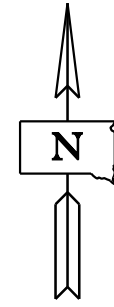


STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	PT 0908(105)349	E1	E25

Section E: Structure Plans

INDEX OF SHEETS -

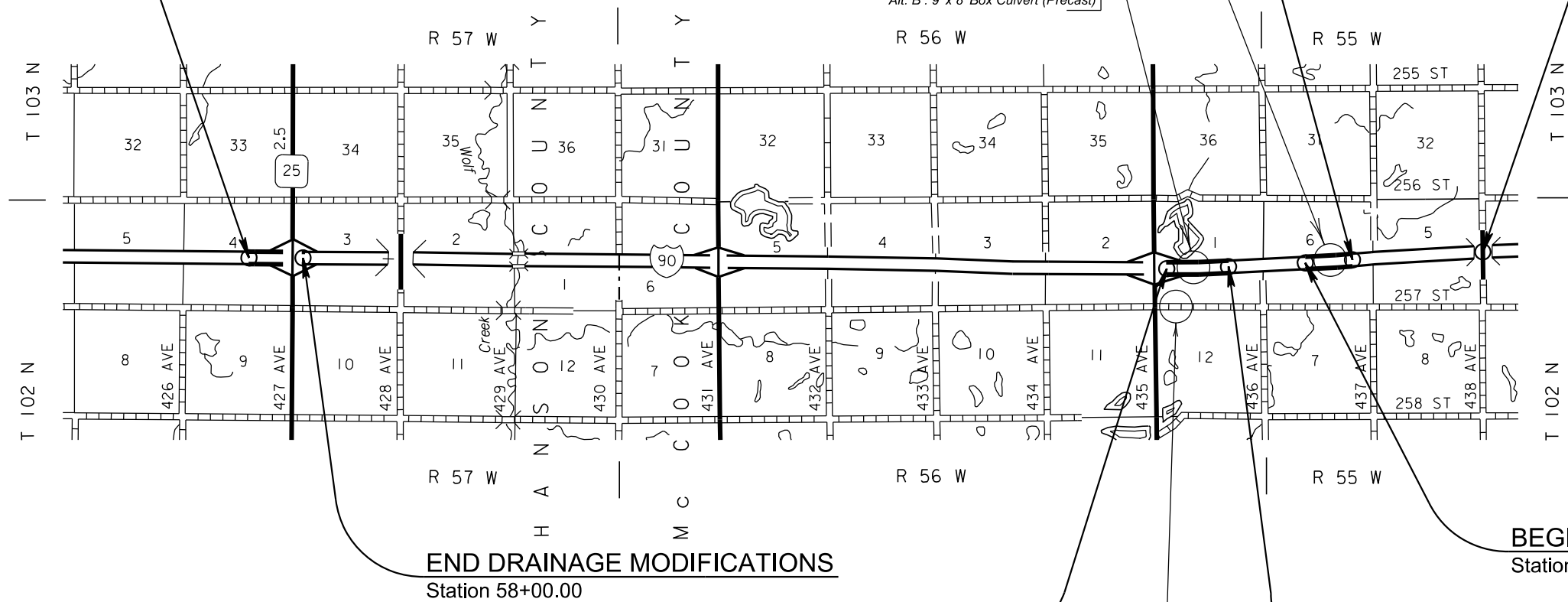
Sheet E1	Layout Map and Index
Sheet E2	Estimate of Structure Quantities
Sheet E3 to E7	Str. No. 44-052-140 11' x 5' Box Culvert (Precast)
Sheet E8 to E16	Str. No. 44-054-126 Site 1 Alt. A : 8' x 8' Box Culvert (C.I.P.)
Sheet E17 to E21	Str. No. 44-054-126 Site 1 Alt. B : 9' x 8' Box Culvert (Precast)
Sheet E22 to E25	Str. No. 44-065-126 2 - 9' x 4' Box Culvert (Precast)



BEGIN PT 0908(105)349
Begin Drainage Modifications
Station 36+12.00

END PT 0908(105)349
END GRADING
Station 570+00.00

Temporary Gardrail
Station 633+30



Sta. 553 + 90.00
Str. No. 44-065-126
2 - 9' x 4' Box Culvert (Precast)

Site 1 Sta. 496 + 40.00
Str. No. 40-054-126
Alt. A : 8' x 8' Box Culvert (C.I.P.) or
Alt. B : 9' x 8' Box Culvert (Precast)

END DRAINAGE MODIFICATIONS
Station 58+00.00

BEGIN GRADING
Station 548+45.00

BEGIN GRADING
Station 479+55.00

END GRADING
Station 507+30.00

Sta. 1 + 82.00 (257 St.)
Str. No. 44-052-140
11' x 5' Box Culvert (Precast)

SECTION E – ESTIMATE OF STRUCTURE QUANTITIES

Str. No. 44-052-140 & 44-065-126

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
420E0200	Structure Excavation, Box Culvert	112	CuYd
421E0200	Box Culvert Undercut	437	CuYd
560E0156	11'x5' Precast Concrete Box Culvert, Furnish	44.0	Ft
560E0157	11'x5' Precast Concrete Box Culvert, Install	44.0	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
560E2090	2-9'x4' Precast Concrete Box Culvert, Furnish	170.0	Ft
560E2091	2-9'x4' Precast Concrete Box Culvert, Install	170.0	Ft
560E3090	2-9'x4' Precast Concrete Box Culvert End Section, Furnish	2	Each
560E3091	2-9'x4' Precast Concrete Box Culvert End Section, Install	2	Each
700E0210	Class B Riprap	95.8	Ton
831E0110	Type B Drainage Fabric	122	SqYd
831E0300	Reinforcement Fabric (MSE)	496	SqYd

Site 1 – Alternate A Str. No. 44-054-126

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
420E0200	Structure Excavation, Box Culvert	76	CuYd
421E0200	Box Culvert Undercut	312	CuYd
460E0120	Class A45 Concrete, Box Culvert	214.1	CuYd
460E0380	Install Dowel in Concrete	22	Each
480E0100	Reinforcing Steel	35,234	Lb
700E0210	Class B Riprap	24.0	Ton
831E0110	Type B Drainage Fabric	35	SqYd
831E0300	Reinforcement Fabric (MSE)	437	SqYd

Site 1 – Alternate B Str. No. 44-054-126

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
420E0200	Structure Excavation, Box Culvert	64	CuYd
421E0200	Box Culvert Undercut	291	CuYd
560E0116	9'x8' Precast Concrete Box Culvert, Furnish	216.0	Ft
560E0117	9'x8' Precast Concrete Box Culvert, Install	216.0	Ft
560E1116	9'x8' Precast Concrete Box Culvert End Section, Furnish	2	Each
560E1117	9'x8' Precast Concrete Box Culvert End Section, Install	2	Each
700E0210	Class B Riprap	25.7	Ton
831E0110	Type B Drainage Fabric	37	SqYd
831E0300	Reinforcement Fabric (MSE)	406	SqYd

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	PT 0908(105)349	E4	E25

SPECIFICATIONS

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

GENERAL NOTES

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

- Box culvert and box culvert end section design will conform to the AASHTO LRFD Bridge Design Specifications, 9th Edition.
- 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.
- 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 LRF 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. AASHTO Ware 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.
- The design of the barrel sections will be based on a minimum fill height of 1 foot and include all subsequent fill heights up to and including the maximum fill height of 5 ft. over the box culvert.
- Minimum inside corner fillet will be 6 in.
- 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.
- Lift holes will be plugged with an approved nonshrinkable grout.
- The Fabricator will imprint on the structure the date of construction as specified and detailed on Standard Plate No. 460.02.
- 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.
- Installation of the precast sections will be in accordance with the final approved shop plans.
- Care will be taken when placing sections. Sections will be only moved using the lifting holes by approved equipment.
- Soils below the bottom of the proposed RCBC consist of dark gray silt clay. Groundwater was encountered in the borings at an elevation of 1433.3 feet during the subsurface investigation conducted in August 2023. Dewatering will be required during construction.

DESIGN MIX OF CONCRETE

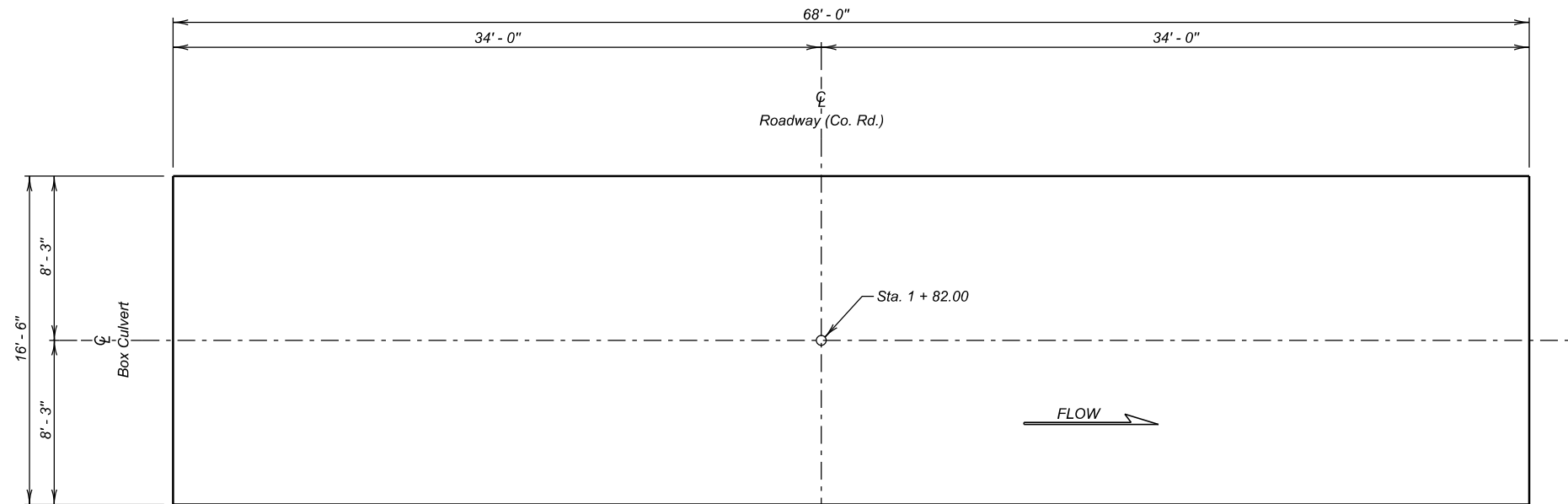
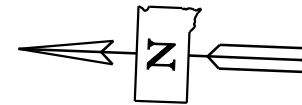
- Mix will be as per fabricator's design, however minimum compressive strength will not be less than 4500 p.s.i. at 28 days.
- Type II cement is required.

SHOP PLANS

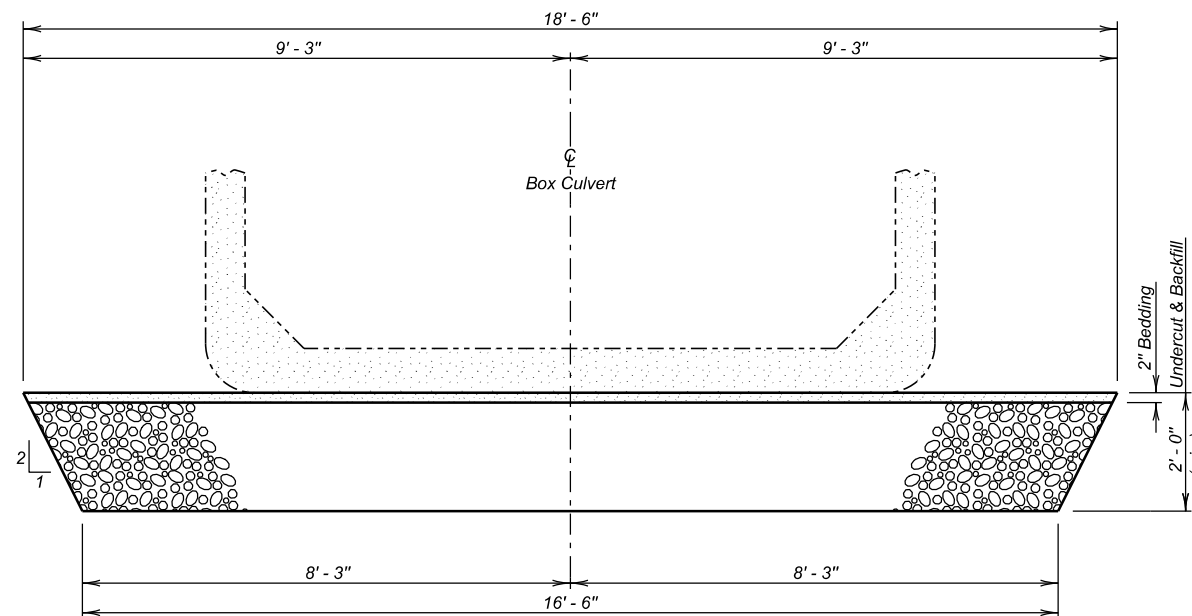
The fabricator will submit shop plans in accordance with the Construction Specifications. Include design and independent check design, if applicable, with initial submittal.

ESTIMATED QUANTITIES		
ITEM	UNIT	QUANTITY
Box Culvert Undercut	Cu. Yd.	90

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



UNDERCUT LAYOUT
(Bottom Dimensions)



TYPICAL SECTION
(For Limits of Undercut)

NOTES AND UNDERCUT DETAILS

FOR

11' X 5' BOX CULVERT (PRECAST)

TRIB. TO WOLF CREEK 0° SKEW
 STA. 1 + 82.00 (257 ST.) SEC. 1/12-T102N-R56W
 STR. NO. 44-052-140 PT 0908(105)349
 HL-93

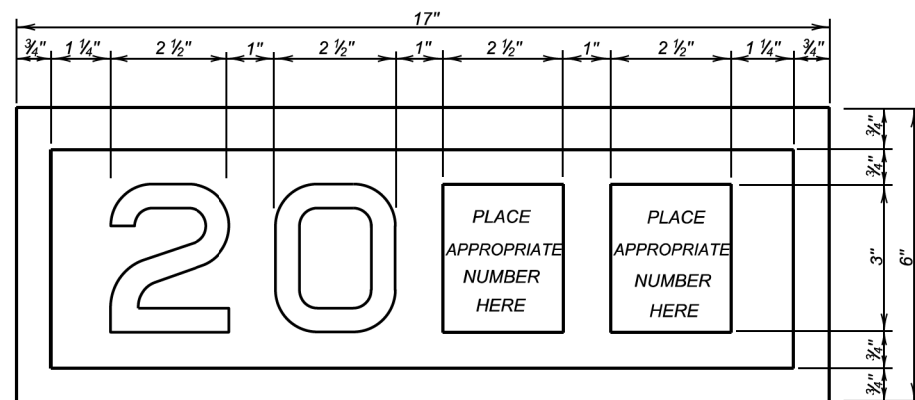
MCCOOK COUNTY

S. D. DEPT. OF TRANSPORTATION

MARCH 2024

2 OF 5

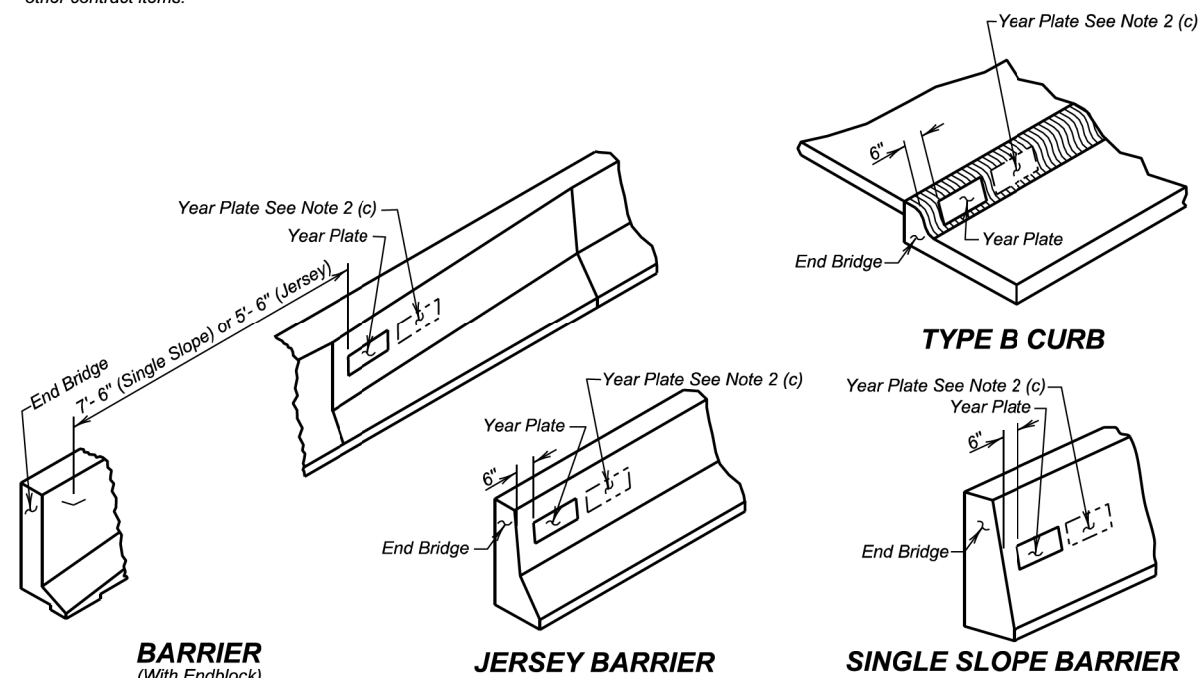
DESIGNED BY AH MCCCK07W6	CK. DES. BY SD 07W6TA02	DRAFTED BY BT/CRW	Steve A. Johnson BRIDGE ENGINEER
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YEAR PLATE DETAILS

GENERAL NOTES:

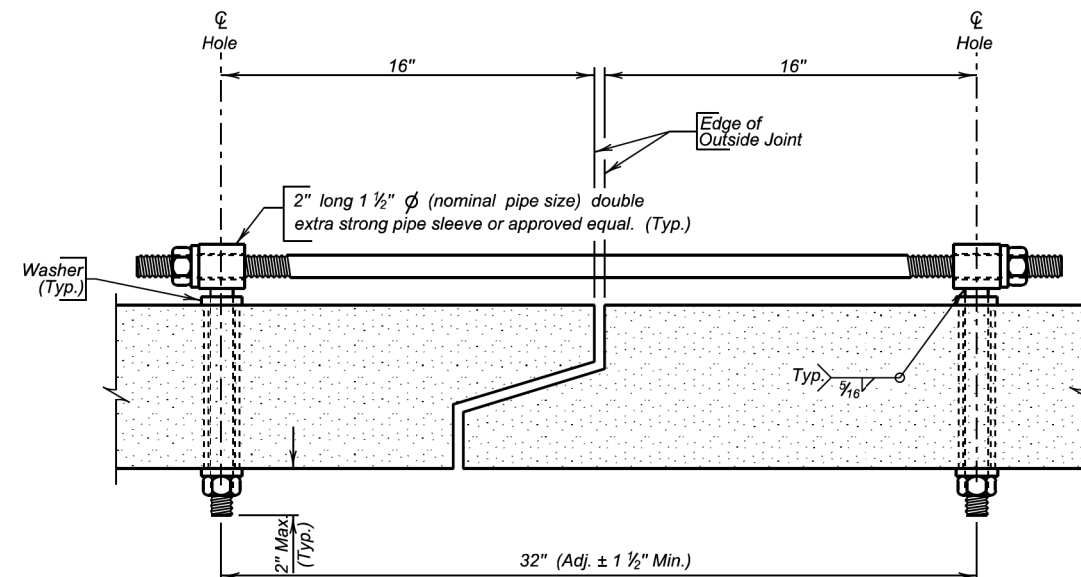
- Year plates of the general dimensions shown will be constructed on all box culverts and bridges. The year plates will be constructed in reverse and attached to the forms in such a manner that the finished imprint in the concrete does not exceed one-half (1/2) inch in depth.
- Year plates will be located on structure(s) as follows:
 - On cast-in-place box culverts the year plates will be four and one-half (4 1/2) 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.
 - 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.
 - 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.
- 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.



TYPE B CURB

January 22, 2021

Published Date: 2025	S D D O T	YEAR PLATE DETAILS	PLATE NUMBER 460.02
			Sheet 1 of 1



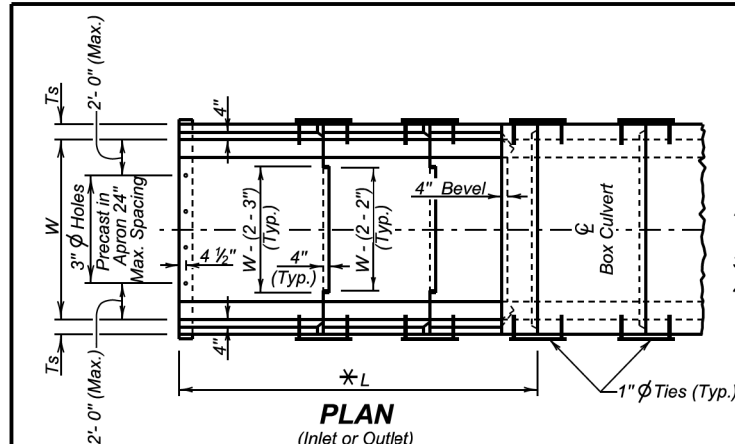
TIE BOLT ASSEMBLY

GENERAL NOTES:

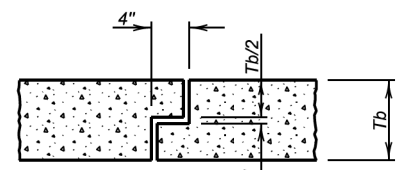
- All holes for tie bolts shall be cast-in-place, 16 inches from outside edge of joint. Cast in inserts or sleeves, if used, shall be made of a corrosion resistant material.
- Ties shall be 1 inch diameter and conform to the requirements of ASTM A36, ASTM A307, or ASTM F1554, Gr. 36. Nuts shall be heavy 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.
- Welding and weld inspection shall be in conformance with AWS/ANSI D1.1 - (Current Year) Structural Welding Code - Steel.
- Tie Bolt Assembly shall be galvanized in accordance with ASTM A153 or ASTM F2329 as applicable.
- 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.
- 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	S D D O T	PRECAST BOX CULVERT TIE BOLT ASSEMBLY DETAILS	PLATE NUMBER 560.01
			Sheet 1 of 1

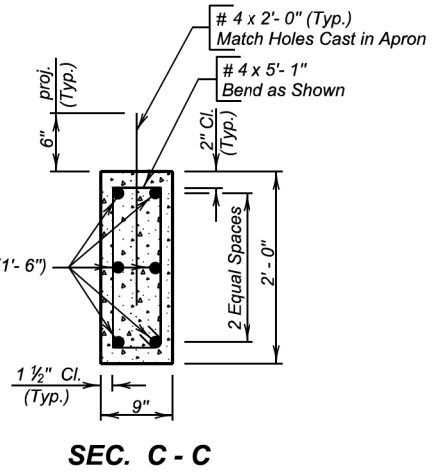
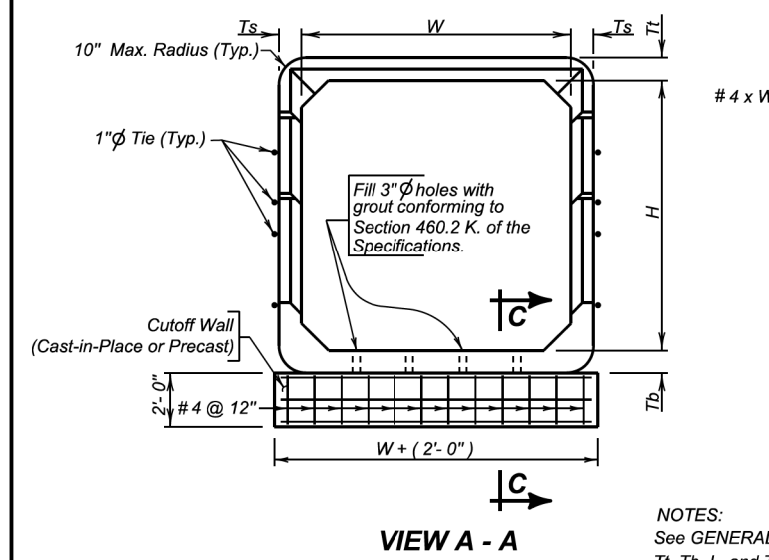
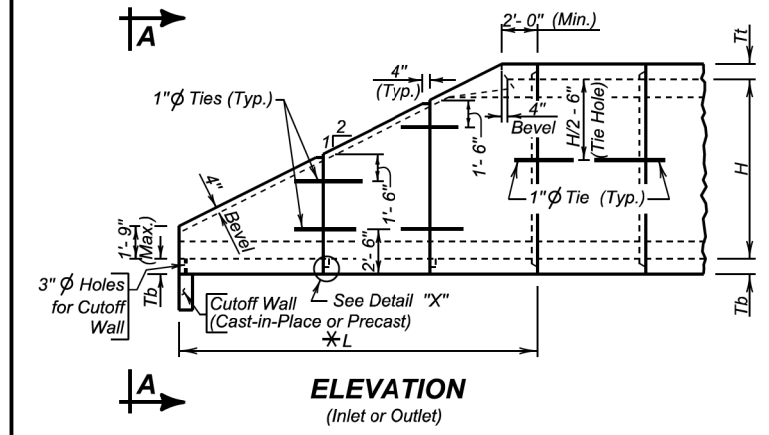


- CUTOFF WALL**
- All costs associated with furnishing and installing the Cutoff Wall, whether precast or cast-in-place, shall be incidental to the contract unit price per each for "Precast Box Culvert End Section, Furnish".
 - Concrete for cast-in-place cutoff wall shall be Class M6 concrete in accordance with Section 462 of the Specifications.
 - All reinforcing steel shall conform to ASTM A615 Grade 60.
 - 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.



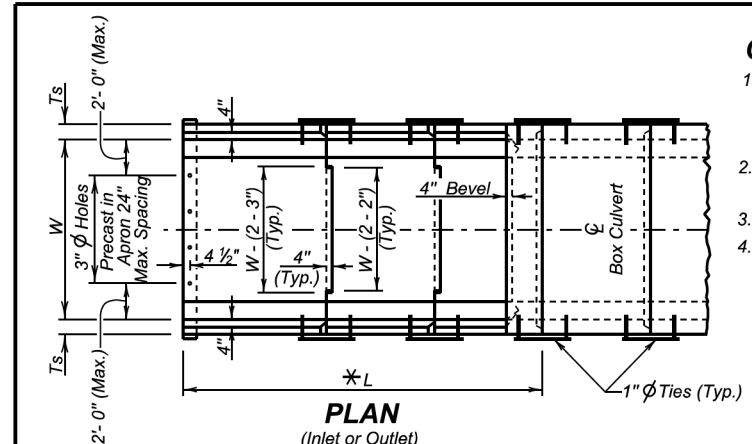
LEGEND

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

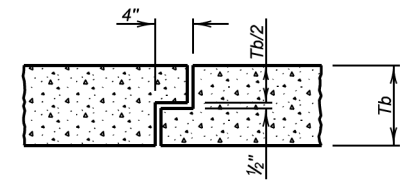
NOTES:
See GENERAL DRAWING for W and H dimensions.
Tt, Tb, L, and Ts dimensions shall be furnished by the Contractor.
* Length and number of units may vary from that shown.

June 26, 2015

S D D O T	PRECAST SINGLE BOX CULVERT SLOPED END SECTION DETAILS WITH 2'-0" CUTOFF WALL	PLATE NUMBER 560.10
	Published Date: 2025	Sheet 1 of 1

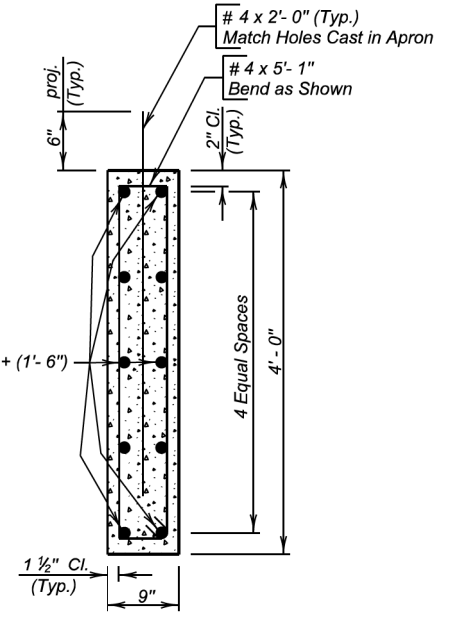
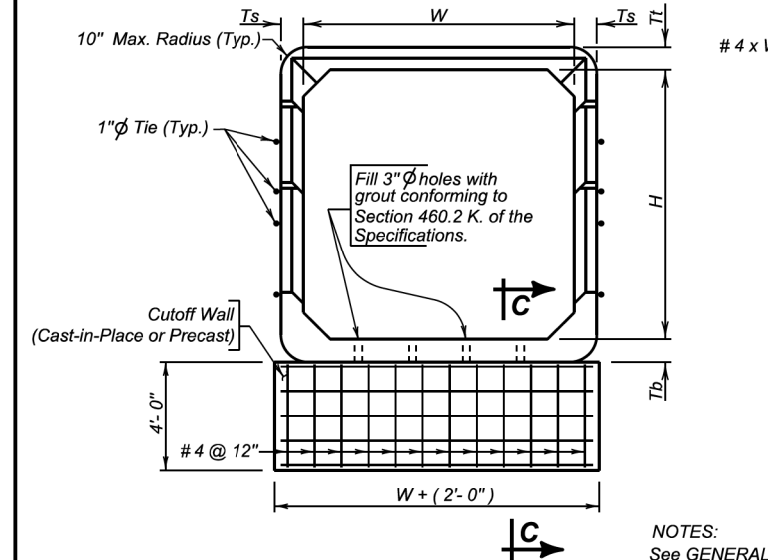
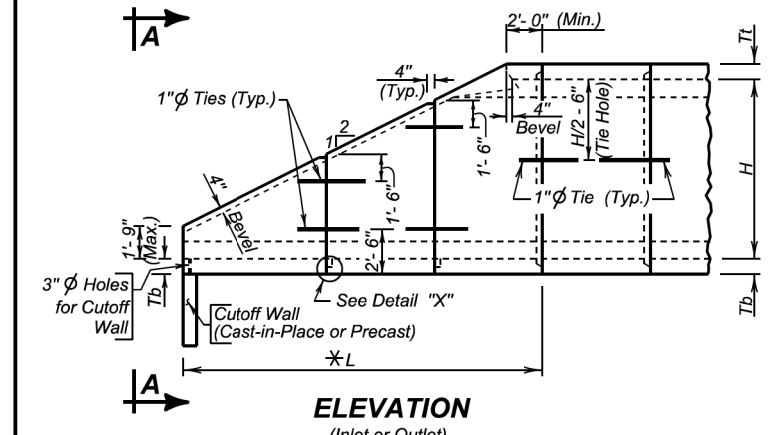


- CUTOFF WALL**
- All costs associated with furnishing and installing the Cutoff Wall, whether precast or cast-in-place, shall be incidental to the contract unit price per each for "Precast Box Culvert End Section, Furnish".
 - Concrete for cast-in-place cutoff wall shall be Class M6 concrete in accordance with Section 462 of the Specifications.
 - All reinforcing steel shall conform to ASTM A615 Grade 60.
 - 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.



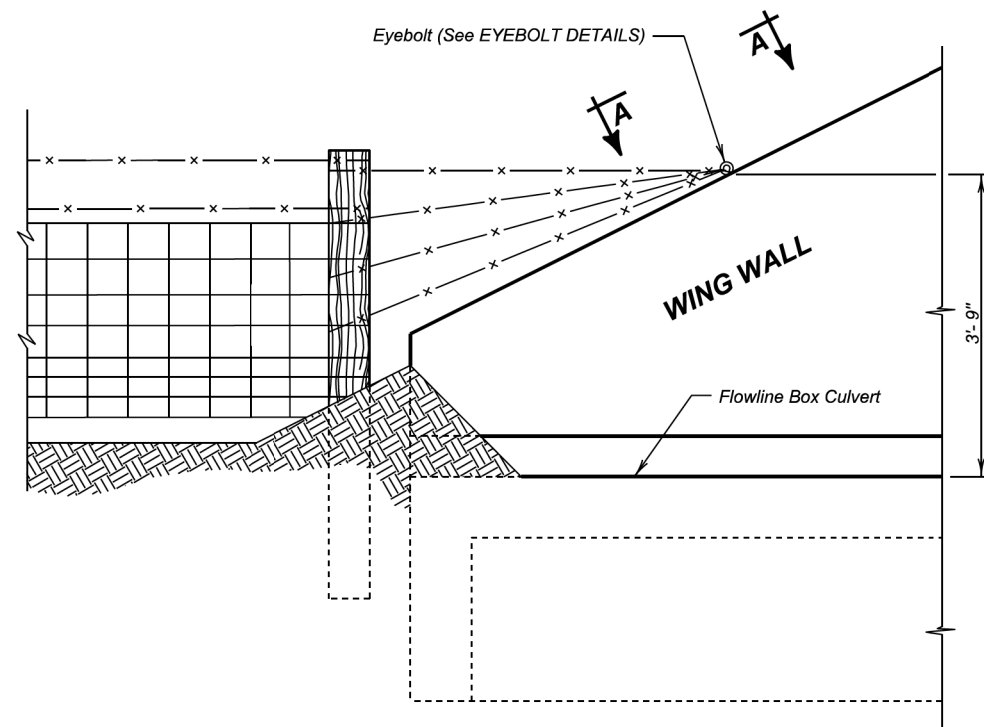
LEGEND

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

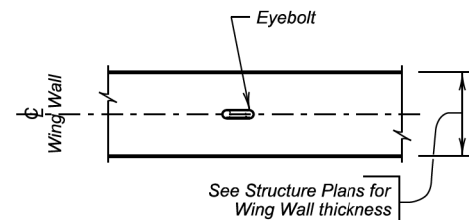
S D D O T	PRECAST SINGLE BOX CULVERT SLOPED END SECTION DETAILS WITH 4'-0" CUTOFF WALL	PLATE NUMBER 560.11
	Published Date: 2025	Sheet 1 of 1



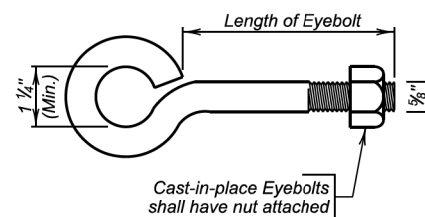
DETAIL FOR FENCE ANCHORS

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 $\frac{5}{8}$ 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 $4\frac{1}{2}$ 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 $\frac{5}{8}$ 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

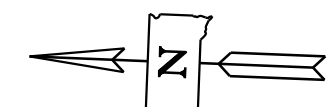
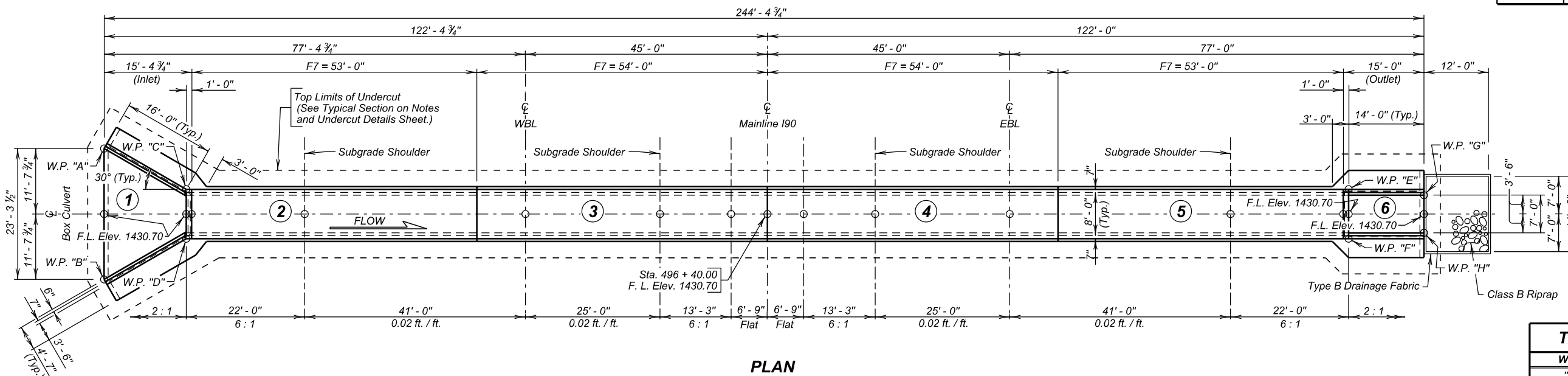
December 23, 2012

S D D O T	FENCE ANCHORS FOR BOX CULVERT WING WALLS	PLATE NUMBER 620.16
		Sheet 1 of 1

Published Date: 2025

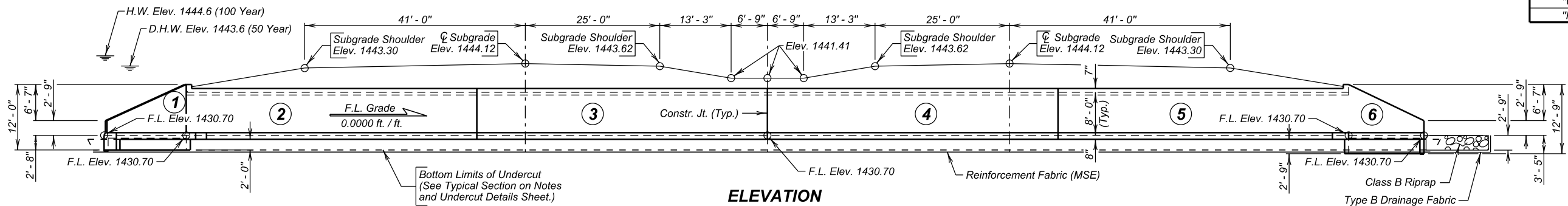
The elevations shown in these plans are based on the National Geodetic Survey (NGS) North American Vertical Datum of 1988 (NAVD88).

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	PT 0908(105)349	E8	E25



W. P.	STATION	OFFSET
"A"	496 + 51.81	122.39' Lt.
"B"	496 + 28.47	122.42' Lt.
"C"	496 + 44.74	108.00' Lt.
"D"	496 + 35.54	108.01' Lt.
"E"	496 + 44.43	108.00' Rt.
"F"	496 + 35.29	107.99' Rt.
"G"	496 + 43.33	122.00' Rt.
"H"	496 + 36.36	121.99' Rt.

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



ITEM	UNIT	QUANTITY
Class A45 Concrete, Box Culvert	Cu. Yd.	214.1
Reinforcing Steel	Lb.	35234
Structure Excavation, Box Culvert	Cu. Yd.	76
Box Culvert Undercut	Cu. Yd.	312
Class B Riprap	Ton	24.0
Type B Drainage Fabric	Sq. Yd.	35
Reinforcement Fabric (MSE)	Sq. Yd.	437
Install Dowel in Concrete	Each	22

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

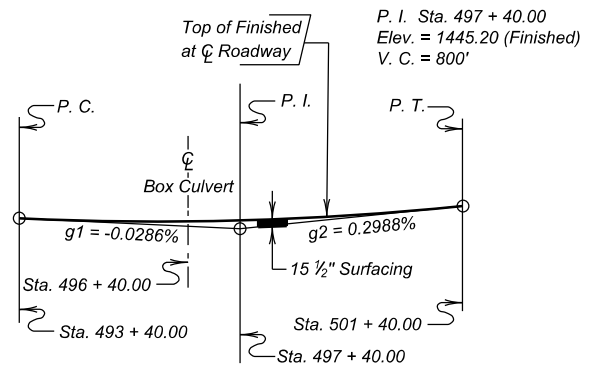
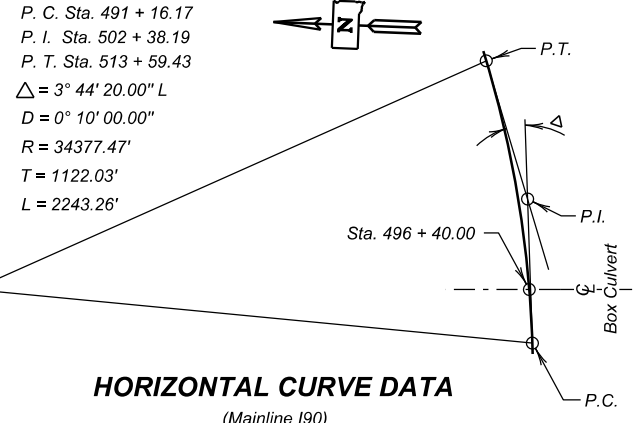
INDEX OF CULVERT SHEETS -

- Sheet No. 1 - General Drawing and Quantities
- Sheet No. 2 - Notes and Undercut Details
- Sheet No. 3 - Dowel Placement Details
- Sheet No. 4 - Inlet Details
- Sheet No. 5 - Outlet Details
- Sheet No. 6 - F7 Barrel End Section Details (53' - 0")
- Sheet No. 7 - F7 Barrel Interior Section Details (54' - 0")
- Sheet No. 8 - Standard Plate No.'s 460.02 and 460.10
- Sheet No. 9 - Standard Plate No. 620.16

HYDRAULIC DATA

Q_d	441 cfs
A_d	56 sq ft
V_d	7.9 fps
Q_F	1691 cfs
Q_{100}	2062 cfs
Q_{OT}	> Q_{100}
V_{max}	8.5 fps

Q_d = Design discharge for the proposed culvert based on 50 year frequency. El. 1443.6.
 Q_{OT} = Overtopping discharge and frequency >100 year recurrence interval. El. 1445.3 @ 190 WBL Sta. 494 + 10.
 Q_F = Designated peak discharge for the basin approaching proposed project based on 50 year frequency.
 Q_{100} = Computed discharge for the basin approaching proposed project based on 100 year frequency. El. 1444.6.
 V_{max} = Maximum computed outlet velocity for the proposed culvert, based on 100 year frequency.



**SITE 1
ALTERNATE A**
GENERAL DRAWING AND QUANTITIES
 FOR
8' X 8' BOX CULVERT (C.I.P.)
 TRIB. TO WOLF CREEK 0° SKEW
 STA. 496 + 40.00 SEC. 1-T102N-R56W
 STR. NO. 44-054-126 PT 0908(105)349
 PCN 07W6 HL-93
 MCCOOK COUNTY
 S. D. DEPT. OF TRANSPORTATION
 MARCH 2024

DESIGNED BY AH MCCOK07W6	CK. DES. BY SD 07W6TB01	DRAFTED BY BT/CRW	BRIDGE ENGINEER <i>Steve A. Johnson</i>
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SPECIFICATIONS

- Design Specifications: AASHTO LRFD Bridge Design Specifications, 9th Edition.
- 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 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.
- 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 7 ft. (F7).
- Design Material Strengths: Concrete $f_c = 4500$ p.s.i.
Reinforcing Steel $f_y = 60000$ p.s.i.
- All concrete will be Class A45, Box Culvert conforming to Section 460 of the Construction Specifications.
- All reinforcing steel will conform to ASTM A615 Grade 60.
- All lap splices shown are contact lap splices unless noted otherwise.
- All exposed edges will be chamfered $\frac{3}{4}$ inch unless noted otherwise in the plans.
- Use 1 inch clear cover on all reinforcing steel EXCEPT as shown.
- The Contractor will imprint on the structure the date of construction as specified and detailed on Standard Plate No. 460.02.
- Care will be taken to establish Working Points (W.P.) as shown on the wings.
- Circled numbers in PLAN and ELEVATION views on the General Drawing are section I.D. Numbers (see SDDOT Materials Manual).
- Cost of Preformed Expansion Joint Filler used in apron construction will be incidental to the other contract items.
- Soils below the flowline of the RCBC consist of dark gray to black silt clay. Groundwater was encountered an elevation of 1426.1 feet during the subsurface investigation conducted in November 2022. Seasonal fluctuations in groundwater can be expected. Dewatering may be required during construction.

GEOTEXTILE SPECIFICATION

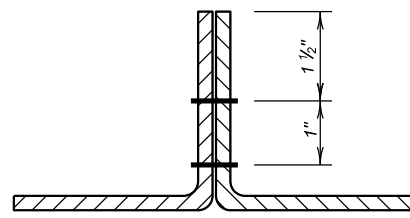
- Reinforcement Fabric (MSE) will conform to Section 831. The Reinforcement Fabric (MSE) provided will be on the Approved Products List or will be certified by the supplier to meet this specification prior to installation.
- Reinforcement Fabric (MSE) will be paid for at the contract unit price per sq. yd. for Reinforcement Fabric (MSE). Payment will be full compensation for furnishing and installing the Reinforcement Fabric (MSE) only. Granular backfill materials will be paid for as part of the Box Culvert Undercut bid item.

INSTALLATION PROCEDURE - GEOTEXTILE

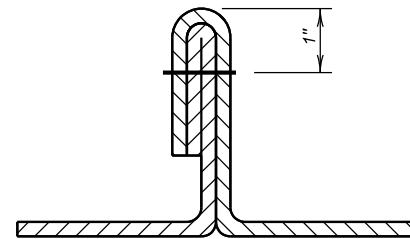
Place the Reinforcement Fabric (MSE) on as level and smooth of a surface as possible. Any protrusions that might damage the geotextile will be removed prior to placing the geotextile. All seams in the geotextile will be stitched in accordance with the seaming procedure and as shown on the detail labeled "Seam Types." No equipment will be allowed on the geotextile until the granular backfill material is in place. The geotextile will be kept as taut as possible prior to backfilling. Granular backfill material will be dumped behind the leading edge of the fill and pushed into place with a loader or dozer.

SEAMING PROCEDURE

- The sewn seams will consist of two parallel rows of stitching ("prayer" seam, Type SSa-2), or a J-seam (Type SSn-1), using a single row of stitching. The stitching will be a lock type stitch.
- If the Type SSa-2 seam is used, the two rows of stitching will be 1" apart with a tolerance of plus or minus 0.5" and will not cross, except for restitching. The minimum seam allowance, i.e., minimum distance from the geotextile edge to the stitch line nearest to that edge, will be 1.5".
- If the J seam (Type SSn-1) is used, the minimum seam allowance will be 1".
- The seam, stitch type, and the equipment used to perform the stitching will be as recommended by the manufacturer of the geotextile and approved by the Engineer. The seams will be sewn in such a manner that the seam can be readily inspected by the Engineer.
- The thread used will be high-strength polypropylene, polyester, or Kevlar thread.

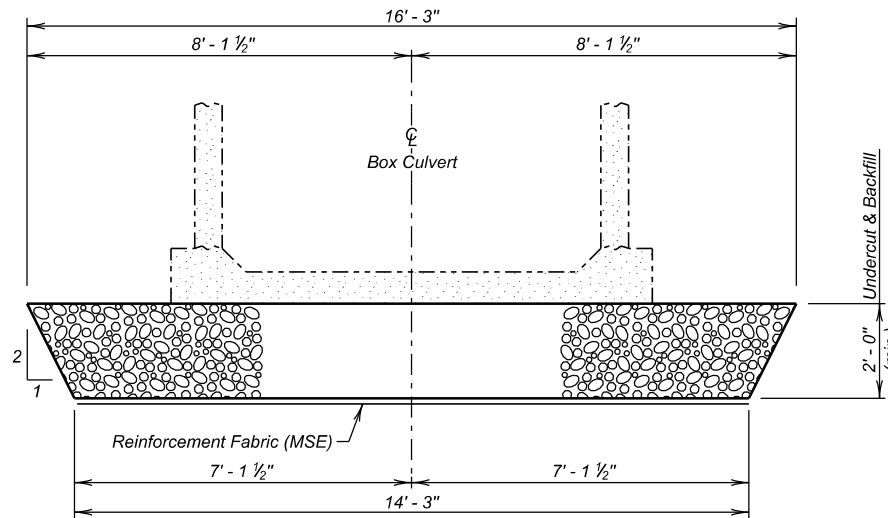


Flat or "prayer" seam
Type SSa-2

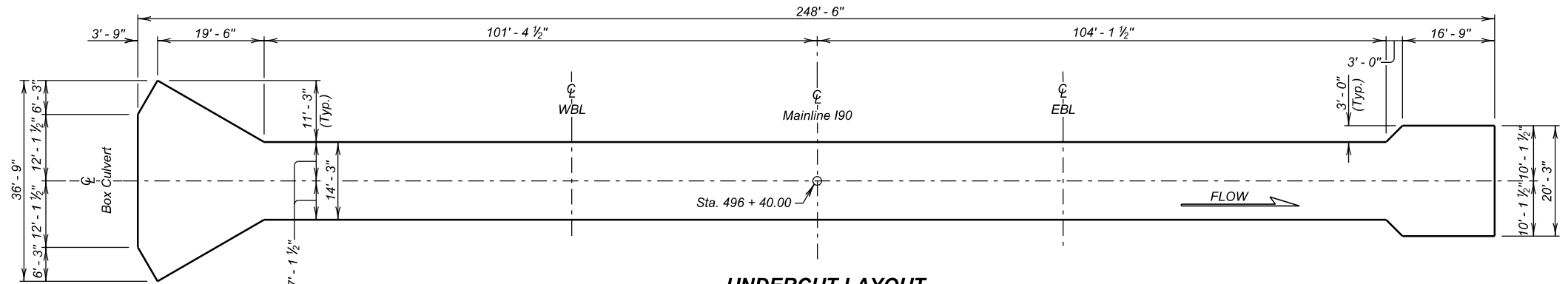
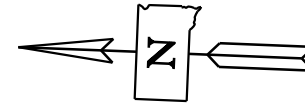


J seam
Type SSn-1

GEOTEXTILE SEAM TYPES



TYPICAL SECTION
(For Limits of Undercut)



UNDERCUT LAYOUT
(Bottom Dimensions)

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	PT 0908(105)349	E9	E25

ESTIMATED QUANTITIES

ITEM	UNIT	QUANTITY
Box Culvert Undercut	Cu. Yd.	312
Reinforcement Fabric (MSE)	Sq. Yd.	437

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

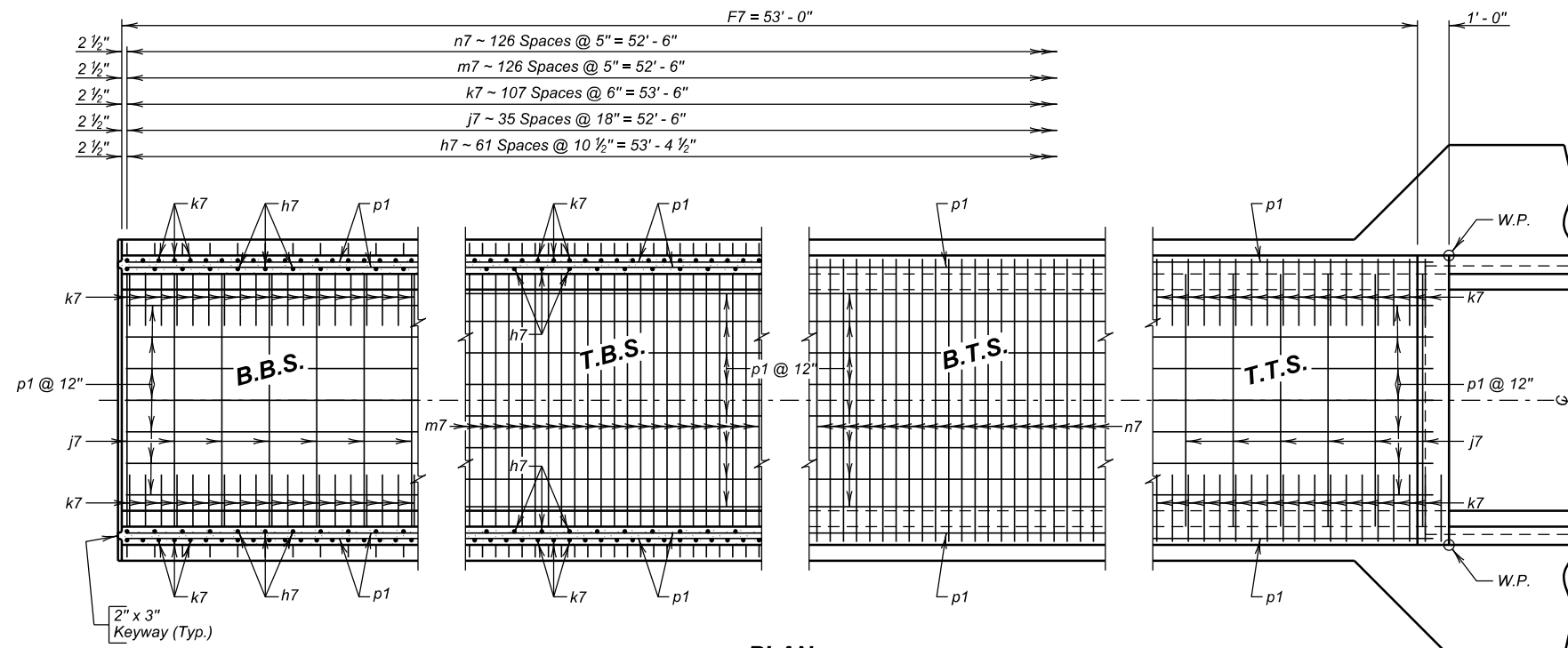
**SITE 1
ALTERNATE A
NOTES AND UNDERCUT DETAILS
FOR
8' X 8' BOX CULVERT (C.I.P.)**

TRIB. TO WOLF CREEK
STA. 496 + 40.00
STR. NO. 44-054-126

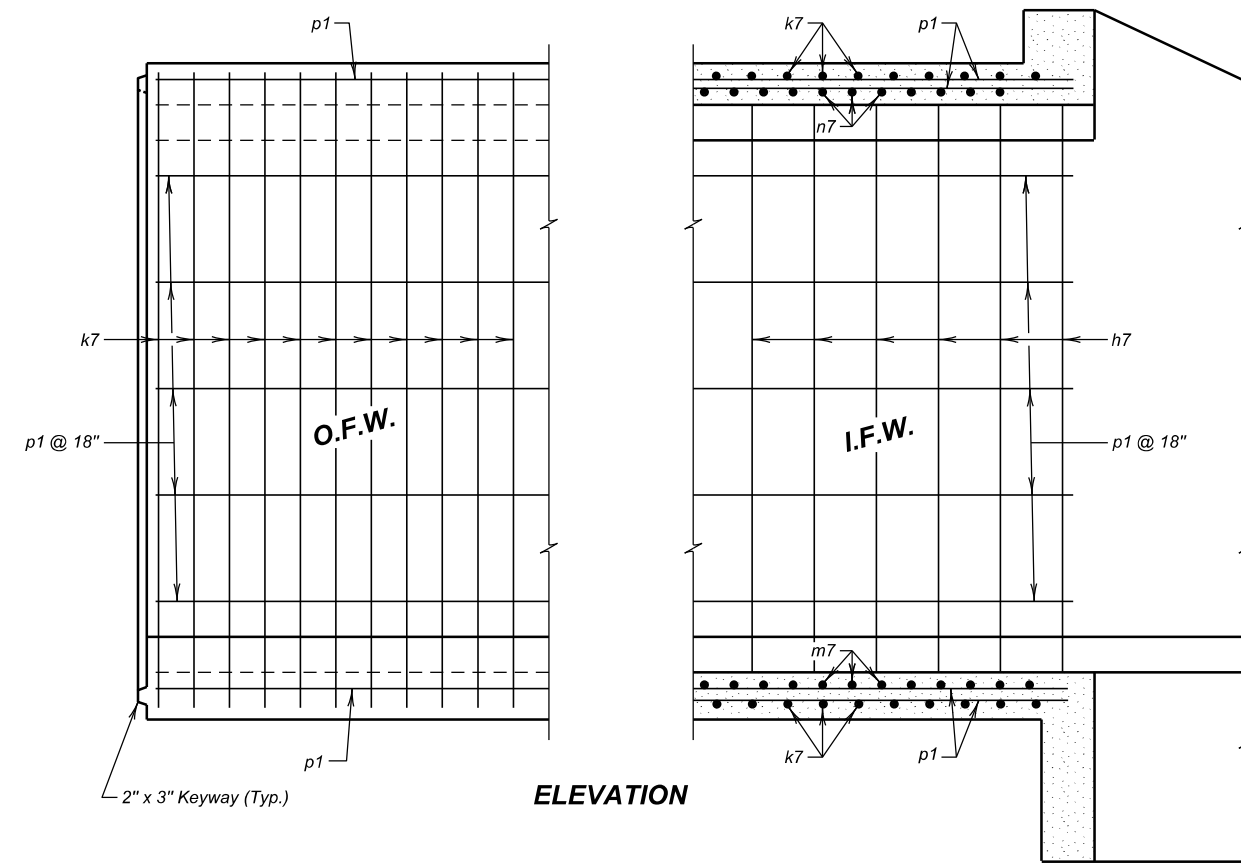
0° SKEW
SEC. 1-T102N-R56W
PT 0908(105)349
HL-93

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

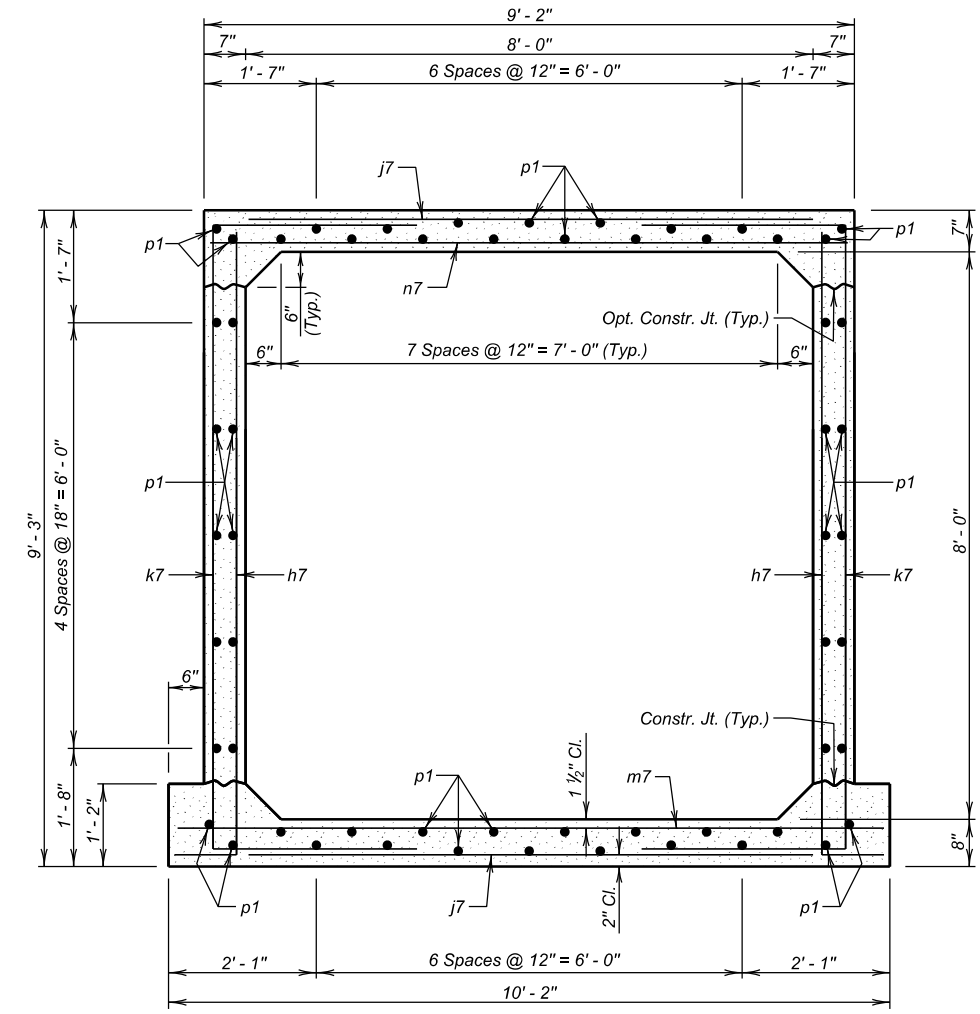
DESIGNED BY AH MCCOK07W6	CK. DES. BY SD 07W6TB02	DRAFTED BY BT/CRW	Steve A. Johnson BRIDGE ENGINEER
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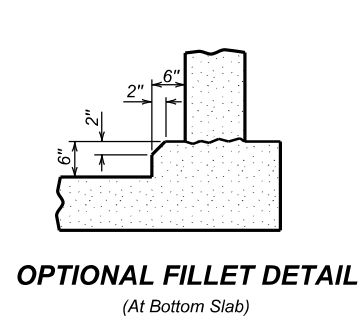
PLAN
(Outlet End shown, Inlet similar by rotation)



ELEVATION



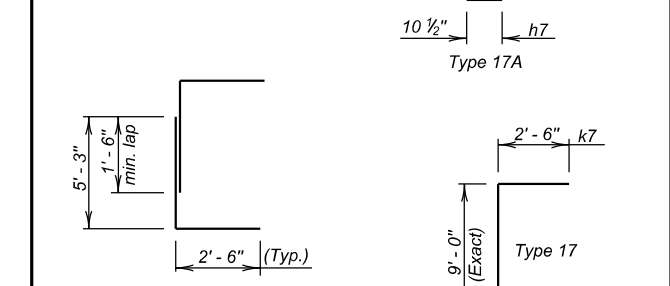
F7 BARREL HALF SECTION
(7'-0" Maximum Fill)



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. Quantity of z1 bars is for two construction joints.

REINFORCING SCHEDULE				
(For 2 - F7 Barrel End Sections)				
Mk.	No.	Size	Length	Type
h7	248	4	9' - 6"	17A
j7	144	4	8' - 0"	Str.
k7	432	4	14' - 0"	17
m7	254	5	9' - 9"	Str.
n7	254	5	8' - 9"	Str.
p1	116	4	53' - 6"	Str.
z1	52	5	3' - 6"	Str.



OPTIONAL K7 SPLICE DETAIL
Contractor may use optional reinforcing steel splice, as shown. The cost of the additional reinforcing steel shall be borne by the Contractor.

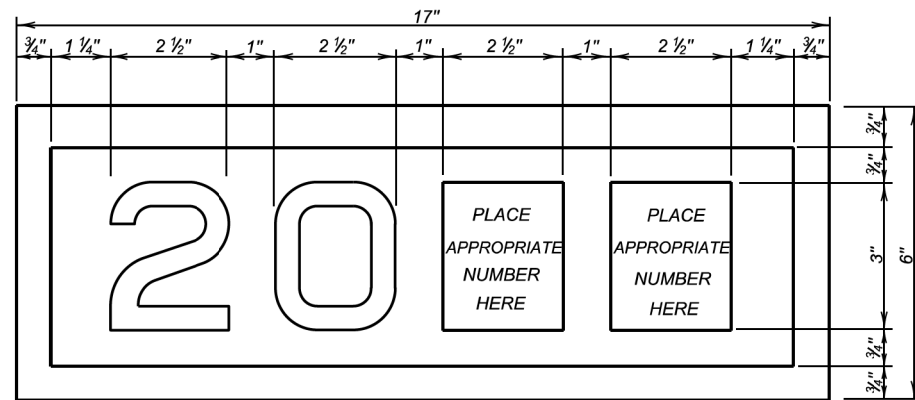
NOTES:
All dimensions are out to out of bars.
Request for additional reinforcing steel splices at points other than those shown, must be submitted to the Engineer for prior approval. If additional splices are approved, no payment will be allowed for the added quantity of reinforcing steel.

ESTIMATED QUANTITIES			
ITEM	Class A45 Concrete, Box Culvert	Reinforcing Steel	Structure Excavation, Box Culvert
UNIT	Cu.Yd.	Lb.	Cu.Yd.
2 - F7 Barrel End Sections @ 53' - 0"	88.2	15620	26.7

LEGEND FOR PLACING RE-STEEL	
T.T.S.	- Top of Top Slab
B.T.S.	- Bottom of Top Slab
T.B.S.	- Top of Bottom Slab
B.B.S.	- Bottom of Bottom Slab
O.F.W.	- Outside Face of Wall
I.F.W.	- Inside Face of Wall

SITE 1
ALTERNATE A
F7 BARREL END SECTION DETAILS (53' - 0")
FOR
8' X 8' BOX CULVERT (C.I.P.)
TRIB. TO WOLF CREEK 0° SKEW
STA. 496 + 40.00 SEC. 1-T102N-R56W
STR. NO. 44-054-126 PT 0908(105)349
HL-93

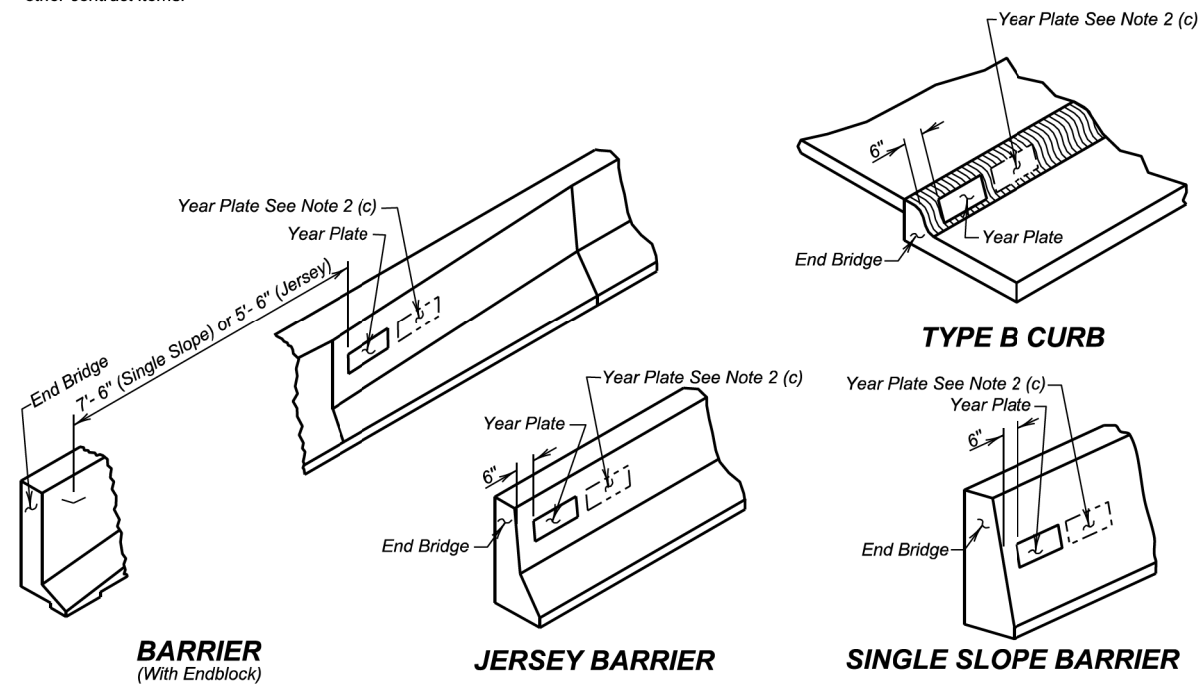
MCCOOK COUNTY
S. D. DEPT. OF TRANSPORTATION
MARCH 2024



YEAR PLATE DETAILS

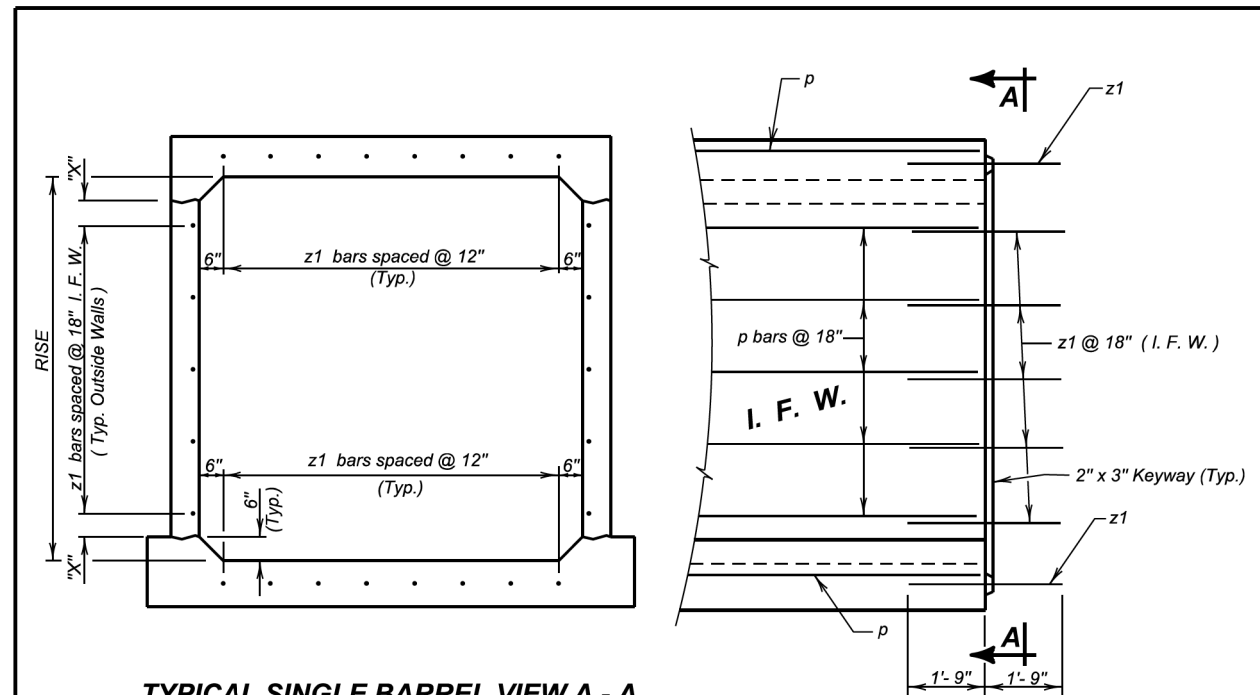
GENERAL NOTES:

- 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.
- Year plates will be located on structure(s) as follows:
 - On cast-in-place box culverts the year plates will be four and one-half (4 1/2) 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.
 - 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.
 - 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.
- 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	S D D O T	YEAR PLATE DETAILS	PLATE NUMBER 460.02
			Sheet 1 of 1



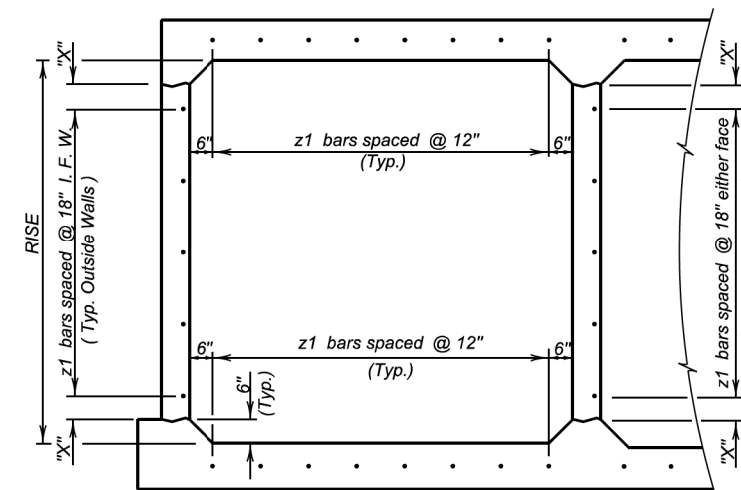
TYPICAL SINGLE BARREL VIEW A - A

ELEVATION

LEGEND FOR PLACING RE-STEEL

I. F. W. - Inside Face Wall

RISE	"X"
3'-0"	3"
4'-0"	9"
5'-0"	6"
6'-0"	3"
7'-0"	9"
8'-0"	6"
9'-0"	3"
10'-0"	9"
11'-0"	6"
12'-0"	3"
13'-0"	9"
14'-0"	6"



TYPICAL MULTIPLE BARREL VIEW A - A

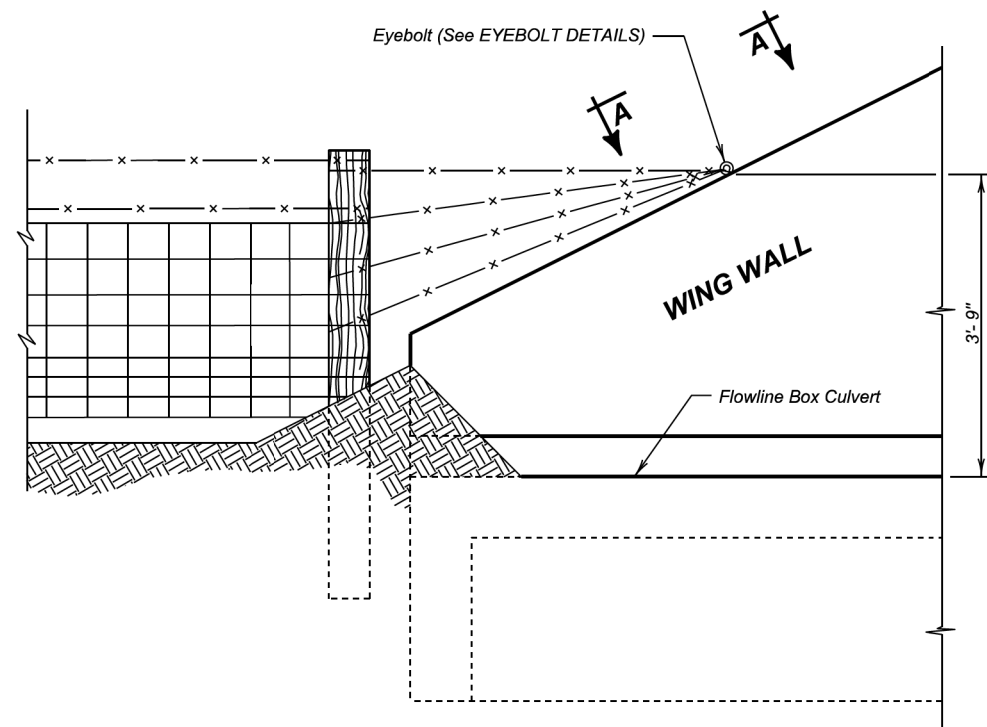
GENERAL NOTES:

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

June 1, 2022

Published Date: 2025	S D D O T	BOX CULVERT BARREL TIE REINFORCEMENT	PLATE NUMBER 460.10
			Sheet 1 of 1

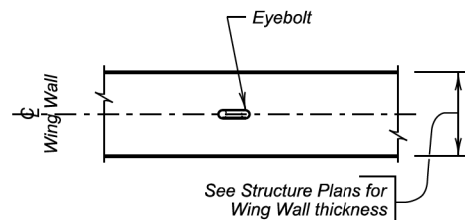
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	PT 0908(105)349	E16	E25



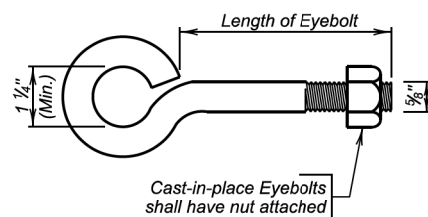
DETAIL FOR FENCE ANCHORS

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 5/8 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 1/2 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 5/8 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

S D D O T	FENCE ANCHORS FOR BOX CULVERT WING WALLS	PLATE NUMBER 620.16
		Sheet 1 of 1

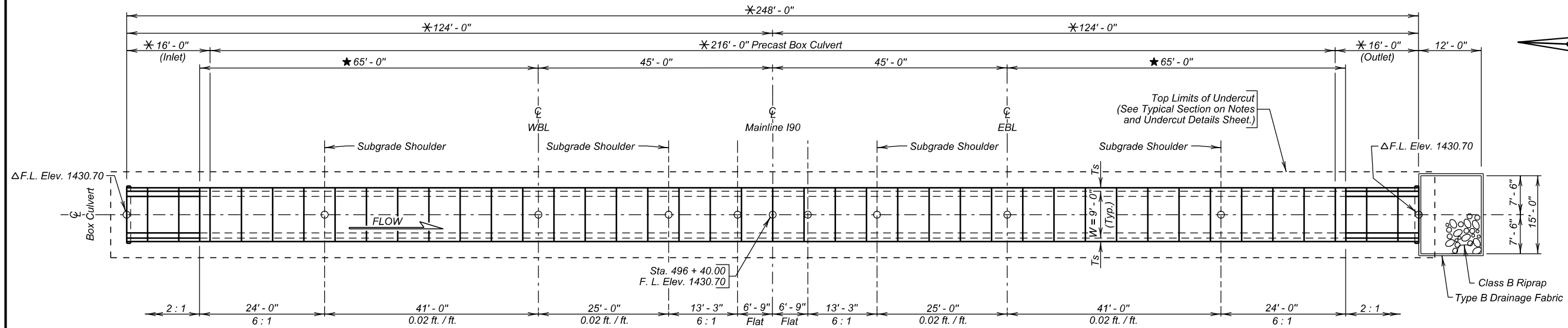
Published Date: 2025

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

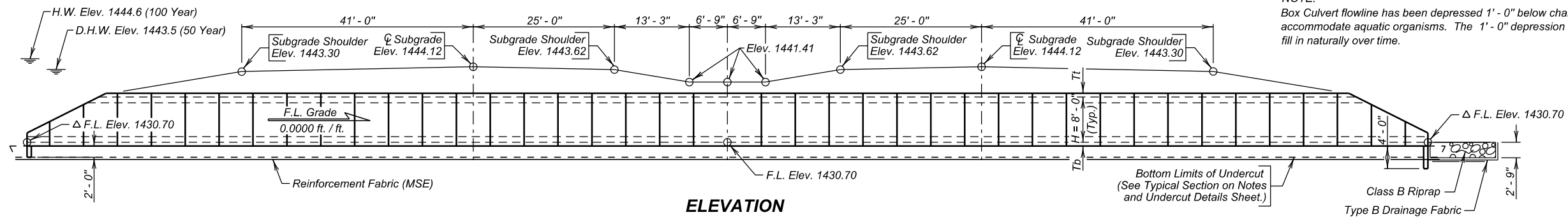
- * Dimension may vary with fabricator and/or installation. See Shop Plans for actual installation length.
- ★ Minimum distance to satisfy fill slope.
- △ Based on dimensions shown.

Revised August 5, 2024 AH/SD

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	PT 0908(105)349	E17	E25



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.

ESTIMATED QUANTITIES		
ITEM	UNIT	QUANTITY
Structure Excavation, Box Culvert	Cu. Yd.	64
Box Culvert Undercut	Cu. Yd.	291
Class B Riprap	Ton	25.7
Type B Drainage Fabric	Sq. Yd.	37
Reinforcement Fabric (MSE)	Sq. Yd.	406
9' X 8' Precast Concrete Culvert, Furnish	Ft.	216
9' X 8' Precast Concrete Culvert, Install	Ft.	216
9' X 8' Precast Concrete Culvert End Section, Furnish	Each	2
9' X 8' Precast Concrete Culvert End Section, Install	Each	2

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

INDEX OF CULVERT SHEETS-

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

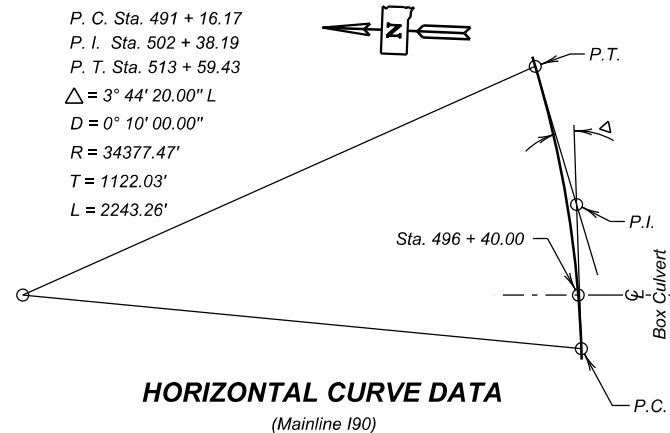
LEGEND

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

HYDRAULIC DATA

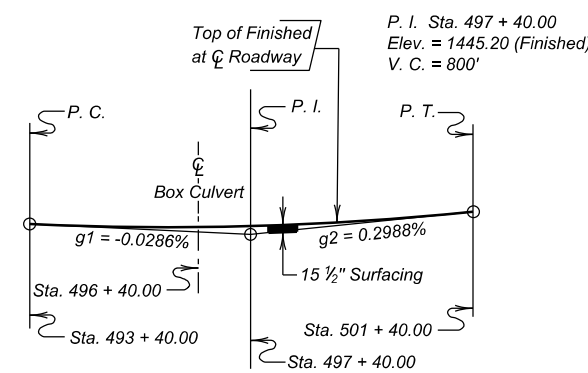
Q_d	453 cfs
A_d	63 sq ft
V_d	7.2 fps
Q_F	1691 cfs
Q_{100}	2062 cfs
Q_{OT}	> Q_{100}
V_{max}	7.8 fps

Q_d = Design discharge for the proposed culvert based on 50 year frequency. El. 1443.5.
 Q_{OT} = Overtopping discharge and frequency >100 year recurrence interval. El. 1445.3 @ I90 WBL Sta. 494 + 10.
 Q_F = Designated peak discharge for the basin approaching proposed project based on 50 year frequency.
 Q_{100} = Computed discharge for the basin approaching proposed project based on 100 year frequency. El. 1444.6.
 V_{max} = Maximum computed outlet velocity for the proposed culvert, based on 100 year frequency.



HORIZONTAL CURVE DATA

(Mainline 190)



VERTICAL CURVE DATA

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

SITE 1
ALTERNATE B
GENERAL DRAWING AND QUANTITIES

FOR
9' X 8' BOX CULVERT (PRECAST)
TRIB. TO WOLF CREEK 0° SKEW
STA. 496 + 40.00 SEC. 1-T102N-R56W
STR. NO. 44-054-126 PT 0908(105)349
PCN 07W6 HL-93

MCCOOK COUNTY
S. D. DEPT. OF TRANSPORTATION

MARCH 2024

1 OF 5

DESIGNED BY AH MCCOK07W6	CK. DES. BY SD 07W6TB10	DRAFTED BY BT/CRW	Steve A. Johnson BRIDGE ENGINEER
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STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	PT 0908(105)349	E18	E25

SPECIFICATIONS

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

GENERAL NOTES

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

- Box culvert and box culvert end section design will conform to the AASHTO LRFD Bridge Design Specifications, 9th Edition.
- 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.
- 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.
- 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 7 ft. over the box culvert.
- Minimum inside corner fillet will be 6 in.
- 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.
- Lift holes will be plugged with an approved nonshrinkable grout.
- The Fabricator will imprint on the structure the date of construction as specified and detailed on Standard Plate No. 460.02.
- 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.
- Installation of the precast sections will be in accordance with the final approved shop plans.
- Care will be taken when placing sections. Sections will be only moved using the lifting holes by approved equipment.
- Soils below the bottom of the proposed RCBC consist of dark gray to black silt clay. Groundwater was encountered in the borings at an elevation of 1426.1 feet during the subsurface investigation conducted in November 2022. Seasonal fluctuations in groundwater can be expected. Dewatering may be required during construction.

DESIGN MIX OF CONCRETE

- Mix will be as per fabricator's design, however minimum compressive strength will not be less than 4500 p.s.i. at 28 days.
- 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.

GEOTEXTILE SPECIFICATION

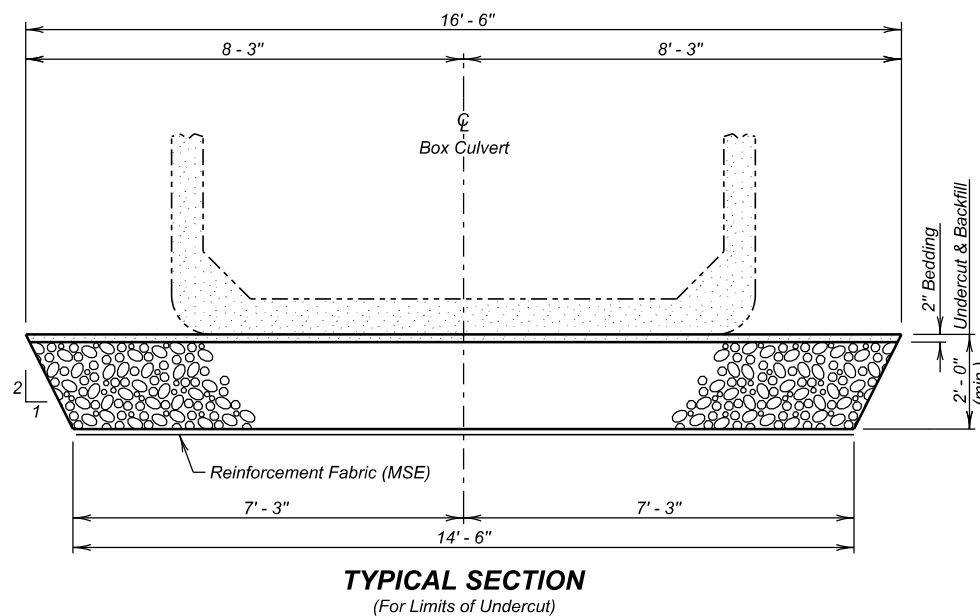
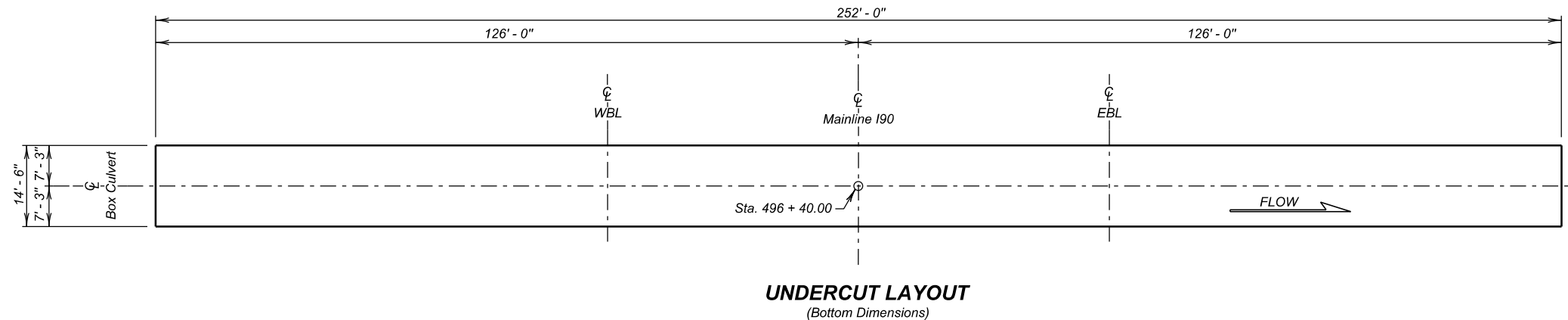
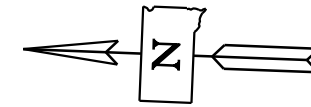
- Reinforcement Fabric (MSE) will conform to Section 831. The Reinforcement Fabric (MSE) provided will be on the Approved Products List or will be certified by the supplier to meet this specification prior to installation.
- Reinforcement Fabric (MSE) will be paid for at the contract unit price per sq. yd. for Reinforcement Fabric (MSE). Payment will be full compensation for furnishing and installing the Reinforcement Fabric (MSE) only. Granular backfill materials will be paid for as part of the Box Culvert Undercut bid item.

INSTALLATION PROCEDURE - GEOTEXTILE

Place the Reinforcement Fabric (MSE) on as level and smooth of a surface as possible. Any protrusions that might damage the geotextile will be removed prior to placing the geotextile. All seams in the geotextile will be stitched in accordance with the seaming procedure and as shown on the detail labeled "Seam Types." No equipment will be allowed on the geotextile until the granular backfill material is in place. The geotextile will be kept as taut as possible prior to backfilling. Granular backfill material will be dumped behind the leading edge of the fill and pushed into place with a loader or dozer.

SEAMING PROCEDURE

- The sewn seams will consist of two parallel rows of stitching ("prayer" seam, Type SSa-2), or a J-seam (Type SSn-1), using a single row of stitching. The stitching will be a lock type stitch.
- If the Type SSa-2 seam is used, the two rows of stitching will be 1" apart with a tolerance of plus or minus 0.5" and will not cross, except for restitching. The minimum seam allowance, i.e., minimum distance from the geotextile edge to the stitch line nearest to that edge, will be 1.5".
- If the J seam (Type SSn-1) is used, the minimum seam allowance will be 1".
- The seam, stitch type, and the equipment used to perform the stitching will be as recommended by the manufacturer of the geotextile and approved by the Engineer. The seams will be sewn in such a manner that the seam can be readily inspected by the Engineer.
- The thread used will be high-strength polypropylene, polyester, or Kevlar thread.



ESTIMATED QUANTITIES		
ITEM	UNIT	QUANTITY
Box Culvert Undercut	Cu. Yd.	291
Reinforcement Fabric (MSE)	Sq. Yd.	406

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

9' X 8' BOX CULVERT (PRECAST)

TRIB. TO WOLF CREEK
STA. 496 + 40.00
STR. NO. 44-054-126

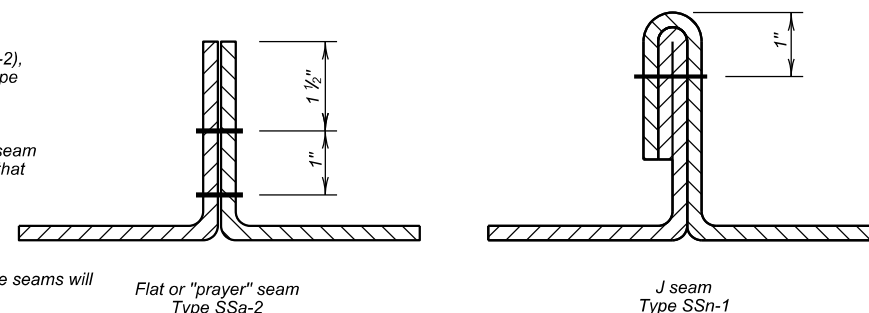
0° SKEW
SEC. 1-T102N-R56W
PT 0908(105)349
HL-93

MCCOOK COUNTY

S. D. DEPT. OF TRANSPORTATION

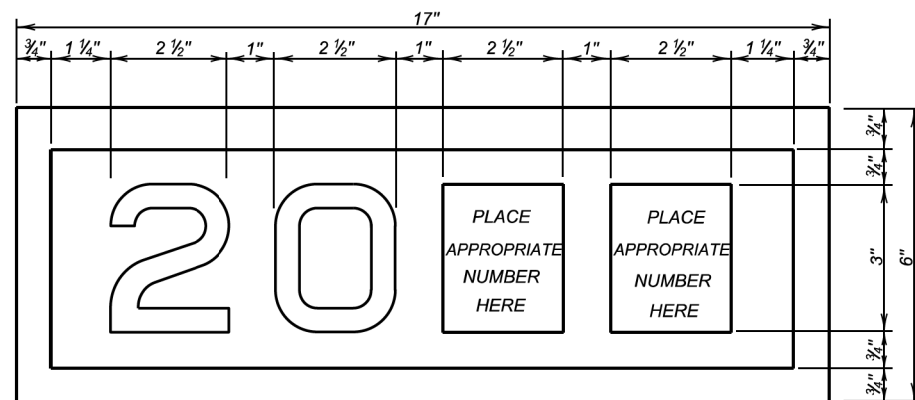
MARCH 2024

2 OF 5



GEOTEXTILE SEAM TYPES

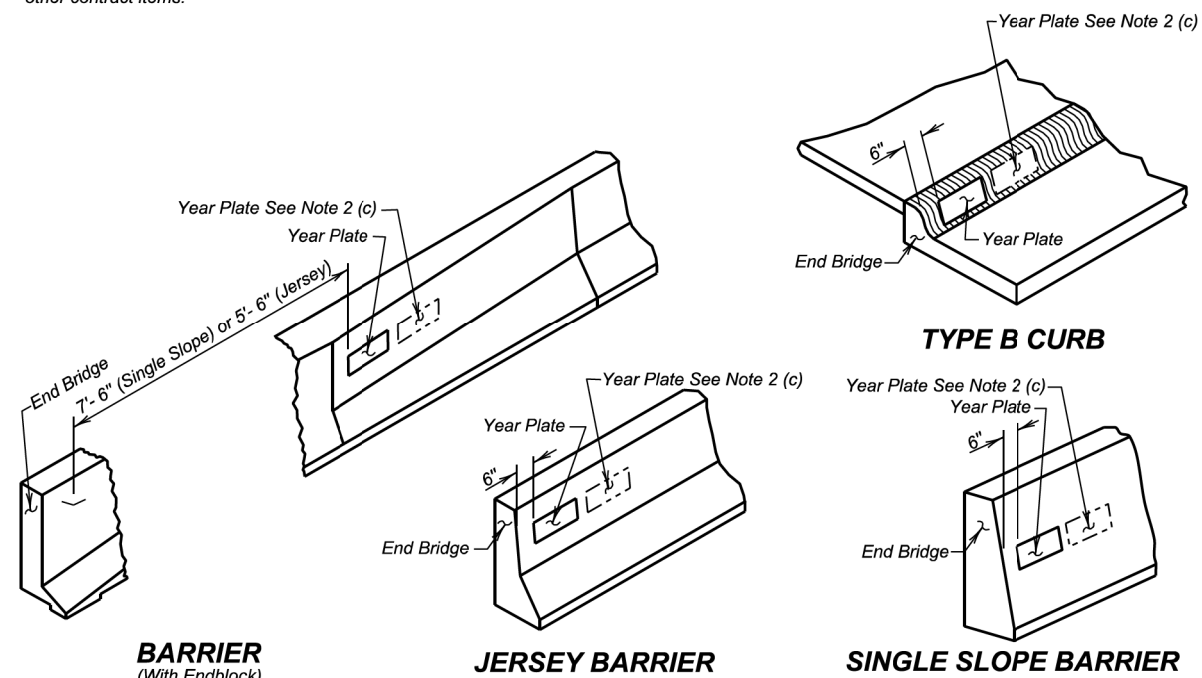
DESIGNED BY AH MCCK07W6	CK. DES. BY SD 07W6TB11	DRAFTED BY BT/CRW	Steve A. Johnson BRIDGE ENGINEER
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YEAR PLATE DETAILS

GENERAL NOTES:

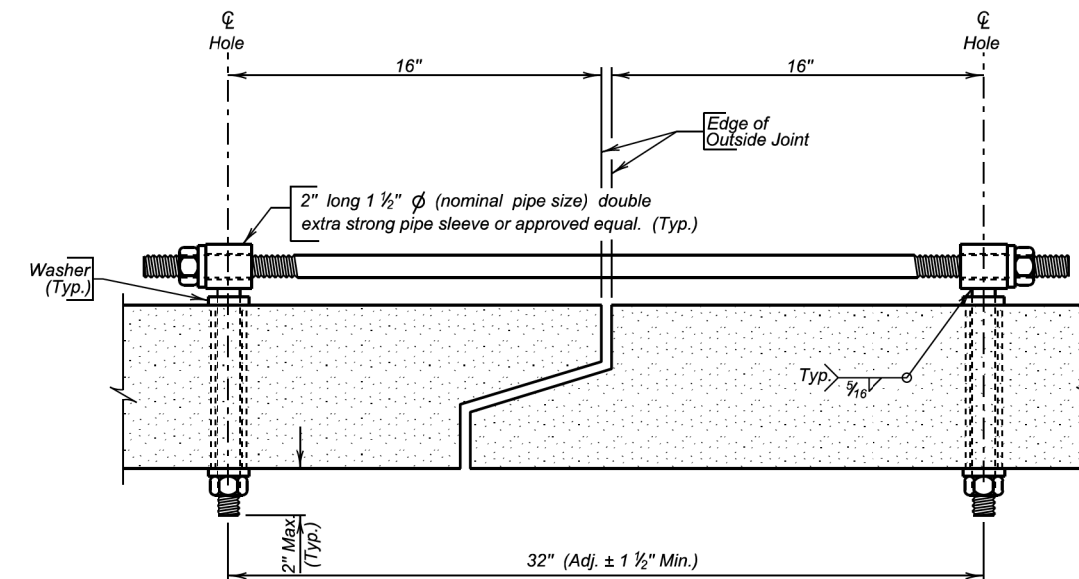
- Year plates of the general dimensions shown will be constructed on all box culverts and bridges. The year plates will be constructed in reverse and attached to the forms in such a manner that the finished imprint in the concrete does not exceed one-half (1/2) inch in depth.
- Year plates will be located on structure(s) as follows:
 - On cast-in-place box culverts the year plates will be four and one-half (4 1/2) 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.
 - 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.
 - 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.
- 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.



TYPE B CURB

January 22, 2021

Published Date: 2025	S D D O T	YEAR PLATE DETAILS	PLATE NUMBER 460.02
			Sheet 1 Of 1



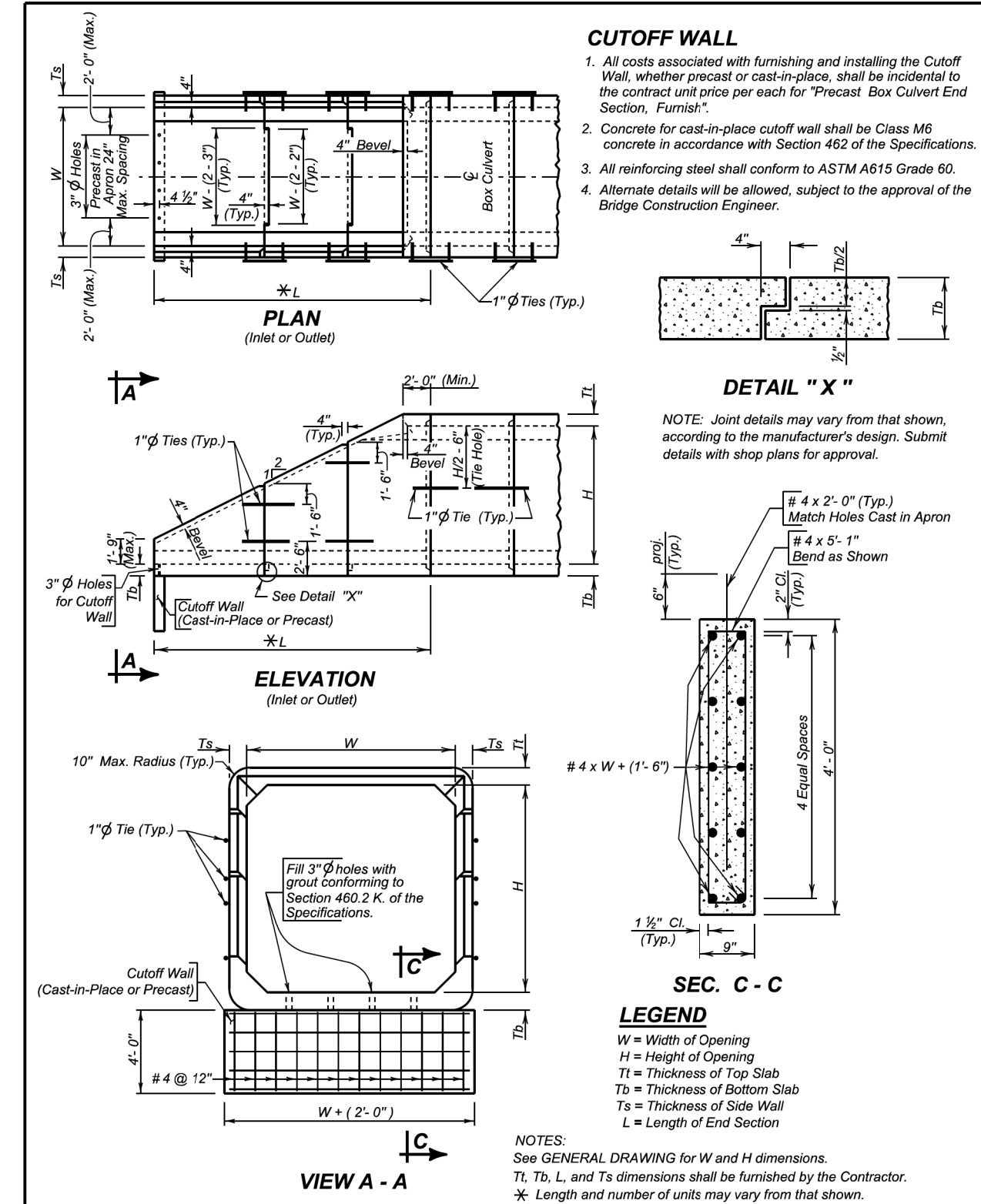
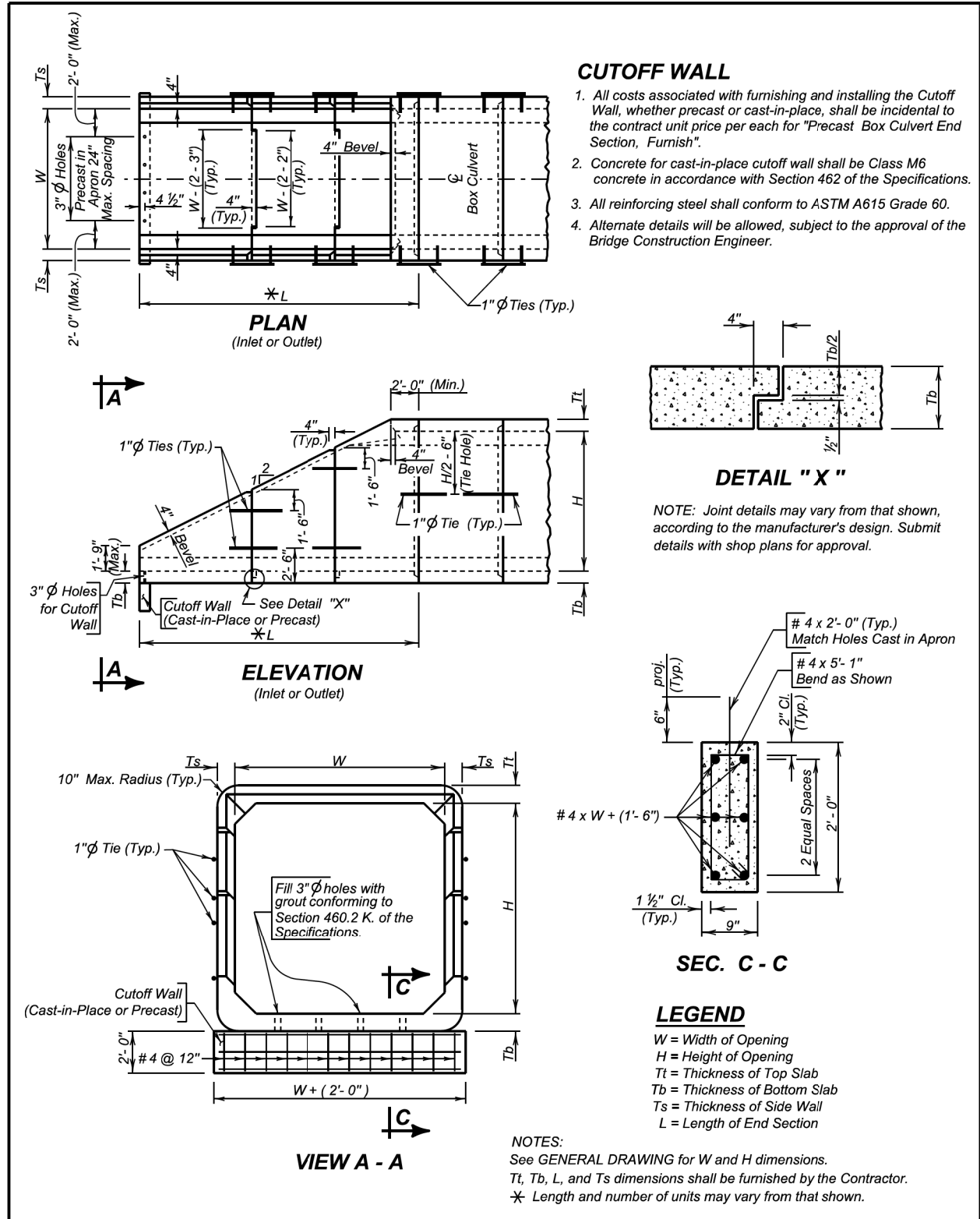
TIE BOLT ASSEMBLY

GENERAL NOTES:

- 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.
- Ties shall be 1 inch diameter 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.
- Welding and weld inspection shall be in conformance with AWS/ANSI D1.1 - (Current Year) Structural Welding Code - Steel.
- Tie Bolt Assembly shall be galvanized in accordance with ASTM A153 or ASTM F2329 as applicable.
- 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.
- 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".

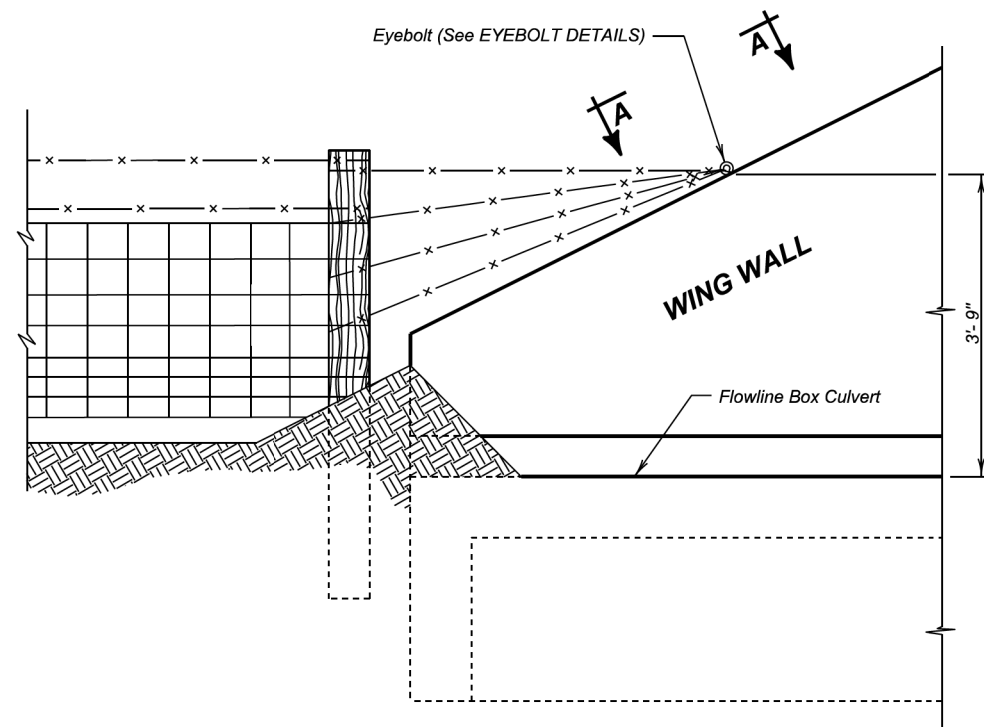
March 21, 2016

Published Date: 2025	S D D O T	PRECAST BOX CULVERT TIE BOLT ASSEMBLY DETAILS	PLATE NUMBER 560.01
			Sheet 1 of 1



Published Date: 2025	S D D O T	PRECAST SINGLE BOX CULVERT SLOPED END SECTION DETAILS WITH 2'-0" CUTOFF WALL	PLATE NUMBER 560.10
			Sheet 1 of 1

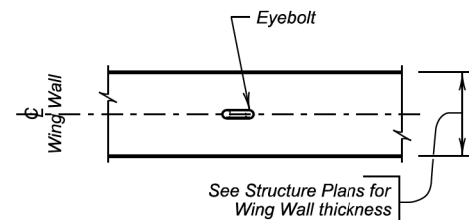
Published Date: 2025	S D D O T	PRECAST SINGLE BOX CULVERT SLOPED END SECTION DETAILS WITH 4'-0" CUTOFF WALL	PLATE NUMBER 560.11
			Sheet 1 of 1



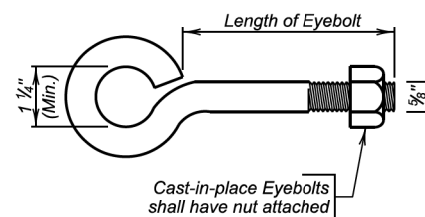
DETAIL FOR FENCE ANCHORS

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 $\frac{5}{8}$ 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 $4\frac{1}{2}$ 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 $\frac{5}{8}$ 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

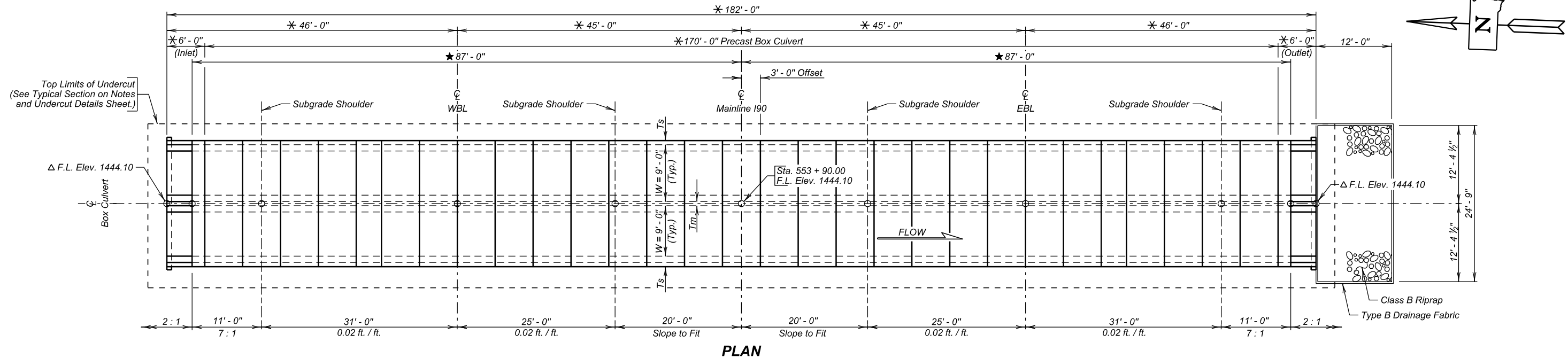
S D D O T	FENCE ANCHORS FOR BOX CULVERT WING WALLS	PLATE NUMBER 620.16
		Sheet 1 of 1

Published Date: 2025

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.

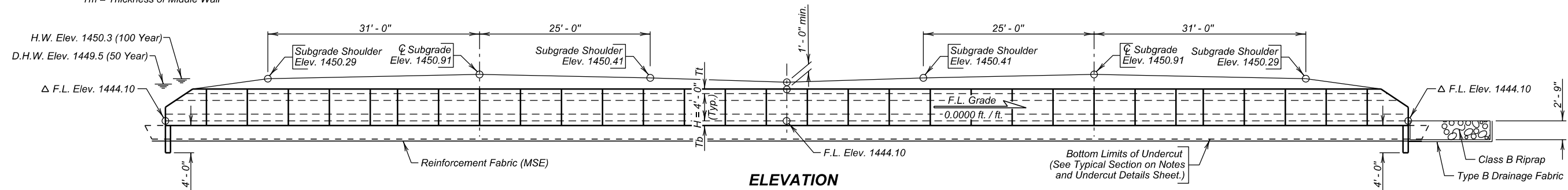
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	PT 0908(105)349	E22	E25



PLAN

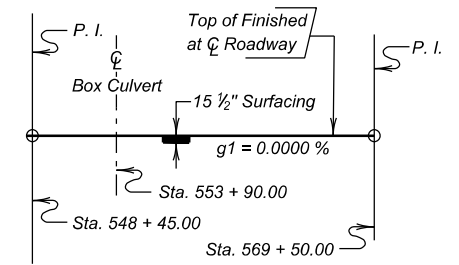
LEGEND

- 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



ELEVATION

P. I. Sta. 548 + 45.00 Elev. = 1452.20 (Finished)
 P. I. Sta. 569 + 50.00 Elev. = 1452.20 (Finished)



GRADELINE DATA

HYDRAULIC DATA

Q _d	316 cfs
A _d	72 sq ft
V _d	4.4 fps
Q _p	316 cfs
Q ₁₀₀	424 cfs
Q _{OT}	>Q ₁₀₀
V _{max}	5.9 fps

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 560.21 & 620.16

Q_d = Design discharge for the proposed culvert based on 50 year frequency. El. 1449.5.
 Q_{OT} = Overtopping discharge and frequency >100 year recurrence interval. El. 1452.2 @ 190 WBL Sta. 548 + 45 to 569 + 50.
 Q_p = Designated peak discharge for the basin approaching proposed project based on 50 year frequency.
 Q₁₀₀ = Computed discharge for the basin approaching proposed project based on 100 year frequency. El. 1450.3.
 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.	90
Box Culvert Undercut	Cu. Yd.	347
Class B Riprap	Ton	42.4
Type B Drainage Fabric	Sq. Yd.	56
Reinforcement Fabric (MSE)	Sq. Yd.	496
2 - 9' X 4' Precast Concrete Culvert, Furnish	Ft.	170
2 - 9' X 4' Precast Concrete Culvert, Install	Ft.	170
2 - 9' X 4' Precast Concrete Culvert End Section, Furnish	Each	2
2 - 9' X 4' Precast Concrete Culvert End Section, Install	Each	2

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

GENERAL DRAWING AND QUANTITIES

FOR
2 - 9' X 4' BOX CULVERT (PRECAST)
 TRIB. TO WOLF CREEK 0° SKEW
 STA. 553 + 90.00 SEC. 6-T102N-R55W
 STR. NO. 44-065-126 PT 0908(105)349
 PCN 07W6 HL-93

MCCOOK COUNTY
 S. D. DEPT. OF TRANSPORTATION

MARCH 2024 **1** OF **4**

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

DESIGNED BY AH MCKK07W6	CK. DES. BY SD 07W6TC01	DRAFTED BY BT/CRW <i>Steve A. Johnson</i>	BRIDGE ENGINEER
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STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	PT 0908(105)349	E23	E25

SPECIFICATIONS

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

GENERAL NOTES

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

- Box culvert and box culvert end section design will conform to the AASHTO LRFD Bridge Design Specifications, 9th Edition.
- 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.
- 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.
- The design of the barrel sections will be based on a minimum fill height of 1 foot and include all subsequent fill heights up to and including the maximum fill height of 5 ft. over the box culvert.
- Minimum inside corner fillet will be 6 in.
- 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.
- Lift holes will be plugged with an approved nonshrinkable grout.
- The Fabricator will imprint on the structure the date of construction as specified and detailed on Standard Plate No. 460.02.
- 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.
- Installation of the precast sections will be in accordance with the final approved shop plans.
- Care will be taken when placing sections. Sections will be only moved using the lifting holes by approved equipment.
- Soils below the bottom of the proposed RBCB consist of gray to brown silt clay. Groundwater was encountered in the borings at an elevation of 1438.3 feet during the subsurface investigation conducted in November 2022. Seasonal fluctuations in groundwater can be expected. Dewatering may be required during construction.

DESIGN MIX OF CONCRETE

- Mix will be as per fabricator's design, however minimum compressive strength will not be less than 4500 p.s.i. at 28 days.
- 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.

GEOTEXTILE SPECIFICATION

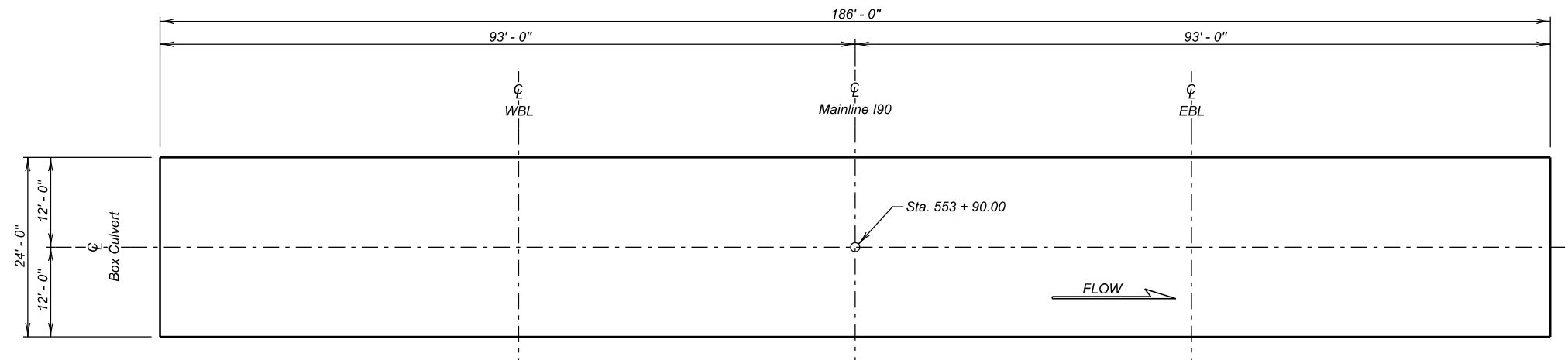
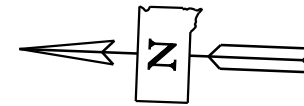
- Reinforcement Fabric (MSE) will conform to Section 831. The Reinforcement Fabric (MSE) provided will be on the Approved Products List or will be certified by the supplier to meet this specification prior to installation.
- Reinforcement Fabric (MSE) will be paid for at the contract unit price per sq. yd. for Reinforcement Fabric (MSE). Payment will be full compensation for furnishing and installing the Reinforcement Fabric (MSE) only. Granular backfill materials will be paid for as part of the Box Culvert Undercut bid item.

INSTALLATION PROCEDURE - GEOTEXTILE

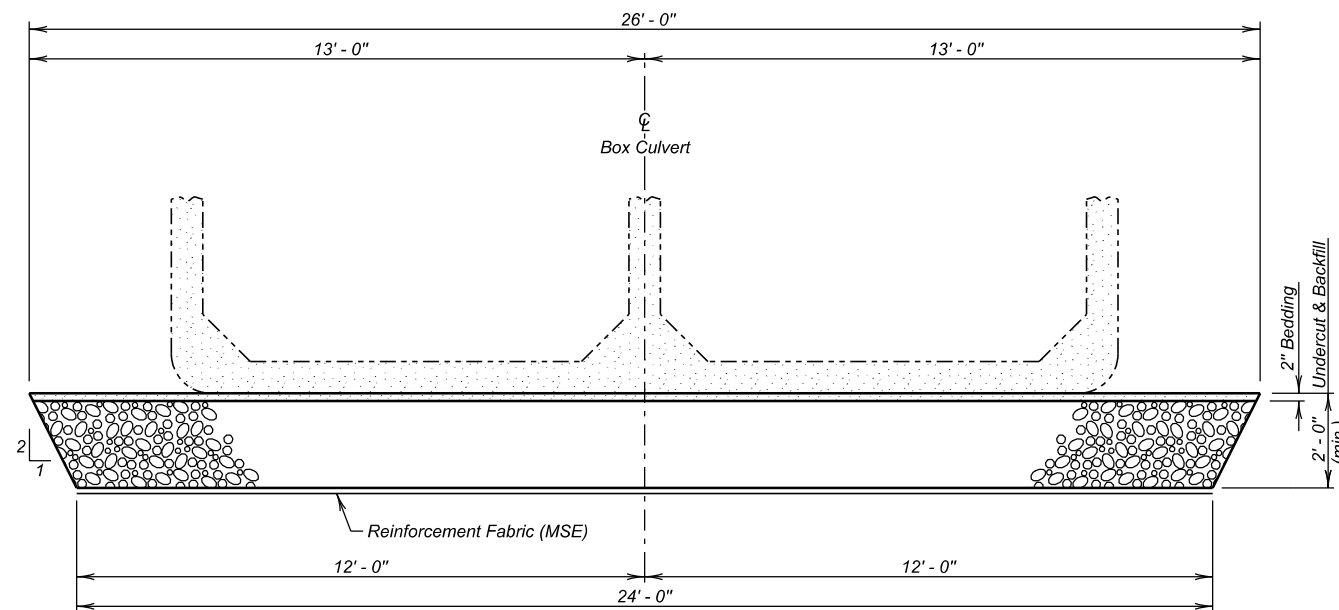
Place the Reinforcement Fabric (MSE) on as level and smooth of a surface as possible. Any protrusions that might damage the geotextile will be removed prior to placing the geotextile. All seams in the geotextile will be stitched in accordance with the seaming procedure and as shown on the detail labeled "Seam Types." No equipment will be allowed on the geotextile until the granular backfill material is in place. The geotextile will be kept as taut as possible prior to backfilling. Granular backfill material will be dumped behind the leading edge of the fill and pushed into place with a loader or dozer.

SEAMING PROCEDURE

- The sewn seams will consist of two parallel rows of stitching ("prayer" seam, Type SSa-2), or a J-seam (Type SSn-1), using a single row of stitching. The stitching will be a lock type stitch.
- If the Type SSa-2 seam is used, the two rows of stitching will be 1" apart with a tolerance of plus or minus 0.5" and will not cross, except for restitching. The minimum seam allowance, i.e., minimum distance from the geotextile edge to the stitch line nearest to that edge, will be 1.5".
- If the J seam (Type SSn-1) is used, the minimum seam allowance will be 1".
- The seam, stitch type, and the equipment used to perform the stitching will be as recommended by the manufacturer of the geotextile and approved by the Engineer. The seams will be sewn in such a manner that the seam can be readily inspected by the Engineer.
- The thread used will be high-strength polypropylene, polyester, or Kevlar thread.



UNDERCUT LAYOUT
(Bottom Dimensions)



TYPICAL SECTION
(For Limits of Undercut)

ESTIMATED QUANTITIES		
ITEM	UNIT	QUANTITY
Box Culvert Undercut	Cu. Yd.	347
Reinforcement Fabric (MSE)	Sq. Yd.	496

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

NOTES AND UNDERCUT DETAILS

FOR

2 - 9' X 4' BOX CULVERT (PRECAST)

TRIB. TO WOLF CREEK
STA. 553 + 90.00
STR. NO. 44-065-126
PCN 07W6

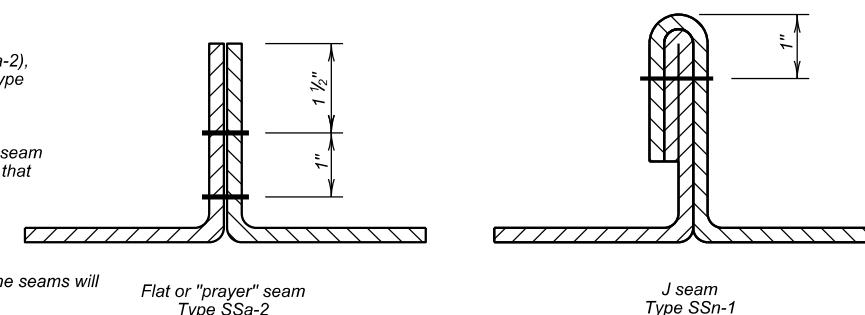
0° SKEW
SEC. 6-T102N-R55W
PT 0908(105)349
HL-93

MCCOOK COUNTY

S. D. DEPT. OF TRANSPORTATION

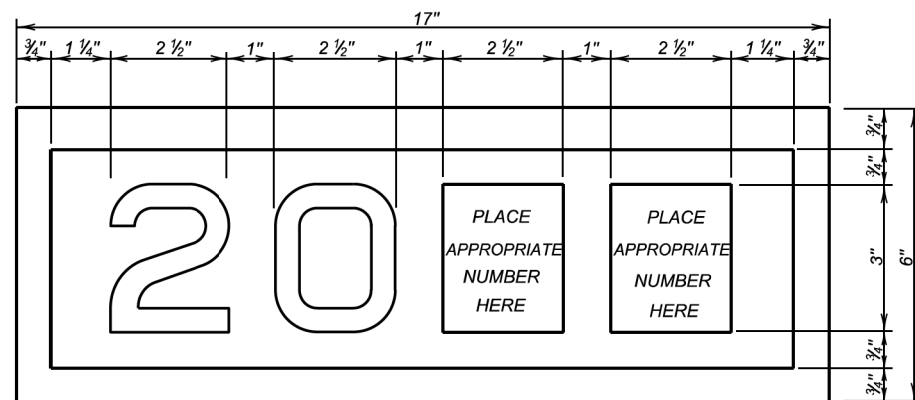
MARCH 2024

2 OF 4



GEOTEXTILE SEAM TYPES

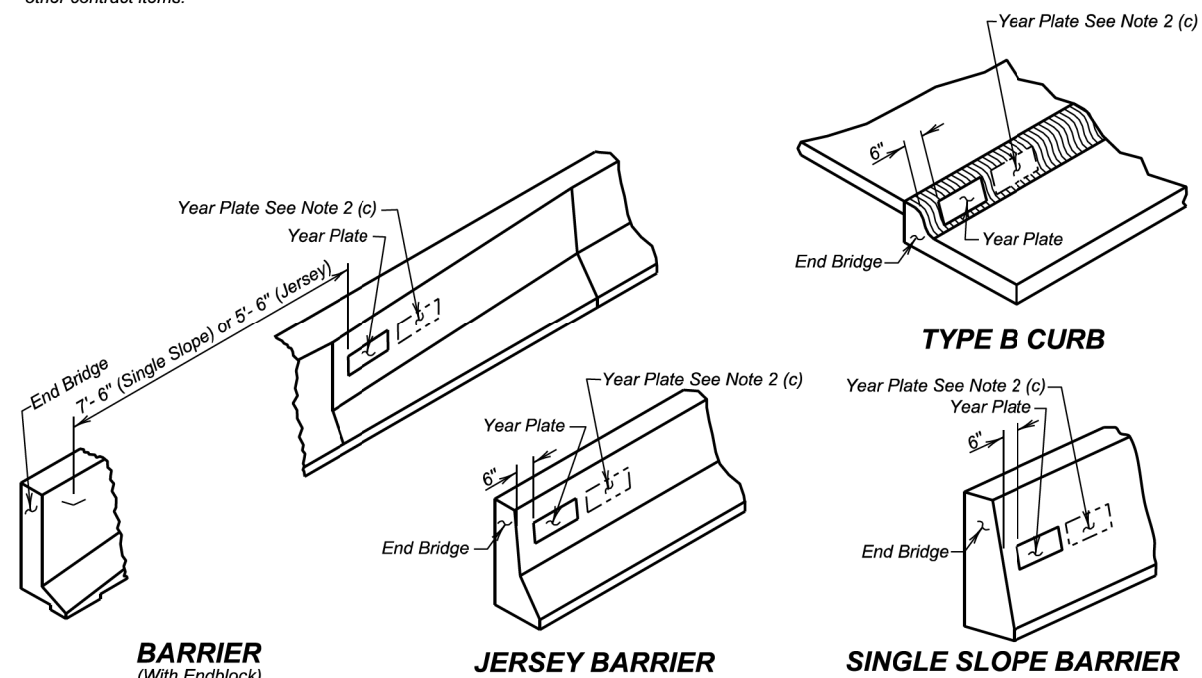
DESIGNED BY AH MCC07W6	CK. DES. BY SD 07W6TC02	DRAFTED BY BT/CRW	Steve A. Johnson BRIDGE ENGINEER
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YEAR PLATE DETAILS

GENERAL NOTES:

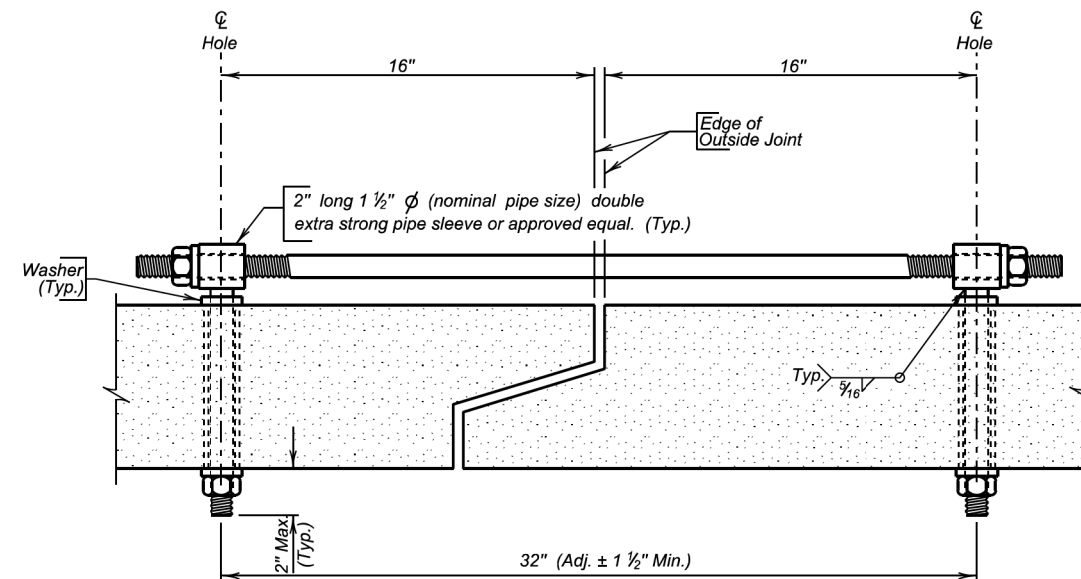
- Year plates of the general dimensions shown will be constructed on all box culverts and bridges. The year plates will be constructed in reverse and attached to the forms in such a manner that the finished imprint in the concrete does not exceed one-half (1/2) inch in depth.
- Year plates will be located on structure(s) as follows:
 - On cast-in-place box culverts the year plates will be four and one-half (4 1/2) 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.
 - 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.
 - 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.
- 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.



TYPE B CURB

January 22, 2021

Published Date: 2025	S D D O T	YEAR PLATE DETAILS	PLATE NUMBER 460.02
			Sheet 1 of 1



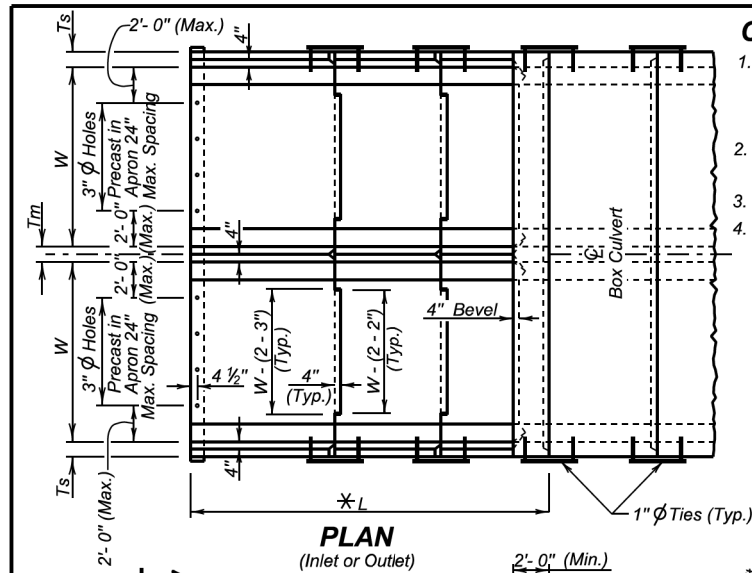
TIE BOLT ASSEMBLY

GENERAL NOTES:

- 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.
- Ties shall be 1 inch diameter 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.
- Welding and weld inspection shall be in conformance with AWS/ANSI D1.1 - (Current Year) Structural Welding Code - Steel.
- Tie Bolt Assembly shall be galvanized in accordance with ASTM A153 or ASTM F2329 as applicable.
- 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.
- 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".

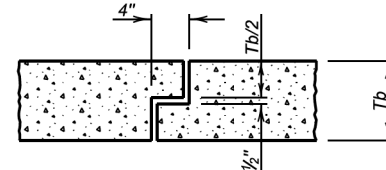
March 21, 2016

Published Date: 2025	S D D O T	PRECAST BOX CULVERT TIE BOLT ASSEMBLY DETAILS	PLATE NUMBER 560.01
			Sheet 1 of 1



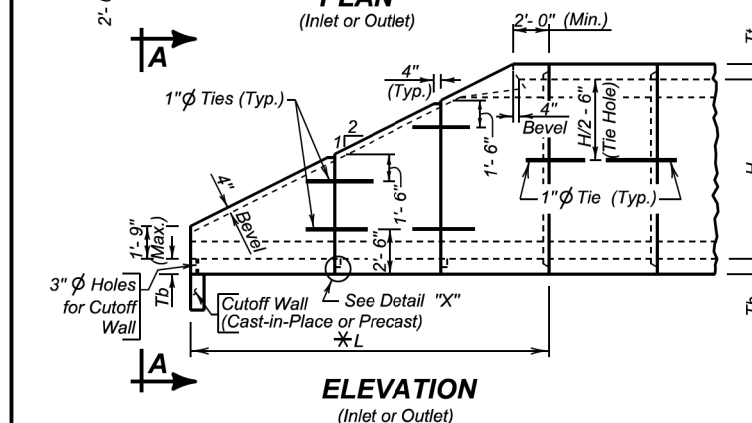
CUTOFF WALL

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.

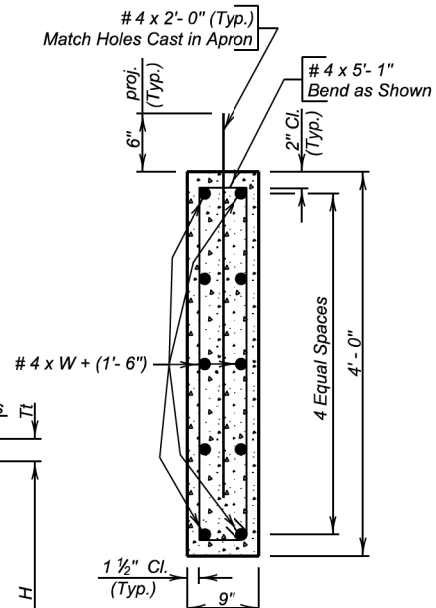


DETAIL "X"

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



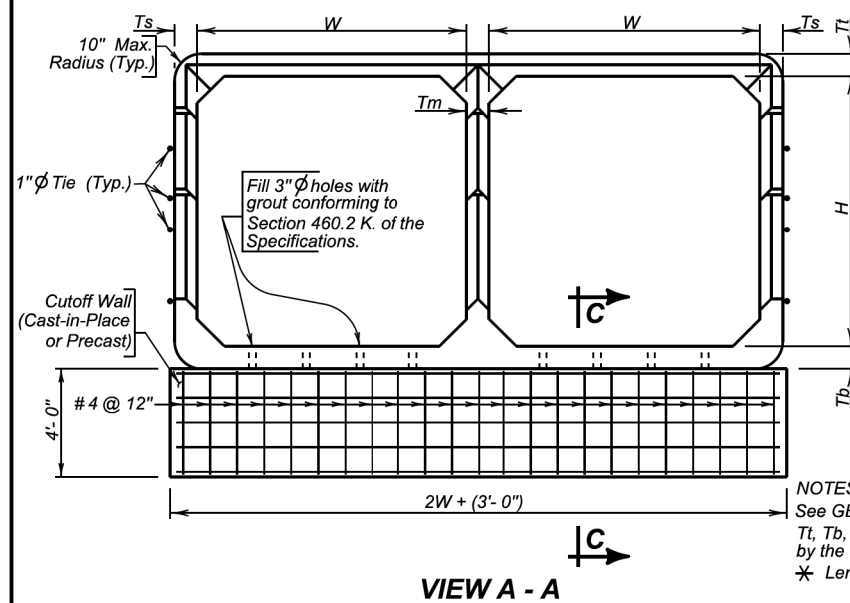
ELEVATION (Inlet or Outlet)



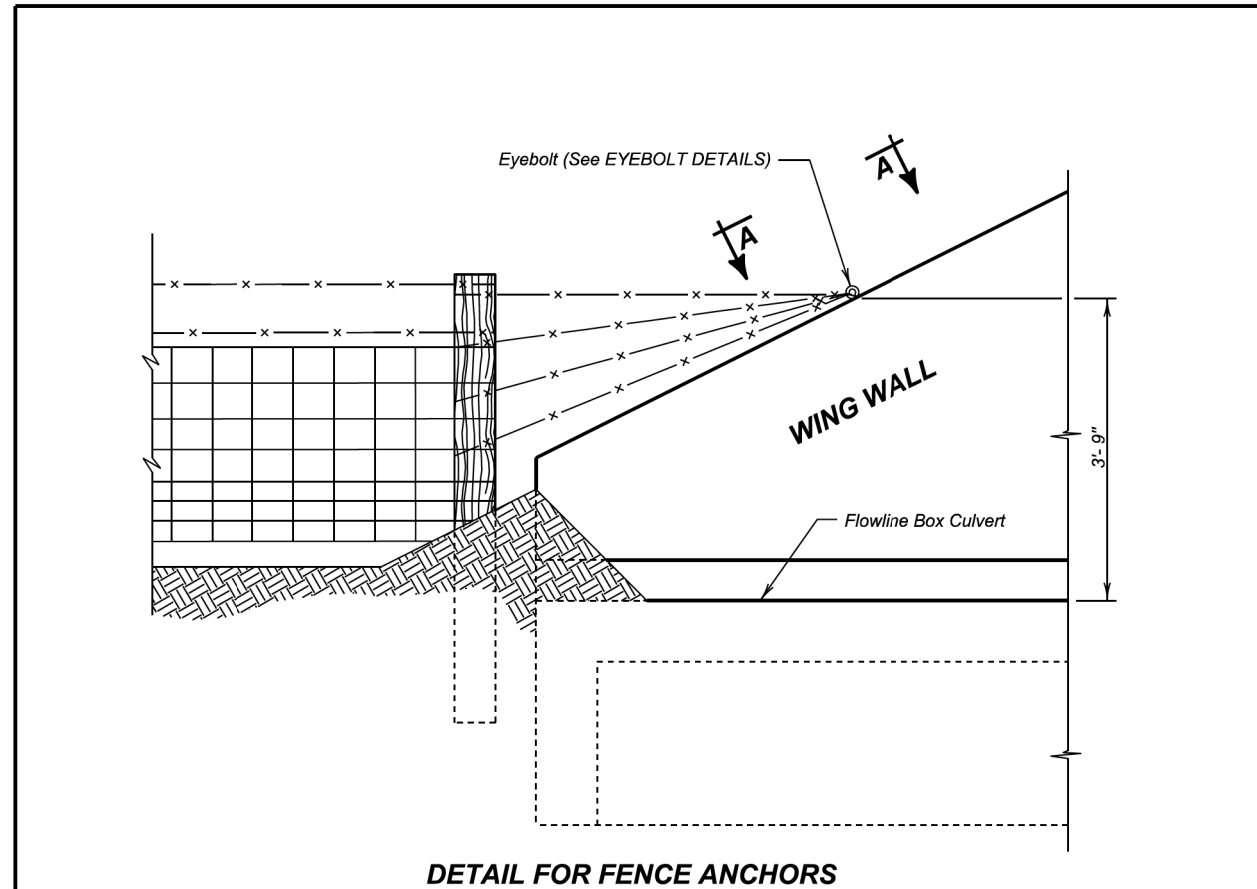
SEC. C - C

- 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.



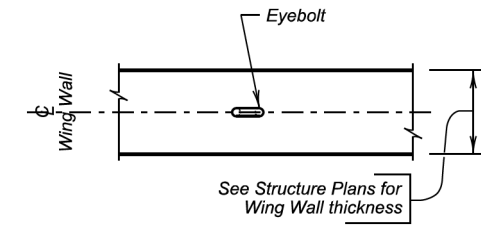
VIEW A - A



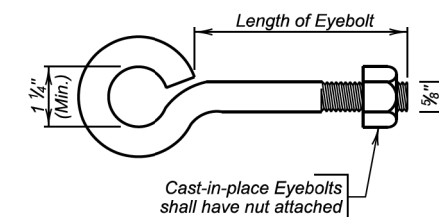
DETAIL FOR FENCE ANCHORS

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 5/8 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 1/2 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 5/8 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

S D D O T	PRECAST DOUBLE BOX CULVERT SLOPED END SECTION DETAILS WITH 4'-0" CUTOFF WALL	PLATE NUMBER 560.21
	Published Date: 2025	Sheet 1 of 1

S D D O T	FENCE ANCHORS FOR BOX CULVERT WING WALLS	PLATE NUMBER 620.16
	Published Date: 2025	Sheet 1 of 1