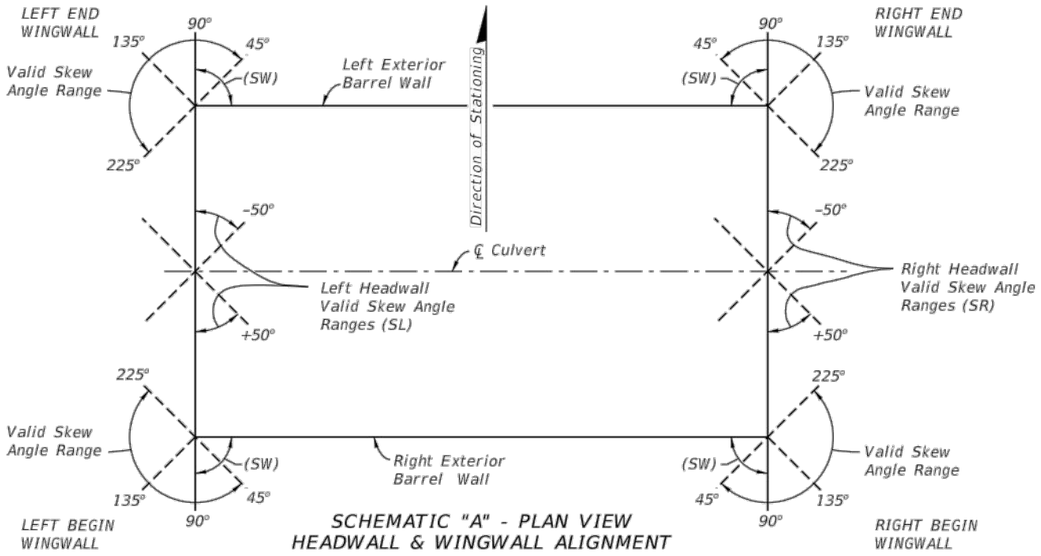
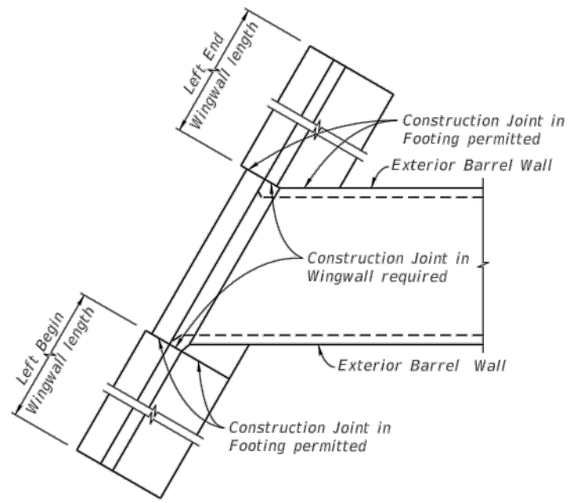


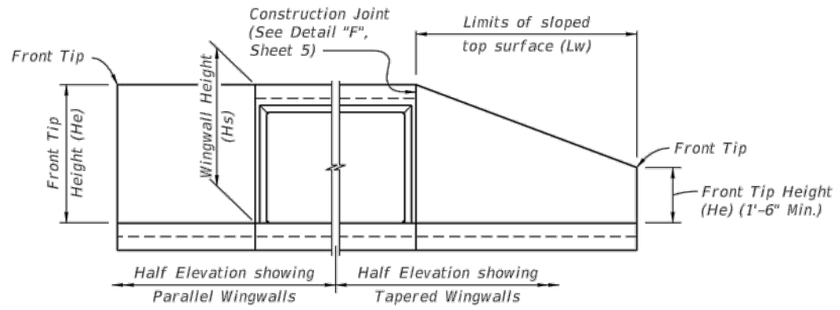
SCHEMATIC "A" - PLAN VIEW
HEADWALL & WINGWALL ALIGNMENT

NOTE: All headwall and culvert skew angles are measured in degrees from a line perpendicular to the centerline of culvert (counter-clockwise positive), see Schematic "B".



PART PLAN SHOWING PARALLEL WINGWALLS
AND LOCATION OF CONSTRUCTION JOINTS

NOTE:
Construction Joints in wingwalls and footings are located as follows: For non-skewed wingwalls they are located adjacent to the exterior face of the exterior barrel wall; when the ℄ of wingwall and ℄ of exterior barrel wall results in an acute angle see Left End Wingwall above, and when the angle is obtuse see Left Begin Wingwall above and Detail C (Sheet 5).



END ELEVATION
OF CULVERT

GENERAL NOTES:

LIVE LOAD: HL-93.

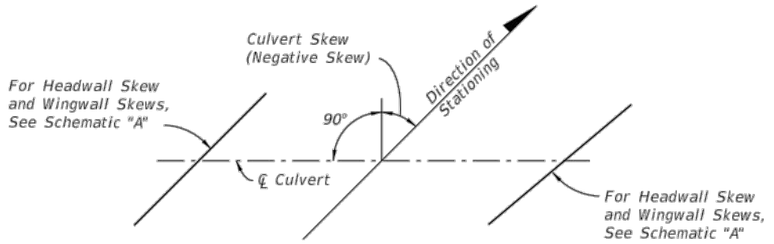
CONSTRUCTION LOADING: It is the construction Contractor's responsibility to provide for supporting construction loads that exceed AASHTO HL-93, and any construction load applied prior to 2 feet of compacted fill placed above the top slab.

SURFACE FINISH: All concrete surfaces shall receive a general surface finish.

SKEWED CONSTRUCTION JOINTS: Construction joints in barrels of culverts with skewed wingwalls may be placed parallel to the headwalls and the reinforcing steel, and the slabs may be cut provided that the cut reinforcing steel extends beyond the construction joint enough for splices to be made in accordance with Table 1 on this sheet. The cost of construction joints and additional reinforcing shall be at the expense of the Contractor.

CULVERT EXTENSIONS: For cut backs and ties into existing concrete box culverts see Sheet 6 of 8.

REINFORCING STEEL: See the "Box Culvert Data Tables" in the Contract Plans for grade and bar spacing. See the Reinforcing Bar List in the Contract Plans for bar sizes and bar bending details.



SCHEMATIC "B" - PLAN VIEW
CULVERT ALIGNMENT

NOTE: For Culvert Skew see Contract Plans.

TABLE 1 - MINIMUM BAR SPLICE LENGTHS FOR LONGITUDINAL REINFORCING

BAR SIZE	SPLICE (CLASS B) CLASS II (3400 psi)	SPLICE (CLASS B) CLASS IV (5500 psi)	BAR SIZE	SPLICE (CLASS B) CLASS II (3400 psi)	SPLICE (CLASS B) CLASS IV (5500 psi)
#3	1'-4"	1'-0"	#8	3'-5"	2'-8"
#4	1'-9"	1'-4"	#9	4'-3"	3'-4"
#5	2'-2"	1'-8"			
#6	2'-7"	2'-0"			
#7	3'-0"	2'-4"			

TABLE 1 NOTE: Splice lengths are based on an AASHTO Class B tension lap splice for the Specification Section 346 concrete class shown.

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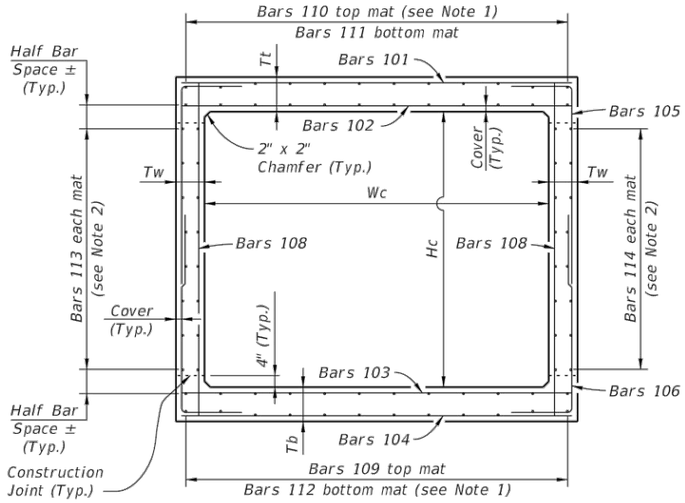
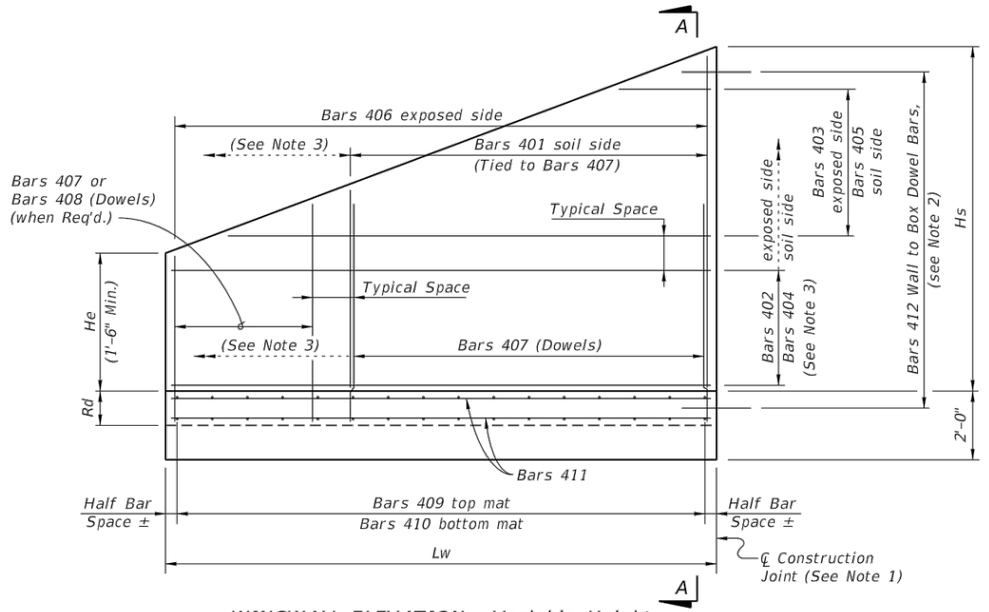


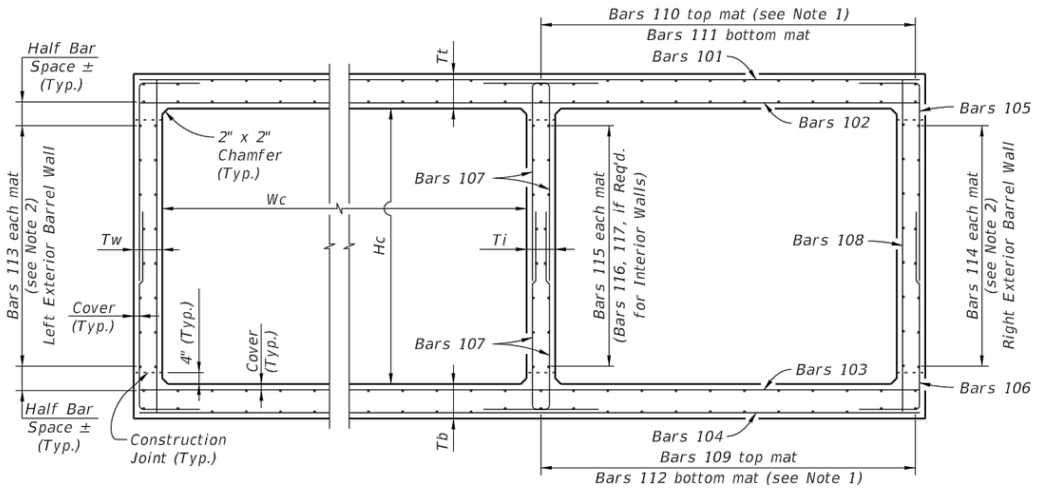
TYPICAL SECTION THRU SINGLE BARREL CULVERT

CULVERT BARREL NOTES:

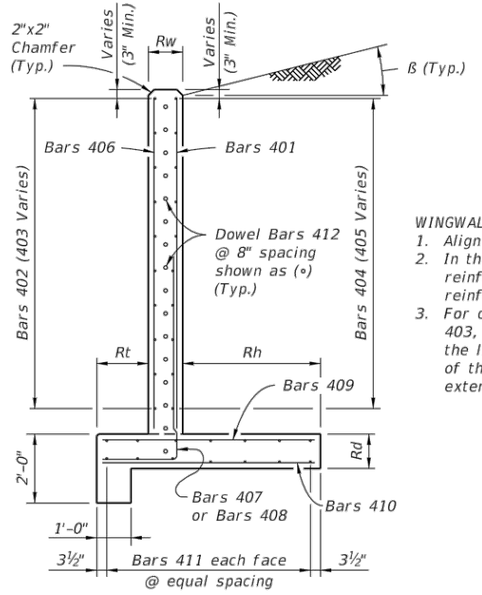
1. Space Bars 110 and 112 with a bar in each corner, and at the ℄ of interior walls (for multiple barrel culverts only), and the remaining bars placed at equal spacing shown in the Contract Plans. Adjust last bar spacing when required.
2. Place Bars 113 and 114 at spacing shown in the Contract Plans evenly between Bars 109 and 111.
3. Locate the first transverse bar from the ends of the culvert at one half the bar spacing, but provide the minimum reinforcement cover and not greater than 4" clear.



WINGWALL ELEVATION - Variable Height
(Left End shown - other corners similar)



TYPICAL SECTION THRU MULTIPLE BARREL CULVERT



WINGWALL SECTION A-A

WINGWALL NOTES:

1. Align construction joint perpendicular to wingwall.
2. In the vicinity of the construction joint, field bend reinforcement as necessary to maintain minimum reinforcement cover.
3. For constant height wingwalls, variable length Bars 403, 405 & 408 are not required, and as such the limits of Bars 401 & 407 extend the full length of the wingwall, and the limits of Bars 402 & 404 extend to the full height of the wingwall.

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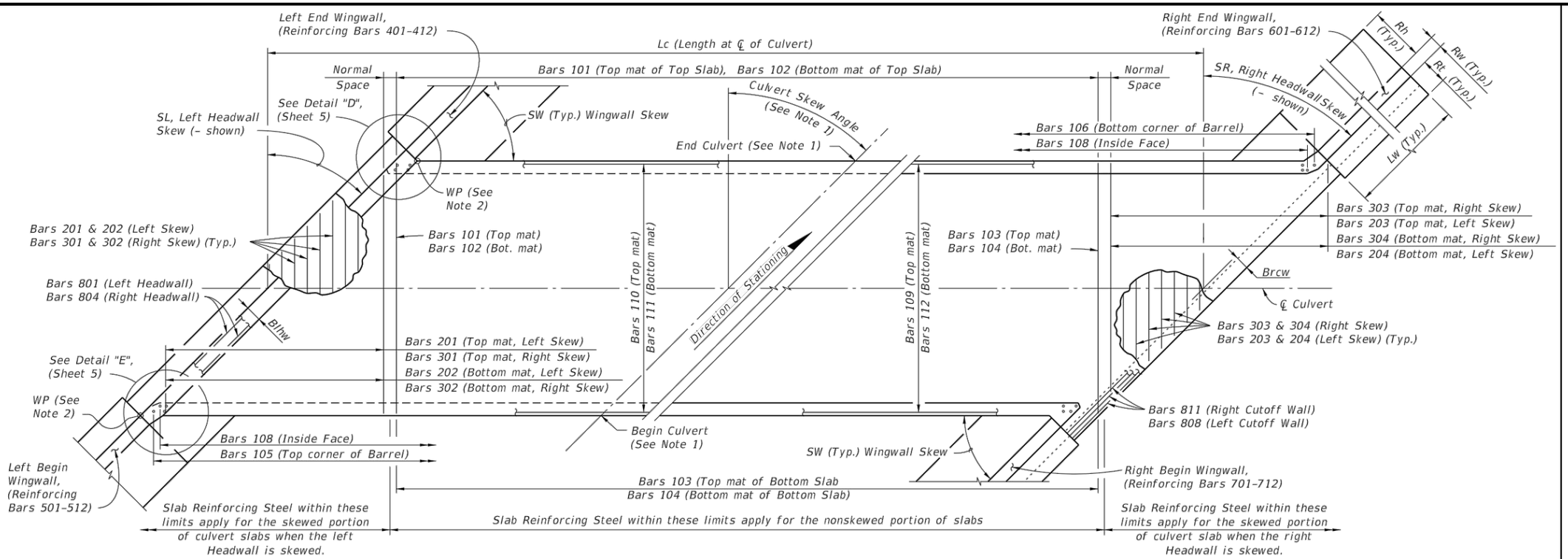
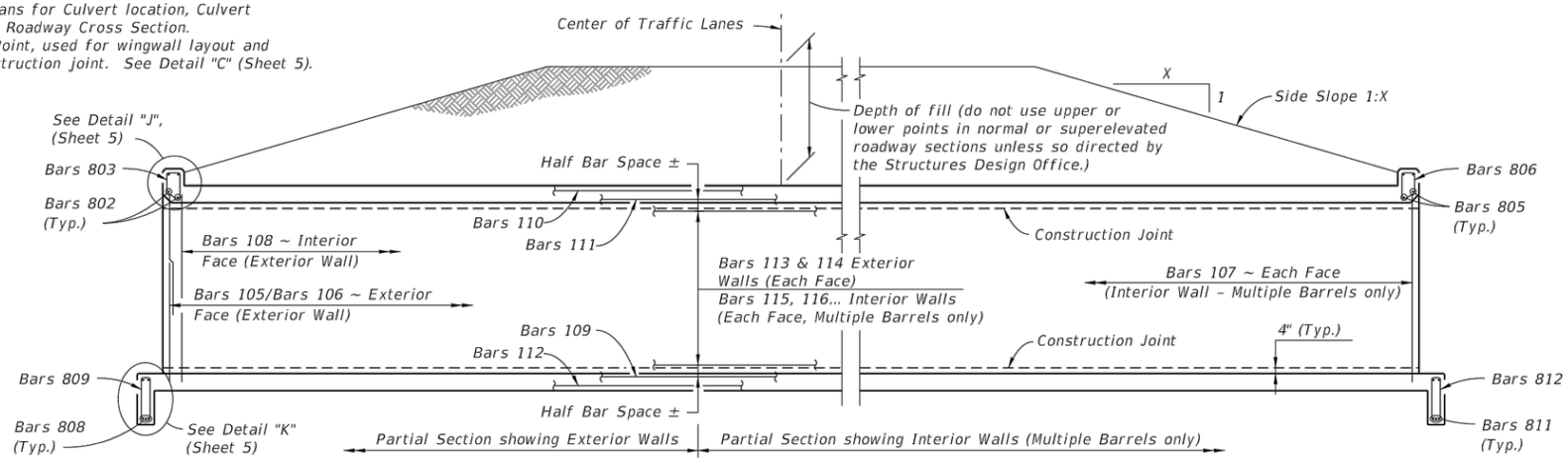


PARTIAL PLAN TOP SLAB
(Left Side, Left Skew)

PARTIAL PLAN BOTTOM SLAB
(Right Side, Right Skew)

NOTES:
1. See Contract Plans for Culvert location, Culvert Skew Angle and Roadway Cross Section.
2. WP = Working Point, used for wingwall layout and location of construction joint. See Detail "C" (Sheet 5).

SINGLE BARREL BOX CULVERT
(Skewed Culvert With Parallel Wingwalls Shown)



LONGITUDINAL SECTION THRU CULVERT
(Transverse Top & Bottom Slab Reinforcing Not Shown For Clarity)

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CONCRETE BOX CULVERT DETAILS

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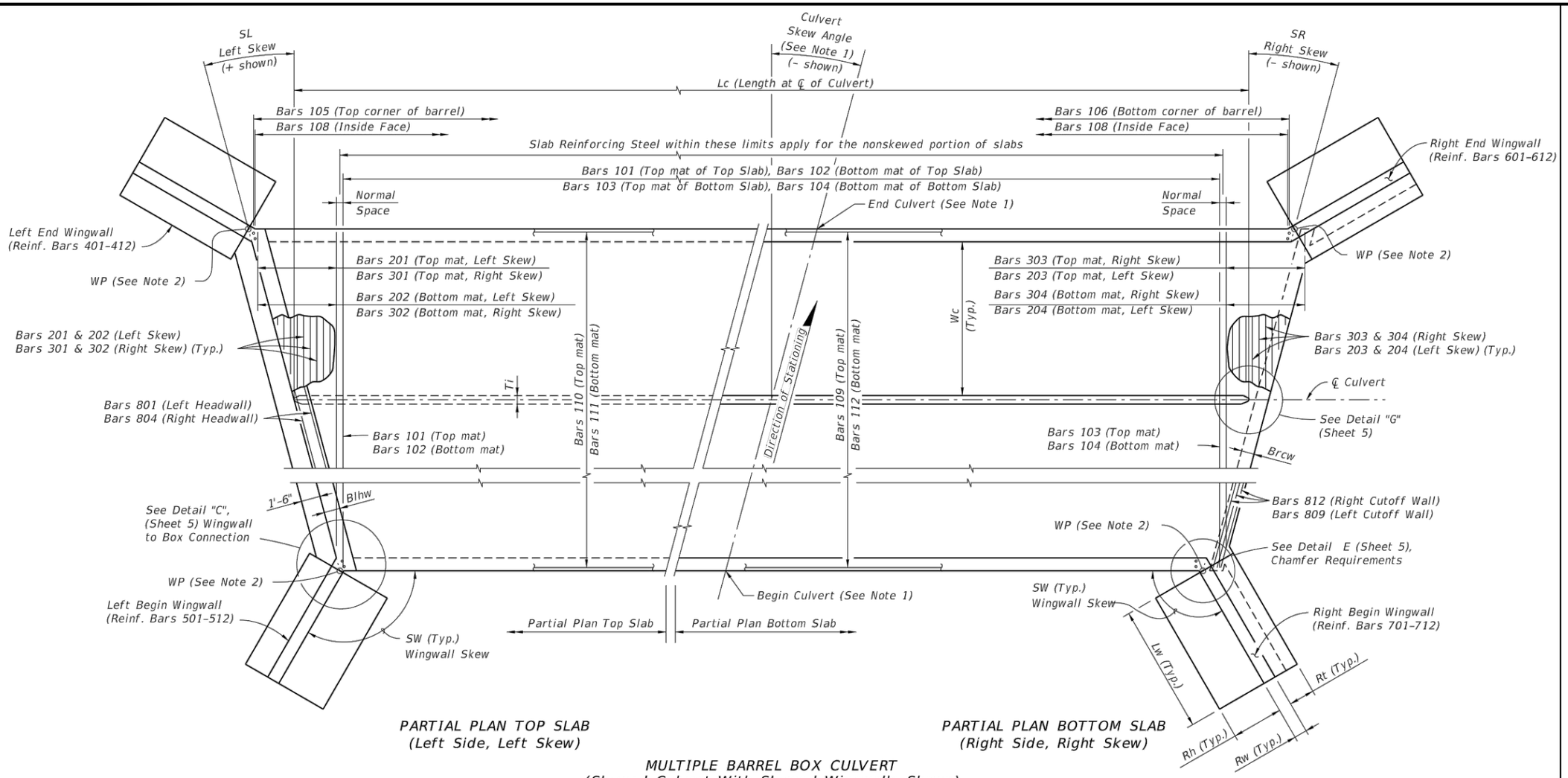

PARTIAL PLAN TOP SLAB
(Left Side, Left Skew)

PARTIAL PLAN BOTTOM SLAB
(Right Side, Right Skew)

MULTIPLE BARREL BOX CULVERT
(Skewed Culvert With Skewed Wingwalls Shown)

NOTES:
1. See Contract Plans for Culvert Location, Culvert Skew Angle and Roadway Cross Section.
2. WP = Working Point, used for wingwall layout and location of construction joint. See Detail C (Sheet 5).

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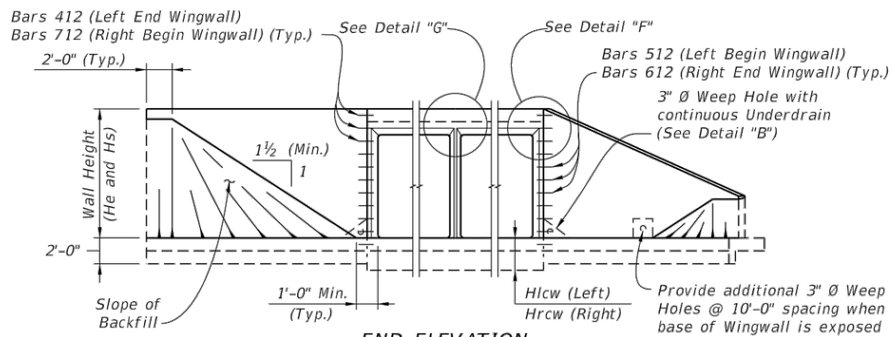
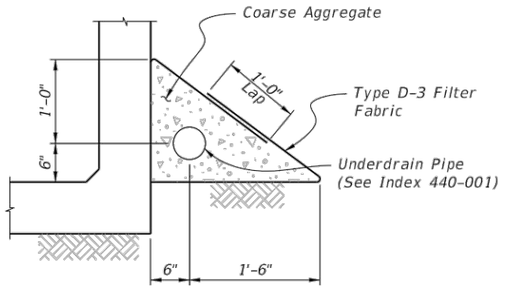


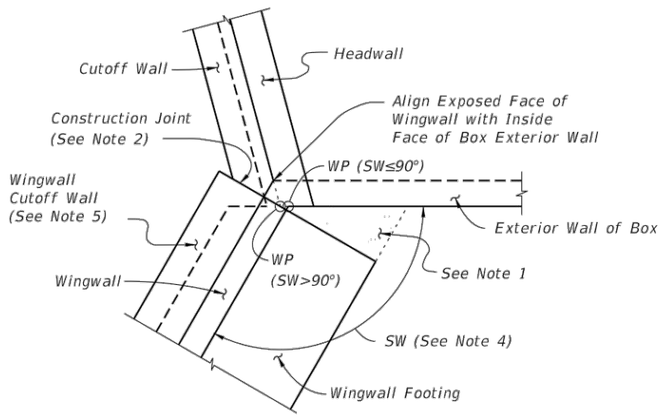
END ELEVATION
(Showing Constant Height And Variable Height Wingwalls)



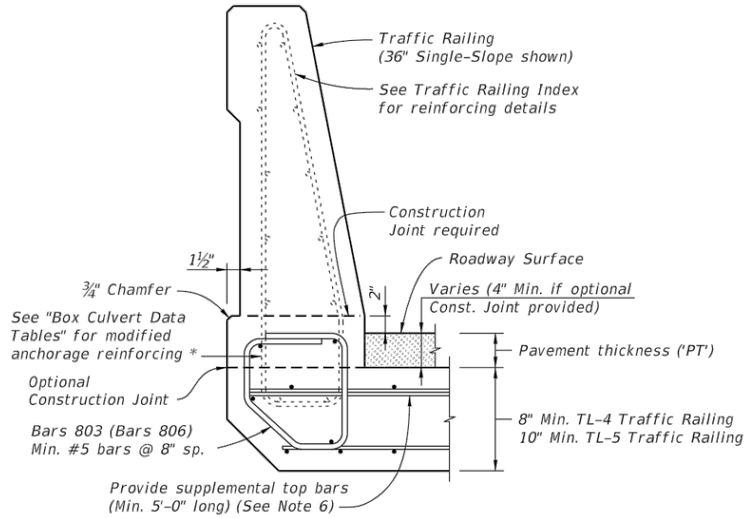
DETAIL "B"
UNDERDRAIN DETAIL
(Similar to Type II ~ Index 440-001)

NOTES:
1. For small angles, the Contractor may elect to fill the area between the box and the wingwall footing with unreinforced concrete. For wingwall skew angles less then 90 degrees, field bend wingwall reinforcement as necessary while maintaining cover. No additional payment will be made for this work.
2. Location of Construction Joint determined by WP at theoretical intersection of:
   – Soil side face of Headwall and outside face of Box Exterior Wall, for SW≤90°;
   – Outside face of Wingwall and outside face of Box Exterior Wall, for SW>90°.
3. Provide 6" chamfer when angle 'A' is greater than 45°. Maintain minimum wall thickness. Field adjust reinforcing to maintain cover.
4. Wingwall Skew Angles (SW) are measured from the adjacent box exterior wall to the wingwall.
5. Turn or extend Wingwall Cutoff Wall as necessary to meet Box Cutoff Wall.
6. Provide additional reinforcement in the top of the top slab below traffic railings to ensure a minimum area of 0.80 sq. in./ft. transverse reinforcing.

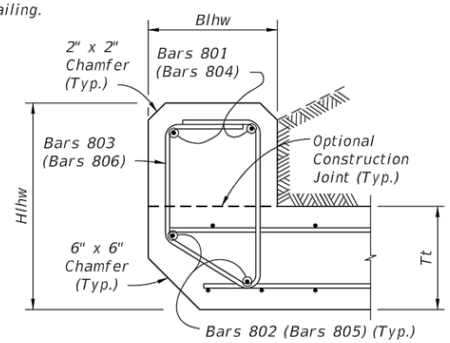
* Included in the cost of the Traffic Railing.



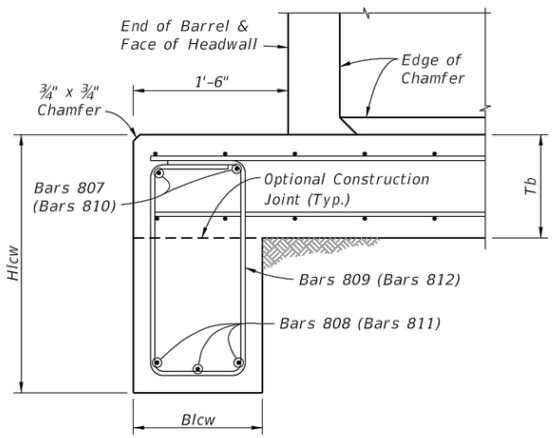
DETAIL "C" - PLAN VIEW
WINGWALL TO BOX CONNECTION
(Left Begin Corner Shown, Other Corners Similar)



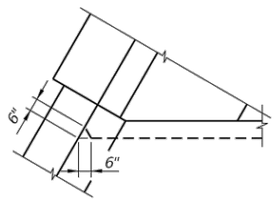
DETAIL "I"
TRAFFIC RAILING ATTACHMENT TO HEADWALL



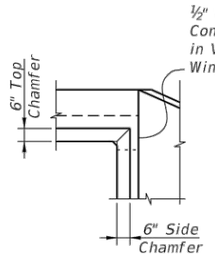
DETAIL "J"
LEFT HEADWALL SECTION
(Right Headwall similar)



DETAIL "K"
LEFT CUTOFF WALL SECTION
(Right Cutoff Wall similar)



DETAIL "D"



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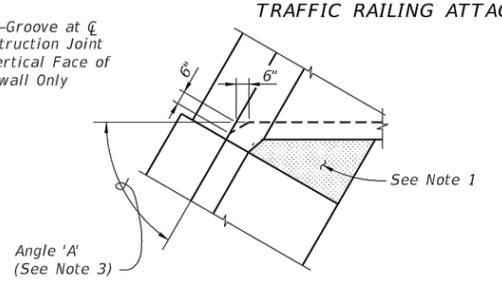

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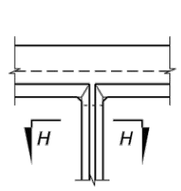
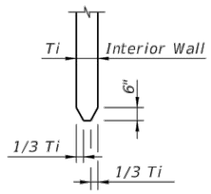


DETAIL "G"



SECTION H-H

CROSS REFERENCE:
See Sheet 3 for locations of Details "D", "E", "J" & "K".
See Sheet 4 for locations of Detail "C".

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FDOT FY 2023-24 STANDARD PLANS

CONCRETE BOX CULVERT DETAILS

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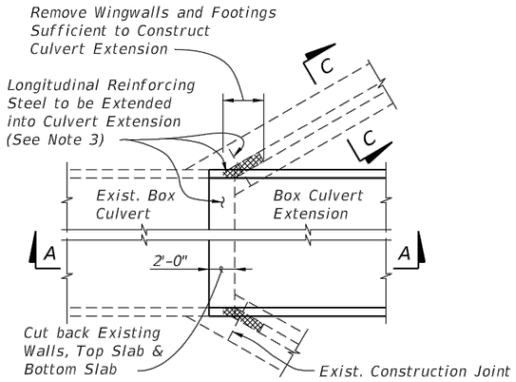
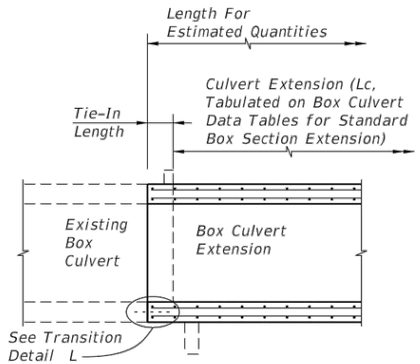
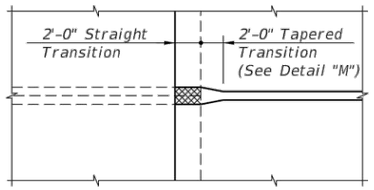


OUTSIDE WALLS OF BOXES

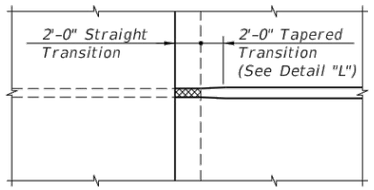


SECTION A-A

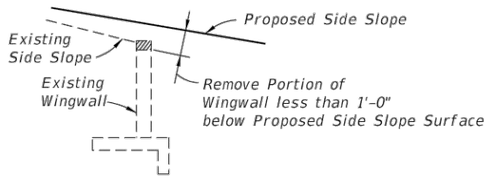
FLARED WINGWALL



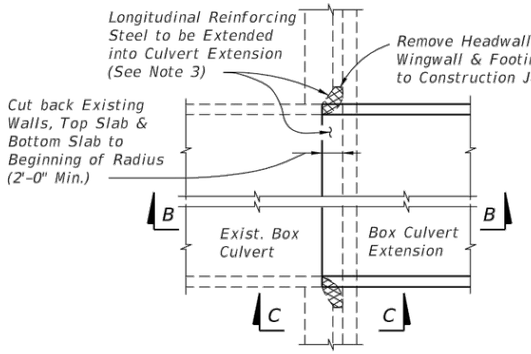
INTERIOR DOUBLE WALLS OF BOXES



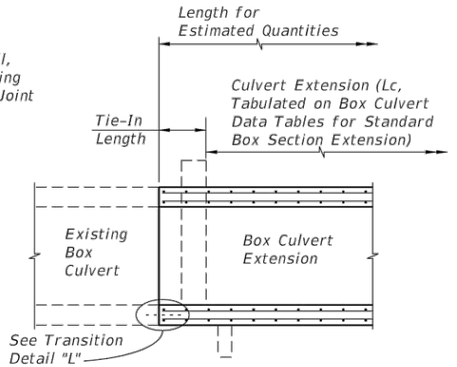
INTERIOR SINGLE WALLS OF BOXES



SECTION C-C



OUTSIDE WALLS OF BOXES



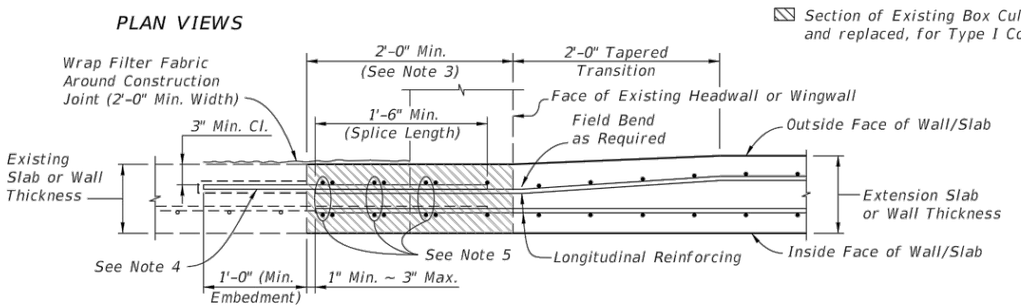
SECTION B-B

STRAIGHT WINGWALL

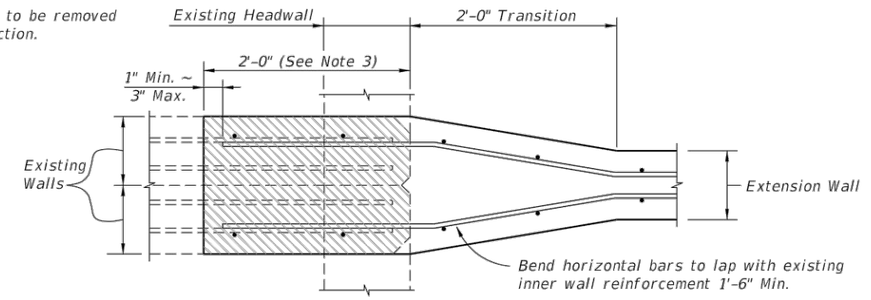
NOTES:

1. The Box Culvert Data Tables and Reinforcing Bar List do not include the additional quantities needed for dowel connections or transitions from double walls of existing concrete box culverts; the cost for additional reinforcement and the thickened concrete wall in the transitional area shall be included in the costs for concrete and steel in the culvert extension.
2. Cost for removal and disposal of material from existing headwalls, wingwalls and box, and cost of cleaning, straightening and extending or doweling longitudinal reinforcing steel shall be included in the cost for concrete and steel of the culvert extension.
3. Remove existing concrete while avoiding damage to existing reinforcement. Clean and straighten existing reinforcement, lap and tie onto extension reinforcement.
4. Dowel in #4 Bars @ 1'-0" max. spacing into wall/slab when there is a single mat of existing reinforcing steel, otherwise splice 1'-6" as shown for inside reinforcement. Use an Adhesive Bonding Material System in accordance with Specifications Section 416 & 937.
5. Provide additional transverse bars for top and bottom slab, parallel and full width of any skewed joint connection when shown in the Plans.
6. See Box Culvert Data Table notes in Plans for Connection Types allowed.

PLAN VIEWS



DETAIL "L" - TRANSITION FOR EXTERIOR WALL/SLAB EXTENSION
(Interior Single Walls Similar)



DETAIL "M" - TRANSITION FOR INTERIOR DOUBLE WALLS OF BOX CULVERTS

TYPE I CONNECTION DETAILS FOR CONCRETE BOX CULVERT EXTENSIONS
(CUT BACK EXISTING CONCRETE)

LAST REVISION	REVISION	DESCRIPTION:		INDEX	SHEET
01/01/12			FY 2023-24 STANDARD PLANS — CONCRETE BOX CULVERT DETAILS	400-289	6 of 8

REVISED NO.	BY	DATE	DESCRIPTION

	INITIALS	DATE
DESIGN	JV	
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Arcadia Stormwater and Flood Control
Culvert Special Details
INCLUDES PORTIONS OF:
SECTIONS 25, 26, 31, 36, TOWNSHIP 37S., RANGE 24, 25E.

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SHEET NO. SD6

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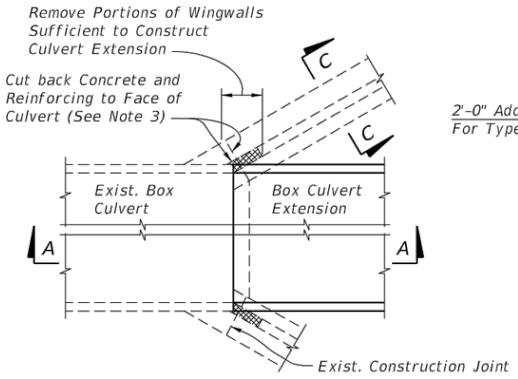
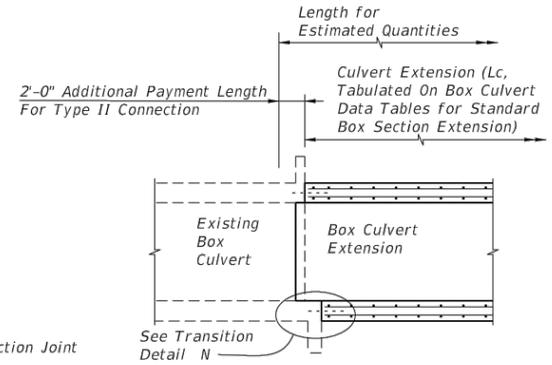
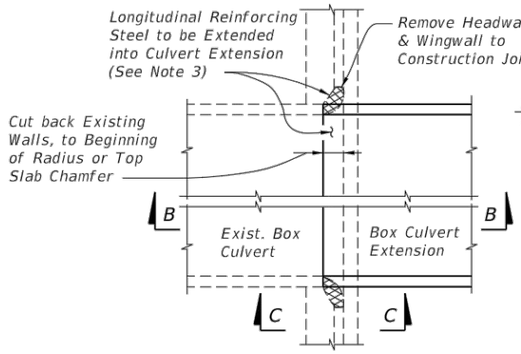


OUTSIDE WALLS OF BOXES

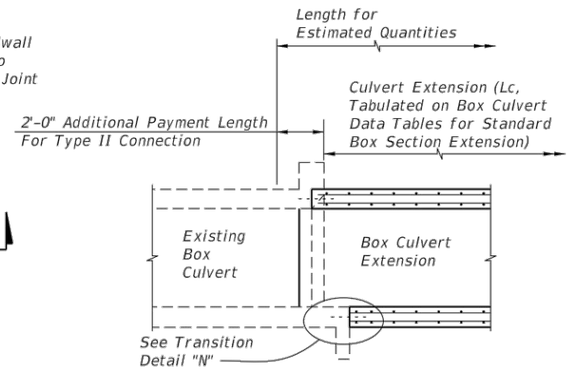


SECTION A-A

FLARED WINGWALL

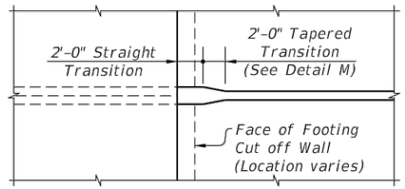


OUTSIDE WALLS OF BOXES

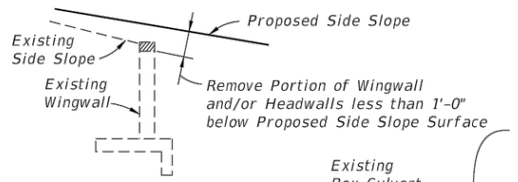


SECTION B-B

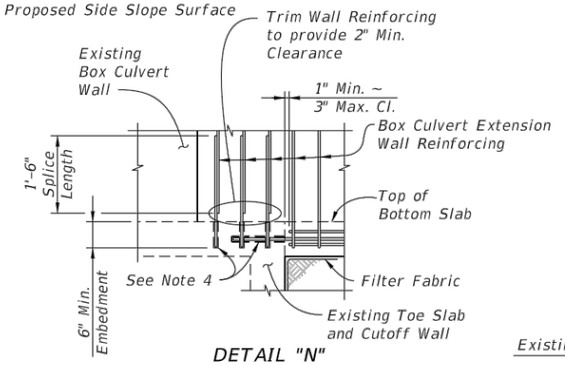
STRAIGHT WINGWALL



INTERIOR DOUBLE WALLS OF BOXES



SECTION C-C



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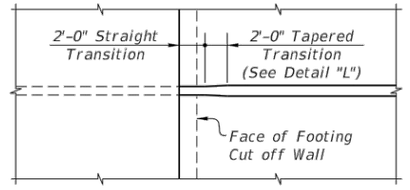
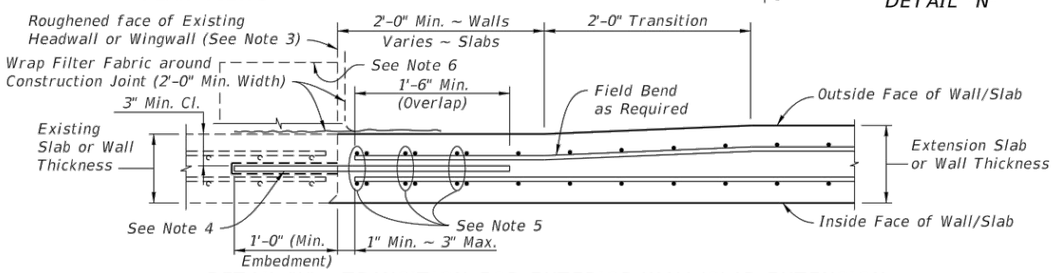
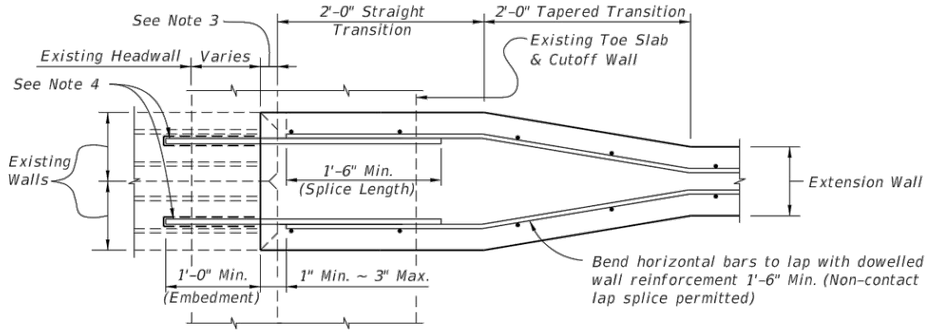


INTERIOR SINGLE WALLS OF BOXES

PLAN VIEWS



DETAIL "L" - TRANSITION FOR EXTERIOR WALL/SLAB EXTENSION
(Interior Single Walls Similar)



DETAIL "M" - TRANSITION FOR INTERIOR DOUBLE WALLS OF BOX CULVERTS

NOTES:

1. The Box Culvert Data Tables and Reinforcing Bar List do not include the additional quantities needed for dowel connections or transitions from double walls of existing concrete box culverts; the cost for additional reinforcement and the thickened concrete wall in the transitional area shall be included in the costs for concrete and steel in the culvert extension.
2. Cost for roughening and cleaning existing headwalls, wingwalls and box, and cost of doweling longitudinal reinforcing steel shall be included in the cost for concrete and steel of the culvert extension.
3. Remove existing concrete and reinforcing back to edge of any chamfers exceeding 1". Roughen and clean existing or exposed surface and coat with a Type A epoxy bonding compound in accordance with the manufacturer's recommendations.
4. Dowel in #5 Bars @ 1'-0" max. spacing horizontally into center of wall/slab. Provide vertical dowels in footing to match size, alignment and spacing of outside vertical wall reinforcing. Use an Adhesive Bonding Material System in accordance with Specifications Section 416 & 937.
5. Provide additional transverse bars for top and bottom slab, parallel and full width of any skewed joint connection when shown in the Plans.
6. Remove top of existing headwall when necessary to provide 1'-0" clearance below finished grade. Saw cut full width and seal with Type F-2 epoxy compound to protect exposed reinforcing.
7. See Box Culvert Data Table notes in Plans for Connection Types allowed.

TYPE II CONNECTION DETAILS FOR CONCRETE BOX CULVERT EXTENSIONS
(ADHESIVE DOWEL TO EXISTING CONCRETE)

LAST REVISION	REVISION	DESCRIPTION:				
01/01/12			FY 2023-24 STANDARD PLANS	CONCRETE BOX CULVERT DETAILS	INDEX 400-289	SHEET 7 of 8

REVISED	NO.	BY	DATE	DESCRIPTION

	INITIALS	DATE
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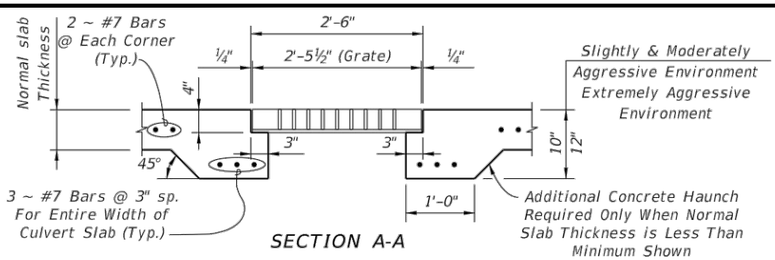
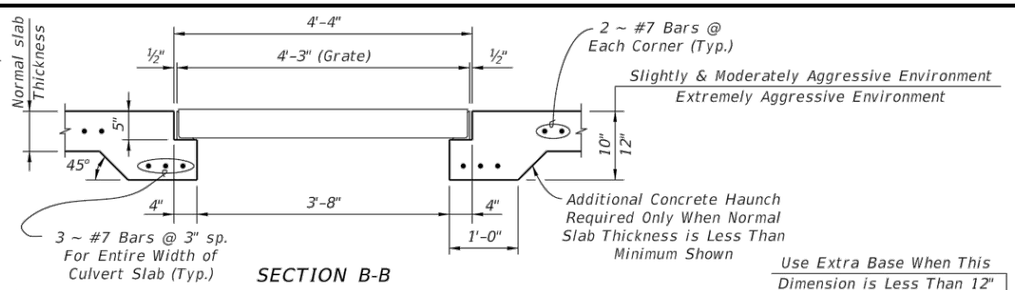
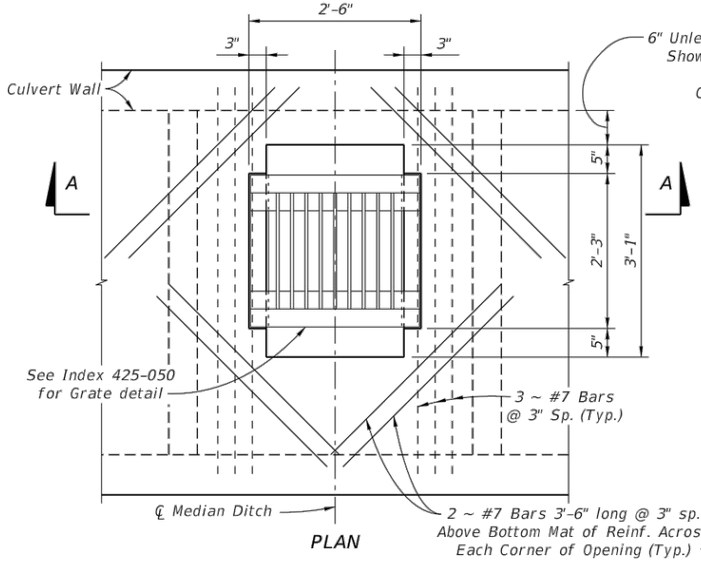


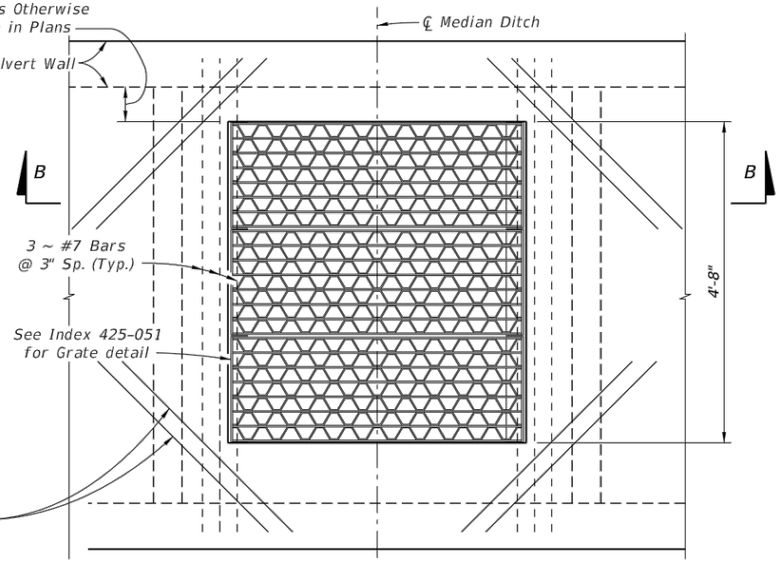
SECTION A-A



SECTION B-B



PLAN



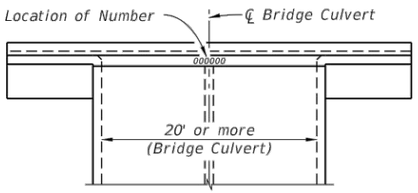
PLAN

INLET TYPE A GRATE

INLET TYPE B GRATE

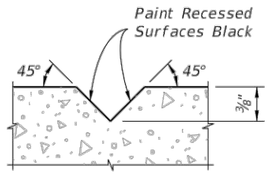
NOTES:
1. Cost of Steel Grating to be included in cost of Box Culvert.
2. All reinforcing shall be 2" clear for Slightly and Moderately Aggressive Environments, and 3" clear for Extremely Aggressive Environments.

INLET IN TOP OF BOX CULVERT



The number is to be placed in the center of the top surface of all bridge culvert headwalls. For Bridge Number see Plan-Profile sheet(s).

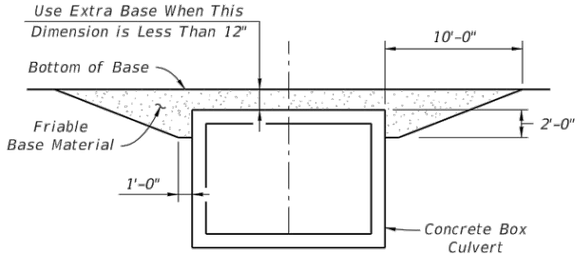
TOP VIEW OF HEADWALL



SECTION THRU RECESSED V-GROOVE TO FORM INSCRIBED FIGURES

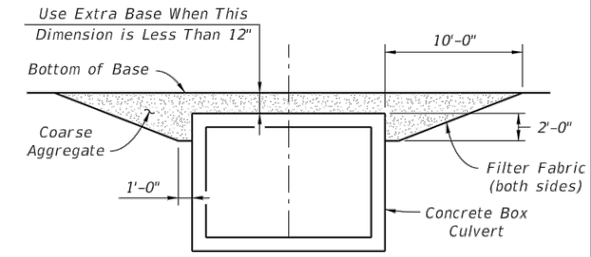
Black Plastic Figures 3" in height as approved by the Engineer may be used in lieu of numbers formed by ⅜" V-Grooves. V-Grooves shall be formed by preformed figures.

BRIDGE CULVERT NUMBER LOCATION



The cost of furnishing and installing extra friable base material shall be included in the cost of the Box Culvert.

FRIABLE BASE



Place coarse aggregate in 6 inch lifts and compact sufficiently as to be firm and unyielding. Provide coarse aggregate gravel or stone meeting the requirements of Specification Section 901-2 or 901-3 respectively. Meet the gradation requirements of Specification Section 901-6, Grades 4, 467, 5, 56 or 57 unless restricted in the plans. Provide Type D-3 filter fabric (see Specification Section 985). The cost of furnishing and installing the coarse aggregate and filter fabric shall be included in the cost of the Box Culvert.

ASPHALTIC CONCRETE BASE

NOTE: Extra base is required when cross box culverts are located on facilities subject to high speed traffic (>45 mph) or high traffic volumes (>1600 ADT) and the cover is within the range specified in the notation above.

EXTRA BASE FOR BOX CULVERTS CROSSING UNDER FLEXIBLE PAVEMENT

LAST REVISION	REVISION	DESCRIPTION:				
07/01/14			FY 2023-24 STANDARD PLANS	CONCRETE BOX CULVERT DETAILS	INDEX 400-289	SHEET 8 of 8

REVISED NO.	BY	DATE	DESCRIPTION

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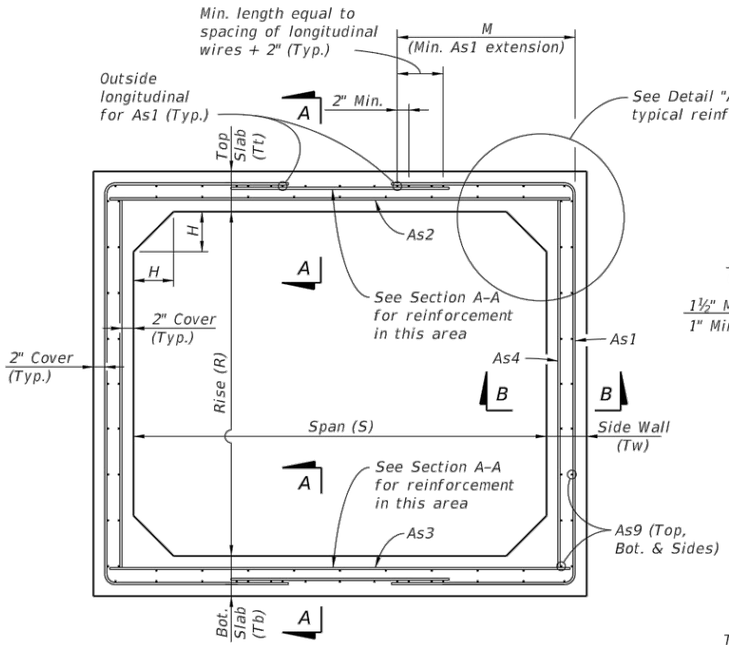
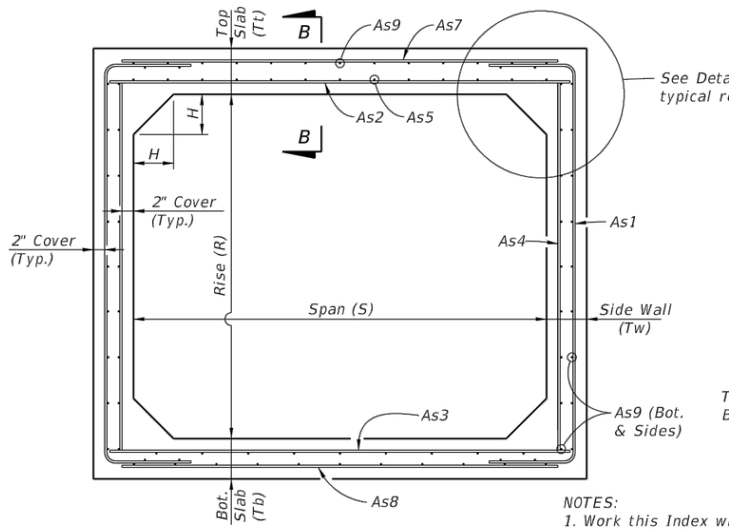
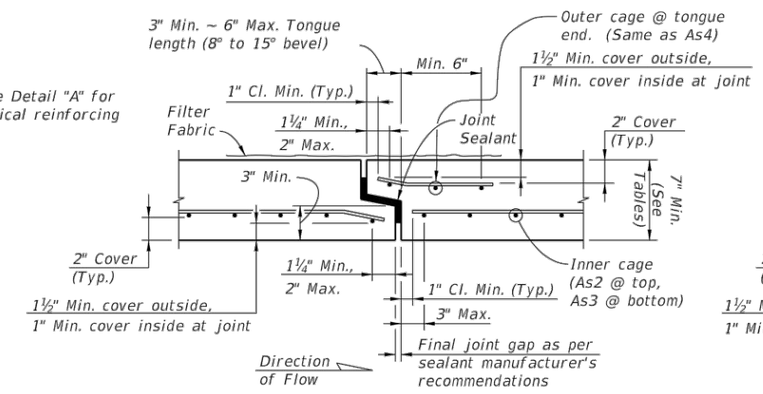


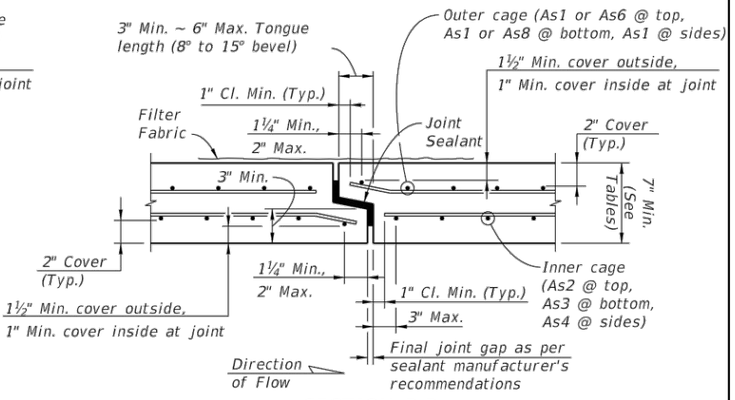
TYPICAL BOX SECTION (TYPE 2)
DESIGN EARTH COVER 2' OR GREATER
(Option 1 Reinforcing Configuration Shown)



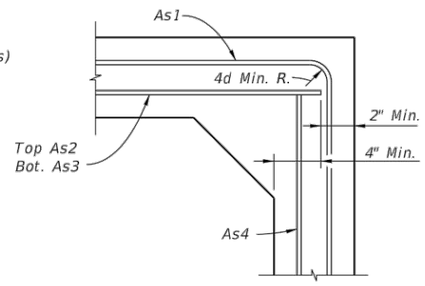
TYPICAL BOX SECTION (TYPE 1)
DESIGN EARTH COVER LESS THAN 2'
(Option 1 Reinforcing Configuration Shown)



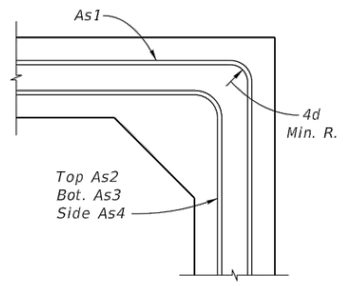
SECTION A-A



SECTION B-B
TYPICAL SECTION THRU JOINT



DETAIL "A"
(OPTION 1)



DETAIL "A"
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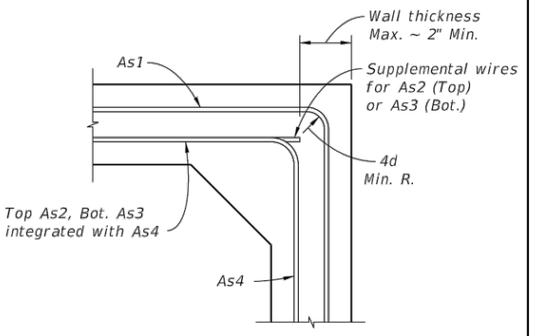

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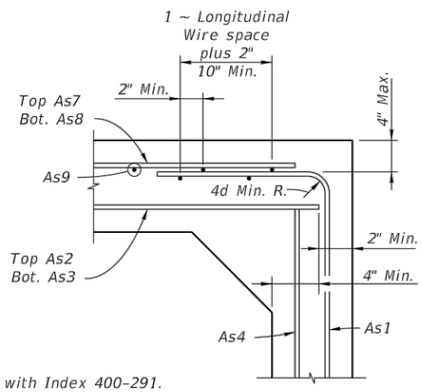
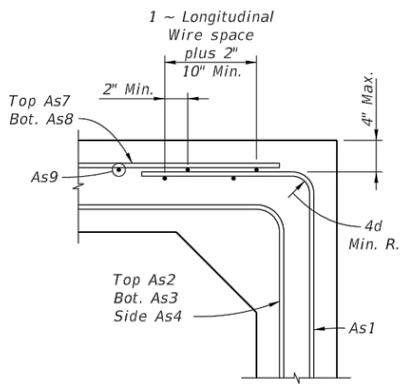
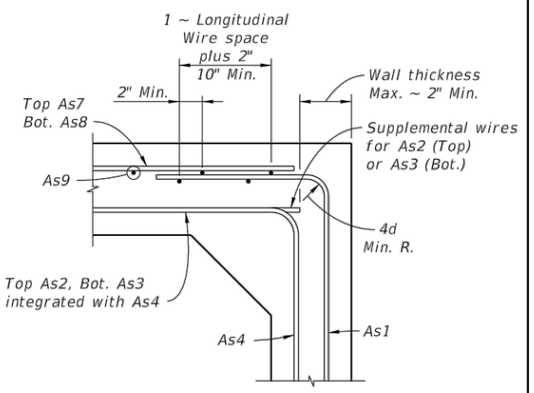


DETAIL "B"
(OPTION 1)



DETAIL "B"
(OPTION 2)



DETAIL "B"
(OPTION 3)

NOTES:
1. Work this Index with Index 400-291.
2. See sheets 2 thru 5 for dimensions and areas of reinforcement.

STANDARD PRECAST BOX CULVERT WITH 2" CONCRETE COVER

LAST REVISION	REVISION	DESCRIPTION:		INDEX	SHEET
07/01/13			FY 2023-24 STANDARD PLANS	400-292	1 of 14

STANDARD PRECAST CONCRETE BOX CULVERTS

REVISED NO.	BY	DATE	DESCRIPTION

	INITIALS	DATE
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SCALE		

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GENERAL NOTES.

1. These precast designs may be substituted for cast-in-place box culverts designed to AASHTO LRFD Bridge Design Specifications, 4th Edition. Designs are based on the design criteria shown in FDOT Structures Design Guidelines.

2. Loading: HL-93 & any fill heights between the minimum & maximum shown.

3. Only one design of precast box culvert is to be used for any installation.

4. Reinforcing steel must consist of smooth or deformed welded wire reinforcement (WWR) meeting the requirements of Specification Section 931. Longitudinal reinforcement may consist of reinforcing bars meeting the requirements of Specification Section 931. Minimum cover must be 2" for slightly or moderately aggressive environments or 3" for extremely aggressive environments, unless otherwise shown. The spacing of circumferential wires must not be less than 2" nor more than 4". The spacing of longitudinal wires or bars must not be more than 8".

5. As9 longitudinal wires must have a minimum cross-sectional area of 40% of the circumferential wires, but not less than a W2.5 or D4.0 for WWR, or #3 bars for deformed bars.

6. Welding of reinforcement must be limited to the locations shown in ASTM C1577 and in accordance with ANSI/AWS D1.4 "Structural Welding Code - Reinforcing Steel".

7. For alternate reinforcing configuration Options 2 and 3 shown in Detail "A" and "B" (Sheet 1), As1 may be extended to the middle of either slab and lap spliced with As7 and As8. As4 may be lap spliced at any location or connected to As2 or As3 at corners by welding.

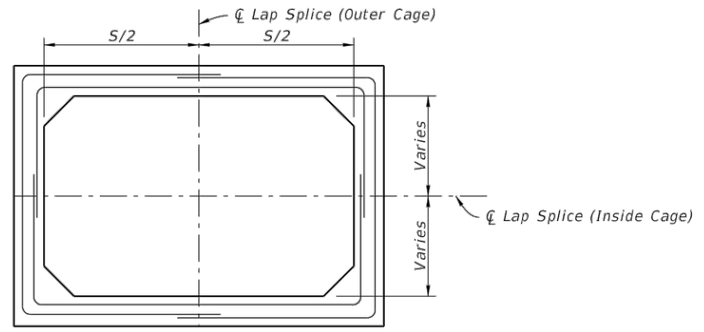
8. Haunch dimensions may vary between the minimum and maximum dimensions shown in the Design Tables but only one haunch dimension must be used within the full length of the box culvert installation.

9. Submittal of redesign calculations are not required for any increase to the slab and/or wall thickness when the minimum reinforcement areas shown in the Design Tables are provided.

10. For Design Earth Cover greater than 10 feet, the Contractor may interpolate the required areas of reinforcement and slab or wall thickness, Interpolated areas of reinforcement, slab or wall thickness must be approved by the Engineer.

11. Minimum length of precast box segments is 4 feet and maximum length is 16 feet.

12. See Index 400-291 for connections to wingwalls, headwalls and other general details.



SCHEMATIC OF LAP SPLICE LOCATIONS
FOR OPTION 2 & 3 REINFORCING CONFIGURATIONS

NOTES: 1. See Sheet 1 for Reinforcing Details and dimension locations.
2. See Sheet 14 for WWR Bending Diagram.

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STANDARD PRECAST CONCRETE BOX CULVERTS

REVISED	NO.	BY	DATE	DESCRIPTION

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Arcadia, Florida, 34265
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Arcadia Stormwater and Flood Control
Culvert Special Details
INCLUDES PORTIONS OF:
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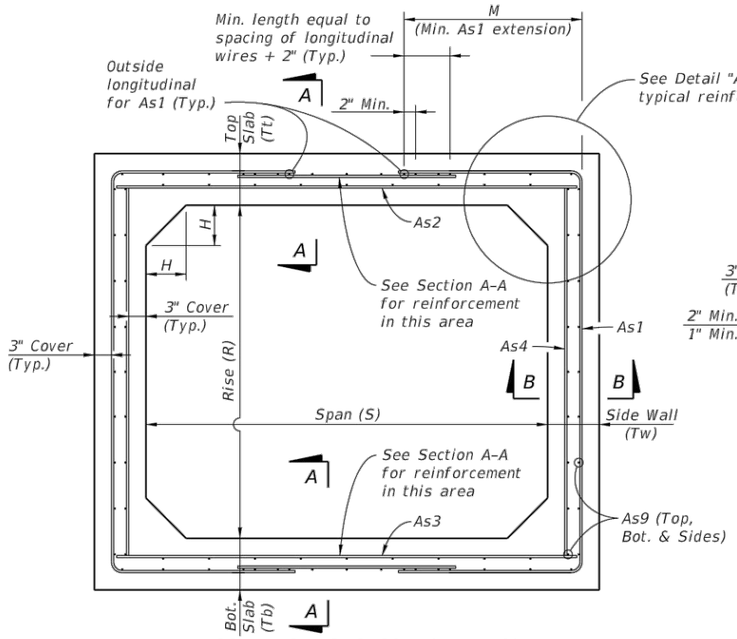
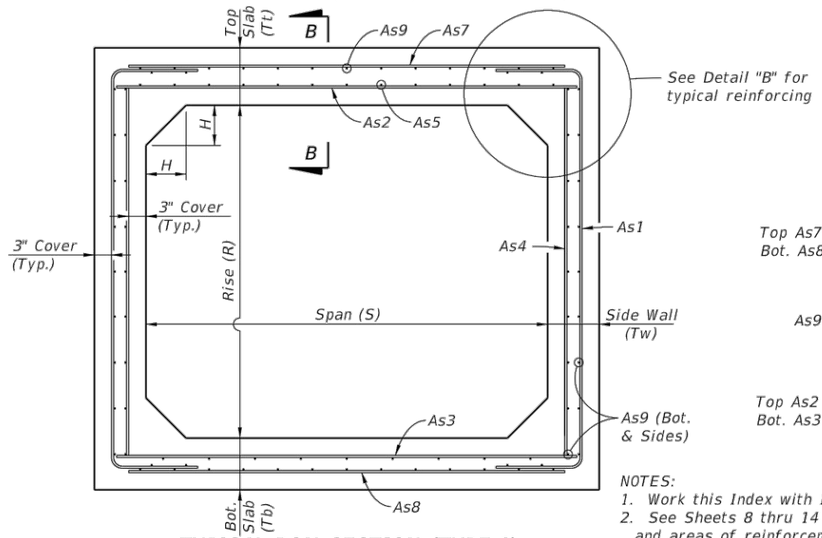


TYPICAL BOX SECTION (TYPE 2)
DESIGN EARTH COVER 2' OR GREATER
(Option 1 Reinforcing Configuration Shown)



TYPICAL BOX SECTION (TYPE 1)
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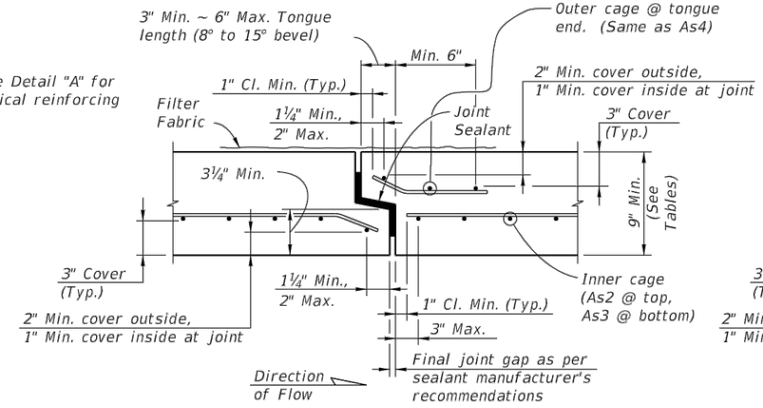
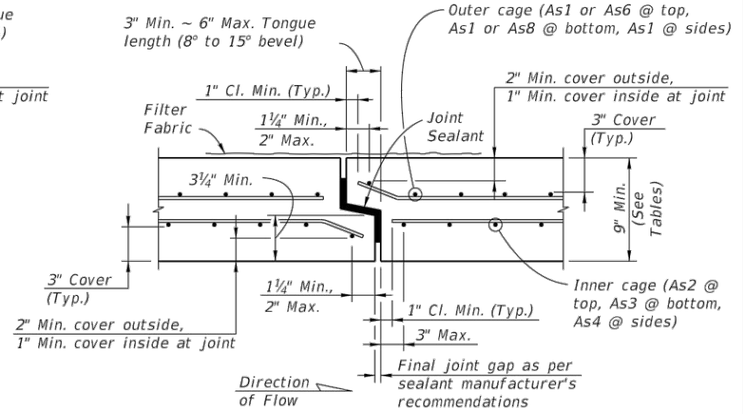
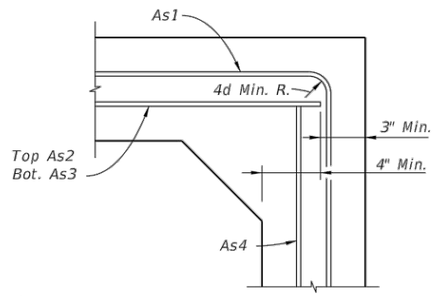
(Option 1 Reinforcing Configuration Shown)



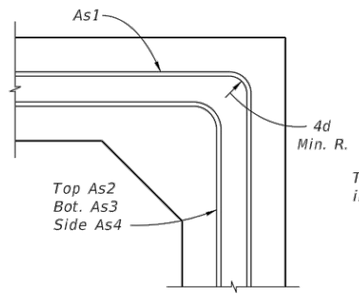
SECTION A-A



SECTION B-B
TYPICAL SECTION THRU JOINT



DETAIL "A"
(OPTION 1)



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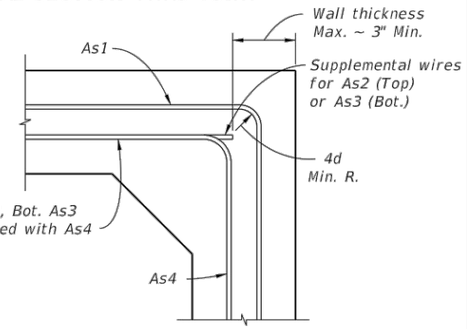

DETAIL "A"
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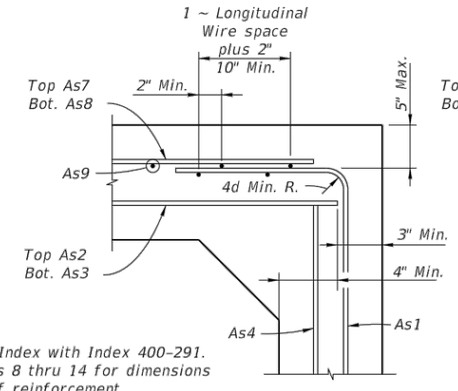

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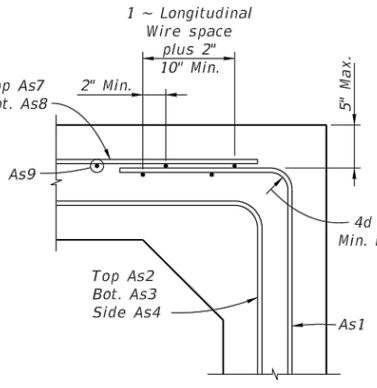

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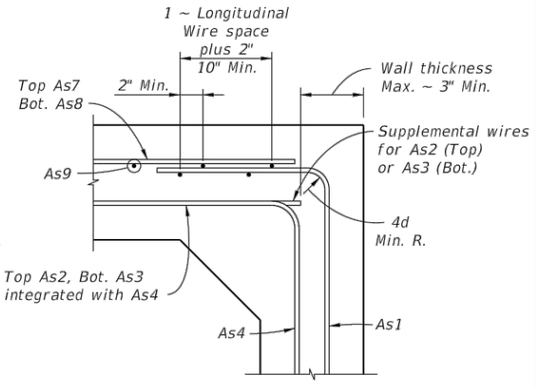

DETAIL "B"
(OPTION 3)

NOTES:
1. Work this Index with Index 400-291.
2. See Sheets 8 thru 14 for dimensions and areas of reinforcement.

STANDARD PRECAST BOX CULVERT WITH 3" CONCRETE COVER

LAST REVISION	REVISION	DESCRIPTION:
07/01/13		

FDOT FY 2023-24 STANDARD PLANS

STANDARD PRECAST CONCRETE BOX CULVERTS

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TABLE 14 - STANDARD PRECAST BOX CULVERT DESIGNS (3" COVER) - 10' SPANS

SPAN x RISE (S) (R) (Ft.)	SLAB / WALL THICKNESS TOP (Tt) (in.)	BOT. (Tb) (in.)	SIDE (Tw) (in.)	HAUNCH (H) (in.)	DESIGN EARTH COVER ABOVE TOP SLAB	REINFORCEMENT AREAS (sq. in./Ft.) As1	As2	As3	As4	As5	As7	As8	As9	As1 EXT. LENGTH (M) (in.)
10' x 5'	10	10	10	4 to 12	0.33' - <2'	0.60	0.73	0.61	0.24	0.24	0.50	0.57	See General Note 5	–
					2' - <3'	0.60	0.73	0.61	0.12	–	–	–		58
					3' - <5'	0.57	0.64	0.58	0.12	–	–	–		53
					5' - 10'	0.65	0.60	0.60	0.12	–	–	–		52
					15'	0.94	0.90	0.89	0.12	–	–	–		47
	10	10	10	8 to 12	20'	1.24	1.23	1.19	0.12	–	–	–		47
	11	11.5	10		25'	1.39	1.37	1.28	0.12	–	–	–		47
	12.5	12.5	10		30'	1.38	1.43	1.41	0.12	–	–	–		47
10' x 6'	10	10	10	4 to 12	0.33' - <2'	0.58	0.75	0.64	0.24	0.24	0.48	0.56		–
					2' - <3'	0.58	0.75	0.64	0.12	–	–	–		58
					3' - <5'	0.56	0.67	0.62	0.12	–	–	–		52
					5' - 10'	0.64	0.64	0.65	0.12	–	–	–		52
					15'	0.92	0.96	0.95	0.12	–	–	–		47
	10	10	10	8 to 12	20'	1.21	1.31	1.27	0.12	–	–	–		47
	11	11.5	10		25'	1.35	1.44	1.36	0.12	–	–	–		47
	12.5	12.5	10		30'	1.35	1.51	1.49	0.12	–	–	–		47
10' x 7'	10	10	10	4 to 12	0.33' - <2'	0.57	0.78	0.67	0.24	0.24	0.48	0.57		–
					2' - <3'	0.57	0.78	0.67	0.12	–	–	–		58
					3' - <5'	0.58	0.70	0.65	0.12	–	–	–		58
					5' - 10'	0.65	0.68	0.70	0.12	–	–	–		52
					15'	0.92	1.02	1.02	0.12	–	–	–		47
	10	10	10	8 to 12	20'	1.21	1.38	1.35	0.12	–	–	–		47
	11	11.5	10		25'	1.33	1.52	1.44	0.12	–	–	–		47
	12.5	12.5	10		30'	1.38	1.58	1.57	0.12	–	–	–		47
10' x 8'	10	10	10	4 to 12	0.33' - <2'	0.58	0.80	0.70	0.24	0.26	0.48	0.58		–
					2' - <3'	0.58	0.80	0.70	0.12	–	–	–		64
					3' - <5'	0.60	0.72	0.68	0.12	–	–	–		58
					5' - 10'	0.67	0.72	0.75	0.12	–	–	–		52
					15'	0.95	1.08	1.08	0.12	–	–	–		47
	10	10	10	8 to 12	20'	1.24	1.45	1.44	0.12	–	–	–		47
	11	11.5	10		25'	1.36	1.59	1.52	0.12	–	–	–		47
	12.5	12.5	10		30'	1.45	1.64	1.64	0.12	–	–	–		47
10' x 9'	10	10	10	4 to 12	0.33' - <2'	0.61	0.82	0.73	0.24	0.26	0.50	0.61		–
					2' - <3'	0.61	0.82	0.73	0.14	–	–	–		70
					3' - <5'	0.64	0.75	0.73	0.13	–	–	–		64
					5' - 10'	0.72	0.77	0.80	0.12	–	–	–		58
					15'	1.00	1.13	1.15	0.12	–	–	–		52
	10	10	10	8 to 12	20'	1.30	1.53	1.52	0.12	–	–	–		47
	11	11.5	10		25'	1.42	1.66	1.60	0.12	–	–	–		47
	12.5	12.5	10		30'	1.57	1.70	1.72	0.12	–	–	–		47
10' x 10'	10	10	10	4 to 12	0.33' - <2'	0.66	0.84	0.75	0.24	0.27	0.52	0.65		–
					2' - <3'	0.66	0.84	0.75	0.20	–	–	–		79
					3' - <5'	0.70	0.77	0.79	0.19	–	–	–		70
					5' - 10'	0.79	0.81	0.87	0.18	–	–	–		64
					15'	1.09	1.19	1.23	0.15	–	–	–		52
	10	10	10	8 to 12	20'	1.40	1.61	1.61	0.14	–	–	–		52
	11	11.5	10		25'	1.53	1.74	1.68	0.14	–	–	–		47
	12.5	12.5	10.5		30'	1.60	1.71	1.74	0.14	–	–	–		47

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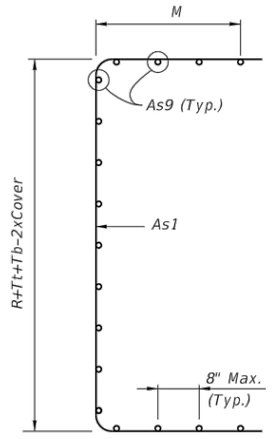
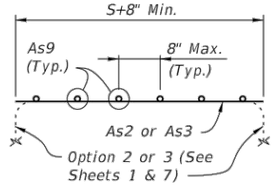
STANDARD PRECAST CONCRETE BOX CULVERTS

WELDED WIRE REINFORCEMENT BENDING DIAGRAM



WWR PIECE NO. 1
(2 Reqd. per segment)



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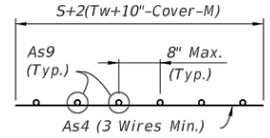
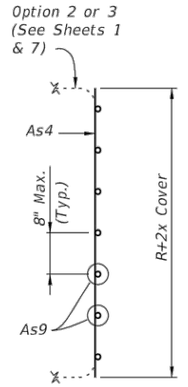


WWR PIECE NO. 4
(Tongue Reinforcement)
(4 Reqd. per segment)



WWR PIECE NO. 3
(2 Reqd. per segment)

TYPE 2 BOX SECTION (DESIGN EARTH COVER 2' OR GREATER)

WWR PIECE NO. 1
(2 Reqd. per segment)

WWR PIECE NO. 2
(2 Reqd. per segment)

WWR PIECE NO. 4
(2 Reqd. per segment)

WWR PIECE NO. 3
(2 Reqd. per segment)

TYPE 1 BOX SECTION (DESIGN EARTH COVER LESS THAN 2')

REINFORCEMENT NOTES:
1. Reinforcement bending dimensions are out-to-out.
2. See General Notes 4, 5 and 6 on Sheet 2.
3. See Tables 1 thru 16 for dimensions M, R, S, Tb, Tt and Tw.
4. Dimension "A" is determined by the Manufacturer in accordance with the requirements of Detail "B" on Sheets 1 and 7.

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REVISED NO.	BY	DATE	DESCRIPTION

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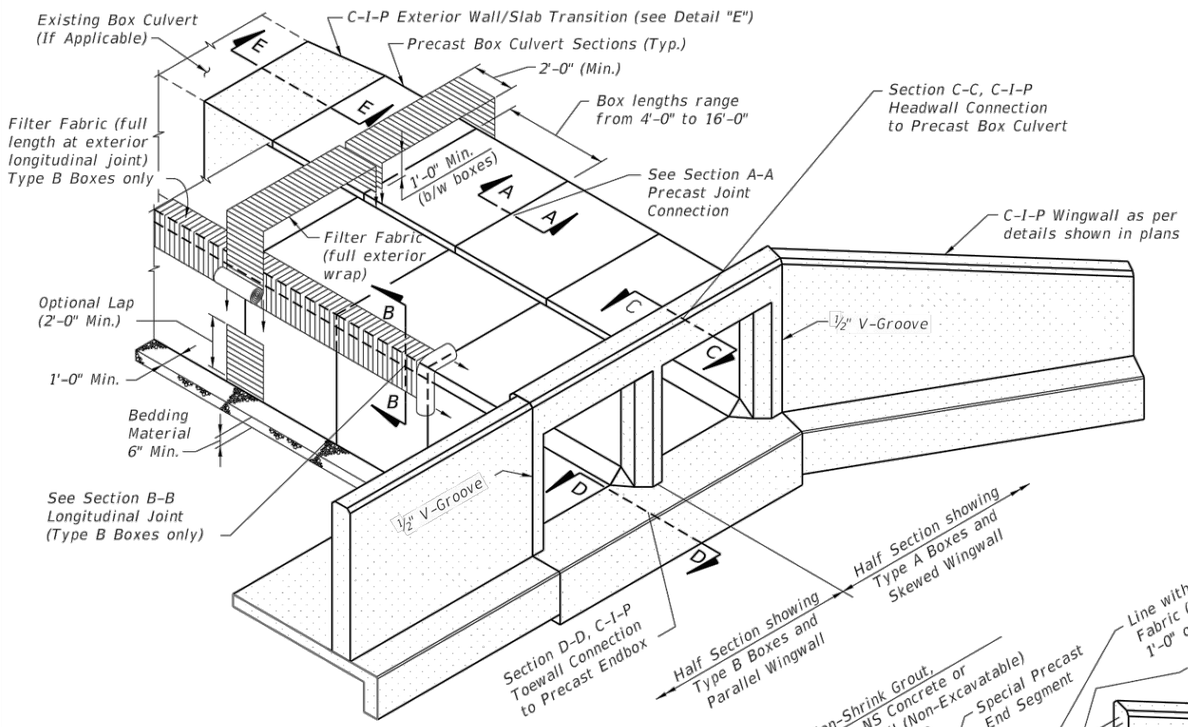
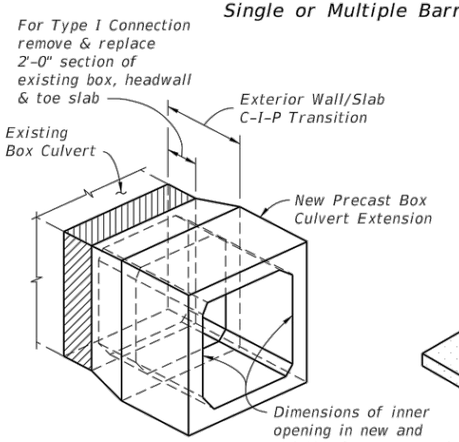
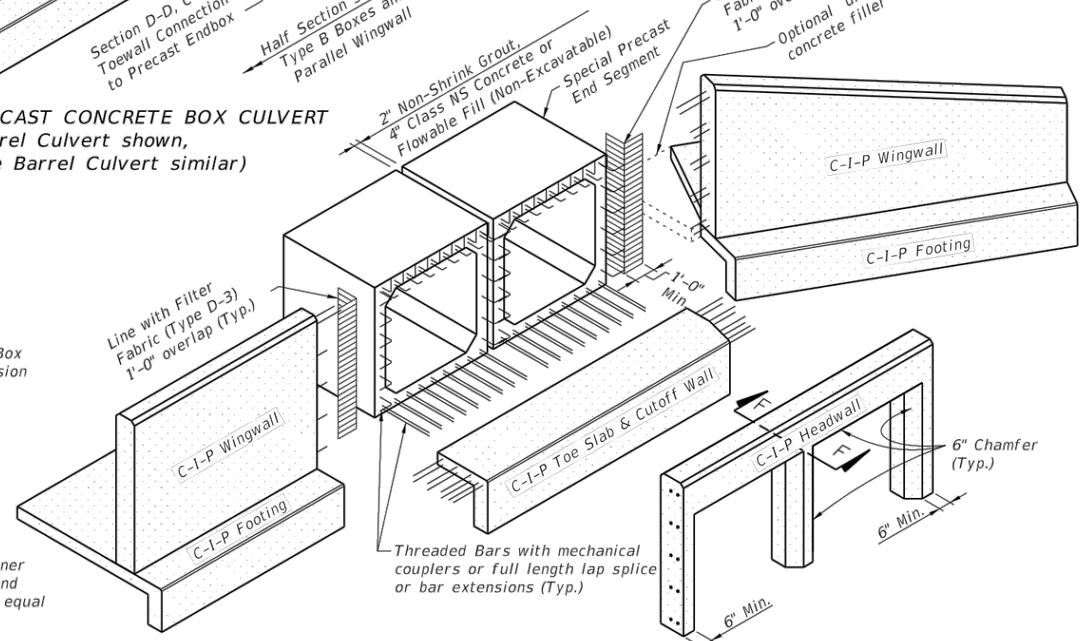


ISOMETRIC VIEW OF PRECAST CONCRETE BOX CULVERT
(Double Barrel Culvert shown,
Single or Multiple Barrel Culvert similar)



DETAIL E
PICTORIAL VIEW OF EXTERIOR
WALL/SLAB TRANSITION



EXPLODED VIEW OF CONNECTIONS AT END OF CULVERT
(Double Barrel Culvert shown, Single or Multiple Barrel Culvert similar)

PERMITTED PRECAST ALTERNATE BOX SECTIONS				
TYPE	DESCRIPTION	SINGLE BARREL	MULTIPLE BARRELS	DESIGN NOTES
A	Single Cell Monolithic (Four Sided)			Index 400-292 or Contractor Design
B	Single Cell Two-Piece (Four Sided)	Three sided bottom section; Top slab section		Contractor Design
C	Multicell Monolithic	Not Applicable		Contractor Design

GENERAL NOTES:

1. Specifications:
   - General:
     - FDOT Standard Specifications for Road and Bridge Construction, Section 410 (current edition, and supplements thereto).
   - Concrete (Precast):
     - Class III or Class II Modified (5,000 psi) for slightly aggressive environments.
     - Class IV (5,500 psi) for moderately to extremely aggressive environments.
   - Concrete (Cast-In-Place):
     - Class II (3,400 psi) for slightly aggressive environments.
     - Class IV (5,500 psi) for moderately to extremely aggressive environments.
   - Reinforcing Steel:
     - Maintain minimum clearance of 2" for slightly and moderately aggressive environments or 3" for extremely aggressive environments, unless otherwise shown. Equal area substitution of welded wire (WWR) reinforcement is permitted.
2. Work this Index with the Cast-In-Place Concrete Box Culvert Details and Data Tables shown in the plans, Index 400-289 and the Precast Concrete Box Culverts shown in the shop drawings.
3. All joints between precast sections must be tongue & groove with joint sealant. Joints between cast-in-place & precast sections shall have longitudinal reinforcing extending from top, bottom & both side slabs of the precast box tied to the cast-in-place reinforcement. Single barrel culverts may have precast headwalls cast integrally with the end segment when approved by the Engineer.
4. Extension of existing multiple barrel box culverts with multiple single cell precast box culverts is not permitted unless approved by the District Structures Engineer. Full transition details must be shown in the shop drawings when approved.
5. Culverts larger than the specified size may be substituted with no additional payment to the Contractor. Substitution must be approved by the Engineer, minimum earth cover and invert elevations shown in the Contract Documents must be maintained.

LAST REVISION	REVISION	DESCRIPTION:
01/01/11		

FDOT FY 2023-24 STANDARD PLANS

PRECAST CONCRETE BOX CULVERTS - SUPPLEMENTAL DETAILS

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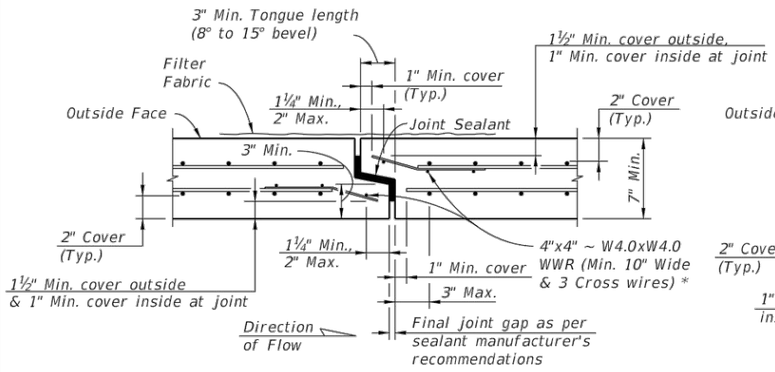
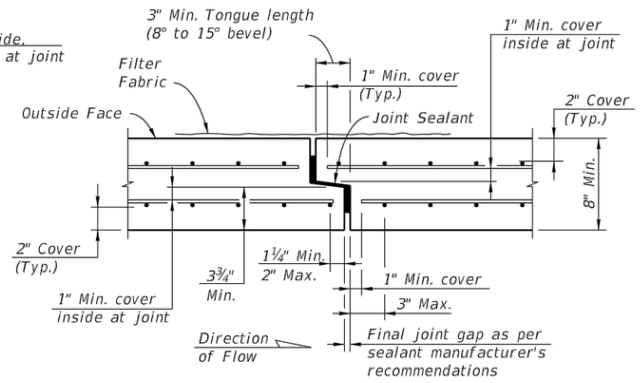
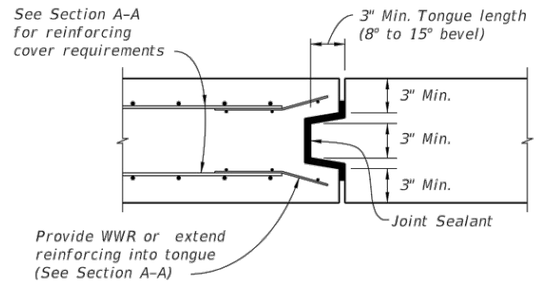


SECTION A-A
(2" Cover - Thin Wall Detail)

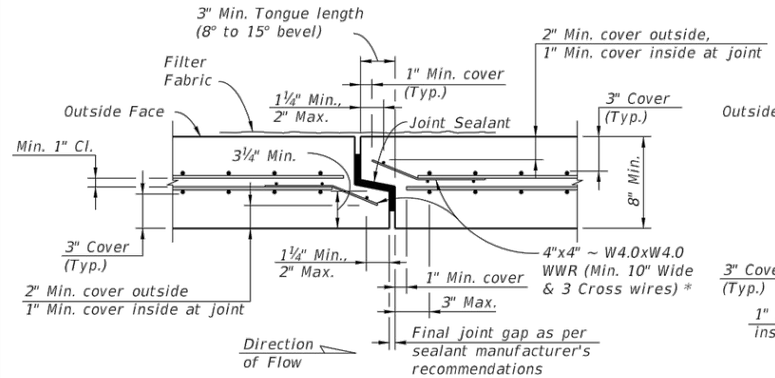


SECTION A-A
(2" Cover - Thick Wall Detail)



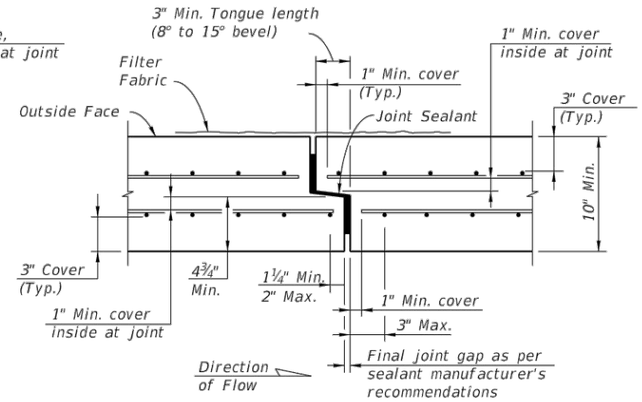
ALTERNATE BOTTOM SLAB TRANSVERSE JOINT
TYPICAL SECTION
(DOUBLE-SIDED TONGUE & GROOVE JOINT)
(All reinforcing not shown for clarity)

NOTE:
Bottom Slab Joints in Type B Boxes may be single tongue & groove joints as shown in Section A-A when the Top Slab Joints are oriented as shown in Schematic "A".

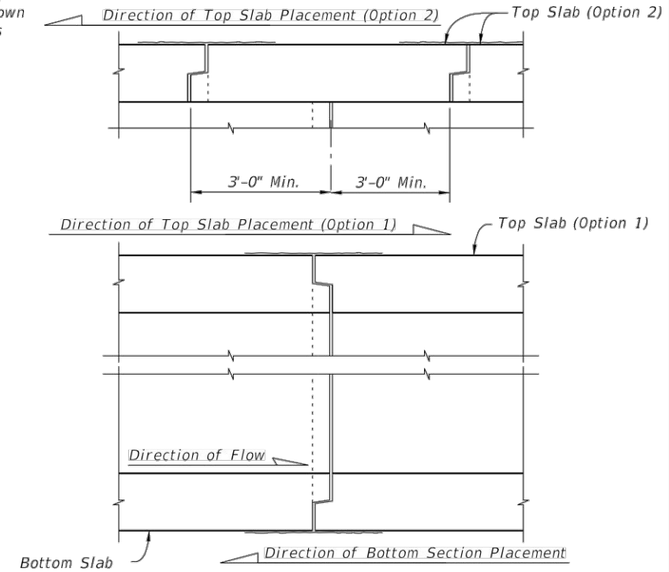


SECTION A-A
(3" Cover - Thin Wall Detail)

* At the Contractor's option when the box culvert reinforcing utilizes WWR, extend wall and slab reinforcing into the joint and bend to maintain cover in lieu of 4"x4" ~ W4.0xW4.0 WWR at joint. Transverse wire in tongue may be cut at corners of box to allow bending of the WWR.



SECTION A-A
(3" Cover - Thick Wall Detail)



SCHEMATIC "A"
TYPE B BOX SECTION PLACEMENT
FOR SINGLE TONGUE & GROOVE JOINTS

PRECAST SEGMENT TO SEGMENT TONGUE & GROOVE TRANSVERSE JOINTS

TWO-PIECE PRECAST SEGMENT ADDITIONAL JOINT DETAILS (TYPE B BOX)

LAST REVISION	REVISION	DESCRIPTION:
07/01/15		

FDOT FY 2023-24 STANDARD PLANS

PRECAST CONCRETE BOX CULVERTS - SUPPLEMENTAL DETAILS

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Arcadia, Florida, 34265
(863) 494-4114

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Culvert Special Details
INCLUDES PORTIONS OF:
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10/6/2022 10:50:41 AM

PLOTTED: 7/1/2025 10:50:41 AM BY: Smith, Philip
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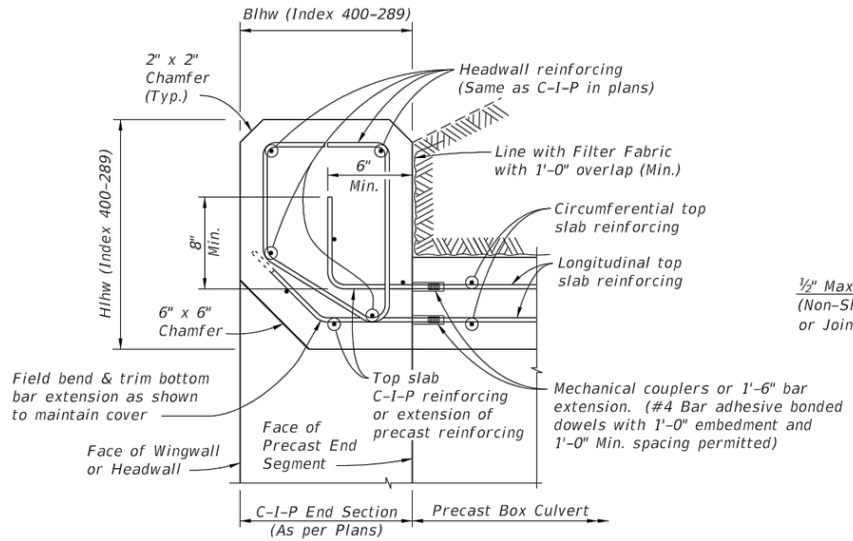
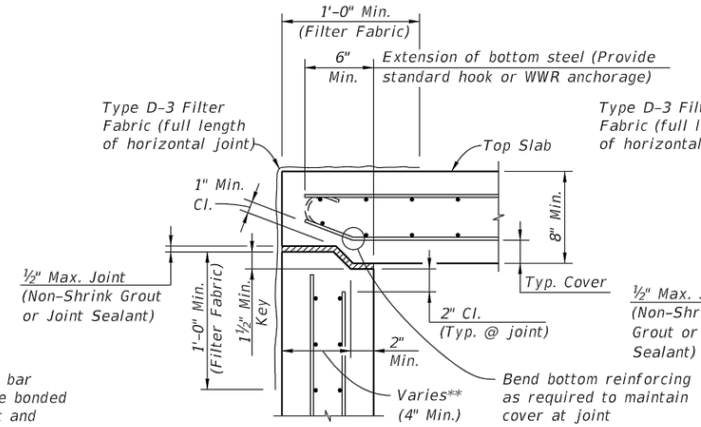
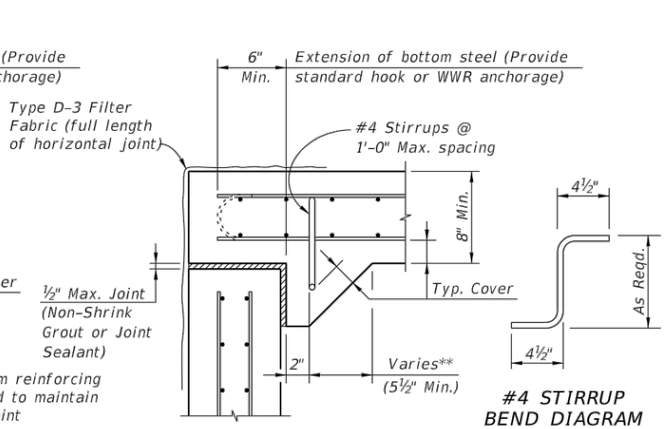


SECTION C-C
C-I-P HEADWALL DETAILS AND CONNECTION TO PRECAST BOX



SECTION B-B
TOP SLAB TO WALL JOINT
(KEYED JOINT)

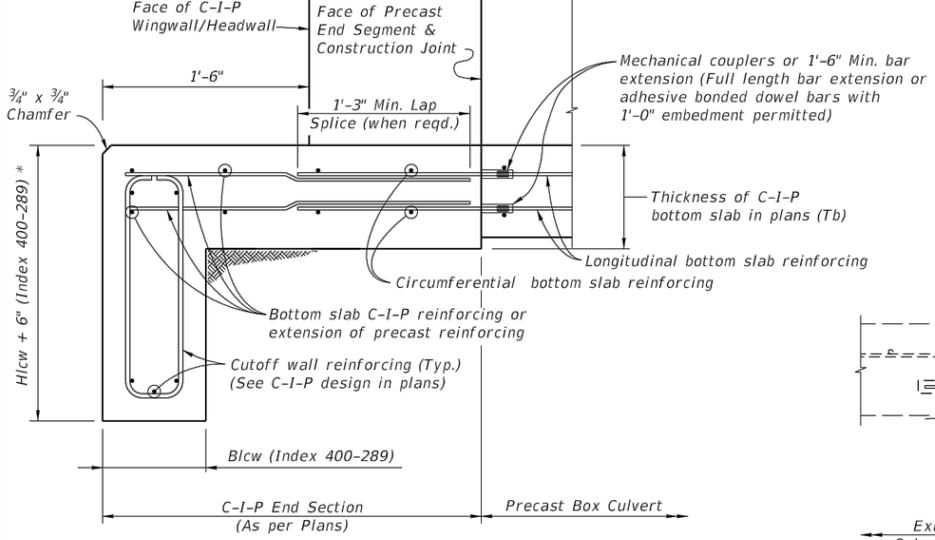


SECTION B-B
TOP SLAB TO WALL JOINT
(HAUNCHED JOINT)

#4 STIRRUP
BEND DIAGRAM

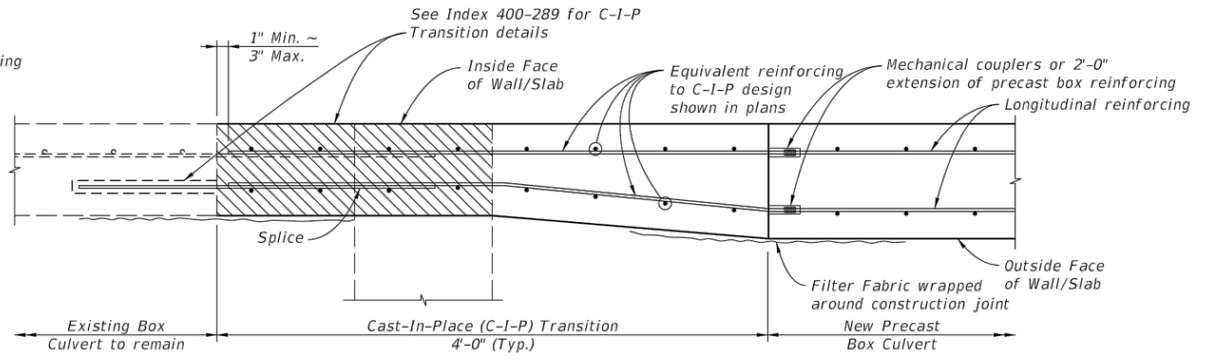
** Provide adequate width to satisfy shear strength requirements at joint

TYPE B BOX LONGITUDINAL JOINTS



SECTION D-D
C-I-P TOE SLAB & CUTOFF WALL DETAILS
AND CONNECTION TO PRECAST BOX

* Provide additional 6" depth of cutoff wall at no additional cost.



SECTION E-E
EXTERIOR WALL/SLAB TRANSITION DETAIL FOR PRECAST EXTENSION
(Type I Connection shown, Type II Connection similar)

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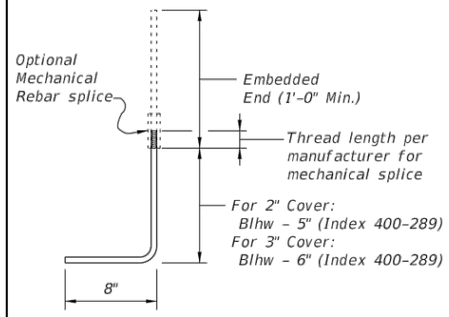
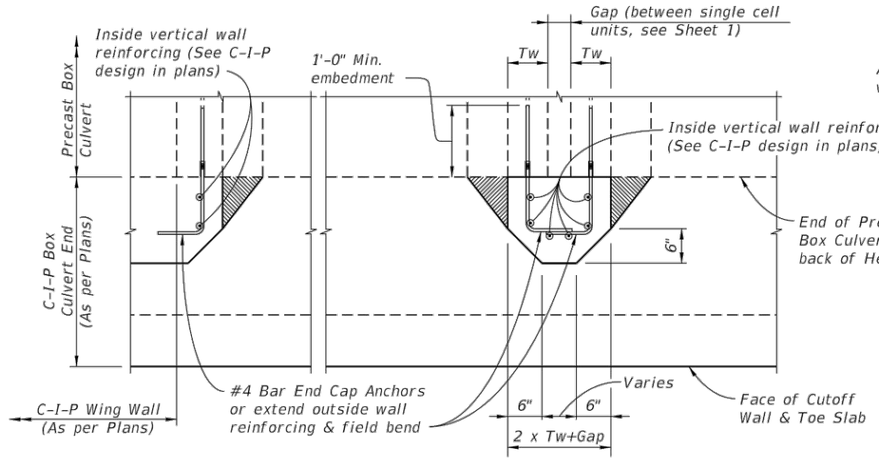
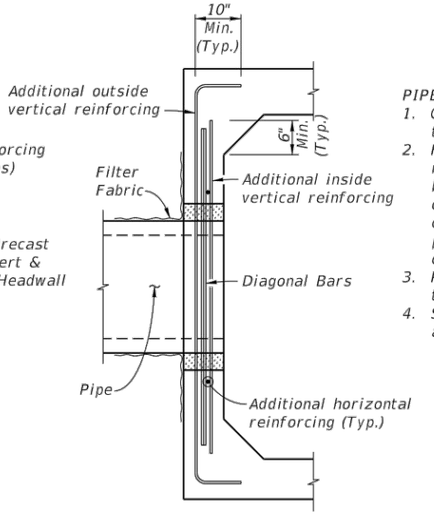


#4 BAR END CAP ANCHOR BAR BEND DIAGRAM



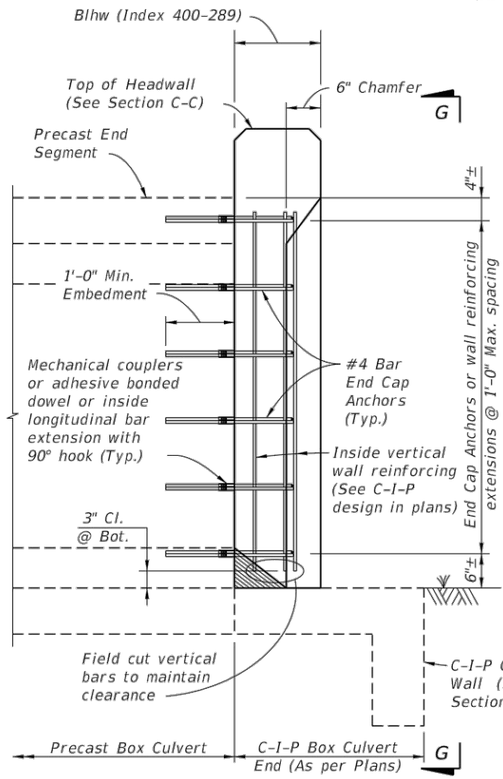
SECTION H-H



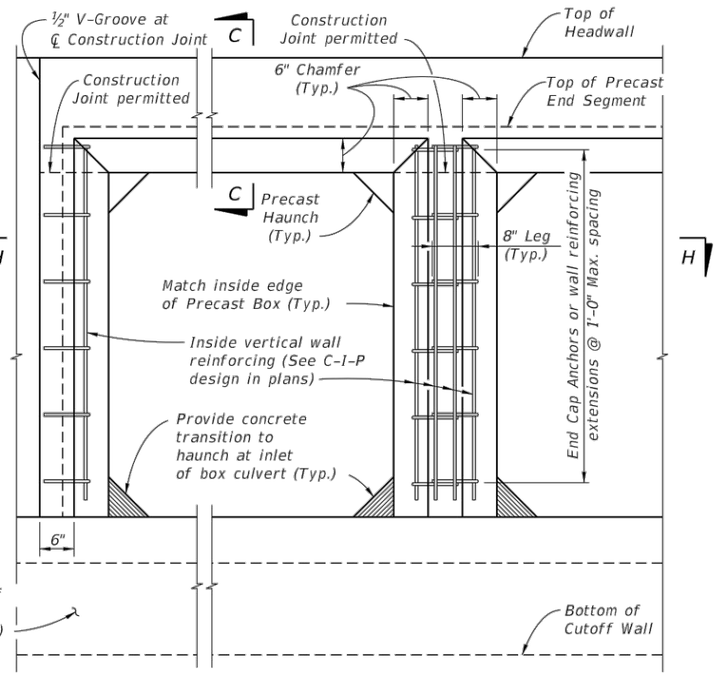
PIPE BLOCKOUT NOTES:

1. Cut box culvert reinforcement as required to maintain 2" cover.
2. For Precast Sections construct opening a minimum of 1'-6" away from any box to box joint, except opening may be a minimum of 1'-0" away from joint when at least 2'-0" of clearance to the box to box joint is provided on the opposite side of the pipe opening.
3. Pipe blockout diameter to be 6" greater than pipe outside diameter.
4. See Drainage Plans for size, placement, and invert elevation.

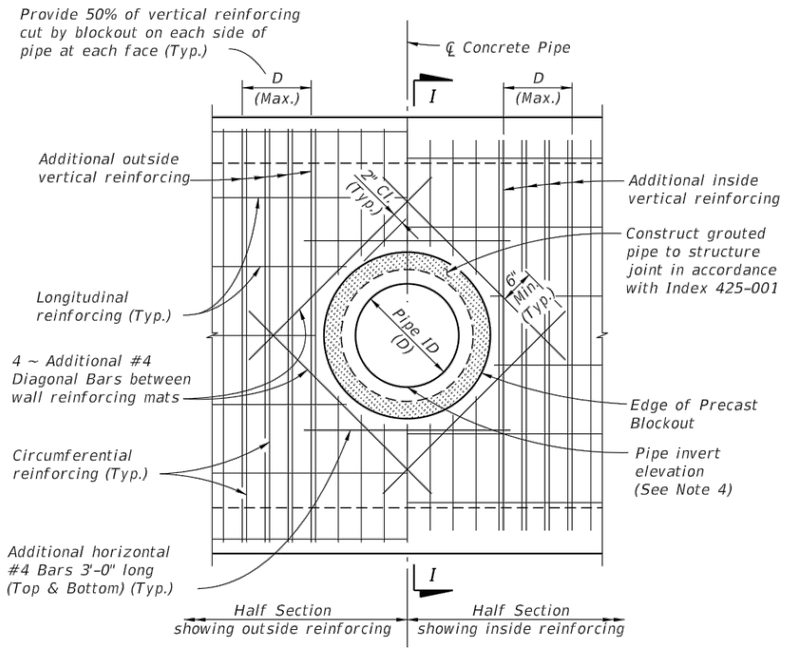
SECTION I-I
(Showing additional blockout reinforcing only)



SECTION F-F



VIEW G-G
(Headwall, Toe Slab and Cutoff Wall Reinforcing not shown for clarity)



ELEVATION VIEW

PIPE BLOCKOUT DETAILS

C-I-P END CAP DETAILS AND CONNECTION TO PRECAST BOX

LAST REVISION	REVISION	DESCRIPTION:			
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PRECAST CONCRETE BOX CULVERTS - SUPPLEMENTAL DETAILS

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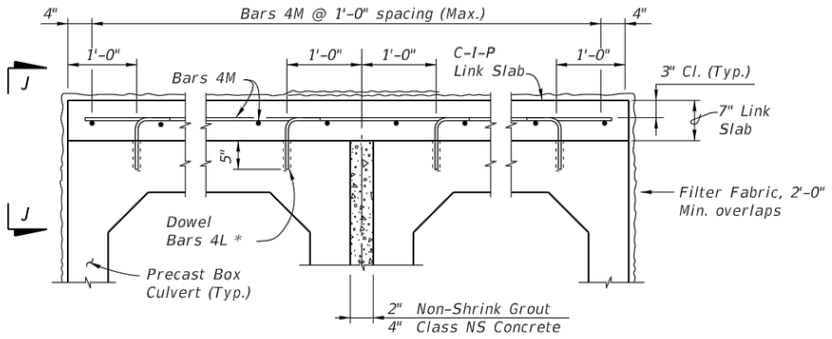
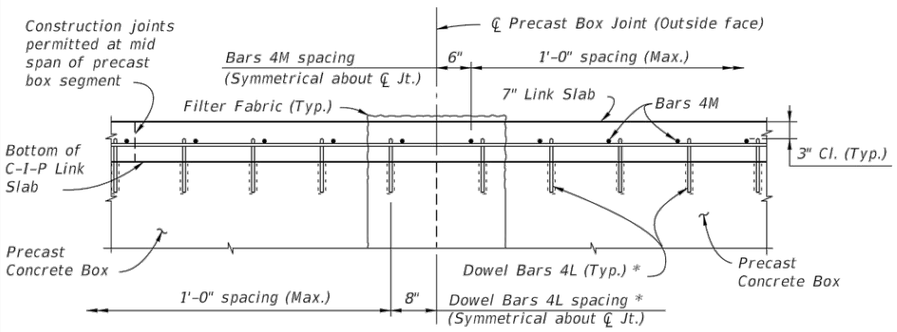


LINK SLAB TYPICAL SECTION
(Multiple Barrel Culvert shown, Single Barrel Culvert similar)

* Install dowels with an Adhesive Bonding Material System in accordance with Specification Section 416. The Contractor may substitute mechanical couplers in lieu of adhesive bonded dowels. Shift dowels to clear box culvert reinforcing.



VIEW J-J

LINK SLAB NOTES:

1. Provide a Cast-In-Place Link Slab to ensure uniform joint opening of precast box culverts when the differential settlement shown in the plans exceeds the following limits, except that a Link Slab is not required for differential settlements less than ½".

$$\Delta Y \leq \frac{(L)^2}{760 \times R \times W}$$

Where:
ΔY = Maximum Long-Term Differential Settlement (ft.)
R = Exterior height of Box Culvert (ft.)
W = Length of Box Culvert Segments (ft.)
L = Effective length for single curvature deflection (ft.)

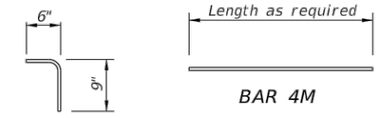
2. Extend Link Slab to back face of headwalls and to limits of existing box culverts for extensions.

ESTIMATED LINK SLAB QUANTITIES		
ITEM	UNIT	QUANTITY
Class II or IV Concrete (Culvert)	CY/SF	0.0216
Reinforcing Steel (Roadway)	Lb./SF	1.52

NOTE: Estimated quantities are based the plan area of precast box slabs, and are provided for information only. No additional payment will be made for Link Slabs where these are required for the precast box culverts.

BILL OF REINFORCING STEEL			
MARK	SIZE	NO. REQ'D	LENGTH
L	4	2 per Barrel/Ft.	1'-3"
M	4	As Reqd.	As Reqd.

REINFORCING STEEL BENDING DIAGRAMS



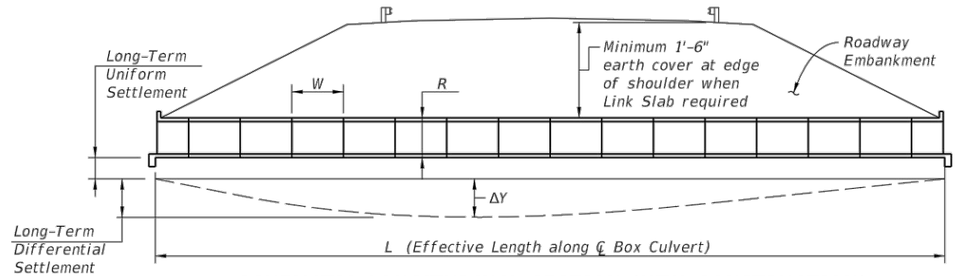
DOWEL BARS 4L

BAR 4M

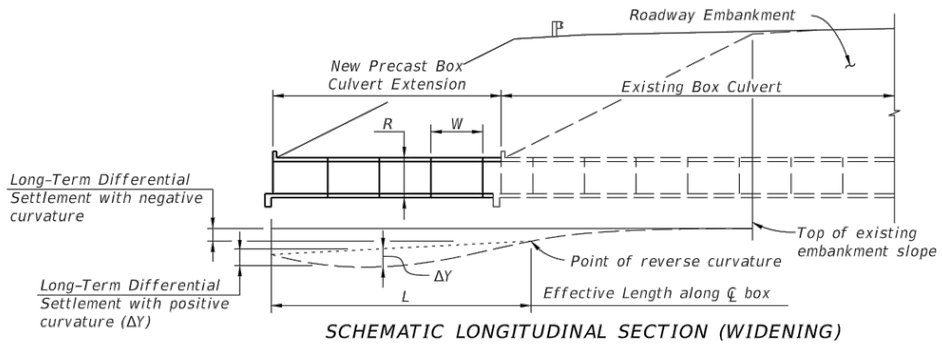
NOTES:
1. All bar dimensions are out to out.
2. Lap splice length for Bars 4M is 1'-4" minimum.

DESIGN NOTE:

1. Link Slab required when joint openings from differential settlement exceed ⅛" as determined in Link Slab Note 1.



SCHEMATIC LONGITUDINAL SECTION (NEW CONSTRUCTION)



SCHEMATIC LONGITUDINAL SECTION (WIDENING)

DIFFERENTIAL SETTLEMENT COUNTERMEASURES FOR PRECAST BOX CULVERTS

LAST REVISION	REVISION	DESCRIPTION:
01/01/09		

FDOT FY 2023-24 STANDARD PLANS

PRECAST CONCRETE BOX CULVERTS - SUPPLEMENTAL DETAILS

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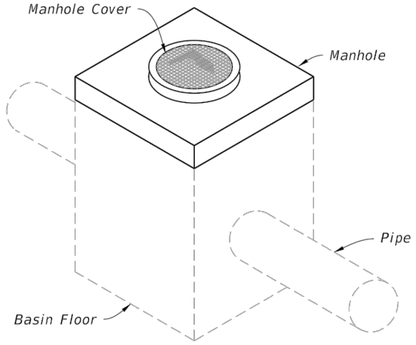
GENERAL NOTES:

1. Use a 1-piece cover, unless the 2-piece cover is called for in the Plans, except at inlets and manholes with sump bottoms. Use the 2-piece cover when the sump depth exceeds 2', unless otherwise noted.
2. Include "Adjustable" on the cover for Type I manhole adjustable frames.
3. For square or rectangular precast drainage structures, use either deformed or smooth WWR meeting the requirements of Specification 931. WWR must be continuous around the box and lapped in accordance with Option 1 or 3 as shown in the Wall Reinforcing Splice Details.
4. Lap splice horizontal steel in the walls of rectangular structures in accordance with Option 1, 2 or 3 as shown in the Wall Reinforcing Splice Details.
5. Welding of splices and laps is permitted. Use AASHTO M259 requirements and restrictions on welds.
6. Rebar straight end embedment of peripheral reinforcement may be used in lieu of ACI standard hooks for top and bottom slabs, except when hooks are specifically called for in the Plans.
7. Precast opening for pipe must be the pipe OD plus 6" (± 2" tolerance). Use mortar to seal the pipe into the opening of such a mix that shrinkage will not cause leakage into or out of the structure. Dry-pack mortar may be used to seal openings less than 2½" wide.

TABLE OF CONTENTS:



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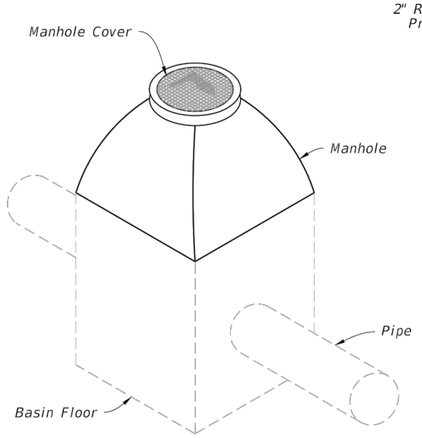
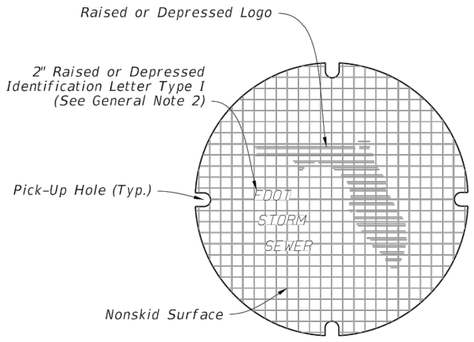
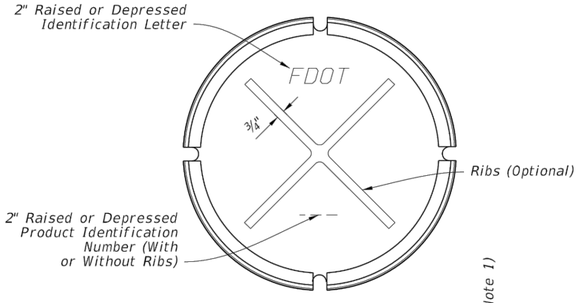


TYPE 8

MANHOLE TOPS



PLAN



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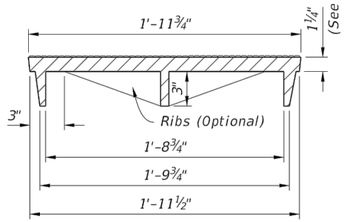
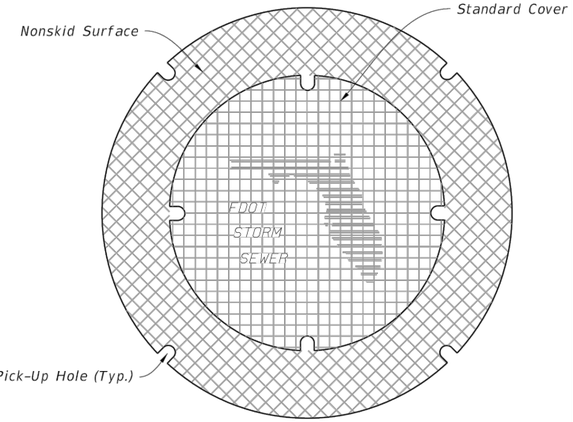


ELEVATION

1-PIECE COVER



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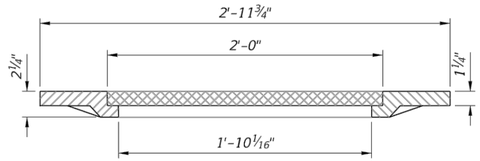

ELEVATION

2-PIECE COVER

MANHOLE COVERS

LAST REVISION	REVISION	DESCRIPTION:
11/01/23		

FDOT FY 2025-26 STANDARD PLANS

SUPPLEMENTARY DETAILS FOR DRAINAGE STRUCTURES

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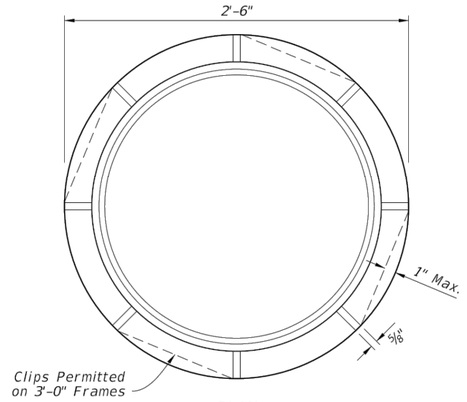
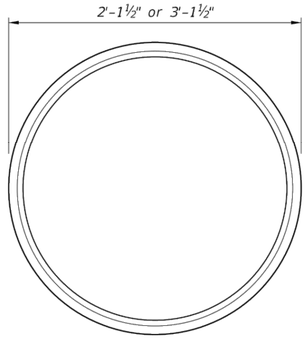
TABLE 1 WEIGHT OF CASTINGS (lb)						
Frame Type	2'-0" OPENING		3'-0" OPENING			
	Frame	Cover (Std.)	Frame	2-Piece Cover		
				Inside	Outside	Total
I	155	190	220	190	220	410
II	145	190	255	190	220	410
III	90	190	180	190	220	410

NOTE:
Frame Type I in Table 1, includes Adjustable frames.



PLAN



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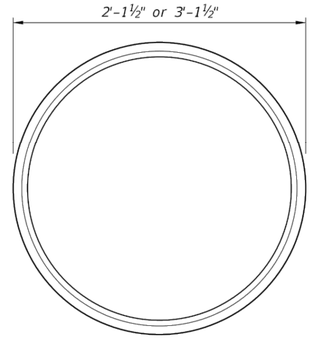

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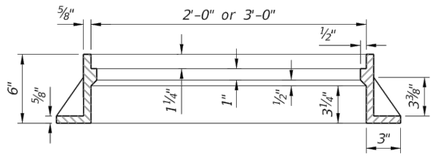
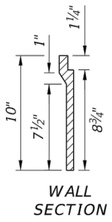
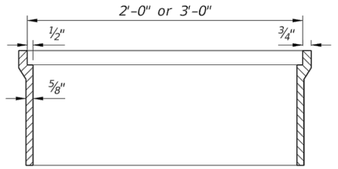


ELEVATION

TYPE I
(For Manholes)

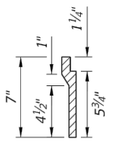


WALL SECTION



ELEVATION

TYPE II
(For Curb Inlets Types 1, 2, 3, & 4)



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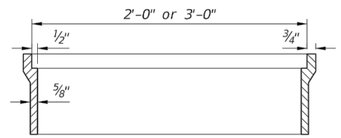
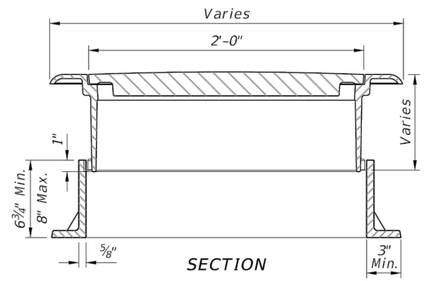


ELEVATION

TYPE III
(For Curb Inlets Types 7 & 8)

MANHOLE FRAMES



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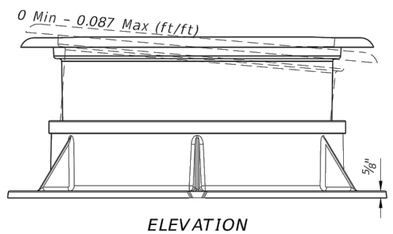
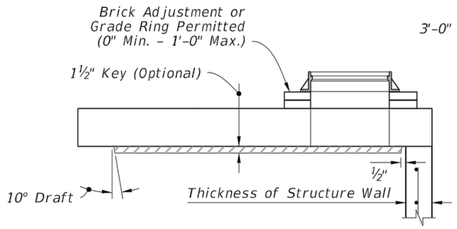
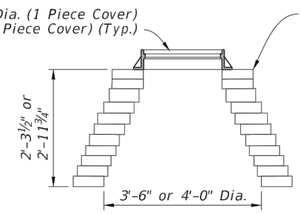


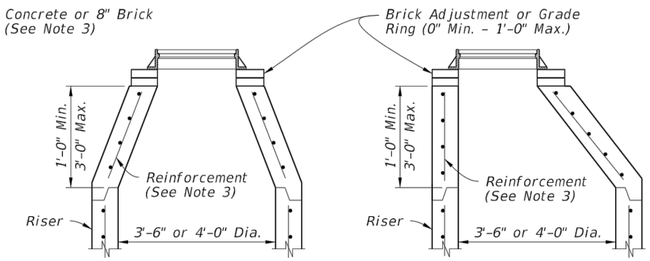
ELEVATION

TYPE I ADJUSTABLE FRAME





BRICK OR C.I.P CONCRETE
(Brick Shown)



PRECAST CONCENTRIC CONE

PRECAST ECCENTRIC CONE

TYPE 7

TYPE 8

MANHOLE TOPS

NOTES:

1. Use Class II concrete for Manhole top Type 7 slabs.
2. Manhole top Type 7 slabs may be of cast-in-place or precast construction. The optional key is for precast tops and in lieu of dowels. Omit frame and slab openings when top is used over a junction box.
3. Manhole top Type 8 may be of cast-in-place, precast concrete construction, or brick construction. For concrete construction, use the same concrete and steel reinforcement as the supporting wall unit. An eccentric cone may be used.
4. Use construction joint options, as shown on Sheet 6 to secure manhole tops to structures.
5. Frames may be adjusted to a maximum 12" height with brick or precast ASTM C478 grade rings.
6. Manhole top Type 8 may be substituted for a Type 7, if the minimum dimensions are not reduced.
7. Manhole top Type 7 may be substituted for Type 8, if the minimum thickness (h) above pipe opening cannot be maintained with Type 8.

MANHOLE FRAMES AND MANHOLE TOPS

LAST REVISION	DESCRIPTION:	FY 2025-26 STANDARD PLANS	SUPPLEMENTARY DETAILS FOR DRAINAGE STRUCTURES	INDEX	SHEET
11/01/20	REVISION			425-001	2 of 8

REVISED	NO.	BY	DATE	DESCRIPTION

	INITIALS	DATE
DESIGN	JV	
DRAWN	PCS	
CHECKED	MP	
QUALITY CHK		
SCALE		

PREPARED FOR:
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Arcadia, Florida, 34265
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Since 1919

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CIVIL, TRANSPORTATION, SUBSURFACE & STRUCTURAL ENGINEERING
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DATE

Arcadia Stormwater and Flood Control
Special Details
INCLUDES PORTIONS OF:
SECTIONS 25, 26, 31, 36, TOWNSHIP 37S., RANGE 24, 25E.

JOB NO. 21Y01018LC
SHEET NO. SD19

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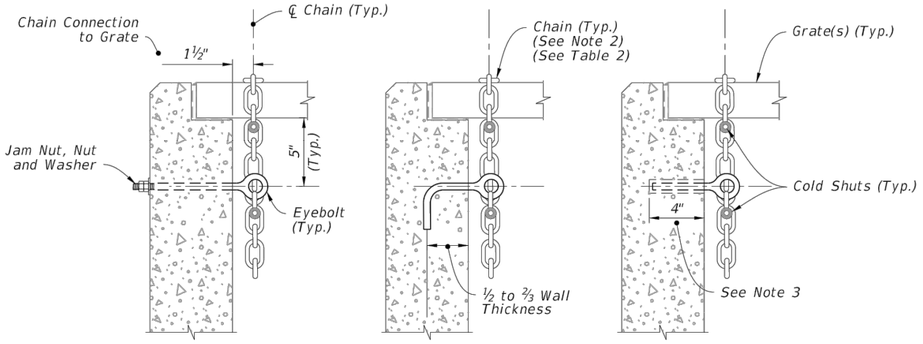


THRU-BOLT J-TYPE ADHESIVE BONDED ANCHOR

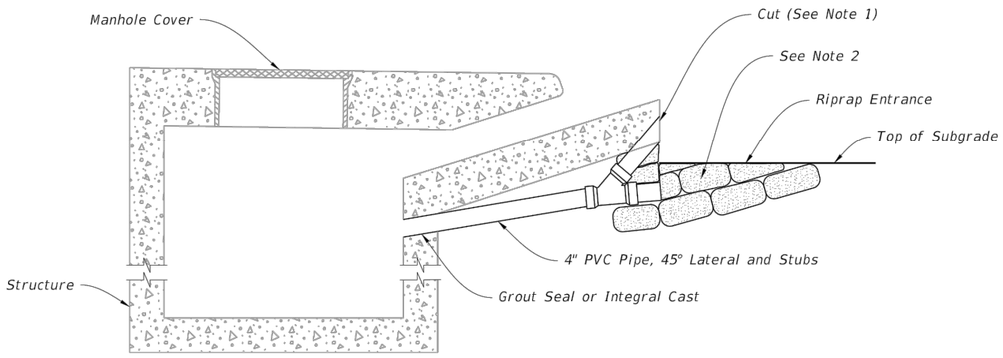
NOTES:

1. Install either a ½" Ø x 1" Diameter Threaded Straight (Thru-Bolt), a J-Type, or an adhesive Bonded Anchor Eyebolt.
2. Install a 5/16" Chain and 3/16" Cold Shuts. When chaining two grates together provide adequate loop for easy handling.
3. Install adhesive bonded anchor option with a minimum of 4" embedment, and in accordance with Specification 416.

TABLE 2
EYEBOLT AND CHAIN REQUIREMENTS

Index Number	Inlet Type	Eye-Bolts	Length of Chain	Handling & Remarks
425-030	1	1	4'-0"	Slide & Spin
	2	2	2 @ 4'-0"	Slide & Spin
425-031	N/A	1	3'-8"	Slide or Slide & Spin
425-032	N/A	1	4'-0"	Slide & Spin
425-040	S	1	4'-0"	Slide & Spin
425-041	V	1	4'-0"	Slide & Spin
425-050	A	1	3'-0"	Slide
425-051	B	1	5'-0"	Slide & Spin
425-052	C	1	2'-6"	Slide & Spin
	D	1	2'-6"	Slide & Spin
	E	2	2 @ 2'-6"	Slide & Spin
	H	2	2 @ 2'-6"	Flip Ctr. Grate and Slide & Spin Single Free Grate
			1 or 2 @ 1'-6"	Center Grate(s) Chained to One End Grate
425-053	F	1	3'-6"	Flip or Slide & Spin
	G	1	6'-0"	Slide
			2'-0"	Lifting Loop
425-054	J	1	4'-0"	Slide & Spin

LOCKING GRATES TO INLETS

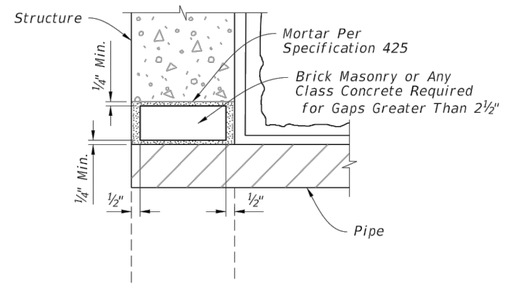


NOTES:

1. Bevel cut upper stub to match forming for apron face. Capping or plugging of upper stub is not required. Remove friable base material at stub opening to permit covering of opening with structural course material.
2. Remove riprap, cement PVC cap on lower stub, and place compacted fill in entrance prior to placing base material.

SUBGRADE AND BASE TEMPORARY DRAINS

SECTION



DETAIL "A"

NOTE:

Wrap with Type D-3 geotextile in accordance with Specification 514.

PIPE TO STRUCTURE GEOTEXTILE WRAP

LOCKING GRATES, SUBGRADE AND BASE TEMPORARY DRAINS, AND PIPE TO STRUCTURE GEOTEXTILE WRAP

LAST REVISION	REVISION	DESCRIPTION:				
11/01/23			FDOT FY 2025-26 STANDARD PLANS	SUPPLEMENTARY DETAILS FOR DRAINAGE STRUCTURES	INDEX 425-001	SHEET 3 of 8

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