

## FLUME NOTES:

REINFORCING BAR CLEARANCES WILL BE AS FOLLOWS:

EDGE CLEARANCES: 2" EXCEPT  
TOP OF FLOOR 2 1/4" TO NEAR TRANSV. REINF. BAR  
BOTTOM OF FLOOR 3 1/4" TO NEAR TRANSV. REINF. BAR

END CLEARANCES:

VERTICAL TOP 2"  
VERTICAL BOTTOM 3 1/4"  
TRANSVERSE 2"

FLOOR OF FLUME IS TO BE FINISHED SMOOTH. SIDES OF FOOTING ARE TO BE FORMED TO INSURE 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	21"	26"	31"	41"	54"

THIS SPLICE, IF USED WILL BE AT THE CONTRACTOR'S EXPENSE. BEVELED 2x4 KEYWAYS ARE TO BE USED FOR 9" AND 10" WALLS AND 2x6 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.

### 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, 5TH ED., SERIES OF 2010.

### 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, 5TH ED., SERIES OF 2010: REINFORCING STEEL IN ACCORDANCE WITH AASHTO LRFD SECTION 5, GRADE 60. CONCRETE IN ACCORDANCE WITH AASHTO LRFD SECTION 5, f'c = 4.0 KSI.

### TABLE OF FLUME DIMENSIONS

S x H	K	M	V (3:1)	V (4:1)	L	N	O	P	R	T	U
3'x3'	9'-6"	2'-3"	2'-4 1/2"	2'-3 3/8"	13'-0"	2'-0"	1'-1"	3'-6"	0'-9"	0'-11"	0'-9"
4'x4'	11'-0"	3'-0"	3'-2"	3'-1 1/8"	14'-0"	2'-3"	1'-10"	3'-6"	1'-0"	0'-11"	0'-9"
5'x3'	11'-6"	2'-3"	2'-4 1/2"	2'-3 3/8"	13'-0"	2'-0"	1'-1"	3'-6"	0'-9"	0'-11"	0'-9"
5'x4'	12'-0"	3'-0"	3'-2"	3'-1 1/8"	14'-0"	2'-3"	1'-10"	3'-6"	1'-0"	0'-11"	0'-9"
5'x5'	12'-6"	3'-9"	3'-11 1/8"	3'-10 3/8"	15'-0"	2'-6"	2'-7"	3'-6"	1'-0"	0'-11"	0'-9"
5'x6'	13'-0"	4'-6"	4'-8 3/8"	4'-7 3/8"	16'-0"	2'-9"	3'-5"	3'-6"	1'-3"	0'-11"	0'-9"
6'x3'	12'-6"	2'-3"	2'-4 1/2"	2'-3 3/8"	13'-0"	2'-0"	1'-1"	3'-6"	0'-9"	0'-11"	0'-9"
6'x4'	13'-0"	3'-0"	3'-2"	3'-1 1/8"	14'-0"	2'-3"	1'-10"	3'-6"	1'-0"	0'-11"	0'-9"
6'x5'	13'-6"	3'-9"	3'-11 1/8"	3'-10 3/8"	15'-0"	2'-6"	2'-7"	3'-6"	1'-0"	0'-11"	0'-9"
6'x6'	14'-0"	4'-6"	4'-8 3/8"	4'-7 3/8"	16'-0"	2'-9"	3'-5"	3'-6"	1'-3"	0'-11"	0'-9"
6'x7'	14'-6"	5'-3"	5'-6 3/8"	5'-5 3/8"	17'-0"	3'-0"	4'-2"	3'-9"	1'-3"	0'-11"	0'-9"
6'x8'	15'-0"	6'-0"	6'-3 3/8"	6'-2 3/8"	18'-0"	3'-3"	4'-11"	4'-0"	1'-3"	0'-11"	0'-10"
8'x4'	15'-0"	3'-0"	3'-2"	3'-1 1/8"	14'-0"	2'-3"	1'-10"	3'-6"	1'-0"	1'-0"	0'-9"
8'x5'	15'-6"	3'-9"	3'-11 1/8"	3'-10 3/8"	15'-0"	2'-6"	2'-7"	3'-6"	1'-0"	1'-0"	0'-9"
8'x6'	16'-0"	4'-6"	4'-8 3/8"	4'-7 3/8"	16'-0"	2'-9"	3'-5"	3'-6"	1'-3"	1'-0"	0'-9"
8'x7'	16'-6"	5'-3"	5'-6 3/8"	5'-5 3/8"	17'-0"	3'-0"	4'-2"	3'-9"	1'-3"	1'-0"	0'-9"
8'x8'	17'-0"	6'-0"	6'-3 3/8"	6'-2 3/8"	18'-0"	3'-3"	4'-11"	4'-0"	1'-3"	1'-0"	0'-10"
8'x9'	17'-6"	6'-9"	7'-1 3/8"	6'-11 1/8"	19'-0"	3'-6"	5'-8"	4'-3"	1'-3"	1'-0"	0'-10"
8'x10'	18'-0"	7'-6"	7'-10 1/8"	7'-8 3/8"	20'-0"	3'-9"	6'-6"	4'-6"	1'-3"	1'-0"	0'-10"
10'x4'	17'-0"	3'-0"	3'-2"	3'-1 1/8"	14'-0"	2'-3"	1'-10"	3'-6"	1'-0"	1'-0"	0'-9"
10'x5'	17'-6"	3'-9"	3'-11 1/8"	3'-10 3/8"	15'-0"	2'-6"	2'-7"	3'-6"	1'-0"	1'-1"	0'-9"
10'x6'	18'-0"	4'-6"	4'-8 3/8"	4'-7 3/8"	16'-0"	2'-9"	3'-5"	3'-6"	1'-3"	1'-1"	0'-9"
10'x7'	18'-6"	5'-3"	5'-6 3/8"	5'-5 3/8"	17'-0"	3'-0"	4'-2"	3'-9"	1'-3"	1'-1"	0'-9"
10'x8'	19'-0"	6'-0"	6'-3 3/8"	6'-2 3/8"	18'-0"	3'-3"	4'-11"	4'-0"	1'-3"	1'-1"	0'-10"
10'x9'	19'-6"	6'-9"	7'-1 3/8"	6'-11 1/8"	19'-0"	3'-6"	5'-8"	4'-3"	1'-3"	1'-1"	0'-10"
10'x10'	20'-0"	7'-6"	7'-10 1/8"	7'-8 3/8"	20'-0"	3'-9"	6'-6"	4'-6"	1'-3"	1'-1"	0'-10"
10'x11'	20'-6"	8'-3"	8'-8 3/8"	8'-6 3/8"	21'-0"	4'-0"	7'-3"	4'-9"	1'-3"	1'-1"	0'-11"
10'x12'	21'-0"	9'-0"	9'-5 3/8"	9'-3 3/8"	22'-0"	4'-3"	8'-0"	5'-0"	1'-3"	1'-1"	1'-0"
12'x4'	19'-0"	3'-0"	3'-2"	3'-1 1/8"	14'-0"	2'-3"	1'-10"	3'-6"	1'-0"	1'-2"	0'-9"
12'x5'	19'-6"	3'-9"	3'-11 1/8"	3'-10 3/8"	15'-0"	2'-6"	2'-7"	3'-6"	1'-0"	1'-2"	0'-9"
12'x6'	20'-0"	4'-6"	4'-8 3/8"	4'-7 3/8"	16'-0"	2'-9"	3'-5"	3'-6"	1'-3"	1'-2"	0'-9"
12'x7'	20'-6"	5'-3"	5'-6 3/8"	5'-5 3/8"	17'-0"	3'-0"	4'-2"	3'-9"	1'-3"	1'-2"	0'-9"
12'x8'	21'-0"	6'-0"	6'-3 3/8"	6'-2 3/8"	18'-0"	3'-3"	4'-11"	4'-0"	1'-3"	1'-2"	0'-10"
12'x9'	21'-6"	6'-9"	7'-1 3/8"	6'-11 1/8"	19'-0"	3'-6"	5'-8"	4'-3"	1'-3"	1'-2"	0'-10"
12'x10'	22'-0"	7'-6"	7'-10 1/8"	7'-8 3/8"	20'-0"	3'-9"	6'-6"	4'-6"	1'-3"	1'-2"	0'-10"
12'x11'	22'-6"	8'-3"	8'-8 3/8"	8'-6 3/8"	21'-0"	4'-0"	7'-3"	4'-9"	1'-3"	1'-2"	0'-11"
12'x12'	23'-0"	9'-0"	9'-5 3/8"	9'-3 3/8"	22'-0"	4'-3"	8'-0"	5'-0"	1'-3"	1'-2"	1'-0"

### TABLE OF FLUME CONCRETE (CY)

CULV. SIZE S x H	3:1 SLOPE FLUME				4:1 SLOPE FLUME							
	L3 TOTAL		L2 PER FOOT		L3 TOTAL		L2 PER FOOT					
	WALLS	FOOTING	WALLS	FOOTING	WALLS	FOOTING	WALLS	FOOTING				
3'x3'	3.1	4.0	0.12	0.220	0.4	0.1	4.3	5.5	0.110	0.215	0.4	0.1
4'x4'	4.3	5.0	0.156	0.256	0.6	0.2	5.9	6.8	0.153	0.250	0.6	0.2
5'x3'	3.1	5.3	0.112	0.292	0.5	0.2	4.3	7.2	0.110	0.285	0.5	0.2
5'x4'	4.3	5.6	0.156	0.292	0.7	0.3	5.9	7.8	0.153	0.285	0.7	0.3
5'x5'	5.6	6.0	0.200	0.292	0.7	0.4	7.8	8.3	0.196	0.285	0.7	0.3
5'x6'	7.1	6.4	0.244	0.292	0.9	0.5	9.8	8.9	0.239	0.285	0.9	0.5
6'x3'	3.1	5.9	0.112	0.328	0.6	0.2	4.3	8.1	0.110	0.320	0.6	0.2
6'x4'	4.3	6.3	0.156	0.328	0.8	0.3	5.9	8.7	0.153	0.320	0.8	0.3
6'x5'	5.6	6.8	0.200	0.328	0.8	0.4	7.8	9.3	0.196	0.320	0.8	0.4
6'x6'	7.1	7.2	0.244	0.328	1.0	0.6	9.8	10.0	0.239	0.320	1.0	0.6
6'x7'	8.6	7.6	0.288	0.328	1.1	0.7	11.9	10.6	0.282	0.320	1.1	0.7
6'x8'	11.4	8.9	0.369	0.362	1.2	0.8	15.9	12.4	0.360	0.354	1.2	0.8
8'x4'	4.3	8.4	0.156	0.432	1.0	0.4	5.9	11.5	0.153	0.422	1.0	0.4
8'x5'	5.6	8.9	0.200	0.432	1.0	0.5	7.8	12.3	0.196	0.422	1.0	0.5
8'x6'	7.1	9.5	0.244	0.432	1.2	0.7	9.8	13.1	0.239	0.422	1.2	0.7
8'x7'	8.6	10.0	0.288	0.432	1.3	0.8	11.9	13.9	0.282	0.422	1.3	0.8
8'x8'	11.4	10.8	0.369	0.440	1.5	1.0	15.9	15.0	0.360	0.431	1.5	1.0
8'x9'	13.5	11.3	0.417	0.440	1.6	1.1	18.7	15.9	0.408	0.431	1.6	1.1
8'x10'	15.6	11.9	0.466	0.440	1.7	1.2	21.8	16.7	0.456	0.431	1.7	1.2
10'x4'	4.3	10.6	0.156	0.549	1.1	0.4	5.9	14.6	0.153	0.537	1.1	0.4
10'x5'	5.6	11.3	0.200	0.549	1.1	0.5	7.8	15.7	0.196	0.537	1.1	0.5
10'x6'	7.1	12.0	0.244	0.549	1.4	0.8	9.8	16.7	0.239	0.537	1.4	0.8
10'x7'	8.6	12.7	0.288	0.549	1.6	1.0	11.9	17.7	0.282	0.537	1.6	1.0
10'x8'	11.4	13.7	0.369	0.558	1.7	1.1	15.9	19.1	0.360	0.546	1.7	1.1
10'x9'	13.5	14.4	0.417	0.558	1.9	1.3	18.7	20.1	0.408	0.546	1.9	1.2
10'x10'	15.6	15.1	0.466	0.558	2.0	1.4	21.8	21.1	0.456	0.546	2.0	1.4
10'x11'	17.7	16.1	0.567	0.567	2.2	1.6	27.5	22.5	0.554	0.555	2.2	1.5
10'x12'	24.4	17.1	0.677	0.576	2.4	1.7	34.2	24.0	0.662	0.564	2.3	1.7
12'x4'	4.3	13.1	0.156	0.679	1.3	0.4	5.9	18.1	0.153	0.664	1.3	0.4
12'x5'	5.6	14.0	0.200	0.679	1.3	0.6	7.8	19.4	0.196	0.664	1.3	0.6
12'x6'	7.1	14.9	0.244	0.679	1.6	0.9	9.8	20.7	0.239	0.664	1.6	0.9
12'x7'	8.6	15.8	0.288	0.679	1.8	1.1	11.9	21.9	0.282	0.664	1.8	1.1
12'x8'	11.4	16.9	0.369	0.689	2.0	1.2	15.9	23.5	0.360	0.674	1.9	1.2
12'x9'	13.5	17.7	0.417	0.689	2.1	1.4	18.7	24.8	0.408	0.674	2.1	1.4
12'x10'	15.6	18.6	0.466	0.689	2.3	1.6	21.8	26.1	0.456	0.674	2.3	1.6
12'x11'	17.7	19.8	0.567	0.699	2.5	1.8	27.5	27.8	0.554	0.683	2.5	1.7
12'x12'	24.4	21.0	0.677	0.708	2.7	1.9	34.2	29.5	0.662	0.693	2.7	1.9

NOTE: L3 CONCRETE QUANTITIES ASSUME A 1'00" ANGLE 'C'.

S = CULVERT SPAN  
H = CULVERT HEIGHT

### TABLE OF FLUME REINFORCING

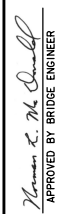
BAR S	FLUME SPAN				
	c1, c2	f1	f2	h1	m1
3'-0"	5 @ 1'-0"	6 @ 1'-0"	5 @ 1'-0"	5 @ 1'-0"	6 @ 1'-0"
4'-0"	5 @ 1'-0"	6 @ 1'-0"	5 @ 1'-0"	5 @ 1'-0"	6 @ 1'-0"
5'-0"	5 @ 0'-6"	6 @ 1'-0"	5 @ 1'-0"	5 @ 1'-0"	6 @ 1'-0"
6'-0"	5 @ 0'-6"	6 @ 1'-0"	5 @ 1'-0"	5 @ 1'-0"	6 @ 1'-0"
8'-0"	6 @ 0'-6"	6 @ 1'-0"	5 @ 1'-0"	5 @ 1'-0"	6 @ 1'-0"
10'-0"	7 @ 0'-6"	6 @ 1'-0"	5 @ 1'-0"	5 @ 1'-0"	6 @ 1'-0"
12'-0"	7 @ 0'-6"	6 @ 1'-0"	5 @ 1'-0"	5 @ 1'-0"	6 @ 1'-0"

BAR H	FLUME HEIGHT				
	a1	b1	b2	c3	s1
3'-0"	4 @ 1'-0"	5 @ 1'-0"	4 @ 1'-0"	---	#5
4'-0"	4 @ 1'-0"	5 @ 1'-0"	4 @ 1'-0"	5 @ 1'-0"	#5
5'-0"	4 @ 1'-0"	5 @ 1'-0"	4 @ 1'-0"	5 @ 0'-6"	#5
6'-0"	4 @ 1'-0"	5 @ 1'-0"	4 @ 1'-0"	5 @ 0'-6"	#6
7'-0"	5 @ 1'-0"	5 @ 1'-0"	4 @ 1'-0"	5 @ 0'-6"	#6
8'-0"	5 @ 1'-0"	5 @ 1'-0"	4 @ 1'-0"	5 @ 0'-6"	#6
9'-0"	4 @ 0'-6"	5 @ 1'-0"	4 @ 1'-0"	5 @ 0'-6"	#6
10'-0"	5 @ 0'-6"	5 @ 1'-0"	4 @ 1'-0"	6 @ 0'-6"	#6
11'-0"	5 @ 0'-6"	5 @ 1'-0"	4 @ 1'-0"	7 @ 0'-6"	#6
12'-0"	5 @ 0'-6"	5 @ 1'-0"	4 @ 1'-0"	7 @ 0'-6"	#6

NOTE: THE RESPECTIVE BAR SIZE AND SPACING SHOULD BE USED FOR APPROPRIATE FLUME SIZE WHEN THE SPAN AND HEIGHT ARE DIFFERENT.

REVISED 05-13 - ADDED #3 BARS TO THE 4'-0" HEIGHT IN THE TABLE OF FLUME REINFORCING. ENCL. 1070S (GENERAL DIMENSIONS) - RCF-01-12 - THIS SHEET ISSUED 04-12.

05-13 LATEST REVISION DATE   
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