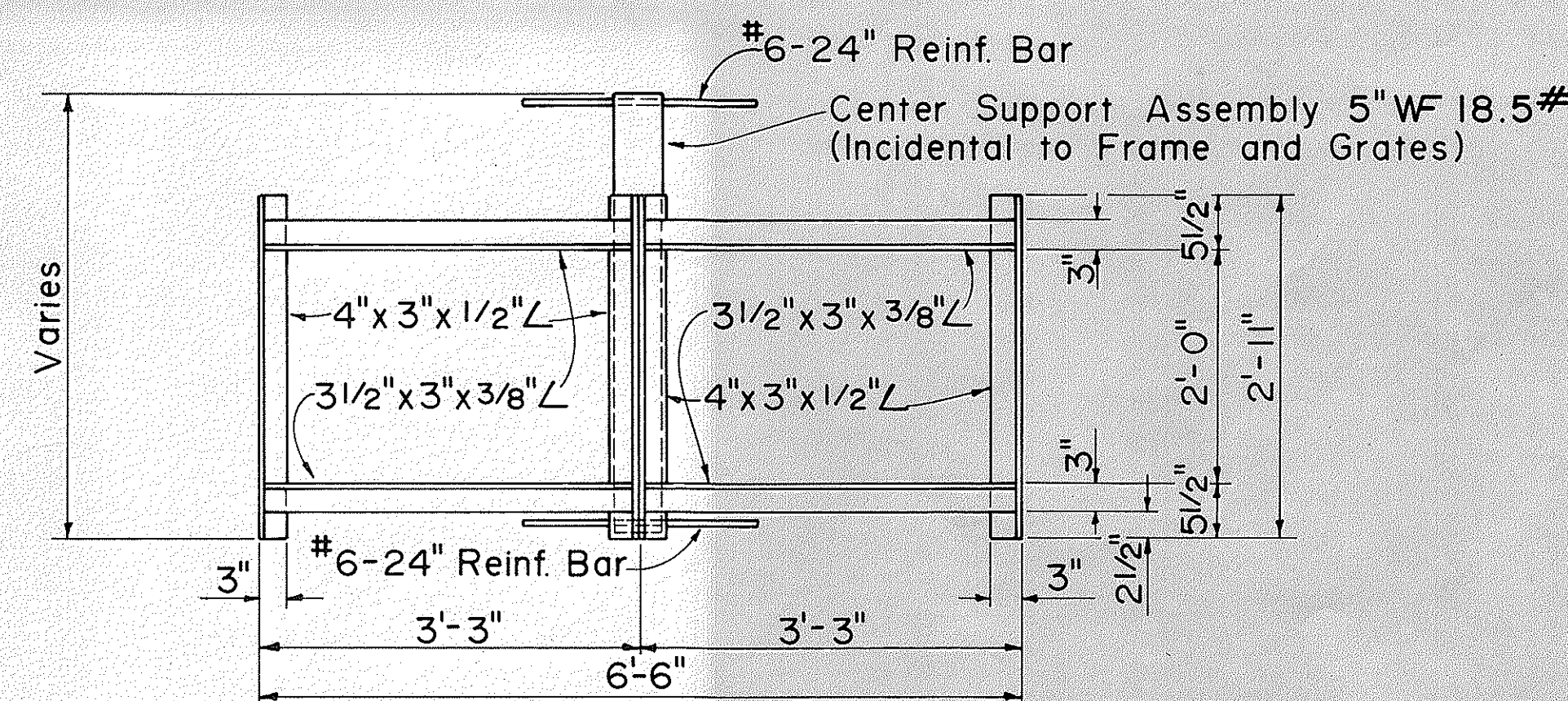
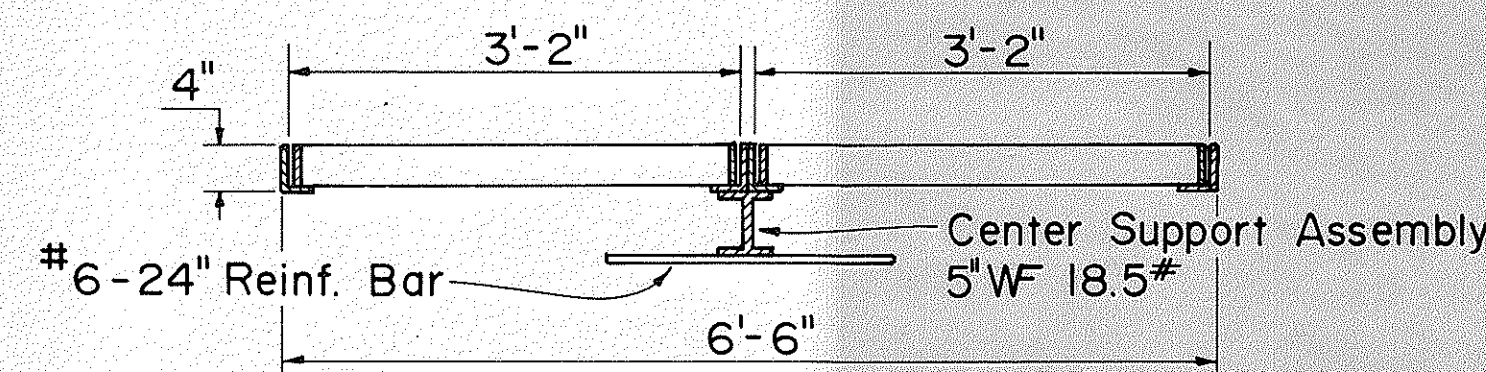


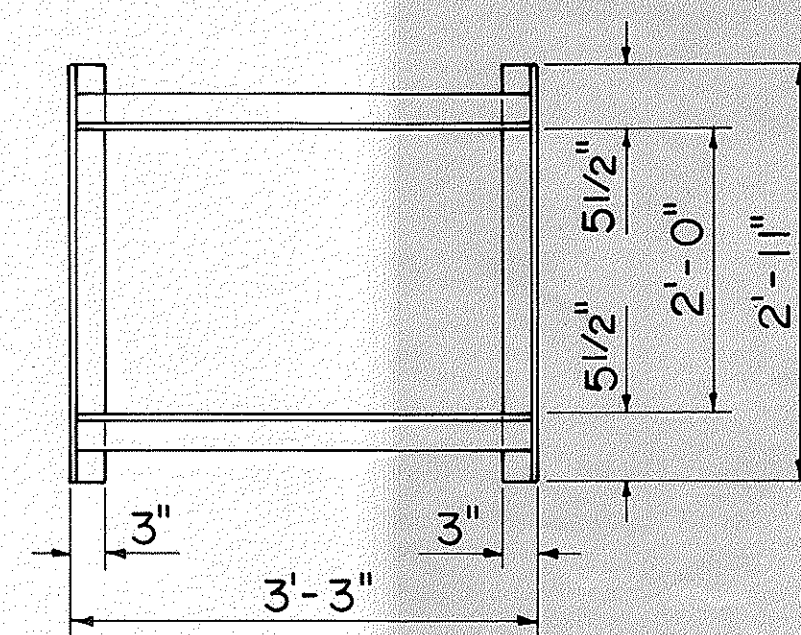
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	RS-0900(14)	1981	7	1011



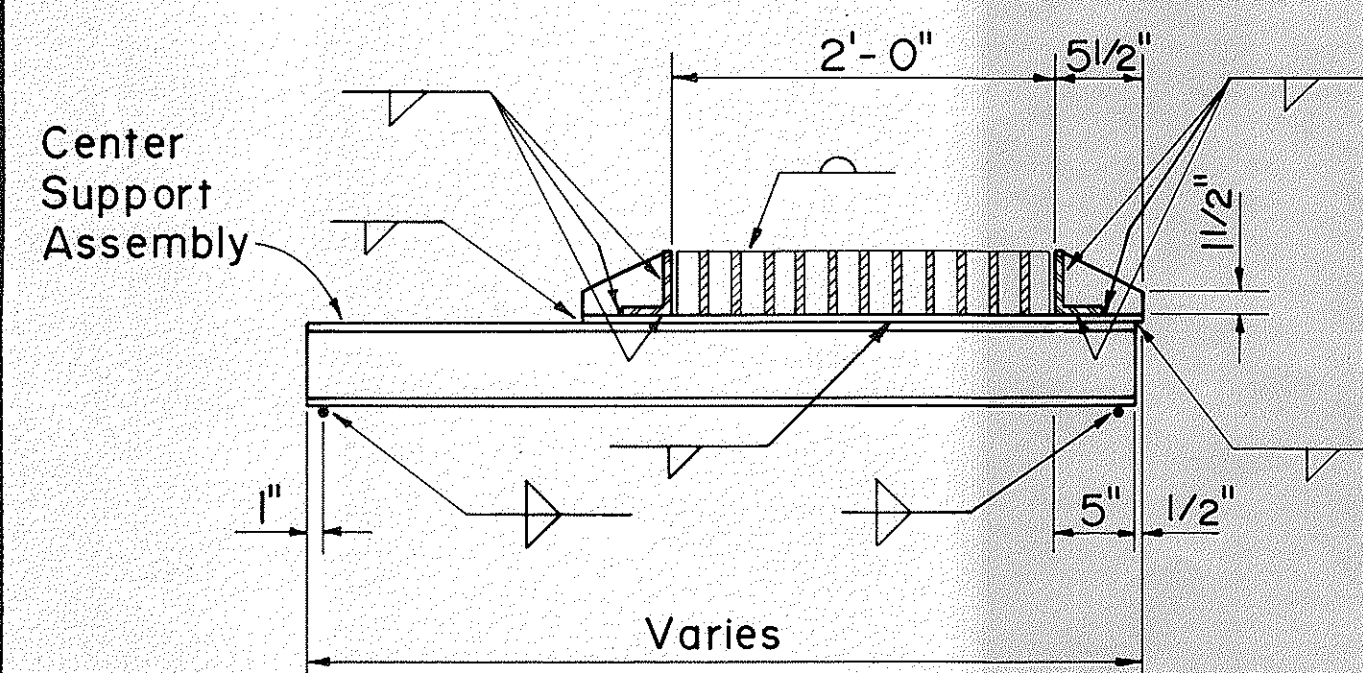
PLAN
(Two or More Grates)



LONGITUDINAL SECTION
(Thru Frame & Grate)

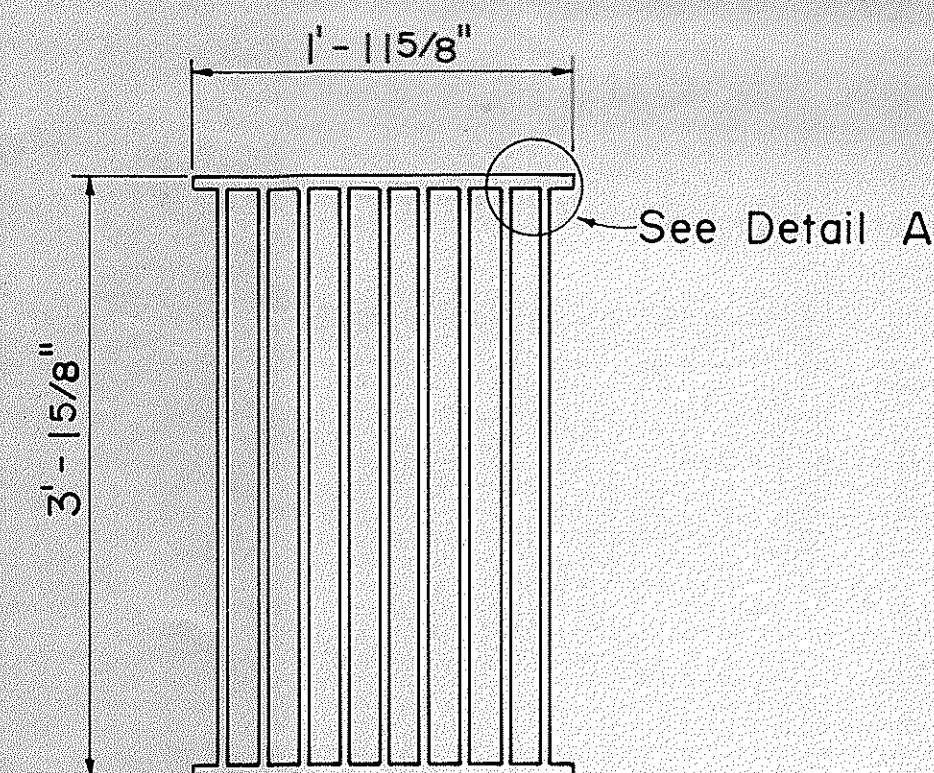


PLAN
(Single Grate)

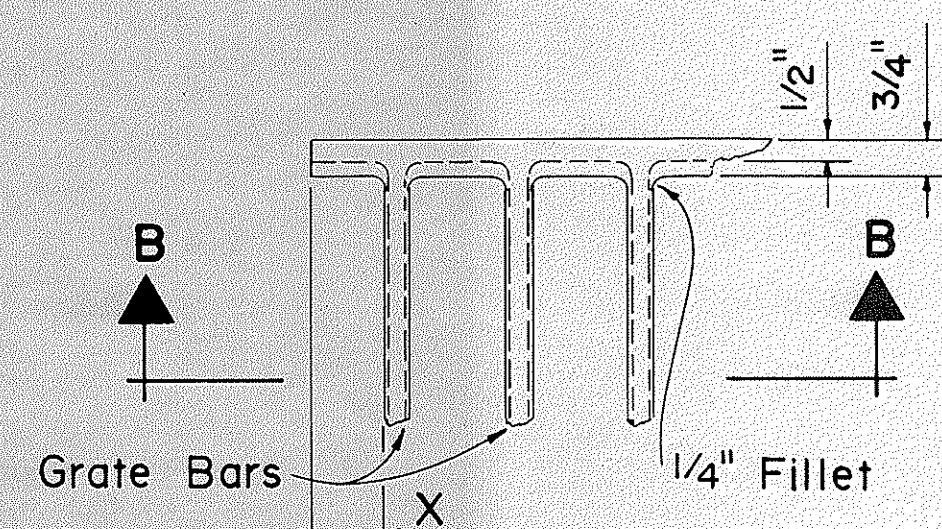


CROSS SECTION
(Thru Frame & Grate)

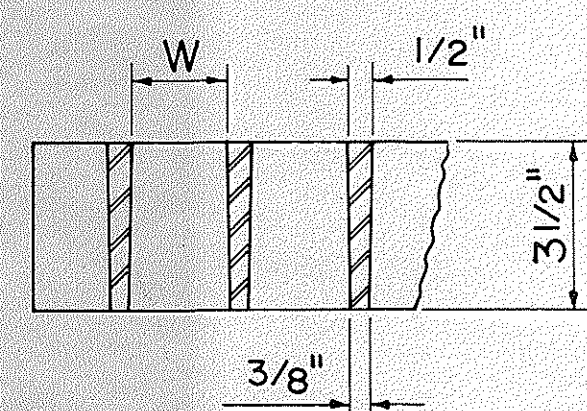
FRAME DETAILS



PLAN

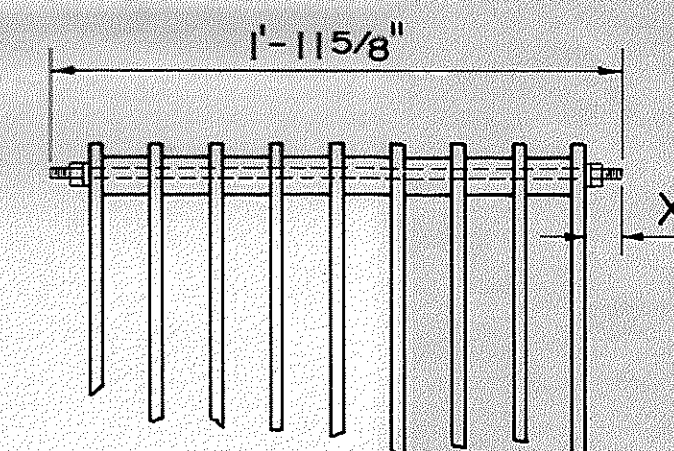


DETAIL A

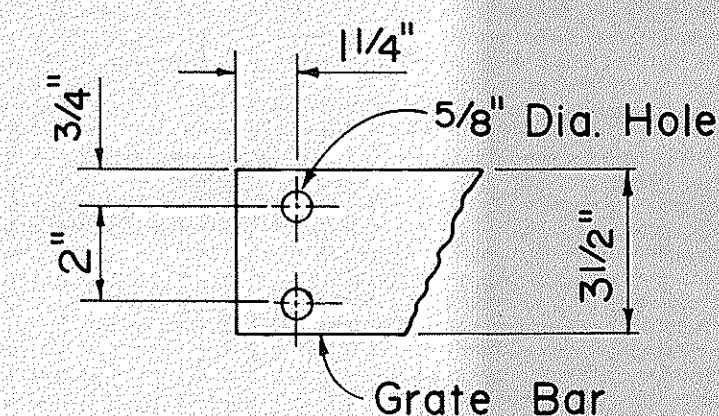


SECTION B-B

ALTERNATIVE CAST MALLEABLE IRON
OR CAST STEEL GRATE

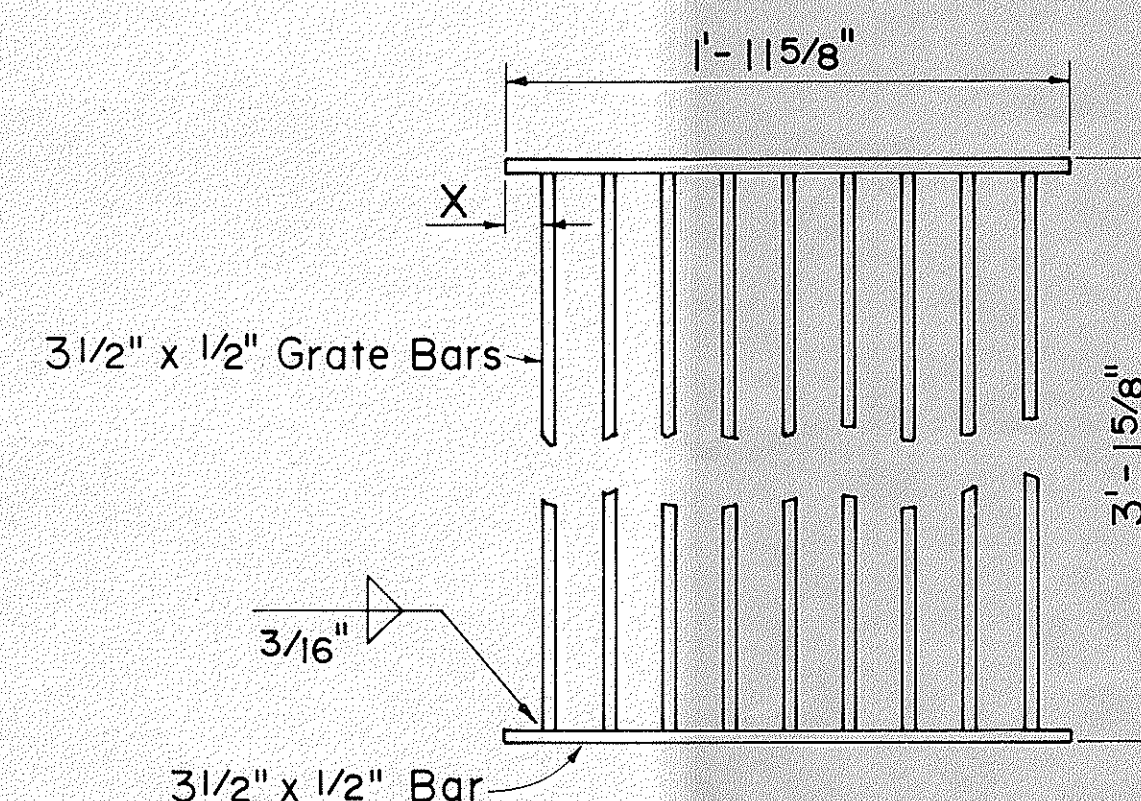


BOLTED END BLOCK



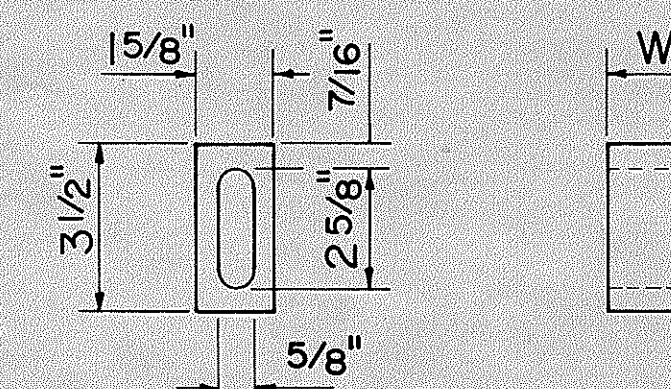
END OF BAR

ALTERNATIVE BOLTED GRATE

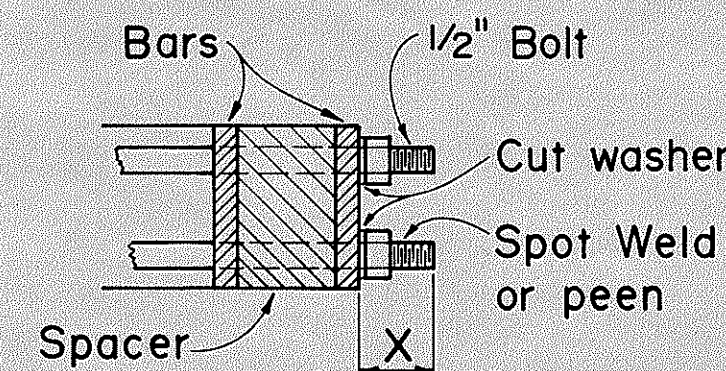


PLAN

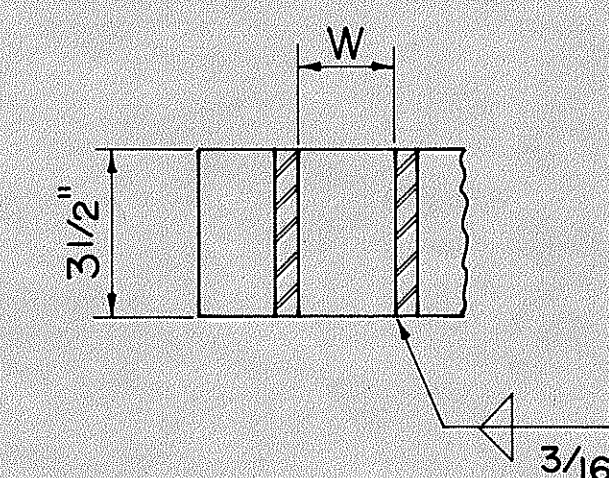
ALTERNATIVE WELDED GRATE



BAR SPACER



BOLTING DETAIL



SECTION

GENERAL NOTES

- Contractor has the option of using cast malleable iron, cast steel, welded, or bolted grate.
- All welds 3/8" unless otherwise noted.
- Type A-9 - Use in locations off the roadbed on all types of highways.
- Type A-12 - Use within the roadbed on all types of highways.

APPROVAL RECOMMENDED:
 HYDRAULIC DESIGN ENGINEER
 APPROVED:
 ASSISTANT CHIEF, ENGINEERING

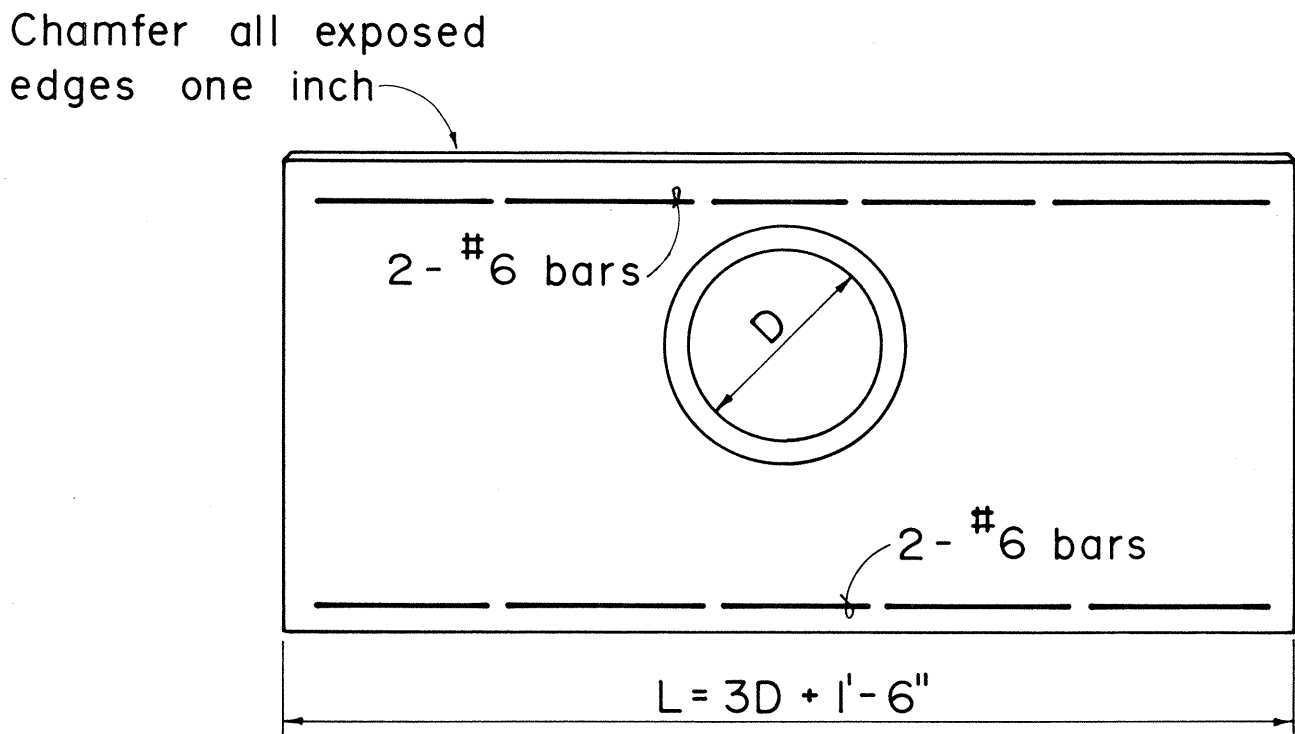
GRATE BAR SPACING TABLE			
TYPE	NO. BARS	CLEAR BAR SPACING-W	X
A-9	9	2"	1 9/16"
A-12	12	1 3/8"	1 1/4"

NO.	REVISION	APPROVED BY	DATE
1.	Supersedes Sht. DH 7 approved 12-17-69	H.T.	6/22/79

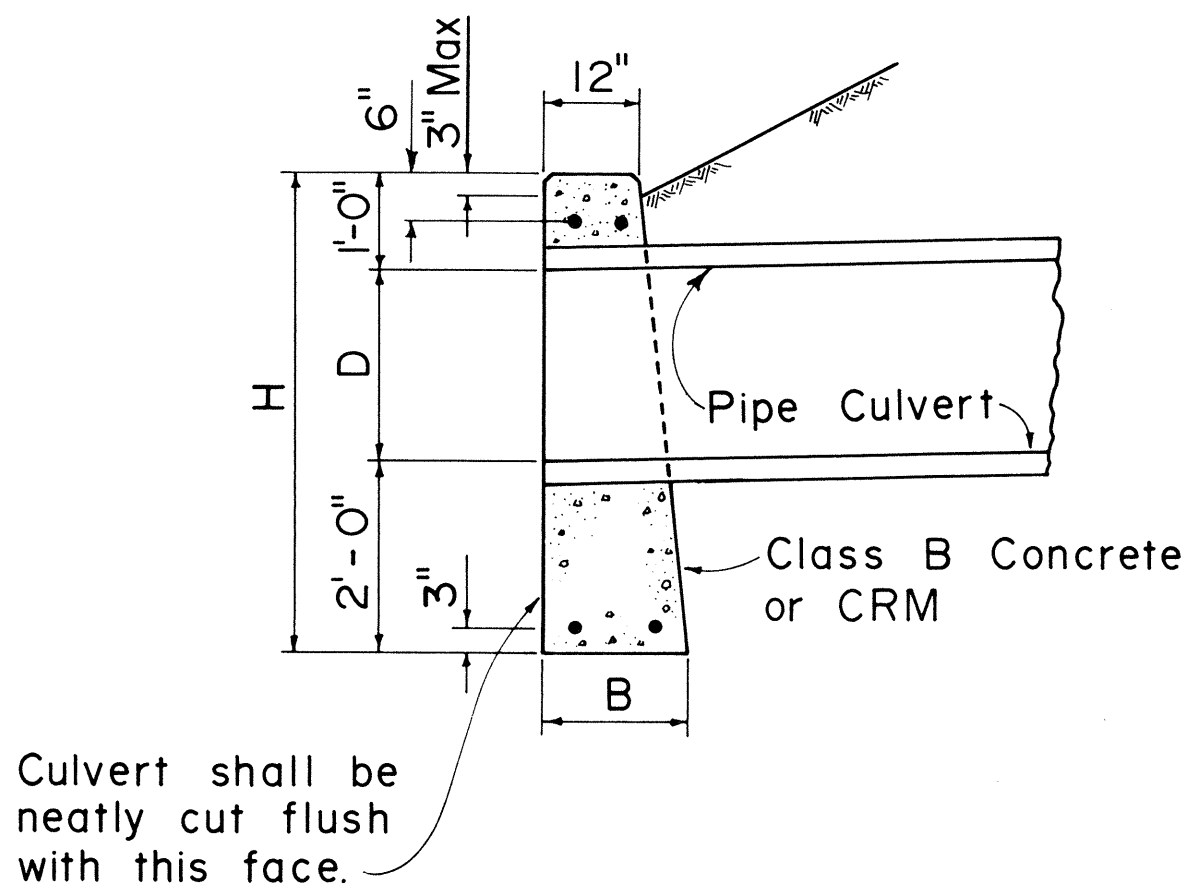
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION	
STANDARD DETAILS	
TYPE A-9 AND A-12 FRAMES AND GRATES	
Not To Scale	Date: Dec. 1977
SHEET NO. 1 OF 4 SHEETS DH 7	

SURVEY PLOTTED BY	DATE
DRAWN BY	
CHECKED BY	
NOTE BOOK	
NO.	

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	RS-0900(14)	1981	8	1011



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

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

APPROVAL RECOMMENDED:
T. Takano
 HYDRAULIC DESIGN ENGINEER
 6-19-79
 DATE

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

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

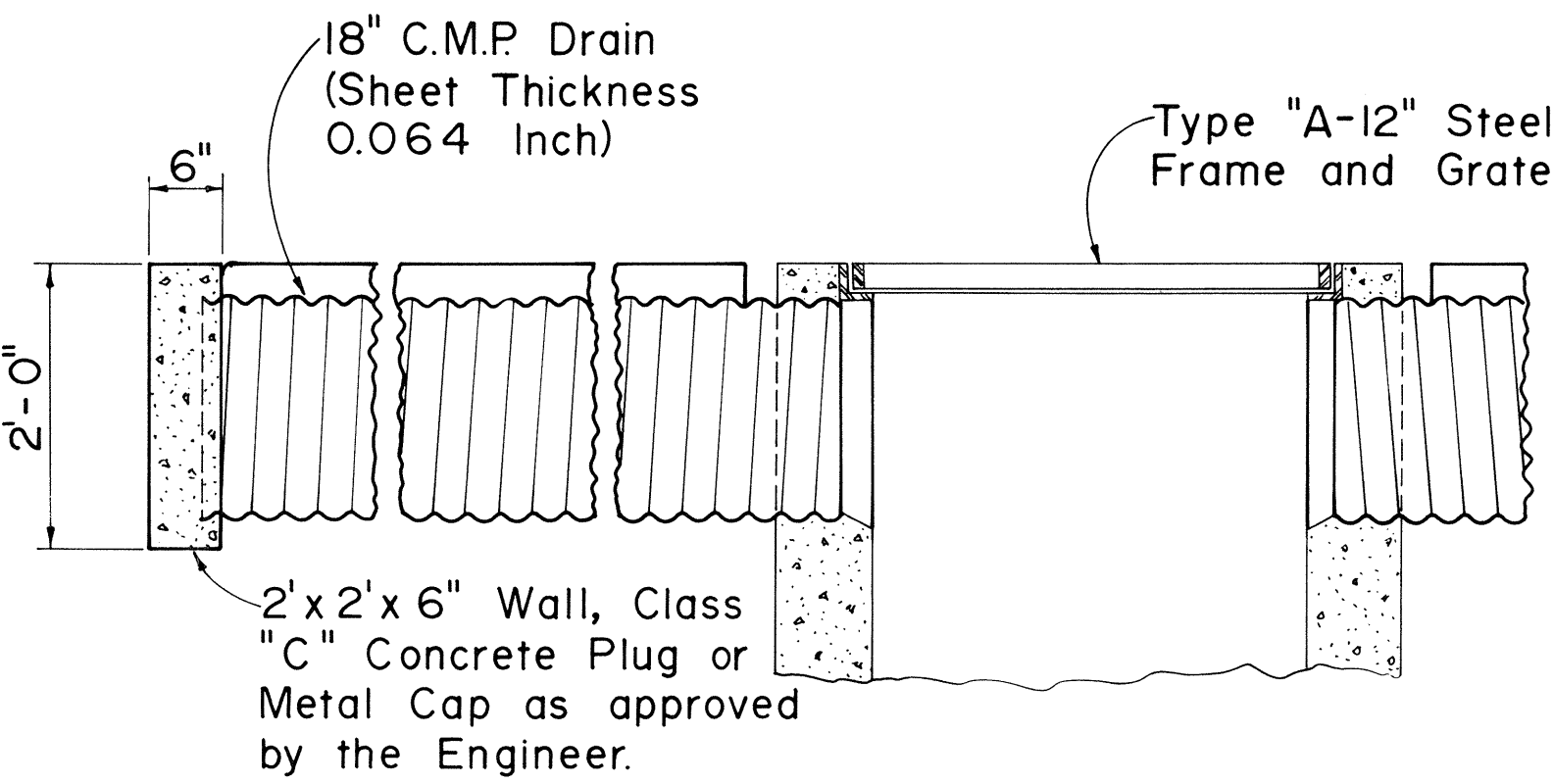
STATE OF HAWAII
 DEPARTMENT OF TRANSPORTATION
 HIGHWAYS DIVISION

STANDARD DETAIL
 CONCRETE OR CEMENT
 RUBBLE MASONRY HEADWALLS

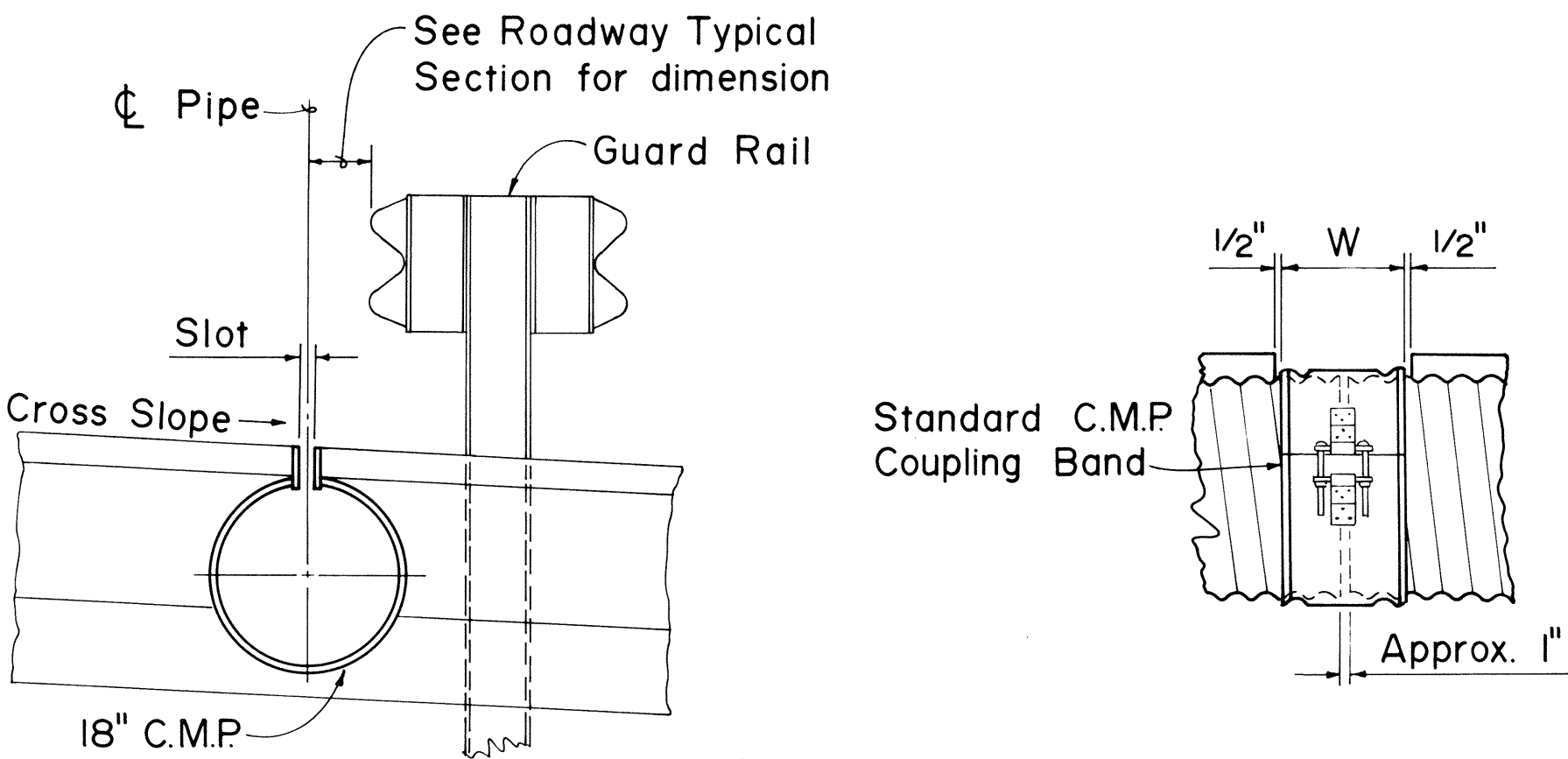
Not To Scale
 Date: June 1979

SHEET No. 2 OF 4 SHEETS DH10

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	RS-0900(4)	1981	9	10-11

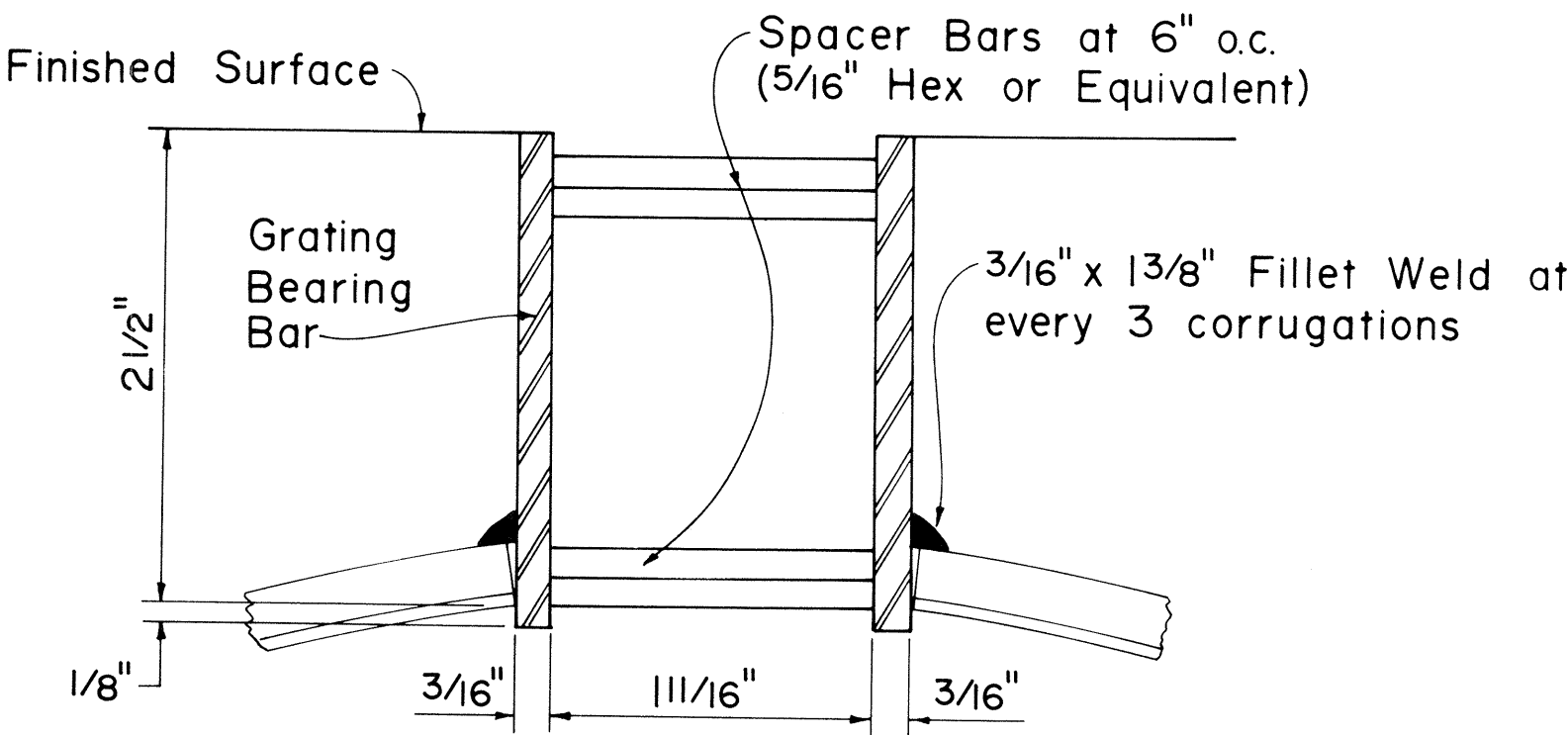


TYPICAL DRAIN CONNECTION



JOINT DETAIL

TYPICAL CROSS SECTION



TYPICAL SLOT SECTION

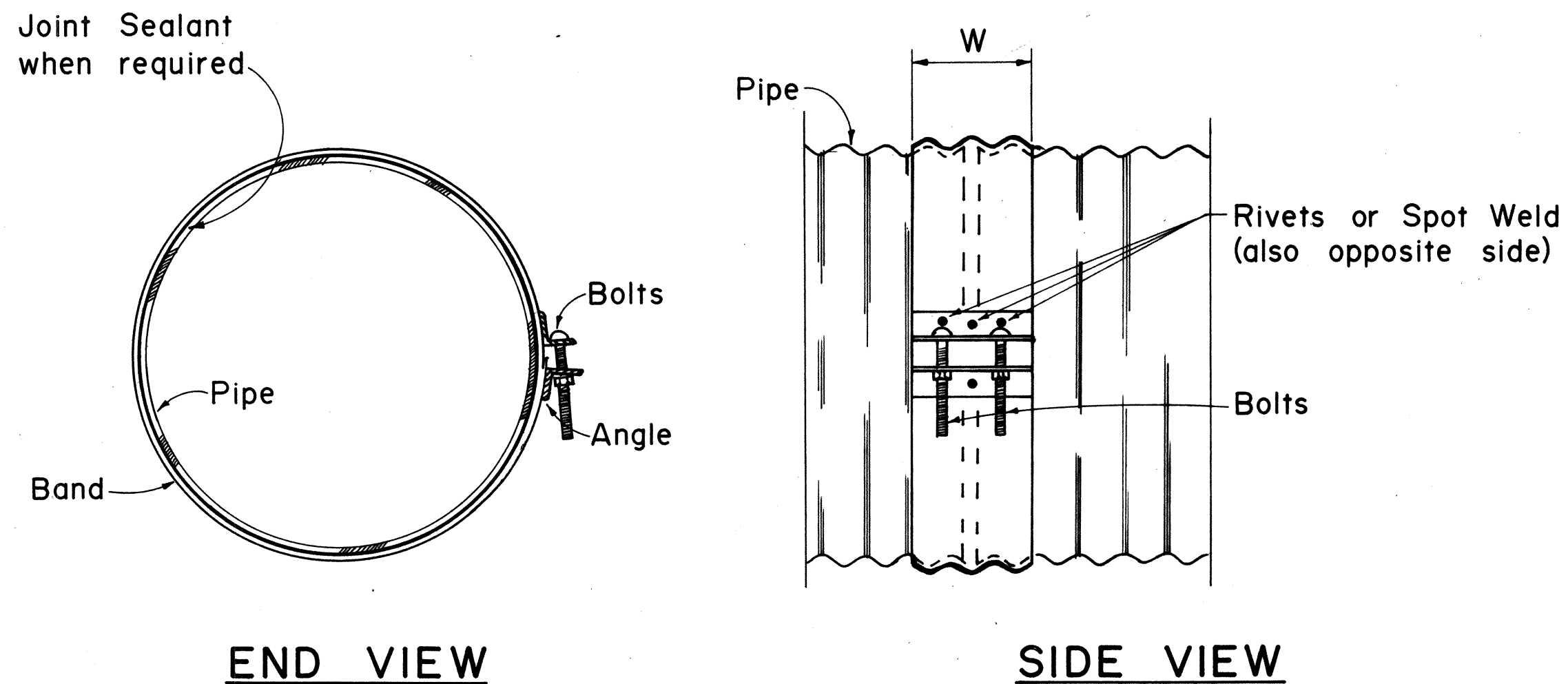
18" SLOTTED C.M.P. DRAIN

APPROVAL RECOMMENDED:
P. Takano 6-19-77
 HYDRAULIC DESIGN ENGINEER DATE
 APPROVED:
Herbert Zaleski 6-22-77
 ASSISTANT CHIEF, ENGINEERING DATE

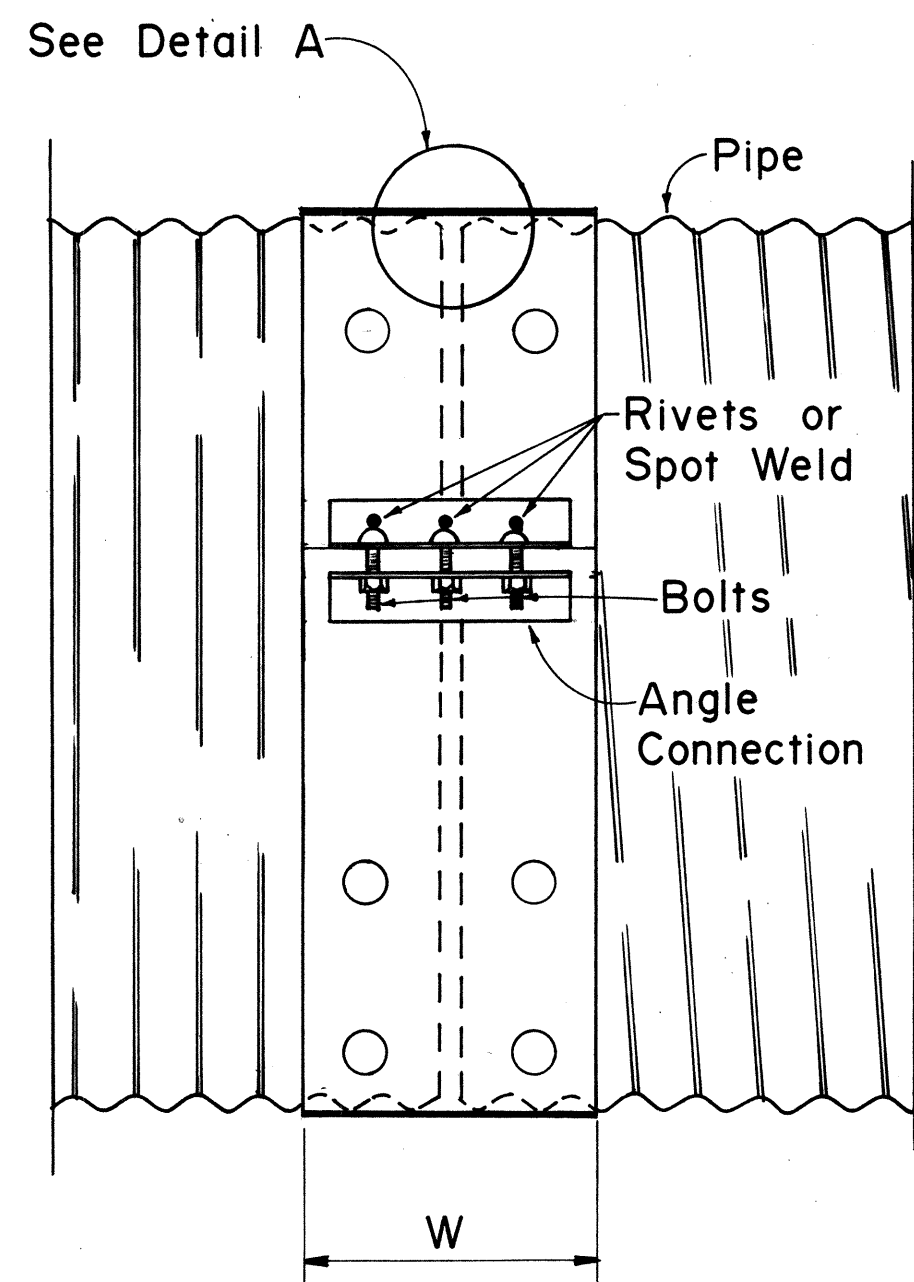
NO.	REVISION	APPROVED BY	DATE
1.	Supersedes Sht. DH 17 approved 6 - 3 - 76	H.H.	6/22/77

STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION
STANDARD DETAILS 18" SLOTTED C.M.P. DRAIN
Not To Scale Date: Dec. 1977

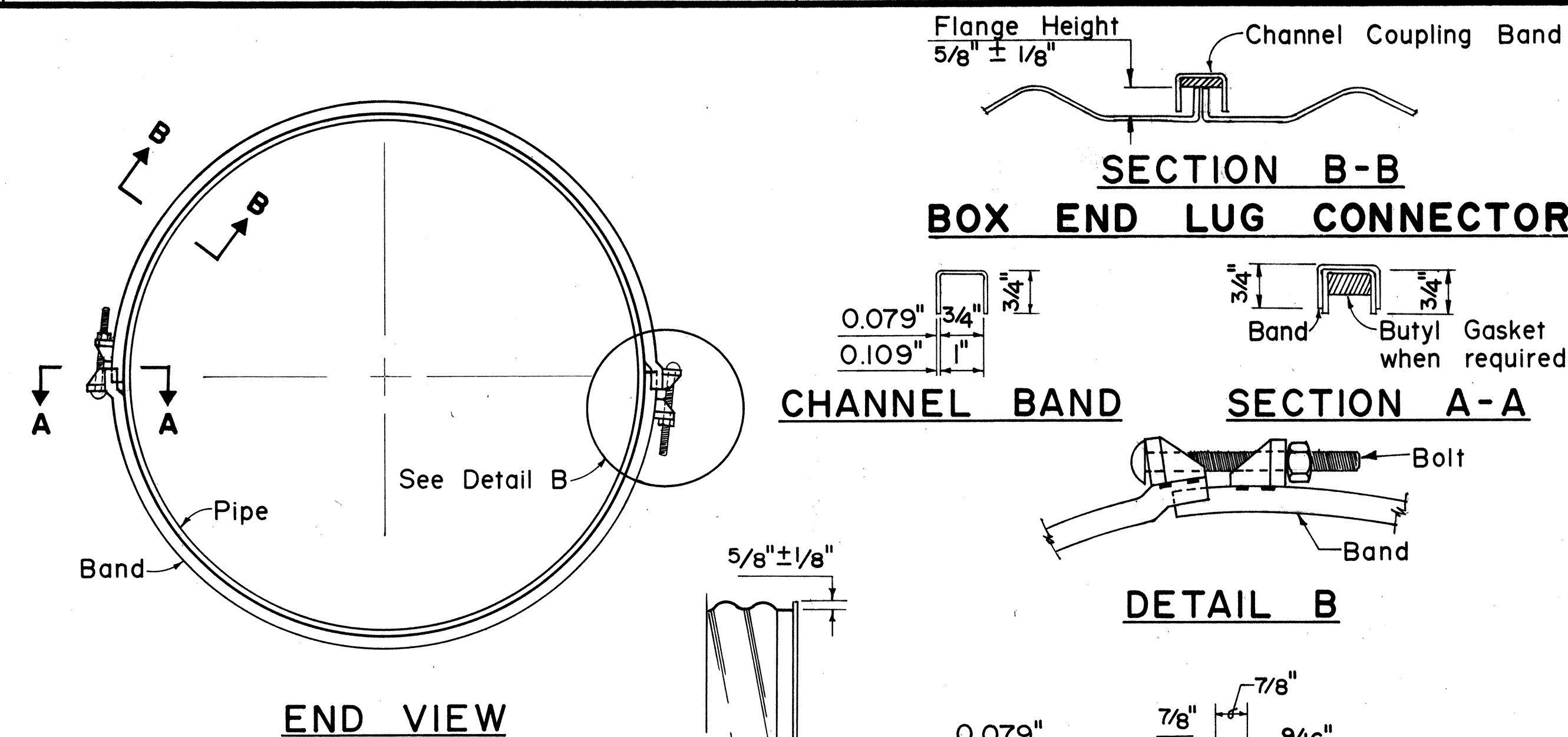
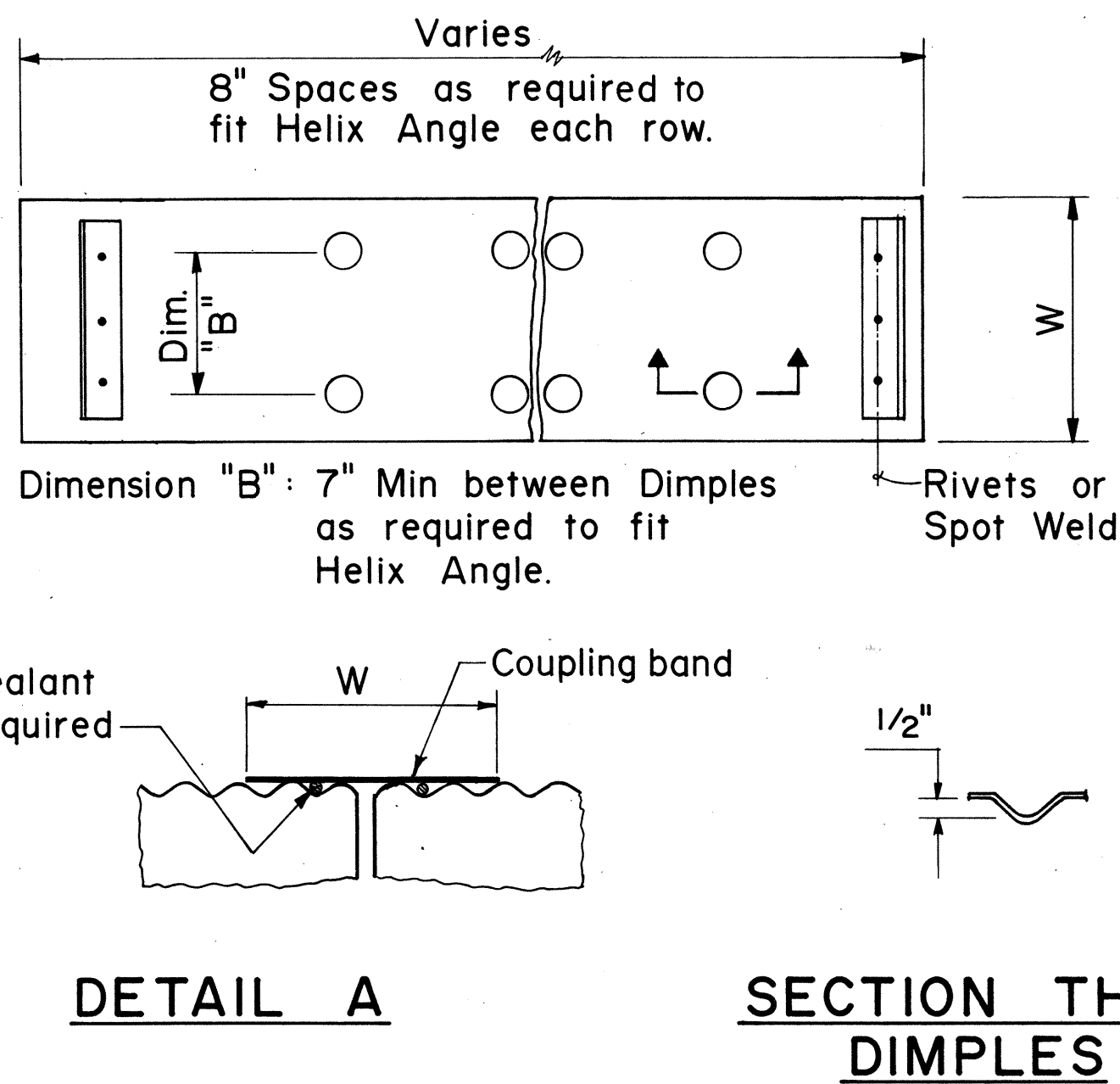
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	RS-0900(14)	1981	10	10-11



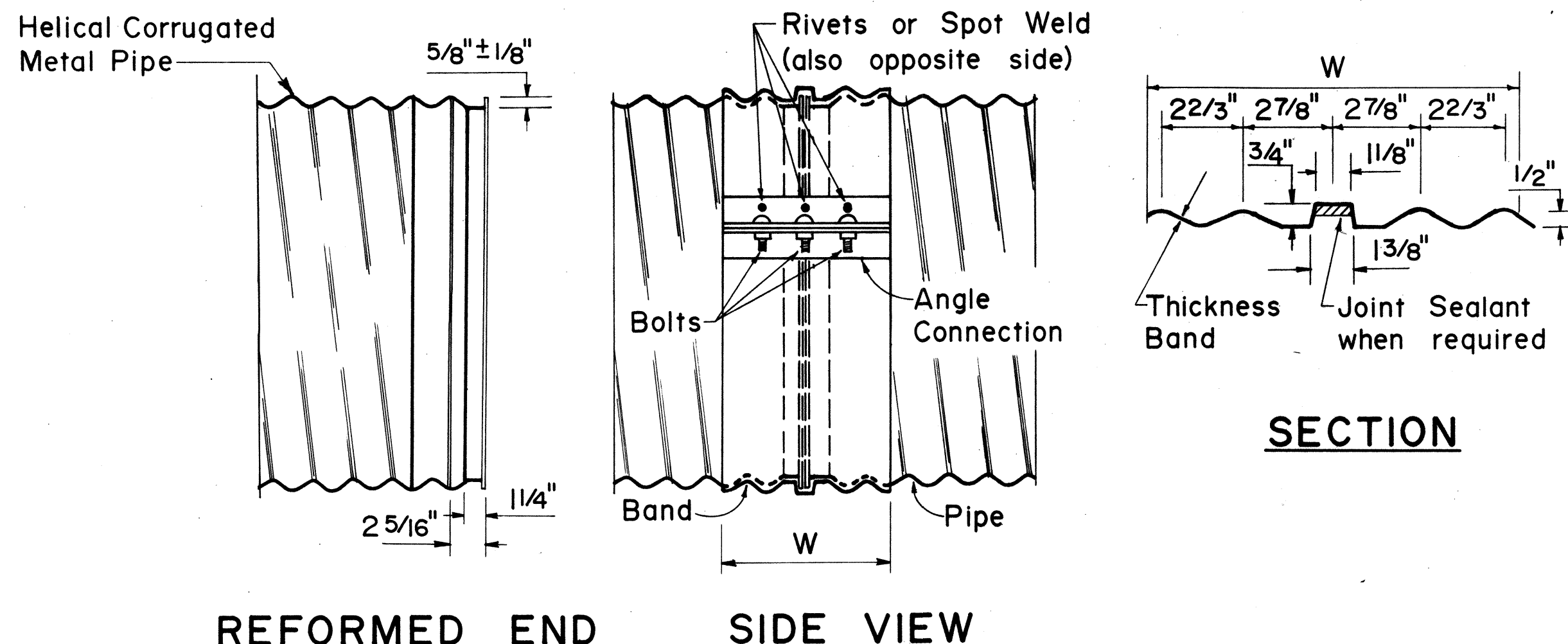
ANNULAR COUPLING BAND



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

- All coupling band connection hardware shall be galvanized or electro plated in accordance with Standard Specifications.
- For pipe arches use same width band as for round pipe of same periphery.
- Two pieces band required for pipe greater than 48" diameter.
- Fillet welds of equivalent strengths may be substituted for spot welds or rivets.
- Dimensions and thickness shown are in inches and are nominal.
- 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 2x2x3/16 x 7	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 2x2x3/16 x 7	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	2 2/3 x 1/2	12 - 36	7	0.079-0.138	2ea 2x2x3/16x 7	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
		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
		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:
 9-1-79
 HYDRAULIC DESIGN ENGINEER DATE
 APPROVED:
 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