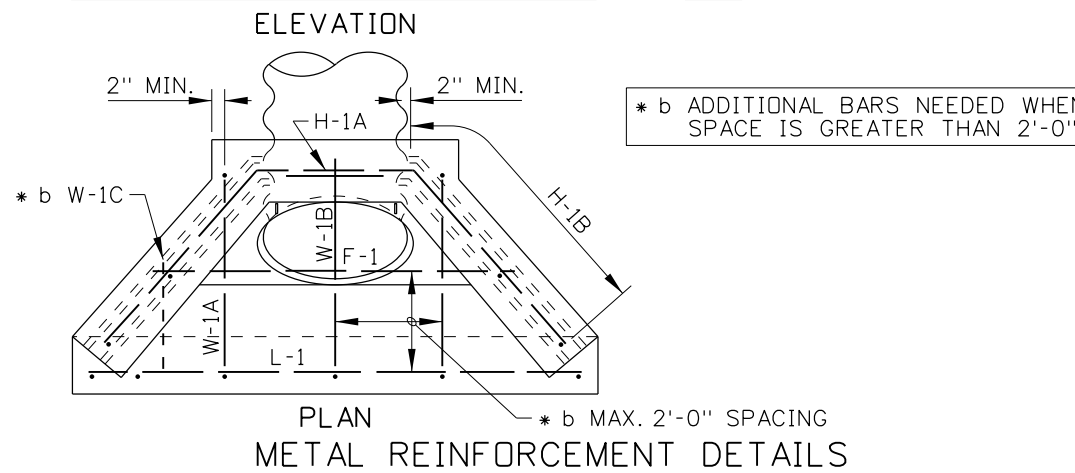
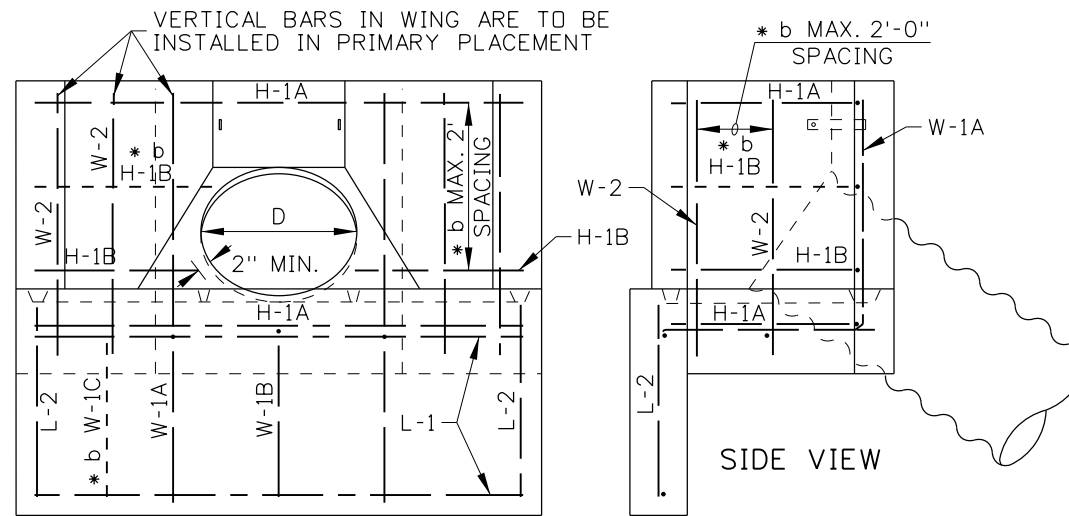




METAL REINFORCEMENT TABLE				
MARK	LOCATION	BAR SIZE	(NO. BARS) HDWL. SIZE	SKETCH
F-1	FLOOR	NO. 4	(1) 12"-36" (2) 42"	
L-1	TOP & BOTOM OF INLET LIP IN FLOOR	NO. 4	(2) 12"-42"	
H-1A	HORIZ. IN TOP OF WING WALL & IN FLOOR BACK WALL	NO. 4	(2) 12"-42"	
H-1B	HORIZ. IN WING WALL BETWEEN H-1As' (PAIRS)	NO. 4	(2) 12"-42" (4) 30"-36" (6) 42"	
W-1A	EACH SIDE OF PIPE IN BACKWALL, FLOOR, & INLET LIP	NO. 4	(2) 12"-42"	
W-1B	IN FLOOR, & INLET LIP, UNDER PIPES	NO. 4	(1) 12"-30" (2) 12"-42"	
W-1C	IN FLOOR, & INLET LIP	NO. 4	(2) 12"-42"	
L-2	VERTICAL IN FLOOR, & INLET LIP	NO. 4	(2) 12"-42"	
W-2	VERTICAL IN WING WALLS	NO. 4	(1) 12"-30" (2) 12"-42"	



METAL REINFORCEMENT DETAILS

HEADWALL DIMENSION TABLE											
CULVERT SIZE DIAMETER (IN.)	IN INCHES										
	D/24	A	B	H	L	M	N	P	Q	S	V
12	1/2	13	20 7/16	21	24 5/8	25	21	27 1/2	22 7/16	12 9/16	53 13/16
15	5/8	16 1/4	23 1/8	24 1/4	28 1/8	28 1/4	24 1/4	30 3/8	26 11/16	15 3/16	62 9/16
18	3/4	19 1/2	25 7/8	27 1/2	33 1/8	31 1/2	27 1/2	34 1/4	30 15/16	18 1/16	71 1/4
21	7/8	22 3/4	28 5/8	30 3/4	37 3/8	34 3/4	30 3/4	37 3/8	35 3/16	20 3/4	79 15/16
24	1	26	31 3/8	34	41 9/16	38	34	41	39 3/8	23 1/2	88 5/8
30	1 1/4	32 1/2	36 3/4	40 1/2	50 1/16	44 1/2	40 1/2	47 3/4	47 1/8	28 5/16	106 1/16
36	1 1/2	39	42 1/4	47	58 9/16	51	47	54 1/2	56 3/8	34 3/8	123 1/2
42	1 3/4	45 1/2	47 1/16	53 1/2	67 1/16	57 1/2	53 1/2	61 1/4	64 7/8	39 5/8	140 7/8

GRATE DIMENSION & MATERIALS TABLE									
CULVERT SIZE DIAMETER (IN.)	IN INCHES								
	DIMENSIONS				BAR SIZES				
	A'	* c X	Y	Z	B-1	B-2	B-3	B-4	
12	11	19 3/16	28 1/2	18 7/8	1x1/4	1 1/4x1/4	1 1/4x1 1/4x1/4	1x1/4x9	
15	14	23 3/4	36 7/8	24 3/16	1x1/4	1 1/4x1/4	1 1/4x1 1/4x1/4	1x1/4x9	
18	17	28 3/8	45 5/16	29 1/2	1x1/4	1 1/4x1/4	1 1/4x1 1/4x1/4	1x1/4x9	
21	20	32 15/16	53 3/4	34 13/16	1x1/4	1 1/4x1/4	1 1/4x1 1/4x1/4	1x1/4x9	
24	23	37 9/16	62 3/16	40 1/8	1x1/4	1 1/4x1/4	1 1/4x1 1/4x1/4	1x1/4x9	
30	29	46 3/4	79 1/16	50 13/16	1 1/4x1/4	1 1/2x1/4	1 1/2x1 1/2x1/4	1 1/2x1 1/4x9	
36	35	55 7/8	92 5/16	61 1/2	1 1/2x1/4	1 3/4x1/4	1 3/4x1 3/4x1/4	1 3/4x1 1/4x9	
42	41	65 1/16	112 3/16	72 3/16	1 3/4x1/4	2 1/4x3/8	2 1/4x2 1/2x3/8	2 1/4x3 3/8x9	

\* c ALLOW 3/4"-1" EXTRA BAR LENGTH FOR HOLE FABRICATION

NOMINAL SIZE DIAMETER (IN.)	CONCRETE (C.Y.)				STEEL (LBS.)
	WING & BCKWL.	FLOOR	LIP	TOTAL	
12	0.179	0.148	0.167	0.494	24.6
15	0.248	0.200	0.193	0.633	27.8
18	0.309	0.259	0.220	0.788	31.0
21	0.386	0.326	0.247	0.959	35.8
24	0.472	0.400	0.274	1.146	39.4
30	0.671	0.572	0.327	1.570	46.1
36	0.905	0.774	0.381	2.061	57.6
42	1.176	1.007	0.435	2.618	73.6

NOTES

1. THE SIPHON HEADWALL SHALL BE USED ONLY WHEN PROTECTED BY GUARDRAIL OR INSTALLED OUTSIDE THE CLEAR ZONE.
2. ALL CAST-IN-PLACE HEADWALLS SHALL CONFORM TO SECTION 609 - MINOR STRUCTURES, OF THE CURRENT ITD STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION.
3. THE METAL REINFORCEMENT SHALL BE NO. 4 BARS. ALL REINFORCEMENT SHALL HAVE A MINIMUM CONCRETE COVER OF 2" OR 3" MINIMUM COVER IF CAST AGAINST EARTH.
4. ALL EDGES TO HAVE 3/4" CHAMFER OR TOOLED EDGES.
5. ALL PIPE INLETS/OUTLETS WITH A CONCRETE SIPHON HEADWALL SHALL HAVE THE INLET HEADWALLS BEVELED. USE ENTRANCE LOSS COEFFICIENT  $K_e = 0.2$  FOR BEVELED ENTRANCES.
6. THE METAL FOR THE GRATE SHALL MEET THE REQUIREMENTS OF ASTM A 36. WELDING OF THE METAL GRATE SHALL MEET THE REQUIREMENTS OF THE AMERICAN WELDING SOCIETY D1.1. GRATES FOR INLET HEADWALLS WILL BE REQUIRED ONLY WHEN SHOWN ON THE ROADWAY PLANS. GRATES NEED NOT BEPAINTED OR GALVANIZED.
7. THE USE OF CONCRETE, CORRUGATED METAL, OR CORRUGATED POLYETHYLENE PIPE WITH A SIPHON HEADWALL IS ALLOWED (CONCRETE PIPE SHOWN ON DRAWING).
8. A SIPHON SYSTEM REQUIRES A GRATE ON THE BOTH INLET AND OUTLET HEADWALL.
9. NOT TO SCALE.

ORIGINAL STORED AT: ITD, Headquarters 3311 West State Boise, Idaho

ORIGINAL SIGNED BY: MILDRED L. MILLER DATE ORIGINAL SIGNED: DECEMBER 19, 2005

REVISIONS							
NO.	DATE	BY	NO.	DATE	BY	NO.	DATE
1	02-64		6	06-92	MSM		
2	02-68		7	12-92	TMR		
3	09-68		8	06-02	MSM		
4	10-69		9	12-05	MSM		
5	04-90	GB					

SCALES SHOWN ARE FOR 11" X 17" PRINTS ONLY  
CADD FILE NAME: d10\_1205.dgn  
DRAWING DATE:

IDAHO TRANSPORTATION DEPARTMENT  
BOISE IDAHO

ORIGINAL SIGNED BY: LOREN THOMAS  
HIGHWAYS PROGRAM OVERSIGHT ENGINEER  
ORIGINAL SIGNED BY: STEVEN HUTCHINSON  
CHIEF ENGINEER

STANDARD DRAWING  
CONCRETE HEADWALL FOR SIPHONS  
REQUIRES SHEET 1 OF 2

English  
STANDARD DRAWING NO.  
D-10  
SHEET 2 OF 2