

SECTION III
DRAINAGE

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DRAINAGE FACILITIES

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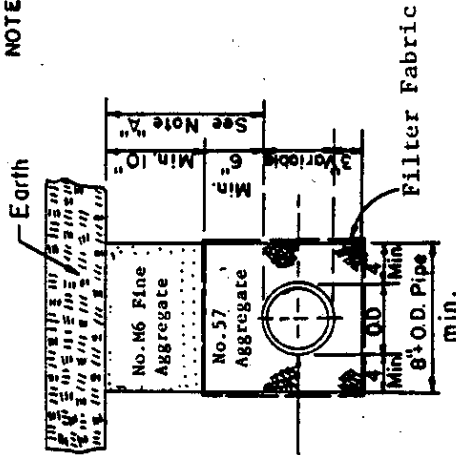
DRAINAGE FACILITIES

<u>No.</u>	<u>Title</u>
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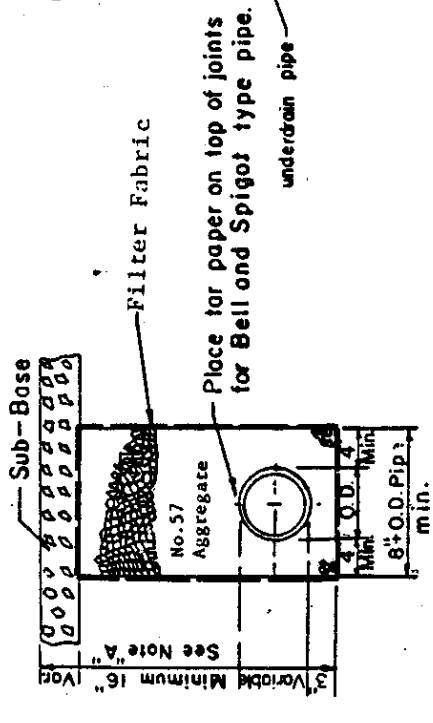
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D-90	Concrete Cradle Detail

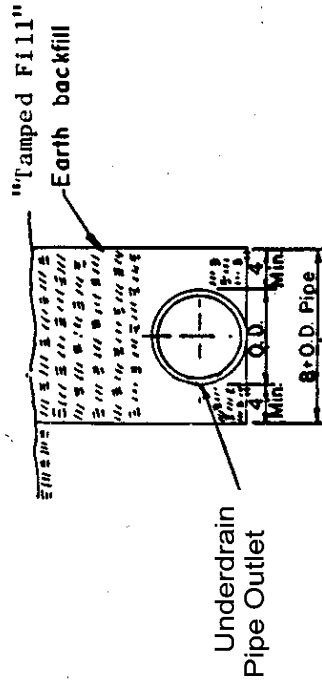
NOTE "A": WHERE UNDERDRAIN IS OUTLETTED INTO AN INLET, OR WHERE ANY OTHER UNUSUAL CONDITIONS PREVAIL, THESE DIMENSIONS MAY BE VARIED AS DIRECTED.
 NOTE: UNDERDRAIN TO BE LAID ON A MINIMUM OF 0.5% GRADE UNLESS OTHERWISE DIRECTED.



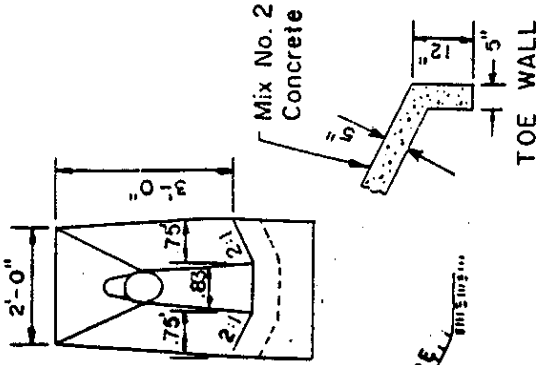
SUB SURF. CE DRAINAGE DITCH SECTION



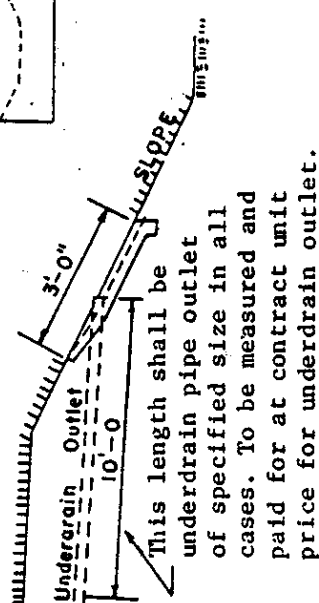
SUB-BASE DRAINAGE DITCH SECTION



OUTLET DITCH SECTION



Mix No. 2 Concrete
 TOE WALL



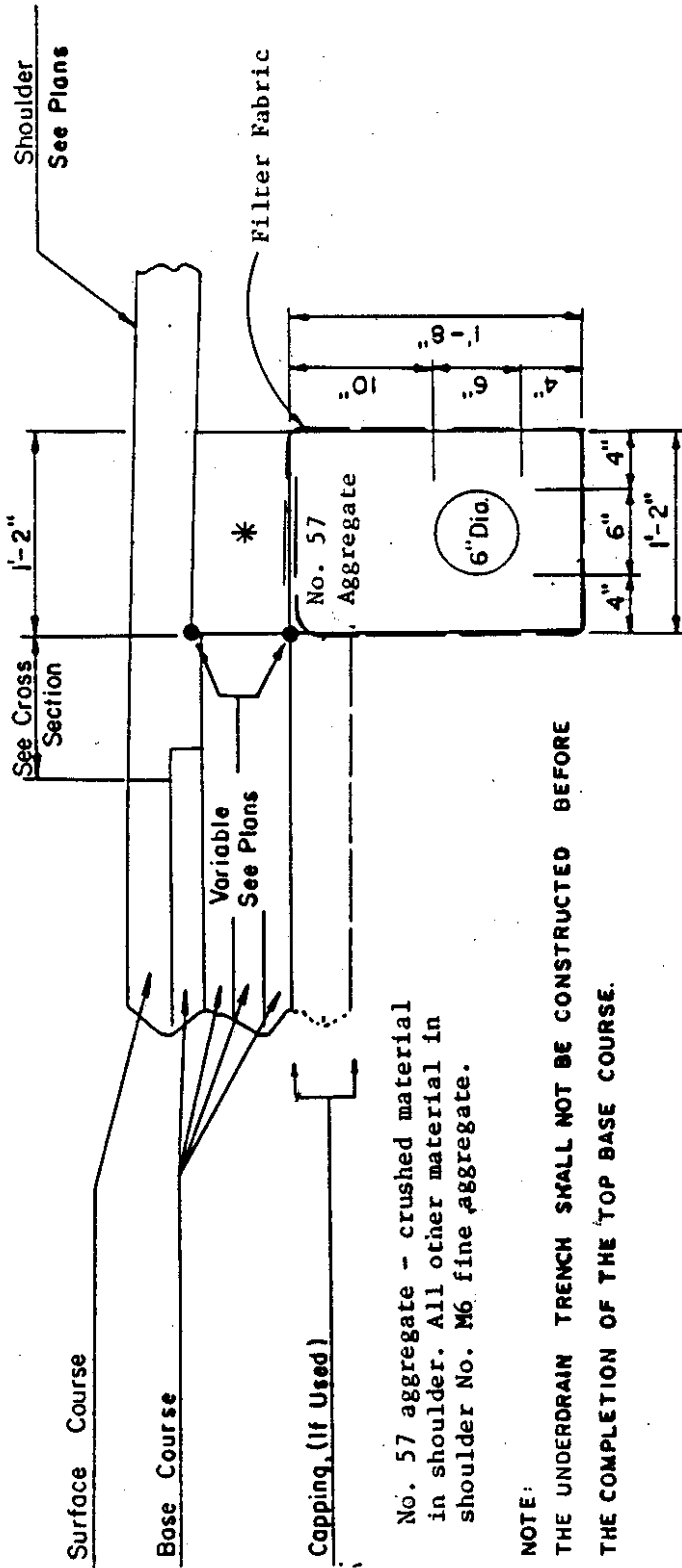
Underdrain Outlet
 This length shall be underdrain pipe outlet of specified size in all cases. To be measured and paid for at contract unit price for underdrain outlet.
 5" CONCRETE GUTTER FOR UNDERDRAIN OUTLET

REVISED	D
	I

STANDARD DRAINAGE DETAILS
 STANDARD UNDERDRAINS

APPROVED: *[Signature]* 9/200
 COUNTY ENGINEER
 DESIGN ENGINEER: *[Signature]* 9/1/89
 DATE

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* No. 57 aggregate - crushed material in shoulder. All other material in shoulder No. M6 fine aggregate.

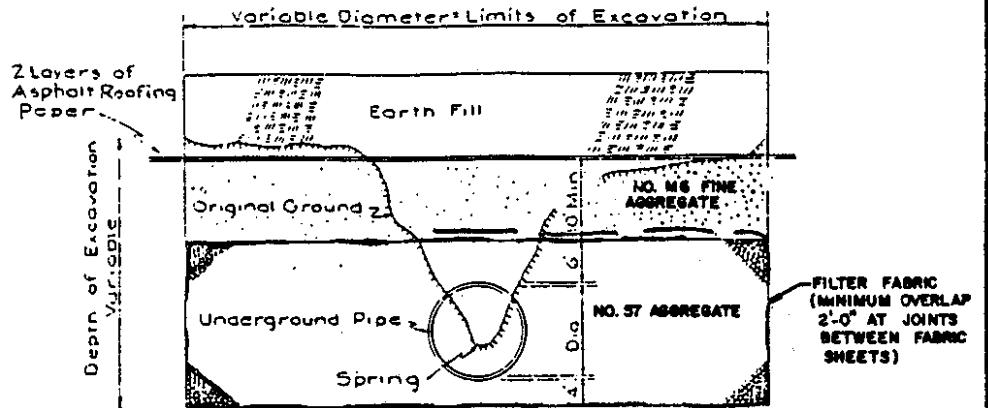
NOTE:
THE UNDERDRAIN TRENCH SHALL NOT BE CONSTRUCTED BEFORE THE COMPLETION OF THE TOP BASE COURSE.

REVISED	D	2

STANDARD DRAINAGE DETAILS
LONGITUDINAL UNDERDRAIN
FOR FLEXIBLE PAVING

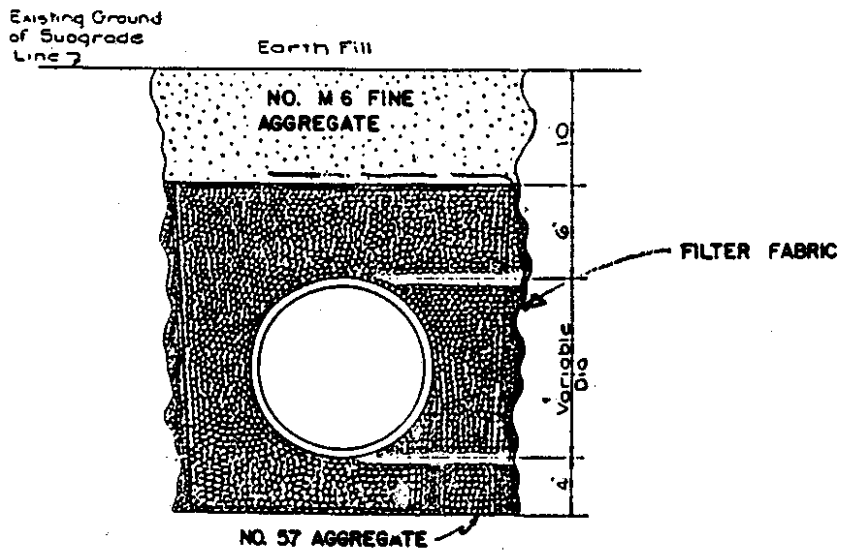
ANNE ARUNDEL
COUNTY
DEPARTMENT OF
PUBLIC WORKS

APPROVED: *[Signature]* 9/1/00
CHIEF ENGINEER
DESIGN ENGINEER
DATE

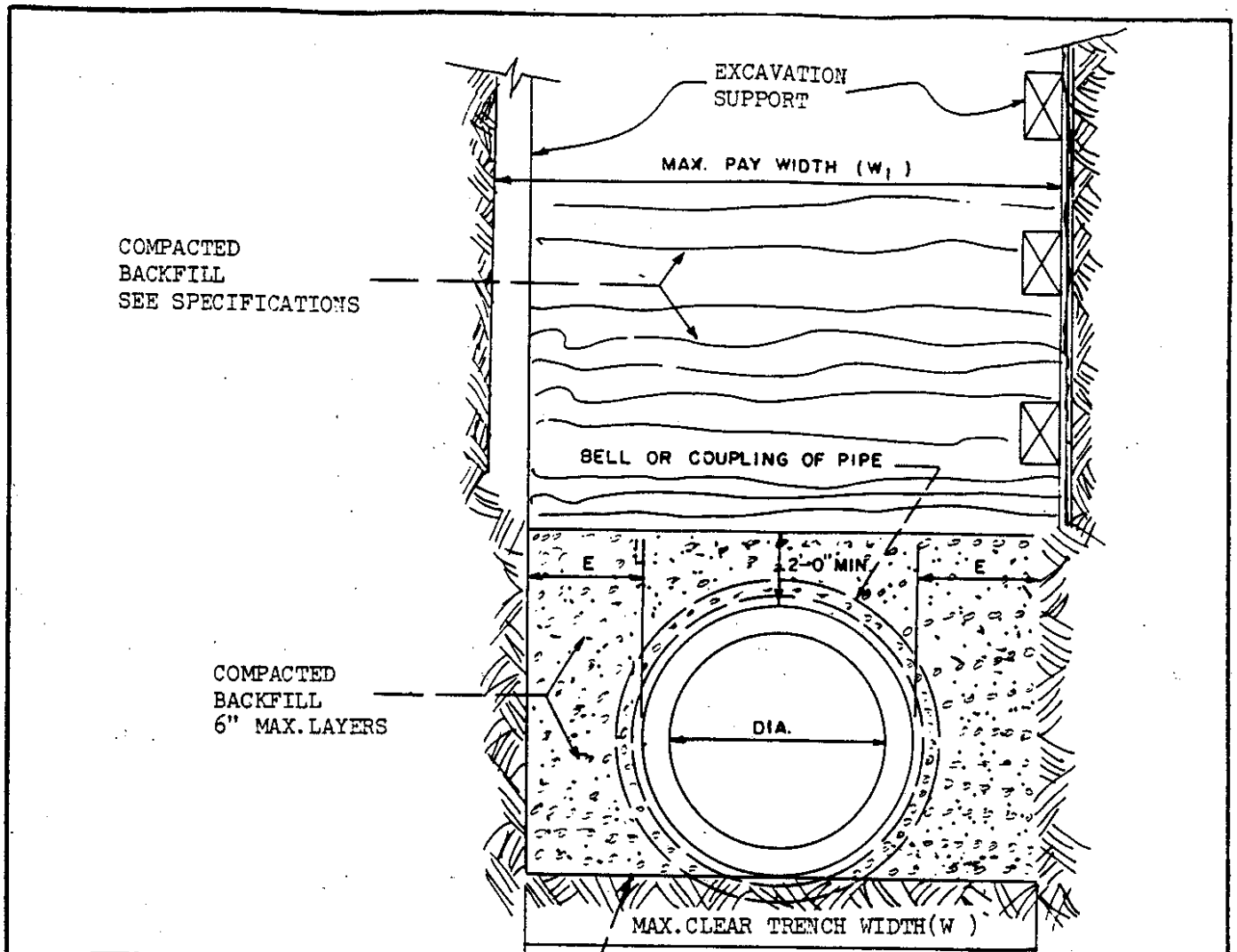


Circular Plan View not shown To be used where noted on Plans.

Two layers of three ply asphalt roofing paper Cost of paper and installation must be included in the Contract price for aggregate backfill for underdrain



ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS	APPROVED <i>[Signature]</i> CHIEF ENGINEER	STANDARD DRAINAGE DETAILS SPRING CONTROL METHOD & DETAIL	REVISED	D
	DESIGN ENGINEER DATE		_____	3
	_____		_____	_____
	_____		_____	_____
	_____		_____	_____



D	W ₁	E
12"	42"	9"
15"	48"	9"
18"	48"	9"
21"	48"	9"
24"	60"	9"
27"	60"	12"
30"	76"	12"
33"	76"	12"
36"	76"	12"
42"	88"	15"
48"	96"	15"
54"	104"	15"
60"	114"	15"
66"	126"	15"
72"	132"	15"
78"	144"	15"

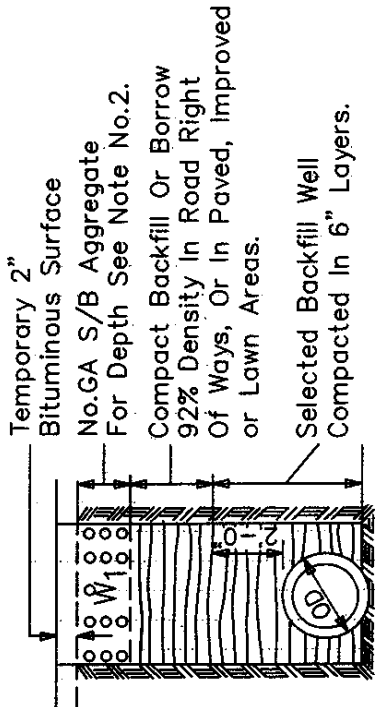
FIRM SUBGRADE FLAT BOTTOM TRENCH WITH EXCAVATED BELL HOLES.

- NOTES:
1. MAXIMUM CLEAR TRENCH WIDTH AND PAY WIDTH TO 1' OVER OUTSIDE DIAMETER OF PIPE SHALL BE 2E+ OUTSIDE DIAMETER OF PIPE.
 2. MAXIMUM PAY WIDTH FROM 1' ABOVE OUTSIDE DIAMETER OF PIPE TO EXISTING SURFACE OR FINISHED GRADE SHALL BE W₁.
 3. FOR PIPE ARCH AND ELLIPTICAL PIPE SPANS USE NEXT HIGHER TABLE VALUE FOR E. SEE DETAIL D/5 FOR W₁ VALUE.

ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS	APPROVED <i>[Signature]</i> CHIEF ENGINEER	STANDARD DRAINAGE DETAILS TRENCH DETAIL	REVISED	D 4
	DESIGN ENGINEER DATE			

NOTES:

1. Temporary surface to be maintained at contractors expense.
2. Aggregate quantities are based on: Depth-6" for Dirt Roads, Shoulders, Driveways, Sidewalks, etc. 12" for Paved Roads and Shoulders.
3. Weight-130 Lbs. Per Cubic Foot. width see detail D/4.
4. See detail D/6 for method of cutting & repairing openings in county roadways.



TRENCH

TRENCHES IN ROADS OTHER THAN STATE ROADS

SIZE	CIRCULAR			ARCH			ELLIPTICAL				
	W1	GA S/B		W1	GA S/B		W1	GA S/B			
		6"	12"		6"	12"		6"	12"		
12"	42"	0.114	0.228	14" x 9"	48"	0.130	0.260	23" x 14"	48"	0.130	0.260
15"	48"	0.130	0.260	17" x 13"	48"	0.130	0.260	30" x 19"	60"	0.162	0.324
18"	48"	0.130	0.260	21" x 15"	48"	0.130	0.260	34" x 22"	76"	0.205	0.411
21"	48"	0.130	0.260	24" x 18"	48"	0.130	0.260	38" x 24"	76"	0.205	0.411
24"	60"	1.162	0.324	28" x 20"	60"	0.162	0.324	42" x 27"	88"	0.238	0.476
27"	60"	0.162	0.324	35" x 24"	76"	0.205	0.411	45" x 29"	88"	0.238	0.476
30"	76"	0.205	0.411	42" x 29"	88"	0.238	0.476	53" x 34"	96"	0.260	0.520
33"	76"	0.205	0.411	49" x 33"	96"	0.260	0.520	60" x 38"	104"	0.281	0.562
36"	88"	0.238	0.476	57" x 38"	104"	0.281	0.562	68" x 43"	114"	0.308	0.617
42"	88"	0.238	0.476	64" x 43"	114"	0.308	0.617	76" x 48"	132"	0.357	0.715
48"	96"	0.260	0.520	71" x 47"	126"	0.341	0.682	83" x 53"	144"	0.390	0.780
54"	104"	0.281	0.562	77" x 52"	132"	0.357	0.715	91" x 58"	150"	0.406	0.812
60"	114"	0.308	0.617	83" x 57"	144"	0.390	0.780				
66"	126"	0.341	0.682								
72"	132"	0.357	0.715								

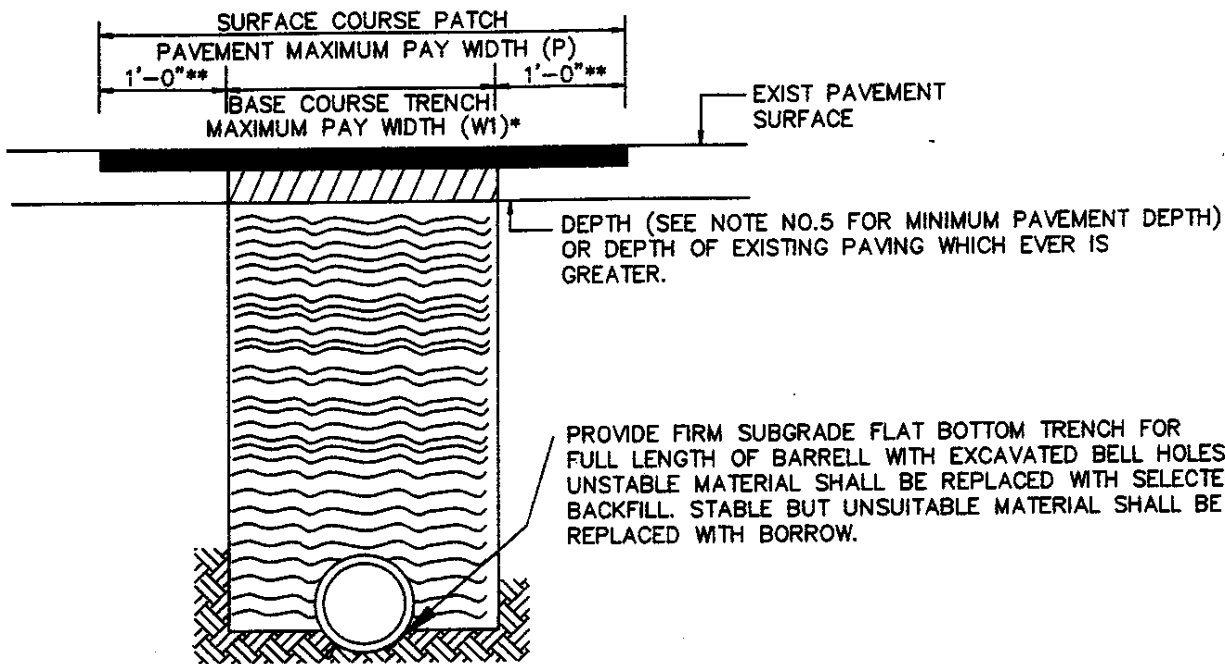
GA S/B = Graded Aggregate for Subbase in Tons per Linear Foot, For Estimating only.

APPROVED
Arnold Brown 5/17/99
 CHIEF ENGINEER
Patricia 4/12/99
 DESIGN ENGINEER
 DATE:

ANNE ARUNDEL
 COUNTY
 DEPARTMENT OF
 PUBLIC WORKS

REVISED

STANDARD DRAINAGE DETAILS
 TEMPORARY PAVEMENT DETAIL AND
 CRUSHER RUN STONE PAYMENT QUANTITIES



NOTES:

1. TEMPORARY SURFACE (EITHER GRADED AGGREGATE OR BITUMINOUS CONCRETE) TO BE INSTALLED AND MAINTAINED AT THE CONTRACTORS EXPENSE.
2. CONTRACTOR RESPONSIBLE FOR TRENCH SUPPORT.
3. AGGREGATE SUBBASE SHALL BE CLEANED AND THOROUGHLY COMPACTED PRIOR TO PLACING PERMANENT PAVEMENT MATERIAL.
4. TRENCH SUPPORT MATERIAL TO BE REMOVED IN SUCH A MANNER THAT BACKFILL MATERIAL FOR FIRST TWO FEET ABOVE PIPE WILL BE COMPACTED AGAINST UNDISTURBED EARTH.
5. MINIMUM PAVED QUANTIES BASED ON:
DEPTH 1 1/2" BITUMINOUS CONCRETE SURFACE COURSE (SC) AND 5" BITUMINOUS CONCRETE BASE COURSE (BF PLACED IN TWO LAYERS)
WEIGHT 150 LBS. PER CUBIC FOOT
- * 6. FOR COMPACTION AND AGGREGATE DETAILS AND TRENCH PAY WIDTHS QUANTITIES SEE STD. PLATES D/4 AND D/5 RESPECTIVELY.
- ** 7. AREA TO BE MILLED TO A DEPTH OF 1 1/2" TO ACCOMODATE PLACEMENT OF THE BITUMINOUS CONCRETE SURFACE COURSE.
8. SURFACE COURSE PATCH PAVING SHALL EXTEND A MINIMUM DISTANCE OF 1'-0" BEYOND ANY DISTURBED SURFACE PAVEMENT INDEPENDENT OF THE SURFACE COURSE PATCH PAVEMENT MAXIMUM PAY WIDTH.
9. REQUIRED THAT FLOWABLE FILL BE USED IN TRENCHES IN ROADS CLASSIFIED AS ARTERIAL OR ANY ROAD WHOSE PAVEMENT IS CUT WITHIN FIVE (5) YEARS OF THE ROAD BEING CONSTRUCTED OR RESURFACED SEE PLATE D/6A.

DETAIL OF CUTTING & REPLACING PAVEMENT IN ROADWAYS OTHER THAN STATE ROADS
(BITUMINOUS CONCRETE FOR SURFACE COURSE AND BASE COURSE IN TONS PER LINEAR FOOT ARE FOR ESTIMATING ONLY)

CIRCULAR				ARCH				ELLIPTICAL						
SIZE	P	BIT CONC. SURF. COURSE	W1	BIT CONC. BASE COURSE	SIZE	P	BIT CONC. SURF. COURSE	W1	BIT CONC. BASE COURSE	SIZE	P	BIT CONC. SURF. COURSE	W1	BIT CONC. BASE COURSE
		TONS PER LIN.FT.		TONS PER LIN.FT.			TONS PER LIN.FT.					TONS PER LIN.FT.		TONS PER LIN.FT.
12"	66"	0.051	42"	0.108	14" x 9"	72"	0.056	48"	0.123					
15"	72"	0.056	48"	0.123	17" x 13"	72"	0.056	48"	0.123					
18"	72"	0.056	48"	0.123	21" x 15"	72"	0.056	48"	0.123	23" x 14"	72"	0.056	48"	0.123
21"	72"	0.056	48"	0.123	24" x 18"	72"	0.056	60"	0.123					
24"	84"	0.065	60"	0.154	28" x 20"	84"	0.065	60"	0.154	30" x 19"	84"	0.065	60"	0.154
27"	84"	0.065	60"	0.154						34" x 22"	100"	0.077	76"	0.195
30"	100"	0.077	76"	0.195	35" x 24"	100"	0.077	76"	0.195	38" x 24"	100"	0.077	76"	0.195
33"	100"	0.077	76"	0.195						42" x 27"	112"	0.086	88"	0.226
36"	100"	0.077	76"	0.195	42" x 29"	112"	0.086	88"	0.226	45" x 29"	112"	0.086	88"	0.226
42"	112"	0.086	88"	0.226	49" x 33"	120"	0.093	96"	0.247	53" x 34"	120"	0.093	96"	0.247
48"	120"	0.093	96"	0.247	57" x 38"	128"	0.099	104"	0.267	60" x 38"	128"	0.099	104"	0.267
54"	128"	0.099	104"	0.267	64" x 43"	138"	0.106	114"	0.293	68" x 43"	138"	0.106	114"	0.293
60"	138"	0.106	114"	0.293	71" x 47"	150"	0.116	126"	0.324	76" x 48"	156"	0.120	132"	0.339
66"	150"	0.116	126"	0.324	77" x 52"	156"	0.120	132"	0.339	83" x 53"	168"	0.129	144"	0.370
72"	156"	0.120	132"	0.339	83" x 57"	168"	0.129	144"	0.370	91" x 58"	174"	0.134	150"	0.386

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APPROVED
Donald Brown 5/17/99
CHIEF ENGINEER

Bob C... 4/12/99
DESIGN ENGINEER

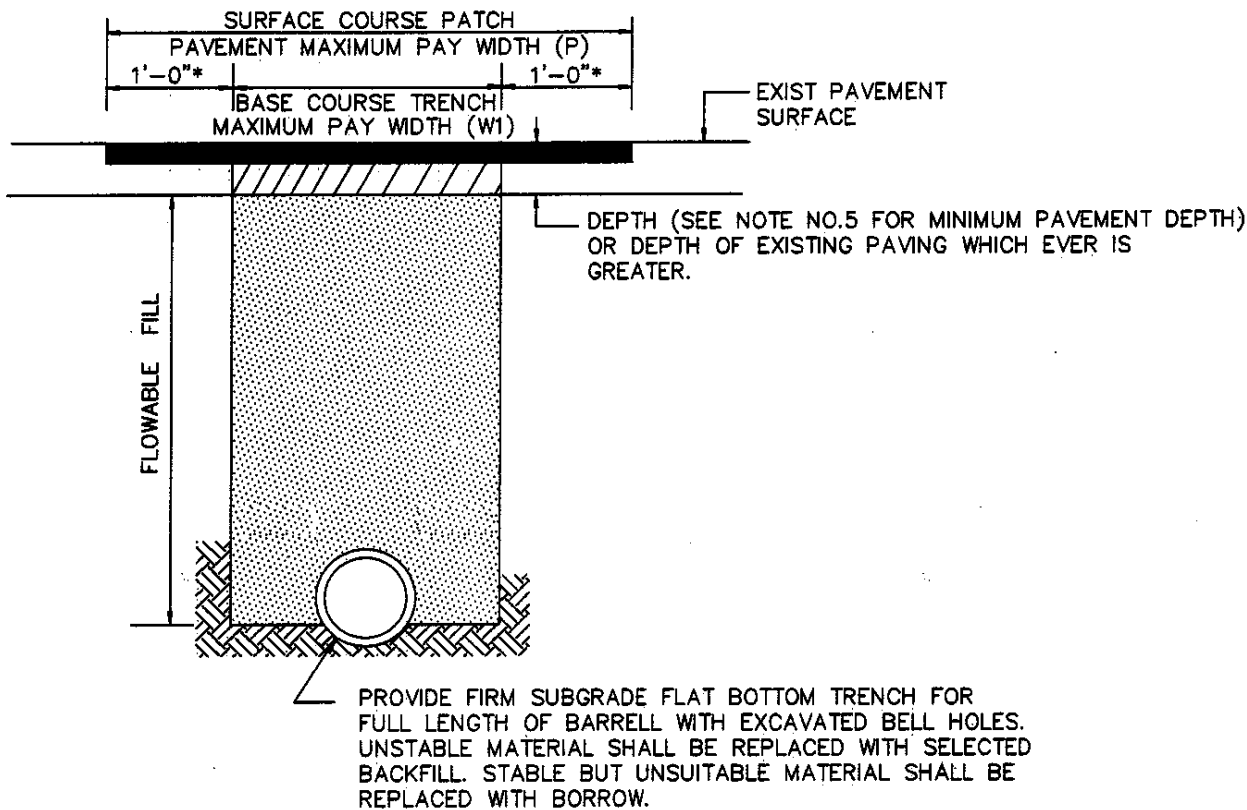
DATE:

STANDARD DRAINAGE DETAILS

PAYMENT QUANTITIES FOR REPAVING TRENCHES

REVISED

D
6



NOTES:

1. TEMPORARY SURFACE(EITHER GRADED AGGREGATE OR BITUMINOUS CONCRETE) TO BE INSTALLED AND MAINTAINED AT THE CONTRACTORS EXPENSE.
2. CONTRACTOR RESPONSIBLE FOR TRENCH SUPPORT.
3. PRIOR TO PLACEMENT OF THE FLOWABLE FILL THE CONTRACTOR SHALL PROVIDE POSITIVE CONTAINMENT OF THE FLOWABLE FILL MATERIAL TO PREVENT FLOW BEYOND THE DESIRED PLACEMENT LOCATION.
4. FOR PAY WIDTH QUANTITIES SEE STANDARD PLATE D/6
5. MINIMUM PAVED QUANTITIES BASED ON:
 DEPTH 1 1/2" BITUMINOUS CONCRETE SURFACE COURSE (SC) AND 5" BITUMINOUS CONCRETE BASE COURSE (BF PLACED IN TWO LAYERS)
 WEIGHT 150 LBS. PER CUBIC FOOT
- * 6. AREA TO BE MILLED TO A DEPTH OF 1 1/2" TO ACCOMODATE PLACEMENT OF THE BITUMINOUS CONCRETE SURFACE COURSE.
7. SURFACE COURSE PATCH PAVING SHALL EXTEND A MINIMUM DISTANCE OF 1'-0" BEYOND ANY DISTURBED SURFACE PAVEMENT INDEPENDENT OF THE SURFACE COURSE PATCH PAVEMENT MAXIMUM PAY WIDTH.
8. REQUIRED THAT FLOWABLE FILL BE USED IN TRENCHES IN ROADS CLASSIFIED AS ARTERIAL OR ANY ROAD WHOSE PAVEMENT IS CUT WITHIN FIVE YEARS OF THE ROAD BEING CONSTRUCTED OR RESURFACED

ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS	APPROVED CHIEF ENGINEER DATE: 4/12/99 DESIGN ENGINEER	STANDARD DRAINAGE DETAILS TRENCH DETAIL FOR FLOWABLE FILL	REVISED _____ _____ _____	D <hr style="width: 50%; margin: 0 auto;"/> 6 A
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FIGURES SHOWN IN TABLE ARE MEASURED FROM INVERT OF PIPE TO GRADE

Pipe Dia.	Class I		Class II		Class III		Class IV		Class V	
	Min. Depth	Max. Depth	Min. Depth	Max. Depth	Min. Depth	Max. Depth	Min. Depth	Max. Depth	Min. Depth	Max. Depth
12"			4	7	3	14	3			
14"										
15"			4	11	3	22	3			
16"										
18"			4	12	3	23	3			
20"										
21"			4	12	3	24	3			
24"			5	13	4	25	4			
27"			5	13	4	20	4			
30"			5	13	4	21	4			
36"			6	9	5	14	5	22	5	
42"			6	9	5	14	5	21	5	
48"			6	10	6	15	6	22	6	
54"			6	11	6	16	6	23	6	
60"			7	12	7	17	7	23	7	
66"	8	10	7	13	7	17	7	24	7	
72"	8	11	8	13	8	17	8	25	8	

PIPE SHALL NOT BE USED WHERE THERE ARE BLANK SPACES IN THE TABLE.

REVIS	D
	7

STANDARD DRAINAGE DETAIL
PERMISSIBLE DEPTH TABLE
CONCRETE PIPE

APPROVED

 CHIEF ENGINEER

 DESIGN ENGINEER
 DATE _____

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COUNTY
DEPARTMENT OF
PUBLIC WORKS

BASIC TABLE

**DEAD LOAD AT 110 LBS. PER CU. FT. AND $K_p = 0.130$, ORDINARY MAXIMUM FOR CLAY
LIVE LOAD $H = 20$ LOADING WITHOUT IMPACT**

SIZE PIPE	TRENCH WIDTH	DEPTH OF COVER																	
		1 FT.		2 FT.		3 FT.		4 FT.		5 FT.		6 FT.							
		DEAD	LIVE	DEAD	LIVE	DEAD	LIVE	DEAD	LIVE	DEAD	LIVE	DEAD	LIVE						
12"	3.0'	313	3760	613	1460	881	788	1138	448	1287	320	1534	224						
15"	3.0'	359	4058	613	1946	881	1088	1138	666	1287	448	1534	324						
18"	3.42'	393	4146	693	2208	1014	1258	1309	778	1566	534	1823	374						
21"	3.70'	426	4380	771	2384	1134	1376	1436	858	1754	582	2026	416						
24"	4.0'	518	4476	827	2586	1214	1524	1566	960	1901	650	2218	464						
27"	4.82'	540	4576	1035	2748	1477	1648	1919	1050	2323	720	2702	512						
30"	5.08'	607	4678	1176	2896	1577	1770	2046	1136	2501	784	2984	560						
36"	5.67'	737	4784	1428	3126	1748	1984	2331	1296	2825	906	3284	650						
42"	6.75'	799	4828	1597	3296	2155	2170	2757	1450	3408	1014	4010	768						
48"	7.33'	862	4988	1723	3440	2277	2320	3034	1578	3726	1136	4555	832						
54"	7.92'	944	5088	1788	3520	2481	2442	3240	1690	4067	1232	4825	916						
60"	8.5'	998	5196	1951	3584	2662	2538	3576	1792	4371	1306	5150	992						
66"	9.08'	1059	5302	2056	3632	2859	2608	3766	1878	4674	1392	5581	1050						
72"	9.67'	1732	165	2208	3670	3084	2666	4009	1930	4934	1462	6064	1104						
12"	3.0'	1732	165	2208	2792	2792	2792	3152	3152	3386	3386	3564	3564						
15"	3.0'	1732	240	2208	2792	2792	2792	3152	3152	3386	3386	3564	3564						
18"	3.42'	2028	278	2631	3337	3337	3337	3761	3761	4223	4223	4467	4467						
21"	3.70'	2268	314	2948	3780	3780	3780	4385	4385	4805	4805	5141	5141						
24"	4.0'	2464	346	3256	4224	4224	4224	4928	4928	5456	5456	5808	5808						
27"	4.82'	3080	384	4040	5429	5429	5429	6565	6565	7322	7322	7903	7903						
30"	5.08'	3325	420	4272	5912	5912	5912	6821	6821	7844	7844	8526	8526						
36"	5.67'	3708	544	5050	6816	6816	6816	8122	8122	9182	9182	10135	10135						
42"	6.75'	4511	560	6165	8521	8521	8521	10375	10375	11878	11878	13281	13281						
48"	7.33'	5087	628	6803	9465	9465	9465	11653	11653	13427	13427	15083	15083						
54"	7.92'	5514	694	7444	10339	10339	10339	12890	12890	15302	15302	16543	16543						
60"	8.50'	6000	752	8106	11127	11127	11127	14067	14067	16292	16292	18438	18438						
66"	9.08'	6443	890	8712	12161	12161	12161	15246	15246	17887	17887	20147	20147						
72"	9.67'	6835	864	11615	13157	13157	13157	16549	16549	19221	19221	21894	21894						

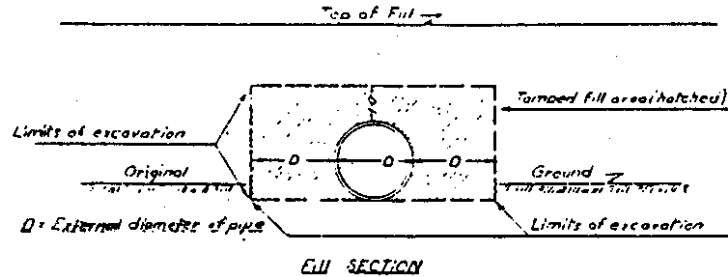
D 8

REVISED

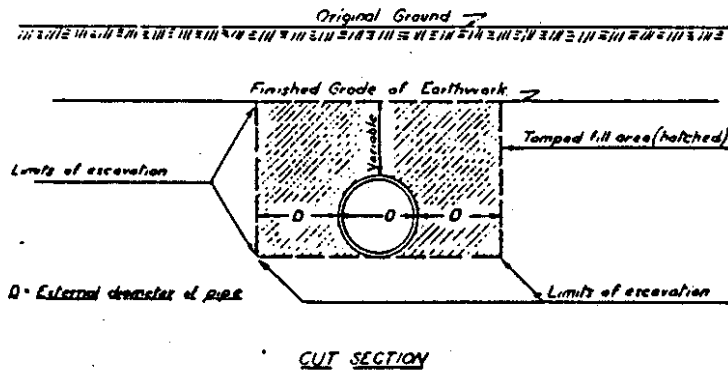
**STANDARD DRAINAGE DETAIL
COMPUTED LOADS ON CONDUITS
IN POUNDS PER LINEAR FOOT**

ROVER
CHIEF ENGINEER
DESIGN ENGINEER
DATE

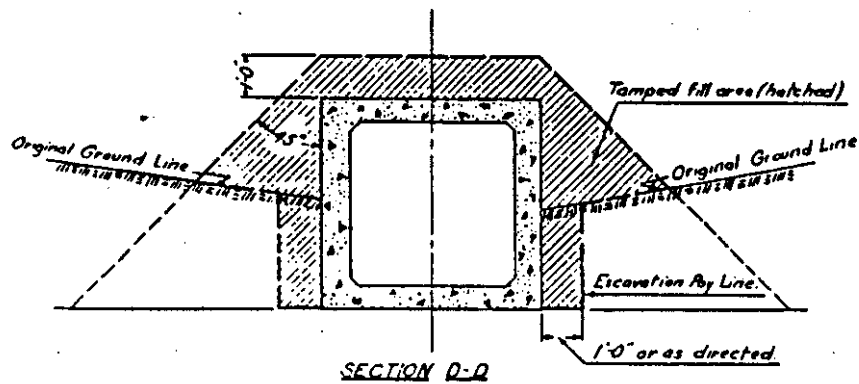
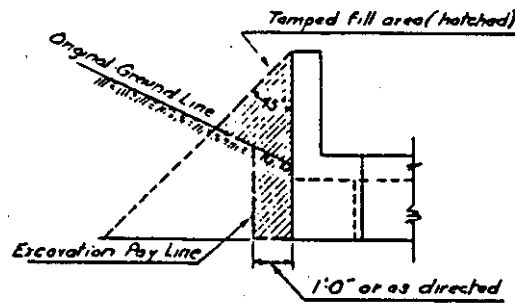
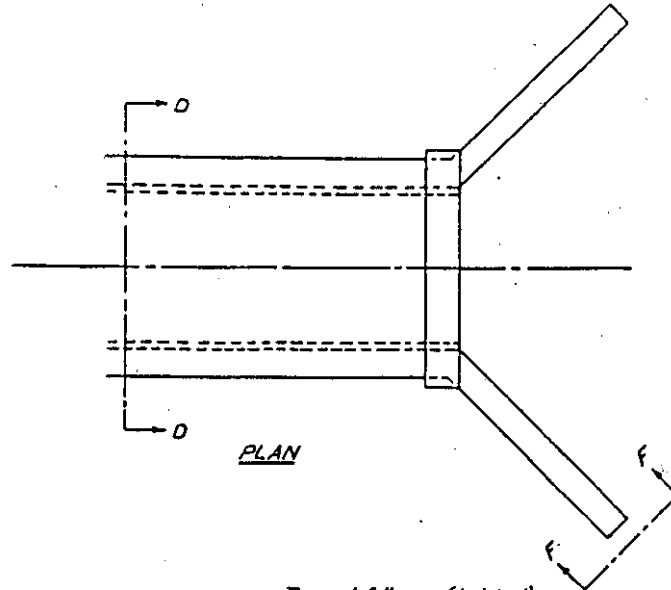
ANNE ARUNDEL
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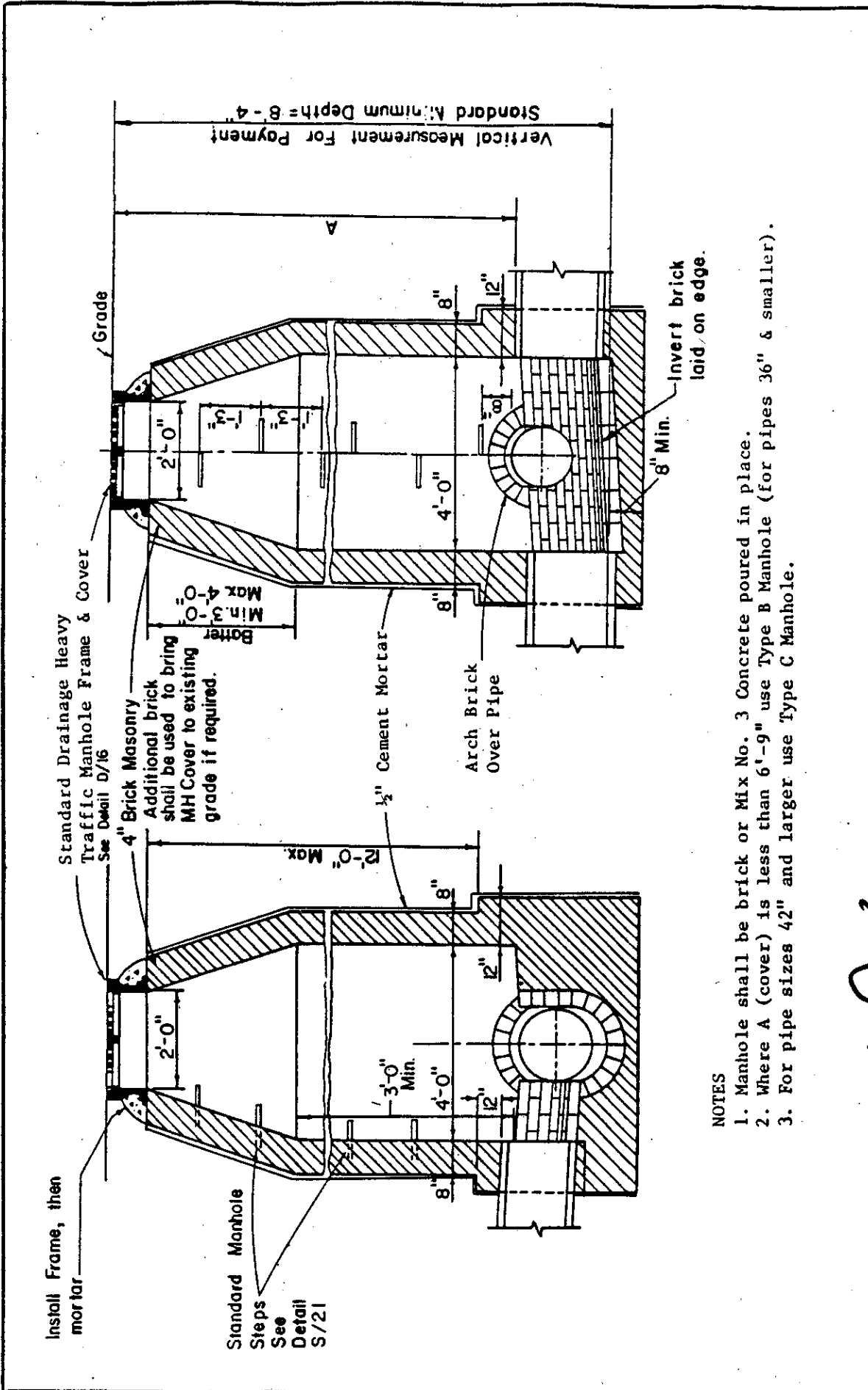
IN THE CASE OF PIPE, FOR PIPE CULVERTS, THE YARDAGE OF "TAMPED FILL" TO BE INCLUDED, SHALL BE BOUNDED BY VERTICAL PLANES, EQUI-DISTANT FROM THE CENTER LINE OF THE PIPE AND SEPARATED BY A DISTANCE OF NOT MORE THAN THREE TIMES THE EXTERNAL DIAMETER OF THE BODY OF THE PIPE. THE UPPER PAY LIMIT, IN FILL SECTIONS, SHALL CONSIST OF A HORIZONTAL PLANE ONE FOOT ABOVE THE TOP OF THE PIPE. IN THE EVENT THAT THE PIPE IS IN A CUT SECTION, THE PAY LIMITS SHALL BE EXTENDED TO A HORIZONTAL PLANE AT THE ELEVATION OF THE FINISHED GRADE OF THE EARTHWORK. IN EITHER CASE A DEDUCTION SHALL BE MADE FOR THE AREA OCCUPIED BY THE PIPE.



ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS	APPROVED <i>[Signature]</i> CHIEF ENGINEER	STANDARD DRAINAGE DETAILS STANDARD LIMITS OF TAMPED FILL OVER PIPE CULVERTS	REVISED	D 9
	DESIGN ENGINEER <i>[Signature]</i>		_____	
	DATE		_____	
	_____		_____	
	_____		_____	



ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS	APPROVER <i>William J. [Signature]</i> 4/7/88	STANDARD DRAINAGE DETAILS STANDARD LIMITS OF TAMPED FILL OVER BOX CULVERTS	REVISED	0 10
	CHIEF ENGINEER DESIGN ENGINEER <i>Robert [Signature]</i> 9/6/88		_____	
	DATE		_____	
	_____		_____	



NOTES

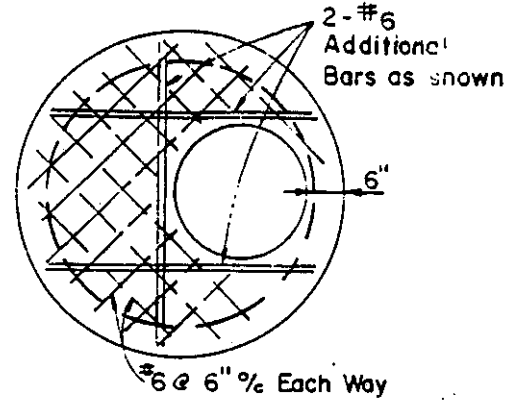
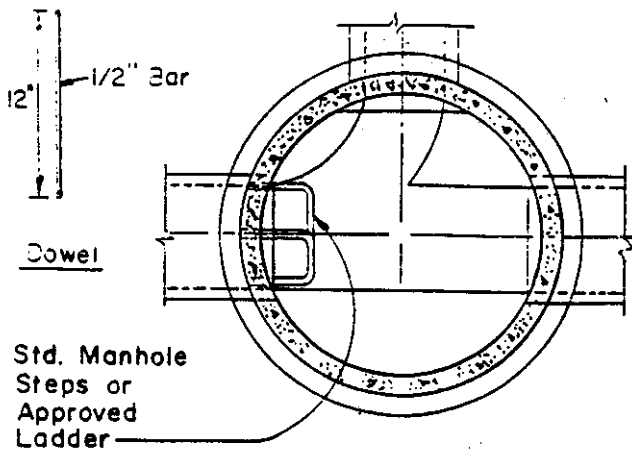
1. Manhole shall be brick or Mix No. 3 Concrete poured in place.
2. Where A (cover) is less than 6'-9" use Type B Manhole (for pipes 36" & smaller).
3. For pipe sizes 42" and larger use Type C Manhole.

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STANDARD DRAINAGE DETAILS
TYPE A-I MANHOLE
(FOR NORMAL DEPTHS)

APPROVED: *[Signature]* 9/17/08
CHIEF ENGINEER
DESIGN ENGINEER: *[Signature]*
DATE

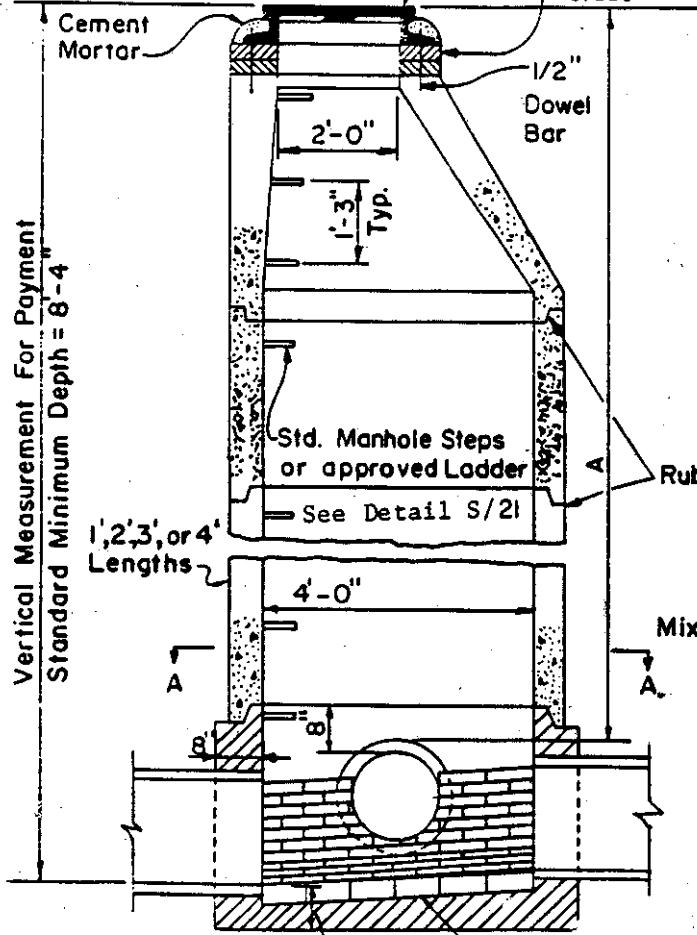
ANNE ARUNDEL
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DEPARTMENT OF
PUBLIC WORKS



SECTION A-A

Standard Drainage Heavy Traffic Manhole Frame & Cover SEE DETAIL D/16

4" Min., 12" Max. Brick Masonry

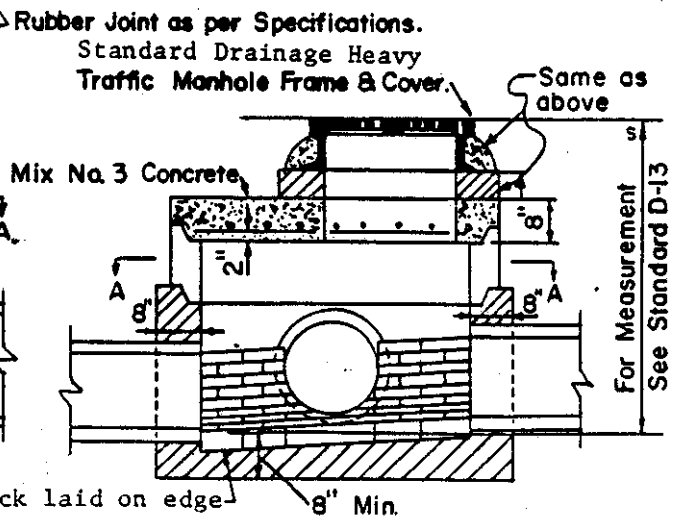


SECTIONAL ELEVATION

TYPE A-2

SLAB REINFORCING TYPE A-3

1. Precast Reinf. Conc. Manhole shall be furnished in accordance with ASTM Designation C478.
2. Manhole bottom shall be brick inverts only.
3. For pipe sizes 42" and larger use Type C Manhole.
4. Where A (cover) is more than 6'-9" use Type A-2 Manhole; 6'-9" or less, use Type A-3 Manhole.
5. Other types of Precast Manholes may be used if approved by D.P.W.



SECTIONAL ELEVATION

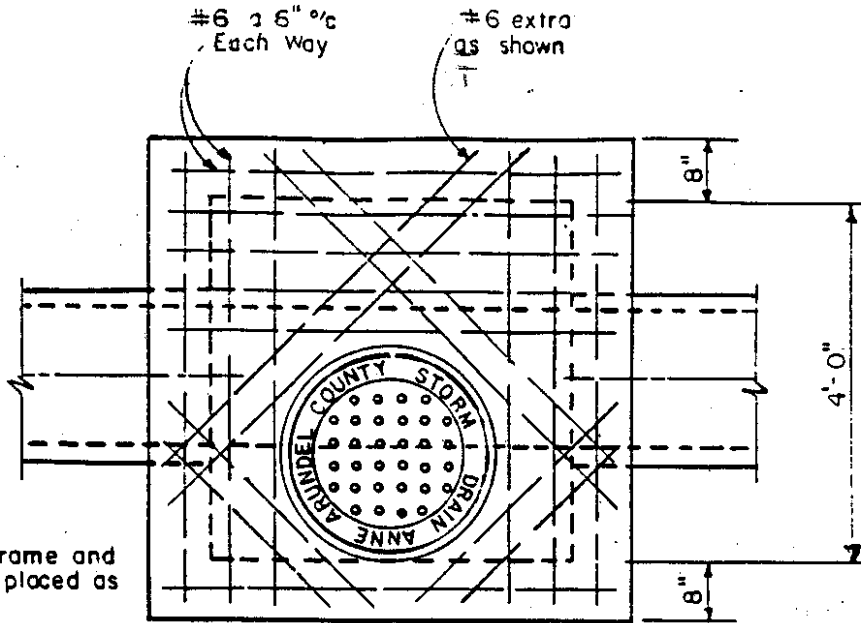
TYPE A-3

ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS

APPROVED
 CHIEF ENGINEER
 DESIGN ENGINEER
 DATE

STANDARD DRAINAGE DETAILS
 TYPE A-2 & A-3
 PRECAST MANHOLE

REVISED	D
6/9/10	12



Note:
Manhole frame and cover to be placed as shown.

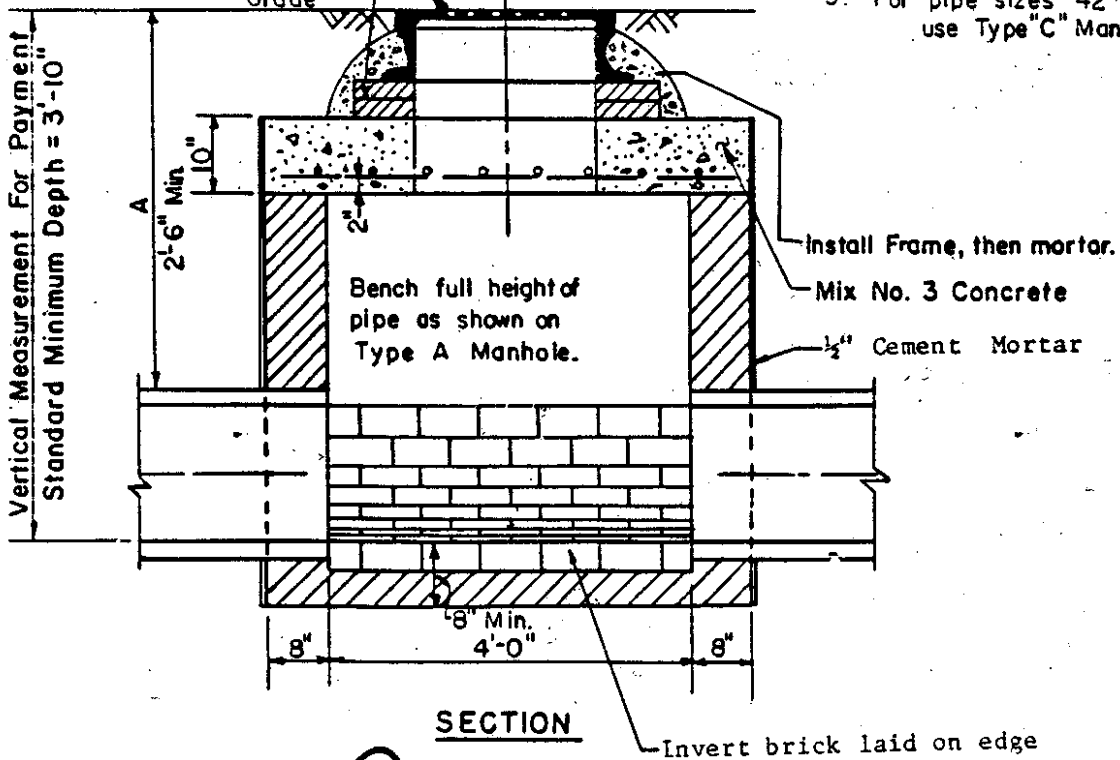
PLAN

4" Brick masonry. Additional brick shall be used to bring MH Cover to existing grade if required. Max. Depth = 12"

Standard Drainage Heavy Traffic Manhole Frame and Cover. See Detail D/16

Notes :

1. Walls and base slab shall be brick.
2. Where A(cover) is greater than 6'-9" use Type "A" Manhole.
3. For pipe sizes 42" and larger use Type "C" Manhole.



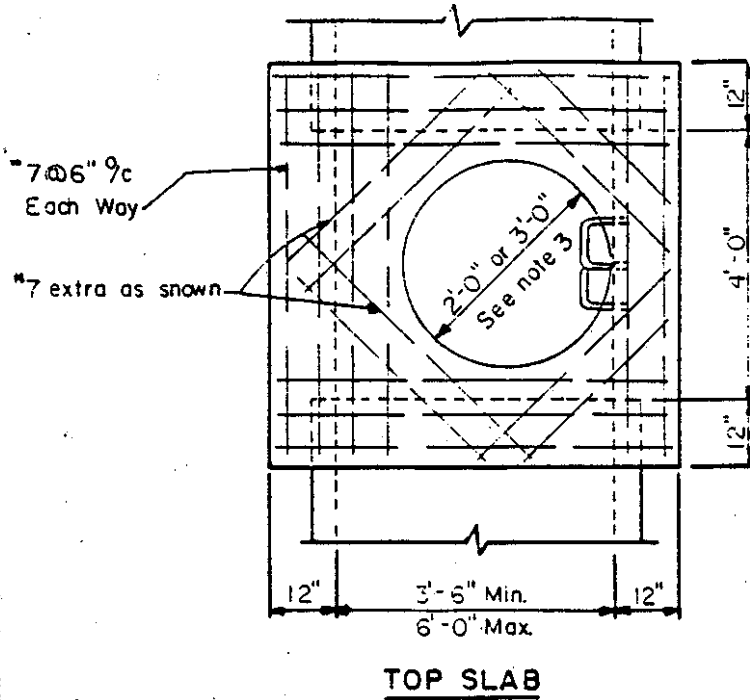
SECTION

ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS

APPROVED
[Signature]
CHIEF ENGINEER
DATE

STANDARD DRAINAGE DETAILS
TYPE "B" MANHOLE
(SHALLOW)

REVISED	D
6/91 <i>[Signature]</i>	
	13



BASIS OF PAYMENT

Storm Drain Manhole Type "C" shall be paid for on the basis of the Lump Sum Price Bid for each size Manhole complete and in place. No additional Payment will be made for linear feet of Vertical Depth.

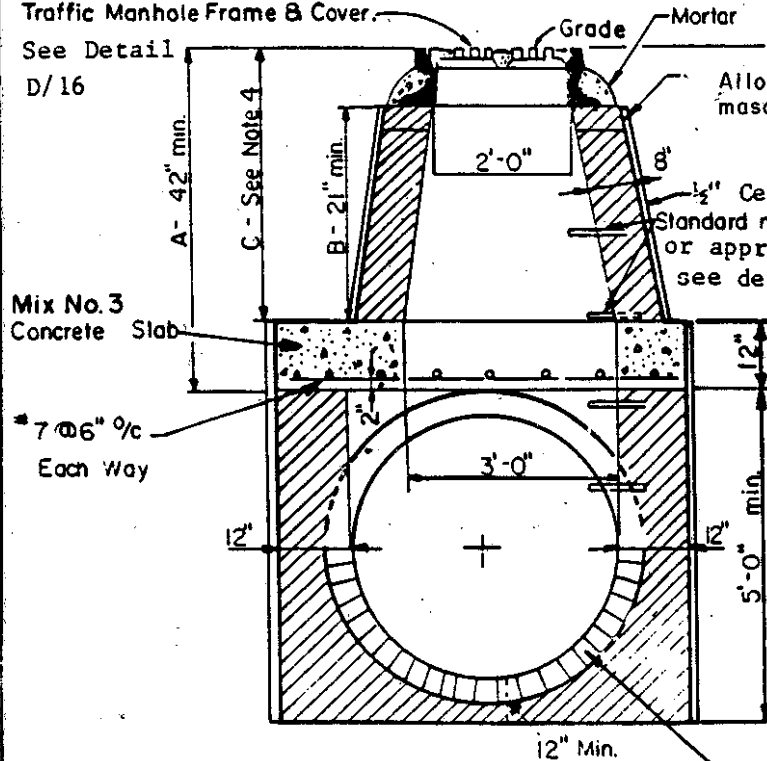
NOTES

1. Walls and base slab shall be brick or Mix No. 3 concrete poured in place.
2. For pipes 36" or smaller use Type "A" or Type "B" Manhole. Use Type "B" where "A" cover is less than 6'9".
3. Where "A" is less than 3'-6" use Alternate Manhole Stack.
4. Where "C" is less than 12' use 8" wall, where greater than 12' use 12" wall.

Standard Drainage Heavy

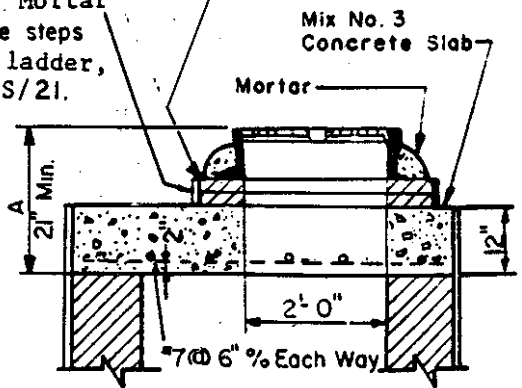
Traffic Manhole Frame & Cover

See Detail D/16



Allowable grade adjustment with brick masonry - 4" MIN, 12" MAX.

1/2" Cement Mortar
Standard manhole steps or approved ladder, see detail S/21.



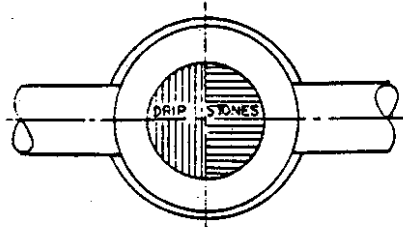
ALTERNATE MANHOLE STACK

(See Note 3)

SECTION

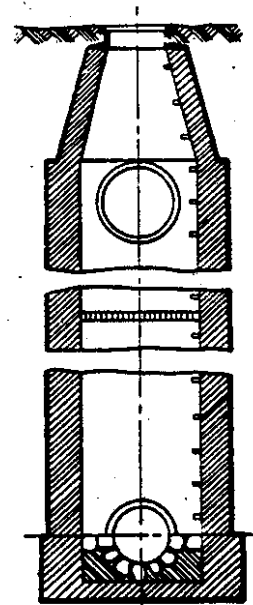
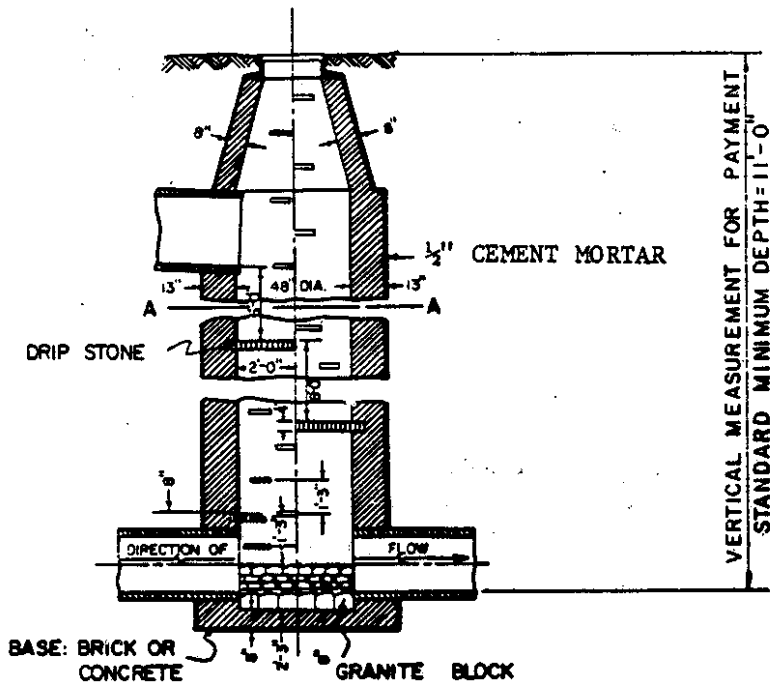
Invert brick laid on edge

<p>ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS</p>	<p>APPROVED 9/17/00 CHIEF ENGINEER DESIGN ENGINEER</p>	<p>STANDARD DRAINAGE DETAILS TYPE "C" MANHOLE 42" & LARGER PIPES</p>	<p>REVISED 6/95 D 14</p>
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SECTION A-A

GRANITE DRIP STONES ARE PREFERABLE BUT IF NOT AVAILABLE SOME OTHER APPROVED TYPE MAY BE USED.




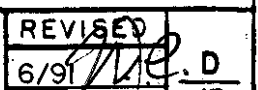
NOTE: LOCATION OF DRIP STONES MAY BE ADJUSTED TO MEET THE REQUIREMENTS OF EACH BASE BUT NORMALLY SHALL BE 6' APART

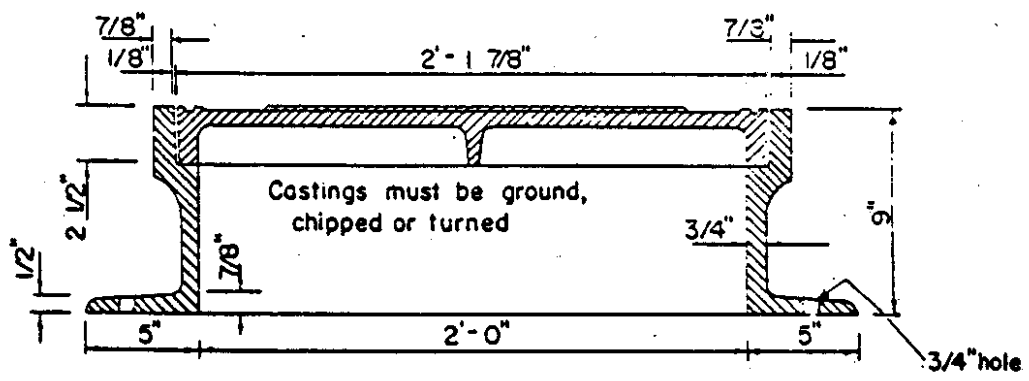
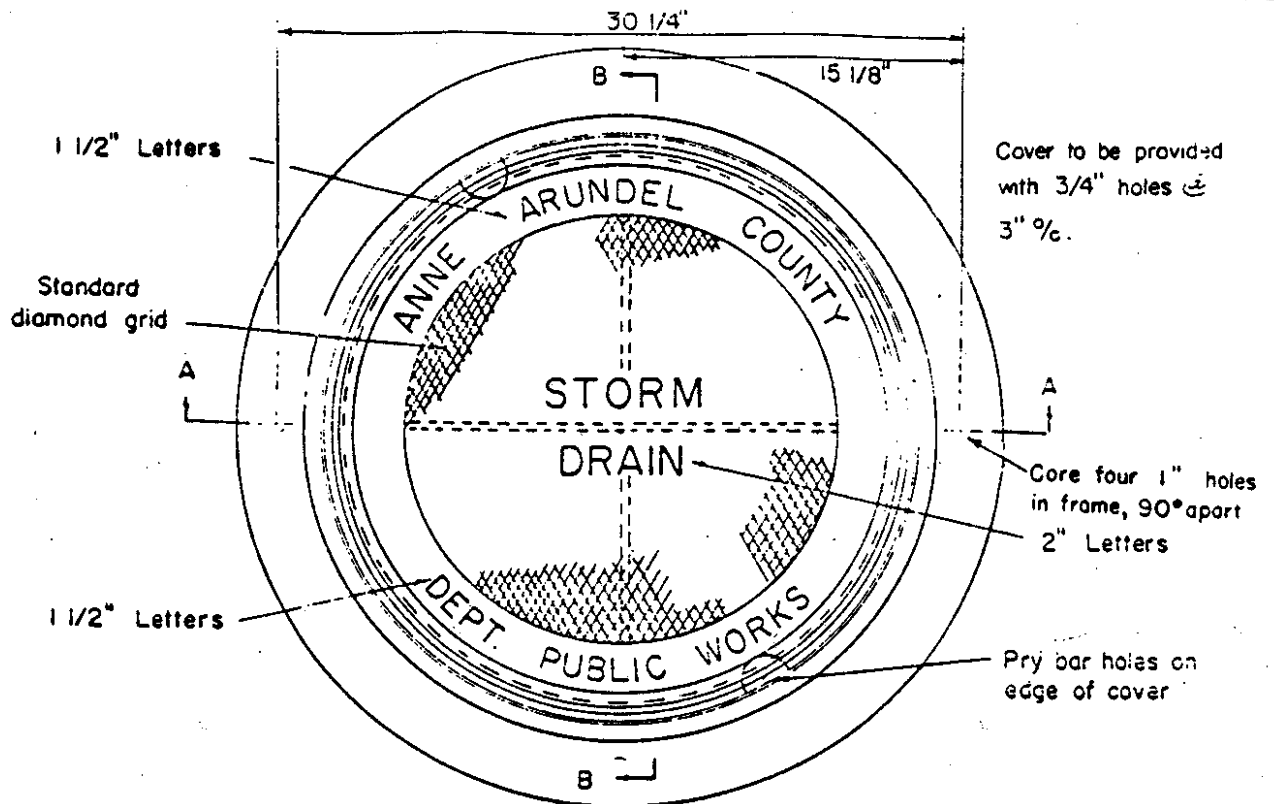
BASE THICKNESS
8" WALL - 12" BASE
13" WALL - 16" BASE

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

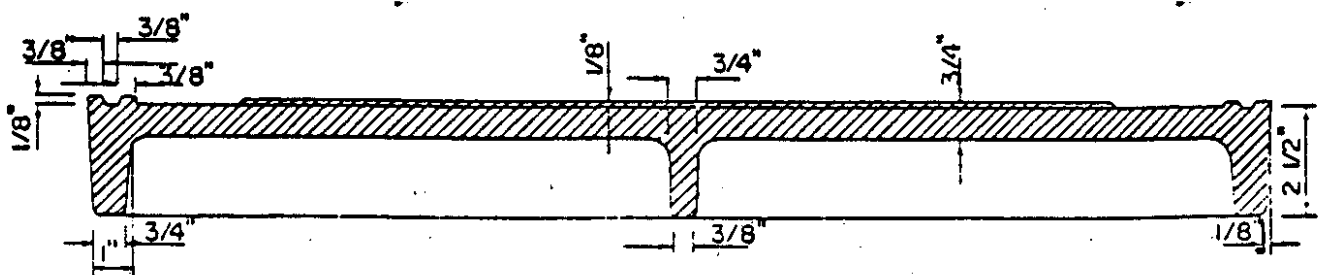
NOTES

1. For details not shown on this sheet see Std. Detail D-11.

ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS	APPROVED  CHIEF ENGINEER DESIGN ENGINEER DATE	STANDARD DRAINAGE DETAILS STANDARD DROP MANHOLE	REVISED 6/91  D 15
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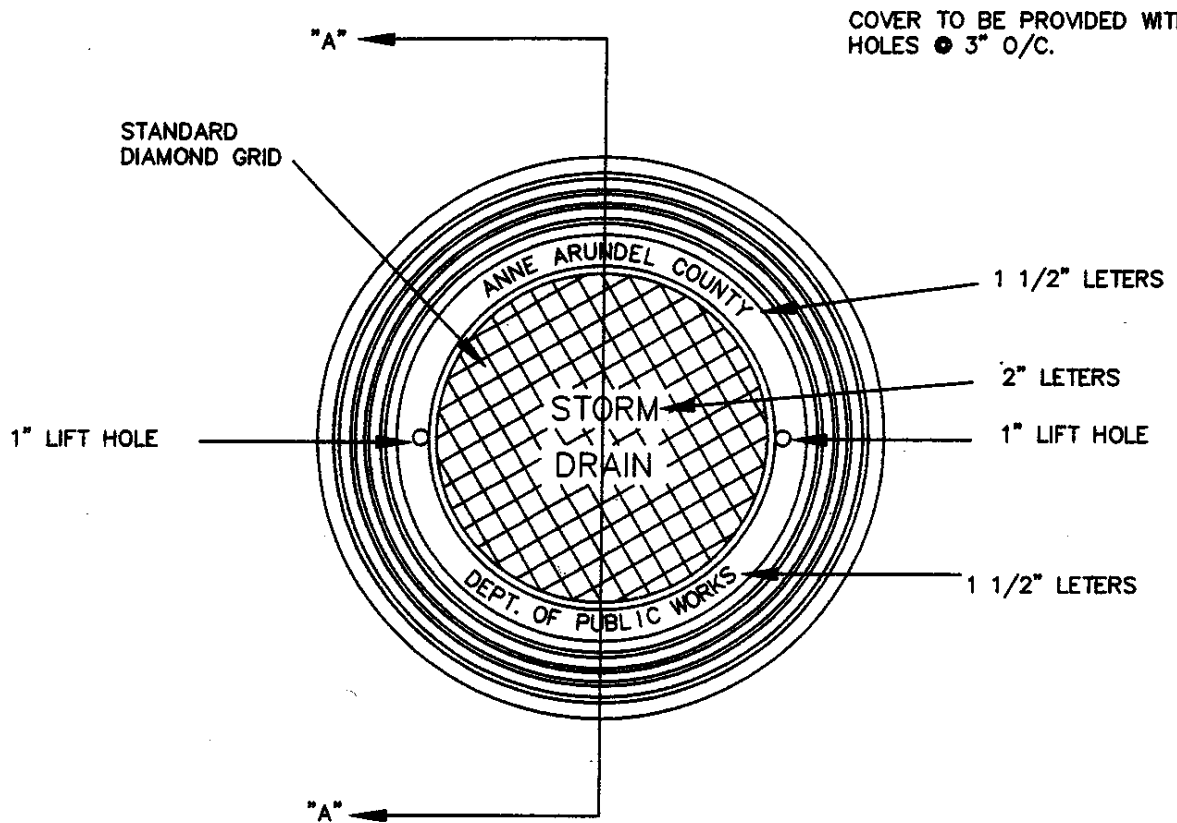
SECTION "A-A"



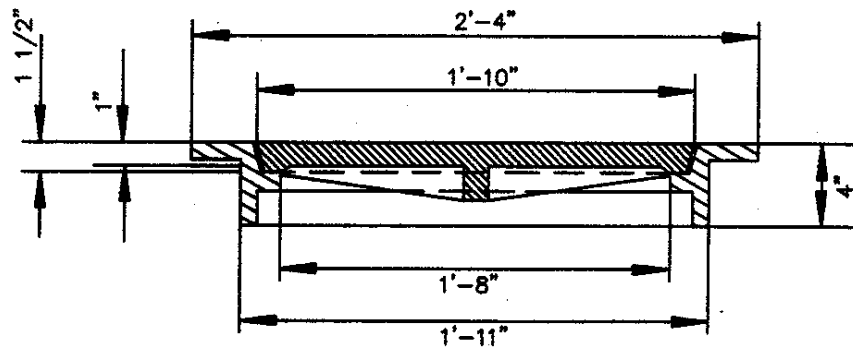
SECTION "B-B"

TOTAL WT. 420 LBS.

ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS	 CHIEF ENGINEER	STANDARD DRAINAGE DETAILS HEAVY TRAFFIC MANHOLE FRAME AND COVER	REVISED	D 16
	 DESIGN ENGINEER			
DATE				



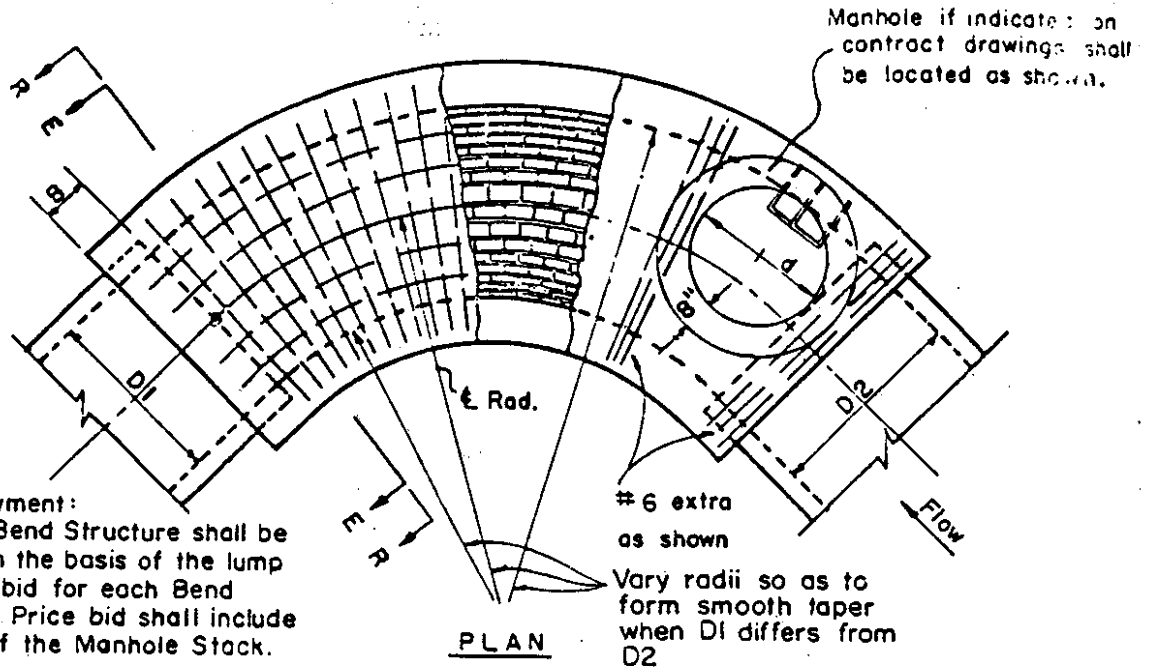
COVER TO BE PROVIDED WITH 3/4" HOLES @ 3" O/C.



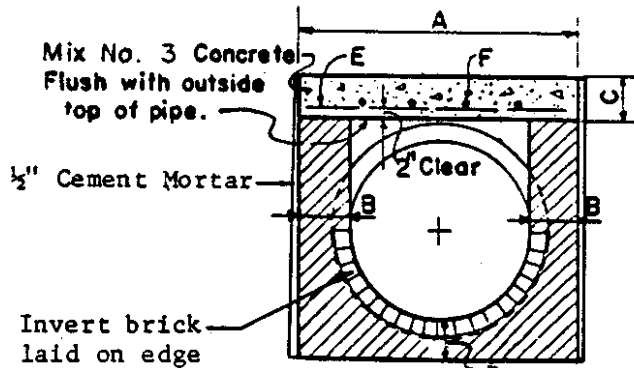
SECTION "A"-"A"

WEIGHT 185 LBS.

ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS	APPROVED <i>Ronald Brown</i> 5/17/99 CHIEF ENGINEER DESIGN ENGINEER DATE:	STANDARD DRAINAGE DETAILS SIDEWALK FRAME AND COVER	REVISED 	D 17
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Basis of Payment:
 Standard Bend Structure shall be paid for on the basis of the lump sum price bid for each Bend Structure. Price bid shall include the cost of the Manhole Stack.

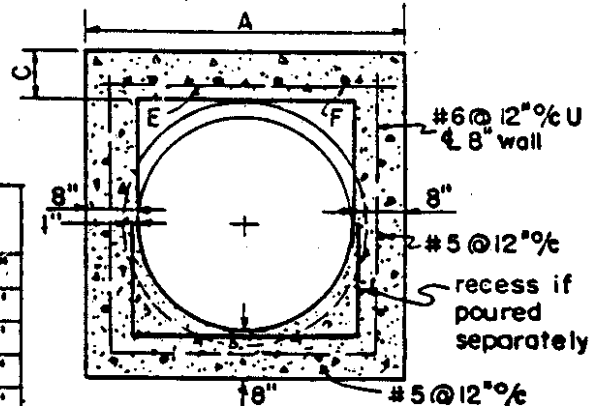


- NOTES:**
1. Material Walls and base shall be brick or Mix No. 3 concrete see Section E-E (where 12" thickness is required 8" Reinforced Concrete may be substituted, See Section R-R).
 2. Loads Superload = A.A.S.H.T.O. H-20 Fill Load = 0 to 15 ft. Earth.
 3. Manhole Details steps, frame, cover, walls and max. batter shall be as shown on contract drawings or standard manhole Type A.
 4. Bend Data ϵ radius, B, C, and reinforcement shall be based upon D1 or D2 whichever is smaller.
 5. Manhole Opening d shall be based on downstream pipe size D2.

6. Frame and cover for manhole on 54" and larger bends shall be 2'-6" with lettering and holes as shown for 2'-0" frame.

Pipe Dia.	ϵ Radius	A	B	C	Bars E ϵ Spacing	Bars F	d ^A
30"	5'-0"	3'-10"	8"	8"	#5 @ 6" ϵ	3-#5	2'-6"
33"	6'-0"	4'-1"	8"	8"	#5 @ 6" ϵ	3-#5	2'-6"
36"	6'-0"	4'-4"	8"	8"	#5 @ 6" ϵ	3-#5	3'-0"
42"	7'-0"	4'-10"	8"	10"	#5 @ 6" ϵ	4-#5	3'-0"
48"	8'-0"	5'-4"	8"	10"	#5 @ 6" ϵ	4-#5	3'-0"
54"	9'-0"	6'-6"	12"	10"	#5 @ 6" ϵ	5-#5	3'-0"+
60"	10'-0"	7'-0"	12"	12"	#6 @ 8" ϵ	6-#5	3'-0"+
66"	11'-0"	7'-6"	12"	12"	#6 @ 8" ϵ	7-#5	3'-0"+
72"	12'-0"	8'-0"	12"	12"	#6 @ 8" ϵ	7-#5	3'-0"+

(x) See note #1, (*) See note #4, (A) See notes #5 and #8.
 (+) Special cover See note #6 above.



7. Min. length of curve is 4'-0" for type "C" manhole stack.
8. Manhole stack shall conform to that of Type "C" Manhole (D-14).

APPROVED
 ANNE ARUNDEL COUNTY
 DEPARTMENT OF PUBLIC WORKS
 CHIEF ENGINEER
 DESIGN ENGINEER
 DATE

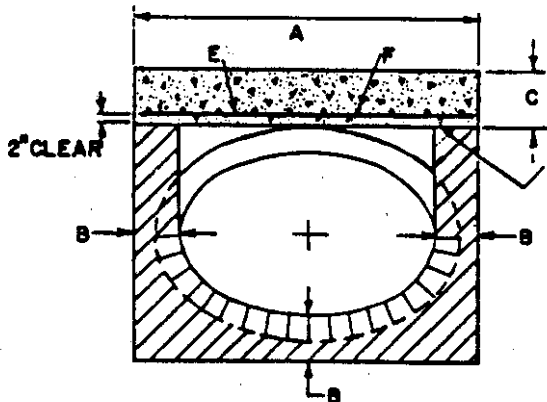
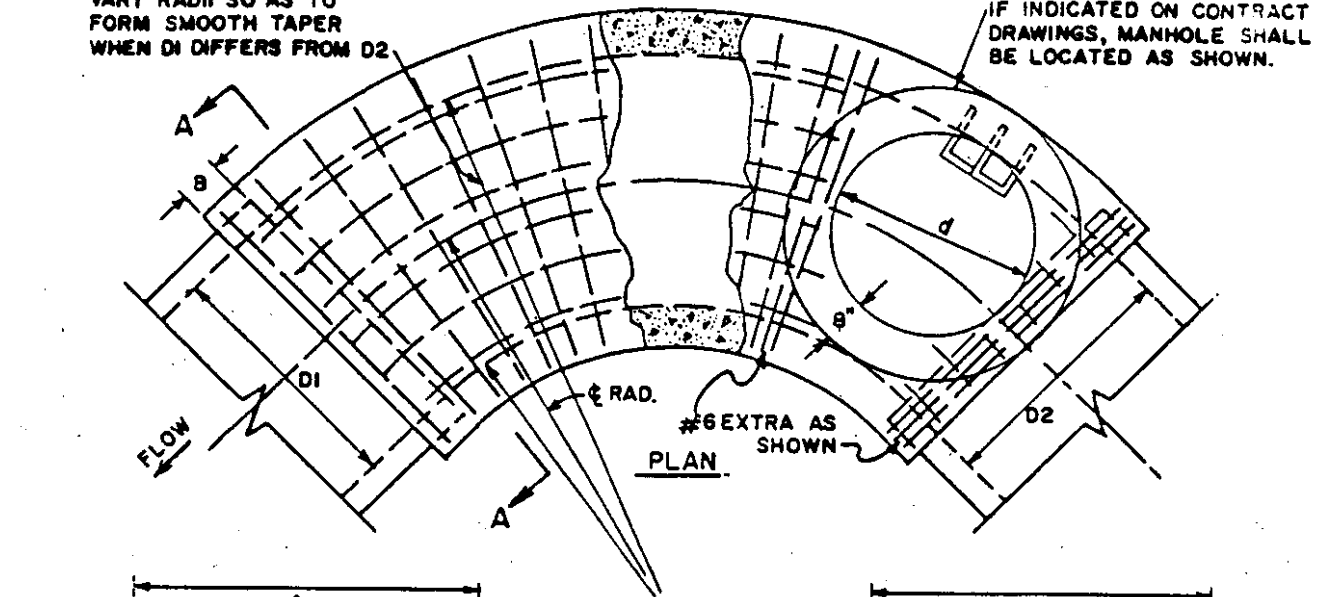
STANDARD DRAINAGE DETAILS
 BEND STRUCTURE
 CIRCULAR PIPE

REVISED	D
6/91	18

BASIS OF PAYMENT: STANDARD BEND STRUCTURE SHALL BE PAID FOR ON THE BASIS OF THE LUMP SUM PRICE BID FOR EACH BEND STRUCTURE. PRICE BID SHALL INCLUDE THE COST OF THE MANHOLE STACK.

VARY RADII SO AS TO FORM SMOOTH TAPER WHEN D1 DIFFERS FROM D2

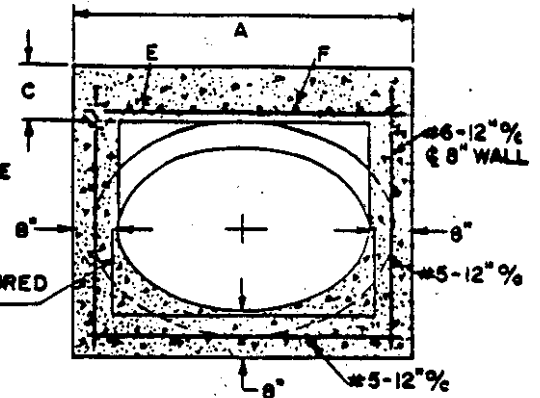
IF INDICATED ON CONTRACT DRAWINGS, MANHOLE SHALL BE LOCATED AS SHOWN.



SECTION A-A (Brick)

MIX NO. 3 CONCRETE FLUSH WITH OUTSIDE TOP OF PIPE.

1" RECESS IF POURED SEPARATELY



SECTION A-A (Concrete)

NOTES:

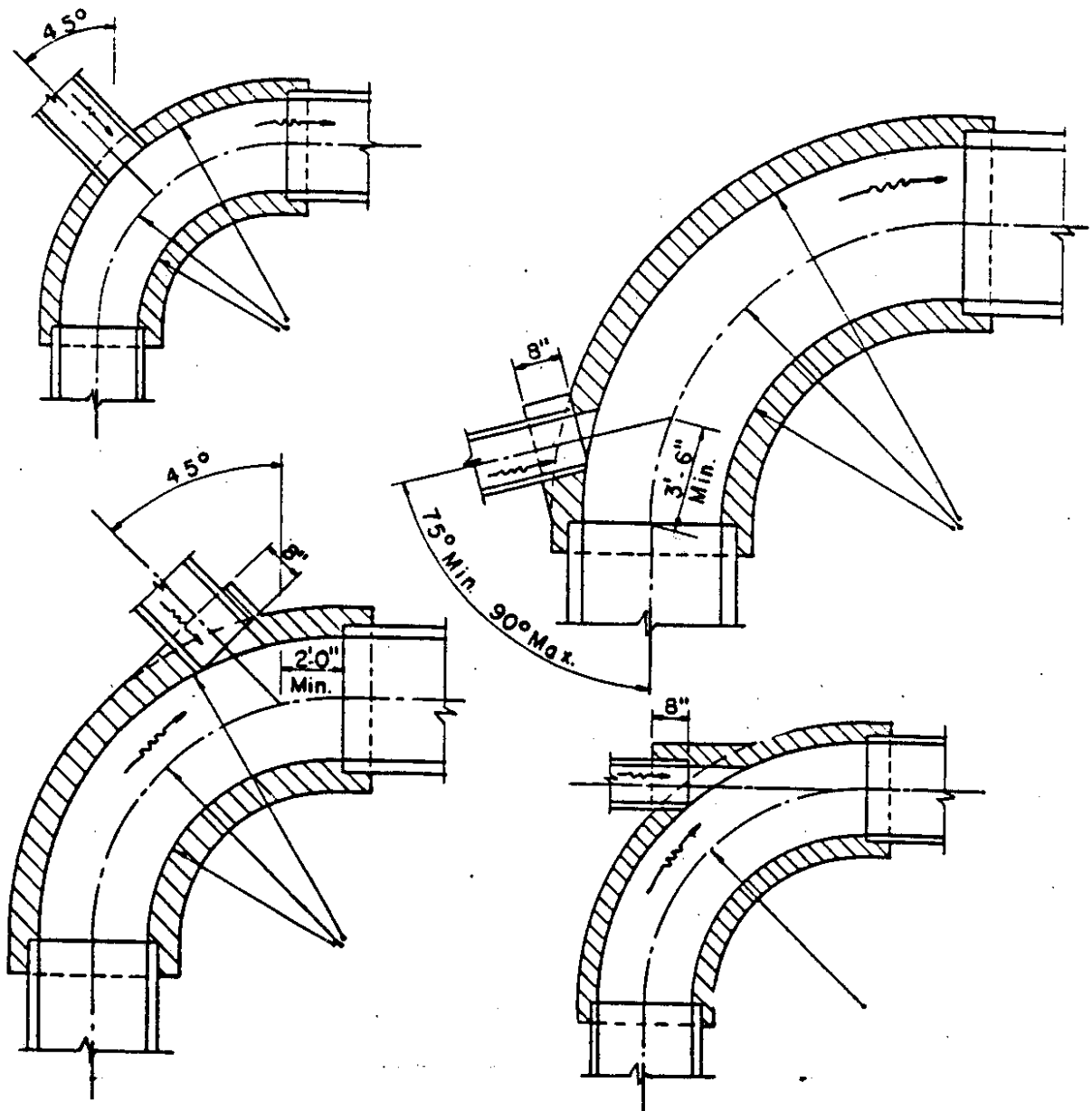
1. WALLS AND BOTTOM SHALL BE BRICK OR MIX NO. 3 CONCRETE WHERE 12" BRICK THICKNESS IS REQUIRED, 8" REINFORCED CONCRETE MAY BE SUBSTITUTED.
2. LOADS SUPERLOAD = A.A.S.H.T.O. H-20. FILL LOAD = 0 TO 15' EARTH.
3. BEND DATA, ϵ RAD, B, C, AND REINFORCING

4. SHALL BE BASED UPON D1 OR D2, WHICHEVER IS SMALLER.
5. MANHOLE OPENING "G" SHALL BE BASED ON DOWNSTREAM PIPE SIZE (D2).
6. MANHOLE DETAILS SHALL BE SHOWN ON CONTRACT DRAWINGS. OR USE STANDARD TYPE "A" MANHOLE. (D/11)
7. MIN. LENGTH OF CURVE IS 4'-0" FOR TYPE "C" MANHOLE STACK.
8. MANHOLE STACK SHALL CONFORM TO THAT OF TYPE "C" MANHOLE (D/14)
9. FOR CMAA DIMENSION A WILL BE HORIZONTAL DIMENSION OF ARCH PLUS 28.

EQ. RD.	PIPE DIMEN	ϵ RAD.	A	B	C	BARS E SPACING	BARS F SPACING	d ^a
30"	36" X 24"	6'-0"	4'-6"	8"	10"	#5 @ 6"	#5 @ 8"	3'-0"
33"	42" X 27"	7'-0"	4'-10"	8"	10"	#5 @ 6"	#5 @ 8"	3'-0"
36"	45" X 29"	8'-0"	5'-1"	8"	10"	#5 @ 6"	#5 @ 8"	3'-0"
42"	53" X 34"	9'-0"	5'-9"	8"	10"	#5 @ 6"	#5 @ 8"	3'-0"
48"	60" X 38"	10'-0"	6'-4"	8"	12"	#6 @ 8"	#6 @ 10"	3'-0"
54"	68" X 43"	11'-0"	7'-8"	12"	12"	#6 @ 8"	#6 @ 10"	3'-0"
60"	76" X 48"	12'-0"	8'-4"	12"	12"	#6 @ 8"	#6 @ 10"	3'-0"
66"	83" X 53"	13'-0"	8'-11"	12"	12"	#6 @ 8"	#6 @ 10"	3'-0"
72"	91" X 58"	14'-0"	9'-7"	12"	12"	#6 @ 8"	#6 @ 10"	3'-0"

(A) SEE NOTES 6 AND 7.

ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS	APPROVED CHIEF ENGINEER	STANDARD DRAINAGE DETAILS BEND STRUCTURE ELLIPTICAL PIPE	REVISED 6/9/19	D 19
	DESIGN ENGINEER DATE			

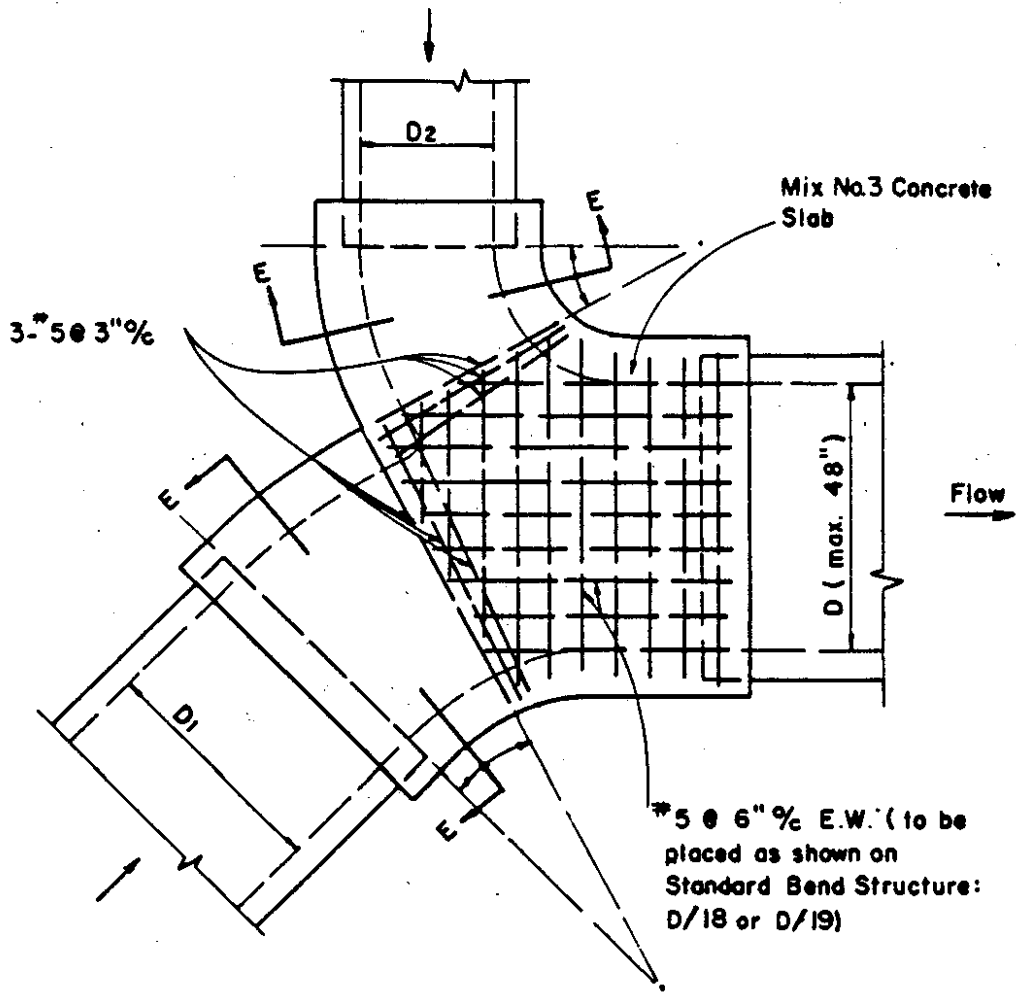


Notes

Manhole location, size and details, concrete and reinforcing steel requirements, center line radius and other details shall be in accordance with Bend Structure Detail D/18 or D/19

ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS	APPROVED <i>William J. [Signature]</i> CHIEF ENGINEER DESIGN ENGINEER DATE	STANDARD DRAINAGE DETAILS CONNECTION LOCATIONS TO BEND STRUCTURES	REVISED _____ _____ _____ _____
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D
20



PLAN

NOTES-

Sections E-E (between limits shown) shall conform to Standard Bend Structure (D/18 or D/19)

Where manhole is required (as indicated on Contract Drawings), manhole location and extra reinforcing shall be as shown on Standard Bend Structure D/18 or D/19.

Walls and base shall conform to Standard Bend Structure D/18 or D/19

Manhole stack shall conform to that of Type "C" Manhole D/14

Apply Dampproofing on Exterior Surfaces.

BASIS OF PAYMENT Standard Junction Chamber shall be paid for on the basis of the lump sum price bid for each Junction Chamber. Price bid shall include the price of the manhole stack where required.

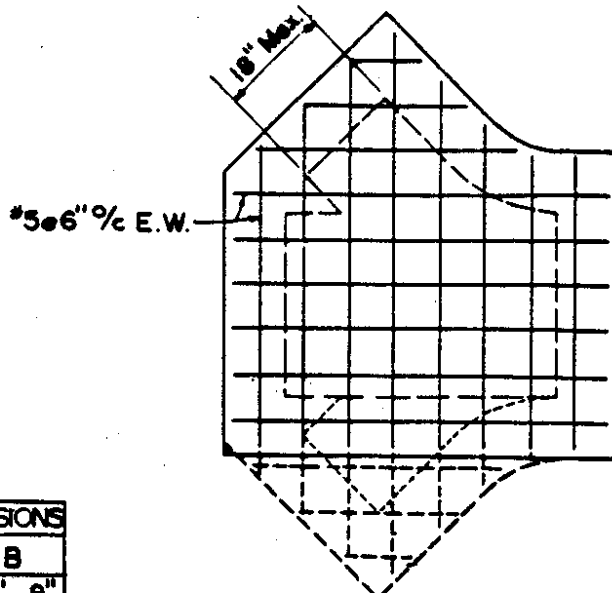
ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS	APPROVE <i>[Signature]</i> 9/1/66 CHIEF ENGINEER	STANDARD DRAINAGE DETAILS TYPE I JUNCTION CHAMBER TOP SLAB REINFORCING	REVISED	D 2T
	DATE <i>9/1/66</i> DESIGN ENGINEER			

NOTES

1. Wells and base shall be Brick or Mix No.3 Concrete.
2. Superload = A.A.S.H.T.O. - 20 Earth Load = 0' to 12'.

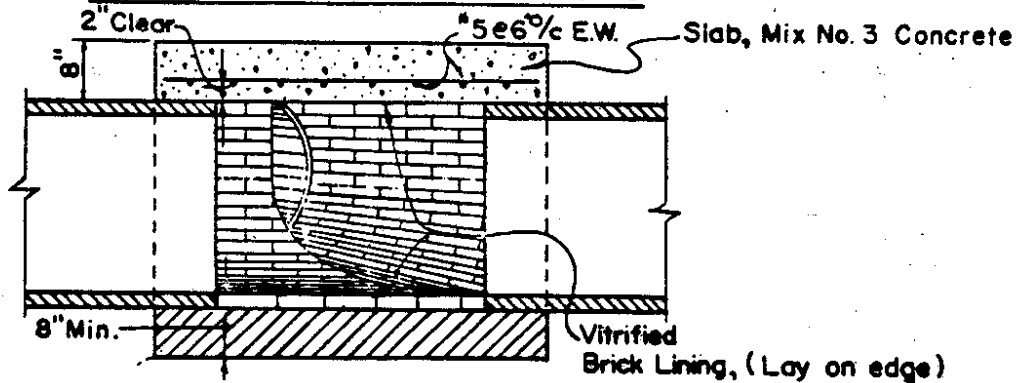
BASIS OF PAYMENT

Standard Single or Double Brick "Y" shall be paid for on the basis of the lump sum bid for each type "Y" Structure.

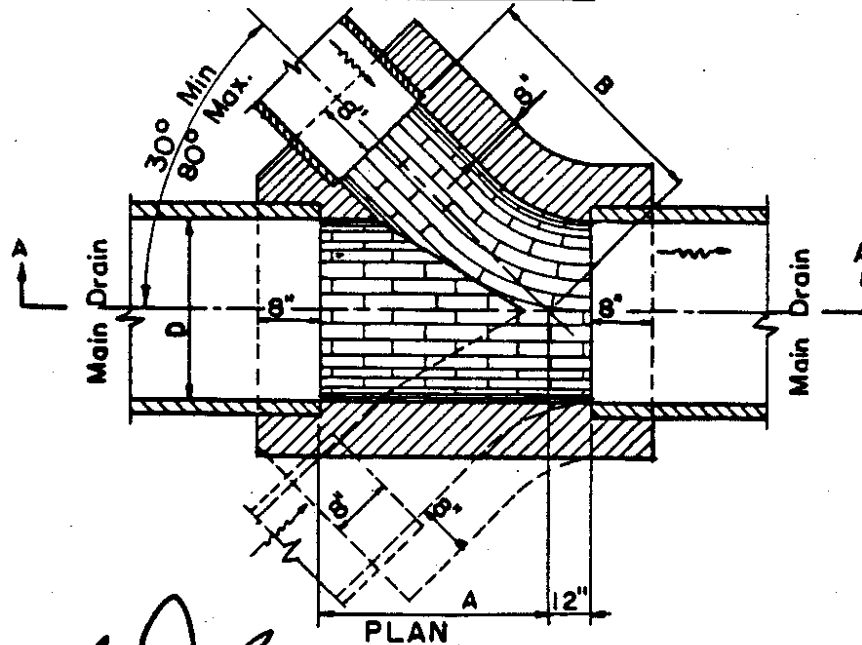


MINIMUM DIMENSIONS		
D	A	B
15-18	3' - 9"	2' - 9"
21-30	4' - 4"	3' - 7"
33-36	4' - 7"	3' - 11"

PLAN OF ROOF SLAB REINFORCING



SECTION A-A



PLAN

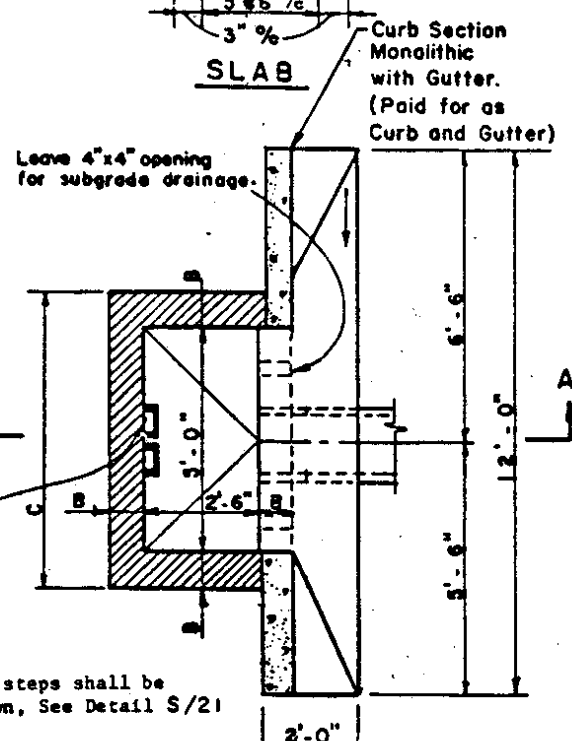
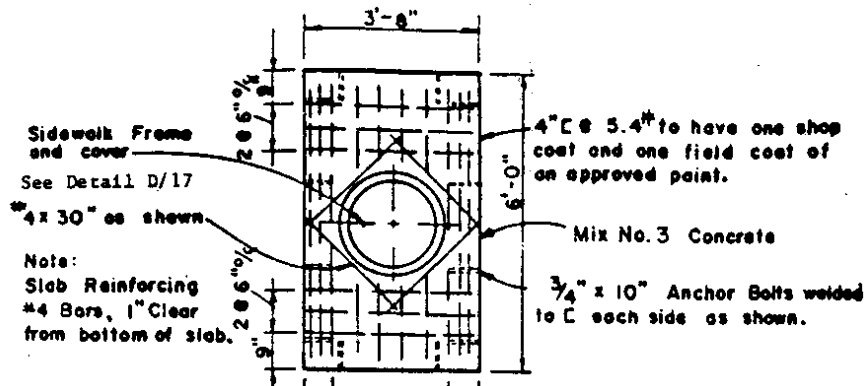
ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS

APPROVED *[Signature]*
 CHIEF ENGINEER
 DESIGN ENGINEER
 DATE

STANDARD DRAINAGE DETAILS
 STANDARD BRICK "Y"
 SINGLE & DOUBLE

REVISED	DATE
<i>[Signature]</i>	5/9/21

D/22



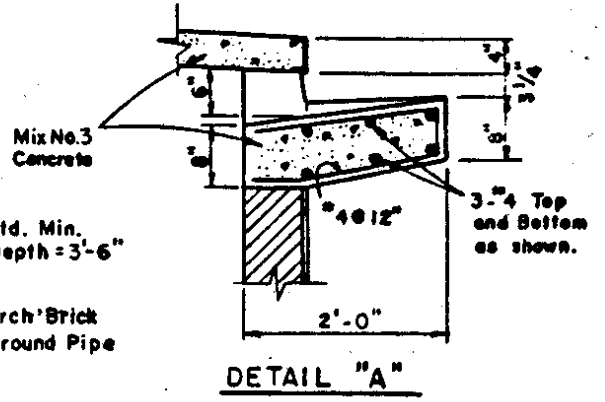
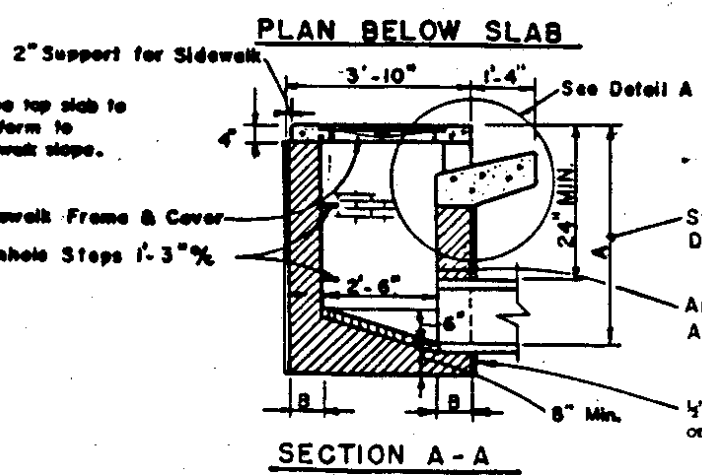
NOTES

1. Invert shall be brick laid on edge
2. Base shall be brick or Mix No. 3 Concrete.
3. Walls shall be Brick (Br.), Mix No. 3 Concrete (P.C.) or Reinforced Concrete (R.C.). See Table for dimensions.

A	B †	C	WALLS
< 6'	8"	6'-4"	Br. or P.C.
6' to 10'	12"	7'-0"	Br. or P.C.
6' to 15'	8"	6'-4"	R.C.*

4. * Reinforcing - 4 @ 10" E.W. in C. of walls. Reinforcing continuous at corners. All laps 1'-4"
5. ALLOWABLE GRADE ADJUSTMENT WITH BRICK MASONRY - 4" MIN., 12" MAX.
6. Precast inlet shall meet the requirements of AASHTO M 199.

† Well Thickness (B) may be stepped at depths shown.

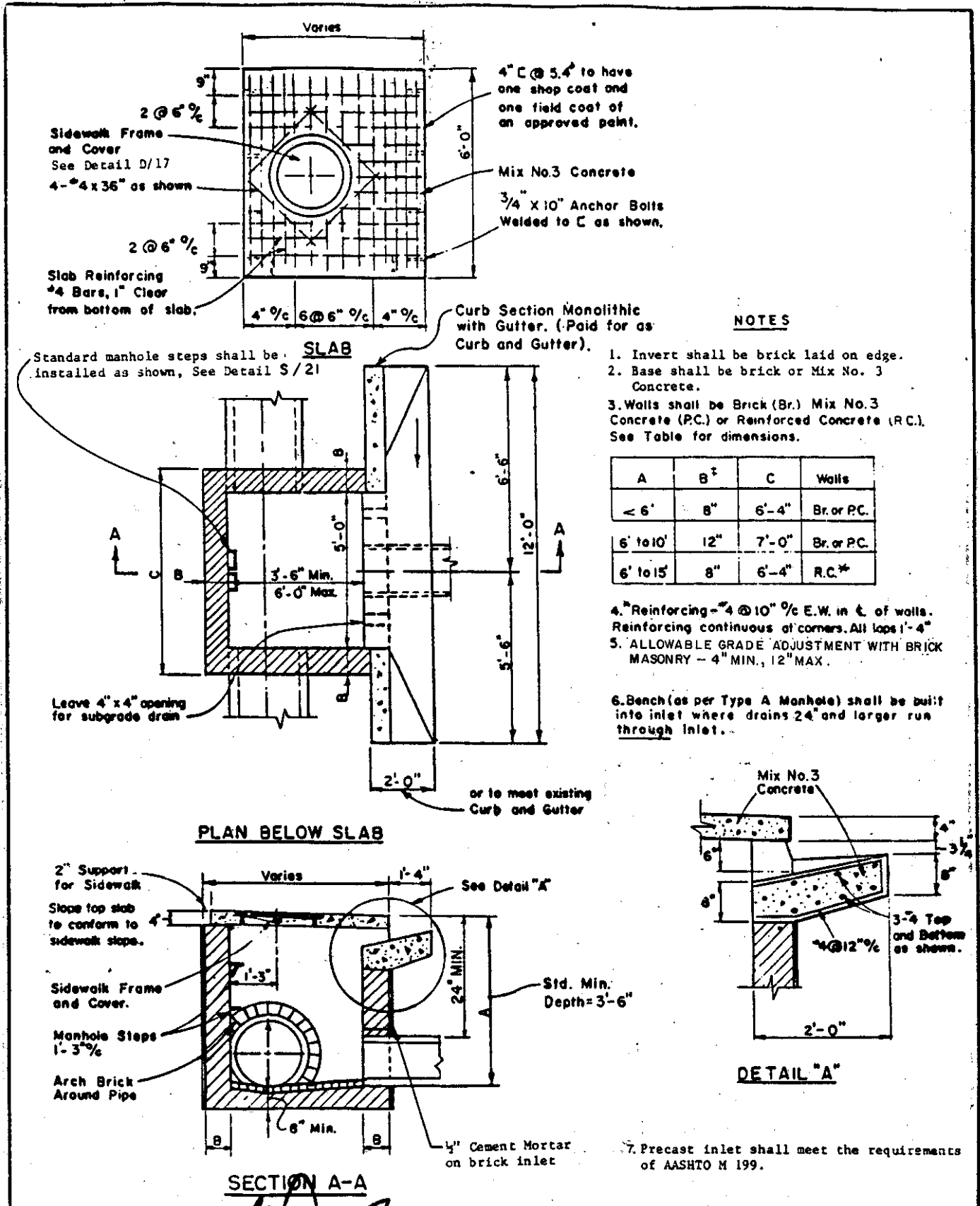


ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS

APPROVED
 CHIEF ENGINEER
 DESIGN ENGINEER

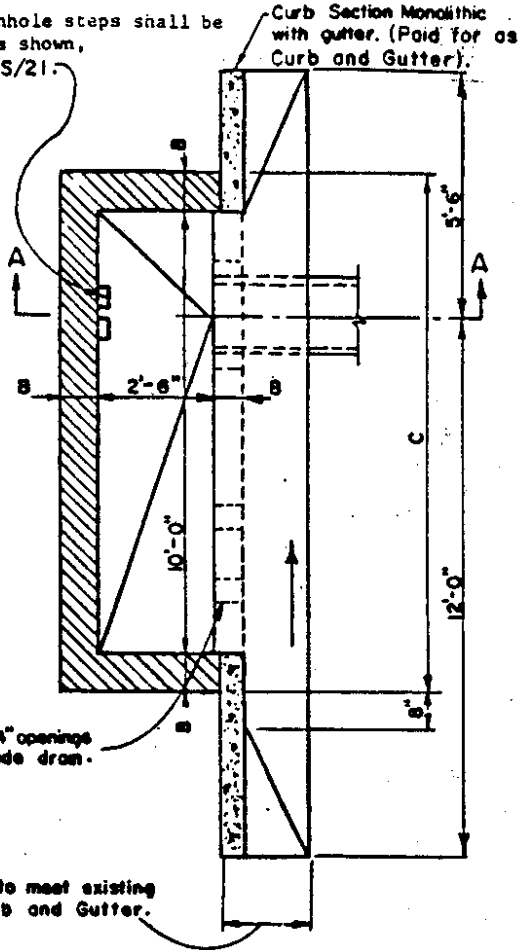
STANDARD DRAINAGE DETAILS
 TYPE A-1 INLET

REVISED
 6/94
 7/97
 023



ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS	APPROVES <i>[Signature]</i> CHIEF ENGINEER	STANDARD DRAINAGE DETAILS TYPE A-2 INLET	REVISED 6/9/00 5/5/00	D 24
	DESIGN ENGINEER DATE			

Standard manhole steps shall be installed as shown, See Detail S/21.

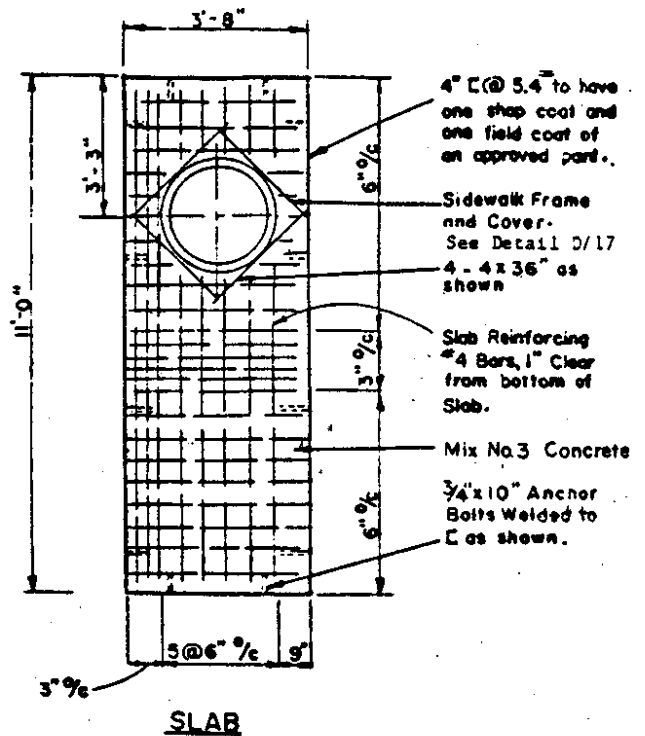


Leave 4"x4" openings for subgrade drain.

2'-0" or to meet existing Curb and Gutter.

PLAN BELOW SLAB

† Wall thickness (B) may be stepped at depths shown.

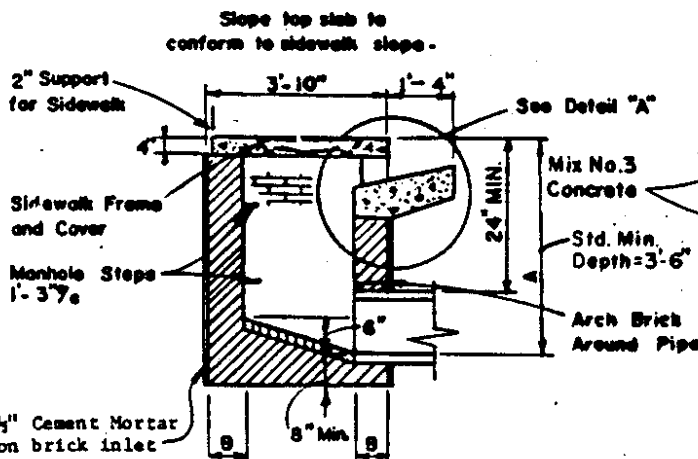


SLAB

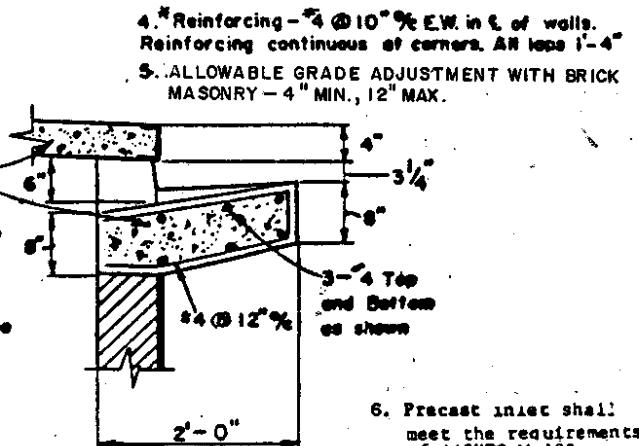
NOTES

1. Invert shall be brick laid on edge.
2. Base shall be brick or Mix No. 3 Concrete.
3. Walls shall be Brick (Br.), Mix No. 3 Concrete (P.C.), or Reinforced Concrete (R.C.). See Table for dimensions

A	B †	C	Walls
< 5'	8"	11'-4"	Br. or P.C.
5' to 8'	12"	12'-0"	Br. or P.C.
8' to 10'	8"	11'-4"	R.C. *



SECTION A-A



DETAIL "A"

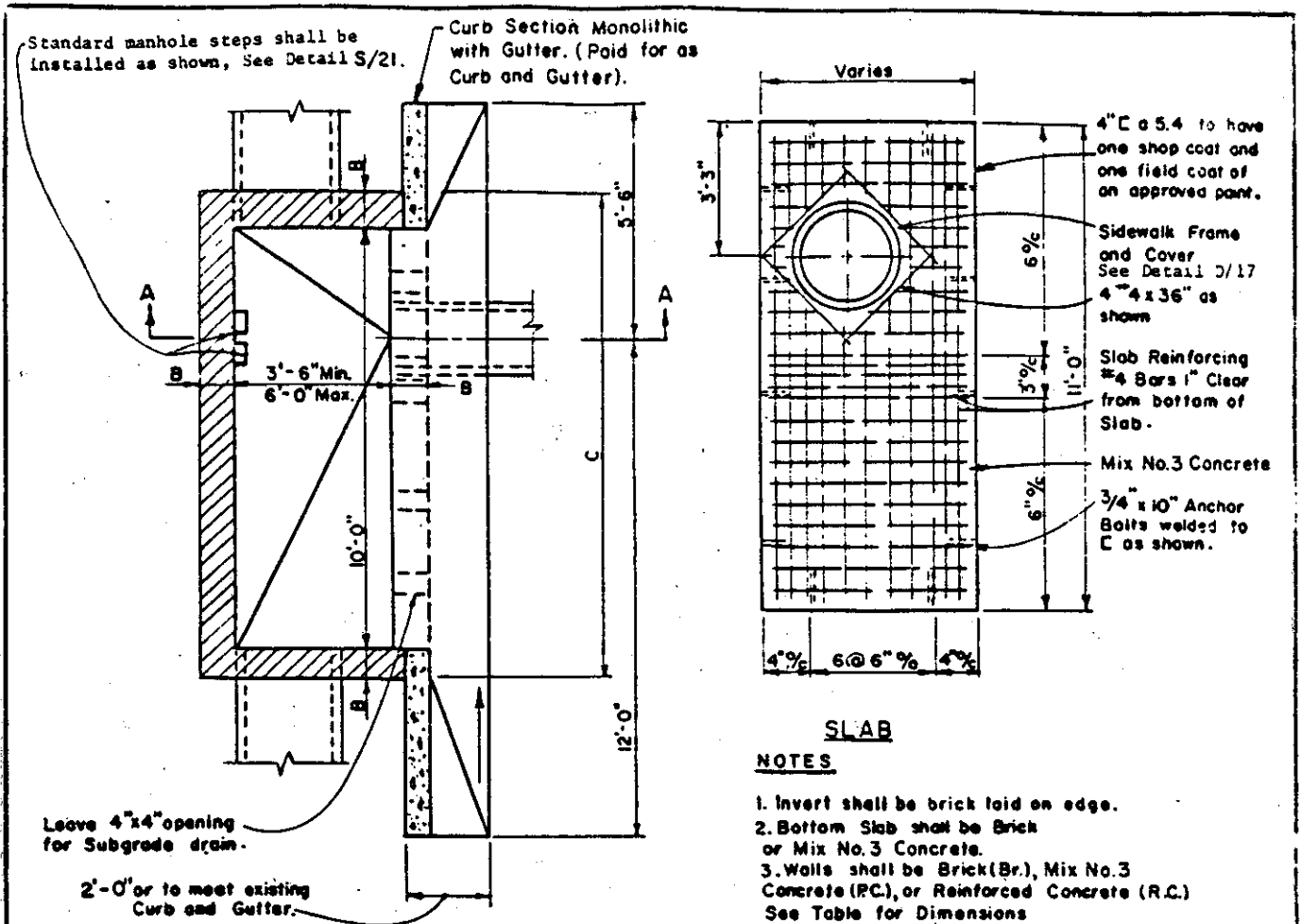
4. *Reinforcing - 4 @ 10" E.W. in $\frac{1}{2}$ of walls. Reinforcing continuous at corners. All laps 1'-4"
5. ALLOWABLE GRADE ADJUSTMENT WITH BRICK MASONRY - 4" MIN., 12" MAX.

6. Precast inlet shall meet the requirements of AASHTO M 199.

APPROVED
 ANNE ARUNDEL COUNTY
 DEPARTMENT OF PUBLIC WORKS
 CHIEF ENGINEER
 DESIGN ENGINEER
 DATE

STANDARD DRAINAGE DETAILS
 TYPE B-1 INLET

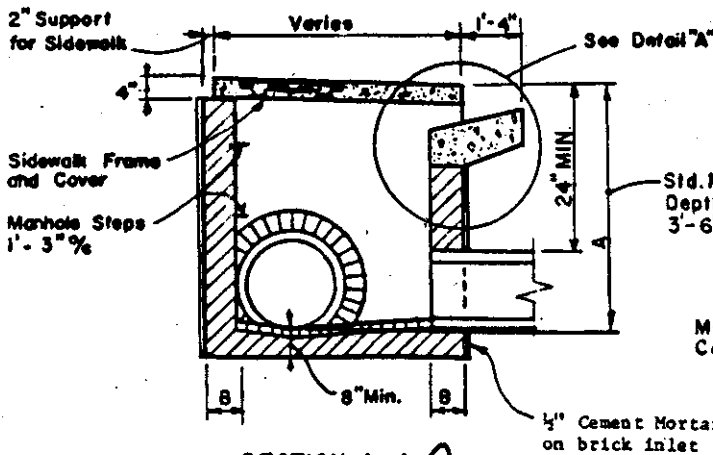
REVISED
 6/9/00
 25



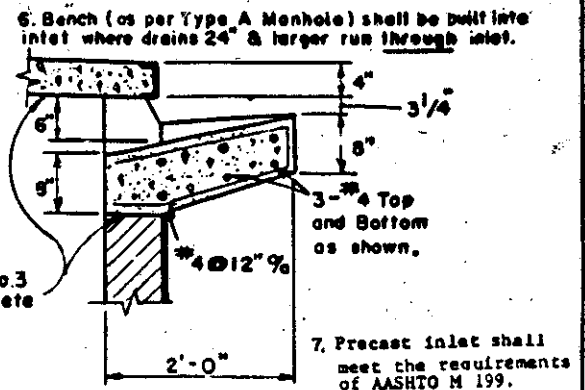
PLAN BELOW SLAB

± Wall Thickness (B) may be stepped at depths shown.

Slope Top Slab to conform to Sidewalk Slope.



SECTION A-A



DETAIL "A"

SLAB

NOTES

- Invert shall be brick laid on edge.
- Bottom Slab shall be Brick or Mix No. 3 Concrete.
- Walls shall be Brick (Br.), Mix No. 3 Concrete (PC), or Reinforced Concrete (R.C.) See Table for Dimensions

A	B [±]	C	Walls
< 5'	8"	11'-4"	Br. or PC.
5' to 8'	12"	12'-0"	Br. or PC.
5' to 10'	8"	11'-4"	R.C.*

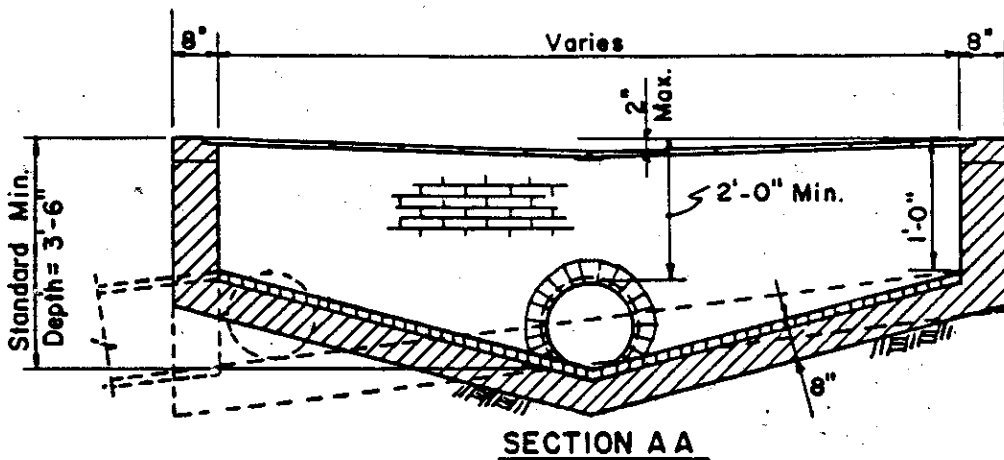
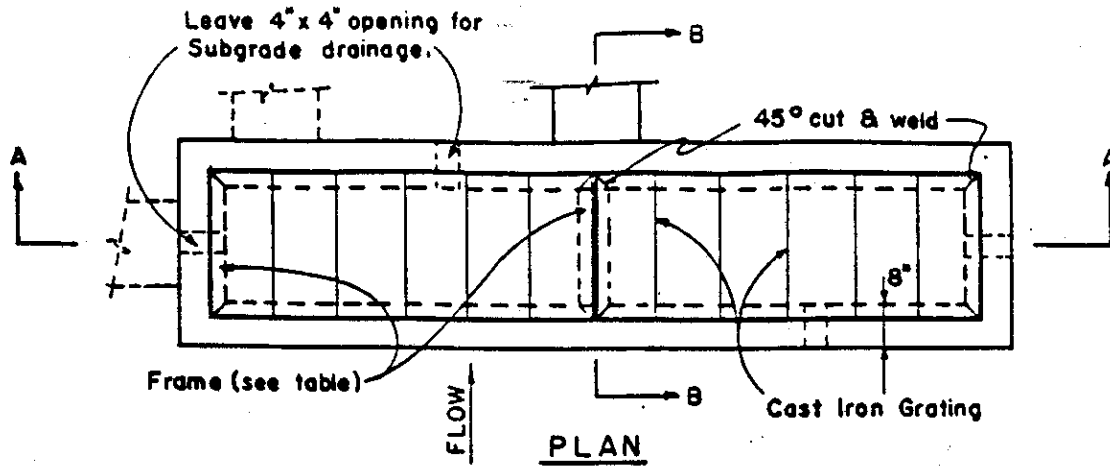
- ALLOWABLE GRADE ADJUSTMENT WITH BRICK MASONRY - 4" MIN., 12" MAX.
- * Reinforcing - #4 @ 10" % E.W. in \perp of walls Reinforcing continuous at corners. All Laps 1'-4"
- Bench (as per Type A Manhole) shall be built into inlet where drains 24" & larger run through inlet.

ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS

APPROVED
 CHIEF ENGINEER
 DESIGN ENGINEER

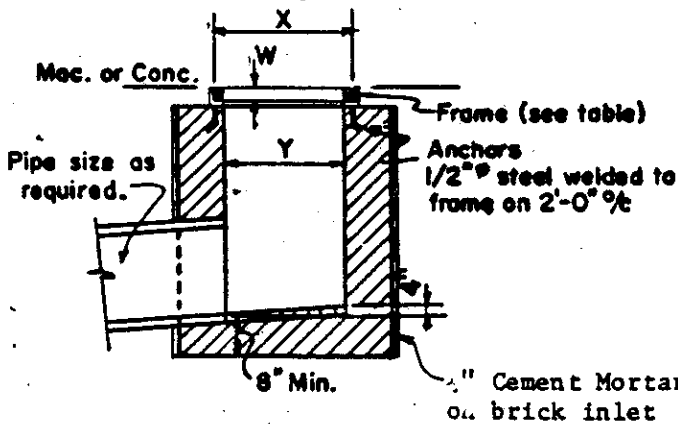
STANDARD DRAINAGE DETAILS
 TYPE B-2 INLET

REVISED
 6/9/11
 26



Notes:

1. Base and walls shall be brick or Mix No. 3 concrete
2. Maximum depth of wall shall be 3'-6" where outlet pipe requires greater depth, drop section shall be formed around pipe.
3. Invert shall be brick laid on edge.



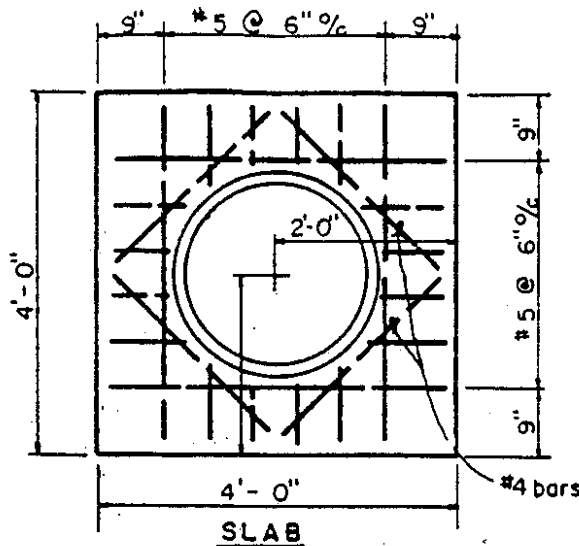
SECTION BB

FRAME DIMENSION TABLE

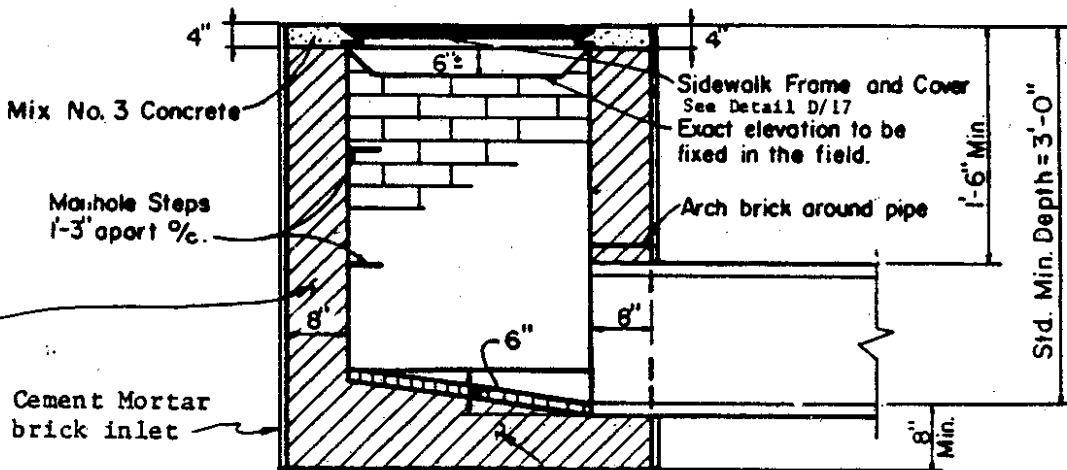
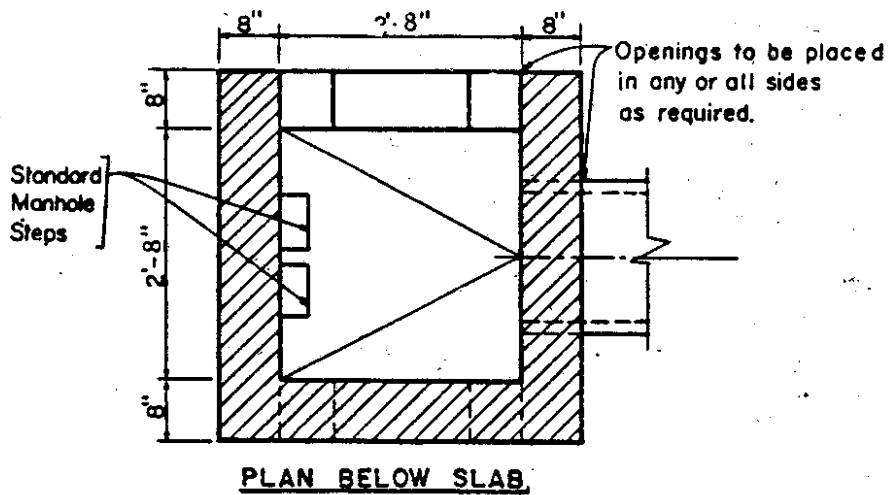
	W	X	Y	FRAME ANGLES
S	3"	2'-9"	2'-7"	3 1/2" x 2 1/2" x 3/8"
A	2-1/2"	2'-2"	1'-9"	3 1/2" x 2 1/2" x 3/8"
B	1-3/4"	1'-5"	1'-0"	2" x 2 1/2" x 3/8"

4. ALLOWABLE GRADE ADJUSTMENT WITH BRICK MASONRY 4" MIN; 12" MAX.
5. Precast inlet shall meet the requirements of AASHTO M 199.

ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS	APPROVED CHIEF ENGINEER DESIGN ENGINEER DATE	STANDARD DRAINAGE DETAILS TYPE "C" INLET	REVISED 6/9/91 5/23/92 27
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- NOTES:
1. Invert shall be brick laid on edge.
 2. Allowable grade adjustment with brick masonry 4" min, 12" max.
 3. Where Depth is 3'-6" or greater Standard Manhole steps shall be installed as shown. See Detail S-21
 4. Maximum Vertical Depth of inlet shall be 8'-0".
 5. Precast inlet shall meet the requirements of AASHTO M 199



SECTION
 Walls shall be brick Mix No. 3 Concrete or reinforced concrete
 Base shall be brick or Mix No. 3 Concrete.

ANNE ARUNDEL COUNTY
 DEPARTMENT OF PUBLIC WORKS

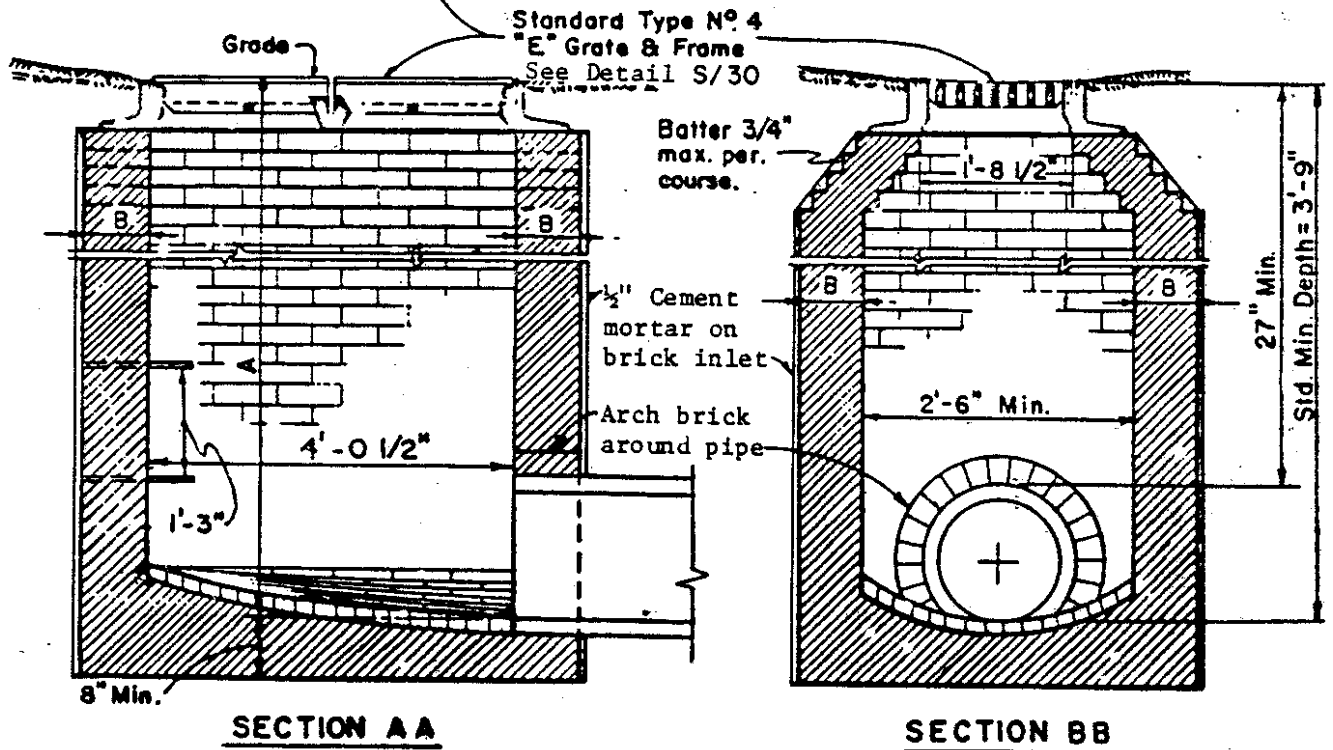
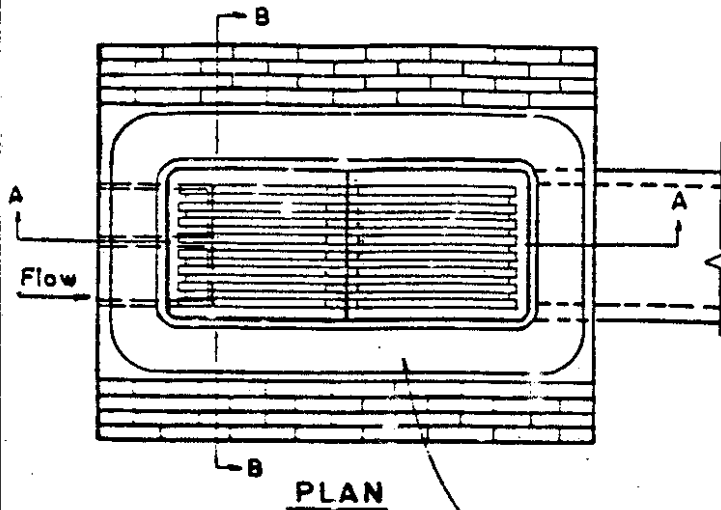
APPROVED: *[Signature]* 9/1/08
 CHIEF ENGINEER
 DESIGN ENGINEER: *[Signature]* 9/1/08
 DATE

STANDARD DRAINAGE DETAILS
 TYPE "D" INLET

REVISED	DATE	BY
6/91		<i>[Signature]</i>
5/93		<i>[Signature]</i>

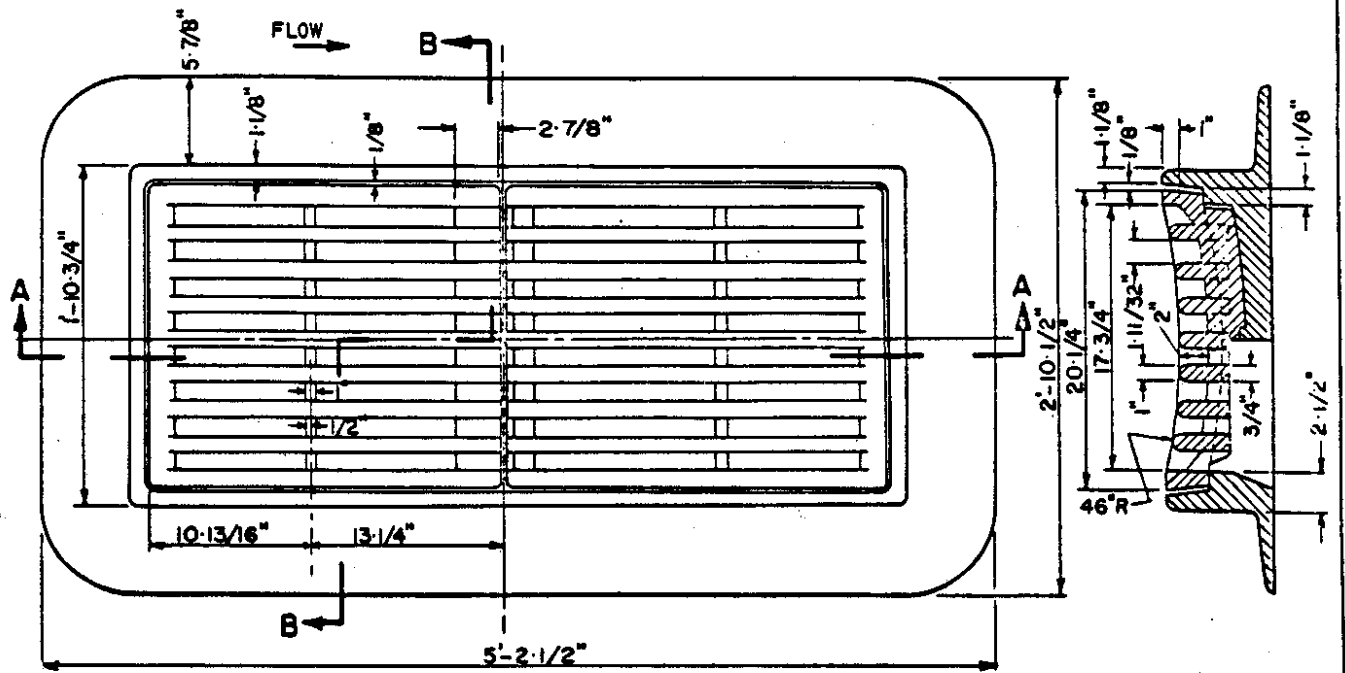
Notes:

1. Base shall be Brick or Mix No.3 Conc. Invert shall be brick laid on edge.
2. Walls shall be Brick (Br) Mix No.3 Conc. (PC) or Reinforced Mix No.3 Conc.(RC). See Table below for dimensions.
3. * Reinforcing = # 4 @ 10" % EW in ϵ of walls. Reinforcing continuous at corners. All laps 1'-4".
4. Top 4" of walls shall be brick masonry. Additional brick shall be used to bring Cover to existing grade if required.
5. Bench (as per Type A Manhole) shall be built into inlet where drains 24" and larger run through inlet.
6. Standard manhole steps shall be installed as shown, See Detail S/21
7. Precast inlet shall meet the requirements of AASHTO M 199.



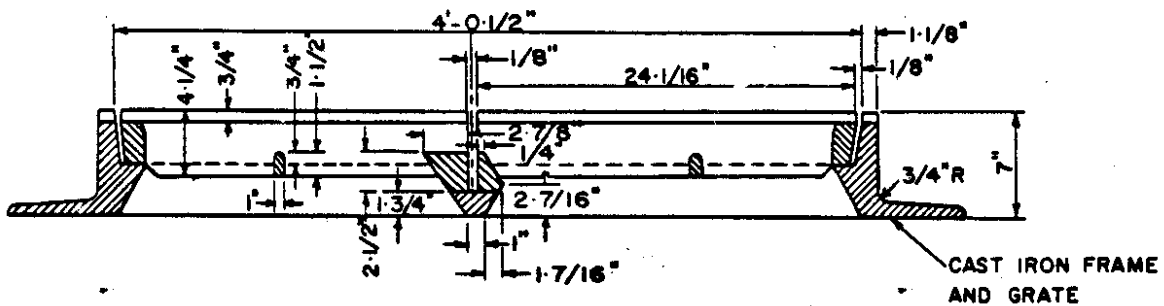
A	B	Walls
< 6'	8"	Br. or P.C.
6' to 10'	12"	Br. or P.C.
6' to 15'	8"	R.C. #

ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS	APPROVED CHIEF ENGINEER DESIGN ENGINEER DATE _____	STANDARD DRAINAGE DETAILS TYPE "E" INLET	REVISED 6/9/74 D 29
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PLAN

SECTION B-E



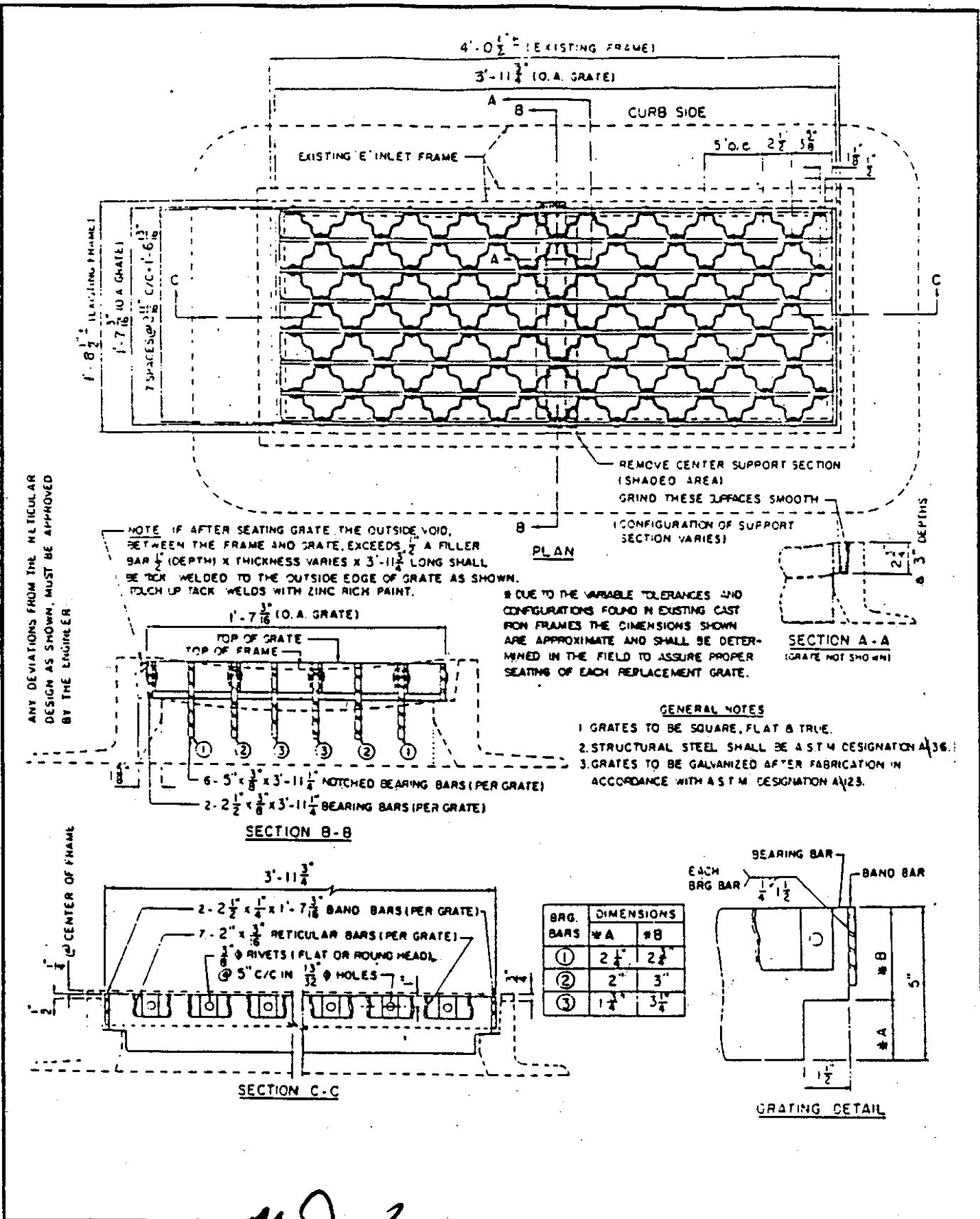
SECTION A-A

CAST IRON FRAME AND GRATE

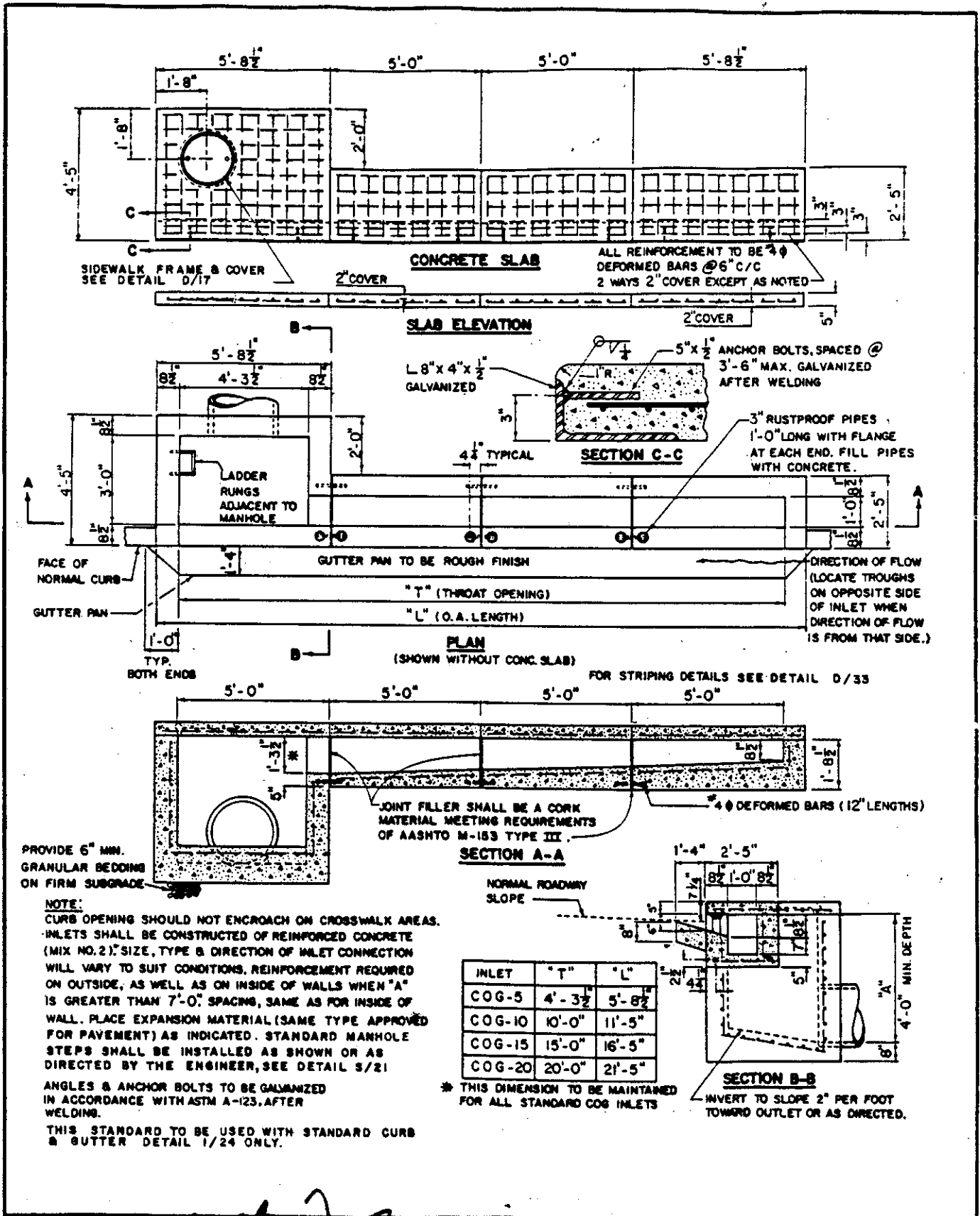
NOTE

1. APPROXIMATE WEIGHTS:
EA. GRATE - 216 LBS.
FRAME (FULL FLANGE) - 668 LBS.
2. END AND/OR SIDE FLANGES MAY BE OMITTED IF NECESSARY.

ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS	APPROVED	STANDARD DRAINAGE DETAILS TYPE NO. 4 "E" GRATE	REVISED	D 30
	CHIEF ENGINEER			
	DESIGN ENGINEER			
	DATE			



ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS	APPROVED <i>[Signature]</i> CHIEF ENGINEER	STANDARD DRAINAGE DETAILS TYPE E & H INLET COMBINATION RETICULAR REPLACEMENT GRATE	REVISED	D 31
	DESIGN ENGINEER <i>[Signature]</i>		_____	
	DATE		_____	
	_____		_____	



NOTE:
 CURB OPENING SHOULD NOT ENCRUSH 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. STANDARD MANHOLE STEPS SHALL BE INSTALLED AS SHOWN OR AS DIRECTED BY THE ENGINEER, SEE DETAIL S/21
 ANGLES & ANCHOR BOLTS TO BE GALVANIZED IN ACCORDANCE WITH ASTM A-123, AFTER WELDING.
 THIS STANDARD TO BE USED WITH STANDARD CURB & GUTTER DETAIL 1/24 ONLY.

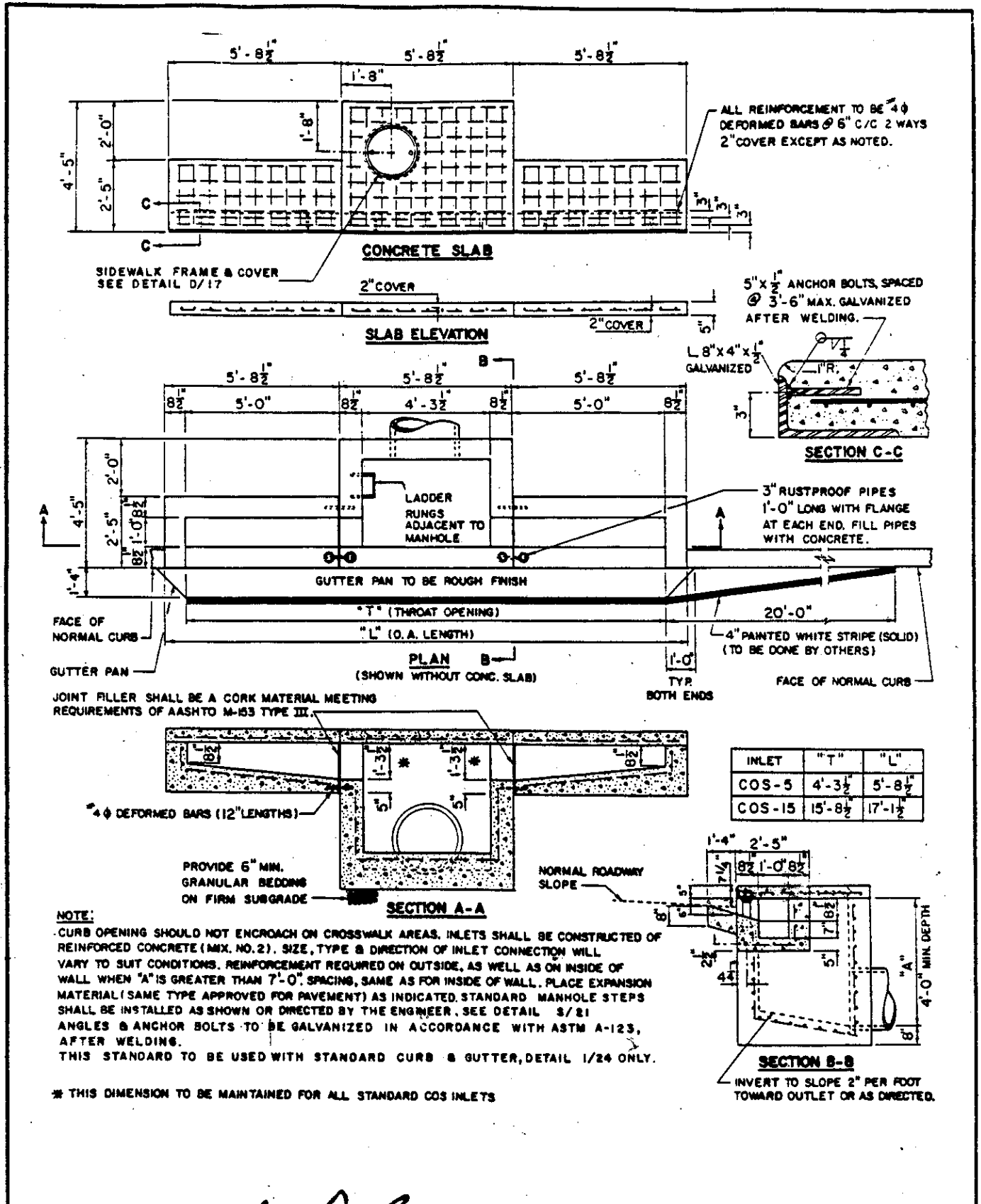
INLET	"T"	"L"
COG-5	4'-3 1/2"	5'-8 1/2"
COG-10	10'-0"	11'-5"
COG-15	15'-0"	16'-5"
COG-20	20'-0"	21'-5"

* THIS DIMENSION TO BE MAINTAINED FOR ALL STANDARD COG INLETS

ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS
 APPROVED: *[Signature]* 9/7/00
 CHIEF ENGINEER
 DESIGN ENGINEER: *[Signature]* 9/16/00
 DATE

STANDARD DRAINAGE DETAILS
 STANDARD COG INLETS
 5', 10', 15' & 20'

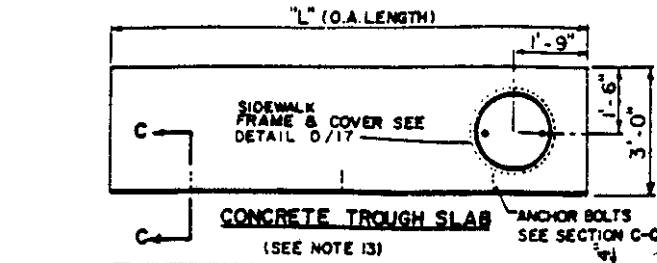
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	32



ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS	APPROVED <i>[Signature]</i> CHIEF ENGINEER	STANDARD DRAINAGE DETAILS STANDARD COS INLETS 5' & 15'	REVISED	D 33
	DESIGN ENGINEER DATE		_____	
	_____		_____	
	_____		_____	

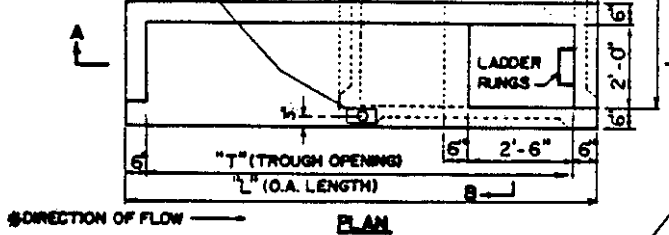
GENERAL NOTES:

1. CURB OPENING SHOULD NOT ENCRoACH ON CROSSWALK AREAS.
2. CONCRETE TO BE MIX NO. 6 (4500 PSI).
3. THREADED PLASTIC INSERTS TO BE PROVIDED FOR HANDLING.
4. PIPE KNOCKOUT, 4.5' VERTICALLY, TO BE PROVIDED AS SHOWN ON PLANS.
5. INLET INVERTS TO BE PROVIDED IN THE FIELD AS REQUIRED.
6. GRADE AND SLOPE ADJUSTMENT COMPLETED IN THE FIELD AS REQUIRED.
7. WHERE PIPE INVERT ARE ABOVE BOTTOM OF BOX PROVIDE CONCRETE OR BRICK GIMMEL TO MEET PIPE INVERT.
8. STANDARD MANHOLE STEPS SHALL BE INSTALLED AS SHOWN OR AS DIRECTED BY THE ENGINEER, SEE DETAIL 9/21.
9. CHANNELS AND ANCHOR BOLTS TO BE GALVANIZED IN ACCORDANCE WITH ASTM A 123, AFTER WELDING.
10. PIPE KNOCKOUT, HORIZONTALLY, ARE CONTINGENT UPON THE SIZE OF THE PIPE CONNECTED. A 6" THICKNESS, HOWEVER MUST BE MAINTAINED AROUND THE PERIMETER OF THE WALL.
11. FOR CONFIGURATION OF GUTTER PAN AND STRIPING DETAILS REFER TO SEE DETAIL D/33.
12. 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.
13. REFER TO DETAIL D/34A FOR DETAILS OF COG-20 PRECAST CONCRETE TROUGH SLAB, ALSO DETAILS FOR ADJUSTMENT COLLARS AND INLET SLABS FOR OTHER COG INLETS.

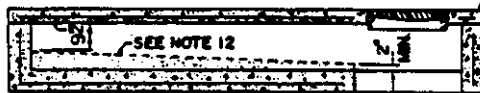


SLAB ELEVATION
 4 # DEFORMED BARS 10" C/C
 4 # DEFORMED BARS 7" C/C

STEEL SUPPORT POSTS
 @ 5'-0" C/C 3" WITH 4" X 9" X 1/2" CAP & BASE PLATE



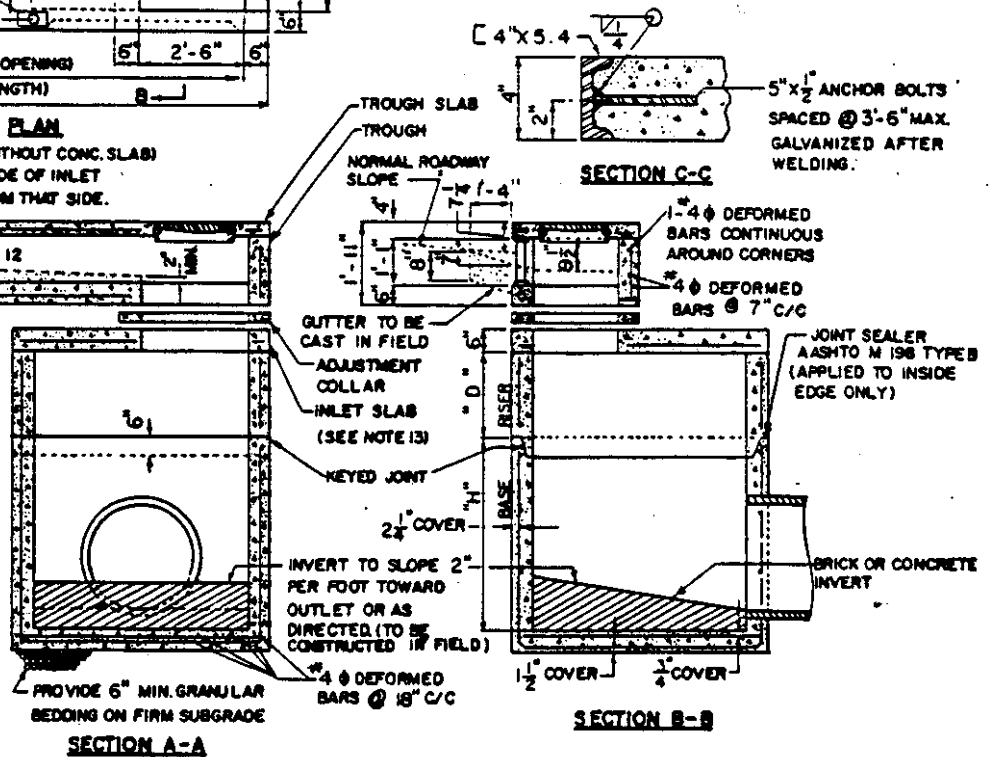
PLAN
 (SHOWN WITHOUT CONC. SLAB)
 * LOCATE TROUGH ON OPPOSITE SIDE OF INLET WHEN DIRECTION OF FLOW IS FROM THAT SIDE.



SEE NOTE 13

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"

"W"	"Y"	"H"	"D"
4'-0"	4'-0"	5'TO10'	1'TO5'
4'-0"	6'-0"	5'TO10'	1'TO5'
6'-0"	6'-0"	5'TO10'	1'TO5'
6'-0"	8'-0"	5'TO10'	1'TO5'
6'-0"	10'-0"	5'TO10'	1'TO5'
6'-0"	12'-0"	5'TO10'	1'TO5'

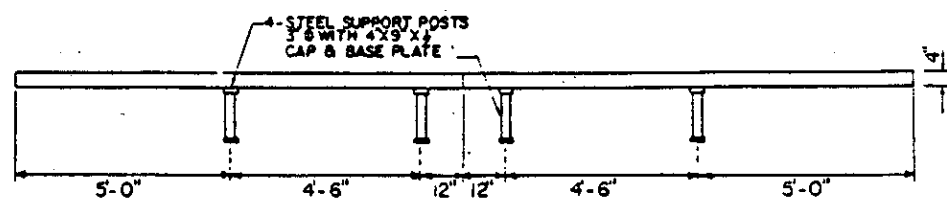
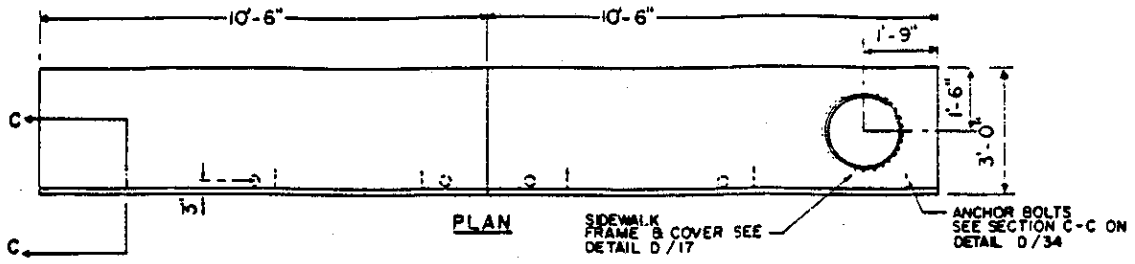


THIS STANDARD TO BE USED WITH COMBINATION CURB & GUTTER, SEE DETAIL 1/24

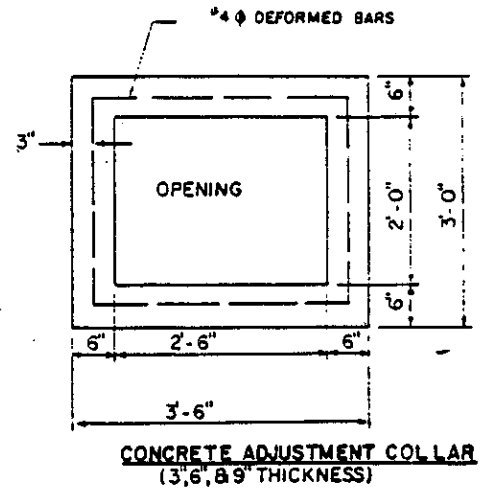
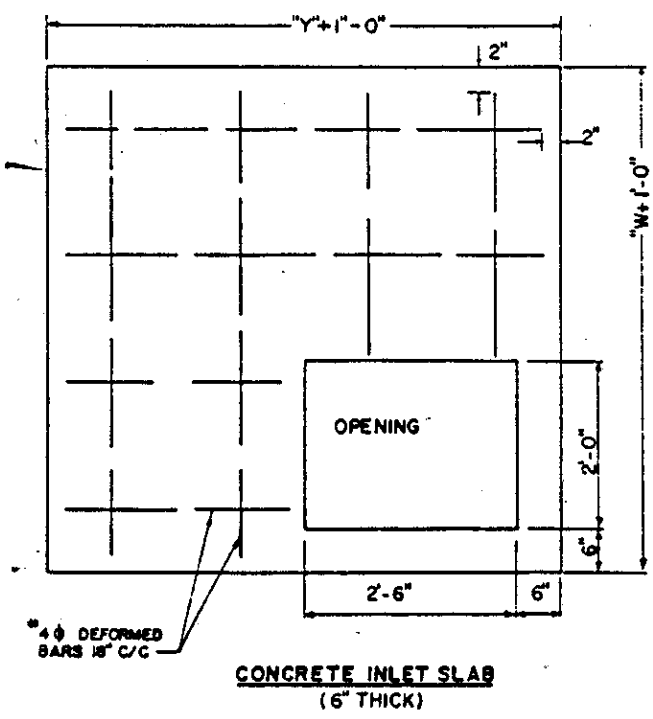
APPROVED: *[Signature]*
 ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS
 CHIEF ENGINEER
 DESIGN ENGINEER
 DATE

STANDARD DRAINAGE DETAILS
 PRECAST SQUARE AND RECTANGULAR COG INLETS
 5', 10', 15' & 20'

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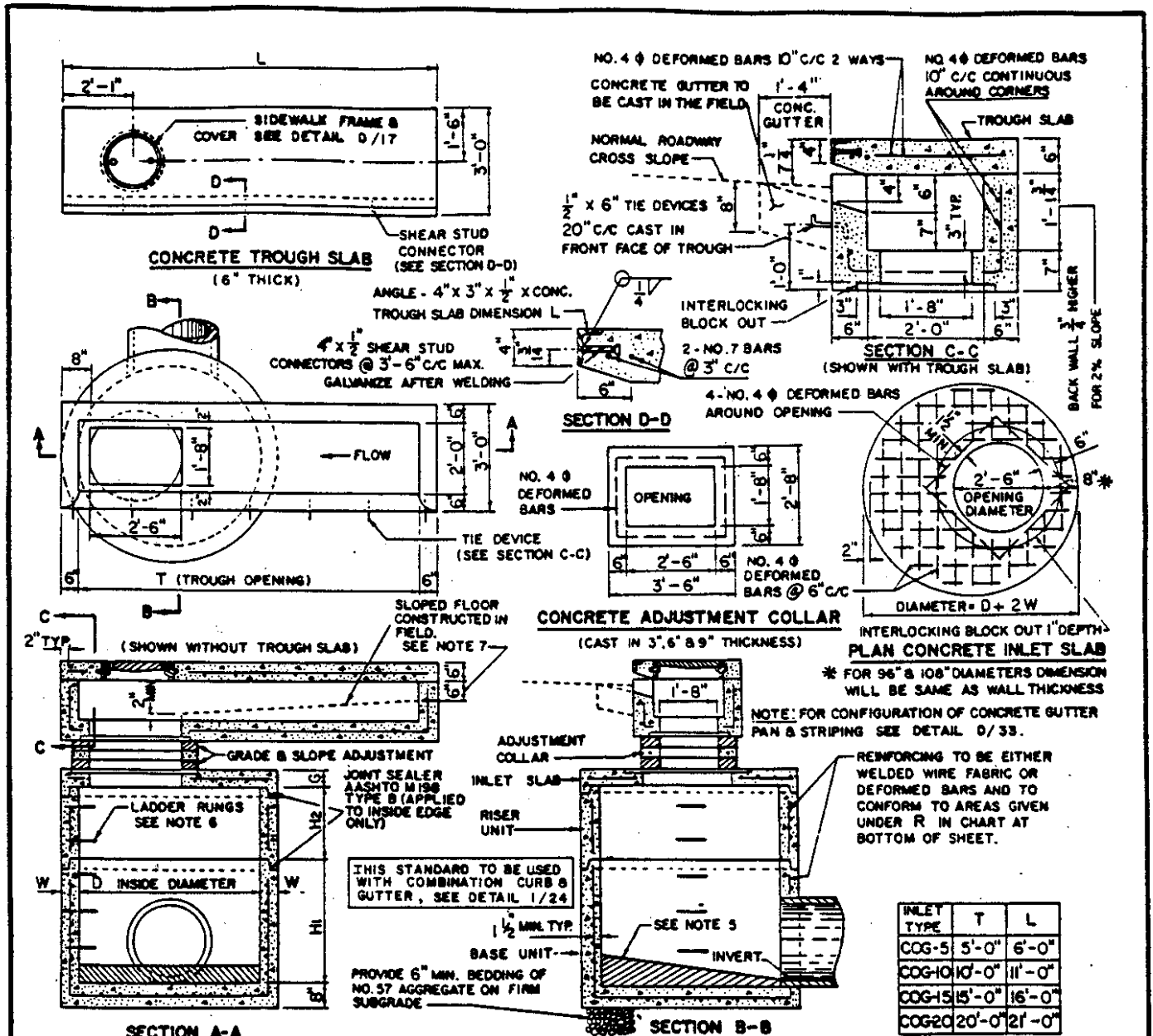


ELEVATION
COG- 20 TROUGH SLAB
 (TO BE CAST IN TWO SECTIONS)



- NOTES:**
1. CONCRETE TO BE MIX NO. 6 (4500 PSI).
 2. SEE DETAILS D/34 FOR COG INLET DETAILS, Y & W DIMENSIONS ETC.
 3. THE CONCRETE INLET SLAB AND CONCRETE ADJUSTMENT COLLAR ARE FOR ALL COG INLETS.

ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS	APPROVED <i>[Signature]</i> CHIEF ENGINEER	STANDARD DRAINAGE DETAILS DETAILS FOR PRECAST CONCRETE COG-20 TROUGH SLABS & DETAILS FOR ADJUSTMENT COLLARS AND INLET SLABS	REVISED	D 34A
	DESIGN ENGINEER <i>[Signature]</i>		_____	
	DATE		_____	
	_____		_____	



NOTES:

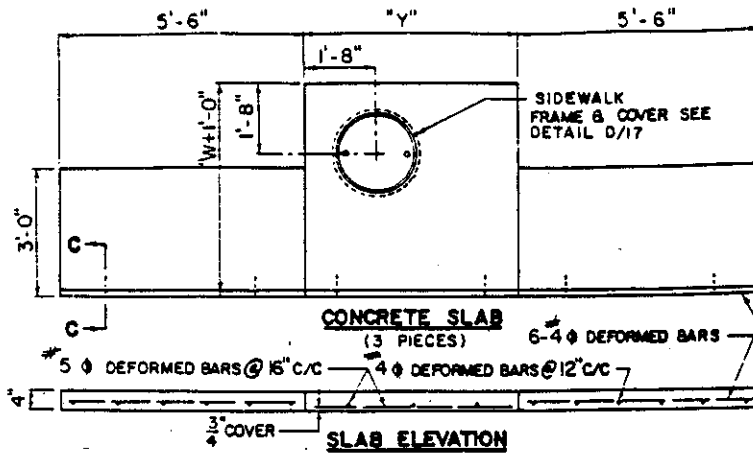
1. CURB OPENING SHALL NOT ENCRONCH ON CROSSWALK AREAS.
2. CONCRETE TO BE MIX. NO. 6 (4500 PSI)
3. ANGLES AND ANCHOR BOLTS TO BE GALVANIZED AFTER WELDING IN ACCORDANCE WITH ASTM A 123.
4. GRADE AND SLOPE ADJUSTMENTS SHALL BE COMPLETED IN THE FIELD USING PRECAST ADJUSTMENT COLLAR AND MORTAR.
5. A CONCRETE OR BRICK CHANNEL SHALL BE PROVIDED IN THE FIELD AND SHALL SLOPE 2" PER FT. TOWARD OUTLET.
6. STANDARD MANHOLE STEPS SHALL BE INSTALLED AS SHOWN OR AS DIRECTED BY THE ENGINEER, SEE DETAIL 5/21.
7. 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.
8. SEE DETAIL D/358 FOR ALTERNATE PRECAST TROUGH FLOOR.

CIRCULAR BASE AND RISER UNIT DIMENSIONS				INLET SLAB	R-REN. SO. IN. PER FOOT
H1	H2	W	D*		
1' to 4'	1' to 4'	4"	36"	NOT USED	.09
1' to 5'	1' to 5'	5"	48"	6"	.12
1' to 6'	1' to 6'	6"	60"	8"	.15
1' to 7'	1' to 7'	7"	72"	8"	.18
1' to 8'	1' to 8'	8"	84"	8"	.21
1' to 9'	1' to 9'	9"	96"	8"	.24
1' to 10'	1' to 10'	10"	108"	8"	.27

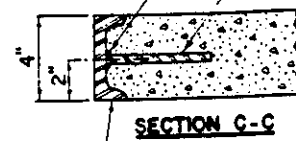
APPROVED: *[Signature]*
 ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS
 CHIEF ENGINEER
 DESIGN ENGINEER
 DATE

STANDARD DRAINAGE DETAILS
PRECAST CIRCULAR
COG INLETS
5', 10', 15' & 20'

REVISED
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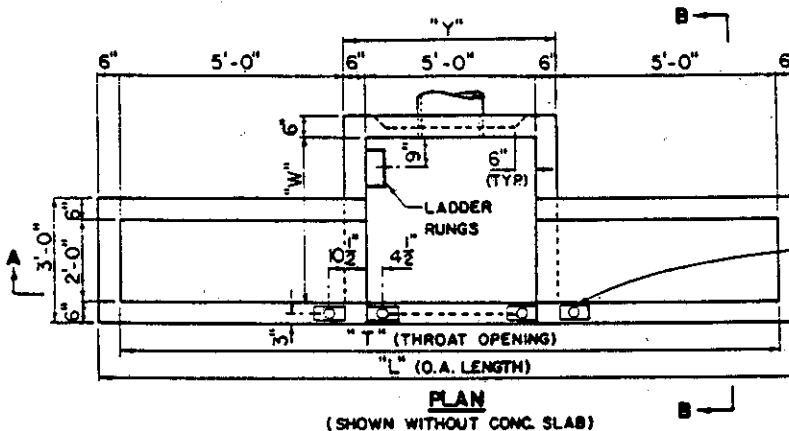


5" x 1/2" ANCHOR BOLTS SPACED @ 3'-6" MAX. GALVANIZED AFTER WELDING

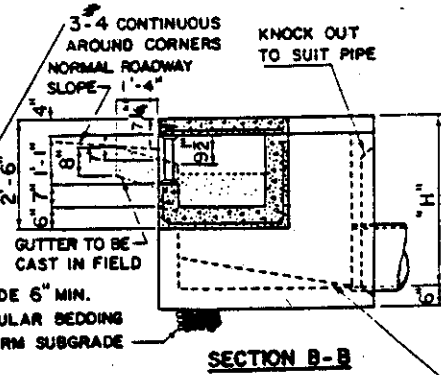
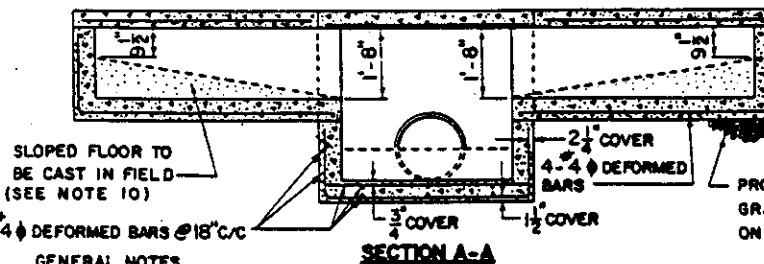


INLET	"T"	"L"
COS-5	5'-0"	6'-0"
COS-15	16'-0"	17'-0"

FOR CONFIGURATION OF GUTTER PAN & STRIPING DETAILS, SEE DETAIL D/33



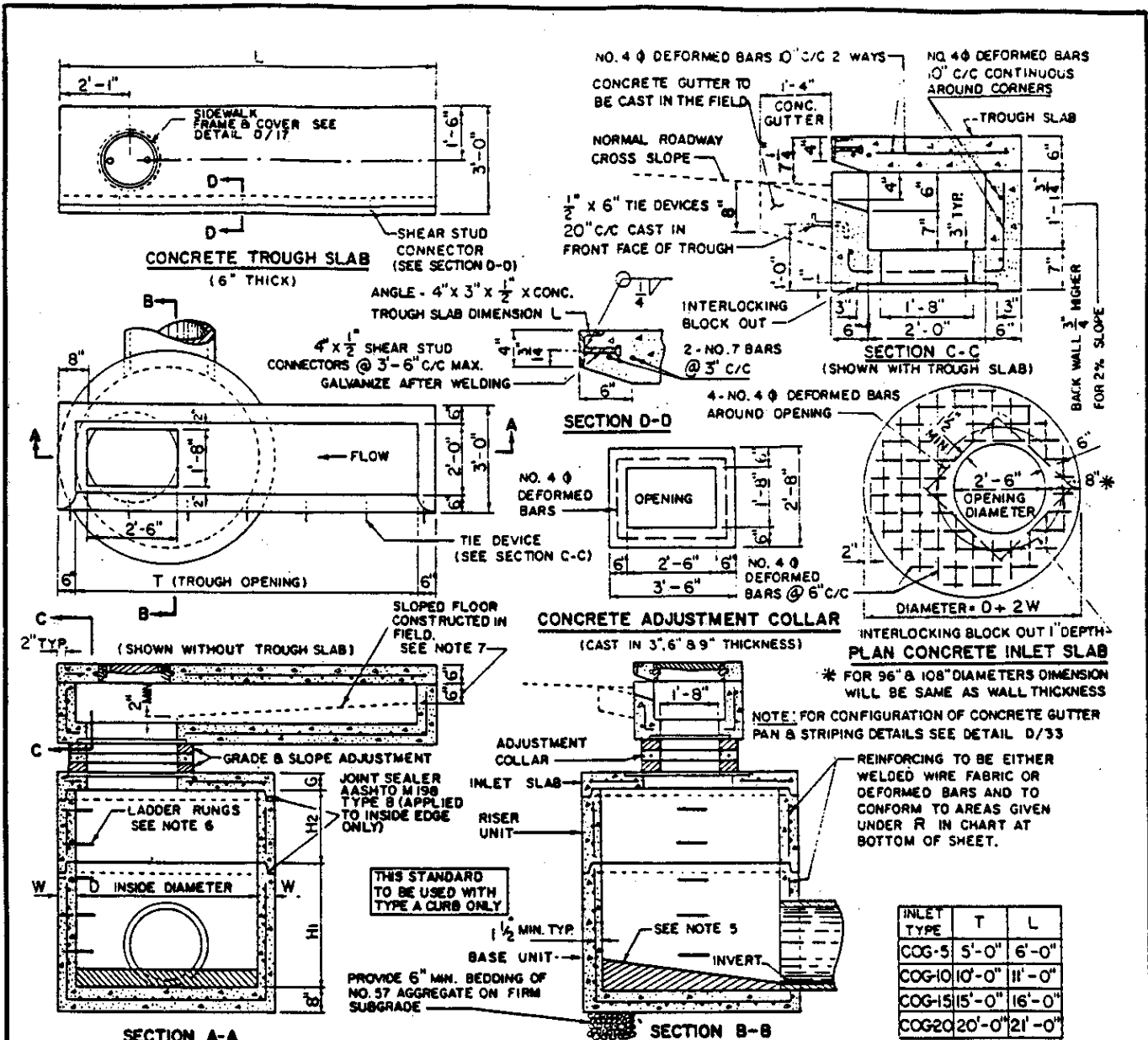
STEEL SUPPORT POSTS 3" Ø WITH 4" X 9" X 1/2" CAP & BASE PLATE



- GENERAL NOTES**
1. CURB OPENING SHOULD NOT ENCR OACH ON CROSSWALK AREAS.
 2. CONCRETE TO BE MIX NO.6
 3. THREADED PLASTIC INSERTS TO BE PROVIDED FOR HANDLING.
 4. PIPE KNOCKOUTS 4.5' VERTICALLY, TO BE PROVIDED AS SHOWN ON PLAN.
 5. INLET INVERTS TO BE PROVIDED IN FIELD AS REQUIRED.
 6. WHERE PIPE INVERTS ARE ABOVE BOTTOM OF BOX PROVIDE CONCRETE OR BRICK CHANNEL TO MEET PIPE INVERT.
 7. STANDARD MANHOLE STEPS SHALL BE INSTALLED AS SHOWN OR AS DIRECTED BY THE ENGINEER, SEE DETAIL S/21
 8. CHANNELS AND ANCHOR BOLTS TO BE GALVANIZED IN ACCORDANCE WITH ASTM A-123, AFTER WELDING.
 9. PIPE KNOCKOUTS, HORIZONTALLY, ARE CONTINGENT UPON THE SIZE OF THE PIPE CONNECTED. A 6" THICKNESS, HOWEVER, MUST BE MAINTAINED AROUND THE PERIMETER OF THE WALL.
 10. 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.
 11. THIS STANDARD TO BE USED WITH STANDARD COMBINATION CURB AND GUTTER, DETAIL I/24 ONLY.

"W"	"Y"	"H"
6'-0"	6'-0"	4' TO 8'
8'-0"	6'-0"	4' TO 8'
10'-0"	6'-0"	4' TO 8'
12'-0"	6'-0"	4' TO 8'

ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS	APPROVE <i>[Signature]</i> 1/1/88 CHIEF ENGINEER	STANDARD DRAINAGE DETAILS PRECAST SQUARE AND RECTANGULAR COS INLETS 5' & 15'	REVISED	D 35
	DESIGN ENGINEER <i>[Signature]</i> 9/16/80			
	DATE			

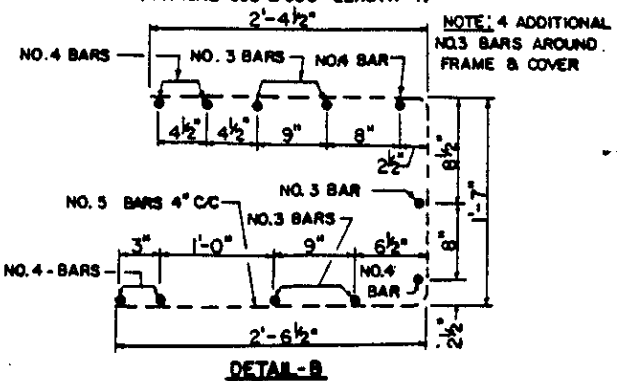
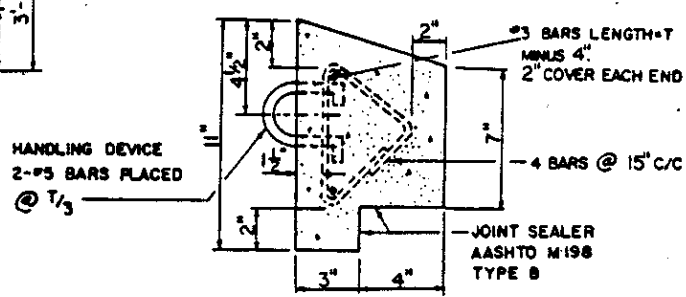
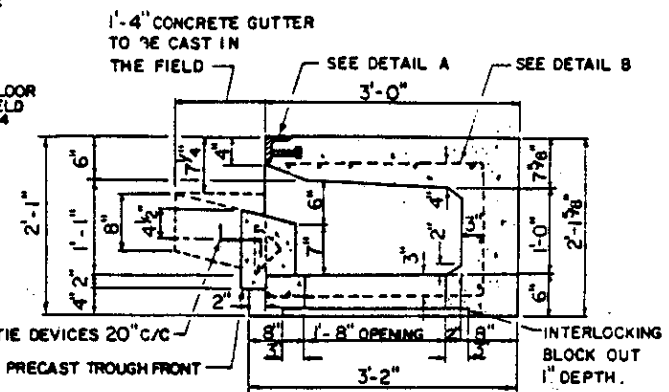
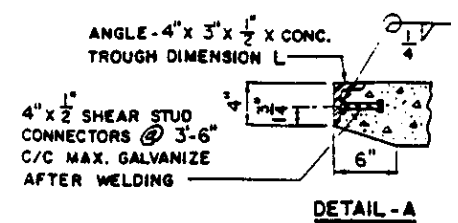
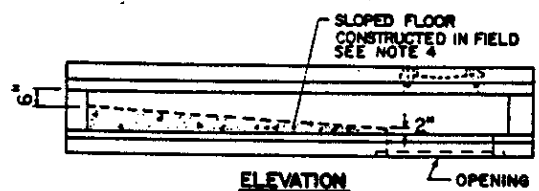
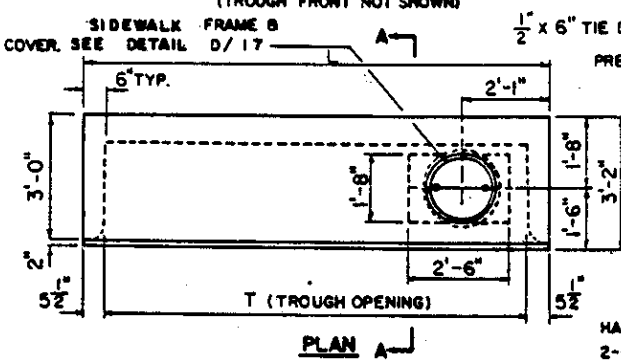
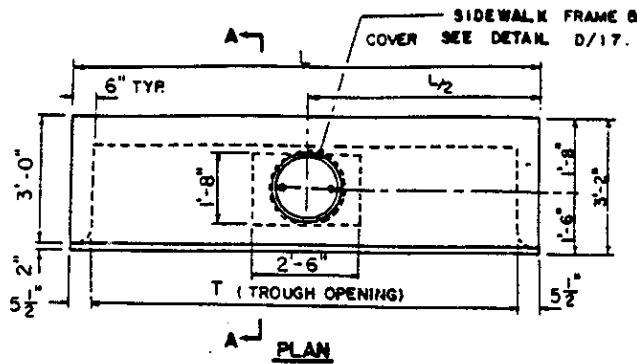


- NOTES:**
1. CURB OPENING SHALL NOT ENCRUCH ON CROSSWALK AREAS.
 2. CONCRETE TO BE MIX. NO. 6 (4500 PSI)
 3. ANGLES AND ANCHOR BOLTS TO BE GALVANIZED AFTER WELDING IN ACCORDANCE WITH ASTM A 123.
 4. GRADE AND SLOPE ADJUSTMENTS SHALL BE COMPLETED IN THE FIELD USING PRECAST ADJUSTMENT COLLAR AND MORTAR.
 5. A CONCRETE OR BRICK CHANNEL SHALL BE PROVIDED IN THE FIELD AND SHALL SLOPE 2" PER FT. TOWARD OUTLET.
 6. STANDARD MANHOLE STEPS SHALL BE INSTALLED AS SHOWN OR AS DIRECTED BY THE ENGINEER, SEE DETAIL S/21.
 7. 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.
 8. SEE DETAIL D/35B FOR ALTERNATE PRECAST TROUGH FLOOR.

CIRCULAR BASE AND RISER UNIT DIMENSIONS				INLET SLAB	R-REN. SQ. IN. PER FOOT
H1	H2	W	D		
1' to 4'	1' to 4'	4"	36"	NOT USED	.09
1' to 5'	1' to 5'	5"	48"	6"	.12
1' to 6'	1' to 6'	6"	60"	8"	.15
1' to 7'	1' to 7'	7"	72"	8"	.18
1' to 8'	1' to 8'	8"	84"	8"	.21
1' to 9'	1' to 9'	9"	96"	8"	.24
1' to 10'	1' to 10'	10"	108"	8"	.27

THIS STANDARD TO BE USED WITH COMBINATION CURB & GUTTER, SEE DETAIL 1/24

ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS APPROVED [Signature] CHIEF ENGINEER [Signature] DESIGN ENGINEER DATE	STANDARD DRAINAGE DETAILS PRECAST CIRCULAR COS INLETS 5', 10', 15' & 20'	REVISED	D 35A	



- NOTES:**
1. CONCRETE TO BE MIX NO. 6 (4500 PSI)
 2. ASTM A 615 GRADE 60 STEEL.
 3. SEE DETAIL D/348 FOR PRECAST CIRCULAR COS INLET DETAILS AND DETAIL D/35A FOR PRECAST CIRCULAR COS INLET DETAILS.
 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 PRECAST TROUGH FLOOR.

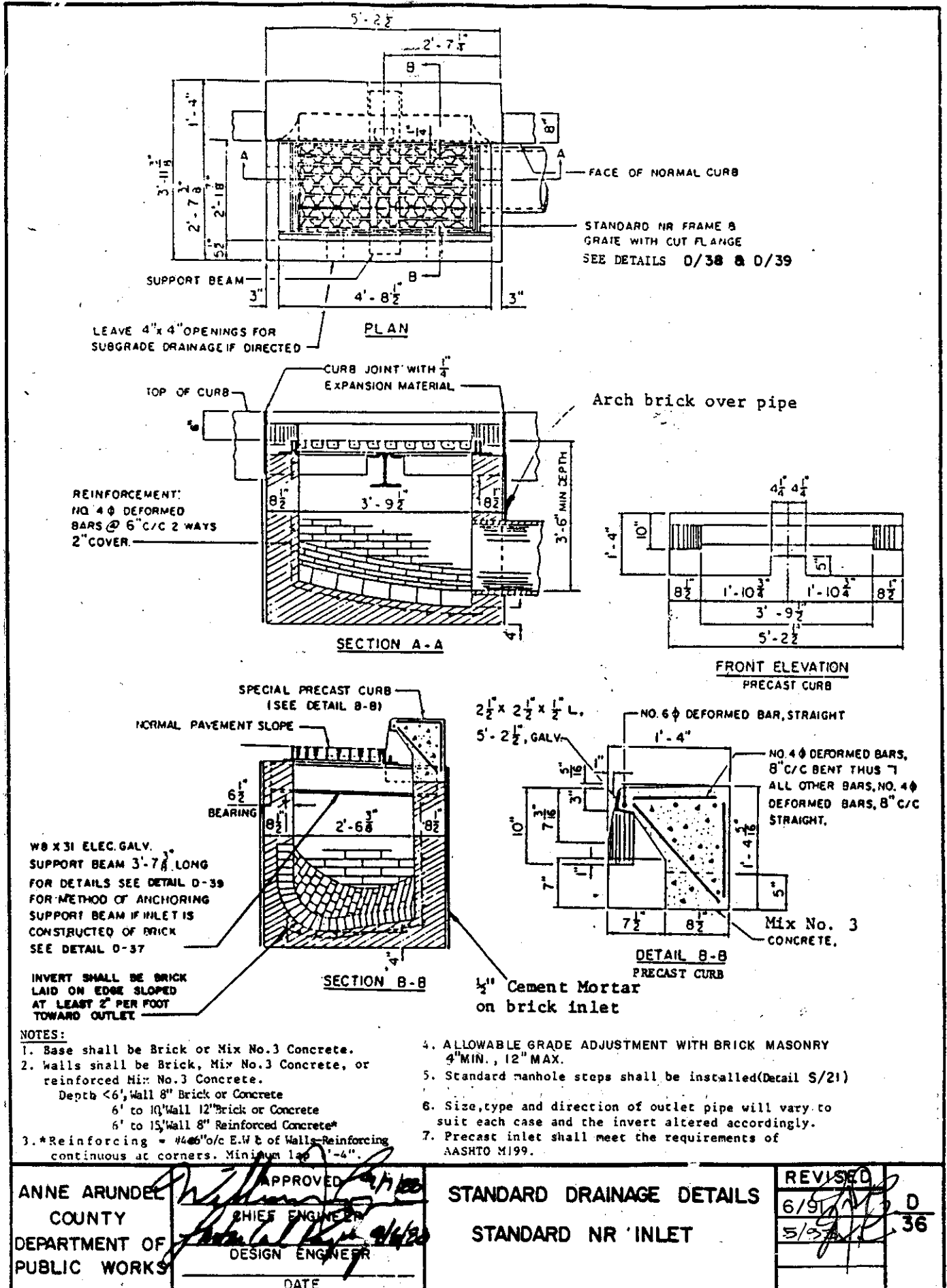
INLET TYPE	T	L
COG-5	5'-0"	6'-0"
COG-10	10'-0"	11'-0"
COG-15	15'-0"	16'-0"
COG-20	20'-0"	21'-0"
COS-5	5'-0"	6'-0"
COS-10	10'-0"	11'-0"
COS-15	15'-0"	16'-0"
COS-20	20'-0"	21'-0"

ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS

APPROVED
 CHIEF ENGINEER
 DESIGN ENGINEER
 DATE

STANDARD DRAINAGE DETAILS
 ALTERNATE PRECAST TROUGHS
 FOR PRECAST CIRCULAR COG & COS INLETS

REVISED
 D
 35B

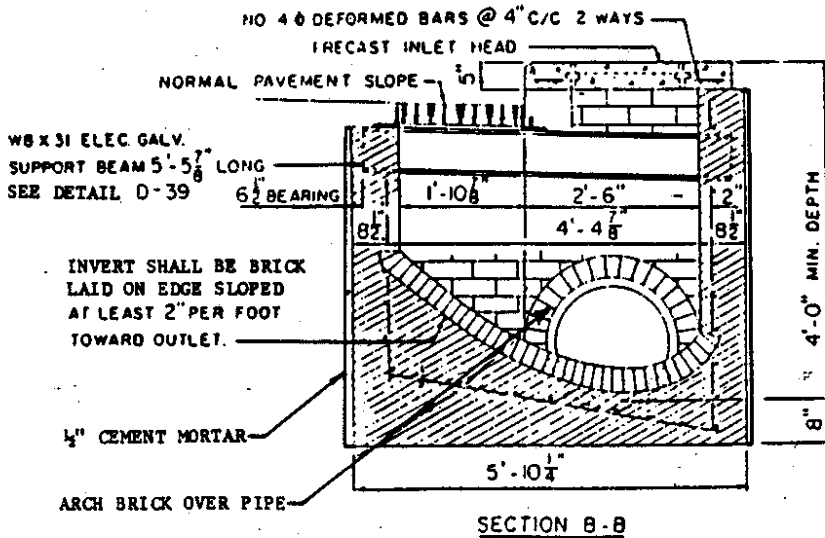
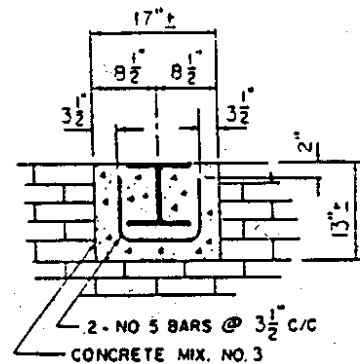
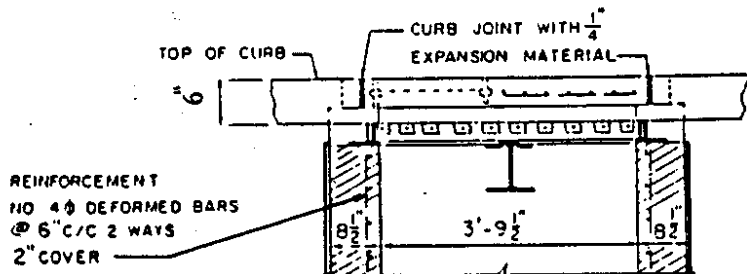
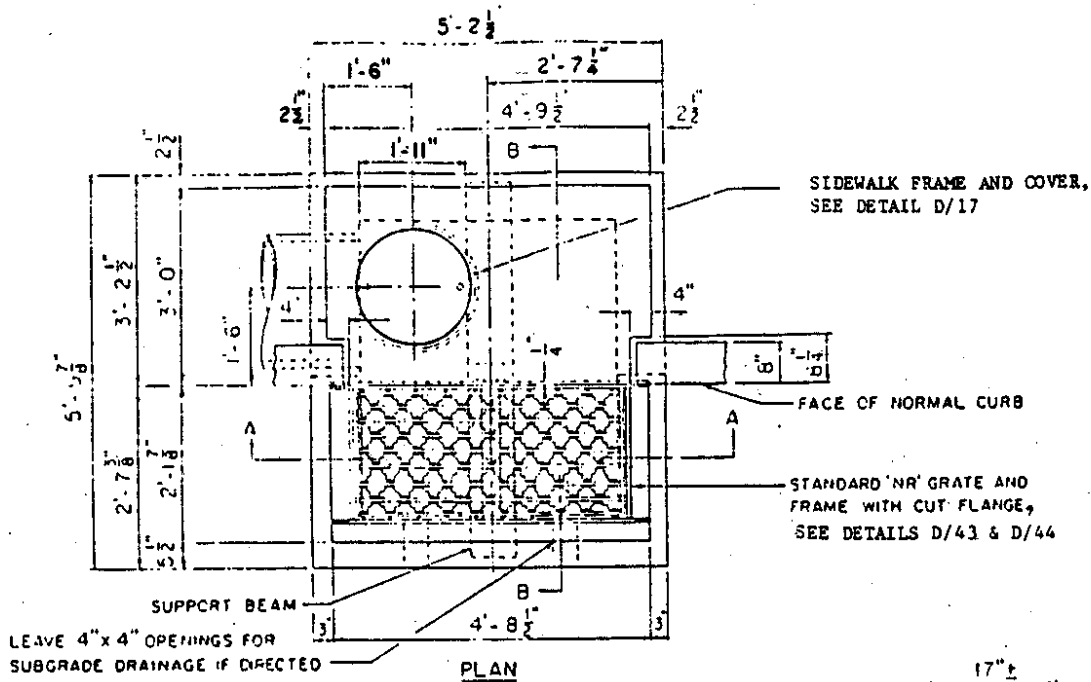


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DEPARTMENT OF PUBLIC WORKS

CHIEF ENGINEER
DESIGN ENGINEER
DATE

STANDARD DRAINAGE DETAILS
STANDARD NR INLET

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6/9/91
5/9/91
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36



NOTES:

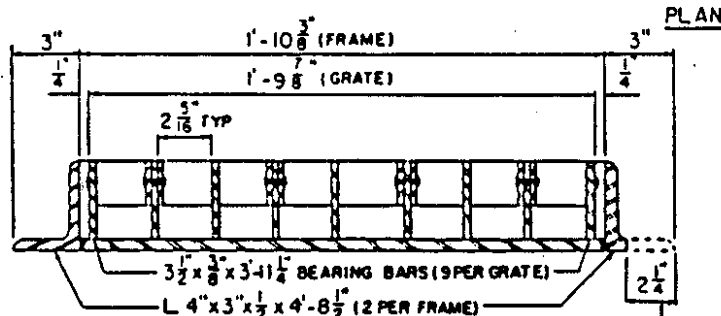
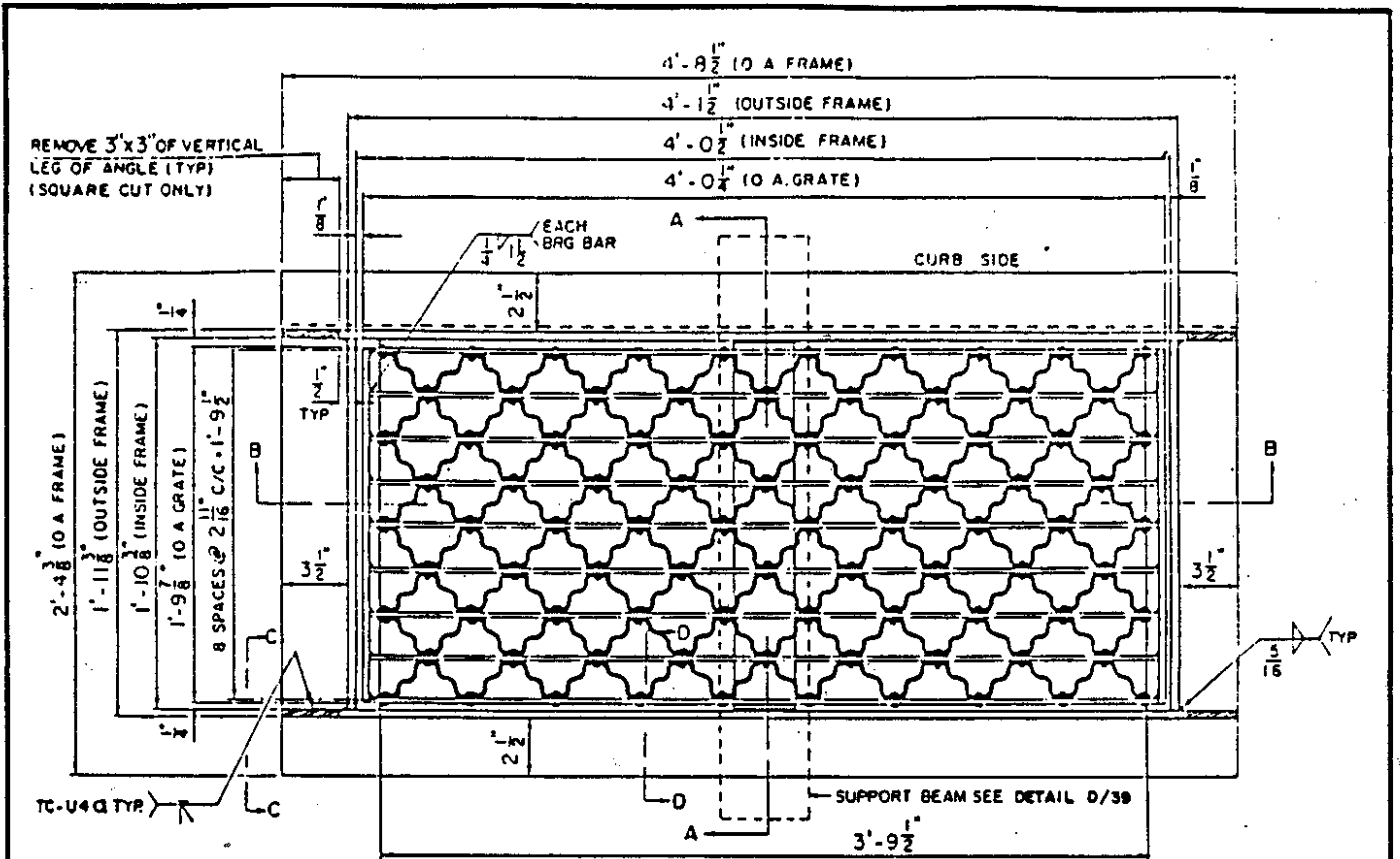
1. Base shall be Brick or Mix No.3 Concrete.
2. Walls shall be Brick, Mix No.3 Concrete, or Reinforced Mix No.3 Concrete.
DEPTH < 6' Wall 8" Brick or Concrete
6' to 10' Wall 12" Brick or Concrete
6' to 15' Wall 8" Reinforced Concrete*
- 3.*Reinforcing = 400# o/c.E.M.t of Walls
Reinforcing continuous at corners
Minimum lap 1'-4".
4. ALLOWABLE GRADE ADJUSTMENT WITH BRICK MASONRY 4" MIN, 12" MAX.
5. Standard manhole steps shall be installed, See Detail S/21.
6. Size, type and direction of outlet pipe will vary to suit each case and Invert altered accordingly.
7. Precast inlet shall meet the requirements of AASHTO M 199

ANNE ARUNDEL
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DEPARTMENT OF
PUBLIC WORKS

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[Signature]
CHIEF ENGINEER
DESIGN ENGINEER
DATE

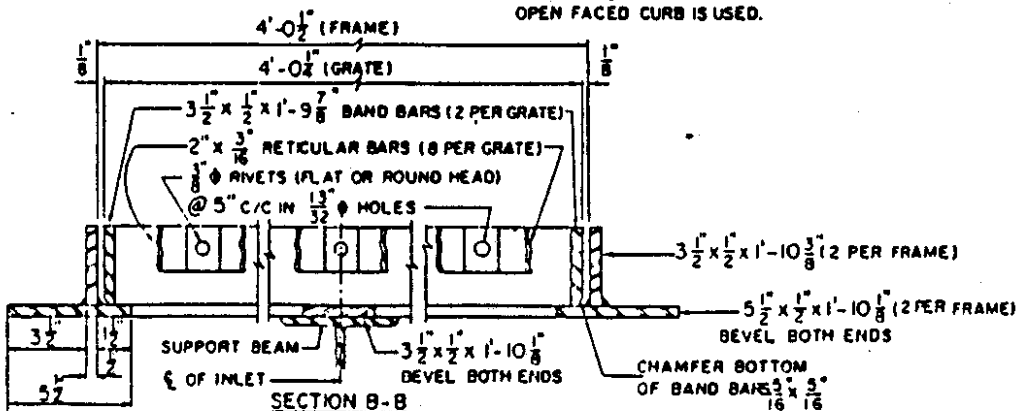
STANDARD DRAINAGE DETAILS
STANDARD NRM INLET

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5/53	37



SECTION A-A

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



SECTION B-B

GENERAL NOTES

- 1. FRAMES & GRATES TO BE SQUARE FLAT & TRUE.
- 2. STRUCTURAL STEEL SHALL BE A.S.T.M DESIGNATION A-36.
- 3. FRAMES & GRATES TO BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH A.S.T.M. DESIGNATION A-123

ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS

[Signature]
 CHIEF ENGINEER

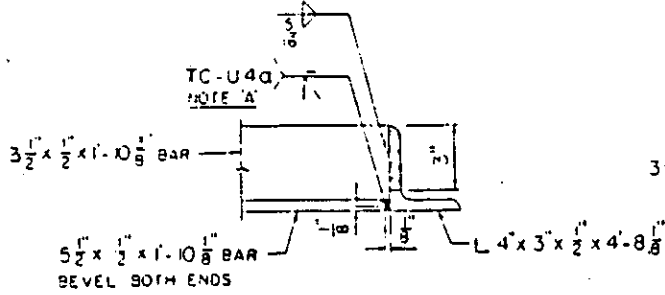
[Signature]
 DESIGN ENGINEER

DATE

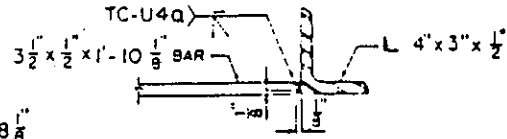
STANDARD DRAINAGE DETAILS
STANDARD NR INLET
FRAME & GRATE

REVISED	D
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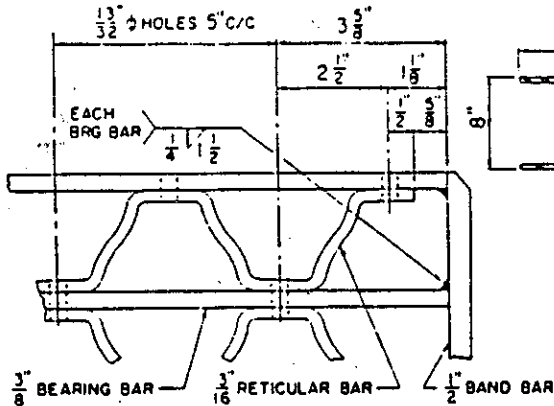
NOTE 'A' - WELD $5\frac{1}{2} \times \frac{1}{2}$ BAR TO $4 \times 3 \times \frac{1}{2}$ L
BEFORE WELDING $3\frac{1}{2} \times \frac{1}{2}$ BAR



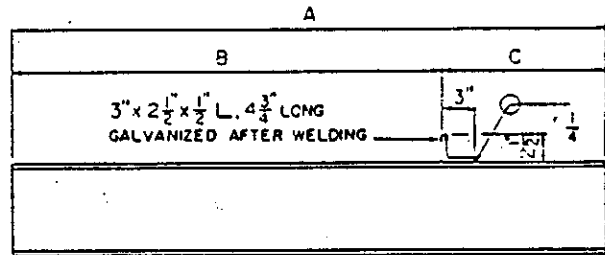
SECTION C-C



SECTION D-D
(GRATE NOT SHOWN)





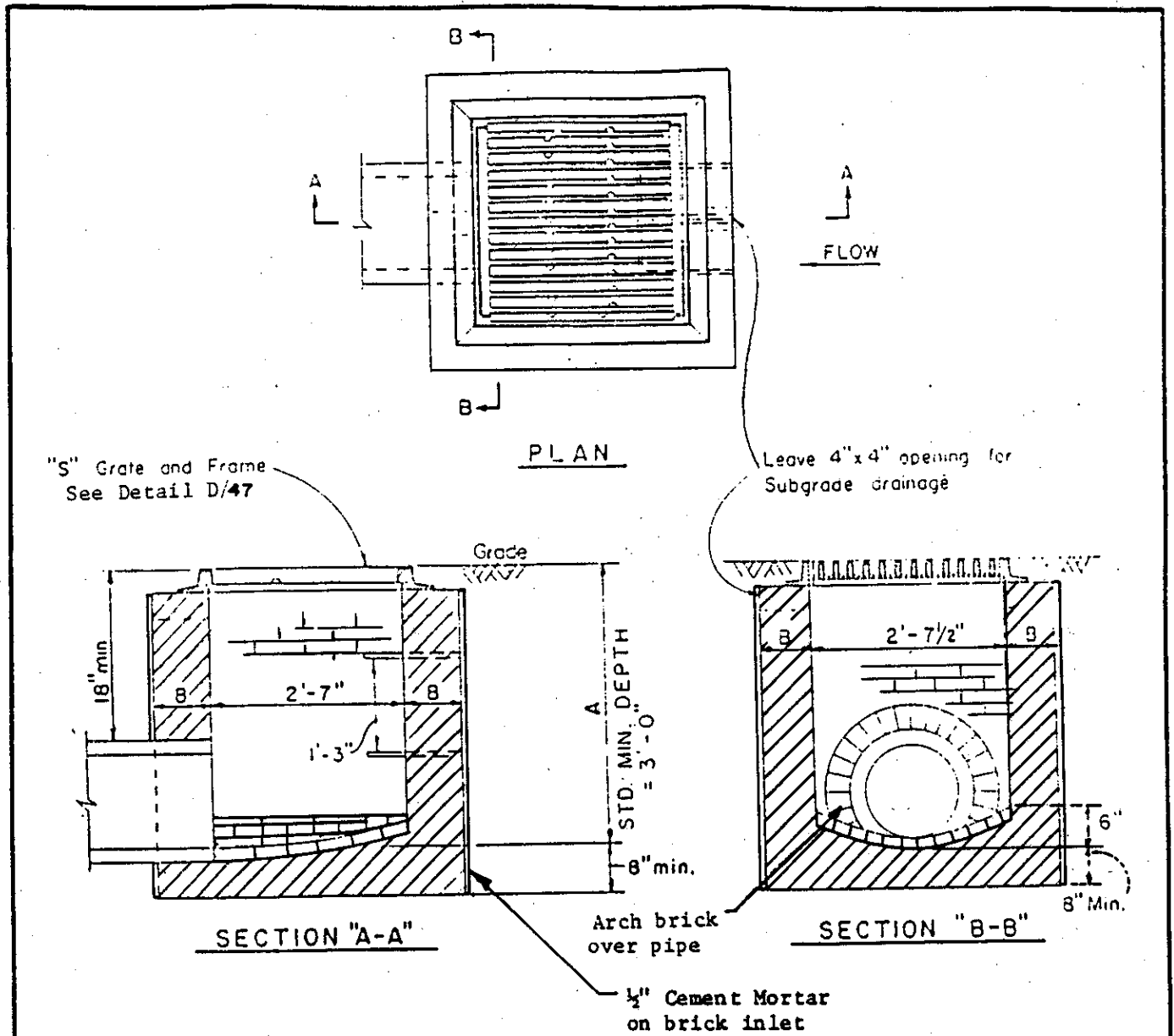
GRATING DETAIL



SUPPORT BEAM
WB X 31 ELEC. GALV.

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

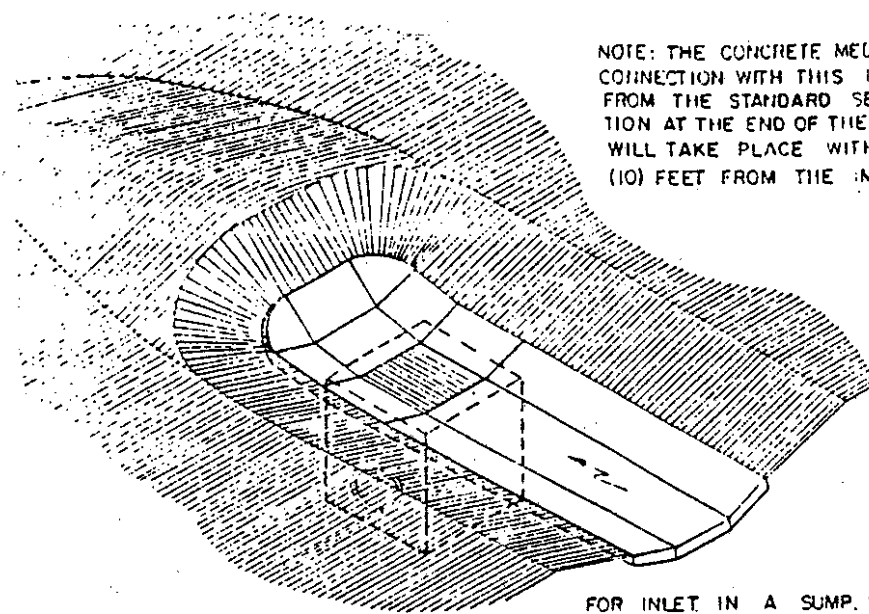
ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS	APPROVED  CHIEF ENGINEER	STANDARD DRAINAGE DETAILS STANDARD NR INLET FRAME & GRATE	REVISED	0 39
	DESIGN ENGINEER 		_____	
	DATE		_____	
	_____		_____	



NOTES:

1. Wall and Base shall be Brick or Mix No.3 Concrete
2. B=8" Where A is less than 8'
B=12" Where A is 8' to 14'
3. Allowable grade adjustment with brick masonry 4" Min., 12" Max.
4. Invert shall be brick laid on edge.
5. Bench (as per Type A Manhole) shall be built into inlet where drains 24" and longer run through inlet.
6. Where A is 3'-6" or greater standard manhole steps shall be installed as shown. See Detail S/21.
7. Precast inlets shall meet the requirements of AASHTO M 199

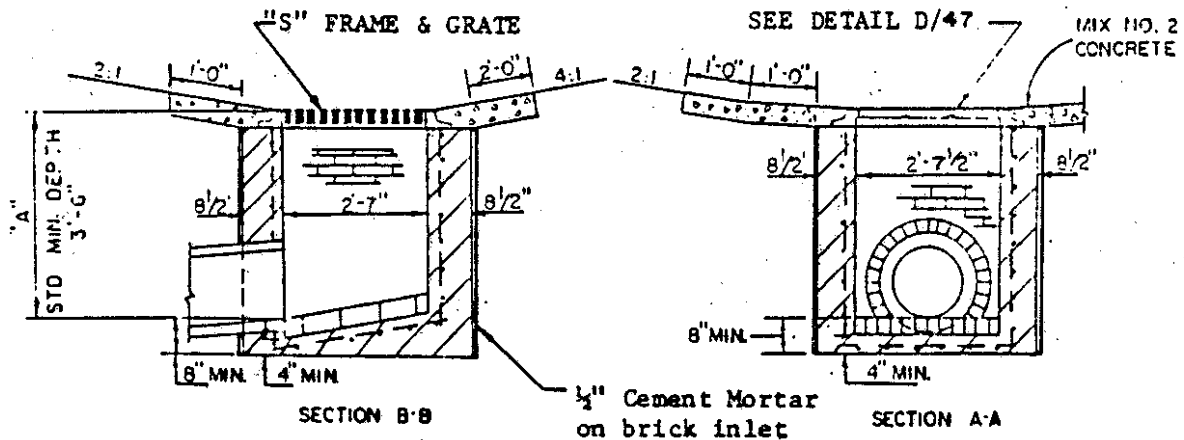
ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS	APPROVED <i>[Signature]</i> CHIEF ENGINEER	STANDARD DRAINAGE DETAILS TYPE "S" INLET	REVISED 6/19/10 5/9/10	D 40
	DESIGN ENGINEER DATE			



NOTE: THE CONCRETE MEDIAN DITCH 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 WITHIN A DISTANCE OF TEN (10) FEET FROM THE INLET.

FOR INLET IN A SUMP. SEE GUTTER DETAILS AS SHOWN IN THE ISOMETRIC VIEW ON STD. D/43

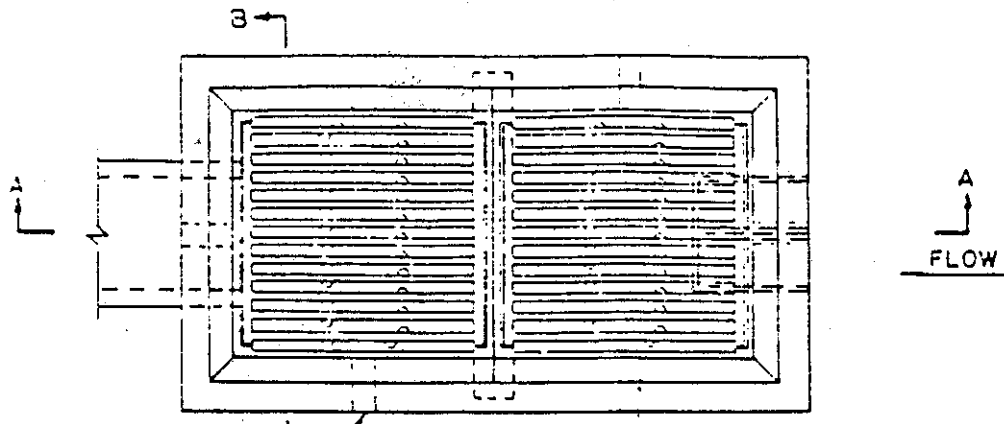
ISOMETRIC VIEW



NOTES:

1. Base shall be plain Mix No.3 Concrete or Brick. Invert shall be brick laid on edge. Invert to slope down toward outlet at the rate of two(2) inches per foot, or as directed.
2. Walls shall be constructed of reinforced Mix No.3 Concrete or brick. Size, type & direction of inlet connection will vary to suit conditions.
3. Reinforcement No.4 (1/2") deformed bars at 6"C. to C., 2" cover.
4. 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.
5. Allowable grade adjustment with brick masonry 4" Min., 12" Max.
6. Standard manhole steps should be installed, see Detail S/21.
7. Precast inlets shall meet the requirements of AA SHTO M 199

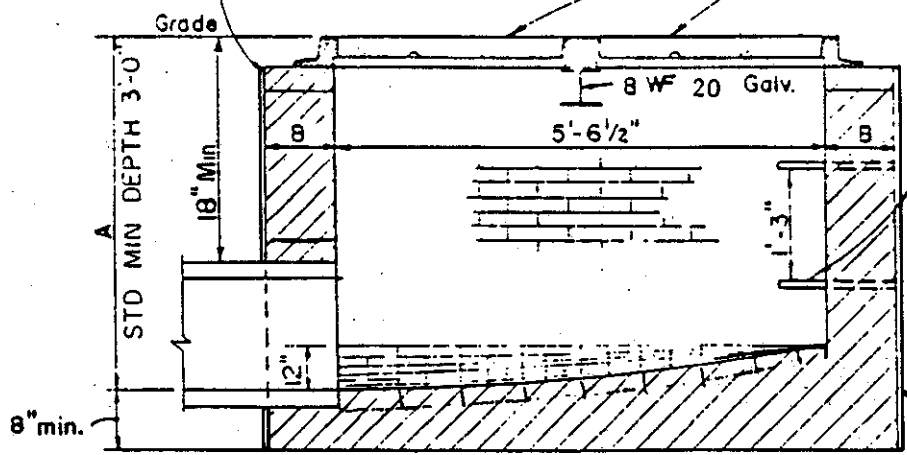
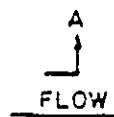
ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS	APPROVED CHIEF ENGINEER DESIGN ENGINEER DATE	STANDARD DRAINAGE DETAILS TYPE SD INLET SINGLE GRATE	REVISED 6/9/41 5/22/41 D-41
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PLAN

Leave 4" x 4" opening for Subgrade drainage.

"S" Grate & Frame with cut Flanges See Detail D/47

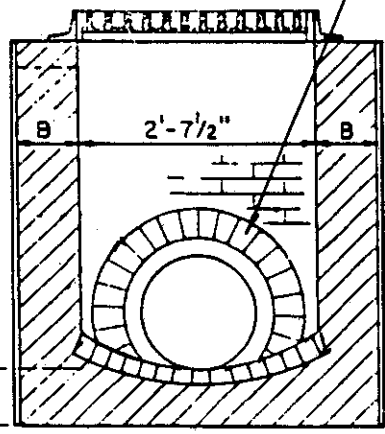


SECTION "A-A"

Where A is 3'-6" or greater standard manhole steps shall be installed as shown. See Detail S/21.

1/2" Cement Mortar on brick inlet

Arch brick over pipe



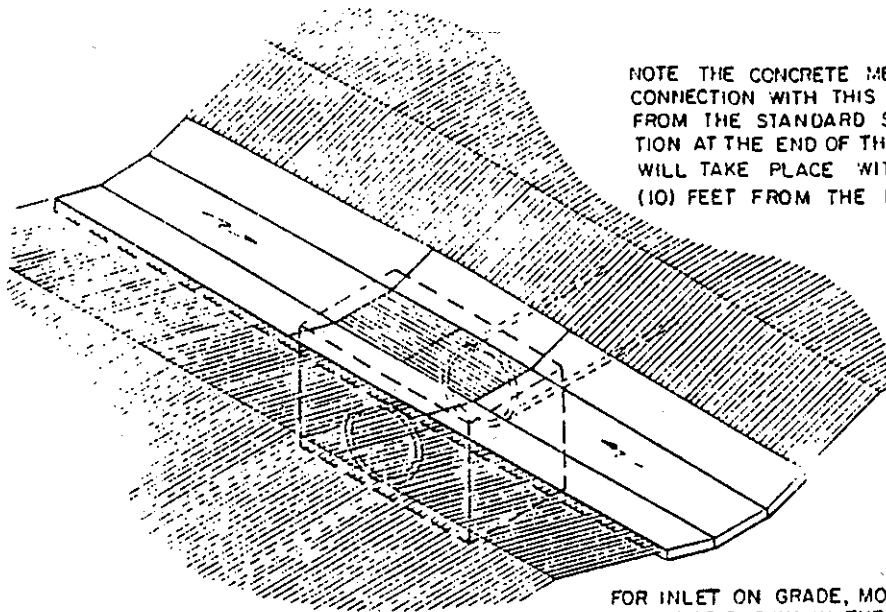
SECTION "B-B"

Notes:

1. Base shall be Brick or Mix No. 3 Concrete.
2. Walls shall be Brick (Br.) Mix No. 3 Concrete (P.C.) or Reinf. Mix No. 3 Conc. (R.C.) See Table for dimensions.
3. *Reinforcing = "4 @ 10" % E.W. in $\frac{1}{2}$ of walls. Reinforcing continuous at corners. All laps 1'-4"
4. Allowable grade adjustment with brick masonry 4" min., 12" max.
5. invert shall be brick laid on edge.
6. Bench (as per Type A Manhole) shall be built into inlet where drains 24" and larger run through inlet.
7. Precast inlets shall meet the requirements of AASHTO M 199

A	B	Walls
< 6'	8"	Br. or P.C.
6' to 10'	12"	Br. or P.C.
6' to 15'	8"	R.C. *

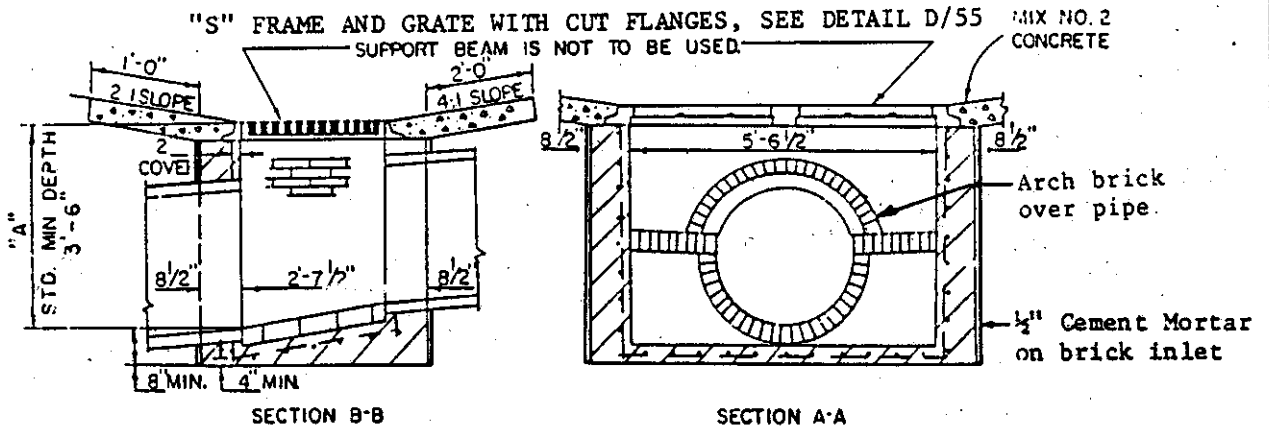
ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS	APPROVED <i>[Signature]</i> CHIEF ENGINEER DESIGN ENGINEER <i>[Signature]</i> DATE _____	STANDARD DRAINAGE DETAILS DOUBLE TYPE "S" INLET	REVISED 6/9/91 5/2/91 D 42
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NOTE THE CONCRETE MEDIAN DITCH TO BE 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 WITHIN A DISTANCE OF TEN (10) FEET FROM THE INLET.

ISOMETRIC VIEW

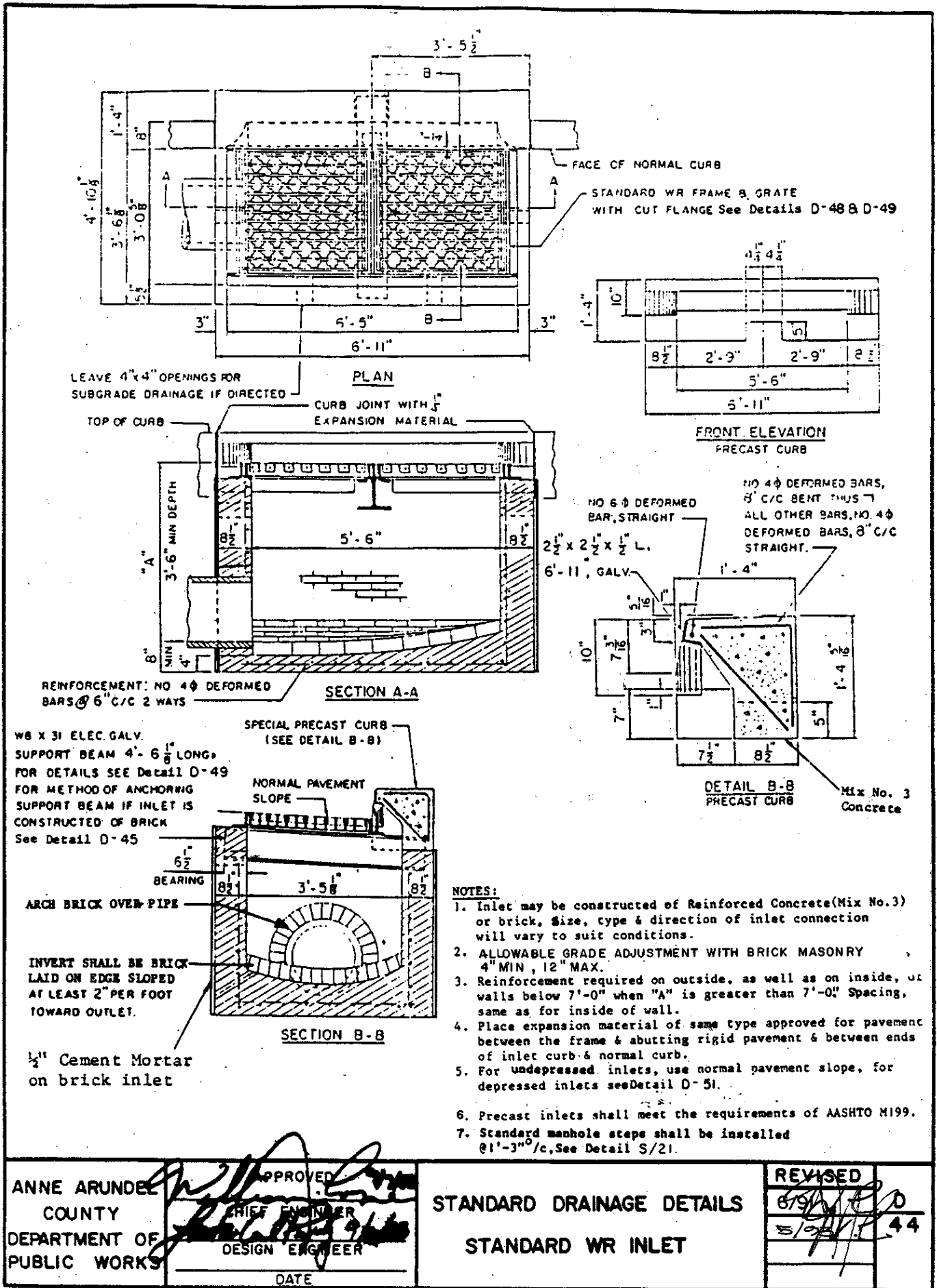
FOR INLET ON GRADE, MODIFY SLOPES AS SHOWN IN THE ISOMETRIC VIEW ON ST'D. D/41



NOTES:

1. Base shall be plain Mix No.3 Concrete or Brick. Invert shall be brick laid on edge. Invert to slope down toward outlet at the rate of two(2) inches per foot, or as directed.
2. Walls shall be constructed of reinforced Mix No.3 Concrete or brick. Size, type & direction of inlet will vary to suit conditions.
3. Reinforcement No.4 (1/2") deformed bars at 6"C. to C., 2" cover.
4. 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.
5. Allowable grade adjustment with brick masonry 4" Min., 12" Max.
6. Standard manhole steps should be installed, see Deatail S/21.
7. Precast inlets shall meet the requirements of AA SHTO M 199

ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS	APPROVE CHIEF ENGINEER DESIGN ENGINEER DATE	STANDARD DRAINAGE DETAILS TYPE SOT INLET DOUBLE GRATE TANDEM	REVISED 6/9/11 43
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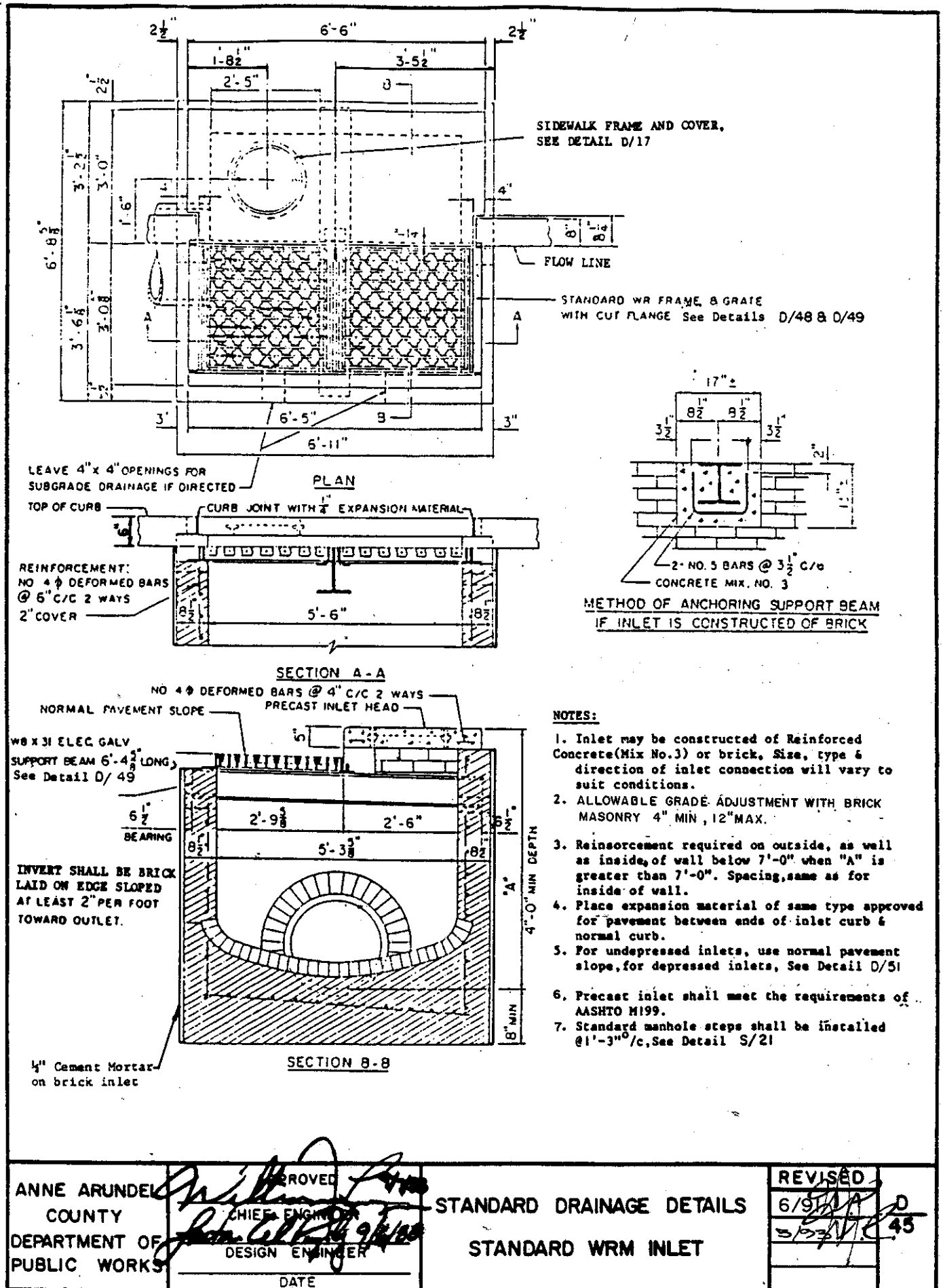


ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS

APPROVED
 CHIEF ENGINEER
 DESIGN ENGINEER
 DATE

STANDARD DRAINAGE DETAILS
 STANDARD WR INLET

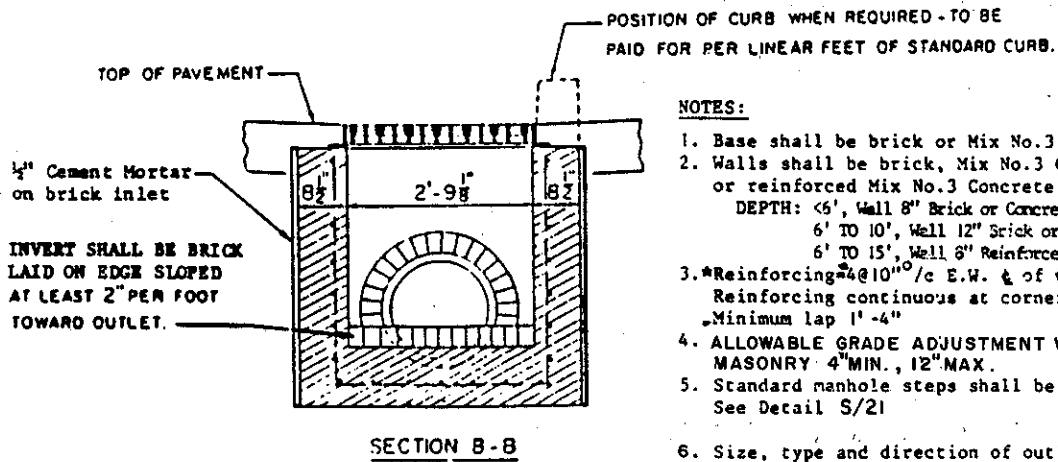
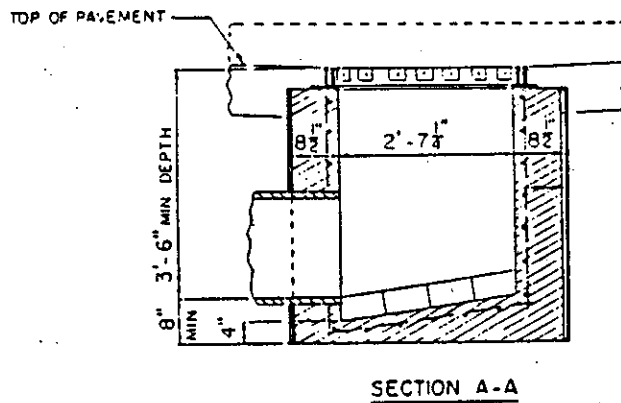
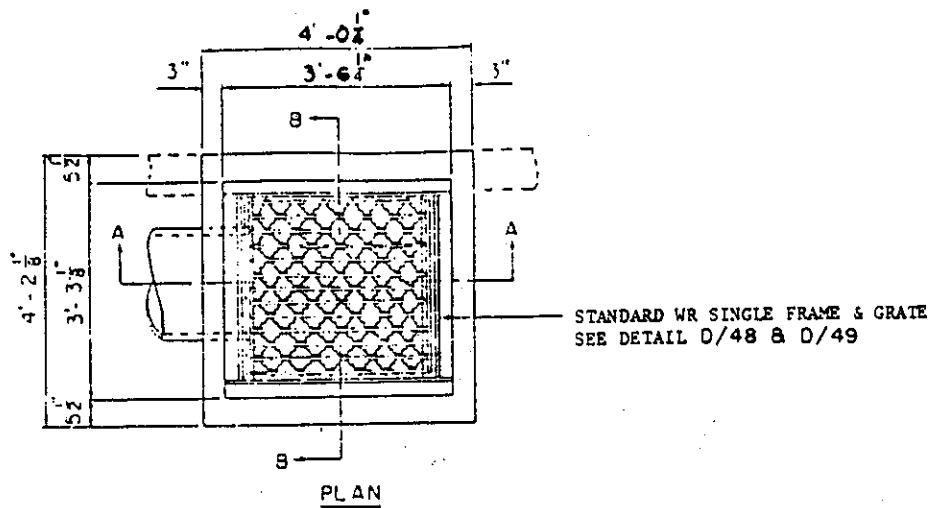
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6/9/21	D
5/25/21	44



NOTES:

1. Inlet may be constructed of Reinforced Concrete (Mix No. 3) or brick. Size, type & direction of inlet connection will vary to suit conditions.
2. ALLOWABLE GRADE ADJUSTMENT WITH BRICK MASONRY 4" MIN, 12" MAX.
3. Reinforcement required on outside, as well as inside, of wall below 7'-0" when "A" is greater than 7'-0". Spacing, same as for inside of wall.
4. Place expansion material of same type approved for pavement between ends of inlet curb & normal curb.
5. For undepressed inlets, use normal pavement slope, for depressed inlets, See Detail D/51
6. Precast inlet shall meet the requirements of AASHTO M199.
7. Standard manhole steps shall be installed @ 1'-3" c/c, See Detail S/21

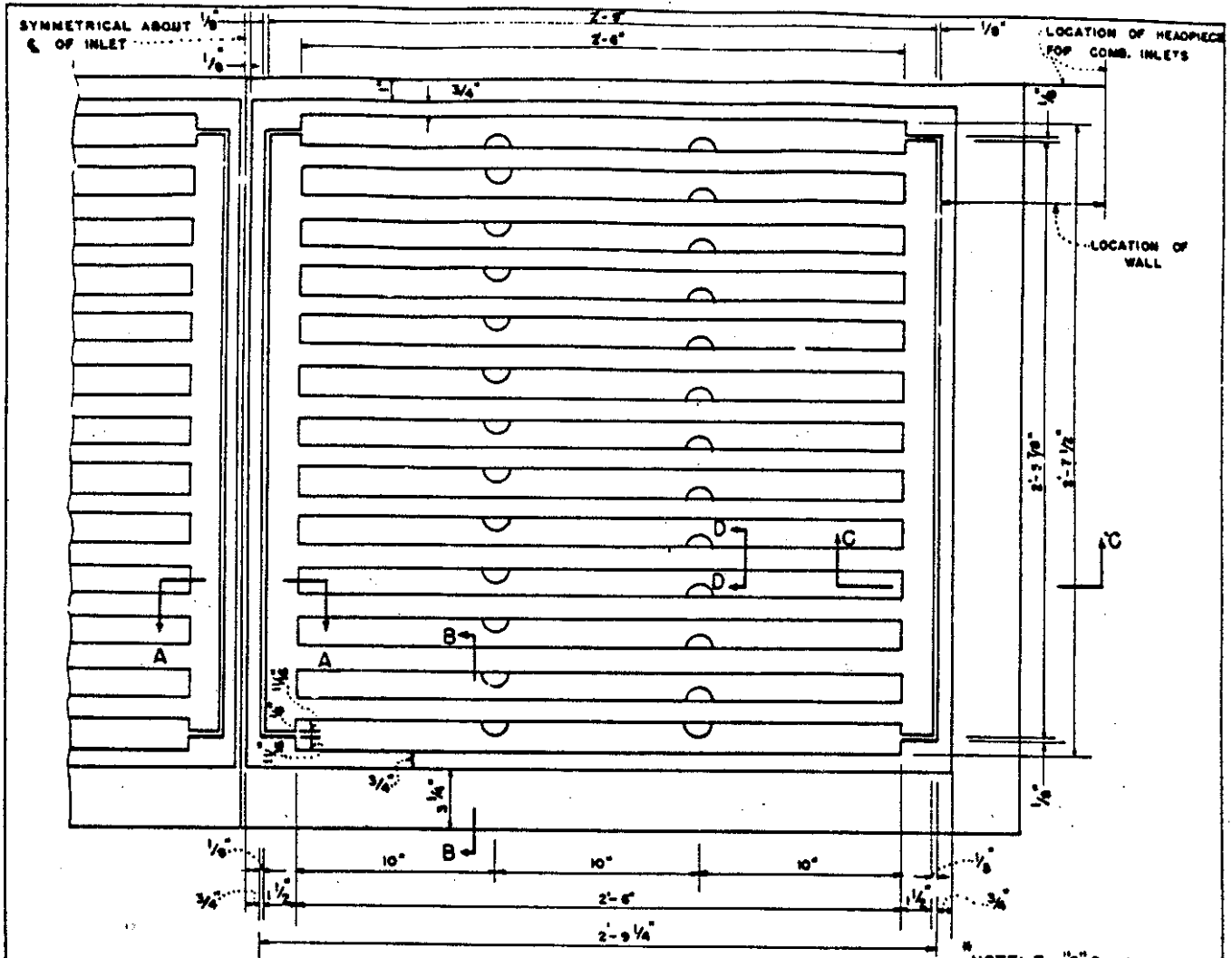
ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS	APPROVED <i>[Signature]</i> CHIEF ENGINEER DESIGN ENGINEER DATE	STANDARD DRAINAGE DETAILS STANDARD WRM INLET	REVISED 6/9/94 3/23/94 45
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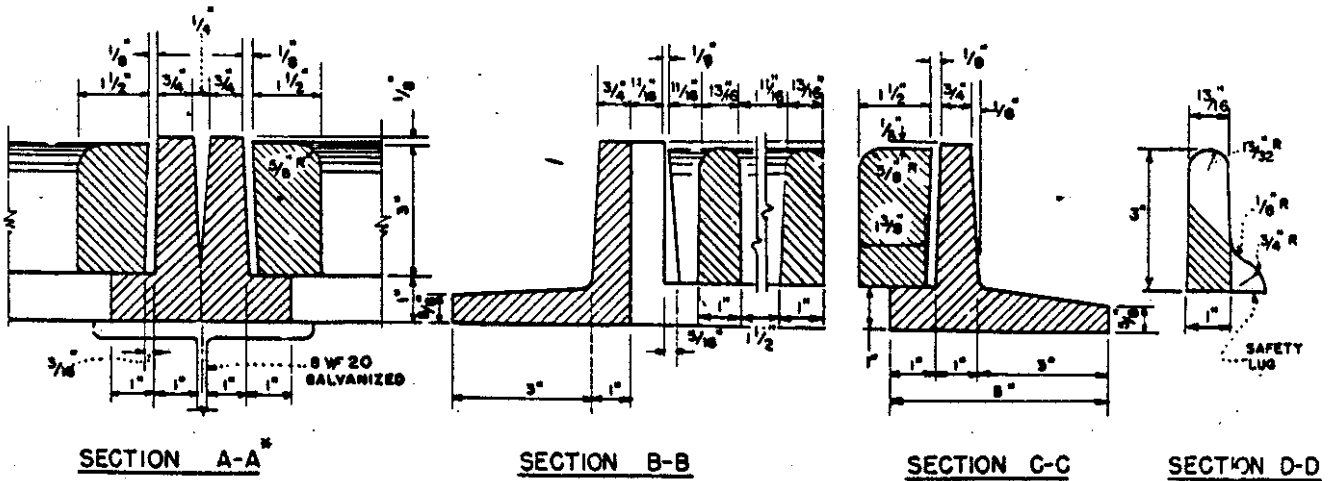
NOTES:

1. Base shall be brick or Mix No.3 Concrete.
2. Walls shall be brick, Mix No.3 Concrete, or reinforced Mix No.3 Concrete:
DEPTH: <6', Wall 8" Brick or Concrete
6' TO 10', Wall 12" Brick or Concrete
6' TO 15', Wall 8" Reinforced Concrete*
- 3.*Reinforcing #4@10"/c E.W. & of walls
Reinforcing continuous at corners
Minimum lap 1'-4"
4. ALLOWABLE GRADE ADJUSTMENT WITH BRICK MASONRY: 4" MIN., 12" MAX.
5. Standard manhole steps shall be installed, See Detail S/21
6. Size, type and direction of outlet pipe will vary to suit each case and the invert altered accordingly.
7. Precast inlet shall meet the requirements of AASHTO M199.

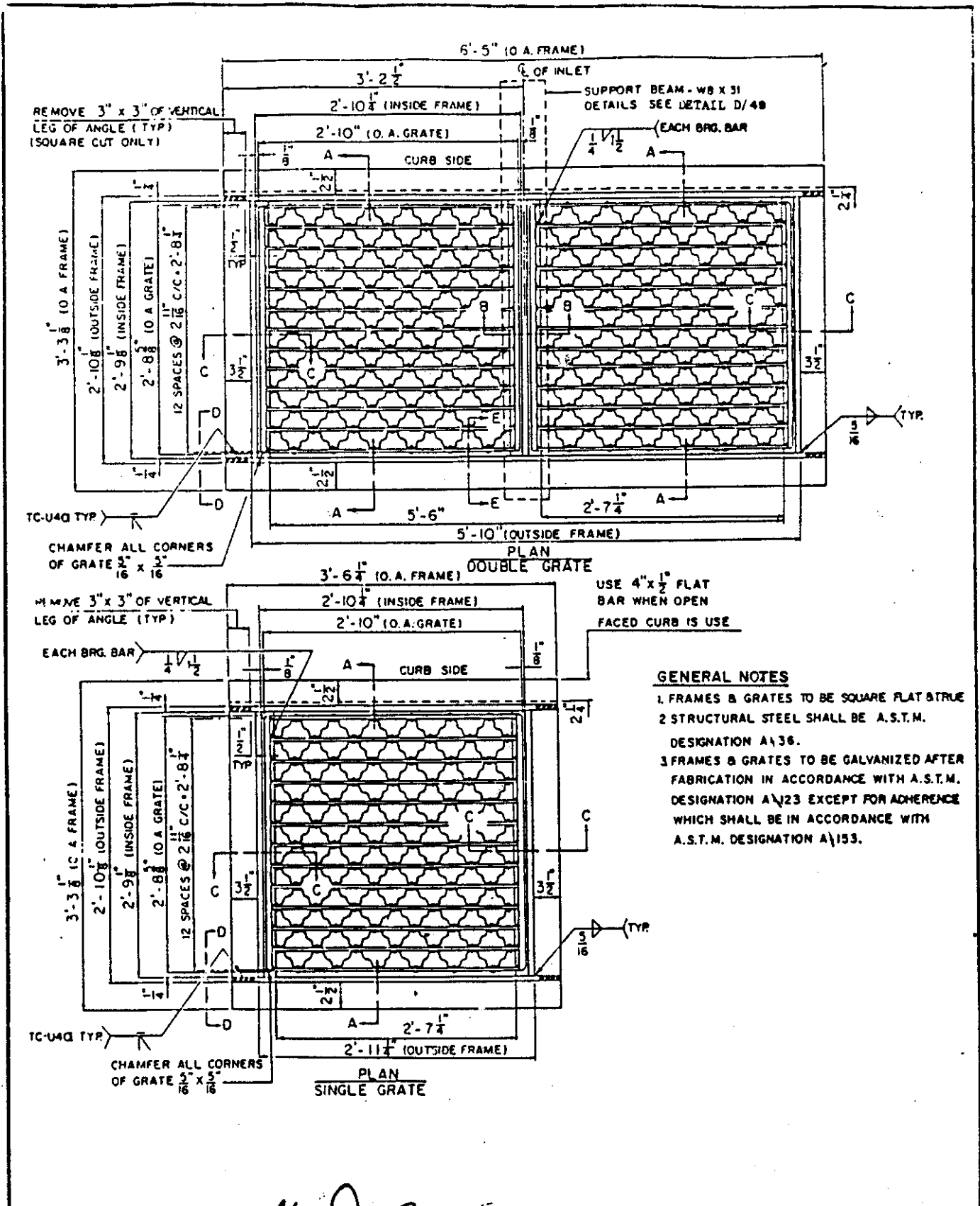
<p>ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS</p>	<p>APPROVED [Signature] CHIEF ENGINEER DESIGN ENGINEER DATE</p>	<p>STANDARD DRAINAGE DETAILS - STANDARD WR INLET</p>	<p>REVISED 6/29/91 D 46</p>
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PLAN
Double "S" Comb. Combination Inlet*



ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS	APPROVED <i>[Signature]</i> 9/16/00 CHIEF ENGINEER	STANDARD DRAINAGE DETAILS "S" GRATE DETAILS	REVISED	D 47
	DESIGN ENGINEER <i>[Signature]</i> 9/16/00			
	DATE			



APPROVED

ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS

CHIEF ENGINEER

DESIGN ENGINEER

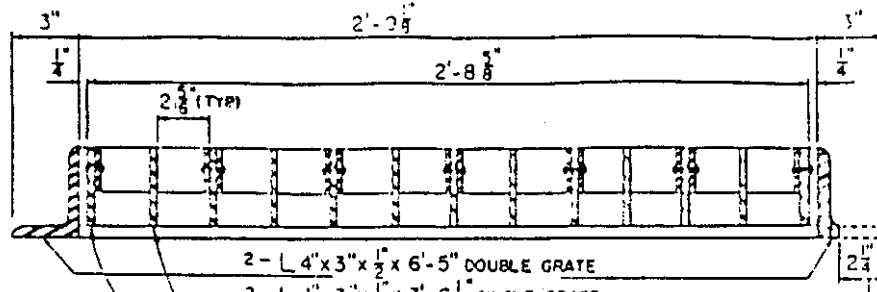
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STANDARD DRAINAGE DETAILS

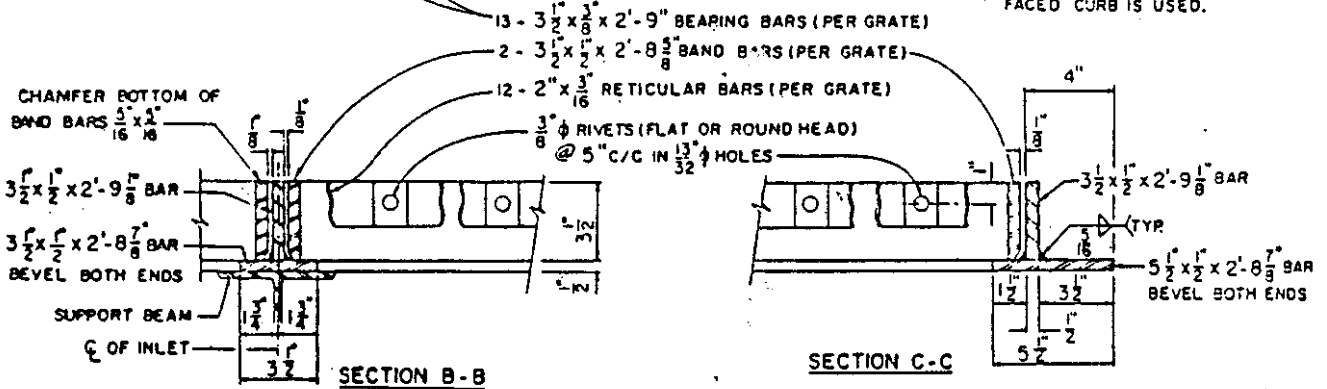
STANDARD WR INLET

FRAME & GRATE

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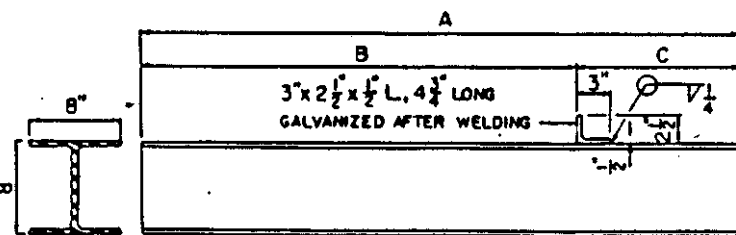
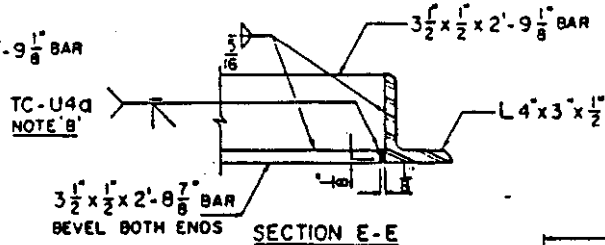
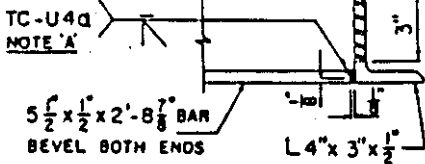


USE 4" x 1/2" FLAT BAR WHEN OPEN FACED CURB IS USED.

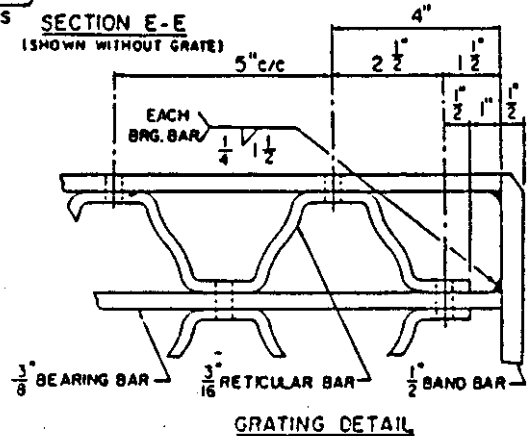


NOTE 'B' - WELD 3 1/2" x 1/2" x 2'-8 7/8" BAR TO 4" x 3" x 1/2" L BEFORE WELDING 3 1/2" x 1/2" x 2'-9 1/8" BAR

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



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

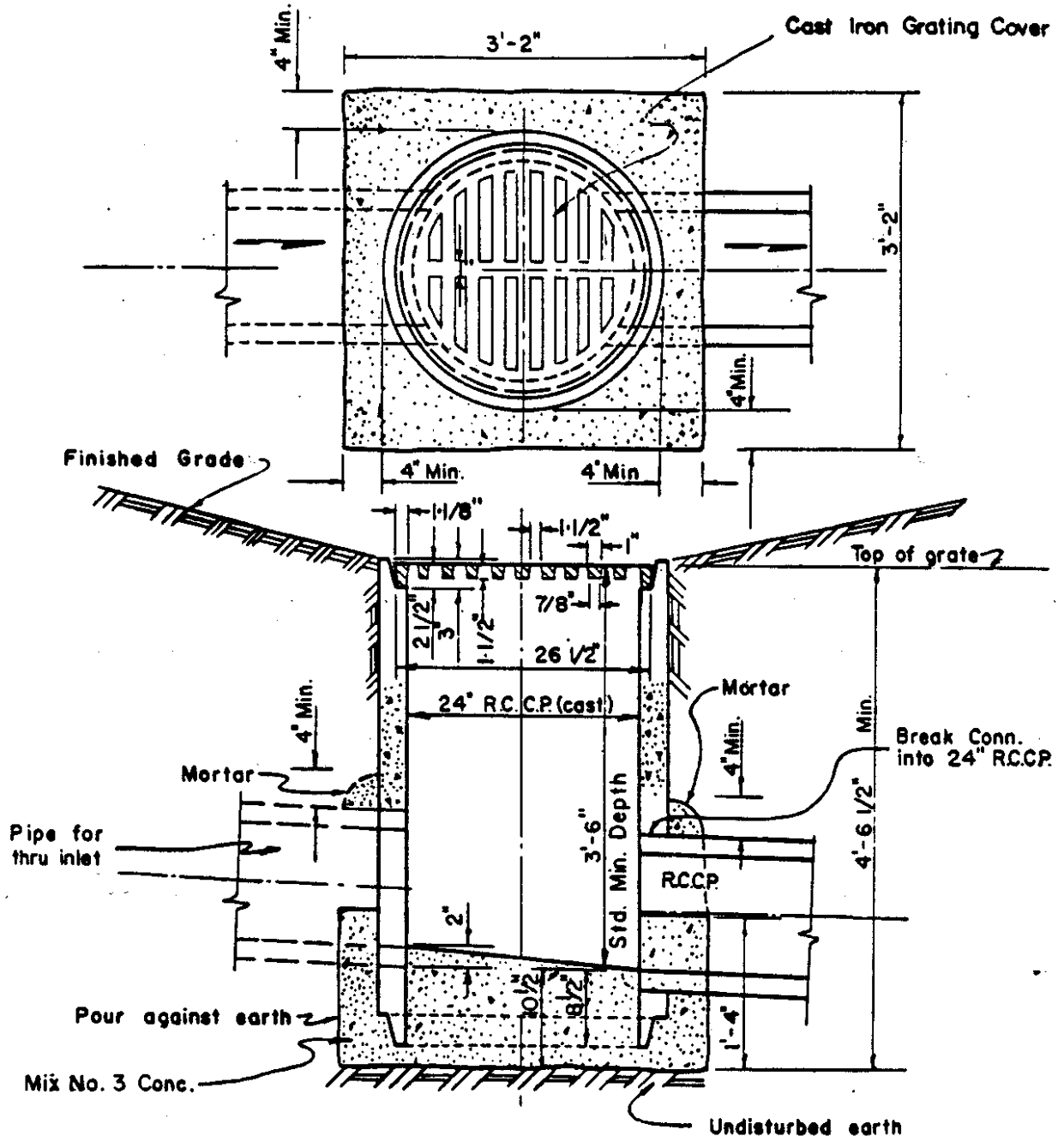


ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS

APPROVED: *[Signature]*
 CHIEF ENGINEER
 DESIGN ENGINEER
 GATE

STANDARD DRAINAGE DETAILS
 STANDARD WR INLET
 FRAME & GRATE

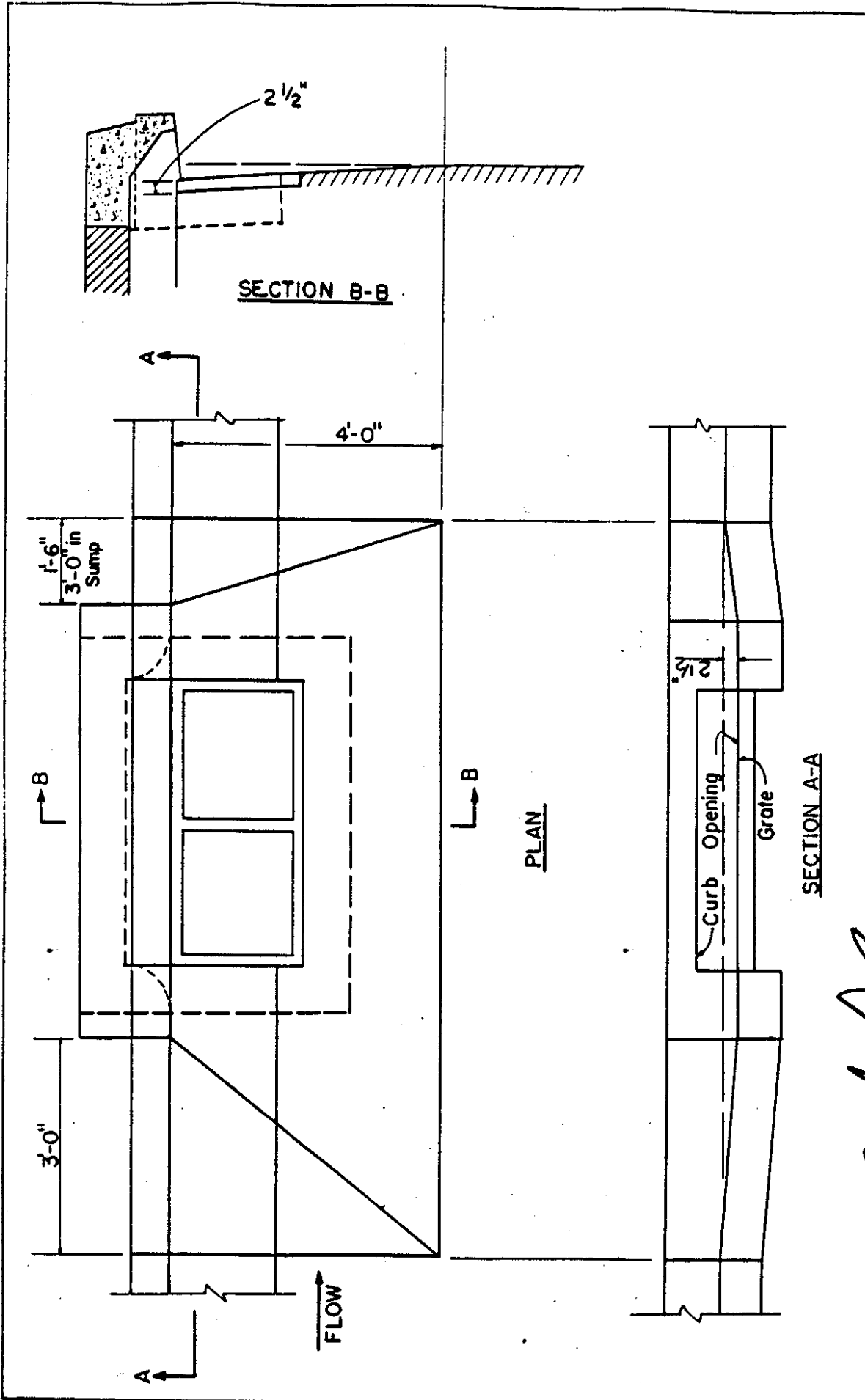
REVISED	D
	49



NOTE:
 Inlet to be used in a swale or sump.
 Max. capacity under .25' head = 3 c.f.s.
 To be used with 15" conn. or smaller.
 Not to be used in roadway or parking area.

To be used only when approved by D.P.W.

ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS	APPROVED <i>[Signature]</i> 9/7/88 CHIEF ENGINEER DESIGN ENGINEER DATE	STANDARD DRAINAGE DETAILS YARD TYPE INLET	REVISED 	D 50
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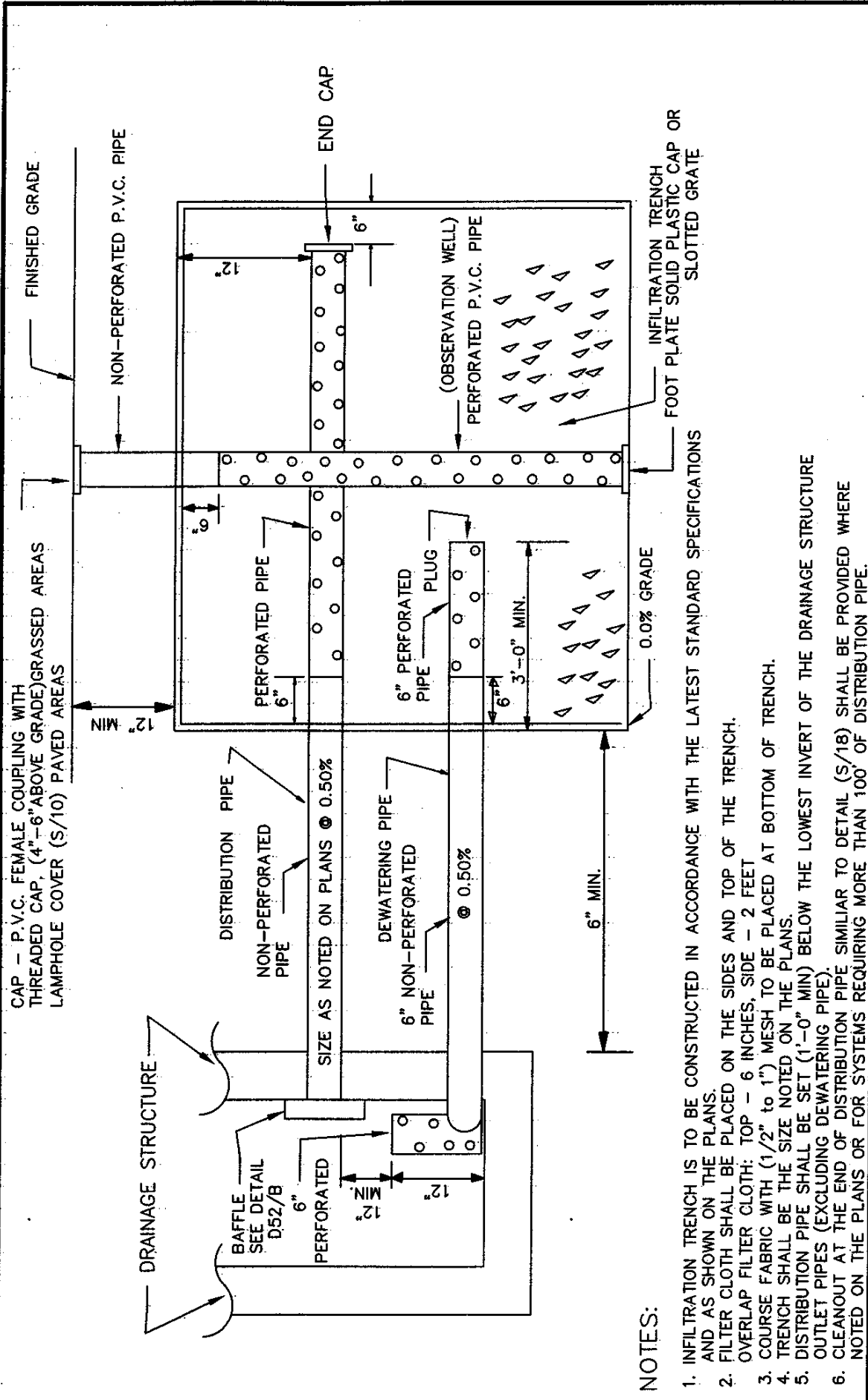


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STANDARD DRAINAGE DETAILS
INLET DEPRESSION DETAIL

APPROVED
CHIEF ENGINEER
DESIGN ENGINEER
DATE

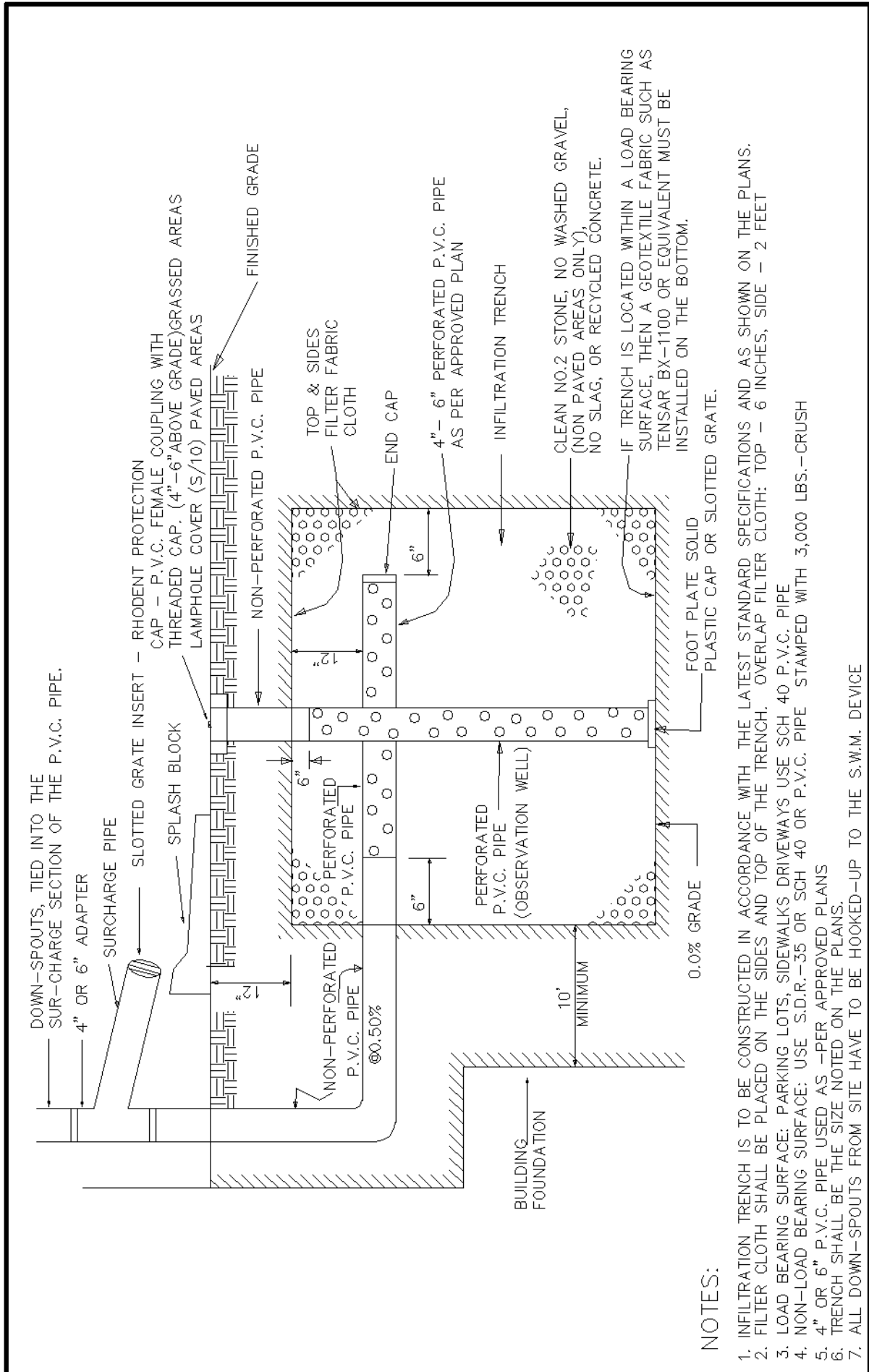
ANNE ARUNDEL
COUNTY
DEPARTMENT OF
PUBLIC WORKS



NOTES:

1. INFILTRATION TRENCH IS TO BE CONSTRUCTED IN ACCORDANCE WITH THE LATEST STANDARD SPECIFICATIONS AND AS SHOWN ON THE PLANS.
2. FILTER CLOTH SHALL BE PLACED ON THE SIDES AND TOP OF THE TRENCH.
3. OVERLAP FILTER CLOTH: TOP - 6 INCHES, SIDE - 2 FEET
4. COURSE FABRIC WITH (1/2" to 1") MESH TO BE PLACED AT BOTTOM OF TRENCH.
5. TRENCH SHALL BE THE SIZE NOTED ON THE PLANS.
6. DISTRIBUTION PIPE SHALL BE SET (1'-0" MIN) BELOW THE LOWEST INVERT OF THE DRAINAGE STRUCTURE
7. OUTLET PIPES (EXCLUDING DEWATERING PIPE).
8. CLEANOUT AT THE END OF DISTRIBUTION PIPE SIMILAR TO DETAIL (S/18) SHALL BE PROVIDED WHERE NOTED ON THE PLANS OR FOR SYSTEMS REQUIRING MORE THAN 100' OF DISTRIBUTION PIPE.

ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS	APPROVED <i>Donald C. Brown</i> 5/17/99 CHIEF ENGINEER	DATE: 9/12/99 DESIGN ENGINEER
STANDARD DRAINAGE DETAILS TYPICAL INFILTRATION STRUCTURE (FROM DRAINAGE STRUCTURE)		
REVISED		
D / 52		



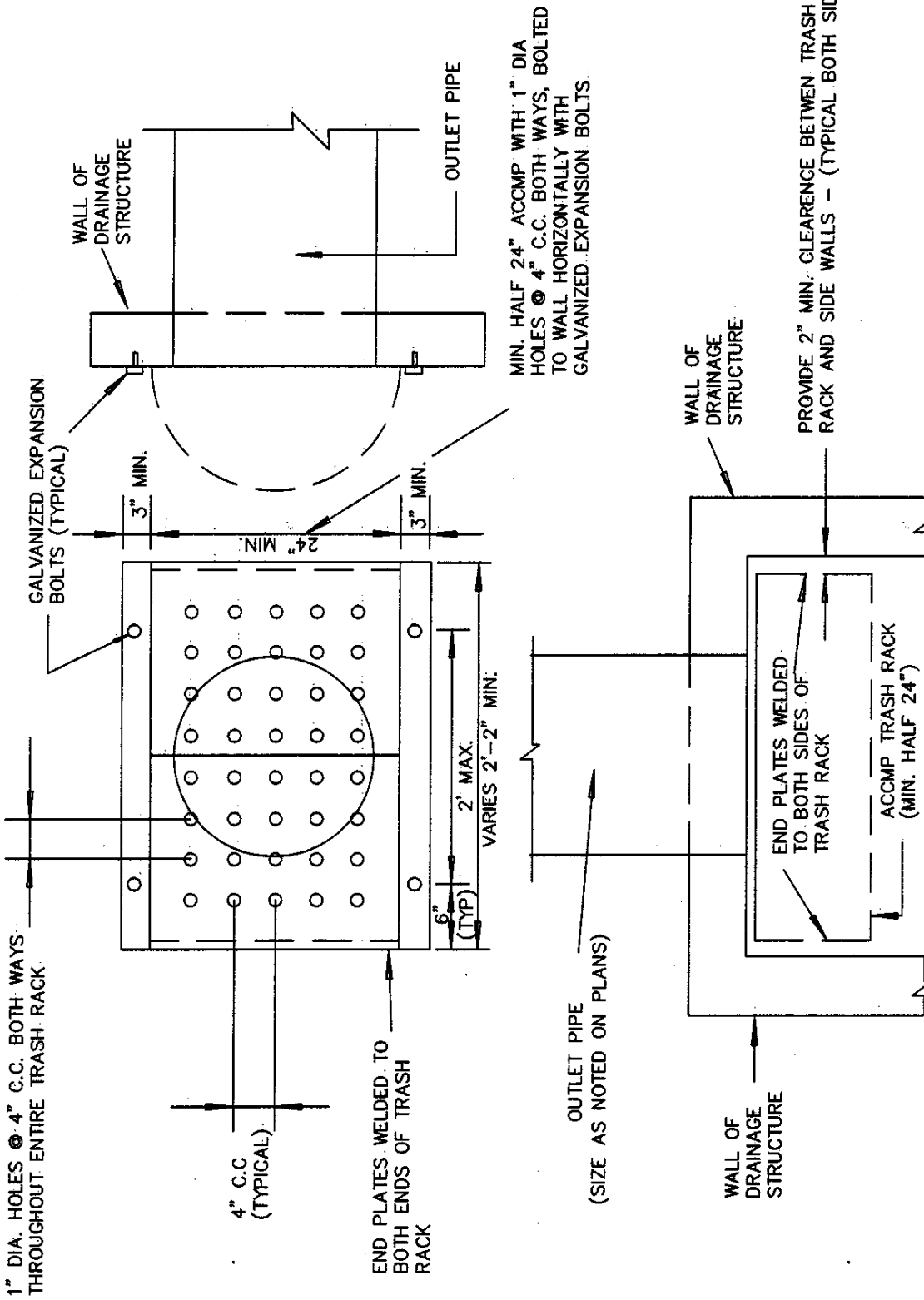
NOTES:

1. INFILTRATION TRENCH IS TO BE CONSTRUCTED IN ACCORDANCE WITH THE LATEST STANDARD SPECIFICATIONS AND AS SHOWN ON THE PLANS.
2. FILTER CLOTH SHALL BE PLACED ON THE SIDES AND TOP OF THE TRENCH. OVERLAP FILTER CLOTH: TOP - 6 INCHES, SIDE - 2 FEET
3. LOAD BEARING SURFACE: PARKING LOTS, SIDEWALKS DRIVEWAYS USE SCH 40 P.V.C. PIPE
4. NON-LOAD BEARING SURFACE: USE S.D.R.-35 OR SCH 40 OR P.V.C. PIPE STAMPED WITH 3,000 LBS.-CRUSH
5. 4" OR 6" P.V.C. PIPE USED AS -PER APPROVED PLANS
6. TRENCH SHALL BE THE SIZE NOTED ON THE PLANS.
7. ALL DOWN-SPOUTS FROM SITE HAVE TO BE HOOKED-UP TO THE S.W.M. DEVICE

ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS	APPROVED CHIEF ENGINEER DESIGN ENGINEER DATE:	STANDARD DRAINAGE DETAILS TYPICAL INFILTRATION STRUCTURE (FROM ROOF LEADERS OF BUILDING)	REVISED
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D

52A



D - 52B

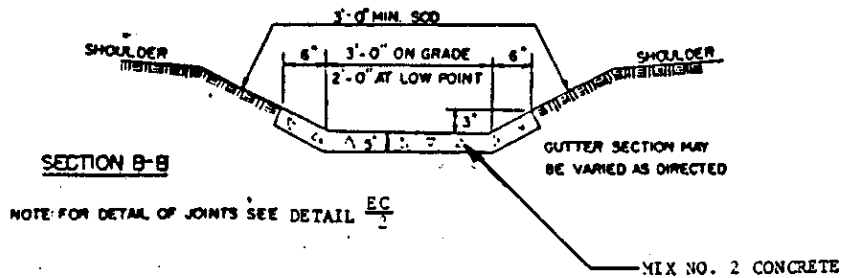
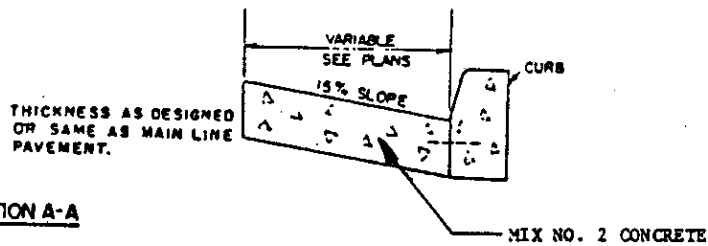
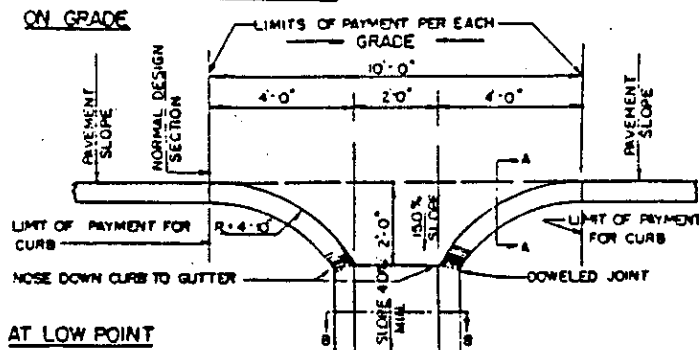
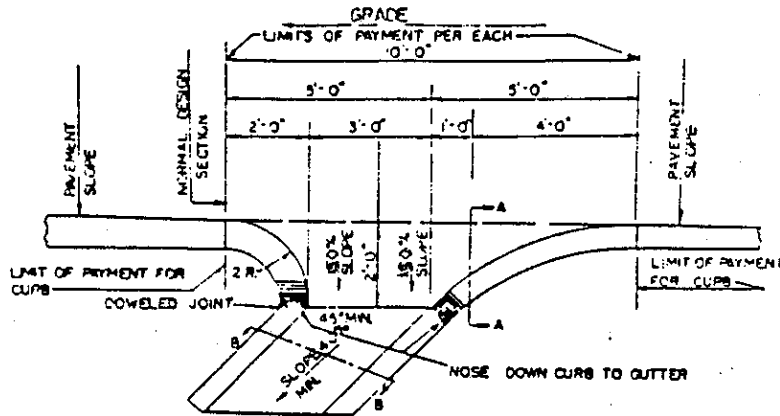
REVISED

STANDARD DRAINAGE DETAILS

TYPICAL INFILTRATION STRUCTURE (BAFFEL)

APPROVED *Ronald S. Smith* 5/17/99
 CHIEF ENGINEER
Mark Deane 5/12/99
 DESIGN ENGINEER
 DATE

ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS

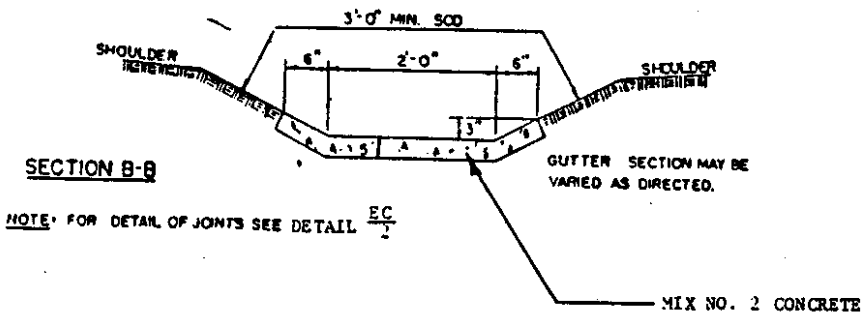
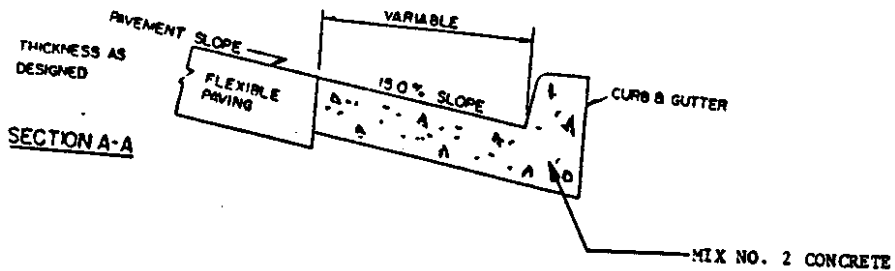
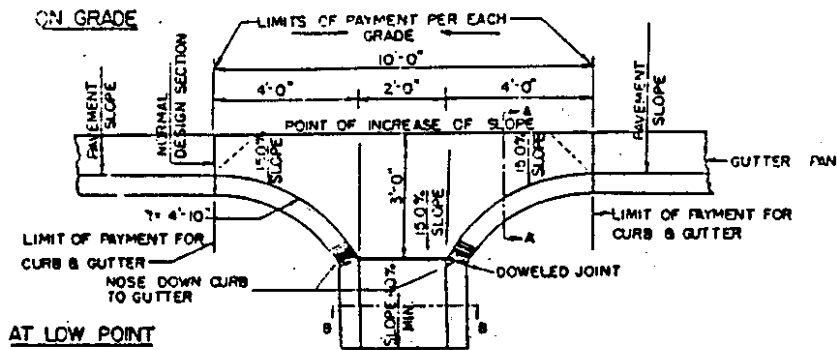
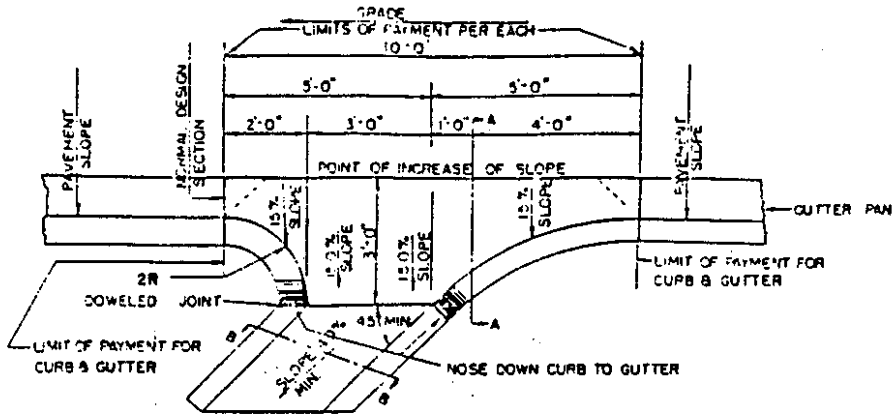


ANNE ARUNDEL
COUNTY
DEPARTMENT OF
PUBLIC WORKS

APPROVED
CHIEF ENGINEER
DESIGN ENGINEER
DATE

STANDARD DRAINAGE DETAILS
STANDARD CURB OPENING DETAIL
CURB SECTION

REVISED	D
	53



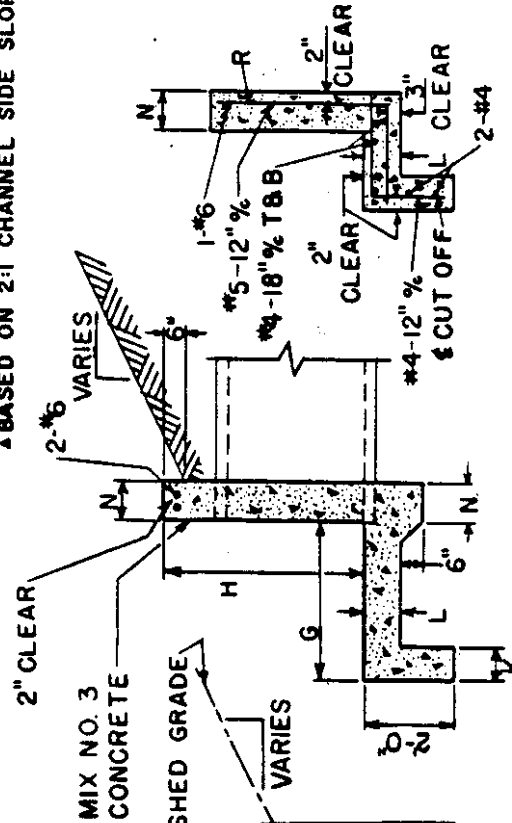
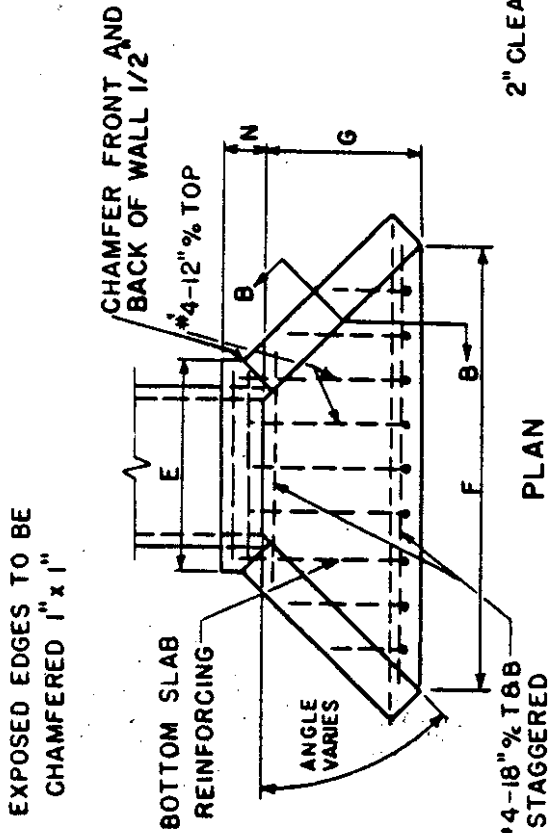
NOTE: FOR DETAIL OF JOINTS SEE DETAIL EC 7

ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS	APPROVED: <i>[Signature]</i> 4/1/88 CHIEF INSPECTOR DESIGN ENGINEER: <i>[Signature]</i> 9/16/88 DATE:	STANDARD DRAINAGE DETAILS STANDARD CURB OPENING DETAIL CURB & GUTTER SECTION	REVISED 	D 54
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D	E	F	G	H	J	K*	L	N	R	VOL. CY.
18"	3'-0"	7'-6"	3'-0"	3'-0"	2'-0"	8"	8"	8"	#5-12"	1.70
21"	3'-4"	7'-9"	3'-0"	3'-3"	2'-0"	8"	8"	8"	#5-12"	1.60
24"	3'-8"	8'-0"	3'-0"	3'-6"	2'-0"	8"	8"	8"	#5-12"	1.90
27"	3'-11"	8'-3"	3'-0"	3'-9"	2'-0"	8"	8"	8"	#5-12"	2.00
30"	4'-2"	8'-6"	3'-0"	4'-0"	2'-1 1/2"	8"	8"	10"	#5-12"	2.85
36"	4'-8"	10'-0"	3'-6"	4'-6"	2'-3"	8"	10"	10"	#5-12"	3.15
42"	5'-3"	11'-6"	4'-0"	5'-0"	2'-9"	8"	10"	10"	#5-12"	3.87
48"	5'-10"	13'-0"	4'-6"	5'-6"	3'-0"	8"	10"	12"	#5-12"	5.08
54"	6'-5"	14'-6"	5'-0"	6'-0"	3'-3"	9"	12"	12"	#6-8"	6.50
60"	7'-0"	16'-0"	5'-6"	6'-6"	3'-6"	9"	12"	12"	#6-8"	7.98
66"	7'-7"	17'-6"	6'-0"	7'-0"	3'-9"	9"	12"	14"	#6-8"	9.14
72"	8'-2"	19'-0"	6'-6"	7'-6"	4'-3"	9"	12"	14"	#6-8"	11.10

*BASED ON 2:1 CHANNEL SIDE SLOPES, AND 45° ANGLE

NOTE:
HEADWALL TO BE PARALLEL TO
OF ROADWAY UNLESS OTHERWISE NOTED IN CONTRACT DRAWINGS.



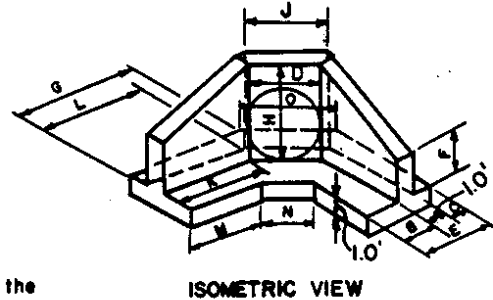
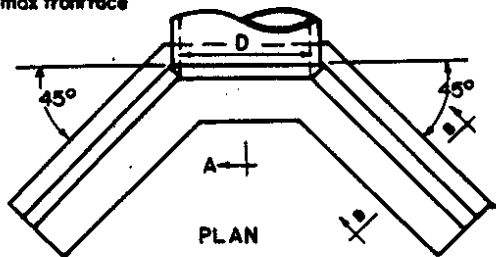
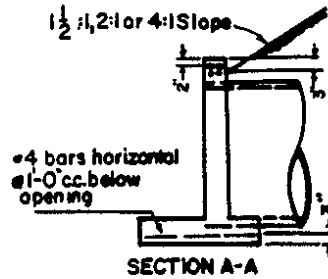
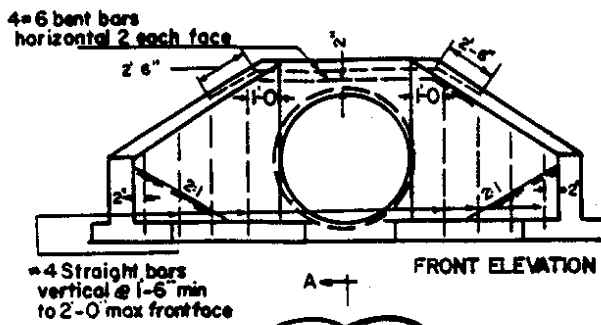
FRONT ELEVATION

APPROVED: *[Signature]*
 CHIEF ENGINEER
 DESIGN ENGINEER: *[Signature]*
 DATE: _____

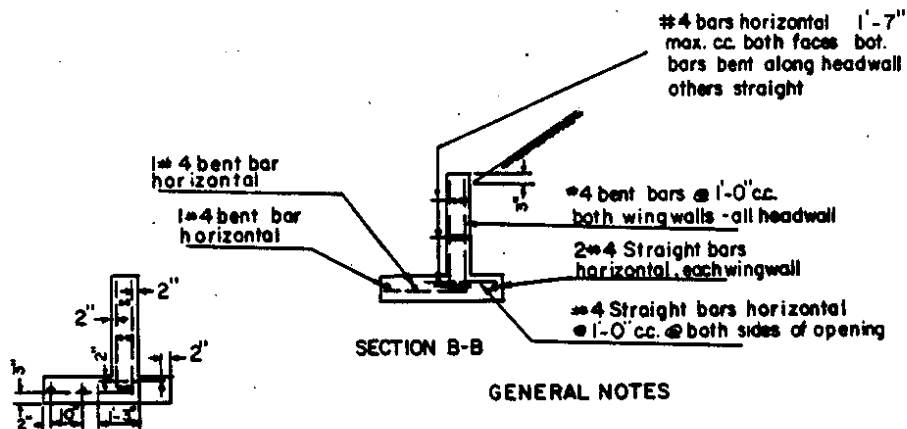
ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS

STANDARD DRAINAGE DETAILS
 TYPE "A" HEADWALL
 CIRCULAR PIPE

REVISED



NOTE: Whenever this headwall is used in conjunction with a paved channel the footing of the headwall shall be lowered below the finished grade of the channel the thickness of the channel paving in order that the channel might be blended into the headwall. The "H" and "F" dimensions and the steel reinforcing shall be adjusted.



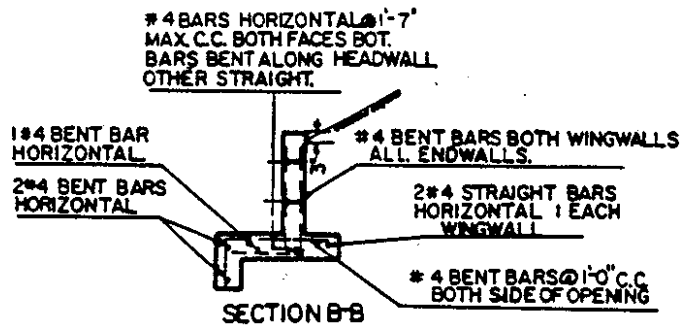
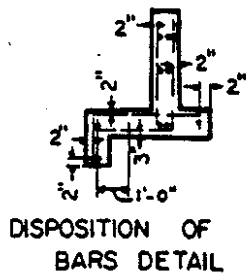
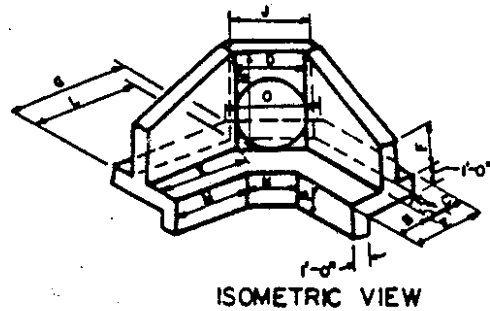
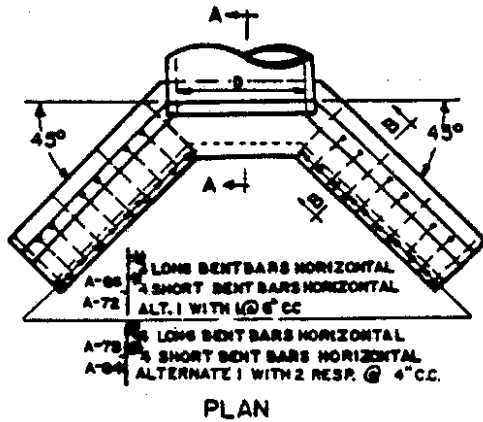
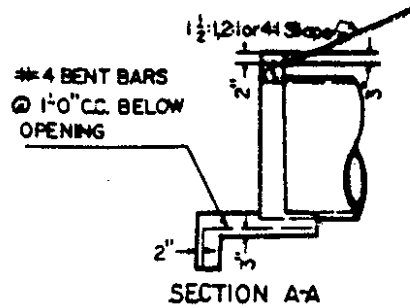
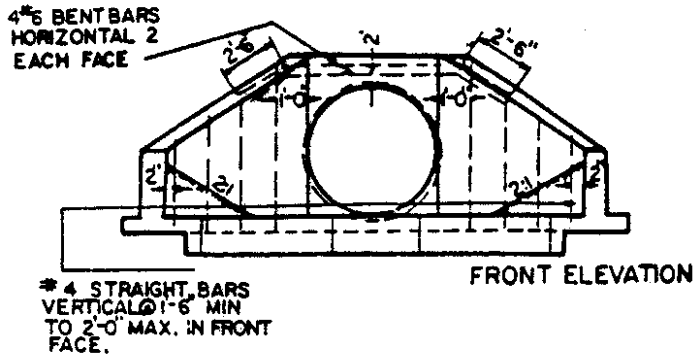
GENERAL NOTES

- Concrete : Mix No. 3
- Reinforcing : Deformed steel bars #4 & #6
- Chamfer : All exposed edges 1"X1" or as directed

Quantities in table to be used for estimating only

Opening		Dimensions													Vol.	Steel
D Inches	Areq Sq.Ft.	B	C	E	F	G	H	J	K	L	M	N	O	Conc. C.Y.	lbs.	
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	

ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS	APPROVED <i>[Signature]</i> 9/17/88 CHIEF ENGINEER	STANDARD DRAINAGE DETAILS MODIFIED TYPE A-1 HEADWALL 48" 54" 60"	REVISED	D <hr/> 56
	DATE <i>[Signature]</i> 9/14/88 DESIGN ENGINEER		_____	
	_____		_____	
	_____		_____	



GENERAL NOTES

- CONCRETE : MIX NO. 3
- REINFORCING : DEFORMED STEEL BARS #4 & #6
- CHAMFER : ALL EXPOSED EDGES 1X TOR AS DIRECTED

NOTE: WHENEVER THIS HEADWALL IS USED IN CONJUNCTION WITH A PAVED CHANNEL THE FOOTING OF THE HEADWALL SHALL BE LOWERED BELOW THE FINISHED GRADE OF THE CHANNEL THE THICKNESS OF THE CHANNEL PAVING, IN ORDER THAT THE CHANNEL MIGHT BE BLENDED INTO THE HEADWALL. THE "H" AND "F" DIMENSIONS AND THE STEEL REINFORCING SHALL BE ADJUSTED

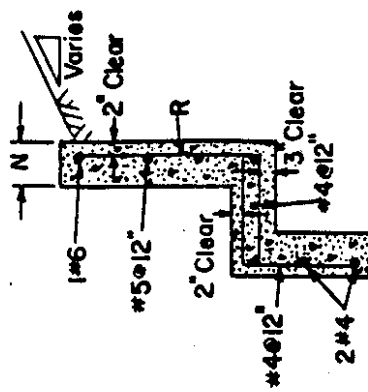
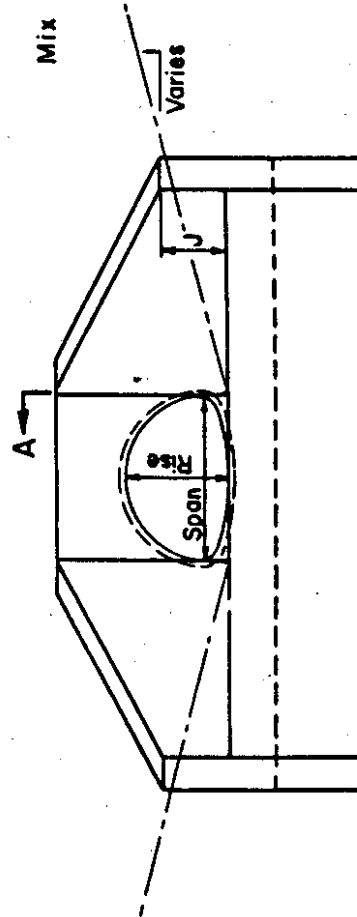
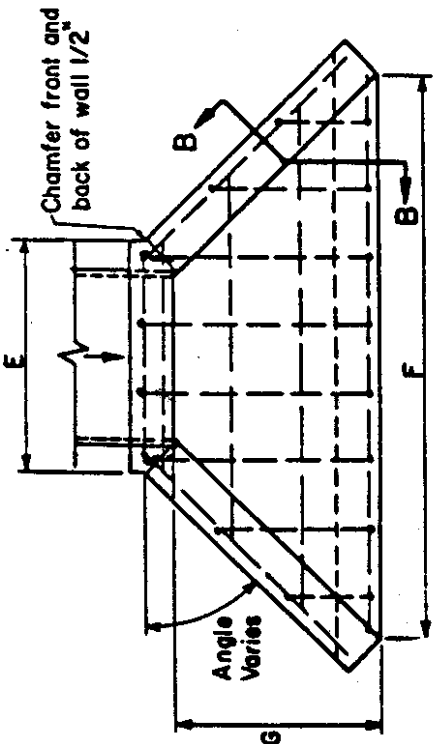
QUANTITIES IN TABLE TO BE USED FOR ESTIMATING ONLY

OPENING		DIMENSION														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"	8'-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 1/4"	11'-8 3/4"	10'-1 1/2"	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'-8"	4'-0"	8'-6 3/4"	2'-6"	13.3	885	
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	

ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS	APPROVED <i>[Signature]</i> 9/1/88 CHIEF ENGINEER	STANDARD DRAINAGE DETAILS MODIFIED TYPE 'A-1' HEADWALL	REVISED	D 57
	DESIGN ENGINEER <i>[Signature]</i> 9/1/88			
	DATE			

OPENING		DIMENSION										QUANT.	
D INCHES	AREA SQ. FT.	A	B	E	F	G	J	K	L	M	R	Δ CONC. C.Y.	
17"x13"	1.1	2'-1"	2'-0"	2'-5"	7'-5"	3'-0"	1'-0"	8"	8"	8"	#5@12"	1.04	
21"x15"	1.6	2'-3"	2'-0"	2'-9"	7'-9"	3'-0"	1'-0"	8"	8"	8"	#5@12"	1.12	
24"x18"	2.2	2'-6"	2'-9"	3'-0"	8'-0"	3'-0"	1'-0"	8"	8"	8"	#5@12"	1.20	
28"x20"	2.9	2'-8"	2'-0"	3'-4"	8'-4"	3'-0"	1'-2"	8"	8"	8"	#5@12"	1.29	
35"x24"	4.5	3'-0"	2'-0"	3'-11"	8'-11"	3'-0"	1'-4"	8"	8"	8"	#5@12"	1.45	
42"x29"	6.5	3'-5"	2'-0"	4'-6"	9'-6"	3'-0"	1'-11"	8"	10"	8"	#5@12"	1.74	
49"x33"	8.9	3'-9"	2'-0"	5'-1"	10'-1"	3'-0"	2'-3"	8"	10"	8"	#5@12"	1.93	
57"x38"	11.6	4'-2"	2'-0"	5'-9"	11'-9"	3'-6"	2'-5"	8"	10"	8"	#5@12"	2.46	
64"x43"	14.7	4'-7"	2'-0"	6'-4"	13'-0"	3'-10"	2'-8"	9"	12"	10"	#5@12"	3.47	
71"x47"	18.1	4'-11"	2'-0"	6'-11"	14'-3"	4'-2"	2'-10"	9"	12"	10"	#5@12"	4.02	

Δ Based on 2:1 channel side slopes and 45° angle.



SECTION A-A
(Reinforcing not shown
Similar to B-B)

- Note:
1. Chamfer exposed edges 1" x 1"
 2. Concrete quantities to be used for estimating only.
 3. Headwall to be parallel to center of roadway

REVISIONS

STANDARD DRAINAGE DETAILS
TYPE "A" HEADWALL
METAL PIPE ARCH

ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS

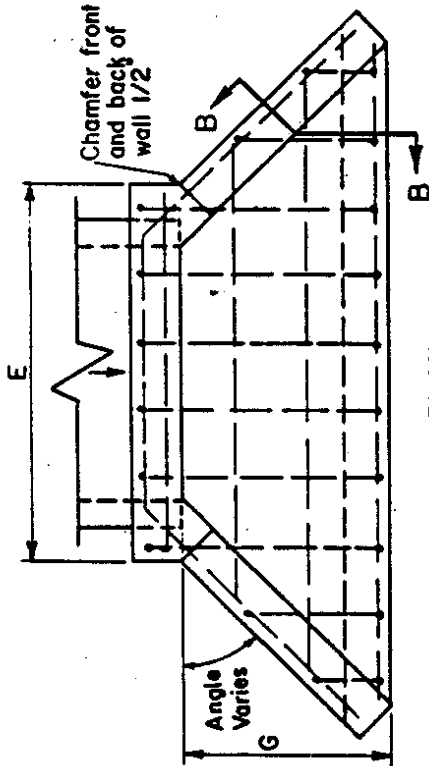
CHIEF ENGINEER
DESIGN ENGINEER

DATE

D 38

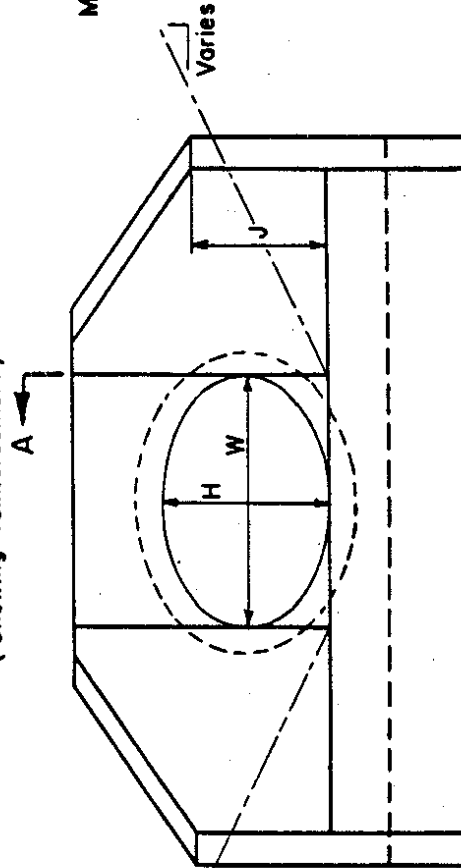
EQ. RD	W	H	A	B	E	F	G	J	K	L	N	R	CONC. CT
36"	45"	29"	3'-9"	2'-0"	5'-6"	9'-9"	3'-0"	2'-0"	8"	10"	8"	#5@12"	2.17
42"	53"	34"	4'-3"	2'-0"	6'-3"	11'-5"	3'-6"	2'-3"	8"	10"	10"	#5@12"	2.99
48"	60"	38"	4'-8"	2'-0"	7'-0"	12'-4"	3'-8"	2'-6"	8"	10"	10"	#5@12"	3.38
54"	68"	43"	5'-1"	2'-0"	7'-8"	13'-8"	4'-0"	2'-9"	9"	12"	10"	#5@12"	4.53
60"	76"	48"	5'-6"	2'-0"	8'-5"	15'-4"	4'-6"	3'-0"	9"	12"	10"	#5@12"	5.32
66"	83"	53"	6'-0"	2'-0"	9'-1"	17'-0"	5'-0"	3'-3"	9"	12"	12"	#6@8"	7.07
72"	91"	58"	6'-6"	2'-0"	9'-10"	18'-3"	5'-4"	3'-6"	9"	12"	12"	#6@8"	7.88

*Based on 2:1 channel side slopes and 45° angle.



PLAN

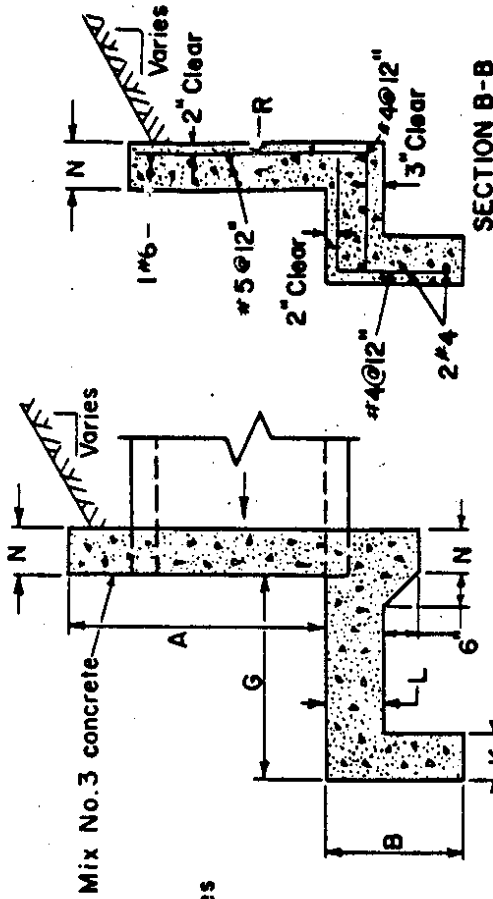
(Showing reinforcement)



ELEVATION

Note:

1. Chamfer exposed edges 1" x 1"
2. Concrete quantities to be used for estimating only.



(Reinforcing not shown
Similar to B-B)

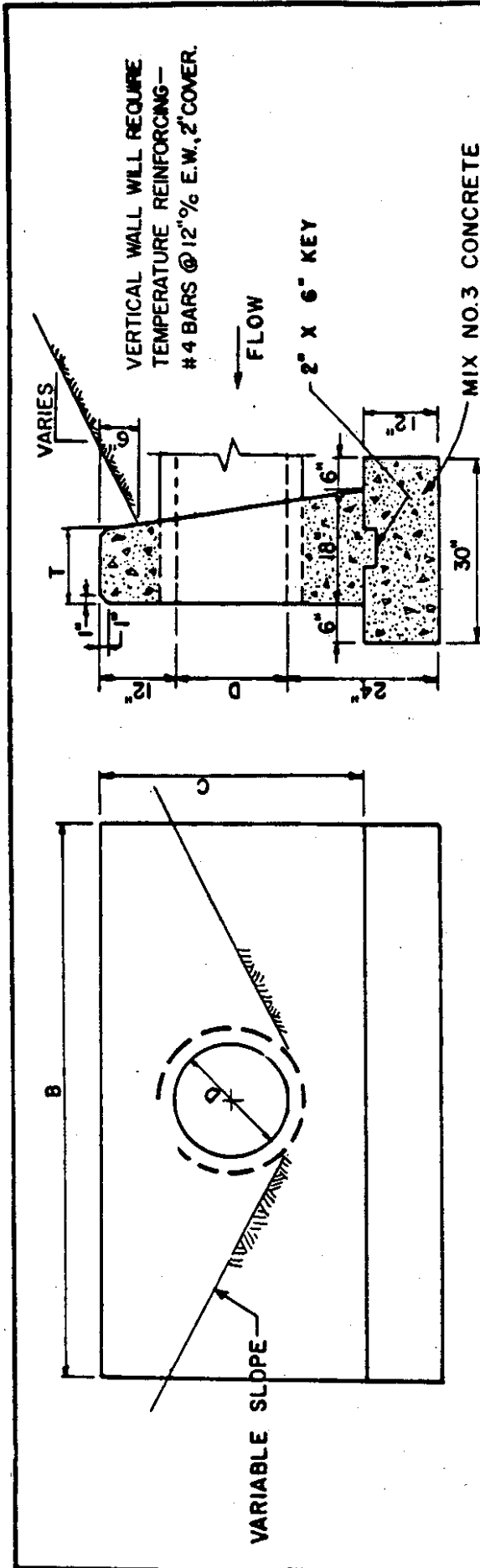
3. Headwall to be parallel to 1/4 of roadway.

APPROVED: *[Signature]* 9/17/00
 ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS
 CHIEF ENGINEER
 DESIGN ENGINEER
 DATE

STANDARD DRAINAGE DETAILS
 TYPE "A" HEADWALL
 ELLIPTICAL CONCRETE PIPE

REVISED	

D 59



- NOTE:**
1. HEADWALL CAN BE CONSTRUCTED WITH A 5" CONCRETE APRON, AS SHOWN ON D/81, IF DESIRED.
 2. EXPOSED EDGES TO BE CHAMFERED 1" x 1".
 3. CONCRETE QUANTITIES TO BE USED FOR ESTIMATING ONLY.
 4. HEADWALL TO BE PARALLEL TO 1/4 OF ROADWAY.

D	BOTH		1-1/2:1 SLOPE ONLY		2:1 SLOPE ONLY	
	C	T	B	VOLUME CU. YDS	B	VOLUME CU. YDS
12"	3'-0"	8"	5'-0"	1.02	6'-0"	1.23
15"	3'-3"	8"	5'-6"	1.12	7'-0"	1.47
18"	3'-6"	8"	6'-0"	1.29	8'-0"	1.76
21"	3'-9"	10"	7'-0"	1.60	9'-0"	2.10
24"	4'-0"	10"	8'-0"	1.93	10'-0"	2.47
27"	4'-3"	12"	8'-6"	2.22	11'-0"	3.10
30"	4'-6"	12"	9'-0"	2.35	12'-0"	3.25
36"	5'-0"	12"	10'-6"	2.96	13'-6"	3.95
42"	5'-6"	12"	12'-0"	3.54	15'-0"	4.58

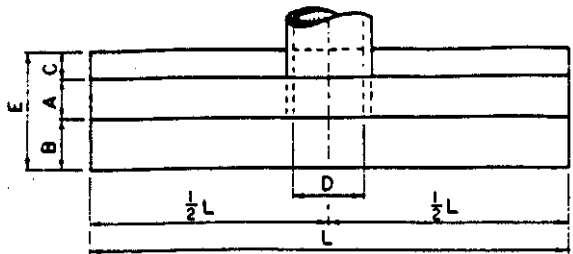
REVISIONS

D/60

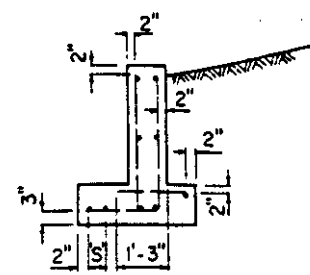
STANDARD DRAINAGE DETAILS
TYPE "B" HEADWALL
CIRCULAR PIPE

APPROVED: *[Signature]* 7/17/88
CHIEF ENGINEER
DESIGN ENGINEER: *[Signature]* 7/6/88
DATE

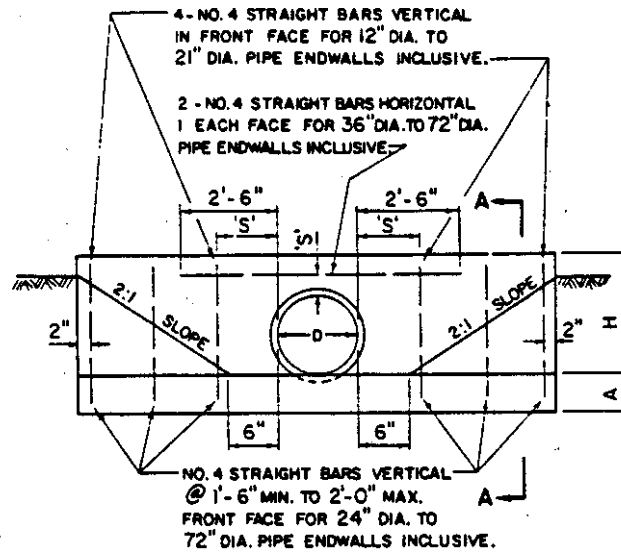
ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS



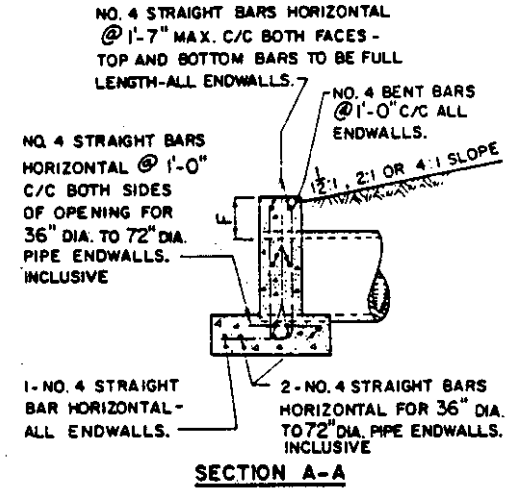
PLAN



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.
INCHES	SQ. FT.									
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

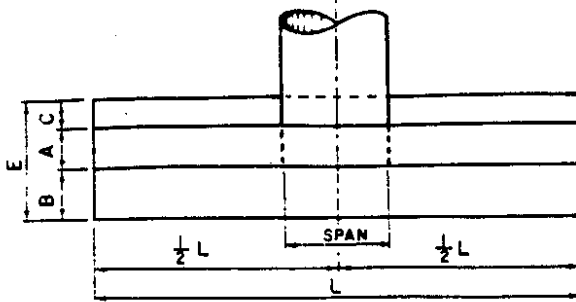
'S' DISTANCES

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.

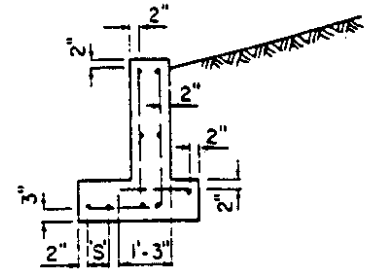
GENERAL NOTES:

CONCRETE: MIX NO. 3
 REINFORCING: DEFORMED STEEL BARS-NO. 4
 CHAMFER: ALL EXPOSED EDGES 1"x 1" OR AS DIRECTED.

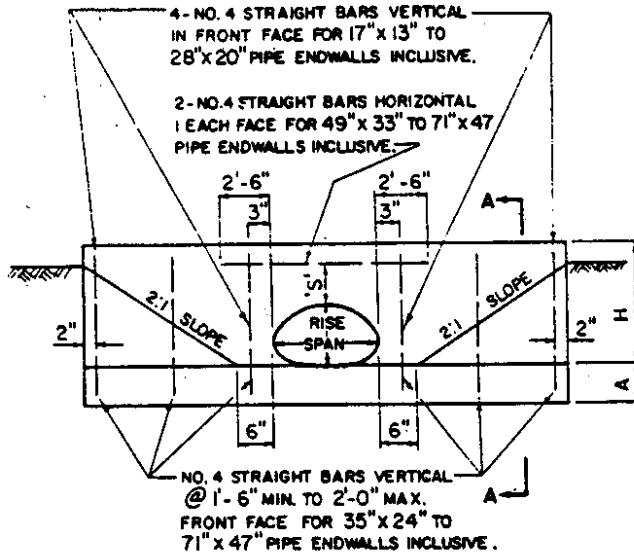
ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS	APPROVED CHIEF ENGINEER	STANDARD DRAINAGE DETAILS STANDARD TYPE C ENDWALL ROUND PIPE	REVISED	D 61
	DESIGN ENGINEER DATE		_____	
	_____		_____	
	_____		_____	
	_____		_____	



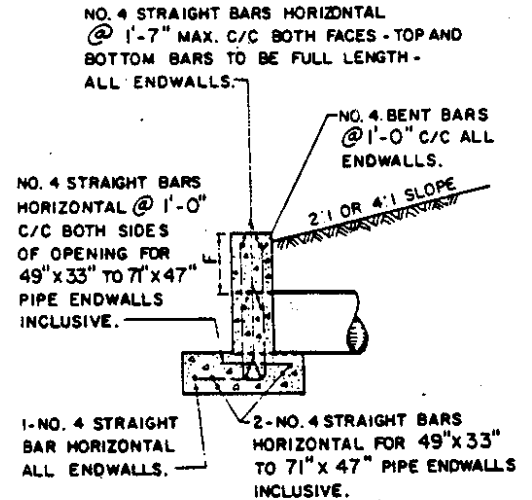
PLAN



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.
INCHES S X R	SQ. FT.									
17X13	1.23	9"	6"	6"	1'-9"	6"	1'-7"	6'-3"	0.54	38
21X15	1.77	9"	6"	6"	1'-9"	11"	2'-2"	9'-6"	0.98	56
24X18	2.40	9"	6"	6"	1'-9"	8"	2'-2"	9'-6"	0.96	55
28X20	3.14	9"	6"	6"	1'-9"	9"	2'-3"	9'-6"	0.96	55
35X24	4.91	9"	14"	6"	2'-5"	14"	3'-2"	13'-8"	1.98	96
42X29	7.07	9"	14"	6"	2'-5"	9"	3'-2"	13'-8"	1.92	95
49X33	9.62	12"	16"	10"	3'-2"	14"	3'-11"	17'-11"	4.34	186
57X38	12.57	12"	16"	10"	3'-2"	10"	4'-0"	17'-11"	4.73	186
64X43	15.90	12"	20"	12"	3'-8"	13"	4'-8"	21'-9"	6.27	243
71X47	19.64	12"	20"	12"	3'-8"	10"	4'-9"	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:

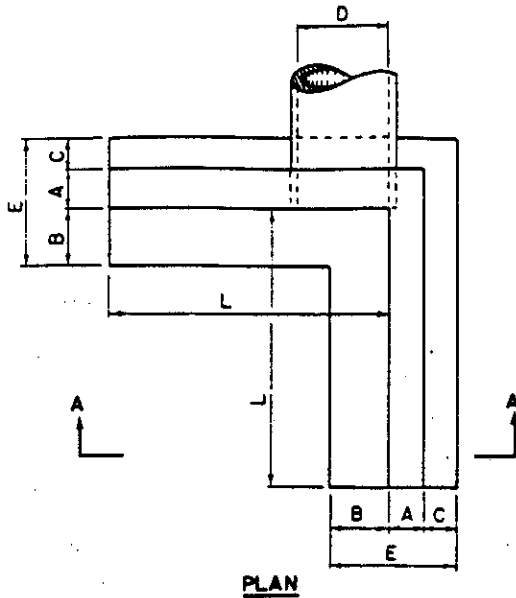
CONCRETE: MIX NO. 3
 REINFORCING: DEFORMED STEEL BARS NO. 4
 CHAMFER: ALL EXPOSED EDGES 1" x 1" OR AS DIRECTED.

APPROVED
 ANNE ARUNDEL COUNTY
 DEPARTMENT OF PUBLIC WORKS

CHIEF ENGINEER
 DESIGN ENGINEER
 DATE

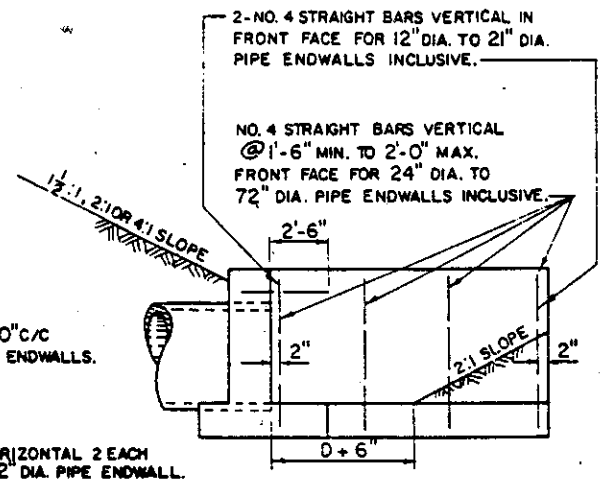
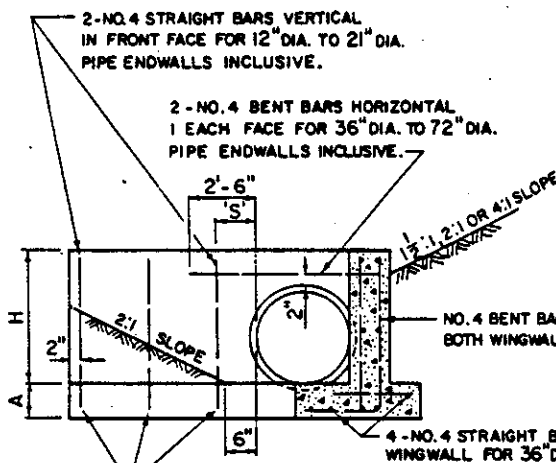
STANDARD DRAINAGE DETAILS
 STANDARD TYPE C ENDWALL
 ARCH PIPE

REVISED	D
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QUANTITIES FOR ESTIMATING PURPOSES ONLY

OPENING D INCHES	AREA SQ. FT.	DIMENSIONS						QUANTITIES	
		A	B	C	E	H	L	CONC. C.Y.	STEEL LBS.
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



2-NO. 4 STRAIGHT BARS VERTICAL IN FRONT FACE FOR 12" DIA. TO 21" DIA. PIPE ENDWALLS INCLUSIVE.

2-NO. 4 BENT BARS HORIZONTAL 1 EACH FACE FOR 36" DIA. TO 72" DIA. PIPE ENDWALLS INCLUSIVE.

NO. 4 STRAIGHT BARS VERTICAL @ 1'-6" MIN. TO 2'-0" MAX. FRONT FACE FOR 24" DIA. TO 72" DIA. PIPE ENDWALLS INCLUSIVE.

4-NO. 4 STRAIGHT BARS HORIZONTAL 2 EACH WINGWALL FOR 36" DIA. TO 72" DIA. PIPE ENDWALL.

NO. 4 BENT BARS @ 1'-0" C/C BOTH WINGWALLS ALL ENDWALLS.

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.

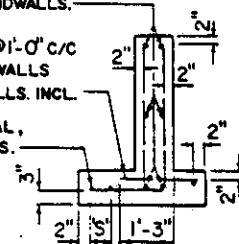
GENERAL NOTES

CONCRETE: MIX NO. 3
 REINFORCING: DEFORMED STEEL BARS - NO. 4
 CHAMFER: ALL EXPOSED EDGES 1" x 1" OR AS DIRECTED.

'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.

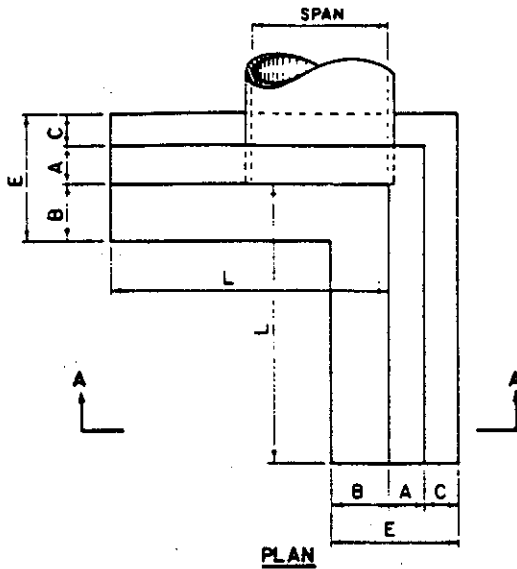
DISPOSITION OF BARS DETAIL



APPROVED
 ANNE ARUNDEL COUNTY
 DEPARTMENT OF PUBLIC WORKS
 CHIEF ENGINEER
 DESIGN ENGINEER
 DATE

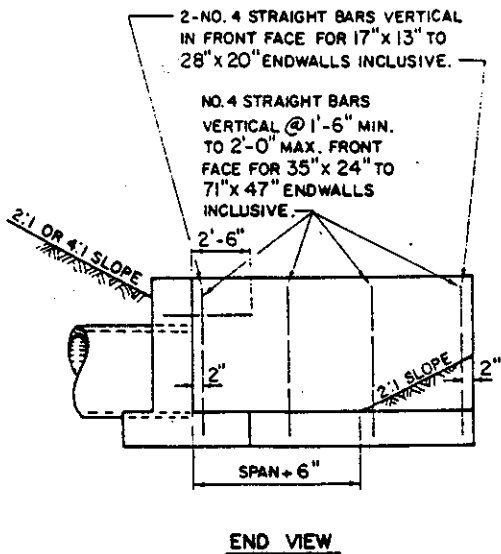
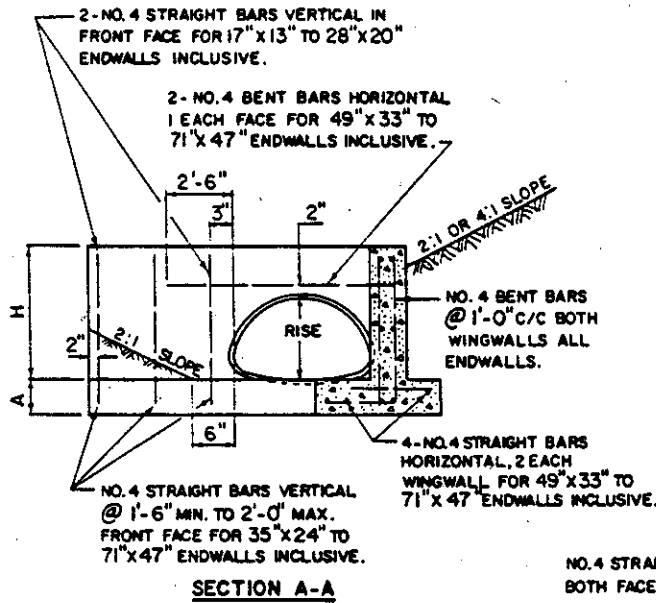
STANDARD DRAINAGE DETAILS
 TYPE "E" HEADWALL
 CIRCULAR PIPE

REVISED	D 63



QUANTITIES FOR ESTIMATING PURPOSES ONLY

OPENING SIZE INCHES S x R	AREA SQ. FT.	DIMENSIONS						QUANTITIES	
		A	B	C	E	H	L	CONC. C.Y.	STEEL LBS.
17 X 13	1.23	9"	6"	6"	1'-9"	1'-7"	3'-9"	.73	53
21 X 15	1.77	9"	6"	6"	1'-9"	2'-2"	5'-10"	1.30	75
24 X 18	2.40	9"	6"	6"	1'-9"	2'-2"	5'-10"	1.28	75
28 X 20	3.14	9"	6"	6"	1'-9"	2'-2"	5'-10"	1.26	74
35 X 24	4.9'	9"	14"	6"	2'-5"	3'-2"	8'-6"	2.57	118
42 X 29	7.07	9"	14"	6"	2'-5"	3'-2"	8'-6"	2.52	117
49 X 33	9.62	12"	16"	10"	3'-2"	3'-11"	11'-3"	5.80	271
57 X 38	12.57	12"	16"	10"	3'-2"	3'-11"	11'-3"	5.65	261
64 X 43	15.90	12"	20"	12"	3'-8"	4'-8"	13'-9"	8.12	366
71 X 47	19.64	12"	20"	12"	3'-8"	4'-8"	13'-9"	7.98	355



SECTION A-A

'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.

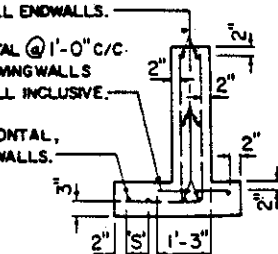
GENERAL NOTES

CONCRETE: MIX NO. 3
 REINFORCING: DEFORMED STEEL BARS-NO. 4
 CHAMFER: ALL EXPOSED EDGES 1" X 1" 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" X 33" TO 71" X 47" ENDWALL INCLUSIVE.

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

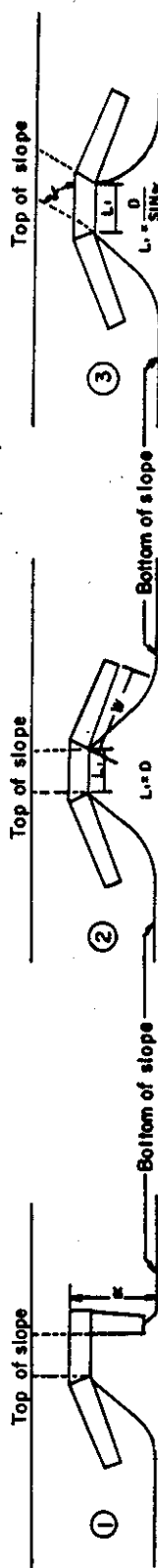


DISPOSITION OF BARS DETAIL

APPROVED
 ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS
 CHIEF ENGINEER
 DESIGN ENGINEER
 DATE

STANDARD DRAINAGE DETAILS
 TYPE "E" HEADWALL
 METAL PIPE ARCH

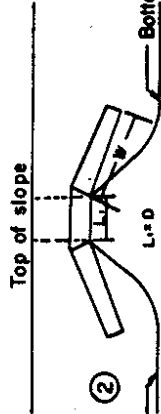
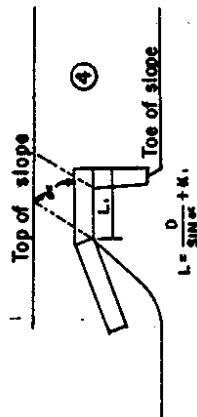
REVISED
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Case 1 standard Type "F" Headwall.

Case 2 When a water course is perpendicular or askew to the ξ , 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 ξ , the "F" headwall can be used by making the shorter wing equal in length and angle to the longer wing.

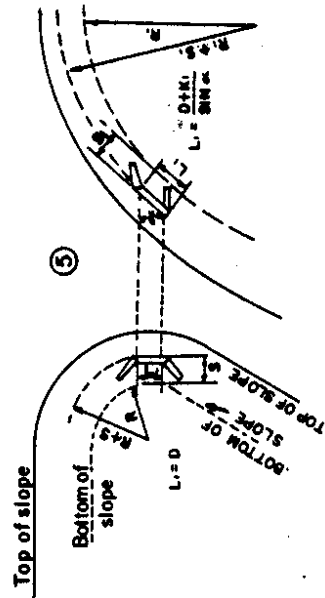
Case 3 When the drainage conditions are similar to case 2 but it is desired to place the pipe askew, the "F" headwall can be used. The wings will be placed the same as in case 2, but the length of the headwall will be increased due to the increased area of pipe.



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" headwall 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" headwall can be used as follows

a. Determine direction of pipe - b. compute S , then a line which is perpendicular to the ξ of the pipe and tangent to the arc whose radius is $R+S$ determines the location of

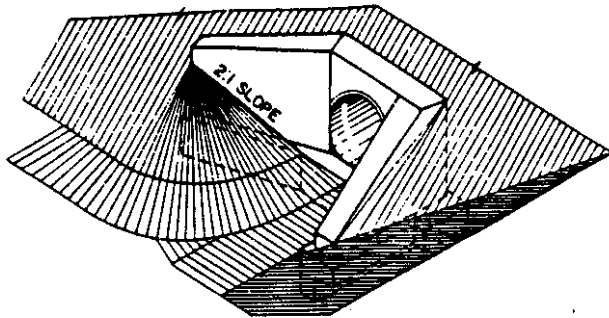


the headwall. The length of the wingwalls is standard but the angle is such, that the end of the wingwall is $6'$ from the toe of the slope, as shown. S , is computed in like manner and the location of the headwall is the intersection of the arc $R+S$, and the ξ of the pipe. The wings are located as described above, or as shown.

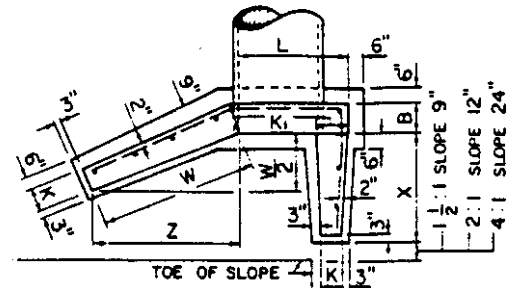
ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS
 APPROVED 9/7/65
 CHIEF ENGINEER
 DESIGN ENGINEER
 DATE

STANDARD DRAINAGE DETAILS
 STANDARD TYPE "F" HEADWALL
 MODIFICATION

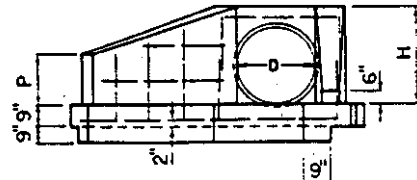
REVISED
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ISOMETRIC VIEW



PLAN



ELEVATION

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		CONC. CU.YDS.	STEEL LBS.
		L	B	H	W	X	Z	K ₁	K	P			
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	

NOTES

- CONCRETE: MIX NO. 3
- 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" x 1" OR AS DIRECTED.

NOTE: WHENEVER THIS HEADWALL IS USED IN CONJUNCTION WITH A PAVED CHANNEL THE FOOTING OF THE HEADWALL SHALL BE LOWERED BELOW THE FINISHED GRADE OF THE CHANNEL THE THICKNESS OF THE CHANNEL PAVING IS ORDER THAT THE CHANNEL MIGHT BE BLENDED INTO THE HEADWALL. THE "U", "P" AND "F" DIMENSIONS AND THE STEEL REINFORCING SHALL BE ADJUSTED AS REQUIRED.

SLOPE 2 : 1													
OPENING		DIMENSIONS										QUANTITIES	
PIPE DIA. D	AREA SQ.FT.	ENDWALL			WINGS					1- ENDWALL 2- WINGS		CONC. CU.YDS.	STEEL LBS.
		L	B	H	W	X	Z	K ₁	K	P			
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'-2"	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	90	
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	

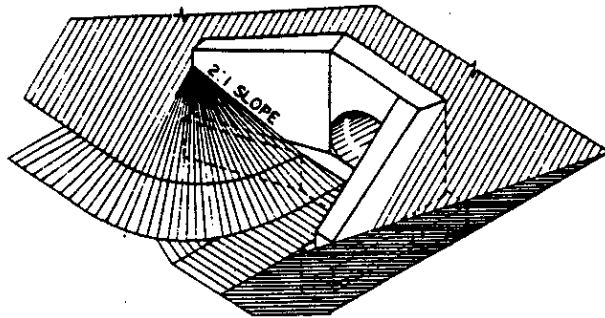
SLOPE 4 : 1													
OPENING		DIMENSIONS										QUANTITIES	
PIPE DIA. D	AREA SQ.FT.	ENDWALL			WINGS					1- ENDWALL 2- WINGS		CONC. CU.YDS.	STEEL LBS.
		L	B	H	W	X	Z	K ₁	K	P			
12"	0.79	1'-9"	9"	1'-5"	2'-6"	3'-8"	2'-2"	9"	8"	1'-3"	0.81	45	
15"	1.23	2'-0"	9"	1'-9"	3'-0"	5'-0"	2'-7"	9"	8"	1'-5"	1.04	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	

ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS

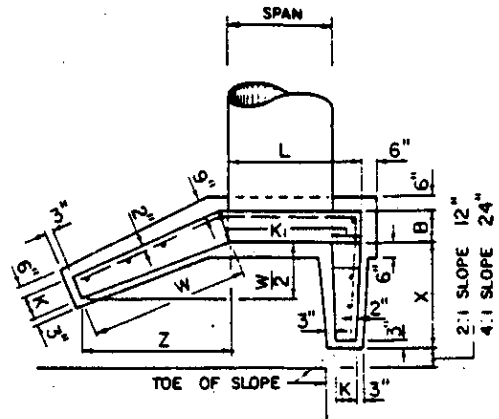
APPROVED *[Signature]* 9/1/13
 CHIEF ENGINEER
 DESIGN ENGINEER *[Signature]* 9/1/13
 DATE

STANDARD DRAINAGE DETAILS
 STANDARD TYPE "F" HEADWALL
 ROUND PIPE

REVISED	D 66



ISOMETRIC VIEW

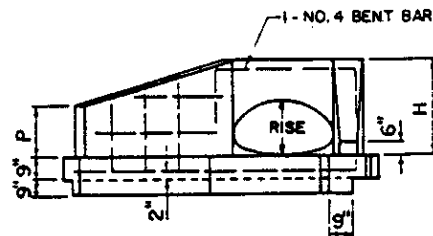


PLAN

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" X 15"	1.23	2'-2"	9"	1'-9"	2'-3"	1'-10"	2'-0"	9"	7"	1'-3"	0.60	39	
21" X 15"	1.77	2'-6"	9"	1'-9"	2'-3"	1'-10"	2'-0"	9"	7"	1'-3"	0.62	40	
24" X 18"	2.40	2'-9"	9"	2'-0"	2'-7"	2'-5"	2'-3"	9"	8"	1'-5"	0.80	45	
28" X 20"	3.14	3'-1"	9"	2'-4"	3'-0"	3'-0"	2'-7"	9"	8"	1'-7"	0.98	59	
35" X 24"	4.91	3'-11"	12"	2'-11"	4'-0"	4'-0"	3'-5"	12"	11"	2'-1"	1.77	85	
42" X 28"	7.07	4'-6"	12"	2'-11"	4'-0"	4'-0"	3'-5"	12"	11"	2'-1"	1.82	86	
48" X 33"	9.62	5'-1"	12"	3'-6"	4'-8"	5'-2"	4'-1"	12"	11"	2'-6"	2.35	117	
57" X 38"	12.57	5'-9"	12"	4'-0"	5'-4"	6'-2"	4'-7"	12"	11"	2'-10"	2.73	185	

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" X 15"	1.23	2'-2"	9"	1'-7"	2'-6"	3'-8"	2'-2"	9"	8"	1'-3"	0.86	46	
21" X 15"	1.77	2'-6"	9"	1'-11"	3'-0"	5'-0"	2'-2"	9"	8"	1'-5"	1.10	69	
24" X 18"	2.40	2'-9"	9"	2'-1"	3'-3"	4'-0"	2'-10"	9"	8"	1'-6"	1.22	72	
28" X 20"	3.14	3'-1"	9"	2'-2"	3'-6"	6'-0"	3'-0"	9"	8"	1'-7"	1.34	76	
35" X 24"	4.91	3'-11"	12"	2'-8"	4'-6"	8'-0"	3'-11"	12"	11"	2'-2"	2.35	107	
42" X 28"	7.07	4'-6"	12"	3'-4"	5'-6"	10'-4"	4'-9"	12"	11"	2'-7"	3.20	150	
48" X 33"	9.62	5'-1"	12"	3'-3"	5'-6"	10'-4"	4'-9"	12"	11"	2'-7"	3.23	151	
57" X 38"	12.57	5'-9"	12"	3'-9"	6'-6"	12'-4"	5'-8"	12"	11"	3'-0"	3.98	185	



ELEVATION

GENERAL NOTES

- CONCRETE : MIX NO. 3
- 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" x 1" OR AS DIRECTED.

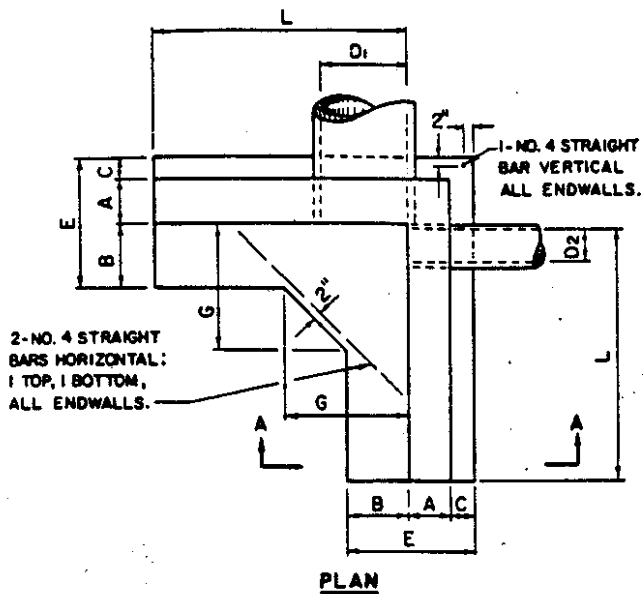
NOTE:WHenever THIS HEADWALL IS USED IN CONJUNCTION WITH A PAVED CHAMBER THE FOOTING OF THE HEADWALL SHALL BE LOWERED BELOW THE FINISHED GRADE OF THE CHAMBER THE THICKNESS OF THE CHAMBER PAVING IN ORDER THAT THE CHAMBER HEIGHT BE BLENDED INTO THE HEADWALL. THE "B", "P" AND "F" DIMENSIONS AND THE STEEL REINFORCING SHALL BE ADJUSTED AS REQUIRED.

ANNE ARUNDEL
COUNTY
DEPARTMENT OF
PUBLIC WORKS

APPROVED
CHIEF ENGINEER
DESIGN ENGINEER
DATE

STANDARD DRAINAGE DETAILS
STANDARD TYPE "F" HEADWALL
ARCH PIPE

REVISED	
	D
	67



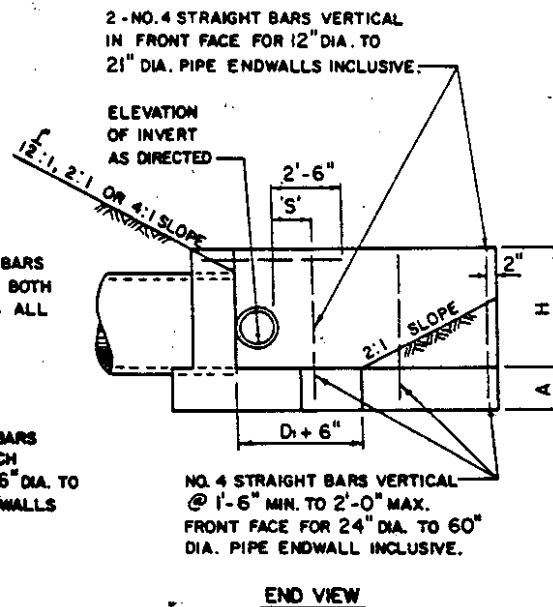
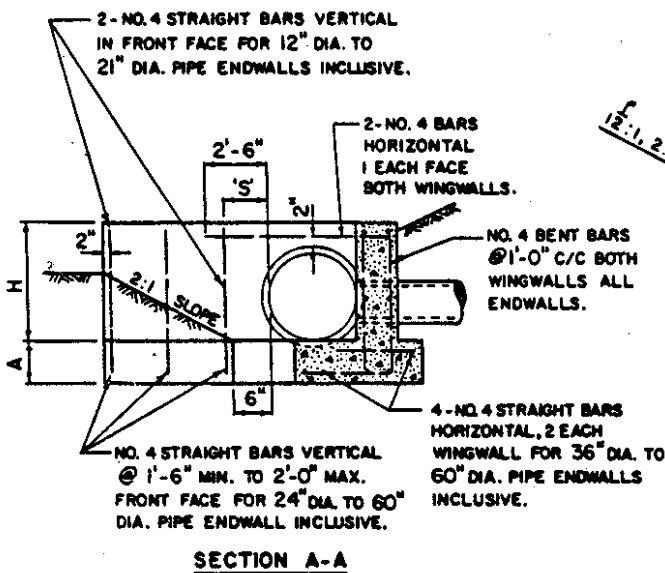
NO. 4 BARS HORIZONTAL @ 1'-7" MAX. C/C BOTH FACES - LAP 1'-3" TOP AND BOTTOM BARS @ CORNER BOTH WINGWALLS ALL ENDWALLS.

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 DETAIL 'D/68 A.



NOTES:
CONCRETE: MIX NO. 3
REINFORCING: DEFORMED STEEL BARS NO. 4
CHAMFER: ALL EXPOSED EDGES 1" X 1" OR AS DIRECTED.
SOD: PLACE SOD, 3" WIDE, AROUND ENDWALL AS INDICATED ON THE PLANS.

'S' DISTANCES
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.

ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS	APPROVED <i>[Signature]</i> 9/7/88 CHIEF ENGINEER	STANDARD DRAINAGE DETAILS STANDARD TYPE H ENDWALL ROUND PIPE	REVISED
	DESIGN ENGINEER <i>[Signature]</i> 9/6/88 DATE		D
			68

QUANTITIES FOR ESTIMATING PURPOSES ONLY

D1	D2	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

D1	D2	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	448
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 DETAIL D/68

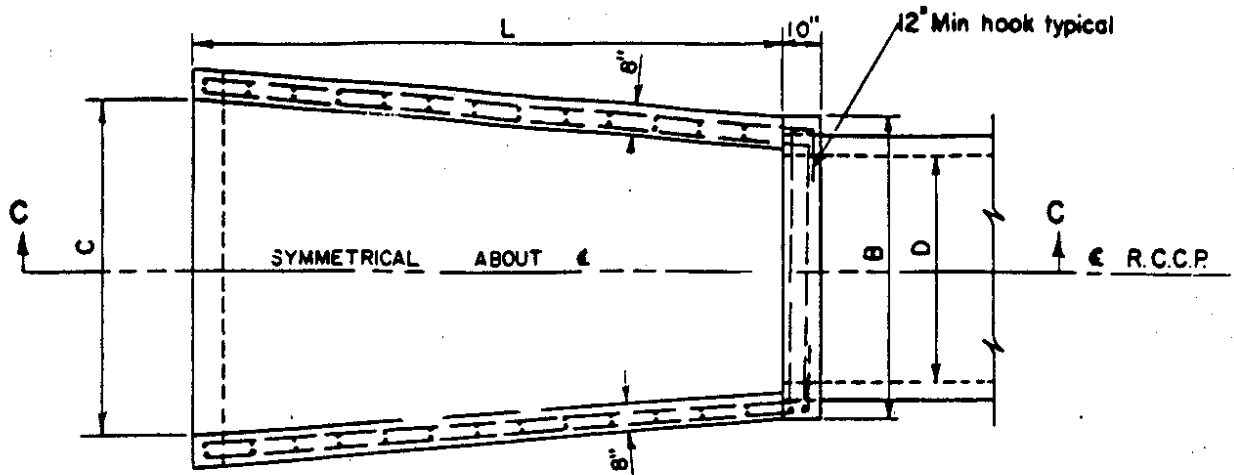
ANNE ARUNDEL
COUNTY
DEPARTMENT OF
PUBLIC WORKS

APPROVED *[Signature]* 9/1/03
CHIEF ENGINEER
[Signature] 9/1/03
DESIGN ENGINEER
DATE

STANDARD DRAINAGE DETAILS
STANDARD TYPE H ENDWALL
ROUND PIPE

REVISED

D
68A

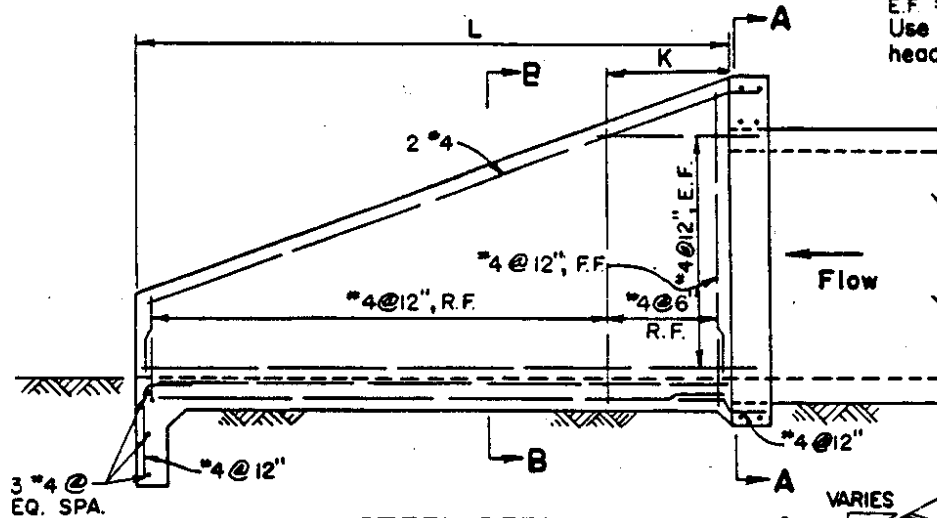


PLAN
(Showing wall reinforcement only)

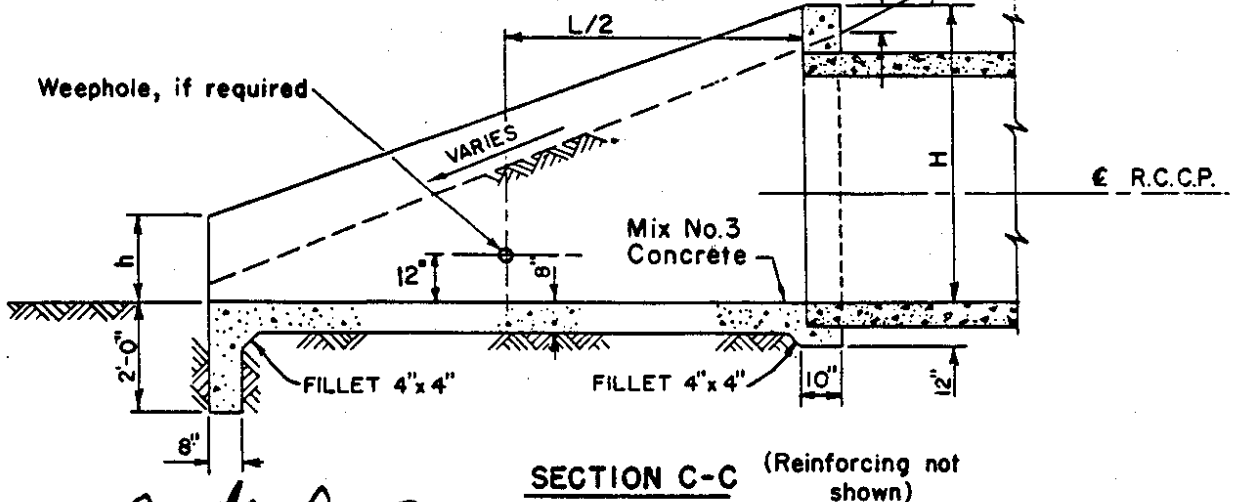
NOTE:

R.F. = Rear Face
 F.F. = Front Face (Exposed)
 E.F. = Each Face
 Use only where other headwalls can not be used.
 Headwall to be parallel to ϵ of roadway.

FOR SECTIONS A-A & B-B. SEE DETAIL, D-70

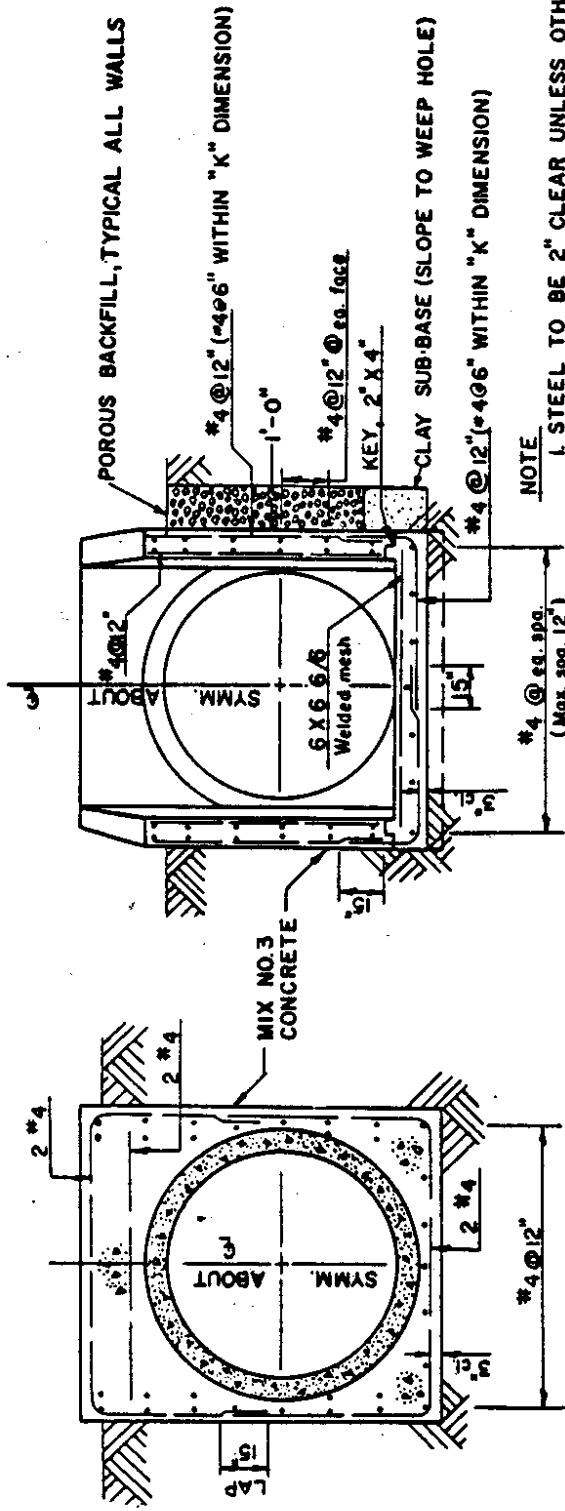


STEEL DETAIL



SECTION C-C (Reinforcing not shown)

ANNE ARUNDE COUNTY DEPARTMENT OF PUBLIC WORKS	APPROVED <i>[Signature]</i> CHIEF ENGINEER	STANDARD DRAINAGE DETAILS TYPE "O" HEADWALL CIRCULAR PIPE	REVISED	D 69
	DESIGN ENGINEER <i>[Signature]</i> 9/16/02			
	DATE			



SECTION A-A

SECTION B-B

NOTE
 1. STEEL TO BE 2" CLEAR UNLESS OTHERWISE SHOWN.
 2. PROVIDE ONE 3" CAST IRON WEEP HOLE IN EACH WINGWALL, AT CENTER, FOR PIPES OVER 36" DIA. PLACE WEEP HOLE AT TOP OF CLAY SUBBASE.

3. USE ONLY WHERE OTHER HEADWALLS CAN NOT BE USED.
 4. HEADWALL TO BE PARALLEL TO 1/2 OF ROADWAY.
 5. FOR PLAN VIEW, STEEL DETAIL AND SECTION C-C, SEE DETAIL D-69

HEADWALLS FOR CIRCULAR PIPE (R.C.C.P.)

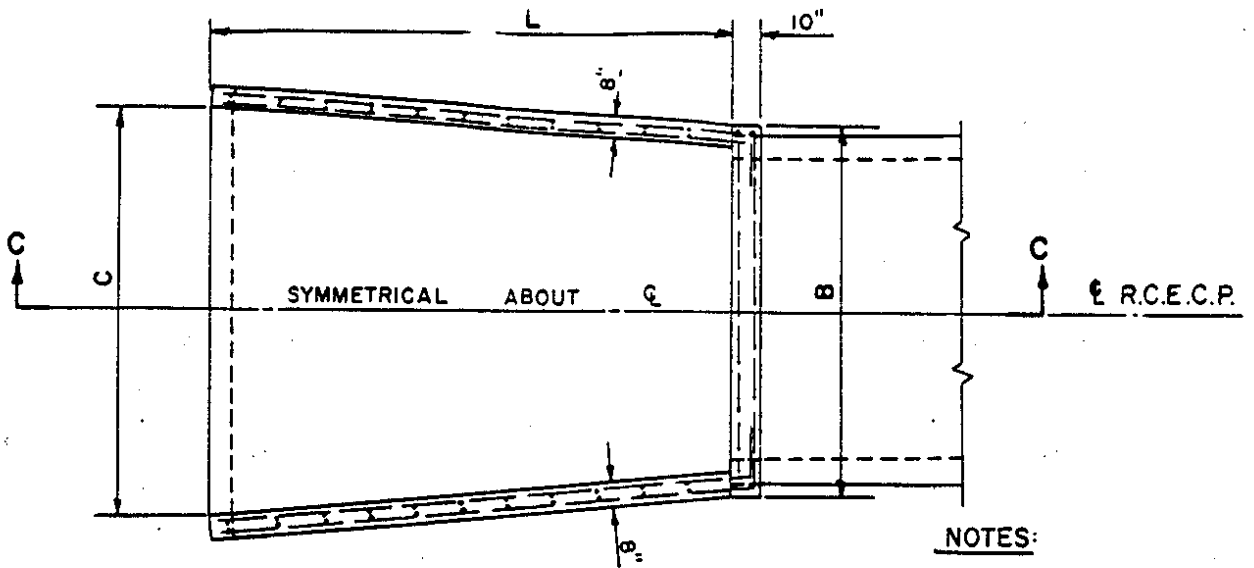
DIMENSIONS	DIAMETER - (D)											
	18"	21"	24"	27"	30"	36"	42"	48"	54"	60"	66"	72"
B	2'-10"	3'-1"	3'-4"	3'-7"	4'-2"	4'-8"	5'-2"	5'-6"	6'-2"	6'-10"	7'-6"	8'-0"
C	2'-7"	2'-11"	3'-4"	3'-8"	4'-5"	5'-2"	5'-11"	6'-8"	7'-5"	8'-4"	9'-1"	9'-10"
H	3'-0"	3'-3"	3'-6"	3'-9"	4'-0"	4'-6"	5'-0"	5'-6"	6'-0"	6'-6"	7'-0"	7'-6"
h	1'-0"	1'-0"	1'-0"	1'-0"	1'-3"	1'-6"	1'-9"	2'-0"	2'-3"	2'-6"	2'-9"	3'-0"
L	5'-6"	6'-0"	6'-6"	7'-0"	8'-0"	9'-0"	10'-3"	11'-6"	12'-9"	14'-0"	15'-3"	16'-6"
K	-	-	-	-	-	-	-	1'-0"	1'-0"	2'-0"	3'-0"	4'-0"

REVISIONS	

STANDARD DRAINAGE DETAILS
 TYPE "O" HEADWALL
 CIRCULAR PIPE

APPROVED: *[Signature]*
 CHIEF ENGINEER
 DESIGN ENGINEER: *[Signature]* 7/6/82
 DATE

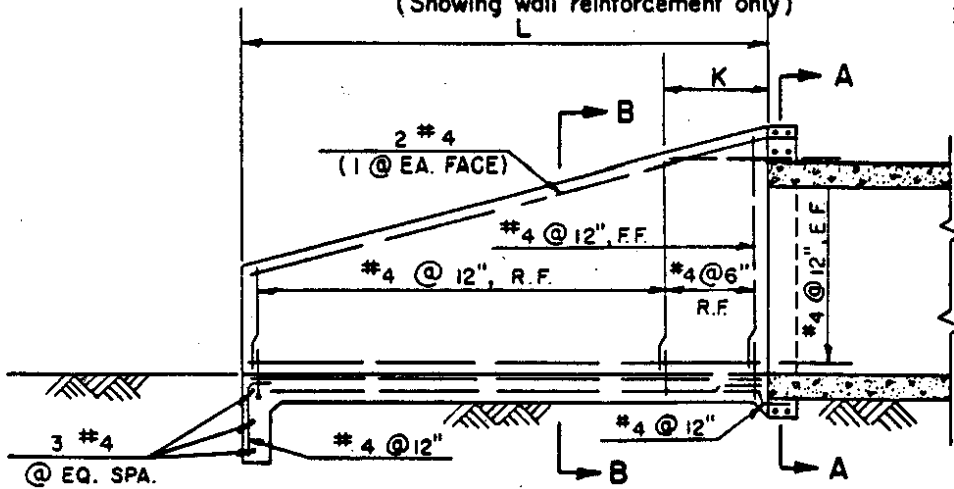
ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS



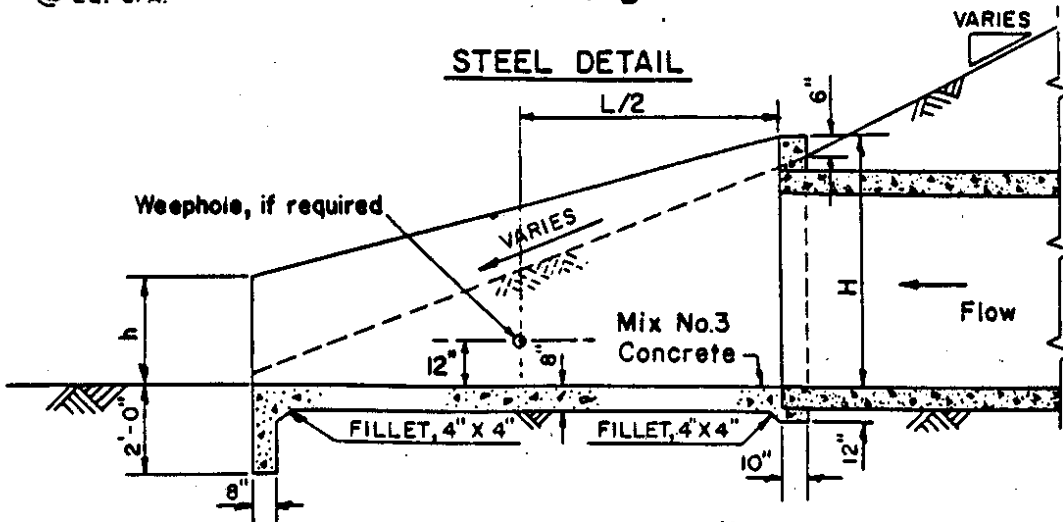
PLAN
(Showing wall reinforcement only)

NOTES:

1. R.F - Rear Face
2. F.F. - Front Face
3. E.F. - Each Face
4. Steel to be 2" clear unless otherwise shown.
5. Headwall to be parallel to ϵ of roadway.
6. For Sections "A-A" and "B-B", See Detail D/72



STEEL DETAIL



SECTION C-C (Reinforcing not shown)

APPROVED
[Signature]
 CHIEF ENGINEER
 DESIGN ENGINEER
 DATE

STANDARD DRAINAGE DETAILS
TYPE "O" HEADWALL
 ELLIPTICAL PIPE

REVISED

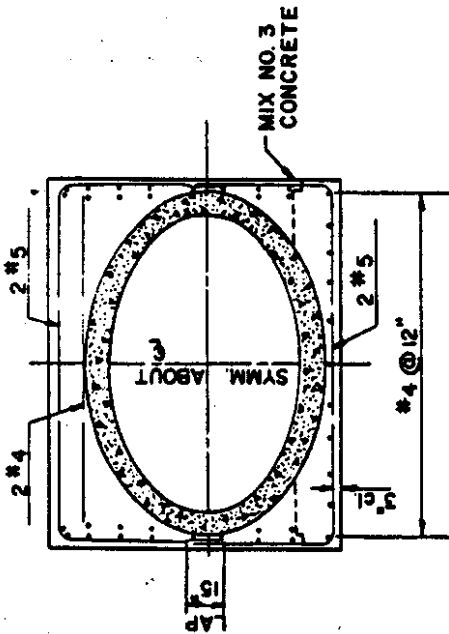
D
71

HEADWALLS FOR ELLIPTICAL PIPE (R.C.E.C.P.)

SPAN	RISE	EQUIV ROUND	B	C	H	h	L	K
23"	14"	18"	3'-5"	2'-11"	2'-5"	1'-0"	4'-3"	-
30"	19"	24"	4'-0"	3'-9"	2'-10"	1'-0"	5'-4"	-
38"	24"	30"	4'-8"	4'-8"	3'-4"	1'-0"	6'-6"	-
42"	27"	33"	5'-0"	5'-1"	3'-7"	1'-3"	7'-2"	-
45"	29"	36"	5'-3"	5'-5"	3'-10"	1'-4"	7'-8"	-
53"	34"	42"	6'-0"	6'-4"	4'-3"	1'-7"	8'-8"	-
60"	38"	48"	6'-8"	7'-1"	4'-8"	1'-9"	9'-6"	-
68"	43"	54"	7'-5"	7'-11"	5'-1"	2'-0"	10'-7"	-

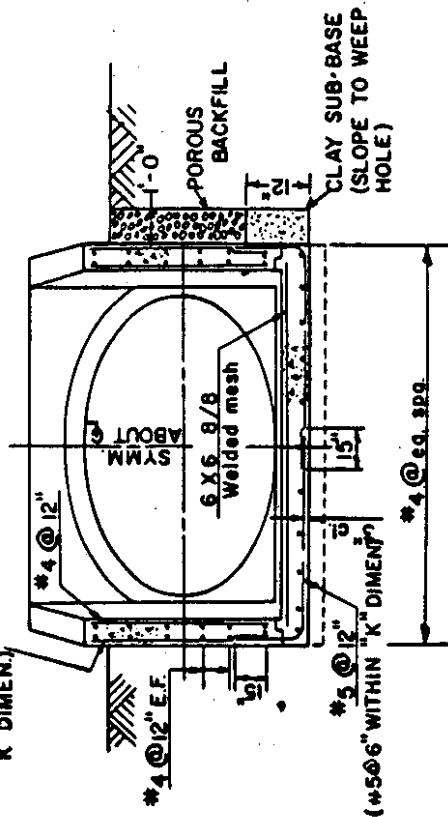
NOTE

1. PROVIDE ONE 3" CAST IRON PIPE WEEP HOLE IN EACH WING-WALL, AT CENTER, FOR PIPES OVER 60" SPAN. PLACE WEEP HOLE AT TOP OF CLAY SUB-BASE.
2. USE ONLY WHERE OTHER HEADWALLS CAN NOT BE USED.
3. HEADWALL TO BE PARALLEL TO $\frac{1}{4}$ OF ROADWAY.
4. FOR CMPA DIMENSIONS B AND H SHALL BE BASED UPON HORIZONTAL AND VERTICAL DIMENSIONS OF ARCH.
5. FOR PLAN VIEW, STEEL DETAIL AND SECTION "C-C", SEE DETAIL D/71.



SECTION A-A

*4 @ 12" (4 @ 6" WITHIN "K" DIMEN.)



SECTION B-B

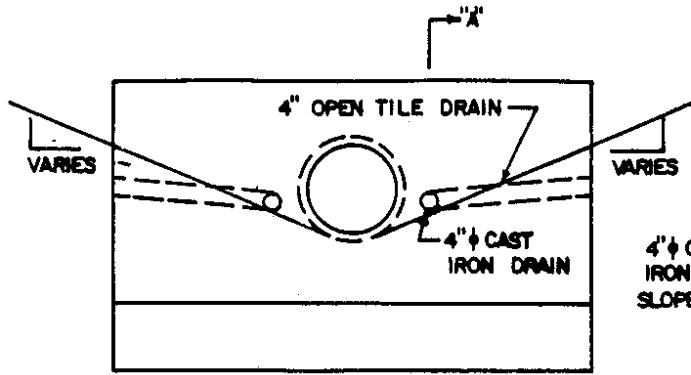
APPROVED: *[Signature]* 9/7/80
 CHIEF ENGINEER
 DESIGN ENGINEER: *[Signature]* 9/6/80
 ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS
 DATE: _____

STANDARD DRAINAGE DETAILS
 TYPE "O" HEADWALL
 ELLIPTICAL PIPE

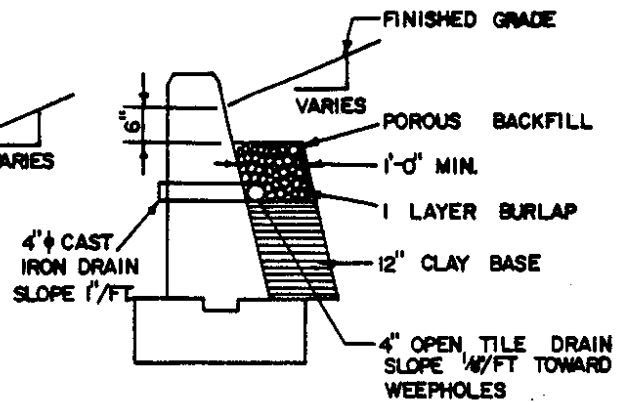
REVISED

D/72

NOTE: DAMP-PROOF REAR FACE OF WALL UP TO 1'-6" BELOW TOP OF WALL

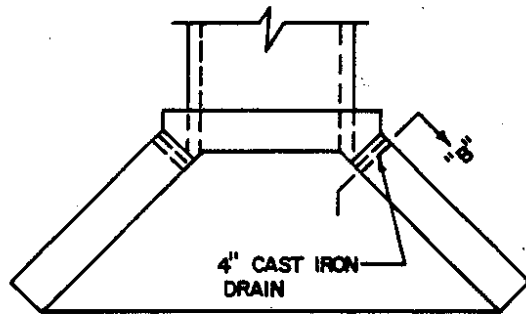


ELEVATION

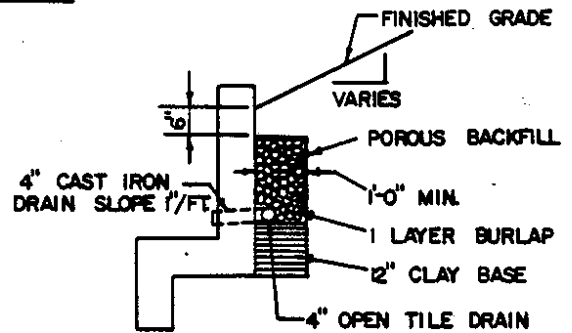


SECTION "A-A"

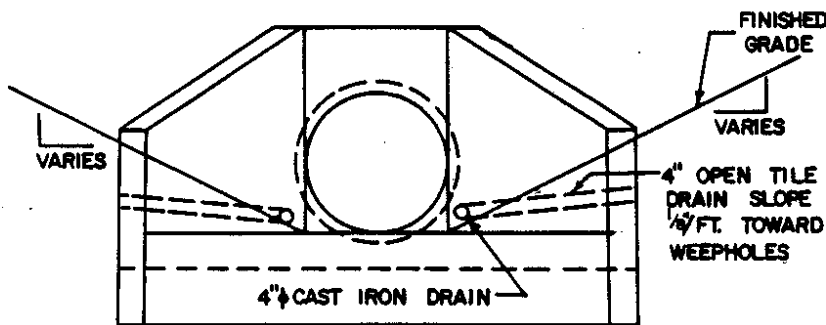
TYPE "B" HEADWALL



PLAN



SECTION "B-B"



ELEVATION

NOTE: THE PLACEMENT AND CONSTRUCTION OF WEEPHOLES FOR THE TYPE A-I; E; F AND "O" HEADWALLS WILL BE SIMILAR TO THAT SHOWN FOR THE TYPE "A" HEADWALL

TYPE "A" HEADWALL

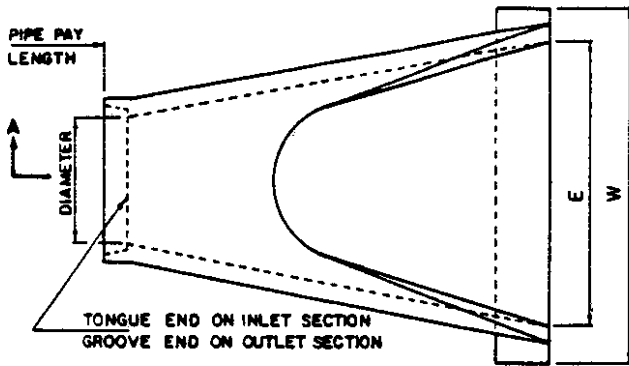
ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS

APPROVED *[Signature]* 9/1/88
 CHIEF ENGINEER
 DESIGN ENGINEER *[Signature]* 9/6/88
 DATE _____

STANDARD DRAINAGE DETAILS
 DETAILS OF WEEPHOLES
 FOR HEADWALLS

REVISED

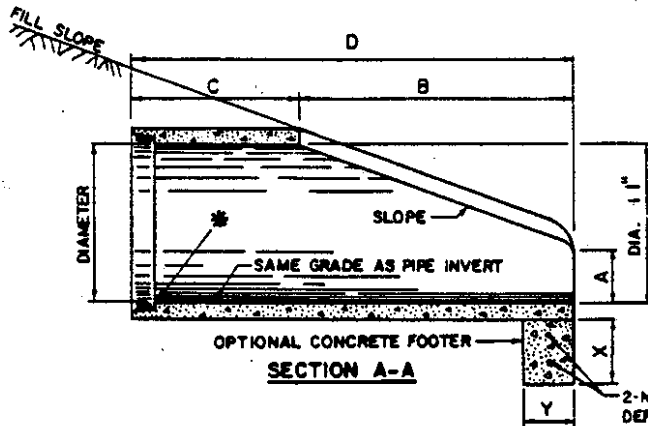
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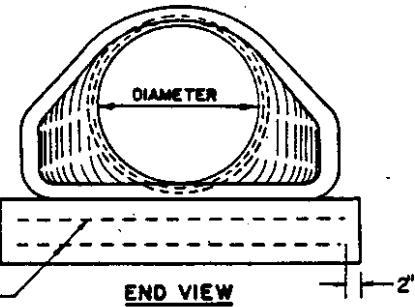
PLAN

NOTES:

1. CONTRACTOR HAS OPTION OF FURNISHING END SECTIONS CONFORMING TO DETAILS ON THIS SHEET OR END SECTIONS CONFORMING TO DETAILS ON 0/75.
2. END SECTIONS MUST BE REINFORCED TO CONFORM WITH CLASS IV 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.



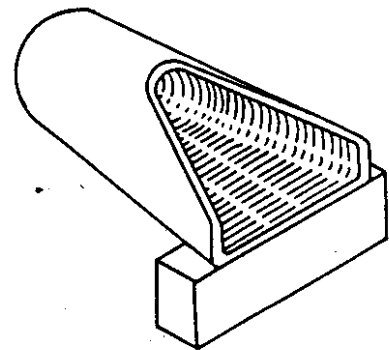
* INVERT ELEVATION TO BE AT THE PIPE END OF THE STANDARD END SECTION. ELEVATIONS TO BE NOTED ON THE CONSTRUCTION PLANS.



QUANTITIES FOR ESTIMATING PURPOSES ONLY

DIMENSIONS										QUANTITIES		
CONCRETE END SECTION							CONCRETE FOOTER				CONC. C.Y.	STEEL LBS.
DIA.	SLOPE	A	B	C	D	E	W	X	Y			
12"	3:1	4"	2'-0"	4'-0"	6'-0"	2'-0"	3'-0"	12"	9"	0.08	24.00	
15"	3:1	6"	2'-4"	3'-10"	6'-2"	2'-6"	3'-6"	12"	9"	0.10	28.50	
18"	3:1	10"	2'-2"	4'-0"	6'-2"	3'-0"	4'-0"	12"	9"	0.11	33.00	
21"	3:1	9"	3'-0"	3'-4"	6'-1"	3'-6"	4'-6"	12"	9"	0.13	37.50	
24"	3:1	11"	3'-7"	2'-8"	6'-3"	4'-0"	5'-0"	15"	9"	0.17	42.00	
27"	3:1	10"	4'-1"	2'-0"	6'-1"	4'-6"	5'-6"	15"	9"	0.19	46.50	
30"	3:1	1'-1"	4'-5"	1'-10"	6'-3"	5'-0"	6'-0"	15"	9"	0.21	51.00	
33"	3:1	1'-2"	4'-7"	2'-2"	6'-9"	5'-6"	6'-6"	15"	9"	0.23	55.50	
36"	3:1	1'-3"	5'-3"	3'-1"	8'-4"	6'-0"	7'-3"	15"	9"	0.25	62.25	
42"	3:1	1'-9"	5'-5"	2'-10"	8'-3"	6'-6"	7'-9"	15"	9"	0.27	66.75	
48"	3:1	2'-1"	6'-0"	2'-2"	8'-2"	7'-0"	8'-6"	18"	12"	0.47	73.50	
54"	2:4:1	2'-8"	5'-2"	2'-10"	8'-0"	7'-6"	9'-0"	18"	12"	0.50	78.00	
60"	2:1	2'-7"	4'-11"	3'-8"	8'-7"	8'-0"	9'-6"	18"	12"	0.53	82.50	
66"	2:1	2'-4"	6'-6"	1'-9"	8'-3"	8'-6"	10'-0"	18"	12"	0.56	87.00	
72"	2:1	2'-10"	6'-6"	1'-9"	8'-3"	9'-0"	10'-9"	18"	12"	0.60	93.75	

SEE NOTE 3 ABOVE FOR CONCRETE FOOTER



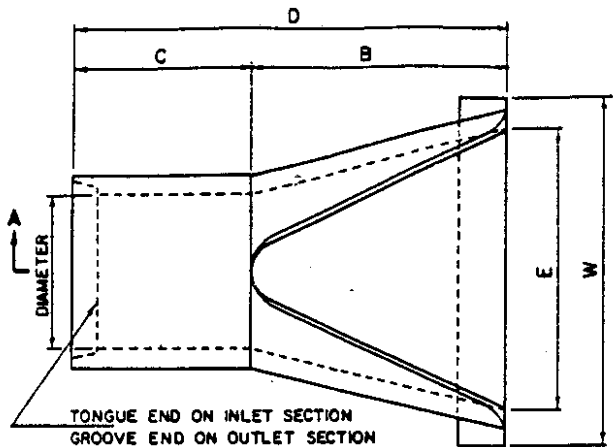
ISOMETRIC VIEW

ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS

APPROVED *[Signature]*
 CHIEF ENGINEER
 DESIGN ENGINEER *[Signature]*
 DATE

STANDARD DRAINAGE DETAILS
 STANDARD CONCRETE END SECTION
 ROUND CONCRETE PIPE

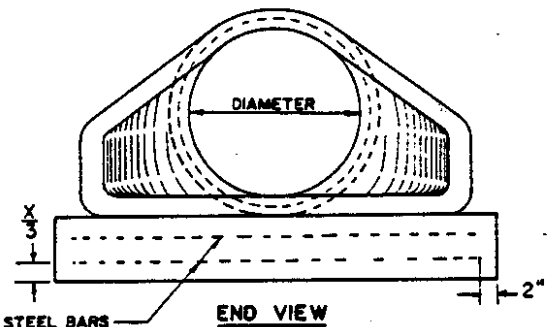
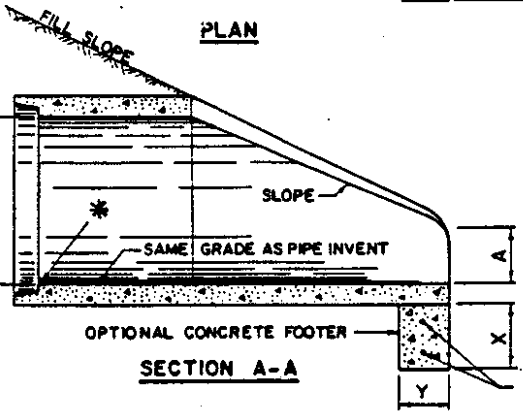
REVISED	D 74



NOTES:

1. CONTRACTOR HAS OPTION OF FURNISHING END SECTIONS CONFORMING TO DETAILS ON THIS SHEET OR END SECTIONS CONFORMING TO DETAILS 0/74.
2. END SECTIONS MUST BE REINFORCED TO CONFORM WITH CLASS IV 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.

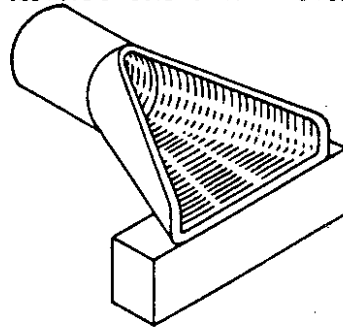
*INVERT ELEVATION TO BE AT THE PIPE END OF THE STANDARD END SECTION. ELEVATIONS TO BE NOTED ON THE CONSTRUCTION PLANS.



QUANTITIES FOR ESTIMATING PURPOSES ONLY

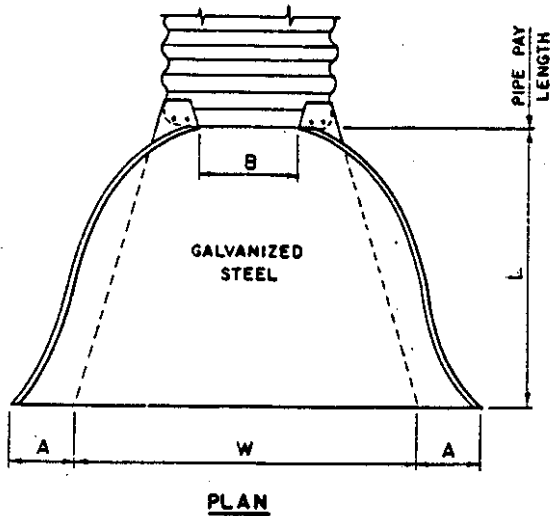
DIMENSIONS										QUANTITIES	
CONCRETE END SECTION						CONCRETE FOOTER				CONC. C.Y.	STEEL LBS.
DIA.	SLOPE	A	B	C	D	E	W	X	Y		
12"	3:1	4"	2'-0"	4'-0 ³ / ₄ "	6'-0 ³ / ₄ "	2'-0"	3'-0"	12"	9"	0.08	24.00
15"	3:1	6"	2'-3"	3'-10"	6'-1"	2'-6"	3'-6"	12"	9"	0.10	28.50
18"	3:1	9"	2'-3"	3'-10"	6'-1"	3'-0"	4'-0"	12"	9"	0.11	33.00
21"	3:1	9"	3'-0"	3'-1 ¹ / ₂ "	6'-1 ¹ / ₂ "	3'-6"	4'-6"	12"	9"	0.13	37.50
24"	3:1	9 ¹ / ₂ "	3'-7 ¹ / ₂ "	2'-6"	6'-1 ¹ / ₂ "	4'-0"	5'-0"	15"	9"	0.17	42.00
27"	3:1	10 ¹ / ₂ "	4'-1 ¹ / ₂ "	2'-0"	6'-1 ¹ / ₂ "	4'-6"	5'-6"	15"	9"	0.19	46.50
30"	3:1	1'-0"	4'-6"	1'-7 ¹ / ₂ "	6'-1 ¹ / ₂ "	5'-0"	6'-0"	15"	9"	0.21	51.00
33"	3:1	1'-2"	4'-7"	2'-2"	6'-9"	5'-6"	6'-6"	15"	9"	0.23	55.50
36"	3:1	1'-3"	5'-3"	2'-0 ³ / ₄ "	6'-1 ³ / ₄ "	6'-0"	7'-3"	15"	9"	0.25	62.25
42"	3:1	1'-6" OR 1'-9"	5'-3"	2'-11"	8'-2"	6'-6"	7'-9"	15"	9"	0.27	66.75
48"	3:1	2'-0"	6'-0"	2'-2"	8'-2"	7'-0"	8'-6"	18"	12"	0.47	73.50
54"	2.4:1	2'-3"	5'-5"	2'-9 ¹ / ₄ "	8'-2 ¹ / ₄ "	7'-6"	9'-0"	18"	12"	0.50	78.00

SEE NOTE 3 ABOVE FOR CONCRETE FOOTER

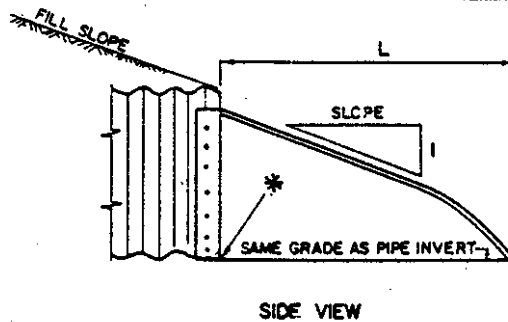
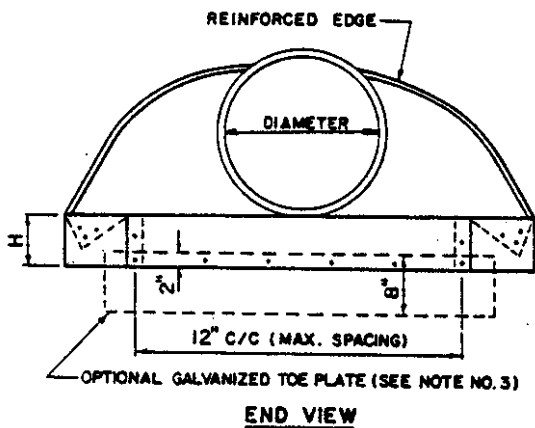


ISOMETRIC VIEW

ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS	APPROVED <i>[Signature]</i> CHIEF ENGINEER	STANDARD DRAINAGE DETAILS STANDARD CONCRETE END SECTION ROUND CONCRETE PIPE	REVISED	D 75
	DESIGN ENGINEER <i>[Signature]</i>		_____	
	DATE		_____	
	_____		_____	



DIMENSIONS								
PIPE DIA.	GA.	A 1"±	B MAX.	H 1"±	L 1 1/2"±	W 2"±	APPROX. SLOPE	UNIT
12"	16	6"	6"	6"	21"	24"	2 1/2	1 PC.
15"	16	7"	8"	6"	26"	30"	2 1/2	1 PC.
18"	16	8"	10"	6"	31"	36"	2 1/2	1 PC.
21"	16	9"	12"	6"	36"	42"	2 1/2	1 PC.
24"	16	10"	13"	6"	41"	48"	2 1/2	1 PC.
30"	14	12"	16"	8"	51"	60"	2 1/2	1 PC.
36"	14	14"	19"	9"	60"	72"	2 1/2	2 PC.
42"	12	16"	22"	11"	69"	84"	2 1/2	2 PC.
48"	12	18"	27"	12"	78"	90"	2 1/8	2 OR 3 PC.
54"	12	18"	30"	12"	84"	102"	2	2 OR 3 PC.
60"	12 & 10	18"	33"	12"	87"	114"	1 1/2	3 PC.
66"	12 & 10	18"	36"	12"	87"	120"	1 1/2	3 PC.
72"	12 & 10	18"	39"	12"	87"	126"	1 1/3	3 PC.
78"	12 & 10	18"	42"	12"	87"	132"	1 1/4	3 PC.
84"	12 & 10	18"	45"	12"	87"	138"	1 1/8	3 PC.



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

NOTES:

1. ALL 3 PIECE UNITS TO HAVE 12 GA. SIDES AND 10 GA. CENTER PANELS (EXCEPT 48" AND 54" PIPES, ALL PANELS SHALL BE 12 GA.). WIDTH OF CENTER PANELS TO BE GREATER THAN 20% OF THE PIPE PERIPHERY. MULTIPLE PANEL UNITS TO HAVE LAP SEAMS WHICH ARE TO BE TIGHTLY JOINED BY 3/8" GALVANIZED RIVETS OR BOLTS.
2. FOR 60" THRU 84" SIZES, REINFORCED EDGES TO BE SUPPLEMENTED WITH GALVANIZED STIFFENER ANGLES. THE ANGLES WILL BE 2" x 2" x 1/4" FOR 60" THRU 72" DIAMETER AND 2 1/2" x 2 1/2" x 1/4" FOR 78" AND 84" DIAMETER. THE ANGLES TO BE ATTACHED BY 3/8" GALVANIZED NUTS AND BOLTS.
3. TOE PLATE SHALL BE USED WHEN SPECIFIED ON THE PLANS. COST OF TOE PLATE TO BE INCLUDED IN BID PRICE PER EACH OF METAL END SECTION.
4. TYPE 3 CONNECTION INCLUDES ONE FOOT OF PIPE LENGTH FOR 42" THRU 84" DIAMETER AS A CONNECTOR SECTION. THE CONNECTOR SECTION WILL BE ATTACHED TO THE END SECTION BY GALVANIZED RIVETS OR BOLTS. SEE DETAIL D/78.
5. WHERE END SECTION IS TO BE APPLIED TO A STRUCTURAL PLATE PIPE, THE END SECTION SHALL BE ORDERED WITHOUT THE ONE FOOT OF PIPE LENGTH AS STIPULATED IN NOTE 4; INSTEAD, DRILL HOLES AND FIELD BOLT THE END SECTION DIRECTLY TO THE STRUCTURAL PLATE PIPE.

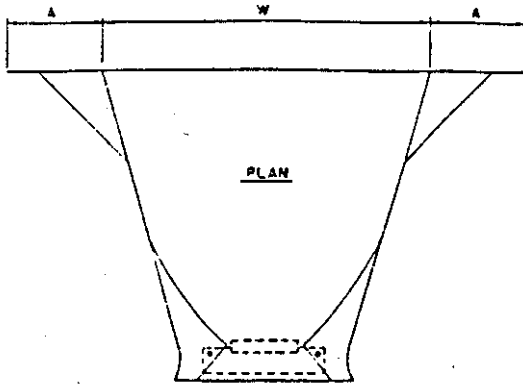
ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS

APPROVED: *[Signature]* 9/17/88
 CHIEF ENGINEER

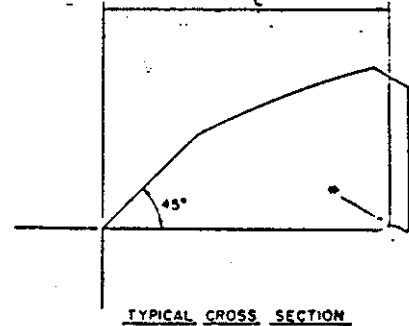
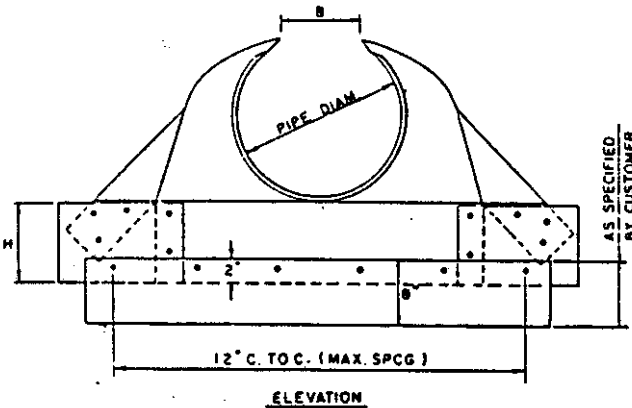
DESIGN ENGINEER: *[Signature]*
 DATE: _____

STANDARD DRAINAGE DETAILS
 STANDARD METAL END SECTION
 ROUND METAL PIPE

REVISED	
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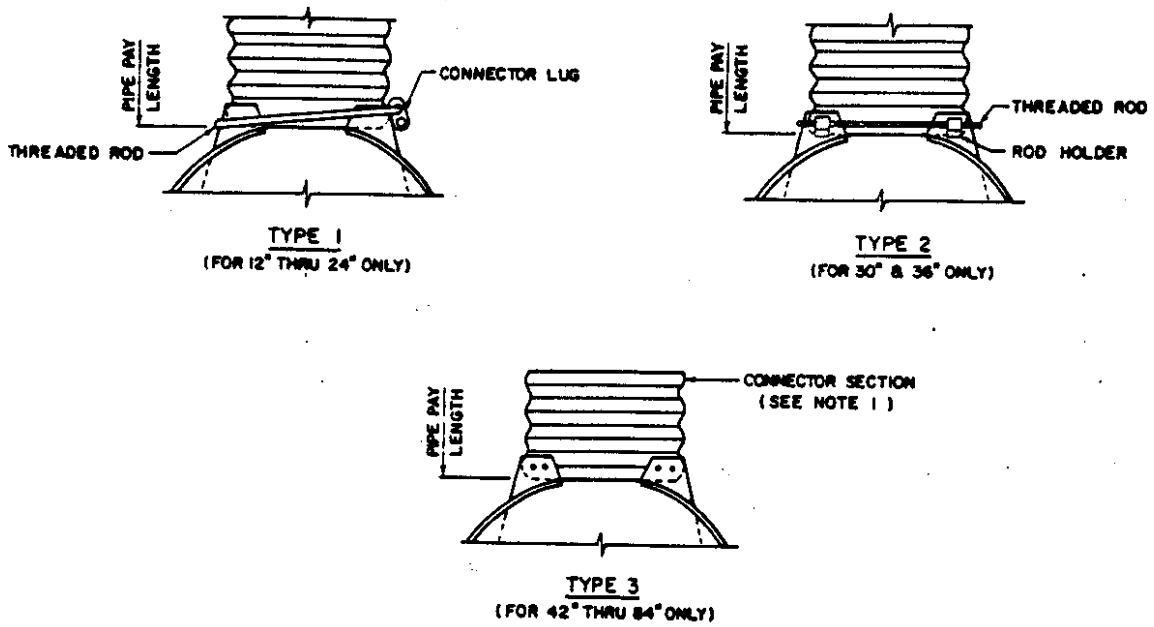
PIPE DIAM.	GA.	DIMENSION					BOOTS
		A 1" [±]	B	H	L 1 1/2"	W 2"	
12	16	7 1/2	6	6	21	24	1 PC.
15	16	8 5/8	8	6	26	30	1 PC.
18	16	9 1/4	9	6	31	36	1 PC.
21	16	9 7/8	11	6 1/4	36	42	1 PC.
24	14	11 1/4	12	6	42	48	1 PC.
30	14	13	15	7 1/2	52 1/2	60	2 PC.
36	12	14	18	8	63	72	2 PC.
42	12	16 3/4	21	10 1/2	73 1/2	84	2 PC.
48	12	18 1/4	27	12	84	90	2 PC.



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

- NOTE:
- 1- ALL RODS, BOLTS, NUTS, ETC. TO BE HOT DIP GALVANIZED, ELECTRO-GALVANIZED OR CADMIUM PLATED.
 - 2- SPECIFICATIONS AASHTO DESIGNATION M 36
 - 3- END SECTIONS TO BE SHIPPED WITH TOP FINISHING PIECE BOLTED IN PLACE AND CONNECTION PIECE ASSEMBLED IN PLACE.

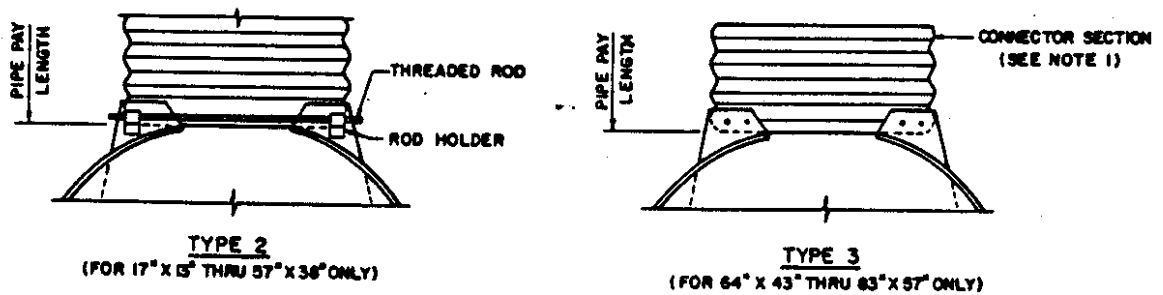
ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS	APPROVED CHIEF ENGINEER DESIGN ENGINEER DATE _____	STANDARD DRAINAGE DETAILS STANDARD METAL END SECTION ROUND METAL PIPE	REVISED _____ _____ _____	D 77
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CONNECTIONS FOR ROUND PIPE

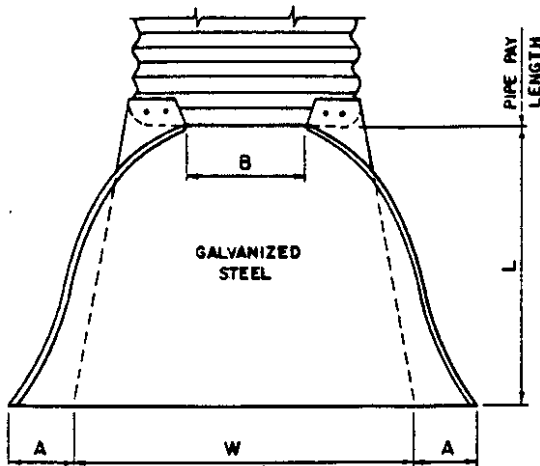
NOTES:

1. TYPE 3 CONNECTION INCLUDES ONE FOOT OF THE PIPE LENGTH FOR 42" THRU 84" ROUND SIZES OR FOR 64" X 43" THRU 83" X 57" ARCH SIZES AS A CONNECTOR SECTION. THE CONNECTOR SECTION WILL BE ATTACHED TO THE END SECTION BY GALVANIZED RIVETS OR BOLTS.
2. WHERE END SECTION IS TO BE APPLIED TO A STRUCTURAL PLATE PIPE OR STRUCTURAL PLATE PIPE ARCH THE END SECTION SHALL BE ORDERED WITHOUT THE ONE FOOT OF PIPE LENGTH. INSTEAD, DRILL HOLES AND FIELD BOLT THE END SECTION DIRECTLY TO THE STRUCTURAL PLATE PIPE OR STRUCTURAL PLATE PIPE ARCH.



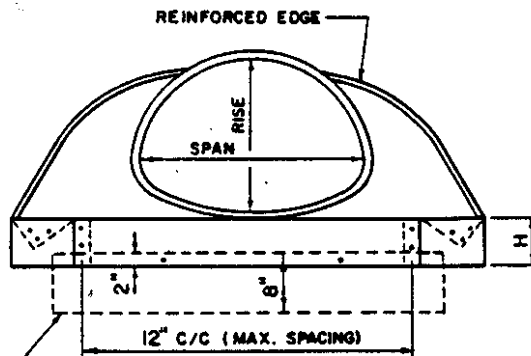
CONNECTIONS FOR PIPE ARCH

ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS	APPROVED <i>[Signature]</i> 9/7/88 CHIEF ENGINEER	STANDARD DRAINAGE DETAILS STANDARD CONNECTIONS METAL END SECTIONS	REVISED	D 78
	DESIGN ENGINEER <i>[Signature]</i>		_____	
	DATE		_____	
	_____		_____	
	_____		_____	



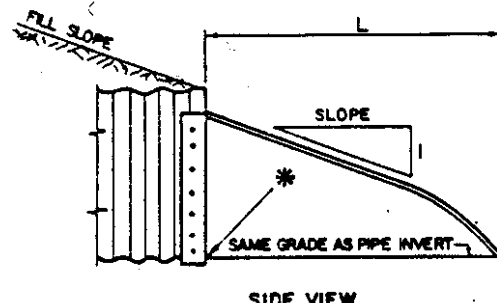
PLAN

DIMENSIONS									
PIPE ARCH DIMENSIONS		GA.	A	B	H	L	W	APPROX. SLOPE	UNIT
SPAN	RISE		1" ±	MAX.	1" ±	1 1/2" ±	2" ±		
17"	13"	16	7"	9"	6"	19"	30"	2 1/2	1 PC.
21"	15"	16	7"	10"	6"	23"	36"	2 1/2	1 PC.
24"	18"	16	8"	12"	6"	28"	42"	2 1/2	1 PC.
28"	20"	16	9"	14"	6"	32"	48"	2 1/2	1 PC.
35"	24"	14	10"	16"	6"	39"	60"	2 1/2	1 PC.
42"	29"	14	12"	18"	8"	46"	75"	2 1/2	1 PC.
49"	33"	12	13"	21"	9"	53"	85"	2 1/2	2 PC.
57"	38"	12	18"	26"	12"	63"	90"	2 1/2	2 OR 3 PC.
64"	43"	12	18"	30"	12"	70"	102"	2 1/4	2 OR 3 PC.
71"	47"	12	18"	33"	12"	77"	114"	2 1/4	3 PC.
77"	52"	12	18"	36"	12"	77"	126"	2	3 PC.
83"	57"	12	18"	39"	12"	77"	138"	2	3 PC.



OPTIONAL GALVANIZED TOE PLATE (SEE NOTE NO. 4)

END VIEW



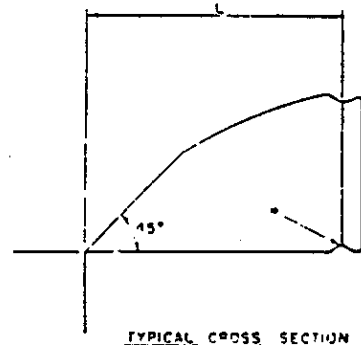
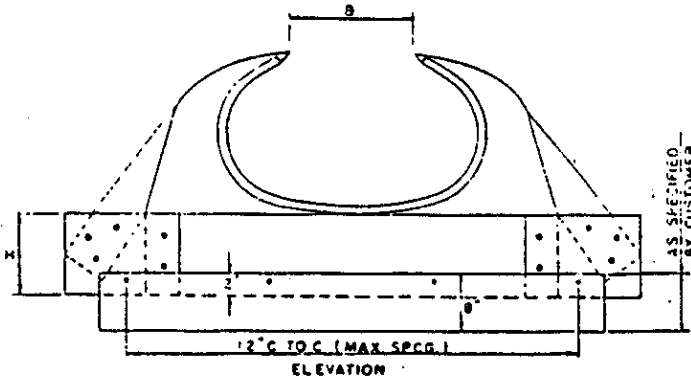
SIDE VIEW

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

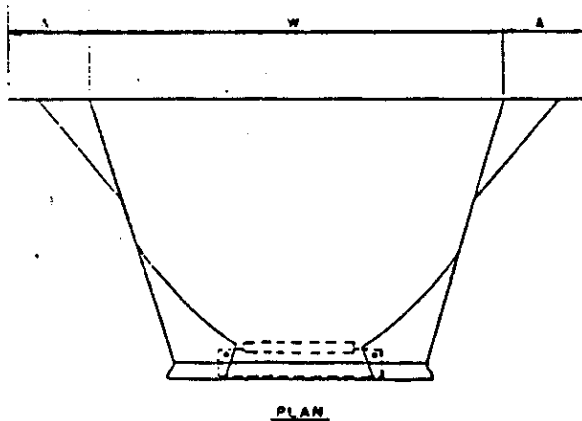
NOTES:

1. ALL 3 PIECE UNITS 12 GA. SIDES AND 10 GA. CENTER PANELS (EXCEPT 57" x 36" AND 64" x 43" PIPES, ALL PANELS SHALL BE 12 GA.). WIDTH OF CENTER PANELS TO BE GREATER THAN 20% OF THE PIPE PERIMERY. MULTIPLE PANEL UNITS TO HAVE LAP SEAMS WHICH ARE TO BE TIGHTLY JOINED BY 3/8" GALVANIZED RIVETS OR BOLTS.
2. FOR THE 77" x 52" AND 83" x 57" SIZES, REINFORCED EDGE TO BE SUPPLEMENTED BY 2" x 2" GALVANIZED ANGLES. THE ANGLES ARE TO BE ATTACHED BY 1/2" GALVANIZED NUTS AND BOLTS.
3. ANGLE REINFORCEMENT WILL BE PLACED UNDER THE CENTER PANEL SEAMS ON THE 77" x 52" AND 83" x 57" SIZES.
4. TOE PLATE SHALL BE USED WHEN SPECIFIED ON THE PLANS. COST OF TOE PLATE TO BE INCLUDED IN BID PRICE PER EACH OF METAL END SECTION.
5. TYPE 3 CONNECTION INCLUDES ONE FOOT OF PIPE LENGTH FOR 64" x 43" THRU 83" x 57" DIAMETER AS A CONNECTOR SECTION. THE CONNECTOR SECTION WILL BE ATTACHED TO THE END SECTION BY GALVANIZED RIVETS OR BOLTS. SEE DETAIL D/78.
6. WHERE END SECTION IS TO BE APPLIED TO A STRUCTURAL PLATE PIPE ARCH, THE END SECTION SHALL BE ORDERED WITHOUT THE ONE FOOT OF PIPE LENGTH AS STIPULATED IN NOTE 5; INSTEAD, DRILL HOLES AND FIELD BOLT THE END SECTION DIRECTLY TO THE STRUCTURAL PLATE PIPE ARCH.

ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS	APPROVED <i>[Signature]</i> 9/17/08 CHIEF ENGINEER	STANDARD DRAINAGE DETAILS STANDARD METAL END SECTION ARCH METAL PIPE	REVISED	D 79
	DESIGN ENGINEER <i>[Signature]</i> 9/16/08		_____	
	DATE _____		_____	
	_____		_____	



TYPICAL CROSS SECTION
 H INVERT ELEVATION TO BE AT THE PIPE END OF THE STANDARD END SECTION. ELEVATIONS TO BE NOTED ON THE PLANS.



Pipe-Arch		GAGE	Dimensions in					Splice
Span	Rise		A ± 1/8 in	B (max)	C ± 1/8 in	L ± 1/2 in	W ± 2 in	
17	13	16	7	9	6	19	10	1 Pc
21	15	16	7	10	6	23	15	1 Pc
24	18	16	8	12	6	25	12	1 Pc
28	20	16	9	14	6	32	18	1 Pc
35	24	14	10	16	6	39	13	1 Pc
42	29	14	12	18	8	44	15	1 Pc
49	33	12	13	21	9	53	15	2 Pc
57	38	12	18	25	12	63	19	2 Pc
64	43	12	18	30	12	73	122	2 Pc
71	47	12	18	33	12	77	114	2 Pc
77	52	12	18	36	12	77	126	2 Pc
83	57	12	18	39	12	77	138	2 Pc

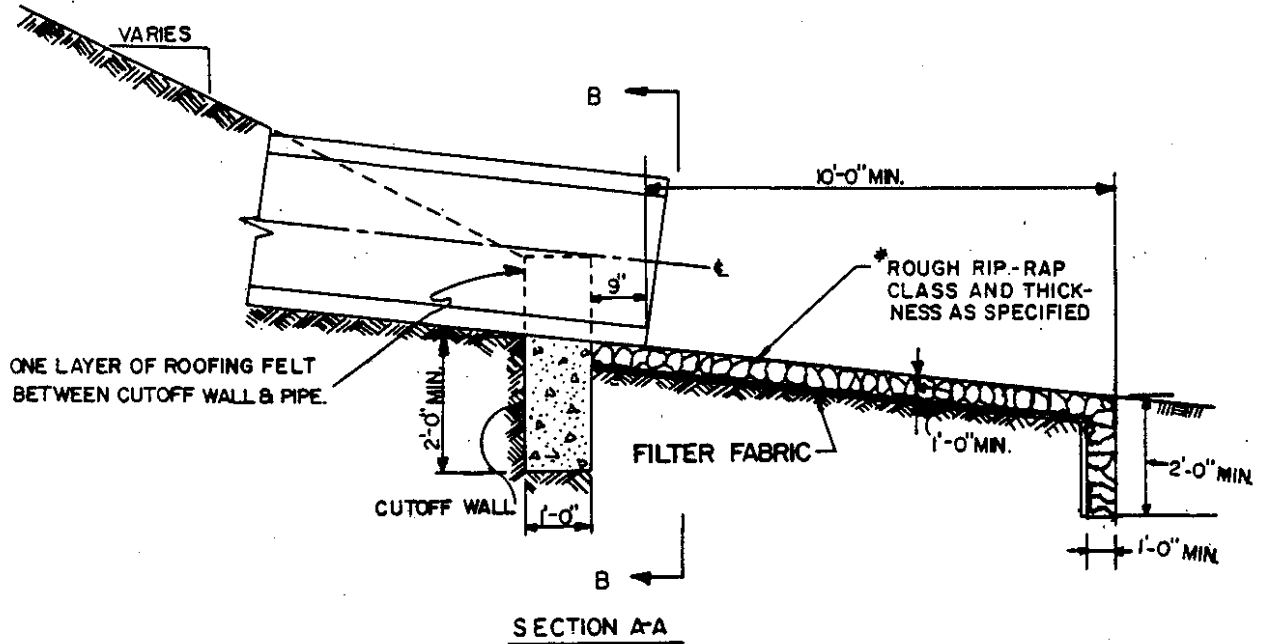
NOTES:

- ALL 3 PIECE UNITS 12 GA. SIDES AND 10 GA. CENTER PANELS (EXCEPT 57" X 38" AND 64" X 43" PIPES, ALL PANELS SHALL BE 12 GA.) WIDTH OF CENTER PANELS TO BE GREATER THAN 20% OF THE PIPE PERIPHERY. MULTIPLE PANEL UNITS TO HAVE LAP SEAMS WHICH ARE TO BE TIGHTLY JOINED BY 3/8" GALVANIZED RIVETS OR BOLTS.
- FOR THE 77" X 52" AND 83" X 57" SIZES, REINFORCED EDGE TO BE SUPPLEMENTED BY 2" X 2" X 1/4" GALVANIZED ANGLES. THE ANGLES ARE TO BE ATTACHED BY 1/2" GALVANIZED NUTS AND BOLTS.
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- WHERE END SECTION IS TO BE APPLIED TO A STRUCTURAL PLATE PIPE ARCH, THE END SECTION SHALL BE ORDERED WITHOUT THE ONE FOOT OF PIPE LENGTH AS STIPULATED IN NOTE 5; INSTEAD, DRILL HOLES AND FIELD BOLT THE END SECTION DIRECTLY TO THE STRUCTURAL PLATE PIPE ARCH.

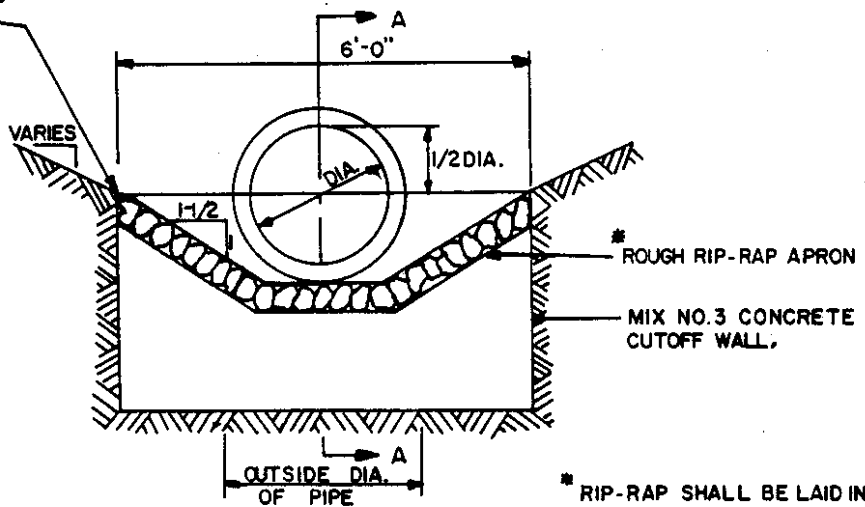
ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS	APPROVED <i>[Signature]</i> 9/17/00 CHIEF ENGINEER	STANDARD DRAINAGE DETAILS STANDARD METAL END SECTION ARCH METAL PIPE	REVISED	D 80
	DESIGN ENGINEER <i>[Signature]</i>			
	DATE			

NOTE:

TYPE 'B' HEADWALL D/60 CAN BE USED IN PLACE OF CUTOFF WALL IF DESIRED.



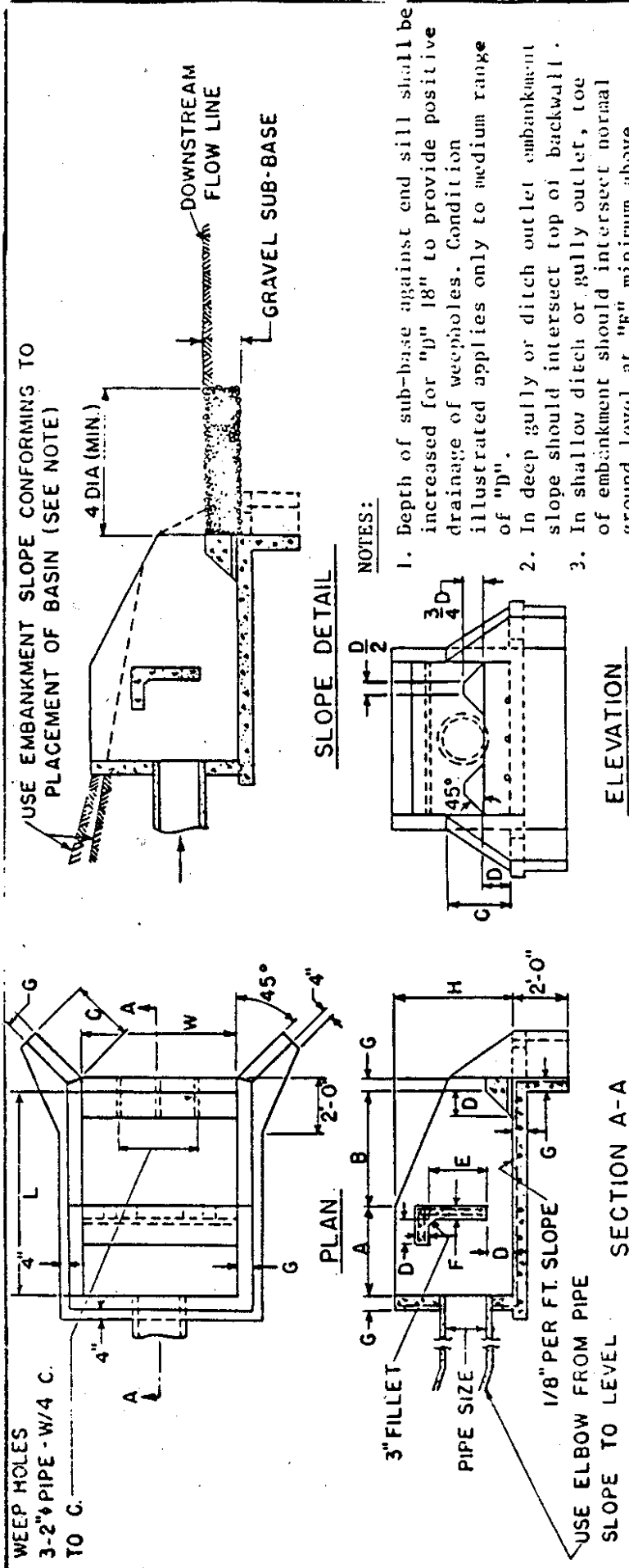
WARP CHANNEL SECTION INTO HEADWALL, IF NECESSARY.



* RIP-RAP SHALL BE LAID IN A FASHION THAT WILL GIVE MAXIMUM ROUGHNESS TO THE SURFACE BY DISPLACEMENT OF THE INDIVIDUAL STONES. ALTERNATELY UP OR DOWN ABOUT ONE INCH AND AS OTHERWISE DIRECTED BY THE ENGINEER.

CUTOFF WALL TO BE PARALLEL TO & UNLESS OTHERWISE NOTED ON CONTRACT DRAWINGS.

ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS	APPROVED <i>[Signature]</i> 9/17/88 CHIEF ENGINEER	STANDARD DRAINAGE DETAILS CUTOFF WALL and OUTLET PAVING	REVISED	D 81
	DESIGN ENGINEER <i>[Signature]</i> 9/16/88 DATE		_____	
	_____		_____	
	_____		_____	
	_____		_____	



PIPE SIZE	MAX DIS-CHARGE C.F.S.	BASIN DIMENSIONS								QUANTITIES			
		W	H	L	A	B	C	D	E	F	G	STEEL LBS.	CU.YD.
12"	10	4'-3"	3'-2"	5'-8"	2'-7"	3'-1"	1'-10"	0'-8"	1'-8"	0'-6"	0'-6"	264	2.72
18"	21	5'-6"	4'-3"	7'-4"	3'-3"	4'-1"	2'-4"	0'-11"	2'-1"	0'-6"	0'-6"	378	3.90
24"	38	6'-9"	5'-3"	9'-0"	3'-11"	5'-1"	2'-10"	1'-2"	2'-6"	0'-6"	0'-6"	498	5.52
30"	59	8'-0"	6'-3"	10'-8"	4'-7"	6'-1"	3'-4"	1'-4"	3'-0"	0'-7"	0'-6"	1023	8.53
36"	85	9'-3"	7'-3"	12'-4"	5'-3"	7'-1"	3'-10"	1'-7"	3'-6"	0'-8"	0'-7"	1592	12.98
42"	115	10'-6"	8'-0"	14'-0"	6'-0"	8'-0"	4'-5"	1'-9"	3'-11"	0'-9"	0'-8"	1926	18.15
48"	151	11'-9"	9'-0"	15'-8"	6'-9"	8'-11"	4'-11"	2'-0"	4'-5"	0'-10"	0'-9"	2365	24.84

NOTES:

1. Depth of sub-base against end sill shall be increased for "D" 18" to provide positive drainage of weepholes. Condition illustrated applies only to medium range of "D".
2. In deep gully or ditch outlet embankment slope should intersect top of backwall.
3. In shallow ditch or gully outlet, toe of embankment should intersect normal ground level at "E" minimum above outlet flow line.
4. For outlet at normal ground level, embankment slope should intersect 2:1 side slopes of outlet channel at "E" above outlet flow line.
5. Basin dimensions are based on discharge and not pipe size. Dimensions of basin apply only to outlet velocities from 20 to 30 F.P.S.
6. See D/83,84,85 & 86 for additional detail.
7. All concrete shall be Mix No. 3.

ELEVATION

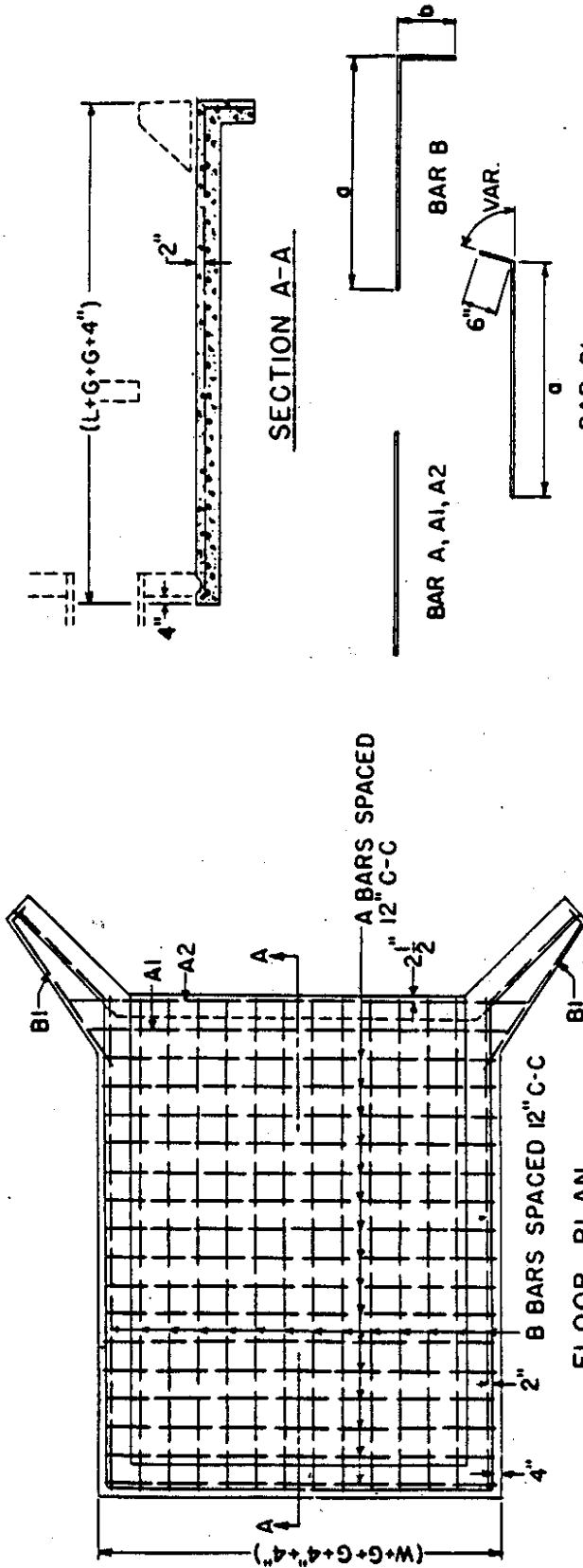
SECTION A-A

APPROVED: *[Signature]* 9/17/88
 CIVIL ENGINEER
 DESIGN ENGINEER
 DATE

ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS

STANDARD DRAINAGE DETAILS
 ENERGY DISSIPATOR

REVISED: / /
 D / 82



PIPE SIZE	A		A1		A2		B		B1		LIN. FT.			
	L	W	NO.	LGTH	NO.	LGTH	a	b	a	b		NO.	NO. 4	
12"	5'-8"	4'-3"	7	6'-4"	1	7'-2"	1	6'-6"	1'-7"	5	4'-2"	0'-6"	2	102.9
18"	7'-4"	5'-6"	6	6'-10"	9	7'-8"	1	8'-2"	1'-7"	5	4'-3"	0'-6"	2	135.9
24"	9'-0"	6'-9"	6	8'-2"	10	8'-10"	1	10'-0"	1'-7"	7	4'-7"	0'-6"	2	190.6
30"	10'-8"	8'-0"	6	9'-6"	12	10'-4"	1	11'-6"	1'-6"	9	5'-1"	0'-6"	2	264.8
36"	12'-4"	9'-3"	7	10'-11"	14	11'-10"	1	12'-10"	1'-5"	11	5'-5"	0'-6"	2	351.6
42"	14'-0"	10'-6"	8	12'-4"	15	13'-0"	1	14'-4"	1'-4"	11	5'-10"	0'-6"	2	405.6
48"	15'-8"	11'-9"	9	13'-9"	17	14'-4"	1	16'-10"	1'-3"	13	6'-2"	0'-6"	2	512.1

NOTE: SEE D/82,84,85 & 86 FOR ADDITIONAL DETAILS.

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 CHIEF ENGINEER
[Signature] 9/6/88
 DESIGN ENGINEER

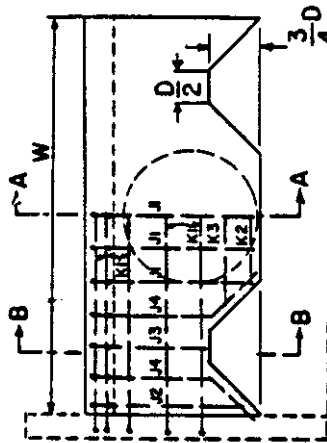
ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS

REVISIONS

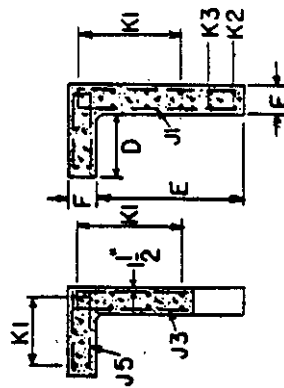
STANDARD DRAINAGE DETAILS
 ENERGY DISSIPATOR
 FLOOR

D/83

PIPE SIZE	J1		J2		J3		J4		J5		K1		K2		K3		LIN. FT.					
	W	E F	D F	o	b	NO.	o	b	NO.	o	b	NO.	o	b	NO.	o	NO.	NO.4	NO.5			
12"	4'-3"	2'-2"	1'-2"	1'-10"	0'-3"	1	1'-6"	0'-3"	2	2'-1"	0'-3"	2	1'-8"	0'-3"	5	4'-9"	0'-7"	8	1'-6"	2	87.5	
18"	5'-6"	2'-7"	1'-5"	2'-3"	0'-3"	3	1'-11"	0'-3"	2	1'-7"	0'-3"	2	2'-2"	0'-3"	7	6'-0"	0'-7"	8	1'-10"	2	122.3	
24"	6'-9"	3'-0"	1'-8"	2'-8"	0'-3"	3	2'-4"	0'-3"	2	1'-9"	0'-3"	2	2'-7"	0'-3"	7	7'-3"	0'-7"	8	2'-2"	2	143.7	
30"	8'-0"	3'-6"	1'-10"	3'-2"	0'-4"	3	2'-10"	0'-4"	2	2'-2"	0'-4"	2	3'-1"	0'-4"	9	8'-8"	0'-7"	8	2'-8"	2	198.5	
36"	9'-3"	4'-1"	2'-2"	3'-9"	0'-5"	3	3'-5"	0'-5"	4				4'-4"	0'-5"	4	10'-10"	0'-7"	10	3'-0"	2	298.5	
42"	10'-6"	4'-7"	2'-5"	4'-3"	0'-6"	3	3'-11"	0'-6"	4				4'-10"	0'-6"	4	11'-6"	0'-7"	10	3'-6"	2	330.0	
48"	11'-9"	5'-2"	2'-9"	4'-10"	0'-7"	5	4'-6"	0'-7"	2	3'-4"	0'-7"	2	5'-5"	0'-7"	4	12'-11"	0'-7"	10	3'-10"	2	418.8	

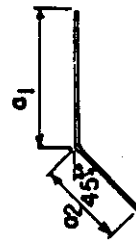


ELEVATION



SECTION B-B

SECTION A-A



$a = a_1 + a_2$ on J4 BARS



BAR J1,2,3,4,5



BAR K1

BAR K2,3

NOTE: SEE D/82.83,84,86 FOR ADDITIONAL DETAILS

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 CHIEF ENGINEER 9/16/88
 ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS
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STANDARD DRAINAGE DETAILS
 ENERGY DISSIPATOR
 BAFFLE

D/85

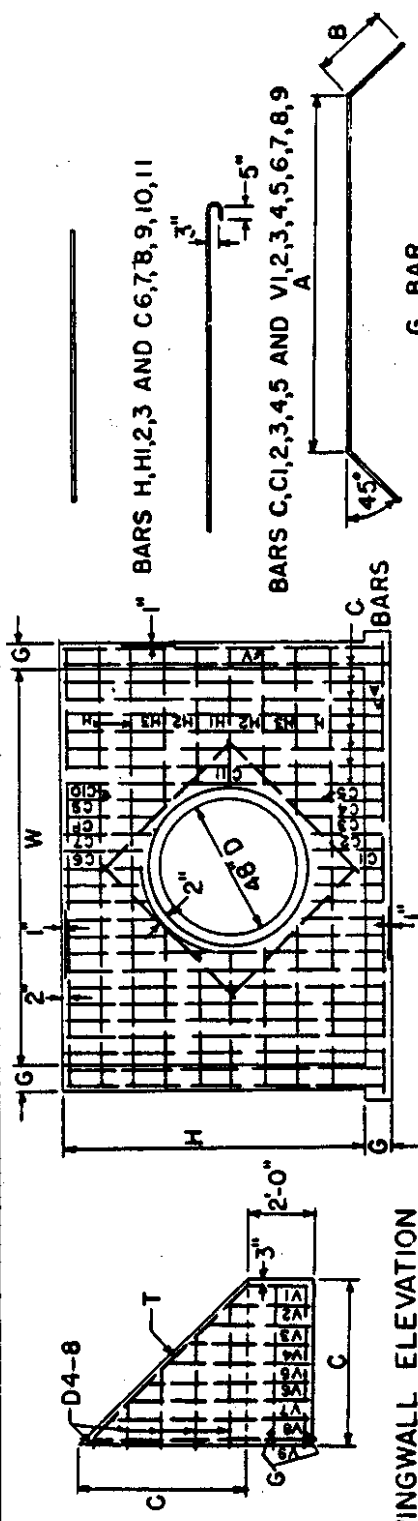
BACKWALL BARS

PIPE SIZE	W	H	G	C	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	H	H1	H2	H3	LIN. FT.
12"	4'-3"	3'-2"	0'-6"	4'-2"	4	1'-5"	1			1'-1"						5'-1"	3	1'-10"	2	36.1
18"	5'-6"	4'-3"	0'-6"	5'-3"	2	1'-9"	1	2'-2"	2	1'-4"	1	1'-11"	2			2'-6"	4	6'-4"	3	59.3
24"	6'-9"	5'-3"	0'-6"	6'-3"	4	1'-10"	1	2'-2"	2	1'-7"	1	1'-11"	2			2'-11"	4	7'-7"	3	86.9
30"	8'-0"	6'-3"	0'-6"	7'-4"	6	2'-1"	1	2'-3"	2	1'-10"	1	2'-0"	2			3'-0"	4	9'-0"	3	124.1
36"	9'-3"	7'-3"	0'-7"	8'-5"	12	2'-2"	1	2'-2"	2	2'-2"	1	2'-3"	2			3'-5"	4	10'-5"	4	211.4
42"	10'-6"	8'-0"	0'-8"	9'-3"	14	2'-7"	1	2'-7"	2	2'-1"	1	2'-2"	2			4'-9"	4	11'-10"	3	276.8
48"	11'-9"	9'-0"	0'-9"	10'-4"	16	2'-10"	1	2'-10"	2	2'-4"	1	2'-4"	2			5'-4"	4	13'-2"	4	336.8

WINGWALL BARS

PIPE SIZE	V1	V2	V3	V4	V5	V6	V7	V8	V9	G BARS	LIN. FT.
12"	1'-10"	2'-6"	2	3'-10"	2	3'-10"	2			A 4'-8" 1'-8" 6'-0" 2	28.7
18"	2'-4"	2'-6"	2	3'-4"	2	4'-4"	2			B 5'-11" 2'-2" 10'-3" 2	40.8
24"	2'-10"	2'-6"	2	3'-7"	2	4'-8"	2			7'-2" 2'-8" 12'-6" 2	46.5
30"	3'-4"	2'-6"	2	3'-3"	2	4'-0"	2	4'-9"	2	8'-7" 3'-2" 14'-11" 2	58.8
36"	3'-10"	2'-6"	2	3'-1"	2	3'-7"	2	4'-2"	2	10'-0" 3'-8" 17'-4" 2	62.5
42"	4'-5"	2'-6"	2	3'-0"	2	3'-6"	2	4'-0"	2	11'-5" 4'-3" 19'-11" 2	120.8
48"	4'-11"	2'-6"	2	3'-1"	2	3'-7"	2	4'-1"	2	12'-10" 4'-9" 22'-4" 2	128.6

NOTE:
 1. H BARS SPCD 12" C-C ALL WALLS.
 2. C AND V BARS (CULV. SIZES 12", 18", 24") SPCD. 12" C-C.
 3. C AND V BARS (CULV. SIZE 30") SPCD. 9" C-C.
 4. C AND V BARS (CULV. SIZES 36", 42", 48") SPCD. 6" C-C.
 5. SEE D/82 83 84 85 FOR ADDITIONAL DETAILS.



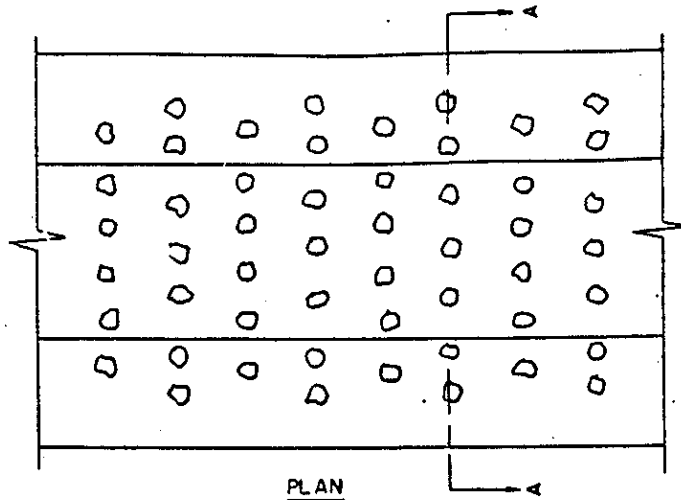
APPROVED: *[Signature]* 9/17/88
 CHIEF ENGINEER
 DESIGN ENGINEER: *[Signature]* 9/16/88
 DATE: _____

ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS

STANDARD DRAINAGE DETAILS
 ENERGY DISSIPATOR
 WING AND BACKWALL

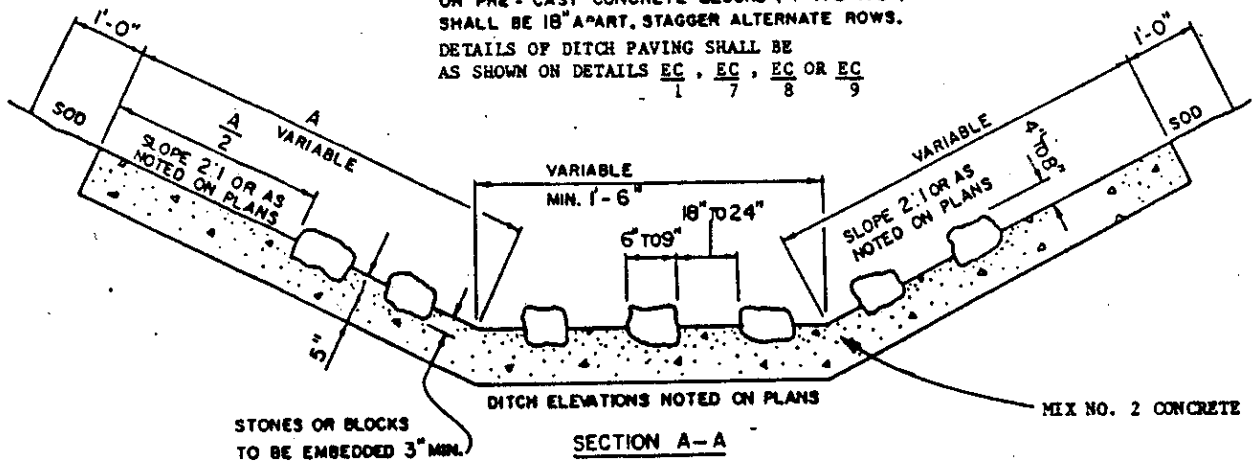
REVISED: _____

D/86



PLAN

NOTE: ROW OF STONES (AS SHOWN BELOW) OR PRE-CAST CONCRETE BLOCKS (4" X 8" X 8") SHALL BE 18" APART, STAGGER ALTERNATE ROWS. DETAILS OF DITCH PAVING SHALL BE AS SHOWN ON DETAILS EC 1, EC 7, EC 8 OR EC 9

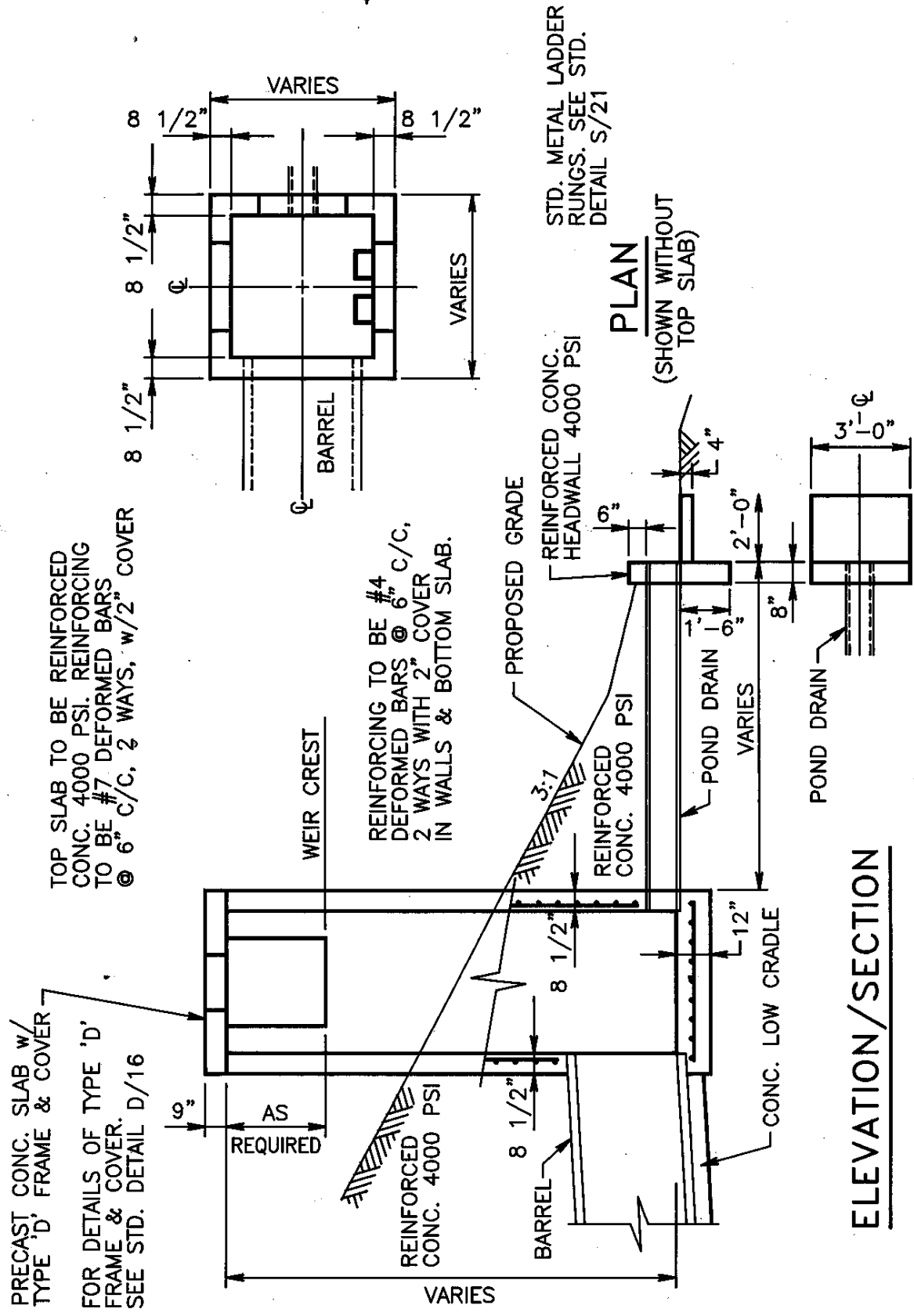


SECTION A-A

APPROVED 9/7/88
 ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS
 CHIEF ENGINEER
 DESIGN ENGINEER
 DATE

STANDARD DRAINAGE DETAILS
 5" CONCRETE ENERGY DISSIPATING GUTTER

REVISED	D 87



TOP SLAB TO BE REINFORCED CONC. 4000 PSI. REINFORCING TO BE #7 DEFORMED BARS @ 6" C/C, 2 WAYS, w/2" COVER

PRECAST CONC. SLAB w/ TYPE 'D' FRAME & COVER FOR DETAILS OF TYPE 'D' FRAME & COVER. SEE STD. DETAIL D/16

REINFORCING TO BE #4 DEFORMED BARS @ 6" C/C, 2 WAYS WITH 2" COVER IN WALLS & BOTTOM SLAB.

STD. METAL LADDER RUNGS. SEE STD. DETAIL S/21

PLAN
(SHOWN WITHOUT TOP SLAB)

ELEVATION/SECTION

PLAN VIEW OF POND DRAIN HEADWALL

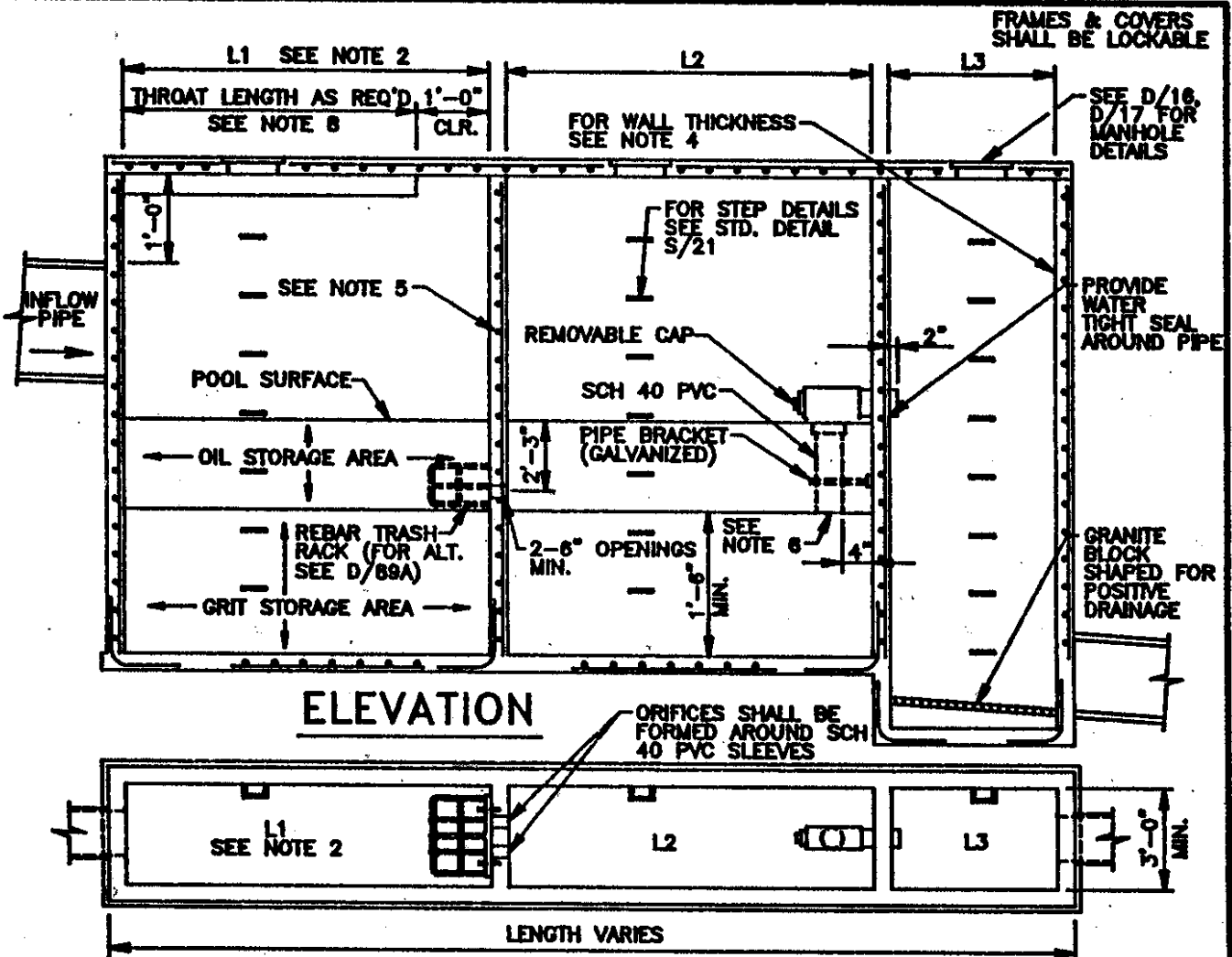
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APPROVED
Ronald Brown
CHIEF ENGINEER
DESIGN ENGINEER
DATE 12/7/95

STANDARD DRAINAGE DETAILS
RISER DETAIL

REVISED

88/D

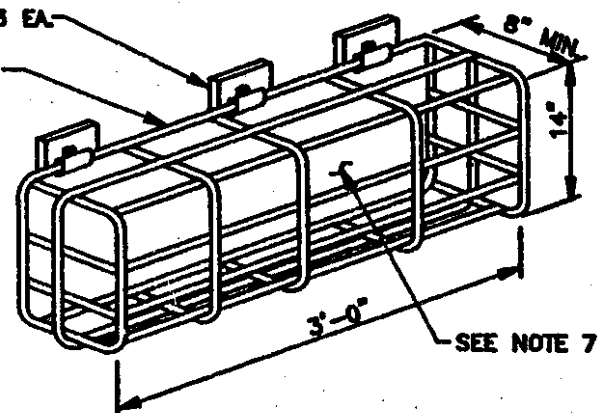


PLAN VIEW - TOP SLAB REMOVED

NOTES:

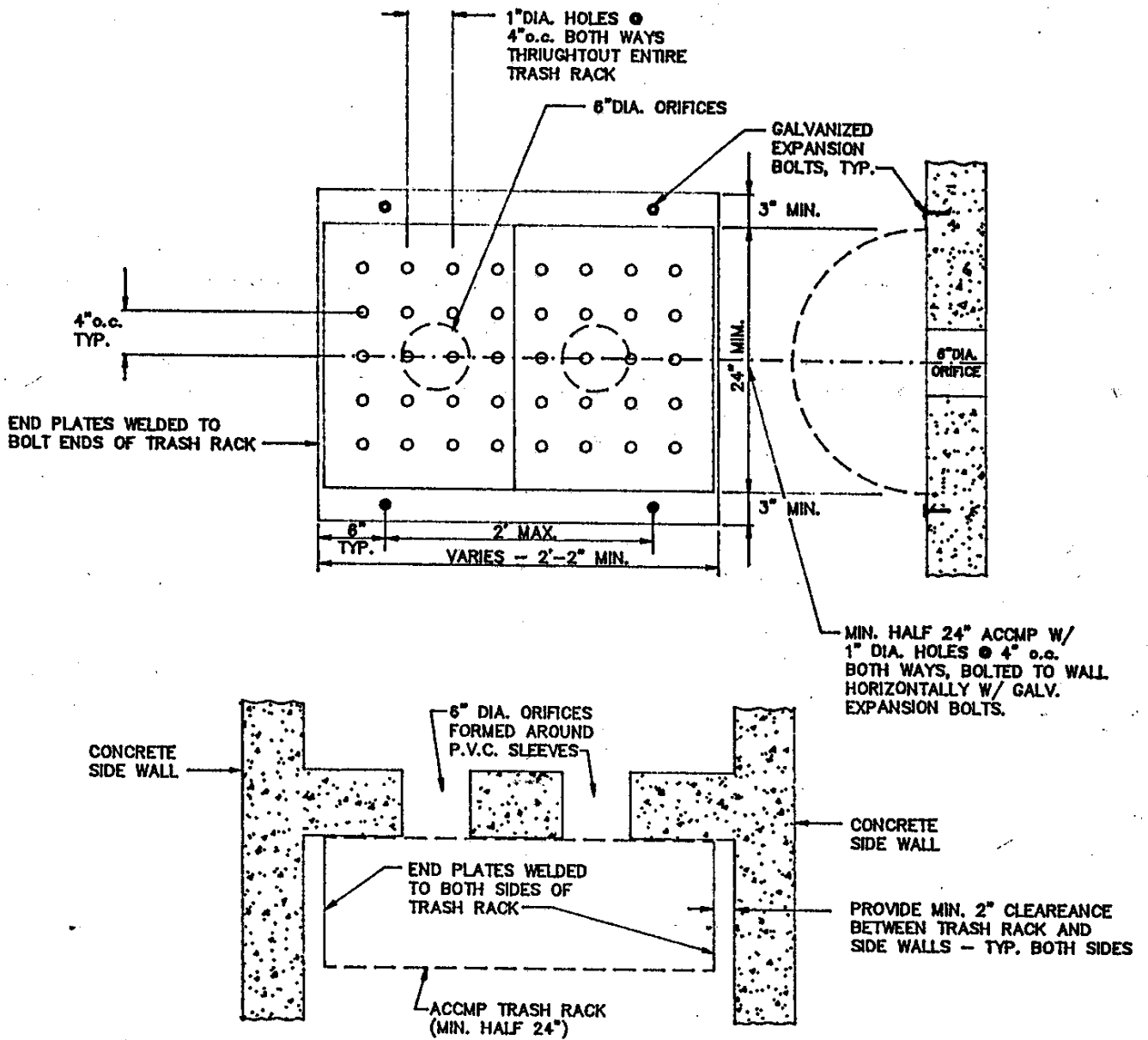
1. TOP SLABS SHALL BE DESIGNED TO SUPPORT HS-20 LOADS.
2. L1 SHALL BE GREATER THAN OR EQUAL TO L2.
3. STEEL REINFORCING SIZES & SPACING SHALL BE SELECTED DURING DESIGN DEPENDING ON SIZE & DEPTH OF STRUCTURE.
4. MINIMUM ACCEPTABLE WALL THICKNESS SHALL BE 6".
5. HORIZONTAL STEEL REINFORCEMENT IN INTERIOR WALLS SHALL BE ANCHORED TO EXTERIOR WALLS.
6. EXTEND TO BOTTOM OF OIL STORAGE VOLUME.
7. TRASH RACK OPENINGS SHALL BE 3x AREA OF ORIFICE OPENINGS.
8. WHERE THE THROAT IS TO BE INCORPORATED INTO A CURB AND GUTTER LOCATION A DEPRESSED GUTTER PAN IS REQUIRED AS SHOWN ON STD. DETAIL D/24.
9. TRASH RACK MATERIAL SHALL BE HOT DIPPED GALVANIZED OR EPOXY COATED.
10. ALL REINFORCING STEEL TO BE ASTM A 615 GRADE 60, & CONCRETE TO BE $f'_c = 4000$ psi @ 28 DAYS.
11. 2" MINIMUM CONCRETE COVER OF REINFORCING STEEL UNLESS SPECIFIED.

TUBE HINGES - 3 EA.
NO. 4 BARS



REBAR TRASH RACK ISOMETRIC

ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS	APPROVED <i>Ronald E. Bowen</i> CHIEF ENGINEER	STANDARD DRAINAGE DETAILS WATER QUALITY INLET	REVISED	D 89
	DESIGN ENGINEER DATE 12/7/95		_____ _____ _____	

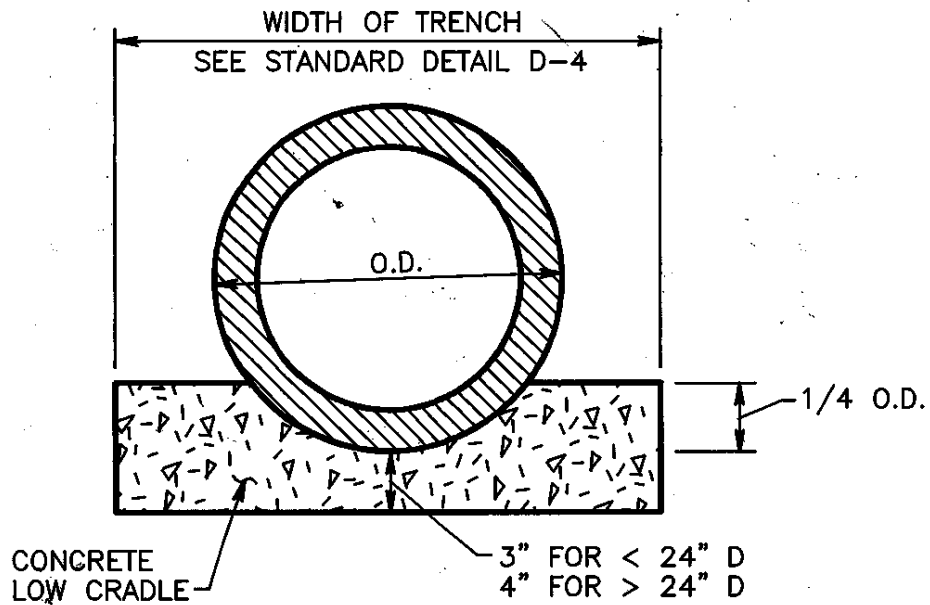


PLAN VIEW

ACCMP TRASH RACK

NO SCALE

ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS	APPROVED <i>Ronald C. Brown</i> CHIEF ENGINEER	STANDARD DRAINAGE DETAILS WATER QUALITY INLET	REVISED	D 89A
	DESIGN ENGINEER <i>[Signature]</i>		_____	
	DATE 12/7/95		_____	
	_____		_____	



$F'_c = 3000 \text{ PSI}$

ANNE ARUNDEL
COUNTY
DEPARTMENT
OF
PUBLIC WORKS

APPROVED
Ronald Bowen
CHIEF ENGINEER
[Signature]
DESIGN ENGINEER
DATE *10/17/95*

STANDARD DRAINAGE DETAILS
CONCRETE CRADLE DETAIL

REVISED

$\frac{D}{90}$