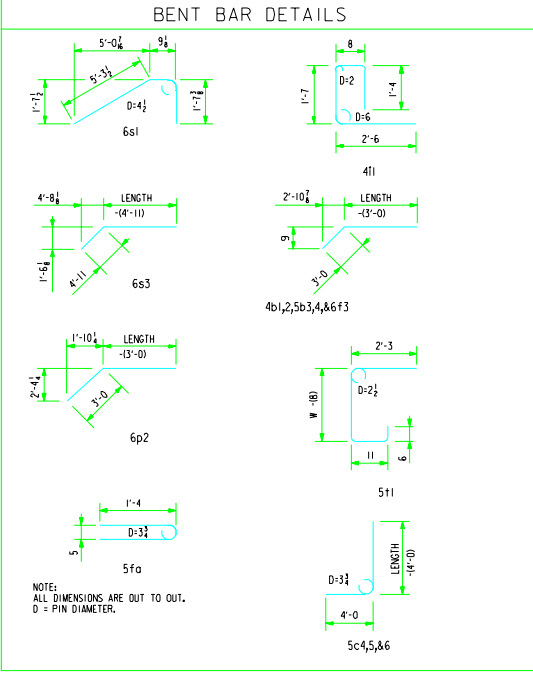


BILL OF REINFORCING FOR ONE HEADWALL 0° SKEW CULVERT SPAN X CULVERT HEIGHT

LOCATION	SHAPE	BAR	12' X 12'			12' X 10'			12' X 8'			12' X 6'			10' X 12'			10' X 10'			10' X 8'			10' X 6'			10' X 5'			10' X 4'			BAR										
			NO.	LENGTH	WT.	NO.	LENGTH	WT.	NO.	LENGTH	WT.	NO.	LENGTH	WT.	NO.	LENGTH	WT.	NO.	LENGTH	WT.	NO.	LENGTH	WT.	NO.	LENGTH	WT.	NO.	LENGTH	WT.	NO.	LENGTH	WT.											
FENCE ANCHOR		5fo	2	3'-1	7	2	3'-1	7	2	3'-1	7	2	3'-1	7	2	3'-1	7	2	3'-1	7	2	3'-1	7	2	3'-1	7	2	3'-1	7	2	3'-1	7	5fo										
WINGWALL, B.F.H.		4b1	2	40'-11	55	2	34'-9	46	2	28'-7	38	2	22'-5	30	2	40'-11	55	2	34'-9	46	2	28'-7	38	2	22'-5	30	2	40'-11	55	2	34'-9	46	2	28'-7	38	2	22'-5	30	2	40'-11	55		
WINGWALL, B.F.L.		4b2	20	VAR	39'-6	342	16	VAR	2 EACH 11'-8 TO 33'-4	240	12	VAR	2 EACH 11'-8 TO 27'-2	156	8	VAR	2 EACH 11'-8 TO 21'-0	87	20	VAR	2 EACH 11'-8 TO 33'-4	342	16	VAR	2 EACH 11'-8 TO 27'-2	240	12	VAR	2 EACH 11'-8 TO 21'-0	156	8	VAR	2 EACH 11'-8 TO 17'-11	59	4	VAR	2 EACH 11'-8 TO 14'-10	35	4b2				
WINGWALL, F.F.H.		5b3	2	40'-11	85	2	34'-9	72	2	28'-7	60	2	22'-5	47	2	40'-11	85	2	34'-9	72	2	28'-7	60	2	22'-5	47	2	40'-11	85	2	34'-9	72	2	28'-7	60	2	22'-5	47	2	40'-11	85		
WINGWALL, F.F.L.		5b4	22	VAR	39'-6	552	18	VAR	2 EACH 8'-7 TO 33'-4	394	14	VAR	2 EACH 8'-7 TO 27'-2	261	10	VAR	2 EACH 8'-7 TO 21'-0	154	22	VAR	2 EACH 8'-7 TO 33'-4	552	18	VAR	2 EACH 8'-7 TO 27'-2	394	14	VAR	2 EACH 8'-7 TO 21'-0	261	10	VAR	2 EACH 8'-7 TO 17'-11	111	6	VAR	2 EACH 8'-7 TO 14'-10	73	5b4				
WINGWALL, F.F.V.		4c1	76	VAR	4'-6	448	64	VAR	2 EACH 2'-10 TO 12'-11	337	52	VAR	2 EACH 2'-10 TO 11'-0	240	40	VAR	2 EACH 2'-10 TO 9'-0	158	76	VAR	2 EACH 2'-9 TO 14'-9	444	64	VAR	2 EACH 2'-9 TO 12'-10	333	52	VAR	2 EACH 2'-9 TO 10'-11	237	40	VAR	2 EACH 2'-9 TO 8'-11	156	32	VAR	2 EACH 2'-9 TO 6'-8	82	4c1				
WINGWALL, F.F.V.		4c2	4	14'-0	37	2	12'-0	16	2	10'-0	13	2	8'-0	11	4	14'-0	37	2	12'-0	16	2	10'-0	13	2	8'-0	11	4	14'-0	37	2	12'-0	16	2	10'-0	13	2	8'-0	11	4	14'-0	37		
WINGWALL, B.F.V.		5c3	12	VAR	4'-6	46	12	VAR	2 EACH 2'-10 TO 12'-11	46	12	VAR	2 EACH 2'-10 TO 11'-0	46	12	VAR	2 EACH 2'-10 TO 9'-0	46	12	VAR	2 EACH 2'-9 TO 14'-9	45	12	VAR	2 EACH 2'-9 TO 12'-10	45	12	VAR	2 EACH 2'-9 TO 10'-11	45	12	VAR	2 EACH 2'-9 TO 8'-11	45	12	VAR	2 EACH 2'-9 TO 6'-8	45	5c3				
WINGWALL, B.F.V.		5c4	64	VAR	8'-10 TO 18'-10	923	52	VAR	2 EACH 8'-10 TO 16'-11	698	40	VAR	2 EACH 8'-10 TO 15'-0	497	28	VAR	2 EACH 8'-10 TO 13'-0	319	64	VAR	2 EACH 8'-9 TO 18'-9	918	52	VAR	2 EACH 8'-9 TO 16'-10	694	40	VAR	2 EACH 8'-9 TO 14'-11	494	28	VAR	2 EACH 8'-9 TO 12'-11	316	20	VAR	2 EACH 8'-9 TO 10'-8	213	14	VAR	2 EACH 8'-9 TO 8'-8	142	5c4
WINGWALL, B.F.V.		5c5	50	10'-6	548	38	10'-6	416	26	10'-6	285	-	-	50	10'-6	548	38	10'-6	416	26	10'-6	285	-	-	50	10'-6	548	38	10'-6	416	26	10'-6	285	-	-	50	10'-6	548					
WINGWALL, B.F.V.		5c6	4	18'-10	79	2	16'-11	35	2	15'-0	31	2	12'-8	26	4	18'-10	79	2	16'-11	35	2	15'-0	31	2	12'-8	26	4	18'-10	79	2	16'-11	35	2	15'-0	31	2	12'-8	26	4	18'-10	79		
APRON, LONGIT., BOTTL.		4a1	8	23'-6	147	8	23'-6	126	8	19'-6	104	8	15'-6	83	7	23'-6	129	7	19'-6	91	7	15'-6	72	7	13'-6	63	7	11'-6	54	4	11'-6	54	4	11'-6	54	4	11'-6	54					
APRON, LONGIT., BOTTL.		4a2	6	35'-8	143	6	29'-6	118	6	23'-5	94	6	17'-4	69	6	35'-8	143	6	29'-6	118	6	23'-5	94	6	17'-4	69	6	35'-8	143	6	29'-6	118	6	23'-5	94	6	17'-4	69					
APRON, LONGIT., TOP		6f1	12	27'-6	496	12	23'-6	424	12	19'-6	351	12	15'-6	279	10	27'-6	413	10	23'-6	353	10	19'-6	293	10	15'-6	233	10	13'-6	203	10	11'-6	173	6f1										
APRON, LONGIT., TOP		6f2	14	VAR	23'-3	318	12	VAR	2 EACH 4'-0 TO 19'-3	108	10	VAR	2 EACH 4'-0 TO 15'-3	147	6	VAR	2 EACH 5'-0 TO 23'-3	226	10	VAR	2 EACH 4'-4 TO 19'-3	147	6	VAR	2 EACH 3'-9 TO 11'-3	77	6	VAR	2 EACH 3'-9 TO 9'-3	59	4	VAR	2 EACH 4'-5 TO 7'-3	35	6f2								
APRON, LONGIT., TOP		6f3	2	40'-11	123	2	34'-9	104	2	28'-7	86	2	22'-5	67	2	40'-11	123	2	34'-9	104	2	28'-7	86	2	22'-5	67	2	40'-11	123	2	34'-9	104	2	28'-7	86	2	22'-5	67					
PARAPET, VERTICAL		4i1	25	6'-1	102	25	6'-1	102	25	6'-1	102	25	6'-1	102	25	6'-1	102	25	6'-1	102	25	6'-1	102	25	6'-1	102	25	6'-1	102	25	6'-1	102	25	6'-1	102	25	6'-1	102					
PARAPET, HORIZONTAL		7j1	4	13'-8	112	4	13'-4	109	4	13'-4	109	4	13'-2	108	4	13'-8	112	4	13'-4	109	4	13'-4	109	4	13'-2	108	4	13'-8	112	4	13'-4	109	4	13'-4	109	4	13'-2	108					
APRON, TRANS., TOP		6m1	24	VAR	13'-10 TO 26'-3	4023	29	VAR	13'-6 TO 24'-0	817	23	VAR	13'-4 TO 21'-9	609	18	VAR	13'-4 TO 19'-9	447	34	VAR	11'-6 TO 24'-3	921	29	VAR	11'-6 TO 22'-0	730	23	VAR	11'-6 TO 19'-9	540	18	VAR	11'-6 TO 17'-8	392	15	VAR	11'-6 TO 16'-7	314	13	VAR	11'-6 TO 15'-10	265	6m1
APRON, TRANS., BOTTL.		6m2	24	VAR	7'-9 TO 19'-3	486	20	VAR	7'-9 TO 17'-3	376	16	VAR	7'-9 TO 15'-3	276	12	VAR	7'-9 TO 13'-3	189	24	VAR	5'-9 TO 15'-3	414	20	VAR	5'-9 TO 13'-3	315	16	VAR	5'-9 TO 11'-3	228	12	VAR	5'-9 TO 10'-3	153	10	VAR	5'-9 TO 9'-3	120	8	VAR	5'-9 TO 8'-3	90	6m2
CURTAIN, HORIZONTAL		6p1	4	12'-6	75	4	12'-6	75	4	12'-6	75	4	12'-6	75	4	10'-6	63	4	10'-6	63	4	10'-6	63	4	10'-6	63	4	10'-6	63	4	10'-6	63	4	10'-6	63	4	10'-6	63					
CURTAIN, HORIZONTAL		6p2	8	18'-7	223	8	16'-1	193	8	13'-7	163	8	11'-10	142	8	18'-7	223	8	16'-1	193	8	13'-7	163	8	11'-10	142	8	18'-7	223	8	16'-1	193	8	13'-7	163	8	11'-10	142					
WING SLOPE, BOTH F.		6s1	4	7'-8	46	4	7'-8	46	4	7'-8	46	4	7'-8	46	4	7'-8	46	4	7'-8	46	4	7'-8	46	4	7'-8	46	4	7'-8	46	4	7'-8	46	4	7'-8	46	4	7'-8	46					
WING SLOPE, BOTH F.		6s2	4	37'-6	225	4	31'-0	186	4	24'-6	147	4	18'-0	108	4	37'-6	225	4	31'-0	186	4	24'-6	147	4	18'-0	108	4	37'-6	225	4	31'-0	186	4	24'-6	147	4	18'-0	108					
WING SLOPE, F.F.		6s3	2	42'-9	128	2	36'-3	109	2	29'-9	89	2	23'-3	70	2	42'-9	128	2	36'-3	109	2	29'-9	89	2	23'-3	70	2	42'-9	128	2	36'-3	109	2	29'-9	89	2	23'-3	70					
CURTAIN, VERT.		5h1	32	8'-0	267	28	7'-6	219	24	7'-0	175	20	6'-6	136	30	8'-0	250	26	7'-6	203	22	7'-0	161	18	6'-6	122	16	6'-6	108	14	6'-6	95	5h1										
ESTIMATED QUANTITIES ONE HEADWALL		REINF. STEEL	7036 lbs.			5537 lbs.			4207 lbs.			2883 lbs.			6687 lbs.			5232 lbs.			3953 lbs.			2670 lbs.			2215 lbs.			1816 lbs.													
		CONCRETE	1.8			1.6			1.6			1.5			1.6			1.5			1.4			1.4			1.4			1.5													
		PARAPET	63.9			45.6			33.8			22.6			16.6			9.5			5.0			2.5			1.5			1.5													
		WINGWALLS	22.2			13.4			9.1			5.0			2.2			1.4			0.9			0.5			0.3			0.2													
		FOOTINGS	39.9			30.6			23.1			16.1			9.7			5.7			3.7			2.3			1.4			0.9													



NOTE: INCLUDES TOP OF WINGWALL QUANTITIES. WEIGHT OF BARS OVER 40'-0 LONG INCLUDE AN ALLOWANCE OF 2'-0 FOR LAP.

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 "d", "6f1", AND "6f2" 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.

NOTES:
 1. SEE DRAWING RCB-01-87 FOR GENERAL INFORMATION, SPECIFICATIONS, AND DESIGN STRESSES.

LATEST REVISION DATE: 1-1-98
 APPROVED BY: *William A. Ruppert*
 STANDARD DESIGN
FLARED WING HEADWALLS
 FOR REINFORCED CONCRETE BOX CULVERTS
 HIGHWAY DIVISION
 IOWA DEPARTMENT OF TRANSPORTATION
 MAY, 1987

FWH 0-1-87

REVISED 1/88-BEND DIMENSIONS OF #30, #31, #32, #33, #34, #35, #36, #37, #38, #39, #40, #41, #42, #43, #44, #45, #46, #47, #48, #49, #50, #51, #52, #53, #54, #55, #56, #57, #58, #59, #60, #61, #62, #63, #64, #65, #66, #67, #68, #69, #70, #71, #72, #73, #74, #75, #76, #77, #78, #79, #80, #81, #82, #83, #84, #85, #86, #87, #88, #89, #90, #91, #92, #93, #94, #95, #96, #97, #98, #99, #100, #101, #102, #103, #104, #105, #106, #107, #108, #109, #110, #111, #112, #113, #114, #115, #116, #117, #118, #119, #120, #121, #122, #123, #124, #125, #126, #127, #128, #129, #130, #131, #132, #133, #134, #135, #136, #137, #138, #139, #140, #141, #142, #143, #144, #145, #146, #147, #148, #149, #150, #151, #152, #153