

# DRAINAGE SUMMARY

## ESTIMATED QUANTITIES

PROJECT: KAMEHAMEHA HWY., WAHIAWA AVOCADO ST. TO KILANI AVE.

PROJECT NO.: F-F-080-1(5)

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-F-080-1(5)	1980	40	121

ITEM NO.	UNIT USED	206	503	508	602	603	603	603	603	603	603	603	604	604	604	604	
		1000	0010	0100	1000	1010	6180	6379	7220	7340	7380	7500	0370	2150	2160	2170	
		C.Y.	C.Y.	C.Y.	Lb.	L.F.	L.F.	L.F.	L.F.	L.F.	L.F.	L.F.	L.F.	Ea.	Ea.	Ea.	
TYPE OF STRUCTURE	STATION (FROM - TO)	Structure Excavation other than at Bridges	Class A Concrete other than in Bridges	Cement Rubble Masonry	Reinforcing Steel other than in Bridges	24 inch RCP, Class III	54 inch CMP, sht. "1" 0.109" or 48 inch RCP, Class III	66 inch CMP, sht. "1" 0.109" or 60 inch RCP, Class III	24 inch CMP, sht. "1" 0.109" or 24 inch RCP, Class III or 24 inch ACP, Class III	30 inch CMP, sht. "1" 0.109" or 30 inch RCP, Class III or 30 inch ACP, Class III	36 inch CMP, sht. "1" 0.109" or 30 inch RCP, Class III or 30 inch ACP, Class III	42 inch CMP, sht. "1" 0.109" or 36 inch RCP, Class III or 36 inch ACP, Class III	PRE-CAST CONCRETE STORM DRAIN MANHOLE	Type A Cast Iron Frame and Cover	Type B Cast Iron Frame and Cover	Type C Cast Iron Frame and Cover	
SDMH	± STA. 76+24% 275 RT.	256	10.6		1200			38									
TYPE "IA-40" C.B.	B STA. 76+34.55% 437 RT.	52	16.1		1866				14				1				
TYPE "IA-20" C.B.	± STA. 77+21 RT.	329	12.9		1622		94						1				
TYPE "IA-40" C.B.	± STA. 79+56 RT.	770	13.1		1645		236						1				
TYPE "IA-40" C.B.	± STA. 80+98 RT.	437	16.8		2035		134						1				
TYPE "IA-20" C.B.	± STA. 82+40 RT.	391	12.5		1545							138	1				
TYPE "IA-20" C.B.	± STA. 84+10 RT.	383	11.0		1366							166	1				
TYPE "IA-20" C.B.	± STA. 85+65 RT.	368	11.4		1387							150	1				
TYPE "ID-6" C.B.	± STA. 86+60 RT.	197	7.9		976						90		1				
PRE-CAST SDMH	± STA. 88+00% 34 RT.	339	2.1		238						136		2		1		
TYPE "IC-20" C.B.	± STA. 88+03.55% 442 RT.	61	12.3		1435				10				1				
TYPE "IA-20" C.B.	± STA. 89+50 RT.	638	11.5		1370				144				1				
TYPE "IC-20" C.B.	± STA. 91+69 RT.	420	10.5		1266				216				1				
TYPE "IA-20" C.B.	± STA. 92+50 RT.	152	10.5		1266				76				1				
TYPE "IA-20" C.B.	± STA. 93+98 RT.	278	10.8		1266			152					1				
TYPE A C.B.	± STA. 77+71 LT.	210	11.6		155			82						1			
TYPE A C.B.	± STA. 82+45 LT.	204	11.2		155			66						1			
CRM HEADWALL AND CULVERT EXTENSION	± STA. 98+58 LT.	15		26		14											

DATE: \_\_\_\_\_ REVISION: \_\_\_\_\_



FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-F-080-1(5)	1980	41	123

True North

DATE	
DESIGNED BY	
DRAWN BY	
CHECKED BY	
NO. OF SHEETS	
NO.	

**CURVE DATA**

	1	3	4
Δ	31° 20' 30"	90° 00' 00"	90° 00' 00"
R	300.00'	30.00'	30.00'
T	84.16'	30.00'	30.00'
C	162.07'	42.43'	42.43'
L	164.10'	47.12'	47.12'

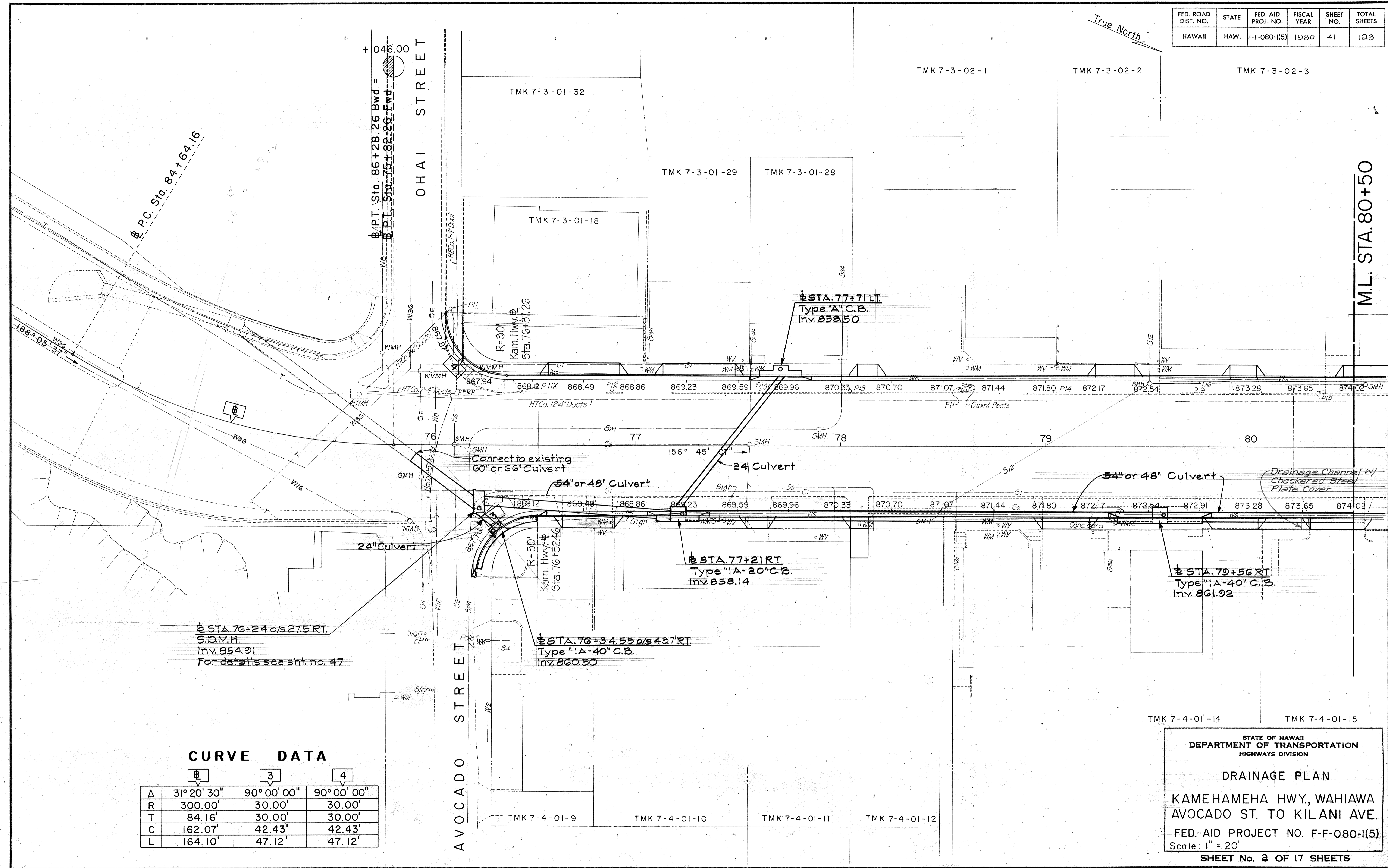
STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

**DRAINAGE PLAN**

KAMEHAMEHA HWY, WAHIAWA  
AVOCADO ST. TO KILANI AVE.

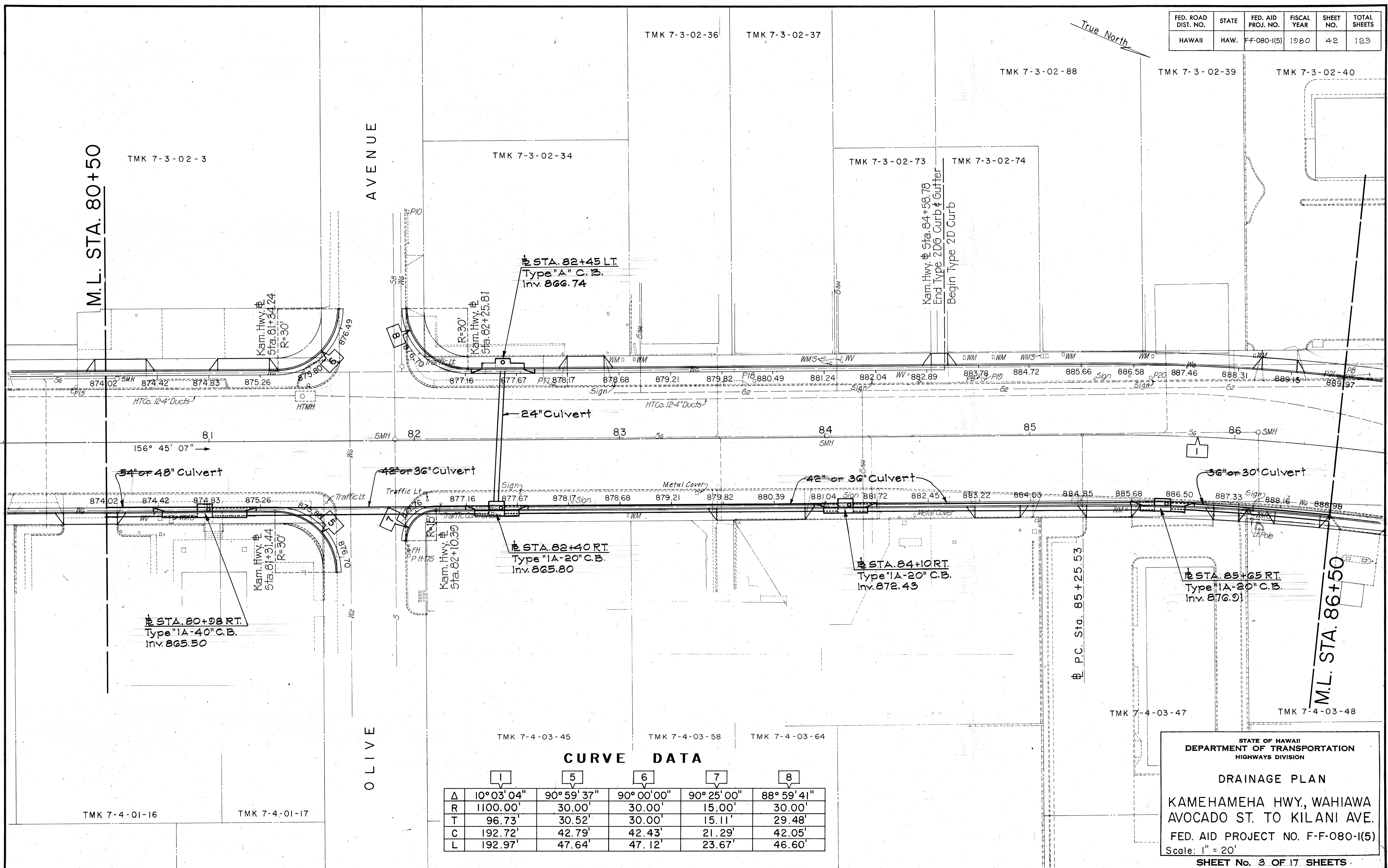
FED. AID PROJECT NO. F-F-080-1(5)  
Scale: 1" = 20'

SHEET No. 2 OF 17 SHEETS





FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-F-080-1(5)	1980	42	123



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

**CURVE DATA**

	1	5	6	7	8
Δ	10° 03' 04"	90° 59' 37"	90° 00' 00"	90° 25' 00"	88° 59' 41"
R	1100.00'	30.00'	30.00'	15.00'	30.00'
T	96.73'	30.52'	30.00'	15.11'	29.48'
C	192.72'	42.79'	42.43'	21.29'	42.05'
L	192.97'	47.64'	47.12'	23.67'	46.60'

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

**DRAINAGE PLAN**

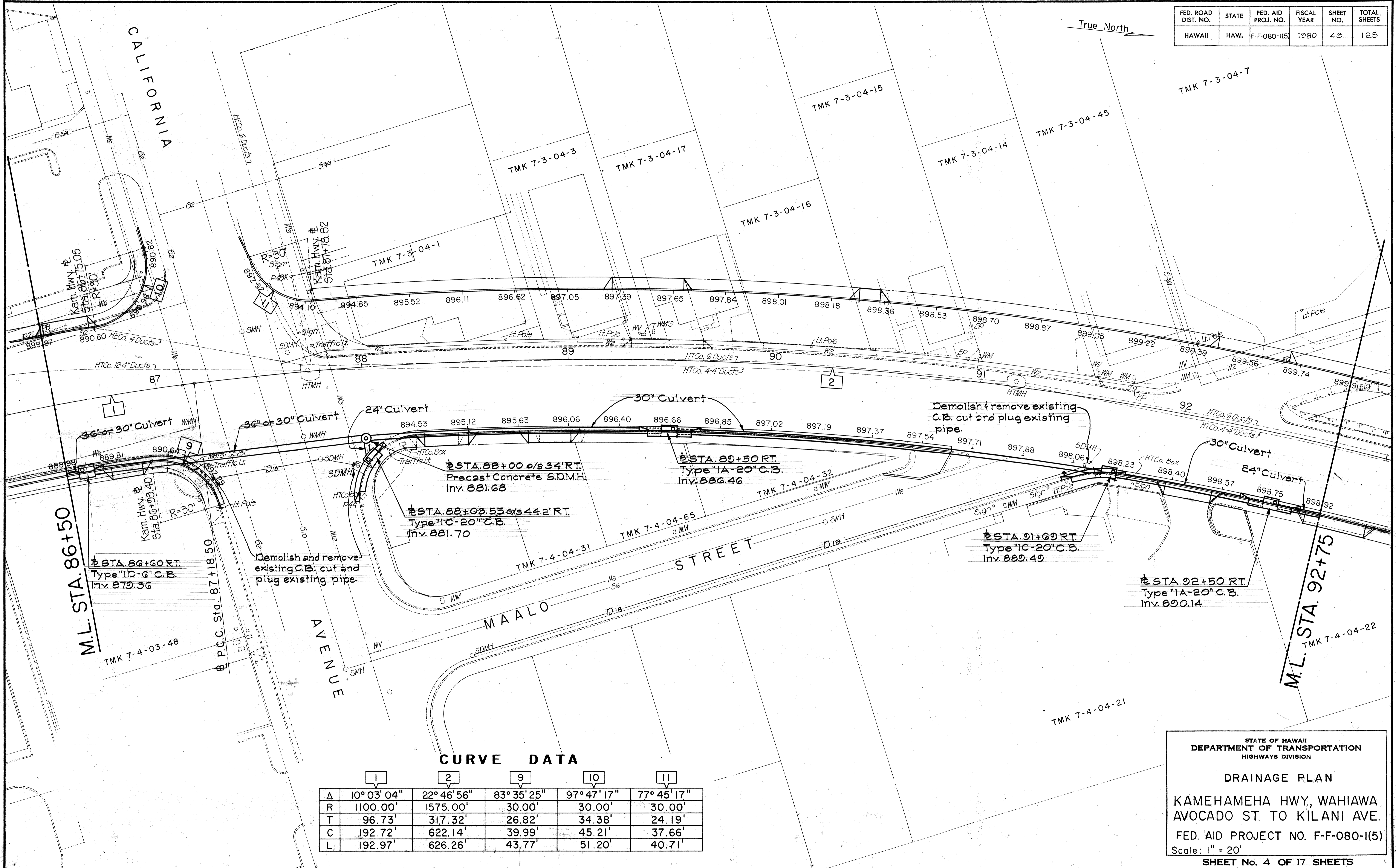
KAMEHAMEHA HWY, WAHIAWA  
AVOCADO ST. TO KILANI AVE.

FED. AID PROJECT NO. F-F-080-1(5)  
Scale: 1" = 20'

SHEET No. 3 OF 17 SHEETS



FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-F-080-1(5)	1080	43	123



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

**CURVE DATA**

	1	2	9	10	11
Δ	10° 03' 04"	22° 46' 56"	83° 35' 25"	97° 47' 17"	77° 45' 17"
R	1100.00'	1575.00'	30.00'	30.00'	30.00'
T	96.73'	317.32'	26.82'	34.38'	24.19'
C	192.72'	622.14'	39.99'	45.21'	37.66'
L	192.97'	626.26'	43.77'	51.20'	40.71'

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

**DRAINAGE PLAN**

KAMEHAMEHA HWY, WAHIAWA  
AVOCADO ST. TO KILANI AVE.

FED. AID PROJECT NO. F-F-080-1(5)  
Scale: 1" = 20'

SHEET No. 4 OF 17 SHEETS



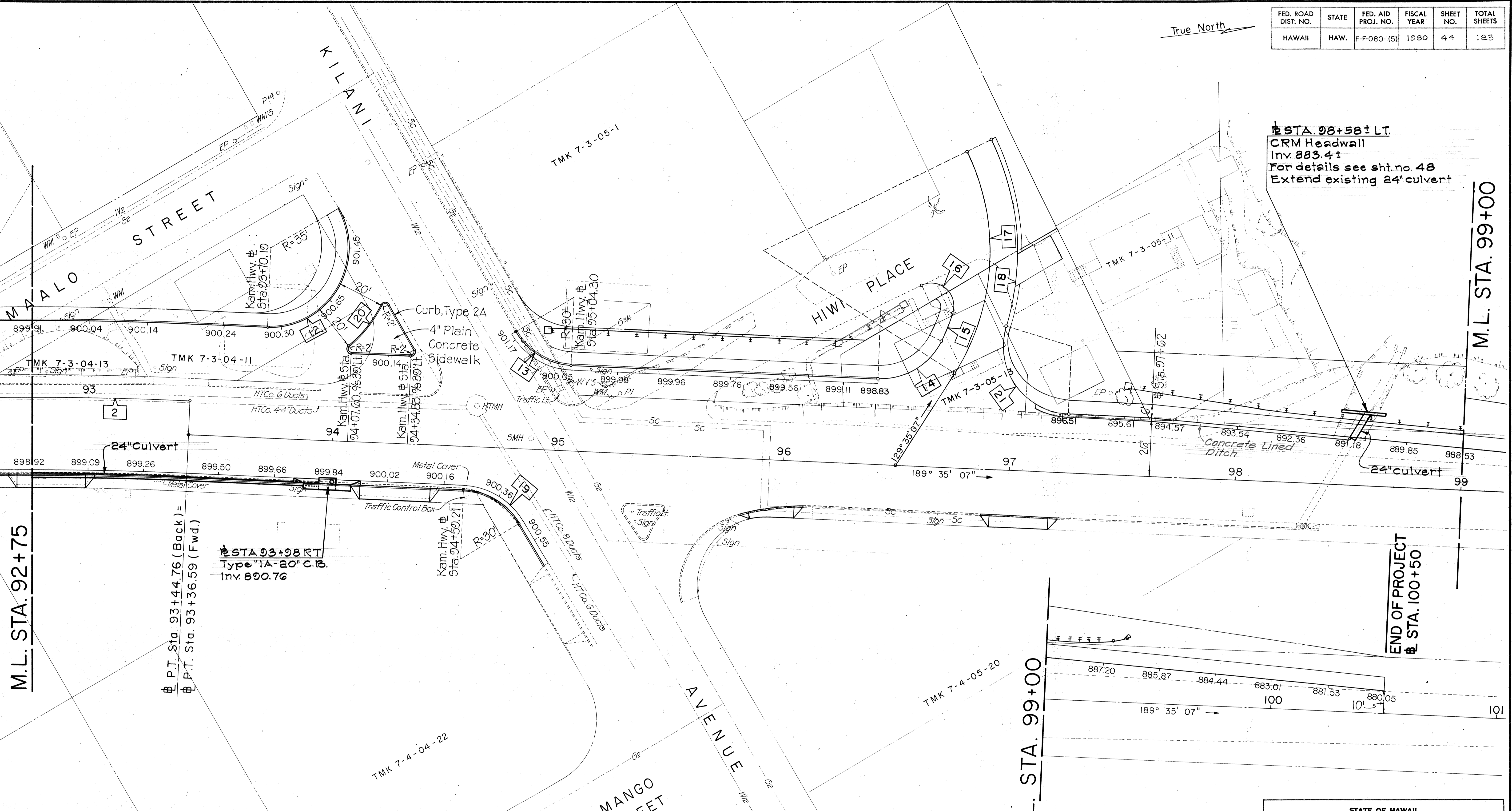
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-F-080-I(5)	1980	44	123

True North

± STA. 98+58 ± LT.  
 CRM Headwall  
 Inv. 883.4 ±  
 For details see sht. no. 48  
 Extend existing 24" culvert

M.L. STA. 99+00

END OF PROJECT  
 ± STA. 100+50



**CURVE DATA**

	2	12	13	14	15	16	17	18	19	20	21
Δ	22° 46' 56"	122° 50' 00"	57° 10' 00"	65° 30' 12"	9° 34' 02"	132° 49' 25"	58° 42' 00"	43° 24' 23"	56° 52' 52"	24° 45' 07"	104° 42' 23"
R	1575.00'	35.00'	30.00'	30.00'	88.00'	10.00'	100.00'	112.00'	30.00'	55.00'	30.00'
T	317.32'	64.24'	16.34'	19.30'	7.36'	22.90'	56.23'	44.58'	16.25'	12.07'	38.89'
C	622.14'	61.47'	28.71'	32.46'	14.68'	18.33'	98.03'	82.84'	28.58'	23.58'	47.51'
L	626.26'	75.04'	29.93'	34.30'	14.69'	23.18'	102.45'	84.85'	29.78'	23.76'	54.82'

SURVEY PLOTTED BY	DATE
DRAWN BY	
CHECKED BY	
QUANTITIES BY	
NOTED BY	
CHECKED BY	

STATE OF HAWAII  
 DEPARTMENT OF TRANSPORTATION  
 HIGHWAYS DIVISION

**DRAINAGE PLAN**

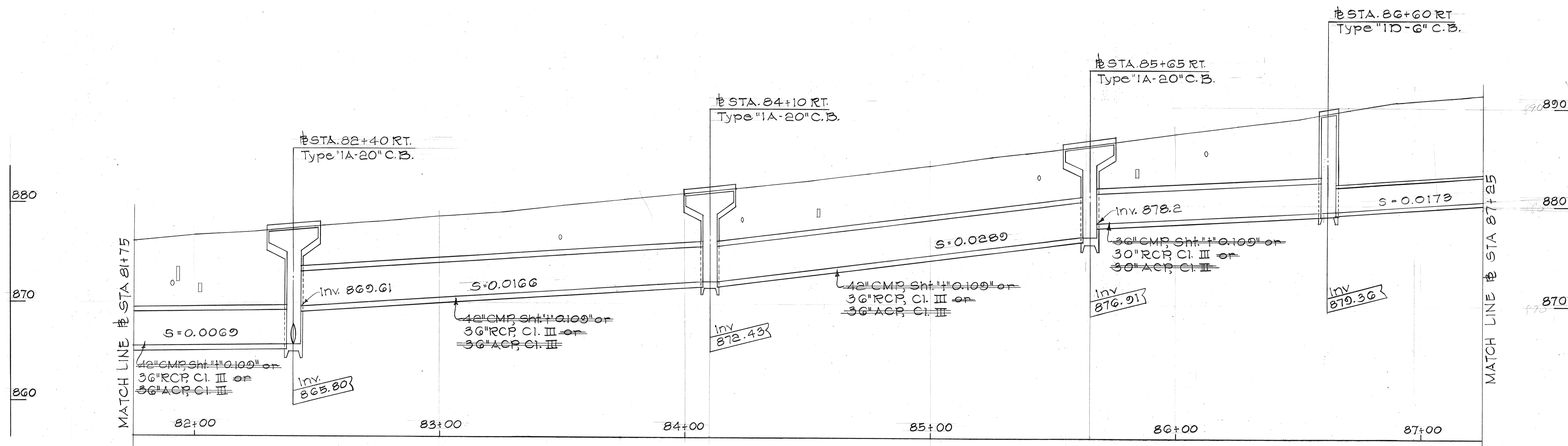
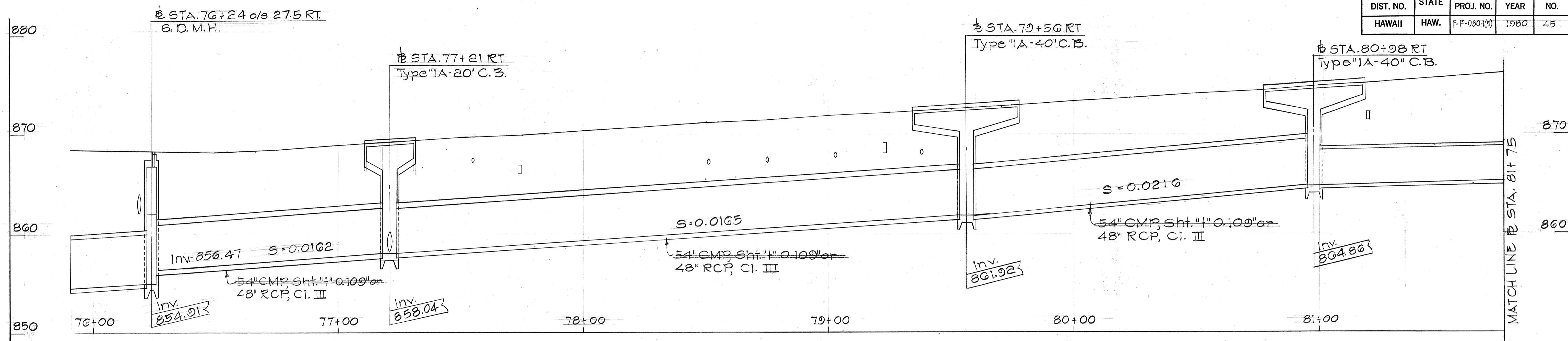
KAMEHAMEHA HWY, WAHIAWA  
 AVOCADO ST. TO KILANI AVE.

FED. AID PROJECT NO. F-F-080-I(5)  
 Scale: 1" = 20'

**SHEET No. 5 OF 17 SHEETS**



FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-F-080-1(5)	1980	45	123



PROFILE OF CULVERTS ALONG KAMEHAMEHA HIGHWAY

SCALE: HORIZ. 1" = 20'  
VERT. 1" = 5'

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

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

**DRAINAGE DETAILS**

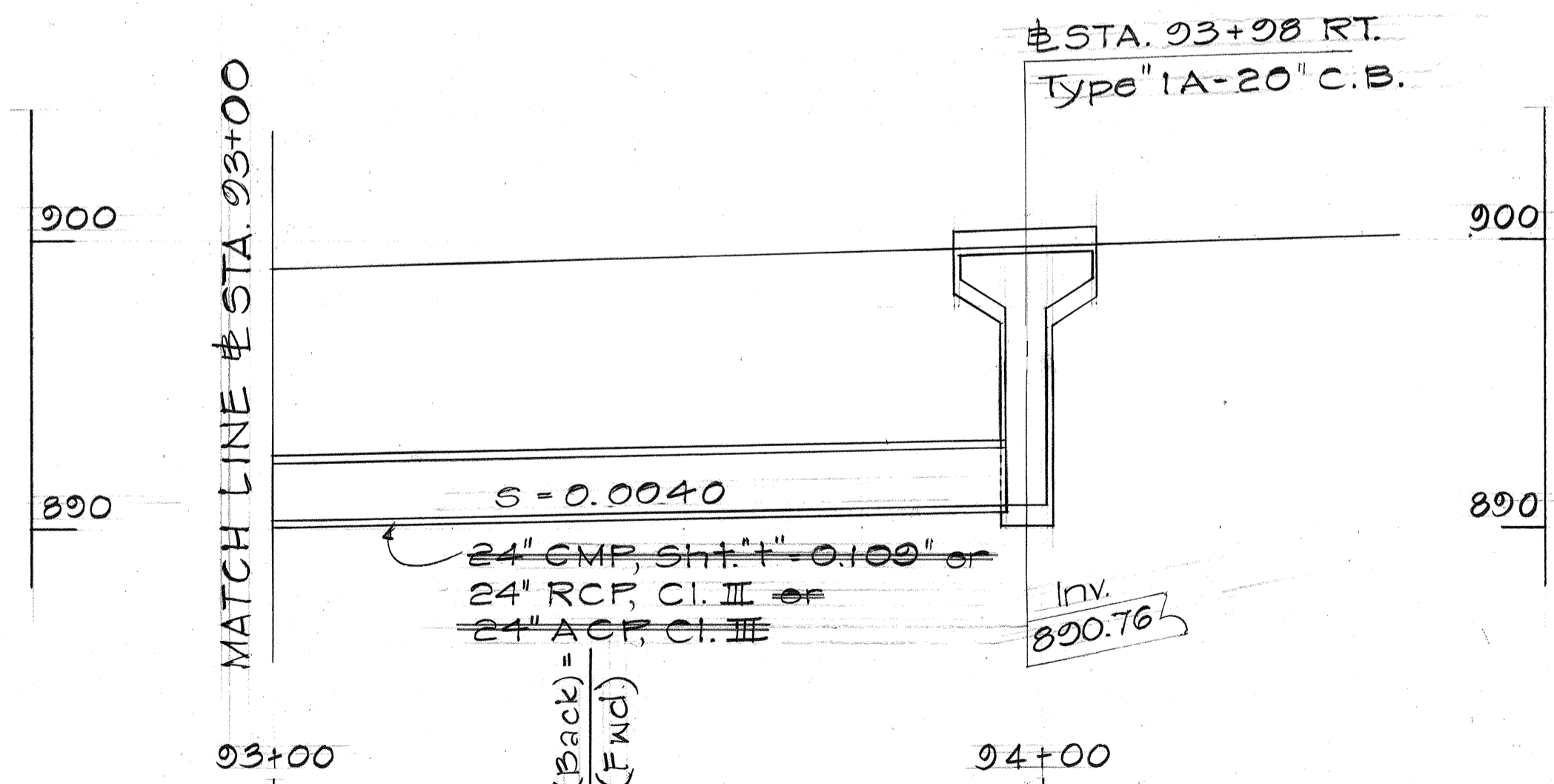
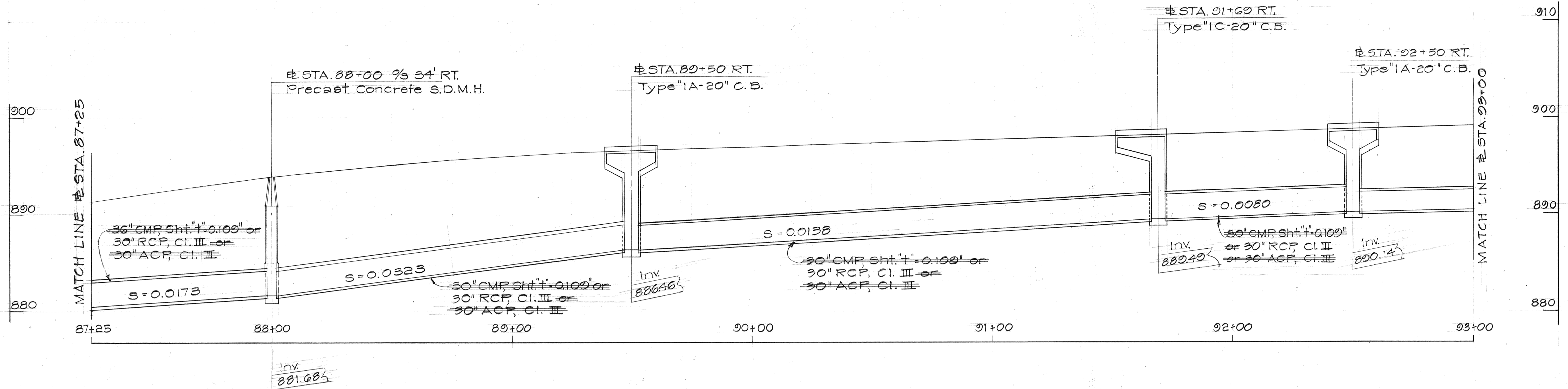
KAMEHAMEHA HWY, WAHIAWA  
AVOCADO ST. TO KILANI AVE.

FED. AID PROJECT NO. F-F-080-1(5)  
Scale: As Noted Date: May 1980

SHEET NO. 6 OF 17 SHEETS



FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-F-080-1(5)	1980	46	123



PROFILE OF CULVERTS ALONG KAMEHAMEHA HIGHWAY

SCALE: HORIZ. 1" = 20'  
 VERT. 1" = 5'

# Sta 93+44.76 (Back)  
 # Sta 93+36.50 (Fwd)

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

STATE OF HAWAII  
 DEPARTMENT OF TRANSPORTATION  
 HIGHWAYS DIVISION

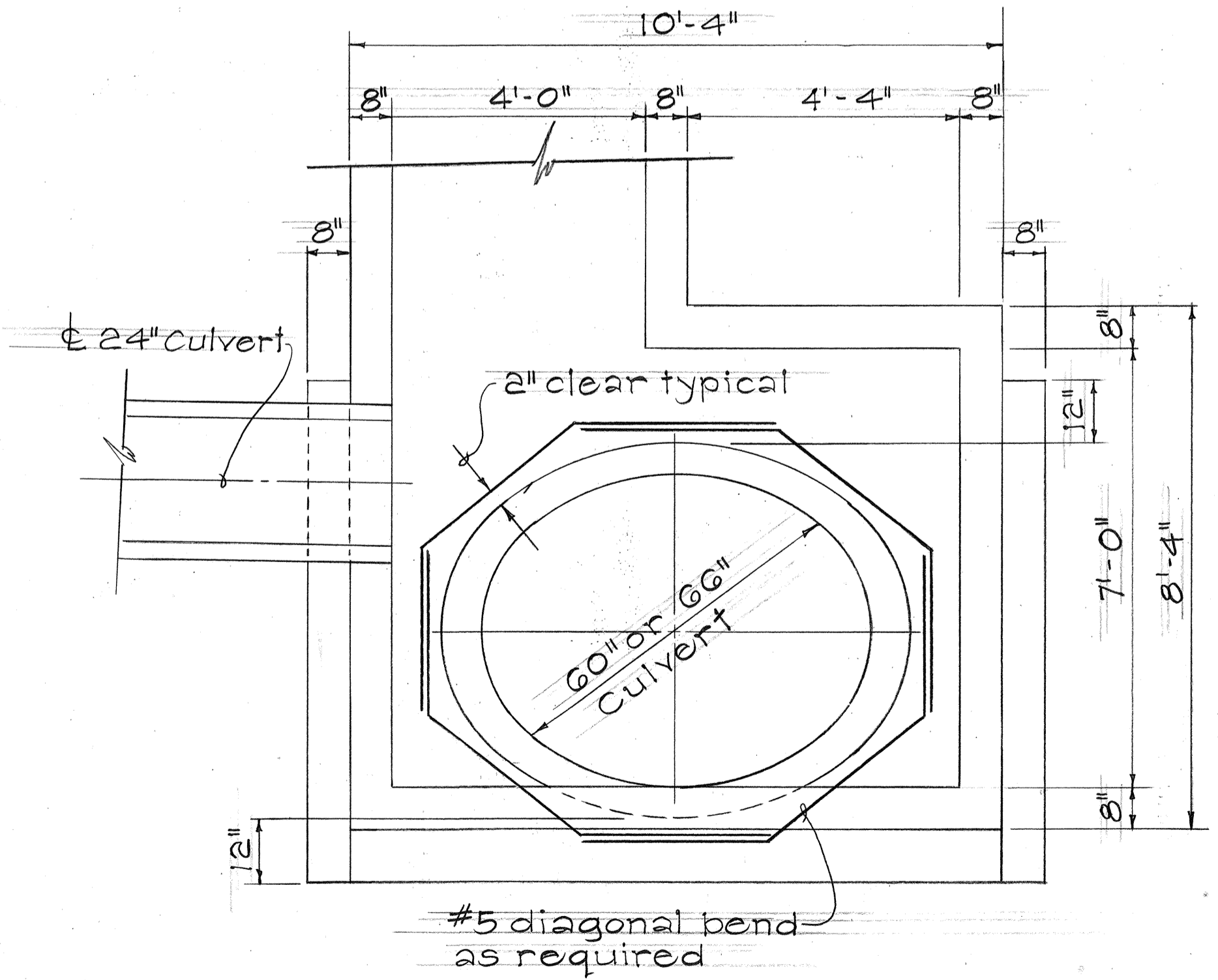
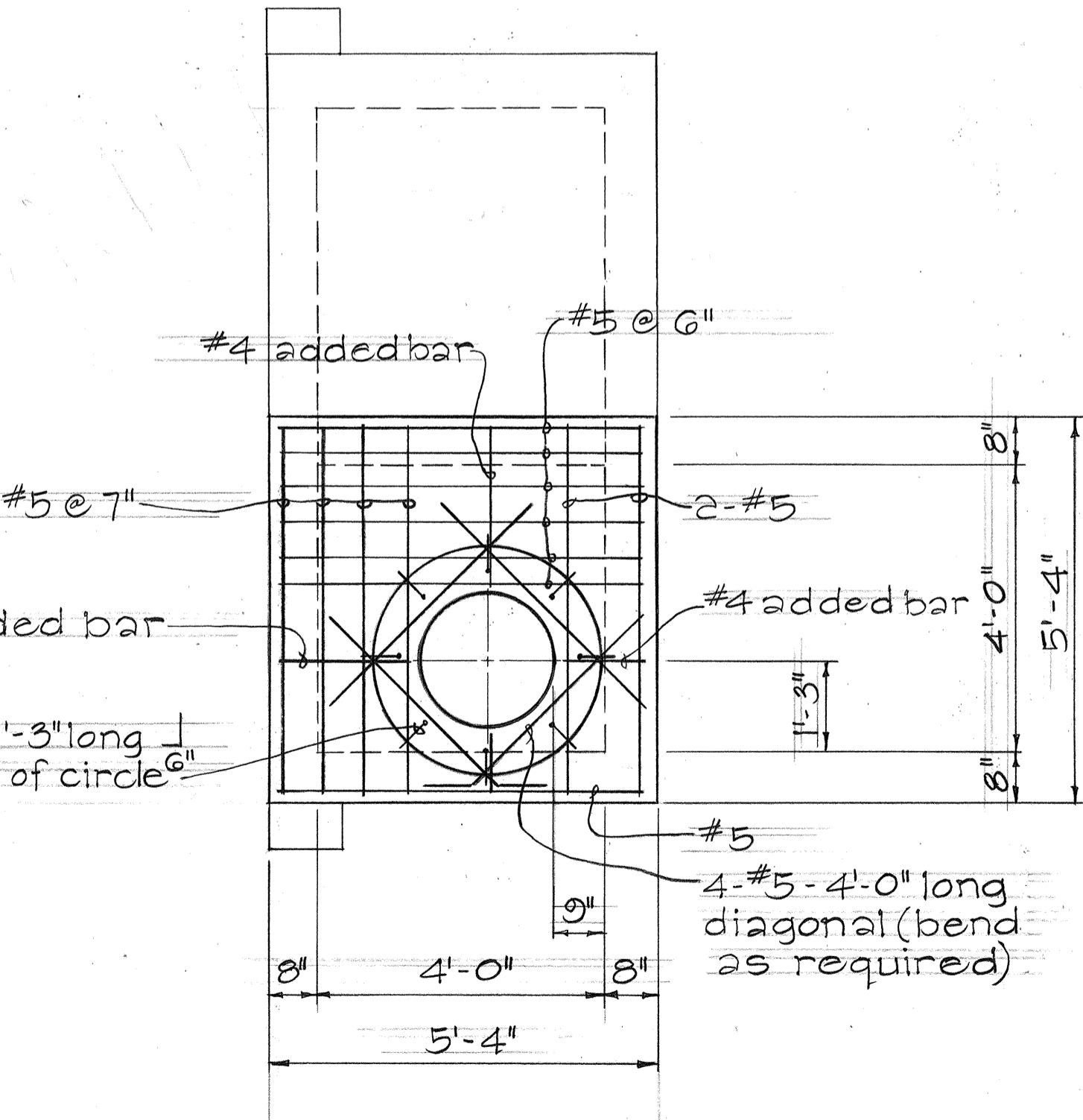
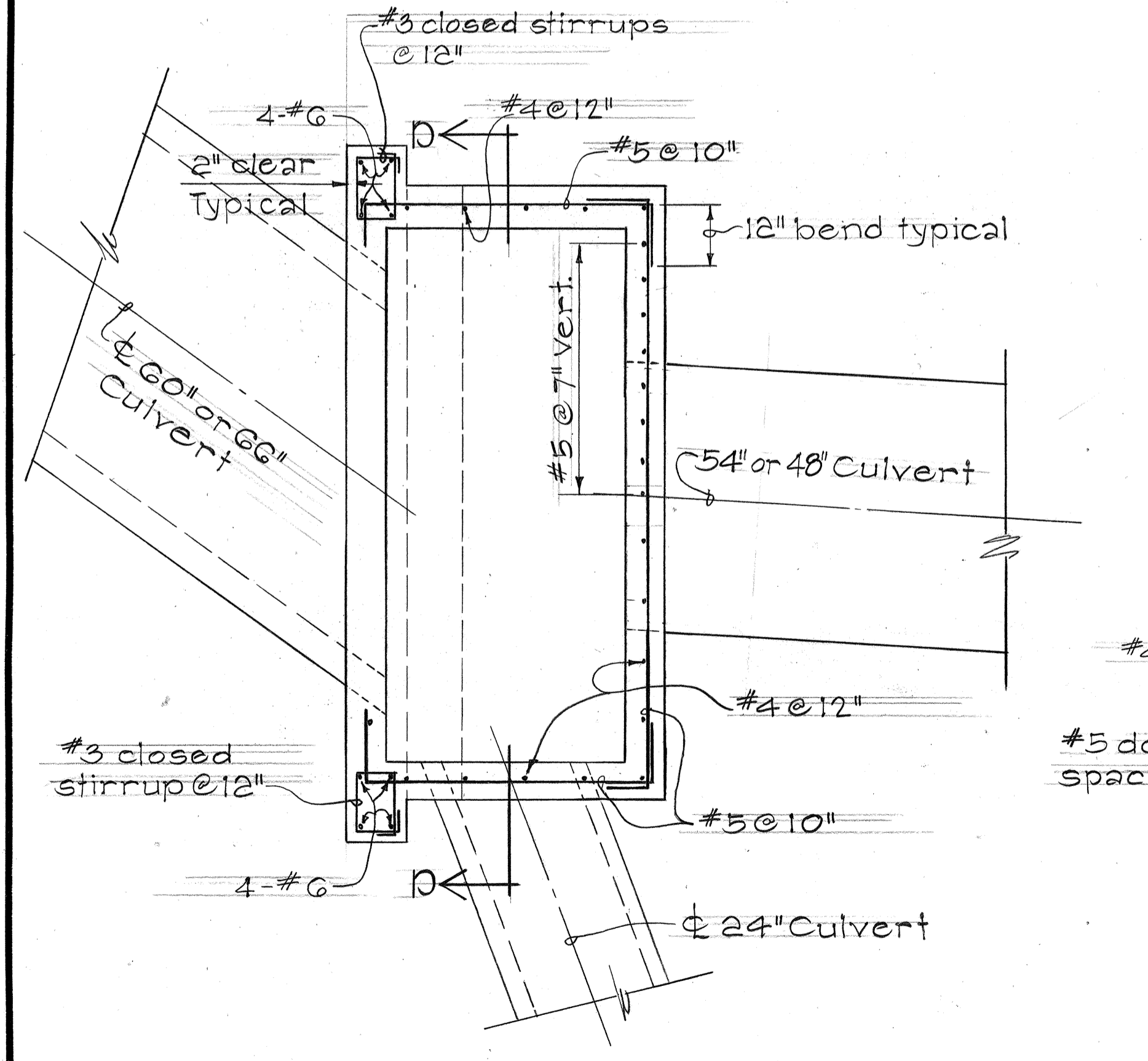
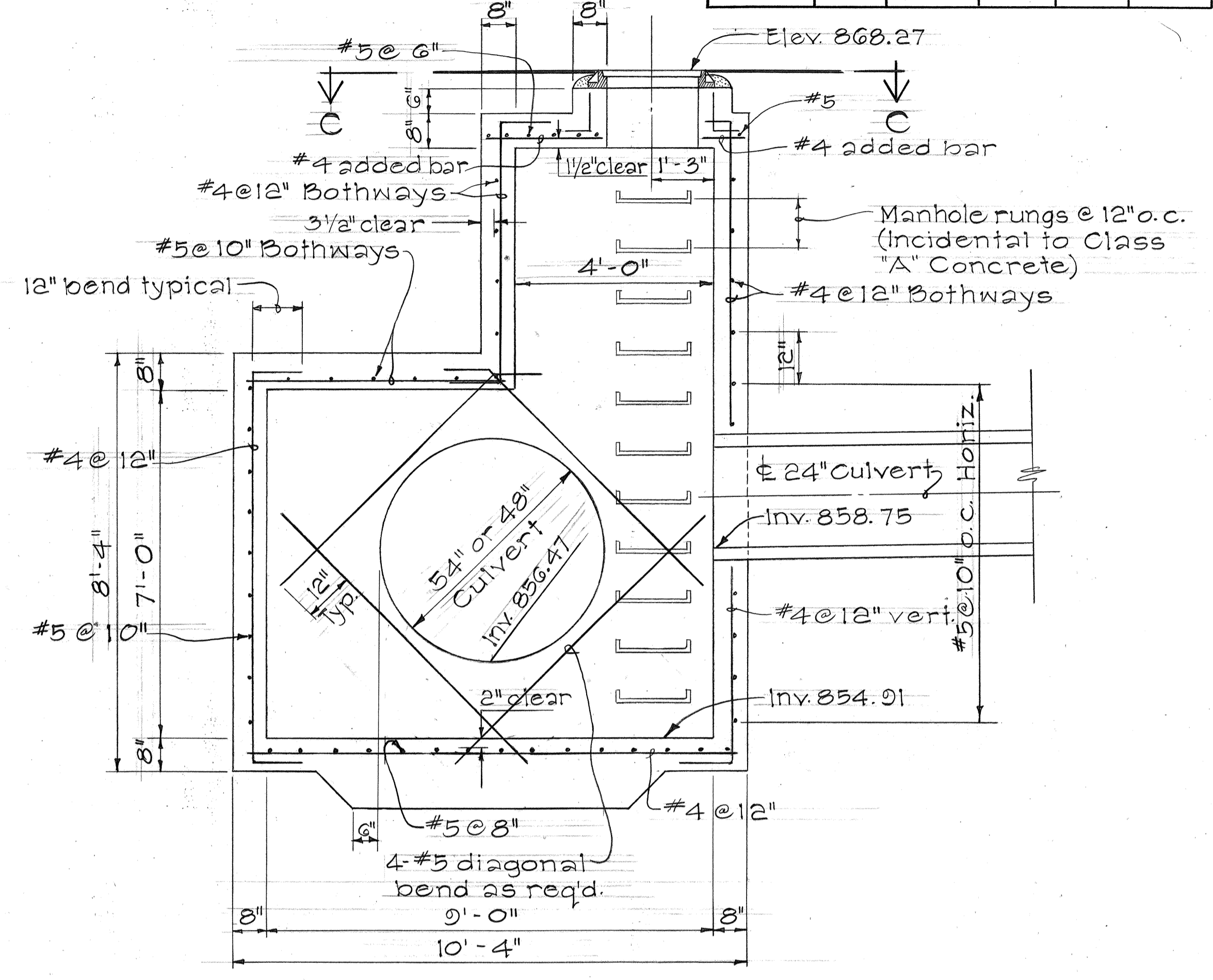
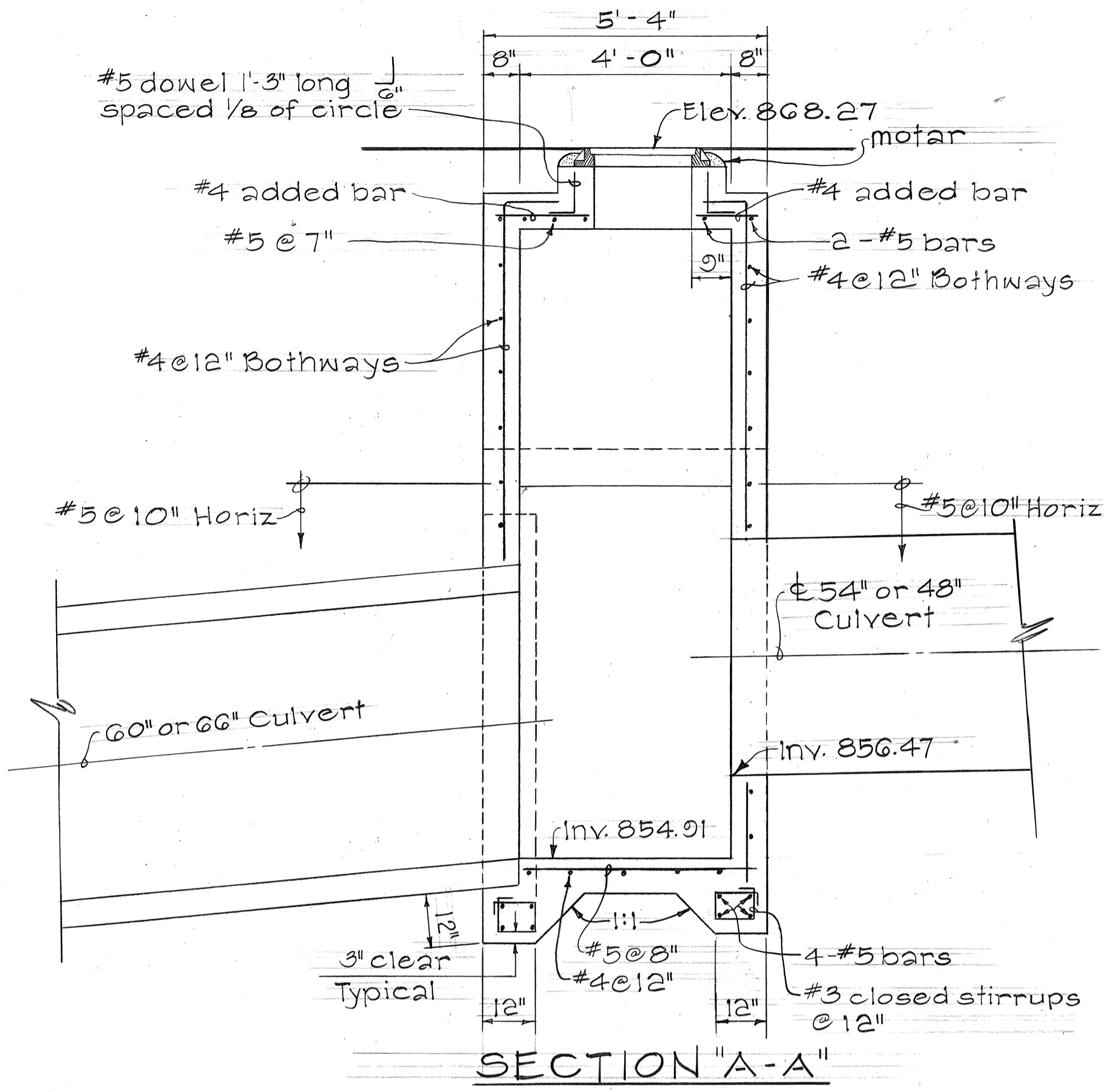
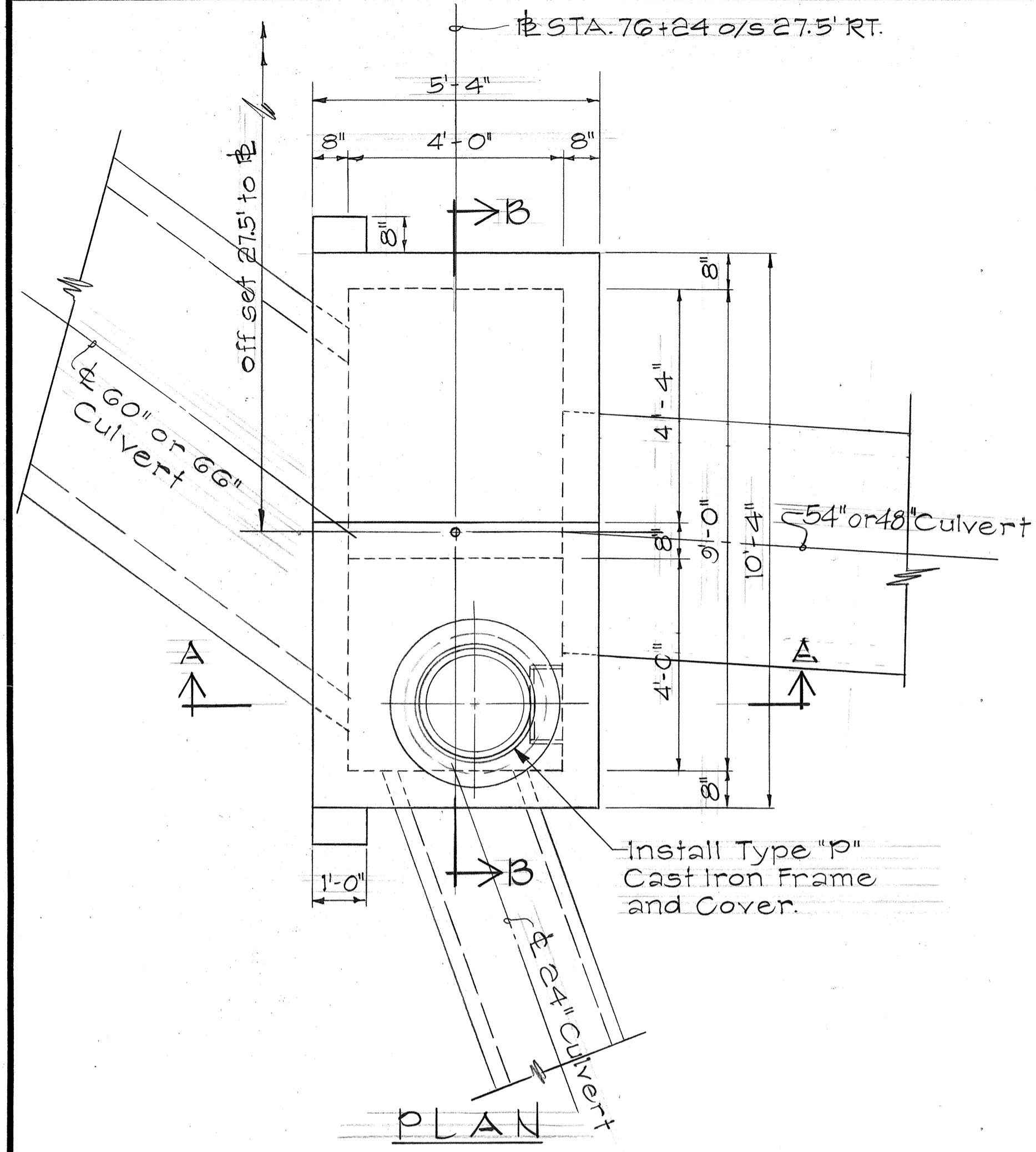
**DRAINAGE DETAILS**

KAMEHAMEHA HWY, WAHIANA  
 AVOCADO ST. TO KILANI AVE.  
 FED. AID PROJECT NO. F-F-080-1(5)  
 Scale: As Noted Date: May 1980

SHEET NO. 7 OF 17 SHEETS



FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-F-080-1(5)	1980	47	123



S.D.M.H. @ STA. 76+24 o/s 27.5' RT.

DATE	_____
SURVEY PLANNED BY	_____
DRAWN BY	_____
DESIGNED BY	_____
QUANTITIES BY	_____
CHECKED BY	_____

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

**DRAINAGE DETAILS**

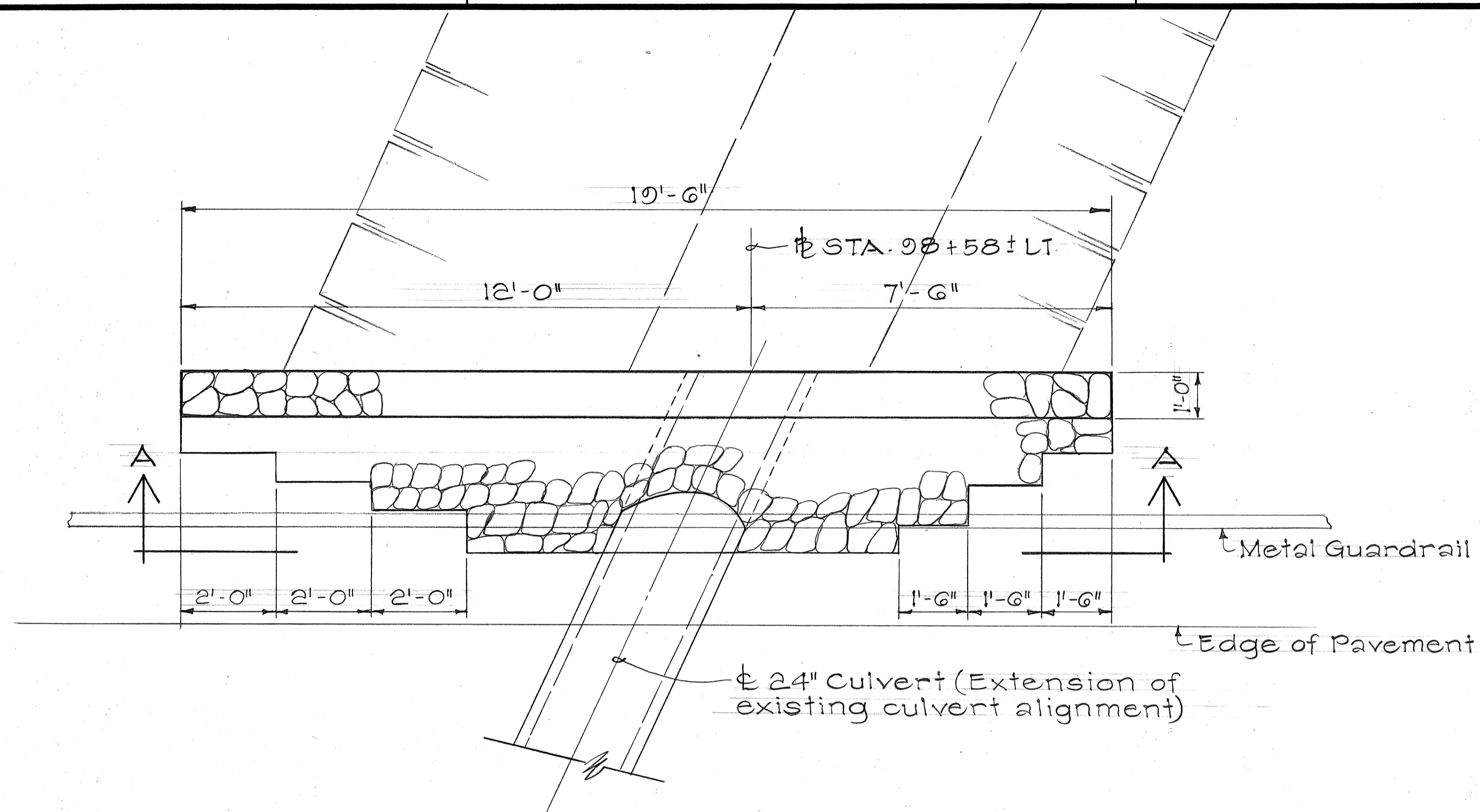
KAMEHAMEHA HWY, WAHIAWA  
AVOCADO ST. TO KILANI AVE.

FED. AID PROJECT NO. F-F-080-1(5)  
Scale: 1/2" = 1'-0" Date: May 1980

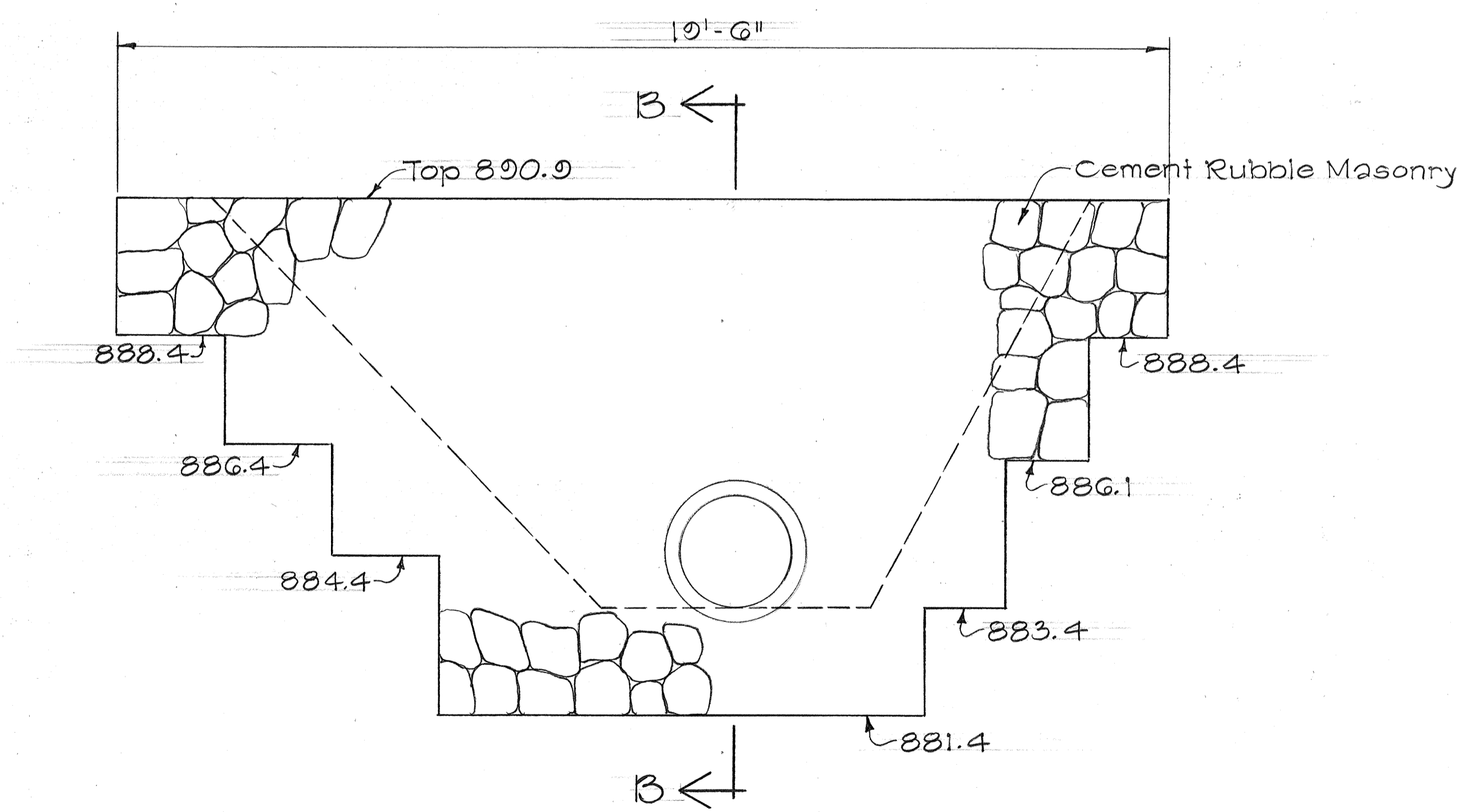
SHEET NO. 8 OF 17 SHEETS



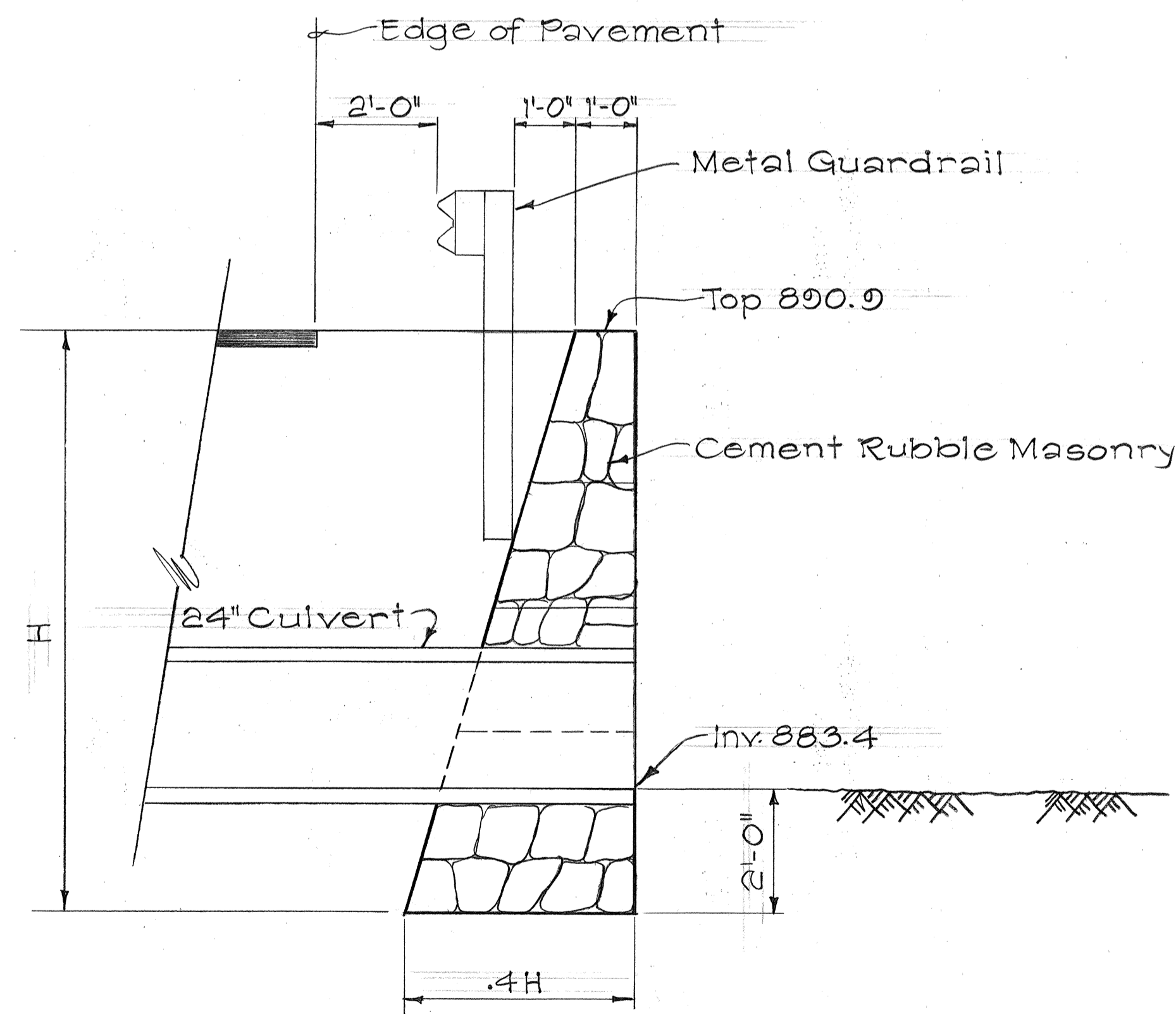
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-F-080-1(5)	1980	48	123



PLAN



SECTION "A-A"



SECTION "B-B"

C.R.M. HEADWALL @ STA. 98+58± LT.

ORIGINAL PLAN	DATE
DRAWN BY	
TRACED BY	
DESIGNED BY	
QUANTITIES BY	
CHECKED BY	
No.	

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

**DRAINAGE DETAILS**

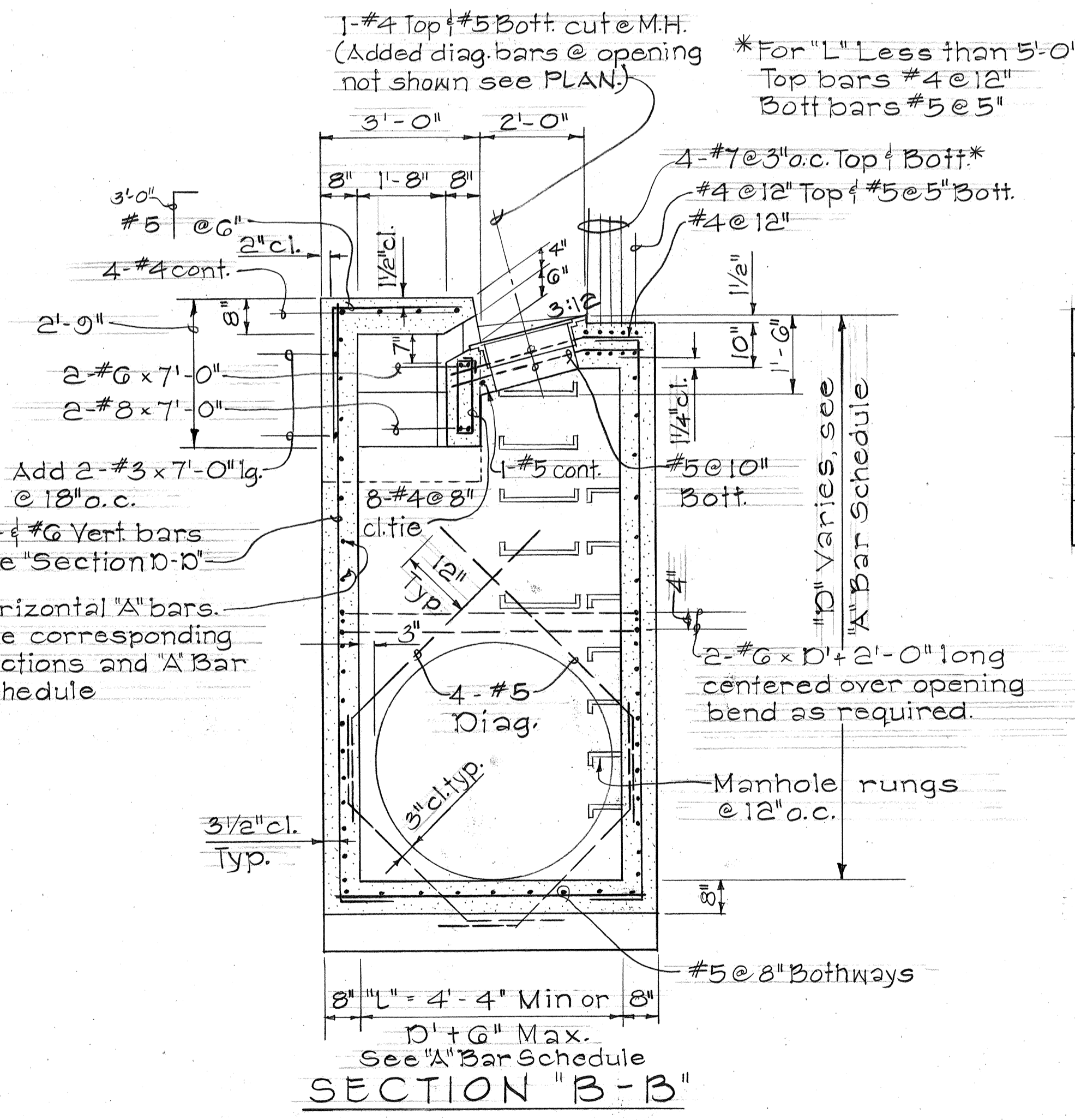
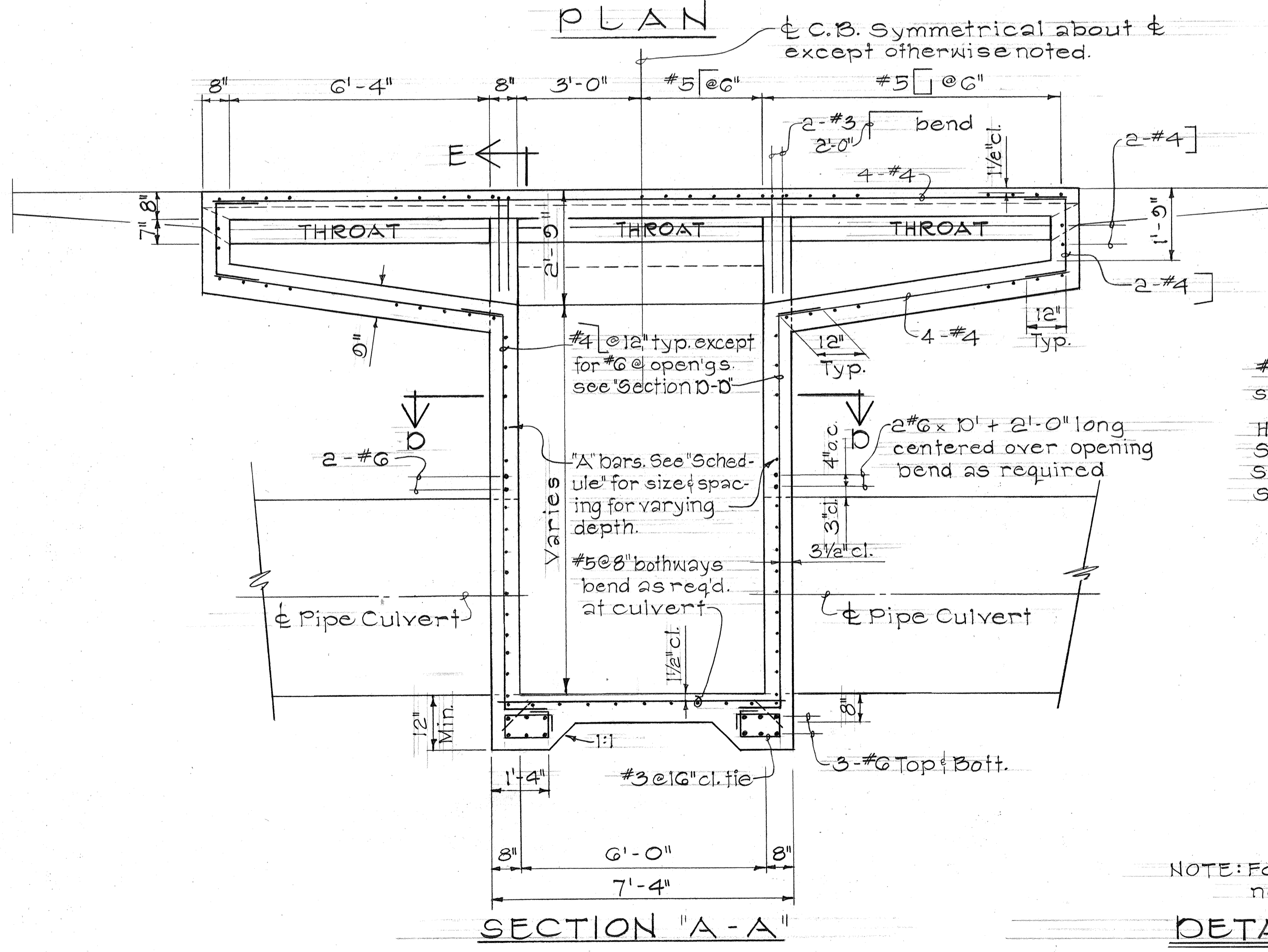
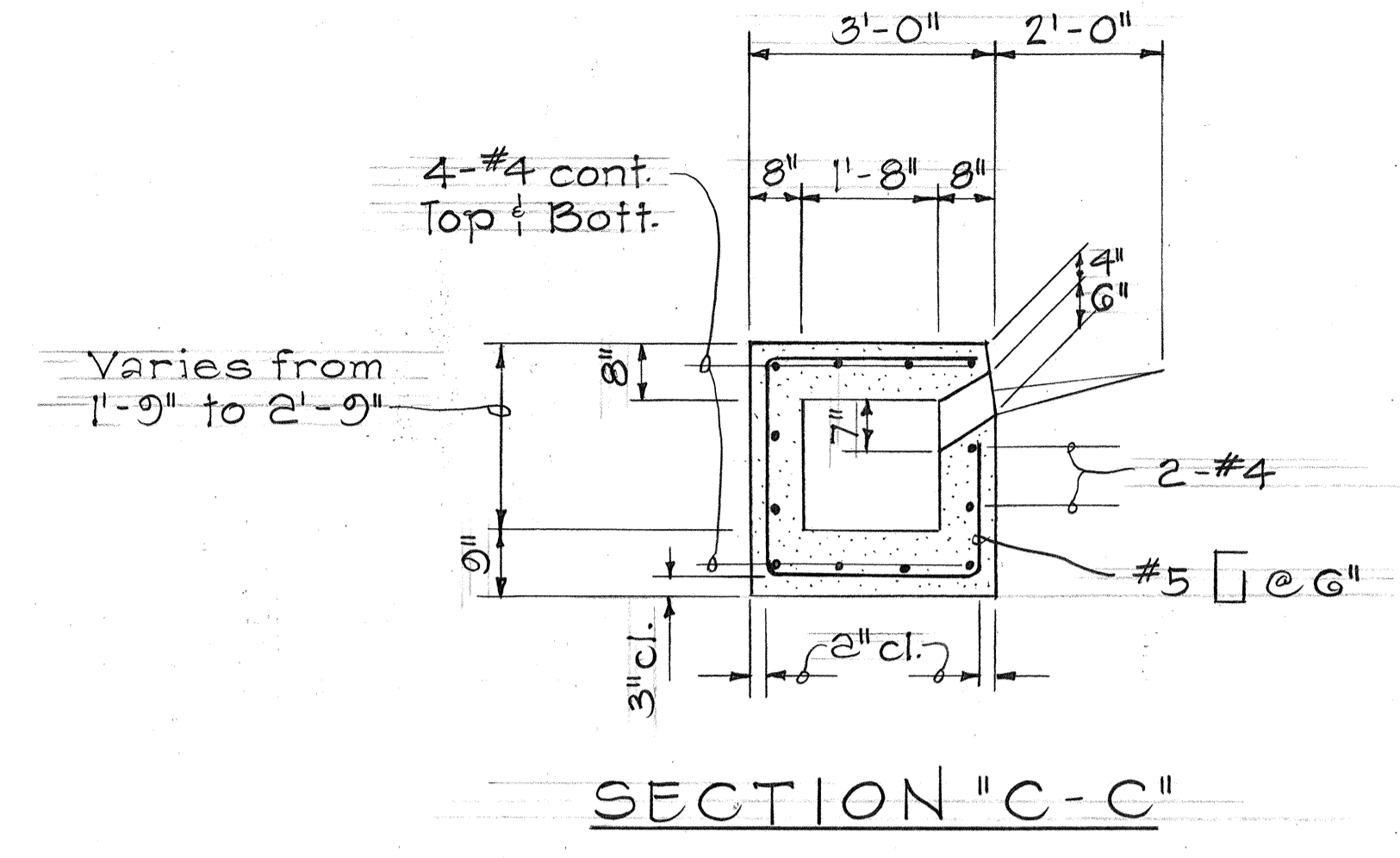
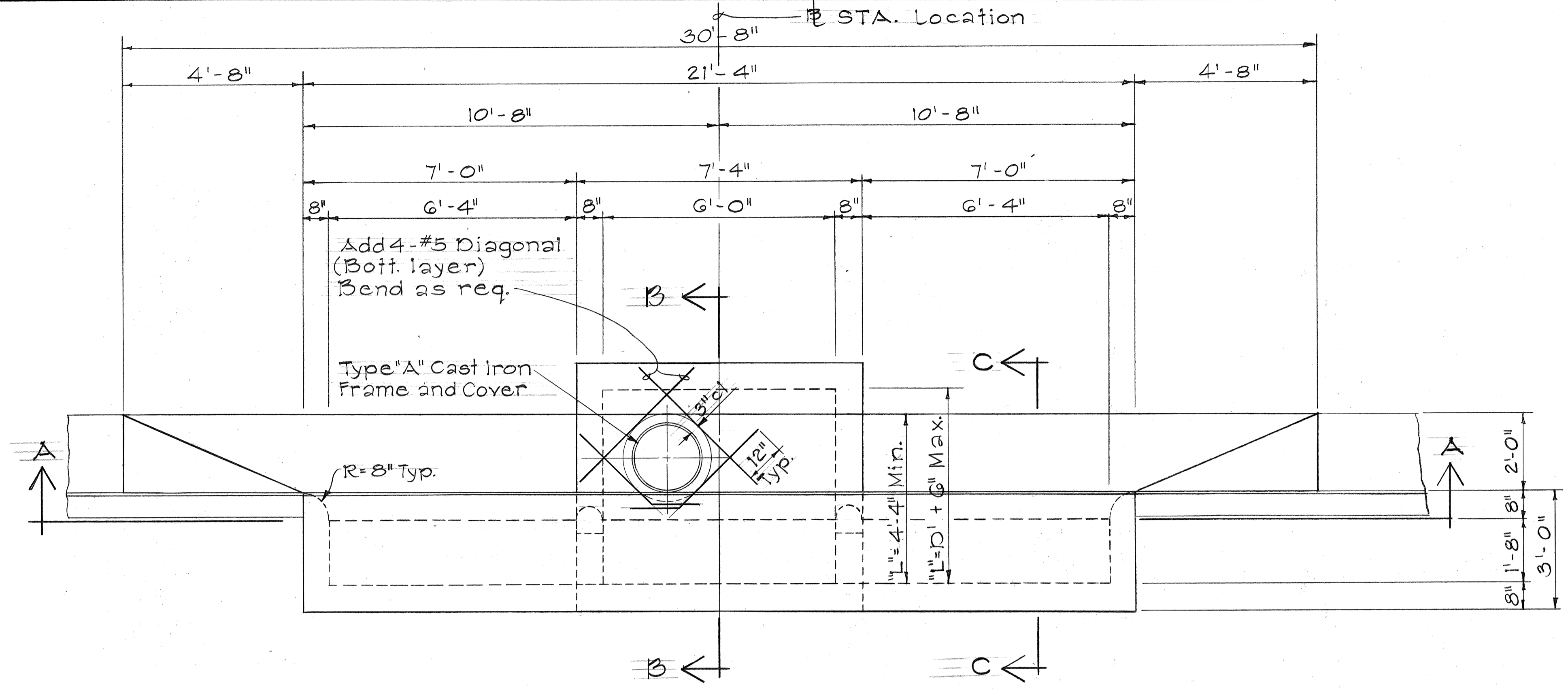
KAMEHAMEHA HWY, WAHIAWA  
AVOCADO ST. TO KILANI AVE.

FED. AID PROJECT NO. F-F-080-1(5)  
Scale: 1/2" = 1'-0" Date: May 1980

SHEET No. 9 OF 17 SHEETS



FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-F-080-1(5)	1980	49	123



"D" MAX.	6'-0"
0 TO 5'-0"	#4 @ 10" o.c.
5'-1" TO 10'-0"	#5 @ 9" o.c.
10'-1" TO 15'-0"	#5 @ 6" o.c.

DATE: \_\_\_\_\_  
 SURVEY PLOTTED BY: \_\_\_\_\_  
 ORIGINAL PLAN: \_\_\_\_\_  
 DRAWN BY: \_\_\_\_\_  
 TRACED BY: \_\_\_\_\_  
 NOTE BOOK: \_\_\_\_\_  
 DESIGNED BY: \_\_\_\_\_  
 QUANTITIES BY: \_\_\_\_\_  
 CHECKED BY: \_\_\_\_\_  
 No. \_\_\_\_\_

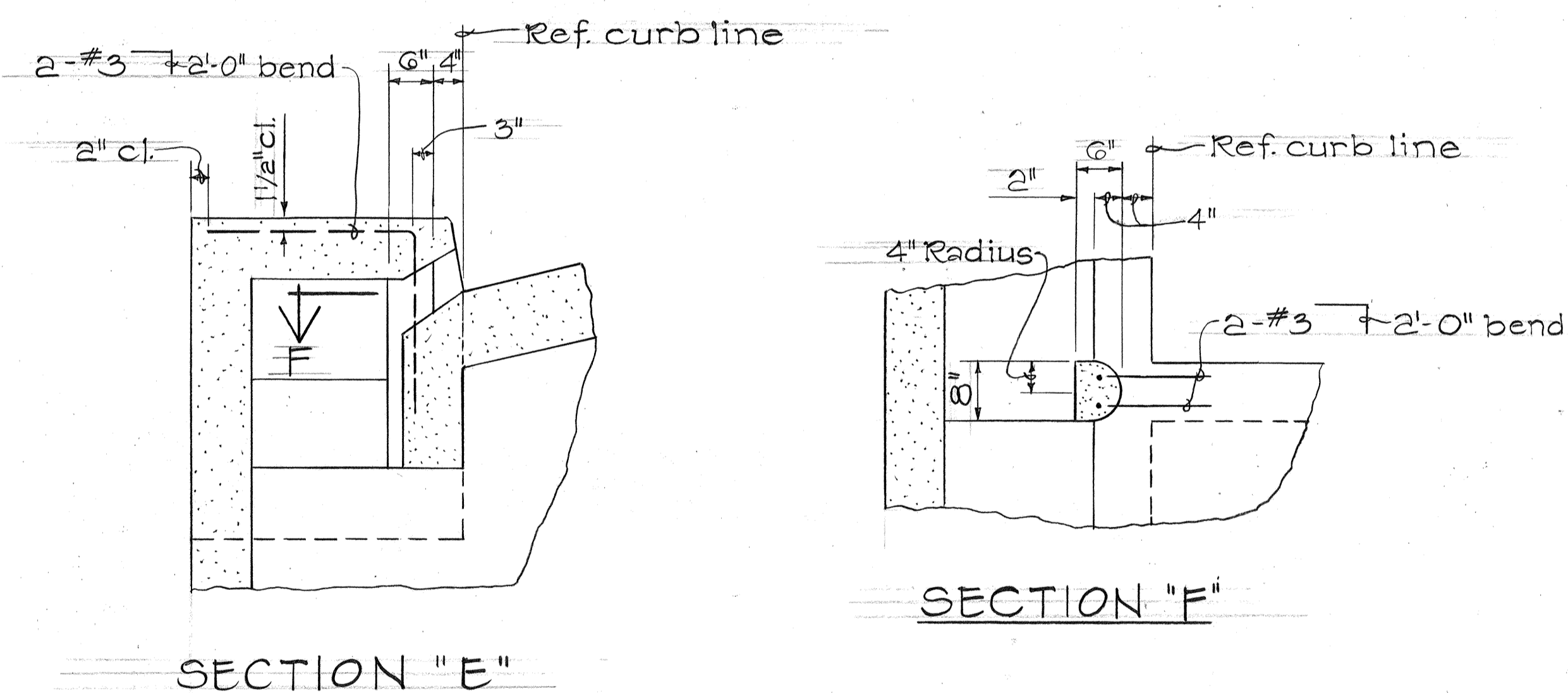
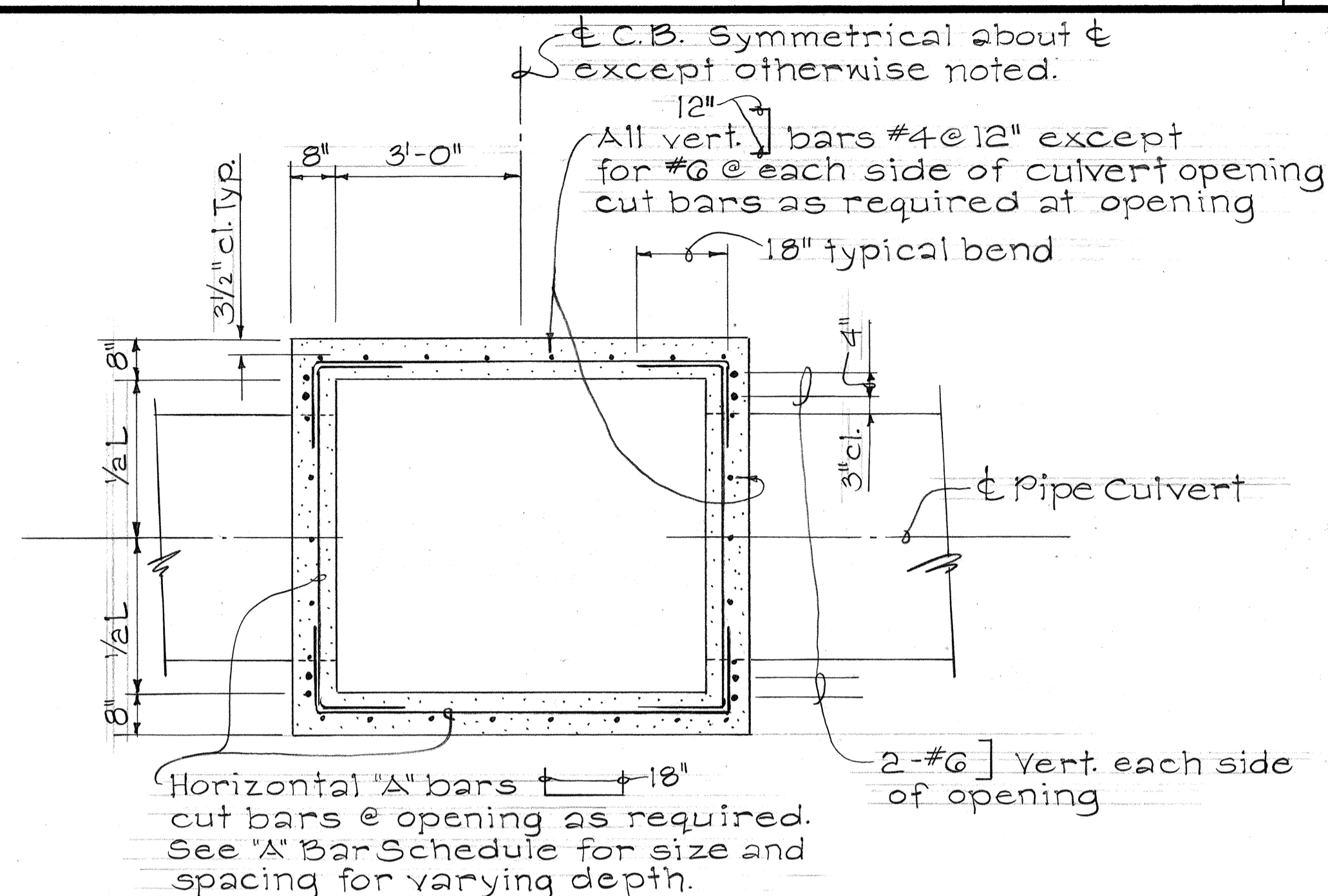
NOTE: For other details, section views and general notes see sheet number 30.

DETAILS OF "A-20" C.B.

STATE OF HAWAII  
 DEPARTMENT OF TRANSPORTATION  
 HIGHWAYS DIVISION  
**DRAINAGE DETAILS**  
 KAMEHAMEHA HWY, WAHIAWA  
 AVOCADO ST. TO KILANI AVE.  
 FED. AID PROJECT NO. F-F-080-1(5)  
 Scale: 1/2" = 1'-0" Date: May 1980  
 SHEET NO. 10 OF 17 SHEETS



FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-F-080-1(5)	1980	50	123



DETAILS OF "1A-20" C.B.

GENERAL NOTES:

- Culvert shall enter and leave C.B. from any position and in the direction indicated by the plans or ordered by the Engineer.
- "D" shall be the maximum outside dimension of the culvert at the C.B. wall.
- The type of curb and gutter shall conform to the type specified on the roadway plans.
- Manhole Rungs (12" o.c) are required when "D" is greater than 4 feet 6 inches. Only one rung (16" from the bottom) is required if "D" is 4 feet 6 inches or less. Type "A" Cast Iron frame & cover and manhole rungs may be placed at any location as ordered by the Engineer.

STRUCTURAL NOTES:

- DESIGN LOADS -  
Active Soil Pressure - 37 psf equivalent fluid & 2' surcharge  
Live Load - Roadway HS 20  
Sidewalk 85 psf or 10K accidental wheel load.
- MATERIALS -  
Reinforcing Steel - ASTM A615 Grade 40  
Concrete - Class A  
Structural Steel - ASTM A36
- CONSTRUCTION REQUIREMENTS -  
a. Concrete protection - Unless noted otherwise, clear cover shall be as follows:  
Suspended Slab - Top Bars - 1 1/2"  
Suspended Slab - Bottom Bars - 1 1/4"  
Foundation Slab - Top Bars - 1 1/2"  
Concrete cast against the earth - 3"  
Walls - 3 1/2" from outside face  
Beams - 1 1/2"  
b. All horizontal wall reinforcing shall be bent 18" around corners as shown in Section "D-D" and all vertical wall reinforcing shall be bent 12" into top of foundation slabs as shown in Section "B-B" unless noted otherwise.  
c. Culvert & manhole openings shall be additionally reinforced as shown.  
d. Chamfer all exposed formed corners 3/4" and tool all finished corners 3/8" radius.  
e. Unless noted otherwise Horizontal wall reinforcing shall be as shown in the Schedule. Horizontal Reinforcing size and spacing on any one structure may be varied with its depth as shown in the schedule.

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

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

**DRAINAGE DETAILS**

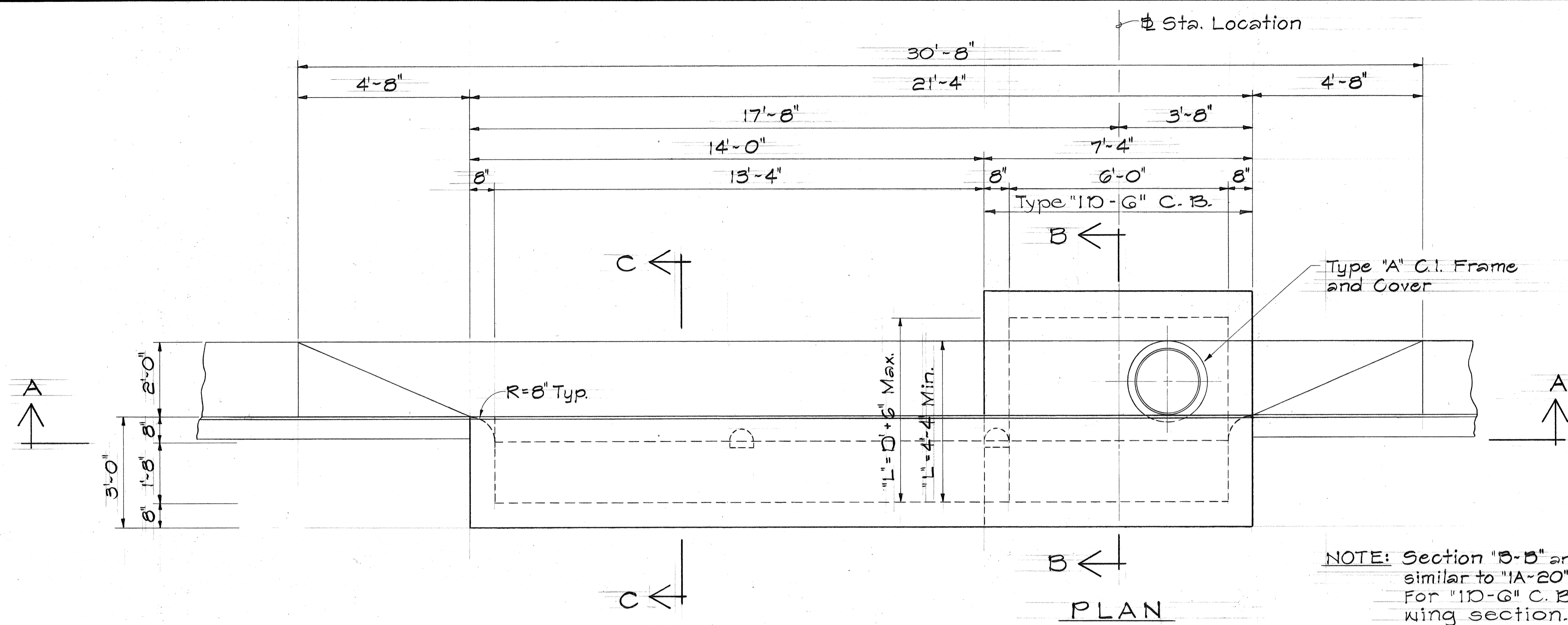
KAMEHAMEHA HWY, WAHIAWA  
AVOCADO ST. TO KILANI AVE.

FED. AID PROJECT NO. F-F-080-1(5)  
Scale: As Noted Date: May 1980

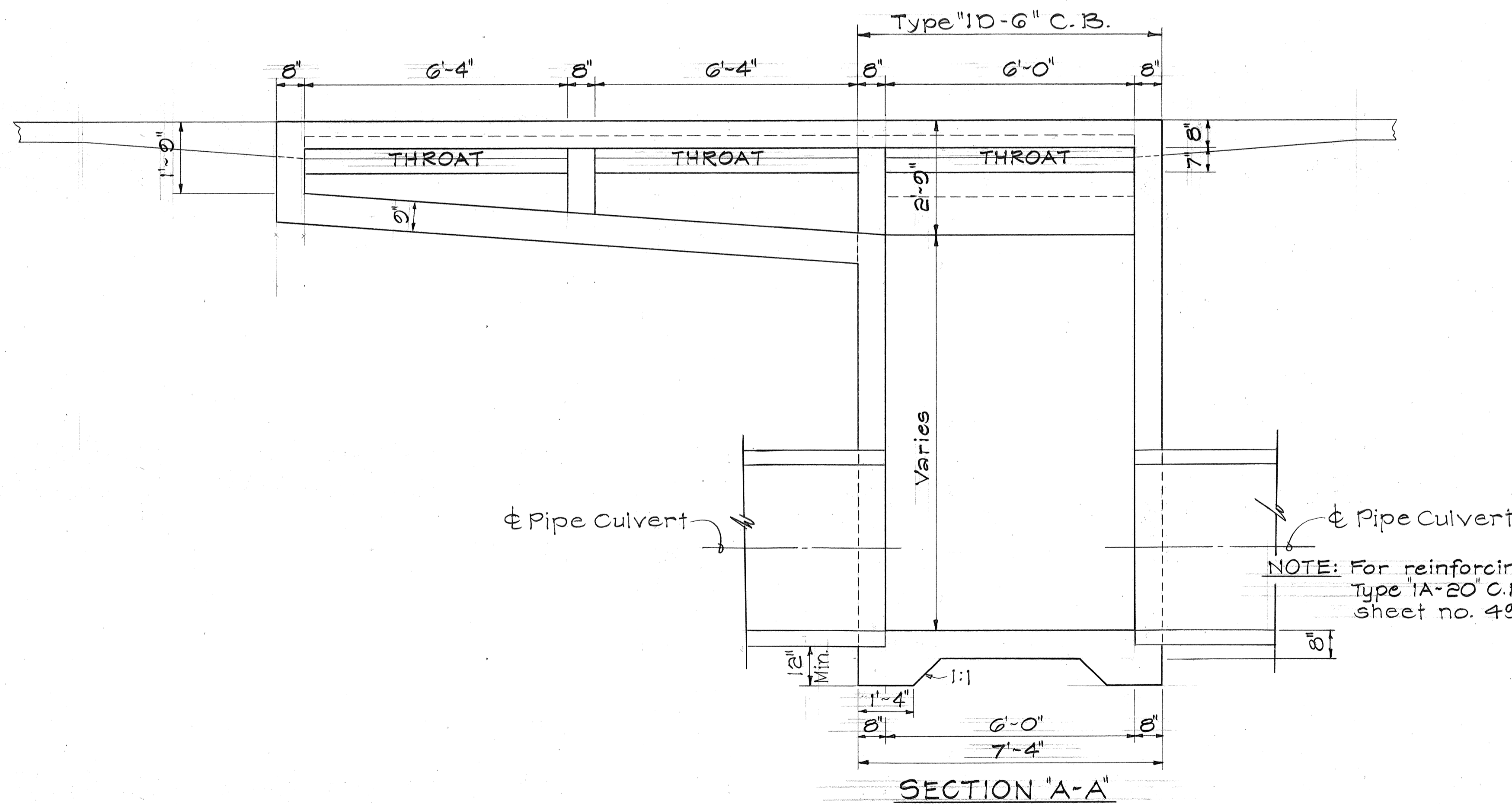
SHEET NO. 11 OF 17 SHEETS



FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-F-080-1(5)	1980	51	123



NOTE: Section "B-B" and "C-C" similar to "1A-20" C.B. For "10-6" C.B. omit wing section.



NOTE: For reinforcing steel see Type "1A-20" C.B. details sheet no. 49 & 50.

DETAILS OF "1C-20" & "10-6" C.B.

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

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

**DRAINAGE DETAILS**

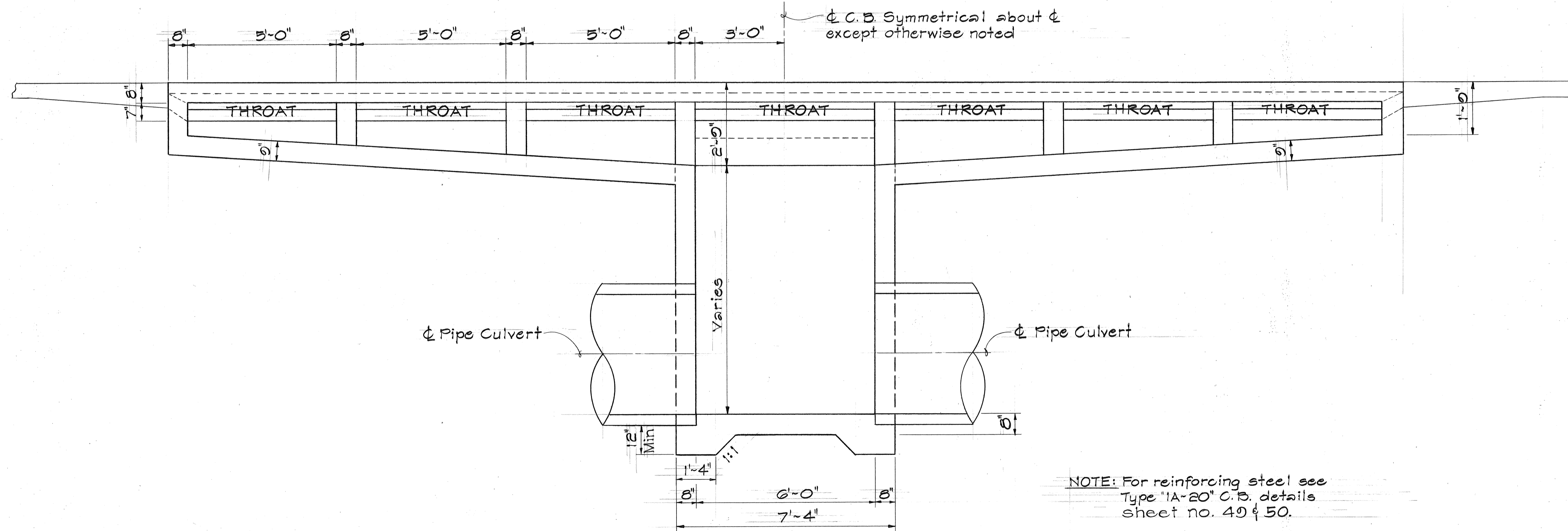
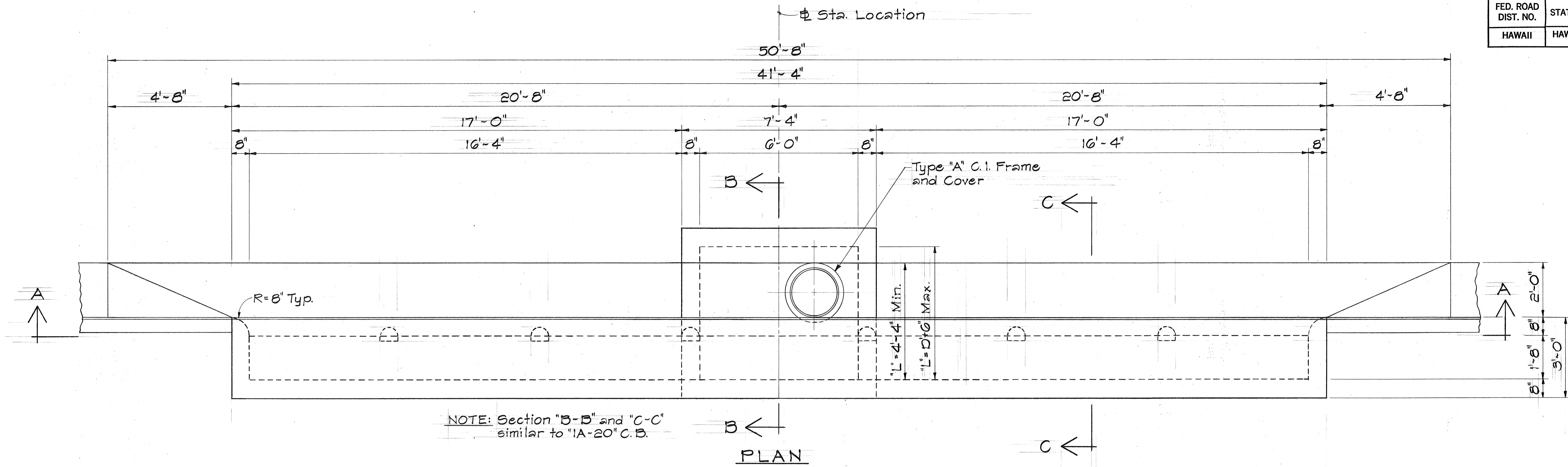
KAMEHAMEHA HWY, WAHIAWA  
AVOCADO ST. TO KILANI AVE.

FED. AID PROJECT NO. F-F-080-1(5)  
Scale: 1/2" = 1'-0" Date: May 1980

SHEET No. 12 OF 17 SHEETS



FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-F-080-1(5)	1980	52	123



SECTION "A-A"  
DETAIL OF "1A-40" C.B.

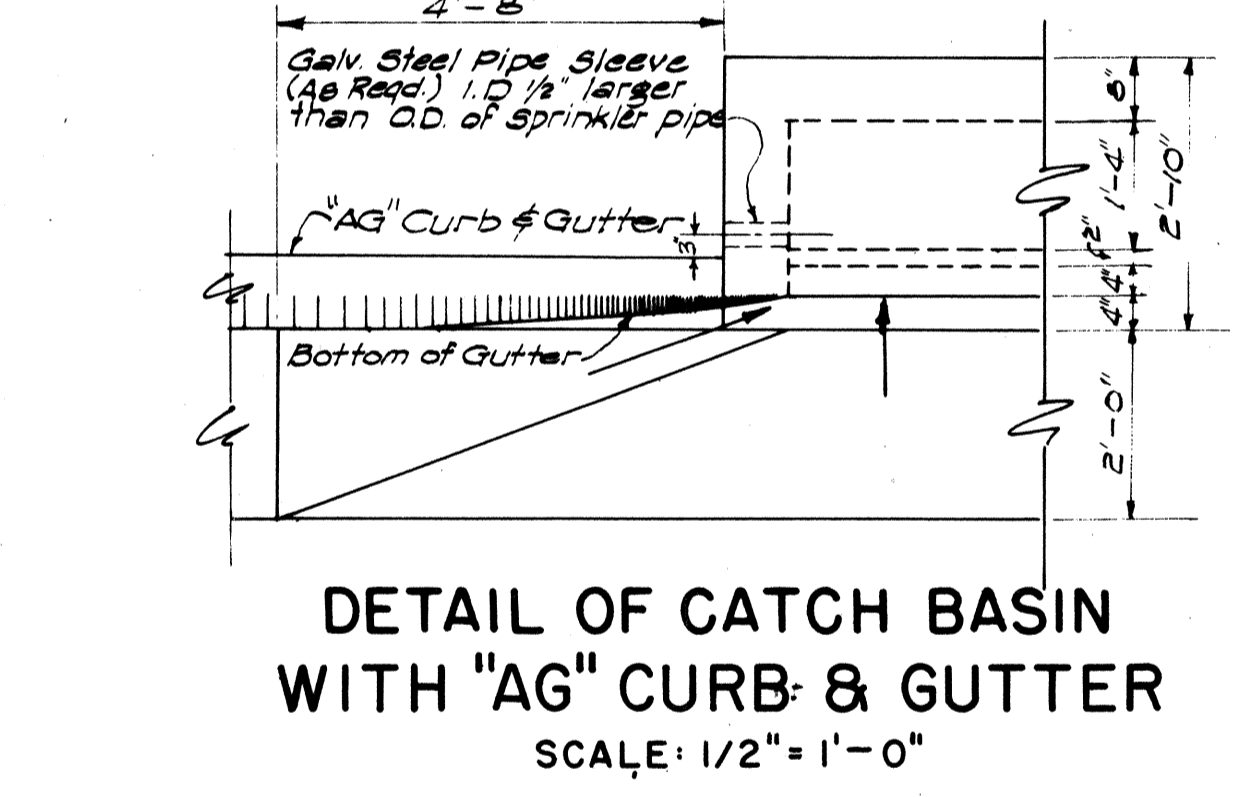
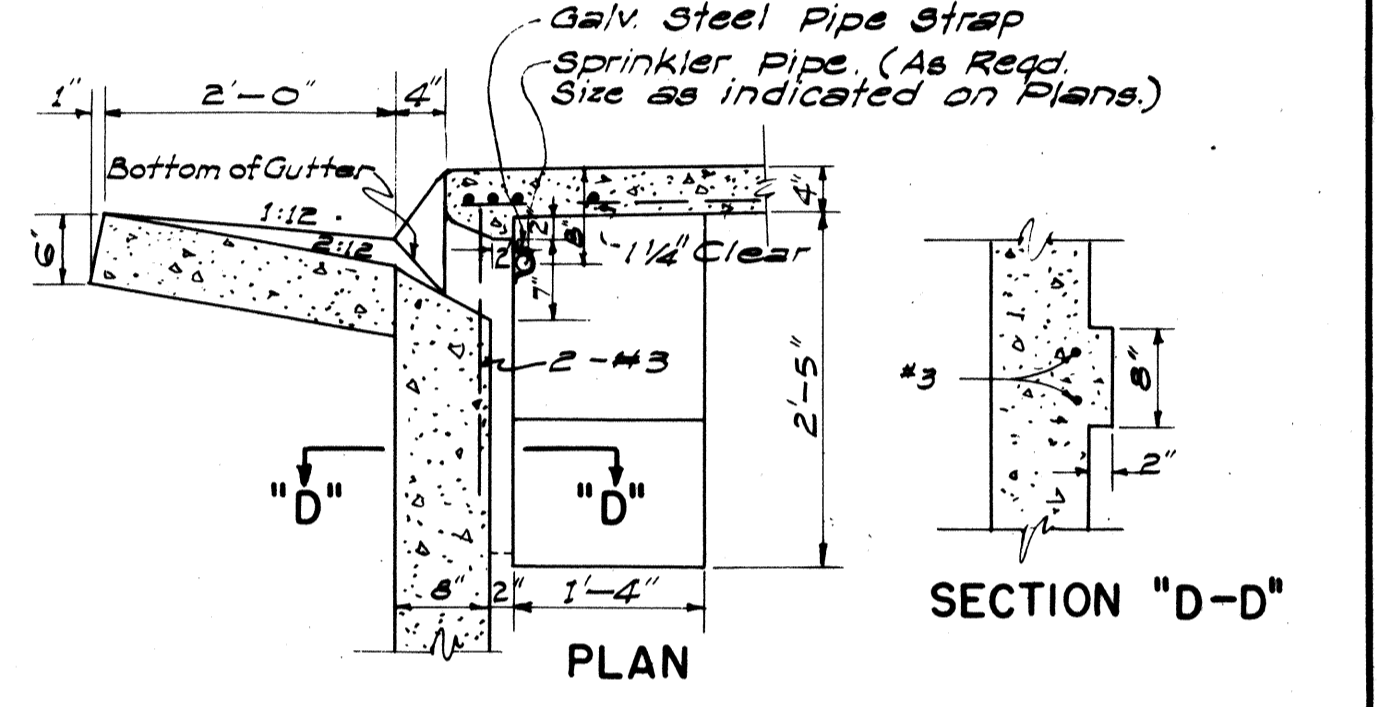
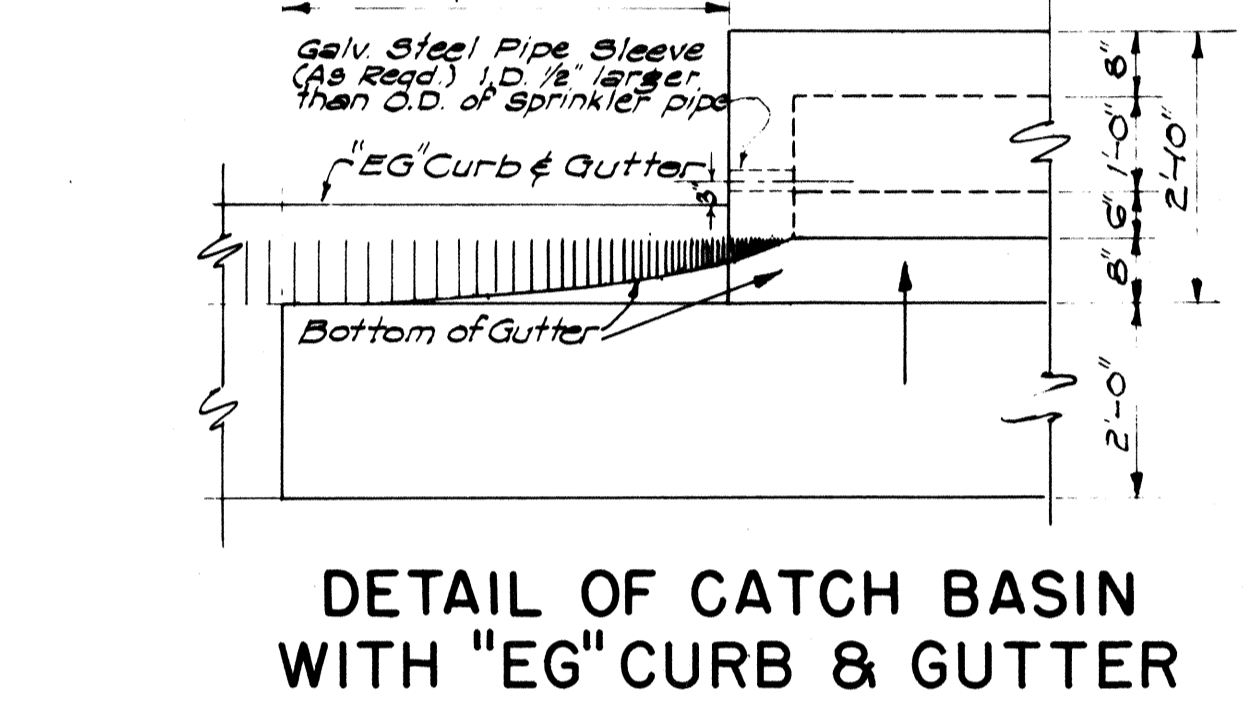
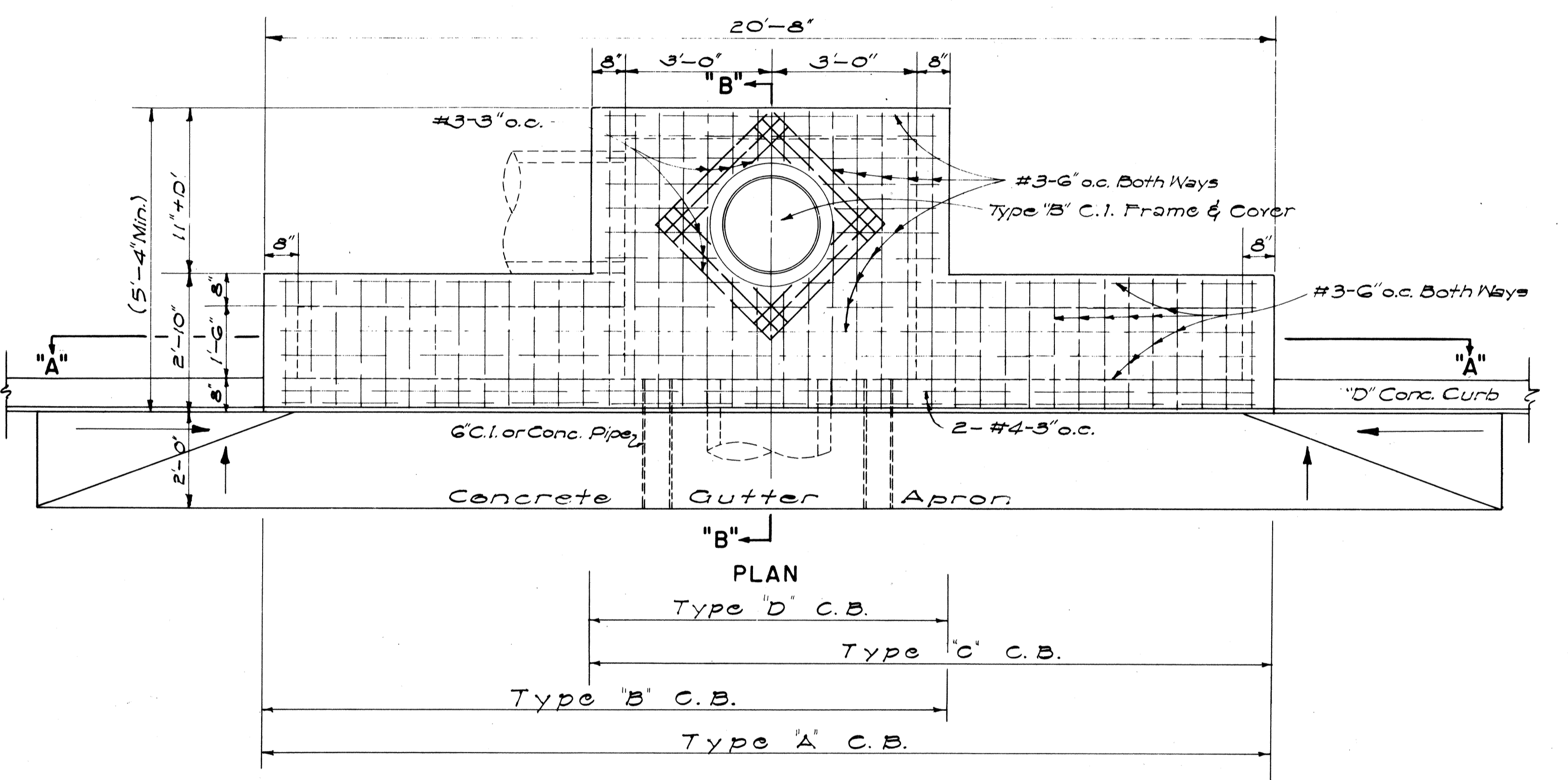
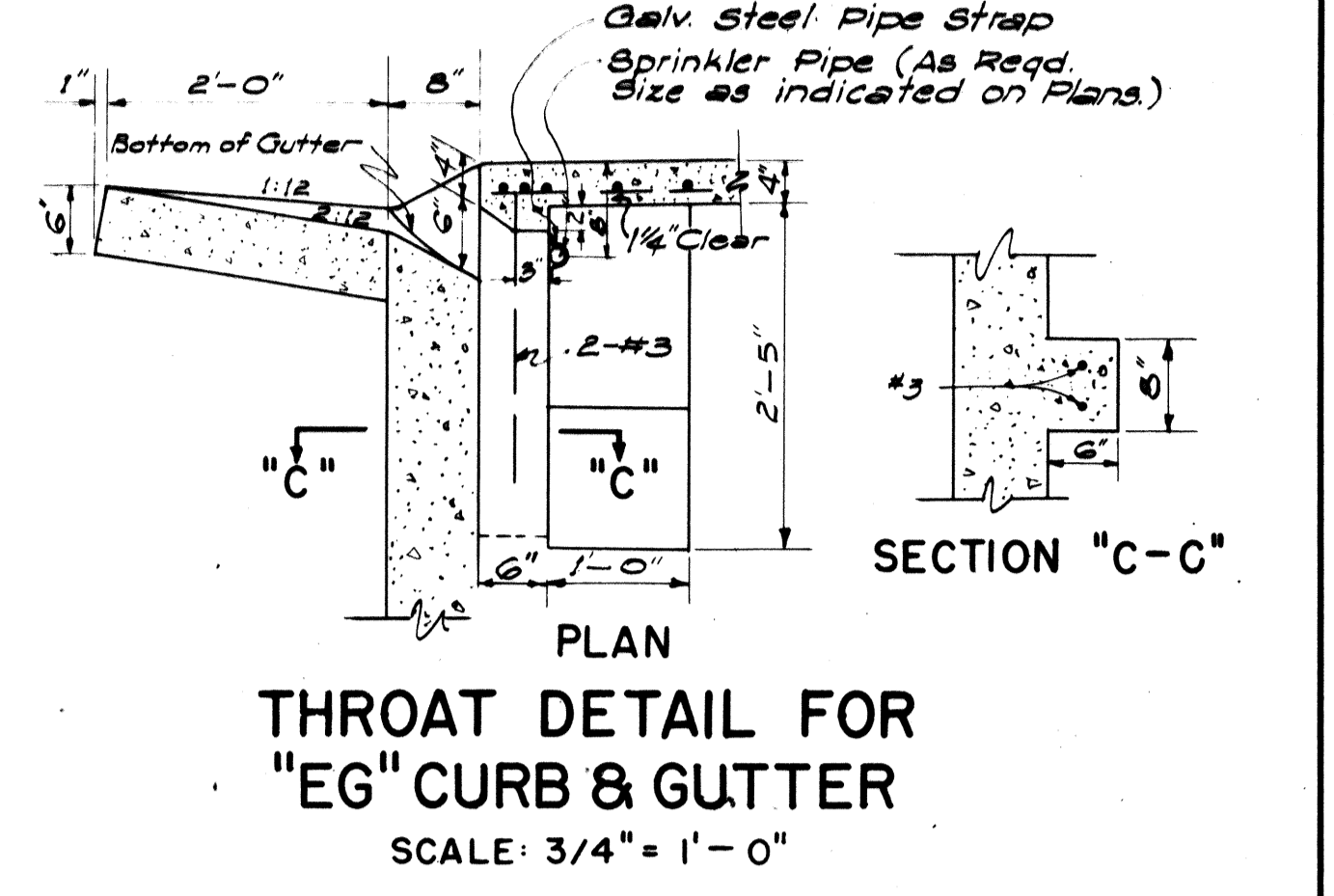
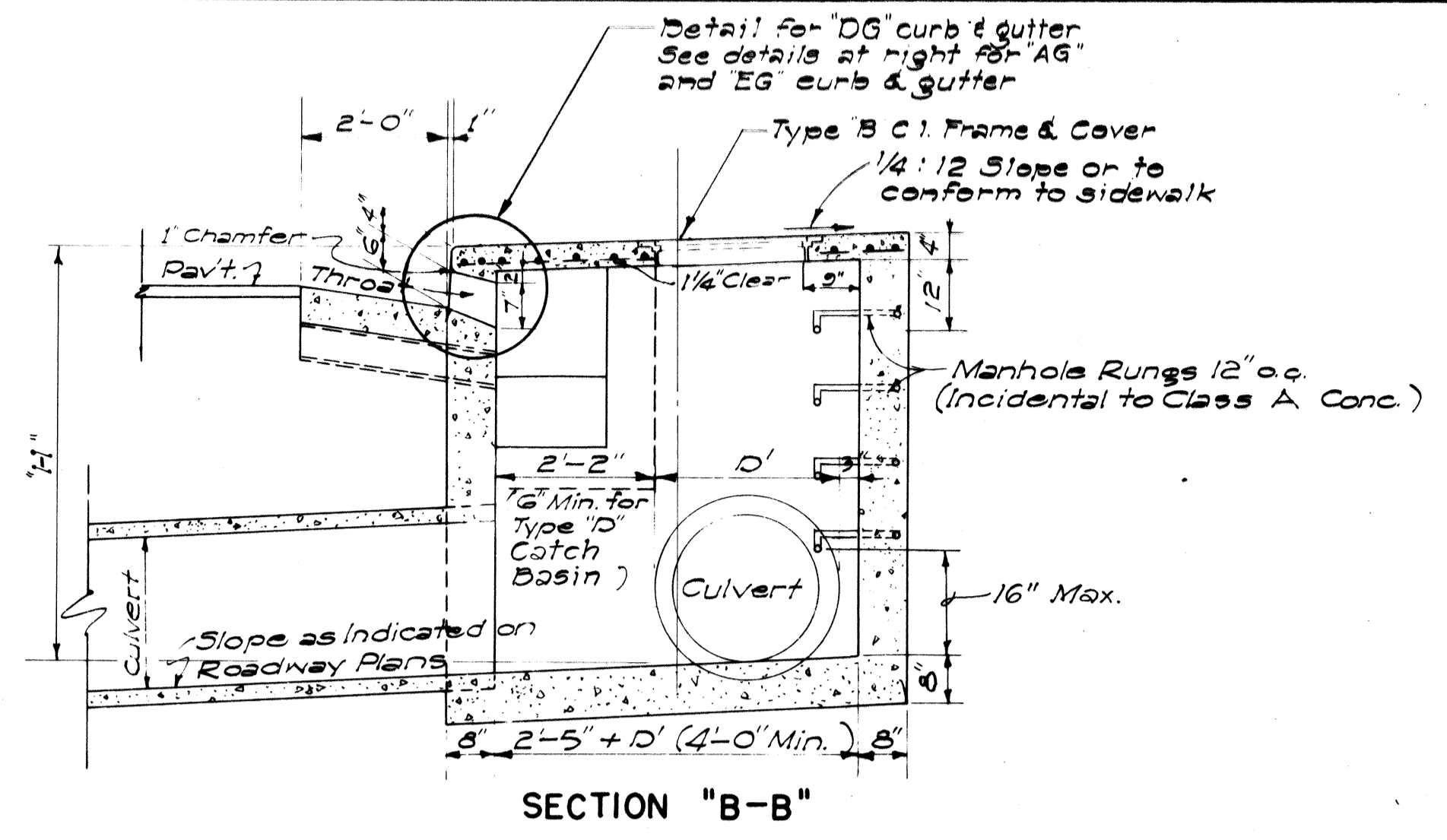
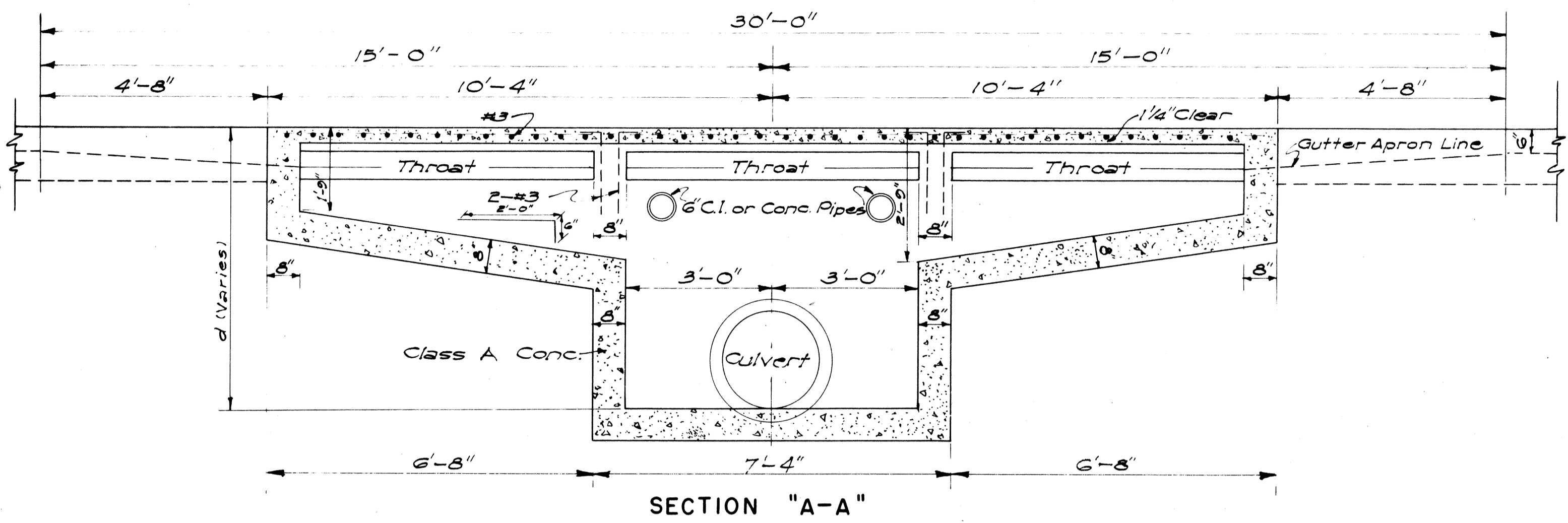
ORIGINAL PLAN	DATE
SURVEY PLOTTED BY	"
DRAWN BY	"
TRACED BY	"
DESIGNED BY	"
QUANTITIES BY	"
CHECKED BY	"
No.	

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION  
**DRAINAGE DETAILS**  
KAMEHAMEHA HWY, WAHIAWA  
AVOCADO ST. TO KILANI AVE.  
FED. AID PROJECT NO. F-F-080-1(5)  
Scale: 1/2" = 1'-0" Date: May 1980  
SHEET No. 13 OF 17 SHEETS



2/17/50

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	FF-080-1(5)	1980	53	123



DETAILS OF TYPES "A", "B", "C" AND "D" CATCH BASINS  
SCALE: 1/2" = 1'-0"

GENERAL NOTES

- Quantities based on  $d = 5.75'$  and  $D' = 30'$ .
- Quantities do not include concrete for Gutter Apron.
- The Contractor shall install two 6" Cast Iron or Concrete Pipes as incidental to Class A Concrete for Construction Drainage. The Engineer shall determine the exact location in the field.
- Culvert shall leave C.B. from any position and any direction indicated by plans or ordered by the Engineer. Culvert may both enter and leave C.B. so that C.B. will also act as Manhole.
- The Contractor shall install Galvanized Steel Pipe Sleeves and Straps as incidental to Sprinkler System.
- The type of curb and/or gutter (Type 1, 2, 3, etc.) shall conform to the type specified on the roadway plans.
- 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. Type "B" Cast Iron Frame and Cover and Manhole Rungs may be placed at any location as ordered by the Engineer.

ESTIMATED QUANTITIES

Type	Class A Conc. Struct. Exc.	Reinf. Steel	Gutter Length
"A"	7.5 c.y.	24.7 c.y.	145 lb.
"B"	6.0 c.y.	21.5 c.y.	108 lb.
"C"	6.0 c.y.	21.5 c.y.	108 lb.
"D"	4.9 c.y.	16.5 c.y.	77 lb.

APPROVAL RECOMMENDED:  
J. Pakar 12-17-69  
 HYDRAULIC DESIGN ENGINEER DATE

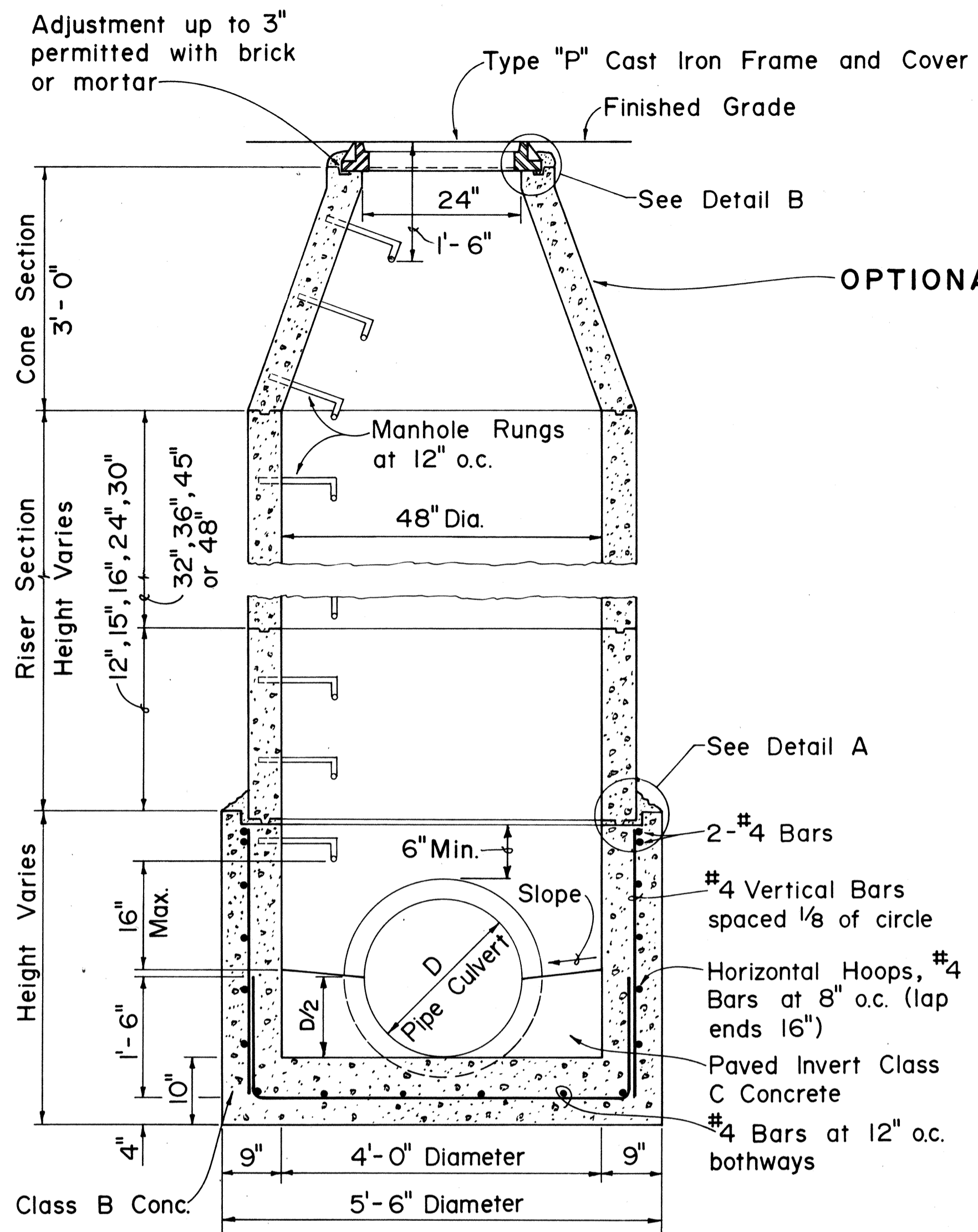
APPROVED:  
William J. Pakar 12-17-69  
 ASSISTANT CHIEF, ENGINEERING DATE

NO.	REVISION	APPROVED BY	DATE
1	Spacing on Manhole Rungs to conform to OSHA.	HT.	1-21-75

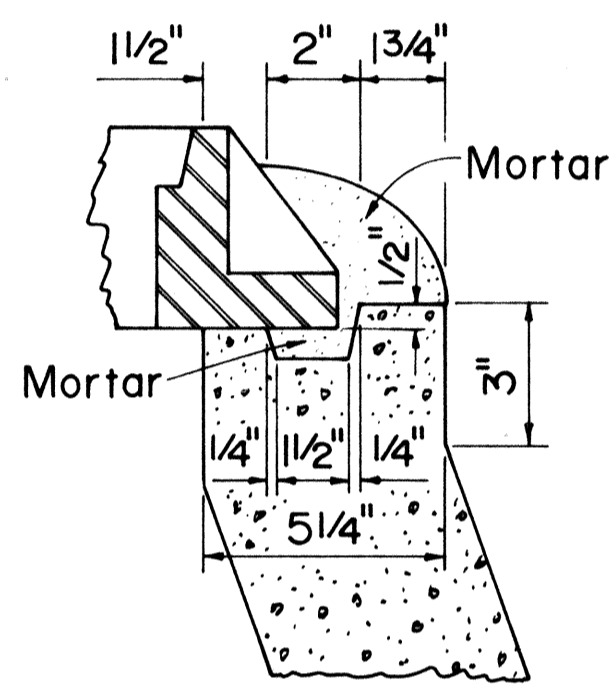
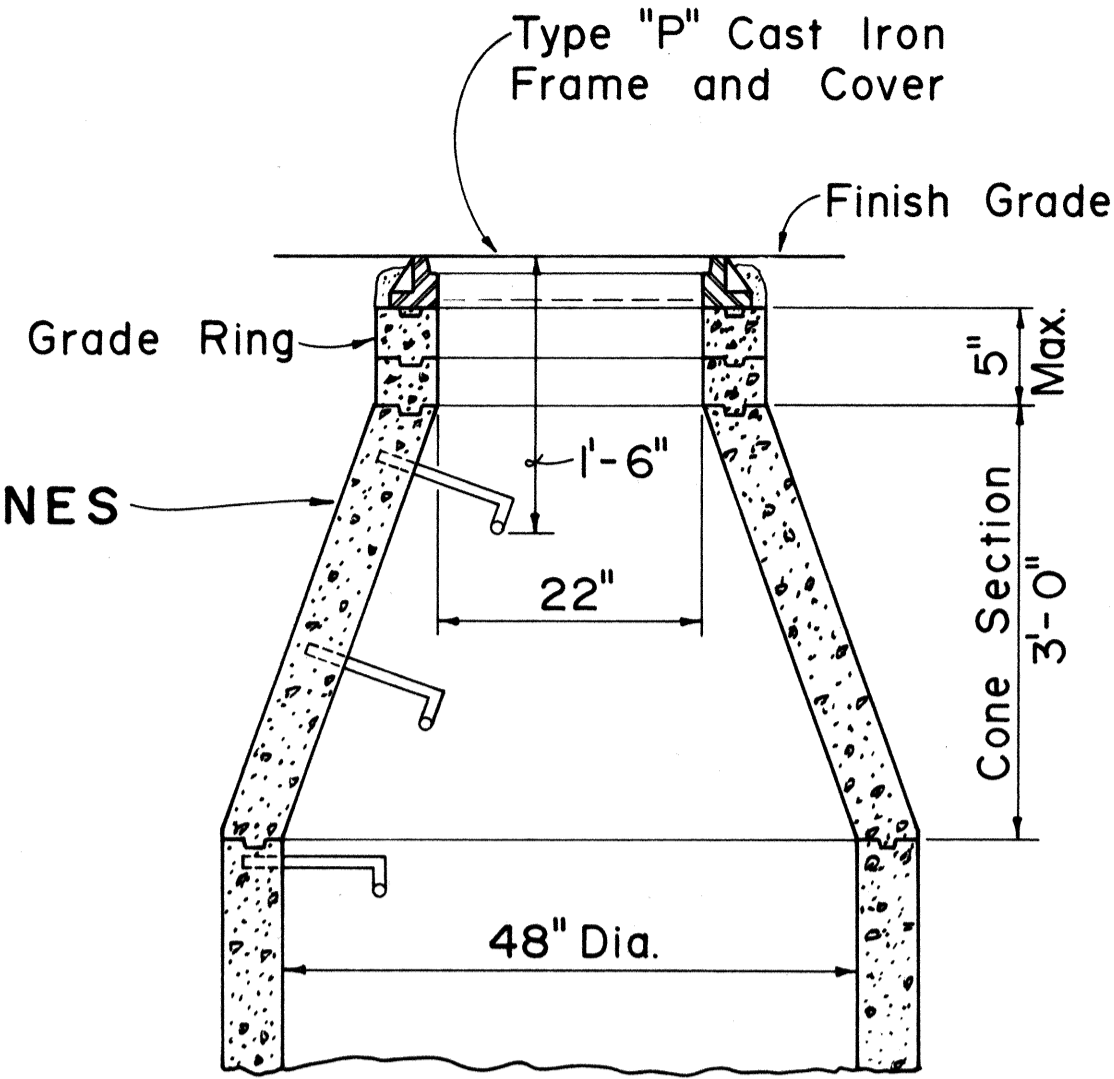
STATE OF HAWAII  
 DEPARTMENT OF TRANSPORTATION  
 HIGHWAYS DIVISION  
 STANDARD DETAILS  
**CATCH BASINS**

ORIGINAL PLAN  
 SURVEY PLOTTED BY: DATE: \_\_\_\_\_  
 DESIGNED BY: \_\_\_\_\_  
 DRAWN BY: \_\_\_\_\_  
 CHECKED BY: \_\_\_\_\_

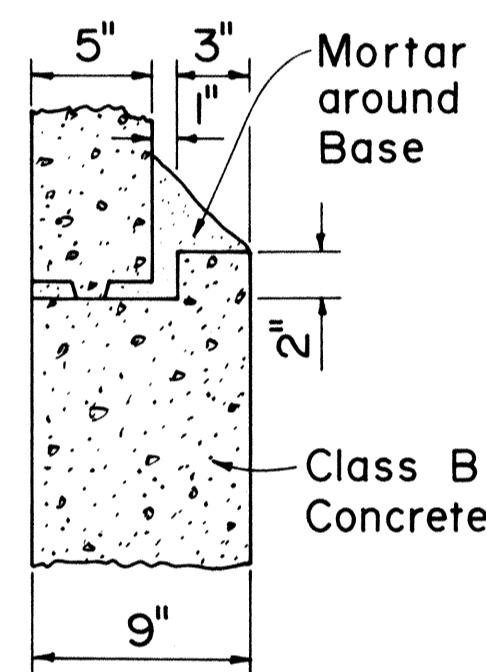
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	FF-080-1(5)	1980	54	123



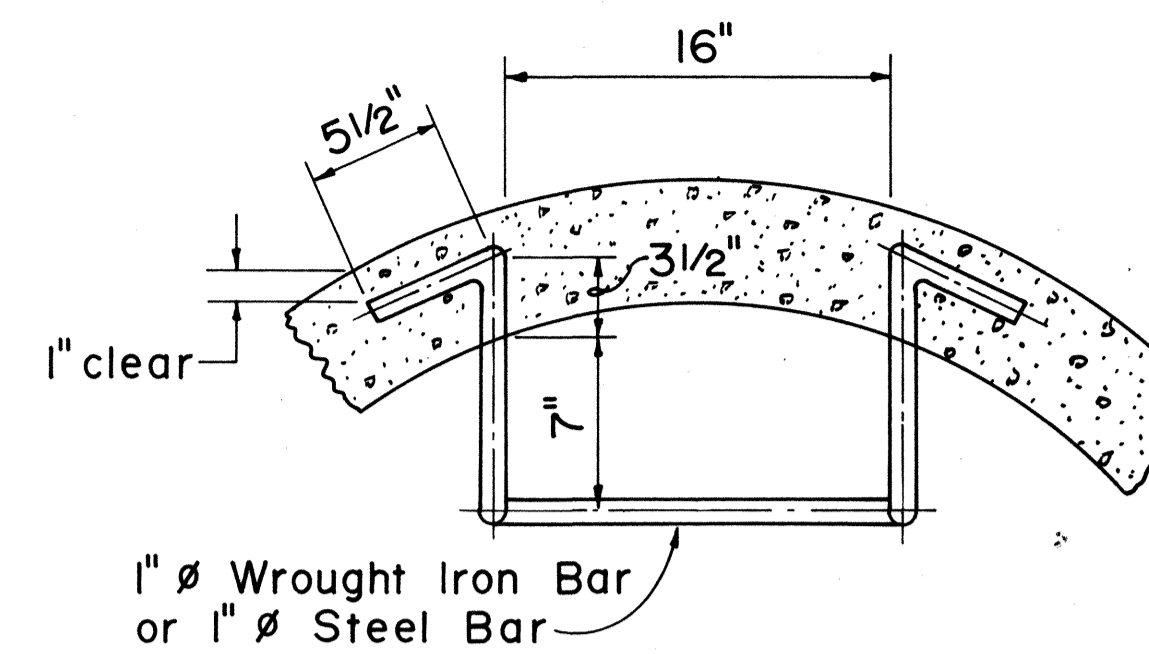
**SECTION**



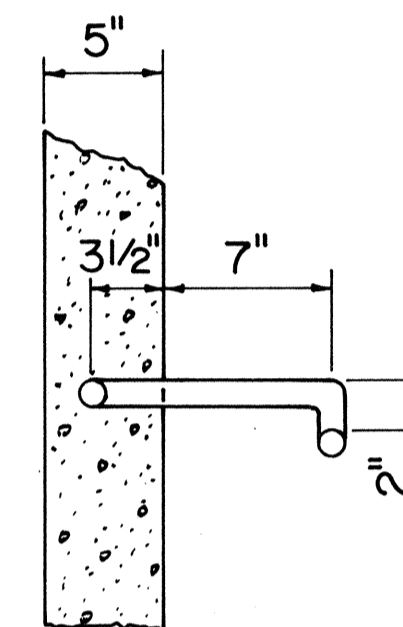
**DETAIL B**



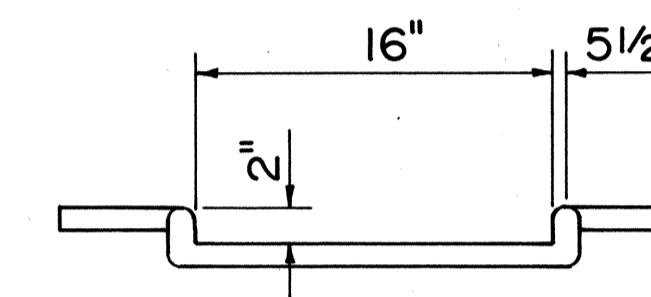
**DETAIL A**



**PLAN**

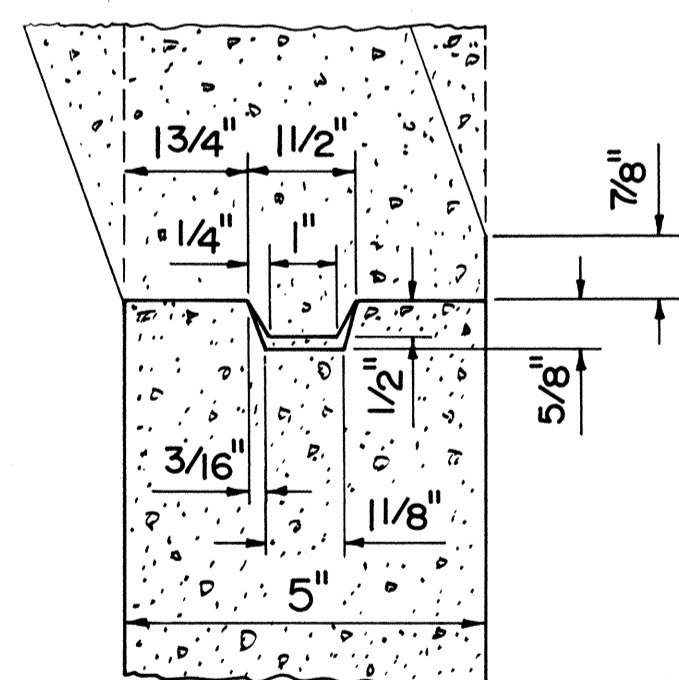


**SIDE VIEW**

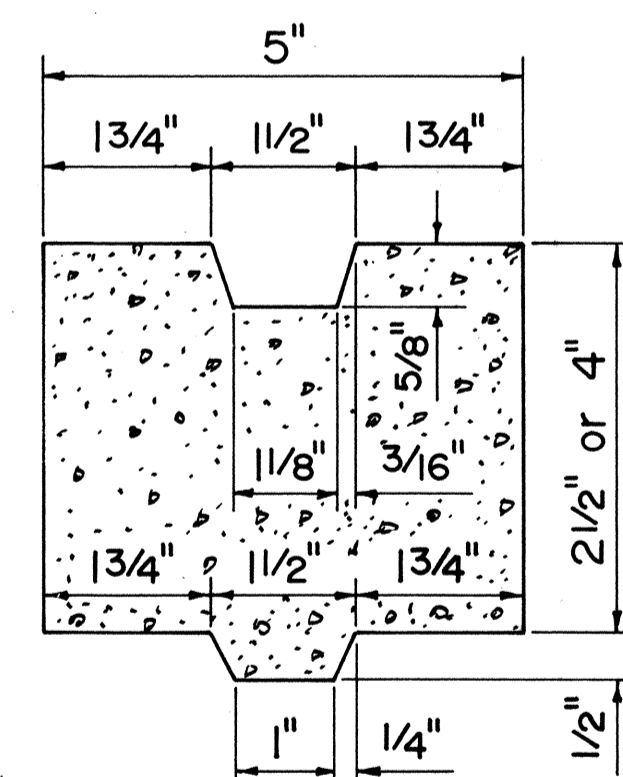


**FRONT VIEW**

**MANHOLE RUNGS**



**DETAIL FOR RISER JOINTS**



**GRADE RING DETAIL**

**PRECAST CONCRETE MANHOLE**

**GENERAL NOTES**

1. Select appropriate combination of risers and grade rings for required height.
2. All joints to be grouted as set.
3. Manufacturers may submit to the Engineer for approval, prior to manufacturing, designs other than those shown on this sheet.

APPROVAL RECOMMENDED:  
*P. Palano*  
 HYDRAULIC DESIGN ENGINEER 6-19-79 DATE

APPROVED:  
*Herbert K. Kei...*  
 ASSISTANT CHIEF, ENGINEERING 6-22-79 DATE

NO.	REVISION	APPROVED BY	DATE
1.	Supersedes Sht. DH 5A approved 2-25-71	H.T.	6/22/79

STATE OF HAWAII  
 DEPARTMENT OF TRANSPORTATION  
 HIGHWAYS DIVISION

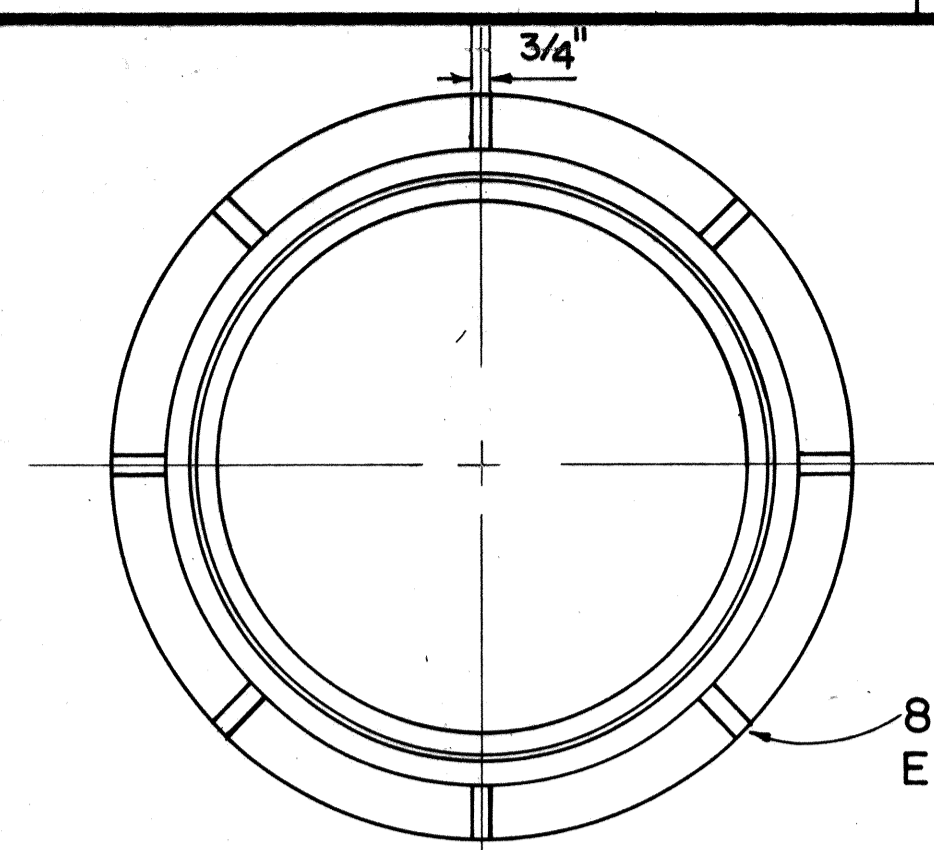
STANDARD DETAILS  
**PRECAST CONCRETE  
 MANHOLES**

Not To Scale Date: Dec. 1977

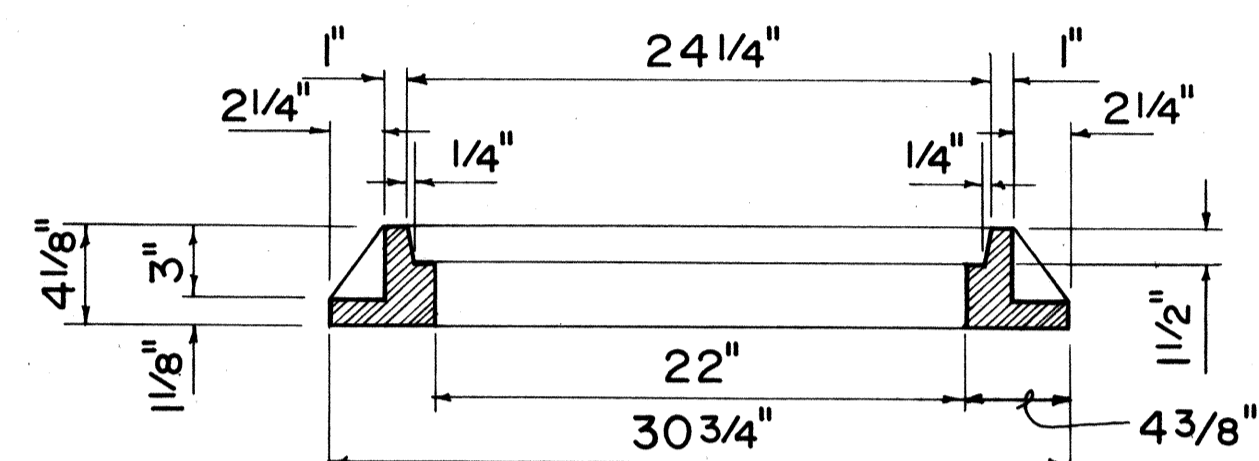
DATE	
SURVEY PLOTTED BY	
DRAWN BY	
TRACED BY	
NOTE BOOK	
QUANTITIES BY	
CHECKED BY	
No.	



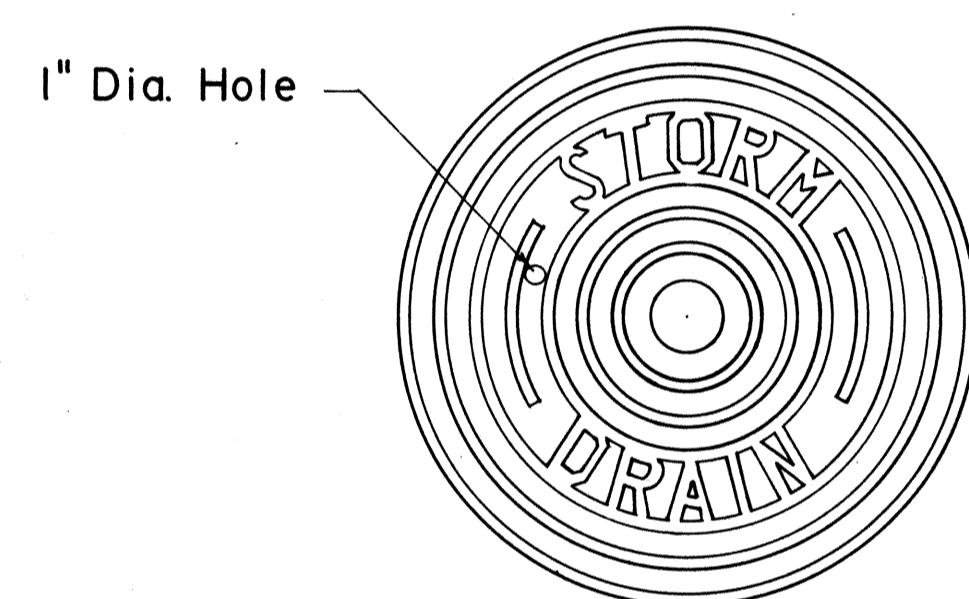
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-F-080-(8)	1980	55	123



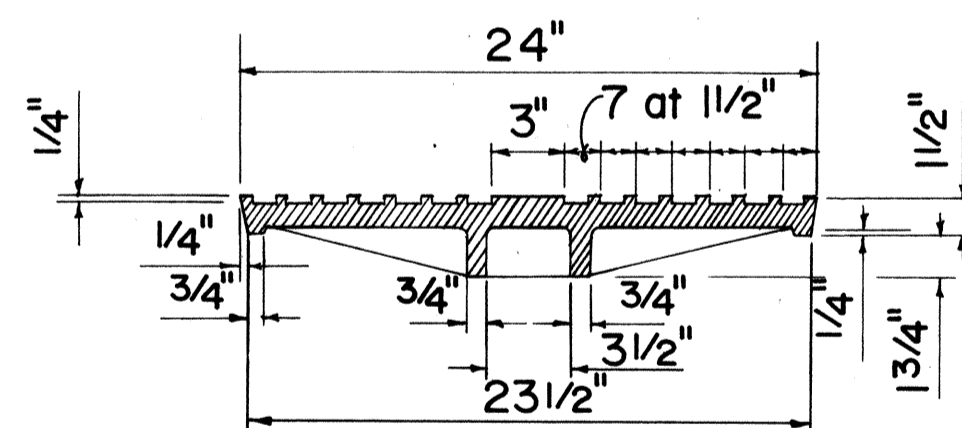
PLAN OF FRAME



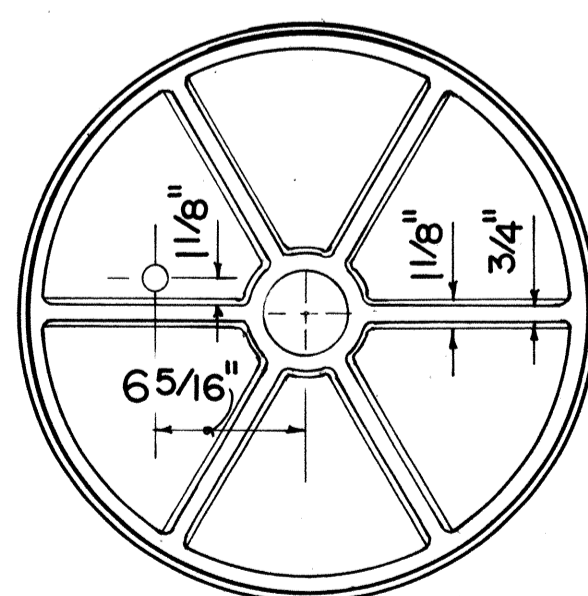
SECTION OF FRAME



TOP VIEW OF COVER

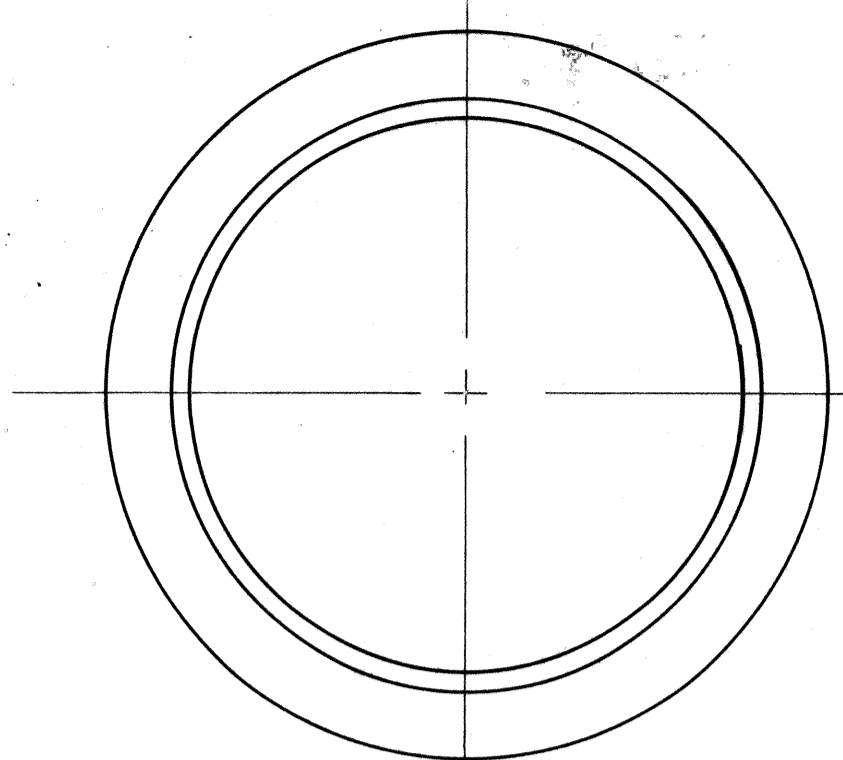


SECTION

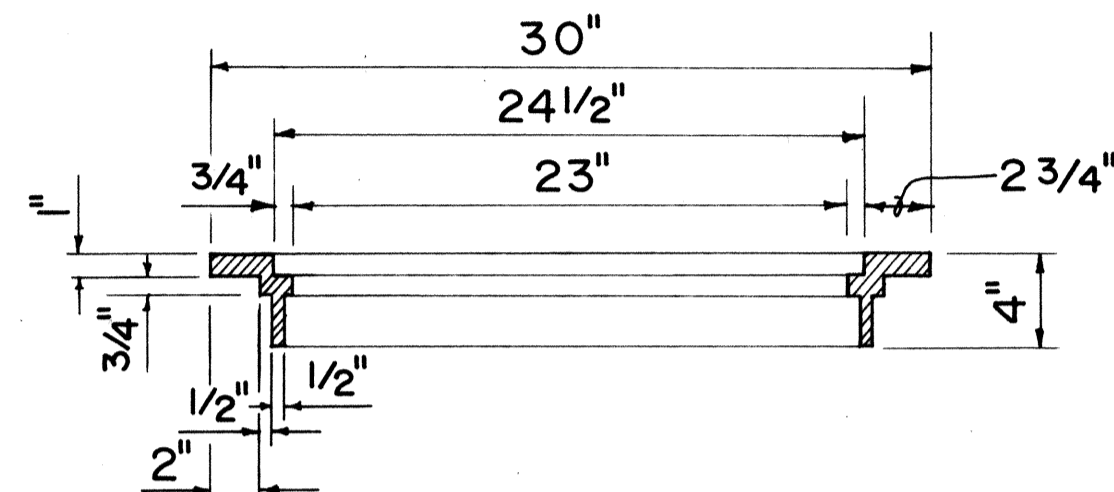


BOTTOM VIEW OF COVER

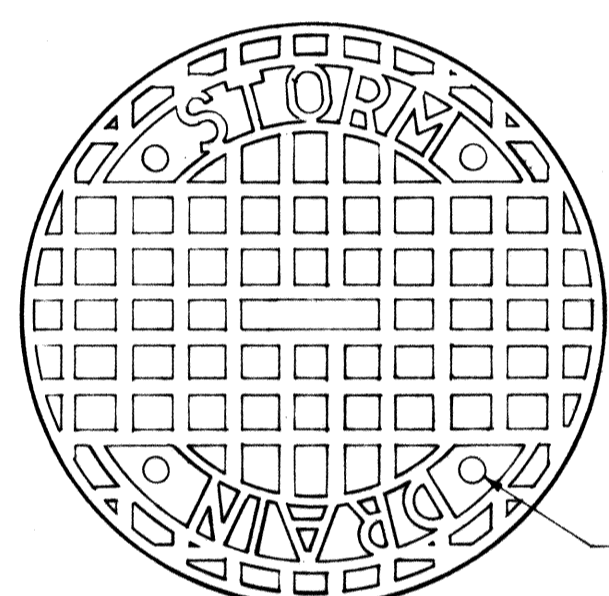
**TYPE "P" CAST IRON FRAME AND COVER**



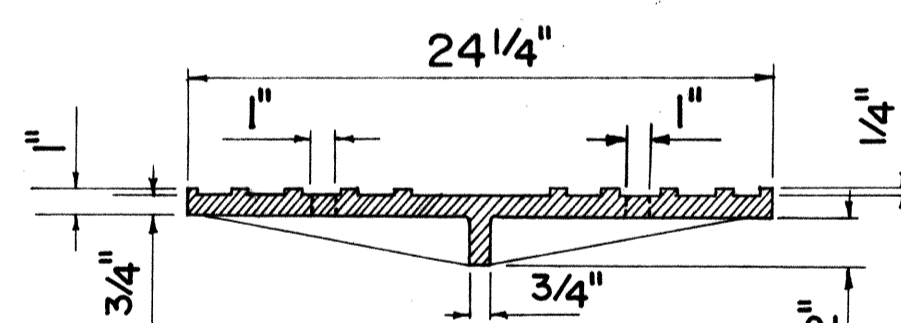
PLAN OF FRAME



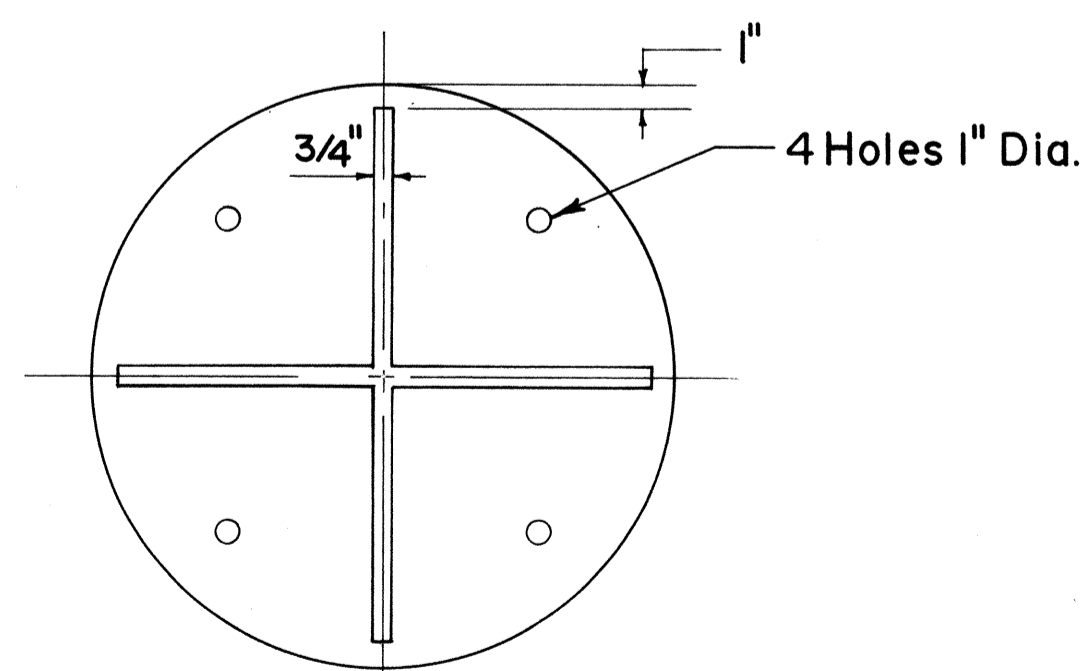
SECTION OF FRAME



TOP VIEW OF COVER

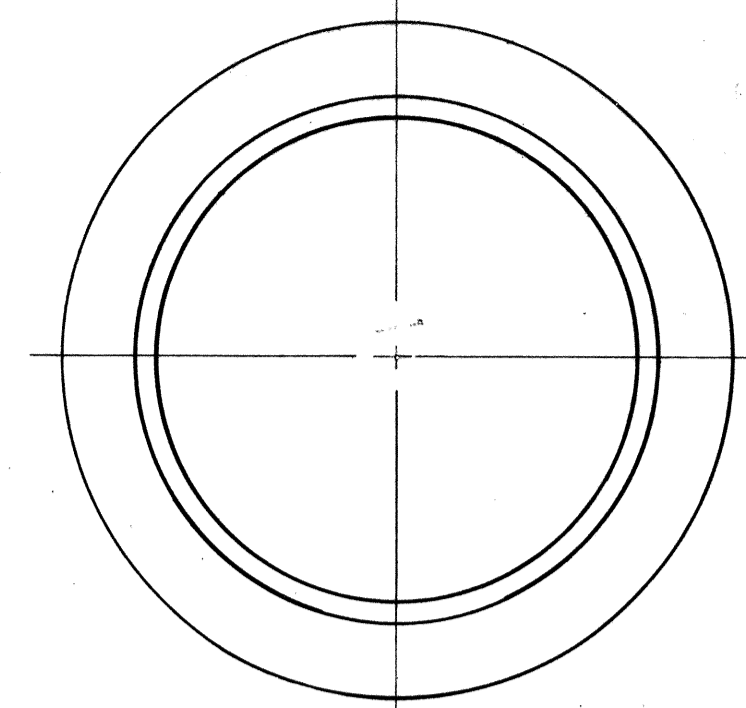


SECTION

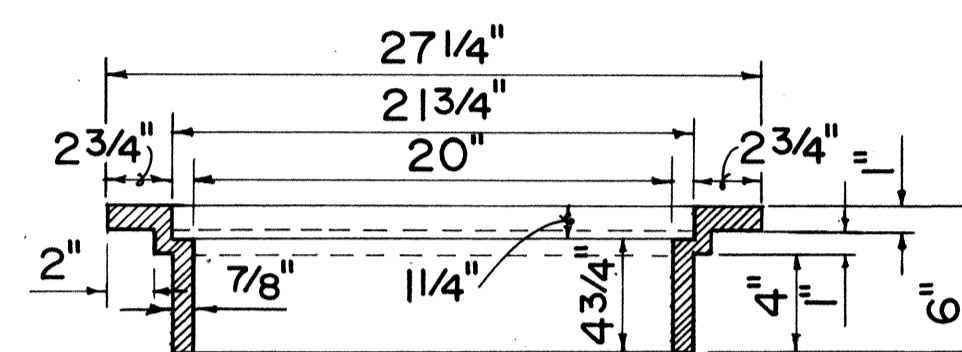


BOTTOM VIEW OF COVER

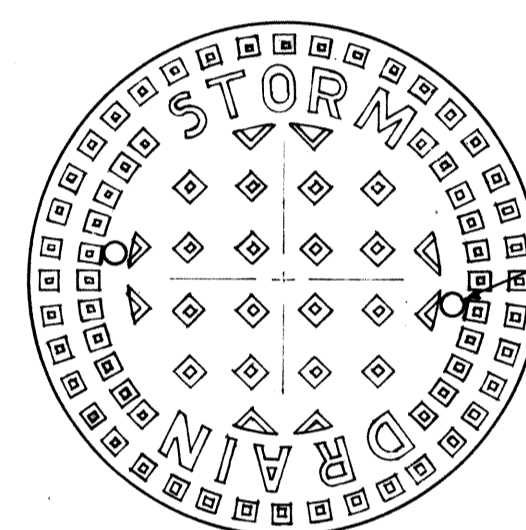
**TYPE "B" CAST IRON FRAME AND COVER**



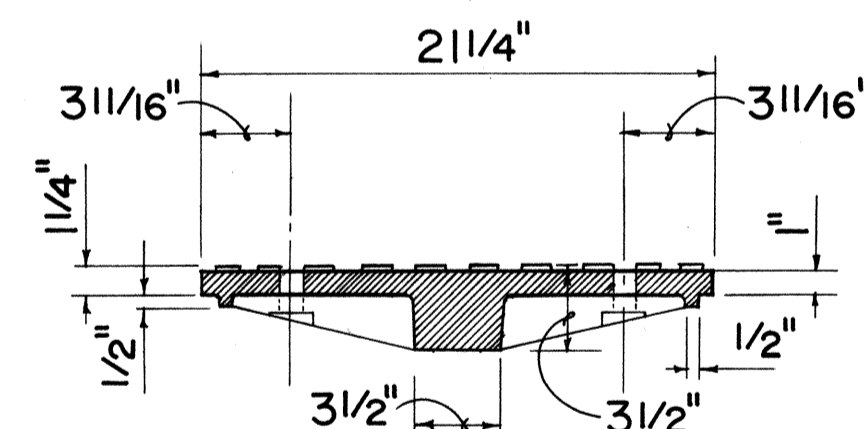
PLAN OF FRAME



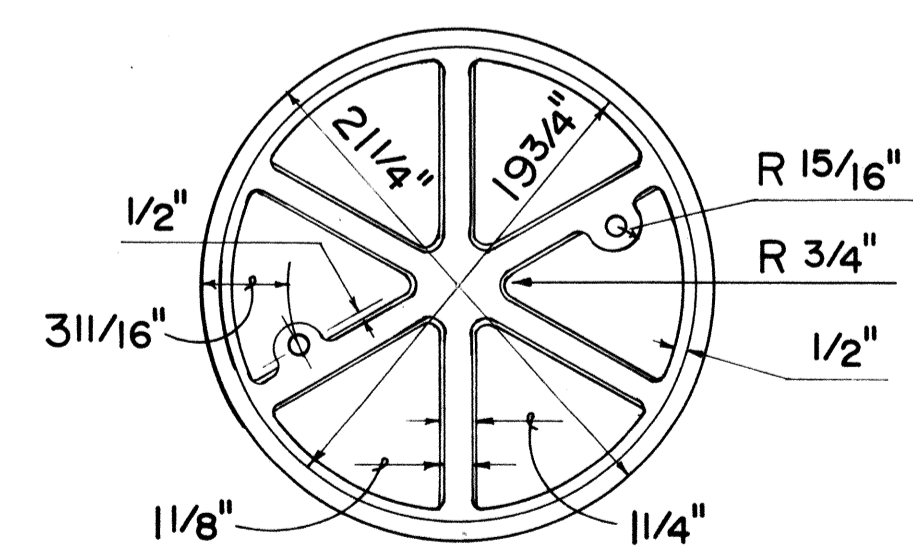
SECTION OF FRAME



TOP VIEW OF COVER

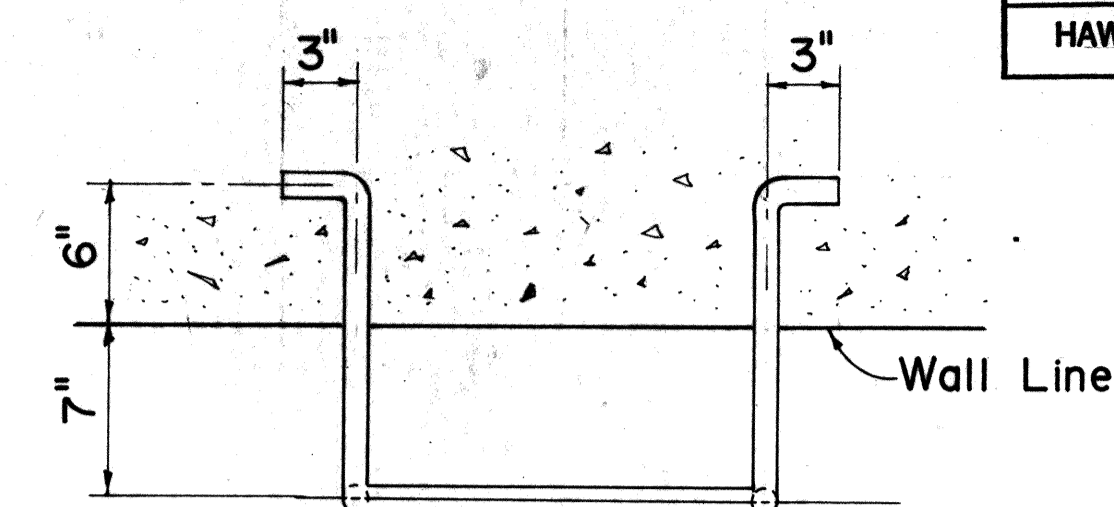


SECTION

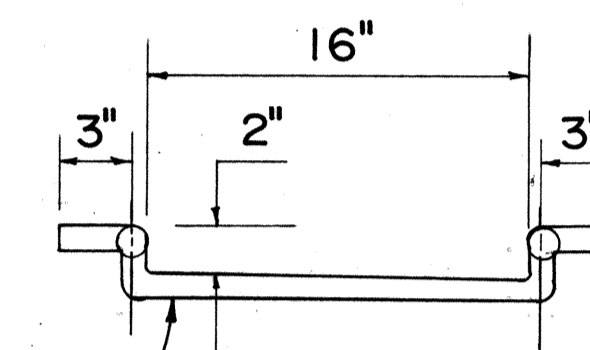


BOTTOM VIEW OF COVER

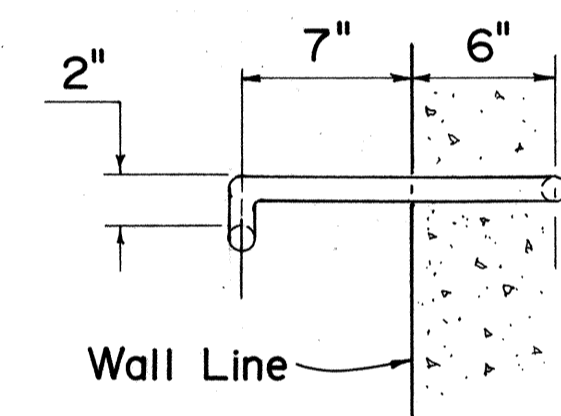
**TYPE "A" CAST IRON FRAME AND COVER**



PLAN



FRONT VIEW



SIDE VIEW

**MANHOLE RUNG**

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

APPROVED:  
*Harold Zakeishi*  
 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

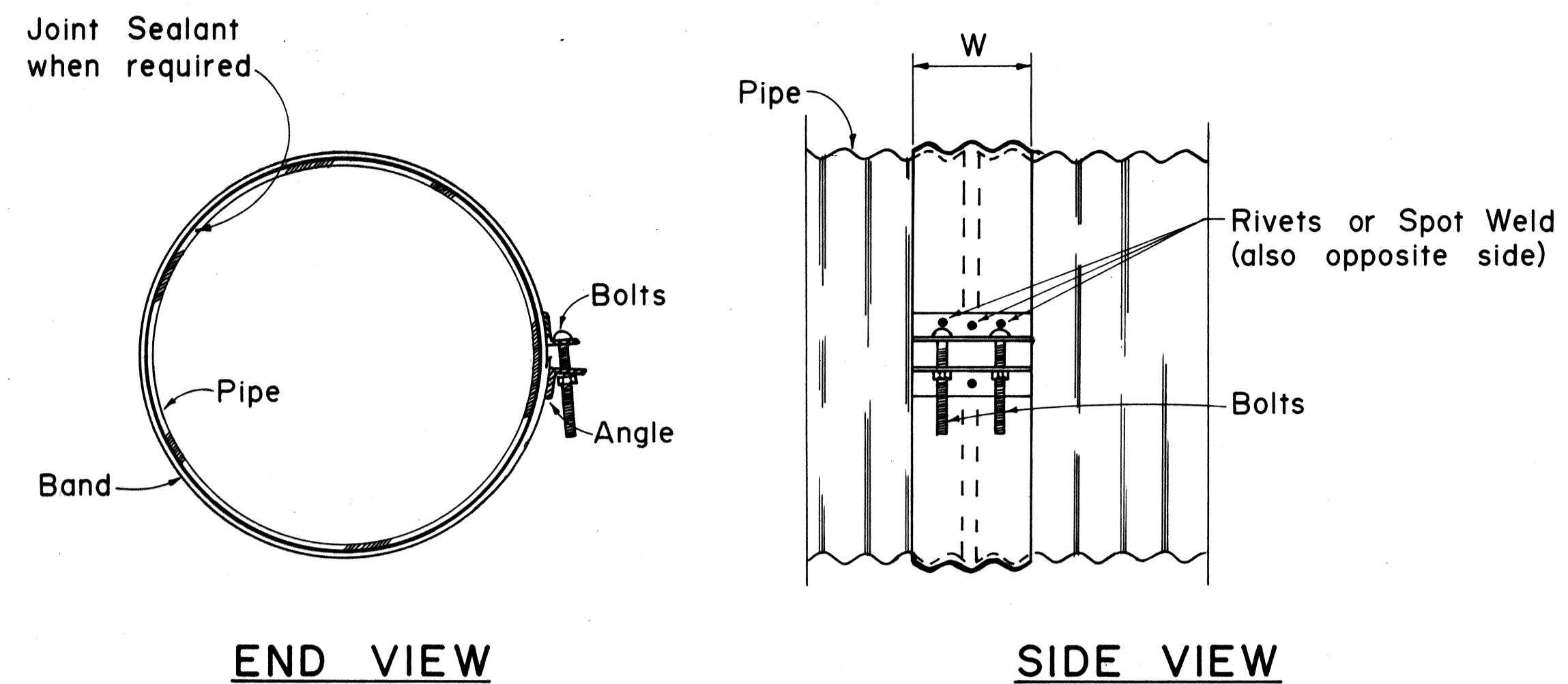
STATE OF HAWAII  
 DEPARTMENT OF TRANSPORTATION  
 HIGHWAYS DIVISION

STANDARD DETAILS  
 CATCH BASIN AND  
 MANHOLE CASTINGS

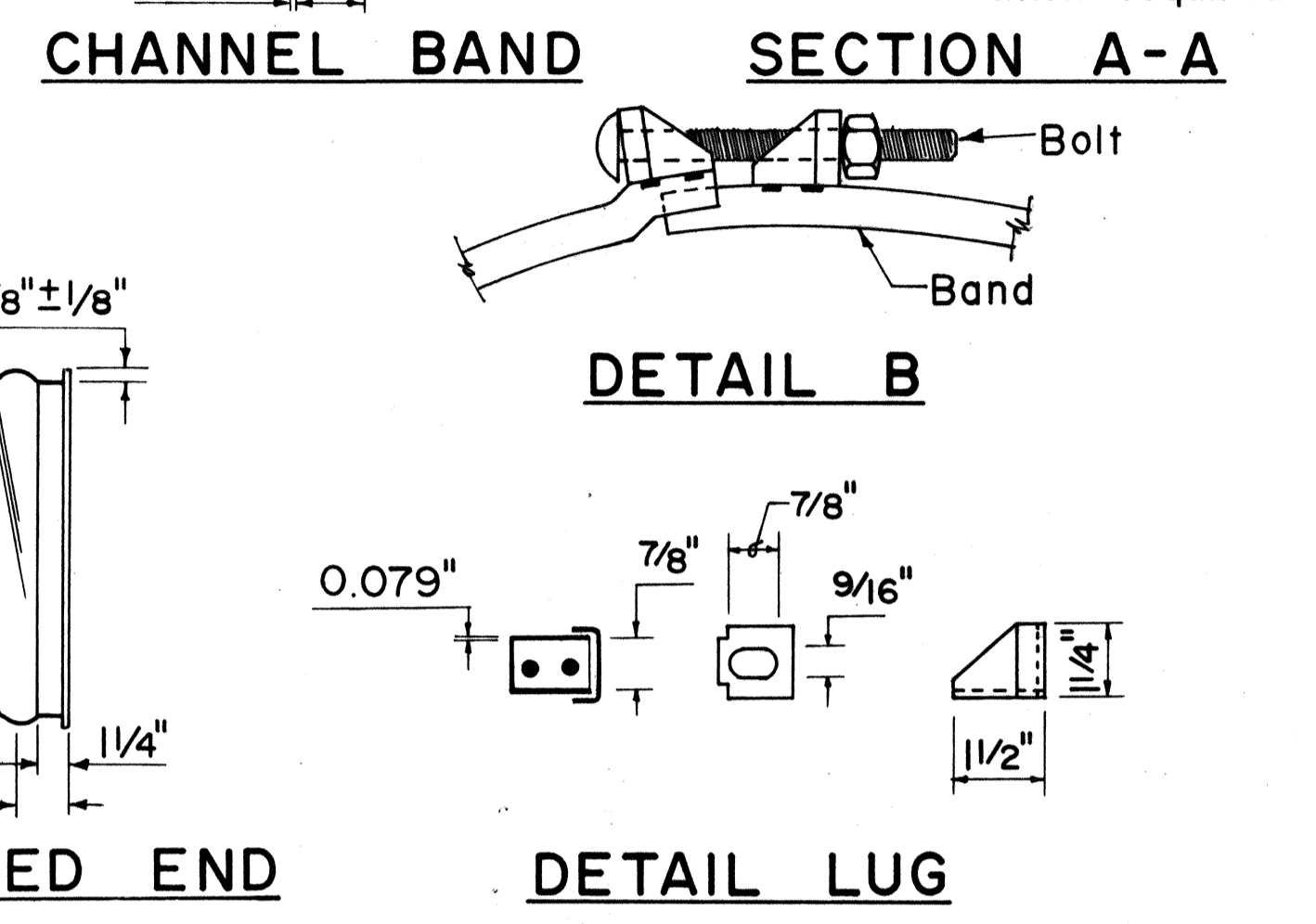
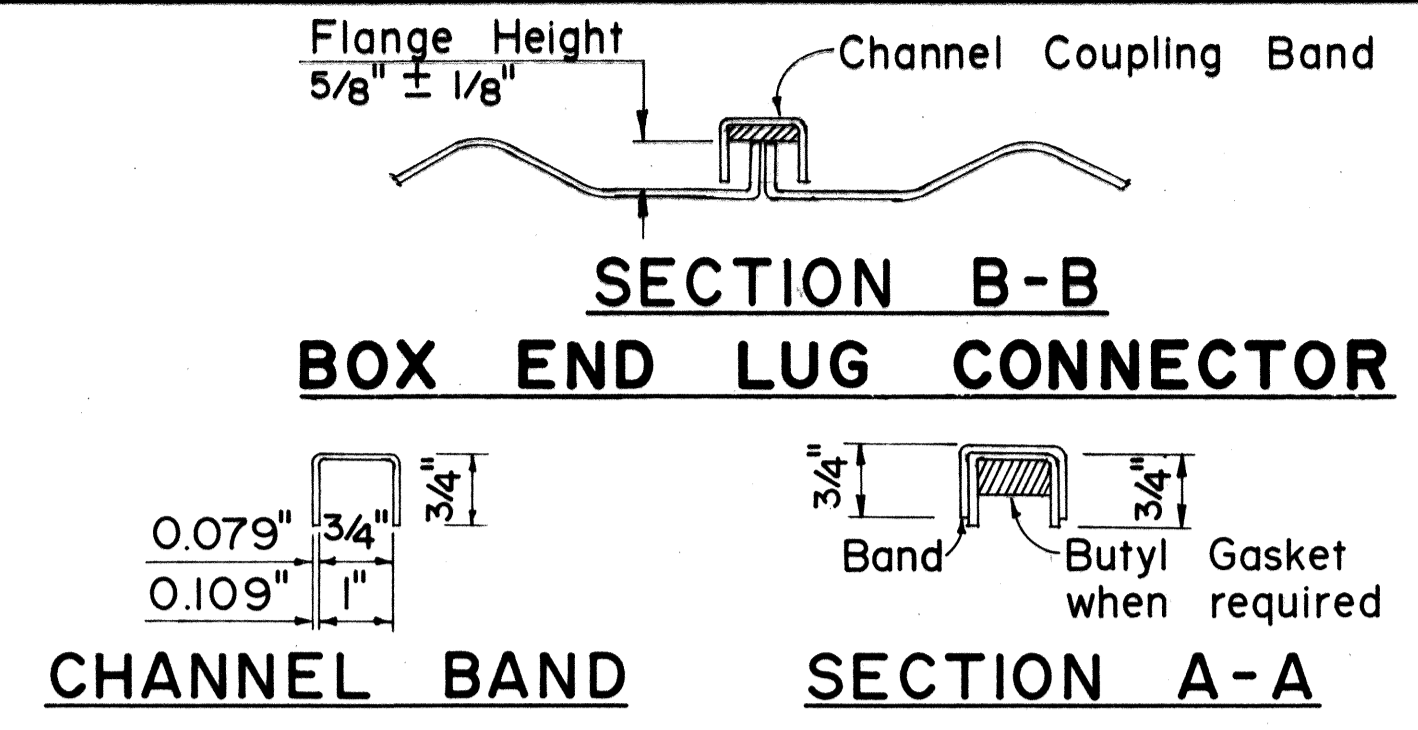
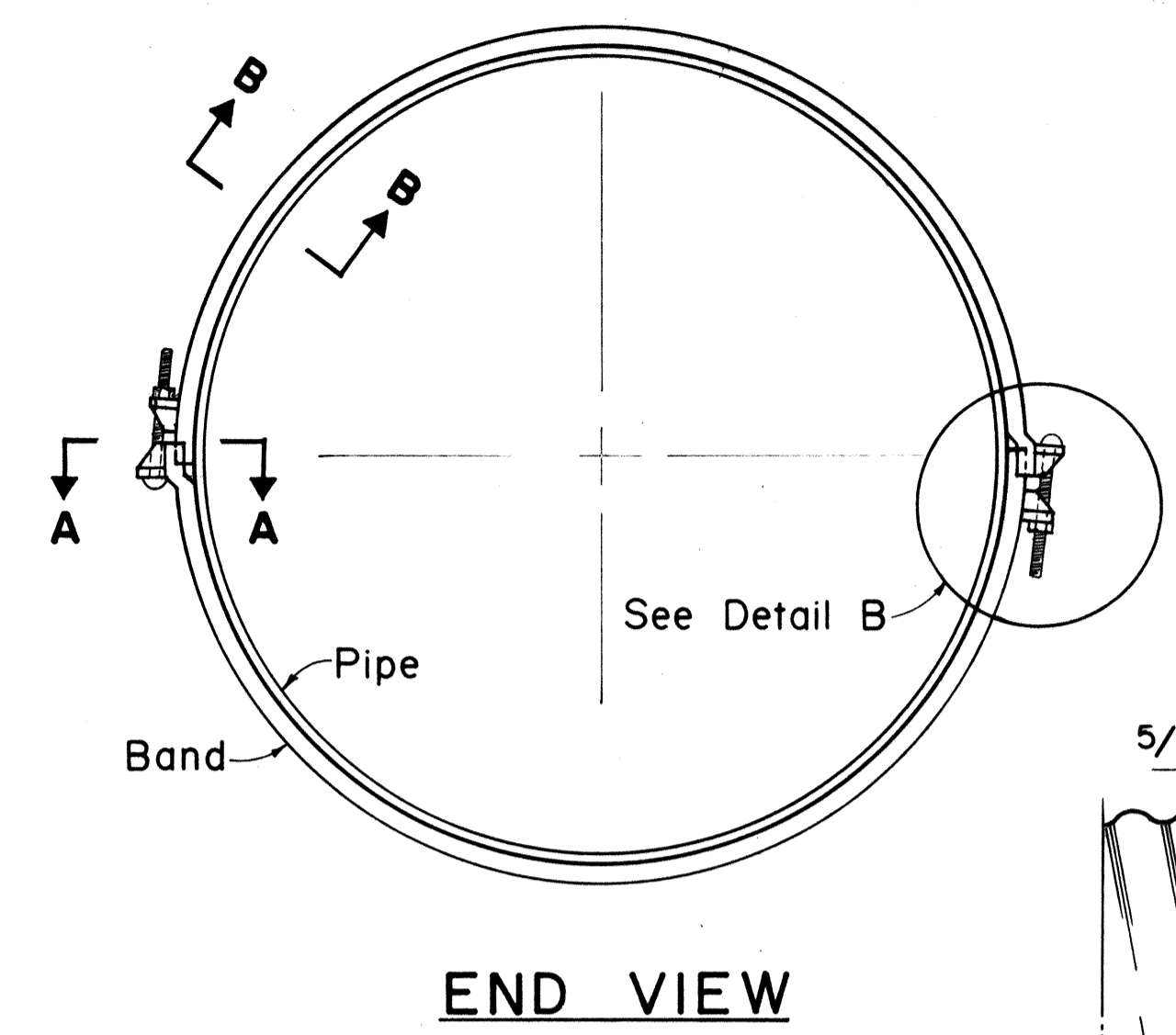
Not To Scale Date: Dec. 1977

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

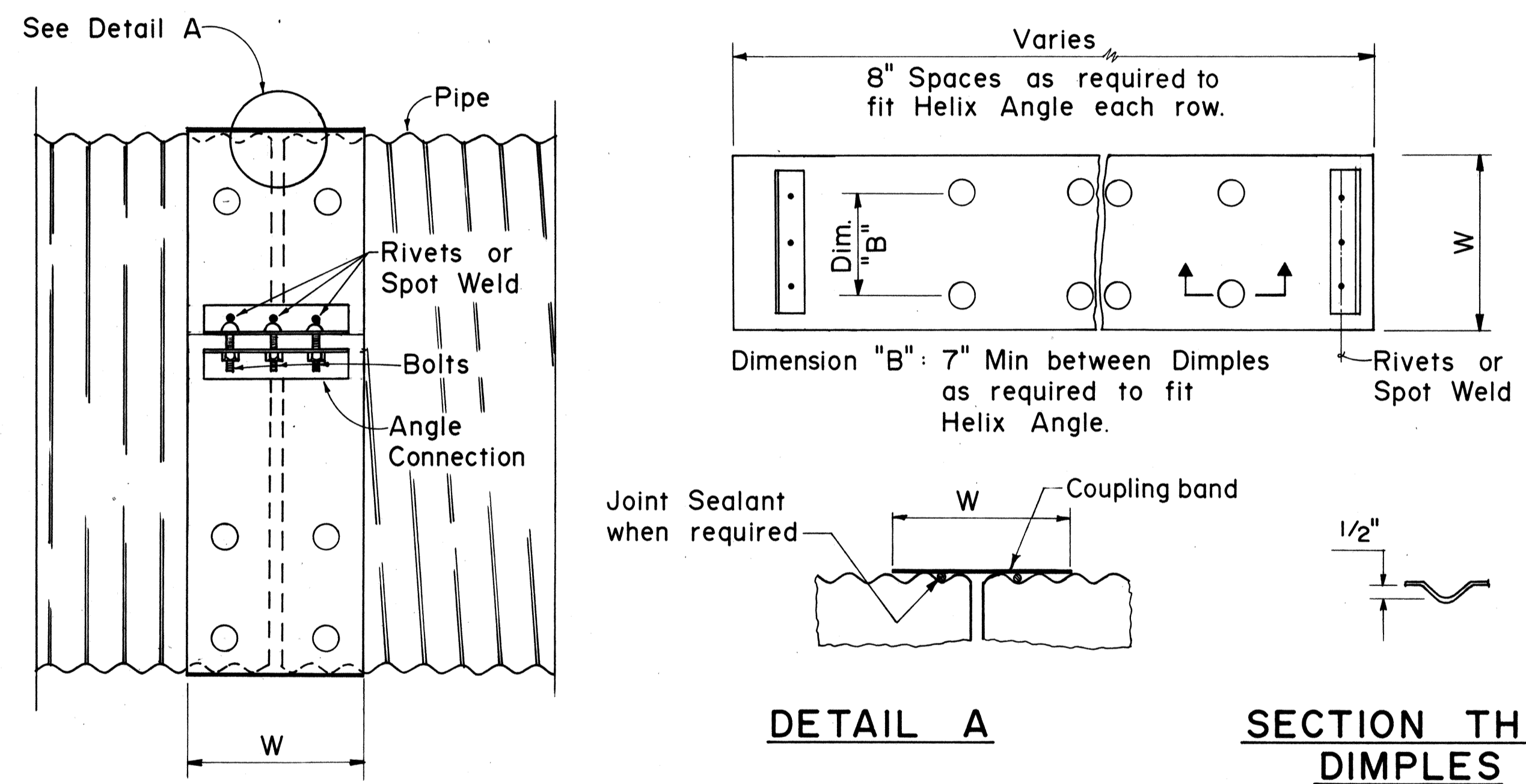
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-F-080-1(5)	1980	56	123



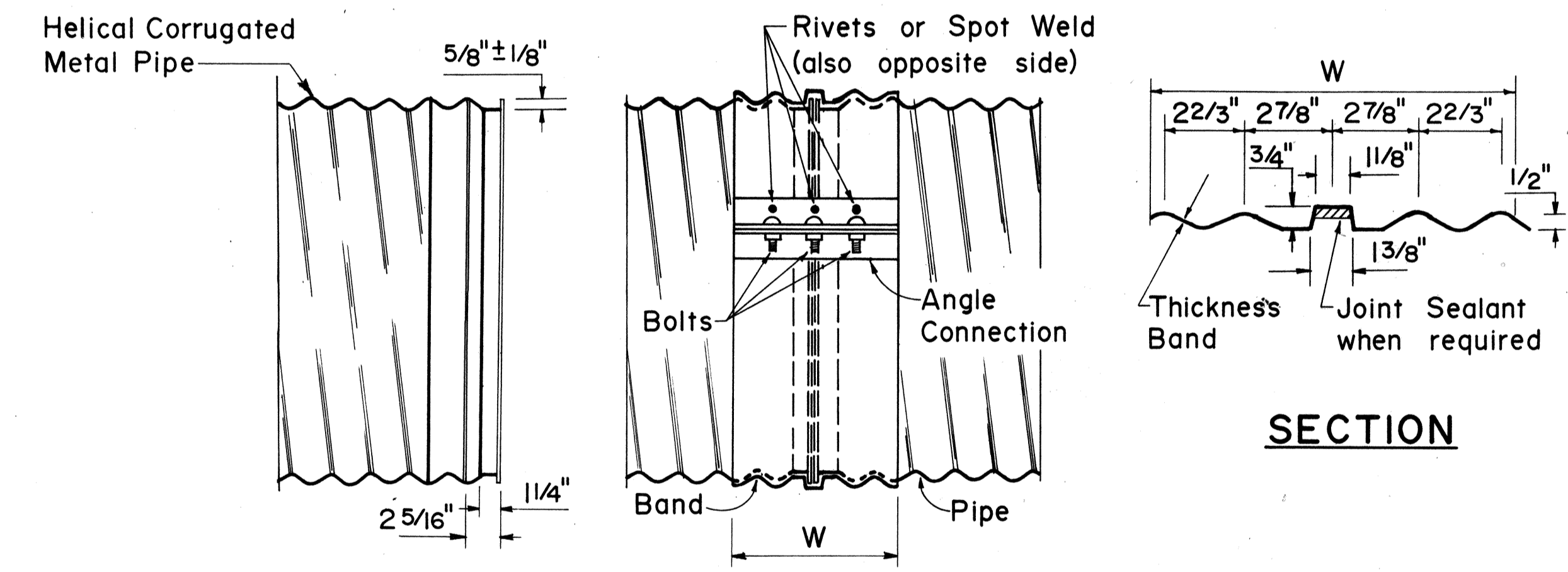
**END VIEW**  
**SIDE VIEW**  
**ANNULAR COUPLING BAND**



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



**UNIVERSAL COUPLING BAND ANGLE CONNECTION**



**REFORMED END**  
**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.

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

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
	3 x 1	66 - 84	16 1/2	0.168	2ea 2x2x3/16x12	3 ea 1/2 x 6	4ea 3/8	
		36 - 72	10 1/2	0.079-0.138	2ea 2x2x3/16x7	2 ea 1/2 x 6	3ea 3/8	
ANNULAR	22/3 x 1/2	78 - 120	16 1/2	0.079-0.138	2ea 2x2x3/16x12	3 ea 1/2 x 6	4ea 3/8	
		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
	3 x 1	78 - 84	12	0.168	2ea 2x2x3/16x12	3 ea 1/2 x 6	4ea 3/8	5ea 1/2
		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	SPOTWELD
CHANNEL	22/3 x 1/2	12 - 72	12	0.079-0.138	2 ea Lugs	1 ea 1/2 x 6	4 ea 1/2
		36 - 72	12	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

NO.	REVISION	APPROVED BY	DATE

APPROVAL RECOMMENDED:  
*P. Palano*  
 HYDRAULIC DESIGN ENGINEER 9-7-79 DATE  
 APPROVED:  
*Hubert S. Zelenko*  
 ASSISTANT CHIEF, ENGINEERING 9-14-79 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. 17 OF 17 SHEETS DH 18