Estimate of Quantities - Flume Basin

Bill of Reinforcing Steel			14' x 4'				14' x 5'				14' x 6'				14' x 7'				14' x 8'			
Bar	Location	Shape	Size	No.	Length	Weight	Size	No.	Length	Weight	Size	No.	Length	Weight	Size	No.	Length	Weight	Size	No.	Length	Weight
5a1	Walls - Vert. - F.F.		5	30	2'-8";6'-2"	138	5	32	3'-5";7'-2"	177	5	34	4'-3";8'-2"	220	5	36	5'-0";9'-3"	268	5	38	5'-9";10'-3"	317
5b1	Walls - Longit.- F.F. & B.F.		5	12	16'-5"	205	5	16	17'-6"	292	5	20	18'-7"	388	5	20	19'-7"	409	5	24	20'-8"	517
5b2	Walls - Longit.- F.F. & B.F.		5	4	15'-1"	63	5	4	16'-1"	67	5	4	17'-5"	73	5	8	18'-5"	154	5	8	19'-5"	162
c1	Walls - Vert. - B.F.		5	27	27'-3";27'-6"	771	5	21	29'-3";29'-7"	644	5	15	31'-5";31'-8"	493	5	9	33'-5";33'-8"	315	5	3	35'-7";35'-10"	112
c2	Walls - Vert. - B.F.		5	2	21'-7";21'-10"	45	5	10	21'-7";23'-10"	237	5	18	21'-7";25'-10"	445	5	26	21'-7";27'-10"	670	5	34	21'-9";30'-0"	918
c3	Walls - Vert. - B.F.		5	4	4'-10";5'-0"	21	5	20	4'-10";6'-0"	113	5	36	4'-11";7'-0"	224	5	52	4'-11";8'-1"	353	5	68	4'-11";9'-1"	496
6f1	Floor - Longit.- Top		6	22	14'-8"	485	6	23	15'-8"	541	6	23	16'-11"	584	6	24	17'-11"	646	6	24	18'-11"	682
5f2	Floor - Longit.- Bott.		5	22	14'-8"	337	5	23	15'-8"	376	5	23	16'-11"	406	5	24	17'-11"	448	5	24	18'-11"	474
5g1	Curtain Bracket - Vert.		5	4	5'-6"	23	5	4	5'-6"	23	5	4	5'-9"	24	5	4	6'-0"	25	5	4	6'-3"	26
5h1	Basin Backwall - Vert.		5	16	7'-10"	131	5	16	8'-4"	139	5	16	9'-1"	152	5	16	9'-7"	160	5	16	10'-1"	168
6m1	Floor Trans. - Top		6	20	15'-4";22'-5"	567	6	21	15'-5";22'-11"	605	6	22	15'-7";23'-5"	644	6	24	15'-4";23'-11"	707	6	25	15'-7";24'-7"	754
6p1	Curtain - Trans.		6	2	22'-4",22'-6"	67	6	2	22'-10",23'-0"	69	6	2	23'-3",23'-6"	70	6	2	23'-9",24'-0"	72	6	2	24'-5",24'-8"	74
6s1	Wall - Top Slope		6	4	16'-8"	100	6	4	17'-9"	107	6	4	18'-10"	113	6	4	19'-10"	119	6	4	20'-11"	126
5t1	Curtain - Vert.		5	18	6'-4"	119	5	18	6'-4"	119	5	19	6'-7"	130	5	19	6'-10"	135	5	19	7'-1"	140
Total Weight (LB)						3072				3509				3966				4481				4966
Concrete (CY)	Footing		15.5				16.6				18.5				19.9				21.6			
	Walls		2.6				3.6				4.7				5.7				7.9			
	Total		18.1				20.2				23.2				25.6				29.5			

Bill of Reinforcing Steel			14' x 9'				14' x 10'				14' x 11'				14' x 12'			
Bar	Location	Shape	Size	No.	Length	Weight	Size	No.	Length	Weight	Size	No.	Length	Weight	Size	No.	Length	Weight
5a1	Walls - Vert. - F.F.		5	40	6'-6";11'-3"	370	5	42	7'-4";12'-3"	429	5	44	8'-1";13'-4"	491	5	46	8'-10";14'-4"	556
5b1	Walls - Longit.- F.F. & B.F.		5	28	21'-9"	635	5	32	22'-9"	759	5	32	23'-10"	795	5	36	24'-11"	936
5b2	Walls - Longit.- F.F. & B.F.		5	8	20'-6"	171	5	8	21'-6"	179	5	12	22'-7"	283	5	12	23'-7"	295
c1	Walls - Vert. - B.F.		–	--	–	--	--	--	–	–	--	--	--	--	--	--	--	--
c2	Walls - Vert. - B.F.		5	39	21'-9";31'-3"	1078	6	41	22'-7";32'-7"	1699	7	43	23'-7";34'-1"	2534	7	45	23'-9";34'-9"	2690
c3	Walls - Vert. - B.F.		5	78	5'-4";10'-1"	627	6	82	6'-2";11'-1"	1062	7	86	6'-11";12'-2"	1677	7	90	7'-8";13'-2"	1916
6f1	Floor - Longit.- Top		6	25	19'-11"	748	6	25	20'-11"	785	6	26	21'-11"	856	6	26	22'-11"	895
5f2	Floor - Longit.- Bott.		5	25	19'-11"	519	5	25	20'-11"	545	5	26	21'-11"	594	5	26	22'-11"	621
5g1	Curtain Bracket - Vert.		5	4	6'-5"	27	5	4	6'-8"	28	5	4	6'-11"	29	5	4	7'-2"	30
5h1	Basin Backwall - Vert.		5	16	10'-7"	177	5	16	11'-1"	185	5	16	11'-7"	193	5	17	12'-1"	214
6m1	Floor Trans. - Top		6	26	15'-9";25'-1"	797	6	28	15'-6";25'-7"	864	6	29	15'-9";26'-3"	915	6	30	16'-1";26'-11"	969
6p1	Curtain - Trans.		6	2	24'-11",25'-2"	75	6	2	25'-5",25'-8"	77	6	2	26'-1",26'-4"	79	6	2	26'-9",27'-0"	81
6s1	Wall - Top Slope		6	4	22'-0"	132	6	4	23'-0"	138	6	4	24'-1"	145	6	4	25'-2"	151
5t1	Curtain - Vert.		5	20	7'-4"	153	5	20	7'-7"	158	5	21	7'-10"	172	5	21	8'-1"	177
Total Weight (LB)						5509				6908				8763				9531
Concrete (CY)	Footing		23.1				24.7				26.5				28.4			
	Walls		9.4				11.0				14.1				17.6			
	Total		32.5				35.7				40.6				46.0			

Estimate of Quantities - Flume Basin

Bill of Reinforcing Steel			14' x 13'				14' x 14'			
Bar	Location	Shape	Size	No.	Length	Weight	Size	No.	Length	Weight
5a1	Walls - Vert. - F.F.		5	48	9'-8";15'-4"	626	5	50	10'-6";16'-5"	702
5b1	Walls - Longit.- F.F. & B.F.		5	40	26'-0"	1085	5	44	27'-0"	1239
5b2	Walls - Longit.- F.F. & B.F.		5	12	24'-7"	308	5	12	25'-8"	321
c1	Walls - Vert. - B.F.		--	--	--	--	--	--	--	--
c2	Walls - Vert. - B.F.		8	47	24'-5";35'-11"	3786	8	49	24'-9";36'-9"	4023
c3	Walls - Vert. - B.F.		8	94	8'-6";14'-2"	2844	8	98	9'-3";15'-2"	3194
6f1	Floor - Longit.- Top		6	27	23'-11"	970	6	27	24'-11"	1010
5f2	Floor - Longit.- Bott.		5	27	23'-11"	674	5	27	24'-11"	702
5g1	Curtain Bracket - Vert.		5	4	7'-4"	31	5	4	7'-7"	32
5h1	Basin Backwall - Vert.		5	17	12'-7"	223	5	17	13'-0"	231
6m1	Floor Trans. - Top		6	32	15'-10";27'-5"	1039	6	33	16'-1";28'-1"	1095
6p1	Curtain - Trans.		6	2	27'-3",27'-6"	82	6	2	27'-11",28'-3"	84
6s1	Wall - Top Slope		6	4	26'-3"	158	6	4	27'-3"	164
5t1	Curtain - Vert.		5	22	8'-4"	191	5	22	8'-7"	197
Total Weight (LB)						12,017				12,994
Concrete (CY)	Footing		30.1				33.7			
	Walls		20.0				24.4			
	Total		50.1				58.1			

Variable Dimensions

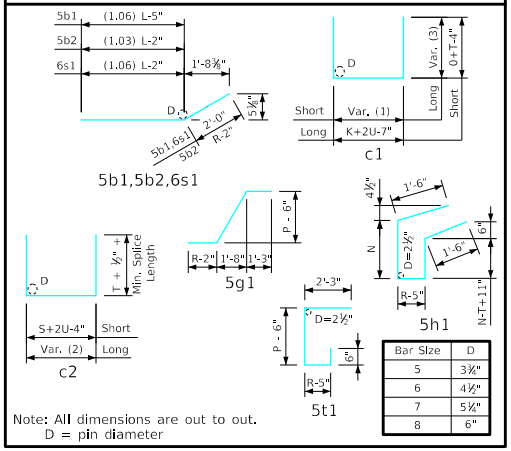
Variable (1)	$K+2U-4" - \frac{(K-S)\ (\text{No. of c1} - 1)}{\text{No. of c1} + \text{c2} - 1}$
Variable (2)	$S+2U-4" + \frac{(K-S)\ (\text{No. of c2} - 1)}{\text{No. of c1} + \text{c2} - 1}$
Variable (3)	$O+T-4" + \frac{(N+V-O)\ (\text{No. of c1} - 1)}{\text{No. of c1} + \text{c2} - 1}$

Table of Flume Basin Dimensions

S x H	K	L	M	N	O	P	R	T	U	V
14' x 4'	21'-0"	14'-0"	3'-0"	2'-3"	1'-10"	3'-6"	1'-0"	1'-2"	9"	3'-1⅛"
14' x 5'	21'-6"	15'-0"	3'-9"	2'-6"	2'-7"	3'-6"	1'-0"	1'-2"	9"	3'-10⅜"
14' x 6'	22'-0"	16'-0"	4'-6"	2'-9"	3'-5"	3'-6"	1'-3"	1'-2"	9"	4'-7⅝"
14' x 7'	22'-6"	17'-0"	5'-3"	3'-0"	4'-2"	3'-9"	1'-3"	1'-2"	9"	5'-5"
14' x 8'	23'-0"	18'-0"	6'-0"	3'-3"	4'-11"	4'-0"	1'-3"	1'-2"	10"	6'-2¼"
14' x 9'	23'-6"	19'-0"	6'-9"	3'-6"	5'-8"	4'-3"	1'-3"	1'-2"	10"	6'-11½"
14' x 10'	24'-0"	20'-0"	7'-6"	3'-9"	6'-6"	4'-6"	1'-3"	1'-2"	10"	7'-8¾"
14' x 11'	24'-6"	21'-0"	8'-3"	4'-0"	7'-3"	4'-9"	1'-3"	1'-2"	11"	8'-6"
14' x 12'	25'-0"	22'-0"	9'-0"	4'-3"	8'-0"	5'-0"	1'-3"	1'-2"	1'-0"	9'-3⅜"
14' x 13'	25'-6"	23'-0"	9'-9"	4'-6"	8'-10"	5'-3"	1'-3"	1'-2"	1'-0"	10'-0⅝"
14' x 14'	26'-0"	24'-0"	10'-6"	4'-9"	9'-7"	5'-6"	1'-3"	1'-3"	1'-1"	10'-9⅞"

S = Culvert Span
H = Culvert Height

Bent Bar Details



Bar Size	D
5	3⅜"
6	4½"
7	5⅛"
8	6"

Note: All dimensions are out to out.
D = pin diameter

Note:
See Sheet RCFB 09-20 for flume basin details and notes.

LATEST REVISION DATE

APPROVED BY BRIDGE ENGINEER

IOWA DOT Highway Division

Standard Design

Single Reinforced Concrete Box Culverts

December, 2020

Flume Basin Details

14'-0" Span

RCFB 08-20

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