

Flume Notes:

- Reinforcing bar clearances will be as follows:
 Edge clearances: 2" except
 Top of floor 2¼" to near transverse reinforcing bar
 Bottom of floor 3½" to near transverse reinforcing bar
 End clearances:
 Vertical top 2"
 Vertical bottom 3½"
 Transverse 2"
- Floor of flume is to be finished smooth. Sides of footing are to be formed to ensure correct line and grade.
- All floor reinforcing steel is to be supported at intervals of not more than 3'-0" in either direction as outlined in the Standard Specifications.
- The vertical bars in the walls may be spliced above the footing at the contractor's option as follows:

Bar Size Number	4	5	6	7	8
Minimum Splice Length	20"	24"	29"	34"	38"

This splice, if used will be at the contractor's expense.

- Beveled 2"x4" keyways are to be used for 9" and 10" walls and 2"x6" keyways are used for 11" and greater wall thickness.
- Keyway dimensions shown on the plans are based on nominal dimensions unless stated otherwise. In addition, the bevel used on the keyway shall be limited to a maximum of 10 degrees from vertical.
- These flume standards label all reinforcing steel with English notation (5a1 is ⅝ inch diameter bar). English reinforcing received in the field may display the following "bar designation". The "bar designation" is the stamped impression on the reinforcing bars, and is equivalent to the bar diameter in millimeters.

English Size	4	5	6	7	8
Bar Designation	13	16	19	22	25

General Considerations:

The flume standards, when used in combination with a properly completed Situation Plan and the appropriate Standard Sheet 1070 series will provide structural plans and the flume "Estimated Project Quantities".



Specifications:

Design:
 AASHTO LRFD Bridge Design Specifications, 8th Ed., Series of 2017.

Construction:
 Iowa Department of Transportation Standard Specifications for Highway and Bridge Construction, current series, plus applicable General Supplemental Specifications, Developmental Specifications, Supplemental Specifications and Special Provisions

Design Stresses:

Design stresses for the following materials are in accordance with the AASHTO LRFD Bridge Design Specifications, 8th Ed., Series of 2017:
 Reinforcing steel in accordance with AASHTO LRFD Section 5, Grade 60.
 Concrete in accordance with AASHTO LRFD Section 5, f'c = 4.0 ksi.

LATEST REVISION DATE	 APPROVED BY BRIDGE ENGINEER		
		Standard Design Single Reinforced Concrete Box Culverts December, 2020	
		Reinforced Concrete Flume Details Quantities and Notes	RCF 01-20

ENGLISHIGNEDFLUMES.DGN - RCF 02-20 - THIS SHEET ISSUED 12-2020.

Table of Flume Dimensions

Table with 12 columns (S x H, K, M, V (3:1), V (4:1), L, N, O, P, R, T, U) and 30 rows of dimensions for various culvert sizes and slopes.

Table of Flume Concrete (CY)

Table with 12 columns (Culv. Size S x H, 3:1 Slope Flume, 4:1 Slope Flume) and 30 rows of concrete quantities for walls, footing, stub curtain, and basin curtain.

Note: L3 concrete quantities assume a 1.000° angle "C".

S = Culvert Span
H = Culvert Height

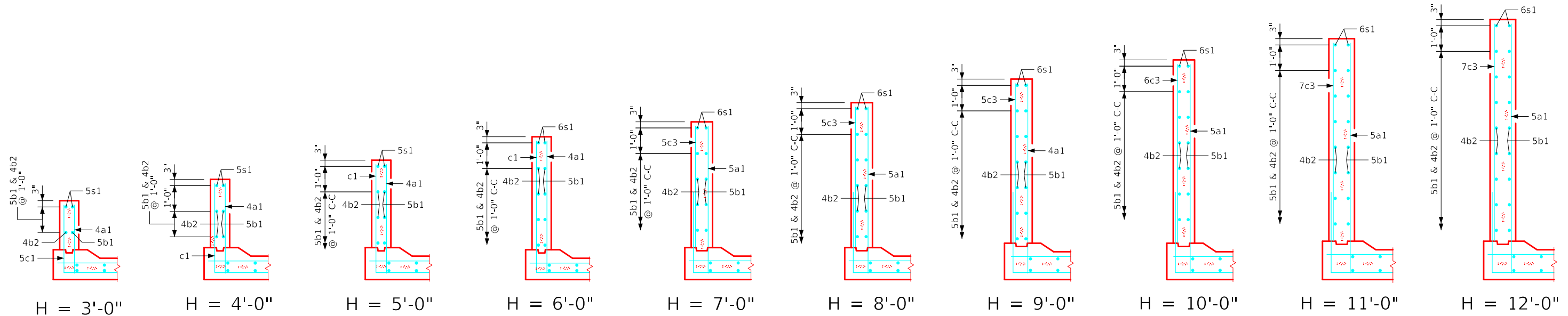
Table of Flume Reinforcing

Table with 6 columns (Bar, c1, c2, f1, f2, h1, m1) and 14 rows of reinforcing bar specifications for flume spans and heights.

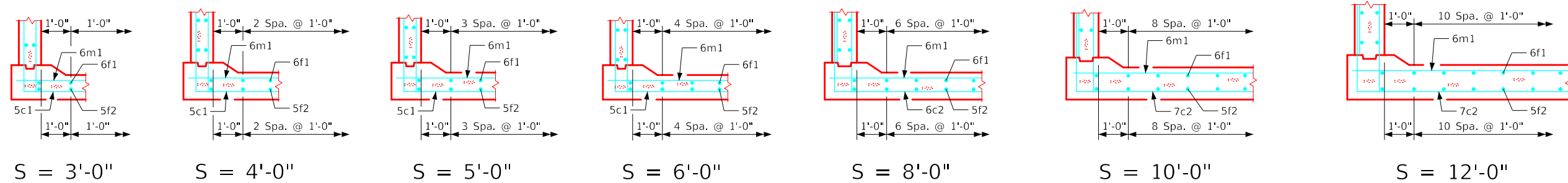
Note: The respective bar size and spacing should be used for appropriate flume size when the span and height are different.

Logo for IOWA DOT Highway Division, Standard Design Single Reinforced Concrete Box Culverts, December 2020, Reinforced Concrete Flume Details, Quantities and Notes, RCF 02-20.

ENGLISHIGNEDFLUMES.DGN - RCF 03-20 - THIS SHEET ISSUED 12-2020.

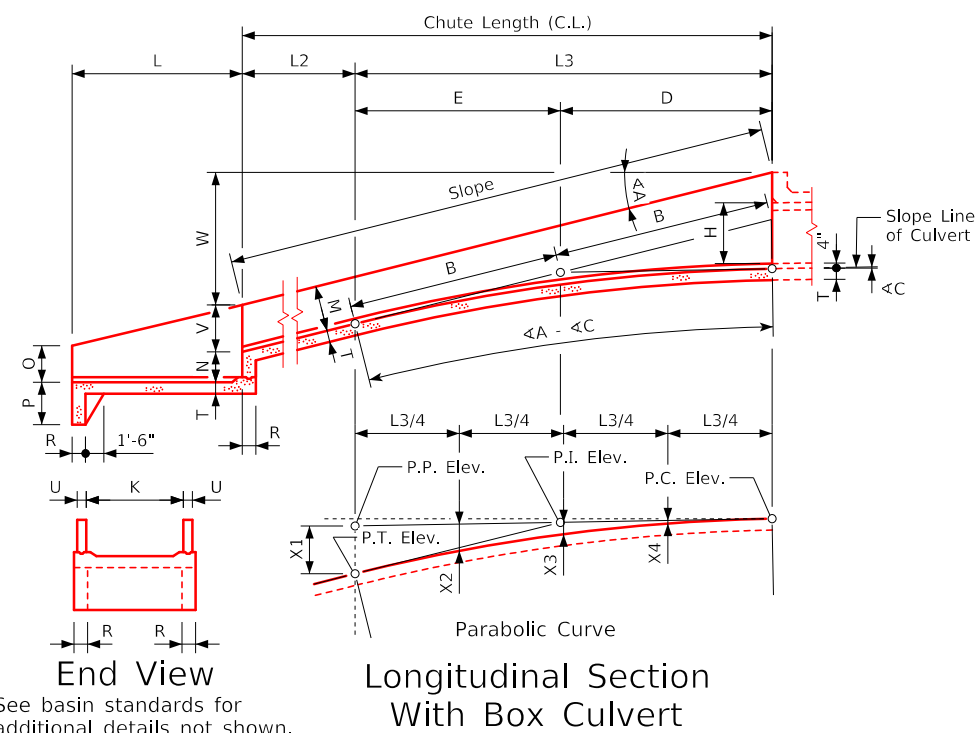


Flume Wall Sections
(Normal to Flowline)

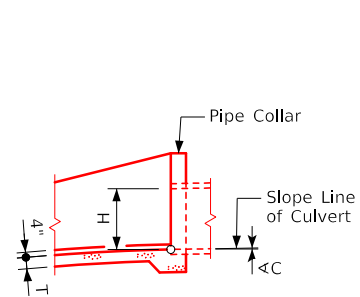


Flume Floor Half Sections
(Normal to Flowline)

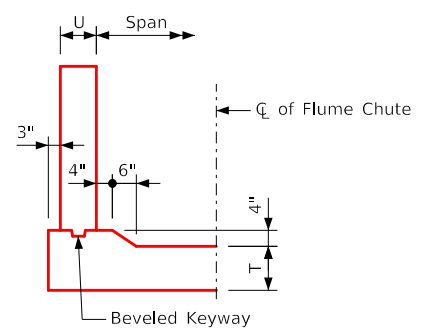
Note:
Mix and match detailed floors and detailed walls for appropriate flume size. This Standard includes connection to a RCB Culvert (Typ.). Connection to concrete pipe shall require case by case design and is not part of this Standard.



Longitudinal Section With Box Culvert



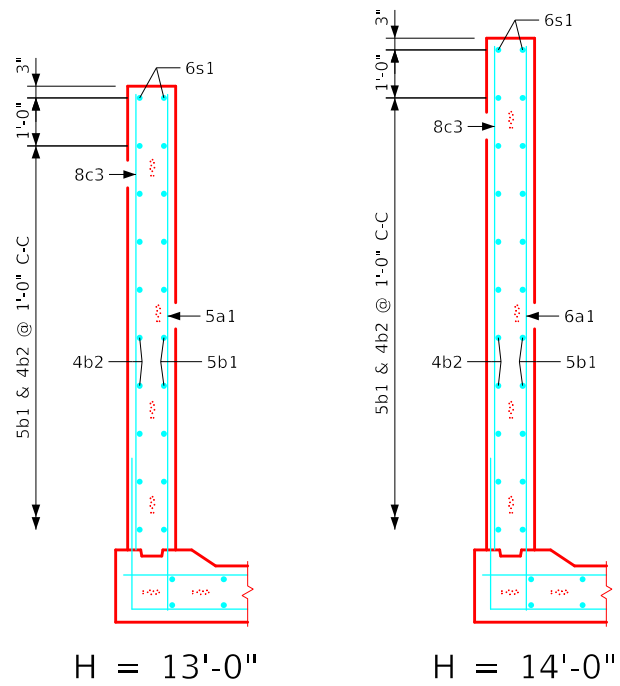
Longitudinal Section With Pipe Culvert



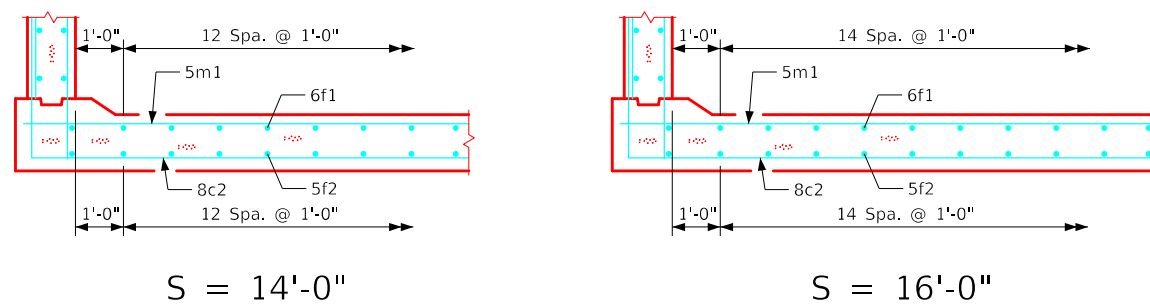
Flume Chute Details
(Normal to Flowline)

Note: See sheet RCF 04-20 for additional span and height details.

LATEST REVISION DATE	 APPROVED BY BRIDGE ENGINEER	 Standard Design Single Reinforced Concrete Box Culverts December, 2020	
		Reinforced Concrete Flume Details Details	RCF 03-20



Flume Wall Sections
(Normal to Flowline)



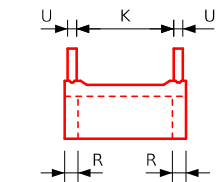
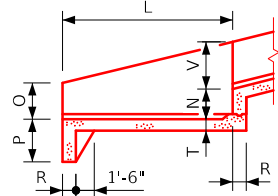
Flume Floor Half Sections
(Normal to Flowline)

Note:
Mix and match detailed floors and detailed walls for appropriate flume size. This Standard includes connection to a RCB Culvert (Typ.). Connection to concrete pipe shall require case by case design and is not part of this Standard.

Note: See sheet RCF 03-20 for additional span and height details.

ENGLISHIGNEDFLUMES.DGN - RCF 04-20 - THIS SHEET ISSUED 12-2020.

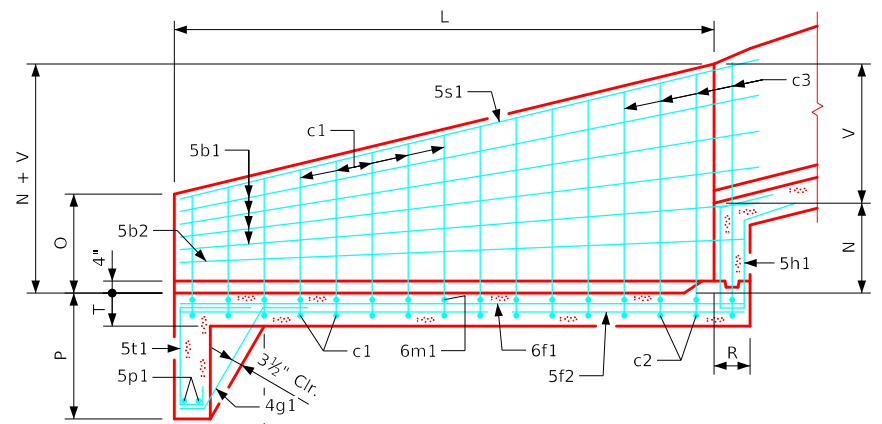
LATEST REVISION DATE	 APPROVED BY BRIDGE ENGINEER		
		Standard Design Single Reinforced Concrete Box Culverts December, 2020	
		Reinforced Concrete Flume Details Details	RCF 04-20



End Details

Estimate of Quantities - Flume Basin

Bill of Reinforcing Steel			3' x 3'			4' x 4'			5' x 3'			5' x 4'			5' x 5'			5' x 6'								
Bar	Location	Shape	Size	No.	Length	Weight	Size	No.	Length	Weight	Size	No.	Length	Weight	Size	No.	Length	Weight	Size	No.	Length	Weight				
4a1	Walls - Vert. - F.F.	└─┘	4	28	1'-8":4'-10"	61	4	30	2'-5":5'-11"	84	4	28	1'-8":4'-10"	61	4	30	2'-5":5'-11"	84	4	32	3'-2":6'-11"	108	4	34	4'-0":7'-11"	135
5b1	Walls - Longit.- F.F. & B.F.	└─┘	5	8	15'-4"	128	5	12	16'-5"	205	5	8	15'-4"	128	5	12	16'-5"	205	5	16	17'-6"	292	5	16	18'-7"	310
5b2	Walls - Longit.- F.F. & B.F.	└─┘	5	4	13'-10"	58	5	4	15'-1"	63	5	4	13'-10"	58	5	4	15'-1"	63	5	4	16'-1"	67	5	8	17'-5"	145
c1	Walls - Vert. - B.F.	└─┘	5	14	13'-9":14'-0"	203	5	15	16'-9":17'-0"	264	5	14	15'-9":16'-0"	232	5	15	17'-9":18'-0"	280	5	12	19'-9":20'-1"	249	6	9	21'-11":22'-2"	298
c2	Walls - Vert. - B.F.	└─┘	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5	4	12'-1":13'-7"	54
c3	Walls - Vert. - B.F.	└─┘	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5	8	5'-3":6'-0"	47
6f1	Floor - Longit.- Top	└─┘	6	11	13'-5"	222	6	12	14'-8"	264	6	13	13'-5"	262	6	13	14'-8"	286	6	14	15'-8"	329	6	14	16'-11"	356
5f2	Floor - Longit.- Bott.	└─┘	5	11	13'-5"	154	5	12	14'-8"	184	5	13	13'-5"	182	5	13	14'-8"	199	5	14	15'-8"	229	5	14	16'-11"	247
4g1	Curtain Bracket - Vert.	└─┘	4	4	5'-3"	14	4	4	5'-6"	15	4	4	5'-3"	14	4	4	5'-6"	15	4	4	5'-6"	15	4	4	5'-9"	15
5h1	Basin Backwall - Vert.	└─┘	5	5	7'-4"	38	5	6	8'-1"	51	5	7	7'-4"	54	5	7	8'-1"	59	5	7	8'-7"	63	5	7	9'-4"	68
6m1	Floor Trans. - Top	└─┘	6	14	4'-8":10'-11"	164	6	15	5'-8":12'-5"	204	6	14	6'-8":12'-11"	206	6	15	6'-8":13'-11"	226	6	16	6'-8":13'-11"	247	6	17	6'-8":14'-5"	269
5p1	Curtain - Trans.	└─┘	5	2	11'-0"	23	5	2	12'-4":12'-6"	26	5	2	13'-0"	27	5	2	13'-4":13'-6"	28	5	2	13'-10":14'-0"	29	5	2	14'-3":14'-6"	30
5s1	Wall - Top Slope	└─┘	5	4	15'-7"	65	5	4	16'-8"	70	5	4	15'-7"	65	5	4	16'-8"	70	5	4	17'-9"	74	5	4	18'-10"	79
5t1	Curtain - Vert.	└─┘	5	9	6'-1"	57	5	10	6'-4"	66	5	10	6'-1"	63	5	11	6'-4"	73	5	11	6'-4"	73	5	11	6'-7"	76
Total Weight (LB)						1187				1496				1352				1588				1876			2351	
Concrete (CY)																										
Footing					5.3				6.8				6.4				7.4					8.0			9.1	
Walls					1.8				2.6				1.9				2.6					3.6			4.7	
Total					7.1				9.4				8.3				10.0					11.6			13.8	



Longitudinal Section

Variable Dimensions

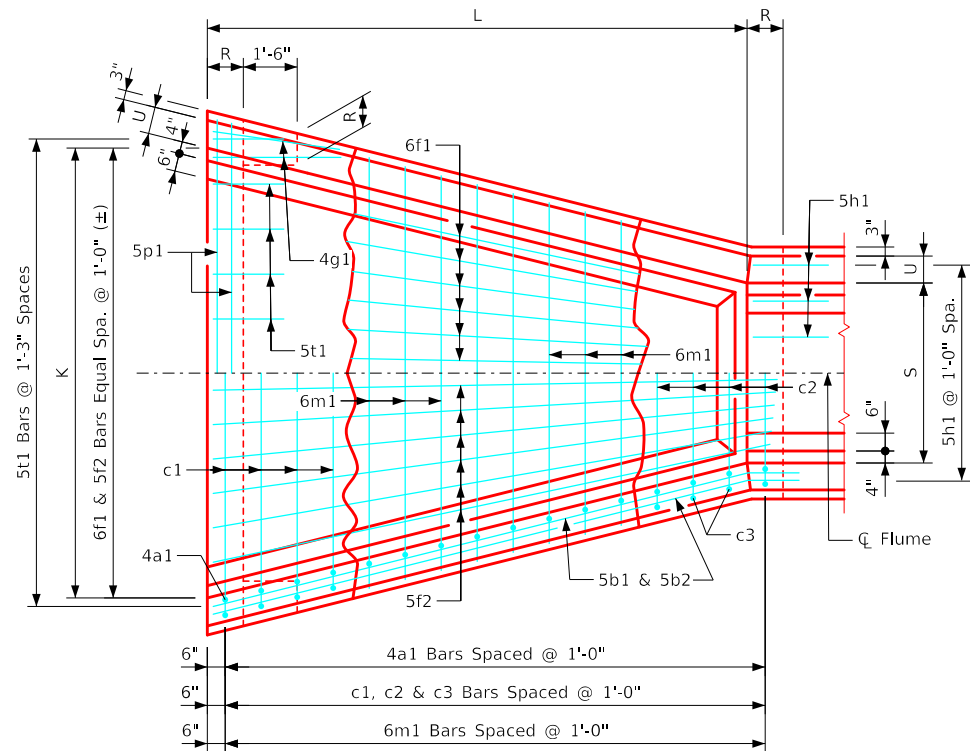
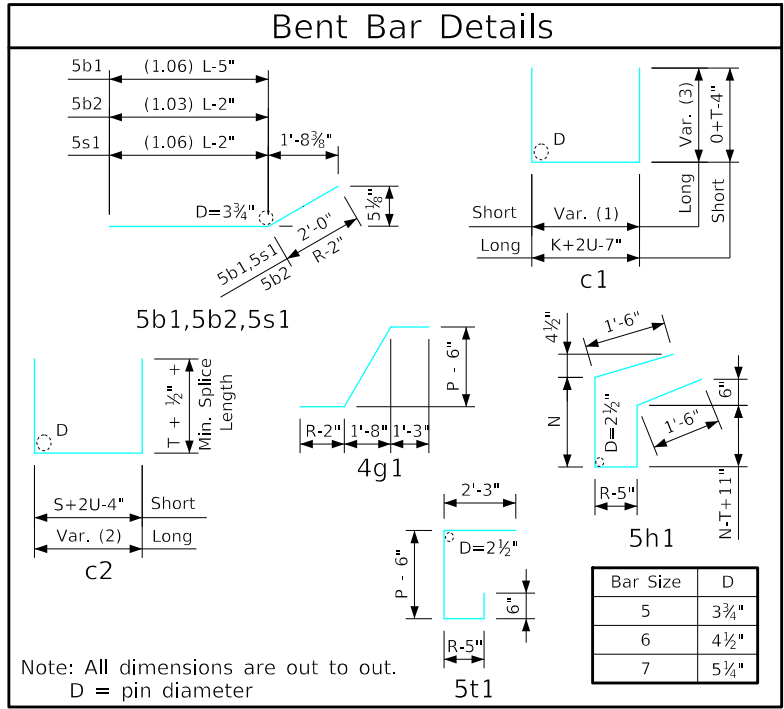
Variable (1)	$K+2U-4"$ (K-S) (No. of c1 - 1) No. of c1 + c2 - 1
Variable (2)	$S+2U-4"$ (K-S) (No. of c2 - 1) No. of c1 + c2 - 1
Variable (3)	$O+T-4"$ (N+V-O) (No. of c1 - 1) No. of c1 + c2 - 1

Table of Flume Basin Dimensions

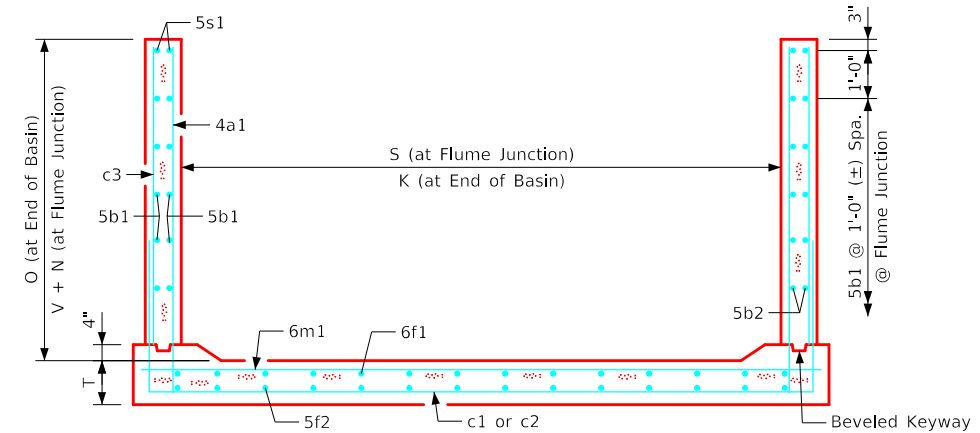
S x H	K	L	M	N	O	P	R	T	U	V
3' x 3'	9'-6"	13'-0"	2'-3"	2'-0"	1'-1"	3'-6"	9"	11"	9"	2'-3 $\frac{3}{8}$ "
4' x 4'	11'-0"	14'-0"	3'-0"	2'-3"	1'-10"	3'-6"	1'-0"	11"	9"	3'-1 $\frac{1}{8}$ "
5' x 3'	11'-6"	13'-0"	2'-3"	2'-0"	1'-1"	3'-6"	9"	11"	9"	2'-3 $\frac{3}{8}$ "
5' x 4'	12'-0"	14'-0"	3'-0"	2'-3"	1'-10"	3'-6"	1'-0"	11"	9"	3'-1 $\frac{1}{8}$ "
5' x 5'	12'-6"	15'-0"	3'-9"	2'-6"	2'-7"	3'-6"	1'-0"	11"	9"	3'-10 $\frac{3}{8}$ "
5' x 6'	13'-0"	16'-0"	4'-6"	2'-9"	3'-5"	3'-6"	1'-3"	11"	9"	4'-7 $\frac{3}{8}$ "

S = Culvert Span
H = Culvert Height

- ### Flume Basin Notes:
- See Sheet RCFB 01-20 for general information.
 - c2 & c3 bars are lapped.



Plan View



5'-0" x 5'-0" Flume Basin Example Shown

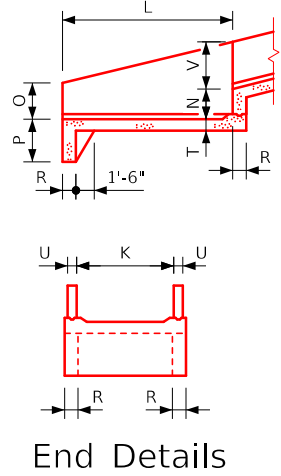
LATEST REVISION DATE

Standard Design
Single Reinforced Concrete Box Culverts
December, 2020

Flume Basin Details
3'-0", 4'-0" & 5'-0" Spans

RCFB 01-20

ENGLISHIGNEDFLUMES.DGN - RCFB 01-20 - THIS SHEET ISSUED 12-2020.



Estimate of Quantities - Flume Basin

Bill of Reinforcing Steel			6' x 3'		6' x 4'		6' x 5'		6' x 6'		6' x 7'		6' 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	28	1'-8":4'-10"	95	5	30	2'-5":5'-11"	130	5	32	3'-2":6'-11"	168	5	34	4'-0":7'-11"	211	5	36	4'-9":9'-0"	258	5	38	5'-6":10'-0"	307
5b1	Walls - Longit.- F.F. & B.F.	└─┘	5	8	15'-4"	128	5	12	16'-5"	205	5	16	17'-6"	292	5	16	18'-7"	310	5	20	19'-7"	409	5	24	20'-8"	517
5b2	Walls - Longit.- F.F. & B.F.	└─┘	5	4	13'-10"	58	5	4	15'-1"	63	5	4	16'-1"	67	5	8	17'-5"	145	5	8	18'-5"	154	5	8	19'-5"	162
c1	Walls - Vert. - B.F.	└─┘	5	27	16'-9":17'-0"	475	5	29	18'-9":19'-0"	571	5	23	20'-9":21'-1"	502	5	17	22'-11":23'-2"	409	5	11	24'-11":25'-2"	287	5	5	27'-1":27'-4"	142
c2	Walls - Vert. - B.F.	└─┘	--	--	--	--	--	--	--	--	5	8	13'-1":14'-10"	116	5	16	13'-1":16'-10"	250	5	24	13'-1":18'-10"	399	5	32	13'-3":21'-0"	572
c3	Walls - Vert. - B.F.	└─┘	--	--	--	--	--	--	--	--	5	16	5'-1":6'-0"	92	5	32	5'-2":7'-0"	203	5	48	5'-2":8'-1"	332	5	64	5'-2":9'-1"	476
6f1	Floor - Longit.- Top	└─┘	6	14	13'-5"	282	6	14	14'-8"	308	6	15	15'-8"	353	6	15	16'-11"	381	6	16	17'-11"	431	6	16	18'-11"	455
5f2	Floor - Longit.- Bott.	└─┘	5	14	13'-5"	196	5	14	14'-8"	214	5	15	15'-8"	245	5	15	16'-11"	265	5	16	17'-11"	299	5	16	18'-11"	316
5g1	Curtain Bracket - Vert.	└─┘	5	4	5'-3"	22	5	4	5'-6"	23	5	4	5'-9"	24	5	4	6'-0"	25	5	4	6'-3"	26	5	4	6'-3"	26
5h1	Basin Backwall - Vert.	└─┘	5	8	7'-4"	61	5	8	8'-1"	67	5	8	8'-7"	72	5	8	9'-4"	78	5	8	9'-10"	82	5	8	10'-4"	86
6m1	Floor Trans. - Top	└─┘	6	14	7'-8":13'-11"	227	6	15	7'-8":14'-5"	249	6	16	7'-8":14'-11"	271	6	17	7'-8":15'-5"	295	6	18	7'-8":15'-11"	319	6	19	7'-10":16'-7"	348
6p1	Curtain - Trans.	└─┘	6	2	14'-0"	42	6	2	14'-4",14'-6"	43	6	2	14'-10",15'-0"	45	6	2	15'-3",15'-6"	46	6	2	15'-9",16'-0"	48	6	2	16'-5",16'-8"	50
6s1	Wall - Top Slope	└─┘	6	4	15'-7"	94	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	11	6'-1"	70	5	11	6'-4"	73	5	12	6'-4"	79	5	12	6'-7"	82	5	13	6'-10"	93	5	13	7'-1"	96
Total Weight (LB)						1750				2046				2432				2812				3255				3679
Concrete (CY)																										
			Footing			7.0				8.1				8.7				9.8				10.7				12.4
			Walls			1.8				2.6				3.6				4.7				5.8				7.9
			Total			8.8				10.7				12.3				14.5				16.5				20.3

Variable Dimensions

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

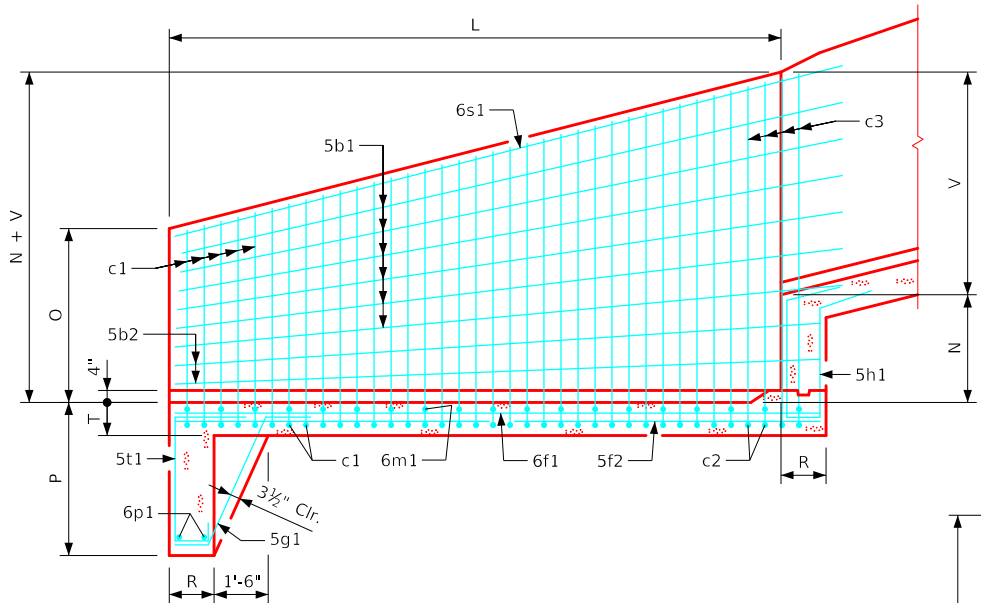
Table of Flume Basin Dimensions

S x H	K	L	M	N	O	P	R	T	U	V
6' x 3'	12'-6"	13'-0"	2'-3"	2'-0"	1'-1"	3'-6"	9"	11"	9"	2'-3 3/4"
6' x 4'	13'-0"	14'-0"	3'-0"	2'-3"	1'-10"	3'-6"	1'-0"	11"	9"	3'-1 1/8"
6' x 5'	13'-6"	15'-0"	3'-9"	2'-6"	2'-7"	3'-6"	1'-0"	11"	9"	3'-10 3/8"
6' x 6'	14'-0"	16'-0"	4'-6"	2'-9"	3'-5"	3'-6"	1'-3"	11"	9"	4'-7 3/8"
6' x 7'	14'-6"	17'-0"	5'-3"	3'-0"	4'-2"	3'-9"	1'-3"	11"	9"	5'-5"
6' x 8'	15'-0"	18'-0"	6'-0"	3'-3"	4'-11"	4'-0"	1'-3"	11"	10"	6'-2 1/4"

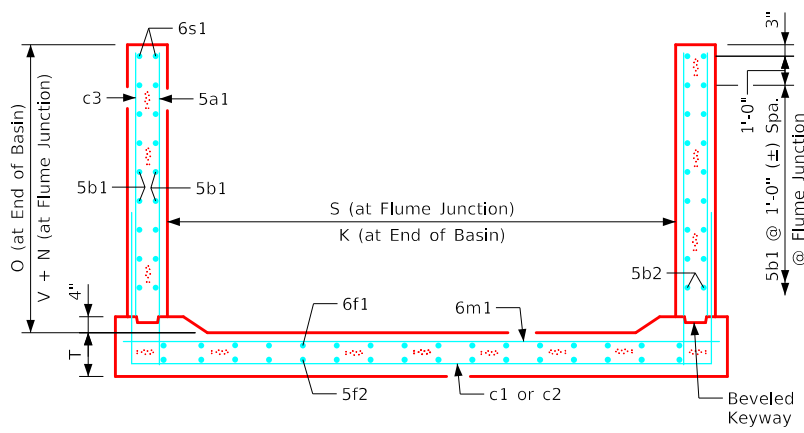
Flume Basin Notes:

- See Sheet RCFB 01-20 for general information.
- c2 & c3 bars are lapped.
- c1 bars are omitted if both "S" and "H" are equal to or larger than 8' and 9' respectively.

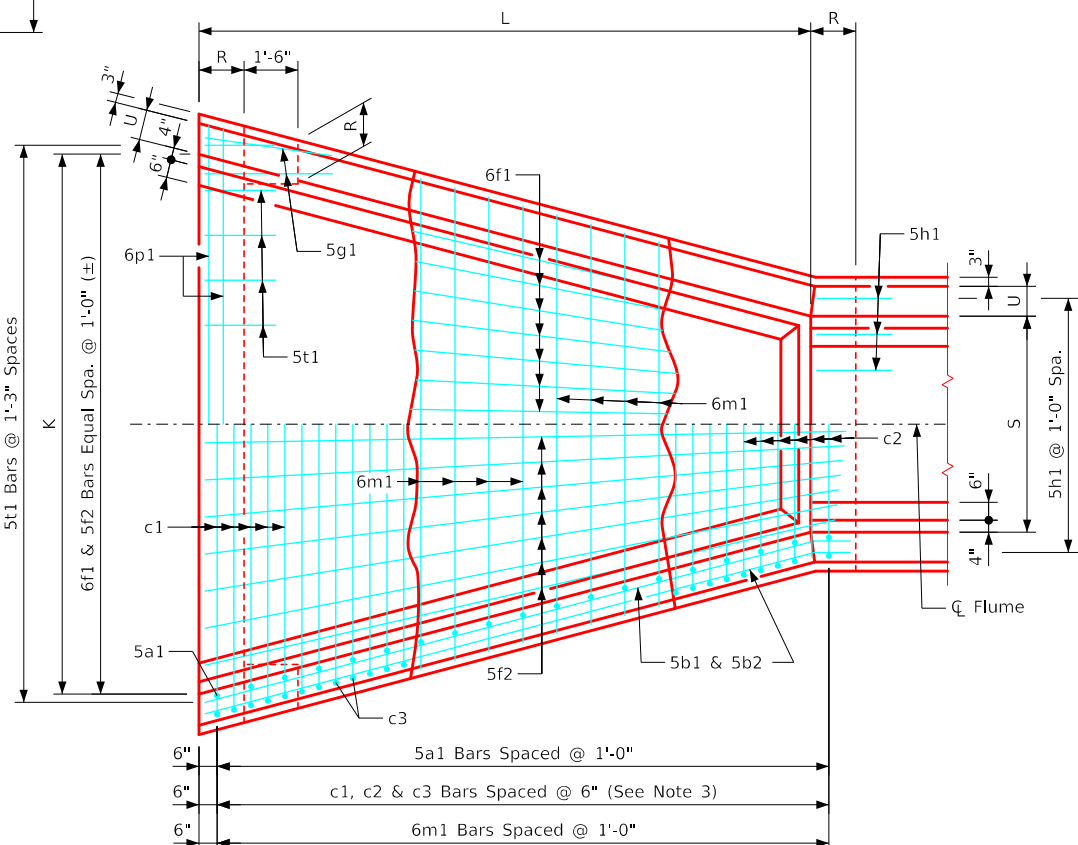
S = Culvert Span
H = Culvert Height



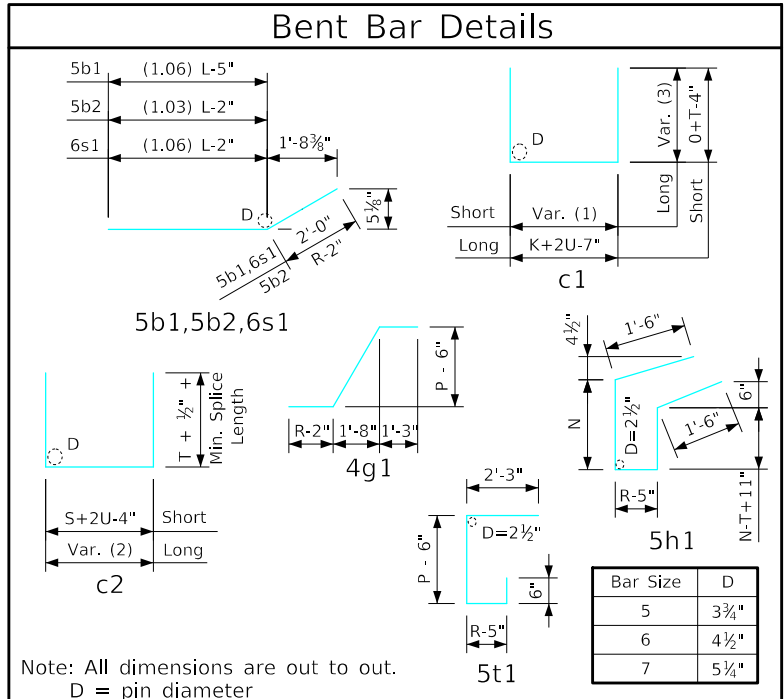
Longitudinal Section



6'-0" x 8'-0" Flume Basin Example Shown



Plan View



ENGLISHIGNEDFLUMES.DGN - RCFB 02-20 - THIS SHEET ISSUED 12-2020.

LATEST REVISION DATE

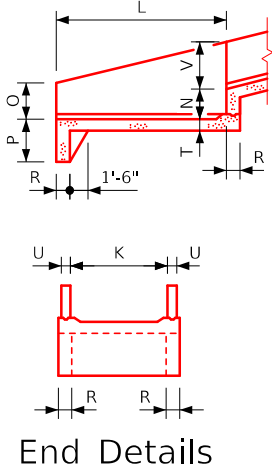
Standard Design
Single Reinforced Concrete Box Culverts
December, 2020

Flume Basin Details
6'-0" SPAN

RCFB 02-20

Estimate of Quantities - Flume Basin

Bill of Reinforcing Steel			8' x 4'			8' x 5'			8' x 6'			8' x 7'			8' x 8'			8' x 9'			8' x 10'									
Bar	Location	Shape	Size	No.	Length	Weight	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'-6":6'-0"	133	5	32	3'-3":7'-0"	171	5	34	4'-1":8'-0"	214	5	36	4'-10":9'-1"	261	5	38	5'-7":10'-1"	310	5	40	6'-4":11'-1"	363	5	42	7'-2":12'-1"	422
5b1	Walls - Longit.- F.F. & B.F.		5	12	16'-5"	205	5	16	17'-6"	292	5	16	18'-7"	310	5	20	19'-7"	409	5	24	20'-8"	517	5	28	21'-9"	635	5	28	22'-9"	664
5b2	Walls - Longit.- F.F. & B.F.		5	4	15'-1"	63	5	4	16'-1"	67	5	8	17'-5"	145	5	8	18'-5"	154	5	8	19'-5"	162	5	8	20'-6"	171	5	12	21'-6"	269
c1	Walls - Vert. - B.F.		5	29	20'-11":21'-2"	636	5	22	22'-11":23'-3"	530	5	16	25'-1":25'-4"	421	5	10	27'-1":27'-4"	284	5	4	29'-3":29'-6"	123	--	--	--	--	--	--	--	--
c2	Walls - Vert. - B.F.		--	--	--	--	5	9	15'-3":17'-3"	153	5	17	15'-3":19'-3"	306	5	25	15'-3":21'-3"	476	5	33	15'-5":23'-5"	668	5	39	15'-5":24'-11"	820	6	41	16'-3":26'-3"	1309
c3	Walls - Vert. - B.F.		--	--	--	--	5	18	5'-0":6'-0"	103	5	34	5'-0":7'-0"	213	5	50	5'-1":8'-1"	343	5	66	5'-1":9'-1"	488	5	78	5'-4":10'-1"	627	6	82	6'-2":11'-1"	1062
6f1	Floor - Longit.- Top		6	16	14'-8"	352	6	17	15'-8"	400	6	17	16'-11"	432	6	18	17'-11"	484	6	18	18'-11"	511	6	19	19'-11"	568	6	19	20'-11"	597
5f2	Floor - Longit.- Bott.		5	16	14'-8"	245	5	17	15'-8"	278	5	17	16'-11"	300	5	18	17'-11"	336	5	18	18'-11"	355	5	19	19'-11"	395	5	19	20'-11"	415
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	5	4	6'-5"	27	5	4	6'-8"	28
5h1	Basin Backwall - Vert.		5	10	8'-0"	83	5	10	8'-6"	89	5	10	9'-3"	96	5	10	9'-9"	102	5	10	10'-3"	107	5	10	10'-9"	112	5	10	11'-3"	117
6m1	Floor Trans. - Top		6	15	9'-8":16'-5"	294	6	16	9'-8":16'-11"	319	6	17	9'-8":17'-5"	346	6	18	9'-8":17'-11"	373	6	19	9'-10":18'-7"	405	6	20	9'-10":19'-1"	434	6	21	9'-10":19'-7"	464
6p1	Curtain - Trans.		6	2	16'-4",16'-6"	49	6	2	16'-10",17'-0"	51	6	2	17'-3",17'-6"	52	6	2	17'-9",18'-0"	54	6	2	18'-5",18'-8"	56	6	2	18'-11",19'-2"	57	6	2	19'-5",19'-8"	59
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	22'-0"	126	6	4	22'-0"	132	6	4	23'-0"	138
5t1	Curtain - Vert.		5	13	6'-4"	86	5	13	6'-4"	86	5	14	6'-7"	96	5	15	7'-1"	111	5	15	7'-4"	115	5	15	7'-4"	115	5	15	7'-7"	119
Total Weight (LB)						2269				2669				3068				3520				3965				4456				5663
Concrete (CY)	Footing				9.9				10.6				11.9				12.9				14.1				15.2				16.3	
	Walls				2.6				3.6				4.7				5.8				7.9				9.4				11.1	
	Total				12.5				14.2				16.6				18.7				22.0				24.6				27.4	



Variable Dimensions

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

Table of Flume Basin Dimensions

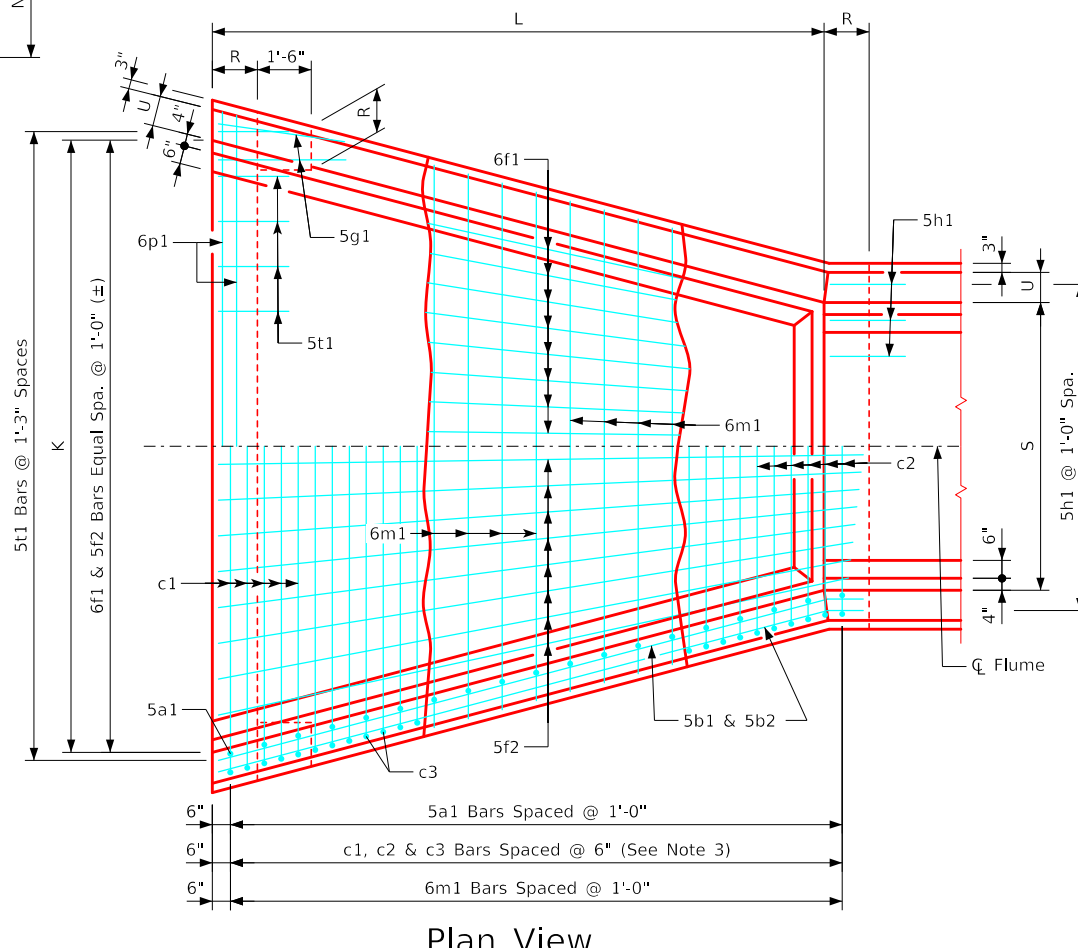
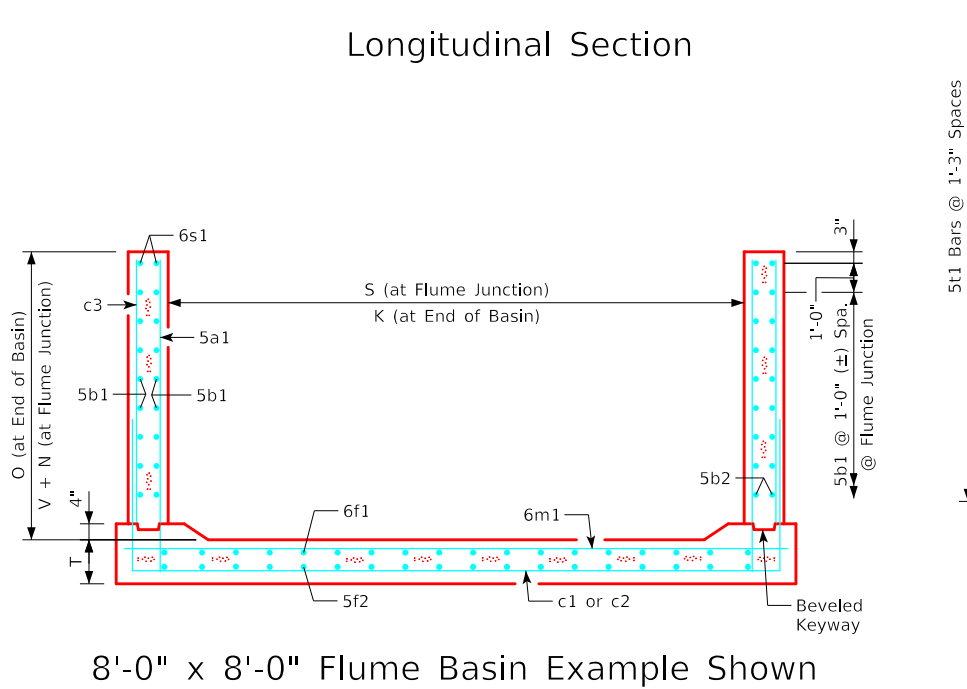
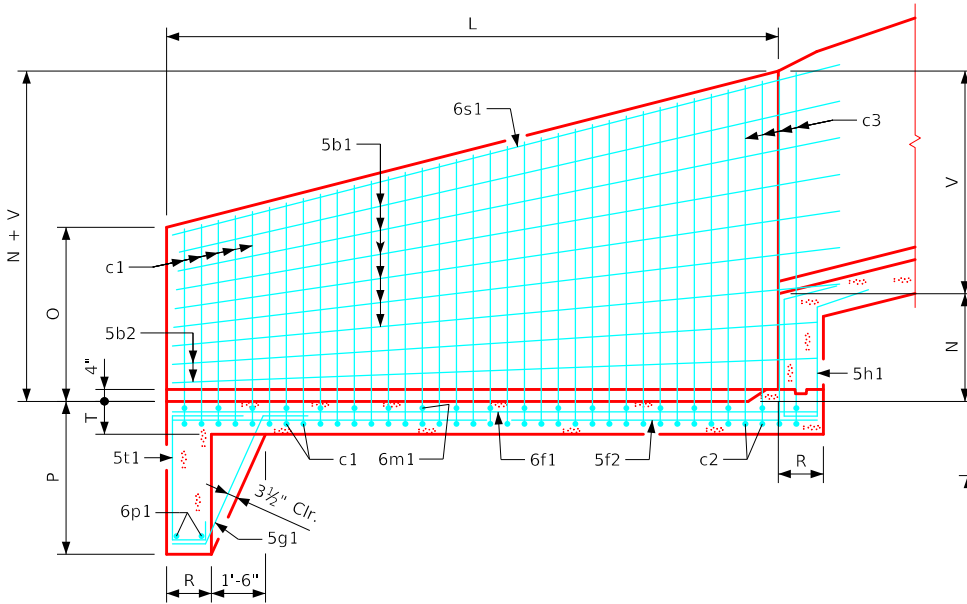
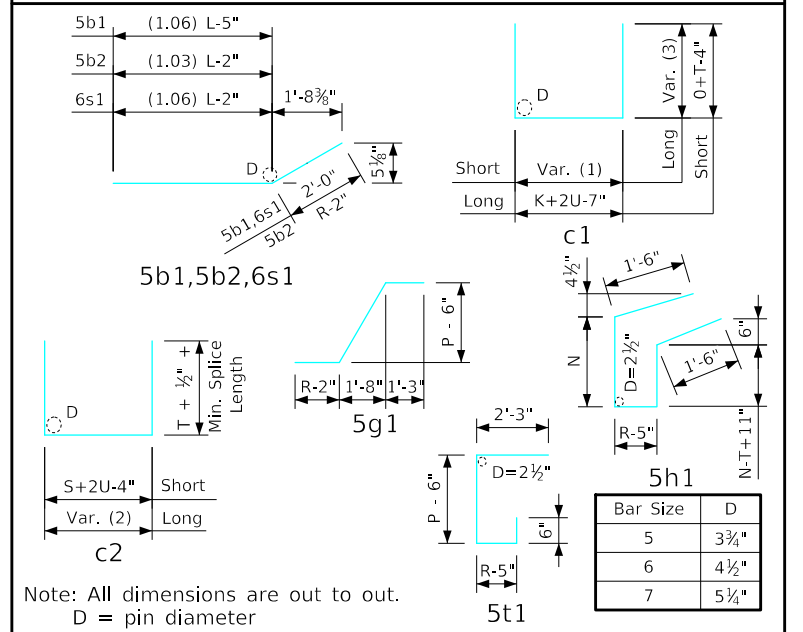
S x H	K	L	M	N	O	P	R	T	U	V
8' x 4'	15'-0"	14'-0"	3'-0"	2'-3"	1'-10"	3'-6"	1'-0"	1'-0"	0'-9"	3'-1 1/8"
8' x 5'	15'-6"	15'-0"	3'-9"	2'-6"	2'-7"	3'-6"	1'-0"	1'-0"	0'-9"	3'-10 3/8"
8' x 6'	16'-0"	16'-0"	4'-6"	2'-9"	3'-5"	3'-6"	1'-3"	1'-0"	0'-9"	4'-7 3/8"
8' x 7'	16'-6"	17'-0"	5'-3"	3'-0"	4'-2"	3'-9"	1'-3"	1'-0"	0'-9"	5'-5"
8' x 8'	17'-0"	18'-0"	6'-0"	3'-3"	4'-11"	4'-0"	1'-3"	1'-0"	0'-10"	6'-2 1/4"
8' x 9'	17'-6"	19'-0"	6'-9"	3'-6"	5'-8"	4'-3"	1'-3"	1'-0"	0'-10"	6'-11 1/2"
8' x 10'	18'-0"	20'-0"	7'-6"	3'-9"	6'-6"	4'-6"	1'-3"	1'-0"	0'-10"	7'-8 3/4"

Flume Basin Notes:

- See Sheet RCFB 01-20 for general information.
- c2 & c3 bars are lapped.
- c1 bars are omitted if both "S" and "H" are equal to or larger than 8' and 9' respectively.

S = Culvert Span
H = Culvert Height

Bent Bar Details



LATEST REVISION DATE

Standard Design
Single Reinforced Concrete Box Culverts
December, 2020

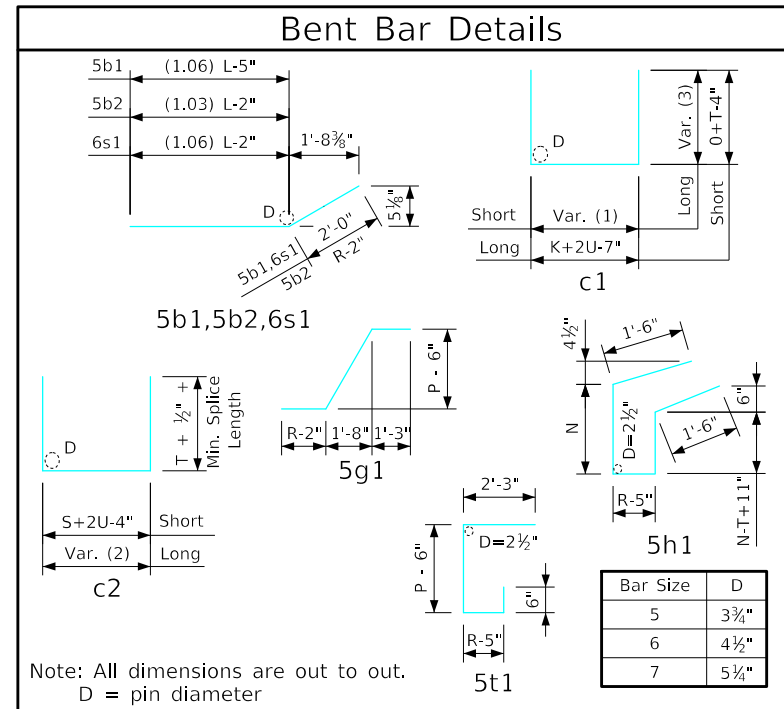
Flume Basin Details
8'-0" Span

RCFB 03-20

ENGLISHIGNEDFLUMES.DGN - RCFB 03-20 - THIS SHEET ISSUED 12-2020.

Estimate of Quantities - Flume Basin

Bill of Reinforcing Steel			10' x 4'				10' x 5'				10' x 6'				10' x 7'				10' x 8'				10' x 9'				10' x 10'				10' x 11'				10' x 12'							
Bar	Location	Shape	Size	No.	Length	Weight	Size	No.	Length	Weight	Size	No.	Length	Weight	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'-7":6'-1"	136	5	32	3'-4":7'-1"	174	5	34	4'-2":8'-1"	217	5	36	4'-11":9'-2"	264	5	38	5'-8":10'-2"	314	5	40	6'-5":11'-2"	367	5	42	7'-3":12'-2"	425	5	44	8'-0":13'-3"	488	5	46	8'-9":14'-3"	552				
5b1	Walls - Longit.- F.F. & B.F.	—	5	12	16'-5"	205	5	16	17'-6"	292	5	16	18'-7"	310	5	20	19'-7"	409	5	24	20'-8"	517	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	4	15'-1"	63	5	4	16'-1"	67	5	8	17'-5"	145	5	8	18'-5"	154	5	8	19'-5"	162	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.	—	5	28	23'-1":23'-4"	678	5	22	25'-1":25'-5"	579	5	15	27'-3":27'-6"	428	5	9	29'-3":29'-6"	276	5	3	31'-5":31'-8"	99	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--					
c2	Walls - Vert. - B.F.	—	5	1	17'-5"	18	5	9	17'-5":19'-5"	173	5	18	17'-5":21'-8"	367	5	26	17'-5":23'-8"	557	5	34	17'-7":25'-10"	770	5	39	17'-7":27'-1"	908	6	41	18'-5":28'-5"	1442	7	43	19'-5":29'-11"	2168	7	45	19'-7":30'-7"	2307				
c3	Walls - Vert. - B.F.	—	5	2	5'-0"	10	5	18	5'-0":6'-0"	103	5	36	4'-11":7'-0"	224	5	52	4'-11":8'-1"	353	5	68	4'-11":9'-1"	496	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	18	14'-8"	397	6	19	15'-8"	447	6	19	16'-11"	483	6	20	17'-11"	538	6	20	18'-11"	568	6	21	19'-11"	628	6	21	20'-11"	660	6	22	21'-11"	724	6	22	22'-11"	757				
5f2	Floor - Longit.- Bott.	—	5	18	14'-8"	275	5	19	15'-8"	310	5	19	16'-11"	335	5	20	17'-11"	374	5	20	18'-11"	395	5	21	19'-11"	436	5	21	20'-11"	458	5	22	21'-11"	503	5	22	22'-11"	526				
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	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	12	7'-11"	99	5	12	8'-5"	105	5	12	9'-2"	115	5	12	9'-8"	121	5	12	10'-2"	127	5	12	10'-8"	134	5	12	11'-2"	140	5	12	11'-8"	146	5	13	12'-2"	165				
6m1	Floor Trans. - Top	—	6	15	11'-8":18'-5"	339	6	16	11'-8":18'-11"	367	6	17	11'-8":19'-5"	397	6	18	11'-8":19'-11"	427	6	19	11'-10":20'-7"	463	6	20	11'-10":21'-1"	494	6	21	11'-10":21'-7"	527	6	22	12'-0":22'-3"	566	6	23	12'-2":22'-11"	606				
6p1	Curtain - Trans.	—	6	2	18'-4":18'-6"	55	6	2	18'-10":19'-0"	57	6	2	19'-3":19'-6"	58	6	2	19'-9":20'-0"	60	6	2	20'-5":20'-8"	62	6	2	20'-11":21'-2"	63	6	2	21'-5":21'-8"	65	6	2	22'-1":22'-4"	67	6	2	22'-9":23'-0"	69				
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	6	4	22'-0"	132	6	4	23'-0"	138	6	4	24'-1"	145	6	4	25'-2"	151				
5t1	Curtain - Vert.	—	5	15	6'-4"	99	5	15	6'-4"	99	5	15	6'-7"	103	5	16	6'-10"	114	5	16	7'-1"	118	5	17	7'-4"	130	5	17	7'-7"	134	5	18	7'-10"	147	5	18	8'-1"	152				
Total Weight (LB)			2497				2903				3319				3791				4243				4752				6017				7738				8462							
Concrete (CY)			Footing				11.9				12.7				14.2				15.4				16.8				18.0				19.3				20.8				22.4			
			Walls				2.6				3.6				4.7				5.7				7.9				9.4				11.0				14.1				17.6			
			Total				14.5				16.3				18.9				21.1				24.7				27.4				30.3				34.9				40.0			



Variable Dimensions

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

Table of Flume Basin Dimensions

S x H	K	L	M	N	O	P	R	T	U	V
10' x 4'	17'-0"	14'-0"	3'-0"	2'-3"	1'-10"	3'-6"	1'-0"	1'-1"	9"	3'-1 1/2"
10' x 5'	17'-6"	15'-0"	3'-9"	2'-6"	2'-7"	3'-6"	1'-0"	1'-1"	9"	3'-10 3/8"
10' x 6'	18'-0"	16'-0"	4'-6"	2'-9"	3'-5"	3'-6"	1'-3"	1'-1"	9"	4'-7 7/8"
10' x 7'	18'-6"	17'-0"	5'-3"	3'-0"	4'-2"	3'-9"	1'-3"	1'-1"	9"	5'-5"
10' x 8'	19'-0"	18'-0"	6'-0"	3'-3"	4'-11"	4'-0"	1'-3"	1'-1"	10"	6'-2 1/4"
10' x 9'	19'-6"	19'-0"	6'-9"	3'-6"	5'-8"	4'-3"	1'-3"	1'-1"	10"	6'-11 1/2"
10' x 10'	20'-0"	20'-0"	7'-6"	3'-9"	6'-6"	4'-6"	1'-3"	1'-1"	10"	7'-8 3/4"
10' x 11'	20'-6"	21'-0"	8'-3"	4'-0"	7'-3"	4'-9"	1'-3"	1'-1"	11"	8'-6"
10' x 12'	21'-0"	22'-0"	9'-0"	4'-3"	8'-0"	5'-0"	1'-3"	1'-1"	1'-0"	9'-3 3/8"

S = Culvert Span
H = Culvert Height

Note:
See Sheet RCFB 05-20 for flume basin details and notes.

LATEST REVISION DATE

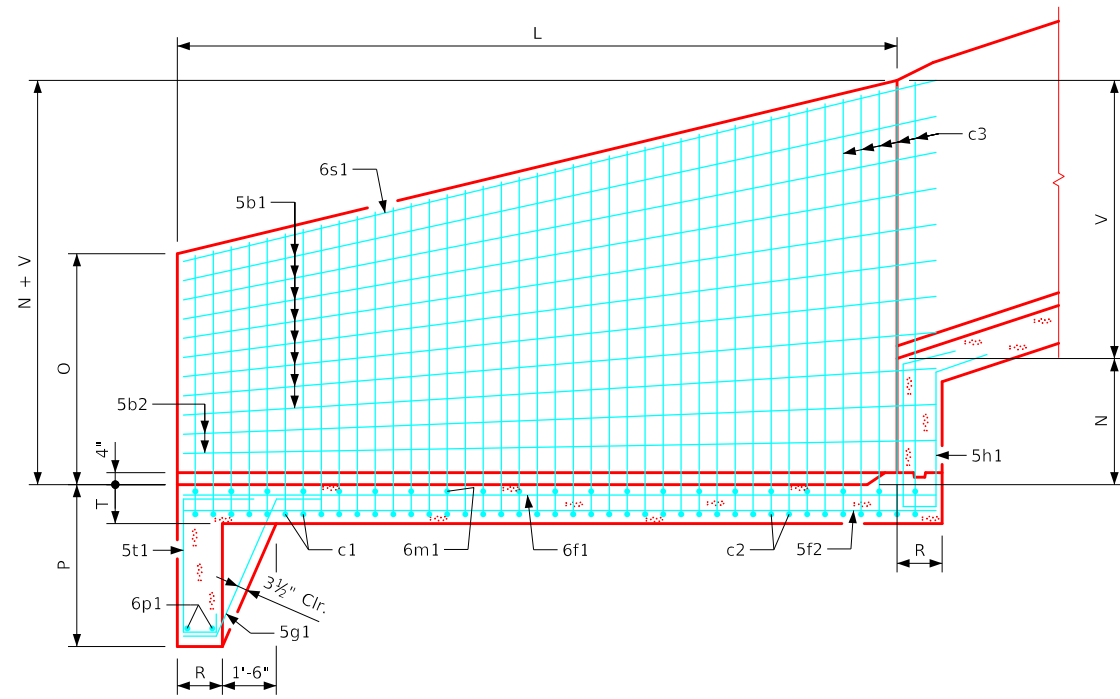
Standard Design
**Single Reinforced Concrete
Box Culverts**
December, 2020

APPROVED BY BRIDGE ENGINEER

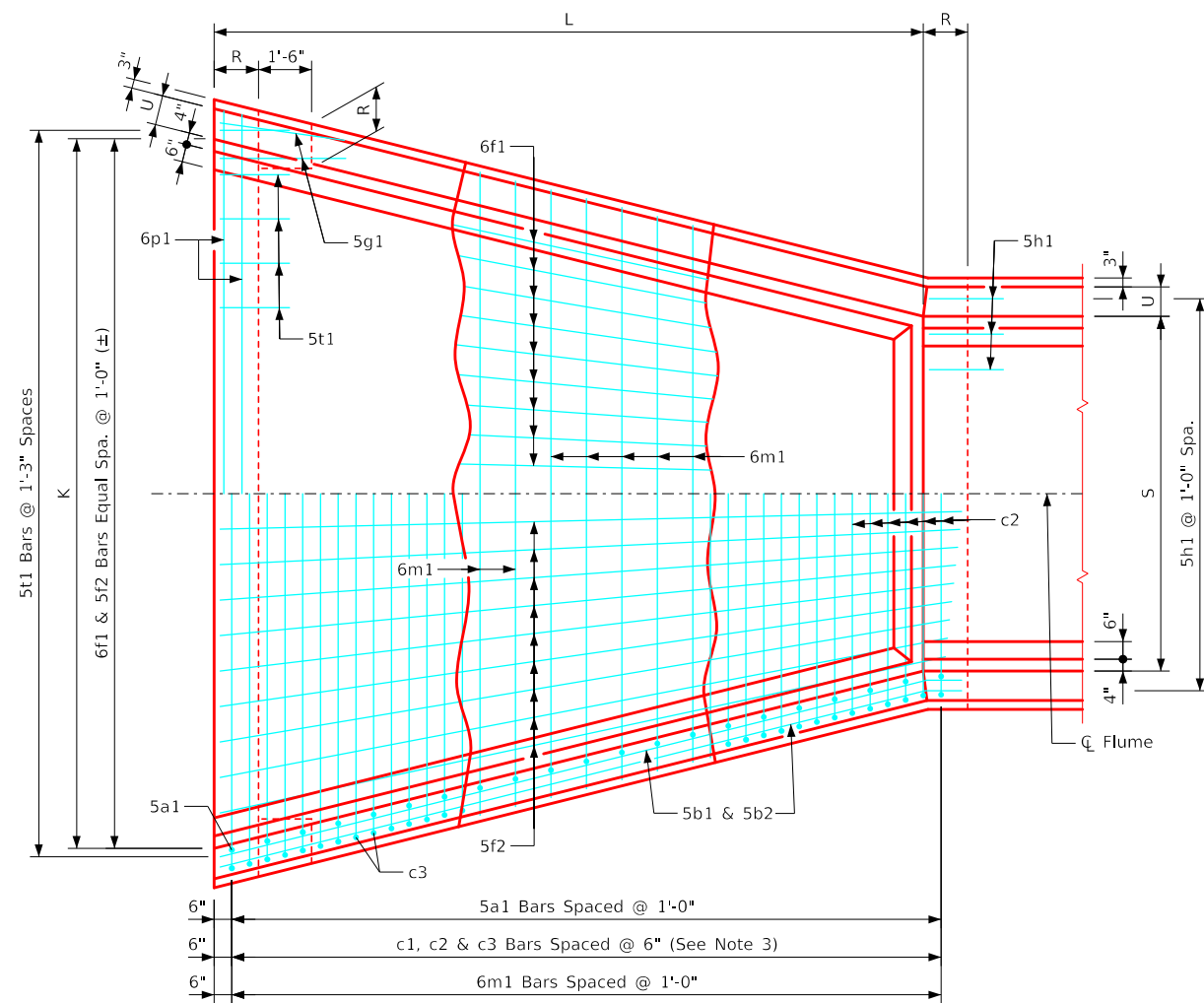
**Flume Basin
Details**
10'-0" Span

RCFB 04-20

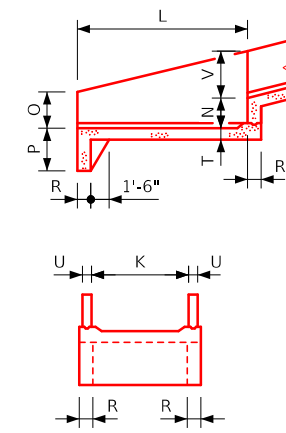
ENGLISHIGNEDFLUMES.DGN - RCFB 05-20 - THIS SHEET ISSUED 12-2020.



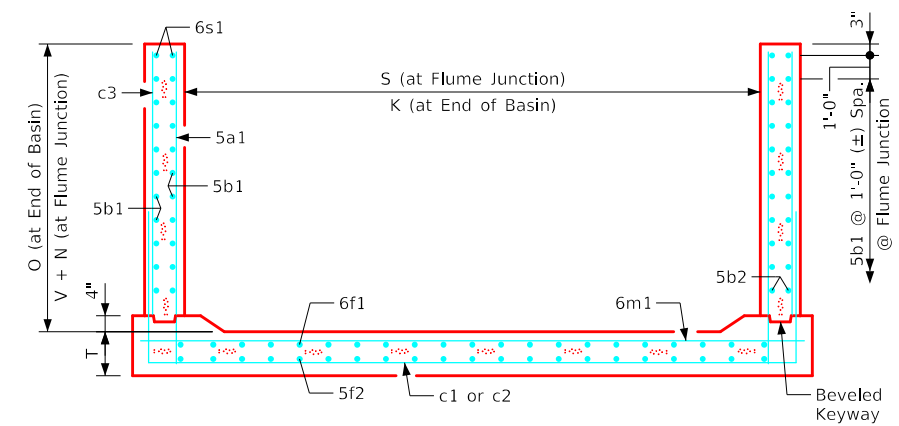
Longitudinal Section



Plan View



End Details



10'-0" x 10'-0" Flume Basin Example Shown

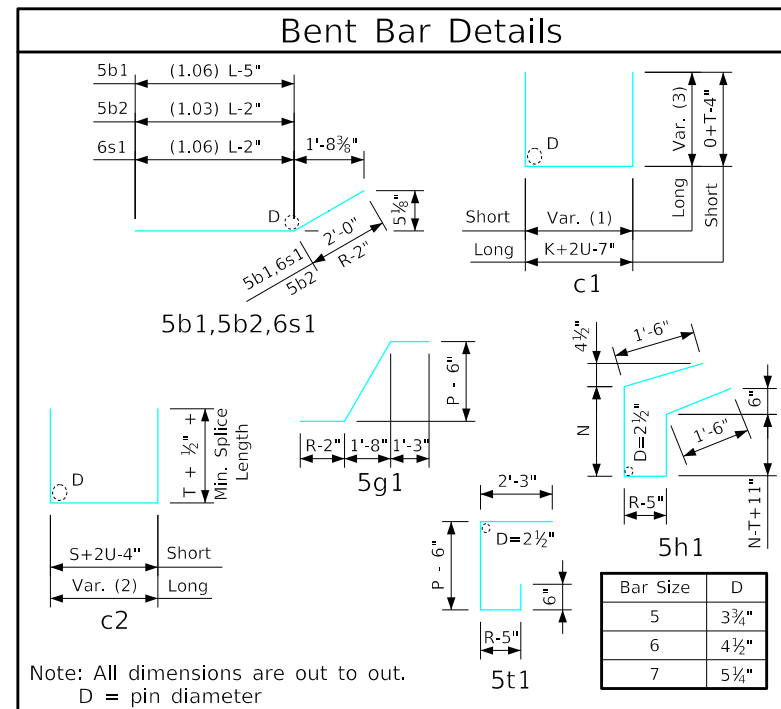
Flume Basin Notes:

1. See Sheet RCF 01-20 for general information.
2. c2 & c3 bars are lapped.
3. c1 bars are omitted if both "S" and "H" are equal to or larger than 8' and 9' respectively.
4. See Sheet RCFB 04-20 for flume basin quantities.

LATEST REVISION DATE	 APPROVED BY BRIDGE ENGINEER		
		Standard Design Single Reinforced Concrete Box Culverts December, 2020	
		Flume Basin Details 10'-0" Span	RCFB 05-20

Estimate of Quantities - Flume Basin

Bill of Reinforcing Steel			12' x 4'				12' x 5'				12' x 6'				12' x 7'				12' x 8'				12' x 9'				12' x 10'				12' x 11'				12' x 12'							
Bar	Location	Shape	Size	No.	Length	Weight	Size	No.	Length	Weight	Size	No.	Length	Weight	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	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	12	16'-5"	205	5	16	17'-6"	292	5	20	18'-7"	388	5	20	19'-7"	409	5	24	20'-8"	517	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	4	15'-1"	63	5	4	16'-1"	67	5	4	17'-5"	73	5	8	18'-5"	154	5	8	19'-5"	162	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.	—	5	27	25'-3":25'-6"	715	5	21	27'-3":27'-7"	601	5	15	29'-5":29'-8"	462	5	9	31'-5":31'-8"	296	5	3	33'-7":33'-10"	105	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--				
c2	Walls - Vert. - B.F.	—	5	2	19'-7":19'-10"	41	5	10	19'-7":21'-10"	216	5	18	19'-7":23'-10"	408	5	26	19'-7":25'-10"	616	5	34	19'-9":28'-0"	847	5	39	19'-9":29'-3"	997	6	41	20'-7":30'-7"	1575	7	43	21'-7":32'-1"	2358	7	45	21'-9":32'-9"	2506				
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	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	20	14'-8"	441	6	21	15'-8"	494	6	21	16'-11"	534	6	22	17'-11"	592	6	22	18'-11"	625	6	23	19'-11"	688	6	23	20'-11"	723	6	24	21'-11"	790	6	24	22'-11"	826				
5f2	Floor - Longit.- Bott.	—	5	20	14'-8"	306	5	21	15'-8"	343	5	21	16'-11"	371	5	22	17'-11"	411	5	22	18'-11"	434	5	23	19'-11"	478	5	23	20'-11"	502	5	24	21'-11"	549	5	24	22'-11"	574				
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	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	14	7'-10"	114	5	14	8'-4"	122	5	14	9'-1"	133	5	14	9'-7"	140	5	14	10'-1"	147	5	14	10'-7"	155	5	14	11'-1"	162	5	14	11'-7"	169	5	15	12'-1"	189				
6m1	Floor Trans. - Top	—	6	15	13'-8":20'-5"	384	6	16	13'-8":20'-11"	416	6	17	13'-8":21'-5"	448	6	18	13'-8":21'-11"	481	6	19	13'-10":22'-7"	520	6	20	13'-10":23'-1"	554	6	21	13'-10":23'-7"	590	6	22	14'-0":24'-3"	632	6	23	14'-2":24'-11"	675				
6p1	Curtain - Trans.	—	6	2	20'-4":20'-6"	61	6	2	20'-10":21'-0"	63	6	2	21'-3":21'-6"	64	6	2	21'-9":22'-0"	66	6	2	22'-5":22'-8"	68	6	2	22'-11":23'-2"	69	6	2	23'-5":23'-8"	71	6	2	24'-1":24'-4"	73	6	2	24'-9":25'-0"	75				
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	6	4	22'-0"	132	6	4	23'-0"	138	6	4	24'-1"	145	6	4	25'-2"	151				
5t1	Curtain - Vert.	—	5	16	6'-4"	106	5	17	6'-4"	112	5	17	6'-7"	117	5	17	6'-10"	121	5	18	7'-1"	133	5	18	7'-4"	138	5	19	7'-7"	150	5	19	7'-10"	155	5	20	8'-1"	169				
Total Weight (LB)			2718				3146				3579				4051				4523				5041				6368				8146				8898							
Concrete (CY)			Footing				14.0				15.0				16.7				18.1				19.6				21.1				22.3				24.2				26.0			
			Walls				2.6				3.6				4.7				5.7				7.9				9.4				11.0				14.1				17.6			
			Total				16.6				18.6				21.4				23.8				27.5				30.5				33.3				38.3				43.6			



Variable Dimensions

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

Table of Flume Basin Dimensions

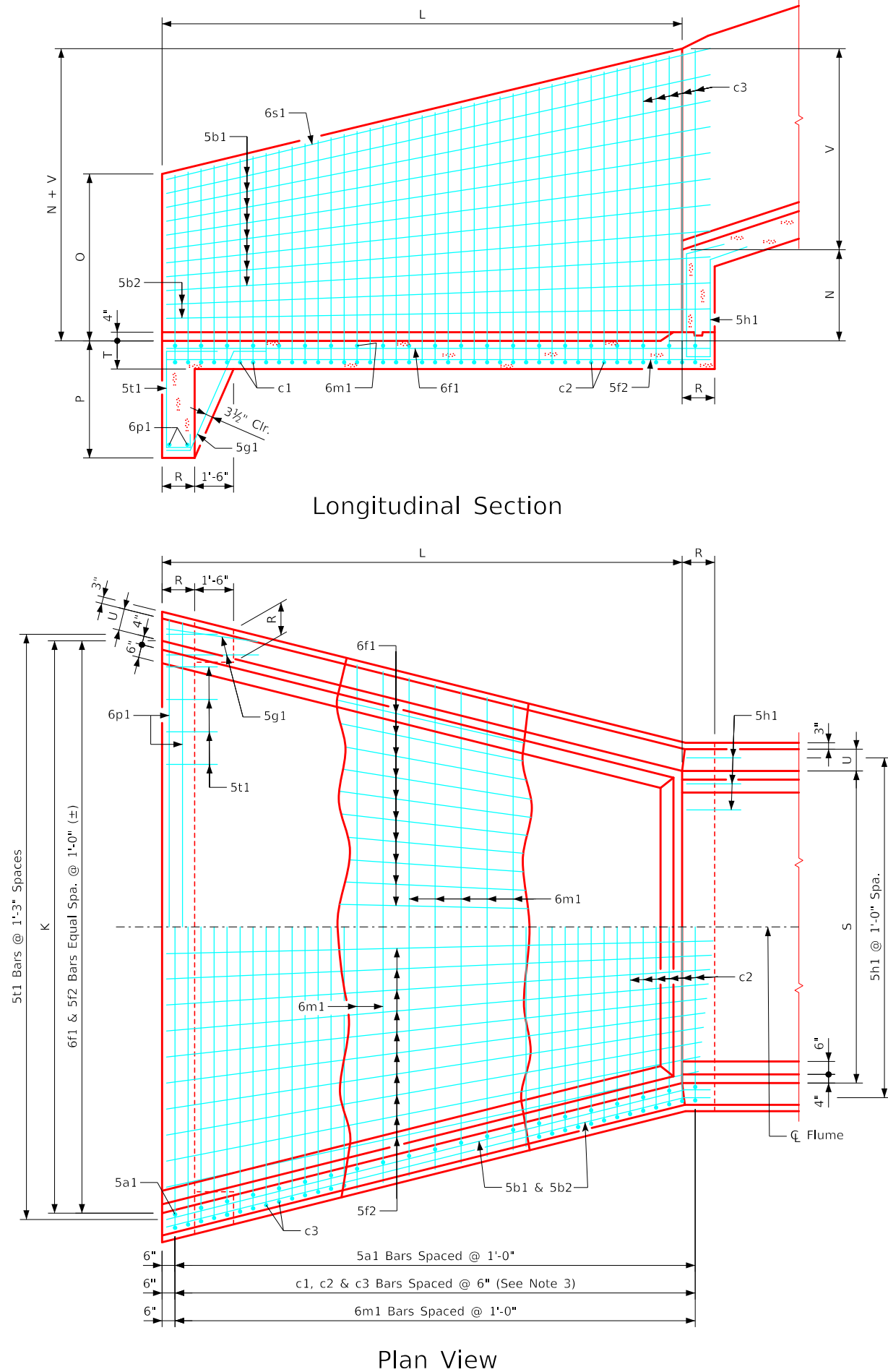
S x H	K	L	M	N	O	P	R	T	U	V
12' x 4'	19'-0"	14'-0"	3'-0"	2'-3"	1'-10"	3'-6"	1'-0"	1'-2"	9"	3'-1 1/8"
12' x 5'	19'-6"	15'-0"	3'-9"	2'-6"	2'-7"	3'-6"	1'-0"	1'-2"	9"	3'-10 3/8"
12' x 6'	20'-0"	16'-0"	4'-6"	2'-9"	3'-5"	3'-6"	1'-3"	1'-2"	9"	4'-7 7/8"
12' x 7'	20'-6"	17'-0"	5'-3"	3'-0"	4'-2"	3'-9"	1'-3"	1'-2"	9"	5'-5"
12' x 8'	21'-0"	18'-0"	6'-0"	3'-3"	4'-11"	4'-0"	1'-3"	1'-2"	10"	6'-2 1/4"
12' x 9'	21'-6"	19'-0"	6'-9"	3'-6"	5'-8"	4'-3"	1'-3"	1'-2"	10"	6'-11 1/2"
12' x 10'	22'-0"	20'-0"	7'-6"	3'-9"	6'-6"	4'-6"	1'-3"	1'-2"	10"	7'-8 3/4"
12' x 11'	22'-6"	21'-0"	8'-3"	4'-0"	7'-3"	4'-9"	1'-3"	1'-2"	11"	8'-6"
12' x 12'	23'-0"	22'-0"	9'-0"	4'-3"	8'-0"	5'-0"	1'-3"	1'-2"	1'-0"	9'-3 3/8"

S = Culvert Span
H = Culvert Height

Note:
See Sheet RCFB 07-20 for flume basin details and notes.

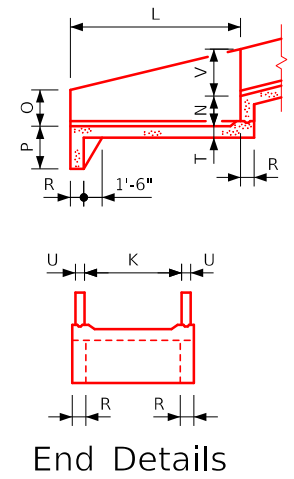
LATEST REVISION DATE	 APPROVED BY BRIDGE ENGINEER		
		Standard Design Single Reinforced Concrete Box Culverts December, 2020	
		Flume Basin Details 12'-0" Span	RCFB 06-20

ENGLISHIGNEDFLUMES.DGN - RCFB 07-20 - THIS SHEET ISSUED 12-2020.

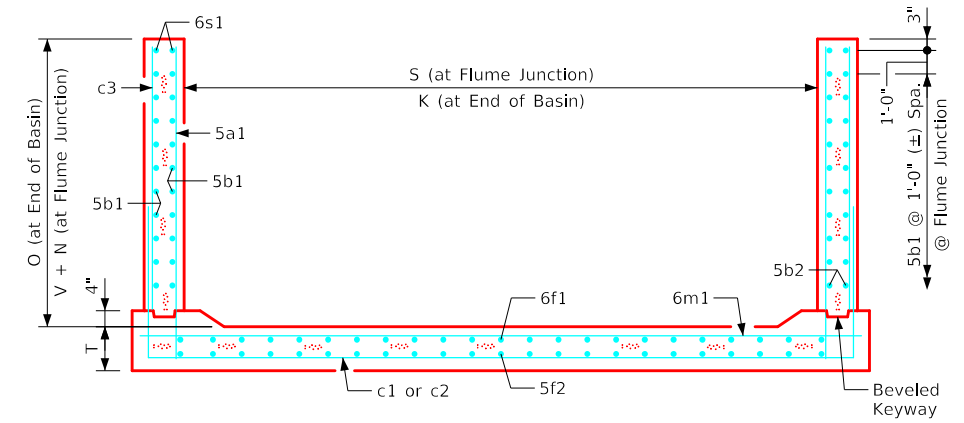


Longitudinal Section

Plan View



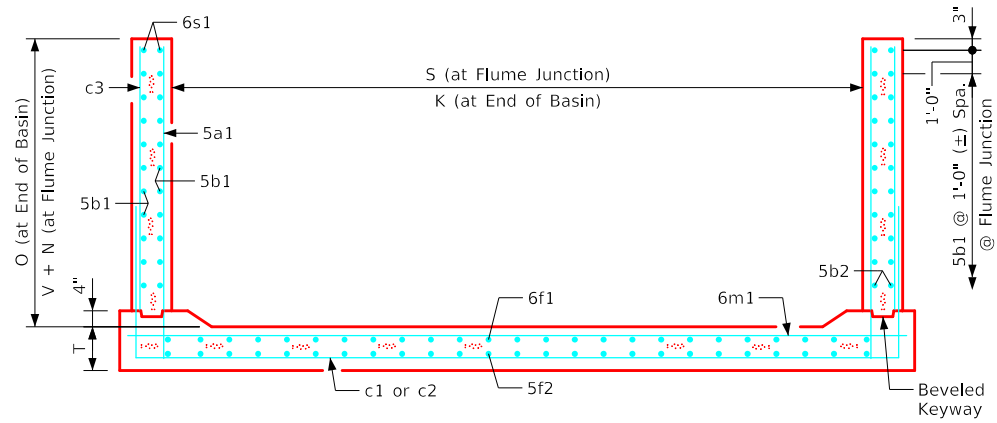
End Details



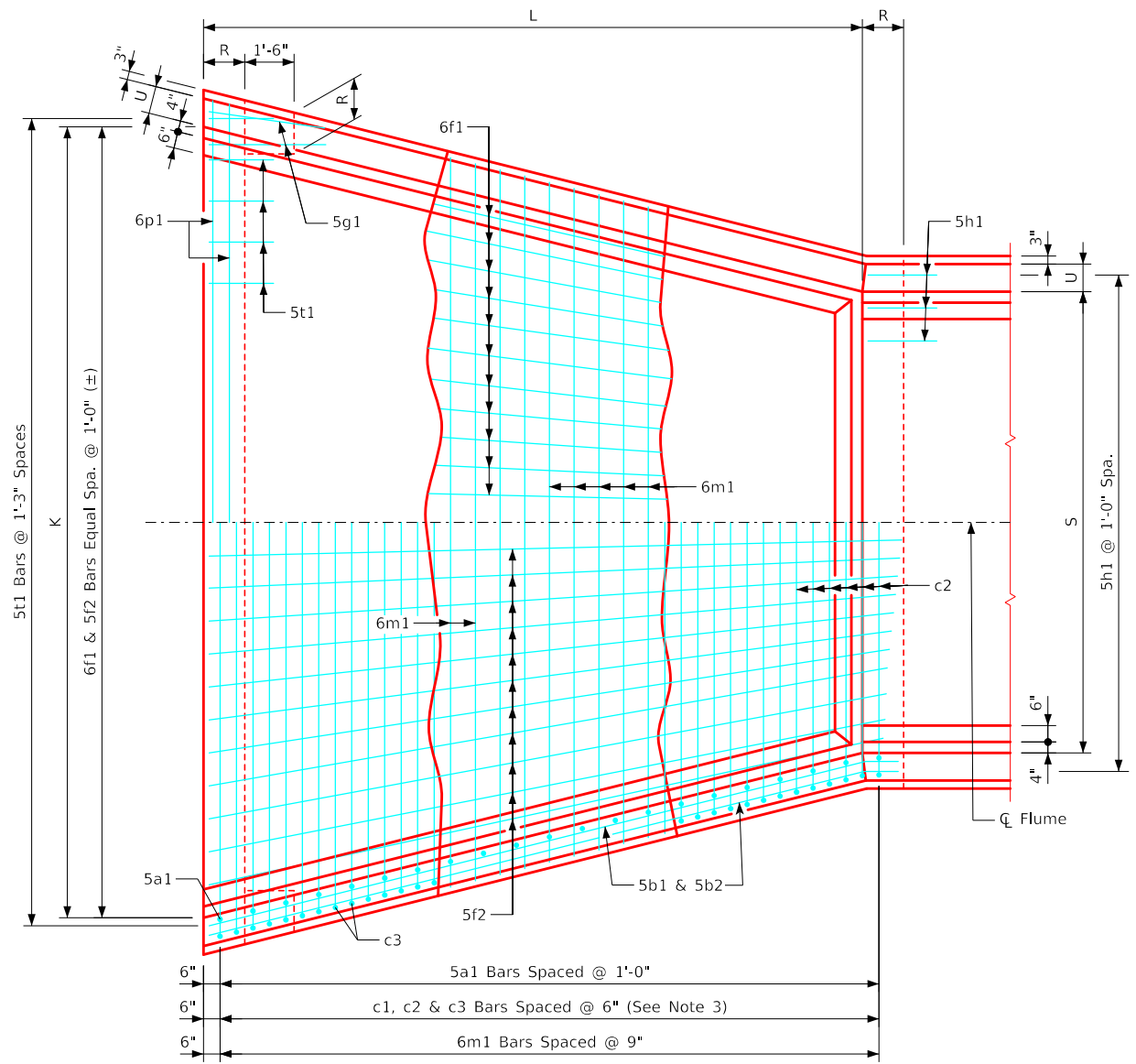
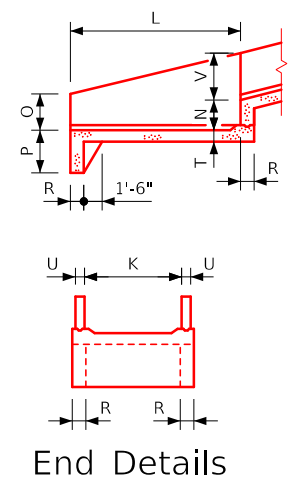
12'-0" x 10'-0" Flume Basin Example Shown

- Flume Basin Notes:**
1. See Sheet RCF 01-20 for general information.
 2. c2 & c3 bars are lapped.
 3. c1 bars are omitted if both "S" and "H" are equal to or larger than 8' and 9' respectively.
 4. See Sheet RCFB 06-20 for flume basin quantities.

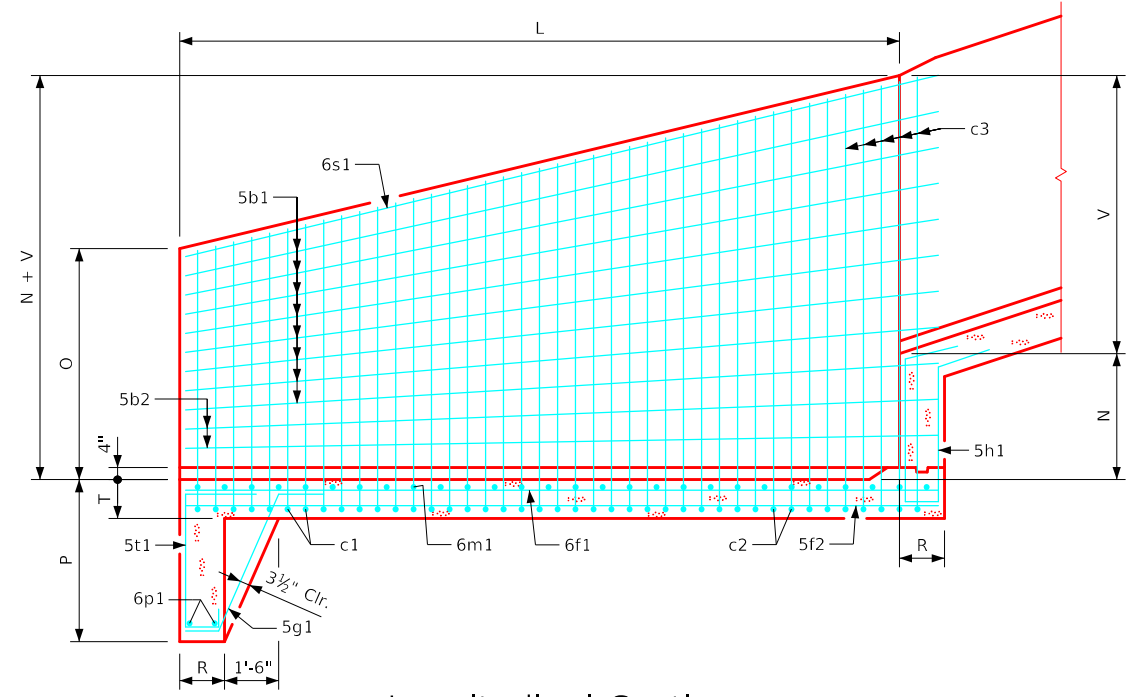
LATEST REVISION DATE	 APPROVED BY BRIDGE ENGINEER		
		Standard Design Single Reinforced Concrete Box Culverts December, 2020	
		Flume Basin Details 12'-0" Span	RCFB 07-20



14'-0" x 10'-0" Flume Basin Example Shown



Plan View



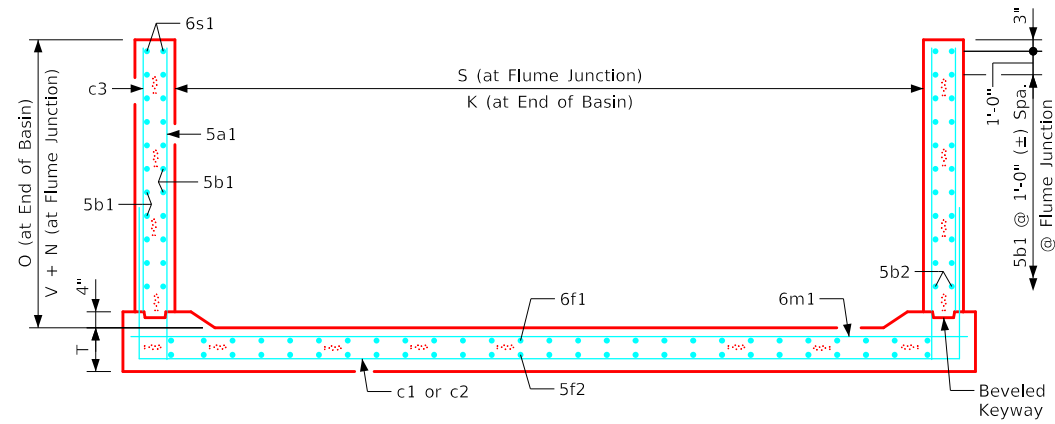
Longitudinal Section

- Flume Basin Notes:**
1. See Sheet RCF 01-20 for general information.
 2. c2 & c3 bars are lapped.
 3. c1 bars are omitted if both "S" and "H" are equal to or larger than 8' and 9' respectively.
 4. See Sheet RCFB 08-20 for flume basin quantities.

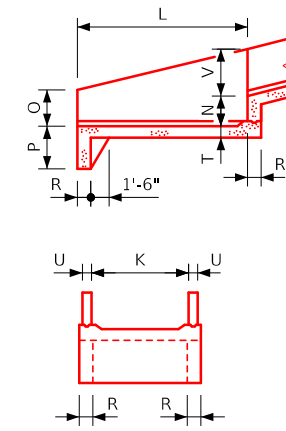
ENGLISHIGNEDFLUMES.DGN - RCFB 09-20 - THIS SHEET ISSUED 12-2020.

LATEST REVISION DATE	 APPROVED BY BRIDGE ENGINEER		
		Standard Design Single Reinforced Concrete Box Culverts December, 2020	
		Flume Basin Details 14'-0" Span	RCFB 09-20

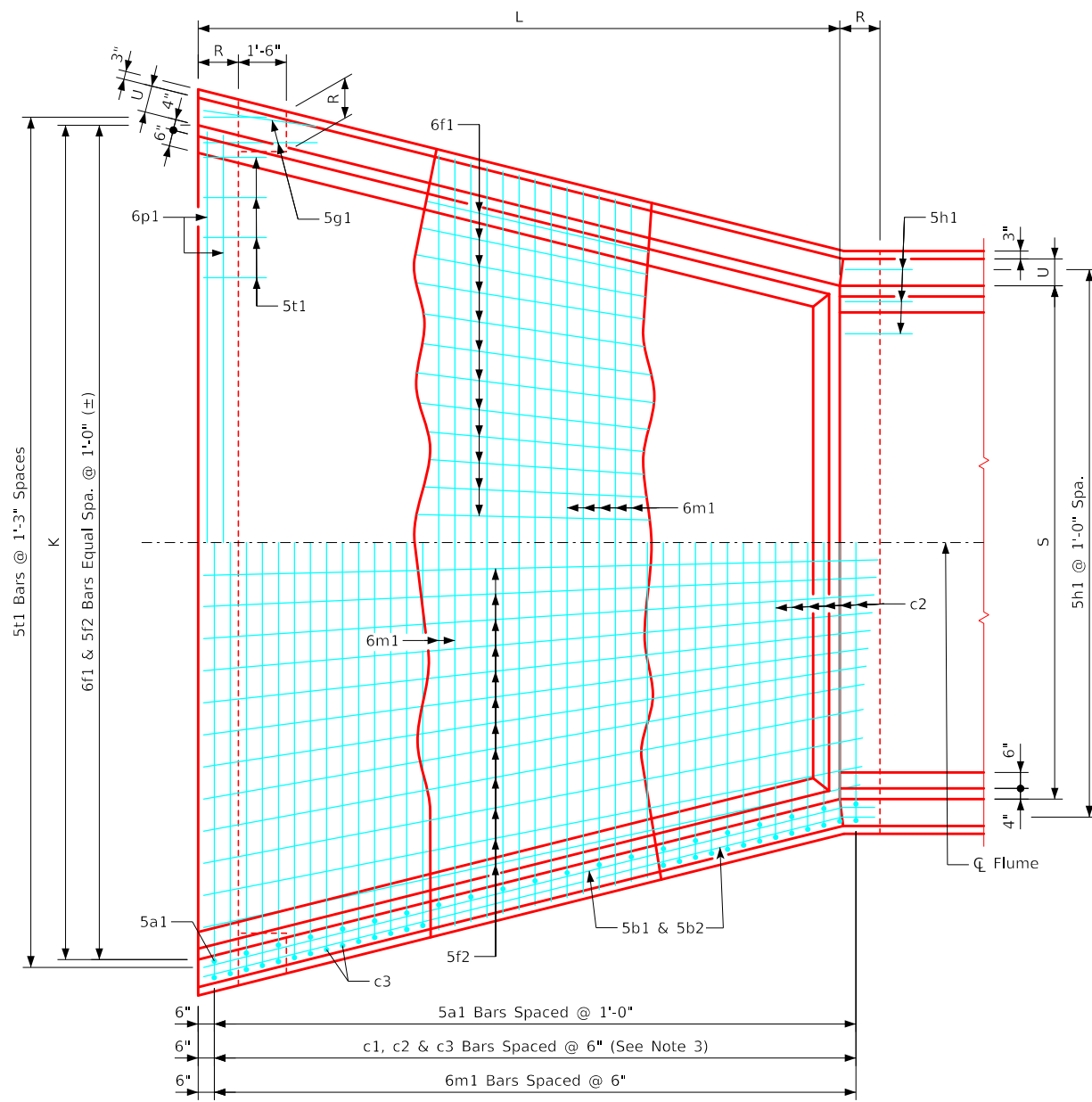
ENGLISHIGNEDFLUMES.DGN - RCFB 11-20 - THIS SHEET ISSUED 12-2020.



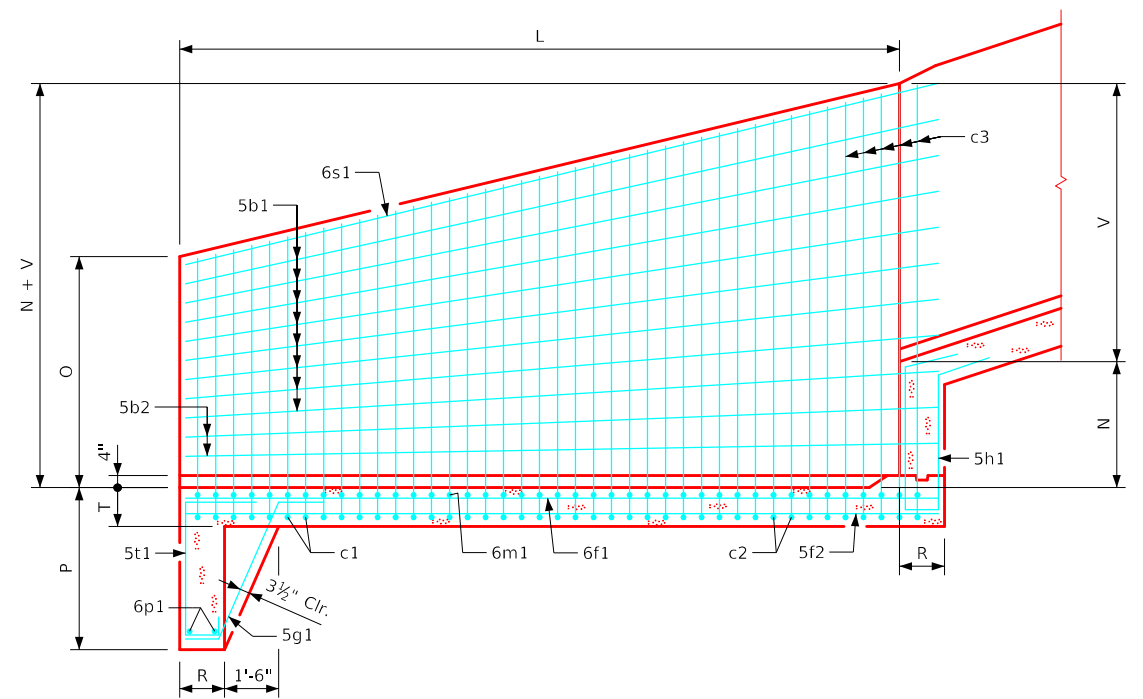
16'-0" x 10'-0" Flume Basin Example Shown



End Details



Plan View



Longitudinal Section

Flume Basin Notes:

1. See Sheet RCF 01-20 for general information.
2. c2 & c3 bars are lapped.
3. c1 bars are omitted if both "S" and "H" are equal to or larger than 8' and 9' respectively.
4. See Sheet RCFB 10-20 for flume basin quantities.

LATEST REVISION DATE	 APPROVED BY BRIDGE ENGINEER		
		Standard Design Single Reinforced Concrete Box Culverts December, 2020	
		Flume Basin Details 16'-0" Span	RCFB 11-20

Estimate of Quantities - Flume Bell Joints

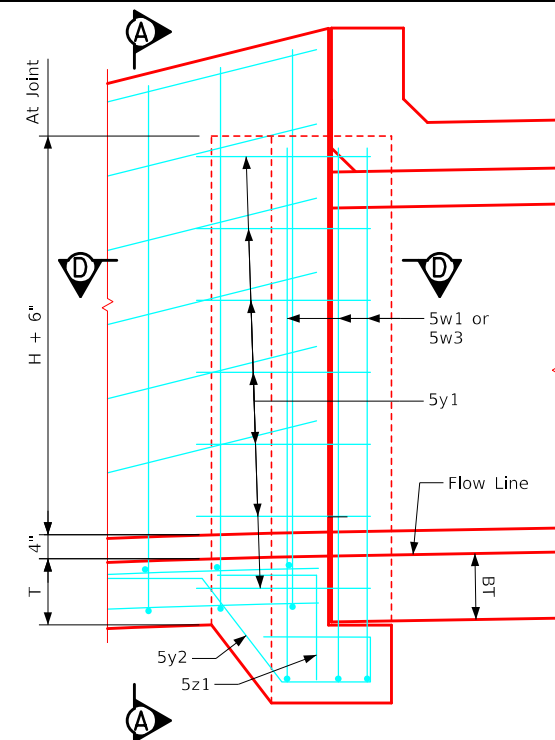
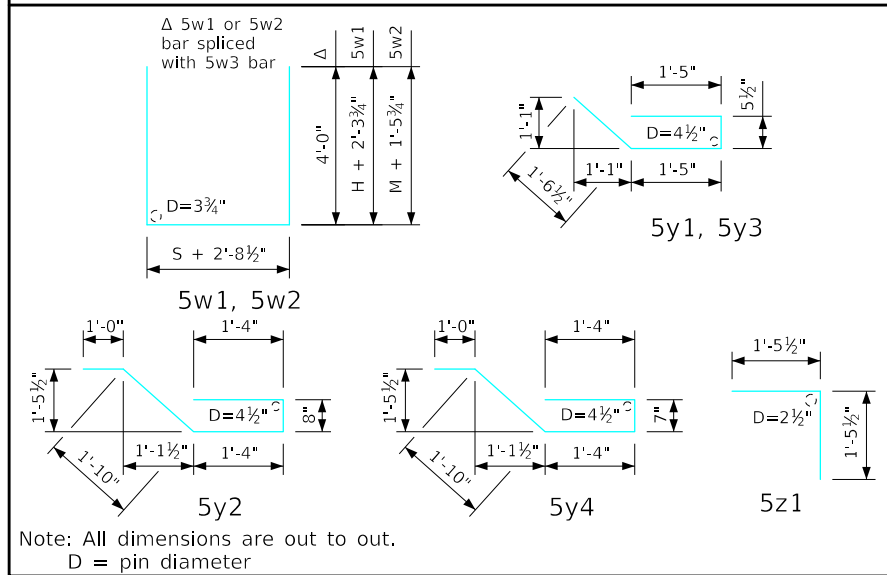
Junction Bell Joint		3' x 3'			4' x 4'			5' x 3'			5' x 4'			5' x 5'			5' x 6'			
Bar	Location	Shape	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight
5w1	Walls & Floor		3	16'-4"	51	3	14'-9"	46	3	18'-4"	57	3	15'-9"	49	3	15'-9"	49	3	15'-9"	49
5w3	Walls Vert.		--	---	--	6	4'-4"	27	--	---	--	6	4'-4"	27	6	5'-4"	33	6	6'-4"	40
5y1	Walls Horiz.		10	4'-10"	50	12	4'-10"	60	10	4'-10"	50	12	4'-10"	60	14	4'-10"	71	16	4'-10"	81
5y2	Floor Vert.		5	6'-2"	32	6	6'-2"	39	7	6'-2"	45	7	6'-2"	45	7	6'-2"	45	7	6'-2"	45
5z1	Floor Vert.		5	2'-11"	15	6	2'-11"	18	7	2'-11"	21	7	2'-11"	21	7	2'-11"	21	7	2'-11"	21
Total Weight (LB)					148			190			173			202			219			236
Concrete (CY)		Footing	0.7			0.8			0.8			0.8			0.8			0.8		
		Walls	0.4			0.6			0.4			0.6			0.7			0.8		
		Total	1.1			1.4			1.2			1.4			1.5			1.6		
Chute Bell Joint		3' x 3'			4' x 4'			5' x 3'			5' x 4'			5' x 5'			5' x 6'			
Bar	Location	Shape	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight
5w2	Walls & Floor		3	13'-2"	41	3	15'-8"	49	3	15'-2"	47	3	16'-8"	52	3	18'-2"	57	3	19'-8"	62
5y3	Walls Horiz.		8	4'-10"	40	8	4'-10"	40	8	4'-10"	40	10	4'-10"	40	10	4'-10"	50	12	4'-10"	60
5y4	Floor Vert.		5	6'-1"	32	6	6'-1"	38	7	6'-1"	44	7	6'-1"	44	7	6'-1"	44	7	6'-1"	44
5z1	Floor Vert.		5	2'-11"	15	6	2'-11"	18	7	2'-11"	21	7	2'-11"	21	7	2'-11"	21	7	2'-11"	21
Total Weight (LB)					128			145			152			157			172			187
Concrete (CY)		Footing	0.7			0.7			0.8			0.8			0.8			0.8		
		Walls	0.2			0.3			0.2			0.3			0.4			0.5		
		Total	0.9			1.0			1.0			1.1			1.2			1.3		

Barrel & Chute Dimensions

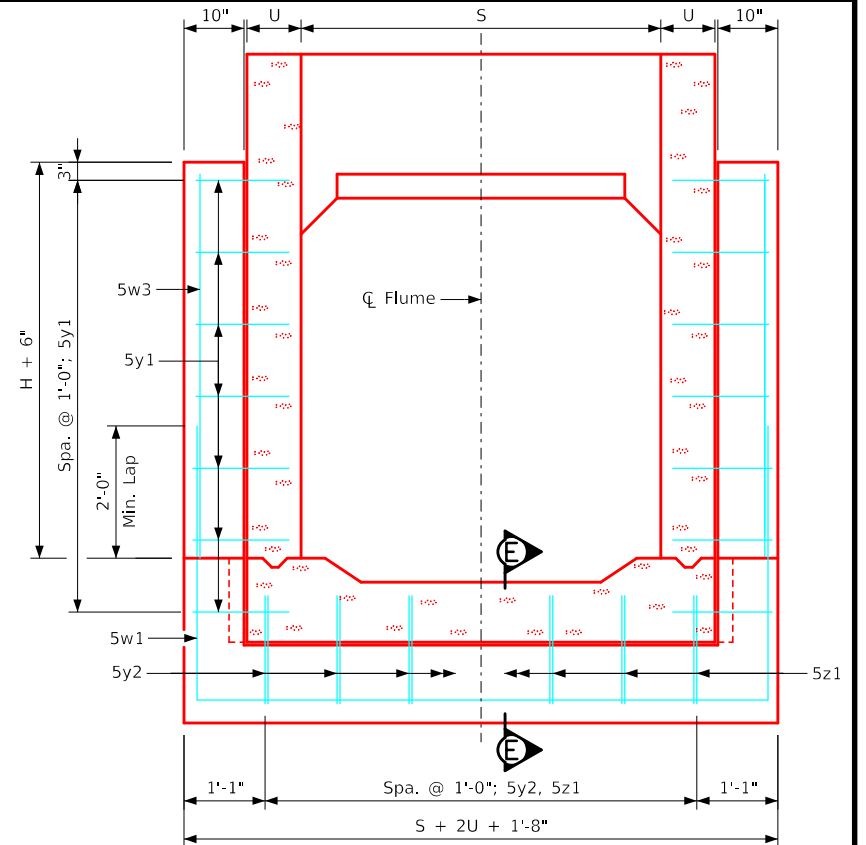
S x H	M	T	U	BT	BU
3' x 3'	2'-3"	11"	9"	10"	9"
4' x 4'	3'-0"	11"	9"	10"	9"
5' x 3'	2'-3"	11"	9"	10"	9"
5' x 4'	3'-0"	11"	9"	10"	9"
5' x 5'	3'-9"	11"	9"	10"	9"
5' x 6'	4'-6"	11"	9"	10"	9"

S = Culvert Span
H = Culvert Height

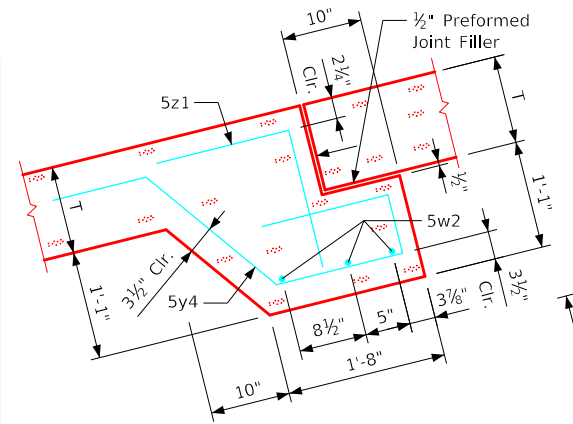
Bent Bar Details



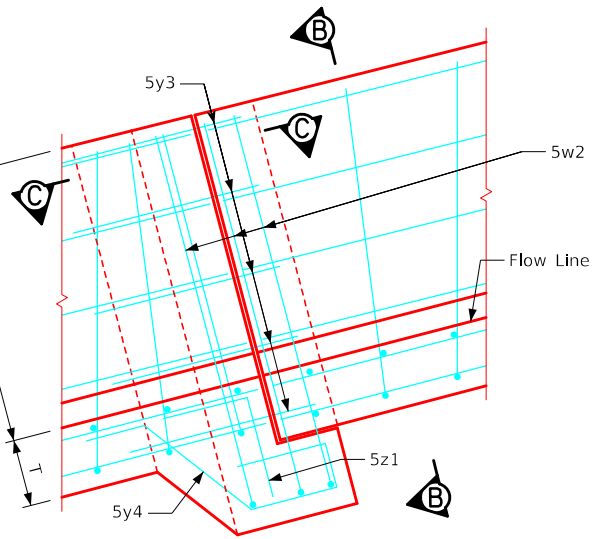
Part Elev.- Junction Bell Jt.



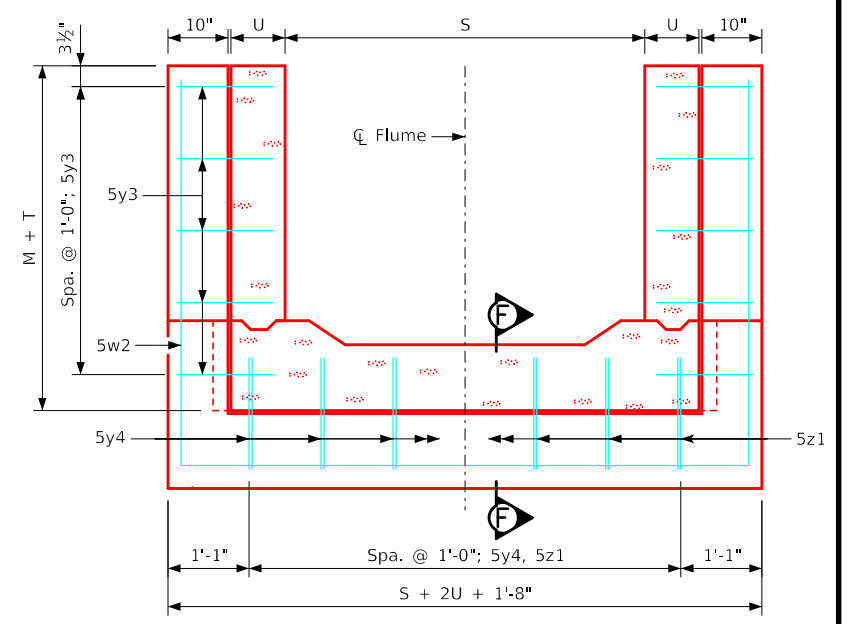
Section A-A



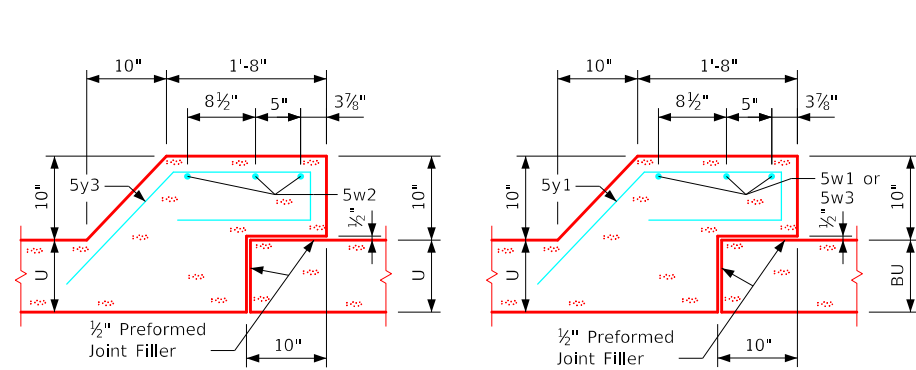
Section F-F



Part Elevation - Chute Bell Jt.

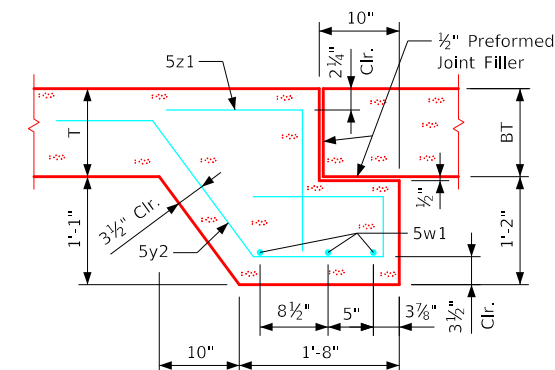


Section B-B



Section C-C

Section D-D



Section E-E

Notes:

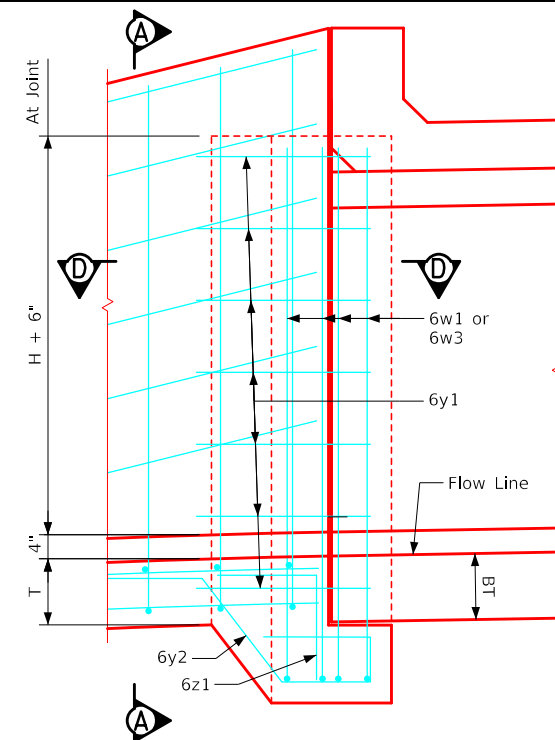
- Dimensions and quantities shown based on "U" flume walls, "BU" barrel walls, "T" flume floor and "BT" barrel floor thicknesses.
- Change lengths of bars 5w1 and adjust reinforcing steel and concrete quantities accordingly for wall and floor thicknesses other than shown.
- Floor bars m1 are to be shortened 6" at bell joints.
- See Sheet RCF 01-20 for general information.

LATEST REVISION DATE	 APPROVED BY BRIDGE ENGINEER		
		Standard Design Single Reinforced Concrete Box Culverts December, 2020	
		Flume Bell Joint Details 3'-0", 4'-0" & 5'-0" Spans	FBJ 01-20

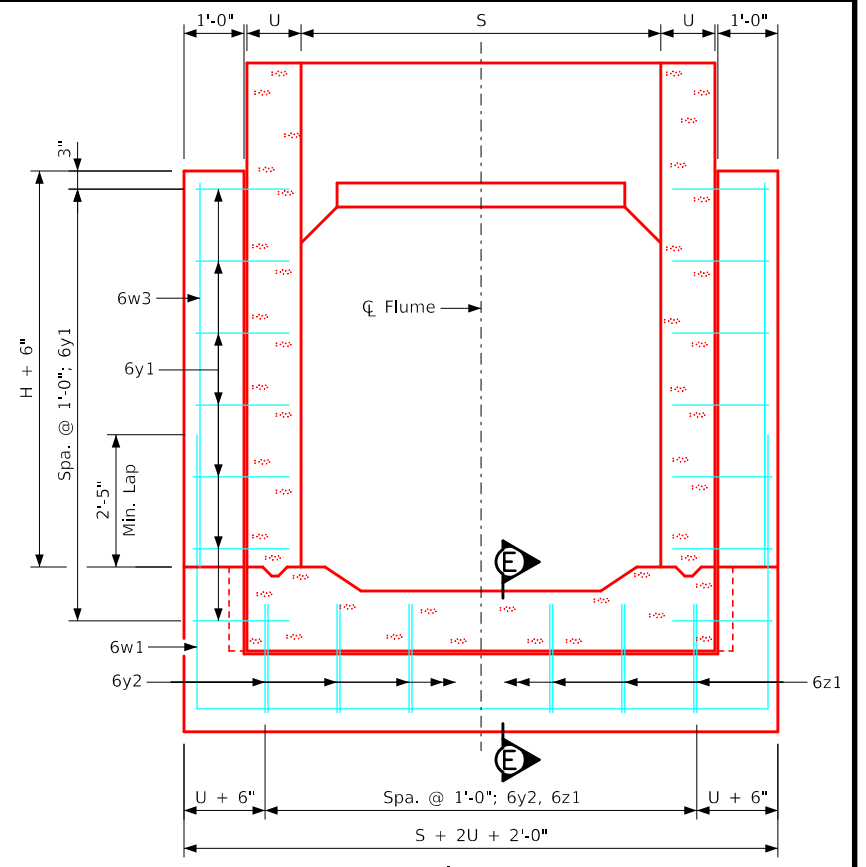
ENGLISHIGNEDFLUMES.DGN - FBJ 01-20 - THIS SHEET ISSUED 12-2020.

Estimate of Quantities - Flume Bell Joints

Junction Bell Joint			6' x 3'			6' x 4'			6' x 5'			6' x 6'			6' x 7'			6' x 8'		
Bar	Location	Shape	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight
6w1	Walls & Floor		4	20'-0"	120	4	18'-3"	110	4	18'-3"	110	4	18'-3"	110	4	18'-5"	111	4	18'-5"	111
6w3	Walls Vert.		--	---	--	8	4'-4"	52	8	5'-4"	64	8	6'-4"	76	8	7'-4"	88	8	8'-4"	100
6y1	Walls Horiz.		10	6'-2"	93	12	6'-2"	111	14	6'-2"	130	16	6'-2"	148	18	6'-2"	167	20	6'-3"	188
6y2	Floor Vert.		8	7'-3"	87	8	7'-3"	87	8	7'-3"	87	8	7'-3"	87	8	7'-3"	87	8	7'-3"	87
6z1	Floor Vert.		8	3'-3"	39	8	3'-3"	39	8	3'-3"	39	8	3'-3"	39	8	3'-3"	39	8	3'-3"	39
Total Weight (LB)			339			399			430			460			491			525		
Concrete (CY)			Footings			1.3			1.3			1.3			1.3			1.3		
			Walls			0.6			0.8			1.0			1.2			1.4		
			Total			1.9			2.1			2.3			2.5			2.9		
Chute Bell Joint			6' x 3'			6' x 4'			6' x 5'			6' x 6'			6' x 7'			6' x 8'		
Bar	Location	Shape	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight
6w2	Walls & Floor		4	16'-10"	101	4	18'-4"	110	4	19'-10"	119	4	18'-3"	110	4	18'-5"	111	4	18'-5"	111
6w4	Walls Vert.		--	---	--	--	---	--	--	---	--	4	4'-0"	48	8	4'-9"	57	8	5'-6"	66
6y3	Walls Horiz.		6	6'-2"	56	8	6'-2"	74	10	6'-2"	93	12	6'-2"	111	12	6'-2"	111	14	6'-3"	131
6y4	Floor Vert.		8	7'-2"	86	8	7'-2"	86	8	7'-2"	86	8	7'-2"	86	8	7'-2"	86	8	7'-2"	86
6z1	Floor Vert.		8	3'-3"	39	8	3'-3"	39	8	3'-3"	39	8	3'-3"	39	8	3'-3"	39	8	3'-3"	39
Total Weight (LB)			282			309			337			394			403			433		
Concrete (CY)			Footings			1.3			1.3			1.3			1.3			1.3		
			Walls			0.3			0.5			0.6			0.8			0.9		
			Total			1.6			1.8			1.9			2.1			2.3		



Part Elevation - Junction Bell Jt.

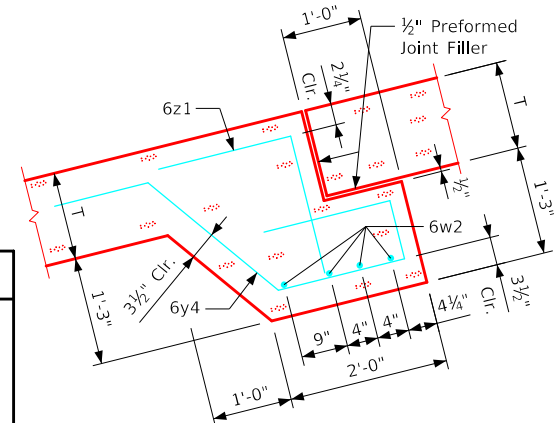


Section A-A

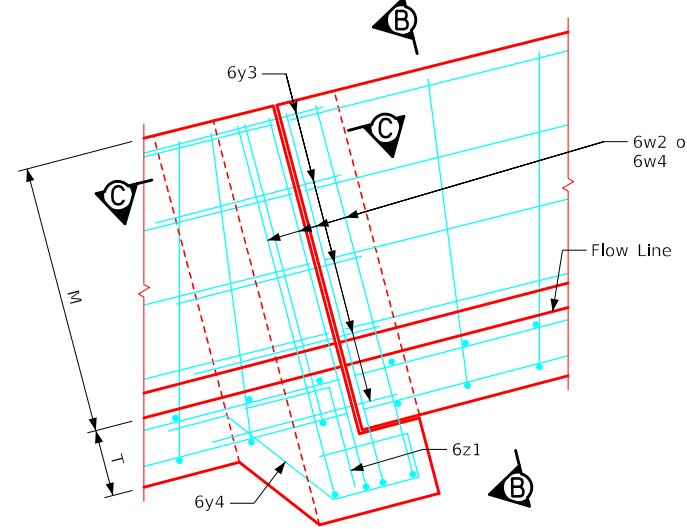
Barrel & Chute Dimensions

S x H	M	T	U	BT	BU
6' x 3'	2'-3"	11"	9"	10"	9"
6' x 4'	3'-0"	11"	9"	10"	9"
6' x 5'	3'-9"	11"	9"	10"	9"
6' x 6'	4'-6"	11"	9"	10"	9"
6' x 7'	5'-3"	11"	9"	10"	9"
6' x 8'	6'-0"	11"	10"	10"	9"

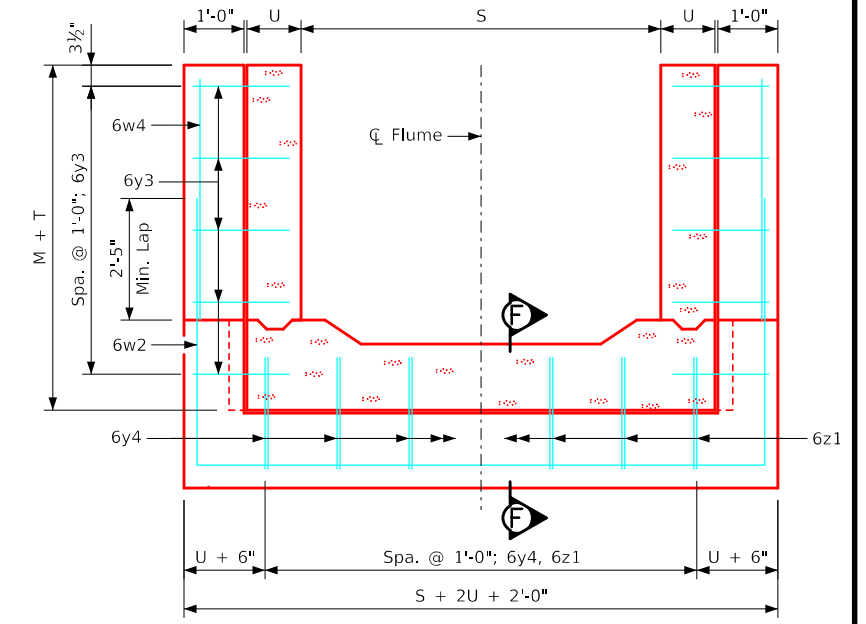
S = Culvert Span
H = Culvert Height



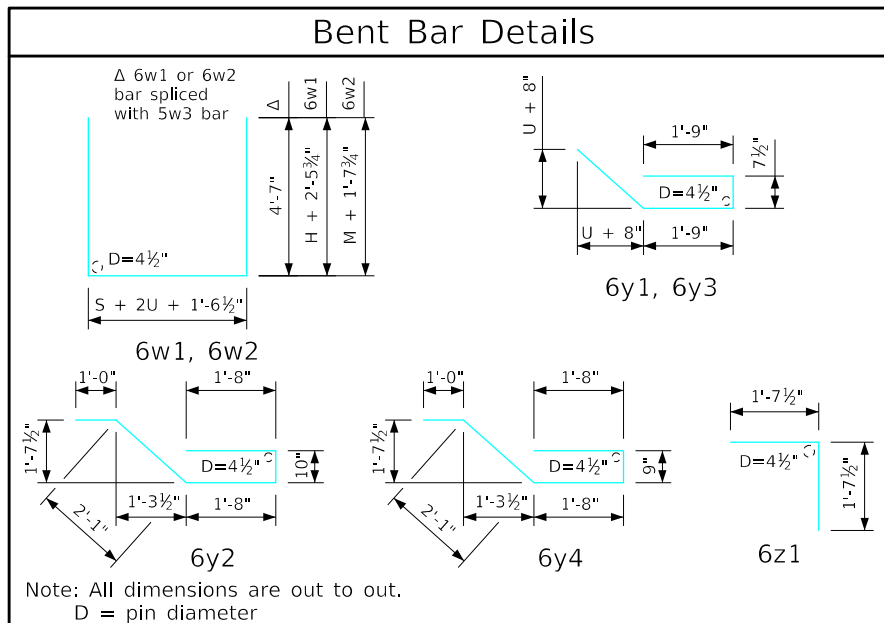
Section F-F



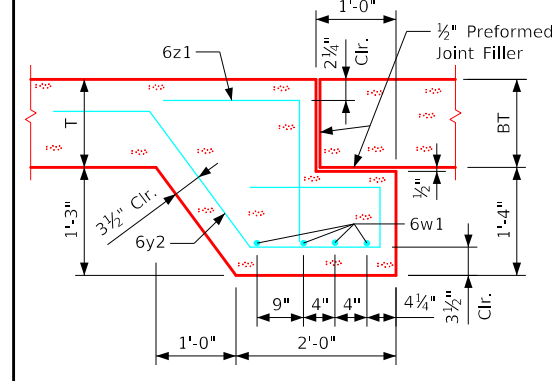
Part Elevation - Chute Bell Jt.



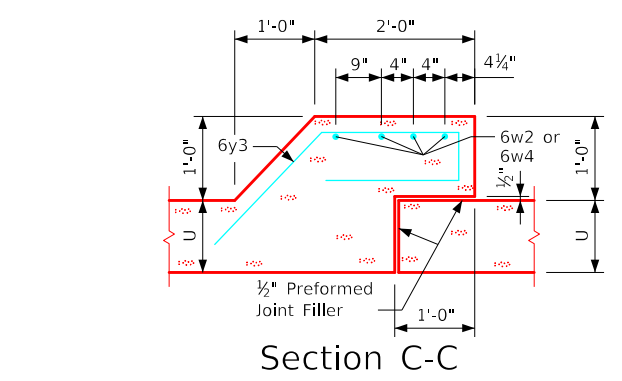
Section B-B



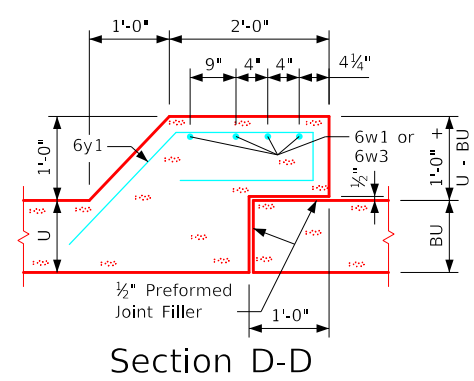
Note: All dimensions are out to out.
D = pin diameter



Section E-E



Section C-C



Section D-D

Notes:

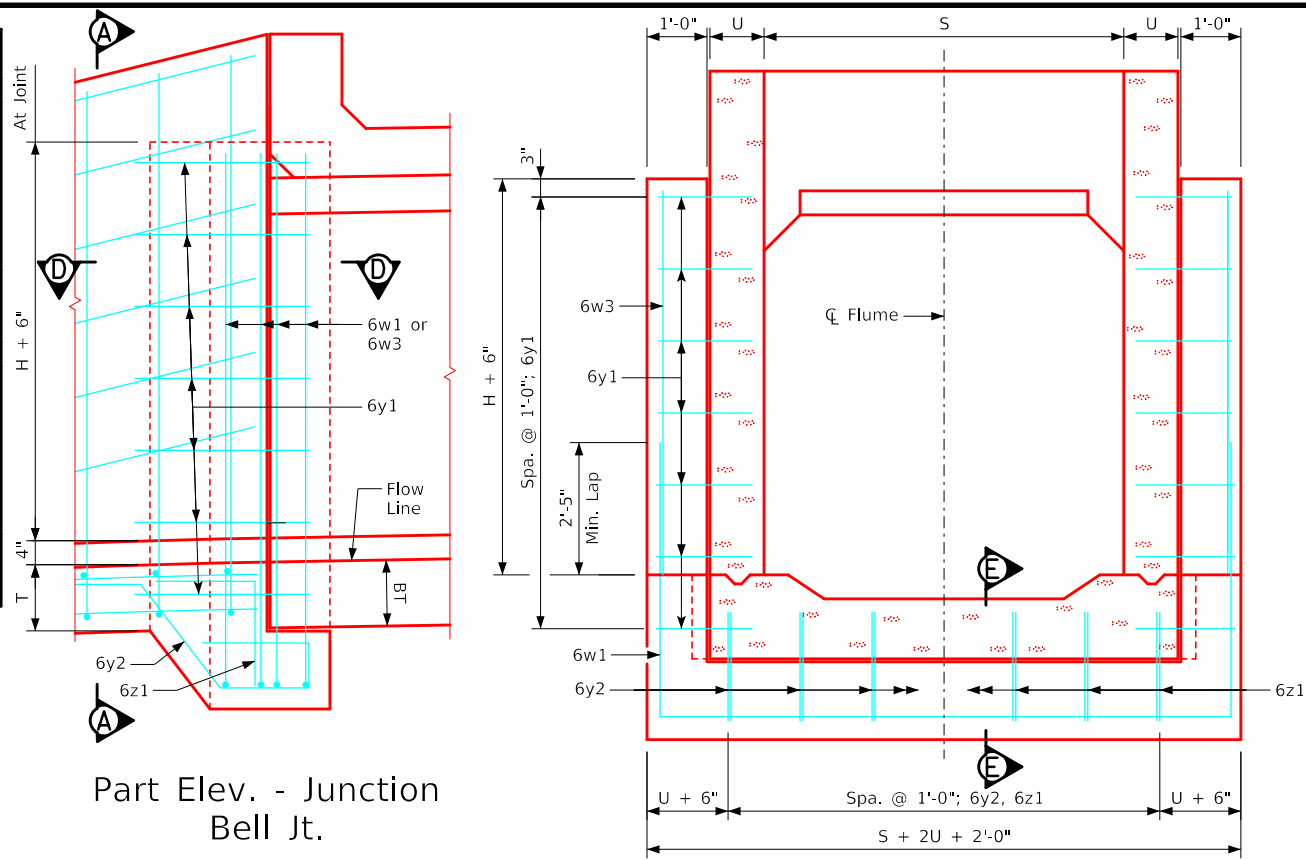
- Dimensions and quantities shown based on "U" flume walls, "BU" barrel walls, "T" flume floor and "BT" barrel floor thicknesses.
- Change lengths of bars 6w1 and adjust reinforcing steel and concrete quantities accordingly for wall and floor thicknesses other than shown.
- Floor bars m1 are to be shortened 6" at bell joints.
- See Sheet RCF 01-20 for general information.

LATEST REVISION DATE	 APPROVED BY BRIDGE ENGINEER		
		Standard Design Single Reinforced Concrete Box Culverts December, 2020	
		Flume Bell Joint Details 6'-0" Span	FBJ 02-20

ENGLISHIGNEDFLUMES.DGN - FBJ 02-20 - THIS SHEET ISSUED 12-2020.

Estimate of Quantities - Flume Bell Joints

Junction Bell Joint			8' x 4'			8' x 5'			8' x 6'			8' x 7'			8' x 8'			8' x 9'			8' x 10'		
Bar	Location	Shape	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight
6w1	Walls & Floor		4	20'-5"	123	4	20'-5"	123	4	20'-5"	123	4	20'-5"	123	4	20'-7"	124	4	20'-7"	124	4	20'-7"	124
6w3	Walls Vert.		8	4'-4"	52	8	5'-4"	64	8	6'-4"	76	8	7'-4"	88	8	8'-4"	100	8	9'-4"	112	8	10'-4"	124
6y1	Walls Horiz.		12	6'-2"	111	14	6'-2"	130	16	6'-2"	148	18	6'-2"	167	20	6'-3"	188	22	6'-3"	207	24	6'-3"	225
6y2	Floor Vert.		10	7'-5"	111	10	7'-5"	111	10	7'-5"	111	10	7'-5"	111	10	7'-5"	111	10	7'-5"	111	10	7'-5"	111
6z1	Floor Vert.		10	3'-5"	51	10	3'-5"	51	10	3'-5"	51	10	3'-5"	51	10	3'-5"	51	10	3'-5"	51	10	3'-5"	51
Total Weight (LB)			448			479			509			540			574			605			635		
Concrete (CY)			Footing	1.6			1.6			1.6			1.6			1.6			1.6				
			Walls	0.8			1.0			1.2			1.4			1.6			1.8				
			Total	2.4			2.6			2.8			3.0			3.2			3.4				
Chute Bell Joint			8' x 4'			8' x 5'			8' x 6'			8' x 7'			8' x 8'			8' x 9'			8' x 10'		
Bar	Location	Shape	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight
6w2	Walls & Floor		4	22'-0"	132	4	20'-5"	123	4	20'-5"	123	4	20'-7"	124	4	20'-7"	124	4	20'-7"	124	4	20'-7"	124
6w4	Walls Vert.		--	--	--	--	--	--	8	4'-0"	48	8	4'-9"	57	8	5'-6"	66	8	6'-3"	75	8	7'-0"	84
6y3	Walls Horiz.		8	6'-2"	74	10	6'-2"	93	12	6'-2"	111	12	6'-2"	111	14	6'-3"	131	16	6'-3"	150	18	6'-3"	169
6y4	Floor Vert.		10	7'-4"	110	10	7'-4"	110	10	7'-4"	110	10	7'-4"	110	10	7'-4"	110	10	7'-4"	110	10	7'-4"	110
6z1	Floor Vert.		10	3'-5"	51	10	3'-5"	51	10	3'-5"	51	10	3'-5"	51	10	3'-5"	51	10	3'-5"	51	10	3'-5"	51
Total Weight (LB)			358			386			443			452			482			510			538		
Concrete (CY)			Footing	1.5			1.5			1.5			1.5			1.6			1.6				
			Walls	0.5			0.6			0.8			0.9			1.0			1.2				
			Total	2.0			2.1			2.3			2.4			2.6			2.8				



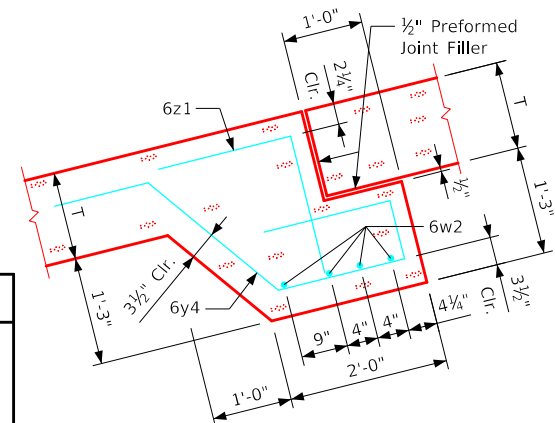
Part Elev. - Junction Bell Jt.

Section A-A

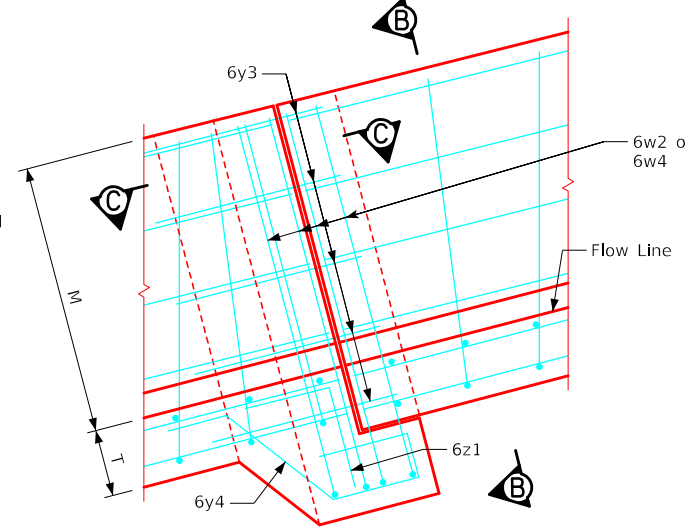
Barrel & Chute Dimensions

S x H	M	T	U	BT	BU
8' x 4'	3'-0"	1'-0"	9"	11"	9"
8' x 5'	3'-9"	1'-0"	9"	11"	9"
8' x 6'	4'-6"	1'-0"	9"	11"	9"
8' x 7'	5'-3"	1'-0"	9"	11"	9"
8' x 8'	6'-0"	1'-0"	10"	11"	9"
8' x 9'	6'-9"	1'-0"	10"	11"	9"
8' x 10'	7'-6"	1'-0"	10"	11"	10"

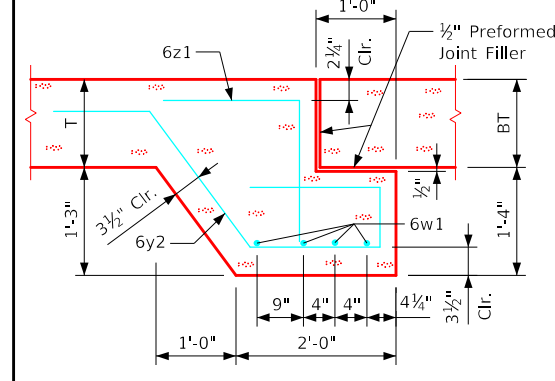
S = Culvert Span
H = Culvert Height



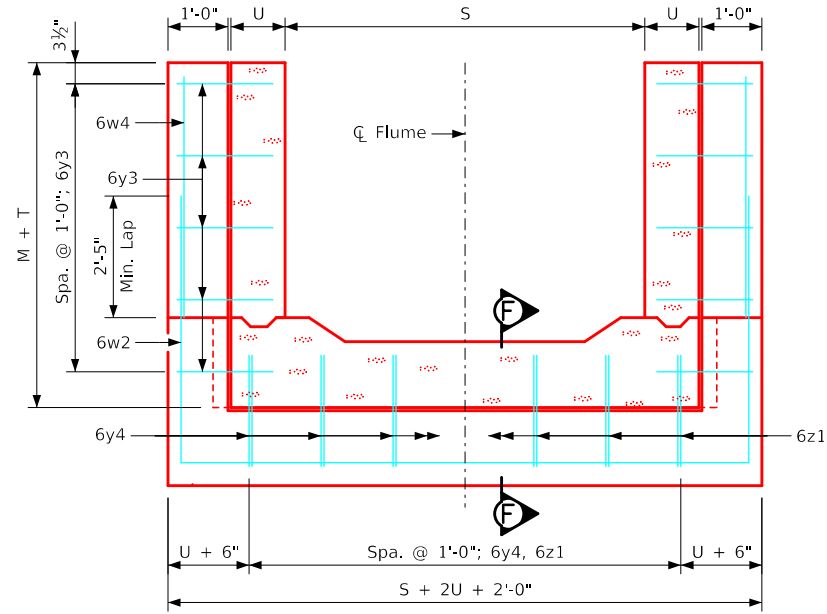
Section F-F



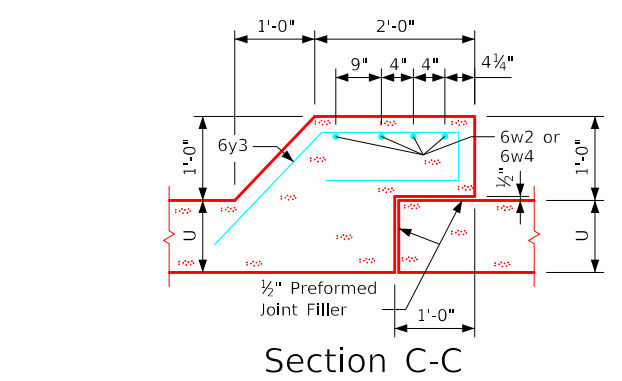
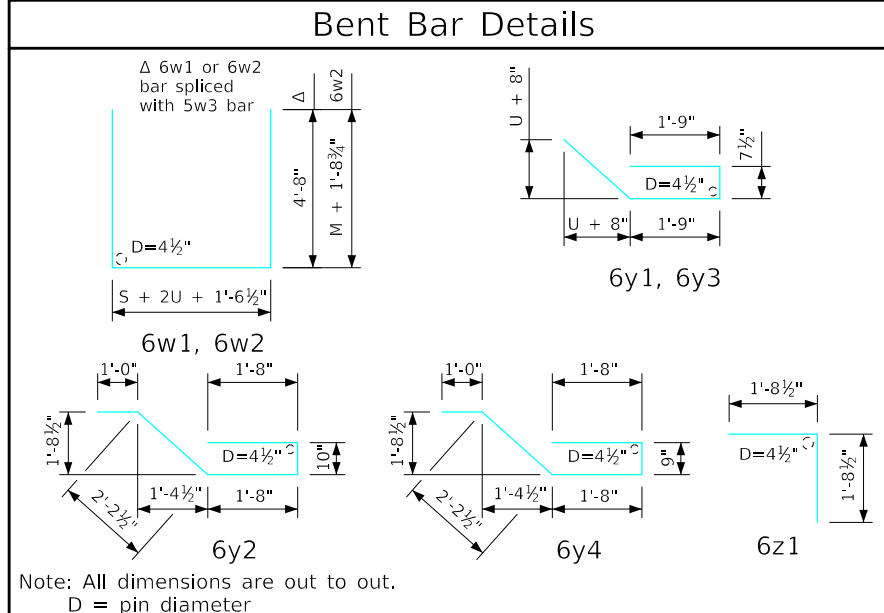
Part Elevation - Chute Bell Jt.



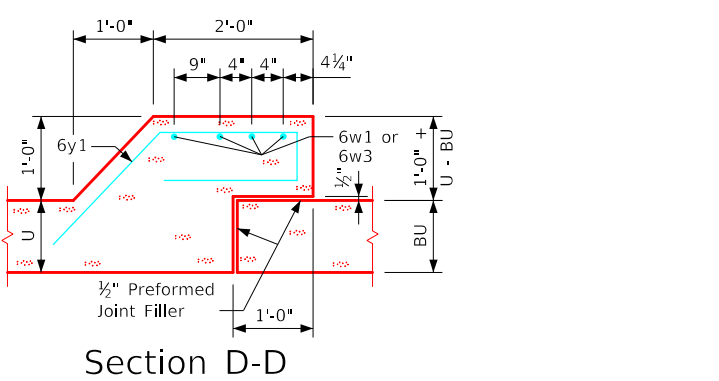
Section E-E



Section B-B



Section C-C



Section D-D

- Notes:**
- Dimensions and quantities shown based on "U" flume walls, "BU" barrel walls, "T" flume floor and "BT" barrel floor thicknesses.
 - Change lengths of bars 6w1 and adjust reinforcing steel and concrete quantities accordingly for wall and floor thicknesses other than shown.
 - Floor bars m1 are to be shortened 6" at bell joints.
 - See Sheet RCF 01-20 for general information.

LATEST REVISION DATE

Standard Design
Single Reinforced Concrete Box Culverts
December, 2020

Flume Bell Joint Details
8'-0" Span

FBJ 03-20

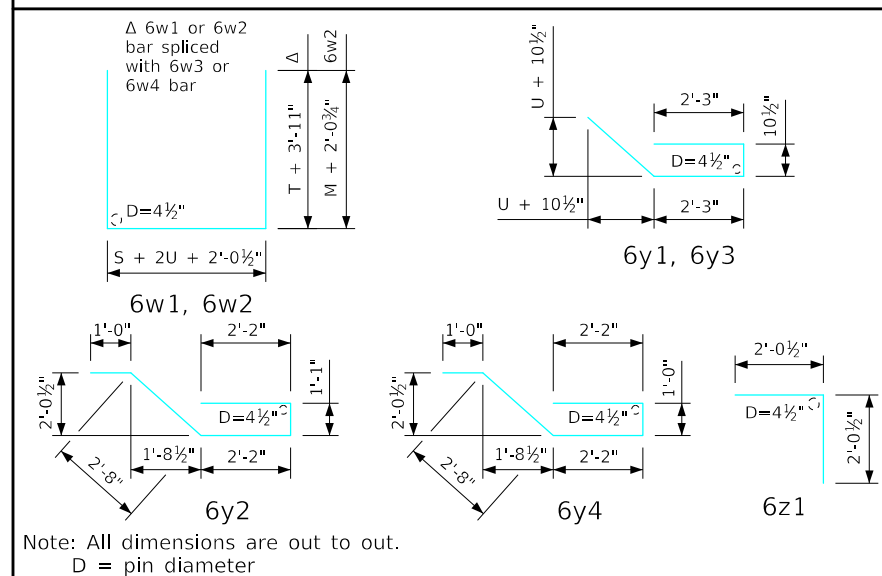
ENGLISHIGNEDFLUMES.DGN - FBI_03-20 - THIS SHEET ISSUED 12-2020.

Estimate of Quantities - Flume Bell Joints

Junction Bell Joint			10' x 4'			10' x 5'			10' x 6'			10' x 7'			10' x 8'			10' x 9'			10' x 10'			10' x 11'			10' x 12'		
Bar	Location	Shape	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight			
6w1	Walls & Floor		4	23'-7"	142	4	23'-7"	142	4	23'-7"	142	4	23'-7"	142	4	23'-9"	143	4	23'-9"	143	4	23'-9"	143	4	23'-11"	144	4	24'-1"	145
6w3	Walls Vert.		8	4'-4"	52	8	5'-4"	64	8	6'-4"	76	8	7'-4"	88	8	8'-4"	100	8	9'-4"	112	8	10'-4"	124	8	11'-4"	136	8	12'-4"	148
6y1	Walls Horiz.		12	7'-8"	138	14	7'-8"	161	16	7'-8"	184	18	7'-8"	207	20	7'-10"	235	22	7'-10"	259	24	7'-10"	282	26	7'-11"	309	28	8'-1"	340
6y2	Floor Vert.		12	9'-1"	164	12	9'-1"	164	12	9'-1"	164	12	9'-1"	164	12	9'-1"	164	12	9'-1"	164	12	9'-1"	164	12	9'-1"	164	12	9'-1"	164
6z1	Floor Vert.		12	4'-1"	74	12	4'-1"	74	12	4'-1"	74	12	4'-1"	74	12	4'-1"	74	12	4'-1"	74	12	4'-1"	74	12	4'-1"	74	12	4'-1"	74
Total Weight (LB)			570			605			640			675			716			752			787			827			871		
Concrete (CY)			2.8			2.8			2.8			2.8			2.9			2.9			2.9			2.9			3.6		
Footings			2.8			2.8			2.8			2.8			2.9			2.9			2.9			2.9			2.9		
Walls			1.3			1.6			1.9			2.1			2.4			2.7			3.0			3.3			3.6		
Total			4.1			4.4			4.7			4.9			5.3			5.6			5.9			6.2			6.5		

Chute Bell Joint			10' x 4'			10' x 5'			10' x 6'			10' x 7'			10' x 8'			10' x 9'			10' x 10'			10' x 11'			10' x 12'		
Bar	Location	Shape	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight			
6w2	Walls & Floor		4	23'-8"	142	4	25'-2"	151	4	23'-7"	142	4	23'-7"	142	4	23'-9"	143	4	23'-9"	143	4	23'-9"	143	4	23'-11"	144	4	24'-1"	145
6w4	Walls Vert.		8	4'-6"	52	8	5'-6"	64	8	6'-6"	76	8	7'-6"	88	8	8'-6"	100	8	9'-6"	112	8	10'-6"	124	8	11'-6"	136	8	12'-6"	148
6y3	Walls Horiz.		8	7'-8"	92	10	7'-8"	115	12	7'-8"	138	14	7'-8"	161	16	7'-10"	188	18	7'-10"	212	20	7'-11"	240	22	8'-1"	268	24	8'-1"	296
6y4	Floor Vert.		12	9'-0"	162	12	9'-0"	162	12	9'-0"	162	12	9'-0"	162	12	9'-0"	162	12	9'-0"	162	12	9'-0"	162	12	9'-0"	162	12	9'-0"	162
6z1	Floor Vert.		12	4'-1"	74	12	4'-1"	74	12	4'-1"	74	12	4'-1"	74	12	4'-1"	74	12	4'-1"	74	12	4'-1"	74	12	4'-1"	74	12	4'-1"	74
Total Weight (LB)			470			502			564			573			610			642			675			687			726		
Concrete (CY)			2.8			2.8			2.8			2.8			2.8			2.8			2.8			2.8			2.9		
Footings			2.8			2.8			2.8			2.8			2.8			2.8			2.8			2.8			2.9		
Walls			0.8			1.0			1.2			1.4			1.6			1.8			2.0			2.3			2.5		
Total			3.6			3.8			4.0			4.2			4.4			4.6			4.8			5.1			5.4		

Bent Bar Details

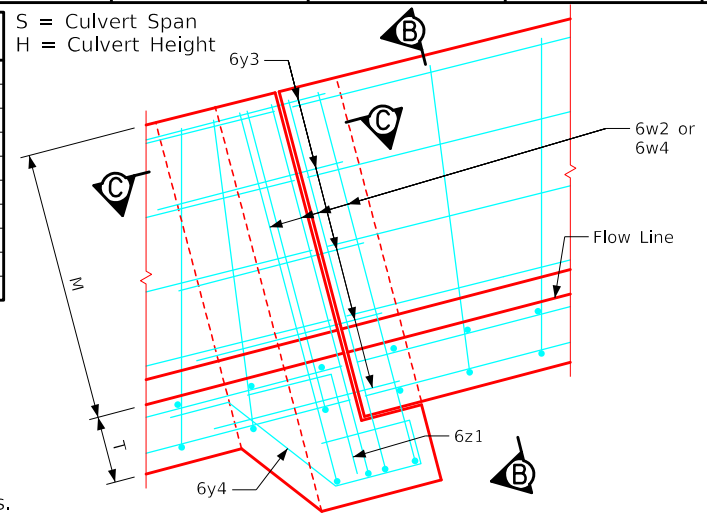


Barrel & Chute Dimensions

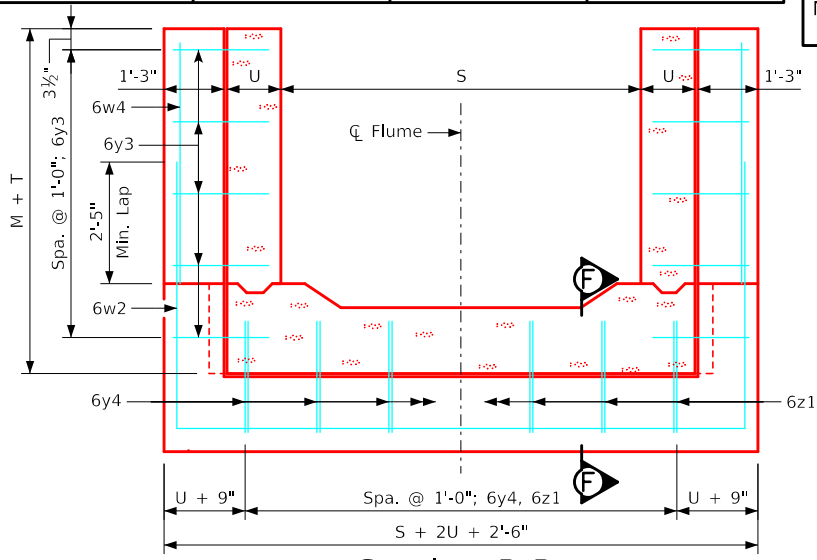
S x H	M	T	U	BT	BU
10' x 4'	3'-0"	1'-1"	9"	1'-0"	9"
10' x 5'	3'-9"	1'-1"	9"	1'-0"	9"
10' x 6'	4'-6"	1'-1"	9"	1'-0"	9"
10' x 7'	5'-3"	1'-1"	9"	1'-0"	9"
10' x 8'	6'-0"	1'-1"	10"	1'-0"	9"
10' x 9'	6'-9"	1'-1"	10"	1'-0"	9"
10' x 10'	7'-6"	1'-1"	10"	1'-0"	10"
10' x 11'	8'-3"	1'-1"	11"	1'-0"	11"
10' x 12'	9'-0"	1'-1"	1'-0"	1'-0"	1'-0"

Notes:

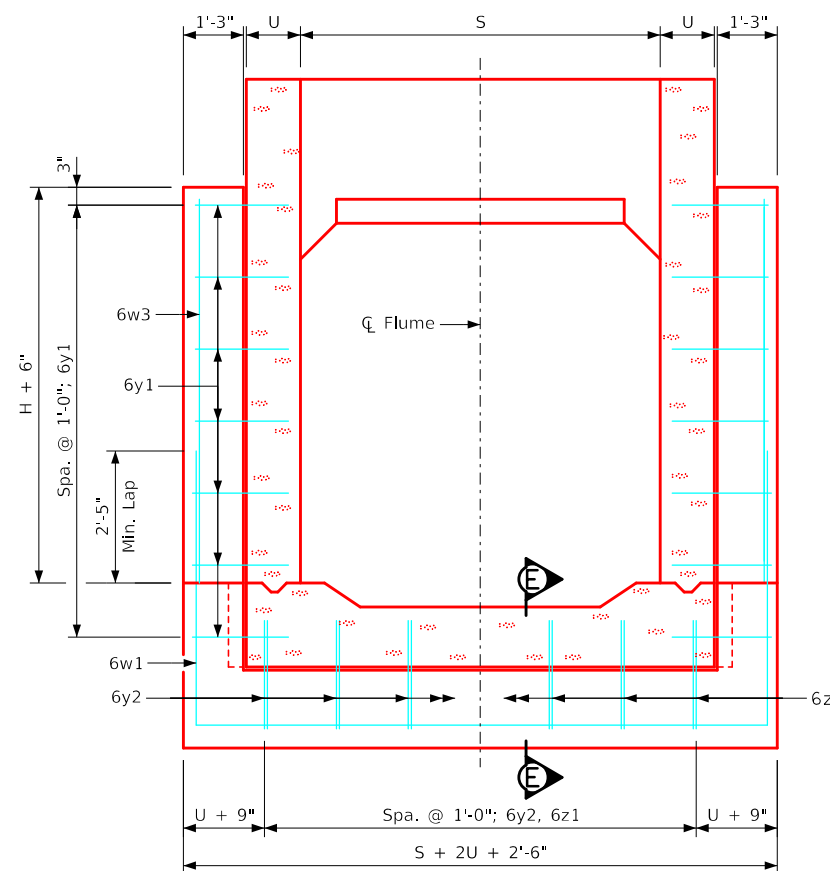
- Dimensions and quantities shown based on "U" flume walls, "BU" barrel walls, "T" flume floor and "BT" barrel floor thicknesses.
- Change lengths of bars 6w1 and adjust reinforcing steel and concrete quantities accordingly for wall and floor thicknesses other than shown.
- Floor bars m1 are to be shortened 6" at bell joints.
- See Sheet RCF 01-20 for general information.



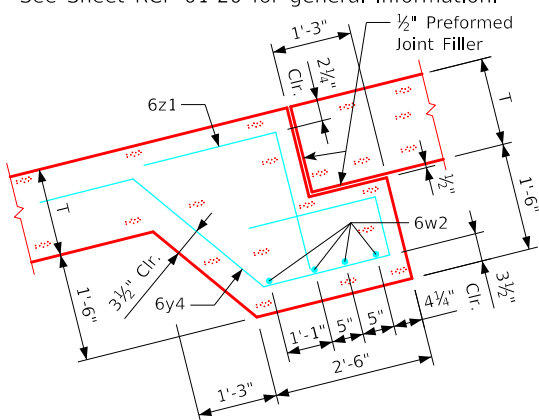
Part Elevation - Chute Bell Jt.



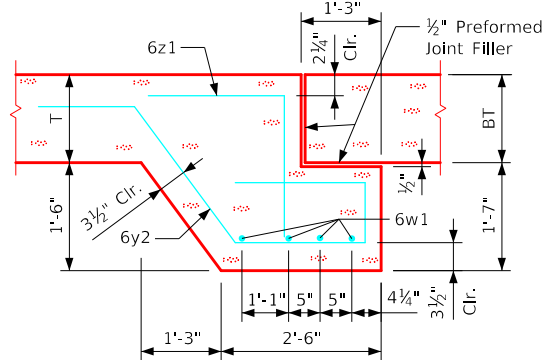
Section B-B



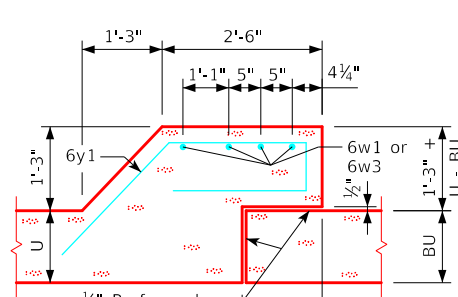
Section A-A



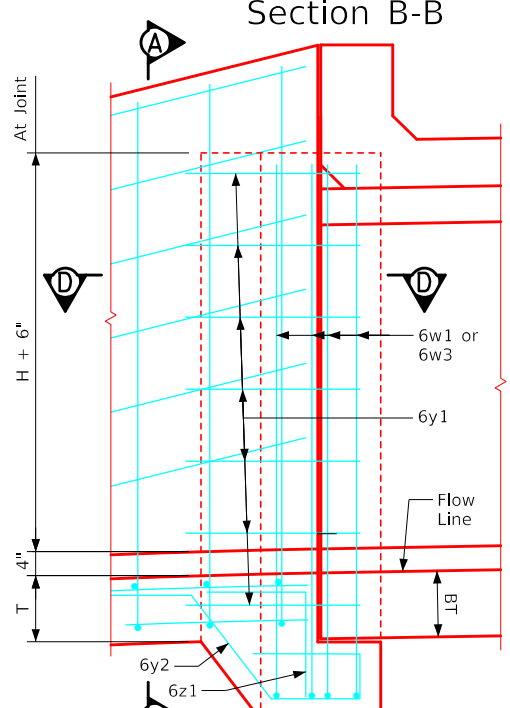
Section F-F



Section E-E



Section D-D



Part Elev. - Junction Bell Jt.

ENGLISHIGNEDFLUMES.DGN - FBI_04-20 - THIS SHEET ISSUED 12-2020.

Standard Design
Single Reinforced Concrete Box Culverts
 December, 2020

Flume Bell Joint Details
 10'-0" Span

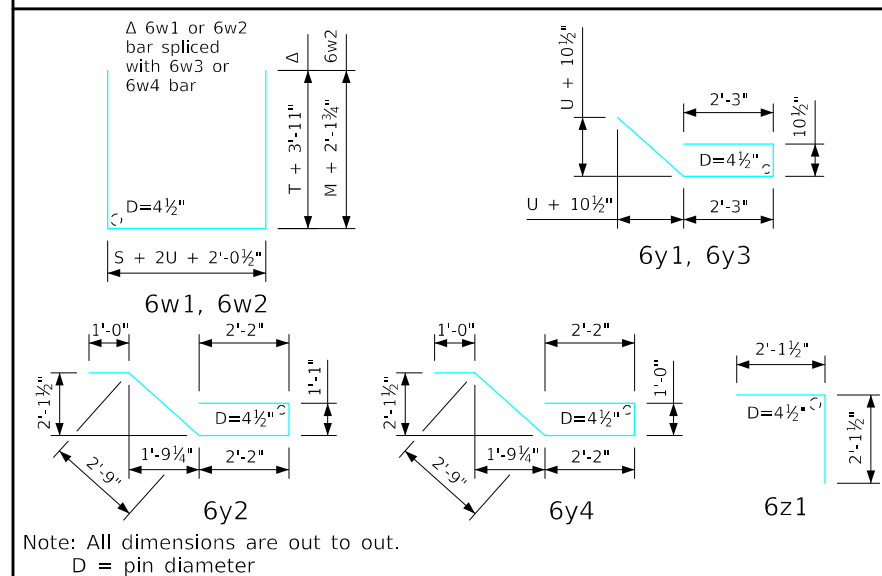
FBJ 04-20

Estimate of Quantities - Flume Bell Joints

Junction Bell Joint			12' x 4'		12' x 5'		12' x 6'		12' x 7'		12' x 8'		12' x 9'		12' x 10'		12' x 11'		12' x 12'										
Bar	Location	Shape	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight						
6w1	Walls & Floor		4	25'-9"	155	4	25'-9"	155	4	25'-9"	155	4	25'-11"	156	4	25'-11"	156	4	26'-1"	157	4	26'-3"	158						
6w3	Walls Vert.		8	4'-4"	52	8	5'-4"	64	8	6'-4"	76	8	7'-4"	88	8	8'-4"	100	8	9'-4"	112	8	10'-4"	124	8	11'-4"	136	8	12'-4"	148
6y1	Walls Horiz.		12	7'-8"	138	14	7'-8"	161	16	7'-8"	184	18	7'-8"	207	20	7'-10"	235	22	7'-10"	259	24	7'-10"	282	26	7'-11"	309	28	8'-1"	340
6y2	Floor Vert.		14	9'-2"	193	14	9'-2"	193	14	9'-2"	193	14	9'-2"	193	14	9'-2"	193	14	9'-2"	193	14	9'-2"	193	14	9'-2"	193	14	9'-2"	193
6z1	Floor Vert.		14	4'-3"	89	14	4'-3"	89	14	4'-3"	89	14	4'-3"	89	14	4'-3"	89	14	4'-3"	89	14	4'-3"	89	14	4'-3"	89	14	4'-3"	89
Total Weight (LB)					627			662			697			732			773			809			844			884			928
Concrete (CY)																													
Footings			3.3			3.3			3.3			3.3			3.3			3.3			3.3			3.3			3.4		
Walls			1.3			1.6			1.9			2.1			2.4			2.7			3.0			3.3			3.6		
Total			4.6			4.9			5.2			5.4			5.7			6.0			6.3			6.6			7.0		

Chute Bell Joint			12' x 4'		12' x 5'		12' x 6'		12' x 7'		12' x 8'		12' x 9'		12' x 10'		12' x 11'		12' x 12'										
Bar	Location	Shape	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight						
6w2	Walls & Floor		4	25'-10"	155	4	27'-4"	164	4	25'-9"	155	4	25'-9"	155	4	25'-11"	156	4	25'-11"	156	4	26'-1"	157	4	26'-3"	158			
6w4	Walls Vert.		8	4'-6"	52	8	5'-6"	64	8	6'-6"	76	8	7'-6"	88	8	8'-6"	100	8	9'-6"	112	8	10'-6"	124	8	11'-6"	136	8	12'-6"	148
6y3	Walls Horiz.		12	7'-8"	138	14	7'-8"	161	16	7'-8"	184	18	7'-8"	207	20	7'-10"	235	22	7'-10"	259	24	7'-10"	282	26	7'-11"	309	28	8'-1"	340
6y4	Floor Vert.		14	9'-1"	191	14	9'-1"	191	14	9'-1"	191	14	9'-1"	191	14	9'-1"	191	14	9'-1"	191	14	9'-1"	191	14	9'-1"	191	14	9'-1"	191
6z1	Floor Vert.		14	4'-3"	89	14	4'-3"	89	14	4'-3"	89	14	4'-3"	89	14	4'-3"	89	14	4'-3"	89	14	4'-3"	89	14	4'-3"	89	14	4'-3"	89
Total Weight (LB)					527			559			621			630			667			699			732			744			783
Concrete (CY)																													
Footings			3.2			3.2			3.2			3.2			3.2			3.2			3.2			3.3			3.3		
Walls			0.8			1.0			1.2			1.4			1.6			1.8			2.0			2.3			2.5		
Total			4.0			4.2			4.4			4.6			4.8			5.0			5.2			5.6			5.8		

Bent Bar Details

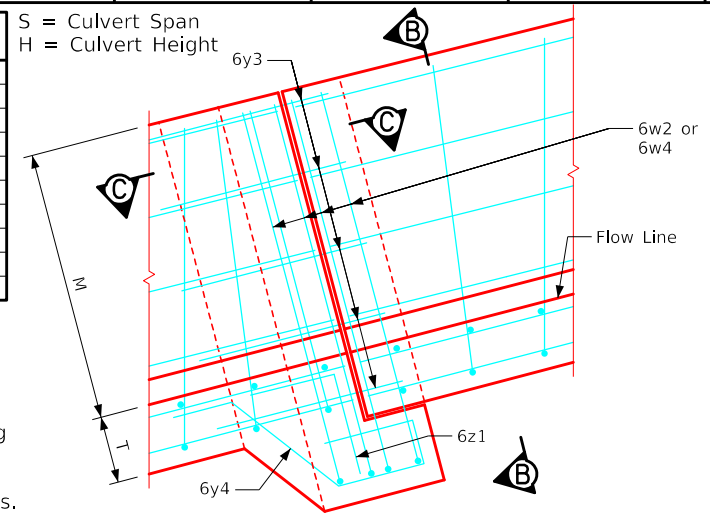


Barrel & Chute Dimensions

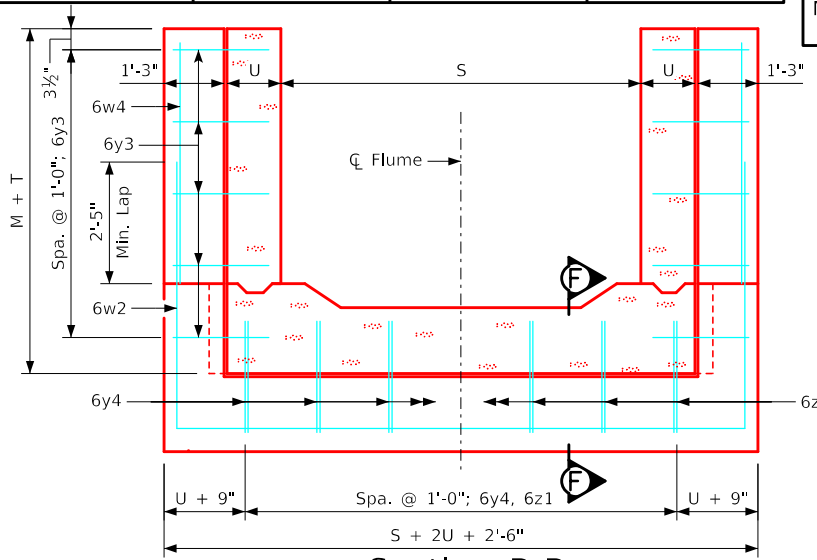
S x H	M	T	U	BT	BU
12' x 4'	3'-0"	1'-2"	9"	1'-1"	9"
12' x 5'	3'-9"	1'-2"	9"	1'-1"	9"
12' x 6'	4'-6"	1'-2"	9"	1'-1"	9"
12' x 7'	5'-3"	1'-2"	9"	1'-1"	9"
12' x 8'	6'-0"	1'-2"	10"	1'-1"	9"
12' x 9'	6'-9"	1'-2"	10"	1'-1"	9"
12' x 10'	7'-6"	1'-2"	10"	1'-1"	10"
12' x 11'	8'-3"	1'-2"	11"	1'-1"	11"
12' x 12'	9'-0"	1'-2"	1'-0"	1'-1"	1'-0"

Notes:

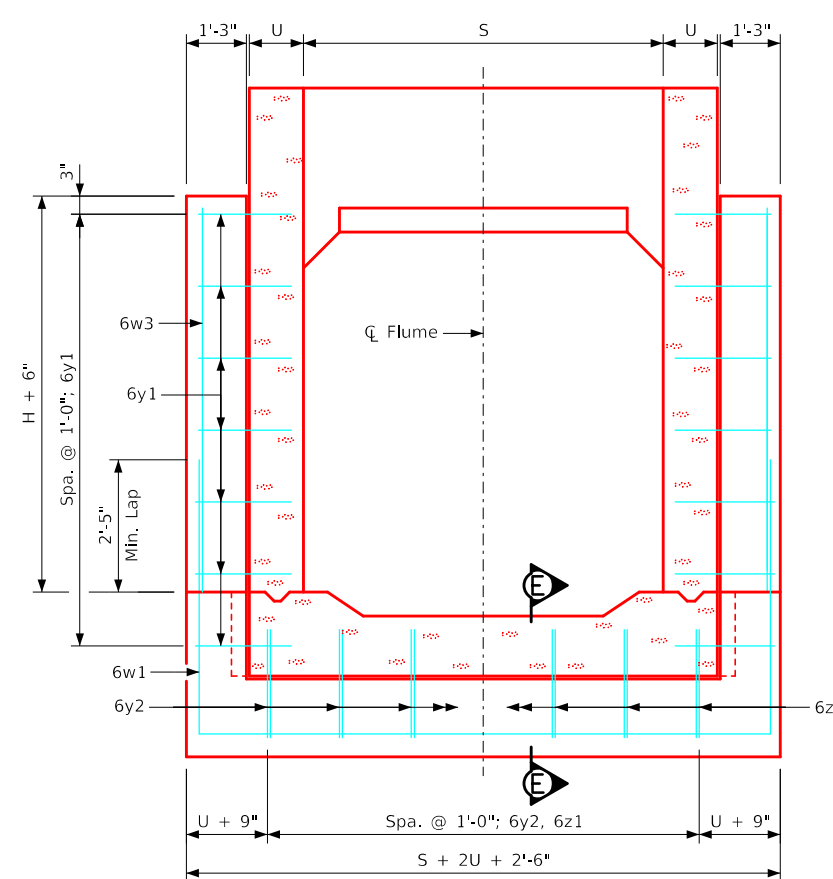
- Dimensions and quantities shown based on "U" flume walls, "BU" barrel walls, "T" flume floor and "BT" barrel floor thicknesses.
- Change lengths of bars 6w1 and adjust reinforcing steel and concrete quantities accordingly for wall and floor thicknesses other than shown.
- Floor bars m1 are to be shortened 6" at bell joints.
- See Sheet RCF 01-20 for general information.



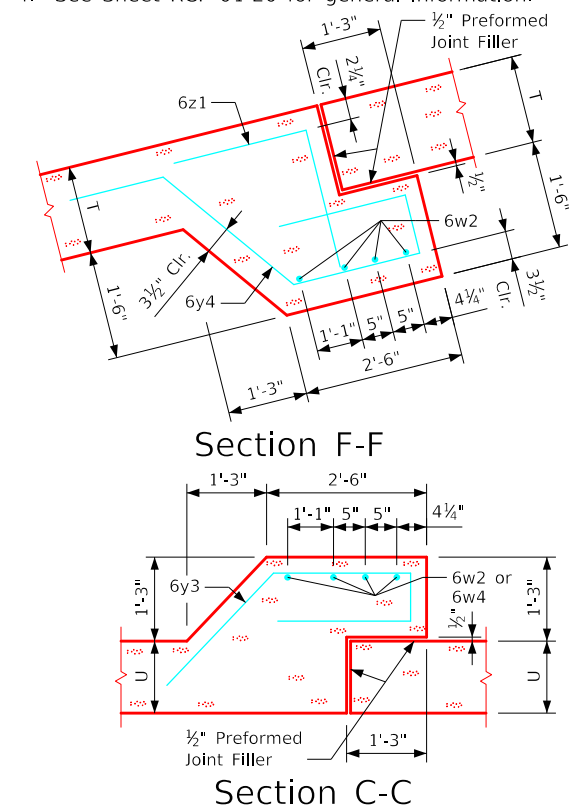
Part Elevation - Chute Bell Jt.



Section B-B

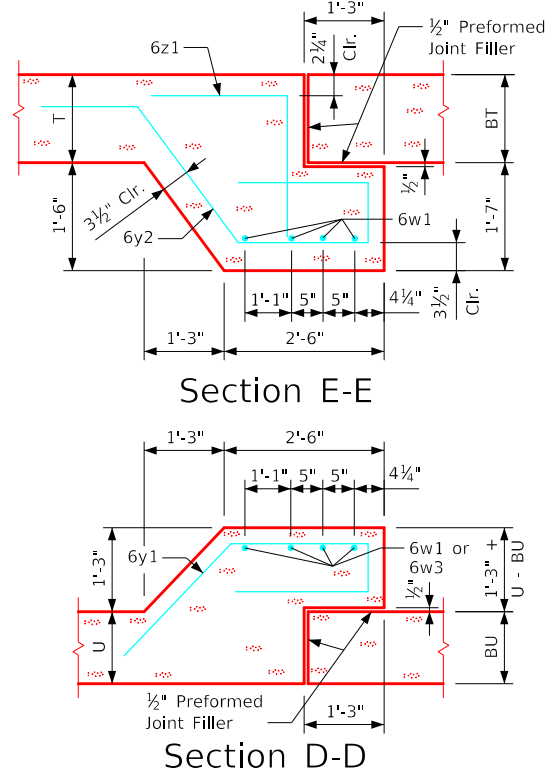


Section A-A



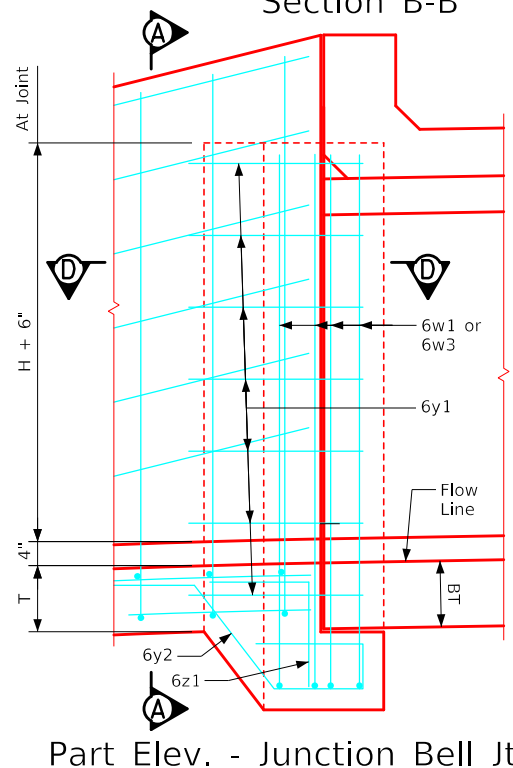
Section F-F

Section C-C



Section E-E

Section D-D



Part Elev. - Junction Bell Jt.

IOWADOT Highway Division

Standard Design
Single Reinforced Concrete
Box Culverts
December, 2020

Flume Bell Joint
Details
12'-0" Span

FBJ 05-20

LATEST REVISION DATE: _____
APPROVED BY BRIDGE ENGINEER: _____

ENGLISHIGNEDFLUMES.DGN - FBI_05-20 - THIS SHEET ISSUED 12-2020.

Estimate of Quantities - Flume Bell Joints

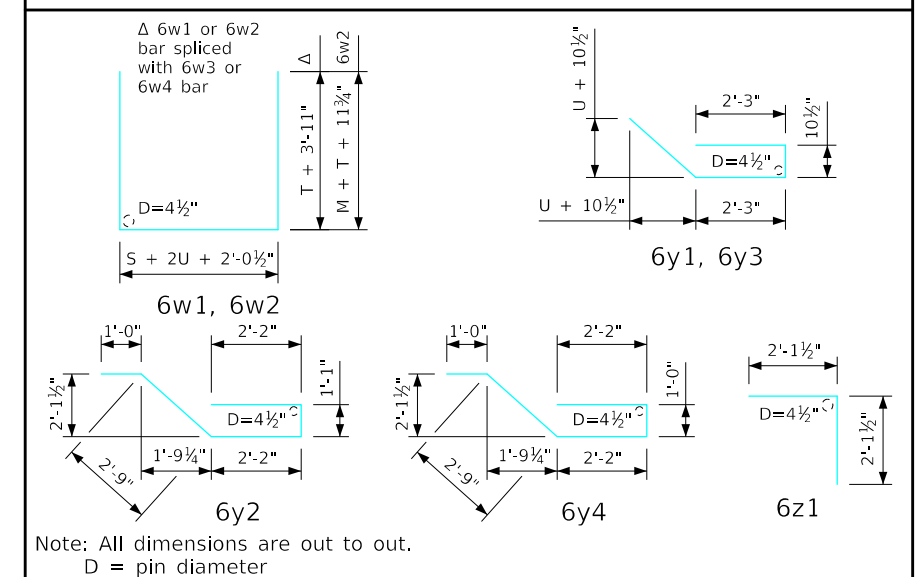
Junction Bell Joint			14' x 4'			14' x 5'			14' x 6'			14' x 7'			14' x 8'			14' x 9'			14' x 10'			14' x 11'			14' x 12'			14' x 13'			14' x 14'					
Bar	Location	Shape	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight						
6w1	Walls & Floor		4	27'-9"	167	4	27'-9"	167	4	27'-9"	167	4	27'-9"	167	4	27'-11"	168	4	27'-11"	168	4	27'-11"	168	4	28'-1"	169	4	28'-3"	170	4	28'-3"	170	4	28'-7"	172			
6w3	Walls Vert.		8	4'-4"	52	8	5'-4"	64	8	6'-4"	76	8	7'-4"	88	8	8'-4"	100	8	9'-4"	112	8	10'-4"	124	8	11'-4"	136	8	12'-4"	148	8	13'-4"	160	8	14'-4"	172			
6y1	Walls Horiz.		12	7'-8"	138	14	7'-8"	161	16	7'-8"	184	18	7'-8"	207	20	7'-10"	235	22	7'-10"	259	24	7'-10"	282	26	7'-11"	309	28	8'-1"	340	30	8'-1"	364	32	8'-2"	393			
6y2	Floor Vert.		16	9'-2"	220	16	9'-2"	220	16	9'-2"	220	16	9'-2"	220	16	9'-2"	220	16	9'-2"	220	16	9'-2"	220	16	9'-2"	220	16	9'-2"	220	16	9'-2"	220	16	9'-2"	220			
6z1	Floor Vert.		16	4'-3"	102	16	4'-3"	102	16	4'-3"	102	16	4'-3"	102	16	4'-3"	102	16	4'-3"	102	16	4'-3"	102	16	4'-3"	102	16	4'-3"	102	16	4'-3"	102	16	4'-3"	102			
Total Weight (LB)			679			714			749			784			825			861			896			936			980			1016			1059					
Concrete (CY)			Footings			3.6			3.6			3.6			3.6			3.6			3.6			3.7			3.7			3.7			3.7					
			Walls			1.3			1.6			1.9			2.1			2.4			2.7			3.0			3.3			3.6			4.1					
			Total			4.9			5.2			5.5			5.7			6.0			6.3			6.6			7.0			7.3			7.6			7.8		
Chute Bell Joint			14' x 4'			14' x 5'			14' x 6'			14' x 7'			14' x 8'			14' x 9'			14' x 10'			14' x 11'			14' x 12'			14' x 13'			14' x 14'					
6w2	Walls & Floor		4	29'-4"	176	4	29'-4"	176	4	29'-4"	176	4	29'-4"	176	4	27'-11"	168	4	27'-11"	168	4	27'-11"	168	4	28'-1"	169	4	28'-3"	170	4	28'-3"	170	4	28'-7"	172			
6w4	Walls Vert.		--	--	--	--	--	--	8	4'-0"	48	8	4'-9"	57	8	5'-6"	66	8	6'-3"	75	8	7'-0"	84	8	7'-9"	93	8	8'-6"	102	8	9'-3"	111	8	10'-0"	120			
6y3	Walls Horiz.		8	7'-8"	92	10	7'-8"	115	12	7'-8"	138	12	7'-8"	138	14	7'-10"	165	16	7'-10"	188	18	7'-10"	212	18	7'-11"	214	20	8'-1"	243	22	8'-1"	267	24	8'-2"	294			
6y4	Floor Vert.		16	9'-1"	218	16	9'-1"	218	16	9'-1"	218	16	9'-1"	218	16	9'-1"	218	16	9'-1"	218	16	9'-1"	218	16	9'-1"	218	16	9'-1"	218	16	9'-1"	218	16	9'-1"	218			
6z1	Floor Vert.		16	4'-3"	102	16	4'-3"	102	16	4'-3"	102	16	4'-3"	102	16	4'-3"	102	16	4'-3"	102	16	4'-3"	102	16	4'-3"	102	16	4'-3"	102	16	4'-3"	102	16	4'-3"	102			
Total Weight (LB)			579			611			673			682			719			751			784			796			835			868			906					
Concrete (CY)			Footings			3.5			3.5			3.5			3.5			3.5			3.5			3.5			3.6			3.6			3.6					
			Walls			0.8			1.0			1.2			1.4			1.6			1.8			2.0			2.3			2.5			2.7			2.9		
			Total			4.3			4.5			4.7			4.9			5.1			5.3			5.5			5.9			6.1			6.3			6.5		

Barrel & Chute Dimensions

S x H	M	T	U	BT	BU
14' x 4'	3'-0"	1'-2"	9"	1'-1"	9"
14' x 5'	3'-9"	1'-2"	9"	1'-1"	9"
14' x 6'	4'-6"	1'-2"	9"	1'-1"	9"
14' x 7'	5'-3"	1'-2"	9"	1'-1"	9"
14' x 8'	6'-0"	1'-2"	10"	1'-1"	9"
14' x 9'	6'-9"	1'-2"	10"	1'-1"	9"
14' x 10'	7'-6"	1'-2"	10"	1'-1"	10"
14' x 11'	8'-3"	1'-2"	11"	1'-1"	11"
14' x 12'	9'-0"	1'-2"	1'-0"	1'-1"	1'-0"
14' x 13'	9'-9"	1'-2"	1'-0"	1'-1"	1'-1"
14' x 14'	10'-6"	1'-3"	1'-1"	1'-2"	1'-2"

S = Culvert Span
H = Culvert Height

Bent Bar Details



Notes:

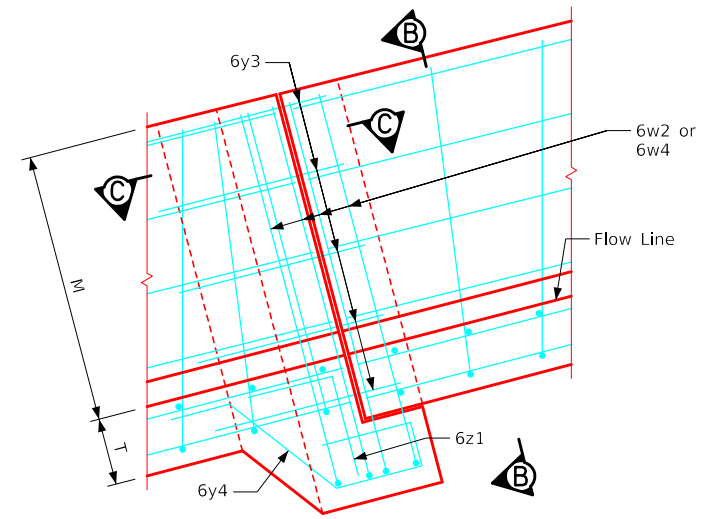
- Dimensions and quantities shown based on "U" flume walls, "BU" barrel walls, "T" flume floor and "BT" barrel floor thicknesses.
- Change lengths of bars 6w1 and adjust reinforcing steel and concrete quantities accordingly for wall and floor thicknesses other than shown.
- Floor bars m1 are to be shortened 6" at bell joints.
- See Sheet RCF 01-20 for general information.

Note:
See Sheet FBJ 07-20 for flume bell joint details.

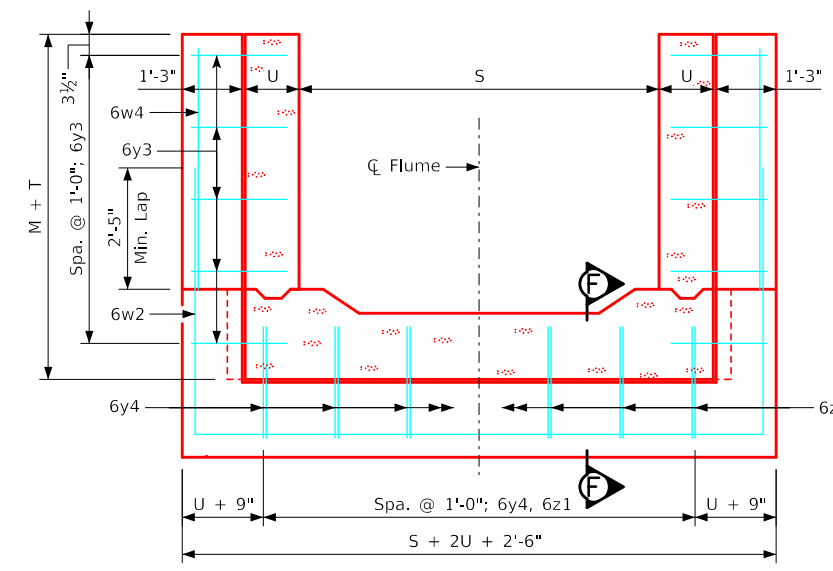
LATEST REVISION DATE	 APPROVED BY BRIDGE ENGINEER		
		Standard Design Single Reinforced Concrete Box Culverts December, 2020	
		Flume Bell Joint Details 14'-0" Span	FBJ 06-20

ENGLISHDESIGNEDFLUMES.DGN - FBJ_06-20 - THIS SHEET ISSUED 12-2020.

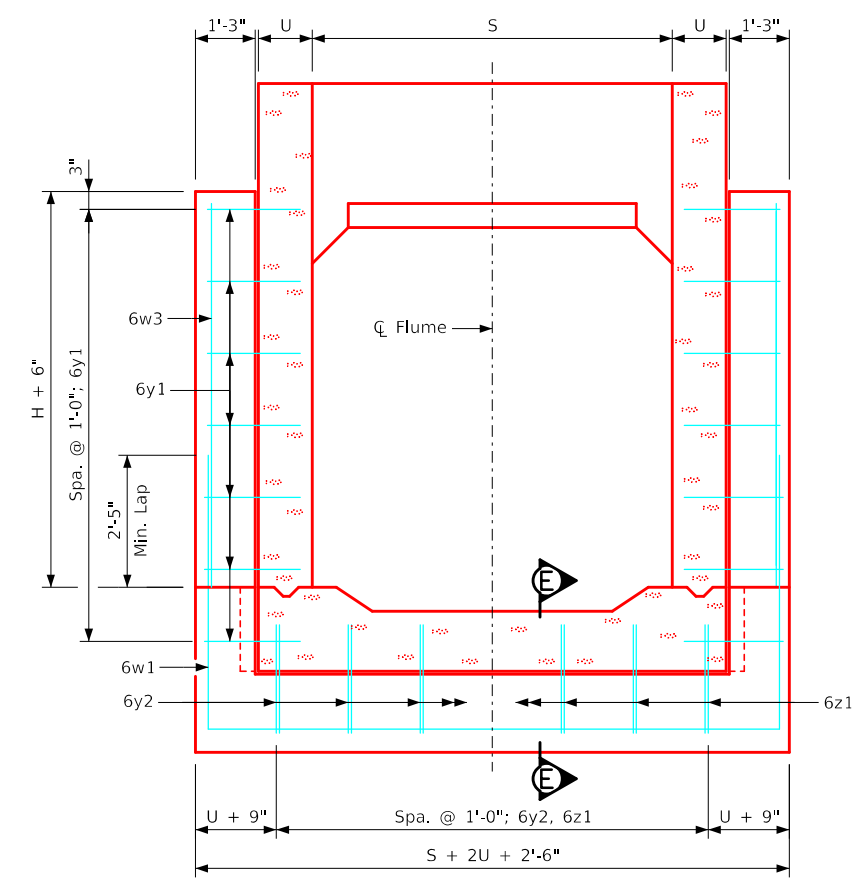
ENGLISHIGNEDFLUMES.DGN - FBI.07-20 - THIS SHEET ISSUED 12-2020.



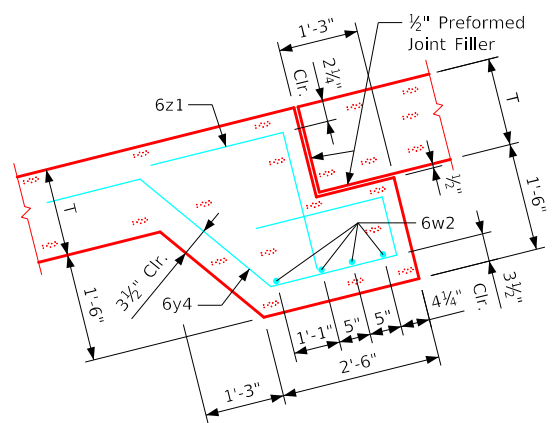
Part Elevation - Chute Bell Jt.



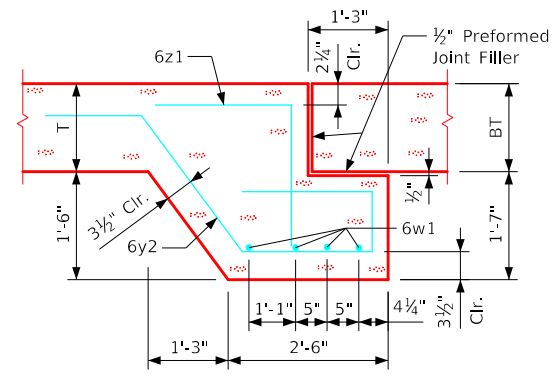
Section B-B



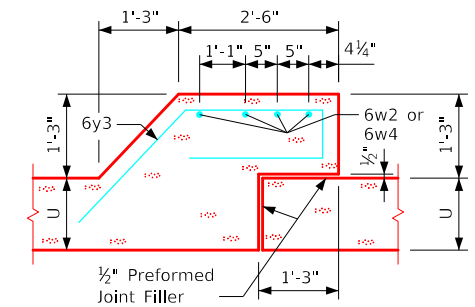
Section A-A



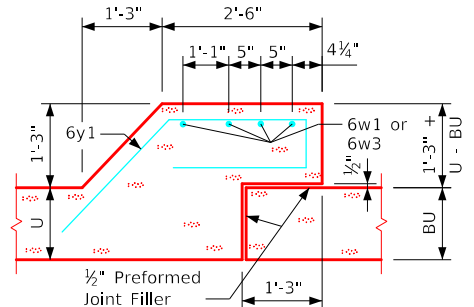
Section F-F



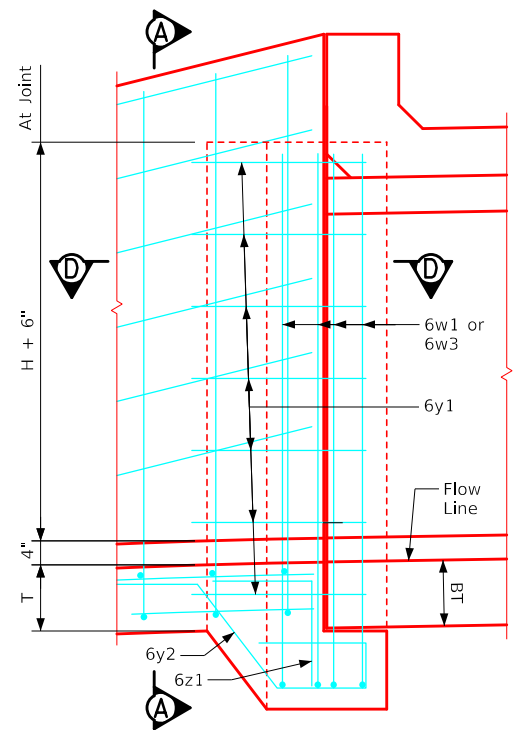
Section E-E



Section C-C



Section D-D



Part Elev. - Junction Bell Jt.

LATEST REVISION DATE	 APPROVED BY BRIDGE ENGINEER		
		Standard Design Single Reinforced Concrete Box Culverts December, 2020	
		Flume Bell Joint Details 14'-0" Span	FBJ 07-20

Estimate of Quantities - Flume Bell Joints

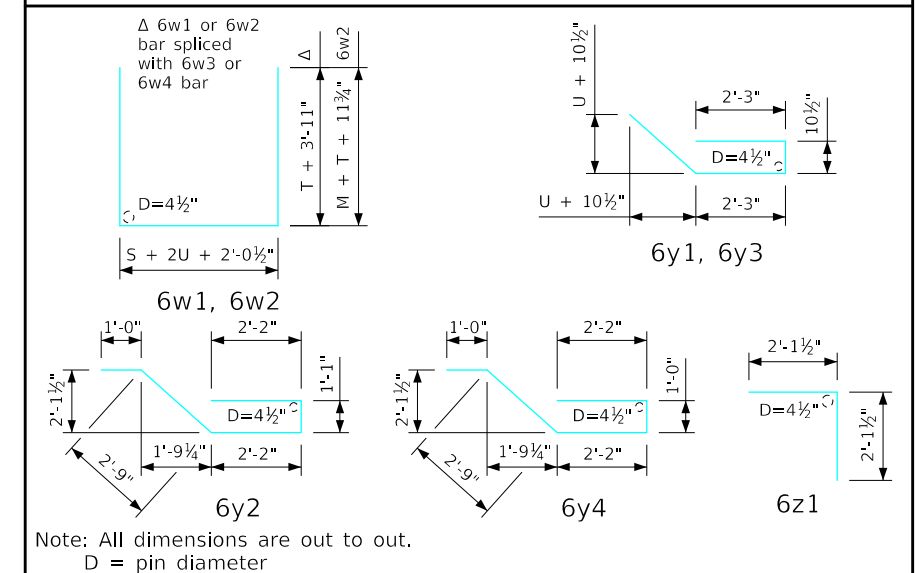
Junction Bell Joint			16' x 4'			16' x 5'			16' x 6'			16' x 7'			16' x 8'			16' x 9'			16' x 10'			16' x 11'			16' x 12'			16' x 13'			16' x 14'		
Bar	Location	Shape	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight			
6w1	Walls & Floor		4	29'-9"	179	4	29'-9"	179	4	29'-9"	179	4	29'-9"	179	4	29'-11"	180	4	29'-11"	180	4	29'-11"	180	4	30'-1"	181	4	30'-3"	182	4	30'-3"	182	4	30'-7"	184
6w3	Walls Vert.		8	4'-4"	52	8	5'-4"	64	8	6'-4"	76	8	7'-4"	88	8	8'-4"	100	8	9'-4"	112	8	10'-4"	124	8	11'-4"	136	8	12'-4"	148	8	13'-4"	160	8	14'-4"	172
6y1	Walls Horiz.		12	7'-8"	138	14	7'-8"	161	16	7'-8"	184	18	7'-8"	207	20	7'-10"	235	22	7'-10"	259	24	7'-10"	282	26	7'-11"	309	28	8'-1"	340	30	8'-1"	364	32	8'-2"	393
6y2	Floor Vert.		18	9'-2"	248	18	9'-2"	248	18	9'-2"	248	18	9'-2"	248	18	9'-2"	248	18	9'-2"	248	18	9'-2"	248	18	9'-2"	248	18	9'-2"	248	18	9'-2"	248	18	9'-2"	248
6z1	Floor Vert.		18	4'-3"	115	18	4'-3"	115	18	4'-3"	115	18	4'-3"	115	18	4'-3"	115	18	4'-3"	115	18	4'-3"	115	18	4'-3"	115	18	4'-3"	115	18	4'-3"	115	18	4'-3"	115
Total Weight (LB)			732			767			802			837			878			914			949			989			1033			1069			1112		
Concrete (CY)			Footing			4.0			4.0			4.0			4.0			4.0			4.0			4.0			4.1			4.1			4.1		
			Walls			1.3			1.6			1.9			2.1			2.4			2.7			3.0			3.3			3.6			3.9		
			Total			5.3			5.6			5.9			6.1			6.4			6.7			7.0			7.3			7.7			8.0		
Chute Bell Joint			16' x 4'			16' x 5'			16' x 6'			16' x 7'			16' x 8'			16' x 9'			16' x 10'			16' x 11'			16' x 12'			16' x 13'			16' x 14'		
6w2	Walls & Floor		4	31'-4"	188	4	29'-9"	179	4	29'-9"	179	4	29'-11"	180	4	29'-11"	180	4	29'-11"	180	4	30'-1"	181	4	30'-3"	182	4	30'-3"	182	4	30'-7"	184			
6w4	Walls Vert.		--	--	--	--	--	--	8	4'-0"	48	8	4'-9"	57	8	5'-6"	66	8	6'-3"	75	8	7'-0"	84	8	7'-9"	93	8	8'-6"	102	8	9'-3"	111	8	10'-0"	120
6y3	Walls Horiz.		8	7'-8"	92	10	7'-8"	115	12	7'-8"	138	12	7'-8"	138	14	7'-10"	165	16	7'-10"	188	18	7'-10"	212	18	7'-11"	214	20	8'-1"	243	22	8'-1"	267	24	8'-2"	294
6y4	Floor Vert.		18	9'-1"	246	18	9'-1"	246	18	9'-1"	246	18	9'-1"	246	18	9'-1"	246	18	9'-1"	246	18	9'-1"	246	18	9'-1"	246	18	9'-1"	246	18	9'-1"	246	18	9'-1"	246
6z1	Floor Vert.		18	4'-3"	115	18	4'-3"	115	18	4'-3"	115	18	4'-3"	115	18	4'-3"	115	18	4'-3"	115	18	4'-3"	115	18	4'-3"	115	18	4'-3"	115	18	4'-3"	115	18	4'-3"	115
Total Weight (LB)			632			664			726			735			772			804			837			849			888			921			959		
Concrete (CY)			Footing			3.8			3.8			3.8			3.8			3.9			3.9			3.9			3.9			3.9			4.0		
			Walls			0.8			1.0			1.2			1.4			1.6			1.8			2.0			2.3			2.5			2.7		
			Total			4.6			4.8			5.0			5.2			5.5			5.7			5.9			6.2			6.4			6.6		

Barrel & Chute Dimensions

S x H	M	T	U	BT	BU
16' x 4'	3'-0"	1'-2"	9"	1'-1"	9"
16' x 5'	3'-9"	1'-2"	9"	1'-1"	9"
16' x 6'	4'-6"	1'-2"	9"	1'-1"	9"
16' x 7'	5'-3"	1'-2"	9"	1'-1"	9"
16' x 8'	6'-0"	1'-2"	10"	1'-1"	9"
16' x 9'	6'-9"	1'-2"	10"	1'-1"	9"
16' x 10'	7'-6"	1'-2"	10"	1'-1"	10"
16' x 11'	8'-3"	1'-2"	11"	1'-1"	11"
16' x 12'	9'-0"	1'-2"	1'-0"	1'-1"	1'-0"
16' x 13'	9'-9"	1'-2"	1'-0"	1'-1"	1'-1"
16' x 14'	10'-6"	1'-3"	1'-1"	1'-2"	1'-2"

S = Culvert Span
H = Culvert Height

Bent Bar Details



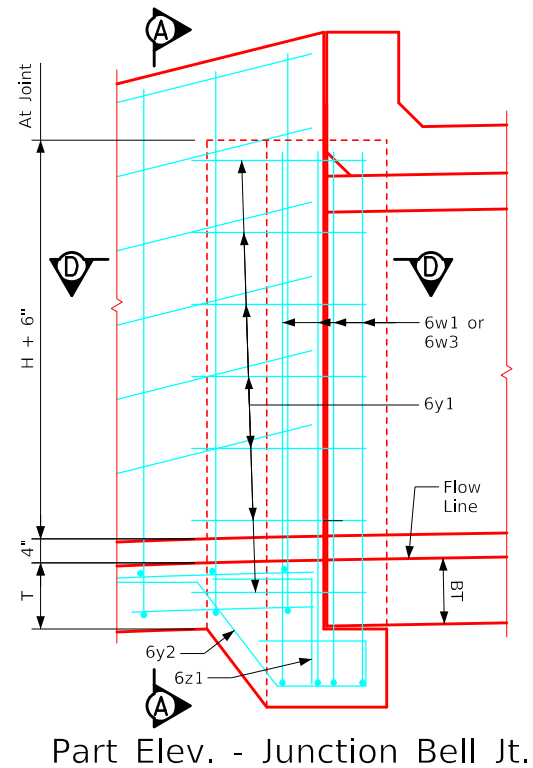
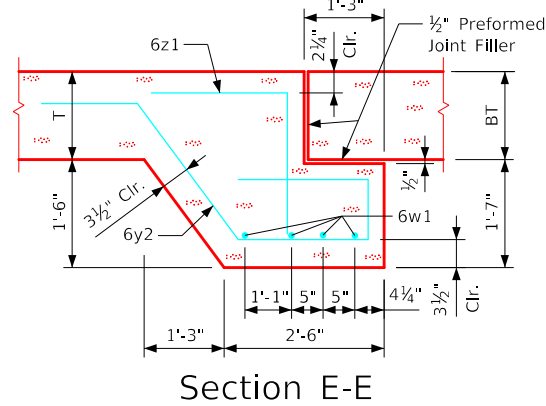
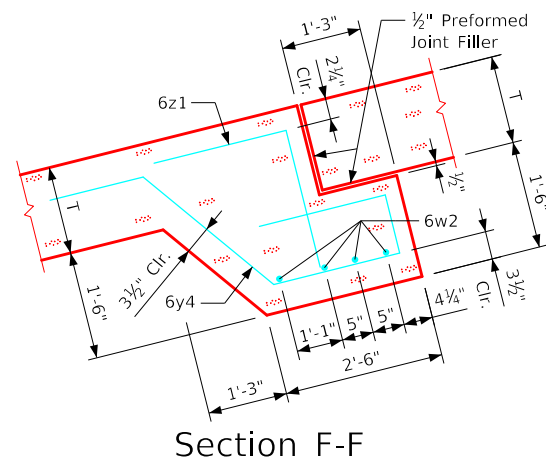
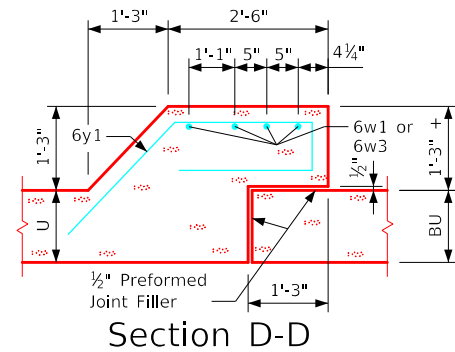
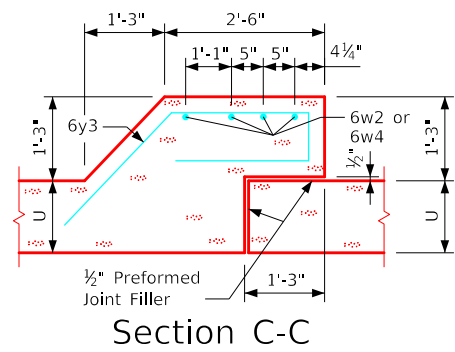
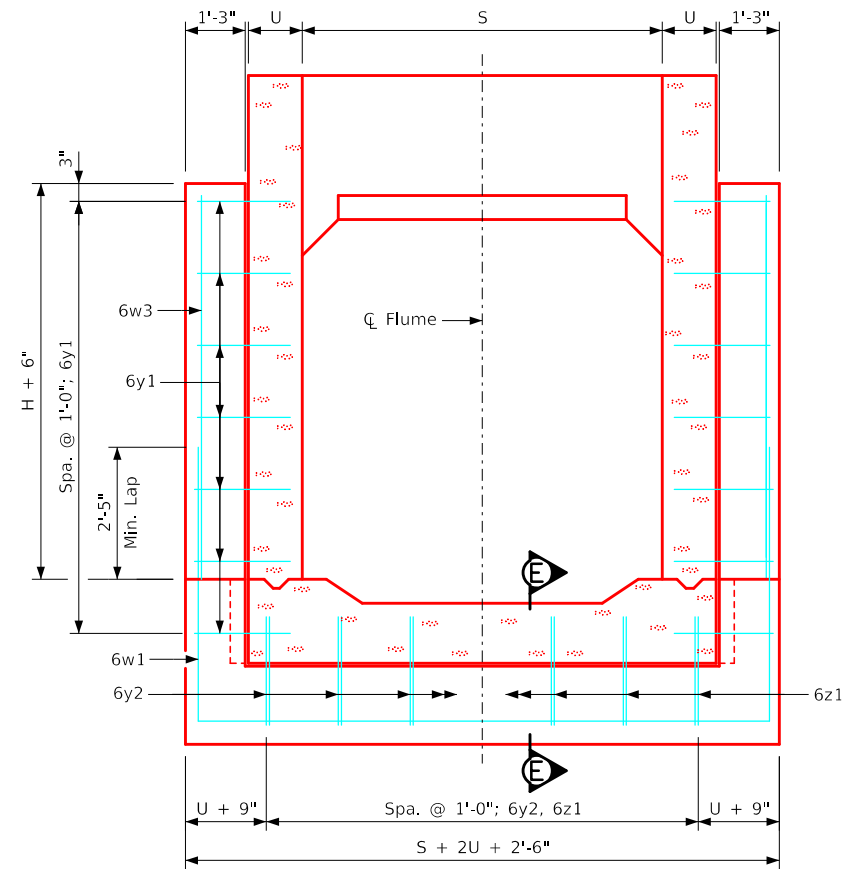
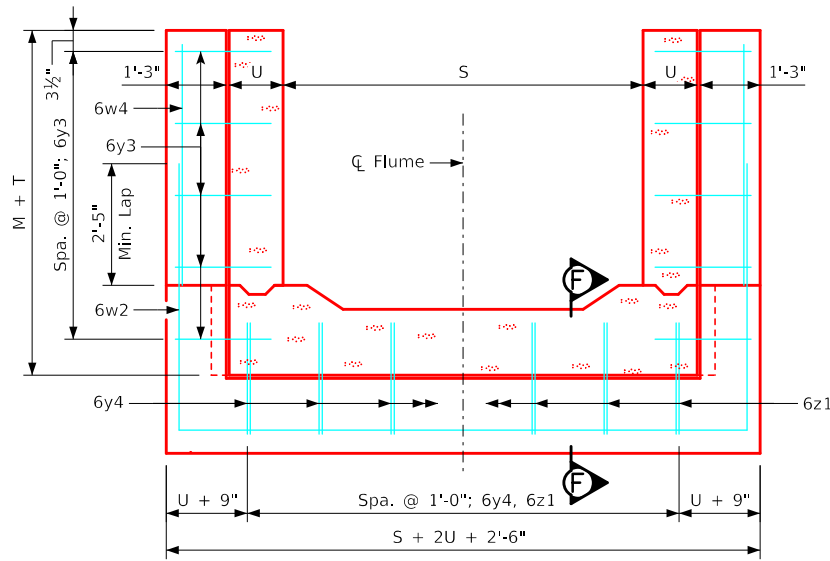
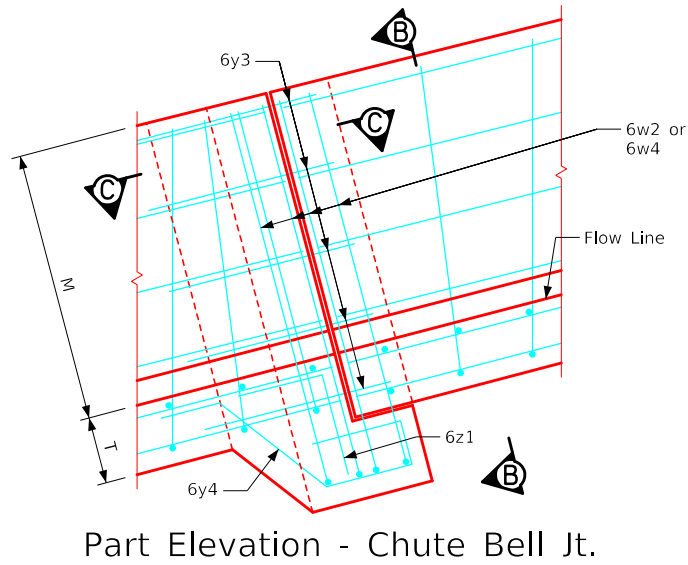
Notes:



- Dimensions and quantities shown based on "U" flume walls, "BU" barrel walls, "T" flume floor and "BT" barrel floor thicknesses.
- Change lengths of bars 6w1 and adjust reinforcing steel and concrete quantities accordingly for wall and floor thicknesses other than shown.
- Floor bars m1 are to be shortened 6" at bell joints.
- See Sheet RCF 01-20 for general information.

Note:
See Sheet FBJ 09-20 for flume bell joint details.

LATEST REVISION DATE	 APPROVED BY BRIDGE ENGINEER		
		Standard Design Single Reinforced Concrete Box Culverts December, 2020	
		Flume Bell Joint Details 16'-0" Span	FBJ 08-20

ENGLISHIGNEDFLUMES.DGN - FBJ 09-20 - THIS SHEET ISSUED 12-2020.



LATEST REVISION DATE	 APPROVED BY BRIDGE ENGINEER		
		Standard Design Single Reinforced Concrete Box Culverts December, 2020	
		Flume Bell Joint Details 16'-0" Span	FBJ 09-20