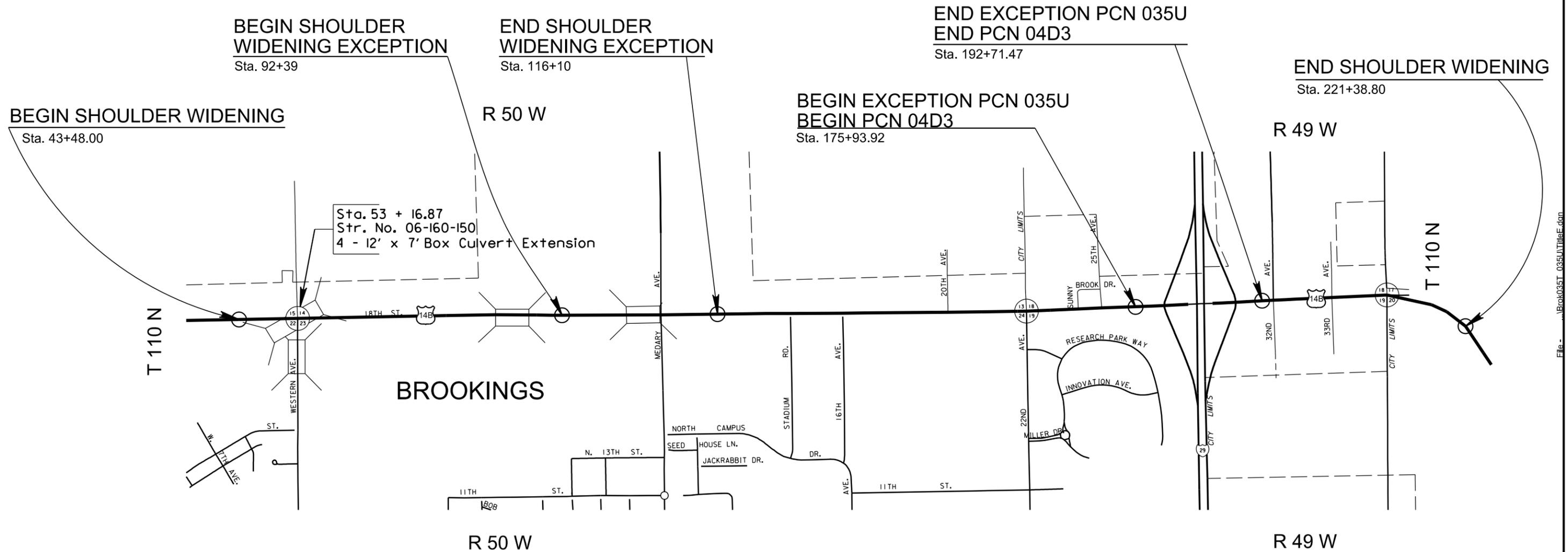
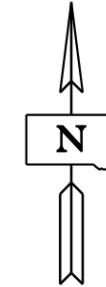


STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	NH 014B(04)418	E1	E10

Section E: Structure Plans

INDEX OF SHEETS -

Sheet E1 Layout Map and Index
Sheet E2 Estimate of Structure Quantities
Sheet E3 to E10 4 - 12' x 7' Box Culvert Extension



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STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	NH 014B(04)418	E2	E10

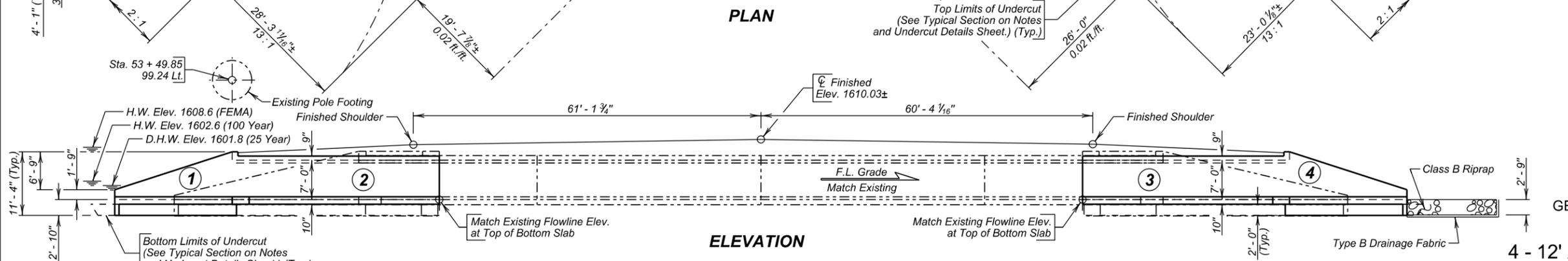
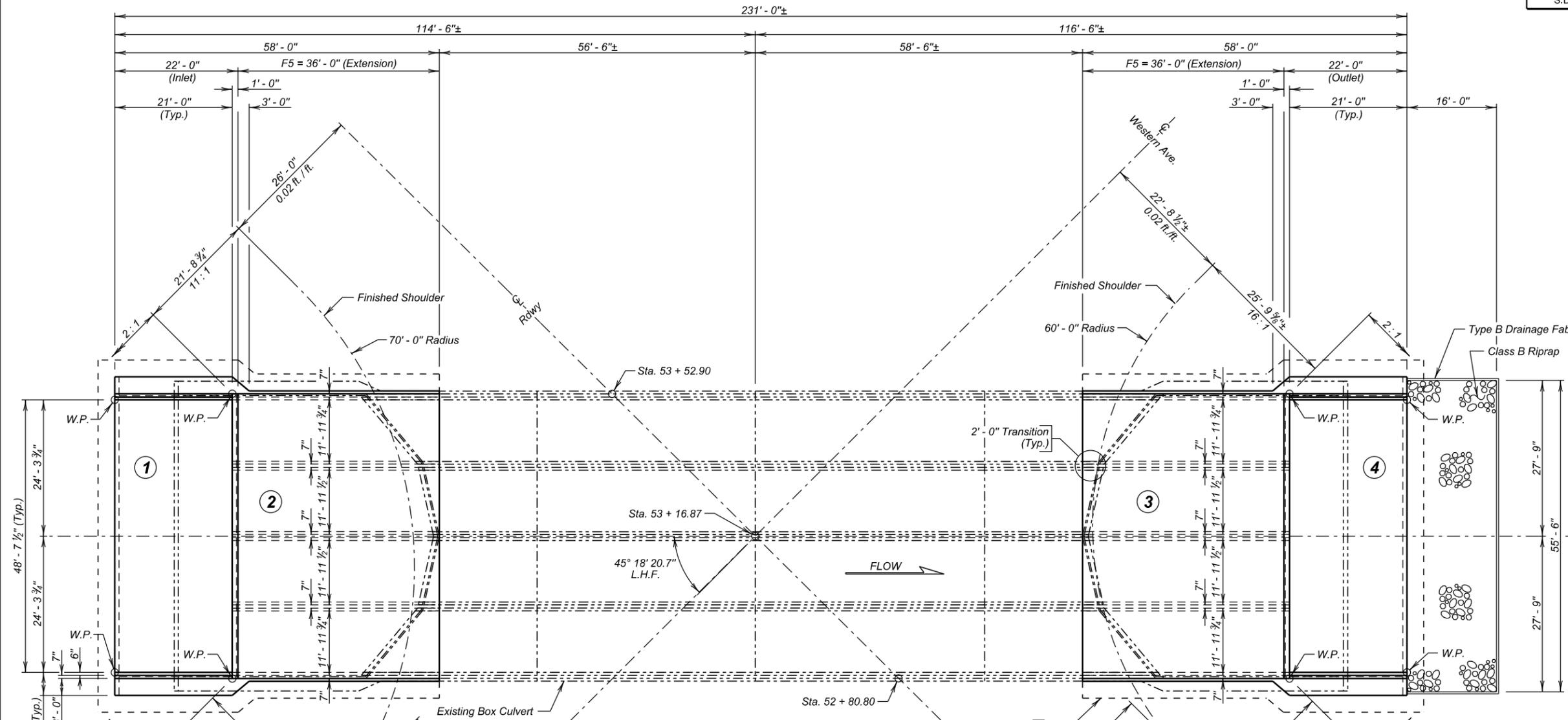
SECTION E – ESTIMATE OF STRUCTURE QUANTITIES

**Str. No. 06-160-150
4 - 12' x 7' Box Culvert Extension
Sta. 53 + 16.87**

Bid Item Number	Item	Quantity	Unit
420E0200	Structure Excavation, Box Culvert	185	CuYd
421E0200	Box Culvert Undercut	265	CuYd
460E0120	Class A45 Concrete, Box Culvert	369.1	CuYd
460E0300	Breakout Structural Concrete	186.8	CuYd
460E0380	Install Dowel in Concrete	186	Each
480E0100	Reinforcing Steel	67,820	Lb
700E0210	Class B Riprap	126.6	Ton
831E0110	Type B Drainage Fabric	142	SqYd

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

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	NH 014B(04)418	E3	E10



- X028- INDEX OF CULVERT SHEETS -**
- Sheet No. 1 - General Drawing and Quantities
 - Sheet No. 2 - Notes and Undercut Details
 - Sheet No. 3 - Breakout and Dowel Placement Details
 - Sheet No. 4 - Excavation Details @ Utility Pole
 - Sheet No. 5 - Inlet and Outlet Details
 - Sheet No. 6 - F5 Barrel End Section Details (36' - 0") (A)
 - Sheet No. 7 - F5 Barrel End Section Details (36' - 0") (B)
 - Sheet No. 8 - Standard Plate No.'s 460.03 and 620.16

HYDRAULIC DATA

Q_d	367 cfs
A_d	92 sq. ft.
V_d	4.0 fps
Q_F	367 cfs
Q_{100}	600 cfs
Q_{OT}	2927 cfs
Q_{FEMA}	3600 cfs
V_{max}	5.5 fps

Q_d = Design discharge for the proposed culvert based on 25 year frequency. El. 1601.8.
 Q_{OT} = Overtopping discharge and frequency > Q_{100} yr. recurrence interval. El. 1608.2. Location Sta 40 + 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. 1602.6.
 V_{max} = Maximum computed outlet velocity for the proposed culvert based on a 100 year frequency.

ESTIMATED QUANTITIES

ITEM	UNIT	QUANTITY
Class A45 Concrete, Box Culvert	Cu. Yd.	369.1
Reinforcing Steel	Lb.	67820
Structure Excavation, Box Culvert	Cu. Yd.	185
Box Culvert Undercut	Cu. Yd.	265
Class B Riprap	Ton	126.6
Type B Drainage Fabric	Sq. Yd.	142
Breakout Structural Concrete	Cu. Yd.	186.8
Install Dowel in Concrete	Each	186

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

NOTE:
 All stations are based on the survey of the existing box culvert. The intent is to match the existing box culvert location, flowline and slope.

* Topeka Shiner Stream

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

GENERAL DRAWING AND QUANTITIES FOR 4 - 12' X 7' BOX CULVERT EXTENSION

OVER N. BR. SIX MILE CREEK * 45° 18' 20.7" L.H.F. SKEW
 STA. 53 + 16.87 SEC. 14/22-T110N-R50W
 STR. NO. 06-160-150 NH 014B(04)418
 PCN 035U HS 20-44 & ALT.

BROOKINGS COUNTY
 S. D. DEPT. OF TRANSPORTATION

OCTOBER 2013 (1) OF (8)

-X028-

DESIGNED BY DM BROK035U	CK. DES. BY KSK 035UWA01	DRAFTED BY GW Kevin N. Coeden BRIDGE ENGINEER
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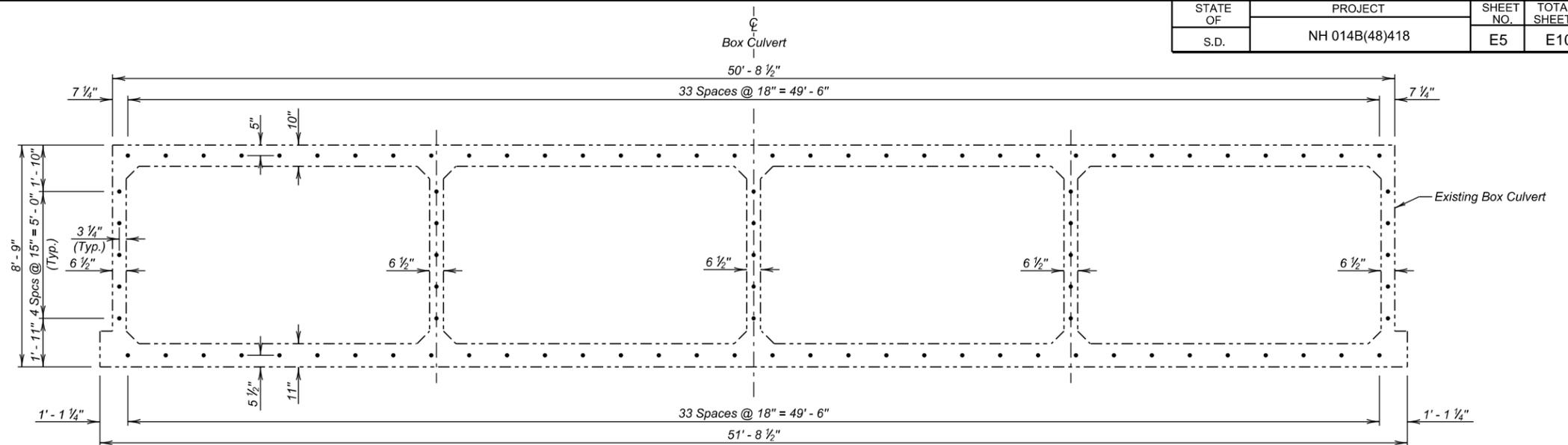
BREAKOUT STRUCTURAL CONCRETE

1. This work shall consist of breaking out and disposing of structural concrete. All broken out concrete and other discarded material shall be disposed of in accordance with the WASTE DISPOSAL SITE notes found in the Environmental Commitments.
2. Define the breakout limits with saw cuts.
3. Any additional breakout required due to spalling or cracking of the existing structure will be determined by the Engineer. Where additional breakout in the barrel section of the existing structure is required, care shall be taken not to damage any of the existing reinforcing steel. All steel will be left in place and thoroughly cleaned by sandblasting.
4. Additional breakout in existing walls or top slab will require shoring up of the parapet and top slab, as directed by the Engineer.
5. Plans quantity payment will be full compensation for this item regardless of the quantity actually broken out, unless measurement is ordered by the Engineer. If the Engineer orders breakout beyond the limits shown, this additional breakout will be paid for at the contract unit price per cubic yard for Breakout Structural Concrete. If additional breakout is caused by the Contractor's operations, no additional payment will be made.
6. Breakout Structural Concrete will be paid for at the contract unit price per cubic yard. This payment shall be full compensation for furnishing all materials, labor, tools and equipment necessary or incidental to breaking out the structural concrete. Payment includes, but is not limited to, excavation required to perform the required breakout, sawcutting, breaking out concrete, cleaning, and sandblasting reinforcing steel and concrete surfaces, and removing and disposing of all waste materials to satisfactorily complete the work.

INSTALLING DOWELS IN CONCRETE

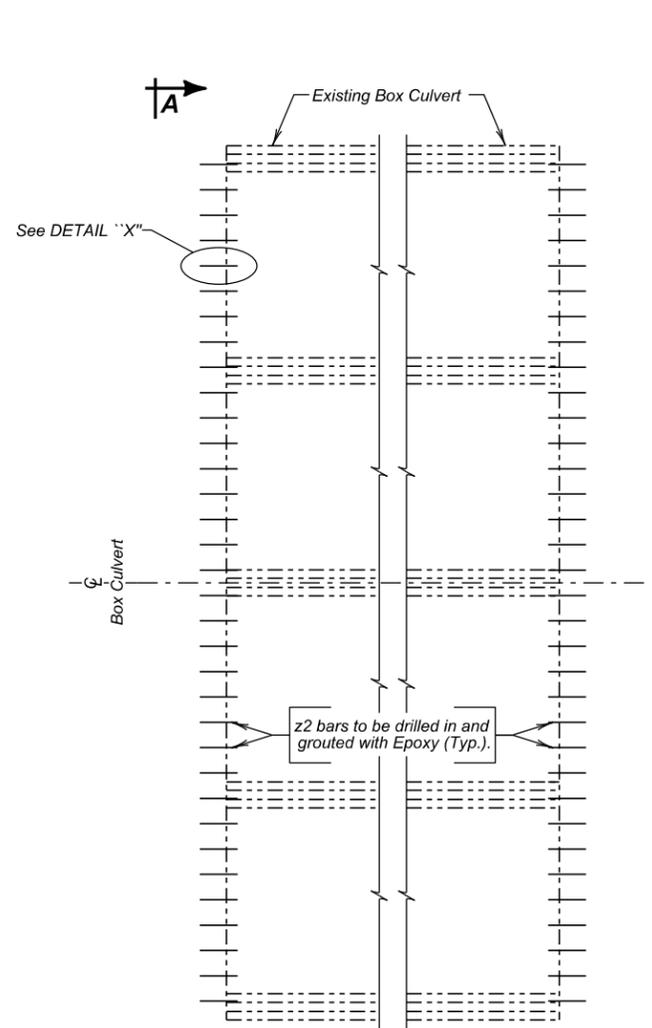
1. The epoxy resin mixture shall be of a type for bonding steel to hardened concrete and shall conform to AASHTO M235 Type IV, Grade 3 (Equivalent to ASTM C881 Type IV, Grade 3).
2. The diameter of the drilled holes shall not be less than 1/8 inch greater, nor more than 3/8 inch greater than the diameter of the dowels or as per the Manufacturer's recommendations. Holes shall not be drilled using core bits. The drilled holes shall be blown out with compressed air using a device that will reach the back of the hole to ensure that all debris or loose material has been removed prior to epoxy injection.
3. Mix epoxy resin as recommended by the Manufacturer and apply by an injection method as approved by the Engineer. Beginning at the back of the drilled holes, fill the holes 1/2 to 2/3 full of epoxy, or as recommended by the Manufacturer, prior to insertion of the steel bar. Care shall be taken to prevent epoxy from running out of the horizontal holes prior to steel bar insertion. Rotate the steel bar during installation to eliminate voids and ensure complete bonding of the bar. Insertion of the bars by dipping or painting methods will not be allowed.
4. No loads shall be applied to the epoxy grouted dowel bars until the epoxy resin has had sufficient time to cure as specified by the epoxy resin manufacturer.
5. Embed dowels 8" into existing concrete.
6. Dowel bars shall be #6 deformed bars conforming to ASTM A615 Grade 60.
7. The cost of drilling holes, epoxy resin, dowels, installation, and other incidental items shall be included in the contract unit price per each for Install Dowel in Concrete.

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	NH 014B(48)418	E5	E10

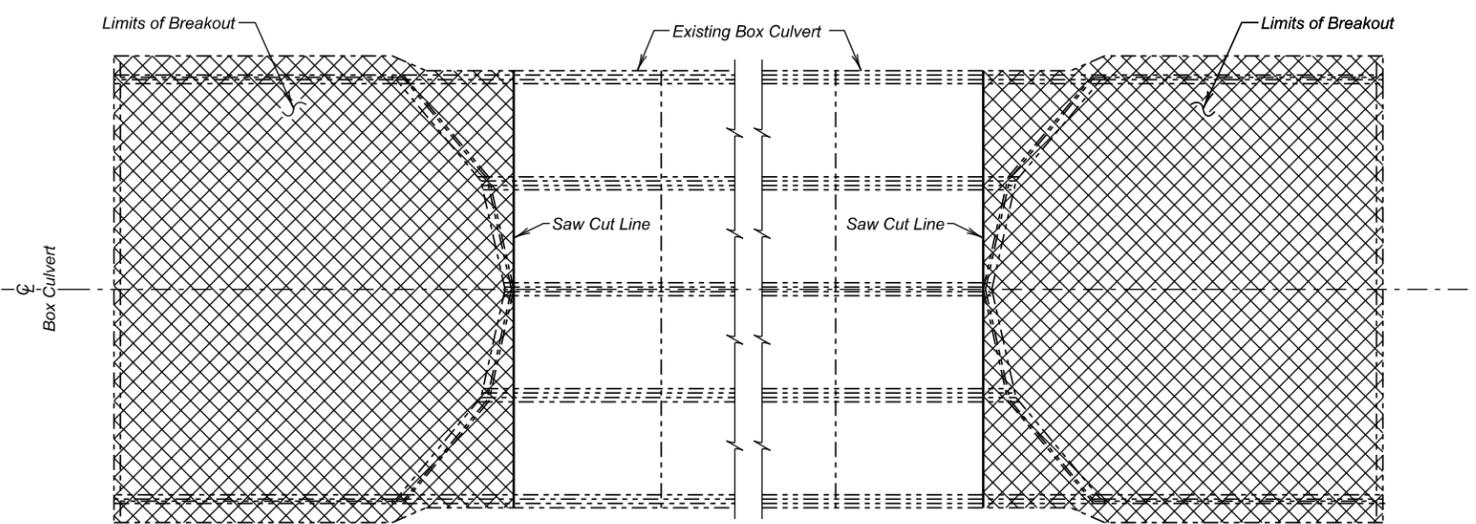


VIEW A-A

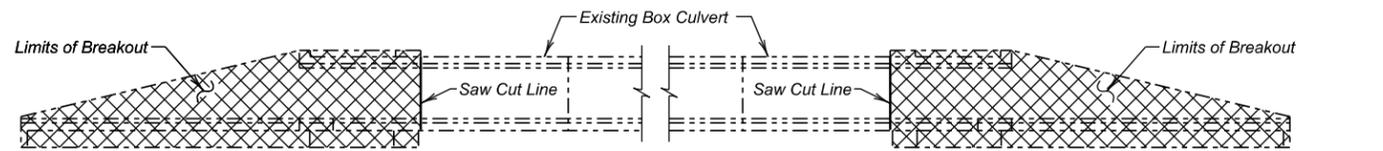
(Dowel Locations at Inlet & Outlet)



PLAN - DOWEL DETAILS
(Inlet and Outlet)



PLAN - BREAKOUT DETAILS



ELEVATION - BREAKOUT DETAILS

BREAKOUT AND DOWEL PLACEMENT DETAILS

FOR

4 - 12' X 7' BOX CULVERT EXTENSION

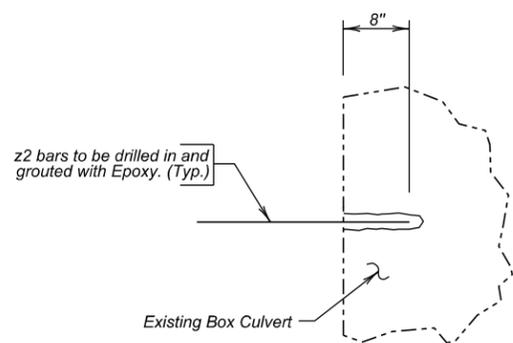
OVER N. BR. SIX MILE CREEK 45° 18' 20.7" L.H.F. SKEW
 STA. 53 + 16.87 SEC. 14/22-T110N-R50W
 STR. NO. 06-160-150 NH 014B(04)418
 HS 20-44 & ALT.

BROOKINGS COUNTY

S. D. DEPT. OF TRANSPORTATION

OCTOBER 2013

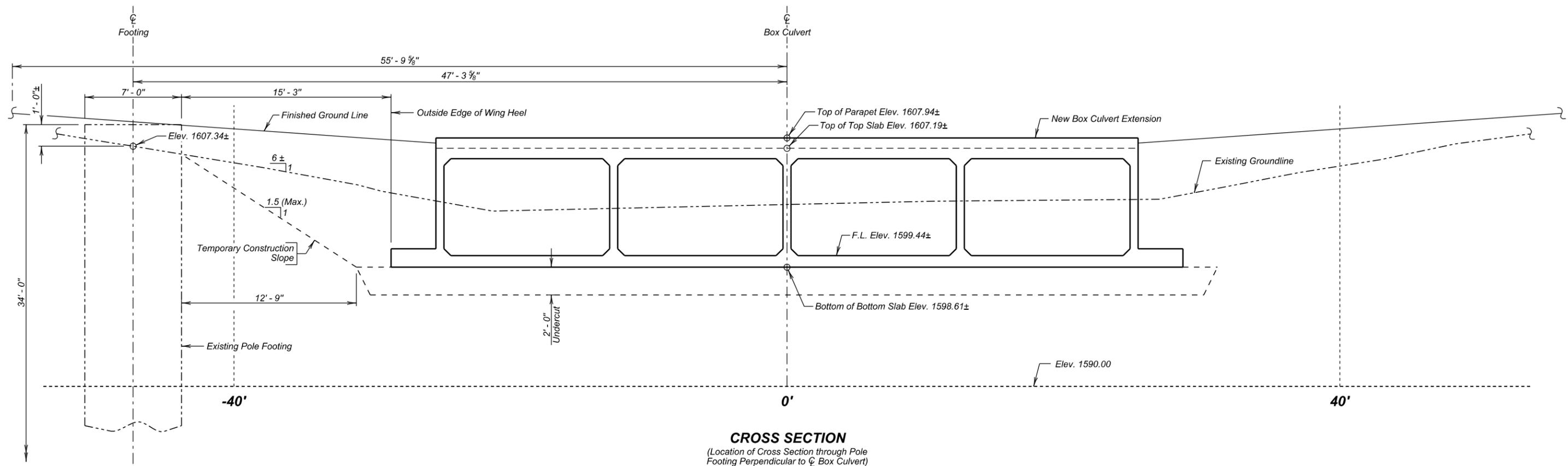
ESTIMATED QUANTITIES		
ITEM	UNIT	QUANTITY
Breakout Structural Concrete	Cu. Yd.	186.8
Install Dowel In Concrete	Each	186



DETAIL "X"

DESIGNED BY DM BROK035U	CK. DES. BY KSK 035UWA03	DRAFTED BY GW	Kevin N. Goeden BRIDGE ENGINEER
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STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	NH 014B(04)418	E6	E10



NOTES:

1. Excavation shall not exceed limits shown.
2. Excavation must take place between April 1 and September 30.

EXCAVATION DETAILS @ UTILITY POLE
 FOR

4 - 12' X 7' BOX CULVERT EXTENSION

OVER N. BR. SIX MILE CREEK 45° 18' 20.7" L.H.F. SKEW
 STA. 53 + 16.87 SEC. 14/22-T110N-R50W
 STR. NO. 06-160-150 NH 014B(04)418
 HS 20-44
 & ALT.

BROOKINGS COUNTY

S. D. DEPT. OF TRANSPORTATION

MAY 2014

4 OF 8

DESIGNED BY DM BROK035U	CK. DES. BY MM 035UGA04	DRAFTED BY GW	<i>Kevin N. Coeden</i> BRIDGE ENGINEER
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REINFORCING SCHEDULE

(For One Inlet and One Outlet)

Mk.	No.	Size	Length	Type	Bending Details
a1	8	6	50'-6"	Str.	
b1	8	6	49'-9"	Str.	
c	8	5	4'-6"	1A	
c1	16	5	21'-9"	Str.	
c2	8	5	7'-0"	19B	
d1	16	5	5'-6"	19B	
e	100	4	7'-0"	S12	
e1	64	4	9'-3"	S12A	
f1	102	4	5'-3"	S6A	
g0	24	5	5'-0"	Str.	
g1	20	4	26'-3"	Str.	
g2	8	4	22'-9"	Str.	
h	28	4	18'-6"	17A	
k	48	4	13'-3"	17A	
p6	20	6	7'-0"	Str.	
p7	20	4	23'-6"	Str.	
p8	8	4	25'-0"	Str.	
p9	8	4	27'-3"	Str.	
e2	98	4	7'-6"	S12	
u1	98	4	20'-6"	Str.	
u2	50	4	48'-3"	Str.	

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

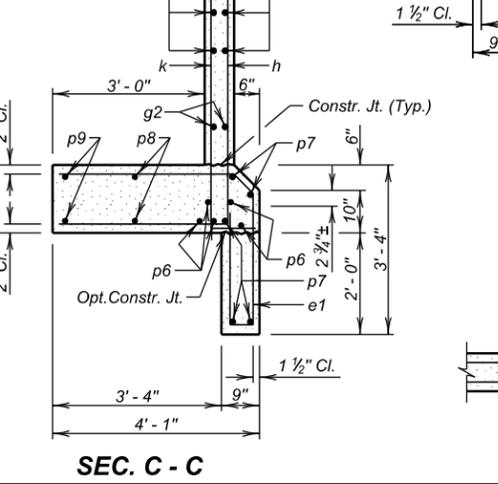
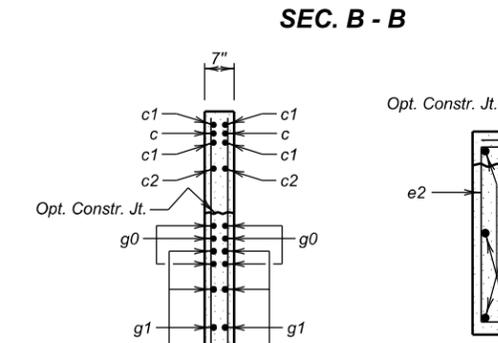
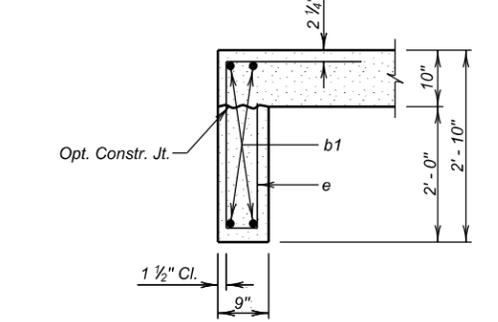
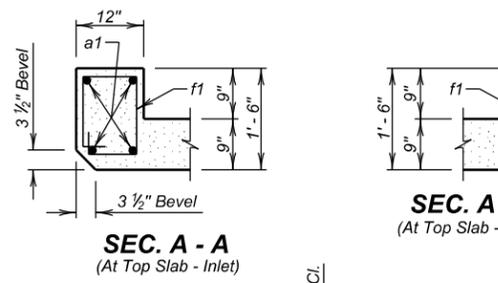
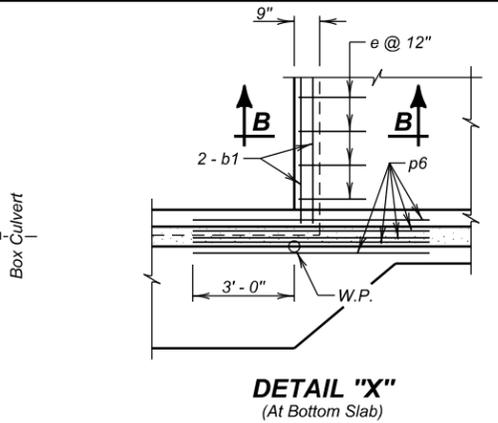
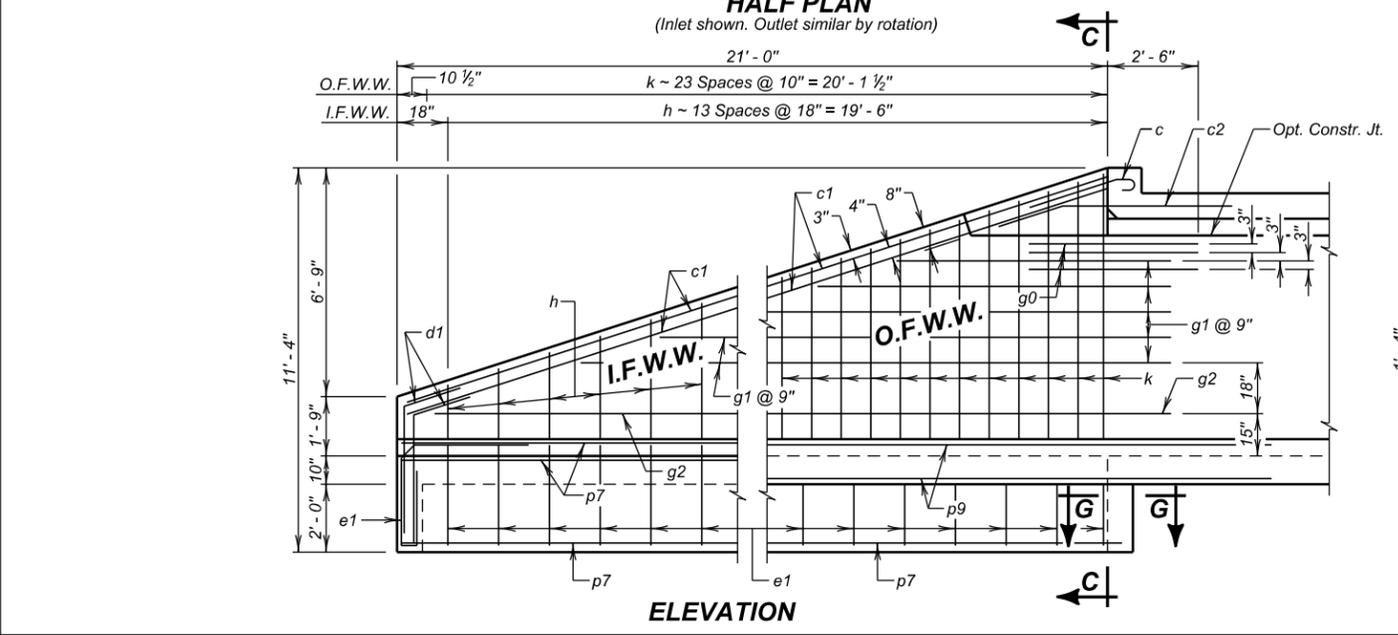
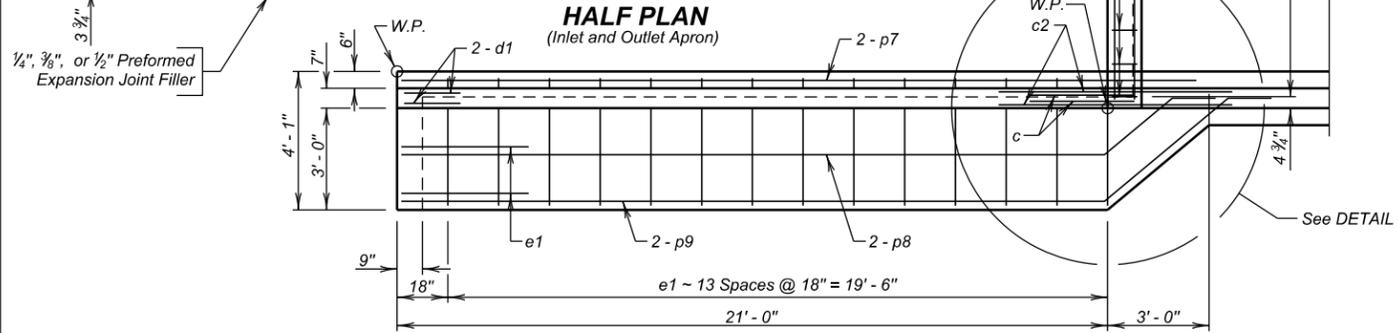
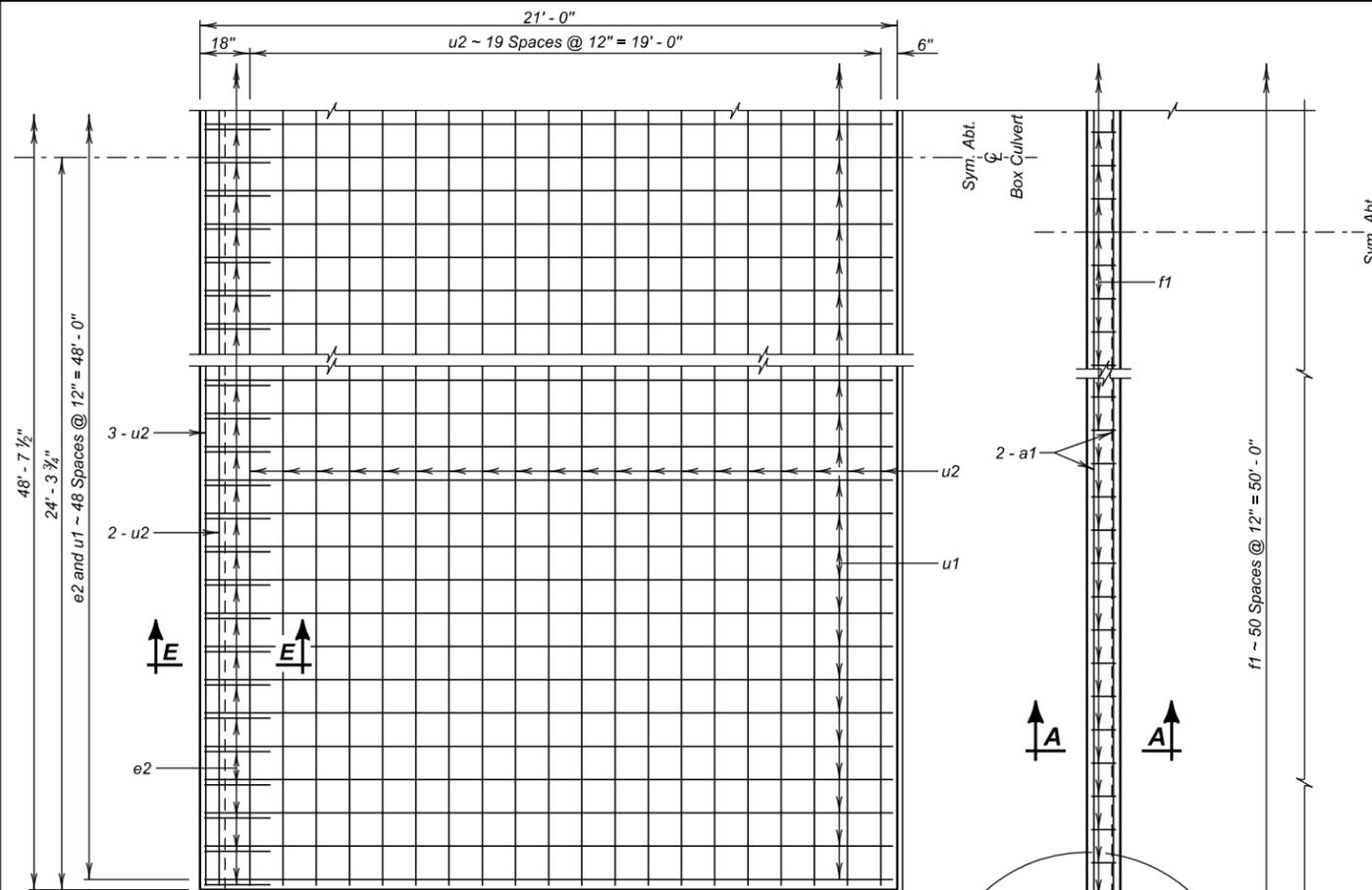
ESTIMATED QUANTITIES			
ITEM	Class A45 Concrete, Box Culvert	Reinforcing Steel	Structure Excavation, Box Culvert
UNIT	Cu. Yd.	Lb.	Cu. Yd.
Inlet	23.5	2574	12.6
Inlet Apron	22.3	1722	22.3
Outlet	23.4	2574	12.6
Outlet Apron	22.3	1722	22.3

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

INLET AND OUTLET DETAILS FOR
4 - 12' X 7' BOX CULVERT EXTENSION
 OVER N. BR. SIX MILE CREEK 45° 18' 20.7" L.H.F. SKEW
 STA. 53 + 16.87 SEC. 14/22-T110N-R50W
 STR. NO. 06-160-150 NH 014B(04)418
 HS 20-44 & ALT.

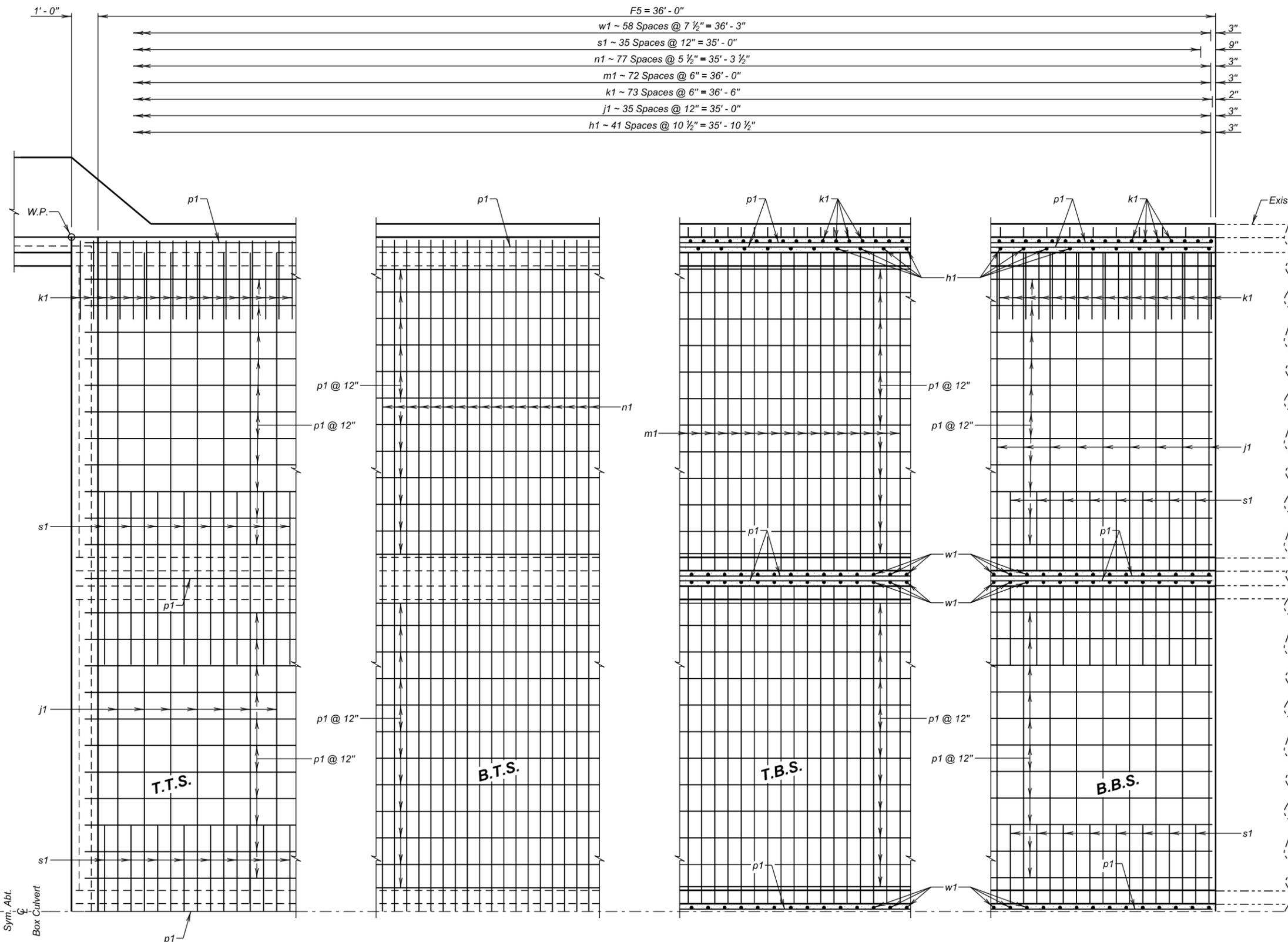
BROOKINGS COUNTY
 S. D. DEPT. OF TRANSPORTATION
 OCTOBER 2013

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 CK. DES. BY KSK 035UWA05
 DRAFTED BY GW
 Kevin N. Coeden
 BRIDGE ENGINEER



SEC. E - E

SEC. G - G

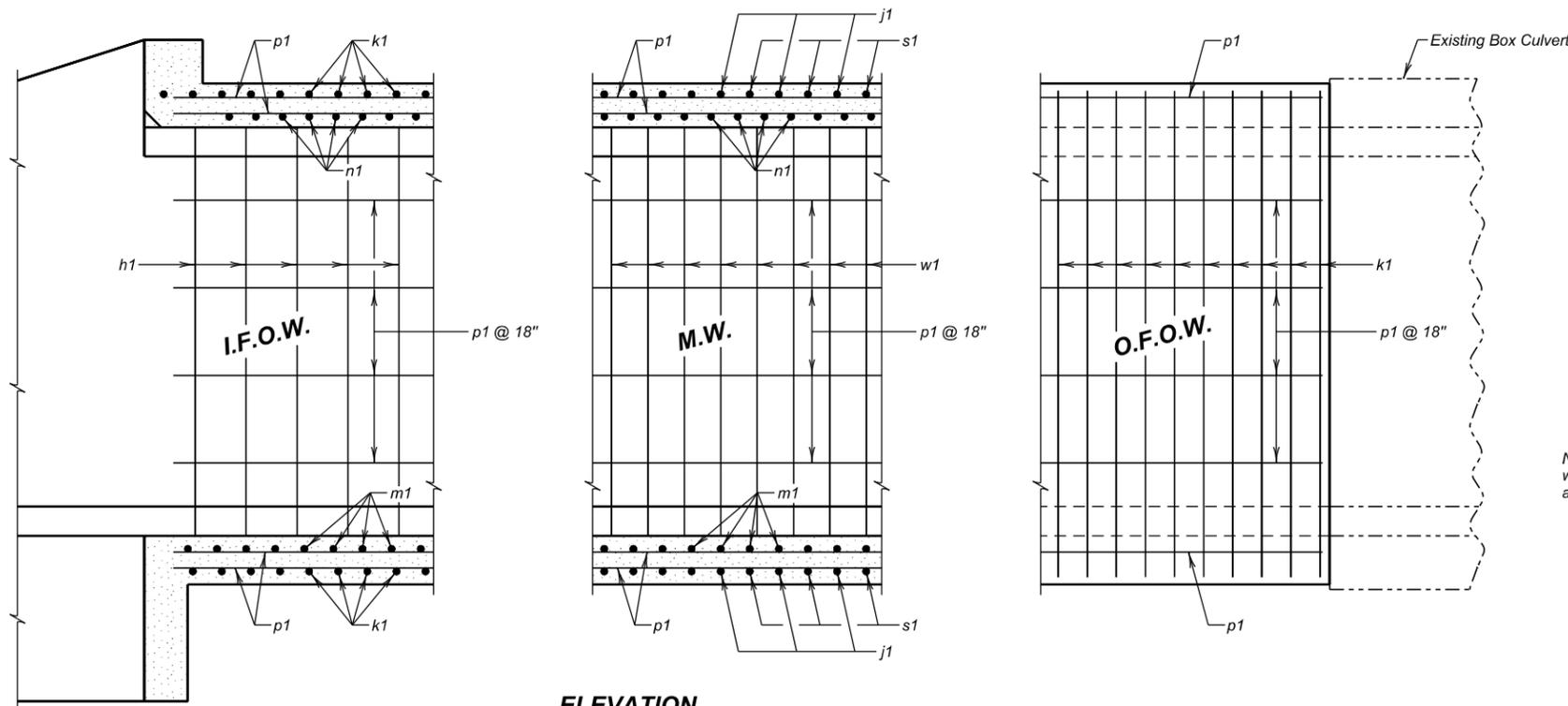


LEGEND FOR PLACING RE- STEEL	
T.T.S.	- Top of Top Slab
B.T.S.	- Bottom of Top Slab
T.B.S.	- Top of Bottom Slab
B.B.S.	- Bottom of Bottom Slab

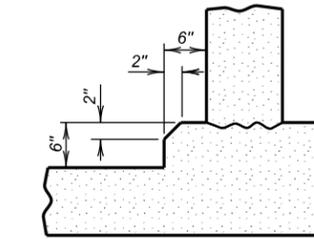
HALF PLAN
(Inlet Shown, Outlet similar by rotation)

F5 BARREL END SECTION (36' - 0") (A)
FOR
4 - 12' X 7' BOX CULVERT EXTENSION
OVER N. BR. SIX MILE CREEK 45° 18' 20.7" L.H.F. SKEW
STA. 53 + 16.87 SEC. 14/22-T110N-R50W
STR. NO. 06-160-150 NH 014B(04)418
HS 20-44 & ALT.

BROOKINGS COUNTY
S. D. DEPT. OF TRANSPORTATION
OCTOBER 2013



ELEVATION
(Inlet shown. Outlet similar by rotation)



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.

REINFORCING SCHEDULE				
(For Two F5 Barrel End Sections @ 36' - 0")				
Mk.	No.	Size	Length	Type
h1	168	4	9' - 0"	17A
j1	144	7	49' - 9"	Str.
k1	296	5	14' - 3"	17
m1	146	6	51' - 6"	Str.
n1	156	6	50' - 6"	Str.
p1	241	4	36' - 6"	Str.
s1	432	7	6' - 6"	Str.
w1	354	4	18' - 9"	S11A
z2	*	6	2' - 3"	Str.

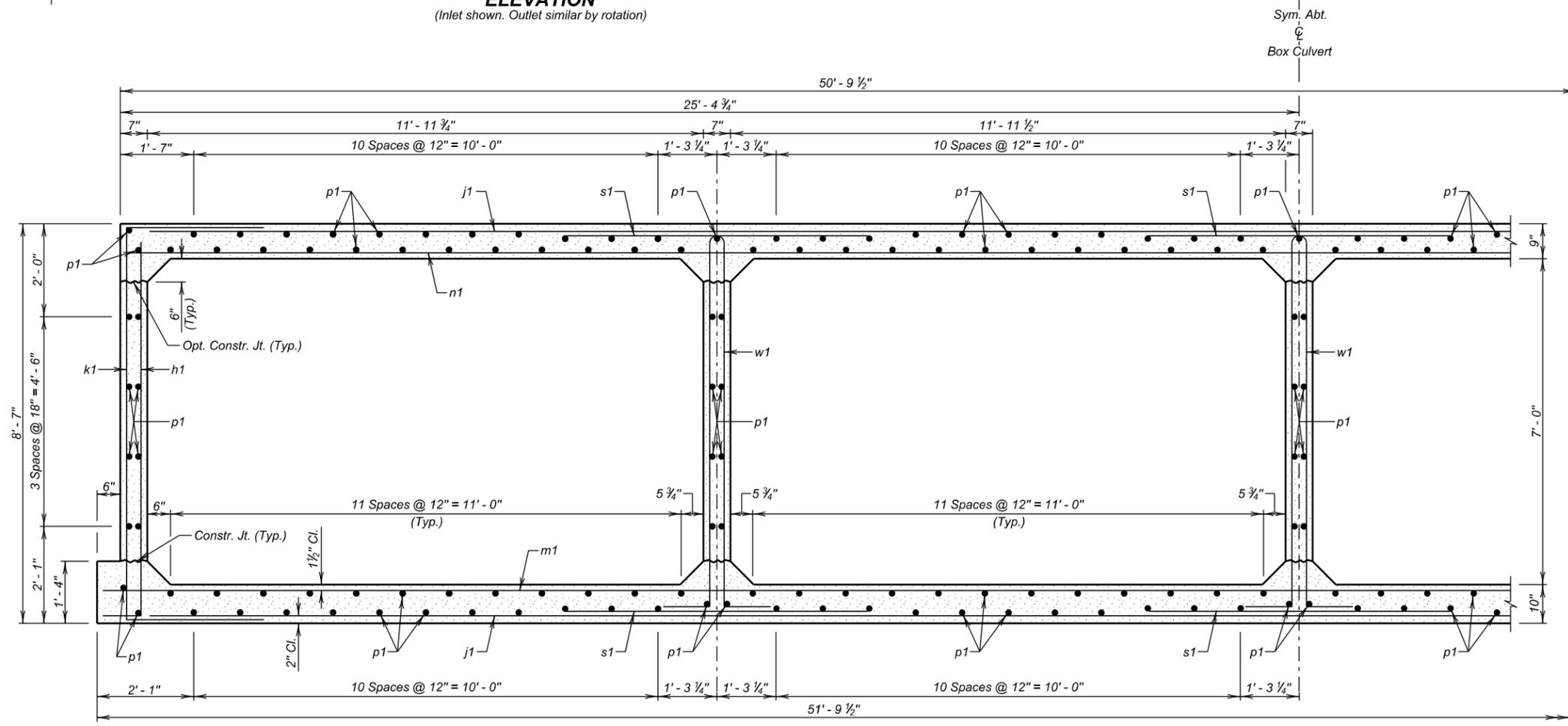
Bending Details	
	Type 17
	Type S11A
	Type 17A

OPTIONAL k1 SPLICE DETAIL
Contractor may use optional reinforcing steel splice, as shown. The cost of the additional reinforcing steel shall be borne by the Contractor.

NOTES:
All dimensions are out to out of bars.
Request for additional reinforcing steel splices at points other than those shown, must be submitted to the Engineer for prior approval. If additional splices are approved, no payment will be allowed for the added quantity of reinforcing steel.
*Quantity of z2 dowel bars is not included in reinforcing steel. (See BREAKOUT AND DOWEL PLACEMENT DETAILS Sheet).

ESTIMATED QUANTITIES			
ITEM	Class A45 Concrete, Box Culvert	Reinforcing Steel	Structure Excavation, Box Culvert
UNIT	Cu.Yd.	Lb.	Cu.Yd.
2 - F5 Barrel End Sections @ 36' - 0"	277.6	59228	115.1

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



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

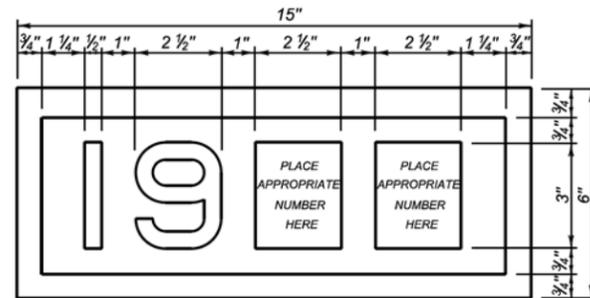
F5 BARREL END SECTION (36' - 0") (B)
FOR
4 - 12' X 7' BOX CULVERT EXTENSION
OVER N. BR. SIX MILE CREEK 45° 18' 20.7" L.H.F. SKEW
STA. 53 + 16.87 SEC. 14/22-T110N-R50W
STR. NO. 06-160-150 NH 014B(04)418
HS 20-44 & ALT.

BROOKINGS COUNTY
S. D. DEPT. OF TRANSPORTATION

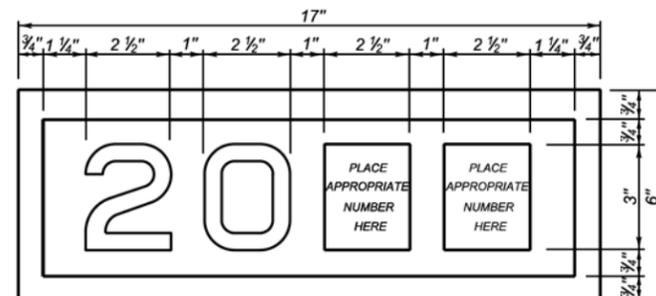
OCTOBER 2013 7 OF 8

DESIGNED BY DM BROK035U	CK. DES. BY KSK 035UWA07	DRAFTED BY GW	<i>Kevin N. Goeden</i> BRIDGE ENGINEER
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**YEAR PLATE
DETAILS FOR
ORIGINAL CONSTRUCTION**

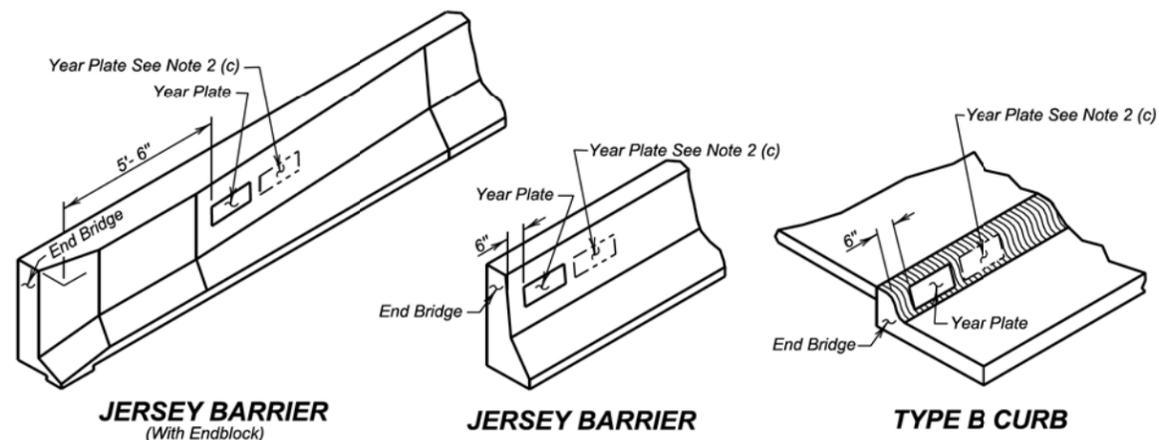


**YEAR PLATE
DETAILS FOR
NEW CONSTRUCTION**



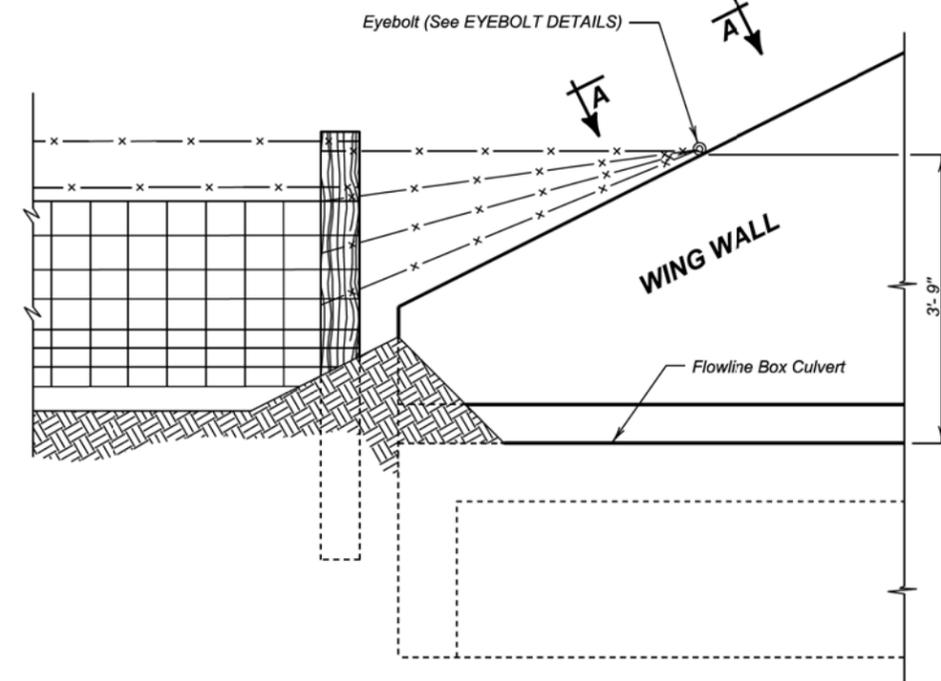
GENERAL NOTES:

- Year plates of the general dimensions shown shall be constructed on all box culverts and bridges. The year plates shall 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 shall be located on structure(s) as follows:
 - On cast-in-place box culverts the year plates shall 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 shall be centered laterally on the upstream face of the top slab. Where an extended interior wall interferes with this location, the year plate shall be centered in an adjacent barrel.
 - On bridges with six (6) inch curbs or "Jersey" shaped barriers with no endblocks, the year plate shall 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 "Jersey" shaped barrier endblocks, the year plate shall be centered on the upper sloped portion of the barrier approximately 5'-6" from the end of the bridge, or as designated by the Engineer. There shall 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 shall be placed as listed above and the other located adjacent to it. Both year plates shall 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 shall be incidental to other contract items.



June 26, 2012

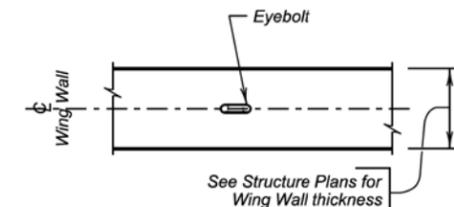
Published Date: 4th Qtr. 2014	S D D O T	DUAL DATE YEAR PLATE DETAILS	PLATE NUMBER 460.03
			Sheet 1 of 1



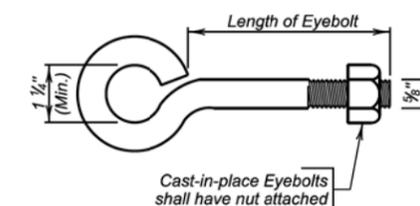
DETAIL FOR FENCE ANCHORS

GENERAL NOTES:

- The fence and post details shown are for illustrative purpose only. The fence shall be as specified elsewhere in the plans.
- Eyebolts shall be placed on all of the box culvert wing walls.
- Eyebolts shall be 5/8 inch diameter and shall conform to ASTM A307.
- 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.
- 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.
- The cost for furnishing and installing eyebolts and/or concrete inserts shall be incidental to various contract items.



VIEW A - A



EYEBOLT DETAILS

December 23, 2012

Published Date: 4th Qtr. 2014	S D D O T	FENCE ANCHORS FOR BOX CULVERT WING WALLS	PLATE NUMBER 620.16
			Sheet 1 of 1