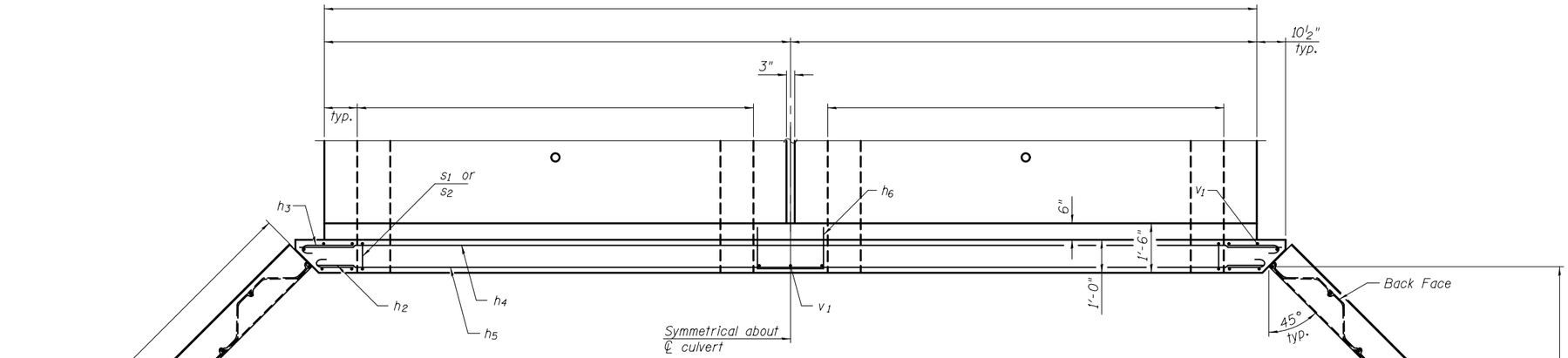
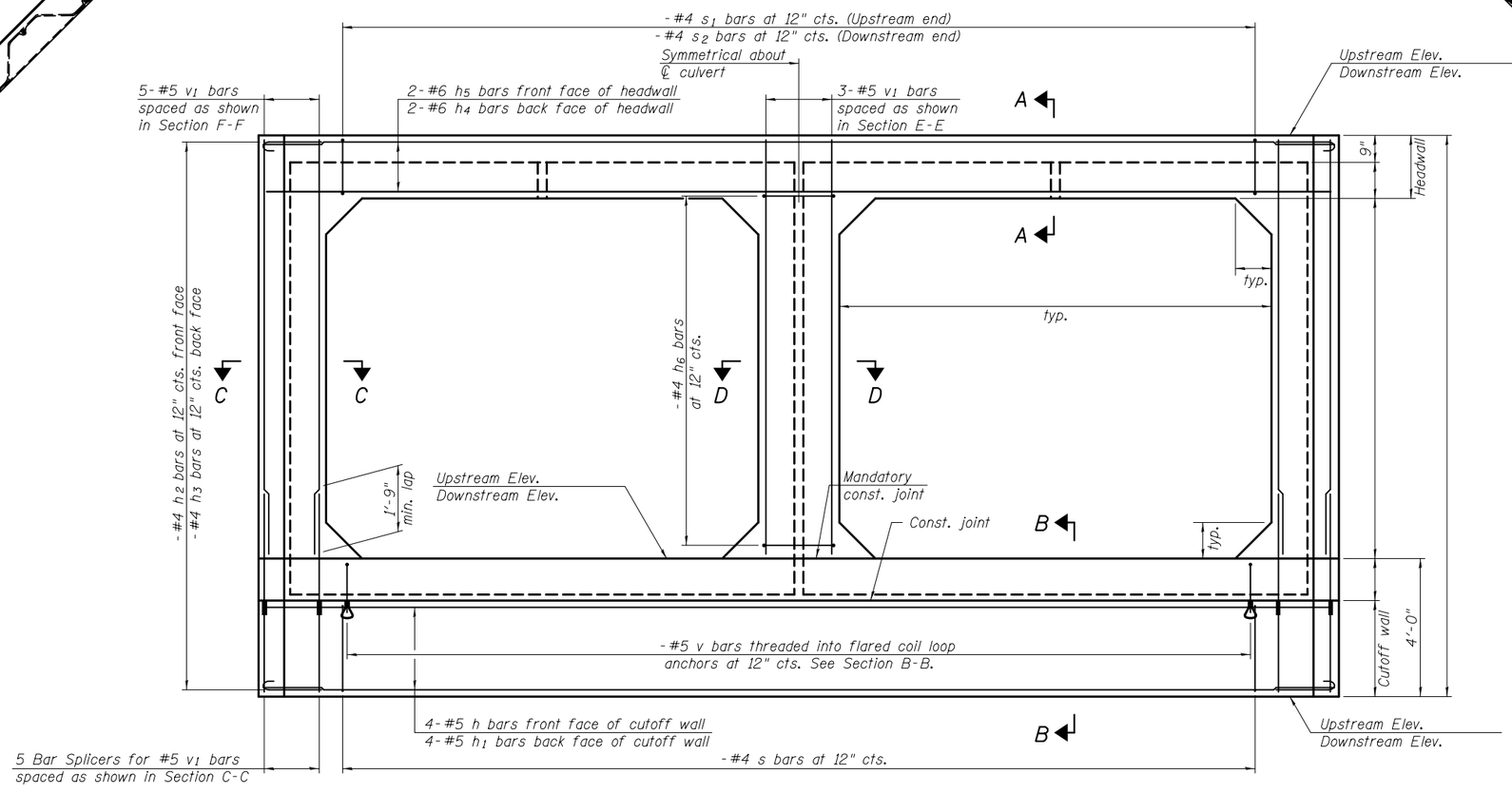
CELL / MODEL NAME	DESCRIPTION	DATE
CIPES-DCB-PSSP-ZS (1 of 2)	Cast-in-Place End Section for Double Cell Precast Box Culvert, Permanent Steel Sheet Pile Wingwalls, Zero Skew	10/15/2016
CIPES-PSSP-ZS-DETAILS (2 of 2)	Details for Cast-in-Place End Section for Precast Box Culvert, Permanent Steel Sheet Pile Wingwalls, Zero Skew	10/15/2016
CIPES-SCB-PSSP-ZS (1 of 2)	Cast-in-Place End Section for Single Cell Precast Box Culvert, Permanent Steel Sheet Pile Wingwalls, Zero Skew	10/15/2016
CIPES-TCB-PSSP-ZS (1 of 2)	Cast-in-Place End Section for Triple Cell Precast Box Culvert, Permanent Steel Sheet Pile Wingwalls, Zero Skew	10/15/2016
DCB-GPE	Double Cell Precast Box Culvert with Apron End Section, General Plan and Elevation Sheet	10/15/2016
MCB-AES (1 of 2)	Multi-Cell Precast Box Culvert Apron End Section Details	10/15/2016
MCB-AES (2 of 2)	Multi-Cell Precast Box Culvert Apron End Section Details	10/15/2016
MCB-TES (1 of 2)	Multi-Cell Precast Box Culvert Tapered End Sections	10/15/2016
MCB-TES (2 of 2)	Multi-Cell Precast Box Culvert Tapered End Sections	10/15/2016
SCB-AES (1 of 2)	Single Cell Precast Box Culvert Apron End Section Details	10/15/2016
SCB-AES (2 of 2)	Single Cell Precast Box Culvert Apron End Section Details	10/15/2016
SCB-GPE	Single Cell Precast Box Culvert with Apron End Section, General Plan and Elevation Sheet	10/15/2016
SCB-TES (1 of 2)	Single_Cell Precast Box Culvert Tapered End Section	10/15/2016
SCB-TES (2 of 2)	Single_Cell Precast Box Culvert Tapered End Section	10/15/2016
TCB-GPE	Triple Cell Precast Box Culvert with Apron End Section, General Plan and Elevation Sheet	10/15/2016
TPGBC-ZS (1 of 2)	Traversable Pipe Grate for Box Culverts, Zero Skew	10/15/2016

CELL / MODEL NAME	DESCRIPTION	DATE
TPGBC-ZS (2 of 2)	Traversable Pipe Grate for Box Culverts, Zero Skew	10/15/2016



PLAN



END ELEVATION

(Wingwalls omitted in this view for clarity.)

Note:

The design fill height for this structure is feet. The precast concrete box culvert sections shall conform to the standard designs of ASTM C 1577.

The box culvert end section shall be built in the field and a precast option is not allowed except the cutoff wall may be precast. If the Contractor elects to use a precast cutoff wall, shop drawings and a proposed construction sequence shall be submitted to the Engineer for approval.

Areas of the precast box culvert in contact with cast-in-place concrete shall be sandblasted, cleaned, and wetted prior to placing concrete in the field according to Article 503.09(b).

The ends of the precast box sections adjacent to the end section shall be formed without male and female shapes.

The joints between precast box sections shall be sealed, all voids filled with a mastic joint sealer. In addition, the joints shall be externally sealed on all four sides with a 13 inch wide external sealing band. The seal shall be centered over the joint, secured in place and protected during the backfilling process.

Tilt h_2 and h_3 bars as required to maintain clearance.

Extend precast concrete box culvert welded wire fabric into end section. Bend as necessary to provide $1\frac{1}{2}$" clear cover.

See sheet of for culvert construction sequence.
See sheet of for Section A-A, B-B, C-C and D-D.
See sheet of for additional wing wall details.

BILL OF MATERIAL

Item	Unit	Total
Culvert End Sections, Culvert No.	Each	

CIPES-DCB-PSSP-ZS 10-15-2016

(Sheet 1 of 2)

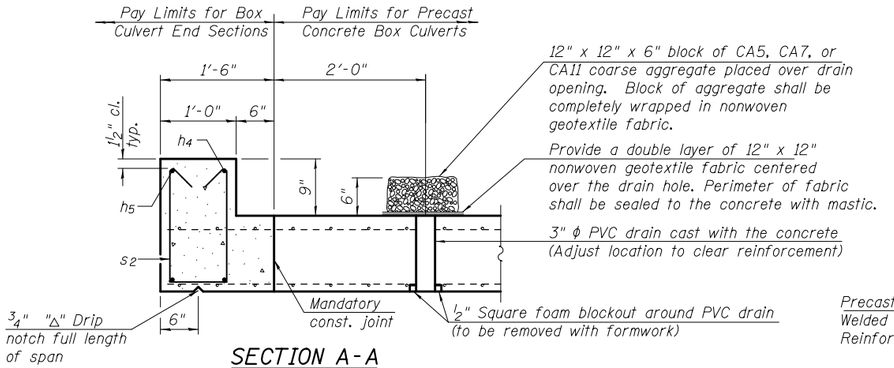
FILE NAME =	USER NAME =	DESIGNED -	REVISED -
		CHECKED -	REVISED -
	PLOT SCALE =	DRAWN -	REVISED -
	PLOT DATE =	CHECKED -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

BOX CULVERT END SECTION DETAILS
STRUCTURE NO.
SHEET NO. OF SHEETS

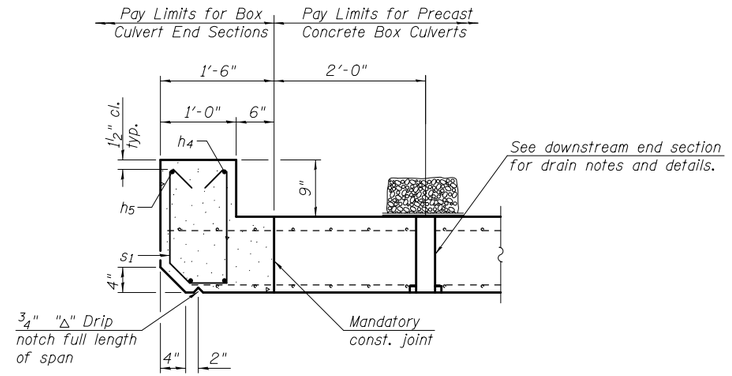
F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.

CONTRACT NO.
ILLINOIS FED. AID PROJECT



SECTION A-A
(Downstream End)

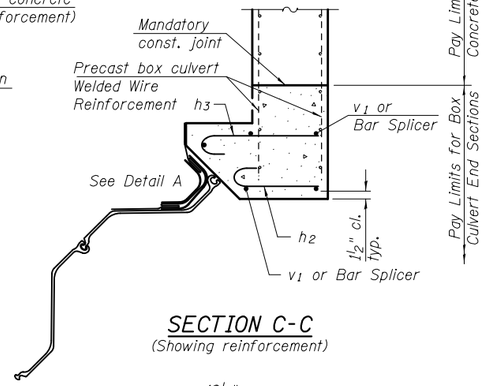
(All costs associated with furnishing and constructing the above drain detail will not be measured for payment but shall be included in the contract unit price for the associated work.)



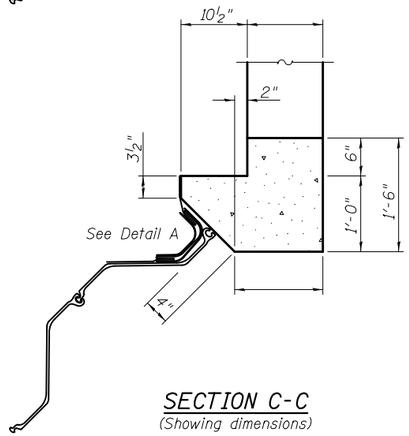
SECTION A-A
(Upstream End)

* If soil conditions permit, the back face of cutoff wall may be poured directly against the soil. Provide 3" cover by increasing cutoff wall thickness to 1'-1½".

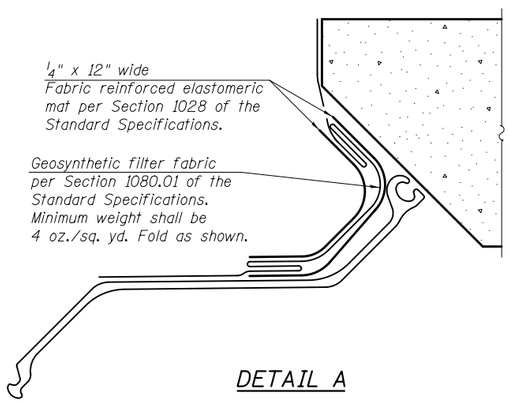
SECTION B-B



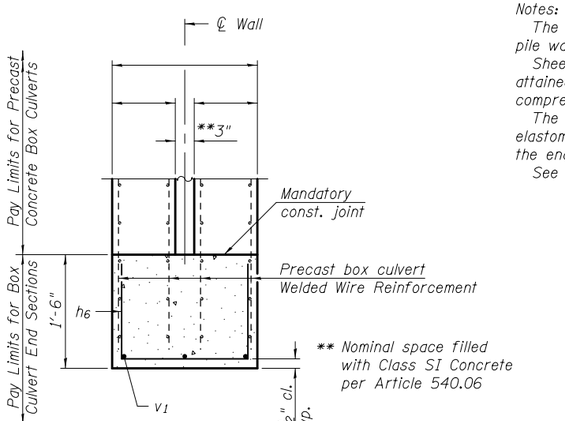
SECTION C-C
(Showing reinforcement)



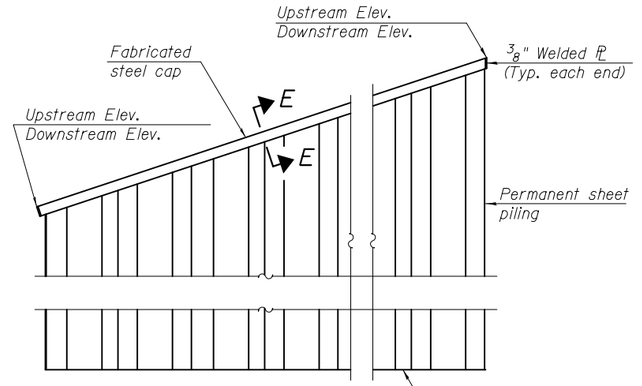
SECTION C-C
(Showing dimensions)



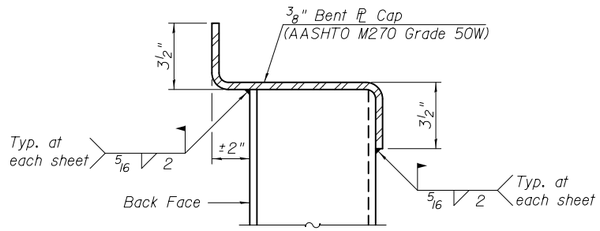
DETAIL A



SECTION D-D
(For multiple cells only)



WINGWALL ELEVATION



SECTION E-E

Notes:

The minimum effective section modulus of the permanent sheet pile wall shall be in.³/ft.

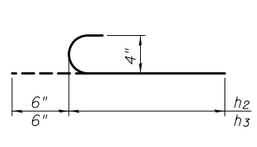
Sheet piling shall not be driven until the concrete strength has attained a minimum flexural strength of 650 psi or a minimum compressive strength of 3500 psi.

The cost of furnishing and installing the fabricated steel cap, elastomeric mat, and filter fabric shall be included in the cost of the end section.

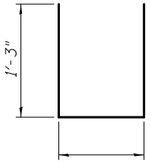
See sheet of for culvert construction sequence.

ONE END SECTION BILL OF MATERIAL
(For information only)

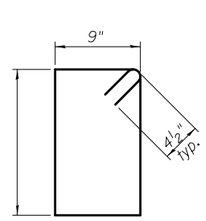
Bar	No.	Size	Length	Shape
h		#5		
h1		#5		
h2		#4		
h3		#4		
h4		#6		
h5		#6		
h6		#4		
s		#4		
s1		#4		
s2		#4		
v		#5		
v1		#5		
Concrete Box Culverts			Cu. Yd.	
Reinforcement Bars			Pound	
Bar Splicers			Each	
Permanent Sheet Piling			Sq. Ft.	



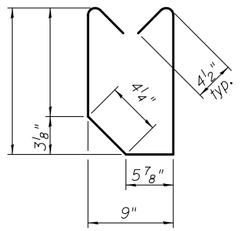
BARS h2 and h3



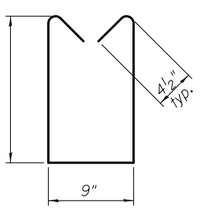
BAR h6
(For multiple cells only)



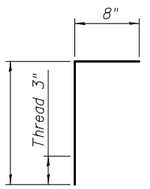
BAR s



BAR s1



BAR s2



BAR v

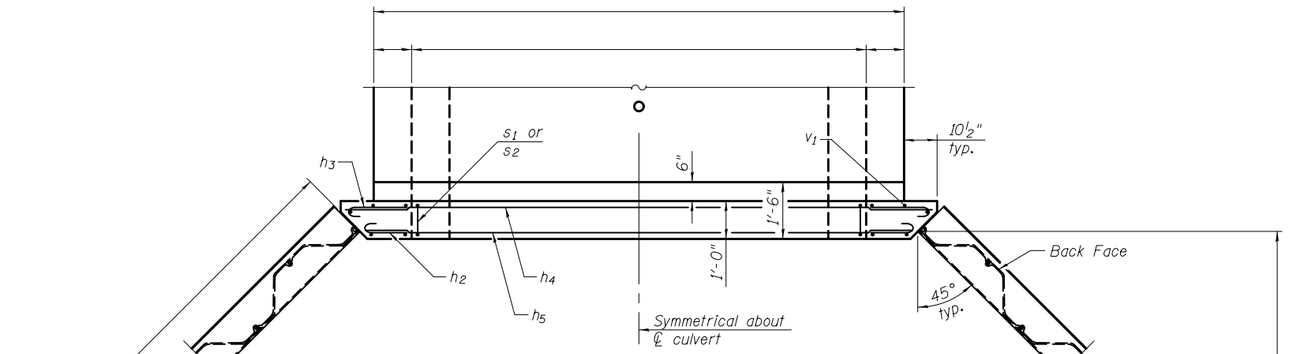
CIPES-PSSP-ZS-DETAILS 10-15-2016

FILE NAME =	USER NAME =	DESIGNED -	REVISED -
		CHECKED -	REVISED -
	PLOT SCALE =	DRAWN -	REVISED -
	PLOT DATE =	CHECKED -	REVISED -

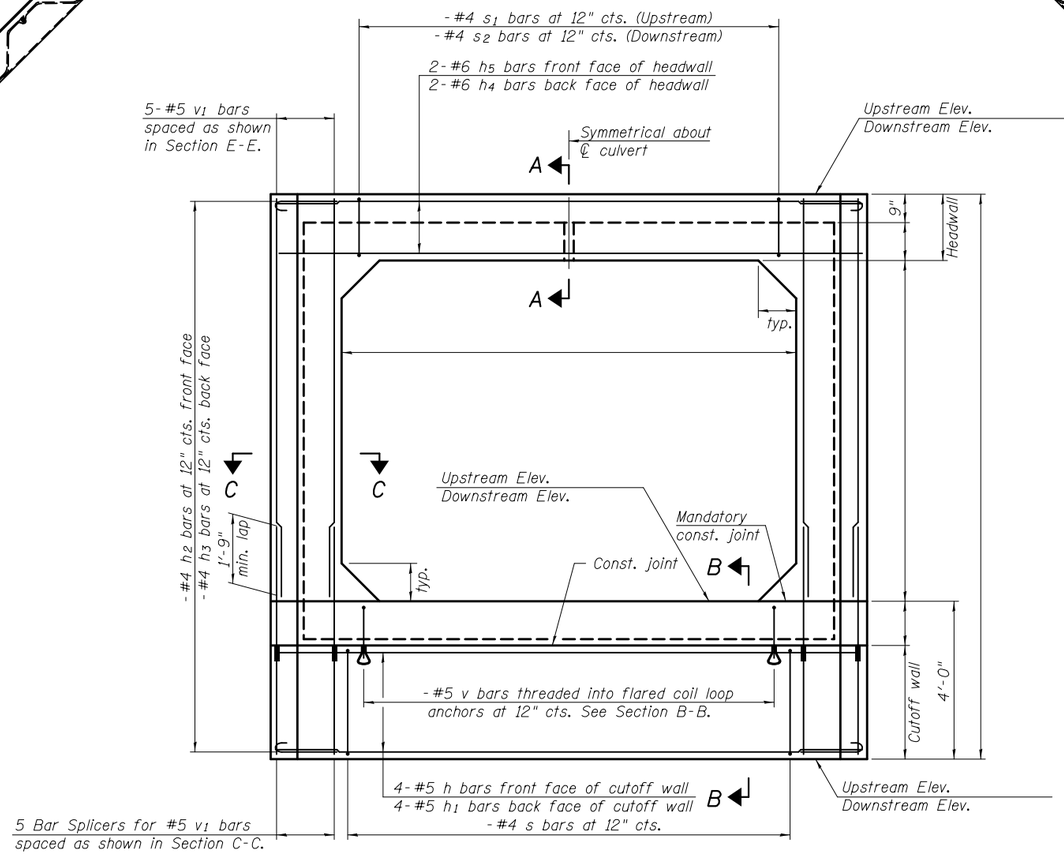
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

BOX CULVERT END SECTION DETAILS
STRUCTURE NO.
SHEET NO. OF SHEETS

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		CONTRACT NO.		
	ILLINOIS FED. AID PROJECT			



PLAN



END ELEVATION

(Wingwalls omitted in this view for clarity.)

Note:

The design fill height for this structure is feet. The precast concrete box culvert sections shall conform to the standard designs of ASTM C 1577.

The box culvert end section shall be built in the field and a precast option is not allowed except the cutoff wall may be precast. If the Contractor elects to use a precast cutoff wall, shop drawings and a proposed construction sequence shall be submitted to the Engineer for approval.

Areas of the precast box culvert in contact with cast-in-place concrete shall be sandblasted, cleaned, and wetted prior to placing concrete in the field according to Article 503.09(b).

The ends of the precast box sections adjacent to the end section shall be formed without male and female shapes.

The joints between precast box sections shall be sealed, all voids filled with a mastic joint sealer. In addition, the joints shall be externally sealed on all four sides with a 13 inch wide external sealing band. The seal shall be centered over the joint, secured in place and protected during the backfilling process.

Tilt h_2 and h_3 bars as required to maintain clearance.

Extend precast concrete box culvert welded wire reinforcement into end section. Bend as necessary to provide $1\frac{1}{2}$'' clear cover.

See sheet of for culvert construction sequence.

See sheet of for Section A-A, B-B and C-C.

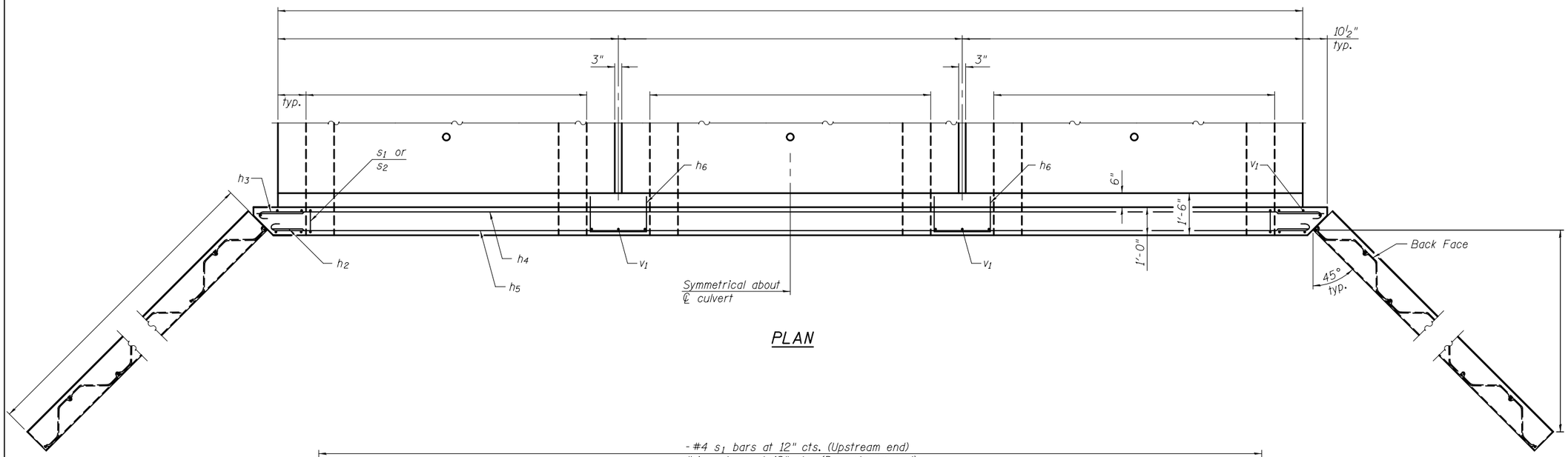
See sheet of for additional wing wall details.

BILL OF MATERIAL

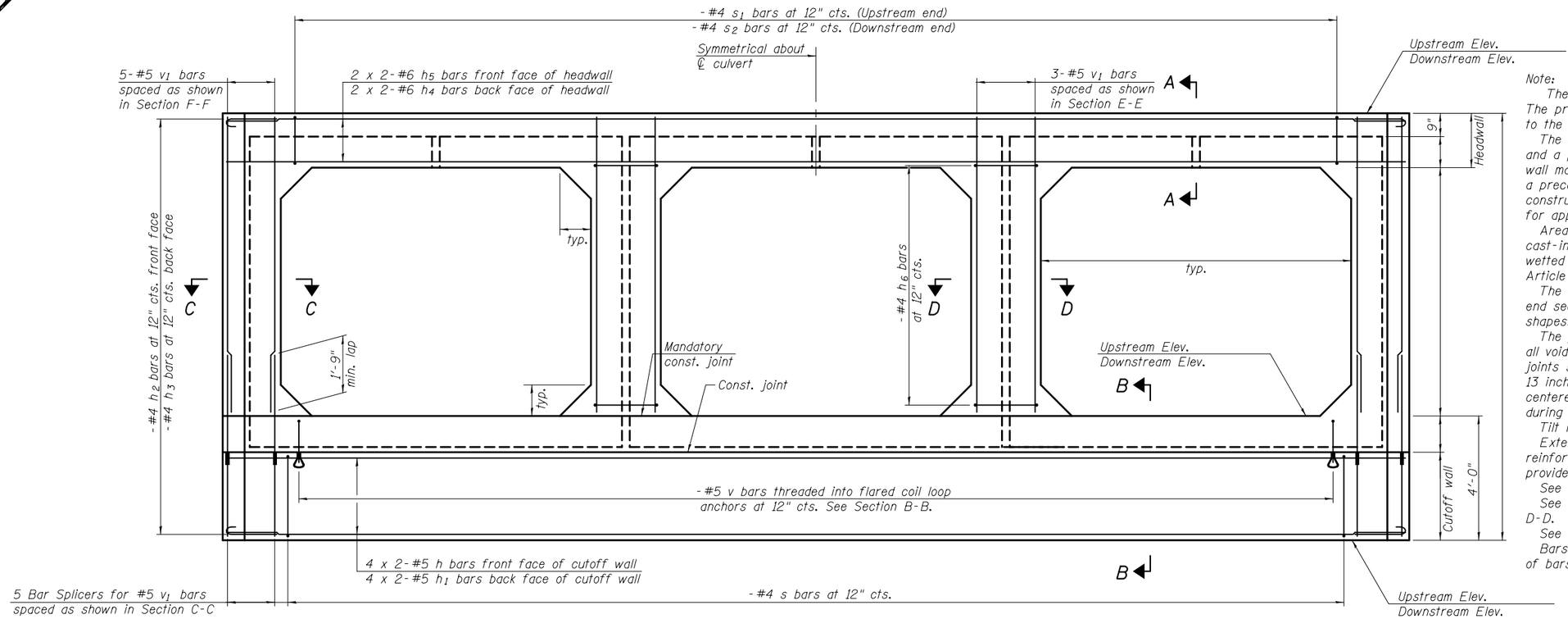
Item	Unit	Total
Culvert End Sectons, Culvert No.	Each	

CIPES-SCB-PSSP-ZS 10-15-2016

FILE NAME =	USER NAME =	DESIGNED -	REVISED -	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	BOX CULVERT END SECTION DETAILS STRUCTURE NO.	F.A. RTE.	SECTION / COUNTY / TOTAL SHEETS / SHEET NO.
		CHECKED -	REVISED -				
	PLOT SCALE =	DRAWN -	REVISED -				CONTRACT NO.
	PLOT DATE =	CHECKED -	REVISED -		SHEET NO. OF SHEETS		ILLINOIS FED. AID PROJECT



PLAN



END ELEVATION

(Wingwalls omitted in this view for clarity.)

Note:

The design fill height for this structure is feet. The precast concrete box culvert sections shall conform to the standard designs of ASTM C 1577.

The box culvert end section shall be built in the field and a precast option is not allowed except the cutoff wall may be precast. If the Contractor elects to use a precast cutoff wall, shop drawings and a proposed construction sequence shall be submitted to the Engineer for approval.

Areas of the precast box culvert in contact with cast-in-place concrete shall be sandblasted, cleaned, and wetted prior to placing concrete in the field according to Article 503.09(b).

The ends of the precast box sections adjacent to the end section shall be formed without male and female shapes.

The joints between precast box sections shall be sealed, all voids filled with a mastic joint sealer. In addition, the joints shall be externally sealed on all four sides with a 13 inch wide external sealing band. The seal shall be centered over the joint, secured in place and protected during the backfilling process.

Tilt h_2 and h_3 bars as required to maintain clearance.

Extend precast concrete box culvert welded wire reinforcement into end section. Bend as necessary to provide $1\frac{1}{2}$'' clear cover.

See sheet of for culvert construction sequence.

See sheet of for Section A-A, B-B, C-C and D-D.

See sheet of for additional wing wall details.

Bars indicated thus 4 x 2- #5 etc. indicates 4 lines of bars with 2 lengths per line.

BILL OF MATERIAL

Item	Unit	Total
Culvert End Sectons, Culvert No.	Each	

CIPES-TCB-PSSP-ZS 10-15-2016

FILE NAME =	USER NAME =	DESIGNED -	REVISED -
		CHECKED -	REVISED -
	PLOT SCALE =	DRAWN -	REVISED -
	PLOT DATE =	CHECKED -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

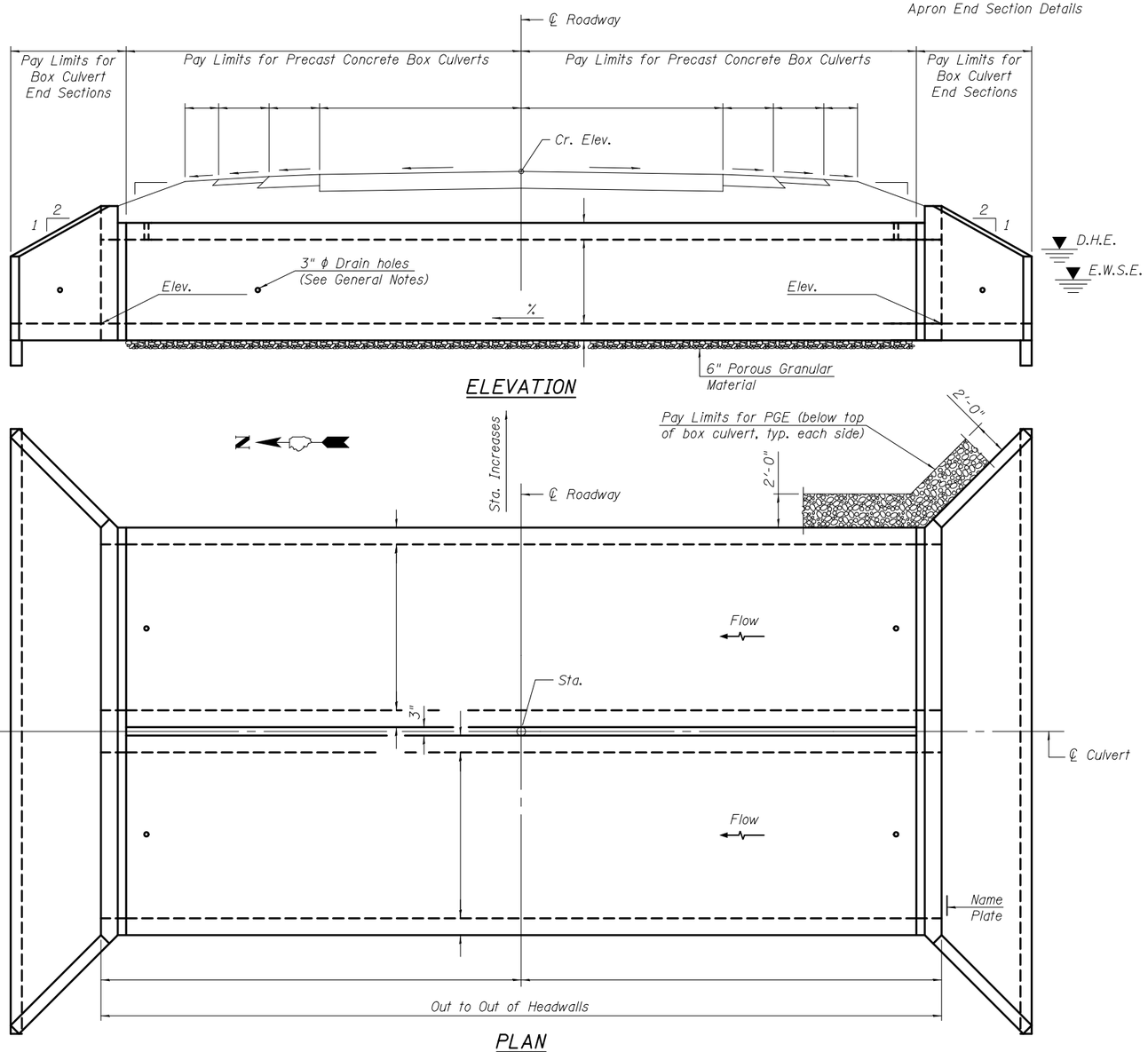
BOX CULVERT END SECTION DETAILS
STRUCTURE NO.
SHEET NO. OF SHEETS

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		CONTRACT NO.		
	ILLINOIS FED. AID PROJECT			

Benchmark:

Existing Structure:

INDEX OF SHEETS



PLAN

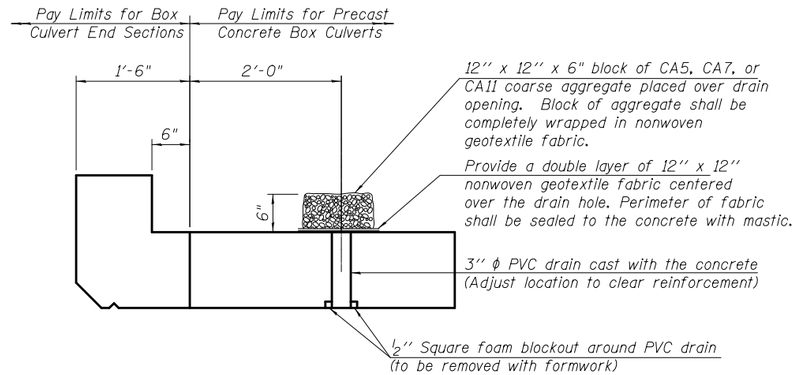
GENERAL NOTES

The design fill height for this box is _ ft. The precast box culvert sections shall conform to the requirements of ASTM C 1577.

Drain holes shall be provided on exterior culvert walls for each precast box segment with a clear rise greater than 3 ft. The drain hole shall be located within 1/3 of the clear rise of the box culvert, shall not intercept the haunch, and shall conform to the requirements of Article 503.11 of the Standard Specification.

Nonwoven geotextile fabric shall conform to the requirements of Art. 1080.01 of the Standard Specifications. The minimum weight of the fabric shall be 6 ounces per square yard.

Precast concrete box culverts and box culvert end sections shall be backfilled with Porous Granular Embankment below the top of the box culvert extending to a vertical plane 2 ft from the exterior sides of the culvert, 2 ft from the back face of the end sections, and not closer than 2 ft from the face of embankment.



DRAIN DETAIL

(All costs associated with furnishing and constructing the above drain detail will not be measured for payment but shall be included in the contract unit price for the associated work.)

PROFILE GRADE

DESIGN SPECIFICATIONS

2012 AASHTO LRFD Bridge Design Specifications
6th Edition with 2013 interims

LOADING HL-93

DESIGN STRESSES

PRECAST UNITS

f'c = 5,000 psi
fy = 65,000 psi (Welded Wire Reinforcement)

FIELD UNITS

f'c = 3,500 psi
fy = 65,000 psi (Welded Wire Reinforcement)

TOTAL BILL OF MATERIAL

ITEM	UNIT	TOTAL
Removal of Existing Structures	Each	
Name Plates	Each	
Box Culvert End Sections, Culvert No. _	Each	
Precast Concrete Box Culverts, x	Foot	
Porous Granular Embankment	Cu. Yd.	
Structure Excavation	Cu. Yd.	

WATERWAY INFORMATION

Drainage Area = sq. mi. Low Grade Elev. = @ Sta.

Flood	Freq. Yr.	Q C.F.S.	Opening Sq. Ft. Exist.	Opening Sq. Ft. Prop.	Nat. H.W.E.	Head - Ft. Exist.	Head - Ft. Prop.	Headwater El. Exist.	Headwater El. Prop.
	10								
Design	50								
Base	100								
Overtopping									
Max. Calc.	500								

STATION
BUILT BY
STATE OF ILLINOIS
F.A. RT. SEC.
LOADING HL-93
STR. NO.

NAME PLATE

See Std. 515001

LOCATION SKETCH

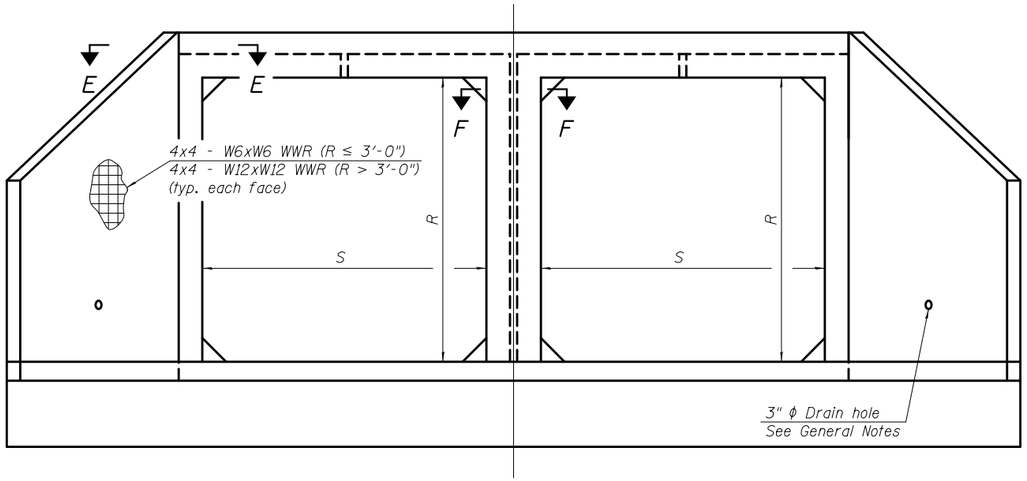
N

GENERAL PLAN AND ELEVATION

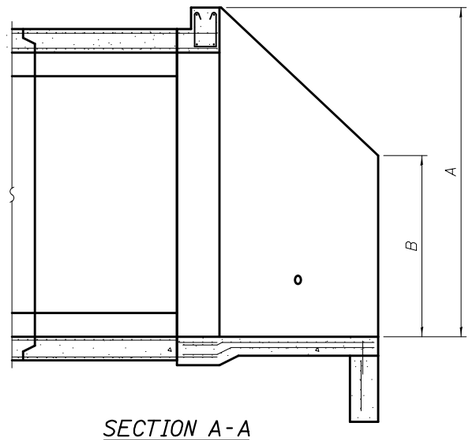
IL RTE. OVER
F.A. RTE. SEC.
COUNTY
STATION
S.N. -

DCB-GPE 10-15-2016

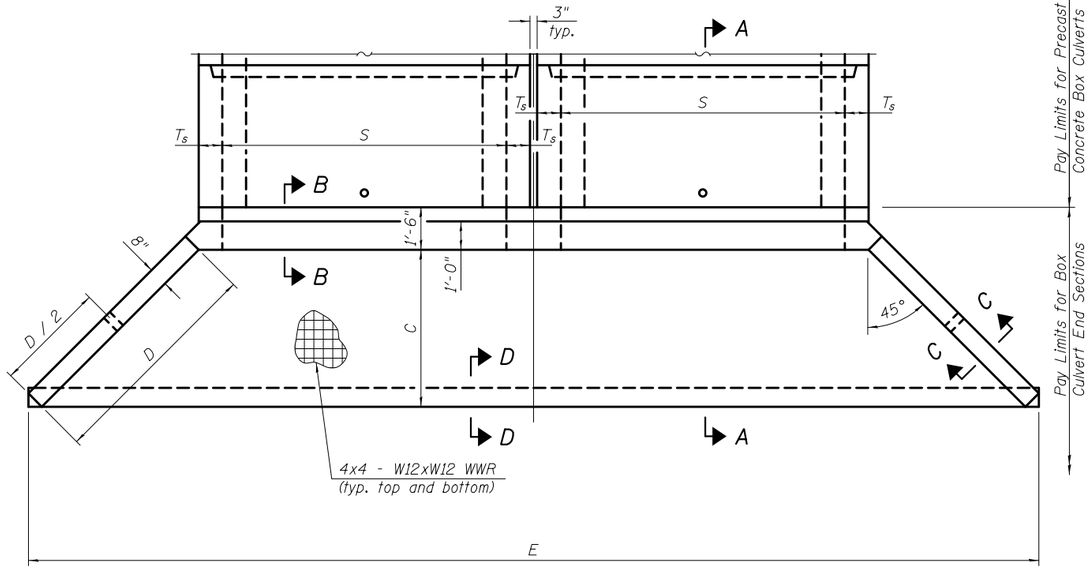
FILE NAME =	USER NAME =	DESIGNED -	REVISED -	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION		F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		CHECKED -	REVISED -							
	PLOT SCALE =	DRAWN -	REVISED -					CONTRACT NO.		
	PLOT DATE =	CHECKED -	REVISED -		SHEET NO. OF SHEETS			ILLINOIS FED. AID PROJECT		



END VIEW



SECTION A-A



PLAN

GENERAL NOTES

Box Culvert End Sections shall be constructed according to the requirements of Section 540 of the Standard Specifications except as modified herein. End sections will be paid for at the contract unit price per each for Box Culvert End Sections.

Box section dimensions, materials, and reinforcement details for Box Culvert End Sections shall be according to the requirements for ASTM C 1577 as required for the design of the portion of the culvert within the limits of Precast Concrete Box Culverts except as modified herein.

Details for Double Cell Box Culvert shown. Details for Triple Cell Box Culvert similar.

The details contained herein are for constructing the end sections using cast-in-place (CIP) construction. The Contractor may propose to furnish the end sections using precast construction methods and the end sections may consist of multiple precast concrete segments. The Contractor shall be responsible for determining all details associated with the precast option including any strengthening or stiffening provisions necessary for handling the precast segments. Conceptual details followed by shop drawings and design calculations sealed by an Illinois Licensed Structural Engineer shall be submitted to the Engineer for review and approval. Elements of the precast option shall at a minimum result in the same wingwall geometry and not have a thickness less than that detailed herein. The option to construct the end sections using precast construction methods shall be at no additional charge.

Shop drawings that detail slab thickness and reinforcement layout for the Box Culvert End Sections shall be provided to the Engineer for review and approval. Reinforcement bars not detailed herein shall be detailed with a clear distance at the end of the reinforcement not less than $\frac{1}{2}$" nor more than 2".

All exposed concrete edges shall be chamfered $\frac{3}{4}$" unless noted otherwise.

The contractor may use reinforcement bars in lieu of welded wire reinforcement (WWR). Reinforcement bars shall be limited to the sizes of #3 through #5 bars, a maximum spacing of the lesser of 8" or the member thickness, and shall result in an area of reinforcement equal to or greater than that provided by the WWR. Minimum lap lengths detailed herein are applicable to WWR and reinforcement bars.

Reinforcement (circumferential and longitudinal) in the precast concrete box culvert segments immediately adjacent to the box culvert end sections that is being lapped with the end section reinforcement shall not be less than that required by ASTM C 1577 for the design fill height or the reinforcement detailed for the end section, whichever is greater.

Reinforcement bars shall conform to the requirements of ASTM A 706 Gr 60.

Class SI concrete shall be used for construction of the end section.

Bonded construction joints shall be prepared according to Article 503.09 of the Standard Specifications.

One drain hole shall be provided in each wingwall for end sections of box culverts having an opening with a clear rise greater than 3 ft. The drain hole shall be located within 1/3 of the clear rise of the box culvert and shall conform to the requirements of Article 503.11 of the Standard Specifications.

APRON END SECTION DIMENSIONS

							Double Cell		Triple Cell	
Span (S)	Rise (R)	T_t, T_b, & T_s	A	B	C	D	E	Concrete Cu. Yd.	E	Concrete Cu. Yd.
7'-0"	2'-0"	8"	3'-5"	2'-3"	2'-11 3/8"	4'-2"	23'-9"	6.6		
7'-0"	3'-0"	8"	4'-5"	2'-9"	3'-11 3/8"	5'-7"	25'-9 1/8"	8.0		
7'-0"	4'-0"	8"	5'-5"	3'-3"	4'-11 3/8"	7'-0"	27'-9 1/8"	9.5		
7'-0"	5'-0"	8"	6'-5"	3'-9"	5'-11 3/8"	8'-5"	29'- 9 1/8"	11.2		
7'-0"	6'-0"	8"	7'-5"	4'-3"	6'-11 1/2"	9'-10"	31'-9 1/4"	13.1		
8'-0"	2'-0"	8"	3'-5"	2'-3"	2'-11 3/8"	4'-2"	25'-9"	7.1		
8'-0"	3'-0"	8"	4'-5"	2'-9"	3'-11 3/8"	5'-7"	27'-9 1/8"	8.6		
8'-0"	4'-0"	8"	5'-5"	3'-3"	4'-11 3/8"	7'-0"	29'-9 1/8"	10.2		
8'-0"	5'-0"	8"	6'-5"	3'-9"	5'-11 3/8"	8'-5"	31'-9 1/8"	11.9		
8'-0"	6'-0"	8"	7'-5"	4'-3"	6'-11 1/2"	9'-10"	33'-9 1/4"	13.8		
9'-0"	2'-0"	9"	3'-6"	2'-3"	3'-0 3/4"	4'-4"	28'-3 7/8"	8.2	39'-0 7/8"	11.4
9'-0"	3'-0"	9"	4'-6"	2'-9"	4'-0 3/4"	5'-9"	30'-3 7/8"	9.7	41'-0 7/8"	13.3
9'-0"	4'-0"	9"	5'-6"	3'-3"	5'-0 3/4"	7'-2"	32'-3 7/8"	11.4	43'-0 7/8"	15.4
9'-0"	5'-0"	9"	6'-6"	3'-9"	6'-0 7/8"	8'-7"	34'-4"	13.2	45'-1"	17.6
9'-0"	6'-0"	9"	7'-6"	4'-3"	7'-0 1/8"	9'-11"	36'-2 5/8"	15.1	46'-11 5/8"	19.8
10'-0"	2'-0"	10"	3'-7"	2'-4"	3'-1 1/2"	4'-5"	30'-9 1/4"	9.2	42'-8 1/4"	13.0
10'-0"	3'-0"	10"	4'-7"	2'-10"	4'-1 1/2"	5'-10"	32'-9 1/4"	10.8	44'-8 1/4"	15.0
10'-0"	4'-0"	10"	5'-7"	3'-4"	5'-1 1/2"	7'-3"	34'-9 3/8"	12.6	46'-8 3/8"	17.2
10'-0"	5'-0"	10"	6'-7"	3'-10"	6'-1 1/2"	8'-8"	36'-9 3/8"	14.5	48'-8 3/8"	19.5
10'-0"	6'-0"	10"	7'-7"	4'-4"	7'-1 1/2"	10'-1"	38'-9 3/8"	16.6	50'-8 3/8"	22.0
11'-0"	2'-0"	11"	3'-8"	2'-4"	3'-2 7/8"	4'-7"	33'-4 1/8"	10.4	46'-5 1/8"	14.7
11'-0"	3'-0"	11"	4'-8"	2'-10"	4'-2 7/8"	6'-0"	35'-4 1/8"	12.1	48'-5 1/8"	16.9
11'-0"	4'-0"	11"	5'-8"	3'-4"	5'-2 1/4"	7'-4"	37'-2 3/4"	13.9	50'-3 3/4"	19.1
11'-0"	5'-0"	11"	6'-8"	3'-10"	6'-2 1/4"	8'-9"	39'-2 7/8"	15.8	52'-3 7/8"	21.4
11'-0"	6'-0"	11"	7'-8"	4'-4"	7'-2 1/4"	10'-2"	41'-2 7/8"	18.1	54'-3 7/8"	24.2
12'-0"	2'-0"	12"	3'-9"	2'-5"	3'-3 5/8"	4'-8"	35'-9 1/2"	11.6	50'-0 1/2"	16.5
12'-0"	3'-0"	12"	4'-9"	2'-11"	4'-3 5/8"	6'-1"	37'-9 1/2"	13.4	52'-0 1/2"	18.8
12'-0"	4'-0"	12"	5'-9"	3'-5"	5'-3 5/8"	7'-6"	39'-9 5/8"	15.4	54'-0 5/8"	21.2
12'-0"	5'-0"	12"	6'-9"	3'-11"	6'-3 5/8"	8'-11"	41'-9 5/8"	17.6	56'-0 5/8"	23.8
12'-0"	6'-0"	12"	7'-9"	4'-5"	7'-3 5/8"	10'-4"	43'-9 5/8"	19.8	58'-0 5/8"	26.6

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FILE NAME =	USER NAME =	DESIGNED -	REVISED -
		CHECKED -	REVISED -
	PLOT SCALE =	DRAWN -	REVISED -
	PLOT DATE =	CHECKED -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

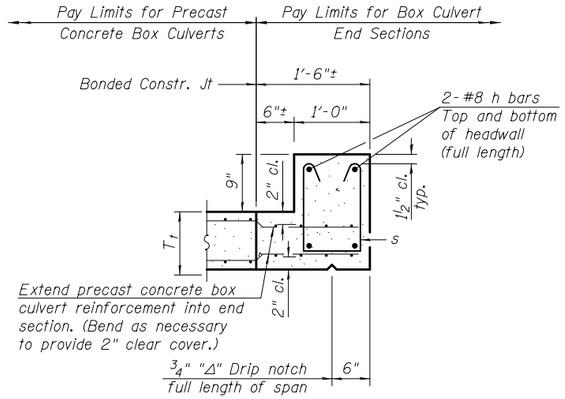
MULTI-CELL PRECAST CONCRETE BOX CULVERT APRON END SECTION DETAILS – STRUCTURE NO.

SHEET NO. OF SHEETS

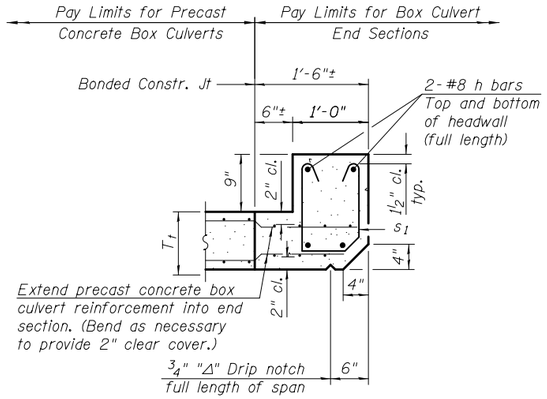
F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.

CONTRACT NO.

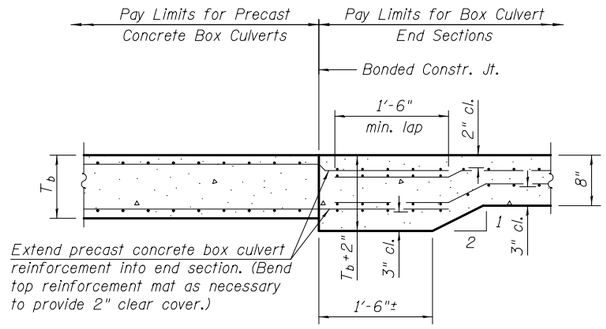
ILLINOIS FED. AID PROJECT



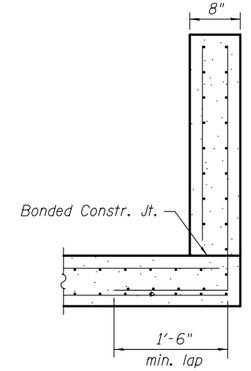
SECTION B-B
(Top slab at downstream end)



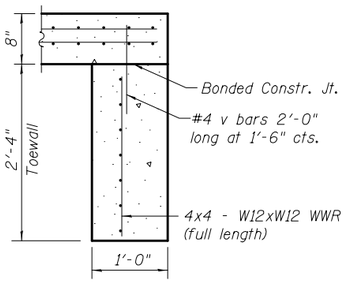
SECTION B-B
(Top slab at upstream end)



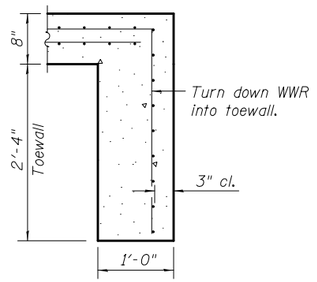
SECTION B-B
(Bottom slab)



SECTION C-C



SECTION D-D

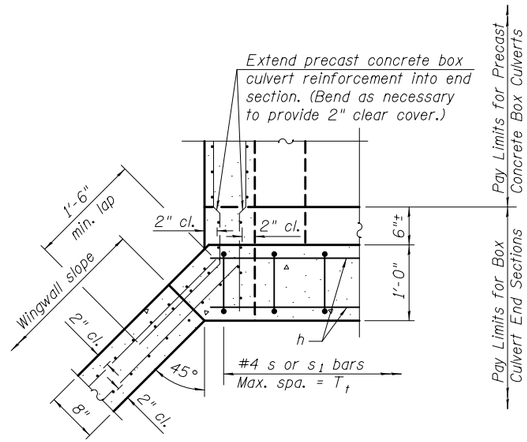


ALT. SECTION D-D

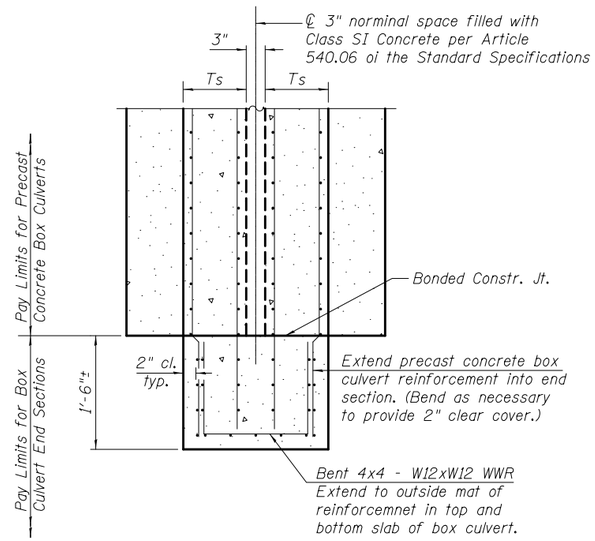
TOEWALL CONSTRUCTION SEQUENCE

1. Perform excavation and construct toewall.
2. Backfill accordingly and prepare bedding for box culvert end sections.
3. Construct remainder of box culvert end section.

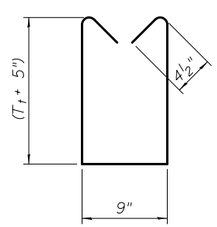
Note:
If soil conditions permit, the toewall may be poured monolithically with the bottom slab of the end section using Alt. Section D-D subject to approval from the Engineer.



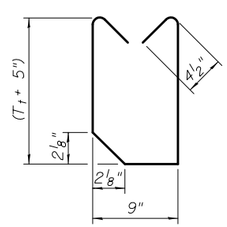
SECTION E-E



SECTION F-F



BAR s



BAR s_1

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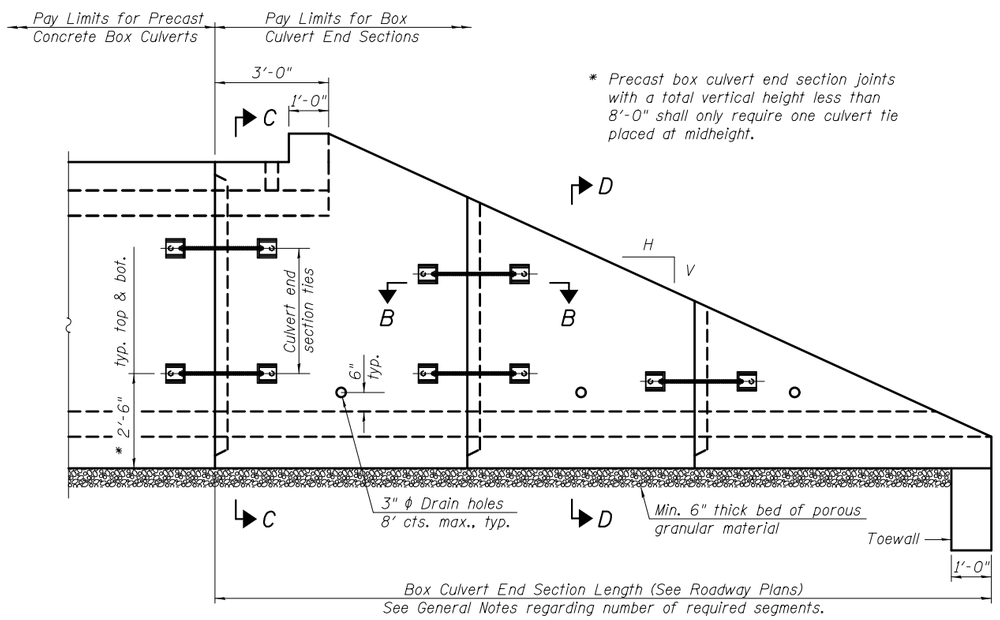
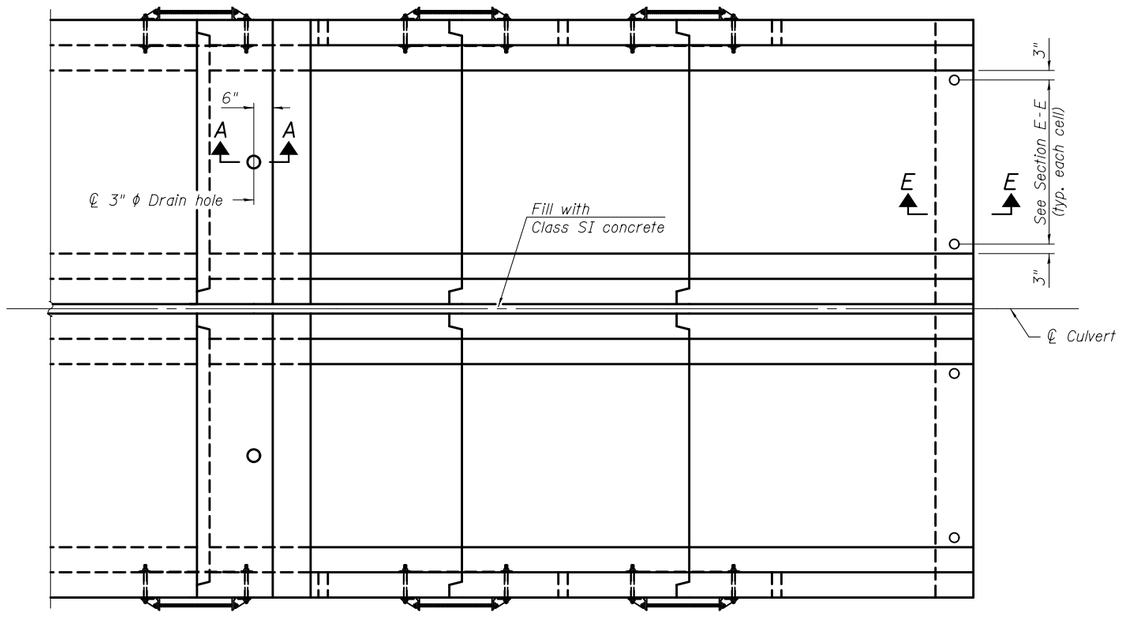
FILE NAME =	USER NAME =	DESIGNED -	REVISED -	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	MULTI-CELL PRECAST CONCRETE BOX CULVERT APRON END SECTION DETAILS – STRUCTURE NO.	F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		CHECKED -	REVISED -							
	PLOT SCALE =	DRAWN -	REVISED -					CONTRACT NO.		
	PLOT DATE =	CHECKED -	REVISED -		SHEET NO. OF SHEETS			ILLINOIS FED. AID PROJECT		

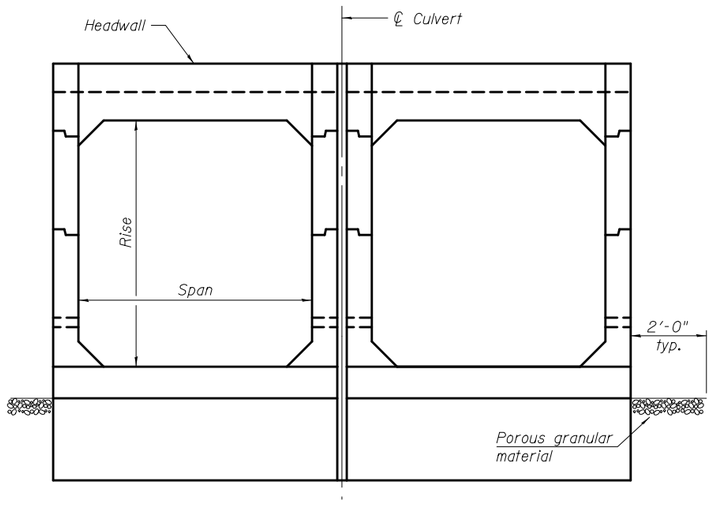


* Precast box culvert end section joints with a total vertical height less than 8'-0" shall only require one culvert tie placed at midheight.

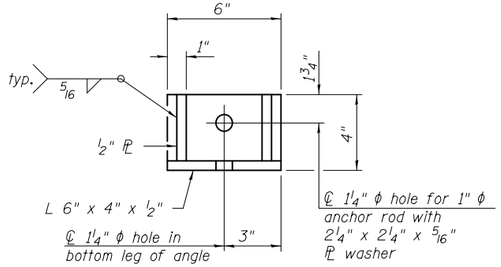
ELEVATION



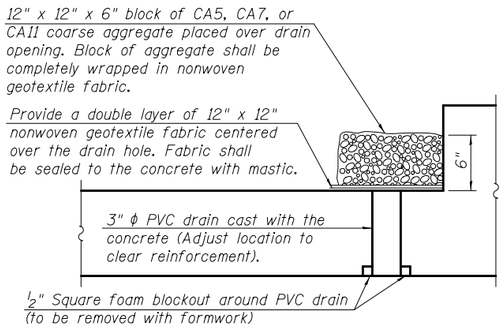
PLAN



END VIEW

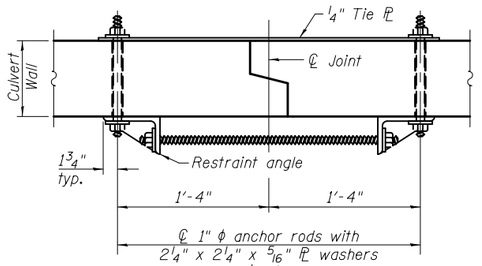


RESTRAINT ANGLE DETAIL



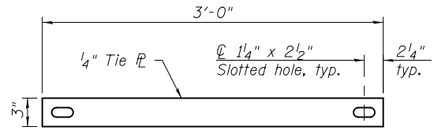
SECTION A-A

(All costs associated with furnishing and constructing the above drain detail will not be measured for payment but shall be included in the contract unit price for the associated work.)



SECTION B-B

(Showing end section tie details)



TIE PLATE DETAIL

GENERAL NOTES

Box Culvert End Sections shall be constructed according to the requirements of Section 540 of the Standard Specifications except as modified herein. This work will be measured for payment as each, with each end of each culvert being one each. End sections will be paid for at the contract unit price per each for Box Culvert End Sections of the culvert number specified.

Typical box section dimensions, materials, and reinforcement details for Box Culvert End Sections shall be according to the requirements of ASTM C 1577 as required for the design of the portion of the culvert within the limits of Precast Concrete Box Culverts except as modified herein.

Number of segments shown in Elevation is for example only. Length and number of precast box sections required to construct Box Culvert End Sections shall be determined by the Contractor.

See roadway plans for embankment slope (V:H).

1" ϕ anchor rods for the culvert ties shall conform to the requirements of ASTM F1554, Grade 105. Structural steel for tie plate and restraint angle shall conform to the requirements of Article 1006.04 of the Standard Specifications. All components of the culvert tie detail shall be galvanized according to the requirements of AASHTO M 111 or M 232 as applicable. 2 1/4" x 2 1/4" x 5/16" plate washers shall be provided under each nut required for the anchor rods. Anchor rods connecting precast sections shall be brought to a snug tight condition followed by an additional 1/2 turn on one of the nuts for anchor rods installed in the walls. Match marks shall be provided on the bolt and nut to verify relative rotation between the bolt and the nut. Holes in the walls for the culvert tie assembly may be drilled using core bits in lieu of using formed holes.

All costs associated with furnishing and installing or constructing the toewall and culvert ties will not be measured for payment but shall be included in the contract unit price for Box Culvert End Sections of the culvert number specified.

Drain holes shall conform to the requirements of Article 503.11 of the Standard Specifications unless noted otherwise.

Nonwoven geotextile fabric shall conform to the requirements of Article 1080.01. The minimum weight of the fabric shall be 6 oz. / sq. yd..

For end sections with traversable pipe grate systems, see grate detail sheet for required modifications.

The 3" nominal space between adjacent end sections shall be filled with Class SI concrete in accordance with Article 540.06 of the Standard Specifications. Cost included with Box Culvert End Sections.

Details for double cell box culvert shown. Details for other multi-cell box culverts similar.

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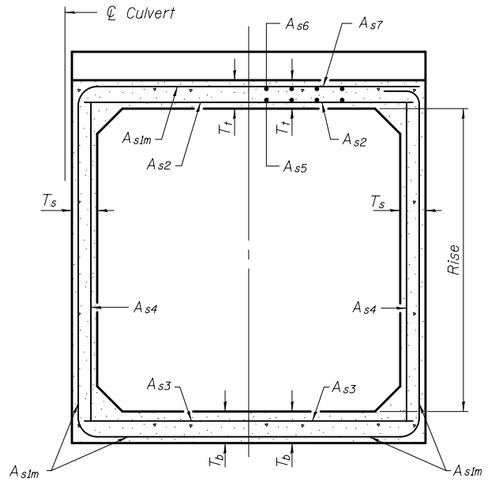
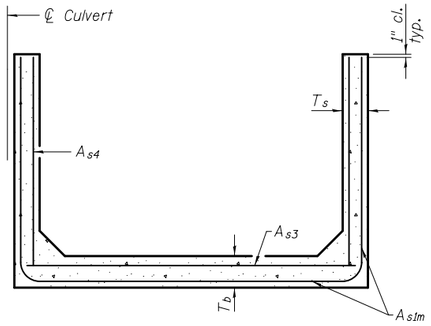
		CHECKED -	REVISED -							
	PLOT SCALE =	DRAWN -	REVISED -		SHEET NO. OF SHEETS			CONTRACT NO.		
	PLOT DATE =	CHECKED -	REVISED -				ILLINOIS	FED. AID PROJECT		

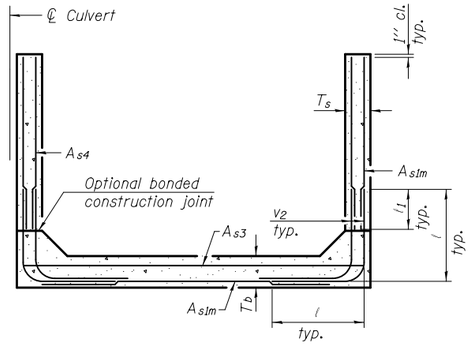


(Design Earth Cover ≥ 2 ft) (Design Earth Cover < 2 ft)

SECTION C-C



SECTION D-D



ALTERNATE SECTION D-D

A_{s1m} REINFORCEMENT

($in.^2$ / ft)

T_s (in.) \ Rise (ft)	2	3	4	5	6	7	8	9	10	11	12
4	0.19	0.17									
5	0.26	0.21	0.18								
6	0.22	0.26	0.23	0.22							
7	0.25	0.33	0.59	0.27	0.28						
8	0.40	0.35	0.43	0.39	0.36	0.34	0.40				
9	0.44	0.39	0.35	0.43	0.40	0.37	0.36	0.48			
10	0.48	0.42	0.38	0.47	0.44	0.41	0.38	0.42	0.56		
11	0.52	0.45	0.54	0.50	0.46	0.44	0.41	0.46	0.50	0.65	
12	0.55	0.49	0.58	0.54	0.50	0.48	0.45	0.46	0.46	0.61	0.75

(A_{s1m} reinforcement based upon welded wire reinforcement conforming to AASHTO M 55 or M 221).

ℓ_1 DIMENSION

#3 bar = 2′-0″
#4 bar = 2′-8″
#5 bar = 3′-4″
#6 bar = 3′-11″

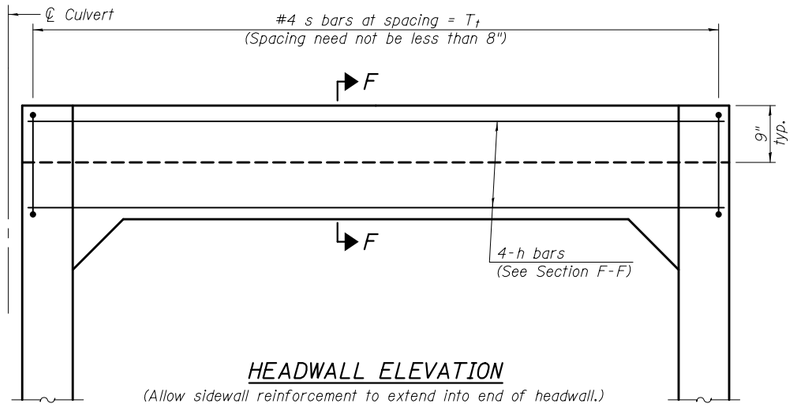
Notes:

Alternate Section D-D is provided to allow the Contractor the option of casting the bottom slab of the end section first followed by construction of the sidewalls using conventional forming methods. Shop drawings that detail slab thickness and reinforcement layout shall be submitted to the Engineer for review and approval when using Alternate Section D-D.

The size and spacing of the v_2 bars shall provide a minimum reinforcement area along each face of the walls ($in.^2$/ft.) equal to 1.10*(A_{s1m}). v_2 bars may consist of #3 thru #6 size reinforcement bars and the longitudinal spacing shall not exceed the lesser of the wall thickness or 8 inches.

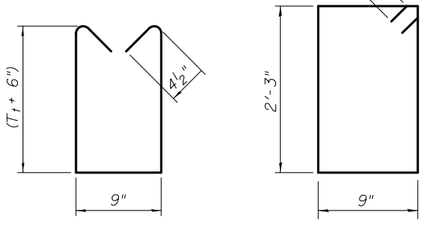
Bonded construction joints shall be prepared according to Article 503.09 of the Standard Specifications.

Sections C-C, D-D, and Headwall Elevation are symmetric about ℄ culvert through 180° rotation.



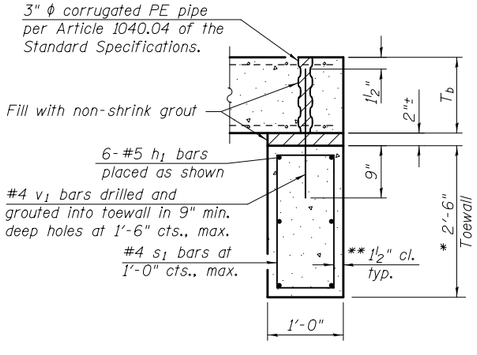
HEADWALL ELEVATION

(Allow sidewall reinforcement to extend into end of headwall.)



BAR s

BAR s_1



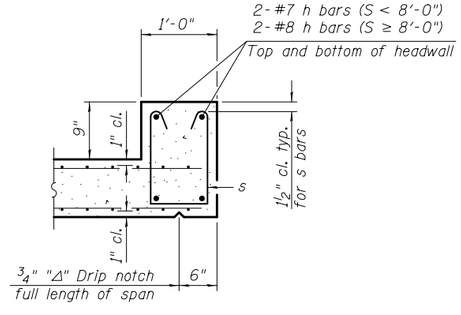
SECTION E-E

TOEWALL CONSTRUCTION SEQUENCE

1. Perform excavation and construct toewall.
2. Backfill according to the applicable paragraphs of Article 502.10 of the Standard Specifications and place bedding for precast box culvert end sections.
3. Set precast box culvert end section.
4. Drill and epoxy grout reinforcement in toewall in accordance with Section 584 of the Standard Specifications.
5. Pressure grout voids using non-shrink grout conforming to Section 1024 of the Standard Specifications.

* The Contractor may furnish a precast or cast-in-place toewall. The Contractor shall be responsible for the strength and stability of the precast toewall during handling. Additional lifting points may be required depending upon the length of the toewall or the Contractor may need to modify the design of the toewall for the proposed handling the method.

** If soil conditions permit, the sides of the toewall may be poured directly against the soil. The clear cover on the sides of the toewall shall be increased to 3" by increasing the thickness of the toewall.



SECTION F-F

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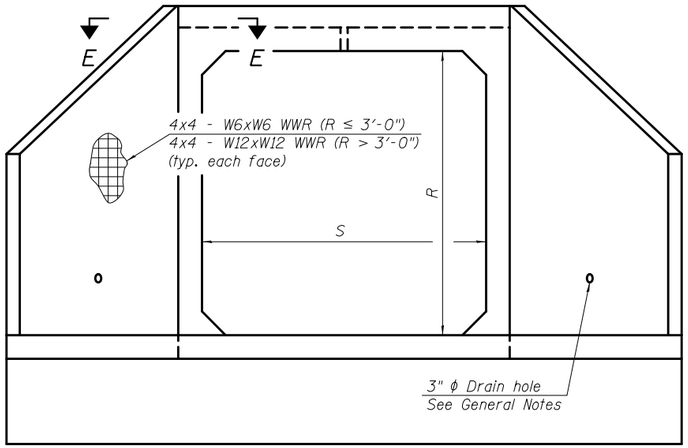
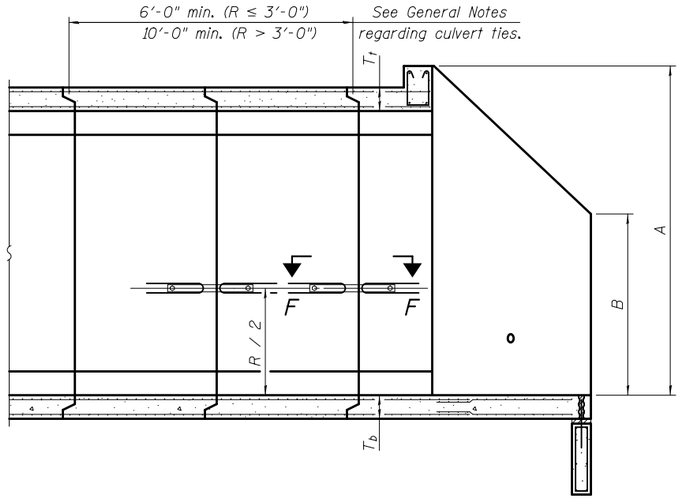
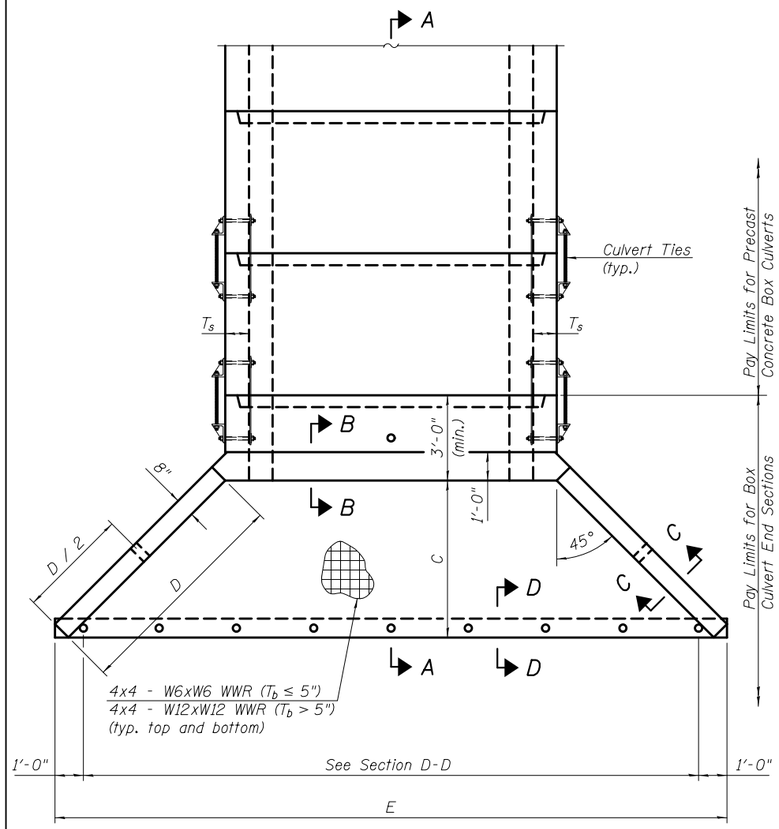


END VIEW



SECTION A-A



PLAN

GENERAL NOTES

Box Culvert End Sections shall be constructed according to the requirements of Section 540 of the Standard Specifications except as modified herein. End sections will be paid for at the contract unit price per each for Box Culvert End Sections.

The Contractor may furnish the end section as a single precast concrete piece or construct the end section in the field using cast-in-place (CIP) construction. For CIP construction, the bottom slab thickness shall be increased by 2" and the clear cover to the bottom mat of reinforcement shall be increased to 3".

Box section dimensions, materials, and reinforcement details for Box Culvert End Sections shall be according to the requirements for ASTM C 1577 as required for the design of the portion of the culvert within the limits of Precast Concrete Box Culverts except as modified herein.

The number of culvert ties shall be sufficient to engage the minimum length of culvert barrel shown within the pay limits for Precast Concrete Box Culverts and will be dependent upon the length of box culvert segments furnished by the Contractor. Culvert ties are not required for box culverts having a rise (R) less than or equal to 3 ft and a span (S) greater than or equal to 10 ft.

All costs associated with furnishing and installing or constructing the toewall and culvert ties will not be measured for payment but shall be included in the unit price for Box Culvert End Sections of the culvert number specified.

Shop drawings that detail slab thickness and reinforcement layout for the Box Culvert End Sections shall be provided to the Engineer for review and approval. Reinforcement bars not detailed herein shall be detailed with a clear distance at the end of the reinforcement not less than $\frac{1}{2}$" nor more than 2". For the precast option, it shall be the Contractor's responsibility for determining a method of handling and a construction procedure shall be included on the shop drawings. The Contractor shall determine and detail in the shop drawings any necessary strengthening or stiffening provisions necessary to handle the precast segment. Any required modifications shall be at no extra charge.

All exposed concrete edges shall be chamfered $\frac{3}{4}$" unless noted otherwise.

The Contractor may use reinforcement bars in lieu of welded wire reinforcement (WWR). Reinforcement bars shall be limited to the sizes of #3 through #5 bars, a maximum spacing of the lesser of 8" or the member thickness, and shall result in an area of reinforcement equal to or greater than that provided by the WWR. Minimum lap lengths detailed herein are applicable to WWR and reinforcement bars.

Reinforcement (circumferential and longitudinal) in the culvert barrel portion of the end section being lapped with reinforcement from the wingwalls or bottom slab of the end section shall not be less than that required by ASTM C 1577 for the design fill height or the reinforcement detailed for the end section, whichever is greater.

Reinforcement bars shall conform to the requirements of ASTM A 706 Gr 60.

Bonded construction joints shall be prepared according to Article 503.09 of the Standard Specifications.

One drain hole shall be provided in each wingwall for end sections of box culverts having an opening with a clear rise greater than 3 ft. The drain hole shall be located within the lower 1/3 of the clear rise of the box culvert and shall conform to the requirements of Article 503.11 of the Standard Specifications.

APRON END SECTION DIMENSIONS

Span (S)	Rise (R)	T_t	T_b	T_s	A	B	C	D	E	Concrete Cu. Yd.	Culvert Ties Required
3'-0"	2'-0"	7"	6"	4"	3'-4"	2'-2"	2'-10 5/8"	4'-1"	10'-4 5/8"	2.8	Yes
3'-0"	2'-0"	4"	4"	4"	3'-1"	2'-1"	2'-7 7/8"	3'-9"	9'-11"	2.3	Yes
3'-0"	3'-0"	7"	6"	4"	4'-4"	2'-8"	3'-10 5/8"	5'-6"	12-4 5/8"	3.7	Yes
3'-0"	3'-0"	4"	4"	4"	4'-1"	2'-7"	3'-7 7/8"	5'-2"	11'-11"	3.1	Yes
4'-0"	2'-0"	7.5"	6"	5"	3'-4 1/2"	2'-2 1/2"	2'-11 3/8"	4'-2"	11'-8"	3.3	Yes
4'-0"	2'-0"	5"	5"	5"	3'-2"	2'-1"	2'-8 1/2"	3'-10"	11'-2 3/8"	2.8	Yes
4'-0"	3'-0"	7.5"	6"	5"	4'-4 1/2"	2'-8 1/2"	3'-11 3/8"	5'-7"	13'-8 1/8"	4.2	Yes
4'-0"	3'-0"	5"	5"	5"	4'-2"	2'-7"	3'-8 1/2"	5'-3"	13'-2 3/8"	3.7	Yes
4'-0"	4'-0"	7.5"	6"	5"	5'-4 1/2"	3'-2 1/2"	4'-11 3/8"	7'-0"	15'-8 1/8"	5.3	Yes
4'-0"	4'-0"	5"	5"	5"	5'-2"	3'-1"	4'-8 5/8"	6'-8"	15'-2 1/2"	4.7	Yes
5'-0"	2'-0"	8"	7"	6"	3'-5"	2'-3"	2'-11 3/8"	4'-2"	12'-10"	3.9	Yes
5'-0"	2'-0"	6"	6"	6"	3'-3"	2'-2"	2'-10"	4'-0"	12'-7 1/4"	3.5	Yes
5'-0"	3'-0"	8"	7"	6"	4'-5"	2'-9"	3'-11 3/8	5'-7"	14'-10 1/8"	4.9	Yes
5'-0"	3'-0"	6"	6"	6"	4'-3"	2'-8"	3'-10"	5'-5"	14'-7 1/4"	4.5	Yes
5'-0"	4'-0"	8"	7"	6"	5'-5"	3'-3"	4'-11 3/8"	7'-0"	16'-10 1/8"	6.1	Yes
5'-0"	4'-0"	6"	6"	6"	5'-3"	3'-2"	4'-9 1/4"	6'-9"	16'-5 7/8"	5.5	Yes
5'-0"	5'-0"	8"	7"	6"	6'-5"	3'-9"	5'-11 3/8"	8'-5"	18'-10 1/8"	7.4	Yes
5'-0"	5'-0"	6"	6"	6"	6'-3"	3'-8"	5'-9 1/4"	8'-2"	18'-5 7/8"	6.8	Yes
6'-0"	2'-0"	8"	7"	7"	3'-5"	2'-3"	2'-11 3/8"	4'-2"	14'-0"	4.3	Yes
6'-0"	2'-0"	7"	7"	7"	3'-4"	2'-2"	2'-10 5/8"	4'-1"	13'-10 5/8"	4.2	Yes
6'-0"	3'-0"	8"	7"	7"	4'-5"	2'-9"	3'-11 3/8"	5'-7"	16'-0 1/8"	5.4	Yes
6'-0"	3'-0"	7"	7"	7"	4'-4"	2'-8"	3'-10 5/8"	5'-6"	15'-10 5/8"	5.2	Yes
6'-0"	4'-0"	8"	7"	7"	5'-5"	3'-3"	4'-11 3/8"	7'-0"	18'-0 1/8"	6.5	Yes
6'-0"	4'-0"	7"	7"	7"	5'-4"	3'-2"	4'-10 3/4"	6'-11"	17'-10 3/4"	6.5	Yes
6'-0"	5'-0"	8"	7"	7"	6'-5"	3'-9"	5'-11 3/8"	8'-5"	20'-0 1/8"	8.0	Yes
6'-0"	5'-0"	7"	7"	7"	6'-4"	3'-8"	5'-10 3/4"	8'-4"	19'-10 3/4"	7.8	Yes
6'-0"	6'-0"	8"	7"	7"	7'-5"	4'-3"	6'-11 1/2"	9'-10"	22'-0 1/4"	9.5	Yes
6'-0"	6'-0"	7"	7"	7"	7'-4"	4'-2"	6'-10 3/4"	9'-9"	21'-10 3/4"	9.3	Yes
7'-0"	2'-0"	8"	8"	8"	3'-5"	2'-3"	2'-11 3/8"	4'-2"	15'-2"	4.9	Yes
7'-0"	3'-0"	8"	8"	8"	4'-5"	2'-9"	3'-11 3/8"	5'-7"	17'-2 1/8"	6.1	Yes
7'-0"	4'-0"	8"	8"	8"	5'-5"	3'-3"	4'-11 3/8"	7'-0"	19'-2 1/8"	7.4	Yes
7'-0"	5'-0"	8"	8"	8"	6'-5"	3'-9"	5'-11 3/8"	8'-5"	21'-2 1/8"	8.9	Yes
7'-0"	6'-0"	8"	8"	8"	7'-5"	4'-3"	6'-11 1/2"	9'-10"	23'-2 1/4"	10.6	Yes
8'-0"	2'-0"	8"	8"	8"	3'-5"	2'-3"	2'-11 3/8"	4'-2"	16'-2"	5.3	Yes
8'-0"	3'-0"	8"	8"	8"	4'-5"	2'-9"	3'-11 3/8"	5'-7"	18'-2 1/8"	6.5	Yes
8'-0"	4'-0"	8"	8"	8"	5'-5"	3'-3"	4'-11 3/8"	7'-0"	20'-2 1/8"	7.8	Yes
8'-0"	5'-0"	8"	8"	8"	6'-5"	3'-9"	5'-11 3/8"	8'-5"	22'-2 1/8"	9.3	Yes
8'-0"	6'-0"	8"	8"	8"	7'-5"	4'-3"	6'-11 1/2"	9'-10"	24'-2 1/4"	11.0	Yes
9'-0"	2'-0"	9"	9"	9"	3'-6"	2'-3"	3'-0 3/4"	4'-4"	17'-6 7/8"	6.2	Yes
9'-0"	3'-0"	9"	9"	9"	4'-6"	2'-9"	4'-0 3/4"	5'-9"	19'-6 7/8"	7.5	Yes
9'-0"	4'-0"	9'	9"	9"	5'-6"	3'-3"	5'-0 3/4"	7'-2"	21'-6 7/8"	9.0	Yes
9'-0"	5'-0"	9"	9"	9"	6'-6"	3'-9"	6'-0 7/8"	8'-7"	23'-7"	10.6	Yes
9'-0"	6'-0"	9"	9"	9"	7'-6"	4'-3"	7'-0 1/8"	9'-11"	25'-5 5/8"	12.4	Yes
10'-0"	2'-0"	10"	10"	10"	3'-7"	2'-4"	3'-1 1/2"	4'-5"	18'-10 1/4"	7.1	No
10'-0"	3'-0"	10"	10"	10"	4'-7"	2'-10"	4'-1 1/2"	5'-10"	20'-10 1/4"	8.6	No
10'-0"	4'-0"	10"	10"	10"	5'-7"	3'-4"	5'-1 1/2"	7'-3"	22'-10 3/8"	10.2	Yes
10'-0"	5'-0"	10"	10"	10"	6'-7"	3'-10"	6'-1 1/2"	8'-8"	24'-10 3/8"	12.0	Yes
10'-0"	6'-0"	10"	10"	10"	7'-7"	4'-4"	7'-1 1/2"	10'-1"	26'-10 3/8"	13.9	Yes
11'-0"	2'-0"	11"	11"	11"	3'-8"	2'-4"	3'-2 7/8"	4'-7"	20'-3 1/8"	8.2	No
11'-0"	3'-0"	11"	11"	11"	4'-8"	2'-10"	4'-2 7/8"	6'-0"	22'-3 1/8"	9.8	No
11'-0"	4'-0"	11"	11"	11"	5'-8"	3'-4"	5'-2 1/4"	7'-4"	24'-1 3/4"	11.5	Yes
11'-0"	5'-0"	11"	11"	11"	6'-8"	3'-10"	6'-2 1/4"	8'-9"	26'-1 3/4"	13.3	Yes
11'-0"	6'-0"	11"	11"	11"	7'-8"	4'-4"	7'-2 1/4"	10'-2"	28'-1 7/8"	15.5	Yes
12'-0"	2'-0"	12"	12"	12"	3'-9"	2'-5"	3'-3 5/8"	4'-8"	21'-6 1/2"	9.3	No
12'-0"	3'-0"	12"	12"	12"	4'-9"	2'-11"	4'-3 5/8"	6'-1"	23'-6 1/2"	11.1	No
12'-0"	4'-0"	12"	12"	12"	5'-9"	3'-5"	5'-3 5/8"	7'-6"	25'-6 5/8"	13.0	Yes
12'-0"	5'-0"	12"	12"	12"	6'-9"	3'-11"	6'-3 5/8"	8'-11"	27'-6 5/8"	14.1	Yes
12'-0"	6'-0"	12"	12"	12"	7'-9"	4'-5"	7'-3 5/8"	10'-4"	29'-6 5/8"	17.4	Yes

Note: Two sets of apron end section dimensions are shown above for some box culvert sizes due to the top and bottom slabs having different thicknesses per ASTM C 1577 for design fill heights less than 2 ft.

SCB-AES

10-15-2016

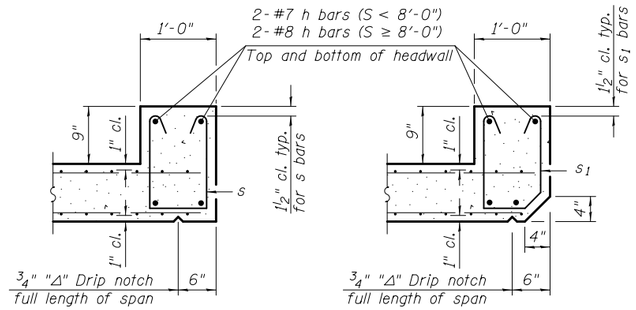
FILE NAME =	USER NAME =	DESIGNED -	REVISED -
		CHECKED -	REVISED -
	PLOT SCALE =	DRAWN -	REVISED -
	PLOT DATE =	CHECKED -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

PRECAST CONCRETE BOX CULVERT APRON END SECTION DETAILS – STRUCTURE NO.

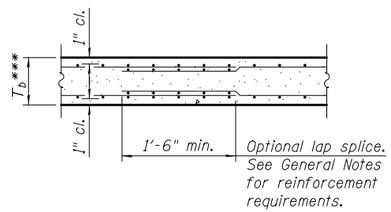
SHEET NO. OF SHEETS

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		CONTRACT NO.		
	ILLINOIS FED. AID PROJECT			

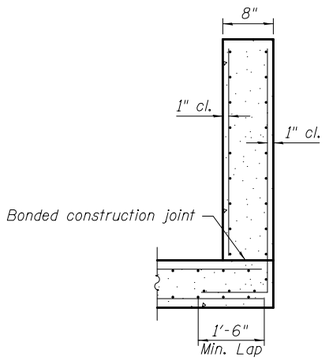


SECTION B-B
(Top slab at downstream end)

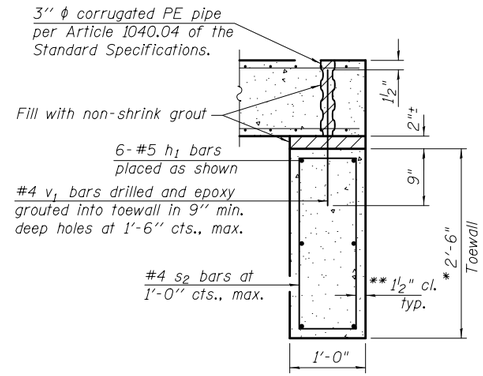
SECTION B-B
(Top slab at upstream end)



SECTION B-B
(Bottom Slab)

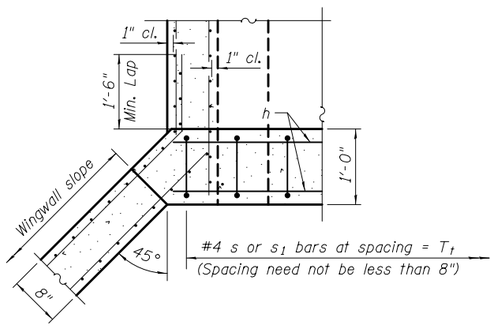


SECTION C-C

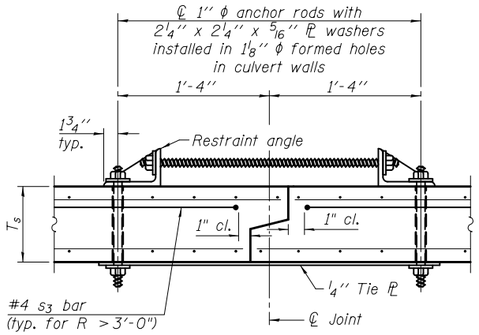


SECTION D-D

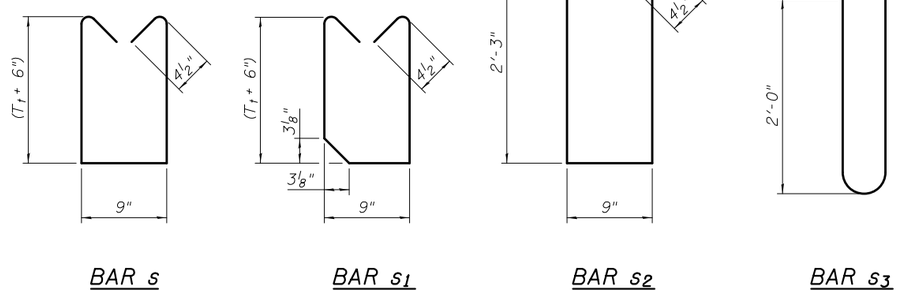
*** This dimension shall be increased by 2" for CIP construction.



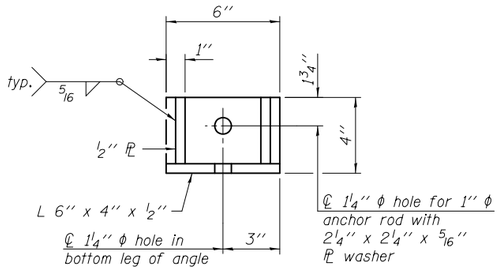
SECTION E-E



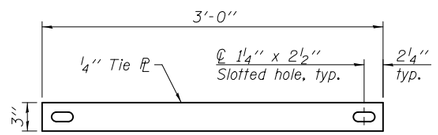
SECTION F-F
(Showing culvert tie details)



BAR s | BAR s1 | BAR s2 | BAR s3



RESTRAINT ANGLE DETAIL



TIE PLATE DETAIL

TOEWALL CONSTRUCTION SEQUENCE

1. Perform excavation and construct toewall.
2. Backfill accordingly and place bedding for precast box culvert end sections.
3. Set precast box culvert end section.
4. Drill and epoxy grout reinforcement in toewall in accordance with Section 584 of the Standard Specifications.
5. Pressure grout voids using non-shrink grout conforming to Section 1024 of the Standard Specifications.

* The Contractor may furnish a precast or cast-in-place toewall. The Contractor shall be responsible for the strength and stability of the precast toewall during handling. Additional lifting points may be required depending upon the length of the toewall or the Contractor may need to modify the design of the toewall for the proposed handling method.

** If soil conditions permit, the sides of the toewall may be poured directly against the soil. The clear cover on the sides of the toewall shall be increased to 3" by increasing the thickness of the toewall.

Notes:

1" ϕ anchor rods for the culvert ties shall conform to the requirements of ASTM F1554, Grade 105. Structural steel for the tie plate and restraint angle shall conform to the requirements of Article 1006.04 of the Standard Specifications. All components of the culvert tie detail shall be galvanized according to the requirements of AASHTO M 111 or M 232 as applicable. 2¼"x2¼"x5/16" plate washers shall be provided under each nut required for the anchor rods. Anchor rods connecting precast sections shall be brought to a snug tight condition followed by an additional ½ turn on one of the nuts for anchor rods installed in the walls. Match marks shall be provided on the bolt and nut to verify relative rotation between the bolt and the nut. Holes in the walls for the culvert tie assembly may be drilled using core bits in lieu of using formed holes.

SCB-AES

10-15-2016

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		CHECKED -	REVISED -
	PLOT SCALE =	DRAWN -	REVISED -
	PLOT DATE =	CHECKED -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

PRECAST CONCRETE BOX CULVERT APRON END SECTION DETAILS – STRUCTURE NO.

SHEET NO. OF SHEETS

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.

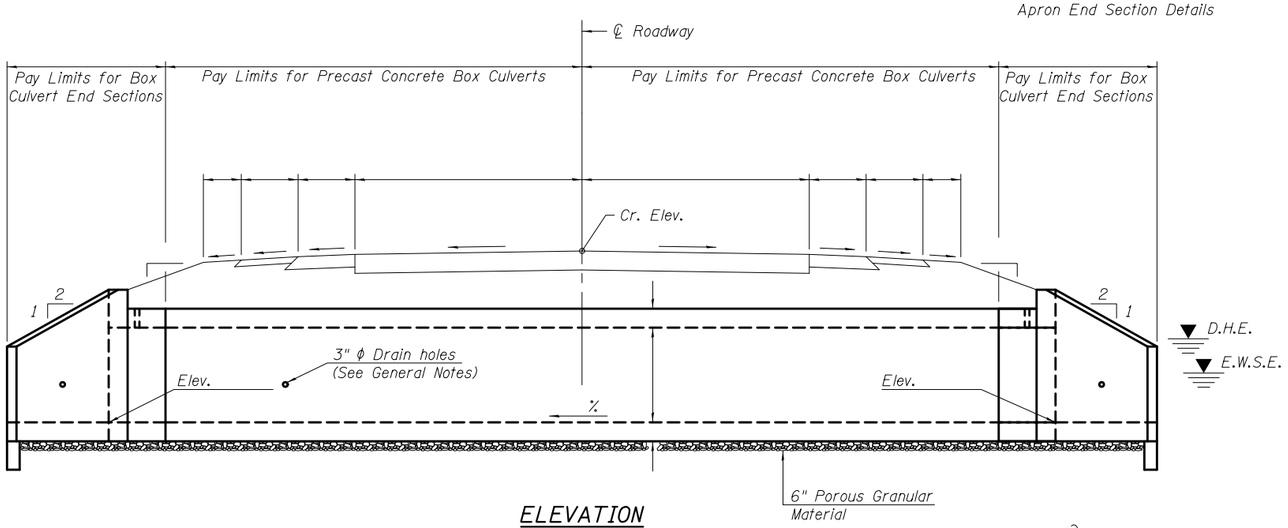
CONTRACT NO.

ILLINOIS FED. AID PROJECT

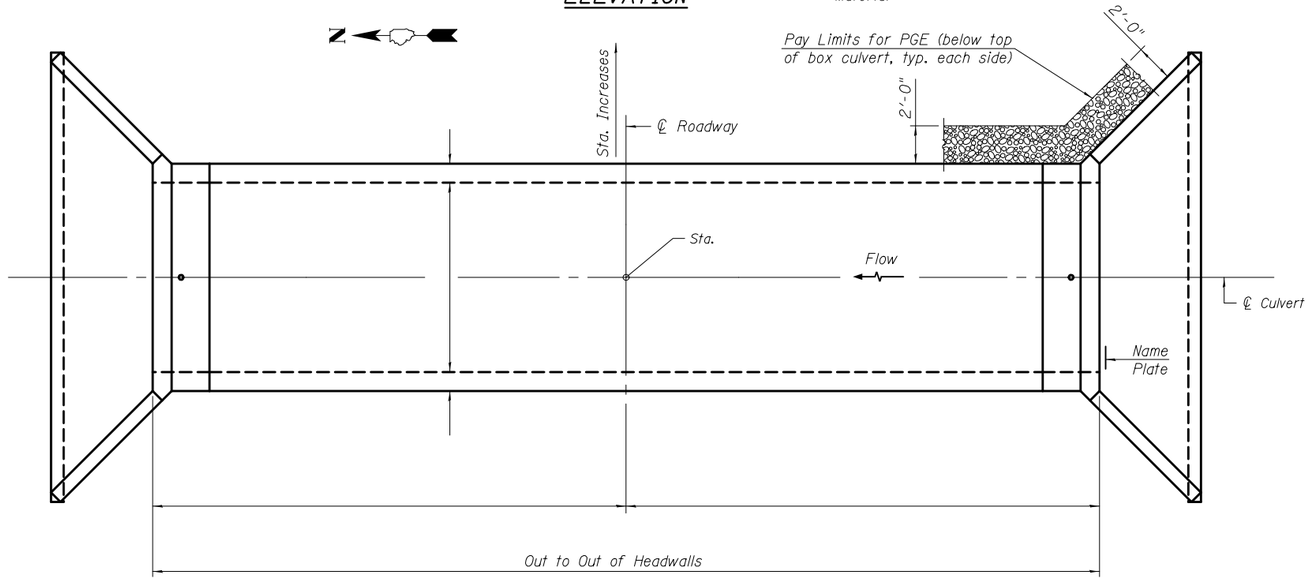
Benchmark:

Existing Structure:

INDEX OF SHEETS



ELEVATION



PLAN

WATERWAY INFORMATION

Drainage Area = sq. mi. Low Grade Elev. = @ Sta.

Flood	Freq. Yr.	Q C.F.S.	Opening Sq. Ft. Exist.	Opening Sq. Ft. Prop.	Nat. H.W.E.	Head - Ft. Exist.	Head - Ft. Prop.	Headwater El. Exist.	Headwater El. Prop.
	10								
Design	50								
Base	100								
Overtopping									
Max. Calc.	500								

GENERAL NOTES

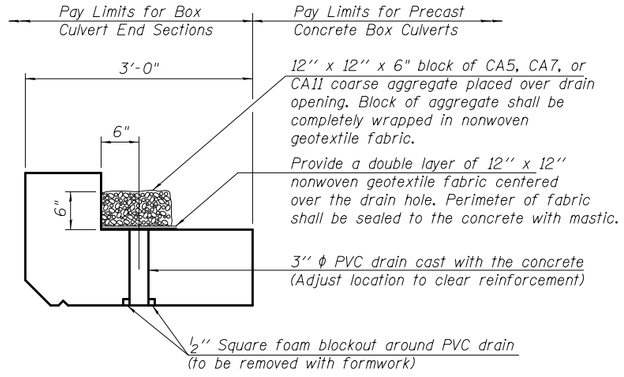
The design fill height for this box is _ ft. The precast box culvert sections shall conform to the requirements of ASTM C 1577.

Drain holes shall be provided on exterior culvert walls for each precast box segment with a clear rise greater than 3 ft. The drain hole shall be located within 1/3 of the clear rise of the box culvert, shall not intercept the haunch, and shall conform to the requirements of Article 503.11 of the Standard Specification.

The 6 in. thick layer of porous granular material required for the precast concrete box culvert per Art. 540.06 of the Standard Specifications shall also apply to the end sections. Cost of the porous granular material will not be paid for separately but shall be included in the unit price of the work for which it is required.

Nonwoven geotextile fabric shall conform to the requirements of Art. 1080.01 of the Standard Specifications. The minimum weight of the fabric shall be 6 ounces per square yard.

Precast concrete box culverts and box culvert end sections shall be backfilled with Porous Granular Embankment below the top of the box culvert extending to a vertical plane 2 ft from the exterior sides of the culvert, 2 ft from the back face of the end sections, and not closer than 2 ft from the face of embankment.



DRAIN DETAIL

(All costs associated with furnishing and constructing the above drain detail will not be measured for payment but shall be included in the contract unit price for the associated work.)

PROFILE GRADE

DESIGN SPECIFICATIONS

2012 AASHTO LRFD Bridge Design Specifications
6th Edition with 2013 interims

LOADING HL-93

DESIGN STRESSES

PRECAST UNITS

f'c = 5,000 psi
fy = 65,000 psi (Welded Wire Reinforcement)

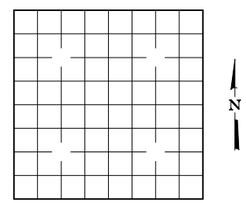
TOTAL BILL OF MATERIAL

ITEM	UNIT	TOTAL
Removal of Existing Structures	Each	
Name Plates	Each	
Box Culvert End Sections, Culvert No. _	Each	
Precast Concrete Box Culverts, x	Foot	
Porous Granular Embankment	Cu. Yd.	

STATION
BUILT BY
STATE OF ILLINOIS
F.A. RT. SEC.
LOADING HL-93
STR. NO.

NAME PLATE

See Std. 515001



LOCATION SKETCH

GENERAL PLAN AND ELEVATION

IL RTE. OVER
F.A. RTE. SEC.
COUNTY
STATION
S.N. -

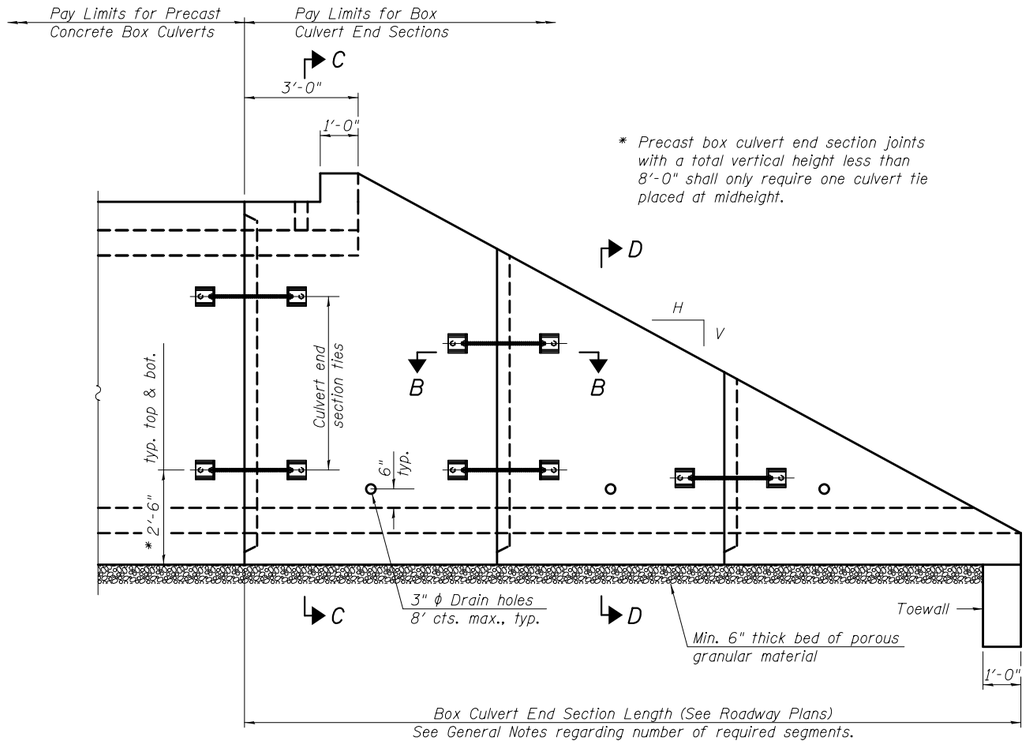
SCB-GPE 10-15-2016

FILE NAME =	USER NAME =	DESIGNED -	REVISED -
		CHECKED -	REVISED -
	PLOT SCALE =	DRAWN -	REVISED -
	PLOT DATE =	CHECKED -	REVISED -

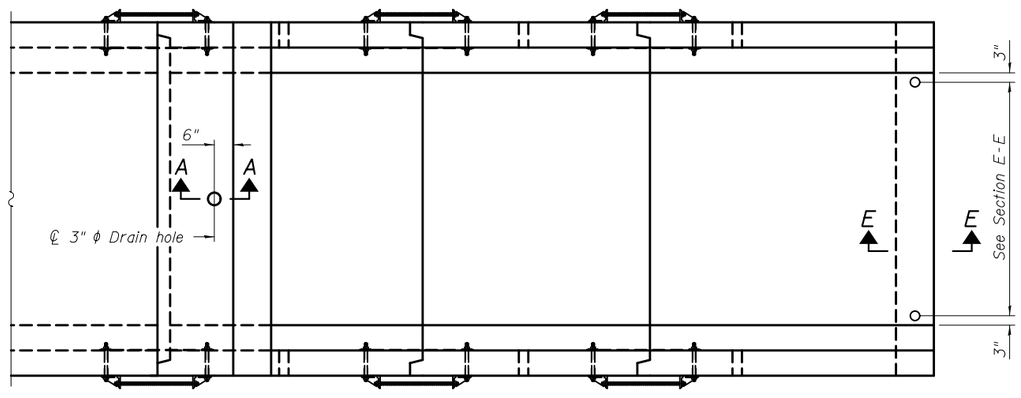
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

SHEET NO. OF SHEETS

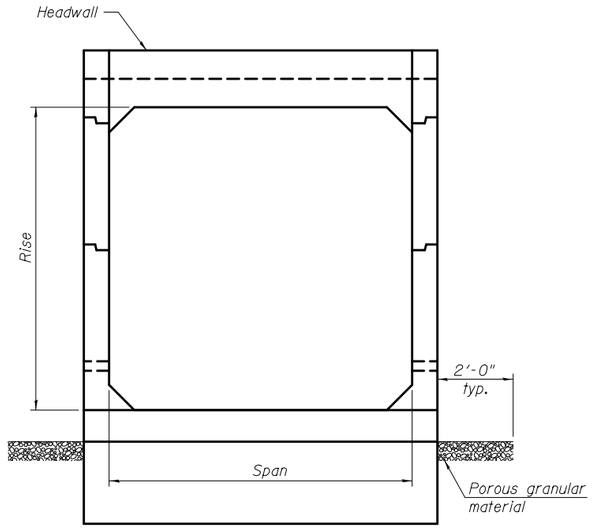
F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		CONTRACT NO.		
	ILLINOIS	FED. AID PROJECT		



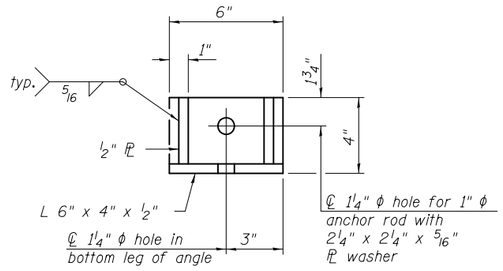
ELEVATION



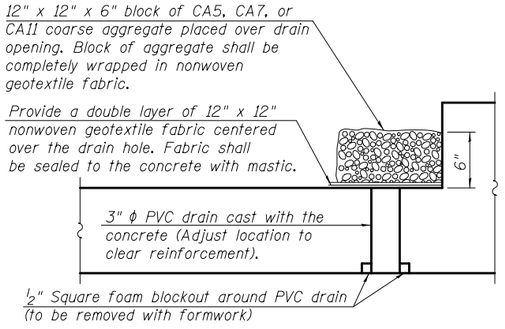
PLAN



END VIEW

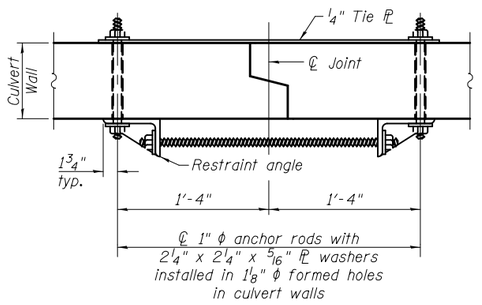


RESTRAINT ANGLE DETAIL



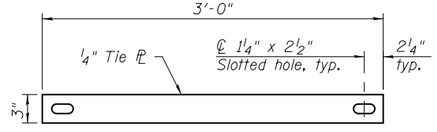
SECTION A-A

(All costs associated with furnishing and constructing the above drain detail will not be measured for payment but shall be included in the contract unit price for the associated work.)



SECTION B-B

(Showing end section tie details)



TIE PLATE DETAIL

GENERAL NOTES

Box Culvert End Sections shall be constructed according to the requirements of Section 540 of the Standard Specifications except as modified herein. This work will be measured for payment as each, with each end of each culvert being one each. End sections will be paid for at the contract unit price per each for Box Culvert End Sections of the culvert number specified.

Typical box section dimensions, materials, and reinforcement details for Box Culvert End Sections shall be according to the requirements of ASTM C 1577 as required for the design of the portion of the culvert within the limits of Precast Concrete Box Culverts except as modified herein.

Number of segments shown in Elevation is for example only. Length and number of precast box sections required to construct Box Culvert End Sections shall be determined by the Contractor.

See roadway plans for embankment slope (V:H).

1" ϕ anchor rods for the culvert ties shall conform to the requirements of ASTM F1554, Grade 105. Structural steel for tie plate and restraint angle shall conform to the requirements of Article 1006.04 of the Standard Specifications. All components of the culvert tie detail shall be galvanized according to the requirements of AASHTO M 111 or M 232 as applicable. 2 1/4" x 2 1/4" x 5/16" plate washers shall be provided under each nut required for the anchor rods. Anchor rods connecting precast sections shall be brought to a snug tight condition followed by an additional 1/2 turn on one of the nuts for anchor rods installed in the walls. Match marks shall be provided on the bolt and nut to verify relative rotation between the bolt and the nut. Holes in the walls for the culvert tie assembly may be drilled using core bits in lieu of using formed holes.

All costs associated with furnishing and installing or constructing the toewall and culvert ties will not be measured for payment but shall be included in the contract unit price for Box Culvert End Sections of the culvert number specified.

Drain holes shall conform to the requirements of Article 503.11 of the Standard Specifications unless noted otherwise.

Nonwoven geotextile fabric shall conform to the requirements of Article 1080.01. The minimum weight of the fabric shall be 6 oz. / sq. yd..

For end sections with traversable pipe grate systems, see grate detail sheet for required modifications.

SCB-TES

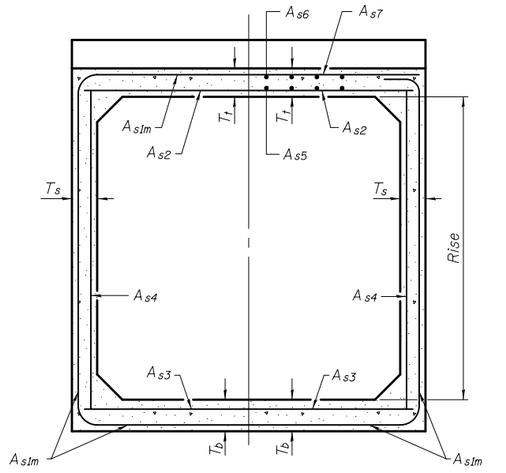
10-15-2016

FILE NAME =	USER NAME =	DESIGNED -	REVISED -
		CHECKED -	REVISED -
	PLOT SCALE =	DRAWN -	REVISED -
	PLOT DATE =	CHECKED -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

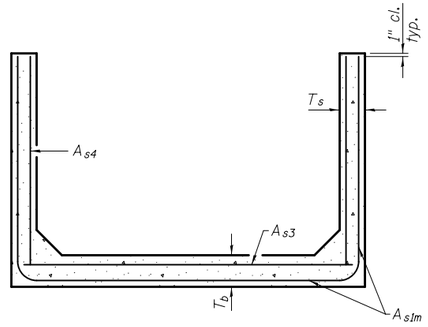
SINGLE CELL PRECAST BOX CULVERT TAPERED END SECTIONS
STRUCTURE NO.
SHEET NO. OF SHEETS

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		CONTRACT NO.		
	ILLINOIS	FED. AID PROJECT		

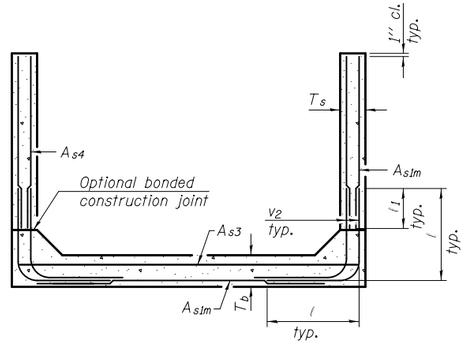


(Design Earth Cover ≥ 2 ft) (Design Earth Cover < 2 ft)

SECTION C-C



SECTION D-D



ALTERNATE SECTION D-D

A_{s1m} REINFORCEMENT

($in.^2$ / ft)

T_s (in.) \ Rise (ft)	2	3	4	5	6	7	8	9	10	11	12
4	0.19	0.17									
5	0.26	0.21	0.18								
6	0.22	0.26	0.23	0.22							
7	0.25	0.33	0.59	0.27	0.28						
8	0.40	0.35	0.43	0.39	0.36	0.34	0.40				
9	0.44	0.39	0.35	0.43	0.40	0.37	0.36	0.48			
10	0.48	0.42	0.38	0.47	0.44	0.41	0.38	0.42	0.56		
11	0.52	0.45	0.54	0.50	0.46	0.44	0.41	0.46	0.50	0.65	
12	0.55	0.49	0.58	0.54	0.50	0.48	0.45	0.46	0.46	0.61	0.75

(A_{s1m} reinforcement based upon welded wire reinforcement conforming to AASHTO M 55 or M 221).

ℓ_1 DIMENSION

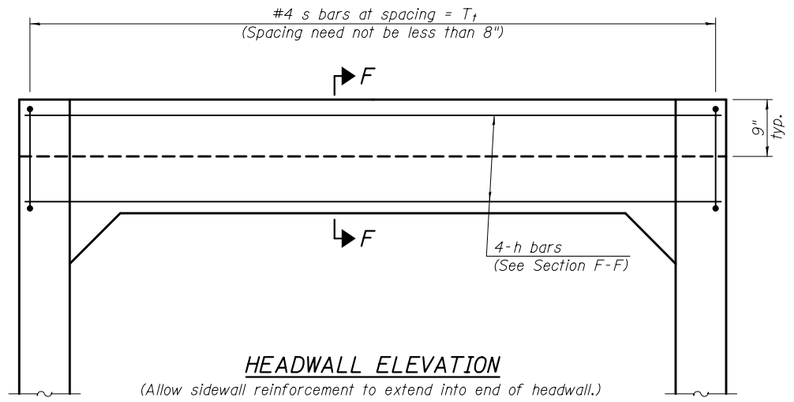
#3 bar = 2'-0"
#4 bar = 2'-8"
#5 bar = 3'-4"
#6 bar = 3'-11"

Notes:

Alternate Section D-D is provided to allow the Contractor the option of casting the bottom slab of the end section first followed by construction of the sidewalls using conventional forming methods. Shop drawings that detail slab thickness and reinforcement layout shall be submitted to the Engineer for review and approval when using Alternate Section D-D.

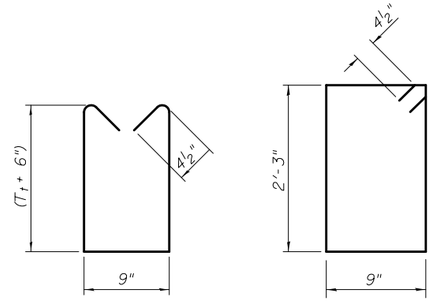
The size and spacing of the v_2 bars shall provide a minimum reinforcement area along each face of the walls ($in.^2$/ft.) equal to 1.10*(A_{s1m}). v_2 bars may consist of #3 thru #6 size reinforcement bars and the longitudinal spacing shall not exceed the lesser of the wall thickness or 8 inches.

Bonded construction joints shall be prepared according to Article 503.09 of the Standard Specifications.



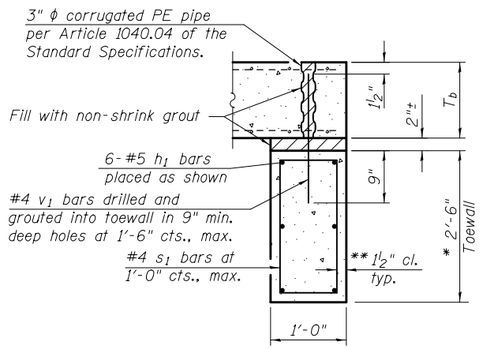
HEADWALL ELEVATION

(Allow sidewall reinforcement to extend into end of headwall.)



BAR s

BAR s_1



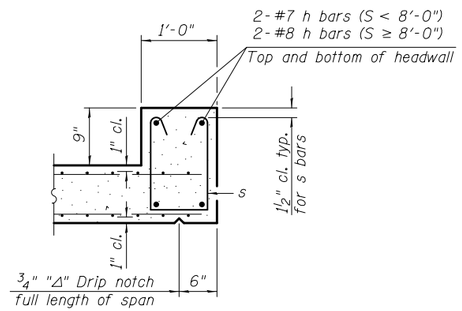
SECTION E-E

TOEWALL CONSTRUCTION SEQUENCE

1. Perform excavation and construct toewall.
2. Backfill according to the applicable paragraphs of Article 502.10 of the Standard Specifications and place bedding for precast box culvert end sections.
3. Set precast box culvert end section.
4. Drill and epoxy grout reinforcement in toewall in accordance with Section 584 of the Standard Specifications.
5. Pressure grout voids using non-shrink grout conforming to Section 1024 of the Standard Specifications.

* The Contractor may furnish a precast or cast-in-place toewall. The Contractor shall be responsible for the strength and stability of the precast toewall during handling. Additional lifting points may be required depending upon the length of the toewall or the Contractor may need to modify the design of the toewall for the proposed handling the method.

** If soil conditions permit, the sides of the toewall may be poured directly against the soil. The clear cover on the sides of the toewall shall be increased to 3" by increasing the thickness of the toewall.



SECTION F-F

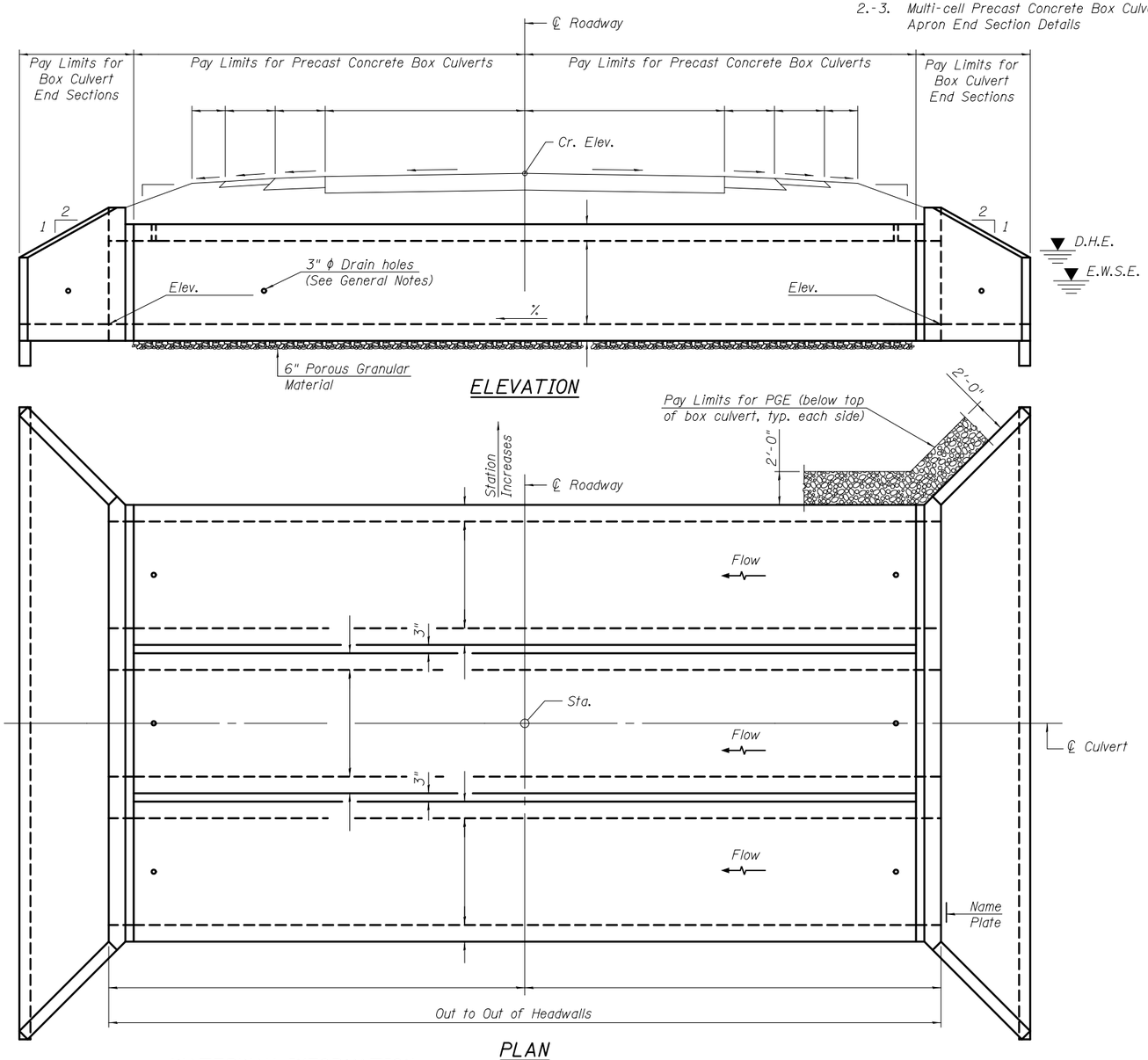
SCB-TES 10-15-2016

FILE NAME =	USER NAME =	DESIGNED -	REVISED -	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	SINGLE CELL PRECAST BOX CULVERT TAPERED END SECTIONS STRUCTURE NO.	F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		CHECKED -	REVISED -							
	PLOT SCALE =	DRAWN -	REVISED -		SHEET NO. OF SHEETS			CONTRACT NO.		
	PLOT DATE =	CHECKED -	REVISED -				ILLINOIS	FED. AID PROJECT		

Benchmark:

Existing Structure:

INDEX OF SHEETS



PLAN

WATERWAY INFORMATION

Drainage Area = sq. mi. Low Grade Elev. = @ Sta.

Flood	Freq. Yr.	Q C.F.S.	Opening Sq. Ft. Exist.	Opening Sq. Ft. Prop.	Nat. H.W.E.	Head - Ft. Exist.	Head - Ft. Prop.	Headwater El. Exist.	Headwater El. Prop.
	10								
Design	50								
Base	100								
Overtopping									
Max. Calc.	500								

TCB-GPE 10-15-2016

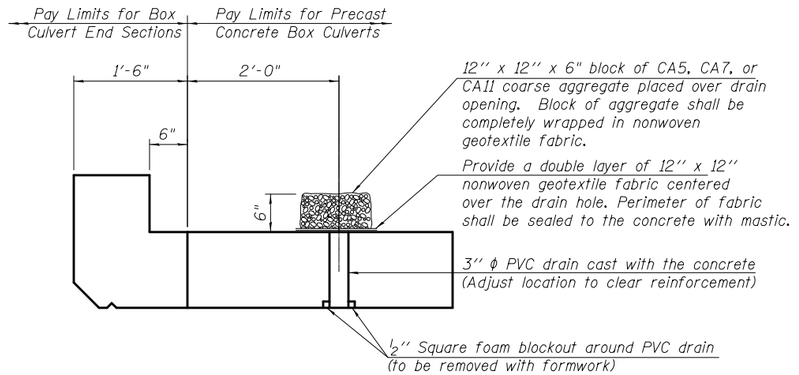
GENERAL NOTES

The design fill height for this box is _ ft. The precast box culvert sections shall conform to the requirements of ASTM C 1577.

Drain holes shall be provided on exterior culvert walls for each precast box segment with a clear rise greater than 3 ft. The drain hole shall be located within 1/3 of the clear rise of the box culvert, shall not intercept the haunch, and shall conform to the requirements of Article 503.11 of the Standard Specification.

Nonwoven geotextile fabric shall conform to the requirements of Art. 1080.01 of the Standard Specifications. The minimum weight of the fabric shall be 6 ounces per square yard.

Precast concrete box culverts and box culvert end sections shall be backfilled with Porous Granular Embankment below the top of the box culvert extending to a vertical plane 2 ft from the exterior sides of the culvert, 2 ft from the back face of the end sections, and not closer than 2 ft from the face of embankment.



DRAIN DETAIL

(All costs associated with furnishing and constructing the above drain detail will not be measured for payment but shall be included in the contract unit price for the associated work.)

PROFILE GRADE

DESIGN SPECIFICATIONS

2012 AASHTO LRFD Bridge Design Specifications
6th Edition with 2013 interims

LOADING HL-93

DESIGN STRESSES

PRECAST UNITS

f'c = 5,000 psi
fy = 65,000 psi (Welded Wire Reinforcement)

FIELD UNITS

f'c = 3,500 psi
fy = 65,000 psi (Welded Wire Reinforcement)

TOTAL BILL OF MATERIAL

ITEM	UNIT	TOTAL
Removal of Existing Structures	Each	
Name Plates	Each	
Box Culvert End Sections, Culvert No. _	Each	
Precast Concrete Box Culverts, x	Foot	
Porous Granular Embankment	Cu. Yd.	

STATION
BUILT BY
STATE OF ILLINOIS
F.A. RT. SEC.
LOADING HL-93
STR. NO.

NAME PLATE

See Std. 515001

LOCATION SKETCH

N

GENERAL PLAN AND ELEVATION

IL RTE. OVER
F.A. RTE. SEC.
COUNTY
STATION
S.N. -

FILE NAME =	USER NAME =	DESIGNED -	REVISED -
		CHECKED -	REVISED -
	PLOT SCALE =	DRAWN -	REVISED -
	PLOT DATE =	CHECKED -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

SHEET NO. OF SHEETS

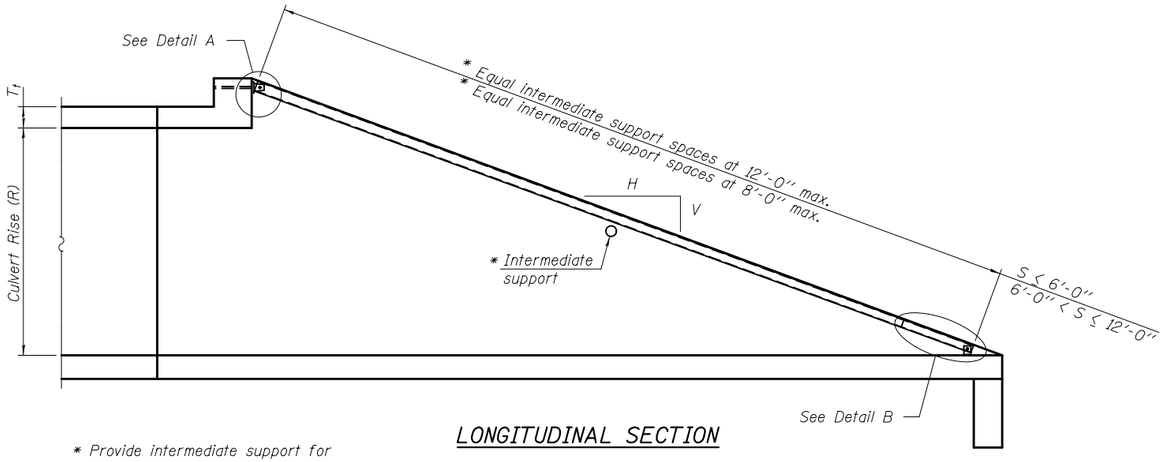
F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		CONTRACT NO.		
	ILLINOIS	FED. AID PROJECT		

GENERAL NOTES

The minimum edge distance from the center of a hole to the free edge of a structural shape or plate shall be 1½" unless noted otherwise.

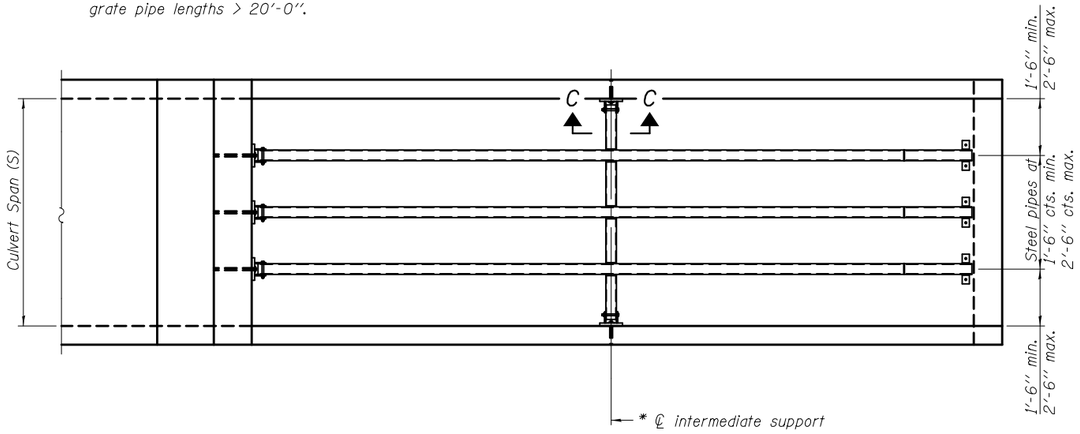
This standard shall only be used on concrete end sections not skewed more than ±15 degrees with roadway.

The Contractor may install the thru bolts using drilling and grouting in lieu of providing a formed hole using steel pipe. Installation shall be in accordance with Article 509.06 using a method that results in the annulus surrounding the bolt being completed filled with adhesive. The method of drilling shall not result in spalled concrete at the exit face. Epoxy grouted thru bolts shall be snug tightened followed by an additional ⅓ turn on the interior nut at final installation. Cost included with Traversable Pipe Grate.

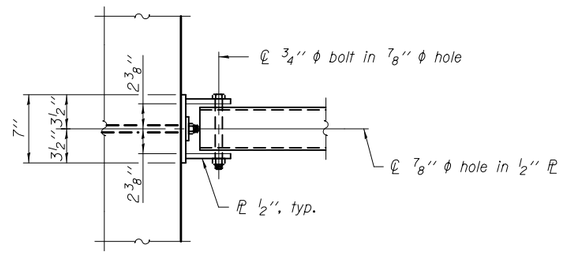


LONGITUDINAL SECTION

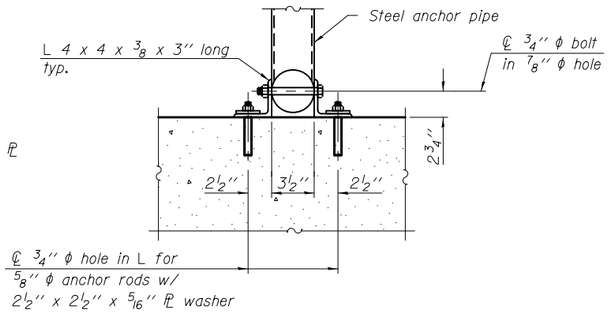
* Provide intermediate support for grate pipe lengths > 20'-0".



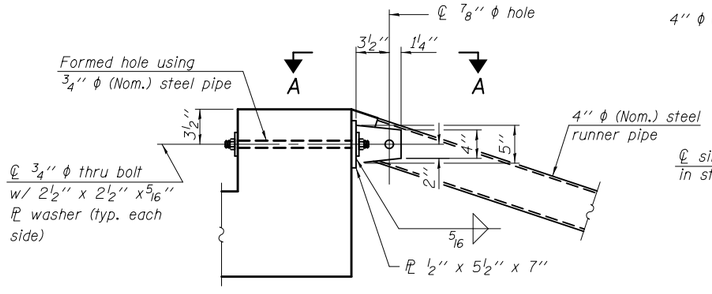
PLAN VIEW



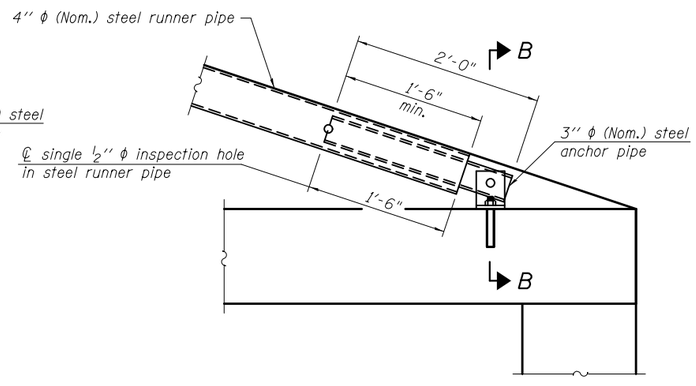
VIEW A-A



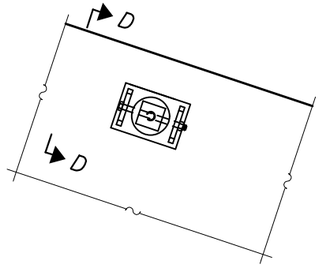
SECTION B-B



DETAIL A

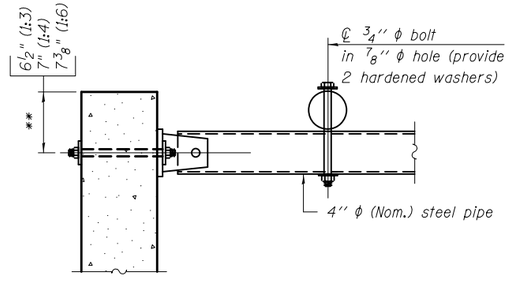


DETAIL B



VIEW C-C

(See Detail A for dimensions and details not shown.)



SECTION D-D

** Measured perpendicular to top of culvert wall. In addition, formed hole shall be located a minimum of 6" measured horizontally from any vertical joints necessary for construction of the culvert end section.

TPGBC-ZS

10-15-2016

(Sheet 1 of 2)

FILE NAME =	USER NAME =	DESIGNED -	REVISED -	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	TRAVERSABLE PIPE GRATE FOR BOX CULVERTS STRUCTURE NO.	F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		CHECKED -	REVISED -							
	PLOT SCALE =	DRAWN -	REVISED -					CONTRACT NO.		
	PLOT DATE =	CHECKED -	REVISED -		SHEET NO. OF SHEETS		ILLINOIS	FED. AID PROJECT		

PIPE-GRATE SCHEDULE FOR BOX CULVERT END SECTIONS

Precast Box Culvert Dimensions			Slope of End Section								
			1:3			1:4			1:6		
S (ft)	R (ft)	T_1 (in)	Main Pipe No. / Length	Int. Support No. / Length	Total Length of Pipe	Main Pipe No. / Length	Int. Support No. / Length	Total Length of Pipe	Main Pipe No. / Length	Int. Support No. / Length	Total Length of Pipe
4	2	7.5	1 @ 8'-10"	N/A	8'-10"	1 @ 11'-7"	N/A	11'-7"	1 @ 17'-2"	N/A	17'-2"
4	2	5	1 @ 8'-2"	N/A	8'-2"	1 @ 10'-8"	N/A	10'-8"	1 @ 15'-11"	N/A	15'-11"
4	3	7.5	1 @ 12'-0"	N/A	12'-0"	1 @ 15'-8"	N/A	15'-8"	1 @ 23'-3"	1 @ 3'-7"	26'-10"
4	3	5	1 @ 11'-4"	N/A	11'-4"	1 @ 14'-10"	N/A	14'-10"	1 @ 22'-0"	1 @ 3'-7"	25'-7"
4	4	7.5	1 @ 15'-2"	N/A	15'-2"	1 @ 19'-10"	1 @ 3'-7"	23'-5"	1 @ 29'-4"	2 @ 3'-7"	36'-6"
4	4	5	1 @ 14'-6"	N/A	14'-6"	1 @ 18'-11"	N/A	18'-11"	1 @ 28'-1"	2 @ 3'-7"	35'-3"
5	2	8	1 @ 8'-11"	N/A	8'-11"	1 @ 11'-9"	N/A	11'-9"	1 @ 17'-5"	N/A	17'-5"
5	2	6	1 @ 8'-5"	N/A	8'-5"	1 @ 11'-1"	N/A	11'-1"	1 @ 16'-5"	N/A	16'-5"
5	3	8	1 @ 12'-1"	N/A	12'-1"	1 @ 15'-10"	N/A	15'-10"	1 @ 23'-6"	1 @ 4'-7"	28'-1"
5	3	6	1 @ 11'-7"	N/A	11'-7"	1 @ 15'-2"	N/A	15'-2"	1 @ 22'-6"	1 @ 4'-7"	27'-1"
5	4	8	1 @ 15'-3"	N/A	15'-3"	1 @ 20'-0"	1 @ 4'-7"	24'-7"	1 @ 29'-7"	2 @ 4'-7"	38'-9"
5	4	6	1 @ 14'-9"	N/A	14'-9"	1 @ 19'-3"	N/A	19'-3"	1 @ 28'-7"	2 @ 4'-7"	37'-9"
5	5	8	1 @ 18'-5"	N/A	18'-5"	1 @ 24'-1"	2 @ 4'-7"	33'-3"	1 @ 35'-8"	3 @ 4'-7"	49'-5"
5	5	6	1 @ 17'-11"	N/A	17'-11"	1 @ 23'-5"	1 @ 4'-7"	28'-0"	1 @ 34'-8"	2 @ 4'-7"	43'-10"
6	2	8	2 @ 8'-11"	N/A	17'-10"	2 @ 11'-9"	N/A	23'-6"	2 @ 17'-5"	N/A	34'-10"
6	2	7	2 @ 8'-8"	N/A	17'-4"	2 @ 11'-5"	N/A	22'-10"	2 @ 16'-11"	N/A	33'-10"
6	3	8	2 @ 12'-1"	N/A	24'-2"	2 @ 15'-10"	N/A	31'-8"	2 @ 23'-6"	1 @ 5'-7"	52'-7"
6	3	7	2 @ 11'-10"	N/A	23'-8"	2 @ 15'-6"	N/A	31'-0"	2 @ 23'-0"	1 @ 5'-7"	51'-7"
6	4	8	2 @ 15'-3"	N/A	30'-6"	2 @ 20'-0"	1 @ 5'-7"	45'-7"	2 @ 29'-7"	2 @ 5'-7"	70'-4"
6	4	7	2 @ 15'-0"	N/A	30'-0"	2 @ 19'-8"	1 @ 5'-7"	44'-11"	2 @ 29'-1"	2 @ 5'-7"	69'-4"
6	5	8	2 @ 18'-5"	N/A	36'-10"	2 @ 24'-1"	2 @ 5'-7"	59'-4"	2 @ 35'-8"	3 @ 5'-7"	88'-1"
6	5	7	2 @ 18'-2"	N/A	36'-4"	2 @ 23'-9"	2 @ 5'-7"	58'-8"	2 @ 35'-2"	2 @ 5'-7"	81'-6"
6	6	8	2 @ 21'-7"	1 @ 5'-7"	48'-9"	2 @ 28'-3"	2 @ 5'-7"	67'-8"	2 @ 41'-9"	3 @ 5'-7"	100'-3"
6	6	7	2 @ 21'-4"	1 @ 5'-7"	48'-3"	2 @ 27'-11"	2 @ 5'-7"	67'-0"	2 @ 41'-3"	3 @ 5'-7"	99'-3"
7	2	8	2 @ 8'-11"	N/A	17'-10"	2 @ 11'-9"	N/A	23'-6"	2 @ 17'-5"	N/A	34'-10"
7	3	8	2 @ 12'-1"	N/A	24'-2"	2 @ 15'-10"	N/A	31'-8"	2 @ 23'-6"	2 @ 6'-7"	60'-2"
7	4	8	2 @ 15'-3"	N/A	30'-6"	2 @ 20'-0"	2 @ 6'-7"	53'-2"	2 @ 29'-7"	3 @ 6'-7"	78'-11"
7	5	8	2 @ 18'-5"	N/A	36'-10"	2 @ 24'-1"	3 @ 6'-7"	67'-11"	2 @ 35'-8"	4 @ 6'-7"	97'-8"
7	6	8	2 @ 21'-7"	2 @ 6'-7"	56'-4"	2 @ 28'-3"	3 @ 6'-7"	76'-3"	2 @ 41'-9"	5 @ 6'-7"	116'-5"
7	7	8	2 @ 24'-9"	3 @ 6'-7"	69'-3"	2 @ 32'-4"	4 @ 6'-7"	91'-0"	2 @ 47'-10"	6 @ 6'-7"	135'-2"
8	2	8	3 @ 8'-11"	N/A	26'-9"	3 @ 11'-9"	N/A	35'-3"	3 @ 17'-5"	N/A	52'-3"
8	3	8	3 @ 12'-1"	N/A	36'-3"	3 @ 15'-10"	N/A	47'-6"	3 @ 23'-6"	2 @ 7'-7"	85'-8"
8	4	8	3 @ 15'-3"	N/A	45'-9"	3 @ 20'-0"	2 @ 7'-7"	75'-2"	3 @ 29'-7"	3 @ 7'-7"	111'-6"
8	5	8	3 @ 18'-5"	N/A	55'-3"	3 @ 24'-1"	3 @ 7'-7"	95'-0"	3 @ 35'-8"	4 @ 7'-7"	137'-4"
8	6	8	3 @ 21'-7"	2 @ 7'-7"	79'-11"	3 @ 28'-3"	3 @ 7'-7"	107'-6"	3 @ 41'-9"	5 @ 7'-7"	163'-2"
8	7	8	3 @ 24'-9"	3 @ 7'-7"	97'-0"	3 @ 32'-4"	4 @ 7'-7"	127'-4"	3 @ 47'-10"	6 @ 7'-7"	189'-0"
8	8	8	3 @ 27'-11"	3 @ 7'-7"	106'-6"	3 @ 36'-6"	4 @ 7'-7"	139'-10"	3 @ 53'-11"	6 @ 7'-7"	207'-3"
9	2	9	3 @ 9'-3"	N/A	27'-9"	3 @ 12'-1"	N/A	36'-3"	3 @ 17'-11"	N/A	53'-9"
9	3	9	3 @ 12'-4"	N/A	37'-0"	3 @ 16'-2"	N/A	48'-6"	3 @ 24'-0"	3 @ 8'-7"	97'-9"
9	4	9	3 @ 15'-6"	N/A	46'-6"	3 @ 20'-4"	2 @ 8'-7"	78'-2"	3 @ 30'-1"	3 @ 8'-7"	116'-0"
9	5	9	3 @ 18'-8"	N/A	56'-0"	3 @ 24'-5"	3 @ 8'-7"	99'-0"	3 @ 36'-2"	4 @ 8'-7"	142'-10"
9	6	9	3 @ 21'-10"	2 @ 8'-7"	82'-8"	3 @ 28'-7"	3 @ 8'-7"	111'-6"	3 @ 42'-3"	5 @ 8'-7"	169'-8"
9	7	9	3 @ 25'-0"	3 @ 8'-7"	100'-9"	3 @ 32'-8"	4 @ 8'-7"	132'-4"	3 @ 48'-4"	6 @ 8'-7"	196'-6"
9	8	9	3 @ 28'-2"	3 @ 8'-7"	110'-3"	3 @ 36'-10"	4 @ 8'-7"	144'-10"	3 @ 54'-5"	6 @ 8'-7"	214'-9"
9	9	9	3 @ 31'-4"	3 @ 8'-7"	119'-9"	3 @ 40'-11"	5 @ 8'-7"	165'-8"	3 @ 60'-6"	7 @ 8'-7"	241'-7"
10	2	10	3 @ 9'-6"	N/A	28'-6"	3 @ 12'-5"	N/A	37'-3"	3 @ 18'-5"	N/A	55'-3"
10	3	10	3 @ 12'-8"	N/A	38'-0"	3 @ 16'-6"	N/A	49'-6"	3 @ 24'-6"	3 @ 9'-7"	102'-3"
10	4	10	3 @ 15'-10"	N/A	47'-6"	3 @ 20'-8"	2 @ 9'-7"	81'-2"	3 @ 30'-7"	3 @ 9'-7"	120'-6"
10	5	10	3 @ 19'-0"	N/A	57'-0"	3 @ 24'-9"	3 @ 9'-7"	103'-0"	3 @ 36'-8"	4 @ 9'-7"	148'-4"
10	6	10	3 @ 22'-1"	2 @ 9'-7"	85'-5"	3 @ 28'-11"	3 @ 9'-7"	115'-6"	3 @ 42'-9"	5 @ 9'-7"	176'-2"
10	7	10	3 @ 25'-3"	3 @ 9'-7"	104'-6"	3 @ 33'-0"	4 @ 9'-7"	137'-4"	3 @ 48'-10"	6 @ 9'-7"	204'-0"
10	8	10	3 @ 28'-5"	3 @ 9'-7"	114'-0"	3 @ 37'-2"	4 @ 9'-7"	149'-10"	3 @ 54'-11"	6 @ 9'-7"	222'-3"
10	9	10	3 @ 31'-7"	4 @ 9'-7"	133'-1"	3 @ 41'-3"	5 @ 9'-7"	171'-8"	3 @ 61'-0"	7 @ 9'-7"	250'-1"
10	10	10	3 @ 34'-9"	4 @ 9'-7"	142'-7"	3 @ 45'-5"	5 @ 9'-7"	184'-2"	3 @ 67'-1"	8 @ 9'-7"	277'-11"
11	2	11	4 @ 9'-9"	N/A	39'-0"	4 @ 12'-9"	N/A	51'-0"	4 @ 18'-11"	N/A	75'-8"
11	3	11	4 @ 12'-11"	N/A	51'-8"	4 @ 16'-11"	N/A	67'-8"	4 @ 25'-0"	3 @ 10'-7"	131'-9"
11	4	11	4 @ 16'-1"	N/A	64'-4"	4 @ 21'-0"	2 @ 10'-7"	105'-2"	4 @ 31'-1"	3 @ 10'-7"	156'-1"
11	6	11	4 @ 22'-5"	2 @ 10'-7"	110'-10"	4 @ 29'-3"	3 @ 10'-7"	148'-9"	4 @ 43'-3"	5 @ 10'-7"	225'-11"
11	8	11	4 @ 28'-9"	3 @ 10'-7"	146'-9"	4 @ 37'-6"	4 @ 10'-7"	192'-4"	4 @ 55'-5"	6 @ 10'-7"	285'-2"
11	10	11	4 @ 35'-0"	4 @ 10'-7"	182'-4"	4 @ 45'-9"	5 @ 10'-7"	235'-11"	4 @ 67'-7"	8 @ 10'-7"	355'-0"
11	11	11	4 @ 38'-2"	4 @ 10'-7"	195'-0"	4 @ 49'-10"	6 @ 10'-7"	262'-10"	4 @ 73'-8"	9 @ 10'-7"	389'-11"
12	2	12	4 @ 10'-0"	N/A	40'-0"	4 @ 13'-1"	N/A	52'-4"	4 @ 19'-5"	N/A	77'-8"
12	3	12	4 @ 13'-2"	N/A	52'-8"	4 @ 17'-3"	N/A	69'-0"	4 @ 25'-6"	3 @ 11'-7"	136'-9"
12	4	12	4 @ 16'-4"	N/A	65'-4"	4 @ 21'-4"	2 @ 11'-7"	108'-6"	4 @ 31'-7"	4 @ 11'-7"	172'-8"
12	6	12	4 @ 22'-8"	2 @ 11'-7"	113'-10"	4 @ 29'-7"	3 @ 11'-7"	153'-1"	4 @ 43'-9"	5 @ 11'-7"	232'-11"
12	8	12	4 @ 29'-0"	3 @ 11'-7"	150'-9"	4 @ 37'-10"	4 @ 11'-7"	197'-8"	4 @ 55'-11"	7 @ 11'-7"	304'-9"
12	10	12	4 @ 35'-4"	4 @ 11'-7"	187'-8"	4 @ 46'-1"	5 @ 11'-7"	242'-3"	4 @ 68'-1"	8 @ 11'-7"	365'-0"
12	12	12	4 @ 41'-8"	5 @ 11'-7"	224'-7"	4 @ 54'-4"	6 @ 11'-7"	286'-10"	4 @ 80'-3"	10 @ 11'-7"	436'-10"

TPGBC-ZS

10-15-2016

FILE NAME =	USER NAME =	DESIGNED -	REVISED -	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	TRAVERSABLE PIPE GRATE FOR BOX CULVERTS	F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		CHECKED -	REVISED -							
	PLOT SCALE =	DRAWN -	REVISED -					CONTRACT NO.		
	PLOT DATE =	CHECKED -	REVISED -		SHEET NO. OF SHEETS		ILLINOIS	FED. AID PROJECT		