

SCHEDULE OF ROADWAY LINED SWALES & DITCHES									
						CL. B CONCRETE OR SHOTCRETE			
LOCATION		TYPE	CONCRETE GUTTER TYPE 61218	CONCRETE GUTTER TYPE 61614	LINED DITCHES TYPE 1	LINED DITCHES TYPE 4		DITCH & CHANNEL EXCAVATION	REINFORCING STEEL
	ITEM	—	609.2218	609.2614	640.010	640.040		207.01	—
	UNIT	—	Lin. Ft.	Lin. Ft.	N.I.C. Lin. Ft.	Lin. Ft.		Cu. Yd.	Lbs.
Ramp C Sta. 13+50 to FWR Sta. 123+75		G1218	3289						8551
Ramp C-1 Sta. 13+00 to FWR Sta. 99+00		G1218	670						1742
FWR Sta. 93+50 to FWR Sta. 99+00		G1614		550					524
Ramp A Sta. 13+00 to FWR Sta. 123+15		G1618	2180						5668
FWR Sta. 123+75 to FWR Sta. 129+90		G1614		615					586
FWR Sta. 123+75 to FWR Sta. 129+10		4				535		384	653
FWR Sta. 132+60 to FWR Sta. 144+30		G1614		1160					1106
FWR Sta. 138+07 to FWR Sta. 142+75		G1614		468					446
FWR Sta. 142+75 to FWR Sta. 147+70		G1218	425						1207
FWR Sta. 149+70 to FWR Sta. 154+00		G1218	430						1118
FWR Sta. 166+25 to FWR Sta. 170+30		G1218	335						811
FWR Sta. 167+25 to FWR Sta. 172+55		G1218	530						1370
FWR Sta. 170+25 to FWR Sta. 182+50		G1218	425						1105
FWR Sta. 178+60 to FWR Sta. 184+50		G1218	530						1534
FWR Sta. 182+50 to FWR Sta. 186+00		1			350			28	334
FWR Sta. 184+50 to FWR Sta. 187+70		1			236			24	282
TOTAL			6139	2793	N.I.C. 0	535		384	19,276

NOTE:

ITEM NO.

609.2218

609.2614

~~N.I.C.~~
0

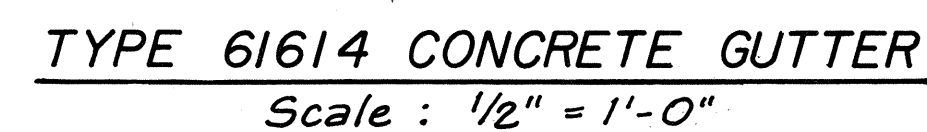
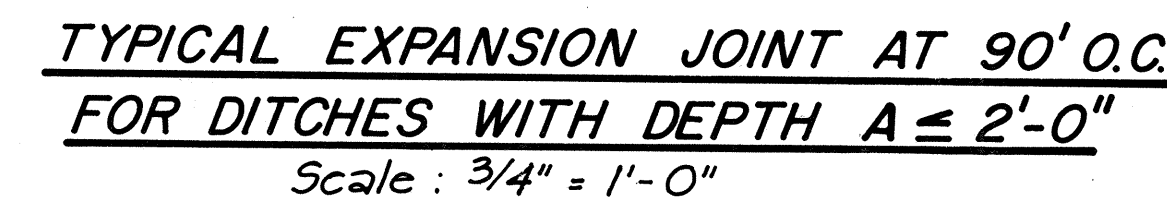
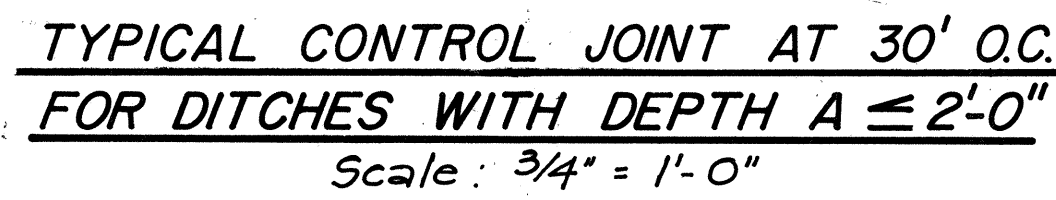
640.040

207.01

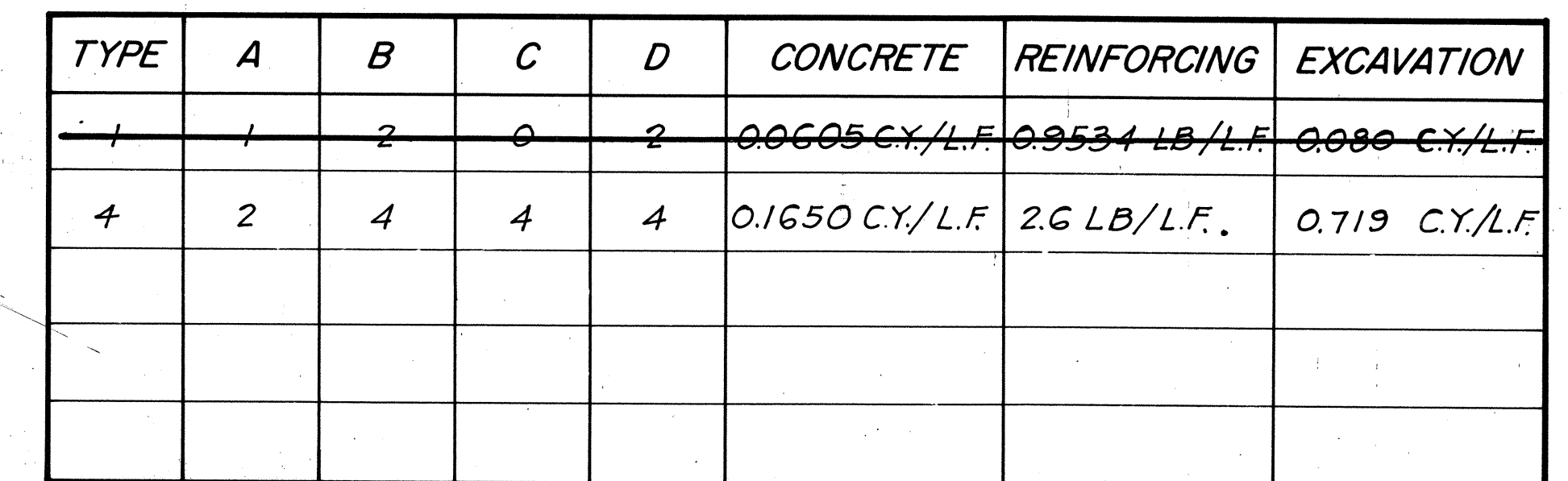
—

ITEM NO.

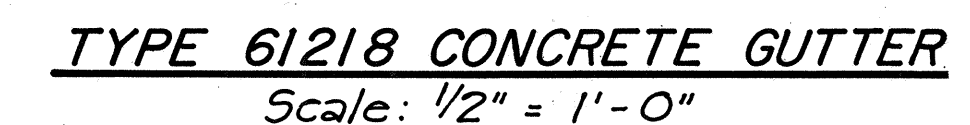
DATE	REVISION
2/4/81	Deleted Type G1218 Gutter from Sta. 142+75 to Sta. 154+00. Revised Column Totals.



DATE	REVISION
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1. Contractor may substitute Lined Ditches of other Shapes and of equal or greater Capacity if approved by the Engineer. Payment will be on the original Ditch as shown on the Plans.
2. Ditch Transitions shall be paid under the adjacent downstream Ditch Type.
3. Wire mesh Reinforcement shall be incidental to Concrete Gutter or Lined Ditch.
4. Openings in Gutters for Guard Rail Posts shall be incidental to Concrete Gutter.

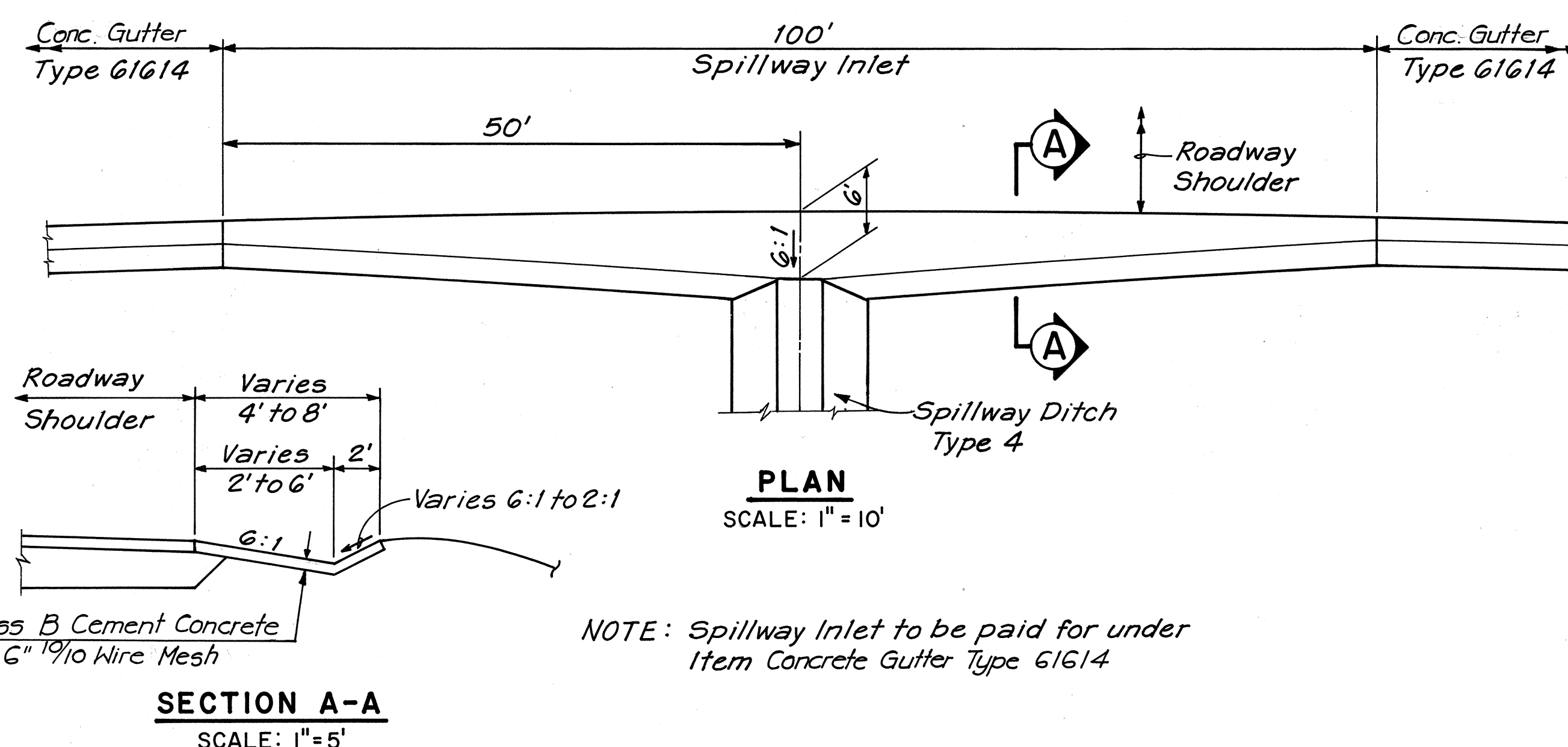
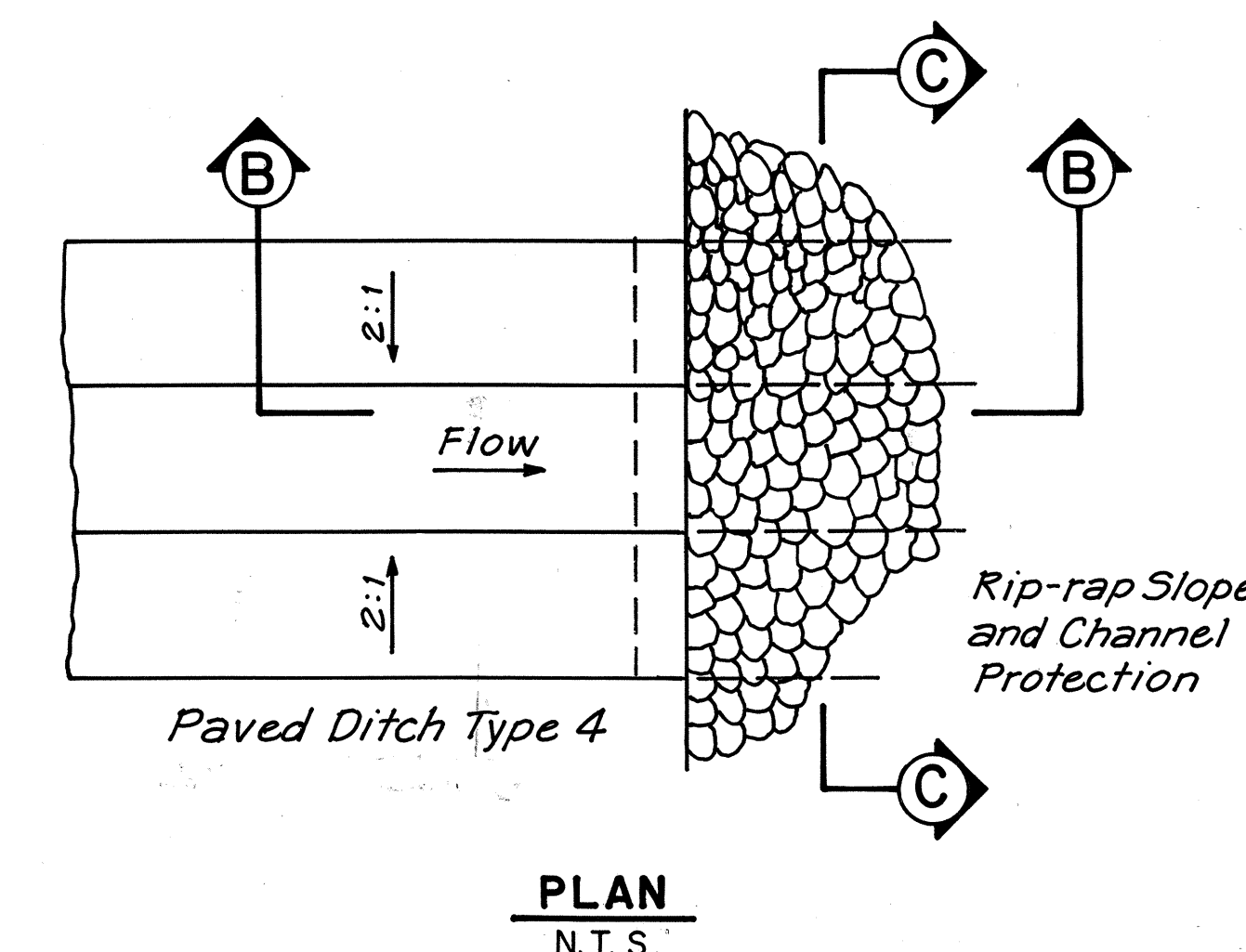
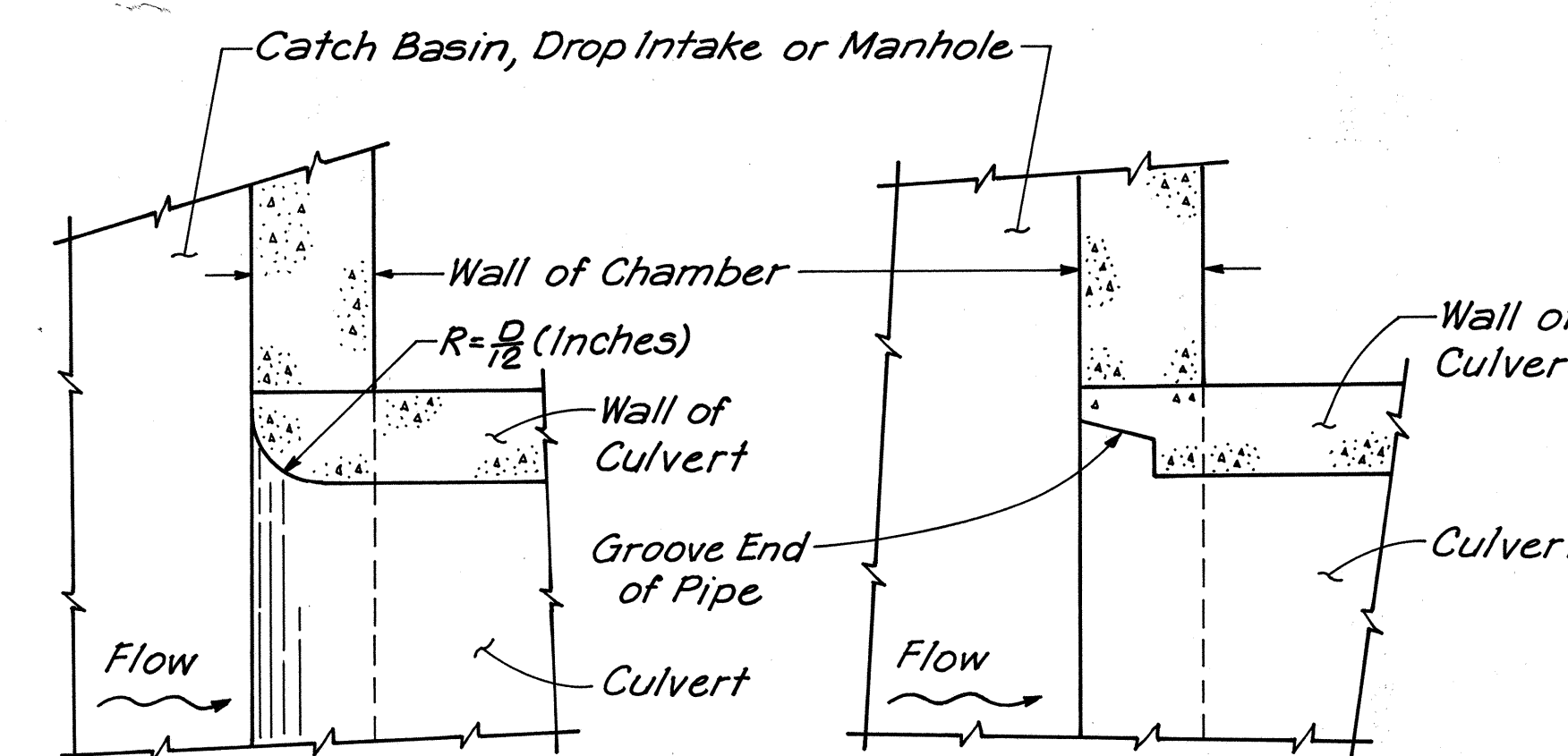
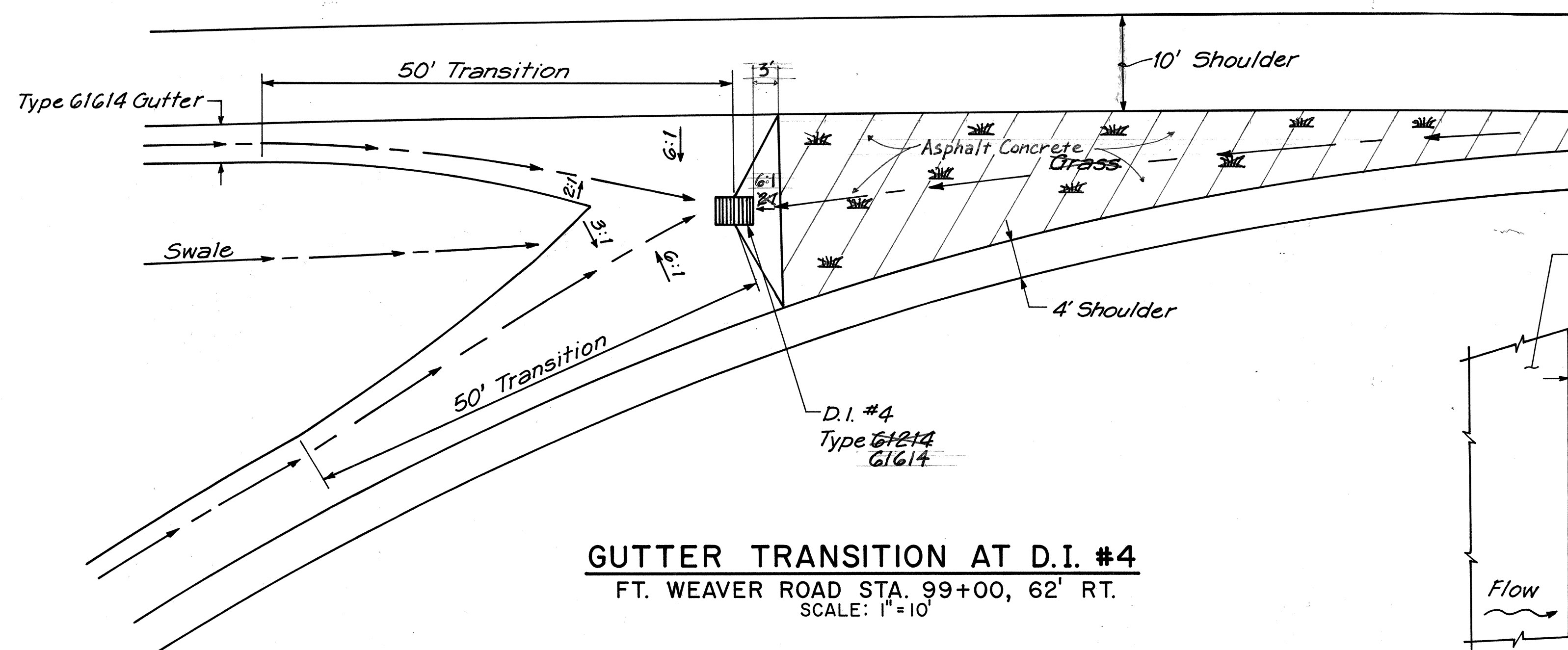


SCALE: AS SHOWN DATE: SEPT 1979

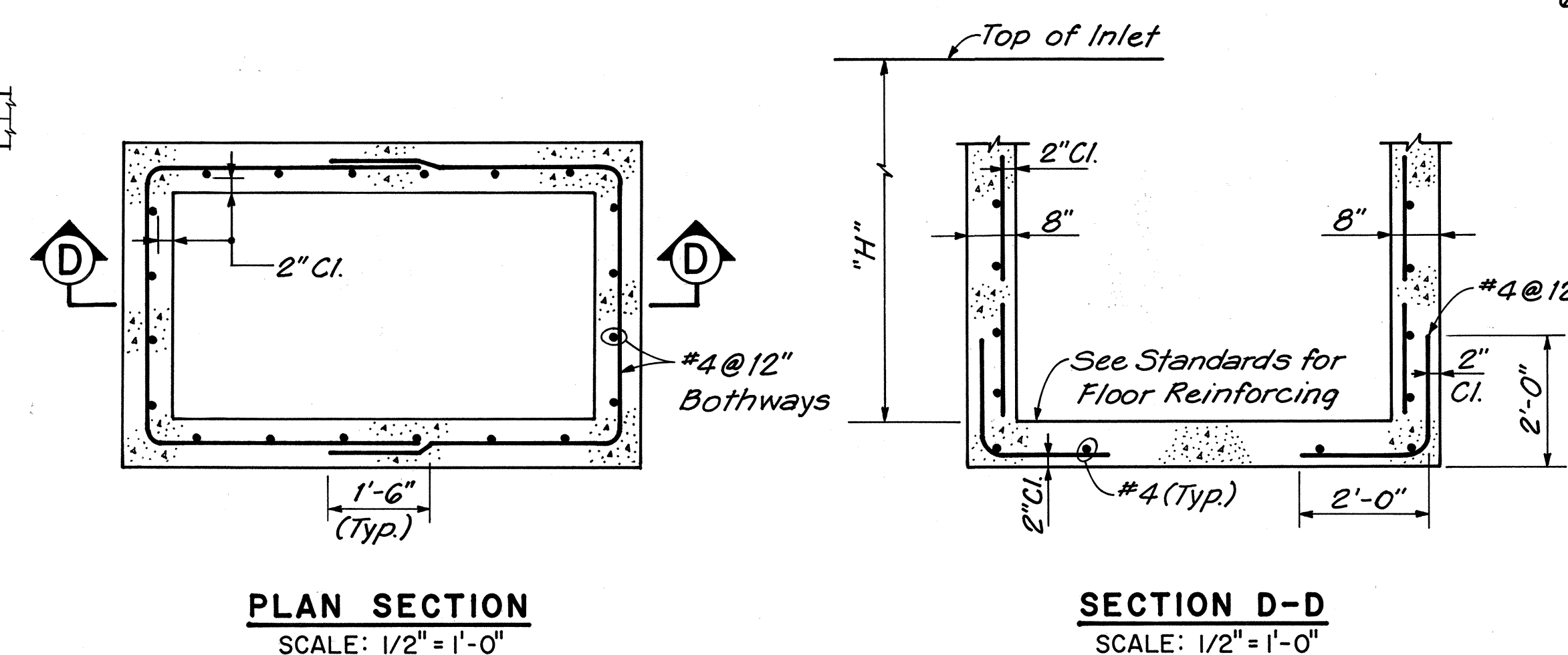
SHEET NO. 1 OF 3 SHEETS

C.O. 44 R

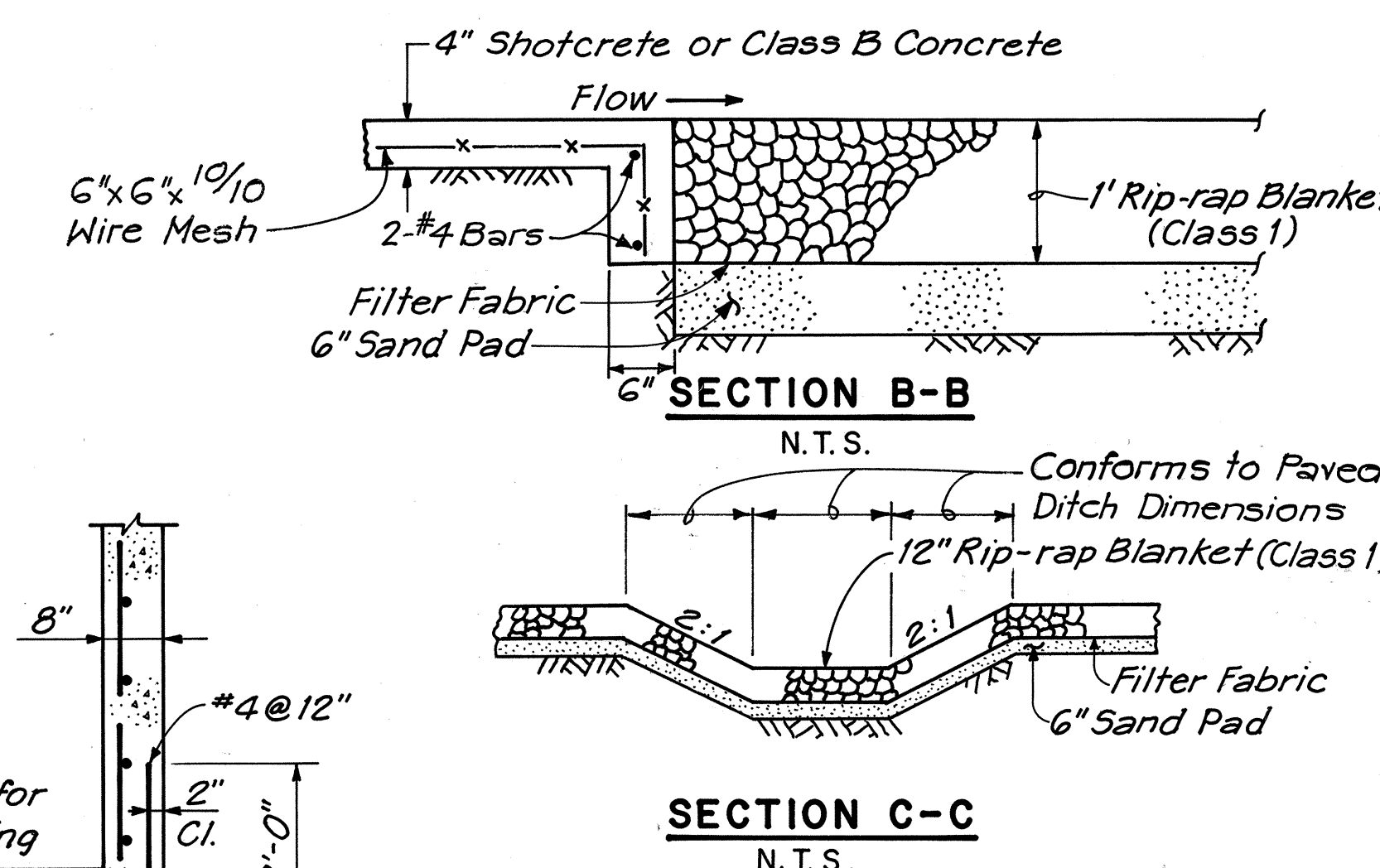
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	M-7600(2)	1980	45	244



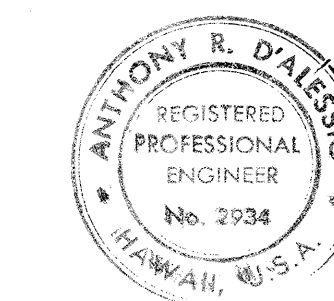
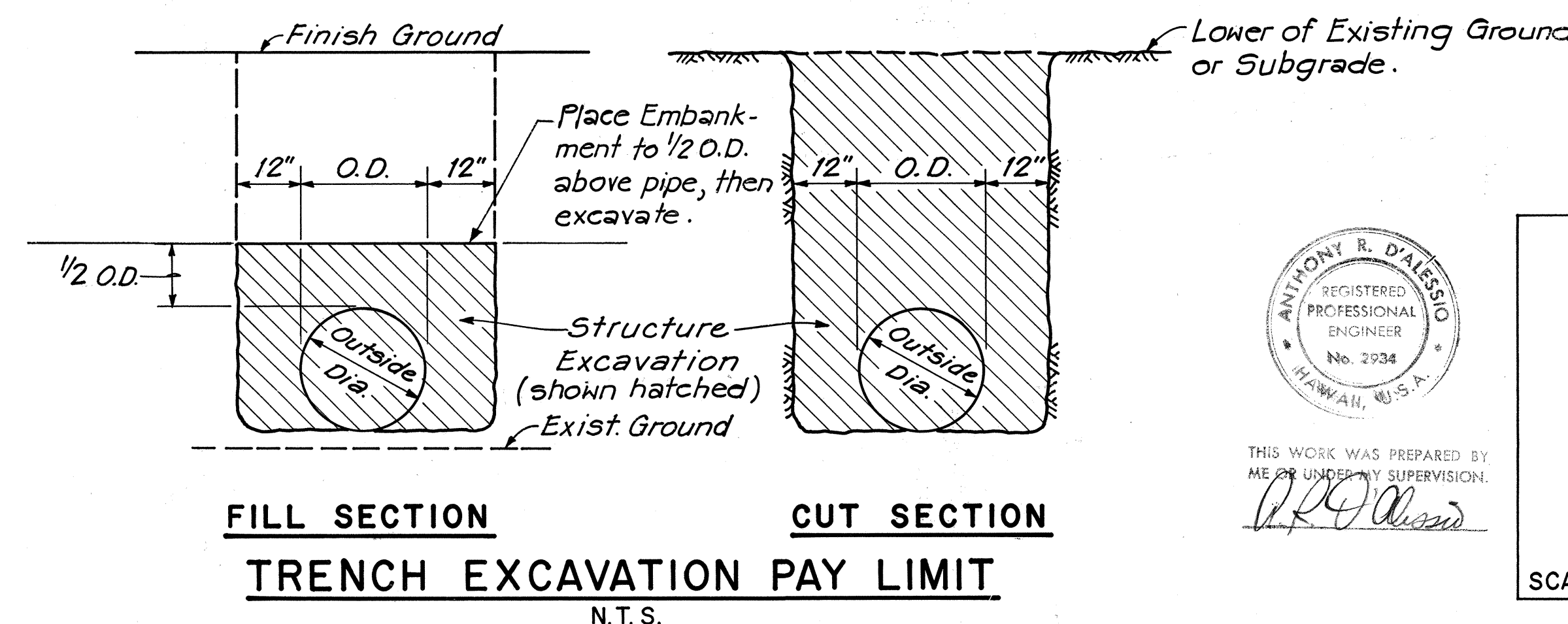
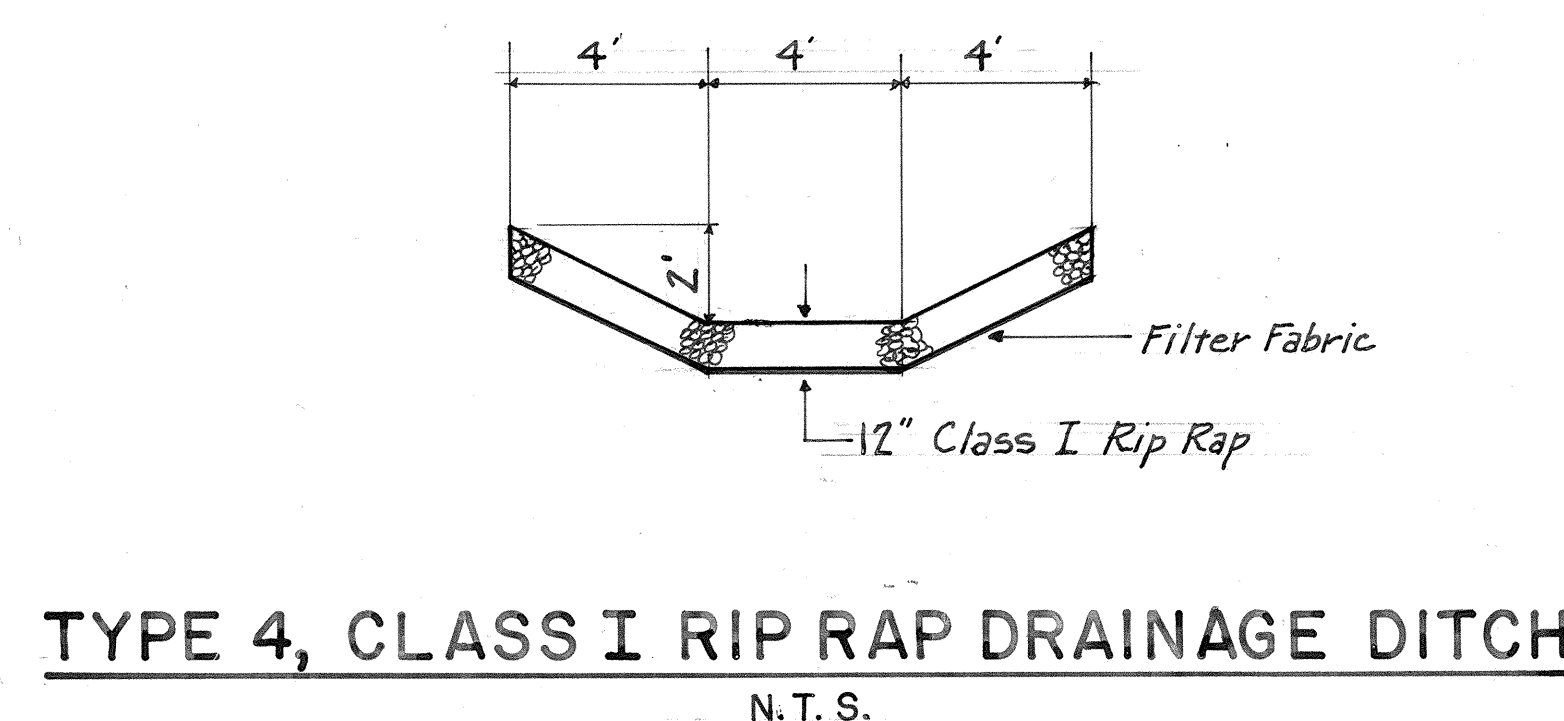
SPILLWAY INLET DETAILS
F.W.R. STA. 125+94



TYPICAL WALL REINFORCING FOR CATCH BASINS AND DROP INTAKES WHEN "H" EXCEEDS 6'-0"



DITCH TERMINAL DETAILS

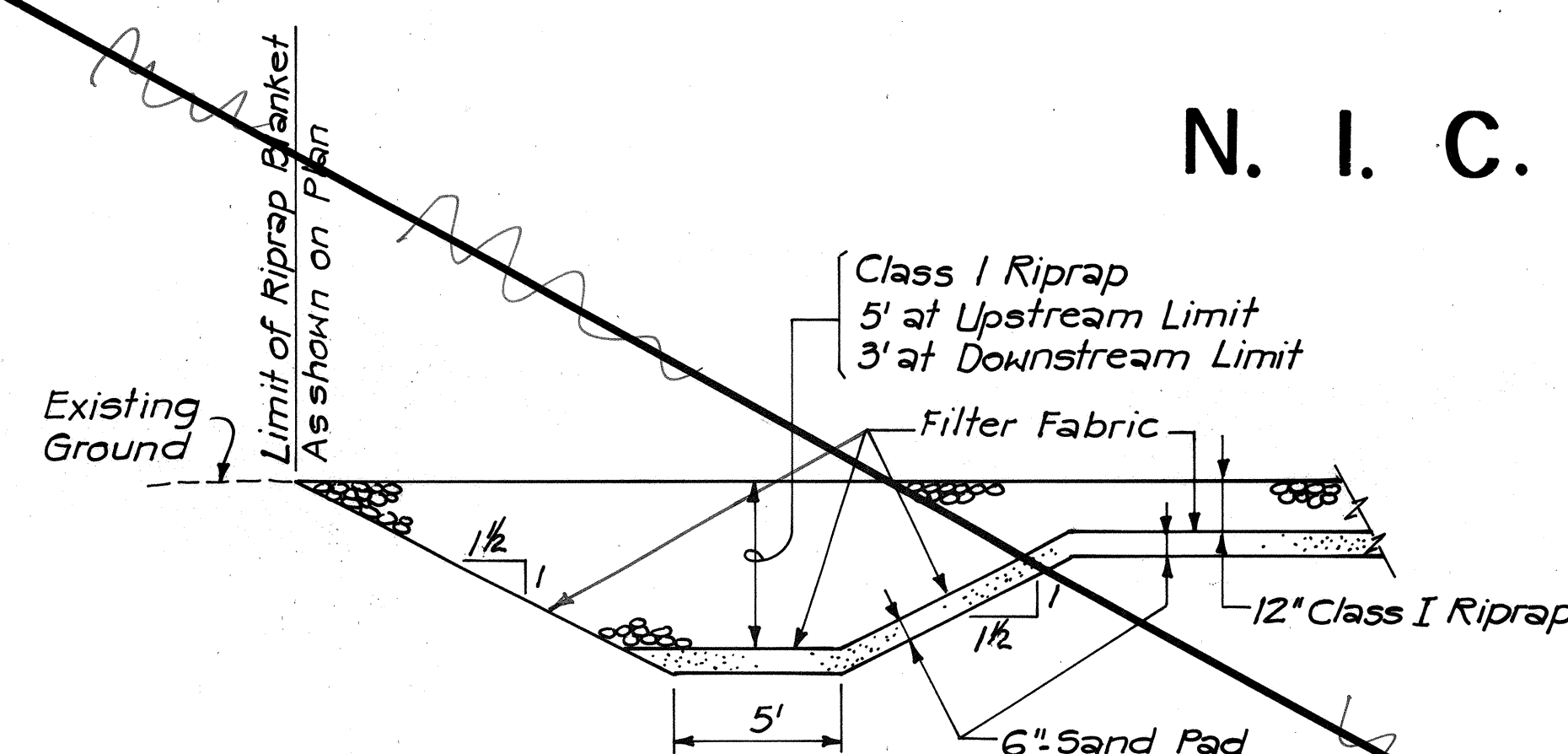


THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION	
DRAINAGE DETAILS	
FORT WEAVER ROAD SOUTH OF FARRINGTON HIGHWAY TO THE VICINITY OF RENTON ROAD	
SCALE: AS SHOWN	DATE: SEPT 1979
SHEET NO. 2 OF 3 SHEETS	

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	M-7600 (2)	1980	46R	244

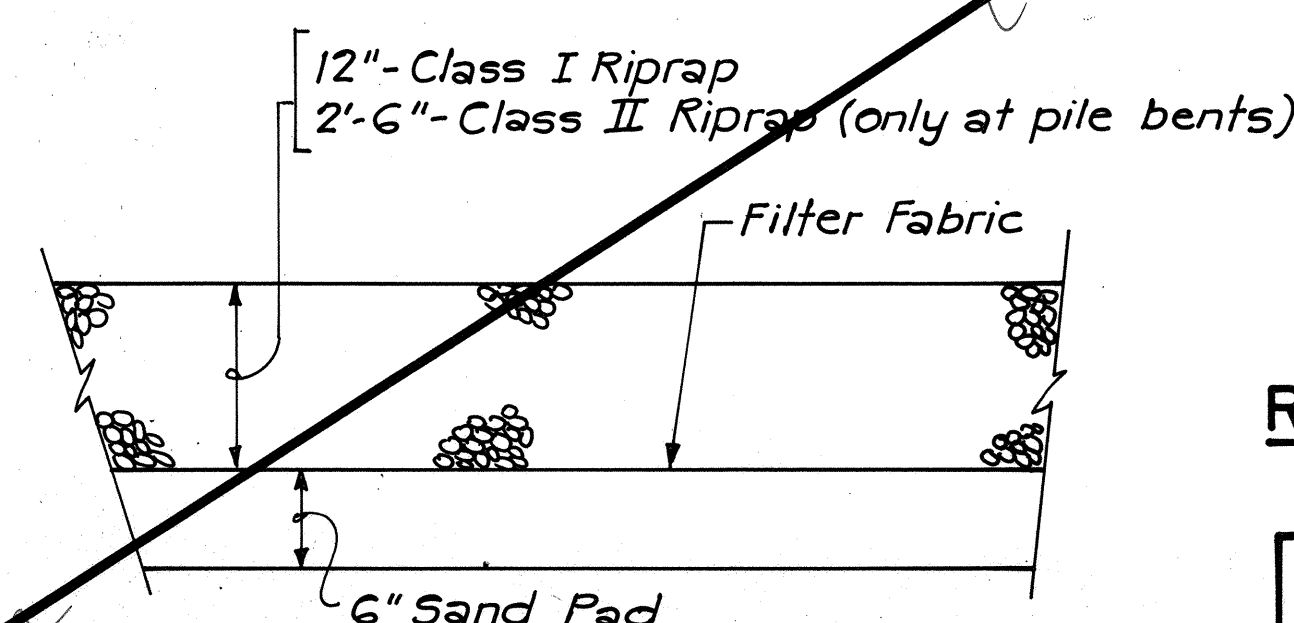
N. I. C.



NOTE: Shown excavation slopes may be flattened as required by Soil conditions.

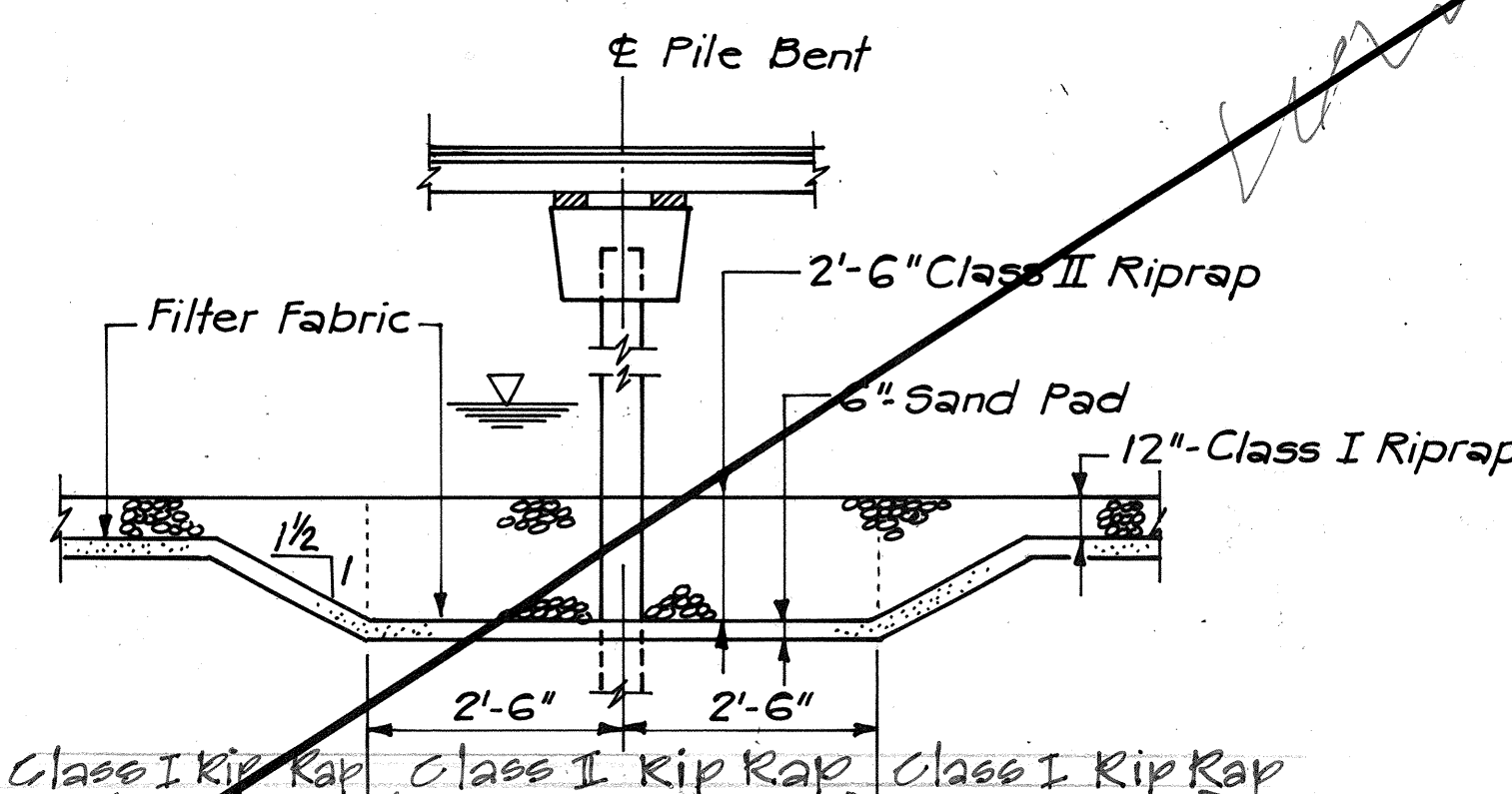
RIPRAP CUTOFF DETAIL AT UPSTREAM AND DOWNSTREAM LIMITS OF RIPRAP PROTECTION

N.T.S.



RIPRAP SECTION

N.T.S.



NOTE: 2'-6" thick Riprap shall be extended min. 12' upstream and downstream from pile bent ends.

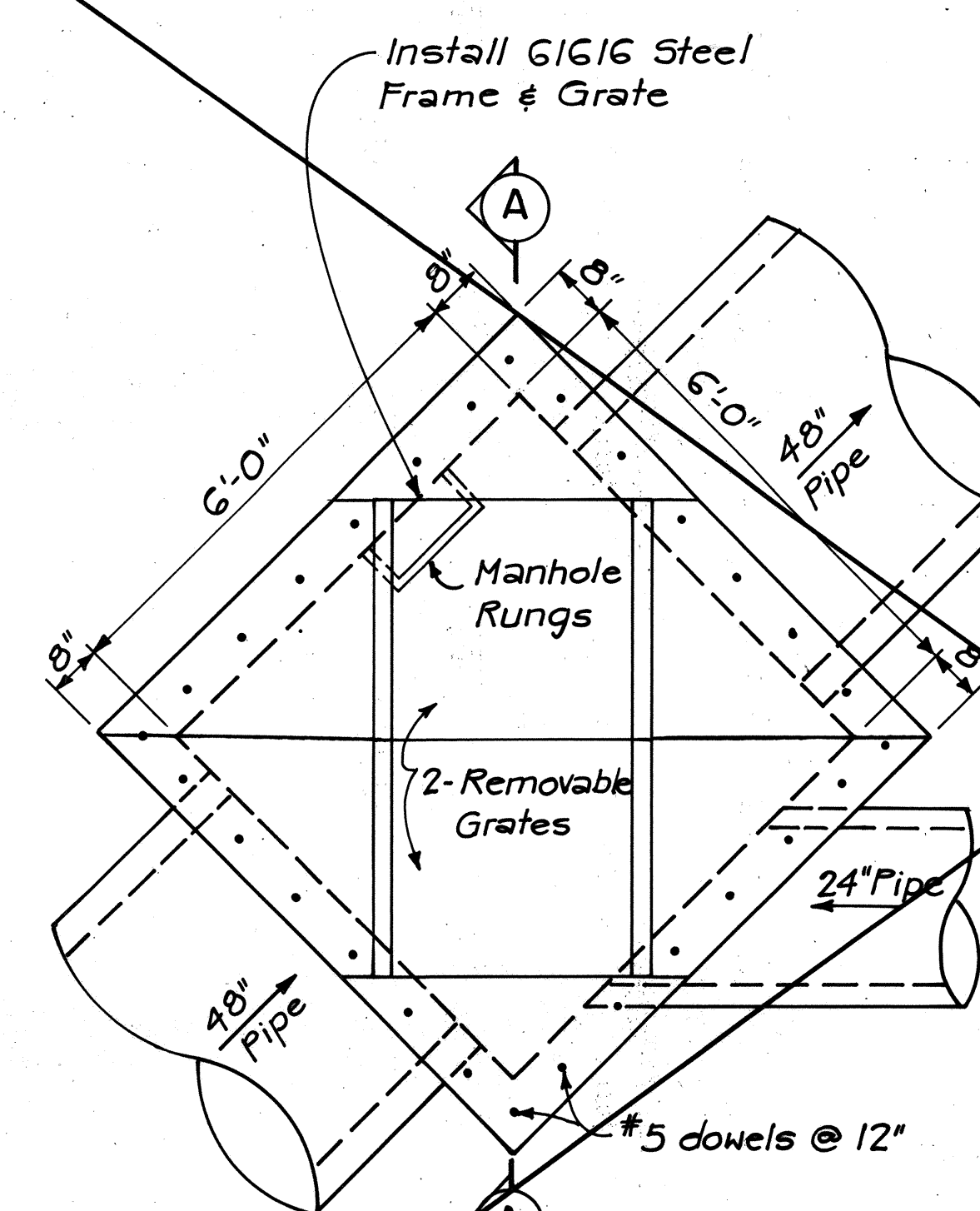
SECTION OF RIPRAP AT PILE BENTS FOR TRESTLE STRUCTURE

N.T.S.

RIPRAP NOTES:

1. Sand Pad shall not be required where subsoil consists of Coral/Sand material, as directed by the Engineer.
2. Subject to the approval of the Engineer, gradual & uniform overexcavation of less than 6 inches below the excavation line need not be backfilled. The finish grade line may be lowered by the approved amount of overexcavation. Overexcavation will not be paid.
3. Sand Pad is not required in embankment slope areas.
4. Filter Fabric is required under all Rip-Rap

RIP-RAP PROTECTION AT HONOLULU STREAM STRUCTURE

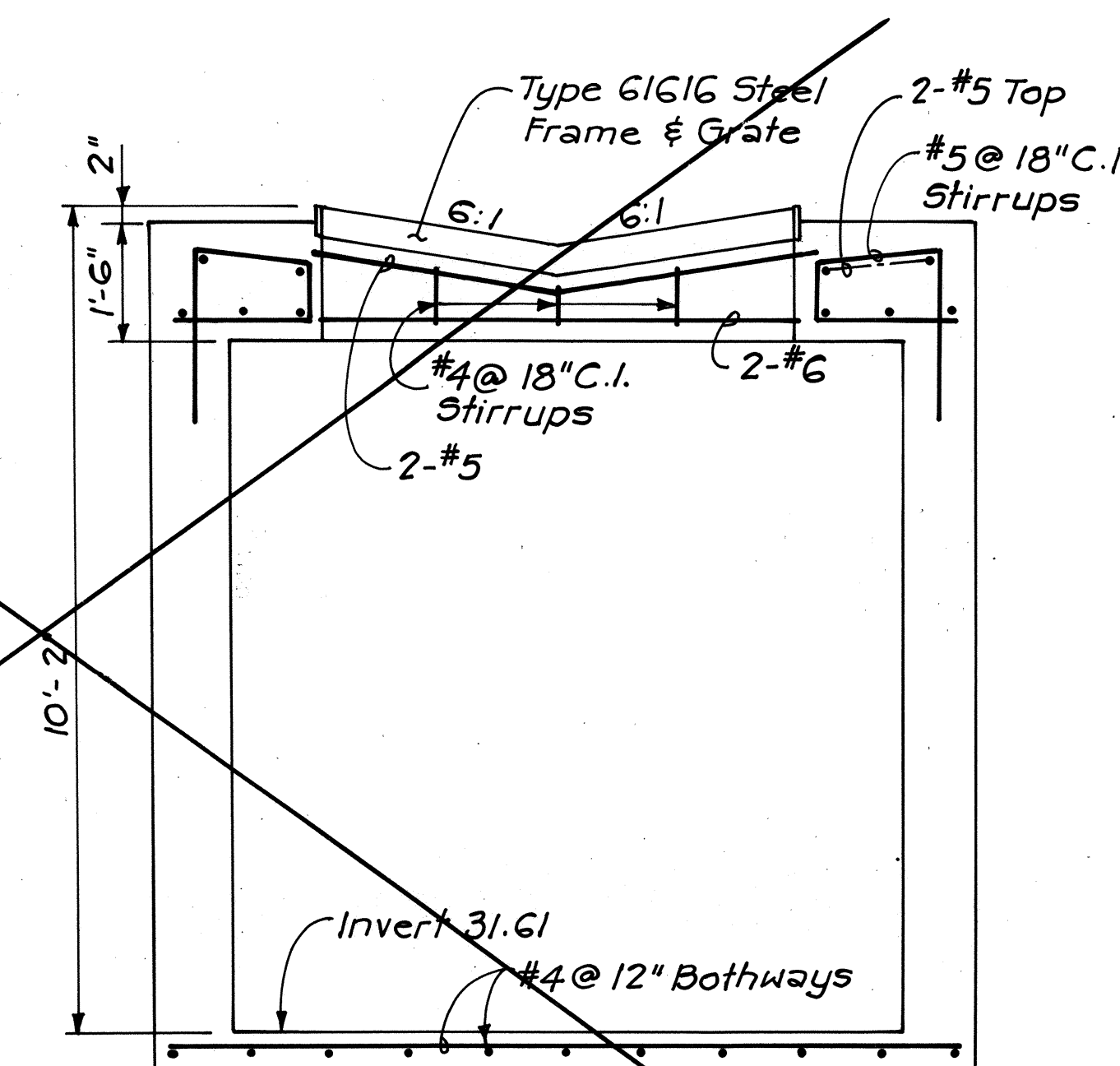


PLAN

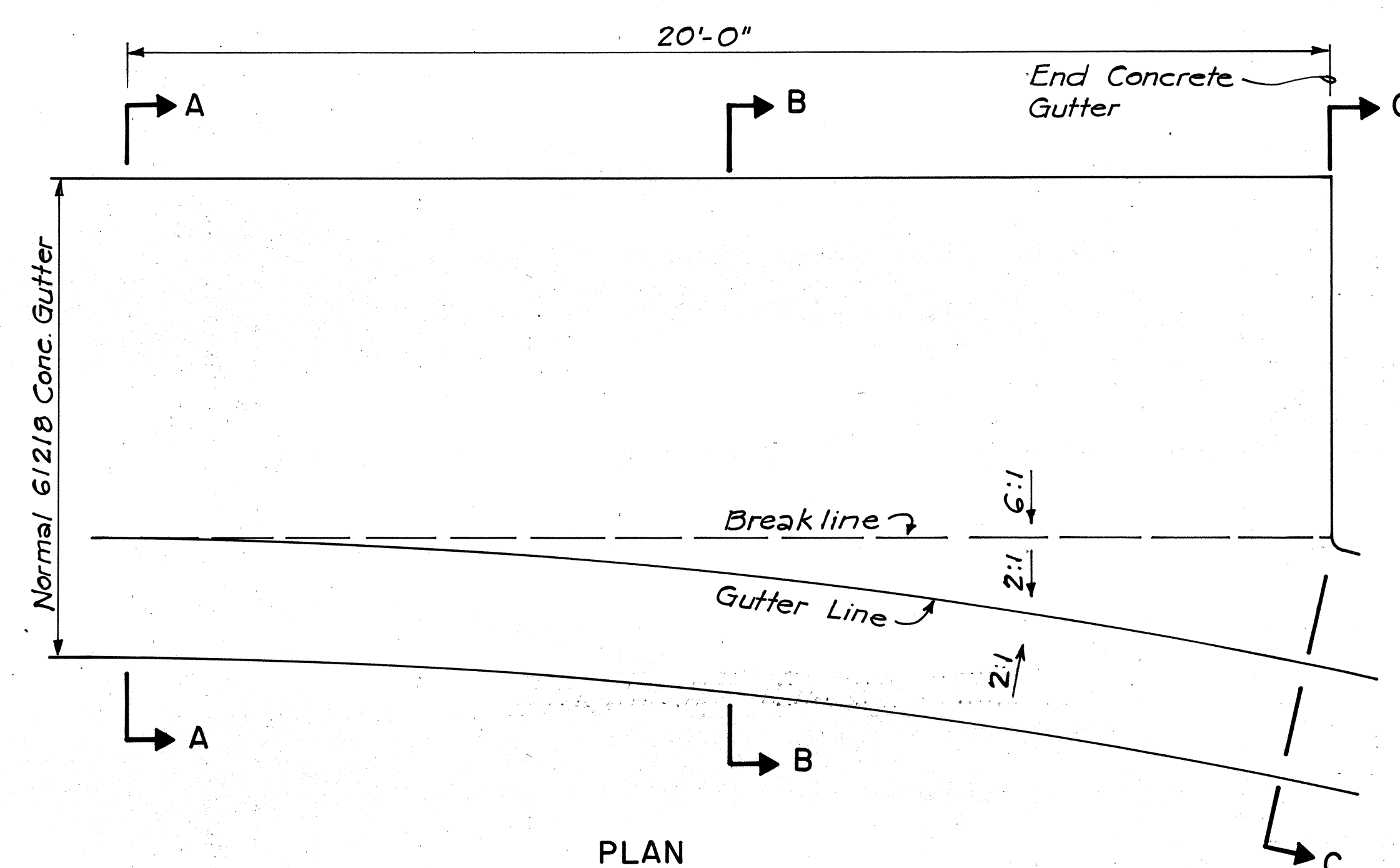
N. I. C.

D.I. #53 DETAILS

Scale: 1/2" = 1'-0"



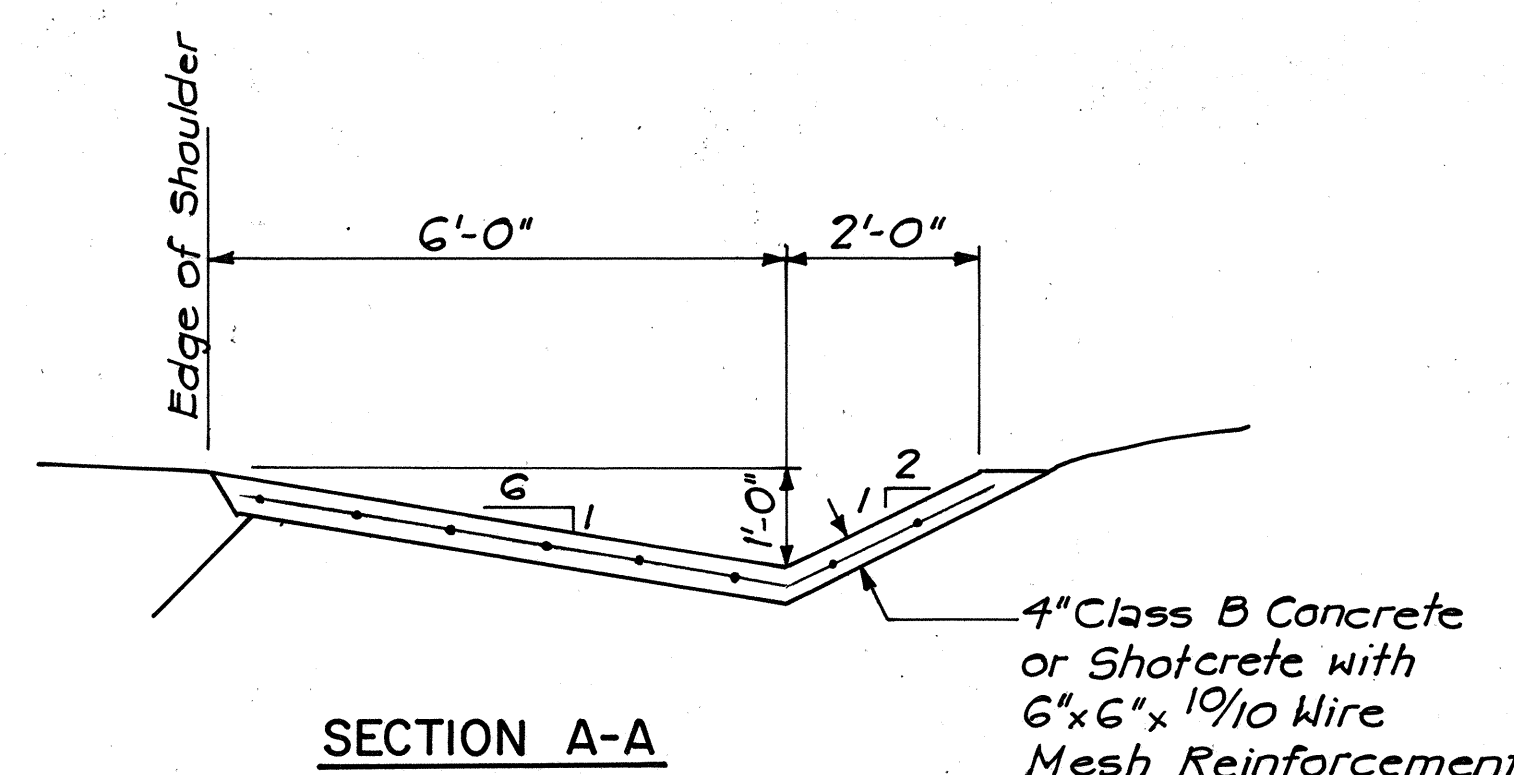
SECTION



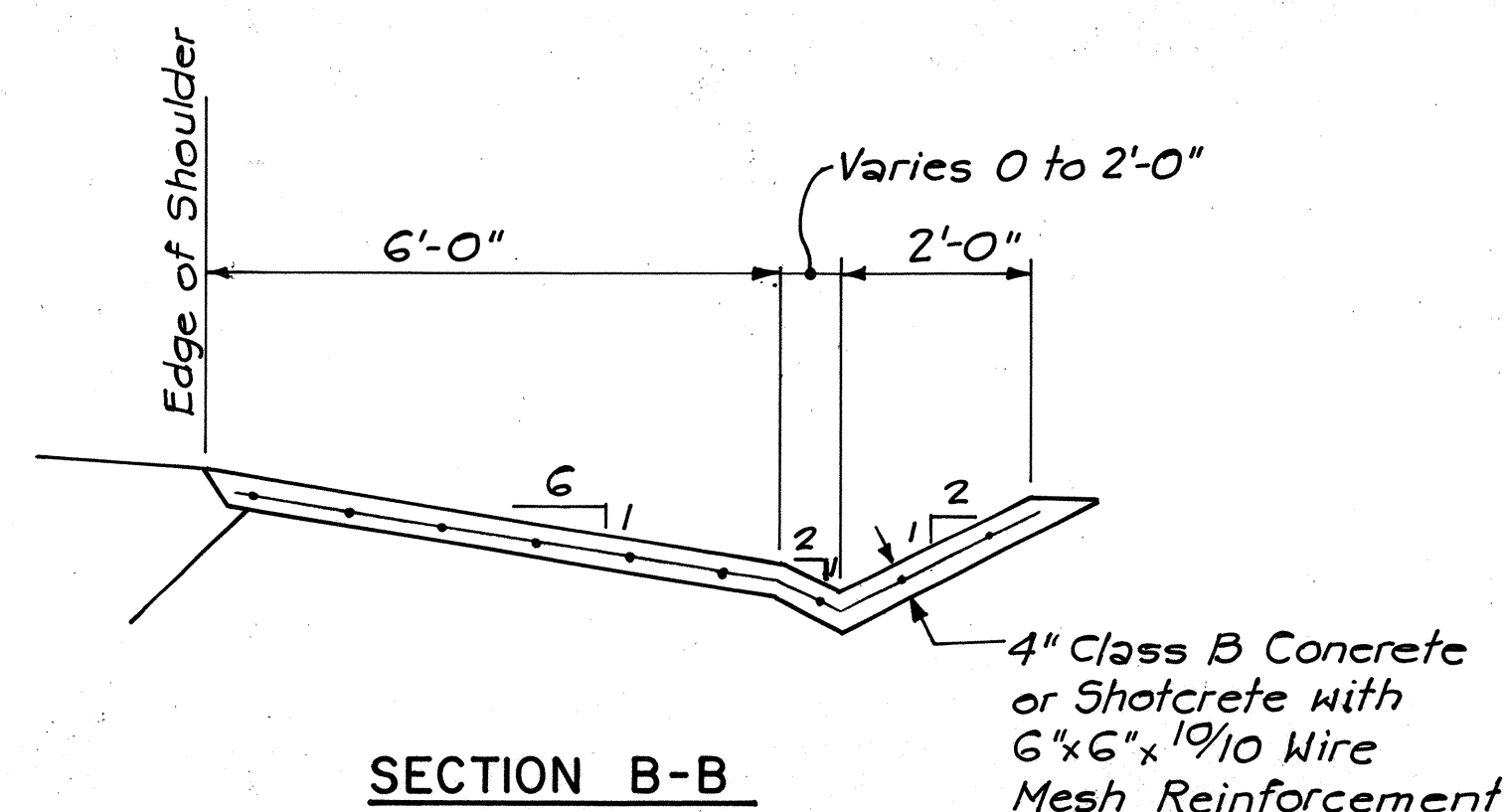
PLAN

TRANSITION DETAIL

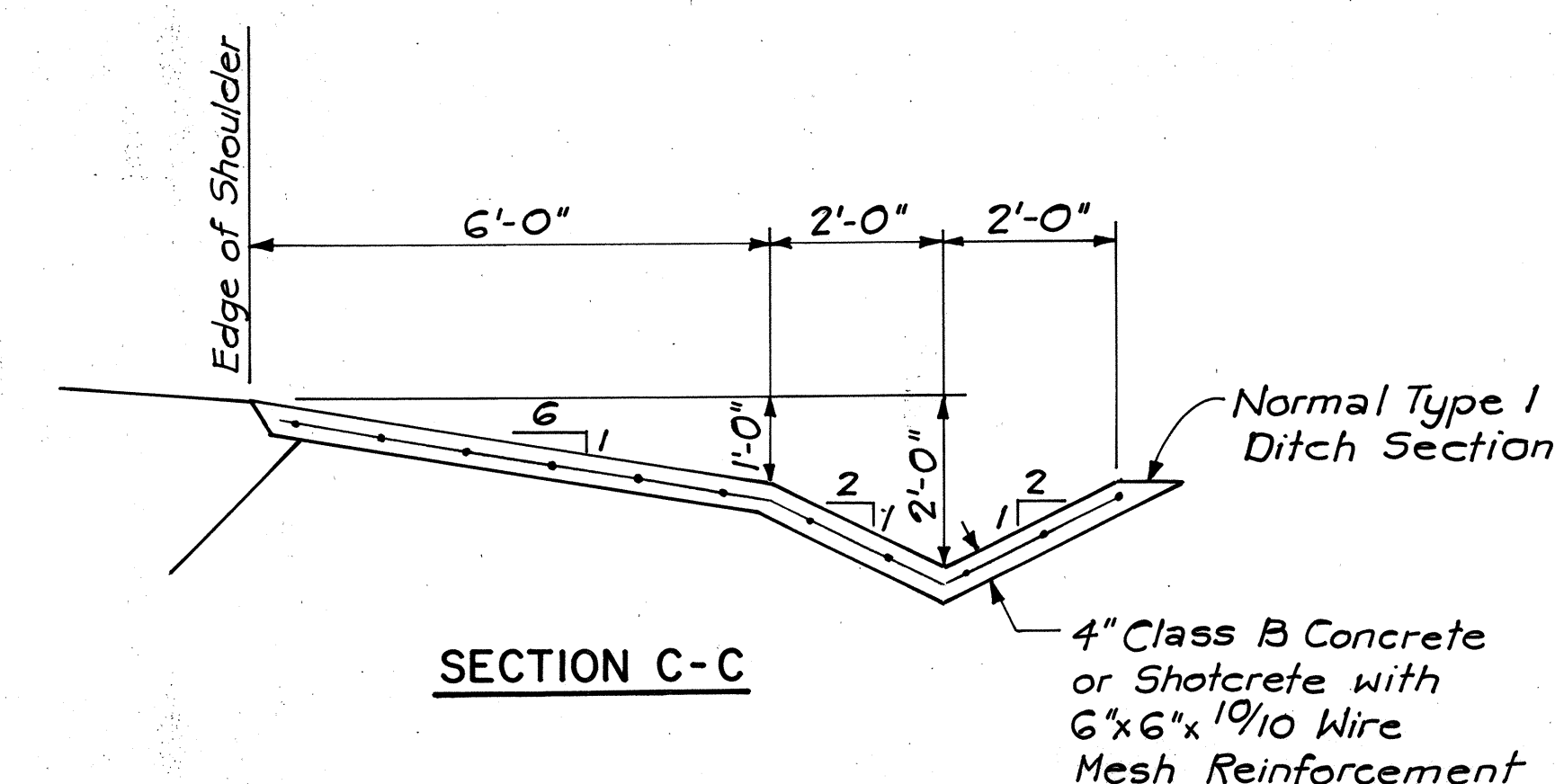
FROM TYPE 61218 GUTTER TO TYPE I PAVED DITCH
Scale: 1/2" = 1'-0"



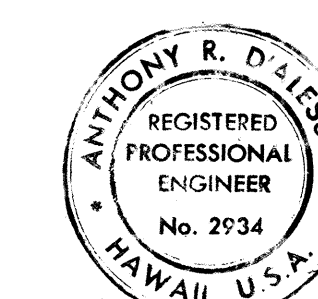
SECTION A-A



SECTION B-B



SECTION C-C



THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

6/6/80 Deleted D.I. #53 Details, per Addendum No. 1.

DATE REVISION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
LAND TRANSPORTATION FACILITIES DIVISION

DRAINAGE DETAILS

FORT WEAVER ROAD
SOUTH OF FARRINGTON HIGHWAY
TO THE VICINITY OF RENTON ROAD
SCALE: AS SHOWN DATE: SEPT 1979

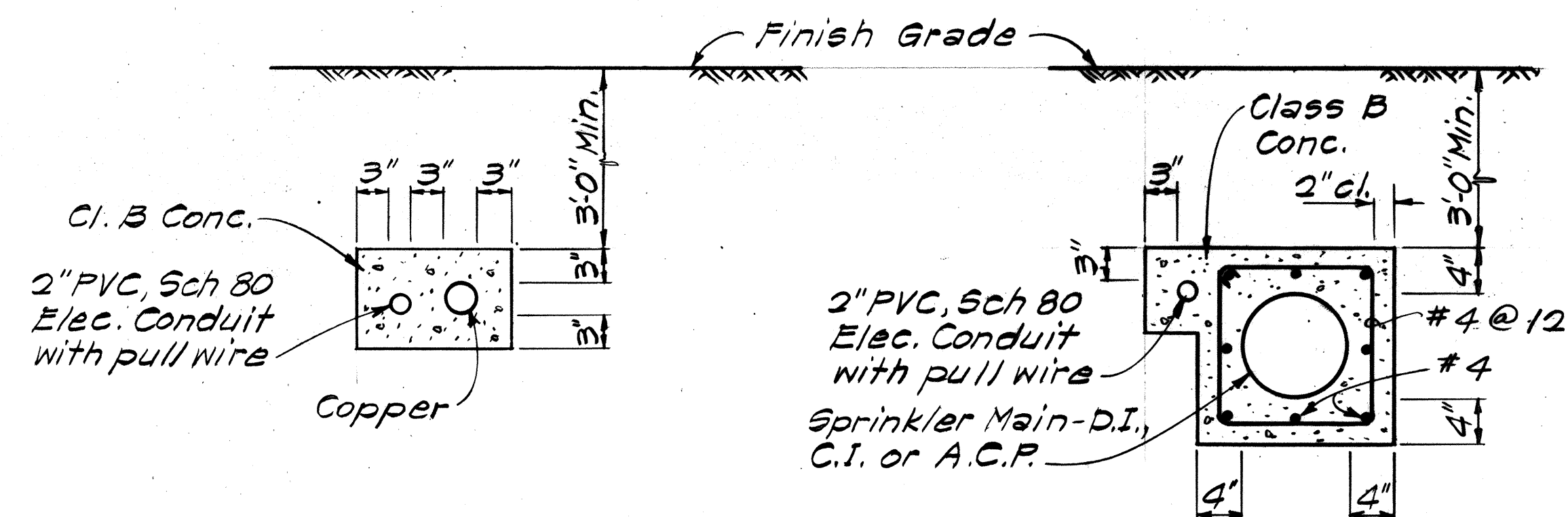
SHEET NO. 3 OF 3 SHEETS

46R

SURVEY PLOTTED BY	DATE
DESIGNED BY	
TRACED BY	
NOTE BOOK	
QUANTITIES BY	
CHECKED BY	
No.	

This diagram illustrates a two-manual trenchless pipe installation system. It shows a cross-section of the ground with a trench. A 2" conduit is being pulled through the trench. The system includes a Type CC1 Pull Box at each end, a Cap or Plug end, and a Conc. Jacket. Dimensions are provided for the trench width (10' and 8'), the conduit diameter (2"), and the pull box dimensions (6' and 4'). A note indicates a minimum depth of 3' for the trench.

Scale: 1" = 10'



4" AND LARGER SIZES

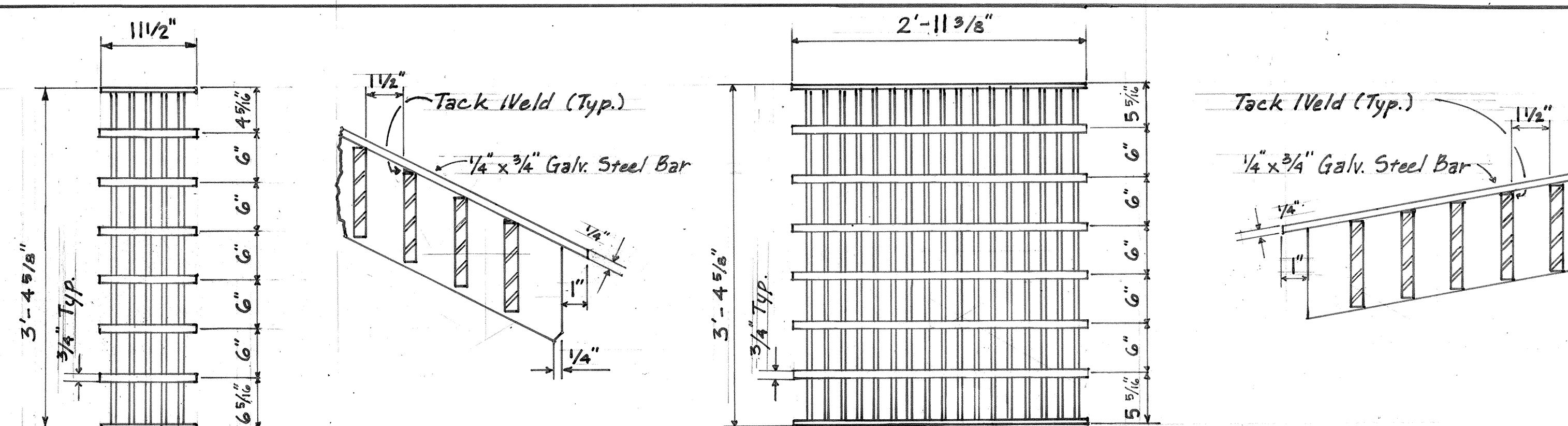
Scale: 1" = 1'-0"

Technical drawing of a manhole frame and grate assembly. The drawing shows a rectangular frame with a central grate. Dimensions are given in inches and feet. The frame is 4'-4" wide and 3'-0" high. The grate is 4'-0" wide and 3'-0" high. The frame has a 1'-0" wide side panel and a 4'-0" wide top panel. The grate has a 1'-0" wide side panel and a 4'-0" wide top panel. The frame is labeled "Manhole Rungs" and "Frame & Grate". The grate is labeled "Manhole Rungs".

[illegible]

Scale : $\frac{3}{4}" = 1'-0"$

ORIGINAL PLAN	SURVEY PLOTTED BY _____	DATE _____
	DRAWN BY _____	" _____
	TRACED BY _____	" _____
NOTE BOOK	DESIGNED BY _____	" _____
	QUANTITIES BY _____	" _____
No. _____	CHECKED BY _____	" _____



SECTION

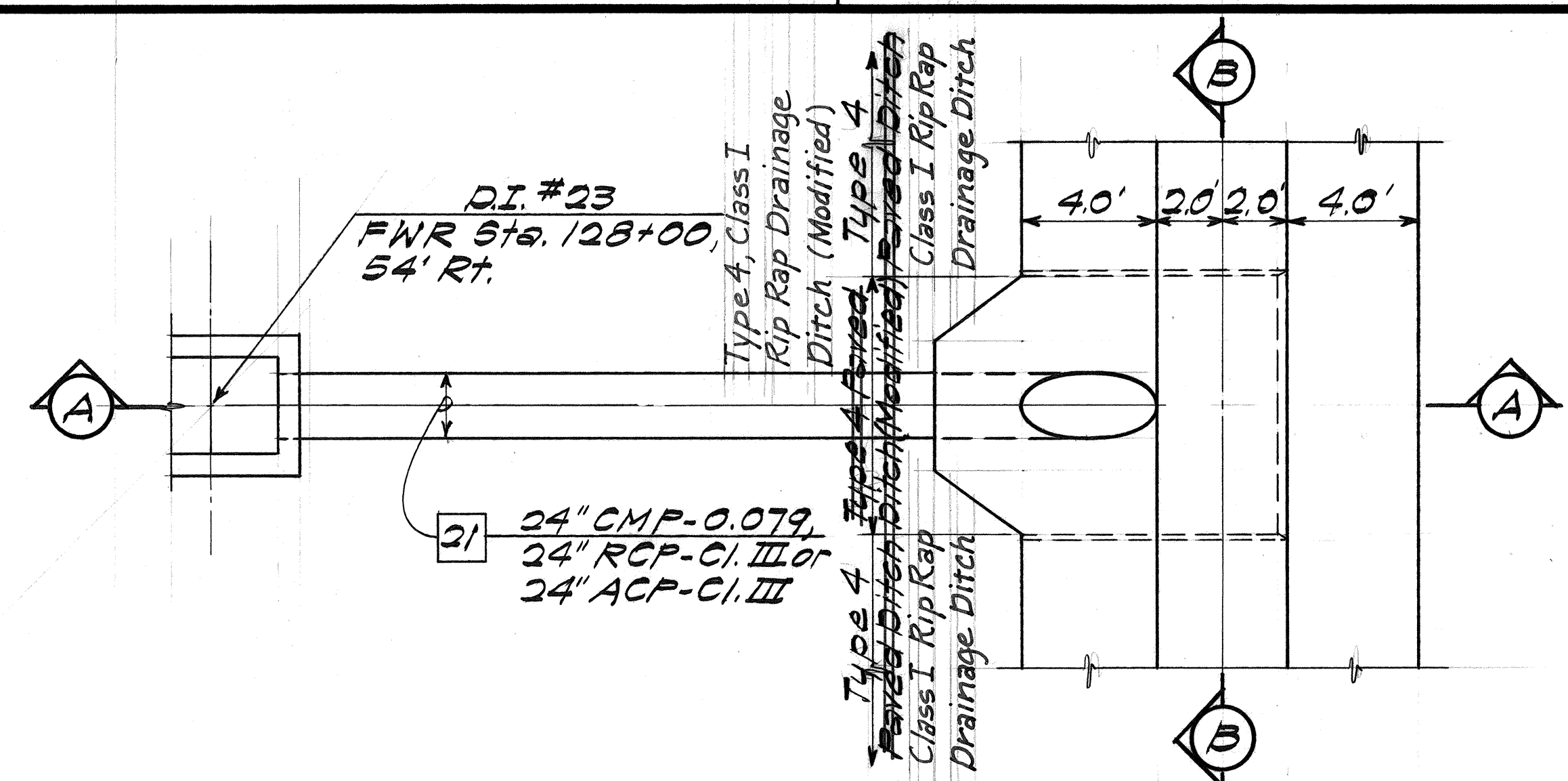
D.I. No. 13 F.I.V.R. STA. III+70.62 LT.

Field Revision No. 43

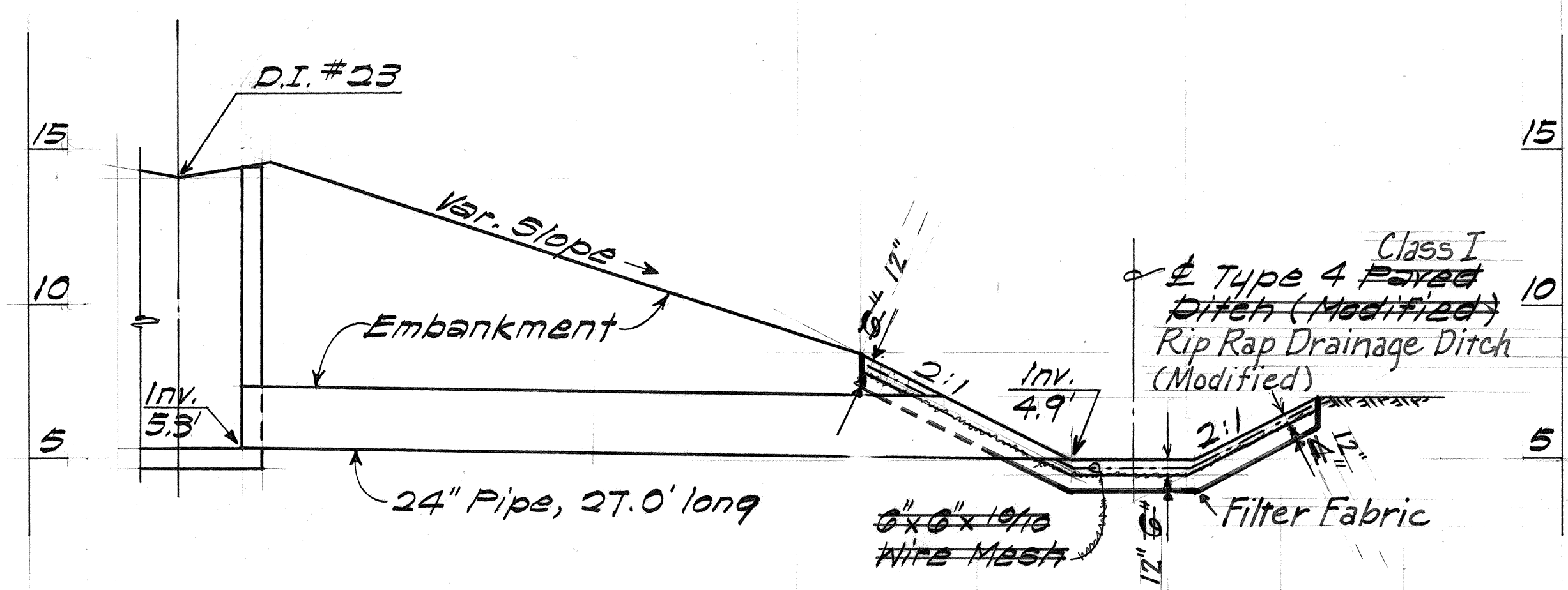
SHEET No. 32 OF 3 SHEETS

ADD.46S-

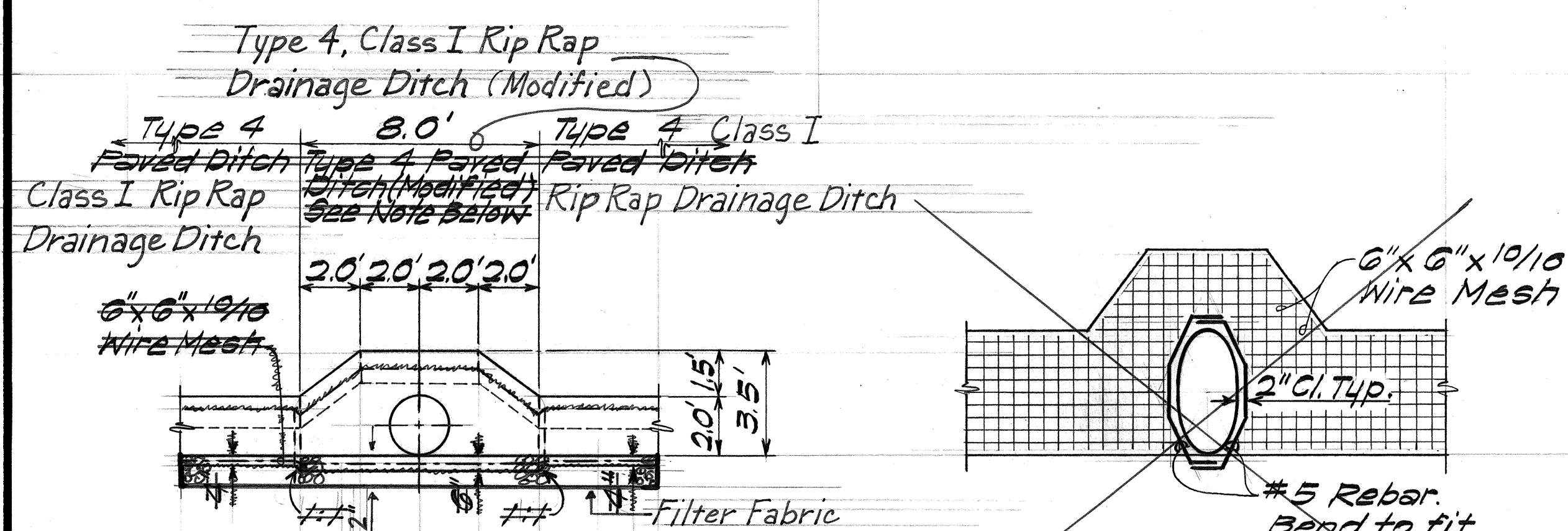
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	M-7600(2)	1981	C04652	244



PLAN



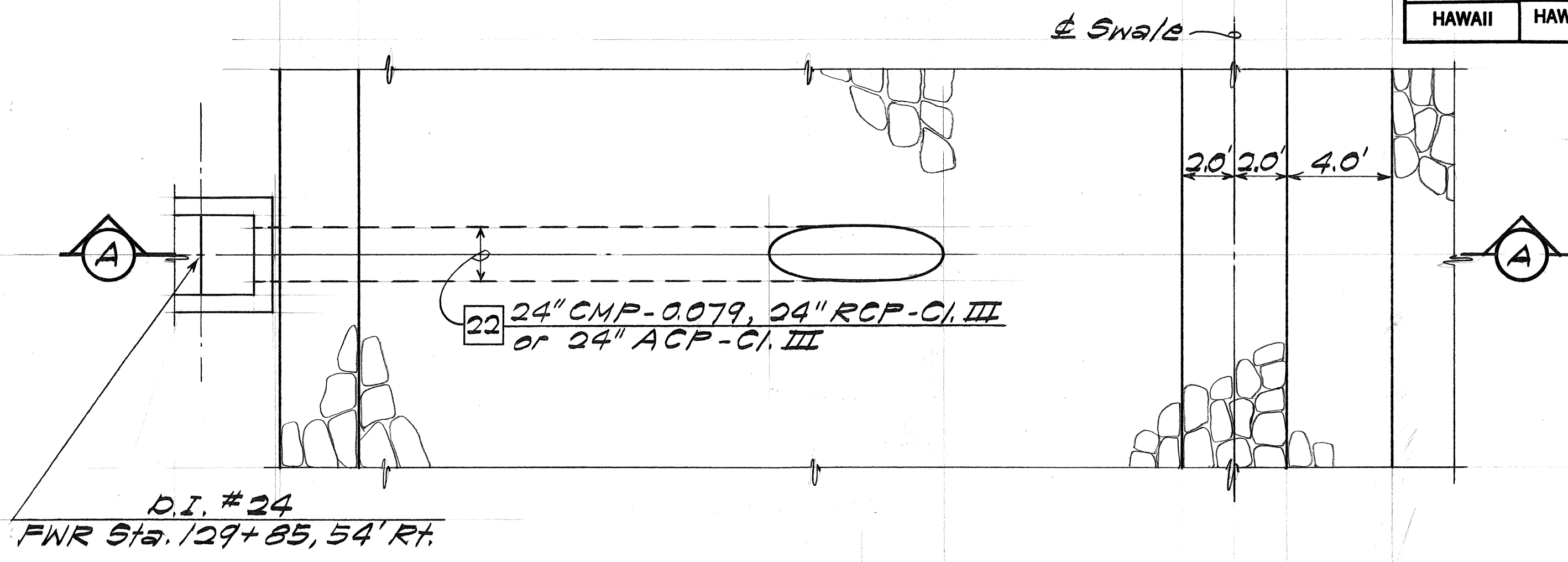
SECTION A-A



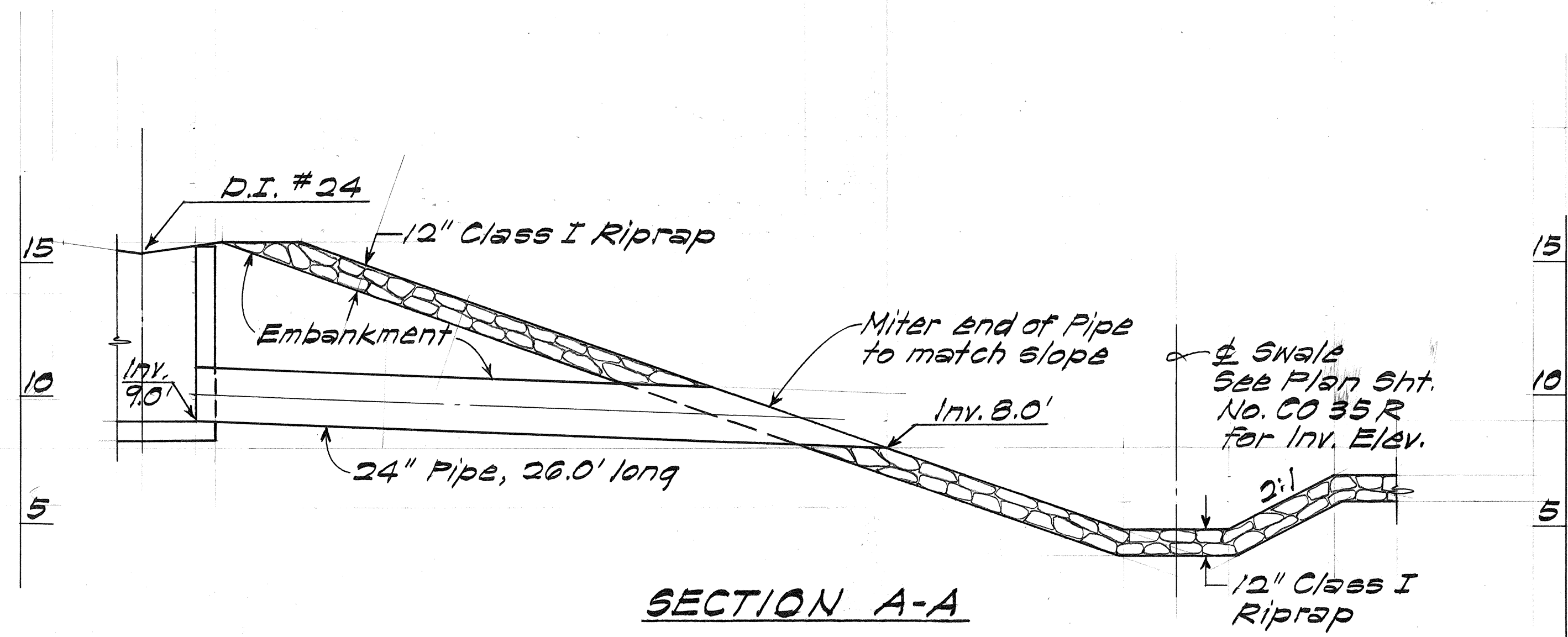
SECTION B-B

DRAINLINE NO. 21
Scale: 1"=4'

REINFORCEMENT
AT PIPE OPENING

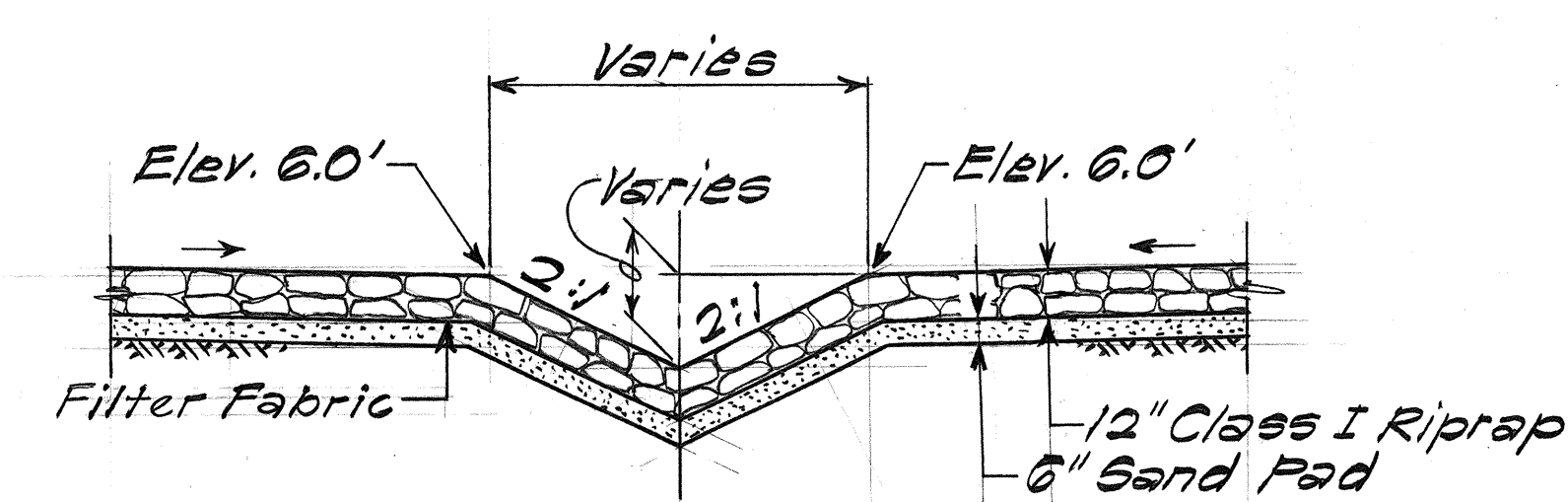


PLAN

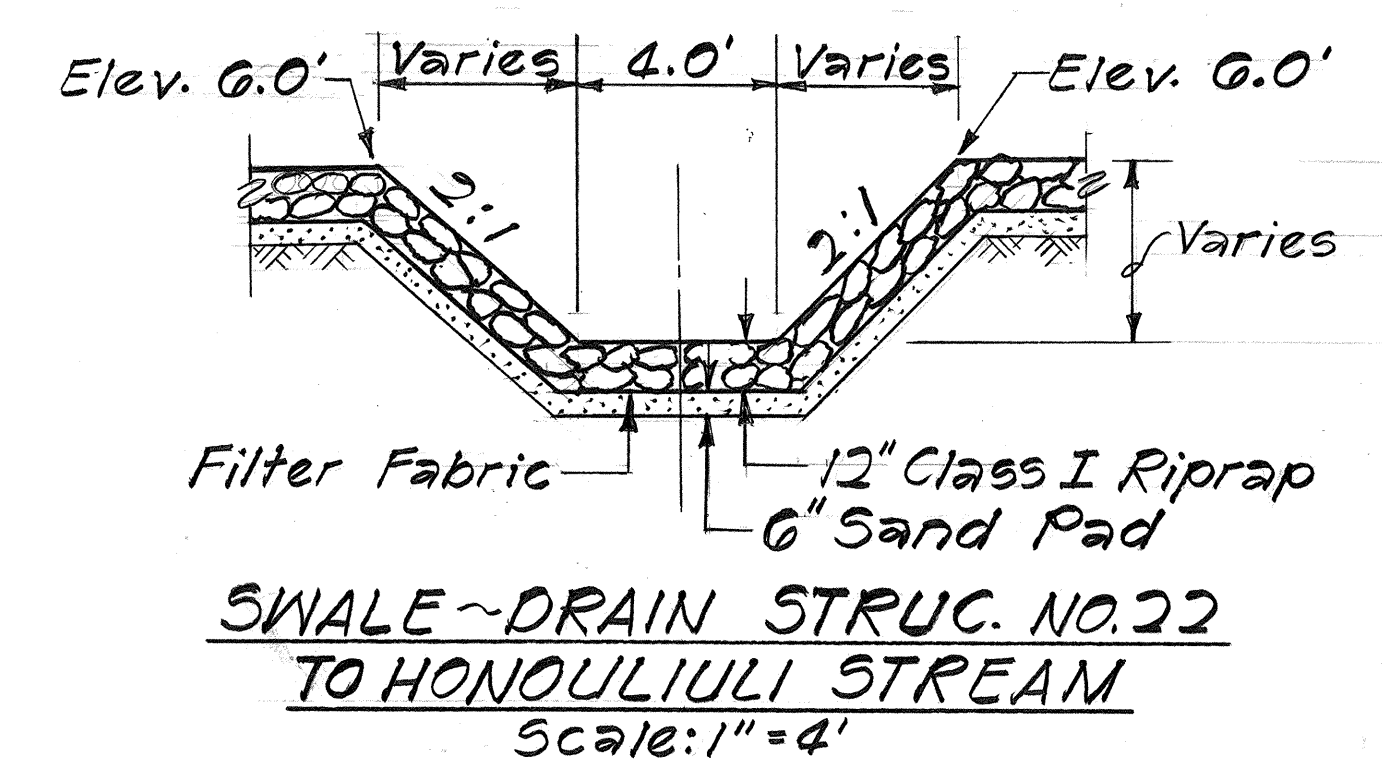


SECTION A-A

DRAINLINE NO. 22
Scale: 1"=4'



HONOLULI STREAM SWALE
Scale: 1"=4'



SWALE-DRAIN STRUC. NO. 22
TO HONOLULI STREAM
Scale: 1"=4'

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
LAND TRANSPORTATION FACILITIES DIVISION

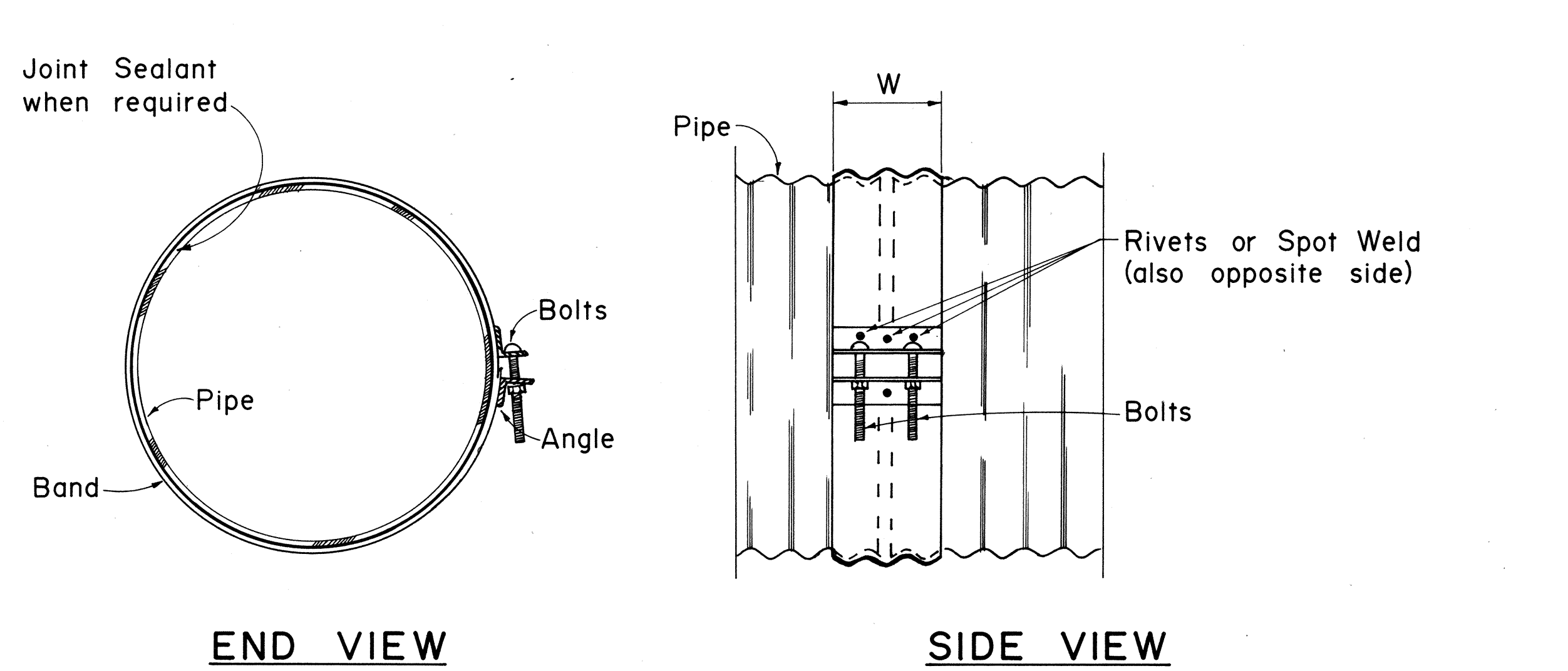
DRAINAGE DETAILS

FORT WEAVER ROAD
SOUTH OF FARRINGTON HIGHWAY
TO THE VICINITY OF RENTON ROAD

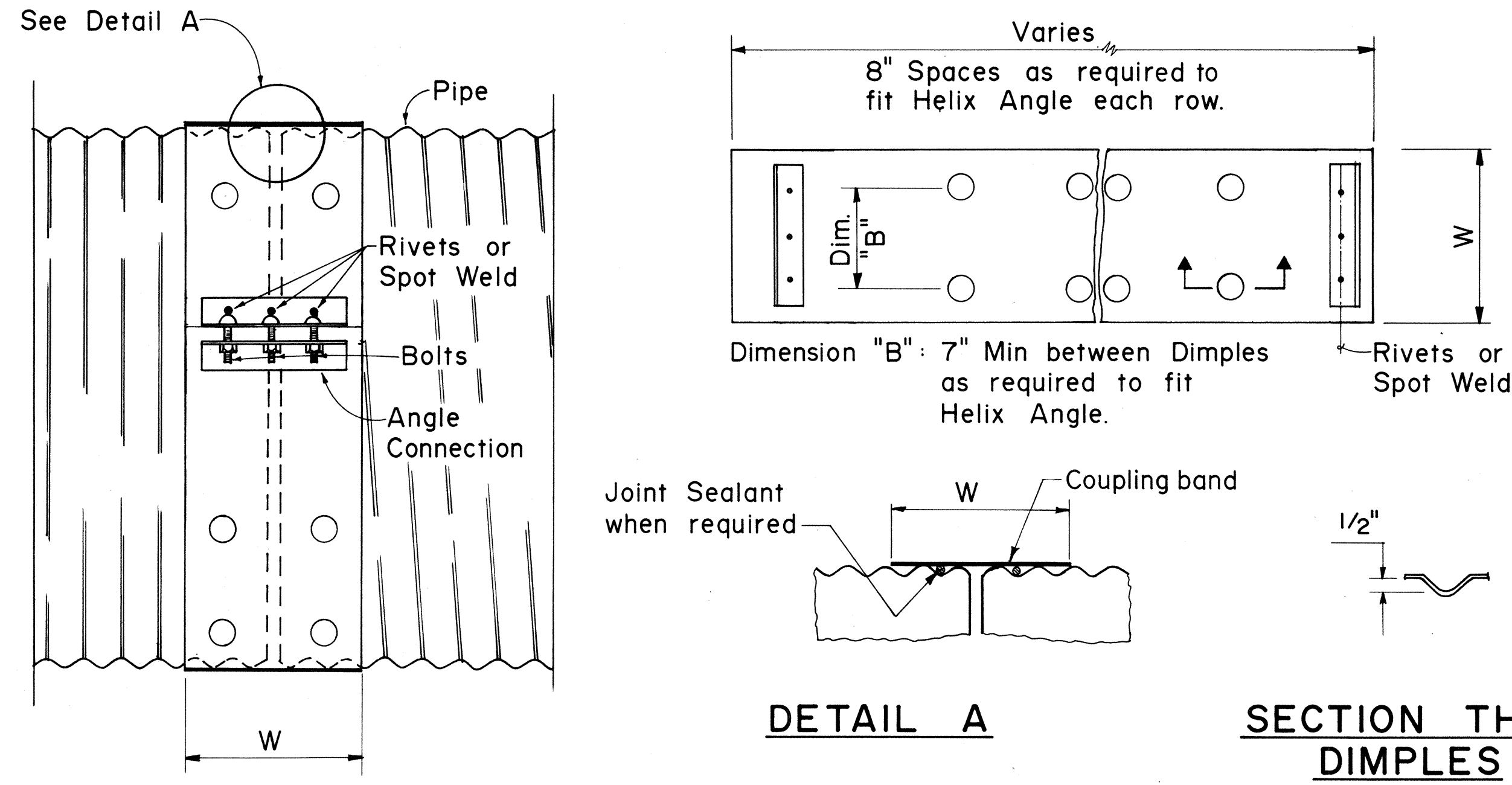
SCALE: AS SHOWN DATE: MAY, 1981
SHEET No. 3b OF 3 SHEETS

ORIGINAL PLAN	DATE
DRAWN BY	
DESIGNED BY	
QUANTITIES BY	
CHECKED BY	
NO.	

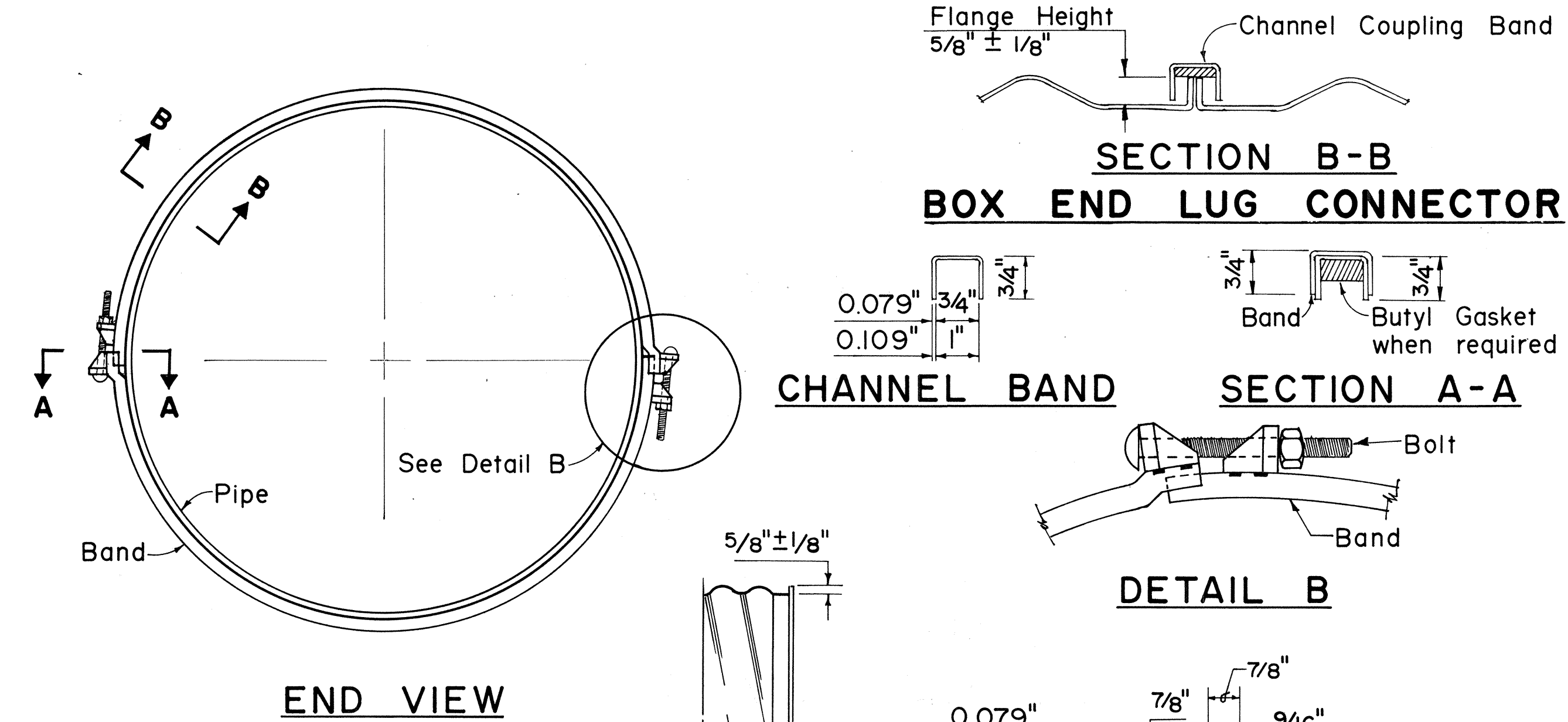
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	M-7600(2)	1980	47	244



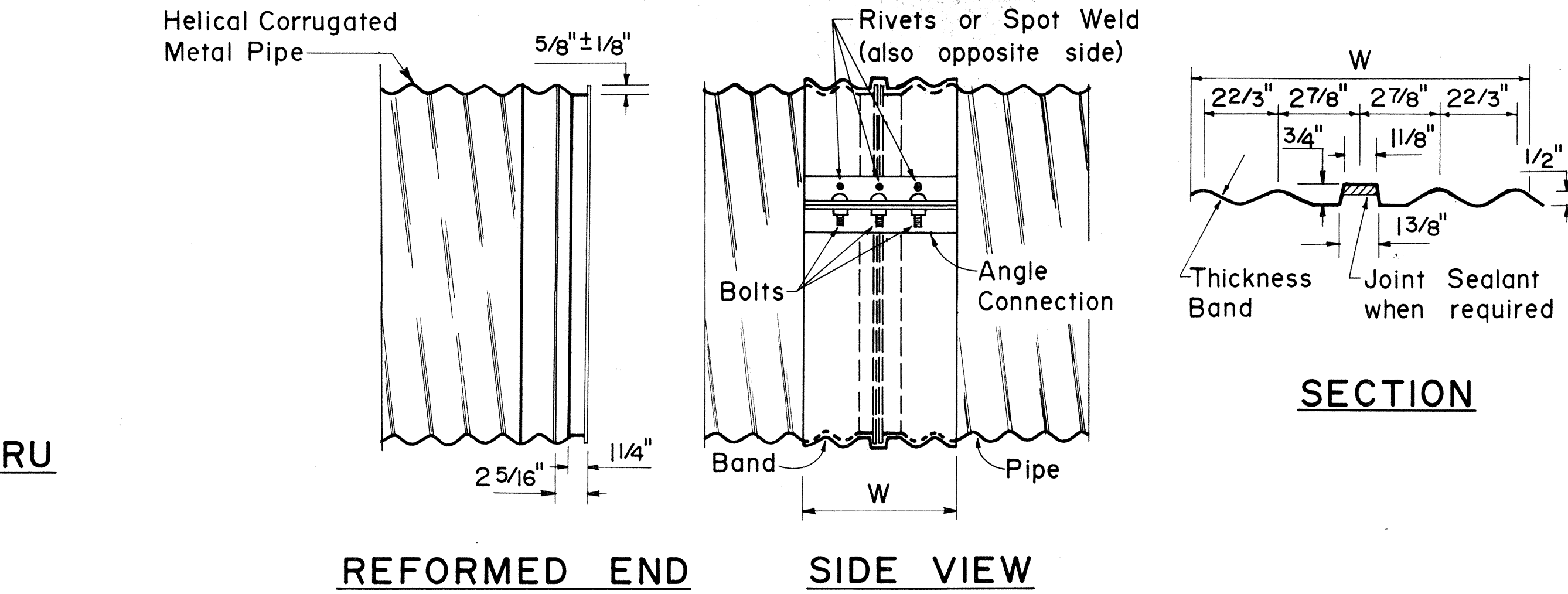
ANNULAR COUPLING BAND



UNIVERSAL COUPLING BAND ANGLE CONNECTION



CHANNEL COUPLING BAND FOR USE ON REFORMED END C.M.P.



WING CHANNEL COUPLING BAND FOR REFORMED END H.C.M.P.

GENERAL NOTES

1. All coupling band connection hardware shall be galvanized or electro plated in accordance with Standard Specifications.
2. For pipe arches use same width band as for round pipe of same periphery.
3. Two pieces band required for pipe greater than 48" diameter.
4. Fillet welds of equivalent strengths may be substituted for spot welds or rivets.
5. Dimensions and thickness shown are in inches and are nominal.
6. Band thickness shall be not more than 2 standard thicknesses lighter than the thickness of the pipe, and, in no case shall be lighter than 0.079 inch.

COUPLING TYPE	CORRUGATION	PIPE SIZE	W	PIPE WALL THICKNESS	ANGLE CONNECTIONS-QUANTITIES PER CONNECTION	DIMENSIONS	BOLTS	RIVETS	SPOT WELD
UNIVERSAL	22/3 x 1/2	12 - 36	10 1/2	0.079-0.138	2ea 2x2x3/16x7	2 ea 1/2 x 6	3ea 3/8	3ea 1/2	
		42- 60	16 1/2	0.168	2ea 2x2x3/16x12	3 ea 1/2 x 6	4ea 3/8	5ea 1/2	
		66-84	16 1/2	0.168	2ea 2x2x3/16x12	3 ea 1/2 x 6	4ea 3/8		
	3 x 1	36- 72	10 1/2	0.079-0.138	2ea 2x2x3/16x7	2 ea 1/2 x 6	3ea 3/8		
		78-120	16 1/2	0.079-0.138	2ea 2x2x3/16x12	3 ea 1/2 x 6	4ea 3/8		
ANNULAR	22/3 x 1/2	12 - 36	7	0.079-0.138	2ea 2x2x3/16x7	2 ea 1/2 x 6	3ea 3/8	3ea 1/2	
		42- 72	12	0.079-0.168	2ea 2x2x3/16x12	3 ea 1/2 x 6	4ea 3/8	5ea 1/2	
		78- 84	12	0.168	2ea 2x2x3/16x12	3 ea 1/2 x 6	4ea 3/8	5ea 1/2	
	3 x 1	36- 42	14	0.079-0.109	2ea 2x2x3/16x12	3 ea 1/2 x 6	4ea 3/8		
		48-84	14	0.079-0.109	2ea 2x2x3/16x12	3 ea 1/2 x 6	4ea 3/8	5ea 1/2	
		90-120	14	0.079-0.109	2ea 2x2x3/16x12	3 ea 1/2 x 6	4ea 3/8		

COUPLING TYPE	CORRUGATION	PIPE SIZE	W	PIPE WALL THICKNESS	LUG TYPE CONNECTORS-QUANTITIES PER CONNECTION	DIMENSIONS	BOLTS	SPOT WELD
CHANNEL	22/3 x 1/2	12 - 72		0.079-0.138	2 ea Lugs	1 ea 1/2 x 6	4 ea 1/2	
	3 x 1	36- 72		0.079-0.138	2 ea Lugs	1 ea 1/2 x 6	4 ea 1/2	
WING	22/3 x 1/2	12 - 72	12	0.079-0.138	6 ea Lugs	3 ea 1/2 x 6	12 ea 1/2	
	3 x 1	78-84	12	0.168	6 ea Lugs	3 ea 1/2 x 6	12 ea 1/2	
		36-120	12	0.079-0.109	6 ea Lugs	3 ea 1/2 x 6	12 ea 1/2	

APPROVAL RECOMMENDED:
P. Takano 9-7-79
 HYDRAULIC DESIGN ENGINEER DATE
 APPROVED:
Hubert Z. Zaleski 9-14-79
 ASSISTANT CHIEF, ENGINEERING DATE

NO.	REVISION	APPROVED BY	DATE

STATE OF HAWAII
 DEPARTMENT OF TRANSPORTATION
 HIGHWAYS DIVISION

STANDARD DETAILS
 C.M.P. COUPLING DETAILS
 STANDARD JOINT

Not To Scale Date: Sept. 1979

SHEET NO. 1 OF 10 SHEETS DH18

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	M-7600(2)	1980	48	244

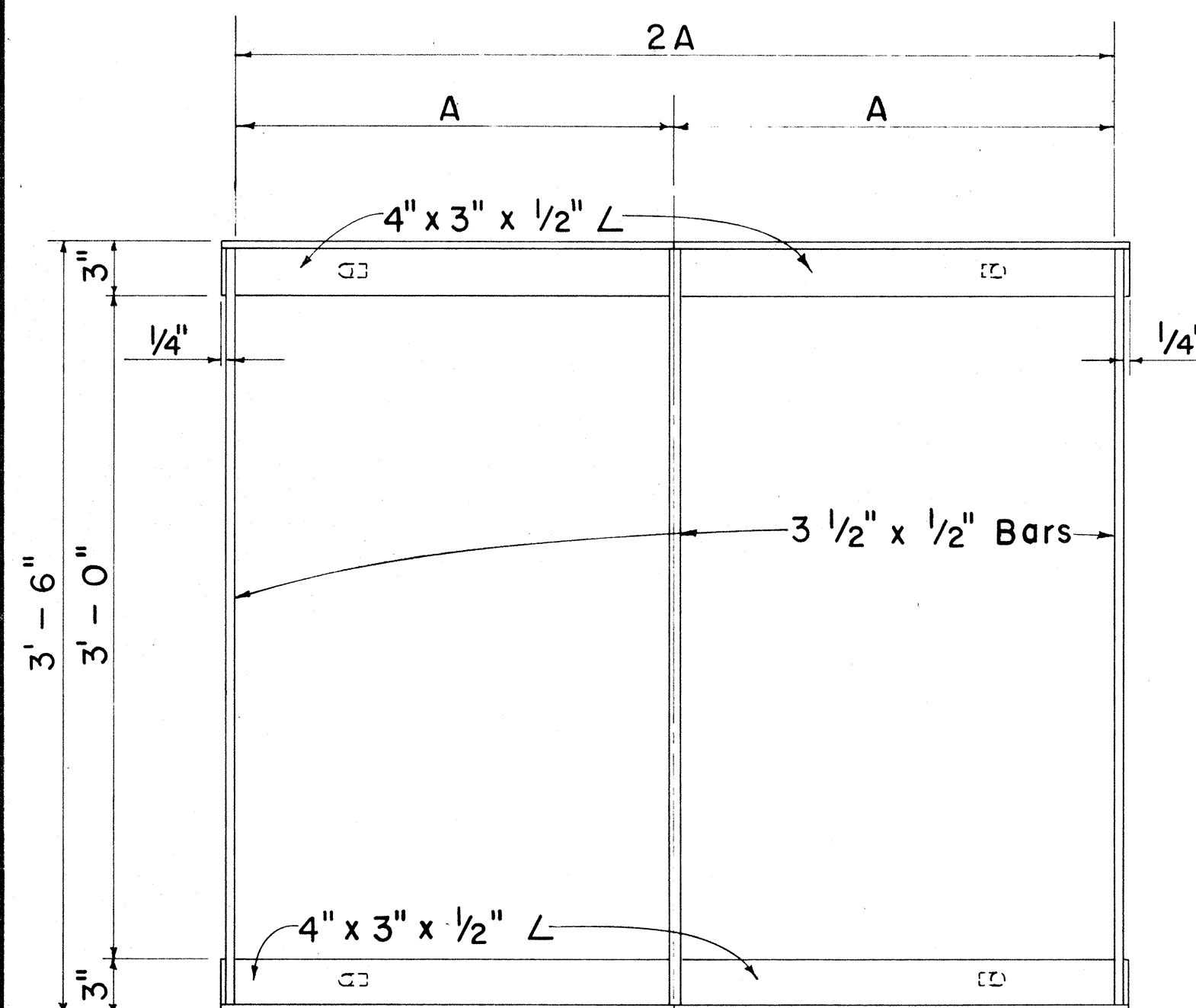
GENERAL NOTES

- Grates and Frames shall be hot dip galvanized after fabrication, see specifications.
- All welds $\frac{3}{8}$ " unless otherwise noted.
- Refer to "Spacing Table" for Types 61614 & 61616 Drop Intake and Frame & Grates dimensions.
- The Frame & Grate materials shall conform to the specifications of ASTM Designation Structural Steel A283, Grade D and the Standard Specifications.
- Culvert shall leave Drop Intake from any position and any direction indicated by plans or ordered by the Engineer. Culverts may both enter and leave Drop Intake so that Drop Intake will act as manhole.
- Manhole Rungs (12" o.c.) are required when "H" is greater than 4 feet 6 inches. Only one rung (16 inches from the bottom) is required if "H" is 4 feet 6 inches or less. Manhole Rungs may be placed at any location as ordered by the Engineer.

SPACING TABLE

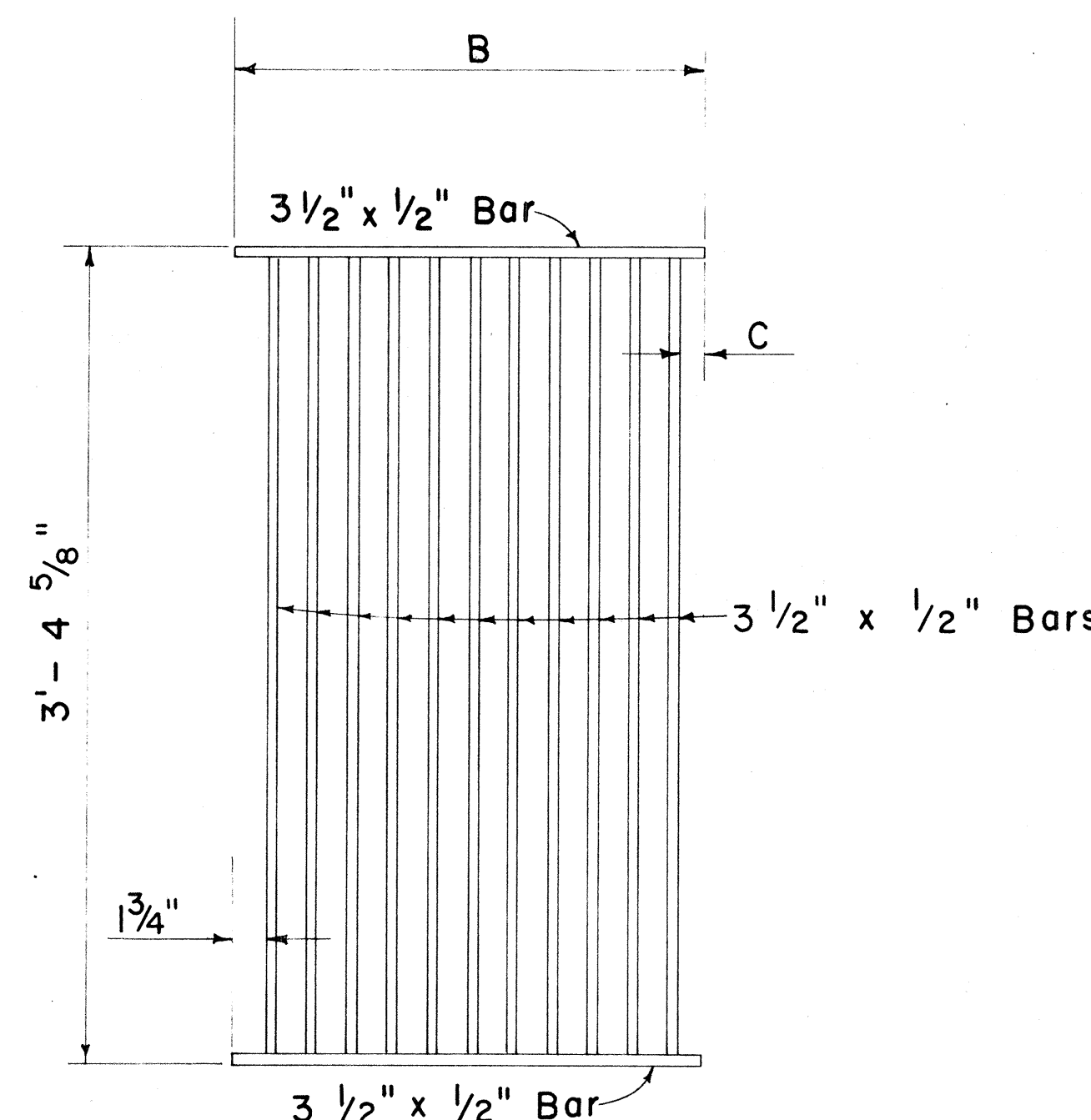
TYPE	NO. BARS	A	B	C	D
61614	11	2'-0"	1'-11 $\frac{1}{2}$ "	1 $\frac{1}{4}$ "	1'-6"
61616	17	3'-0"	2'-11 $\frac{3}{8}$ "	1 $\frac{1}{8}$ "	2'-0"

NO.	REVISION	APPROVED BY	DATE



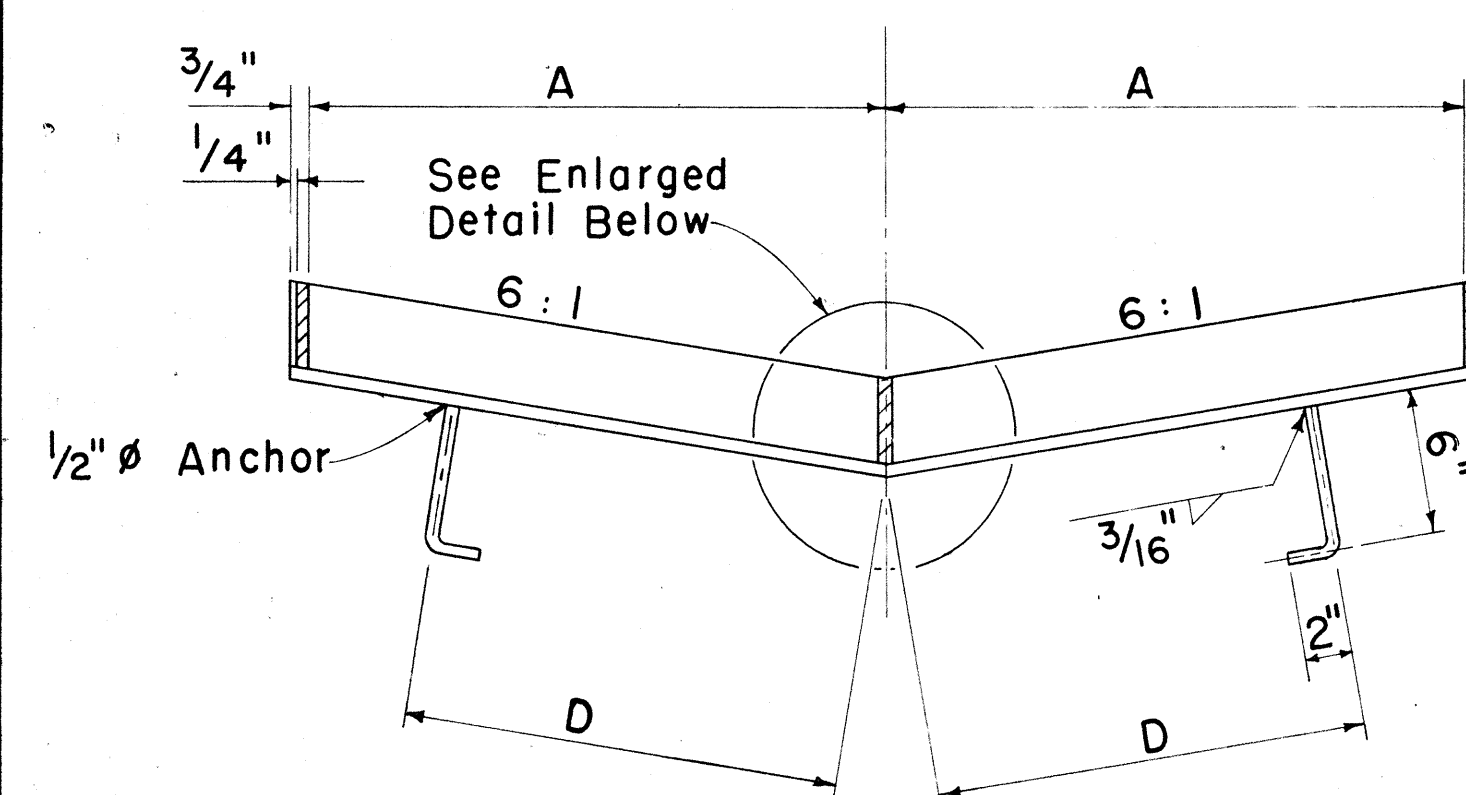
PLAN

Scale: 1 1/2" = 1'-0"



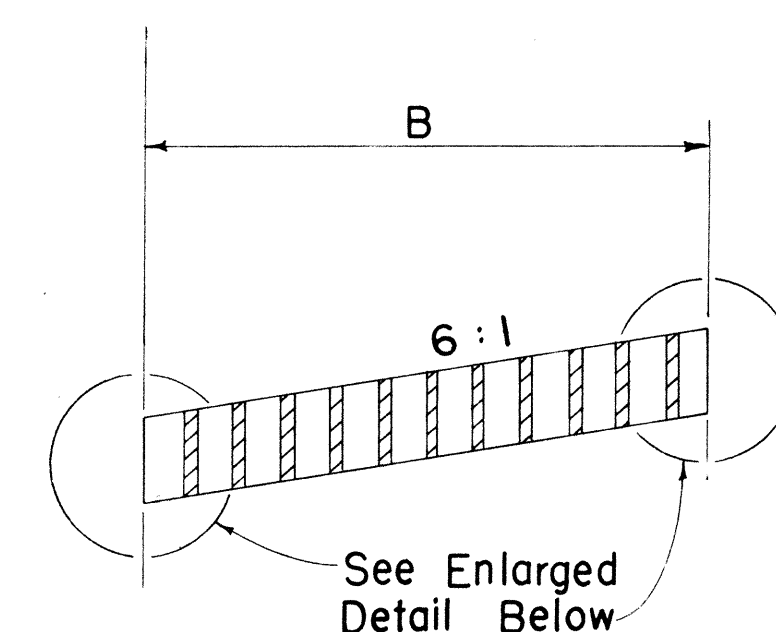
PLAN

Scale: 1 1/2" = 1'-0"



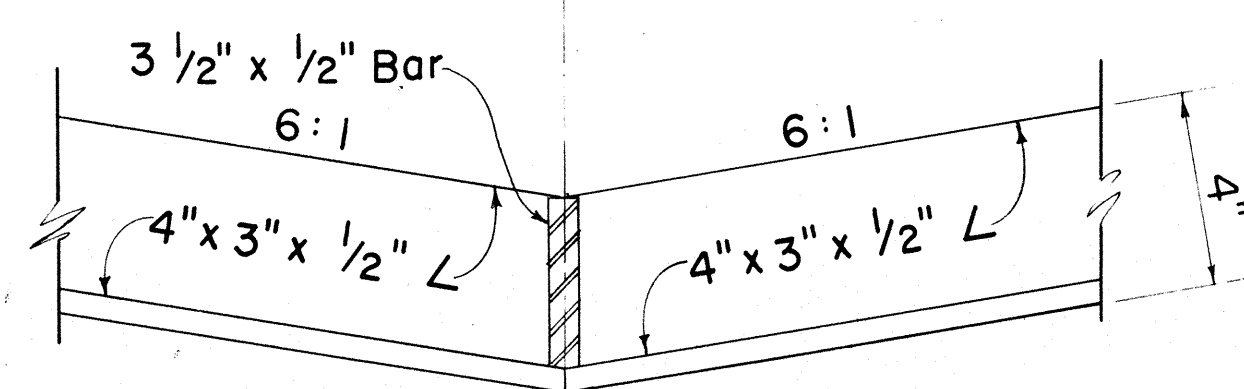
SECTION

Scale: 1 1/2" = 1'-0"



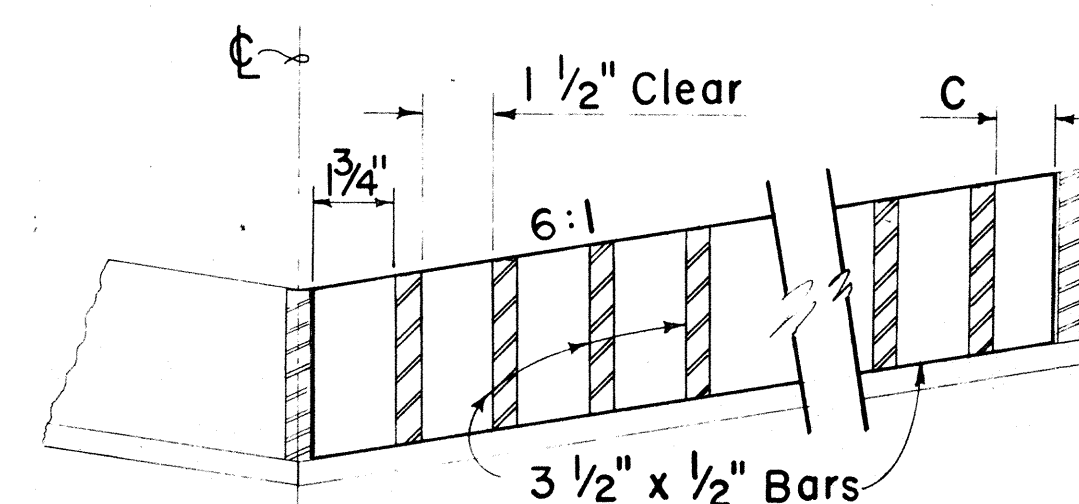
SECTION

Scale: 1 1/2" = 1'-0"



FRAME

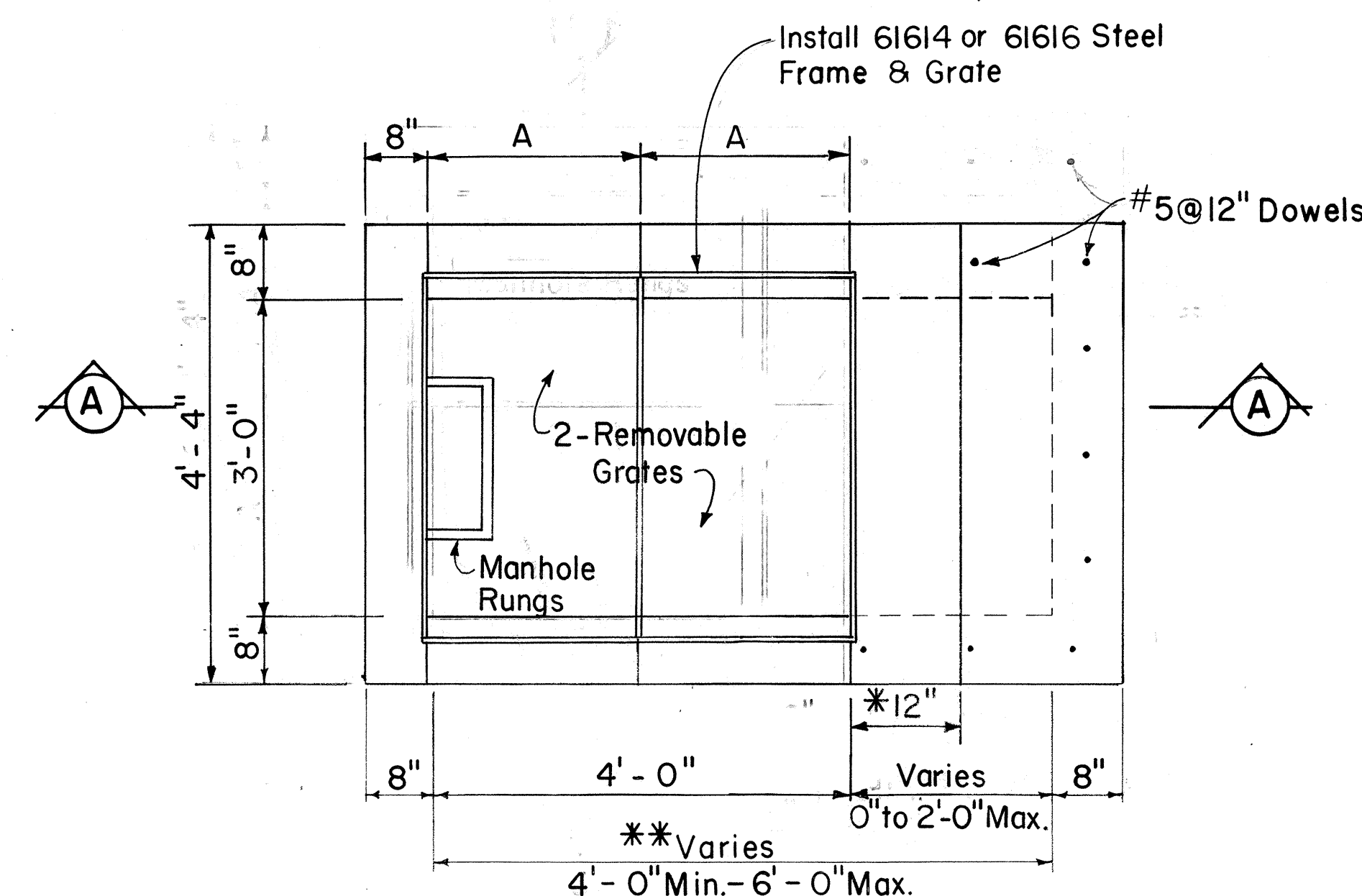
Scale: 3" = 1'-0"



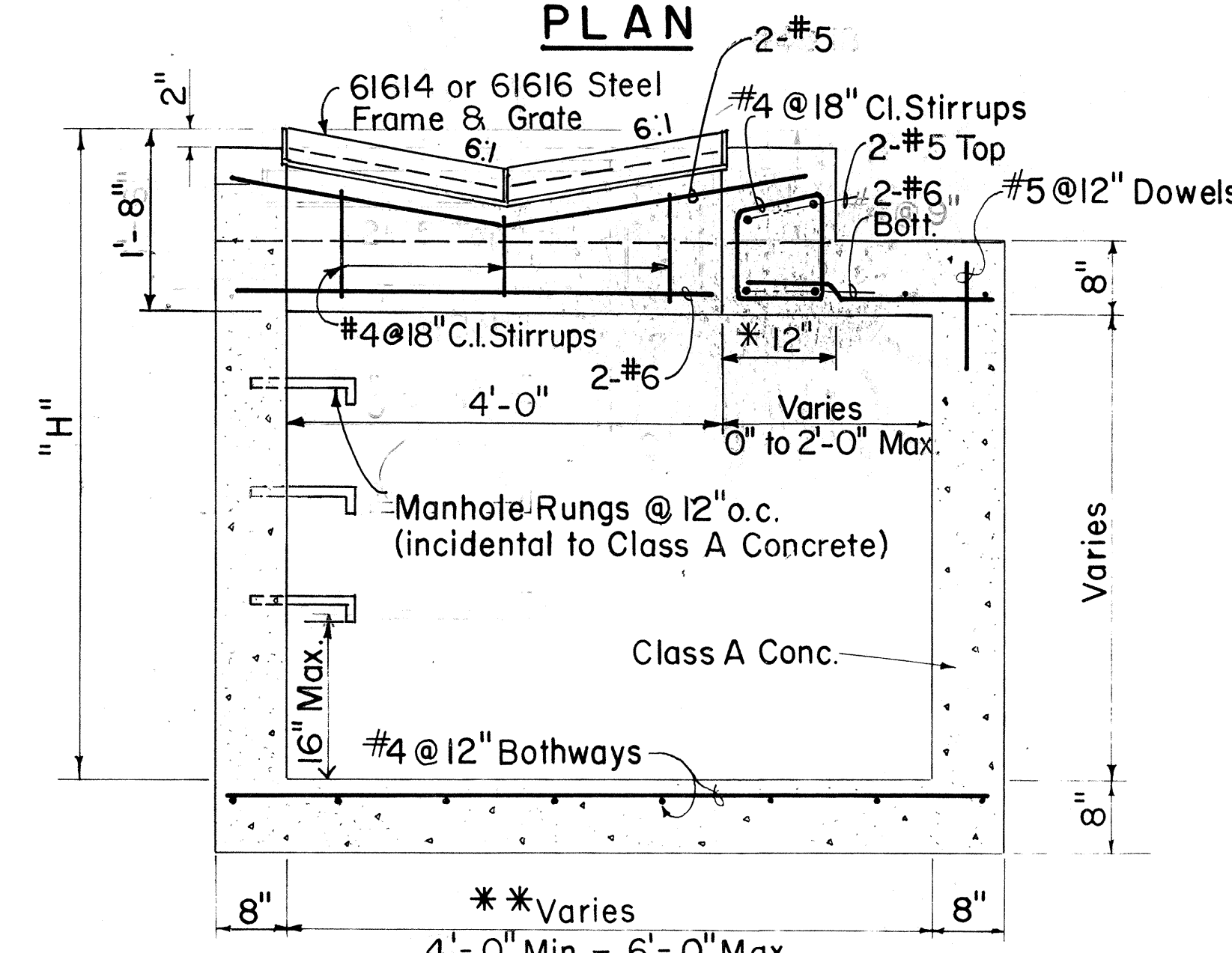
GRATE

Scale: 3" = 1'-0"

DETAILS OF TYPE 61614 OR 61616 STEEL FRAME AND GRATE



PLAN

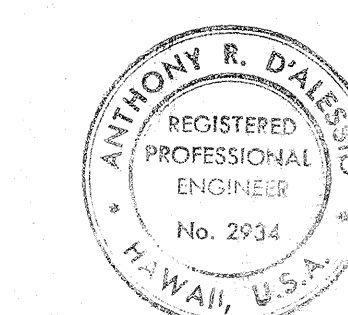


SECTION A-A

DETAILS OF 61614 OR 61616 DROP INTAKE

Scale: 3/4" = 1'-0"

- * For Minimum size box of 3'-0", use 8" and eliminate reinforcing steel shown in the top portion.
- ** For Culverts larger than 30", the minimum dimension shall be D+1'.



THIS WORK WAS PREPARED BY
ME UNDER MY SUPERVISION
[Signature]

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

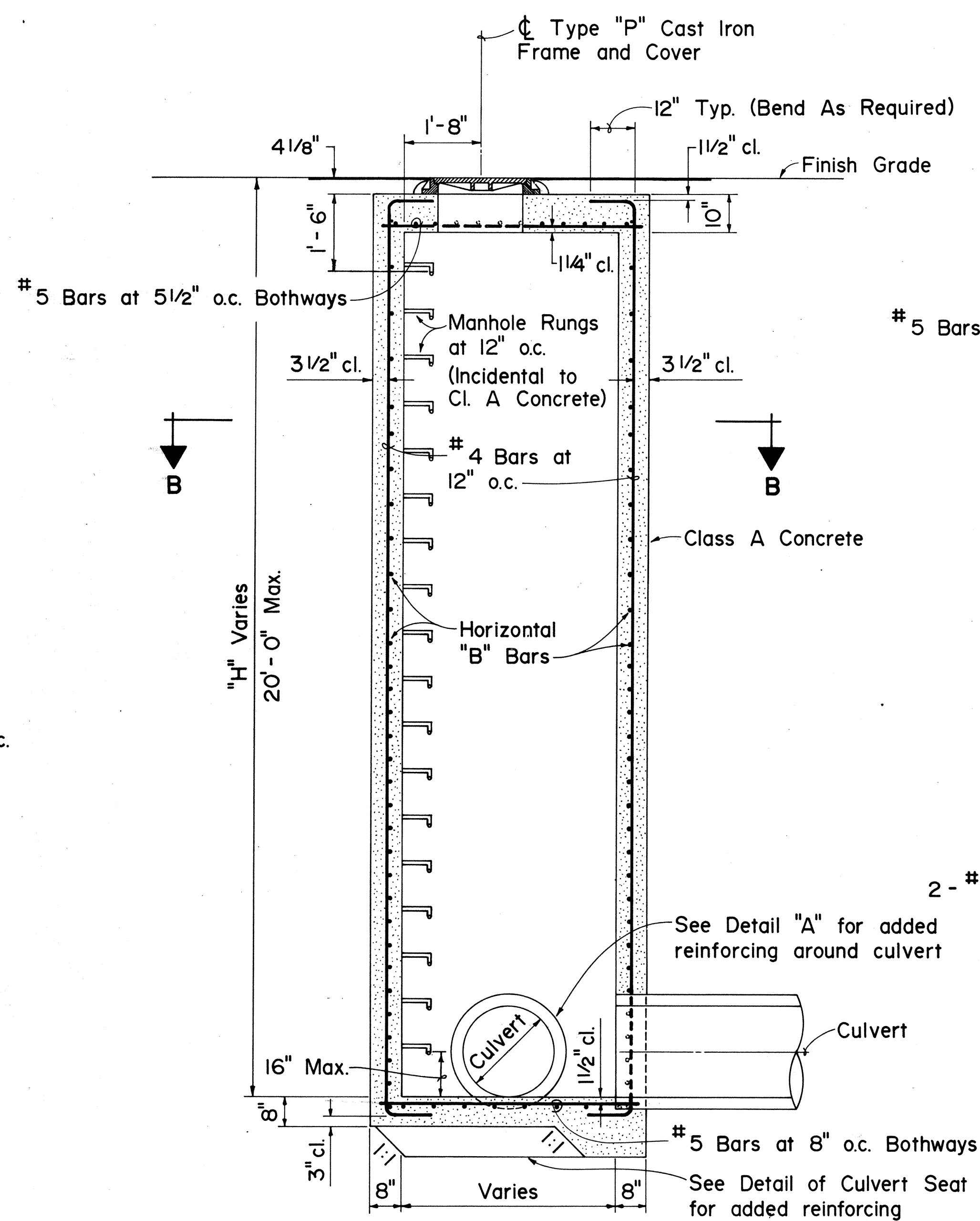
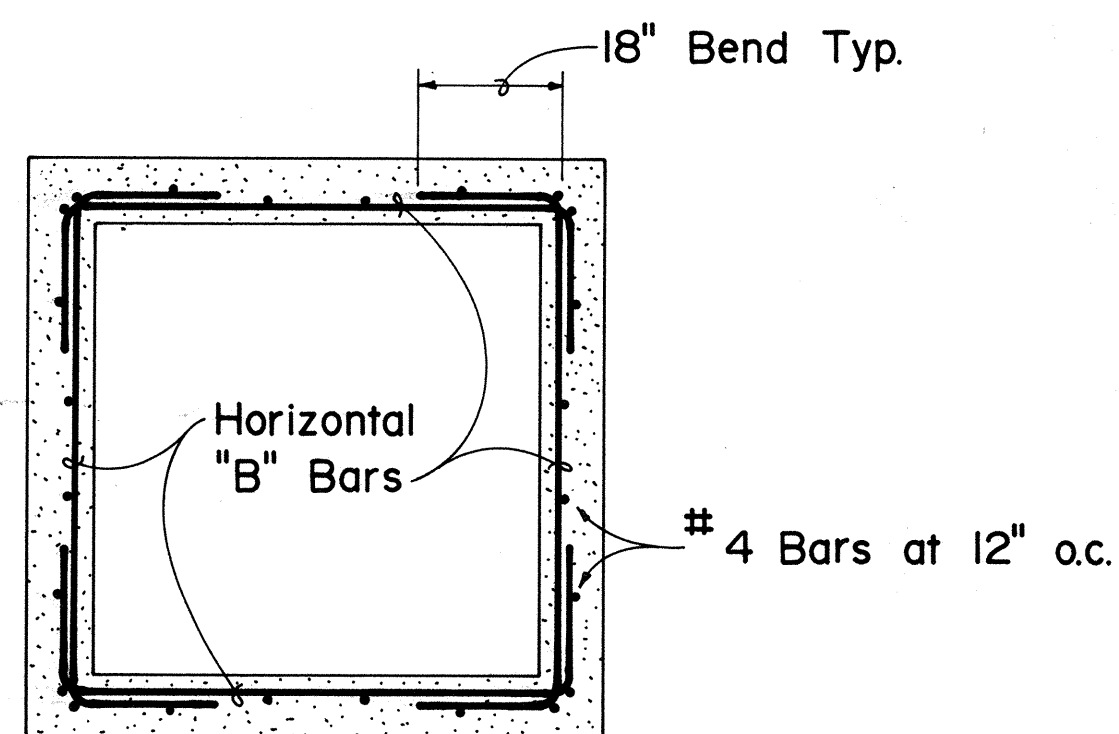
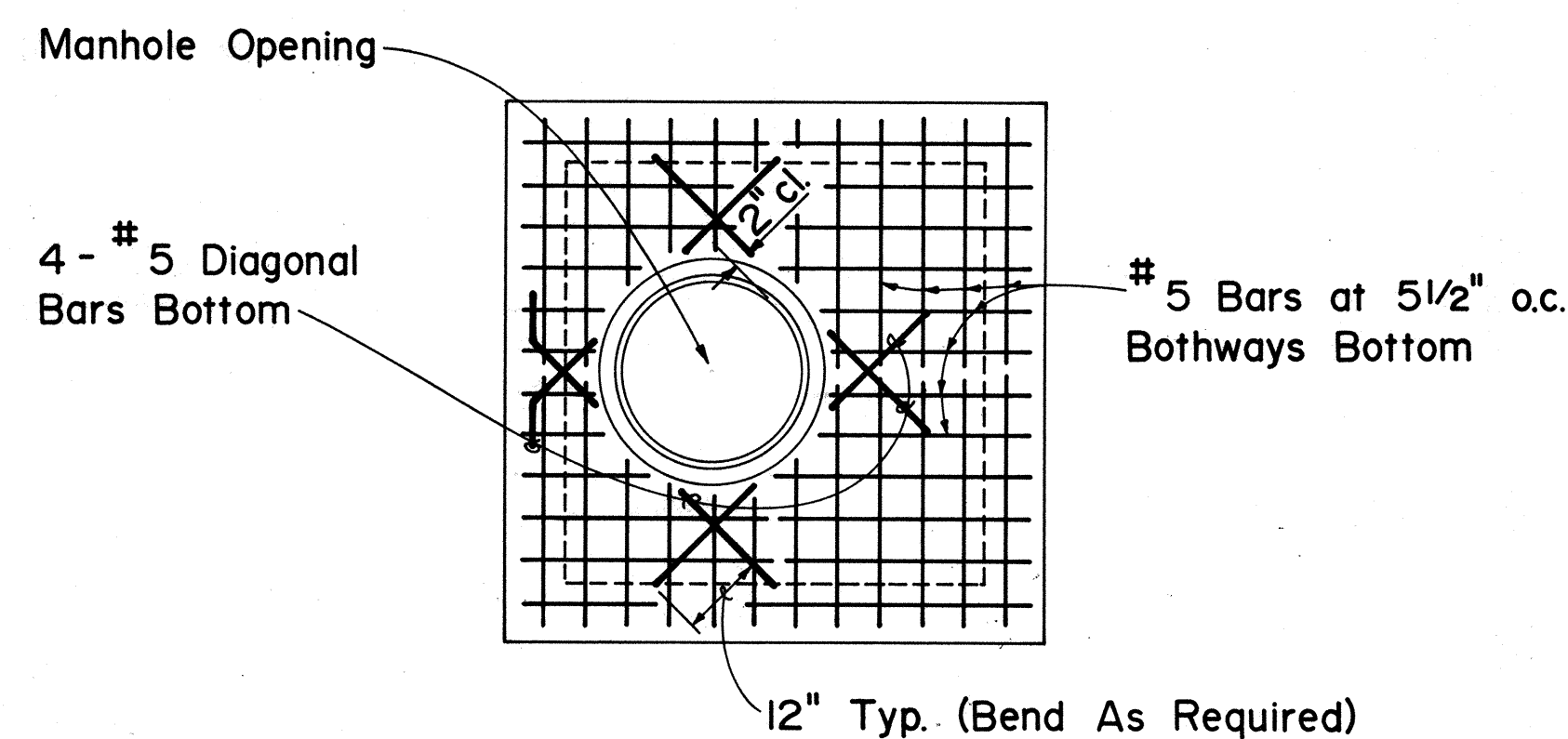
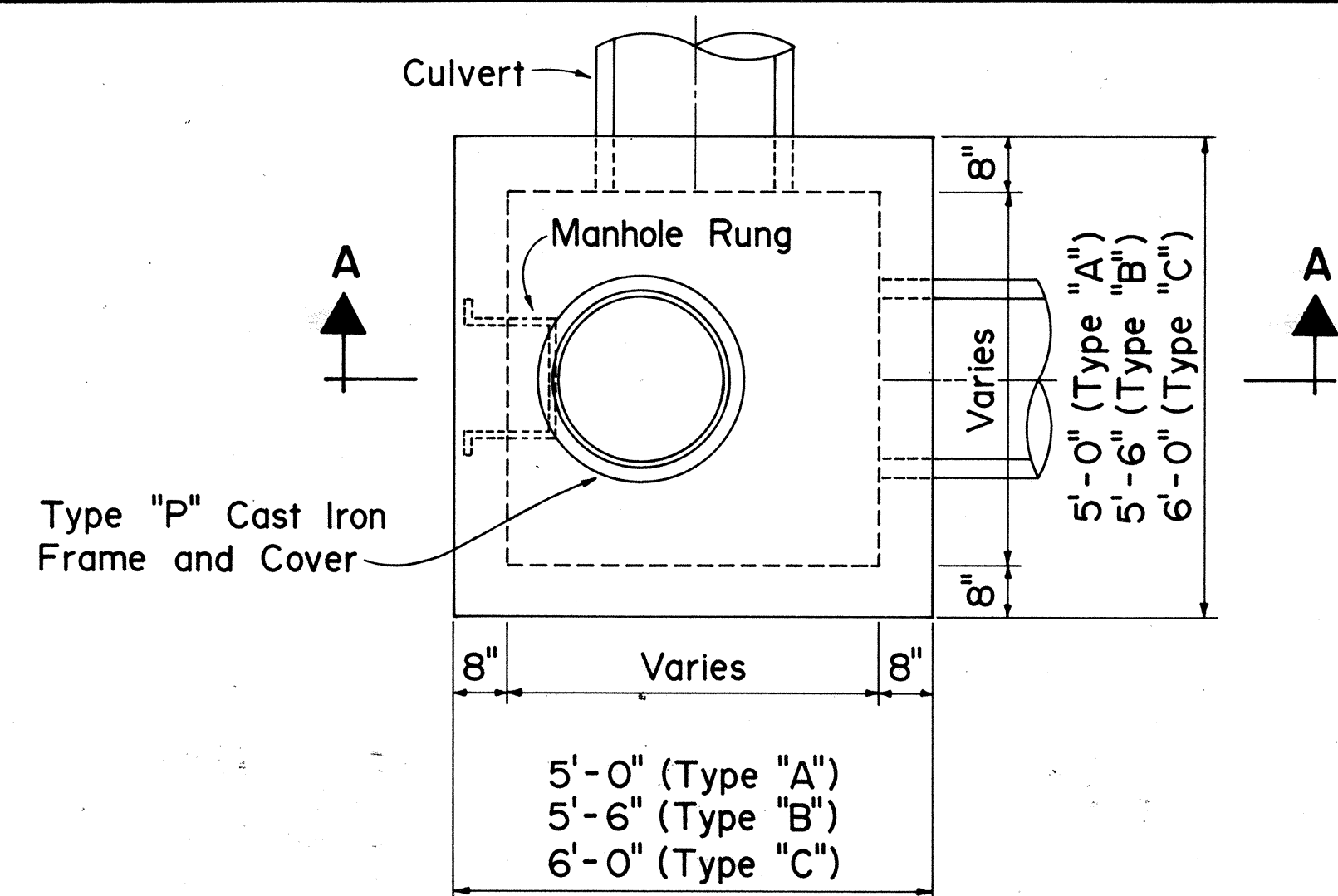
TYPE 61614 & 61616 GRATED DROP INTAKES

Scales: As Noted

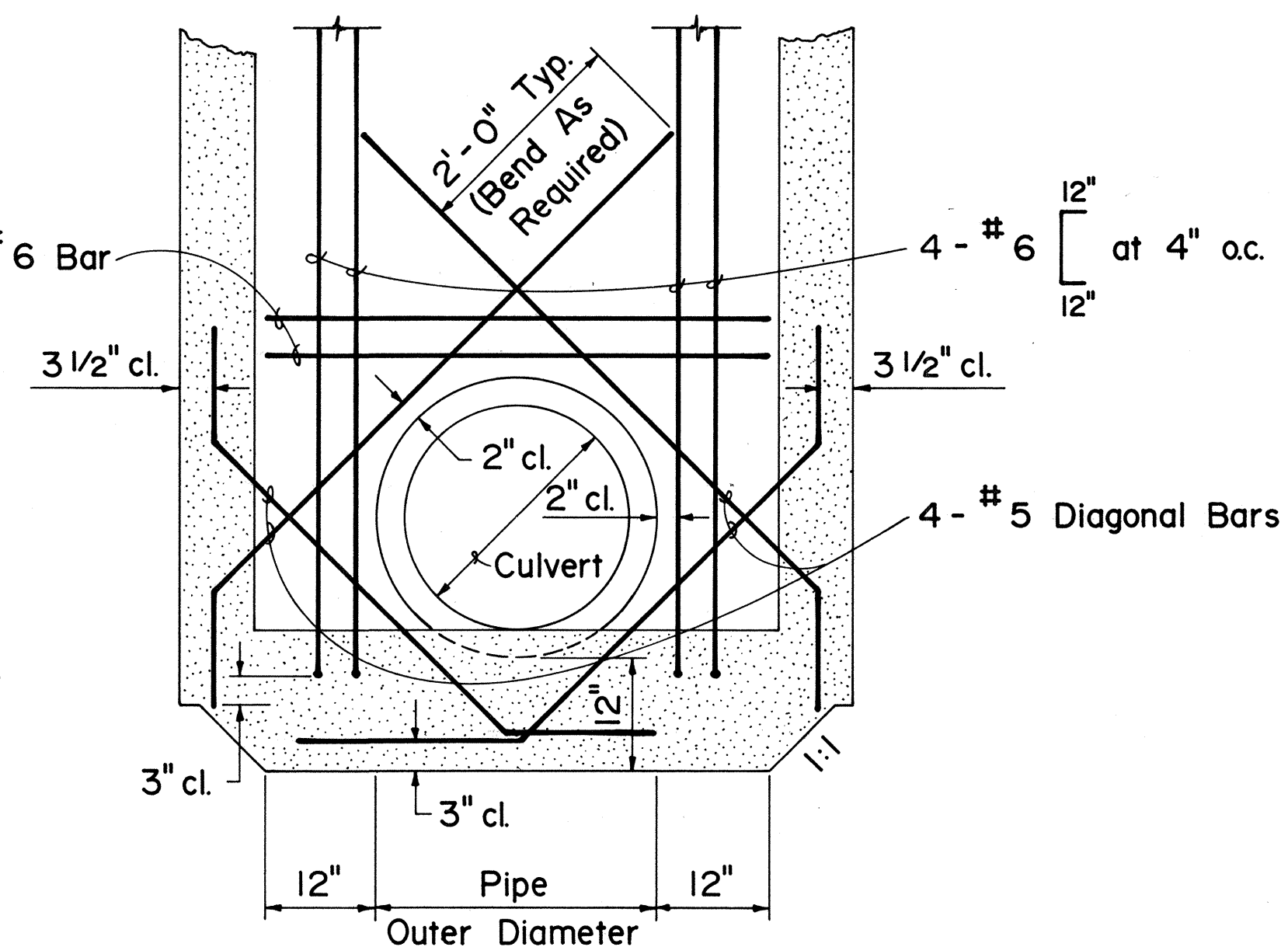
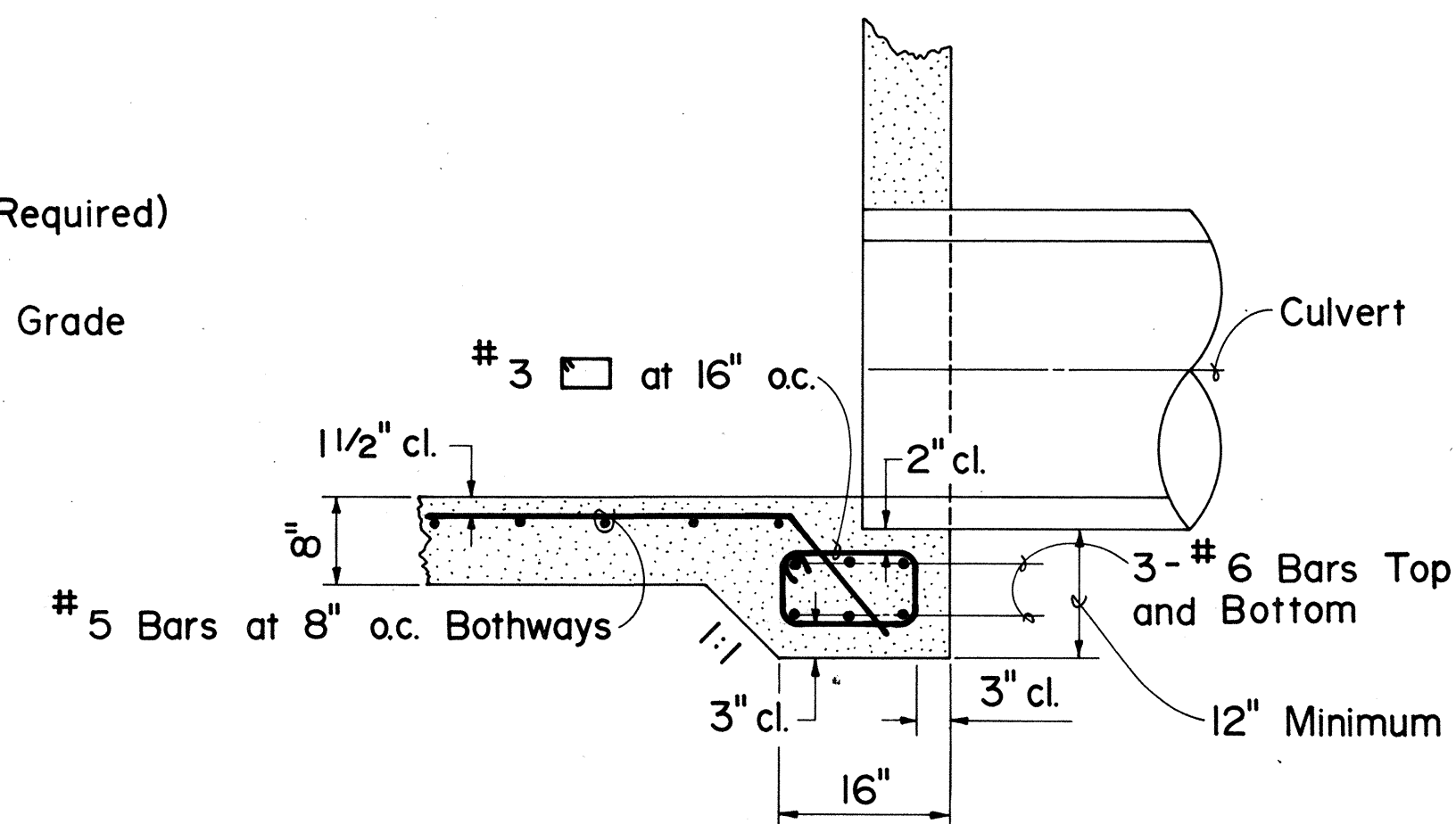
Date: Feb. 1969

SHEET No. 2 OF 10 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	117000(2)	1981	004951	244



"H" VARIES	HORIZONTAL "B" BARS
5' - 0" Max.	# 4 at 12" o.c.
10' - 0" Max.	# 4 at 9" o.c.
15' - 0" Max.	# 4 at 6" o.c.
20' - 0" Max.	# 5 at 6" o.c.



APPROVAL RECOMMENDED:
T. Takano
 HYDRAULIC DESIGN ENGINEER 8-20-80
 DATE

APPROVED:
Robert Z. Leitch
 ASSISTANT CHIEF, ENGINEERING 8-20-80
 DATE

NO.	REVISION	APPROVED BY	DATE
1.	Supersedes Sht. DH 5 approved 12-17-69	H.F.	8/20/80

STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION
STANDARD DETAILS TYPE A, B, AND C STORM DRAIN MANHOLE
Not To Scale Date: August 1980

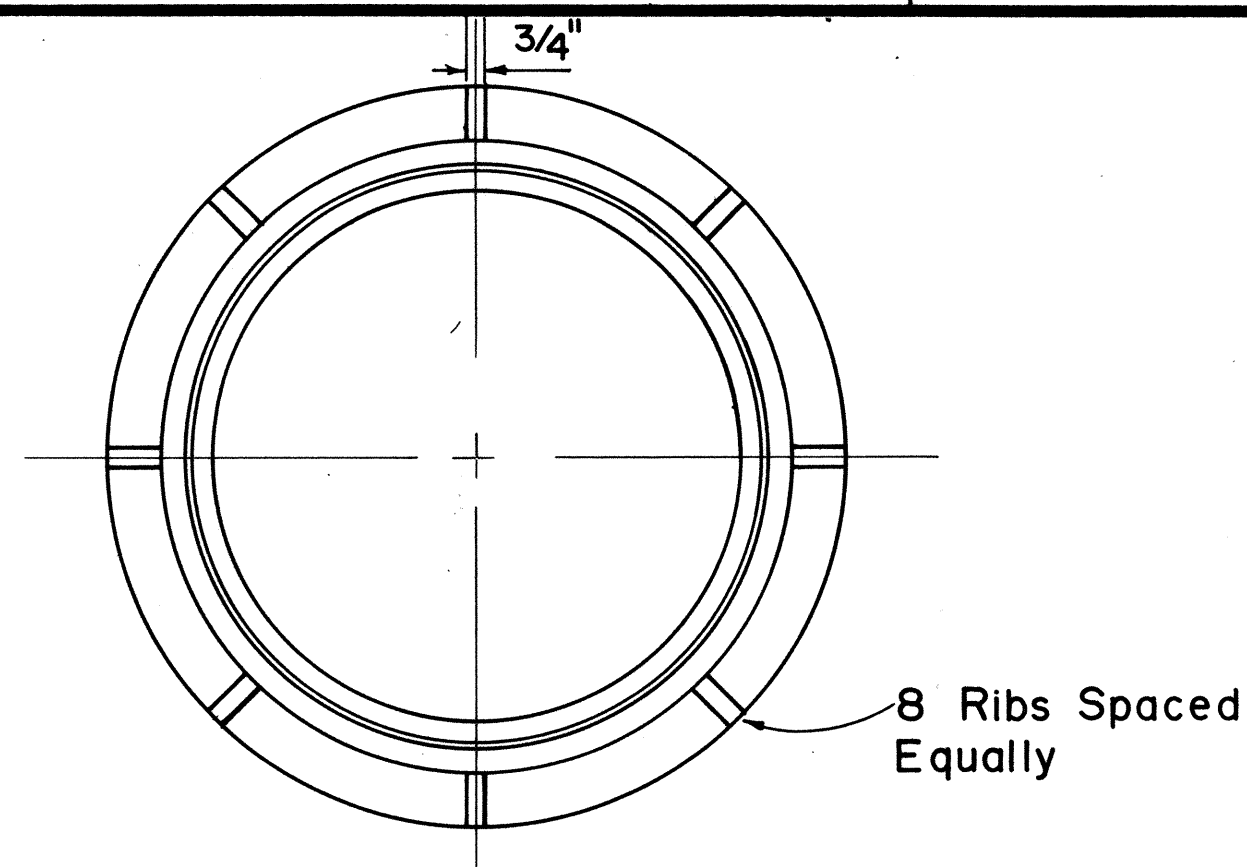
SHEET No. 32 OF 10 SHEETS DH5

C049S-1

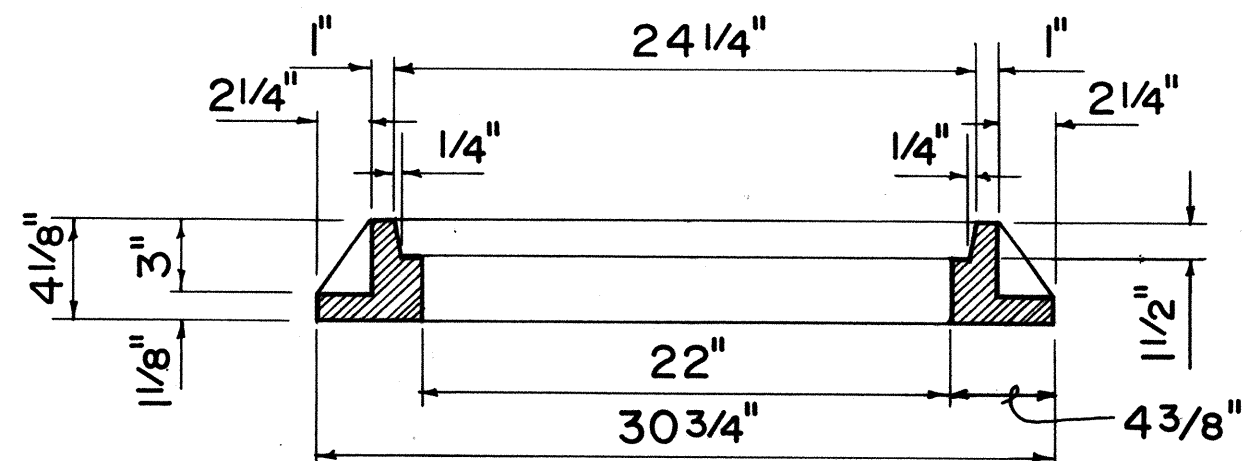
ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
NO. 1	DRAWN BY	
NO. 2	DESIGNED BY	
NO. 3	QUANTITIES BY	
NO. 4	CHECKED BY	

TYPE "A", "B", & "C" STORM DRAIN MANHOLE

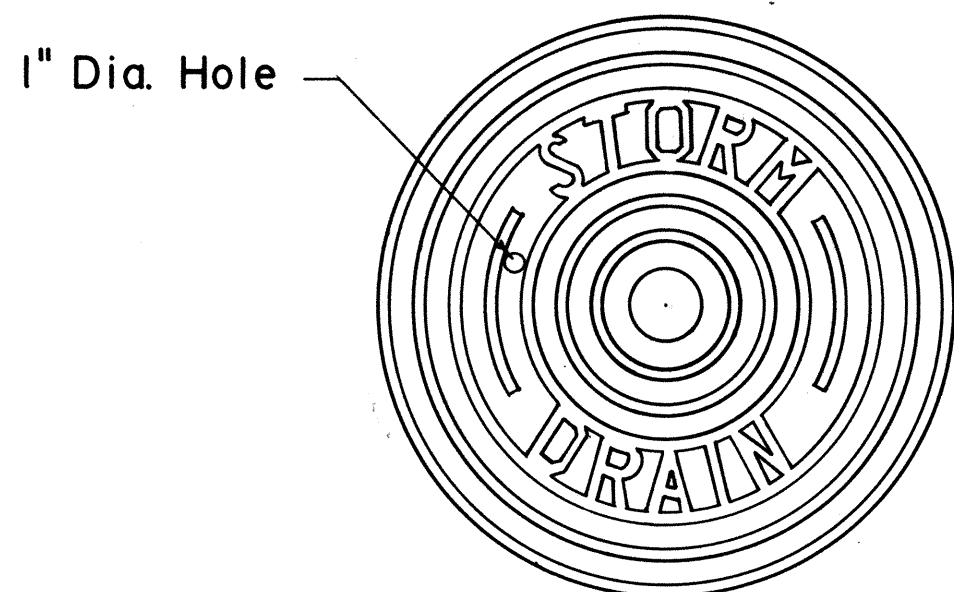
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	M-7600(2)	1980	50	244



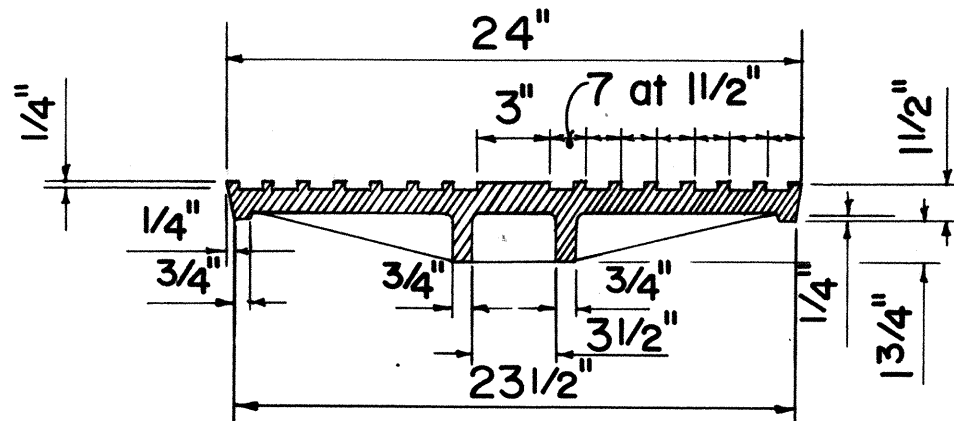
PLAN OF FRAME



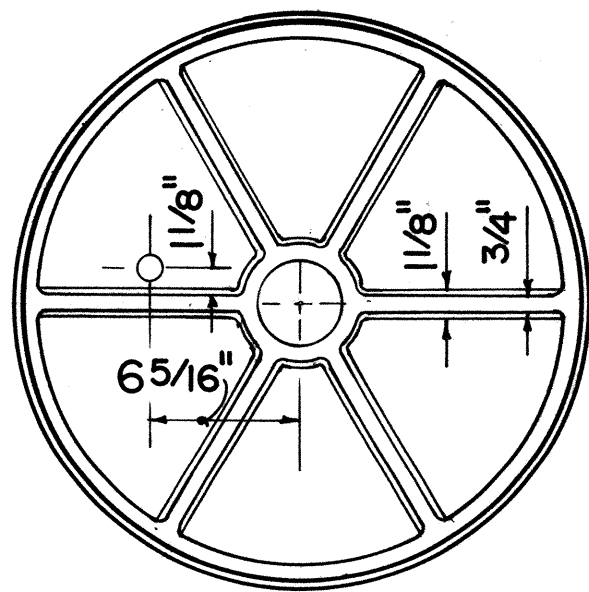
SECTION OF FRAME



TOP VIEW OF COVER

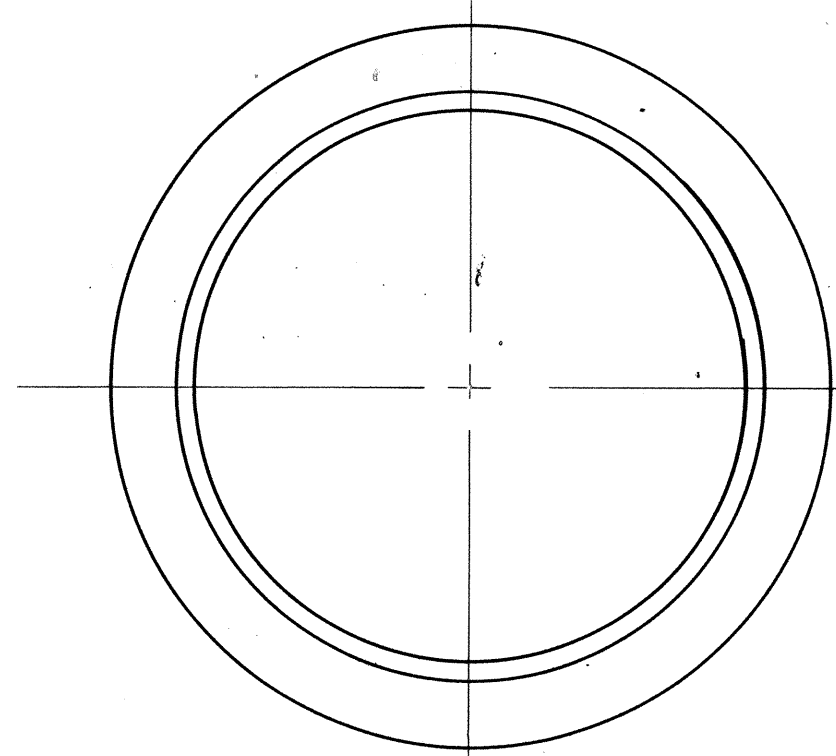


SECTION

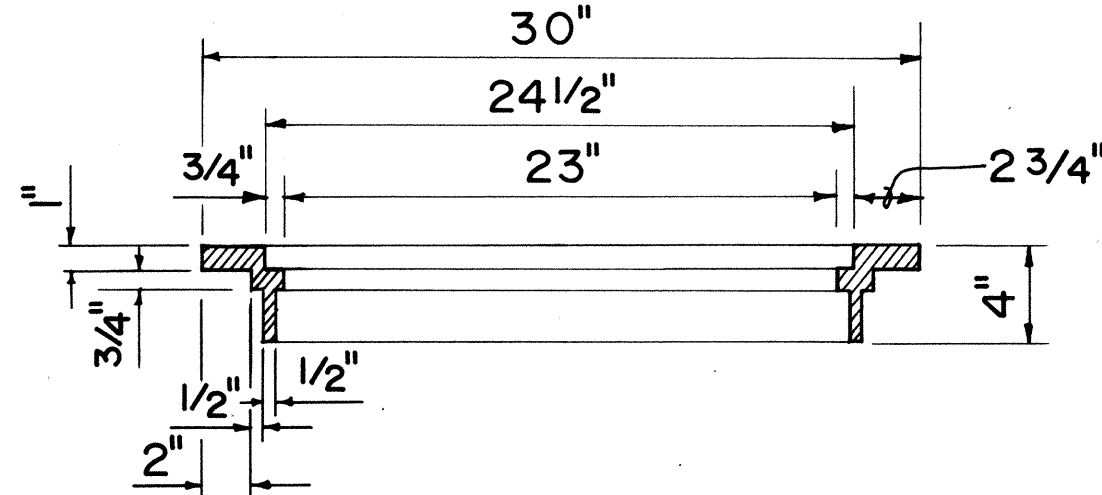


BOTTOM VIEW OF COVER

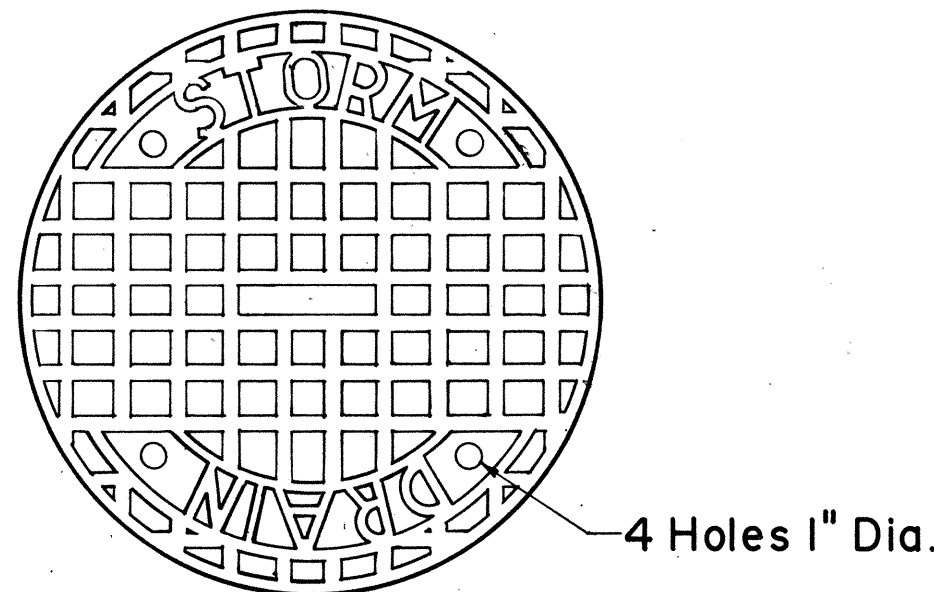
TYPE "P" CAST IRON
FRAME AND COVER



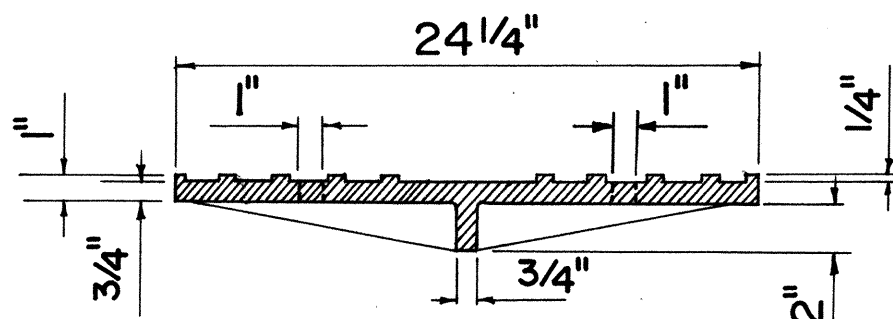
PLAN OF FRAME



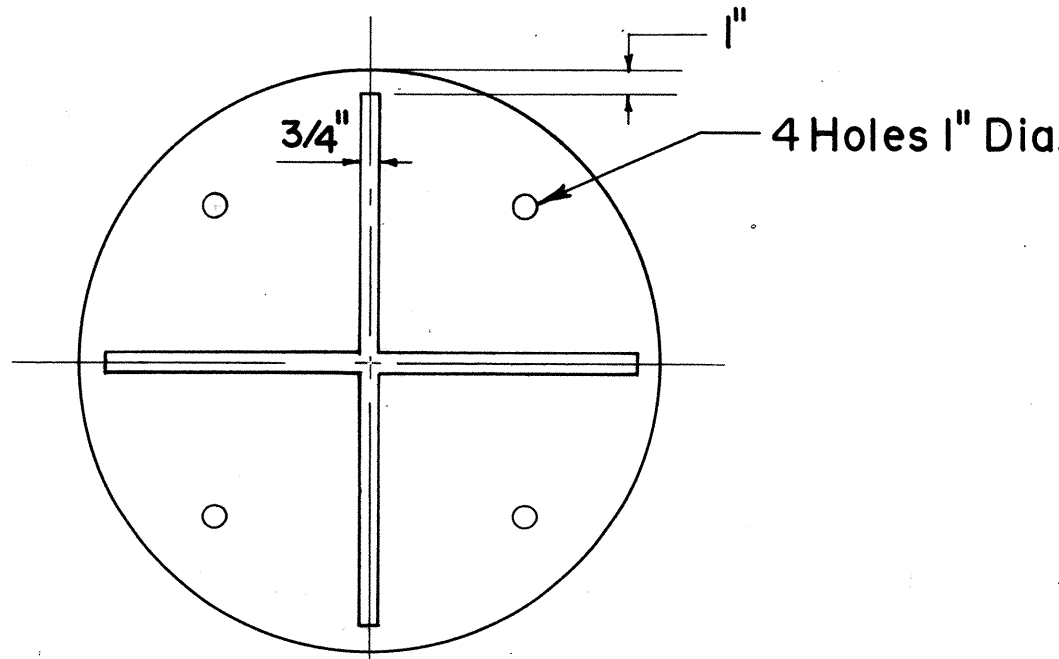
SECTION OF FRAME



TOP VIEW OF COVER

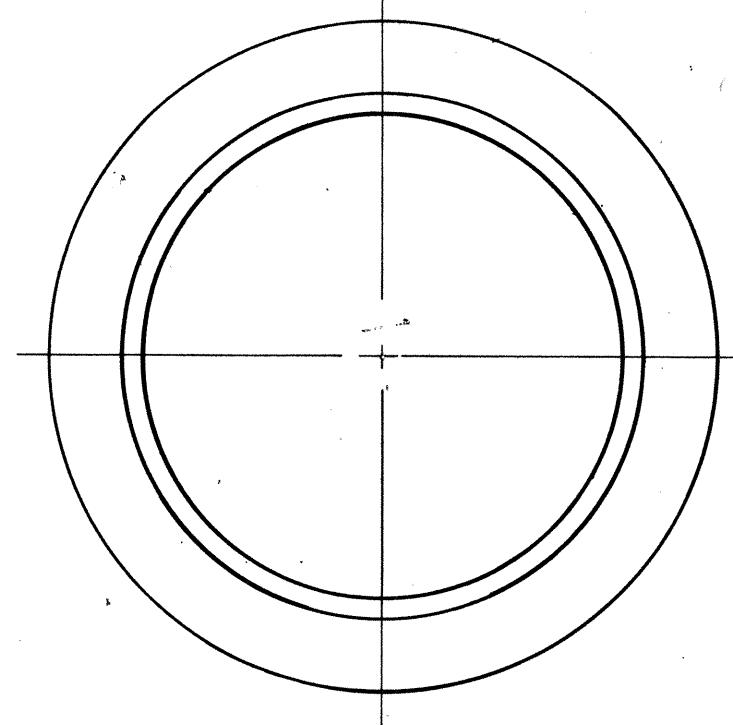


SECTION

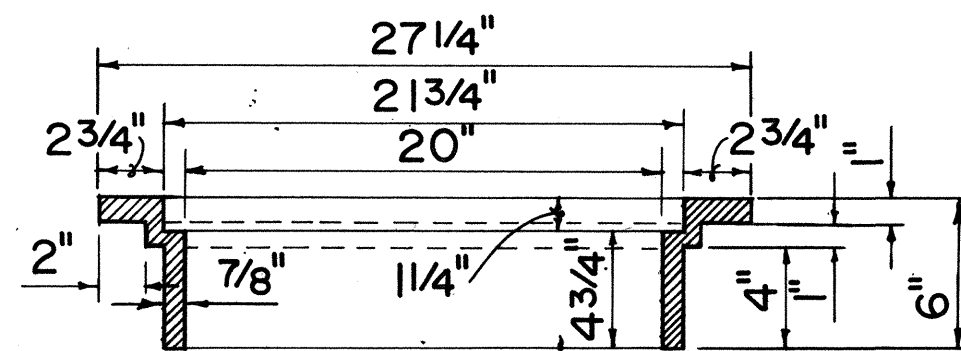


BOTTOM VIEW OF COVER

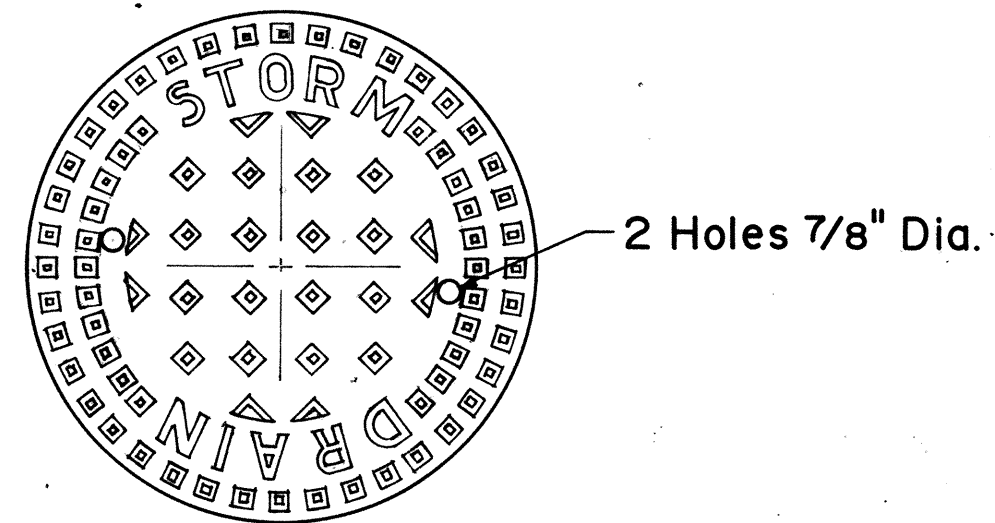
TYPE "B" CAST IRON
FRAME AND COVER



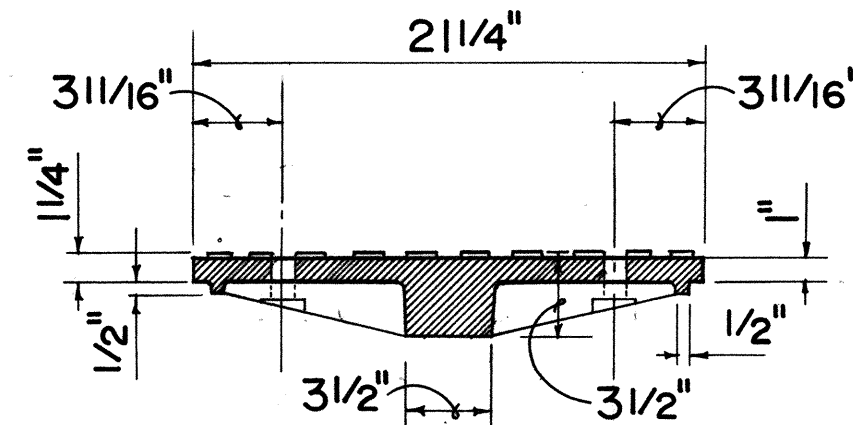
PLAN OF FRAME



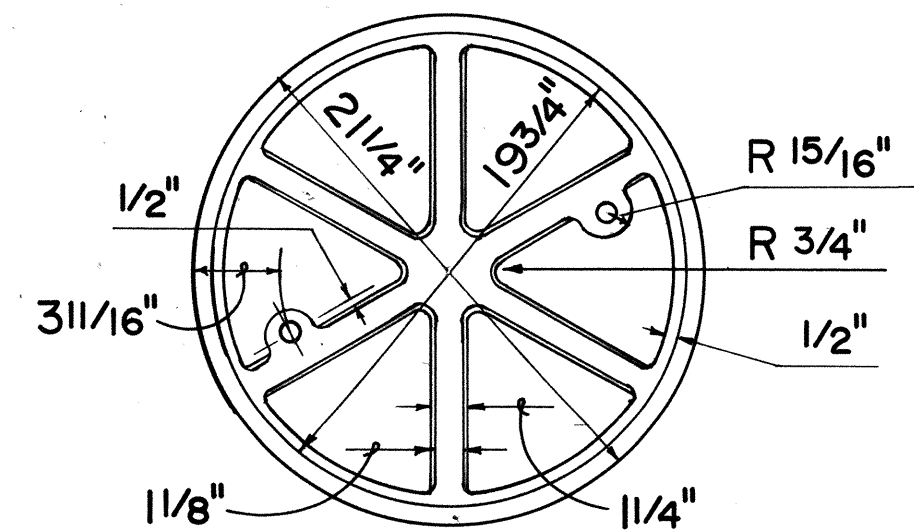
SECTION OF FRAME



TOP VIEW OF COVER

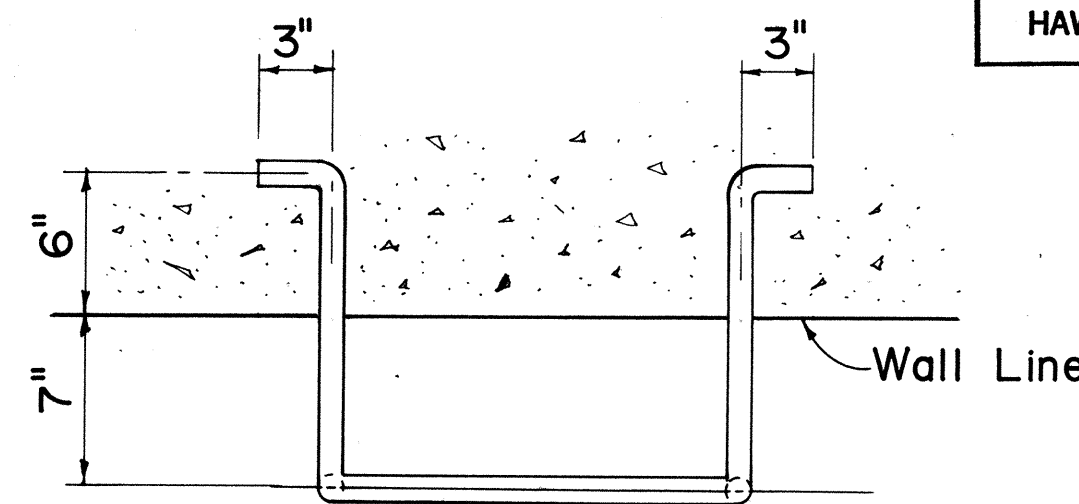


SECTION

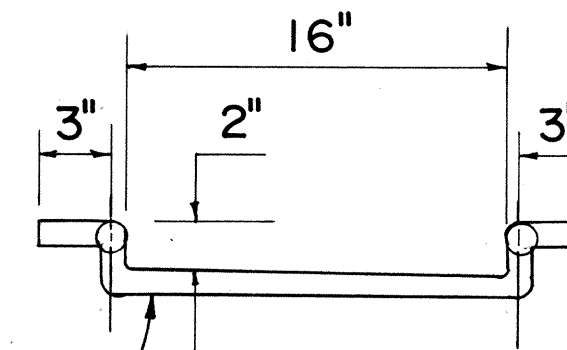


BOTTOM VIEW OF COVER

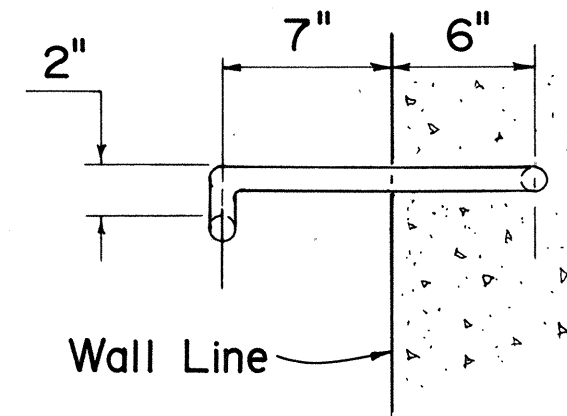
TYPE "A" CAST IRON
FRAME AND COVER



PLAN



FRONT VIEW



SIDE VIEW

MANHOLE RUNG

APPROVAL RECOMMENDED:
 HYDRAULIC DESIGN ENGINEER 6-19-79 DATE
 APPROVED:
 ASSISTANT CHIEF, ENGINEERING 6-22-79 DATE

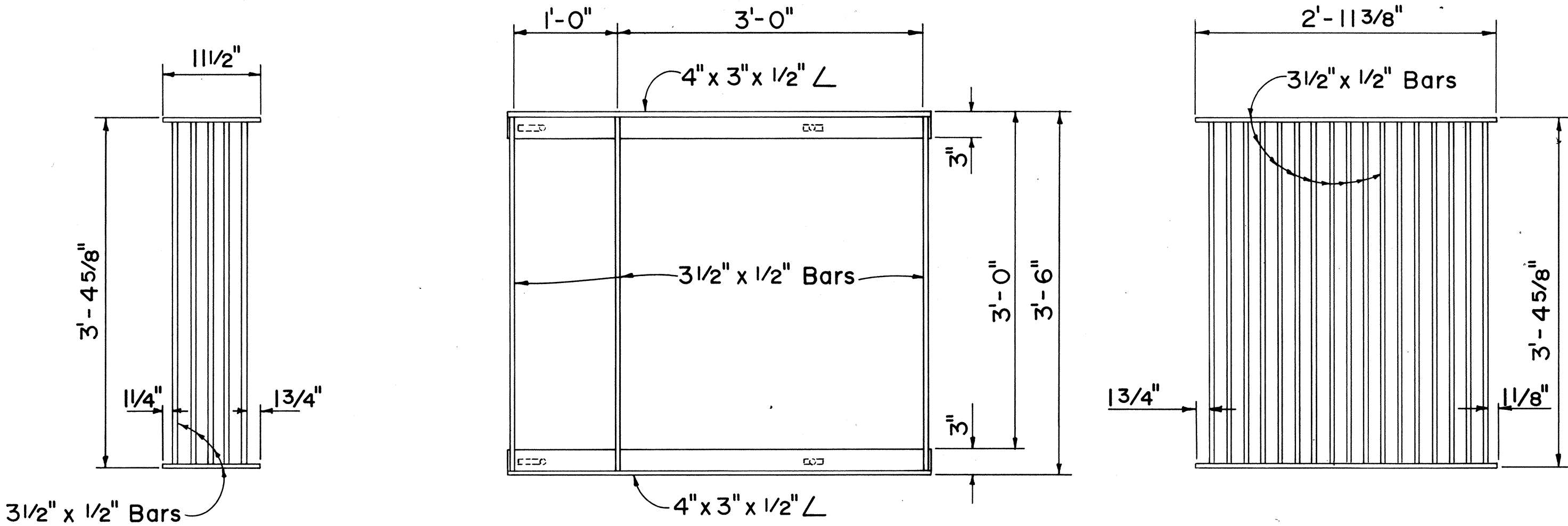
NO.	REVISION	APPROVED BY	DATE
1.	Supersedes Sht. DH 6 approved 12-17-69	H.P.	6/22/79

STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION
STANDARD DETAILS CATCH BASIN AND MANHOLE CASTINGS
Not To Scale Date: Dec. 1977
SHEET NO. 4 OF 10 SHEETS DH 6

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	M-7600(2)	1980	51	244

GENERAL NOTE

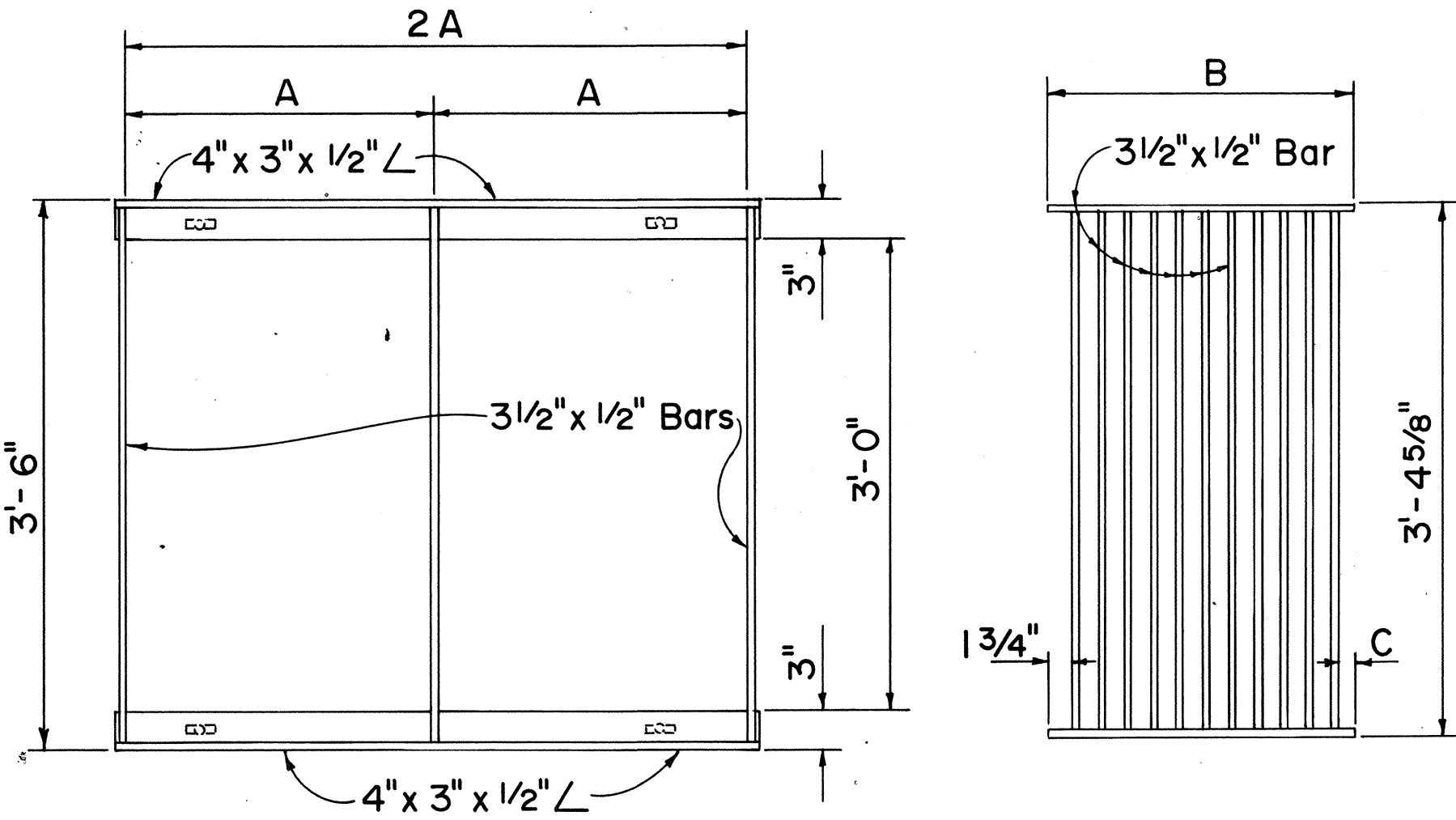
1. All welds 3/8" unless otherwise noted.



PLAN

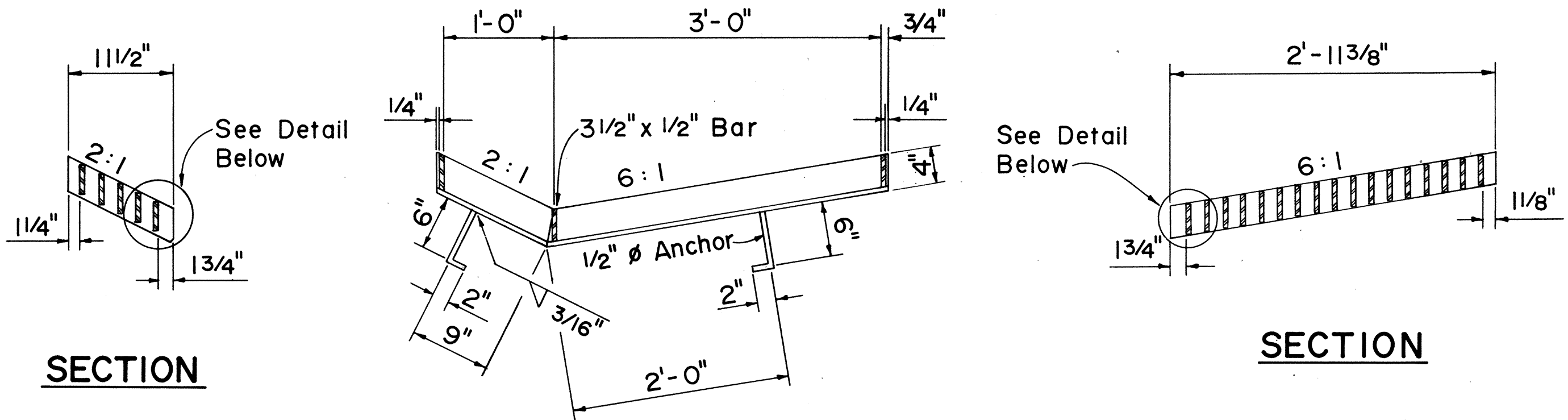
PLAN

PLAN



PLAN

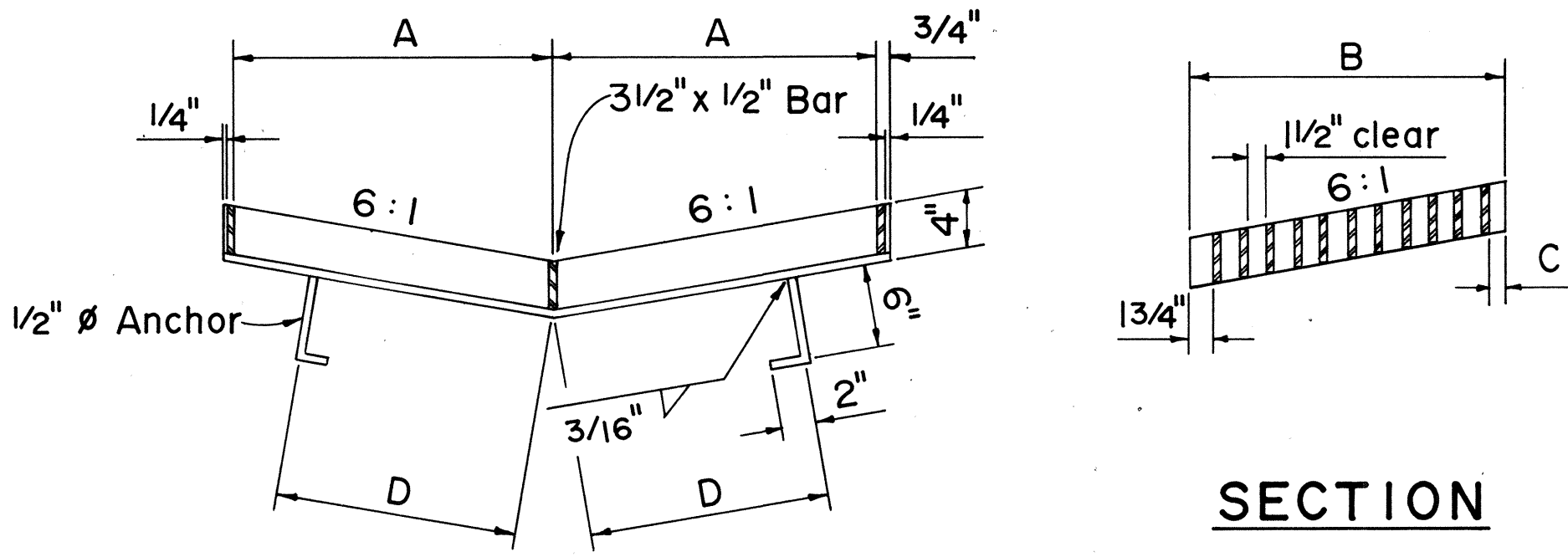
PLAN



SECTION

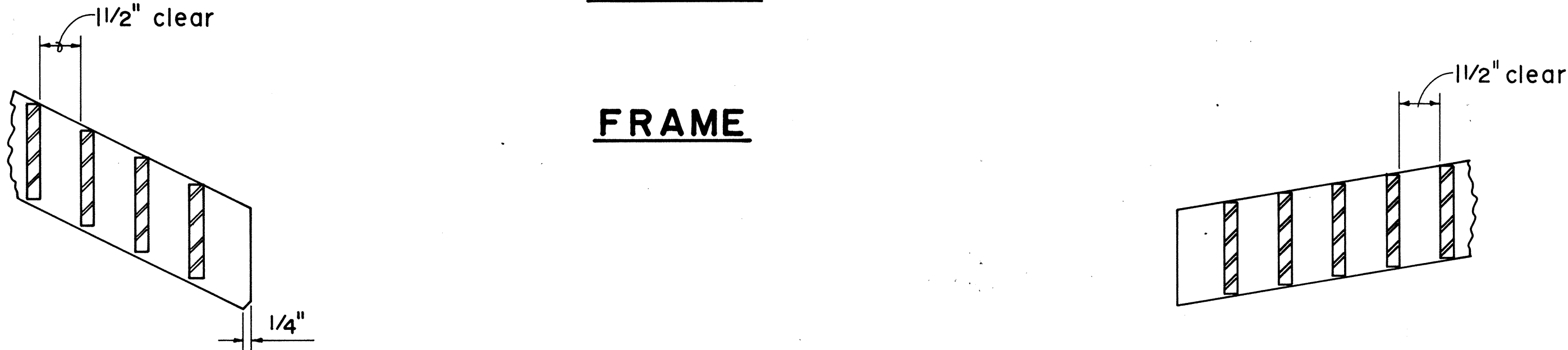
SECTION

SECTION



SECTION

SECTION



GRATE

GRATE

FRAME

FRAME

61614 OR 61616 STEEL FRAME AND GRATE

DIMENSIONS					
TYPE	NO. BARS	A	B	C	D
61614	11	2'-0"	1'-11 1/2"	1 1/4"	1'-6"
61616	17	3'-0"	2'-11 3/8"	1 1/8"	2'-0"

APPROVAL RECOMMENDED:
A. Takano 6-19-79
 HYDRAULIC DESIGN ENGINEER DATE
 APPROVED:
Herbert Takeishi 6-22-79
 ASSISTANT CHIEF, ENGINEERING DATE

NO.	REVISION	APPROVED BY	DATE
1.	Supersedes Sht. DH 8 & DH 9 approved 12-17-69	H.T.	6/22/79

STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION
STANDARD DETAILS 61214, 61614 & 61616 STEEL FRAMES AND GRATES
Not To Scale Date: Dec. 1977

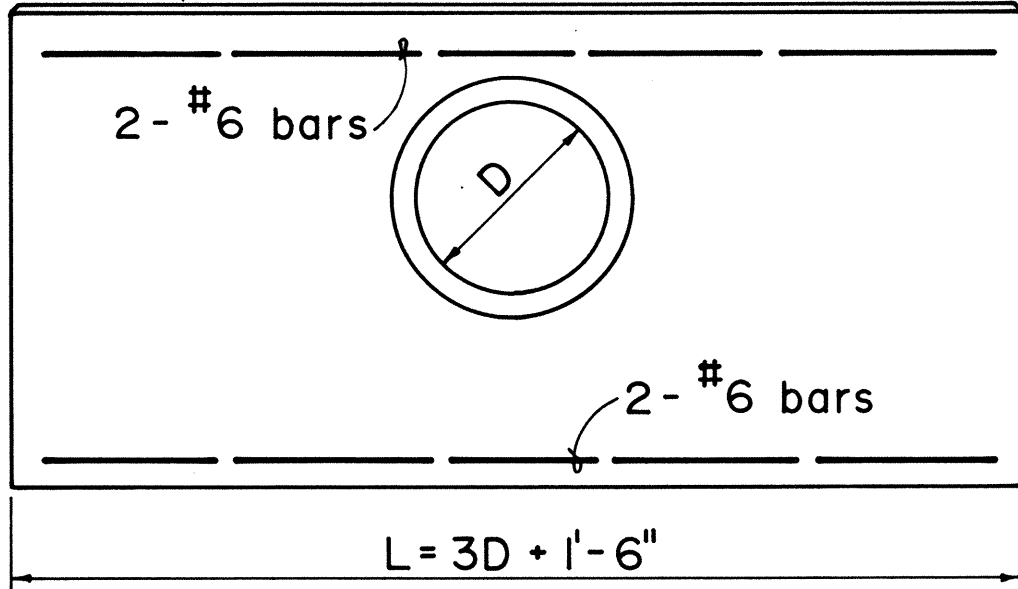
SHEET No. 5 OF 10 SHEETS DH 8

ORIGINAL PLAN	DATE
DRAWN BY	
TRACED BY	
DESIGNED BY	
CHECKED BY	
NOTE BOOK	
No.	

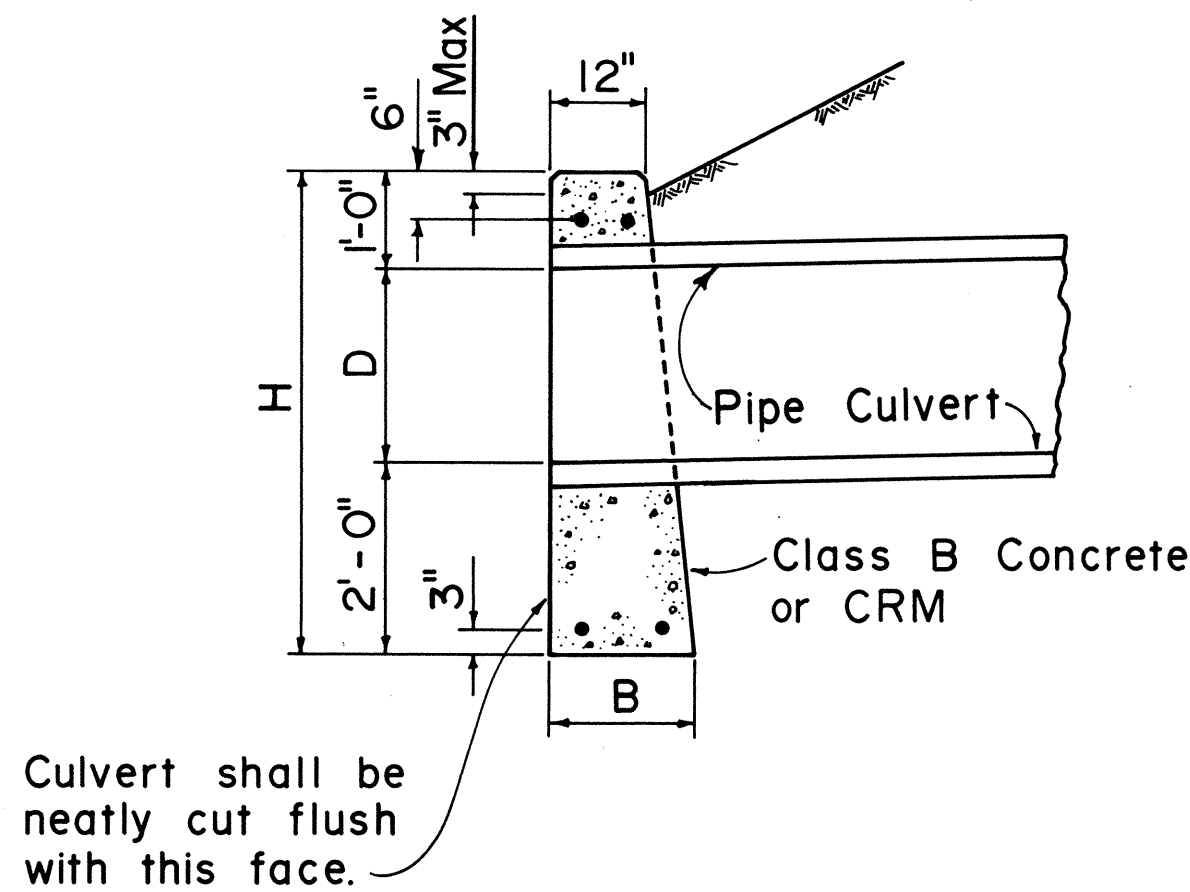
61214 STEEL FRAME AND GRATES

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	M-7600(2)	1980	52	244

Chamfer all exposed edges one inch



ELEVATION



SECTION

DATA FOR CONC. HDWL.			
D	B	L	H
18"	1'-6"	6'-0"	4'-6"
24"	1'-6"	7'-6"	5'-0"
30"	2'-0"	9'-0"	5'-6"
36"	2'-0"	10'-6"	6'-0"
42"	2'-6"	12'-0"	6'-6"
48"	2'-6"	13'-6"	7'-0"

DATA FOR CRM HDWL.			
D	B	L	H
18"	1'-9"	6'-0"	4'-6"
24"	2'-0"	7'-6"	5'-0"
30"	2'-3"	9'-0"	5'-6"
36"	2'-6"	10'-6"	6'-0"

CONCRETE OR CRM HEADWALL

APPROVAL RECOMMENDED:
T. Takano 6-19-79
 HYDRAULIC DESIGN ENGINEER DATE
 APPROVED:
Harbert Zaleishi 6-22-79
 ASSISTANT CHIEF, ENGINEERING DATE

NO.	REVISION	APPROVED BY	DATE
1.	Supersedes Sht. DH 10 approved 12-17-69	H.T.	6/22/79

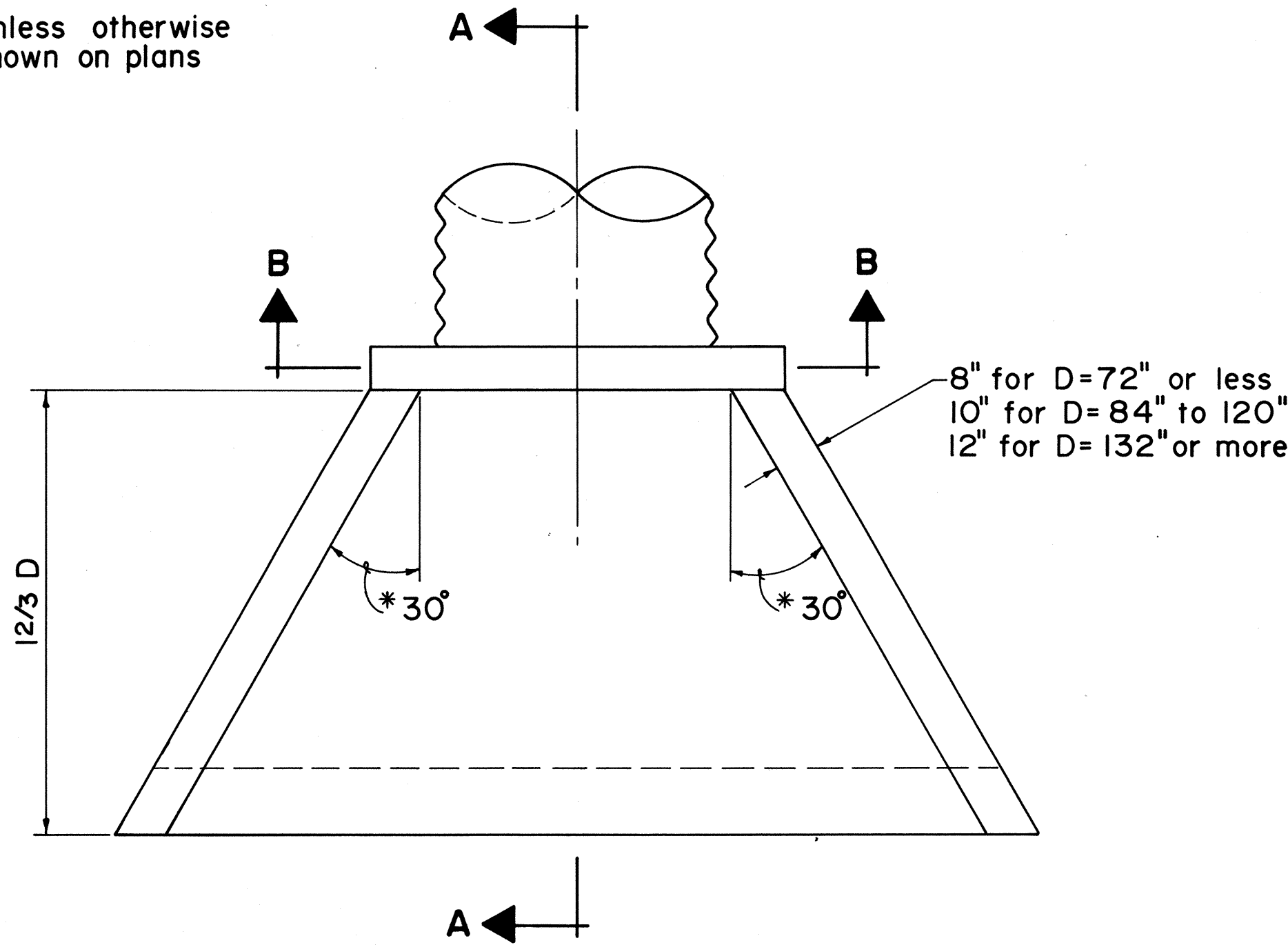
STATE OF HAWAII
 DEPARTMENT OF TRANSPORTATION
 HIGHWAYS DIVISION
 STANDARD DETAIL
 CONCRETE OR CEMENT
 RUBBLE MASONRY HEADWALLS
 Not To Scale Date: June 1979

SHEET NO. 6 OF 10 SHEETS DH10

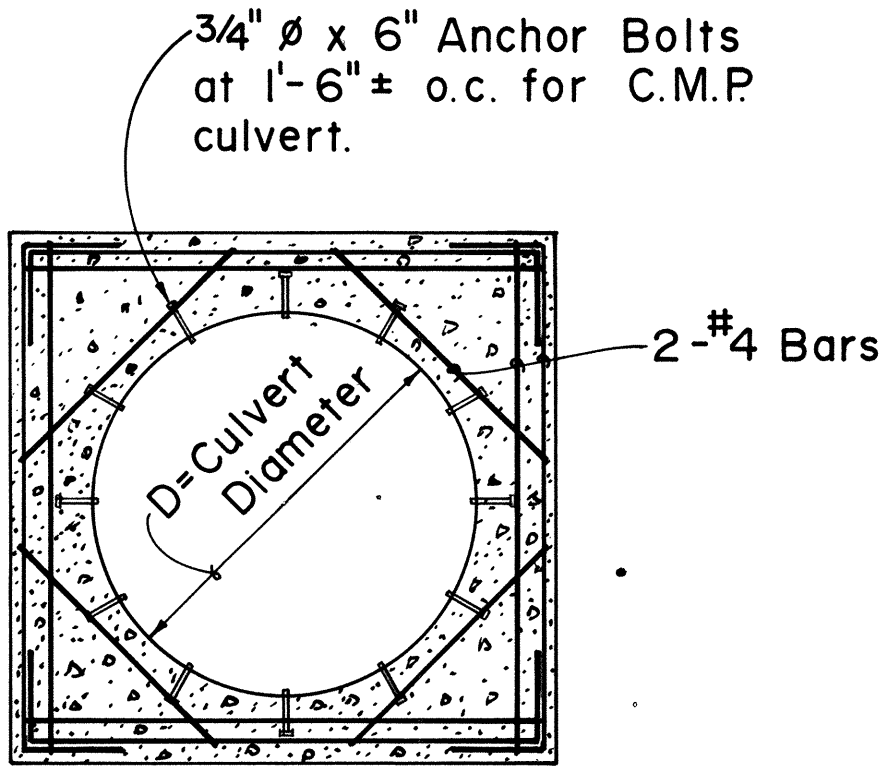
ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
NOTE BOOK	DRAWN BY	
	DESIGNED BY	
	CHECKED BY	

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	M-7600(2)	1980	53	244

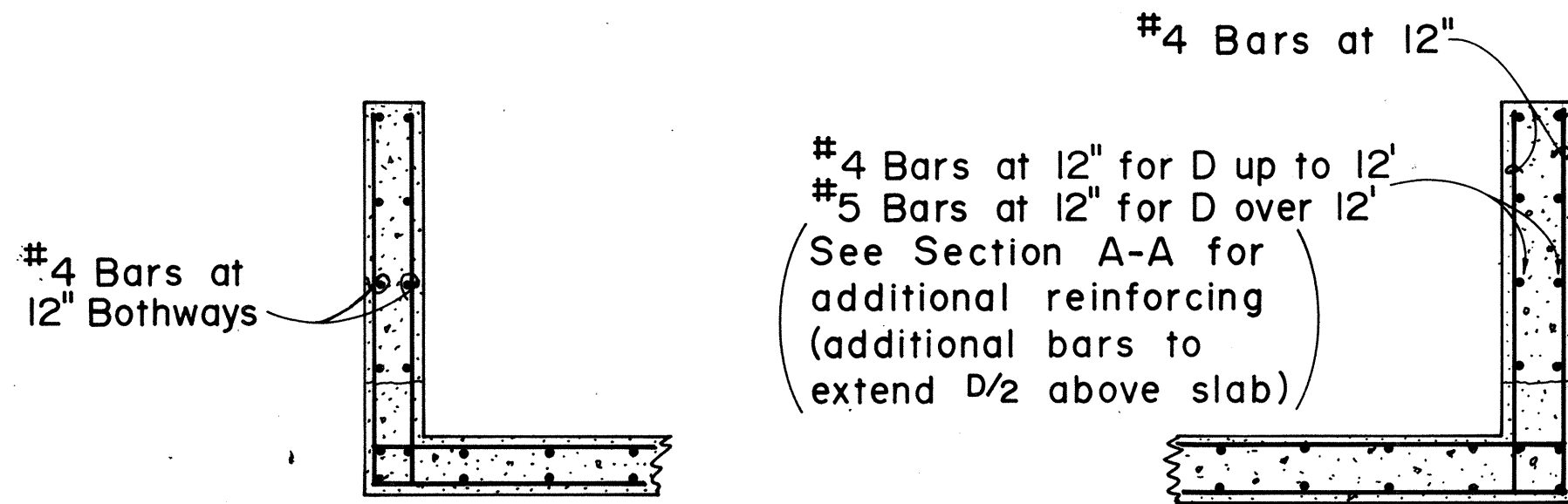
* Unless otherwise shown on plans



PLAN



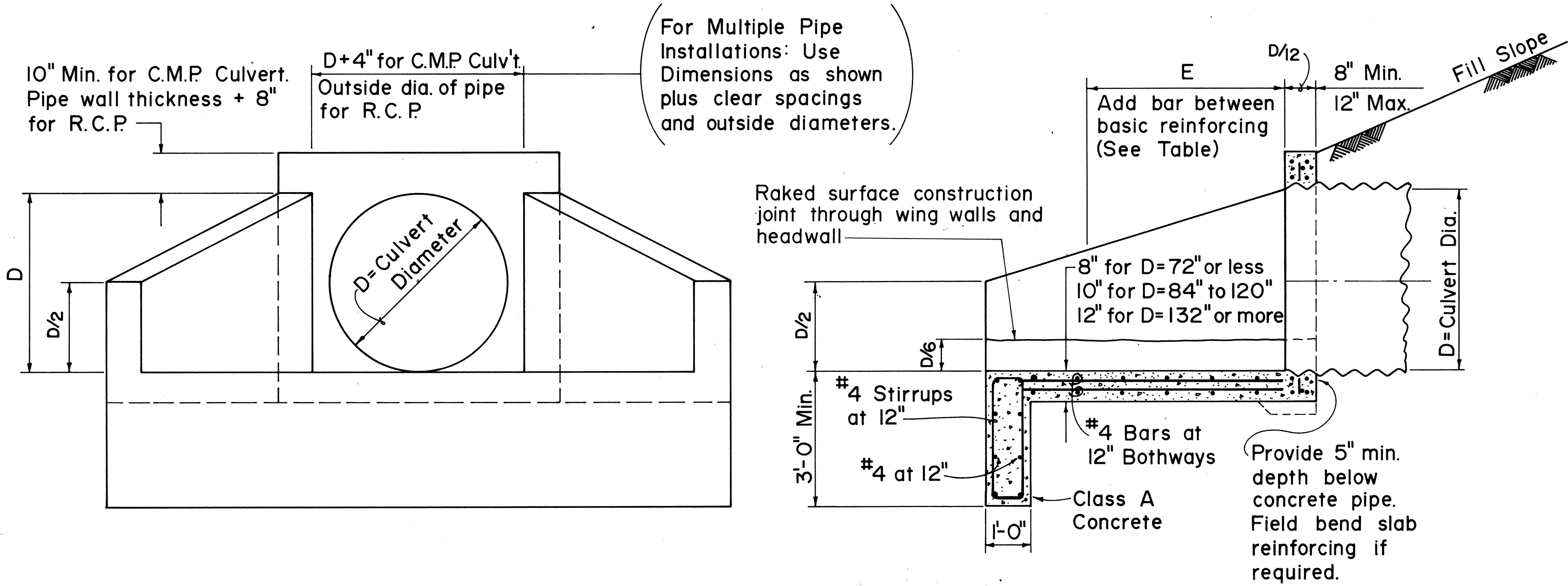
SECTION B-B



8" WING WALL

10" TO 12" WING WALLS

TYPICAL WING WALL REINFORCING



FRONT ELEVATION

SECTION A-A

CULVERT DIA. (INCHES)	ADD BAR SIZE	E (FEET)
108	#4	3
120	#4	5
144	#5	8
180	#7	11

ADDITIONAL REINFORCING

APPROVAL RECOMMENDED:
T. Nakano
 HYDRAULIC DESIGN ENGINEER 6-19-79 DATE
 APPROVED:
Herbert Zaleishi
 ASSISTANT CHIEF, ENGINEERING 6-22-79 DATE

NO.	REVISION	APPROVED BY	DATE
1.	Supersedes Sht. DH 13 approved 12-17-69	H.T.	6/22/79

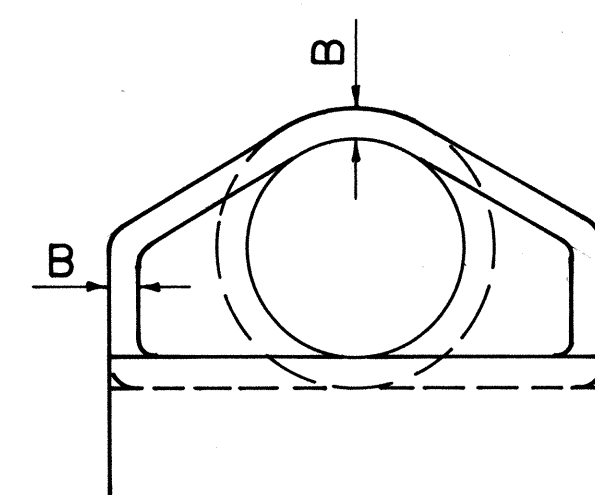
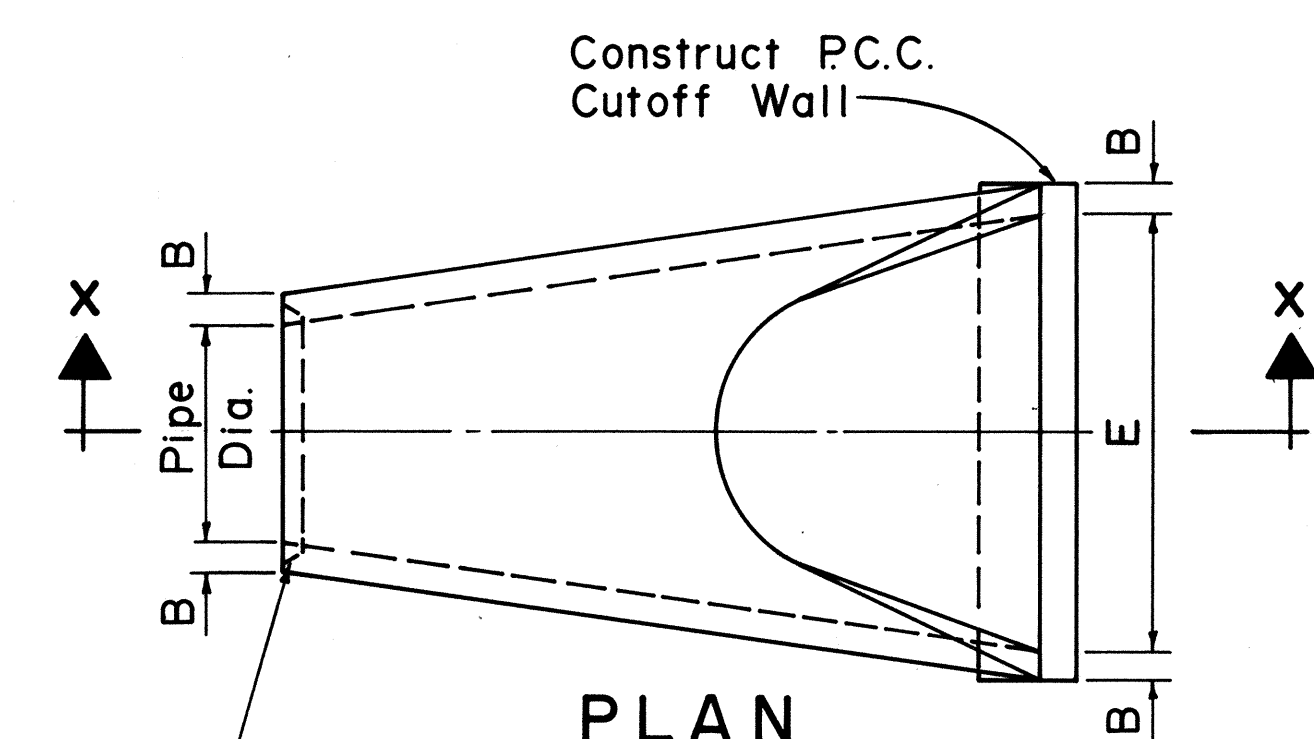
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION STANDARD DETAILS INLET STRUCTURES Not To Scale Date: Dec. 1977

SHEET NO. 7 OF 10 SHEETS DH13

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	M-76002	1980	54	244

GENERAL NOTES

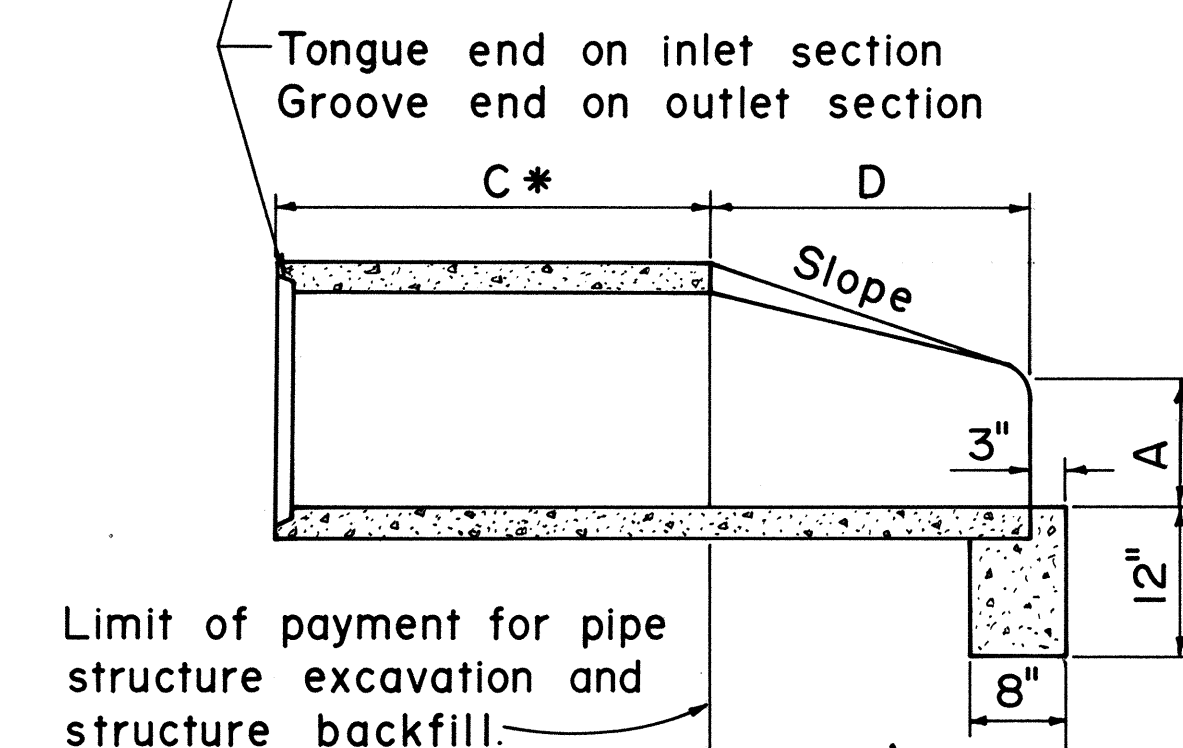
- All 3pc. bodies to have 0.109" thick sides and 0.138" thick center panels. Width of center panels to be greater than 20% of the pipe periphery. Multiple panel bodies to have lap seams which are to be tightly joint by $\frac{3}{8}$ " galvanized rivets or bolts.
- Reinforced edges to be supplemented with galvanized stiffener angles for the 60" thru 84" round, 77"x 52" and 83"x 57" pipe - arch sizes. The angles will be 2"x 2" x $\frac{1}{4}$ " for the 60" thru 72" round, 77"x 52" and 83"x 57" pipe - arch sizes and 2 $\frac{1}{2}$ " x 2 $\frac{1}{2}$ " x $\frac{1}{4}$ " for 78" and 84" round. The angles to be attached by $\frac{3}{8}$ " galvanized nuts and bolts.
- Angle reinforcement will be placed under the center panel seams on the 77" x 52" and 83" x 57" pipe - arch sizes.
- Galvanized toe plate to be available as an accessory when specified.
- End of pipe to be finished with annular corrugations to conform to flared end section so that no leakage results from the connection. Other designs may be used with approval of the Engineer.
- Contractor has the option of using either Type A or B "Precast Concrete Flared End Section".



END VIEW

*C dimension shall be as desired by manufacturer and will be paid for at the price paid for concrete pipe.

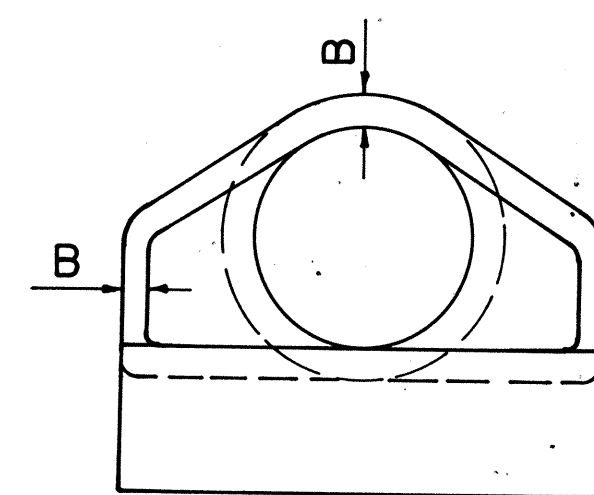
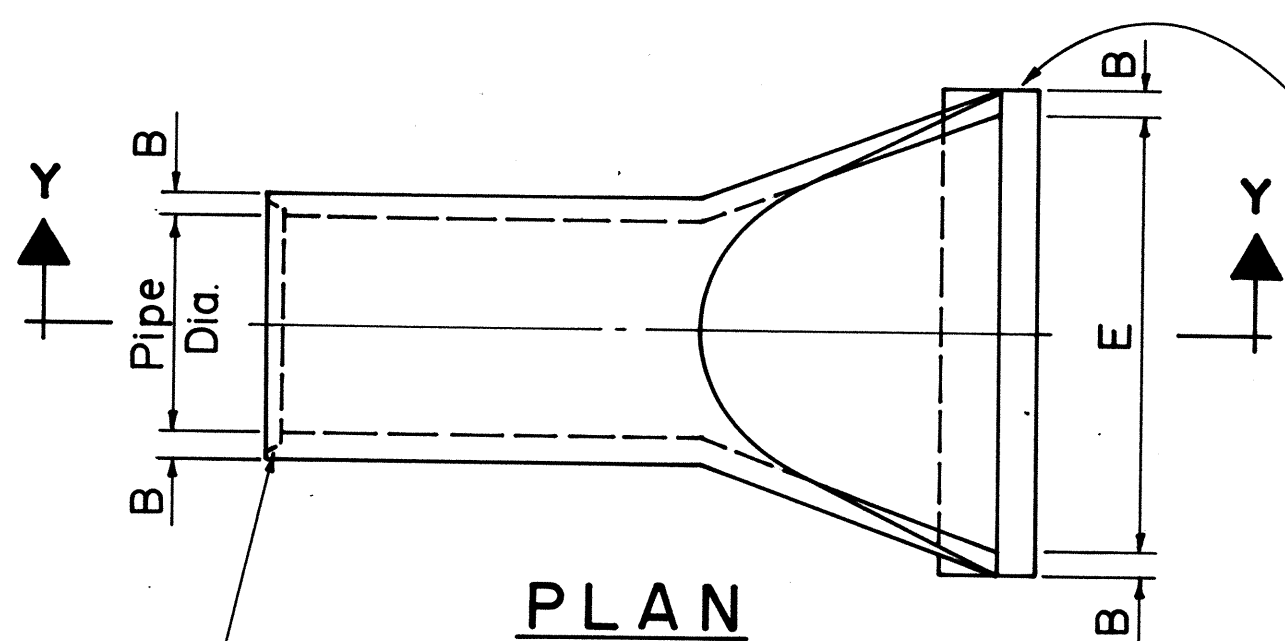
MINIMUM DIMENSIONS						
PIPE DIA.	A	B	C*	D	E	SLOPE
12"	4"	2"		2'-0"	2'-0"	2:1 or Flatter
18"	9"	2 $\frac{1}{2}$ "		2'-3"	3'-0"	
24"	9 $\frac{1}{2}$ "	3"		3'-7 $\frac{1}{2}$ "	4'-0"	
30"	1'-0"	3 $\frac{1}{2}$ "		4'-6"	5'-0"	
36"	1'-3"	4"		5'-3"	6'-0"	
42"	1'-9"	4 $\frac{1}{2}$ "		5'-3"	6'-6"	
48"	2'-0"	5"		6'-0"	7'-0"	
54"	2'-3"	5 $\frac{1}{2}$ "		5'-5"	7'-6"	



Structure excavation and structure backfill included in price paid for flared end section.

SECTION X-X

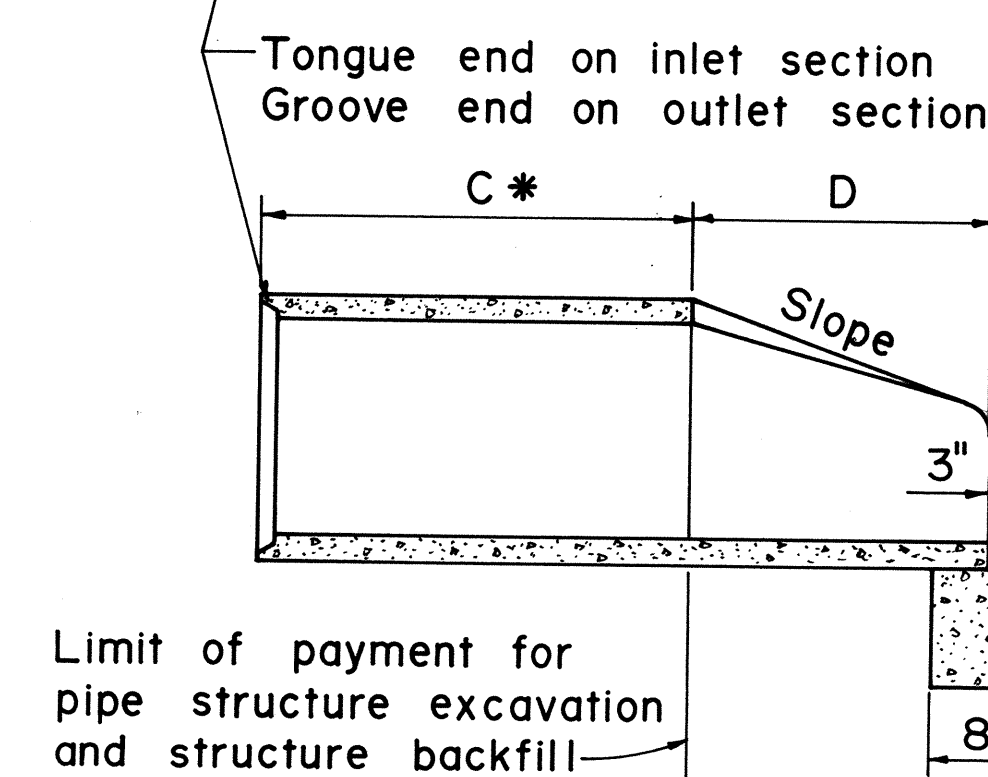
PRECAST CONCRETE FLARED END SECTION TYPE A



END VIEW

*C dimension shall be as desired by manufacturer and will be paid for at the price paid for concrete pipe.

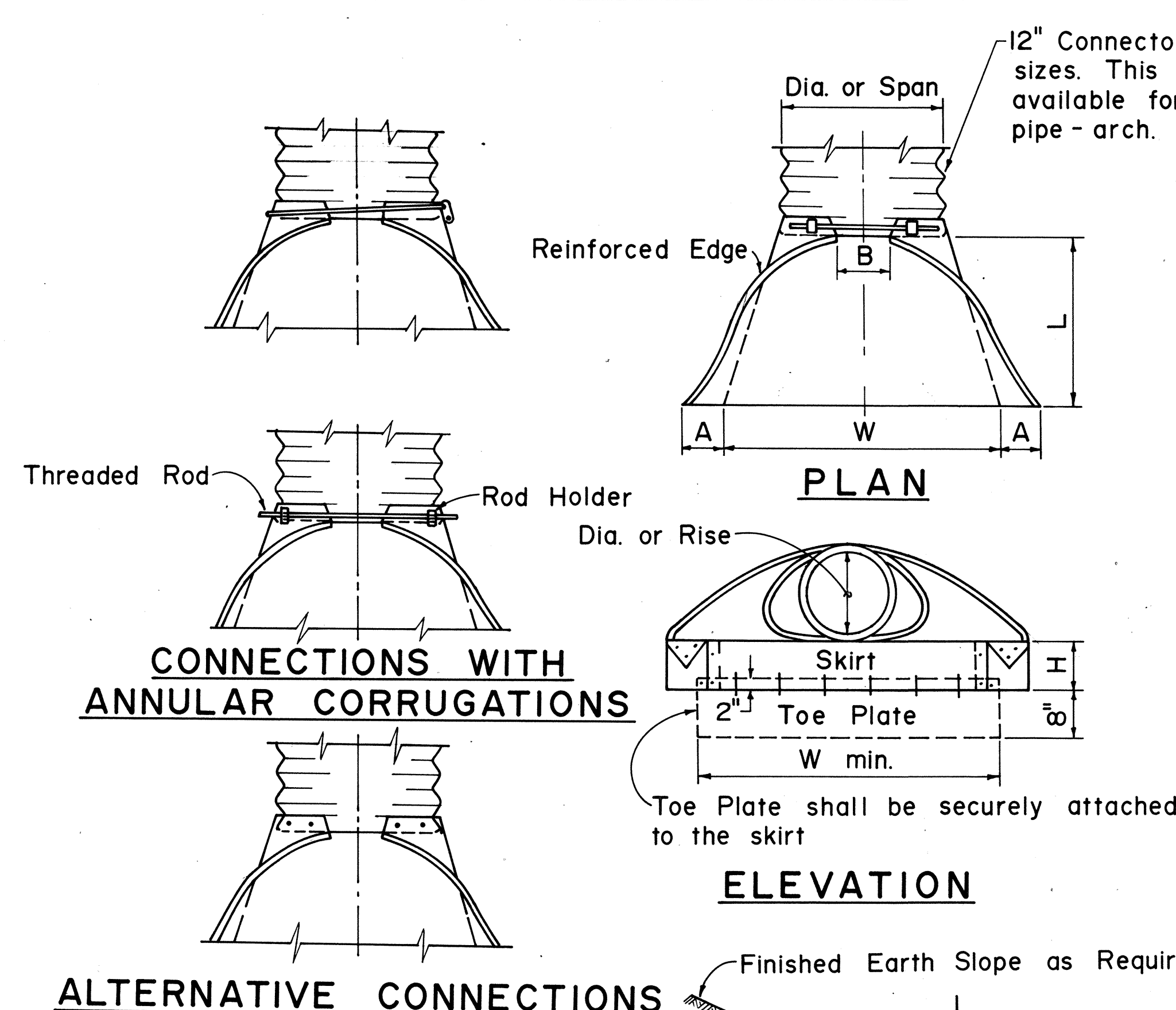
MINIMUM DIMENSIONS						
PIPE DIA.	A	B	C*	D	E	SLOPE
12"	4"	1 $\frac{3}{4}$ "		1'-10"	2'-0"	2:1 or Flatter
18"	9"	2"		2'-1"	3'-0"	
24"	9 $\frac{1}{2}$ "	2 $\frac{1}{2}$ "		3'-6"	4'-0"	
30"	1'-0"	3"		4'-5"	5'-0"	
36"	1'-3"	3 $\frac{3}{8}$ "		5'-2"	6'-0"	
42"	1'-9"	3 $\frac{3}{4}$ "		5'-3"	6'-6"	
48"	2'-0"	4 $\frac{1}{4}$ "		6'-0"	7'-0"	
54"	2'-3"	4 $\frac{5}{8}$ "		5'-6"	6'-10"	



Structure excavation and structure backfill included in price paid for flared end section.

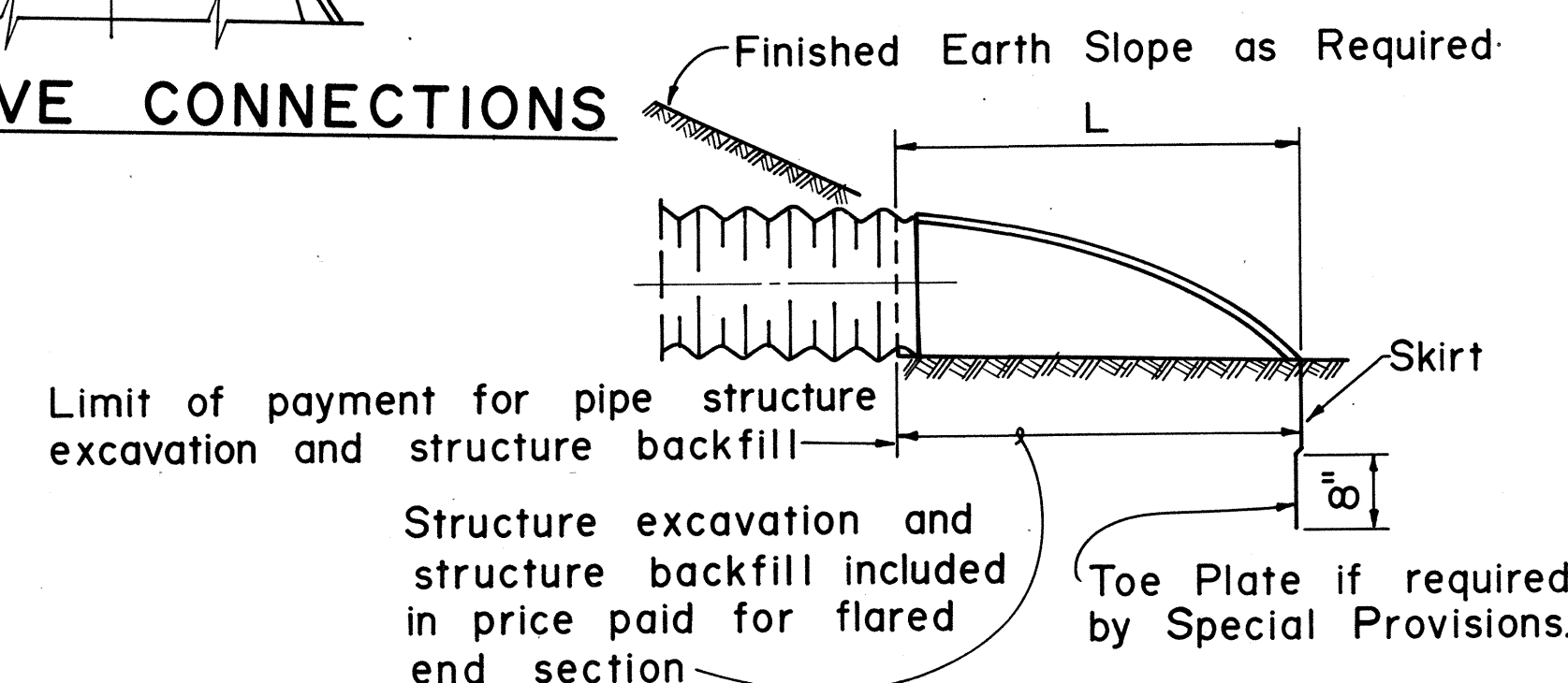
SECTION Y-Y

PRECAST CONCRETE FLARED END SECTION TYPE B



CONNECTIONS WITH ANNULAR CORRUGATIONS

ALTERNATIVE CONNECTIONS



TYPICAL CROSS - SECTION

CIRCULAR PIPES						
PIPE DIA.	THICKNESS	DIMENSIONS-INCHES				
		A	B	H	L	W
		1±	MAX	1±	1 $\frac{1}{2}$ ±	2±
12"	0.064"	6	6	6	21	24
15"	0.064"	7	8	6	26	30
18"	0.064"	8	10	6	31	36
21"	0.064"	9	12	6	36	42
24"	0.064"	10	13	6	41	48
30"	0.079"	12	16	8	51	60
36"	0.079"	14	19	9	60	72
42"	0.109"	16	22	11	69	84
48"	0.109"	18	27	12	78	90
54"	0.109"	18	30	12	84	102
60"	0.109"	18	33	12	87	114
66"	0.109"	18	36	12	87	120
72"	0.109"	18	39	12	87	126
78"	0.109"	18	42	12	87	132
84"	0.109"	18	45	12	87	138

PIPE - ARCHES						
INCHES	THICKNESS	DIMENSIONS-INCHES				
		A	B	H	L	W
		1±	MAX	1±	1 $\frac{1}{2}$ ±	2±
21	15	0.064"	7	10	6	23
24	18	0.064"	8	12	6	28
28	20	0.064"	9	14	6	32
35	24	0.079"	10	16	6	39
42	29	0.079"	12	18	8	46
49	33	0.102"	13	21	9	53
57	38	0.102"	18	26	12	63
64	43	0.102"	18	30	12	70
71	47	0.102"	18	33	12	77
77	52	0.102"	18	36	12	77
83	57	0.102"	18	39	12	77

FLARED END SECTIONS FOR C.M.P. CULVERTS

NO.	REVISION	APPROVED BY	DATE
1.	Replaces Sht. DH 14 approved 12-17-69	H.T.	6/22/79

APPROVAL RECOMMENDED:

P. Nakano
HYDRAULIC DESIGN ENGINEER 6-19-79
DATE

APPROVED:
Robert Zaleski
ASSISTANT CHIEF, ENGINEERING 6-22-79
DATE

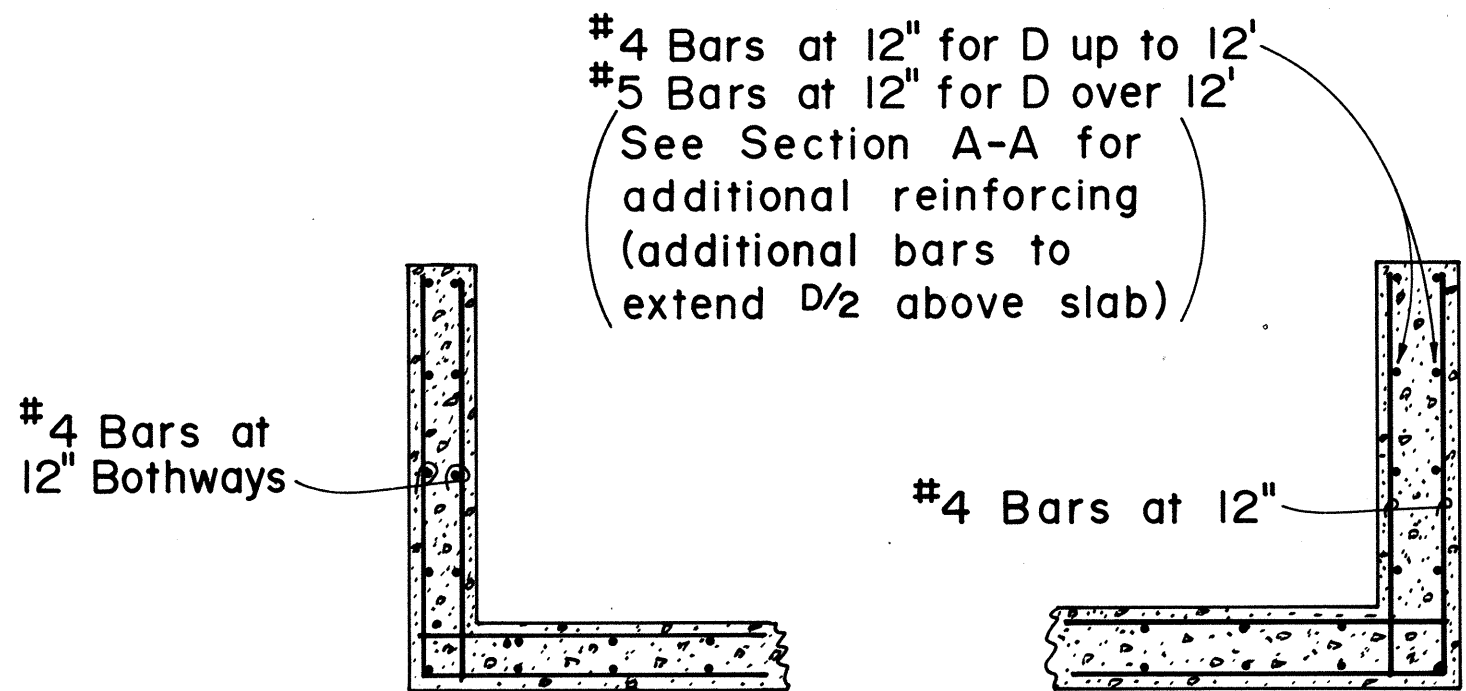
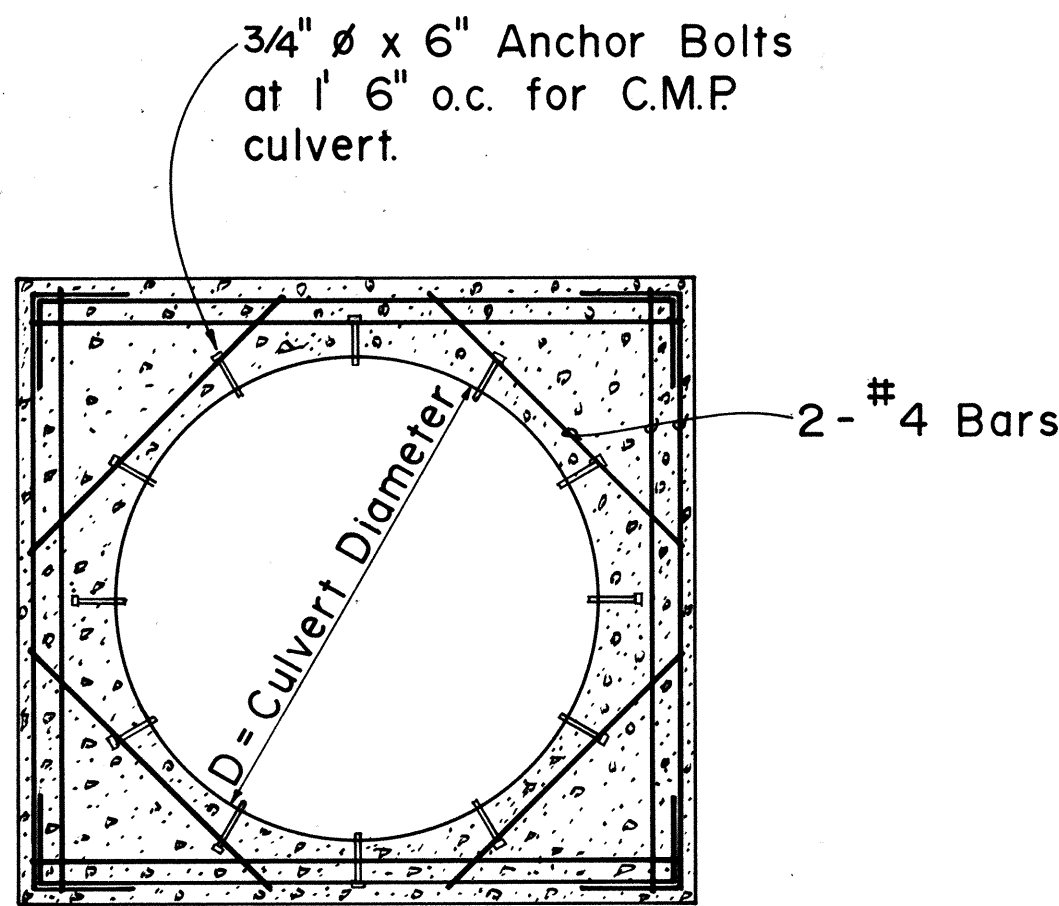
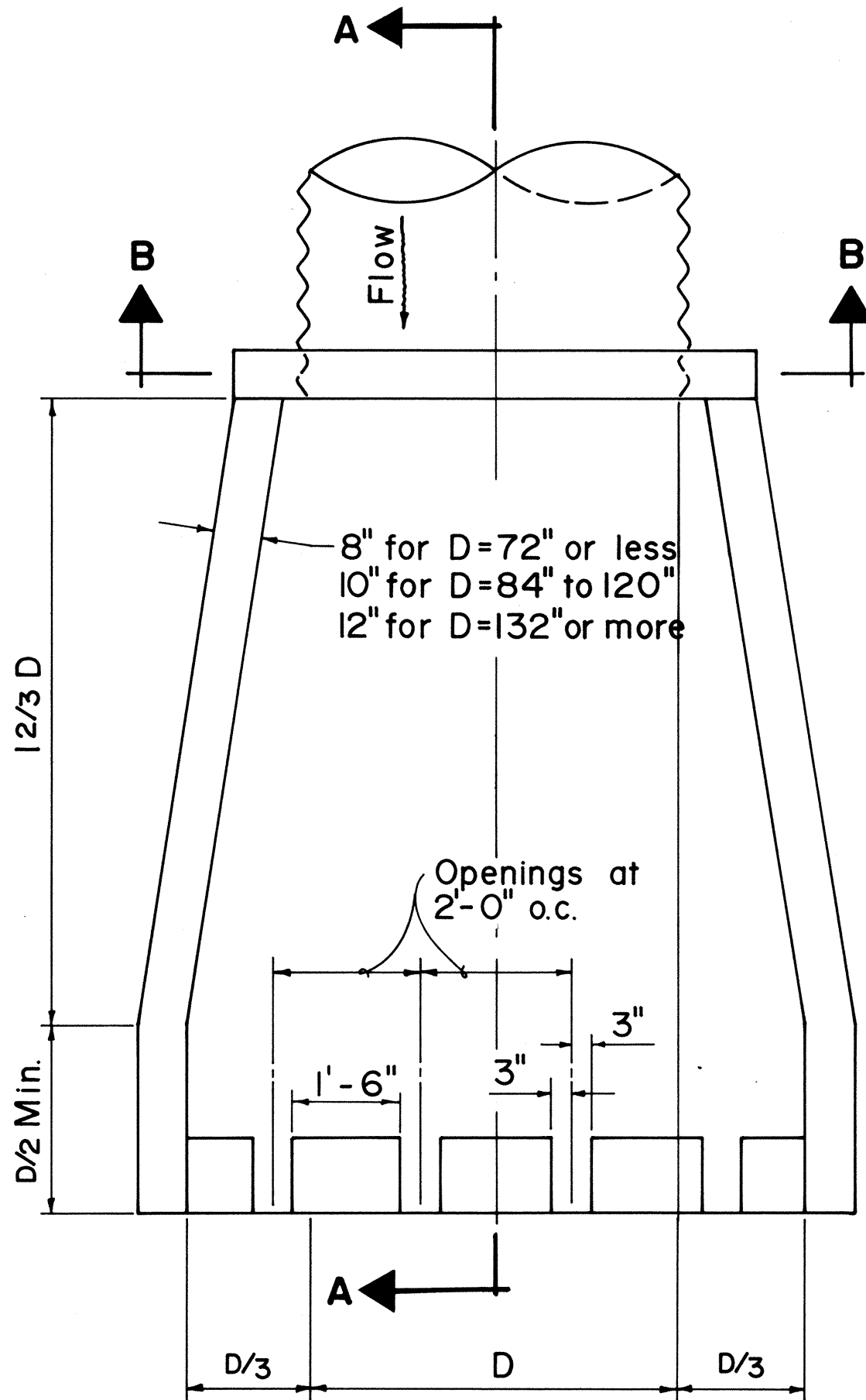
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD DETAILS
FLARED END SECTION
FOR CULVERTS

Not To Scale Date June 1979

SHEET No. 8 OF 10 SHEETS DH 14

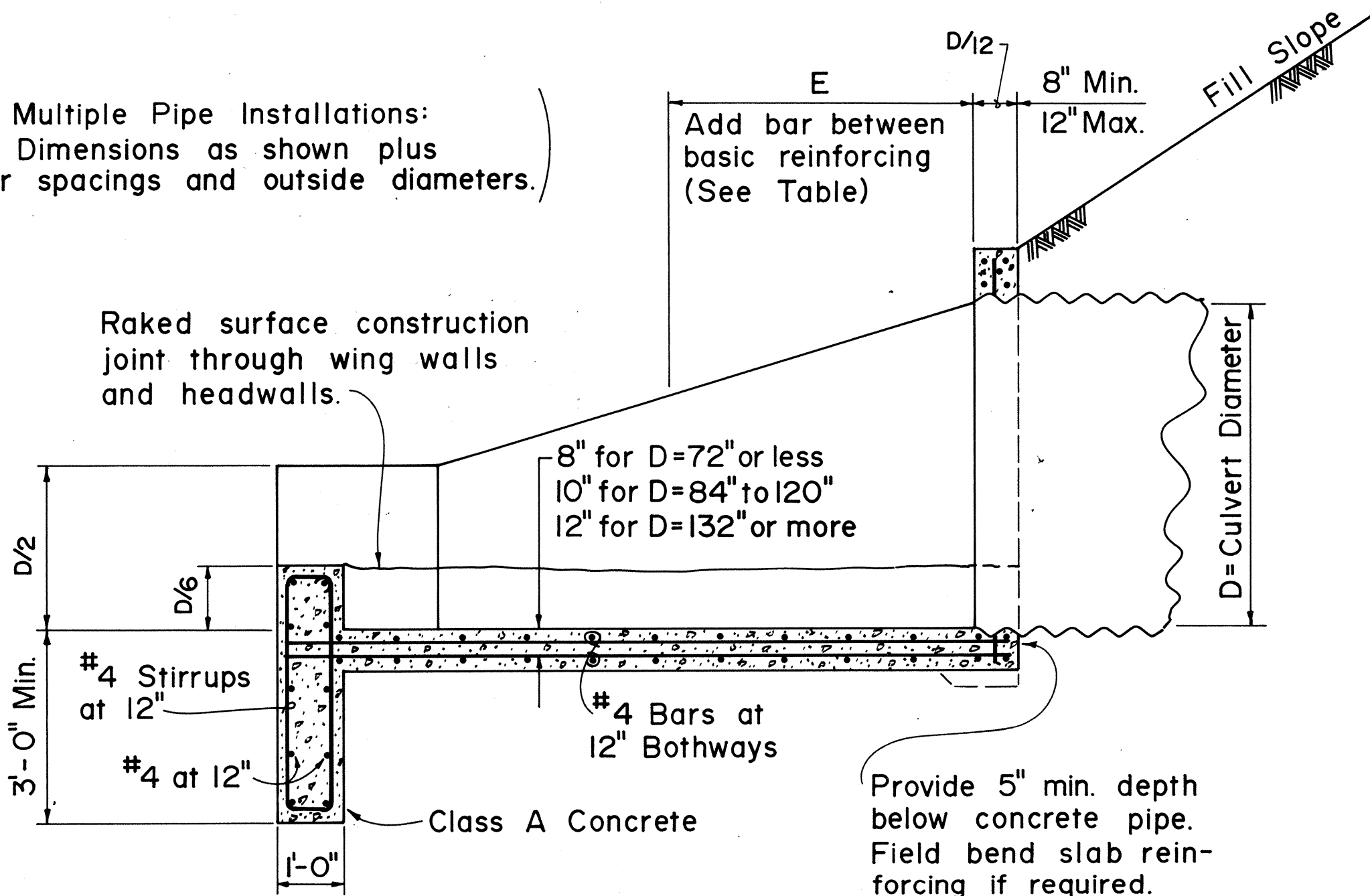
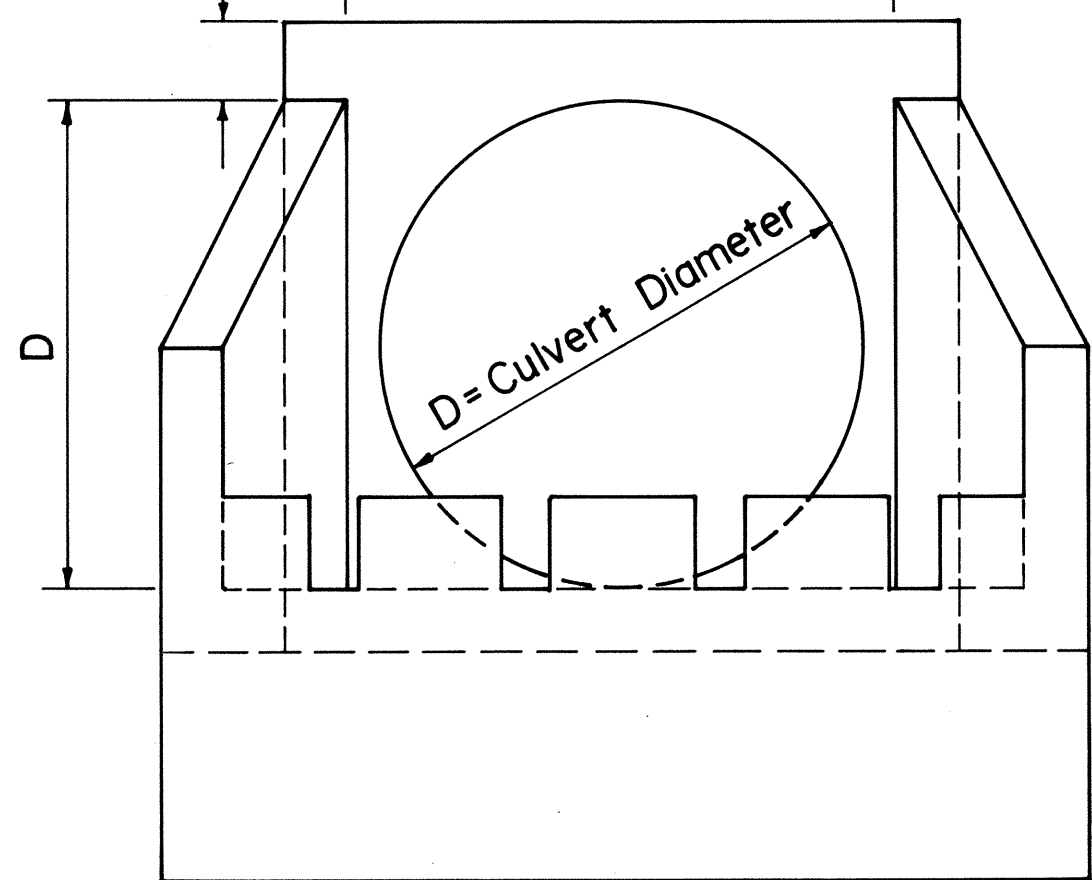
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	M-7600(2)	1980	55	244



10" Min. for C.M.P. Culvert.
Pipe wall thickness + 8" for R.C.P.

$D+4"$ for C.M.P. Culv't.
Outside dia. of pipe for R.C.P.

(For Multiple Pipe Installations: Use Dimensions as shown plus clear spacings and outside diameters.)



CULVERT DIA. (INCHES)	ADD BAR SIZE	E (FEET)
108	#4	3
120	#4	5
144	#5	8
180	#7	11

ADDITIONAL REINFORCING

APPROVAL RECOMMENDED:

P. Sakano 6-19-79
HYDRAULIC DESIGN ENGINEER DATE

APPROVED:

Herbert Zaleishi 6-22-79
ASSISTANT CHIEF, ENGINEERING DATE

NO.	REVISION	APPROVED BY	DATE
1.	Supersedes Sht. DH 15 approved 12-17-69	H.T.	6/22/79

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD DETAILS
OUTLET STRUCTURE

Not To Scale Date: Dec. 1977

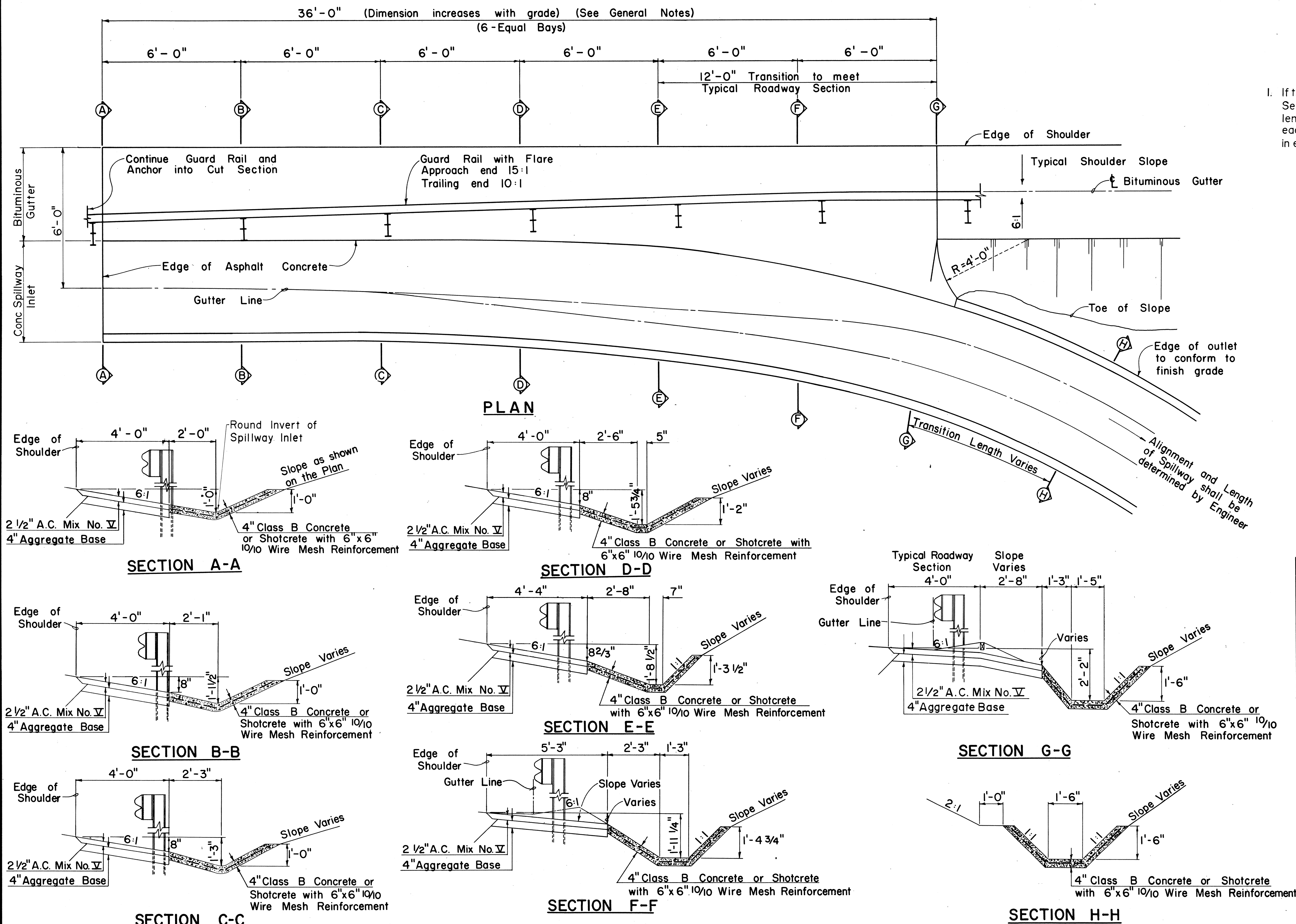
OUTLET STRUCTURE FOR CULVERT SIZES 48 IN. TO 180 IN. DIAMETER

SURVEY PLOTTED BY	DATE
DRAWN BY	
TRACED BY	
DESIGNED BY	
CHECKED BY	
ORIGINAL PLAN	
NOTE BOOK	
No.	

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	M-7600(2)	1980	56	244

GENERAL NOTES

- If the average grade of pavement for the length from Section A-A to Section G-G exceeds 2%, this length shall be increased in increments of 6' for each 1% increase in average grade of pavement in excess of 2%.



NO.	REVISION	APPROVED BY	DATE
1.	Round invert of spillway inlet.	H.T.	6/22/79

APPROVAL RECOMMENDED:		10-13-76
<i>G. Pakano</i>	HYDRAULIC DESIGN ENGINEER	DATE
APPROVED:		10-14-76
<i>Harbert S. Zakeishi</i>	ASSISTANT CHIEF, ENGINEERING	DATE

STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION
STANDARD DETAILS
CONCRETE SPILLWAY INLET
Scale: 1/2" = 1'-0" Date: October, 1976
SHEET No. 10 OF 10 SHEETS DH 20