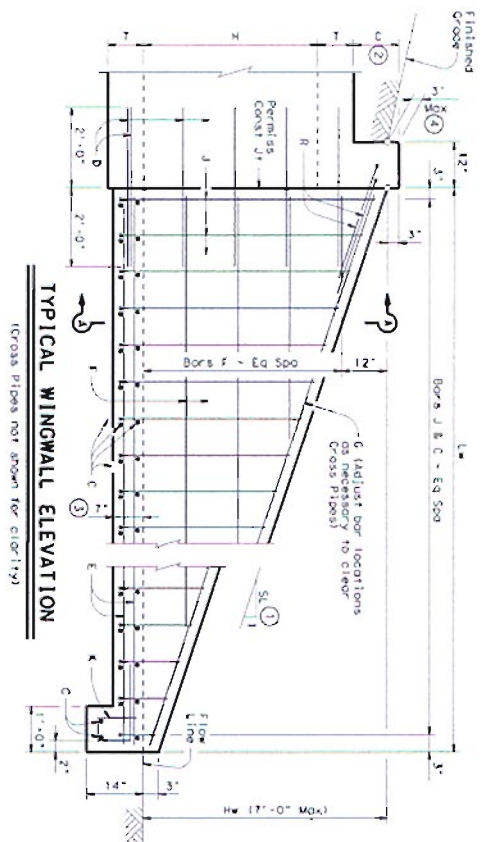
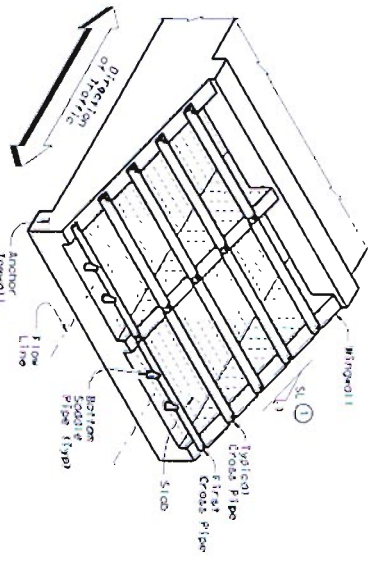


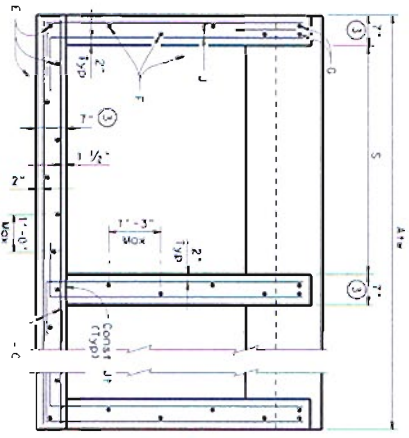
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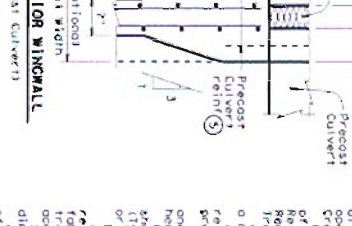
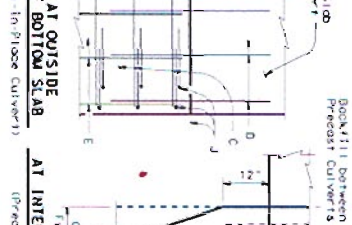
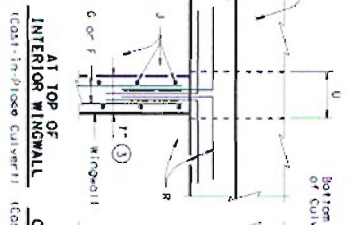
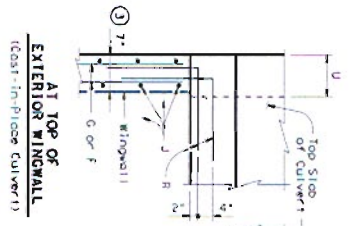
TYPICAL MINGWALL ELEVATION
(Cross Pipes not shown for clarity)



ISOMETRIC VIEW OF TYPICAL INSTALLATION
(Showing Reinforced Anchor Position)



SECTION A-A
(Showing Typical Ringwall and Ring Slab reinforcing in place before cast)



PLAN VIEWS OF CORNER DETAILS

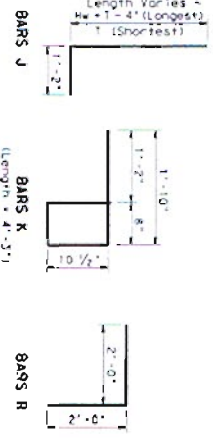


TABLE OF REINFORCING BAR SIZES & SPACING

Bar	Size	Spacing
C	#4	10" Max
D	#4	match F & E
E	#4	1'-0" Max
F	#4	1'-3" Max
G	#6	Stitch
H	#4	10" Max
J	#4	1'-0" Max
K	#4	1'-0" Max
R	#4	Stitch

- Slope will be 4:1 or steeper.
- 0" min to 5'-0" max. Estimated curb heights are shown elsewhere in the plans. For structures without railing and curbs taller than 1'-0", refer to ECD standards.
- Ringwall and slab thicknesses may be the same as the adjacent culvert wall and slab thicknesses (7" minimum, 1" thickness greater than the minimum (7") are used, unless otherwise specified). No additional compensation will be allowed.
- For vehicle safety, curbs shall project no more than 3" from finished grade. If necessary, to meet these requirements, no changes will be made in quantities and no additional compensation will be allowed for this work.
- For Culverts with C, C', or C'', the precast culvert reinforcing may extend 1'-0" minimum into Ringwall. Ringwall Bars D and H may be omitted. Otherwise, refer to the Ringwall connection detail on the SETB-00 Standard.

Formulas: (All values are in Feet)

$H_w = H + 1 + C = 0.250$
 $L_w = H_w - 0.250 = 1.00$

For East-In-Place Culverts:
 $A1 = (N1) \cdot S + (N1 + 1) \cdot (U)$
 For Precast Culverts:
 $A1 = (N1) \cdot (2U + S) + (N1 + 1) \cdot (0.506')$

Total Ringwall Area (S.F.):
 $(A1) \cdot (0.5) = 0.250' \cdot (N1 + 1)$

Total Concrete Volume (C.Y.):
 $(A1) \cdot (1.41) = 0.383' \cdot (N1 + 1) + (A1) \cdot (1.009) = 11.167' - 0.583' \cdot (N1 + 1) + (21)$

Total Reinforcing (Lbs):
 $(A1) \cdot (1.55) = 1.55' \cdot (N1 + 1) + (4.43) \cdot (N1 + 1) = 5.98' \cdot (N1 + 1)$

- GENERAL NOTES:**
- Designed according to current AASHTO Standard and other applicable standards. Show herein are minimum requirements. Reinforcing steel is intended for use in those installations where out-of-control vehicles are likely to traverse the openings, perpendicular to the wall.
 - Cross Pipes are designed for a traveling load of 10,000 pounds or yield as recommended by Research Report 280-211, Safety Treatment of Transportation Infrastructure, March 1981, Texas A&M University.
 - All concrete shall be Class "C" and shall have a minimum compressive strength of 3600 psi. All reinforcing steel shall be of the type specified to provide a minimum clear cover of 1 1/2".
 - The quantities for concrete, reinforcing steel, and precast culvert are based on the information given in the drawings. The quantities for Ringwall, Cross Pipes, Sleeve Pipes, and Saddle Pipes shall govern to the requirements of ASTM A55 of 1981, E 1453, Grade B1, ASTM A500 (Grade B1, B1.1).
 - Balls and nuts shall conform to ASTM A307.
 - All steel components, except the concrete reinforcing, shall be galvanized or galvanized steel.
 - Transportation Department shall be notified in accordance with the specifications.
 - See BCS standard sheet for additional details.
 - Although design drawings bearing the seal of a professional engineer will be acceptable for precast construction of the Safety End Treatments.

Texas Department of Transportation
 DIVISION OF DESIGN

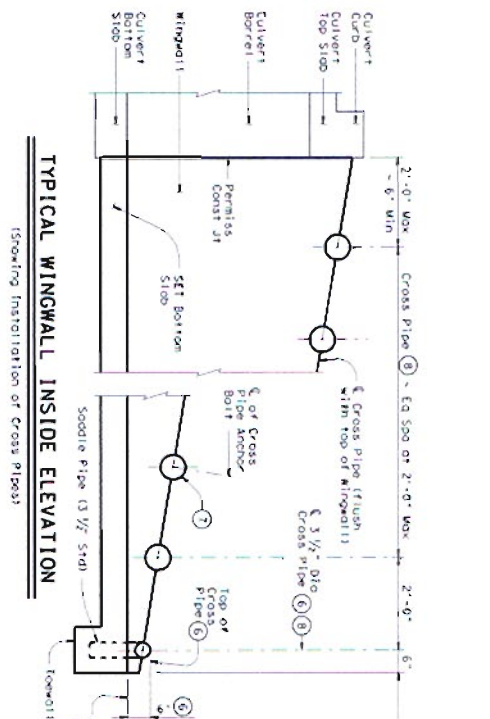
SAFETY END TREATMENT FOR BOX CULVERTS (MAXIMUM H_w = 7'-0") TYPE 1 - PARALLEL DRAINAGE

SETB-PD

DATE	DESCRIPTION	BY	CHKD	APP	DATE
07/2001	REVISED	DESIGNED	DESIGNED	DESIGNED	07/2001

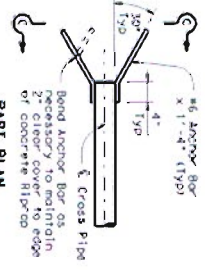
PROJECT NO. _____ CONTRACT NO. _____ SHEET NO. _____

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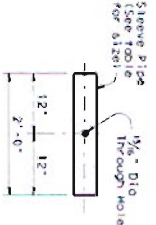
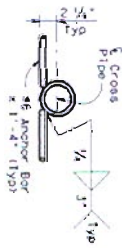
TYPICAL WINGWALL INSIDE ELEVATION
(Showing Installation of Cross Pipes)

PART PLAN



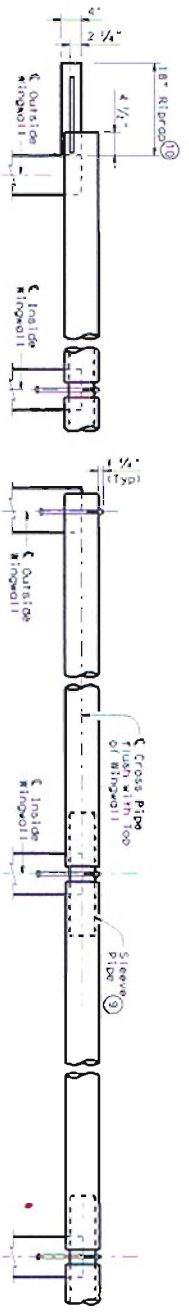
OPTIONAL ANCHOR BAR DETAILS

SECTION C-C



SLEEVE PIPE DETAILS (3)

SECTION THROUGH INSTALLATION OF TYPICAL FULL CROSS PIPE
(Anchor details and dimensions are similar to those shown below in SECTION THROUGH INSTALLATION OF 3/2" FIRST CROSS PIPE DETAIL.)

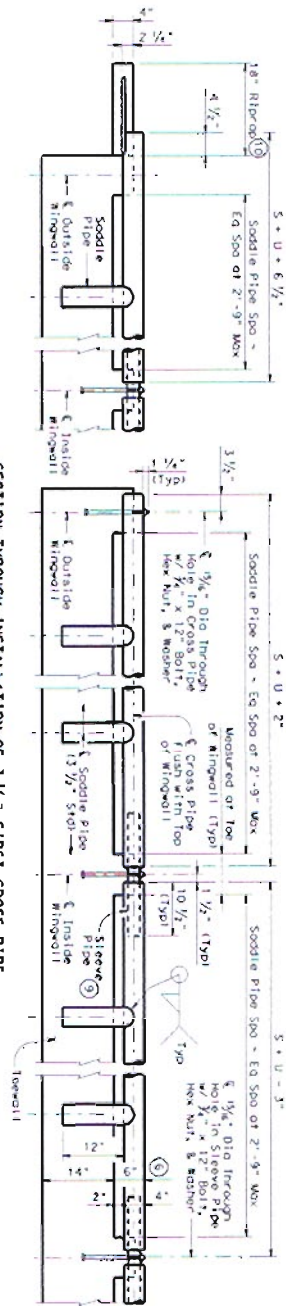


OUTSIDE CULVERT BARREL WITH OPTIONAL ANCHOR BARS & RIPRAP

SECTION THROUGH INSTALLATION OF 3/2" FIRST CROSS PIPE

OUTSIDE CULVERT BARREL WITH BOLTED ANCHOR

INSIDE CULVERT BARREL



REQUIRED PIPE SIZES (6)

Culvert Sill	Cross Pipe Sill	Sleeve Pipe Sill
3'-0" to 4'-0"	3'-0" to 4'-0"	3'-0" to 4'-0"
4'-0" to 4'-6"	4'-0" to 4'-6"	4'-0" to 4'-6"
4'-6" to 5'-0"	4'-6" to 5'-0"	4'-6" to 5'-0"
5'-0" to 5'-6"	5'-0" to 5'-6"	5'-0" to 5'-6"
5'-6" to 6'-0"	5'-6" to 6'-0"	5'-6" to 6'-0"

STANDARD PIPE SIZES

Pipe Size	Pipe O.D.	Pipe I.D.
2'-0" - 3'-0"	2,015	2,469
3'-0" - 3'-6"	3,500	3,968
3'-6" - 4'-0"	4,000	4,548
4'-0" - 4'-6"	4,500	4,926
4'-6" - 5'-0"	5,063	5,447
5'-0" - 5'-6"	5,626	6,065

- The proper installation of the 1'-2 1/2" Cross Pipe is critical for vehicle safety. The top of the first cross pipe must be placed at or no more than 6" above the flow line.
- The third cross pipe from the bottom of the culvert shall always be installed using a bolted connection. Care shall be taken to ensure that concrete does not flow into this connection to ensure the stability of the bolted connection to allow stream access.
- Cross pipes and sleeve pipes (if required) shall be shown in the REQUIRED PIPE SIZES table. Saddle pipes for the 3/2" first cross pipe shall also be 3/2".
- At contractor's option, the cross pipe may be continuous across the inside wingwalls. If such option is selected, the sleeve pipe shall be continuous across the wingwall. The sleeve pipe shall be continuous across the wingwall to the centerline of each interior wingwall.
- Riprap will be required when using the post-tension anchor bar detail and shall be included in the Price Bid for Safety End Treatment. Such riprap shall be concrete riprap in accordance with Item 437, Riprap.

Texas Department of Transportation
Brazos Valley
SAFETY END TREATMENT
FOR BOX CULVERTS
(MAXIMUM HW = 7'-0")
TYPE I - PARALLEL DRAINAGE

SETB-PD

DATE	DESCRIPTION	BY	CHKD	DATE