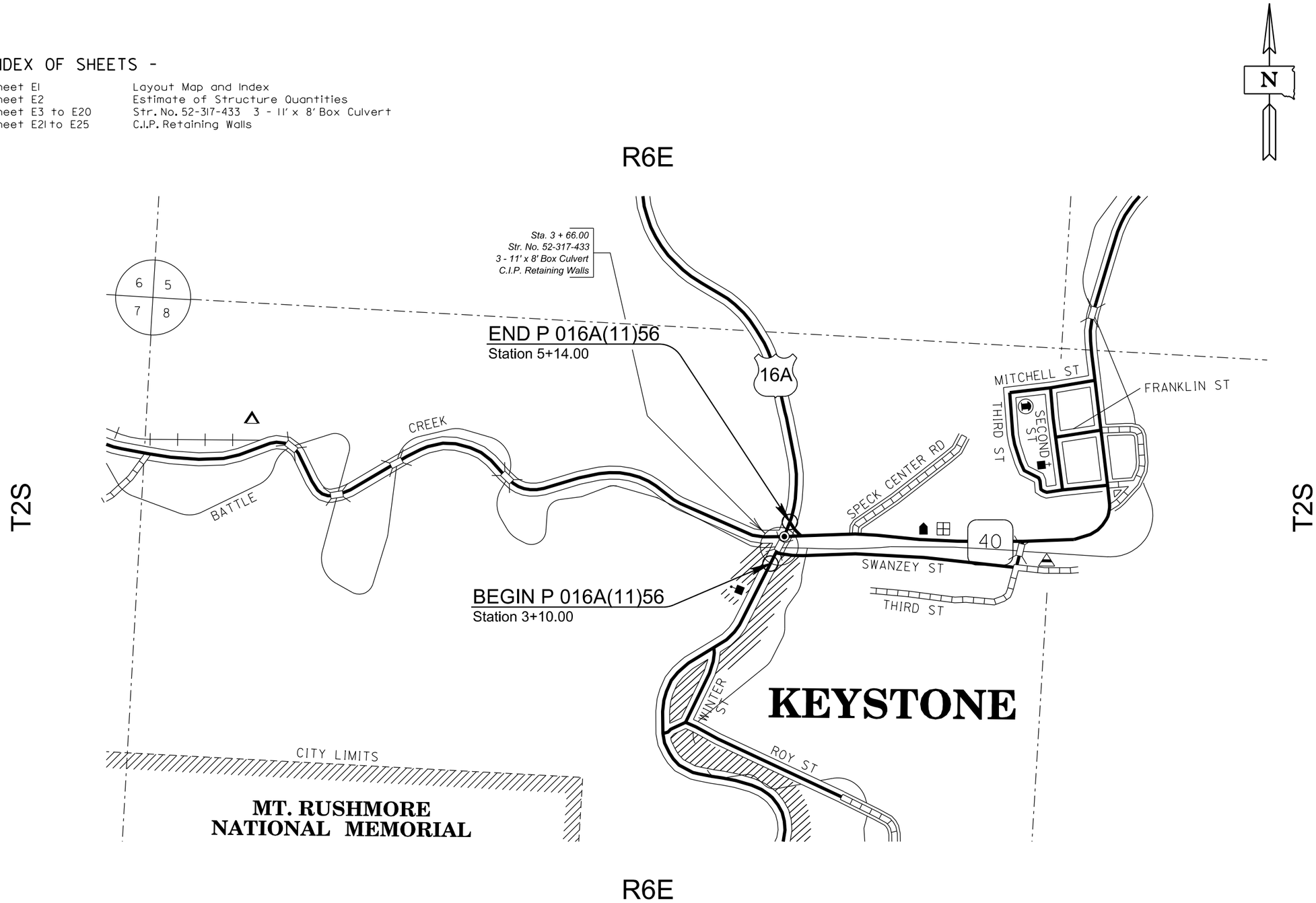
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P 016A(11)56	E1	E25

Section E: Structure Plans

INDEX OF SHEETS -



SECTION E – ESTIMATE OF STRUCTURE QUANTITES

Str. No. 52-317-433

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
250E0030	Incidental Work, Structure	Lump Sum	LS
420E0200	Structure Excavation, Box Culvert	161	CuYd
421E0200	Box Culvert Undercut	437	CuYd
460E0120	Class A45 Concrete, Box Culvert	371.1	CuYd
464E0100	Controlled Density Fill	0.6	CuYd
470E0050	Steel Bicycle Railing	147.0	Ft
480E0100	Reinforcing Steel	56,603	Lb
700E0210	Class B Riprap	150.1	Ton
831E0110	Type B Drainage Fabric	158	SqYd

C.I.P. Retaining Walls

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
420E0300	Structure Excavation, Retaining Wall	233	CuYd
421E0200	Box Culvert Undercut	32	CuYd
430E0300	Granular Bridge End Backfill	14.3	CuYd
460E0100	Class A45 Concrete, Miscellaneous	30.0	CuYd
470E0050	Steel Bicycle Railing	35.0	Ft
480E0100	Reinforcing Steel	4,560	Lb

INCIDENTAL WORK, STRUCTURE

1. In place centerline Sta. 3+53.30, 27.21’ Lt to centerline Sta. 3+79.76, 29.52 Rt. is a single span 40’ Prestressed Box Girder Bridge with a 56’-0” clear roadway. The superstructure consists of a reinforced concrete slab with curbs and steel railing continuous across the bridge. The deck has been overlaid with 1 3/4 inches of asphalt. The substructure consists of reinforced concrete vertical abutments, all of which are supported on timber piling. Adjacent to the in place bridge, 5’ West of the West edge of the bridge deck at centerline Sta 3+47.25, 40.21 Lt. to centerline Sta 3+50.02, 34.27 Lt. is A 6’-0” wide separate pedestrian bridge with steel railings supported on a Prestressed Box Girder beam.

2. Break down and remove the existing bridges, and approach/sleeper slabs if applicable, to 1-foot below finished groundline, or as required to construct the new structure in accordance with Section 110 of the Construction Specifications. All portions of the existing bridges 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. An appropriate site will be as described in the Environmental Commitments Notes in the plans.

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

4. The foregoing is a general description of the in-place bridges 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.

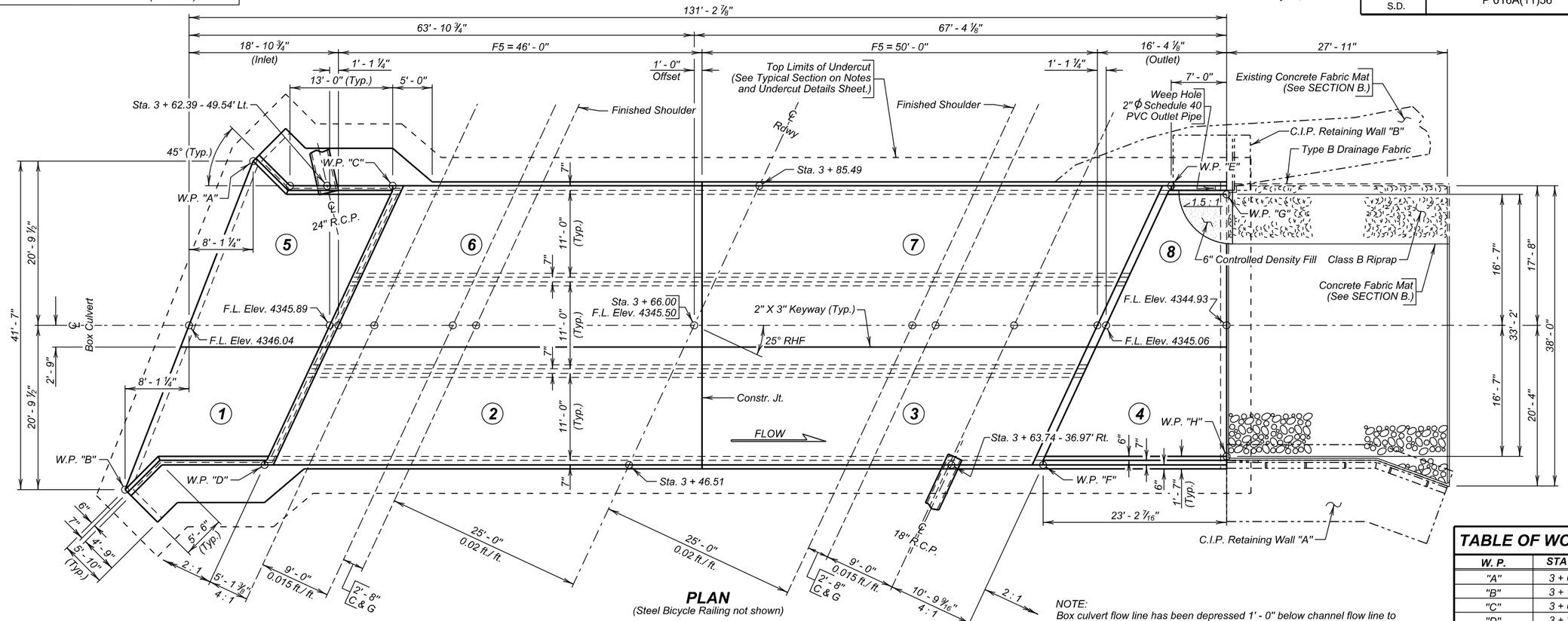
NOTICE - LEAD BASED PAINT

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

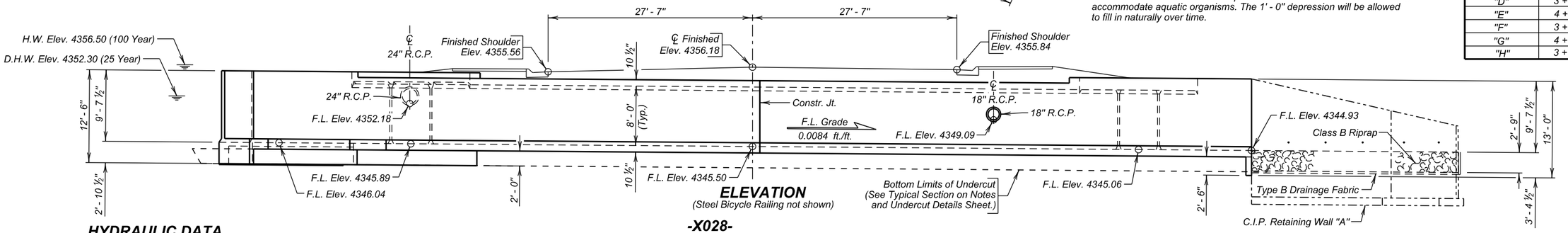
The elevations shown in these plans are based on the National Geodetic Survey (NGS) North American Vertical Datum of 1988 (NAVD88).

Revised February 18, 2026 BB

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P 016A(11)56	E3	E25



PLAN
(Steel Bicycle Railing not shown)



ELEVATION
(Steel Bicycle Railing not shown)

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

TABLE OF WORKING POINTS

W. P.	STATION	OFFSET
"A"	3 + 61.26	59.36' Lt.
"B"	3 + 16.73	56.47' Lt.
"C"	3 + 65.89	42.03' Lt.
"D"	3 + 27.02	41.78' Lt.
"E"	4 + 07.51	47.22' Rt.
"F"	3 + 68.64	47.47' Rt.
"G"	4 + 09.49	54.02' Rt.
"H"	3 + 79.43	68.04' Rt.

HYDRAULIC DATA

Q_d	1147 cfs
A_d	209 sq ft
V_d	5.5 fps
Q_F	1147 cfs
Q_{100}	3350 cfs
Q_{OT}	2467 cfs
V_{max}	10.4 fps

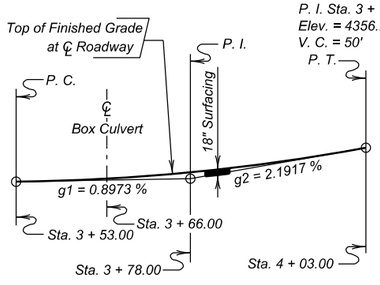
Q_d = Design discharge for the proposed culvert based on 25 year frequency. El. 4352.30'.

Q_{OT} = Overtopping discharge and frequency 2467 - cfs and 72 - year recurrence interval. El. 4355.50' @ Sta. 2 + 56±.

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. 4356.50'.

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



VERTICAL CURVE DATA

-X028-
INDEX OF CULVERT SHEETS -

ESTIMATED QUANTITIES

	ITEM	UNIT	QUANTITY
	Class A45 Concrete, Box Culvert	Cu. Yd.	371.1
	Reinforcing Steel	Lb.	56603
	Structure Excavation, Box Culvert	Cu. Yd.	161
	Box Culvert Undercut	Cu. Yd.	437
≠	Class B Riprap	Ton	150.1
	Type B Drainage Fabric	Sq. Yd.	158
	Controlled Density Fill	Cu. Yd.	0.6
	Steel Bicycle Railing	Ft.	147

≠ 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

GENERAL DRAWING AND QUANTITIES

FOR

3 - 11' X 8' BOX CULVERT

OVER BATTLE CREEK
STA. 3 + 66.00
STR. NO. 52-317-433
PCN 05V8

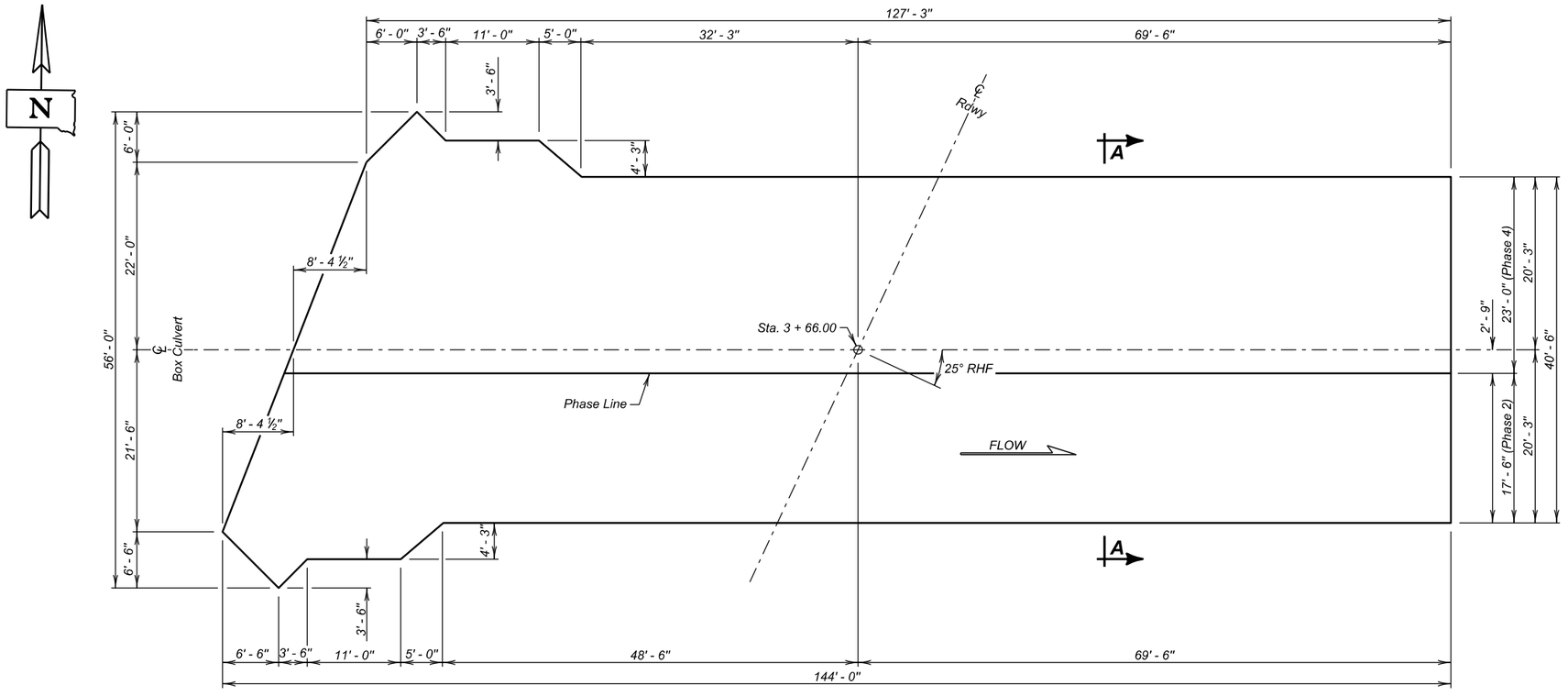
25° RHF SKEW
SEC. 8-T2S-R6E
P 016A(11)56
HL-93

PENNINGTON COUNTY
S. D. DEPT. OF TRANSPORTATION
MAY 2024

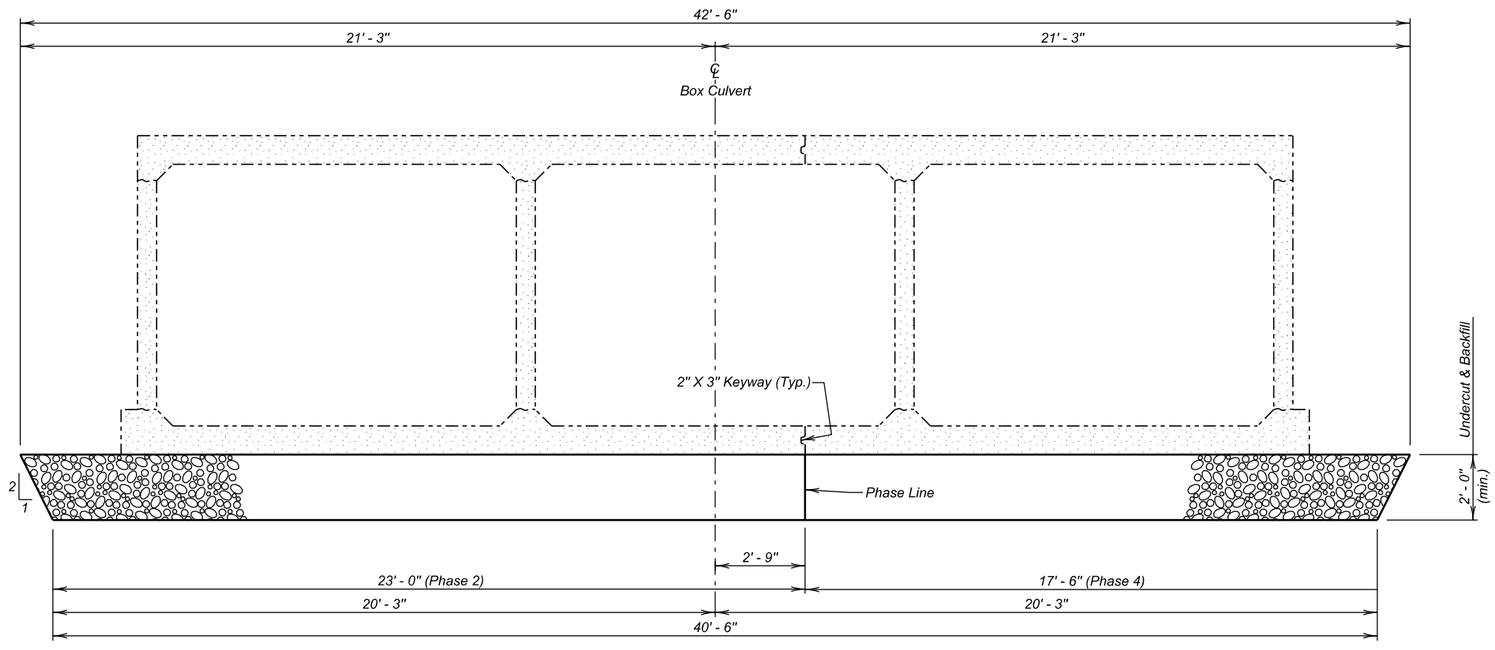
- X028 -

DESIGNED BY	CK. DES. BY	DRAFTED BY	
BB PENN05V8	BR 05V8LA01	MG	Steve A Johnson BRIDGE ENGINEER

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P 016A(11)56	E4	E25



UNDERCUT LAYOUT
(Bottom Dimensions)



SECTION A - A
(For Limits of Undercut)

SPECIFICATIONS

1. *Design Specifications: AASHTO LRFD Bridge Design Specifications, 9th Edition.*
2. *Construction Specifications: South Dakota Standard Specifications for Roads and Bridges, 10-1-25 Version, Required Provisions, and Special Provisions as included in the Proposal. The Standard Specifications for Roads and Bridges are available for download and viewing at: https://dot.sd.gov/doing-business/contractors/standard-specifications*

GENERAL NOTES

1. *Design Live Load: HL-93. No construction loading in excess of legal load was considered.*
2. *The design of the barrel section is based on a minimum fill height of 1 feet and includes all subsequent fill heights up to and including the maximum fill heights of 5 ft. (F5).*
3. *Design Material Strengths: Concrete $f'c$ = 4500 p.s.i.*
   Reinforcing Steel fy = 60000 p.s.i.
4. *All concrete will be Class A45, Box Culvert conforming to Section 460 of the Construction Specifications.*
5. *All reinforcing steel will conform to ASTM A615 Grade 60.*
6. *All lap splices shown are contact lap splices unless noted otherwise.*
7. *All exposed edges will be chamfered ¾ inch unless noted otherwise in the plans.*
8. *Use 1 inch clear cover on all reinforcing steel EXCEPT as shown.*
9. *The Contractor will imprint on the structure the date of construction as specified and detailed on Standard Plate No. 460.02.*
10. *Care will be taken to establish Working Points (W.P.) as shown on the wings.*
11. *Circled numbers in PLAN and ELEVATION views on the General Drawing are section I.D. Numbers (see SDDOT Materials Manual).*
12. *Cost of Preformed Expansion Joint Filler used in apron construction will be incidental to the other contract items.*
13. *Soils below the bottom of the proposed RCBC consist of brown silty sandy gravel. Groundwater within the excavation is expected to be at the water surface elevation of the creek. Dewatering will be required for construction of the RCBC. All cost incurred for dewatering will be incidental to other contract items.*

ESTIMATED QUANTITIES

	ITEM	UNIT	QUANTITY
⍁	Box Culvert Undercut	Cu. Yd.	437

⍁ *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

3 - 11' X 8' BOX CULVERT

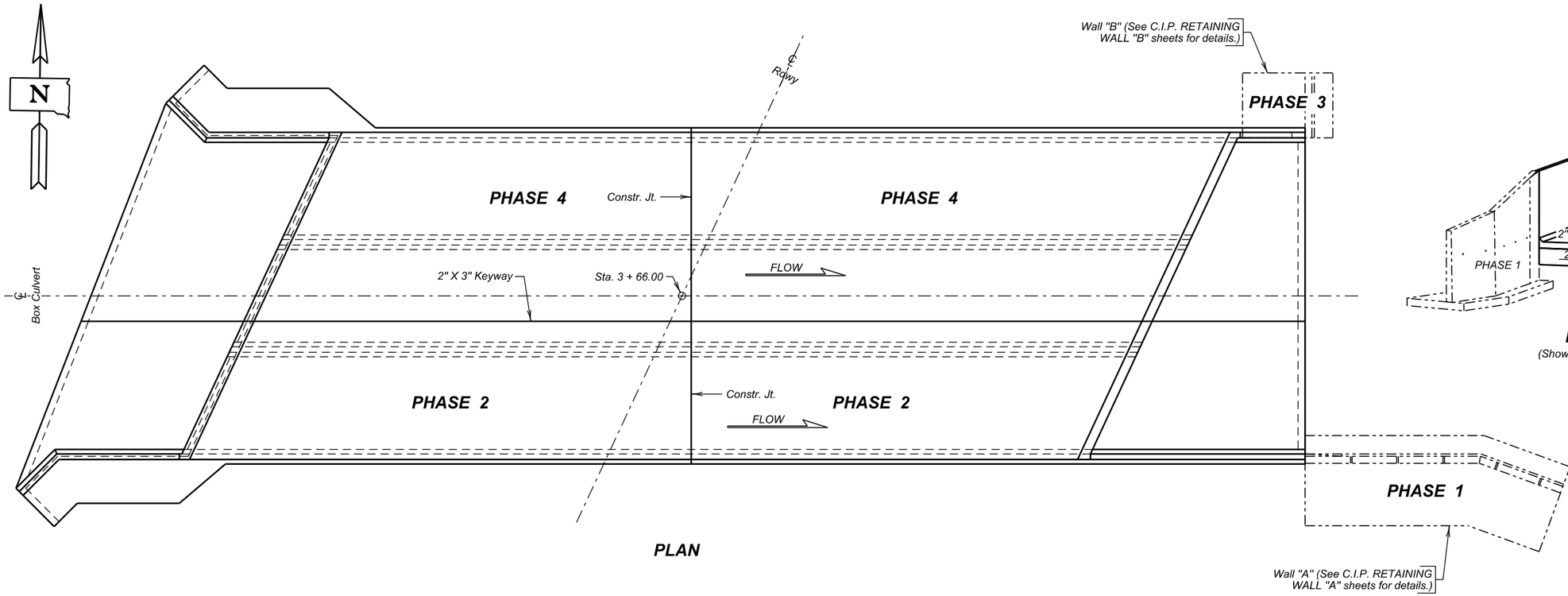
OVER BATTLE CREEK
STA. 3 + 66.00
STR. NO. 52-317-433

25° RHF SKEW
SEC. 8-T2S-R6E
P 016A(11)56
HL-93

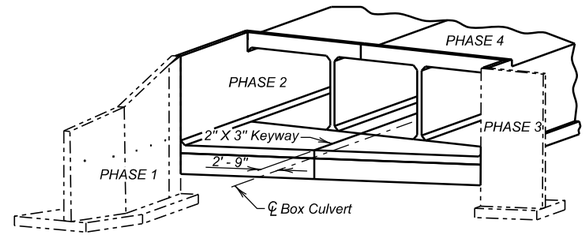
PENNINGTON COUNTY
S. D. DEPT. OF TRANSPORTATION
MAY 2024

DESIGNED BY	CK. DES. BY	DRAFTED BY	
BB PENN05V8	BR 05V8LA02	MG	Steve A Johnson BRIDGE ENGINEER

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P 016A(11)56	E5	E25

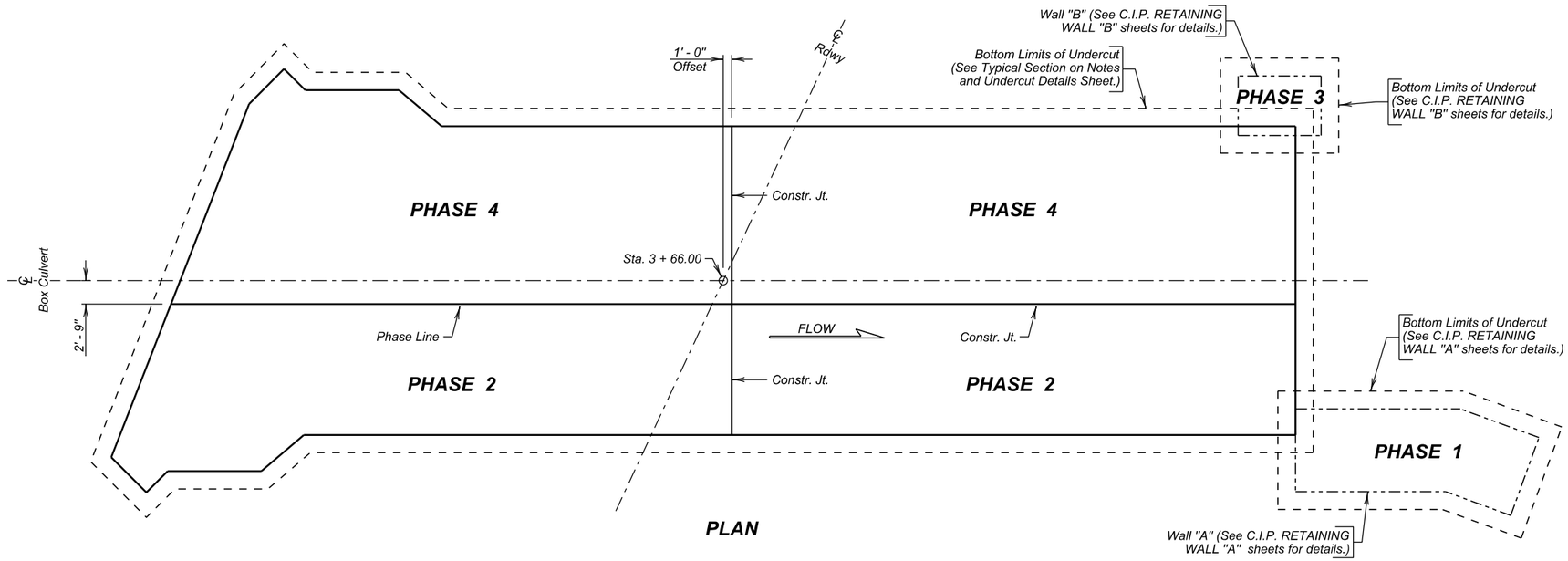


PLAN



ISOMETRIC VIEW

(Showing outlet end with phasing details.)



PLAN

NOTE:
Phase construction is required to convey stream.

PHASE CONSTRUCTION DETAILS

FOR

3 - 11' X 8' BOX CULVERT

OVER BATTLE CREEK — 25° RHF SKEW

STA. 3 + 66.00 — SEC. 8-T2S-R6E

STR. NO. 52-317-433 — P 016A(11)56

HL-93

PENNINGTON COUNTY

S. D. DEPT. OF TRANSPORTATION

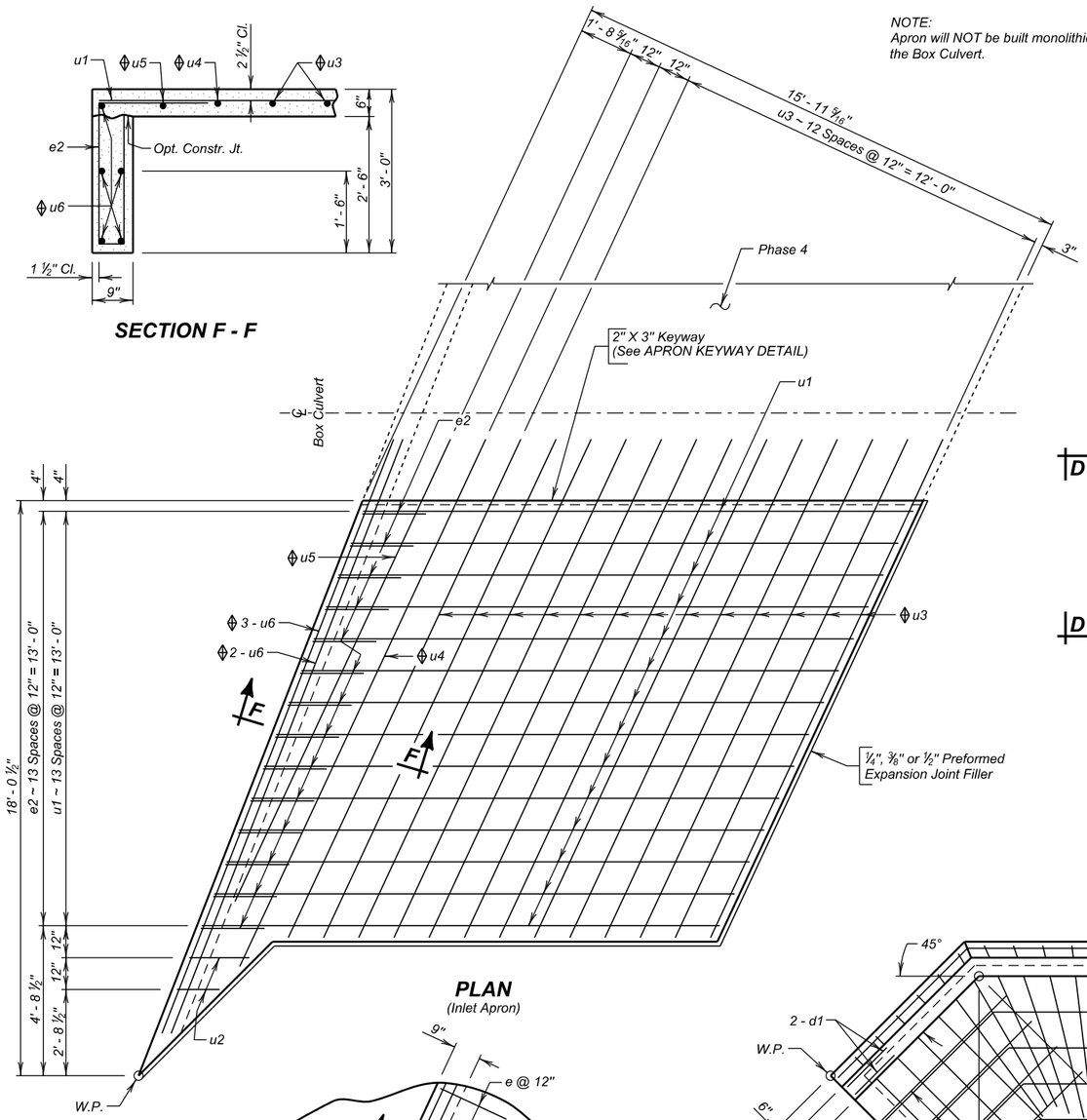
MAY 2024

DESIGNED BY	CK. DES. BY	DRAFTED BY	
BB	BR	MG	Steve A Johnson BRIDGE ENGINEER
PENN05V8	05V8LA03		

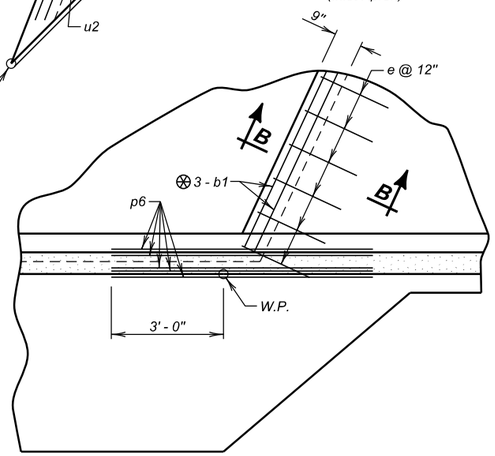
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P 016A(11)56	E6	E25

SECTION F - F

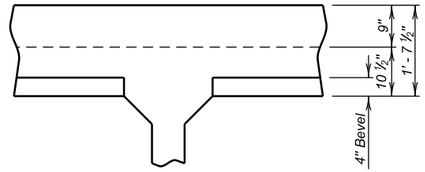
NOTE:
Apron will NOT be built monolithic with the Box Culvert.



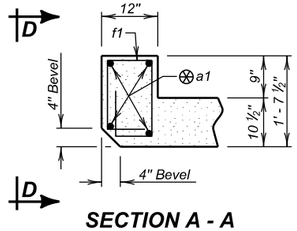
PLAN
(Inlet Apron)



DETAIL "X"
(At Bottom Slab)

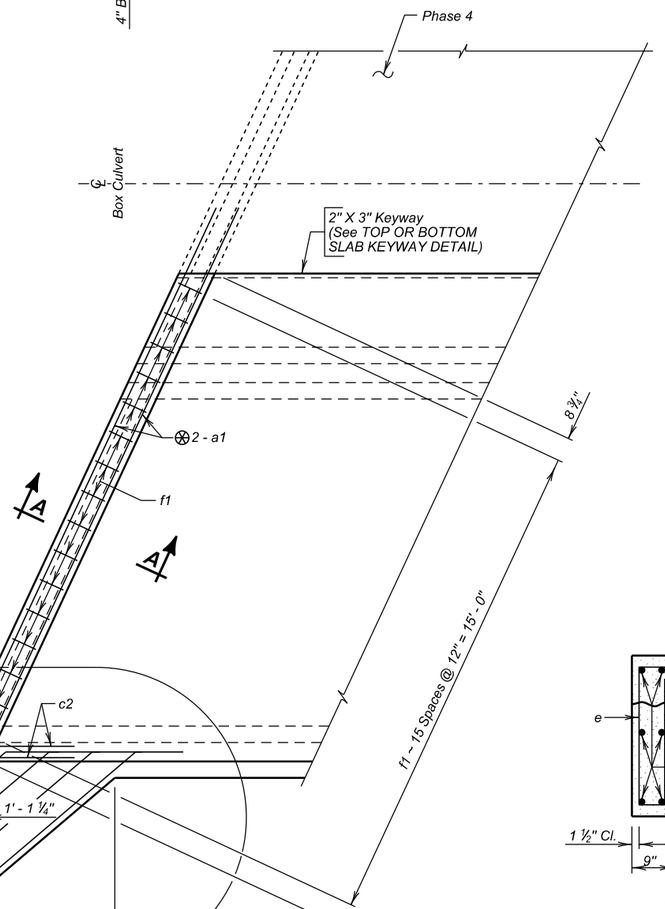


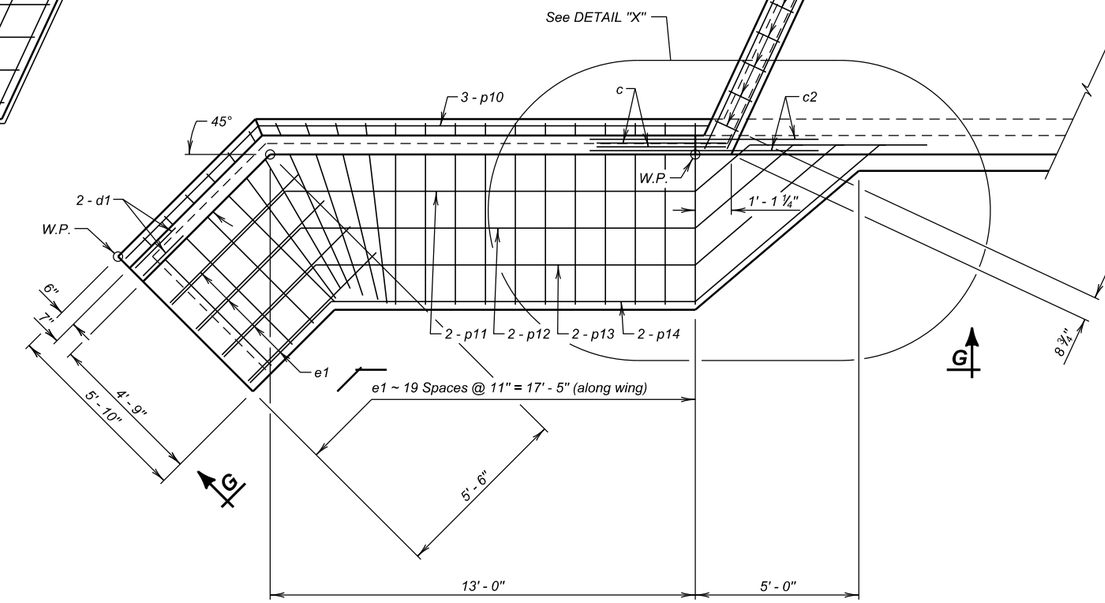
VIEW D - D
(At Middle Wall)



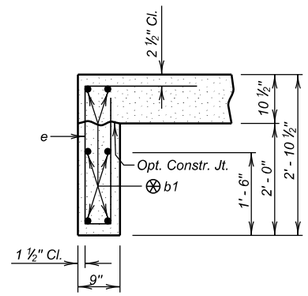
SECTION A - A
(At Top Slab)

NOTES:
⟠ 2' - 0" min. lap
⊛ 2' - 3" min. lap





PLAN



SECTION B - B

INLET DETAILS (A) - PHASE 2

FOR

3 - 11' X 8' BOX CULVERT

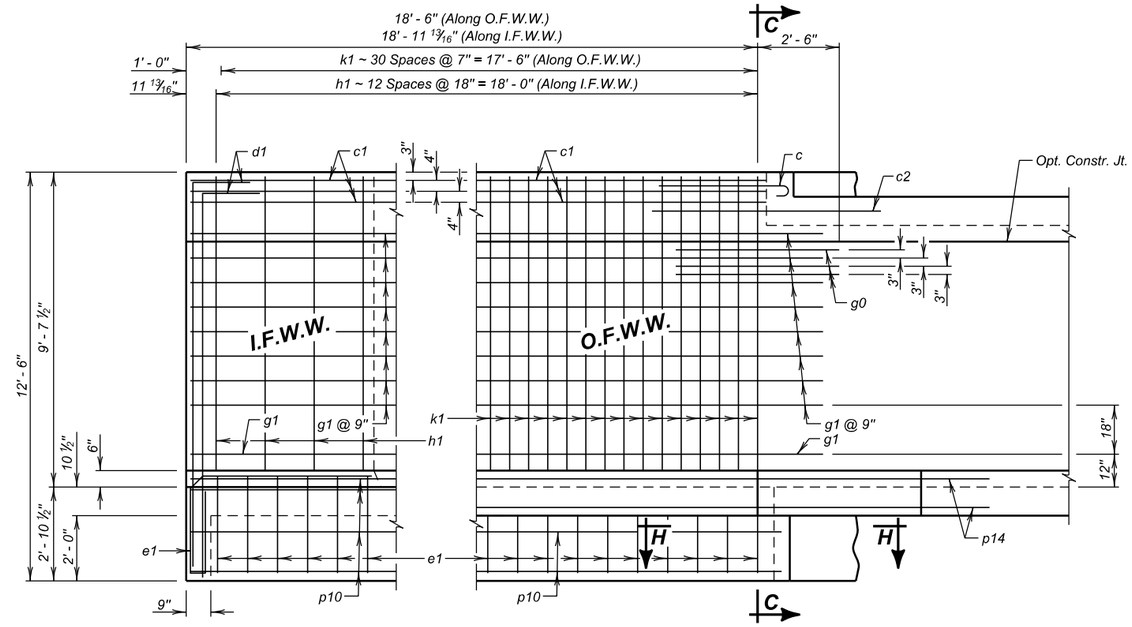
OVER BATTLE CREEK
STA. 3 + 66.00
STR. NO. 52-317-433

25° RHF SKEW
SEC. 8-T2S-R6E
P 016A(11)56
HL-93

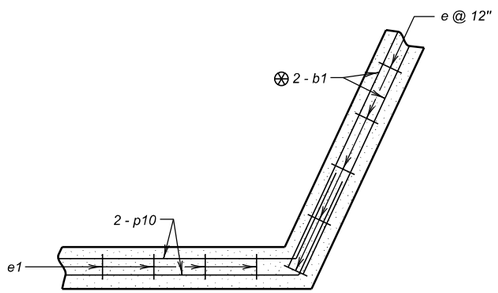
PENNINGTON COUNTY
S. D. DEPT. OF TRANSPORTATION
MAY 2024

DESIGNED BY	CK. DES. BY	DRAFTED BY	
BB	BR	MG	Steve A Johnson BRIDGE ENGINEER
PENN05V8	05V8LA04		

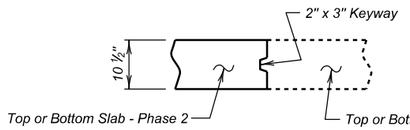
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P 016A(11)56	E7	E25



VIEW G - G

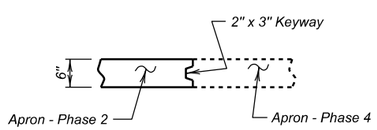


SECTION H - H



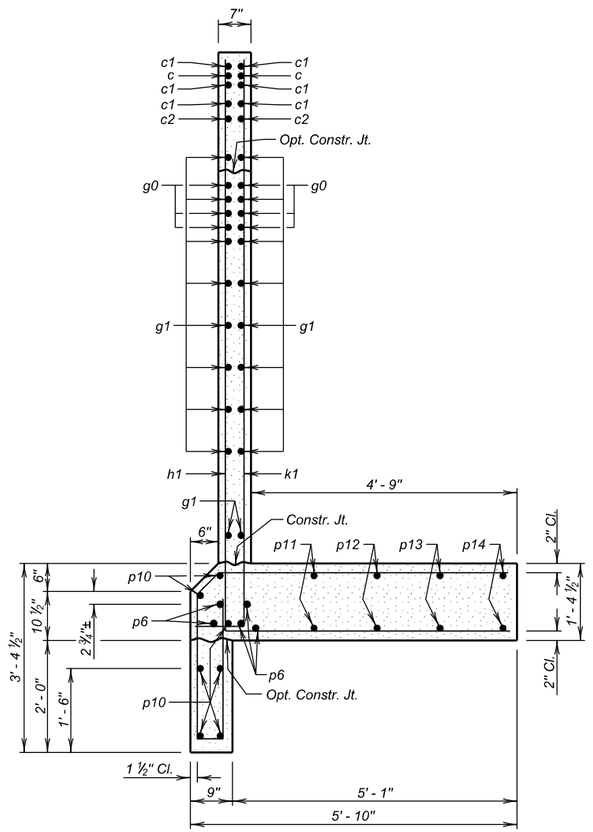
TOP OR BOTTOM SLAB KEYWAY DETAIL

(Resteel not shown)



APRON KEYWAY DETAIL

(Resteel not shown)

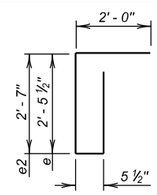


SECTION C - C

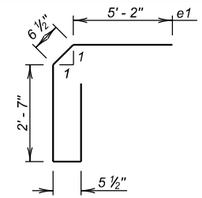
REINFORCING SCHEDULE

	Mk.	No.	Size	Length	Type
	a1	4	6	18' - 6"	Str.
	b1	6	6	18' - 3"	Str.
	c	2	5	4' - 6"	1A
*	c1	6	5	18' - 3"	Str.
	c2	2	5	7' - 0"	Str.
	d1	4	5	13' - 6"	17A
	e	16	4	7' - 3"	S12
	e1	24	4	11' - 3"	S12A
	f1	16	4	5' - 6"	S6A
	g0	6	5	5' - 0"	Str.
	g1	18	4	20' - 9"	19B
	h1	13	4	15' - 3"	17A
	k1	31	4	11' - 0"	17A
	p6	5	6	7' - 0"	Str.
	p10	7	4	21' - 6"	19B
*	p11	2	4	21' - 3"	Str.
**	p12	2	4	22' - 0"	Str.
**	p13	2	4	22' - 9"	Str.
*	p14	2	4	23' - 6"	Str.
	INLET APRON				
	e2	15	4	7' - 6"	S12
BB	u1	7	4	33' - 6"	Str.
	u2	1	4	3' - 3"	Str.
	u3	13	4	17' - 3"	Str.
	u4	1	4	18' - 3"	Str.
	u5	1	4	16' - 0"	Str.
	u6	5	4	20' - 0"	Str.

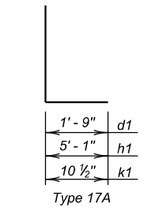
Bending Details



Type S12



Type S12A



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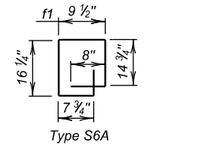
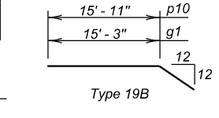
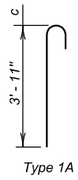


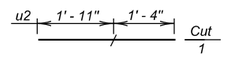
Type S6A

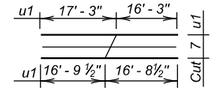


Type 19B



Type 1A





NOTES:

All dimensions are out to out of bars.

BB 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 - Phase 2	13.7	1701	6.6
Inlet Apron - Phase 2	5.8	474	5.8

LEGEND FOR PLACING RE-STEEL

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

INLET DETAILS (B) - PHASE 2

FOR

3 - 11' X 8' BOX CULVERT

OVER BATTLE CREEK
STA. 3 + 66.00
STR. NO. 52-317-433

25° RHF SKEW
SEC. 8-T2S-R6E
P 016A(11)56
HL-93

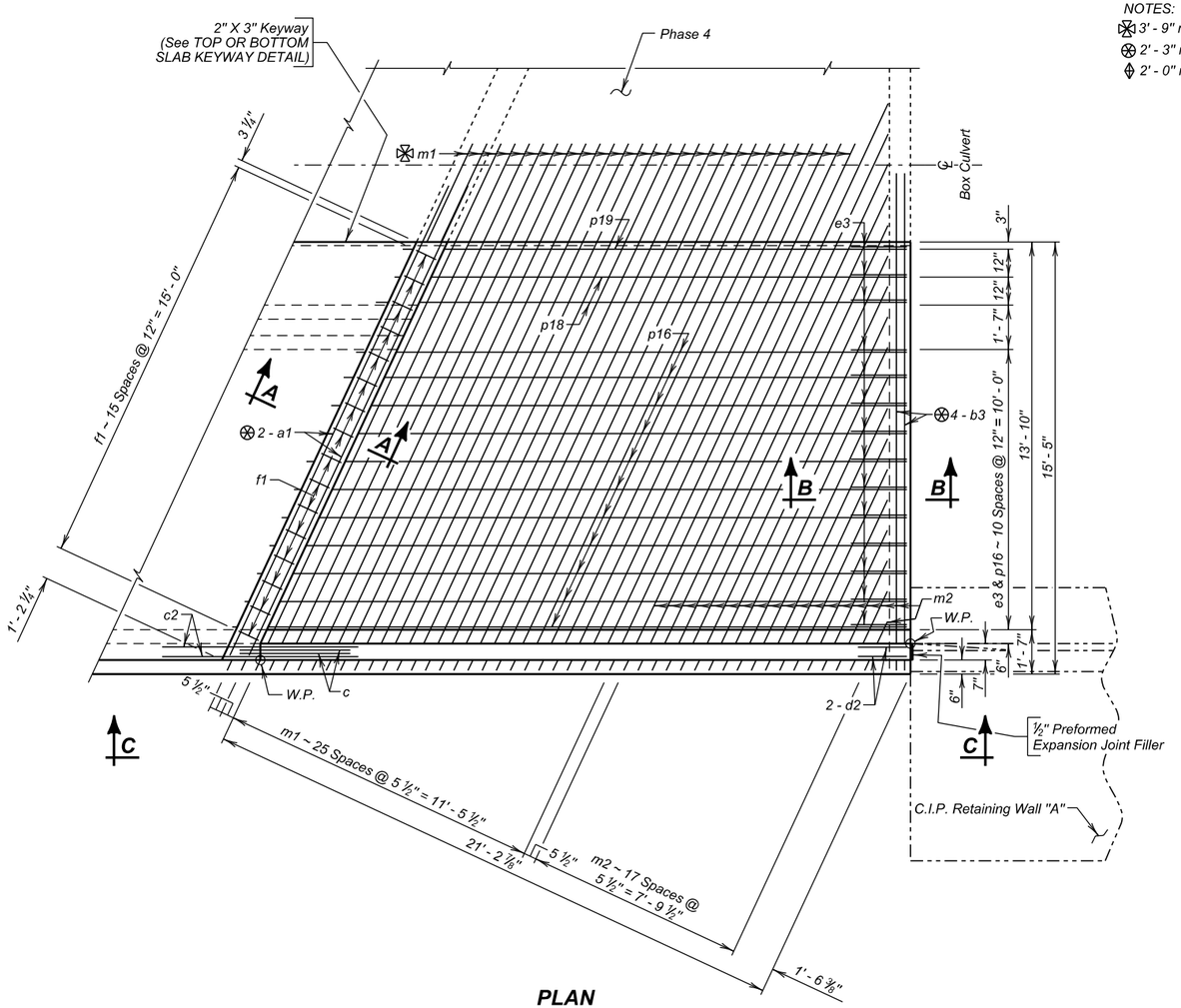
PENNINGTON COUNTY
S. D. DEPT. OF TRANSPORTATION
MAY 2024

5 OF 18

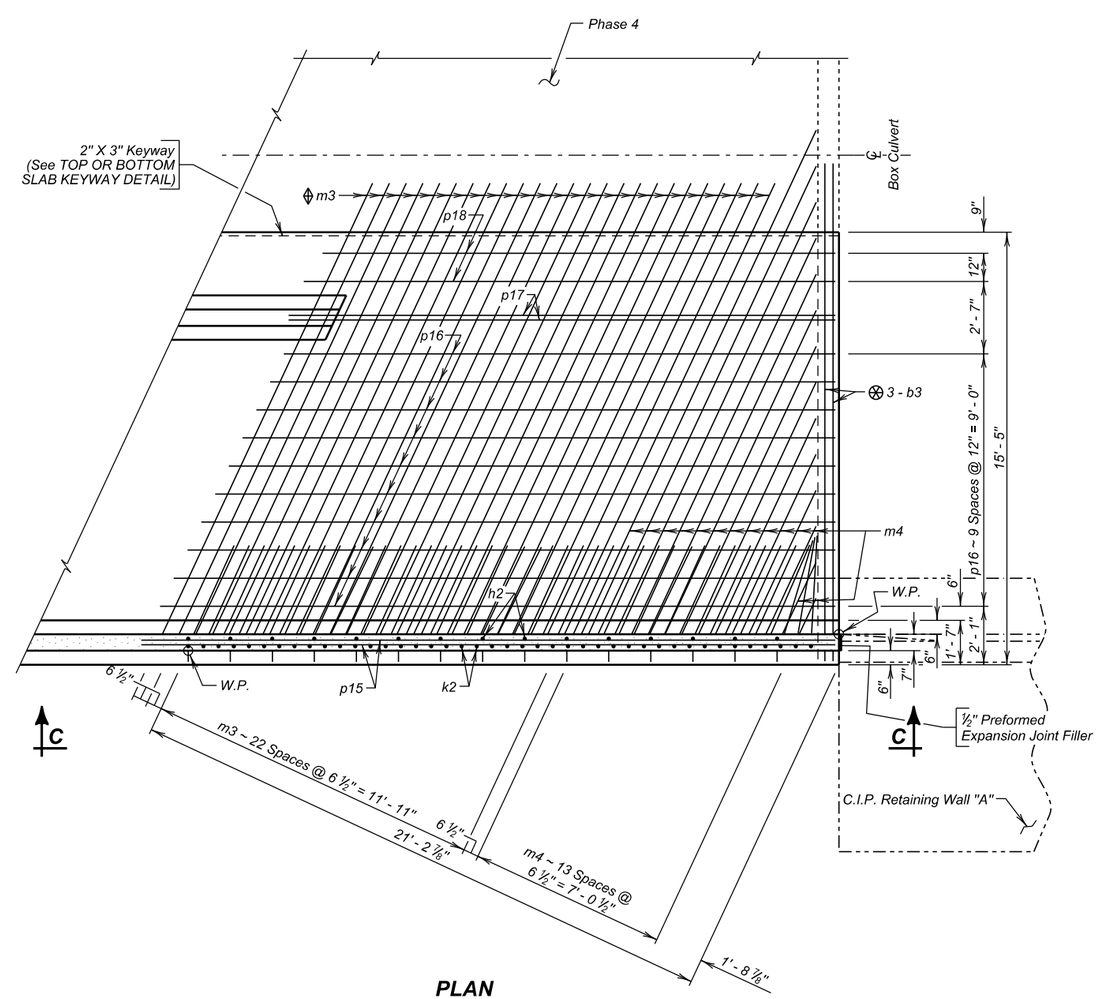
DESIGNED BY	CK. DES. BY	DRAFTED BY	
BB	BR	MG	BRIDGE ENGINEER
PENN05V8	05V8LA05		

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P 016A(11)56	E8	E25

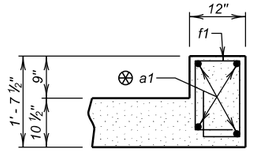
NOTES:
- 3' - 9" min. lap
- 2' - 3" min. lap
- 2' - 0" min. lap



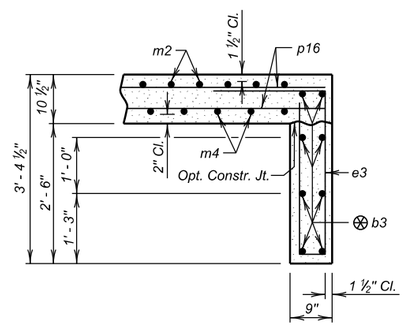
PLAN
(Top Steel)



PLAN
(Bottom Steel)



SECTION A - A
(At Top Slab)



SECTION B - B

OUTLET DETAILS (A) - PHASE 2

FOR

3 - 11' X 8' BOX CULVERT

OVER BATTLE CREEK
STA. 3 + 66.00
STR. NO. 52-317-433

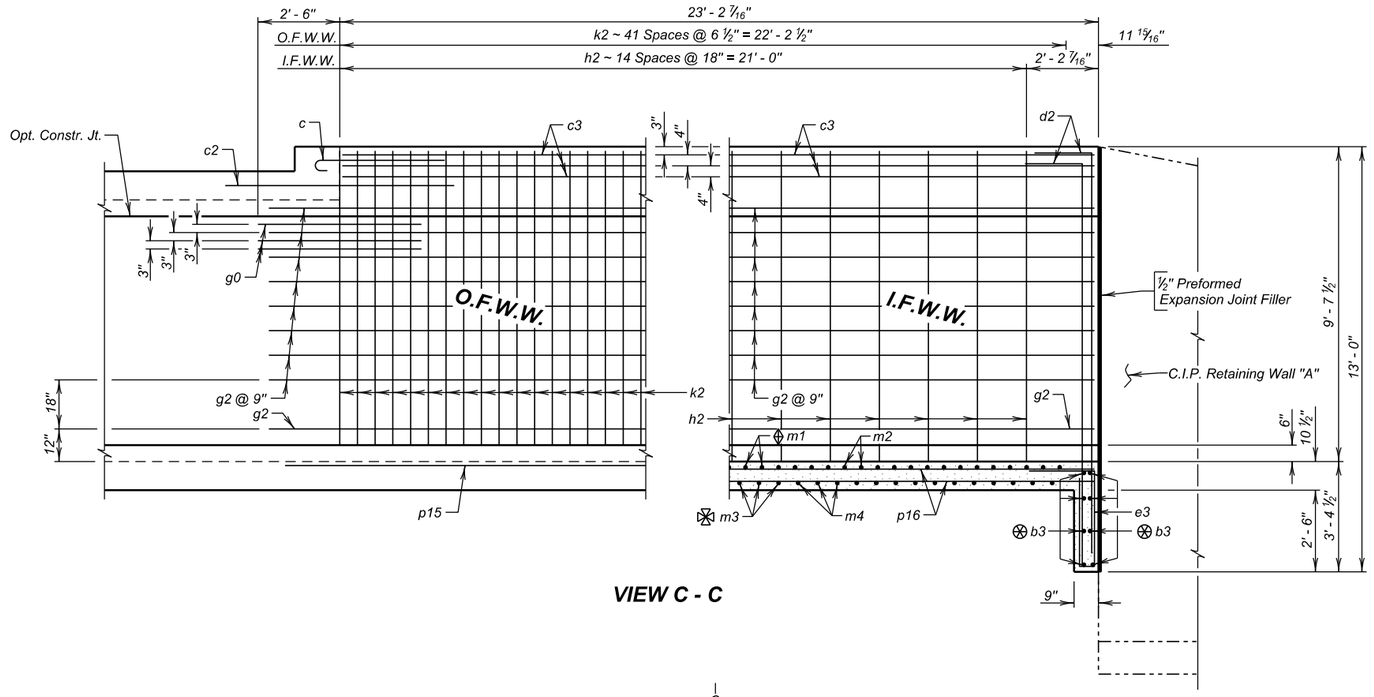
25° RHF SKEW
SEC. 8-T2S-R6E
P 016A(11)56
HL-93

PENNINGTON COUNTY
S. D. DEPT. OF TRANSPORTATION
MAY 2024

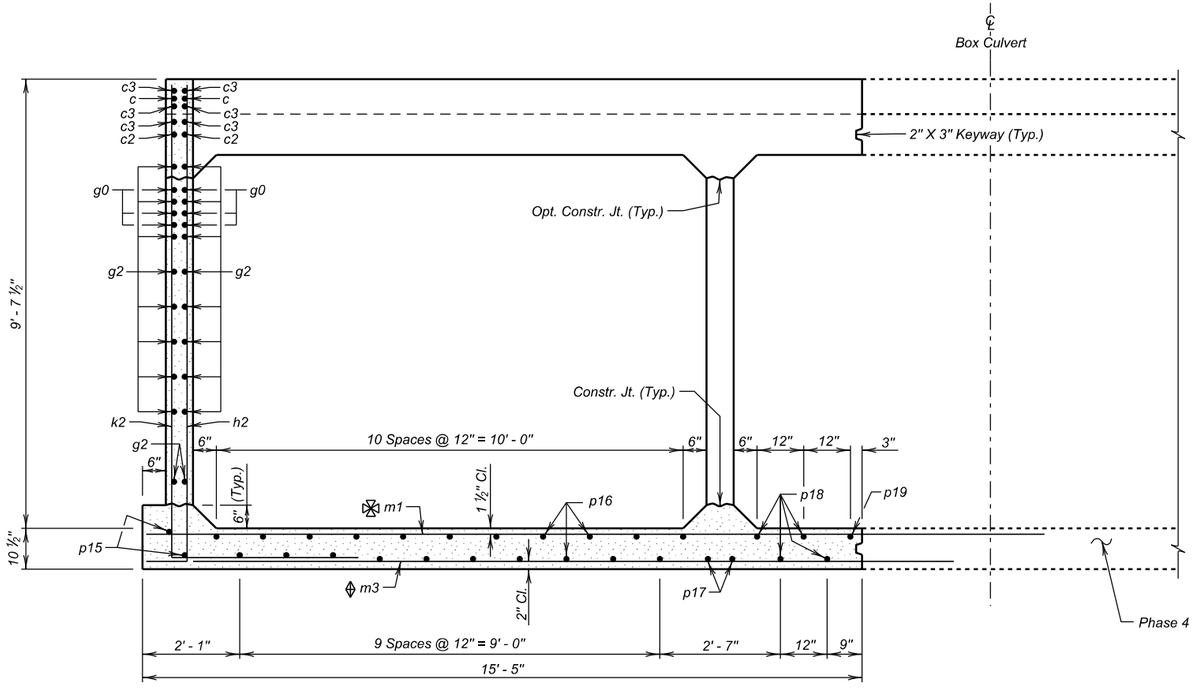
6 OF 18

DESIGNED BY	CK. DES. BY	DRAFTED BY	
BB	BR	MG	Steve A Johnson BRIDGE ENGINEER
PENN05V8	05V8LA06		

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P 016A(11)56	E9	E25

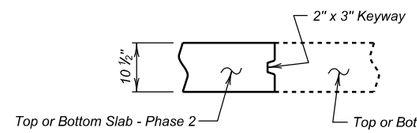


VIEW C - C



TYPICAL OUTLET SECTION

(At parapet)



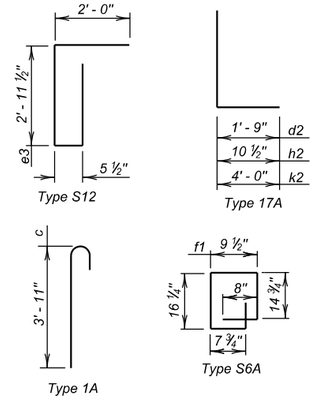
TOP OR BOTTOM SLAB KEYWAY DETAIL

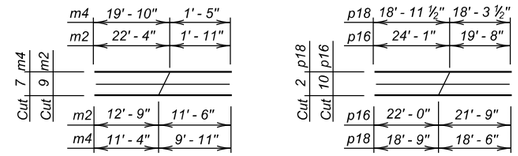
(Resteel not shown)

REINFORCING SCHEDULE

Mk.	No.	Size	Length	Type
a1	4	6	18' - 6"	Str.
b3	8	6	17' - 9"	Str.
c	2	5	4' - 6"	1A
c2	2	5	7' - 0"	Str.
c3	6	5	23' - 0"	Str.
d2	4	5	14' - 0"	17A
e3	14	4	8' - 3"	S12
f1	16	4	5' - 6"	S6A
g0	6	5	5' - 0"	Str.
g2	18	4	25' - 3"	19B
h2	15	4	11' - 0"	17A
k2	42	6	14' - 3"	17A
m1	28	8	20' - 9"	Str.
⌀ m2	9	8	24' - 3"	Str.
m3	25	4	17' - 9"	Str.
⌀ m4	7	4	21' - 3"	Str.
p15	4	4	24' - 9"	Str.
⌀ p16	10	4	43' - 9"	Str.
p17	2	4	19' - 6"	Str.
⌀ p18	2	4	37' - 3"	Str.
p19	1	4	18' - 0"	Str.

Bending Details





NOTES:
All dimensions are out to out of bars.
⌀ *See cutting diagram.*

ESTIMATED QUANTITIES

ITEM	Class A45 Concrete, Box Culvert	Reinforcing Steel	Structure Excavation, Box Culvert
UNIT	Cu. Yd.	Lb.	Cu. Yd.
Outlet - Phase 2	19.6	5007	13.0

LEGEND FOR PLACING RE-STEEL

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

OUTLET DETAILS (B) - PHASE 2

FOR

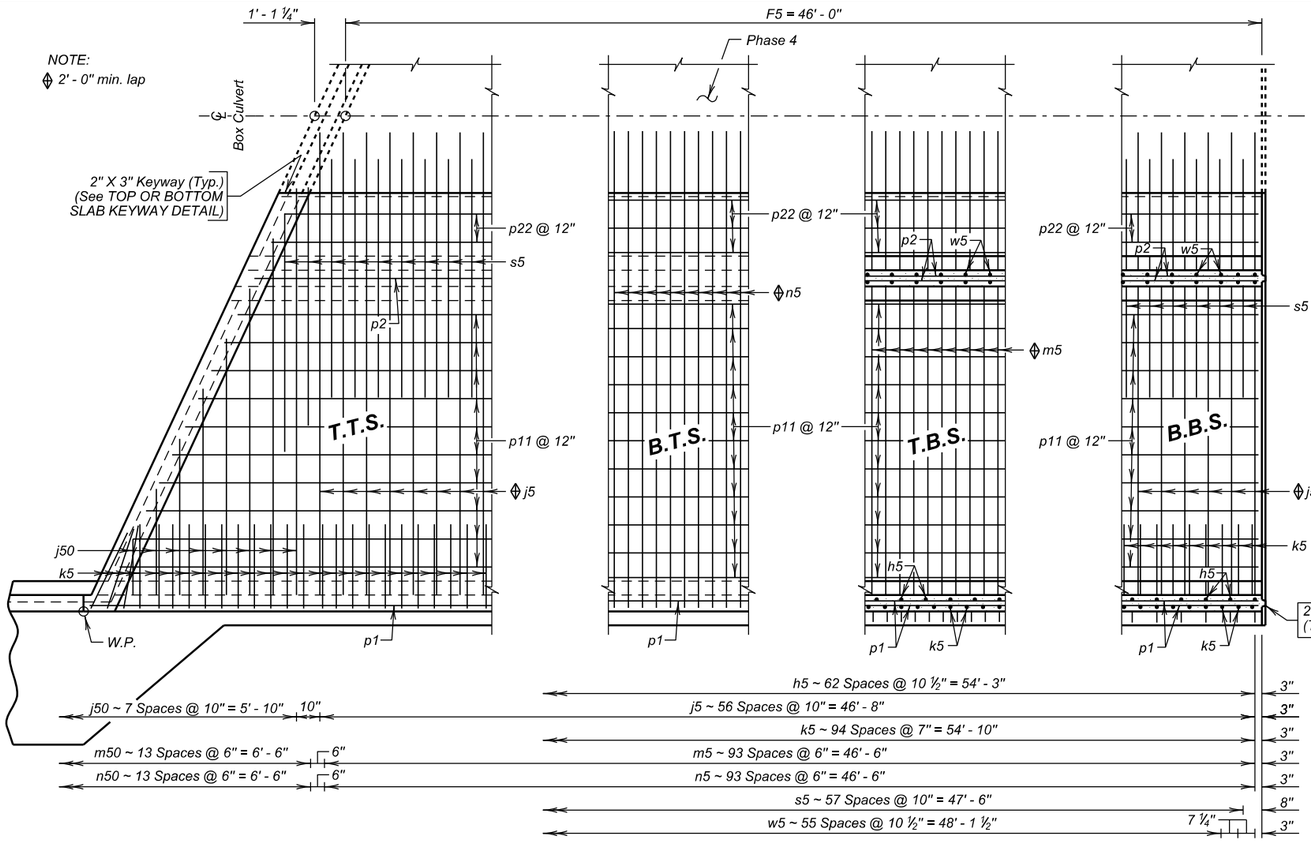
3 - 11' X 8' BOX CULVERT

OVER BATTLE CREEK — 25° RHF SKEW
STA. 3 + 66.00 — SEC. 8-T2S-R6E
STR. NO. 52-317-433 — P 016A(11)56
HL-93

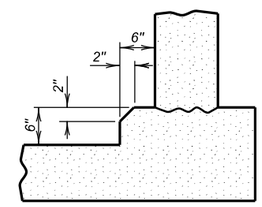
PENNINGTON COUNTY
S. D. DEPT. OF TRANSPORTATION
MAY 2024

DESIGNED BY	CK. DES. BY	DRAFTED BY	
BB	BR	MG	Steve A. Johnson BRIDGE ENGINEER
PENN05V8	05V8LA07		

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P 016A(11)56	E10	E25



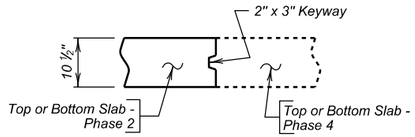
PLAN
(Inlet end Phase 2 shown)



OPTIONAL FILLET DETAIL
(At Bottom Slab)

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

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

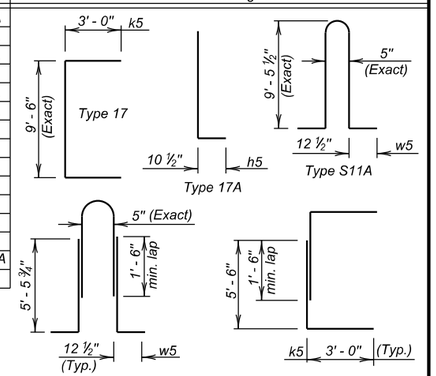


TOP OR BOTTOM SLAB KEYWAY DETAIL
(Resteel not shown)

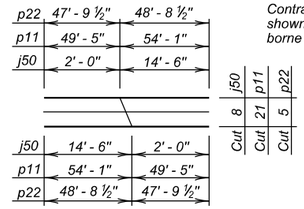
REINFORCING SCHEDULE
(For One F5 Barrel End Section)

	Mk.	No.	Size	Length	Type
	h5	63	4	10' - 0"	17A
	j5	114	4	16' - 6"	Str.
⍁	j50	8	4	16' - 6"	Str.
	k5	95	4	15' - 6"	17
	m5	94	5	17' - 6"	Str.
⍁	m50	7	5	19' - 3"	Str.
	n5	94	5	17' - 0"	Str.
⍁	n50	7	5	18' - 3"	Str.
	p1	14	4	55' - 0"	Str.
	p2	13	4	49' - 6"	Str.
⍁	p11	21	4	103' - 6"	Str.
⍁	p22	5	4	96' - 6"	Str.
	s5	116	4	8' - 6"	Str.
	w5	58	4	21' - 3"	S11A
△	z1	38	5	3' - 6"	Str.

Bending Details



OPTIONAL w5 SPLICE DETAIL OPTIONAL k5 SPLICE DETAIL



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

NOTES:

⍁ *See cutting diagram.*

All dimensions are out to out of bars.

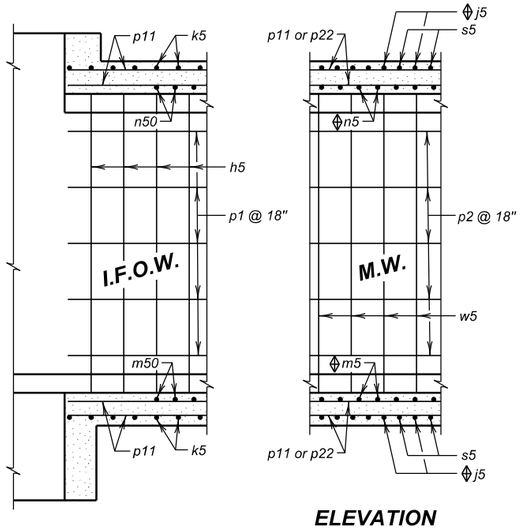
Request for additional reinforcing steel splices at points other than those shown, must be submitted to the Engineer for prior approval. If additional splices are approved, no payment will be allowed for the added quantity of reinforcing steel.

ESTIMATED QUANTITIES

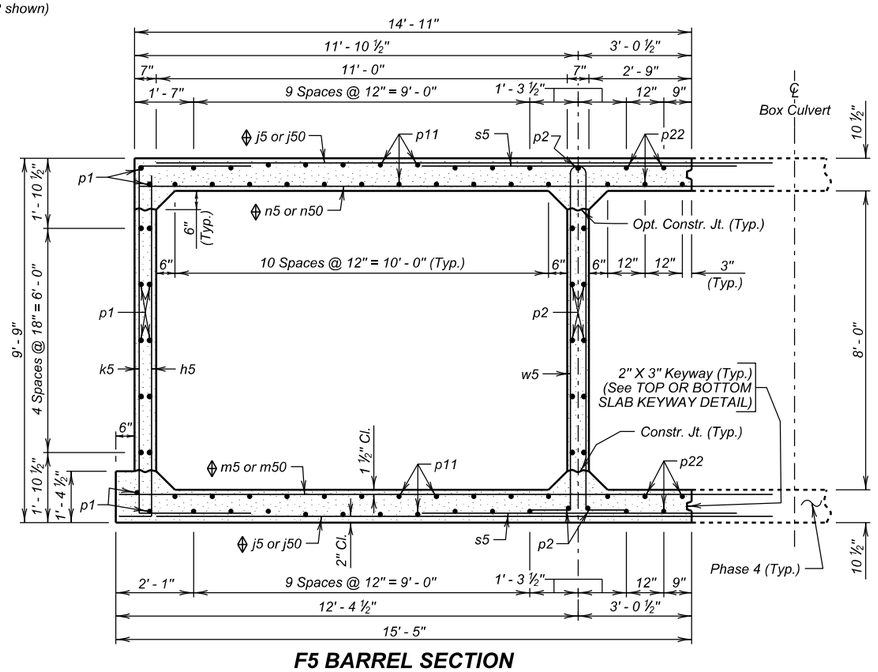
ITEM	Class A45 Concrete, Box Culvert	Reinforcing Steel	Structure Excavation, Box Culvert
UNIT	Cu.Yd.	Lb.	Cu.Yd.
F5 Barrel End Section @ 46' - 0" - Phase 2	69.3	10745	25.4

LEGEND FOR PLACING RE-STEEL

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



ELEVATION



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

F5 BARREL END SECTION DETAILS (46' - 0") - PHASE 2

FOR

3 - 11' X 8' BOX CULVERT

OVER BATTLE CREEK
STA. 3 + 66.00
STR. NO. 52-317-433

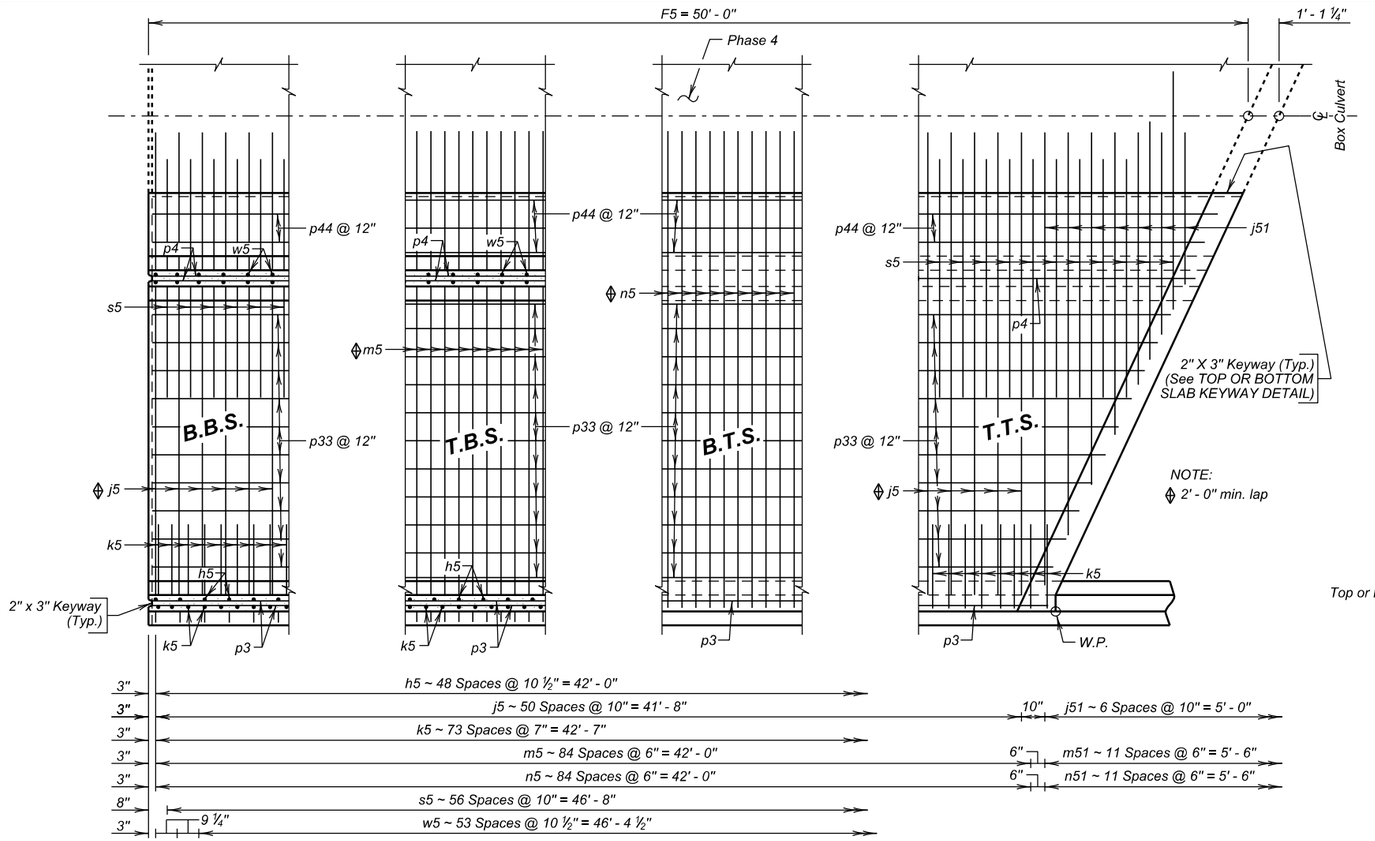
25° RHF SKEW
SEC. 8-T2S-R6E
P 016A(11)56
HL-93

PENNINGTON COUNTY
S. D. DEPT. OF TRANSPORTATION
MAY 2024

8 OF 18

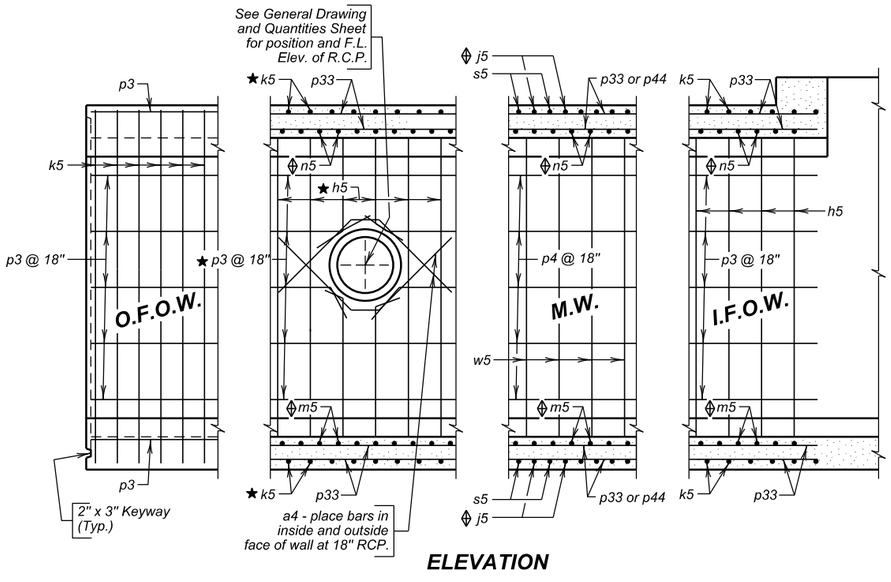
DESIGNED BY	CK. DES. BY	DRAFTED BY	
BB	BR	MG	BRIDGE ENGINEER
PENN05V8	05V8LA08		

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P 016A(11)56	E11	E25

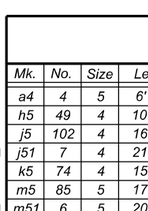


PLAN
(Outlet end Phase 2 shown)

★ NOTE:
Cut and bend h5, k5, and p3 bars as required to place 18" RCP thru barrel wall.

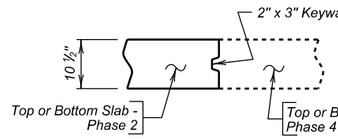


ELEVATION



OPTIONAL FILLET DETAIL
(At Bottom Slab)

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

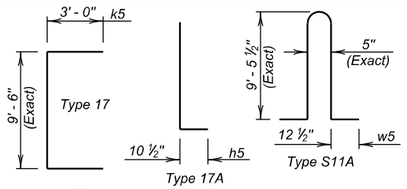


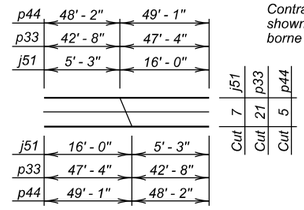
TOP OR BOTTOM SLAB KEYWAY DETAIL
(Resteel not shown)

REINFORCING SCHEDULE
(For One F5 Barrel End Section)

Mk.	No.	Size	Length	Type
a4	4	5	6' - 3"	19A
h5	49	4	10' - 0"	17A
j5	102	4	16' - 6"	Str.
⍁ j51	7	4	21' - 3"	Str.
k5	74	4	15' - 6"	17
m5	85	5	17' - 6"	Str.
⍁ m51	6	5	20' - 3"	Str.
n5	85	5	17' - 0"	Str.
⍁ n51	6	5	20' - 3"	Str.
p3	14	4	42' - 9"	Str.
p4	13	4	48' - 0"	Str.
⍁ p33	21	4	90' - 0"	Str.
⍁ p44	5	4	97' - 3"	Str.
s5	114	4	8' - 6"	Str.
w5	56	4	21' - 3"	S11A

Bending Details





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

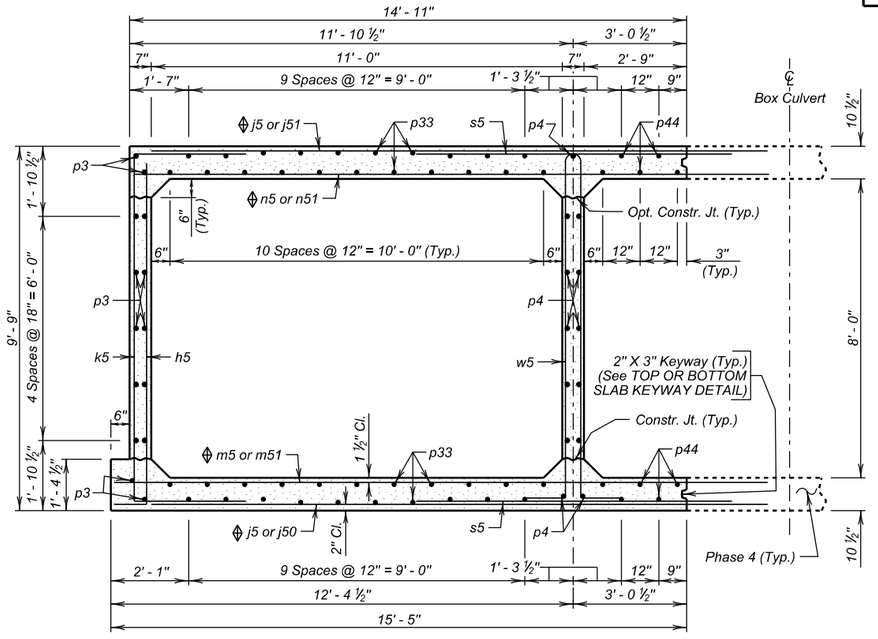
NOTES:
⍁ *See cutting diagram.*
All dimensions are out to out of bars.
Request for additional reinforcing steel splices at points other than those shown, must be submitted to the Engineer for prior approval. If additional splices are approved, no payment will be allowed for the added quantity of reinforcing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

ESTIMATED QUANTITIES

ITEM	Class A45 Concrete, Box Culvert	Reinforcing Steel	Structure Excavation, Box Culvert
UNIT	Cu.Yd.	Lb.	Cu.Yd.
F5 Barrel End Section @ 50' - 0" - Phase 2	61.8	9501	22.6

LEGEND FOR PLACING RE-STEEL

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



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

F5 BARREL END SECTION DETAILS (50' - 0") - PHASE 2
FOR
3 - 11' X 8' BOX CULVERT

OVER BATTLE CREEK
STA. 3 + 66.00
STR. NO. 52-317-433

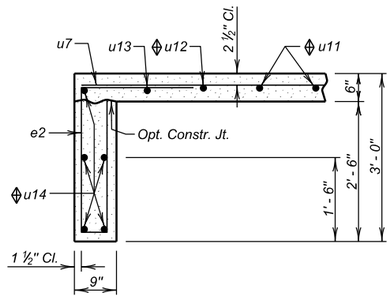
25° RHF SKEW
SEC. 8-T2S-R6E
P 016A(11)56
HL-93

PENNINGTON COUNTY
S. D. DEPT. OF TRANSPORTATION
MAY 2024

9 OF 18

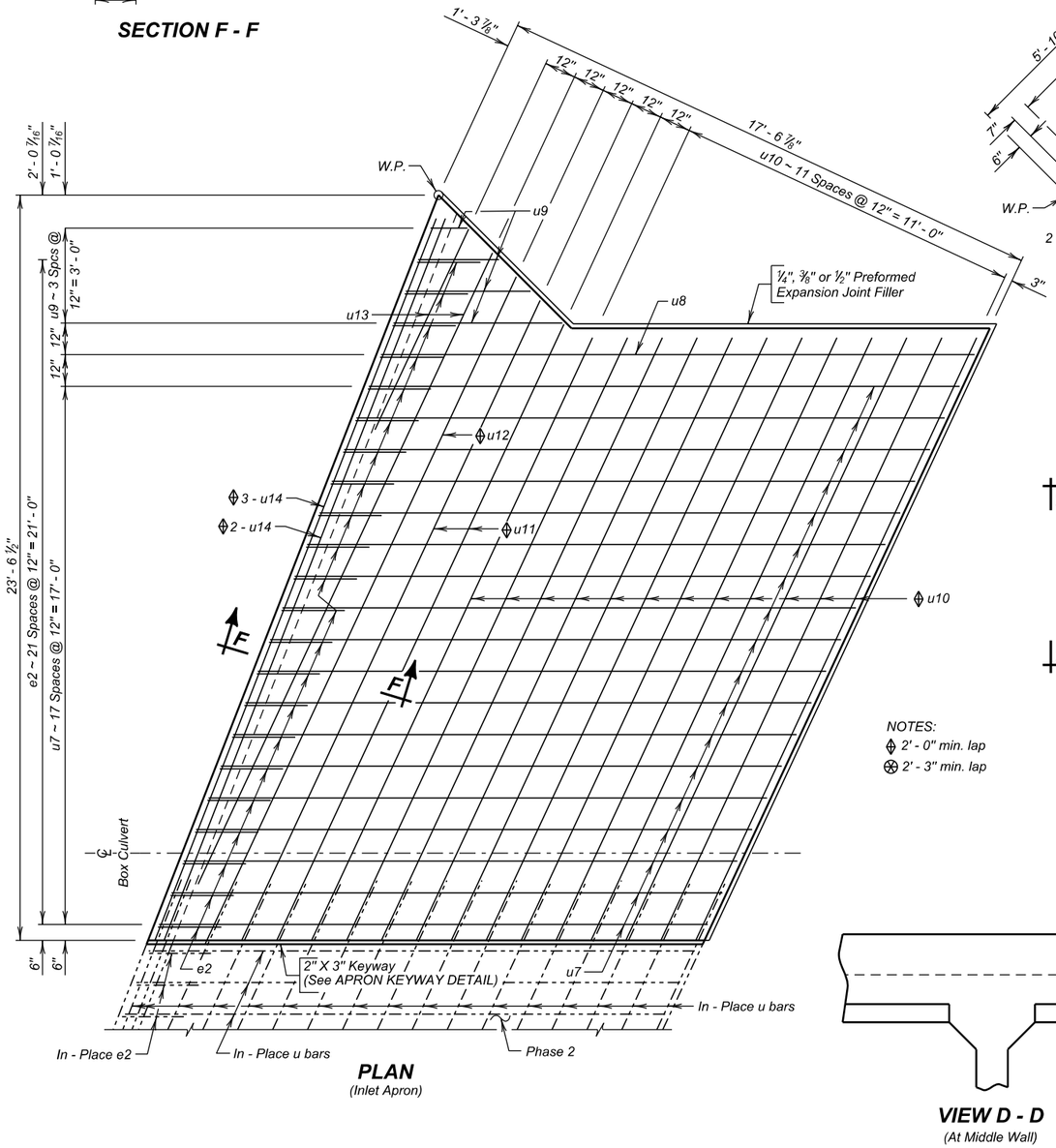
DESIGNED BY	CK. DES. BY	DRAFTED BY	
BB	BR	MG	BRIDGE ENGINEER
PENN05V8	05V8LA09		

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P 016A(11)56	E12	E25



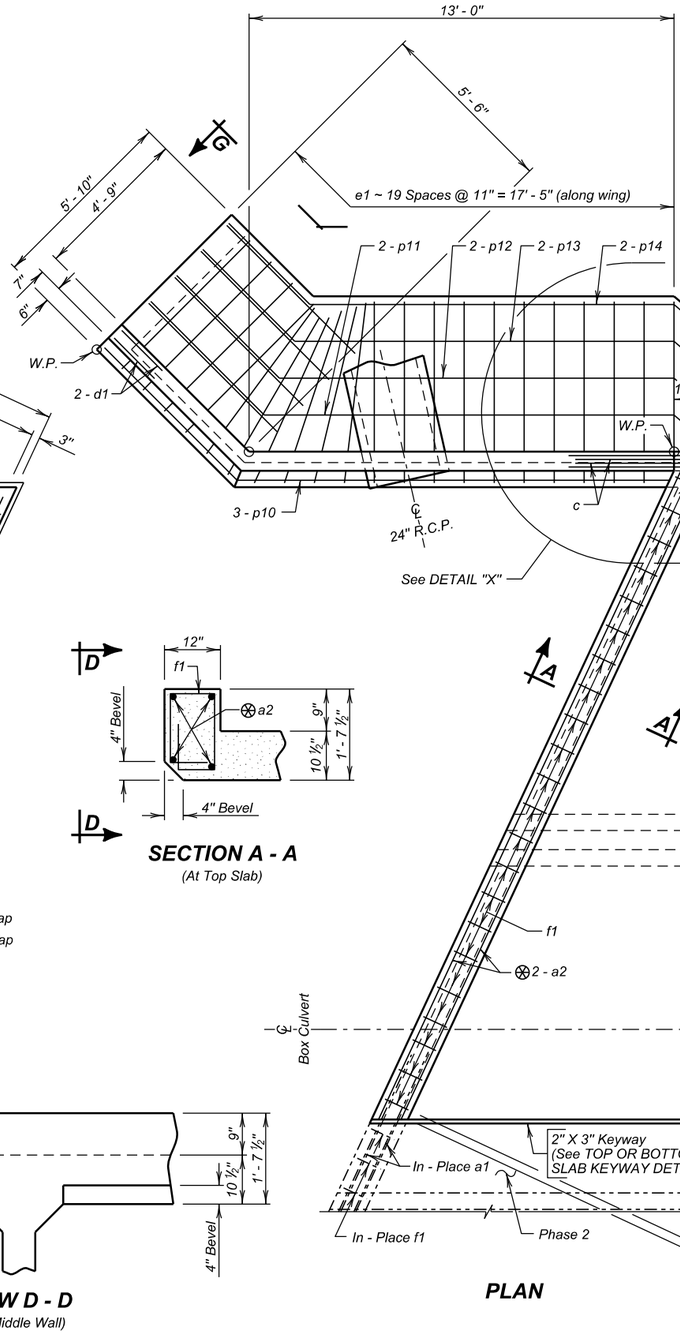
SECTION F - F

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

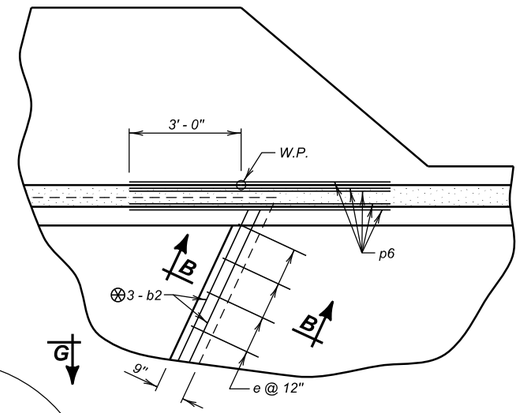


PLAN
(Inlet Apron)

NOTES:
2' - 0" min. lap
2' - 3" min. lap

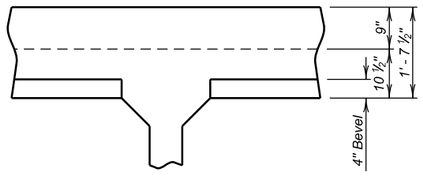


PLAN

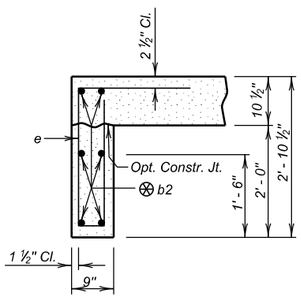


DETAIL "X"
(At Bottom Slab)

SECTION A - A
(At Top Slab)



VIEW D - D
(At Middle Wall)



SECTION B - B

INLET DETAILS (A) - PHASE 4
FOR
3 - 11' X 8' BOX CULVERT

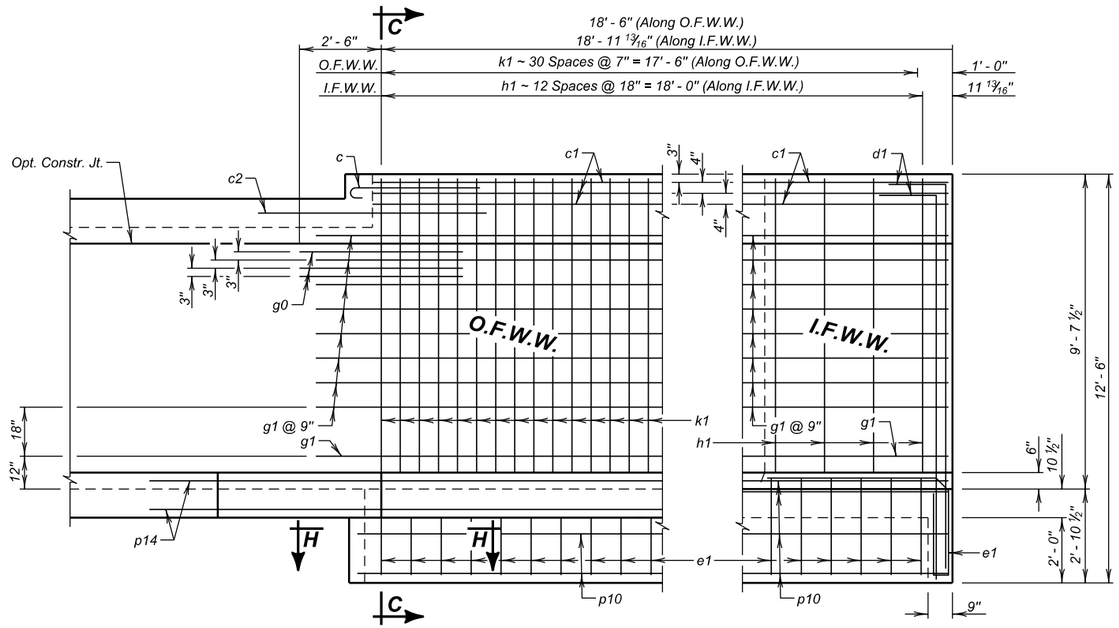
OVER BATTLE CREEK
STA. 3 + 66.00
STR. NO. 52-317-433

25° RHF SKEW
SEC. 8-T2S-R6E
P 016A(11)56
HL-93

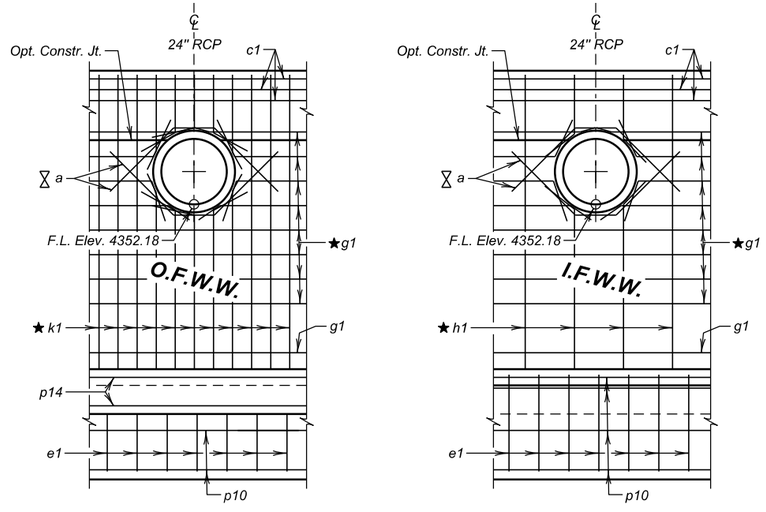
PENNINGTON COUNTY
S. D. DEPT. OF TRANSPORTATION
MAY 2024

DESIGNED BY	CK. DES. BY	DRAFTED BY	
BB PENN05V8	BR 05V8LA10	MG	Steve A Johnson BRIDGE ENGINEER

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P 016A(11)56	E13	E25

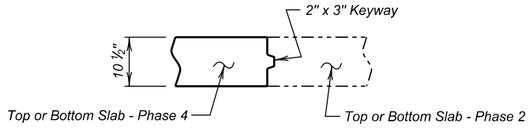


VIEW G - G

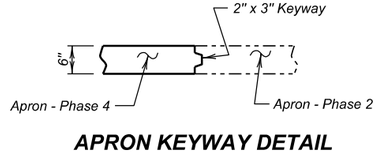


VIEW G - G
(showing typ. steel revision at pipe location)

NOTES:
★ Cut and bend g1, h1, and k1 bars as required to place 24" RCP thru barrel walls.
⧖ Place a bars at inside face and outside face of walls at 24" RCP location.



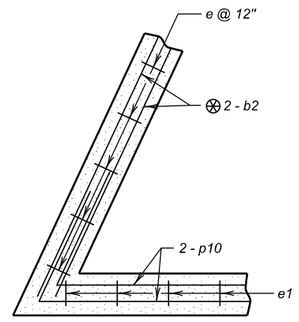
TOP OR BOTTOM SLAB KEYWAY DETAIL
(Resteel not shown)



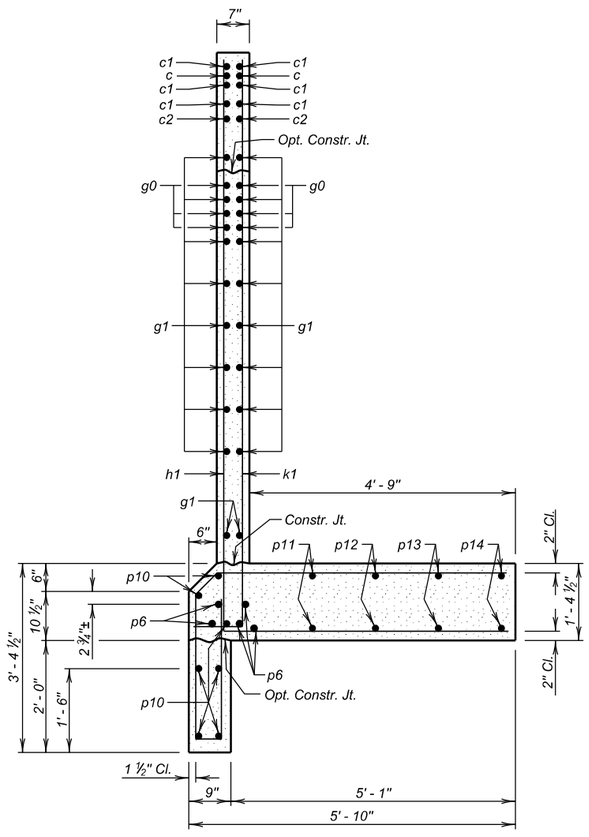
APRON KEYWAY DETAIL
(Resteel not shown)

LEGEND FOR PLACING RE-STEEL

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



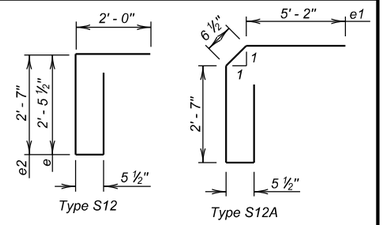
SECTION H - H

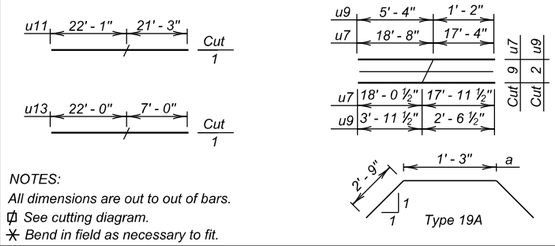


SECTION C - C

REINFORCING SCHEDULE

	Mk.	No.	Size	Length	Type	Bending Details
	a	4	5	6' - 9"	19A	
	a2	4	6	22' - 3"	Str.	
	b2	6	6	22' - 0"	Str.	
	c	2	5	4' - 6"	1A	
✳	c1	6	5	18' - 3"	Str.	
	c2	2	5	7' - 0"	Str.	
	d1	4	5	13' - 6"	17A	
	e	22	4	7' - 3"	S12	
	e1	24	4	11' - 3"	S12A	
	f1	22	4	5' - 6"	S6A	
	g0	6	5	5' - 0"	Str.	
	g1	18	4	20' - 9"	19B	
	h1	13	4	15' - 3"	17A	
	k1	31	4	11' - 0"	17A	
	p6	5	6	7' - 0"	Str.	
	p10	7	4	21' - 6"	19B	
✳	p11	2	4	21' - 3"	Str.	
✳	p12	2	4	22' - 0"	Str.	
✳	p13	2	4	22' - 9"	Str.	
✳	p14	2	4	23' - 6"	Str.	
	INLET APRON					
	e2	22	4	7' - 6"	S12	
⌀	u7	9	4	36' - 0"	Str.	
	u8	1	4	18' - 9"	Str.	
⌀	u9	2	4	6' - 6"	Str.	
	u10	12	4	21' - 0"	Str.	
⌀	u11	1	4	43' - 3"	Str.	
	u12	1	4	23' - 0"	Str.	
⌀	u13	1	4	29' - 0"	Str.	
	u14	5	4	24' - 6"	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 - Phase 4	13.9	1836	4.5
Inlet Apron - Phase 4	8.5	662	8.5

INLET DETAILS (B) - PHASE 4
FOR
3 - 11' X 8' BOX CULVERT

OVER BATTLE CREEK
STA. 3 + 66.00
STR. NO. 52-317-433

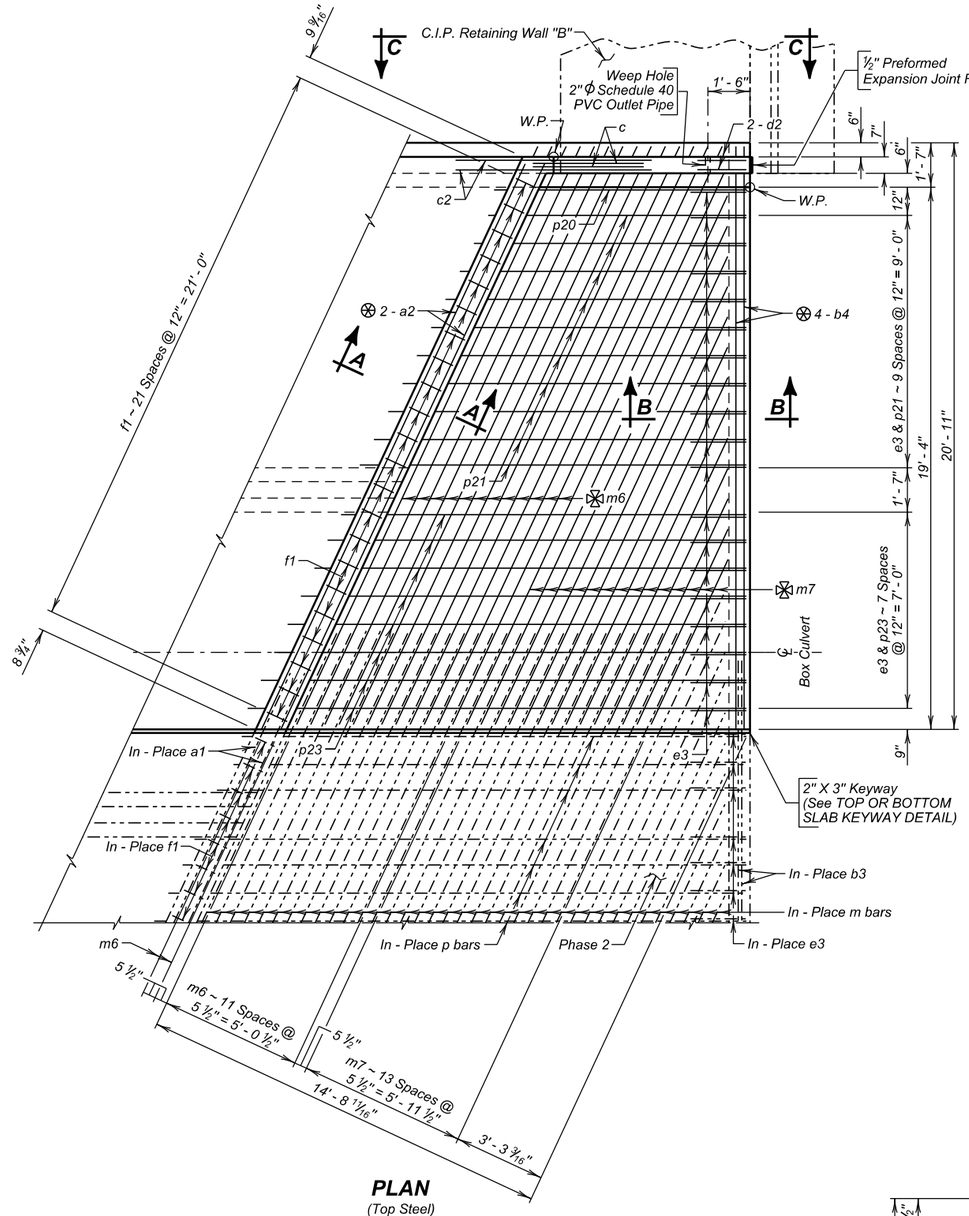
25° RHF SKEW
SEC. 8-T2S-R6E
P 016A(11)56
HL-93

PENNINGTON COUNTY
S. D. DEPT. OF TRANSPORTATION
MAY 2024

11 OF 18

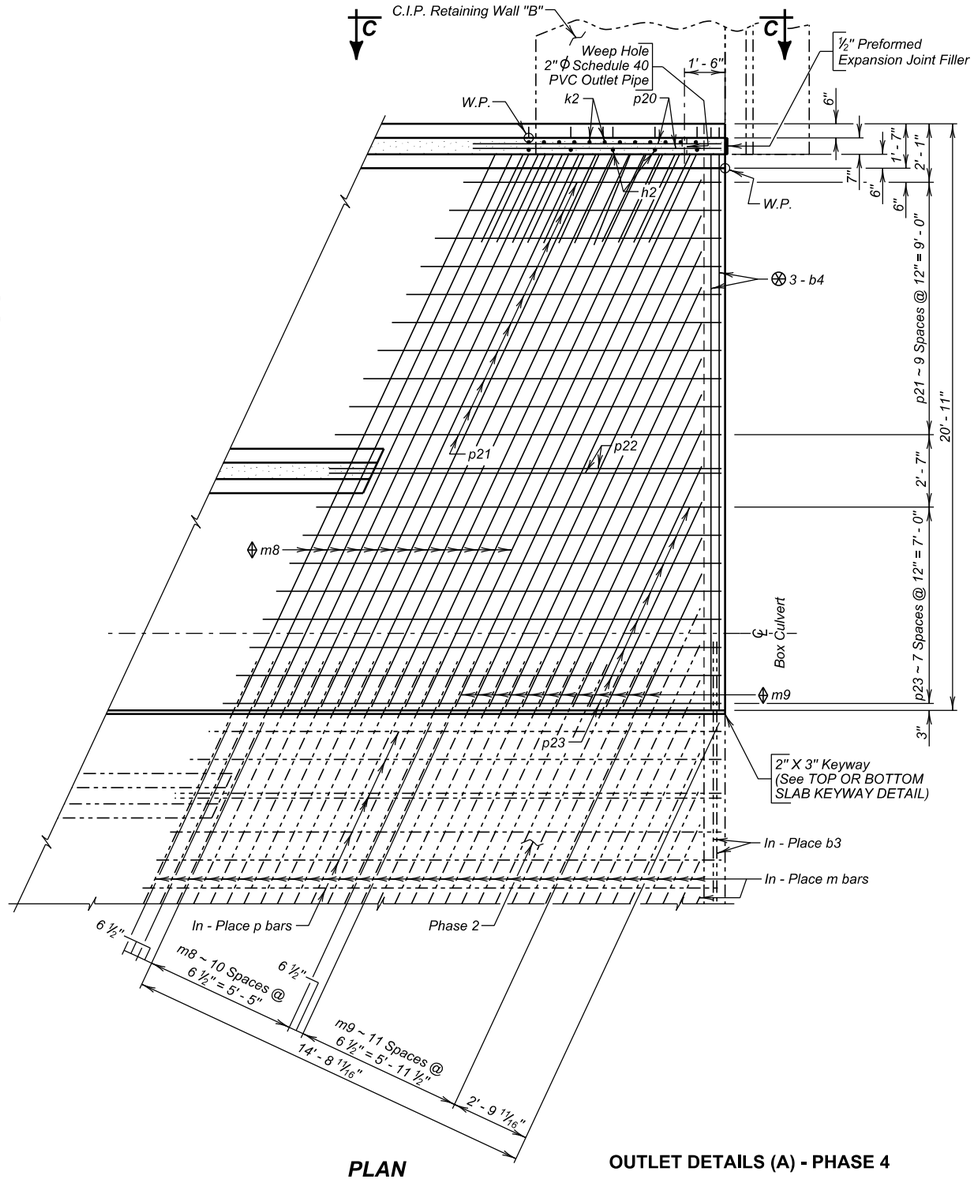
DESIGNED BY	CK. DES. BY	DRAFTED BY	
BB	BR	MG	Steve A Johnson BRIDGE ENGINEER
PENN05V8	05V8LA11		

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P 016A(11)56	E14	E25

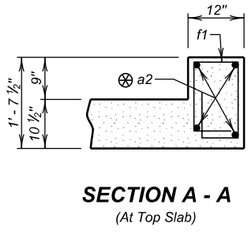


PLAN
(Top Steel)

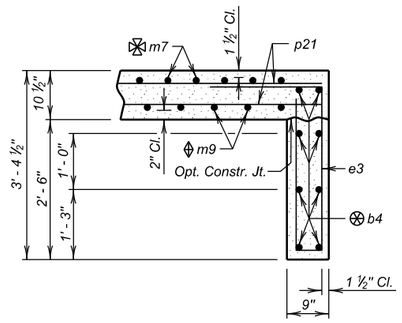
NOTES:
- 3' - 9" min. lap
- 2' - 3" min. lap
- 2' - 0" min. lap



PLAN
(Bottom Steel)



SECTION A - A
(At Top Slab)



SECTION B - B

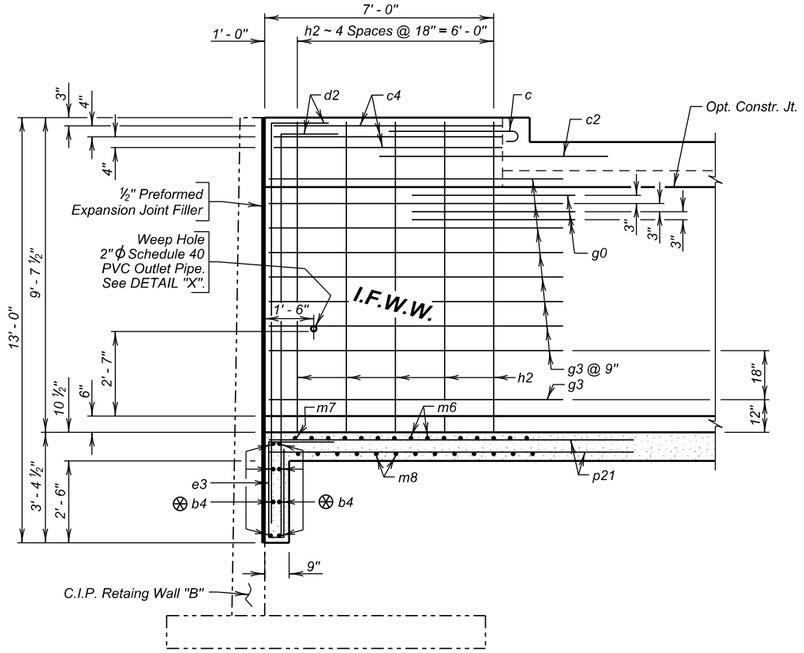
OUTLET DETAILS (A) - PHASE 4
FOR
3 - 11' X 8' BOX CULVERT

OVER BATTLE CREEK — 25° RHF SKEW
STA. 3 + 66.00 — SEC. 8-T2S-R6E
STR. NO. 52-317-433 — P 016A(11)56
HL-93

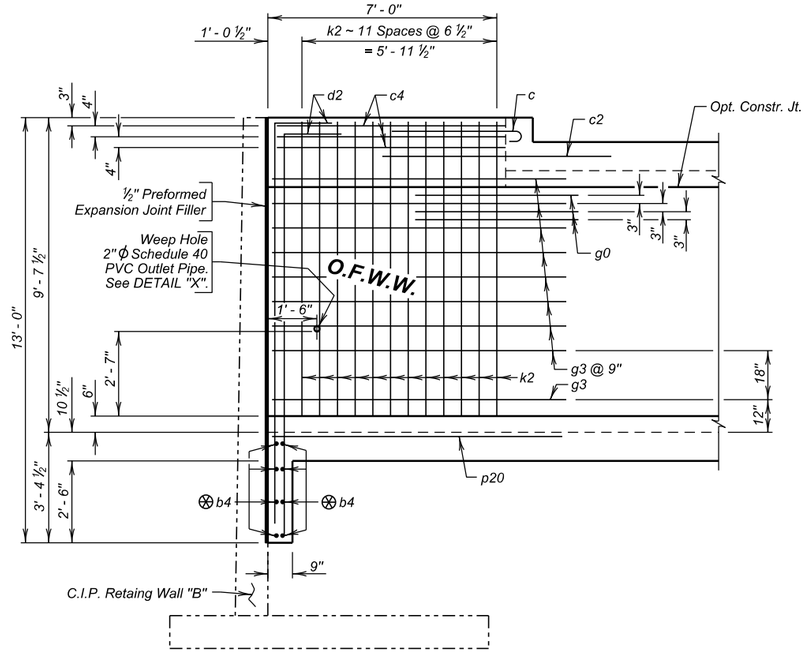
PENNINGTON COUNTY
S. D. DEPT. OF TRANSPORTATION
MAY 2024

DESIGNED BY	CK. DES. BY	DRAFTED BY	
BB	BR	MG	Steve A Johnson BRIDGE ENGINEER
PENN05V8	05V8LA12		

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P 016A(11)56	E15	E25



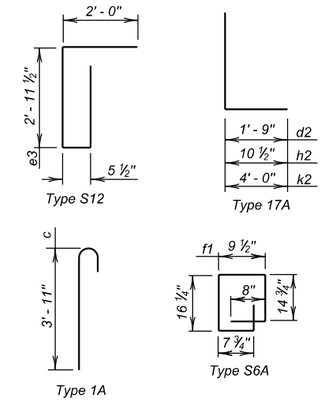
VIEW C - C

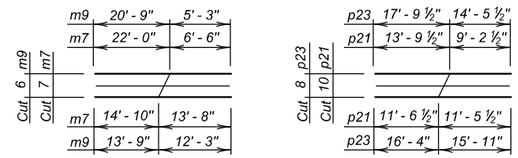


VIEW C - C

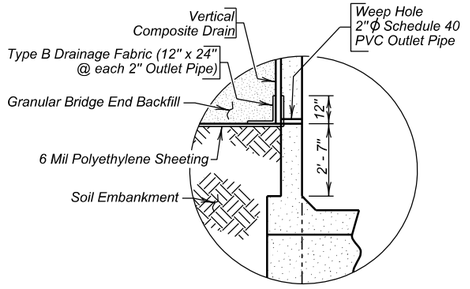
REINFORCING SCHEDULE

Mk.	No.	Size	Length	Type	Bending Details
a2	4	6	22' - 3"	Str.	
b4	8	6	20' - 9"	Str.	
c	2	5	4' - 6"	1A	
c2	2	5	7' - 0"	Str.	
c4	6	5	6' - 9"	Str.	
d2	4	5	14' - 0"	17A	
e3	19	4	8' - 3"	S12	
f1	22	4	5' - 6"	S6A	
g0	6	5	5' - 0"	Str.	
g3	18	4	9' - 0"	19B	
h2	5	4	11' - 0"	17A	
k2	12	6	14' - 3"	17A	
m6	14	8	22' - 9"	Str.	
ϕ m7	7	8	28' - 6"	Str.	
m8	13	4	21' - 9"	Str.	
ϕ m9	6	4	26' - 0"	Str.	
p20	3	4	9' - 0"	Str.	
ϕ p21	10	4	23' - 0"	Str.	
p22	2	4	14' - 0"	Str.	
ϕ p23	8	4	32' - 3"	Str.	

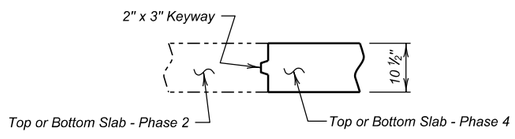




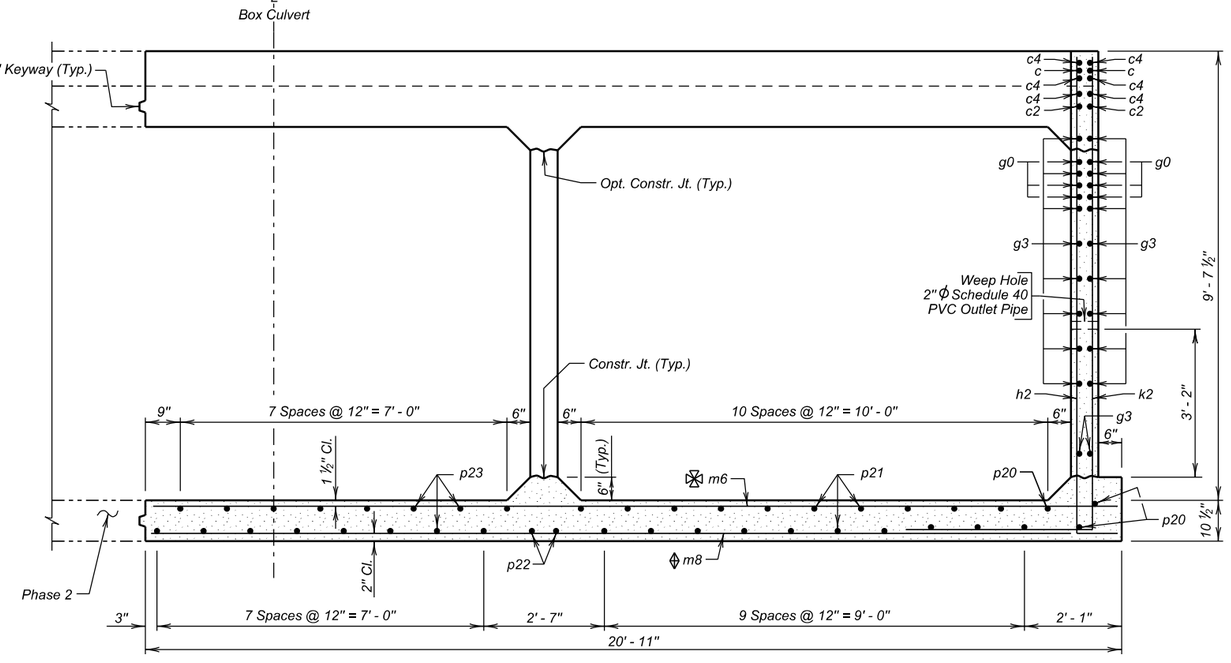
NOTES:
All dimensions are out to out of bars.
ϕ See cutting diagram.



DETAIL "X"



TOP OR BOTTOM SLAB KEYWAY DETAIL
(Resteel not shown)



TYPICAL OUTLET SECTION
(At parapet)

ESTIMATED QUANTITIES

ITEM	Class A45 Concrete, Box Culvert	Reinforcing Steel	Structure Excavation, Box Culvert
UNIT	Cu. Yd.	Lb.	Cu. Yd.
ϕ Outlet - Phase 4	13.2	3165	9.8

ϕ Includes 1 ft. of 2" dia. PVC Pipe and and 0.3 sq. yds. of Type B Drainage Fabric for weep hole.

LEGEND FOR PLACING RE-STEEL

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

OUTLET DETAILS (B) - PHASE 4

FOR

3 - 11' X 8' BOX CULVERT

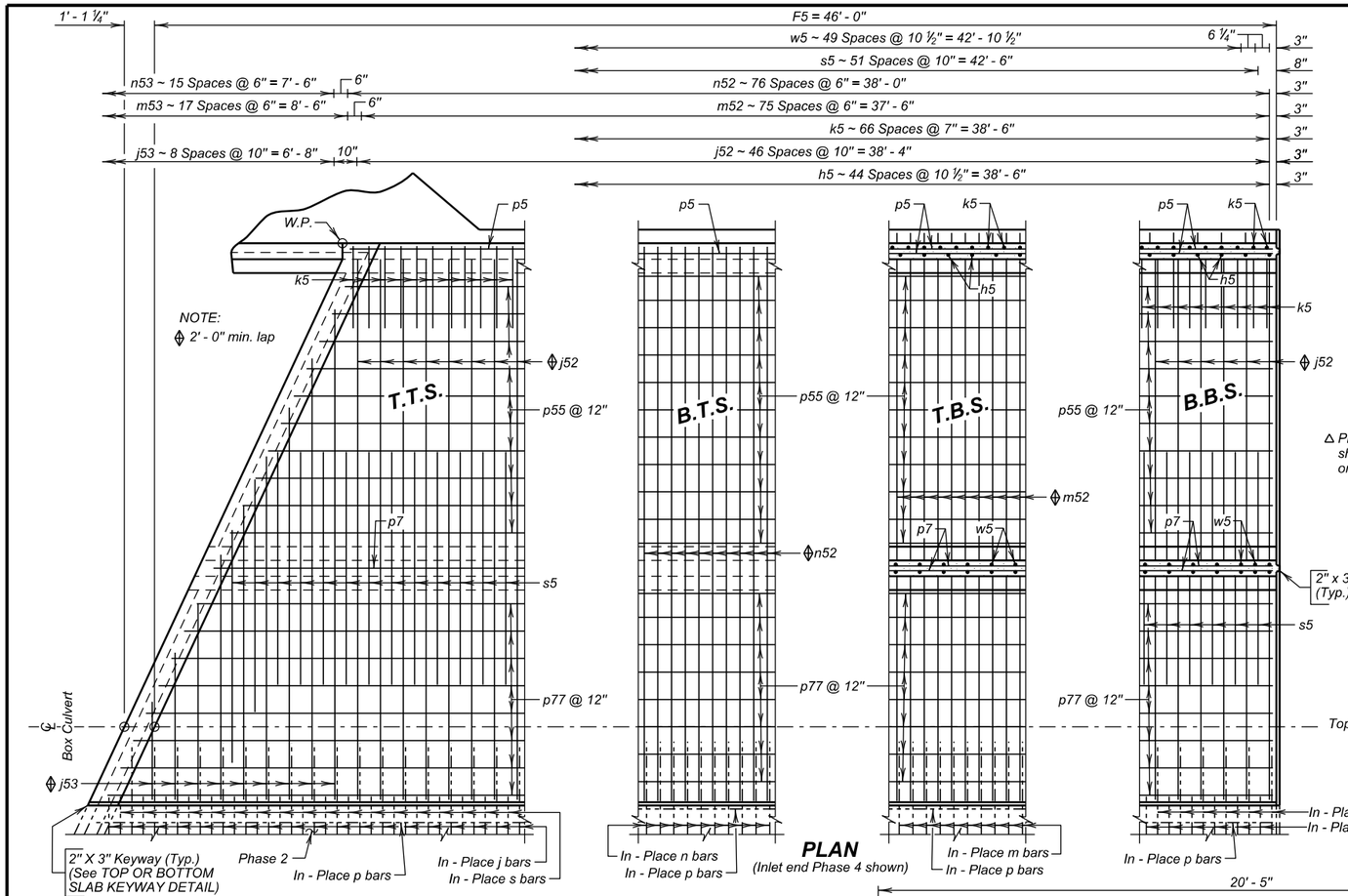
OVER BATTLE CREEK — 25° RHF SKEW
STA. 3 + 66.00 — SEC. 8-T2S-R6E
STR. NO. 52-317-433 — P 016A(11)56
HL-93

PENNINGTON COUNTY
S. D. DEPT. OF TRANSPORTATION
MAY 2024

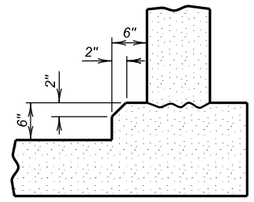
13 OF 18

DESIGNED BY	CK. DES. BY	DRAFTED BY	
BB	BR	MG	Steve A Johnson BRIDGE ENGINEER
PENN05V8	05V8LA13		

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P 016A(11)56	E16	E25



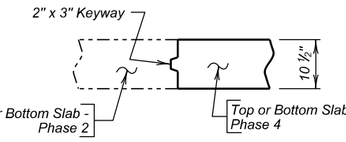
PLAN
(Inlet end Phase 4 shown)



OPTIONAL FILLET DETAIL
(At Bottom Slab)

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

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

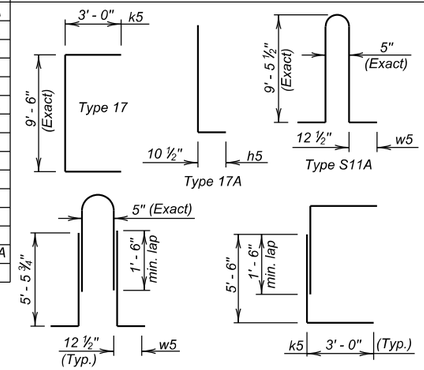


TOP OR BOTTOM SLAB KEYWAY DETAIL
(Resteel not shown)

REINFORCING SCHEDULE
(For One F5 Barrel End Section)

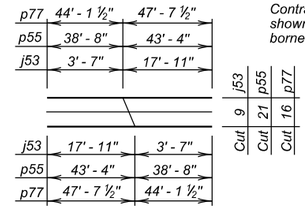
	Mk.	No.	Size	Length	Type
	h5	45	4	10' - 0"	17A
	j52	94	4	19' - 9"	Str.
⏍	j53	9	4	21' - 6"	Str.
	k5	67	4	15' - 6"	17
	m52	76	5	20' - 9"	Str.
⏍	m53	9	5	22' - 6"	Str.
	n52	77	5	20' - 3"	Str.
⏍	n53	8	5	22' - 6"	Str.
	p5	14	4	38' - 9"	Str.
	p7	13	4	44' - 0"	Str.
⏍	p55	21	4	82' - 0"	Str.
⏍	p77	16	4	91' - 9"	Str.
	s5	104	4	8' - 6"	Str.
	w5	52	4	21' - 3"	S11A
△	z1	48	5	3' - 6"	Str.

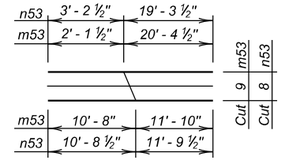
Bending Details



OPTIONAL w5 SPLICE DETAIL OPTIONAL k5 SPLICE DETAIL

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





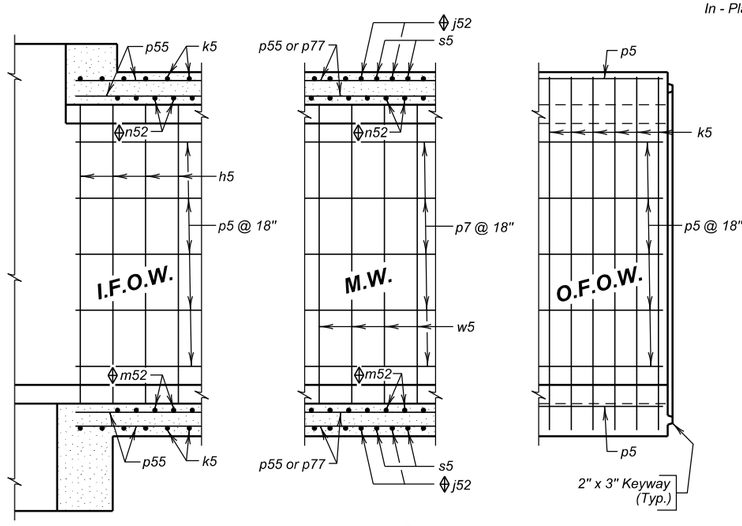
NOTES:
⏍ *See cutting diagram.*
All dimensions are out to out of bars.
Request for additional reinforcing steel splices at points other than those shown, must be submitted to the Engineer for prior approval. If additional splices are approved, no payment will be allowed for the added quantity of reinforcing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

ESTIMATED QUANTITIES

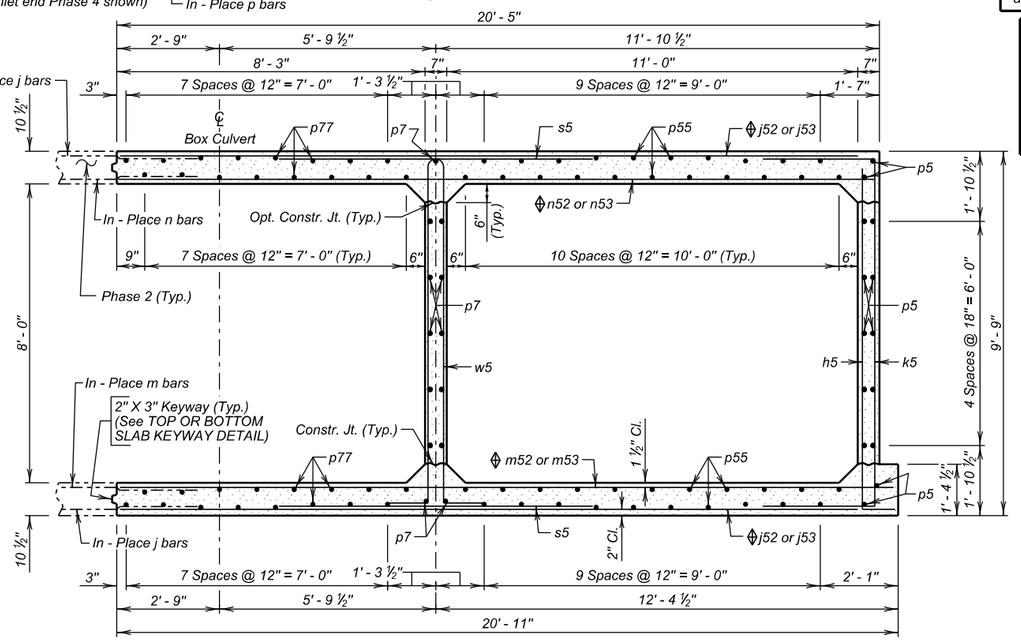
ITEM	Class A45 Concrete, Box Culvert	Reinforcing Steel	Structure Excavation, Box Culvert
UNIT	Cu.Yd.	Lb.	Cu.Yd.
F5 Barrel End Section @ 46' - 0" - Phase 4	73.2	10413	28.8

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



ELEVATION



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

F5 BARREL END SECTION DETAILS (46' - 0") - PHASE 4

FOR

3 - 11' X 8' BOX CULVERT

OVER BATTLE CREEK
STA. 3 + 66.00
STR. NO. 52-317-433

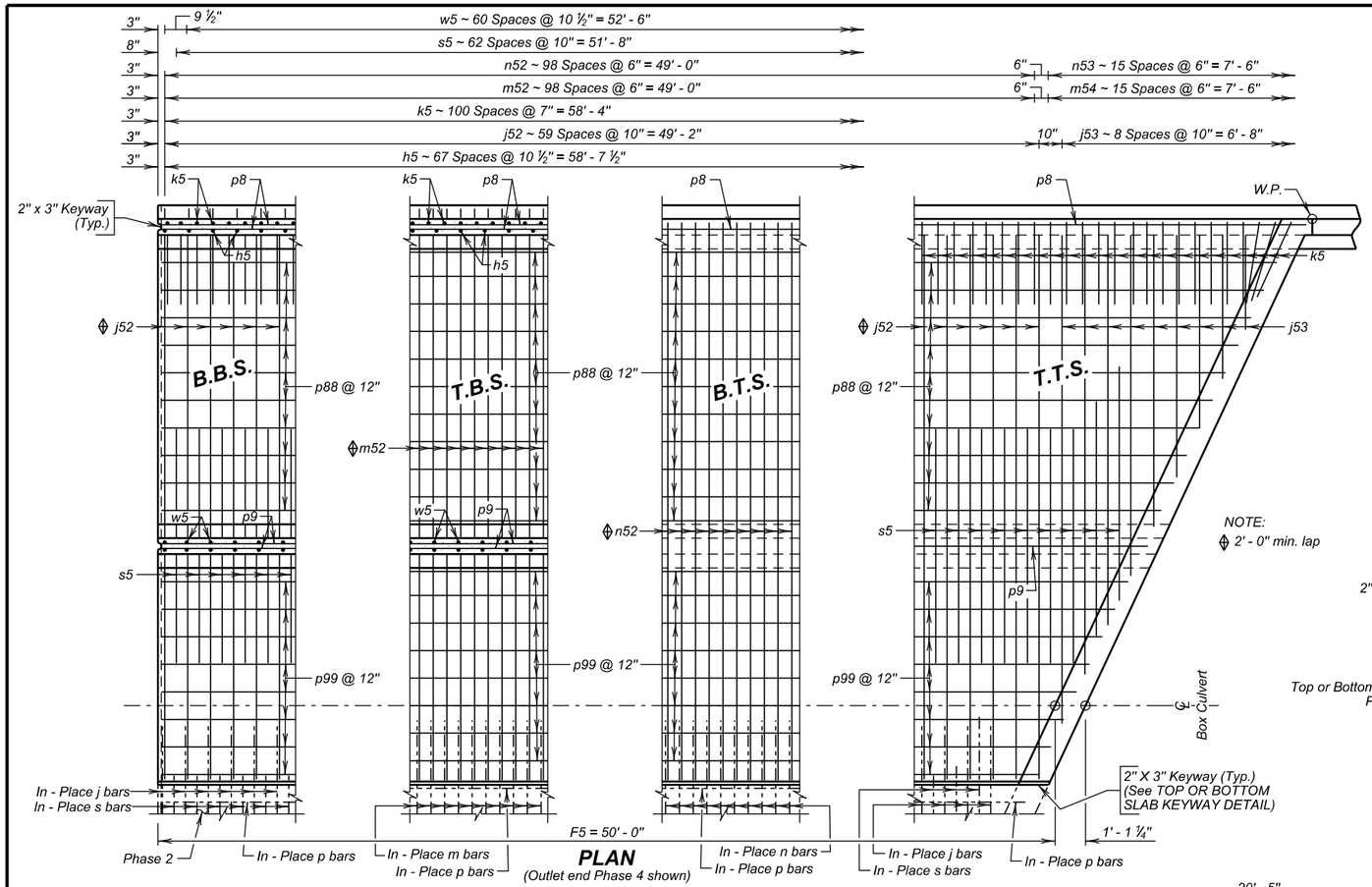
25° RHF SKEW
SEC. 8-T2S-R6E
P 016A(11)56
HL-93

PENNINGTON COUNTY
S. D. DEPT. OF TRANSPORTATION
MAY 2024

14 OF 18

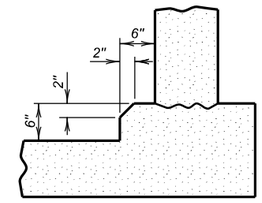
DESIGNED BY	CK. DES. BY	DRAFTED BY	
BB	BR	MG	BRIDGE ENGINEER
PENN05V8	05V8LA14		

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P 016A(11)56	E17	E25



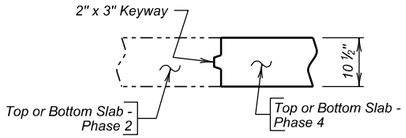
PLAN
(Outlet end Phase 4 shown)

NOTE:
◊ 2' - 0" min. lap



OPTIONAL FILLET DETAIL
(At Bottom Slab)

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

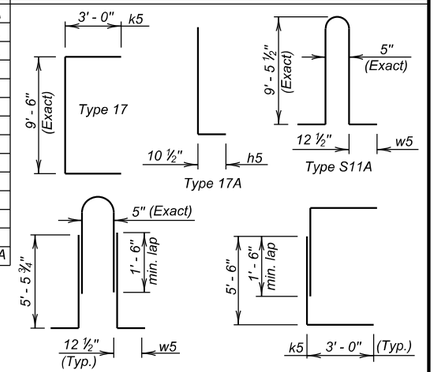


TOP OR BOTTOM SLAB KEYWAY DETAIL
(Resteel not shown)

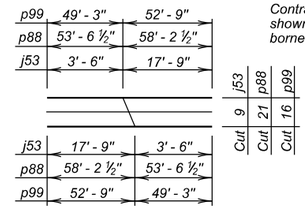
REINFORCING SCHEDULE
(For One F5 Barrel End Section)

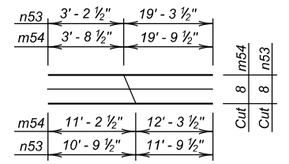
Mk.	No.	Size	Length	Type
h5	68	4	10' - 0"	17A
j52	120	4	19' - 9"	Str.
◊ j53	9	4	21' - 6"	Str.
k5	101	4	15' - 6"	17
m52	99	5	20' - 9"	Str.
◊ m54	8	5	23' - 6"	Str.
n52	99	5	20' - 3"	Str.
◊ n53	8	5	22' - 6"	Str.
p8	14	4	59' - 0"	Str.
p9	13	4	53' - 6"	Str.
◊ p88	21	4	111' - 9"	Str.
◊ p99	16	4	102' - 0"	Str.
s5	126	4	8' - 6"	Str.
w5	62	4	21' - 3"	S11A

Bending Details



OPTIONAL w5 SPLICE DETAIL OPTIONAL k5 SPLICE DETAIL





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

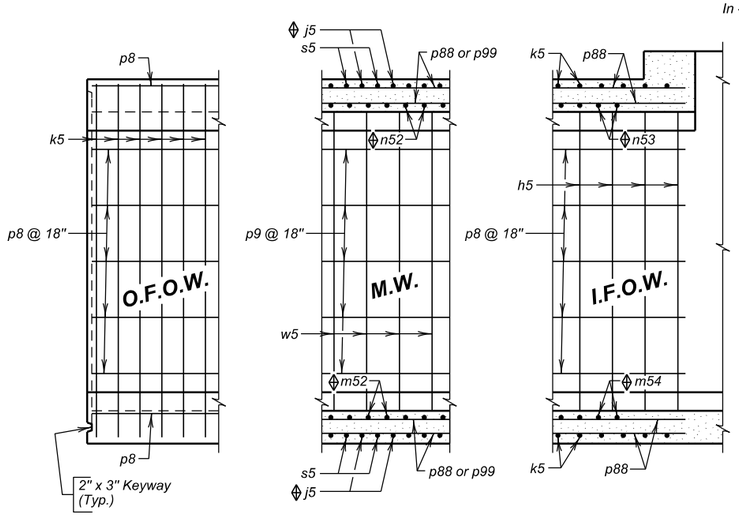
NOTES:
◊ See cutting diagram.
All dimensions are out to out of bars.
Request for additional reinforcing steel splices at points other than those shown, must be submitted to the Engineer for prior approval. If additional splices are approved, no payment will be allowed for the added quantity of reinforcing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

ESTIMATED QUANTITIES

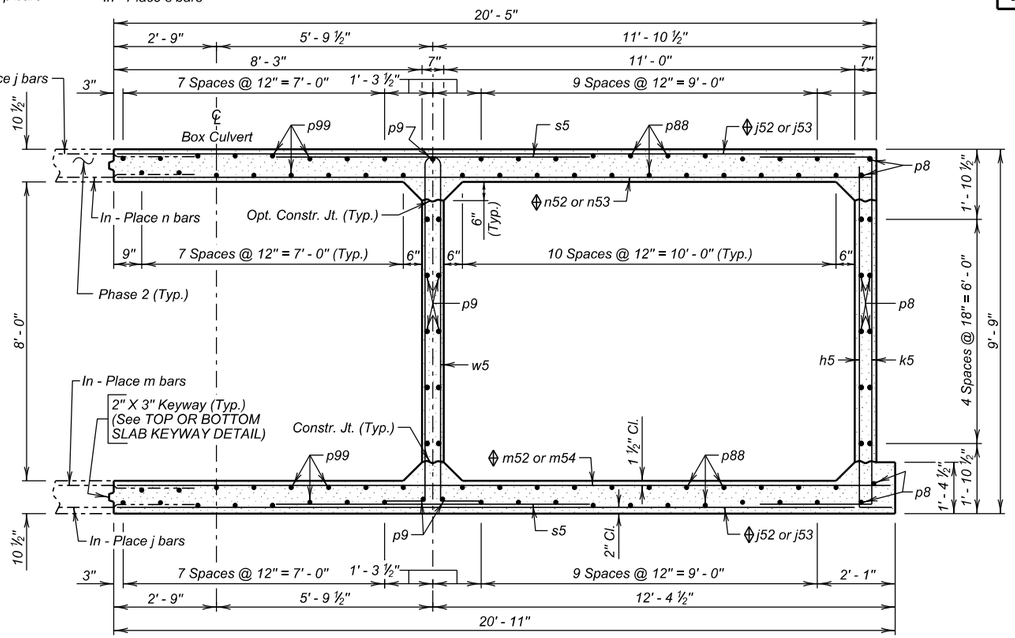
ITEM	Class A45 Concrete, Box Culvert	Reinforcing Steel	Structure Excavation, Box Culvert
UNIT	Cu.Yd.	Lb.	Cu.Yd.
F5 Barrel End Section @ 50' - 0" - Phase 4	92.1	13099	36.3

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



ELEVATION



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

F5 BARREL END SECTION DETAILS (50' - 0") - PHASE 4
FOR
3 - 11' X 8' BOX CULVERT

OVER BATTLE CREEK
STA. 3 + 66.00
STR. NO. 52-317-433

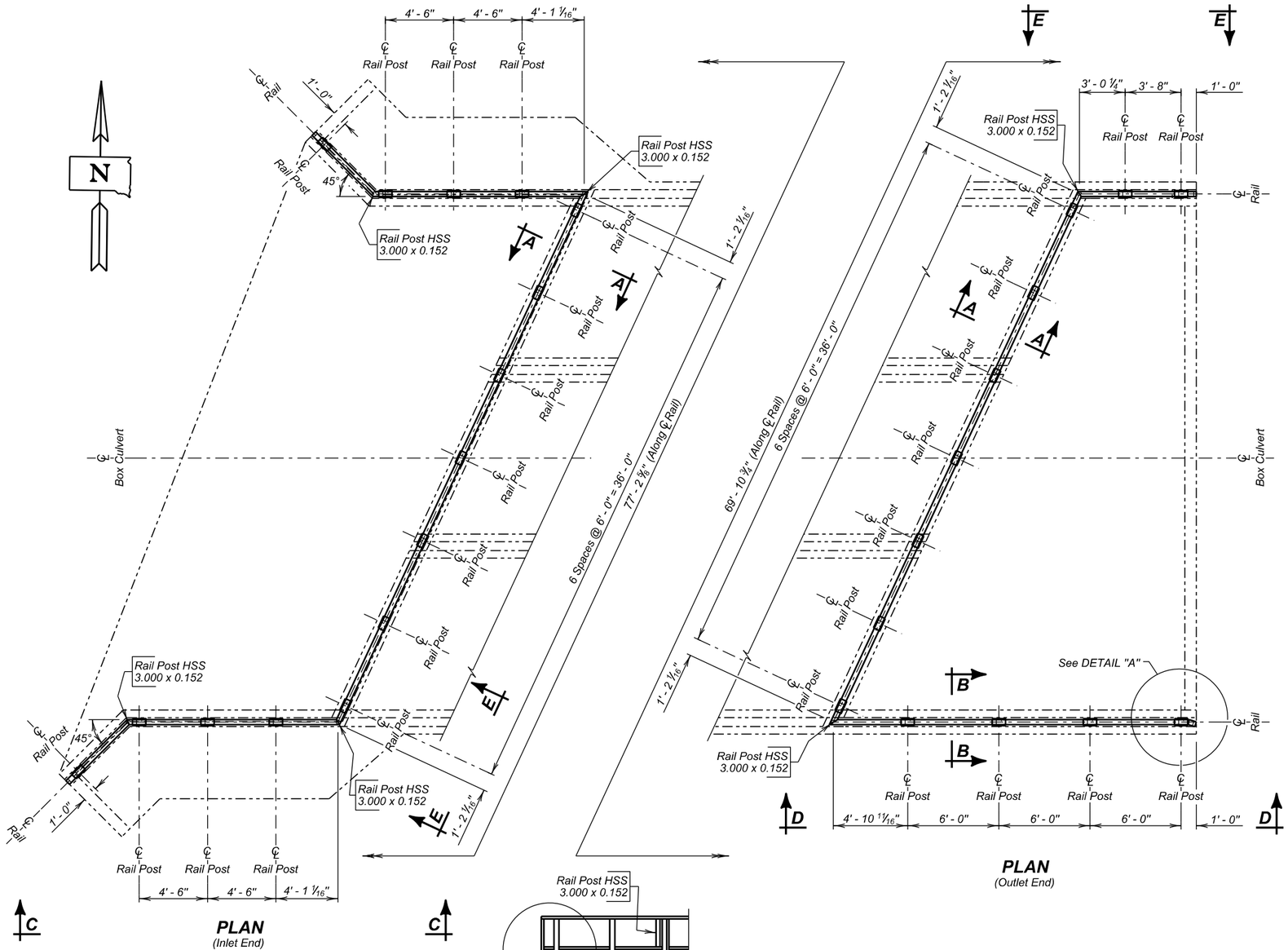
25° RHF SKEW
SEC. 8-T2S-R6E
P 016A(11)56
HL-93

PENNINGTON COUNTY
S. D. DEPT. OF TRANSPORTATION
MAY 2024

15 OF 18

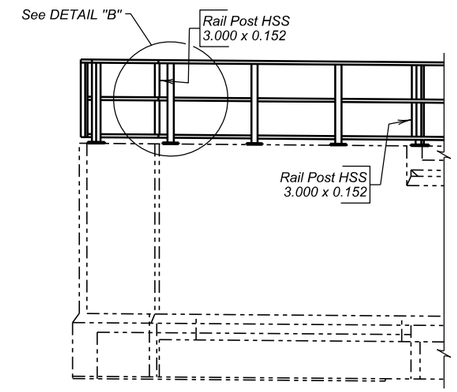
DESIGNED BY	CK. DES. BY	DRAFTED BY	
BB	BR	MG	BRIDGE ENGINEER
PENN05V8	05V8LA15		

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P 016A(11)56	E18	E25



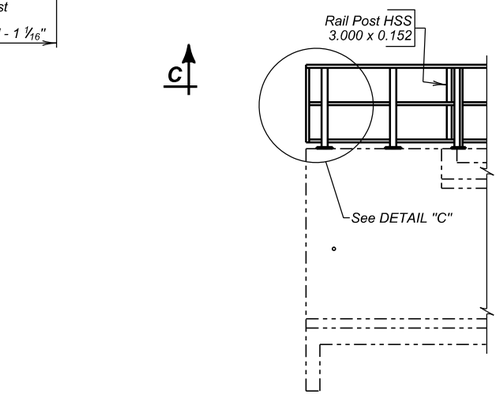
PLAN
(Inlet End)

PLAN
(Outlet End)

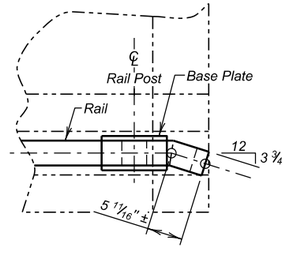


VIEW C - C
(Inlet End - South Wingwall)

VIEW D - D
(Outlet End - South Wingwall)



VIEW E - E
(Outlet End - North Wingwall)



DETAIL "A"

BICYCLE RAILING DETAILS (A)

FOR

3 - 11' X 8' BOX CULVERT

OVER BATTLE CREEK
STA. 3 + 66.00
STR. NO. 52-317-433

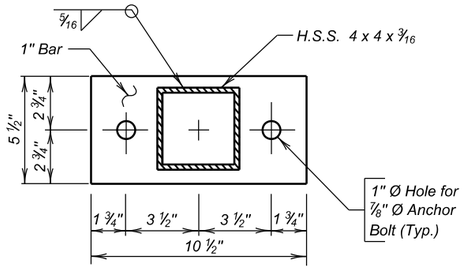
25° RHF SKEW
SEC. 8-T2S-R6E
P 016A(11)56
HL-93

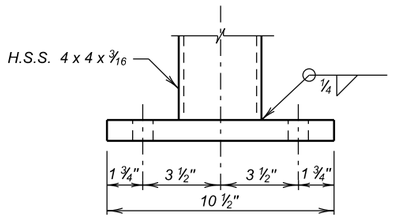
PENNINGTON COUNTY
S. D. DEPT. OF TRANSPORTATION
MAY 2024

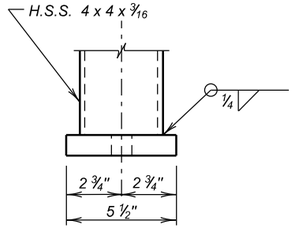
16 OF 18

DESIGNED BY	CK. DES. BY	DRAFTED BY	
BB	BR	MG	Steve A Johnson BRIDGE ENGINEER
PENN05V8	05V8LA16		

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P 016A(11)56	E19	E25

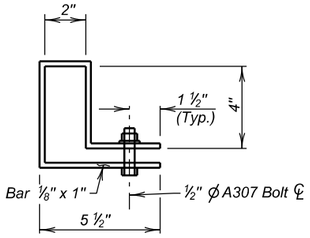




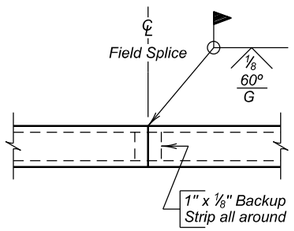


BASE PLATE DETAILS

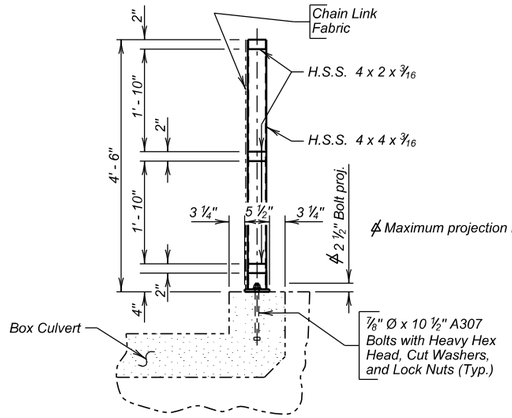
(Top of Parapet and Wingwalls)



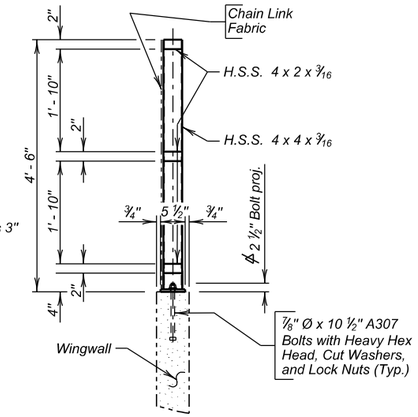
BRACKET "N"



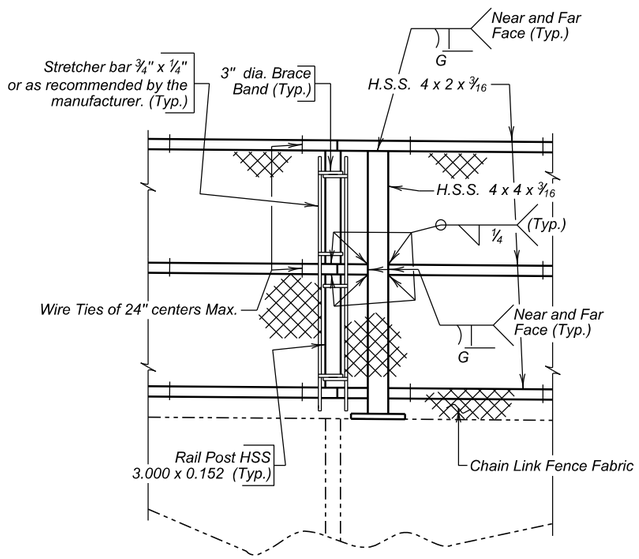
RAIL SPLICE DETAILS



SECTION A - A

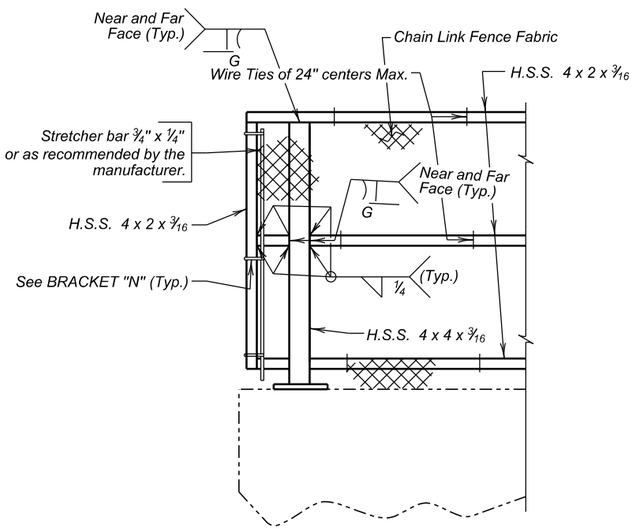


SECTION B - B



DETAIL "C"

(Typ. all corners)



DETAIL "C"

(Typ. all ends)

RAILING

1. All rail posts will be built vertical.
2. All structural steel for railing will conform to ASTM A500, Grade B or C. Material less than 1/4" thick may be ASTM A1011, Grade 36. Railpost base plates will conform to ASTM A36.
3. The Contractor may use either cast in place anchor bolts or drilled and epoxied anchor rods for anchoring the pipe handrail. Anchor Bolts and nuts will conform to ASTM A307. Anchor rods will conform to ASTM 1554, Grade 36. Washers will be in accordance with ASTM F436. Hardware will be galvanized in accordance with ASTM F2329. Bolts will be hex head "Structural" type with heavy hex, lock nuts, and round washers.
4. All anchor bolts and rods will be tightened to a torque of 120 ft./lbs. (approximated without the use of a calibrated torque wrench).
5. Epoxy will be in accordance with ASTM C881 Type IV. Hole size will be as per the epoxy manufacturer's recommendations. Core bits will not be used to drill anchor rod holes.
6. All steel railing will be galvanized in accordance with ASTM F2329. All steel railing will have Natina Solution treatment applied per manufacturer's recommendations. The galvanized steel railing will be cleaned in accordance with ASTM D6386 before application of the Natina Solution.

   Natina
   1555 N VIP Blvd.
   Casa Grande, AZ 85122
   https://www.natina.com/
7. Welding and weld inspection will be done in accordance with the current edition of AWS D1.5 Structural Welding Code.
8. The cost of structural steel, drilling holes, anchor bolts, Natina Solution treatment, galvanizing, welding and weld inspection, and all that is incidental to the fabrication of the railing will be included in the contract unit price per foot for Steel Bicycle Railing.

CHAIN LINK FENCE

1. The chain link fence fabric and supports will conform to Section 930 of the Construction Specifications as modified by the following notes:

   a. The chain link fence fabric and miscellaneous hardware will be galvanized and conform to AASHTO M181. The fence fabric will be type IV 9 gauge wire woven in a 2 inch diamond mesh. Knuckled selvage will be used on the top and bottom of the fence fabric.

   b. The chainlink fabric and miscellaneous hardware will have a Natina Solution treatment applied per manufacturer's recommendations.

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      Casa Grande, AZ 85122
      https://www.natina.com/

   c. A brown (AMS STD 595 Color 30045) thermally extruded polyvinyl chloride coating may be applied to the wire ties in lieu of the Natina Solution treatment.

2. The chain link fence will be incidental to the contract unit price per foot for Steel Bicycle Railing. This payment will be full compensation for furnishing all material, labor, tools, and equipment necessary or incidental to the construction of the chain link fence including chain link fence fabric, wire ties, miscellaneous hardware, and Natina Solution treatment, all to satisfactorily complete this work.

ESTIMATED QUANTITIES		
ITEM	UNIT	QUANTITY
Steel Bicycle Railing	Ft.	147

BICYCLE RAILING DETAILS (B)

FOR

3 - 11' X 8' BOX CULVERT

OVER BATTLE CREEK
STA. 3 + 66.00
STR. NO. 52-317-433

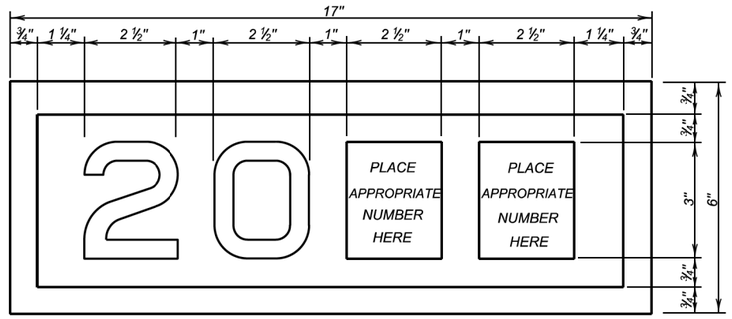
25° RHF SKEW
SEC. 8-T2S-R6E
P 016A(11)56
HL-93

PENNINGTON COUNTY
S. D. DEPT. OF TRANSPORTATION
MAY 2024

17 OF 18

DESIGNED BY	CK. DES. BY	DRAFTED BY	
BB	BR	MG	Steve A Johnson
PENN05V8	05V8LA17		BRIDGE ENGINEER

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P 016A(11)56	E20	E25



YEAR PLATE DETAILS

GENERAL NOTES:

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

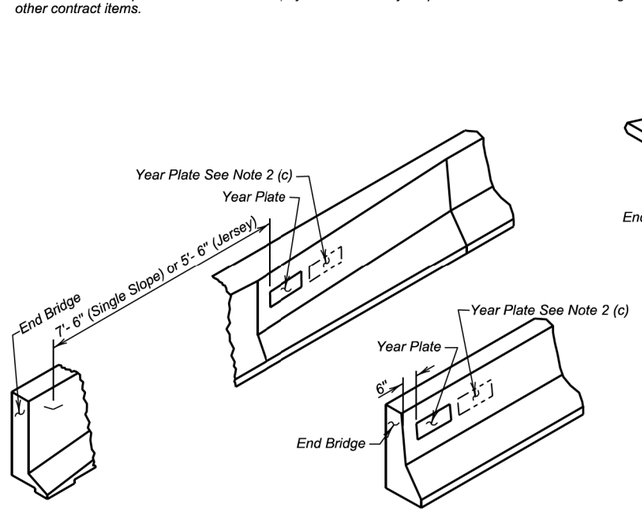
2. Year plates will be located on structure(s) as follows:

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

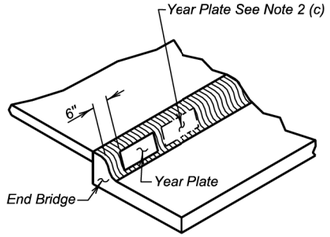
   b. On bridges with six (6) inch curbs, "Jersey" shaped barriers with no endblocks, or "Single Slope" shaped barriers with no endblocks, the year plate will be centered vertically on the curb face approximately six (6) inches from the end of the bridge, or as designated by the Engineer. On bridges with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

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

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

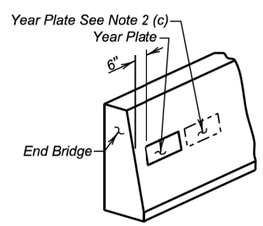


BARRIER
(With Endblock)



TYPE B CURB

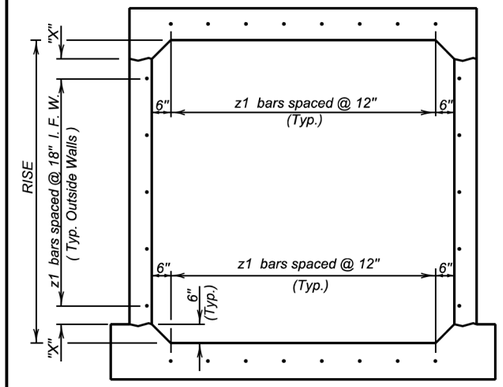
JERSEY BARRIER



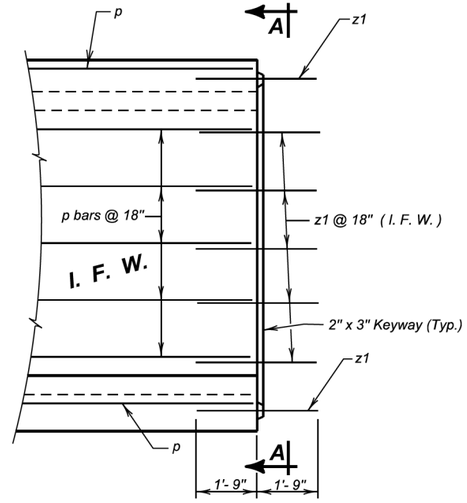
SINGLE SLOPE BARRIER

January 22,2021

Published Date: 2026	SDDOT	YEAR PLATE DETAILS	PLATE NUMBER 460.02
			Sheet 1 Of 1



TYPICAL SINGLE BARREL VIEW A - A

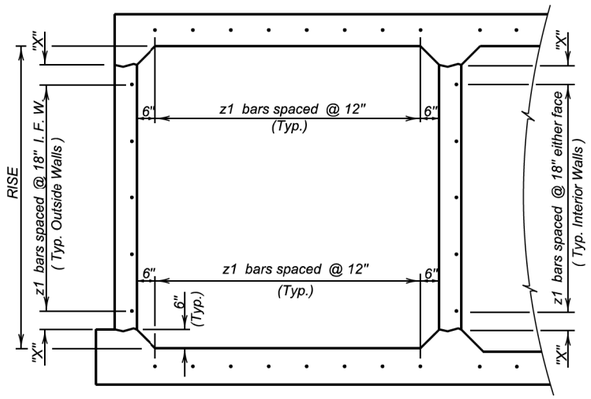


ELEVATION

LEGEND FOR PLACING RE-STEEL

I. F. W.	- Inside Face Wall

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



TYPICAL MULTIPLE BARREL VIEW A - A

GENERAL NOTES:

1. z1 bars will be placed in the middle of the 2" X 3" keyway in the top and bottom slabs. z1 bars will be lapped with the longitudinal p bars in the inside face of the wall for outside walls and in either face for interior walls. z1 bars are listed and included elsewhere in plans.

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

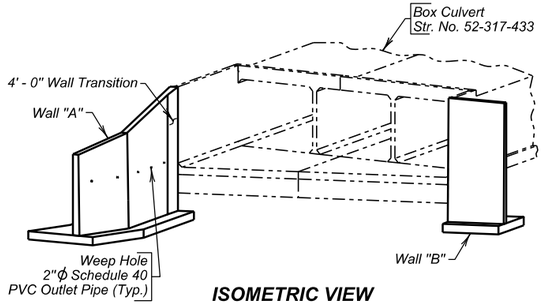
June 1, 2022

Published Date: 2026	SDDOT	BOX CULVERT BARREL TIE REINFORCEMENT	PLATE NUMBER 460.10
			Sheet 1 of 1

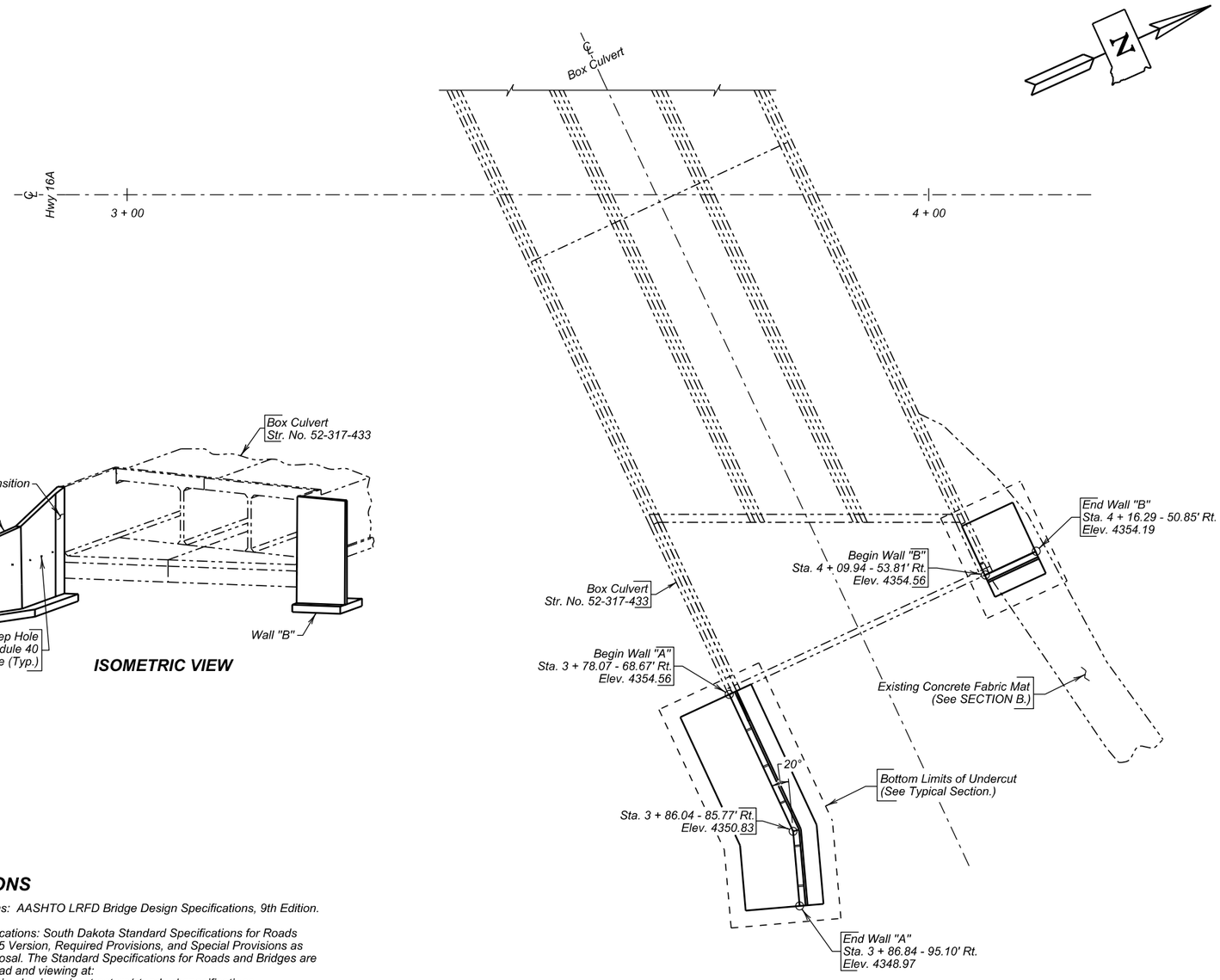
3 - 11' X 8' BOX CULVERT
STR. NO. 52-317-433
MAY 2024

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

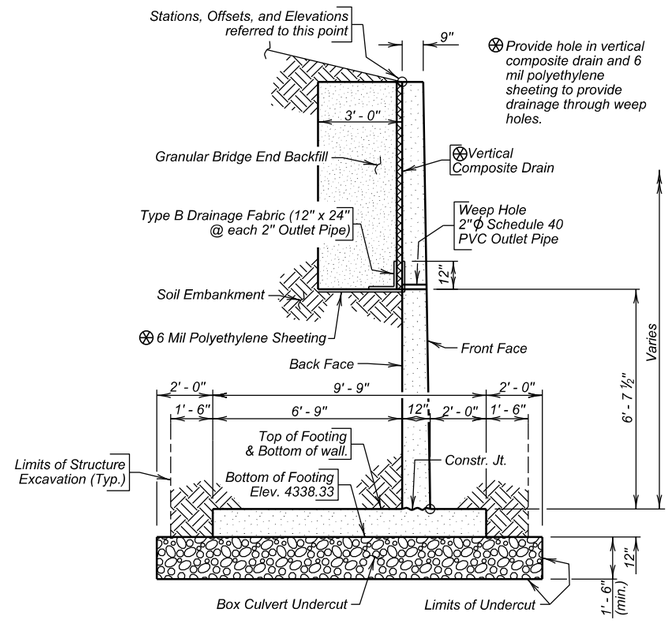
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P 016A(11)56	E21	E25



ISOMETRIC VIEW



PLAN
(Steel Bicycle Railing not shown)



TYPICAL SECTION
(Re-Steel & Steel Bicycle Railing not shown)

ESTIMATED QUANTITIES

ITEM	UNIT	QUANTITY
Class A45 Concrete, Miscellaneous	Cu. Yd.	30.0
Reinforcing Steel	Lb.	4560
Box Culvert Undercut	Cu. Yd.	32
Structure Excavation, Retaining Wall	Cu. Yd.	233
Granular Bridge End Backfill	Cu. Yd.	14.3
Steel Bicycle Railing	Ft.	35

SPECIFICATIONS

1. Design Specifications: AASHTO LRFD Bridge Design Specifications, 9th Edition.
2. Construction Specifications: South Dakota Standard Specifications for Roads and Bridges, 10-1-25 Version, Required Provisions, and Special Provisions as included in the Proposal. The Standard Specifications for Roads and Bridges are available for download and viewing at: https://dot.sd.gov/doing-business/contractors/standard-specifications

GENERAL NOTES

1. All concrete will be Class A45, Box Culvert conforming to Section 460 of the Construction Specifications.
2. All reinforcing steel will conform to ASTM A615 Grade 60.
3. All exposed edges will be chamfered ¾ inch unless noted otherwise in the plans.
4. Use 1 inch clear cover on all reinforcing steel EXCEPT as shown.

FOUNDATION PREPARATION

Foundation Preparation will consist of undercutting the wall footing from 2 feet in front of to 2 feet behind the footing to a depth of 1.5 feet below the bottom of the footing as shown on the typical section. Box Culvert Undercut Backfill material conforming to Section 421 of the Specifications will be placed to the bottom of footing elevation.

INDEX OF RETAINING WALL SHEETS-

GENERAL LAYOUT, QUANTITIES, AND NOTES

FOR

C.I.P. RETAINING WALLS "A" AND "B"

ADJACENT TO BATTLE CREEK SEC. 8-T2S-R6E
PCN 05V8 P 016A(11)56

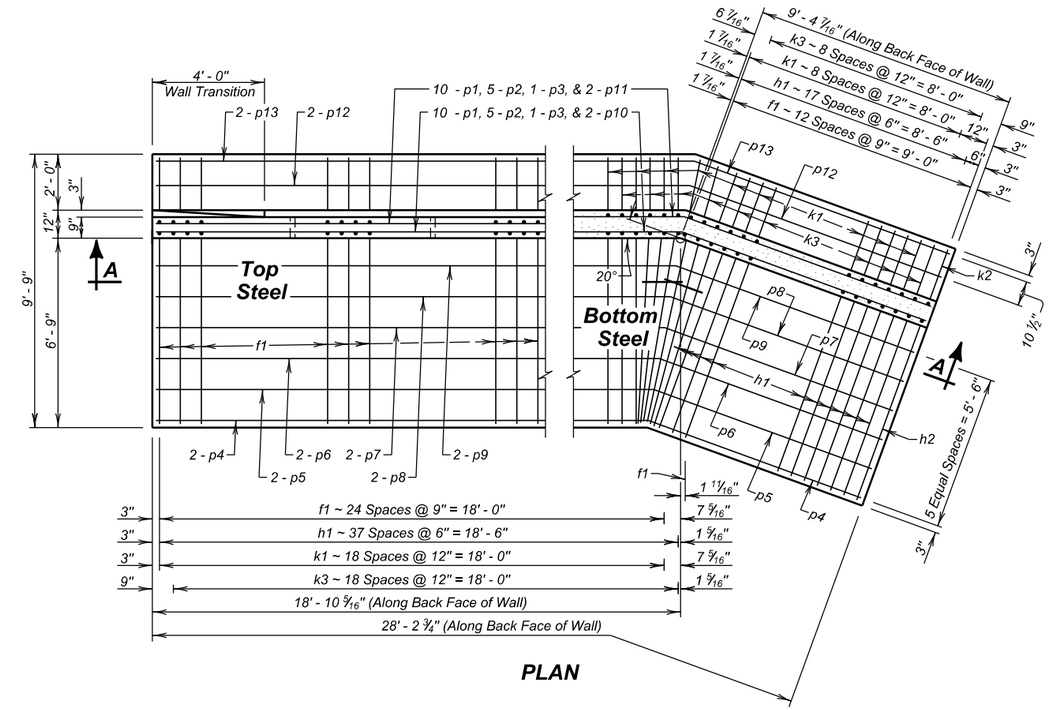
PENNINGTON COUNTY
S. D. DEPT. OF TRANSPORTATION
FEBRUARY 2025

1 OF 5

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

DESIGNED BY	CK. DES. BY	DRAFTED BY	
BB	BR	BT	Steven A. Johnson BRIDGE ENGINEER
PENN05V8	05V8LB01		

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P 016A(11)56	E22	E25



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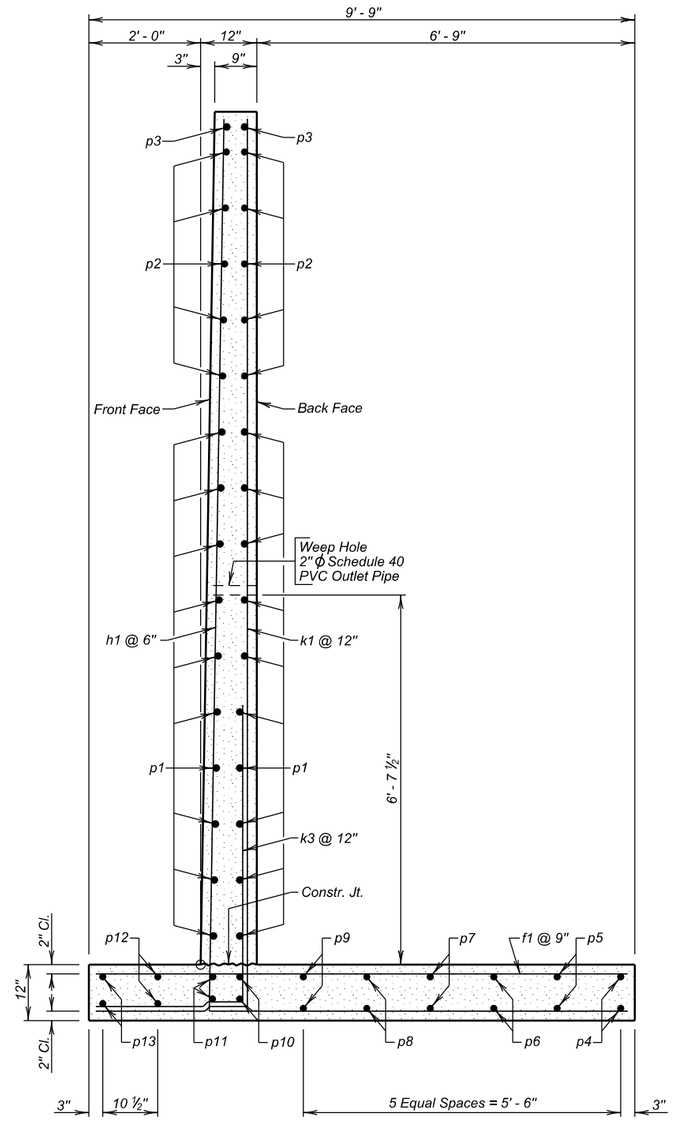
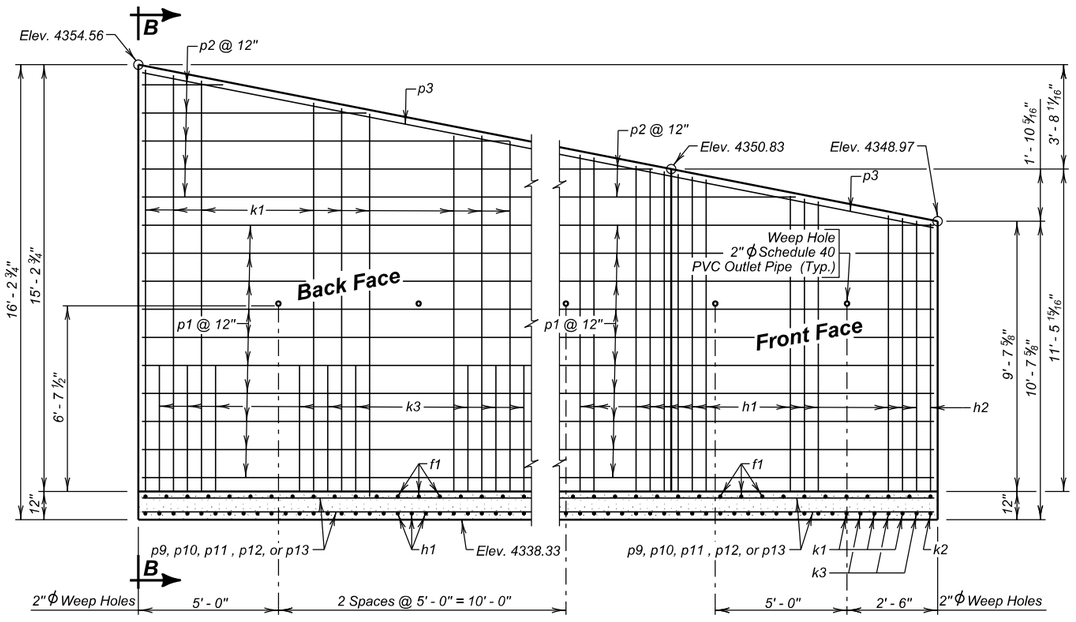


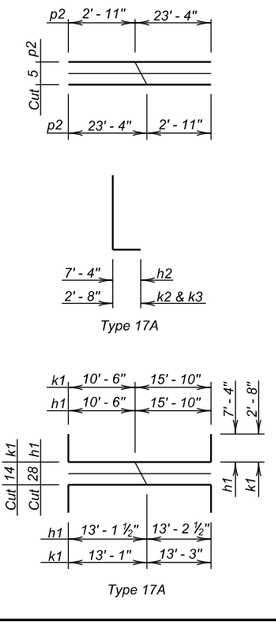
SECTION B - B



SECTION A - A

REINFORCING SCHEDULE

	Mk.	No.	Size	Length	Type	Bending Details
⌀	h1	28	4	41' - 0"	17A	
	h2	1	4	17' - 9"	17A	
⌀	k1	14	7	31' - 8"	17A	
	k2	1	7	13' - 1"	17A	
	k3	28	7	7' - 0"	17A	
	p1	20	4	28' - 3"	Str.	
⌀	p2	5	4	26' - 3"	Str.	
✳	p3	2	6	28' - 0"	Str.	
✳	p4	2	4	25' - 7"	Str.	
✳	p5	2	4	26' - 0"	Str.	
✳	p6	2	4	26' - 5"	Str.	
✳	p7	2	4	26' - 9"	Str.	
✳	p8	2	4	27' - 2"	Str.	
✳	p9	2	4	27' - 7"	Str.	
✳	p10	2	4	28' - 0"	Str.	
✳	p11	2	4	28' - 3"	Str.	
✳	p12	2	4	28' - 7"	Str.	
✳	p13	2	4	28' - 11"	Str.	



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

ESTIMATED QUANTITIES

	ITEM	UNIT	QUANTITY
⌀	Class A45 Concrete, Miscellaneous	Cu. Yd.	24.0
	Reinforcing Steel	Lb.	3569
	Box Culvert Undercut	Cu. Yd.	24
	Structure Excavation, Retaining Wall	Cu. Yd.	187.6
	Granular Bridge End Backfill	Cu. Yd.	12.1

⌀ Includes 5 ft. of 2" dia. PVC Pipe and and 1.1 sq. yds. of Type B Drainage Fabric for weep holes.

1. 86 sq. ft. 6 mil Polyethylene Sheeting, not including laps.
2. 198 sq. ft. Vertical Composite Drain.

Items 1 and 2 are approximate quantities contained in the Granular Bridge End Backfill and are for information only.

WALL "A" DETAILS

FOR

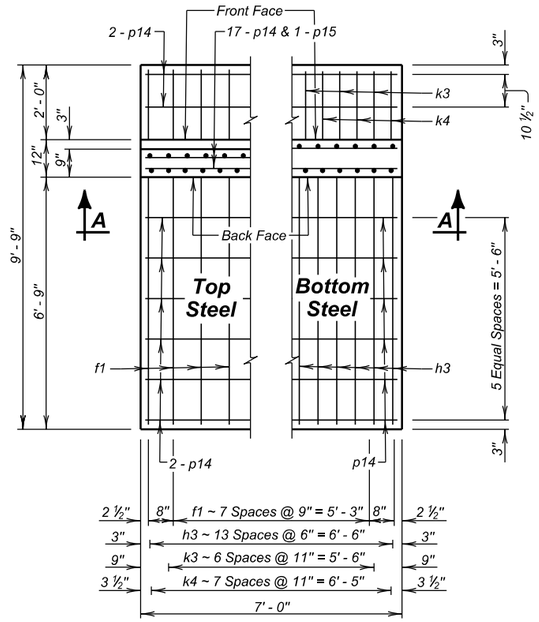
C.I.P. RETAINING WALLS "A" AND "B"

ADJACENT TO BATTLE CREEK SEC. 8-T2S-R6E
P 016A(11)56

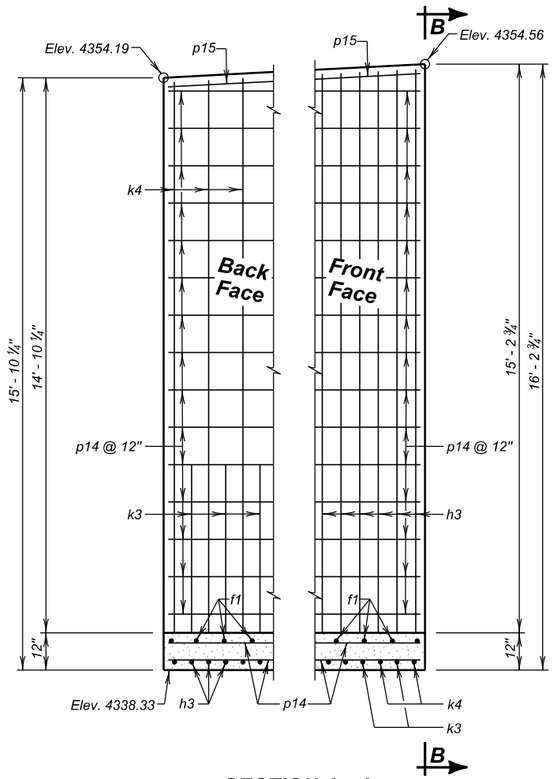
PENNINGTON COUNTY
S. D. DEPT. OF TRANSPORTATION
FEBRUARY 2025

DESIGNED BY	CK. DES. BY	DRAFTED BY	
BB	BR	BT	Steve A Johnson BRIDGE ENGINEER
PENN05V8	05V8LB02		

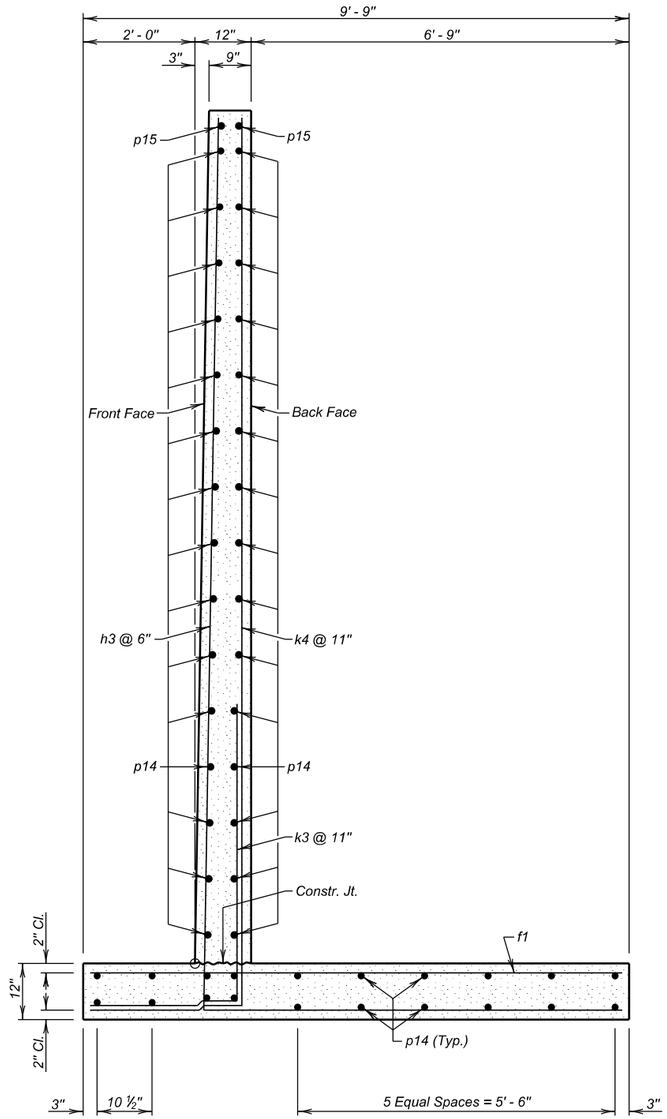
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P 016A(11)56	E23	E25



PLAN



SECTION A - A

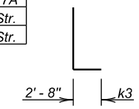


SECTION B - B

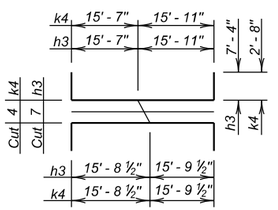
REINFORCING SCHEDULE

Mk.	No.	Size	Length	Type
f1	9	6	9' - 6"	Str.
h3	7	4	46' - 2"	17A
k3	7	7	7' - 0"	17A
k4	4	7	36' - 10"	17A
p14	50	4	6' - 9"	Str.
p15	2	6	6' - 9"	Str.

Bending Details



Type 17A



Type 17A

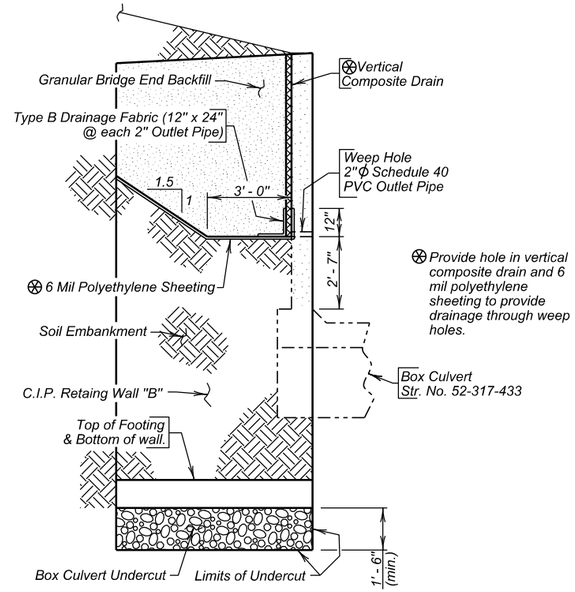
NOTES:
All dimensions are out to out of bars.

ESTIMATED QUANTITIES

ITEM	UNIT	QUANTITY
Class A45 Concrete, Miscellaneous	Cu. Yd.	6.0
Reinforcing Steel	Lb.	991
Box Culvert Undercut	Cu. Yd.	8
Structure Excavation, Retaining Wall	Cu. Yd.	45.7
Granular Bridge End Backfill	Cu. Yd.	2.2

1. 22 sq. ft. 6 mil Polyethylene Sheeting, not including laps.
2. 20 sq. ft. Vertical Composite Drain.

Items 1 and 2 are approximate quantities contained in the Granular Bridge End Backfill and are for information only.



ELEVATION
(Showing Backfill Details)

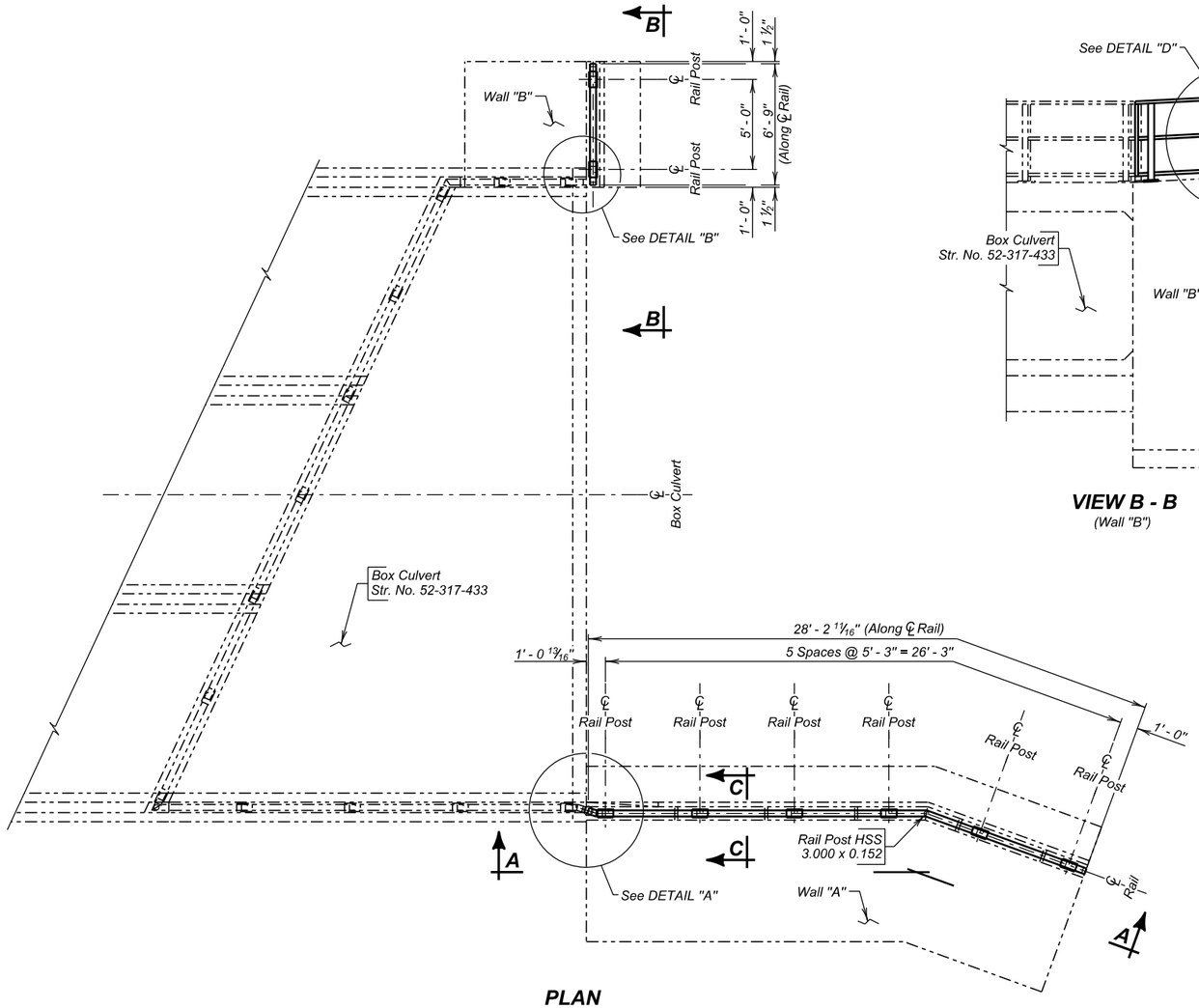
WALL "B" DETAILS
FOR
C.I.P. RETAINING WALLS "A" AND "B"
ADJACENT TO BATTLE CREEK
SEC. 8-T2S-R6E
P 016A(11)56

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

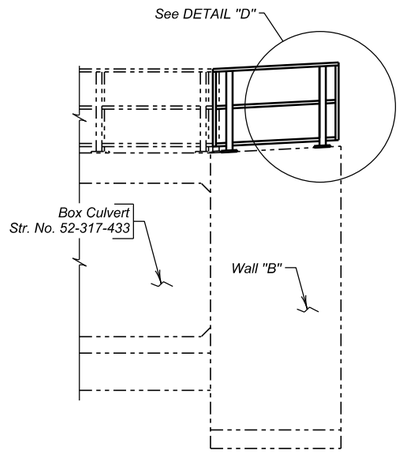
3 OF 5

DESIGNED BY	CK. DES. BY	DRAFTED BY	
BB	BR	BT	Steve A Johnson BRIDGE ENGINEER
PENN05V8	05V8LB03		

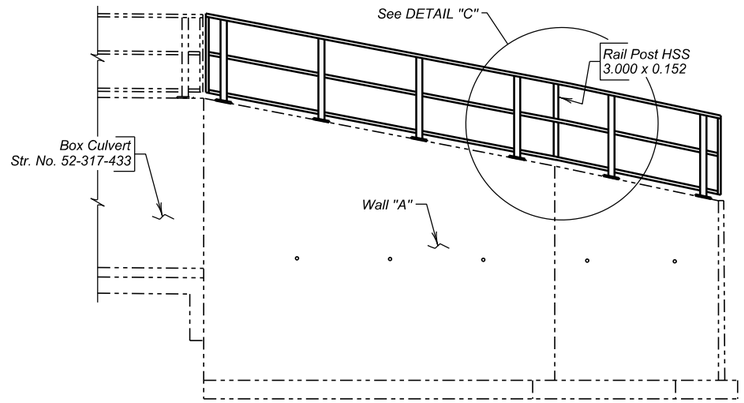
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P 016A(11)56	E24	E25



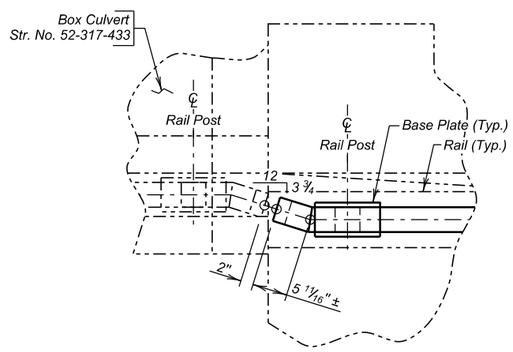
PLAN



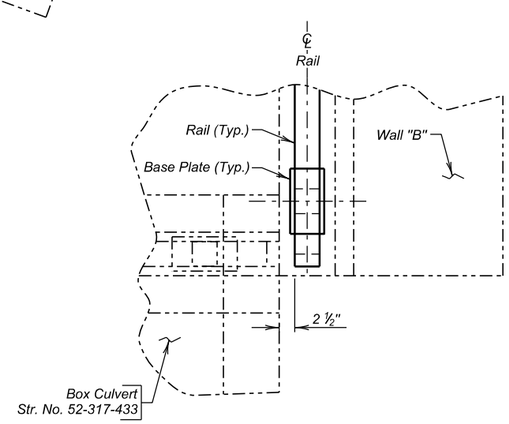
VIEW B - B
(Wall "B")



VIEW A - A
(Wall "A")



DETAIL "A"



DETAIL "B"

BICYCLE RAILING DETAILS (A)

FOR

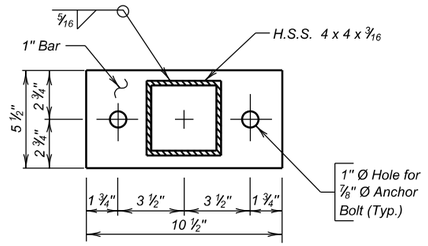
C.I.P. RETAINING WALLS "A" AND "B"

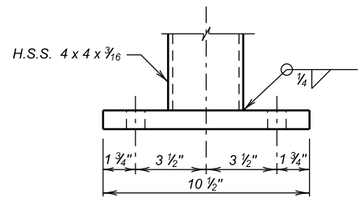
ADJACENT TO BATTLE CREEK SEC. 8-T2S-R6E
P 016A(11)56

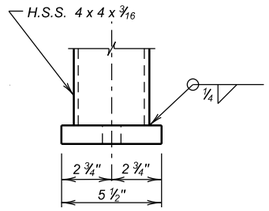
PENNINGTON COUNTY
S. D. DEPT. OF TRANSPORTATION
FEBRUARY 2025

DESIGNED BY	CK. DES. BY	DRAFTED BY	
BB	BR	BT	Steve A Johnson BRIDGE ENGINEER
PENN05V8	05V8LB04		

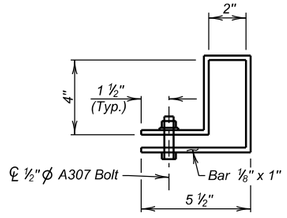
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P 016A(11)56	E25	E25



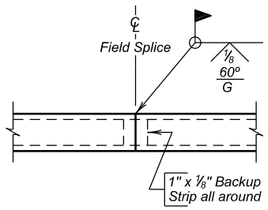




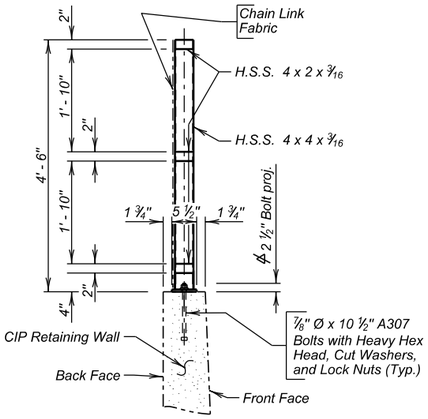
BASE PLATE DETAILS
(Top of C.I.P. Retaining Walls)



BRACKET "N"

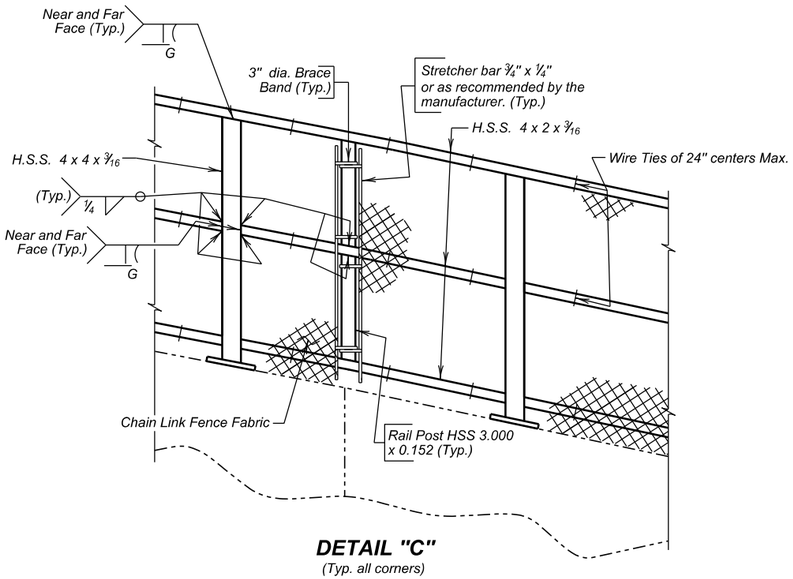


RAIL SPLICE DETAILS

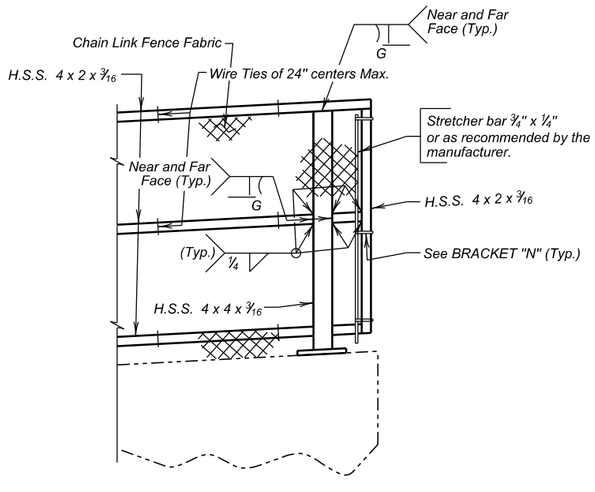


℄ Maximum projection is 3"

SECTION C - C



DETAIL "C"
(Typ. all corners)



DETAIL "D"
(Typ. all ends)

RAILING

1. All rail posts will be built vertical.
2. All structural steel for railing will conform to ASTM A500, Grade B or C. Material less than ¼" thick may be ASTM A1011, Grade 36. Railpost base plates will conform to ASTM A36.
3. The Contractor may use either cast in place anchor bolts or drilled and epoxied anchor rods for anchoring the pipe handrail. Anchor Bolts and nuts will conform to ASTM A307. Anchor rods will conform to ASTM 1554, Grade 36. Washers will be in accordance with ASTM F436. Hardware will be galvanized in accordance with ASTM F2329. Bolts will be hex head "Structural" type with heavy hex, lock nuts, and round washers.
4. All anchor bolts and rods will be tightened to a torque of 120 ft./lbs. (approximated without the use of a calibrated torque wrench).
5. Epoxy will be in accordance with ASTM C881 Type IV. Hole size will be as per the epoxy manufacturer's recommendations. Core bits will not be used to drill anchor rod holes.
6. All steel railing will be galvanized in accordance with ASTM F2329. All steel railing will have Natina Solution treatment applied per manufacturer's recommendations. The galvanized steel railing will be cleaned in accordance with ASTM D6386 before application of the Natina Solution.

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   Casa Grande, AZ 85122
   https://www.natina.com/
7. Welding and weld inspection will be done in accordance with the current edition of AWS D1.5 Structural Welding Code.
8. The cost of structural steel, drilling holes, anchor bolts, Natina Solution treatment, galvanizing, welding and weld inspection, and all that is incidental to the fabrication of the railing will be included in the contract unit price per foot for Steel Bicycle Railing.

CHAIN LINK FENCE

1. The chain link fence fabric and supports will conform to Section 930 of the Construction Specifications as modified by the following notes:

   a. The chain link fence fabric and miscellaneous hardware will be galvanized and conform to AASHTO M181. The fence fabric will be type IV 9 gauge wire woven in a 2 inch diamond mesh. Knuckled selvage will be used on the top and bottom of the fence fabric.

   b. The chainlink fabric and miscellaneous hardware will have a Natina Solution treatment applied per manufacturer's recommendations.

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      https://www.natina.com/

   c. A brown (AMS STD 595 Color 30045) thermally extruded polyvinyl chloride coating may be applied to the wire ties in lieu of the Natina Solution treatment.

2. The chain link fence will be incidental to the contract unit price per foot for Steel Bicycle Railing. This payment will be full compensation for furnishing all material, labor, tools, and equipment necessary or incidental to the construction of the chain link fence including chain link fence fabric, wire ties, miscellaneous hardware, and Natina Solution treatment, all to satisfactorily complete this work.

ESTIMATED QUANTITIES		
ITEM	UNIT	QUANTITY
Steel Bicycle Railing	Ft.	35

BICYCLE RAILING DETAILS (B)

FOR

C.I.P. RETAINING WALLS "A" AND "B"

ADJACENT TO BATTLE CREEK SEC. 8-T2S-R6E
P 016A(11)56

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

5 OF 5

DESIGNED BY	CK. DES. BY	DRAFTED BY	
BB	BR	BT	Steve A Johnson BRIDGE ENGINEER
PENN05V8	05V8LB05		