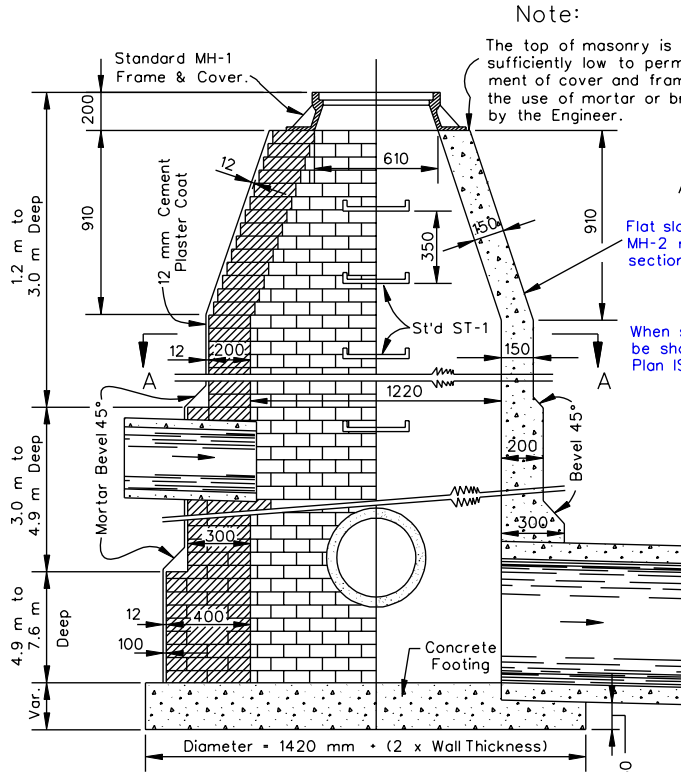


See Standard SL-1 for applicability of safety slabs.



SECTION B-B

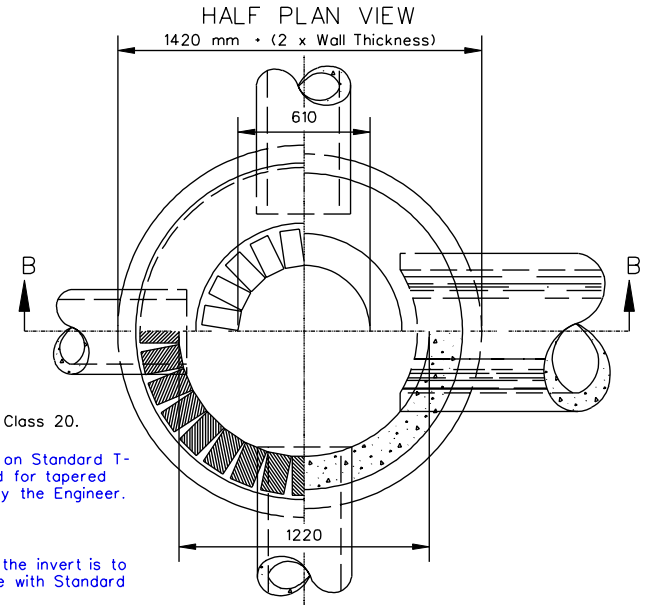
BRICK
CONCRETE
OR
CONCRETE BLOCK

Note:
The top of masonry is to be left sufficiently low to permit proper adjustment of cover and frame to grade by the use of mortar or brick as directed by the Engineer.

All concrete to be Class 20.

Flat slab top as detailed on Standard T-MH-2 may be substituted for tapered section when approved by the Engineer.

When specified on plans the invert is to be shaped in accordance with Standard Plan IS-1.



HALF SECTION A-A
(WITH FRAME AND COVER REMOVED)

BRICK
CONCRETE

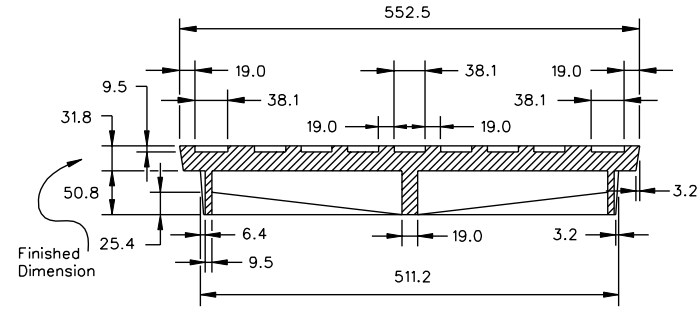
TABLE OF QUANTITIES *

DEPTH	BRICK		CONCRETE	
	THOUSANDS	MANHOLE	CONCRETE	MANHOLE
Meters		Cu. Meters		Cu. Meters
1.20	0.50	0.60	1.05	
1.50	0.70	0.60	1.25	
1.80	0.90	0.60	1.45	
2.10	1.00	0.60	1.65	
2.40	1.20	0.60	1.85	
2.70	1.40	0.60	2.10	
3.00	1.60	0.60	2.30	
3.30	1.90	0.70	2.60	
3.60	2.20	0.70	2.90	
3.90	2.50	0.70	3.15	
4.20	2.80	0.70	3.45	
4.50	3.10	0.70	3.70	
4.80	3.40	0.70	4.00	
5.10	4.00	0.85	4.60	
INCREMENT ‡	1.45	-	1.45	

Notes:

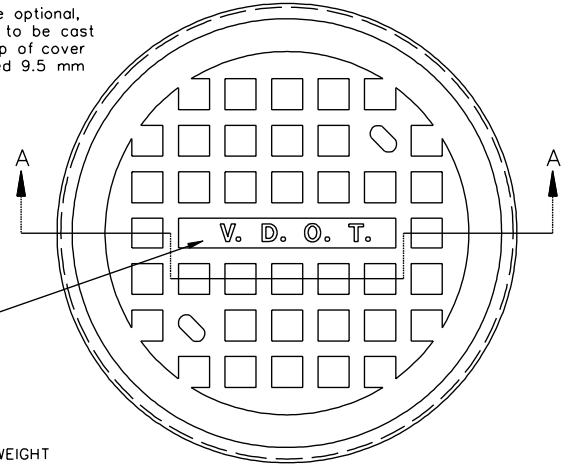
- * Quantities shown are for manhole without pipes. The amount displaced by pipes must be deducted to obtain true quantities.
- A base thickness of 225 mm was used in computing concrete quantities.
- ‡ Increments to be added for each additional meter of depth.
- Materials may be brick, concrete or approved concrete block.
- If blocks are used the minimum thickness of same is to be 125 mm.
- Other thicknesses are to conform to wall thickness shown for concrete.

MANHOLE FOR 300 mm - 1200 mm PIPE CULVERTS



SECTION A-A

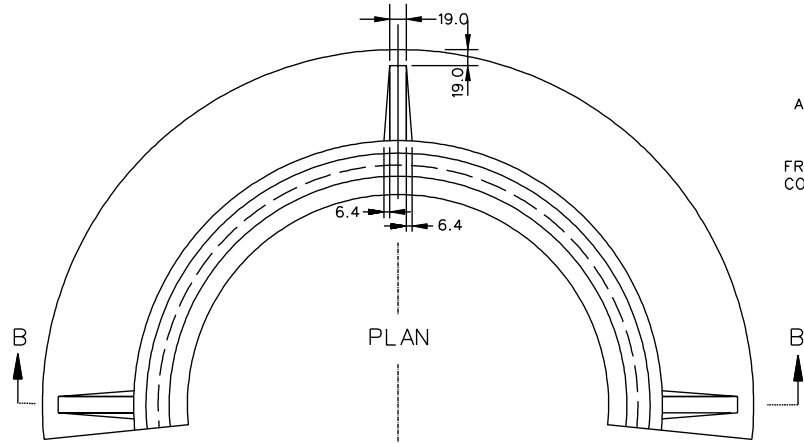
The letters V.D.O.T. are optional, if used the letters are to be cast in the depression in top of cover 25 mm wide and raised 9.5 mm high as shown.



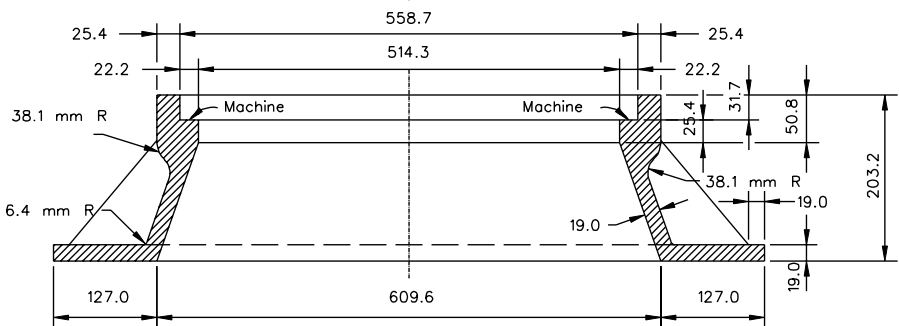
Lettering Optional

APPROXIMATE WEIGHT
CAST IRON
FRAME 108.4 ± 5.4 kg.
COVER 62.1 ± 3.1 kg.

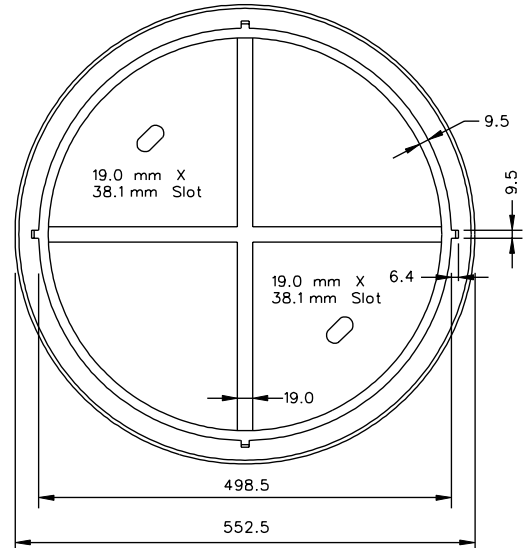
TOP



PLAN



SECTION B-B



BOTTOM

SPECIFICATION REFERENCE
224 302

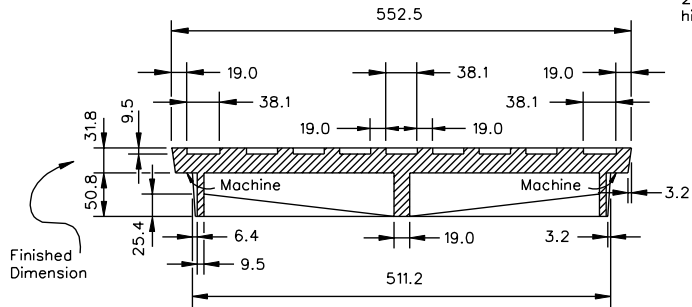
STANDARD MANHOLE FRAME AND COVER

VIRGINIA DEPARTMENT OF TRANSPORTATION

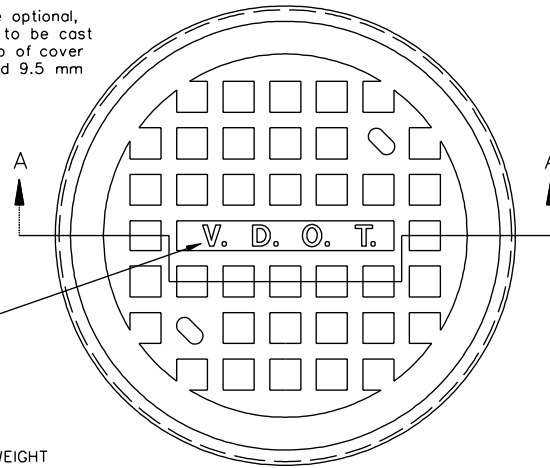
UNLESS OTHERWISE NOTED, ALL DIMENSIONS ON THIS SHEET ARE IN MILLIMETERS

MH-1

Notes:
The letters V.D.O.T. are optional,
if used the letters are to be cast
in the depression in top of cover
25 mm wide and raised 9.5 mm
high as shown.



SECTION A-A



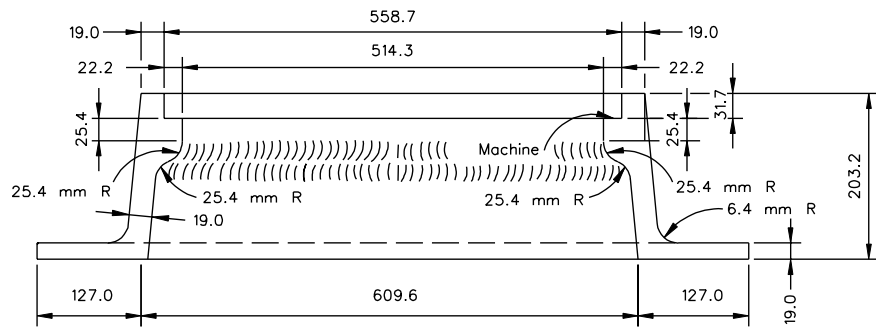
TOP

APPROXIMATE WEIGHT

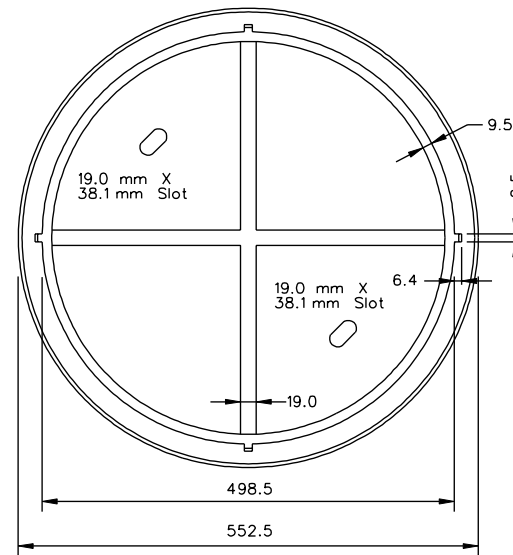
CAST IRON

COVER 62.1 ± 3.1 kg.

FRAME 106.6 ± 5.3 kg.



FRAME SECTION AT MID POINT



BOTTOM

Sheet 3 of 5

STANDARD MANHOLE FRAME AND COVER

VIRGINIA DEPARTMENT OF TRANSPORTATION

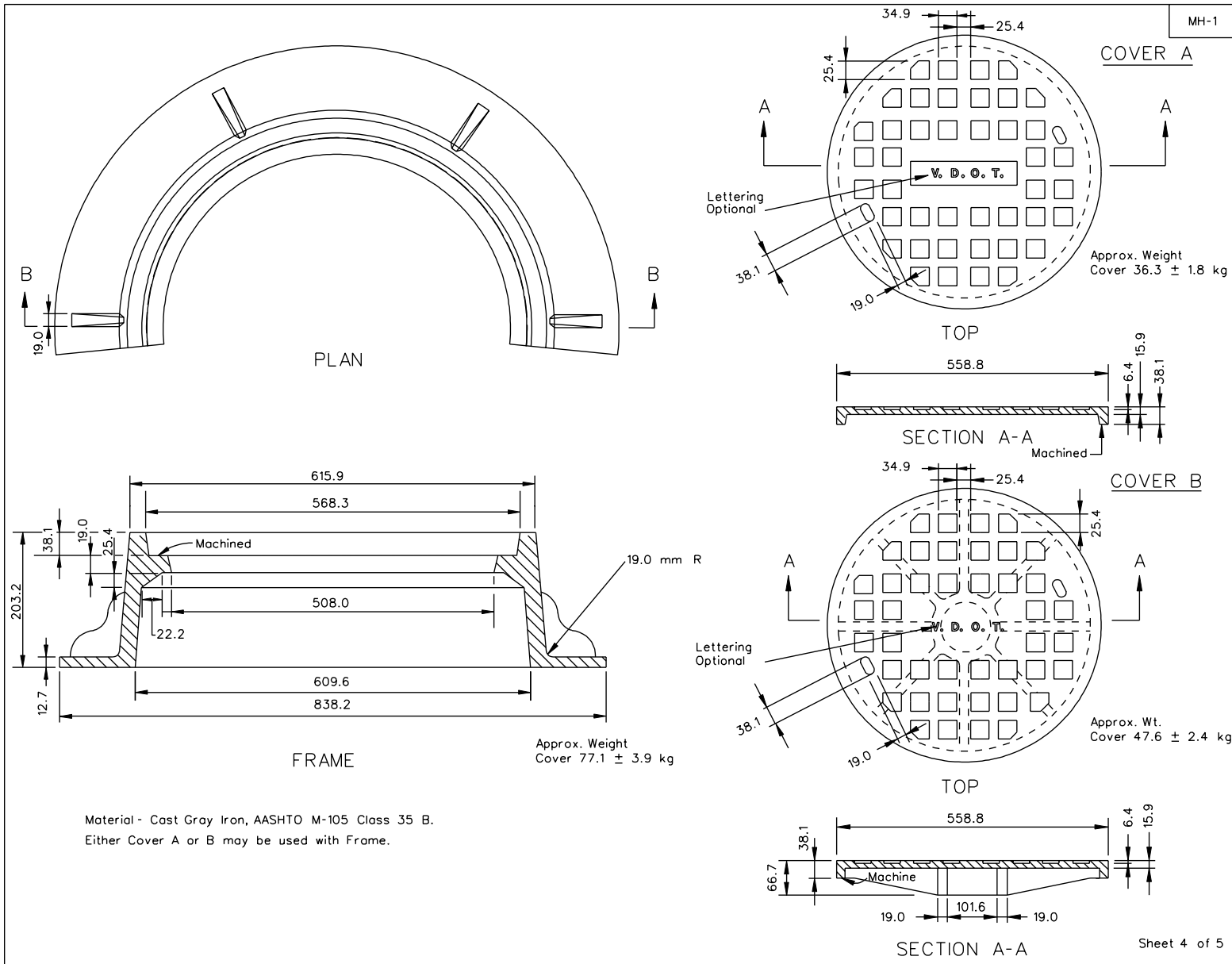
106.03

UNLESS OTHERWISE NOTED, ALL DIMENSIONS
ON THIS SHEET ARE IN MILLIMETERS

SPECIFICATION
REFERENCE

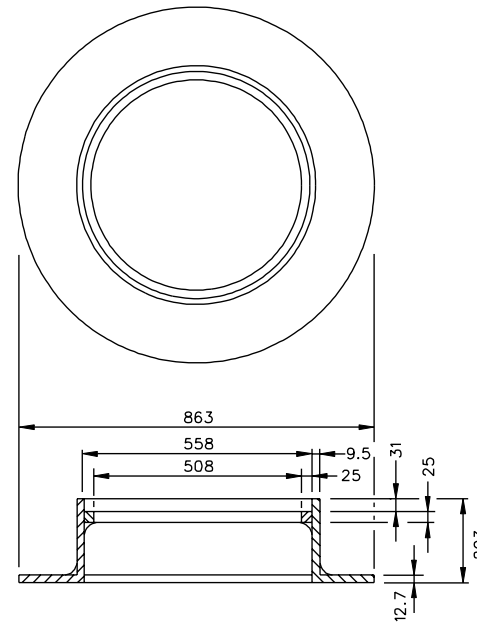
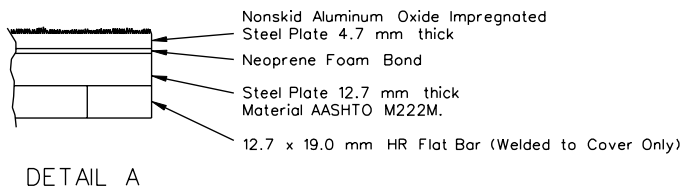
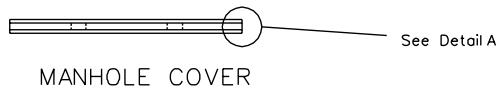
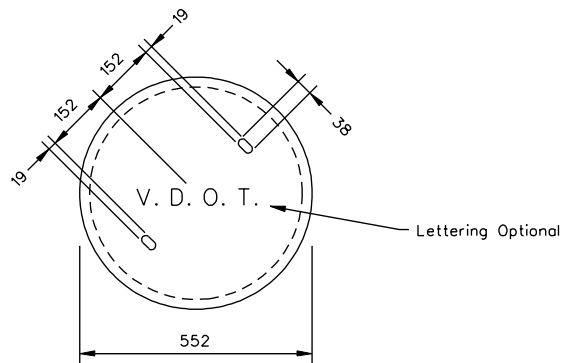
224
302

REVISED ON 7/02



Material - Cast Gray Iron, AASHTO M-105 Class 35 B.
 Either Cover A or B may be used with Frame.

SPECIFICATION REFERENCE	STANDARD MANHOLE FRAME AND COVER		Sheet 4 of 5
224 302	VIRGINIA DEPARTMENT OF TRANSPORTATION		UNLESS OTHERWISE NOTED, ALL DIMENSIONS ON THIS SHEET ARE IN MILLIMETERS
			106.04



SECTION C-C
MANHOLE FRAME

Notes:

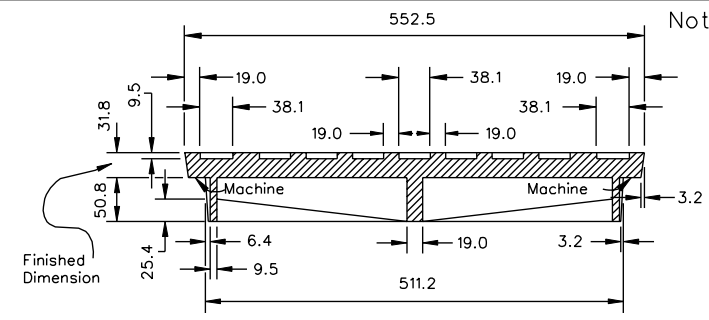
Structural Components shall conform to AASHTO M222M.

Frame and Cover shall have a continuous flush fit.

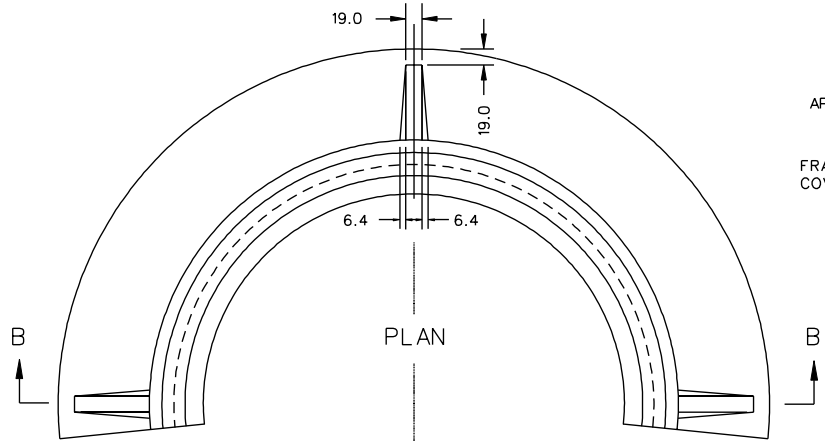
STANDARD MANHOLE FRAME AND COVER

VIRGINIA DEPARTMENT OF TRANSPORTATION

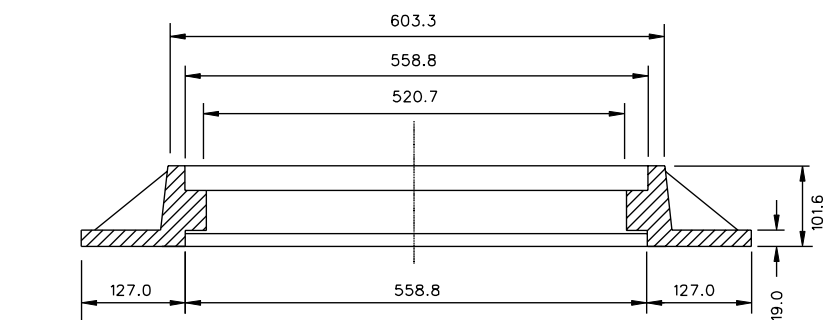
MH-1A



SECTION A-A

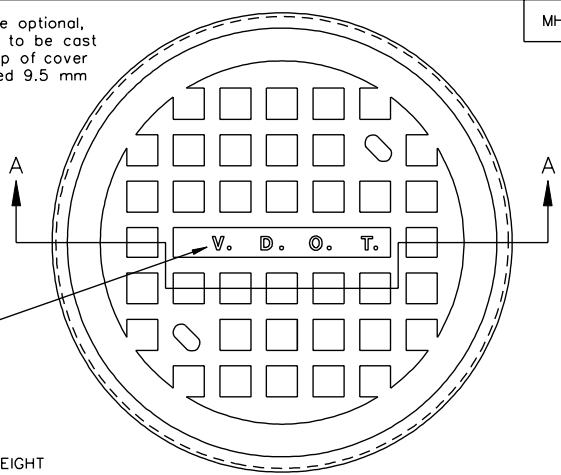


PLAN



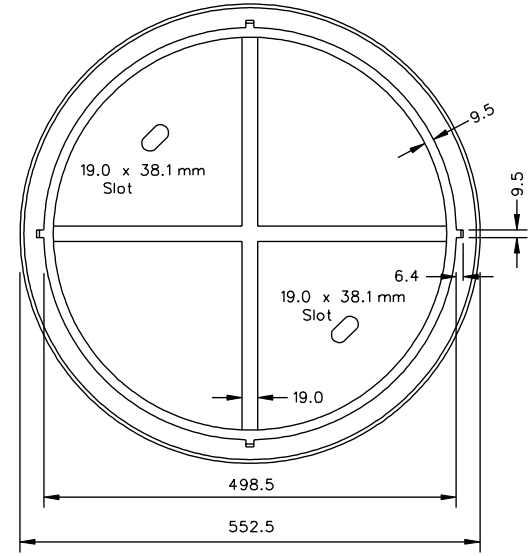
SECTION B-B

Notes: The letters V.D.O.T. are optional, if used the letters are to be cast in the depression in top of cover 25 mm wide and raised 9.5 mm high as shown.



TOP

APPROXIMATE WEIGHT
CAST IRON
FRAME 78.9 ± 3.9 kg.
COVER 62.1 ± 3.1 kg.



BOTTOM

SPECIFICATION REFERENCE
224 302

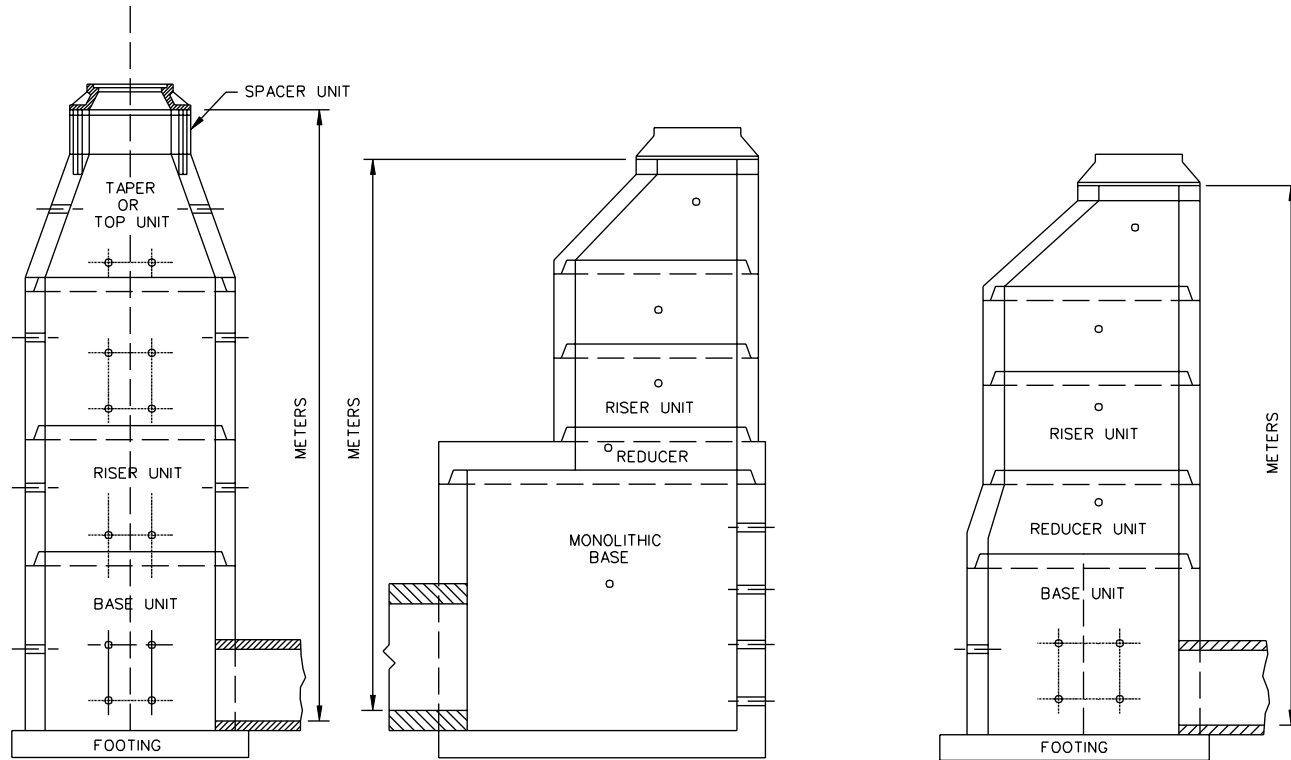
STANDARD MANHOLE FRAME AND COVER

VIRGINIA DEPARTMENT OF TRANSPORTATION

UNLESS OTHERWISE NOTED, ALL DIMENSIONS ON THIS SHEET ARE IN MILLIMETERS

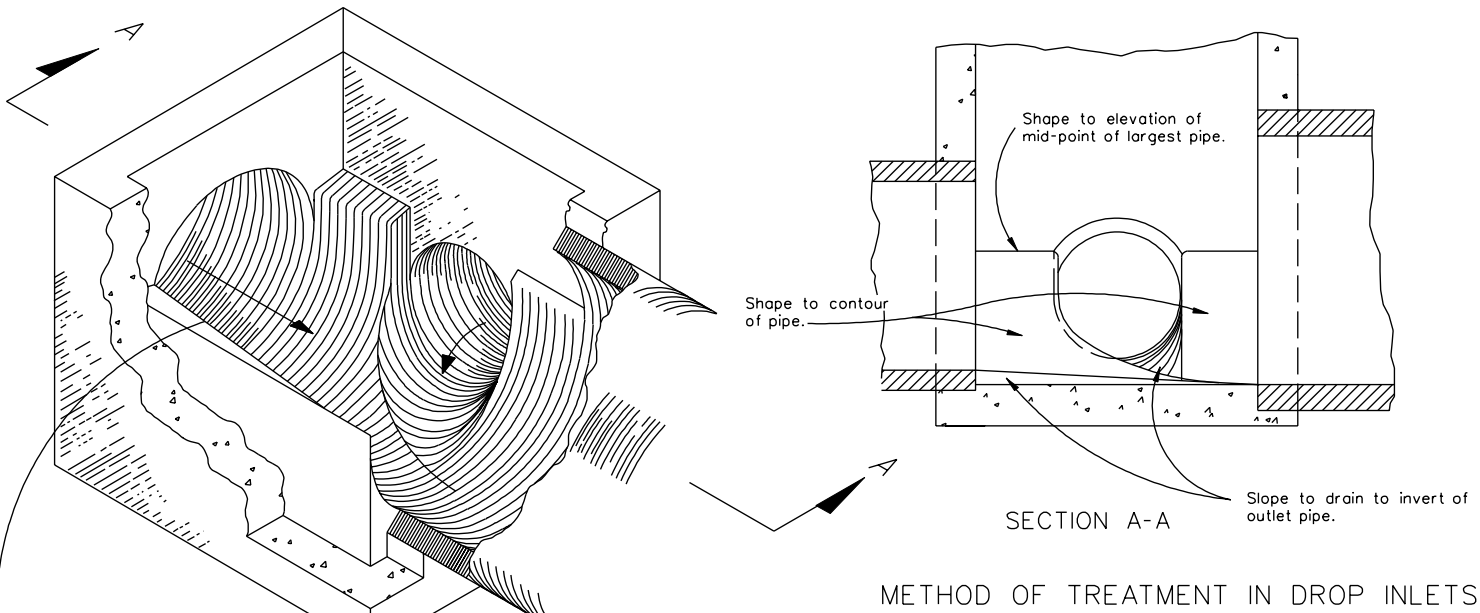
106.06

For details of all component parts and
"General Notes - Precast" see sheets
103.01 - 103.11



PRECAST MANHOLE

VIRGINIA DEPARTMENT OF TRANSPORTATION

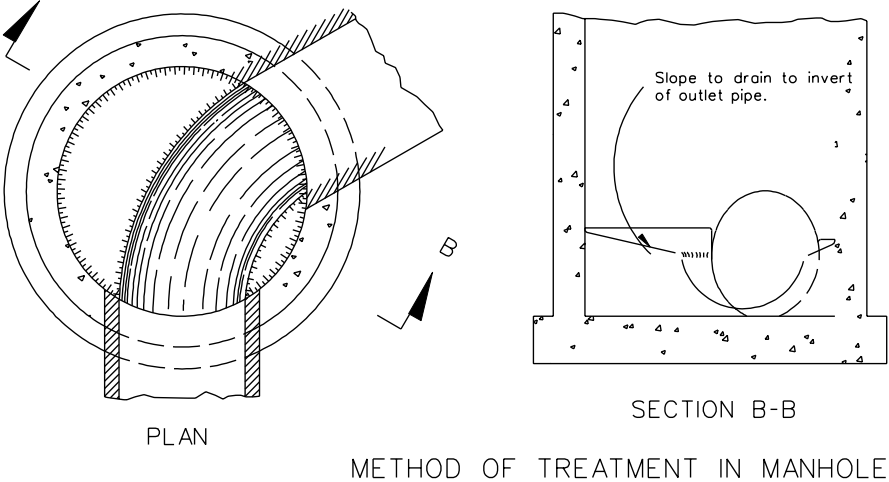


Notes:

Shaping of manhole and inlet inverts in accordance with this drawing is to apply to those structures specified on plans or where invert of pipe is above invert of structure.

Manhole or drop inlet is to be formed and constructed in accordance with applicable standard or special drawing. The invert shaping as detailed hereon is to consist of a Portland Cement Concrete mix conforming to Class 20 or Class 10, except that 25% of coarse aggregate may be up to 100 mm in diameter and consist of stone, broken brick, broken concrete or broken concrete block. The surface shall be left smooth by means of hand trowelling. None of the coarse aggregate shall remain exposed.

Details of invert shaping as shown hereon are for example purposes only. Each manhole or drop inlet is to be shaped individually to best fit the particular inlet and outlet configuration and flow lines.

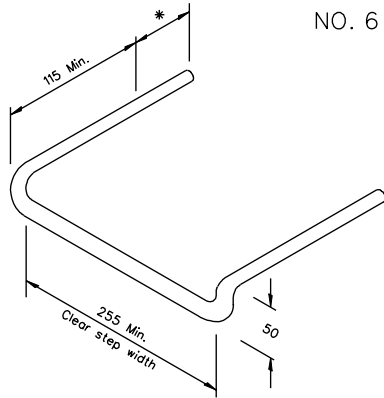


SPECIFICATION REFERENCE
302

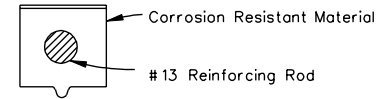
STANDARD METHOD OF SHAPING MANHOLE & INLET INVERTS

ST-1

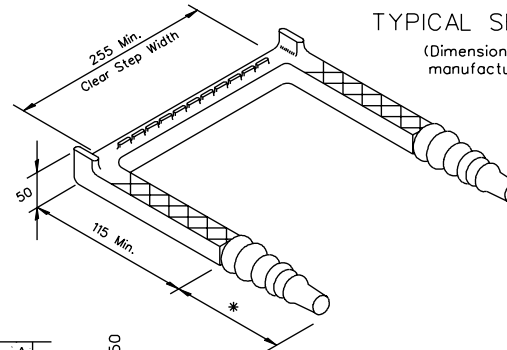
NO. 6 GALVANIZED STEEL STEP



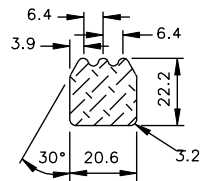
Notes: #13, Grade 400, reinforcing rod encased in a corrosion resistant rubber or other material approved by the Engineer.



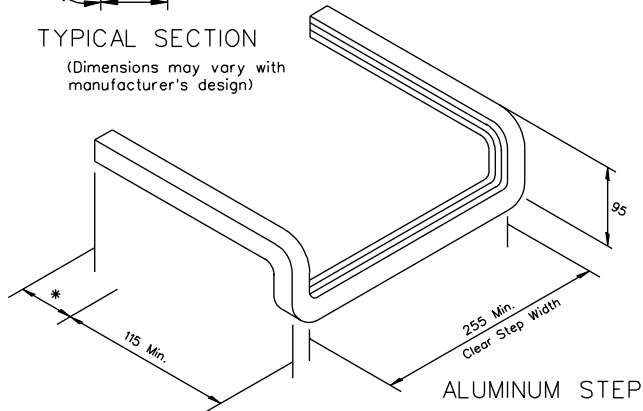
TYPICAL SECTION
(Dimension may vary with manufacturer's design)



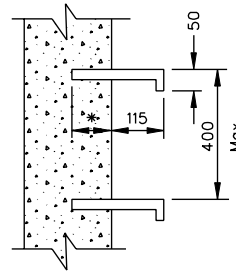
Notes: (Aluminum Step)
Steps shall be fabricated in accordance with ASTM B221M, Alloy 6005-T5.
That portion of the step encased in masonry shall be uniformly coated with a bituminous, solvent type, asbestos filled aluminum pigmented coating conforming to Federal Specification TC-C-00498A.



TYPICAL SECTION
(Dimensions may vary with manufacturer's design)



ALUMINUM STEP



Notes:

Steps will be required in all structures with a depth of 1.2 m or greater unless otherwise noted on the plans.

All steps shall protrude 115 mm from inside face of structure wall.

Maximum step spacing to be 400 mm c-c.

Steps shall withstand a minimum force of 1335 Newtons when extended 115 mm from the face of the support.

Steps are to be vertically aligned and uniformly spaced for the entire depth of any structure.

In precast units steps may be cast in place, mortared into holes provided by the fabricator, or driven.

Steps differing in dimensions, configuration, or materials from those shown may also be used provided they meet the minimum requirements shown hereon and the Contractor has furnished the Engineer with details and certified test reports of the proposed substitute and has received written approval from the Engineer for the use of such steps.

All steps installed shall be provided with slip-resistant surfaces such as but not limited to, corrugated knurled, or dimpled surfaces.

* Minimum of 75 mm embedment

STANDARD STEP

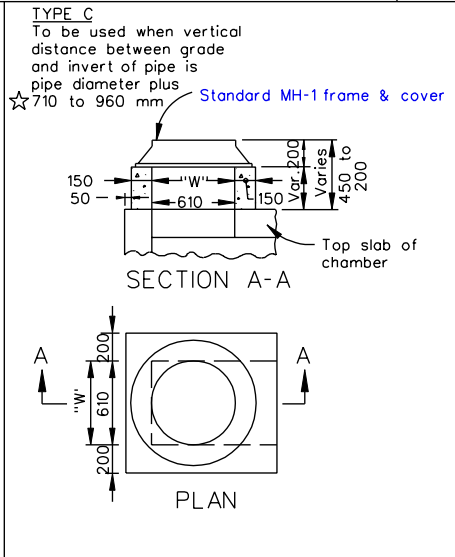
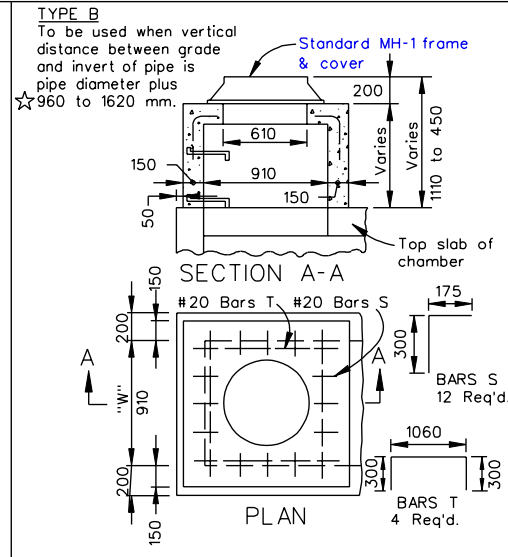
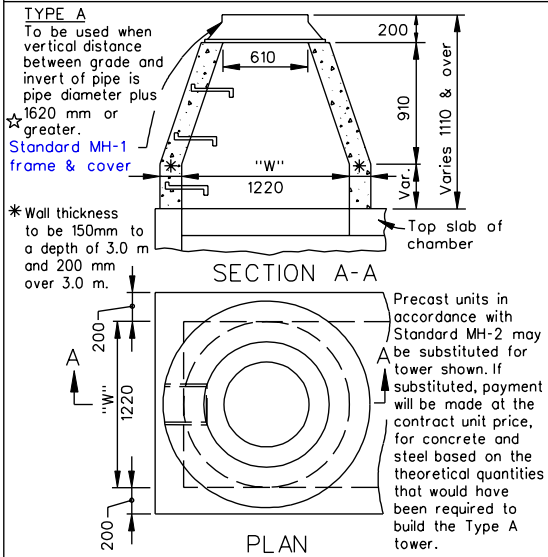
VIRGINIA DEPARTMENT OF TRANSPORTATION

SPECIFICATION REFERENCE

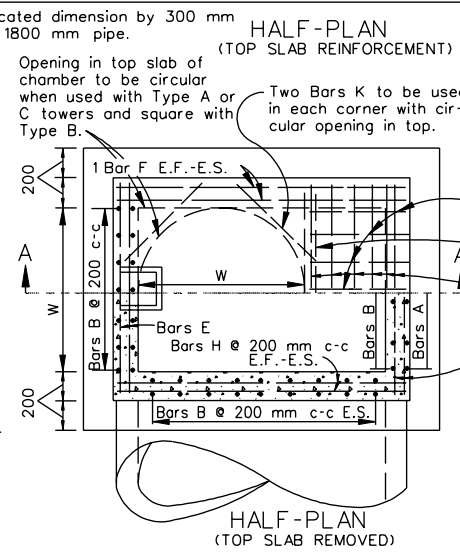
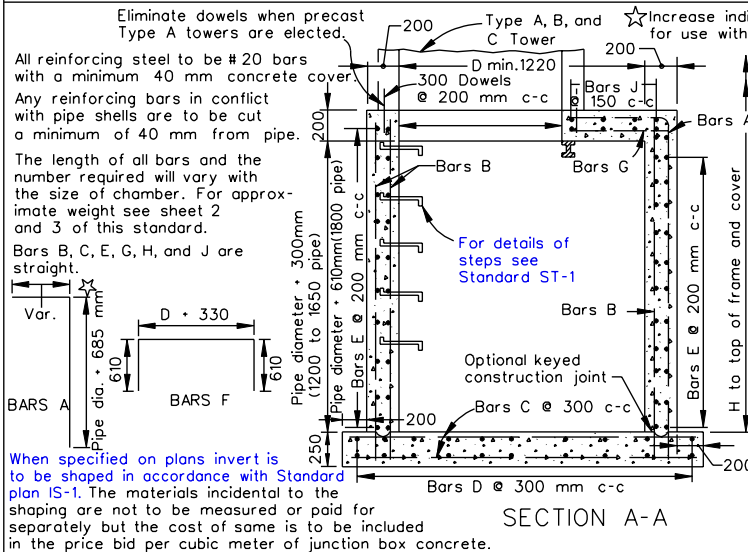
NONE

106.09

UNLESS OTHERWISE NOTED, ALL DIMENSIONS ON THIS SHEET ARE IN MILLIMETERS



DETAIL OF CHAMBER



For details method of turning angles and approximate quantities see sheet 2 of 3.

Precast chambers of the bolt together type may be substituted when approved on an individual basis.

All concrete to be Class 20 if cast in place, 30 MPa if precast.

Sheet 1 of 3

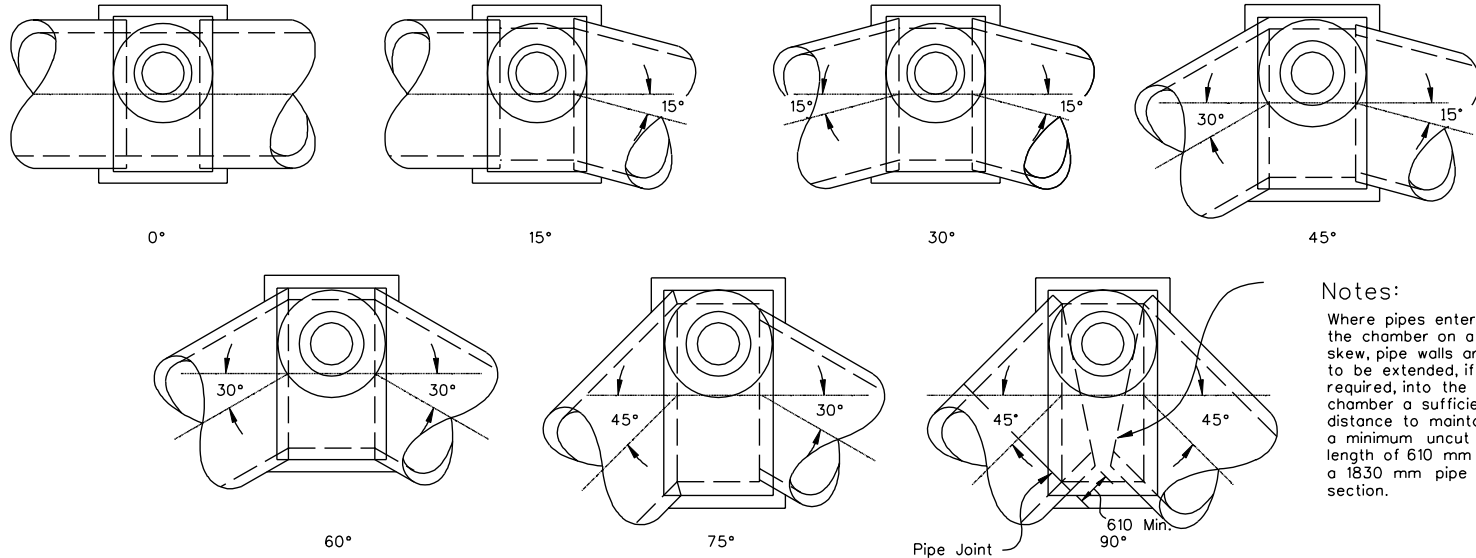
SPECIFICATION REFERENCE
105
233
302

JUNCTION BOX FOR 1200 mm - 1800 mm PIPE CULVERTS

VIRGINIA DEPARTMENT OF TRANSPORTATION

UNLESS OTHERWISE NOTED, ALL DIMENSIONS ON THIS SHEET ARE IN MILLIMETERS 106.10

LOCATION OF CHAMBER TO FIT VARIOUS FLOW LINE ANGLES



Notes:

Where pipes enter the chamber on a skew, pipe walls are to be extended, if required, into the chamber a sufficient distance to maintain a minimum uncut length of 610 mm in a 1830 mm pipe section.

		QUANTITIES FOR CHAMBER											
		PIPE SIZE		ANGLE OF TURN									
				0°			1° - 30°			31° - 60°			61° - 90°
mm	D	CONC.	STEEL	D	CONC.	STEEL	D	CONC.	STEEL	D	CONC.	STEEL	
TYPE A "W" = 1220	1200	1210	3.03	586	1270	3.13	597	1420	3.44	640	1720	4.12	726
	1350	1370	3.44	664	1420	3.54	706	1600	3.92	733	1950	4.83	815
	1500	1520	3.85	751	1600	4.01	813	1770	4.43	830	2150	5.39	936
	1650	1670	4.87	919	1750	5.02	938	1950	5.35	1006	2380	6.06	1138
	1800	1820	5.16	1019	1900	5.50	1045	2130	5.97	1129	2590	7.33	1289
TYPE B "W" = 910	1200	1210	2.89	521	1270	2.99	532	1420	3.30	577	1720	3.37	653
	1350	1370	3.27	593	1420	3.37	622	1600	3.76	658	1950	3.93	734
	1500	1520	3.66	674	1600	3.83	694	1770	4.25	748	2150	4.61	873
	1650	1670	4.14	823	1750	3.98	877	1950	4.29	933	2380	5.22	1070
	1800	1820	4.91	916	1900	5.25	946	2130	5.72	1026	2590	7.08	1172
TYPE C "W" = 610	1200	1210	2.33	467	1270	2.42	477	1420	2.69	513	1720	3.24	586
	1350	1370	2.65	533	1420	2.74	560	1600	3.08	591	1950	3.89	659
	1500	1520	3.02	606	1600	3.14	626	1770	3.50	673	2150	4.36	775
	1650	1670	3.44	722	1750	3.55	759	1950	3.65	811	2380	4.41	935
	1800	1820	4.07	832	1900	4.38	855	2130	4.80	929	2590	6.04	1068

QUANTITIES FOR TOWER**

TYPE A
0.492 cubic meter concrete
0.658 increment per meter to 3.0 m depth
0.909 increment per meter to 3.0 m

TYPE B
0.249 cubic meter concrete
28 kg reinforcing steel
0.650 increment per meter

TYPE C
0.000 cubic meter concrete
0.364 increment per meter

* Quantities shown are for chambers without pipes. Pipe displacement of concrete and steel must be deducted to obtain true quantities. See sheet 3 of 3.
** Quantities shown are for minimum towers of each type. For towers above minimum height increments shown per meter must be added.

STRUCTURAL STEEL

When "W" is 1220 = 23 kg
When "W" is 910 = 18 kg
When "W" is 610 = 14 kg

JUNCTION BOX FOR 1200 mm - 1800 mm PIPE CULVERTS

VIRGINIA DEPARTMENT OF TRANSPORTATION

DISPLACEMENT QUANTITIES FOR PIPE OPENINGS

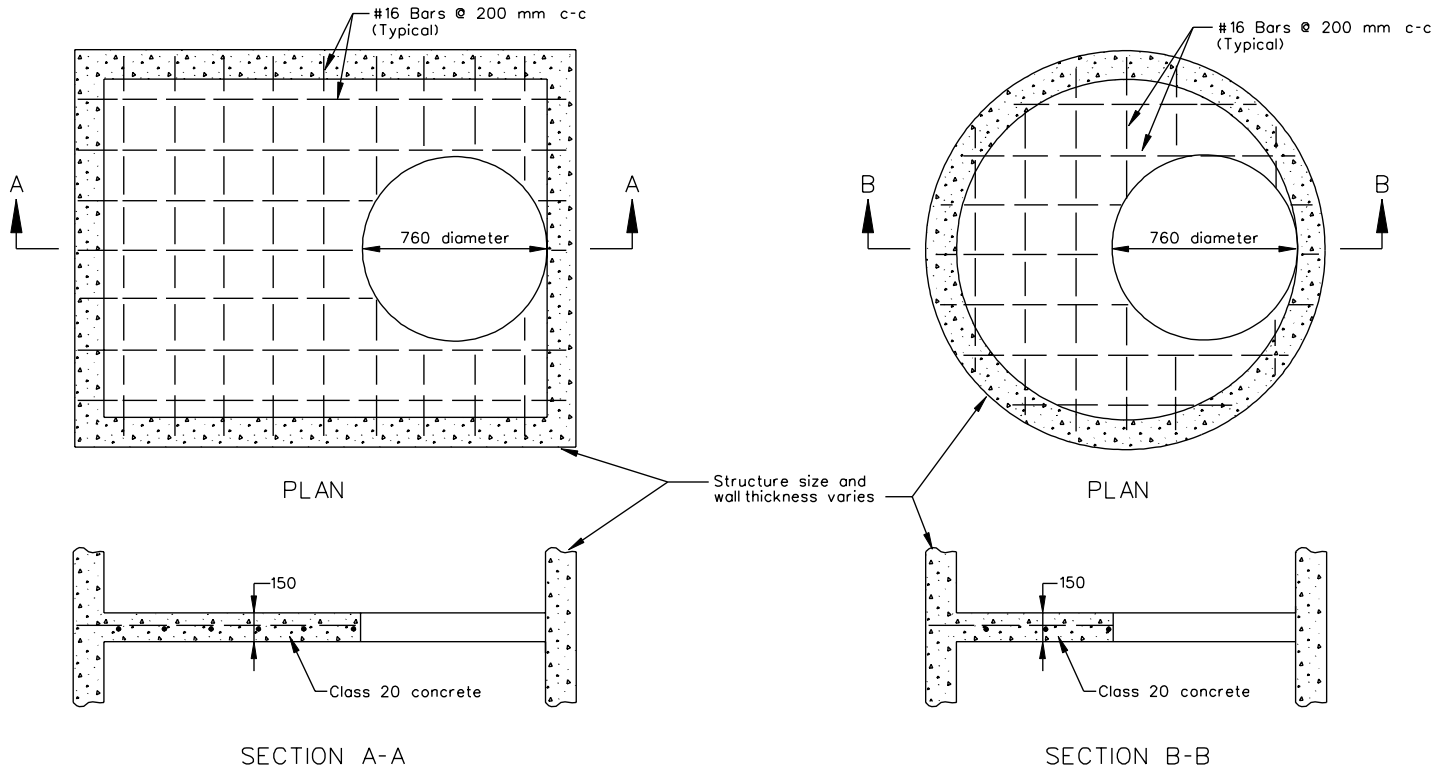
(To be used with St'd JB-I Junction Box)

PIPE SIZE (mm)	PIPE CLASS	CONCRETE				REINF. STEEL Kilograms
		0	15	30	45	
		Cu. Meters	Cu. Meters	Cu. Meters	Cu. Meters	
300	III, IV, V	0.027	0.028	0.031	0.038	8
300	CM	0.015	0.015	0.017	0.021	5
375	III, IV, V	0.038	0.040	0.044	0.054	11
375	CM	0.023	0.024	0.026	0.032	7
450	III, IV, V	0.053	0.055	0.061	0.076	15
450	CM	0.033	0.034	0.037	0.047	10
600	III, IV, V	0.090	0.093	0.105	0.128	24
600	CM	0.058	0.060	0.067	0.083	16
750	III, IV, V	0.137	0.142	0.159	0.196	36
750	CM	0.090	0.093	0.105	0.128	24
900	III, IV, V	0.194	0.201	0.225	0.277	49
900	CM	0.130	0.135	0.151	0.185	34
1050	III, IV, V	0.261	0.270	0.302	0.372	65
1050	CM	0.177	0.183	0.205	0.252	45
1200	III, IV, V	0.337	0.349	0.391	0.481	83
1200	CM	0.231	0.239	0.268	0.329	58
1350	III, IV	0.424	0.439	0.491	0.603	103
1350	V	0.443	0.459	0.514	0.631	108
1350	CM	0.292	0.303	0.339	0.417	72
1500	III, IV	0.519	0.538	0.602	0.738	125
1500	V	0.541	0.561	0.628	0.771	130
1500	CM	0.361	0.368	0.421	0.515	88
1650	III, IV	0.625	0.648	0.725	0.891	150
1650	V	0.649	0.673	0.753	0.926	155
1650	CM	0.437	0.452	0.506	0.622	106
1800	III, IV	0.741	0.768	0.859	1.057	177
1800	V	0.767	0.795	0.889	1.094	183
1800	CM	0.519	0.538	0.602	0.741	125

SPECIFICATION REFERENCE 105 233 302	<h2 style="margin: 0;">JUNCTION BOX FOR 1200 mm - 1800 mm PIPE CULVERTS</h2> <p style="margin: 0; font-size: small;">VIRGINIA DEPARTMENT OF TRANSPORTATION</p>	UNLESS OTHERWISE NOTED, ALL DIMENSIONS ON THIS SHEET ARE IN MILLIMETERS	106.12
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REVISED ON 2/01

SL-1



Notes:

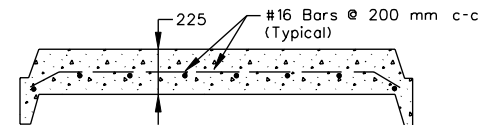
Safety Slabs are to be provided at 2.43 m minimum and 3.65 m maximum vertical intervals and are to be spaced so as not to conflict with openings for pipes as directed by the engineer.

Access holes are to be staggered from one side of structure to the other where applicable. Steps are to be staggered accordingly.

Cost to be included in applicable Drop Inlet, Manhole or Junction Box.

May be precast or cast in place.

See cast in place drawings for further details.



Reinforced Steel to be in accordance with A.S.T.M. A-615M
Concrete to be 30 MPa

TYPICAL PRECAST UNIT

SPECIFICATION REFERENCE	TYPICAL CONCRETE SAFETY SLAB FOR DROP INLETS, MANHOLES AND JUNCTION BOXES		UNLESS OTHERWISE NOTED, ALL DIMENSIONS ON THIS SHEET ARE IN MILLIMETERS
302			106.13
VIRGINIA DEPARTMENT OF TRANSPORTATION			