Revision	By	Approved	Date
ORIGINAL		Kercheval	12/75
Add Metric		T. Stanton	03/03
Reformatted		T. Stanton	04/06
Edited		T. Stanton	02/09
Edited	S.S.	T. Regello	03/11

SAN DIEGO REGIONAL STANDARD DRAWING

PIPE CULVERT - HEADWALLS, ENDWALLS & WARPED WINGWALLS

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

7/26/2012

Chairperson R.C.E. 19246 Date

DRAWING NUMBER **D-44D**

WARPED WINGWALLS (all measurements in feet and/or inches unless otherwise noted)

WALL DIMENSIONS AND REINFORCING

Element Slope	H	8'or less	10'	12'	14'	16'	18'	20'
1/4:1	Front face reinf	#4@12	#4@ 7	#5@ 7	#5@ 5	#6@ 6	#7@ 7	#7@ 6
	Rear face reinf	#4@12	#4@12	#4@12	#4@12	#4@12	#4@12	#4@12
3/4:1	Front face reinf	#4@12	#4@12	#4@12	#4@12	#4@10	#4@ 8	#4@ 6
	Rear face reinf	#4@12	#4@12	#4@12	#4@10	#4@ 7	#4@ 6	#5@ 8
1-1/4:1	Front face reinf	#4@12	#4@12	#4@12	#4@12	#4@12	#4@12	#4@12
	Rear face reinf	#4@ 8	#4@ 8	#4@ 5	#5@ 6	#6@ 7	#6@ 6	#7@ 6
D at Cutoff Wall		6"	6"	6"	7-1/2"	8"	9-1/2"	11"
D at Culvert		6"	6"	6"	8"	9-1/2"	11"	1'-1"

STIFFENING BEAM DIMENSIONS AND REINFORCING

H max \ L	12'	14'	16'	18'	20'	25'	30'	35'	40' or more
6'	No beam. Place 2-#6 in each face along top of wall.								
8'									
10'				A= 1'					
12'				B= 9"					
14'		Total 6-#6				A= 1'-6"			
16'					B= 1'			A= 1'-10"	
18'				Total 6-#7			B=1'		A=2'
20'						Total 6-#8		B= 1'-6"	
							Total 8-#9		

NOTES

1. Walls designed for 2' surcharge; earth density = 120 # / cu. ft.; equivalent fluid pressure = 36 #/cu. ft.
2. Vary "D" at warped wall uniformly from that at cutoff wall to that at culvert, for maximum H > 12'.
3. Dimensions "L", "W", "H", "M", "N", "Elev a", "Angle of flare", and end "slope" (as apply) are shown on the plans.
4. All exposed concrete edges to be chamfered 3/4".