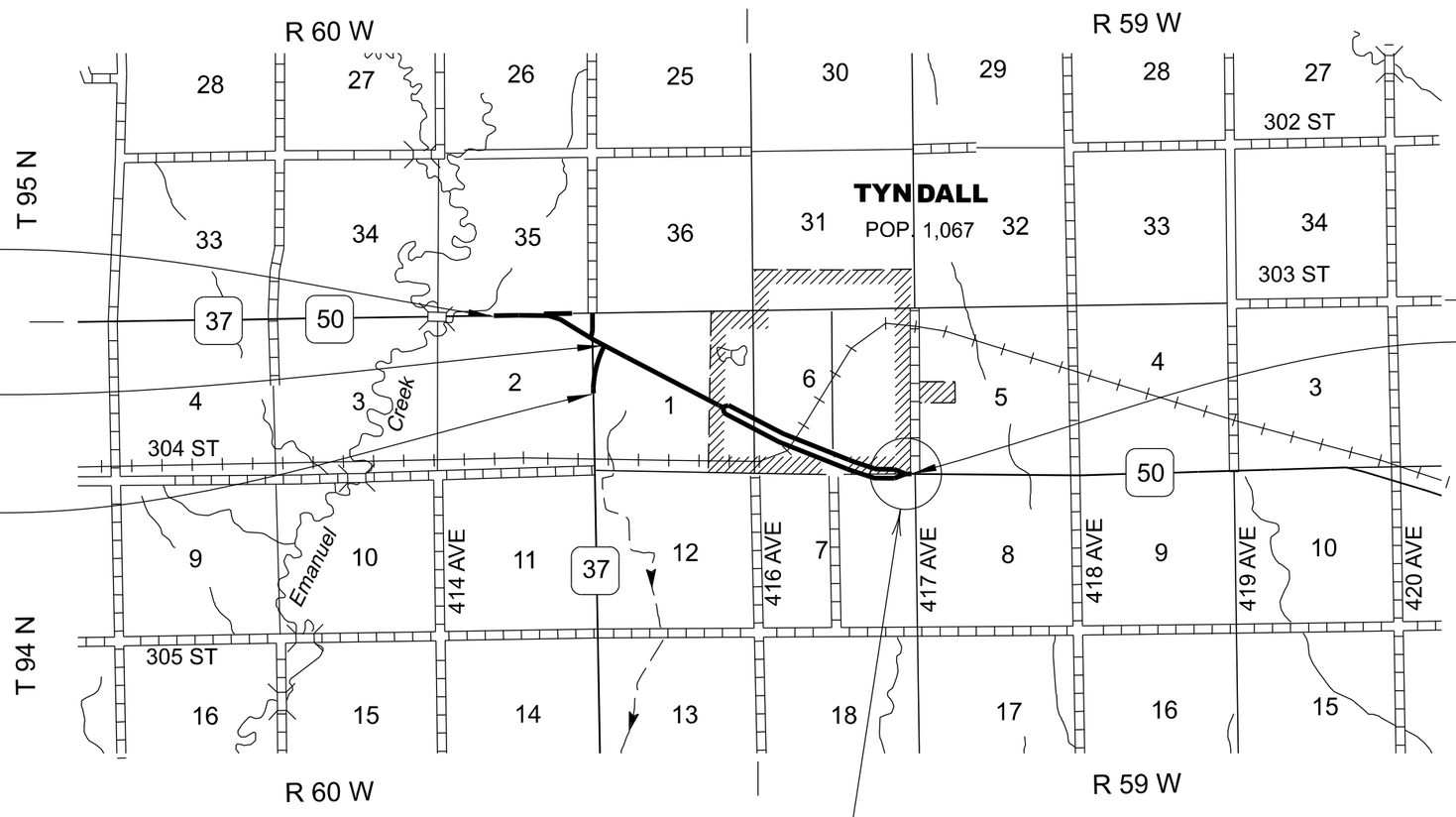
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	NH-PH 0050(116)354 P 0037(168)19	E1	E13

Section E: Structure Plans

INDEX OF SHEETS -



BEGIN NH-PH 0050(116)354

Station -9+51.75 = Station -9+51.75
on F 473(1) Approximately 2003.26' East and
66.71' North of the Southwest corner of Section 35 -
Township 95 North - Range 60 West of the 5th PM
MRM: 354.00+0.283

END P 0037(168)19

Station 478+04.62 = Station 8+13.1
on FAP 167A(3) Approximately 1058.45' South and
495.45' East of the Northwest corner of Section 1
Township 94 North - Range 60 West of the 5th PM
MRM: 355.00+0.031

BEGIN P 0037(168)19

Station 459+89.26 = Station 459+89.30
on PH 0037(139)11 Approximately 2420.36' North and
111.73' West of the Southwest corner of Section 1 -
Township 94 North - Range 60 West of the 5th PM
MRM: 020.00+0.027

END NH-PH 0050(116)354

Station 141+64.11 = Station 141+64.11
on F 473(1) Approximately 91.06' West and
0.77' North of the Southwest corner of Section 5 -
Township 94 North - Range 59 West of the 5th PM
MRM: 357.14+0.037

Site 1 Sta. 138 + 40.00
Str. No. 05-159-130
Alt. A : 12' X 5' Box Culvert (C.I.P) or
Alt. B : 12' X 5' Box Culvert (Precast)

October 15, 2025

SECTION E – ESTIMATE OF STRUCTURE QUANTITIES

Site 1 – Alternate A
Str. No. 05-159-130

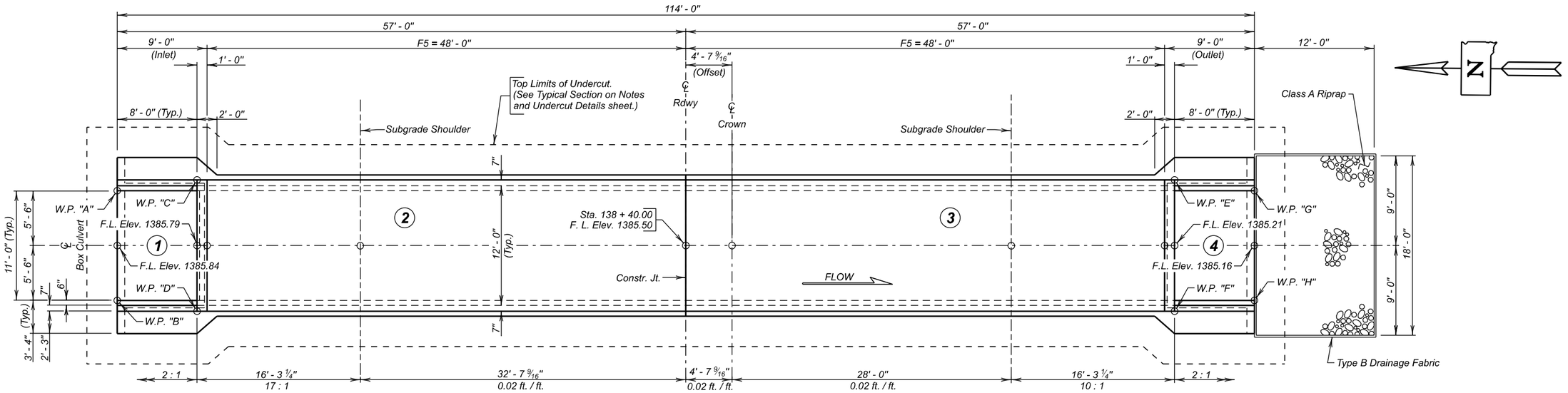
BID ITEM NUMBER	ITEM	QUANTITY	UNIT
420E0200	Structure Excavation, Box Culvert	47	CuYd
421E0200	Box Culvert Undercut	178	CuYd
460E0120	Class A45 Concrete, Box Culvert	108.5	CuYd
480E0100	Reinforcing Steel	26,623	Lb
700E0110	Class A Riprap	25.2	Ton
831E0110	Type B Drainage Fabric	39	SqYd

Site 1 – Alternate B
Str. No. 05-159-130

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
420E0200	Structure Excavation, Box Culvert	43	CuYd
421E0200	Box Culvert Undercut	166	CuYd
560E0156	11'x5' Precast Concrete Box Culvert, Furnish	96.0	Ft
560E0157	11'x5' Precast Concrete Box Culvert, Install	96.0	Ft
560E1156	11'x5' Precast Concrete Box Culvert End Section, Furnish	2	Each
560E1157	11'x5' Precast Concrete Box Culvert End Section, Install	2	Each
700E0110	Class A Riprap	25.2	Ton
831E0110	Type B Drainage Fabric	39	SqYd

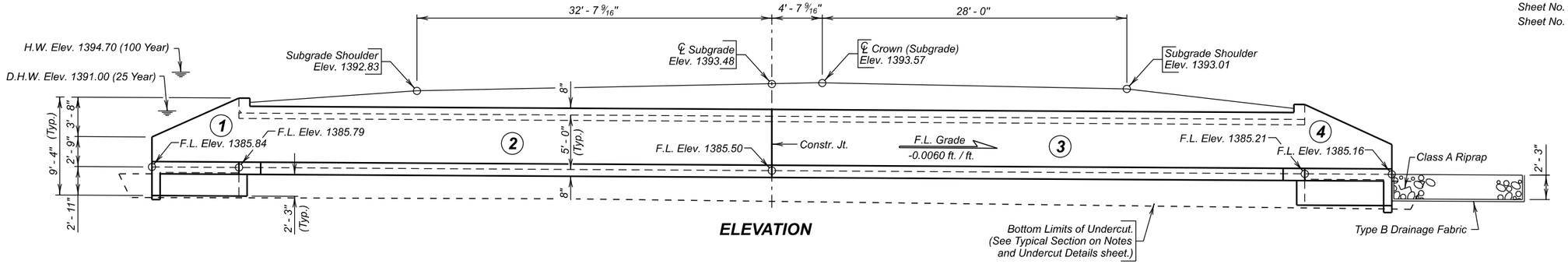
The elevations shown in these plans are based on the National Geodetic Survey (NGS) North American Vertical Datum of 1988 (NAVD88).

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	NH-PH 0050(116)354 P 0037(168)19	E3	E13



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.

PLAN



ELEVATION

INDEX OF CULVERT SHEETS-

ESTIMATED QUANTITIES

ITEM	UNIT	QUANTITY
Class A45 Concrete, Box Culvert	Cu. Yd.	108.5
Reinforcing Steel	Lb.	26623
Structure Excavation, Box Culvert	Cu. Yd.	47
Box Culvert Undercut	Cu. Yd.	178
Type B Drainage Fabric	Sq. Yd.	39
✳ Class A Riprap	Ton	25.2

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

HYDRAULIC DATA

Q_d	254 cfs
A_d	29 sq ft
V_d	8.8 fps
Q_F	254 cfs
Q_{100}	490 cfs
Q_{OT}	509 cfs
V_{max}	11.0 fps

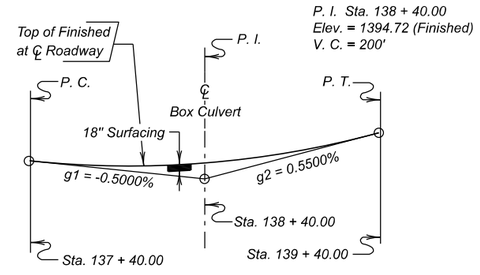
Q_d = Design discharge for the proposed culvert based on 25 year frequency. El. 1391.00.

Q_{OT} = Overtopping discharge and frequency >100 year recurrence interval. El. 1395.1 @ Sta. 138 + 40 ±.

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. 1394.70.

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



VERTICAL CURVE DATA

TABLE OF WORKING POINTS

W. P.	STATION	OFFSET
"A"	138 + 45.50	57.00' Lt.
"B"	138 + 34.50	57.00' Lt.
"C"	138 + 46.58	49.00' Lt.
"D"	138 + 33.42	49.00' Lt.
"E"	138 + 46.58	49.00' Rt.
"F"	138 + 33.42	49.00' Rt.
"G"	138 + 45.50	57.00' Rt.
"H"	138 + 34.50	57.00' Rt.

SITE 1
ALTERNATE A

GENERAL DRAWING AND QUANTITIES

FOR

12' X 5' BOX CULVERT (C.I.P.)

OVER SILVER CREEK — 0° SKEW
STA. 138 + 40.00 — SEC. 6/7-T94N-R59W
STR. NO. 05-159-130 — NH-PH 0050(116)354
PCN 04K7 — HL-93

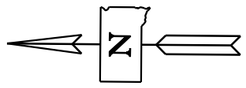
BON HOMME COUNTY
S. D. DEPT. OF TRANSPORTATION
AUGUST 2024

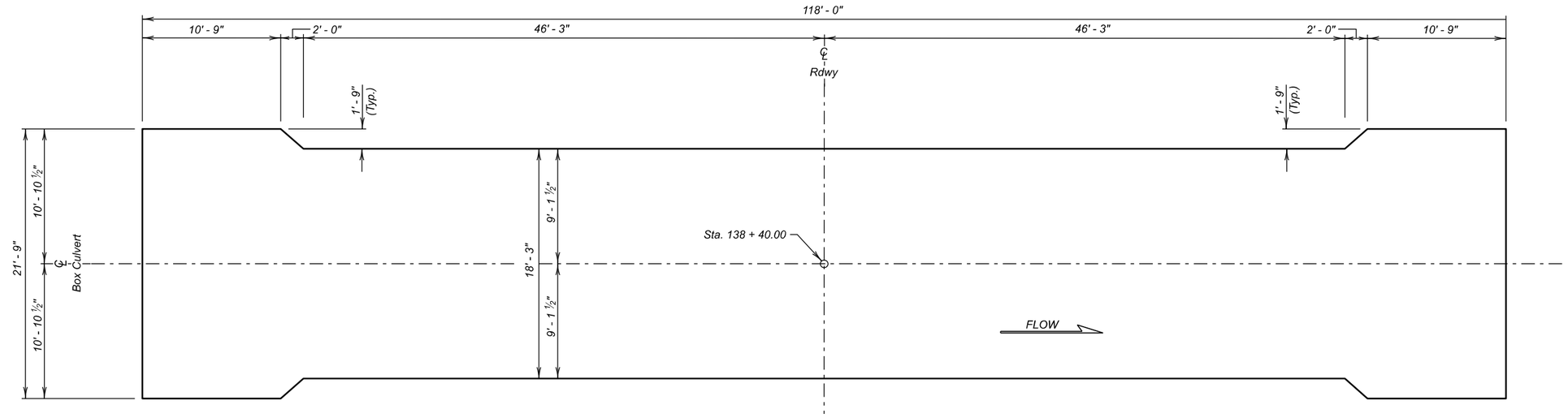
1 OF 6

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

DESIGNED BY	CK. DES. BY	DRAFTED BY	
BM	AH	CK	Steve A Johnson BRIDGE ENGINEER
BONH04K7	04K7TB01		

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	NH-PH 0050(116)354 P 0037(168)19	E4	E13





UNDERCUT LAYOUT

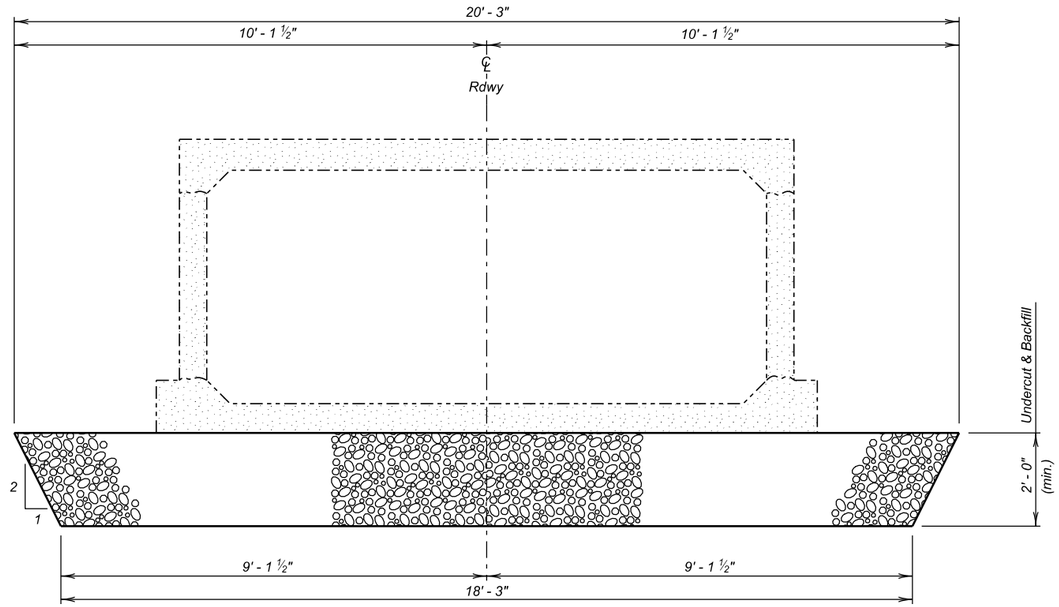
(Bottom Dimensions)

SPECIFICATIONS

1. *Design Specifications: AASHTO LRFD Bridge Design Specifications, 9th Edition.*
2. *Construction Specifications: South Dakota Standard Specifications for Roads and Bridges, 2015 Edition and required Provisions, Supplemental Specifications, and Special Provisions as included in the Proposal.*

GENERAL NOTES

1. *Design Live Load: HL-93 and construction loading consisting of one 7' - 6" gage axle with gross axle weight = 95,850 lbs. The construction load will not be applied until a minimum of 4 ft. of fill has been placed over the box culvert. Other construction loads in excess of legal load must be submitted thru proper channels to the Office of Bridge Design for analysis.*
2. *The design of the barrel section is based on a minimum fill height of 2 feet and includes all subsequent fill heights up to and including the maximum fill height of 5 ft. (F5).*
3. *Design Material Strengths: Concrete f'c = 4500 p.s.i.*
   Reinforcing Steel fy = 60000 p.s.i.
4. *All concrete will be Class A45 Concrete, Box Culvet conforming to Section 460 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 concrete corners and 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 brown silt clay with sand.*
14. *Groundwater was encountered in the borings at an elevation of 1384.9 feet during the subsurface investigation conducted in September 2021. Dewatering will be required during construction.*



TYPICAL SECTION

(For Limits of Undercut)

ESTIMATED QUANTITIES

	ITEM	UNIT	QUANTITY
℄	Box Culvert Undercut	Cu. Yd.	178

℄ *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

12' X 5' BOX CULVERT (C.I.P.)

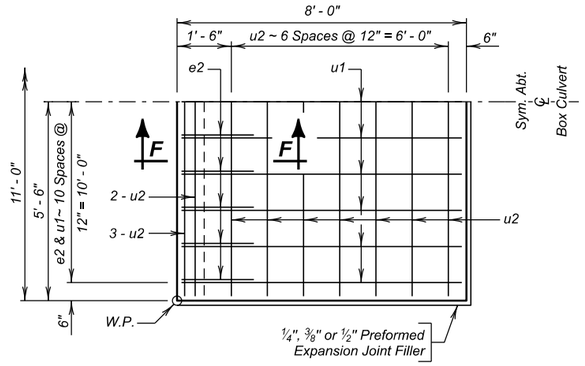
OVER SILVER CREEK — 0° SKEW
STA. 138 + 40.00 — SEC. 6/7-T94N-R59W
STR. NO. 05-159-130 — NH-PH 0050(116)354
HL-93

BON HOMME COUNTY
S. D. DEPT. OF TRANSPORTATION
AUGUST 2024

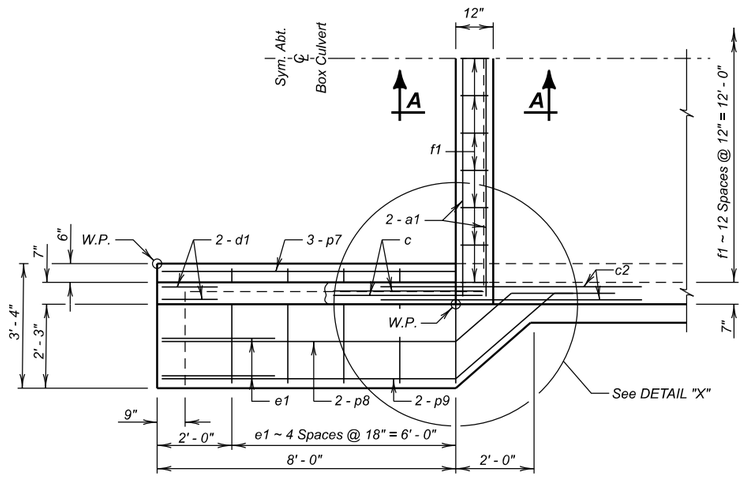
DESIGNED BY	CK. DES. BY	DRAFTED BY	
BM	AH	CK	Steve A. Johnson BRIDGE ENGINEER
BONH04K7	04K7TB02		

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	NH-PH 0050(116)354 P 0037(168)19	E5	E13

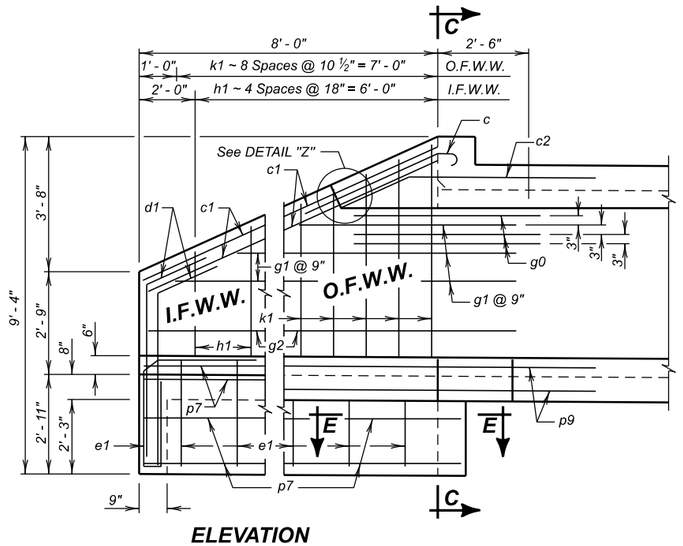
NOTE:
Apron will NOT be built monolithic with the Box Culvert.



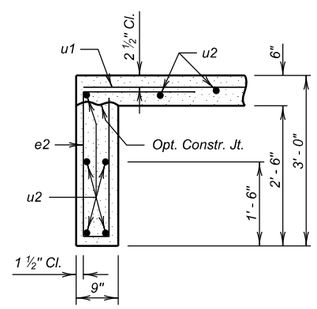
HALF PLAN
(Inlet or Outlet Apron)



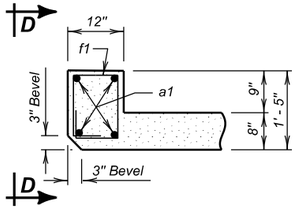
HALF PLAN



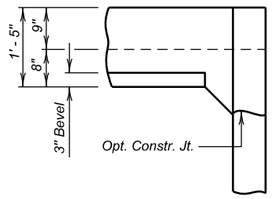
ELEVATION



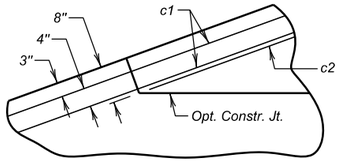
SECTION F - F



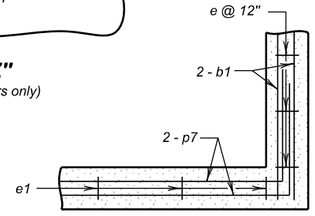
SECTION A - A
(At Top Slab)



VIEW D - D
(At Exterior Wall)



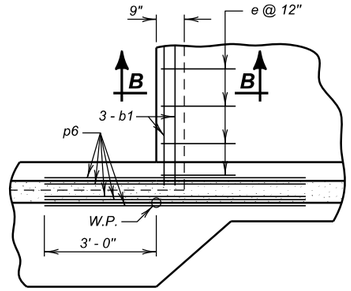
DETAIL "Z"
(showing c1 & c2 bars only)



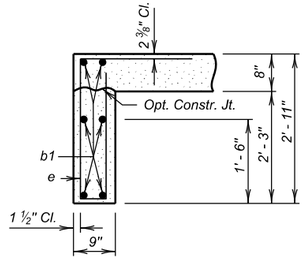
SECTION E - E

LEGEND FOR PLACING RE-STEEL

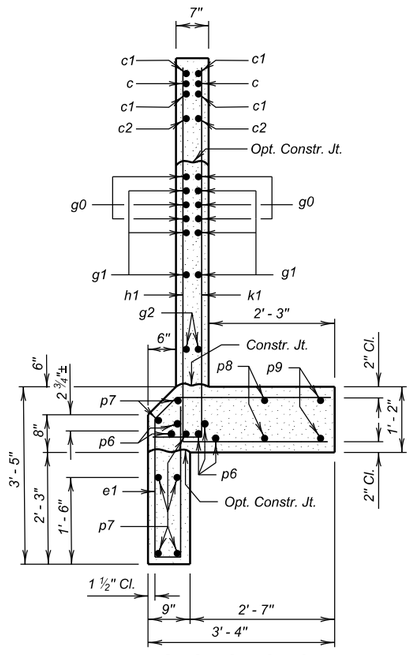
O. F. W. W. - Outside Face of Wing Wall
I. F. W. W. - Inside Face of Wing Wall



DETAIL "X"
(At Bottom Slab)



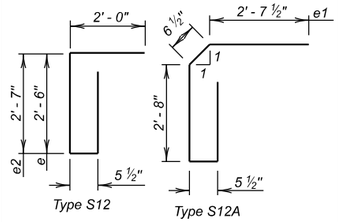
SECTION B - B

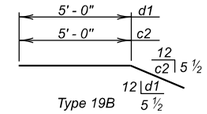


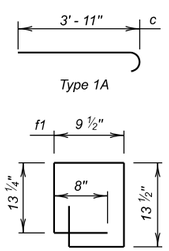
SECTION C - C

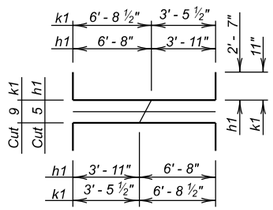
REINFORCING SCHEDULE
(For One Inlet or One Outlet)

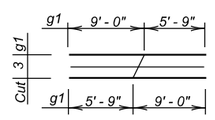
	Mk.	No.	Size	Length	Type	Bending Details
*	a1	4	6	12' - 9"	Str.	
	b1	6	6	12' - 3"	Str.	
*	c	4	5	4' - 6"	1A	
	c1	8	5	8' - 9"	Str.	
	c2	4	5	7' - 0"	19B	
	d1	8	5	6' - 9"	19B	
	e	13	4	7' - 3"	S12	
	e1	14	4	8' - 9"	S12A	
	f1	13	4	5' - 3"	S6A	
	g0	12	5	5' - 0"	Str.	
℄	g1	6	4	14' - 9"	Str.	
	g2	4	4	9' - 9"	Str.	
℄	h1	5	4	15' - 9"	17A	
℄	k1	9	4	12' - 0"	17A	
	p6	10	6	7' - 0"	Str.	
*	p7	14	4	10' - 6"	Str.	
*	p8	4	4	11' - 6"	Str.	
*	p9	4	4	13' - 0"	Str.	
	INLET APRON					
	e2	11	4	7' - 6"	S12	
	u1	11	4	7' - 9"	Str.	
	u2	12	4	10' - 9"	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	7.2	1096	3.9
Inlet Apron	2.5	198	2.5
Outlet	7.2	1096	3.9
Outlet Apron	2.5	198	2.5

SITE 1
ALTERNATE A

INLET OR OUTLET DETAILS

FOR

12' X 5' BOX CULVERT (C.I.P.)

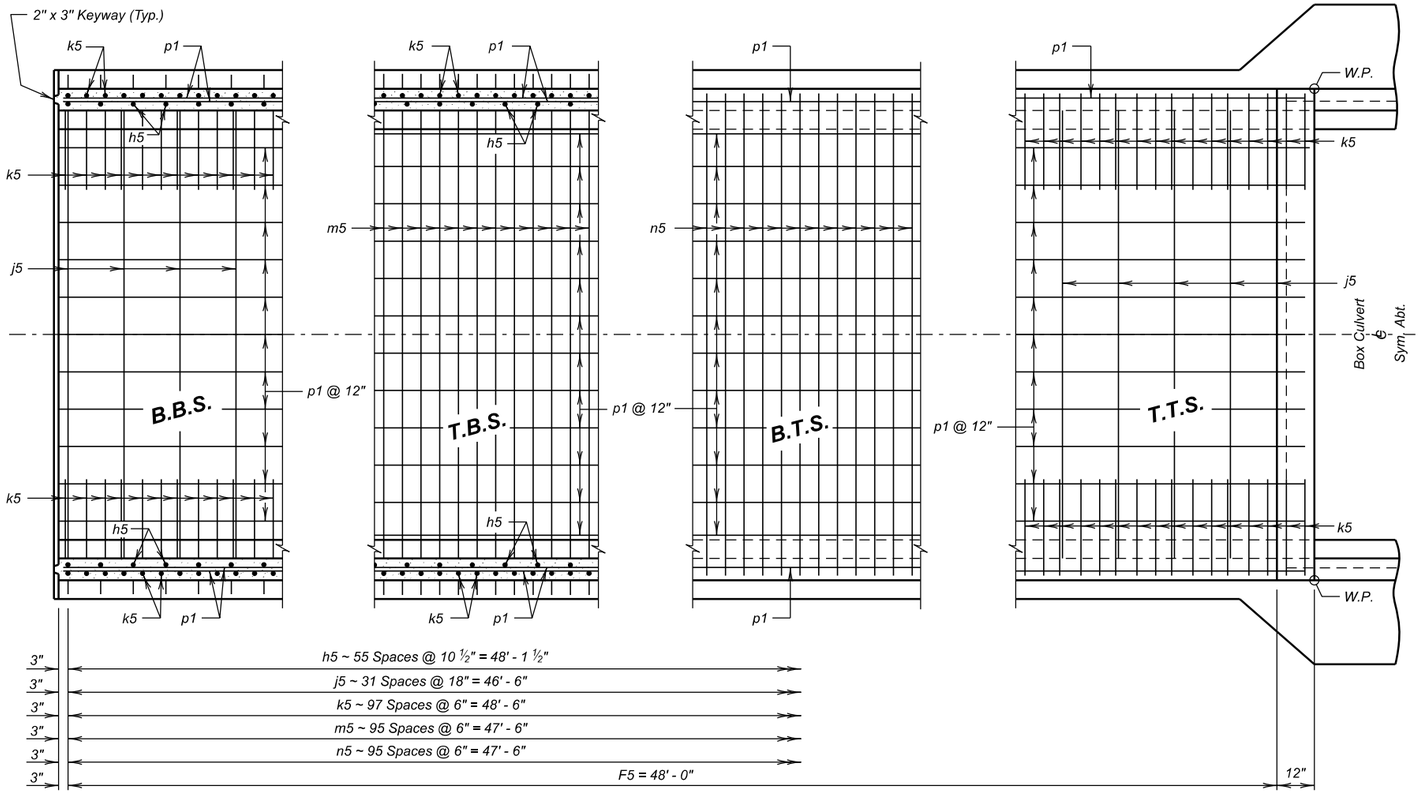
OVER SILVER CREEK — 0° SKEW
STA. 138 + 40.00 — SEC. 6/7-T94N-R59W
STR. NO. 05-159-130 — NH-PH 0050(116)354
HL-93

BON HOMME COUNTY
S. D. DEPT. OF TRANSPORTATION
AUGUST 2024

3 OF 6

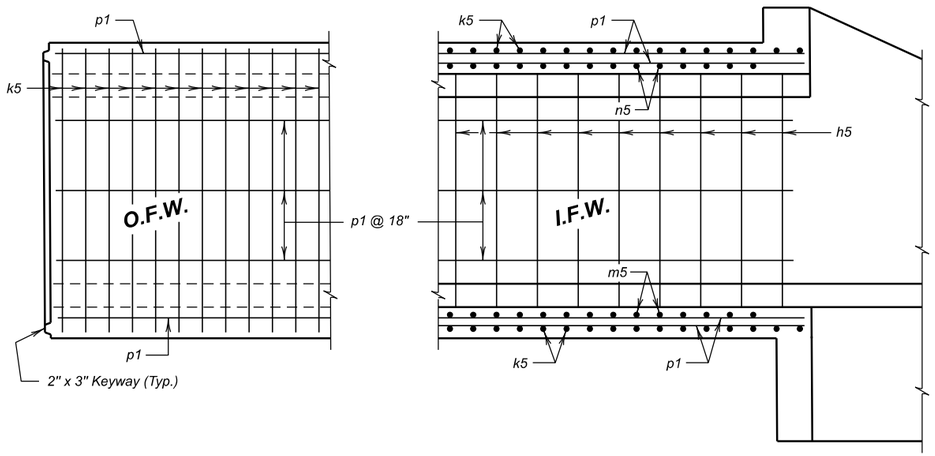
DESIGNED BY	CK. DES. BY	DRAFTED BY	
BM	AH	CK	Steven A Johnson BRIDGE ENGINEER
BONH04K7	04K7TB03		

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	NH-PH 0050(116)354 P 0037(168)19	E6	E13

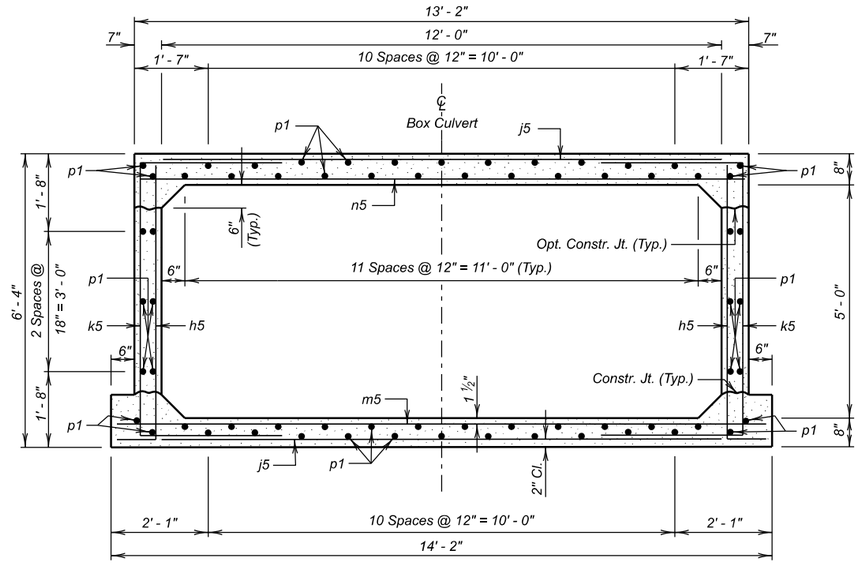


HALF PLAN

(Outlet End Shown, Inlet similar by rotation)

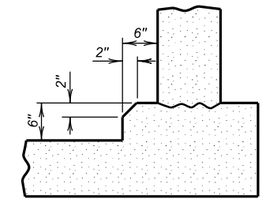


ELEVATION



F5 BARREL SECTION

(5' - 0" Maximum Fill)



OPTIONAL FILLET DETAIL

(At Bottom Slab)

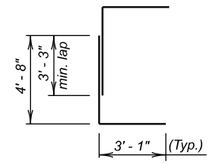
Note: Contractor may form the optional full fillet, with 2" Chamfer, as detailed. The cost of the additional concrete will be borne by the Contractor.

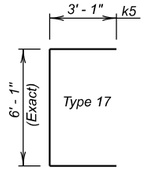
△ *Place z1 bars thru construction joint between barrel sections as shown on Standard Plate No. 460.10. Number of z1 bars shown is for one construction joint.*

REINFORCING SCHEDULE

(For Two F5 Barrel End Sections)

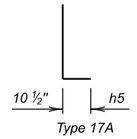
	Mk.	No.	Size	Length	Type	Bending Details
	h5	224	4	6' - 9"	17A	
	j5	128	4	12' - 0"	Str.	
	k5	392	6	12' - 3"	17	
	m5	192	7	13' - 9"	Str.	
	n5	192	7	12' - 9"	Str.	
	p1	132	4	48' - 6"	Str.	
△	z1	30	5	3' - 6"	Str.	





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 @ 48' - 0"	89.1	24035	33.6

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

SITE 1
ALTERNATE A

F5 BARREL END SECTION DETAILS (48' - 0")

FOR

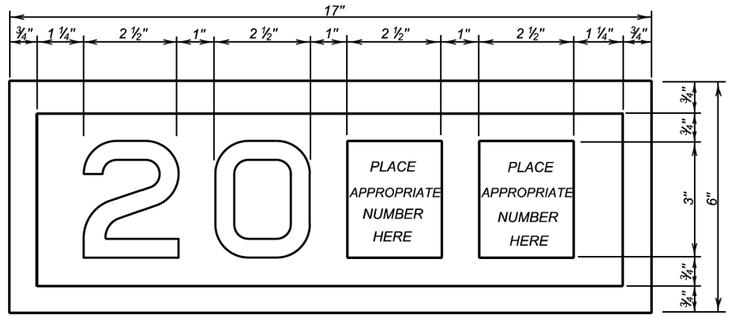
12' X 5' BOX CULVERT (C.I.P.)

OVER SILVER CREEK
STA. 138 + 40.00
STR. NO. 05-159-130

0° SKEW
SEC. 6/7-T94N-R59W
NH-PH 0050(116)354
HL-93

BON HOMME COUNTY
S. D. DEPT. OF TRANSPORTATION
AUGUST 2024

DESIGNED BY	CK. DES. BY	DRAFTED BY	
BM BONH04K7	AH 04K7TB05	CK	Steve A Johnson BRIDGE ENGINEER



YEAR PLATE DETAILS

GENERAL NOTES:

1. Year plates of the general dimensions shown will be constructed on all box culverts and bridges. The year plates will be constructed in reverse and attached to the forms in such a manner that the finished imprint in the concrete does not exceed one-half (1/2) inch in depth.

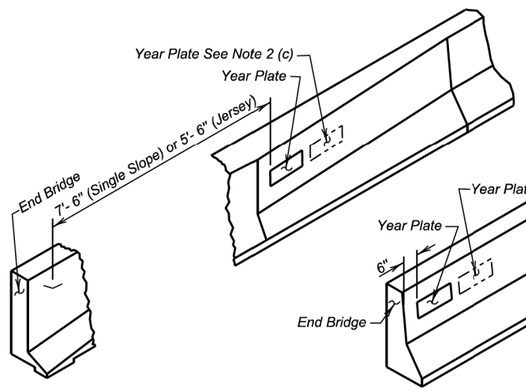
2. Year plates will be located on structure(s) as follows:

   a. On cast-in-place box culverts the year plates will be four and one - half (4 ½) inches below the top of the upstream parapet wall and centered laterally on the upstream face. On precast box culverts the year plate will be centered laterally on the upstream face of the top slab. Where an extended interior wall interferes with this location, the year plate will be centered in an adjacent barrel.

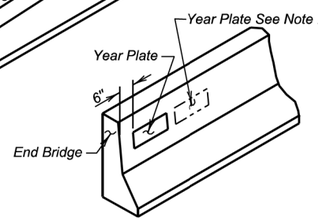
   b. On bridges with six (6) inch curbs, "Jersey" shaped barriers with no endblocks, or "Single Slope" shaped barriers with no endblocks, the year plate will be centered vertically on the curb face approximately six (6) inches from the end of the bridge, or as designated by the Engineer. On bridges with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

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

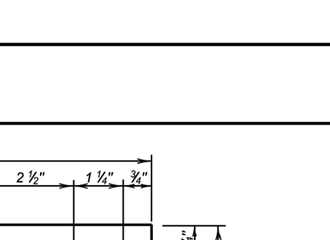
3. There will be no separate measurement or payment made for year plates on box culverts and bridges. All costs for this work will be incidental to other contract items.



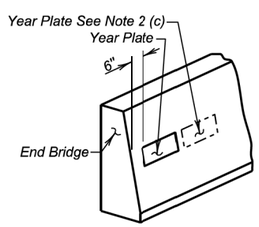
BARRIER
(With Endblock)



JERSEY BARRIER



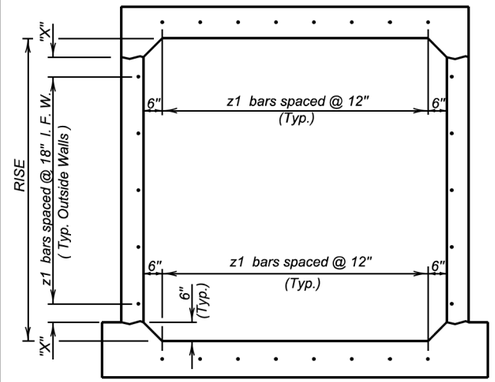
TYPE B CURB



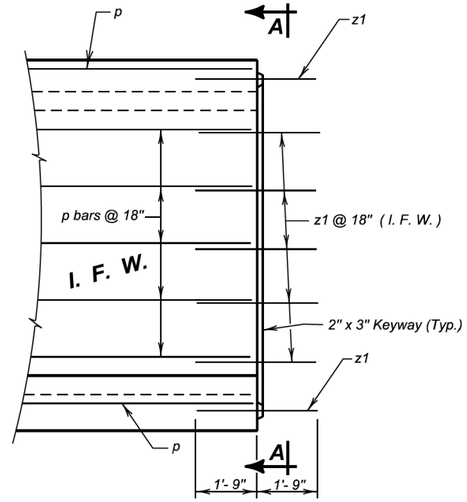
SINGLE SLOPE BARRIER

January 22, 2021

Published Date: 2025	SDDOT	YEAR PLATE DETAILS	PLATE NUMBER 460.02 Sheet 1 Of 1

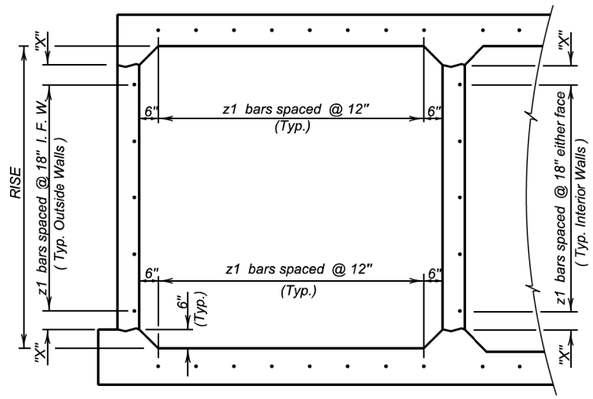


TYPICAL SINGLE BARREL VIEW A - A



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"

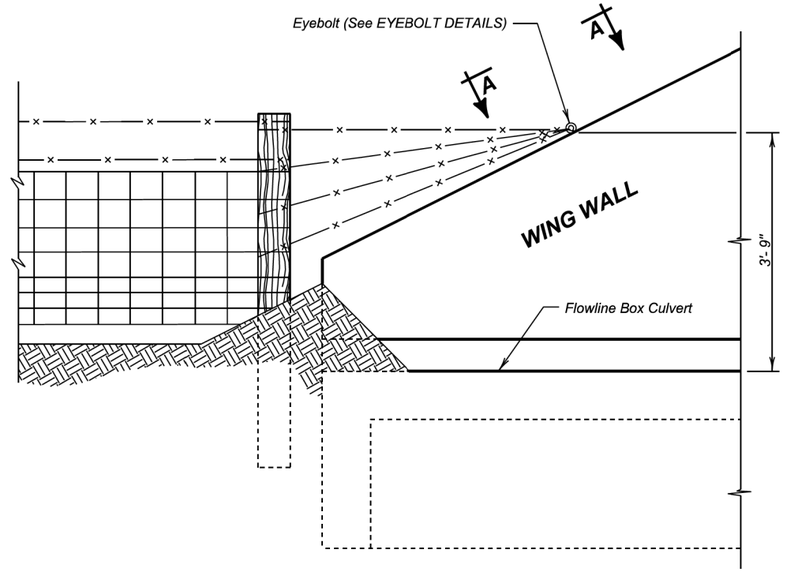
GENERAL NOTES:

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

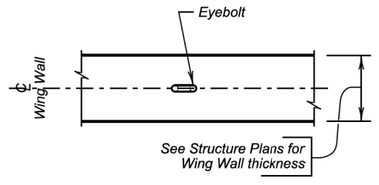
Published Date: 2025	SDDOT	BOX CULVERT BARREL TIE REINFORCEMENT	PLATE NUMBER 460.10 Sheet 1 of 1



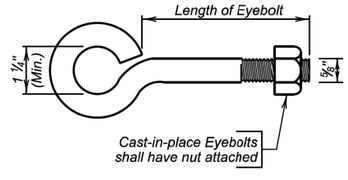
DETAIL FOR FENCE ANCHORS

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: 2025	SDDOT	FENCE ANCHORS FOR BOX CULVERT WING WALLS	PLATE NUMBER 620.16 Sheet 1 of 1

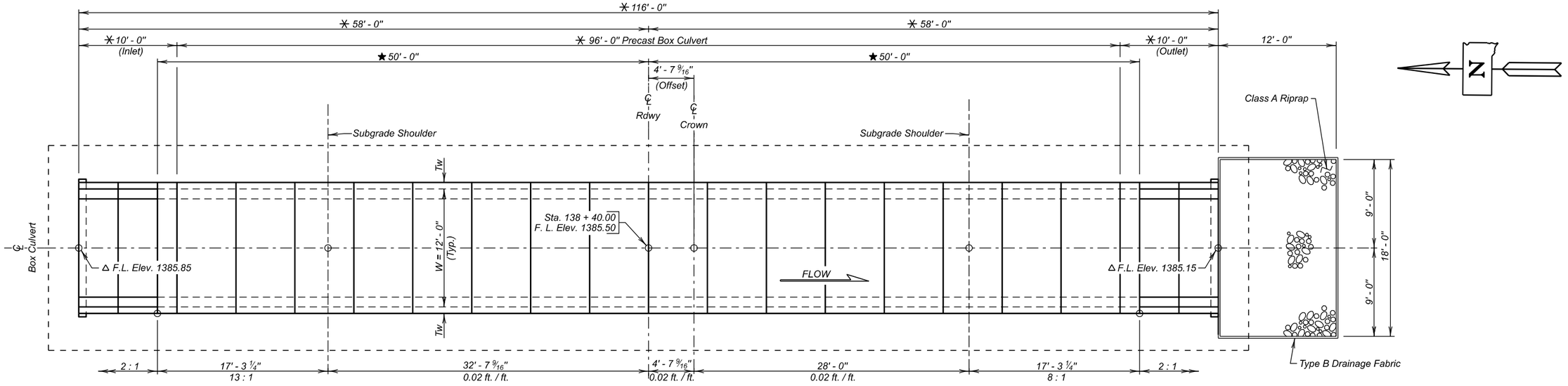
SITE 1
ALTERNATE A

12' X 5' BOX CULVERT (C.I.P.)
STR. NO. 05-159-130
AUGUST 2024

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

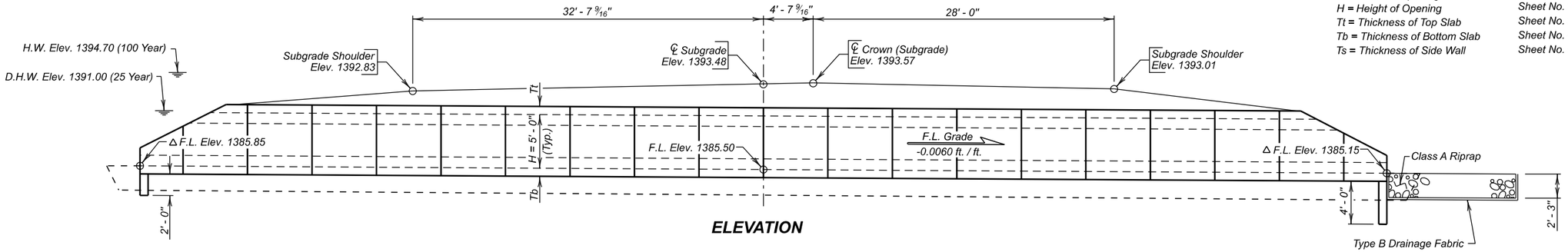
⚹ Dimension may vary with fabricator and/or installation. See Shop Plans for actual installation length.
★ Minimum distance to satisfy clear zone.
△ Based on dimensions shown.

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	NH-PH 0050(116)354 P 0037(168)19	E9	E13



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

LEGEND

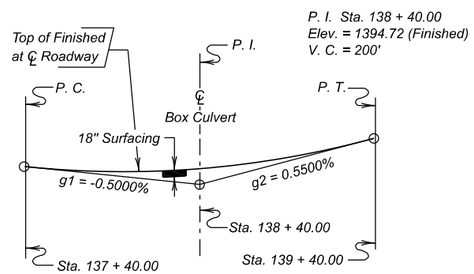
W = Width of Opening
H = Height of Opening
Tt = Thickness of Top Slab
Tb = Thickness of Bottom Slab
Ts = Thickness of Side Wall

INDEX OF CULVERT SHEETS-

HYDRAULIC DATA

Q_d	254 cfs
A_d	29 sq ft
V_d	8.8 fps
Q_F	254 cfs
Q_{100}	490 cfs
Q_{OT}	509 cfs
V_{max}	11.0 fps

Q_d = Design discharge for the proposed culvert based on 25 year frequency. El. 1391.00.
Q_{OT} = Overtopping discharge and frequency >100 year recurrence interval. El. 1395.1 @ Sta. 138 + 40 ±.
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. 1394.70.
V_{max} = Maximum computed outlet velocity for the proposed culvert, based on 100 year frequency.



P. I. Sta. 138 + 40.00
Elev. = 1394.72 (Finished)
V. C. = 200'

VERTICAL CURVE DATA

ESTIMATED QUANTITIES

	ITEM	UNIT	QUANTITY
∢	Structure Excavation, Box Culvert	Cu. Yd.	43
	Box Culvert Undercut	Cu. Yd.	166
≠	Class A Riprap	Ton	25.2
	Type B Drainage Fabric	Sq. Yd.	39
	11' X 5' Precast Concrete Culvert, Furnish	Ft.	96
	11' X 5' Precast Concrete Culvert, Install	Ft.	96
	11' X 5' Precast Concrete Culvert End Section, Furnish	Each	2
	11' X 5' Precast Concrete Culvert End Section, Install	Each	2

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

SITE 1
ALTERNATE B

GENERAL DRAWING AND QUANTITIES

FOR

12' X 5' BOX CULVERT (PRECAST)

OVER SILVER CREEK — 0° SKEW
STA. 138 + 40.00 — SEC. 6/7-T94N-R59W
STR. NO. 05-159-130 — NH-PH 0050(116)354
PCN 04K7 — HL-93

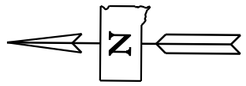
BON HOMME COUNTY
S. D. DEPT. OF TRANSPORTATION
AUGUST 2024

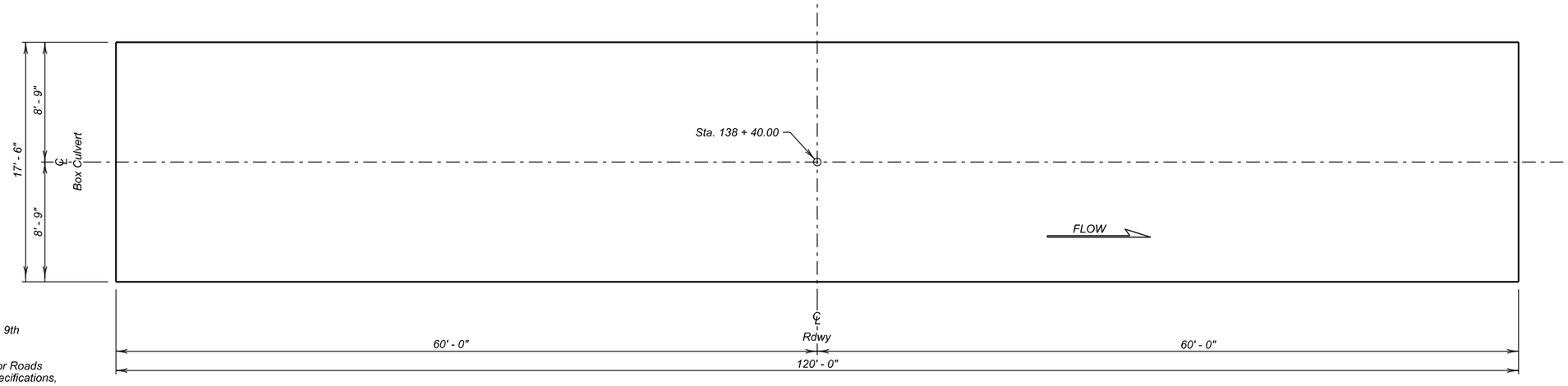
1 OF 5

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

DESIGNED BY	CK. DES. BY	DRAFTED BY	
BM	AH	CK	Steve A Johnson
BONH04K7	04K7TB08		BRIDGE ENGINEER

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	NH-PH 0050(116)354 P 0037(168)19	E10	E13





SPECIFICATIONS

1. *Design Specifications: AASHTO LRFD Bridge Design Specifications, 9th Edition.*
2. *Construction Specifications: South Dakota Standard Specifications for Roads and Bridges, 2015 Edition and required Provisions, Supplemental Specifications, and Special Provisions as included in the Proposal.*

GENERAL NOTES

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 and construction loading consisting of one 7' - 6" gage axle with gross axle weight = 95,850 lbs. The construction load will not be applied until a minimum of 4 ft. of fill has been placed over the box culvert. If other construction loads in excess of legal load are anticipated by the Contractor, the Contractor will submit a design analysis for the anticipated construction loading, through the proper channels, to the Office of Bridge Design for approval.*
3. *The box culvert 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 feet 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 inches.*
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. *Soils below the bottom of the proposed box culvert consist of brown silt clay with sand.*
13. *Groundwater was encountered in the borings at an elevation 1384.9 feet during the subsurface investigation conducted in September 2021. Dewatering will be required during construction.*

DESIGN MIX OF CONCRETE

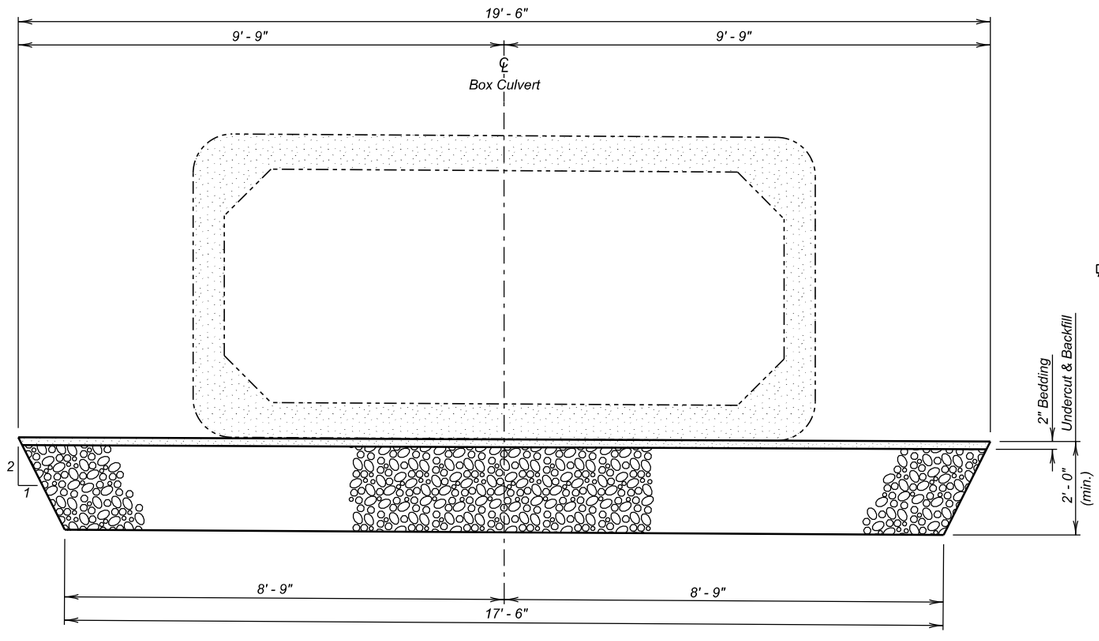
1. *Mix will be as per fabricator's design; however, a minimum compressive strength shall not be less than 4500 p.s.i. at 28 days.*
2. *Type II cement is required.*

SHOP PLANS

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

UNDERCUT LAYOUT

(Bottom Dimensions)



TYPICAL SECTION

(For Limits of Undercut)

ESTIMATED QUANTITIES

	ITEM	UNIT	QUANTITY
₵	Box Culvert Undercut	Cu. Yd.	166

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

SITE 1
ALTERNATE B

NOTES AND UNDERCUT DETAILS

FOR

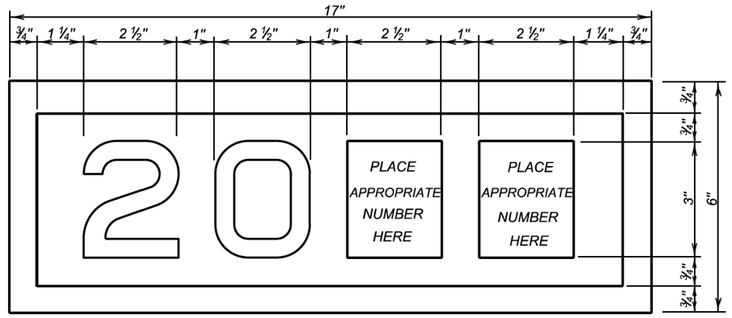
12' X 5' BOX CULVERT (PRECAST)

OVER SILVER CREEK — 0° SKEW
STA. 138 + 40.00 — SEC. 6/7-T94N-R59W
STR. NO. 05-159-130 — NH-PH 0050(116)354
HL-93

BON HOMME COUNTY
S. D. DEPT. OF TRANSPORTATION
AUGUST 2024

DESIGNED BY	CK. DES. BY	DRAFTED BY	
BM	AH	CK	BRIDGE ENGINEER
BONH04K7	04K7TB09		

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	NH-PH 0050(116)354 P 0037(168)19	E11	E13



YEAR PLATE DETAILS

GENERAL NOTES:

1. Year plates of the general dimensions shown will be constructed on all box culverts and bridges. The year plates will be constructed in reverse and attached to the forms in such a manner that the finished imprint in the concrete does not exceed one-half (1/2) inch in deptn.

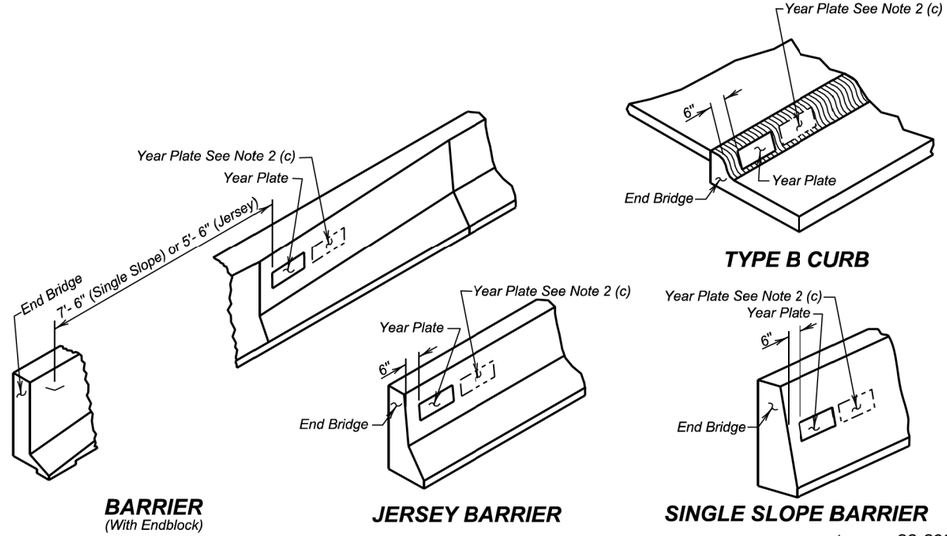
2. Year plates will be located on structure(s) as follows:

   a. On cast-in-place box culverts the year plates will be four and one - half (4 ½) inches below the top of the upstream parapet wall and centered laterally on the upstream face. On precast box culverts the year plate will be centered laterally on the upstream face of the top slab. Where an extended interior wall interferes with this location, the year plate will be centered in an adjacent barrel.

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

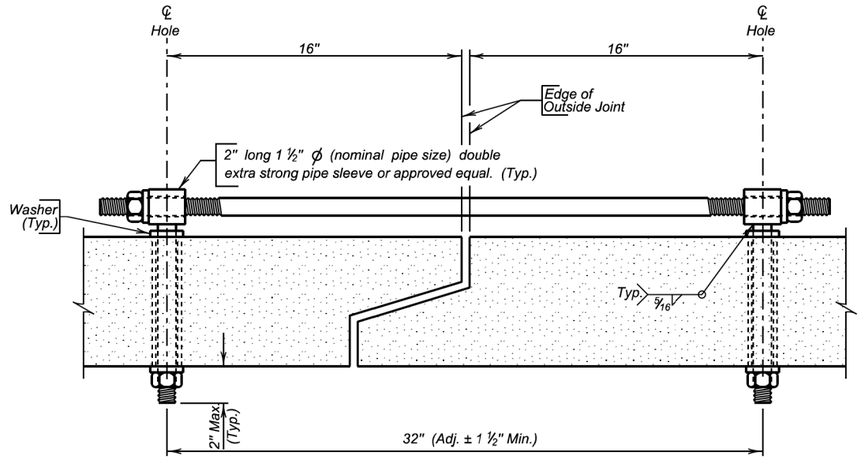
   c. When the plans specify that both the original date of construction and the date of reconstruction are to be shown, one date will be placed as listed above and the other located adjacent to it. Both year plates will be shown at each end of the bridge on opposite sides.

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



January 22, 2021

Published Date: 2025	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.

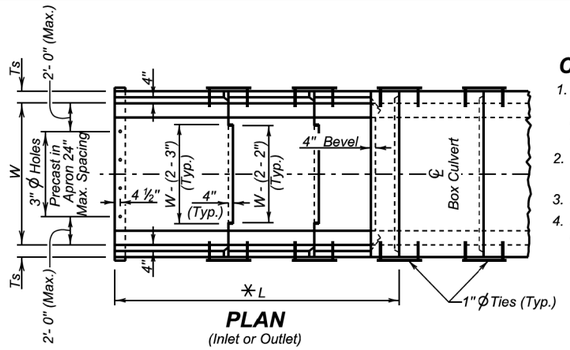
6. All costs for furnishing and installing the precast box culvert tie bolt assembly shall be incidental to the contract unit price per Foot for "Precast Concrete Box Culvert, Furnish".

March 21, 2016

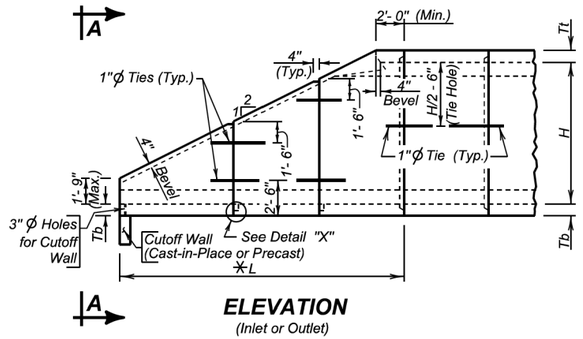
Published Date: 2025	SDDOT	PRECAST BOX CULVERT TIE BOLT ASSEMBLY DETAILS	PLATE NUMBER 560.01
			Sheet 1 of 1

SITE 1
ALTERNATE B

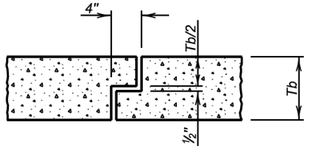
12' X 5' BOX CULVERT (PRECAST)
STR. NO. 05-159-130
AUGUST 2024



PLAN
(Inlet or Outlet)

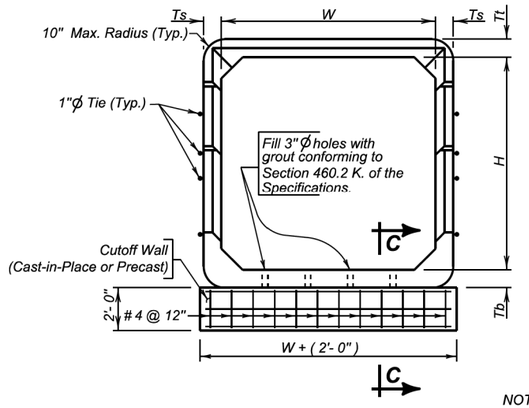


ELEVATION
(Inlet or Outlet)

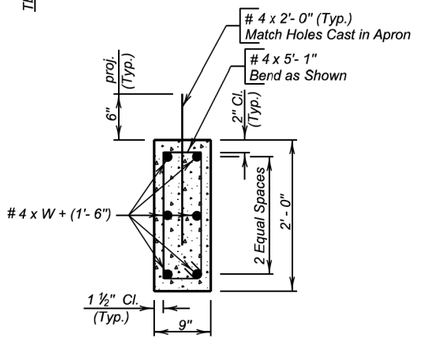


DETAIL "X"

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



VIEW A - A



SEC. C - C

LEGEND

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

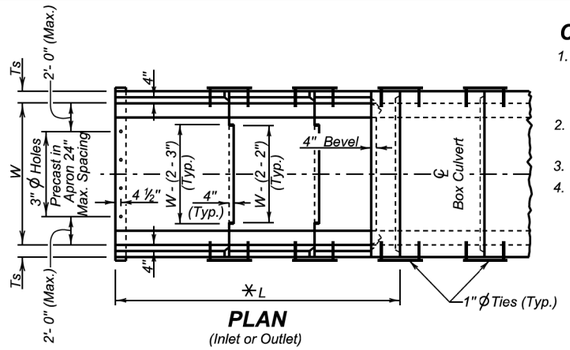
NOTES:
See GENERAL DRAWING for W and H dimensions.
Tt, Tb, L, and Ts dimensions shall be furnished by the Contractor.
⁎ Length and number of units may vary from that shown.

June 26, 2015

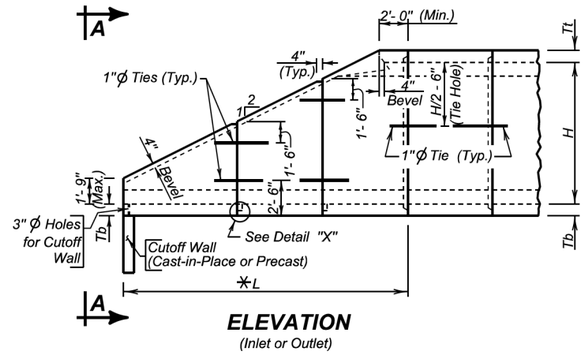
Published Date: 2025	SDDOT	PRECAST SINGLE BOX CULVERT SLOPED END SECTION DETAILS WITH 2'–0" CUTOFF WALL	PLATE NUMBER 560.10
			Sheet 1 of 1

CUTOFF WALL

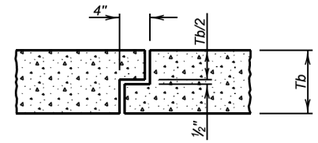
1. All costs associated with furnishing and installing the Cutoff Wall, whether precast or cast-in-place, shall be incidental to the contract unit price per each for "Precast Box Culvert End Section, Furnish".
2. Concrete for cast-in-place cutoff wall shall be Class M6 concrete in accordance with Section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



PLAN
(Inlet or Outlet)

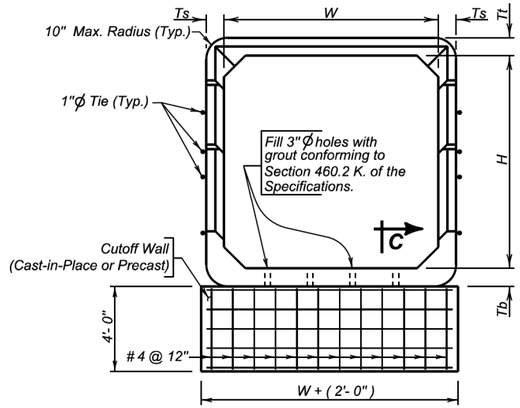


ELEVATION
(Inlet or Outlet)

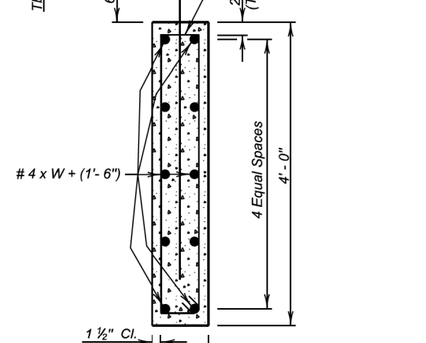


DETAIL "X"

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



VIEW A - A



SEC. C - C

LEGEND

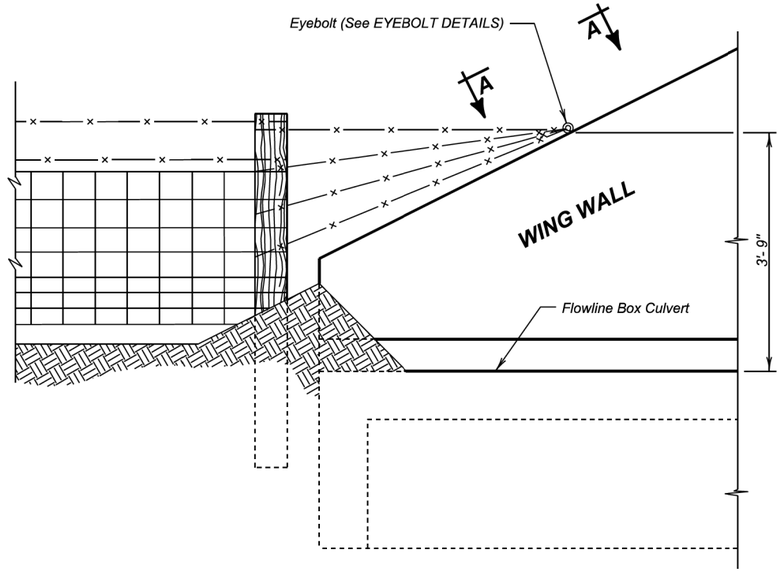
W = Width of Opening
H = Height of Opening
Tt = Thickness of Top Slab
Tb = Thickness of Bottom Slab
Ts = Thickness of Side Wall
L = Length of End Section

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

June 26, 2015

Published Date: 2025	SDDOT	PRECAST SINGLE BOX CULVERT SLOPED END SECTION DETAILS WITH 4'–0" CUTOFF WALL	PLATE NUMBER 560.11
			Sheet 1 of 1

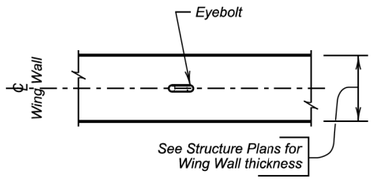
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	NH-PH 0050(116)354 P 0037(168)19	E13	E13



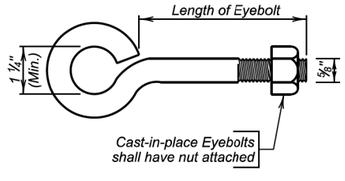
DETAIL FOR FENCE ANCHORS

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: 2025	SDDOT	FENCE ANCHORS FOR BOX CULVERT WING WALLS	PLATE NUMBER 620.16 Sheet 1 of 1

SITE 1
ALTERNATE B

12' X 5' BOX CULVERT (PRECAST)
STR. NO. 05-159-130
AUGUST 2024

5 OF 5