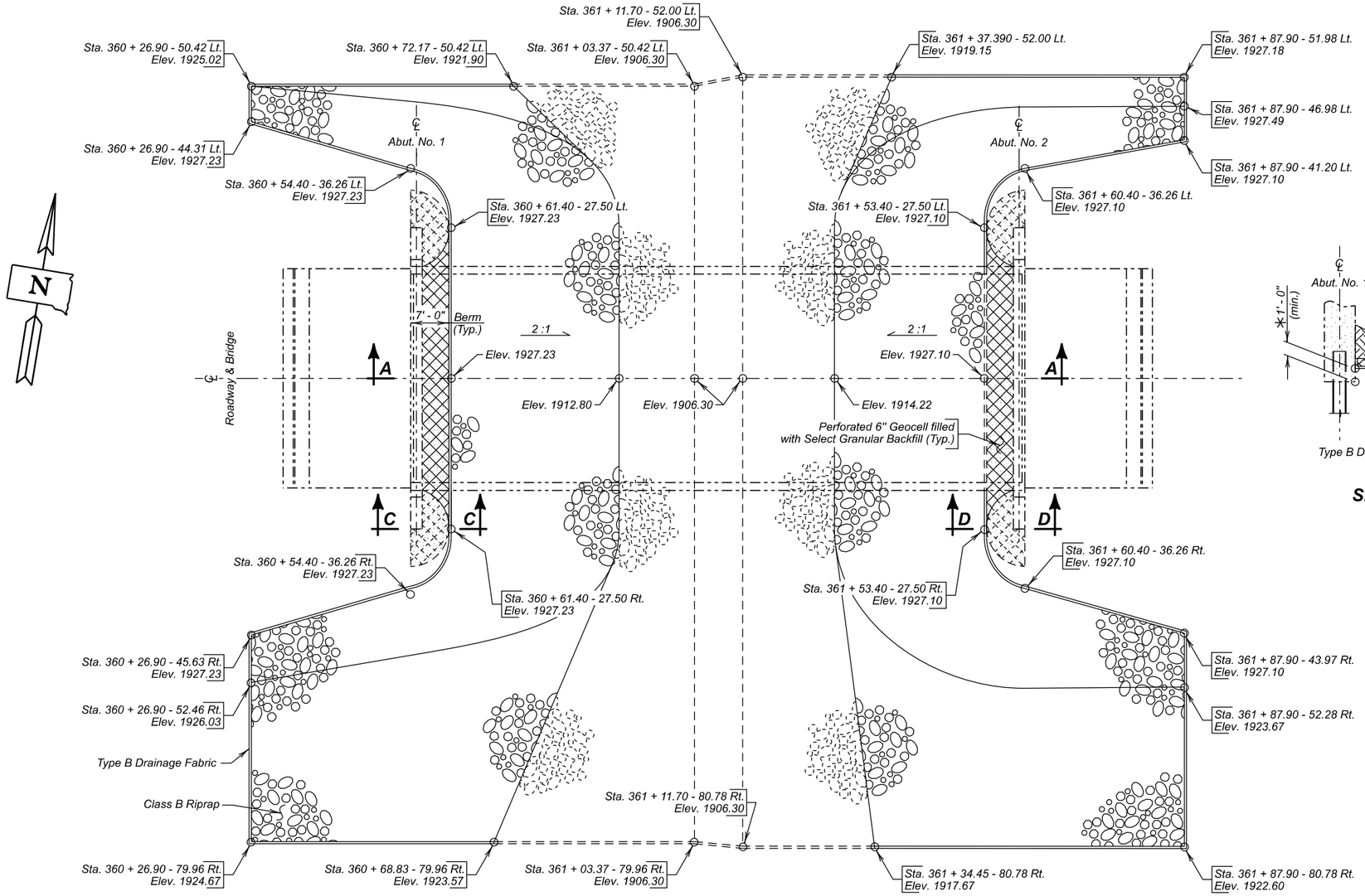
S. D. DEPT. OF TRANSPORTATION

MARCH 2024

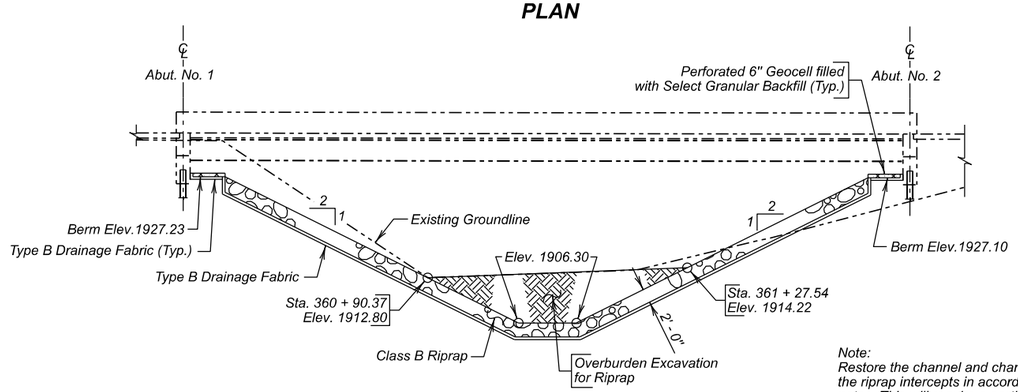
20 OF 25

DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU	SK	BT	Steve A Johnson BRIDGE ENGINEER
LYMN06G7	06G7TF20		

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E95	E99

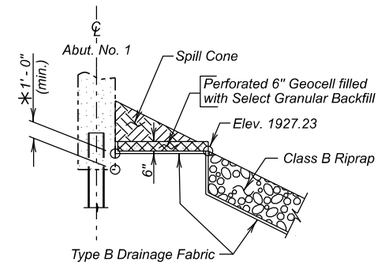


PLAN

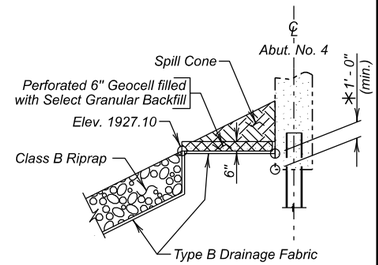


SECTION A - A

Note:
Restore the channel and channel banks to the existing conditions between the riprap intercepts in accordance with the Overburden Excavation for Riprap notes. This will require a portion of the riprap to be buried.



SECTION C - C



SECTION D - D

⚹ *Bridge berm will be built according to Standard Plate No. 120.10. (See SECTION B.)*

ESTIMATED QUANTITIES

	ITEM	UNIT	QUANTITY
⚹	Class B Riprap	Ton	1635.0
	Type B Drainage Fabric	Sq. Yd.	1903
	Overburden Excavation for Riprap	Cu. Yd.	584
⏢	Select Granular Backfill	Ton	14.7
☆	Perforated Geocell	Sq. Ft.	419

☆ *See PERFORATED GEOCELL notes for payment information.*

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

RIPRAP DETAILS

FOR

106' - 0" STEEL GIRDER BRIDGE

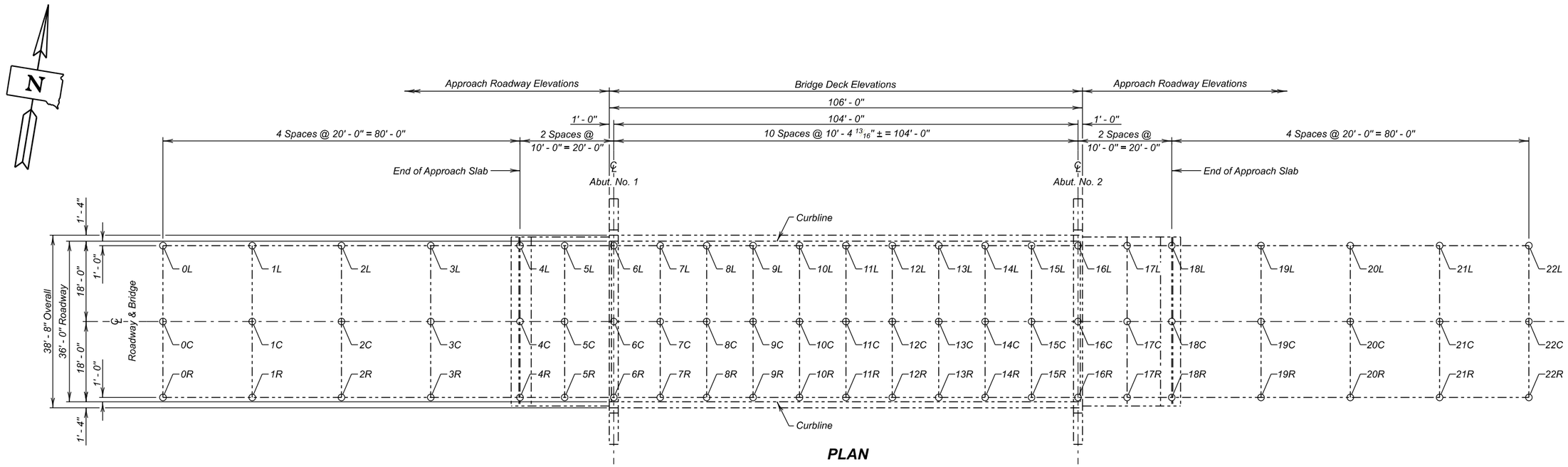
36' - 0" ROADWAY — 0° SKEW
OVER MEDICINE CREEK — SEC. 5-T105N-R79W
STA. 360 + 54.40 TO 361 + 60.40 — P-B 0248(12)173
STR. NO. 43-014-188 — HL-93

LYMAN COUNTY
S. D. DEPT. OF TRANSPORTATION
MARCH 2024

DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU	SK	BT	Steven A Johnson BRIDGE ENGINEER
LYMN06G7	067GTF21		

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-B 0248(12)173	E96	E99



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	
17L		17C		17R	
18L		18C		18R	
19L		19C		19R	
20L		20C		20R	
21L		21C		21R	
22L		22C		22R	

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.

Table of As-Built Elevations - Bridge Deck					
Location	Elevation	Location	Elevation	Location	Elevation
6L		6C		6R	
8L		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	

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

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

AS - BUILT ELEVATION SURVEY

FOR

106' - 0" STEEL GIRDER BRIDGE

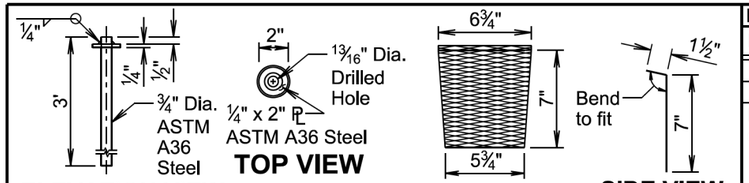
36' - 0" ROADWAY — 0° SKEW
OVER MEDICINE CREEK — SEC. 5-T105N-R79W
STA. 360 + 54.40 TO 361 + 60.40 — P-B 0248(12)173
STR. NO. 43-014-188 — HL-93

LYMAN COUNTY

S. D. DEPT. OF TRANSPORTATION

MARCH 2024

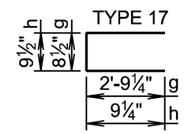
DESIGNED BY	CK. DES. BY	DRAFTED BY	
JU	SK	BT	Steve A Johnson BRIDGE ENGINEER
LYMN06G7	067GTF22		

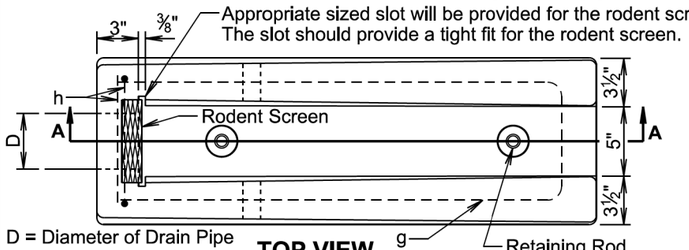


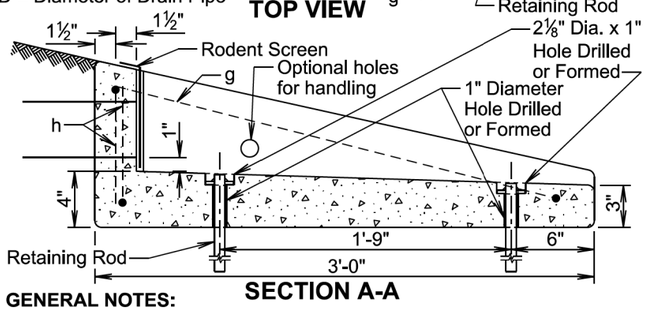
REINFORCING SCHEDULE				
MK.	No.	Size	Length	Type
g	1	4	6'-3"	17
h	2	4	2'-4"	17

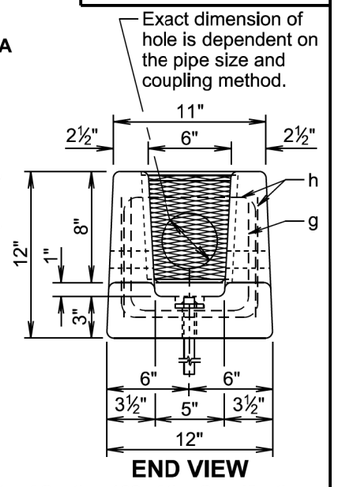
NOTE: All dimensions are out to out of bars.

Bending Details









GENERAL NOTES:

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

All reinforcing steel will conform to ASTM A615, Grade 60 and will be epoxy coated. The reinforcing steel will 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 will be placed in the concrete headwall with the pipe end flush with the concrete surface adjacent to the rodent screen.

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

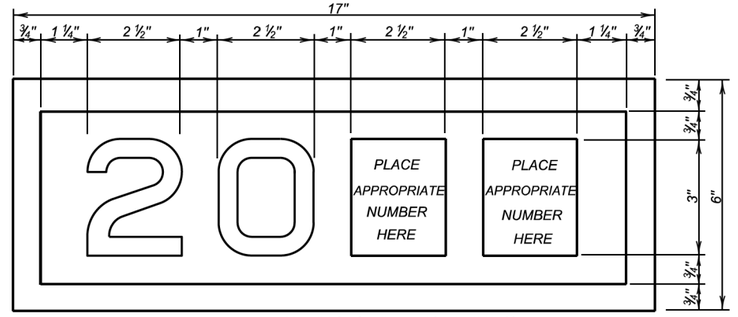
The retaining rod will be galvanized in accordance with ASTM A123 after all shop welding has been completed.

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 will be incidental to the contract unit price per each for "Precast Concrete Headwall for Drain".

November 19, 2021

Published Date: 2027	SDDOT	PRECAST CONCRETE HEADWALL FOR DRAIN	PLATE NUMBER 430.50 Sheet 1 of 1



YEAR PLATE DETAILS

GENERAL NOTES:

1. Year plates of the general dimensions shown will be constructed on all box culverts and bridges. The year plates will 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 (1/2) inch in depth.

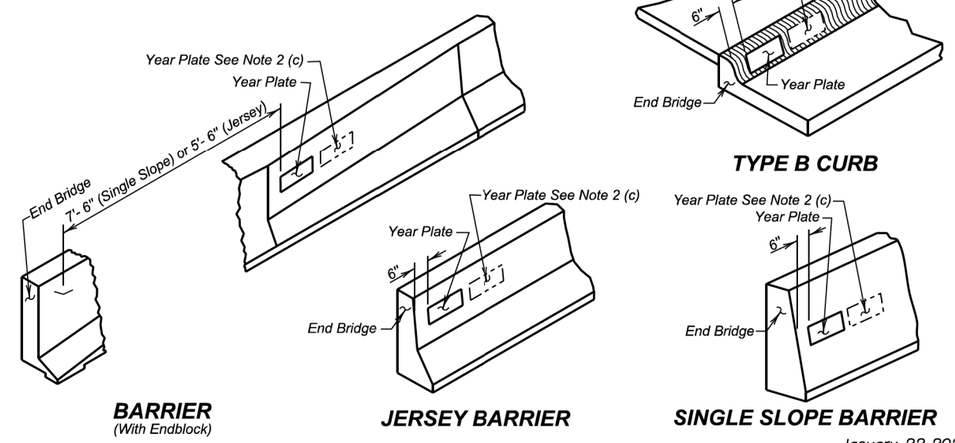
2. Year plates will be located on structure(s) as follows:

   a. On cast-in-place box culverts the year plates will 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 will be centered laterally on the upstream face of the top slab. Where an extended interior wall interferes with this location, the year plate will be centered in an adjacent barrel.

   b. On bridges with six (6) inch curbs, "Jersey" shaped barriers with no endblocks, or "Single Slope" shaped barriers with no endblocks, the year plate will 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 barrier endblocks, the year plate will be centered on the upper sloped portion of the barrier approximately 5'- 6" for "Jersey" shaped barriers from the end of the bridge and 7'-6" for "Single Slope" shaped barriers from the end of bridge, or as designated by the Engineer. There will be one year plate at each end of the bridge on opposite sides.

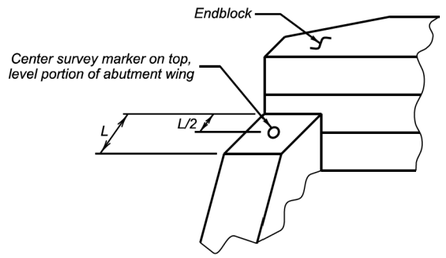
   c. When the plans specify that both the original date of construction and the date of reconstruction are to be shown, one date will be placed as listed above and the other located adjacent to it. Both year plates will be shown at each end of the bridge on opposite sides.

3. There will be no separate measurement or payment made for year plates on box culverts and bridges. All costs for this work will be incidental to other contract items.

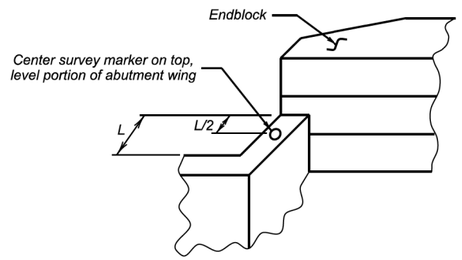


January 22, 2021

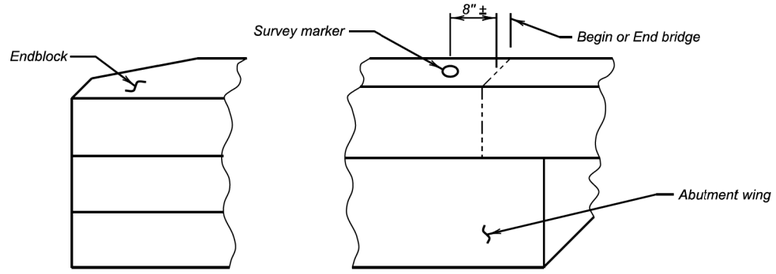
Published Date: 2027	SDDOT	YEAR PLATE DETAILS	PLATE NUMBER 460.02 Sheet 1 Of 1



ABUTMENT WITH "STRAIGHT" WINGS



ABUTMENT WITH "SWEPT BACK" WINGS



ABUTMENT WITH "SWEPT BACK" WINGS

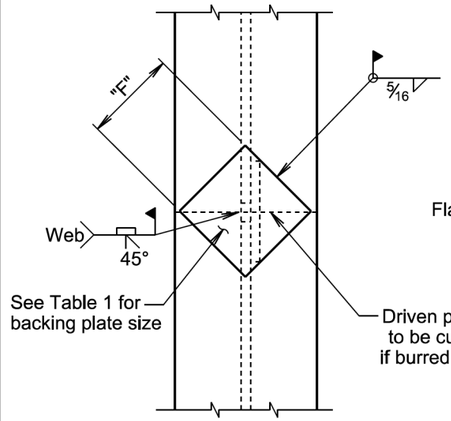
(Endblock on top of wings)

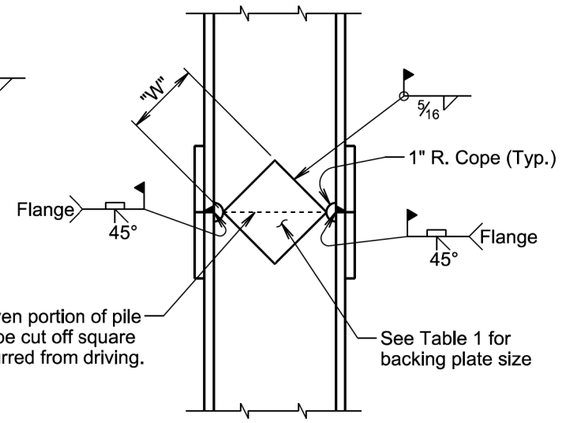
GENERAL NOTES:

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

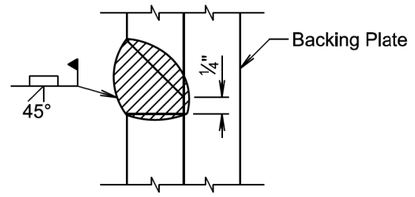
Published Date: 2027	SDDOT	BRIDGE SURVEY MARKER	PLATE NUMBER 460.05
			Sheet 1 of 1





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:

Steel for backing plates will conform to ASTM A709, Grade 50 or ASTM A572, Grade 50.

Welding and weld inspection will be in conformance with AWS D1.5 (Current Year) Bridge Welding Code - Steel.

Welder must be certified and registered with the SDDOT.

Backing plate will at a minimum be as thick as the web of the pile being spliced.

Web must be coped with 1 inch radius.

Submit Welding Procedure Specification (WPS) to Bridge Construction Engineer for approval prior to pile driving.

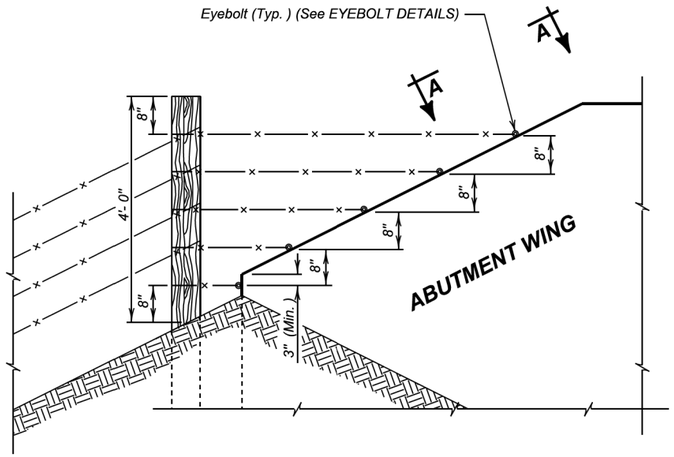
TABLE 1
(BACKING PLATES)

PILE	10"	12"	14"
"F" FLANGE	6½"	8"	10"
"W" WEB	4¾"	6¼"	7½"

April 17, 2026

Published Date: 2027	SDDOT	H PILE SPLICE DETAILS	PLATE NUMBER 510.40
			Sheet 1 of 1

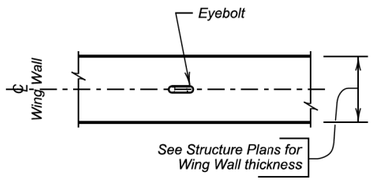
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E99	E99



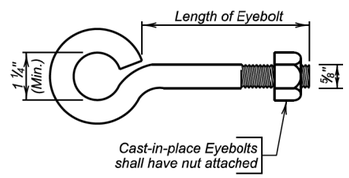
DETAIL FOR FENCE ANCHORS

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 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.



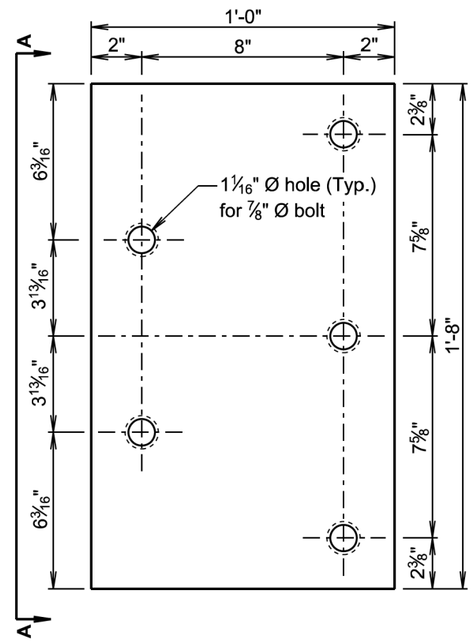
VIEW A - A



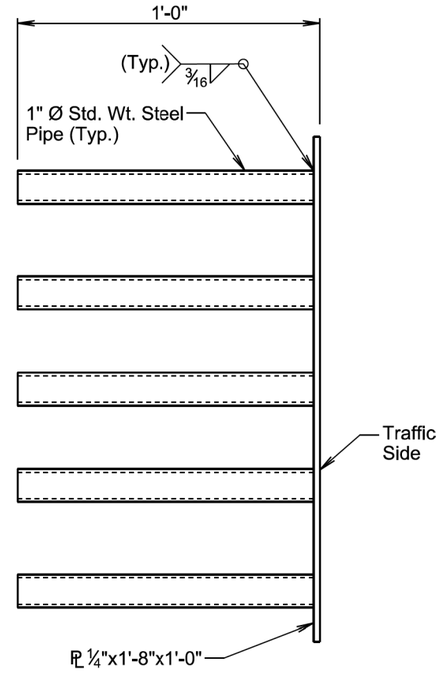
EYEBOLT DETAILS

December 23, 2012

Published Date: 2027	SDDOT	FENCE ANCHORS FOR BRIDGE ABUTMENT WINGS (WINGS LONGER THAN 6')	PLATE NUMBER 620.17
			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, Grade B or ASTM A500, Grade B or C.

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, F3125 Grade 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", "Class A45 Concrete, Bridge Barrier", or "Class A45 Concrete, Bridge Repair", as applicable.

April 17, 2026

Published Date: 2027	SDDOT	5 BOLT INSERT PLATE ASSEMBLY	PLATE NUMBER 630.92
			Sheet 1 of 1

106' - 0" STEEL GIRDER BRIDGE
STR. NO. 43-014-188
MARCH 2024