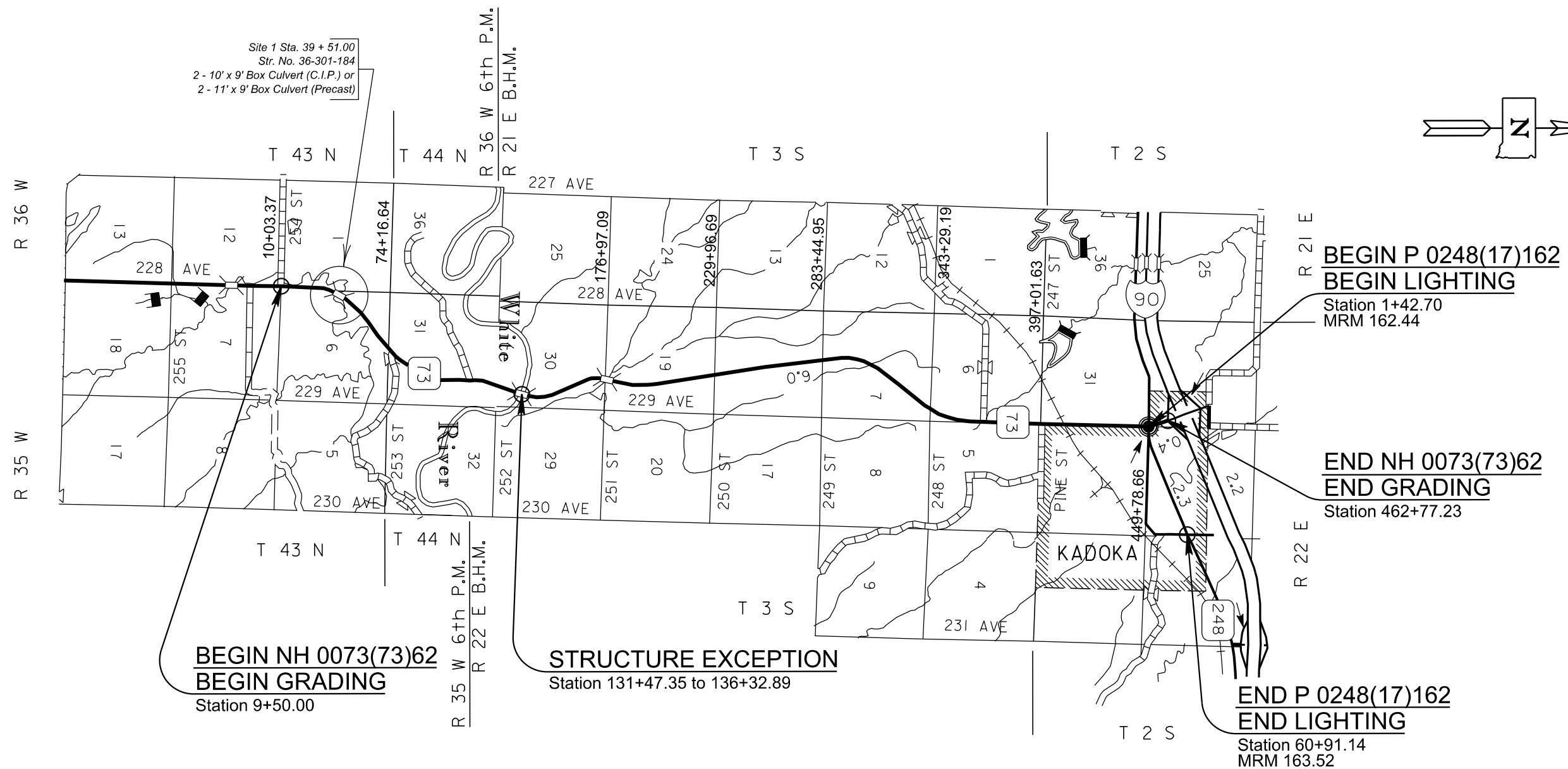


STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	NH 0073(73)62 P 0248(17)162	E1	E14

Section E: Structure Plans

INDEX OF SHEETS -

Sheet E1	Layout Map and Index
Sheet E2	Estimate of Structure Quantities
Sheet E3 to E9	Str. No. 36-301-184 Site 1 Alt. A : 2 - 10' x 9' Box Culvert (C.I.P.)
Sheet E10 to E14	Str. No. 36-301-184 Site 1 Alt. B : 2 - 11' x 9' Box Culvert (Precast)



SECTION E – ESTIMATE OF STRUCTURE QUANTITIES

Site 1

Str. No. 36-301-184

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

Site 1 – Alternate A

Str. No. 36-301-184

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
260E1010	Base Course	5.5	Ton
420E0200	Structure Excavation, Box Culvert	105	CuYd
421E0200	Box Culvert Undercut	311	CuYd
460E0120	Class A45 Concrete, Box Culvert	245.7	CuYd
480E0100	Reinforcing Steel	32,868	Lb
700E0210	Class B Riprap	47.9	Ton
831E0110	Type B Drainage Fabric	67	SqYd

Site 1 – Alternate B

Str. No. 36-301-184

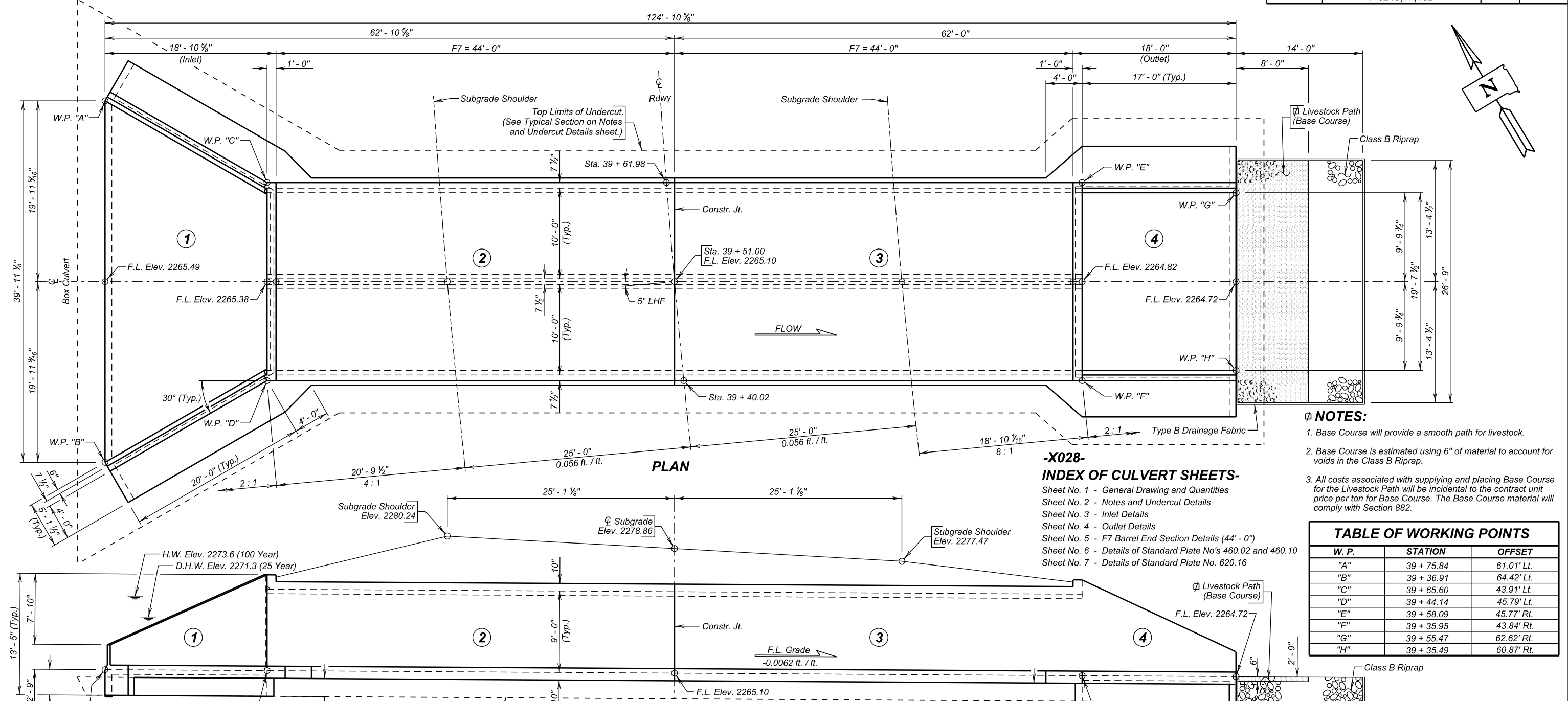
BID ITEM NUMBER	ITEM	QUANTITY	UNIT
260E1010	Base Course	6.0	Ton
420E0200	Structure Excavation, Box Culvert	85	CuYd
421E0200	Box Culvert Undercut	286	CuYd
560E2146	2-11'x9' Precast Concrete Box Culvert, Furnish	92.0	Ft
560E2147	2-11'x9' Precast Concrete Box Culvert, Install	92.0	Ft
560E3146	2-11'x9' Precast Concrete Box Culvert End Section, Furnish	2	Each
560E3147	2-11'x9' Precast Concrete Box Culvert End Section, Install	2	Each
700E0210	Class B Riprap	51.4	Ton
831E0110	Type B Drainage Fabric	71	SqYd

INCIDENTAL WORK, STRUCTURE

- Incidental Work, Structure will consist of the removal of the following structure:
Str. No. 36-301-184. In-place centerline Sta. 39+51 is a 2 - 10' x 8' reinforced concrete box culvert.
- Break down and remove the existing structure 1 foot below finished ground or as required to construct the new structures in accordance with Section 110 of the Specifications. All portions of the existing structure will be removed and disposed of by the Contractor on a site obtained by the Contractor and approved by the Engineer in accordance with the ENVIRONMENTAL COMMITMENTS found in SECTION A.
- During demolition of structure, efforts will be taken to prevent material from falling into the creek. Under no circumstances is asphalt allowed to fall into the creek.
- The foregoing is a general description of the in-place structure and should not be construed to be complete in all details. Before preparing the bid it will be the responsibility of the Contractor to make a visual inspection of the structure to verify the extent of the work and materials involved. If desired by the Contractor, a copy of the original construction plans may be obtained through the Office of Bridge Design.

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 0073(73)62 P 0248(17)162	E3	E14



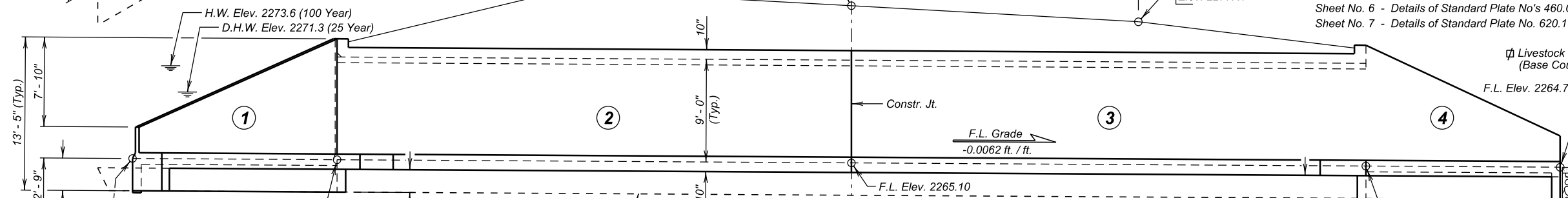
- NOTES:**
- Base Course will provide a smooth path for livestock.
 - Base Course is estimated using 6" of material to account for voids in the Class B Riprap.
 - All costs associated with supplying and placing Base Course for the Livestock Path will be incidental to the contract unit price per ton for Base Course. The Base Course material will comply with Section 882.

**-X028-
INDEX OF CULVERT SHEETS-**

- Sheet No. 1 - General Drawing and Quantities
- Sheet No. 2 - Notes and Undercut Details
- Sheet No. 3 - Inlet Details
- Sheet No. 4 - Outlet Details
- Sheet No. 5 - F7 Barrel End Section Details (44' - 0")
- Sheet No. 6 - Details of Standard Plate No's 460.02 and 460.10
- Sheet No. 7 - Details of Standard Plate No. 620.16

TABLE OF WORKING POINTS

W. P.	STATION	OFFSET
"A"	39 + 75.84	61.01' Lt.
"B"	39 + 36.91	64.42' Lt.
"C"	39 + 65.60	43.91' Lt.
"D"	39 + 44.14	45.79' Lt.
"E"	39 + 58.09	45.77' Rt.
"F"	39 + 35.95	43.84' Rt.
"G"	39 + 55.47	62.62' Rt.
"H"	39 + 35.49	60.87' Rt.



HYDRAULIC DATA

Q_d	563 cfs
A_d	58 sq ft
V_d	9.7 fps
Q_F	563 cfs
Q_{100}	1018 cfs
Q_{OT}	> Q_{100}
V_{max}	11.8 fps

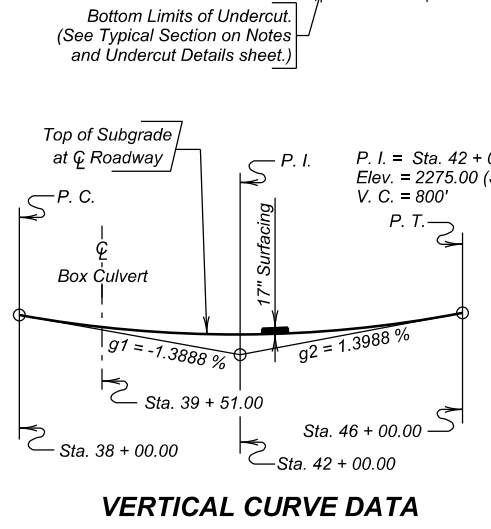
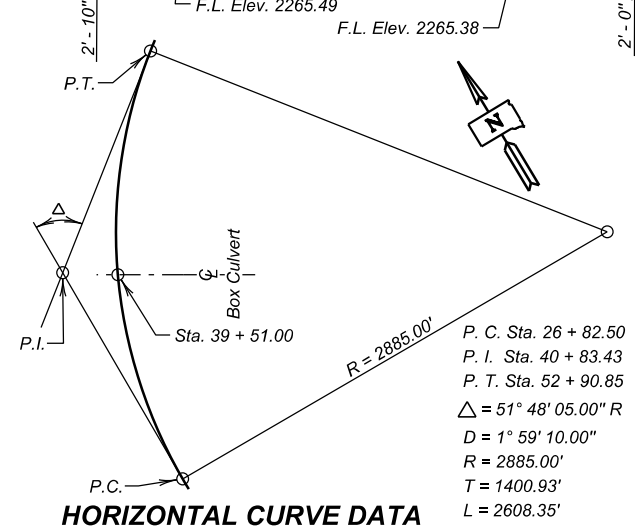
NOTE: Box Culvert flowline has been depressed 1' - 0" below channel flowline to accommodate aquatic organisms. The 1' - 0" depression will be allowed to fill in naturally over time.

ESTIMATED QUANTITIES

ITEM	UNIT	QUANTITY
Class A45 Concrete, Box Culvert	Cu. Yd.	245.7
Reinforcing Steel	Lb.	32868
Structure Excavation, Box Culvert	Cu. Yd.	105
Box Culvert Undercut	Cu. Yd.	311
Base Course	Ton	5.5
Type B Drainage Fabric	Sq. Yd.	67
Class B Riprap	Ton	47.9

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

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



Q_d = Design discharge for the proposed culvert based on 25 year frequency. El. 2271.3.
 Q_{OT} = Overtopping discharge and frequency > Q_{100} year recurrence interval. El. 2280.4 @ Sta. 42 + 00.00.
 Q_F = Designated peak discharge for the basin approaching proposed project based on 25 year frequency.
 Q_{100} = Computed discharge for the basin approaching proposed project based on 100 year frequency. El. 2273.6.
 V_{max} = Maximum computed outlet velocity for the proposed culvert, based on 100 year frequency.

**SITE 1
ALTERNATE A**

GENERAL DRAWING AND QUANTITIES
 FOR
2 - 10' X 9' BOX CULVERT (C.I.P.)
 OVER TRIB. TO WHITE RIVER 5° LHF SKEW
 STA. 39 + 51.00 SEC. 6-T43N-R35W
 STR. NO. 36-301-184 NH 0073(73)62
 PCN 05HV HL-93

JACKSON COUNTY
 S. D. DEPT. OF TRANSPORTATION
 SEPTEMBER 2022

-X028-

DESIGNED BY	CK. DES. BY	DRAFTED BY
BS	CL	MG
JACK05HV	05HVGA01	

BRIDGE ENGINEER

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	NH 0073(73)62 P 0248(17)162	E4	E14

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 bottom of the proposed RCBC consist of 1' of brown sand clay overlying grey to yellow clay silt at the inlet and grey to yellow clay silt at the outlet. Groundwater was encountered in the borings at an elevation of 2267.2 during the subsurface investigation conducted in October 2020. Dewatering will be required for the construction of the RCBC. All costs incurred for dewatering will be incidental to other contract items.

ESTIMATED QUANTITIES

ITEM	UNIT	QUANTITY
Box Culvert Undercut	Cu. Yd.	311

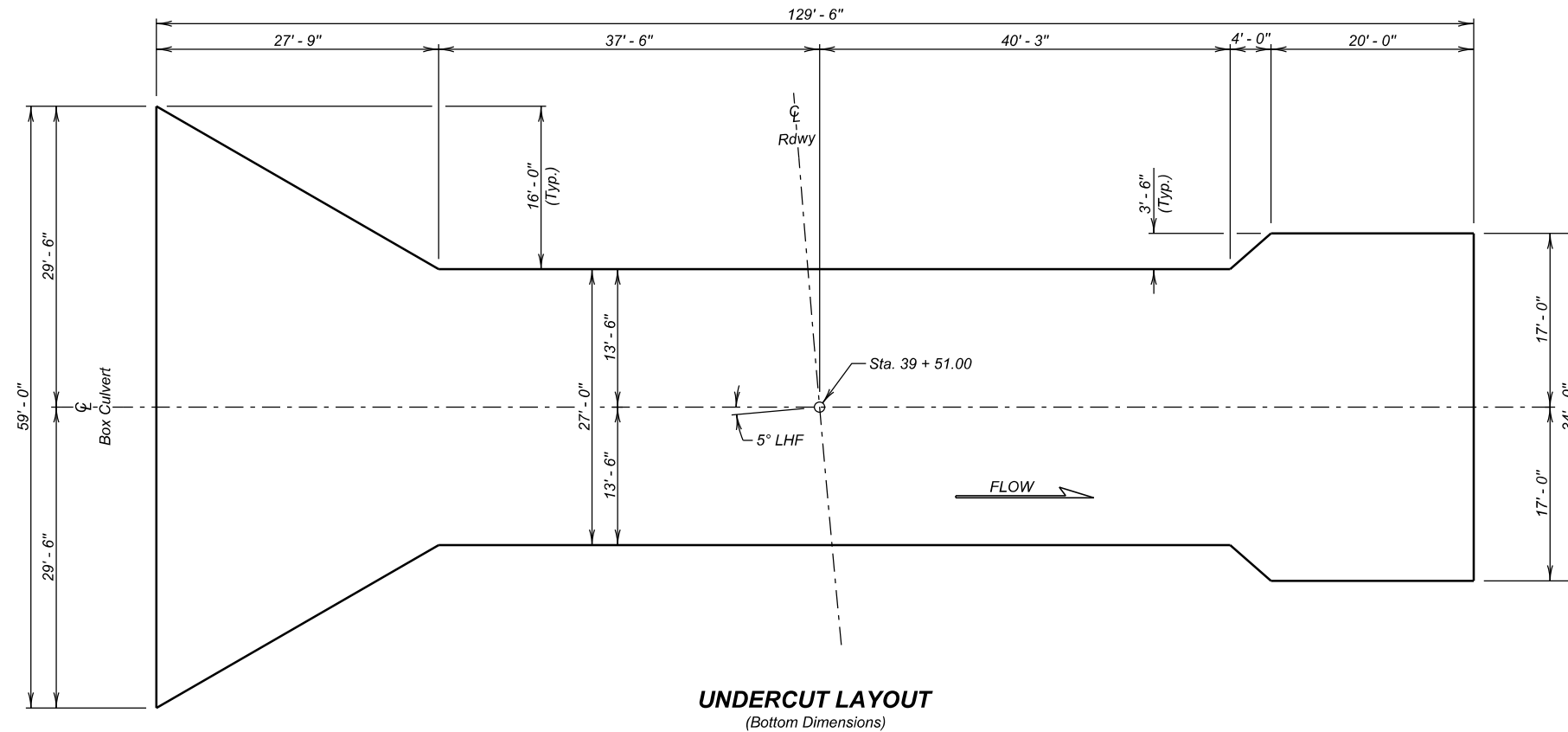
For payment, quantity is based on plan shown undercut dimensions and will not be measured unless the Engineer orders a change.

**SITE 1
ALTERNATE A
NOTES AND UNDERCUT DETAILS
FOR**

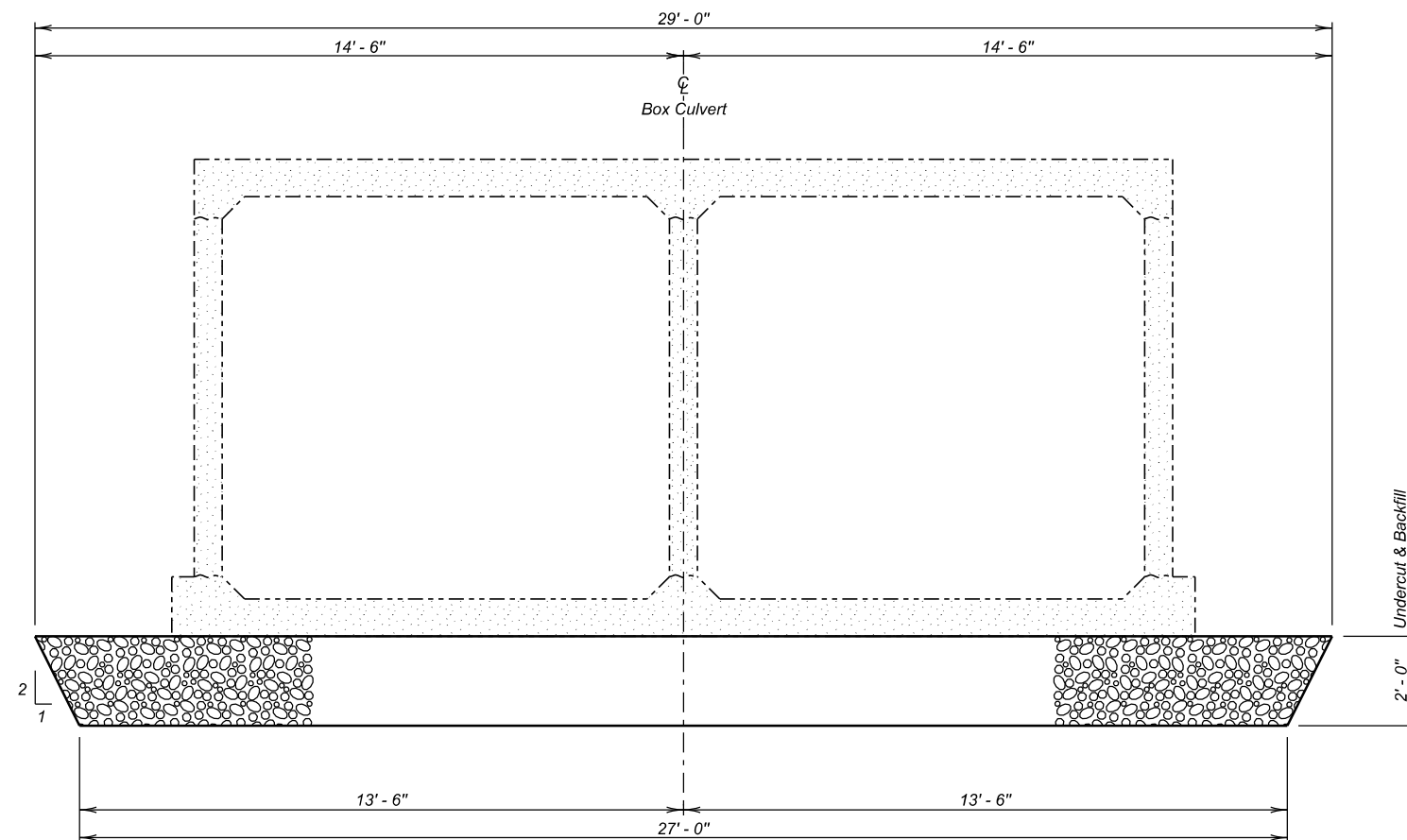
2 - 10' X 9' BOX CULVERT (C.I.P.)
 OVER TRIB. TO WHITE RIVER 5° LHF SKEW
 STA. 39 + 51.00 SEC. 6-T43N-R35W
 STR. NO. 36-301-184 NH 0073(73)62
 HL-93

JACKSON COUNTY
 S. D. DEPT. OF TRANSPORTATION
 SEPTEMBER 2022

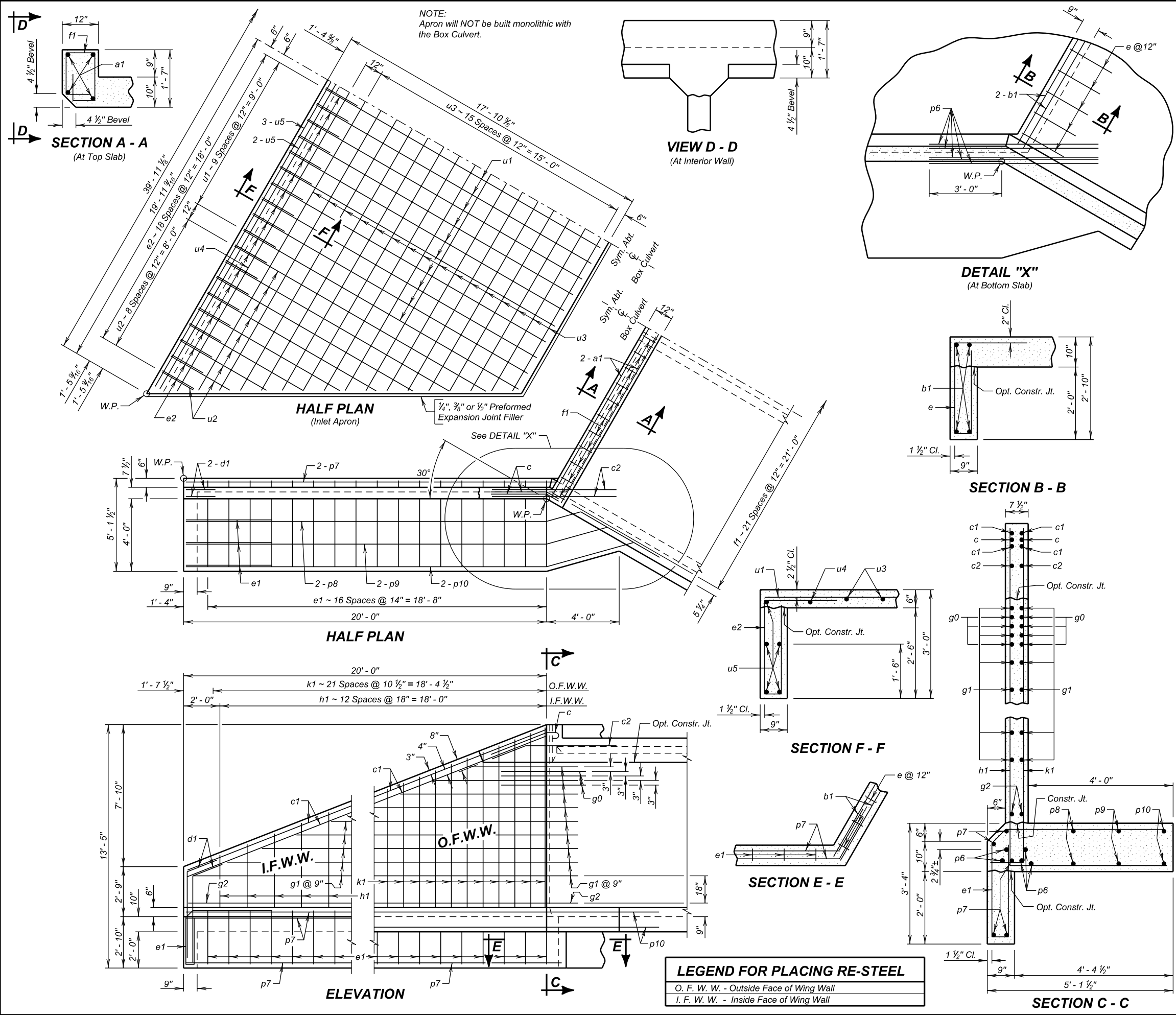
DESIGNED BY BS JACK05HV	CK. DES. BY CL 05HVGA02	DRAFTED BY MG	Steve A. Johnson BRIDGE ENGINEER
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UNDERCUT LAYOUT
(Bottom Dimensions)



TYPICAL SECTION
(For Limits of Undercut)



REINFORCING SCHEDULE

Mk.	No.	Size	Length	Type
a1	4	6	21'-6"	Str.
b1	4	6	19'-9"	Str.
c	4	5	4'-6"	1A
c1	8	5	21'-3"	Str.
c2	4	5	7'-0"	19B
d1	8	5	6'-6"	19B
e	20	4	7'-0"	S12
e1	40	4	10'-6"	S12A
f1	22	4	5'-3"	S6A
g0	12	5	5'-0"	19B
g1	18	4	27'-9"	19B
g2	4	4	21'-9"	19B
h1	13	4	23'-9"	17A
k1	22	4	16'-9"	17A
p6	10	6	7'-0"	Str.
p7	10	4	22'-6"	Str.
p8	4	4	23'-6"	Str.
p9	4	4	25'-0"	Str.
p10	4	4	26'-6"	Str.

INLET APRON				
e2	38	4	7'-6"	S12
u1	20	4	17'-6"	Str.
u2	9	4	18'-0"	Str.
u3	8	4	56'-3"	Str.
u4	1	4	38'-0"	Str.
u5	5	4	38'-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	22.9	2341	11.4
Inlet Apron	12.5	988	12.5

SITE 1 ALTERNATE A INLET DETAILS FOR 2 - 10' X 9' BOX CULVERT (C.I.P.) OVER TRIB. TO WHITE RIVER

5° LHF SKEW
STA. 39 + 51.00
STR. NO. 36-301-184

SEC. 6-T43N-R35W
NH 0073(73)62
HL-93

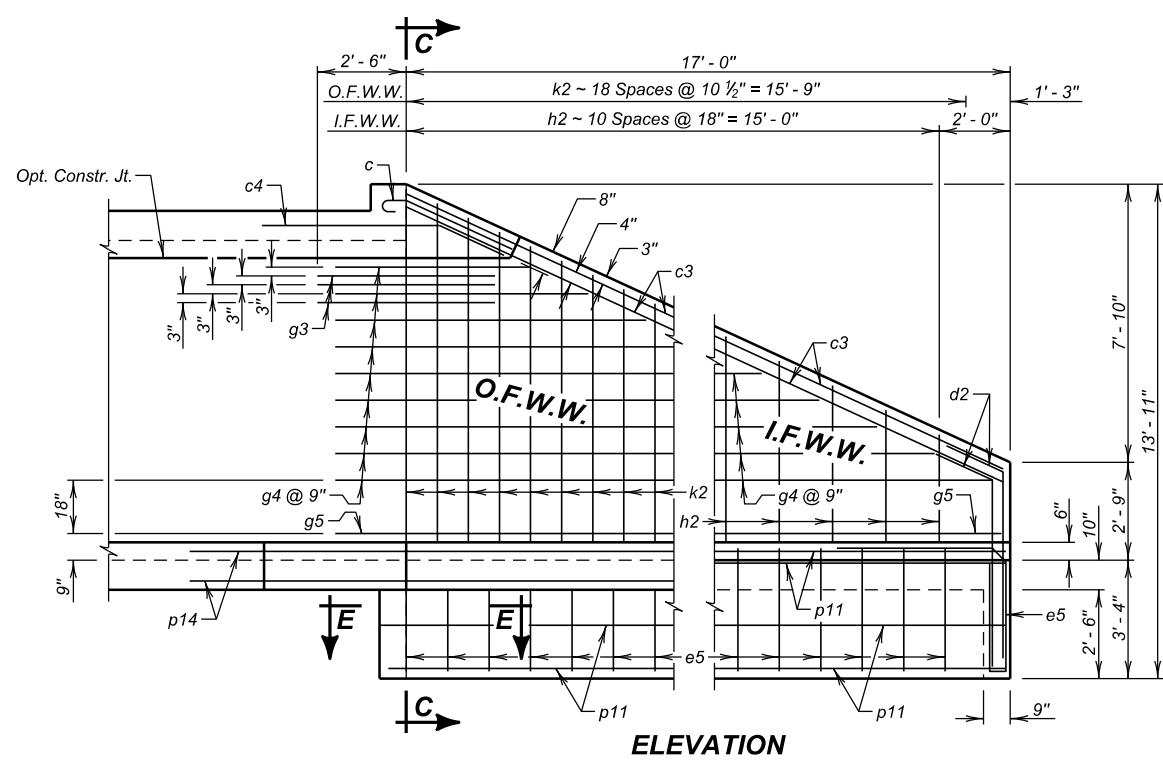
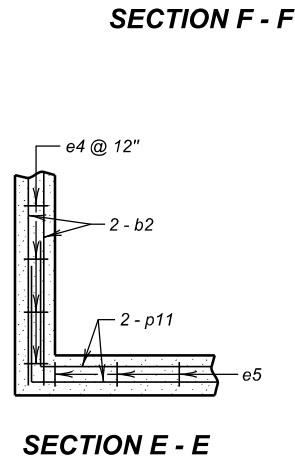
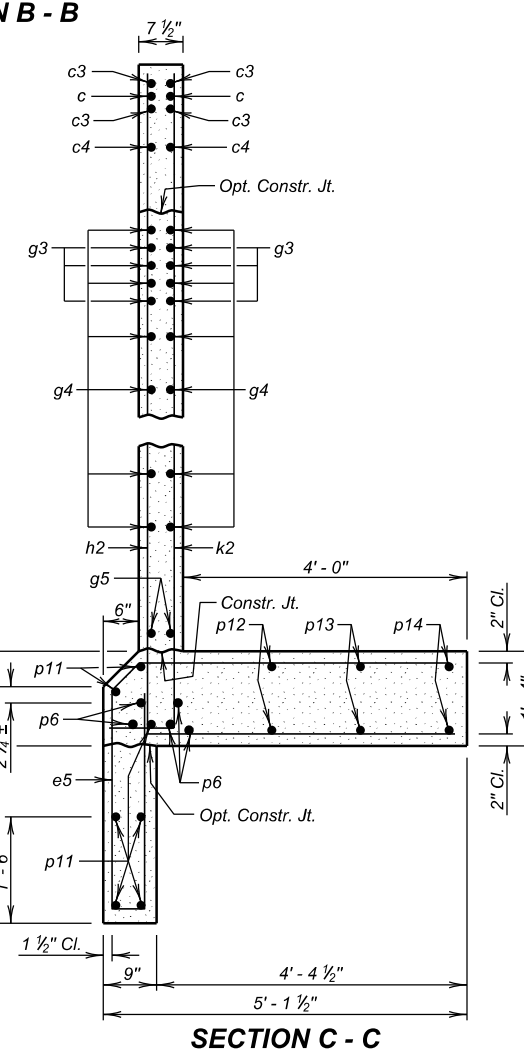
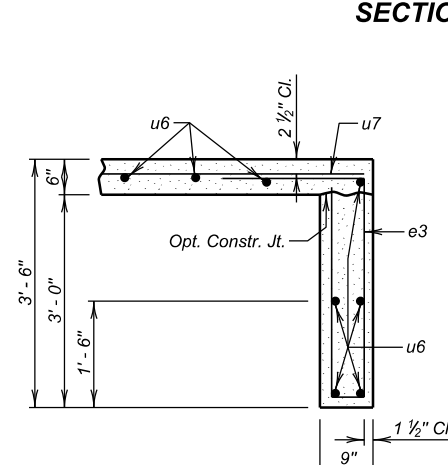
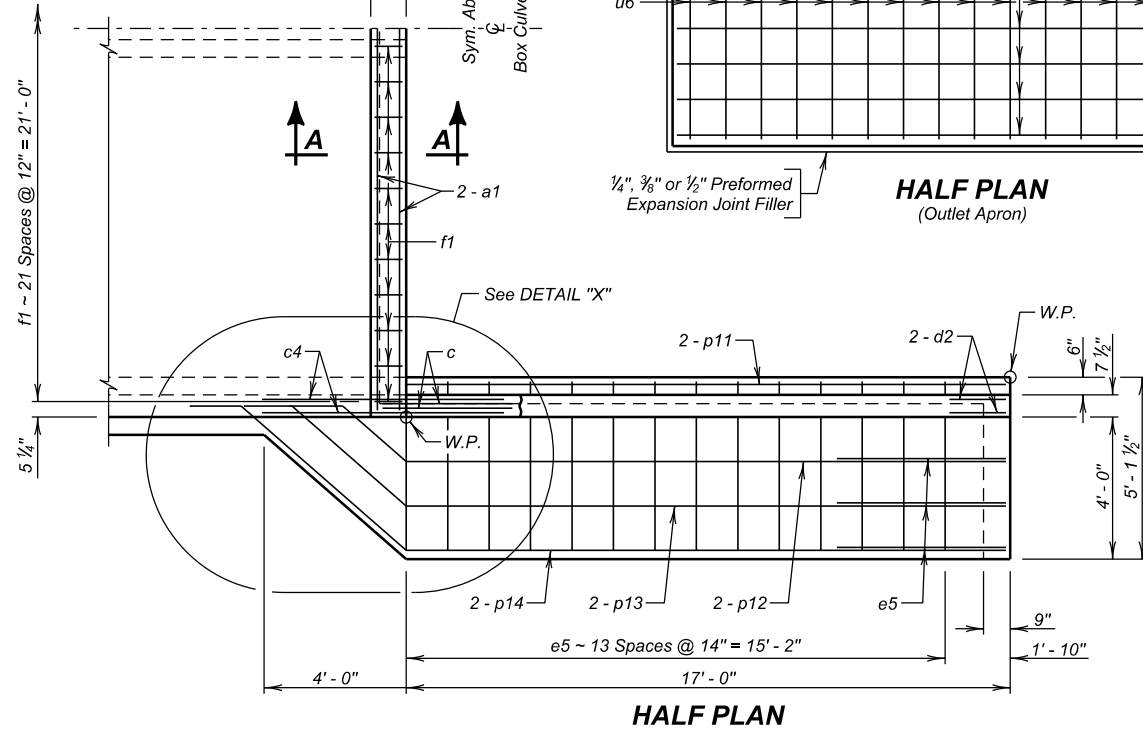
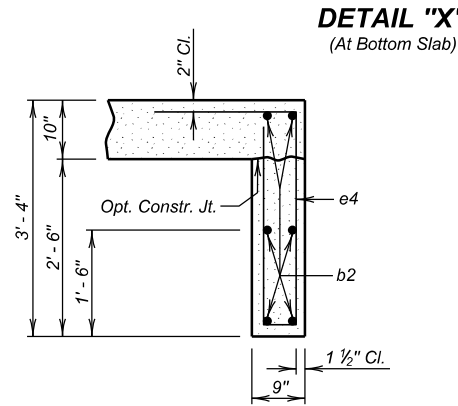
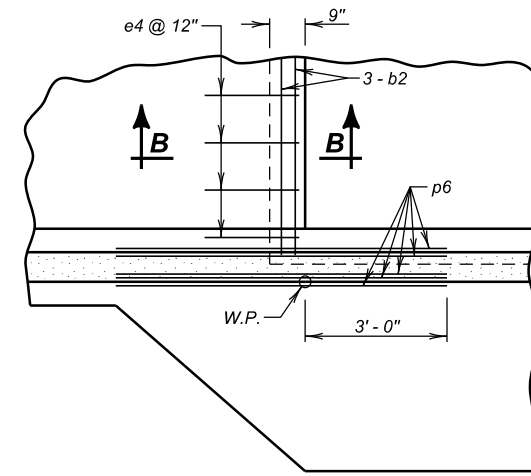
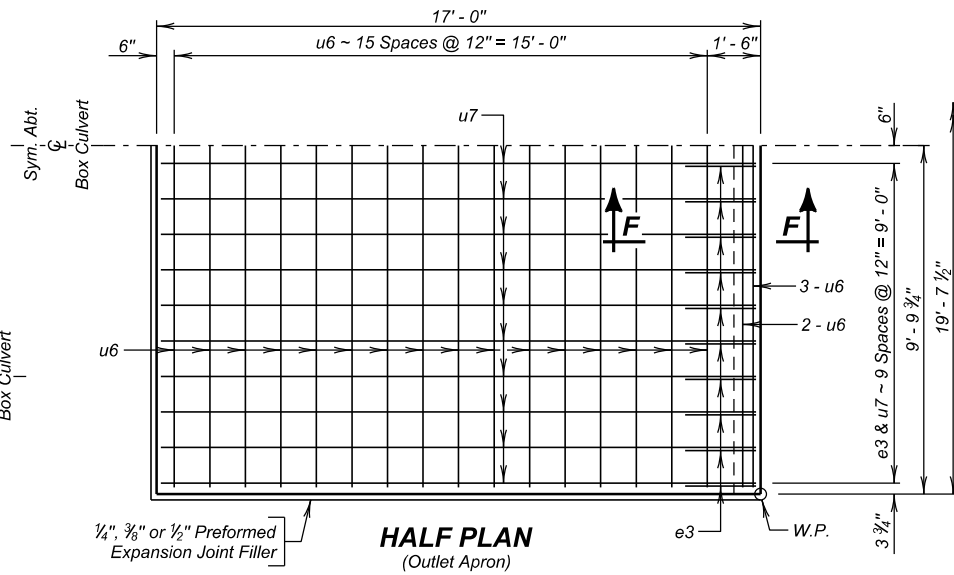
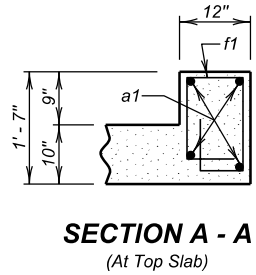
JACKSON COUNTY
S. D. DEPT. OF TRANSPORTATION
SEPTEMBER 2022

DESIGNED BY: BS JACK05HV
CK. DES. BY: CL 05HVGA03
DRAFTED BY: MG

Steve A. Johnson
BRIDGE ENGINEER

3 OF 7

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



REINFORCING SCHEDULE

Mk.	No.	Size	Length	Type	Bending Details	
a1	4	6	21'-6"	Str.	Type S12	
b2	6	6	20'-9"	Str.	Type S12A	
c	4	5	4'-6"	1A	Type 17A	
c3	8	5	18'-6"	Str.	Type 19B	
c4	4	5	7'-0"	19B	Type 19B	
d2	8	5	7'-0"	19B	Type 19B	
e4	21	4	8'-3"	S12	Type S12	
e5	34	4	11'-6"	S12A	Type S12A	
f1	22	4	5'-3"	S6A	Type S6A	
g3	12	5	5'-0"	Str.	Type 17A	
g4	18	4	23'-9"	Str.	Type 17A	
h2	11	4	23'-9"	17A	Type 17A	
k2	19	4	16'-9"	17A	Type 17A	
p6	10	6	7'-0"	Str.	Type 19B	
p11	14	4	19'-6"	Str.	Type 19B	
p12	4	4	20'-9"	Str.	Type 19B	
p13	4	4	22'-6"	Str.	Type 19B	
p14	4	4	24'-6"	Str.	Type 19B	

OUTLET APRON				
e3	20	4	8'-6"	S12
u6	21	4	19'-3"	Str.
u7	20	4	16'-9"	Str.

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

ESTIMATED QUANTITIES

ITEM	Class A45 Concrete, Box Culvert	Reinforcing Steel	Structure Excavation, Box Culvert
UNIT	Cu. Yd.	Lb.	Cu. Yd.
Outlet	21.1	2285	10.9
Outlet Apron	7.8	607	7.8

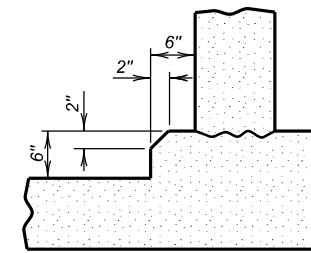
LEGEND FOR PLACING RE-STEEL
O. F. W. W. - Outside Face of Wing Wall
I. F. W. W. - Inside Face of Wing Wall

SITE 1 ALTERNATE A
OUTLET DETAILS
FOR
2 - 10' X 9' BOX CULVERT (C.I.P.)
OVER TRIB. TO WHITE RIVER
STA. 39 + 51.00
STR. NO. 36-301-184
5° LHF SKEW
SEC. 6-T43N-R35W
NH 0073(73)62
HL-93

JACKSON COUNTY
S. D. DEPT. OF TRANSPORTATION
SEPTEMBER 2022

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	NH 0073(73)62 P 0248(17)162	E7	E14

REINFORCING SCHEDULE				
(For 2 - F7 Barrel End Sections)				
Mk.	No.	Size	Length	Type
h7	208	4	11' - 0"	17A
j7	192	5	20' - 6"	Str.
k7	332	4	17' - 0"	17
m7	212	4	22' - 6"	Str.
n7	162	5	21' - 6"	Str.
p1	246	4	44' - 6"	Str.
s7	192	5	6' - 6"	Str.
w7	104	4	23' - 0"	S11A
z1	58	5	3' - 6"	Str.



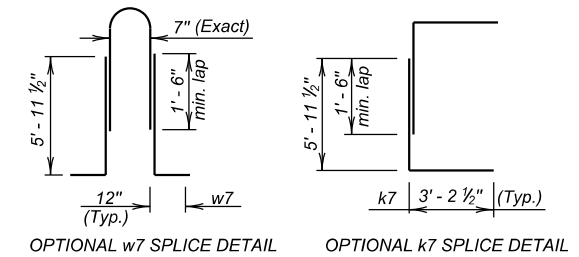
OPTIONAL FILLET DETAIL
(At Bottom Slab)

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

OPTIONAL POUR - BOTTOM SLAB

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

△ Place z1 bars thru construction joint between barrel sections as shown on Standard Plate No. 460.10. Number of z1 bars shown is for 1 construction joint.



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

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

ESTIMATED QUANTITIES			
ITEM	Class A45 Concrete, Box Culvert	Reinforcing Steel	Structure Excavation, Box Culvert
UNIT	Cu. Yd.	Lb.	Cu. Yd.
2 - F7 Barrel End Sections @ 44' - 0"	181.4	26647	62.1

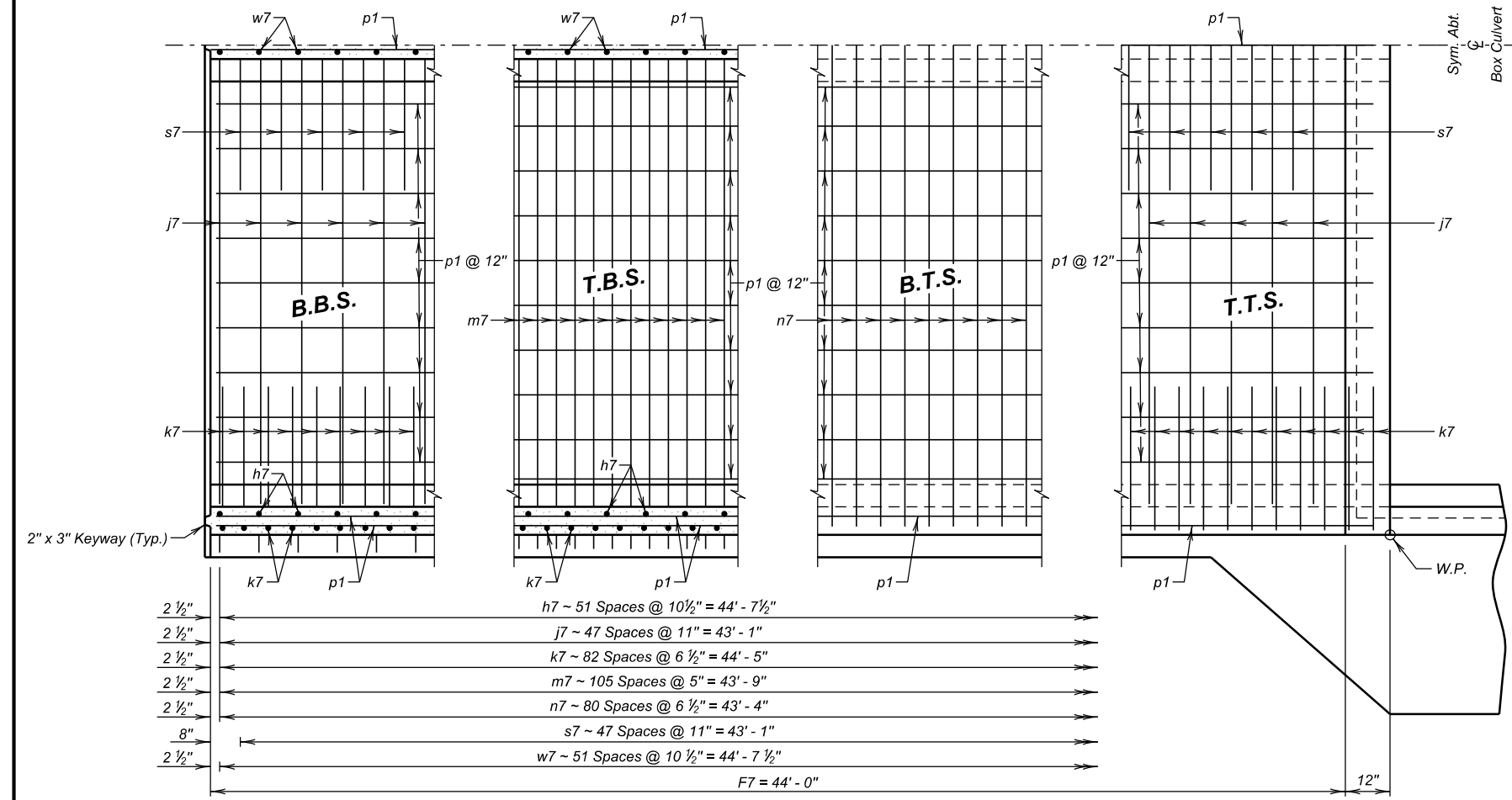
LEGEND FOR PLACING RE-STEEL	
T.T.S.	- Top of Top Slab
B.T.S.	- Bottom of Top Slab
T.B.S.	- Top of Bottom Slab
B.B.S.	- Bottom of Bottom Slab
O.F.O.W.	- Outside Face of Outside Wall
I.F.O.W.	- Inside Face of Outside Wall
M.W.	- Middle Wall

**SITE 1
ALTERNATE A**
F7 BARREL END SECTION DETAILS (44' - 0")
FOR
2 - 10' X 9' BOX CULVERT (C.I.P.)
OVER TRIB. TO WHITE RIVER
STA. 39 + 51.00
STR. NO. 36-301-184

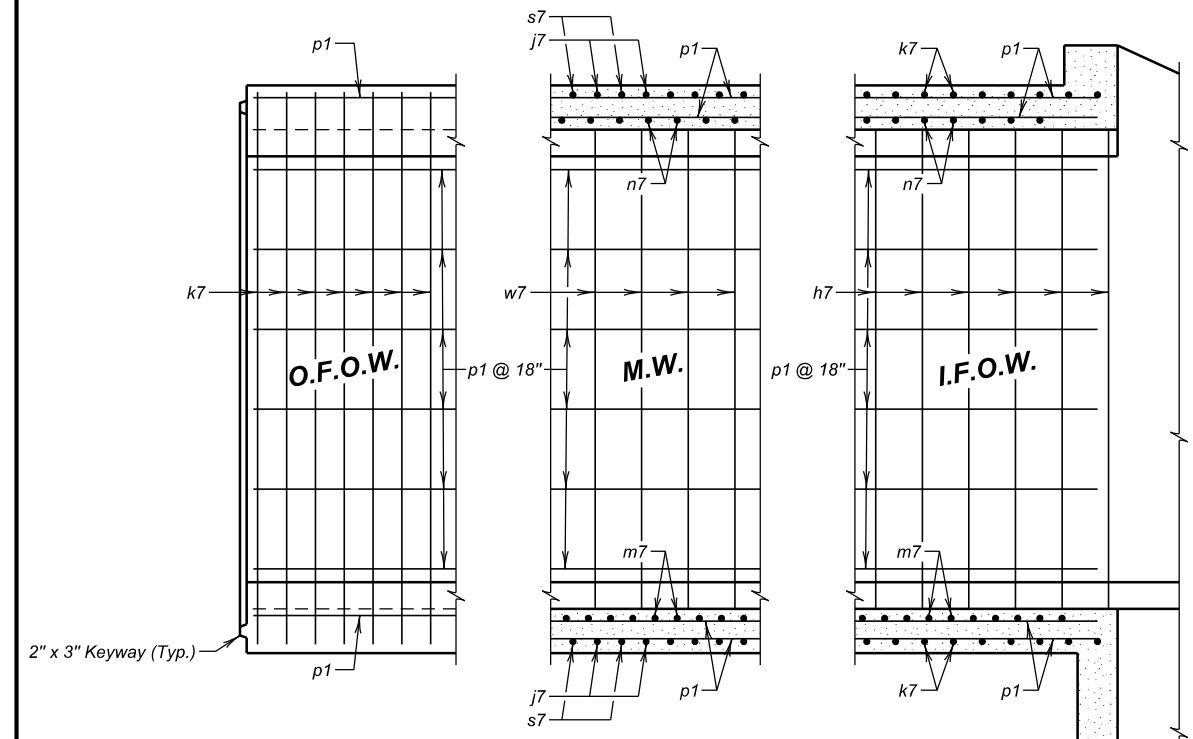
5° LHF SKEW
SEC. 6-T43N-R35W
NH 0073(73)62
HL-93

JACKSON COUNTY
S. D. DEPT. OF TRANSPORTATION
SEPTEMBER 2022

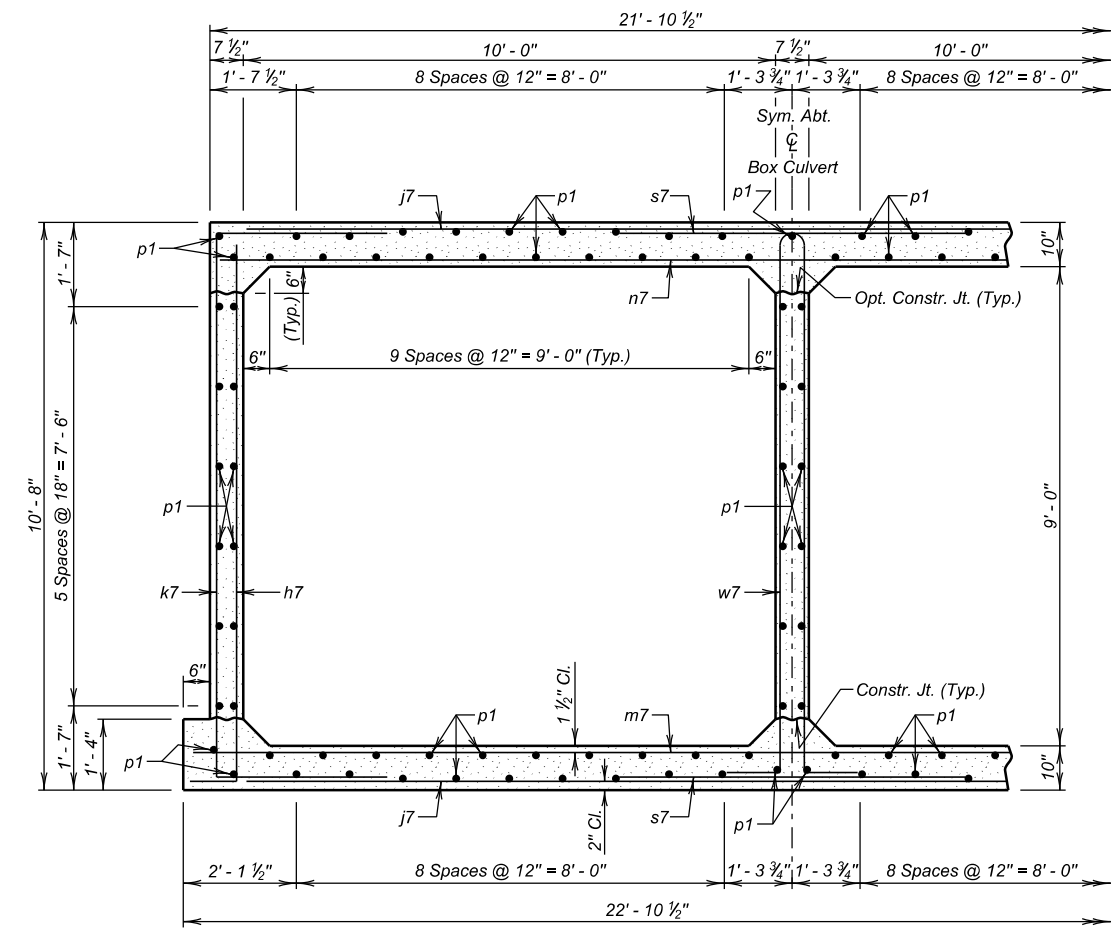
DESIGNED BY BS JACK05HV	CK. DES. BY CL 05HVGA05	DRAFTED BY MG	Steve A. Johnson BRIDGE ENGINEER
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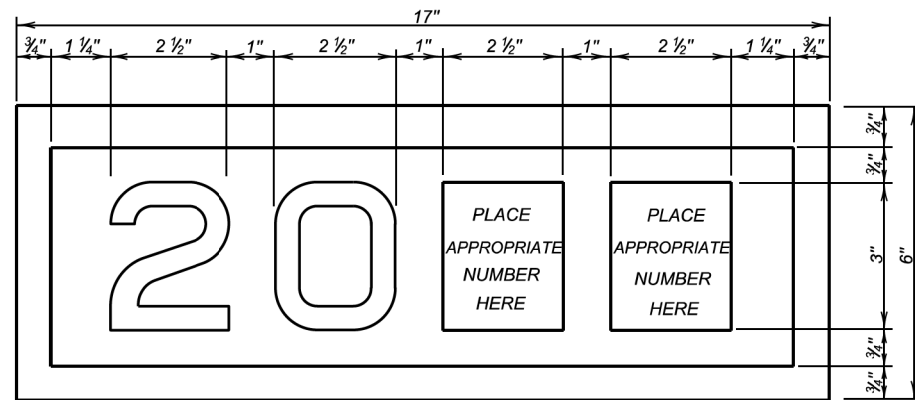
HALF PLAN
(Outlet End shown, Inlet similar by rotation)



ELEVATION



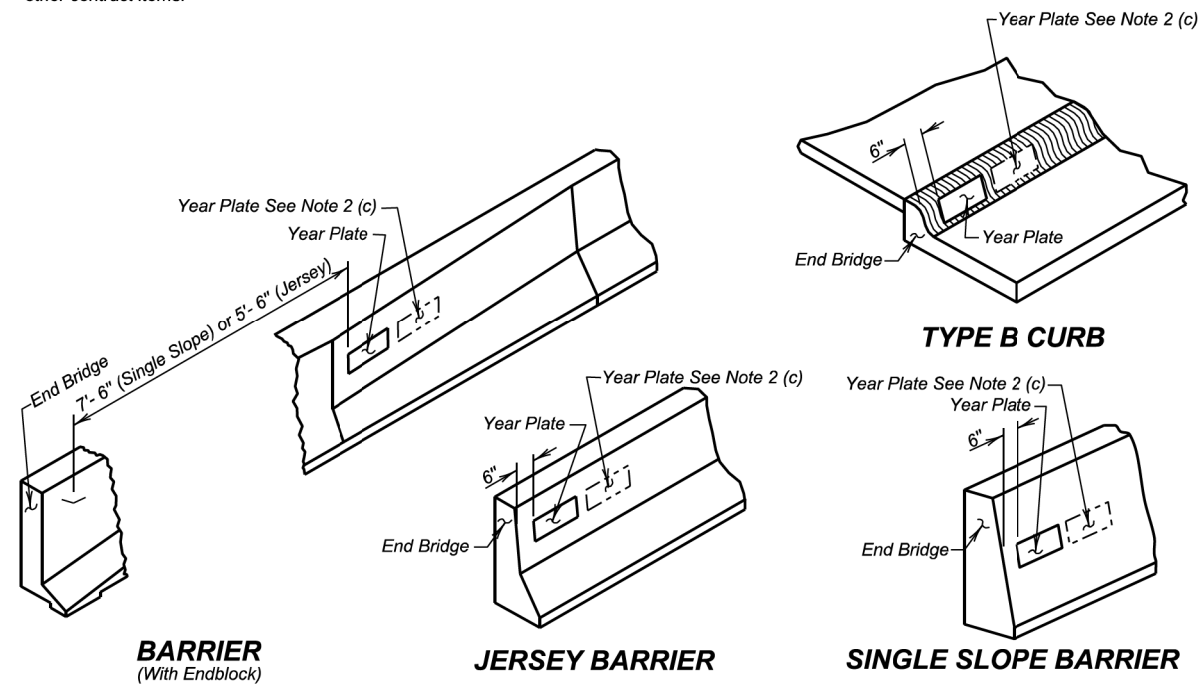
F7 BARREL HALF SECTION
(7' - 0" Maximum Fill)



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.



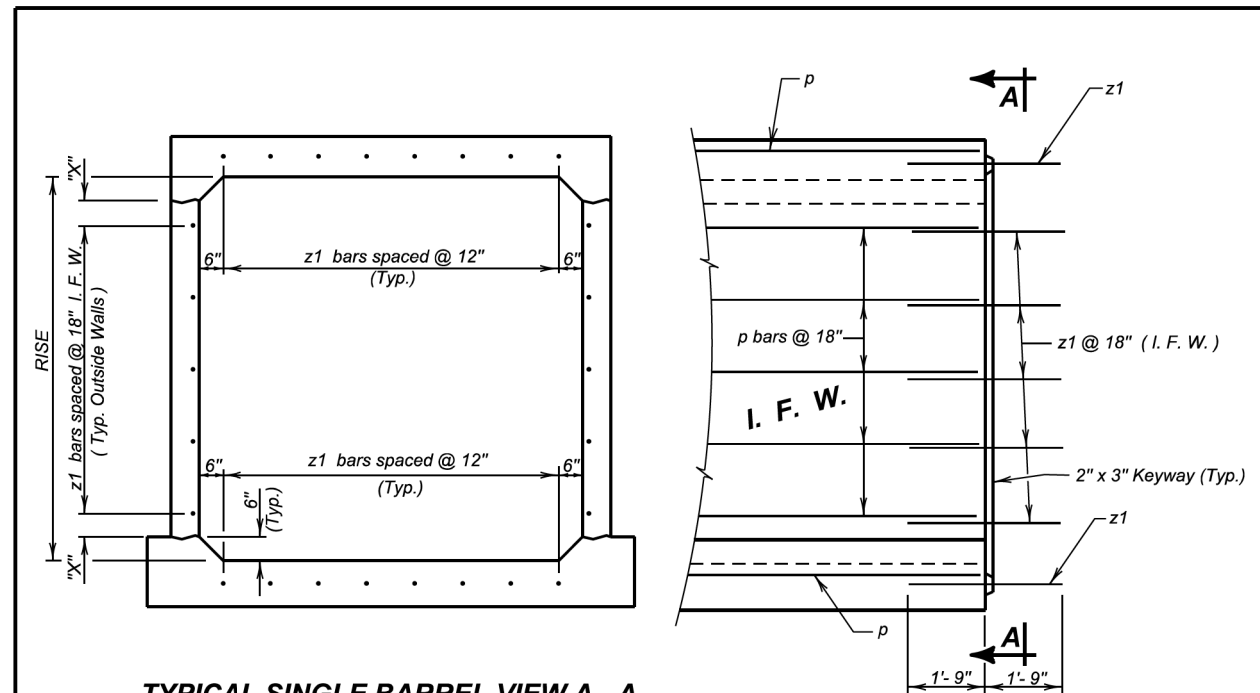
BARRIER
(With Endblock)

JERSEY BARRIER

SINGLE SLOPE BARRIER

January 22, 2021

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



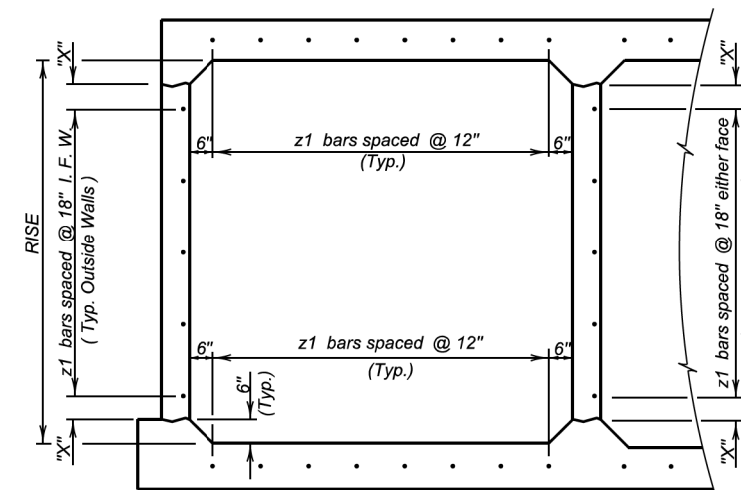
TYPICAL SINGLE BARREL VIEW A - A

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"



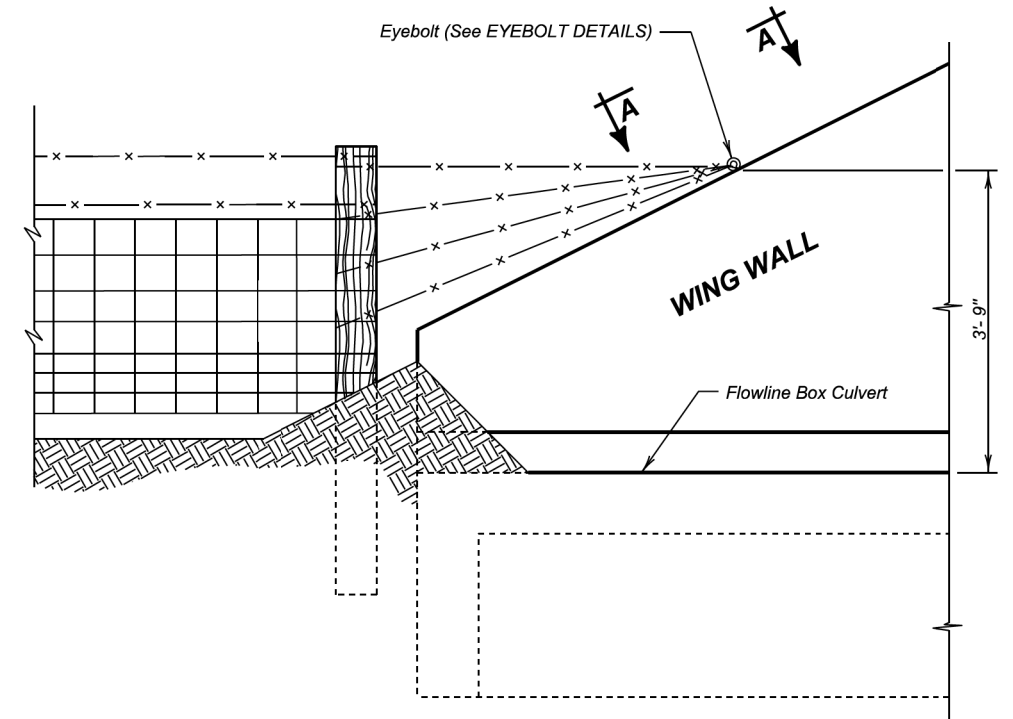
TYPICAL MULTIPLE BARREL VIEW A - A

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

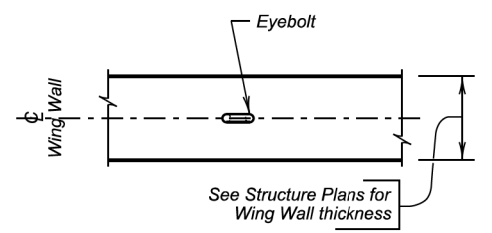
S D D O T	BOX CULVERT BARREL TIE REINFORCEMENT	PLATE NUMBER 460.10
	Published Date: 2025	Sheet 1 of 1



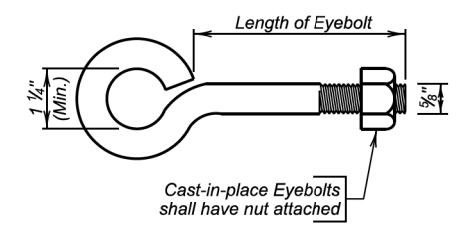
DETAIL FOR FENCE ANCHORS

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 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

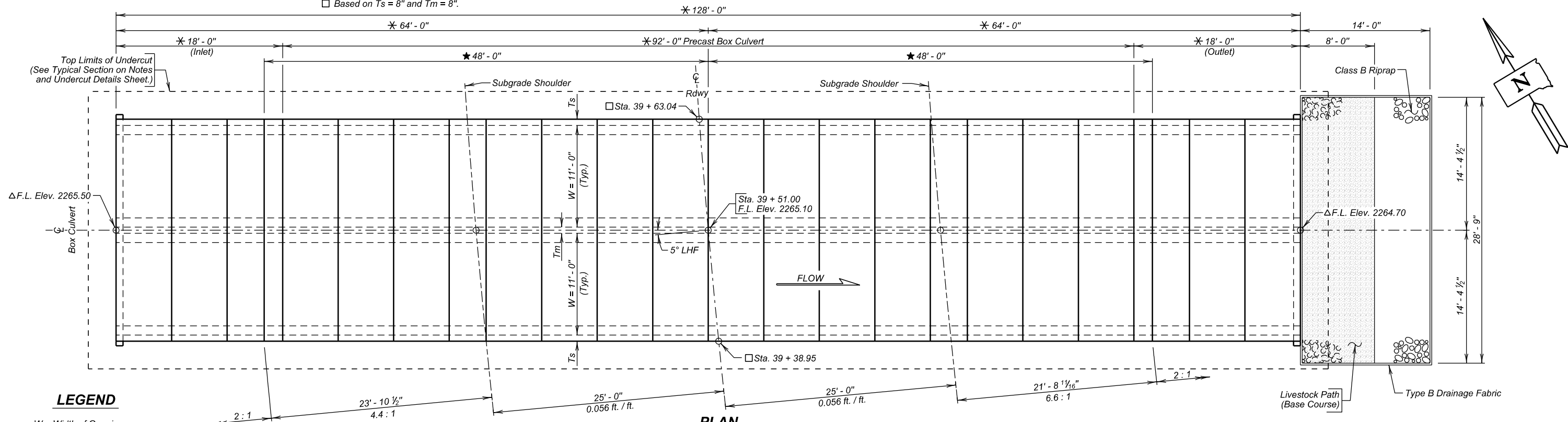
December 23, 2012

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

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

- * Dimension may vary with installation and/or fabrication. See Shop Plans for actual installation length.
- ★ Minimum distance to satisfy clear zone.
- △ Based on dimensions shown.
- Based on $T_s = 8"$ and $T_m = 8"$.

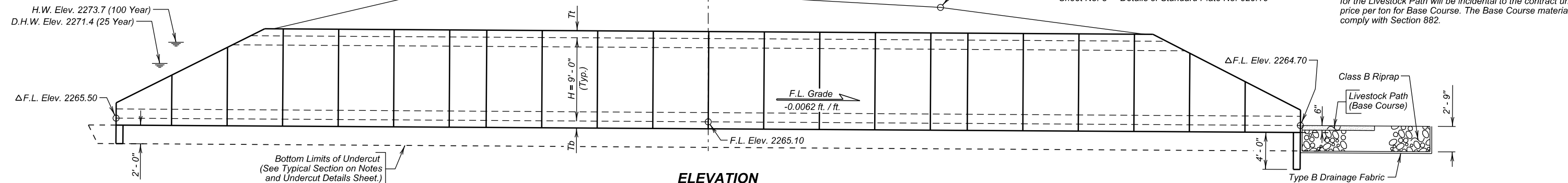
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	NH 0073(73)62 P 0248(17)162	E10	E14



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



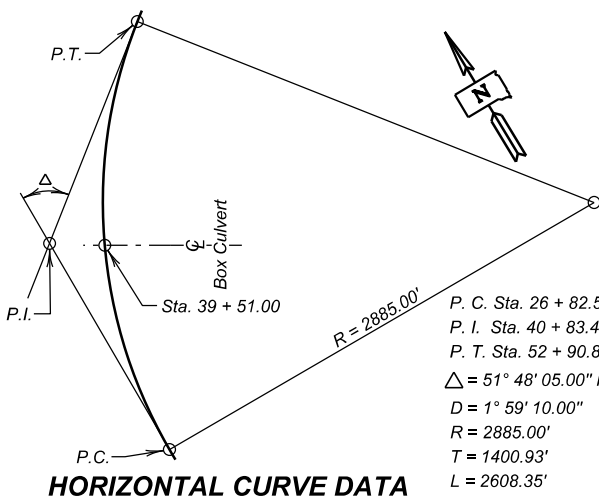
ELEVATION

**-X028-
INDEX OF CULVERT SHEETS-**

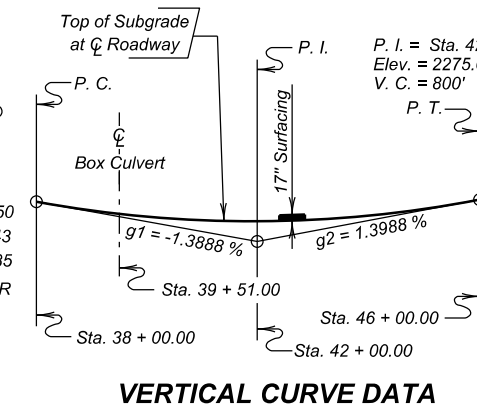
- Sheet No. 1 - General Drawing and Quantities
- Sheet No. 2 - Notes and Undercut Details
- Sheet No. 3 - Details of Standard Plate No.'s 460.02 & 560.01
- Sheet No. 4 - Details of Standard Plate No.'s 560.20 & 560.21
- Sheet No. 5 - Details of Standard Plate No. 620.16

NOTES:

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



HORIZONTAL CURVE DATA



VERTICAL CURVE DATA

HYDRAULIC DATA

Q_d	563 cfs
A_d	61 sq ft
V_d	9.3 fps
Q_F	563 cfs
Q_{100}	1018 cfs
Q_{OT}	$> Q_{100}$
V_{max}	11.4 fps

Q_d = Design discharge for the proposed culvert based on 25 year frequency. El. 2271.4.
 Q_{OT} = Overtopping discharge and frequency $> Q_{100}$ year recurrence interval. El. 2280.4 @ Sta. 42 + 00.00.
 Q_F = Designated peak discharge for the basin approaching proposed project based on 25 year frequency.
 Q_{100} = Computed discharge for the basin approaching proposed project based on 100 year frequency. El. 2273.7.
 V_{max} = Maximum computed outlet velocity for the proposed culvert, based on 100 year frequency.

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.	85
Box Culvert Undercut	Cu. Yd.	286
Class B Riprap	Ton	51.4
Type B Drainage Fabric	Sq. Yd.	71
Base Course	Ton	6.0
2 - 11' X 9' Precast Concrete Culvert, Furnish	Ft.	92
2 - 11' X 9' Precast Concrete Culvert, Install	Ft.	92
2 - 11' X 9' Precast Concrete Culvert End Section, Furnish	Each	2
2 - 11' X 9' Precast Concrete Culvert End Section, Install	Each	2

Quantity is based on 9" bottom slab, 9" 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.

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

**SITE 1
ALTERNATE B
GENERAL DRAWING AND QUANTITIES**

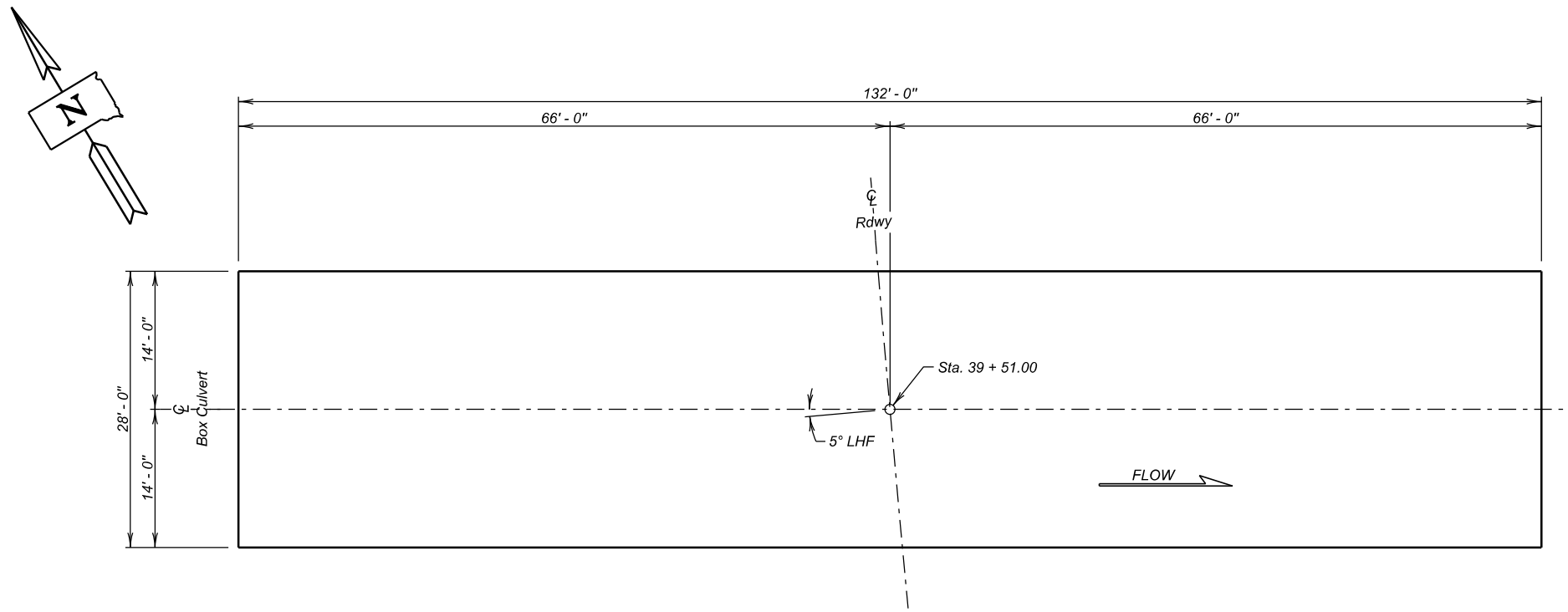
FOR
2 - 11' X 9' BOX CULVERT (PRECAST)
 OVER TRIB. TO WHITE RIVER 5° LHF SKEW
 STA. 39 + 51.00 SEC. 6-T43N-R35W
 STR. NO. 36-301-184 NH 0073(73)62
 PCN 05HV HL-93

JACKSON COUNTY
 S. D. DEPT. OF TRANSPORTATION
 SEPTEMBER 2022

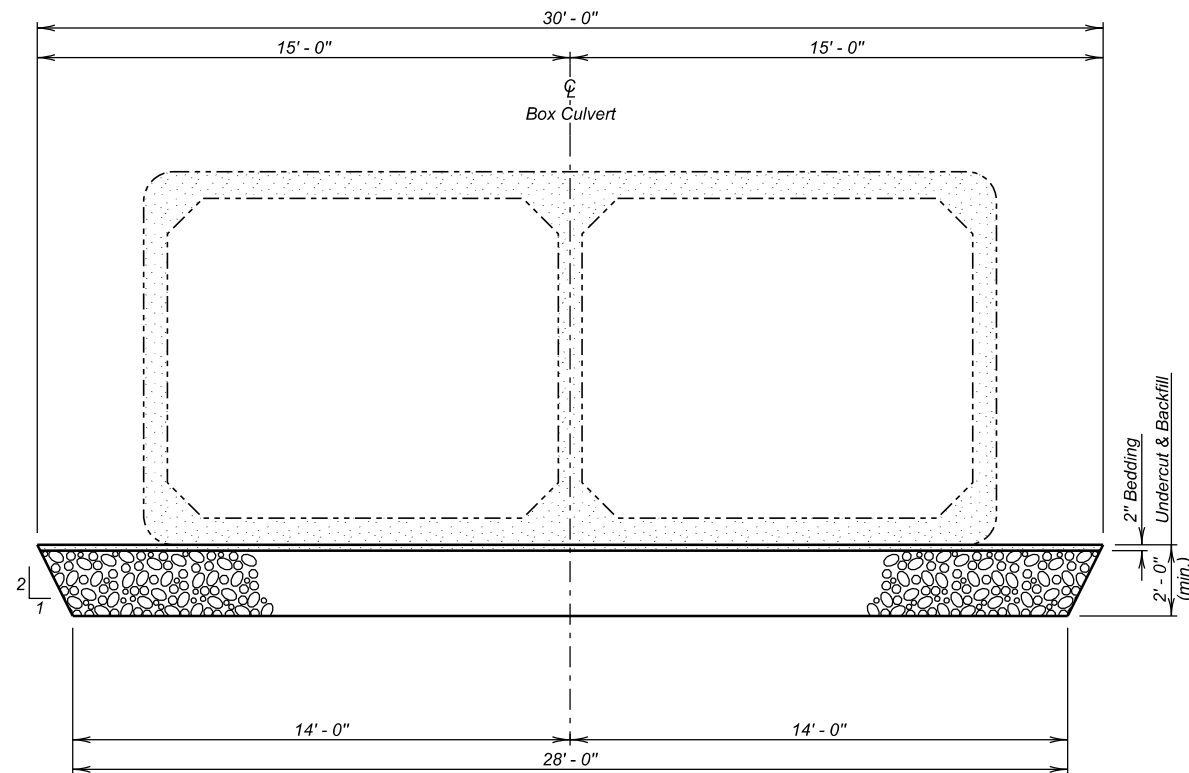
-X028-

DESIGNED BY BS JACK05HV	CK. DES. BY CL 05HVGA08	DRAFTED BY MG	Steve A. Johnson BRIDGE ENGINEER
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STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	NH 0073(73)62 P 0248(17)162	E11	E14



UNDERCUT LAYOUT
(Bottom Dimensions)



TYPICAL SECTION
(For Limits of Undercut)

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 shall 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 weight = 95,850 lbs. The construction load will not be applied until a minimum of 4 feet 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.
- The box culvert will be load rated in accordance with the AASHTO Manual for Bridge Evaluation, 2018 Edition with 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 the three SD legal trucks (Type 3, 3S2, and 3-2) as well as the notional rating load and four specialized hauling vehicles. The structure 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 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 1' of brown sand clay overlying grey to yellow clay silt at the inlet and grey to yellow clay silt at the outlet. Groundwater was encountered in the borings at an elevation of 2267.2 during the subsurface investigation conducted in October 2020. Dewatering will be required for the construction of the RCBC. All costs incurred for dewatering will be incidental to other contract items.

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

**SITE 1
ALTERNATE B
NOTES AND UNDERCUT DETAILS**

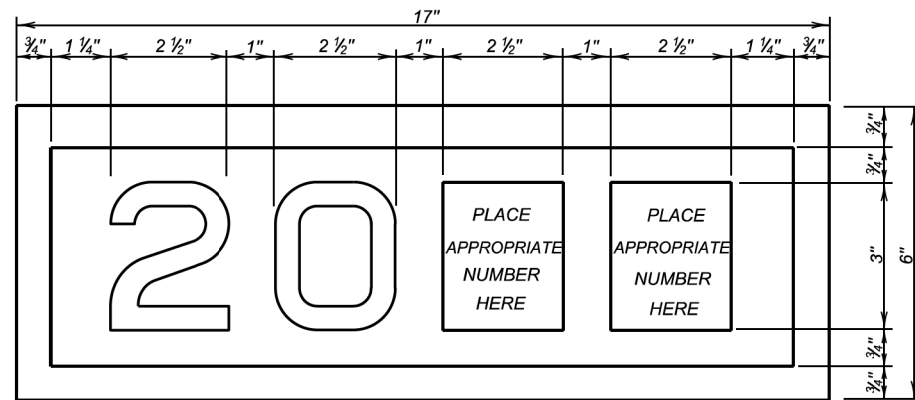
FOR
2 - 11' X 9' BOX CULVERT (PRECAST)
OVER TRIB. TO WHITE RIVER 5° LHF SKEW
STA. 39 + 51.00 SEC. 6-T43N-R35W
STR. NO. 36-301-184 NH 0073(73)62
HL-93

ESTIMATED QUANTITIES		
ITEM	UNIT	QUANTITY
Box Culvert Undercut	Cu. Yd.	286

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

JACKSON COUNTY
S. D. DEPT. OF TRANSPORTATION
SEPTEMBER 2022

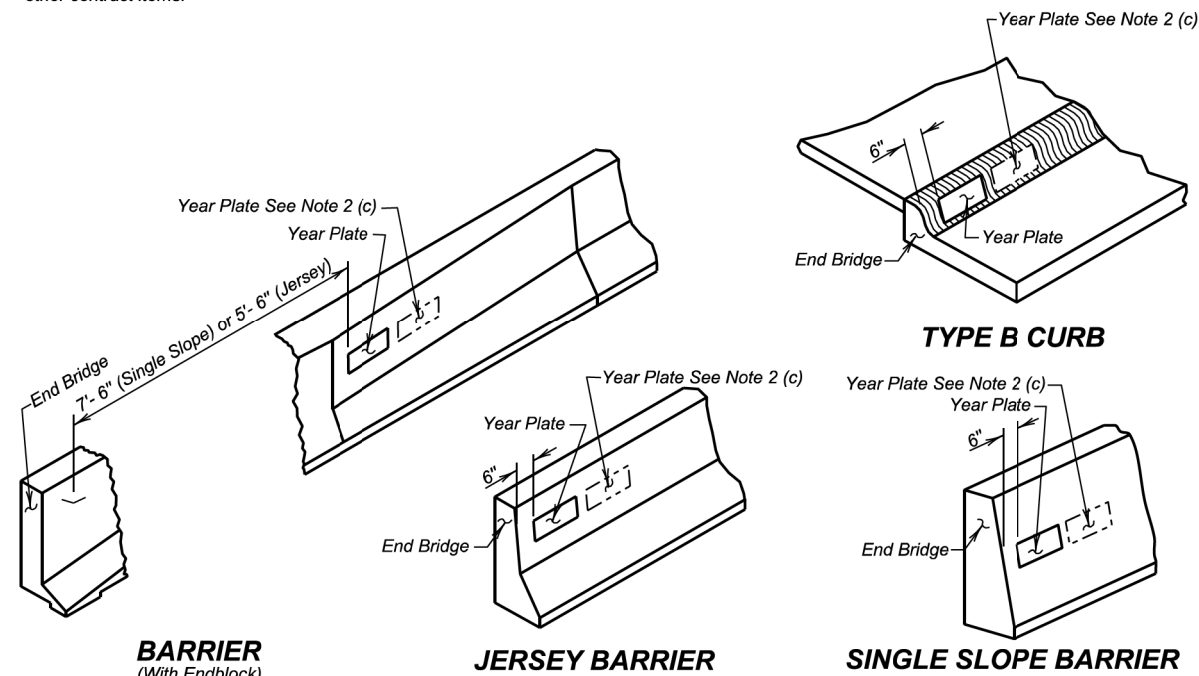
DESIGNED BY BS JACK05HV	CK. DES. BY CL 05HVGA09	DRAFTED BY MG	Steve A. Johnson BRIDGE ENGINEER
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YEAR PLATE DETAILS

GENERAL NOTES:

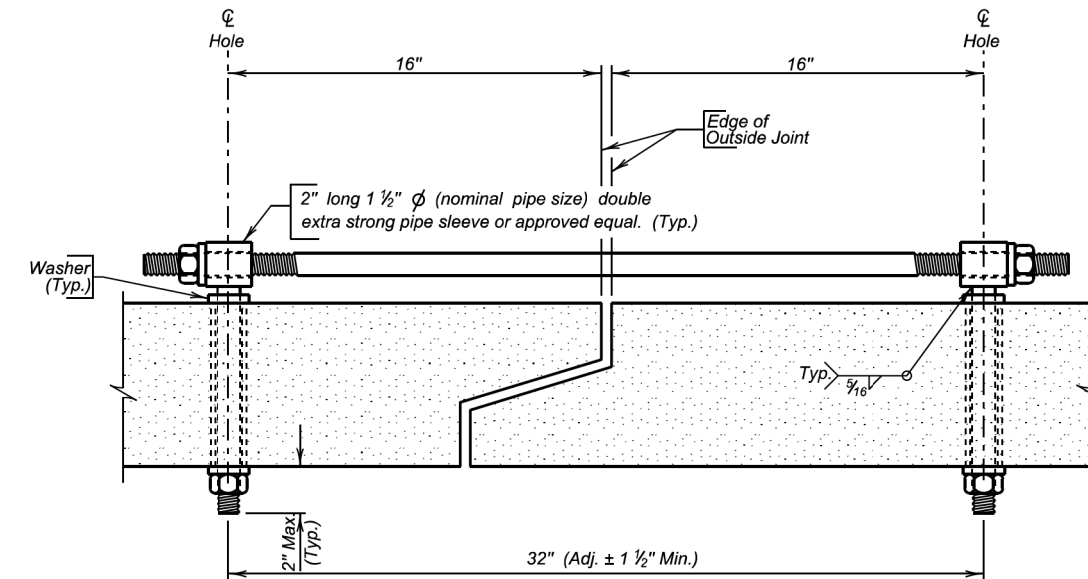
- Year plates of the general dimensions shown will be constructed on all box culverts and bridges. The year plates will be constructed in reverse and attached to the forms in such a manner that the finished imprint in the concrete does not exceed one-half (1/2) inch in depth.
- Year plates will be located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



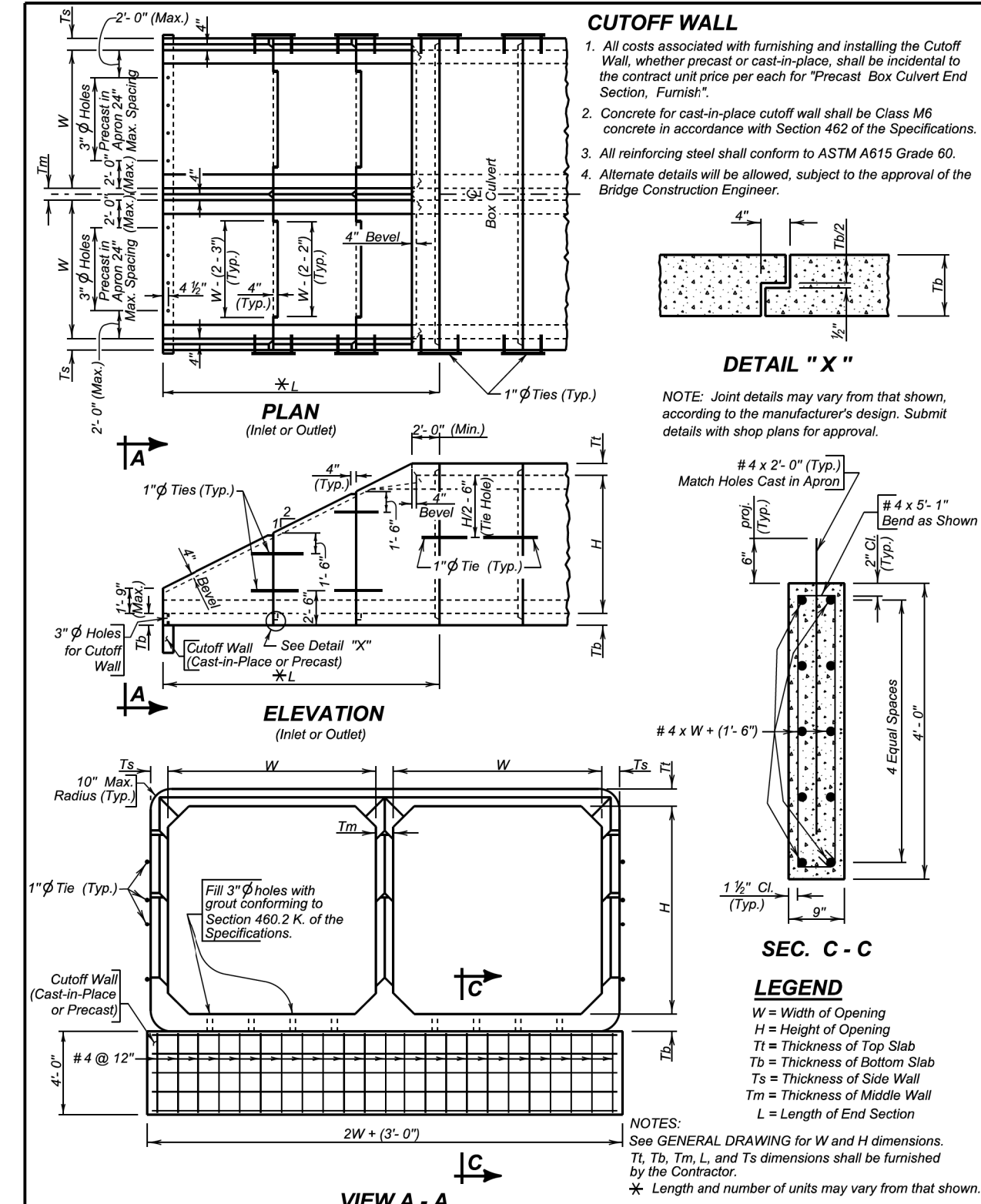
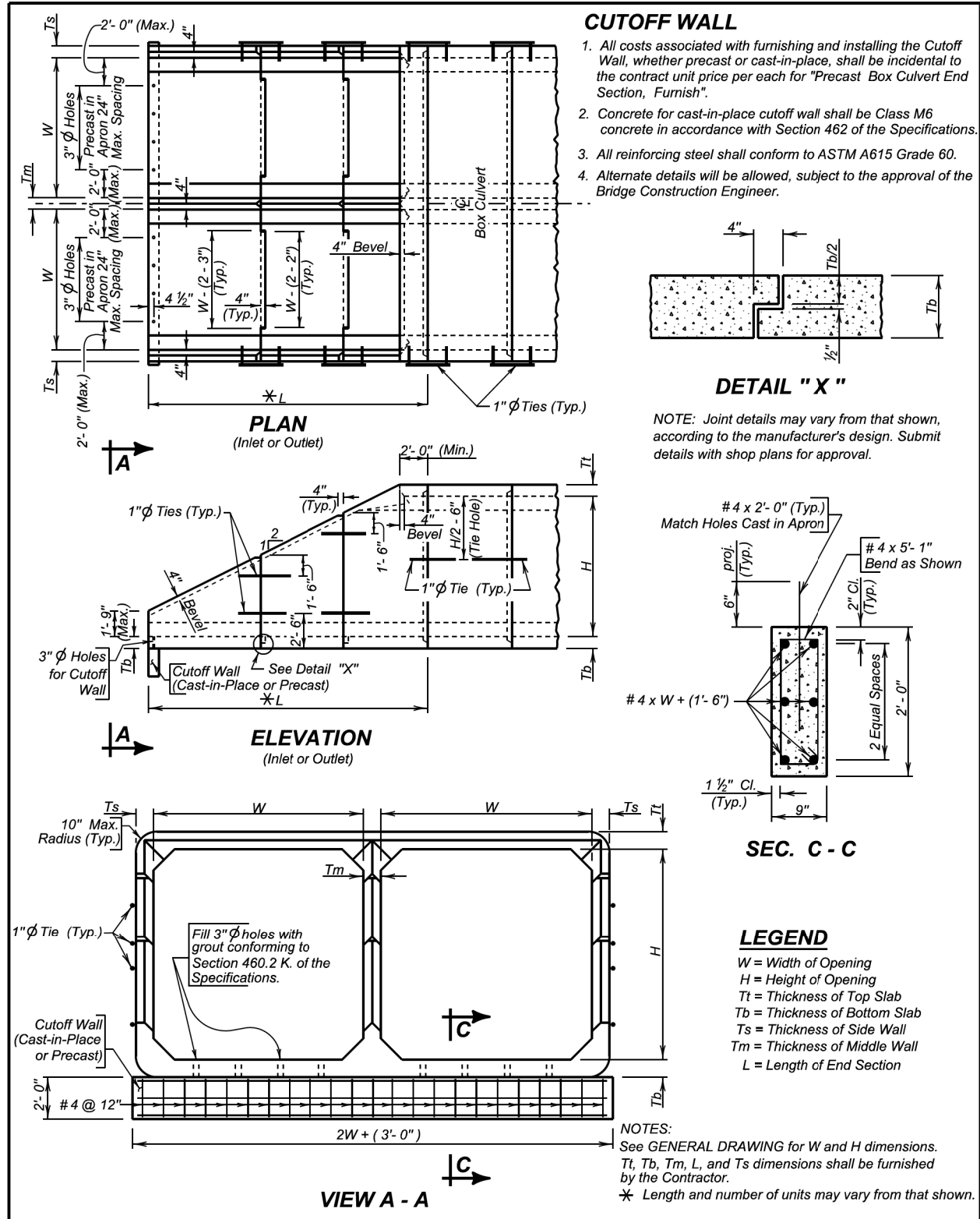
TIE BOLT ASSEMBLY

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 ϕ and conform to the requirements of ASTM A36, ASTM A307, or ASTM F1554, Gr. 36. Nuts shall be heavy hex in conformance with ASTM A563. Washers shall conform to ASTM F436, Type 1. The welded pipe sleeve shall conform to ASTM A53, Grade B.
- 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

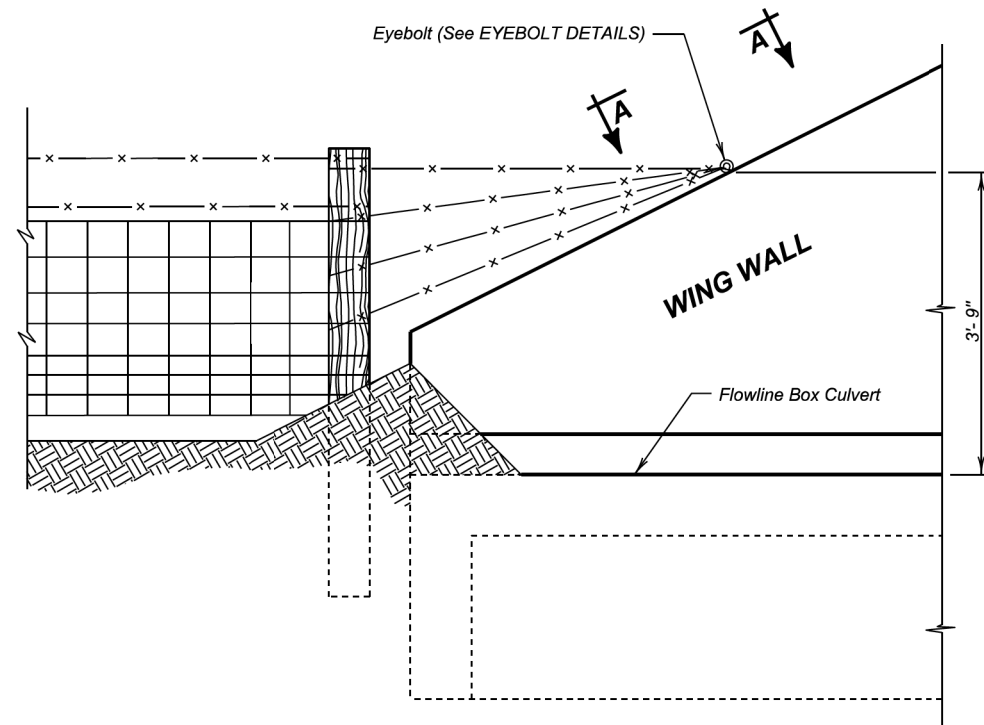
Published Date: 2025	S D D O T	PRECAST BOX CULVERT TIE BOLT ASSEMBLY DETAILS	PLATE NUMBER 560.01
			Sheet 1 of 1



S D D O T	PRECAST DOUBLE BOX CULVERT SLOPED END SECTION DETAILS WITH 2'-0" CUTOFF WALL	PLATE NUMBER 560.20
	Published Date: 2025	Sheet 1 of 1

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

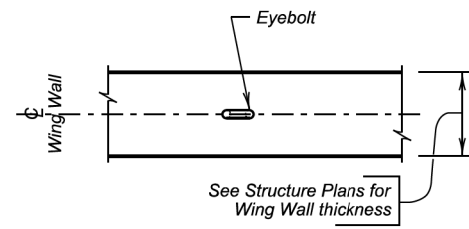
Revised July 24, 2024 PW



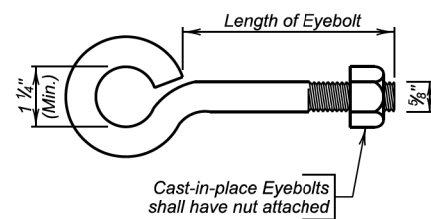
DETAIL FOR FENCE ANCHORS

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