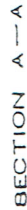


STORM DRAINAGE

DIVISION 600



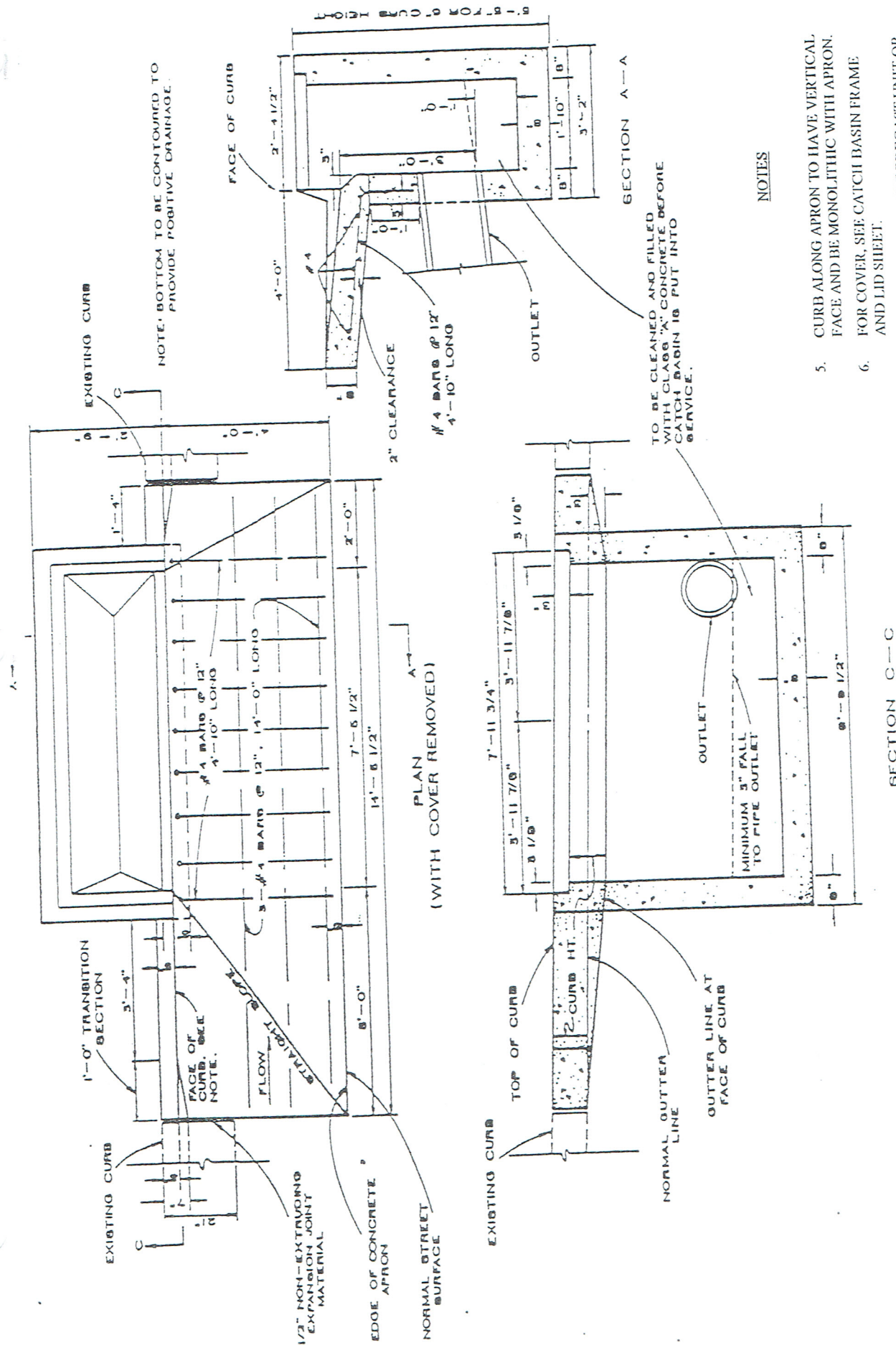
EXISTING CURD



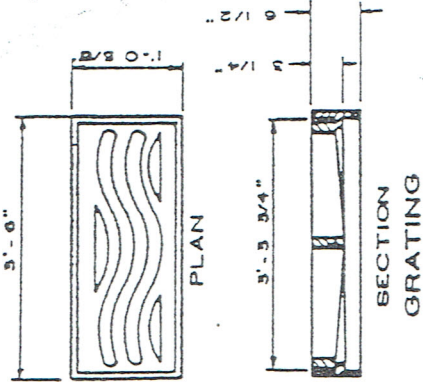
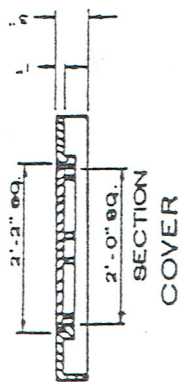
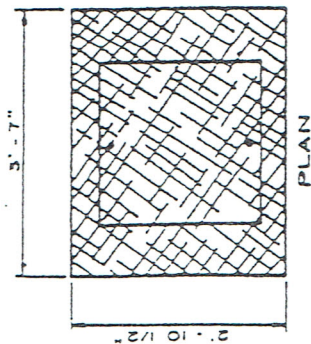
TYPE "A" CATCH BASIN

1. CURB ALONG APRON TO HAVE VERTICAL FACE AND BE MONOLITHIC WITH APRON.
2. FOR COVER, SEE CATCH BASIN FRAME AND LID SHEET.

3. CATCH BASIN MAY BE PRECAST UNIT OR POURED IN PLACE IF GRADE IS NOT GREATER THAN 2.75%.
4. PRECAST UNITS SHALL HAVE MINIMUM WALL THICKNESS OF 5"

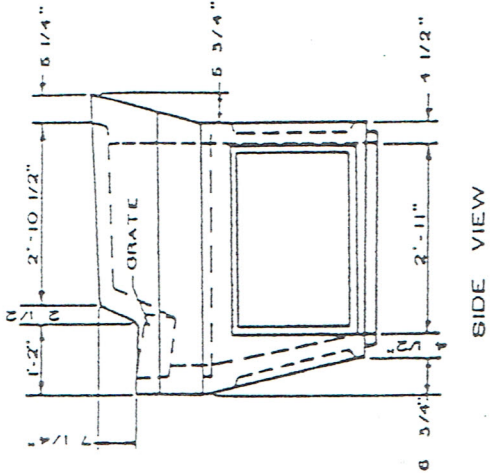


5. CURB ALONG APRON TO HAVE VERTICAL FACE AND BE MONOLITHIC WITH APRON.
6. FOR COVER, SEE CATCH BASIN FRAME AND LID SHEET.
7. CATCH BASIN MAY BE PRECAST UNIT OR POURED IN PLACE IF GRADE IS BETWEEN 2.76% AND 6.25%
8. PRECAST UNITS SHALL HAVE MINIMUM WALL THICKNESS OF 5"

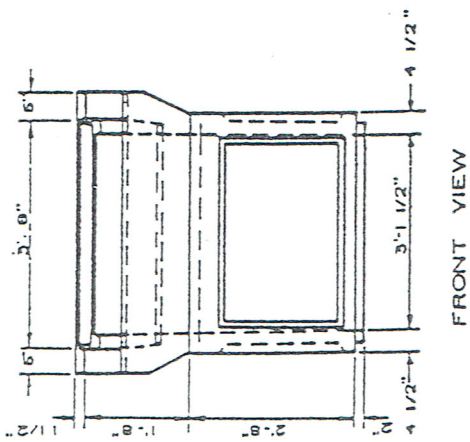


SECTION
GRATING

COVER & GRATING
FOR B - ALTERNATE
CATCH BASIN



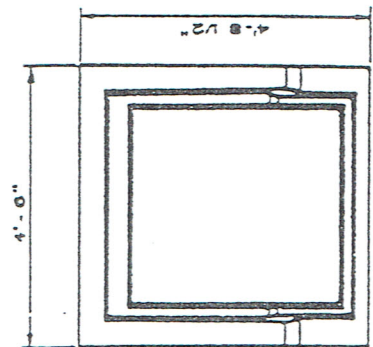
SIDE VIEW



FRONT VIEW

NOTES

1. COVER AND GRATING TO BE NEENAH R-53118 OR EQUIVALENT.
2. PRECAST UNITS SHALL HAVE MINIMUM WALL THICKNESS OF 8".

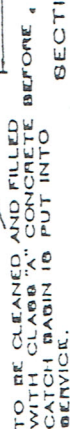
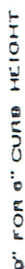


PLAN VIEW

WITHOUT COVER OR GRATING

B - ALTERNATE CATCH BASIN, COVER & GRATING

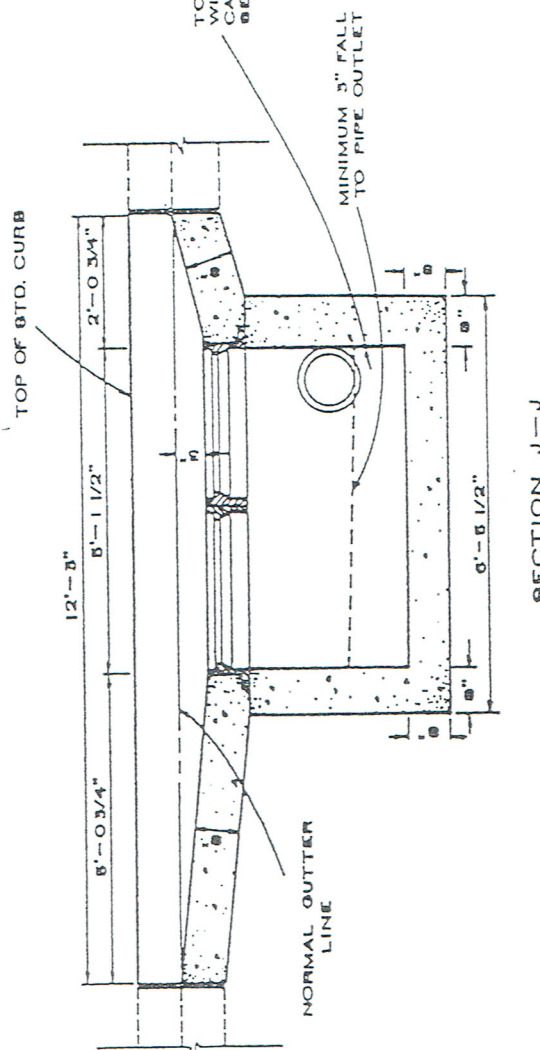
CONFIDENTIAL



SECTION H-H

NOTES

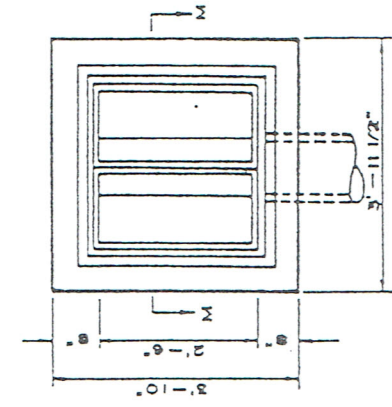
1. FOR COVER SEE CATCH BASIN FRAME AND LID SHEET
2. PRECAST UNITS SHALL HAVE MINIMUM WALL THICKNESS OF 5"
3. CATCH BASIN MAY BE PRECAST UNIT OR FORMED IN PLACE IF GRADE IS GREATER THAN 6.20%.
4. CURB ALONG APRON TO HAVE VERTICAL FACE AND BE MONOLITHIC WITH APRON



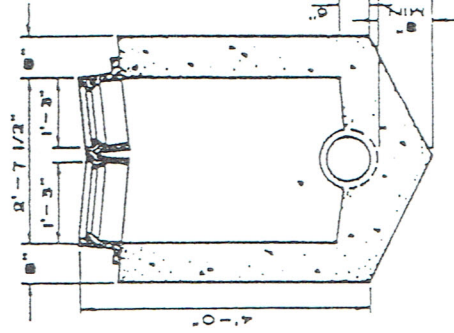
SECTION 2-2

TYPE "C" CATCH BASIN

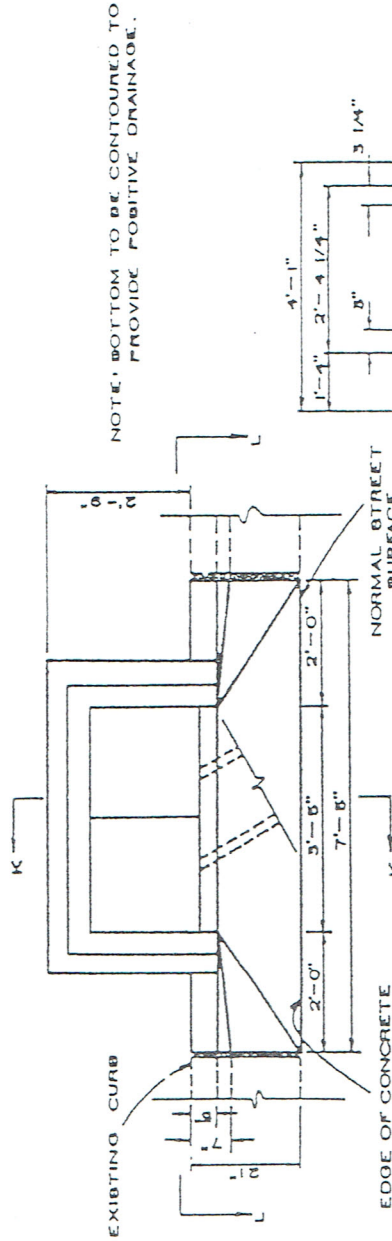
TYPE "D" AND "E" (DOUBLE DRIP) CATCH BASINS



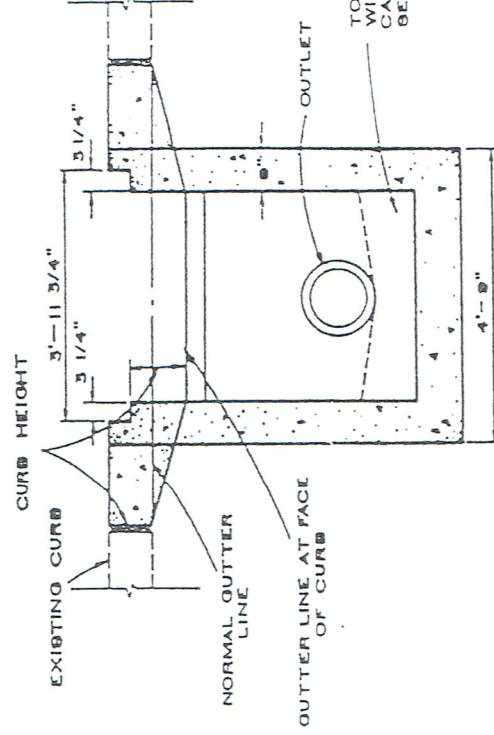
PLAN
(WITH GRATING REMOVED)



SECTION M-M



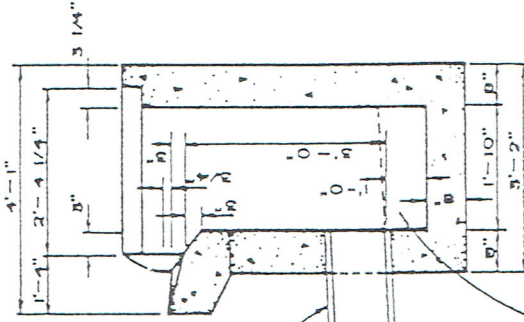
PLAN
(WITH GRATING REMOVED)



SECTION L-L

TYPE "D" CATCH BASIN

FOR USE AT LOW POINT



SECTION K-K

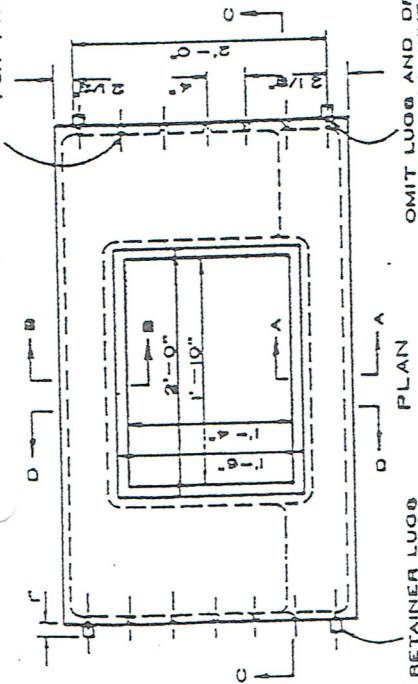
TO BE CLEANED AND FILLED
WITH CLASS "A" CONCRETE BEFORE
CATCH BASIN IS PUT INTO
SERVICE.

NOTES

- 1 FOR GRATING SEE CATCH BASIN FRAME AND LID SHEET
- 2 CURB ALONG APRON (TYPE "D" CATCH BASIN) TO HAVE VERTICAL FACE AND BE MONOLITHIC WITH APRON.
- 3 PRECAST UNITS SHALL HAVE MINIMUM WALL THICKNESS OF 8"

TYPE "E" CATCH BASIN

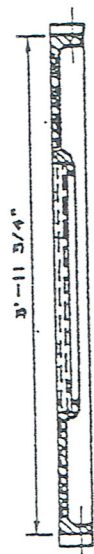
6-1/2" CORED HOLE.
FOR TYPE "B" C.D.



OMIT LUGS AND DRILL FOR 1" CROSS-ROD WHEN USED FOR TYPE "B" CATCH BASIN

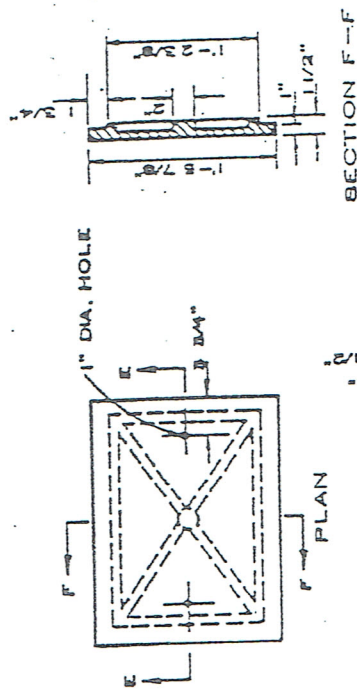
PLAN

RETAINER LUGS

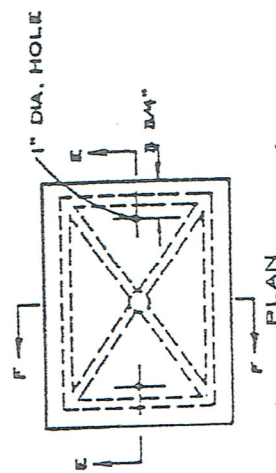


SECTION C-C

FRAME
MIN. WT. - 215 LBS.



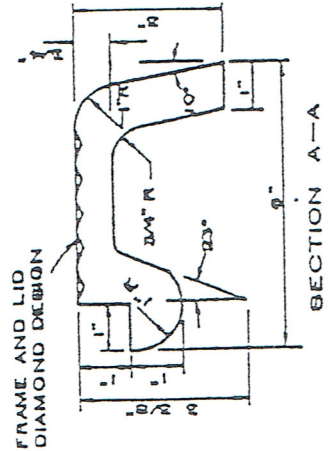
SECTION F-F



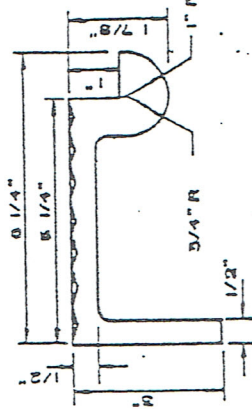
PLAN

SECTION E-E

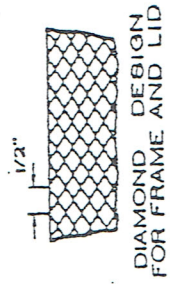
LID



SECTION A-A



SECTION B-B



DIAMOND DESIGN
FOR FRAME AND LID

NOTES

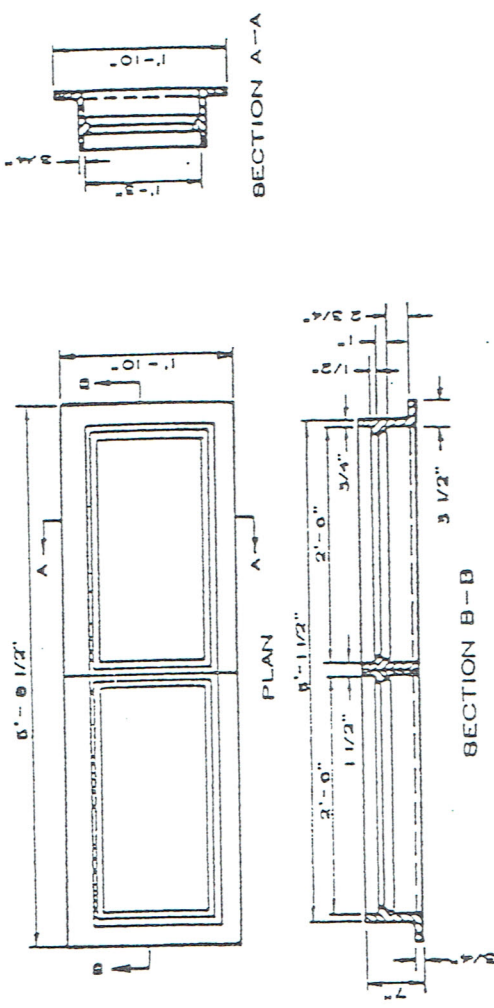
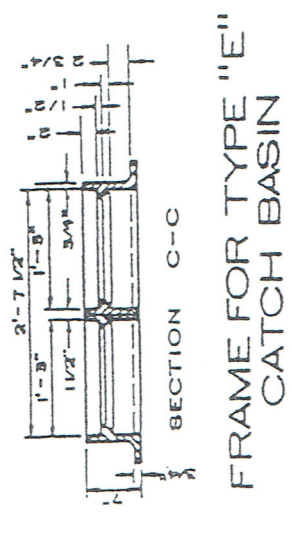
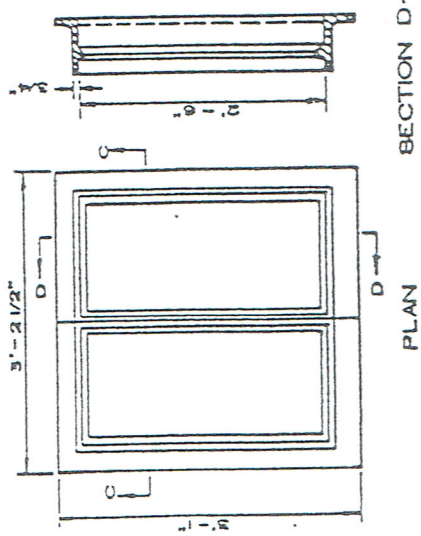
WHEN THIS FRAME IS USED IN PAIRS TO FORM COVERS FOR TYPE "B" CATCH BASINS, EACH PAIR SHALL BE SUPPLIED WITH 6 - 2" X 1/2" MACH. BOLTS AND NUTS, AND ONE STEEL ROD 8' - 4" X 1" THREADED A MIN. OF 2 5/8" AT EACH END WITH 2 NUTS FOR SAME.

THE LUGS SHALL BE OMITTED AND THE CONTACT SURFACES OF THE TWO FRAMES MACHINED TO ENSURE A TRUE RECTANGULAR COVER IN A SINGLE PLANE.

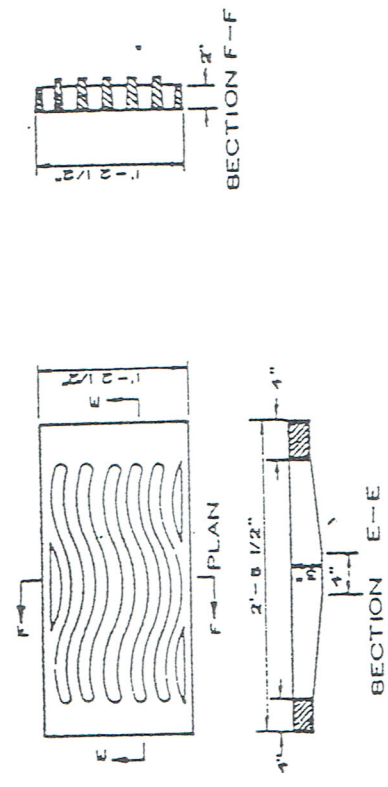
FRAME AND LID SHALL BE NEENAH CATALOG NO. R-3312-A OR EQUIVALENT.

FRAMES AND LIDS FOR TYPE "A", "B" AND "D" CATCH BASINS

NOTE: FRAME AND LID SHALL BE NEENAH CATALOG NO. R-3408-A OR EQUIVALENT FOR TYPE "E" CATCH BASIN AND NO. R-3408-B OR EQUIVALENT FOR TYPE "C" CATCH BASIN.

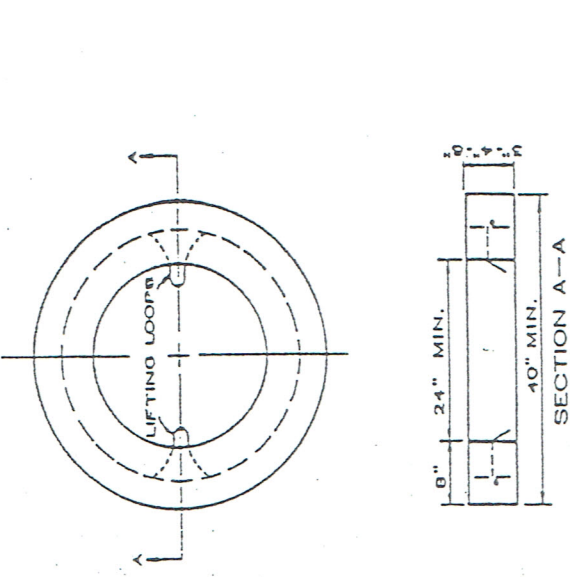


FRAME FOR TYPE "C" CATCH BASIN

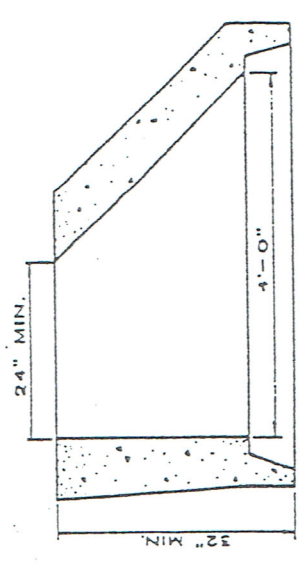


LID FOR TYPE "C" AND "E" CATCH BASINS

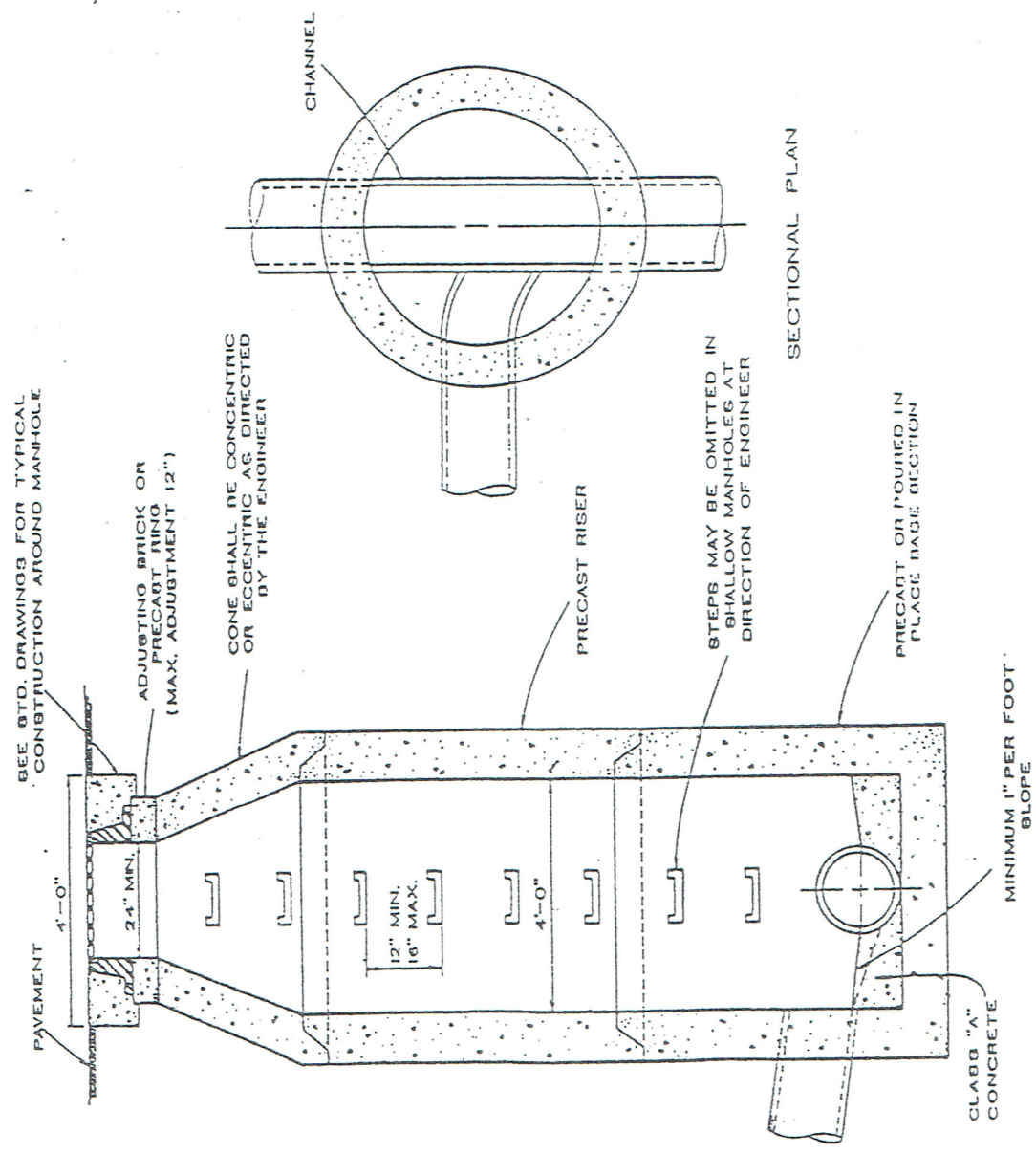
FRAMES AND LIDS FOR TYPE "C" AND "E" CATCH BASINS



PRECAST ADJUSTING RING

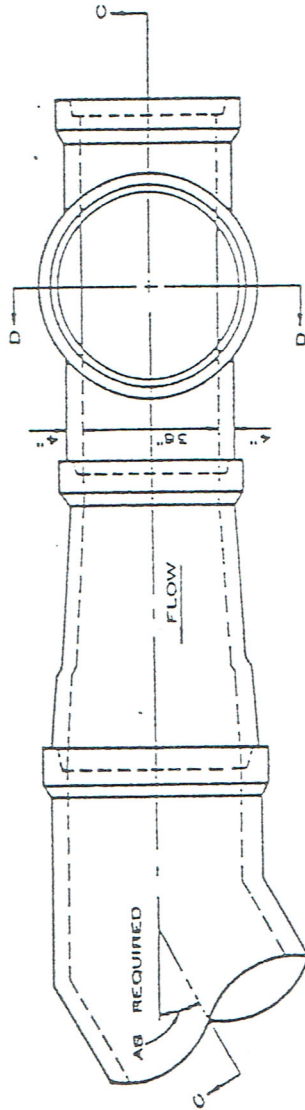


ECCENTRIC CONE

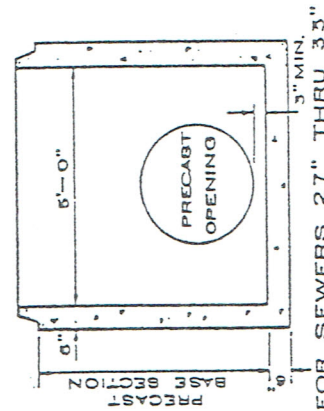
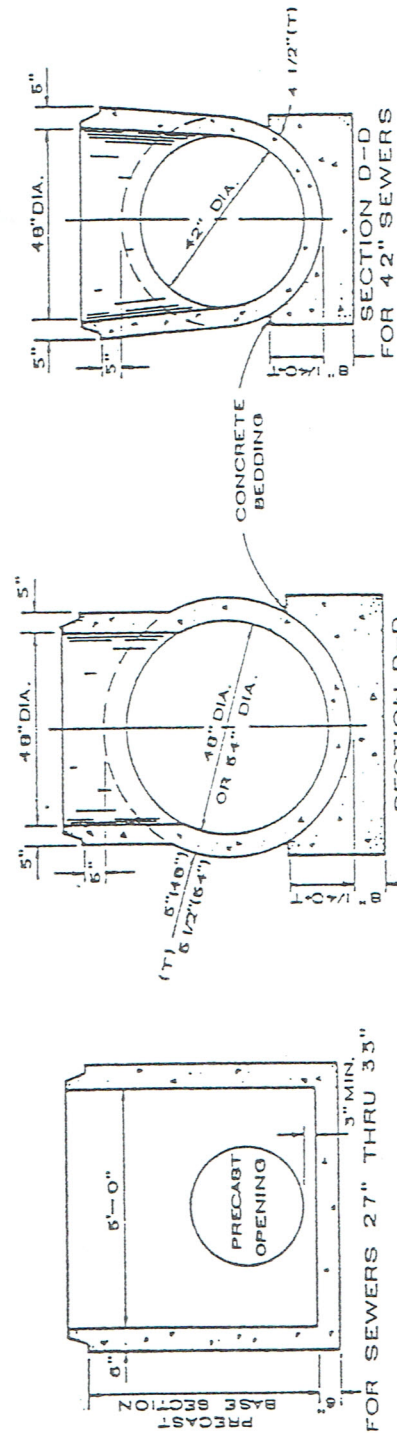
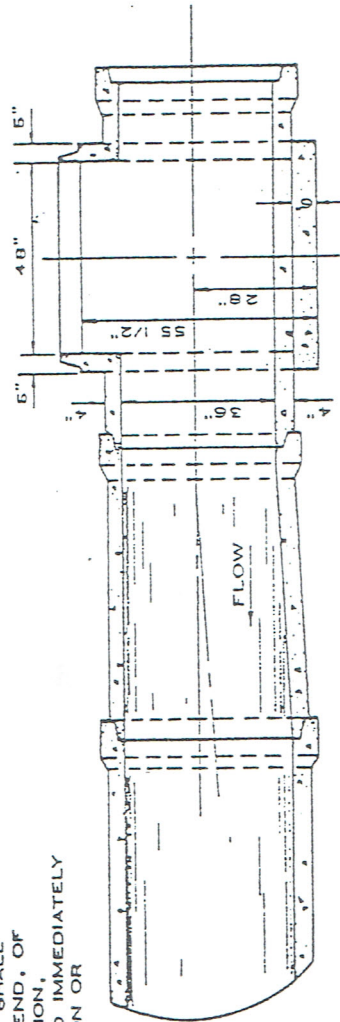


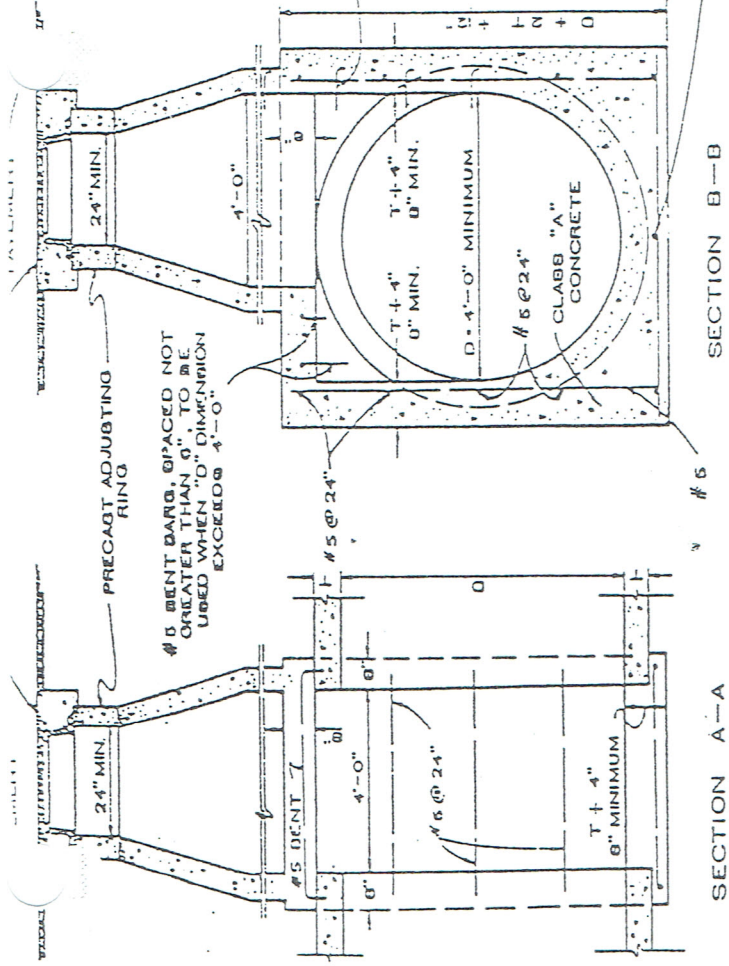
TYPE "A" STORM MANHOLE

TYPE "B" STODOLSKA MANHOLE



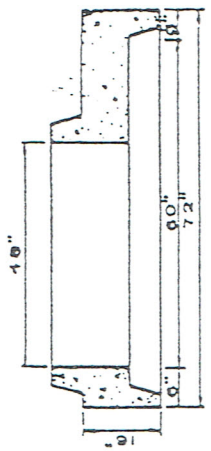
NOTE: CHANGES IN PIPE SIZES SHALL BE MADE BY INSTALLATION OF AN ECCENTRIC REDUCER. CHANGES IN ALIGNMENT SHALL BE MADE BY INSTALLATION OF A BEND. OF SUITABLE DIAMETER AND DEFLECTION, INSTALLED ON THE LOW SIDE AND IMMEDIATELY ADJACENT TO MANHOLE T-SECTION OR ECCENTRIC REDUCER.



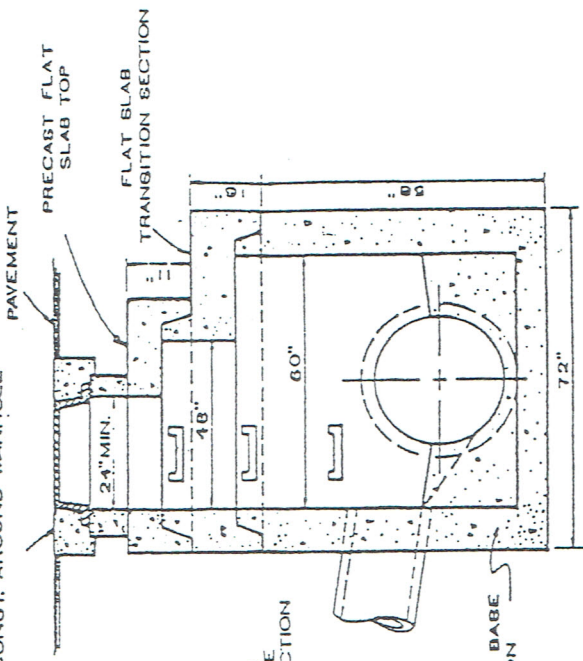


SEE STD. DRAWING FOR STEP DETAIL

FLAT SLAB TRANSITION SECTION

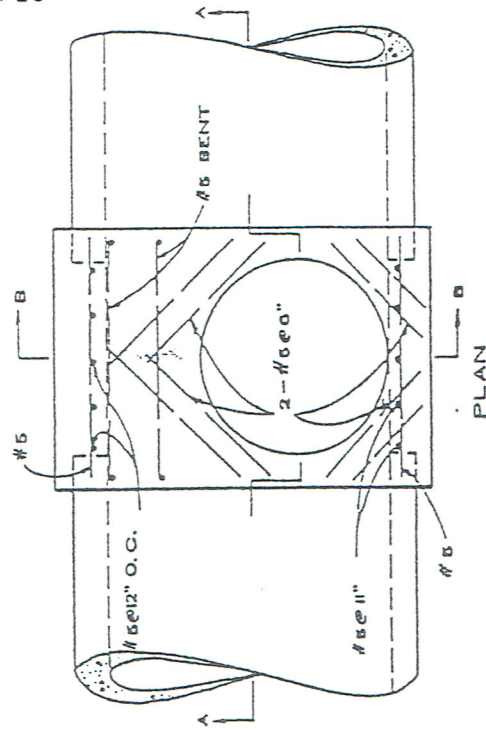


SEE STD. DRAWINGS FOR TYPICAL CONGT. AROUND MANHOLE



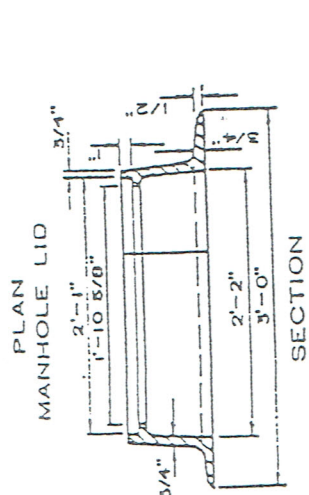
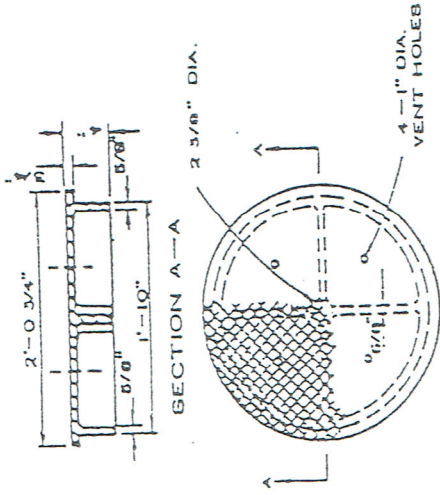
NOTE: IN PLACE OF FLAT SLAB TRANSITION SECTION, MAY USE ECCENTRIC REDUCER AT DIRECTION OF THE ENGINEER.

TYPE "E" MANHOLE (FOR SHALLOW SEWERS)

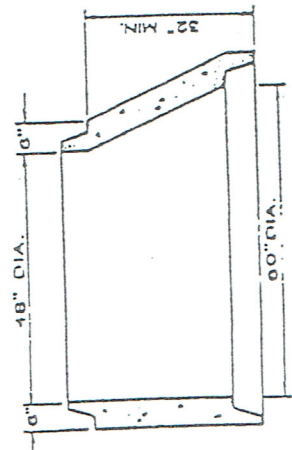


TYPE "C" MANHOLE (FOR SEWERS OVER 48" DIAMETER)

STORM MANHOLES TYPE "C" AND "E"

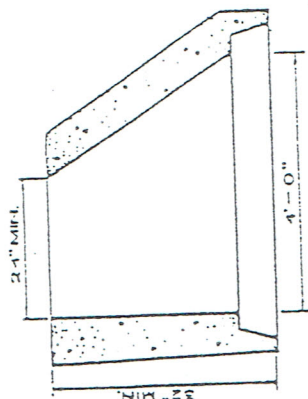


STORM MANHOLE FRAME AND LID

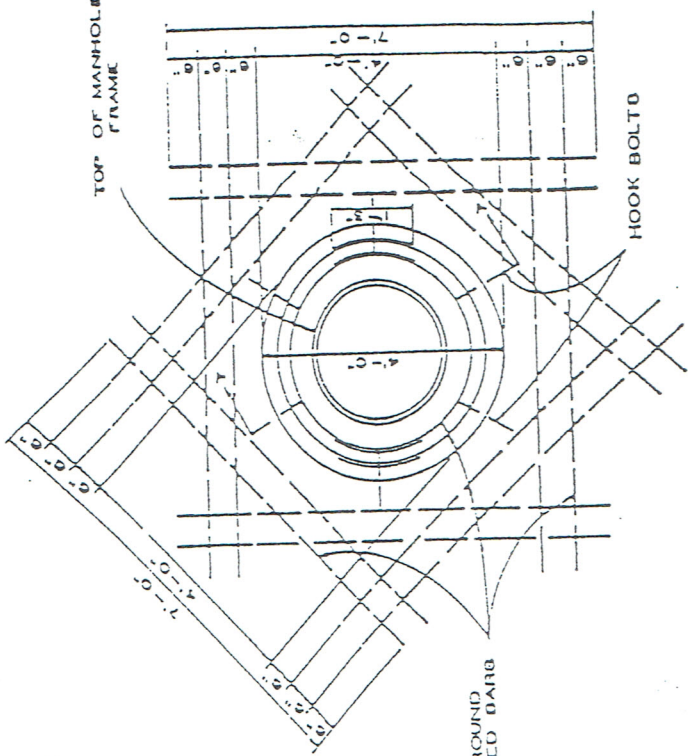


ECCENTRIC REDUCER

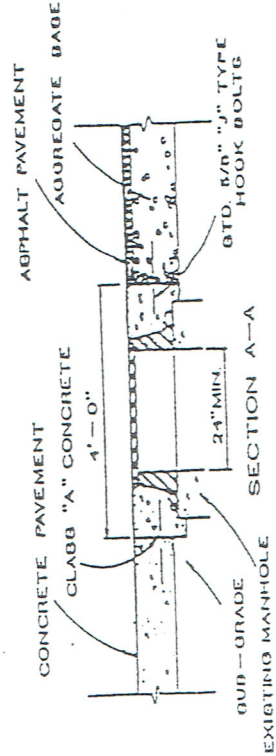
IN PAVED AREAS STORM MANHOLE FRAME AND LID SHALL BE EQUAL OF REENAH CATALOG NO R-1707 OR EAST JORDAN IRON WORKS NO. 1000



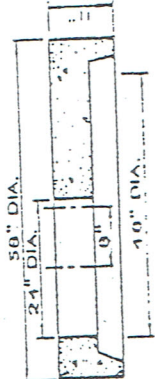
ECCENTRIC CONE



PLAN



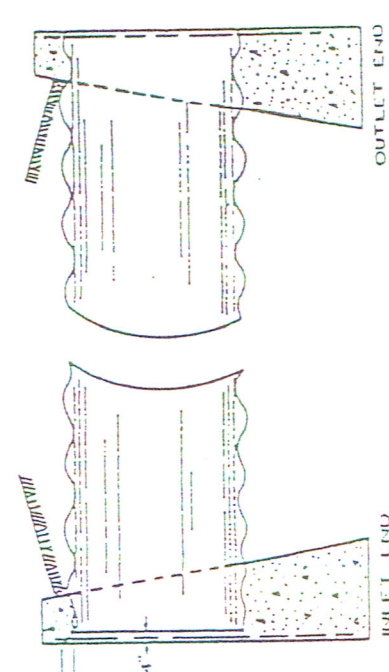
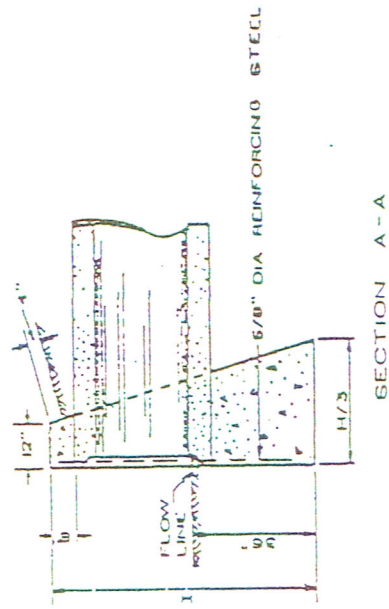
TYPICAL CONSTRUCTION AROUND MANHOLE



FLAT SLAB MANHOLE TOP

STORM MANHOLE FRAME AND LID — CONST. AROUND MANHOLE

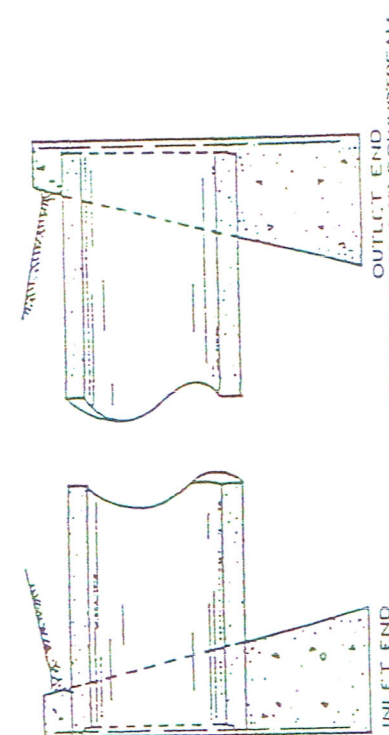
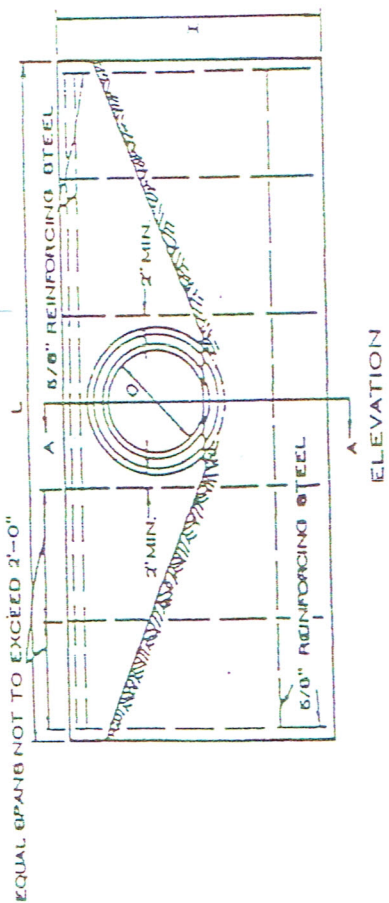
TYPE "A" HEADWALL



END TREATMENT AT HEADWALL

NOTES

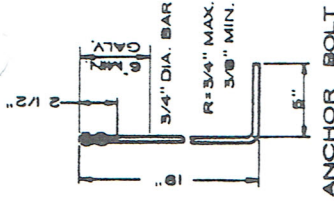
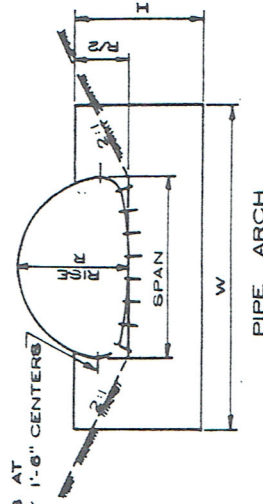
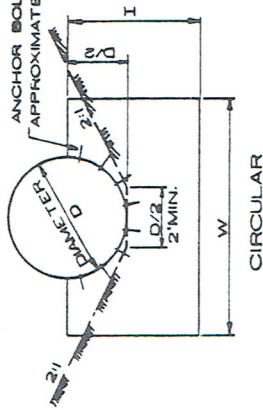
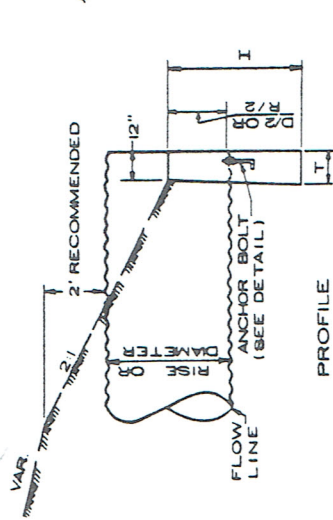
TYPE "A" HEADWALL WHERE REQUIRED WILL BE PROVIDED FOR NONSKEWED CULVERTS HAVING A DIAMETER OR RISE OF 36 INCHES OR LESS. CONCRETE SHALL BE CLASS "A" REINFORCING STEEL BARS SHALL BE 5/8 INCH ROUND. DIMENSIONS AND QUANTITIES ARE SHOWN FOR CIRCULAR SECTION ONLY. IT WILL BE NECESSARY TO DETERMINE DIMENSIONS FOR THE TYPE "A" HEADWALL REQUIRED FOR REINFORCED ELLIPTICAL CONCRETE PIPE OR CORRUGATED METAL PIPE ARCHES IN ACCORDANCE WITH THE EQUATIONS LISTED ON THIS DRAWING. CHAMFER ALL EXPOSED CORNERS $\frac{3}{4}$ OF AN INCH. WHERE THE SOIL BORINGS INDICATE A BEARING CAPACITY OF LESS THAN 2600 POUNDS PER SQUARE FOOT, IT WILL BE NECESSARY TO INCREASE THE WIDTH OF THE BASE. MINIMUM COVER FOR REINFORCING STEEL SHALL BE 2 INCHES.



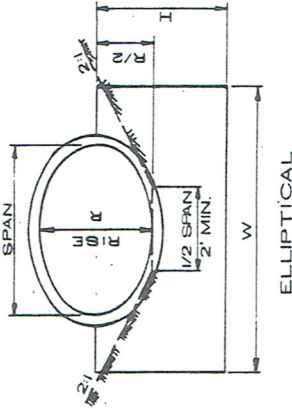
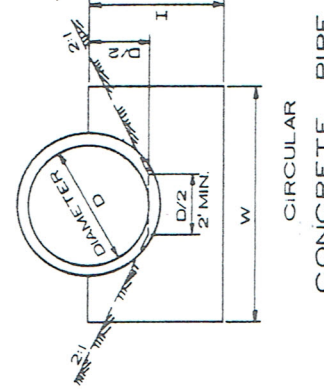
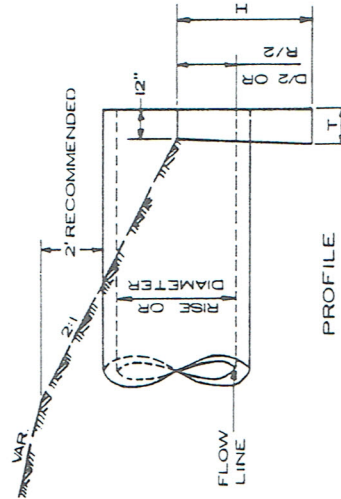
END TREATMENT AT HEADWALL

- L CIRCULAR SECTIONS $5D + 4T$
- L ELLIPTICAL OR PIPE ARCH $4R + 4T + S$
- H CIRCULAR SECTIONS $D + T + 44"$
- H ELLIPTICAL OR PIPE ARCH $R + T + 44"$
- D DIAMETER OF PIPE
- R RISE OF PIPE
- S SPAN OF PIPE
- T THICKNESS OF BARREL
- L LENGTH OF HEADWALL
- H HEIGHT OF HEADWALL

DIMENSIONS	QUANTITIES ONE HEADWALL		
	CONCRETE CU. YDS.	REINFORCING STEEL LBS.	
DIAMETER			
15"	1.7	41	
18"	2.2	57	
21"	2.8	62	
24"	3.3	69	
30"	4.7	92	
36"	6.5	106	



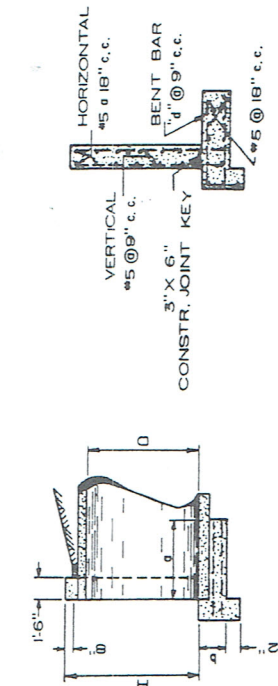
CORRUGATED METAL PIPE



NOTE: ANCHOR BOLTS FOR ANCHORING UPSTREAM END OF METAL PIPES SHALL MEET ASTM A307. TIE TOP 6" MIN. OF BOLT SHALL BE GALVANIZED ACCORDING TO ASTM A153. NUTS SHALL MEET ASTM A325 AND AISI, UNLESS OTHERWISE SPECIFIED. ANCHOR BOLTS SHALL BE USED ONLY ON PIPES WITH SPAN OR RISE GREATER THAN 24" INCHES. ALL CONCRETE SHALL BE CLASS "A".

HEADWALL FOR CORRUGATED METAL PIPE									
CIRCULAR				PIPE ARCH					
D	W	H	T	CONC. CU. YDS.	SPAN	RISE	W	H	T
12"	2'-0"	3'-0"	12"	21	18"	11"	3'-0"	3'-0"	12"
15"	2'-6"	3'-2"	12"	27	22"	13"	3'-6"	3'-0"	12"
18"	3'-0"	3'-3"	12"	33	25"	16"	4'-0"	3'-2"	12"
21"	3'-6"	3'-4"	12"	39	29"	18"	4'-6"	3'-3"	12"
24"	4'-0"	3'-6"	12"	46					
27"	4'-6"	3'-8"	12"	53					
30"	5'-0"	3'-9"	12"	60					
33"	5'-6"	3'-10"	12"	68					
36"	6'-0"	4'-0"	12"	76					
39"	6'-6"	4'-2"	12"	84					
42"	7'-0"	4'-3"	12"	92					
48"	8'-0"	4'-6"	12"	110					
54"	9'-3"	4'-9"	12"	133					
60"	10'-6"	5'-6"	12"	178					
66"	11'-9"	5'-9"	12"	208					
72"	13'-0"	6'-0"	12"	237					
78"	14'-3"	6'-3"	14"	294					
84"	15'-6"	6'-6"	14"	330					

HEADWALL FOR CONCRETE PIPE									
CIRCULAR				ELLIPTICAL					
D	W	H	T	CONC. CU. YDS.	SPAN	RISE	W	H	T
12"	2'-0"	3'-0"	12"	20					
15"	2'-6"	3'-2"	12"	25					
18"	3'-0"	3'-3"	12"	31	23"	14"	3'-5"	3'-2"	12"
21"	3'-6"	3'-4"	12"	37					
24"	4'-0"	3'-6"	12"	43	30"	19"	4'-2"	3'-4"	12"
27"	4'-6"	3'-8"	12"	49	34"	22"	4'-7"	3'-5"	12"
30"	5'-0"	3'-9"	12"	56	38"	24"	5'-0"	3'-6"	12"
33"	5'-6"	3'-10"	12"	62	42"	27"	5'-5"	3'-7"	12"
36"	6'-0"	4'-0"	12"	69	45"	29"	5'-10"	3'-8"	12"
39"	6'-6"	4'-2"	12"	77	49"	32"	6'-6"	3'-10"	12"
42"	7'-0"	4'-3"	12"	84	53"	34"	7'-2"	4'-0"	14"
48"	8'-0"	4'-6"	14"	109	60"	38"	8'-5"	4'-2"	14"
54"	9'-3"	4'-9"	14"	132	68"	43"	9'-8"	4'-4"	16"
60"	10'-6"	5'-6"	16"	193	76"	48"	11'-0"	5'-0"	16"
66"	11'-9"	5'-9"	18"	242	83"	53"	12'-4"	5'-2"	18"
72"	13'-0"	6'-0"	18"	277	91"	58"	13'-7"	5'-5"	18"
78"	14'-3"	6'-3"	20"	337	98"	63"	14'-10"	5'-7"	20"
84"	15'-6"	6'-6"	22"	405	106"	68"	16'-2"	5'-10"	20"



NOTES

TYPE C HEADWALLS WHERE REQUIRED WILL BE PROVIDED FOR SKEWED AND NONSKewed CURVE WALLS WITH MINIMUM DIAMETER OF RISE OF 42 TO 84 INCHES INCLUSIVE. TYPE I IS USED WHEN THE SKEW ANGLE IS 0 DEGREES OR LESS AND TYPE II WHEN THE SKEW ANGLE IS 1 DEGREE AND OVER.

CONCRETE SHALL BE CLASS "A".

REINFORCING STEEL BARS SHALL BE 5/8" ROUND. DIMENSIONS AND QUANTITIES ARE SHOWN FOR CIRCULAR SECTIONS ONLY. WHEN USED WITH REINFORCED ELLIPTICAL CONCRETE PIPE OR CORRUGATED METAL ARCHES IT WILL BE NECESSARY TO DETERMINE SUCH DIMENSIONS AND QUANTITIES WHICH SHALL GENERALLY CONFORM WITH THOSE LISTED FOR THE NEAREST SIZE CIRCULAR PIPE. THE DIMENSIONS ESTABLISHED BY VERTICAL DIAMETER SHALL APPLY TO SPAN.

CHAMFER ALL EXPOSED CORNERS $\frac{3}{4}$ OF AN INCH.

WHERE THE SOIL BORINGS INDICATE A BEARING CAPACITY OF LESS THAN 2600 POUNDS PER SQUARE FOOT IT WILL BE NECESSARY TO INCREASE THE WIDTH OF THE FOOTING.

MINIMUM COVER FOR REINFORCING STEEL SHALL BE 2 INCHES

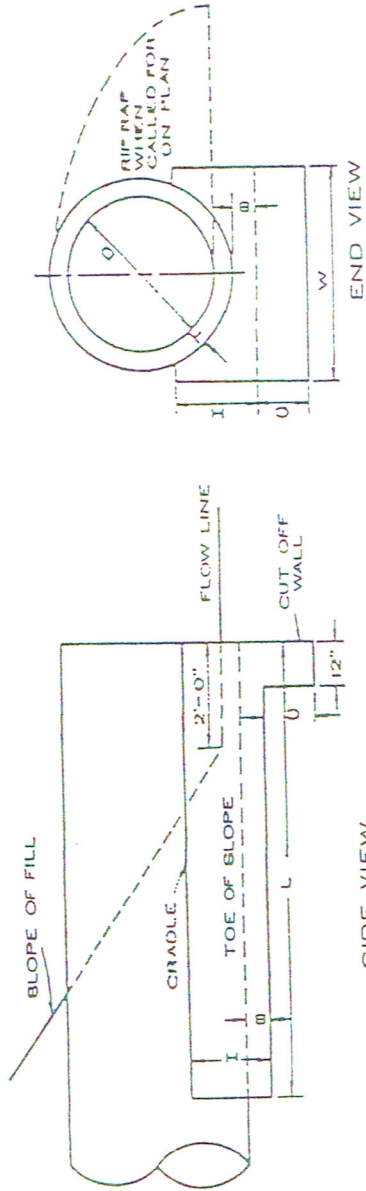
SECTION C-C

SECTION D-D

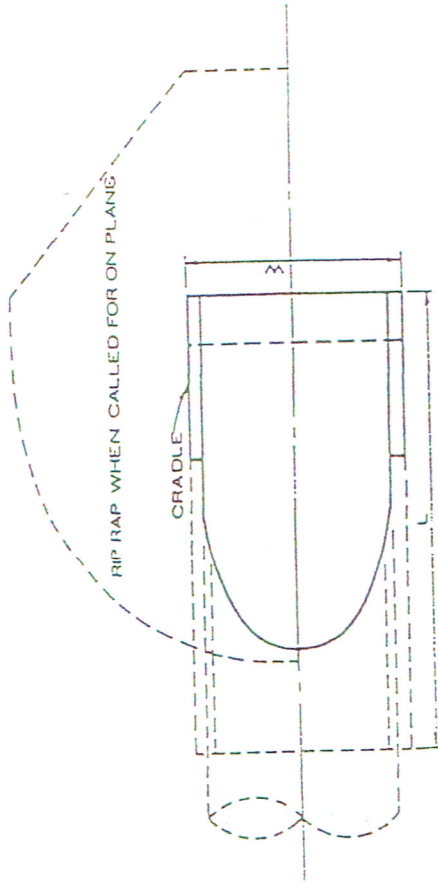
PIPE DIA.	$\theta = 0^\circ$										$\theta = 15^\circ$										$\theta = 30^\circ$										$\theta = 45^\circ$										PIPE DIA.
	H	a	b	c	BAR D	STEEL LBS.	C.Y. CONC. CMP	h ₂	L ₂	L ₁	C.Y. CONC. RCP	STEEL LBS.	C.Y. CONC. CMP	h ₂	L ₂	L ₁	C.Y. CONC. RCP	STEEL LBS.	C.Y. CONC. CMP	h ₂	L ₂	L ₁	C.Y. CONC. RCP	STEEL LBS.	C.Y. CONC. CMP	h ₂	L ₂	L ₁	C.Y. CONC. RCP	STEEL LBS.	C.Y. CONC. CMP	h ₂	L ₂	L ₁	C.Y. CONC. RCP	STEEL LBS.					
42"	4'-1.1"	3'-3"	1'-6"	2'-6"	#5	3'-7"	3'-1"	4'-4"	3'-4"	8.5	6.7	598	8'-9"	4'-6"	3'-8"	3'-2"	7.3	7.1	619	7'-10"	5'-10"	3'-2"	3'-3"	7.5	7.3	633	7'-10"	7'-9"	3'-2"	3'-3"	8.7	8.5	718	42"							
48"	5'-5"	3'-6"	1'-6"	2'-9"	#5	4'-4"	3'-4"	8.5	6.2	793	10'-0"	4'-5"	4'-1"	3'-5"	9.0	8.7	776	6'-9"	6'-10"	3'-5"	3'-6"	9.1	8.8	801	8'-9"	9'-2"	3'-5"	3'-7"	10.6	10.3	925	48"									
54"	5'-11"	3'-9"	1'-6"	3'-0"	#5	5'-2"	3'-6"	10.3	10.0	1069	11'-4"	6'-3"	4'-6"	3'-8"	10.9	10.5	1026	9'-8"	7'-11"	3'-8"	3'-9"	10.8	10.5	1024	9'-8"	10'-7"	3'-6"	3'-10"	12.6	12.2	1198	54"									
60"	6'-6"	4'-0"	1'-6"	3'-3"	#7	5'-11"	3'-11"	12.3	11.8	1149	12'-7"	7'-2"	4'-10"	4'-0"	12.9	12.4	1174	10'-7"	9'-0"	3'-9"	4'-1"	12.7	12.3	1157	10'-7"	12'-0"	3'-10"	4'-1"	14.8	14.3	1354	60"									
72"	7'-7"	4'-6"	1'-7"	3'-9"	#7	7'-5"	4'-5"	17.0	16.2	1783	15'-1"	8'-11"	5'-7"	4'-6"	17.8	17.1	1811	12'-5"	11'-2"	4'-3"	4'-7"	17.3	16.6	1700	12'-5"	14'-10"	4'-3"	4'-8"	20.2	19.6	2076	72"									
84"	8'-8"	5'-0"	1'-10"	4'-3"	#8	9'-0"	5'-0"	23.7	22.8	2595	17'-7"	10'-9"	6'-4"	5'-1"	24.8	23.9	2596	14'-7"	13'-4"	4'-10"	5'-2"	24.1	23.3	2511	14'-3"	17'-8"	4'-8"	5'-2"	27.9	27.0	2980	84"									

TYPE "C" HEADWALL

PIPE CRADLE AND CONCRETE ENCASEMENT



SIDE VIEW



PLAN VIEW

PIPE CRADLE

NOTES

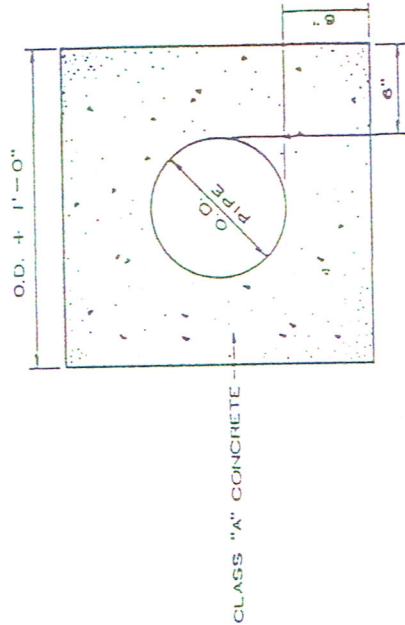
1. LENGTH OF CRADLE TO BE 10'-0" FOR FILLS UP TO 15'-0" DEEP AND EQUAL TO THE DEPTH OF FILL FOR DEPTHS 15'-0" AND OVER.
2. RIP RAP MAY BE PLACED AT INLET AND OUTLET OF CULVERT AS DETERMINED BY THE ENGINEER.

CRADLE DIMENSIONS AND QUANTITIES

D	D	C	H	W	CUBIC YARDS CLASS A CONC. TWO CUT - OFF WALLS CRADLE
12"	6"	14"	0'11"	11'0"	.2
15"	6"	14"	1'0"	2'1"	.2
18"	6"	14"	1'2"	2'5"	.2
24"	6"	1'3"	1'4"	2'11"	.3
27"	6"	1'3"	1'6"	3'3"	.3
30"	6"	1'3"	1'6"	3'6"	.3
33"	6"	1'3"	1'7"	3'10"	.3
36"	6"	1'3"	1'8"	4'1"	.4
39"	6"	1'3"	1'9"	4'4"	.4
42"	6"	2'2"	1'11"	4'8"	.7
48"	6"	2'2"	2'1"	5'3"	.8
54"	8"	1'11"	2'4"	6'11"	.9
60"	8"	1'11"	2'9"	6'6"	.9
66"	10"	1'9"	3'0"	7'3"	.9
72"	10"	1'8"	3'2"	7'10"	.10
84"	10"	1'7"	3'6"	8'11"	.11
					.6126

CONCRETE QUANTITIES

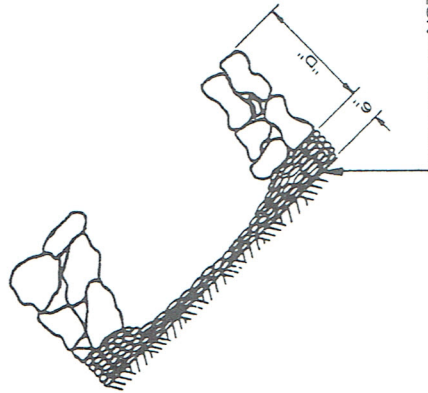
(IN.) DIA.	CY/LF
4	0.07
6	0.08
8	0.10
10	0.11
12	0.13
14	0.14
16	0.16
18	0.19
20	0.20
24	0.23



NOTE: O.D. OF PIPE SHOWN IS THAT OF PIPE BARREL ONLY.

CONCRETE ENCASEMENT DETAIL

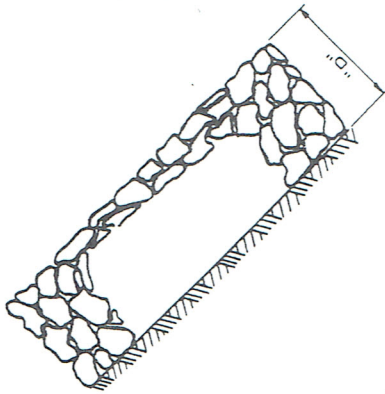
TYPE A



NOTE:

ALL TYPES MAY BE PLACED WITH OR WITHOUT A 6 INCH BED OF NO. 3 OR 4 CRUSHED GRAVEL, STONE, OR SLAG AS SPECIFIED BY THE ENGINEER.

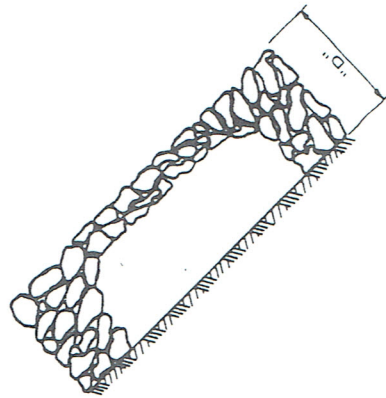
TYPE B



NOTE:

DEPTH "D", MEASURED PERPENDICULAR TO SLOPE, SHALL BE AS SPECIFIED BY THE ENGINEER.

TYPE C

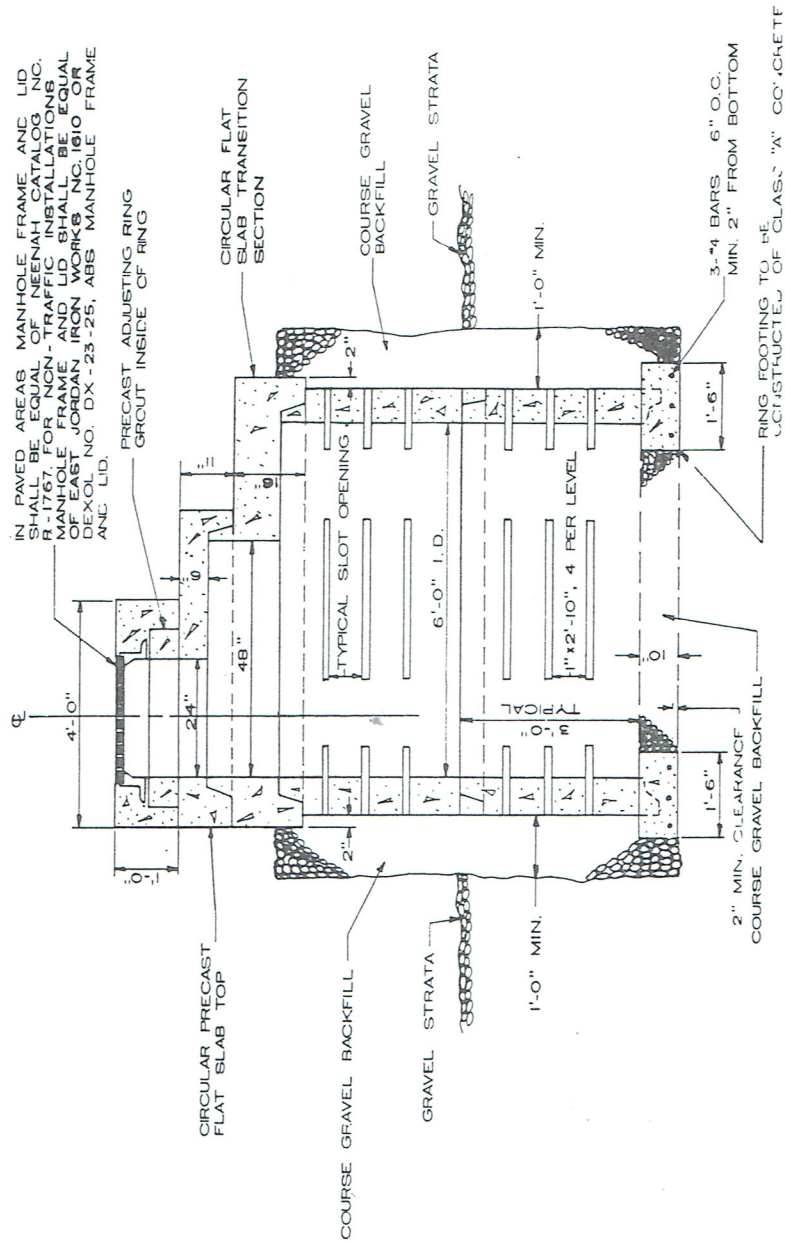


TYPE A SHALL CONSIST OF SIZES SUCH THAT AT LEAST 85 PERCENT OF THE TOTAL MATERIAL BY WEIGHT SHALL BE LARGER THAN AN 18-INCH SQUARE OPENING. THE MATERIAL SMALLER THAN AN 18-INCH SQUARE OPENING SHALL CONSIST PREDOMINANTLY OF ROCK SPALLS AND ROCK FINES AND SHALL BE FREE OF SOIL.

TYPE B SHALL CONSIST OF SIZES SUCH THAT AT LEAST 85 PERCENT OF THE TOTAL MATERIAL BY WEIGHT SHALL BE LARGER THAN A 9 INCH SQUARE OPENING. THE MATERIAL SMALLER THAN A 9-INCH SQUARE OPENING SHALL CONSIST PREDOMINANTLY OF ROCK SPALLS AND ROCK FINES AND SHALL BE FREE OF SOIL.

TYPE C SHALL CONSIST OF SIZES SUCH THAT AT LEAST 50 PERCENT OF THE TOTAL MATERIAL BY WEIGHT SHALL BE LARGER THAN A 9 INCH SQUARE OPENING, AND SHALL BE FREE OF SOIL. THE AMOUNT OF MATERIAL PASSING A 3 INCH SIFVE SHALL BE NOT MORE THAN 15 PERCENT BY WEIGHT OF THE TOTAL MATERIAL.

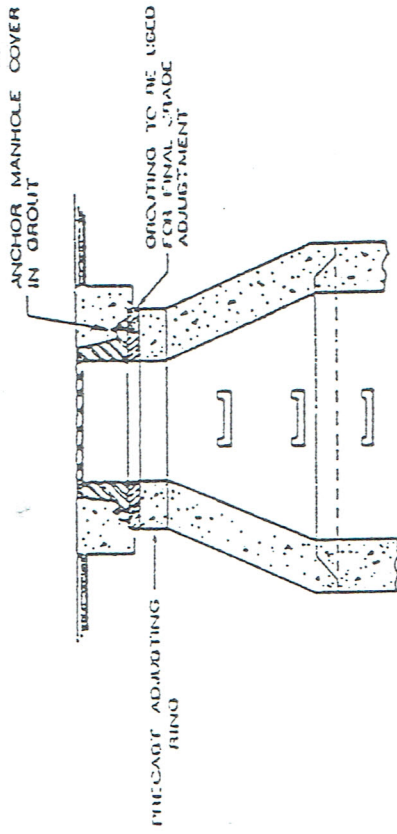
ROCK CHANNEL PROTECTION



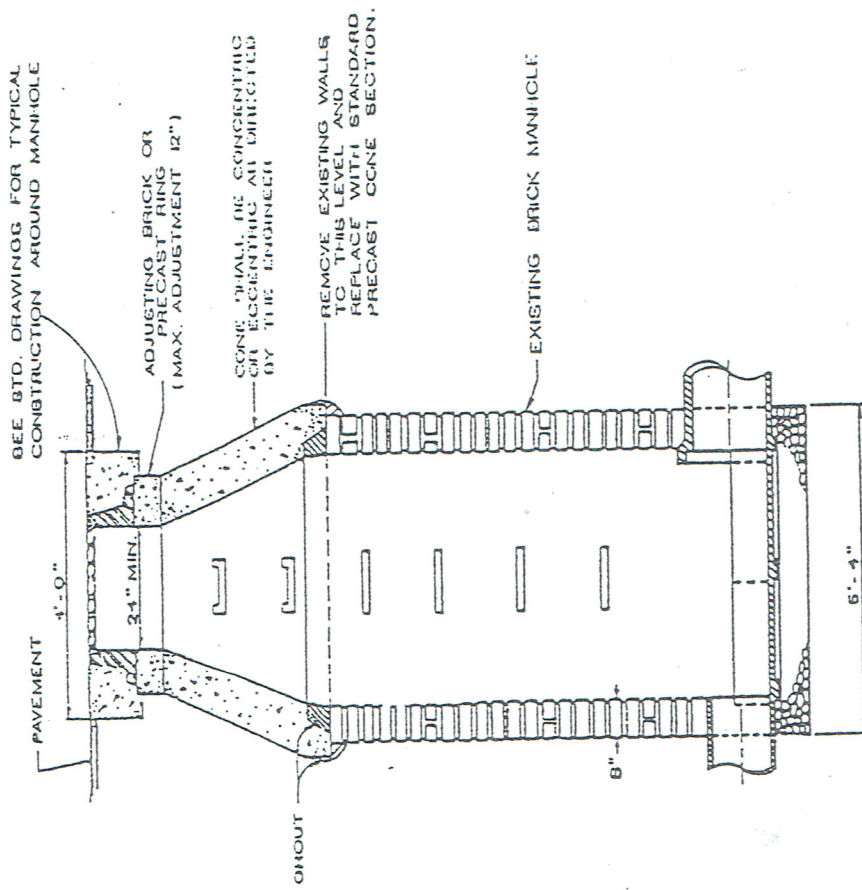
NOTES

1. DRYWELL SHALL EXTEND A MINIMUM OF 3'-0" INTO GRAVEL STRATA. EXACT LOCATION OF GRAVEL STRATA SHALL BE DETERMINED IN THE FIELD BY THE PROJECT ENGINEER.
2. THE SMALLEST DRYWELL SHALL CONSIST OF TWO 3'-0" SECTIONS.
3. ADDITIONAL 3'-0" SECTIONS MAY BE REQUIRED DEPENDING UPON THE DEPTH OF THE GRAVEL STRATA.
4. THE CONTRACTOR SHALL, PRIOR TO ORDERING PIPE SECTIONS FOR DRYWELL, SUBMIT TO THE PROJECT ENGINEER DETAILS OF THE PROPOSED PIPE SECTIONS FOR HIS WRITTEN APPROVAL. THE PIPE SECTIONS SHALL BE MADE OF REINFORCED CONCRETE.

DRYWELL DETAIL



GROUTING MANHOLE COVERS



TYPICAL CONSTRUCTION - REBUILDING MANHOLE CONE SECTION

MISCELLANEOUS STORM DETAILS