Index D296 Three-Sided Concrete Culvert (LRFD)

Design Criteria

AASHTO LRFD Bridge Design Specifications, 6th Edition; ***Structures Design Guidelines (SDG)***; ***Plans Preparation Manual (PPM)*** Volume 1, Chapter 33

Design Assumptions and Limitations

Foundation design is not included in this Index.

Designs for box culvert headwall, cutoff wall and wingwall elements shown in this Index may be produced by computer analysis utilizing the Department's ***LRFD*** Box Culvert Program. Channel linings and foundation designs (spread footing, piles or other systems) should be produced by the EOR and fully detailed in the plans. The culvert barrel design, any foundation modifications and shop drawings shall be submitted by the Contractor.

Headwalls with skew angles less than -50° or greater than +50° require special design authorization. In these cases, other design options should be considered. Contact the District Drainage Engineer to obtain authorization.

Do not include sidewall and top slab dimensions unless site specific limitations are required.

Plan Content Requirements

Insert the entire ***Developmental Design Standards*** Index, received from the Central Office monitor, into the appropriate component plan set in accordance with ***PPM***, Volume 2, Section 3.8.

In the Roadway or Structures Plans:

Include soil borings and foundation design. Show assumed / maximum foundation loads (maximum live and dead loads) on the drawings.

Plans must clearly show the culvert Span, Rise and Design Earth Cover. Include ***Developmental Design Standards*** Index D296 and the completed Three-Sided Concrete Culvert Data Tables in the Contract Plans. If the Department's ***LRFD*** Box Culvert Program is used for design of headwalls, wingwalls and cutoff walls, use the "Include" Key-In Utility in MicroStation and Line 2.prn and Line 3.prn located in the program root directory, to partially complete tables. Manually complete the remaining tables and notes. See Introduction I.3 for more information regarding use of Data Tables.

Use Structures Site Menu>Text>Table Data, which uses "Chart_TTF" Text Style and True Type Font FDOT Mono.

Complete Notes 1 thru 6.

For culverts meeting the definition of a bridge structure include the Bridge Number in the plans and the Load Rating Sheet per ***SDG*** 3.15.14.

THREE-SIDED CONCRETE CULVERT DATA TABLES

BARREL, HEADWALL, CUTOFF WALL AND FOOTING DATA TABLE (inches unless shown otherwise) — Table Date 01-01-16

LOCATION	STRUCTURE NUMBER	BARREL									HEADWALL				CUTOFF WALLS AND SLAB FOUNDATION						SPREAD FOOTINGS					
		Wc(ft)	Hc(ft)	Tt	Tw	Tb	Ti	#cells	Lc(ft)	Cover	Blhw	Hlhw	Brhw	Hrhw	Blcw	Hlcw	Brcw	Hrcw	Bfs	Hfs	SL(deg)	SR(deg)	Bfe	Hfe	Bfi	Hfi
	.																									
	.																									

LEFT SIDE WINGWALLS DATA TABLE (inches unless shown otherwise) — Table Date 01-01-16

STRUCTURE NUMBER	LEFT END WINGWALL									LEFT BEGIN ENDWALL								
	Rt	Rw	Rh	Rd	SW(deg)	β(deg)	He(ft)	Hs(ft)	Lw(ft)	Rt	Rw	Rh	Rd	SW(deg)	β(deg)	He(ft)	Hs(ft)	Lw(ft)
.																		
.																		

RIGHT SIDE WINGWALLS DATA TABLE (inches unless shown otherwise) — Table Date 01-01-16

STRUCTURE NUMBER	RIGHT END WINGWALL									RIGHT BEGIN ENDWALL								
	Rt	Rw	Rh	Rd	SW(deg)	β(deg)	He(ft)	Hs(ft)	Lw(ft)	Rt	Rw	Rh	Rd	SW(deg)	β(deg)	He(ft)	Hs(ft)	Lw(ft)
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.																		

ESTIMATED CONCRETE QUANTITIES (CY unless otherwise noted) — Table Date 01-01-16

STRUCTURE NUMBER	CULVERT FOUNDATIONS								LEFT END WINGWALL			LEFT BEGIN WINGWALL			RIGHT END WINGWALL			RIGHT BEGIN WINGWALL		
	Length (ft.)	SPREAD FOOTINGS				CHANNEL LINING														
		Left	Right	Interior	Sub Total	Slab	Aprons	Sub Total	Footing	Wall	Sub Total	Footing	Wall	Sub Total	Footing	Wall	Sub Total	Footing	Wall	Sub Total
.																				
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MAIN STEEL REINFORCEMENT SPACING (inches) — Table Date 01-01-16

STRUCTURE NUMBER	BARREL														HEADWALLS		CUTOFF WALLS		FOOTINGS	
	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115, 116...	803	806	809	812	901	903
.	See Shop Drawings																				
.																					

WINGWALL STEEL REINFORCEMENT SPACING (inches) — Table Date 01-01-16

STRUCTURE NUMBER	LEFT END WINGWALL							LEFT BEGIN WINGWALL							RIGHT END WINGWALL								RIGHT BEGIN WINGWALL						
	401 407(8)	402 (403)	404 (405)	406	409	410	411	501 507(8)	502 (503)	504 (505)	506	509	510	511	601 607(8)	602 (603)	604 (605)	606	609	610	611	701 707(8)	702 (703)	704 (705)	706	709	710	711
.																												
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WINGWALL NOTE: Bar designations in "( )" are only required for variable height wingwalls.

NOTES [Notes Date 01-01-16]:

1. Environmental Class -----
2. Reinforcing Steel, Grade -----
3. Concrete Class ----- f'c = ----- ksi
4. Soil Properties:
   Friction Angle -----
   Modulus of Subgrade Reaction -----
   Nominal Bearing Capacity -----
5. The assumed foundation vertical reaction is ----- kips/ft.
   The assumed foundation horizontal reaction is ----- kips/ft.
   The Contractor must submit a revised foundation design to the Engineer if the actual loads of the supplied structure exceed these assumed values. Any revised foundation design must be included in the shop drawings and submitted at the same time as the design calculations for the three-sided culvert.
6. Work this Drawing with Developmental Design Standards Index D296 and Sheet Nos. -----

Consideration for Approval of Alternative Technical Proposals

Alternate three-side structures may be considered for approval with concurrence from the District Structures Design Engineer. Current systems under consideration include:

1. Composite Arch Bridge Systems (e.g. Bridge-In-A-Back Pack);
2. Flexible Concrete Composite Arch Systems (e.g. FlexiArch);
3. Metal-Arch Culverts (for Slightly Aggressive Environment).

Manufacturers must be approved by the State Materials Office by either listing in LIMS for Producers with Accepted QC Programs, or project specific approval when appropriate. A Technical Special Provision with material and testing requirements should be submitted by the Contractor for approval prior to acceptance of any Alternative Technical Proposal.

Payment

Item number	Item description	Unit Measure
407-1	Precast Three-Sided Culvert	LF