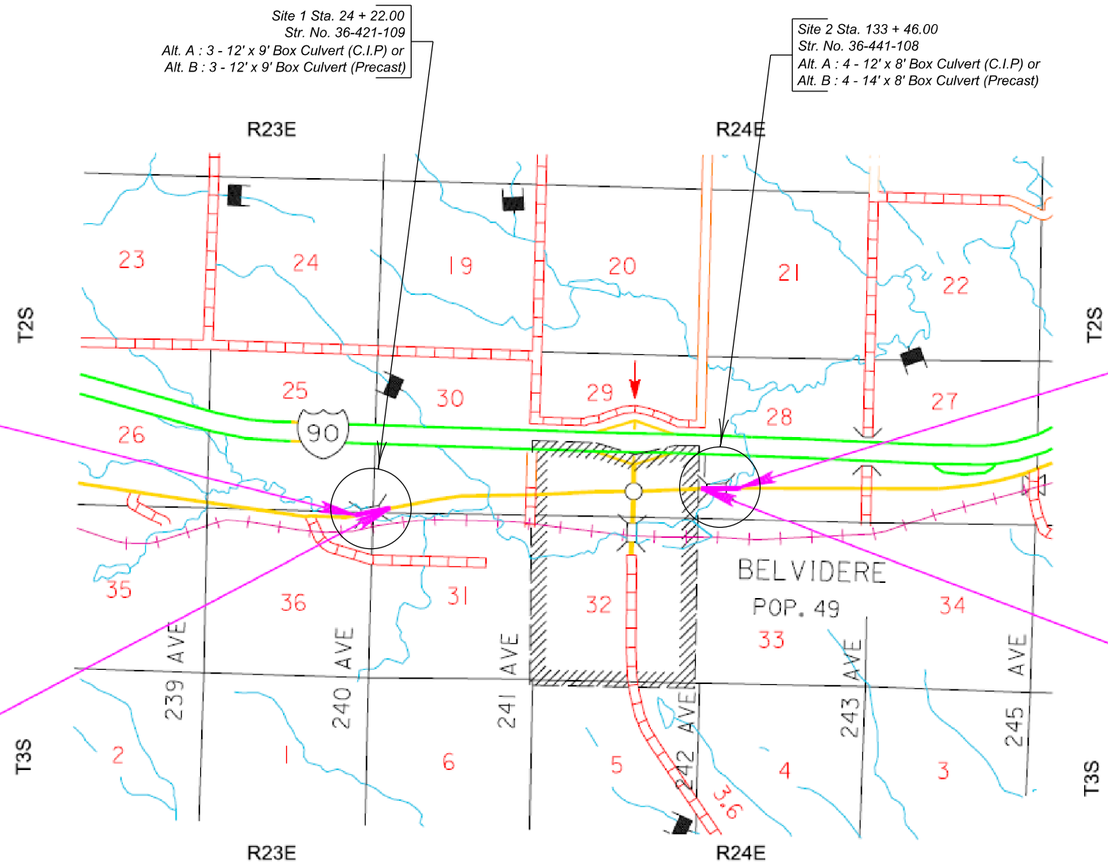
Revised January 20, 2025 BB

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(16)173	E1	E30

Section E: Structure Plans

INDEX OF SHEETS -

Sheet E1	Layout Map and Index
Sheet E2	Estimate of Structure Quantities
Sheet E3 to E9	Str. No. 36-421-109 Site 1 Alt. A : 3 - 12' x 9' Box Culvert (C.I.P.)
Sheet E10 to E15	Str. No. 36-421-109 Site 1 Alt. B : 3 - 12' x 9' Box Culvert (Precast)
Sheet E16 to E25	Str. No. 36-441-108 Site 2 Alt. A : 4 - 12' x 8' Box Culvert (C.I.P.)
Sheet E26 to E30	Str. No. 36-441-108 Site 2 Alt. B : 4 - 14' x 8' Box Culvert (Precast)



BEGIN PROJECT P-B 0248(16)173

Station 20+20.00
Located 113.64' North and
25.11 feet East of the Southwest Corner
Section 30, Township 2 S, Range 24 E
of the Black Hills Meridian

BEGIN EXCEPTION

Station 26+75.00

END PROJECT P-B 0248(16)173

Station 139+00.00
Located 1119 feet North and
438 feet East of the Southwest Corner of
Section 28, Township 2 S, Range 243 E
of the Black Hills Meridian

END EXCEPTION

Station 130+00.00

SECTION E – ESTIMATE OF STRUCTURE QUANTITES

Str. No. 36-421-109

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

Site 1 – Alternate A
Str. No. 36-421-109

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
420E0200	Structure Excavation, Box Culvert	141	CuYd
421E0200	Box Culvert Undercut	429	CuYd
460E0120	Class A45 Concrete, Box Culvert	323.4	CuYd
480E0100	Reinforcing Steel	54,860	Lb
700E0210	Class B Riprap	74.4	Ton
831E0110	Type B Drainage Fabric	92	SqYd

Site 1 – Alternate B
Str. No. 36-421-109

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
420E0200	Structure Excavation, Box Culvert	136	CuYd
421E0200	Box Culvert Undercut	406	CuYd
464E0100	Controlled Density Fill	36.4	CuYd
560E0190	12'x9' Precast Concrete Box Culvert, Furnish	80.0	Ft
560E0191	12'x9' Precast Concrete Box Culvert, Install	80.0	Ft
560E1190	12'x9' Precast Concrete Box Culvert End Section, Furnish	2	Each
560E1191	12'x9' Precast Concrete Box Culvert End Section, Install	2	Each
560E2172	2-12'x9' Precast Concrete Box Culvert, Furnish	80.0	Ft
560E2173	2-12'x9' Precast Concrete Box Culvert, Install	80.0	Ft
560E3172	2-12'x9' Precast Concrete Box Culvert End Section, Furnish	2	Each
560E3173	2-12'x9' Precast Concrete Box Culvert End Section, Install	2	Each
700E0210	Class B Riprap	76.6	Ton
831E0110	Type B Drainage Fabric	94	SqYd

Str. No. 36-441-108

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

Site 2 – Alternate A
Str. No. 36-441-108

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
260E1010	Base Course	5.5	Ton
420E0200	Structure Excavation, Box Culvert	189	CuYd
421E0200	Box Culvert Undercut	572	CuYd
460E0120	Class A45 Concrete, Box Culvert	411.9	CuYd
480E0100	Reinforcing Steel	70,243	Lb
700E0210	Class B Riprap	131.3	Ton
831E0110	Type B Drainage Fabric	147	SqYd

Site 2 – Alternate B
Str. No. 36-441-108

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
260E1010	Base Course	4.9	Ton
420E0200	Structure Excavation, Box Culvert	280	CuYd
421E0200	Box Culvert Undercut	637	CuYd
464E0100	Controlled Density Fill	33.3	CuYd
560E2228	2-14'x8' Precast Concrete Box Culvert, Furnish	176.0	Ft
560E2229	2-14'x8' Precast Concrete Box Culvert, Install	176.0	Ft
560E3228	2-14'x8' Precast Concrete Box Culvert End Section, Furnish	4	Each
560E3229	2-14'x8' Precast Concrete Box Culvert End Section, Install	4	Each
700E0210	Class B Riprap	134.4	Ton
831E0110	Type B Drainage Fabric	158	SqYd

INCIDENTAL WORK, STRUCTURE

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

   Str. No. 36-421-109 In-place centerline Sta. 23+86.35 to centerline Sta. 24+56.00 is a 71'-0 '', 4 span, continuous concrete bridge with a 30'-0" clear roadway. The superstructure consists of a reinforced concrete slab with concrete pigeon hole railing faced with Thrie-Beam continuous across the bridge. The deck has been overlaid with 2.01 inches of low slump dense concrete. The substructure consists of 4 square column reinforced concrete bents and reinforced vertical concrete abutments, all of which are supported on treated timber piles.

   Str. No. 36-441-108 In-place centerline Sta. 133+01.88 to centerline Sta. 134+40.71 is a 140'-0 '', 8 span, continuous concrete bridge with a 30'-0" clear roadway. The superstructure consists of a reinforced concrete slab with concrete pigeon hole faced with Thrie-Beam continuous across the bridge. The deck has been overlaid with 2.01 inches of low slump dense concrete. The substructure consists of 3 square column reinforced concrete bents and reinforced vertical concrete abutments, all of which are supported on treated timber piles.

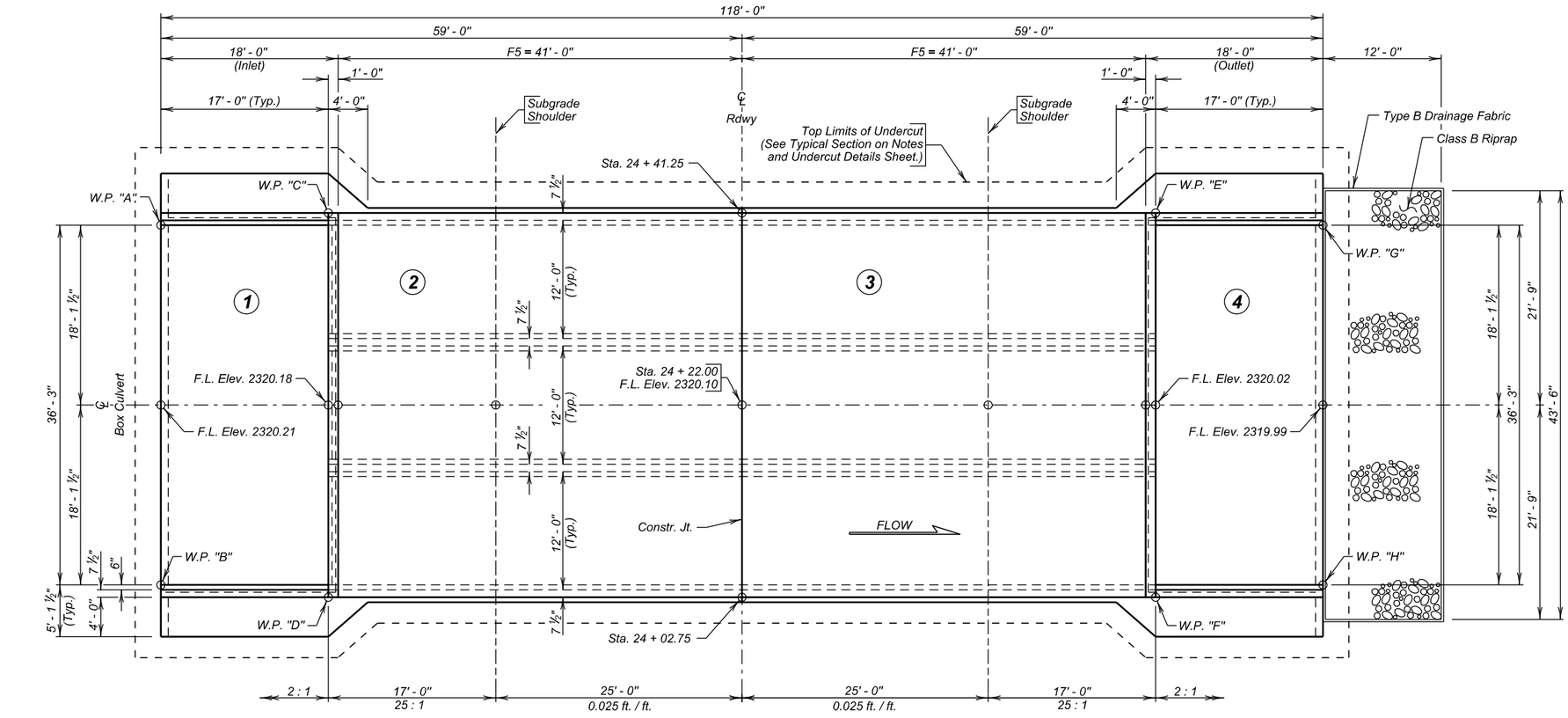
2. Break down and remove the existing structures 1 foot below finished ground or as required to construct the new structures in accordance with Section 110 of the Specifications. All portions of the existing structures shall be removed and disposed of by the Contractor on a site obtained by the Contractor and approved by the Engineer in accordance with notes found in SECTION A.

3. During demolition of structures, efforts shall be taken to prevent material from falling into the creek. Under no circumstances is asphalt allowed to fall into the creek.

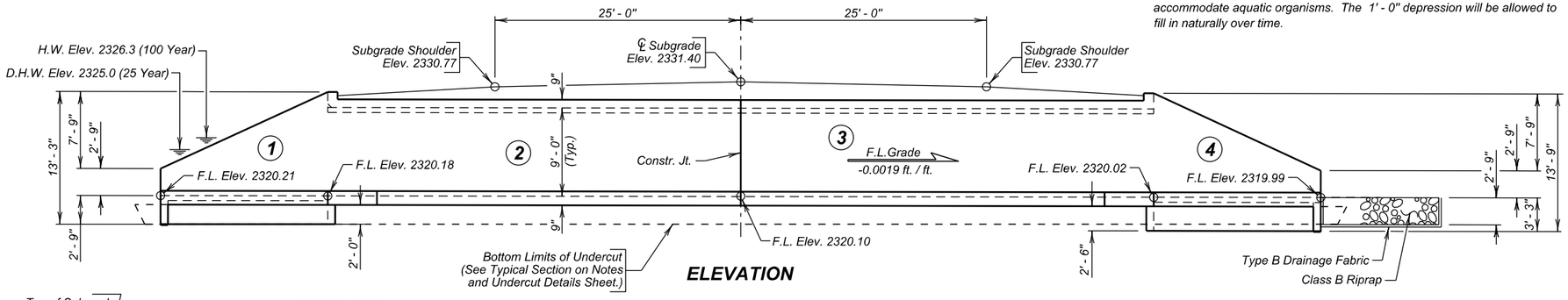
4. The foregoing is a general description of the in-place structures and should not be construed to be complete in all details. Before preparing the bid it shall be the responsibility of the Contractor to make a visual inspection of the structures to verify the extent of the work and materials involved.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

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(16)173	E3	E30

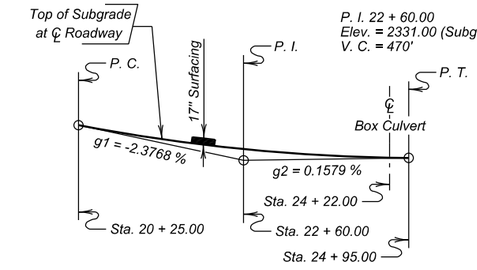


PLAN



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.



VERTICAL CURVE DATA

HYDRAULIC DATA

Q_d	480 cfs
A_d	133 sq ft
V_d	3.6 fps
Q_F	480 cfs
Q_{100}	870 cfs
Q_{OT}	$>Q_{100}$
V_{max}	5.1 fps

Q_d = Design discharge for the proposed culvert based on 25 year frequency. El. 2325.0.

Q_{OT} = Overtopping discharge and frequency $>Q_{100}$ year recurrence interval. El. 2333.0 @ Sta. 26 + 20±.

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. 2326.3.

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

ESTIMATED QUANTITIES

ITEM	UNIT	QUANTITY
Class A45 Concrete, Box Culvert	Cu. Yd.	323.4
Reinforcing Steel	Lb.	54860
Structure Excavation, Box Culvert	Cu. Yd.	141
Box Culvert Undercut	Cu. Yd.	429
Type B Drainage Fabric	Sq. Yd.	92
✳ Class B Riprap	Ton	74.4

✳ For estimating purposes only, a factor of 1.4 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"	24 + 40.12	59.00' Lt.
"B"	24 + 03.87	59.00' Lt.
"C"	24 + 41.25	42.00' Lt.
"D"	24 + 02.75	42.00' Lt.
"E"	24 + 41.25	42.00' Rt.
"F"	24 + 02.75	42.00' Rt.
"G"	24 + 40.12	59.00' Rt.
"H"	24 + 03.87	59.00' 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 - F5 Barrel End Section Details (41' - 0")
Sheet No. 6 - Details of Standard Plate No's 460.02 and 460.10
Sheet No. 7 - Details of Standard Plate No. 620.16

SITE 1
ALTERNATE A

GENERAL DRAWING AND QUANTITIES

FOR

3 - 12' X 9' BOX CULVERT (C.I.P.)

OVER BRAVE BULL CREEK — 0° SKEW
STA. 24 + 22.00 — SEC. 25-T2S-R23E
STR. NO. 36 - 421 - 109 — P-B 0248(16)173
PCN 06NH — HL-93

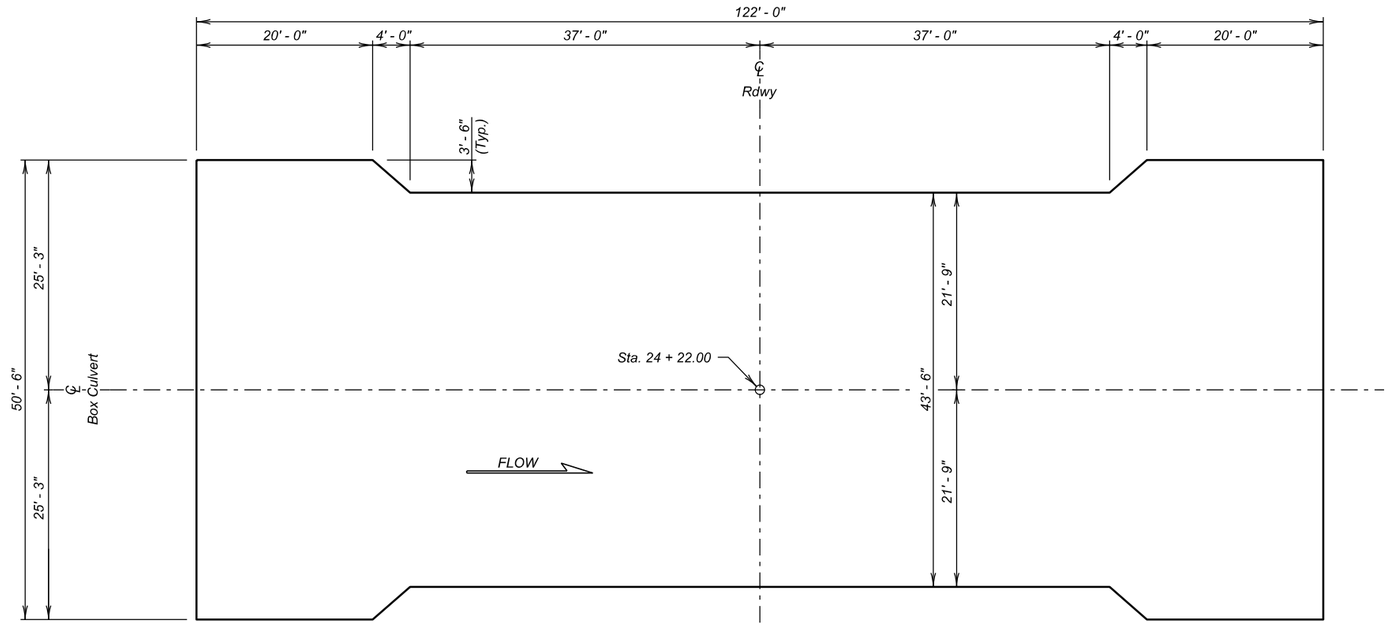
JACKSON COUNTY
S. D. DEPT. OF TRANSPORTATION
FEBRUARY 2025

-X028-

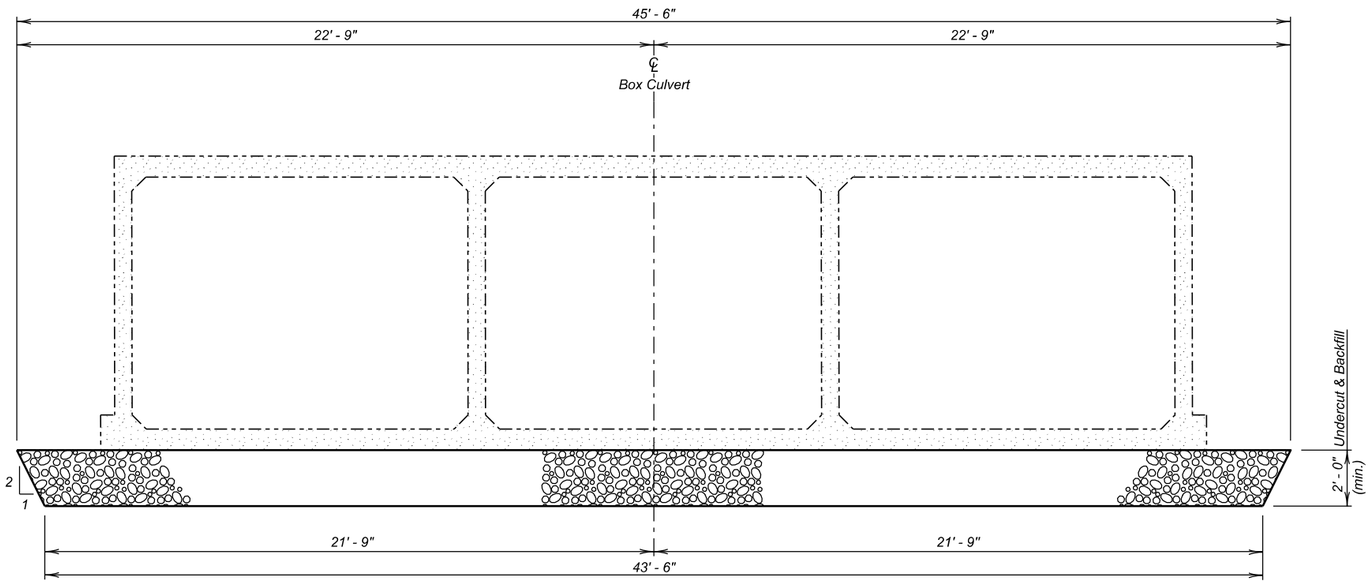
DESIGNED BY	CK. DES. BY	DRAFTED BY	
BB	KS	CK	Steve A Johnson BRIDGE ENGINEER
JACK06NH	06NHTA01		

Revised September 1, 2026 AG

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(16)173	E4	E30



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. No construction loading in excess of legal load was considered.*
2. *The design of the barrel section is based on a minimum fill height of 2 feet and includes all subsequent fill heights up to and including the maximum fill height of 5 ft. (F5).*
3. *Design Material Strengths: Concrete $f'c$ = 4500 p.s.i.*
   Reinforcing Steel fy = 60000 p.s.i.
4. *High sulfate levels are likely to be encountered on this project. All concrete will be Class A45 conforming to section 460, 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.*
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 ¾ 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. *Soils below the bottom of the proposed RCBC consist of approximately 2 feet of brown sand silt overlaying dark gray clay. Groundwater was encountered in the borings at an elevation of 2320.6 feet during the subsurface investigation conducted in July 2023. Dewatering will be required during construction.*

ESTIMATED QUANTITIES

	ITEM	UNIT	QUANTITY
℄	Box Culvert Undercut	Cu. Yd.	429

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

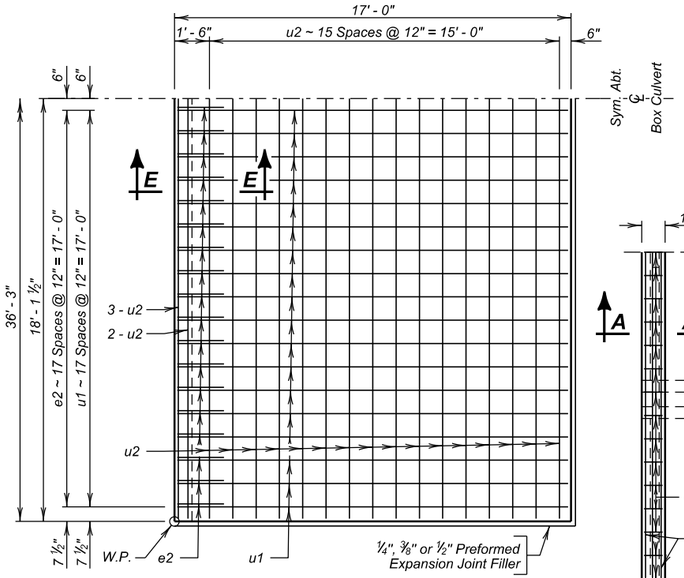
SITE 1
ALTERNATE A
NOTES AND UNDERCUT DETAILS
FOR
3 - 12' X 9' BOX CULVERT (C.I.P.)

OVER BRAVE BULL CREEK — 0° SKEW
STA. 24 + 22.00 — SEC. 25-T2S-R23E
STR. NO. 36 - 421 - 109 — P-B 0248(16)173
HL-93

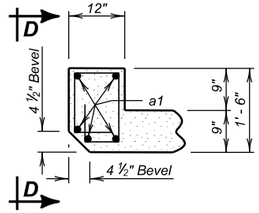
JACKSON COUNTY
S. D. DEPT. OF TRANSPORTATION
FEBRUARY 2025

DESIGNED BY	CK. DES. BY	DRAFTED BY	
BB	KS	CK	Steve A. Johnson BRIDGE ENGINEER
JACK06NH	06NHTA03		

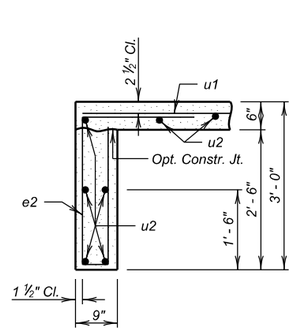
NOTE:
Apron will NOT be built monolithic with the Box Culvert.



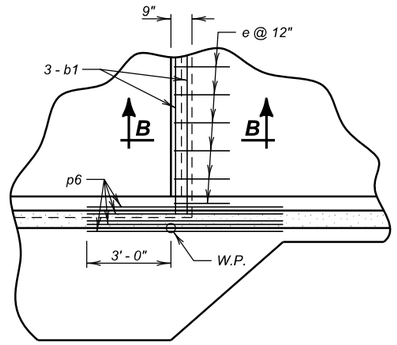
HALF PLAN
(Inlet Apron)



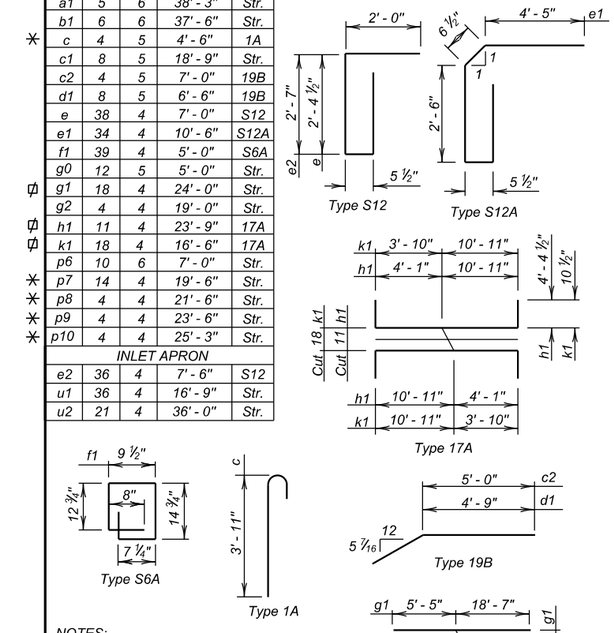
SECTION A - A
(At Top Slab)



SECTION E - E



DETAIL "X"
(At Bottom Slab)



REINFORCING SCHEDULE

	Mk.	No.	Size	Length	Type	Bending Details
	a1	5	6	38' - 3"	Str.	
	b1	6	6	37' - 6"	Str.	
*	c	4	5	4' - 6"	1A	
	c1	8	5	18' - 9"	Str.	
	c2	4	5	7' - 0"	19B	
	d1	8	5	6' - 6"	19B	
	e	38	4	7' - 0"	S12	
	e1	34	4	10' - 6"	S12A	
	f1	39	4	5' - 0"	S6A	
	g0	12	5	5' - 0"	Str.	
⌀	g1	18	4	24' - 0"	Str.	
	g2	4	4	19' - 0"	Str.	
⌀	h1	11	4	23' - 9"	17A	
⌀	k1	18	4	16' - 6"	17A	
	p6	10	6	7' - 0"	Str.	
*	p7	14	4	19' - 6"	Str.	
*	p8	4	4	21' - 6"	Str.	
*	p9	4	4	23' - 6"	Str.	
*	p10	4	4	25' - 3"	Str.	
	INLET APRON					
	e2	36	4	7' - 6"	S12	
	u1	36	4	16' - 9"	Str.	
	u2	21	4	36' - 0"	Str.	

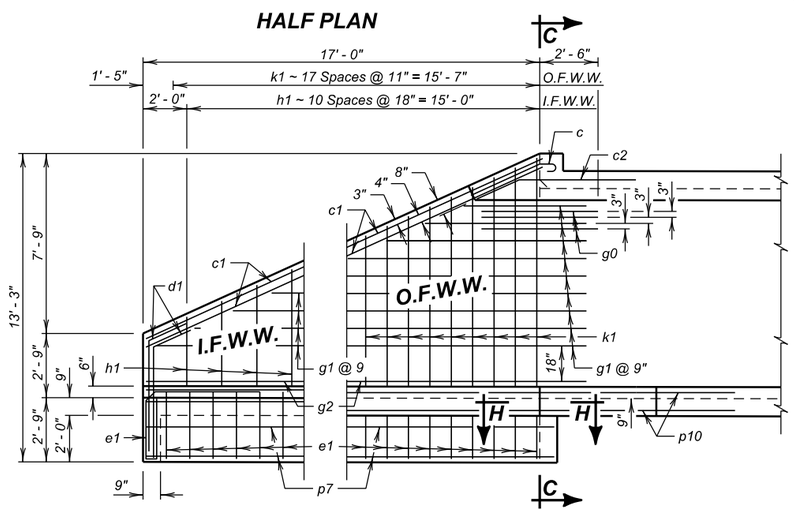
NOTES:
All dimensions are out to out of bars.
⌀ See cutting diagram.
* Bend in field as necessary to fit.

ESTIMATED QUANTITIES

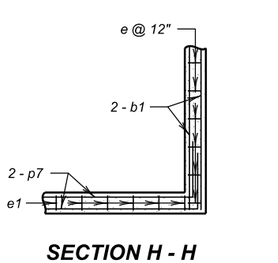
ITEM	Class A45 Concrete, Box Culvert	Reinforcing Steel	Structure Excavation, Box Culvert
UNIT	Cu. Yd.	Lb.	Cu. Yd.
Inlet	21.9	2680	10.8
Inlet Apron	13.9	1088	13.9

LEGEND FOR PLACING RE-STEEL

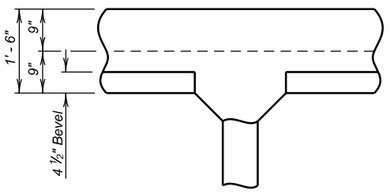
O. F. W. W. - Outside Face of Wing Wall
I. F. W. W. - Inside Face of Wing Wall



ELEVATION

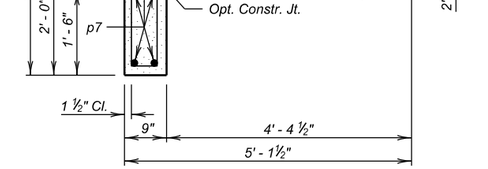


SECTION B - B



VIEW D - D
(At Interior Wall)

SECTION H - H



SECTION C - C

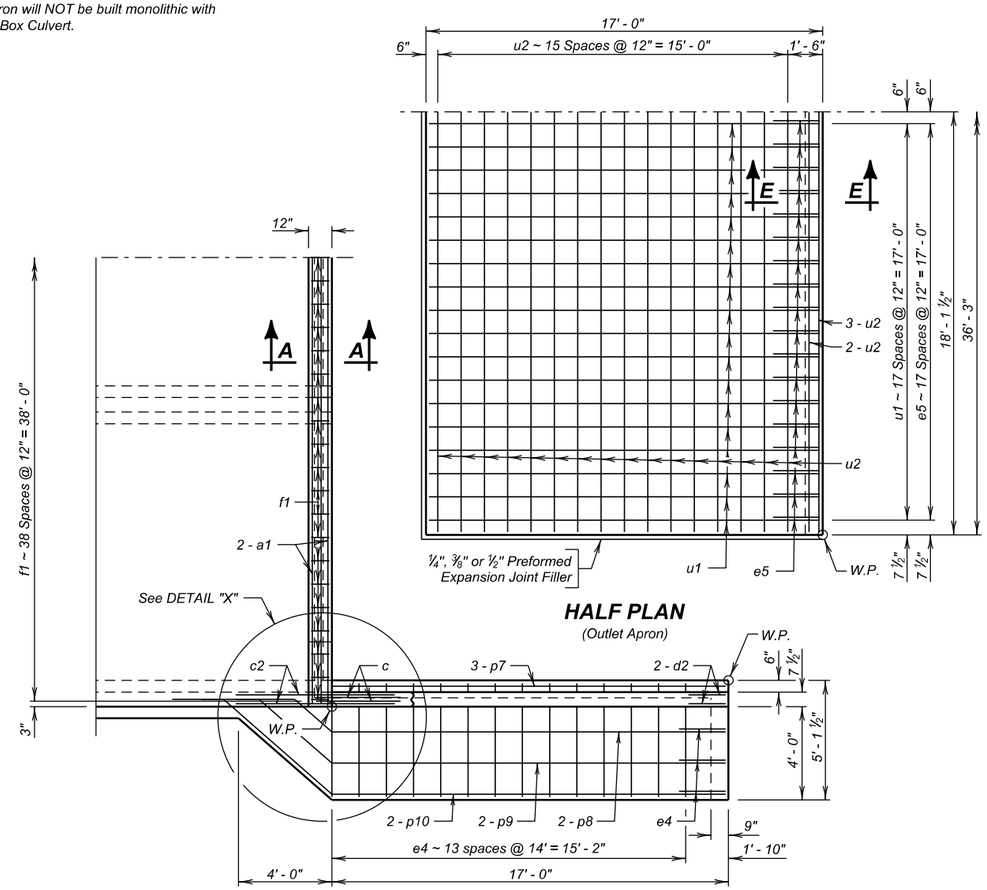
SITE 1
ALTERNATE A
INLET DETAILS
FOR
3 - 12' X 9' BOX CULVERT (C.I.P.)

OVER BRAVE BULL CREEK — 0° SKEW
STA. 24 + 22.00 — SEC. 25-T2S-R23E
STR. NO. 36 - 421 - 109 — P-B 0248(16)173
HL-93

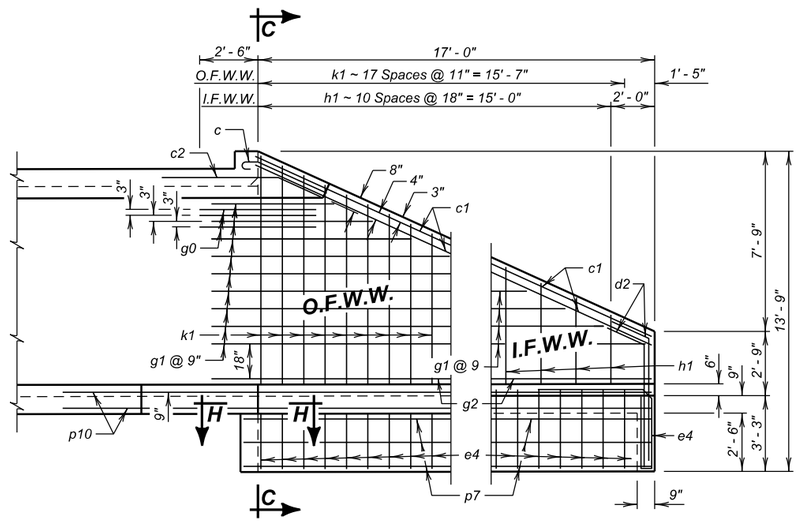
JACKSON COUNTY
S. D. DEPT. OF TRANSPORTATION
FEBRUARY 2025

DESIGNED BY	CK. DES. BY	DRAFTED BY	
BB	KS	CK	Steve A. Johnson BRIDGE ENGINEER
JACK06NH	06NHTA03		

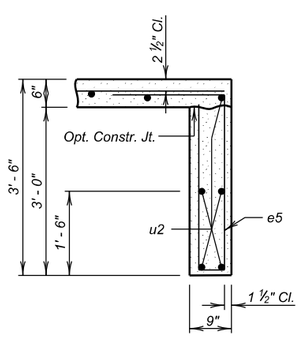
NOTE:
Apron will NOT be built monolithic with the Box Culvert.



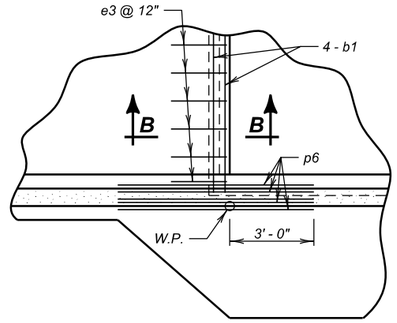
HALF PLAN
(Outlet Apron)



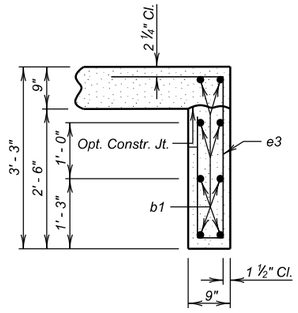
ELEVATION



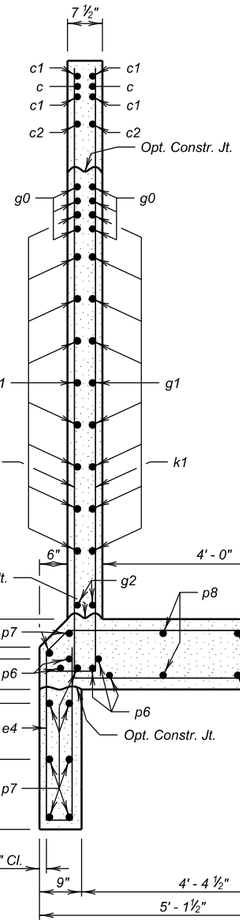
SECTION E - E



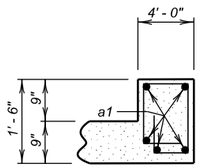
DETAIL "X"
(At Bottom Slab)



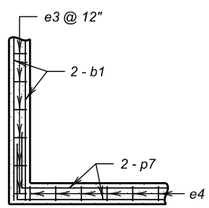
SECTION B - B



SECTION C - C



SECTION A - A
(At Top Slab)

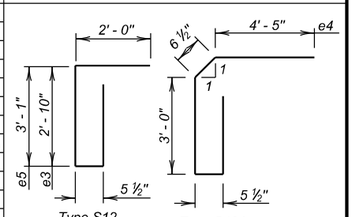


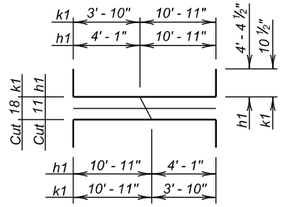
SECTION H - H

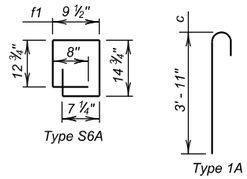
REINFORCING SCHEDULE

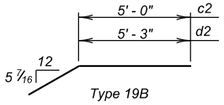
	Mk.	No.	Size	Length	Type
	a1	5	6	38' - 3"	Str.
	b1	8	6	37' - 6"	Str.
✳	c	4	5	4' - 6"	1A
	c1	8	5	18' - 9"	Str.
	c2	4	5	7' - 0"	19B
	d2	8	5	7' - 0"	19B
	e3	38	4	8' - 0"	S12
	e4	34	4	11' - 3"	S12A
	f1	39	4	5' - 0"	S6A
	g0	12	5	5' - 0"	Str.
⌀	g1	16	4	24' - 9"	Str.
	g2	4	4	19' - 0"	Str.
⌀	h1	11	4	23' - 9"	17A
⌀	k1	18	4	16' - 6"	17A
	p6	10	6	7' - 0"	Str.
✳	p7	18	4	19' - 6"	Str.
✳	p8	4	4	21' - 6"	Str.
✳	p9	4	4	23' - 6"	Str.
✳	p10	4	4	25' - 3"	Str.
	OUTLET APRON				
	e5	36	4	8' - 6"	S12
	u1	36	4	16' - 9"	Str.
	u2	21	4	36' - 0"	Str.

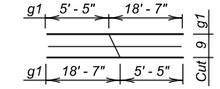
Bending Details











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	21.1	2892	11.9
Outlet Apron	14.4	1112	14.4

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 9' BOX CULVERT (C.I.P.)

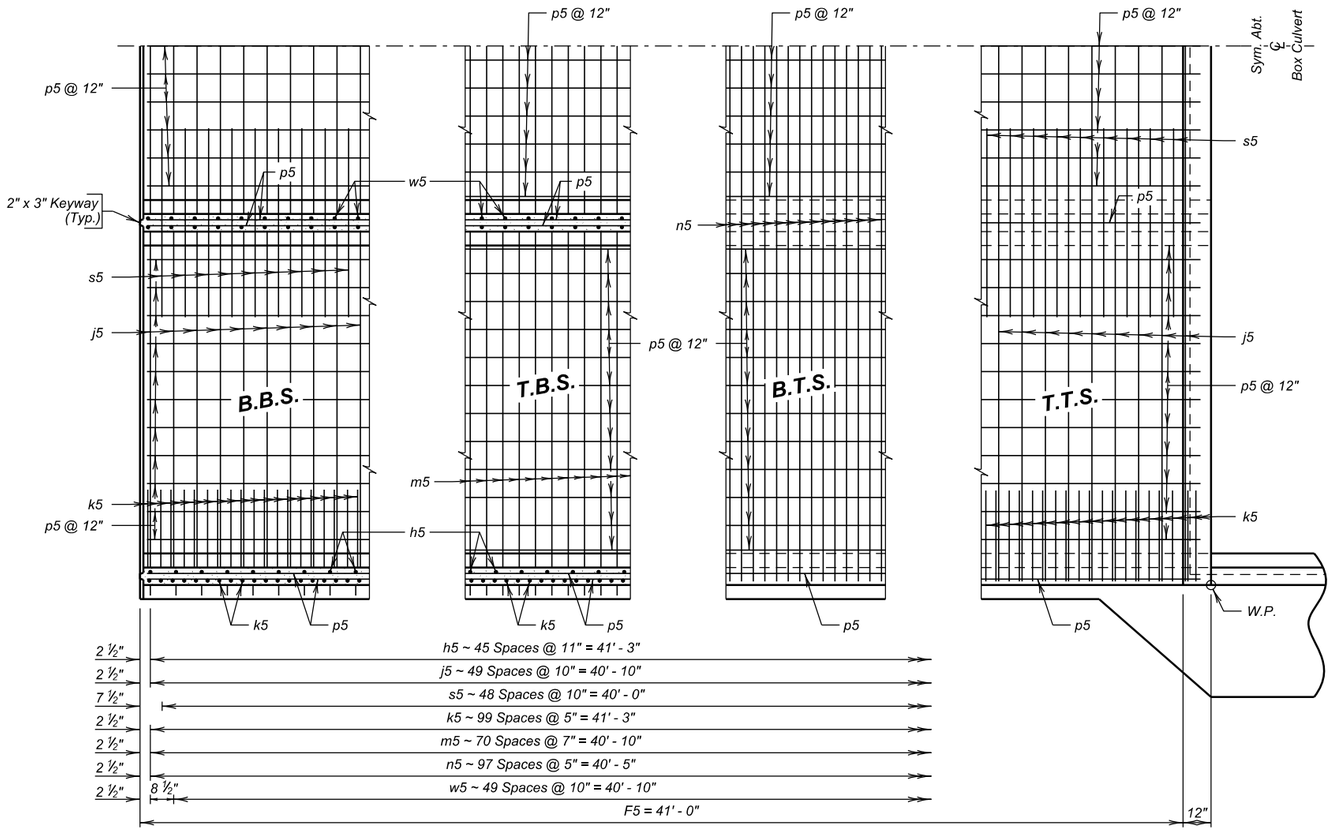
OVER BRAVE BULL CREEK
STA. 24 + 22.00
STR. NO. 36 - 421 - 109

0° SKEW
SEC. 25-T2S-R23E
P-B 0248(16)173
HL-93

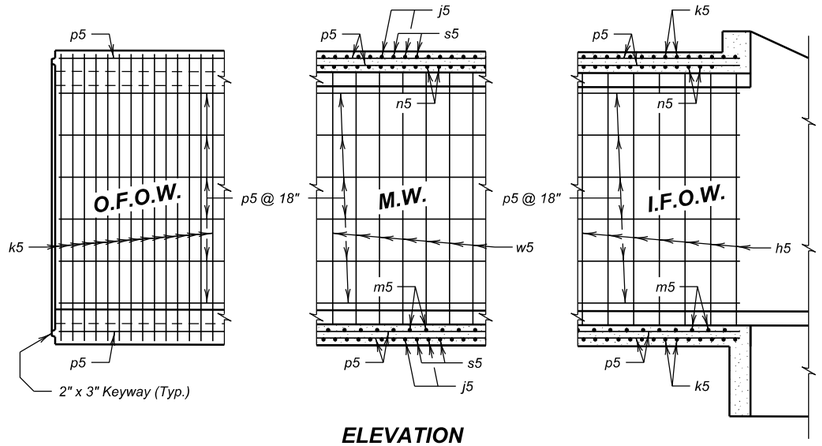
JACKSON COUNTY
S. D. DEPT. OF TRANSPORTATION
FEBRUARY 2025

DESIGNED BY	CK. DES. BY	DRAFTED BY	
BB	KS	CK	Steve A Johnson BRIDGE ENGINEER
JACK06NH	06NHTA04		

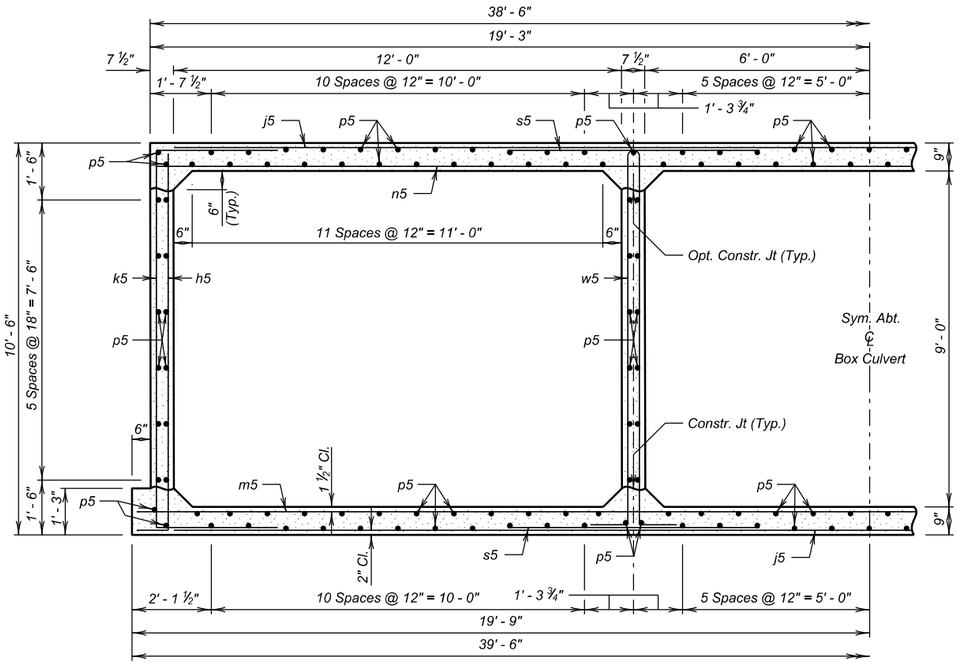
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(16)173	E7	E30



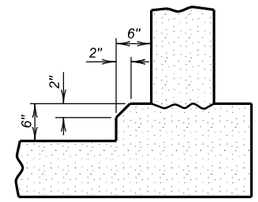
HALF PLAN
(Outlet shown, Inlet similar by rotation)



ELEVATION



F5 BARREL HALF SECTION
(Maximum 5' - 0" Fill)



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.

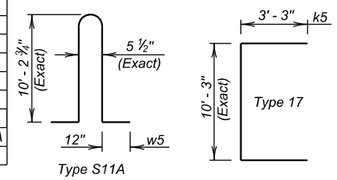
OPTIONAL POUR - BOTTOM SLAB

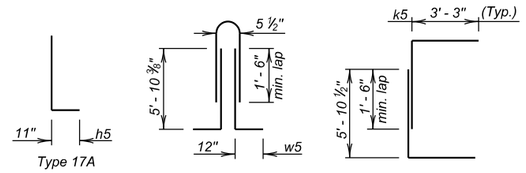
The Bottom Slab may be poured continuously, at the option of the Contractor, with the use of a Preformed Metal keyway conforming to the keyway dimensions and location as shown on the plans. The keyway length will be full width of the bottom slab. Care will be taken to maintain proper alignment of the 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 F5 Barrel End Sections)

Mk.	No.	Size	Length	Type	Bending Details
h5	184	4	11' - 0"	17A	
j5	200	5	37' - 3"	Str.	
k5	400	4	16' - 9"	17	
m5	142	6	39' - 3"	Str.	
n5	196	5	38' - 3"	Str.	
p5	400	4	41' - 6"	Str.	
s5	392	5	6' - 9"	Str.	
w5	204	4	22' - 9"	S11A	
△ z1	96	5	3' - 6"	Str.	





OPTIONAL w5 SPLICE DETAIL OPTIONAL k5 SPLICE DETAIL

Contractor may use optional reinforcing steel splice, 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 - F5 Barrel End Sections @ 41' - 0"	252.1	47088	90.0

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

F5 BARREL END SECTION DETAILS (41' - 0")

FOR

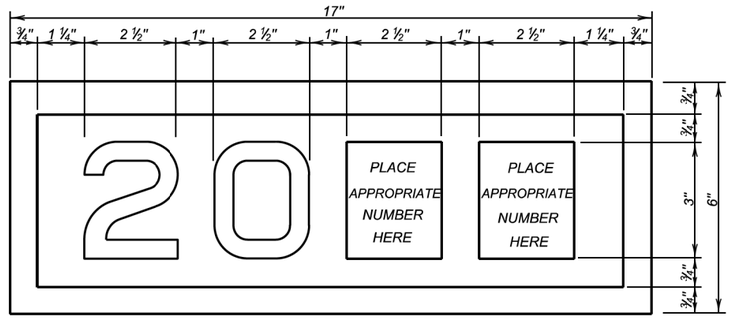
3 - 12' X 9' BOX CULVERT (C.I.P.)

OVER BRAVE BULL CREEK — 0° SKEW
STA. 24 + 22.00 — SEC. 25-T2S-R23E
STR. NO. 36 - 421 - 109 — P-B 0248(16)173
HL-93

JACKSON COUNTY
S. D. DEPT. OF TRANSPORTATION
FEBRUARY 2025

5 OF 7

DESIGNED BY	CK. DES. BY	DRAFTED BY	
BB	KS	CK	Steve A Johnson BRIDGE ENGINEER
JACK06NH	06NHTA05		



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.

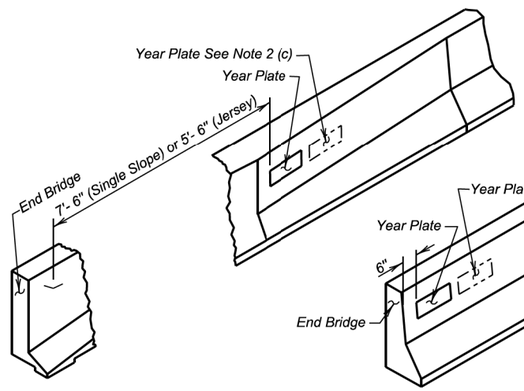
2. Year plates will be located on structure(s) as follows:

   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.

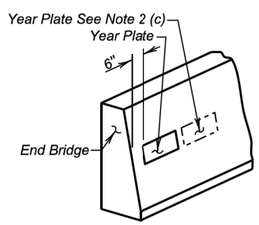
   c. When the plans specify that both the original date of construction and the date of reconstruction are to be shown, one date will be placed as listed above and the other located adjacent to it. Both year plates will be shown at each end of the bridge on opposite sides.

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.

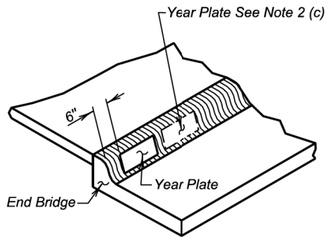


BARRIER
(With Endblock)

JERSEY BARRIER



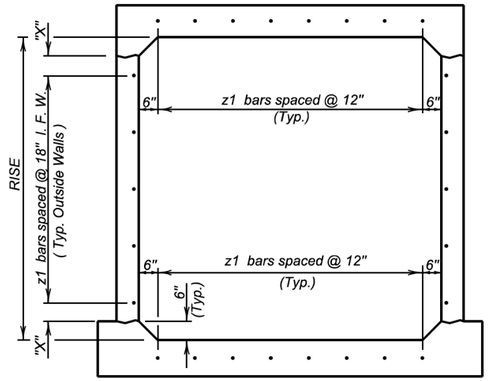
SINGLE SLOPE BARRIER



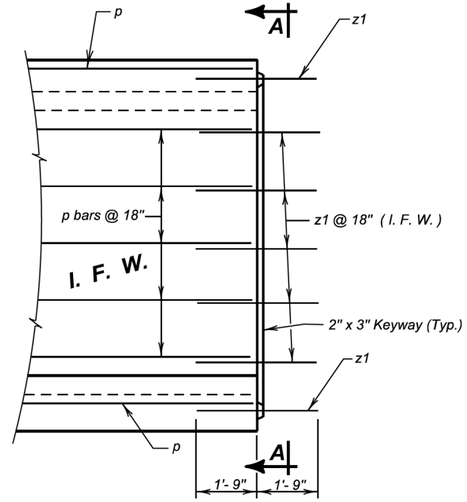
TYPE B CURB

January 22, 2021

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



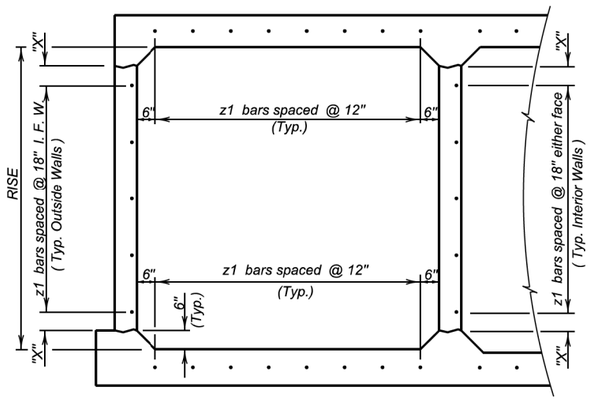
TYPICAL SINGLE BARREL VIEW A - A



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"

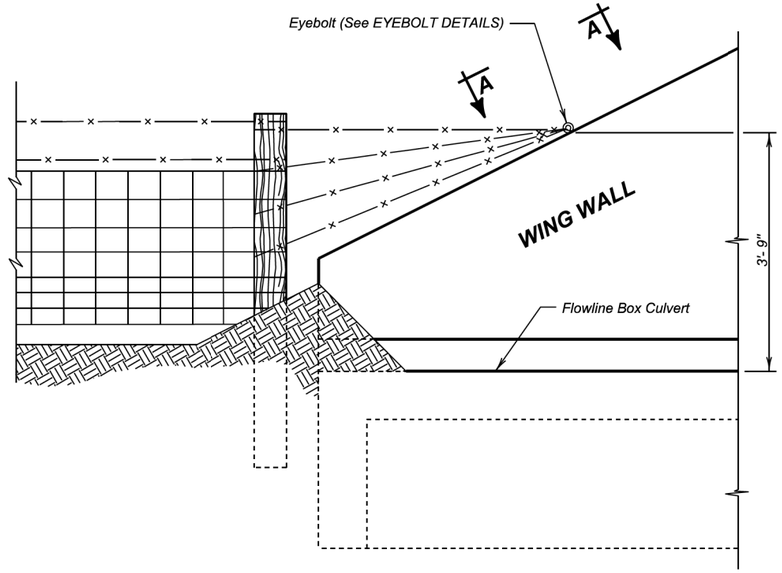
GENERAL NOTES:

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

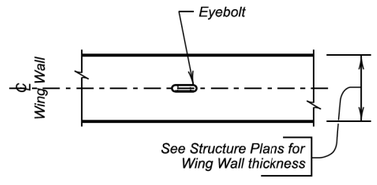
Published Date: 2027	SDDOT	BOX CULVERT BARREL TIE REINFORCEMENT	PLATE NUMBER 460.10 Sheet 1 of 1



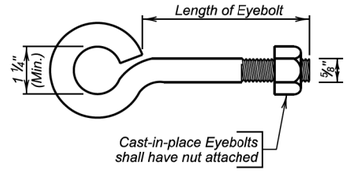
DETAIL FOR FENCE ANCHORS

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

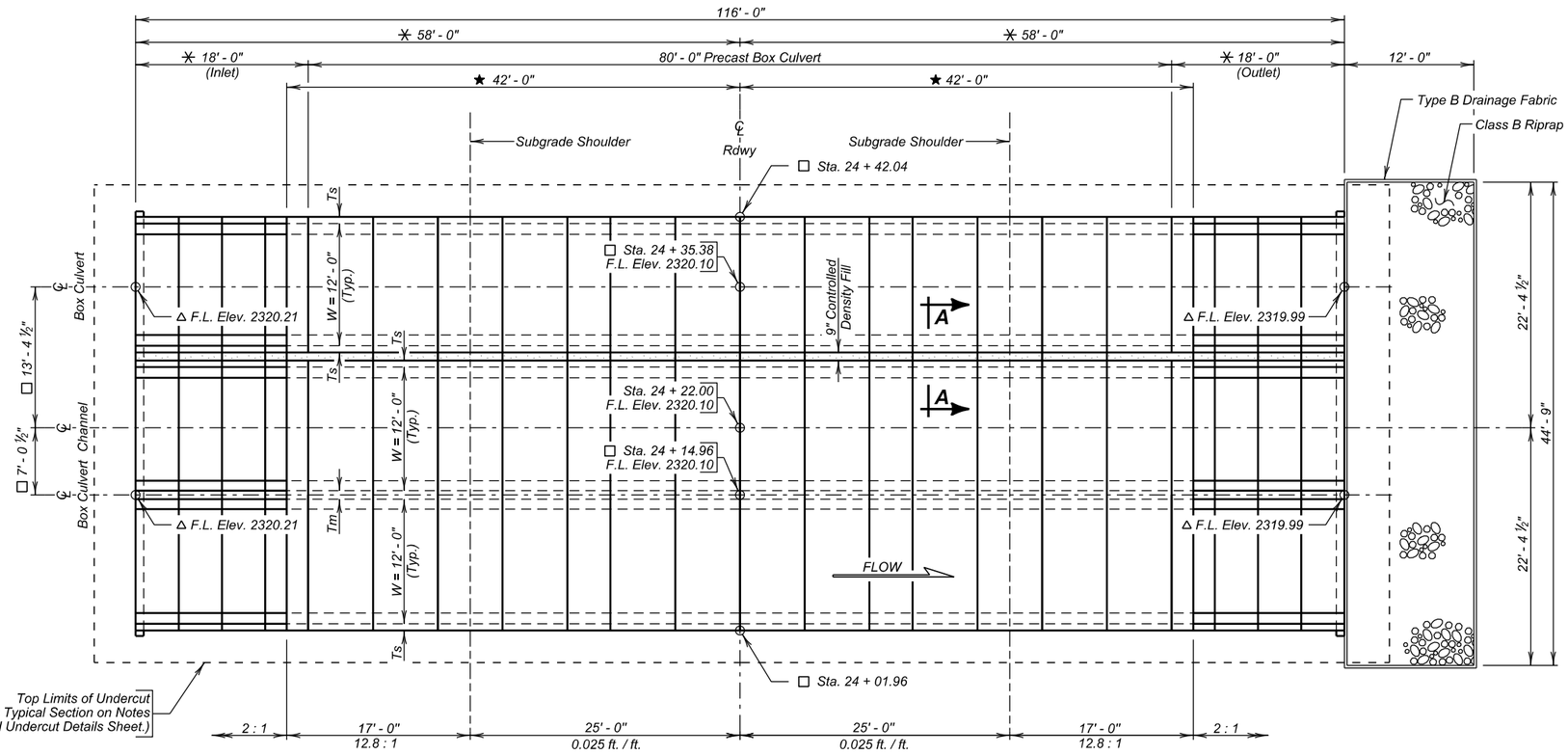
December 23,2012

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

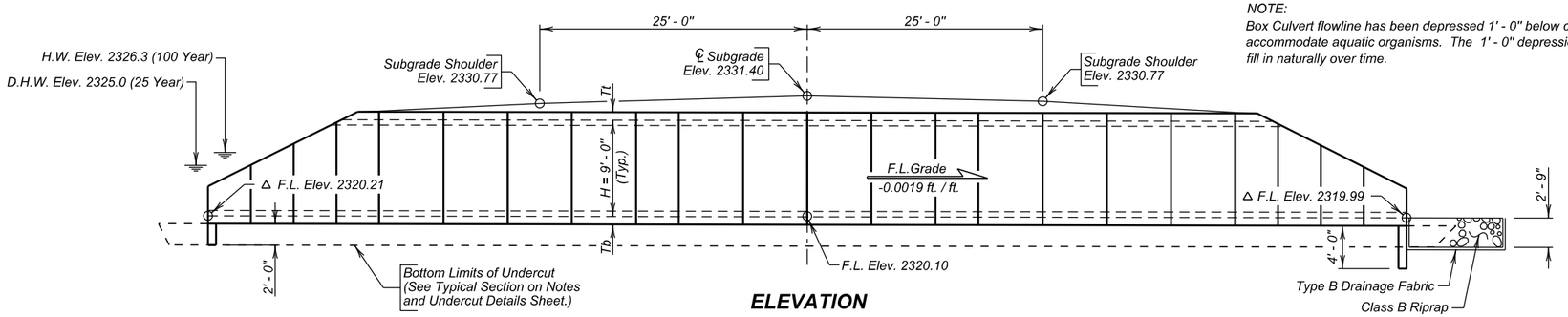
The elevations shown in these plans are based on the National Geodetic Survey (NGS) North American Vertical Datum of 1988 (NAVD88).

⚹ 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 = 8" and Tm = 8".

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E10	E30

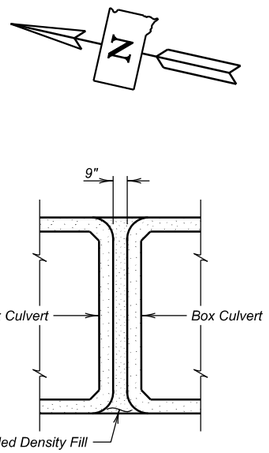


PLAN



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.



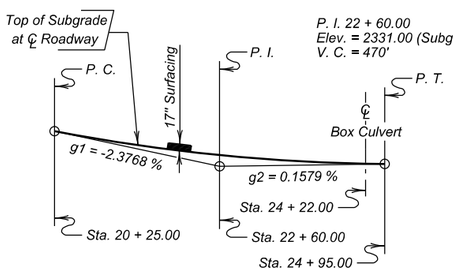
SECTION A - A

ESTIMATED QUANTITIES

	ITEM	UNIT	QUANTITY
∡	Structure Excavation, Box Culvert	Cu. Yd.	136
	Box Culvert Undercut	Cu. Yd.	406
	Type B Drainage Fabric	Sq. Yd.	94
⚹	Class B Riprap	Ton	76.6
	12' X 9' Precast Concrete Culvert, Furnish	Ft.	80
	12' X 9' Precast Concrete Culvert, Install	Ft.	80
	2 - 12' X 9' Precast Concrete Culvert, Furnish	Ft.	80
	2 - 12' X 9' Precast Concrete Culvert, Install	Ft.	80
	12' X 9' Precast Concrete Culvert End Section, Furnish	Each	2
	12' X 9' Precast Concrete Culvert End Section, Install	Each	2
	2 - 12' X 9' Precast Concrete Culvert End Section, Furnish	Each	2
	2 - 12' X 9' Precast Concrete Culvert End Section, Install	Each	2
∡	Controlled Density Fill	Cu. Yd.	36.4

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

∡ Quantity is based on 9" bottom slab, 9" top slab, 8" outside walls and 8" interior walls.



VERTICAL CURVE DATA

HYDRAULIC DATA

Q_d	480 cfs
A_d	133 sq ft
V_d	3.6 fps
Q_F	480 cfs
Q_{100}	870 cfs
Q_{OT}	$>Q_{100}$
V_{max}	5.1 fps

Q_d = Design discharge for the proposed culvert based on 25 year frequency. El. 2325.0.

Q_{OT} = Overtopping discharge and frequency > Q_{100} year recurrence interval. El. 2333.0 @ Sta. 26 + 20±.

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. 2326.3.

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 - Standard Plates No.'s 460.02 and 560.01
Sheet No. 4 - Standard Plates No.'s 560.10 and 560.11
Sheet No. 5 - Standard Plates No.'s 560.20 and 560.21
Sheet No. 6 - Standard Plates No. 620.16

SITE 1
ALTERNATE B

GENERAL DRAWING AND QUANTITIES

FOR

3 - 12' X 9' BOX CULVERT (PRECAST)

OVER BRAVE BULL CREEK — 0° SKEW
STA. 24 + 22.00 — SEC. 25-T2S-R23E
STR. NO. 36 - 421 - 109 — P-B 0248(16)173
PCN 06NH — HL-93

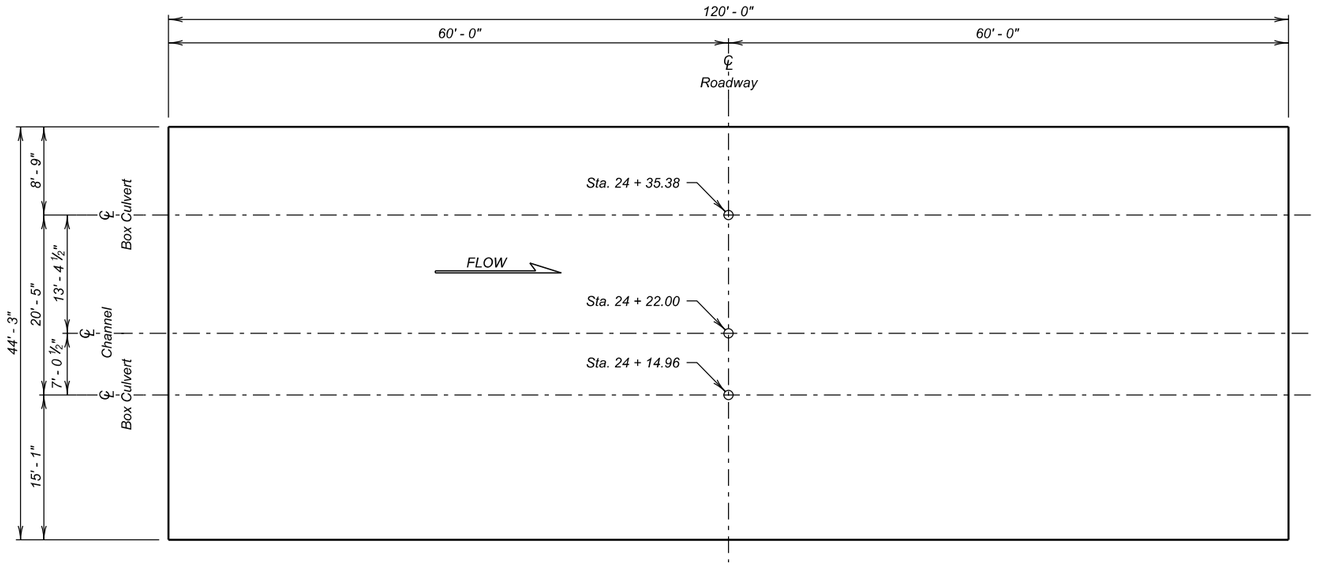
JACKSON COUNTY
S. D. DEPT. OF TRANSPORTATION
FEBRUARY 2025

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

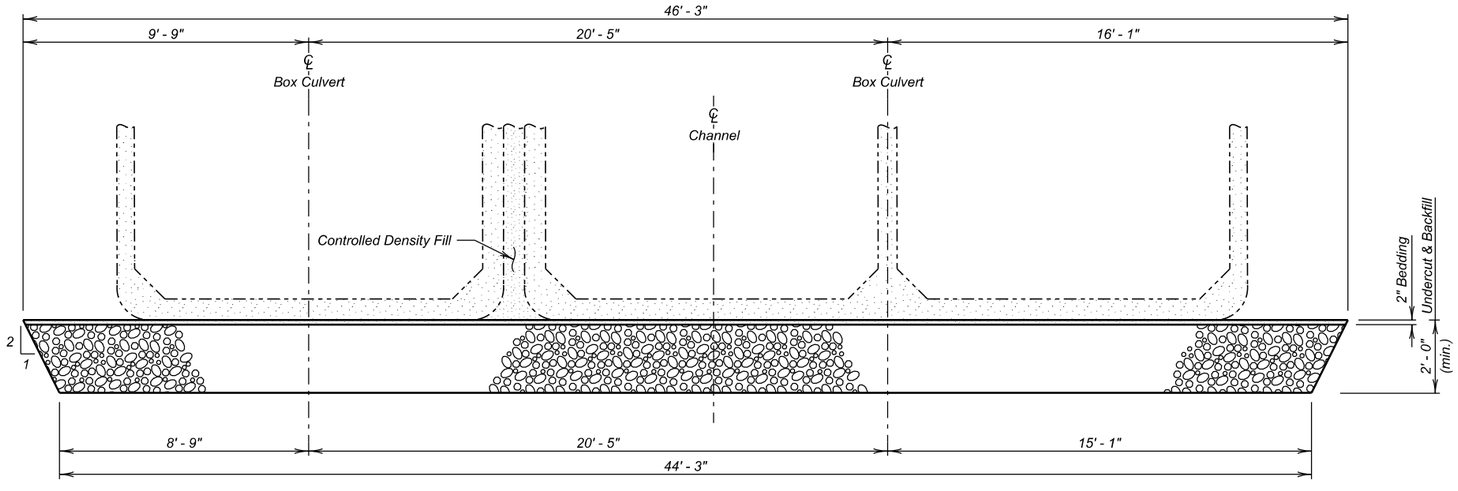
DESIGNED BY	CK. DES. BY	DRAFTED BY	
BB	KS	CK	Steve A Johnson BRIDGE ENGINEER
JACK06NH	06NHTA98		

Revised September 1, 2026 AG

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E11	E30



UNDERCUT LAYOUT
(Bottom Dimensions)



TYPICAL SECTION
(For Limits of Undercut)

ESTIMATED QUANTITIES

	ITEM	UNIT	QUANTITY
⌀	Box Culvert Undercut	Cu. Yd.	406

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

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 a 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 Contruction Specifications. Include design and check design, if applicable, with initial submittal.

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 Construction Specifications with the following criteria:

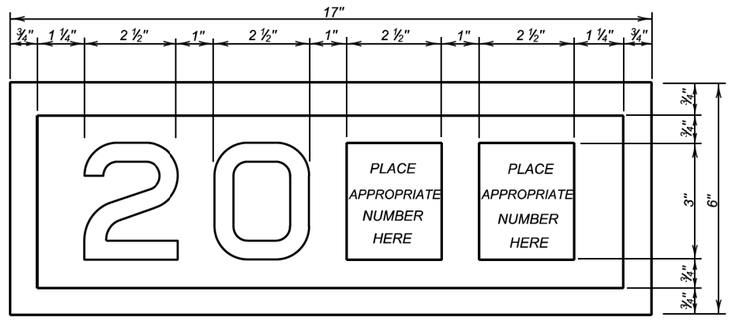
1. Box culvert and box culvert end section design will conform to the AASHTO LRFD Bridge Design Specifications, 9th Edition.
2. Design Live Load: HL-93. No construction loading in excess of legal load is anticipated. If construction loading in excess of legal load is anticipated by the Contractor, the Contractor will submit a proposal including a design analysis for the anticipated construction loading, through the proper channels, to the Office of Bridge Design for approval. Upon approval, the construction load will not be applied until the depth of fill over the box culvert as required by analysis has been placed. At a minimum, 4 feet of fill will be placed over the box culvert prior to applying the construction load All costs associated with accommodating any construction loads will be borne by the Contractor.
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 the 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 4 feet and include all subsequent fill heights up to and including the maximum fill height of 5 feet 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 non-shrinkable 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. Adjust cutoff wall shown on Standard Plates No. 560.10 and 560.20 to extend the full width of the end sections (out-to-out) plus the 9 inch spacing.
13. Soils below the bottom of the proposed box culvert consist of approximately 2 feet of brown sand silt overlaying dark gray clay. Groundwater was encountered in the borings at an elevation of 2320.6 feet during the subsurface investigation counductd in July 2023. Dewatering will be required during construction.

SITE 1
ALTERNATE B
NOTES AND UNDERCUT DETAILS
FOR
3 - 12' X 9' BOX CULVERT (PRECAST)

OVER BRAVE BULL CREEK — 0° SKEW
STA. 24 + 22.00 — SEC. 25-T2S-R23E
STR. NO. 36 - 421 - 109 — P-B 0248(16)173
HL-93

JACKSON COUNTY
S. D. DEPT. OF TRANSPORTATION
FEBRUARY 2025

DESIGNED BY	CK. DES. BY	DRAFTED BY	
BB	KS	CK	Steve A Johnson BRIDGE ENGINEER
JACK06NH	06NHTA98		



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.

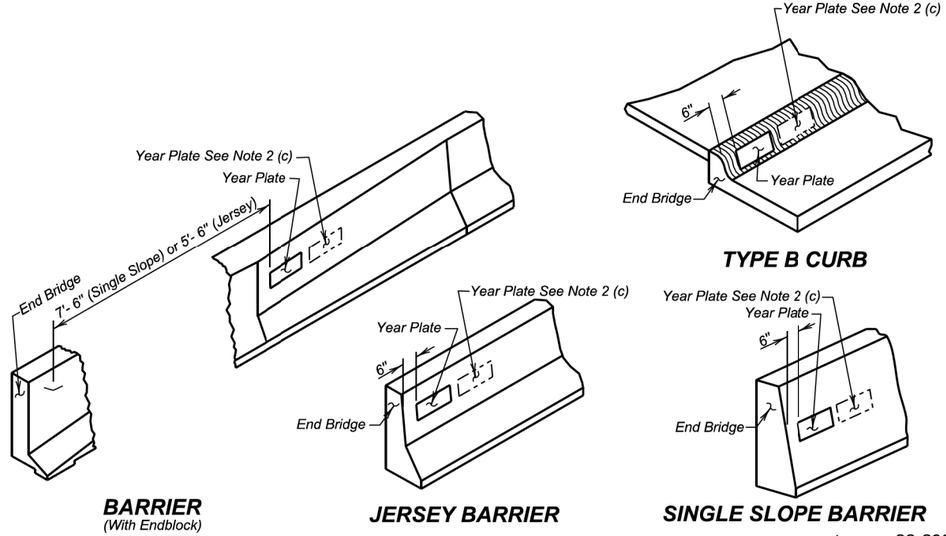
2. Year plates will be located on structure(s) as follows:

   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.

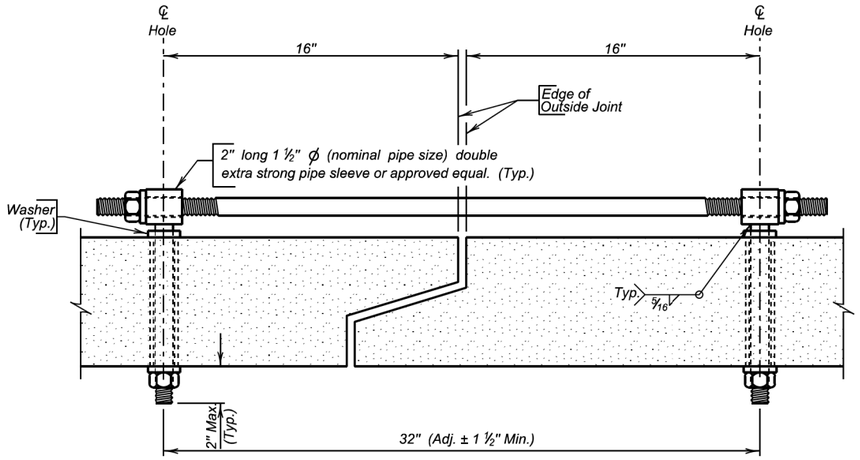
   c. When the plans specify that both the original date of construction and the date of reconstruction are to be shown, one date will be placed as listed above and the other located adjacent to it. Both year plates will be shown at each end of the bridge on opposite sides.

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

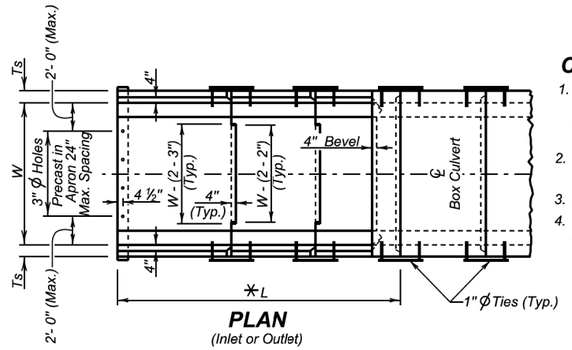
Published Date: 2027	SDDOT	PRECAST BOX CULVERT TIE BOLT ASSEMBLY DETAILS	PLATE NUMBER 560.01
			Sheet 1 of 1

SITE 1
ALTERNATE B

3 - 12' X 9' BOX CULVERT (PRECAST)
STR. NO. 36-421-109
FEBRUARY 2025

Revised September 1, 2026 AG

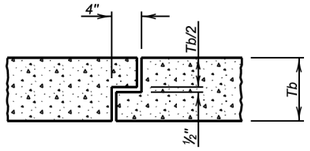
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E13	E30



PLAN
(Inlet or Outlet)

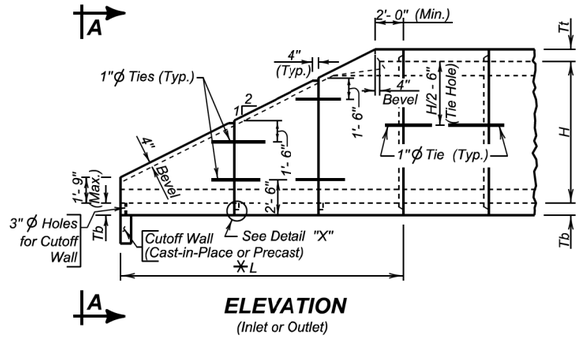
CUTOFF WALL

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.

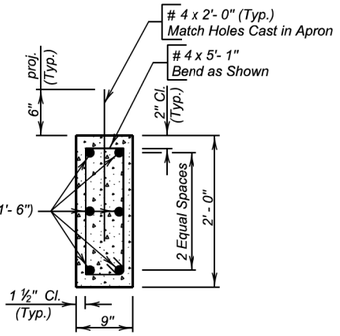


DETAIL " X "

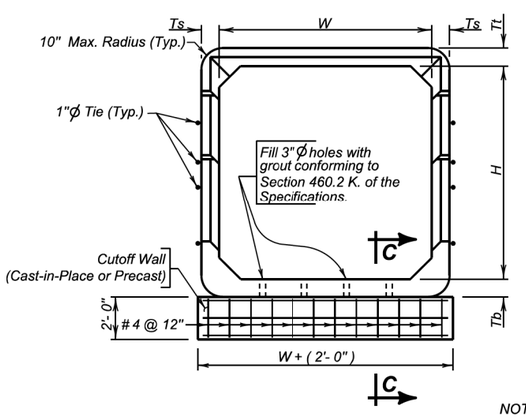
NOTE: Joint details may vary from that shown, according to the manufacturer's design. Submit details with shop plans for approval.



ELEVATION
(Inlet or Outlet)



SEC. C - C



VIEW A - A

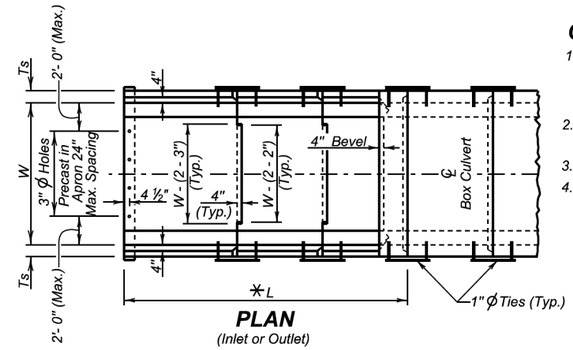
LEGEND

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

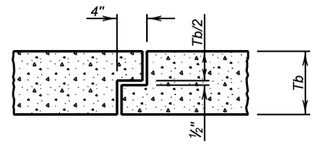
Published Date: 2027	SDDOT	PRECAST SINGLE BOX CULVERT SLOPED END SECTION DETAILS WITH 2'–0" CUTOFF WALL	PLATE NUMBER 560.10
			Sheet 1 of 1



PLAN
(Inlet or Outlet)

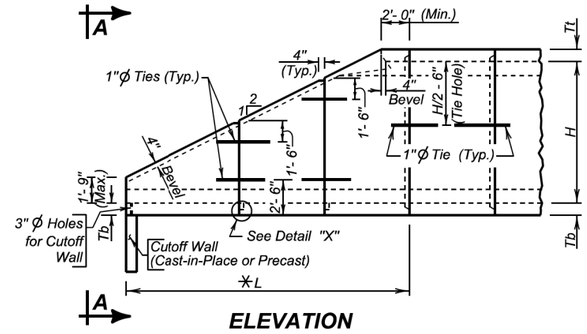
CUTOFF WALL

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.

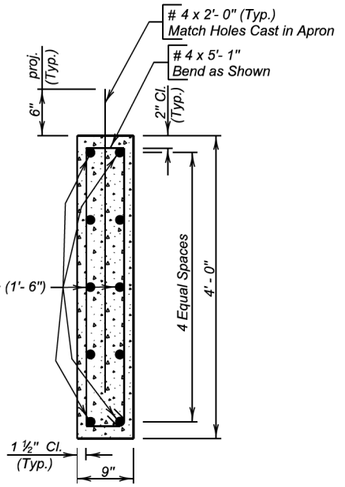


DETAIL " X "

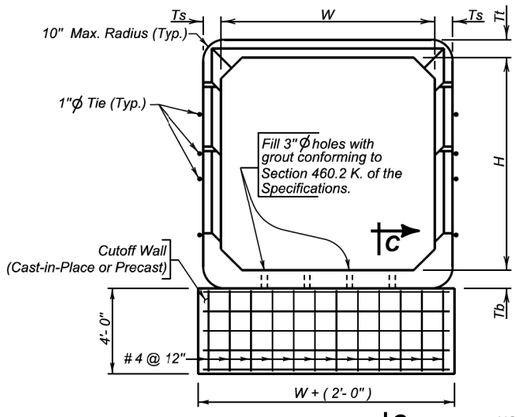
NOTE: Joint details may vary from that shown, according to the manufacturer's design. Submit details with shop plans for approval.



ELEVATION
(Inlet or Outlet)



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

SITE 1
ALTERNATE B

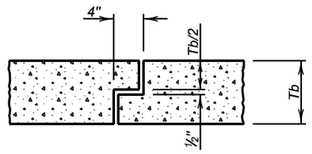
3 - 12' X 9' BOX CULVERT (PRECAST)
STR. NO. 36 - 421 - 109
MARCH 2025

Revised September 1, 2026 AG

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E14	E30

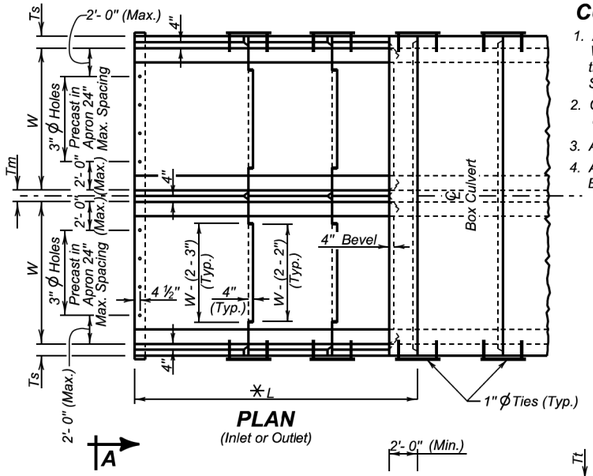
CUTOFF WALL

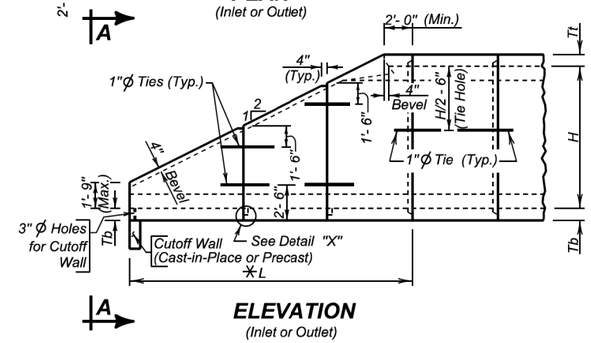
1. All costs associated with furnishing and installing the Cutoff Wall, whether precast or cast-in-place, shall be incidental to the contract unit price per each for "Precast Box Culvert End Section, Furnish".
2. Concrete for cast-in-place cutoff wall shall be Class M6 concrete in accordance with Section 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.

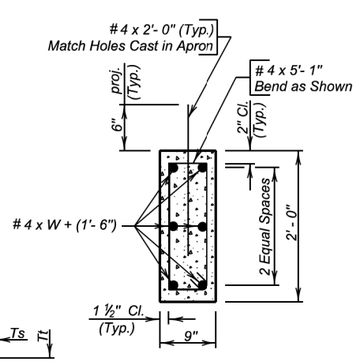


DETAIL " X "

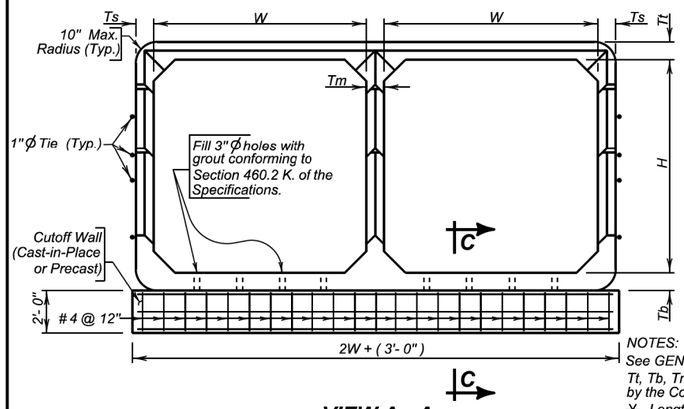
NOTE: Joint details may vary from that shown, according to the manufacturer's design. Submit details with shop plans for approval.







SEC. C - C



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
Tm = Thickness of Middle Wall
L = Length of End Section

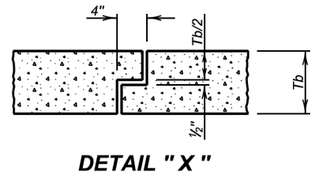
NOTES:
See GENERAL DRAWING for W and H dimensions.
Tt, Tb, Tm, L, and Ts dimensions shall be furnished by the Contractor.
⁎ Length and number of units may vary from that shown.

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

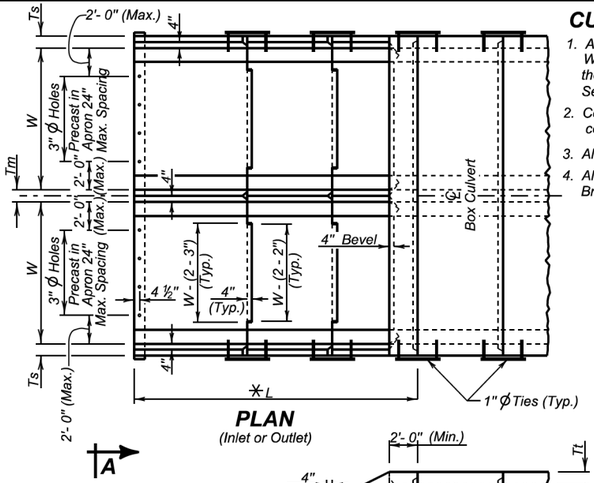
CUTOFF WALL

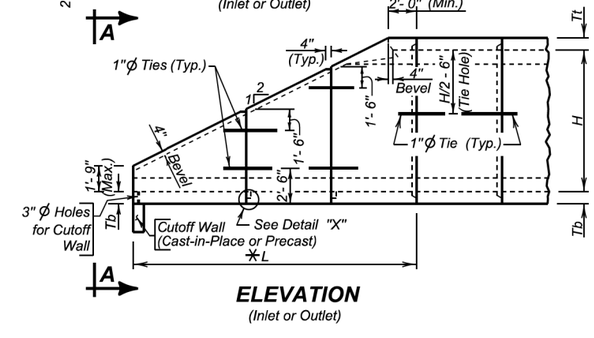
1. All costs associated with furnishing and installing the Cutoff Wall, whether precast or cast-in-place, shall be incidental to the contract unit price per each for "Precast Box Culvert End Section, Furnish".
2. Concrete for cast-in-place cutoff wall shall be Class M6 concrete in accordance with Section 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.

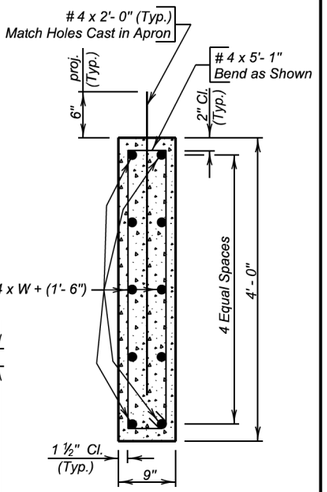


DETAIL " X "

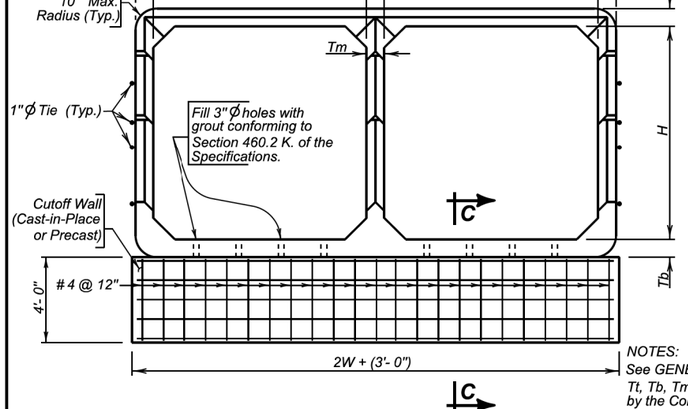
NOTE: Joint details may vary from that shown, according to the manufacturer's design. Submit details with shop plans for approval.







SEC. C - C



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
Tm = Thickness of Middle Wall
L = Length of End Section

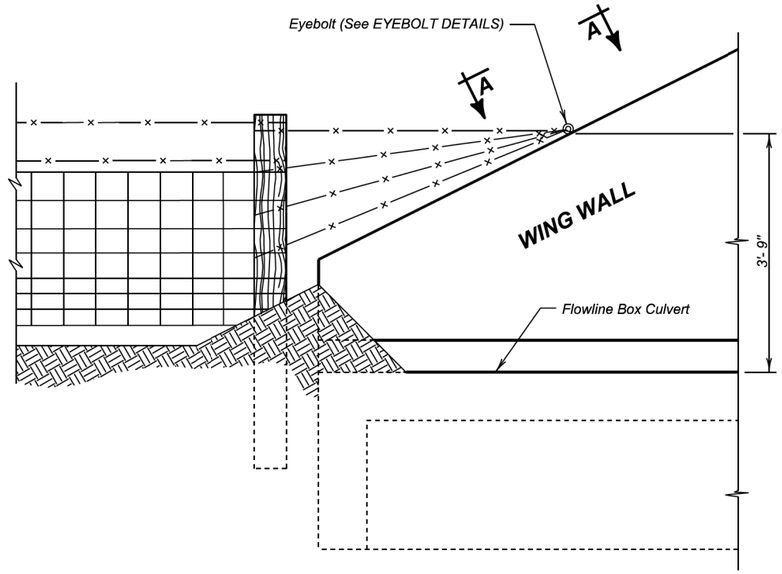
NOTES:
See GENERAL DRAWING for W and H dimensions.
Tt, Tb, Tm, L, and Ts dimensions shall be furnished by the Contractor.
⁎ Length and number of units may vary from that shown.

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

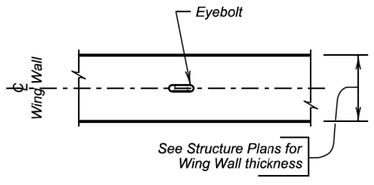
3 - 12' X 9' BOX CULVERT (PRECAST)
STR. NO. 36 - 421 - 109
FEBRUARY 2025



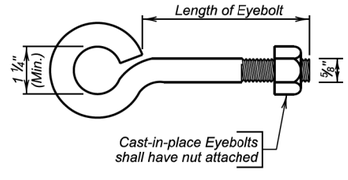
DETAIL FOR FENCE ANCHORS

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

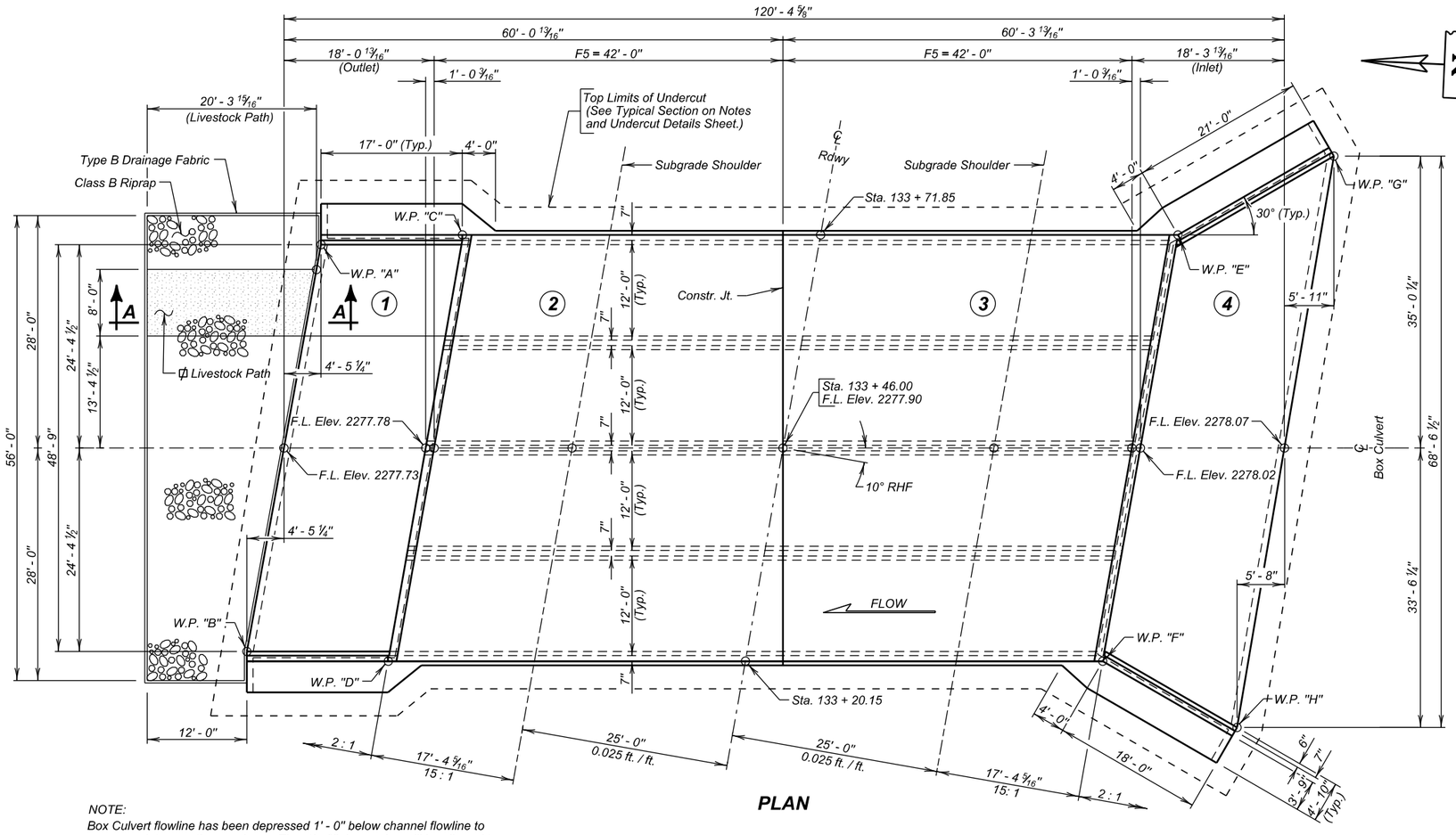
December 23,2012

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).

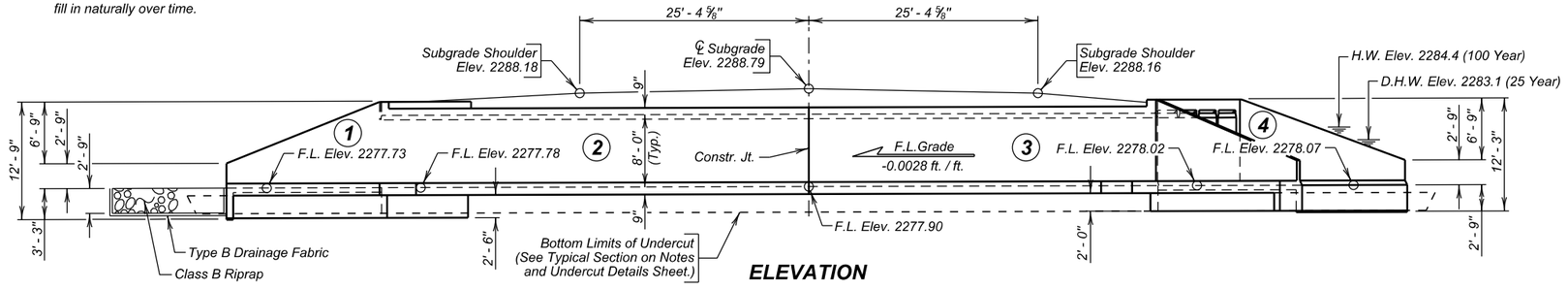
Revised January 20, 2025 BB

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(16)173	E16	E30

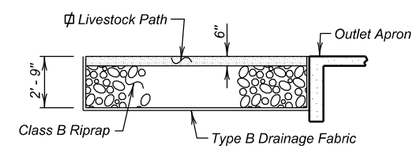


PLAN

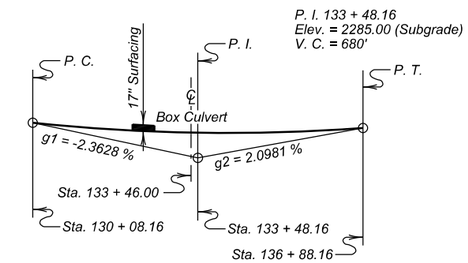
NOTE:
Box Culvert flowline has been depressed 1' - 0" below channel flowline to accommodate aquatic organisms. The 1' - 0" depression will be allowed to fill in naturally over time.



ELEVATION



SECTION A - A



VERTICAL CURVE DATA

ESTIMATED QUANTITIES

	ITEM	UNIT	QUANTITY
	Class A45 Concrete, Box Culvert	Cu. Yd.	411.9
	Reinforcing Steel	Lb.	70243
	Structure Excavation, Box Culvert	Cu. Yd.	189
	Box Culvert Undercut	Cu. Yd.	572
	Type B Drainage Fabric	Sq. Yd.	147
✳	Class B Riprap	Ton	131.3
☆	Base Course	Ton	5.5

✳ 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. Yd. to Tons.

HYDRAULIC DATA

Q_d	762 cfs
A_d	191 sq ft
V_d	4.0 fps
Q_F	762 cfs
Q_{100}	1373 cfs
Q_{OT}	>Q_{100}
V_{max}	6.0 fps

Q_d = Design discharge for the proposed culvert based on 25 year frequency. El. 2283.1.

Q_{OT} = Overtopping discharge and frequency >Q_{100} year recurrence interval. El. 2290.1 @ Sta. 134 + 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. 2284.4.

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

TABLE OF WORKING POINTS

W. P.	STATION	OFFSET
"A"	133 + 60.34	59.02' Lt.
"B"	133 + 10.79	59.29' Lt.
"C"	133 + 64.36	42.46' Lt.
"D"	133 + 12.68	42.36' Lt.
"E"	133 + 79.32	42.36' Rt.
"F"	133 + 27.62	42.36' Rt.
"G"	133 + 91.99	59.14' Rt.
"H"	133 + 22.48	59.65' Rt.

℄ 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.
3. All costs associated with supplying and placing Base Course for the Livestock Path will be paid at the contract unit price per ton for Base Course. The Base Course material will comply with Section 882.

-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 - F5 Barrel End Section Details (42' - 0") (A)
Sheet No. 8 - F5 Barrel End Section Details (42' - 0") (B)
Sheet No. 9 - Details of Standard Plate No's 460.02 and 460.10
Sheet No. 10 - Details of Standard Plate No. 620.16

SITE 2
ALTERNATE A

GENERAL DRAWING AND QUANTITIES

FOR

4 - 12' X 8' BOX CULVERT (C.I.P.)

OVER BRAVE BULL CREEK — 10° RHF SKEW
STA. 133 + 46.00 — SEC. 28-T2S-R24E
STR. NO. 36-441-108 — P-B 0248(16)173
PCN 06NH — HL-93

JACKSON COUNTY
S. D. DEPT. OF TRANSPORTATION
FEBRUARY 2025

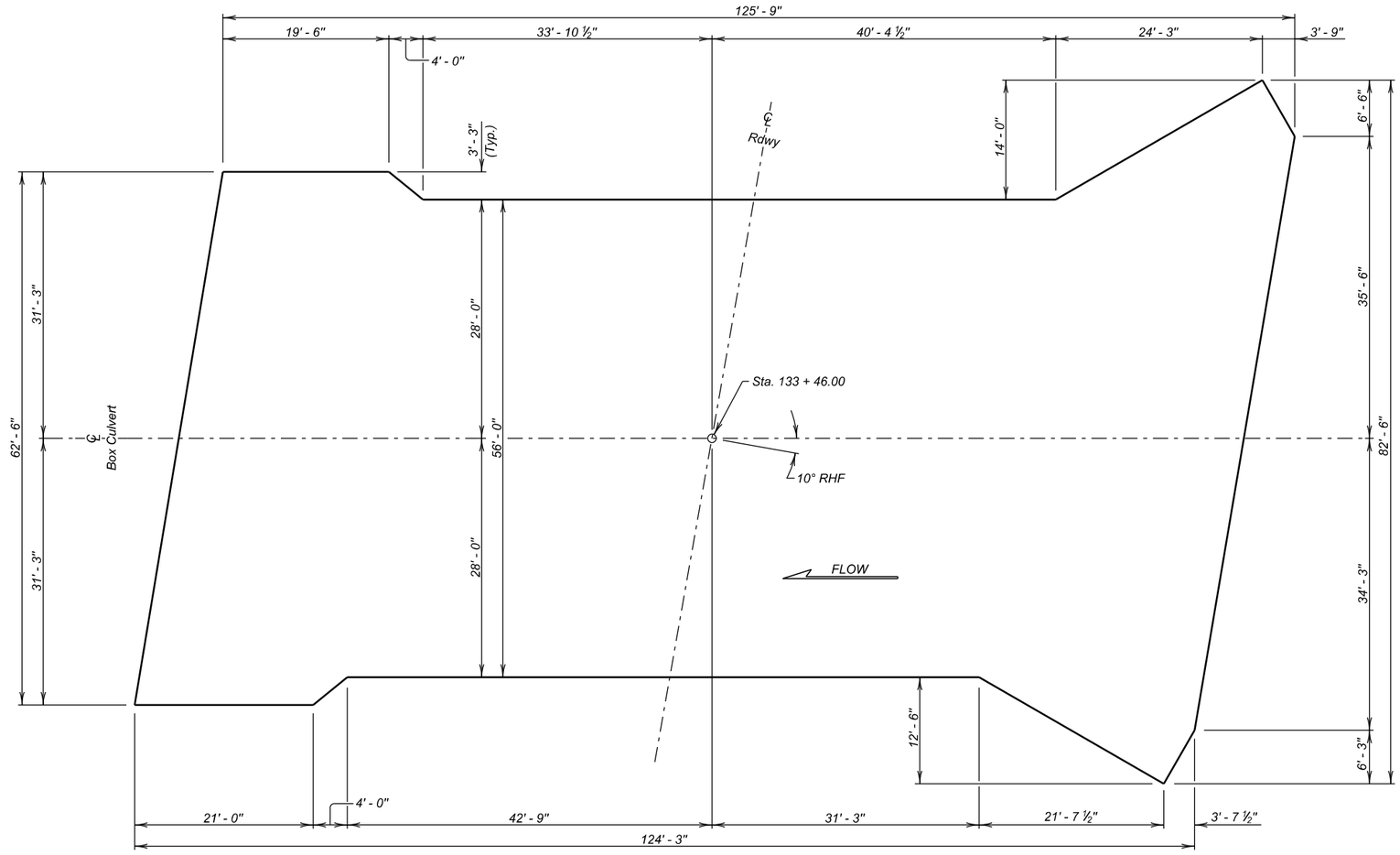
-X028-

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

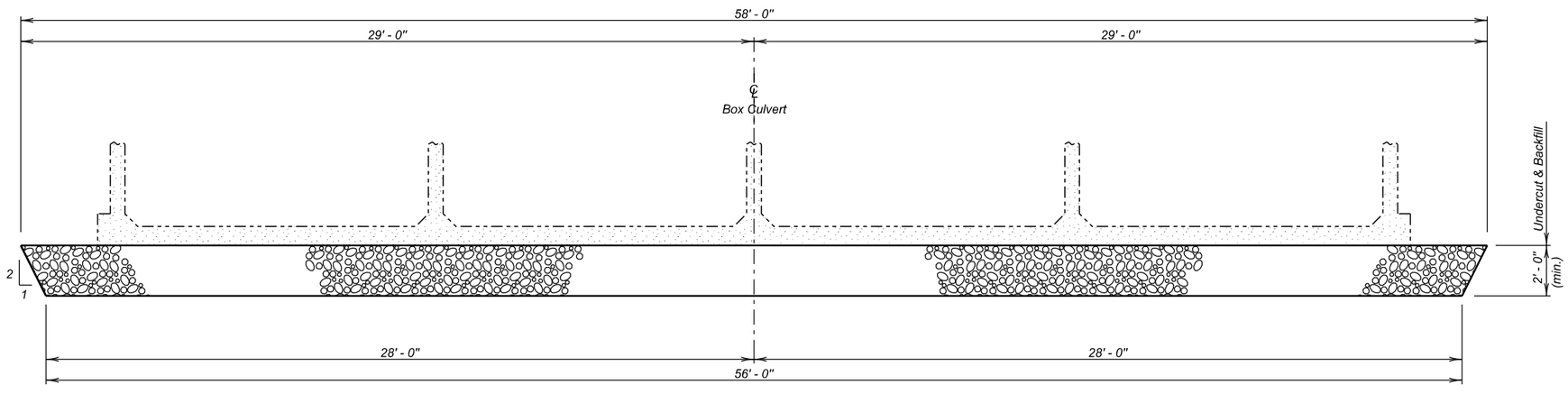
DESIGNED BY	CK. DES. BY	DRAFTED BY	
BB	JJ	BT	Steve A Johnson BRIDGE ENGINEER
JACK06NH	06NHTB01		

Revised September 1, 2026 AG

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(16)173	E17	E30



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. No construction loading in excess of legal load was considered.*
2. *The design of the barrel section is based on a minimum fill height of 2 feet and includes all subsequent fill heights up to and including the maximum fill height of 5 ft. (F5).*
3. *Design Material Strengths: Concrete $f'c$ = 4500 p.s.i.*
   Reinforcing Steel fy = 60000 p.s.i.
4. *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 ¾ inch unless noted otherwise in the plans.*
8. *Use 1 inch clear cover on all reinforcing steel EXCEPT as shown.*
9. *The Contractor will imprint on the structure the date of construction as specified and detailed on Standard Plate No. 460.02.*
10. *Care will be taken to establish Working Points (W.P.) as shown on the wings.*
11. *Circled numbers in PLAN and ELEVATION views on the General Drawing are section I.D. Numbers (see SDDOT Materials Manual).*
12. *Cost of Preformed Expansion Joint Filler used in apron construction will be incidental to the other contract items.*
13. *Soils below the bottom of the proposed box culvert consist of approximately 3 feet of brown sandy clay overlying dark gray clay. Groundwater was encountered in the borings at an elevation of 2278.0 feet during the subsurface investigation conducted on July 2023. Dewatering will be required during construction.*

ESTIMATED QUANTITIES

	ITEM	UNIT	QUANTITY
℄	Box Culvert Undercut	Cu. Yd.	572

℄ *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

4 - 12' X 8' BOX CULVERT (C.I.P.)

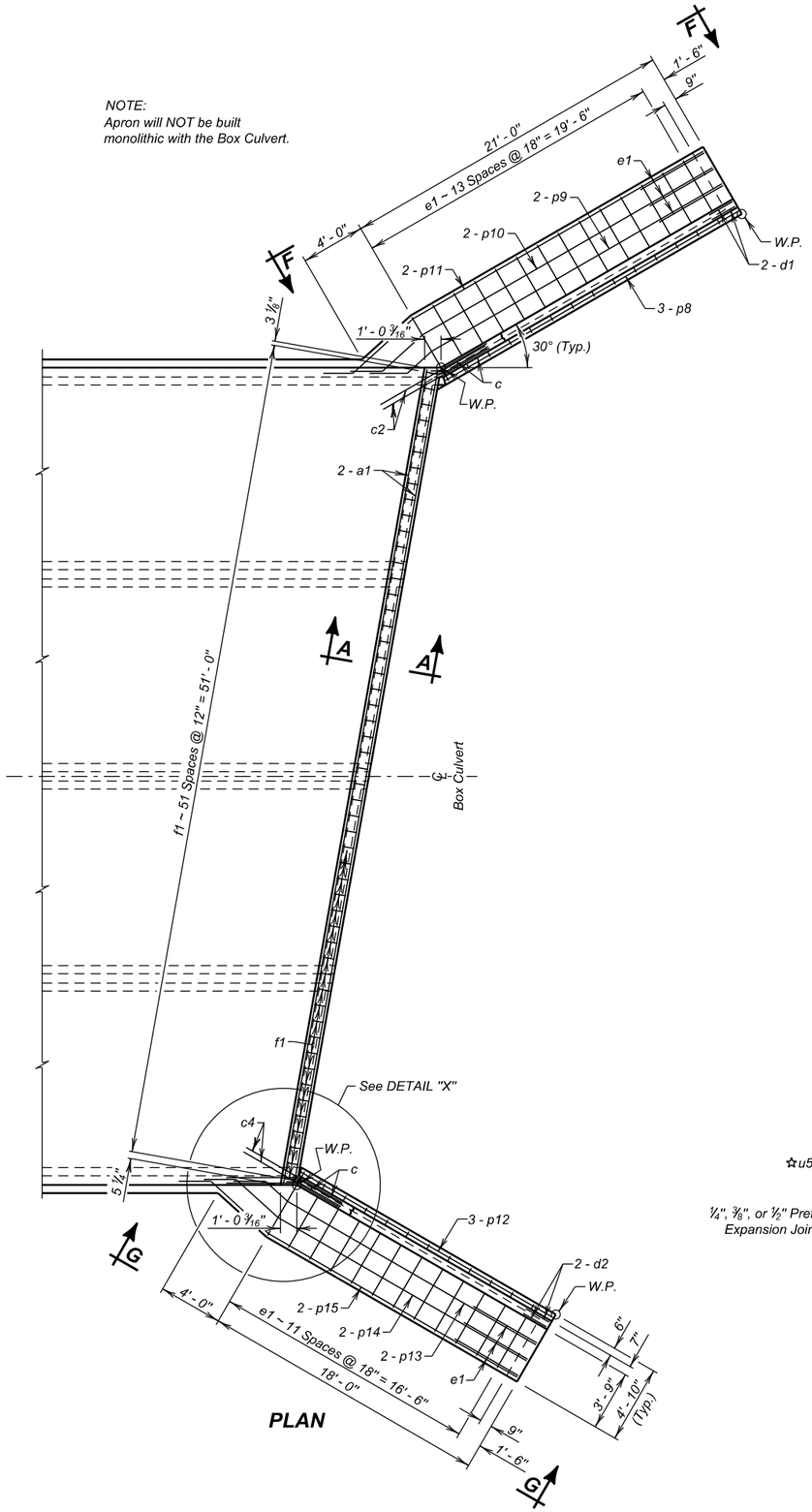
OVER BRAVE BULL CREEK — 10° RHF SKEW
STA. 133 + 46.00 — SEC. 28-T2S-R24E
STR. NO. 36-441-108 — P-B 0248(16)173
HL-93

JACKSON COUNTY
S. D. DEPT. OF TRANSPORTATION
FEBRUARY 2025

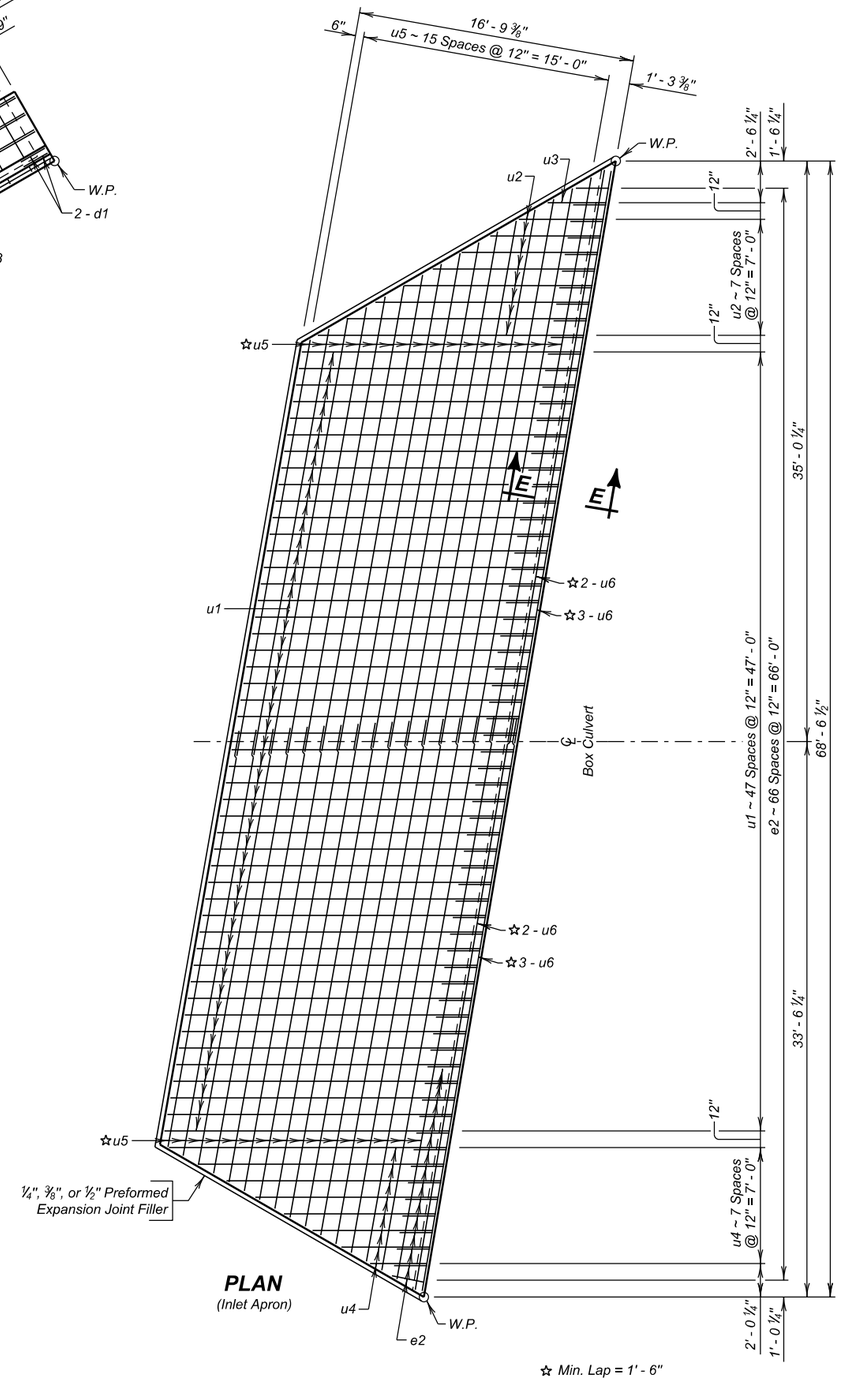
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BB	JJ	BT	Steve A Johnson BRIDGE ENGINEER
JACK06NH	06NHTB02		

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(16)173	E18	E30

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

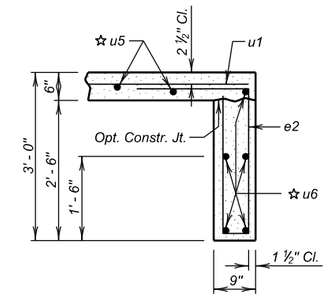


PLAN

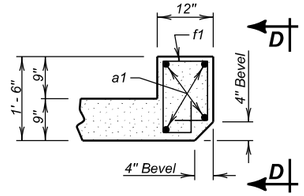


PLAN
(Inlet Apron)

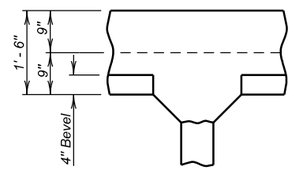
☆ Min. Lap = 1' - 6"



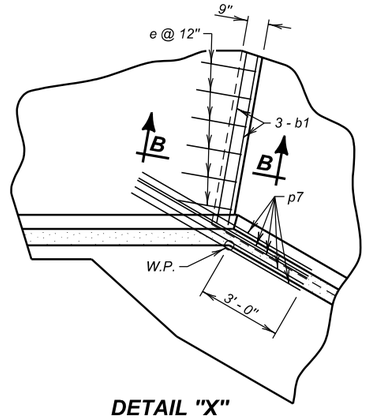
SECTION E - E



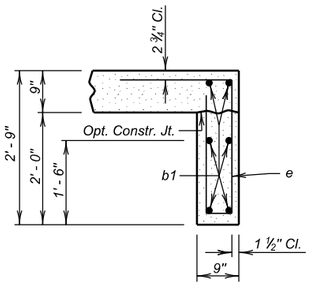
SECTION A - A
(At Top Slab)



VIEW D - D
(At Interior Wall)



DETAIL "X"
(At Bottom Slab)



SECTION B - B

SITE 2
ALTERNATE A

INLET DETAILS (A)

FOR

4 - 12' X 8' BOX CULVERT (C.I.P.)

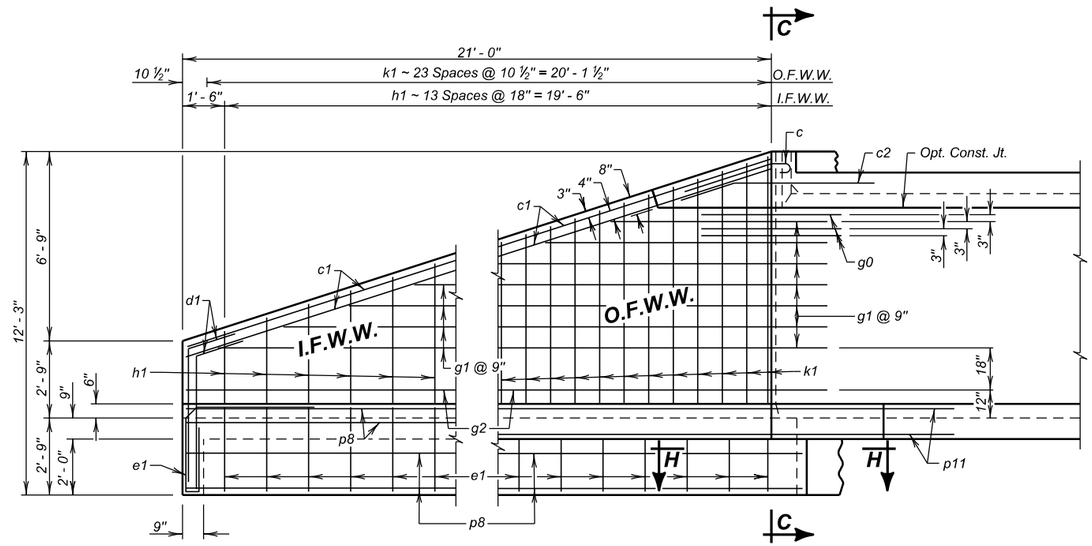
OVER BRAVE BULL CREEK
STA. 133 + 46.00
STR. NO. 36-441-108

10° RHF SKEW
SEC. 28-T2S-R24E
P-B 0248(16)173
HL-93

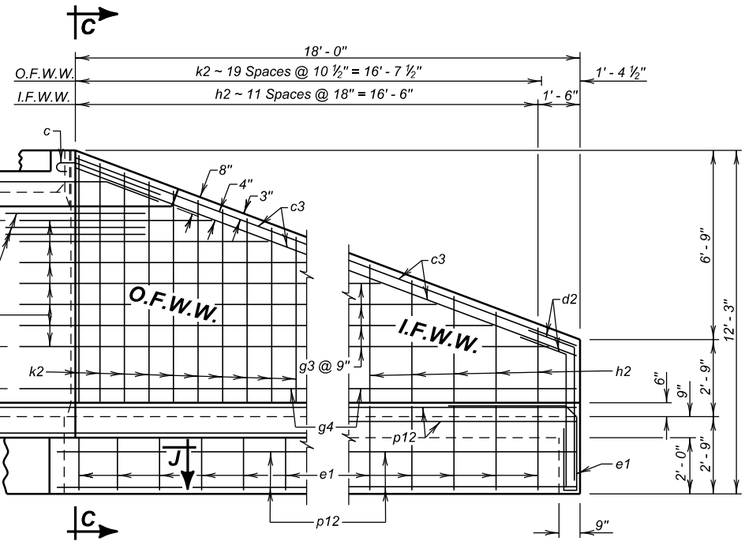
JACKSON COUNTY
S. D. DEPT. OF TRANSPORTATION
FEBRUARY 2025

DESIGNED BY	CK. DES. BY	DRAFTED BY	
BB	JJ	BT	Steve A Johnson BRIDGE ENGINEER
JACK06NH	06NHTB03		

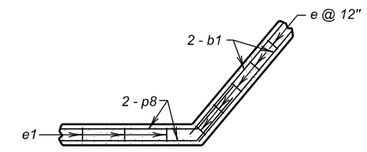
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(16)173	E19	E30



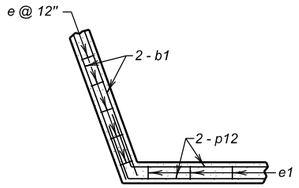
VIEW F - F



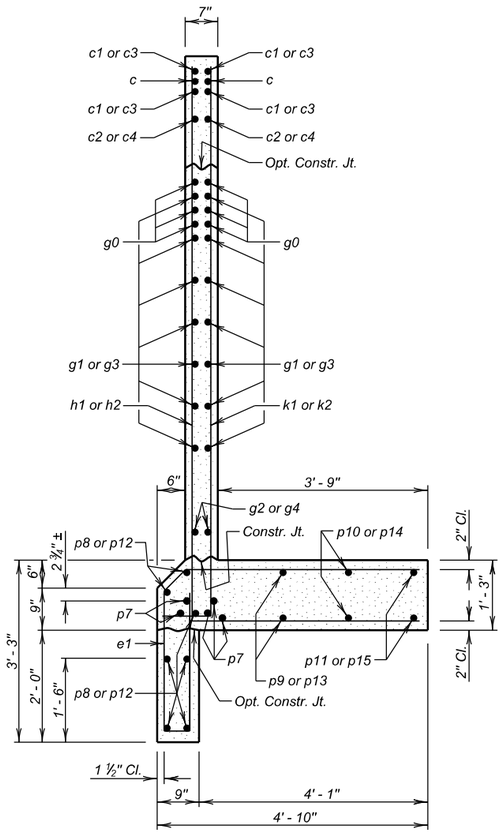
VIEW G - G



SECTION H - H



SECTION J - J



SECTION C - C

ESTIMATED QUANTITIES

ITEM	Class A45 Concrete, Box Culvert	Reinforcing Steel	Structure Excavation, Box Culvert
UNIT	Cu. Yd.	Lb.	Cu. Yd.
Inlet	24.6	2966	12.5
Inlet Apron	23.7	2524	23.7

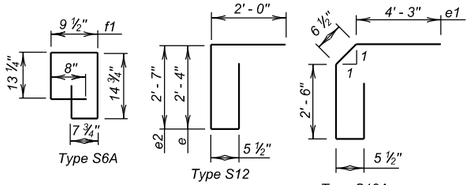
LEGEND FOR PLACING RE-STEEL

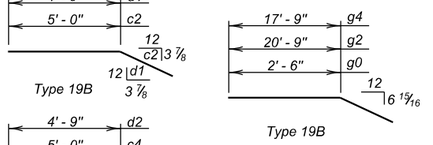
O. F. W. W. - Outside Face of Wing Wall
I. F. W. W. - Inside Face of Wing Wall

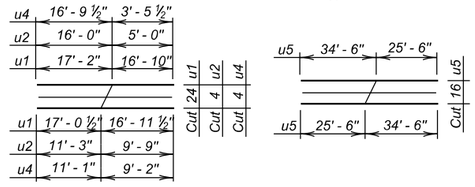
REINFORCING SCHEDULE

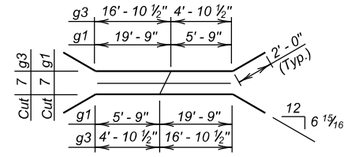
Mk.	No.	Size	Length	Type
a1	4	6	51' - 3"	Str.
b1	6	6	49' - 9"	Str.
✳ c	4	5	4' - 6"	1A
c1	4	5	22' - 0"	Str.
c2	2	5	7' - 0"	19B
c3	4	5	19' - 3"	Str.
c4	2	5	7' - 0"	19B
d1	4	5	6' - 6"	19B
d2	4	5	6' - 6"	19B
e	50	4	7' - 0"	S12
e1	32	4	10' - 3"	S12A
f1	52	4	5' - 3"	S6A
g0	12	5	5' - 0"	19B
⌀ g1	7	4	29' - 6"	19B
g2	2	4	22' - 9"	19B
⌀ g3	7	4	25' - 9"	19B
g4	2	4	19' - 9"	19B
⌀ h1	7	4	22' - 3"	17A
⌀ h2	6	4	22' - 3"	17A
⌀ k1	12	4	15' - 0"	17A
⌀ k2	10	4	15' - 3"	17A
p7	10	6	7' - 0"	Str.
✳ p8	7	4	23' - 6"	Str.
✳ p9	2	4	24' - 6"	Str.
✳ p10	2	4	26' - 0"	Str.
✳ p11	2	4	27' - 6"	Str.
✳ p12	7	4	20' - 6"	Str.
✳ p13	2	4	21' - 6"	Str.
✳ p14	2	4	23' - 0"	Str.
✳ p15	2	4	24' - 6"	Str.
INLET APRON				
e2	67	4	7' - 6"	S12
⌀ u1	24	4	34' - 0"	Str.
⌀ u2	4	4	21' - 0"	Str.
u3	1	4	3' - 6"	Str.
⌀ u4	4	4	20' - 3"	Str.
⌀ u5	32	4	60' - 0"	Str.
⌀ u6	10	4	35' - 0"	Str.

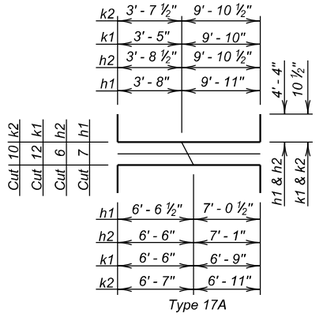
Bending Details











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

SITE 2
ALTERNATE A

INLET DETAILS (B)

FOR

4 - 12' X 8' BOX CULVERT (C.I.P.)

OVER BRAVE BULL CREEK
STA. 133 + 46.00
STR. NO. 36-441-108

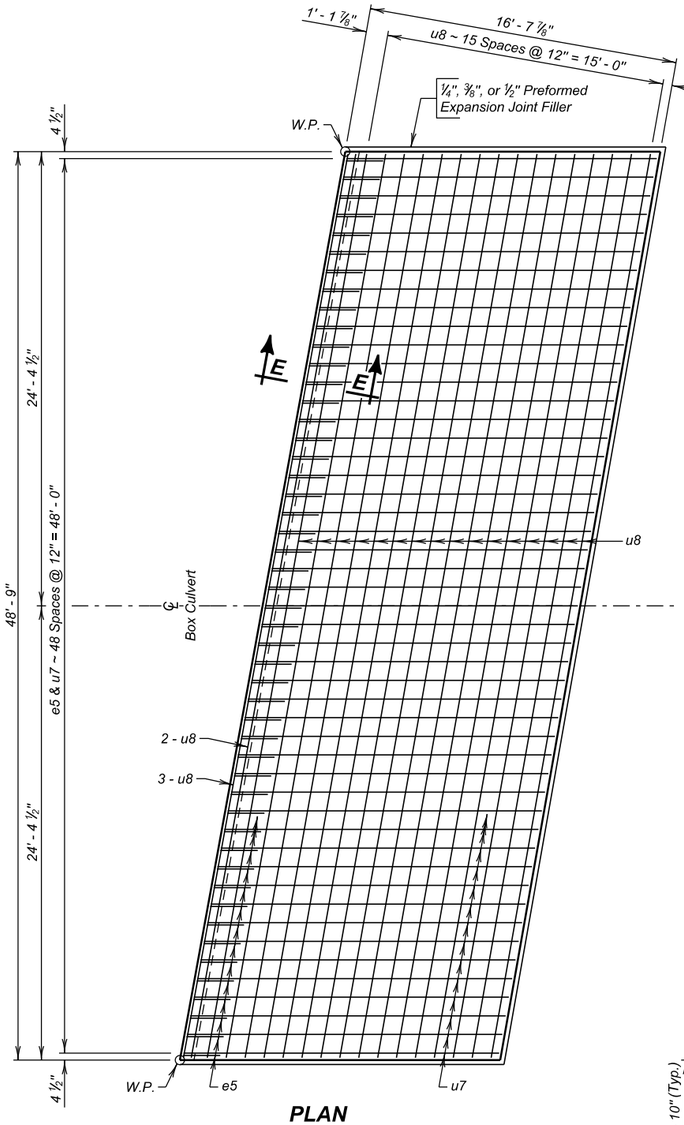
10° RHF SKEW
SEC. 28-T2S-R24E
P-B 0248(16)173
HL-93

JACKSON COUNTY
S. D. DEPT. OF TRANSPORTATION
FEBRUARY 2025

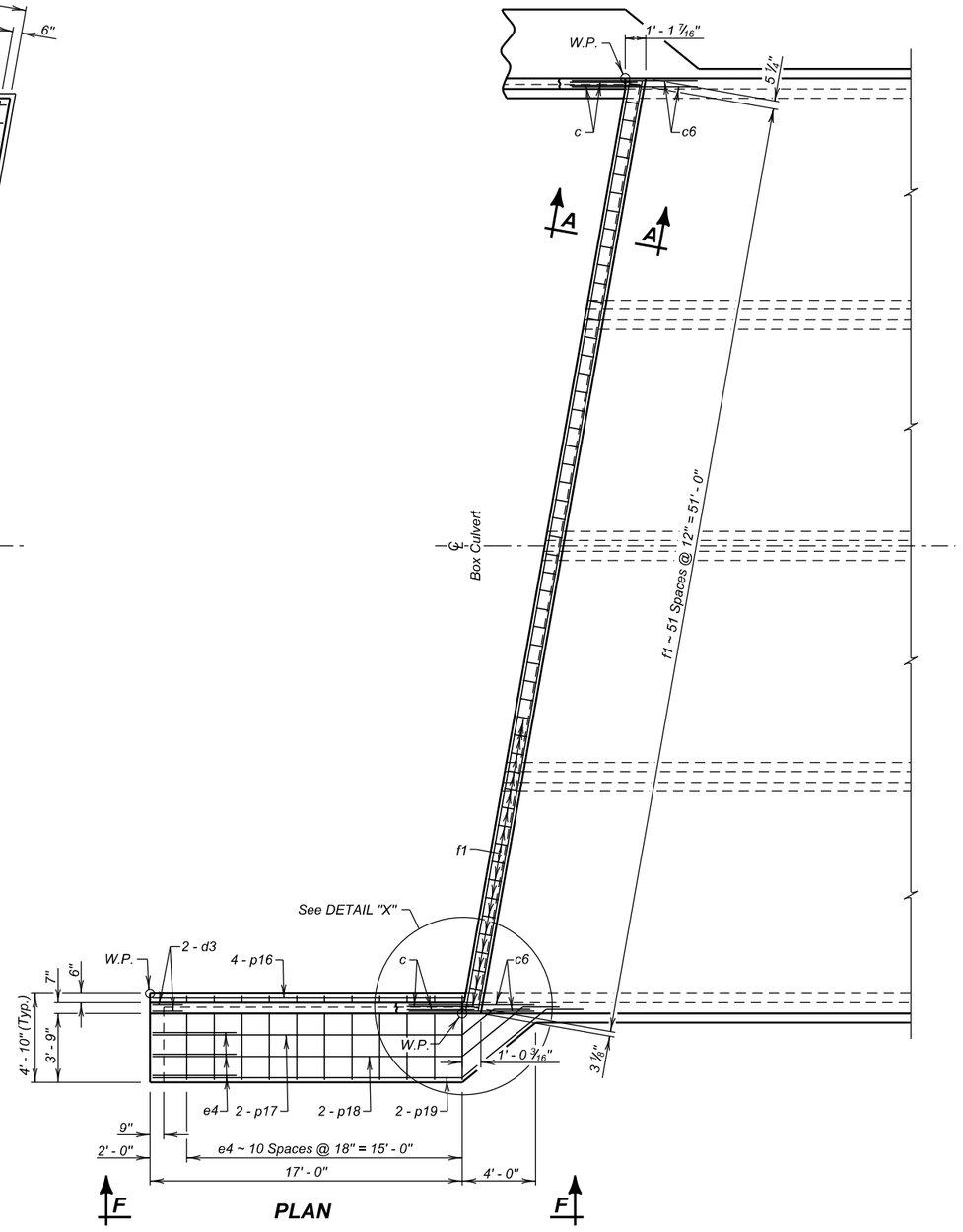
4 OF 10

DESIGNED BY	CK. DES. BY	DRAFTED BY	
BB	JJ	BT	Steve A Johnson BRIDGE ENGINEER
JACK06NH	06NHTB04		

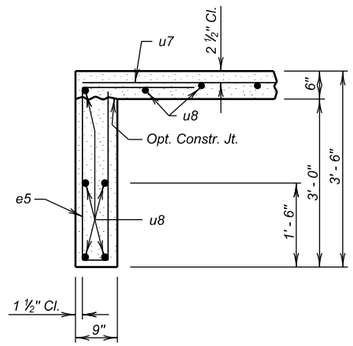
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(16)173	E20	E30



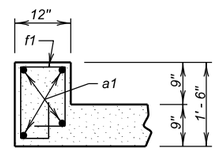
PLAN
(Outlet Apron)



PLAN



SECTION E - E



SECTION A - A
(At Top Slab)

SITE 2
ALTERNATE A

OUTLET DETAILS (A)

FOR

4 - 12' X 8' BOX CULVERT (C.I.P.)

OVER BRAVE BULL CREEK
STA. 133 + 46.00
STR. NO. 36-441-108

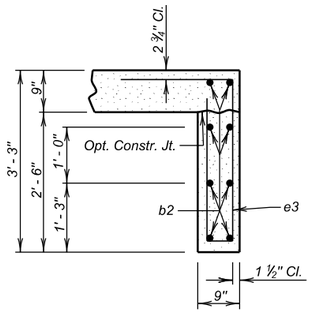
10° RHF SKEW
SEC. 28-T2S-R24E
P-B 0248(16)173
HL-93

JACKSON COUNTY
S. D. DEPT. OF TRANSPORTATION
FEBRUARY 2025

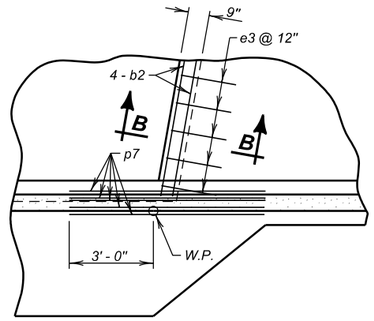
5 OF 10

DESIGNED BY	CK. DES. BY	DRAFTED BY	
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JACK06NH	06NHTB05		

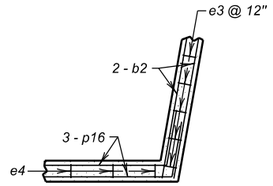
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S.D.	P-B 0248(16)173	E21	E30



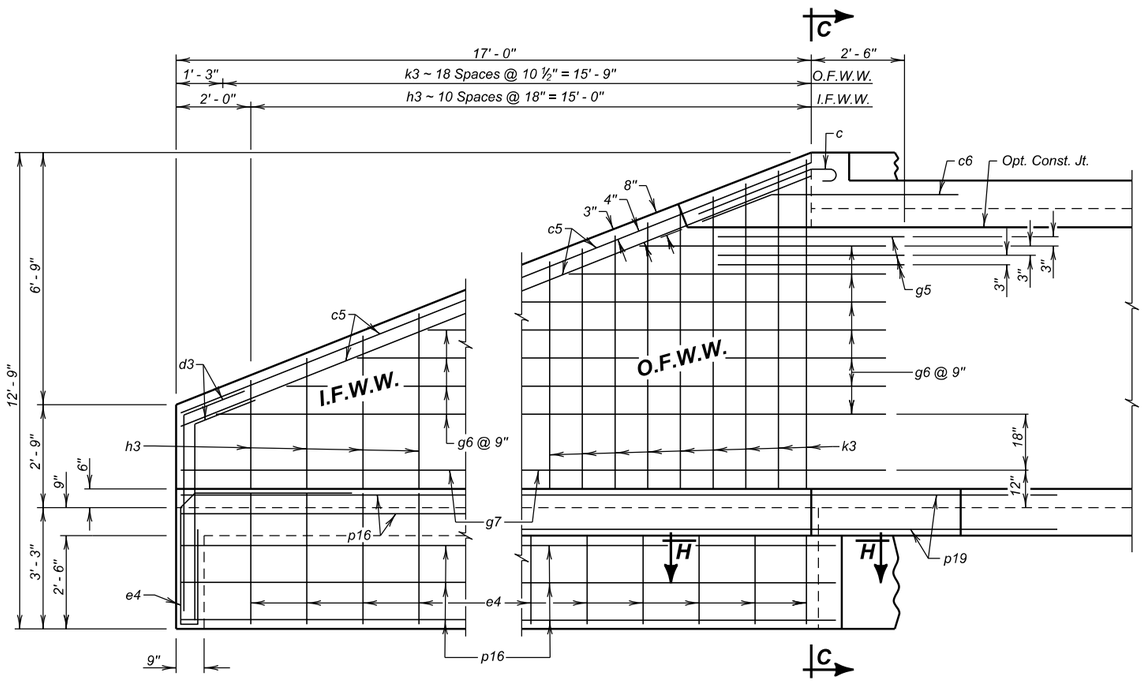
SECTION B - B



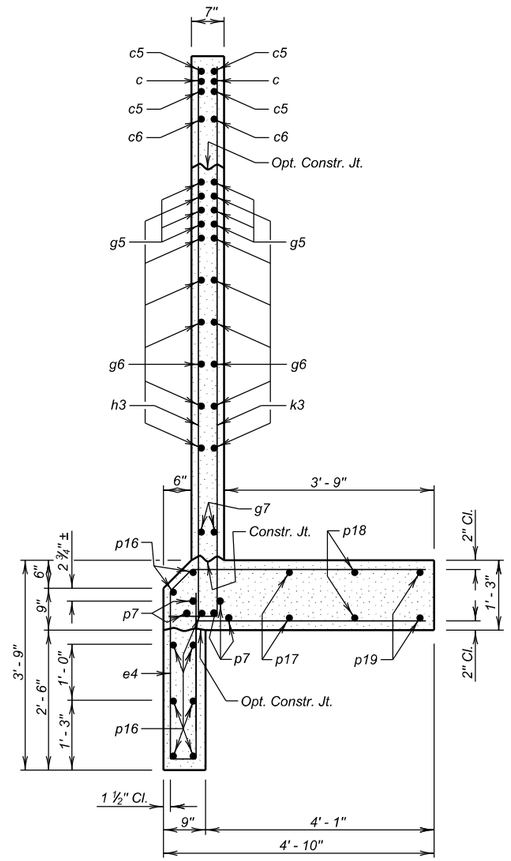
DETAIL "X"
(At Bottom Slab)



SECTION H - H



VIEW F - F

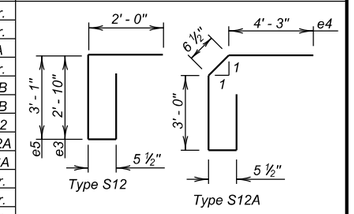


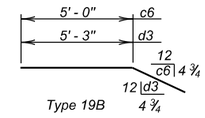
SECTION C - C

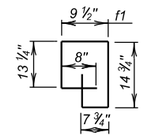
REINFORCING SCHEDULE

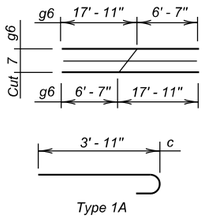
Mk.	No.	Size	Length	Type
a1	4	6	51' - 3"	Str.
b2	8	6	50' - 9"	Str.
* c	4	5	4' - 6"	1A
c5	8	5	18' - 3"	Str.
c6	4	5	7' - 0"	19B
d3	8	5	7' - 0"	19B
e3	51	4	8' - 0"	S12
e4	28	4	11' - 3"	S12A
f1	52	4	5' - 3"	S6A
g5	12	5	5' - 0"	Str.
⌀ g6	14	4	24' - 6"	Str.
g7	4	4	18' - 9"	Str.
⌀ h3	11	4	22' - 6"	17A
⌀ k3	19	4	15' - 3"	17A
p7	10	6	7' - 0"	Str.
* p16	18	4	19' - 6"	Str.
* p17	4	4	20' - 9"	Str.
* p18	4	4	22' - 6"	Str.
* p19	4	4	24' - 3"	Str.
OUTLET APRON				
e5	49	4	8' - 6"	S12
u7	49	4	16' - 9"	Str.
u8	21	4	49' - 3"	Str.

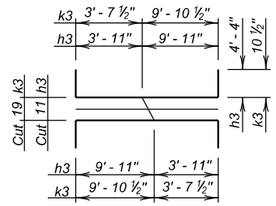
Bending Details











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	23.9	3062	12.8
Outlet Apron	19.4	1517	19.4

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 (B)

FOR

4 - 12' X 8' BOX CULVERT (C.I.P.)

OVER BRAVE BULL CREEK
STA. 133 + 46.00
STR. NO. 36-441-108

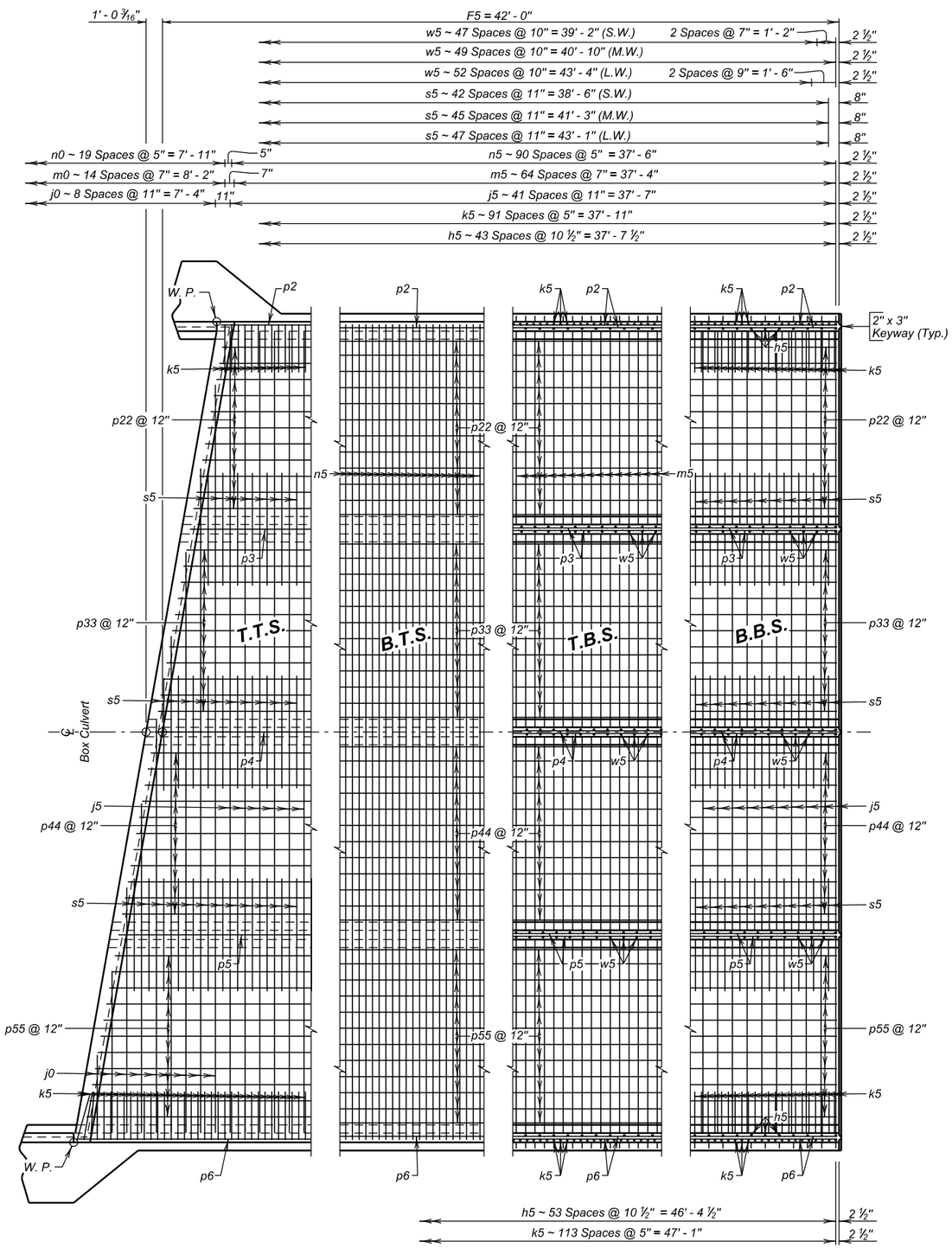
10° RHF SKEW
SEC. 28-T2S-R24E
P-B 0248(16)173
HL-93

JACKSON COUNTY
S. D. DEPT. OF TRANSPORTATION
FEBRUARY 2025

6 OF 10

DESIGNED BY	CK. DES. BY	DRAFTED BY	
BB	JJ	BT	Steve A Johnson BRIDGE ENGINEER
JACK06NH	06NHTB06		

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(16)173	E22	E30



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. W. - Short Wall
M. W. - Middle Wall
L. W. - Long Wall

SITE 2
ALTERNATE A

F5 BARREL END SECTION DETAILS (42' - 0") (A)

FOR

4 - 12' X 8' BOX CULVERT (C.I.P.)

OVER BRAVE BULL CREEK — 10° RHF SKEW

STA. 133 + 46.00 — SEC. 28-T2S-R24E

STR. NO. 36-441-108 — P-B 0248(16)173

HL-93

JACKSON COUNTY

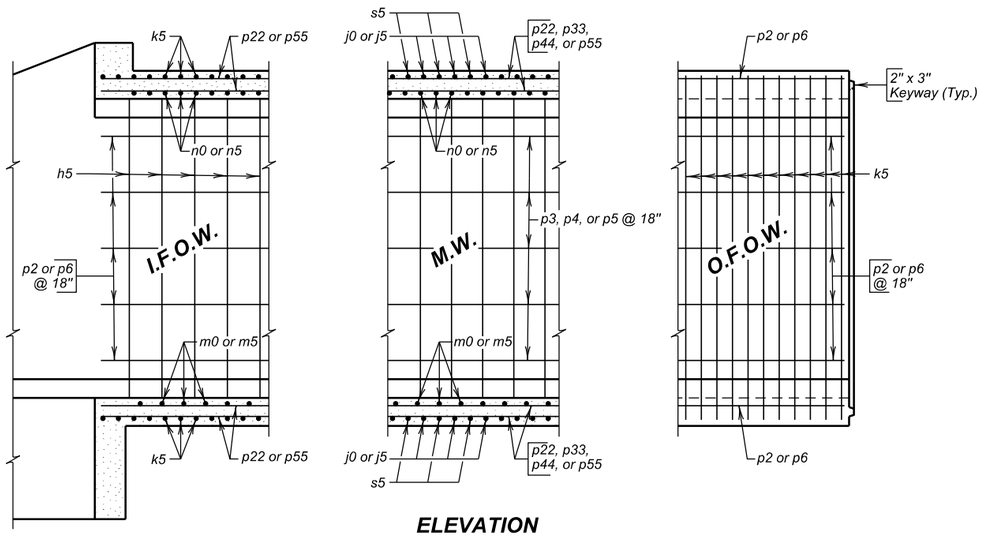
S. D. DEPT. OF TRANSPORTATION

FEBRUARY 2025

7 OF 10

DESIGNED BY	CK. DES. BY	DRAFTED BY	
BB	JJ	BT	Steven A. Johnson BRIDGE ENGINEER
JACK06NH	06NHTB07		

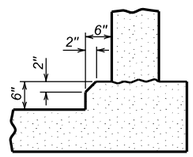
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(16)173	E23	E30



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

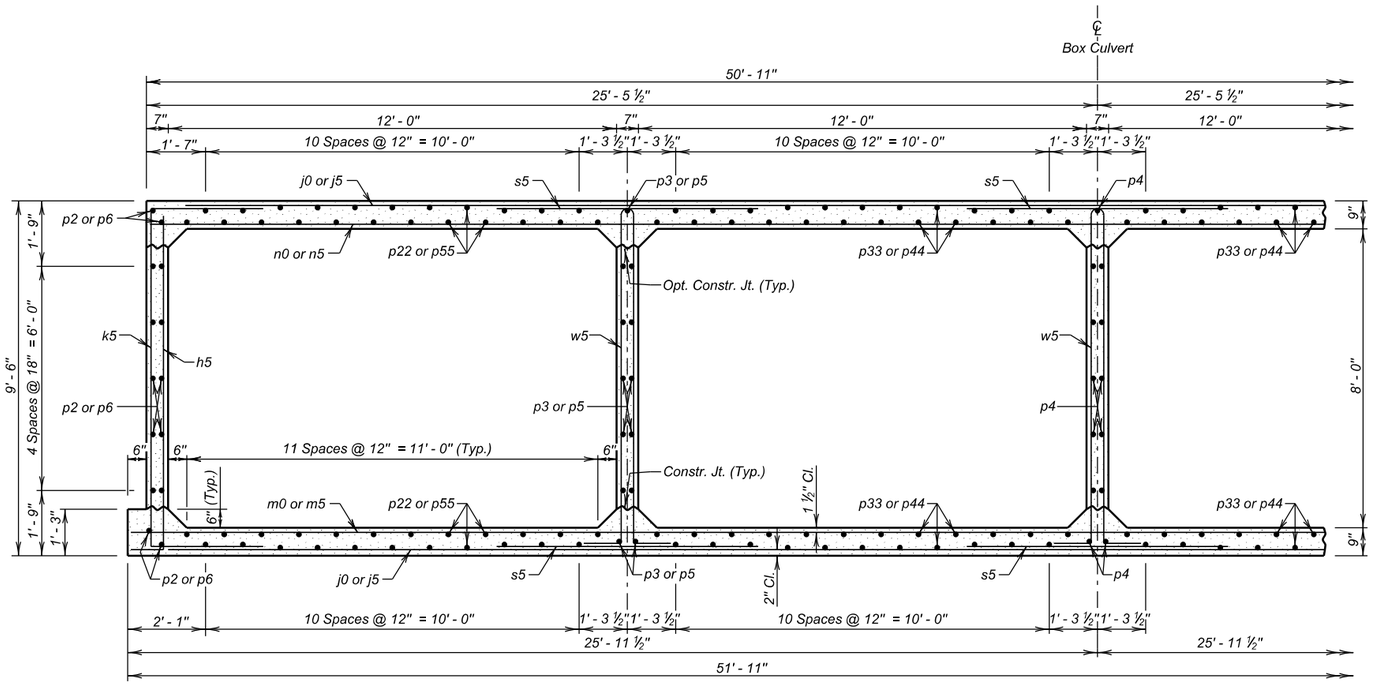
(At Bottom Slab)

NOTE: Contractor may form the optional full fillet, with 2" Chamfer, as 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.



F5 BARREL HALF SECTION

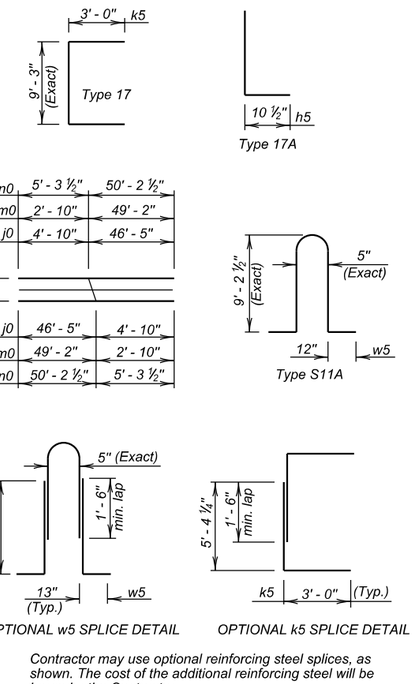
(5' - 0" Maximum Fill)

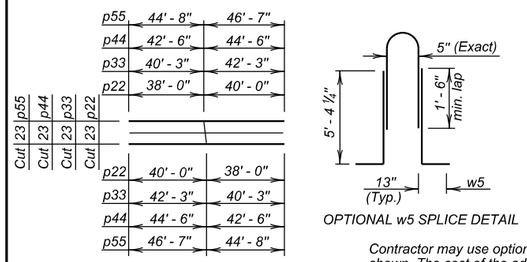
REINFORCING SCHEDULE

(For 2 - F5 Barrel End Sections @ 42' - 0")

	Mk.	No.	Size	Length	Type
	h5	196	4	9' - 9"	17A
⍁	j0	18	5	50' - 9"	Str.
	j5	168	5	49' - 9"	Str.
	k5	412	4	15' - 3"	17
⍁	m0	15	6	52' - 0"	Str.
	m5	130	6	51' - 6"	Str.
⍁	n0	20	5	55' - 6"	Str.
	n5	182	5	50' - 6"	Str.
	p2	28	4	38' - 3"	Str.
	p3	26	4	40' - 6"	Str.
	p4	26	4	42' - 9"	Str.
	p5	26	4	45' - 0"	Str.
	p6	28	4	47' - 3"	Str.
⍁	p22	46	4	78' - 0"	Str.
⍁	p33	46	4	82' - 6"	Str.
⍁	p44	46	4	87' - 0"	Str.
⍁	p55	46	4	91' - 3"	Str.
	s5	548	5	7' - 0"	Str.
	w5	316	4	20' - 9"	S11A
△	z1	121	5	3' - 6"	Str.

Bending Details





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 - F5 Barrel End Sections @ 42' - 0"	320.3	60174	121.1

SITE 2
ALTERNATE A

F5 BARREL END SECTION DETAILS (42' - 0") (B)

FOR

4 - 12' X 8' BOX CULVERT (C.I.P.)

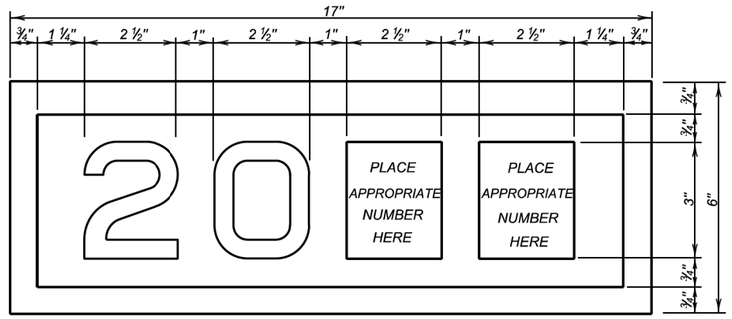
OVER BRAVE BULL CREEK
STA. 133 + 46.00
STR. NO. 36-441-108

10° RHF SKEW
SEC. 28-T2S-R24E
P-B 0248(16)173
HL-93

JACKSON COUNTY
S. D. DEPT. OF TRANSPORTATION
FEBRUARY 2025

8 OF 10

DESIGNED BY	CK. DES. BY	DRAFTED BY	
BB	JJ	BT	Steve A Johnson BRIDGE ENGINEER
JACK06NH	06NHTB08		



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.

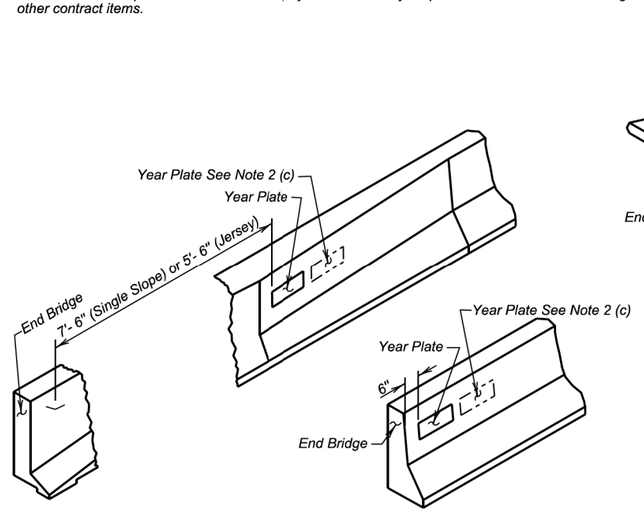
2. Year plates will be located on structure(s) as follows:

   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.

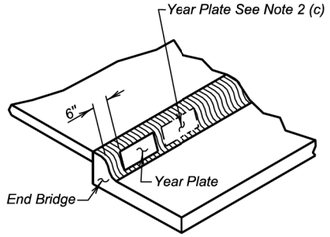
   b. On bridges with six (6) inch curbs, "Jersey" shaped barriers with no endblocks, or "Single Slope" shaped barriers with no endblocks, the year plate will be centered vertically on the curb face approximately six (6) inches from the end of the bridge, or as designated by the Engineer. On bridges with 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.

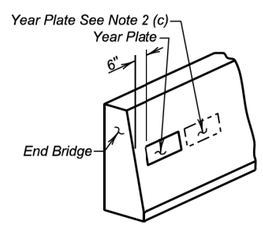


BARRIER
(With Endblock)



TYPE B CURB

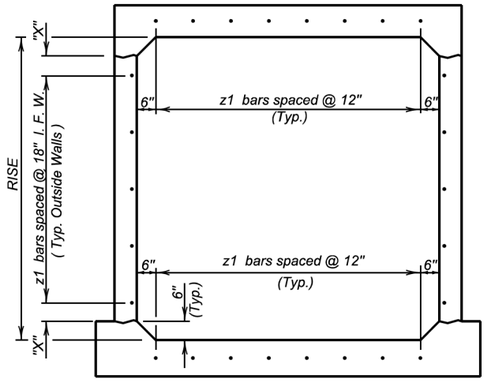
JERSEY BARRIER



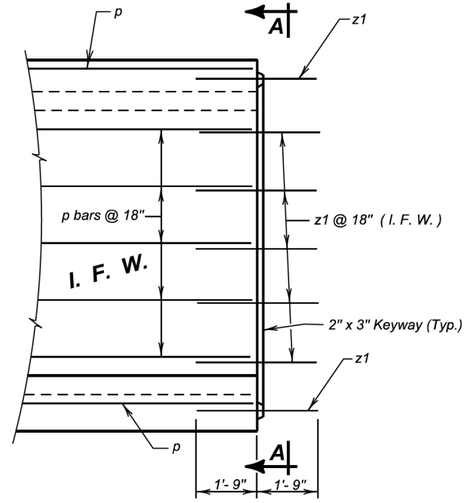
SINGLE SLOPE BARRIER

January 22, 2021

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

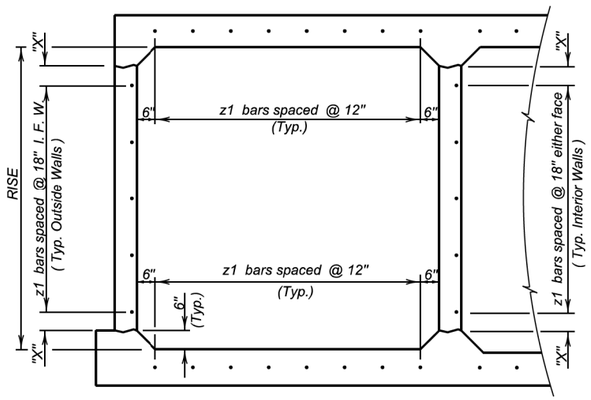


TYPICAL SINGLE BARREL VIEW A - A



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"

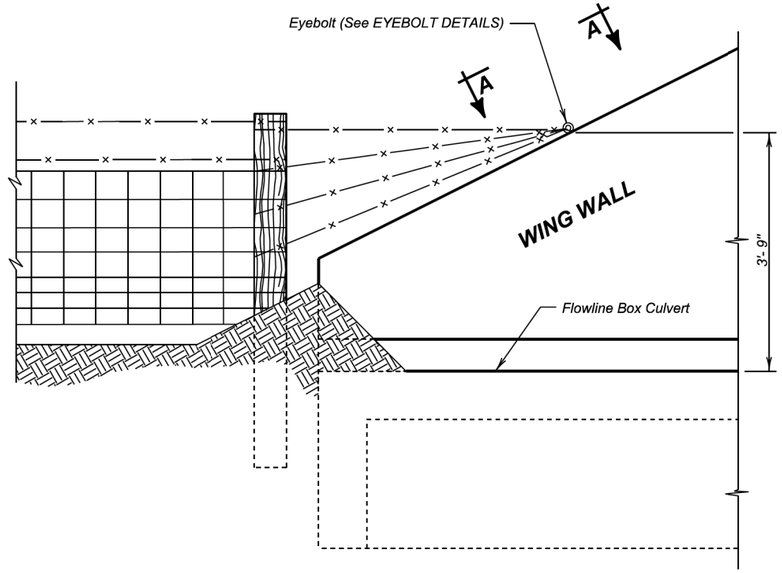
GENERAL NOTES:

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

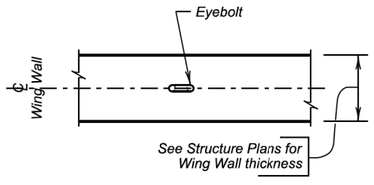
Published Date: 2027	SDDOT	BOX CULVERT BARREL TIE REINFORCEMENT	PLATE NUMBER 460.10 Sheet 1 of 1



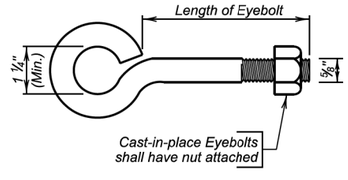
DETAIL FOR FENCE ANCHORS

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).

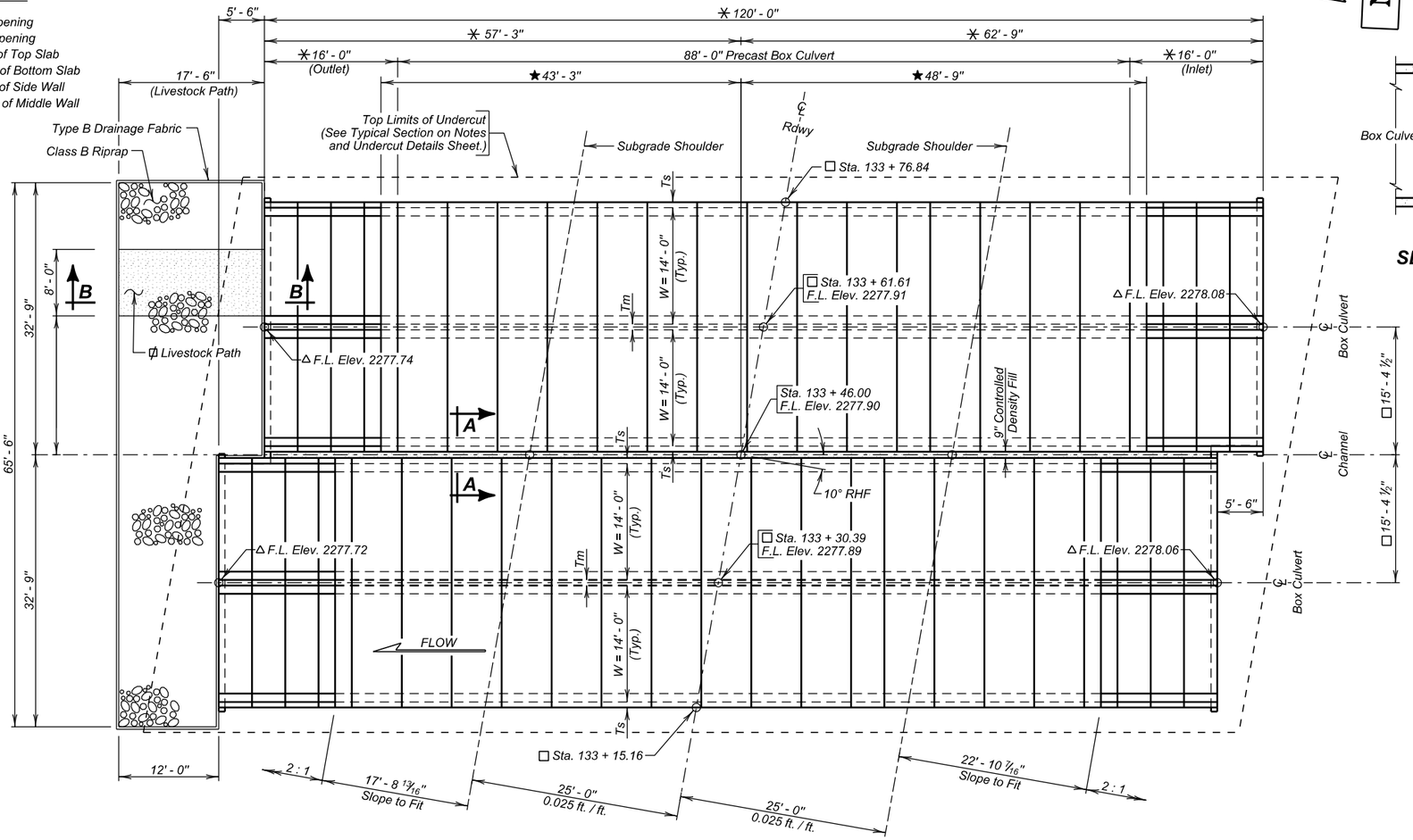
✳ Dimension may vary with installation and/or fabrication. See Shop Plans for actual installation length.
★ Minimum distance to satisfy clear zone.
△ Based on dimensions shown.
☐ Based on Ts = 8" and Tm = 8".

Revised January 20, 2025 BB

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(12)173	E26	E30

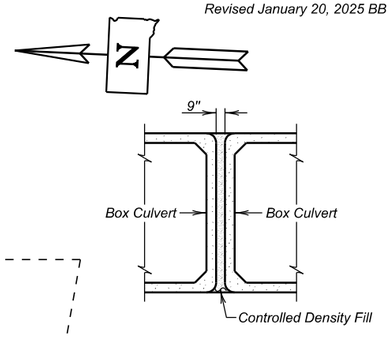
LEGEND

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

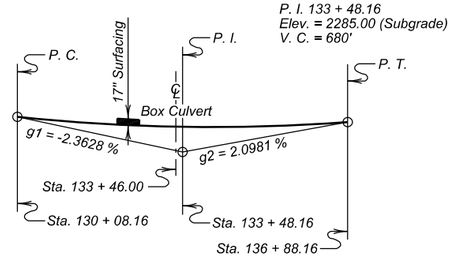


PLAN

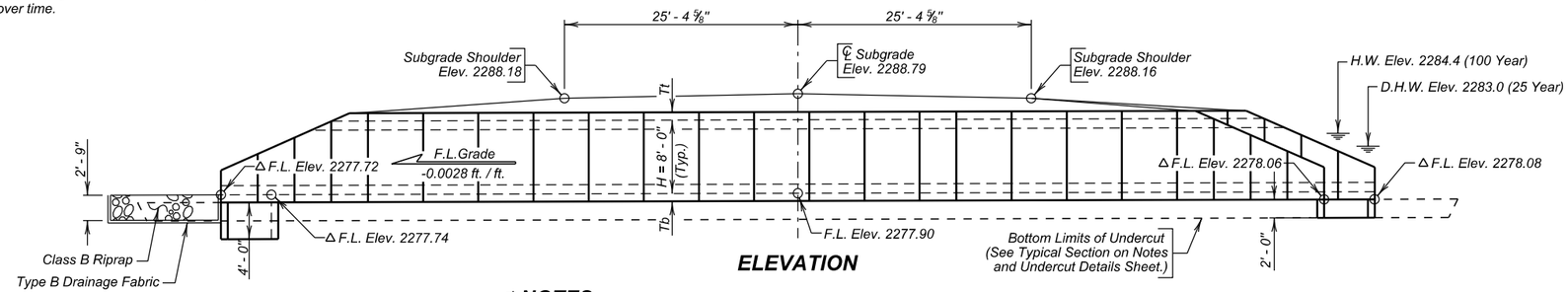
NOTE:
Box Culvert flowline has been depressed 1' - 0" below channel flowline to accommodate aquatic organisms. The 1' - 0" depression will be allowed to fill in naturally over time.



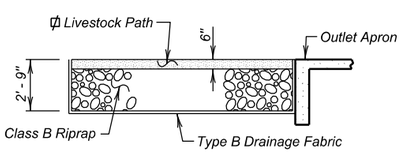
SECTION A - A



VERTICAL CURVE DATA



ELEVATION



SECTION B - B

℄ 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.
3. All costs associated with supplying and placing Base Course for the Livestock Path will be paid at the contract unit price per ton for Base Course. The Base Course material will comply with Section 882.

-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

HYDRAULIC DATA

Q_d	762 cfs
A_d	218 sq ft
V_d	3.5 fps
Q_F	762 cfs
Q_{100}	1373 cfs
Q_{OT}	>Q_{100}
V_{max}	5.3 fps

Q_d = Design discharge for the proposed culvert based on 25 year frequency. El. 2283.0.
Q_{OT} = Overtopping discharge and frequency >Q_{100} year recurrence interval. El. 2290.1 @ Sta. 134 + 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. 2284.4.
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.	280
	Box Culvert Undercut	Cu. Yd.	637
∡	Controlled Density Fill	Cu. Yd.	33.3
≠	Class B Riprap	Ton	134.4
☆	Base Course	Ton	4.9
	Type B Drainage Fabric	Sq. Yd.	158
	2 - 14' X 8' Precast Concrete Culvert, Furnish	Ft.	176
	2 - 14' X 8' Precast Concrete Culvert, Install	Ft.	176
	2 - 14' X 8' Precast Concrete Culvert End Section, Furnish	Each	4
	2 - 14' X 8' Precast Concrete Culvert End Section, Install	Each	4

∡ Quantity is based on 10" bottom slab, 10" top slab, 8" 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. Yd. to Tons.

SITE 2
ALTERNATE B

GENERAL DRAWING AND QUANTITIES

FOR

4 - 14' X 8' BOX CULVERT (PRECAST)

OVER BRAVE BULL CREEK — 10° RHF SKEW
STA. 133 + 46.00 — SEC. 28-T2S-R24E
STR. NO. 36-441-108 — P-B 0248(16)173
PCN 06NH — HL-93

JACKSON COUNTY
S. D. DEPT. OF TRANSPORTATION
FEBRUARY 2025

1 OF 5

-X028-

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

DESIGNED BY	CK. DES. BY	DRAFTED BY	
BB	JJ	BT	Steve A Johnson BRIDGE ENGINEER
JACK06NH	06NHTB11		

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(16)173	E27	E30

Revised September 1, 2026 AG

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. No construction loading in excess of legal load was considered..*
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 5 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 box culvert consist of approximately 3 feet of brown sandy clay overlying dark gray clay. Groundwater was encountered in the borings at an elevation of 2278.0 feet during the subsurface investigation conducted in July 2023. Dewatering will be required during construction.*

DESIGN MIX OF CONCRETE

1. *Mix will be as per fabricator's design, however 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

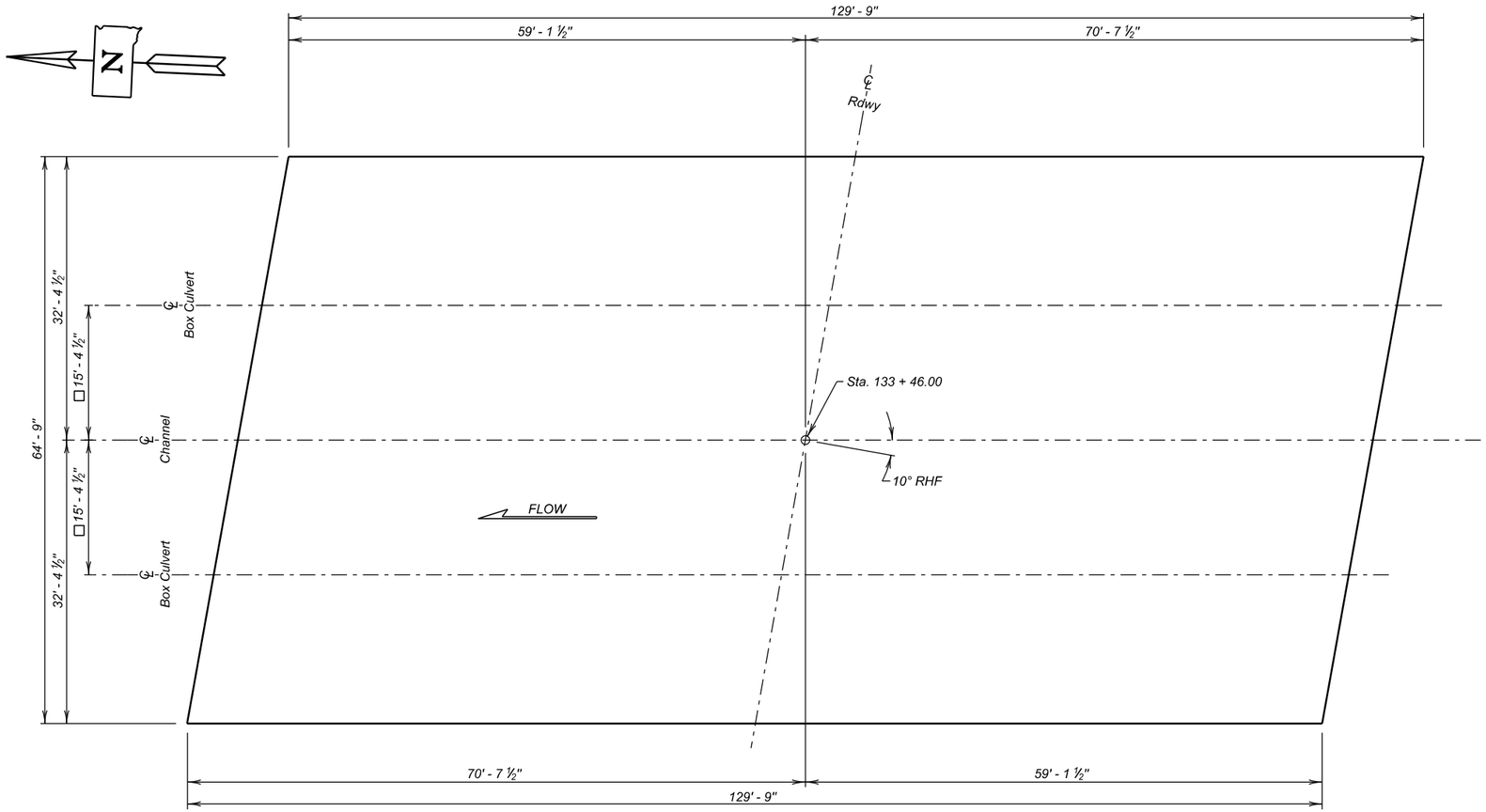
The fabricator will submit shop plans in accordance with the Construction Specifications. Include design and independent check design, if applicable, with initial submittal.

ESTIMATED QUANTITIES

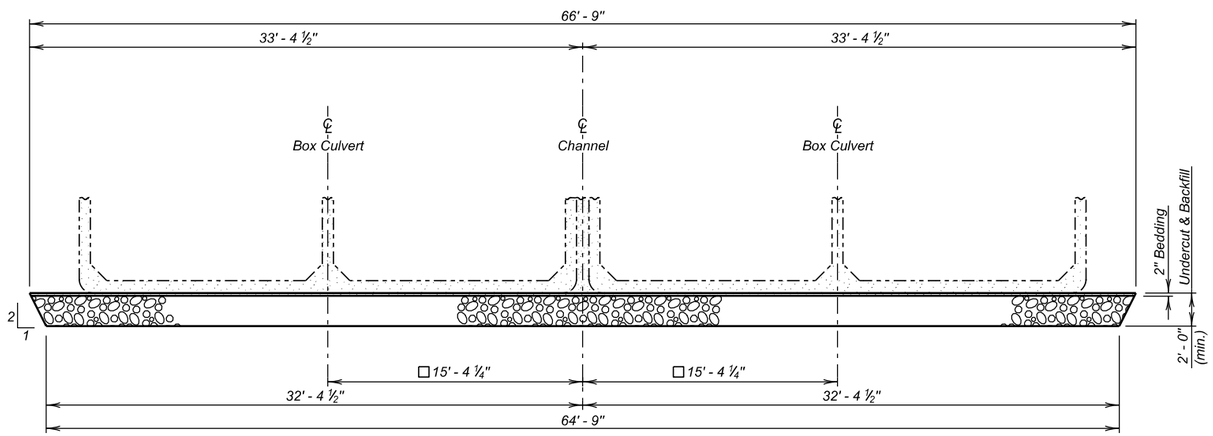
	ITEM	UNIT	QUANTITY
◻	Box Culvert Undercut	Cu. Yd.	637

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

◻ *Based on Ts = 8" and Tm = 8".*



UNDERCUT LAYOUT
(Bottom Dimensions)



TYPICAL SECTION
(For Limits of Undercut)

SITE 2
ALTERNATE B

NOTES AND UNDERCUT DETAILS

FOR

4 - 14' X 8' BOX CULVERT (PRECAST)

OVER BRAVE BULL CREEK — 10° RHF SKEW
STA. 133 + 46.00 — SEC. 28-T2S-R24E
STR. NO. 36-441-108 — P-B 0248(16)173
HL-93

JACKSON COUNTY

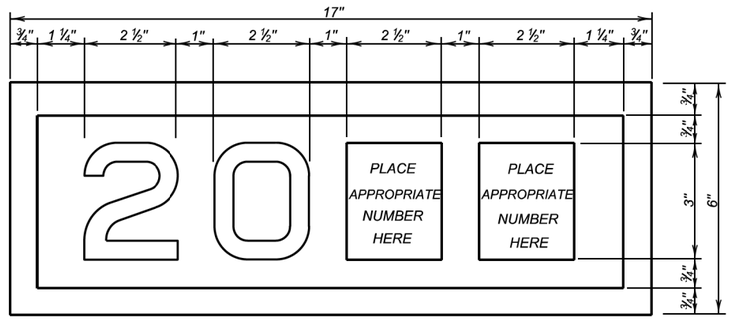
S. D. DEPT. OF TRANSPORTATION

FEBRUARY 2025

DESIGNED BY	CK. DES. BY	DRAFTED BY	
BB	JJ	BT	Steve A Johnson BRIDGE ENGINEER
JACK06NH	06NHTB12		

Revised September 1, 2026 AG

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(16)173	E28	E30



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.

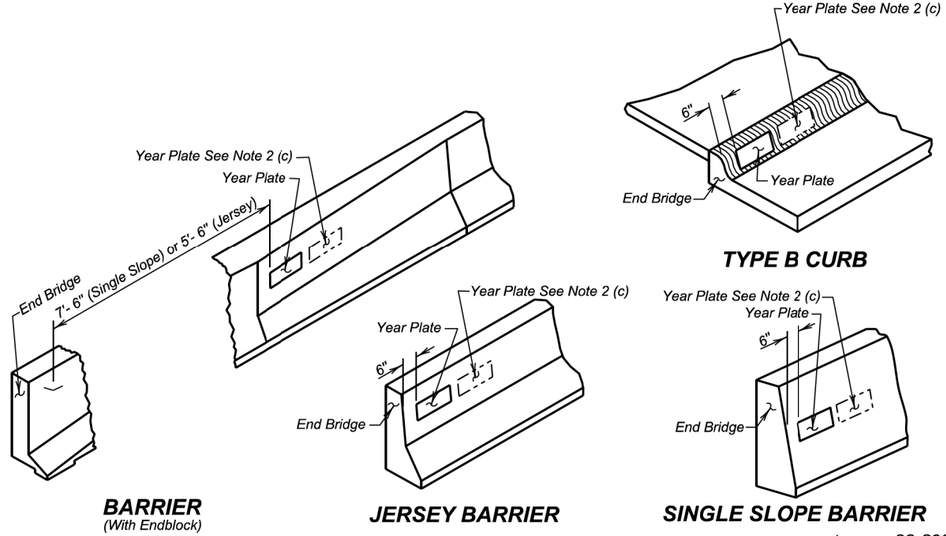
2. Year plates will be located on structure(s) as follows:

   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.

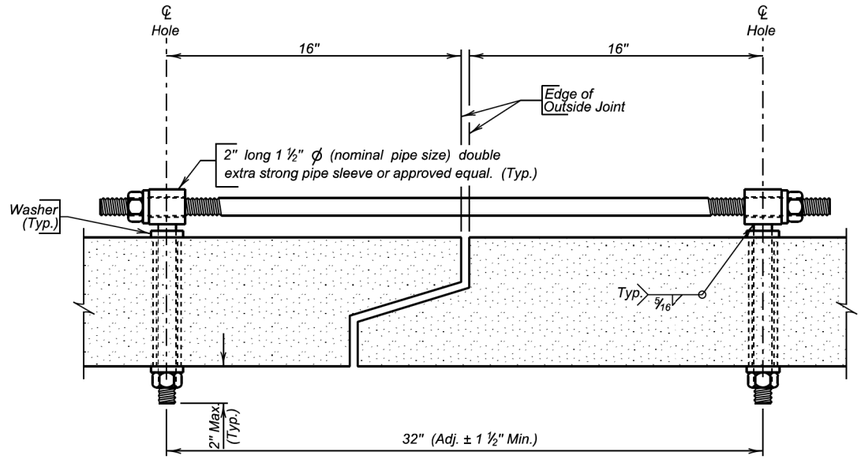
   c. When the plans specify that both the original date of construction and the date of reconstruction are to be shown, one date will be placed as listed above and the other located adjacent to it. Both year plates will be shown at each end of the bridge on opposite sides.

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 2
ALTERNATE B

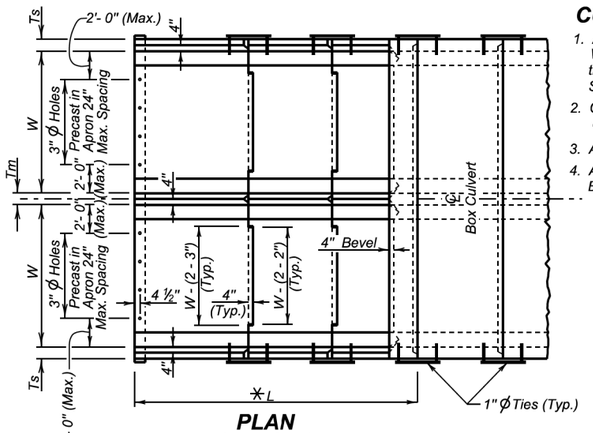
4 - 14' X 8' BOX CULVERT (PRECAST)
STR. NO. 36-441-108
FEBRUARY 2025

Revised September 1, 2026 AG

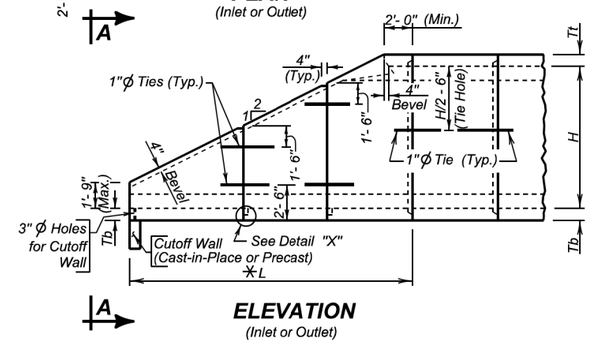
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-B 0248(16)173	E29	E30

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.

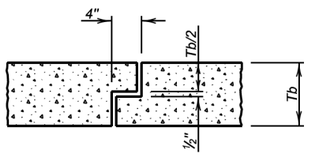


PLAN
(Inlet or Outlet)



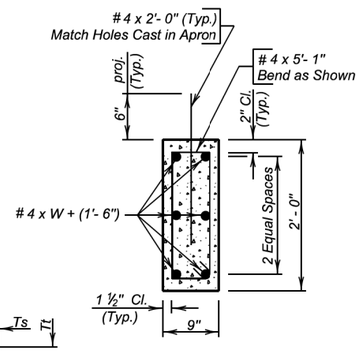
ELEVATION
(Inlet or Outlet)

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

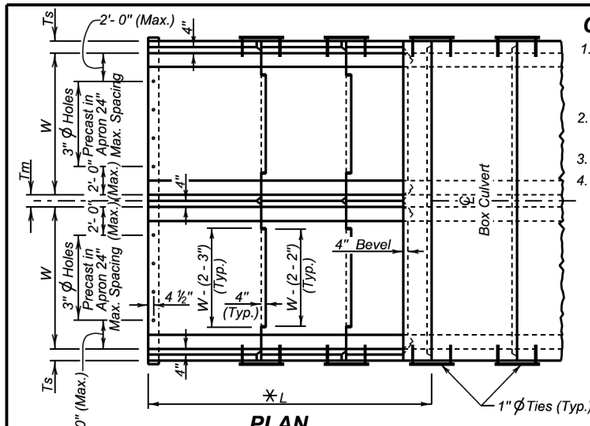
NOTES:
See GENERAL DRAWING for W and H dimensions.
Tt, Tb, Tm, L, and Ts dimensions shall be furnished by the Contractor.
⁎ Length and number of units may vary from that shown.

June 26, 2015

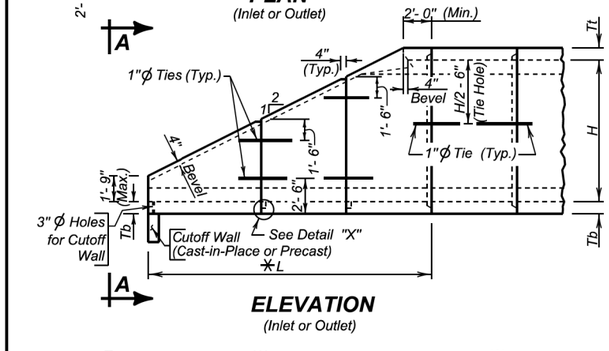
Published Date: 2027	SDDOT	PRECAST DOUBLE BOX CULVERT SLOPED END SECTION DETAILS WITH 2'–0" CUTOFF WALL	PLATE NUMBER 560.20 Sheet 1 of 1

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.

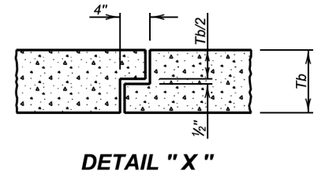


PLAN
(Inlet or Outlet)



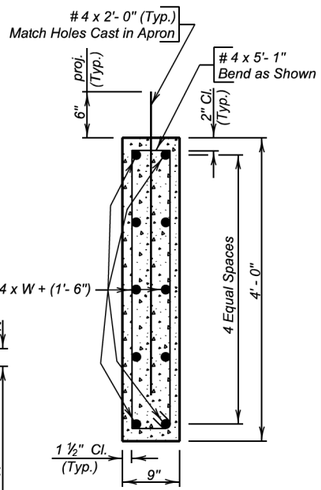
ELEVATION
(Inlet or Outlet)

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

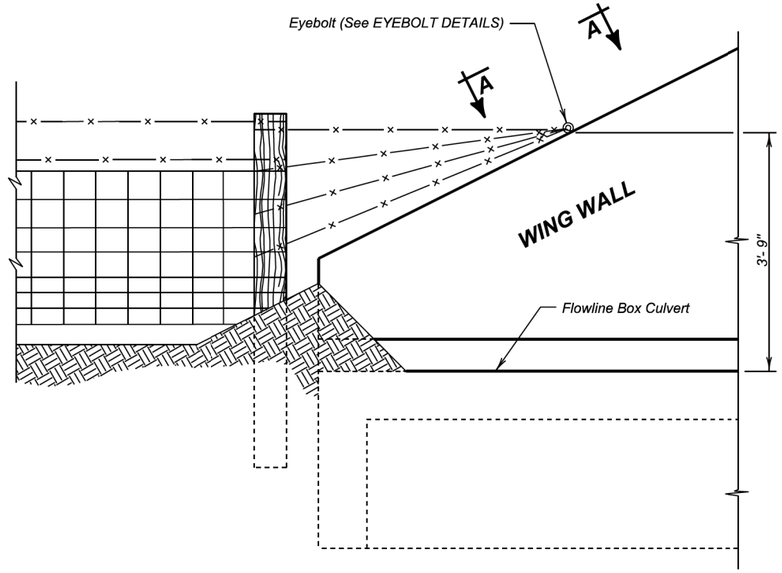
NOTES:
See GENERAL DRAWING for W and H dimensions.
Tt, Tb, Tm, L, and Ts dimensions shall be furnished by the Contractor.
⁎ Length and number of units may vary from that shown.

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 2
ALTERNATE B

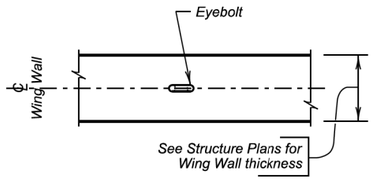
4 - 14' X 8' BOX CULVERT (PRECAST)
STR. NO. 36-441-108
FEBRUARY 2025



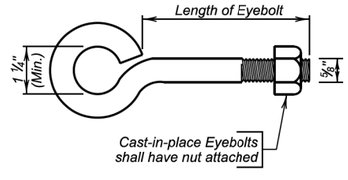
DETAIL FOR FENCE ANCHORS

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