

MDSHA BOOK OF STANDARD

FOR HIGHWAYS, INCIDENTAL STRUCTURES AND TRAFFIC CONTROL APPLICATIONS

STANDARD NUMBERS	DESCRIPTION	Dates	
		MDSHA	FHWA
<i>CATEGORY "3" DRAINAGE</i>			
<i>MD 350.01</i>	<i>STANDARD END SUPPORT WALL METAL OR CONCRETE ROUND PIPE</i>	<i>10/01/01</i>	<i>12/12/86</i>
<i>MD 351.01</i>	<i>STANDARD END SUPPORT WALL METAL PIPE ARCH</i>	<i>10/01/01</i>	<i>12/12/86</i>
<i>MD 352.01</i>	<i>STANDARD HEADWALLS - B-48 B-54 B-60</i>	<i>10/01/01</i>	<i>08/01/84</i>
<i>MD 352.02</i>	<i>STANDARD HEADWALLS - B-66 B-72 B-78 B-84</i>	<i>10/01/01</i>	<i>06/18/75</i>
<i>MD 354.01</i>	<i>STANDARD TYPE C ENDWALL METAL OR CONCRETE ROUND PIPE</i>	<i>10/01/01</i>	<i>12/12/86</i>
<i>MD 355.01</i>	<i>STANDARD TYPE C ENDWALL METAL PIPE ARCH</i>	<i>10/01/01</i>	<i>12/10/86</i>
<i>MD 355.02</i>	<i>STANDARD TYPE C ENDWALL HORIZONTAL ELLIPTICAL CONCRETE PIPE</i>	<i>08/12/02</i>	<i>09/27/01</i>
<i>MD 355.03</i>	<i>STANDARD END SUPPORT WALL HORIZONTAL ELLIPTICAL CONCRETE PIPE</i>	<i>08/12/02</i>	<i>09/27/01</i>
<i>MD 356.01</i>	<i>STANDARD TYPE E ENDWALL METAL OR CONCRETE ROUND PIPE</i>	<i>10/01/01</i>	<i>12/12/86</i>
<i>MD 357.01</i>	<i>STANDARD TYPE E ENDWALL METAL PIPE ARCH</i>	<i>10/01/01</i>	<i>12/12/86</i>
<i>MD 358.01</i>	<i>STANDARD TYPE F ENDWALL METAL OR CONCRETE ROUND PIPE</i>	<i>10/01/01</i>	<i>12/12/86</i>
<i>MD 358.02</i>	<i>SPECIAL TYPE F ENDWALL METAL OR CONCRETE ROUND PIPE</i>	<i>10/01/01</i>	<i>12/12/86</i>
<i>MD 358.03</i>	<i>STANDARD TYPE F ENDWALL MODIFICATIONS</i>	<i>10/01/01</i>	<i>03/23/56</i>
<i>MD 358.04</i>	<i>PRECAST TYPE F ENDWALL METAL OR CONCRETE ROUND PIPE</i>	<i>10/01/01</i>	<i>06/20/95</i>
<i>MD 358.05</i>	<i>PRECAST TYPE F ENDWALL DIMENSIONS METAL OR CONCRETE ROUND PIPE</i>	<i>08/12/02</i>	<i>06/20/95</i>
<i>MD 359.01</i>	<i>STANDARD TYPE F ENDWALL METAL PIPE ARCH</i>	<i>10/01/01</i>	<i>12/12/86</i>

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CATEGORY "3" DRAINAGE			
MD 359.02	PRECAST TYPE F ENDWALL METAL PIPE ARCH	10/01/01	12/16/93
MD 359.03	PRECAST TYPE F ENDWALL DIMENSIONS METAL PIPE ARCH	10/01/01	06/23/92
MD 360.01	STANDARD TYPE G ENDWALL METAL OR CONCRETE ROUND PIPE	10/01/01	12/12/86
MD 360.02	STANDARD TYPE G ENDWALL MODIFICATIONS	10/01/01	03/23/56
MD 362.01	STANDARD TYPE H ENDWALL METAL OR CONCRETE ROUND PIPE	10/01/01	12/12/86
MD 362.01-01	STANDARD TYPE H ENDWALL DIMENSIONS AND QUANTITIES	10/01/01	12/12/86
MD 368.01	STANDARD CONCRETE END SECTION ROUND CONCRETE PIPE	07/01/09	07/27/09
MD 368.02	STANDARD CONCRETE END SECTION ROUND CONCRETE PIPE	07/01/09	07/27/09
MD 369.00	STANDARD CONCRETE END SECTION HORIZONTAL ELLIPTICAL PIPE	07/01/09	07/27/09
MD 370.01	STANDARD METAL END SECTION ROUND METAL PIPE	07/01/09	07/27/09
MD 370.11	STANDARD CONNECTIONS METAL END SECTIONS	07/01/09	07/27/09
MD 371.01	STANDARD METAL END SECTION METAL PIPE ARCH	07/01/09	07/27/09
MD 374.02	STANDARD WR & WRM INLET FRAME AND GRATE	10/01/01	09/21/87
MD 374.03	STANDARD WR & WRM INLET FRAME AND GRATE	10/01/01	09/21/87
MD 374.04	STANDARD WR INLET	10/01/01	02/24/88
MD 374.05	STANDARD WRM INLET	10/01/01	02/24/88

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STANDARD NUMBERS	DESCRIPTION	Dates	
		MDSHA	FHWA
	CATEGORY "3" DRAINAGE		
<i>MD 374.06</i>	<i>SINGLE WR INLET</i>	<i>10/01/01</i>	<i>02/24/88</i>
<i>MD 374.08</i>	<i>TRIPLE WR INLET</i>	<i>10/01/01</i>	<i>02/24/88</i>
<i>MD 374.09</i>	<i>TRIPLE WR FRAME</i>	<i>10/01/01</i>	<i>08/01/84</i>
<i>MD 374.10</i>	<i>TRIPLE WRM INLET</i>	<i>12/07/09</i>	<i>02/24/88</i>
<i>MD 374.12</i>	<i>STANDARD NR & NRM INLET FRAME AND GRATE</i>	<i>10/01/01</i>	<i>08/01/84</i>
<i>MD 374.13</i>	<i>STANDARD NR & NRM INLET FRAME AND GRATE</i>	<i>10/01/01</i>	<i>09/21/87</i>
<i>MD 374.14</i>	<i>STANDARD NR INLET</i>	<i>10/01/01</i>	<i>02/24/88</i>
<i>MD 374.15</i>	<i>STANDARD NRM INLET</i>	<i>10/01/01</i>	<i>02/24/88</i>
<i>MD 374.21</i>	<i>PRECAST WR INLET</i>	<i>10/01/01</i>	<i>03/30/87</i>
<i>MD 374.22</i>	<i>PRECAST WRM INLET</i>	<i>10/01/01</i>	<i>03/30/87</i>
<i>MD 374.23</i>	<i>PRECAST SINGLE WR INLET</i>	<i>10/01/01</i>	<i>03/30/87</i>
<i>MD 374.24</i>	<i>PRECAST NR INLET</i>	<i>10/01/01</i>	<i>03/30/87</i>
<i>MD 374.25</i>	<i>PRECAST NRM INLET</i>	<i>10/01/01</i>	<i>03/30/87</i>
<i>MD 374.26</i>	<i>PRECAST TRIPLE WR INLET</i>	<i>10/01/01</i>	<i>01/02/91</i>
<i>MD 374.27</i>	<i>PRECAST TRIPLE WRM INLET</i>	<i>10/01/01</i>	<i>01/02/91</i>
<i>MD 374.27-01</i>	<i>PRECAST TRIPLE WRM INLET</i>	<i>10/01/01</i>	<i>01/02/91</i>
<i>MD 374.31</i>	<i>STANDARD C O G INLETS 5', 10' 15' & 20'</i>	<i>11/18/04</i>	<i>03/30/87</i>
<i>MD 374.41</i>	<i>STANDARD C O S INLETS 5' & 15'</i>	<i>11/18/04</i>	<i>03/30/87</i>
<i>MD 374.51</i>	<i>PRECAST OR CAST IN PLACE SQUARE AND RECTANGULAR COG INLETS 5', 10', 15' & 20'</i>	<i>08/03/10</i>	<i>07/26/10</i>
<i>MD 374.55</i>	<i>PRECAST CONCRETE INLET SLABS AND ADJUSTMENT COLLARS FOR COG AND COS INLETS</i>	<i>10/01/01</i>	<i>01/02/91</i>

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STANDARD NUMBERS	DESCRIPTION	Dates	
		MDSHA	FHWA
	CATEGORY "3" DRAINAGE		
MD 374.55-01	PRECAST CONCRETE INLET SLABS AND ADJUSTMENT COLLARS FOR COG/COS INLETS TO ACCOMMODATE 6 INCH CURB	03/25/03	05/05/03
MD 374.61	PRECAST OR CAST IN PLACE SQUARE AND RECTANGULAR COS INLETS 5', 10', 15' & 20'	08/03/10	07/26/10
MD 374.62	PRECAST OR CAST IN PLACE CIRCULAR COG INLETS 5', 10', 15' & 20'	08/03/10	07/26/10
MD 374.63	PRECAST OR CAST IN PLACE CIRCULAR COS INLETS 5', 10', 15' & 20'	08/03/10	07/26/10
MD 374.64	ALTERNATE PRECAST TROUGHS FOR COG AND COS INLETS	10/01/01	09/04/91
MD 374.65	DEPRESSED CONCRETE GUTTER PAN FOR COG AND COS INLETS	10/01/01	01/02/91
MD 374.66	PRECAST OR CAST IN PLACE SHALLOW COG INLET 5' OR 10' TROUGH OPENING	10/01/01	02/23/98
MD 374.67	PRECAST OR CAST IN PLACE SHALLOW COS INLET 5' OR 10' TROUGH OPENING	10/01/01	02/23/98
MD 374.68	PRECAST OR CAST-IN-PLACE COG / COS OPENING FOR 8' CURB 5' OR 10' ONLY	01/09/08	11/26/07
MD 374.70	PRECAST STANDARD TYPE S INLET DOUBLE GRATE TANDEM	08/03/10	07/26/10
MD 374.71	PRECAST STANDARD TYPE S COMBINATION INLET DOUBLE GRATE TANDEM	08/03/10	07/26/10
MD 374.72	PRECAST STANDARD TYPE HS COMBINATION INLET	08/03/10	07/26/10
MD 374.73	PRECAST STANDARD TYPE S INLET SINGLE GRATE	08/03/10	07/26/10
MD 374.74	PRECAST STANDARD TYPE E COMBINATION INLET	08/03/10	07/26/10
MD 374.75	PRECAST STANDARD TYPE H COMBINATION INLET	07/01/09	07/27/09

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STANDARD NUMBERS	DESCRIPTION	Dates	
		MDSHA	FHWA
CATEGORY "3" DRAINAGE			
<i>MD 374.85</i>	<i>STANDARD ADA COMPLIANT INLET SINGLE GRATE</i>	<i>07/14/08</i>	<i>02/04/08</i>
<i>MD 374.85-01</i>	<i>STANDARD ADA COMPLIANT INLET SINGLE FRAME AND GRATE</i>	<i>07/14/08</i>	<i>02/04/08</i>
<i>MD 374.86</i>	<i>STANDARD ADA COMPLIANT INLET DOUBLE GRATE TANDEM</i>	<i>07/14/08</i>	<i>02/04/08</i>
<i>MD 374.86-01</i>	<i>STANDARD ADA COMPLIANT INLET DOUBLE FRAME AND GRATE</i>	<i>07/14/08</i>	<i>02/04/08</i>
<i>MD 376.11</i>	<i>STANDARD TYPE E INLET</i>	<i>08/03/10</i>	<i>07/26/10</i>
<i>MD 376.12-01</i>	<i>CURVE VANE GRATE WITH FRAME FOR TYPE "E" INLET (E-CV)</i>	<i>07/01/09</i>	<i>07/27/09</i>
<i>MD 376.21</i>	<i>STANDARD TYPE E COMBINATION INLET</i>	<i>08/03/10</i>	<i>07/26/10</i>
<i>MD 376.22</i>	<i>STANDARD TYPE E COMBINATION INLET STANDARD CAST IRON FRAME</i>	<i>11/18/04</i>	<i>03/23/56</i>
<i>MD 376.24</i>	<i>STANDARD TYPE E COMBINATION INLET DETAIL OF SPECIAL CURB</i>	<i>11/18/04</i>	<i>02/04/69</i>
<i>MD 378.03</i>	<i>STANDARD SINGLE OR DOUBLE OPENING TYPE K INLET OPEN-END GRATE NON-TRAFFIC AREAS</i>	<i>10/01/01</i>	<i>06/23/87</i>
<i>MD 378.04</i>	<i>STANDARD TYPE K INLET REPLACEMENT GRATE</i>	<i>10/01/01</i>	<i>02/08/83</i>
<i>MD 378.05</i>	<i>STANDARD SINGLE OR DOUBLE OPENING TYPE K INLET OPEN-END GRATE</i>	<i>10/01/01</i>	<i>06/23/87</i>
<i>MD 378.06</i>	<i>STANDARD TYPE K INLET SINGLE FRAME AND GRATE</i>	<i>03/15/06</i>	<i>04/05/06</i>
<i>MD 378.07</i>	<i>STANDARD TYPE K INLET DOUBLE FRAME AND GRATE</i>	<i>10/01/01</i>	<i>05/12/75</i>
<i>MD 378.11</i>	<i>PRECAST STANDARD SINGLE OR DOUBLE OPENING TYPE K INLET OPEN-END GRATE</i>	<i>10/01/01</i>	<i>06/23/87</i>
<i>MD 379.01</i>	<i>STANDARD TYPE S INLET SINGLE GRATE</i>	<i>08/03/10</i>	<i>07/26/10</i>
<i>MD 379.02-01</i>	<i>CURVE VANE GRATE WITH FRAME FOR SINGLE TYPE "S" INLET (S-CV)</i>	<i>07/01/09</i>	<i>07/27/09</i>

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STANDARD NUMBERS	DESCRIPTION	Dates	
		MDSHA	FHWA
CATEGORY "3" DRAINAGE			
MD 379.03	STANDARD TYPE S INLET DOUBLE GRATE TANDEM	08/03/10	07/27/09
MD 379.04	STANDARD TYPE S COMBINATION INLET DOUBLE GRATE TANDEM	08/03/10	07/27/09
MD 379.05-01	CURVE VANE GRATES WITH FRAME FOR DOUBLE TYPE "S" INLET (S2-CV)	07/01/09	07/27/09
MD 379.06	STANDARD TYPE S INLET & COMBINATION STEEL FRAME AND GRATE ALTERNATE	07/01/09	07/27/09
MD 379.07	STANDARD TYPE S INLET & COMBINATION STEEL FRAME AND GRATE ALTERNATE	07/01/09	07/27/09
MD 379.08	STANDARD TYPE S INLET & COMBINATION RETICULAR REPLACEMENT GRATE	10/01/01	02/08/83
MD 380.01	STANDARD TYPE HS COMBINATION INLET	08/03/10	07/26/10
MD 381.01	STANDARD YARD INLET	10/01/01	06/23/87
MD 381.02	PRECAST YARD INLET	10/01/01	06/23/87
MD 383.00	48" SQUARE STANDARD SHALLOW MANHOLE	10/01/01	04/26/89
MD 383.01	STANDARD MANHOLE	10/01/01	02/24/88
MD 383.11	STANDARD DROP MANHOLE	10/01/01	02/24/88
MD 383.21	STANDARD 4 FT. CIRCULAR MANHOLE MAX. DEPTH 36 FT.	10/01/01	02/24/88
MD 383.31	STANDARD MANHOLE TYPE A FRAME	10/01/01	03/23/56
MD 383.32	STANDARD MANHOLE TYPE A COVER	10/01/01	03/16/73
MD 383.61	STANDARD MANHOLE TYPE D FRAME & COVER	10/01/01	03/16/73
MD 383.91	STANDARD METAL LADDER RUNGS MISCELLANEOUS STRUCTURES	10/01/01	02/08/83

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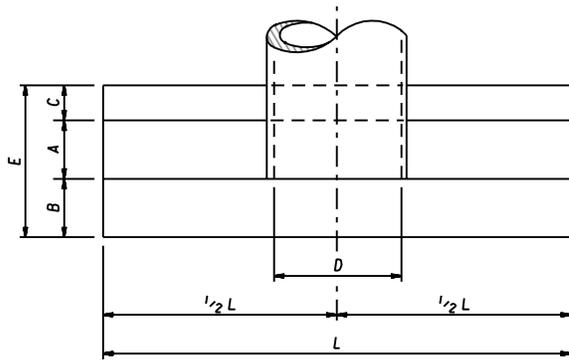
FOR HIGHWAYS, INCIDENTAL STRUCTURES AND TRAFFIC CONTROL APPLICATIONS

STANDARD NUMBERS	DESCRIPTION	Dates	
		MDSHA	FHWA
CATEGORY "3" DRAINAGE			
MD 383.92	COPOLYMER POLYPROPYLENE STEEL ENCAPSULATED LADDER RUNGS MISCELLANEOUS STRUCTURES	10/01/01	03/30/87
MD 384.01	48" DIAMETER PRECAST MANHOLE FOR 12" TO 24" PIPES	10/01/01	01/02/91
MD 384.02	FRAME ANCHORAGE FOR PRECAST MANHOLES	10/01/01	01/02/91
MD 384.03	60" DIAMETER PRECAST MANHOLE FOR 27" TO 36" PIPES	10/01/01	01/02/91
MD 384.05	72" DIAMETER PRECAST MANHOLE FOR 42" TO 48" PIPES	10/01/01	01/02/91
MD 384.07	84" DIAMETER PRECAST MANHOLE FOR 54" TO 60" PIPES	10/01/01	01/02/91
MD 384.09	96" DIAMETER PRECAST MANHOLE FOR 72" PIPES	10/01/01	01/02/91
MD 384.11	120" DIAMETER PRECAST MANHOLE FOR 78" TO 84" PIPES	10/01/01	01/02/91
MD 384.12	PRECAST FLAT SLAB TOP FOR 120" DIAMETER PRECAST MANHOLE	10/01/01	01/02/91
MD 384.13	PRECAST DRIP STONE LANDING DETAILS FOR 48" TO 120" DIAMETER MANHOLES	10/01/01	01/02/91
MD 384.15	PRECAST COMBINATION FLATTOP REDUCER AND DRIP STONE LANDING FOR 60" TO 120" DIAMETER MANHOLES	10/01/01	01/02/91
MD 384.17	PRECAST COMBINATION ECCENTRIC CONE REDUCER AND DRIP STONE LANDING FOR 60" AND 72" DIAMETER MANHOLES	10/01/01	01/02/91
MD 386.01	STANDARD SPRING BOX SPRING OR WELL PROTECTION	10/01/01	03/23/56
MD 386.02	CAPPING EXISTING DUG WELLS	10/01/01	12/06/82
MD 386.03	SPRING CONTROL METHOD & DETAIL	03/15/06	04/05/06

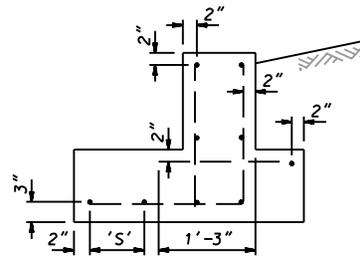
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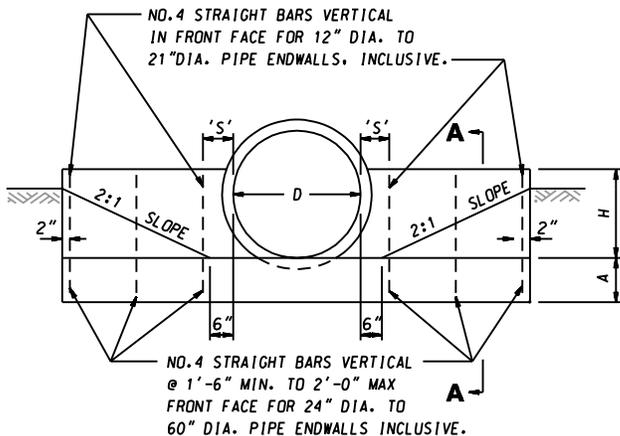
STANDARD NUMBERS	DESCRIPTION	Dates	
		MDSHA	FHWA
CATEGORY "3" DRAINAGE			
<i>MD 386.11</i>	<i>STANDARD JUNCTION BOX</i>	<i>10/01/01</i>	<i>03/23/56</i>
<i>MD 386.21</i>	<i>PRE-CAST REINFORCED CONCRETE SLAB</i>	<i>10/01/01</i>	<i>09/30/75</i>
<i>MD 387.01</i>	<i>STANDARD UNDERDRAINS</i>	<i>10/01/01</i>	<i>04/14/86</i>
<i>MD 387.11</i>	<i>LONGITUDINAL UNDERDRAIN LOCATED AT SHOULDER EDGE FOR FLEXIBLE PAVEMENT</i>	<i>03/21/88</i>	<i>03/21/88</i>
<i>MD 387.12</i>	<i>LONGITUDINAL UNDERDRAIN LOCATED AT PAVEMENT EDGE FOR RIGID PAVEMENT</i>	<i>10/01/01</i>	<i>03/21/88</i>
<i>MD 387.21</i>	<i>LONGITUDINAL UNDERDRAIN LOCATED AT SHOULDER EDGE FOR RIGID PAVEMENT</i>	<i>10/01/01</i>	<i>03/21/88</i>
<i>MD 387.51</i>	<i>STANDARD SUBGRADE DRAINS FLEXIBLE PAVING</i>	<i>10/01/01</i>	<i>03/21/88</i>
<i>MD 387.61</i>	<i>STANDARD SUBGRADE DRAINS RIGID PAVEMENT</i>	<i>10/01/01</i>	<i>03/21/88</i>
<i>MD 388.01</i>	<i>SEDIMENT AND EROSION CONTROL PERMANENT SLOPE DRAIN</i>	<i>10/01/01</i>	<i>07/13/71</i>
<i>MD 388.12</i>	<i>SEDIMENT AND EROSION CONTROL TEMPORARY DITCH BASIN</i>	<i>10/01/01</i>	<i>03/16/73</i>
<i>MD 389.01</i>	<i>STANDARD CONCRETE VALLEY GUTTER, FLUMES, CONCRETE SHOULDER & REBUT</i>	<i>10/01/01</i>	
<i>MD 389.02</i>	<i>TOE WALL DETAIL-5" CONCRETE GUTTER</i>	<i>10/01/01</i>	<i>01/27/69</i>
<i>MD 389.06</i>	<i>SOIL STABILIZATION MATTING DRAINAGE DITCHES</i>	<i>10/01/01</i>	<i>06/27/85</i>
<i>MD 389.07</i>	<i>SOIL STABILIZATION MATTING DRAINAGE DITCHES</i>	<i>10/01/01</i>	<i>04/25/88</i>



PLAN



DISPOSITION OF BARS DETAIL



ELEVATION

NO.4 STRAIGHT BARS HORIZONTAL @ 1'-7" MAX C/C BOTH FACES- BOTTOM BARS TO BE FULL LENGTH ALL ENDWALLS.

NO.4 STRAIGHT BARS HORIZONTAL @ 1'-0" C/C BOTH SIDES OF OPENING FOR 36" TO 60" DIA PIPE ENDWALLS.

1-NO.4 STRAIGHT BAR HORIZONTAL- ALL ENDWALLS.

2-NO.4 STRAIGHT BARS HORIZONTAL FOR 36" TO 60" DIA. PIPE ENDWALLS.

SECTION A - A

QUANTITIES FOR ESTIMATING PURPOSES ONLY

OPENING		DIMENSIONS						QUANTITIES	
D	AREA	A	B	C	E	H	L	CONC. C.Y.	STEEL LBS.
INCHES	SQ. FT								
12	0.79	9"	6"	6"	1'-9"	0'-10"	4'-0"	0.27	24
15	1.23	9"	6"	6"	1'-9"	1'-0 1/2"	4'-9"	0.34	26
18	1.77	9"	6"	6"	1'-9"	1'-3"	5'-6"	0.41	29
21	2.40	9"	6"	6"	1'-9"	1'-5"	6'-3"	0.48	33
24	3.14	9"	14"	6"	2'-5"	1'-6"	7'-0"	0.67	38
27	3.98	9"	14"	6"	2'-5"	1'-8"	7'-9"	0.77	49
30	4.91	9"	14"	6"	2'-5"	1'-9"	8'-6"	0.85	53
33	5.94	9"	14"	6"	2'-5"	1'-11"	9'-3"	0.95	56
36	7.07	12"	16"	10"	3'-2"	2'-0"	10'-0"	1.65	85
42	9.62	12"	16"	10"	3'-2"	2'-3"	11'-6"	1.96	96
48	12.57	12"	16"	10"	3'-2"	2'-6"	13'-0"	2.27	106
54	15.90	12"	20"	12"	3'-8"	2'-9"	14'-6"	2.86	121
60	19.64	12"	20"	12"	3'-8"	3'-0"	16'-0"	3.22	143

'S' DISTANCE

4" FOR 12" DIA. TO 21" DIA. PIPES INCLUSIVE.
 6" FOR 24" DIA. TO 36" DIA. PIPES INCLUSIVE.
 8" FOR 42" DIA. TO 60" DIA. PIPES INCLUSIVE.

GENERAL NOTES

SPECIFICATIONS: LATEST S.H.A.
 CONCRETE SHALL BE MIX NO.2
 REINFORCING: DEFORMED STEEL BARS-NO.4
 CHAMFER: ALL EXPOSED EDGES 1"x1" OR AS DIRECTED.

SPECIFICATION 305 CATEGORY CODE ITEMS

APPROVED *Kirk G. McCall*
 DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT

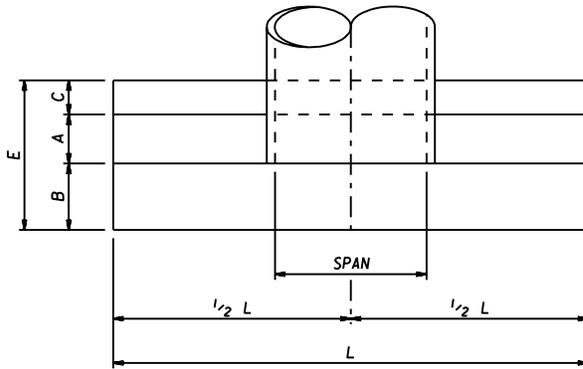
APPROVAL • SHA REVISIONS	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
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REVISED	REVISED

SHA State Highway Administration

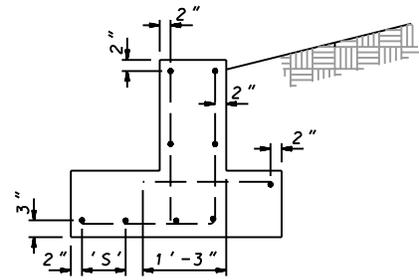
Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
 STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

STANDARD END SUPPORT WALL
METAL OR CONCRETE ROUND PIPE

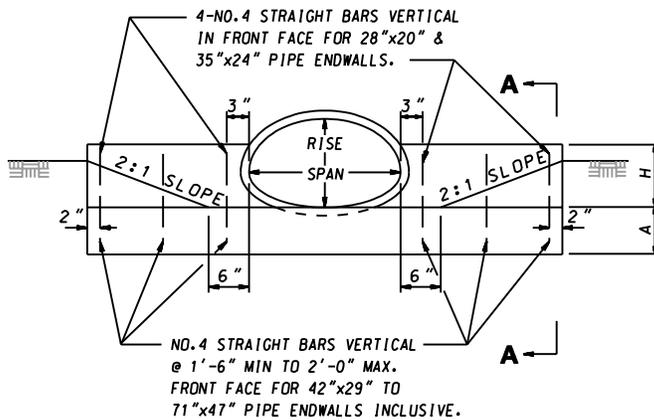
STANDARD NO. MD 350.01



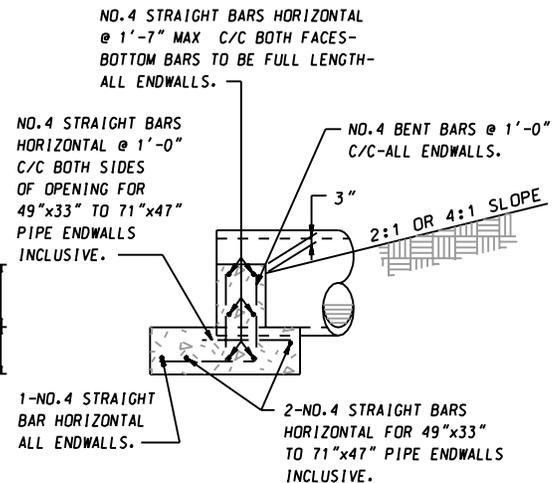
PLAN



DISPOSITION OF BARS DETAIL



ELEVATION



SECTION A-A

'S' DISTANCES

6" FOR 28"x20" TO 42"x29" INCLUSIVE.
8" FOR 49"x33" TO 71"x47" INCLUSIVE.

QUANTITIES FOR ESTIMATING PURPOSES ONLY

OPENING		DIMENSIONS						QUANTITIES	
SIZE	AREA	A	B	C	E	H	L	CONC.	STEEL
INCHES	SQ. FT							C. Y.	LBS.
28x20	3.14	9"	14"	6"	2'-5"	1'-2"	5'-11"	.50	33
35x24	4.91	9"	14"	6"	2'-5"	1'-5"	7'-5"	.65	37
42x29	7.07	12"	16"	10"	3'-2"	1'-8"	8'-10"	1.32	54
49x33	9.62	12"	16"	10"	3'-2"	1'-11"	10'-4"	1.59	77
57x38	12.57	12"	16"	10"	3'-2"	2'-2"	12'-1"	1.92	90
64x43	15.90	12"	20"	12"	3'-8"	2'-6"	13'-7"	2.51	102
71x47	19.64	12"	20"	12"	3'-8"	2'-9"	15'-1"	2.86	112

GENERAL NOTES

SPECIFICATIONS LATEST S.H.A.
CONCRETE SHALL BE MIX NO.2
REINFORCING: DEFORMED STEEL BARS NO.4
CHAMFER: ALL EXPOSED EDGES 1"x1" OR AS DIRECTED.

SPECIFICATION 305 CATEGORY CODE ITEMS

APPROVED *Kirk G. McCall*
DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT

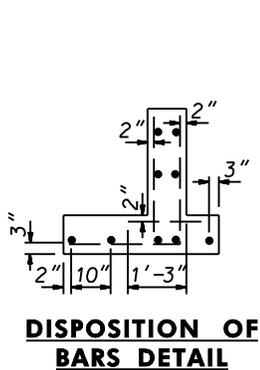
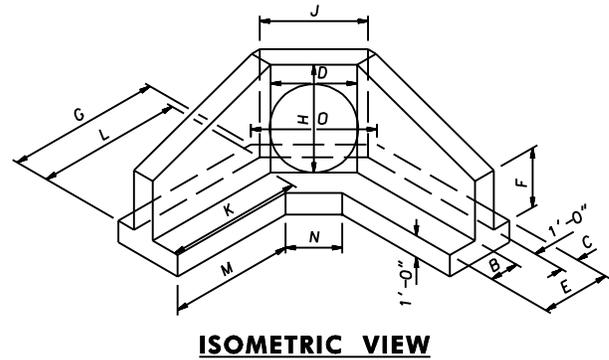
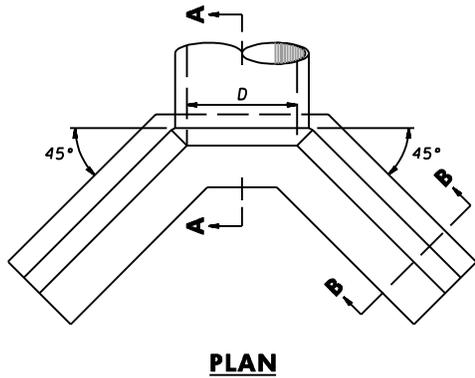
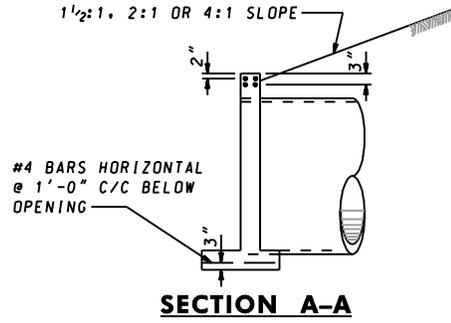
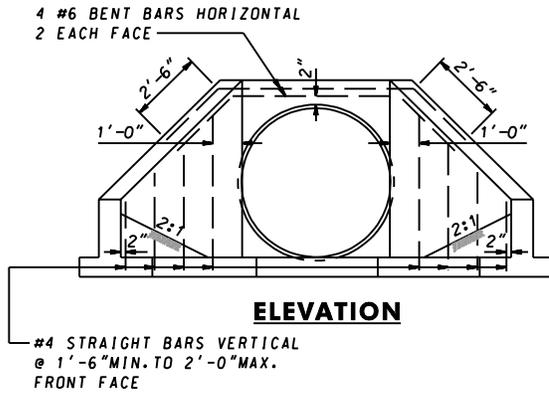


APPROVAL • SHA REVISIONS	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
APPROVAL 8-28-86	APPROVAL 12-12-86
REVISED 10-1-01	REVISED
REVISED	REVISED
REVISED	REVISED

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

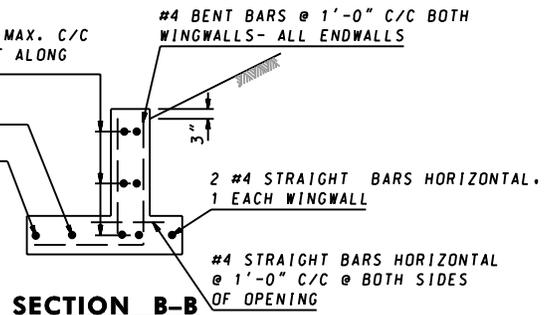
STANDARD END SUPPORT WALL
METAL PIPE ARCH

STANDARD NO. MD 351.01



#4 BARS HORIZONTAL @ 1'-7" MAX. C/C BOTH FACES BOTTOM BARS BENT ALONG ENDWALL OTHERS STRAIGHT.

1 #4 BENT BAR HORIZONTAL
1 #4 BENT BAR HORIZONTAL



NOTES

SPECIFICATIONS: LATEST S.H.A.
CONCRETE SHALL BE MIX NO.2
REINFORCING: DEFORMED STEEL BARS #4 & #6
CHAMFER: ALL EXPOSED EDGES 1"x1" OR AS DIRECTED

OPENING		DIMENSIONS											VOL. CONC. C.Y.	STEEL LBS.	
D INCHES	AREA SQ.FT.	B	C	E	F	G	H	J	K	L	M	N	O		
48	12.57	1'-4"	10"	3'-2"	2'-9"	7'-0 3/4"	5'-0"	4'-10"	6'-3 1/2"	6'-8 1/2"	5'-9"	2'-10 3/4"	5'-6"	4.3	262
54	15.9	1'-8"	1'-0"	3'-8"	3'-0"	7'-8 1/2"	5'-6"	5'-4"	6'-10 1/2"	7'-3 1/2"	6'-2 1/4"	3'-1 1/2"	6'-2"	5.3	301
60	19.64	1'-8"	1'-0"	3'-8"	3'-3"	8'-5"	6'-0"	5'-10"	7'-7 1/4"	8'-0 1/4"	6'-11"	3'-7 1/2"	6'-8"	6.0	361

QUANTITIES IN TABLE TO BE USED FOR ESTIMATING ONLY

SPECIFICATION **305** CATEGORY CODE ITEMS

APPROVED *Kirk G. McCall*
DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT

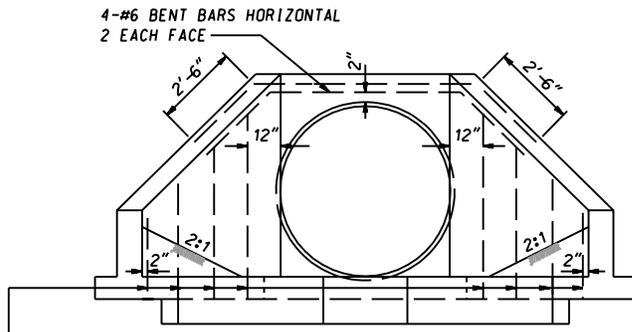
SHA State Highway Administration

APPROVAL • SHA REVISIONS	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
APPROVAL 3-3-59	APPROVAL 2-15-60
REVISED 10-1-01	REVISED 8-1-84
REVISED	REVISED
REVISED	REVISED

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

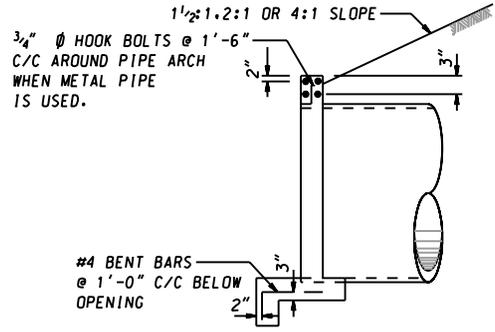
STANDARD HEADWALLS
B-48 B-54 B-60

STANDARD NO. MD 352.01

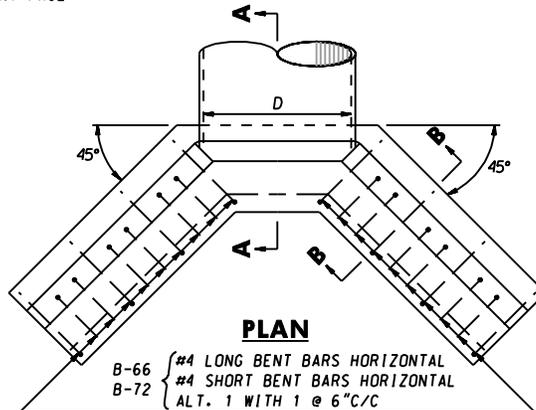


ELEVATION

#4 STRAIGHT BARS VERTICAL @ 1'-6" MIN. TO 2'-0" MAX. IN FRONT FACE



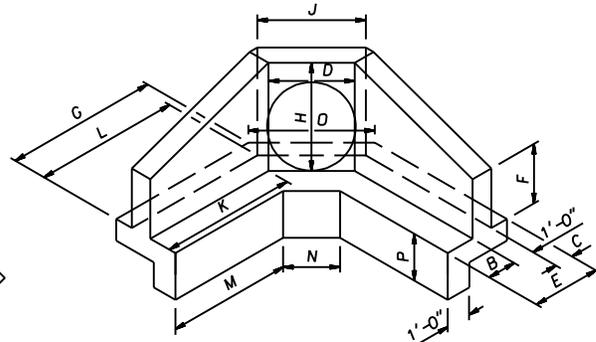
SECTION A-A



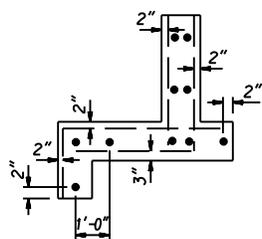
PLAN

B-66 { #4 LONG BENT BARS HORIZONTAL
#4 SHORT BENT BARS HORIZONTAL
ALT. 1 WITH 1 @ 6" C/C

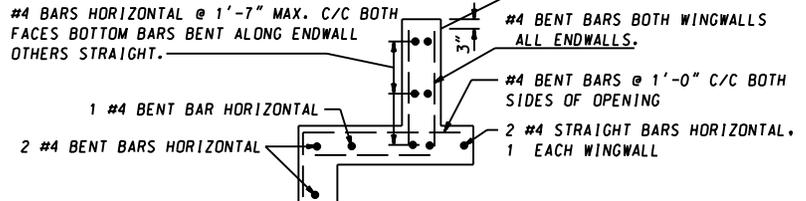
B-78 { #4 LONG BENT BARS HORIZONTAL
#4 SHORT BENT BARS HORIZONTAL
ALT. 1 WITH 2 RESP. 4" C/C



ISOMETRIC VIEW



DISPOSITION OF BARS DETAIL



SECTION B-B

NOTES

SPECIFICATIONS: LATEST S.H.A.
CONCRETE SHALL BE MIX NO. 2
REINFORCING: DEFORMED STEEL BARS #4 & #6
CHAMFER: ALL EXPOSED EDGES 1"x1" OR AS DIRECTED

OPENING		DIMENSIONS													VOL. CONC. C. Y.	STEEL LBS.
D INCHES	AREA SQ. FT.	B	C	E	F	G	H	J	K	L	M	N	O	P		
66	23.80	2'-6"	1'-3"	4'-9"	3'-0"	11'-2 1/2"	6'-8 1/2"	6'-4"	10'-3 1/4"	10'-8 1/2"	9'-3"	3'-5"	7'-4 1/2"	2'-0"	9.7	585
72	28.27	2'-6"	1'-3"	4'-9"	3'-3"	12'-1"	7'-3"	6'-10"	11'-1 3/4"	11'-6 3/4"	10'-1 1/4"	3"-11"	7'-10 1/2"	2'-0"	10.9	645
78	33.20	3'-0"	1'-6"	5'-6"	3'-6"	13'-0 1/2"	7'-9 1/2"	7'-4"	12'-0"	12'-5"	10'-9"	4'-0"	8'-6 3/4"	2'-6"	13.3	865
84	38.48	3'-0"	1'-6"	5'-6"	3'-9"	13'-10"	8'-4"	7'-10"	12'-9 1/2"	13'-2 1/2"	11'-6 1/2"	4'-6"	9'-0 3/4"	2'-6"	14.7	984

QUANTITIES IN TABLE TO BE USED FOR ESTIMATING ONLY

SPECIFICATION **305** CATEGORY CODE ITEMS

APPROVED *Kirk G. McCall*
DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT

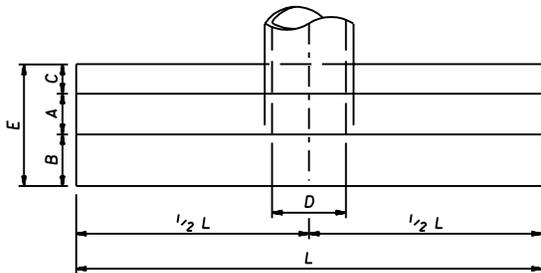
APPROVAL • SHA REVISIONS	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
APPROVAL 3-3-59	APPROVAL
REVISED 10-1-01	REVISED 6-18-75
REVISED	REVISED
REVISED	REVISED

SHA State Highway Administration

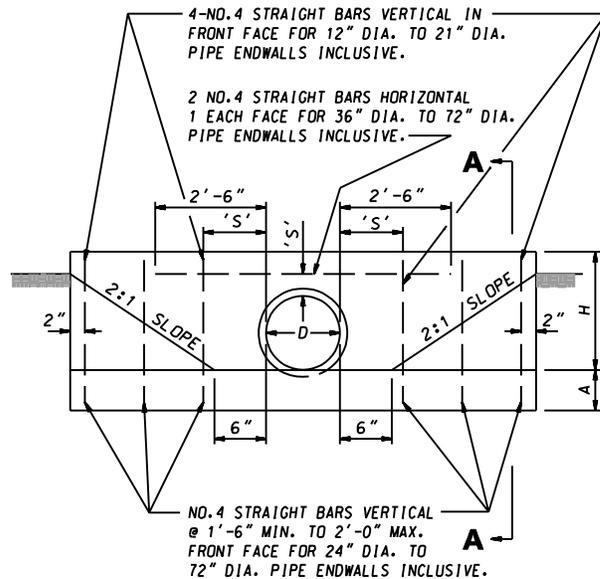
Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

STANDARD HEADWALLS
B-66 B-72 B-78 B-84

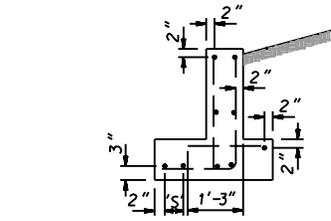
STANDARD NO. MD 352.02



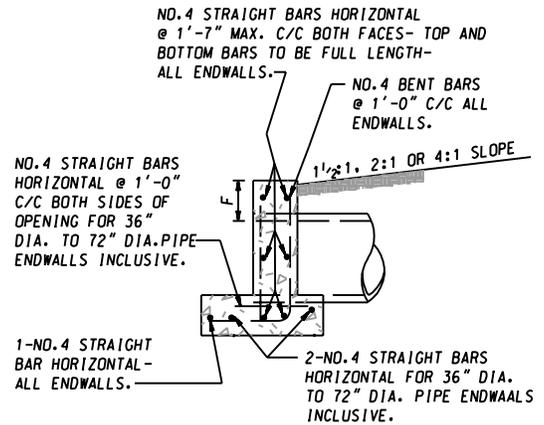
PLAN



ELEVATION



DISPOSITION OF BARS DETAIL



SECTION A-A

QUANTITIES FOR ESTIMATING PURPOSES ONLY

OPENING		DIMENSIONS							QUANTITIES	
D	AREA	A	B	C	E	F	H	L	CONC.	STEEL
INCHES	SO. FT.								C. Y.	LBS.
12	0.79	9"	6"	6"	1'-9"	9"	1'-9"	6'-6"	0.61	41
15	1.23	9"	6"	6"	1'-9"	9"	2'-0"	7'-9"	0.77	47
18	1.77	9"	6"	6"	1'-9"	9"	2'-3"	9'-0"	0.95	54
21	2.40	9"	6"	6"	1'-9"	9"	2'-6"	10'-3"	1.14	70
24	3.14	9"	14"	6"	2'-5"	9"	2'-9"	11'-6"	1.56	80
27	3.98	9"	14"	6"	2'-5"	9"	3'-0"	12'-10"	1.82	88
30	4.91	9"	14"	6"	2'-5"	12"	3'-6"	14'-2"	2.22	98
33	5.94	9"	14"	6"	2'-5"	12"	3'-9"	15'-5"	2.48	105
36	7.07	12"	16"	10"	3'-2"	12"	4'-0"	16'-8"	4.16	182
42	9.62	12"	16"	10"	3'-2"	12"	4'-6"	19'-2"	5.07	206
48	12.57	12"	16"	10"	3'-2"	12"	5'-0"	21'-8"	6.09	244
54	15.90	12"	20"	12"	3'-8"	12"	5'-6"	24'-2"	7.62	275
60	19.64	12"	20"	12"	3'-8"	12"	6'-0"	26'-8"	8.82	304
72	28.27	12"	20"	12"	3'-8"	12"	7'-0"	31'-8"	11.46	377

'S' DISTANCES

4" FOR 12" DIA. TO 21" DIA. PIPES INCLUSIVE.
 6" FOR 24" DIA. TO 36" DIA. PIPES INCLUSIVE.
 8" FOR 42" DIA. TO 72" DIA. PIPES INCLUSIVE.

GENERAL NOTES

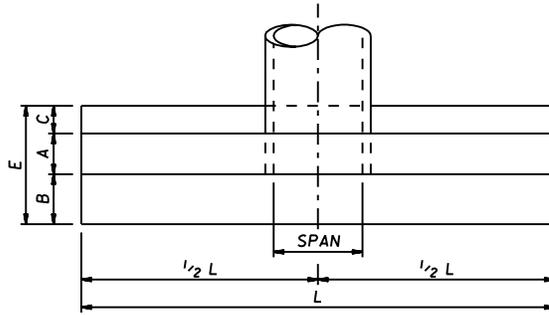
SPECIFICATIONS: LATEST S.H.A.
 CONCRETE SHALL BE MIX NO.2
 REINFORCING: DEFORMED STEEL BARS-NO.4
 CHAMFER: ALL EXPOSED EDGES 1"x1" OR AS DIRECTED

SPECIFICATION 305	CATEGORY CODE ITEMS
APPROVED <i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT	
	APPROVAL • SHA REVISIONS
	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
	APPROVAL 8-28-86
	APPROVAL 12-12-86
REVISED 10-1-01	REVISED
REVISED	REVISED
REVISED	REVISED

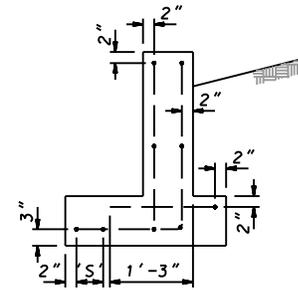
Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
 STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

STANDARD TYPE C ENDWALL
METAL OR CONCRETE ROUND PIPE

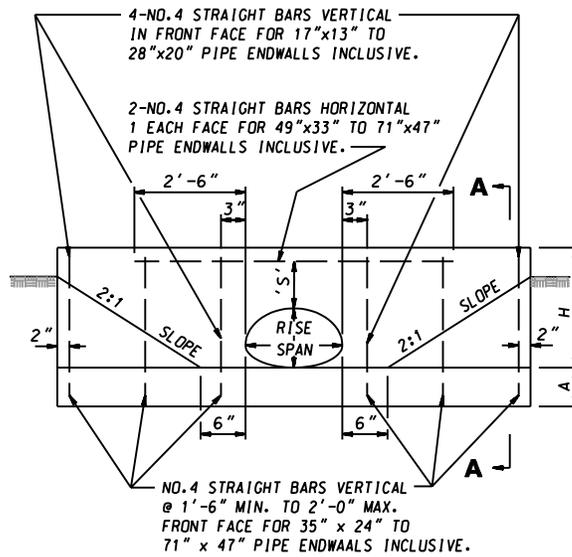
STANDARD NO. MD 354.01



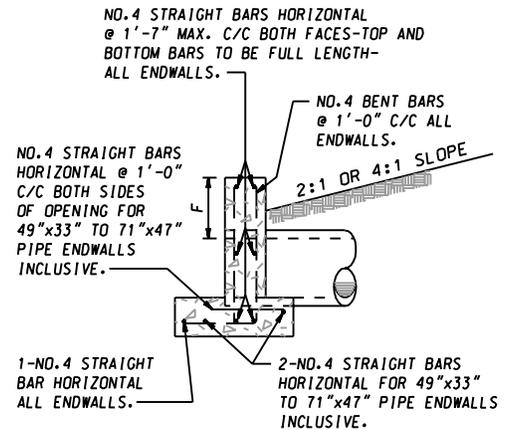
PLAN



DISPOSITION OF BARS DETAIL



ELEVATION



SECTION A-A

QUANTITIES FOR ESTIMATING PURPOSES ONLY

OPENING		DIMENSIONS							QUANTITIES	
D	AREA	A	B	C	E	F	H	L	CONC.	STEEL
INCHES	SO. FT.								C. Y.	LBS.
17X13	1.23	9"	6"	6"	1'-9"	9"	1'-10"	6'-3"	0.54	38
21X15	1.77	9"	6"	6"	1'-9"	9"	2'-0"	9'-6"	0.98	56
24X18	2.40	9"	6"	6"	1'-9"	9"	2'-3"	9'-6"	0.96	55
28X20	3.14	9"	6"	6"	1'-9"	9"	2'-5"	9'-6"	0.96	55
35X24	4.91	9"	14"	6"	2'-5"	12"	2'-9"	13'-8"	1.98	96
42X29	7.07	9"	14"	6"	2'-5"	12"	3'-2"	13'-8"	1.92	95
49X33	9.62	12"	16"	10"	3'-2"	12"	3'-9"	17'-11"	4.34	186
57X38	12.57	12"	16"	10"	3'-2"	12"	4'-2"	17'-11"	4.73	186
64X43	15.90	12"	20"	12"	3'-8"	12"	4'-7"	21'-9"	6.27	243
71X47	19.64	12"	20"	12"	3'-8"	12"	4'-11"	21'-9"	6.05	243

'S' DISTANCES

4" FOR 17" x 13" TO 24" x 18" INCLUSIVE.
 6" FOR 28" x 20" TO 42" x 29" INCLUSIVE.
 8" FOR 49" x 33" TO 71" x 47" INCLUSIVE.

GENERAL NOTES

SPECIFICATIONS: LATEST S.H.A.
 CONCRETE SHALL BE MIX NO. 2
 REINFORCING: DEFORMED STEEL BARS NO. 4
 CHAMFER: ALL EXPOSED EDGES 1"x1" OR AS DIRECTED.

SPECIFICATION 305 CATEGORY CODE ITEMS

APPROVED *Kirk G. McCall*
 DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT

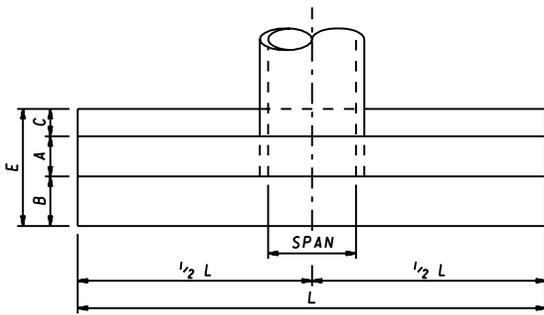


APPROVAL • SHA REVISIONS	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
APPROVAL 8-28-86	APPROVAL 12-10-86
REVISED 10-1-01	REVISED
REVISED	REVISED
REVISED	REVISED

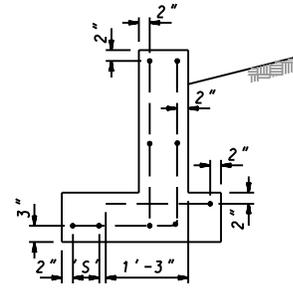
Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
 STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

STANDARD TYPE C ENDWALL
METAL PIPE ARCH

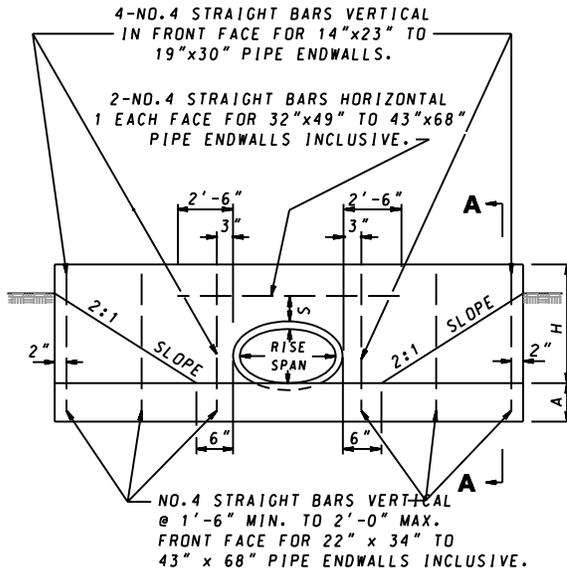
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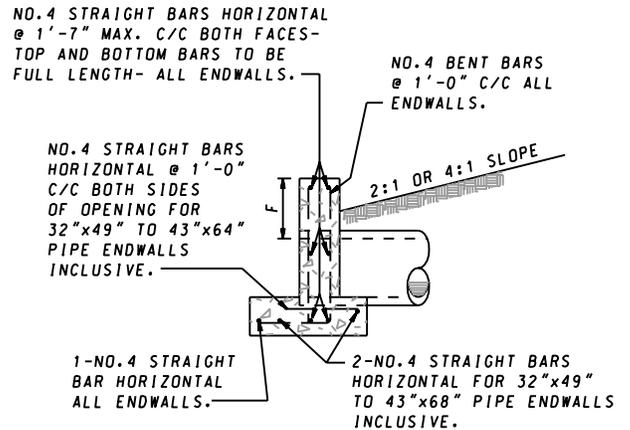
PLAN



DISPOSITION OF BARS DETAIL



ELEVATION



SECTION A-A

QUANTITIES FOR ESTIMATING PURPOSES ONLY

OPENING		DIMENSIONS							QUANTITIES	
D	AREA	A	B	C	E	F	H	L	CONC. C.Y.	STEEL LBS.
RISE x SPAN INCHES	SO. FT.									
14X23	1.8	9"	8"	6"	1'-11"	12"	2'-2"	8'-7"	0.88	56
19X30	3.3	9"	8"	6"	1'-11"	12"	2'-6"	10'-6"	1.15	63
22X34	4.1	9"	14"	6"	2'-5"	13"	2'-11"	12'-6"	1.74	100
24X38	5.1	9"	14"	6"	2'-5"	13"	3'-1"	13'-6"	1.92	116
27X42	6.3	9"	14"	6"	2'-5"	13"	3'-4"	14'-10"	2.19	124
29X45	7.4	9"	14"	10"	2'-9"	14"	3'-7"	16'-0"	2.61	141
32X49	8.8	12"	16"	10"	3'-2"	14"	3'-10"	17'-0"	4.08	202
34X53	10.2	12"	16"	10"	3'-2"	14"	4'-0"	18'-0"	4.40	210
38X60	12.9	12"	16"	10"	3'-2"	15"	4'-5"	20'-4"	5.23	266
43X68	16.6	12"	20"	12"	3'-8"	15"	4'-10"	22'-8"	6.52	307

'S' DISTANCES

6" FOR 14" x 23" TO 27" x 42" INCLUSIVE.
8" FOR 29" x 45" TO 43" x 68" INCLUSIVE.

GENERAL NOTES

SPECIFICATIONS: LATEST S.H.A.
CONCRETE: SEE S.H.A. SPECIFICATIONS
REINFORCEMENT: DEFORMED STEEL BARS NO.4
CHAMFER: ALL EXPOSED EDGES 1"x1" OR AS DIRECTED.

SPECIFICATION **305** CATEGORY CODE ITEMS

APPROVED *Kirk G. McCall*
DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT

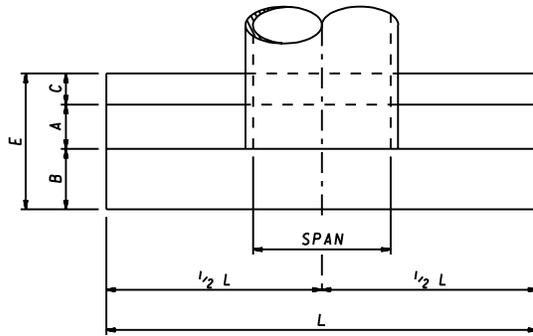
APPROVAL • SHA REVISIONS	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
APPROVAL 10-1-01	APPROVAL 9-27-01
REVISED 8-12-02	REVISED
REVISED	REVISED
REVISED	REVISED

SHA State Highway Administration

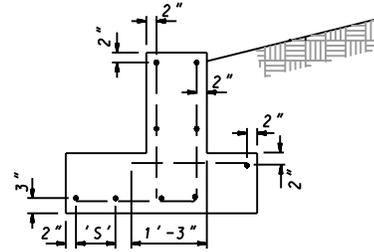
Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

STANDARD TYPE C ENDWALL
HORIZONTAL ELLIPTICAL CONCRETE PIPE

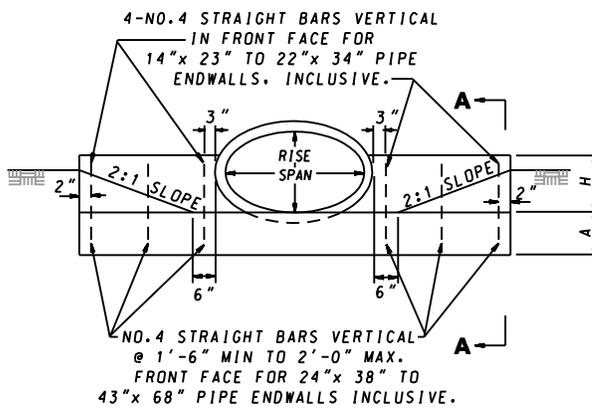
STANDARD NO. MD 355.02



PLAN



DISPOSITION OF BARS DETAIL



ELEVATION

NO.4 STRAIGHT BARS HORIZONTAL @ 1'-7" MAX C/C BOTH FACES- BOTTOM BARS TO BE FULL LENGTH- ALL ENDWALLS.

NO.4 STRAIGHT BARS HORIZONTAL @ 1'-0" C/C BOTH SIDES OF OPENING FOR 32"x49" TO 43"x68" PIPE ENDWALLS INCLUSIVE.

1-NO.4 STRAIGHT BAR HORIZONTAL ALL ENDWALLS.

2-NO.4 STRAIGHT BARS HORIZONTAL FOR 32"x49" TO 43"x68" PIPE ENDWALLS INCLUSIVE.

SECTION A-A

QUANTITIES FOR ESTIMATING PURPOSES ONLY

OPENING		DIMENSIONS						QUANTITIES	
RISE x SPAN	AREA	A	B	C	E	H	L	CONC. C. Y.	STEEL LBS.
INCHES	SO. FT								
14X23	1.8	9"	8"	6"	1'-11"	1'-0"	4'-11"	.42	25
19X30	3.3	9"	8"	6"	1'-11"	1'-2"	6'-2"	.55	32
22X34	4.1	9"	14"	6"	2'-5"	1'-5"	7'-6"	.68	38
24X38	5.1	12"	16"	10"	3'-2"	1'-6"	8'-2"	1.22	51
27X42	6.3	12"	16"	10"	3'-2"	1'-8"	9'-2"	1.41	57
29X45	7.4	12"	16"	10"	3'-2"	1'-9"	9'-9"	1.50	65
32X49	8.8	12"	16"	10"	3'-2"	1'-11"	10'-9"	1.70	94
34X53	10.2	12"	16"	10"	3'-2"	2'-0"	11'-5"	1.81	98
38X60	12.9	12"	16"	12"	3'-4"	2'-1"	12'-4"	2.00	103
43X68	16.6	12"	20"	12"	3'-8"	2'-4"	13'-4"	2.35	111

'S' DISTANCES

6" FOR 14"x23" TO 27"x42" PIPES INCLUSIVE.
8" FOR 29"x45" TO 43"x68" PIPES INCLUSIVE.

GENERAL NOTES

SPECIFICATIONS: LATEST S.H.A.
CONCRETE: SEE S.H.A. SPECIFICATIONS.
REINFORCEMENT: DEFORMED STEEL BARS NO.4
CHAMFER: ALL EXPOSED EDGES 1"x1" OR AS DIRECTED.

SPECIFICATION 305	CATEGORY CODE ITEMS	
APPROVED <i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT		
	APPROVAL • SHA REVISIONS	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
	APPROVAL 10-1-01	APPROVAL 9-27-01
	REVISED 8-12-02	REVISED
	REVISED	REVISED
	REVISED	REVISED

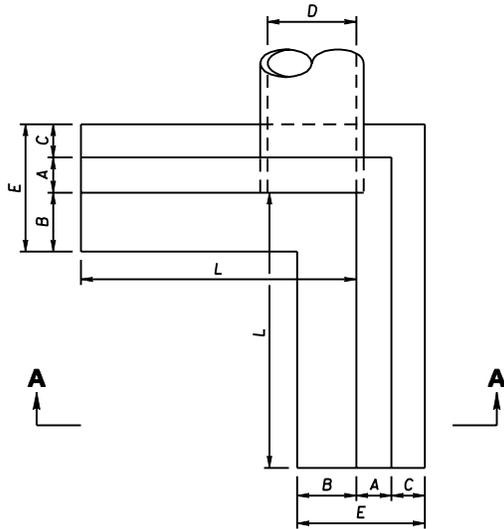
Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

STANDARD END SUPPORT WALL
HORIZONTAL ELLIPTICAL CONCRETE PIPE

STANDARD NO.

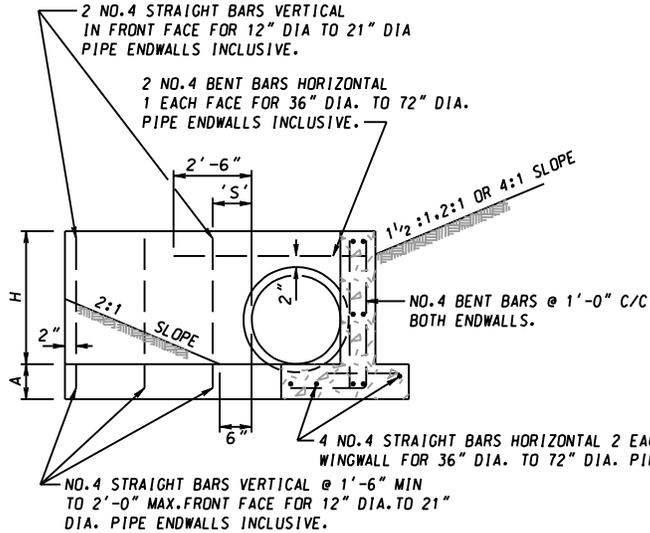
MD 355.03

QUANTITIES FOR ESTIMATING PURPOSES ONLY



PLAN

OPENING		DIMENSIONS						QUANTITIES	
D	AREA	A	B	C	E	H	L	CONC. C.Y.	STEEL LBS.
INCHES	SQ.FT								
12	0.79	9"	6"	6"	1'-9"	1'-9"	3'-6"	0.76	55
15	1.23	9"	6"	6"	1'-9"	2'-0"	4'-3"	0.99	61
18	1.77	9"	6"	6"	1'-9"	2'-3"	5'-0"	1.17	68
21	2.40	9"	6"	6"	1'-9"	2'-6"	5'-9"	1.38	77
24	3.14	9"	14"	6"	2'-5"	2'-9"	6'-6"	1.84	106
27	3.98	9"	14"	6"	2'-5"	3'-0"	7'-3"	2.11	115
30	4.91	9"	14"	6"	2'-5"	3'-6"	8'-0"	2.57	140
33	5.94	9"	14"	6"	2'-5"	3'-9"	8'-9"	2.92	148
36	7.07	12"	16"	10'	3'-2"	4'-0"	9'-6"	4.99	235
42	9.62	12"	16"	10"	3'-2"	4'-6"	11'-0"	6.12	303
48	12.57	12"	16"	10"	3'-2"	5'-0"	12'-6"	7.34	341
54	15.90	12"	20"	12"	3'-8"	5'-6"	14'-0"	9.17	438
60	19.64	12"	20"	12"	3'-8"	6'-0"	15'-6"	10.86	496
72	28.27	12"	20"	12"	3'-8"	7'-0"	17'-0"	12.69	597



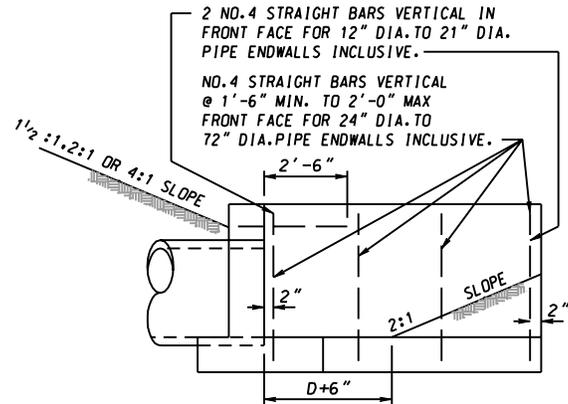
SECTION A-A

'S' DISTANCES

- 4" FOR 12" DIA. TO 21" DIA. PIPES INCLUSIVE.
- 6" FOR 24" DIA. TO 36" DIA. PIPES INCLUSIVE.
- 8" FOR 42" DIA. TO 72" DIA. PIPES INCLUSIVE.

GENERAL NOTES

- SPECIFICATIONS: LATEST S.H.A
- CONCRETE SHALL BE MIX NO.2
- REINFORCING: DEFORMED STEEL BARS - NO.4
- CHAMFER: ALL EXPOSED EDGES 1"x 1" OR AS DIRECTED.

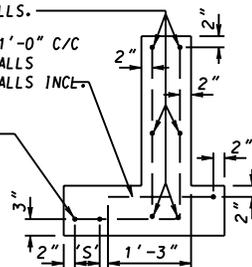


END VIEW

NO.4 STRAIGHT BARS HORIZONTAL @ 1'-7" MAX C/C BOTH FACES-LAP 1'-3" TOP & BOTTOM BARS @ CORNER- BOTH WINGWALLS-ALL ENDWALLS.

NO.4 STRAIGHT BARS HORIZONTAL @ 1'-0" C/C BOTH SIDES OF OPENING BOTH WINGWALLS FOR 36" DIA. TO 72" DIA. PIPE ENDWALLS INCL.

2 NO.4 STRAIGHT BARS HORIZONTAL 1 EACH WINGWALL- ALL ENDWALLS.



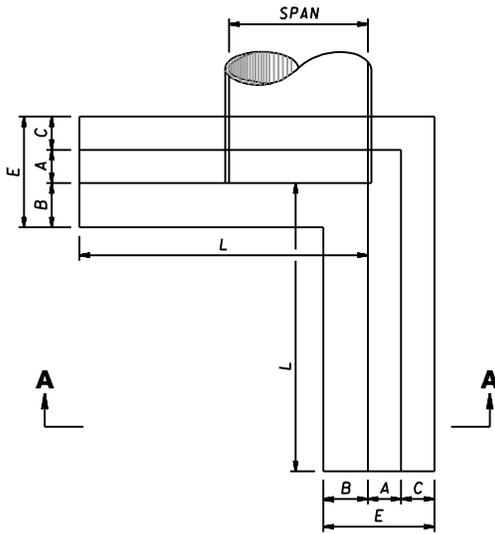
DISPOSITION OF BARS DETAIL

SPECIFICATION 305	CATEGORY CODE ITEMS
APPROVED <i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT	
	APPROVAL • SHA REVISIONS APPROVAL 8-28-86 REVISED 10-1-01 REVISED REVISED
	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION APPROVAL 12-12-86 REVISED REVISED

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
 STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

STANDARD TYPE E ENDWALL
METAL OR CONCRETE ROUND PIPE

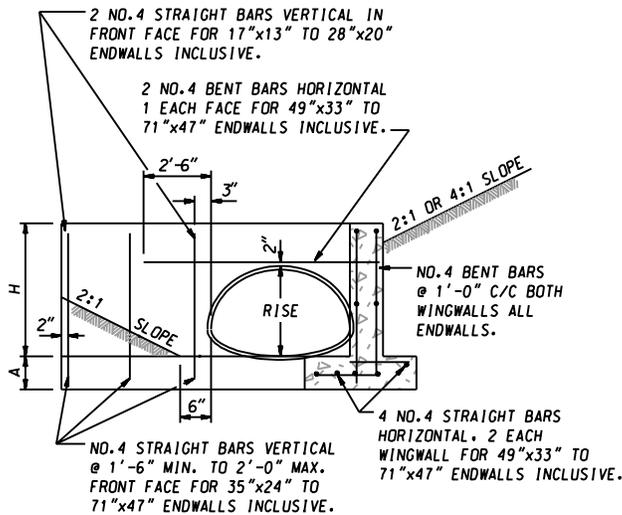
STANDARD NO. MD 356.01



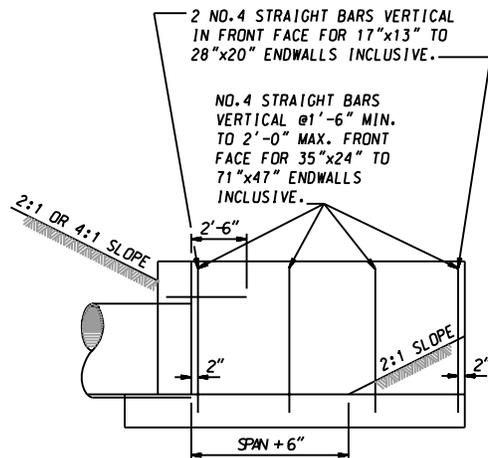
PLAN

QUANTITIES FOR ESTIMATING PURPOSES ONLY

OPENING		DIMENSIONS						QUANTITIES	
SIZE	AREA	A	B	C	E	H	L	CONC. C. Y.	STEEL LBS.
INCHES SxR	SO. FT.								
17x13	1.23	9"	6"	6"	1'-9"	1'-7"	3'-9"	.73	53
21x15	1.77	9"	6"	6"	1'-9"	2'-2"	5'-10"	1.30	75
24x18	2.40	9"	6"	6"	1'-9"	2'-2"	5'-10"	1.28	75
28x20	3.14	9"	6"	6"	1'-9"	2'-2"	5'-10"	1.26	74
35x24	4.91	9"	14"	6"	2'-5"	3'-2"	8'-6"	2.57	118
42x29	7.07	9"	14"	6"	2'-5"	3'-2"	8'-6"	2.52	117
49x33	9.62	12"	16"	10"	3'-2"	3'-11"	11'-3"	5.80	271
57x38	12.57	12"	16"	10"	3'-2"	3'-11"	11'-3"	5.65	261
64x43	15.90	12"	20"	12"	3'-8"	4'-8"	13'-9"	8.12	366
71x47	19.64	12"	20"	12"	3'-8"	4'-8"	13'-9"	7.98	355



SECTION A-A



END VIEW

'S' DISTANCES

4" FOR 17"x13" TO 24"x18" INCLUSIVE.
 6" FOR 28"x20" TO 42"x29" INCLUSIVE.
 8" FOR 49"x33" TO 71"x47" INCLUSIVE.

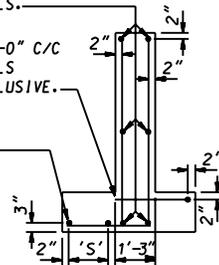
GENERAL NOTES

SPECIFICATIONS: LATEST S.H.A.
 CONCRETE SHALL BE MIX NO.2
 REINFORCING: DEFORMED STEEL BARS- NO. 4
 CHAMFER: ALL EXPOSED EDGES 1"x1" OR AS DIRECTED.

NO.4 STRAIGHT BARS HORIZONTAL @ 1'-7" MAX. C/C BOTH FACES- LAP 1'-3" TOP & BOTTOM BARS @ CORNER- BOTH WINGWALLS- ALL ENDWALLS.

NO.4 STRAIGHT BARS HORIZONTAL @ 1'-0" C/C BOTH SIDES OF OPENING BOTH WINGWALLS FOR 49"x33" TO 71"x47" ENDWALL INCLUSIVE.

2 NO.4 STRAIGHT BARS HORIZONTAL, 1 EACH WINGWALL- ALL ENDWALLS.



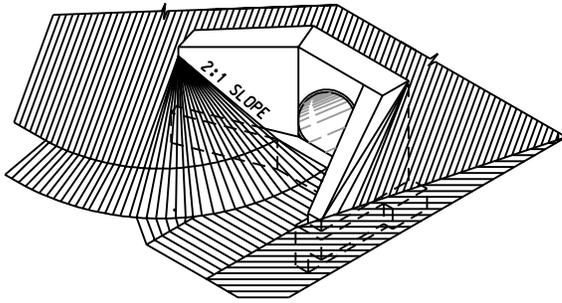
DISPOSITION OF BARS DETAIL

SPECIFICATION 305	CATEGORY CODE ITEMS	
APPROVED	<i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT	
	APPROVAL • SHA REVISIONS	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
	APPROVAL 8-28-86	APPROVAL 12-12-86
	REVISED 10-1-01	REVISED
	REVISED	REVISED
	REVISED	REVISED

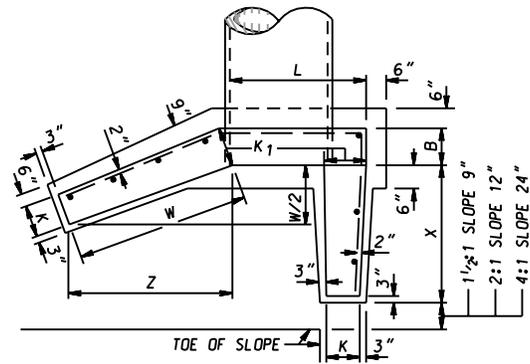
Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
 STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

STANDARD TYPE E ENDWALL
METAL PIPE ARCH

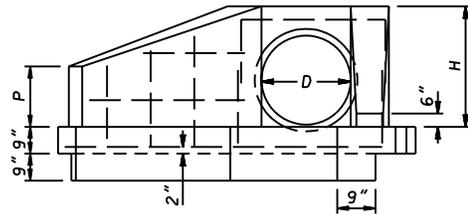
STANDARD NO. MD 357.01



ISOMETRIC VIEW



PLAN



ELEVATION

QUANTITIES FOR ESTIMATING PURPOSES ONLY

SLOPE 1 1/2 : 1												
OPENING		DIMENSIONS									QUANTITIES	
PIPE DIA.	AREA	ENDWALL			WINGS						1-ENDWALL 2-WINGS	
		L	B	H	W	X	Z	K1	K	P	CONC. C.Y.	STEEL LBS.
12"	0.79	1'-9"	9"	1'-8"	2'-0"	1'-3"	1'-9"	9"	7"	1'-4"	0.51	38
15"	1.23	2'-0"	9"	2'-0"	2'-4"	1'-9"	2'-0"	9"	7"	1'-5"	0.63	42
18"	1.77	2'-3"	9"	2'-3"	2'-8"	2'-1"	2'-4"	9"	8"	1'-6"	0.77	48
21"	2.40	2'-6"	9"	2'-7"	3'-1"	2'-6"	2'-8"	9"	8"	1'-9"	1.10	61
24"	3.14	3'-0"	12"	2'-11"	3'-6"	2'-11"	3'-0"	12"	11"	2'-1"	1.43	73
27"	3.98	3'-3"	12"	3'-3"	3'-11"	3'-4"	3'-4"	12"	11"	2'-3"	1.66	85
30"	4.91	3'-6"	12"	3'-6"	4'-4"	3'-9"	3'-9"	12"	11"	2'-4"	1.88	96
33"	5.94	3'-9"	12"	3'-9"	4'-8"	4'-1"	4'-0"	12"	11"	2'-6"	2.10	107
36"	7.07	4'-0"	12"	4'-0"	5'-0"	4'-6"	4'-4"	12"	11"	2'-7"	2.32	118
42"	9.62	4'-6"	12"	4'-7"	5'-9"	5'-4"	5'-0"	12"	11"	2'-11"	2.85	144
48"	12.57	5'-0"	12"	5'-1"	6'-4"	6'-2"	5'-6"	12"	11"	3'-3"	3.37	170

GENERAL NOTES

- SPECIFICATIONS: LATEST S.H.A.
- CONCRETE SHALL BE MIX NO. 2
- REINFORCING: DEFORMED STEEL BARS
- VERTICAL NO. 6 BARS 12" C/C
- HORIZONTAL NO. 4 BARS 12" C/C HOOKED ON ONE END
- CHAMFER: ALL EXPOSED EDGES 1"x1" OR AS DIRECTED.

SLOPE 2 : 1												
OPENING		DIMENSIONS									QUANTITIES	
PIPE DIA.	AREA	ENDWALL			WINGS						1-ENDWALL 2-WINGS	
		L	B	H	W	X	Z	K1	K	P	CONC. C.Y.	STEEL LBS.
12"	0.79	1'-9"	9"	1'-7"	2'-3"	1'-10"	2'-0"	9"	7"	1'-3"	0.55	38
15"	1.23	2'-0"	9"	1'-11"	2'-6"	2'-6"	2'-2"	9"	8"	1'-5"	0.73	46
18"	1.77	2'-3"	9"	2'-2"	3'-0"	3'-0"	2'-7"	9"	8"	1'-7"	0.89	57
21"	2.40	2'-6"	9"	2'-5"	3'-6"	3'-6"	3'-0"	9"	8"	1'-10"	1.27	70
24"	3.14	3'-0"	12"	2'-9"	4'-0"	4'-0"	3'-5"	12"	11"	2'-1"	1.64	82
27"	3.98	3'-3"	12"	3'-0"	4'-4"	4'-6"	3'-9"	12"	11"	2'-3"	1.89	98
30"	4.91	3'-6"	12"	3'-4"	4'-8"	5'-2"	4'-1"	12"	11"	2'-6"	2.14	113
33"	5.94	3'-9"	12"	3'-7"	5'-0"	5'-8"	4'-4"	12"	11"	2'-8"	2.31	123
36"	7.07	4'-0"	12"	3'-10"	5'-4"	6'-2"	4'-7"	12"	11"	2'-10"	2.48	132
42"	9.62	4'-6"	12"	4'-5"	6'-4"	7'-4"	5'-6"	12"	11"	3'-2"	3.30	163
48"	12.57	5'-0"	12"	4'-11"	7'-0"	8'-4"	6'-1"	12"	11"	3'-6"	3.85	193

SLOPE 4 : 1												
OPENING		DIMENSIONS									QUANTITIES	
PIPE DIA.	AREA	ENDWALL			WINGS						1-ENDWALL 2-WINGS	
		L	B	H	W	X	Z	K1	K	P	CONC. C.Y.	STEEL LBS.
12"	0.79	1'-9"	9"	1'-5"	2'-6"	3'-8"	2'-2"	9"	8"	1'-3"	0.81	45
15"	1.23	2'-0"	9"	1'-9"	3'-0"	5'-0"	2'-7"	9"	8"	1'-5"	1.04	68
18"	1.77	2'-3"	9"	2'-0"	3'-6"	6'-0"	3'-0"	9"	8"	1'-7"	1.26	74
21"	2.40	2'-6"	9"	2'-3"	4'-0"	7'-0"	3'-5"	9"	8"	1'-11"	1.75	89
24"	3.14	3'-0"	12"	2'-6"	4'-6"	8'-0"	3'-11"	12"	11"	2'-2"	2.23	104
27"	3.98	3'-3"	12"	2'-9"	5'-0"	9'-2"	4'-4"	12"	11"	2'-4"	2.64	126
30"	4.91	3'-6"	12"	3'-1"	5'-6"	10'-4"	4'-9"	12"	11"	2'-7"	3.04	147
33"	5.94	3'-9"	12"	3'-4"	6'-0"	11'-4"	5'-2"	12"	11"	2'-9"	3.40	164
36"	7.07	4'-0"	12"	3'-7"	6'-6"	12'-4"	5'-8"	12"	11"	3'-0"	3.75	180
42"	9.62	4'-6"	12"	4'-2"	7'-6"	14'-8"	6'-6"	12"	11"	3'-5"	4.67	218
48"	12.57	5'-0"	12"	4'-8"	8'-3"	16'-8"	7'-2"	12"	11"	3'-10"	5.57	277

SPECIFICATION 305 CATEGORY CODE ITEMS

APPROVED *Kirk G. McCall*
DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT

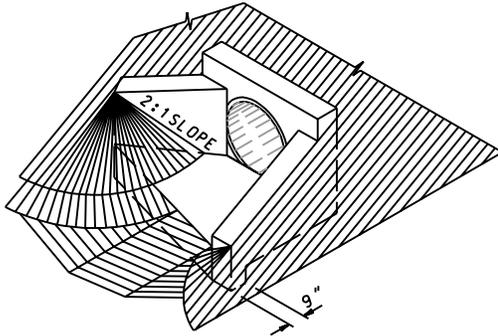
APPROVAL • SHA REVISIONS	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
APPROVAL 8-28-86	APPROVAL 12-12-86
REVISED 10-1-01	REVISED
REVISED	REVISED
REVISED	REVISED

SHA State Highway Administration

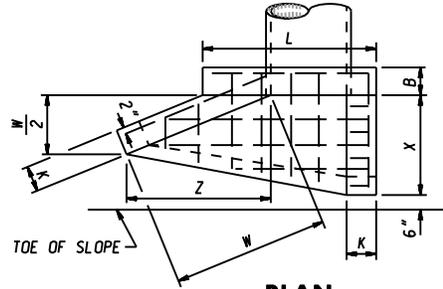
Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

STANDARD TYPE F ENDWALL
METAL OR CONCRETE ROUND PIPE

STANDARD NO. MD 358.01



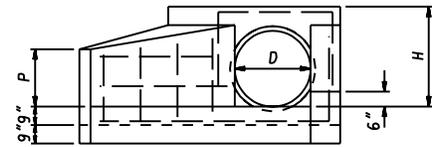
ISOMETRIC VIEW



PLAN

QUANTITIES FOR ESTIMATING PURPOSES ONLY

SLOPE: 1 1/2:1											
OPENING		DIMENSIONS							QUANTITIES		
PIPE DIA. D	AREA SQ. FT.	ENDWALL			WINGS				1-ENDWALL 2-WINGS		
		L	B	H	W	X	Z	K	P	CONC. CU. YDS.	STEEL LBS.
12"	0.79	3'-3"	9"	1'-8"	1'-11"	1'-3"	1'-8"	9"	1'-0"	0.47	33
15"	1.23	3'-6"	9"	2'-0"	2'-5"	1'-8"	2'-1"	9"	1'-2"	0.61	50
18"	1.78	3'-9"	9"	2'-3"	2'-8"	2'-1"	2'-4"	9"	1'-4"	0.75	53
21"	2.40	4'-0"	9"	2'-7"	3'-2"	2'-6"	2'-9"	9"	1'-6"	1.10	71
24"	3.14	5'-0"	12"	2'-11"	3'-5"	2'-11"	2'-11"	12"	1'-9"	1.44	89
27"	3.98	5'-3"	12"	3'-3"	3'-10"	3'-3"	3'-4"	12"	1'-11"	1.69	101
30"	4.91	5'-6"	12"	3'-6"	4'-2"	3'-8"	3'-7"	12"	2'-1"	1.93	112
33"	5.94	5'-9"	12"	3'-9"	4'-6"	4'-3"	3'-11"	12"	2'-3"	2.22	133
36"	7.07	6'-0"	12"	4'-0"	4'-10"	4'-6"	4'-2"	12"	2'-4"	2.51	154
42"	9.62	6'-6"	12"	4'-7"	5'-7"	5'-4"	4'-10"	12"	2'-8"	3.20	189
48"	12.57	7'-0"	12"	5'-1"	6'-3"	6'-2"	5'-5"	12"	2'-11"	3.92	216



ELEVATION

GENERAL NOTES

- SPECIFICATIONS: LATEST S.H.A.
- CONCRETE SHALL BE MIX NO.2
- REINFORCING: DEFORMED STEEL BARS
- ENDWALLS: NO.6 BARS 12" C/C
- WINGWALLS: VERTICAL NO.6 BARS 12" C/C.
- 18" BEND ON ONE END
- HORIZONTAL NO.4 BARS 12" C/C
- 6" HOOK ON ONE END
- FLOOR: NO.4 BARS 12" C/C. 2 WAYS
- CHAMFER: ALL EXPOSED EDGES 1"x1" OR AS DIRECTED.

SLOPE: 2:1											
OPENING		DIMENSIONS							QUANTITIES		
PIPE DIA. D	AREA SQ. FT.	ENDWALL			WINGS				1-ENDWALL 2-WINGS		
		L	B	H	W	X	Z	K	P	CONC. CU. YDS.	STEEL LBS.
12"	0.79	3'-3"	9"	1'-7"	2'-1"	1'-10"	1'-10"	9"	1'-0"	0.53	37
15"	1.23	3'-6"	9"	1'-11"	2'-7"	2'-5"	2'-3"	9"	1'-3"	0.70	55
18"	1.78	3'-9"	9"	2'-2"	2'-11"	2'-11"	2'-6"	9"	1'-5"	0.82	68
21"	2.40	4'-0"	9"	2'-6"	3'-3"	3'-6"	2'-10"	9"	1'-7"	1.23	80
24"	3.14	5'-0"	12"	2'-9"	3'-7"	4'-0"	3'-1"	12"	1'-10"	1.63	92
27"	3.98	5'-3"	12"	3'-0"	4'-0"	4'-6"	3'-6"	12"	2'-0"	1.94	109
30"	4.91	5'-6"	12"	3'-4"	4'-5"	5'-1"	3'-10"	12"	2'-2"	2.24	125
33"	5.94	5'-9"	12"	3'-7"	4'-10"	5'-7"	4'-2"	12"	2'-4"	2.56	146
36"	7.07	6'-0"	12"	3'-10"	5'-2"	6'-2"	4'-6"	12"	2'-6"	2.88	166
42"	9.62	6'-6"	12"	4'-5"	6'-0"	7'-3"	5'-2"	12"	2'-10"	3.74	221
48"	12.57	7'-0"	12"	4'-11"	6'-9"	8'-4"	5'-10"	12"	3'-2"	4.61	262

SLOPE: 4:1											
OPENING		DIMENSIONS							QUANTITIES		
PIPE DIA. D	AREA SQ. FT.	ENDWALL			WINGS				1-ENDWALL 2-WINGS		
		L	B	H	W	X	Z	K	P	CONC. CU. YDS.	STEEL LBS.
12"	0.79	3'-3"	9"	1'-5"	2'-4"	4'-2"	2'-0"	9"	1'-2"	0.76	61
15"	1.23	3'-6"	9"	1'-9"	2'-11"	5'-3"	2'-6"	9"	1'-5"	1.03	81
18"	1.78	3'-9"	9"	2'-0"	3'-1"	6'-4"	2'-11"	9"	1'-7"	1.33	98
21"	2.40	4'-0"	9"	2'-3"	3'-7"	7'-5"	3'-1"	9"	1'-9"	1.89	130
24"	3.14	5'-0"	12"	2'-6"	4'-0"	8'-6"	3'-6"	12"	2'-0"	2.45	161
27"	3.98	5'-3"	12"	2'-9"	4'-6"	9'-7"	3'-11"	12"	2'-2"	2.95	193
30"	4.91	5'-6"	12"	3'-1"	5'-0"	10'-8"	4'-4"	12"	2'-5"	3.44	225
33"	5.94	5'-9"	12"	3'-4"	5'-6"	11'-9"	4'-9"	12"	2'-7"	4.02	236
36"	7.07	6'-0"	12"	3'-7"	5'-11"	12'-10"	5'-2"	12"	2'-10"	4.59	246
42"	9.62	6'-6"	12"	4'-2"	7'-0"	15'-0"	6'-1"	12"	3'-4"	5.98	367
48"	12.57	7'-0"	12"	4'-8"	7'-11"	17'-2"	6'-10"	12"	3'-9"	7.46	499

SPECIFICATION **305** CATEGORY CODE ITEMS

APPROVED *Kirk G. McCall*
DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT

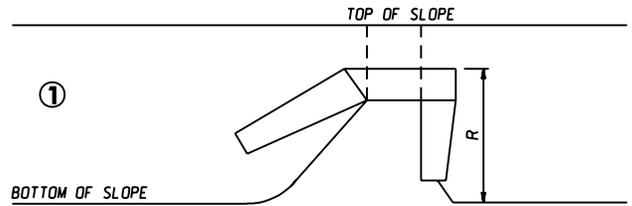


APPROVAL • SHA REVISIONS	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
APPROVAL 8-28-86	APPROVAL 12-12-86
REVISED 10-1-01	REVISED
REVISED	REVISED
REVISED	REVISED

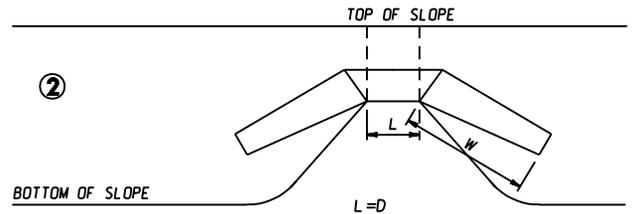
Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES
SPECIAL TYPE F ENDWALL
METAL OR CONCRETE ROUND PIPE

STANDARD NO. MD 358.02

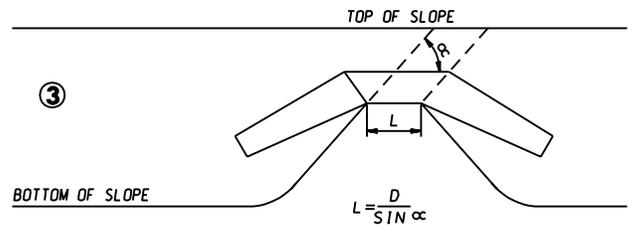
CASE ①. STANDARD TYPE "F" ENDWALL



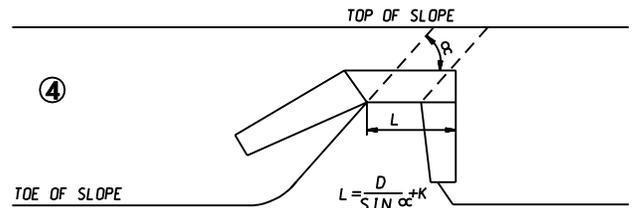
CASE ②. WHEN A WATER COURSE IS PERPENDICULAR OR ASKEW TO THE \mathcal{C} , AND THE SIDE DITCH DRAINAGE IS IN BOTH DIRECTIONS AND IT IS MORE ECONOMICAL OR BETTER PRACTICE TO PLACE THE PIPE AT RIGHT ANGLES TO THE \mathcal{C} , THE "F" ENDWALL CAN BE USED BY MAKING THE SHORTER WING EQUAL IN LENGTH AND ANGLE TO THE LONGER WING.



CASE ③. WHEN THE DRAINAGE CONDITIONS ARE SIMILAR TO CASE 2 BUT IT IS DESIRED TO PLACE THE PIPE ASKEW, THE "F" ENDWALL CAN BE USED. THE WINGS WILL BE PLACED THE SAME AS IN CASE 2, BUT THE LENGTH OF THE HEADWALL WILL BE INCREASED DUE TO THE INCREASED AREA OF THE PIPE.

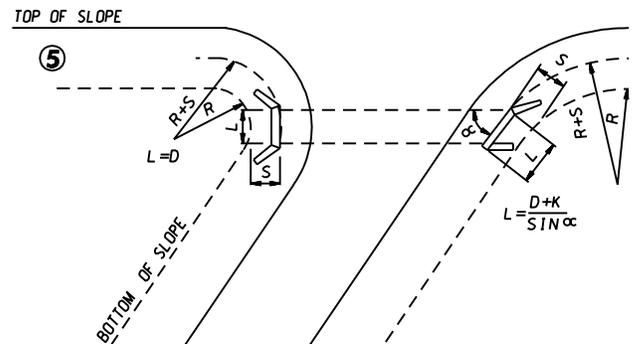


CASE ④. WHEN A PIPE IS PLACED ASKEW TO FOLLOW THE NATURAL WATER COURSE AND THE SIDE DITCH DRAINAGE IS IN ONE DIRECTION, THE "F" ENDWALL WILL BE USED WITH THE EXCEPTION THAT THE HEADWALL WILL BE LENGTHENED DUE TO THE INCREASED AREA OF THE PIPE.



CASE ⑤. WHEN AN ASKEWED ROAD OR ENTRANCE INTERSECTS THE MAIN LINE AND THE DRAINAGE IS PARALLEL TO THE MAIN LINE AND INTERSECTING ROAD OR ENTRANCE, THE "F" ENDWALL CAN BE USED AS FOLLOWS:

A. DETERMINE DIRECTION OF PIPE. B. COMPUTE "S", THEN A LINE WHICH IS PERPENDICULAR TO THE \mathcal{C} OF THE PIPE AND TANGENT TO THE ARC WHOSE RADIUS IS $R + S$ DETERMINES THE LOCATION OF THE HEADWALL. THE LENGTH OF THE WINGWALLS IS STANDARD BUT THE ANGLE IS SUCH, THAT THE END OF THE WINGWALL IS 6" FROM THE TOE OF THE SLOPE, AS SHOWN. "S" IS COMPUTED IN LIKE MANNER, AND THE LOCATION OF THE HEADWALL IS THE INTERSECTION OF THE ARC $R + S$, AND THE \mathcal{C} OF THE PIPE. THE WINGS ARE LOCATED AS DESCRIBED ABOVE, OR AS SHOWN.



SPECIFICATION	CATEGORY CODE ITEMS
APPROVED	<i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT
	APPROVAL • SHA REVISIONS
	APPROVAL 1-26-72
	REVISED 10-1-01
	REVISED
APPROVAL • FEDERAL HIGHWAY ADMINISTRATION	APPROVAL 3-23-56
REVISED	REVISED
REVISED	REVISED

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

STANDARD TYPE F ENDWALL MODIFICATIONS

STANDARD NO. MD 358.03

PIPE SIZE D	DIMENSIONS - SLOPE 1 1/2:1												LAG BOLTS FOR WING WALLS	
	L	X	L ₁	L ₂	W	L ₃	L ₄	Z	H	A	B	P	SPACING C/C	NO. REQ. EA. WALL
12"	4'-2"	1'-5"			1'-11"	-	-	1'-8"	2'-9"	10"	2"	2'-1"	1'-7"	2
15"	4'-9"	1'-10"	-	-	2'-5"	-	-	2'-1"	3'-0"	1'-1"	4"	2'-2"	1'-10"	2
18"	5'-0"	2'-3"	-	-	2'-8"	-	-	2'-4"	3'-4"	1'-5"	5"	2'-5"	2'-2"	2
21"	5'-3"	2'-8"	-	-	2'-10"	-	-	2'-7"	3'-7"	1'-8"	6"	2'-7"	2'-5"	2
24"	5'-7"	3'-1"	-	-	3'-5"	-	-	2'-11"	3'-10"	1'-11"	8"	2'-8"	1'-4"	3
27"	5'-10"	3'-5"	-	-	3'-11"	-	-	3'-5"	4'-1"	2'-2"	10"	2'-9"	1'-5 1/2"	3
30"	6'-2"	3'-10"	1'-3"	4'-0"	4'-2"	1'-5"	3'-0"	3'-7"	4'-5"	2'-6"	11"	3'-0"	1'-7 1/2"	3
33"	6'-5"	4'-4"	1'-9"	4'-0"	4'-7"	1'-10"	3'-0"	3'-11"	4'-8"	2'-9"	1'-0"	3'-2"	1'-9"	3
36"	6'-8"	4'-8"	2'-1"	4'-0"	4'-10"	2'-1"	3'-0"	4'-2"	4'-11"	3'-0"	1'-2"	3'-3"	1'-10 1/2"	3
42"	7'-4"	5'-6"	2'-11"	4'-0"	5'-7"	2'-10"	3'-0"	4'-10"	5'-6"	3'-7"	1'-5"	3'-7"	2'-2"	3
48"	8'-0"	6'-4"	3'-9"	4'-0"	6'-3"	3'-6"	3'-0"	5'-5"	6'-0"	4'-1"	1'-8"	3'-10"	2'-5"	3

PIPE SIZE D	DIMENSIONS - SLOPE 2:1												LAG BOLTS FOR WING WALLS	
	L	X	L ₁	L ₂	W	L ₃	L ₄	Z	H	A	B	P	SPACING C/C	NO. REQ. EA. WALL
12"	3'-3"	2'-0"	-	-	2'-1"	-	-	1'-10"	2'-9"	10"	1"	2'-2"	1'-7"	2
15"	3'-6"	2'-7"	-	-	2'-7"	-	-	2'-3"	3'-0"	1'-1"	3"	2'-3"	1'-10"	2
18"	3'-9"	3'-1"	-	-	2'-11"	-	-	2'-6"	3'-4"	1'-5"	4"	2'-6"	2'-2"	2
21"	4'-0"	3'-7"	-	-	3'-3"	-	-	2'-10"	3'-7"	1'-8"	5"	2'-8"	2'-5"	2
24"	5'-0"	4'-2"	1'-7"	4'-0"	3'-7"	-	-	3'-1"	3'-10"	1'-11"	6"	2'-10"	1'-4"	3
27"	5'-3"	4'-8"	2'-1"	4'-0"	4'-1"	1'-4"	3'-0"	3'-6"	4'-1"	2'-2"	8"	2'-11"	1'-5 1/2"	3
30"	5'-6"	5'-3"	2'-8"	4'-0"	4'-5"	1'-8"	3'-0"	3'-10"	4'-5"	2'-6"	9"	3'-2"	1'-7 1/2"	3
33"	5'-9"	5'-9"	3'-2"	4'-0"	4'-10"	2'-1"	3'-0"	4'-2"	4'-8"	2'-9"	11"	3'-3"	1'-9"	3
36"	6'-0"	6'-4"	3'-9"	4'-0"	5'-2"	2'-5"	3'-0"	4'-6"	4'-11"	3'-0"	1'-0"	3'-5"	1'-10 1/2"	3
42"	6'-6"	7'-5"	4'-10"	4'-0"	6'-0"	3'-3"	3'-0"	5'-2"	5'-6"	3'-7"	1'-3"	3'-9"	2'-2"	3
48"	7'-0"	8'-6"	5'-11"	4'-0"	6'-9"	4'-0"	3'-0"	5'-10"	6'-0"	4'-1"	1'-6"	4'-0"	2'-5"	3

PIPE SIZE D	DIMENSIONS - SLOPE 4:1												LAG BOLTS FOR WING WALLS	
	L	X	L ₁	L ₂	W	L ₃	L ₄	Z	H	A	B	P	SPACING C/C	NO. REQ. EA. WALL
12"	3'-3"	4'-4"	1'-9"	4'-0"	2'-4"	-	-	2'-0"	2'-9"	10"	1"	2'-2"	1'-7"	2
15"	3'-6"	5'-5"	2'-10"	4'-0"	2'-11"	-	-	2'-6"	3'-0"	1'-1"	2 1/2"	2'-5 1/2"	1'-10"	2
18"	3'-9"	6'-6"	3'-11"	4'-0"	3'-4"	-	-	2'-11"	3'-4"	1'-5"	3"	2'-7"	2'-2"	2
21"	4'-4"	7'-7"	5'-0"	4'-0"	3'-7"	-	-	3'-1"	3'-7"	1'-8"	4"	2'-9"	2'-5"	2
24"	5'-0"	8'-8"	6'-1"	4'-0"	4'-0"	1'-3"	3'-0"	3'-6"	3'-10"	1'-11"	4 1/2"	2'-11 1/2"	1'-4"	3
27"	5'-3"	9'-4"	6'-9"	4'-0"	4'-7"	1'-10"	3'-0"	3'-6"	4'-1"	2'-2"	6"	3'-1"	1'-5 1/2"	3
30"	5'-6"	10'-0"	7'-5"	4'-0"	5'-0"	2'-3"	3'-0"	4'-4"	4'-5"	2'-6"	7"	3'-4"	1'-7 1/2"	3
33"	5'-9"	11'-6"	8'-11"	4'-0"	5'-6"	2'-9"	3'-0"	4'-9"	4'-8"	2'-9"	8"	3'-6"	1'-9"	3
36"	6'-0"	13'-0"	10'-5"	4'-0"	5'-11"	3'-2"	3'-0"	5'-2"	4'-11"	3'-0"	9"	3'-8"	1'-10 1/2"	3
42"	6'-6"	15'-2"	12'-7"	4'-0"	7'-0"	4'-3"	3'-0"	6'-1"	5'-6"	3'-7"	1'-0"	4'-0"	2'-2"	3
48"	7'-0"	17'-4"	14'-9"	4'-0"	7'-11"	5'-2"	3'-0"	6'-10"	6'-0"	4'-1"	1'-2"	4'-4"	2'-5"	3

SPECIFICATION CATEGORY CODE ITEMS

APPROVED *Kirk G. McCall*
DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT

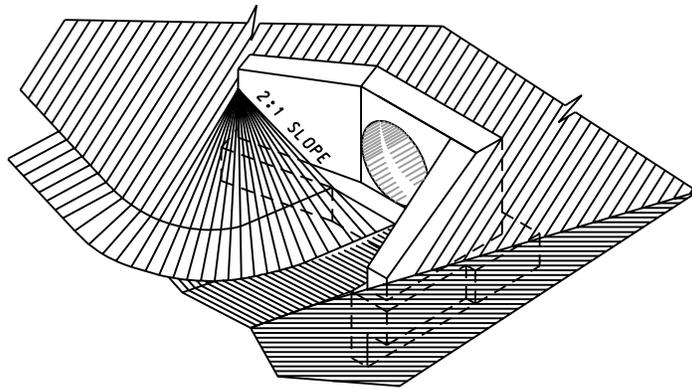


APPROVAL • SHA REVISIONS	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
APPROVAL 6-23-92	APPROVAL 6-23-92
REVISED 8-12-02	REVISED 6-20-95
REVISED	REVISED
REVISED	REVISED

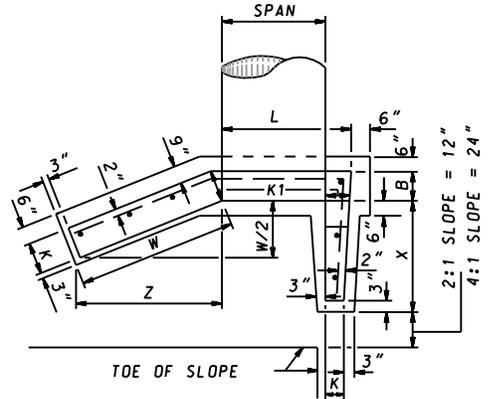
Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

PRECAST TYPE F ENDWALL DIMENSIONS
METAL OR CONCRETE ROUND PIPE

STANDARD NO. MD 358.05



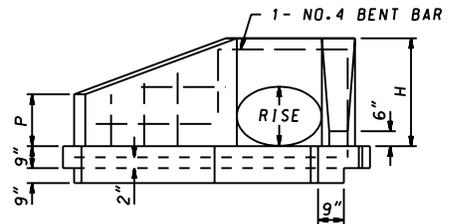
ISOMETRIC VIEW



PLAN

QUANTITIES FOR ESTIMATING PURPOSES ONLY

SLOPE 2:1												
OPENING		DIMENSIONS									QUANTITIES	
SIZE INCHES S x R	AREA SQ. FT.	ENDWALL			WINGS						1-ENDWALL 2-WINGS	
		L	B	H	W	X	Z	K ₁	K	P	CONC. CU. YDS.	STEEL LBS.
17"x13"	1.23	2'-2"	9"	1'-9"	2'-3"	1'-10"	2'-0"	9"	7"	1'-3"	0.60	39
21"x15"	1.77	2'-6"	9"	1'-9"	2'-3"	1'-10"	2'-0"	9"	7"	1'-3"	0.62	40
24"x18"	2.40	2'-9"	9"	2'-0"	2'-7"	2'-5"	2'-3"	9"	8"	1'-5"	0.80	45
28"x20"	3.14	3'-1"	9"	2'-4"	3'-0"	3'-0"	2'-7"	9"	8"	1'-7"	0.98	59
35"x24"	4.91	3'-11"	12"	2'-11"	4'-0"	4'-0"	3'-5"	12"	11"	2'-1"	1.77	85
42"x29"	7.07	4'-6"	12"	2'-11"	4'-0"	4'-0"	3'-5"	12"	11"	2'-1"	1.82	86
49"x33"	9.62	5'-1"	12"	3'-6"	4'-8"	5'-2"	4'-1"	12"	11"	2'-6"	2.35	117
57"x38"	12.57	5'-9"	12"	4'-0"	5'-4"	6'-2"	4'-7"	12"	11"	2'-10"	2.73	185



ELEVATION

SLOPE 4:1												
OPENING		DIMENSIONS									QUANTITIES	
SIZE INCHES S x R	AREA SQ. FT.	ENDWALL			WINGS						1-ENDWALL 2-WINGS	
		L	B	H	W	X	Z	K ₁	K	P	CONC. CU. YDS.	STEEL LBS.
17"x13"	1.23	2'-2"	9"	1'-7"	2'-6"	3'-8"	2'-2"	9"	8"	1'-3"	0.86	46
21"x15"	1.77	2'-6"	9"	1'-11"	3'-0"	5'-0"	2'-7"	9"	8"	1'-5"	1.10	69
24"x18"	2.40	2'-9"	9"	2'-1"	3'-3"	4'-0"	2'-10"	9"	8"	1'-6"	1.22	72
28"x20"	3.14	3'-1"	9"	2'-2"	3'-6"	6'-0"	3'-0"	9"	8"	1'-7"	1.34	76
35"x24"	4.91	3'-11"	12"	2'-8"	4'-6"	8'-0"	3'-11"	12"	11"	2'-2"	2.35	107
42"x29"	7.07	4'-6"	12"	3'-4"	5'-6"	10'-4"	4'-9"	12"	11"	2'-7"	3.20	150
49"x33"	9.62	5'-1"	12"	3'-3"	5'-6"	10'-4"	4'-9"	12"	11"	2'-7"	3.23	151
57"x38"	12.57	5'-9"	12"	3'-9"	6'-6"	12'-4"	5'-8"	12"	11"	3'-0"	3.98	185

GENERAL NOTES

SPECIFICATIONS: LATEST S.H.A.

CONCRETE SHALL BE MIX NO. 2

REINFORCING: DEFORMED STEEL BARS

VERTICAL NO. 6 BARS 12" C/C

HORIZONTAL NO. 4 BARS 12" C/C HOOKED

ON ONE END

CHAMFER:

ALL EXPOSED EDGES 1"x1" OR AS DIRECTED.

SPECIFICATION
305

CATEGORY CODE ITEMS

APPROVED

Kirk G. McCall
DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT



APPROVAL • SHA
REVISIONS
APPROVAL **8-28-86**
REVISOR **10-1-01**

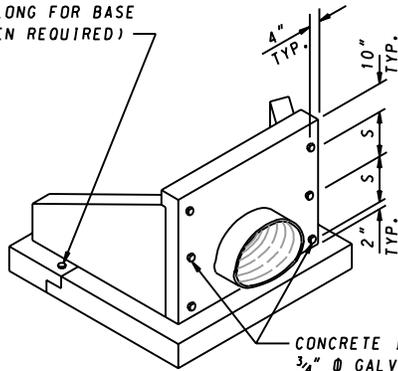
APPROVAL • FEDERAL
HIGHWAY ADMINISTRATION
APPROVAL **12-12-86**
REVISOR
REVISOR

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

**STANDARD TYPE F ENDWALL
METAL PIPE ARCH**

STANDARD NO. MD 359.01

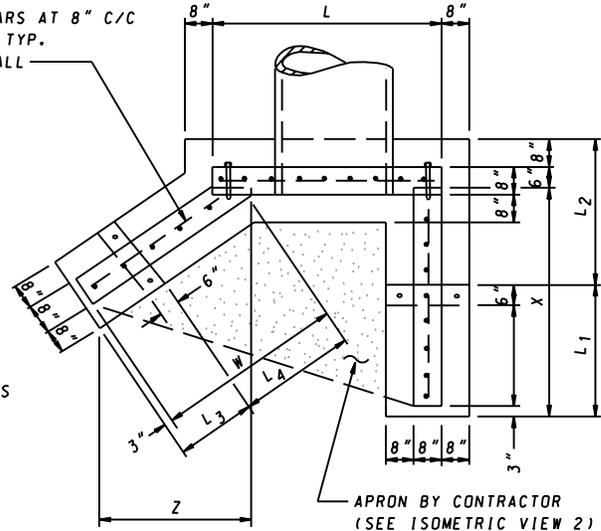
CONCRETE INSERTS WITH
3/4" Ø GALV. LAG BOLTS
8" LONG FOR BASE
(WHEN REQUIRED)



ISOMETRIC VIEW 1

CONCRETE INSERTS WITH
3/4" Ø GALV. LAG BOLTS
10" LONG FOR WING WALLS

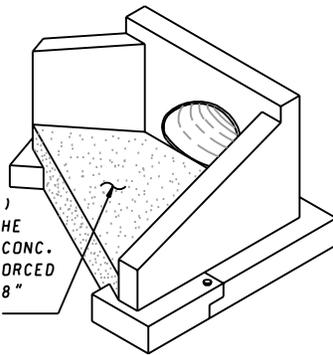
NO.5 BARS AT 8" C/C
2 WAYS TYP.
EACH WALL



APRON BY CONTRACTOR
(SEE ISOMETRIC VIEW 2)

PLAN

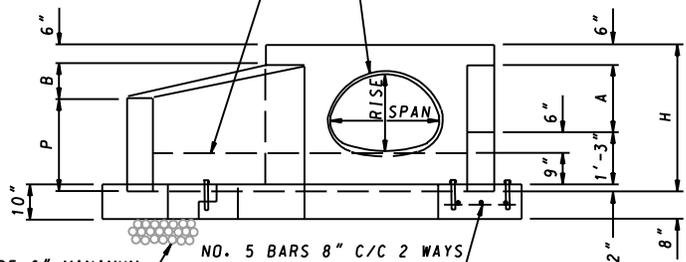
APRON (SHADED AREA)
CAST IN PLACE BY THE
CONTRACTOR, USING CONC.
MIX NO.2 AND REINFORCED
WITH NO.5 BARS AT 8"
C/C 2 WAYS, 2" CL.



ISOMETRIC VIEW 2

APRON BY CONTRACTOR
(SEE ISOMETRIC VIEW 2)

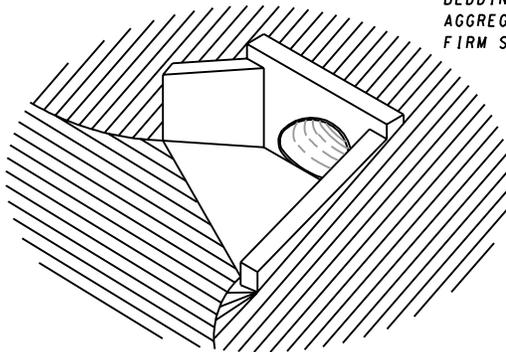
PIPE BY CONTRACTOR
OPENING BY MANUFACTURER



PROVIDE 6" MINIMUM
BEDDING OF NO.57
AGGREGATE ON
FIRM SUBGRADE

NO. 5 BARS 8" C/C 2 WAYS
TYP. EACH BASE PIECE

ELEVATION



ISOMETRIC VIEW 3

NOTES

1. THIS TYPE F ENDWALL SHALL NOT BE USED WITHIN THE CLEAR RECOVERY ZONE.
2. CONCRETE SHALL BE MIX NO. 6 (4500 PSI).
3. REINFORCEMENT SHALL BE DEFORMED BARS AS SHOWN OR WELDED WIRE FABRIC WITH AN EQUIVALENT AREA FOR SQUARE FOOT. DEFORMED BARS SHALL CONFORM TO ASTM A 615, GRADE 60. WELDED WIRE FABRIC SHALL CONFORM TO ASTM A 185 AND A 82.
4. SEE CHARTS ON STANDARD MD-359.03 FOR DIMENSIONS NOT SHOWN.
5. LIFT HOLES OR LIFT EYES SHALL BE PROVIDED FOR HANDLING.
6. EXCAVATION, BACKFILL, CONCRETE, REINFORCEMENT FOR APRON, AND NO.57 AGGREGATE WILL BE INCIDENTAL TO THE CONTRACT PRICE PER EACH FOR THE ENDWALL.
7. CHAMFER ALL EXPOSED EDGES 1" X 1" OR AS DIRECTED.

SPECIFICATION 305	CATEGORY CODE ITEMS
APPROVED	<i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT
	APPROVAL • SHA REVISIONS
	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
	APPROVAL 6-23-92
	REVISION 10-1-01
REVISION	REVISION 12-16-93
REVISION	REVISION
REVISION	REVISION

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

**PRECAST TYPE F ENDWALL
METAL PIPE ARCH**

STANDARD NO. MD 359.02

PIPE SIZE SxR	DIMENSIONS - SLOPE 2:1												LAG BOLTS FOR WING WALLS	
	L	X	L ₁	L ₂	W	L ₃	L ₄	Z	H	A	B	P	SPACING C/C	NO. REQ. EA. WALL
17" x 13"	3'-9"	2'-0"	-	-	2'-1"	-	-	1'-10"	2'-9"	10"	1"	2'-2"	1'-7"	2
21" x 15"	4'-2"	2'-0"	-	-	2'-1"	-	-	1'-10"	2'-9"	10"	1"	2'-2"	1'-7"	2
24" x 18"	4'-6"	3'-1"	-	-	2'-11"	-	-	2'-6"	3'-4"	10"	1"	2'-2"	2'-2"	2
28" x 20"	4'-9"	3'-1"	-	-	2'-11"	-	-	2'-6"	3'-4"	1'-5"	4"	2'-6"	2'-2"	2
35" x 24"	5'-7"	4'-2"	1'-7"	4'-0"	3'-7"	-	-	3'-1"	3'-10"	1'-11"	6"	2'-10"	1'-4"	3
42" x 29"	6'-2"	4'-2"	1'-7"	4'-0"	3'-7"	-	-	3'-1"	3'-10"	1'-11"	6"	2'-10"	1'-4"	3
49" x 33"	6'-8"	5'-3"	2'-8"	4'-0"	4'-5"	1'-8"	3'-0"	3'-10"	4'-5"	2'-6"	9"	3'-2"	1'-7 1/2"	3
57" x 38"	7'-4"	6'-4"	3'-9"	4'-0"	5'-2"	2'-5"	3'-0"	4'-6"	4'-11"	3'-0"	1'-0"	3'-5"	1'-10 1/2"	3

PIPE SIZE SxR	DIMENSIONS - SLOPE 2:1												LAG BOLTS FOR WING WALLS	
	L	X	L ₁	L ₂	W	L ₃	L ₄	Z	H	A	B	P	SPACING C/C	NO. REQ. EA. WALL
17" x 13"	3'-9"	4'-4"	1'-9"	4'-0"	2'-4"	-	-	2'-0"	2'-9"	10"	1"	2'-2"	1'-7"	2
21" x 15"	4'-2"	5'-5"	2'-10"	4'-0"	2'-11"	-	-	2'-6"	3'-0"	1'-1"	2 1/2"	2'-3 1/2"	1'-10"	2
24" x 18"	4'-6"	6'-6"	3'-11"	4'-0"	3'-1"	-	-	2'-11"	3'-4"	1'-5"	3"	2'-7"	2'-2"	2
28" x 20"	4'-9"	6'-6"	3'-11"	4'-0"	3'-1"	-	-	2'-11"	3'-4"	1'-5"	3"	2'-7"	2'-2"	2
35" x 24"	5'-7"	8'-8"	6'-1"	4'-0"	4'-0"	1'-3"	3'-0"	3'-6"	3'-10"	1'-11"	4 1/2"	2'-11 1/2"	1'-4"	3
42" x 29"	6'-2"	10'-10"	8'-8"	4'-0"	5'-0"	2'-3"	3'-0"	4'-4"	4'-5"	2'-6"	7"	3'-4"	1'-4"	3
49" x 33"	6'-8"	10'-10"	8'-8"	4'-0"	5'-0"	2'-3"	3'-0"	4'-4"	4'-5"	2'-6"	7"	3'-4"	1'-7 1/2"	3
57" x 38"	7'-4"	13'-0"	10'-5"	4'-0"	5'-11"	3'-2"	3'-0"	5'-2"	4'-11"	3'-0"	9"	3'-8"	1'-10 1/2"	3

SPECIFICATION CATEGORY CODE ITEMS

APPROVED *Kirk G. McCall*
DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT

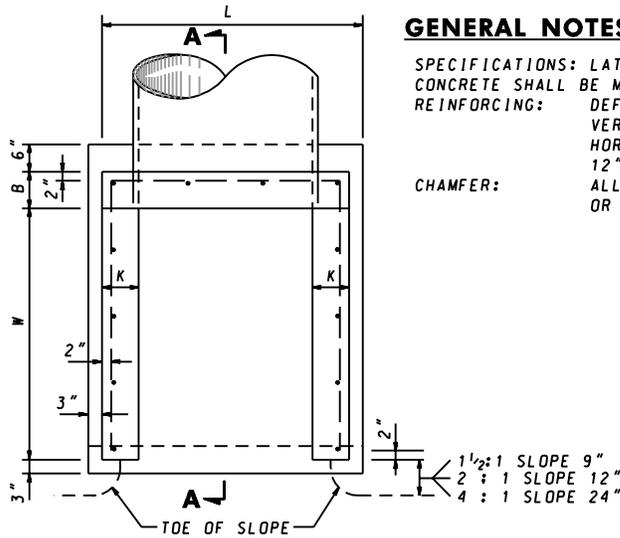


APPROVAL • SHA REVISIONS	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
APPROVAL 6-23-92	APPROVAL 6-23-92
REVISED 10-1-01	REVISED
REVISED	REVISED
REVISED	REVISED

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

PRECAST TYPE F ENDWALL DIMENSIONS
METAL PIPE ARCH

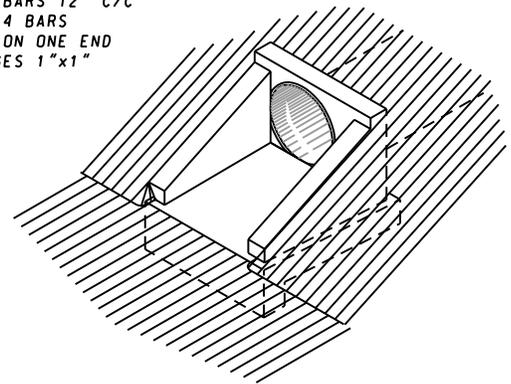
STANDARD NO. MD 359.03



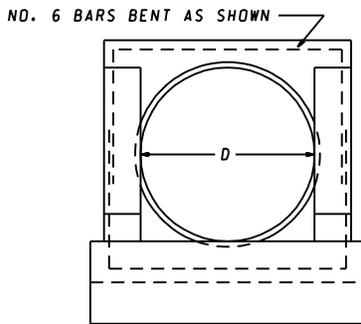
PLAN

GENERAL NOTES

SPECIFICATIONS: LATEST S.H.A.
 CONCRETE SHALL BE MIX NO.2
 REINFORCING: DEFORMED STEEL BARS
 VERTICAL NO. 6 BARS 12" C/C
 HORIZONTAL NO. 4 BARS
 12" C/C HOOKED ON ONE END
 CHAMFER: ALL EXPOSED EDGES 1"x1"
 OR AS DIRECTED.

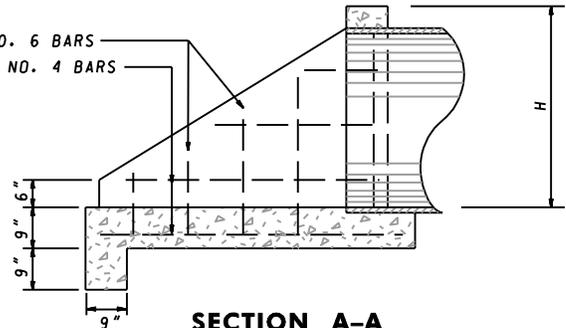


ISOMETRIC VIEW



ELEVATION

VERTICAL NO. 6 BARS
 HORIZONTAL NO. 4 BARS



SECTION A-A

OPENING		DIMENSIONS					QUANTITIES	
PIPE DIA. D	AREA SQ. FT.	ENDWALL			WING		CONC. C. Y.	STEEL LBS.
		L	B	H	W	K		
12"	0.79	2'-0"	9"	1'-8"	1'-0"	6"	.31	29
15"	1.23	2'-3"	9"	2'-0"	1'-5"	6"	.41	31
18"	1.77	2'-6"	9"	2'-3"	1'-10"	6"	.50	41
21"	2.40	2'-9"	9"	2'-6"	2'-3"	6"	.65	49
24"	3.14	3'-6"	12"	2'-11"	2'-9"	9"	1.05	53
27"	3.98	3'-9"	12"	3'-3"	3'-2"	9"	1.18	70
30"	4.91	4'-0"	12"	3'-6"	3'-7"	9"	1.43	73
33"	5.94	4'-3"	12"	3'-9"	4'-0"	9"	1.65	93
36"	7.07	4'-6"	12"	4'-0"	4'-4"	9"	1.86	104
42"	9.62	5'-6"	12"	4'-7"	5'-2"	12"	2.70	126
48"	12.57	6'-0"	12"	5'-1"	6'-0"	12"	3.15	155
54"	15.90	6'-6"	12"	5'-7"	6'-9"	12"	3.74	187
60"	19.64	7'-0"	12"	6'-1"	7'-7"	12"	4.52	218

OPENING		DIMENSIONS					QUANTITIES	
PIPE DIA. D	AREA SQ. FT.	ENDWALL			WING		CONC. C. Y.	STEEL LBS.
		L	B	H	W	K		
12"	0.79	2'-0"	9"	1'-7"	1'-4"	6"	.33	34
15"	1.23	2'-3"	9"	1'-11"	1'-11"	6"	.44	37
18"	1.77	2'-6"	9"	2'-2"	2'-5"	6"	.57	53
21"	2.40	2'-9"	9"	2'-5"	3'-0"	6"	.70	62
24"	3.14	3'-6"	12"	2'-9"	3'-8"	9"	1.16	71
27"	3.98	3'-9"	12"	3'-1"	4'-2"	9"	1.36	81
30"	4.91	4'-0"	12"	3'-4"	4'-9"	9"	1.54	91
33"	5.94	4'-3"	12"	3'-6"	5'-3"	9"	1.82	104
36"	7.07	4'-6"	12"	3'-10"	5'-10"	9"	2.03	116
42"	9.62	5'-6"	12"	4'-5"	6'-11"	12"	3.14	141
48"	12.57	6'-0"	12"	4'-11"	8'-0"	12"	3.90	174
54"	15.90	6'-6"	12"	5'-5"	9'-2"	12"	4.76	240
60"	19.64	7'-0"	12"	5'-11"	10'-2"	12"	5.64	306

QUANTITIES FOR ESTIMATING PURPOSES ONLY

SPECIFICATION 305	CATEGORY CODE ITEMS
APPROVED	<i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT
	APPROVAL • SHA REVISIONS
	APPROVAL 8-28-86
	REVISED 10-1-01
	REVISED
APPROVAL • FEDERAL HIGHWAY ADMINISTRATION	APPROVAL 12-12-86
REVISED	REVISED
REVISED	REVISED

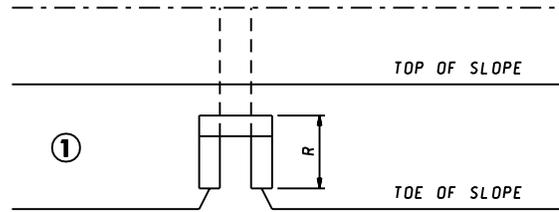
Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
 STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

STANDARD TYPE G ENDWALL
METAL OR CONCRETE ROUND PIPE

STANDARD NO. MD 360.01

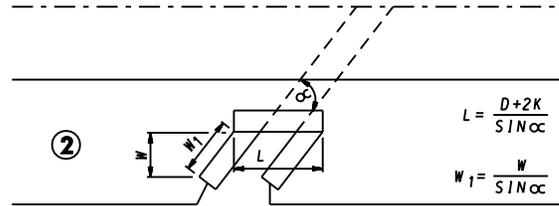
CASE ①

THIS CONDITION IS COVERED BY THE TYPE "G" ENDWALL.



CASE ②

WHEN A PIPE IS TO BE PLACED ASKEW TO FOLLOW THE NATURAL WATER COURSE THE STANDARD "G" ENDWALL SHOULD BE MODIFIED BY LENGTHENING THE HEADWALL TO ALLOW FOR THE INCREASED AREA OF THE PIPE DUE TO THE ASKEW AND THE WINGS LENGTHENED TO CARE FOR THE SLOPE.

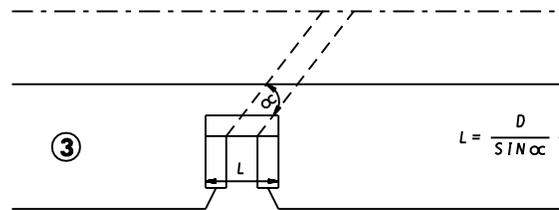


$$L = \frac{D+2K}{\sin \alpha}$$

$$W = \frac{W}{\sin \alpha}$$

CASE ③

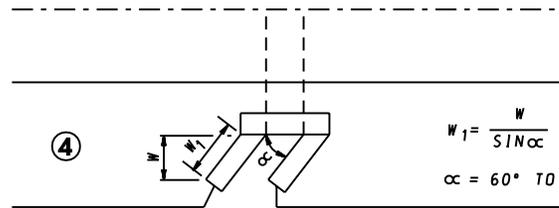
WHEN IT IS NOT PRACTICAL TO PLACE THE ENDWALL ON THE OUTLET END IN LINE WITH THE ENDWALL ON THE INLET END IT IS NECESSARY TO ASKEW THE PIPE. THIS REQUIRES THE LENGTHENING OF THE HEADWALL ONLY TO ALLOW FOR THE INCREASED AREA OF THE PIPE DUE TO THE ASKEW. THE LENGTH OF THE WINGS ARE STANDARD.



$$L = \frac{D}{\sin \alpha} + 2K$$

CASE ④

WHEN A WATER COURSE IS ASKEW AND IT IS MORE ECONOMICAL OR BETTER PRACTICE TO PLACE THE PIPE AT RIGHT ANGLES TO THE CENTERLINE AND RECUT THE OUTLET THE "G" ENDWALL CAN BE USED BY PLACING THE WINGS PARALLEL TO THE COURSE AND LENGTHENING THE WINGWALLS ONLY. THE HEADWALL REMAINS STANDARD.

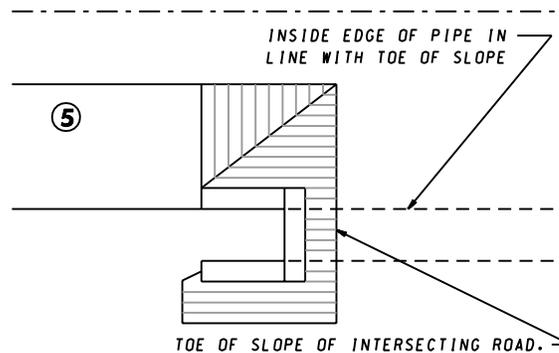


$$W = \frac{W}{\sin \alpha}$$

$$\alpha = 60^\circ \text{ TO } 90^\circ$$

CASE ⑤

THIS CONDITION APPLIES WHEN A ROAD OR ENTRANCE INTERSECTS AT RIGHT ANGLES AND THE WATER COURSE IS PERPENDICULAR TO THE INTERSECTING ROAD OR ENTRANCE THE STANDARD "G" ENDWALL CAN BE USED.

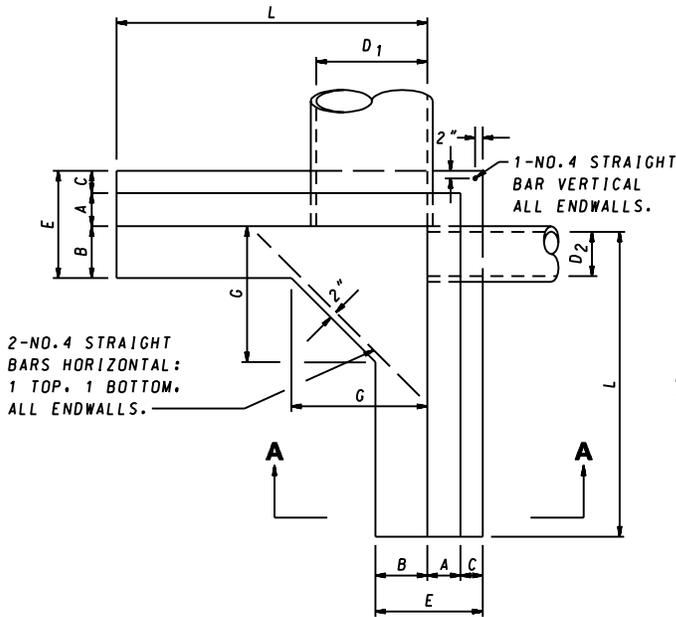


SPECIFICATION	CATEGORY CODE ITEMS
APPROVED	<i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT
	APPROVAL • SHA REVISIONS
	APPROVAL 1-26-72
	REVISED 10-1-01
	REVISED
APPROVAL • FEDERAL HIGHWAY ADMINISTRATION	APPROVAL 3-23-56
REVISED	REVISED
REVISED	REVISED
REVISED	REVISED

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
 STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

STANDARD TYPE G ENDWALL MODIFICATIONS

STANDARD NO. MD 360.02

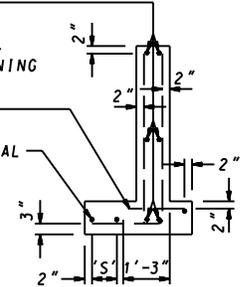


PLAN

NO.4 BARS HORIZONTAL @ 1'-7" MAX C/C BOTH FACES-LAP 1'-3" TOP AND BOTTOM BARS @ CORNER BOTH WINGWALLS ALL ENDWALLS.

NO.4 STRAIGHT BARS HORIZONTAL @ 1'-0" C/C BOTH SIDE OF OPENING FOR 36"DIA. TO 60"DIA. PIPE ENDWALLS INCLUSIVE.

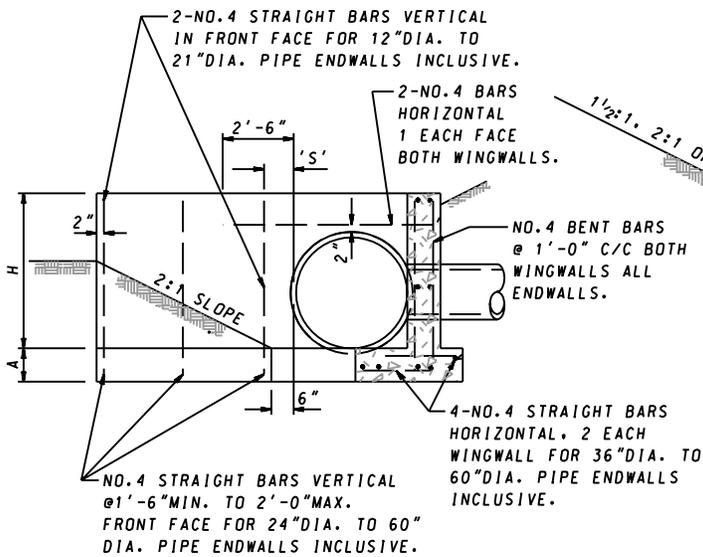
2-NO. 4 STRAIGHT BARS HORIZONTAL 1 EACH WINGWALL ALL ENDWALLS.



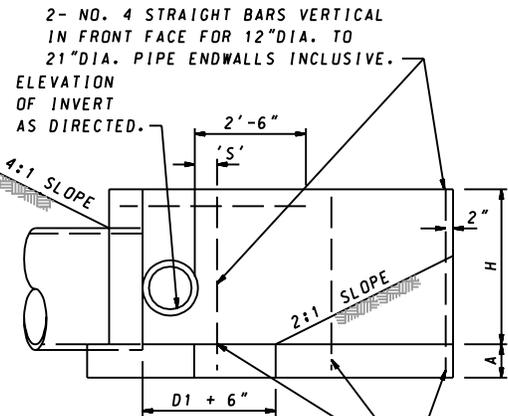
DISPOSITION OF BARS DETAIL

NOTE

FOR DIMENSIONS AND QUANTITIES SEE TABLES ON STANDARD MD 362.01-01



SECTION A-A



END VIEW

GENERAL NOTES

SPECIFICATIONS: LATEST S.H.A. CONCRETE SHALL BE MIX NO.2
 REINFORCING: DEFORMED STEEL BARS NO.4
 CHAMFER: ALL EXPOSED EDGES 1"x1" OR AS DIRECTED
 SOD: PLACE SOD, 3' WIDE, AROUND ENDWALL AS INDICATED ON THE PLANS.

'S' DISTANCE

4" FOR 12"DIA. TO 18"DIA. PIPES INCLUSIVE.
 6" FOR 21"DIA. TO 36"DIA. PIPES INCLUSIVE.
 8" FOR 42"DIA. TO 60"DIA. PIPES INCLUSIVE.

SPECIFICATION 305	CATEGORY CODE ITEMS
APPROVED <i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT	
	APPROVAL • SHA REVISIONS APPROVAL 8-28-86 REVISED 10-1-01
	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION APPROVAL 12-12-86 REVISED REVISED
	REVISED
	REVISED

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
 STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

STANDARD TYPE H ENDWALL
METAL OR CONCRETE ROUND PIPE

STANDARD NO. MD 362.01

QUANTITIES FOR ESTIMATING PURPOSES ONLY

D ₁	D ₂	A	B	C	E	H	L	G	QUANTITIES	
									CONC. C. Y.	STEEL LBS.
12"	12"	9"	6"	6"	1'-9"	1'-9"	3'-6"	1'-6"	0.72	62
15"	12"	9"	6"	6"	1'-9"	2'-0"	4'-3"	2'-0"	0.95	76
15"	15"	9"	6"	6"	1'-9"	2'-0"	4'-3"	2'-0"	0.94	76
18"	12"	9"	6"	6"	1'-9"	2'-3"	5'-0"	2'-3"	1.17	88
18"	15"	9"	6"	6"	1'-9"	2'-3"	5'-0"	2'-3"	1.15	85
18"	18"	9"	6"	6"	1'-9"	2'-3"	5'-0"	2'-3"	1.11	85
21"	12"	9"	14"	6"	2'-5"	2'-9"	6'-6"	3'-0"	1.88	124
21"	15"	9"	14"	6"	2'-5"	2'-9"	6'-6"	3'-0"	1.87	121
21"	18"	9"	14"	6"	2'-5"	2'-9"	6'-6"	3'-0"	1.86	121
21"	21"	9"	14"	6"	2'-5"	2'-9"	6'-6"	3'-0"	1.80	118
24"	12"	9"	14"	6"	2'-5"	2'-9"	6'-6"	3'-0"	1.86	118
24"	15"	9"	14"	6"	2'-5"	2'-9"	6'-6"	3'-0"	1.85	118
24"	18"	9"	14"	6"	2'-5"	2'-9"	6'-6"	3'-0"	1.84	113
24"	21"	9"	14"	6"	2'-5"	2'-9"	6'-6"	3'-0"	1.82	113
24"	24"	9"	14"	6"	2'-5"	2'-9"	6'-6"	3'-0"	1.80	113
27"	12"	9"	14"	6"	2'-5"	3'-6"	8'-0"	3'-9"	2.66	170
27"	15"	9"	14"	6"	2'-5"	3'-6"	8'-0"	3'-9"	2.65	170
27"	18"	9"	14"	6"	2'-5"	3'-6"	8'-0"	3'-9"	2.64	170
27"	21"	9"	14"	6"	2'-5"	3'-6"	8'-0"	3'-9"	2.62	170
27"	24"	9"	14"	6"	2'-5"	3'-6"	8'-0"	3'-9"	2.60	170
27"	27"	9"	14"	6"	2'-5"	3'-6"	8'-0"	3'-9"	2.57	170
30"	12"	9"	14"	6"	2'-5"	3'-6"	8'-0"	3'-9"	2.64	172
30"	15"	9"	14"	6"	2'-5"	3'-6"	8'-0"	3'-9"	2.63	171
30"	18"	9"	14"	6"	2'-5"	3'-6"	8'-0"	3'-9"	2.62	171
30"	21"	9"	14"	6"	2'-5"	3'-6"	8'-0"	3'-9"	2.60	170
30"	24"	9"	14"	6"	2'-5"	3'-6"	8'-0"	3'-9"	2.58	166
30"	27"	9"	14"	6"	2'-5"	3'-6"	8'-0"	3'-9"	2.55	169
30"	30"	9"	14"	6"	2'-5"	3'-6"	8'-0"	3'-9"	2.53	164
33"	12"	12"	16"	10"	3'-2"	4'-0"	9'-6"	4'-6"	5.20	271
33"	15"	12"	16"	10"	3'-2"	4'-0"	9'-6"	4'-6"	5.18	271
33"	18"	12"	16"	10"	3'-2"	4'-0"	9'-6"	4'-6"	5.16	271
33"	21"	12"	16"	10"	3'-2"	4'-0"	9'-6"	4'-6"	5.14	271
33"	24"	12"	16"	10"	3'-2"	4'-0"	9'-6"	4'-6"	5.11	271
33"	27"	12"	16"	10"	3'-2"	4'-0"	9'-6"	4'-6"	5.08	271
33"	30"	12"	16"	10"	3'-2"	4'-0"	9'-6"	4'-6"	5.04	270
33"	33"	12"	16"	10"	3'-2"	4'-0"	9'-6"	4'-6"	5.00	270
36"	12"	12"	16"	10"	3'-2"	4'-0"	9'-6"	4'-6"	5.15	271
36"	15"	12"	16"	10"	3'-2"	4'-0"	9'-6"	4'-6"	5.14	265
36"	18"	12"	16"	10"	3'-2"	4'-0"	9'-6"	4'-6"	5.12	267
36"	21"	12"	16"	10"	3'-2"	4'-0"	9'-6"	4'-6"	5.09	267
36"	24"	12"	16"	10"	3'-2"	4'-0"	9'-6"	4'-6"	5.07	266
36"	27"	12"	16"	10"	3'-2"	4'-0"	9'-6"	4'-6"	5.04	261
36"	30"	12"	16"	10"	3'-2"	4'-0"	9'-6"	4'-6"	5.00	261
36"	33"	12"	16"	10"	3'-2"	4'-0"	9'-6"	4'-6"	4.96	250
36"	36"	12"	16"	10"	3'-2"	4'-0"	9'-6"	4'-6"	4.92	249

D ₁	D ₂	A	B	C	E	H	L	G	QUANTITIES	
									CONC. C. Y.	STEEL LBS.
42"	12"	12"	16"	10"	3'-2"	4'-6"	11'-0"	5'-3"	6.37	328
42"	15"	12"	16"	10"	3'-2"	4'-6"	11'-0"	5'-3"	6.35	328
42"	18"	12"	16"	10"	3'-2"	4'-6"	11'-0"	5'-3"	6.33	327
42"	21"	12"	16"	10"	3'-2"	4'-6"	11'-0"	5'-3"	6.31	321
42"	24"	12"	16"	10"	3'-2"	4'-6"	11'-0"	5'-3"	6.28	317
42"	27"	12"	16"	10"	3'-2"	4'-6"	11'-0"	5'-3"	6.25	320
42"	30"	12"	16"	10"	3'-2"	4'-6"	11'-0"	5'-3"	6.21	315
42"	33"	12"	16"	10"	3'-2"	4'-6"	11'-0"	5'-3"	6.18	313
42"	36"	12"	16"	10"	3'-2"	4'-6"	11'-0"	5'-3"	6.13	308
42"	42"	12"	16"	10"	3'-2"	4'-6"	11'-0"	5'-3"	6.04	307
48"	12"	12"	16"	10"	3'-2"	5'-0"	12'-6"	6'-0"	7.71	387
48"	15"	12"	16"	10"	3'-2"	5'-0"	12'-6"	6'-0"	7.69	381
48"	18"	12"	16"	10"	3'-2"	5'-0"	12'-6"	6'-0"	7.67	382
48"	21"	12"	16"	10"	3'-2"	5'-0"	12'-6"	6'-0"	7.65	381
48"	24"	12"	16"	10"	3'-2"	5'-0"	12'-6"	6'-0"	7.62	376
48"	27"	12"	16"	10"	3'-2"	5'-0"	12'-6"	6'-0"	7.59	375
48"	30"	12"	16"	10"	3'-2"	5'-0"	12'-6"	6'-0"	7.55	374
48"	33"	12"	16"	10"	3'-2"	5'-0"	12'-6"	6'-0"	7.52	370
48"	36"	12"	16"	10"	3'-2"	5'-0"	12'-6"	6'-0"	7.47	362
48"	42"	12"	16"	10"	3'-2"	5'-0"	12'-6"	6'-0"	7.38	362
48"	48"	12"	16"	10"	3'-2"	5'-0"	12'-6"	6'-0"	7.27	352
54"	12"	12"	16"	10"	3'-2"	5'-6"	13'-0"	6'-6"	8.47	392
54"	15"	12"	16"	10"	3'-2"	5'-6"	13'-0"	6'-6"	8.45	392
54"	18"	12"	16"	10"	3'-2"	5'-6"	13'-0"	6'-6"	8.43	391
54"	21"	12"	16"	10"	3'-2"	5'-6"	13'-0"	6'-6"	8.41	392
54"	24"	12"	16"	10"	3'-2"	5'-6"	13'-0"	6'-6"	8.38	392
54"	27"	12"	16"	10"	3'-2"	5'-6"	13'-0"	6'-6"	8.35	405
54"	30"	12"	16"	10"	3'-2"	5'-6"	13'-0"	6'-6"	8.32	405
54"	33"	12"	16"	10"	3'-2"	5'-6"	13'-0"	6'-6"	8.28	405
54"	36"	12"	16"	10"	3'-2"	5'-6"	13'-0"	6'-6"	8.24	405
54"	42"	12"	16"	10"	3'-2"	5'-6"	13'-0"	6'-6"	8.14	404
54"	48"	12"	16"	10"	3'-2"	5'-6"	13'-0"	6'-6"	8.03	414
54"	54"	12"	16"	10"	3'-2"	5'-6"	13'-0"	6'-6"	7.91	412
60"	12"	12"	16"	10"	3'-2"	6'-0"	14'-0"	7'-0"	9.62	490
60"	15"	12"	16"	10"	3'-2"	6'-0"	14'-0"	7'-0"	9.61	489
60"	18"	12"	16"	10"	3'-2"	6'-0"	14'-0"	7'-0"	9.59	481
60"	21"	12"	16"	10"	3'-2"	6'-0"	14'-0"	7'-0"	9.56	474
60"	24"	12"	16"	10"	3'-2"	6'-0"	14'-0"	7'-0"	9.54	473
60"	27"	12"	16"	10"	3'-2"	6'-0"	14'-0"	7'-0"	9.50	472
60"	30"	12"	16"	10"	3'-2"	6'-0"	14'-0"	7'-0"	9.47	465
60"	33"	12"	16"	10"	3'-2"	6'-0"	14'-0"	7'-0"	9.43	463
60"	36"	12"	16"	10"	3'-2"	6'-0"	14'-0"	7'-0"	9.39	456
60"	42"	12"	16"	10"	3'-2"	6'-0"	14'-0"	7'-0"	9.30	449
60"	48"	12"	16"	10"	3'-2"	6'-0"	14'-0"	7'-0"	9.19	446
60"	54"	12"	16"	10"	3'-2"	6'-0"	14'-0"	7'-0"	9.06	438
60"	60"	12"	16"	10"	3'-2"	6'-0"	14'-0"	7'-0"	8.92	430

NOTE FOR STANDARD H ENDWALL DETAILS SEE STANDARD MD 362.01

SPECIFICATION	CATEGORY CODE ITEMS	
APPROVED	<i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT	
	APPROVAL • SHA REVISIONS	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
	APPROVAL 8-28-86	APPROVAL 12-12-86
	REVISED 10-1-01	REVISED
	REVISED	REVISED

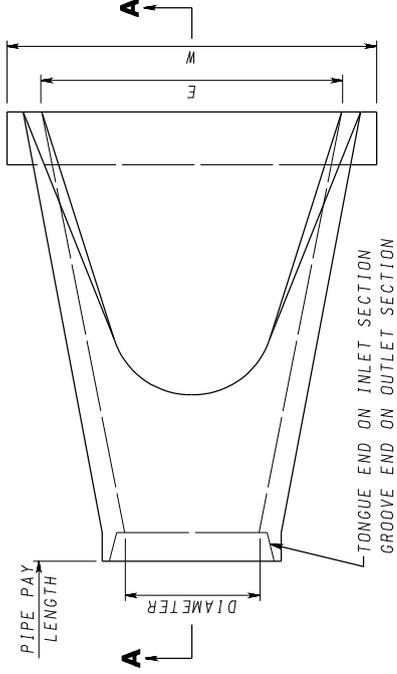
Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
 STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

STANDARD TYPE H ENDWALL
DIMENSIONS 8 QUANTITIES

STANDARD NO. MD 362.01-01

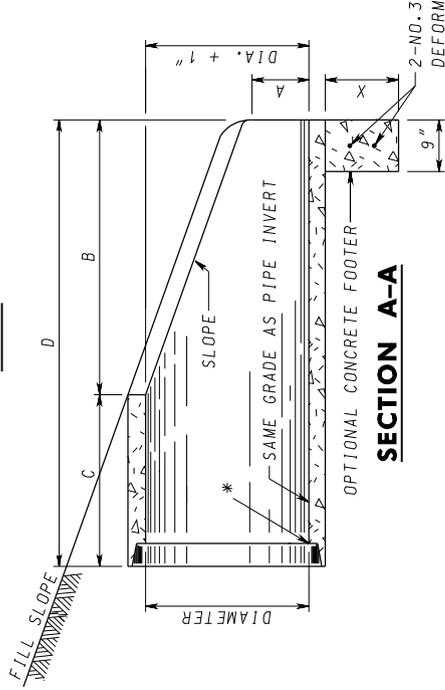
NOTES

1. CONTRACTOR HAS OPTION OF FURNISHING END SECTIONS CONFORMING TO DETAILS ON THIS SHEET OR END SECTIONS CONFORMING TO DETAILS ON STANDARD MD 368.02.
2. END SECTIONS MUST BE REINFORCED TO CONFORM TO ASTM - CLASS IV REINFORCED CONCRETE PIPE.
3. CONCRETE FOOTER SHALL BE USED WHEN SPECIFIED ON THE PLANS. COST OF CONCRETE FOOTER TO BE INCLUDED IN PRICE OF END SECTION. CONCRETE TO BE MIX. NO.2. REINFORCEMENT TO BE NO.3 BARS.

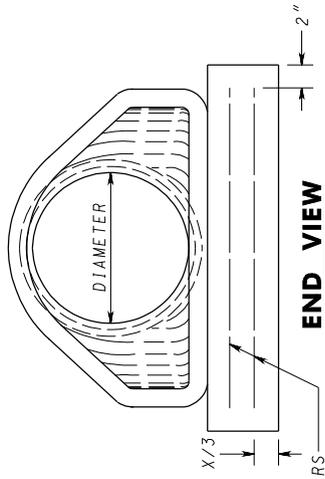


PLAN

* INVERT ELEVATION TO BE AT THE PIPE END OF THE STANDARD END SECTION. ELEVATIONS TO BE NOTED ON THE CONSTRUCTION PLANS.



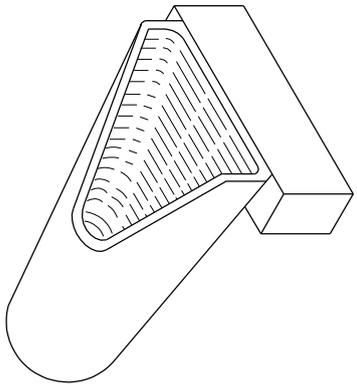
SECTION A-A



QUANTITIES FOR ESTIMATING PURPOSES ONLY

DIA. SLOPE	DIMENSIONS							QUANTITIES		
	A	B	C	D	E	W	X	CONC. C.Y.	STEEL LBS.	
12"	3:1	4"	2'-0"	4'-0 ⁷ / ₈ "	6'-0 ⁷ / ₈ "	2'-0"	3'-0"	12"	0.08	2.01
15"	3:1	6 ¹ / ₂ "	2'-4"	3'-10"	6'-2"	2'-6"	3'-6"	12"	0.10	2.38
18"	3:1	10 ¹ / ₄ "	2'-2"	4'-0"	6'-2"	3'-0"	4'-0"	12"	0.11	2.76
21"	3:1	9"	3'-0"	3'-1 ¹ / ₂ "	6'-1 ¹ / ₂ "	3'-6"	4'-6"	12"	0.13	3.13
24"	3:1	11"	3'-7"	2'-8"	6'-3"	4'-0"	5'-0"	15"	0.17	3.51
27"	3:1	10 ¹ / ₂ "	4'-1 ¹ / ₂ "	2'-0"	6'-1 ¹ / ₂ "	4'-6"	5'-6"	15"	0.19	3.89
30"	3:1	1'-1"	4'-5"	1'-10"	6'-3"	5'-0"	6'-0"	15"	0.21	4.26
33"	3:1	1'-2"	4'-7"	2'-2"	6'-9"	5'-6"	6'-6"	15"	0.23	4.64
36"	3:1	1'-3 ¹ / ₂ "	5'-3"	3'-1"	8'-4"	6'-0"	7'-3"	15"	0.25	5.20

SEE NOTE 3 ABOVE FOR CONCRETE FOOTER



ISOMETRIC VIEW

SPECIFICATION
305

CATEGORY CODE ITEMS

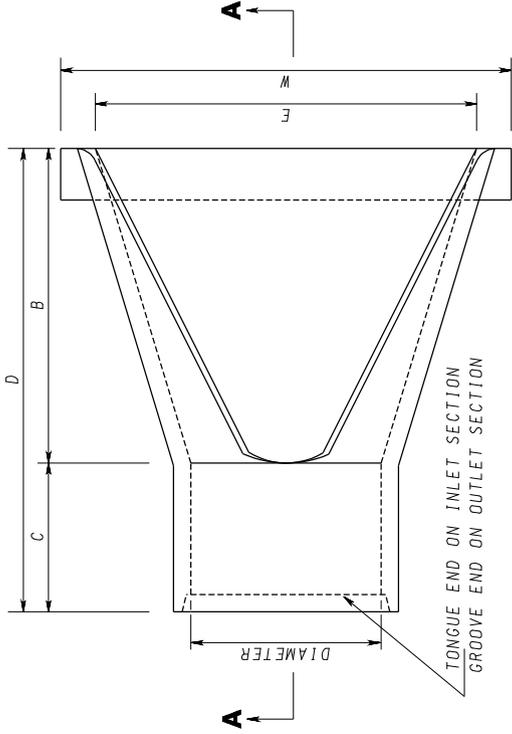
APPROVED
Kat G. McCall
DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT

APPROVAL • SHA REVISIONS	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
APPROVAL 8-28-86	APPROVAL 12-12-86
REVISED 3-15-06	REVISED 4-05-06
REVISED 7-1-09	REVISED 7-27-09
REVISED	REVISED



Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES
STANDARD CONCRETE END SECTION
ROUND CONCRETE PIPE

STANDARD NO. MD 368.01

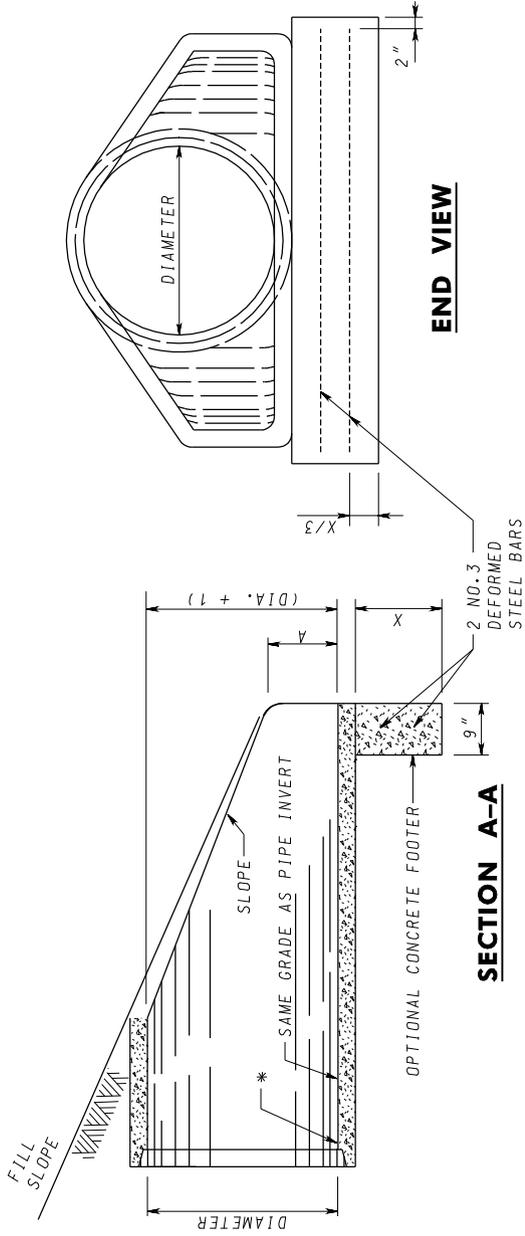


NOTES

1. CONTRACTOR HAS OPTION OF FURNISHING END SECTIONS CONFORMING TO DETAILS ON THIS SHEET OR END SECTIONS CONFORMING TO DETAILS ON STANDARD NO. MD 368.01.
2. END SECTIONS MUST BE REINFORCED TO CONFORM TO ASTM - CLASS IV REINFORCED CONCRETE PIPE. CONCRETE FOOTER SHALL BE USED WHEN SPECIFIED ON THE PLANS. COST OF CONCRETE FOOTER TO BE INCLUDED IN PRICE OF END SECTION. CONCRETE TO BE MIX. NO.2 REINFORCEMENT TO BE NO.3 BARS.
3. CONCRETE FOOTER SHALL BE USED WHEN SPECIFIED ON THE PLANS. COST OF CONCRETE FOOTER TO BE INCLUDED IN PRICE OF END SECTION. CONCRETE TO BE MIX. NO.2 REINFORCEMENT TO BE NO.3 BARS.

* INVERT ELEVATION TO BE AT THE PIPE END OF THE STANDARD END SECTION, ELEVATION TO BE NOTED ON THE CONSTRUCTION PLANS.

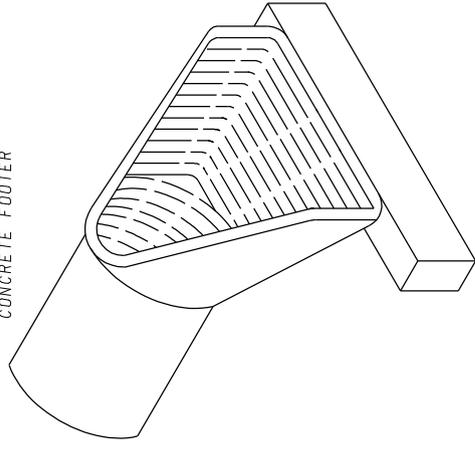
PLAN



SECTION A-A

END VIEW

SEE NOTE 3 ABOVE FOR CONCRETE FOOTER



ISOMETRIC VIEW

QUANTITIES FOR ESTIMATING PURPOSES ONLY

DIA. SLOPE	DIMENSIONS						QUANTITIES		
	CONCRETE END SECTION			CONCRETE FOOTER			CONC. STEEL	FOOTER	
	A	B	C	D	E	W	X	C. Y. LBS.	
12"	4"	2'-0"	4'-0 ⁷ / ₈ "	6'-0 ⁷ / ₈ "	2'-0"	3'-0"	12"	0.08	2.01
15"	6"	2'-3"	3'-10"	6'-1"	2'-6"	3'-6"	12"	0.10	2.38
18"	9"	2'-3"	3'-10"	6'-1"	3'-0"	4'-0"	12"	0.11	2.76
21"	9"	3'-0"	3'-1 ¹ / ₂ "	6'-1 ¹ / ₂ "	3'-6"	4'-6"	12"	0.13	3.13
24"	3:1	9 ¹ / ₂ "	3'-7 ¹ / ₂ "	2'-6"	6'-1 ¹ / ₂ "	4'-0"	15"	0.17	3.51
27"	3:1	10 ¹ / ₂ "	4'-1 ¹ / ₂ "	2'-0"	6'-1 ¹ / ₂ "	4'-6"	15"	0.19	3.89
30"	3:1	1'-0"	4'-6"	1'-7 ³ / ₄ "	6'-1 ³ / ₄ "	5'-0"	15"	0.21	4.26
33"	3:1	1'-2"	4'-7"	2'-2"	6'-9"	5'-6"	15"	0.23	4.64
36"	3:1	1'-3"	5'-3"	2'-10 ³ / ₄ "	8'-1 ³ / ₄ "	6'-0"	15"	0.25	5.20

SPECIFICATION
305

CATEGORY CODE ITEMS

APPROVED

Kat G. McCall
DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT



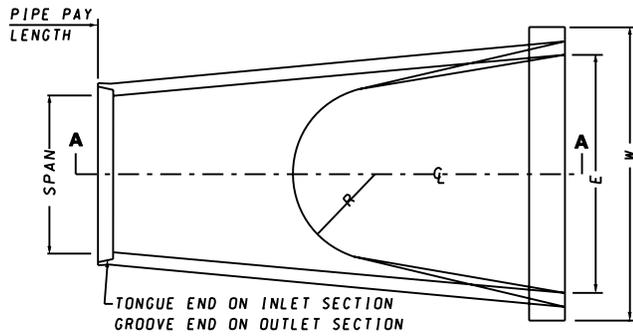
APPROVAL • SHA
REVISIONS HIGHWAY ADMINISTRATION

APPROVAL	8-28-86	APPROVAL	12-12-86
REVISED	3-15-06	REVISED	4-5-06
REVISED	7-1-09	REVISED	7-27-09
REVISED		REVISED	

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES
STANDARD CONCRETE END SECTION
ROUND CONCRETE PIPE

STANDARD NO.

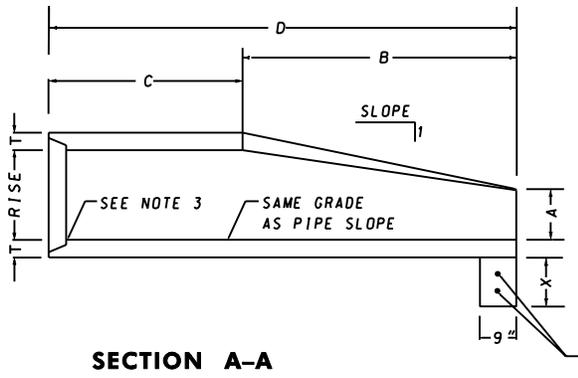
MD 368.02



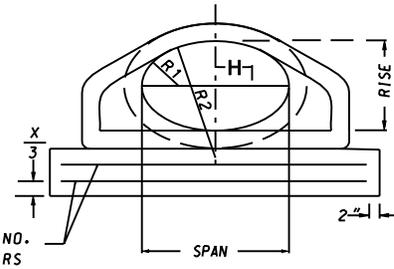
PLANS

NOTES:

1. END SECTIONS SHALL BE REINFORCED TO CONFORM TO ASTM - CLASS IV REINFORCED CONCRETE PIPE.
2. CONCRETE FOOTER SHALL BE USED WHEN SPECIFIED ON THE PLANS. COST OF THE FOOTER TO BE INCLUDED IN PRICE OF THE END SECTION. THE CONCRETE SHALL BE MIX #2 AND THE REINFORCEMENT IS TO BE #3 BARS.
3. INVERT ELEVATION TO BE AT THE PIPE END OF THE STANDARD END SECTION. ELEVATIONS TO BE NOTED ON THE CONSTRUCTION PLANS.



SECTION A-A



END VIEW

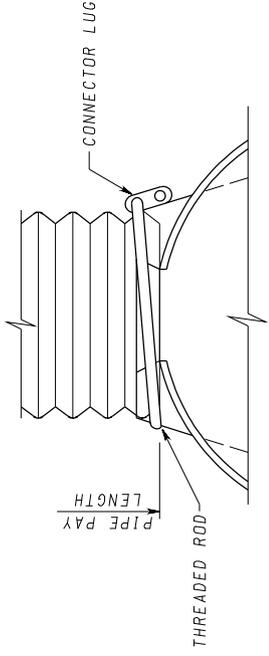
QUANTITIES FOR ESTIMATING PURPOSES ONLY

HERCP				CONCRETE END SECTION										CONCRETE FOOTER			
RISE	SPAN	EQUIV. DIA.	APPR. SLOPE	WALL T	A	B	C	D	E	H	R	R1	R2	W	X	CONC. (CY)	REINF. (LBS.)
14"	23"	18"	3.1:1	2 3/4"	8"	2'-3"	3'-9"	6'-0"	3'-5"	5 3/8"	6"	6"	1'-8"	4'-5"	12"	0.12	3.07
19"	30"	24"	2.8:1	3 1/4"	8 1/2"	3'-3"	2'-9"	6'-0"	4'-6"	6 7/8"	7"	8 1/4"	2'-2 1/4"	5'-6"	15"	0.19	3.86
22"	34"	27"	2.9:1	3 1/2"	9"	4'-0"	2'-0"	6'-0"	5'-1"	7 3/4"	8"	9 1/4"	2'-5 1/4"	6'-1"	15"	0.21	4.32
24"	38"	30"	2.9:1	3 3/4"	9 1/2"	4'-6"	1'-6"	6'-0"	5'-8"	8 5/8"	9"	10 1/4"	2'-8 3/4"	6'-8"	15"	0.23	4.76
29"	45"	36"	2.7:1	4 1/2"	11 1/4"	5'-0"	3'-0"	8'-0"	6'-9"	10 1/2"	12"	12 1/4"	3'-3 1/4"	8'-0"	15"	0.28	5.76

SPECIFICATION 305	CATEGORY CODE ITEMS
APPROVED	<i>Kate G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT
	APPROVAL • SHA REVISIONS
	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
	APPROVAL 7-14-08
	APPROVAL 01-09-08
REVISSED 7-1-09	REVISSED 7-27-09
REVISSED	REVISSED
REVISSED	REVISSED

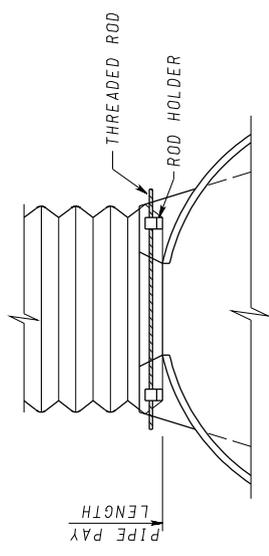
Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
 STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES
STANDARD CONCRETE END SECTION
HORIZONTAL ELLIPTICAL PIPE

STANDARD NO. MD 369.00



TYPE 1

(FOR 12" THRU 24" ONLY)



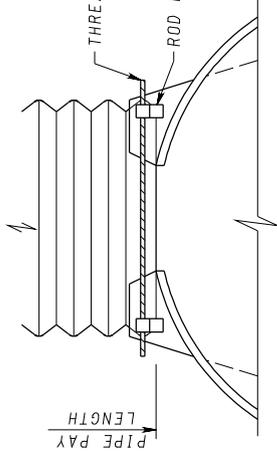
TYPE 2

(FOR 30" THRU 36" ONLY)

CONNECTIONS FOR ROUND PIPE

NOTE:

PIPES AND CONNECTION BANDS SHALL CONFORM TO APPLICABLE SECTION OF THE STANDARD SPECIFICATIONS AND TO AASHTO REQUIREMENTS.



TYPE 2

(FOR 17"x13" THRU 42"x29")

CONNECTIONS FOR PIPE ARCH

SPECIFICATION

CATEGORY CODE ITEMS

APPROVED

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DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT

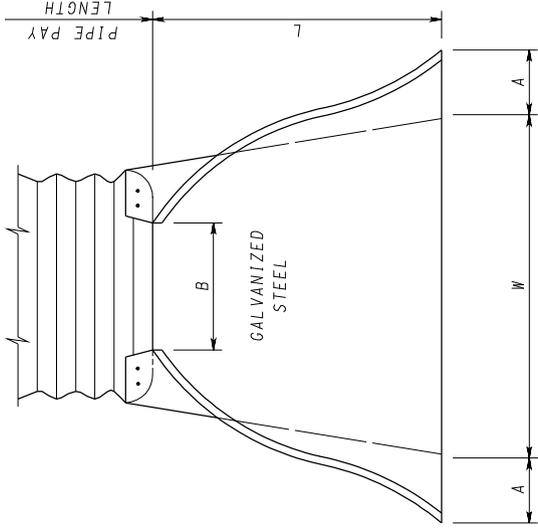


APPROVAL • SHA REVISIONS	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
APPROVAL 8-28-86	APPROVAL 12-12-86
REVISED 10-1-01	REVISED 7-27-09
REVISED 7-1-09	REVISED
REVISED	REVISED

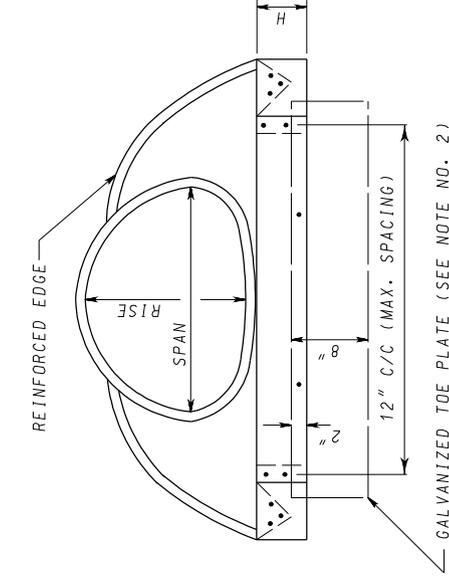
**Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION**
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

**STANDARD CONNECTIONS
METAL END SECTIONS**

STANDARD NO. MD 370.11

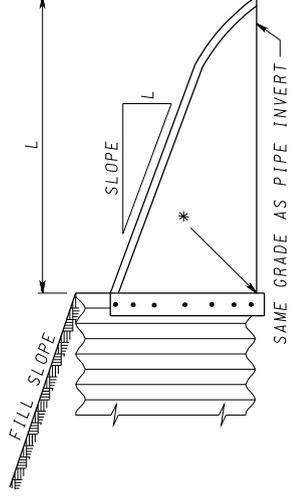


PLAN



END VIEW

DIMENSIONS										
PIPE ARCH DIMENSIONS		GA.	A	B	H	L	W	APPROX. SLOPE	UNIT	
SPAN	RISE									
17"	13"	16	7"	9"	6"	19"	30"	2 1/2	1 1/2	1 PC.
21"	15"	16	7"	10"	6"	23"	36"	2 1/2	1 1/2	1 PC.
24"	18"	16	8"	12"	6"	28"	42"	2 1/2	1 1/2	1 PC.
28"	20"	16	9"	14"	6"	32"	48"	2 1/2	1 1/2	1 PC.
35"	24"	14	10"	16"	6"	39"	60"	2 1/2	1 1/2	1 PC.
42"	29"	14	12"	18"	8"	46"	75"	2 1/2	1 1/2	1 PC.



SIDE VIEW

* INVERT ELEVATION TO BE AT THE PIPE END OF THE STANDARD END SECTION. ELEVATIONS TO BE NOTED ON THE CONSTRUCTION PLANS.

NOTES

- METAL END SECTIONS SHALL BE GAGE 16 FOR ARCH PIPES RANGING FROM 17"X13" THRU 28"X20", AND GAGE 14 FOR PIPES RANGING FROM 35"X24" THRU 42"X29".
- TOE PLATE SHALL BE USED WHEN SPECIFIED ON THE PLANS. THICKNESS OF END PLATES TO BE SAME AS END SECTION. COST OF TOE PLATE TO BE INCIDENTAL TO THE BID PRICE PER EACH OF METAL END SECTION.

SPECIFICATION
303

CATEGORY CODE ITEMS

APPROVED

Kate G. McCall
DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT

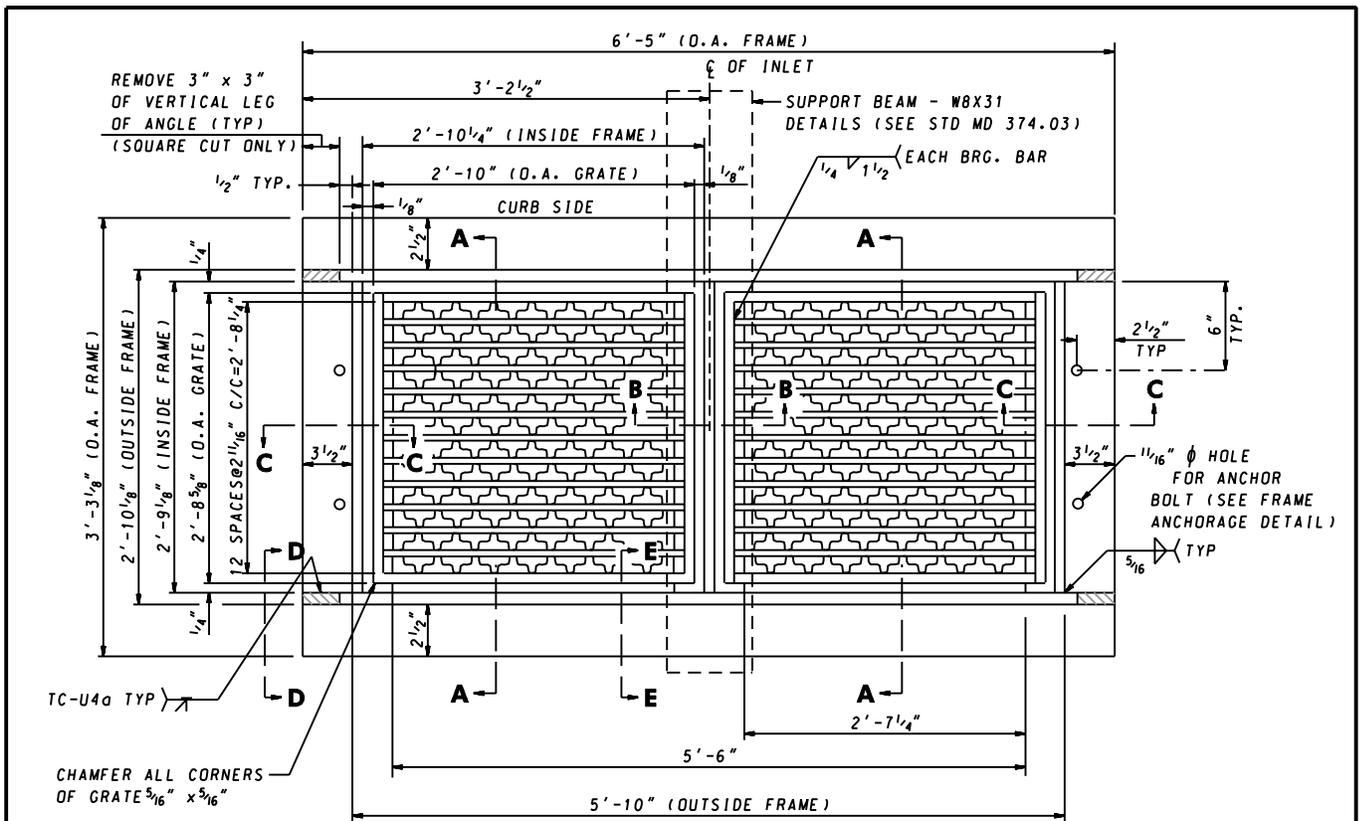


APPROVAL	SHA REVISIONS	FEDERAL HIGHWAY ADMINISTRATION
APPROVAL	8-28-86	APPROVAL 12-12-86
REVISED	10-1-01	REVISED 7-27-09
REVISED	7-1-09	REVISED

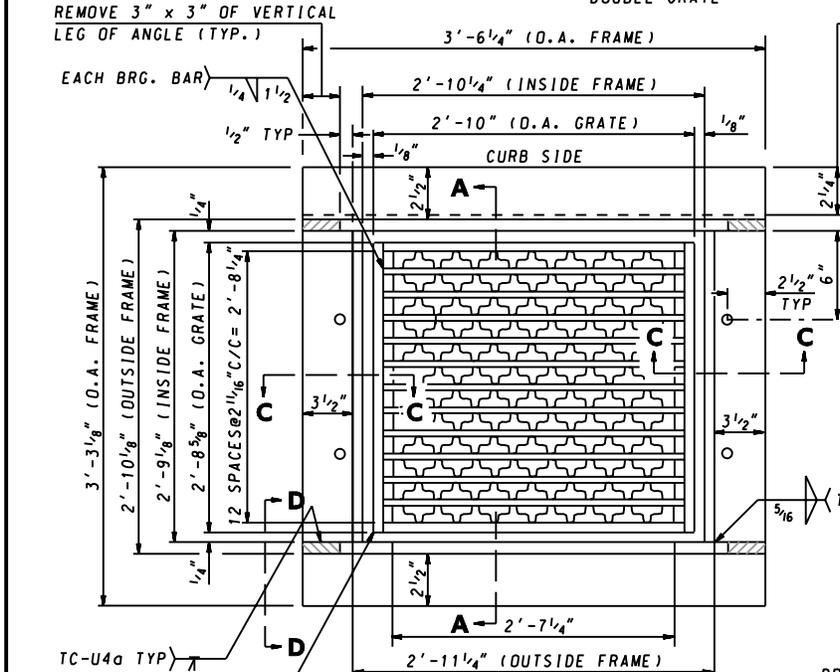
Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES
STANDARD METAL END SECTION
METAL PIPE ARCH

STANDARD NO.

MD 371.01



PLAN
DOUBLE GRATE

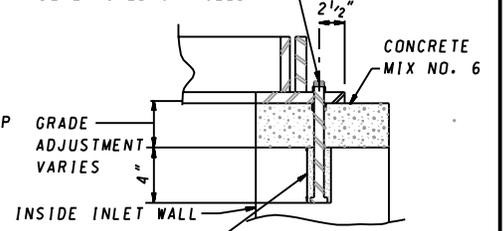


PLAN
SINGLE GRATE

USE 4"x1/2" FLAT BAR WHEN OPEN FACED CURB IS USED

GENERAL NOTES

1. FRAMES & GRATES TO BE SQUARE, FLAT AND TRUE.
 2. STRUCTURAL STEEL SHALL BE A.S.T.M. A-36.
 3. FRAMES AND GRATES TO BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH A.S.T.M. A-123.
 4. GRADE AND SLOPE ADJUSTMENTS COMPLETED IN THE FIELD USING CONCRETE MIX # 6.
- GALVANIZED 3/8" Ø ANCHOR BOLT WITH DOUBLE NUT FOR ADJUSTING FRAME TO GRADE (FOUR BOLTS PER FRAME. LENGTH TO BE DETERMINED IN FIELD.)



FRAME ANCHORAGE
DETAIL

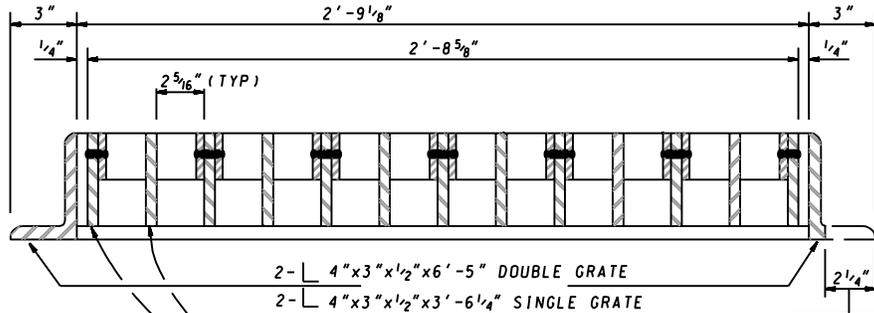
DRILL, SET AND GROUT IN FIELD AS DIRECTED BY THE ENGINEER.

SPECIFICATION 305	CATEGORY CODE ITEMS
APPROVED <i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT	
	APPROVAL • SHA REVISIONS
	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
	APPROVAL 8-30-82
	APPROVAL 9-29-82
REVISED 10-1-01	REVISED 9-21-87
REVISED	REVISED
REVISED	REVISED

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

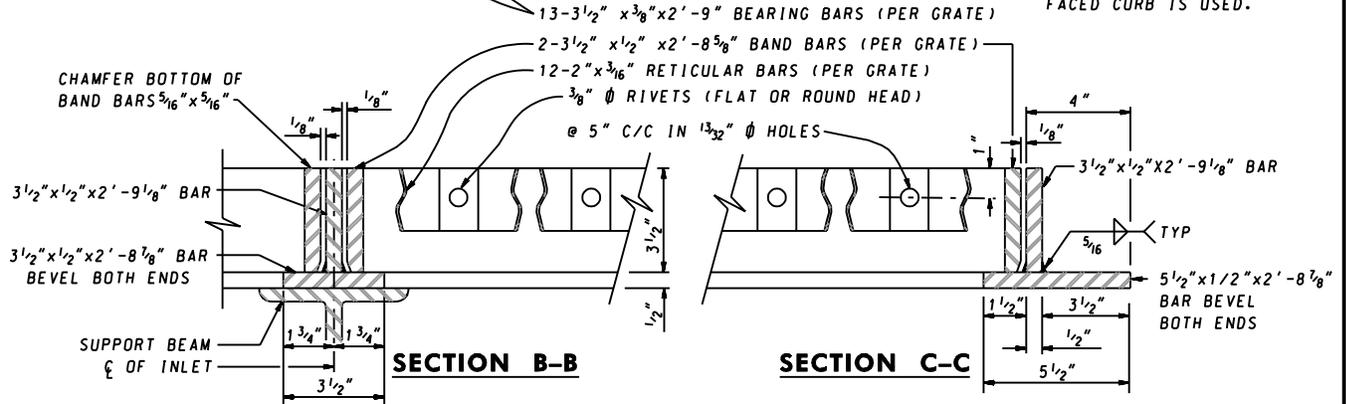
STANDARD WR & WRM INLET
FRAME & GRATE

STANDARD NO. MD 374.02



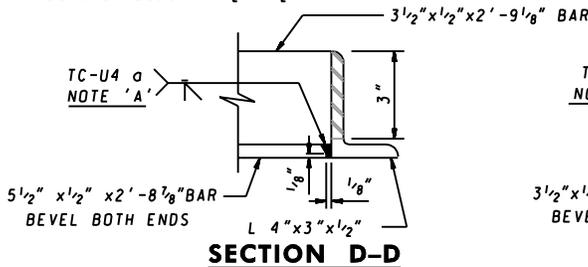
SECTION A-A

USE 4" x 1/2" FLAT BAR WHEN OPEN FACED CURB IS USED.

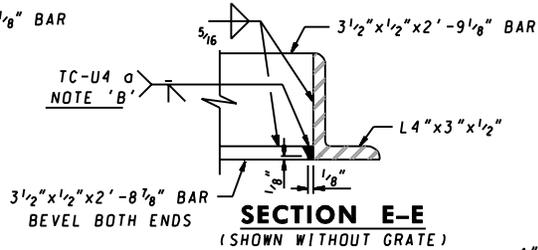


NOTE 'A' - WELD 5 1/2" x 1/2" BAR TO 4" x 3" x 1/2" L BEFORE WELDING 3 1/2" x 1/2" BAR

NOTE 'B' - WELD 3 1/2" x 1/2" x 2'-8 7/8" BAR TO 4" x 3" x 1/2" L BEFORE WELDING 3 1/2" x 1/2" x 2'-9 1/8" BAR

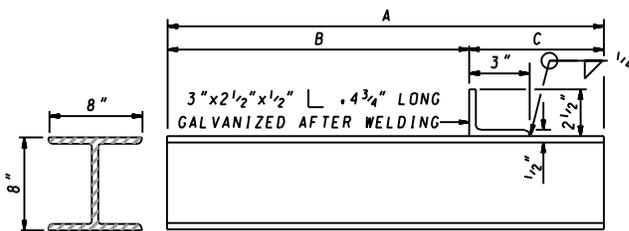


SECTION D-D



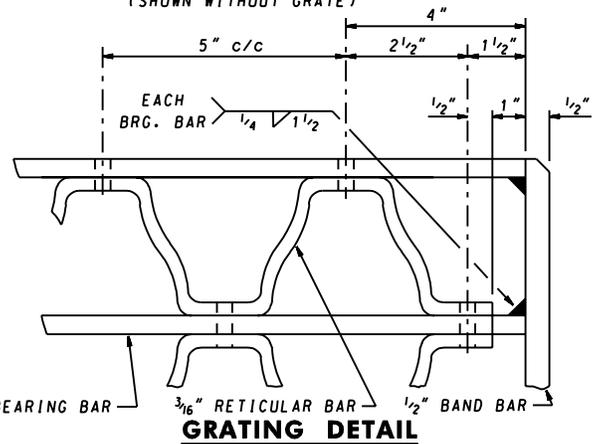
SECTION E-E

(SHOWN WITHOUT GRATE)



SUPPORT BEAM
W8 x 31 (GALVANIZED)

INLET TYPE	DIMENSIONS		
	A	B	C
WR	4'-6 1/8"	3'-4 3/8"	1'-1 3/4"
WRM	6'-4 5/8"	3'-4 3/8"	3'-0 1/4"



GRATING DETAIL

SPECIFICATION 305	CATEGORY CODE ITEMS
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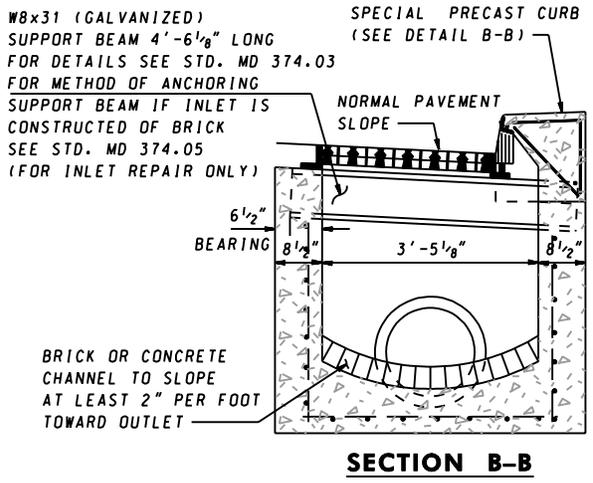
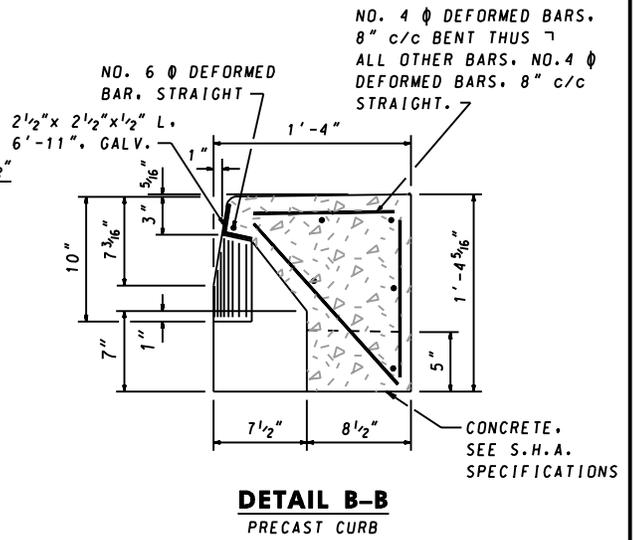
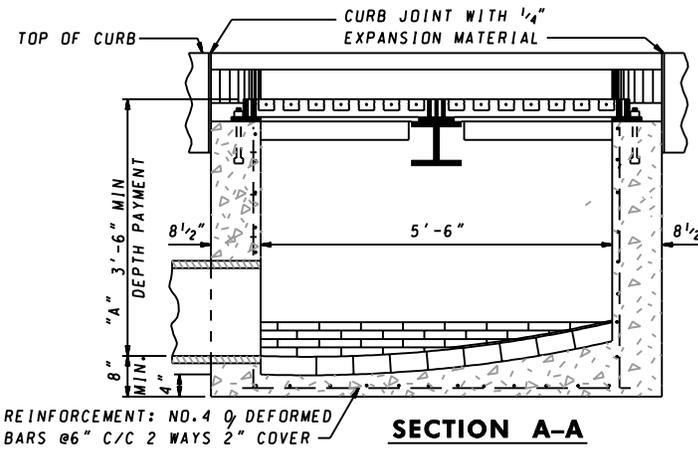
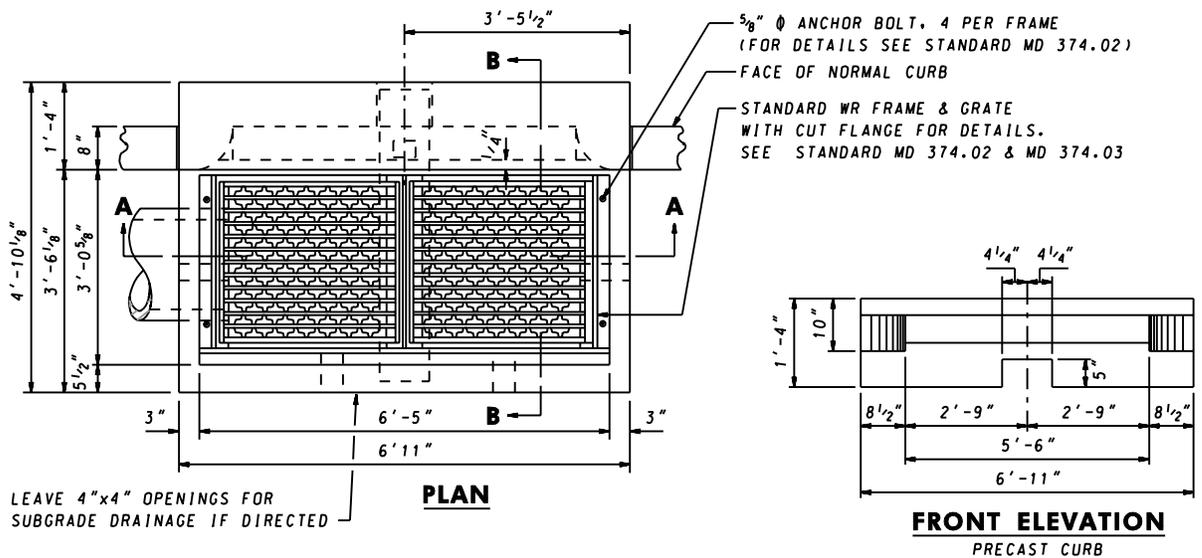
APPROVED *Kirk G. McCall*
DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT

	APPROVAL • SHA REVISIONS	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
	APPROVAL 2-28-75	APPROVAL 1-14-75
	REVISED 10-1-01	REVISED 9-21-87
	REVISED	REVISED

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

STANDARD WR & WRM INLET
FRAME & GRATE

STANDARD NO. MD 374.03



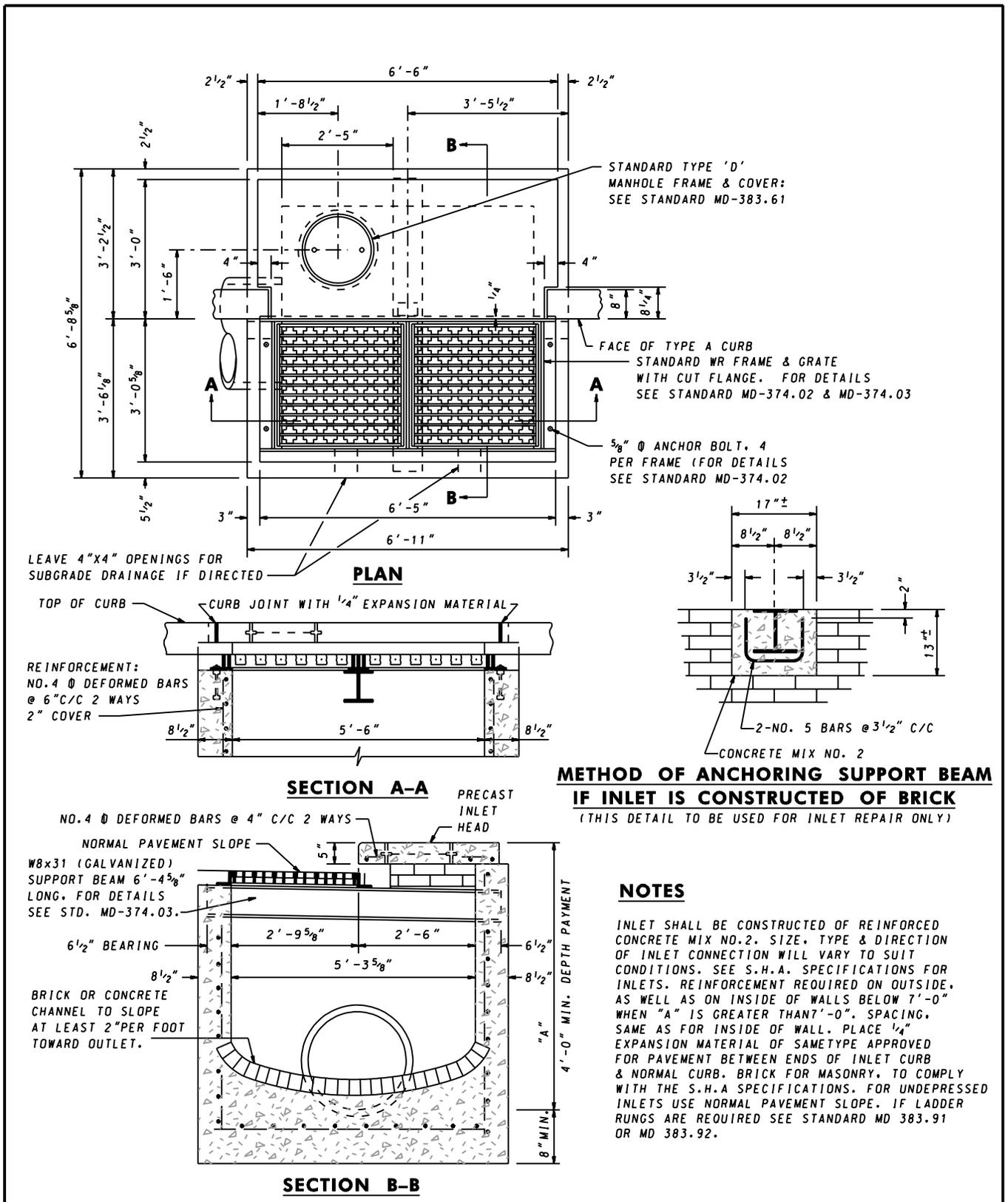
NOTE
INLET SHALL BE CONSTRUCTED OF REINFORCED CONCRETE MIX NO. 2. SIZE, TYPE & DIRECTION OF INLET CONNECTION WILL VARY TO SUIT CONDITIONS. SEE S.H.A. SPECIFICATIONS FOR INLETS. REINFORCEMENT REQUIRED ON OUTSIDE, AS WELL AS ON INSIDE, OF WALLS BELOW 7'-0" WHEN "A" IS GREATER THAN 7'-0". SPACING, SAME AS FOR INSIDE OF WALL. PLACE 1/4" EXPANSION MATERIAL OF SAME TYPE APPROVED FOR PAVEMENT BETWEEN THE FRAME & ABUTTING RIGID PAVEMENT, & BETWEEN ENDS OF INLET CURB & NORMAL CURB. BRICK FOR MASONRY TO COMPLY WITH THE S.H.A. SPECIFICATIONS. FOR UNDEPRESSED INLETS, USE NORMAL PAVEMENT SLOPE. IF LADDER RUNGS ARE REQUIRED SEE STD. NO. MD 383.91 OR MD 383.92.

SPECIFICATION 305	CATEGORY CODE ITEMS
APPROVED <i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT	
	APPROVAL • SHA REVISIONS
	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
	APPROVAL 2-28-75
	APPROVAL 5-12-75
	REVISD 10-1-01
REVISD 2-24-88	
REVISD	REVISD
REVISD	REVISD

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

STANDARD WR INLET

STANDARD NO. MD 374.04

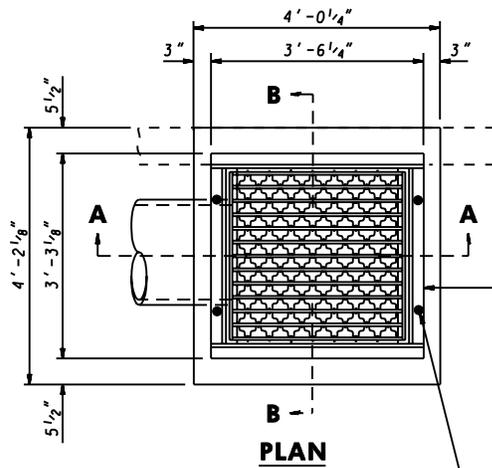


SPECIFICATION 305	CATEGORY CODE ITEMS
APPROVED	<i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT
	APPROVAL • SHA REVISIONS
	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
	APPROVAL 2-28-75
	APPROVAL 5-12-75
REVISED 10-1-01	REVISED 2-24-88
REVISED	REVISED
REVISED	REVISED

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

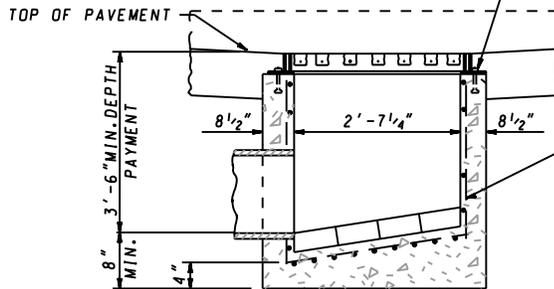
STANDARD WRM INLET

STANDARD NO. MD 374.05



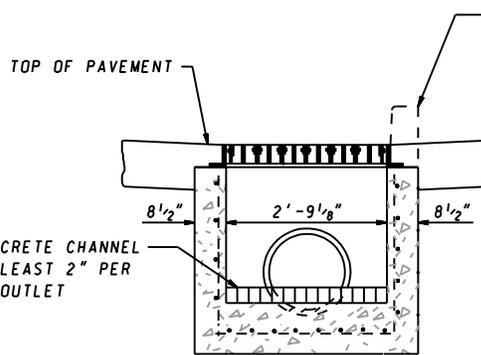
STANDARD WR SINGLE FRAME & GATE. FOR DETAILS SEE STDS. MD 374.02 & MD 374.03

5/8" ϕ ANCHOR BOLT, 4 PER FRAME (FOR DETAILS SEE STD. MD 374.02)



REINFOCMENT:
NO. 4 ϕ DEFORMED
BARS @ 6" c/c 2 WAYS
2" COVER

SECTION A-A



POSITION OF CURB WHEN REQUIRED- TO BE PAID FOR PER LINEAR FEET OF STANDARD CURB.

BRICK OR CONCRETE CHANNEL TO SLOPE AT LEAST 2" PER FOOT TOWARD OUTLET

NOTE

INLET SHALL BE CONSTRUCTED OF REINFORCED CONCRETE (MIX NO. 2). SIZE, TYPE AND DIRECTION OF OUTLET PIPE WILL VARY TO SUIT EACH CASE AND THE INVERT WILL BE ALTERED ACCORDINGLY. BRICK FOR MASONRY, TO COMPLY WITH THE LATEST S.H.A. SPECIFICATIONS. IF LADDER RUNGS ARE REQUIRED SEE STANDARD MD 383.91 OR MD 383.92.

SECTION B-B

SPECIFICATION 305	CATEGORY CODE ITEMS
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APPROVED *Kirk G. McCall*
DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT

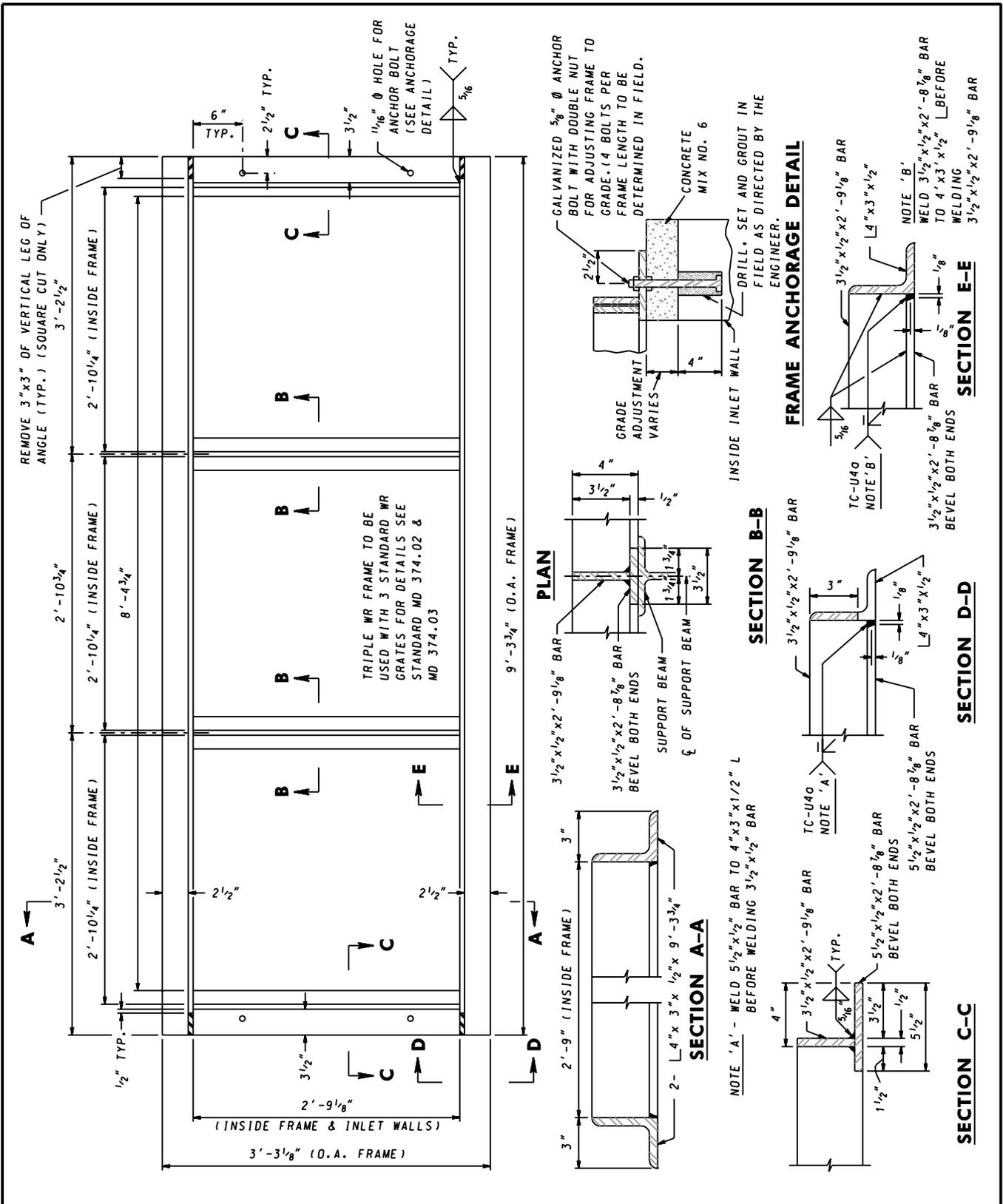


APPROVAL • SHA REVISIONS	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
APPROVAL 3-5-75	APPROVAL 5-22-75
REVISED 10-1-01	REVISED 2-24-88
REVISED	REVISED
REVISED	REVISED

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

SINGLE WR INLET

STANDARD NO. MD 374.06

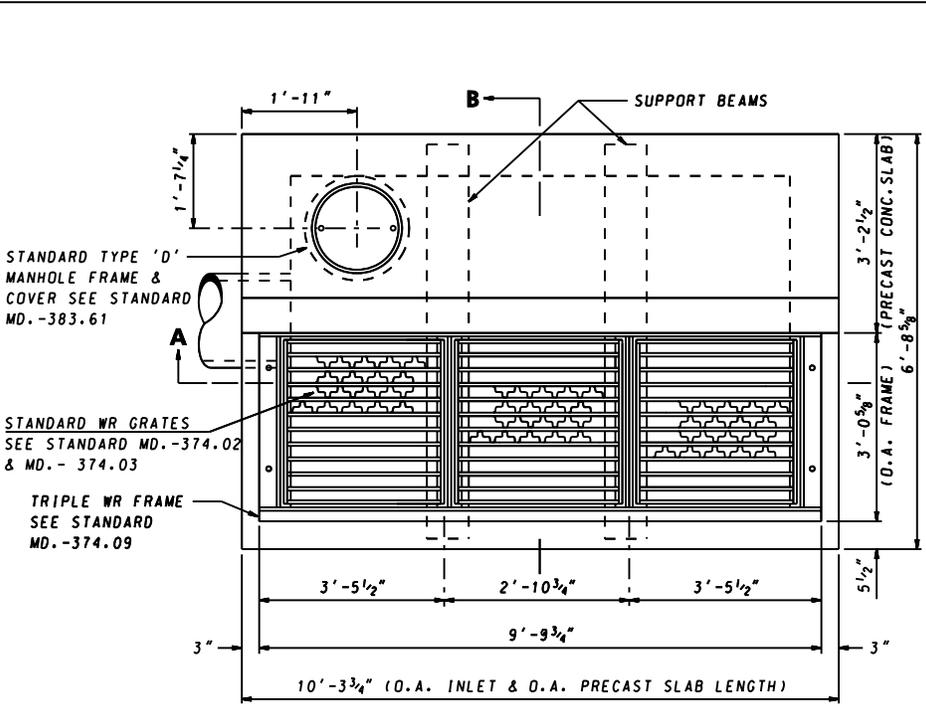


SPECIFICATION 305	CATEGORY CODE ITEMS
APPROVED <i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT	
SHA State Highway Administration	APPROVAL • SHA REVISIONS APPROVAL 8-9-82 REVISED 10-1-01 REVISED REVISED
	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION APPROVAL 9-13-82 REVISED 8-1-84 REVISED REVISED

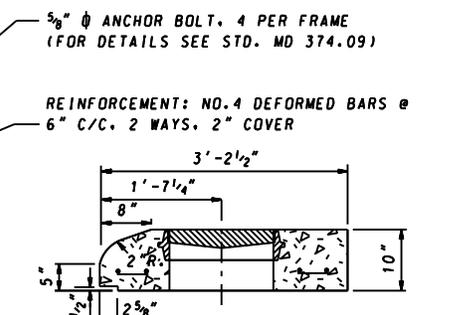
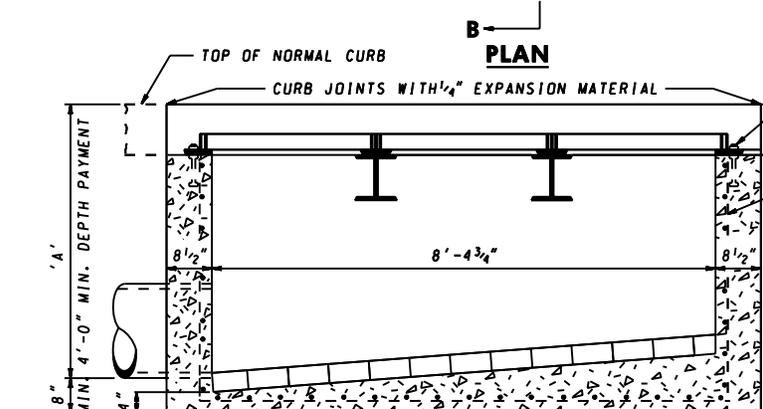
Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

TRIPLE WR FRAME

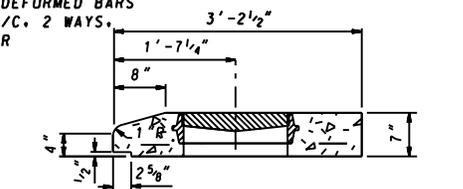
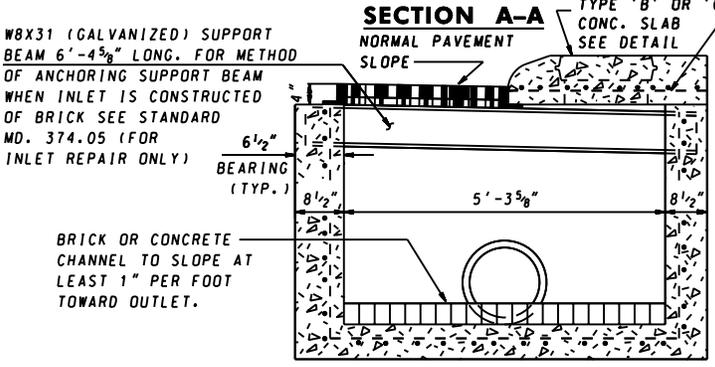
STANDARD NO. MD 374.09



NOTES
 INLET SHALL BE CONSTRUCTED OF REINFORCED CONCRETE (MIX NO. 2). SIZE, TYPE & DIRECTION OF INLET CONNECTION WILL VARY TO SUIT CONDITIONS. SEE S.H.A. SPECIFICATIONS FOR INLETS. REINFORCEMENT REQUIRED ON OUTSIDE, AS WELL AS ON INSIDE OF WALLS BELOW 7'-0" WHEN 'A' IS GREATER THAN 7'-0". SPACING, SAME AS FOR INSIDE OF WALL. PLACE 1/4" EXPANSION MATERIAL, OF SAME TYPE APPROVED FOR PAVEMENT, BETWEEN ENDS OF INLET CURB & NORMAL CURB. BRICK FOR MASONRY, TO COMPLY WITH THE S.H.A. SPECIFICATIONS. METAL LADDER RUNGS SHALL BE INSTALLED IN ACCORDANCE WITH STANDARD MD 383.91 AND MD 383.92 OR AS DIRECTED BY THE ENGINEER.



TYPE 'B' PRECAST CONCRETE SLAB
 (CONC. MIX NO. 2)



TYPE 'C' PRECAST CONCRETE SLAB
 (CONC. MIX NO. 2)

NOTE
 TYPE 'B' SLAB-USED WITH STANDARD TYPE 'B' CONC. CURB
 TYPE 'C' SLAB-USED WITH STANDARD TYPE 'C' CONC. CURB
 FOR STANDARD CURB DETAILS REFER TO STANDARD MD= 620.02

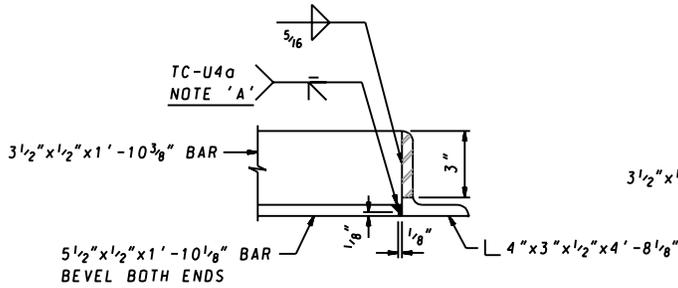
SPECIFICATION 305	CATEGORY CODE ITEMS
APPROVED <i>Kate G. McCall</i>	DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT
	APPROVAL • SHA REVISIONS
	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
	APPROVAL 1-24-83
	APPROVAL 3-1-83
REVISD 12-07-09	REVISD 2-24-88
REVISD	REVISD
REVISD	REVISD

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
 STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

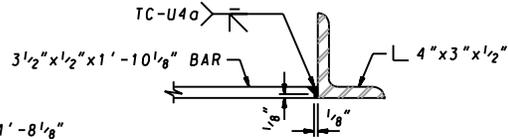
TRIPLE WRM INLET

STANDARD NO. MD 374.10

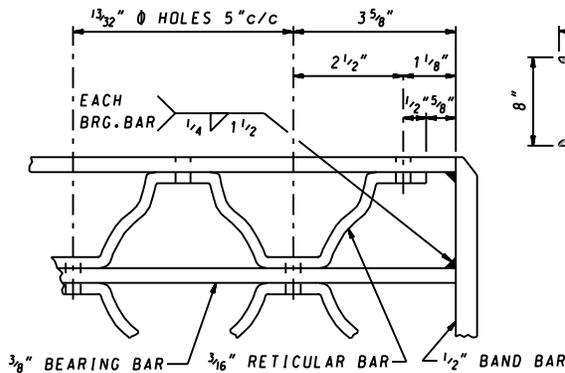
NOTE 'A' - WELD 5 1/2" x 1/2" BAR TO 4" x 3" x 1/2" L
BEFORE WELDING 3 1/2" x 1/2" BAR



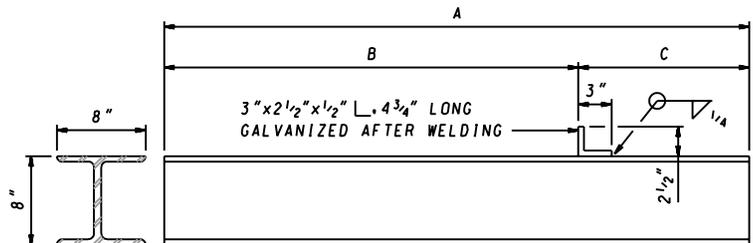
SECTION C-C



SECTION D-D
(GRATE NOT SHOWN)



GRATING DETAIL



SUPPORT BEAM
W8x31 (GALVANIZED)

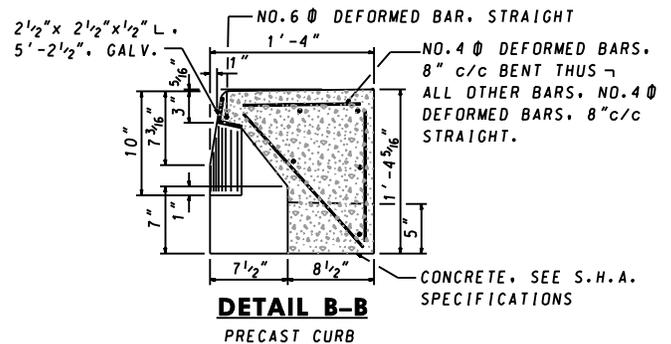
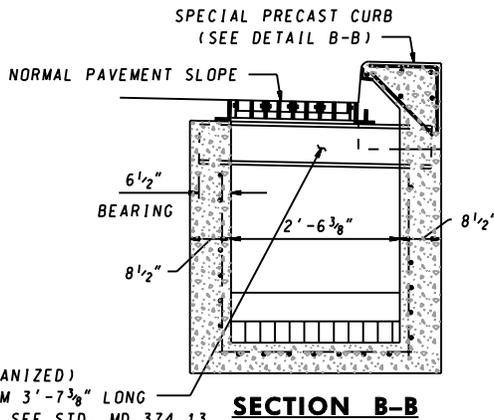
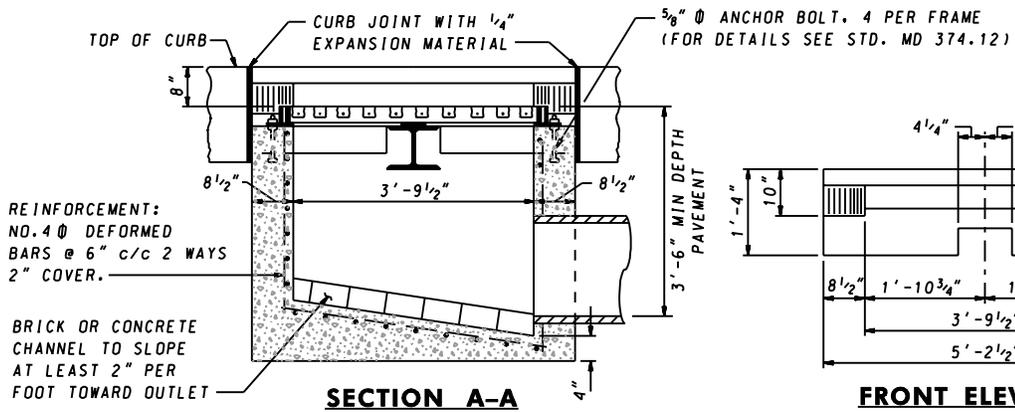
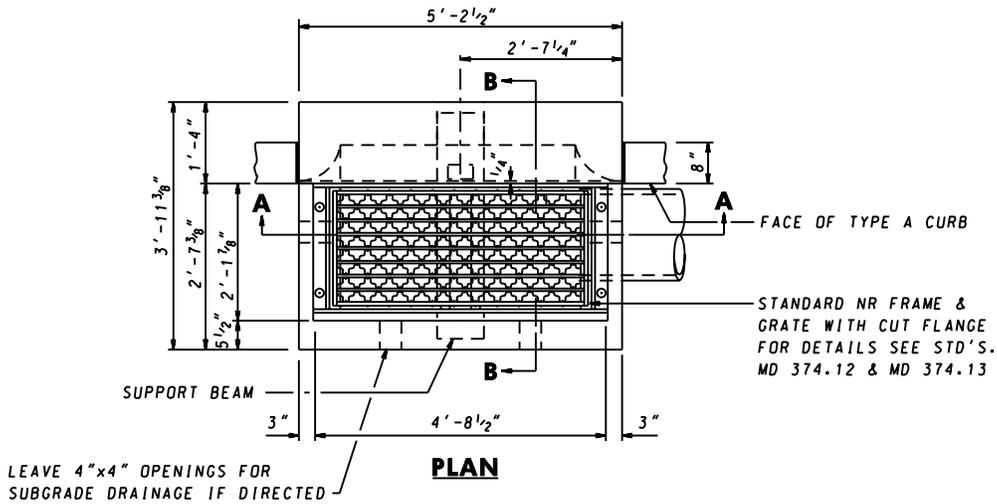
INLET TYPE	DIMENSIONS		
	A	B	C
NR	3' - 7 3/8"	2' - 5 5/8"	1' - 1 3/4"
NRM	5' - 5 7/8"	2' - 5 5/8"	3' - 0 1/4"

SPECIFICATION	CATEGORY CODE ITEMS	
APPROVED	<i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT	
	APPROVAL • SHA REVISIONS	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
	APPROVAL 2-28-75	APPROVAL 5-12-75
	REVISED 10-1-01	REVISED 9-21-87
	REVISED	REVISED
	REVISED	REVISED

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

STANDARD NR & NRM INLET
FRAME & GRATE

STANDARD NO. MD 374.13



W8x31 (GALVANIZED) SUPPORT BEAM 3'-7 3/8" LONG FOR DETAILS SEE STD. MD 374.13 FOR METHOD OF ANCHORING SUPPORT BEAM INLET IF CONSTRUCTED OF BRICK SEE STD. MD 374.15 (FOR INLET REPAIR ONLY)

NOTES

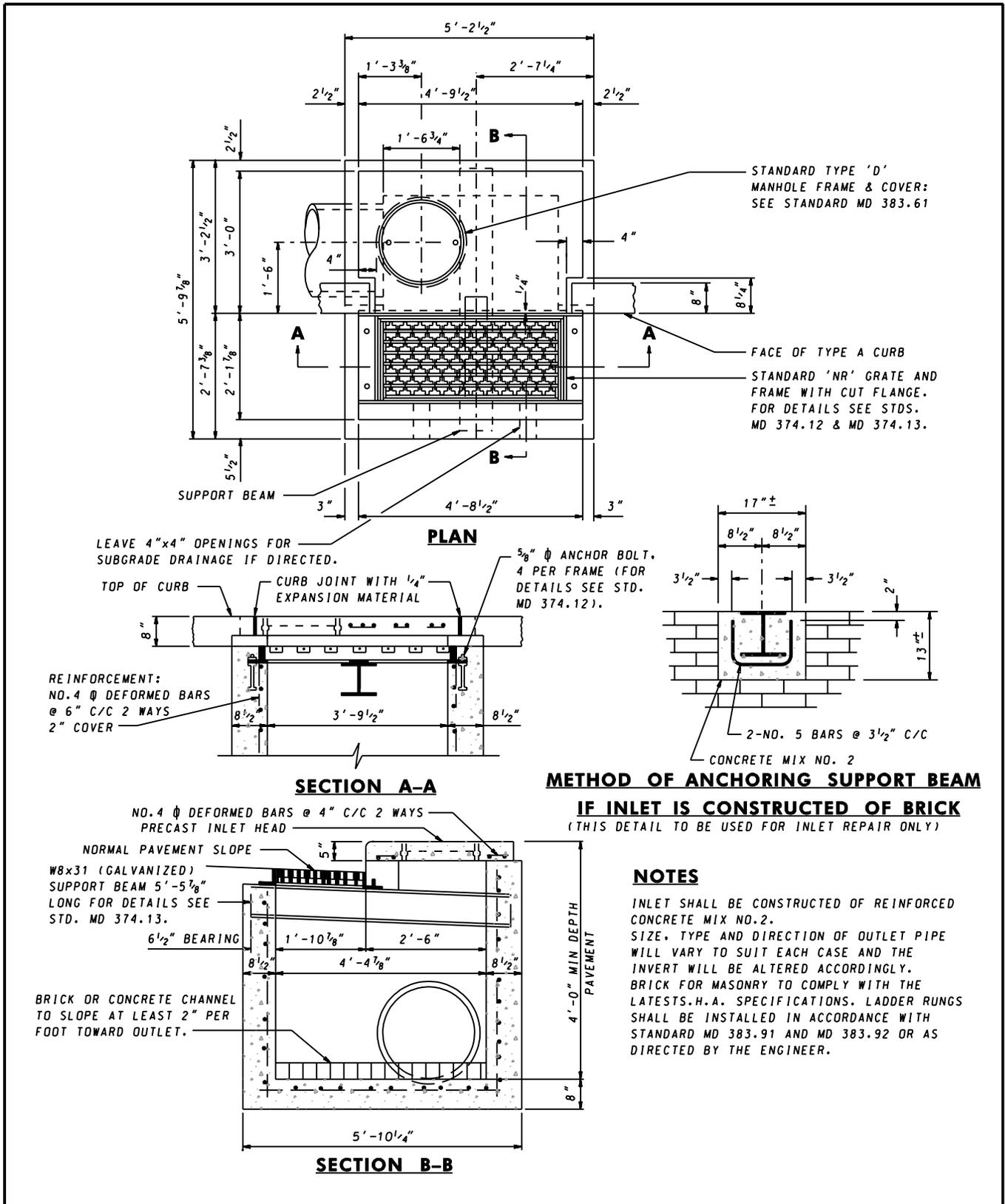
INLET SHALL BE CONSTRUCTED OF REINFORCED CONCRETE (MIX NO.2). SIZE, TYPE AND DIRECTION OF OUTLET PIPE WILL VARY TO SUIT EACH CASE AND THE INVERT WILL BE ALTERED ACCORDINGLY. BRICK FOR MASONRY, TO COMPLY WITH THE LATEST S.H.A. SPECIFICATIONS. IF LADDER RUNGS ARE REQUIRED SEE STD. MD 383.91 OR MD 383.92.

SPECIFICATION 305	CATEGORY CODE ITEMS
APPROVED	<i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT
	APPROVAL • SHA REVISIONS
	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
	APPROVAL 2-28-75
	APPROVAL 5-12-75
	REVISD 10-1-01
REVISD 2-24-88	
REVISD	REVISD
REVISD	REVISD

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

STANDARD NR INLET

STANDARD NO. MD 374.14

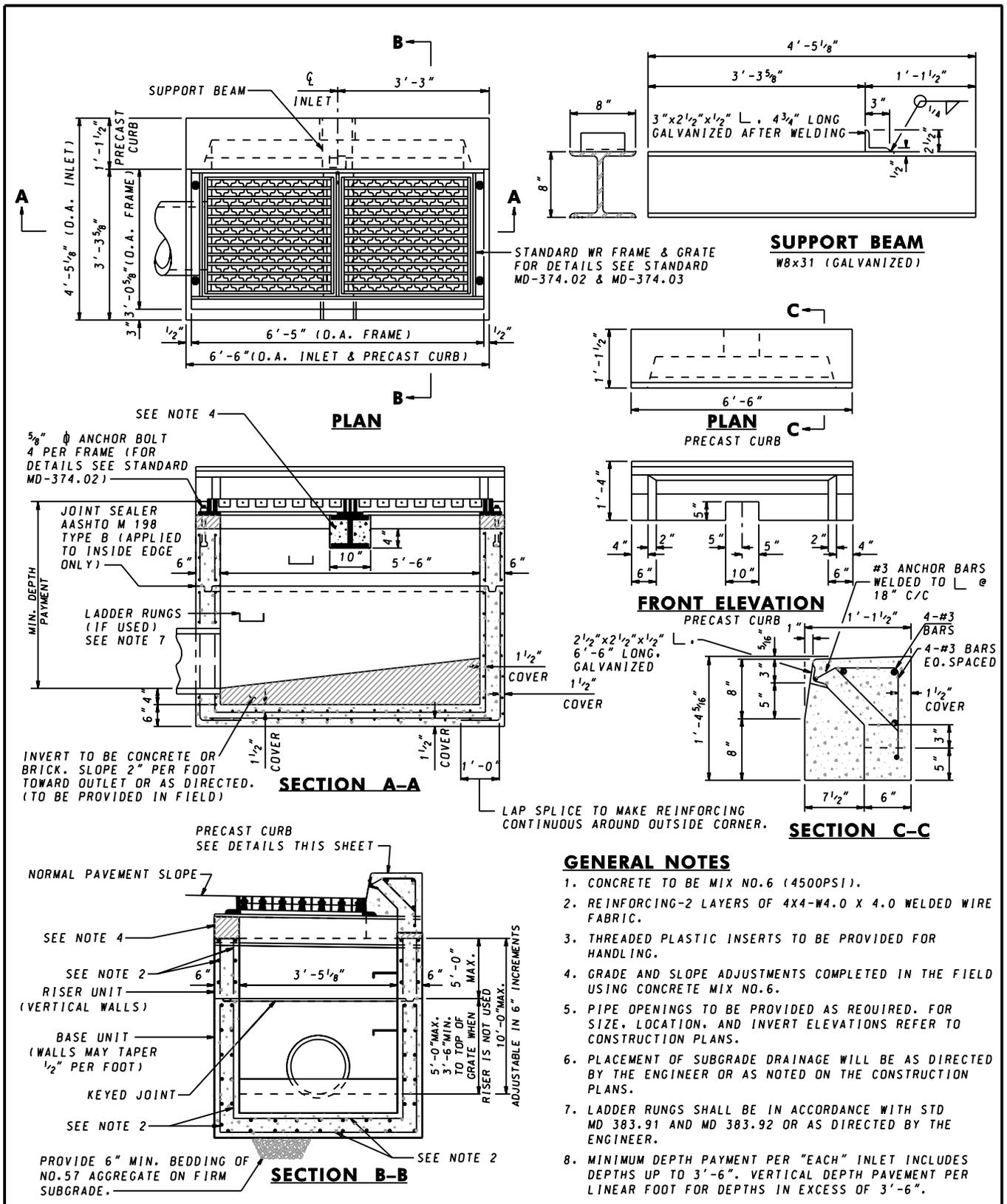


SPECIFICATION 305	CATEGORY CODE ITEMS
APPROVED <i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT	
	APPROVAL • SHA REVISIONS
	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
	APPROVAL 2-28-75
	APPROVAL 5-12-75
	REVISION 10-1-01
REVISION 2-24-88	
REVISION	REVISION
REVISION	REVISION

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
 STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

STANDARD NRM INLET

STANDARD NO. MD 374.15

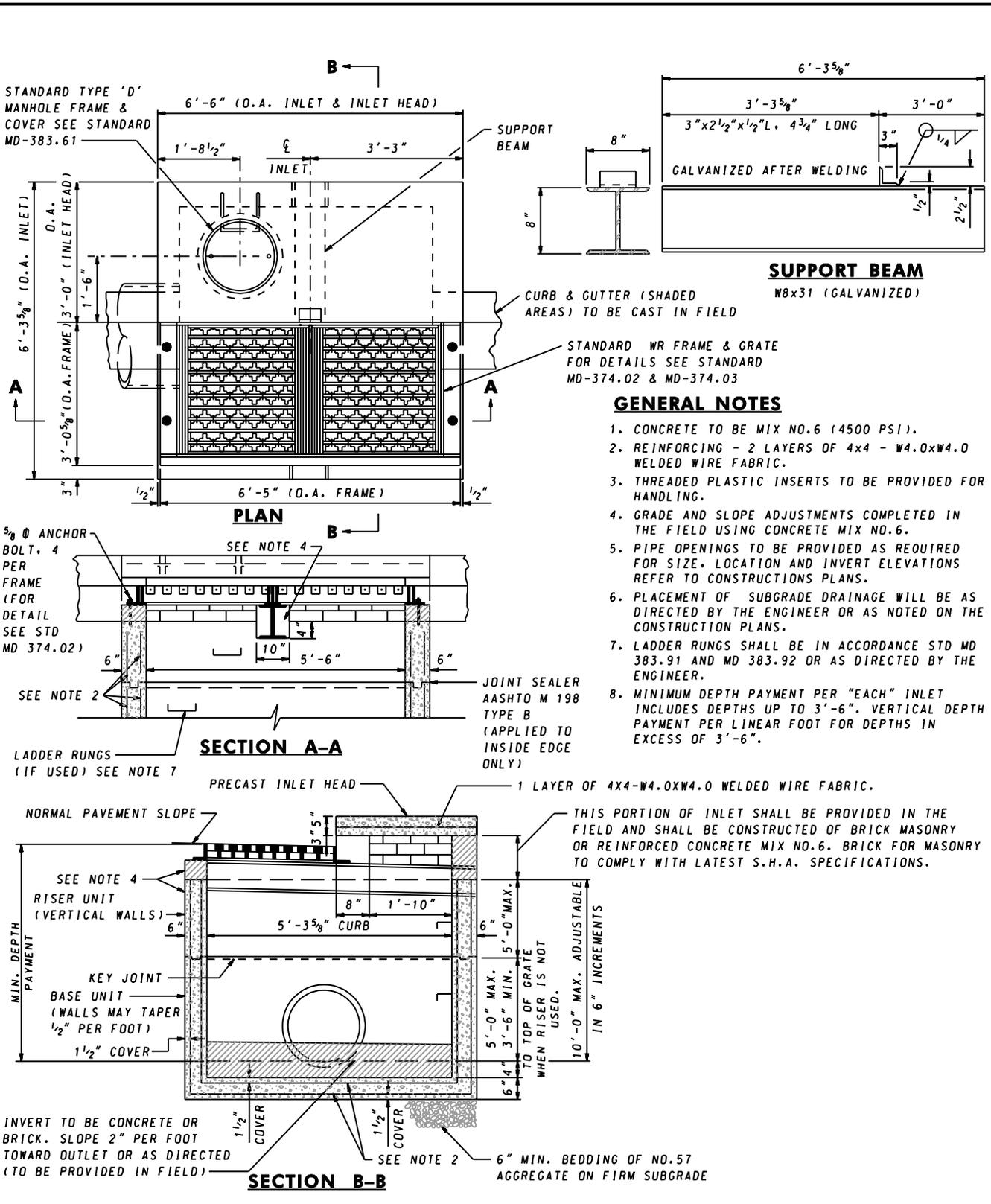


SPECIFICATION 305	CATEGORY CODE ITEMS
APPROVED <i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT	
	APPROVAL • SHA REVISIONS
	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
	APPROVAL 6-4-84
	APPROVAL 8-1-84
	REVISION 10-1-01
REVISION 3-30-87	
REVISION	REVISION
REVISION	REVISION

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
 STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

PRECAST WR INLET

STANDARD NO. MD 374.21

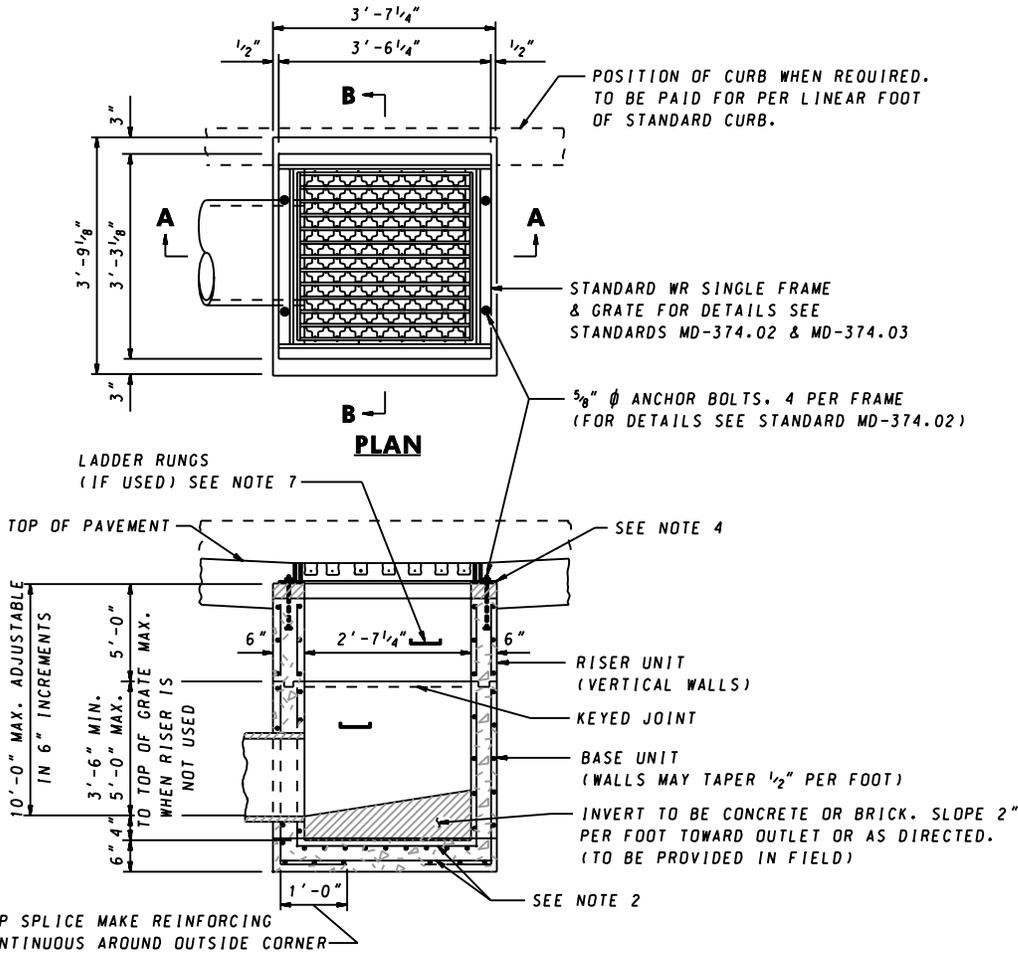


SPECIFICATION 305	CATEGORY CODE ITEMS
APPROVED <i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT	
	APPROVAL • SHA REVISIONS
	APPROVAL 6-4-84
	REVISED 10-1-01
	REVISED
	REVISED

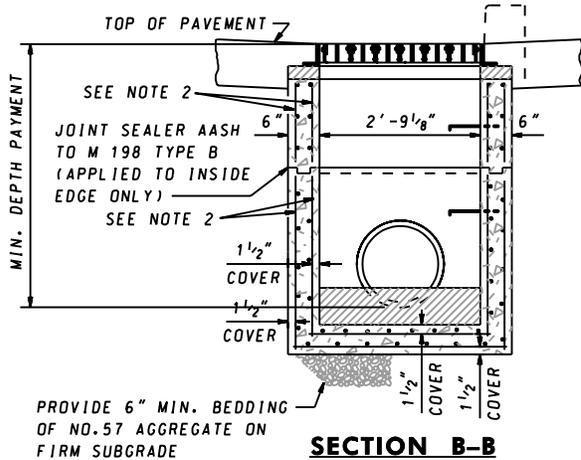
Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
 STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

PRECAST WRM INLET

STANDARD NO. MD 374.22



SECTION A-A



SECTION B-B

NOTES

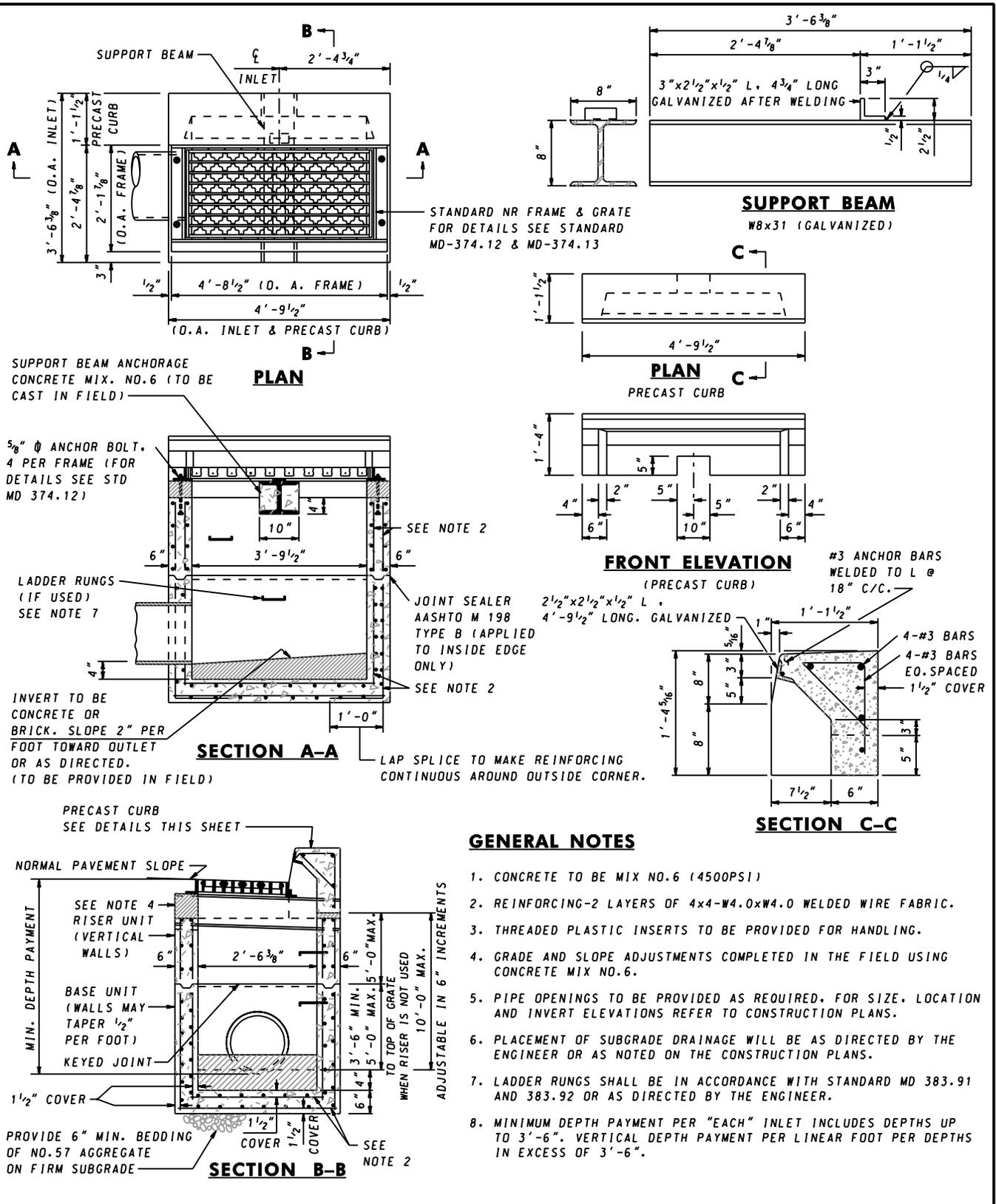
1. CONCRETE TO BE MIX NO. 6 (4500 PSI).
2. REINFORCING-2 LAYERS OF 4x4-W4.0xW4.0 WELDED WIRE FABRIC.
3. THREADED PLASTIC INSERTS TO BE PROVIDED FOR HANDLING.
4. GRADE AND SLOPE ADJUSTMENTS COMPLETED IN THE FIELD USING CONCRETE MIX NO.6.
5. PIPE OPENINGS TO BE PROVIDED AS REQUIRED. FOR SIZE, LOCATION, AND INVERT ELEVATIONS REFER TO CONSTRUCTION PLANS.
6. PLACEMENT OF SUBGRADE DRAINAGE WILL BE AS DIRECTED BY THE ENGINEER OR AS NOTED ON THE CONSTRUCTION PLANS.
7. LADDER RUNGS SHALL BE IN ACCORDANCE WITH STANDARD MD 383.91 AND MD 383.92 OR AS DIRECTED BY THE ENGINEER.
8. MINIMUM DEPTH PAYMENT PER "EACH" INLET INCLUDES DEPTHS UP TO 3'-6". VERTICAL DEPTH PAYMENT PER LINEAR FOOT FOR DEPTHS IN EXCESS OF 3'-6".

SPECIFICATION 305	CATEGORY CODE ITEMS
APPROVED	<i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT
	APPROVAL • SHA REVISIONS
	APPROVAL 6-4-84
	REVISION 10-1-01
	REVISION
APPROVAL • FEDERAL HIGHWAY ADMINISTRATION	
APPROVAL 8-1-84	
REVISION 3-30-87	
REVISION	
REVISION	

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
 STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

PRECAST SINGLE WR INLET

STANDARD NO. MD 374.23

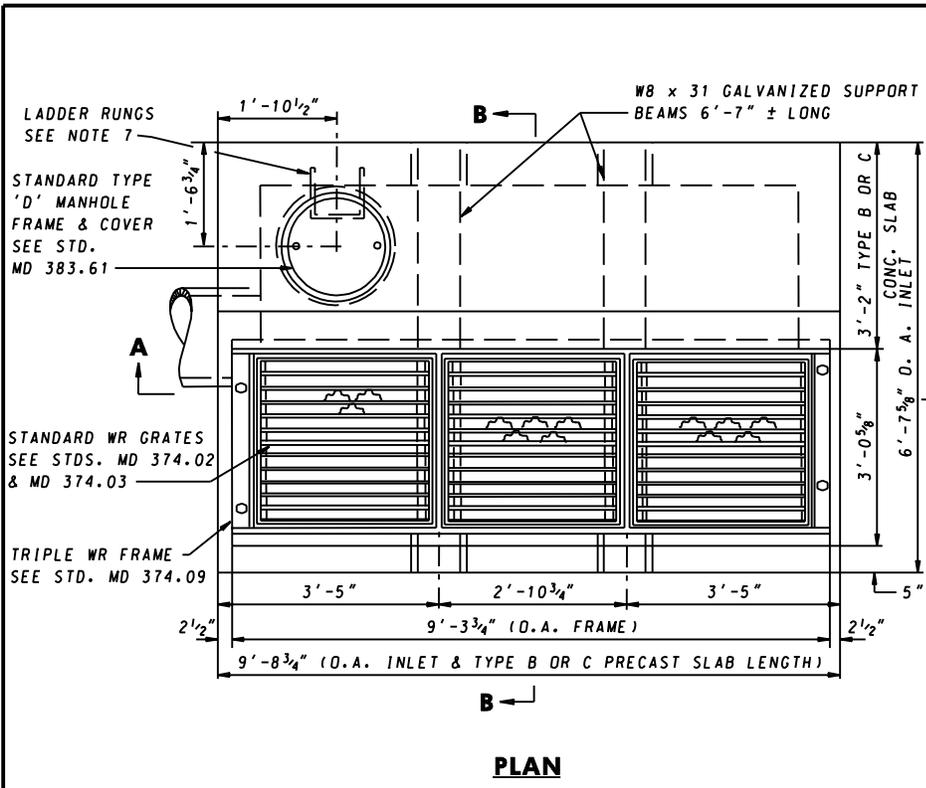


SPECIFICATION 305	CATEGORY CODE ITEMS
APPROVED	<i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT
	APPROVAL • SHA REVISIONS
	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
	APPROVAL 6-4-84
	APPROVAL 8-1-84
REVISED 10-1-01	REVISED 3-30-87
REVISED	REVISED
REVISED	REVISED

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
 STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

PRECAST NR INLET

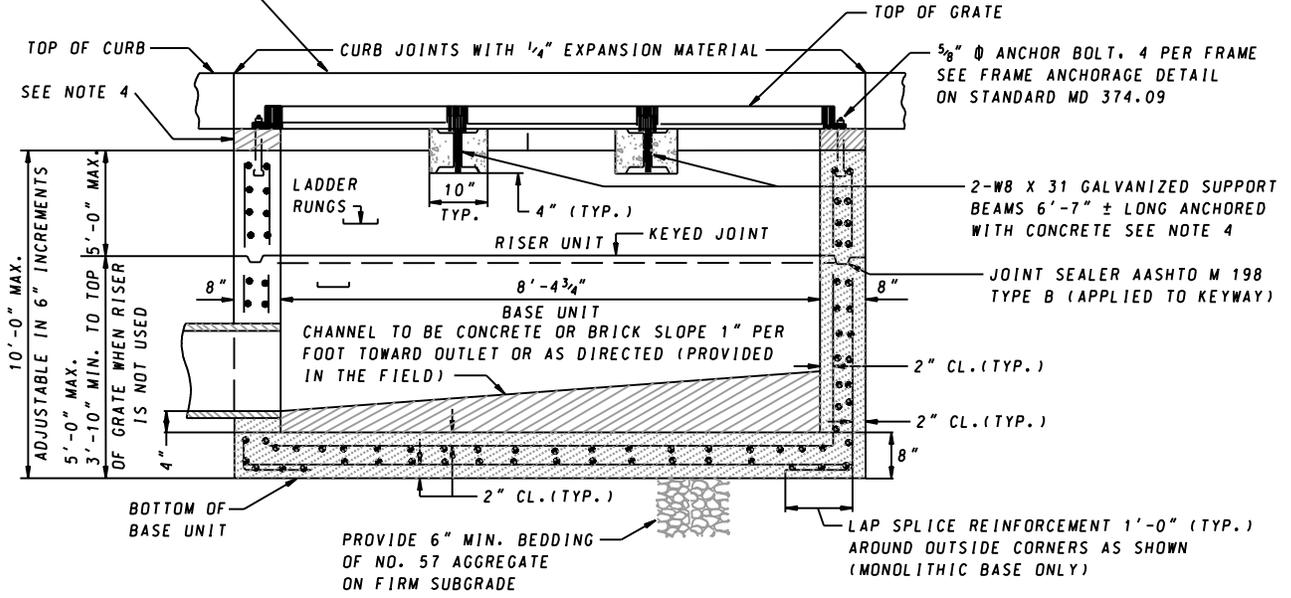
STANDARD NO. MD 374.24



PLAN

FOR SECTION B-B SEE
STD. MD 374.27-01

SEE STD. MD
374.27-01 FOR DETAILS



SECTION A-A

NOTES

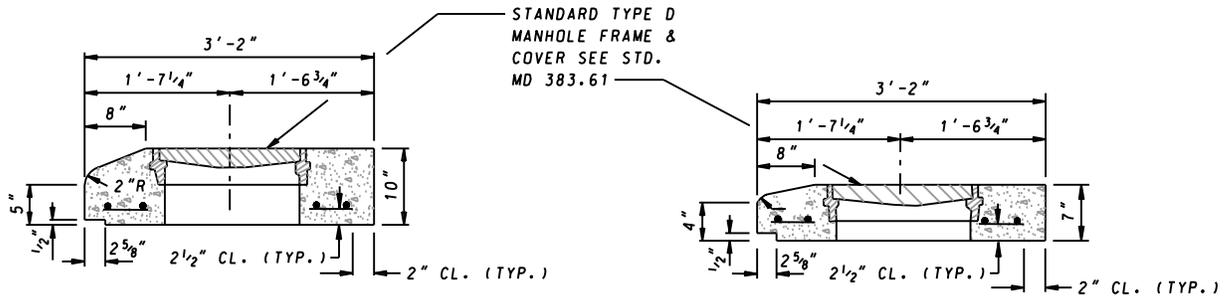
1. CONCRETE TO BE MIX NO. 6 (4500 PSI).
2. REINFORCEMENT-2 LAYERS OF 4x4-W4.0xW4.0 WELDED WIRE FABRIC.
3. THREADED PLASTIC INSERTS TO BE PROVIDED FOR HANDLING.
4. GRADE AND SLOPE ADJUSTMENTS AND SUPPORT BEAM ANCHORAGES SHALL BE COMPLETED IN THE FIELD USING CONCRETE MIX NO.6 GRADE AND SLOPE ADJUSTMENTS SHALL BE MIN. 2", MAX 9".
5. PIPE OPENINGS SHALL BE PROVIDED AS REQUIRED. FOR SIZE, LOCATION AND INVERT ELEVATIONS REFER TO THE CONSTRUCTION PLANS.
6. PLACEMENT OF SUBGRADE DRAINAGE WILL BE AS DIRECTED BY THE ENGINEER OR AS NOTED ON THE CONSTRUCTION PLANS.
7. LADDER RUNGS SHALL BE IN ACCORDANCE WITH STDS. MD 383.91 OR MD 383.92. RUNGS ARE INCIDENTAL TO THE COST OF THE INLET.
8. MINIMUM DEPTH PAYMENT PER EACH SHALL BE 3'-10" MEASURED FROM THE PIPE INVERT TO THE TOP OF THE GRATE AT ITS HIGHEST POINT. VERTICAL DEPTH PAYMENT PER LINEAR FOOT SHALL INCLUDE ALL DEPTHS IN EXCESS OF 3'-10" INCLUDING ALL APPURTENANCES.
9. BASE UNIT WALLS MAY TAPER PER MANUFACTURER'S DESIGN.

SPECIFICATION 305	CATEGORY CODE ITEMS
APPROVED <i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT	
	APPROVAL • SHA REVISIONS APPROVAL 2-22-91
	REVISD 10-1-01
	REVISD
	REVISD

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

PRECAST TRIPLE WRM INLET

STANDARD NO. MD 374.27

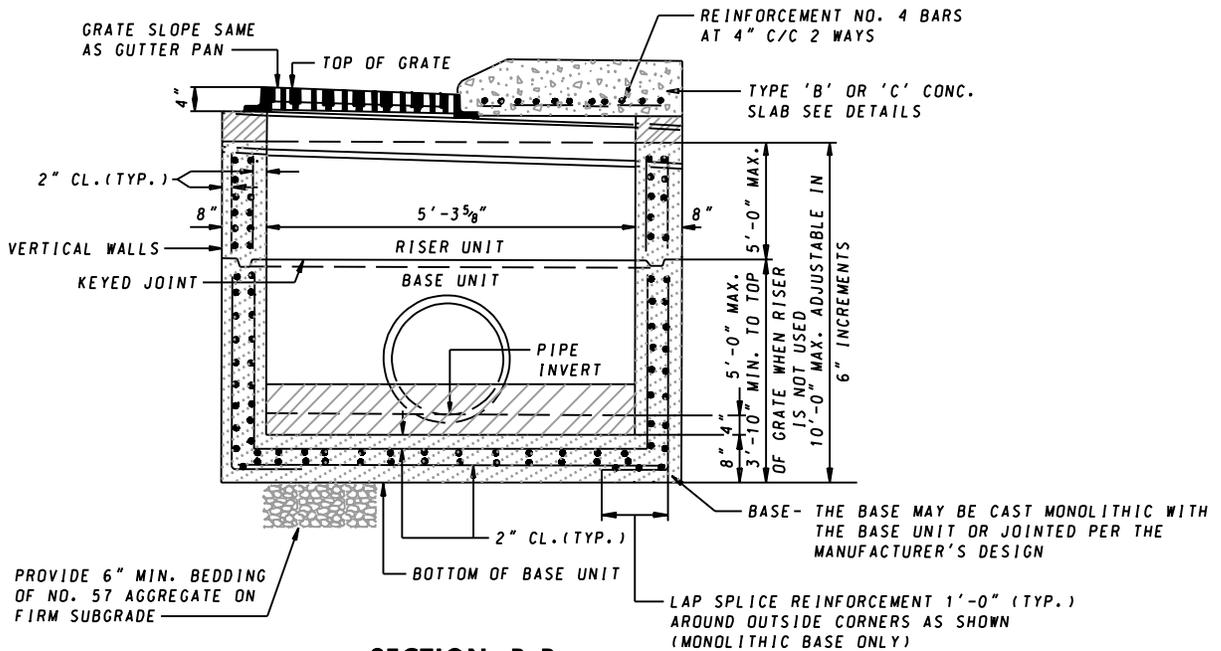


TYPE B PRECAST CONCRETE SLAB
(CONC. MIX NO. 2)

TYPE C PRECAST CONCRETE SLAB
(CONC. MIX NO. 2)

NOTE

TYPE 'B' SLAB SHALL BE USED WITH STD. TYPE 'B' CONC CURB
 TYPE 'C' SLAB SHALL BE USED WITH STD. TYPE 'C' CONC CURB
 FOR STANDARD CURB DETAILS SEE STD. MD 620.02.



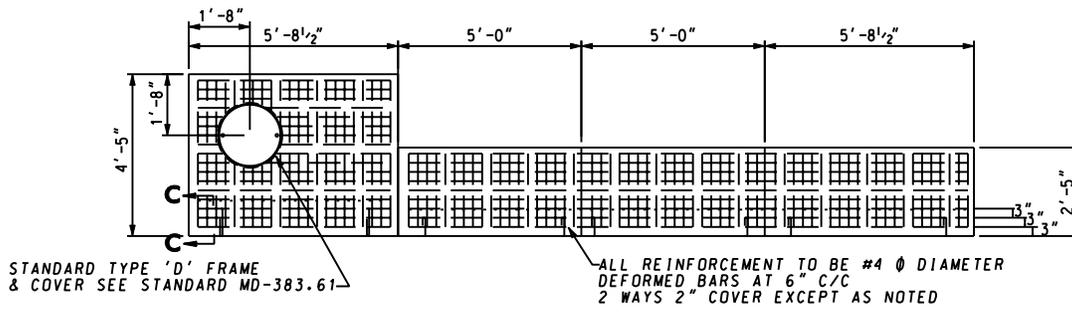
SECTION B-B

SPECIFICATION 305	CATEGORY CODE ITEMS
APPROVED <i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT	
	APPROVAL • SHA REVISIONS
	APPROVAL 2-22-91
	REVISED 10-1-01
	REVISED
	REVISED
APPROVAL • FEDERAL HIGHWAY ADMINISTRATION	
APPROVAL 1-2-91	
REVISED	
REVISED	
REVISED	

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
 STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

PRECAST TRIPLE WRM INLET

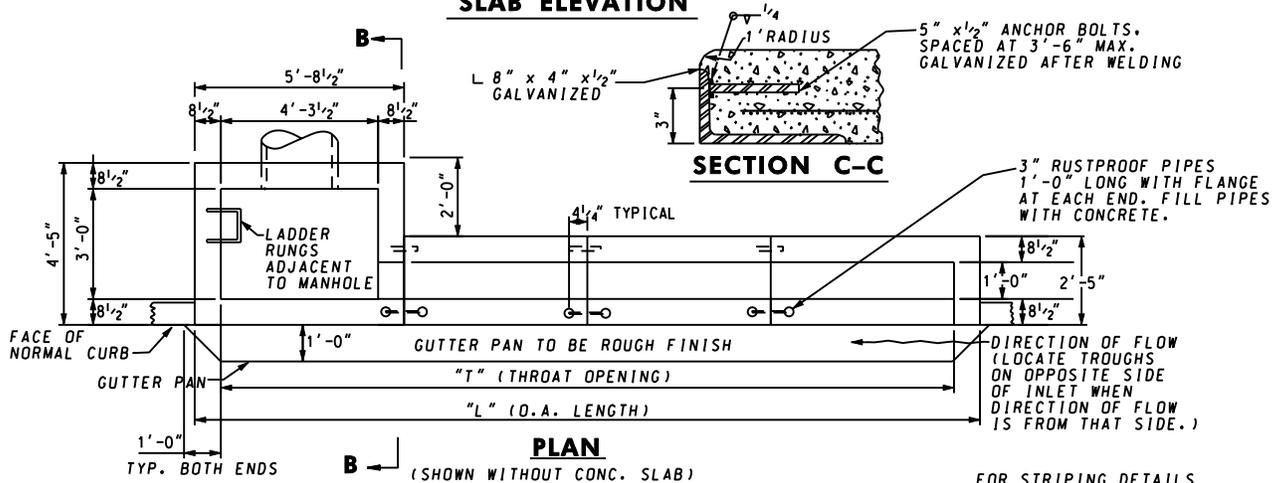
STANDARD NO. MD 374.27-01



CONCRETE SLAB

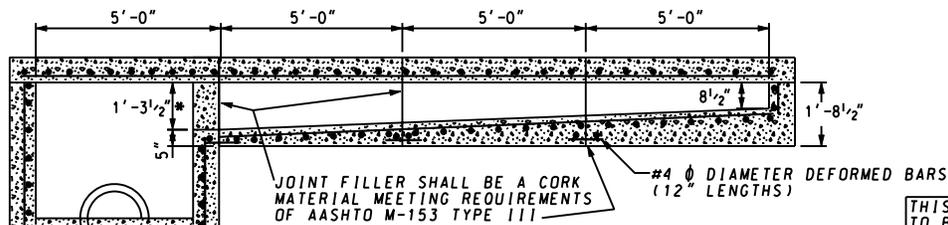


SLAB ELEVATION



FOR STRIPING DETAILS REFER TO STANDARD MD-374.41

NOTE:
INLET DEPTH MUST BE INCREASED WHEN PIPES LARGER THAN 18" ARE USED UNDER THE TROUGH SECTIONS.

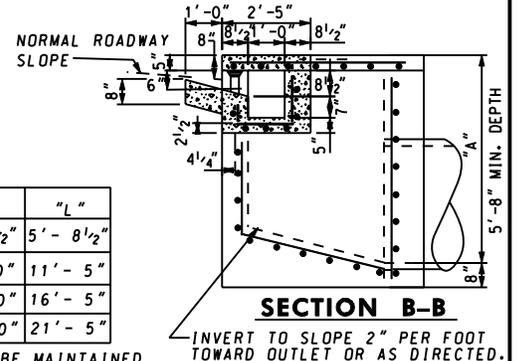


SECTION A-A

NOTE:
CURB OPENING SHOULD NOT ENCRoACH ON CROSSWALK AREAS. INLETS SHALL BE CONSTRUCTED OF REINFORCED CONCRETE (MIX NO. 2). SIZE, TYPE & DIRECTION OF INLET CONNECTION WILL VARY TO SUIT CONDITIONS. REINFORCEMENT REQUIRED ON OUTSIDE, AS WELL AS ON INSIDE OF WALLS WHEN "A" IS GREATER THAN 7'-0". SPACING, SAME AS FOR INSIDE OF WALL. PLACE EXPANSION MATERIAL (SAME TYPE APPROVED FOR PAVEMENT) AS INDICATED. LADDER RUNGS SHALL BE IN ACCORDANCE WITH STD. MD-383.91 AND MD-383.92 OR AS DIRECTED BY THE ENGINEER. ANGLES & ANCHOR BOLTS TO BE GALVANIZED IN ACCORDANCE WITH ASTM A-123, AFTER WELDING.

INLET	"T"	"L"
C O G - 5	4' - 3 1/2"	5' - 8 1/2"
C O G - 10	10' - 0"	11' - 5"
C O G - 15	15' - 0"	16' - 5"
C O G - 20	20' - 0"	21' - 5"

* THIS DIMENSION TO BE MAINTAINED FOR ALL STANDARD COG INLETS

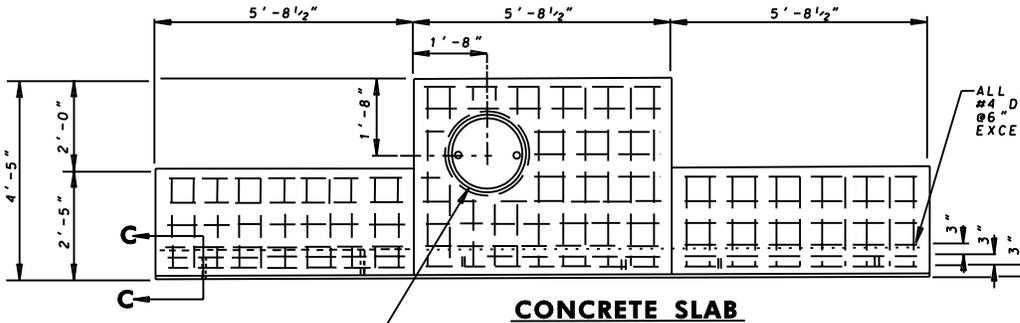


SPECIFICATION 305	CATEGORY CODE ITEMS
APPROVED <i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT	
	APPROVAL • SHA REVISIONS APPROVAL 2-27-81 REVISED 11-18-04 REVISED REVISED
	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION APPROVAL 6-24-81 REVISED 3-30-87 REVISED REVISED

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

STANDARD C O G INLETS
5', 10', 15' & 20'

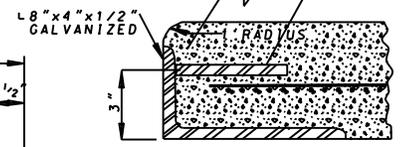
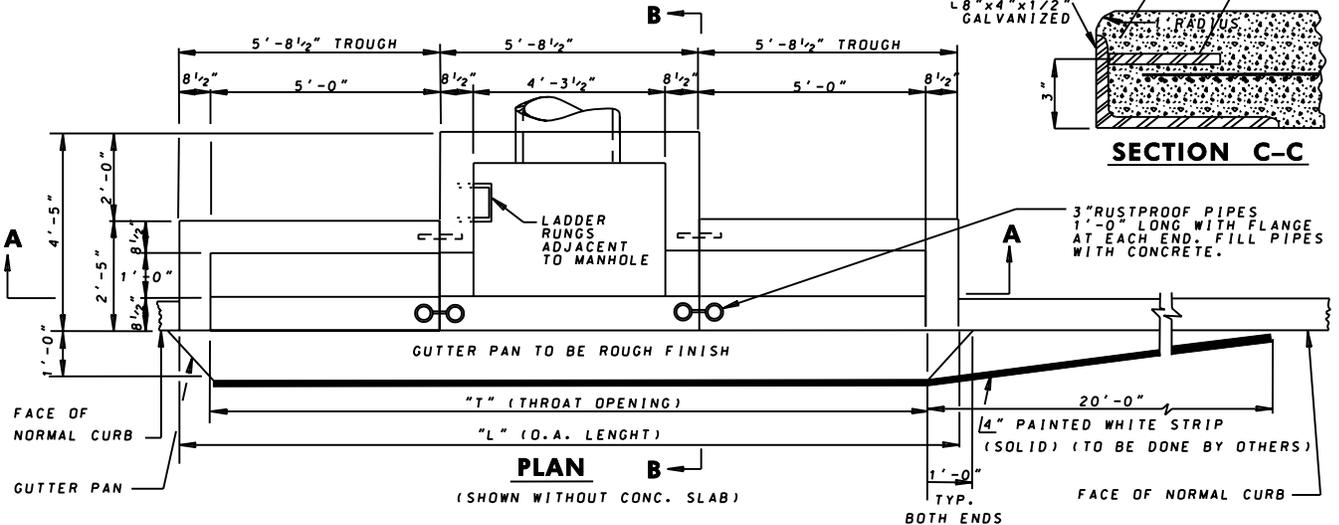
STANDARD NO. MD - 374.31



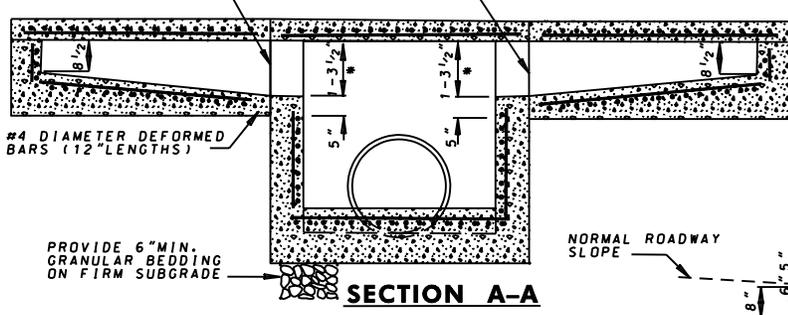
STANDARD TYPE 'D' FRAME & COVER SEE STANDARD MD-383.61



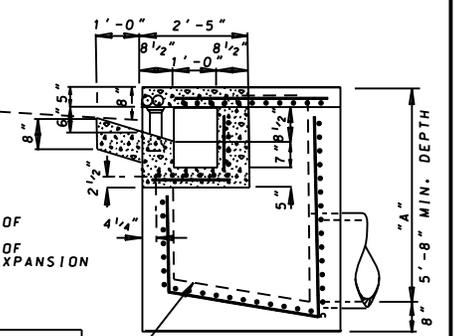
5" x 1/2" ANCHOR BOLTS, SPACED @ 3'-6" MAX. GALVANIZED AFTER WELDING



JOINT FILLER SHALL BE A CORK MATERIAL MEETING REQUIREMENTS OF AASHTO M-153 TYPE III



	INLET	"T"	"L"
COS - 5		4'-3 1/2"	5'-8 1/2"
COS - 15		15'-8 1/2"	17'-1 1/2"



NOTE:
CURB OPENING SHOULD NOT ENCRoACH ON CROSSWALK AREAS. INLETS SHALL BE CONSTRUCTED OF REINFORCED CONCRETE (MIX. MD. 2). SIZE, TYPE & DIRECTION OF INLET CONNECTION WILL VARY TO SUIT CONDITIONS. REINFORCEMENT REQUIRED ON OUTSIDE, AS WELL AS ON INSIDE OF WALL WHEN "A" IS GREATER THAN 7'-0". SPACING, SAME AS FOR INSIDE OF WALL. PLACE EXPANSION MATERIAL (SAME TYPE APPROVED FOR PAVEMENT) AS INDICATED. LADDER RUNGS SHALL BE IN ACCORDANCE WITH STD. MD-383.91 AND MD-383.92 OR AS DIRECTED BY THE ENGINEER. ANGLES & ANCHOR BOLTS TO BE GALVANIZED IN ACCORDANCE WITH ASTM A 123. AFTER WELDING. INLET DEPTH MUST BE INCREASED WHEN PIPES LARGER THAN 18" ARE USED UNDER THE TROUGH SECTIONS.

THIS STANDARD TO BE USED WITH TYPE A CURB ONLY

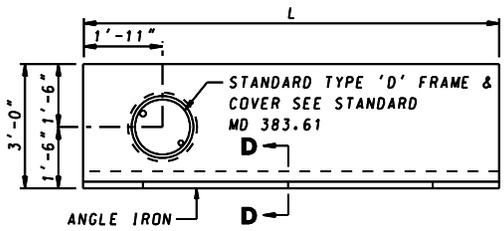
* THIS DIMENSION TO BE MAINTAINED FOR ALL STANDARD COS INLETS.

SPECIFICATION 305	CATEGORY CODE ITEMS
APPROVED <i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT	
	APPROVAL • SHA REVISIONS
	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
	APPROVAL 2-27-81
	REVISION 11-18-04
	REVISION

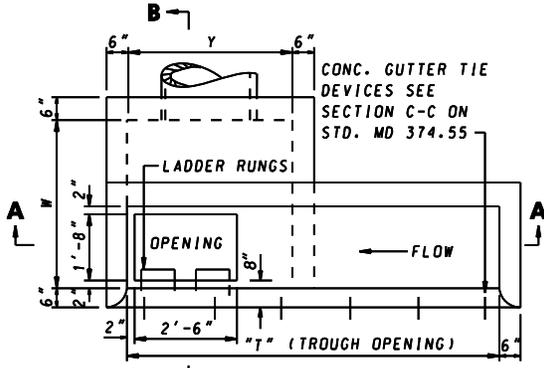
Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

STANDARD C O S INLETS
5' & 15'

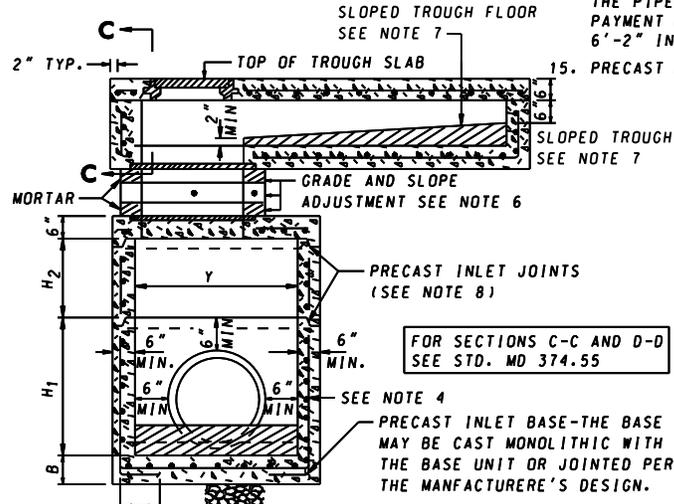
STANDARD NO. MD - 374.41



PRECAST CONCRETE TROUGH SLAB
(6" THICK)



PLAN
(SHOWN WITHOUT TROUGH SLAB)

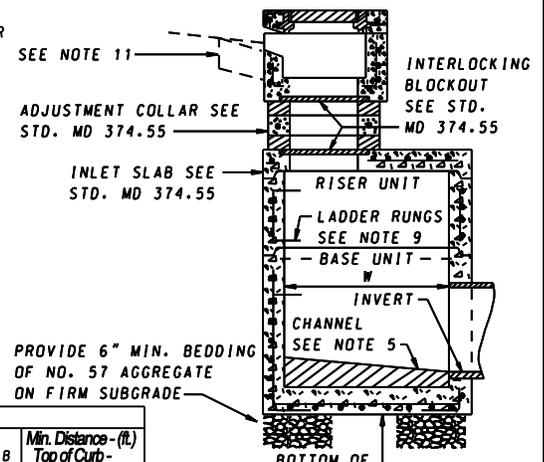


LAP SPLICE REINFORCEMENT 1'-0" (TYP.) AROUND OUTSIDE CORNERS AS SHOWN. (MONOLITHIC BASE ONLY)

SECTION A-A
(SHOWN AS PRECAST)

NOTES

1. THIS STANDARD TO BE USED WITH TYPE A COMBINATION CURB AND GUTTER ONLY..
2. CURB OPENINGS SHALL NOT ENCRDACH ON CROSSWALK AREAS.
3. CONCRETE SHALL BE MIX NO.6 (4500 PSI) FOR PRECAST UNITS AND MIX NO.3 (3500 PSI) FOR STRUCTURES CAST IN PLACE.
4. INLET MAY BE PRECAST OR CAST IN PLACE. REINFORCEMENT SHALL BE NO.4 BARS PLACED IN THE CENTER OF INLET WALLS AT 6" C/C 2 WAYS OR 2 LAYERS OF 4x4-W4.0xW4.0 WELDED WIRE FABRIC WITH 1 1/2" COVER.
5. A CONCRETE OR BRICK CHANNEL WHICH SLOPES AT LEAST 2 IN./FT TOWARD THE OUTLET SHALL BE PROVIDED IN THE FIELD.
6. GRADE AND SLOPE ADJUSTMENTS SHALL BE COMPLETED IN THE FIELD USING PRECAST ADJUSTMENT COLLAR AND MORTAR.
7. SLOPED TROUGH FLOOR TO BE CAST IN THE FIELD AND USED ONLY WHEN ROAD GRADE IS 1.5% OR LESS. WHEN SLOPED TROUGH FLOOR IS USED, ROUGHEN PRECAST TROUGH FLOOR.
8. PRECAST INLET JOINTS- THE MANUFACTURER SHALL FORM MALE AND FEMALE ENDS OF JOINTS USING THEIR OWN DESIGN. THE JOINTS SHALL BE SEALED BY THE CONTRACTOR AND MADE WATERTIGHT USING THE MANUFACTURER'S RECOMMENDED ASTM OR AASHTO APPROVED SEALANT.
9. LADDER RUNGS SHALL BE PLACED IN VERTICAL ALIGNMENT AT 1'-3" C/C. RUNG TYPE SHALL BE IN ACCORDANCE WITH STANDARDS MD 383.91 OR MD 383.92. RUNGS ARE INCIDENTAL TO THE COST OF THE INLET.
10. ANGLE IRON AND SHEAR STUD CONNECTORS SHALL BE GALVANIZED AFTER WELDING IN ACCORDANCE WITH ASTM A 123. SEE STD. MD 374.55 & MD 374.64.
11. SEE STANDARD MD 374.65 FOR DEPRESSED GUTTER PAN.
12. SEE STANDARD MD 374.64 FOR ALTERNATE PRECAST COG TROUGHS.
13. PAY MEASUREMENTS FOR CAST IN PLACE UNIT SHALL BE THE SAME AS THE PRECAST UNIT. REFER TO NOTE 14. ALL OTHER DIMENSIONS SHOWN FOR PRECAST SHALL APPLY TO CAST IN PLACE.
14. MINIMUM DEPTH PAYMENT PER EACH SHALL BE 6'-2" MEASURED FROM THE PIPE INVERT TO THE TOP OF THE TROUGH SLAB. VERTICAL DEPTH PAYMENT PER LINEAR FOOT SHALL INCLUDE ALL DEPTHS IN EXCESS OF 6'-2" INCLUDING ALL APPURTENANCES.
15. PRECAST BASE UNIT WALLS MAY TAPER PER MANUFACTURER'S DESIGN.



SECTION B-B
(SHOWN AS PRECAST)

PIPE SIZE MIN. TO MAX.	PRECAST DIMENSIONS						Min. Distance - (ft.) Top of Curb - Pipe Invert
	W	A + W	Y	H1 BASE	H2 RISER	B	
12"	4'-0"	4'-0"	4'-0"	2'to 10'	1'to 5'	6"	3.84
15" - 24"	4'-0"	4'-0"	4'-0"	3'to 10'	1'to 5'	6"	4.11-4.92
27" - 33"	4'-0"	4'-0"	4'-0"	4'to 10'	1'to 5'	6"	5.19-5.73
36"	4'-0"	4'-0"	4'-0"	5'to 10'	1'to 5'	6"	6.00
42"	4'-0"	6'-0"	6'-0"	5'to 10'	1'to 5'	6"	6.55
48" - 54"	4'-0"	6'-0"	6'-0"	6'to 10'	1'to 5'	6"	7.09-7.63
60"	4'-0"	6'-0"	6'-0"	7'to 10'	1'to 5'	6"	8.17
66" - 72"	6'-0"	6'-0"	8'-0"	8'to 10'	1'to 5'	8"	8.71-9.25
78" - 84"	6'-0"	6'-0"	8'-0"	9'to 10'	1'to 5'	8"	9.80-10.34

INLET TYPE	T	L
COG - 5	5'- 0"	6'- 0"
COG - 10	10'- 0"	11'- 0"
COG - 15	15'- 0"	16'- 0"
COG - 20	20'- 0"	21'- 0"

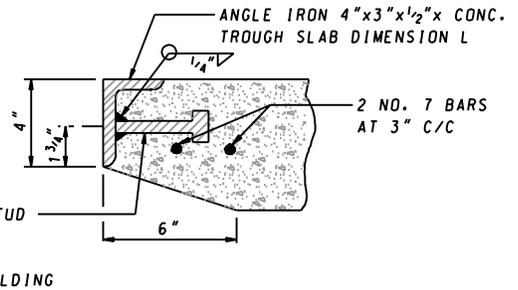
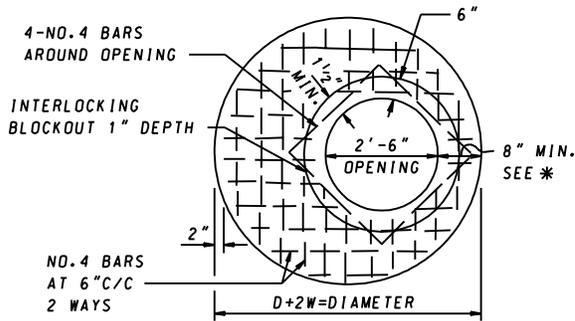
SPECIFICATION **305** CATEGORY CODE ITEMS

APPROVED *Kirk G. McCallum*
DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT

SHA State Highway Administration

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APPROVAL 2-22-91	APPROVAL 1-21-91
REVISED 10-1-01	REVISED 8-16-91
REVISED 08-03-10	REVISED 07-26-10
REVISED	REVISED

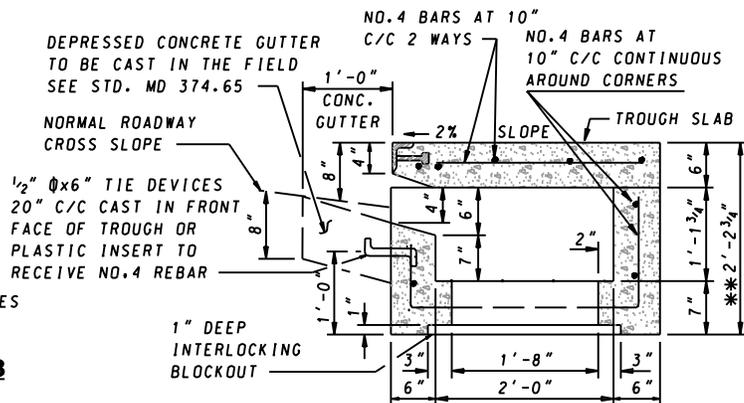
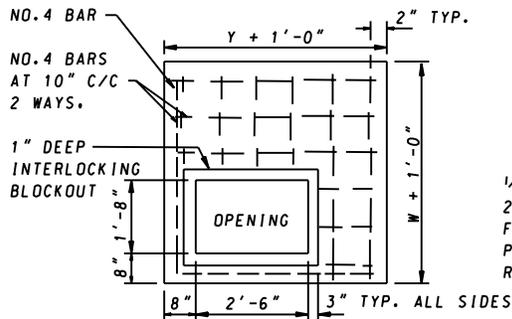
Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES
PRECAST OR CAST IN PLACE
SQUARE AND RECTANGULAR COG INLETS
5', 10', 15' & 20'
STANDARD NO. MD 374.51



PRECAST CONCRETE INLET SLAB FOR CIRCULAR COG & COS INLETS

SECTION D-D
SEE STDS. MD 374.51, MD 374.61, MD 374.62 OR MD 374.63

* THIS DIMENSION FOR THE 96" AND THE 108" DIAMETER INLETS SHALL BE THE SAME AS THE WALL THICKNESS
SEE STD. MD 374.62 OR MD 374.63.

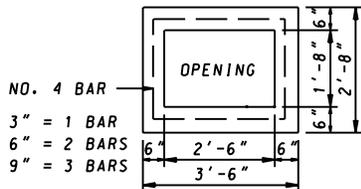


PRECAST CONCRETE INLET SLAB FOR SQUARE & RECTANGULAR COG & COS INLETS

SECTION C-C
SEE STDS. MD 374.51, MD 374.61, MD 374.62 OR MD 374.63

(6" THICK)
SEE STD. MD 374.51 OR 375.61

** HEIGHT OF THE BACK WALL IS 3/4" HIGHER THAN THE FRONT WALL DUE TO 2% SLOPE ON THE TOP TROUGH SLAB.



PRECAST CONCRETE ADJUSTMENT COLLAR FOR SQUARE, RECTANGULAR AND CIRCULAR INLETS

DETAILS FOR COG & COS INLETS ARE SHOWN ON THE FOLLOWING STANDARDS

- MD 374.51 PRECAST OR CAST IN PLACE SQUARE & RECTANGULAR COG INLETS 5', 10', 15', & 20'
- MD 374.61 PRECAST OR CAST IN PLACE SQUARE & RECTANGULAR COS INLETS 5', 10', 15', & 20'
- MD 374.62 PRECAST CIRCULAR COG INLETS 5', 10', 15', & 20'
- MD 374.63 PRECAST CIRCULAR COS INLETS 5', 10', 15', & 20'
- MD 374.64 ALTERNATE PRECAST TROUGHS FOR COG AND COS INLETS
- MD 374.65 DEPRESSED GUTTER PAN FOR COG & COS INLETS

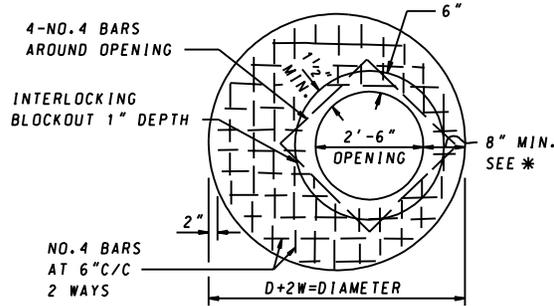
(CAST IN 3", 6", & 9" THICKNESS)
SEE STD. MD 374.51 OR MD 374.61

NOTES

- CONCRETE SHALL BE MIX NO. 6 (4500 PSI).
- ANGLE IRON AND SHEAR STUD CONNECTORS SHALL BE GALVANIZED AFTER WELDING IN ACCORDANCE WITH ASTM A 123.

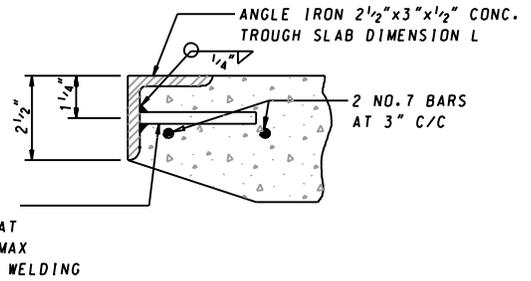
SPECIFICATION 305	CATEGORY CODE ITEMS
APPROVED <i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT	
	APPROVAL • SHA REVISIONS
	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
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	APPROVAL 1-2-91
	REVISION 10-1-01
REVISION	REVISION
REVISION	REVISION

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES
PRECAST CONCRETE
INLET SLABS AND ADJUSTMENT COLLARS
FOR COG AND COS INLETS
STANDARD NO. MD 374.55



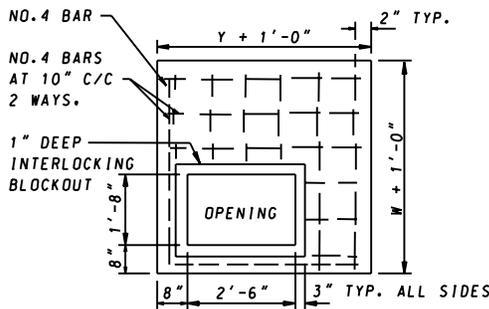
PRECAST CONCRETE INLET SLAB FOR CIRCULAR COG & COS INLETS

* THIS DIMENSION FOR THE 96" AND THE 108" DIAMETER INLETS SHALL BE THE SAME AS THE WALL THICKNESS SEE STD. MD 374.62 OR MD 374.63.



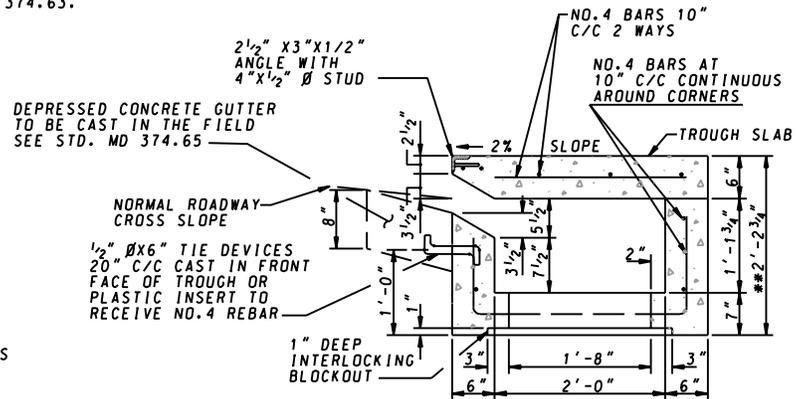
SECTION D-D

SEE STDS. MD 374.51, MD 374.61, MD 374.62 OR MD 374.63



PRECAST CONCRETE INLET SLAB FOR SQUARE & RECTANGULAR COG & COS INLETS

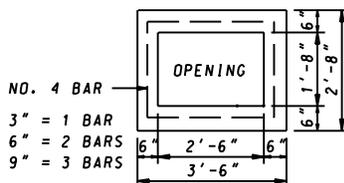
(6" THICK)
SEE STD. MD 374.51 OR 375.61



SECTION C-C

SEE STDS. MD 374.51, MD 374.61, MD 374.62 OR MD 374.63

** HEIGHT OF THE BACK WALL IS 3/4" HIGHER THAN THE FRONT WALL DUE TO 2% SLOPE ON THE TOP TROUGH SLAB.



PRECAST CONCRETE ADJUSTMENT COLLAR FOR SQUARE, RECTANGULAR AND CIRCULAR INLETS

(CAST IN 3", 6", & 9" THICKNESS)
SEE STD. MD 374.51 OR MD 374.61

DETAILS FOR COG & COS INLETS ARE SHOWN ON THE FOLLOWING STANDARDS

- MD 374.51 PRECAST OR CAST IN PLACE SQUARE & RECTANGULAR COG INLETS 5', 10', 15', & 20'
- MD 374.61 PRECAST OR CAST IN PLACE SQUARE & RECTANGULAR COS INLETS 5', 10', 15', & 20'
- MD 374.62 PRECAST OR CAST IN PLACE CIRCULAR COG INLETS 5', 10', 15', & 20'
- MD 374.63 PRECAST OR CAST IN PLACE CIRCULAR COS INLETS 5', 10', 15', & 20'
- MD 374.64 ALTERNATE PRECAST TROUGHS FOR COG AND COS INLETS
- MD 374.65 DEPRESSED CONCRETE GUTTER PAN FOR COG & COS INLETS

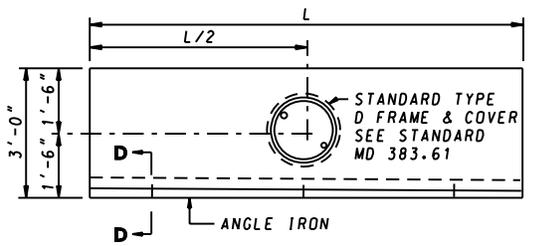
NOTES

1. CONCRETE SHALL BE MIX NO. 6 (4500 PSI).
2. ANGLE IRON AND SHEAR STUD CONNECTORS SHALL BE GALVANIZED AFTER WELDING IN ACCORDANCE WITH ASTM A 123.

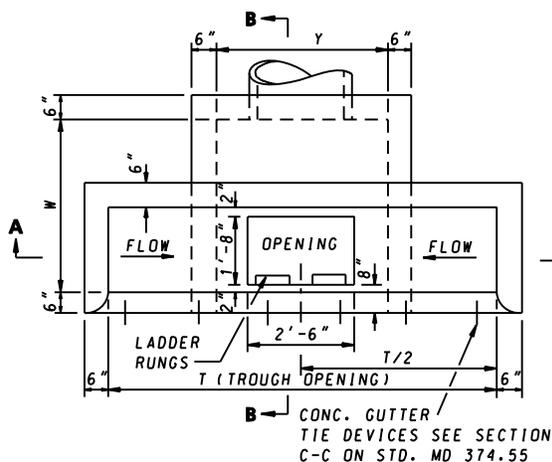
SPECIFICATION 305	CATEGORY CODE ITEMS
APPROVED <i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT	
	APPROVAL • SHA REVISIONS
	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
	APPROVAL 3-25-03
	APPROVAL 5-5-03
REVISIONS	REVISIONS
REVISIONS	REVISIONS
REVISIONS	REVISIONS

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES
PRECAST CONCRETE
INLET SLABS AND ADJUSTMENT COLLARS FOR COG/COS INLETS TO ACCOMODATE 6" CURB

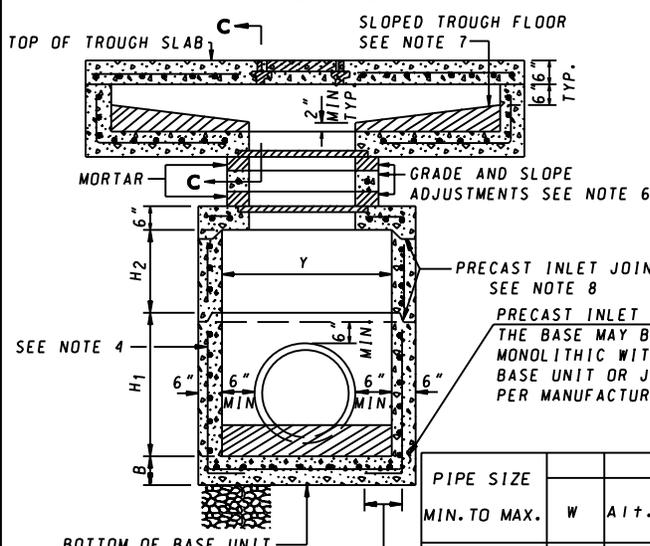
STANDARD NO. MD 374.55-01



PRECAST CONCRETE TROUGH SLAB
(6" THICK)

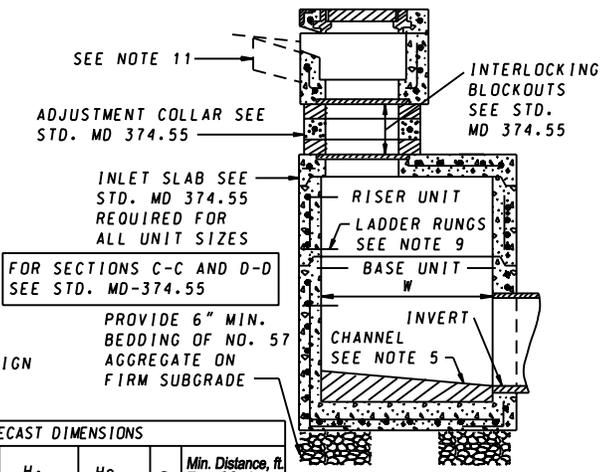


PLAN
(SHOWN WITHOUT TROUGH SLAB)



SECTION A-A
(SHOWN AS PRECAST)

LAP SPLICE REINFORCEMENT 1'-0" (TYP.) AROUND OUTSIDE CORNERS AS SHOWN. (MONOLITHIC BASE ONLY)



SECTION B-B
(SHOWN AS PRECAST)

PIPE SIZE MIN. TO MAX.	PRECAST DIMENSIONS						Min. Distance, ft. Top of Curb - Pipe Invert
	W	A + W	Y	H ₁ BASE	H ₂ RISER	B	
12"	4'-0"	4'-0"	2'to 10'	1'to 5'	6"	3.84	
15" - 24"	4'-0"	4'-0"	3'to 10'	1'to 5'	6"	4.11-4.92	
27" - 33"	4'-0"	4'-0"	4'to 10'	1'to 5'	6"	5.19-5.73	
36"	4'-0"	4'-0"	5'to 10'	1'to 5'	6"	6.00	
42"	4'-0"	6'-0"	6'-0"	5'to 10'	1'to 5'	6"	6.55
48" - 54"	4'-0"	6'-0"	6'-0"	6'to 10'	1'to 5'	6"	7.09-7.63
60"	4'-0"	6'-0"	6'-0"	7'to 10'	1'to 5'	6"	8.17
66" - 72"	6'-0"	8'-0"	8'-0"	8'to 10'	1'to 5'	8"	8.71-9.25
78" - 84"	6'-0"	8'-0"	8'-0"	9'to 10'	1'to 5'	8"	9.80-10.34

INLET TYPE	T	L
COS-5	5'-0"	6'-0"
COS-10	10'-0"	11'-0"
COS-15	15'-0"	16'-0"
COS-20	20'-0"	21'-0"

NOTES

1. THIS STANDARD TO BE USED WITH TYPE A COMBINATION CURB AND GUTTER ONLY.
2. CURB OPENINGS SHALL NOT ENCRDACH ON CROSSWALK AREAS.
3. CONCRETE SHALL BE MIX NO.6 (4500 PSI) FOR PRECAST UNITS AND CONCRETE MIX NO.3 (3500 PSI) FOR CAST IN PLACE UNITS.
4. INLET MAY BE PRECAST OR CAST IN PLACE. REINFORCEMENT SHALL BE NO.4 BARS PLACED IN THE CENTER OF INLET WALLS AT 6" C/C 2 WAY OR 2 LAYERS OF 4x4-W4.0xW4.0 WELDED WIRE FABRIC WITH 1 1/2" COVER.
5. A CONCRETE OR BRICK CHANNEL WHICH SLOPES AT LEAST 2 IN./FT TOWARD THE OUTLET SHALL BE PROVIDED IN THE FIELD.
6. GRADE AND SLOPE ADJUSTMENTS SHALL BE COMPLETED IN THE FIELD USING PRECAST ADJUSTMENT COLLAR AND MORTAR.
7. SLOPED TROUGH FLOOR TO BE CAST IN THE FIELD AND USED ONLY WHEN ROAD GRADE IS 1.5% OR LESS. WHEN SLOPED TROUGH FLOOR IS USED, ROUGHEN PRECAST TROUGH FLOOR.
8. PRECAST INLET JOINTS-THE MANUFACTURER SHALL FORM MALE AND FEMALE ENDS OF JOINTS USING THEIR OWN DESIGN. THE JOINTS SHALL BE SEALED BY THE CONTRACTOR AND MADE WATERTIGHT USING THE MANUFACTURER'S RECOMMENDED ASTM OR AASHTO APPROVED SEALANT.
9. LADDER RUNGS SHALL BE PLACED IN VERTICAL ALIGNMENT AT 1'-3" C/C. RUNGS ARE INCIDENTAL TO THE COST OF THE INLET.
10. ANGLE IRON AND SHEAR STUD CONNECTORS SHALL BE GALVANIZED AFTER WELDING IN ACCORDANCE WITH ASTM A 123. SEE STDS. MD 374.55 & MD 374.64.
11. SEE STANDARD MD 374.65 FOR DEPRESSED GUTTER PAN.
12. SEE STANDARD MD 374.64 FOR ALTERNATE PRECAST COS TROUGHS.
13. PAY MEASUREMENTS FOR CAST IN PLACE UNIT SHALL BE THE SAME AS THE PRECAST UNIT. REFER TO NOTE 14. ALL OTHER DIMENSIONS SHOWN FOR PRECAST UNIT SHALL APPLY TO CAST IN PLACE UNIT.
14. MINIMUM DEPTH PAYMENT PER EACH SHALL BE 6'-2" MEASURED FROM THE PIPE INVERT TO THE TOP OF THE TROUGH SLAB. VERTICAL DEPTH PAYMENT PER LINEAR FOOT SHALL INCLUDE ALL DEPTHS IN EXCESS OF 6'-2" INCLUDING ALL APPURTENANCES.
15. PRECAST BASE UNIT WALLS MAY TAPER PER MANUFACTURER'S DESIGN.

SPECIFICATION **305** CATEGORY CODE ITEMS

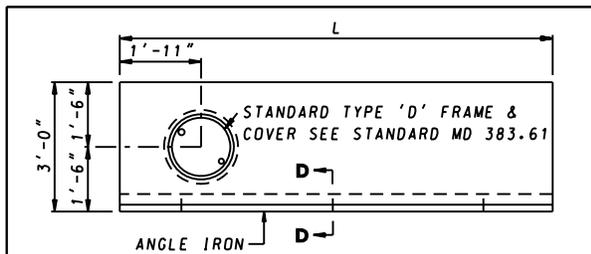
APPROVED *Kirk G. McCall*
DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT



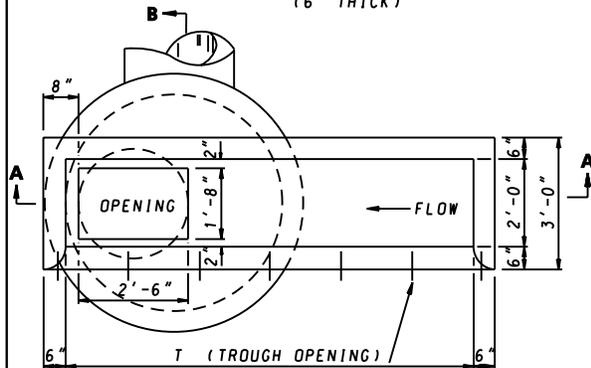
APPROVAL • SHA REVISIONS	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
APPROVAL 2-22-91	APPROVAL 1-2-91
REVISED 10-1-01	REVISED 8-16-91
REVISED 08-03-10	REVISED 07-26-10
REVISED	REVISED

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES
PRECAST OR CAST IN PLACE
SQUARE AND RECTANGULAR COS INLETS
5', 10', 15' & 20'

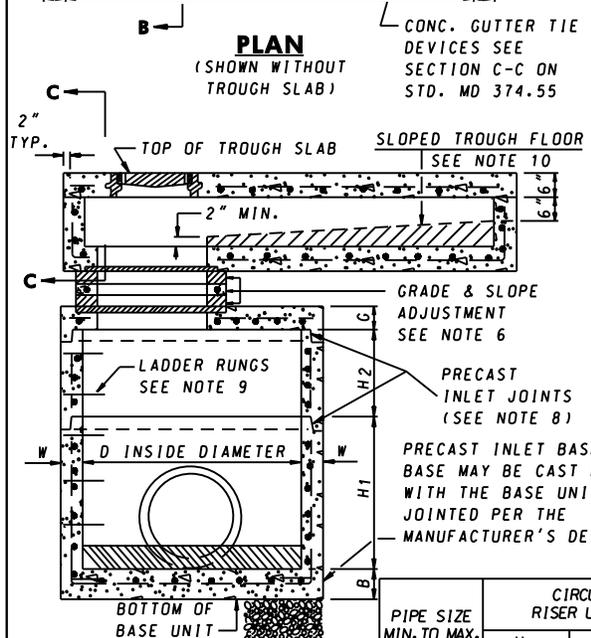
STANDARD NO. MD 374.61



PRECAST CONCRETE TROUGH SLAB
(6" THICK)



PLAN
(SHOWN WITHOUT TROUGH SLAB)



SECTION A-A
(SHOWN PRECAST)

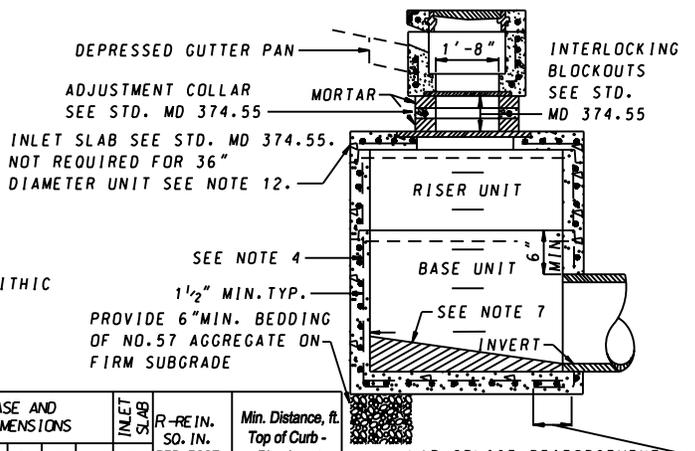
FOR SECTIONS C-C AND D-D SEE STD MD 374.55

INLET TYPE	T	L
COG-5	5'-0"	6'-0"
COG-10	10'-0"	11'-0"
COG-15	15'-0"	16'-0"
COG-20	20'-0"	21'-0"

PIPE SIZE MIN. TO MAX.	CIRCULAR BASE AND RISER UNIT DIMENSIONS						INLET SLAB	R-REIN. SO. IN. PER FOOT	Min. Distance, ft. Top of Curb - Pipe Invert
	H ₁ BASE	H ₂ RISER	W MIN.	B	D	G			
12"	2' TO 4'	1' TO 4'	4"	6"	36"	NOT REQ.	.09	3.84	
15" TO 24"	3' TO 5'	1' TO 5'	5"	6"	48"	8"	.12	4.11-4.92	
27" TO 33"	3' TO 6'	1' TO 6'	6"	6"	60"	8"	.15	5.19-5.73	
36"	5' TO 6'	1' TO 6'	6"	6"	60"	8"	.15	6.00	
42"	5' TO 7'	1' TO 7'	7"	6"	72"	8"	.18	6.55	
48"	6' TO 7'	1' TO 7'	7"	6"	72"	8"	.18	7.09	
54"	6' TO 8'	1' TO 8'	8"	8"	84"	8"	.21	7.63	
60"	7' TO 8'	1' TO 8'	8"	8"	84"	8"	.21	8.17	
66" TO 72"	8' TO 9'	1' TO 8'	9"	8"	96"	8"	.24	8.71-9.25	
78" TO 84"	9' TO 10'	1' TO 8'	10"	8"	120"	8"	.27	9.80-10.34	

NOTES

- THIS STANDARD TO BE USED WITH TYPE A COMBINATION CURB AND GUTTER ONLY.
- CURB OPENINGS SHALL NOT ENCRDACH ON CROSSWALK AREAS.
- CONCRETE SHALL BE MIX. NO.6(4500 PSI) FOR PRECAST UNITS AND CONCRETE MIX NO.3(3500 PSI) FOR CAST IN PLACE UNITS.
- INLET MAY BE PRECAST OR CAST IN PLACE. REINFORCEMENT SHALL BE EITHER WELDED WIRE FABRIC OR REINFORCING BARS AND SHALL CONFORM TO THE AREAS GIVEN UNDER R IN THE CHART ON THIS SHEET.
- ANGLE IRON AND SHEAR STUD CONNECTORS SHALL BE GALVANIZED AFTER WELDING IN ACCORDANCE WITH ASTM A 123. SEE STDS. MD 374.55 & 374.64.
- GRADE AND SLOPE ADJUSTMENTS SHALL BE COMPLETED IN THE FIELD USING PRECAST ADJUSTMENT COLLAR AND MORTAR.
- A CONCRETE OR BRICK CHANNEL WHICH SLOPES AT LEAST 2 IN./FT. TOWARD OUTLET SHALL BE PROVIDED IN THE FIELD.
- PRECAST INLET JOINTS-THE MANUFACTURER SHALL FORM MALE AND FEMALE ENDS OF JOINTS USING THEIR OWN DESIGN. THE JOINTS SHALL BE SEALED BY THE CONTRACTOR AND MADE WATERTIGHT USING THE MANUFACTURERS RECOMMENDED ASTM OR AASHTO APPROVED SEALANT.
- LADDER RUNGS SHALL BE PLACED IN VERTICAL ALIGNMENT AT 1'-3" C/C. RUNGS SHALL BE IN ACCORDANCE WITH STANDARDS MD 383.91 OR MD 383.92. RUNGS ARE INCIDENTAL TO THE COST OF THE INLET.
- SLOPED TROUGH FLOOR TO BE CONSTRUCTED IN THE FIELD USING BRICK OR CONCRETE AND USED ONLY WHEN ROAD GRADE IS 1.5% OR LESS.WHEN SLOPED TROUGH FLOOR IS USED, ROUGHEN PRECAST TROUGH FLOOR.
- MINIMUM DEPTH PAYMENT PER EACH SHALL BE 6'-2" MEASURED FROM THE PIPE INVERT TO THE TOP OF THE TROUGH SLAB. VERTICAL DEPTH PAYMENT PER LINEAR FOOT SHALL INCLUDE ALL DEPTHS IN EXCESS OF 6'-2" INCLUDING ALL APPURTENANCES.
- INLET SLAB NOT REQUIRED FOR 36" DIAMETER INLET. TROUGH SITS DIRECTLY ON TOP OF THE CIRCULAR UNIT. MORTAR AREA BETWEEN THE OUTSIDE WALLS OF THE TROUGH AND THE UNIT WALL.
- SEE STD. MD 374.64 FOR ALTERNATE PRECAST COG TROUGHS AND STD. MD 374.65 FOR DEPRESSED GUTTER PAN DETAILS.
- BASE UNIT WALLS MAY TAPER PER MANUFACTURER'S DESIGN.



SECTION B-B
(SHOWN PRECAST)

SPECIFICATION **305** CATEGORY CODE ITEMS

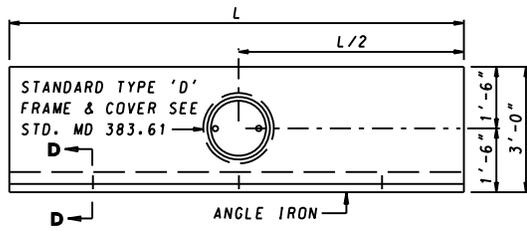
APPROVED *Kirk G. McCall*
DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT

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REVISED 10-1-01	REVISED 8-16-91
REVISED 08-03-10	REVISED 07-26-10
REVISED	REVISED

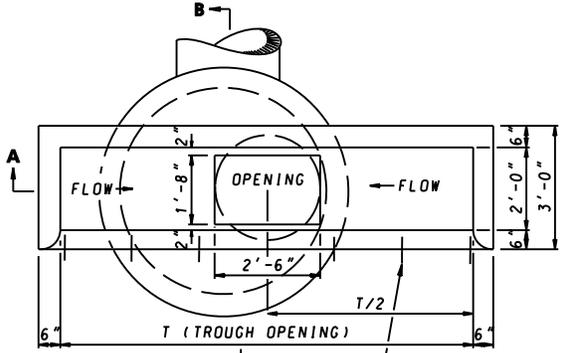
Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES
PRECAST OR CAST
IN PLACE CIRCULAR COG INLETS
5', 10', 15', & 20'

STANDARD NO. MD 374.62



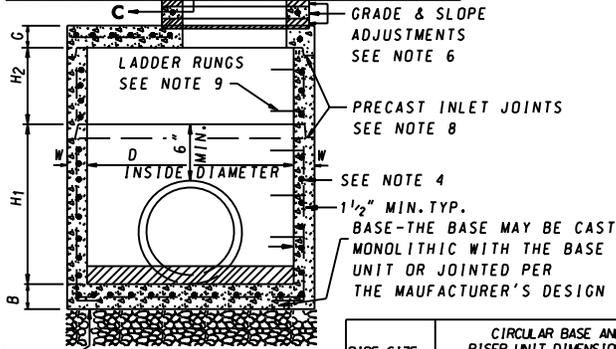
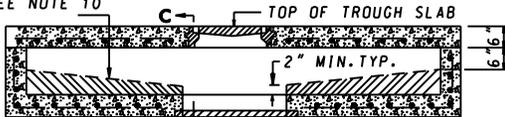


PRECAST CONCRETE TROUGH SLAB
(6" THICK)



PLAN

SLOPED TROUGH FLOOR
SEE NOTE 10



SECTION A-A
(SHOWN PRECAST)

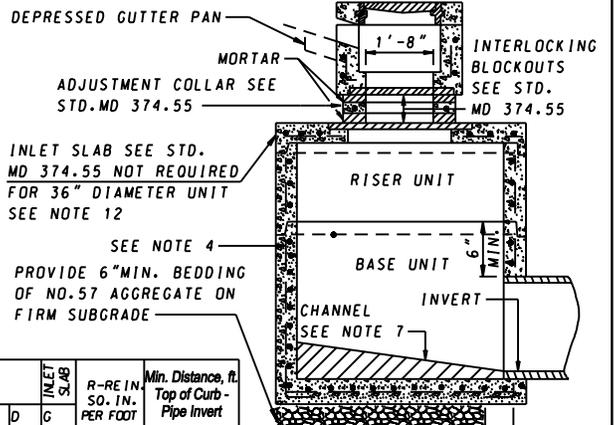
FOR SECTION C-C
AND D-D SEE
STD MD 374.55

INLET TYPE	T	L
COS-5	5'-0"	6'-0"
COS-10	10'-0"	11'-0"
COS-15	15'-0"	16'-0"
COS-20	20'-0"	21'-0"

PIPE SIZE MIN. TO MAX.	CIRCULAR BASE AND RISER UNIT DIMENSIONS						R-REIN. SO. IN. PER FOOT	Min. Distance, ft. Top of Curb - Pipe Invert
	H ₁ BASE	H ₂ RISER	W MIN.	B	D	G		
12"	2' TO 4'	1' TO 4'	4"	6"	36"	NOT REQ.	.09	3.84
15" TO 24"	3' TO 5'	1' TO 5'	5"	6"	48"	8"	.12	4.11-4.92
27" TO 33"	3' TO 6'	1' TO 6'	6"	6"	60"	8"	.15	5.19-5.73
36"	5' TO 6'	1' TO 6'	6"	6"	60"	8"	.15	6.00
42"	5' TO 7'	1' TO 7'	7"	6"	72"	8"	.18	6.55
48"	6' TO 7'	1' TO 7'	7"	6"	72"	8"	.18	7.09
54"	6' TO 8'	1' TO 8'	8"	8"	84"	8"	.21	7.63
60"	7' TO 8'	1' TO 8'	8"	8"	84"	8"	.21	8.17
66" TO 72"	8' TO 9'	1' TO 8'	9"	8"	96"	8"	.24	8.71-9.25
78" TO 84"	9' TO 10'	1' TO 8'	10"	8"	120"	8"	.27	9.80-10.34

NOTES

- THIS STANDARD TO BE USED WITH TYPE A COMBINATION CURB AND GUTTER ONLY.
- CURB OPENING SHALL NOT ENCRoACH ON CROSSWALK AREAS.
- CONCRETE TO BE MIX NO.6 (4500 PSI) FOR PRECAST UNITS AND CONCRETE MIX NO.3 (3500 PSI) FOR STRUCTURES CAST IN PLACE.
- INLET MAY BE PRECAST OR CAST IN PLACE. REINFORCEMENT SHALL BE EITHER WELDED WIRE FABRIC OR REINFORCING BARS AND SHALL CONFORM TO THE AREAS GIVEN UNDER R IN THE CHART ON THIS SHEET.
- ANGLE IRON AND SHEAR STUD CONNECTORS SHALL BE GALVANIZED AFTER WELDING IN ACCORDANCE WITH ASTM A 123. SEE STDS. MD 374.55 & 374.64.
- GRADE AND SLOPE ADJUSTMENTS SHALL BE COMPLETED IN THE FIELD USING PRECAST ADJUSTMENT COLLAR AND MORTAR.
- A CONCRETE OR BRICK CHANNEL WHICH SLOPES AT LEAST 2 IN./FT. TOWARD OUTLET SHALL BE PROVIDED IN THE FIELD.
- PRECAST INLET JOINTS- THE MANUFACTURER SHALL FORM MALE AND FEMALE ENDS OF JOINTS USING THEIR OWN DESIGN. THE JOINTS SHALL BE SEALED BY THE CONTRACTOR AND MADE WATERTIGHT USING THE MANUFACTURERS RECOMMENDED ASTM OR AASHTO APPROVED SEALANT.
- LADDER RUNGS SHALL BE PLACED IN VERTICAL ALIGNMENT AT 1'-3" C/C RUNG TYPE SHALL BE IN ACCORDANCE WITH STDS. MD 383.91 OR MD 383.92. RUNGS ARE INCIDENTAL TO THE COST OF THE INLET.
- SLOPED TROUGH FLOOR TO BE CONSTRUCTED IN THE FIELD USING BRICK OR CONCRETE AND USED ONLY WHEN ROAD GRADE IS 1.5% OR LESS. WHEN SLOPED TROUGH FLOOR IS USED, ROUGHEN PRECAST TROUGH FLOOR.
- MINIMUM DEPTH PAYMENT PER EACH SHALL BE 6'-2" MEASURED FROM THE PIPE INVERT TO THE TOP OF THE TROUGH SLAB. VERTICAL DEPTH PAYMENT PER LINEAR FOOT SHALL INCLUDE ALL DEPTHS IN EXCESS OF 6'-2" INCLUDING ALL APPURTENANCES.
- INLET SLAB NOT REQUIRED FOR 36" DIAMETER INLET. TROUGH SITS DIRECTLY ON THE TOP OF THE CIRCULAR UNIT. MORTAR AREA BETWEEN THE OUTSIDE WALLS OF THE TROUGH AND THE UNIT WALL.
- SEE STD. MD 374.64 FOR ALTERNATE PRECAST COS TROUGHS AND STD. MD 374.65 FOR DEPRESSED GUTTER PAN DETAILS.
- BASE UNIT WALLS TAPER PER MANUFACTURER'S DESIGN.



LAP SPLICE REINFORCEMENT 1'-0"
(TYP.) AROUND OUTSIDE CORNERS
AS SHOWN. (MONOLITHIC BASE ONLY)

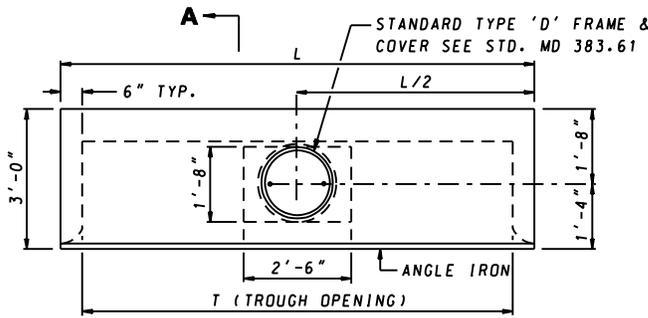
SECTION B-B
(SHOWN PRECAST)

SPECIFICATION	CATEGORY CODE ITEMS	
APPROVED	<i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT	
	APPROVAL • SHA REVISIONS	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
	APPROVAL 2-22-91	APPROVAL 1-2-91
	REVISED 08-03-10	REVISED 07-26-10
	REVISED	REVISED

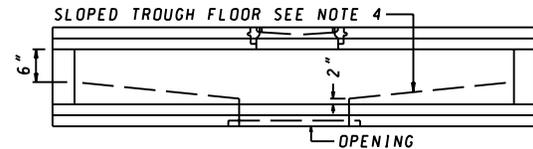
Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES
PRECAST OR CAST IN PLACE
CIRCULAR COS INLETS
5', 10', 15, & 20'

STANDARD NO.

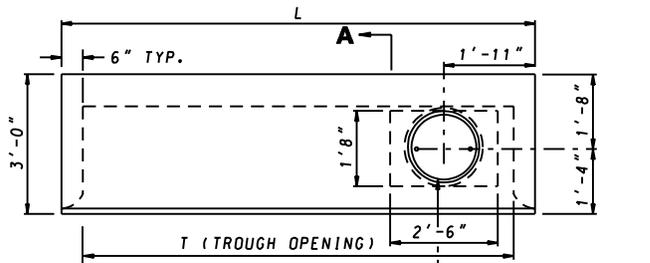
MD 374.63



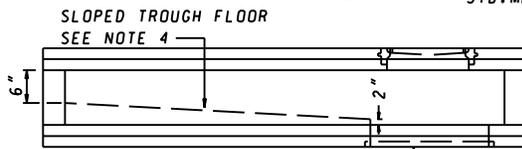
PLAN



ELEVATION
ALTERNATE COS TROUGH
(TROUGH FRONT NOT SHOWN)



PLAN

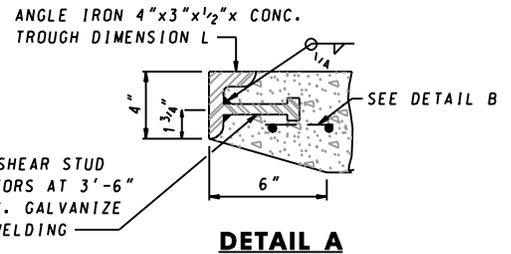


ELEVATION
ALTERNATE COG TROUGH
(TROUGH FRONT NOT SHOWN)

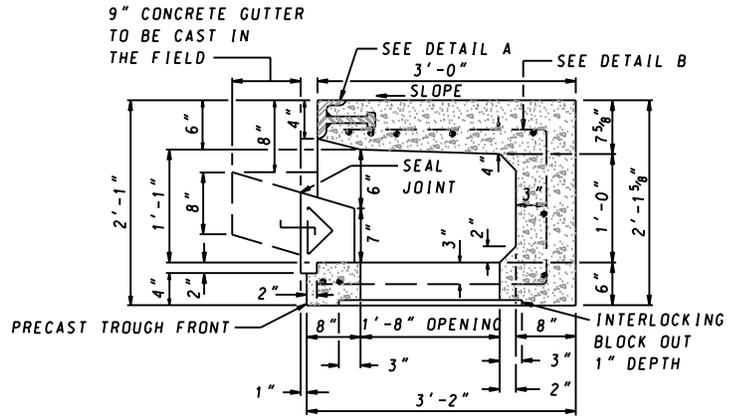
NOTES

1. CONCRETE TO BE MIX NO.6 (4500 PSI).
2. ASTM A 185 GRADE 65 STEEL.
3. THESE TROUGHS MAY BE USED AS ALTERNATES FOR THOSE SHOWN ON STANDARDS MD 374.51, MD 374.61, MD 374.62, & MD 374.63.
4. SLOPED TROUGH FLOOR TO BE CONSTRUCTED IN THE FIELD USING BRICK OR CONCRETE AND USED ONLY WHEN ROAD GRADE IS 1.5% OR LESS. WHEN SLOPED TROUGH FLOOR IS USED, ROUGHEN THE PRECAST TROUGH FLOOR.
5. ANGLE IRON AND SHEAR STUD CONNECTORS SHALL BE GALVANIZED AFTER WELDING IN ACCORDANCE WITH ASTM A 123.
6. WHEN USING THESE TROUGHS THE MINIMUM DEPTH PER EACH SHALL BE THE DEPTH SPECIFIED FOR THE RESPECTIVE INLET.

INLET TYPE	T	L
COG-5	5'-0"	6'-0"
COG-10	10'-0"	11'-0"
COG-15	15'-0"	16'-0"
COG-20	20'-0"	21'-0"
COS-5	5'-0"	6'-0"
COS-10	10'-0"	11'-0"
COS-15	15'-0"	16'-0"
COS-20	20'-0"	21'-0"

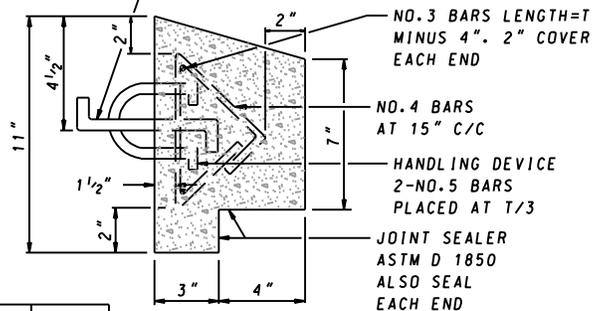


DETAIL A

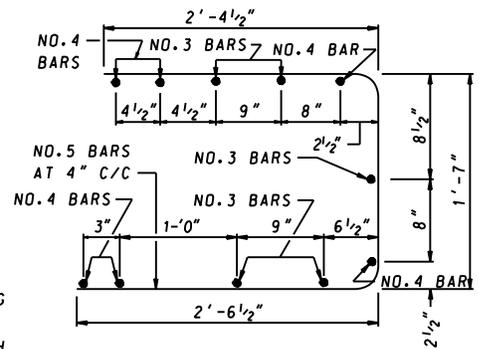


SECTION A-A
(TYPICAL COG & COS)

1/2"x6" TIE DEVICES AT 20" C/C



PRECAST TROUGH FRONT
(TYPICAL COG & COS LENGTH=T)



DETAIL B

SPECIFICATION 305	CATEGORY CODE ITEMS
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APPROVED *Kirk G. McCall*
DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT

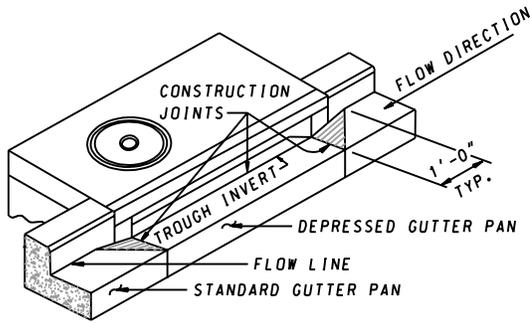


APPROVAL • SHA REVISIONS	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
APPROVAL 2-22-91	APPROVAL 1-2-91
REVISED 10-1-01	REVISED 9-4-91
REVISED	REVISED
REVISED	REVISED

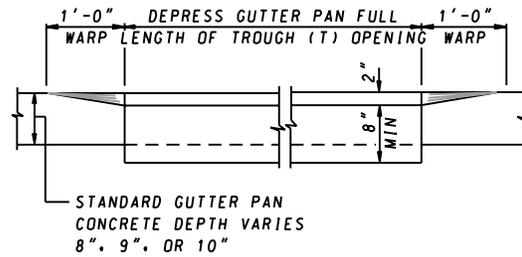
Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

ALTERNATE PRECAST TROUGHS FOR COG & COS INLETS

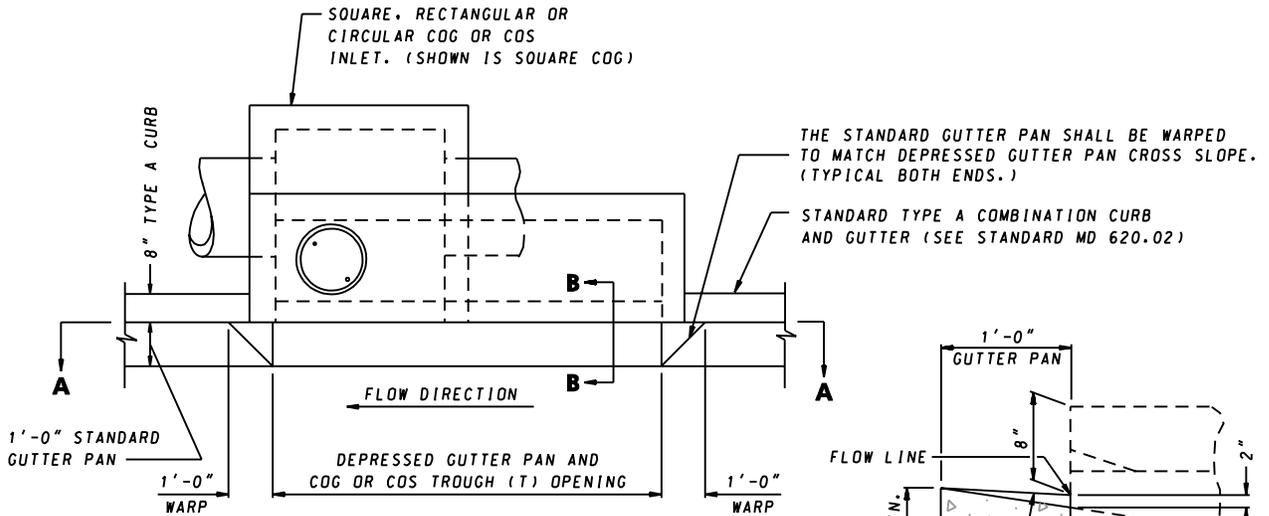
STANDARD NO. MD 374.64



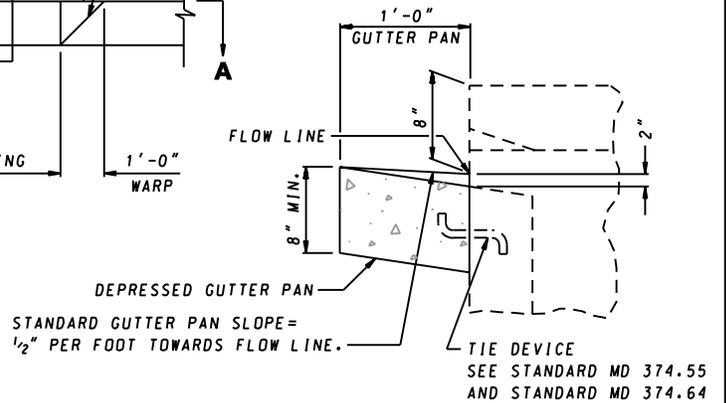
ISOMETRIC



SECTION A-A
(SHOWN LOOKING TOWARD ROADWAY)



PLAN



SECTION B-B

DETAILS FOR COG AND COS INLETS ARE SHOWN ON THE FOLLOWING STANDARDS

- MD 374.51 PRECAST OR CAST IN PLACE SQUARE AND RECTANGULAR COG INLETS 5', 10', 15', & 20'
- MD 374.55 PRECAST CONCRETE TROUGH INLET SLABS AND ADJUSTMENT COLLAR FOR COG AND COS INLETS
- MD 374.61 PRECAST OR CAST IN PLACE SQUARE AND RECTANGULAR COS INLETS 5', 10', 15', & 20'
- MD 374.62 PRECAST CIRCULAR COG INLETS 5', 10', 15', & 20'
- MD 374.63 PRECAST CIRCULAR COS INLETS 5', 10', 15', & 20'
- MD 374.64 ALTERNATE PRECAST TROUGHS FOR COG AND COS INLETS

NOTES

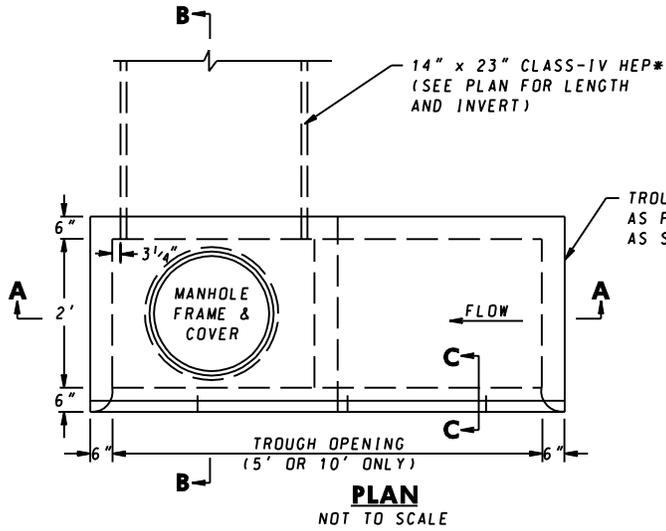
1. COST OF DEPRESSED CONCRETE GUTTER PAN IS INCIDENTAL TO THE COST OF THE INLET.
2. STANDARD TYPE A COMBINATION CURB AND GUTTER PAID FOR SEPARATELY.

SPECIFICATION	CATEGORY CODE ITEMS
APPROVED	<i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT
	APPROVAL • SHA REVISIONS
	APPROVAL 2-22-91
	REVISED 10-1-01
	REVISED
	REVISED

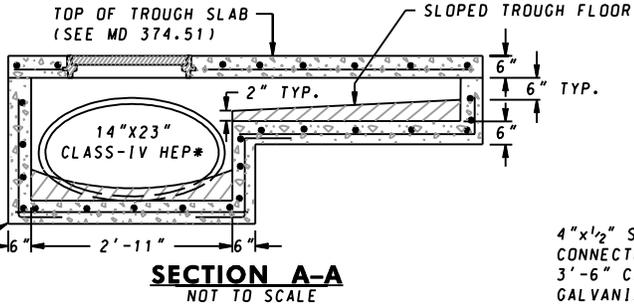
Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

DEPRESSED CONCRETE GUTTER PAN FOR COG AND COS INLETS

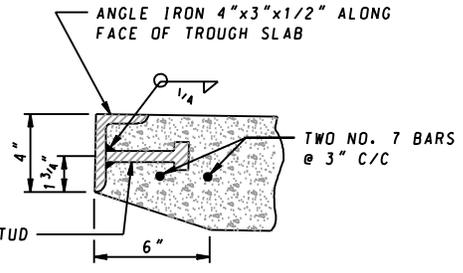
STANDARD NO. MD 374.65



* EQUIVALENT PIPE(S) MAY BE SUBMITTED FOR APPROVAL. SUBMITTAL MUST INCLUDE HYDRAULIC COMPUTATIONS.

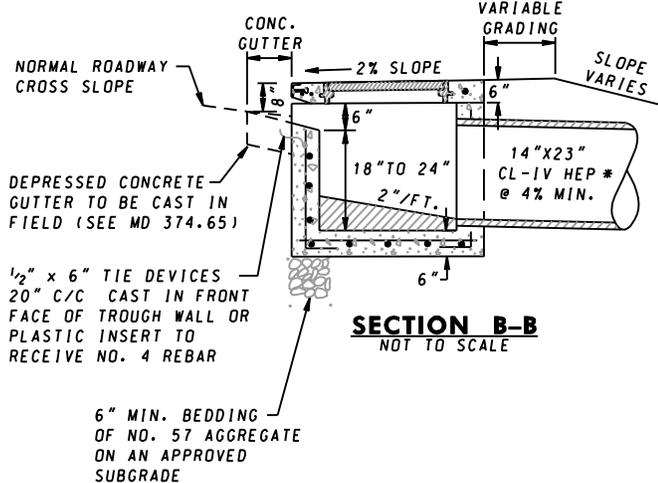


LAP SPLICE REINFORCEMENT 1'-0" (TYP) AROUND CORNERS AS SHOWN



4"x1/2" SHEAR STUD CONNECTORS AT 3'-6" C/C MAX GALVANIZE AFTER WELDING

SECTION C-C
(THROUGH THE TOP SLAB ONLY)
NOT TO SCALE



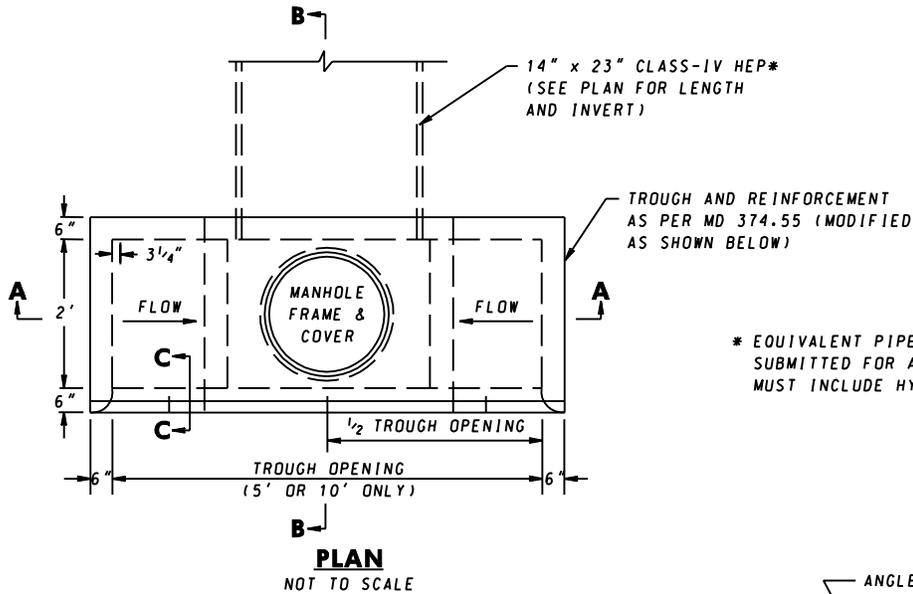
SECTION B-B
NOT TO SCALE

NOTES

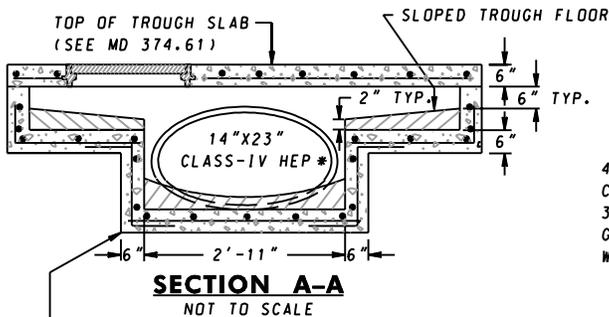
1. SLOPED TROUGH FLOOR TO BE CAST IN THE FIELD AND USED ONLY WHEN ROAD GRADE IS 1.5% OR LESS. WHEN SLOPED TROUGH FLOOR IS USED, ROUGHEN PRECAST TROUGH FLOOR.
2. CONCRETE SHALL BE MIX NO. 6.
3. REINFORCEMENT SHALL BE NO. 4 BARS PLACED IN THE CENTER OF INLET WALLS AT 6" C/C TWO WAYS OR TWO LAYERS OF 4x4-W4.0xW4.0 WELDED WIRE FABRIC WITH 1 1/2" COVER.
4. FOR MANHOLE FRAME AND COVER SEE MD 383.61.
5. MINIMUM DEPTH PAYMENT SHALL BE 3'-6" MEASURED FROM THE BOTTOM OF THE BASE UNIT TO THE TOP OF THE TROUGH SLAB. VERTICAL DEPTH PAYMENT IN EXCESS OF 3'-6" IS NOT PERMITTED. USE OTHER STANDARDS IF ADDITIONAL VERTICAL DEPTH IS REQUIRED.
6. PIPE TO BE PAID FOR SEPARATELY

SPECIFICATION 305	CATEGORY CODE ITEMS										
APPROVED <i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT											
SHA State Highway Administration	<table border="1"> <tr> <td>APPROVAL • SHA REVISIONS</td> <td>APPROVAL • FEDERAL HIGHWAY ADMINISTRATION</td> </tr> <tr> <td>APPROVAL 12-3-97</td> <td>APPROVAL 2-23-98</td> </tr> <tr> <td>REVISED 10-1-01</td> <td>REVISED</td> </tr> <tr> <td>REVISED</td> <td>REVISED</td> </tr> <tr> <td>REVISED</td> <td>REVISED</td> </tr> </table>	APPROVAL • SHA REVISIONS	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION	APPROVAL 12-3-97	APPROVAL 2-23-98	REVISED 10-1-01	REVISED	REVISED	REVISED	REVISED	REVISED
APPROVAL • SHA REVISIONS	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION										
APPROVAL 12-3-97	APPROVAL 2-23-98										
REVISED 10-1-01	REVISED										
REVISED	REVISED										
REVISED	REVISED										

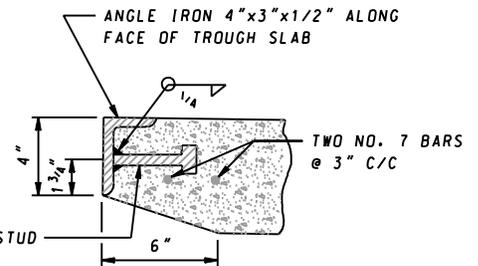
Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
 STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES
PRECAST OR CAST IN PLACE
SHALLOW COG INLET
5' OR 10' TROUGH OPENING
STANDARD NO. MD 374.66



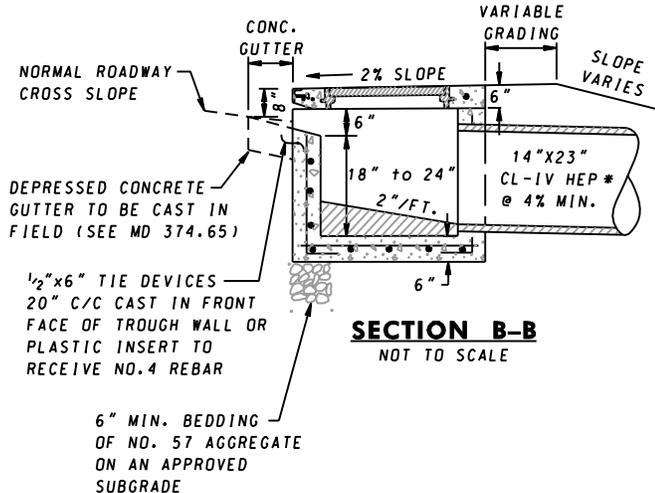
* EQUIVALENT PIPE(S) MAY BE SUBMITTED FOR APPROVAL. SUBMITTAL MUST INCLUDE HYDRAULIC COMPUTATIONS.



LAP SPLICE REINFORCEMENT 1'-0" (TYP) AROUND CORNERS AS SHOWN



SECTION C-C
(THROUGH THE TOP SLAB ONLY)
NOT TO SCALE

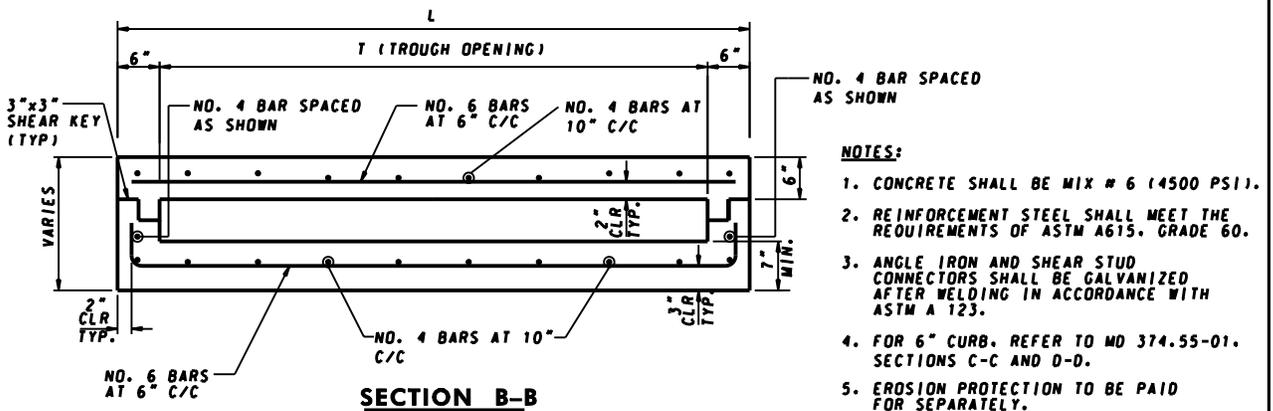
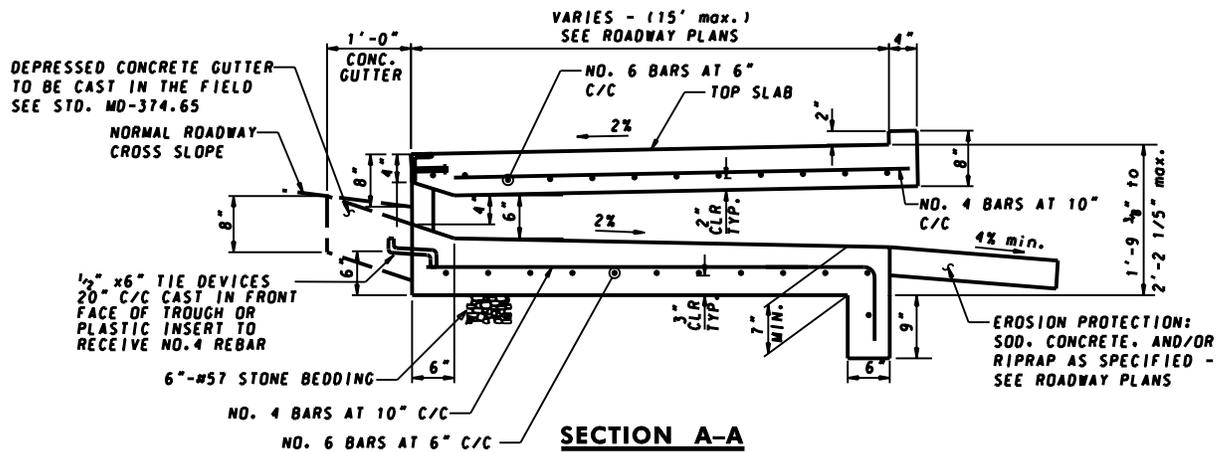
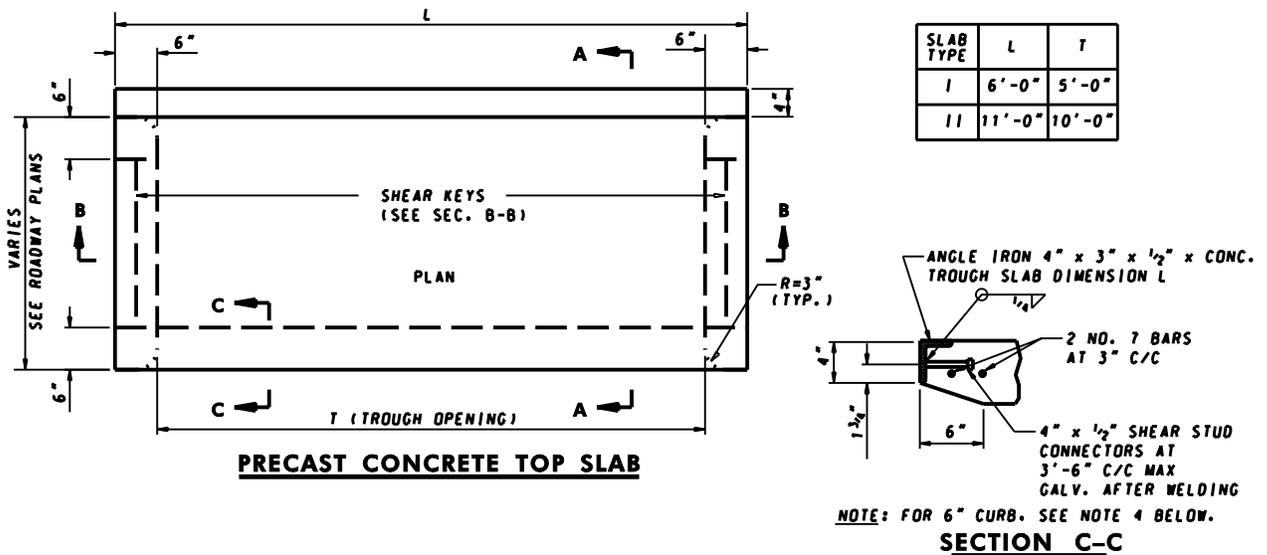


NOTES

- SLOPED TROUGH FLOOR TO BE CAST IN THE FIELD AND USED ONLY WHEN ROAD GRADE IS 1.5% OR LESS. WHEN SLOPED TROUGH FLOOR IS USED, ROUGHEN PRECAST TROUGH FLOOR.
- CONCRETE SHALL BE MIX NO. 6.
- REINFORCEMENT SHALL BE NO. 4 BARS PLACED IN THE CENTER OF INLET WALLS AT 6" C/C TWO WAYS OR TWO LAYERS OF 4x4-W4.0xW4.0 WELDED WIRE FABRIC WITH 1 1/2" COVER.
- FOR MANHOLE FRAME AND COVER SEE MD 383.61.
- MINIMUM DEPTH PAYMENT SHALL BE 3'-6" MEASURED FROM THE BOTTOM OF THE BASE UNIT TO THE TOP OF THE TROUGH SLAB. VERTICAL DEPTH PAYMENT IN EXCESS OF 3'-6" IS NOT PERMITTED. USE OTHER STANDARDS IF ADDITIONAL VERTICAL DEPTH IS REQUIRED.
- PIPE TO BE PAID FOR SEPARATELY.

SPECIFICATION 305	CATEGORY CODE ITEMS
APPROVED	<i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT
	APPROVAL • SHA REVISIONS
	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
	APPROVAL 12-3-97
	APPROVAL 2-23-98
	REVISION 10-1-01
REVISION	REVISION
REVISION	REVISION
REVISION	REVISION

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES
PRECAST OR CAST IN PLACE
SHALLOW COS INLET
5' OR 10' TROUGH OPENING
STANDARD NO. MD 374.67



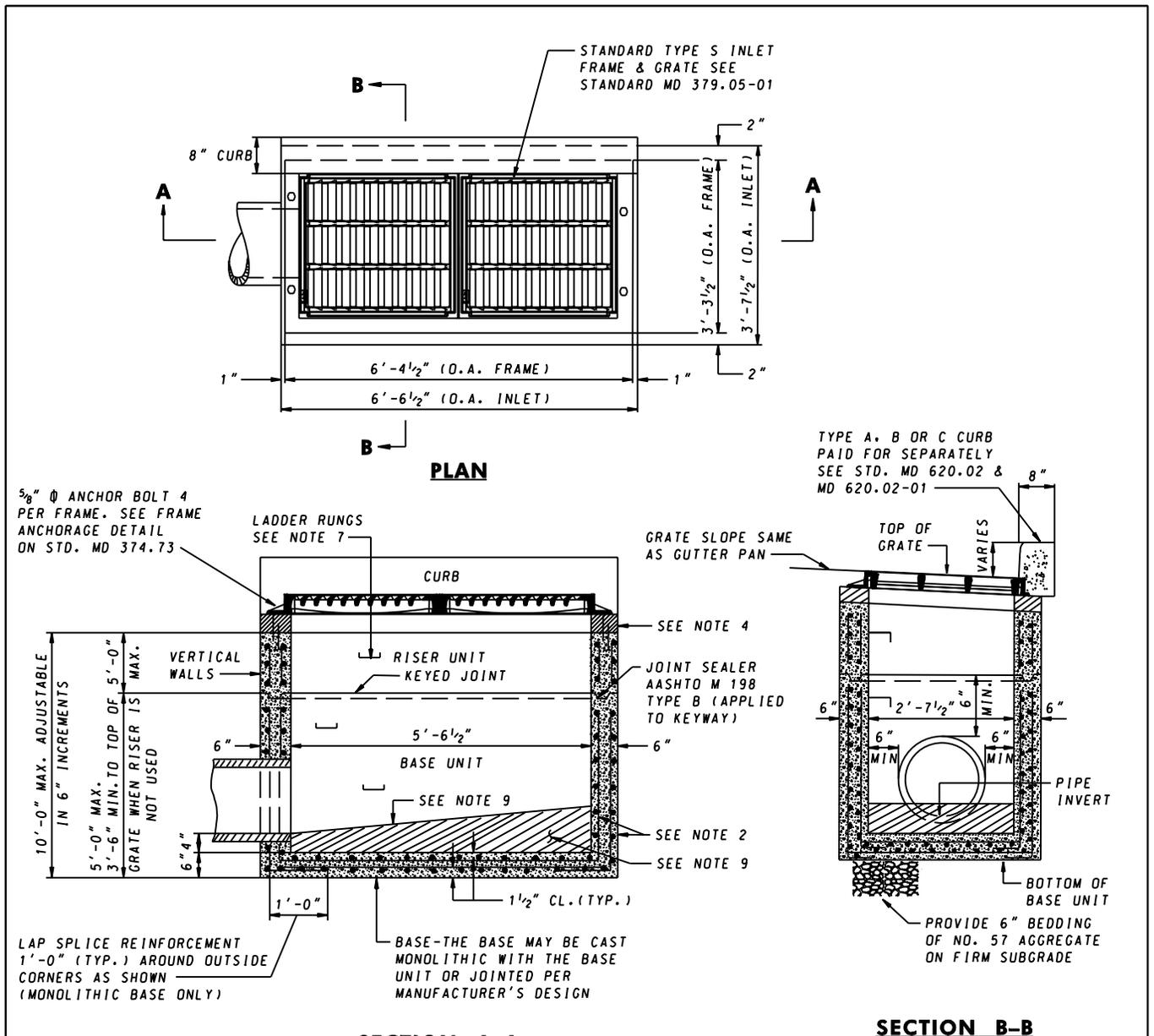
SPECIFICATION 305	CATEGORY CODE ITEMS
APPROVED	<i>Kat G. McCallum</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT
	APPROVAL • SHA REVISIONS
	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
	APPROVAL 12-19-01
	REVISION 1-9-08

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
 STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

PRECAST OR CAST-IN-PLACE
COG /COS OPENING FOR 8" CURB
5' OR 10' ONLY

STANDARD NO.

MD 374.68



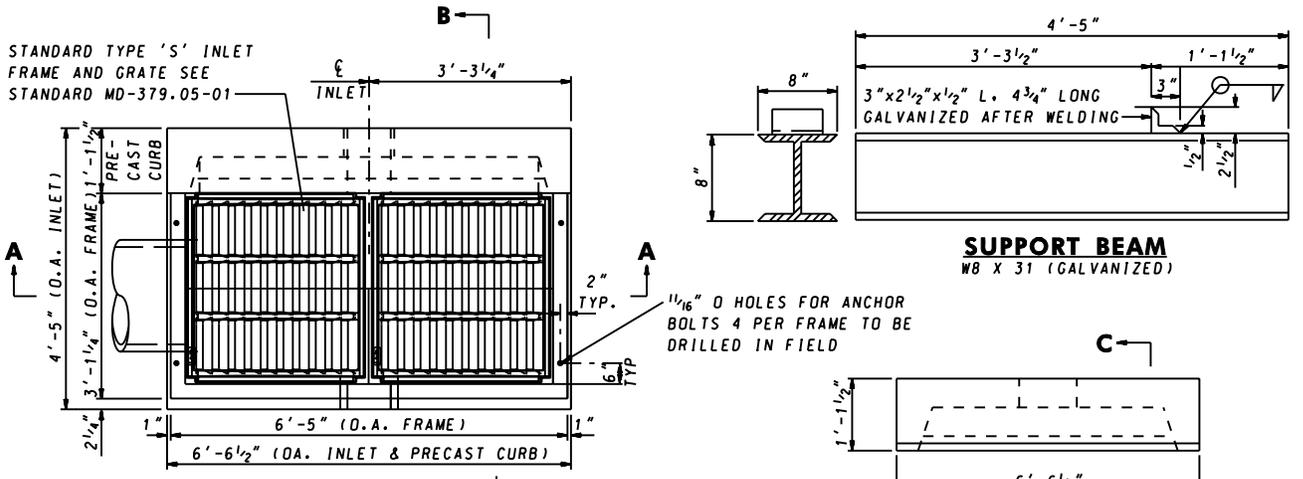
NOTES

1. CONCRETE TO BE MIX NO. 6 (4500 PSI).
2. REINFORCEMENT 2 LAYERS OF 4x4-W4.0xW4.0 WELDED WIRE FABRIC.
3. THREADED PLASTIC INSERTS TO BE PROVIDED FOR HANDLING.
4. GRADE AND SLOPE ADJUSTMENTS MIN. 2", MAX. 9" SHALL BE COMPLETED IN THE FIELD USING CONCRETE MIX NO. 6.
5. PIPE OPENINGS TO BE PROVIDED AS REQUIRED. FOR SIZE, LOCATION AND INVERT ELEVATIONS REFER TO THE CONSTRUCTION PLANS.
6. PLACEMENT OF SUBGRADE DRAINAGE WILL BE AS DIRECTED BY THE ENGINEER OR AS NOTED ON THE CONSTRUCTION PLANS.
7. LADDER RUNGS SHALL BE IN ACCORDANCE WITH STANDARD MD 383.91 OR 383.92. RUNGS ARE INCIDENTAL TO THE COST OF THE INLET.
8. MINIMUM DEPTH PAYMENT PER EACH SHALL BE 3'-6" MEASURED FROM THE PIPE INVERT TO THE TOP OF THE GRATE AT ITS HIGHEST POINT. VERTICAL DEPTH PAYMENT PER LINEAR FOOT SHALL INCLUDE ALL DEPTHS IN EXCESS OF 3'-6" INCLUDING ALL APPURTENANCES.
9. CONCRETE OR BRICK INVERT TO BE PROVIDED IN THE FIELD AND SHALL SLOPE 2 IN./FT TOWARD OUTLET OR AS DIRECTED.
10. BASE WALLS UNIT MAY TAPER PER MANUFACTURER'S DESIGN.

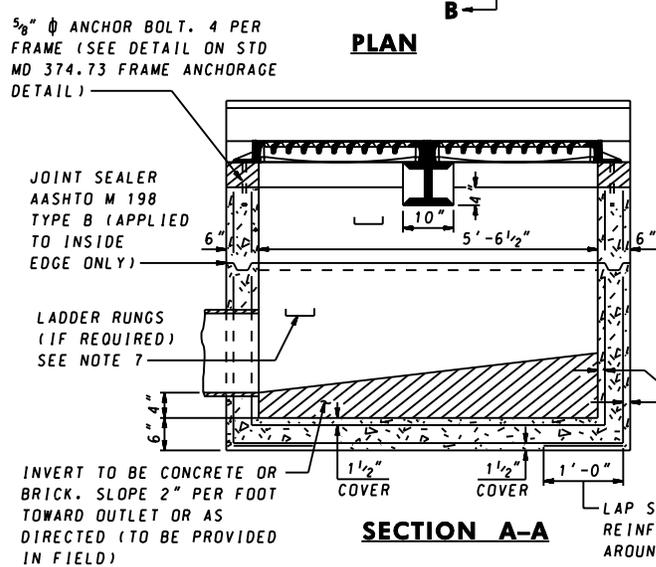
SPECIFICATION 305	CATEGORY CODE ITEMS
APPROVED	<i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT
	APPROVAL • SHA REVISIONS
	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
	APPROVAL 2-22-91
	APPROVAL 1-2-91
	REVISIONS 3-20-07
REVISIONS 7-27-09	
REVISIONS 7-1-09	
REVISIONS 07-26-10	
REVISIONS 08-03-10	
REVISIONS	

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
 STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES
PRECAST STANDARD TYPE S INLET
DOUBLE GRATE TANDEM

STANDARD NO. MD 374.70

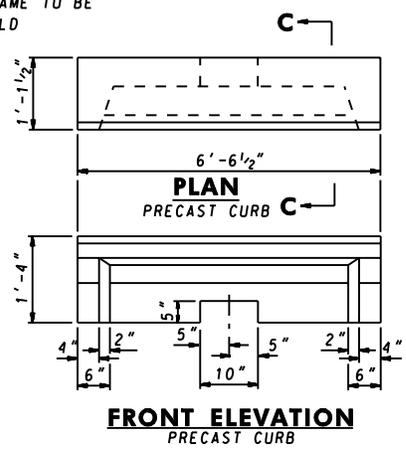


SUPPORT BEAM
WB X 31 (GALVANIZED)

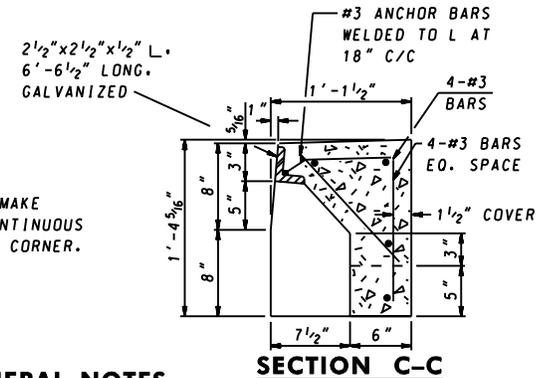


PLAN

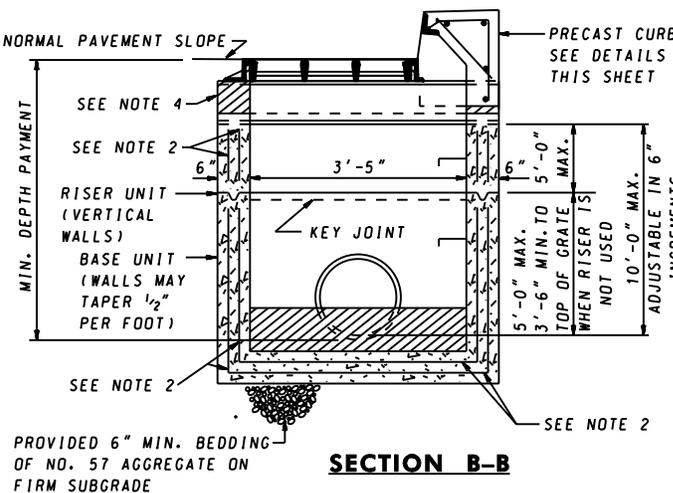
SECTION A-A



FRONT ELEVATION
PRECAST CURB



SECTION C-C



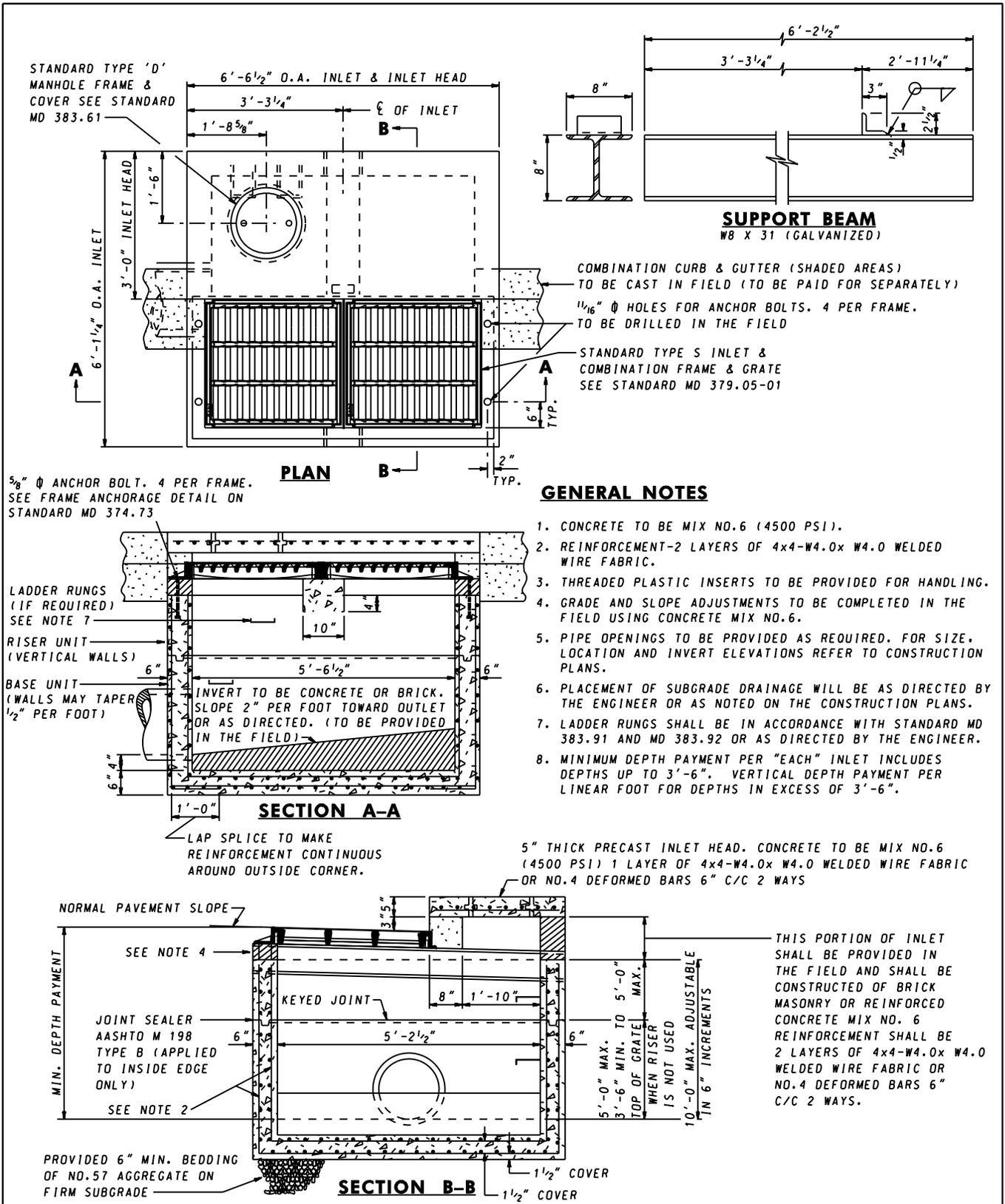
SECTION B-B

GENERAL NOTES

1. CONCRETE TO BE MIX NO. 6 (4500 PSI).
2. REINFORCING-2 LAYERS OF 4x4-W 4.0x W4.0 WELDED WIRE FABRIC.
3. THREADED PLASTIC INSERTS TO BE PROVIDED FOR HANDLING.
4. GRADE AND SLOPE ADJUSTMENTS TO BE COMPLETED IN THE FIELD USING CONCRETE MIX NO. 6.
5. PIPE OPENING TO BE PROVIDED AS REQUIRED. FOR SIZE, LOCATION AND INVERT ELEVATIONS REFER TO CONSTRUCTION PLANS.
6. PLACEMENT OF SUBGRADE DRAINAGE WILL BE AS DIRECTED BY THE ENGINEER OR AS NOTED ON THE CONSTRUCTION PLANS.
7. LADDER RUNGS SHALL BE IN ACCORDANCE WITH STANDARD MD 383.91 & MD 383.92 OR AS DIRECTED BY THE ENGINEER.
8. MINIMUM DEPTH PAYMENT PER "EACH" INCLUDES DEPTHS UP TO 3'-6". VERTICAL DEPTH PAYMENT PER LINEAR FOOT FOR DEPTHS IN EXCESS OF 3'-6".

SPECIFICATION 305	CATEGORY CODE ITEMS
APPROVED <i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT	
 State Highway Administration	APPROVAL • SHA REVISIONS APPROVAL 4-15-87 REVISED 10-1-01 REVISED 7-1-09 REVISED 08-03-10
	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION APPROVAL 6-23-87 REVISED 7-27-09 REVISED 07-26-10 REVISED

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
 STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES
PRECAST STANDARD
TYPE S COMBINATION INLET
DOUBLE GRATE TANDEM
STANDARD NO. MD 374.71



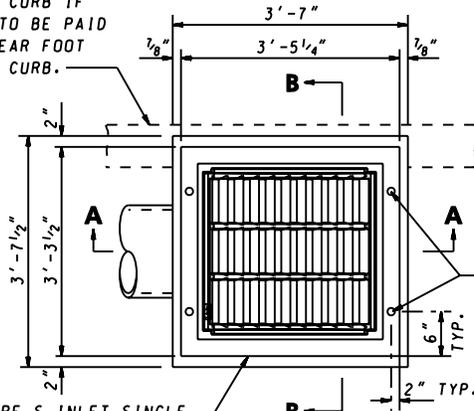
SPECIFICATION 305	CATEGORY CODE ITEMS
APPROVED <i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT	
	APPROVAL • SHA REVISIONS
	APPROVAL 4-15-87
	REVISED 10-1-01
	REVISED 7-1-09
	REVISED 08-03-10
APPROVAL • FEDERAL HIGHWAY ADMINISTRATION	
APPROVAL 6-23-87	
REVISED 7-27-09	
REVISED 07-26-10	

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
 STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

PRECAST STANDARD
TYPE HS COMBINATION INLET

STANDARD NO. MD 374.72

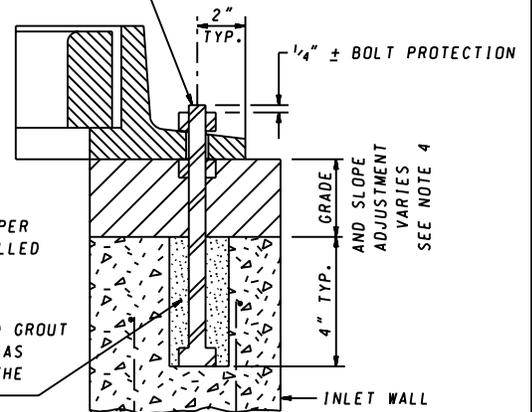
POSITION OF CURB IF REQUIRED. TO BE PAID FOR PER LINEAR FOOT OF STANDARD CURB.



STANDARD TYPE S INLET SINGLE FRAME & GRATE. FOR DETAILS SEE STANDARD MD 379.02-01

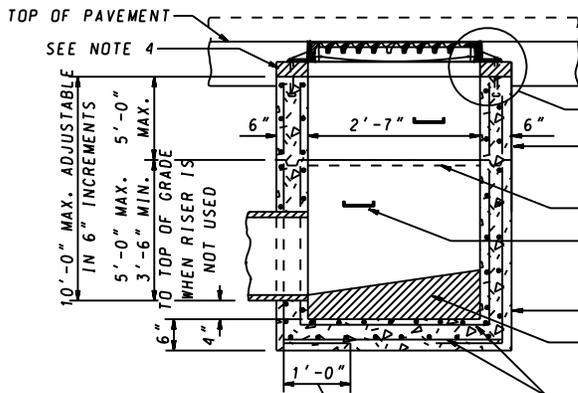
PLAN

GALVANIZED 5/8" Ø ANCHOR BOLT WITH DOUBLE NUT FOR ADJUSTING FRAME TO GRADE AND SLOPE. 4 BOLTS PER FRAME. LENGTH TO BE DETERMINED IN THE FIELD.



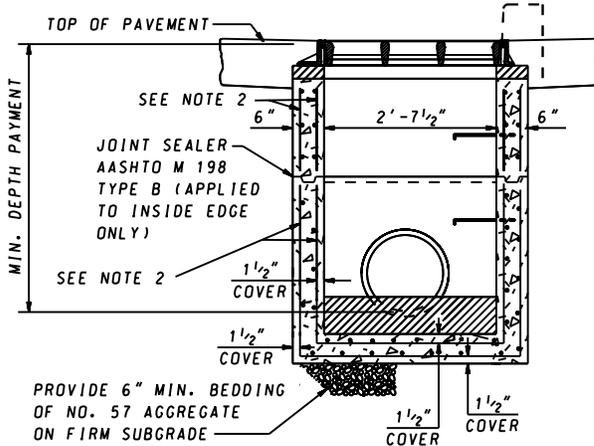
DRILL SET AND GROUT IN THE FIELD AS DIRECTED BY THE ENGINEER.

FRAME ANCHORAGE DETAIL



LAP SPLICE TO MAKE REINFORCING CONTINUOUS AROUND OUTSIDE CORNERS

SECTION A-A



SECTION B-B

GENERAL NOTES

1. CONCRETE TO BE MIX NO. 6 (4500 PSI).
2. REINFORCING-2 LAYERS OF 4x4-W4.0x W4.0 WELDED WIRE FABRIC.
3. THREADED PLASTIC INSERTS TO BE PROVIDED FOR HANDLING.
4. GRADE AND SLOPE ADJUSTMENTS TO BE COMPLETED IN THE FIELD USING CONCRETE MIX NO. 6.
5. PIPE OPENINGS TO BE PROVIDED AS REQUIRED. FOR SIZE, LOCATION AND INVERT ELEVATIONS REFER TO CONSTRUCTION PLANS.
6. PLACEMENT OF SUBGRADE DRAINAGE WILL BE AS DIRECTED BY THE ENGINEER OR AS NOTED ON THE CONSTRUCTION PLANS.
7. LADDER RUNGS SHALL BE IN ACCORDANCE WITH STANDARD MD-383.91, AND MD-383.92 OR AS DIRECTED BY THE ENGINEER.
8. MINIMUM DEPTH PAYMENT PER "EACH" INLET INCLUDES DEPTHS UP TO 3'-6". VERTICAL DEPTH PAYMENT PER LINEAR FOOT FOR DEPTHS IN EXCESS OF 3'-6".

SPECIFICATION 305	CATEGORY CODE ITEMS
-----------------------------	---------------------

APPROVED *Kirk G. McCall*
DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT

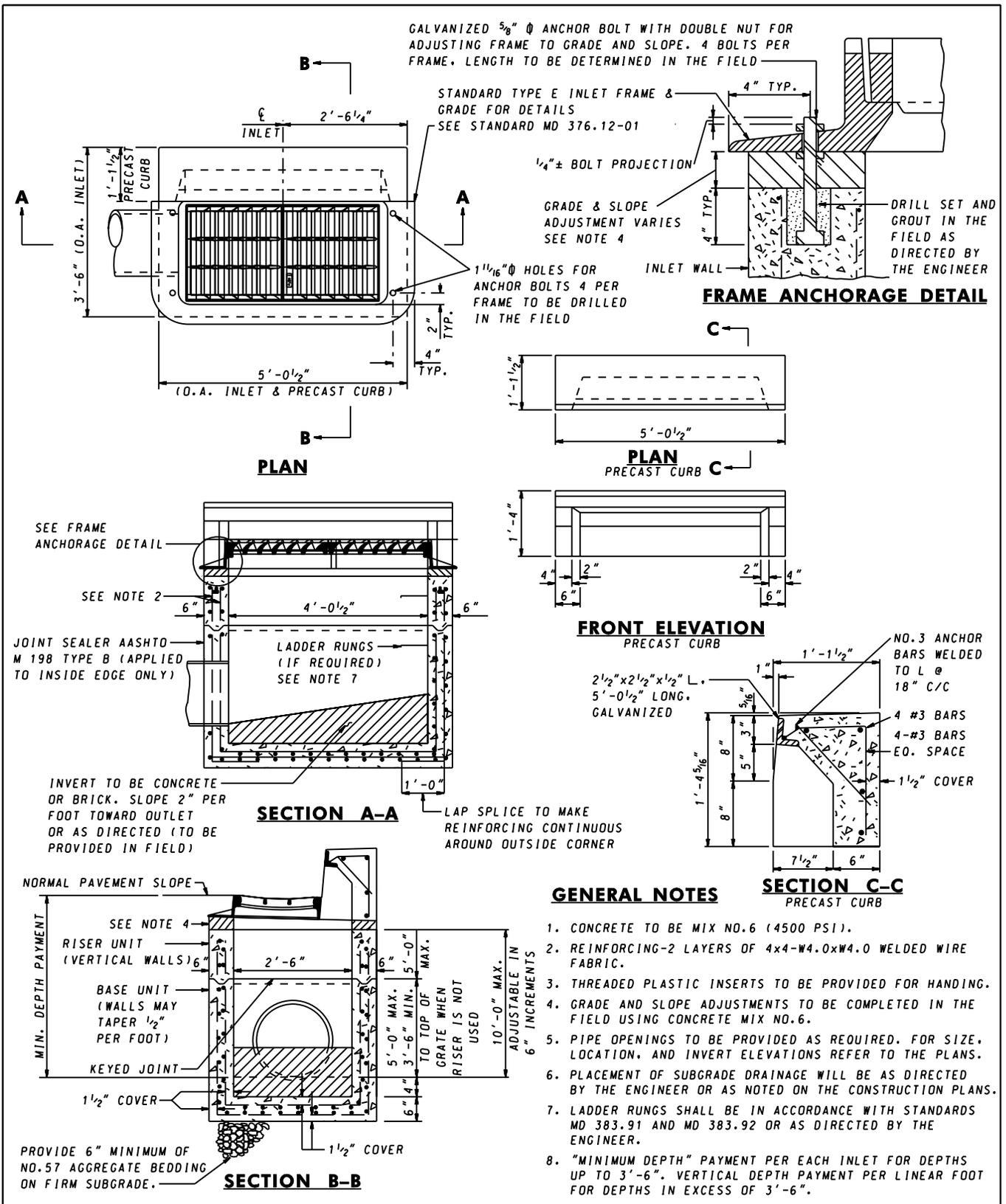


APPROVAL • SHA REVISIONS	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
APPROVAL 4-15-87	APPROVAL 6-23-87
REVISED 10-1-01	REVISED 7-27-09
REVISED 7-1-09	REVISED 07-26-10
REVISED 08-03-10	REVISED

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

PRECAST STANDARD
TYPE S INLET SINGLE GRATE

STANDARD NO. MD 374.73

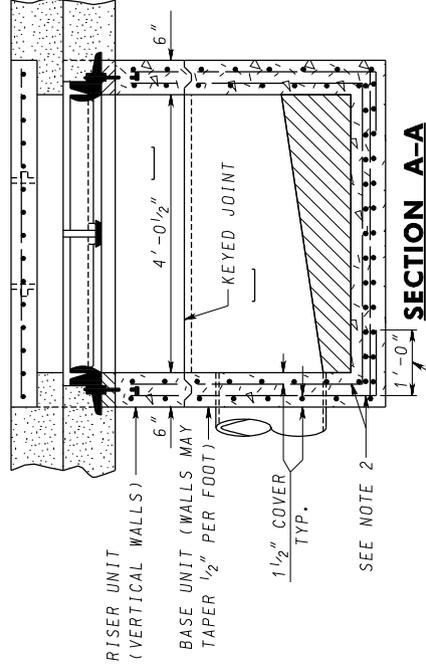
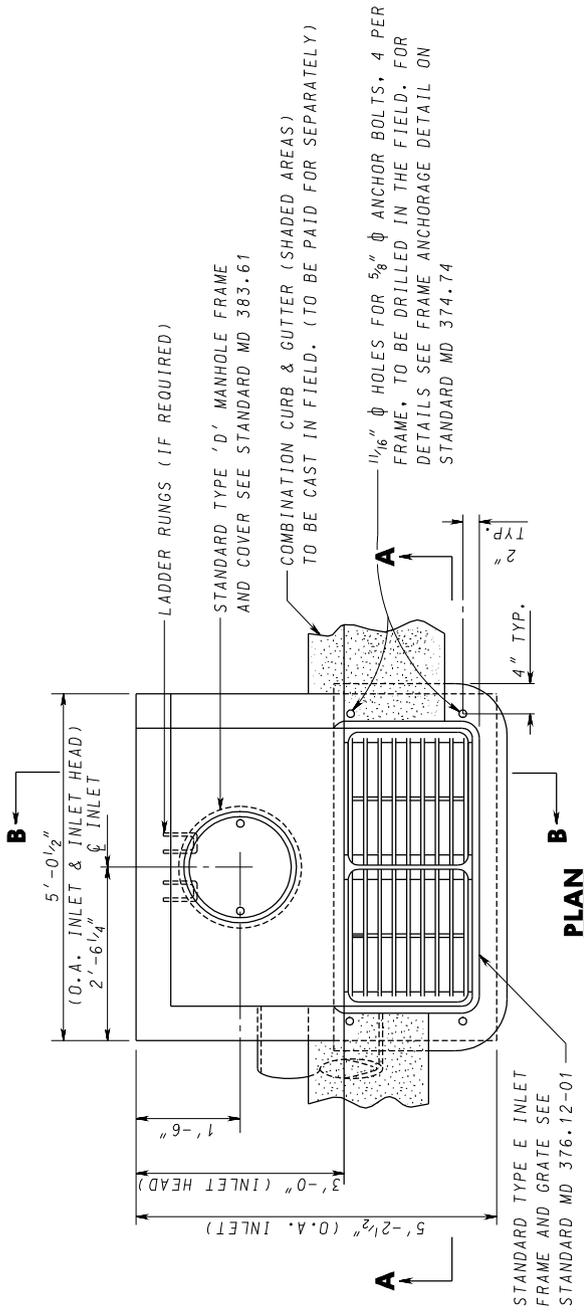


SPECIFICATION 305	CATEGORY CODE ITEMS
APPROVED <i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT	
	APPROVAL • SHA REVISIONS
	APPROVAL 4-15-87
	REVISD 10-1-01
	REVISD 7-1-09
	REVISD 08-03-10
APPROVAL • FEDERAL HIGHWAY ADMINISTRATION	
APPROVAL 6-23-87	
REVISD 7-27-09	
REVISD 07-26-10	
REVISD	

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
 STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

PRECAST STANDARD
TYPE E COMBINATION INLET

STANDARD NO. MD 374.74

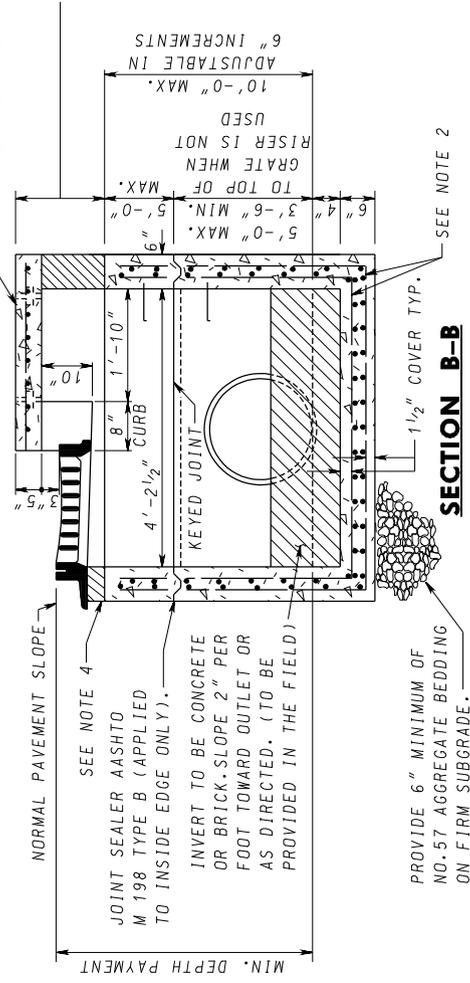


LAP SPLICE TO MAKE REINFORCING CONTINUOUS AROUND OUTSIDE CORNERS.

GENERAL NOTES

1. CONCRETE TO BE MIX NO.6 (4500 PSI).
2. REINFORCING-2 LAYERS OF 4x4-W4.0xW4.0 WELDED WIRE FABRIC.
3. THREADED PLASTIC INSERTS TO BE PROVIDED FOR HANDLING.
4. GRADE AND SLOPE ADJUSTMENTS TO BE COMPLETED IN THE FIELD USING CONCRETE MIX NO.6.
5. PIPE OPENINGS TO BE PROVIDED AS REQUIRED. FOR SIZE, LOCATION, AND INVERT ELEVATIONS REFER TO THE PLANS.
6. PLACEMENT OF SUBGRADE DRAINAGE WILL BE AS DIRECTED BY THE ENGINEER OR AS NOTED ON THE PLANS.
7. LADDER RUNGS SHALL BE IN ACCORDANCE WITH STANDARDS MD 383.91 AND MD 383.92 OR AS DIRECTED BY THE ENGINEER.
8. "MINIMUM DEPTH" PAYMENT PER EACH INLET FOR DEPTHS UP TO 3'-6". VERTICAL DEPTH PAYMENT PER LINEAR FOOT FOR DEPTHS IN EXCESS OF 3'-6".

5" THICK PRECAST INLET HEAD, CONCRETE TO BE MIX NO.6 (4500 PSI) LAYER OF 4x4-W4.0x W4.0 WELDED WIRE FABRIC OR NO.4 DEFORMED BARS 6" C/C 2 WAYS



NORMAL PAVEMENT SLOPE

SEE NOTE 4

JOINT SEALER AXSHTO M 198 TYPE B (APPLIED TO INSIDE EDGE ONLY).

INVERT TO BE CONCRETE OR BRICK. SLOPE 2" PER FOOT TOWARD OUTLET OR AS DIRECTED. (TO BE PROVIDED IN THE FIELD)

THIS PORTION OF INLET SHALL BE PROVIDED IN THE FIELD AND SHALL BE CONSTRUCTED OF BRICK MANSIONRY OR REINFORCED CONCRETE MIX NO.6 REINFORCING SHALL BE 2 LAYERS OF 4x4-W4.0x W4.0 WELDED WIRE FABRIC OR NO.4 DEFORMED BARS 6" C/C 2 WAYS

PROVIDE 6" MINIMUM OF NO.57 AGGREGATE BEDDING ON FIRM SUBGRADE.

SPECIFICATION
305

CATEGORY CODE ITEMS

APPROVED

Kate G. McCall
DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT



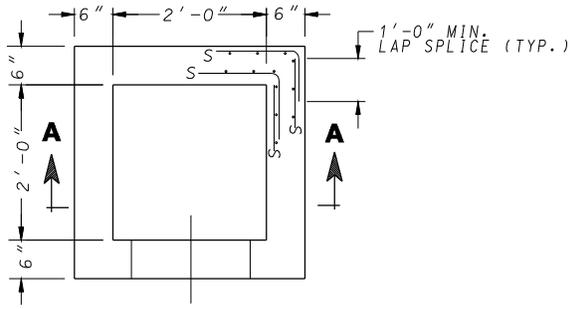
APPROVAL • SHA REVISIONS	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
APPROVAL 4-15-87	APPROVAL 6-23-87
REVISED 10-1-01	REVISED 7-27-09
REVISED 7-1-09	REVISED
REVISED	REVISED

**Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION**
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

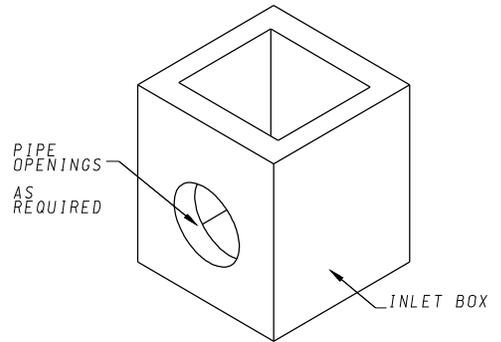
**PRECAST STANDARD
TYPE H COMBINATION INLET**

STANDARD NO.

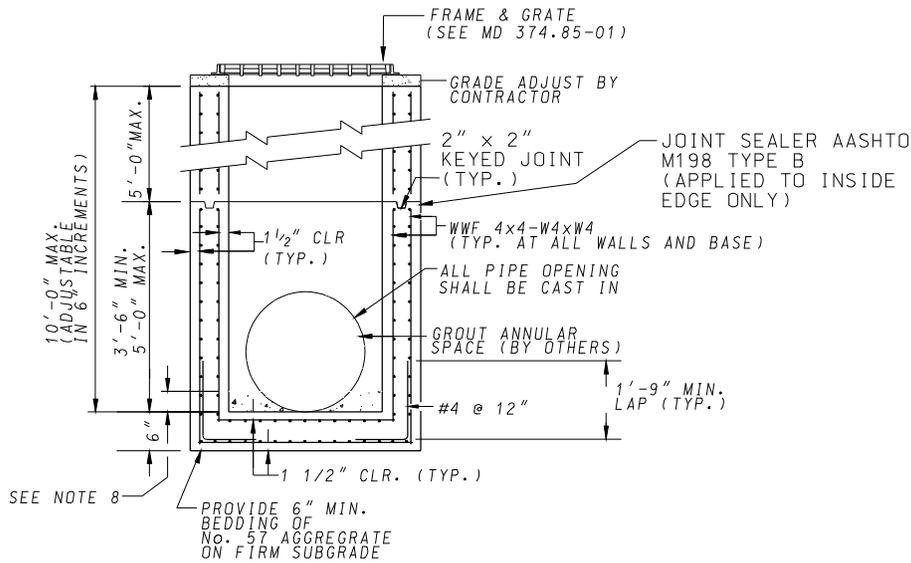
MD 374.75



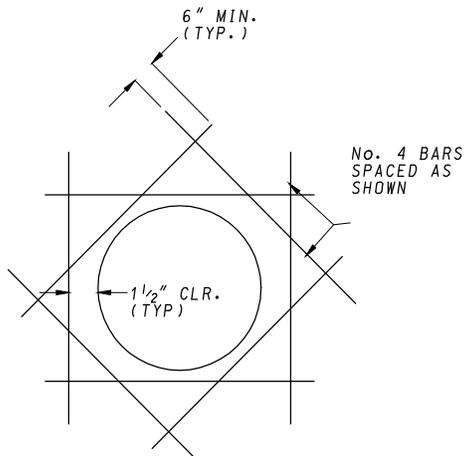
PLAN



ISOMETRIC VIEW



SECTION A-A



REINFORCING AROUND PIPE OPENING

GENERAL NOTES:

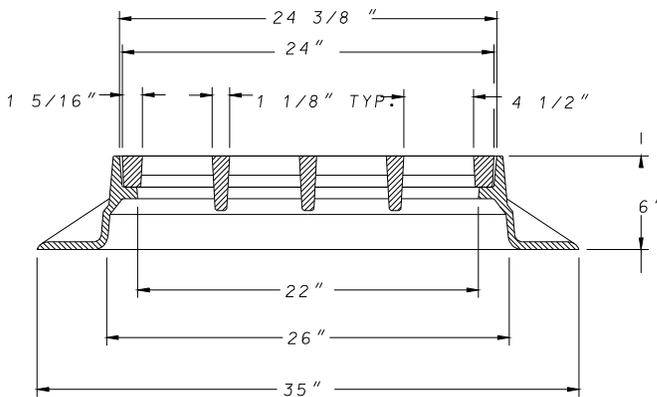
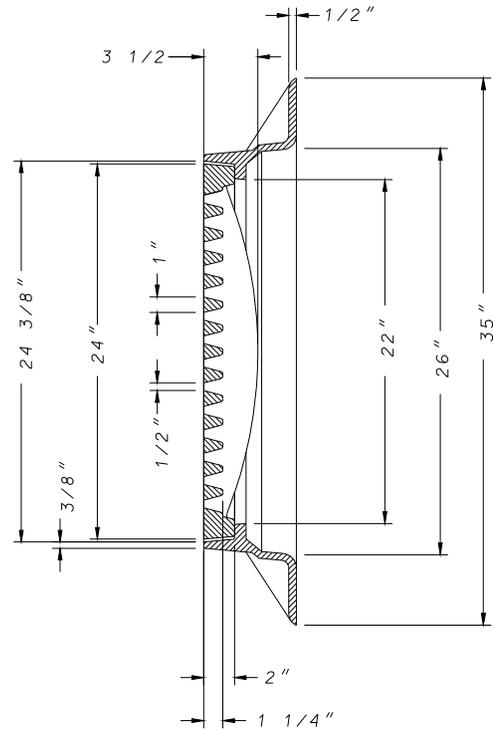
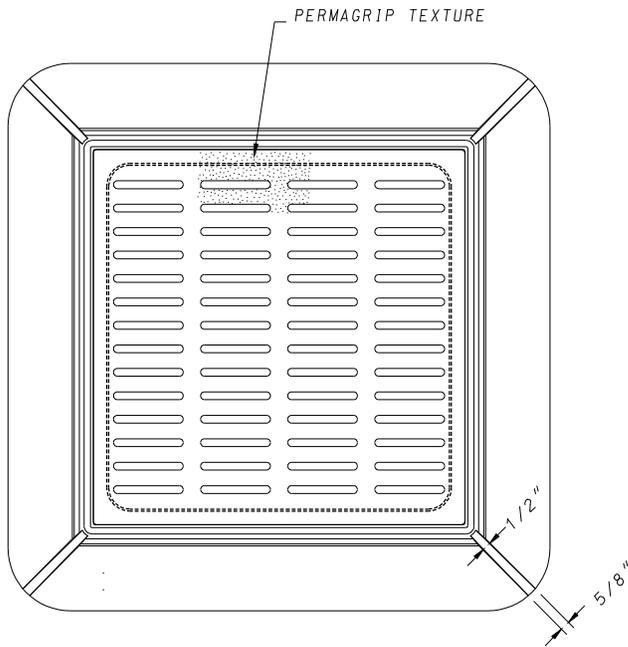
1. CONCRETE SHALL BE MIX No. 6.
2. WELDED WIRE FABRIC SHALL CONFORMS TO ASTM A185. DEFORMED STEEL CONFORMS TO ASTM A615 GRADE 60.
3. OVERALL HEIGHT OF PRECAST IS ADJUSTABLE IN 6" INCREMENTS. FINAL GRADE ADJUSTMENT SHALL BE MADE BY CONTRACTOR WITH CONCRETE MIX No. 6
4. THREADED PLASTIC INSERTS TO BE PROVIDED FOR HANDLING.
5. LADDER RUNGS SHALL BE IN ACCORDANCE WITH STD. MD 383.91 AND STD. MD 383.92 OR AS DIRECTED BY THE ENGINEER.
6. PLACEMENT OF SUBGRADE DRAINAGE WILL BE AS DIRECTED BY THE ENGINEER OR AS NEEDED ON THE CONSTRUCTION PLANS.
7. MINIMUM DEPTH PAYMENT PER "EACH" INLETS INCLUDES DEPTH UP TO 3'-6". VERTICAL DEPTH PAYMENT PER LINEAR FOOT FOR DEPTHS IN EXCESS OF 3'-6".
8. CONCRETE OR BRICK INVERT TO BE PROVIDED IN THE FIELD AND SHALL SLOPE 2" PER FOOT TOWARDS THE OUTLET OR AS DIRECTED.

SPECIFICATION	CATEGORY CODE ITEMS
APPROVED	<i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT
	APPROVAL • SHA REVISIONS
	APPROVAL 7-14-08
	REVISED
	REVISED
APPROVAL • FEDERAL HIGHWAY ADMINISTRATION	APPROVAL 02-04-08
REVISED	REVISED
REVISED	REVISED
REVISED	REVISED

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
 STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

STANDARD ADA COMPLIANT INLET
SINGLE GRATE

STANDARD NO. MD 374.85



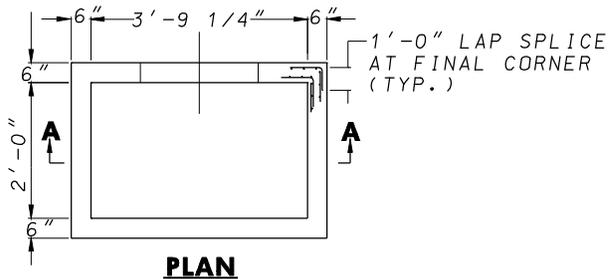
NOTE

MATERIAL: CAST GRAY IRON ASTM A-48, CLASS 35B
 FINISH: NO PAINT
 WEIGHT: FRAME 165 LBS., GRATE 164 LBS.
 GRATE TO BE SUITABLE FOR HS-25 LOADING.
 LONG DIMENSION MUST BE PERPENDICULAR
 TO THE DOMINANT DIRECTION OF TRAVEL.

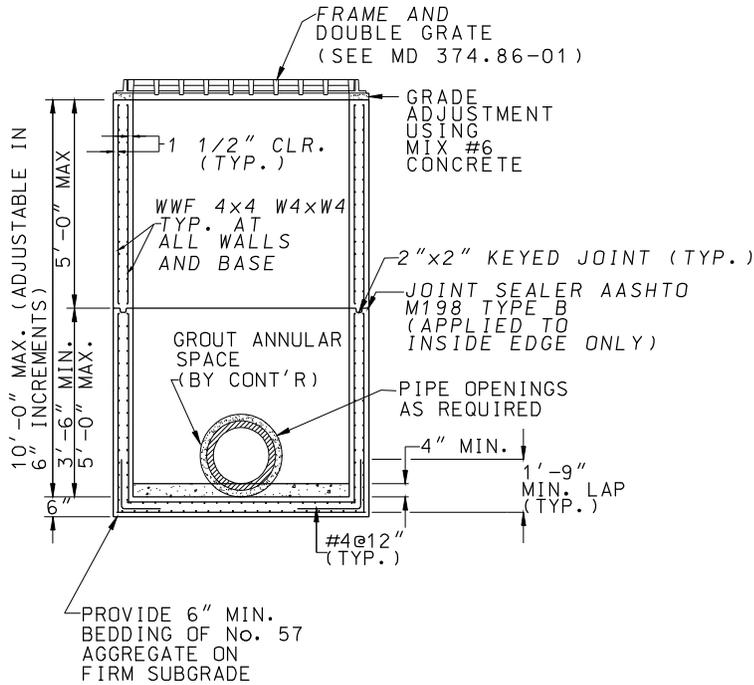
SPECIFICATION	CATEGORY CODE ITEMS
APPROVED	<i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT
	APPROVAL • SHA REVISIONS
	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
	APPROVAL 07-14-08
	APPROVAL 02-04-08
REVISD	REVISD
REVISD	REVISD
REVISD	REVISD

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
 STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES
STANDARD "ADA" COMPLIANT INLET
SINGLE FRAME AND GRATE

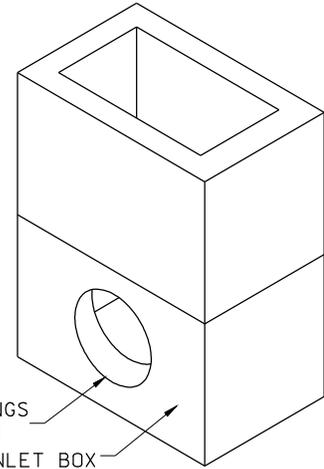
STANDARD NO. MD 374.85-01



PLAN



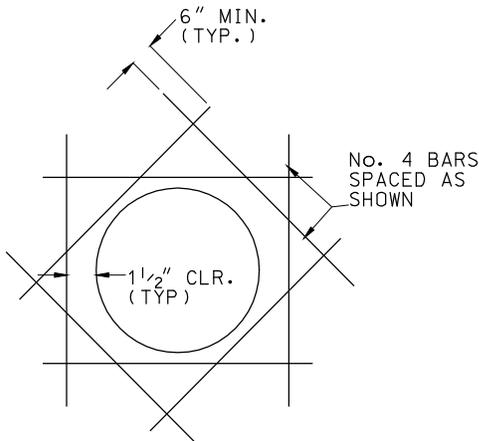
SECTION A



ISOMETRIC VIEW

GENERAL NOTES

1. CONCRETE SHALL BE MIX No. 6.
2. WELDED WIRE FABRIC SHALL CONFORMS TO ASTM A185. DEFORMED STEEL CONFORMS TO ASTM A615 GRADE 60.
3. OVERALL HEIGHT OF PRECAST IS ADJUSTABLE IN 6" INCREMENTS. FINAL GRADE ADJUSTMENT SHALL BE MADE BY CONTRACTOR WITH CONCRETE MIX No. 6.
4. THREADED PLASTIC INSERTS TO BE PROVIDED FOR HANDLING.
5. LADDER RUNGS SHALL BE IN ACCORDANCE WITH STD. MD 383.91 AND STD. MD 383.92, OR AS DIRECTED BY THE ENGINEER.
6. PLACEMENT OF SUBGRADE DRAINAGE WILL BE DIRECTED BY THE ENGINEER OR AS ON THE CONSTRUCTION PLANS.
7. MINIMUM DEPTH PAYMENT PER "EACH" INLETS INCLUDES DEPTH UP TO 3'-6". VERTICAL DEPTH PAYMENT PER LINEAR FOOT FOR DEPTHS IN EXCESS OF 3'-6".
8. CONCRETE OR BRICK INVERT TO BE PROVIDED IN THE FIELD AND SHALL SLOPE 2" PER FOOT TOWARDS THE OUTLET OR AS DIRECTED.

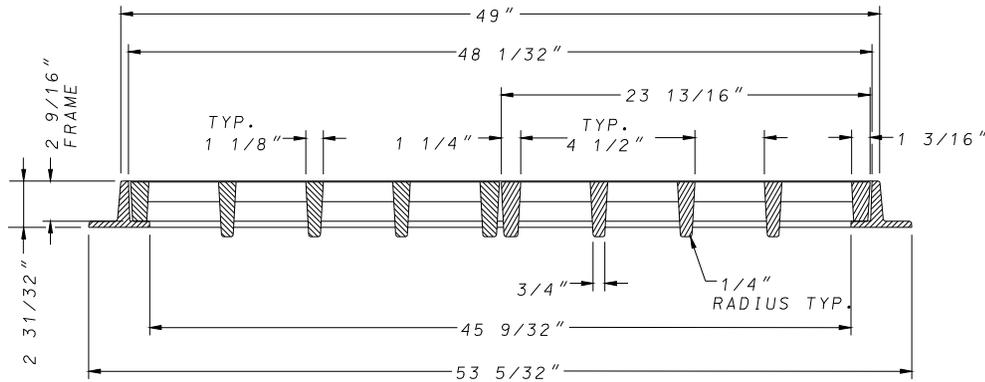
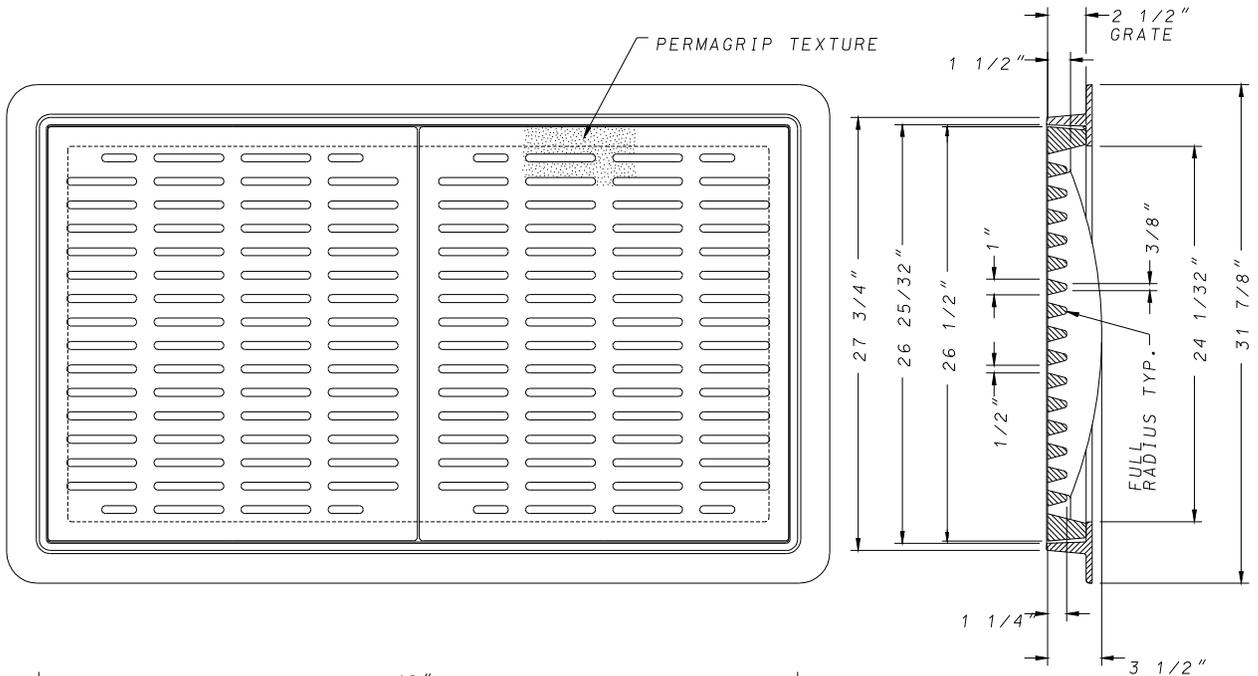


REINFORCING AROUND PIPE OPENING

SPECIFICATION	CATEGORY CODE ITEMS	
APPROVED	<i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT	
	APPROVAL • SHA REVISIONS	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
	APPROVAL 7-14-08	APPROVAL 02-04-08
	REVISED	REVISED
	REVISED	REVISED

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
 STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES
STANDARD ADA COMPLIANT INLET
DOUBLE GRATE TANDEM

STANDARD NO. MD 374.86



NOTES

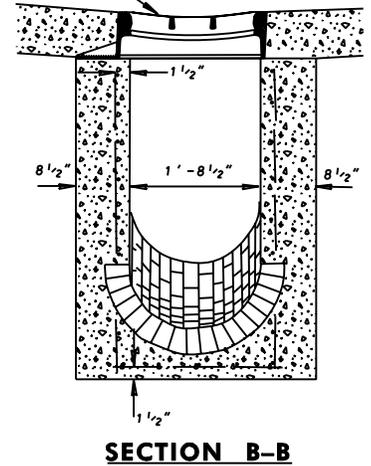
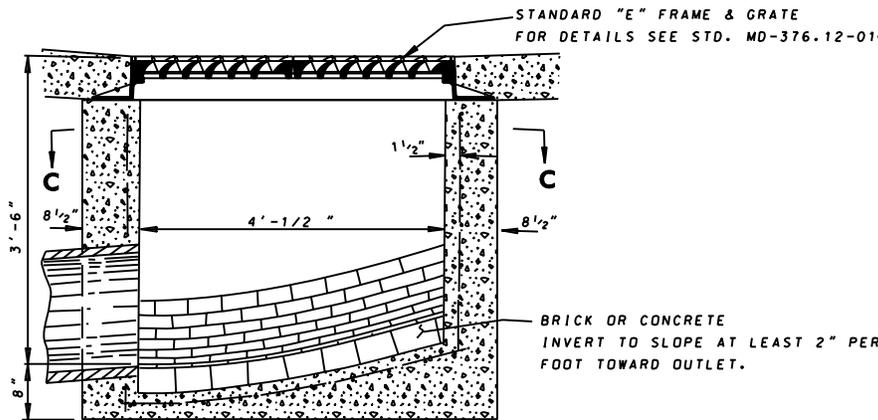
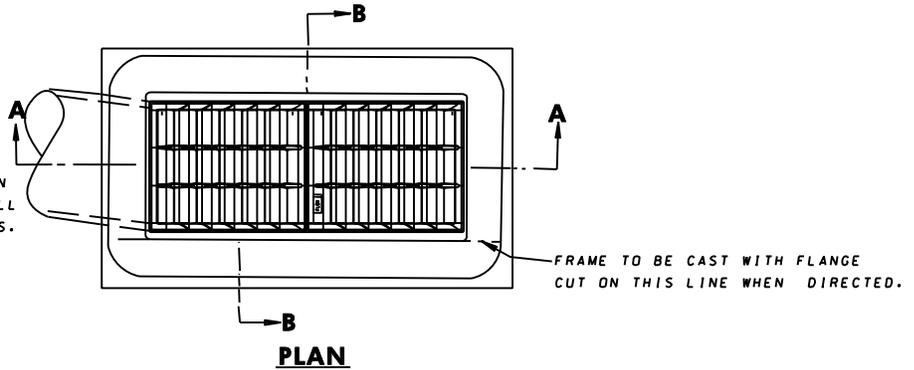
MATERIAL: CAST GRAY IRON ASTM A-48, CLASS 35B
 FINISH: NO PAINT
 WEIGHT: FRAME 120 LBS, GRATE 190 LBS EACH
 GRATE TO BE SUITABLE FOR HS-25 LOADING.
 LONG DIMENSION MUST BE PERPENDICULAR
 TO THE DOMINANT DIRECTION OF TRAVEL.

SPECIFICATION	CATEGORY CODE ITEMS	
APPROVED	<i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT	
	APPROVAL • SHA REVISIONS	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
	APPROVAL 7-14-08	APPROVAL 02-04-08
	REVISED	REVISED
	REVISED	REVISED

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
 STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES
STANDARD "ADA" COMPLIANT INLET
DOUBLE FRAME & GRATE

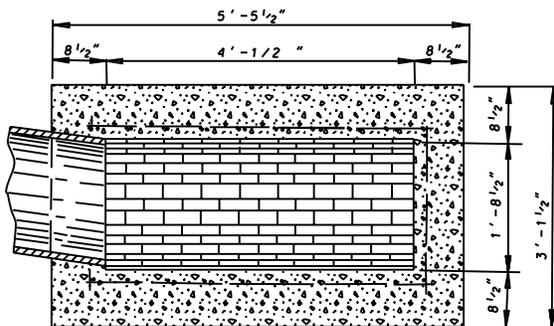
STANDARD NO. MD 374.86-01

SIZE, TYPE AND DIRECTION OF INLET CONNECTION WILL VARY TO SUIT CONDITIONS.



GENERAL NOTES

1. BRICK FOR MASONRY TO COMPLY WITH THE LATEST S.H.A. SPECIFICATIONS.
2. INLET SHALL BE CONSTRUCTED OF REINFORCED CONCRETE (MIX NO. 2).
3. REINFORCEMENT IS TO BE NO 4 Ø BARS AT 6" C/C 2" COVER.



SPECIFICATION 305	CATEGORY CODE ITEMS
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APPROVED *Kirk G. McCall*
DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT

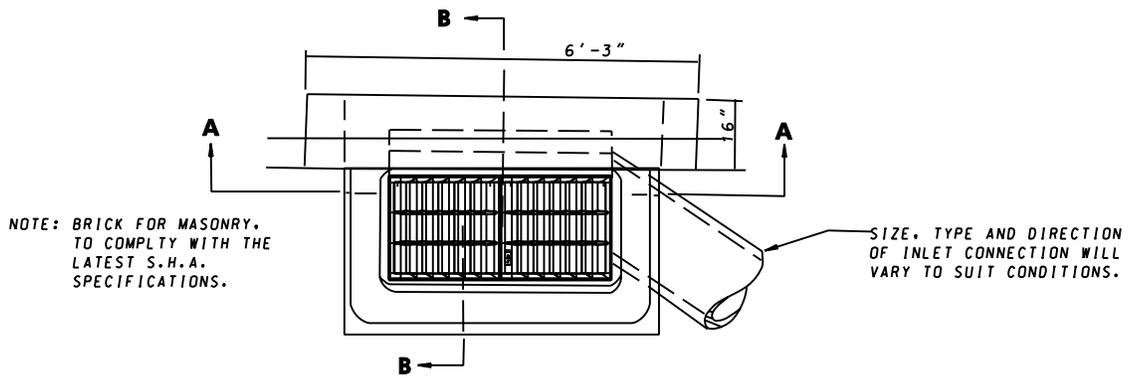


APPROVAL • SHA REVISIONS	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
APPROVAL 12-15-87	APPROVAL 2-24-88
REVISED 11-18-04	REVISED 7-27-09
REVISED 7-1-09	REVISED 07-26-10
REVISED 08-03-10	REVISED

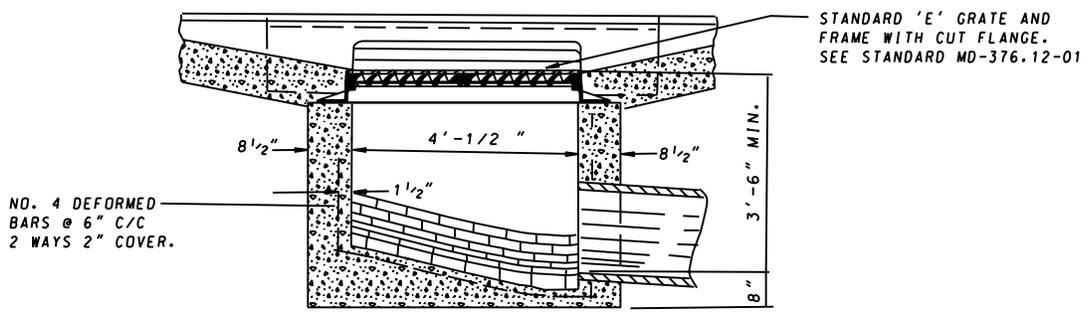
Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

STANDARD TYPE E INLET

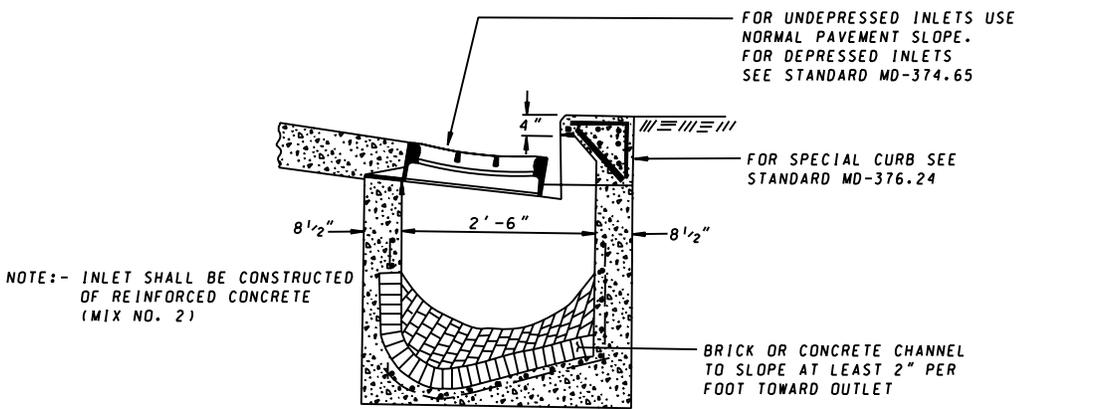
STANDARD NO. MD 376.11



PLAN
(SHOWN WITHOUT TROUGH SLAB)



SECTION A-A



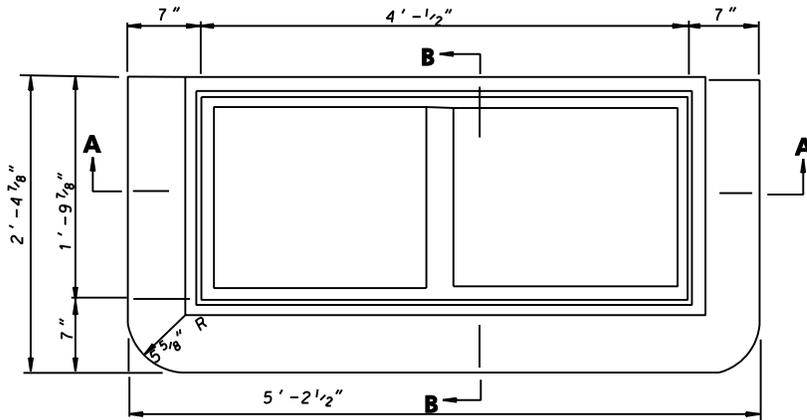
SECTION B-B

SPECIFICATION 305	CATEGORY CODE ITEMS	
APPROVED	DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT	
	APPROVAL • SHA REVISIONS	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
	APPROVAL 12-15-87	APPROVAL 2-24-88
	REVISED 11-18-04	REVISED 7-27-09
	REVISED 7-1-09	REVISED 07-26-10
	REVISED 08-03-10	REVISED

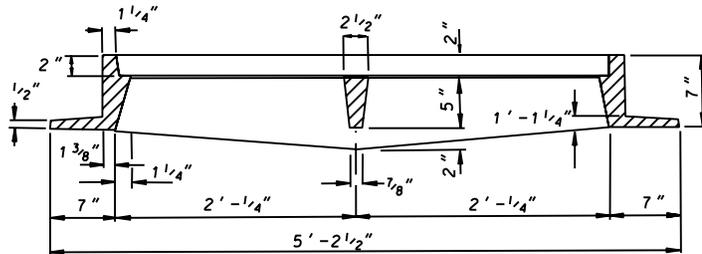
Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
 STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

STANDARD TYPE E COMBINATION INLET

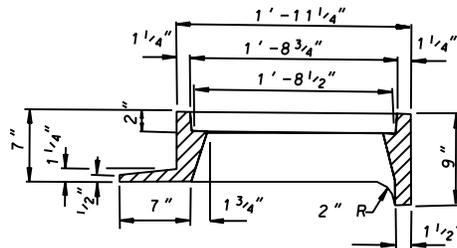
STANDARD NO. MD 376.21



PLAN



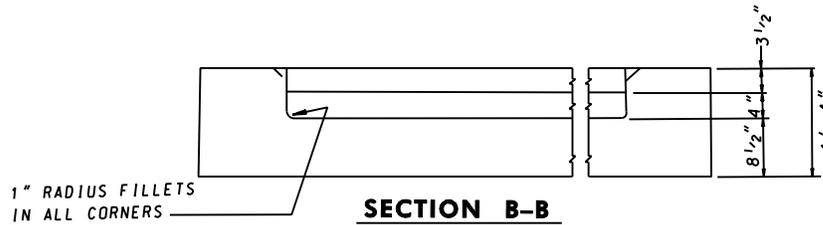
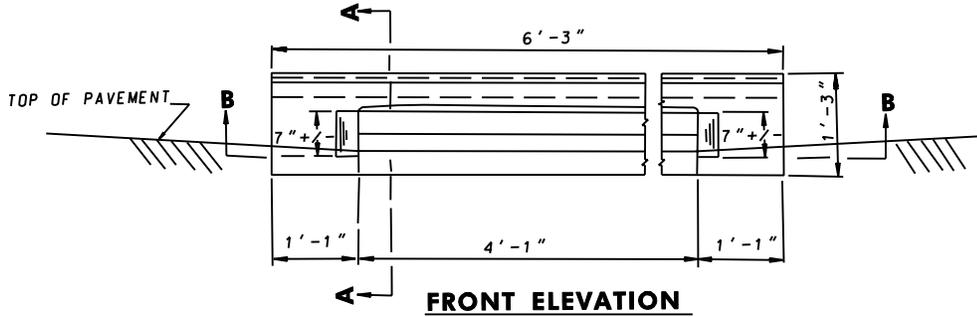
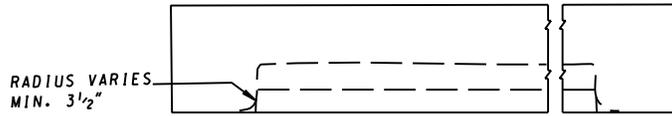
SECTION A-A



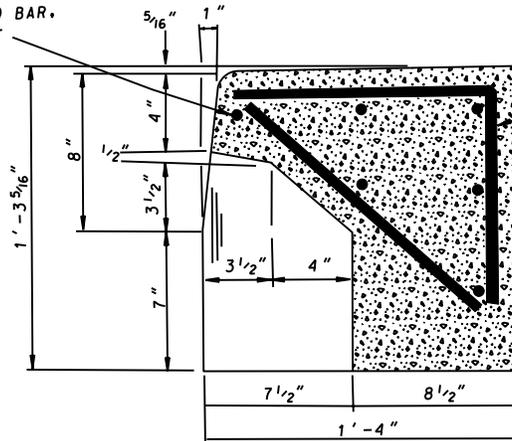
SECTION B-B

CAST IRON FRAME, APPROX. WEIGHT 653 LBS.

SPECIFICATION 305	CATEGORY CODE ITEMS	<p align="center"> Maryland Department of Transportation STATE HIGHWAY ADMINISTRATION STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES STANDARD TYPE E COMBINATION INLET STANDARD CAST IRON FRAME </p>	
APPROVED	 DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT		
	APPROVAL • SHA REVISIONS	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION	<p align="center"> STANDARD NO. MD 376.22 </p>
	APPROVAL 1-26-55	APPROVAL 3-23-56	
	REVISED 11-18-04	REVISED	
	REVISED	REVISED	



NO. 6 DIAMETER
DEFORMED BAR.
STRAIGHT



NO. 4 DIAMETER DEFORMED BARS
8" C/C BENT THUS

ALL OTHER BARS, NO. 4 DIAMETER
DEFORMED BARS, 8" C/C STRAIGHT

SECTION A-A

NOTE: CONCRETE, S.H.A. FINISH.
GRANULITHIC APPROX.
WEIGHT-1200 LBS.

SPECIFICATION
305

CATEGORY CODE ITEMS

APPROVED *Kirk G. McCall*
DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT

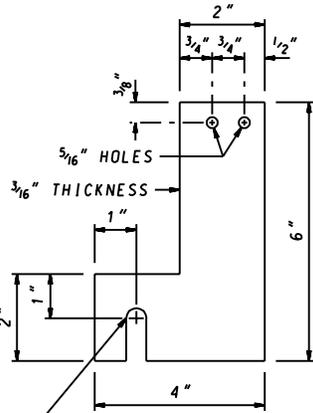


APPROVAL • SHA REVISIONS	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
APPROVAL 1-23-69	APPROVAL 2-24-69
REVISED 11-18-04	REVISED
REVISED	REVISED
REVISED	REVISED

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES
STANDARD TYPE E COMBINATION INLET
DETAIL OF SPECIAL CURB

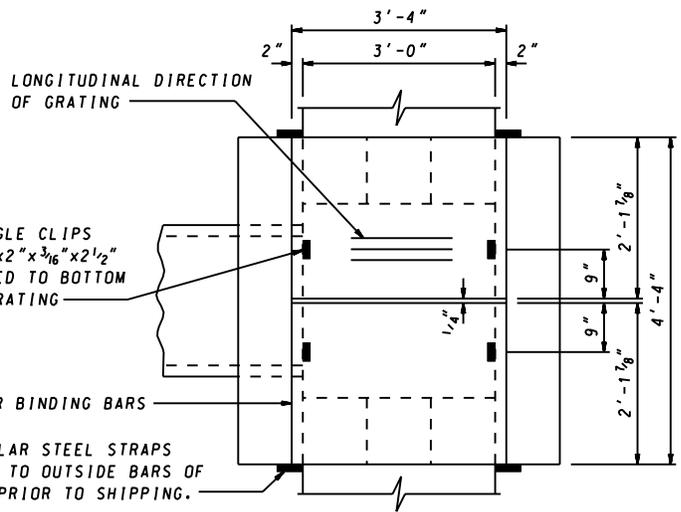
STANDARD NO.

MD 376.24

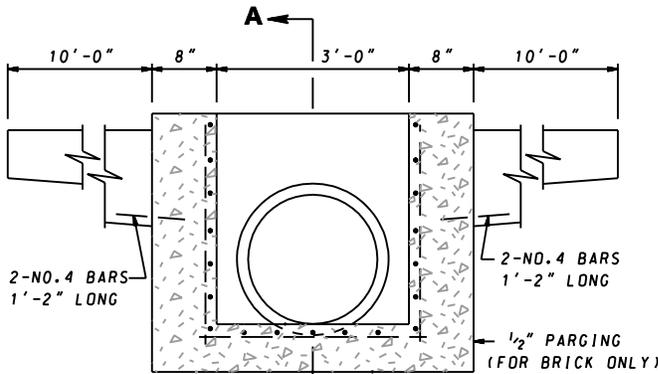


END STRAP DETAIL

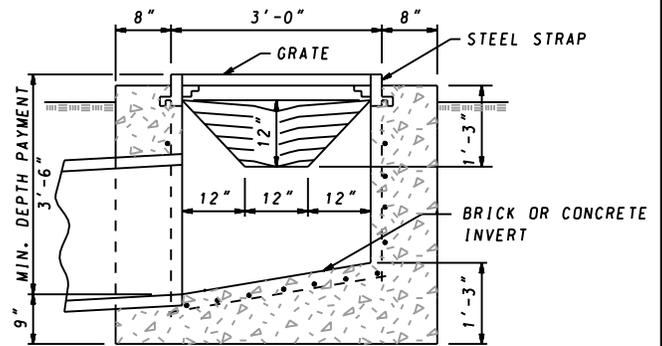
3/16" SLOTTED HOLE TO RECEIVE 1/2"x4" MACHINE BOLT (GALV.) IMBEDDED 3" IN CONC. WALL. NUT TO BE PLACED ON END OF BOLT AFTER GRATE IS INSTALLED.



PLAN



ELEVATION

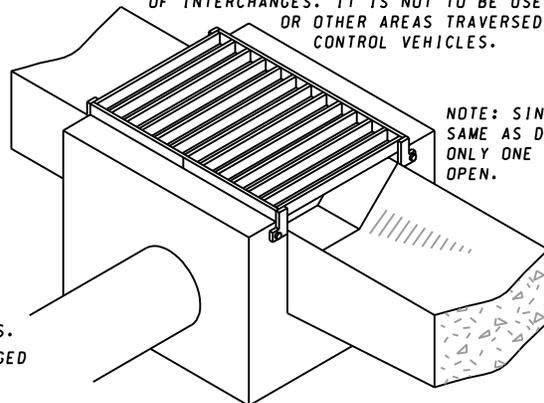


SECTION A-A

NOTES

1. THE CONCRETE VALLEY GUTTER TO BE USED IN CONNECTION WITH THIS INLET, WILL BE WARPED FROM THE STANDARD SECTION TO MEET THE SECTION AT THE END OF THE INLET. THIS TRANSITION WILL TAKE PLACE WITH A DISTANCE OF TEN (10) FEET FROM THE INLET. GUTTER TO BE PAID FOR SEPARATELY.
2. PIPE OUTLETS AND GUTTER APPROACHES CAN BE REVISED TO MEET EXISTING CONDITIONS.
3. INLET MAY BE CONSTRUCTED OF REINFORCED CONCRETE (MIX NO. 2) OR BRICK. CHAMFER INSIDE CORNER 3/4"x3/4". REINFORCEMENT NO. 4 BARS @ 6" C/C, 2" COVER.
4. GRATINGS ARE SUBJECT TO APPROVAL FOR EACH JOB. ANY TYPE OF SUBSTANTIAL TRANSVERSE BARS MAY BE USED WHICH WILL SUPPORT A MINIMUM UNIFORM LOAD OF 50 LBS./SQ. FT. THE TRANSVERSE BARS SHALL BE HELD RIGID BY SPACER BARS.
5. AREA TO BE MADE UP OF TWO EQUAL paneled widths, ARRANGED FOR BOLTING TOGETHER IN THE FIELD.
6. ALL MATERIAL TO BE HOT DIPPED GALVANIZED.

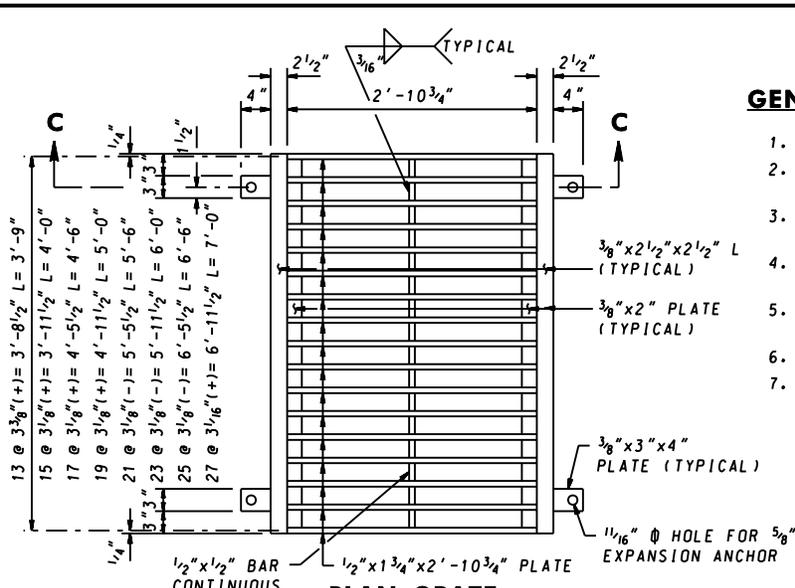
NOTE THIS TYPE OF INLET MAY BE USED IN CONJUNCTION WITH BERM DITCHES, BENCHES, AND SUMP AREAS OF INNER LOOPS OF INTERCHANGES. IT IS NOT TO BE USED IN MEDIANS OR OTHER AREAS TRAVERSED BY OUT-OF-CONTROL VEHICLES.



ISOMETRIC VIEW
(DOUBLE OPENING SHOWN)

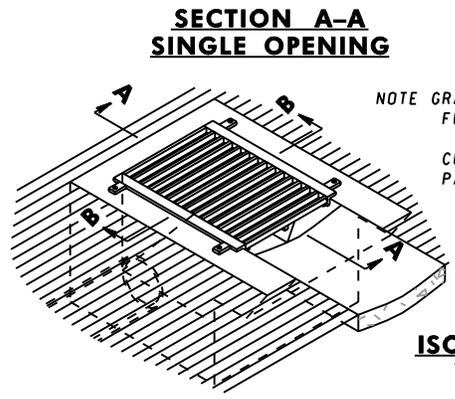
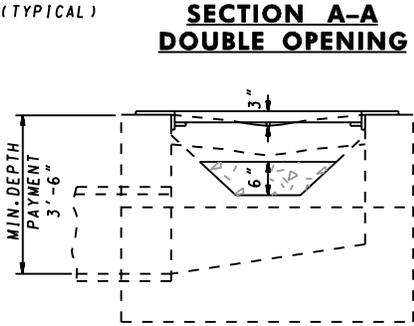
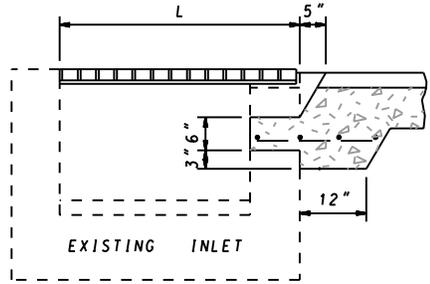
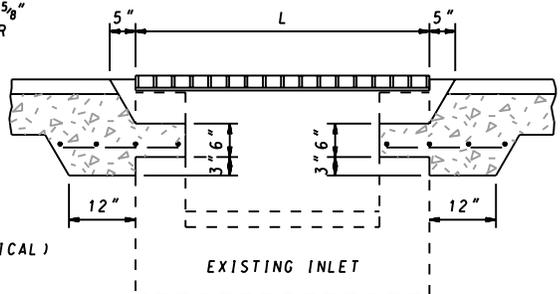
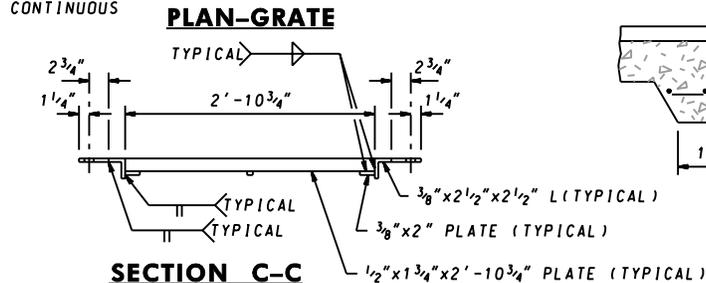
SPECIFICATION 305	CATEGORY CODE ITEMS
APPROVED <i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT	
	APPROVAL • SHA REVISIONS
	APPROVAL 1-23-69
	REVISED 10-1-01
	REVISED
APPROVAL • FEDERAL HIGHWAY ADMINISTRATION	
APPROVAL 2-6-69	
REVISED 6-23-87	
REVISED	
REVISED	

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
 STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES
STANDARD SINGLE OR DOUBLE OPENING
TYPE K INLET OPEN-END GRATE
NON-TRAFFIC AREAS
STANDARD NO. MD 378.03

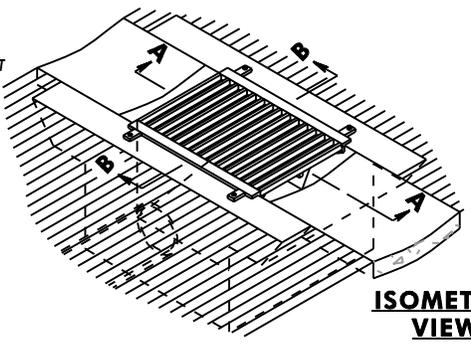


GENERAL NOTES

1. CONCRETE TO BE CONCRETE MIX NO.2.
2. REINFORCEMENT TO BE NO.4 (1/2" Ø) DEFORMED BARS AT 6" C/C. 2" COVER.
3. GRATE TO BE OF STEEL CONSTRUCTION & SHALL BE SQUARE, FLAT & TRUE.
4. STRUCTURAL STEEL SHALL BE A.S.T.M. DESIGNATION A-36.
5. GRATE TO BE GALV. AFTER FABRICATION IN ACCORDANCE A.S.T.M. DESIGNATION A-123.
6. SEE LATEST S.H.A. SPECIFICATIONS.
7. INSTALL 4-5/8" Ø CONCRETE EXPANSION ANCHORS WITH 4-5/8" Ø HEX. HEAD BOLTS. (GALV.)



NOTE GRATE TO BE AS SHOWN OR FURNISH APPROVED EQUIVALENT
CONCRETE GUTTER TO BE PAID FOR SEPARATELY.

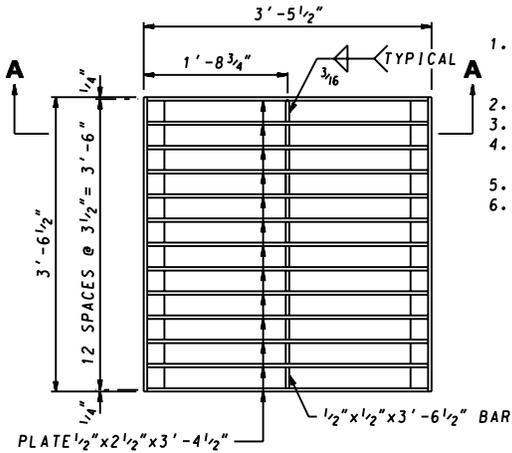


SPECIFICATION 305	CATEGORY CODE ITEMS
APPROVED <i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT	
	APPROVAL • SHA REVISIONS
	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
	APPROVAL 3-8-73
	APPROVAL 3-16-73
REVISED 10-1-01	REVISED 2-8-83
REVISED	REVISED
REVISED	REVISED

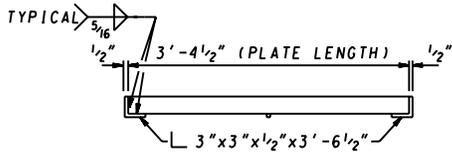
Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

STANDARD TYPE K INLET REPLACEMENT GRATE

STANDARD NO. MD 378.04



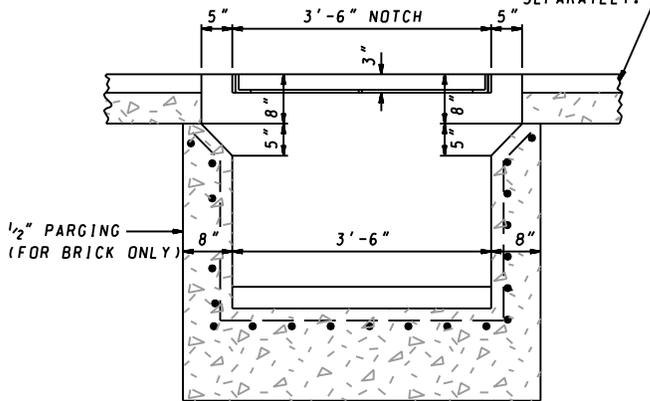
PLAN



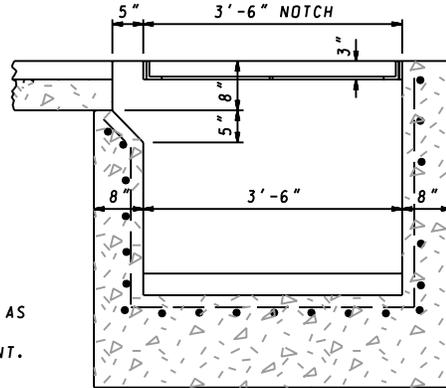
SECTION A-A

NOTE: GRATE TO BE AS SHOWN OR FURNISH APPROVED EQUIVALENT.

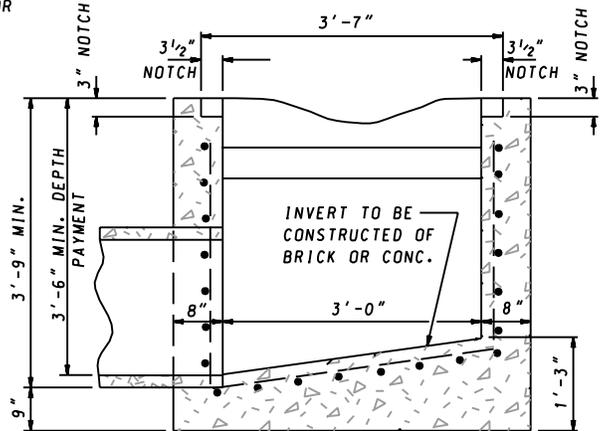
CONCRETE GUTTER TO BE PAID FOR SEPARATELY.



SECTION B-B DOUBLE OPENING

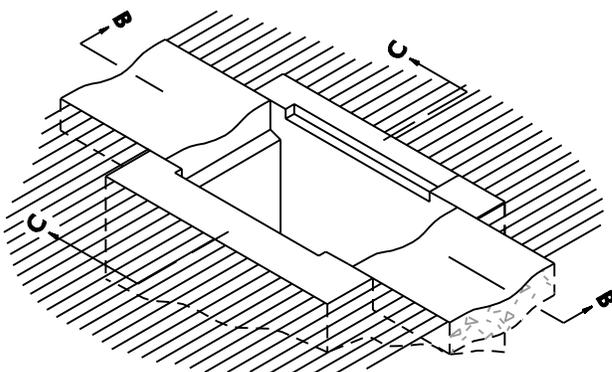


SECTION B-B SINGLE OPENING

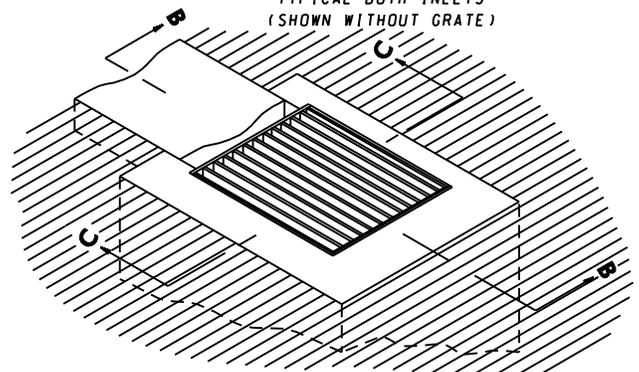


SECTION C-C

TYPICAL BOTH INLETS (SHOWN WITHOUT GRATE)



DOUBLE OPENING
(SHOWN WITHOUT GRATE)



SINGLE OPENING

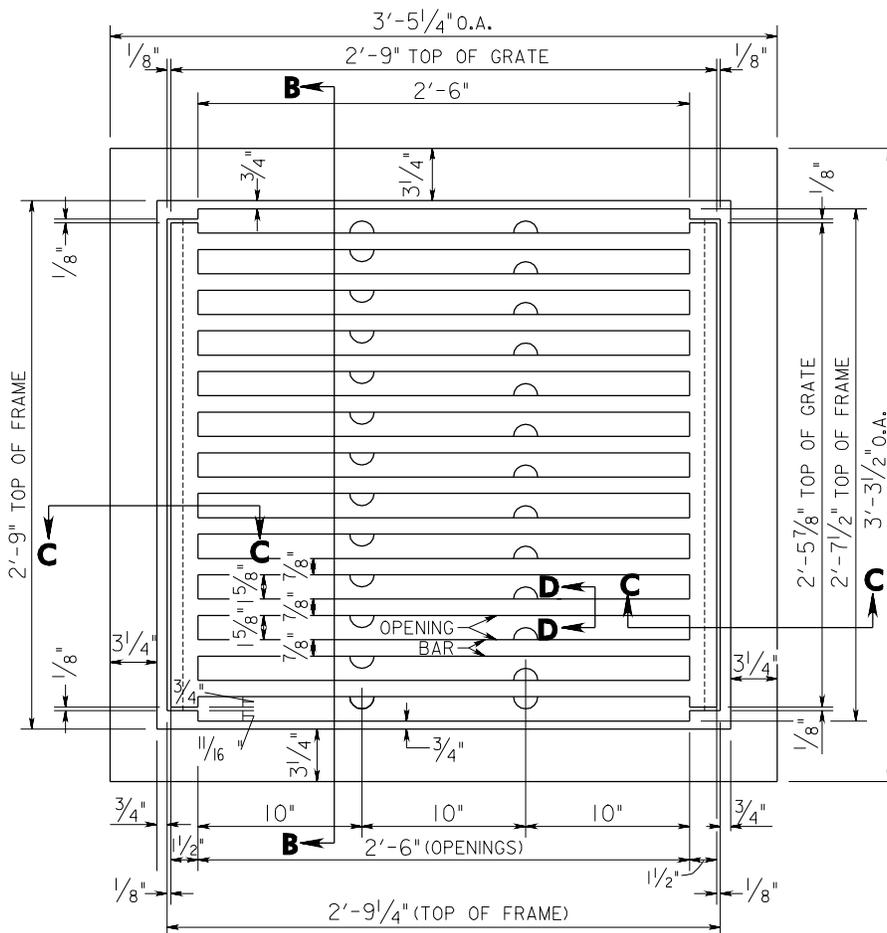
GENERAL NOTES

1. THE INLET IS TO BE CONSTRUCTED OF CONCRETE MIX NO.2 OR BRICK. IF INLET IS CONSTRUCTED OF CONCRETE THE REINFORCEMENT IS TO BE NO.4 DEFORMED BARS AT 6" C/C. 2" COVER.
2. GRATE IS TO BE OF STEEL CONSTRUCTION & SHALL BE SQUARE, FLAT & TRUE.
3. STRUCTURAL STEEL SHALL BE A.S.T.M. DESIGNATION A-36.
4. GRATE TO BE GALV. AFTER FABRICATION IN ACCORDANCE WITH A.S.T.M. DESIGNATION A-123.
5. SEE LATEST S.H.A. SPECIFICATIONS.
6. THIS INLET IS TO BE USED IN MEDIAN DITCHES AND ANY DITCH BEYOND THE SHOULDER AREA. THIS INLET IS NOT TO BE USED IN ROADWAY OR SHOULDER PAVEMENT AREAS OR AREAS WHERE BICYCLE OR MOTORCYCLE TRAFFIC IS ANTICIPATED.

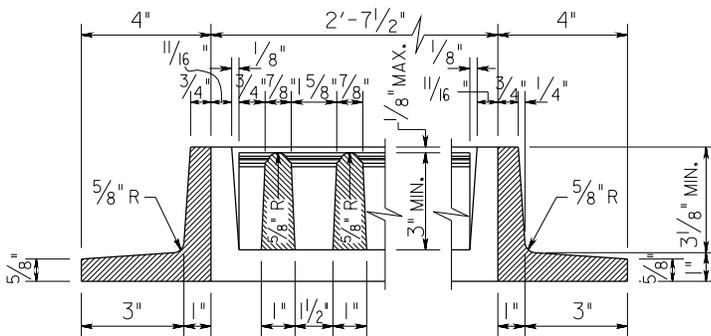
SPECIFICATION 305	CATEGORY CODE ITEMS
APPROVED	<i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT
	APPROVAL • SHA REVISIONS
	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
	APPROVAL
	REVISIONS
APPROVAL 5-28-82	APPROVAL 6-23-87
REVISED 10-1-01	REVISED
REVISED	REVISED
REVISED	REVISED

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
 STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES
STANDARD SINGLE OR DOUBLE OPENING
TYPE K INLET OPEN - END GRATE

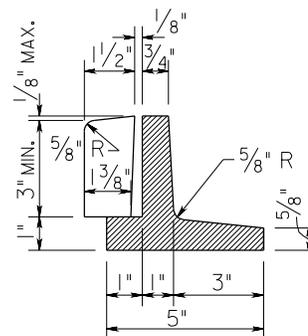
STANDARD NO. MD 378.05



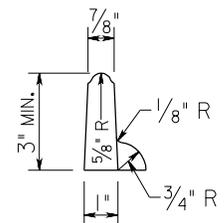
PLAN



SECTION B-B



SECTION C-C



SECTION D-D

MATERIAL: CAST IRON (SEE LATEST S.H.A. SPECIFICATIONS).

**AVERAGE WEIGHTS:
FRAME-270 ± LBS.
GRATE-340 ± LBS.**

SPECIFICATION 305	CATEGORY CODE ITEMS										
APPROVED <i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT											
SHA State Highway Administration	<table border="1"> <tr> <td>APPROVAL • SHA REVISIONS</td> <td>APPROVAL • FEDERAL HIGHWAY ADMINISTRATION</td> </tr> <tr> <td>APPROVAL 2-28-75</td> <td>APPROVAL 5-12-75</td> </tr> <tr> <td>REVISED 3-15-06</td> <td>REVISED 4-5-06</td> </tr> <tr> <td>REVISED</td> <td>REVISED</td> </tr> <tr> <td>REVISED</td> <td>REVISED</td> </tr> </table>	APPROVAL • SHA REVISIONS	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION	APPROVAL 2-28-75	APPROVAL 5-12-75	REVISED 3-15-06	REVISED 4-5-06	REVISED	REVISED	REVISED	REVISED
APPROVAL • SHA REVISIONS	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION										
APPROVAL 2-28-75	APPROVAL 5-12-75										
REVISED 3-15-06	REVISED 4-5-06										
REVISED	REVISED										
REVISED	REVISED										

**Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION**
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

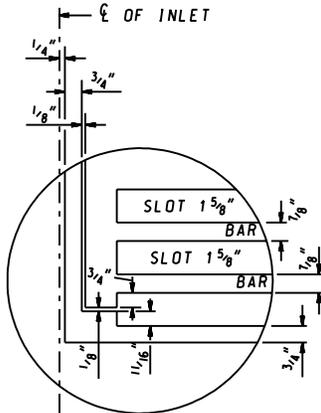
**STANDARD TYPE K INLET
SINGLE FRAME AND GRATE**

STANDARD NO.

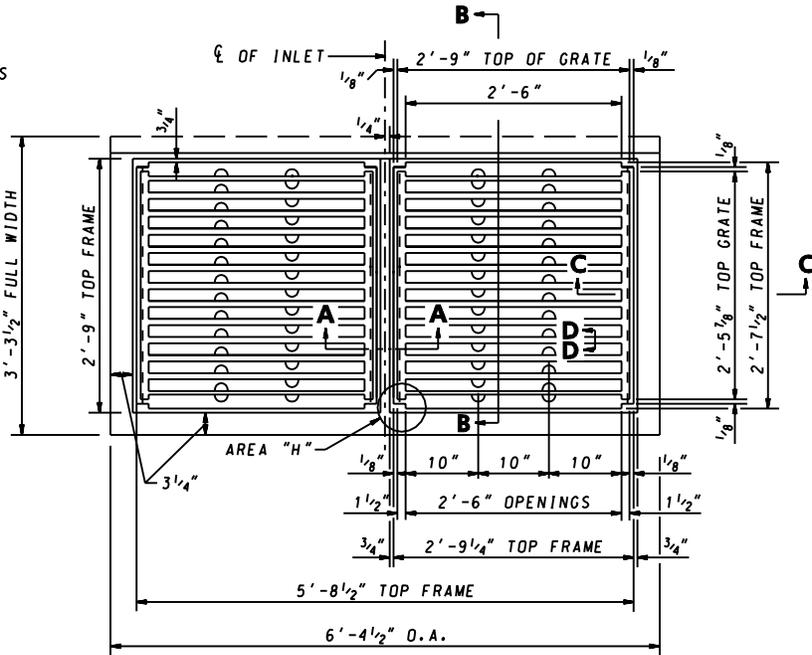
MD-378.06

CAST IRON FRAME & GRATES
SEE LATEST S.H.A. SPECIFICATIONS

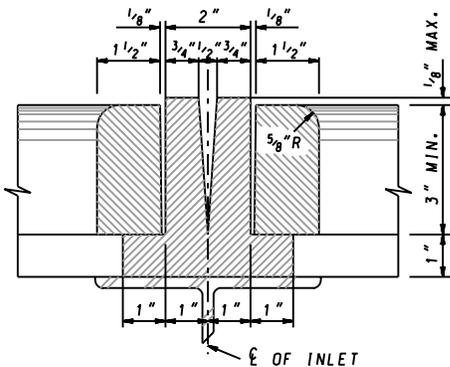
AVERAGE WEIGHTS
FRAME-CUT FLANGE=430 LBS. ±
FRAME-UNCUT=480 LBS. ±
GRATES-2=680 LBS. ±



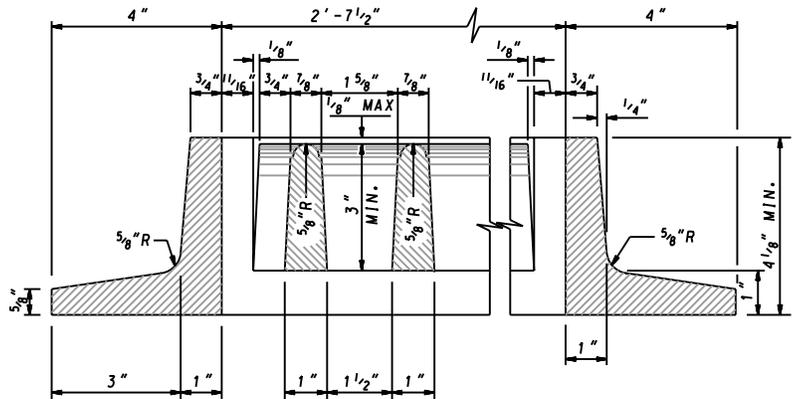
AREA "H" DETAIL



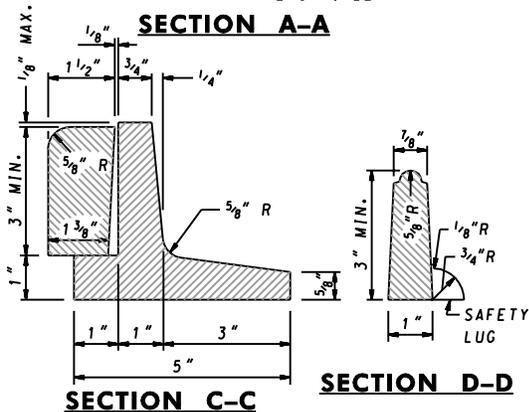
PLAN



SECTION A-A



SECTION B-B



SECTION C-C

SECTION D-D

SPECIFICATION	CATEGORY CODE ITEMS
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APPROVED *Kirk G. McCall*
DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT



APPROVAL • SHA REVISIONS	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
APPROVAL 2-28-75	APPROVAL 5-12-75
REVISED 10-1-01	REVISED
REVISED	REVISED
REVISED	REVISED

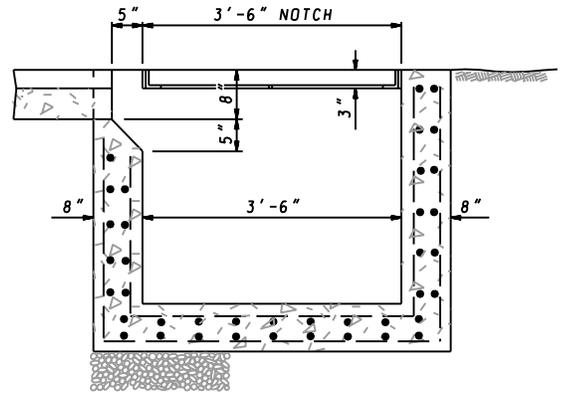
Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

STANDARD TYPE K INLET
DOUBLE FRAME & GRATE

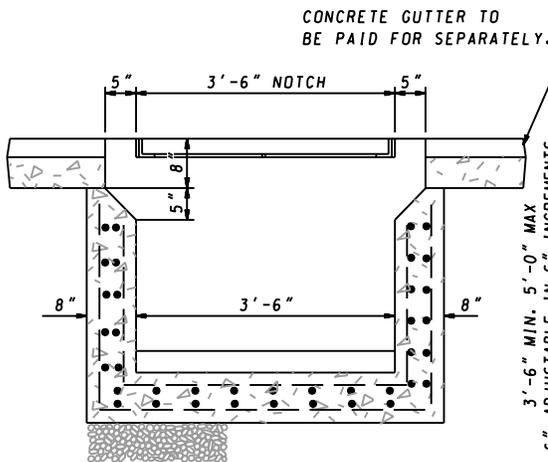
STANDARD NO. MD 378.07

GENERAL NOTES

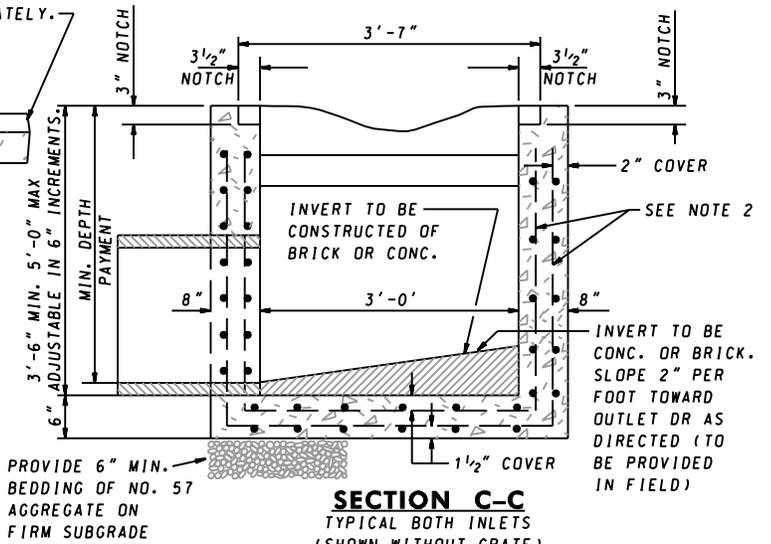
1. CONCRETE TO BE MIX. NO.6 (4500 P.S.I.)
2. REINFORCING-2 LAYERS OF 4x4-W40xW40 WELDED WIRE FABRIC.
3. THREADED PLASTIC INSERTS TO BE PROVIDED FOR HANDLING.
4. PIPE OPENINGS TO BE PROVIDED AS REQUIRED. FOR SIZE, LOCATION AND INVERT ELEVATIONS REFER TO CONSTRUCTION PLANS.
5. FOR GRATE DETAILS SEE STANDARD MD-378-05. GRATE TO BE AS SHOWN OR FURNISH APPROVED EQUIVALENT.
6. "MINIMUM DEPTH" PAYMENT PER "EACH" INLET INCLUDES DEPTHS UP TO 3'-6". VERTICAL DEPTH PAYMENT PER "LINEAR FOOT" FOR DEPTHS IN EXCESS OF 3'-6".
7. THIS INLET IS TO BE USED IN MEDIAN DITCHES AND ANY DITCH BEYOND THE SHOULDER AREA. THIS INLET IS NOT TO BE USED IN ROADWAY OR SHOULDER PAVEMENT AREAS OR WHERE BICYCLE OR MOTORCYCLE TRAFFIC IS ANTICIPATED.



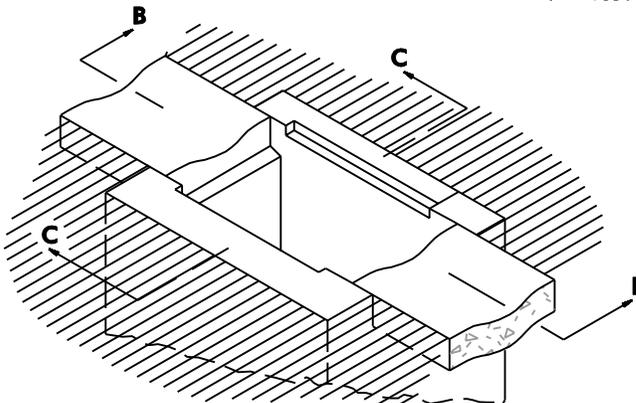
SECTION B-B SINGLE OPENING



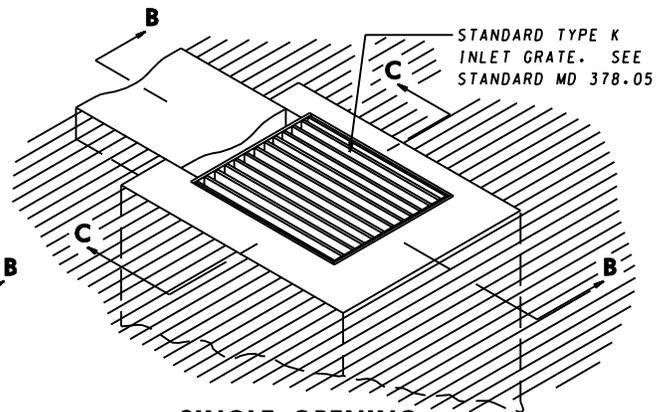
SECTION B-B DOUBLE OPENING



**SECTION C-C
TYPICAL BOTH INLETS
(SHOWN WITHOUT GRATE)**



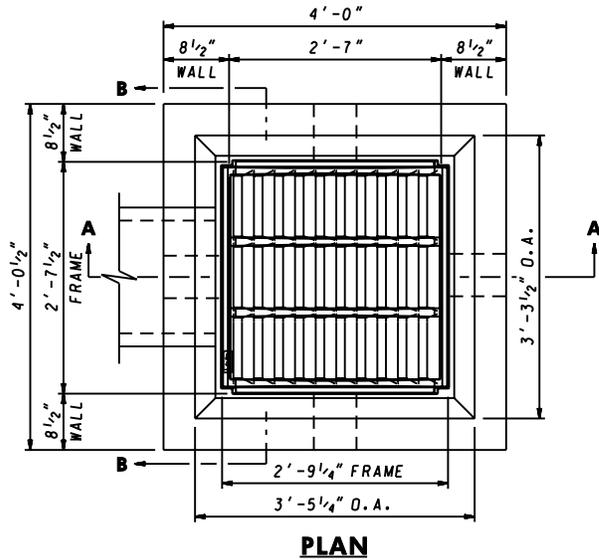
**DOUBLE OPENING
(SHOWN WITHOUT GRATE)**



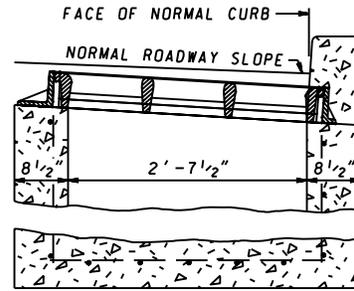
SINGLE OPENING

SPECIFICATION 305	CATEGORY CODE ITEMS
APPROVED	<i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT
	APPROVAL • SHA REVISIONS
	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
	APPROVAL 6-4-84
	APPROVAL 8-1-84
REVISED 10-1-01	REVISED 6-23-87
REVISED	REVISED
REVISED	REVISED

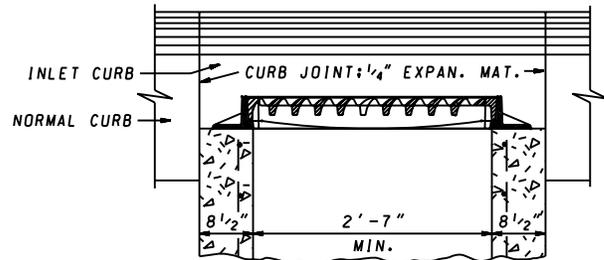
**Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION**
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES
**PRECAST STANDARD
SINGLE OR DOUBLE OPENING
TYPE K INLET OPEN-END GRATE**
STANDARD NO. MD 378.11



NOTE FOR UNDEPRESSED INLETS, USE NORMAL PAVEMENT SLOPE.



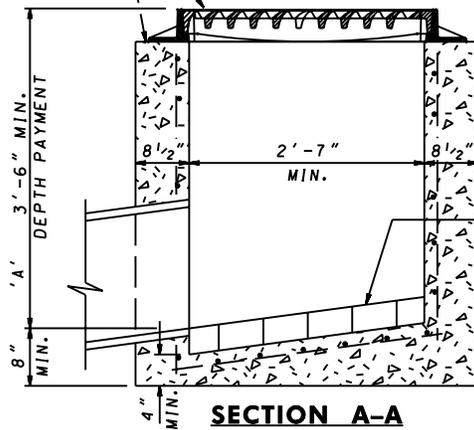
SECTION B-B ADJACENT TO CURB



SECTION A-A ADJACENT TO CURB

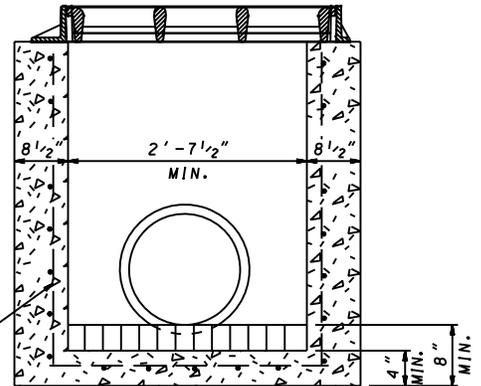
LEAVE 4"x4" OPENINGS FOR SUBGRADE DRAINAGE, IF DIRECTED.

FRAME AND GRATE FOR STANDARD CLASS 'S' INLET SEE STD. MD 379.02-01



SECTION A-A

BRICK OR CONCRETE CHANNEL TO SLOPE AT LEAST 2" PER FOOT TOWARD OUTLET.



SECTION B-B

NO. 4 Ø DEFORMED BARS, 2 WAYS @ 6" C/C 2" COVER.

NOTES

INLET SHALL BE CONSTRUCTED OF REINFORCED CONCRETE (MIX NO. 2). SEE LATEST S.H.A. SPECIFICATIONS FOR INLETS. REINFORCEMENT REQUIRED ON OUTSIDE, AS WELL AS ON INSIDE, OF WALLS BELOW 7'-0" WHEN 'A' IS GREATER THAN 7'-0". SPACING, SAME AS INSIDE OF WALL.
 PLACE 1/4" EXPANSION MATERIAL OF SAME TYPE APPROVED FOR PAVEMENT BETWEEN THE FRAME AND ABUTTING RIGID PAVEMENT, AND BETWEEN ENDS OF INLET CURB AND NORMAL CURB.
 SIZE, TYPE AND DIRECTION OF INLET CONNECTION WILL VARY TO SUIT CONDITIONS.
 WHEN INLET IS USED ADJACENT TO CURB, SLOPE CURB FACE TO MEET INSIDE EDGE OF FRAME, AS SHOWN IN SECTION 'B-B'-ADJACENT TO CURB.
 "BRICK FOR MASONRY", TO COMPLY WITH THE LATEST S.H.A. SPECIFICATIONS.

SPECIFICATION 305	CATEGORY CODE ITEMS
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APPROVED *Kirk G. McCall*
 DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT

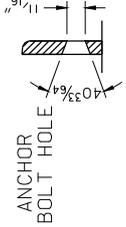
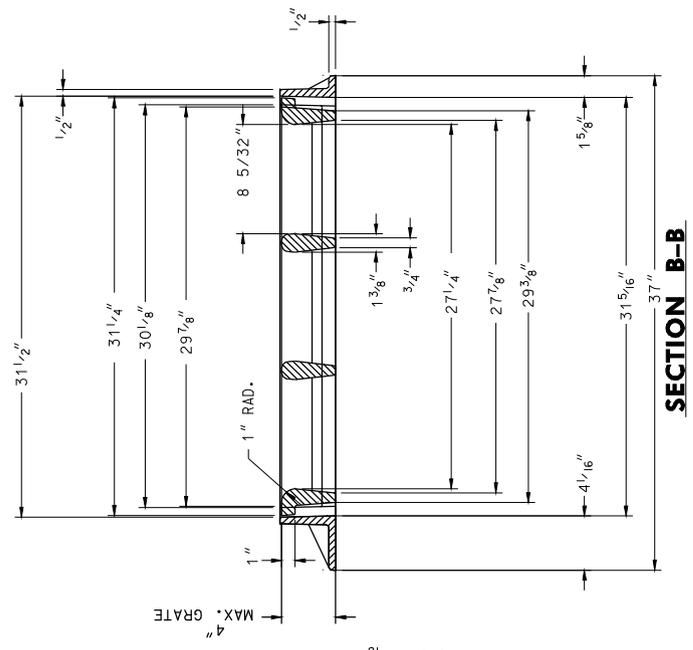
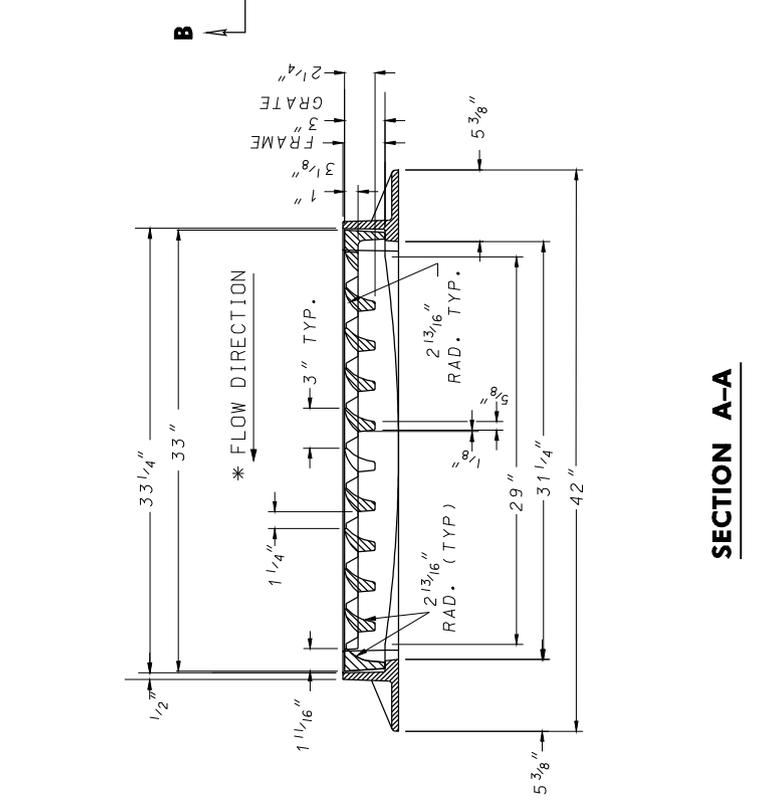
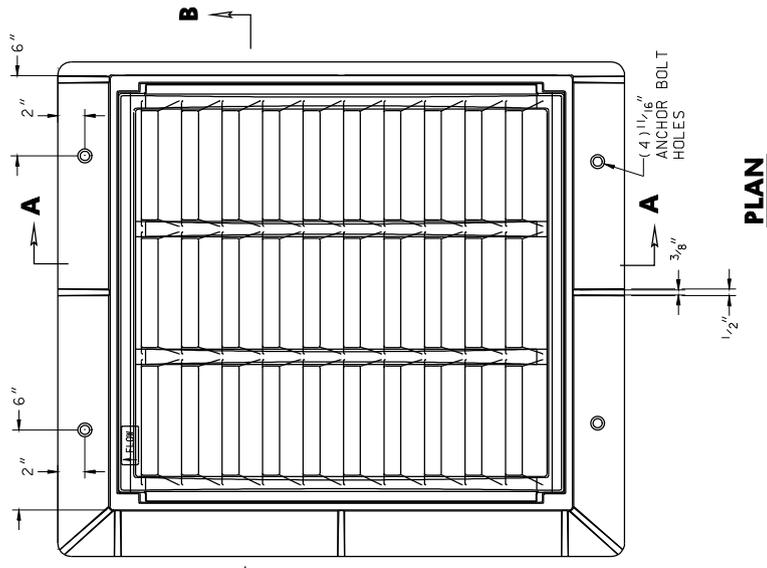


APPROVAL • SHA REVISIONS	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
APPROVAL 7-9-62	APPROVAL 2-24-88
REVISED 10-1-01	REVISED 7-27-09
REVISED 7-1-09	REVISED 07-26-10
REVISED 08-03-10	REVISED

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
 STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

STANDARD TYPE S INLET
SINGLE GRATE

STANDARD NO. MD 379.01



NOTES:

MATERIAL: CAST GRAY IRON ASTM A-48, CLASS 35B

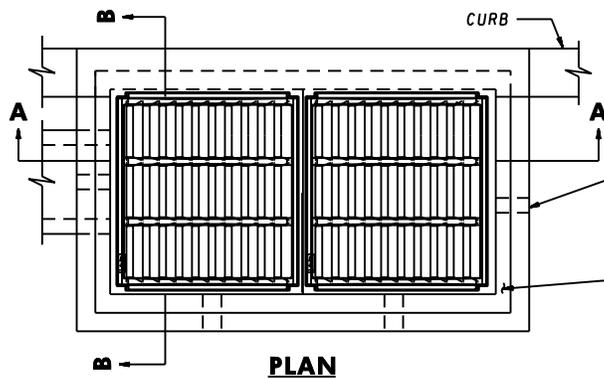
FINISH: NO PAINT

WEIGHT (Min.): FRAME 163#, GRATE 295#

FRAMES TO BE CASTING WITH FLANGE CUT, AS SHOWN, WHEN INLET TO BE PLACED ADJACENT TO CURB OPENING FOR FULL FLANGE/DETAILS, REFER TO THE RESPECTIVE STANDARD PLATES FOR TYPE "S" INLET.

* CONTRACTOR IS RESPONSIBLE FOR CORRECT ORIENTATION OF THE CV-GRATE TOWARD THE DIRECTION OF FLOW.

SPECIFICATION 305		Maryland Department of Transportation STATE HIGHWAY ADMINISTRATION STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES	
APPROVED	 DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT	CURVE VANE GRATE WITH FRAME FOR SINGLE TYPE S INLET (S-CV)	
	APPROVAL • SHA REVISIONS APPROVAL 2-10-04 REVISED 7-1-09	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION APPROVAL 3-31-04 REVISED 7-27-09	STANDARD NO. MD 379.02-01

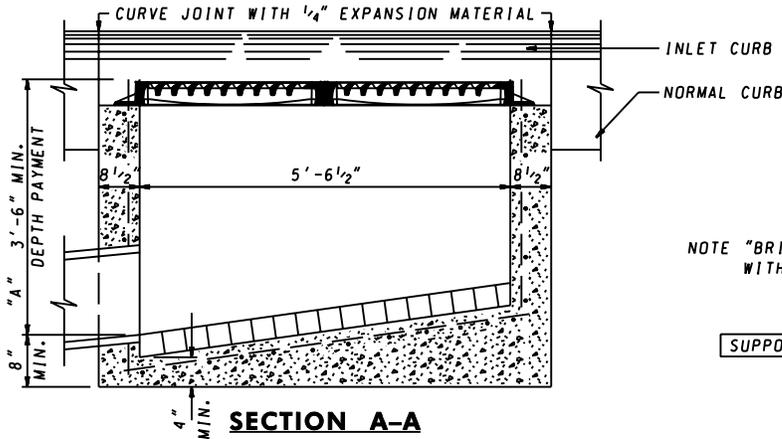


PLAN

INVERT MAY BE PLAIN CONCRETE OR 4" BRICK LAID ON EDGE. INVERT TO SLOPE DOWN TOWARD OUTLET AT THE RATE OF 2" PER FOOT, OR AS DIRECTED.

LEAVE 4"x4" OPENING FOR SUBGRADE DRAINAGE, IF DIRECTED.

STANDARD CLASS 'S' CAST IRON FRAME & GRATES. SEE STANDARD MD 379.05.

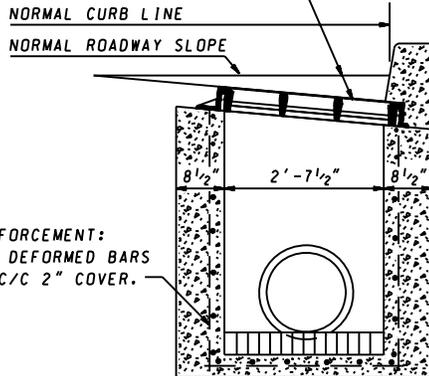


SECTION A-A

NOTE "BRICK FOR MASONRY", TO COMPLY WITH THE LATEST S.H.A. SPECIFICATIONS.

SUPPORT BEAM IS NOT TO BE USED

NOTE FOR UNDEPRESSED INLETS. USE NORMAL PAVEMENT SLOPE.



SECTION B-B

NOTES

INLET SHALL BE CONSTRUCTED OF REINFORCED CONCRETE (MIX NO.2) SIZE, TYPE & DIRECTION OF INLET CONNECTION WILL VARY TO SUIT CONDITIONS.

REINFORCEMENT REQUIRED ON OUTSIDE, AS WELL AS ON INSIDE, OF WALLS BELOW 7'-0" WHEN 'A' IS GREATER THAN 7'-0". SPACING, SAME AS FOR INSIDE OF WALL.

PLACE 1/4" EXPANSION MATERIAL OF SAME TYPE APPROVED FOR PAVEMENT BETWEEN THE FRAME AND ABUTTING RIGID PAVEMENT, & BETWEEN ENDS OF INLET CURB & NORMAL CURB. SLOPE FACE OF CURB TO MEET INSIDE EDGE OF FRAME AS SHOWN IN SECTION B-B.

STANDARD CLASS 'S' INLET (DOUBLE GRATE TANDEM) MAY BE USED WITH ONE END ADJACENT TO CURB. FRAME WILL BE LAID ON NORMAL SLOPE OF ROADWAY UNLESS NOTED OTHERWISE.

ALL WALL AND FRAME & GRATE DIMENSIONS SAME AS WHEN SIDE IS ADJACENT TO CURB AS SHOWN ON LEFT.

INLET MAY BE USED IN LOW SPOTS WHICH ARE NOT ADJACENT TO CURB.

SPECIFICATION 305	CATEGORY CODE ITEMS
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APPROVED *Kirk G. McCall*
DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT



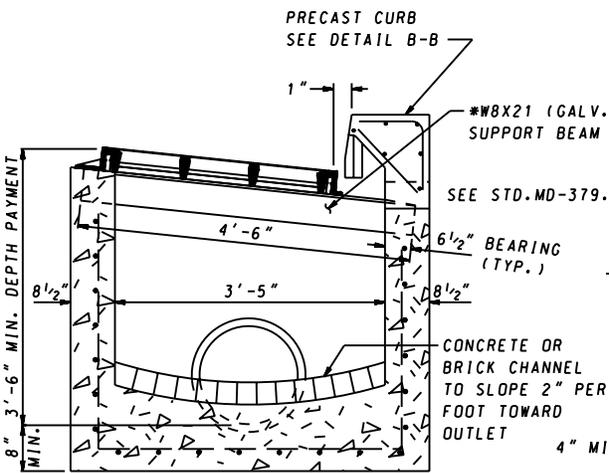
APPROVAL • SHA REVISIONS	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
APPROVAL 10-30-69	APPROVAL 11-10-69
REVISED 10-1-01	REVISED 2-24-88
REVISED 7-1-09	REVISED 7-27-09
REVISED 08-03-10	REVISED 07-26-10

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

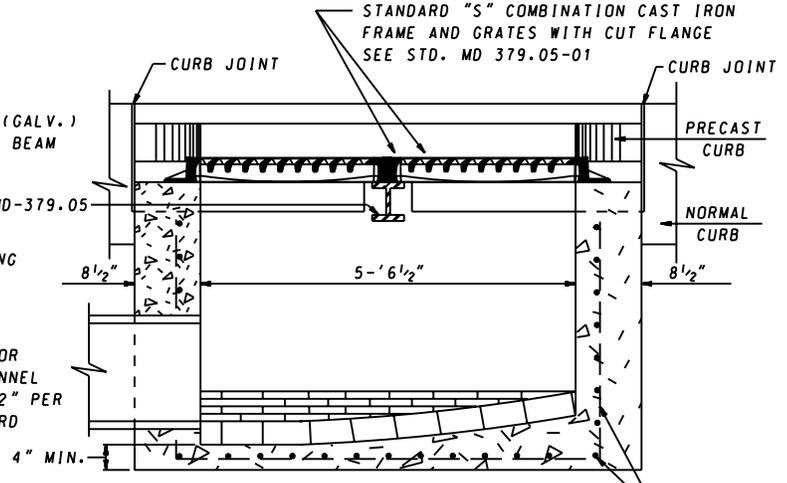
STANDARD TYPE S INLET
DOUBLE GRATE TANDEM

STANDARD NO.

MD 379.03

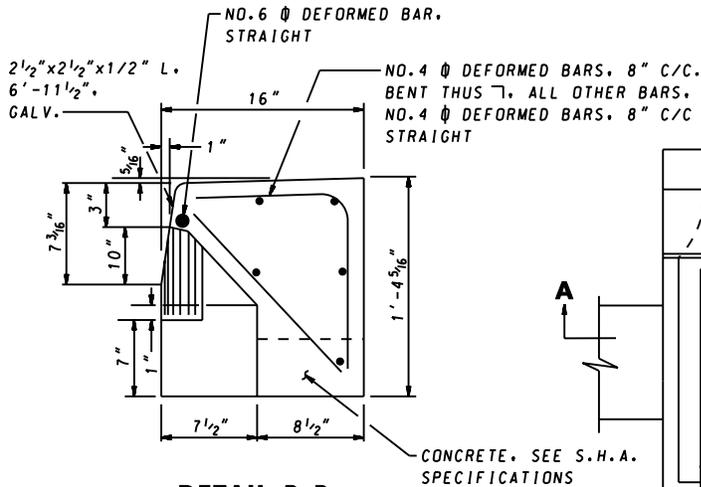


SECTION B-B

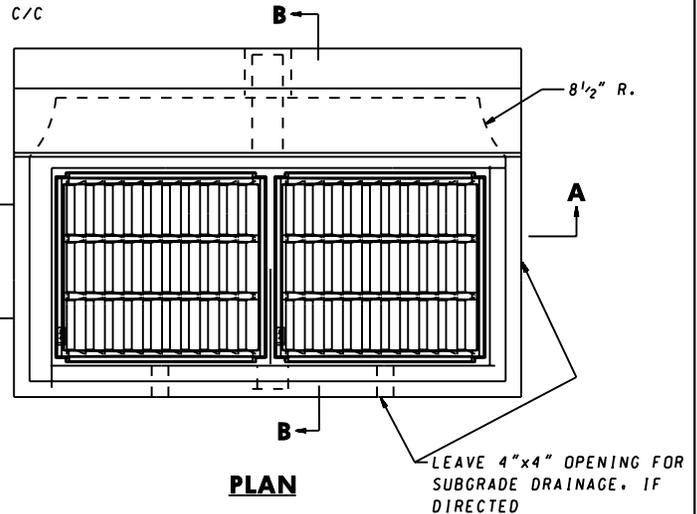


SECTION A-A

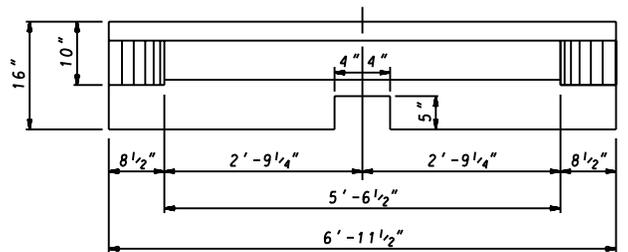
REINFORCEMENT: NO. 4 Ø DEFORMED BARS, 6" C/C 2" COVER
 INVERT MAY BE PLAIN CONCRETE OR 4" BRICK LAID ON EDGE.



DETAIL B-B
 PRECAST CURB



PLAN



ELEVATION
 PRECAST CURB

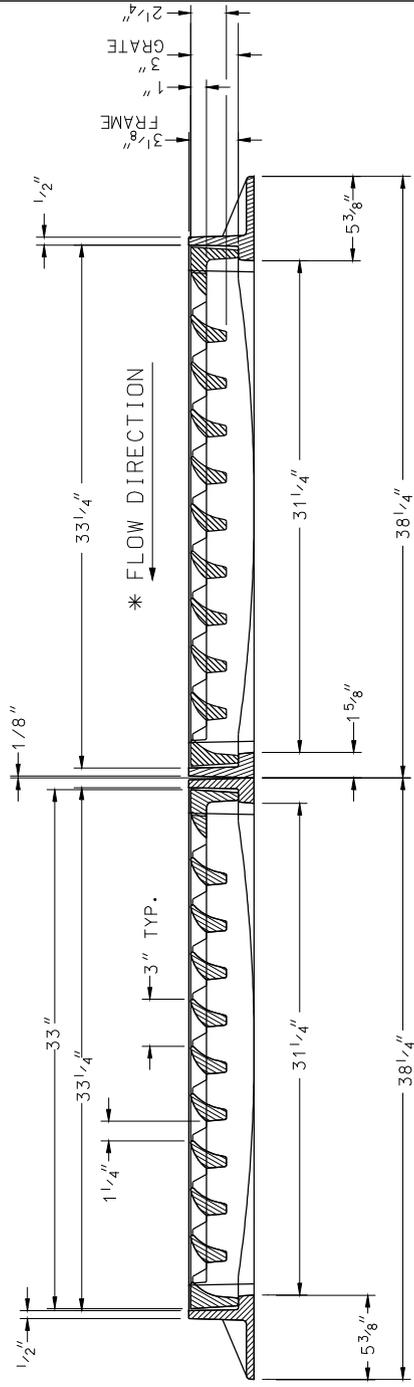
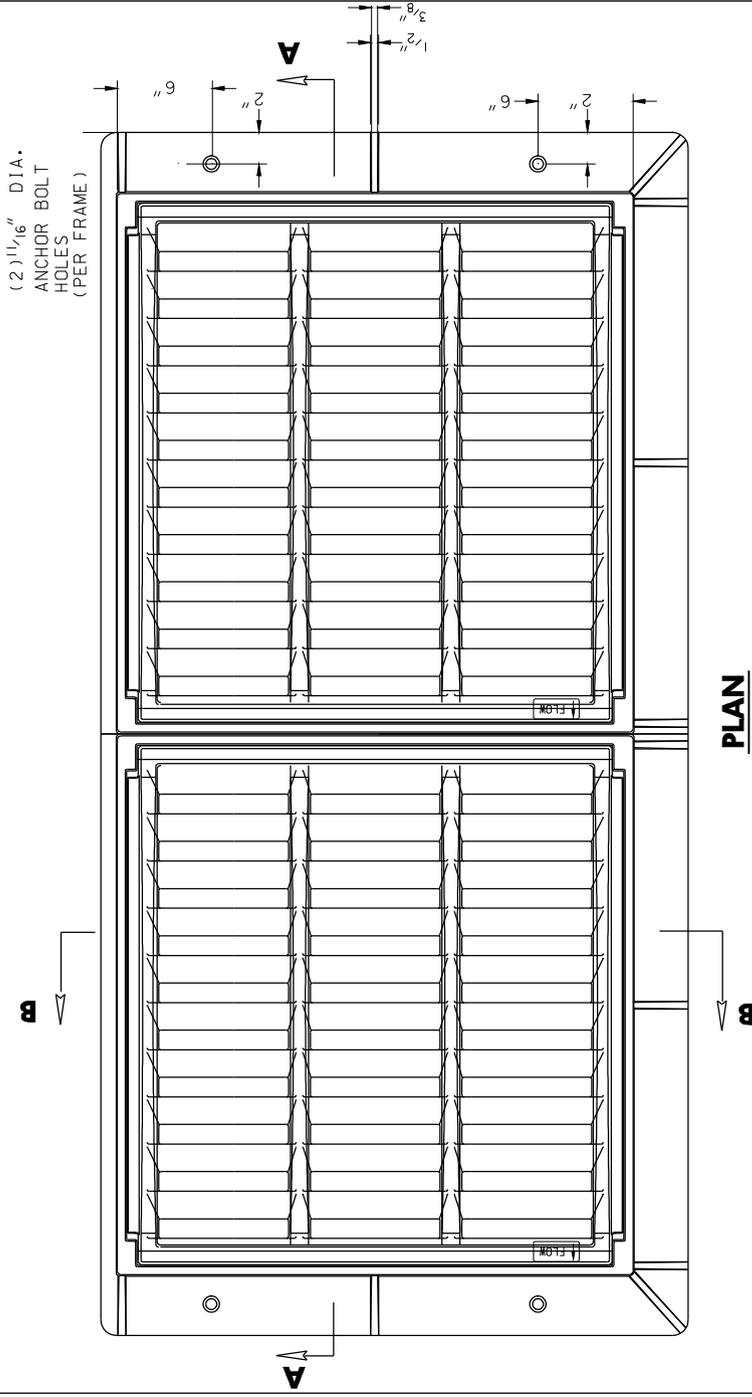
NOTE

INLET SHALL BE CONSTRUCTED OF REINFORCED CONCRETE (MIX NO. 2). SIZE, TYPE, AND DIRECTION OF INLET CONNECTION WILL VARY TO SUIT CONDITIONS. SEE S.H.A. SPECIFICATIONS FOR INLETS. REINFORCEMENT REQUIRED ON OUTSIDE, AS WELL AS ON INSIDE, OF WALLS BELOW 7'-0" WHEN "A" IS GREATER THAN 7'-0". SPACING, SAME AS FOR INSIDE OF WALL. PLACE 1/4" EXPANSION MATERIAL OF SAME TYPE APPROVED FOR PAVEMENT BETWEEN THE FRAME AND ABUTTING RIGID PAVEMENT, AND BETWEEN ENDS OF INLET CURB AND NORMAL CURB. "BRICK FOR MASONRY", TO COMPLY WITH THE S.H.A. SPECIFICATIONS. FOR UNDERPRESSED INLETS, USE NORMAL PAVEMENT SLOPE.
 * FOR METHOD OF ANCHORING SUPPORT BEAM, SEE STD. MD 380.01 IF INLET IS CONSTRUCTED OF BRICK. (FOR INLET REPAIR ONLY)

SPECIFICATION 305	CATEGORY CODE ITEMS
APPROVED	<i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT
	APPROVAL • SHA REVISIONS
	APPROVAL 10-30-69
	REVISED 10-1-01
	REVISED 7-1-09
	REVISED 08-03-10
APPROVAL • FEDERAL HIGHWAY ADMINISTRATION	
APPROVAL 11-10-69	
REVISED 2-24-88	
REVISED 7-27-09	
REVISED 07-26-10	

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
 STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES
STANDARD TYPE S COMBINATION INLET
DOUBLE GRATE TANDEM

STANDARD NO. MD 379.04

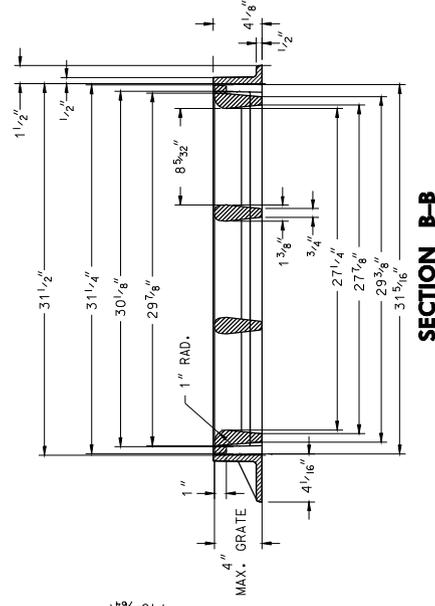
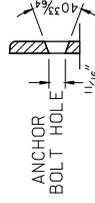


NOTES:

MATERIAL: CAST GRAY IRON ASTM A-48,
CLASS 35B
FINISH: NO PAINT
WEIGHT (MIN.): FRAME 152#, FRAME 152#,
GRATE 295# E.A.

FRAMES TO BE CASTING WITH FLANGE CUT, AS SHOWN, WHEN INLET TO BE PLACED ADJACENT TO CURB OPENING. FOR FULL FLANGE/DETAILS, REFER TO THE RESPECTIVE STANDARD PLATES FOR TYPE "S" INLET.

* CONTRACTOR IS RESPONSIBLE FOR CORRECT ORIENTATION OF THE CV-GRATE TOWARD THE DIRECTION OF FLOW.



SPECIFICATION
305

APPROVED

Kate G. McCall
DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT

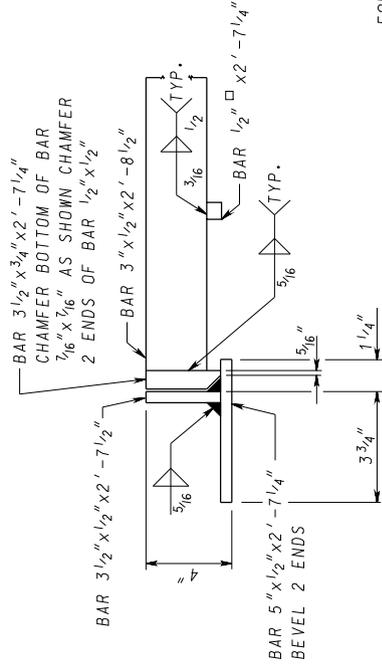


APPROVAL • SHA REVISIONS	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
APPROVAL 2-10-04	APPROVAL 3-31-04
REVISED 7-1-09	REVISED 7-27-09
REVISED	REVISED

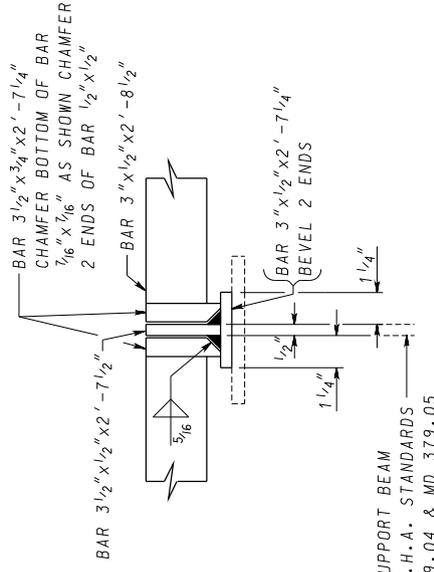
**Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION**
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

**CURVE VANE GRATES WITH FRAME
FOR DOUBLE TYPE "S" INLET (S2-CV)**

STANDARD NO. MD 379.05-01

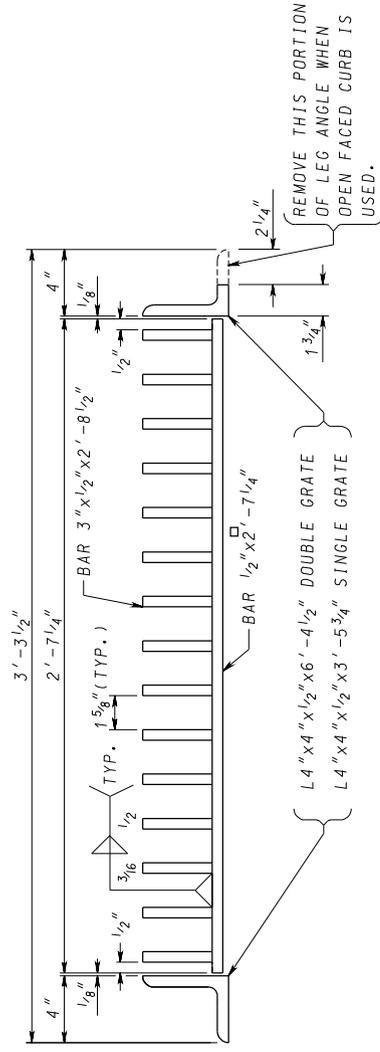


SECTION A-A

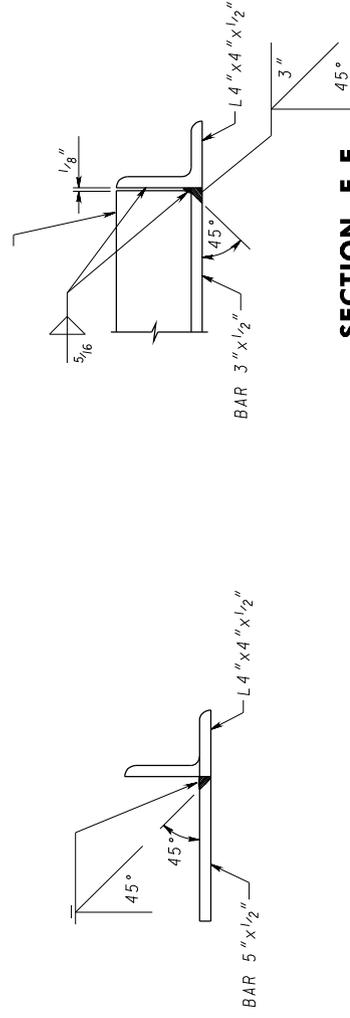


SECTION B-B

FOR SUPPORT BEAM
SEE S.H.A. STANDARDS
MD 379.04 & MD 379.05



SECTION C-C



SECTION D-D

SECTION E-E

NOTE:

NOT COMPATIBLE WITH BICYCLE.

SPECIFICATION CATEGORY CODE ITEMS

APPROVED

Kate G. McCall
DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT



APPROVAL • SHA REVISIONS	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
APPROVAL 4-23-70	APPROVAL 5-5-70
REVISED 10-1-01	REVISED 7-27-09
REVISED 7-1-09	REVISED
REVISED	REVISED

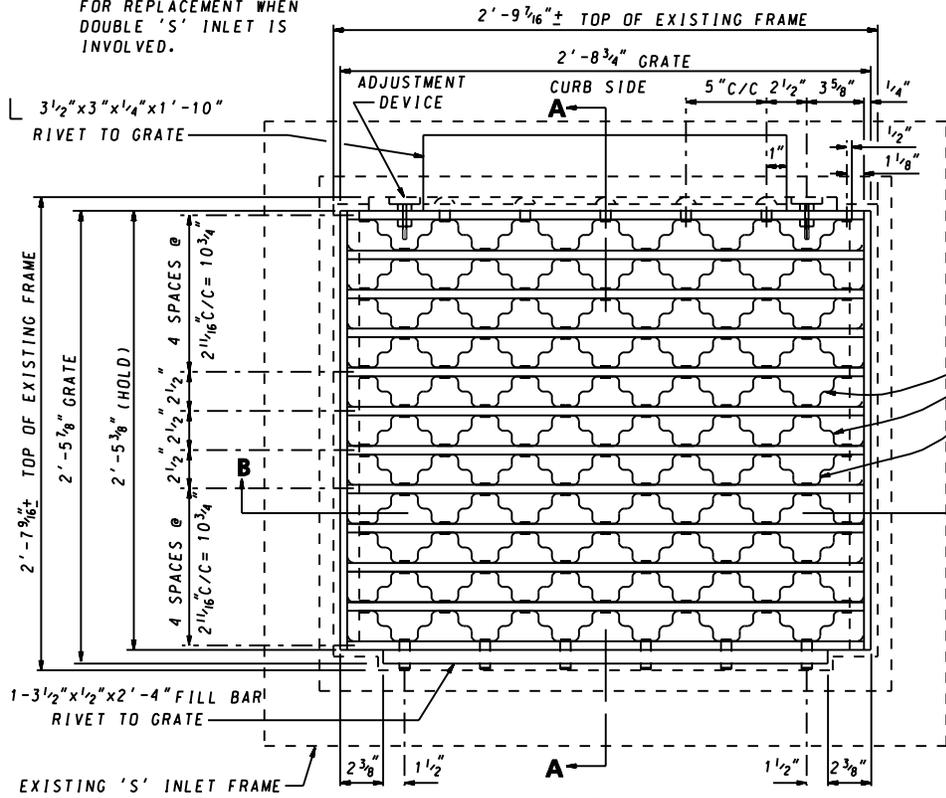
**Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION**
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES
**STANDARD TYPE S INLET & COMBINATION
STEEL FRAME & GRATE ALTERNATE**

STANDARD NO. MD 379.07

NOTE 2 GRATES ARE REQUIRED FOR REPLACEMENT WHEN DOUBLE 'S' INLET IS INVOLVED.

GENERAL NOTES

1. GRATES TO BE SQUARE FLAT & TRUE
2. STRUCTURAL STEEL SHALL BE ASTM DESIGNATION A-36.
3. GRATES TO BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM DESIGNATION A-123.
4. SEE LATEST S.H.A. SPECIFICATIONS.



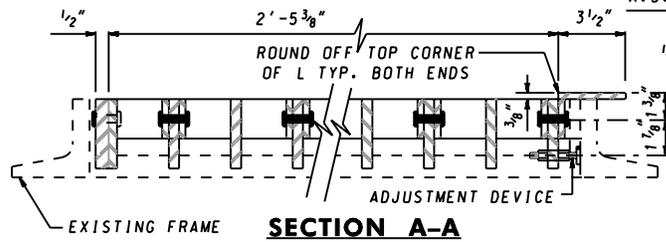
3-SPECIAL RETICULAR BARS

A "LOCKING DEVICE", TO BE DEVELOPED AND SUPPLIED BY THE CONTRACTOR, AND APPROVED BY THE S.H.A. ASSISTANT CHIEF ENGINEER-DESIGN FOR THE PURPOSE OF LOCKING THE GRATE IN-PLACE, IS REQUIRED PRIOR TO THE AWARD OF THE CONTRACT.

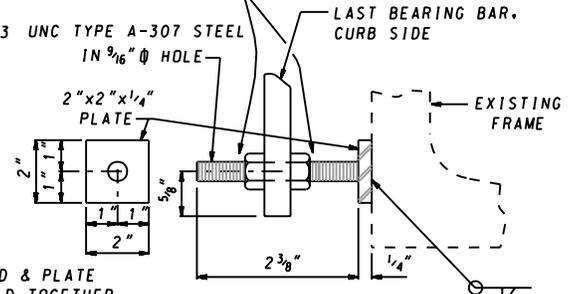
ANY DEVIATIONS FROM THE RETICULAR DESIGN AS SHOWN, MUST BE APPROVED BY THE S.H.A. ASSISTANT CHIEF ENGINEER-DESIGN.

PLAN

1/2-13 HEX THIN NUTS TYPE A-307 STEEL GALVANIZED AS PER A.S.T.M. A-153 & TAPPED OVERSIZE TO FIT 1/2" Ø GALVANIZED STUD



SECTION A-A

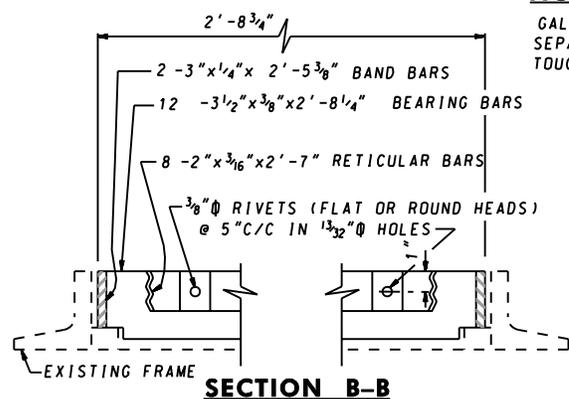


ADJUSTMENT DEVICE

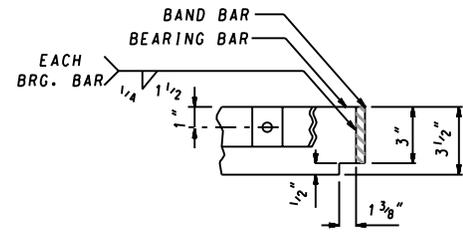
(TWO PER GRATE)

NOTE

GALV. THE STUD & PLATE SEPARATELY, WELD TOGETHER. TOUCH UP WITH ZINC RICH ZRC PAINT.



SECTION B-B

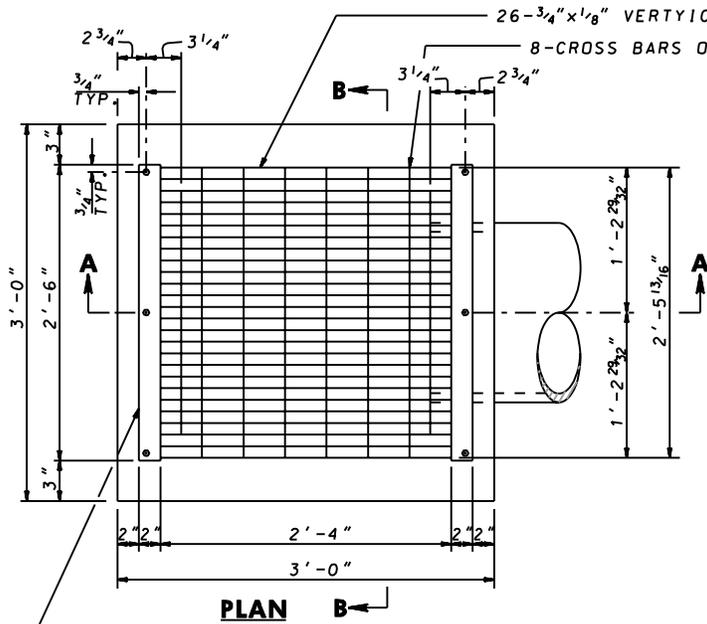


GRATING DETAIL

SPECIFICATION	CATEGORY CODE ITEMS	
APPROVED	<i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT	
	APPROVAL • SHA REVISIONS	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
	APPROVAL 12-20-74	APPROVAL 1-14-75
	REVISED 10-1-01	REVISED 2-8-83
	REVISED	REVISED

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
 STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES
STANDARD TYPE S INLET & COMBINATION
RETICULAR REPLACEMENT GRATE

STANDARD NO. MD 379.08

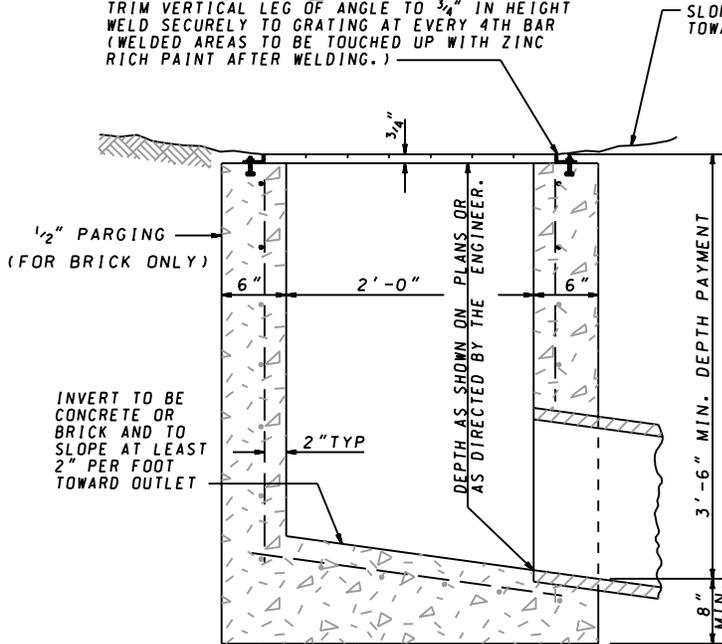


NOTES

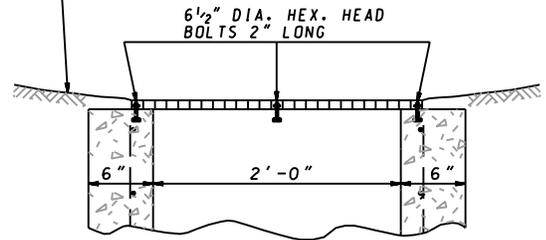
1. GRATING SHALL BE STEEL "IRVING X-BAR TYPE AA" OR APPROVED EQUIVALENT.
2. GRATING TO BE GALVANIZED.
3. INLET TO BE CONSTRUCTED OF CONCRETE (MIX NO. 2) OR BRICK. WHEN INLET IS CONSTRUCTED OF CONCRETE ALL REINFORCING IS TO BE NO. 4 DEFORMED BARS 6" C/C.

NOTE EXPANSION ANCHORS MAY BE USED INSTEAD OF BOLTS.

2-2"x1 1/4"x3/16"x2'-6" L (CENTERED ON GRATE) TRIM VERTICAL LEG OF ANGLE TO 3/4" IN HEIGHT WELD SECURELY TO GRATING AT EVERY 4TH BAR (WELDED AREAS TO BE TOUCHED UP WITH ZINC RICH PAINT AFTER WELDING.)



SECTION A-A



SECTION B-B

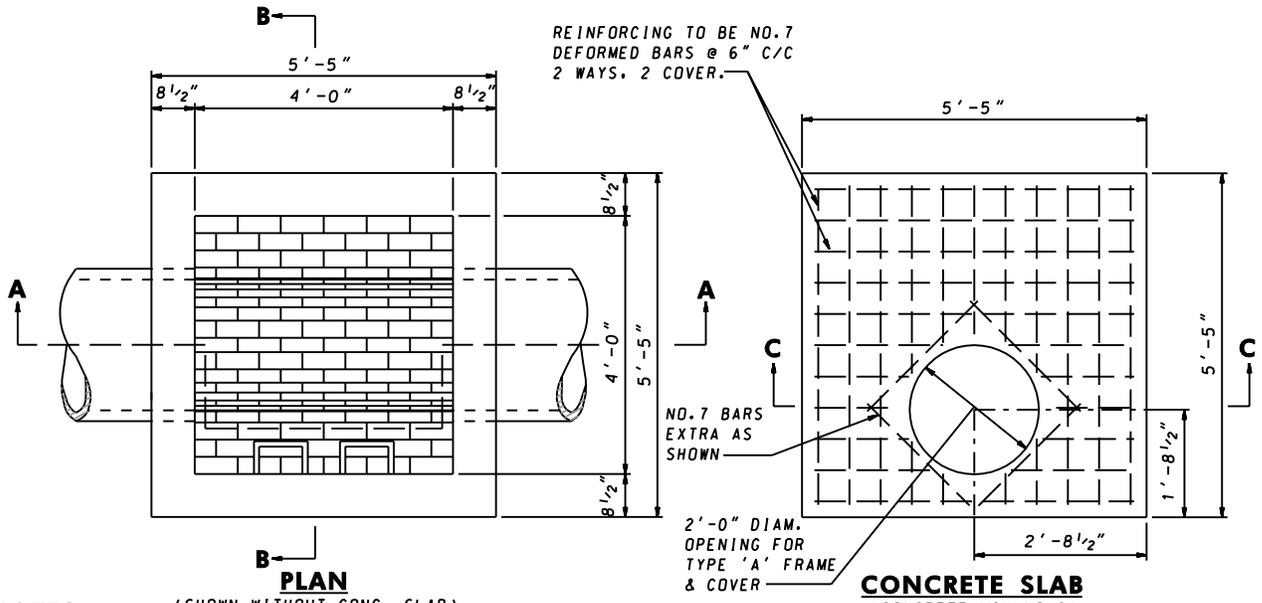
PIPE TYPE, SIZE, SLOPE & INVERT ELEVATION AS SHOWN ON THE PLANS

SPECIFICATION 305	CATEGORY CODE ITEMS
APPROVED	<i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT
	APPROVAL • SHA REVISIONS
	APPROVAL 8-7-72
	REVISED 10-1-01
	REVISED
	REVISED

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
 STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

STANDARD YARD INLET

STANDARD NO. MD 381.01

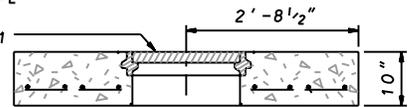


NOTES

1. THIS MANHOLE IS FOR PIPES UP TO 36" DIAMETER.
2. MANHOLE SHALL BE CONSTRUCTED OF REINFORCED CONCRETE (MIX NO. 2). BRICK AND MORTAR MAY BE USED IN NON-TRAFFIC AREAS ONLY
3. BENCH HEIGHT ABOVE OUTGOING PIPE INVERT SHALL BE HALF THE DIAMETER OF THE PIPE.
4. VERTICAL DEPTH PAYMENT PER LINEAR FOOT SHALL INCLUDE ALL DEPTHS IN EXCESS OF THE 3'-10".

(SHOWN WITHOUT CONC. SLAB)

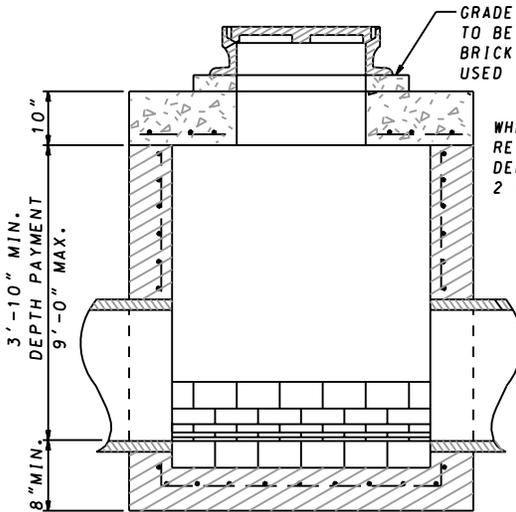
FOR DETAILS OF TYPE 'D' FRAME & COVER SEE STD. MD 383.61



SECTION C-C

PRECAST CONC. SLAB WITH TYPE 'D' FRAME & COVER (NON-TRAFFIC AREAS)

STANDARD TYPE 'A' MANHOLE FRAME & COVER SEE STANDARDS MD-383.31 & 383.32 (WHEN IN NON-TRAFFIC AREAS USE STD. TYPE 'D' FRAME & COVER. SEE SECTION C-C PRECAST CONC. SLAB.



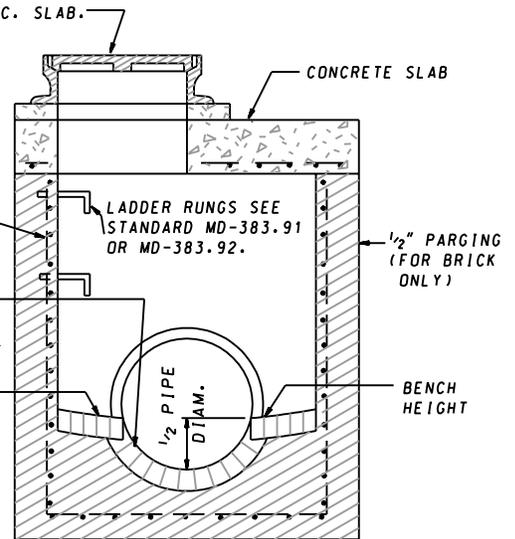
SECTION A-A

GRADE ADJUSTMENT TO BE CONC. MIX NO.2 BRICK & MORTAR MAY BE USED IN NON-TRAFFIC AREAS.

WHEN CONCRETE IS USED REINFORCING TO BE NO.4 DEFORMED BARS @ 6" C/C 2 WAYS, 2 COVER.

CHANNEL SHALL BE CONCRETE OR BRICK

CONCRETE OR BRICK ON EDGE 1/4" FALL PER FT.



SECTION B-B

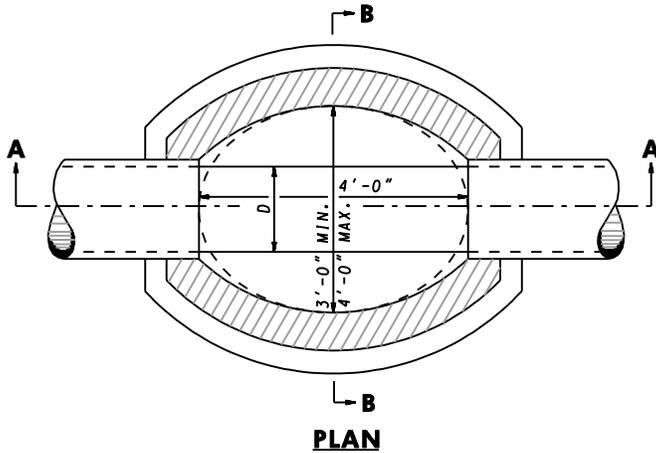
SPECIFICATION 305	CATEGORY CODE ITEMS	
APPROVED	<i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT	
	APPROVAL • SHA REVISIONS	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
	APPROVAL	APPROVAL 3-1-83
	REVISED 10-1-01	REVISED 4-26-89
	REVISED	REVISED
	REVISED	REVISED

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

48" SQUARE
STANDARD SHALLOW MANHOLE

STANDARD NO. MD. 383.00

NOTE MANHOLE SHALL BE CONSTRUCTED OF REINFORCED CONCRETE (MIX NO.2). REINFORCING TO BE NO.4 DEFORMED BARS @ 6" C/C 2 WAYS, 2" COVER. BRICK AND MORTAR MAY BE USED IN NON-TRAFFIC AREAS ONLY.



MANHOLE WALL THICKNESS

8" TO DEPTH OF 12'-0"

12" $\left\{ \begin{array}{l} \text{BELOW DEPTH OF 12'-0"} \\ \text{TO DEPTH OF 24'-0"} \end{array} \right.$

MANHOLE BASE THICKNESS

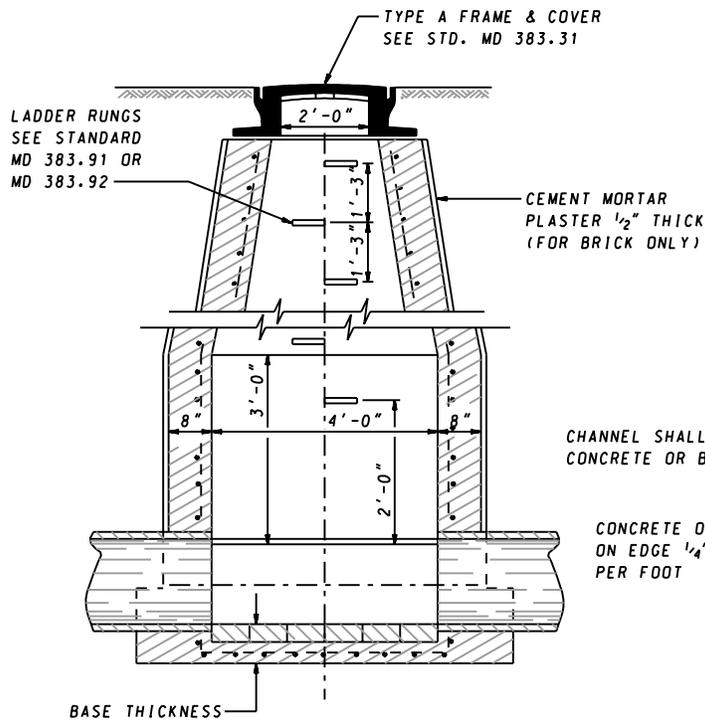
8" WALL-USE 12" BASE

12" WALL-USE 15" BASE

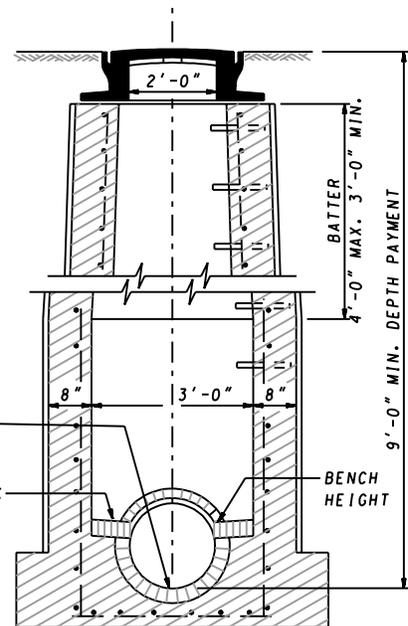
BENCH HEIGHT ABOVE OUTGOING PIPE INVERT

STORM WATER 0.5 D

SANITARY 0.9 D



SECTION A-A



SECTION B-B

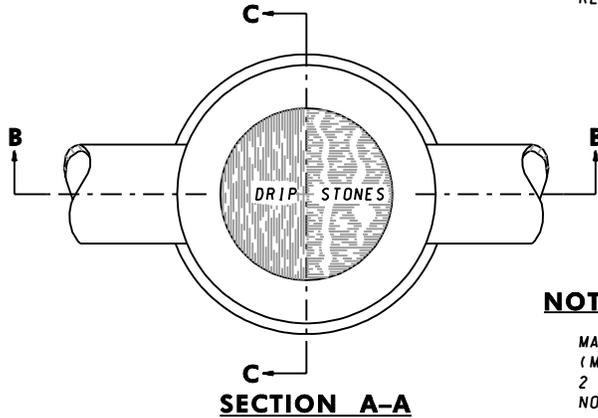
SPECIFICATION 305	CATEGORY CODE ITEMS
APPROVED <i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT	
	APPROVAL • SHA REVISIONS
	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
	APPROVAL 2-7-51
	APPROVAL 3-25-56
	REVISD 10-1-01
REVISD	REVISD 2-24-88
REVISD	REVISD
REVISD	REVISD

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

STANDARD MANHOLE

STANDARD NO. MD 383.01

GRANITE DRIP STONES ARE PREFERABLE BUT IF NOT AVAILABLE SOME OTHER APPROVED TYPE MAY BE USED. LOCATION OF DRIP STONES MAY BE ADJUSTED TO MEET THE REQUIREMENTS OF EACH CASE BUT NORMALLY SHALL BE 6' APART.



WALL THICKNESS

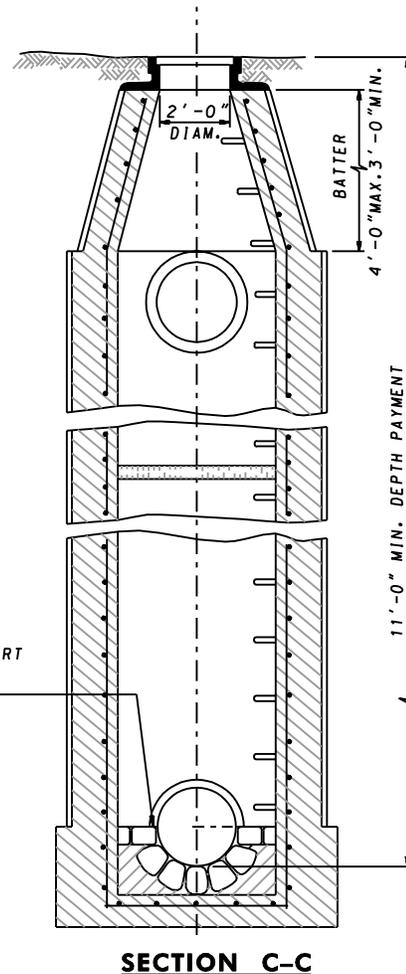
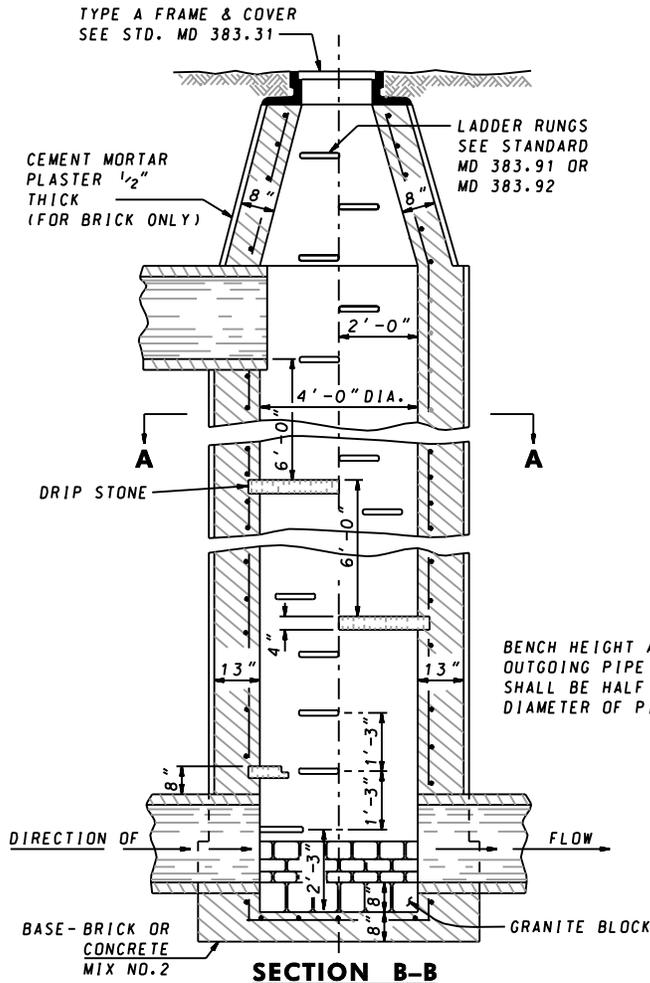
8" TO DEPTH OF 12'-0"
 13" { BELOW DEPTH OF 12'-0"
 TO DEPTH OF 24'-0"

BASE THICKNESS

8" WALL-USE 12" BASE
 13" WALL-USE 16" BASE

NOTE

MANHOLE SHALL BE CONSTRUCTED OF REINFORCED CONCRETE (MIX NO.2). REINFORCING TO BE NO.4 DEFORMED BARS @ 6"C/C 2 WAYS, 2" COVER. BRICK AND MORTAR MAY BE USED IN NON-TRAFFIC AREAS ONLY.



SPECIFICATION 305	CATEGORY CODE ITEMS
APPROVED <i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT	
	APPROVAL • SHA REVISIONS
	APPROVAL 7-23-74
	REVISED 10-1-01
	REVISED
	REVISED

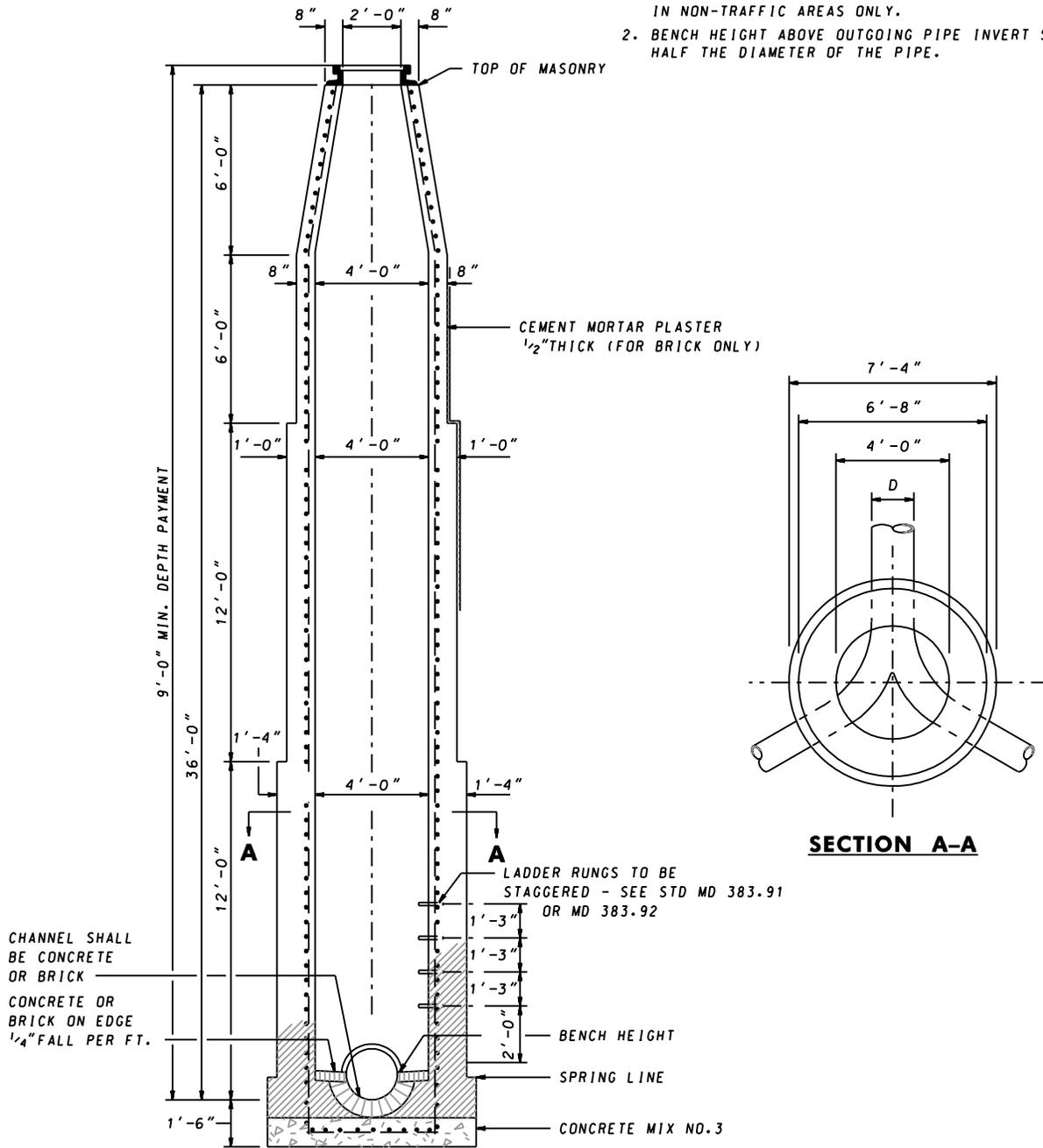
Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
 STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

STANDARD DROP MANHOLE

STANDARD NO. MD 383.11

NOTES

1. MANHOLE SHALL BE CONSTRUCTED OF REINFORCED CONCRETE (MIX NO.2). REINFORCING TO BE NO.4 DEFORMED BARS 6" C/C 2 WAYS. 2" COVER. BRICK AND MORTAR MAY BE USED IN NON-TRAFFIC AREAS ONLY.
2. BENCH HEIGHT ABOVE OUTGOING PIPE INVERT SHALL BE HALF THE DIAMETER OF THE PIPE.



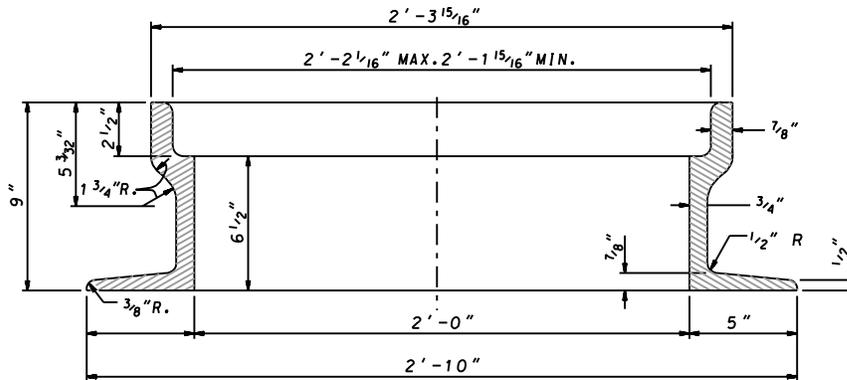
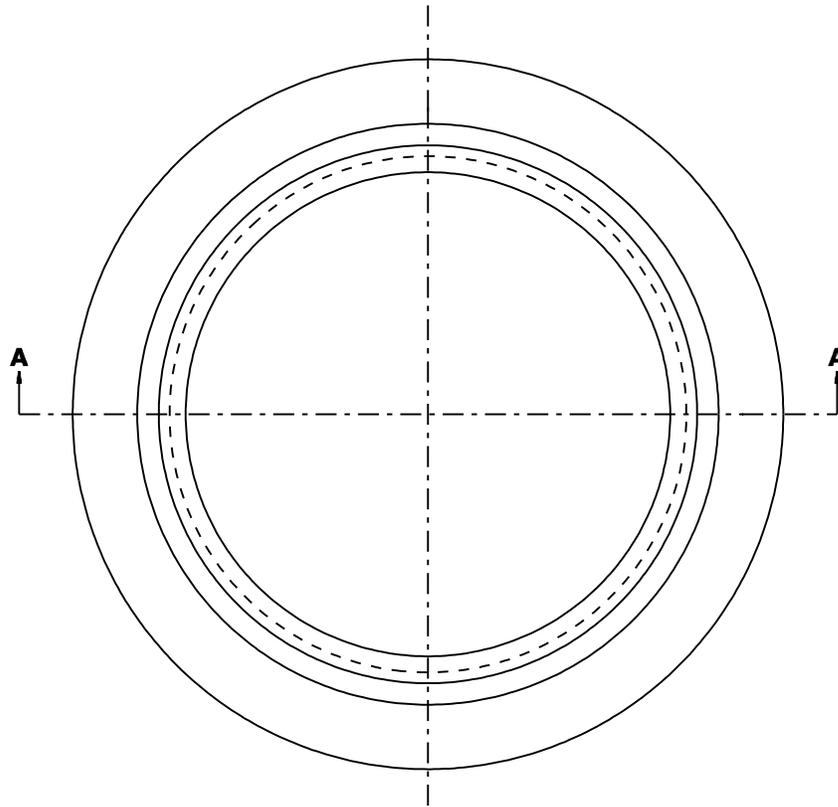
ELEVATION - SECTIONAL VIEW

SPECIFICATION 305	CATEGORY CODE ITEMS
APPROVED <i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT	
	APPROVAL • SHA REVISIONS
	APPROVAL 7-23-74
	REVISED 10-1-01
	REVISED
APPROVAL • FEDERAL HIGHWAY ADMINISTRATION	
APPROVAL 9-11-74	
REVISED 2-24-88	
REVISED	
REVISED	

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
 STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

STANDARD 4 FT. CIRCULAR MANHOLE
MAX. DEPTH 36 FT.

STANDARD NO. MD 383.21



SECTION A-A

MATERIAL - CAST IRON
APPROX. WEIGHT 250 LBS.

SPECIFICATION	CATEGORY CODE ITEMS
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APPROVED *Kirk G. McCall*
DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT

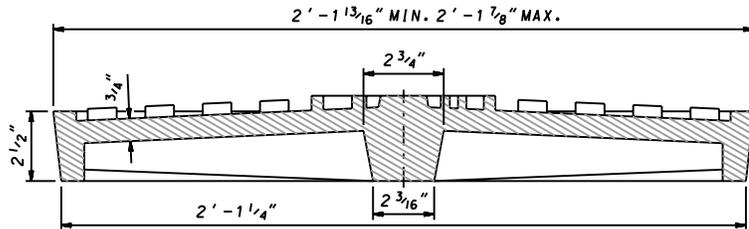
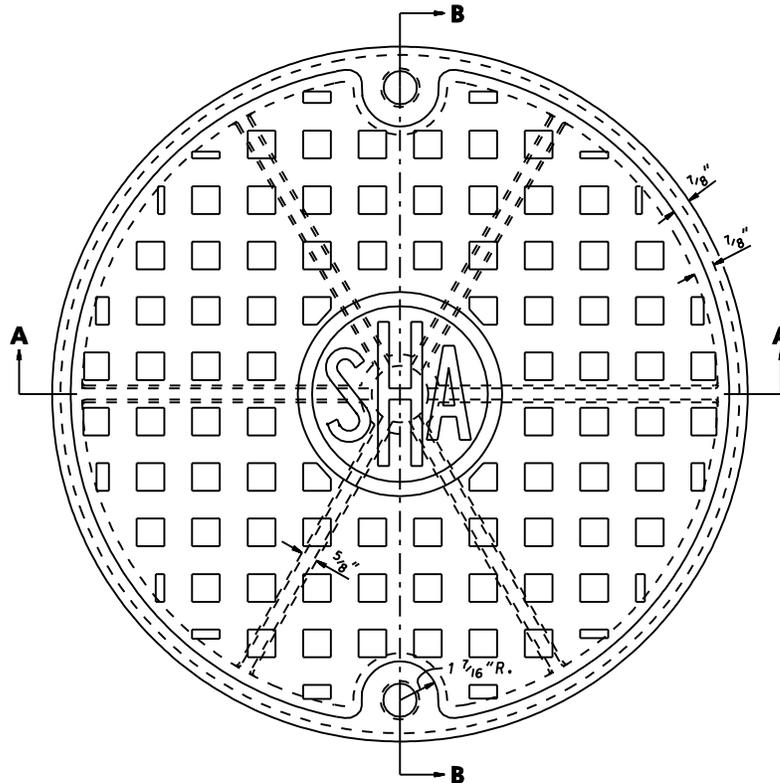


APPROVAL • SHA REVISIONS	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
APPROVAL	APPROVAL 3-23-56
REVISED 10-1-01	REVISED
REVISED	REVISED
REVISED	REVISED

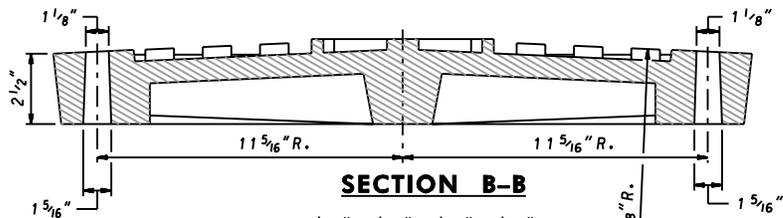
Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

**STANDARD MANHOLE
TYPE A FRAME**

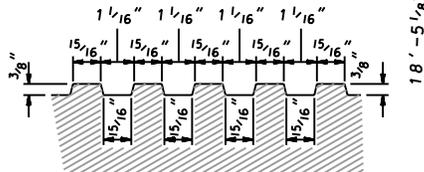
STANDARD NO. MD 383.31



SECTION A-A



SECTION B-B



DETAIL OF CORRUGATIONS

MATERIAL - CAST IRON
APPROX. WEIGHT 170 LBS.

SPECIFICATION	CATEGORY CODE ITEMS
---------------	---------------------

APPROVED *Kirk G. McCall*
DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT

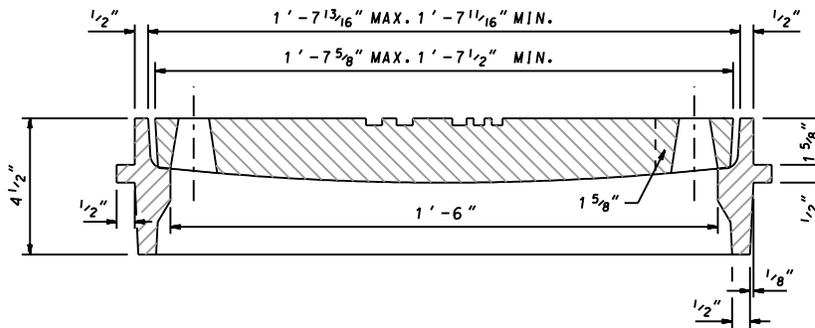
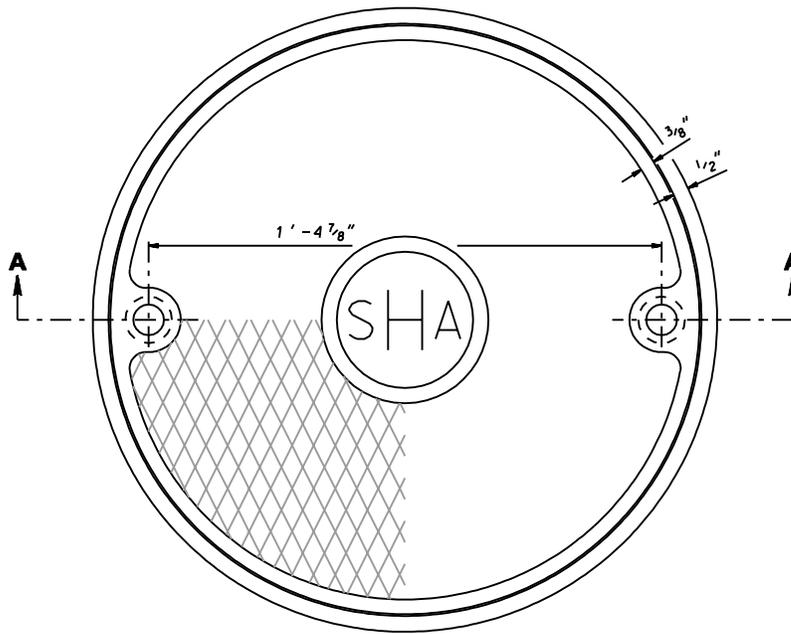


APPROVAL • SHA REVISIONS	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
APPROVAL 2-13-73	APPROVAL 3-16-73
REVISED 10-1-01	REVISED
REVISED	REVISED
REVISED	REVISED

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

STANDARD MANHOLE
TYPE A COVER

STANDARD NO. MD 383.32



SECTION A-A

MATERIAL - CAST IRON
 APPROX. WEIGHT OF FRAME 66 LBS.
 APPROX. WEIGHT OF COVER 107 LBS.

SPECIFICATION	CATEGORY CODE ITEMS
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APPROVED *Kirk G. McCall*
 DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT

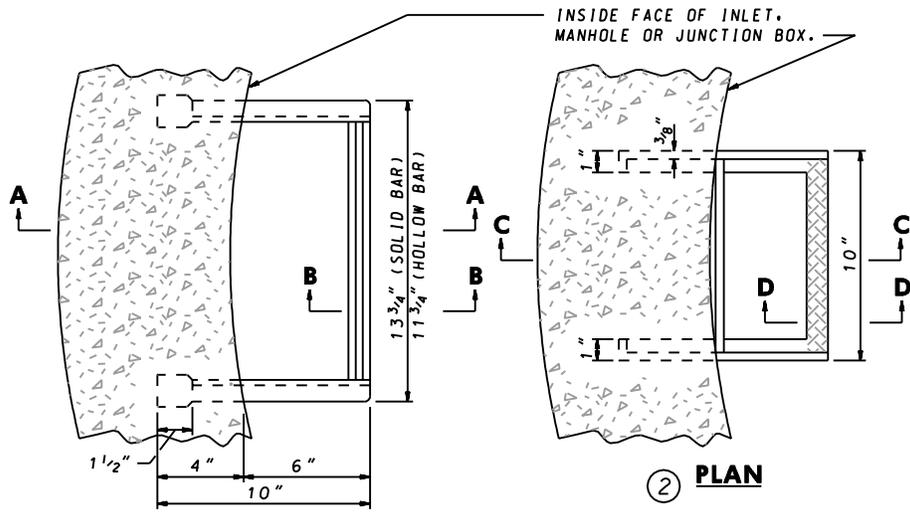


APPROVAL • SHA REVISIONS	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
APPROVAL 2-13-73	APPROVAL 3-16-73
REVISED 10-1-01	REVISED
REVISED	REVISED
REVISED	REVISED

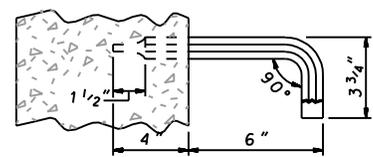
Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
 STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

**STANDARD MANHOLE
 TYPE D FRAME & COVER**

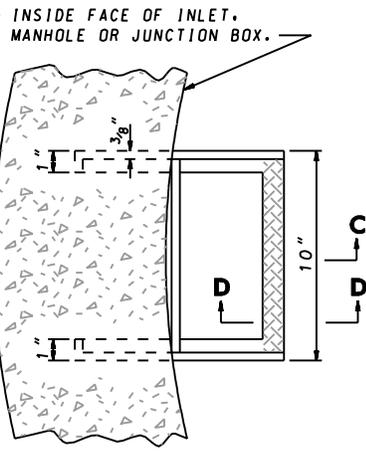
STANDARD NO. MD 383.61



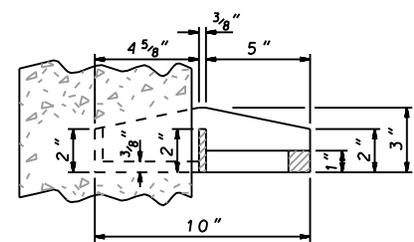
① PLAN



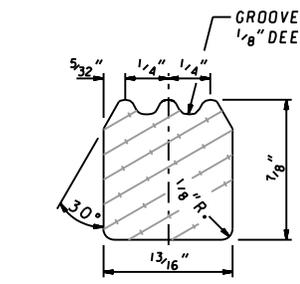
SECTION A-A



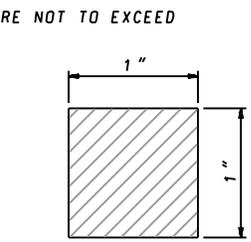
② PLAN



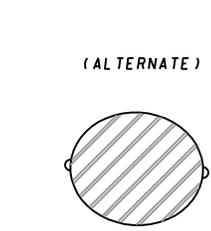
SECTION C-C



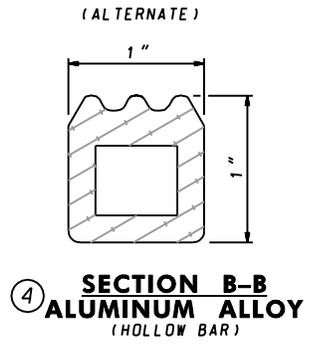
① SECTION B-B ALUMINUM ALLOY (SOLID BAR)



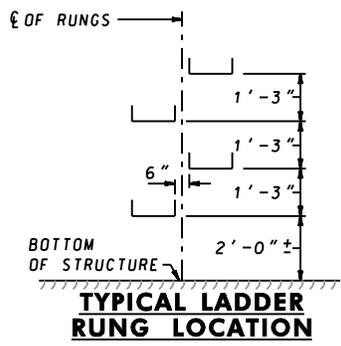
② SECTION D-D CAST IRON



③ SECTION B-B STEEL



④ SECTION B-B ALUMINUM ALLOY (HOLLOW BAR)



TYPICAL LADDER RUNG LOCATION

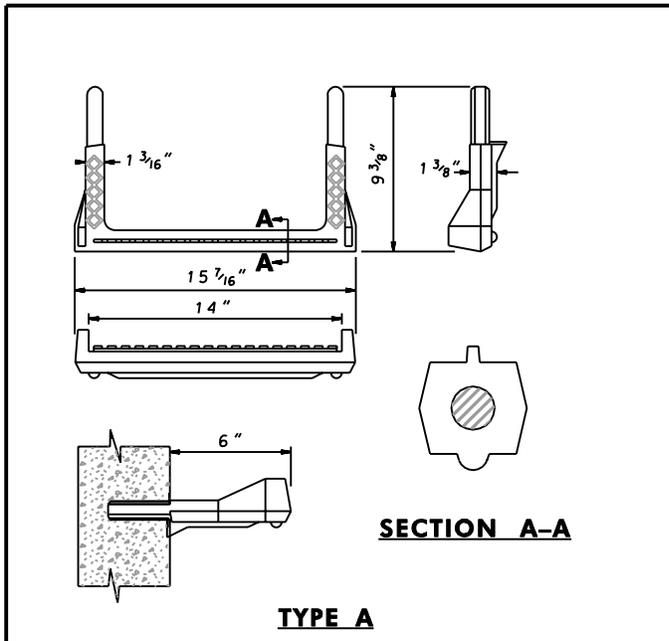
NOTES

- METAL LADDER RUNGS ARE TO BE USED IN INLETS, MANHOLES, AND JUNCTION BOXES OVER THREE FEET IN DEPTH OR AS DIRECTED BY THE ENGINEER. USED EITHER WITH BRICK OR CONCRETE CONSTRUCTION. (WHERE BRICK CONSTRUCTION IS EMPLOYED, THE MORTAR JOINTS SHALL BE ADJUSTED TO ACCOMMODATE LADDER RUNGS.) METAL LADDER RUNGS MAY BE COMPRISED OF ONE OF THE FOLLOWING.
- ①&④ ALUMINUM ALLOY- SHALL CONFORM TO A.S.T.M. DESIGNATION B 221 ALLOY 6061-T6. THAT PORTION EMBEDDED IN THE STRUCTURE SHALL BE COATED WITH ZINC CHROMATE OR APPROVED EQUIVALENT COATING.
 - ② CAST IRON- SHALL CONFORM TO A.S.T.M. A- 48 CLASS 30 B.
 - ③ STEEL- SHALL CONFORM TO A.S.T.M. DESIGNATION A-615 GRADE 40. GALVANIZED AFTER FABRICATION AS PER A.S.T.M. DESIGNATION A-153.

SPECIFICATION	CATEGORY CODE ITEMS
APPROVED	<i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT
APPROVAL • SHA REVISIONS	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
APPROVAL 10-27-70	APPROVAL 11-19-70
REVISED 10-1-01	REVISED 2-8-83
REVISED	REVISED
REVISED	REVISED

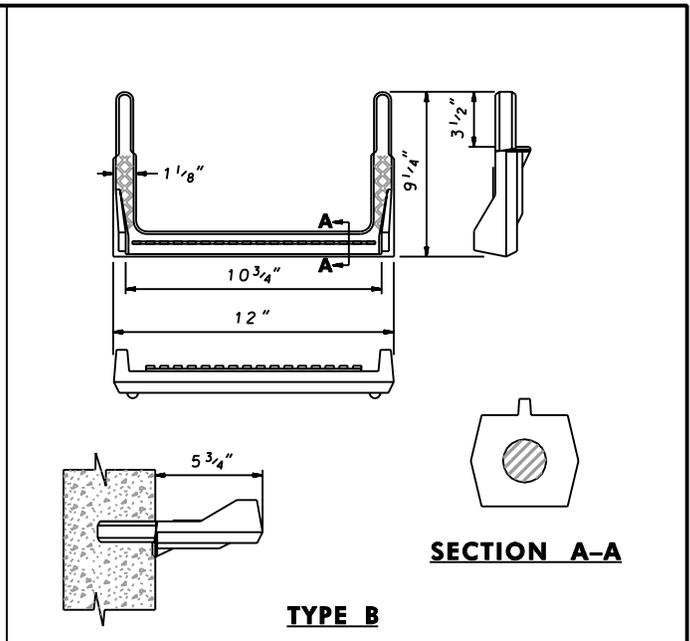
Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
 STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES
STANDARD METAL LADDER RUNGS
MISCELLANEOUS STRUCTURES
STANDARD NO. MD 383.91





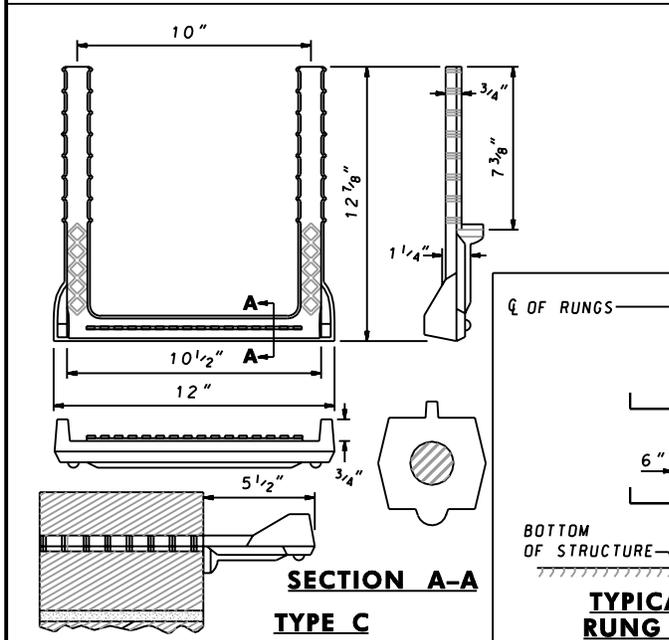
SECTION A-A

TYPE A



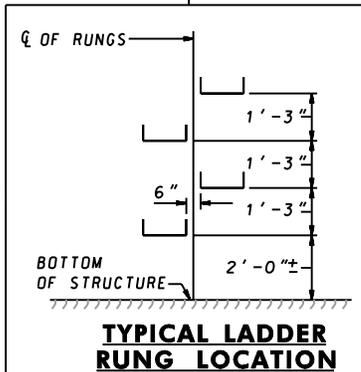
SECTION A-A

TYPE B

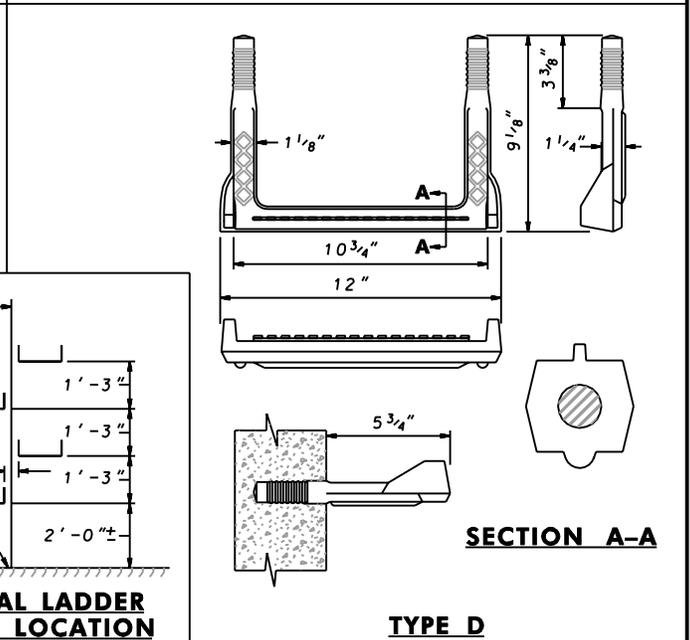


SECTION A-A

TYPE C



TYPICAL LADDER RUNG LOCATION



SECTION A-A

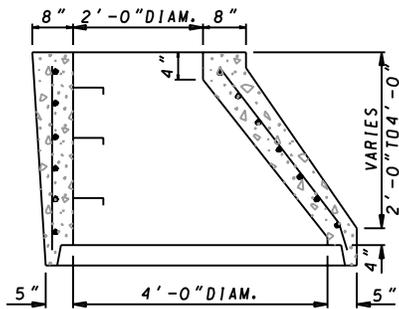
TYPE D

NOTES

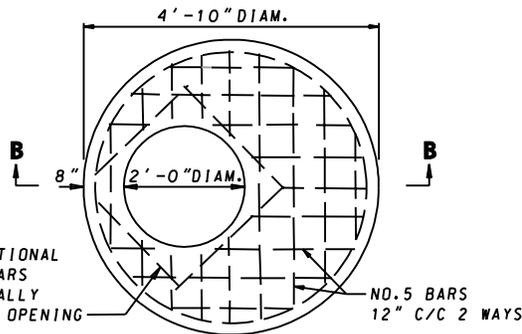
1. TYPES A & B ARE TO BE DRIVEN INTO RECEPTACLES THAT ARE CAST INTO THE WALL.
2. TYPE C IS FOR BRICK AND BLOCK INSTALLATIONS.
3. TYPE D IS PRESS FITTED INTO PREFORMED CONCRETE HOLES.
4. LADDER RUNGS ARE TO BE USED IN INLETS, MANHOLES, AND JUNCTION BOXES OVER THREE FEET IN DEPTH OR AS DIRECTED BY THE ENGINEER. USED EITHER WITH BRICK OR CONCRETE CONSTRUCTION. (WHERE BRICK CONSTRUCTION IS EMPLOYED, THE MORTAR JOINTS SHALL BE ADJUSTED TO ACCOMMODATE LADDER RUNGS.)
5. COPOLYMER POLYPROPYLENE ENCAPSULATED 1/2 IN. DIA. STEEL REINFORCEMENT BAR. STEEL SHALL CONFORM TO ASTM 615 GRADE 60. COPOLYMER POLYPROPYLENE SHALL BE CERTIFIED BY THE MANUFACTURER TO CONFORM TO ASTM D 4101 AND HAVE A MINIMUM EXPOSED SECTION THICKNESS OF 1/8 IN.
6. SECTION A-A SHOWS 1/2" DIA. STEEL REINFORCEMENT BAR.
7. INSTALLATION SHALL CONFORM TO MANUFACTURER'S RECOMMENDATIONS.

SPECIFICATION	CATEGORY CODE ITEMS	
APPROVED	<i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT	
	APPROVAL • SHA REVISIONS	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
	APPROVAL 2-3-87	APPROVAL 3-30-87
	REVISED 10-1-01	REVISED
	REVISED	REVISED
	REVISED	REVISED

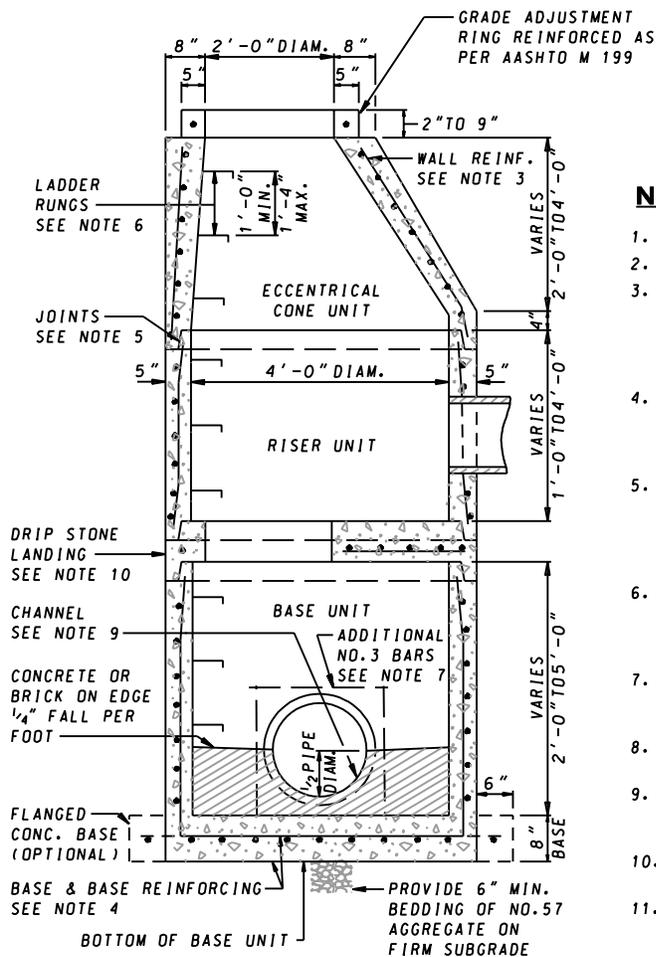
Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
 STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES
COPOLYMER POLYPROPYLENE STEEL
ENCAPSULATED LADDER RUNGS
MISCELLANEOUS STRUCTURES
STANDARD NO. MD 383.92



**ALTERNATE ECCENTRIC
CONE UNIT**



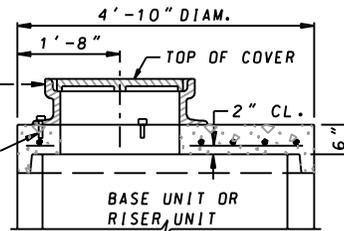
FLAT SLAB TOP
(SHOWN WITHOUT FRAME & COVER)



SECTION VIEW
(SHOWN WITHOUT FRAME & COVER)

STANDARD TYPE A MANHOLE
FRAME & COVER SEE STD.
MD 383.31 & MD 383.32

FRAME ANCHORAGE
SEE STD. MD 384.02



SECTION B-B

NOTES

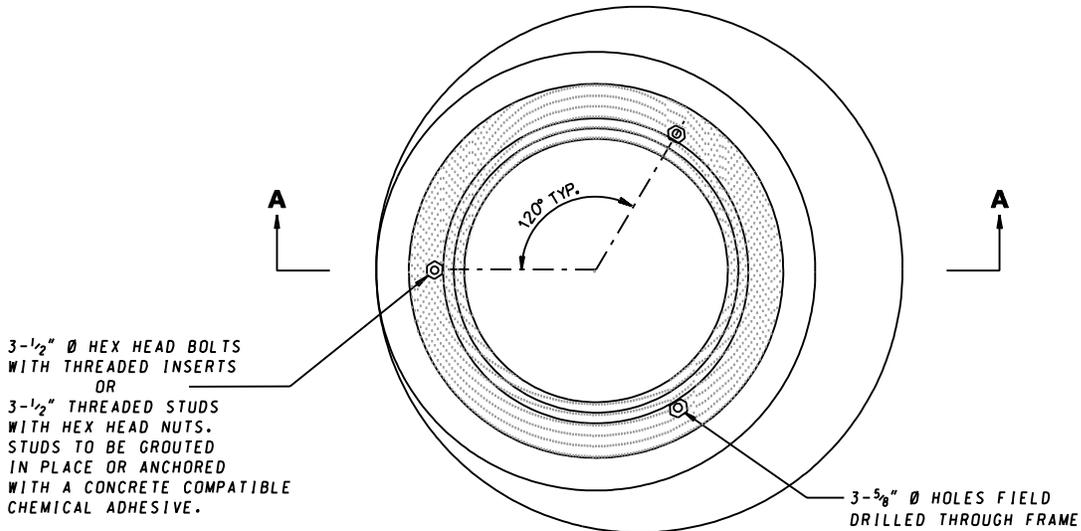
1. MANHOLES SHALL BE CONSTRUCTED IN ACCORDANCE WITH AASHTO M 199.
2. CONCRETE SHALL BE MIX NO. 6 (4500 PSI).
3. WALL REINFORCEMENT FOR BASE UNITS, RISER UNITS AND ECCENTRIC CONE UNITS SHALL BE REINFORCEMENT BASE OR WELDED WIRE FABRIC WITH A MINIMUM AREA OF 0.12 IN. 2 FT. FOR THE 48" DIAMETER MANHOLES. WELDED WIRE FABRIC SHALL CONFORM TO ASTM A 185 AND A 82. REINFORCEMENT BARS SHALL MEET ASTM A 615.GRADE 60.
4. BASE REINFORCEMENT SHALL BE REINFORCEMENT BARS OR WELDED WIRE FABRIC WITH A MINIMUM AREA OF 0.14 IN. 2 FT. THE BASE MAY BE CAST MONOLITHIC WITH THE UNIT OR JOINTED PER MANUFACTURER'S DESIGN.
5. THE MANUFACTURER SHALL FORM MALE AND FEMALE ENDS OF JOINTS USING THEIR DESIGN. THE JOINTS SHALL BE SEALED BY THE CONTRACTOR AND MADE WATERTIGHT USING (WHERE APPLICABLE) MORTAR, RUBBER O-RING GASKETS MEETING ASTM C 361 & C 443 OR FLEXIBLE PLASTIC GASKETS MEETING AASHTO M 198 TYPE B.
6. LADDER RUNGS SHALL BE INSTALLED IN VERTICAL ALIGNMENT AT 1'-4" MAXIMUM C/C. RUNG TYPES SHALL BE IN ACCORDANCE WITH STANDARDS MD 383.91 OR MD 383.92 LADDER RUNGS SHALL BE INCIDENTAL TO THE COST OF THE MANHOLE.
7. WHEN THE DISTANCE BETWEEN MULTIPLE OPENINGS IN THE BASE UNIT OR ANY RISOR UNIT IS LESS THAN 6" ADDITIONAL NO. 3 BARS ARE REQUIRED AROUND OPENINGS.
8. LIFT HOLES OR LIFT EYES SHALL BE PROVIDED IN EACH SECTION FOR HANDLING.
9. MIX NO. 2 CONCRETE OR BRICK CHANNEL SHALL BE PROVIDED IN THE FIELD AND SHALL SLOPE 2" PER FOOT TOWARD OUTLET OR AS DIRECTED BY THE ENGINEER.
10. THE DRIP STONE LANDING SHALL BE USED ONLY WHEN THERE ARE PIPES CONNECTED TO THE RISER UNITS. SEE STD. MD 384.13 FOR DETAILS.
11. MINIMUM DEPTH PAYMENT PER EACH SHALL BE 9'-0" MEASURED FROM THE BOTOM OF THE BASE UNIT TO THE TOP OF THE MANHOLE COVER VERTICAL DEPTH PAYMENT PER LINEAR FOOT SHALL INCLUDE ALL DEPTHS IN EXCESS OF 9'-0". THE COST OF THE DRIP STONE LANDING, NO. 57 AGGREGATE GROUT, SEALANT, AND ALL NECESSARY APPURTENANCES SHALL BE INCIDENTAL TO THE PRICE BID.

SPECIFICATION 305	CATEGORY CODE ITEMS
APPROVED <i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT	
	APPROVAL • SHA REVISIONS
	APPROVAL 2-22-91
	REVISED 10-1-01
	REVISED
APPROVAL • FEDERAL HIGHWAY ADMINISTRATION	
APPROVAL 1-2-91	
REVISED	
REVISED	

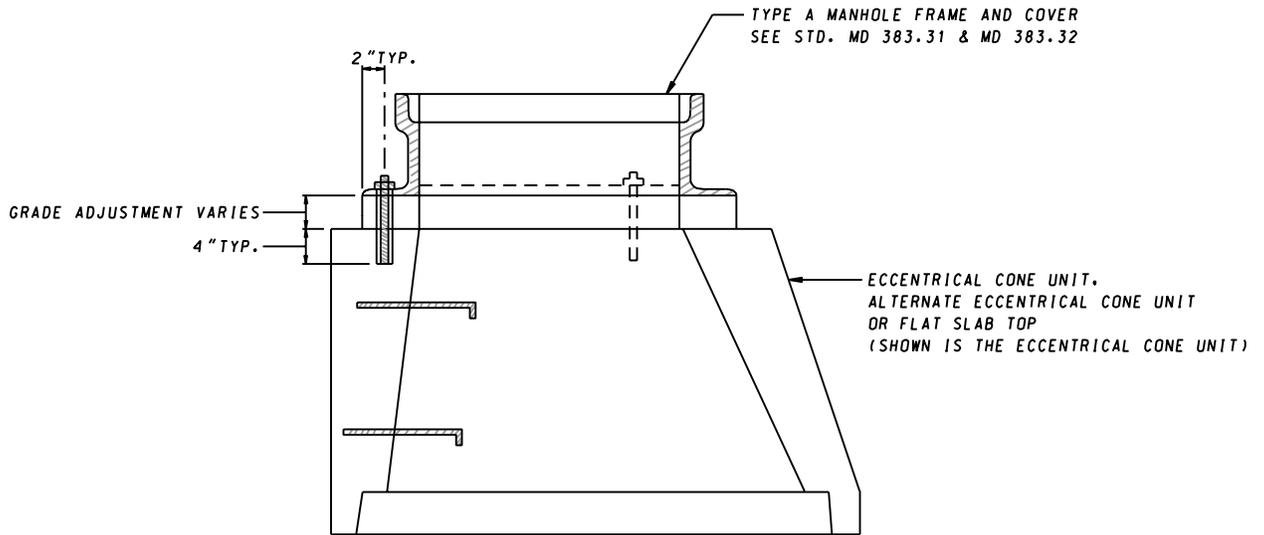
Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

**48" DIAMETER PRECAST MANHOLE
FOR 12" TO 24" PIPES**

STANDARD NO. MD 384.01



PLAN



SECTION A-A

SPECIFICATION	CATEGORY CODE ITEMS
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APPROVED *Kirk G. McCall*
DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT

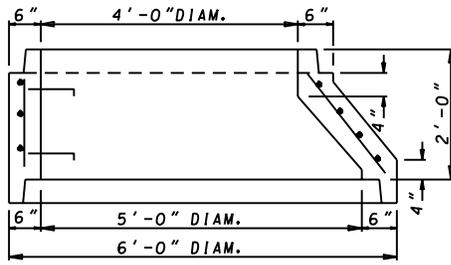


APPROVAL • SHA REVISIONS	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
APPROVAL 2-22-91	APPROVAL 1-2-91
REVISED 10-1-01	REVISED
REVISED	REVISED
REVISED	REVISED

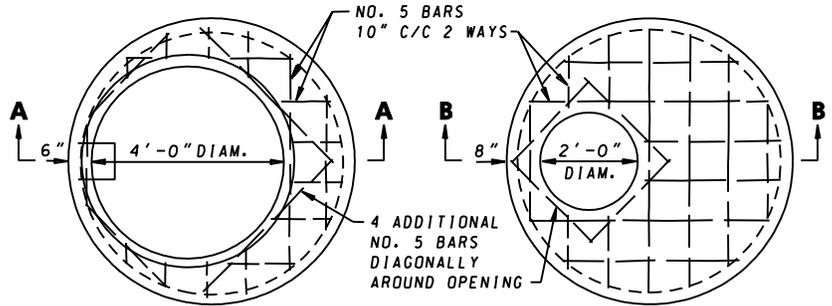
Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

**FRAME ANCHORAGE FOR
PRECAST MANHOLES**

STANDARD NO. MD 384.02

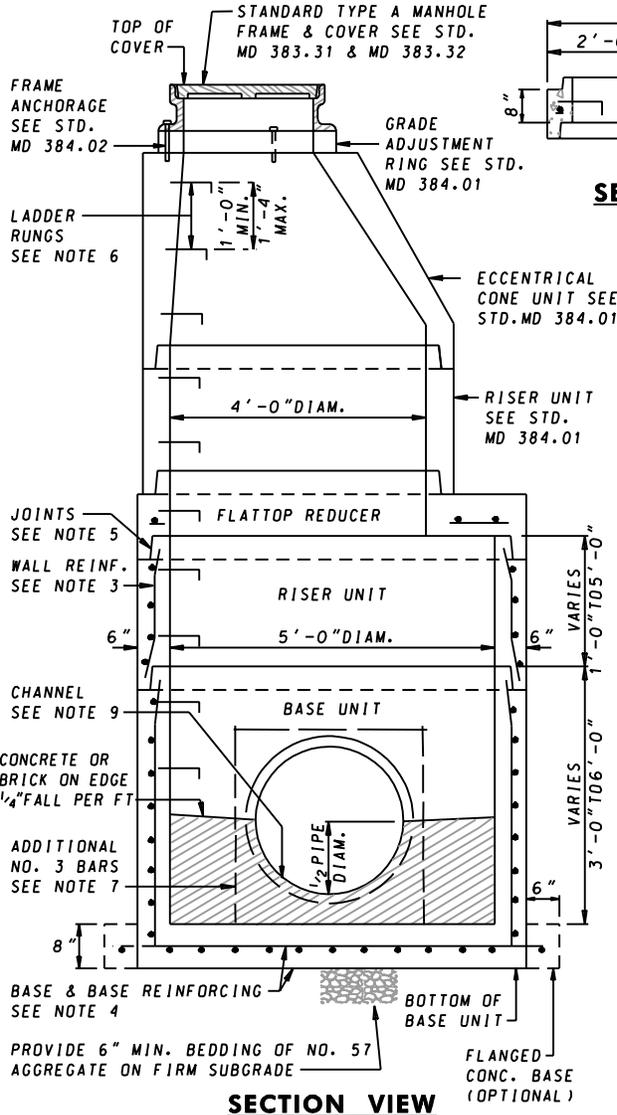


ECCENTRICAL CONE REDUCER
(ALTERNATE FOR FLATTOP REDUCER)

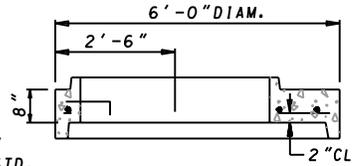


FLATTOP REDUCER

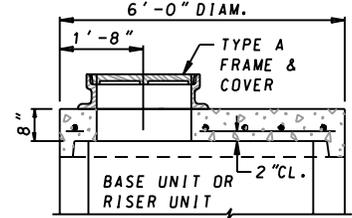
FLAT SLAB TOP
(SHOWN WITHOUT FRAME & COVER)



SECTION VIEW



SECTION A-A



SECTION B-B

NOTES

1. MANHOLES SHALL BE CONSTRUCTED IN ACCORDANCE WITH AASHTO M 199.
2. CONCRETE SHALL BE MIX NO.6 (4500PSI).
3. WALL REINFORCEMENT FOR BASE UNITS, RISER UNITS AND ECCENTRICAL CONE UNITS SHALL BE REINFORCEMENT BARS OR WELDED WIRE FABRIC WITH A MINIMUM AREA OF 0.15 IN.²/FT FOR THE 60" DIAMETER MANHOLES. WELDED WIRE FABRIC SHALL CONFORM TO ASTM A 185 AND A 82. REINFORCEMENT BARS SHALL MEET ASTM A 615, GRADE 60.
4. BASE REINFORCEMENT TO BE REINFORCEMENT BARS OR WELDED WIRE FABRIC WITH A MINIMUM AREA OF 0.17 IN.²/FT. THE BASE SHALL BE CAST MONOLITHIC WITH THE BASE UNIT OR JOINTED PER MANUFACTURER'S DESIGN.
5. THE MANUFACTURER SHALL FORM MALE AND FEMALE ENDS OF JOINTS USING THEIR OWN DESIGN. THE JOINTS SHALL BE SEALED BY THE CONTRACTOR AND MADE WATERTIGHT USING (WHERE APPLICABLE) MORTAR, RUBBER O-RING GASKETS MEETING ASTM C 361 AND C 443 OR FLEXIBLE PLASTIC GASKETS MEETING AASHTO M 198 TYPE B.
6. LADDER RUNGS SHALL BE INSTALLED IN VERTICAL ALIGNMENT AT 1'-4" MAXIMUM C/C. RUNG TYPES SHALL BE IN ACCORDANCE WITH STANDARDS MD 383.91 OR 383.92. LADDER RUNGS SHALL BE INCIDENTAL TO THE COST OF THE MANHOLE.
7. WHEN THE DISTANCE BETWEEN MULTIPLE OPENINGS IN THE BASE UNIT OR ANY RISER UNIT IS LESS THAN 6" ADDITIONAL NO.3 BARS ARE REQUIRED AROUND OPENINGS.
8. LIFT HOLES OR LIFT EYES SHALL BE PROVIDED IN EACH SECTION FOR HANDLING.
9. MIX NO.2 CONCRETE OR BRICK CHANNEL SHALL BE PROVIDED IN THE FIELD AND SHALL SLOPE 2" PER FOOT TOWARD OUTLET OR AS DIRECTED BY THE ENGINEER.
10. THE DRIP STONE LANDING SHALL BE USED ONLY WHEN THERE ARE PIPES CONNECTED TO THE RISER UNITS. SEE STD. MD 384.13 FOR DETAILS.
11. MINIMUM DEPTH PAYMENT PER EACH SHALL BE 9'-0" MEASURED FROM THE BOTTOM OF THE BASE UNIT TO THE TOP OF THE MANHOLE COVER. VERTICAL DEPTH PAYMENT PER LINEAR FOOT SHALL INCLUDE ALL DEPTHS IN EXCESS OF 9'-0". THE COST OF THE DRIP STONE LANDING, NO.57 AGGREGATE, GROUT, SEALANT, AND ALL NECESSARY APPURTENANCES SHALL BE INCIDENTAL TO THE PRICE BID.

SPECIFICATION 305	CATEGORY CODE ITEMS
APPROVED <i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT	
	APPROVAL • SHA REVISIONS APPROVAL 2-22-91 REVISED 10-1-01 REVISED REVISED
	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION APPROVAL 1-2-91 REVISED REVISED REVISED

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

60" DIAMETER PRECAST MANHOLE
FOR 27" TO 36" PIPES

STANDARD NO. MD 384.03

STANDARD TYPE A MANHOLE
FRAME & COVER SEE STD.
MD 383.31 & MD 383.32

FRAME ANCHORAGE
SEE STD.
MD 384.02

TOP OF COVER

GRADE ADJUSTMENT RING SEE STD.
MD 384.01

LADDER RUNGS
SEE NOTE 6

ECCENTRIC CONE UNIT SEE
STD. MD 384.01

RISER UNIT
SEE STD.
MD 384.01

JOINTS
SEE NOTE 5

WALL REINF.
SEE NOTE 3

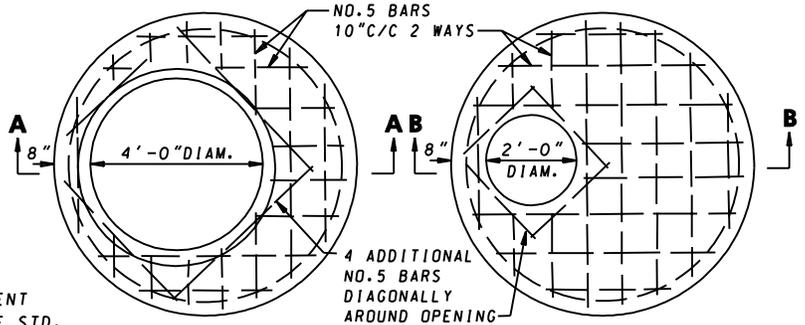
CHANNEL
SEE NOTE 9

CONCRETE OR BRICK ON EDGE
1/4" FALL PER FOOT

ADDITIONAL NO. 3 BARS
SEE NOTE 7

BASE & BASE REINFORCING
SEE NOTE 4

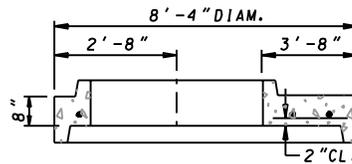
PROVIDE 6" MIN. BEDDING OF NO. 57
AGGREGATE ON FIRM SUBGRADE



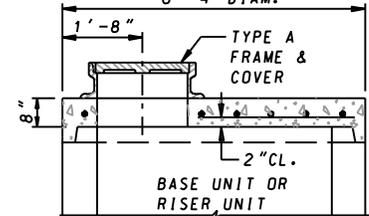
FLATTOP REDUCER

FLAT SLAB TOP

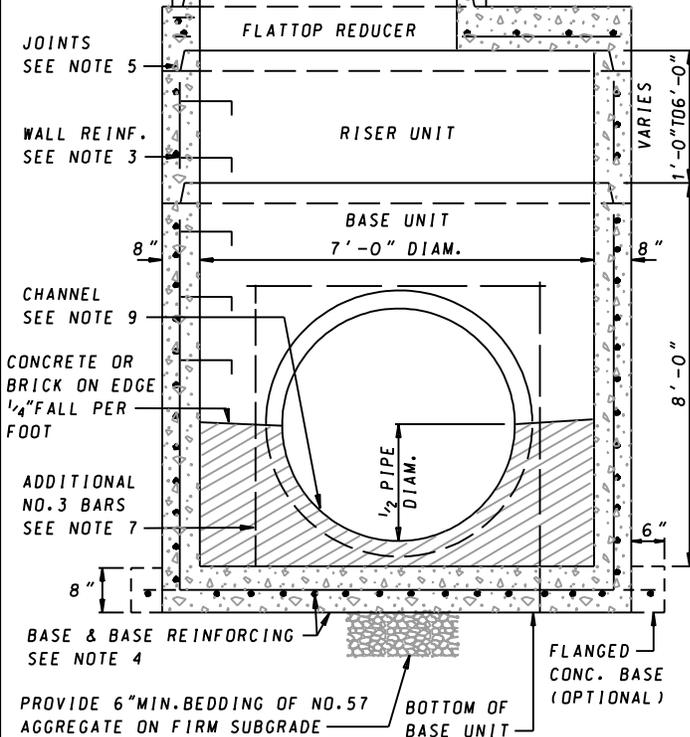
(SHOWN WITHOUT FRAME & COVER)
8'-4" DIAM.



SECTION A-A



SECTION B-B



SECTION VIEW

NOTES

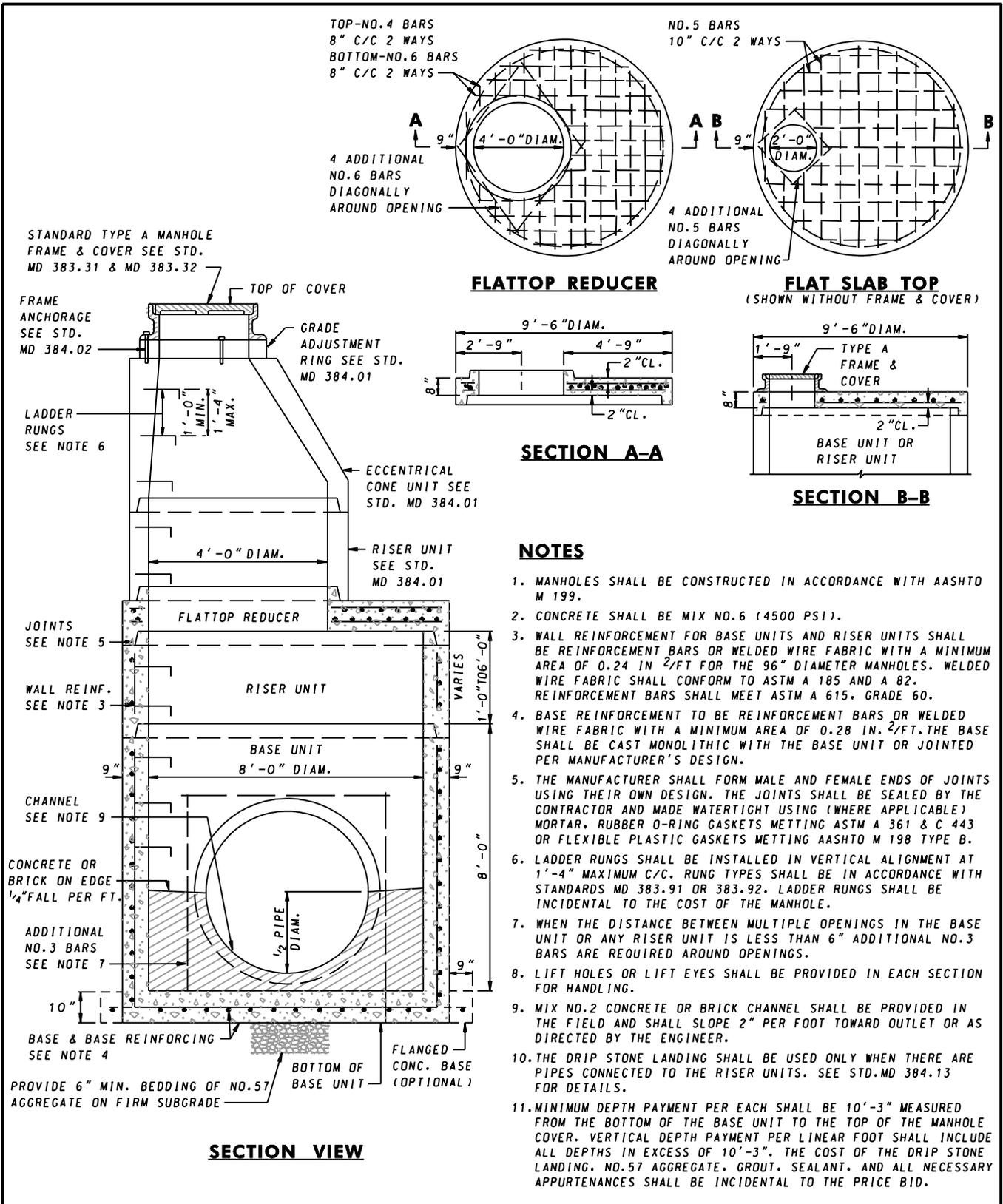
- MANHOLES SHALL BE CONSTRUCTED IN ACCORDANCE WITH AASHTO M 199.
- CONCRETE SHALL BE MIX NO. 6 (4500 PSI).
- WALL REINFORCEMENT FOR BASE UNITS AND RISER UNITS SHALL BE REINFORCEMENT BARS OR WELDED WIRE FABRIC WITH A MINIMUM AREA OF 0.21 IN. ²/FT FOR THE 84" DIAMETER MANHOLES. WELDED WIRE FABRIC SHALL CONFORM TO ASTM A 185 AND A 82. REINFORCEMENT BARS SHALL MEET ASTM A 615 GRADE 60.
- BASE REINFORCEMENT TO BE REINFORCEMENT BARS OR WELDED WIRE FABRIC WITH A MINIMUM AREA OF 0.27 IN. ²/FT. THE BASE SHALL BE CAST MONOLITHIC WITH THE BASE UNIT OR JOINTED PER MANUFACTURER'S DESIGN.
- THE MANUFACTURER SHALL FORM MALE AND FEMALE ENDS OF JOINTS USING THEIR OWN DESIGN. THE JOINTS SHALL BE SEALED BY THE CONTRACTOR AND MADE WATERTIGHT USING (WHERE APPLICABLE) MORTAR, RUBBER O-RING GASKETS MEETING ASTM C 361 AND C 443 OR FLEXIBLE PLASTIC GASKETS MEETING AASHTO M 198 TYPE B.
- LADDER RUNGS SHALL BE INSTALLED IN VERTICAL ALIGNMENT AT 1'-4" MAXIMUM C/C. RUNG TYPES SHALL BE IN ACCORDANCE WITH STANDARDS MD 383.91 OR 383.92. LADDER RUNGS SHALL BE INCIDENTAL TO THE COST OF THE MANHOLE.
- WHEN THE DISTANCE BETWEEN MULTIPLE PIPE OPENING IN THE BASE UNIT OR ANY RISER UNIT IS LESS THAN 6" ADDITIONAL NO. 3 BARS ARE REQUIRED AROUND OPENINGS.
- LIFT HOLES OR LIFT EYES SHALL BE APPRIVED IN EACH SECTION FOR HANDLING.
- MIX NO. 2 CONCRETE OR BRICK CHANNEL SHALL BE PROVIDED IN THE FIELD AND SHALL SLOPE 2" PER FOOT TOWARD OUTLET OR AS DIRECTED BY THE ENGINEER.
- THE DRIP STONE LANDING SHALL BE USED ONLY WHEN THERE ARE PIPES CONNECTED TO THE RISER UNITS. SEE STD. 384.13 FOR DETAILS.
- MINIMUM DEPTH PAYMENT PER EACH SHALL BE 10'-1" MEASURED FROM THE BOTTOM OF THE BASE UNIT TO THE TOP OF THE MANHOLE COVER. VERTICAL DEPTH PAYMENT PER LINEAR FOOT SHALL INCLUDE ALL DEPTHS IN EXCESS OF 10'-1". THE COST OF THE DRIP STONE LANDING, NO. 57 AGGREGATE, GROUT, SEALANT, AND ALL NECESSARY APPURTENANCES SHALL BE INCIDENTAL TO THE PRICE BID.

SPECIFICATION 305	CATEGORY CODE ITEMS
APPROVED <i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT	
	APPROVAL • SHA REVISIONS
	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
	APPROVAL 2-22-91
	APPROVAL 1-2-91
	REVISION 10-1-01
REVISION	REVISION
REVISION	REVISION
REVISION	REVISION

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

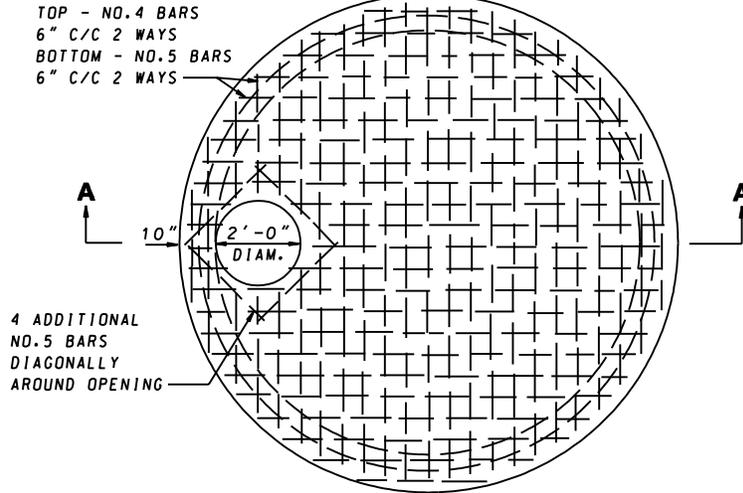
**84" DIAMETER PRECAST MANHOLE
FOR 54" & 60" PIPES**

STANDARD NO. MD 384.07



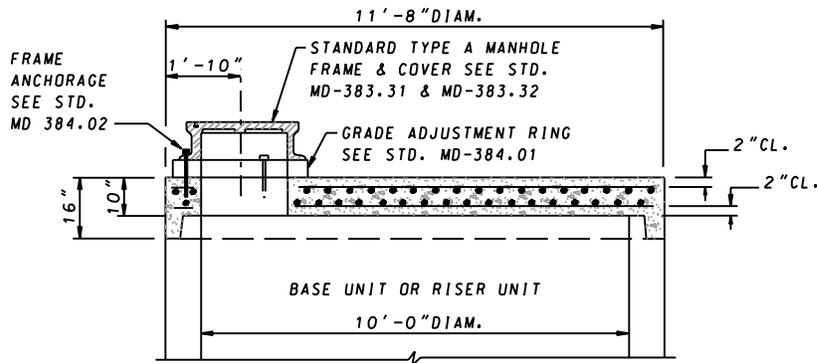
SPECIFICATION 305	CATEGORY CODE ITEMS
APPROVED	<i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT
	APPROVAL • SHA REVISIONS
	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
	APPROVAL 2-22-91
	APPROVAL 1-2-91
REVISED 10-1-01	REVISED
REVISED	REVISED
REVISED	REVISED

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
 STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES
96" DIAMETER PRECAST MANHOLE
FOR 72" PIPES
STANDARD NO. MD 384.09



PLAN

(FRAME AND COVER NOT SHOWN)



SECTION A-A

NOTES

1. CONCRETE SHALL BE MIX NO. 6 (4500 PSI).
2. THE MANUFACTURER SHALL FORM MALE AND FEMALE ENDS OF JOINTS USING THEIR OWN DESIGN.
3. LIFT EYES SHALL BE PROVIDED FOR HANDLING.
4. COST FOR THE PRECAST FLAT SLAB TOP IS INCIDENTAL TO THE COST OF THE 120" PRECAST MANHOLE.
5. FOR USE WITH THE 120" DIAMETER PRECAST MANHOLE, SEE STD. MD 384.11.

SPECIFICATION	CATEGORY CODE ITEMS
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APPROVED *Kirk G. McCall*
DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT

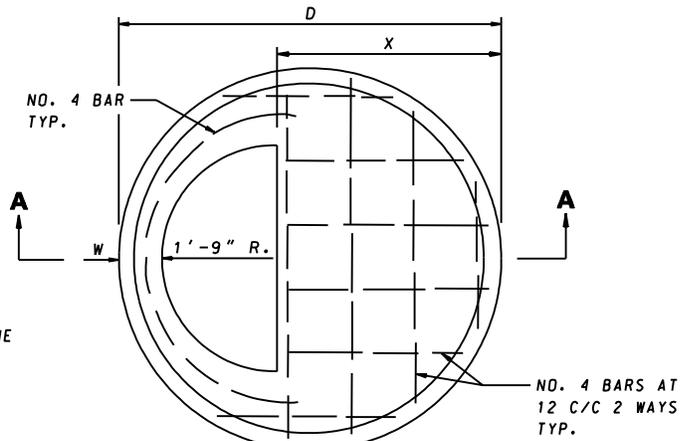
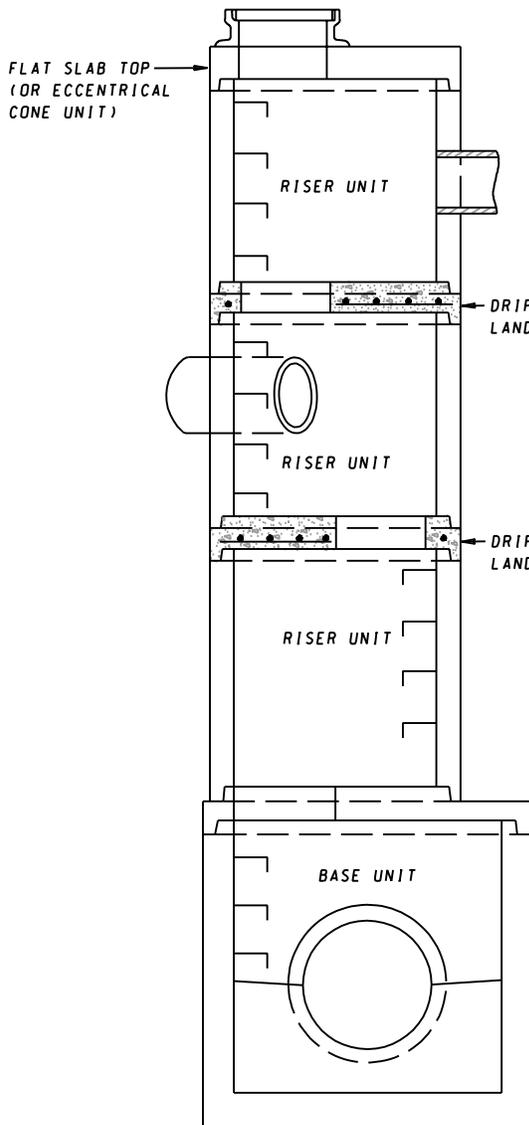


APPROVAL • SHA REVISIONS	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
APPROVAL 2-22-91	APPROVAL 1-2-91
REVISED 10-1-01	REVISED
REVISED	REVISED
REVISED	REVISED

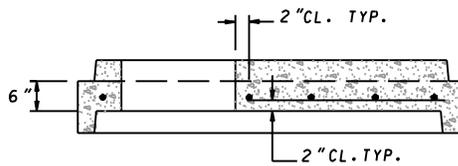
Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

**PRECAST FLAT SLAB TOP FOR
120" DIAMETER PRECAST MANHOLE**

STANDARD NO. MD 384.12



PLAN



**SECTION A-A
DRIP STONE LANDING**

SEE STD. MD 384.15 FOR PRECAST COMBINATION FLATTOP REDUCER AND DRIP STONE LANDING FOR 60" TO 120" DIAMETER MANHOLES AND STD. MD 384.17 FOR PRECAST COMBINATION ECCENTRICAL CONE REDUCER AND DRIP STONE LANDING FOR 60" TO 72" DIAMETER MANHOLES. OTHERWISE USE 48" DIAMETER DRIP STONE LANDING ON THIS SHEET.

METHOD OF PLACING DRIP STONE LANDINGS

PRECAST MANHOLE DIAMETER	DRIP STONE DIMENSIONS		
	D	W	X
48"	4'-10"	8"	2'-5"
60"	6'-0"	8"	3'-7"
72"	7'-2"	8"	4'-9"
84"	8'-4"	8"	5'-11"
96"	9'-6"	9"	7'-0"
120"	11'-8"	10"	9'-1"

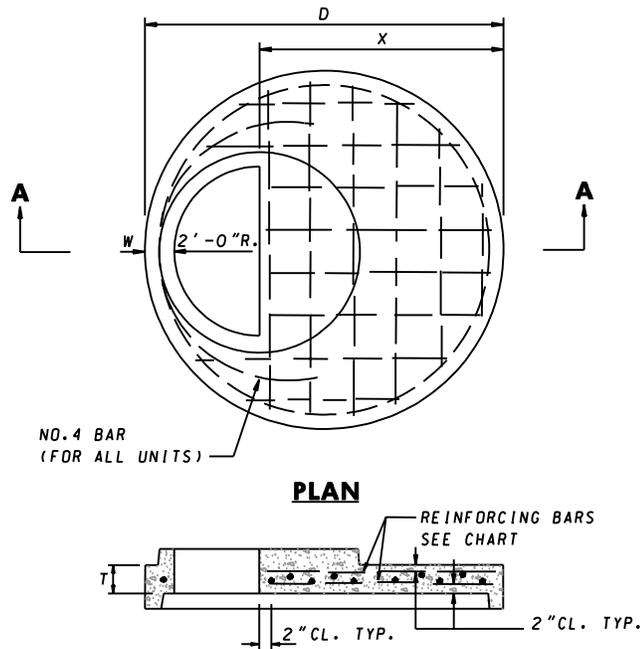
NOTES

1. THE DRIP STONE LANDING SHALL BE USED ONLY WHEN THERE ARE PIPES CONNECTED TO THE RISER UNITS.
2. CONCRETE SHALL BE MIX NO.6 (4500 PSI).
3. REINFORCEMENT SHALL MEET ASTM A 615 GRADE 60.
4. THE MANUFACTURER SHALL FORM MALE AND FEMALE ENDS OF JOINTS USING THEIR OWN DESIGN.
5. LIFT EYES SHALL BE PROVIDED FOR HANDLING.
6. COST FOR THE DRIP STONE LANDING IS INCIDENTAL TO THE COST OF THE MANHOLE.

SPECIFICATION	CATEGORY CODE ITEMS	
APPROVED	<i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT	
	APPROVAL • SHA REVISIONS	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
	APPROVAL 2-22-91	APPROVAL 1-2-91
	REVISED 10-1-01	REVISED
	REVISED	REVISED

**Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION**
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES
**PRECAST DRIP STONE LANDING DETAILS
FOR 48" TO 120" DIAMETER MANHOLES**

STANDARD NO. MD 384.13



SECTION A-A

PRECAST MANHOLE DIAMETER	DIMENSIONS				REINFORCING BARS PLACED 2 WAYS	
	D	T	W	X	TOP LAYER	BOTTOM LAYER
60"	6'-0"	5"	6"	3'-6"	N/A	NO. 5 AT 10" C/C
72"	7'-2"	6"	7"	4'-7"	N/A	NO. 5 AT 10" C/C
84"	8'-4"	7"	8"	5'-8"	N/A	NO. 5 AT 10" C/C
96"	9'-6"	8"	9"	6'-9"	NO. 4 AT 8" C/C	NO. 6 AT 8" C/C
120"	11'-8"	9"	10"	8'-10"	NO. 4 AT 6" C/C	NO. 5 AT 6" C/C

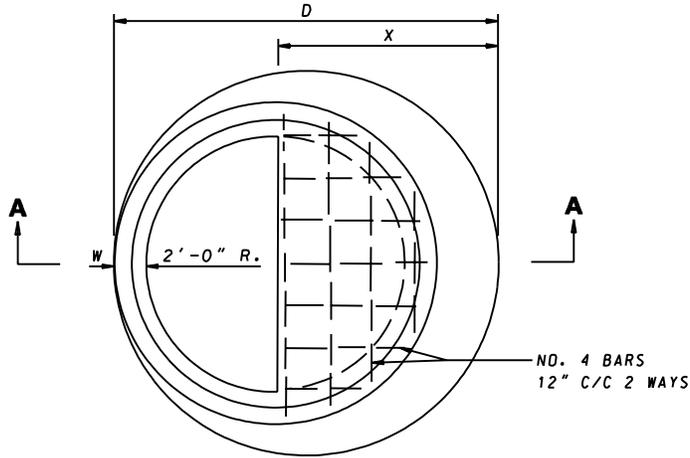
NOTES

1. THE COMBINATION FLATTOP REDUCER DRIP STONE LANDING SHALL BE USED ONLY WHEN THERE ARE PIPES CONNECTED TO THE RISER UNITS. SEE STANDARD MD 384.13 FOR PLACEMENT.
2. CONCRETE SHALL BE MIX NO.6 (4500 PSI).
3. REINFORCEMENT SHALL MEET ASTM A 615 GRADE 60.
4. THE MANUFACTURER SHALL FORM MALE AND FEMALE ENDS OF JOINTS USING THEIR OWN DESIGN.
5. LIFT EYES SHALL BE PROVIDED FOR HANDLING.
6. COST FOR THE COMBINATION FLATTOP REDUCER AND DRIP STONE LANDING IS INCIDENTAL TO THE COST OF THE MANHOLE.

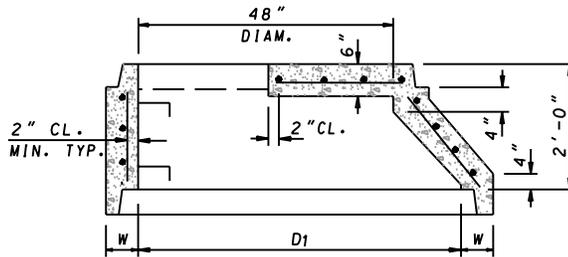
SPECIFICATION	CATEGORY CODE ITEMS	
APPROVED	<i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT	
	APPROVAL • SHA REVISIONS	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
	APPROVAL 2-22-91	APPROVAL 1-2-91
	REVISED 10-1-01	REVISED
	REVISED	REVISED

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
 STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES
PRECAST COMBINATION FLATTOP REDUCER AND DRIP STONE LANDING FOR 60" TO 120" DIAMETER MANHOLES

STANDARD NO. MD 384.15



PLAN



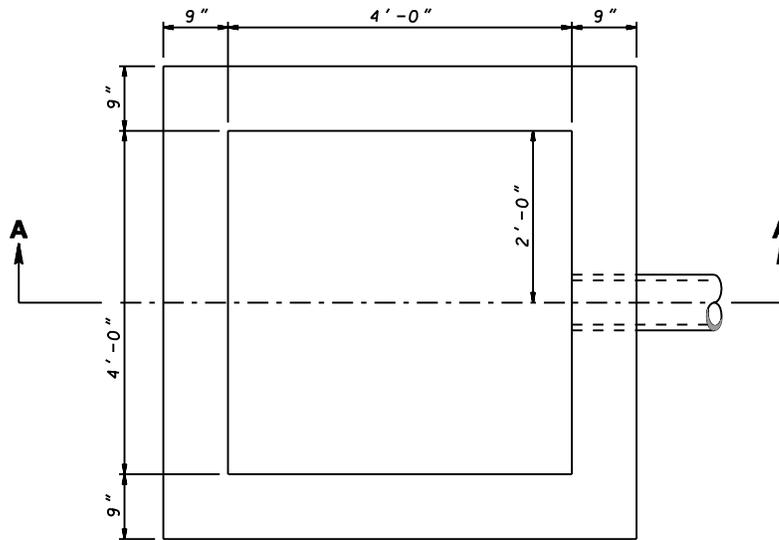
SECTION A-A

PRECAST MANHOLE DIAMETER	DIMENSIONS			
	D	D ₁	W	X
60"	6'-0"	5'-0"	6"	3'-6"
72"	7'-2"	6'-0"	7"	4'-7"

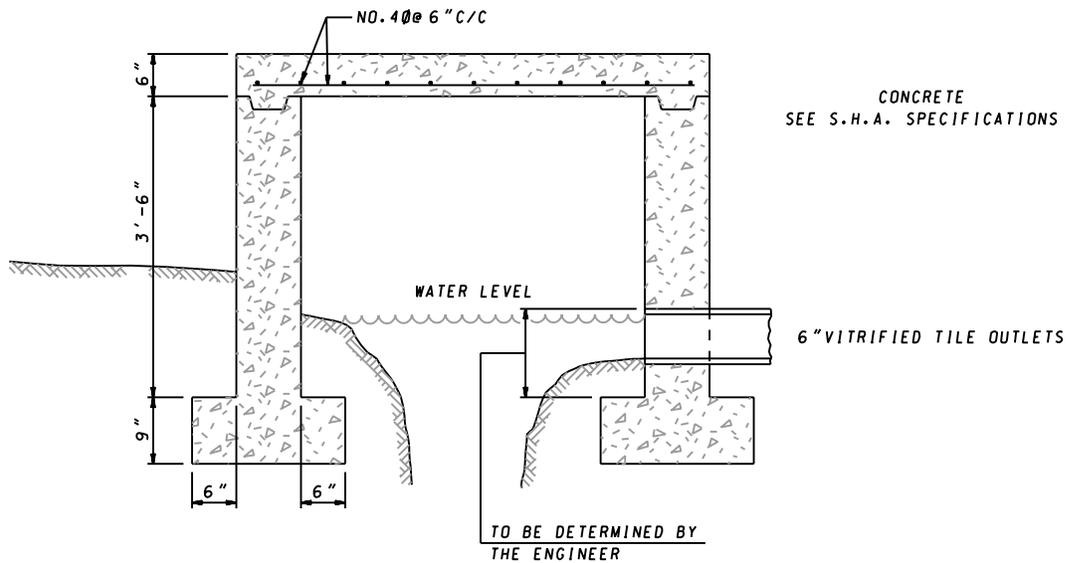
NOTES

1. THE COMBINATION ECCENTRIC CONE REDUCER AND DRIP STONE LANDING SHALL BE USED ONLY WHEN THERE ARE PIPES CONNECTED TO THE RISER UNITS. SEE STANDARD MD 384.13 FOR PLACEMENT.
2. CONCRETE SHALL BE MIX NO.6 (4500 PSI).
3. REINFORCEMENT SHALL BE REINFORCING BARS OR WELDED WIRE FABRIC WITH A MINIMUM AREA OF 0.15 IN. ²/FT FOR THE 60" DIAMETER CONE UNIT AND 0.18 IN. ²/FT FOR THE 72" DIAMETER CONE UNIT.
4. THE MANUFACTURER SHALL FORM MALE AND FEMALE ENDS OF JOINTS USING THEIR OWN DESIGN.
5. LIFT EYES SHALL BE PROVIDED FOR HANDLING.
6. COST FOR THE COMBINATION ECCENTRIC CONE REDUCER AND DRIP STONE LANDING IS INCIDENTAL TO THE COST OF THE MANHOLE.

SPECIFICATION	CATEGORY CODE ITEMS	Maryland Department of Transportation STATE HIGHWAY ADMINISTRATION STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES PRECAST COMBINATION ECCENTRIC CONE REDUCER AND DRIP STONE LANDING FOR 60" AND 72" DIAMETER MANHOLES STANDARD NO. MD 384.17
APPROVED	<i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT	
	APPROVAL • SHA REVISIONS	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
	APPROVAL 2-22-91	APPROVAL 1-2-91
	REVISED 10-1-01	REVISED
	REVISED	REVISED



PLAN



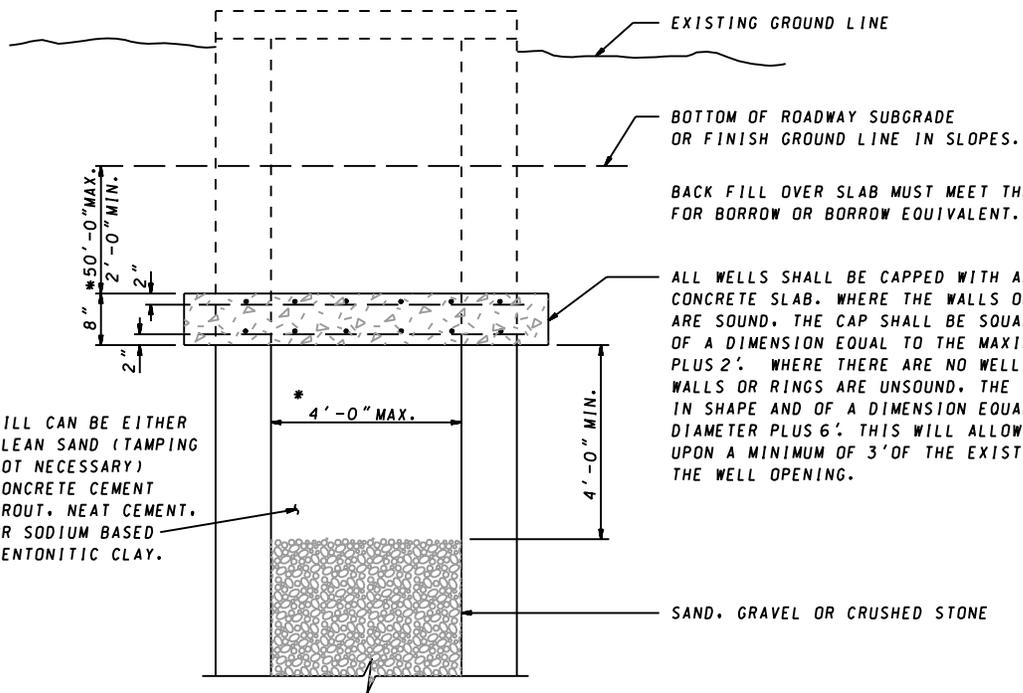
SECTION A-A

SPECIFICATION	CATEGORY CODE ITEMS
APPROVED	<i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT
	APPROVAL • SHA REVISIONS
	APPROVAL 2-7-51
	REVISED 10-1-01
	REVISED
APPROVAL • FEDERAL HIGHWAY ADMINISTRATION	APPROVAL 3-23-56
REVISED	REVISED
REVISED	REVISED
REVISED	REVISED

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
 STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

STANDARD SPRING BOX
SPRING OR WELL PROTECTION

STANDARD NO. MD 386.01



FILL CAN BE EITHER CLEAN SAND (TAMPING NOT NECESSARY) CONCRETE CEMENT GROUT, NEAT CEMENT, OR SODIUM BASED BENTONITIC CLAY.

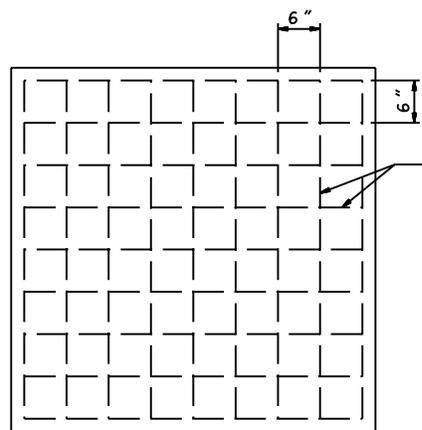
EXISTING GROUND LINE

BOTTOM OF ROADWAY SUBGRADE OR FINISH GROUND LINE IN SLOPES.

BACK FILL OVER SLAB MUST MEET THE REQUIREMENTS FOR BORROW OR BORROW EQUIVALENT.

ALL WELLS SHALL BE CAPPED WITH AN 8" REINFORCED CONCRETE SLAB. WHERE THE WALLS OR THE WELL RINGS ARE SOUND, THE CAP SHALL BE SQUARE IN SHAPE AND OF A DIMENSION EQUAL TO THE MAXIMUM WELL DIAMETER PLUS 2'. WHERE THERE ARE NO WELL RINGS OR WHERE THE WALLS OR RINGS ARE UNSOUND, THE CAP SHALL BE SQUARE IN SHAPE AND OF A DIMENSION EQUAL TO THE MAXIMUM WELL DIAMETER PLUS 6'. THIS WILL ALLOW THE CAP TO REST UPON A MINIMUM OF 3' OF THE EXISTING GROUND BEYOND THE WELL OPENING.

SAND, GRAVEL OR CRUSHED STONE



REINFORCEMENT TO BE NO. 5 Ø DEFORMED BARS @ 6" C/C 2" COVER.

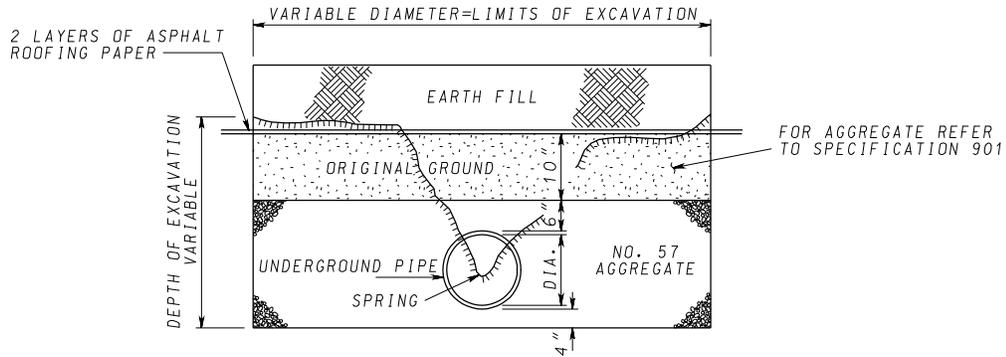
* CONSULT CHIEF, HIGHWAY DESIGN DIVISION OR DIRECTOR, OFFICE OF HIGHWAY DEVELOPMENT WHEN THESE DIMENSIONS ARE EXCEEDED.

SPECIFICATION	CATEGORY CODE ITEMS
APPROVED	<i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT
	APPROVAL • SHA REVISIONS
	APPROVAL 3-11-77
	REVISED 10-1-01
	REVISED
APPROVAL • FEDERAL HIGHWAY ADMINISTRATION	
APPROVAL 4-7-77	
REVISED 12-6-82	
REVISED	

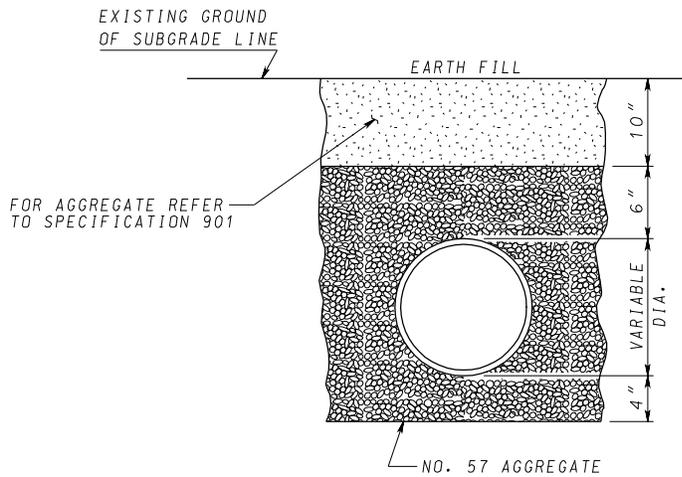
Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
 STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

CAPPING EXISTING DUG WELLS

STANDARD NO. MD 386.02



CIRCULAR PLAN VIEW NOT SHOWN. TO BE USED WHERE NOTED ON THE PLANS OR WHERE DIRECTED BY THE ENGINEER.
 TWO LAYERS OF THREE PLY ASPHALT ROOFING PAPER. COST OF PAPER AND INSTALLATION MUST BE INCLUDED IN THE CONTRACT PRICE FOR MEASUREMENT AND PAYMENT REFER TO 306.04.01 WHEN PIPE IS USED AND TO 306.04.02 WHEN THE PIPE IS OMITTED.



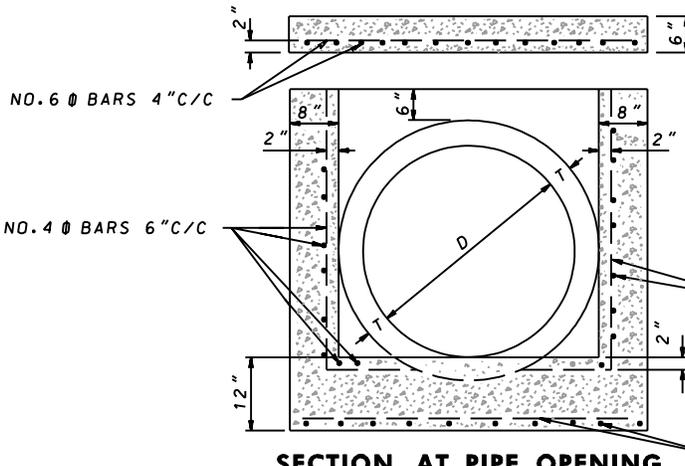
SPECIFICATION 306	CATEGORY CODE ITEMS	
APPROVED <i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT		
	APPROVAL • SHA REVISIONS	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
	APPROVAL 5-1-57	APPROVAL 8-6-57
	REVISED 3-15-06	REVISED 4-5-06
	REVISED	REVISED
	REVISED	REVISED

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
 STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

**SPRING CONTROL
 METHOD & DETAIL**

STANDARD NO.

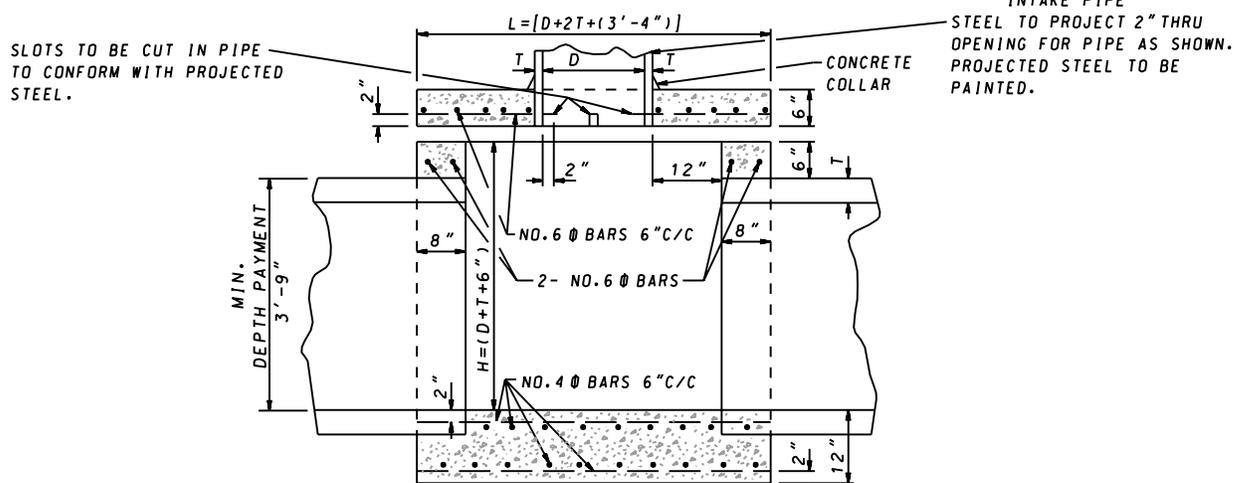
MD 386.03



CONCRETE SHALL BE MIX NO. 2
REINFORCEMENT-DEFORMED BARS

NOTE: NO PROVISION IS TO BE MADE IN
SLAB FOR INTAKE PIPE WHEN
NOT NEEDED.

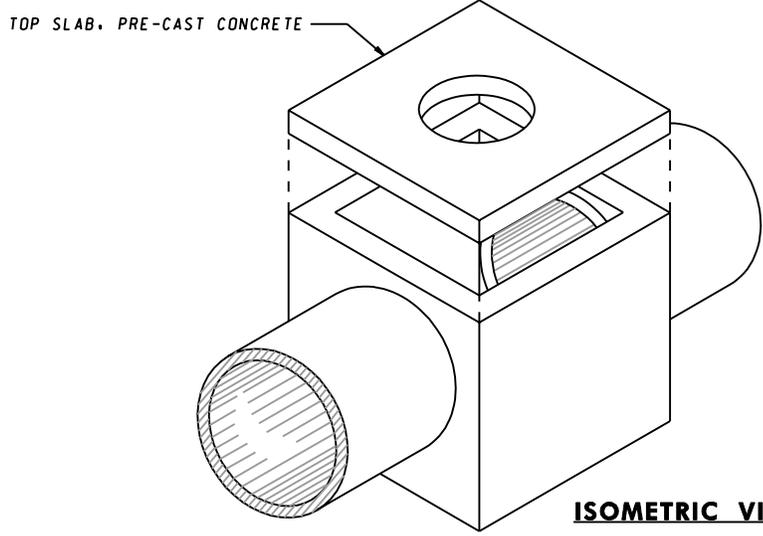
SECTION AT PIPE OPENING



INTAKE PIPE
STEEL TO PROJECT 2" THRU
OPENING FOR PIPE AS SHOWN.
PROJECTED STEEL TO BE
PAINTED.

SLOTS TO BE CUT IN PIPE
TO CONFORM WITH PROJECTED
STEEL.

SECTION ALONG C OF PIPE



ISOMETRIC VIEW

SPECIFICATION 305	CATEGORY CODE ITEMS
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APPROVED *Kirk G. McCall*
DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT

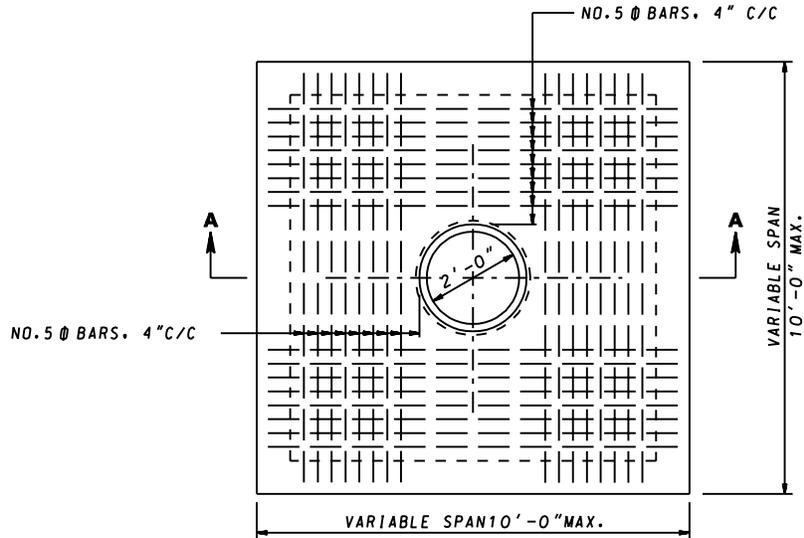


APPROVAL • SHA REVISIONS	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
APPROVAL 2-7-51	APPROVAL 3-23-56
REVISED 10-1-01	REVISED
REVISED	REVISED
REVISED	REVISED

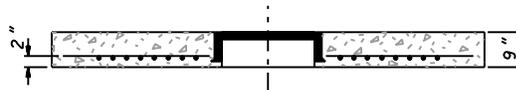
Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

STANDARD JUNCTION BOX

STANDARD NO. MD 386.11



PLAN



SECTION A-A

GENERAL NOTES

- CONCRETE SHALL BE MIX NO. 2
- REINFORCEMENT- DEFORMED BARS
- MANHOLE CASTINGS:- INSIDE DIA.- 2'-0"
- MANHOLE CASTINGS:- MAXIMUM DEPTH- 0'-7"
- ALL MATERIAL TO CONFORM TO S.H.A. SPECIFICATIONS

SPECIFICATION 305	CATEGORY CODE ITEMS
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APPROVED *Kirk G. McCall*
DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT

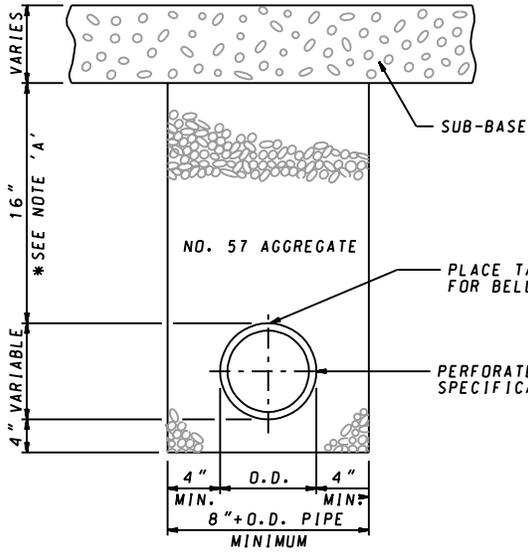


APPROVAL • SHA REVISIONS	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
APPROVAL 2-7-51	APPROVAL 3-23-56
REVISED 10-1-01	REVISED 9-30-75
REVISED	REVISED
REVISED	REVISED

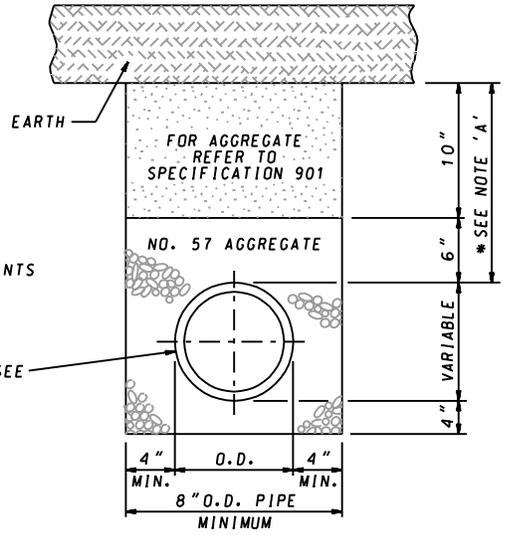
Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

PRE-CAST REINFORCED CONCRETE SLAB

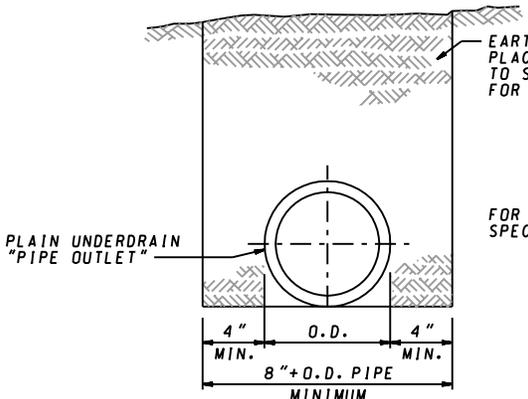
STANDARD NO. MD 386.21



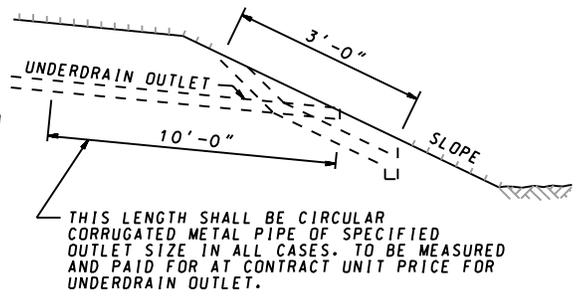
SUB-BASE DRAINAGE DITCH SECTION



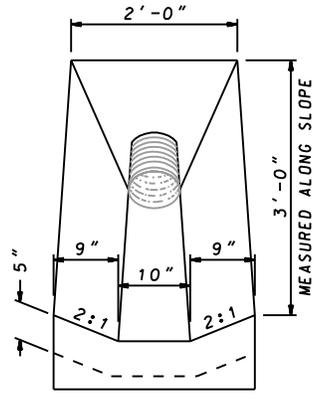
SUB-SURFACE DRAINAGE DITCH SECTION



OUTLET DITCH SECTION



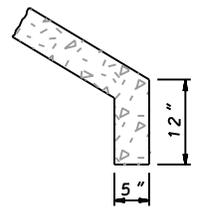
5" CONCRETE GUTTER FOR UNDERDRAIN OUTLET



ELEVATION-UNDERDRAIN OUTLET

NOTE: UNDERDRAIN TO BE LAID ON A MINIMUM OF 0.5% GRADE UNLESS OTHERWISE DIRECTED.

* NOTE 'A': WHERE UNDERDRAIN IS OUTLETTED INTO AN INLET, OR WHERE ANY OTHER UNUSUAL CONDITIONS PREVAIL, THESE DIMENSIONS MAY BE VARIED AS DIRECTED.



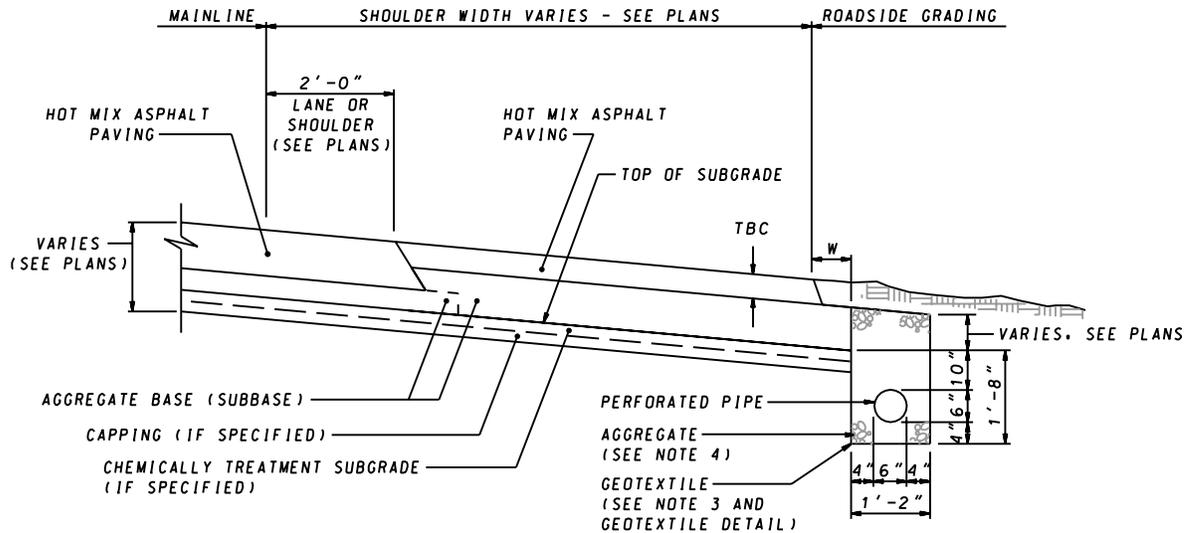
TOE WALL

SPECIFICATION	CATEGORY CODE ITEMS
APPROVED	<i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT
	APPROVAL • SHA REVISIONS
	APPROVAL 3-6-86
	REVISED 10-1-01
	REVISED
	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
	APPROVAL 4-14-86
	REVISED
	REVISED

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
 STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

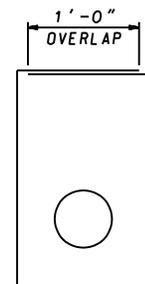
STANDARD UNDERDRAINS

STANDARD NO. MD 387.01



NOTES

1. LONGITUDINAL UNDERDRAIN SHALL BE PLACED ACCORDING TO THE PLANS OR AS DIRECTED BY THE ENGINEER.
2. THE UNDERDRAIN TRENCH SHALL NOT BE CONSTRUCTED BEFORE PLACEMENT OF THE BASE (SUBBASE) COURSE.
3. GEOTEXTILE CLASS SHALL BE AS SPECIFIED IN THE PLANS OR SPECIAL PROVISIONS.
4. AGGREGATE SHALL CONFORM TO SECTION 901 OF THE STANDARD SPECIFICATIONS FOR CONSTRUCTION AND MATERIALS.
5. AGGREGATE SHALL BE TAMPED WITH A LIGHT VIBRATORY TAMPER PRIOR TO OVERLAPPING THE GEOTEXTILE FABRIC.
6. CONTRACT UNIT PRICE BID PER LINEAR FOOT FOR 6" PERFORATED CIRCULAR PIPE LONGITUDINAL UNDERDRAIN SHALL CONSTITUTE FULL COMPENSATION FOR ALL MATERIALS, LABOR, EQUIPMENT AND INCIDENTALS NECESSARY TO DO THE WORK.

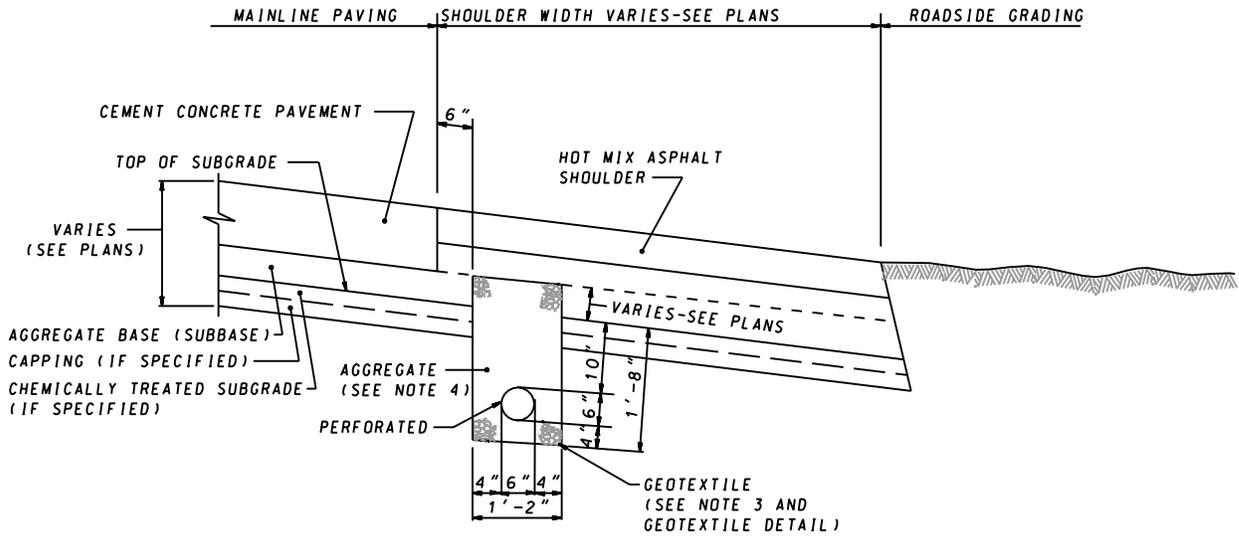


GEOTEXTILE FABRIC
DETAIL

SPECIFICATION 306	CATEGORY CODE ITEMS
APPROVED	<i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT
	APPROVAL • SHA REVISIONS
	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
	APPROVAL 3-6-86
	APPROVAL 4-14-86
REVISED 10-1-01	REVISED 3-21-88
REVISED	REVISED
REVISED	REVISED

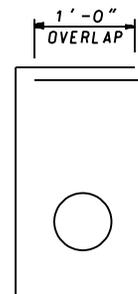
Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES
LONGITUDINAL UNDERDRAIN LOCATED AT SHOULDER EDGE FOR FLEXIBLE PAVEMENT

STANDARD NO. MD 387.11



NOTES

1. LONGITUDINAL UNDERDRAIN SHALL BE PLACED ACCORDING TO THE PLANS OR AS DIRECTED BY THE ENGINEER.
2. THE UNDERDRAIN TRENCH SHALL NOT BE CONSTRUCTED BEFORE PLACEMENT OF THE MAINLINE PAVING.
3. GEOTEXTILE CLASS SHALL BE AS SPECIFIED IN THE PLANS OR SPECIAL PROVISIONS.
4. AGGREGATE SHALL CONFORM TO SECTION 901 OF THE STANDARD SPECIFICATIONS FOR CONSTRUCTION AND MATERIALS.
5. AGGREGATE SHALL BE TAMPED WITH A LIGHT VIBRATORY TAMPER PRIOR TO OVERLAPPING THE GEOTEXTILE FABRIC.
6. CONTRACT UNIT PRICE BID PER LINEAR FOOT FOR 6" PERFORATED CIRCULAR PIPE LONGITUDINAL UNDERDRAIN SHALL CONSTITUTE FULL COMPENSATION FOR ALL MATERIALS, LABOR, EQUIPEMENT AND INCIDENTALS NECESSARY TO DO THE WORK.

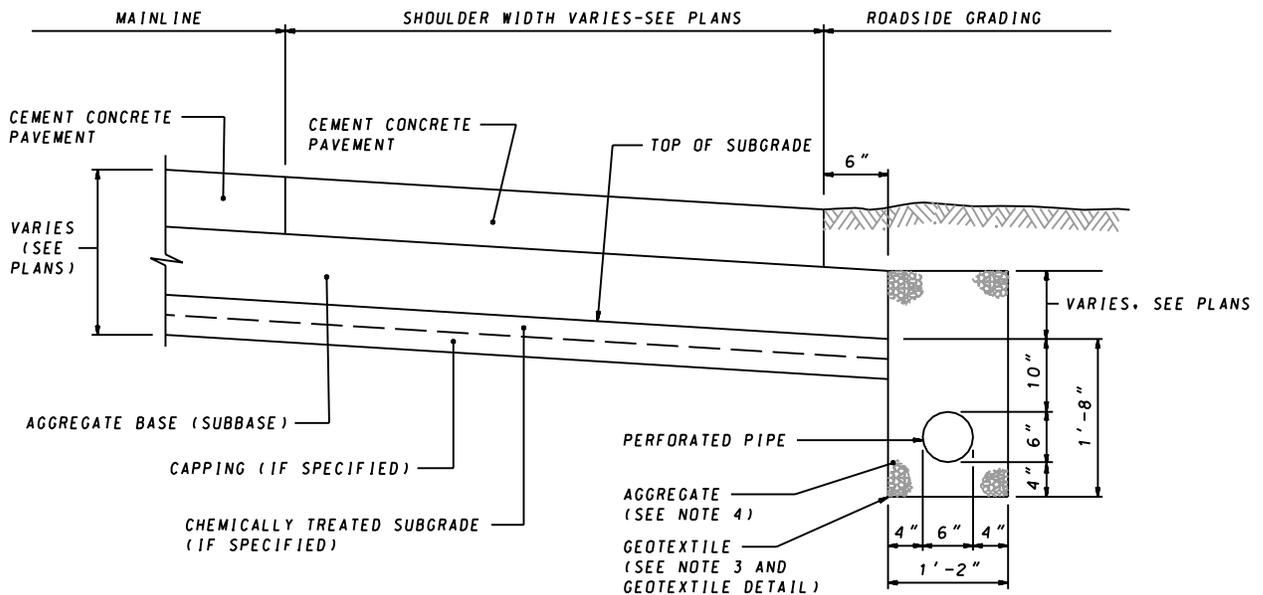


GEOTEXTILE FABRIC
DETAIL

SPECIFICATION 306	CATEGORY CODE ITEMS								
APPROVED	<i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT								
	<table border="1" style="width: 100%;"> <tr> <td style="width: 50%;">APPROVAL • SHA REVISIONS</td> <td style="width: 50%;">APPROVAL • FEDERAL HIGHWAY ADMINISTRATION</td> </tr> <tr> <td>APPROVAL 3-6-86</td> <td>APPROVAL 4-14-86</td> </tr> <tr> <td>REVISED 10-1-01</td> <td>REVISED 3-21-88</td> </tr> <tr> <td>REVISED</td> <td>REVISED</td> </tr> </table>	APPROVAL • SHA REVISIONS	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION	APPROVAL 3-6-86	APPROVAL 4-14-86	REVISED 10-1-01	REVISED 3-21-88	REVISED	REVISED
	APPROVAL • SHA REVISIONS	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION							
	APPROVAL 3-6-86	APPROVAL 4-14-86							
	REVISED 10-1-01	REVISED 3-21-88							
REVISED	REVISED								
REVISED	REVISED								

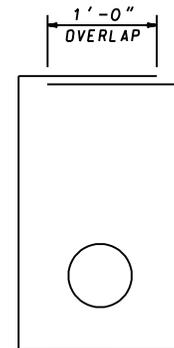
Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
 STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES
LONGITUDINAL UNDERDRAIN LOCATED AT PAVEMENT EDGE FOR RIGID PAVEMENT

STANDARD NO. MD 387.12



NOTES

1. LONGITUDINAL UNDERDRAIN SHALL BE PLACED ACCORDING TO THE PLANS OR DIRECTED BY THE ENGINEER.
2. THE UNDERDRAIN TRENCH SHALL NOT BE CONSTRUCTED BEFORE PLACEMENT OF THE BASE (SUBBASE) COURSE.
3. GEOTEXTILE CLASS SHALL BE AS SPECIFIED IN THE PLANS OR SPECIAL PROVISIONS.
4. AGGREGATE SHALL CONFORM TO SECTION 901 OF STANDARD SPECIFICATIONS FOR CONSTRUCTION AND MATERIALS.
5. AGGREGATE SHALL BE TAMPED WITH A LIGHT VIBRATORY TAMPER PRIOR TO OVERLAPPING THE GEOTEXTILE FABRIC.
6. CONTRACT UNIT PRICE BID PER LINEAR FOOT FOR 6" PERFORATED CIRCULAR PIPE LONGITUDINAL UNDERDRAIN SHALL CONSTITUTE FULL COMPENSATION FOR ALL MATERIALS, LABOR, EQUIPMENT AND INCIDENTALS NECESSARY TO DO THE WORK.

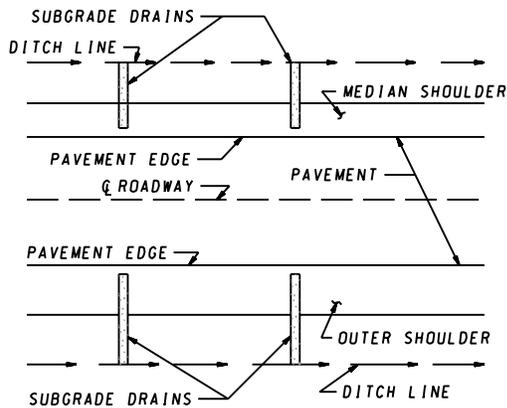


GEOTEXTILE FABRIC
DETAIL

SPECIFICATION 306	CATEGORY CODE ITEMS
APPROVED	<i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT
	APPROVAL • SHA REVISIONS
	APPROVAL 3-6-86
	REVISED 10-1-01
	REVISED
	REVISED
APPROVAL • FEDERAL HIGHWAY ADMINISTRATION	
APPROVAL 4-14-86	
REVISED 3-21-88	
REVISED	
REVISED	

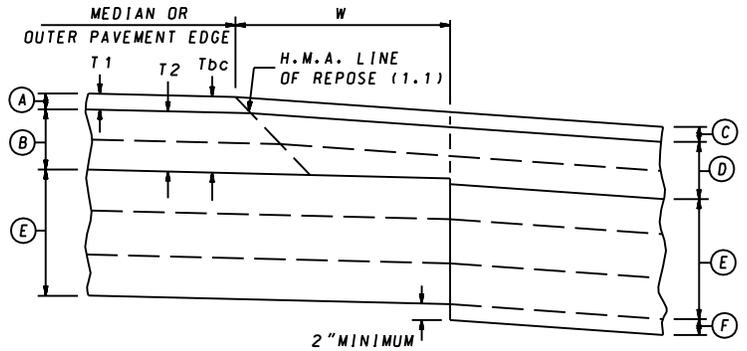
Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES
LONGITUDINAL UNDERDRAIN LOCATED AT SHOULDER EDGE FOR RIGID PAVEMENT

STANDARD NO. MD 387.21

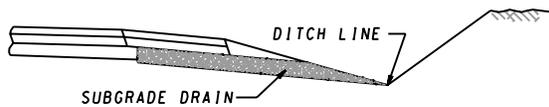


PLAN VIEW

SHOWN IS ONE ROADWAY OF A DUAL HIGHWAY. TWO LANE TWO WAY ROADWAY SAME AS THE OUTER SHOULDER



SECTION VIEW-FILL



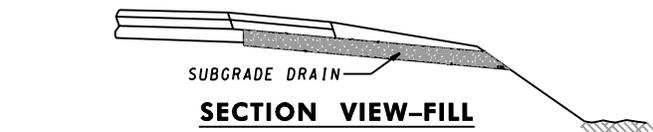
SECTION VIEW-CUT

W	T ₁ + T ₂ = T _{bc}
0'-6"	≤ 4 1/2"
1'-0"	4 1/2" TO 10 1/2"
1'-6"	T _{bc} > 10 1/2"

- (A) FLEXIBLE SURFACE PAVEMENT
- (B) FLEXIBLE BASE PAVEMENT
- (C) FLEXIBLE SURFACE PAVEMENT (SHOULDER)
- (D) FLEXIBLE BASE PAVEMENT (SHOULDER)
- (E) BASE MATERIAL
- (F) SUBGRADE DRAIN MATERIAL
- (G) GEOTEXTILE

NOTES

1. FOR LOCATION AND MATERIAL REFER TO SPECIFICATION 208 FOR METHOD OF MEASUREMENT AND BASIS OF PAYMENT REFER TO SPECIFICATION 208.
2. WHEN THE BOTTOM OF THE SHOULDER FLEXIBLE BASE PAVEMENT (D) IS ABOVE THE MAINLINE BASE MATERIAL (E), THE MATERIAL REQUIRED TO FILL THE AREA WITHIN THE W DIMENSION WILL BE INCIDENTAL TO THE COST OF THE SHOULDER BASE MATERIAL (E). THIS CONDITION WILL BE INDICATED ON THE PLAN TYPICAL CROSS SECTIONS.
3. GEOTEXTILE CLASS SHALL BE AS SPECIFIED IN THE PLANS OR SPECIAL PROVISIONS. REFER TO SPECIFICATION 306 FOR METHOD OF MEASUREMENT AND BASIS OF PAYMENT.



ISOMETRIC VIEW

SPECIFICATION 306	CATEGORY CODE ITEMS
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APPROVED *Kirk G. McCall*
DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT

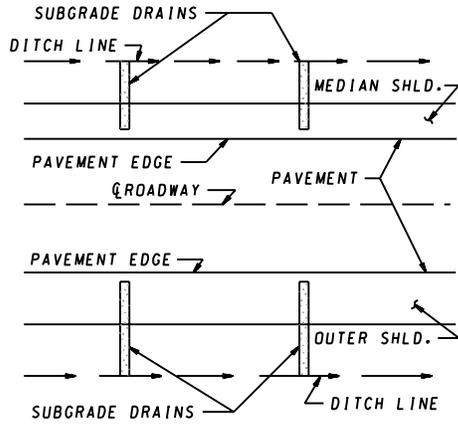


APPROVAL • SHA REVISIONS	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
APPROVAL 9-14-55	APPROVAL 7-7-67
REVISED 10-1-01	REVISED 3-21-88
REVISED	REVISED
REVISED	REVISED

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

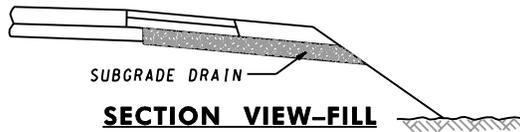
STANDARD SUBGRADE DRAINS
FLEXIBLE PAVING

STANDARD NO. MD 387.51

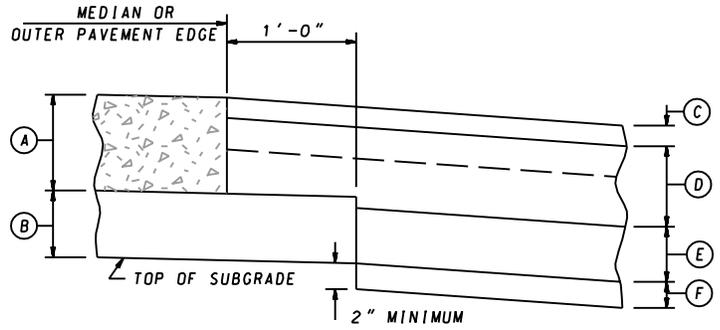


PLAN VIEW

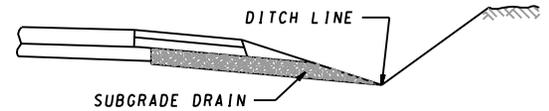
SHOWN IS ONE ROADWAY OF A DUAL HIGHWAY. TWO LANE TWO WAY ROADWAY SAME AS THE OUTER SHOULDER



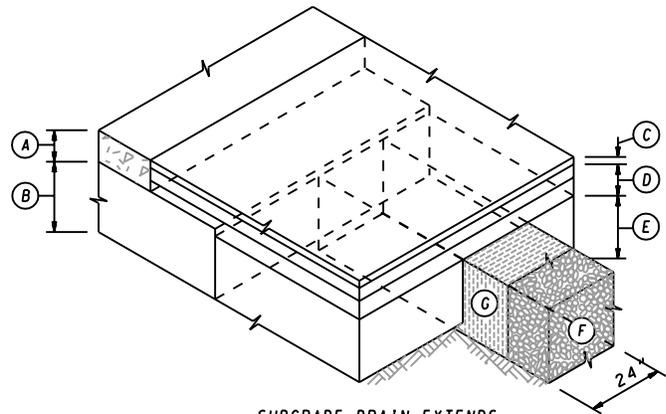
SECTION VIEW-FILL



SECTION VIEW-CUT



- (A) CONCRETE PAVEMENT
- (B) SUBBASE MATERIAL
- (C) FLEXIBLE SURFACE PAVEMENT (SHOULDER)
- (D) FLEXIBLE BASE PAVEMENT (SHOULDER)
- (E) BASE MATERIAL (SHOULDER)
- (F) SUBGRADE DRAIN MATERIAL
- (G) GEOTEXTILE

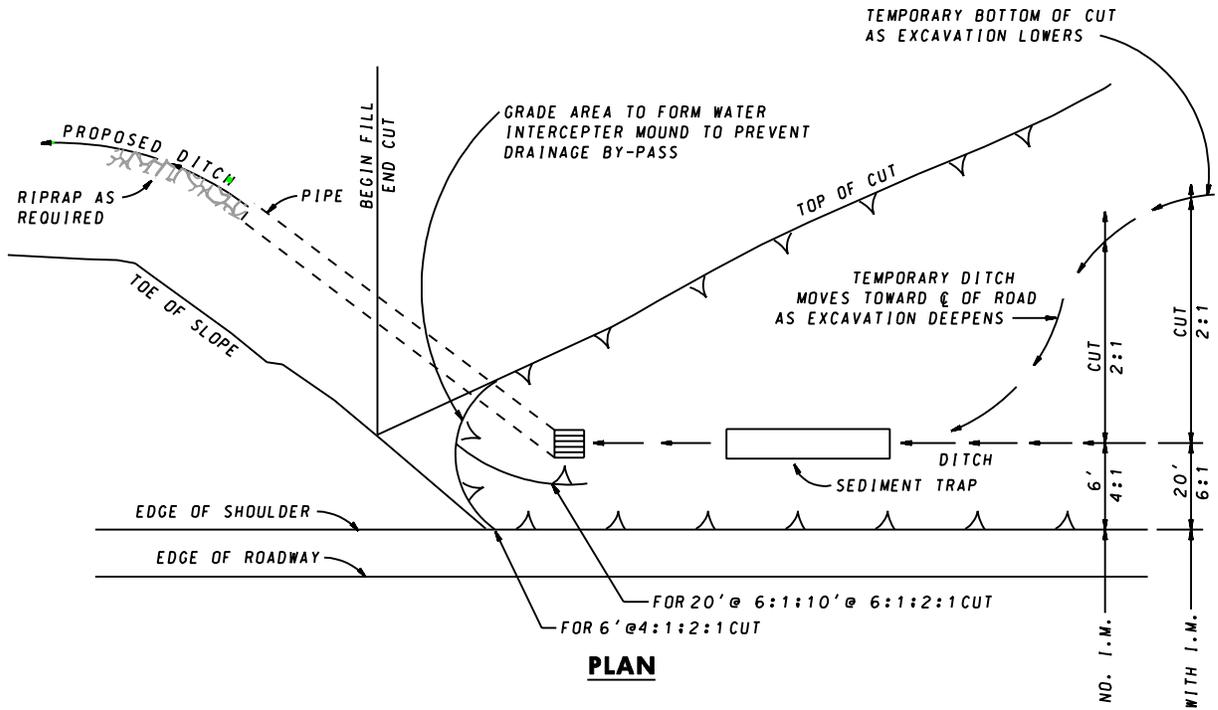


ISOMETRIC VIEW

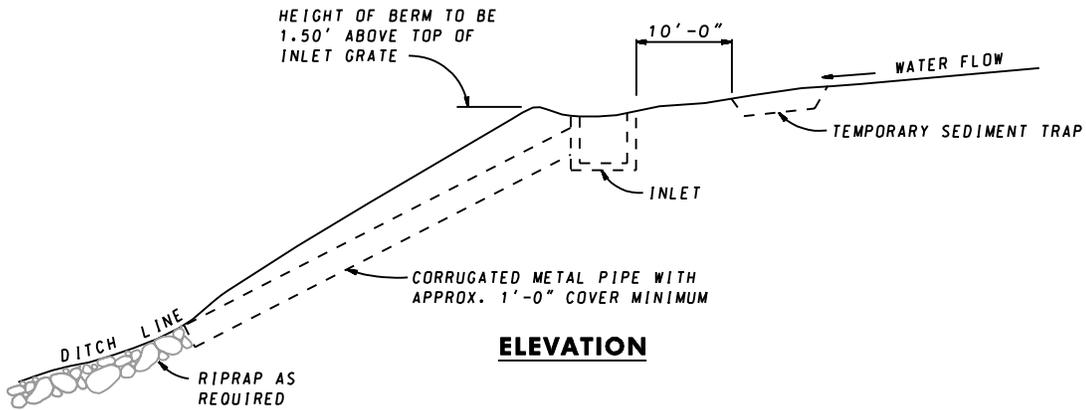
NOTES

1. FOR LOCATION AND MATERIAL REFER TO SPECIFICATION 208. FOR METHOD OF MEASUREMENT AND BASIS OF PAYMENT REFER TO SPECIFICATION 208.
2. WHEN THE BOTTOM OF THE SHOULDER FLEXIBLE BASE PAVEMENT (D) IS ABOVE THE TOP OF THE MAINLINE SUBBASE MATERIAL (B), THE MATERIAL REQUIRED TO FILL THE AREA WITHIN THE 1'-0" DIMENSION WILL BE IDENTICAL TO THE COST OF THE SHOULDER BASE MATERIAL (E). THIS CONDITION WILL BE INDICATED ON THE PLAN TYPICAL CROSS SECTIONS.
3. GEOTEXTILE CLASS SHALL BE AS SPECIFIED IN THE PLANS OR SPECIAL PROVISIONS. REFER TO SPECIFICATION 306 FOR METHOD OF MEASUREMENT AND BASIS OF PAVEMENT.

SPECIFICATION 306	CATEGORY CODE ITEMS	Maryland Department of Transportation STATE HIGHWAY ADMINISTRATION STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES STANDARD SUBGRADE DRAINS RIGID PAVEMENT STANDARD NO. MD 387.61
APPROVED	 DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT	
	APPROVAL • SHA REVISIONS	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
	APPROVAL 1-11-63	APPROVAL 7-7-67
	REVISED 10-1-01	REVISED 3-21-88
	REVISED	REVISED



PLAN



ELEVATION

NOTE: INSTALL CORRUGATED METAL PIPE AND INLET OF REQUIRED SIZE TO CARRY COMPUTED WATER FLOW. CONSTRUCT BERM TYPE DAM TO PREVENT WATER OVERFLOW. IT IS CONTEMPLATED THAT THE SLOPE PIPE WILL BE INSTALLED AT THE SAME TIME THE INLET IS INSTALLED. WHEN THE SLOPE PIPE CANNOT BE INSTALLED AT THE SAME TIME, A TEMPORARY SLOPE DRAIN SHALL BE USED IN CONJUNCTION WITH THE INLET TO ALLOW FOR SAFE DISCHARGE OF WATER UNTIL THE PERMANENT SLOPE PIPE IS INSTALLED.

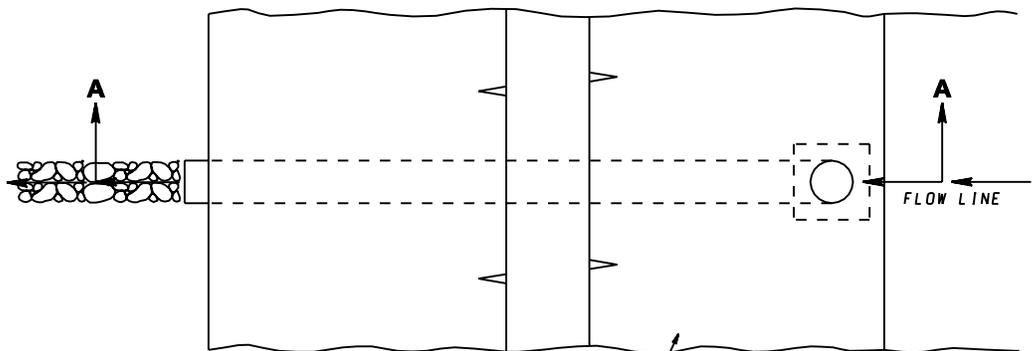
GENERAL NOTE:
ALL DIMENSIONS AND LOCATIONS
NOT INDICATED, FOR ITEMS APPEARING
ON THIS SHEET OR ON THE PLANS,
SHALL BE DIRECTED BY THE ENGINEER.

SPECIFICATION	CATEGORY CODE ITEMS
APPROVED	<i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT
	APPROVAL • SHA REVISIONS
	APPROVAL 7-1-71
	REVISED 10-1-01
	REVISED
APPROVAL • FEDERAL HIGHWAY ADMINISTRATION	
APPROVAL 7-13-71	
REVISED	
REVISED	

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

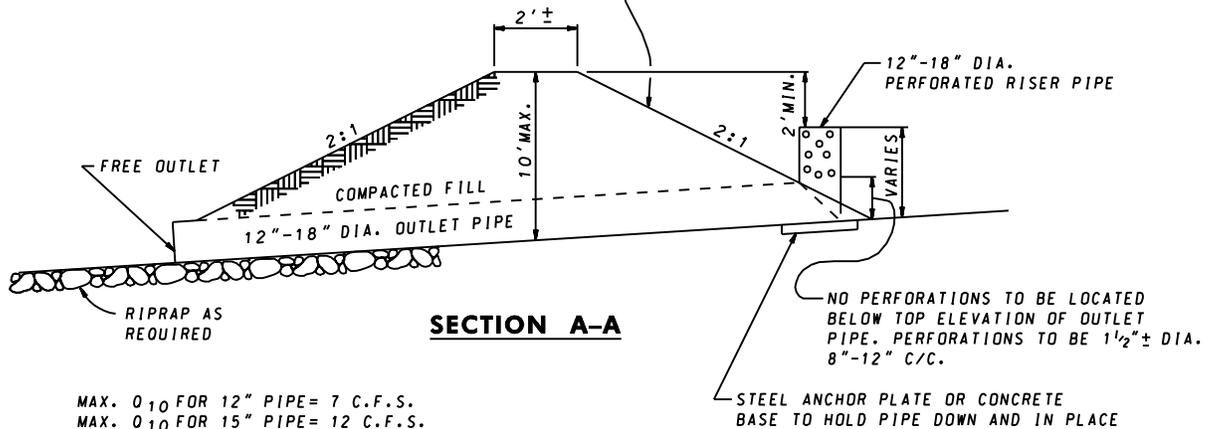
**SEDIMENT AND EROSION CONTROL
PERMANENT SLOPE DRAIN**

STANDARD NO. MD 388.01



PLAN

TEMPORARY EARTH DAM



SECTION A-A

MAX. Q_{10} FOR 12" PIPE = 7 C.F.S.
 MAX. Q_{10} FOR 15" PIPE = 12 C.F.S.
 MAX. Q_{10} FOR 18" PIPE = 18 C.F.S.

GENERAL NOTE:
 ALL DIMENSIONS AND LOCATIONS
 NOT INDICATED, FOR ITEMS APPEARING
 ON THIS SHEET OR ON THE PLANS,
 SHALL BE DIRECTED BY THE ENGINEER.

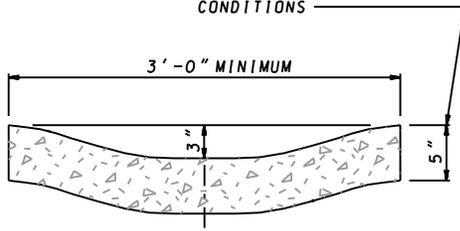
SPECIFICATION	CATEGORY CODE ITEMS	
APPROVED	<i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT	
	APPROVAL • SHA REVISIONS	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
	APPROVAL 7-1-71	APPROVAL 7-13-71
	REVISED 10-1-01	REVISED 3-16-73
	REVISED	REVISED

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
 STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

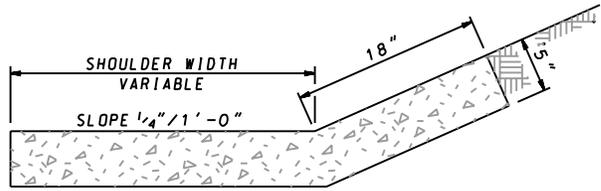
**SEDIMENT AND EROSION CONTROL
 TEMPORARY DITCH BASIN**

STANDARD NO. MD 388.12

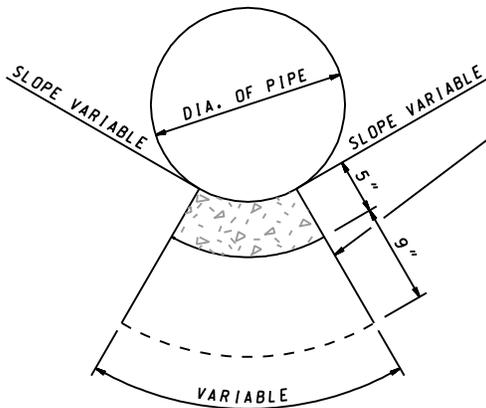
NOTE: AT INTERSECTIONS, THE THICKNESS IS TO BE 8". AND THE TYPICAL SECTION IS SUBJECT TO EXISTING CONDITIONS



VALLEY GUTTER

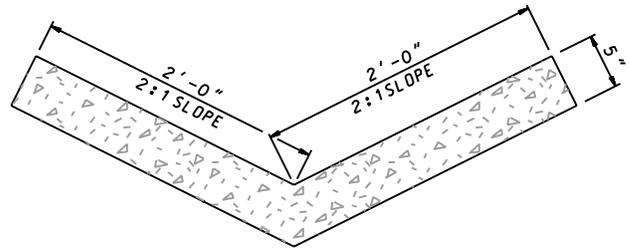


CONCRETE SHOULDER & REBUT

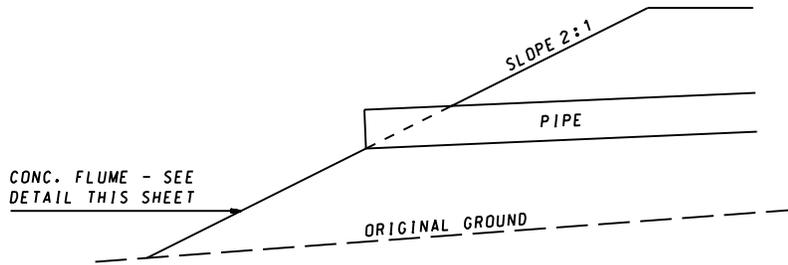


CONCRETE FLUME

CONC. LUG 9" IN DEPTH AND 9" THICK TO BE CONSTRUCTED ON 6'-0" CENTERS



FLUME

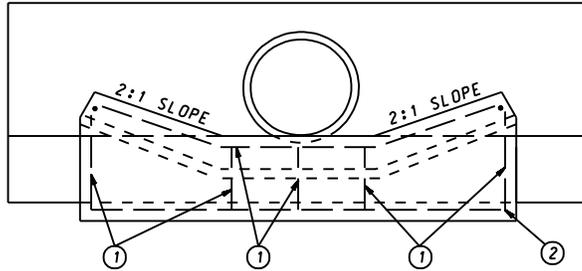


PIPE LOCATIONS UNDER DEEP FILL

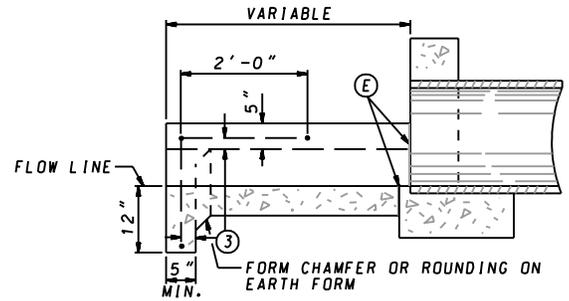
SPECIFICATION	CATEGORY CODE ITEMS	
APPROVED	<i>Kit G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT	
	APPROVAL • SHA REVISIONS	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
	APPROVAL 1-16-63	APPROVAL
	REVISED 10-1-01	REVISED
	REVISED	REVISED
	REVISED	REVISED

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
 STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES
STANDARD CONCRETE VALLEY GUTTER, FLUMES
CONCRETE SHOULDER & REBUT

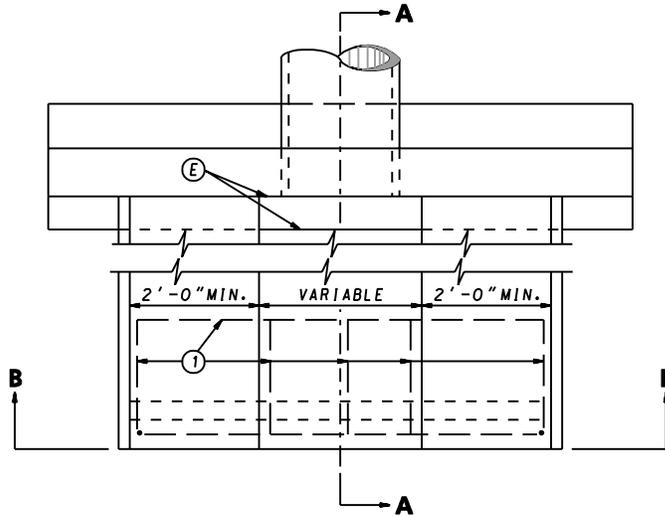
STANDARD NO. MD 389.01



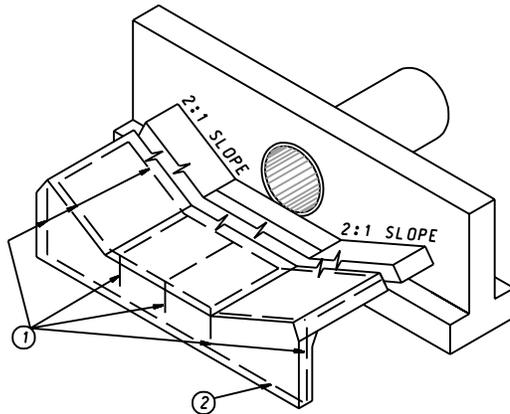
ELEVATION "B-B"



SECTION A-A



PLAN



ISOMETRIC VIEW

REINFORCEMENT DATA
ALL BARS TO BE NO.3

- ① BENT BARS
- ② STRAIGHT BARS
- ③ COVER TO BE 1/2" THICKNESS OF CONC. MIN. COVER ON ENDS
- Ⓔ EXPANSION MATERIAL

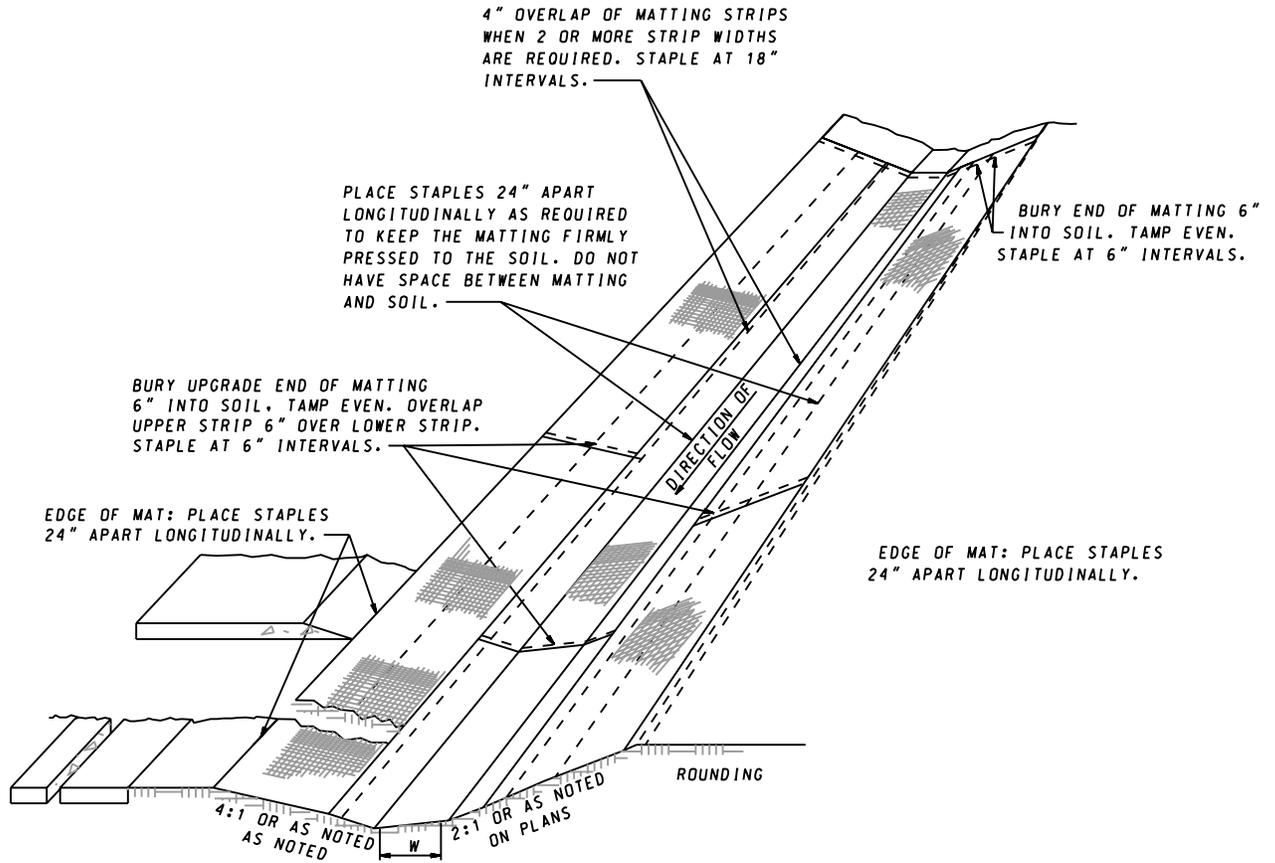
NOTE: COST OF TOE WALL TO BE INCIDENTAL TO SQUARE YARDS OF 5" CONCRETE GUTTER.

SPECIFICATION	CATEGORY CODE ITEMS
APPROVED	<i>Kirk G. McCall</i> DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT
	APPROVAL • SHA REVISIONS
	APPROVAL 1-20-69
	REVISED 10-1-01
	REVISED
	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
	APPROVAL 1-27-69
	REVISED
	REVISED
	REVISED

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

TOE WALL DETAIL - 5" CONCRETE GUTTER

STANDARD NO. MD 389.02



NUMBER OF MAT WIDTHS TO BE NOTED ON PLANS.

WIDTH AS NOTED ON PLANS

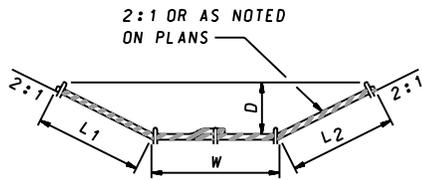


11 GAUGE WIRE OR HEAVIER LATERAL SPACING OF STAPLES TO BE AT EDGE OF MAT, AT OVERLAP OF MATS AND AT BREAK IN GROUND OR MIDPOINT OF MAT WHERE NO BREAKS OCCUR FOR THAT MAT.

NOTE: MAT WIDTH IS 48" ± 1"
 SEE SPECIFICATIONS FOR "SOIL STABILIZATION MATTING" FOR DETAILS OF MAT.
 USE SEED MIX SPECIFIED.
 MULCH IS NOT REQUIRED.
 WHEN TOPSOIL IS SPECIFIED IN THE AREA ADJACENT TO THAT WHERE SOIL STABILIZATION MATTING IS TO BE CONSTRUCTED, IT SHALL ALSO BE PLACED AT THE SAME DEPTH IN THE AREA WHERE SOIL STABILIZATION MATTING IS REQUIRED, PRIOR TO THE INSTALLATION OF THE MATTING.

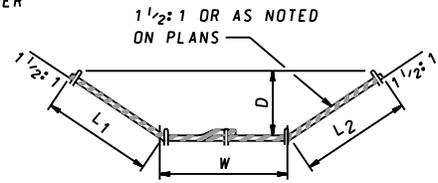
SPECIFICATION 709	CATEGORY CODE ITEMS	Maryland Department of Transportation STATE HIGHWAY ADMINISTRATION STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES SOIL STABILIZATION MATTING DRAINAGE DITCHES
APPROVED	 DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT	
	APPROVAL • SHA REVISIONS	APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
	APPROVAL 6-22-61	APPROVAL 9-28-61
	REVISED 10-1-01	REVISED 6-27-85
	REVISED	REVISED
	REVISED	REVISED
STANDARD NO. MD 389.06		

HIGHWAY SHOULDER



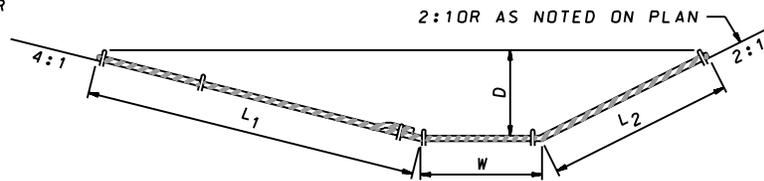
W	MATS	D	L ₁	L ₂
12"	1	8.0"	18"	18"
18"	1	6.7"	15"	15"
24"	2	15.2"	34"	34"
36"	2	12.5"	28"	28"

HIGHWAY SHOULDER



W	MATS	D	L ₁	L ₂
12"	1	10.0"	18"	18"
18"	1	8.3"	15"	15"
24"	1	6.7"	12"	12"
36"	2	15.5"	28"	28"

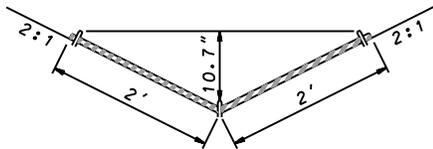
HIGHWAY SHOULDER



NOTE: ADDITIONAL MAT WIDTHS MAY BE USED AS NOTED ON THE PLANS. STAPLES TO BE PLACED AS NOTED BY SYMBOL (□).

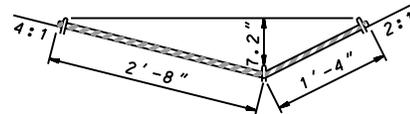
W	MATS	D	L ₁	L ₂
12"	2	12.5"	52"	28"
18"	2	11.6"	48"	26"
24"	2	10.6"	44"	24"
36"	2	8.7"	36"	20"

HIGHWAY SHOULDER



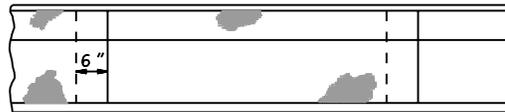
FLUME

HIGHWAY SHOULDER

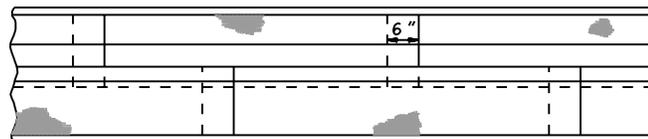


FLUME

DIRECTION OF FLOW →



V-DITCH USING ONE MAT



SIDE DITCH USING TWO OR MORE MATS

SPECIFICATION
709

CATEGORY CODE ITEMS

APPROVED

Kirk G. McCall
DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT



APPROVAL • SHA REVISIONS
APPROVAL **6-22-61**
REVISED **10-1-01**
REVISED
REVISED

APPROVAL • FEDERAL HIGHWAY ADMINISTRATION
APPROVAL **9-28-61**
REVISED **4-25-88**
REVISED
REVISED

**Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION**

STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

**SOIL STABILIZATION MATTING
DRAINAGE DITCHES**

STANDARD NO. MD 389.07