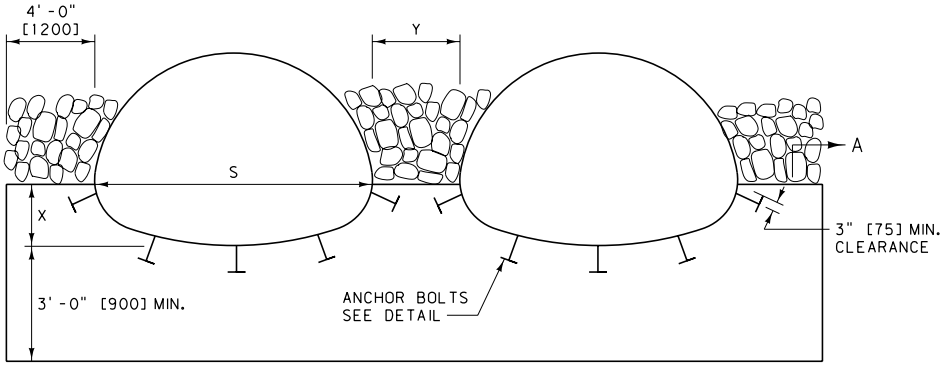


MULTIPLE ARCH CULVERTS

(METAL CULVERTS SHOWN)

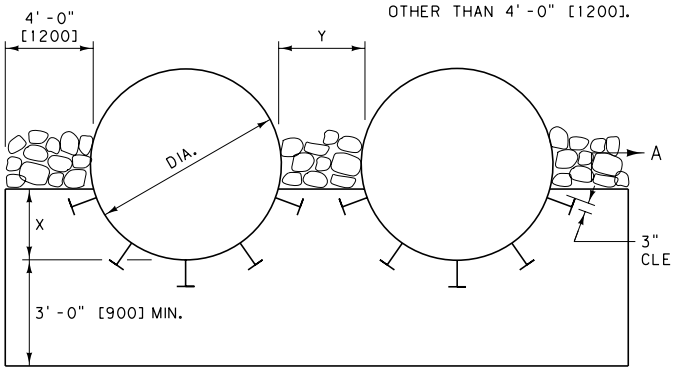
X: VARIABLE (SEE DTL. DWG. NO. 603-10 FOR CONCRETE CULV. AND 603-34 FOR METAL CULV.)

Y: FOR METAL CULV. AND CULV. WITHOUT FETS:
Y = 4'-0" [1200] (OUTSIDE WALL TO OUTSIDE WALL)

S: INSIDE PIPE SPAN

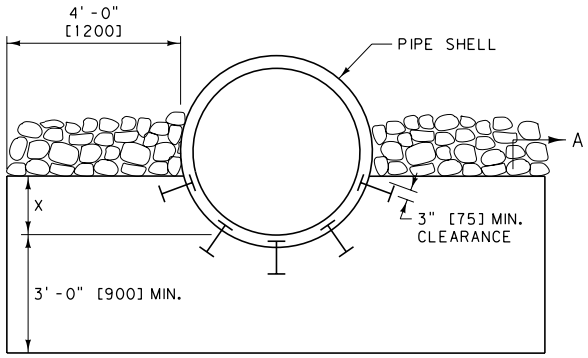
FOR CONCRETE CULV. WITH FETS: USE Y AS REQUIRED FOR PARALLEL PIPE INSTALLATION, PER DTL. DWG. NO. 613-08

NOTE: Y MAY BE INCREASED ON LARGE DIAMETER PIPES (UP TO A MAX. OF 8'-0" [2400]) TO AID IN INSTALLATION AND BACKFILL. THE QUANTITIES SHOWN IN 552-04, 06 & 08 WERE FIGURED USING Y = 4'-0" [1200]. ADJUST QUANTITIES AS NEEDED WHEN Y IS OTHER THAN 4'-0" [1200].



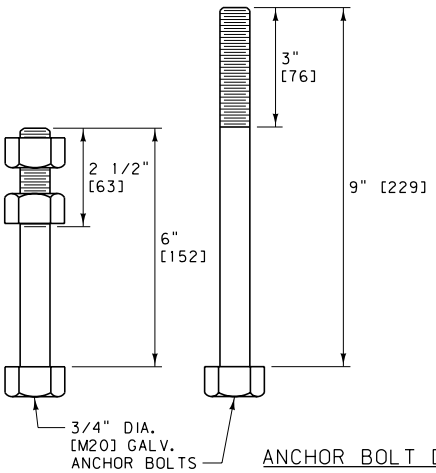
MULTIPLE ROUND CULVERTS

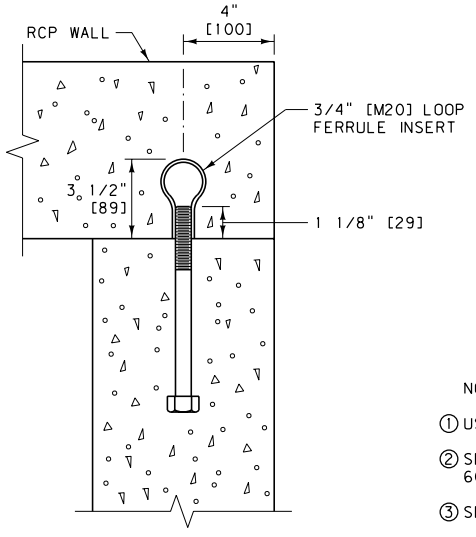
(METAL CULVERTS SHOWN)



SINGLE ROUND CULVERT

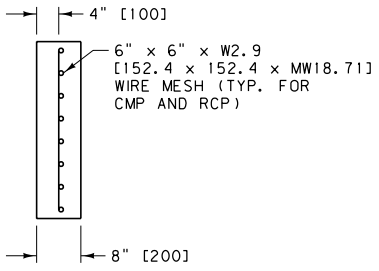
(CONCRETE CULVERT SHOWN)





ANCHOR BOLT DETAILS

6" [152] LONG FOR METAL PIPE
9" [229] LONG FOR CONCRETE PIPE



SECTION A-A

NOTES:

① USE CLASS GENERAL CONCRETE OR EQUAL.

② SEE DTL. DWG. NO. 603-18 AND 603-19 FOR BEDDING UNDER CULVERTS.

③ SEE DTL. DWG. NO. 613-14 FOR RIPRAP.

ANCHOR BOLT SPACING:
MIN. OF FIVE 3/4" DIA. [M20] GALV. ANCHOR BOLTS IN WALL. USE MAX. SPACING OF 1.5' [455].

REINFORCING STEEL:
USE REBAR DOWELS MEETING THE REQUIREMENTS OF AASHTO M 31 GRADE 60 (GRADE 420).

EPOXY RESIN BONDING ADHESIVE:
MEET THE REQUIREMENTS OF AASHTO M 235 TYPE 4.

UNITS SHOWN IN BRACKETS [] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.

DETAILED DRAWING

REFERENCE STANDARD SPEC. SECTION 552, 603, 613

DWG. NO. 552-00

CONCRETE CUTOFF WALLS FOR CULVERTS

EFFECTIVE: SEPTEMBER 2014

MDT MONTANA DEPARTMENT OF TRANSPORTATION

CULVERT INSTALLATION QUANTITIES

DIAMETER OR SPAN x RISE	CUBIC YARDS OF CLASS GENERAL CONCRETE (EACH END)										CUBIC YARDS OF RIPRAP (EACH END) ① (DTL. DWG. NO. 613-14)								C. Y. BEDDING MATERIAL ② PER FOOT OF PIPE (DTL. DWG. NO. 603-19)	
	CUTOFF WALL (DTL. DWG. NO. 552-00)		CONCRETE EDGE PROTECTION (DTL. DWG. NO. 613-08)																	
			1.5:1		2:1		2.5:1		3:1		1.5:1		2:1		2.5:1		3:1			
	SING.	DBL.	SING.	DBL.	SING.	DBL.	SING.	DBL.	SING.	DBL.	SING.	DBL.	SING.	DBL.	SING.	DBL.	SING.	DBL.	SING.	DBL.
RCP (SQ. END)																				
54"	1.1	1.9	2.3	3.4	2.8	4.1	3.4	4.8	3.9	5.6	8.3	13.0	10.3	16.1	12.4	19.5	14.6	22.9	1.0	2.0
60"	1.2	2.0	2.6	3.7	3.1	4.5	3.7	5.3	4.3	6.1	8.8	13.9	11.0	17.3	13.3	20.9	15.6	24.6	1.1	2.2
66"	1.3	2.1	2.8	4.0	3.3	4.8	4.0	5.7	4.6	6.6	9.4	14.8	11.9	18.9	14.4	22.7	16.9	26.7	1.2	2.4
72"	1.3	2.2	3.0	4.3	3.6	5.2	4.3	6.2	5.0	7.2	10.2	16.1	12.6	20.0	15.2	24.1	17.9	28.3	1.3	2.6
78"	1.4	2.3	3.2	4.7	3.9	5.6	4.6	6.7	5.3	7.7	10.7	17.1	13.3	21.1	16.1	25.5	18.9	29.9	1.4	2.8
84"	1.4	2.4	3.4	5.0	4.1	6.0	4.9	7.1	5.7	8.3	11.3	18.0	14.0	22.3	16.9	26.9	19.9	31.6	1.5	3.0
90"	1.5	2.5	3.6	5.3	4.4	6.4	5.2	7.6	6.1	8.8	11.9	18.9	14.7	23.4	17.8	28.2	20.9	33.2	1.6	3.2
96"	1.6	2.6	3.8	5.6	4.7	6.8	5.5	8.1	6.4	9.4	12.5	19.8	15.5	24.6	18.6	29.6	21.9	34.9	1.7	3.4
RCPA (SQ. END)																				
65.00" x 40.00"	1.2	1.9	2.0	3.0	2.4	3.6	2.9	4.3	3.3	4.9	8.3	13.4	10.3	16.6	12.4	20.1	14.6	23.6	1.0	2.1
73.00" x 45.00"	1.2	2.0	2.2	3.3	2.7	4.0	3.2	4.7	3.7	5.4	9.0	14.6	11.1	18.1	13.4	21.8	15.8	25.7	1.1	2.3
88.00" x 54.00"	1.3	2.2	2.6	4.0	3.2	4.8	3.7	5.6	4.3	6.5	10.5	17.3	13.0	21.4	15.7	25.8	18.5	30.3	1.3	2.6
102.00" x 62.00"	1.4	2.4	3.0	4.6	3.6	5.5	4.3	6.5	5.0	7.5	11.9	19.6	14.7	24.3	17.7	29.2	20.8	34.4	1.5	2.9
115.00" x 72.00"	1.5	2.6	3.3	5.1	4.0	6.1	4.8	7.2	5.5	8.4	12.9	21.5	16.1	26.7	19.4	32.1	22.8	37.8	1.7	3.3
122.00" x 77.25"	1.6	2.7	3.6	5.5	4.3	6.6	5.1	7.8	6.0	9.1	13.8	23.0	17.1	28.5	20.7	34.3	24.3	40.4	1.7	3.5
138.00" x 87.13"	1.7	2.8	4.1	6.2	4.9	7.5	5.8	8.9	6.8	10.4	15.5	25.9	19.2	32.1	23.2	38.7	27.2	45.5	1.9	3.8
154.00" x 96.88"	1.8	3.0	4.5	7.1	5.5	8.5	6.5	10.1	7.6	11.7	17.2	29.0	21.4	36.0	25.8	43.3	30.3	50.9	2.1	4.2
168.75" x 106.50"	2.0	3.3	4.9	7.6	5.9	9.2	7.0	10.9	8.1	12.6	18.4	31.2	22.8	38.7	27.5	46.6	32.4	54.7	2.3	4.6

DIAMETER OR SPAN x RISE	CUBIC YARDS OF CLASS GENERAL CONCRETE (EACH END)							CUBIC YARDS OF RIPRAP (EACH END) ① (DTL. DWG. NO. 613-14)				SLOPE	C. Y. BEDDING MATERIAL ② PER FOOT OF PIPE (DTL. DWG. NO. 603-19)	
	CUTOFF WALL (DTL. DWG. NO. 552-00)		CONCRETE EDGE PROTECTION (DTL. DWG. NO. 613-08)											
	SING.	DBL.		SING.	DBL.				SING.	DBL.			SING.	DBL.
RCP (FETS)														
54"	1.8	3.0		2.7	4.2				12.5	21.2			2.0:1	1.0	2.0
60"	1.9	3.2		2.5	4.0				11.9	20.1			1.9:1	1.1	2.2
66"	1.9	3.2		3.0	4.6				13.2	22.5			1.7:1	1.2	2.4
72"	2.0	3.4		3.3	5.1				14.8	25.1			1.9:1	1.3	2.6
78"	2.1	3.5		3.5	5.6				15.6	26.6			1.8:1	1.4	2.7
84"	2.1	3.6		3.5	5.5				15.0	25.8			1.5:1	1.4	2.8
90"	2.3	3.9		3.6	5.8				15.9	27.4			1.5:1	1.5	3.1
RCPA (FETS)														
65.00" x 40.00"	1.7	2.9		2.9	4.6				15.3	26.0			3.0:1	1.0	2.1
73.00" x 45.00"	1.9	3.2		3.1	4.9				16.1	27.5			3.0:1	1.1	2.3
88.00" x 54.00"	2.1	3.5		2.9	4.6				14.0	24.2			2.0:1	1.3	2.6
102.00" x 62.00"	2.1	3.6		4.0	6.4				18.4	31.9			2.0:1	1.5	2.9

METRIC CULVERT INSTALLATION QUANTITIES

DIAMETER OR SPAN x RISE (mm)	CUBIC METERS OF CLASS GENERAL CONCRETE (EACH END)								CUBIC METERS OF RIPRAP (EACH END) ① (DTL. DWG. NO. 613-14)						m³ BEDDING MATERIAL ② PER METER OF PIPE (DTL. DWG. NO. 603-19)	
	CUTOFF WALL (DTL. DWG. NO. 552-00)		CONCRETE EDGE PROTECTION (DTL. DWG. NO. 613-08)													
			1.5:1		2:1		2.5:1		1.5:1		2:1		2.5:1			
	SING.	DBL.	SING.	DBL.	SING.	DBL.	SING.	DBL.	SING.	DBL.	SING.	DBL.	SING.	DBL.	SING.	DBL.
RCP (SQ. END)																
1350	1.0	1.7	1.7	2.5	2.0	3.0	~	~	6.7	10.8	8.3	13.4	~	~	2.57	5.14
1500	1.1	1.8	1.8	2.7	2.2	3.3	~	~	7.2	11.7	9.0	14.5	~	~	2.80	5.60
1650	1.2	2.0	2.0	3.0	2.4	3.6	~	~	7.7	12.6	9.8	15.9	~	~	3.03	6.06
1800	1.2	2.1	2.2	3.2	2.6	3.9	~	~	8.4	13.7	10.4	17.0	~	~	3.27	6.54
1950	1.3	2.2	2.3	3.5	2.8	4.2	~	~	9.0	14.6	11.1	18.1	~	~	3.52	7.04
2100	1.4	2.4	2.5	3.7	3.0	4.5	~	~	9.5	15.6	11.8	19.3	~	~	3.78	7.56
2250	1.4	2.5	2.6	4.0	3.2	4.8	~	~	10.1	16.5	12.5	20.5	~	~	4.04	8.08
2400	1.5	2.6	2.8	4.2	3.4	5.1	~	~	10.6	17.5	13.2	21.7	~	~	4.31	8.62
RCPA (SQ. END)																
1650 x 1015	0.9	1.5	1.6	2.5	1.9	2.9	~	~	6.7	11.0	8.3	13.6	~	~	2.60	5.20
1855 x 1145	1.0	1.6	1.8	2.7	2.1	3.3	~	~	7.3	12.0	9.0	15.0	~	~	2.84	5.68
2235 x 1370	1.1	1.8	2.1	3.3	2.6	3.9	~	~	8.6	14.5	10.7	17.9	~	~	3.27	6.54
2590 x 1575	1.1	2.0	2.5	3.8	3.0	4.6	~	~	9.8	16.6	12.2	20.5	~	~	3.66	7.32
2920 x 1830	1.3	2.2	2.7	4.3	3.3	5.2	~	~	10.8	18.3	13.3	22.7	~	~	4.15	8.30
3100 x 1960	1.3	2.2	2.9	4.6	3.6	5.6	~	~	11.5	19.6	14.3	24.4	~	~	4.33	8.66
3505 x 2215	1.4	2.4	3.4	5.3	4.1	6.4	~	~	13.1	22.4	16.2	27.8	~	~	4.81	9.62
3910 x 2460	1.5	2.6	3.8	6.1	4.6	7.4	~	~	14.7	25.3	18.2	31.4	~	~	5.31	10.62
4285 x 2705	1.6	2.8	4.0	6.4	4.9	7.8	~	~	15.4	26.7	19.1	33.1	~	~	5.73	11.46

DIAMETER OR SPAN x RISE (mm)	CUBIC METERS OF CLASS GENERAL CONCRETE (EACH END)								CUBIC METERS OF RIPRAP (EACH END) ① (DTL. DWG. NO. 613-14)				SLOPE	m³ BEDDING MATERIAL ② PER METER OF PIPE (DTL. DWG. NO. 603-19)	
	CUTOFF WALL (DTL. DWG. NO. 552-00)		CONCRETE EDGE PROTECTION (DTL. DWG. NO. 613-08)												
	SING.	DBL.		SING.	DBL.				SING.	DBL.				SING.	DBL.
RCP (FETS)															
1350	1.3	2.2		2.0	3.1				9.3	15.7			2.0:1	2.57	5.14
1500	1.4	2.4		1.9	2.9				8.8	14.9			1.9:1	2.80	5.60
1650	1.4	2.3		2.2	3.4				9.8	16.7			1.7:1	3.03	6.06
1800	1.5	2.5		2.3	3.7				10.5	17.9			1.9:1	3.27	6.54
1950	1.5	2.6		2.6	4.1				11.6	19.8			1.8:1	3.52	7.04
2100	1.6	2.7		2.7	4.2				11.7	20.1			1.5:1	3.78	7.56
2250	1.7	2.9		2.8	4.5				12.3	21.3			1.5:1	4.04	8.08
RCPA (FETS)															
1650 x 1015	1.3	2.2		2.2	3.4				11.3	19.2			3.0:1	2.60	5.20
1855 x 1145	1.4	2.3		2.3	3.6				11.9	20.4			3.0:1	2.84	5.68
2235 x 1370	1.5	2.6		2.1	3.4				10.4	18.0			2.0:1	3.27	6.54
2590 x 1575	1.6	2.8		3.1	4.9				14.1	24.4			2.0:1	2.98	5.97

NOTES:

① QUANTITIES ARE BASED ON A THICKNESS OF 2 FT. [600] AND ARE PROPORTIONED WHEN A DIFFERENT THICKNESS IS SPECIFIED.

② BEDDING QUANTITIES FOR CONCRETE PIPES ARE BASED ON BEDDING DETAILS SHOWN ON DTL. DWG. NO. 603-19 WITH A WIDTH EQUAL TO (DIAMETER OR SPAN) + 4 FT. [1200] + (2 TIMES CONCRETE SHELL THICKNESS) AND A DEPTH EQUAL TO 2 FT. [600] + (D/4 OR R/3) + (CONCRETE SHELL THICKNESS). TO COMPUTE THE TOTAL BEDDING QUANTITY MULTIPLY BY (LENGTH OF PIPE MINUS 24 FT. [7.0 m]).

UNITS SHOWN IN BRACKETS [] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.

DETAILED DRAWING

REFERENCE STANDARD SPEC. SECTION 552, 603, 613

DWG. NO. 552-04

CONCRETE, RIPRAP AND BEDDING MATERIAL QUANTITIES FOR SING. AND DBL. CULVERT INSTALLATION

EFFECTIVE: SEPTEMBER 2014

MDT MONTANA DEPARTMENT OF TRANSPORTATION

CULVERT INSTALLATION QUANTITIES

DIAMETER OR SPAN x RISE	CUBIC YARDS OF CLASS GENERAL CONCRETE (EACH END) ④								CUBIC YARDS OF RIPRAP (EACH END) ① ④ (DTL. DWG. NO. 613-14)						C. Y. BEDDING MATERIAL ② PER FOOT OF PIPE (DTL. DWG. NO. 603-19)	
	CUTOFF WALL (DTL. DWG. NO. 552-00)		CONCRETE EDGE PROTECTION (DTL. DWG. NO. 613-06)													
			1.5:1		2:1		2.5:1		1.5:1		2:1		2.5:1			
	SING.	DBL.	SING.	DBL.	SING.	DBL.	SING.	DBL.	SING.	DBL.	SING.	DBL.	SING.	DBL.	SING.	DBL.
SSPPA 6" x 2" CORRUGATIONS 18" CORNER RADIUS																
6'-1" x 4'-7"	1.5	2.5	1.8	2.8	2.2	3.3	2.5	3.8	7.8	12.8	9.7	15.9	11.7	19.2	1.2	2.4
6'-4" x 4'-9"	1.5	2.5	2.0	3.0	2.4	3.6	2.8	4.2	8.4	13.7	10.4	17.0	12.5	20.5	1.2	2.3
6'-9" x 4'-11"	1.6	2.7	2.0	3.0	2.3	3.6	2.7	4.2	8.4	13.8	10.4	17.1	12.5	20.7	1.3	2.5
7'-0" x 5'-1"	1.6	2.7	2.1	3.2	2.5	3.8	2.9	4.4	8.8	14.5	10.9	18.0	13.2	21.7	1.2	2.5
7'-3" x 5'-3"	1.6	2.6	2.2	3.4	2.7	4.1	3.2	4.8	9.3	15.4	11.6	19.1	14.0	23.0	1.2	2.5
7'-8" x 5'-5"	1.7	2.8	2.3	3.5	2.7	4.1	3.2	4.9	9.5	15.7	11.8	19.5	14.2	23.5	1.3	2.7
7'-11" x 5'-7"	1.7	2.8	2.4	3.6	2.8	4.3	3.3	5.1	9.8	16.2	12.2	20.1	14.7	24.3	1.3	2.6
8'-2" x 5'-9"	1.6	2.8	2.5	3.8	3.0	4.6	3.6	5.4	10.3	17.1	12.8	21.2	15.5	25.6	1.3	2.6
8'-7" x 5'-11"	1.7	2.9	2.5	3.9	3.1	4.7	3.6	5.5	10.5	17.5	13.0	21.7	15.7	26.1	1.4	2.8
8'-10" x 6'-1"	1.7	2.9	2.7	4.1	3.2	4.9	3.8	5.8	10.9	18.2	13.6	22.5	16.3	27.2	1.4	2.8
9'-4" x 6'-3"	1.8	3.1	2.7	4.1	3.2	5.0	3.8	5.8	11.0	18.4	13.6	22.8	16.4	27.5	1.5	3.0
9'-6" x 6'-5"	1.8	3.1	2.8	4.4	3.4	5.2	4.0	6.2	11.5	19.3	14.3	23.9	17.2	28.8	1.5	2.9
9'-9" x 6'-7"	1.8	3.1	3.0	4.5	3.6	5.5	4.2	6.4	11.9	20.0	14.8	24.7	17.9	29.8	1.4	2.9
10'-3" x 6'-9"	1.9	3.2	3.0	4.7	3.6	5.6	4.3	6.6	12.2	20.4	15.1	25.3	18.2	30.5	1.6	3.1
10'-8" x 6'-11"	2.0	3.5	3.0	4.7	3.6	5.6	4.2	6.6	12.1	20.4	15.0	25.3	18.1	30.6	1.7	3.4
10'-11" x 7'-1"	2.0	3.4	3.1	4.9	3.8	5.9	4.5	6.9	12.7	21.3	15.7	26.5	19.0	31.9	1.7	3.3
11'-5" x 7'-3"	2.1	3.6	3.2	5.0	3.8	6.0	4.5	7.0	12.9	21.8	16.0	27.0	19.3	32.6	1.8	3.6
11'-7" x 7'-5"	2.1	3.6	3.3	5.2	4.0	6.2	4.7	7.3	13.3	22.5	16.5	28.0	19.9	33.7	1.7	3.5
11'-10" x 7'-7"	2.0	3.5	3.5	5.4	4.2	6.5	5.0	7.7	13.9	23.5	17.2	29.1	20.8	35.1	1.7	3.4
12'-4" x 7'-9"	2.2	3.8	3.5	5.5	4.2	6.6	5.0	7.8	14.0	23.7	17.3	29.4	20.9	35.5	1.8	3.7
12'-6" x 7'-11"	2.1	3.7	3.6	5.7	4.4	6.8	5.2	8.1	14.4	24.5	17.9	30.4	21.6	36.6	1.8	3.6
12'-8" x 8'-1"	2.1	3.7	3.8	5.9	4.6	7.1	5.4	8.4	15.0	25.4	18.6	31.5	22.4	37.9	1.8	3.6
12'-10" x 8'-4"	2.1	3.6	3.9	6.1	4.8	7.4	5.6	8.7	15.5	26.3	19.3	32.6	23.2	39.2	1.7	3.5
13'-5" x 8'-5"	2.2	3.9	3.9	6.2	4.7	7.4	5.6	8.8	15.5	26.4	19.3	32.8	23.2	39.5	1.9	3.8
13'-11" x 8'-7"	2.3	4.1	4.0	6.3	4.8	7.6	5.7	9.0	15.8	27.0	19.6	33.5	23.6	40.4	2.0	4.0
14'-1" x 8'-9"	2.3	4.0	4.1	6.5	5.0	7.8	5.9	9.2	16.3	27.7	20.2	34.4	24.3	41.5	2.0	4.0
14'-3" x 8'-11"	2.3	4.0	4.3	6.7	5.2	8.1	6.1	9.6	16.8	28.6	20.9	35.5	25.1	42.8	1.9	3.9
14'-10" x 9'-1"	2.4	4.2	4.3	6.8	5.2	8.2	6.2	9.7	17.0	29.0	21.0	36.0	25.4	43.4	2.1	4.2
15'-4" x 9'-2"	2.5	4.5	4.3	6.9	5.2	8.3	6.2	9.8	17.1	29.4	21.2	36.4	25.6	43.9	2.2	4.5
15'-6" x 9'-5"	2.5	4.4	4.5	7.2	5.4	8.6	6.4	10.2	17.7	30.4	22.0	37.7	26.5	45.4	2.2	4.4
15'-8" x 9'-7"	2.4	4.3	4.7	7.4	5.6	8.9	6.7	10.6	18.3	31.3	22.7	38.8	27.3	46.8	2.2	4.3
15'-10" x 9'-9"	2.4	4.3	4.8	7.6	5.8	9.2	6.9	10.8	18.7	32.0	23.2	39.7	28.0	47.9	2.1	4.2
16'-5" x 9'-11"	2.6	4.5	4.8	7.7	5.8	9.3	6.9	11.0	18.9	32.5	23.4	40.3	28.3	48.6	2.3	4.5
16'-7" x 10'-1"	2.5	4.5	5.0	8.0	6.1	9.6	7.2	11.4	19.5	33.4	24.2	41.5	29.1	50.0	2.2	4.4
SSPPA 6" x 2" CORRUGATIONS 31" CORNER RADIUS																
13'-3" x 9'-4"	2.5	4.3	3.8	6.0	4.6	7.3	5.5	8.6	15.1	25.7	18.8	32.0	22.6	38.5	2.2	4.3
13'-6" x 9'-6"	2.5	4.3	4.0	6.2	4.8	7.5	5.6	8.9	15.6	26.5	19.3	32.9	23.3	39.7	2.1	4.3
14'-0" x 9'-8"	2.6	4.5	4.0	6.3	4.8	7.6	5.7	9.0	15.8	27.0	19.6	33.5	23.6	40.4	2.3	4.5
14'-3" x 9'-10"	2.6	4.4	4.2	6.6	5.0	8.0	6.0	9.4	16.4	28.0	20.4	34.7	24.5	41.9	2.2	4.5
14'-5" x 10'-0"	2.5	4.4	4.3	6.8	5.2	8.2	6.2	9.7	16.8	28.7	20.9	35.6	25.2	42.9	2.2	4.4
14'-11" x 10'-2"	2.7	4.6	4.3	6.9	5.2	8.3	6.2	9.8	17.0	29.1	21.1	36.1	25.4	43.5	2.3	4.7
15'-4" x 10'-4"	2.8	4.9	4.3	6.9	5.2	8.4	6.2	9.9	17.1	29.4	21.2	36.5	25.6	44.0	2.5	4.9
15'-7" x 10'-6"	2.8	4.8	4.5	7.2	5.5	8.7	6.5	10.3	17.7	30.4	22.0	37.7	26.5	45.5	2.4	4.9
15'-10" x 10'-8"	2.7	4.8	4.7	7.5	5.7	9.0	6.7	10.6	18.3	31.4	22.7	38.9	27.4	46.9	2.4	4.8
16'-3" x 10'-10"	2.9	5.0	4.7	7.5	5.7	9.0	6.7	10.7	18.3	31.6	22.8	39.2	27.4	47.3	2.5	5.1
16'-6" x 11'-0"	2.8	5.0	4.9	7.8	5.9	9.4	7.0	11.1	18.9	32.6	23.5	40.4	28.3	48.7	2.5	5.0
17'-0" x 11'-2"	3.0	5.2	4.9	7.8	5.9	9.4	7.0	11.2	19.1	32.9	23.7	40.9	28.5	49.3	2.7	5.3
17'-2" x 11'-4"	2.9	5.2	5.0	8.1	6.1	9.7	7.2	11.5	19.6	33.8	24.3	41.9	29.3	50.5	2.6	5.2
17'-5" x 11'-6"	2.9	5.1	5.2	8.3	6.3	10.0	7.5	11.9	20.2	34.8	25.0	43.2	30.2	52.0	2.6	5.2
17'-11" x 11'-8"	3.0	5.3	5.3	8.5	6.4	10.2	7.5	12.1	20.4	35.4	25.4	43.9	30.6	52.9	2.7	5.5
18'-1" x 11'-10"	3.0	5.3	5.4	8.7	6.5	10.5	7.8	12.4	20.9	36.2	26.0	44.9	31.3	54.1	2.7	5.4
18'-7" x 12'-0"	3.1	5.5	5.4	8.8	6.6	10.6	7.8	12.5	21.1	36.6	26.2	45.4	31.6	54.8	2.8	5.7
18'-9" x 12'-2"	3.1	5.5	5.6	9.0	6.8	10.9	8.1	12.9	21.7	37.6	26.9	46.7	32.5	56.3	2.8	5.6
19'-3" x 12'-4"	3.2	5.7	5.6	9.2	6.8	11.0	8.1	13.0	21.9	38.1	27.2	47.3	32.8	56.9	3.0	5.9
19'-6" x 12'-6"	3.2	5.7	5.8	9.4	7.1	11.4	8.4	13.5	22.5	39.1	28.0	48.6	33.7	58.5	2.9	5.8
19'-8" x 12'-8"	3.2	5.6	6.0	9.6	7.2	11.6	8.6	13.8	23.0	40.0	28.6	49.6	34.4	59.8	2.9	5.8
19'-11" x 12'-10"	3.1	5.6	6.1	9.9	7.4	12.0	8.8	14.2	23.6	40.9	29.3	50.8	35.3	61.2	2.8	5.7
20'-5" x 13'-0"	3.3	5.8	6.2	10.0	7.5	12.1	8.9	14.3	23.8	41.5	29.6	51.5	35.6	62.0	3.0	6.0
20'-7" x 13'-2"	3.2	5.8	6.3	10.2	7.7	12.4	9.1	14.6	24.3	42.3	30.2	52.5	36.4	63.2	3.0	5.9

METRIC CULVERT INSTALLATION QUANTITIES

DIAMETER OR SPAN x RISE (m)	CUBIC METERS OF CLASS GENERAL CONCRETE (EACH END) ④								CUBIC METERS OF RIPRAP (EACH END) ① ④ (DTL. DWG. NO. 613-14)						m^3 BEDDING MATERIAL ② PER METER OF PIPE (DTL. DWG. NO. 603-19)	
	CUTOFF WALL (DTL. DWG. NO. 552-00)		CONCRETE EDGE PROTECTION (DTL. DWG. NO. 613-06)													
			1.5:1		2:1		2.5:1		1.5:1		2:1		2.5:1			
	SING.	DBL.	SING.	DBL.	SING.	DBL.	SING.	DBL.	SING.	DBL.	SING.	DBL.	SING.	DBL.	SING.	DBL.
SSPPA 152 mm x 51 mm CORRUGATIONS 457 mm CORNER RADIUS																
1.850 x 1.400	1.0	1.7	1.5	2.2	1.8	2.6	2.1	3.1	6.1	10.0	7.6	12.5	9.2	15.0	2.64	5.28
1.930 x 1.450	1.0	1.8	1.5	2.3	1.8	2.8	2.2	3.3	6.4	10.5	8.0	13.0	9.6	15.7	2.66	5.32
2.060 x 1.500	1.1	1.9	1.6	2.4	1.9	2.9	2.2	3.4	6.6	10.8	8.3	13.6	10.0	16.4	2.83	5.66
2.130 x 1.550	1.1	1.9	1.7	2.5	2.0	3.0	2.4	3.5	6.8	11.2	8.5	14.0	10.4	17.1	2.84	5.68
2.210 x 1.600	1.1	1.9	1.7	2.6	2.1	3.1	2.5	3.7	7.1	11.7	8.8	14.5	10.7	17.5	2.85	5.70
2.340 x 1.650	1.2	2.0	1.8	2.7	2.1	3.2	2.5	3.8	7.4	12.2	9.2	15.2	11.1	18.3	3.03	6.06
2.410 x 1.700	1.2	2.0	1.9	2.8	2.2	3.4	2.6	4.0	7.6	12.5	9.5	15.8	11.5	19.0	3.03	6.06
2.490 x 1.750	1.2	2.0	1.9	2.9	2.3	3.5	2.8	4.2	7.8	12.9	9.7	16.1	11.8	19.4	3.02	6.04
2.620 x 1.800	1.2	2.1	2.0	3.0	2.4	3.6	2.8	4.3	8.1	13.5	10.1	16.7	12.2	20.2	3.22	6.44
2.690 x 1.850	1.2	2.1	2.1	3.1	2.5	3.8	2.9	4.4	8.3	13.7	10.4	17.3	12.6	20.9	3.21	6.42
2.840 x 1.910	1.3	2.2	2.1	3.2	2.5	3.9	3.0	4.6	8.6	14.3	10.6	17.8	12.8	21.4	3.43	6.86
2.900 x 1.960	1.3	2.2	2.2	3.3	2.6	4.0	3.1	4.7	8.9	14.8	11.0	18.4	13.3	22.1	3.41	6.82
2.970 x 2.010	1.3	2.2	2.3	3.5	2.7	4.2	3.2	4.9	9.1	15.1	11.4	19.0	13.7	22.9	3.37	6.74
3.120 x 2.060	1.3	2.3	2.3	3.5	2.8	4.3	3.3	5.0	9.3	15.7	11.6	19.4	14.0	23.4	3.62	7.24
3.250 x 2.110	1.4	2.4	2.3	3.6	2.8	4.4	3.3	5.2	9.5	16.0	11.8	19.8	14.2	23.9	3.85	7.70
3.330 x 2.160	1.4	2.4	2.4	3.8	2.9	4.5	3.5	5.4	9.8	16.5	12.2	20.5	14.7	24.7	3.83	7.66
3.480 x 2.210	1.5	2.6	2.5	3.8	3.0	4.6	3.5	5.5	10.0	16.8	12.4	20.9	14.9	25.2	4.08	8.16
3.530 x 2.260	1.5	2.5	2.6	4.0	3.1	4.8	3.7	5.7	10.3	17.4	12.8	21.6	15.4	26.0	4.05	8.10
3.610 x 2.310	1.4	2.5	2.7	4.1	3.2	5.0	3.8	5.9	10.6	17.9	13.2	22.2	15.9	26.8	4.01	8.02
3.760 x 2.360	1.5	2.7	2.7	4.2	3.3	5.1	3.9	6.0	10.8	18.3	13.4	22.7	16.1	27.3	4.27	8.54
3.810 x 2.410	1.5	2.6	2.8	4.3	3.4	5.2	4.0	6.2	11.1	18.8	13.8	23.4	16.6	28.1	4.24	8.48
3.860 x 2.460	1.5	2.6	2.9	4.5	3.5	5.4	4.1	6.4	11.4	19.4	14.2	24.0	17.1	28.9	4.18	8.36
3.910 x 2.540	1.5	2.6	3.0	4.6	3.6	5.6	4.3	6.6	11.8	19.9	14.6	24.7	17.6	29.7	4.12	8.24
4.090 x 2.570	1.6	2.8	3.0	4.6	3.6	5.7	4.3	6.7	12.0	20.3	14.8	25.2	17.9	30.3	4.41	8.82
SSPPA 152 mm x 51 mm CORRUGATIONS 787 mm CORNER RADIUS																
4.040 x 2.840	1.8	3.2	2.8	4.4	3.4	5.3	4.0	6.3	11.2	19.0	13.9	23.6	16.7	28.5	5.23	10.46
4.110 x 2.900	1.8	3.2	2.9	4.5	3.5	5.5	4.1	6.5	11.4	19.5	14.2	24.2	17.1	29.2	5.19	10.38
4.270 x 2.950	1.9	3.3	2.9	4.7	3.5	5.6	4.2	6.6	11.7	19.9	14.5	24.8	17.5	29.9	5.46	10.92
4.320 x 3.000	1.9	3.3	3.1	4.8	3.7	5.8	4.4	6.9	12.1	20.7	15.0	25.7	18.1	31.0	5.39	10.78
4.390 x 3.050	1.9	3.3	3.2	5.0	3.8	6.0	4.5	7.1	12.4	21.2	15.4	26.3	18.6	31.8	5.34	10.68
4.550 x 3.100	2.0	3.4	3.2	5.0	3.8	6.1	4.6	7.2	12.5	21.5	15.6	26.7	18.8	32.2	5.66	11.32
4.670 x 3.150	2.1	3.6	3.2	5.1	3.9	6.1	4.6	7.3	12.6	21.7	15.7	27.0	18.9	32.6	5.98	11.96
4.750 x 3.200	2.0	3.6	3.3	5.3	4.0	6.4	4.8	7.6	13.1	22.5	16.3	27.9	19.6	33.7	5.90	11.80
4.830 x 3.250	2.0	3.5	3.5	5.5	4.2	6.6	5.0	7.8	13.5	23.2	16.8	28.8	20.3	34.7	5.82	11.64
4.950 x 3.300	2.1	3.7	3.4	5.5	4.2	6.6	4.9	7.9	13.6	23.4	16.8	29.0	20.3	35.0	6.19	12.38
5.030 x 3.350	2.1	3.7	3.6	5.7	4.3	6.9	5.1	8.2	14.0	24.1	17.4	29.9	21.0	36.1	6.10	12.20
5.180 x 3.400	2.2	3.8	3.6	5.8	4.3	6.9	5.1	8.2	14.1	24.4	17.5	30.3	21.1	36.5	6.45	12.90
5.230 x 3.450	2.2	3.8	3.7	5.9	4.5	7.1	5.3	8.5	14.5	25.0	18.0	31.0	21.7	37.4	6.40	12.80
5.310 x 3.510	2.1	3.8	3.8	6.1	4.6	7.4	5.5	8.8	14.9	25.7	18.5	32.0	22.3	38.5	6.30	12.60
5.460 x 3.560	2.2	3.9	3.9	6.2	4.7	7.5	5.6	8.9	15.1	26.2	18.8	32.5	22.6	39.2	6.62	13.24
5.510 x 3.610	2.2	3.9	4.0	6.4	4.8	7.7	5.7	9.1	15.5	26.8	19.2	33.3	23.2	40.2	6.55	13.10
5.660 x 3.660	2.3	4.1	4.0	6.5	4.8	7.8	5.7	9.2	15.6	27.1	19.4	33.7	23.4	40.6	6.92	13.84
5.720 x 3.710	2.3	4.1	4.1	6.6	5.0	8.0	5.9	9.5	16.1	27.9	19.9	34.6	24.0	41.7	6.82	13.64
5.870 x 3.760	2.4	4.2	4.2	6.7	5.0	8.1	6.0	9.6	16.2	28.2	20.1	35.0	24.3	42.2	7.19	14.38
5.940 x 3.810	2.4	4.2	4.3	6.9	5.2	8.4	6.2	9.9	16.7	29.0	20.7	36.0	25.0	43.4	7.09	14.18
5.990 x 3.860	2.3	4.2	4.4	7.1	5.3	8.6	6.3	10.2	17.0	29.6	21.2	36.8	25.5	44.3	7.02	14.04
6.070 x 3.910	2.3	4.1	4.5	7.3	5.5	8.8	6.5	10.5	17.5	30.3	21.7	37.6	26.2	45.4	6.90	13.80
6.220 x 3.960	2.4	4.3	4.6	7.4	5.5	8.9	6.6	10.6	17.6	30.7	21.9	38.2	26.4	46.0	7.29	14.58
6.270 x 4.010	2.4	4.3	4.7	7.5	5.7	9.1	6.7	10.8	18.0	31.3	22.4	38.9	27.0	46.9	7.20	14.40

NOTES:

① QUANTITIES ARE BASED ON A THICKNESS OF 2 FT. [600] AND ARE PROPORTIONED WHEN A DIFFERENT THICKNESS IS SPECIFIED.

② BEDDING QUANTITIES FOR METAL PIPES ARE BASED ON BEDDING DETAILS SHOWN ON DTL. DWG. NO. 603-19 WITH A WIDTH EQUAL TO (DIAMETER OR SPAN) + 4 FT. [1200] + (2 TIMES CORRUGATION WIDTH) AND A DEPTH EQUAL TO 2 FT. [600] + "X" + (CORRUGATION WIDTH). TO COMPUTE THE TOTAL BEDDING QUANTITY MULTIPLY BY (LENGTH OF PIPE MINUS 24 FT. [7.0 m]).

③ SEE DTL. DWG. NO. 603-32 AND 603-34 FOR "X" DIMENSIONS OF METAL PIPES.

④ FOR PIPES WITH SKEW BEVEL ENDS - DIVIDE THE QUANTITIES SHOWN BY COSINE OF SKEW ANGLE.

UNITS SHOWN IN BRACKETS [] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.

DETAILED DRAWING

REFERENCE STANDARD SPEC. SECTION 552, 603, 613

DWG. NO. 552-06

CONCRETE, RIPRAP AND BEDDING MATERIAL QUANTIES FOR SING. AND DBL. CULVERT INSTALLATION

EFFECTIVE: SEPTEMBER 2014

MDT MONTANA DEPARTMENT OF TRANSPORTATION

CULVERT INSTALLATION QUANTITIES

DIAMETER OR SPAN x RISE	CUBIC YARDS OF CLASS GENERAL CONCRETE (EACH END) ④								CUBIC YARDS OF RIPRAP (EACH END) ① ④ (DTL. DWG. NO. 613-14)						C. Y. BEDDING MATERIAL ② PER FOOT OF PIPE (DTL. DWG. NO. 603-19)	
	CUTOFF WALL (DTL. DWG. NO. 552-00)		CONCRETE EDGE PROTECTION (DTL. DWG. NO. 613-06)													
			1.5:1		2:1		2.5:1		1.5:1		2:1		2.5:1			
	SING.	DBL.	SING.	DBL.	SING.	DBL.	SING.	DBL.	SING.	DBL.	SING.	DBL.	SING.	DBL.	SING.	DBL.
CSP 3" x 1" OR 5" x 1" CORRUGATIONS																
54"	1.2	2.0	2.1	3.0	2.5	3.6	2.9	4.3	8.3	13.3	10.3	16.5	12.5	20.1	0.9	1.8
60"	1.3	2.1	2.2	3.3	2.7	4.0	3.2	4.7	8.9	14.3	11.1	17.8	13.4	21.6	1.0	2.0
66"	1.3	2.2	2.4	3.6	2.9	4.3	3.5	5.1	9.6	15.4	11.9	19.1	14.3	23.1	1.0	2.1
72"	1.4	2.4	2.6	3.9	3.2	4.6	3.7	5.5	10.2	16.4	12.7	20.4	15.2	24.6	1.1	2.3
78"	1.5	2.5	2.8	4.1	3.4	5.0	4.0	5.9	10.8	17.5	13.4	21.7	16.2	26.2	1.2	2.4
84"	1.6	2.7	3.0	4.4	3.6	5.3	4.3	6.3	11.5	18.6	14.2	23.1	17.1	27.7	1.3	2.6
90"	1.6	2.8	3.2	4.7	3.8	5.7	4.6	6.7	12.1	19.7	15.3	24.9	18.0	29.3	1.4	2.7
96"	1.7	3.0	3.4	5.0	4.1	6.1	4.8	7.2	13.0	21.2	16.1	26.3	19.0	30.9	1.5	2.9
102"	1.8	3.1	3.6	5.3	4.3	6.4	5.1	7.6	13.6	22.3	16.9	27.7	19.9	32.5	1.5	3.1
108"	1.9	3.3	3.8	5.6	4.6	6.8	5.4	8.1	14.3	23.5	17.8	29.1	20.9	34.2	1.6	3.3
114"	2.0	3.4	4.0	6.0	4.8	7.2	5.7	8.5	15.0	24.6	18.6	30.6	21.9	35.9	1.7	3.4
120"	2.1	3.6	4.2	6.3	5.1	7.6	6.0	9.0	15.7	25.8	19.5	32.0	22.9	37.6	1.8	3.6
SSPP 6" x 2" CORRUGATIONS																
10'-6"	2.1	3.7	4.4	6.6	5.3	8.0	6.3	9.5	16.4	27.0	20.3	33.5	23.8	39.0	1.9	3.8
11'-0"	2.2	3.9	4.6	6.9	5.6	8.4	6.6	10.0	17.1	28.2	21.2	35.0	24.8	40.7	2.0	4.0
11'-6"	2.3	4.0	4.8	7.2	5.8	8.8	6.9	10.4	17.8	29.5	22.1	36.5	25.8	42.5	2.1	4.2
12'-0"	2.4	4.2	5.0	7.6	6.1	9.2	7.3	10.9	18.5	30.7	23.0	38.1	26.9	44.3	2.2	4.4
12'-6"	2.5	4.4	5.2	7.9	6.3	9.6	7.6	11.4	19.3	32.0	23.9	39.7	28.0	46.2	2.3	4.6
13'-0"	2.6	4.6	5.4	8.2	6.6	10.0	7.9	11.9	20.0	33.3	24.8	41.2	29.0	48.0	2.4	4.8
13'-6"	2.7	4.7	5.6	8.6	6.9	10.4	8.2	12.4	20.8	34.6	25.7	42.8	30.1	49.9	2.5	5.0
14'-0"	2.8	4.9	5.9	8.9	7.1	10.8	8.5	12.9	21.5	35.9	26.7	44.5	31.2	51.8	2.6	5.2
14'-6"	2.9	5.1	6.1	9.3	7.4	11.3	8.8	13.4	22.3	37.2	27.6	46.1	32.3	53.8	2.7	5.4
15'-0"	3.0	5.3	6.3	9.6	7.7	11.7	9.2	13.9	23.0	38.5	28.6	47.8	33.5	55.7	2.8	5.7
15'-6"	3.1	5.4	6.5	10.0	7.9	12.1	9.5	14.5	23.8	39.9	29.5	49.5	34.6	57.7	2.9	5.9
16'-0"	3.2	5.6	6.7	10.4	8.2	12.6	9.8	15.0	24.6	41.3	30.5	51.2	35.8	59.7	3.0	6.1
16'-6"	3.3	5.8	7.0	10.7	8.5	13.0	10.1	15.5	25.4	42.7	31.5	52.9	36.9	61.7	3.2	6.3
17'-0"	3.4	6.0	7.2	11.1	8.8	13.5	10.5	16.1	26.2	44.1	32.5	54.7	38.1	63.8	3.3	6.6
17'-6"	3.5	6.2	7.4	11.5	9.1	13.9	10.8	16.6	27.0	45.5	33.5	56.4	39.3	65.8	3.4	6.8
18'-0"	3.6	6.4	7.7	11.9	9.3	14.4	11.2	17.2	27.8	46.9	34.5	58.2	40.5	67.9	3.5	7.0
19'-0"	3.8	6.8	8.1	12.6	9.9	15.3	11.9	18.3	29.5	49.9	36.6	61.8	42.9	72.2	3.8	7.5
20'-0"	4.0	7.2	8.6	13.4	10.5	16.3	12.6	19.4	31.2	52.9	38.7	65.6	45.4	76.6	4.0	8.0
21'-0"	4.2	7.6	9.1	14.2	11.1	17.3	13.3	20.6	32.9	55.9	40.8	69.3	47.9	81.0	4.3	8.6
CSPA 2 2/3" x 1/2" CORRUGATIONS																
64" x 43"	1.3	2.1	1.7	2.6	2.0	3.1	2.4	3.6	7.4	12.0	9.2	15.0	11.1	18.1	0.9	1.9
71" x 47"	1.3	2.2	1.8	2.8	2.2	3.3	2.6	3.8	7.9	12.8	9.8	16.0	11.7	19.1	1.0	2.1
77" x 52"	1.4	2.3	2.0	3.0	2.4	3.6	2.8	4.2	8.4	13.7	10.4	17.0	12.4	20.3	1.1	2.2
83" x 57"	1.5	2.5	2.1	3.2	2.6	3.9	3.0	4.5	8.9	14.6	11.0	18.1	13.1	21.5	1.2	2.4
CSPA 3" x 1" CORRUGATIONS																
60" x 46"	1.3	2.2	1.7	2.5	2.0	3.0	2.3	3.5	7.2	11.7	9.0	14.5	10.6	17.1	1.0	2.0
66" x 51"	1.4	2.3	1.8	2.8	2.2	3.3	2.6	3.8	7.7	12.6	9.8	15.9	11.3	18.2	1.1	2.2
73" x 55"	1.5	2.5	2.0	2.9	2.3	3.5	2.7	4.1	8.3	13.5	10.3	16.8	11.8	19.2	1.2	2.5
81" x 59"	1.5	2.5	2.2	3.3	2.6	3.9	3.0	4.5	9.1	14.8	11.2	18.4	12.9	21.0	1.2	2.4
87" x 63"	1.6	2.7	2.3	3.5	2.8	4.2	3.2	4.9	9.6	15.7	11.9	19.5	13.6	22.2	1.3	2.6
95" x 67"	1.7	2.9	2.4	3.7	2.9	4.5	3.4	5.2	10.0	16.6	12.5	20.6	14.2	23.3	1.4	2.8
103" x 71"	1.8	3.0	2.6	4.0	3.1	4.7	3.6	5.5	10.6	17.5	13.1	21.7	14.9	24.5	1.5	3.0
112" x 75"	1.9	3.2	2.7	4.2	3.3	5.0	3.8	5.8	11.1	18.5	13.8	22.9	15.6	25.7	1.6	3.2
117" x 79"	2.0	3.4	2.9	4.4	3.4	5.3	4.0	6.2	11.6	19.4	14.4	24.1	16.3	26.9	1.7	3.5
128" x 83"	2.1	3.5	3.0	4.7	3.6	5.6	4.2	6.5	12.1	20.3	15.1	25.2	16.9	28.0	1.8	3.7
137" x 87"	2.2	3.7	3.2	4.9	3.8	5.9	4.4	6.9	12.7	21.3	15.7	26.5	17.6	29.3	2.0	3.9
142" x 91"	2.2	3.9	3.3	5.2	4.0	6.2	4.7	7.2	13.2	22.3	16.4	27.7	18.3	30.4	2.1	4.2

METRIC CULVERT INSTALLATION QUANTITIES

DIAMETER OR SPAN x RISE (mm OR m)	CUBIC METERS OF CLASS GENERAL CONCRETE (EACH END) ④								CUBIC METERS OF RIPRAP (EACH END) ① ④ (DTL. DWG. NO. 613-14)						m^3 BEDDING MATERIAL ② PER METER OF PIPE (DTL. DWG. NO. 603-19)	
	CUTOFF WALL (DTL. DWG. NO. 552-00)		CONCRETE EDGE PROTECTION (DTL. DWG. NO. 613-06)													
			1.5:1		2:1		2.5:1		1.5:1		2:1		2.5:1			
	SING.	DBL.	SING.	DBL.	SING.	DBL.	SING.	DBL.	SING.	DBL.	SING.	DBL.	SING.	DBL.	SING.	DBL.
CSP 75 mm x 25 mm OR 125 mm x 25 mm CORRUGATIONS																
1350	0.9	1.4	1.5	2.2	1.8	2.6	2.2	3.3	6.1	9.7	7.5	12.0	9.6	15.3	2.09	4.18
1500	0.9	1.5	1.6	2.4	2.0	2.9	2.4	3.6	6.5	10.4	8.1	13.0	10.3	16.5	2.27	4.54
1650	1.0	1.6	1.8	2.6	2.1	3.1	2.6	3.9	7.0	11.2	8.7	13.9	11.0	17.7	2.45	4.90
1800	1.0	1.7	1.9	2.8	2.3	3.4	2.9	4.2	7.4	12.0	9.2	14.9	11.7	18.8	2.63	5.26
1950	1.1	1.8	2.0	3.0	2.5	3.6	3.1	4.5	7.9	12.8	9.8	15.8	12.4	20.0	2.82	5.64
2100	1.1	1.9	2.2	3.2	2.6	3.9	3.3	4.8	8.4	13.6	10.4	16.8	13.1	21.2	3.01	6.02
2250	1.2	2.0	2.3	3.5	2.8	4.2	3.5	5.2	8.8	14.4	11.1	18.2	13.8	22.4	3.20	6.40
2400	1.3	2.2	2.5	3.7	3.0	4.4	3.7	5.5	9.5	15.5	11.7	19.2	14.5	23.6	3.40	6.80
2550	1.3	2.3	2.6	3.9	3.2	4.7	3.9	5.8	9.9	16.3	12.3	20.2	15.2	24.9	3.61	7.22
2700	1.4	2.4	2.7	4.1	3.3	5.0	4.1	6.2	10.4	17.1	12.9	21.2	16.0	26.2	3.82	7.64
2850	1.4	2.5	2.9	4.3	3.5	5.2	4.4	6.5	10.9	18.0	13.6	22.3	16.8	27.5	4.03	8.06
3000	1.5	2.6	3.0	4.6	3.7	5.5	4.6	6.9	11.4	18.8	14.2	23.3	17.5	28.8	4.25	8.50
SSPP 152 mm x 51 mm CORRUGATIONS																
3.205	1.6	2.7	3.3	4.9	4.0	6.0	4.8	7.3	12.2	20.1	15.1	24.9	18.2	29.8	4.52	9.04
3.360	1.6	2.9	3.4	5.2	4.2	6.3	5.1	7.6	12.7	21.0	15.8	26.1	19.0	31.2	4.75	9.50
3.515	1.7	3.0	3.6	5.4	4.3	6.6	5.3	8.0	13.3	22.0	16.5	27.2	19.8	32.5	4.99	9.98
3.670	1.8	3.1	3.7	5.7	4.5	6.9	5.5	8.3	13.8	22.9	17.1	28.4	20.6	33.9	5.23	10.46
3.825	1.8	3.2	3.9	5.9	4.7	7.2	5.8	8.7	14.4	23.9	17.8	29.6	21.4	35.3	5.48	10.96
3.980	1.9	3.4	4.1	6.2	4.9	7.5	6.0	9.1	14.9	24.8	18.5	30.8	22.2	36.7	5.73	11.46
4.135	2.0	3.5	4.2	6.4	5.1	7.8	6.3	9.5	15.5	25.8	19.2	32.0	23.0	38.2	5.99	11.98
4.290	2.1	3.6	4.4	6.7	5.3	8.1	6.5	9.9	16.1	26.8	20.0	33.3	23.9	39.6	6.25	12.50
4.445	2.1	3.8	4.6	7.0	5.5	8.5	6.7	10.3	16.7	27.8	20.7	34.5	24.7	41.1	6.52	13.04
4.600	2.2	3.9	4.7	7.2	5.8	8.8	7.0	10.6	17.3	28.9	21.4	35.8	25.6	42.6	6.79	13.58
4.755	2.3	4.0	4.9	7.5	6.0	9.1	7.2	11.0	17.8	29.9	22.1	37.1	26.5	44.1	7.06	14.12
4.910	2.3	4.2	5.1	7.8	6.2	9.5	7.5	11.5	18.4	30.9	22.9	38.4	27.3	45.6	7.34	14.68
5.065	2.4	4.3	5.2	8.1	6.4	9.8	7.8	11.9	19.0	32.0	23.6	39.7	28.2	47.2	7.63	15.26
5.220	2.5	4.5	5.4	8.4	6.6	10.1	8.0	12.3	19.7	33.1	24.4	41.0	29.1	48.8	7.92	15.84
5.375	2.6	4.6	5.6	8.6	6.8	10.5	8.3	12.7	20.3	34.2	25.2	42.4	30.0	50.3	8.21	16.42
5.530	2.7	4.8	5.8	8.9	7.0	10.8	8.5	13.1	20.9	35.3	25.9	43.7	30.9	51.9	8.51	17.02
5.685	2.7	4.9	5.9	9.2	7.2	11.2	8.8	13.5	21.5	36.4	26.7	45.1	31.9	53.6	8.82	17.64
5.840	2.8	5.1	6.1	9.5	7.5	11.6	9.1	14.0	22.2	37.5	27.5	46.5	32.8	55.2	9.13	18.26
5.995	2.9	5.2	6.3	9.8	7.7	11.9	9.3	14.4	22.8	38.6	28.3	47.9	33.8	56.9	9.44	18.88
6.150	3.0	5.4	6.5	10.1	7.9	12.3	9.6	14.9	23.5	39.8	29.1	49.3	34.7	58.5	9.76	19.52
6.305	3.1	5.5	6.7	10.4	8.1	12.7	9.9	15.3	24.1	40.9	29.9	50.8	35.7	60.2	10.08	20.16
6.460	3.1	5.7	6.9	10.7	8.4	13.0	10.1	15.7	24.8	42.1	30.7	52.2	36.6	61.9	10.41	20.82
CSPA 68 mm x 13 mm CORRUGATIONS																
1620 x 1100	0.9	1.5	1.3	1.9	1.5	2.3	1.8	2.7	5.5	8.9	6.8	11.0	8.5	13.8	2.23	4.46
1800 x 1200	1.0	1.6	1.4	2.0	1.6	2.4	2.0	2.9	5.8	9.5	7.2	11.8	9.0	14.6	2.42	4.84
1950 x 1320	1.0	1.7	1.5	2.2	1.7	2.6	2.1	3.2	6.2	10.1	7.7	12.5	9.5	15.5	2.58	5.16
2100 x 1450	1.1	1.8	1.6	2.4	1.9	2.8	2.3	3.4	6.6	10.8	8.1	13.4	10.0	16.4	2.74	5.48
CSPA 75 mm x 25 mm CORRUGATIONS																
1520 x 1170	1.0	1.6	1.2	1.9	1.5	2.2	1.8	2.7	5.3	8.6	6.6	10.7	8.1	13.1	2.38	4.76
1670 x 1300	1.0	1.7	1.4	2.0	1.6	2.4	2.0	2.9	5.8	9.4	7.2	11.7	8.6	13.9	2.59	5.18
1850 x 1400	1.1	1.8	1.4	2.2	1.7	2.6	2.1	3.1	6.1	9.9	7.5	12.3	9.1	14.7	2.81	5.62
2050 x 1500	1.1	1.9	1.6	2.4	1.9	2.9	2.3	3.5	6.6	10.9	8.2	13.5	9.9	16.0	2.86	5.72
2200 x 1620	1.2	2.0	1.7	2.6	2.0	3.1	2.5	3.7	7.0	11.6	8.7	14.4	10.4	16.9	3.07	6.14
2400 x 1720	1.2	2.1	1.8	2.7	2.2	3.3	2.6	4.0	7.4	12.2	9.2	15.2	10.9	17.8	3.27	6.54
2600 x 1820	1.3	2.2	1.9	2.9	2.3	3.5	2.8	4.2	7.8	12.9	9.7	16.1	11.4	18.7	3.50	7.00
2840 x 1920	1.4	2.4	2.0	3.1	2.4	3.7	2.9	4.5	8.2	13.6	10.1	16.9	11.9	19.6	3.72	7.44
2970 x 2020	1.5	2.5	2.1	3.3	2.5	3.9	3.1	4.7	8.6	14.3	10.6	17.8	12.4	20.5	3.94	7.88
3240 x 2120	1.5	2.6	2.2	3.4	2.7	4.1	3.2	5.0	9.0	15.0	11.1	18.7	12.9	21.4	4.16	8.32
3470 x 2220	1.6	2.7	2.3	3.6	2.8	4.3	3.4	5.2	9.4	15.8	11.6	19.6	13.5	22.4	4.38	8.76
3600 x 2320	1.7	2.9	2.4	3.8	2.9	4.6	3.6	5.5	9.8	16.5	12.1	20.5	14.0	23.3	4.62	9.24

NOTES:

① QUANTITIES ARE BASED ON A THICKNESS OF 2 FT. [600] AND ARE PROPORTIONED WHEN A DIFFERENT THICKNESS IS SPECIFIED.

② BEDDING QUANTITIES FOR METAL PIPES ARE BASED ON BEDDING DETAILS SHOWN ON DTL. DWG. NO. 603-19 WITH A WIDTH EQUAL TO (DIAMETER OR SPAN) + 4 FT. [1200] + (2 TIMES CORRUGATION WIDTH) AND A DEPTH EQUAL TO 2 FT. [600] + "X" + (CORRUGATION WIDTH). TO COMPUTE THE TOTAL BEDDING QUANTITY MULTIPLY BY (LENGTH OF PIPE MINUS 24 FT. [7.0 m]).

③ SEE DTL. DWG. NO. 603-32 AND 603-34 FOR "X" DIMENSIONS OF METAL PIPES.

④ FOR PIPES WITH SKEW BEVEL ENDS - DIVIDE THE QUANTITIES SHOWN BY COSINE OF SKEW ANGLE.

UNITS SHOWN IN BRACKETS [] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.

DETAILED DRAWING

REFERENCE STANDARD SPEC. SECTION 552, 603, 613

DWG. NO. 552-08

CONCRETE, RIPRAP AND BEDDING MATERIAL QUANTITIES FOR SING. AND DBL. CULVERT INSTALLATION

EFFECTIVE: SEPTEMBER 2014

MDT MONTANA DEPARTMENT OF TRANSPORTATION