

## BILL OF REINFORCING FOR ONE HEADWALL 0° SKEW CULVERT SPAN x CULVERT HEIGHT

LOCATION	SHAPE	5' x 6'				5' x 5'				5' x 4'				5' x 3'				4' x 4'				3' x 3'										
		BAR NO.	LENGTH	WT.		BAR NO.	LENGTH	WT.		BAR NO.	LENGTH	WT.		BAR NO.	LENGTH	WT.		BAR NO.	LENGTH	WT.		BAR NO.	LENGTH	WT.		BAR NO.	LENGTH	WT.				
FENCE ANCHOR (GALV.)	5fa	2	3'-1"	6	5fa	2	3'-1"	6	5fa	2	3'-1"	6		2	3'-1"	6	5fa	2	3'-1"	6	5fa	2	3'-1"	6	5fa	2	3'-1"	6	5fa	2	3'-1"	6
WINGWALL, F.F.H.	5b1	2	21'-10"	46	5b1	2	18'-10"	39	5b1	2	15'-10"	33	5b1	2	12'-10"	27	5b1	2	15'-10"	33	5b1	2	12'-10"	27	5b1	2	12'-10"	27	5b1	2	12'-10"	27
WINGWALL, F.F.H.	5b2	10 VAR	2 EACH 8'-10x20'-10"	155	5b2	8 VAR	2 EACH 8'-10x17'-10"	111	5b2	6 VAR	2 EACH 8'-10x14'-10"	74	5b2	4 VAR	2 EACH 8'-10x11'-10"	43	5b2	6 VAR	2 EACH 8'-10x14'-10"	74	5b2	4 VAR	2 EACH 8'-10x11'-10"	43	5b2	4 VAR	2 EACH 8'-10x11'-10"	43	5b2	4 VAR	2 EACH 8'-10x11'-10"	43
WINGWALL, B.F.H.	4b3	2	21'-10"	29	4b3	2	18'-10"	25	4b3	2	15'-10"	21	4b3	2	12'-10"	17	4b3	2	15'-10"	21	4b3	2	12'-10"	17	4b3	2	12'-10"	17	4b3	2	12'-10"	17
WINGWALL, B.F.H.	4b4	8 VAR	2 EACH 11'-10x20'-10"	87	4b4	6 VAR	2 EACH 11'-10x17'-10"	59	4b4	4 VAR	2 EACH 11'-10x14'-10"	36	4b4	2	11'-10"	16	4b4	4 VAR	2 EACH 11'-10x14'-10"	36	4b4	2	11'-10"	16	4b4	2	11'-10"	16	4b4	2	11'-10"	16
WINGWALL, F.F.V.	4c1	38 VAR	2 EACH 2'-6x8'-6"	140	4c1	32 VAR	2 EACH 2'-6x7'-6"	107	4c1	26 VAR	2 EACH 2'-6x5'-6"	78	4c1	20 VAR	2 EACH 2'-6x5'-6"	53	4c1	26 VAR	2 EACH 2'-6x6'-6"	78	4c1	20 VAR	2 EACH 2'-6x5'-6"	53	4c1	20 VAR	2 EACH 2'-6x5'-6"	53	4c1	20 VAR	2 EACH 2'-6x5'-6"	53
WINGWALL, F.F.V. (L)	4c2	2	8'-9"	12	4c2	2	7'-9"	10	4c2	2	6'-9"	9	4c2	2	5'-9"	8	4c2	2	6'-9"	9	4c2	2	5'-9"	8	4c2	2	5'-9"	8	4c2	2	5'-9"	8
WINGWALL, F.F.V. (R)	4c2	2	8'-9"	12	4c2	2	7'-9"	10	4c2	2	6'-9"	9	4c2	2	5'-9"	8	4c2	2	6'-9"	9	4c2	2	5'-9"	8	4c2	2	5'-9"	8	4c2	2	5'-9"	8
WINGWALL, B.F.V.	6c3	38 VAR	2 EACH 6'-1x12'-1"	518	6c3	32 VAR	2 EACH 6'-1x11'-1"	286	6c3	26 VAR	2 EACH 6'-1x10'-1"	140	6c3	20 VAR	2 EACH 6'-1x9'-1"	101	6c3	26 VAR	2 EACH 6'-1x10'-1"	140	6c3	20 VAR	2 EACH 6'-1x9'-1"	101	6c3	20 VAR	2 EACH 6'-1x9'-1"	101	6c3	20 VAR	2 EACH 6'-1x9'-1"	101
WINGWALL, B.F.V. (L)	6c4	2	12'-3"	37	6c4	2	11'-3"	23	6c4	2	10'-3"	14	6c4	2	9'-3"	12	6c4	2	10'-3"	14	6c4	2	9'-3"	12	6c4	2	9'-3"	12	6c4	2	9'-3"	12
WINGWALL, B.F.V. (R)	6c4	2	12'-3"	37	6c4	2	11'-3"	23	6c4	2	10'-3"	14	6c4	2	9'-3"	12	6c4	2	10'-3"	14	6c4	2	9'-3"	12	6c4	2	9'-3"	12	6c4	2	9'-3"	12
WINGWALL, B.F.V.	c5	-	-	-	c5	-	-	-	c5	-	-	-	c5	-	-	-	c5	-	-	-	c5	-	-	-	c5	-	-	-	c5	-	-	-
APRON, LONGIT., BOT.	4d1	5	21'-10"	73	4d1	5	18'-10"	63	4d1	5	15'-10"	53	4d1	5	12'-10"	43	4d1	5	15'-10"	53	4d1	4	12'-10"	34	4d1	4	12'-10"	34	4d1	4	12'-10"	34
APRON, LONGIT., TOP	6f1	6	21'-10"	197	6f1	6	18'-10"	170	6f1	6	15'-10"	143	6f1	6	12'-10"	116	6f1	5	15'-10"	119	6f1	4	12'-10"	77	6f1	4	12'-10"	77	6f1	4	12'-10"	77
PARAPET, VERTICAL	4i1	11	6'-5"	47	4i1	11	6'-5"	47	4i1	11	6'-5"	47	4i1	11	6'-5"	47	4i1	9	6'-5"	39	4i1	7	6'-5"	30	4i1	7	6'-5"	30	4i1	7	6'-5"	30
PARAPET, HORIZ.	7j1	4	6'-2"	50	7j1	4	6'-2"	50	7j1	4	6'-2"	50	7j1	4	6'-2"	50	7j1	4	5'-2"	42	7j1	4	4'-2"	34	7j1	4	4'-2"	34	7j1	4	4'-2"	34
APRON, TRANS., TOP	6m1	20	6'-8"	200	6m1	17	6'-8"	170	6m1	14	6'-8"	140	6m1	11	6'-8"	110	6m1	14	5'-8"	119	6m1	11	4'-8"	77	6m1	11	4'-8"	77	6m1	11	4'-8"	77
APRON, TRANS., TOP	m2	-	-	-	m2	-	-	-	m2	-	-	-	m2	-	-	-	m2	-	-	-	m2	-	-	-	m2	-	-	-	m2	-	-	-
APRON, TRANS., BOT.	4m3	19	2'-7"	33	4m3	16	2'-7"	28	4m3	13	2'-7"	22	4m3	10	2'-7"	17	m3	-	-	-	m3	-	-	-	m3	-	-	-	m3	-	-	-
CURTAIN, HORIZ.	6p1	5	6'-8"	50	6p1	5	6'-8"	50	6p1	5	6'-8"	50	6p1	5	6'-8"	50	6p1	5	5'-8"	43	6p1	5	4'-8"	35	6p1	5	4'-8"	35	6p1	5	4'-8"	35
WING SLOPE, BOTH F.	6s1	4	16'-8"	100	6s1	4	13'-7"	82	6s1	4	10'-5"	63	6s1	4	7'-3"	44	6s1	4	10'-5"	63	6s1	4	7'-3"	44	6s1	4	7'-3"	44	6s1	4	7'-3"	44
WING SLOPE, BOTH F. (L)	6s2	2	7'-9"	23	6s2	2	7'-9"	23	6s2	2	7'-9"	23	6s2	2	7'-9"	23	6s2	2	7'-9"	23	6s2	2	7'-9"	23	6s2	2	7'-9"	23	6s2	2	7'-9"	23
WING SLOPE, BOTH F. (R)	6s3	2	7'-9"	23	6s3	2	7'-9"	23	6s3	2	7'-9"	23	6s3	2	7'-9"	23	6s3	2	7'-9"	23	6s3	2	7'-9"	23	6s3	2	7'-9"	23	6s3	2	7'-9"	23
WING SLOPE, F. F.	6s4	2	11'-0"	33	6s4	2	11'-0"	33	6s4	2	11'-0"	33	6s4	2	11'-0"	33	6s4	2	11'-0"	33	6s4	2	11'-0"	33	6s4	2	11'-0"	33	6s4	2	11'-0"	33
WING SLOPE, F. F.	6s5	2	14'-5"	43	6s5	2	11'-3"	34	6s5	2	8'-1"	24	6s5	2	4'-11"	15	6s5	2	8'-1"	24	6s5	2	4'-11"	15	6s5	2	4'-11"	15	6s5	2	4'-11"	15
CURTAIN, VERT.	5t1	6	6'-5"	40	5t1	6	6'-5"	40	5t1	6	6'-5"	40	5t1	6	6'-5"	40	5t1	5	6'-5"	33	5t1	4	6'-5"	27	5t1	4	6'-5"	27	5t1	4	6'-5"	27
CURTAIN, VERT., ENDS	5t2	4	6'-5"	27	5t2	4	6'-5"	27	5t2	4	6'-5"	27	5t2	4	6'-5"	27	5t2	4	6'-5"	27	5t2	4	6'-5"	27	5t2	4	6'-5"	27	5t2	4	6'-5"	27
BRACKET, VERT.	5u1	4	5'-3"	22	5u1	4	5'-3"	22	5u1	4	5'-3"	22	5u1	4	5'-3"	22	5u1	4	5'-3"	22	5u1	4	5'-3"	22	5u1	4	5'-3"	22	5u1	4	5'-3"	22

### HEADWALL NOTES:

THIS HEADWALL IS BASED ON A 3:1 SLOPE NORMAL TO CENTERLINE OF ROADWAY.

THE SIDES OF THE FOOTING ARE TO BE FORMED TO INSURE CORRECT LINE AND GRADE.

ALL EXPOSED CORNERS OF 90° OR SHARPER ARE TO BE FILLETED WITH A 3/4" DRESSED AND BEVELED STRIP.

ALL REINFORCING IS TO BE SECURELY WIRED IN PLACE BEFORE THE CONCRETE IS POURED. ALL SLAB AND FLOOR REINFORCING STEEL IS TO BE SUPPORTED BY BAR CHAIRS AT INTERVALS OF NOT MORE THAN 3'-0" IN EITHER DIRECTION AS OUTLINED IN THE STANDARD SPECIFICATIONS.

CLEAR DISTANCE FROM FACE OF CONCRETE TO NEAR REINFORCING BAR IS TO BE 2" UNLESS OTHERWISE NOTED OR SHOWN. CLEARANCE TO THE BOTTOM ENDS OF VERTICAL BARS SHALL BE 3 INCHES.

CONCRETE QUANTITIES ARE ESTIMATED FROM BACK OF PARAPET.

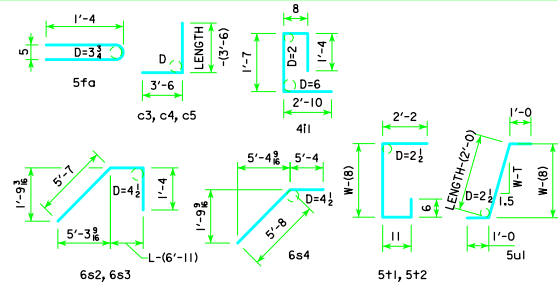
HORIZONTAL TAILS OF BARS "b" & "s" ESTIMATED TO EXTEND 2'-0" BEYOND BACK OF PARAPET (INTO END OF BARREL). LONGITUDINAL BARS "4d1" AND "6f1" ESTIMATED TO PROJECT INTO END SECTION OF BARREL A MINIMUM OF 2'-0" BEYOND BACK OF PARAPET. THE "LENGTH" COLUMN REFLECTS TOTAL NUMBER OF FEET NECESSARY TO MEET THESE REQUIREMENTS.

Δ INCLUDES TOP OF WINGWALL QUANTITIES.

NOTE: WEIGHT OF BARS OVER 40'-0" LONG INCLUDE AN ALLOWANCE OF 2'-0" FOR LAP.

(L) - INDICATES BAR LOCATED AT LEFT CORNER.  
(R) - INDICATES BAR LOCATED AT RIGHT CORNER.  
REFER TO SHEET PW11 0-1-12 FOR LEFT AND RIGHT CORNER LOCATIONS.

### BENT BAR DETAILS



NOTE: ALL DIMENSIONS ARE OUT TO OUT  
D = PIN DIAMETER  
SEE TABLE AT RIGHT FOR PIN DIAMETER "D" OF c BARS

c BAR PIN DIAMETER	
BAR SIZE	D
4	3
5	3 1/2
6	4 1/2

ENGLISH\RFDS\INDS\INGULVERTS.DGN - PW11 0-9-12 - THIS SHEET ISSUED 04-12.

LATEST REVISION DATE

APPROVED BY BRIDGE ENGINEER



**Iowa Department of Transportation**  
Highway Division

STANDARD DESIGN - SINGLE REINFORCED CONCRETE BOX CULVERTS

### PARALLEL WING HEADWALLS

APRIL, 2012

**QUANTITY TABULATION**  
5'-0, 4'-0, & 3'-0 SPANS  
0° SKEW

PW11 0-9-12