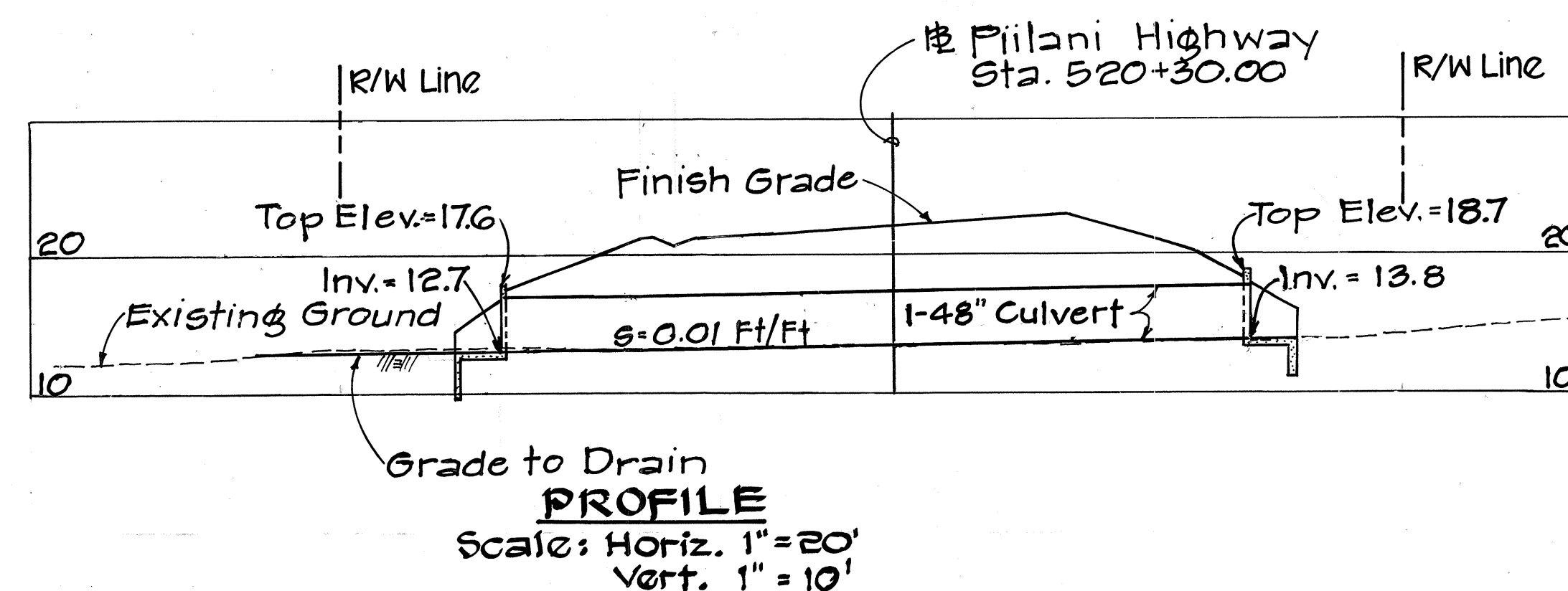
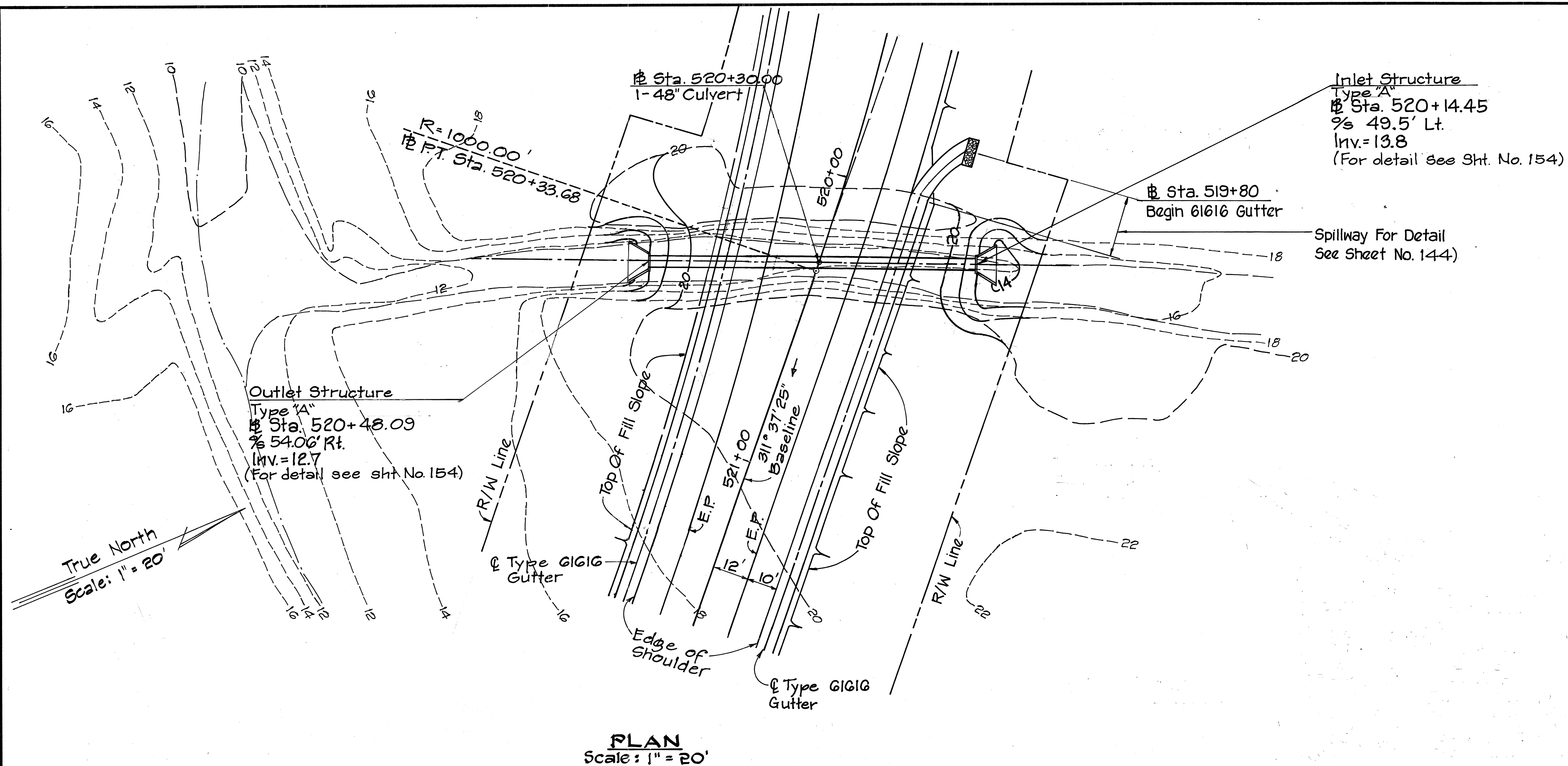
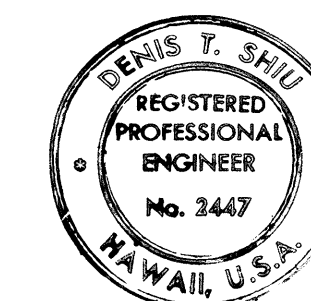


FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-FF-031-1(6)	1978	108	262



CULVERT AT STA. 520+30.00



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Dennis T. Shiu

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DRAINAGE DETAILS

PIILANI HIGHWAY
VICINITY OF MOKULELE HIGHWAY TO
VICINITY OF KILOHANA STREET
F.A. PROJECT NO. F-031-1(6)

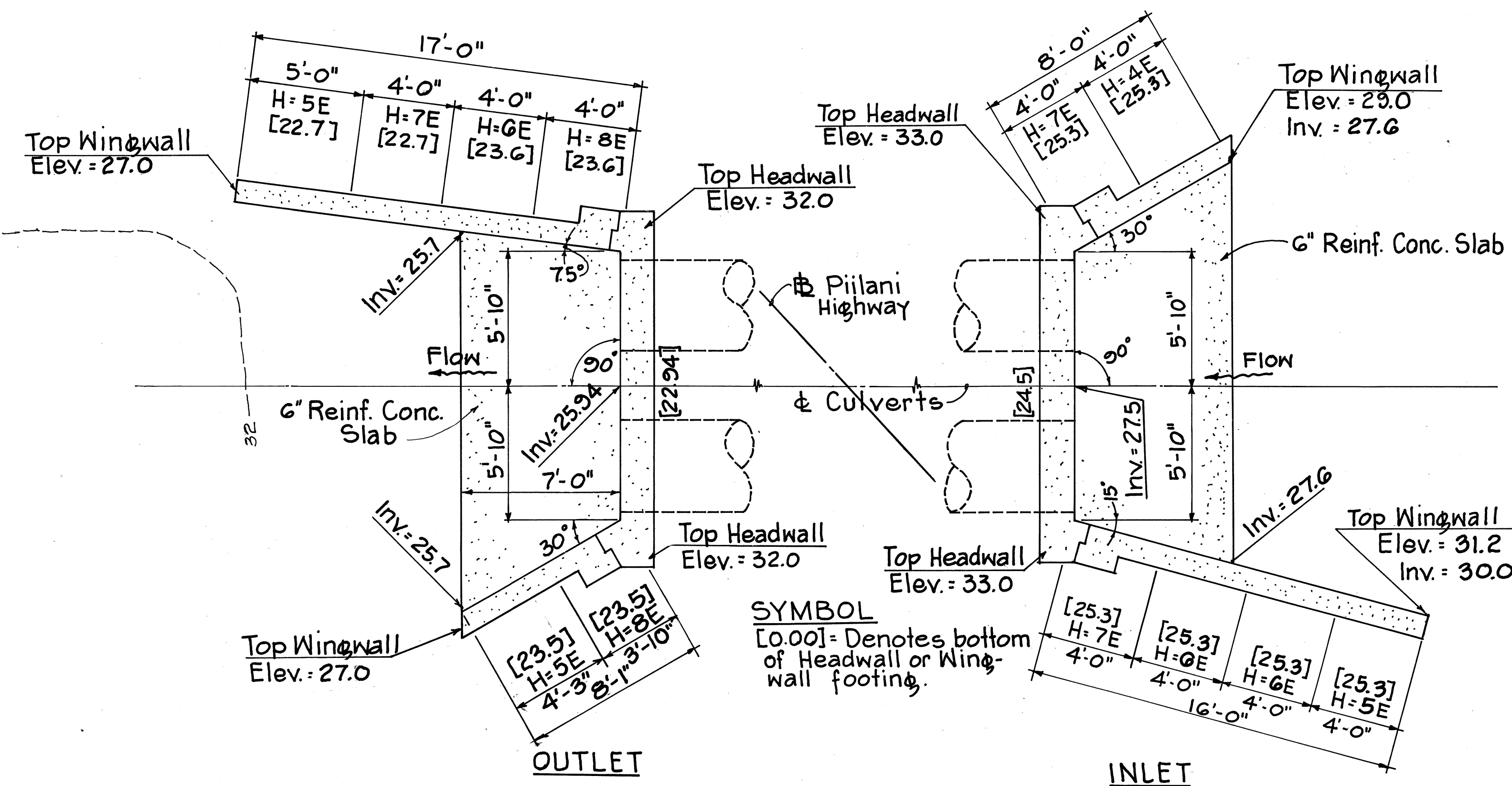
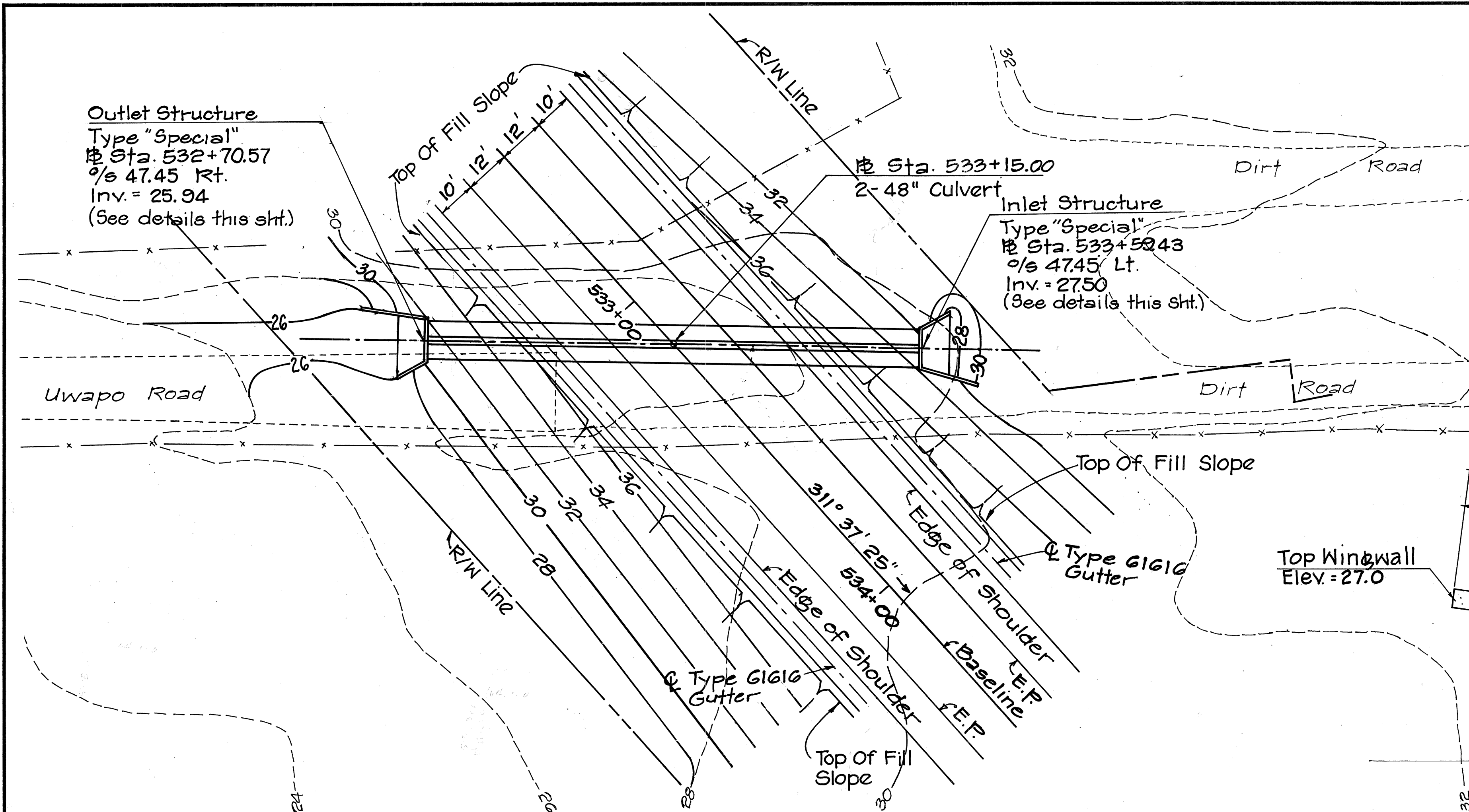
SCALE: AS SHOWN DATE SEP 1978

SHEET No. 1 OF 50 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-RF-031-1(6)	1978	109	262

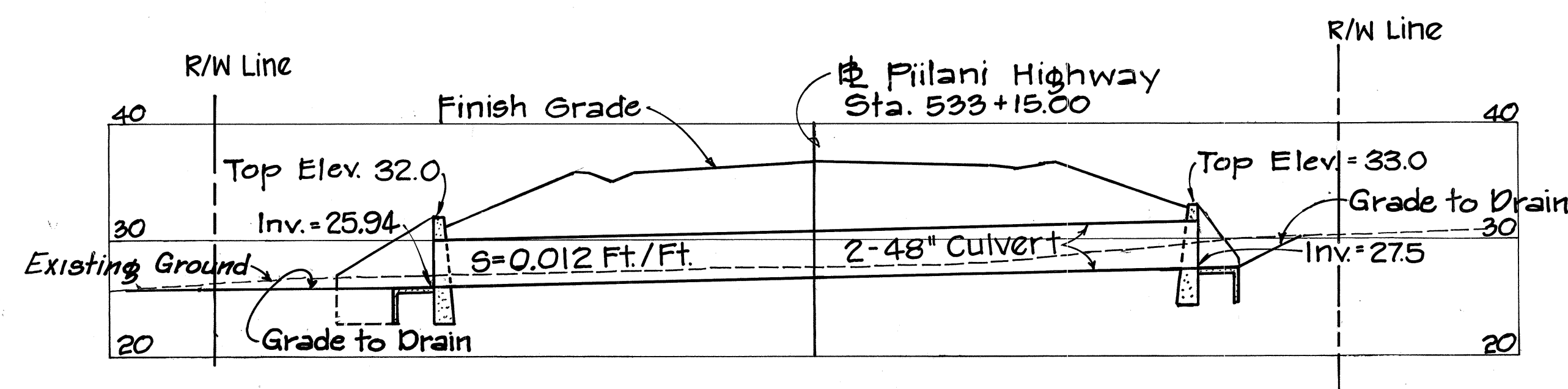
Note:

1. For details of Headwall, Wingwalls, and Apron see details on Sht. No. 147, 148, and T-9.



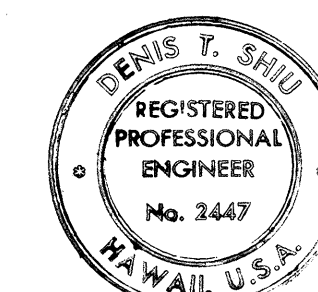
PLAN- INLET & OUTLET STRUCTURES

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



PROFILE Scale: Horiz. 1" = 20' Vert. 1" = 10'

CULVERT AT STA. 533+15.00



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Dennis T. Shiu

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DRAINAGE DETAILS

PIILANI HIGHWAY
VICINITY OF MOKULELE HIGHWAY TO
VICINITY OF KILOHANA STREET
F.A. PROJECT NO. F-031-1(6)

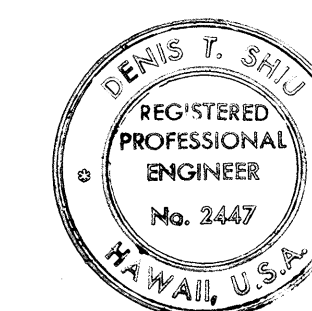
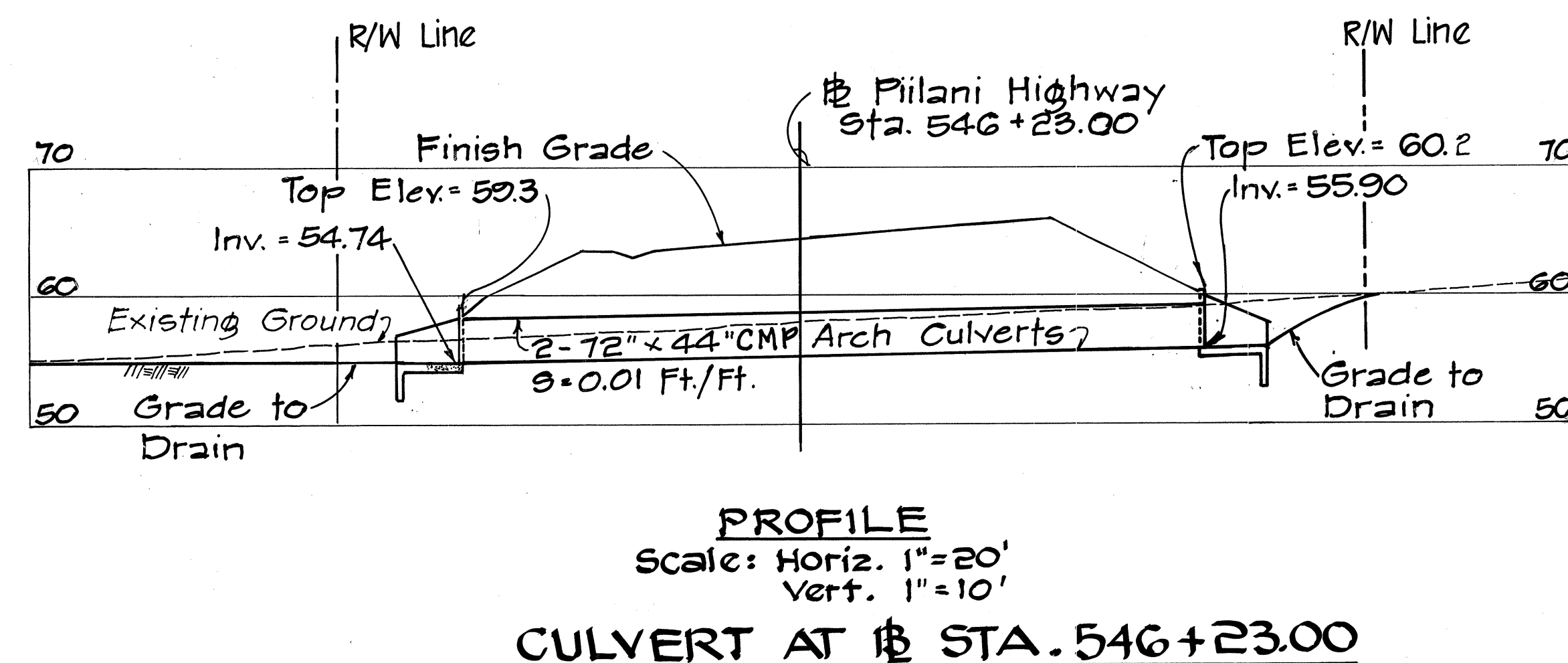
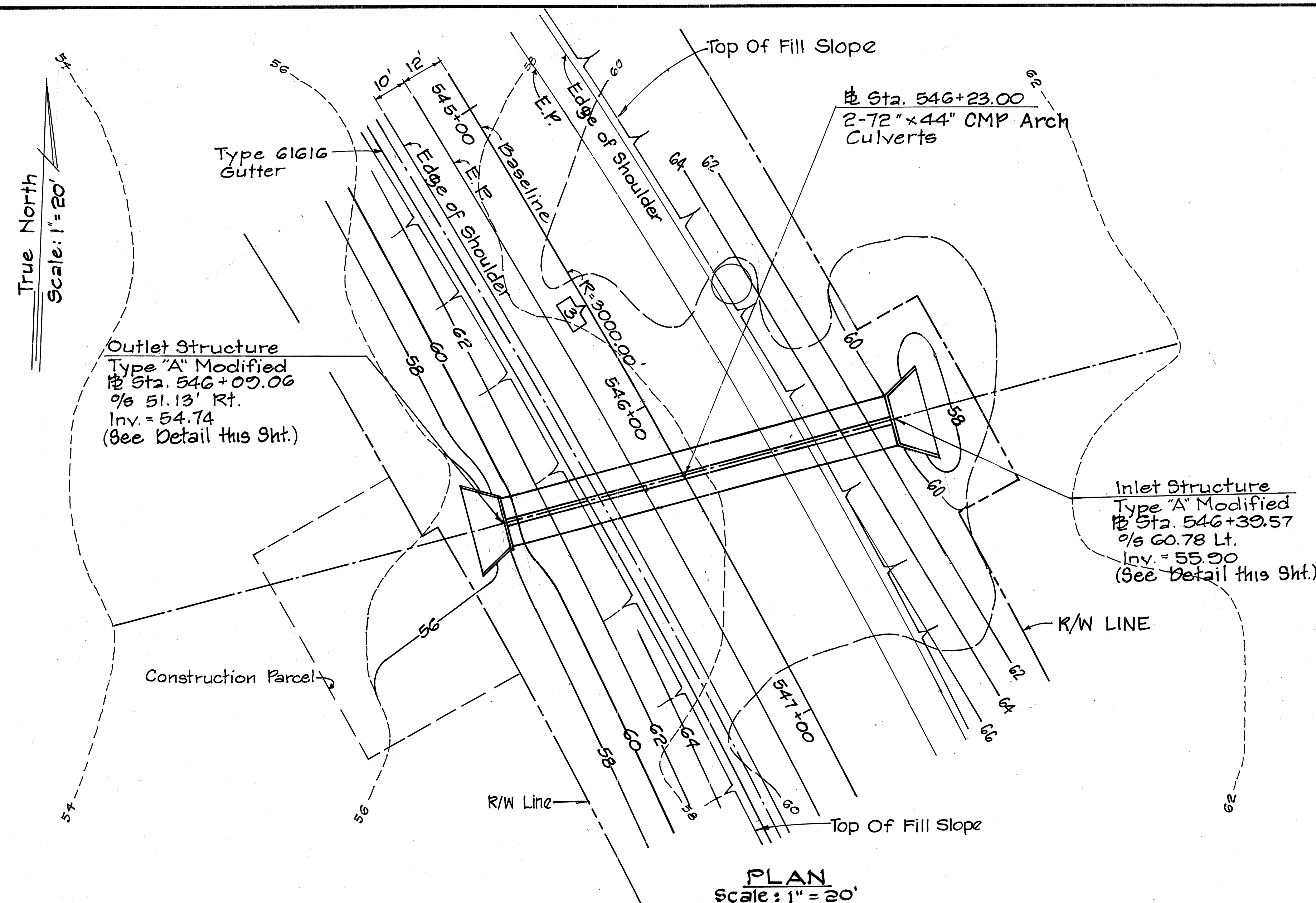
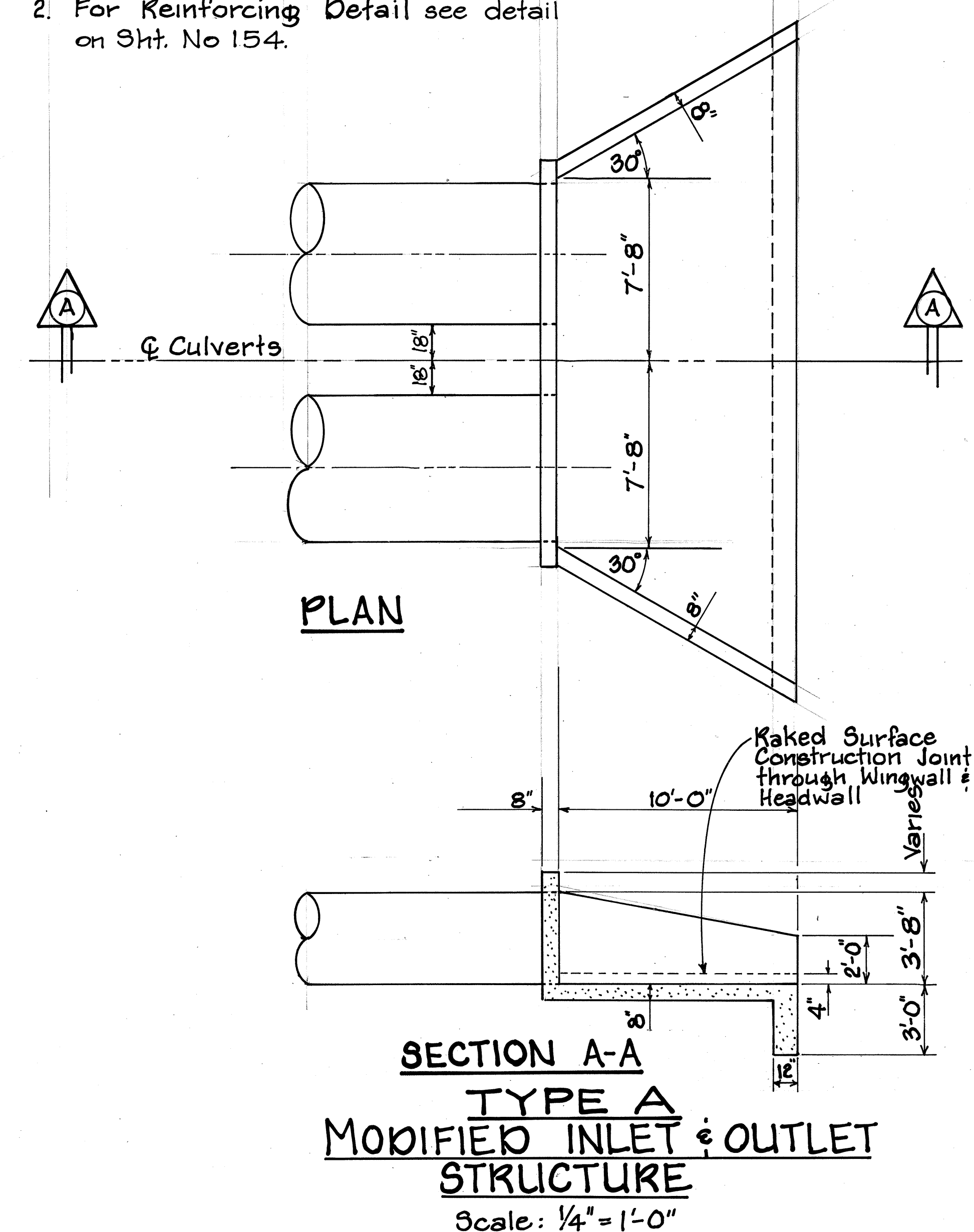
SCALE: AS SHOWN DATE SEP 1978

SHEET No. 2 OF 50 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-RF-031-1(6)	1978	110	262

Note:

1. All Concrete shall be Class A.
2. For Reinforcing Detail see detail on Sht. No 154.



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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DRAINAGE DETAILS

PIILANI HIGHWAY
VICINITY OF MOKULELE HIGHWAY TO
VICINITY OF KILOHANA STREET
F.A. PROJECT NO. F-031-1(6)
SCALE: AS SHOWN DATE SEP 1978

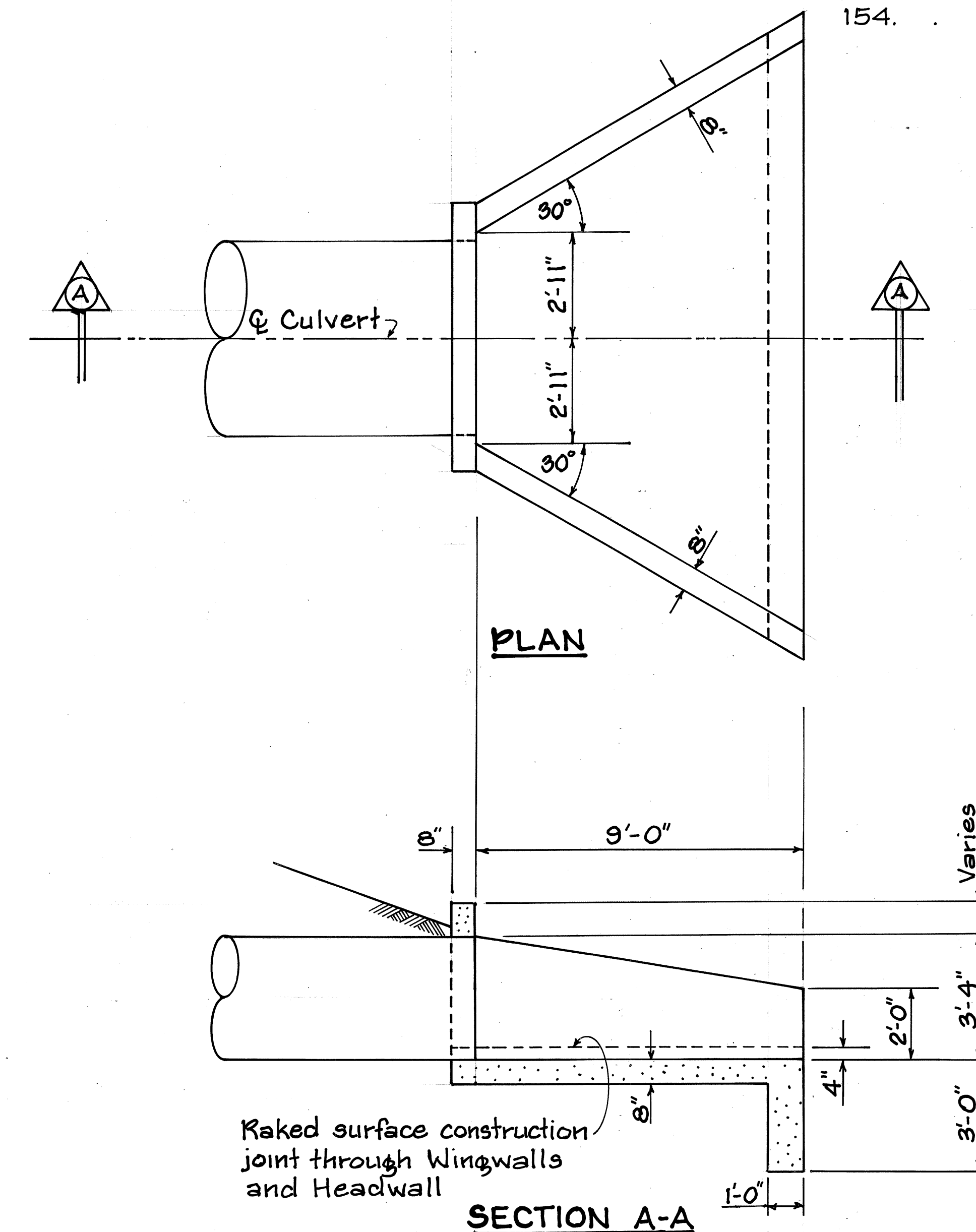
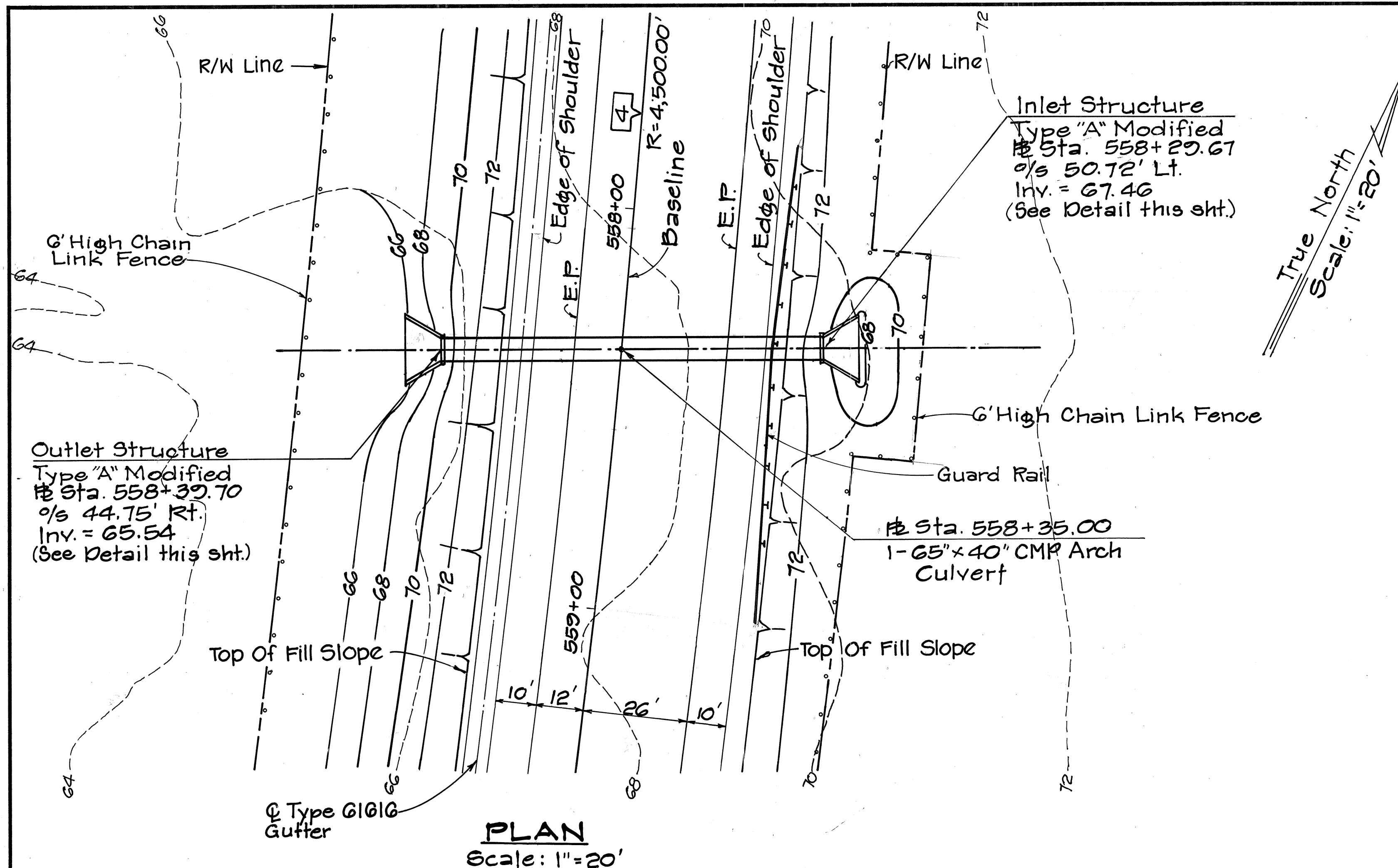
SHEET No. 3 OF 50 SHEETS

DESIGNED BY	DATE
CHECKED BY	
NOTED BY	
ORIGINAL PLAN	
NOTE BOOK	
NO.	

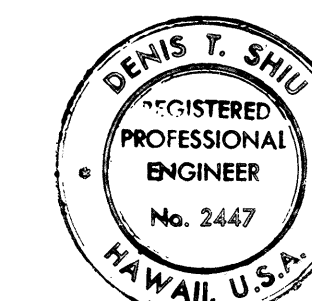
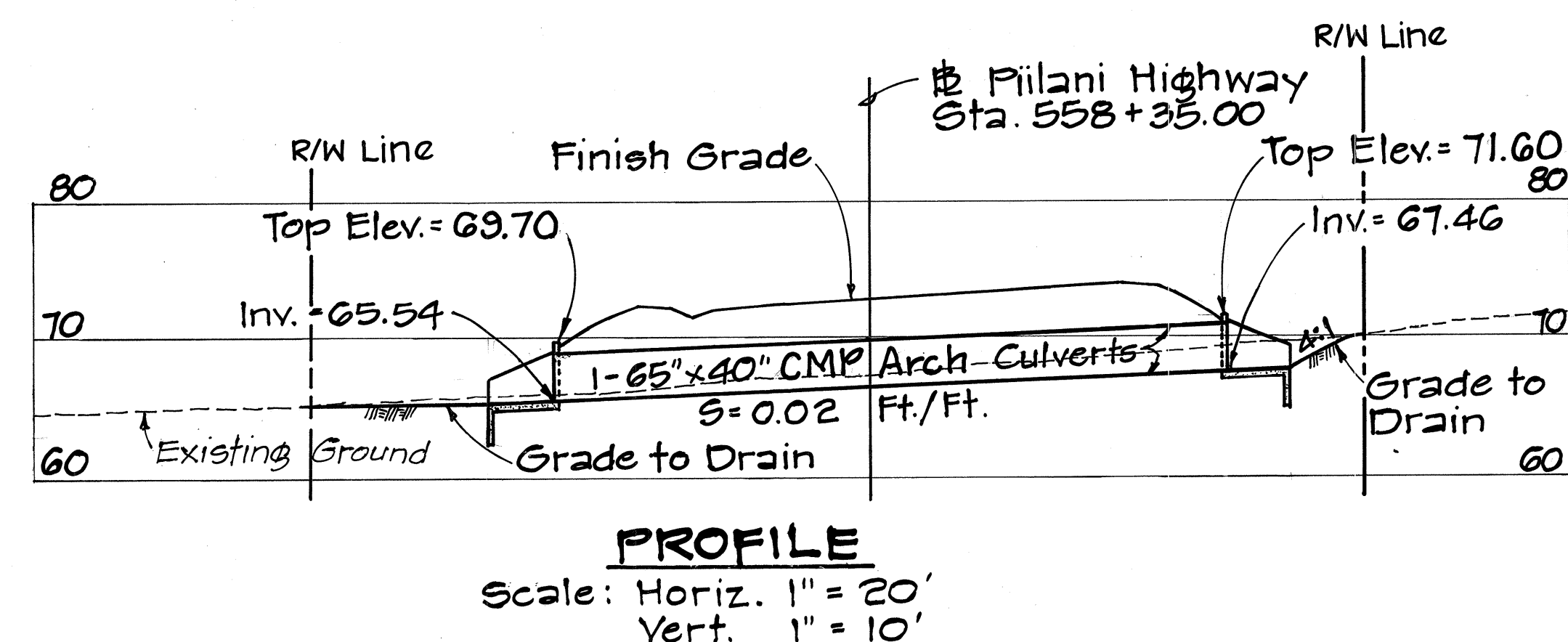
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-RF-031-1(6)	1978	111	262

Note:

1. All concrete shall be Class A.
2. For reinforcing detail see detail on Sht No. 154.



TYPE "A" MODIFIED INLET & OUTLET STRUCTURES
Scale: 3/8" = 1'-0"



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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
LAND TRANSPORTATION FACILITIES DIVISION

DRAINAGE DETAILS

PILANI HIGHWAY
VICINITY OF MOKULELE HIGHWAY TO
VICINITY OF KILOHANA STREET
F.A. PROJECT NO. F-031-1(6)

SCALE: 1" = 50' DATE SEP 1978

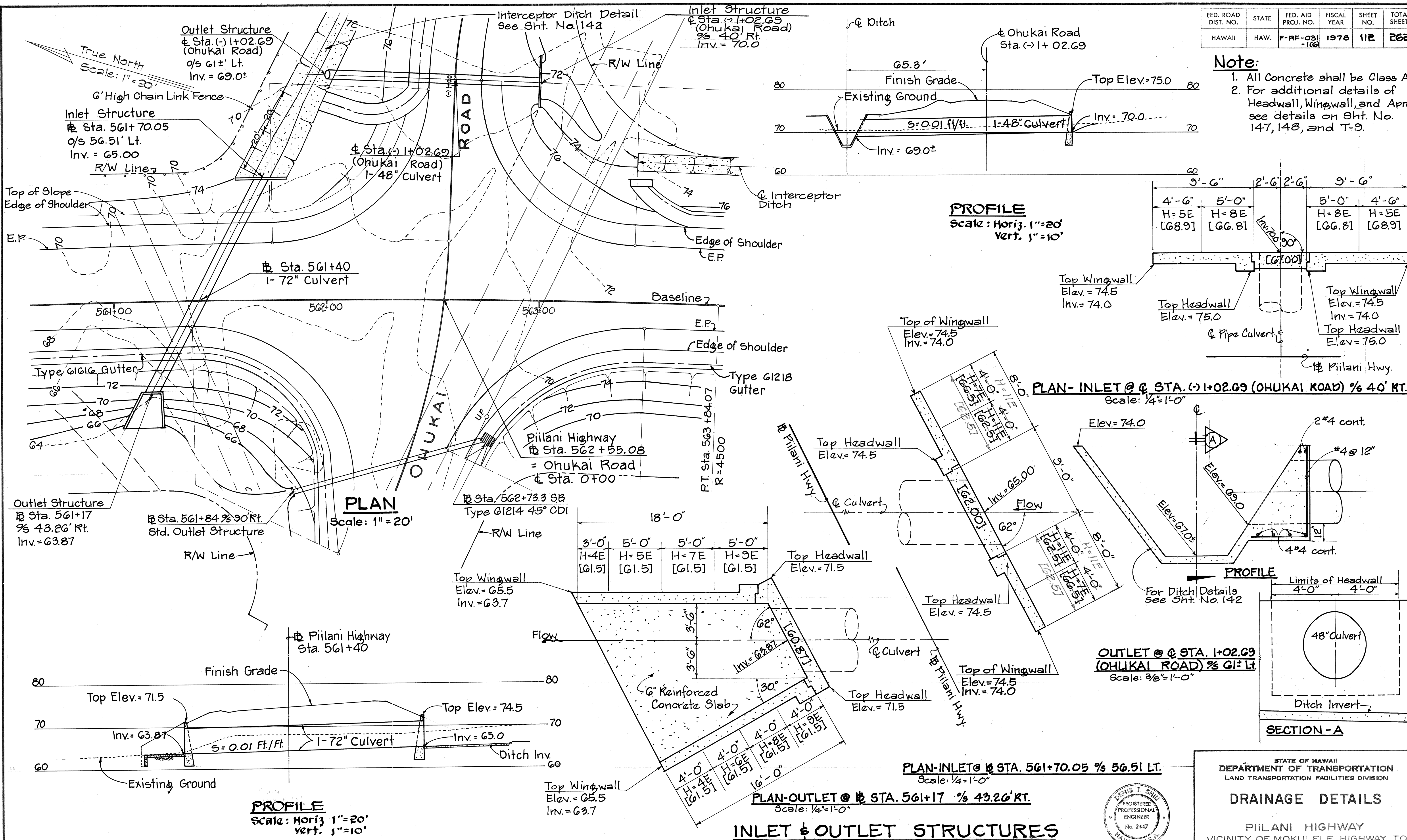
SHEET No. 4 OF 50 SHEETS

ORIGINAL	DATE
PLAN	
DESIGNED BY	
NOTED BY	
CHECKED BY	
DATE	

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-RF-031-1(6)	1978	112	262

Note:

1. All Concrete shall be Class A
2. For additional details of Headwall, Wingwall, and Apron see details on Sht. No. 147, 148, and T-9.

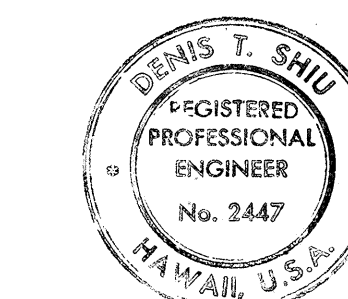


STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
LAND TRANSPORTATION FACILITIES DIVISION

DRAINAGE DETAILS

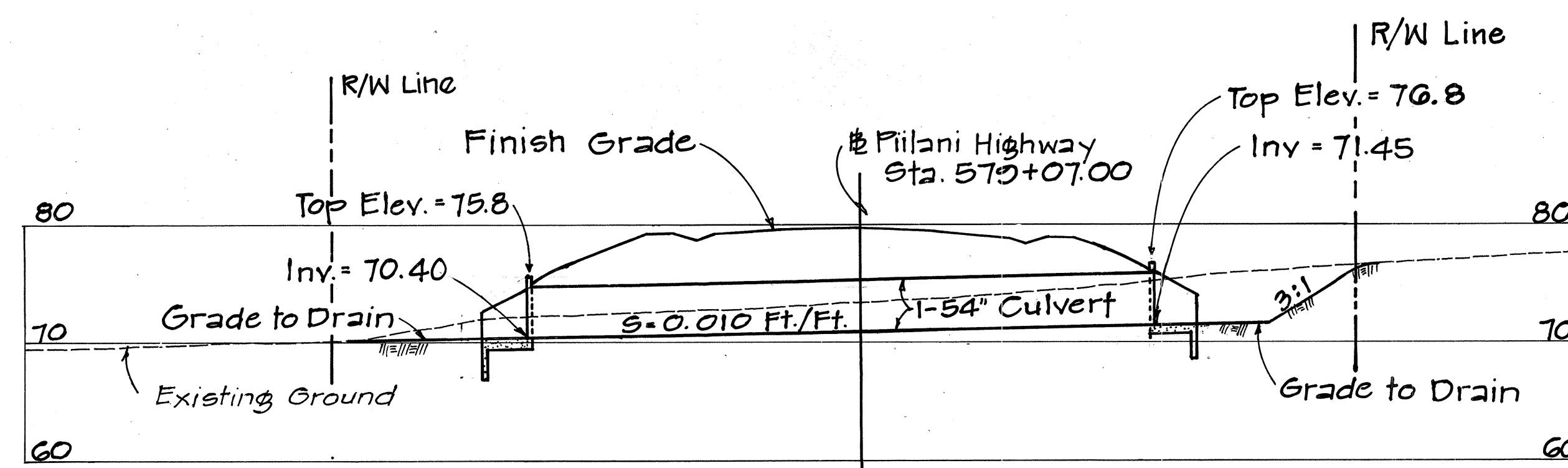
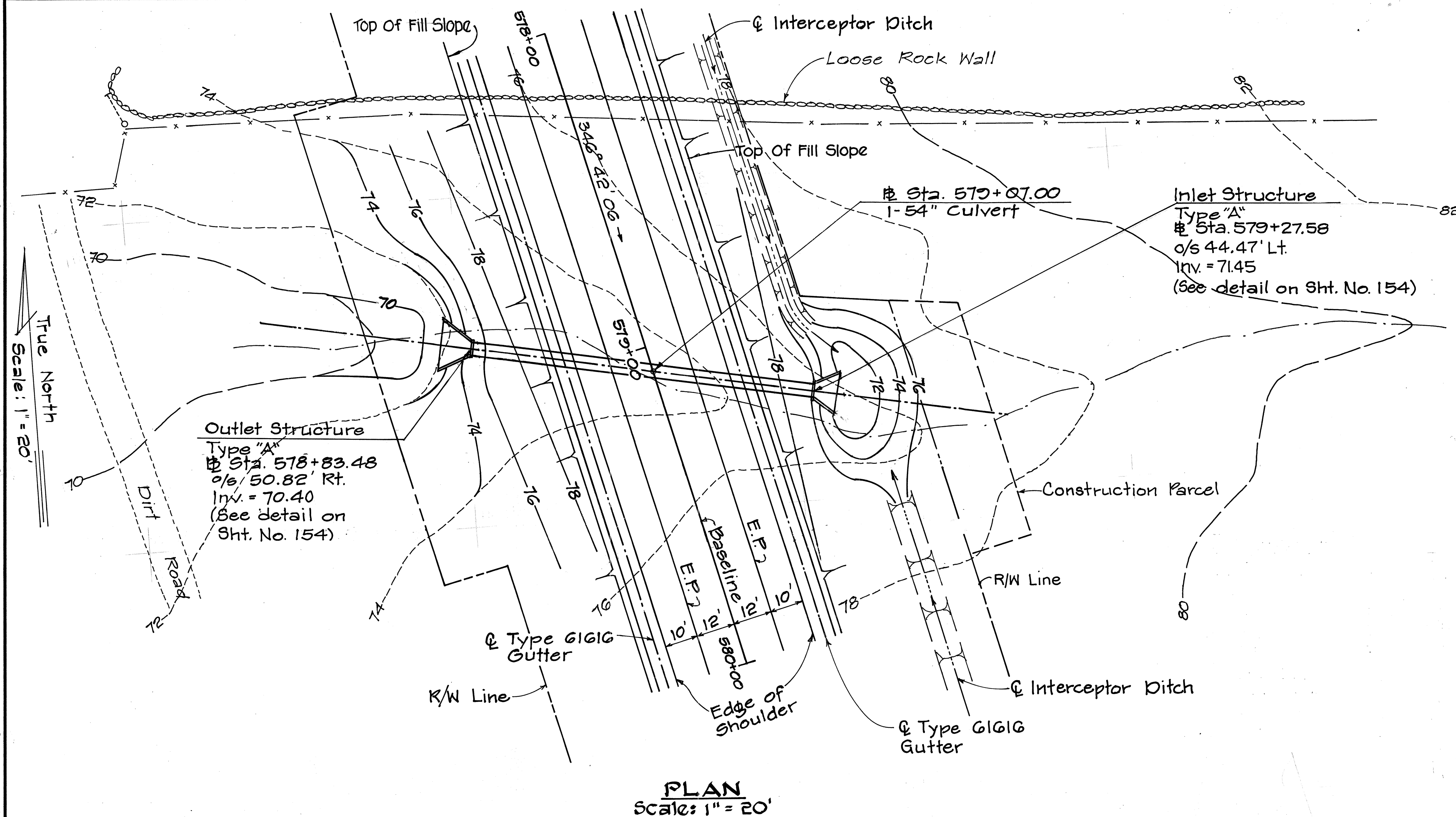
PIILANI HIGHWAY
VICINITY OF MOKULELE HIGHWAY TO
VICINITY OF KILOHANA STREET
F.A. PROJECT NO. F-031-1(6)
SCALE: AS SHOWN DATE SEP 1978

SHEET No. 5 OF 50 SHEETS

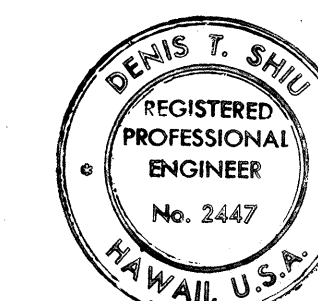


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FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-RF-031-16	1978	113	262



CULVERT AT STA. 579+07.00



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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

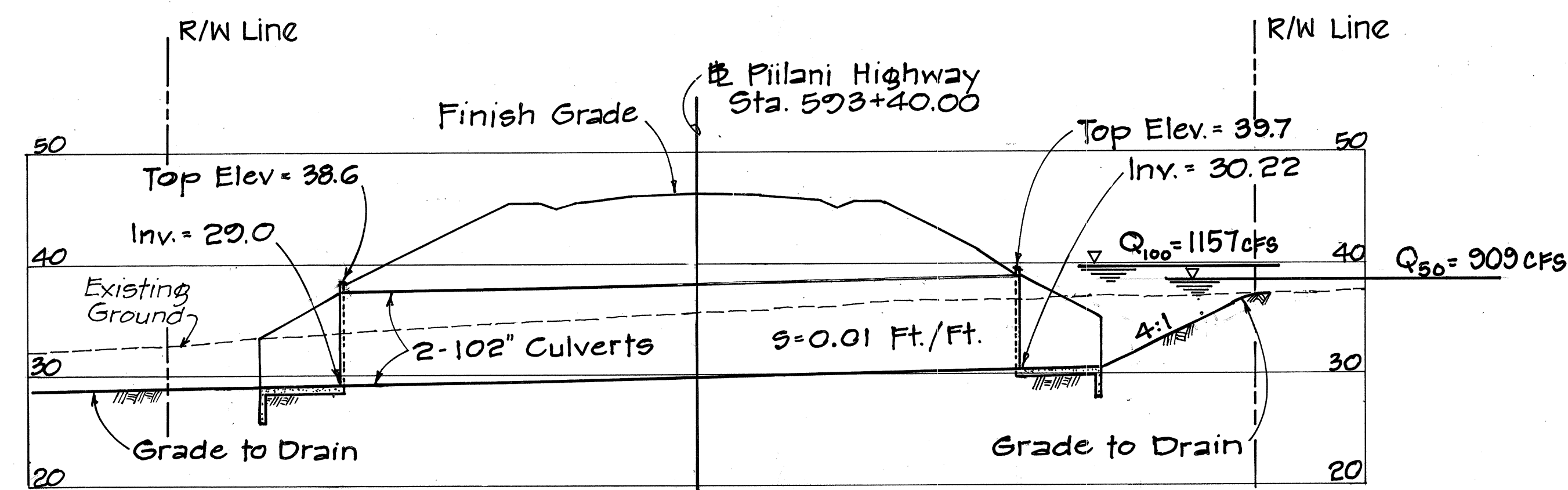
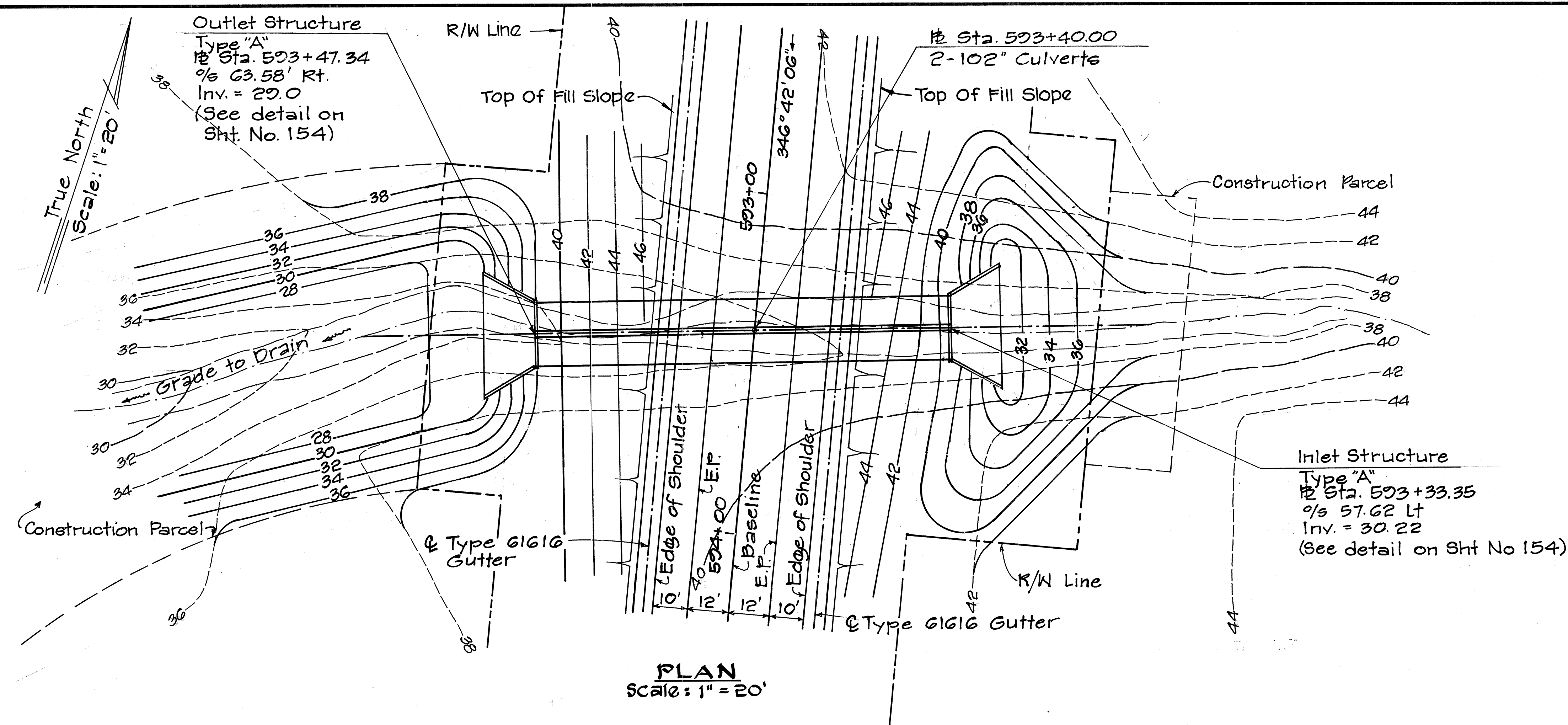
DRAINAGE DETAILS

PIILANI HIGHWAY
VICINITY OF MOKULELE HIGHWAY TO
VICINITY OF KILOHANA STREET
F.A. PROJECT NO. F-031-1(6)

SCALE: AS SHOWN DATE SEP 1978

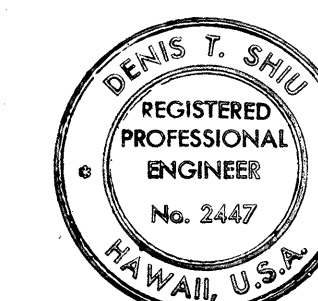
SHEET No. 6 OF 50 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-RF-031-16	1978	114	262



PROFILE
Scale: Horiz. 1" = 20'
Vert. 1" = 10'

CULVERT AT # STA. 593+40.00



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Denis T. Shiu

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

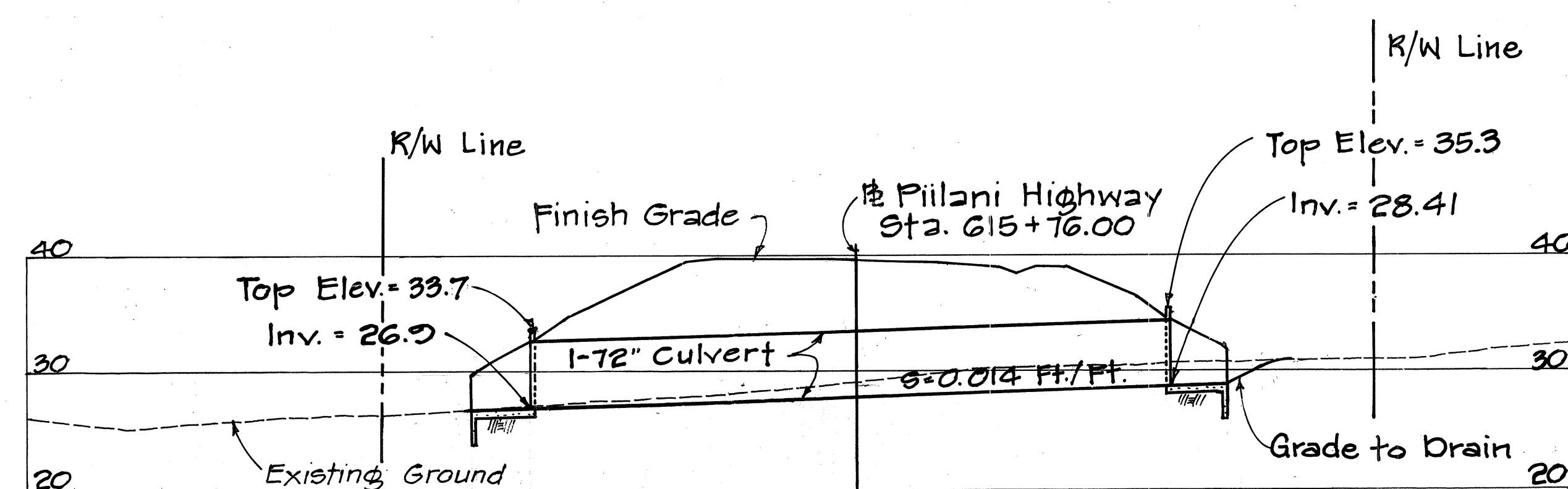
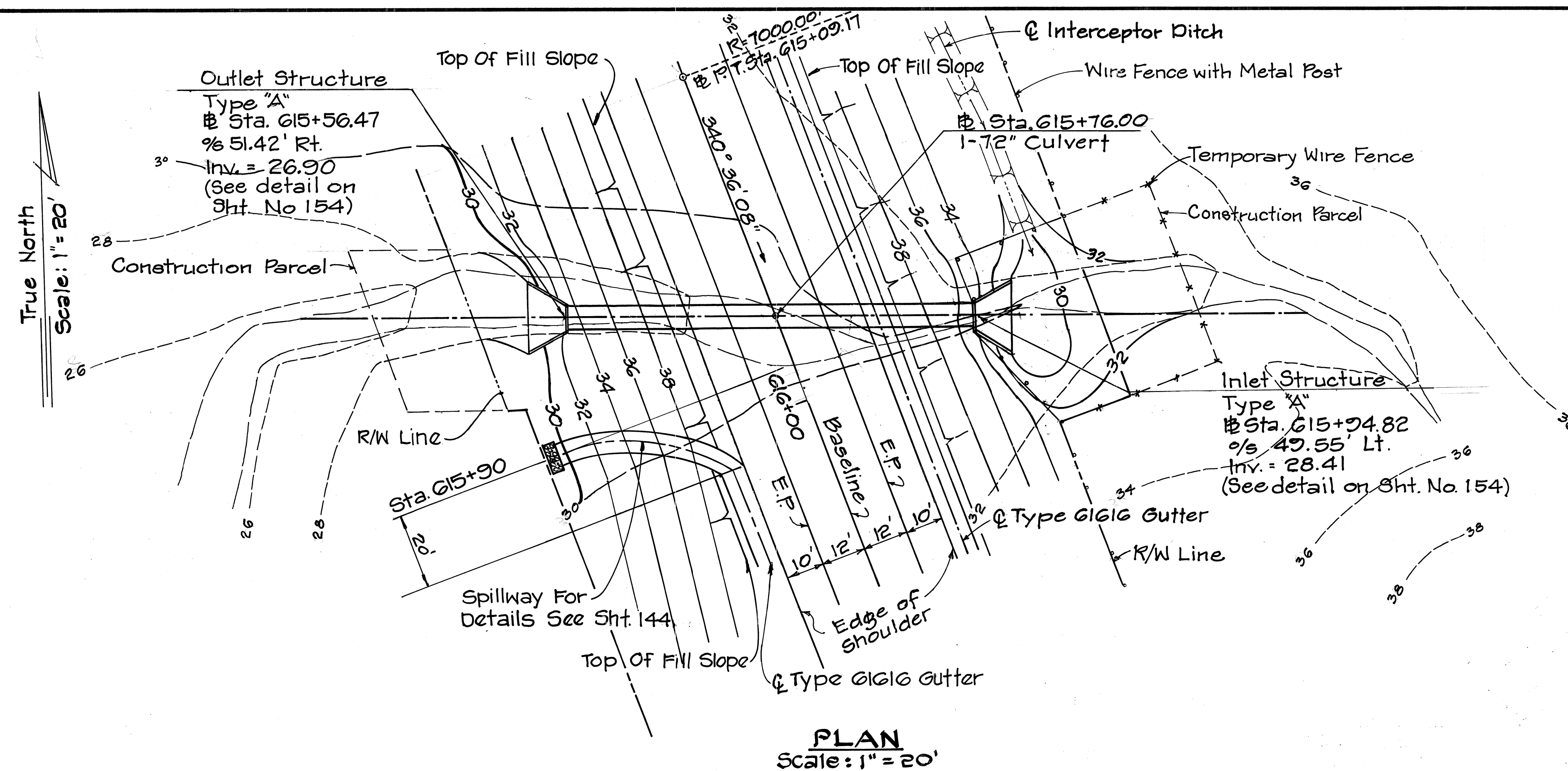
DRAINAGE DETAILS

PIILANI HIGHWAY
VICINITY OF MOKULELE HIGHWAY TO
VICINITY OF KILOHANA STREET

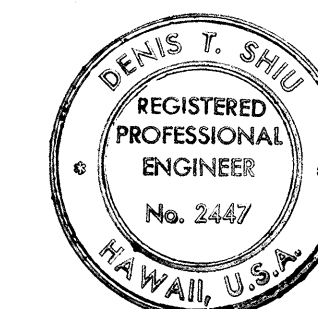
F.A. PROJECT NO. F-031-1(6)
SCALE: AS SHOWN DATE SEP 1978

SHEET No. 7 OF 50 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-RF-031 -166	1978	115	262



PROFILE
Scale: Horiz. 1" = 20'
Vert. 1" = 10'
CULVERT AT STA. 615+76.00



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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

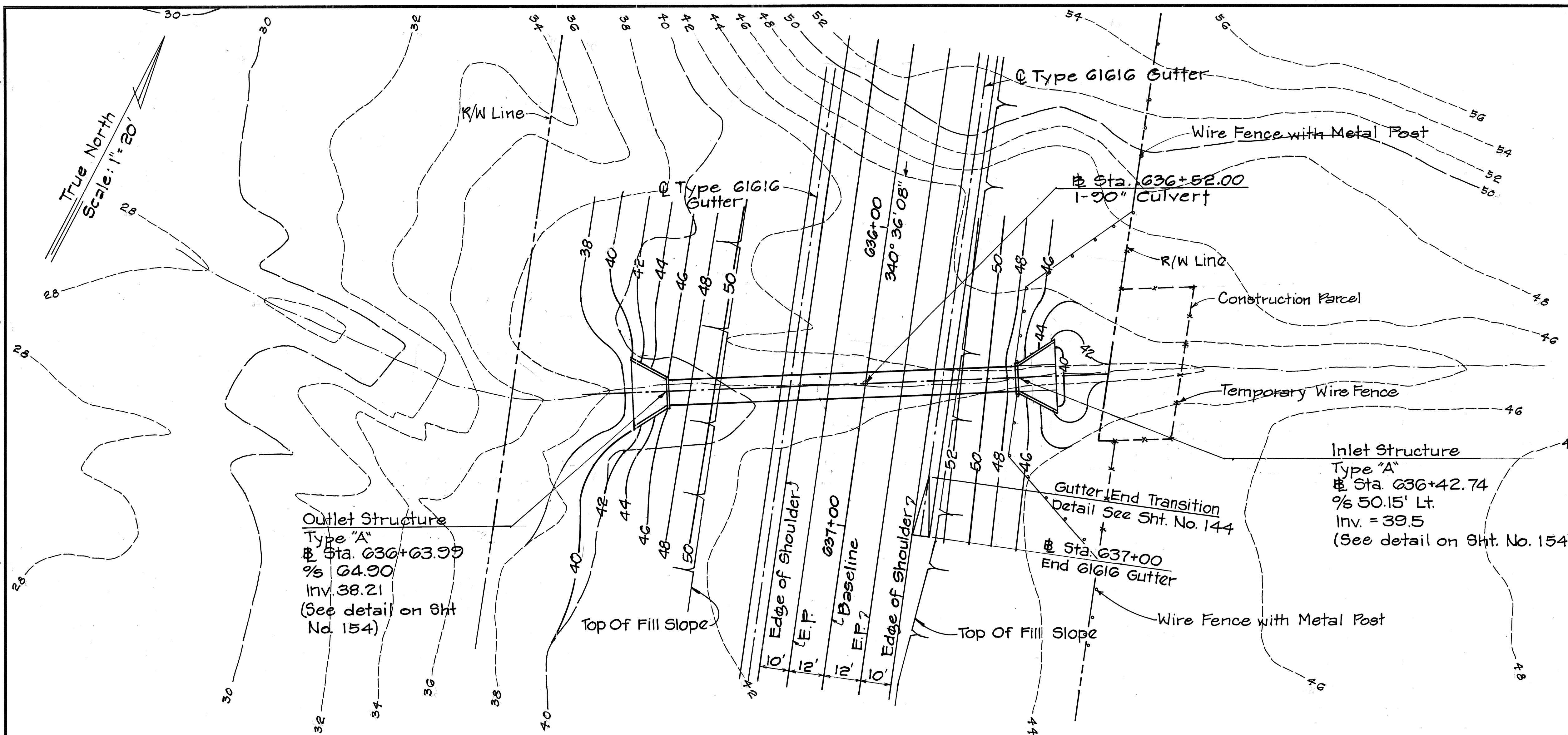
DRAINAGE DETAILS

PIILANI HIGHWAY
VICINITY OF MOKULELE HIGHWAY TO
VICINITY OF KILOHANA STREET

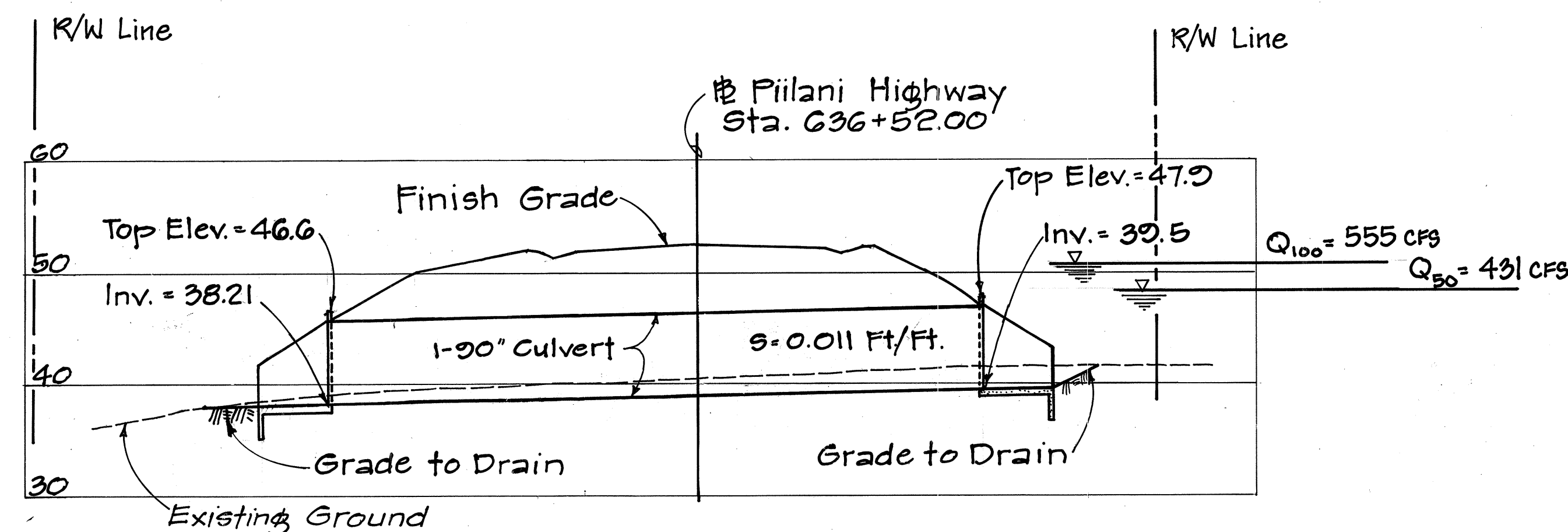
F.A. PROJECT NO. F-031-1(6)
SCALE: AS SHOWN DATE SEP 1978

SHEET No. 8 OF 50 SHEETS

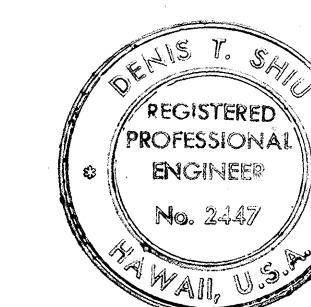
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-RF-031-1(6)	1978	116	262



PLAN
Scale: 1" = 20'



PROFILE
Scale: Horiz. 1" = 20'
Vert. 1" = 10'
CULVERT AT STA. 636+52.00



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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

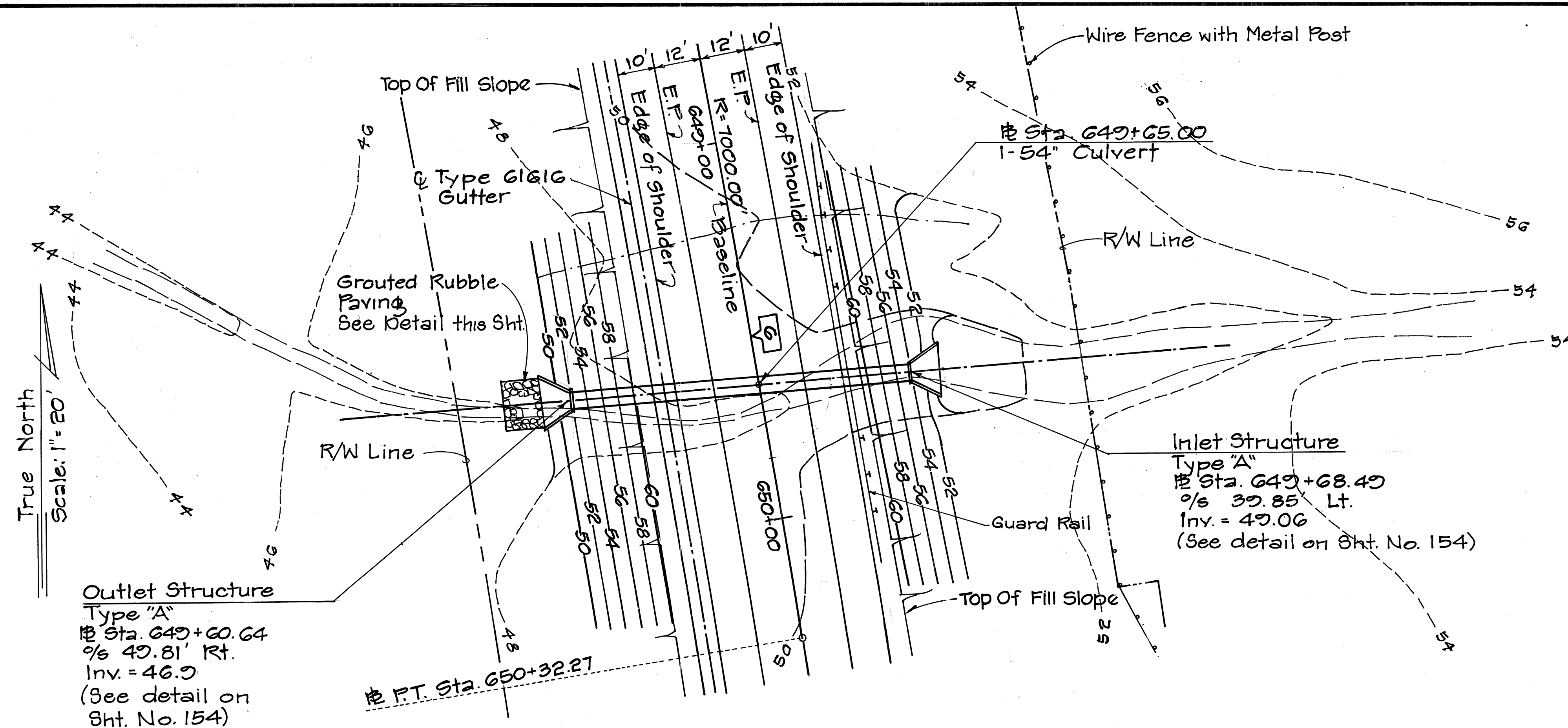
DRAINAGE DETAILS

PIILANI HIGHWAY
VICINITY OF MOKULELE HIGHWAY TO
VICINITY OF KILOHANA STREET
F.A. PROJECT NO. F-031-1(6)

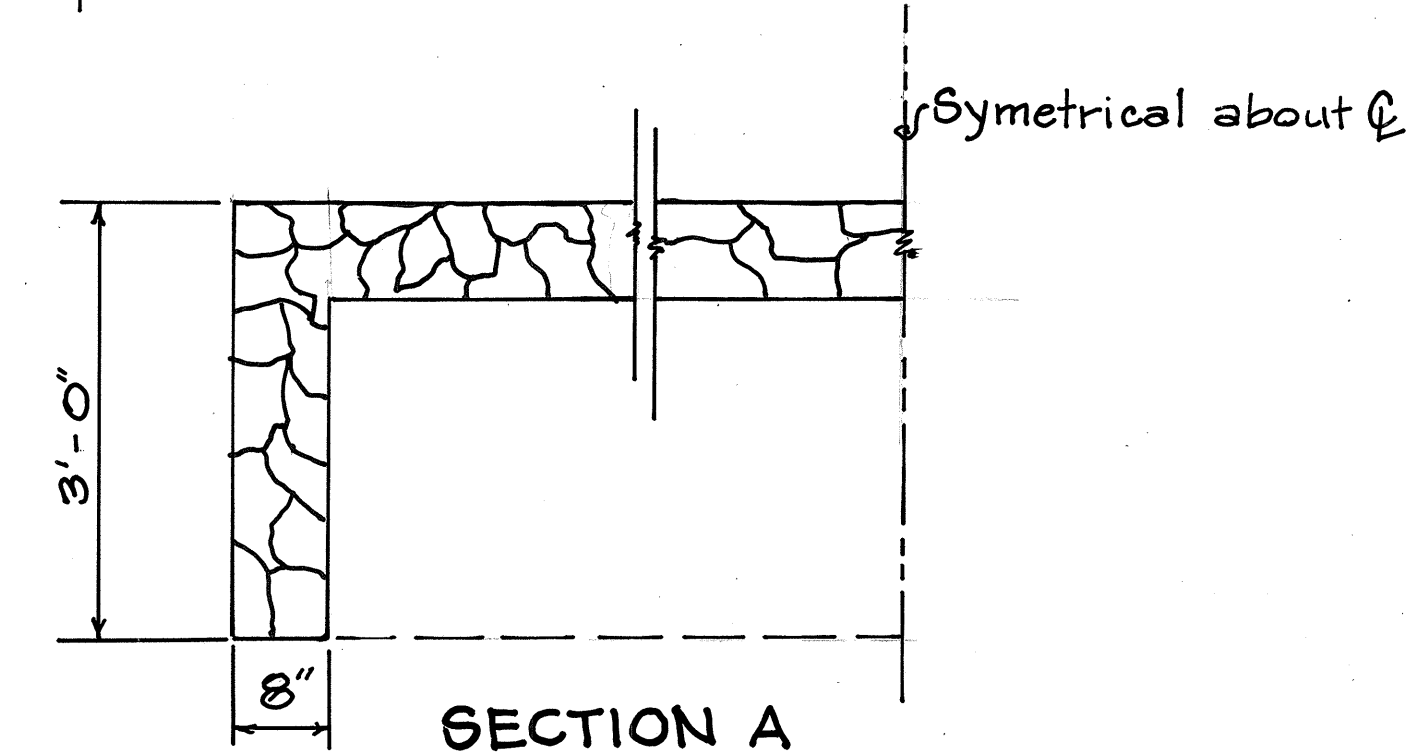
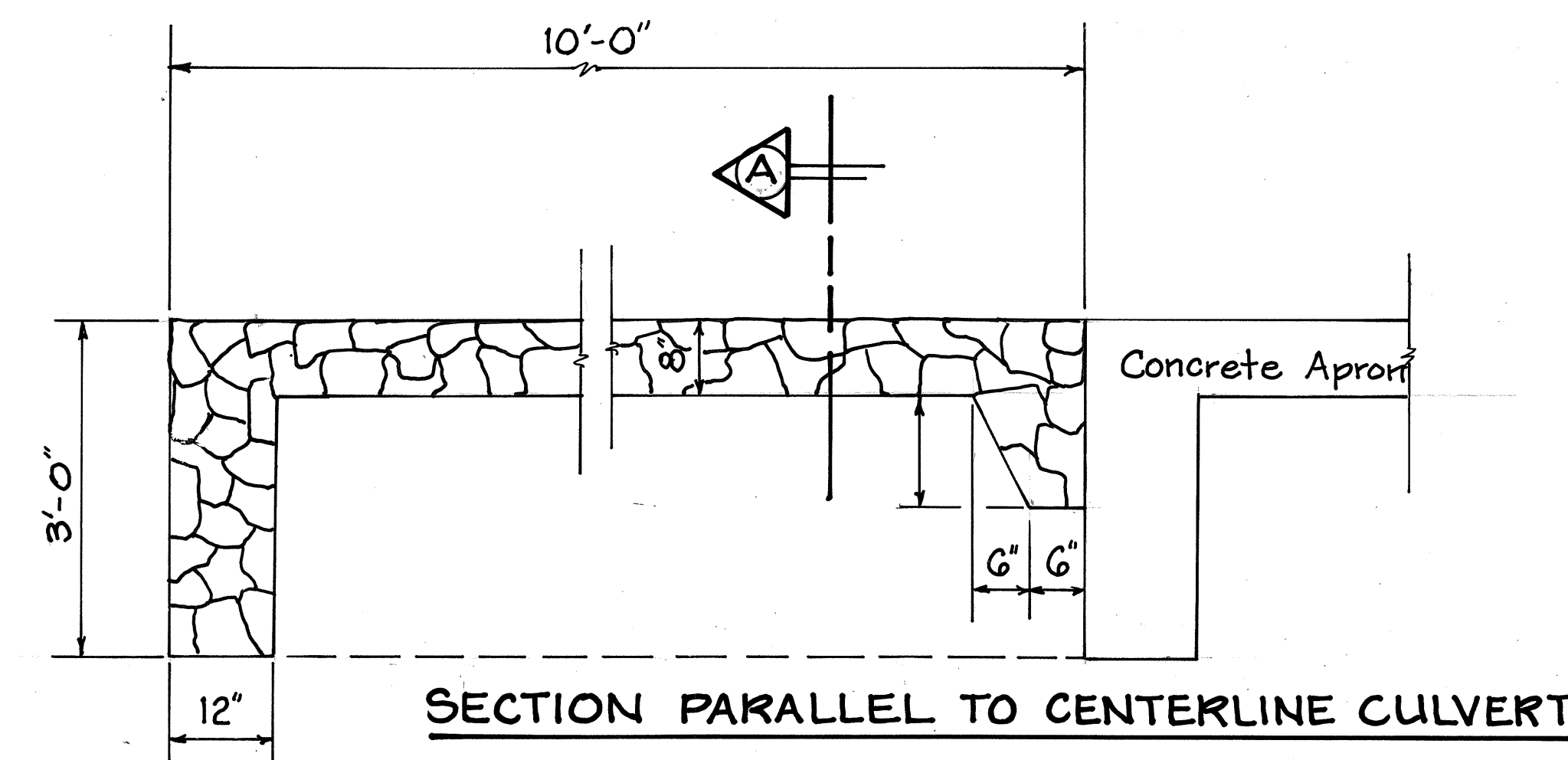
SCALE: AS SHOWN DATE SEP 1978

SHEET No. 9 OF 50 SHEETS

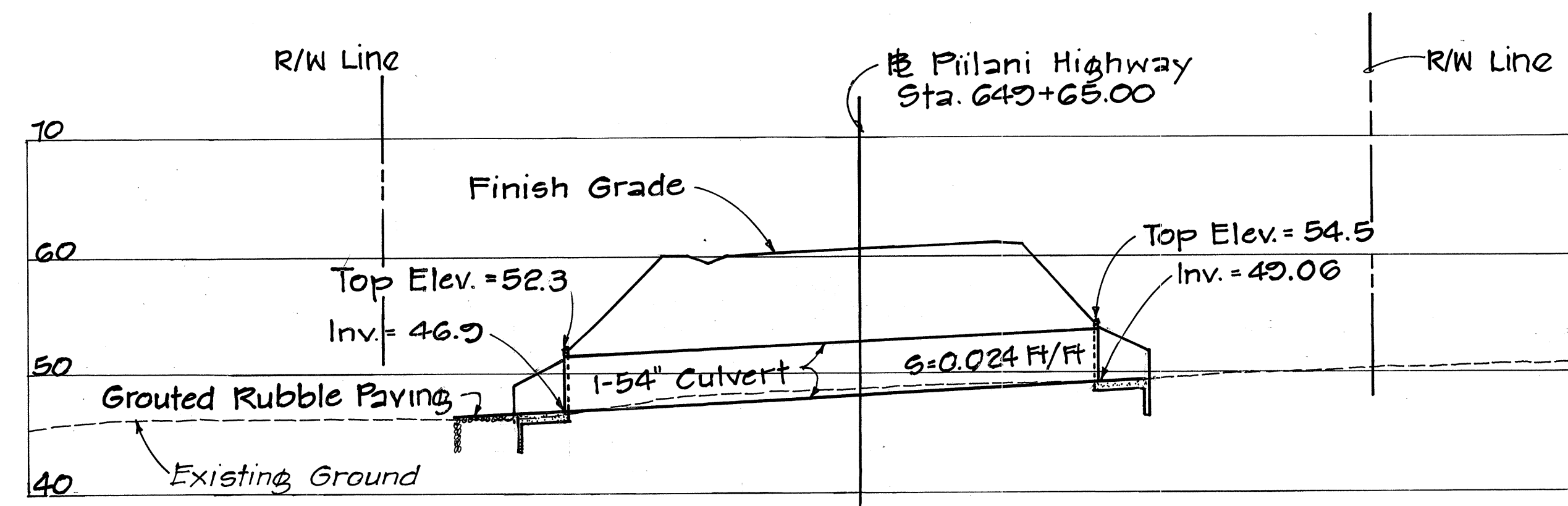
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-RF-031-1(6)	1978	117	262



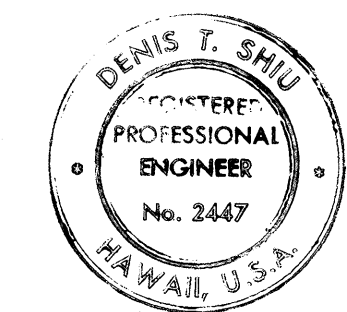
PLAN
Scale: 1" = 20'



GRP APRON DETAIL
Scale: 3/4" = 1'-0"



PROFILE
Scale: Horiz. 1" = 20'
Vert. 1" = 10'
CULVERT AT STA. 649+65.00



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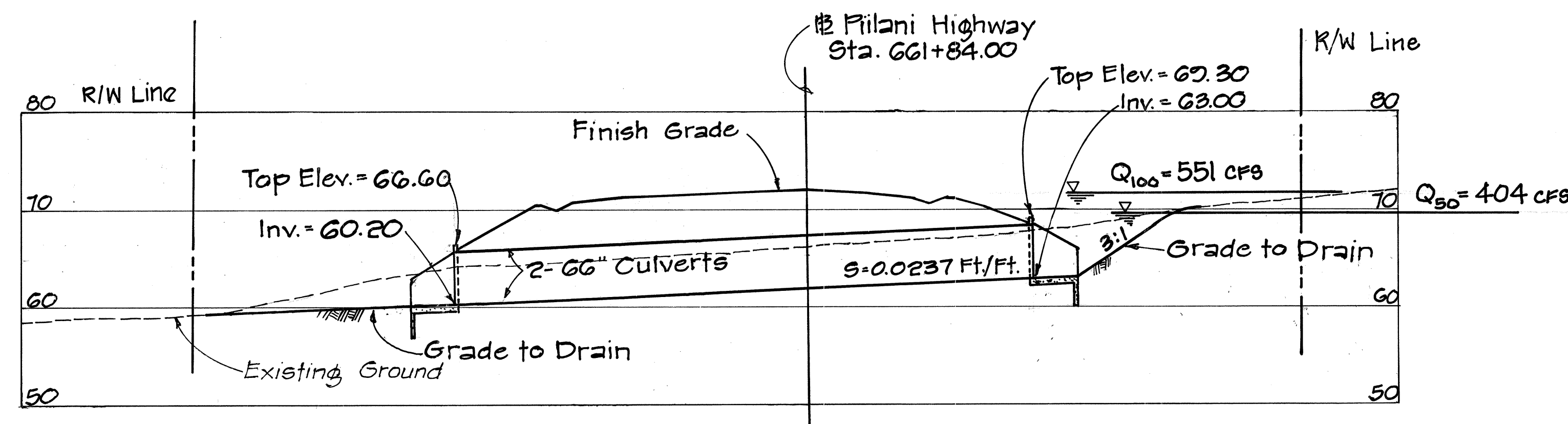
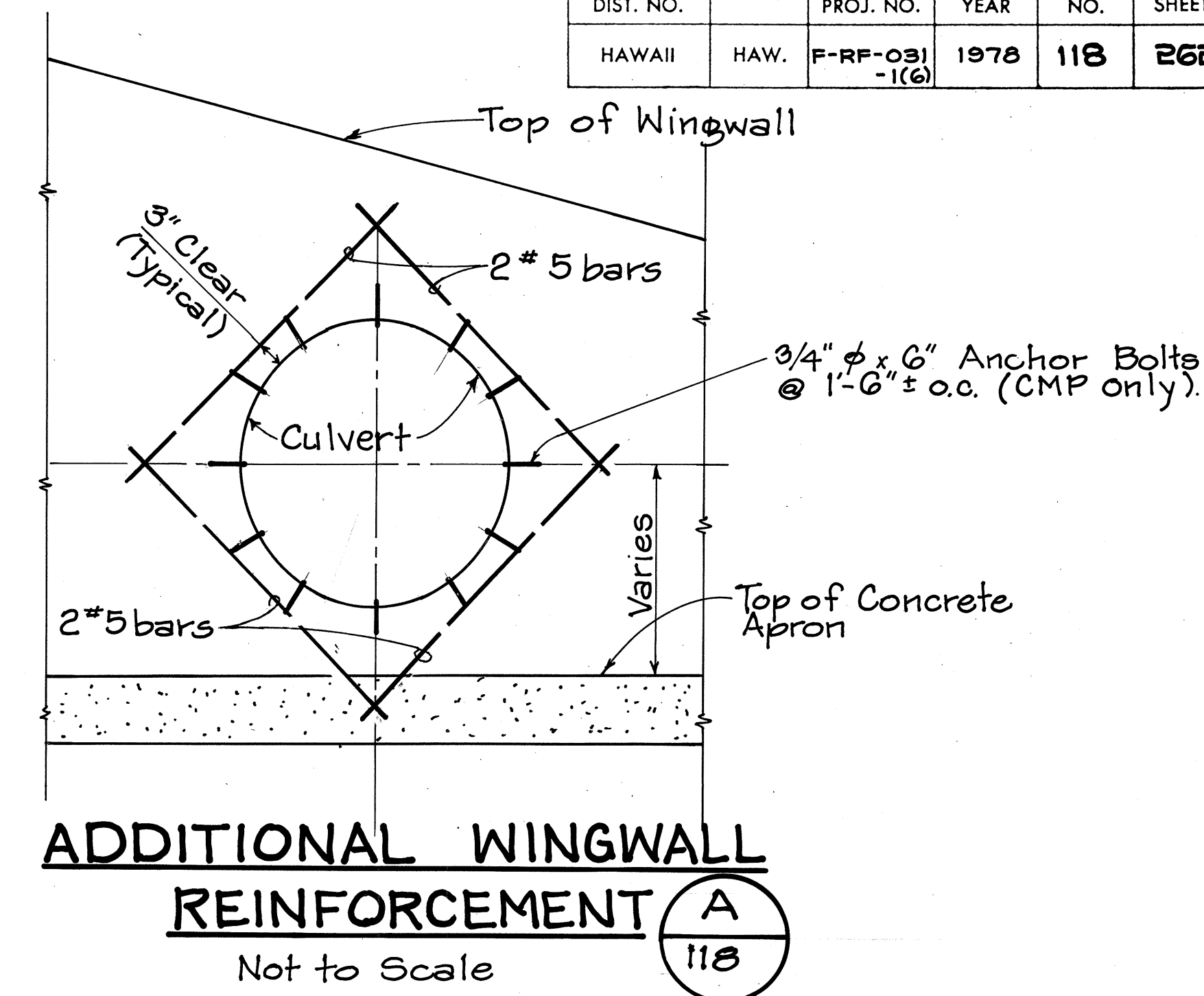
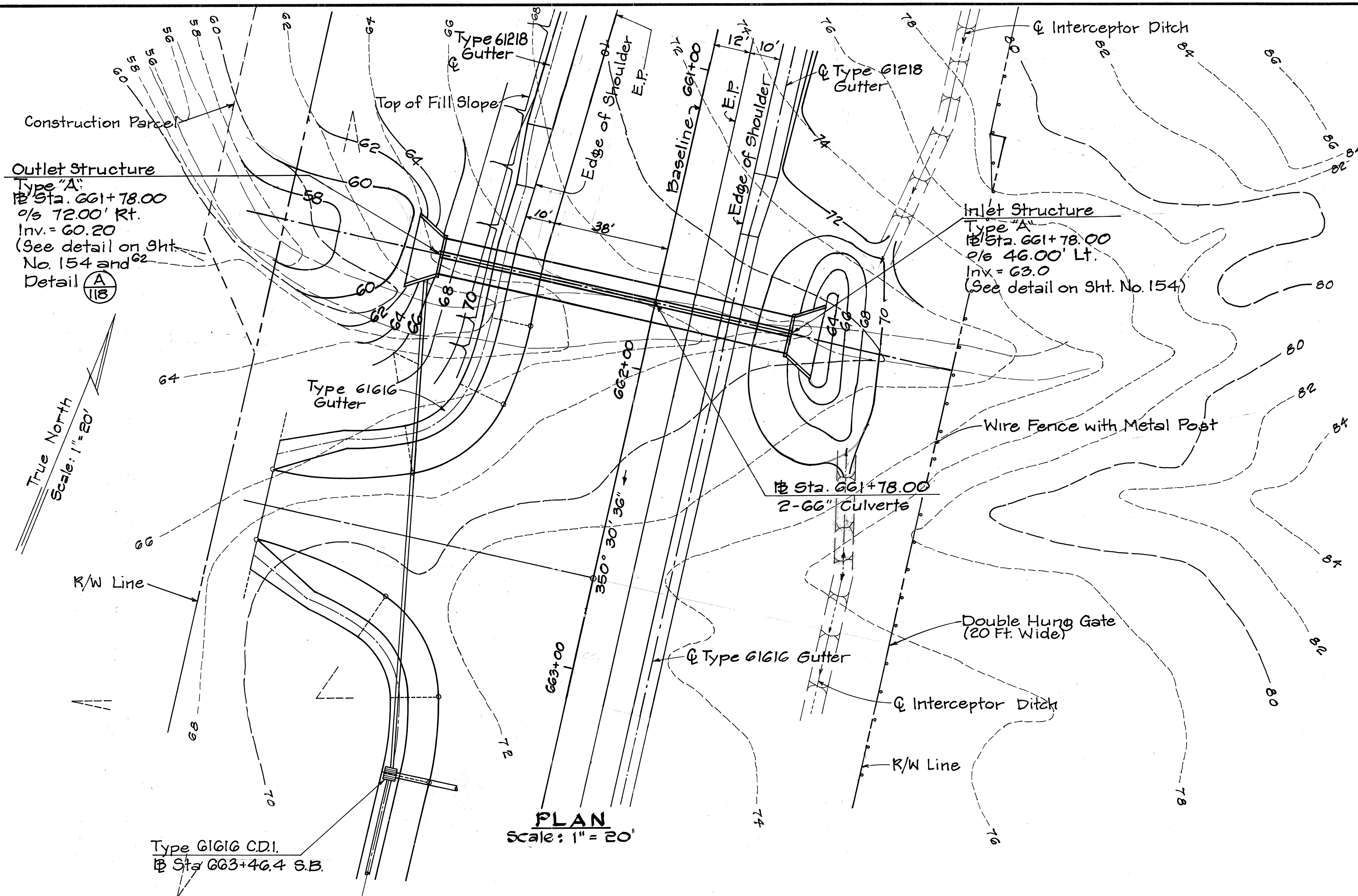
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DRAINAGE DETAILS

PIILANI HIGHWAY
VICINITY OF MOKULELE HIGHWAY TO
VICINITY OF KILOHANA STREET
F.A. PROJECT NO. F-031-1(6)
SCALE: AS SHOWN DATE SEP 1978

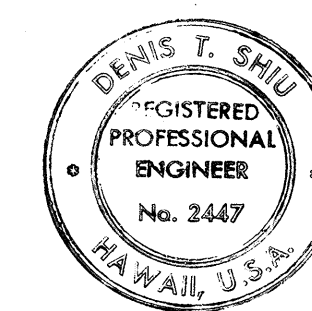
SHEET No. 10 OF 50 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-RF-031-1(6)	1978	118	262



PROFILE
Scale: Horiz. 1" = 20'
Vert. 1" = 10'
CULVERT AT STA. 661+78.00

11-8-79	Move C.D.I. at Sta. 663+46.4 S.B. and Revise gutters on S.B. lane side
DATE	REVISION



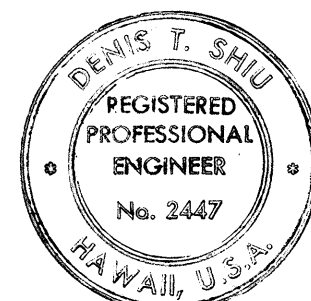
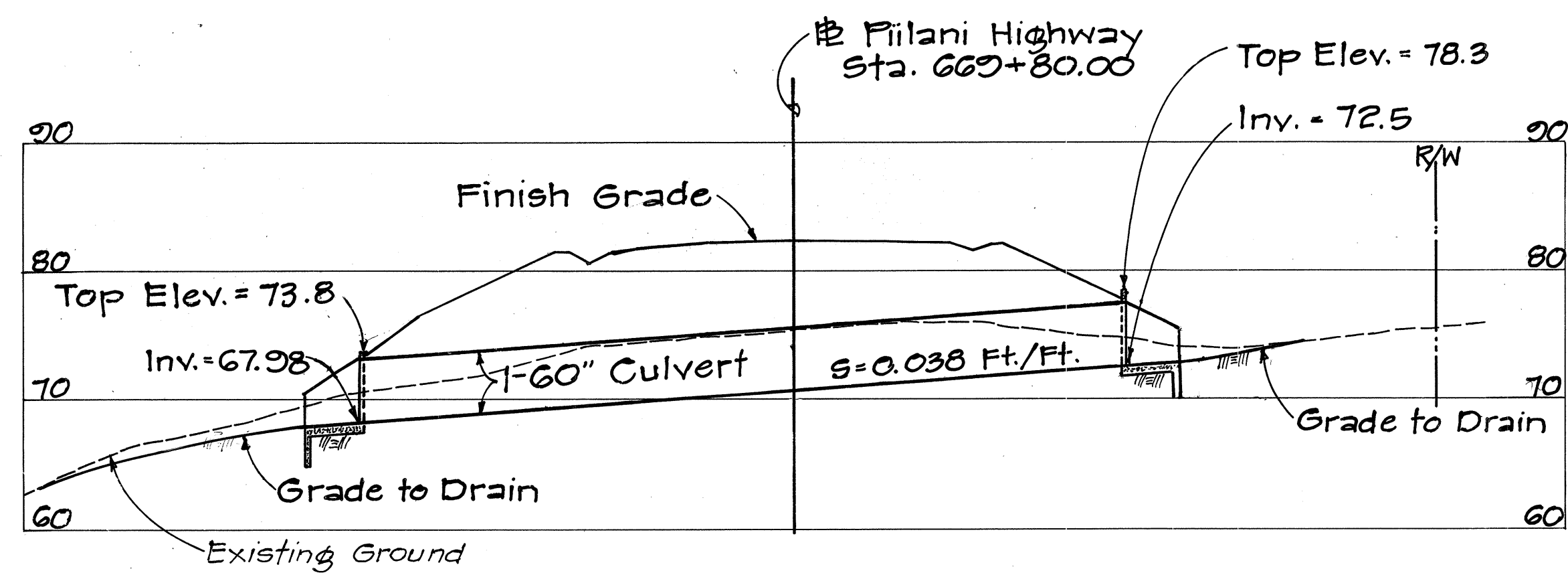
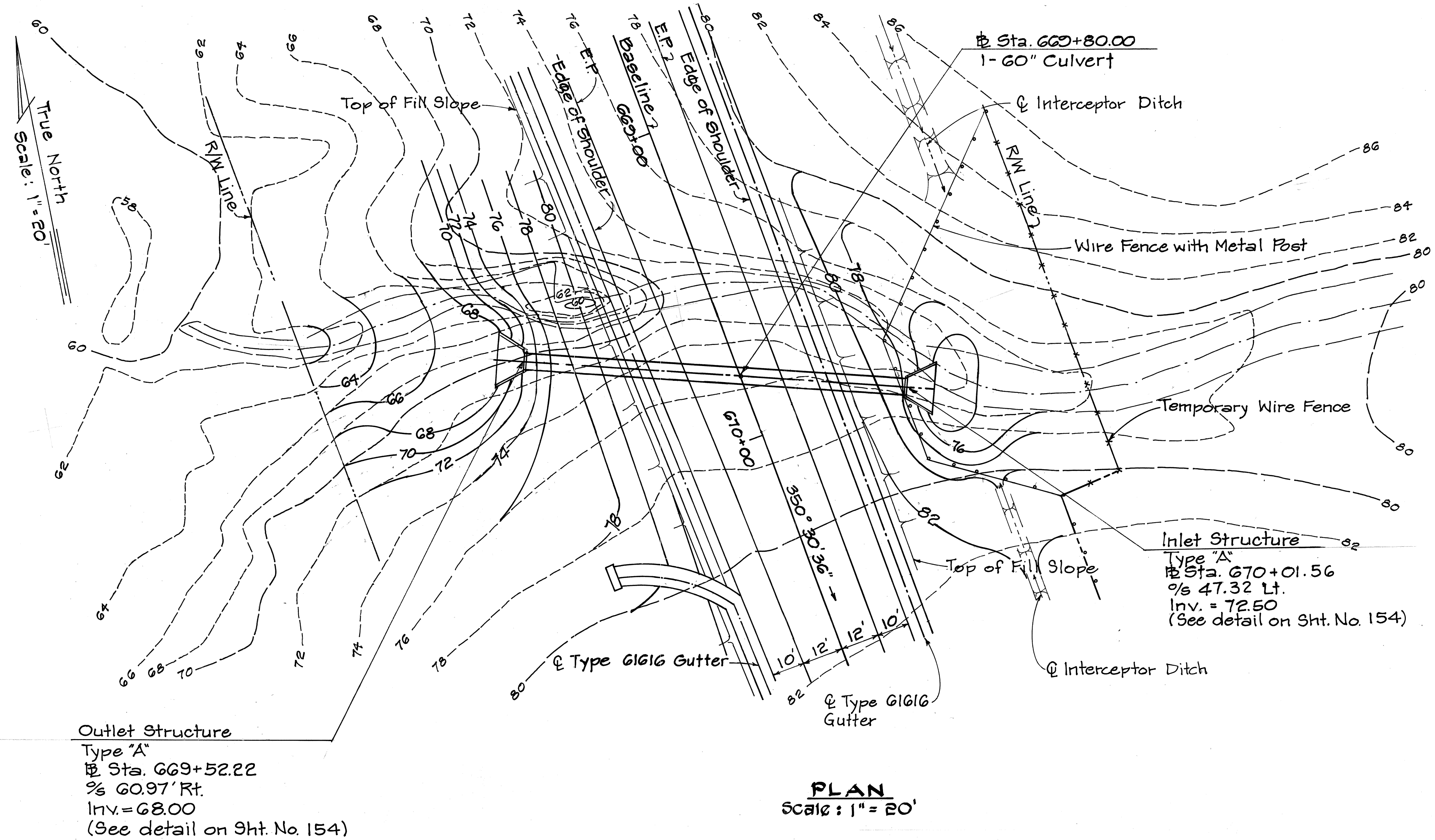
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Denis T. Shiu

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DRAINAGE DETAILS

PIILANI HIGHWAY
VICINITY OF MOKULELE HIGHWAY TO
VICINITY OF KILOHANA STREET
F.A. PROJECT NO. F-031-1(6)
SCALE: AS SHOWN DATE SEP 1978
SHEET No. 11 OF 50 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-RF-031-1(6)	1978	119	262



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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

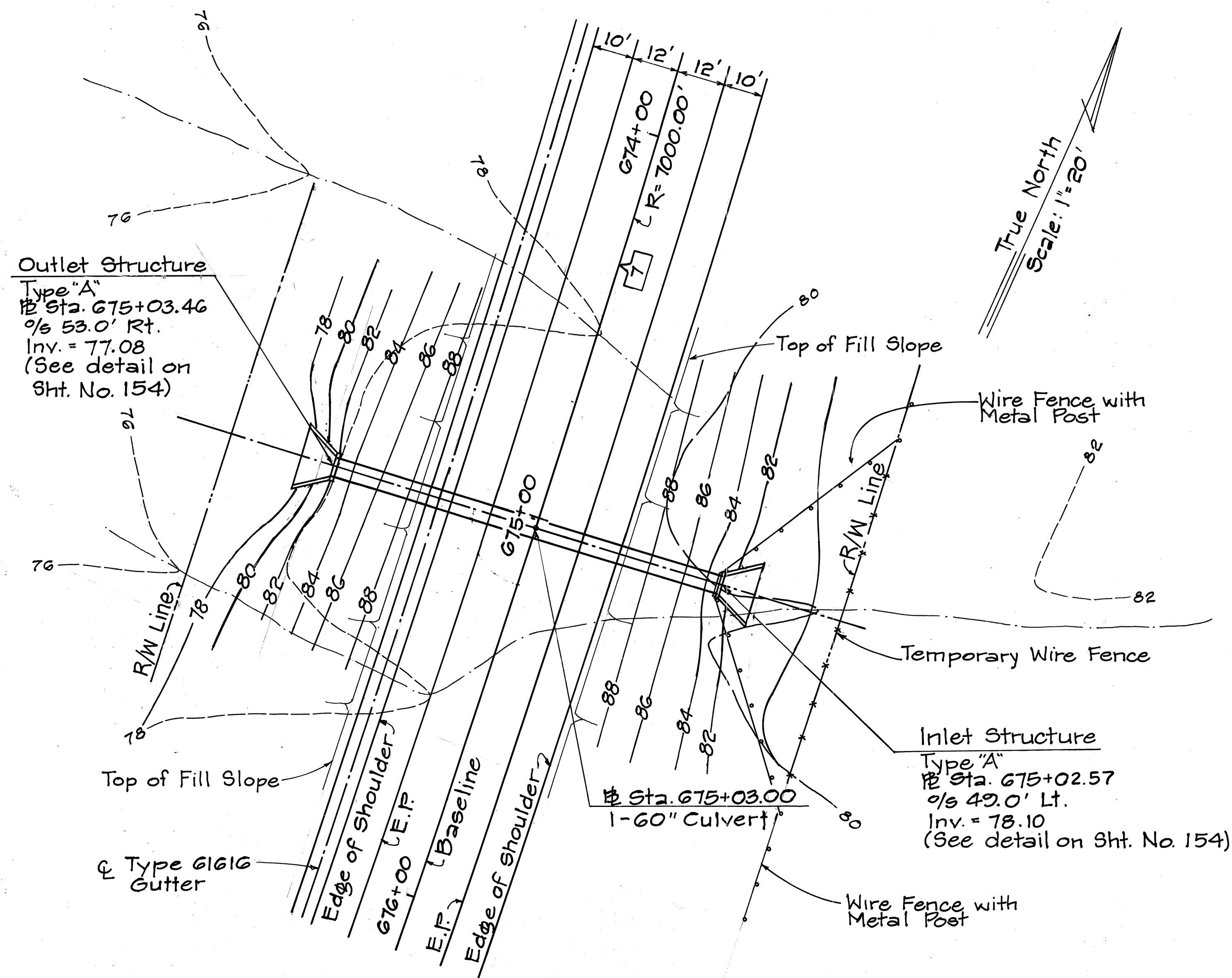
DRAINAGE DETAILS

PIILANI HIGHWAY
VICINITY OF MOKULELE HIGHWAY TO
VICINITY OF KILOHANA STREET

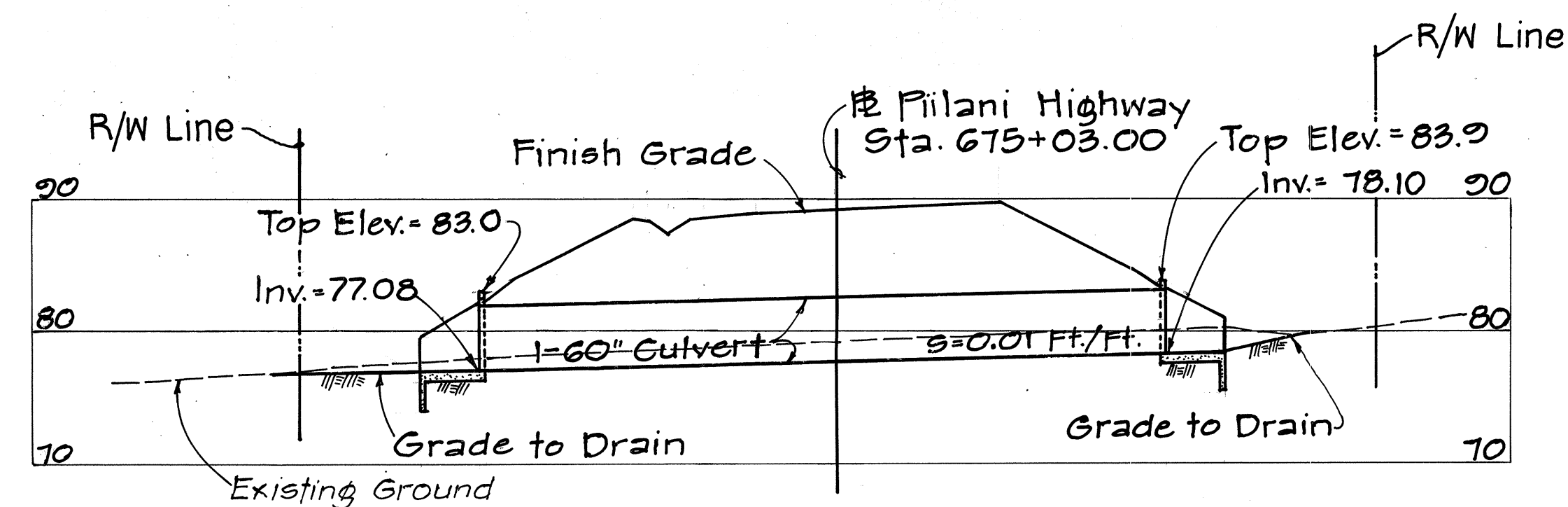
F.A. PROJECT NO. F-031-1(6)
SCALE: AS SHOWN DATE SEP 1978

SHEET No. 12 OF 50 SHEETS

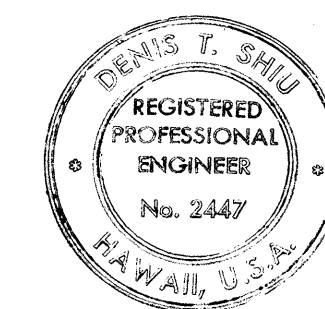
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-RF-031-1(6)	1978	120	262



PLAN
Scale: 1" = 20'



PROFILE
Scale: Horiz. 1" = 20'
Vert. 1" = 10'
CULVERT AT STA. 675+03.00



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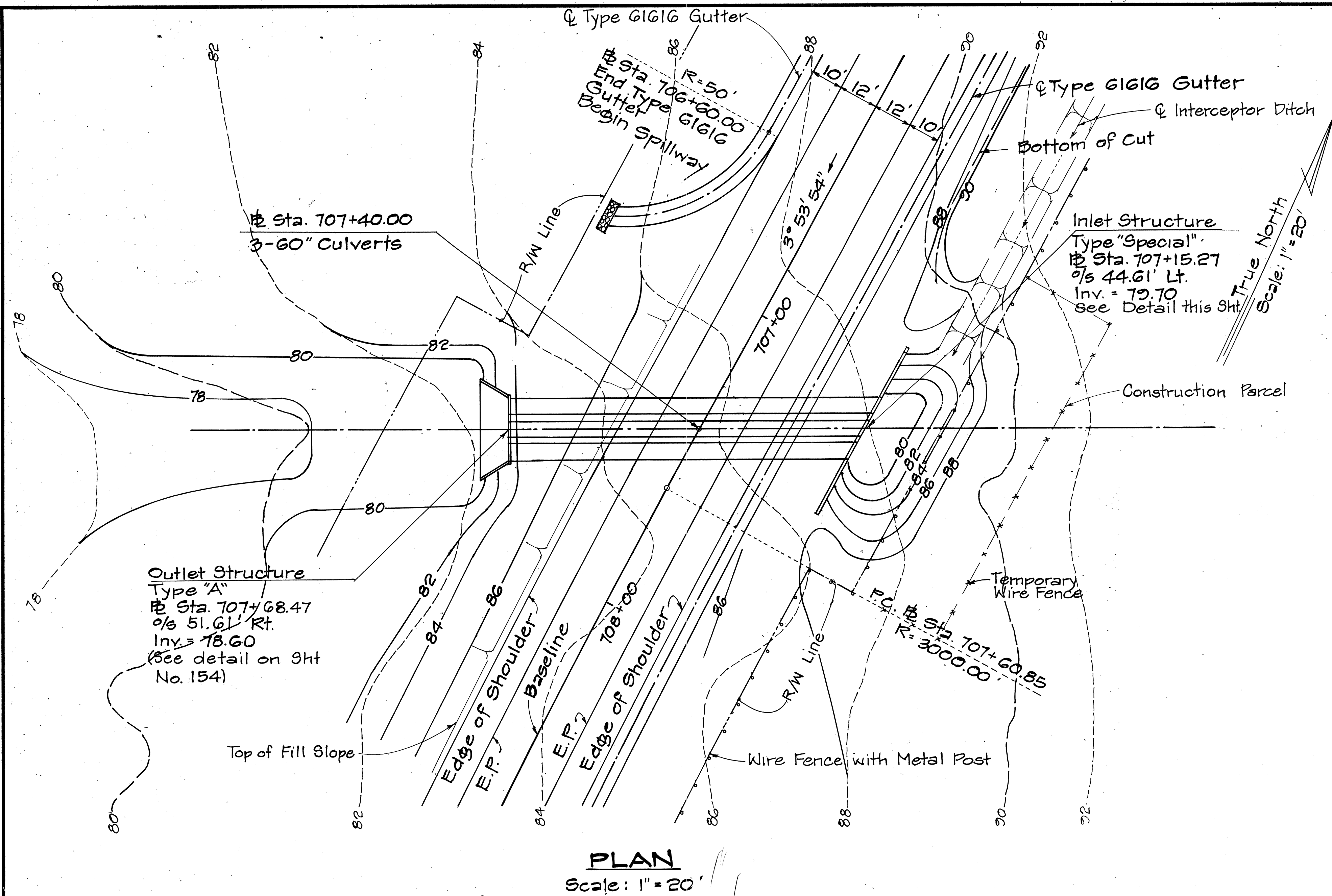
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DRAINAGE DETAILS

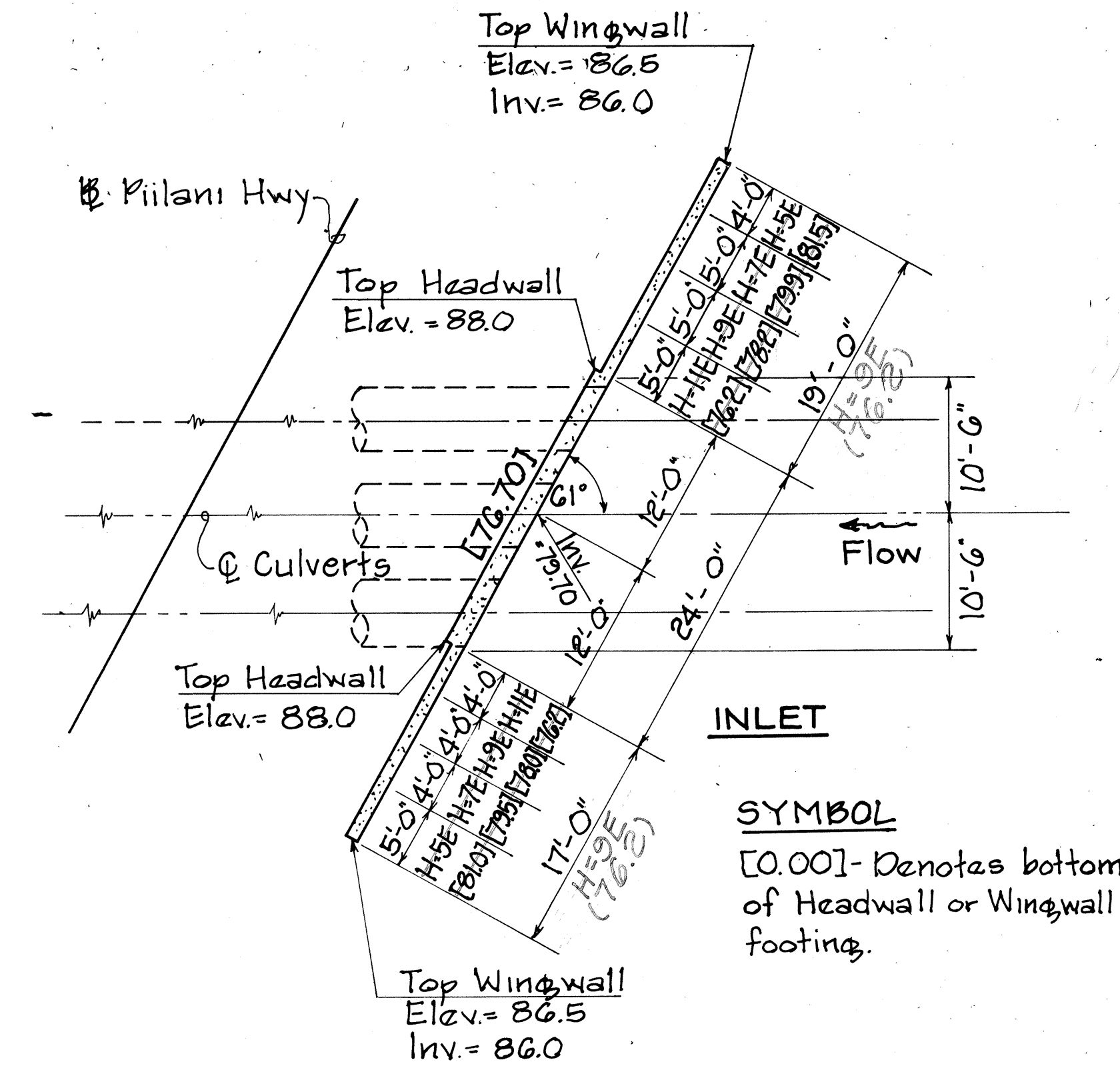
PIILANI HIGHWAY
VICINITY OF MOKULELE HIGHWAY TO
VICINITY OF KILOHANA STREET
F.A. PROJECT NO. F-031-1(6)
SCALE: AS SHOWN DATE SEP 1978

SHEET No. 13 OF 50 SHEETS

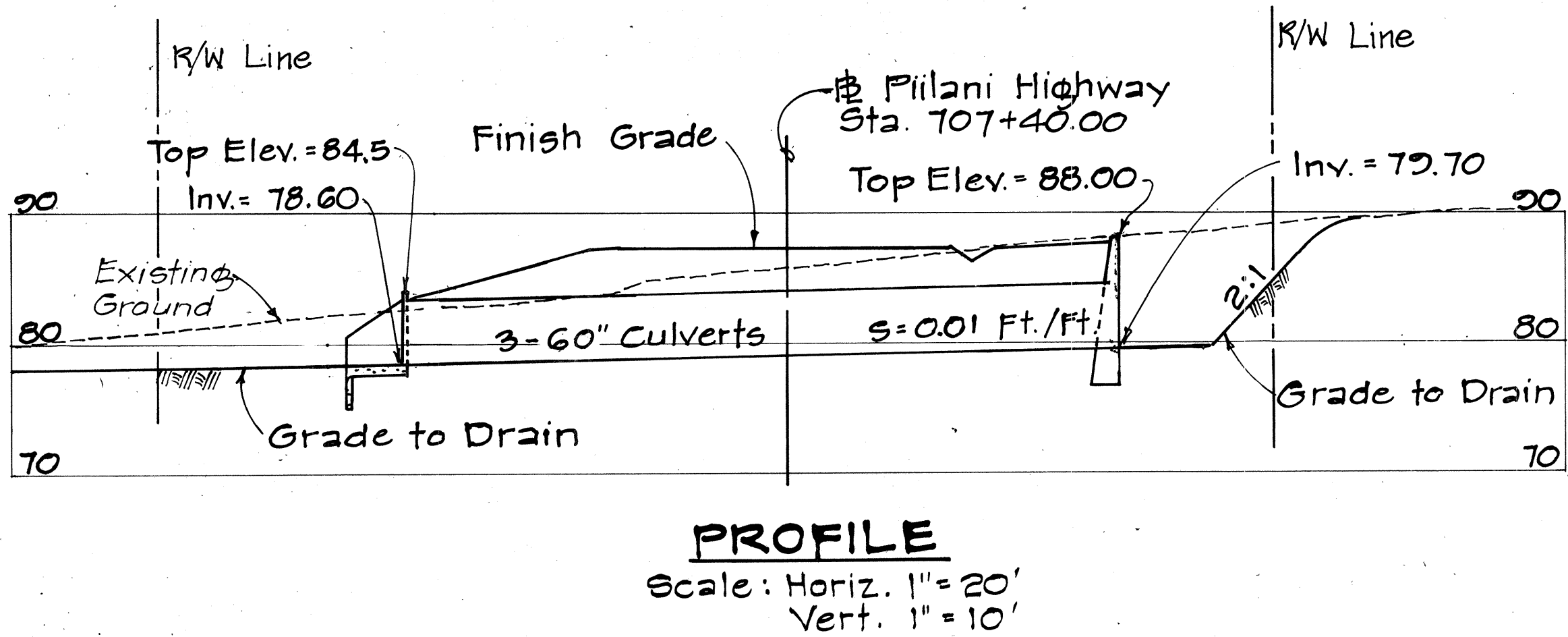
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-RF-031-1(6)	1978	121	262



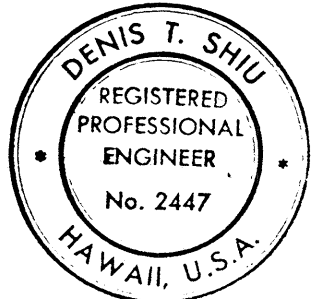
- Note:**
1. All Concrete shall be Class A.
 2. INLET STRUCTURE: For additional detail of Headwall, Wingwalls, and Apron, see detail on Sht. No. 147, 148, and T-9.



PLAN-(INLET STRUCTURE)
Scale: 1"=10'-0"



CULVERT AT STA. 707+40.00



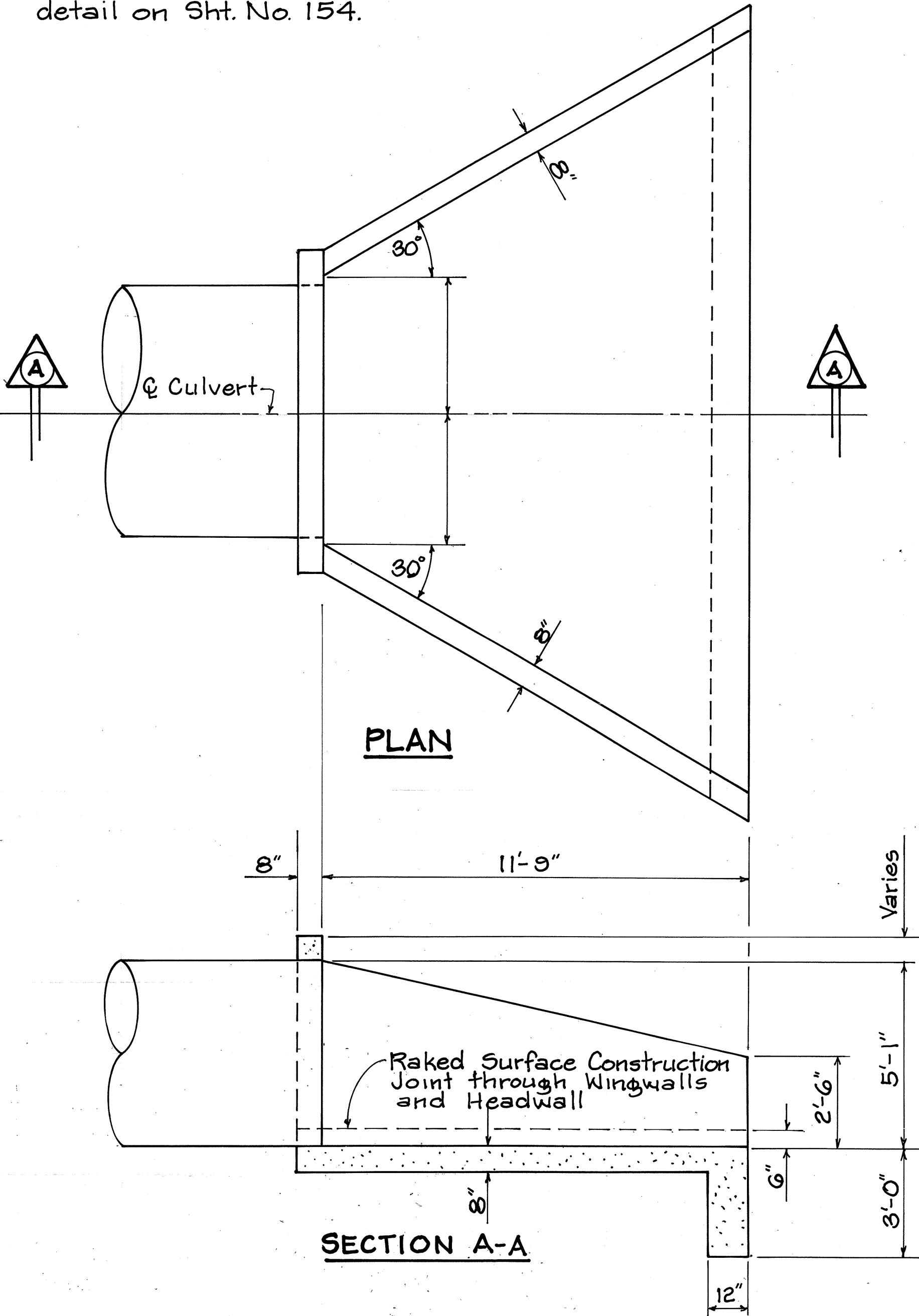
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
LAND TRANSPORTATION FACILITIES DIVISION

DRAINAGE DETAILS
PIILANI HIGHWAY
VICINITY OF MOKULELE HIGHWAY TO
VICINITY OF KILOHANA STREET
F.A. PROJECT NO. F-RF-031-1(6)
SCALE: AS SHOWN DATE SEP 1978

SHEET No. 14 OF 50 SHEETS

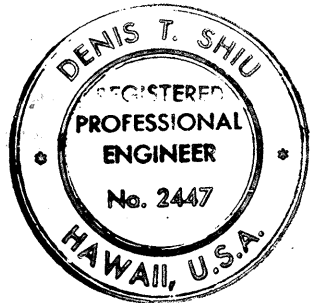
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-RF-031-1(6)	1978	122	262

- Note:**
1. All Concrete shall be Class A.
 2. For Reinforcing detail see detail on Sht. No. 154.



**TYPE "A"
MODIFIED INLET & OUTLET STRUCTURE**

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

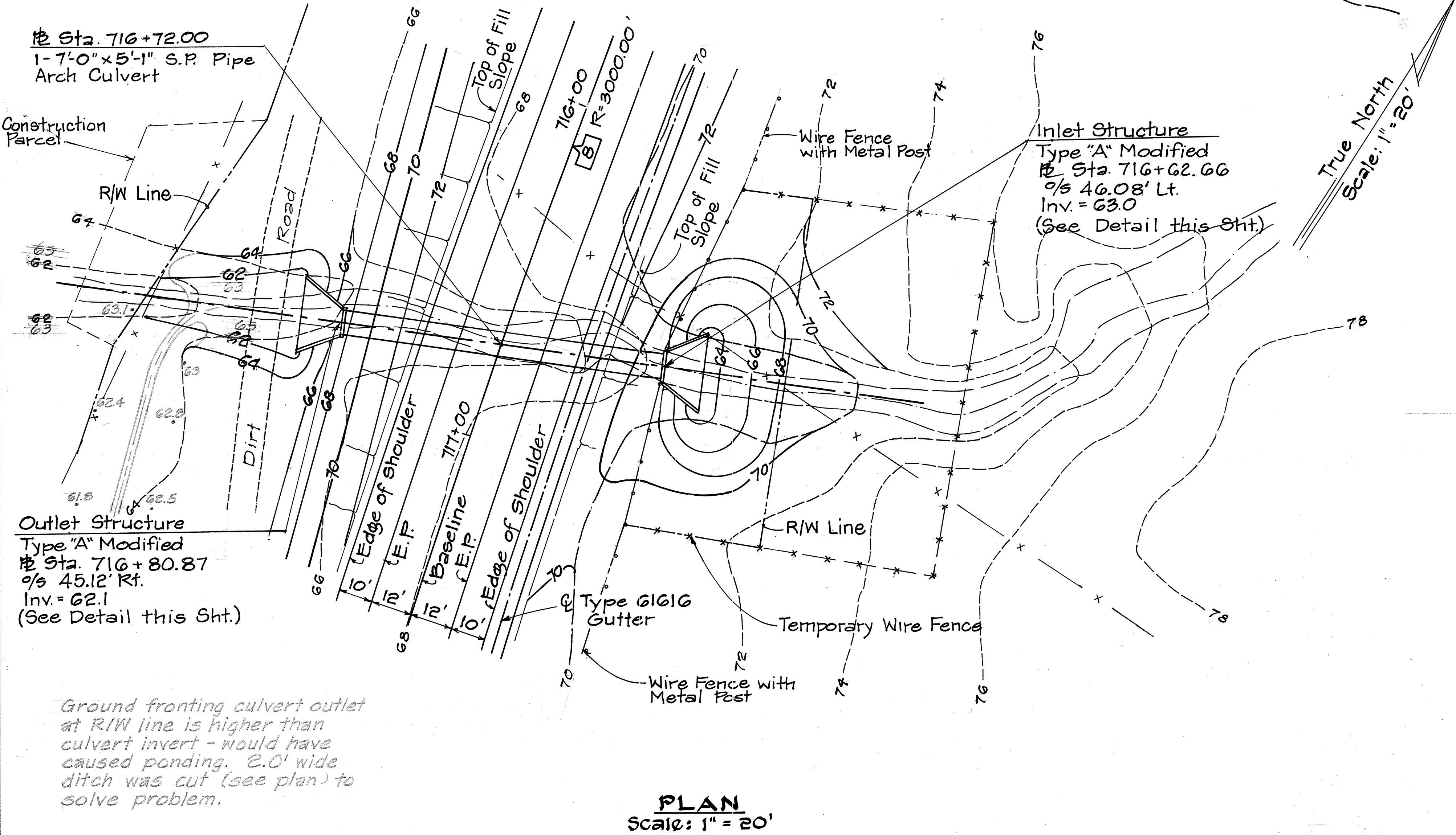


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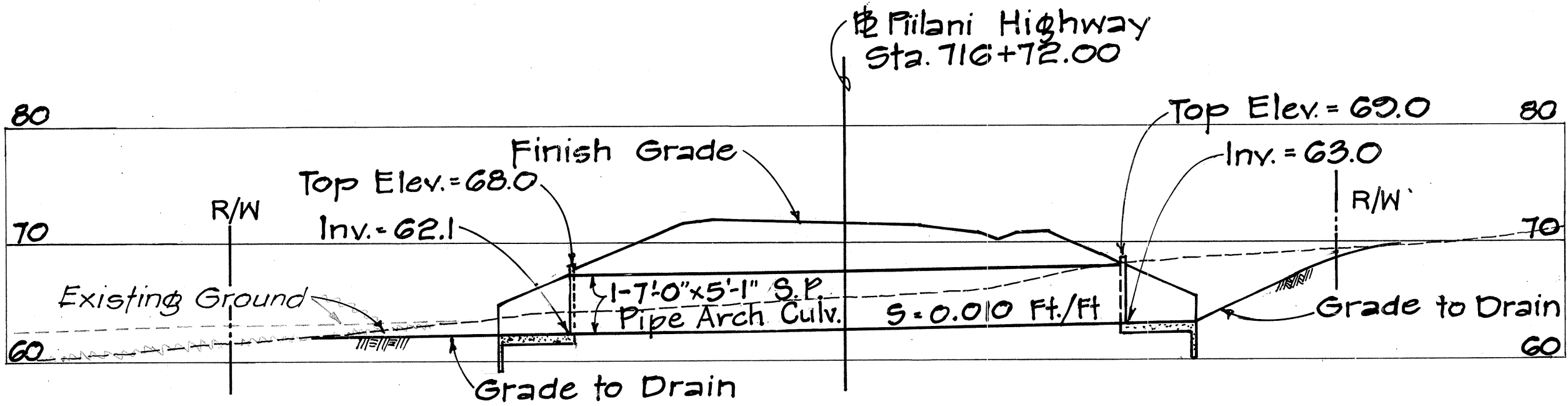
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DRAINAGE DETAILS

PILANI HIGHWAY
VICINITY OF MOKULELE HIGHWAY TO
VICINITY OF KILOHANA STREET
F.A. PROJECT NO. F-031-1(6)
SCALE: AS SHOWN DATE SEP 1978
SHEET No. 15 OF 50 SHEETS



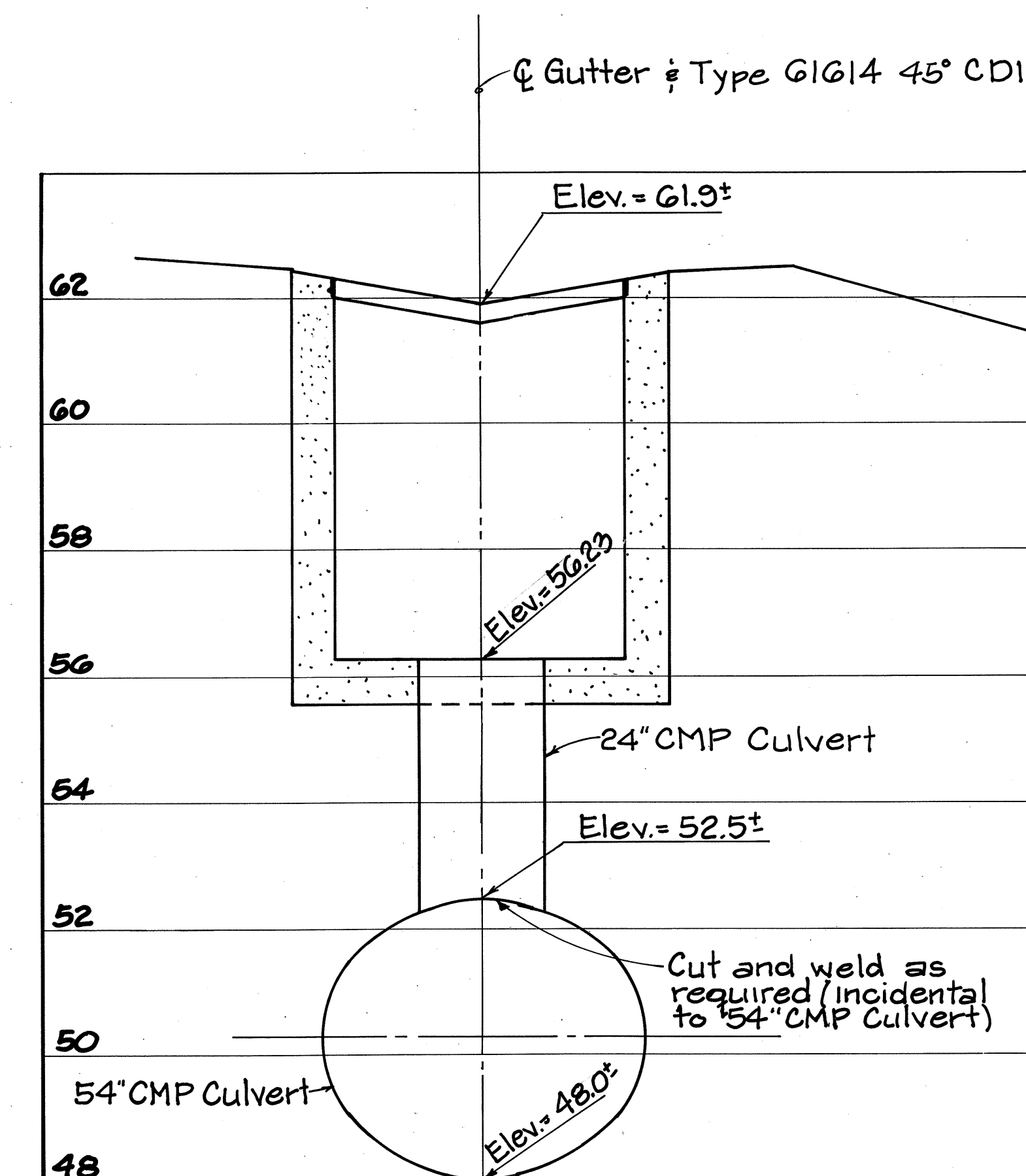
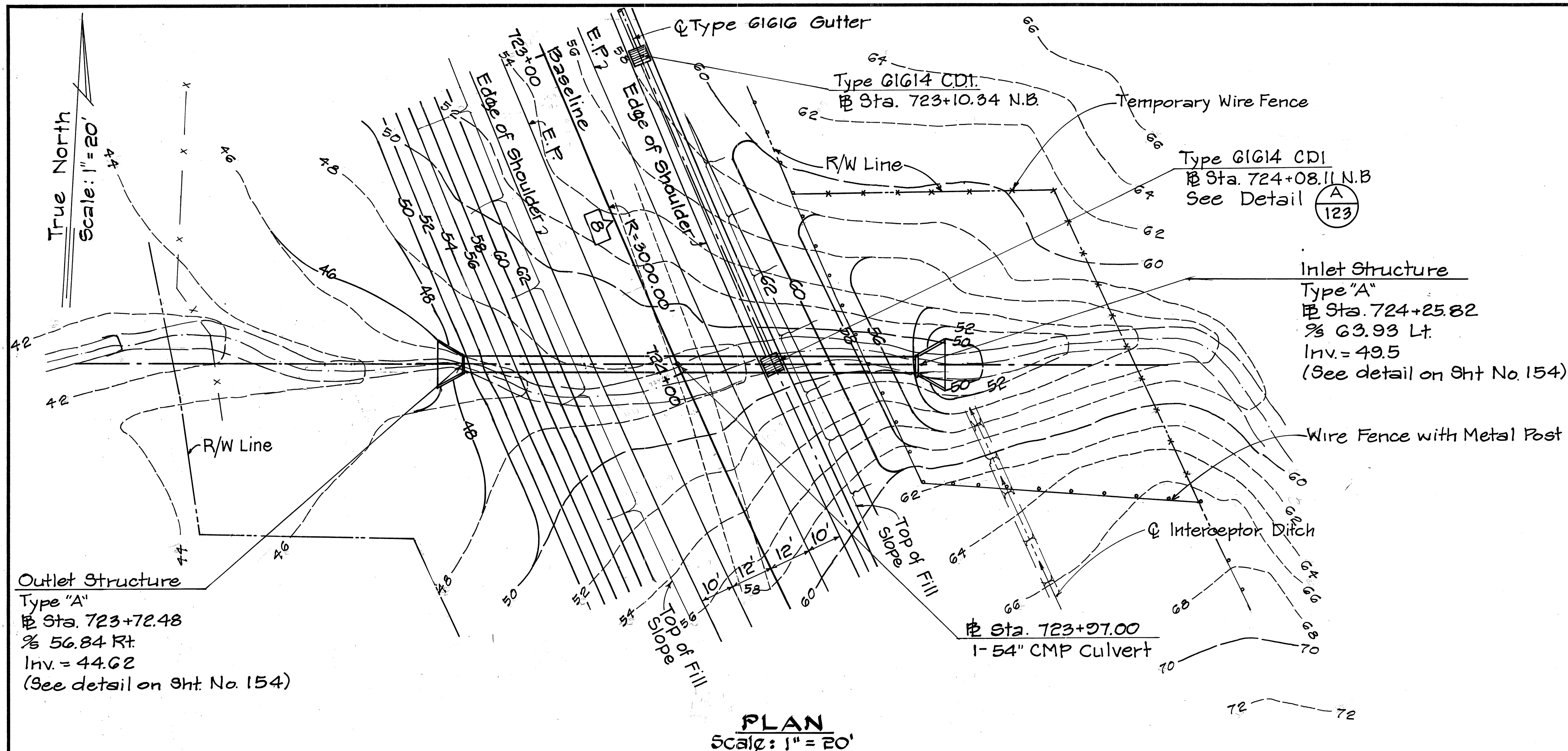
PLAN
Scale: 1" = 20'



PROFILE
Scale: Horiz. 1" = 20'
Vert. 1" = 10'
CULVERT AT STA. 716+72.00

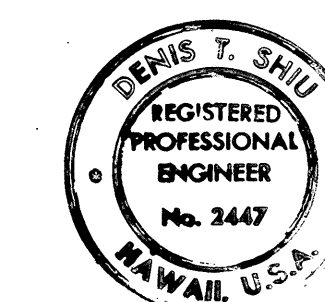
DESIGNED BY	DATE
DRAWN BY	
CHECKED BY	
ORIGINAL	
NOTE BOOK	
NO.	

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-RF-031-1(6)	1978	123	262



STA. 724+08.11 N.B.
Scale: 1" = 2'-0"

A
123



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DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DRAINAGE DETAILS

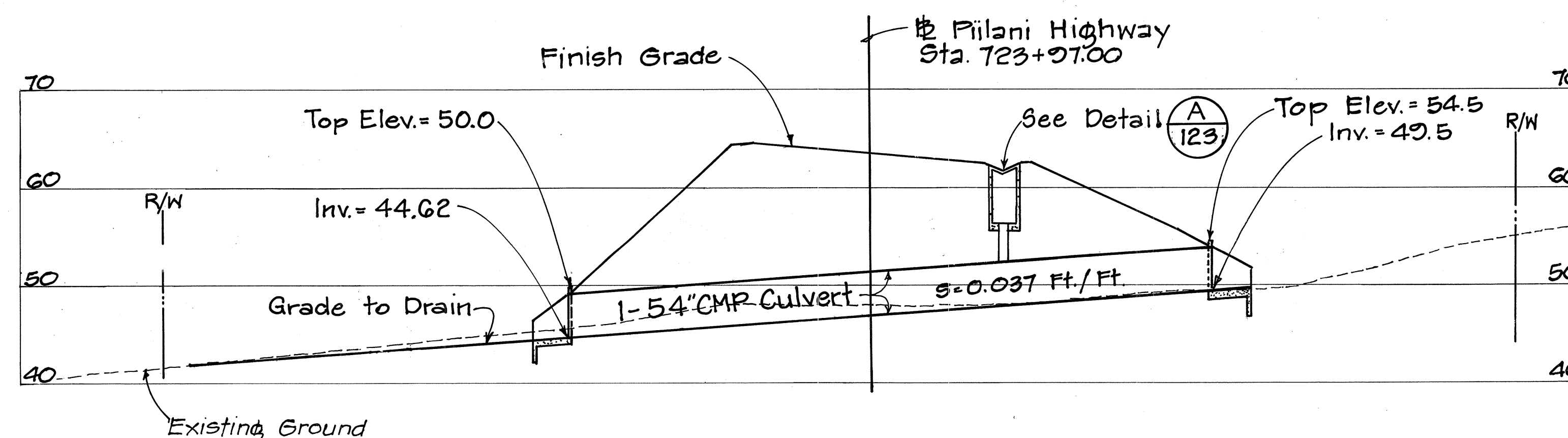
PIILANI HIGHWAY
VICINITY OF MOKULELE HIGHWAY TO
VICINITY OF KILOHANA STREET

F.A. PROJECT NO. F-031-1(6)

SCALE: AS SHOWN DATE SEP 1978

SHEET No. 16 OF 50 SHEETS

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

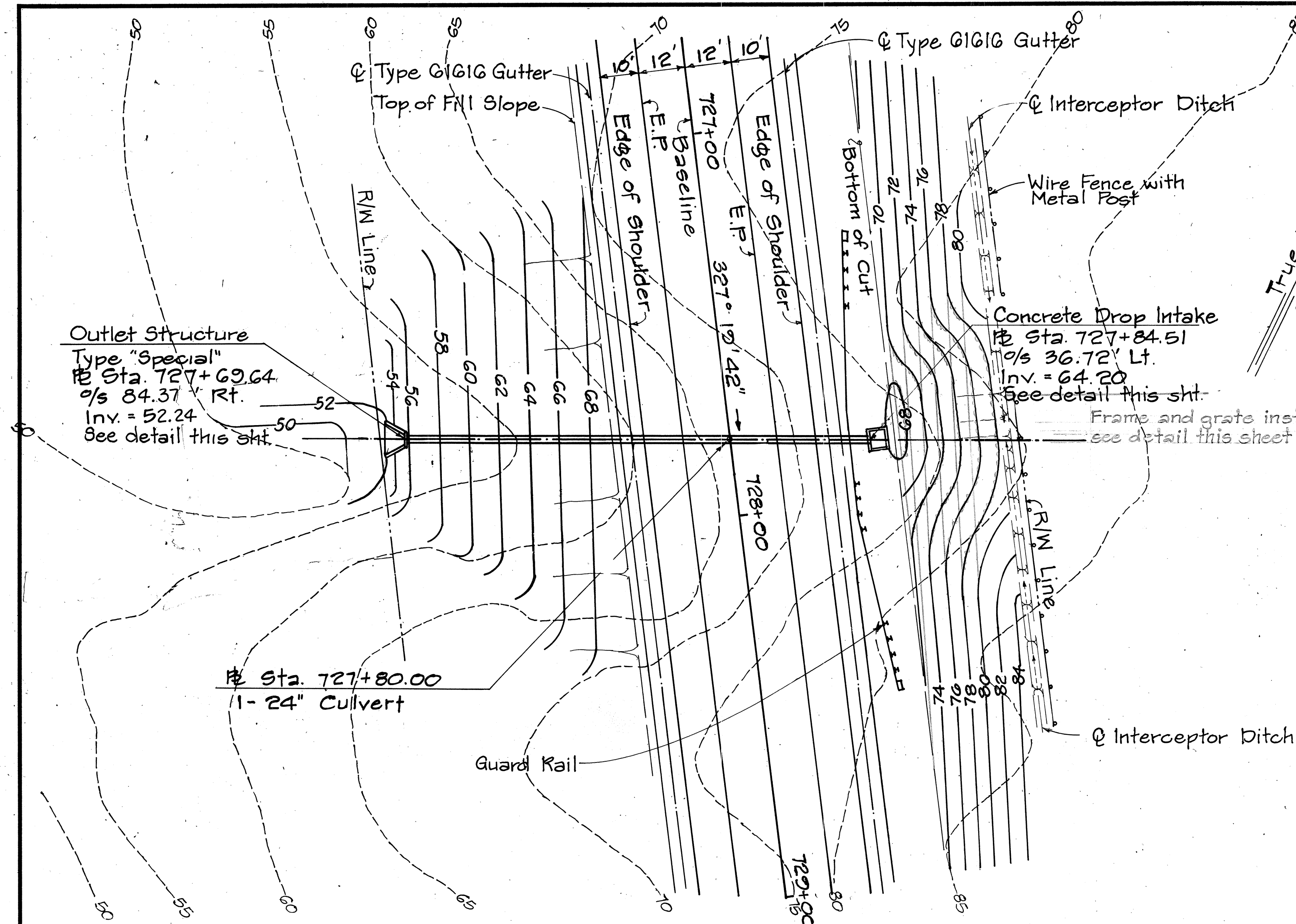


CULVERT AT STA. 723+97.00

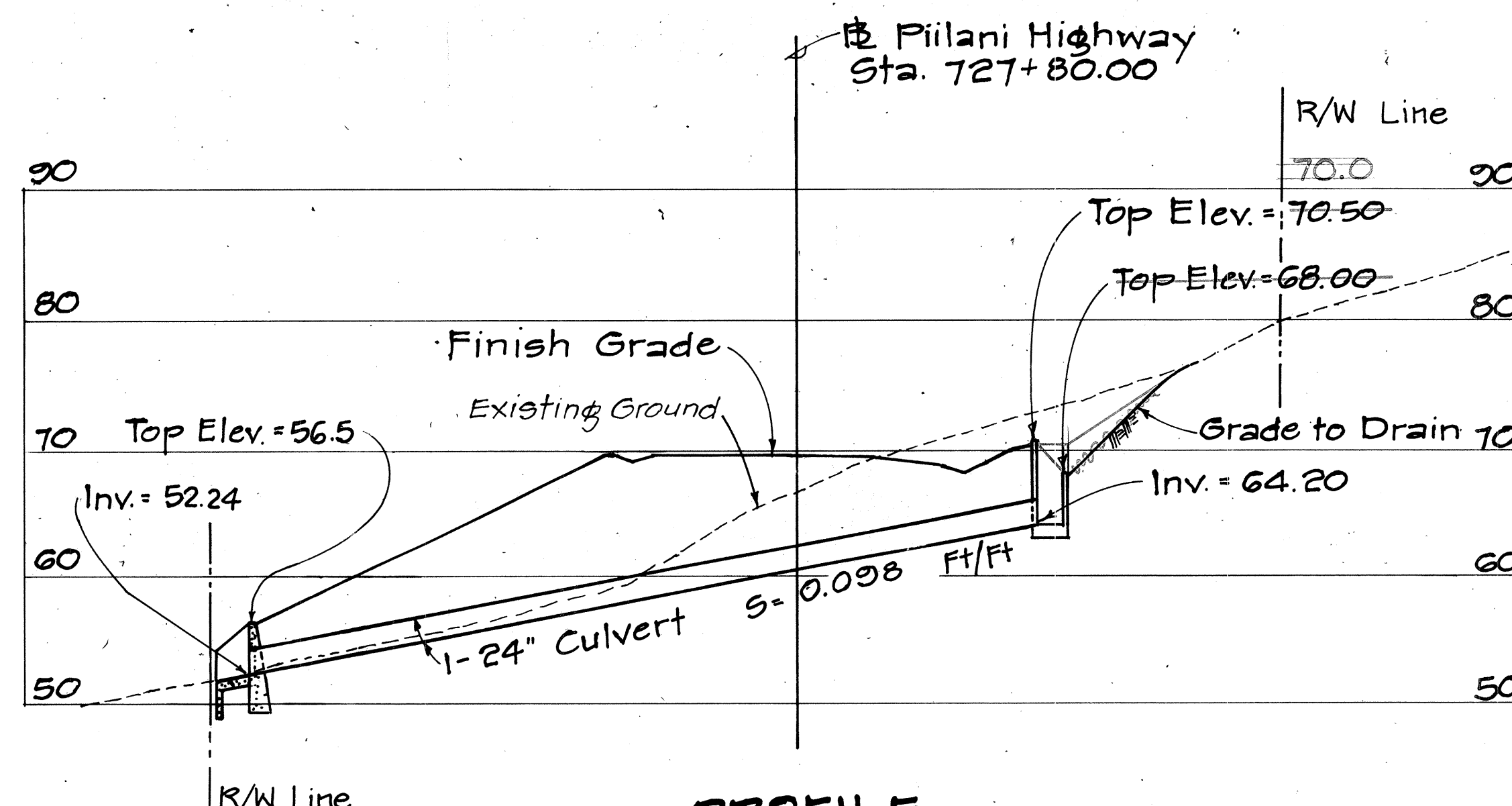
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-RF-031-1(6)	1978	124	262

Note:

1. All Concrete shall be Class A.
2. For additional details of Headwall, Wingwalls, and Apron for the Outlet Structure see details on Sht No 147, 148 and T-9.

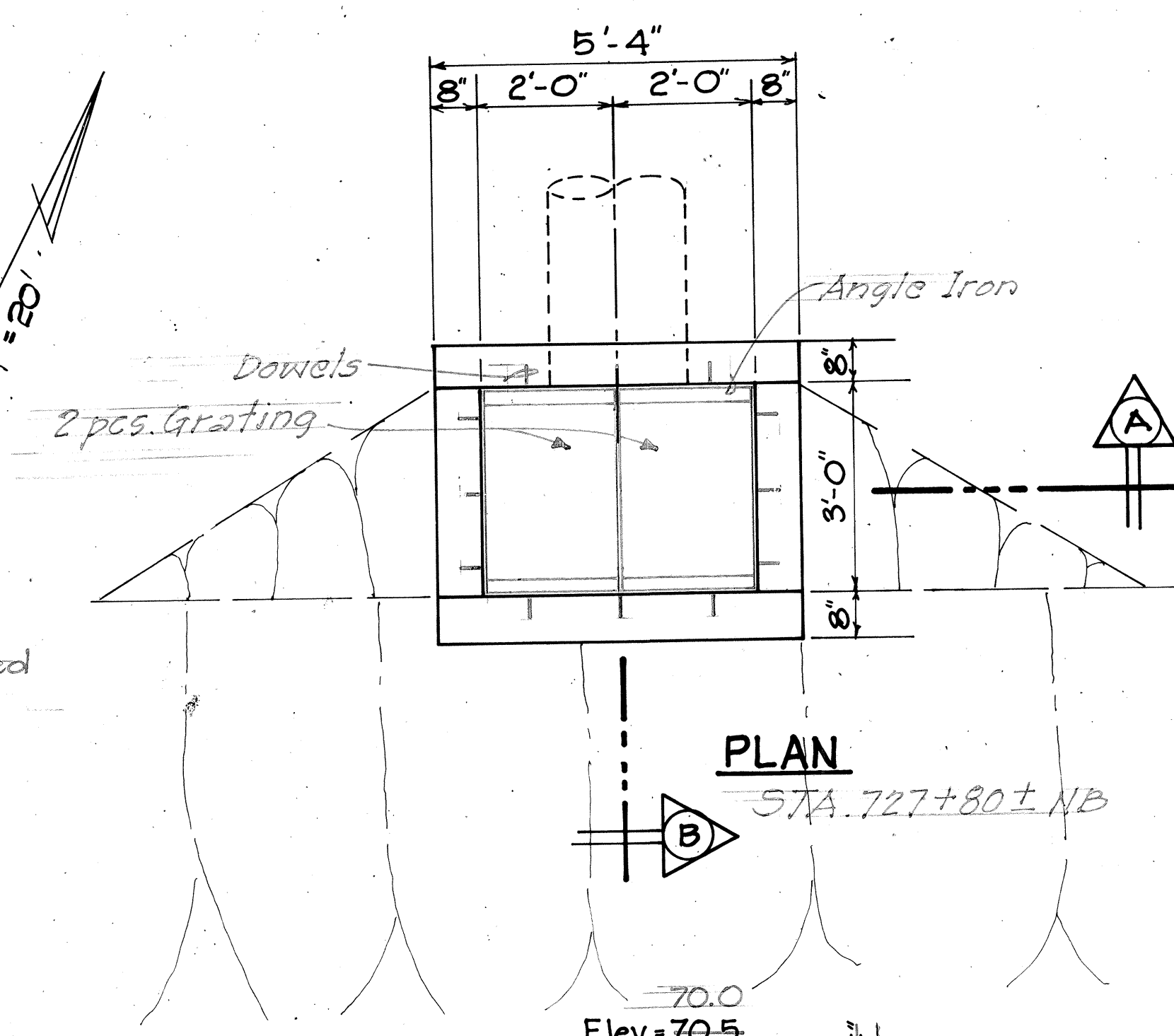


PLAN
Scale: 1" = 20'

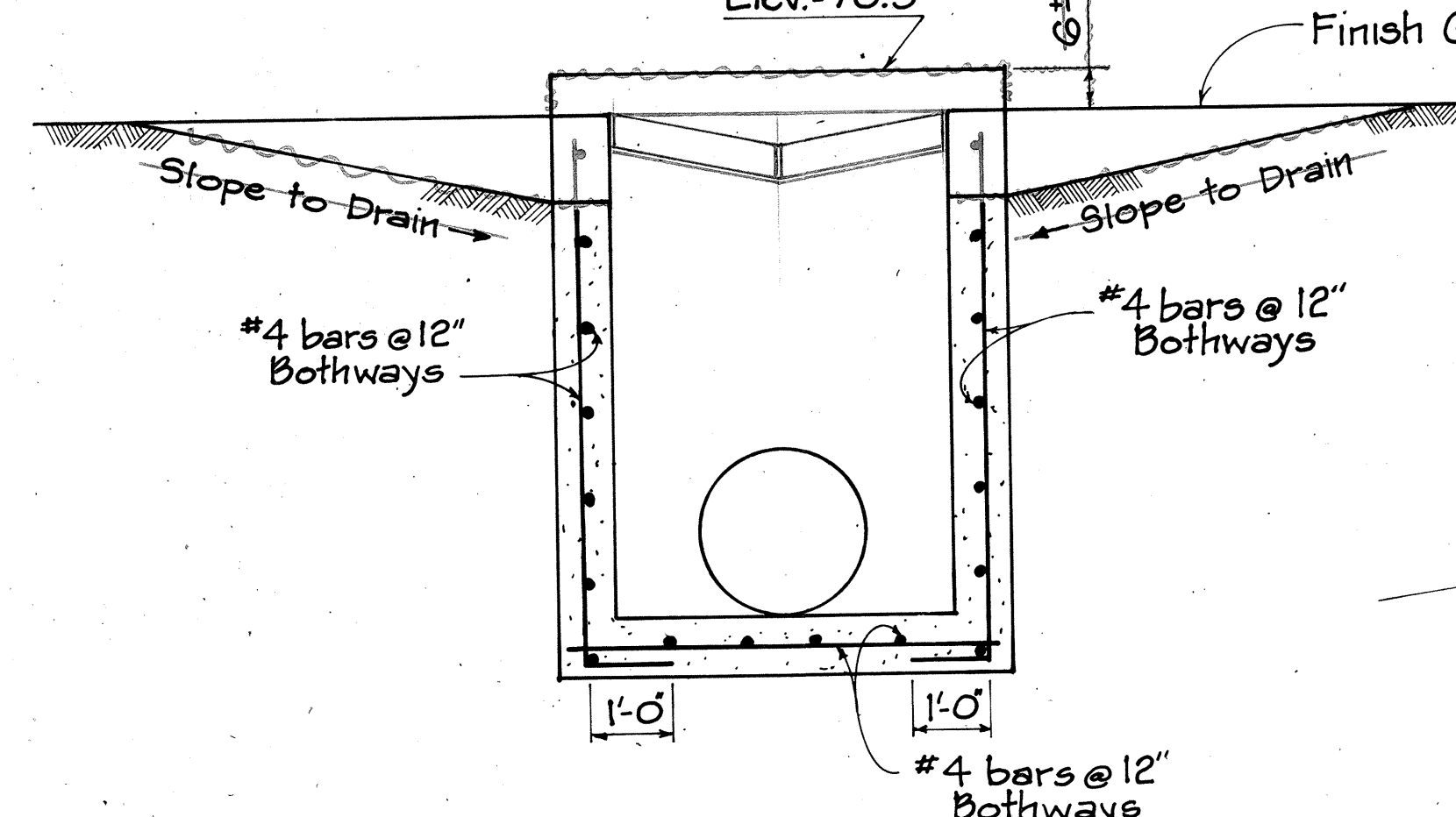


PROFILE
Scale: Horiz. 1" = 20'
Vert. 1" = 10'

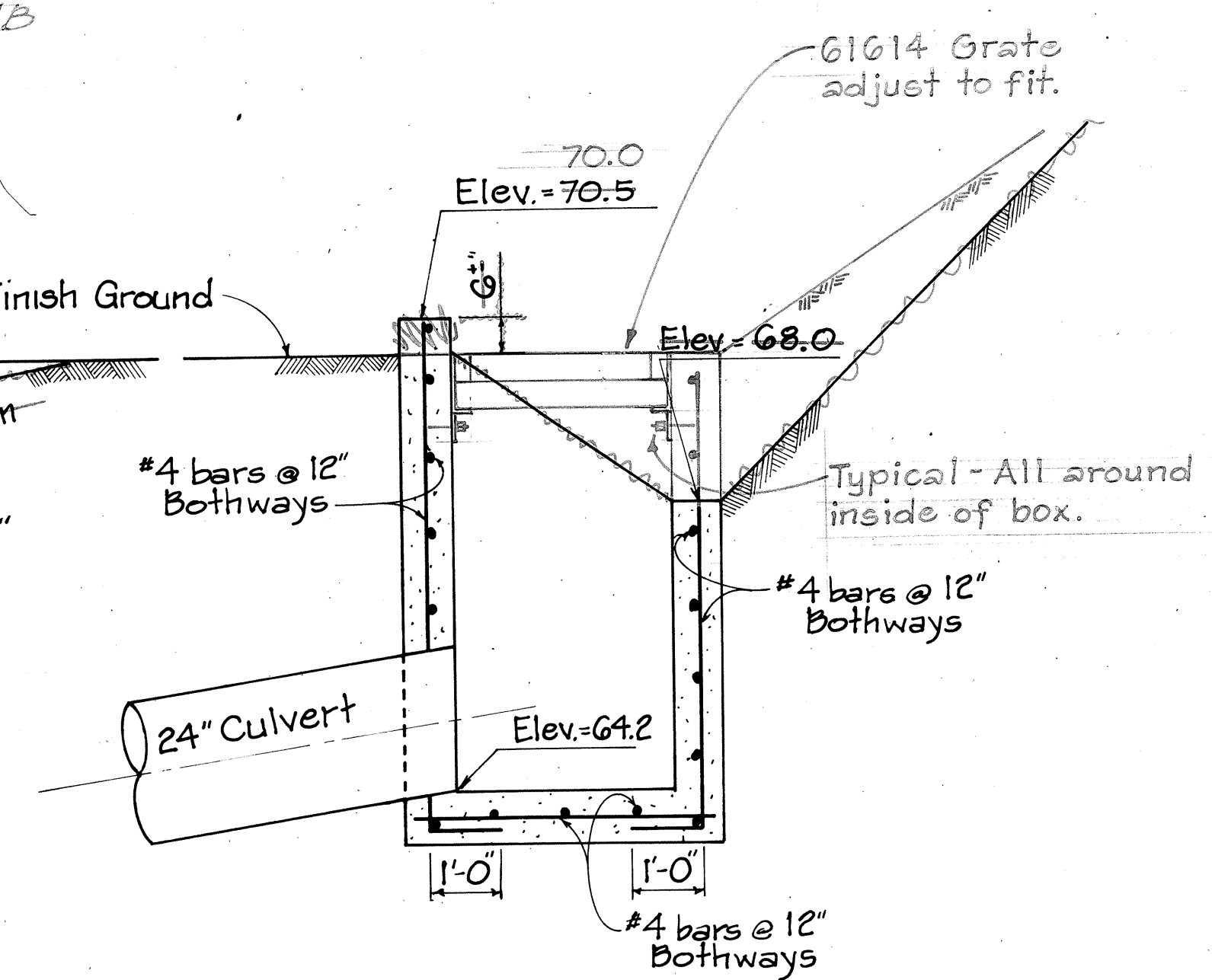
CULVERT AT STA. 727+80.00



PLAN



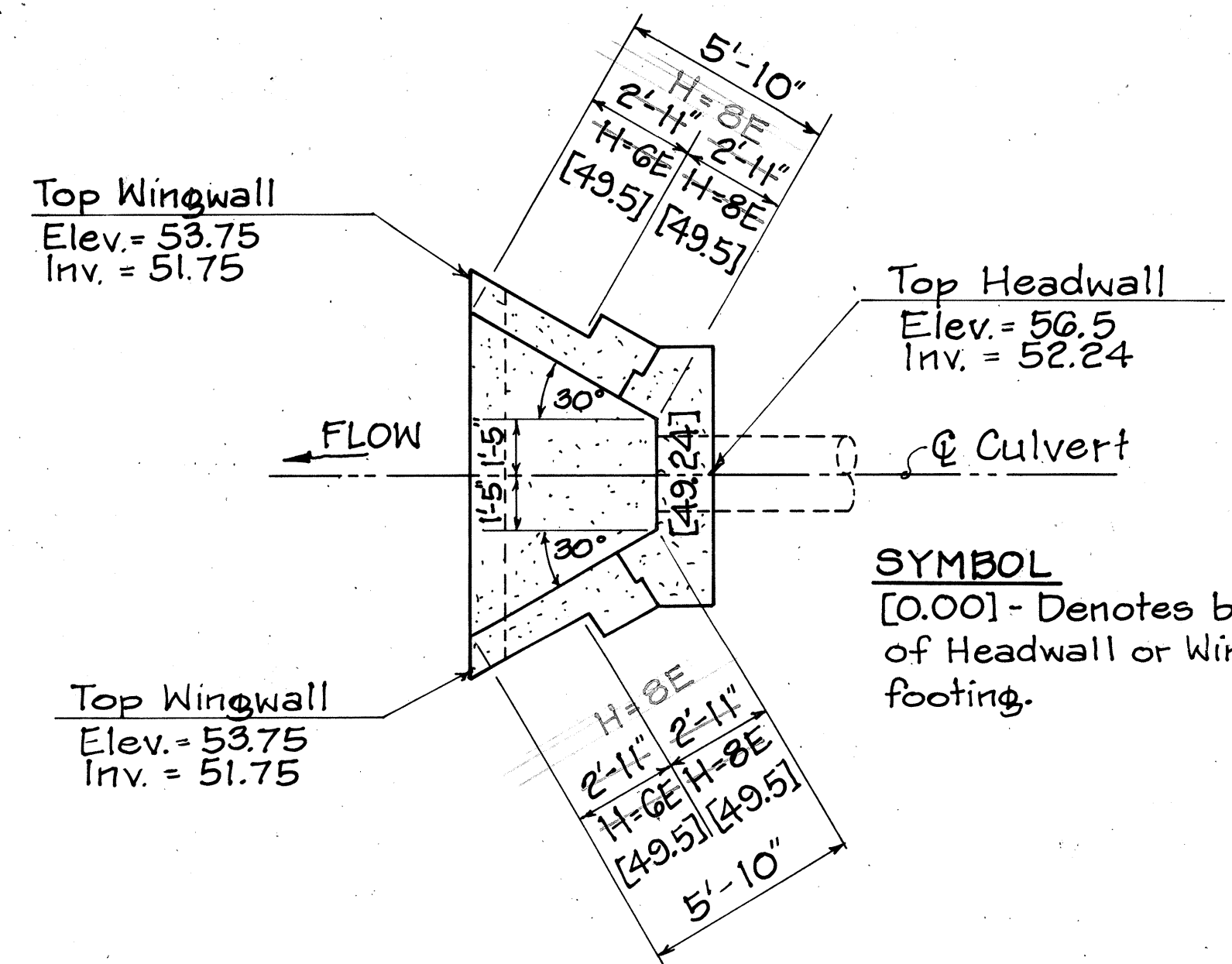
SECTION A



SECTION B

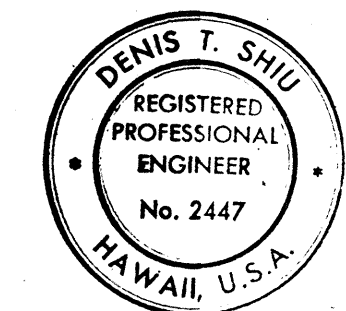
INLET STRUCTURE

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



PLAN-(OUTLET STRUCTURE)
Scale: 1/4" = 1'-0"

SYMBOL
[0.00] - Denotes bottom of Headwall or Wingwall footing.



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DEPARTMENT OF TRANSPORTATION
LAND TRANSPORTATION FACILITIES DIVISION

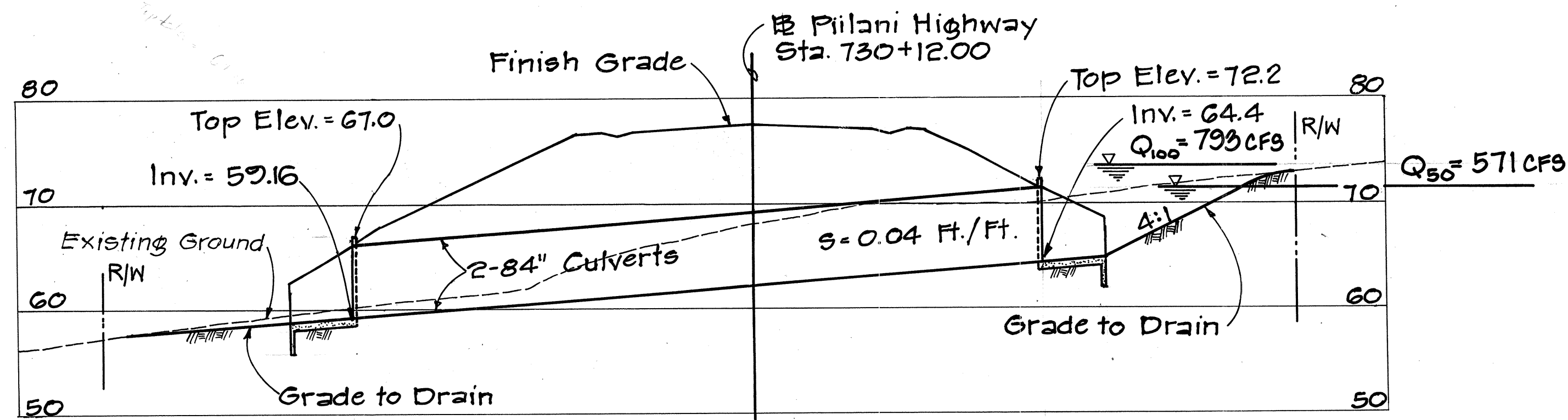
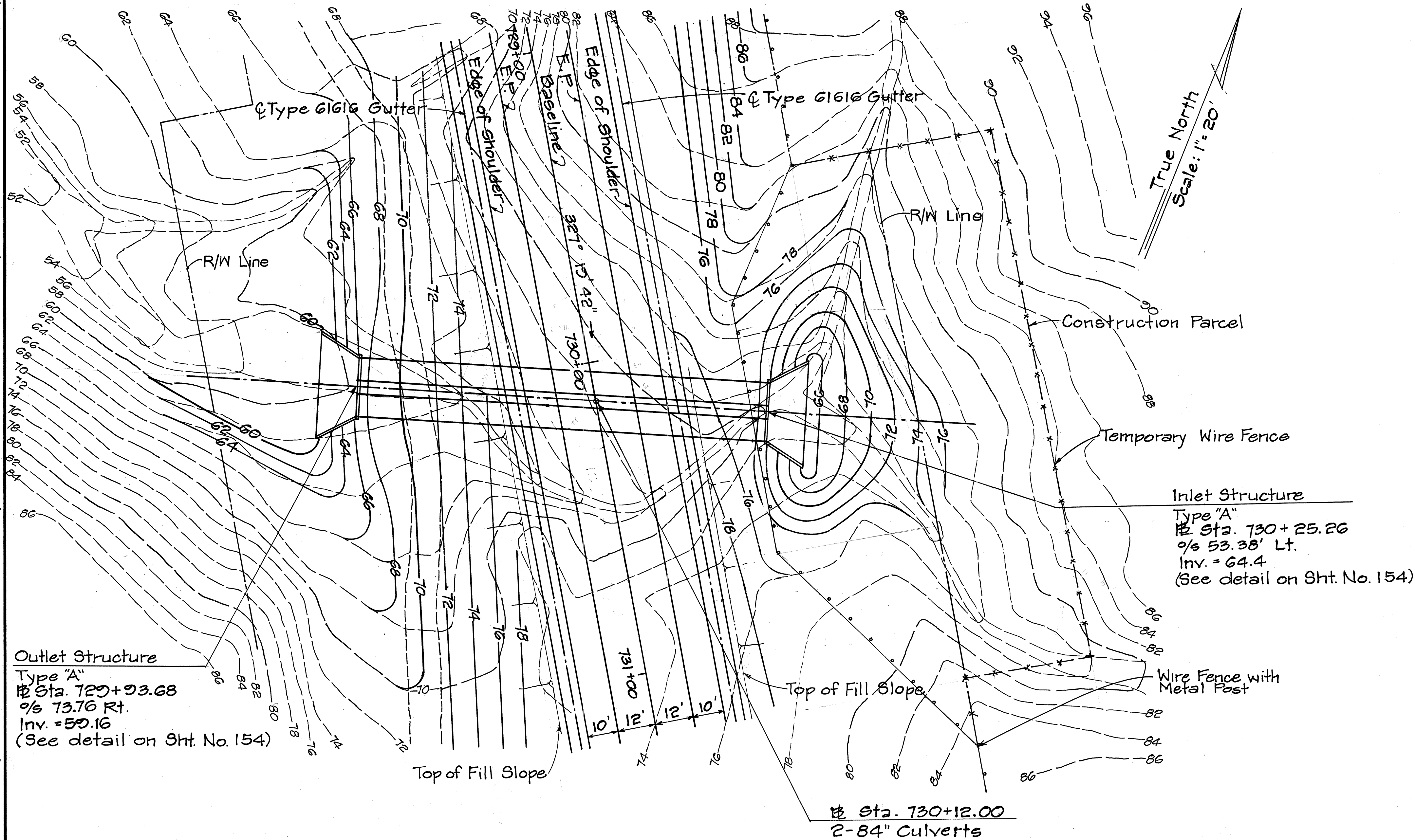
DRAINAGE DETAILS

PIILANI HIGHWAY
VICINITY OF MOKULELE HIGHWAY TO
VICINITY OF KILOHANA STREET
F.A. PROJECT NO. F-RF-031-1(6)

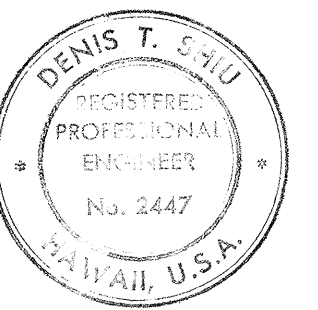
SCALE: AS SHOWN DATE SEP 1978

SHEET No. 17 OF 50 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-RF-031-1(6)	1978	125	262



CULVERT AT STA. 730+12.00



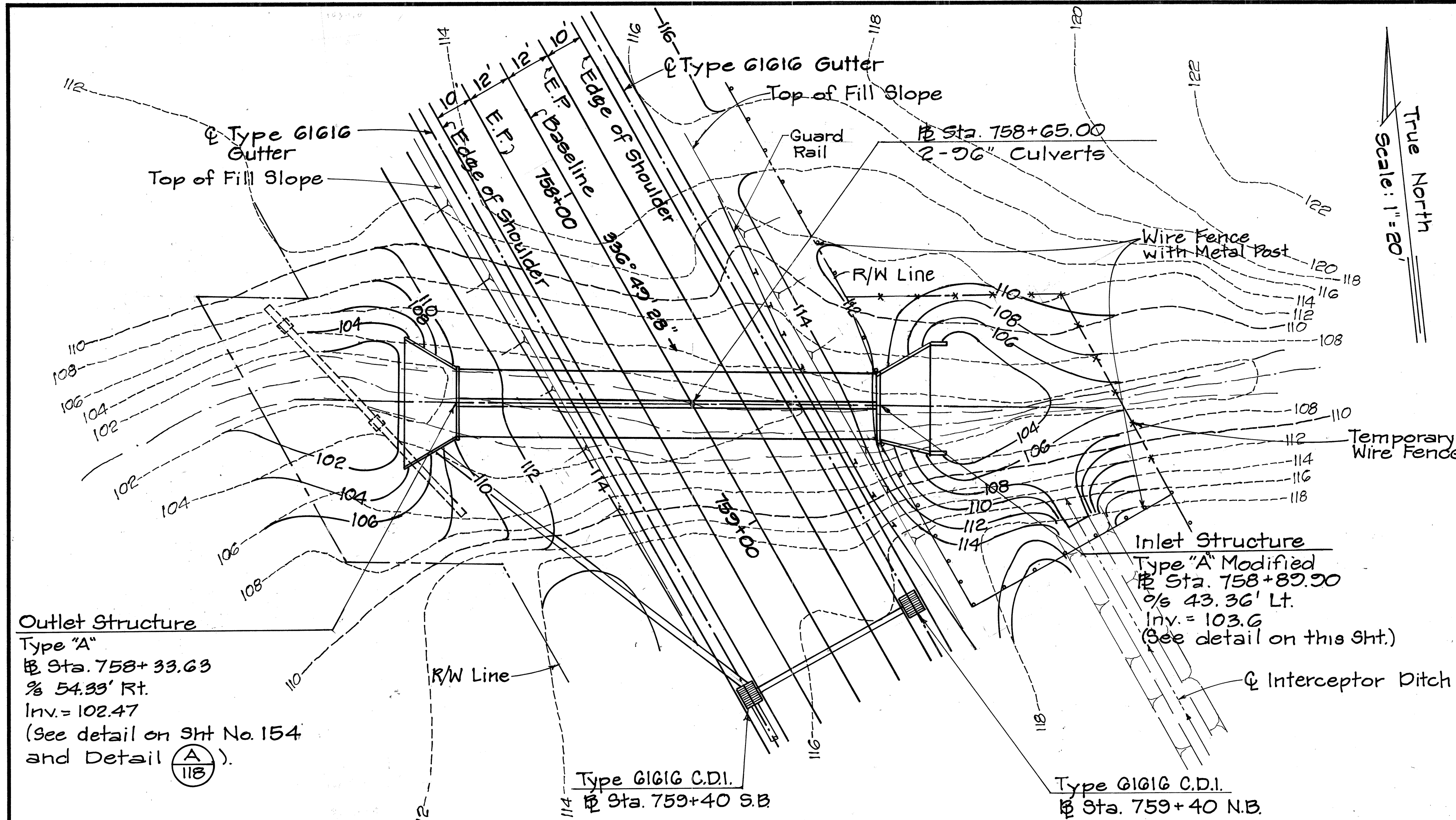
Denis T. Shin

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

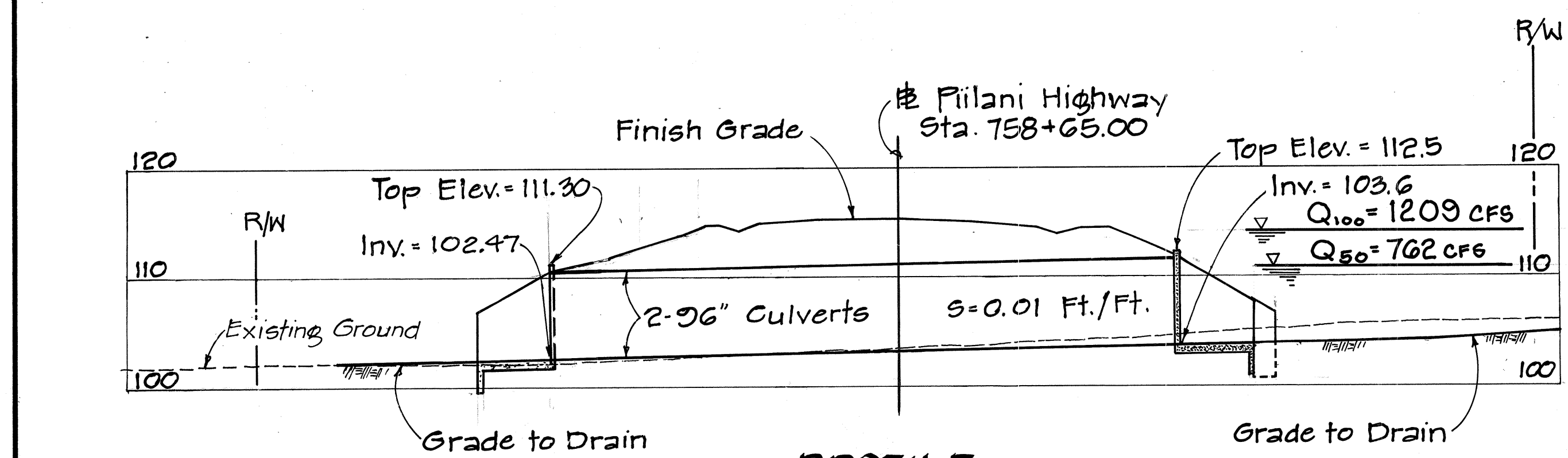
DRAINAGE DETAILS

PIILANI HIGHWAY
VICINITY OF MOKULELE HIGHWAY TO
VICINITY OF KILOHANA STREET
F.A. PROJECT NO. F-031-1(6)
SCALE: AS SHOWN DATE SEP 1978
SHEET No. 18 OF 50 SHEETS

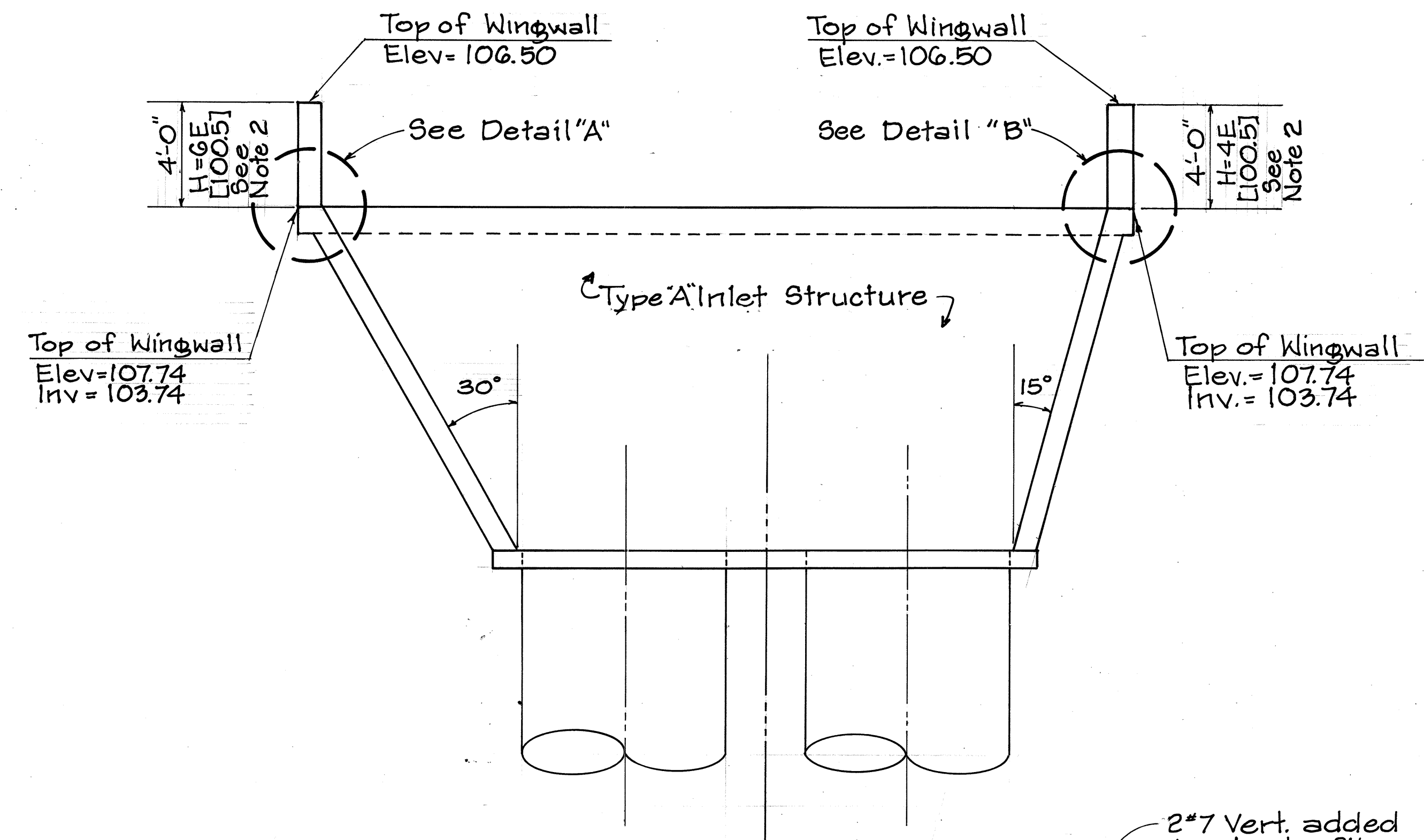
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-RF-031-1(6)	1978	127	262



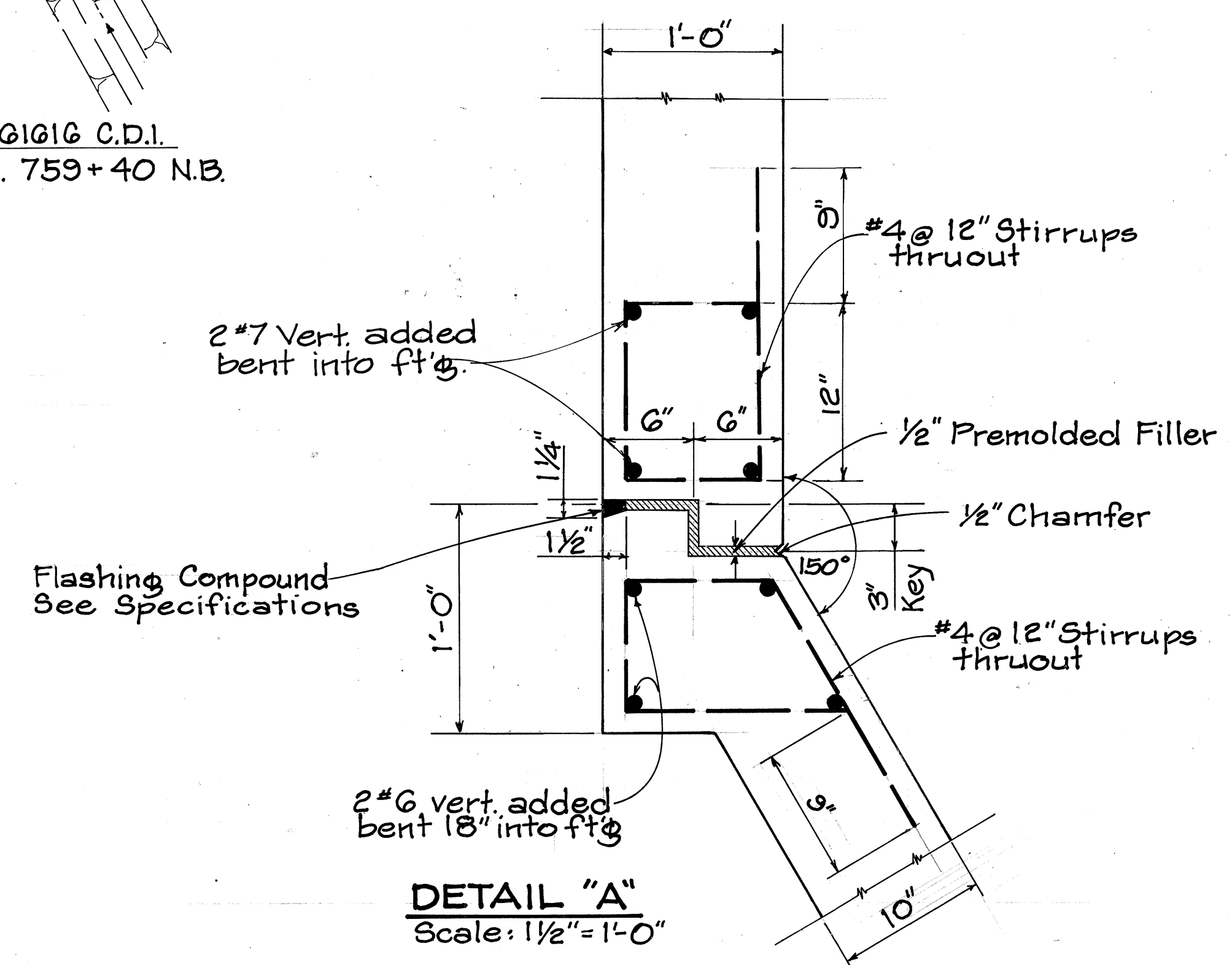
PLAN
Scale: 1" = 20'



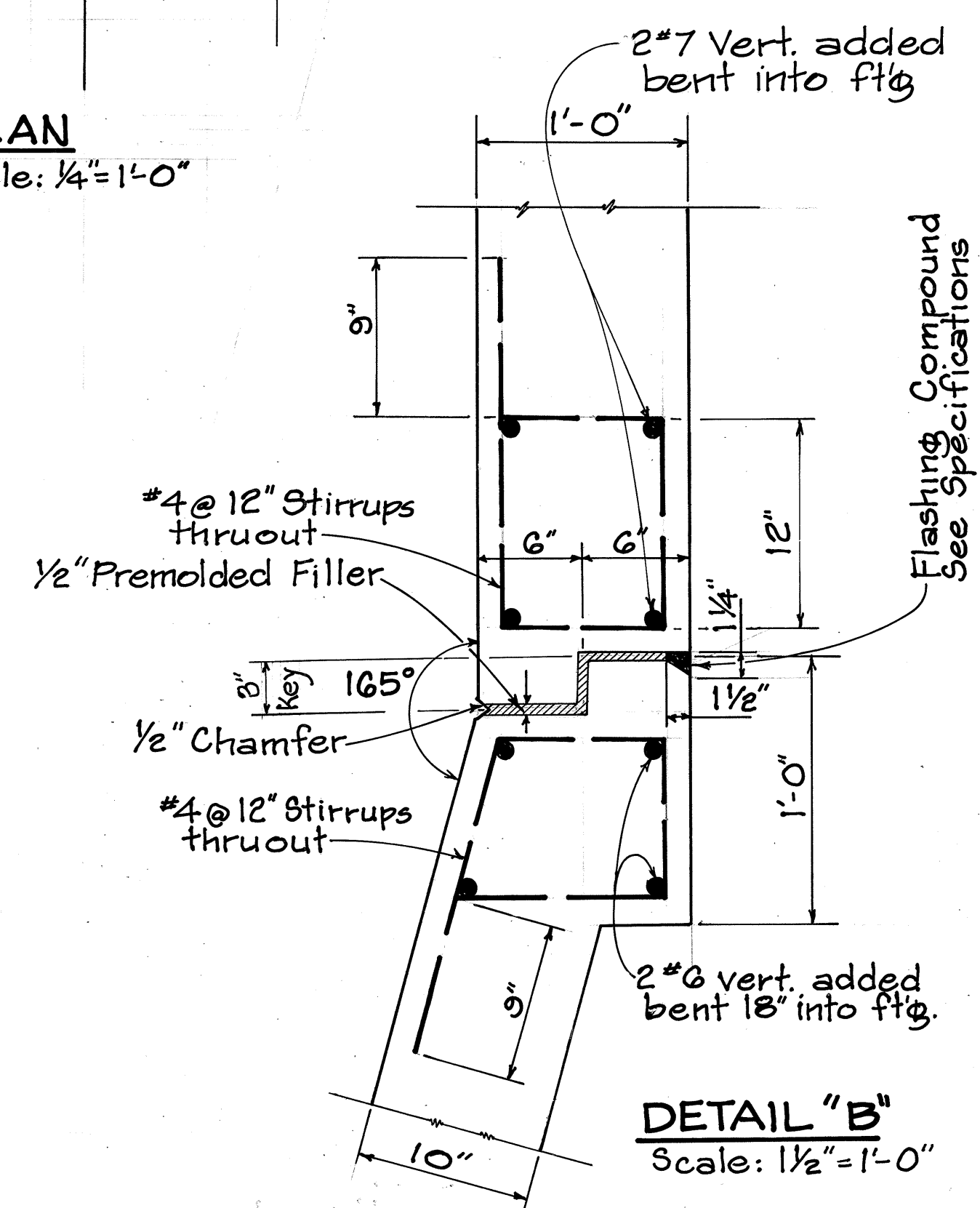
PROFILE
Scale: Horiz. 1" = 20'
Vert. 1" = 10'
CULVERT AT STA. 758+65.00



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



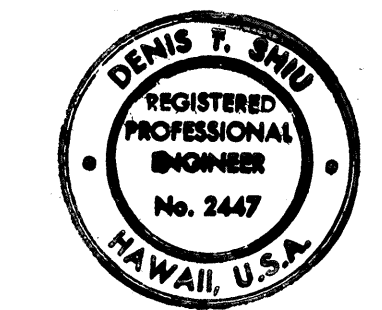
DETAIL "A"
Scale: 1 1/2" = 1'-0"



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

- Note:**
1. All Concrete shall be Class A.
 2. For additional detail of Inlet Structure, see Sht. No. 154.
 3. For additional details, see Sht. No. T-9.

INLET STRUCTURE
Scale As Shown



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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DRAINAGE DETAILS

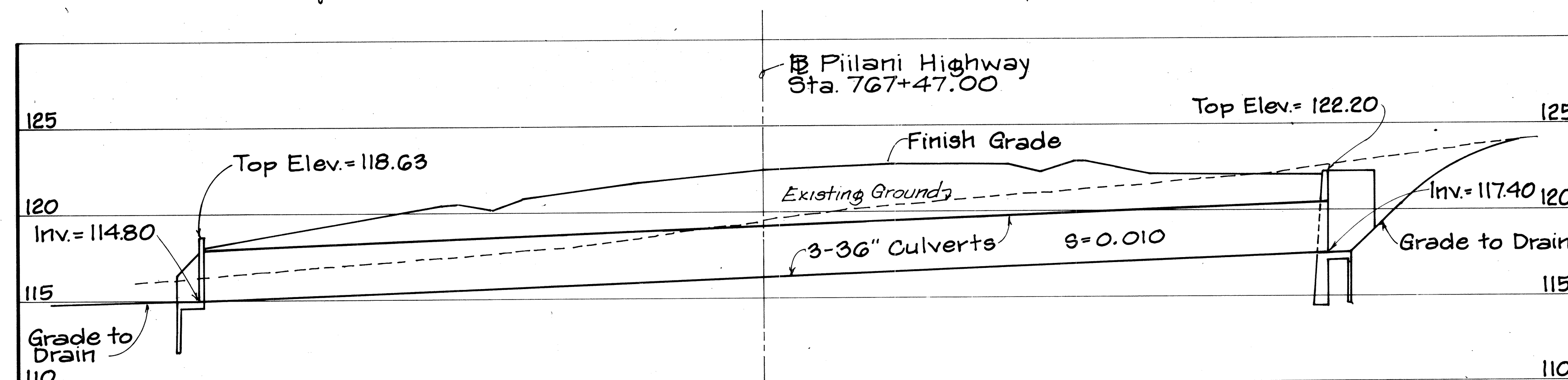
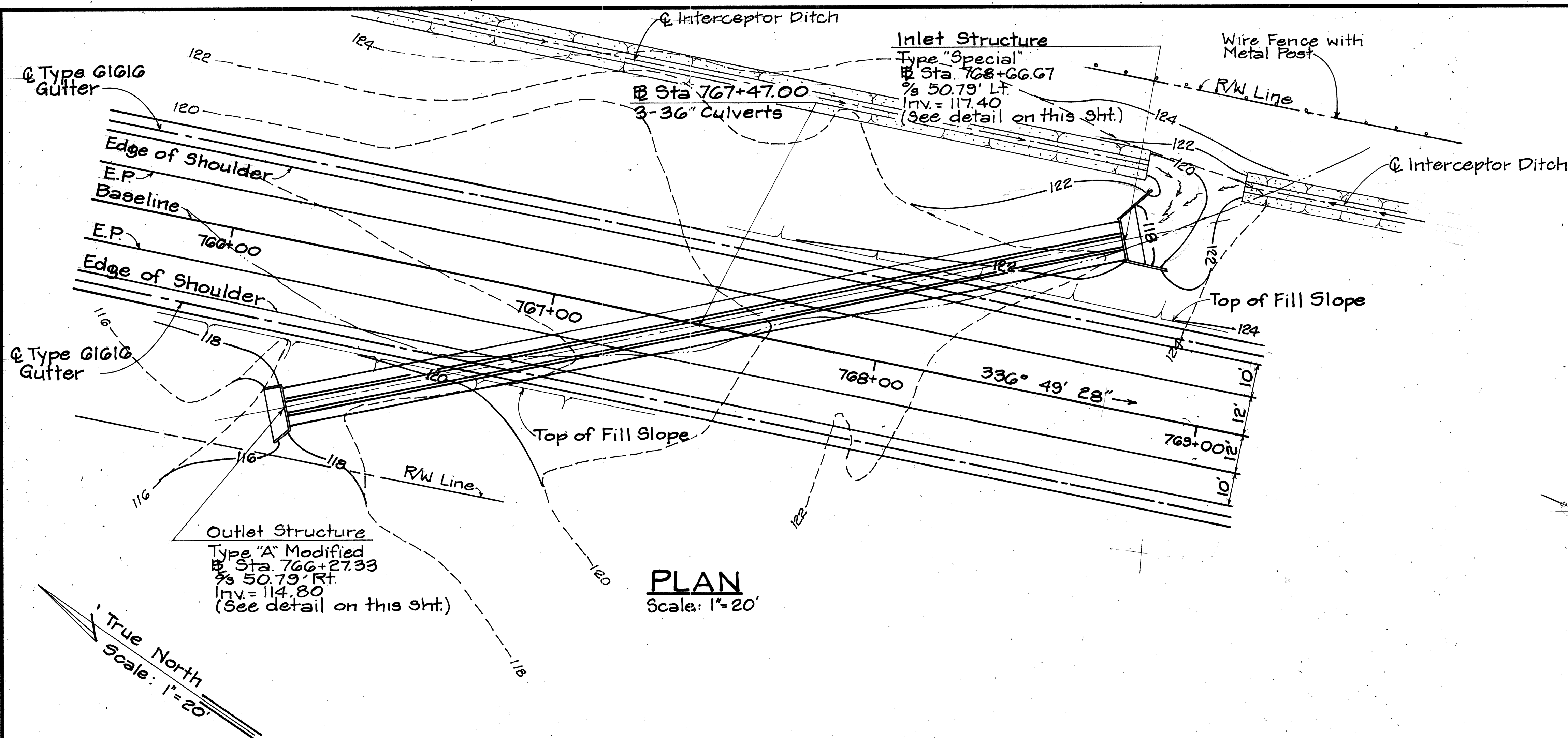
PIILANI HIGHWAY
VICINITY OF MOKULELE HIGHWAY TO
VICINITY OF KILOHANA STREET
F.A. PROJECT NO. F-031-1(6)

SCALE: AS SHOWN DATE SEP 1978

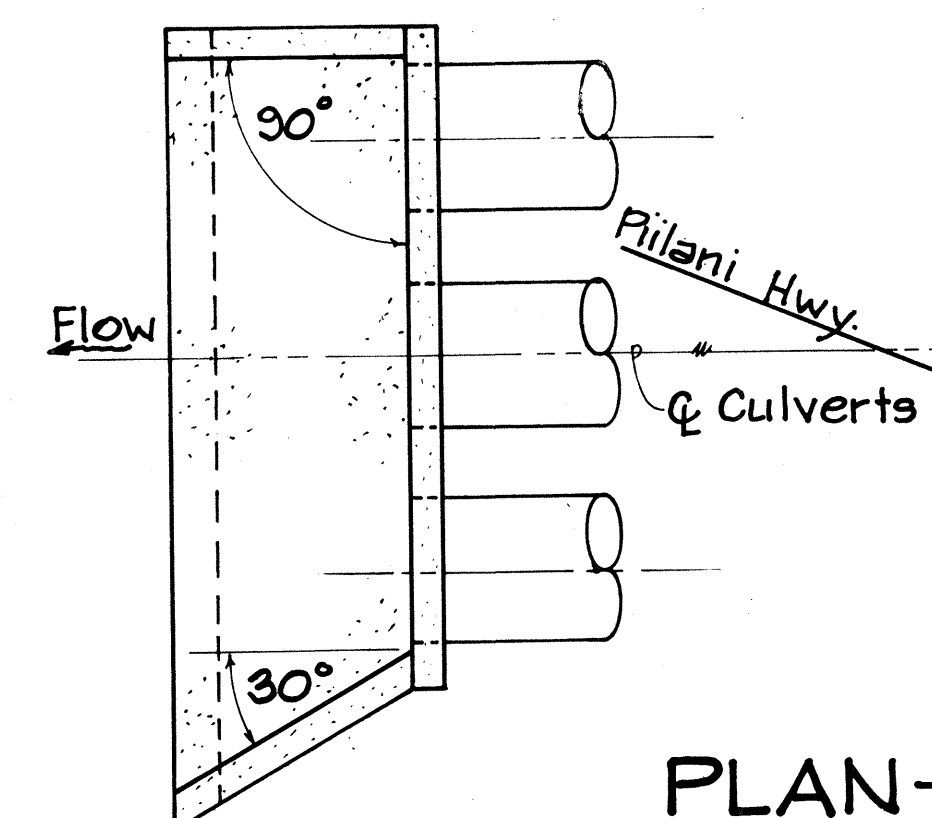
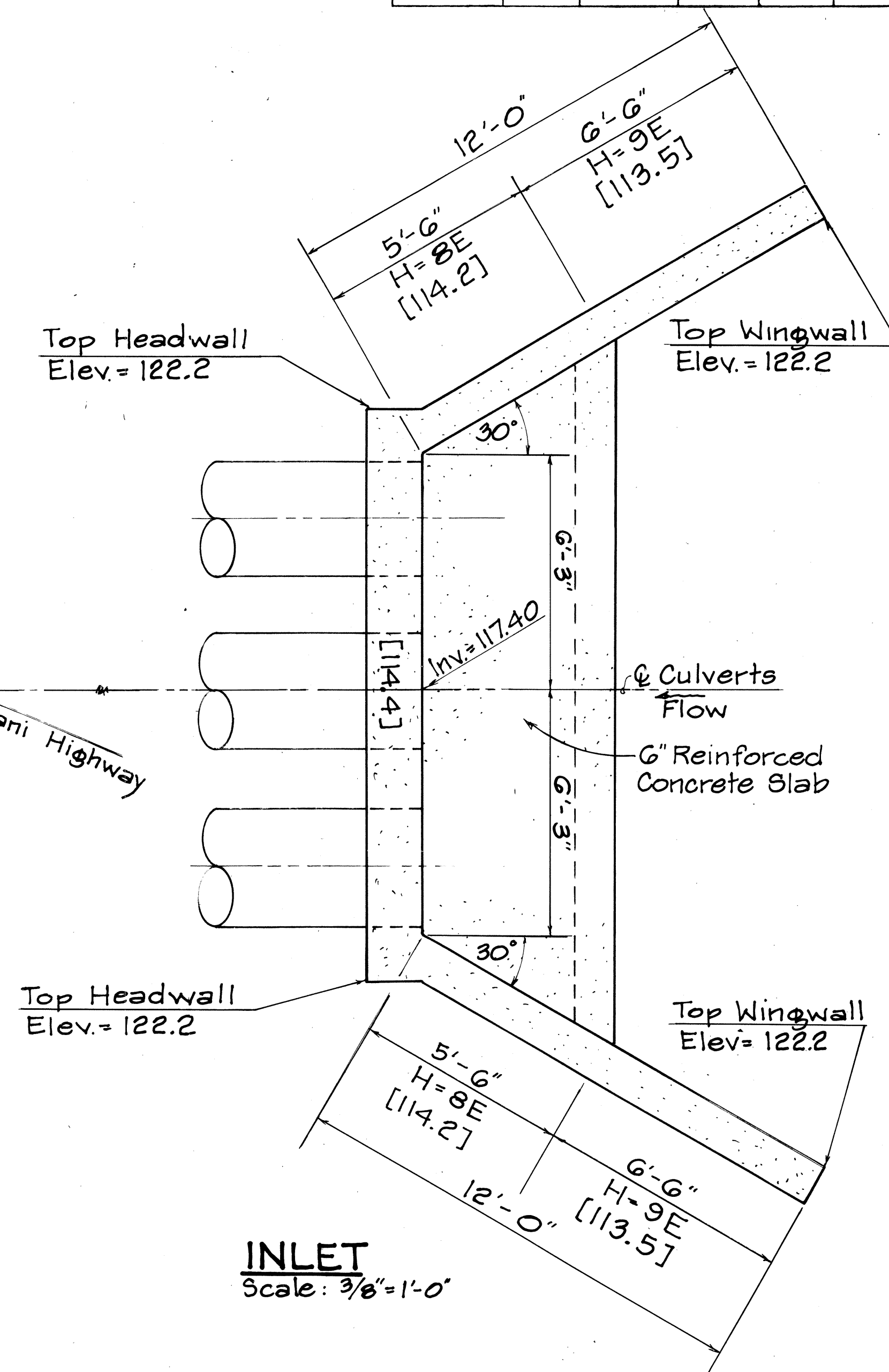
SHEET No. 20 OF 50 SHEETS

ORIGINAL PLAN	DATE
DRAWN BY	
DESIGNED BY	
CHECKED BY	
NOTE BOOK	
NO.	

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-RF-031-1(6)	1978	128	262



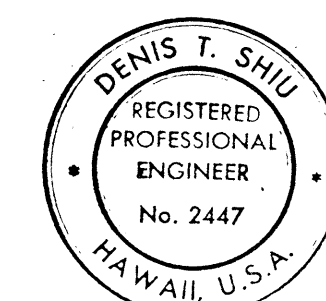
CULVERT @ STA. 767+47.00



PLAN-(INLET & OUTLET STRUCTURES)
Scale as shown

Note:

1. All Concrete shall be Class A.
2. INLET STRUCTURE: For additional details, see Sht. No. 147, 148, and T-9.
3. OUTLET STRUCTURE: For additional detail see Sht. No. 154.



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DEPARTMENT OF TRANSPORTATION
LAND TRANSPORTATION FACILITIES DIVISION

DRAINAGE DETAILS

PIILANI HIGHWAY
VICINITY OF MOKULELE HIGHWAY TO
VICINITY OF KILOHANA STREET
F.A. PROJECT NO. F-RF-031-1(6)

SCALE: AS SHOWN DATE SEP 1978

SHEET No. 21 OF 50 SHEETS

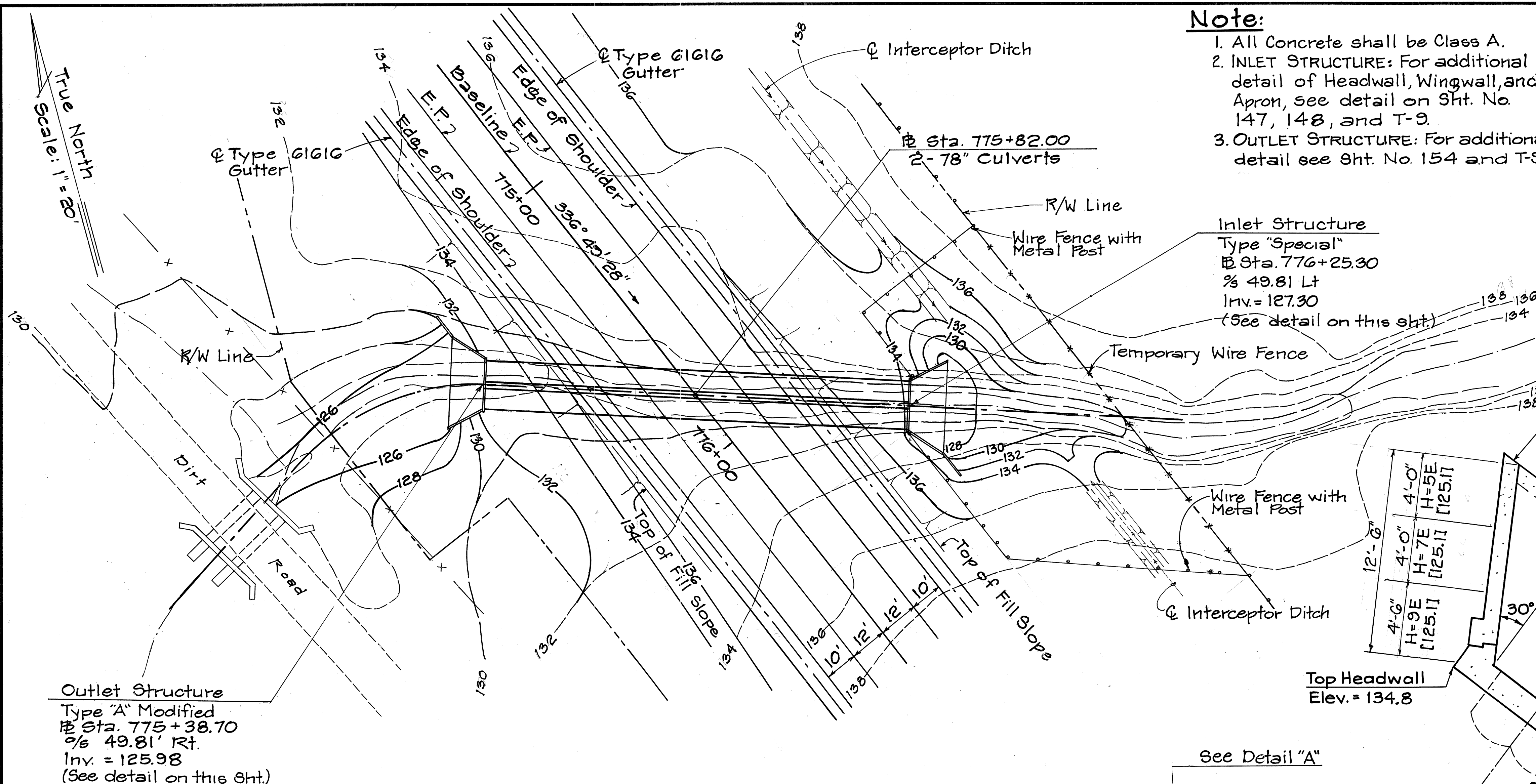
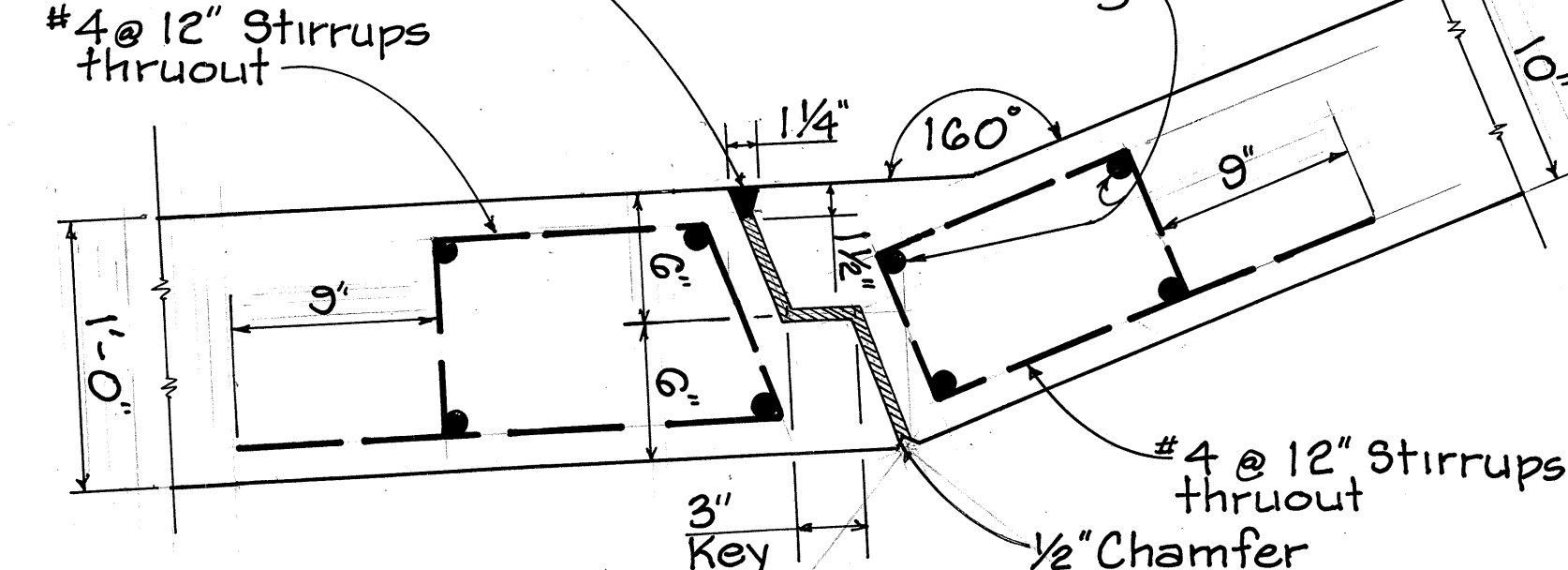
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-RF-031-1(6)	1978	129	262

Note:

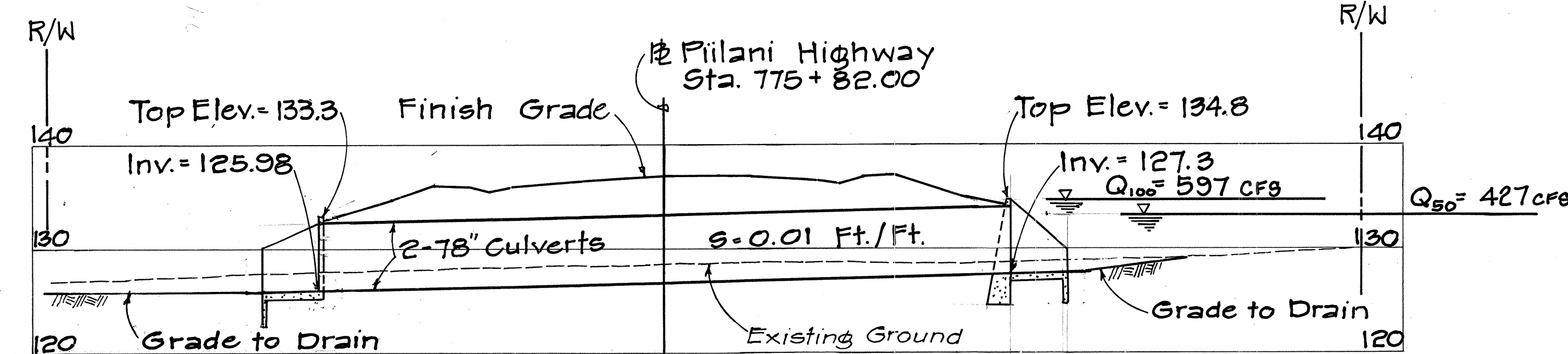
1. All Concrete shall be Class A.
2. INLET STRUCTURE: For additional detail of Headwall, Wingwall, and Apron, see detail on Sht. No. 147, 148, and T-9.
3. OUTLET STRUCTURE: For additional detail see Sht. No. 154 and T-9.

Flashing Compound
See Specifications
#4 @ 12" stirrups thruout

2 #6 Vert. added bent 18" into ft'g



Outlet Structure
Type "A" Modified
Sta. 775+38.70
% 49.81' Rt.
Inv. = 125.98
(See detail on this Sht.)

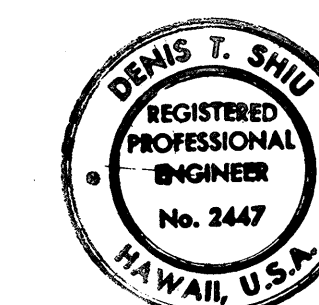


CULVERT AT STA. 775+82.00

PLAN - (INLET & OUTLET STRUCTURES)

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

SYMBOL:
[0.00] - Denotes bottom of Headwall and Wingwall footing.



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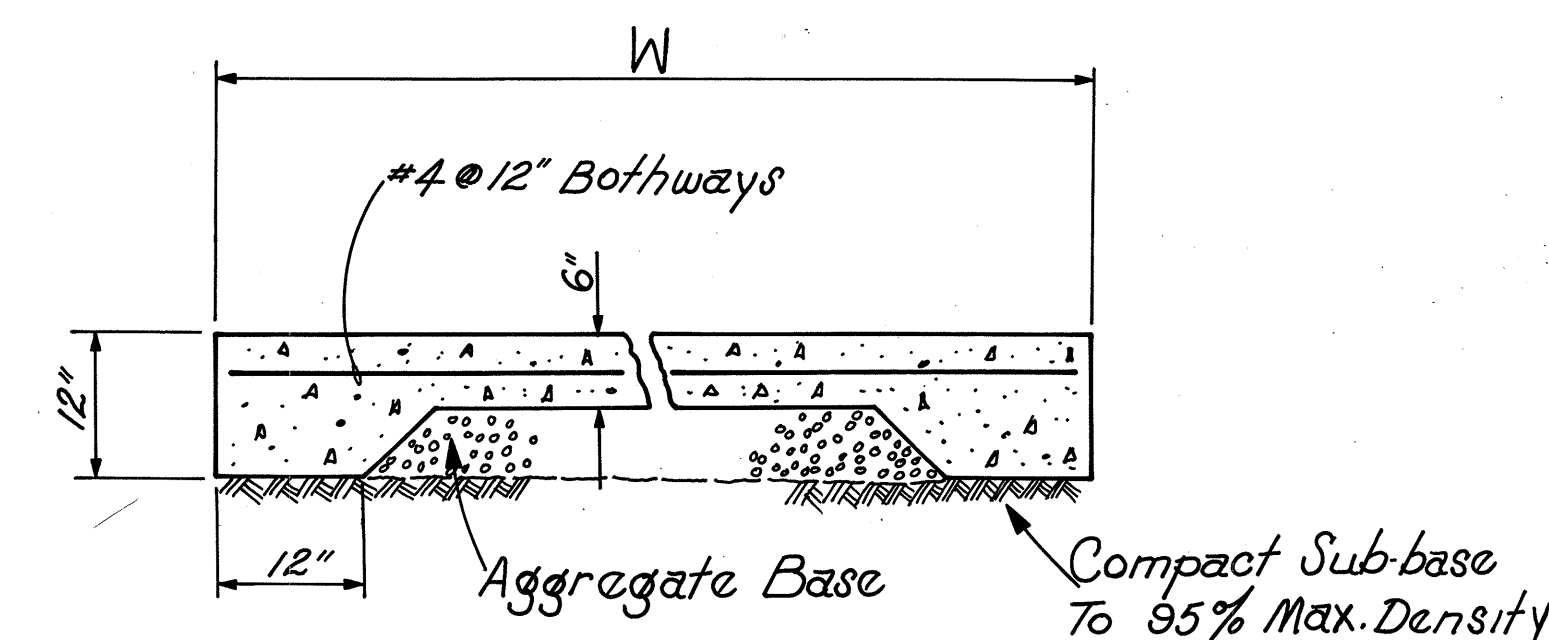
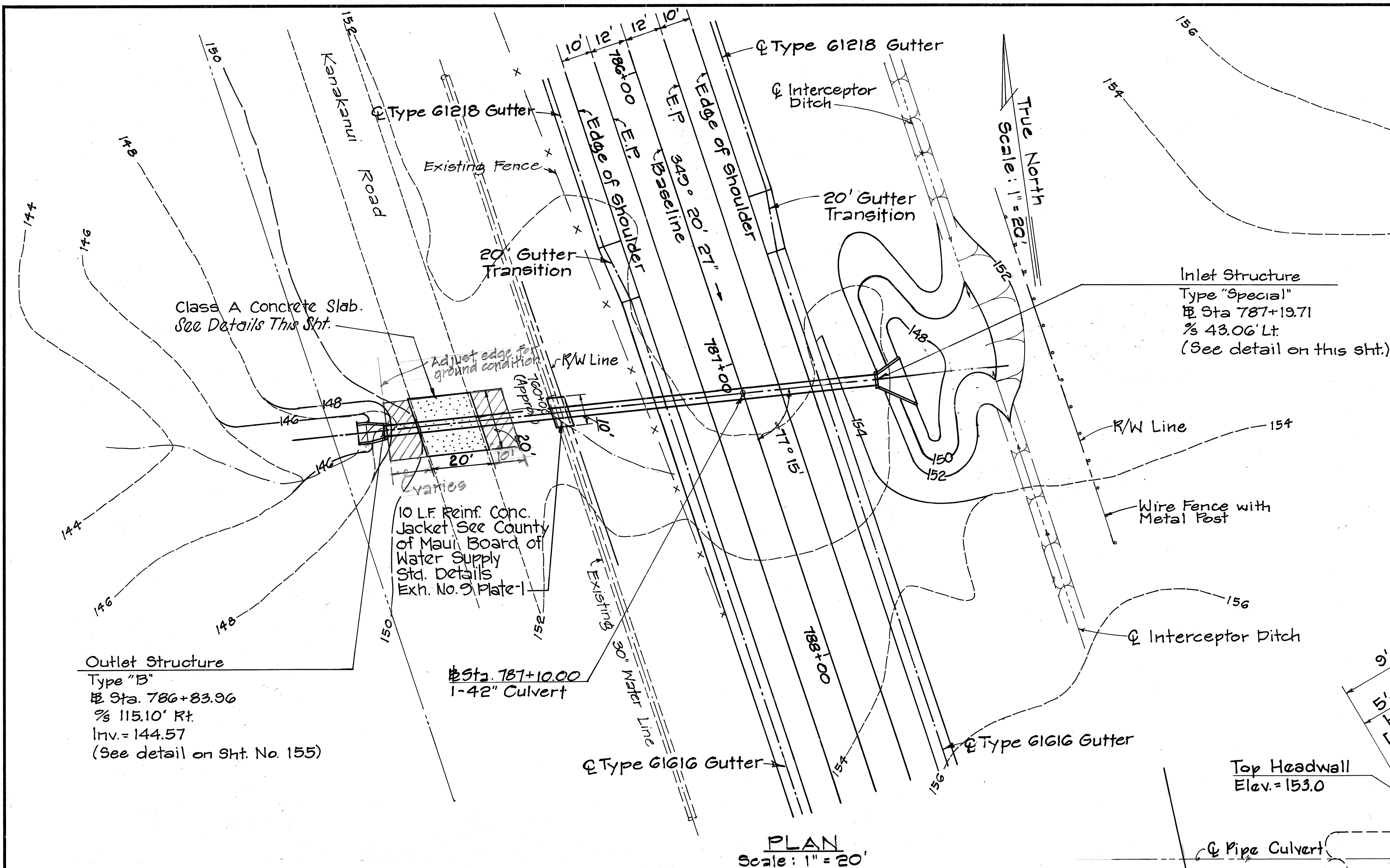
DRAINAGE DETAILS

PIILANI HIGHWAY
VICINITY OF MOKULELE HIGHWAY TO
VICINITY OF KILOHANA STREET
F.A. PROJECT NO. F-031-1(6)

SCALE: AS SHOWN DATE SEP 1978

SHEET No. 22 OF 50 SHEETS

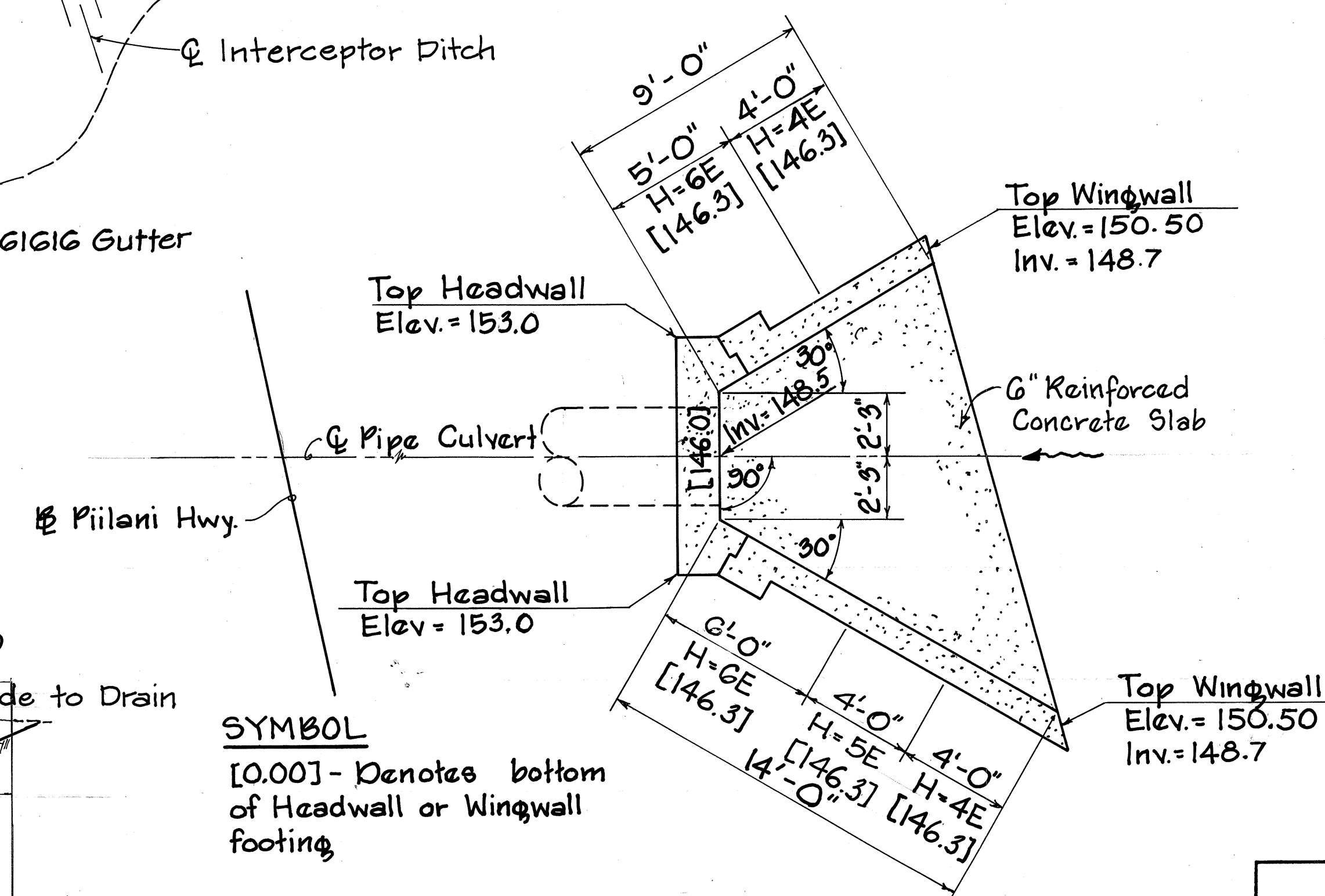
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-RF-031-1(6)	1978	130	262



Concrete Slab Detail

Note:

1. All Concrete shall be Class A.
2. For additional details of Headwall, Wingwall, and Apron see detail on Sht. No. 147, 148, and T-9.

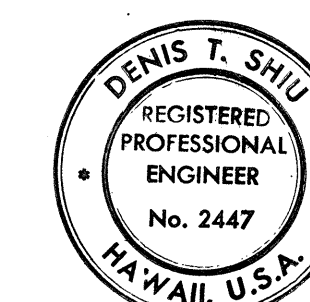


SYMBOL

[0.00] - Denotes bottom of Headwall or Wingwall footing

PLAN (INLET STRUCTURE)

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

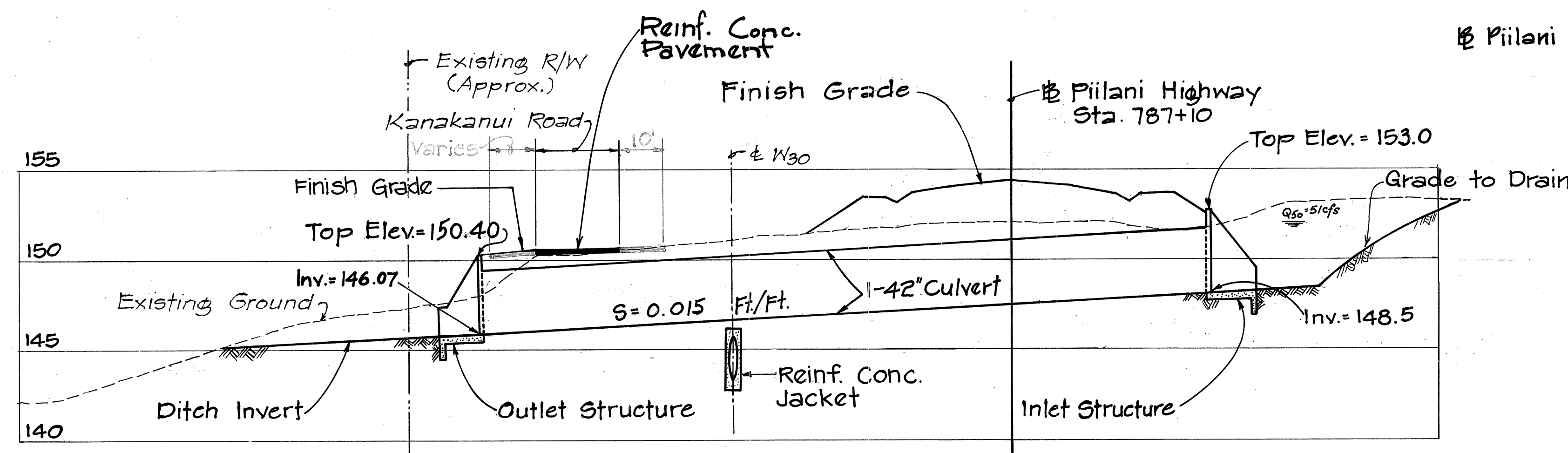


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DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DRAINAGE DETAILS

PILANI HIGHWAY
VICINITY OF MOKULELE HIGHWAY TO
VICINITY OF KILOHANA STREET
F.A. PROJECT NO. F-031-1(6)
SCALE: AS SHOWN DATE SEP 1978
SHEET No. 23 OF 50 SHEETS



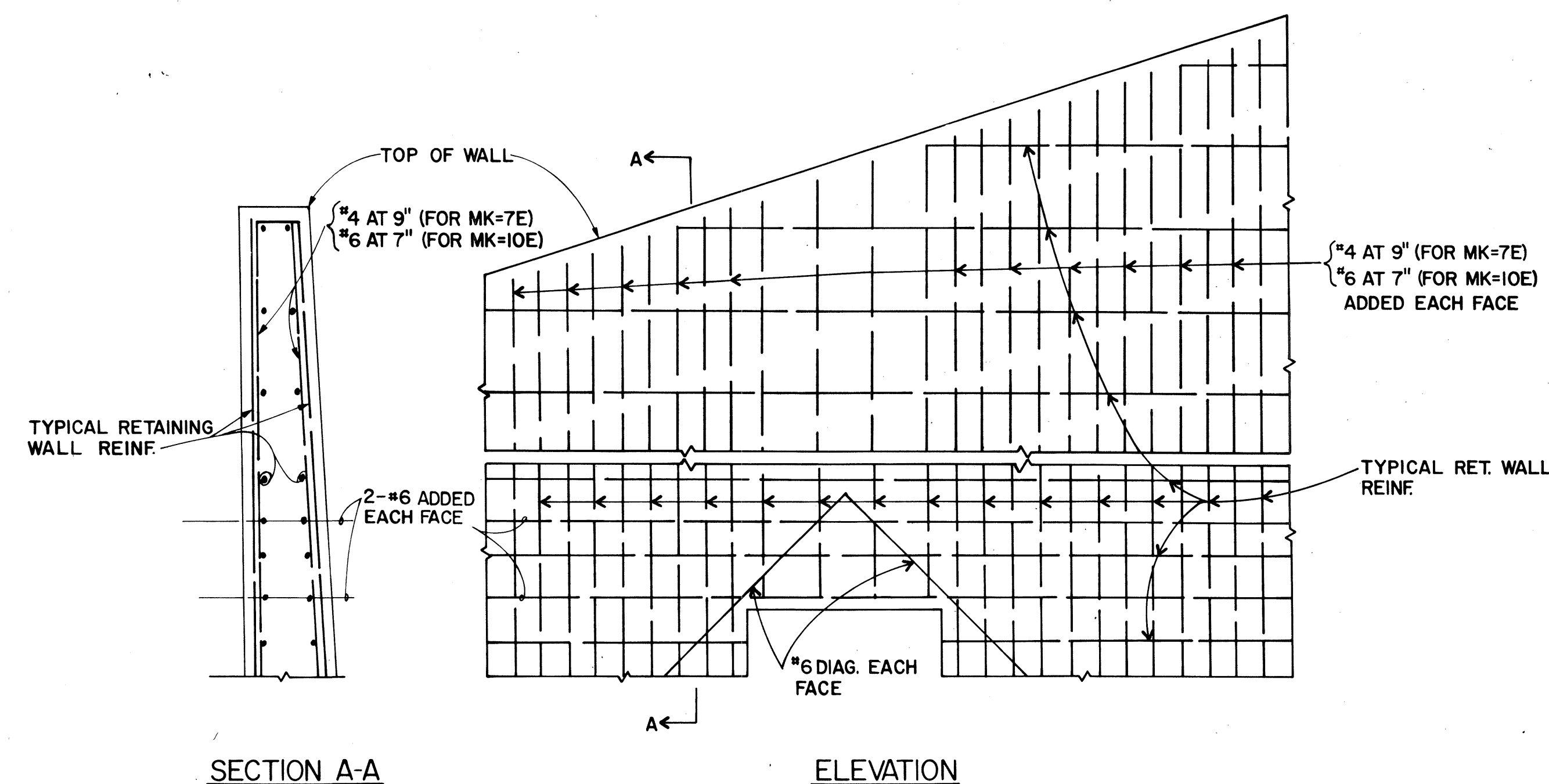
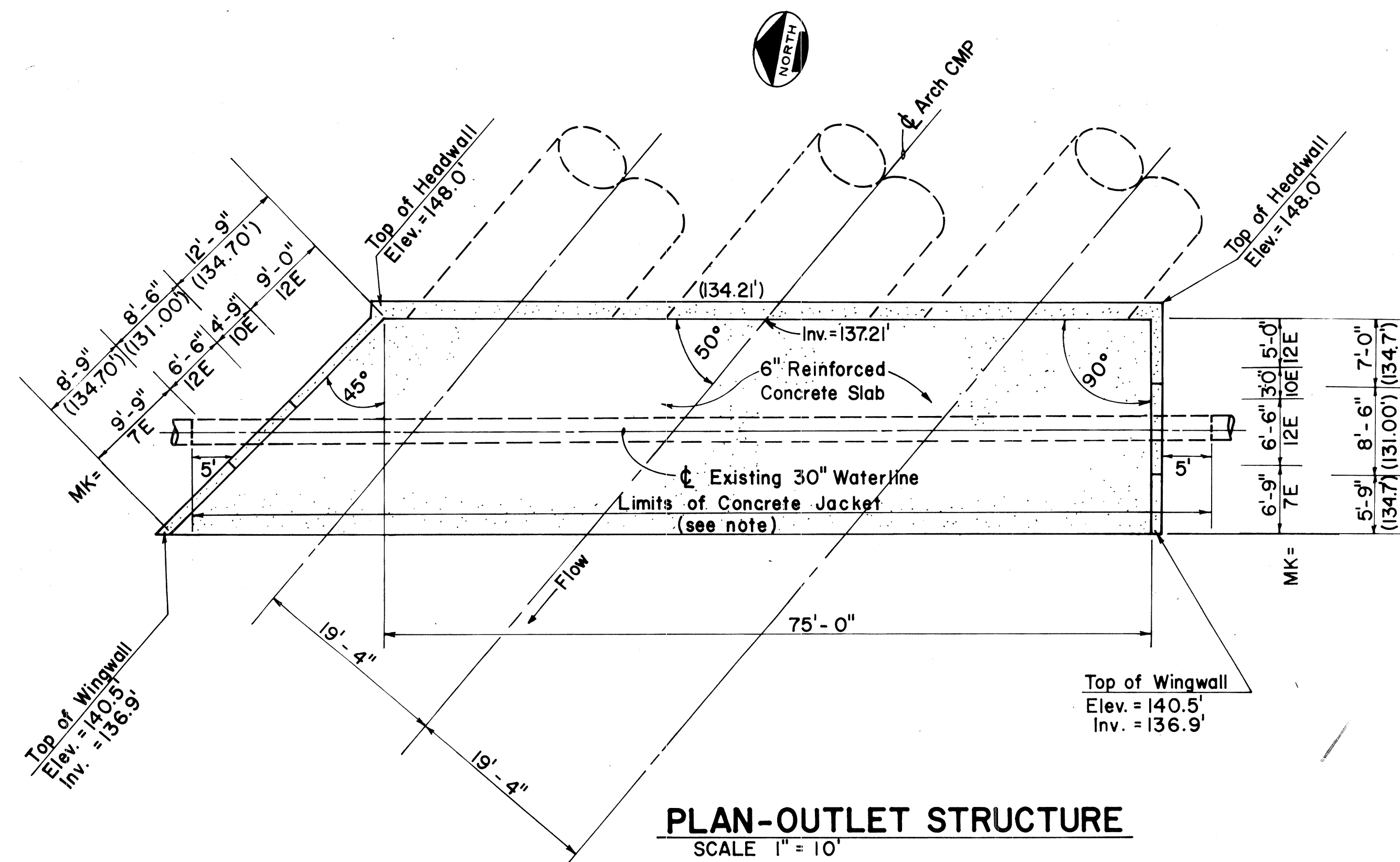
PROFILE

Scale: Horiz. 1" = 20'
Vert. 1" = 5'

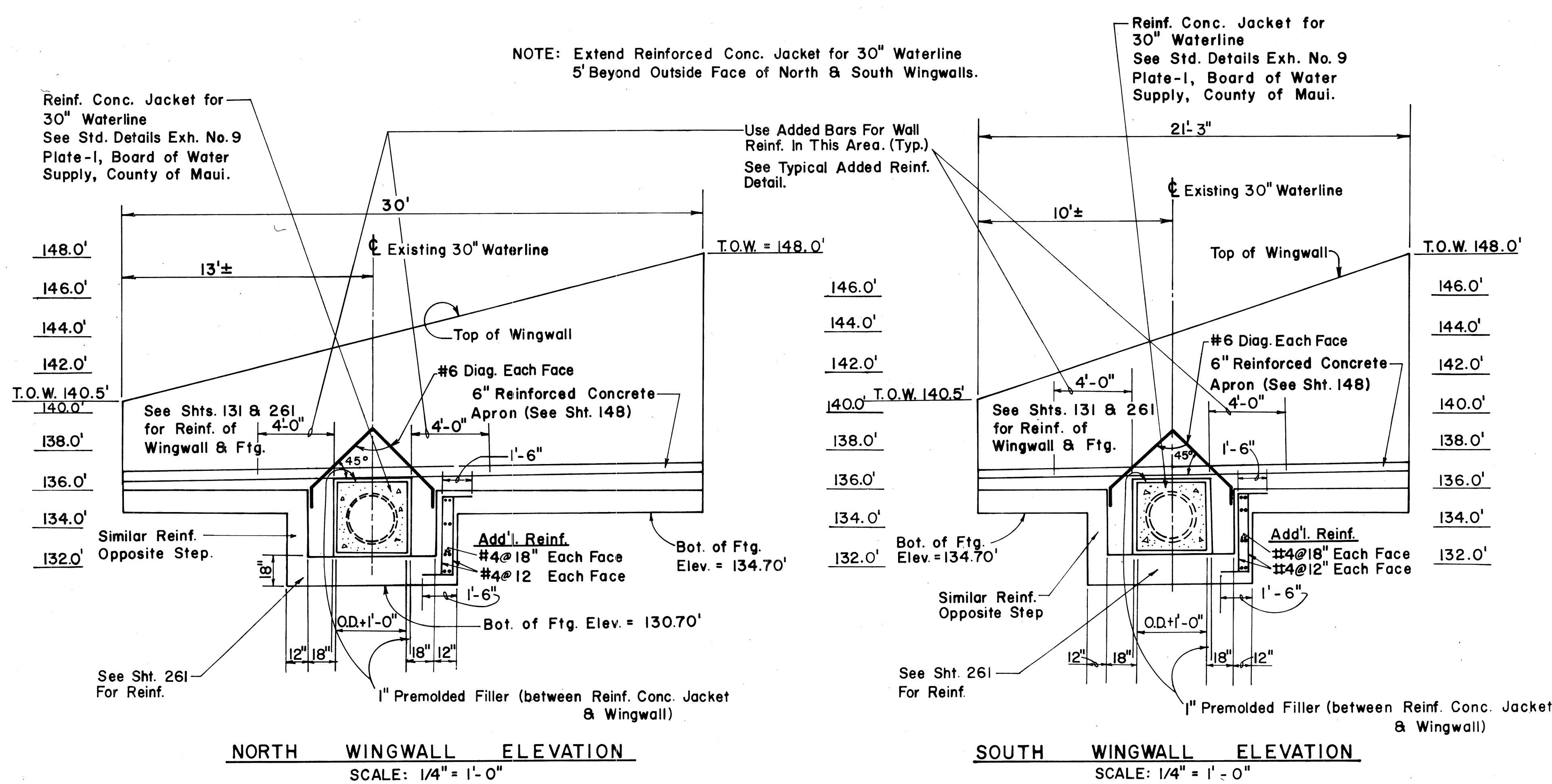
42" CULVERT AT STA. 787+10.00

DATE	.....
DESIGNED BY	.....
CHECKED BY	.....
NO.	.....

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	TQF - RF 031-1(6)	1978	131 S-1	262

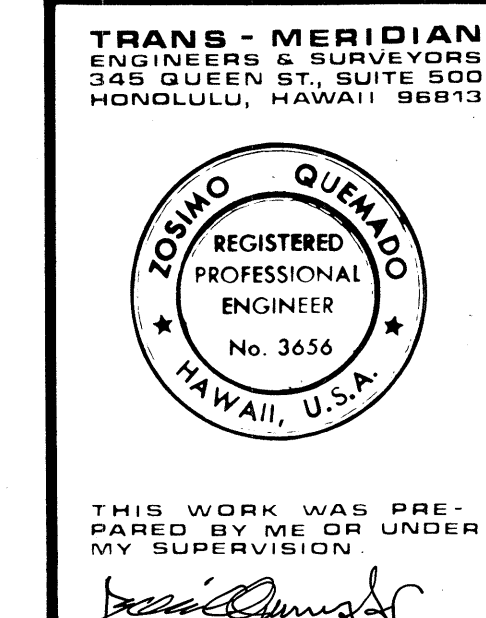


NOTE: Extend Reinforced Conc. Jacket for 30" Waterline 5' Beyond Outside Face of North & South Wingwalls.



DETAILS FOR OUTLET STRUCTURE OF CULVERT AT STA. 55 + 60

SCALE: AS SHOWN



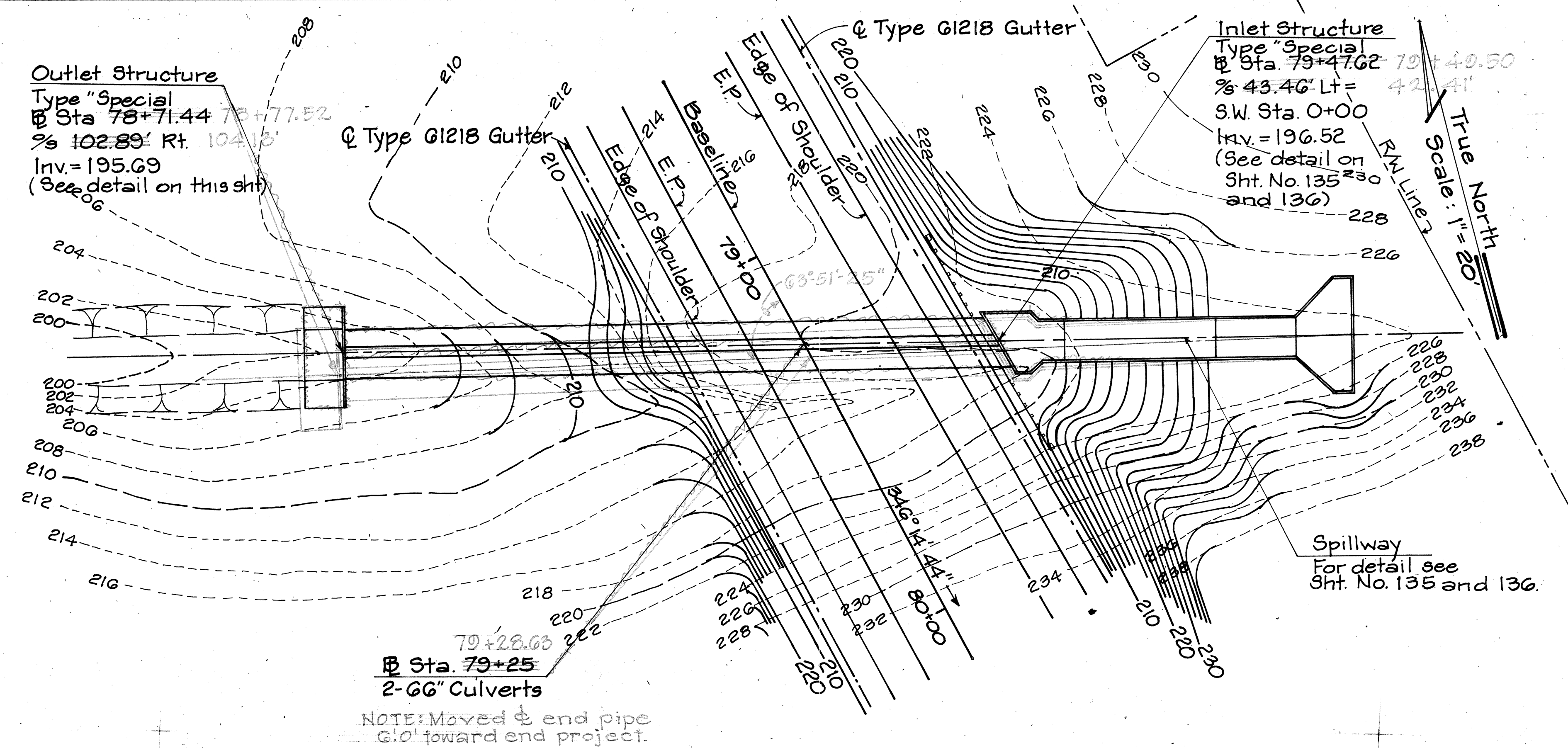
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DRAINAGE DETAILS
PIILANI HIGHWAY
VICINITY OF MOKULELE HIGHWAY TO
VICINITY OF KILOHANA STREET
F.A. PROJECT NO. TQF-RF-031-1(6)

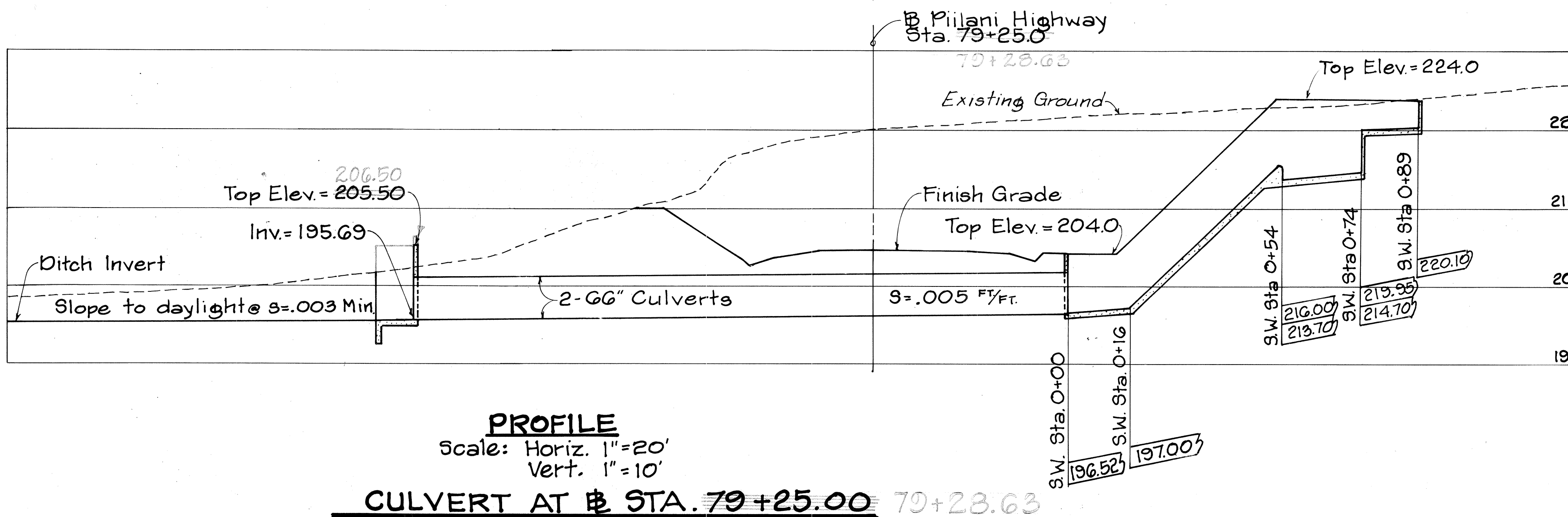
SCALE: AS SHOWN DATE: OCTOBER 1979

SHEET No. OF SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-RF-031-1(6)	1978	132	262

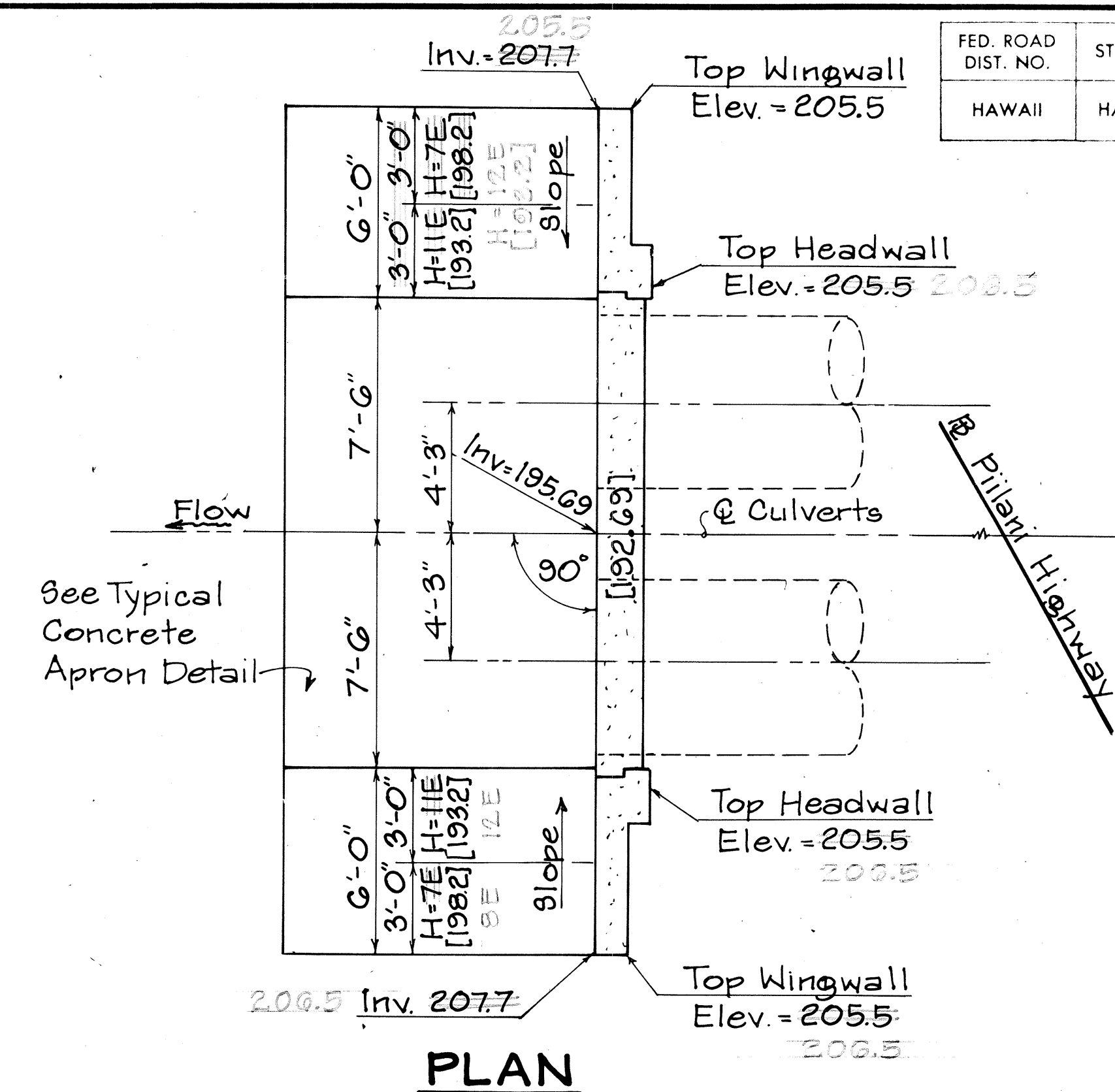


PLAN
Scale: 1"=20'

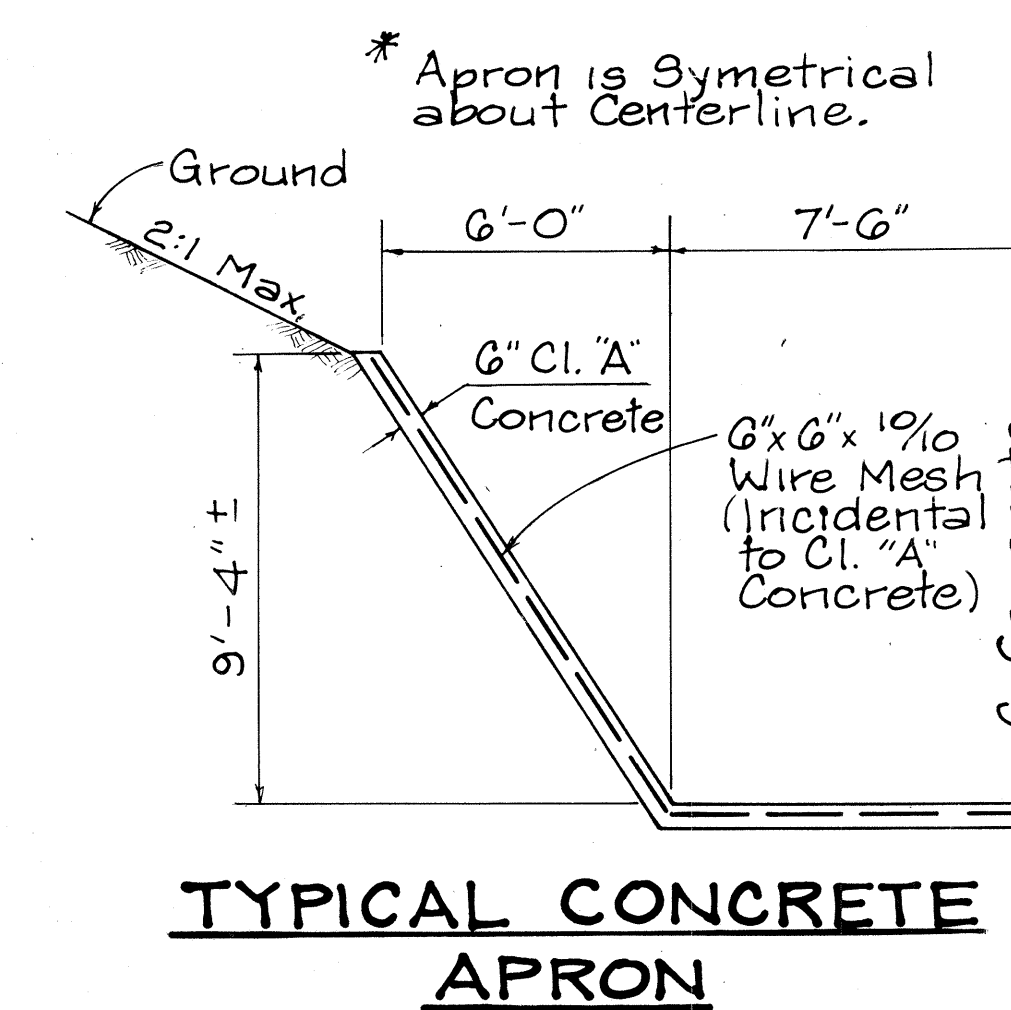


PROFILE
Scale: Horiz. 1"=20'
Vert. 1"=10'

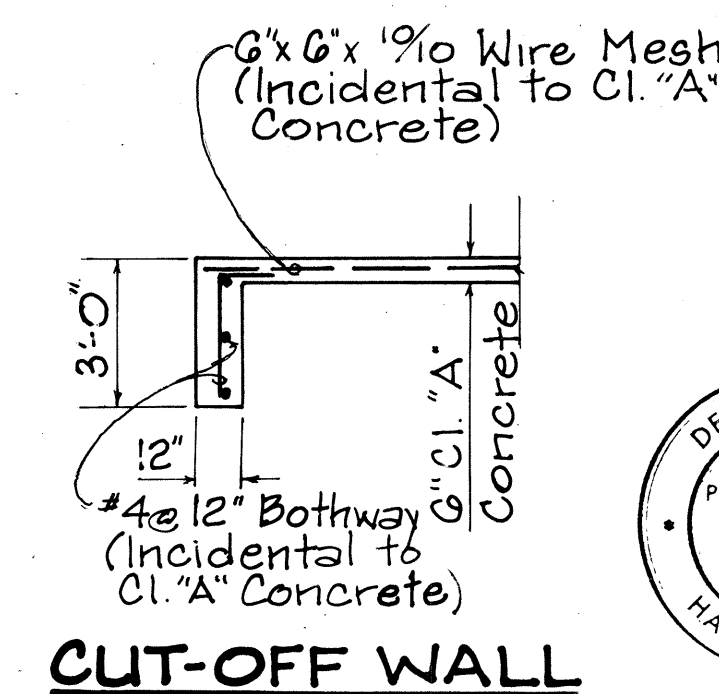
CULVERT AT STA. 79+25.00



OUTLET STRUCTURE
Scale: 1/4"=1'-0"



TYPICAL CONCRETE APRON



CUT-OFF WALL

- Note:**
1. All Concrete shall be Class A.
 2. OUTLET STRUCTURE: For additional detail see Sht. No. 147, 148, and T-9.
 3. For Grading Plan at Outlet see Sheet No. 107.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
LAND TRANSPORTATION FACILITIES DIVISION

DRAINAGE DETAILS
PIILANI HIGHWAY
VICINITY OF MOKULELE HIGHWAY TO
VICINITY OF KILOHANA STREET
F.A. PROJECT NO. F-RF-031-1(6)

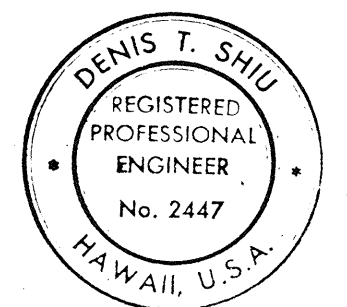
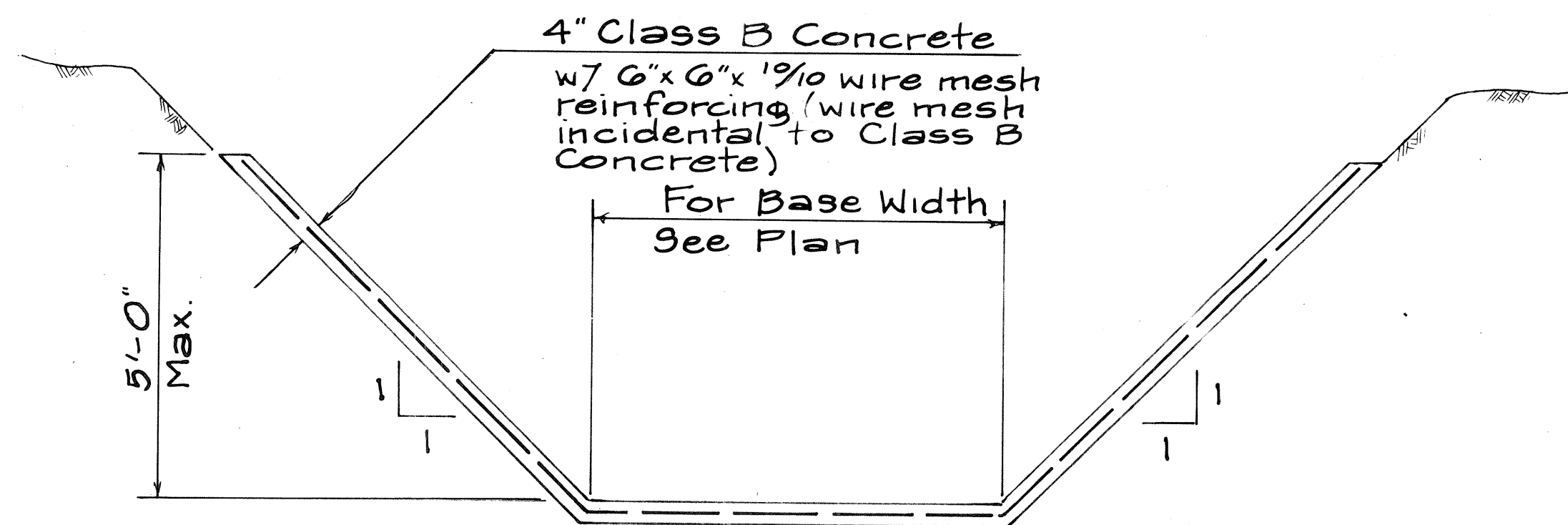
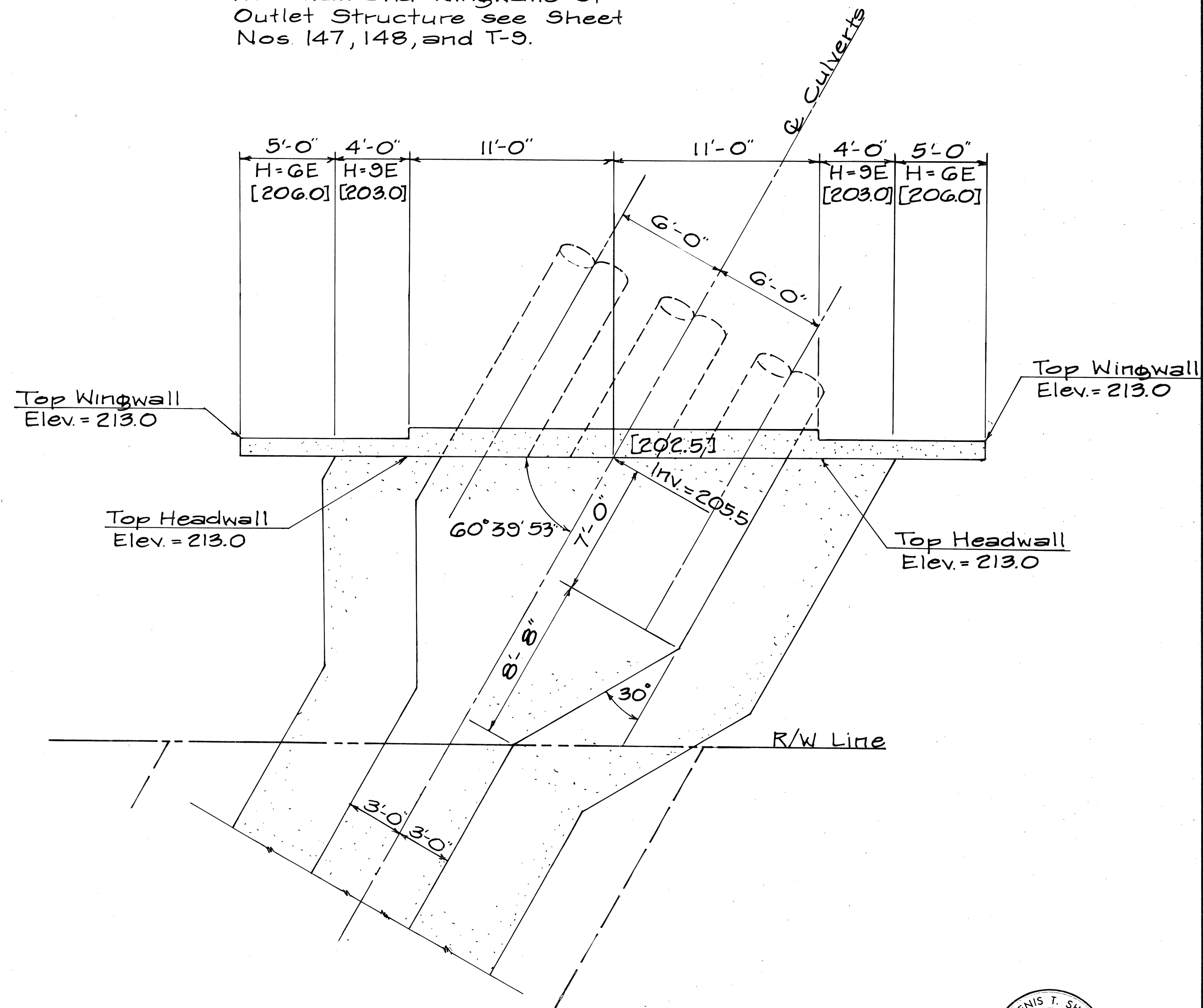
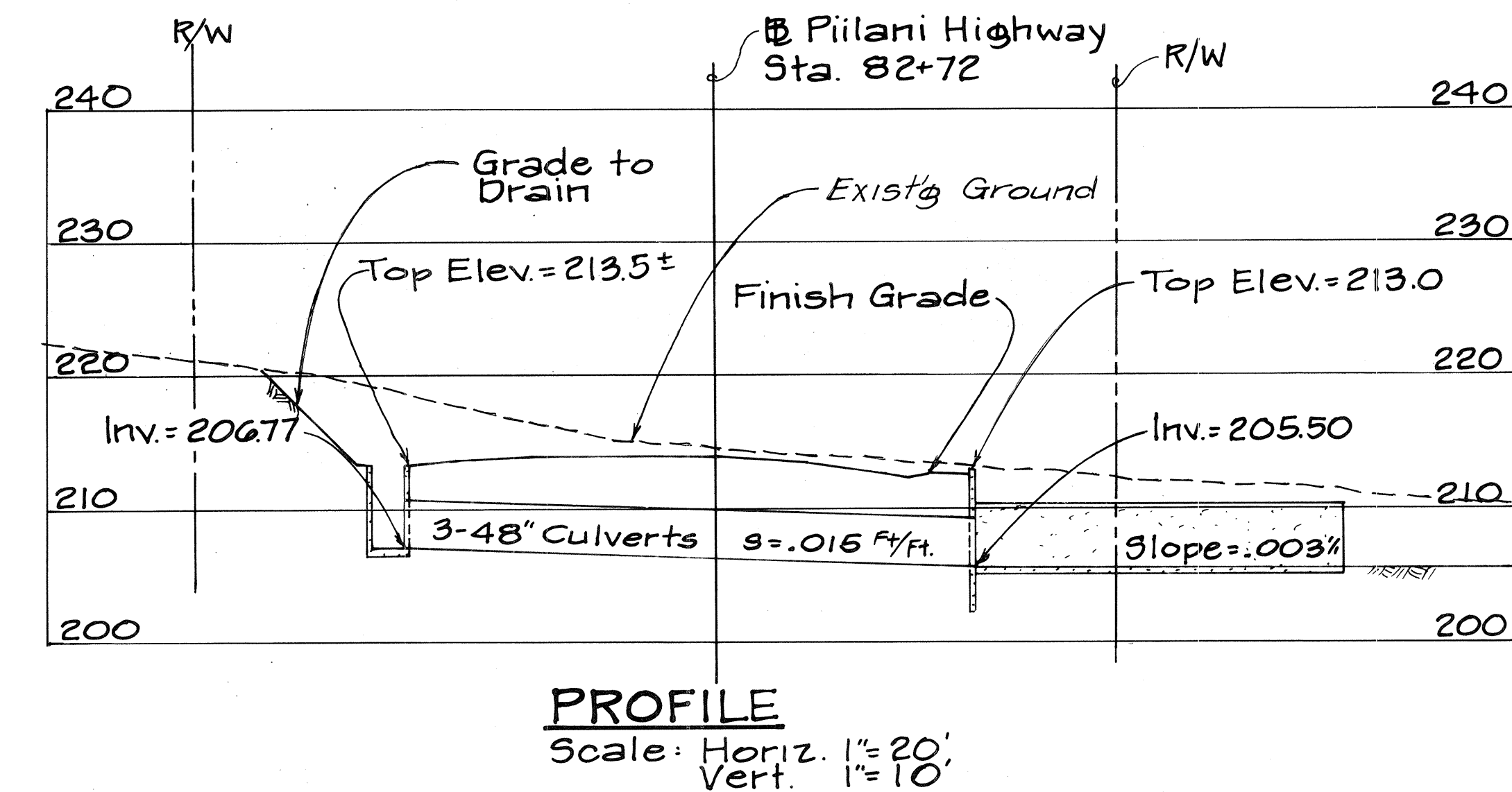
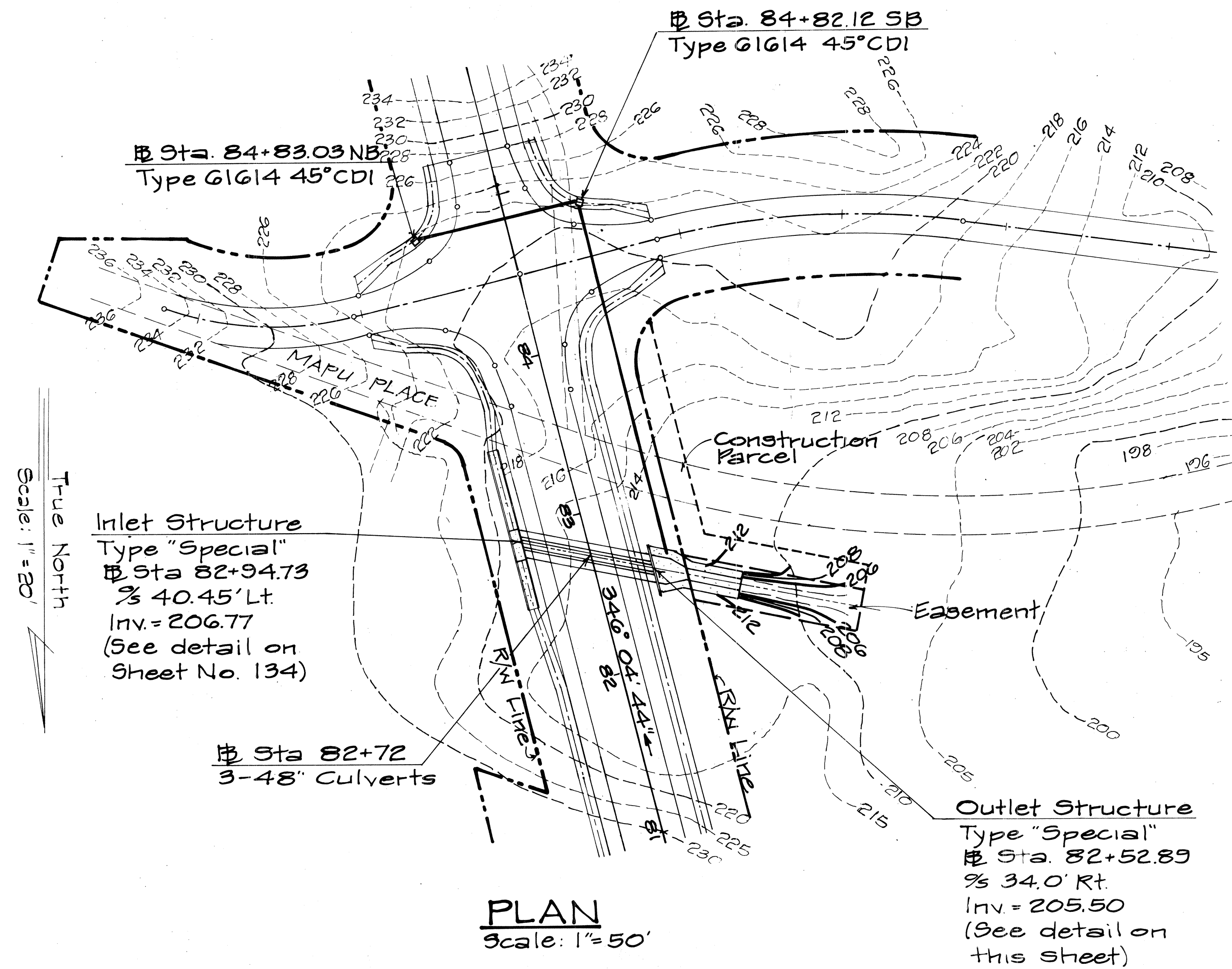
SCALE: AS SHOWN DATE SEP 1978

SHEET No. 25 OF 50 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-RF-031-1(6)	1978	133	262

NOTE:

1. All Concrete shall be Class A.
2. For additional details of the Headwall and Wingwalls of Outlet Structure see Sheet Nos 147, 148, and T-9.



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DEPARTMENT OF TRANSPORTATION
LAND TRANSPORTATION FACILITIES DIVISION

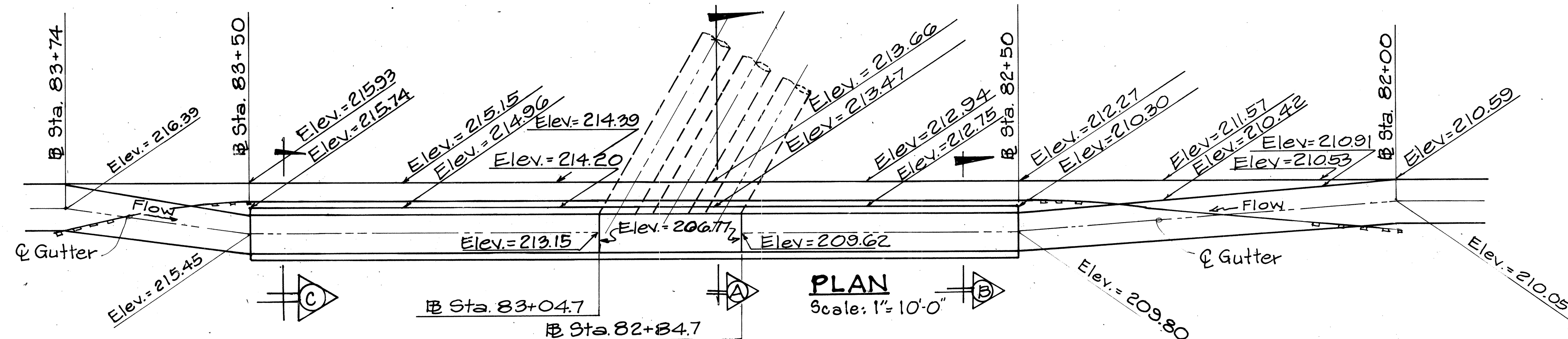
DRAINAGE DETAILS
PIILANI HIGHWAY
VICINITY OF MOKULELE HIGHWAY TO
VICINITY OF KILOHANA STREET
F.A. PROJECT NO. F-RF-031-1(6)

SCALE: AS SHOWN DATE:

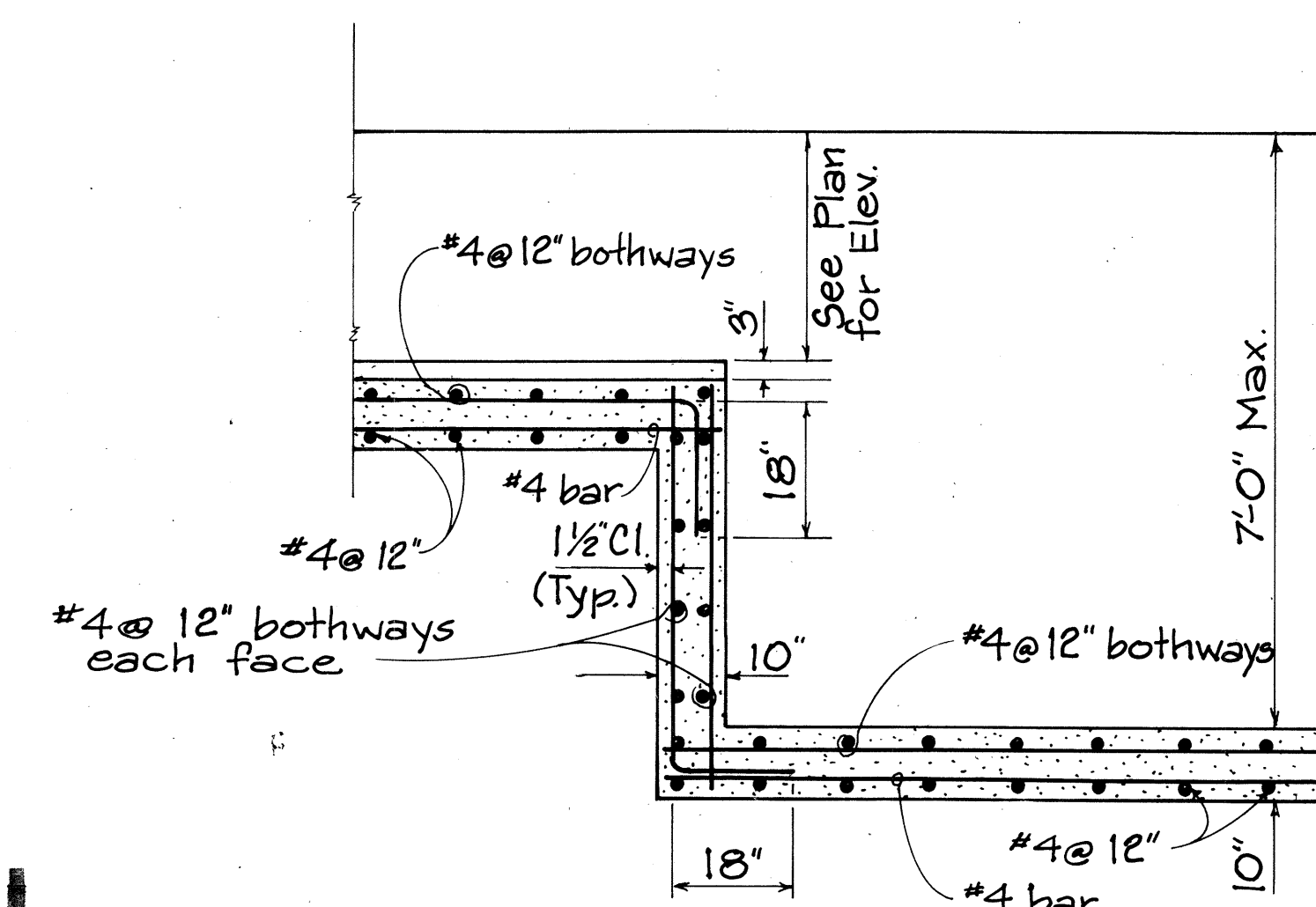
SHEET No. 26 OF 50 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-RF-031-1(6)	1978	134	262

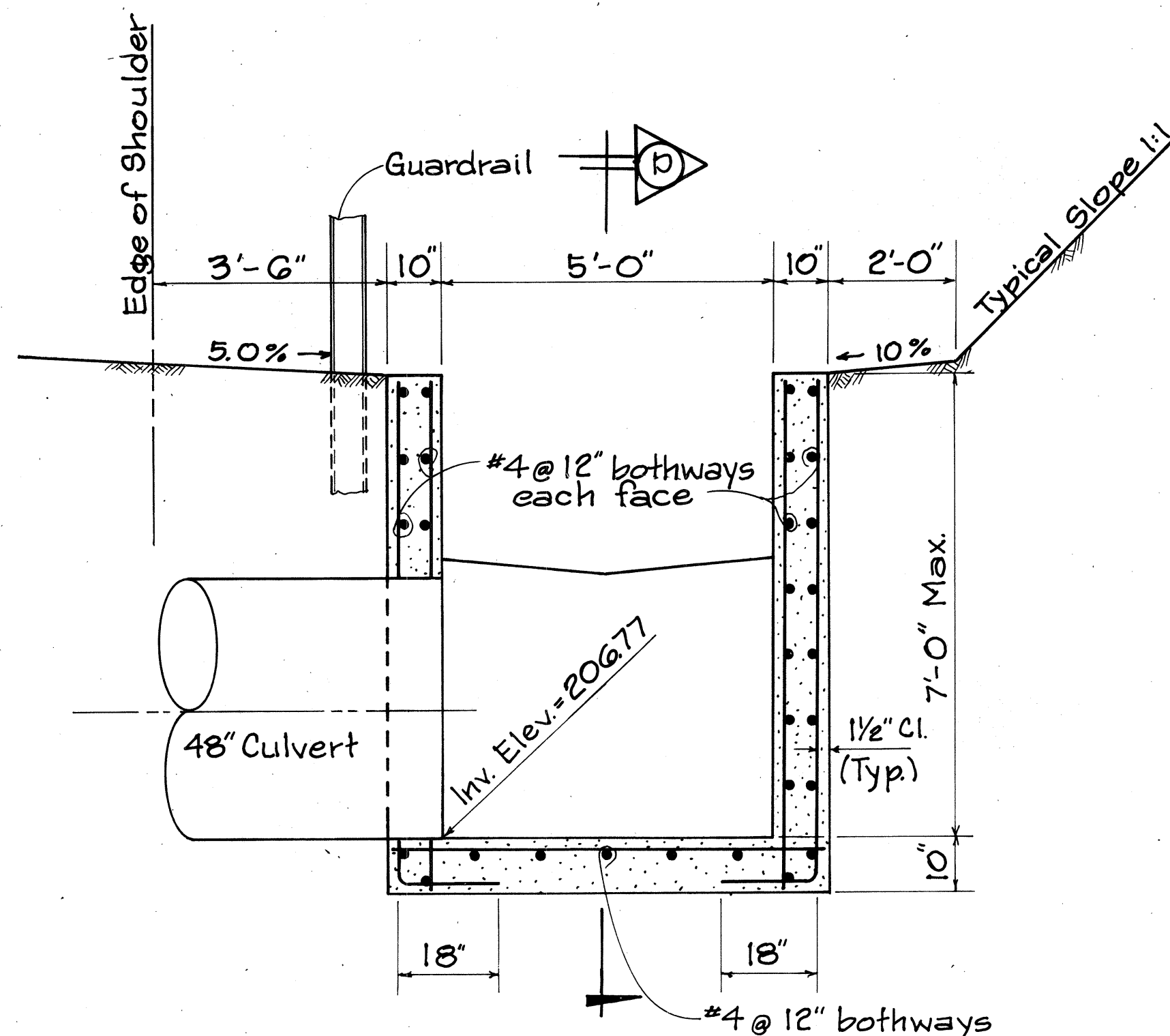
Note:
1. All Concrete shall be Class A.



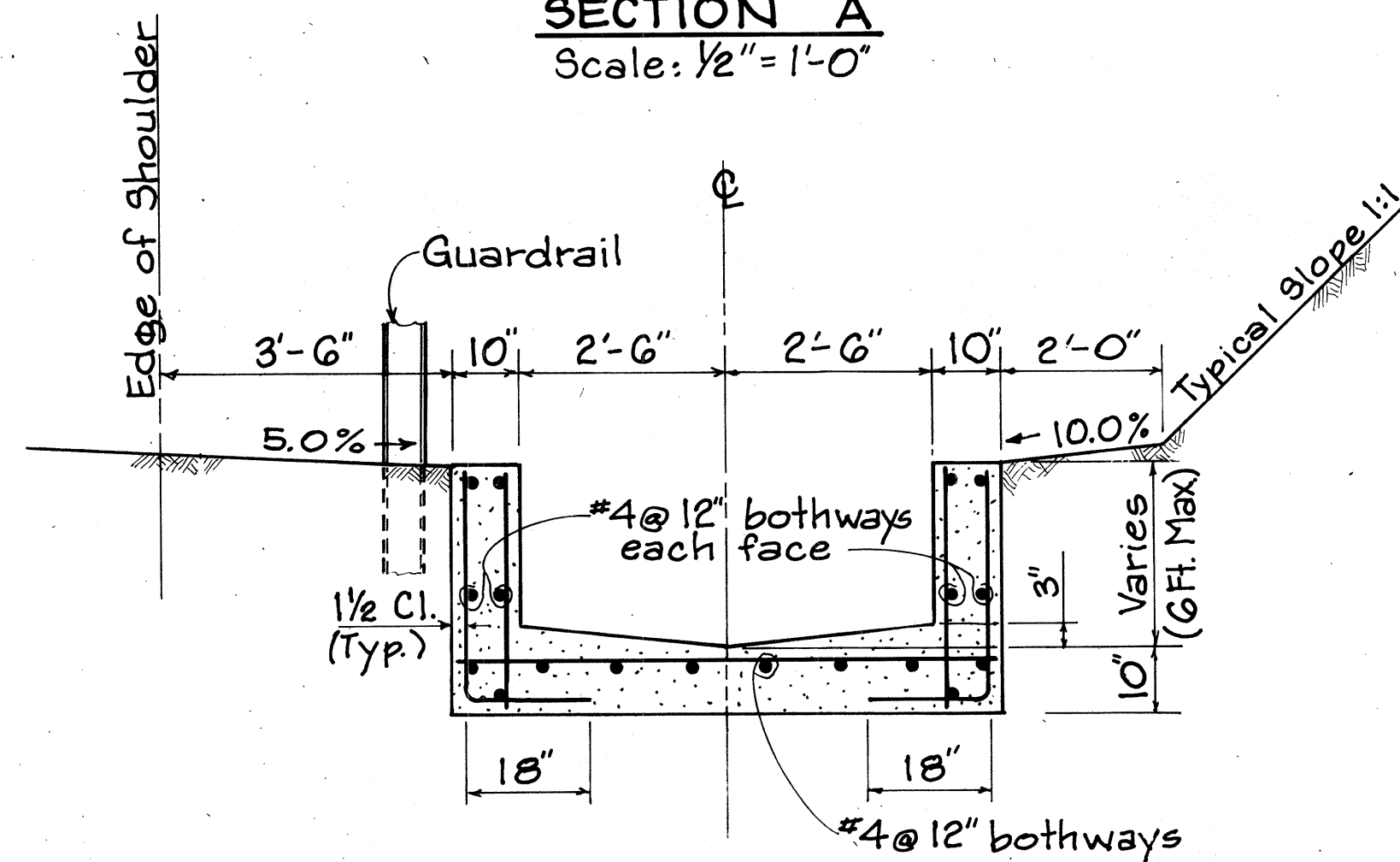
**CULVERT @ STA. 82+72
INLET STRUCTURE**
Scale as shown



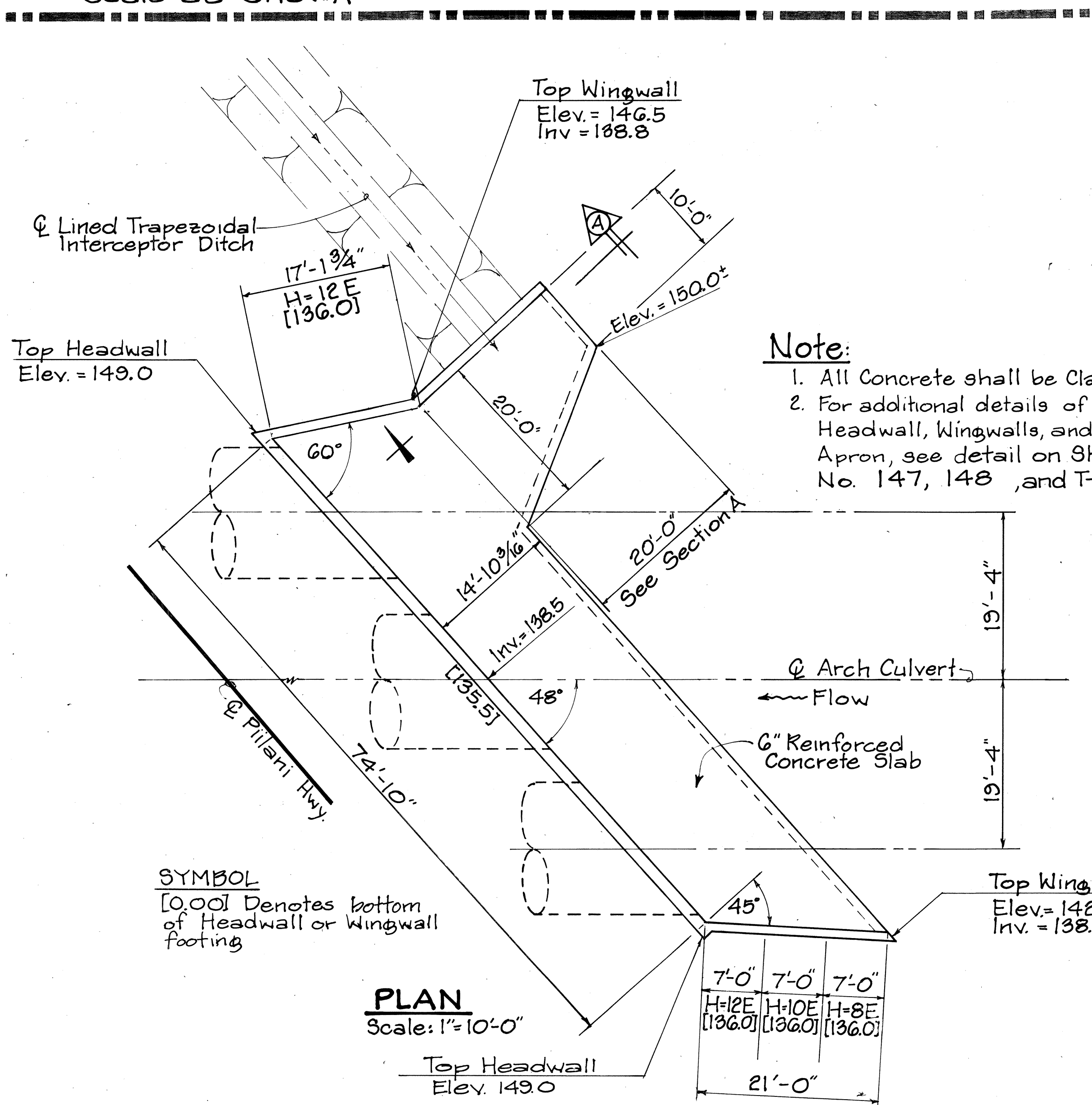
SECTION D
Scale: 1/2"=1'-0"



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

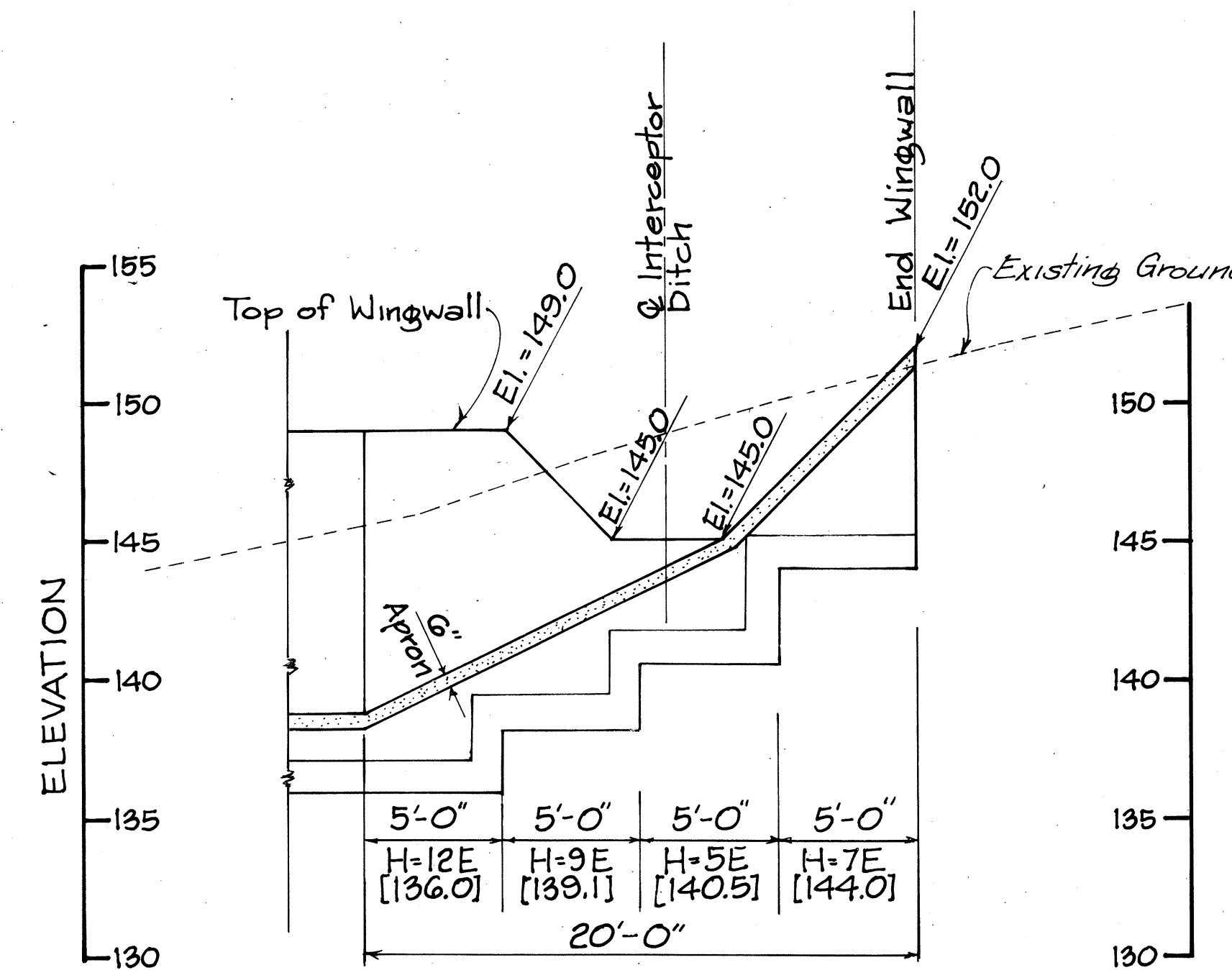


SECTION B & C
Scale: 1/2"=1'-0"



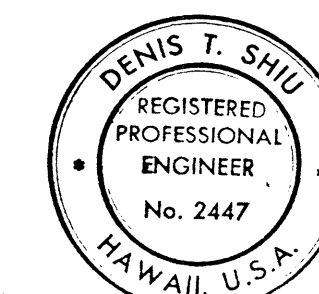
**CULVERT @ STA. 55+60
INLET STRUCTURE**
Scale as shown

Note:
1. All Concrete shall be Class A.
2. For additional details of Headwall, Wingwalls, and Apron, see detail on Sht. No. 147, 148, and T-9.



SECTION A
Scale: 1"=5'-0"

SYMBOL
[0.00] Denotes bottom of Headwall or Wingwall footing



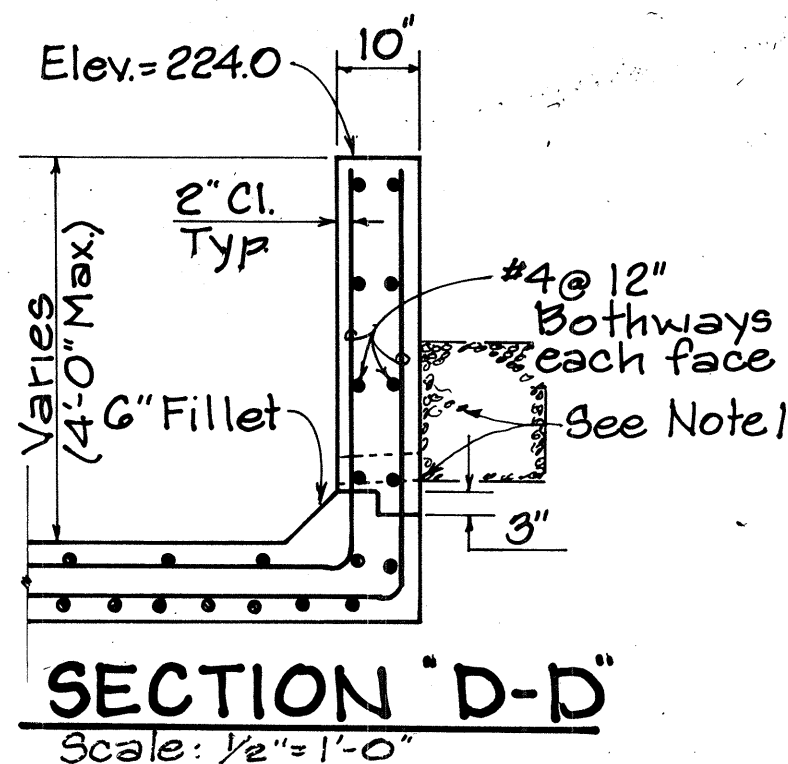
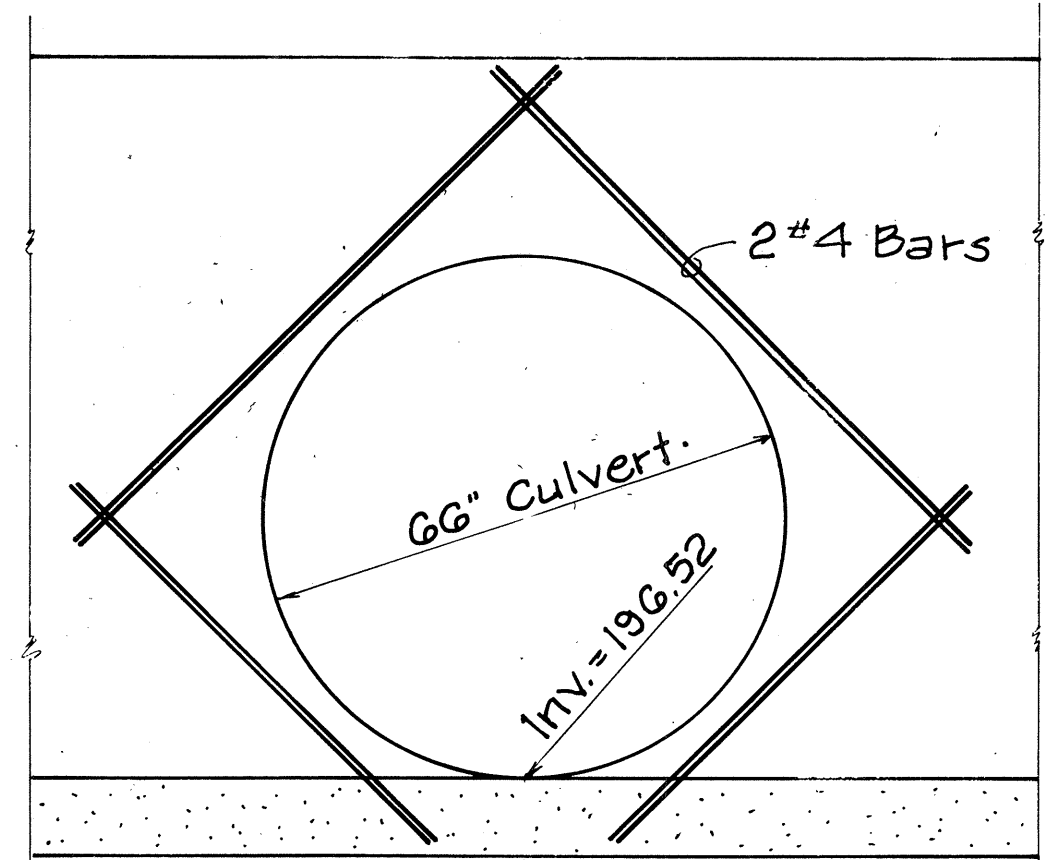
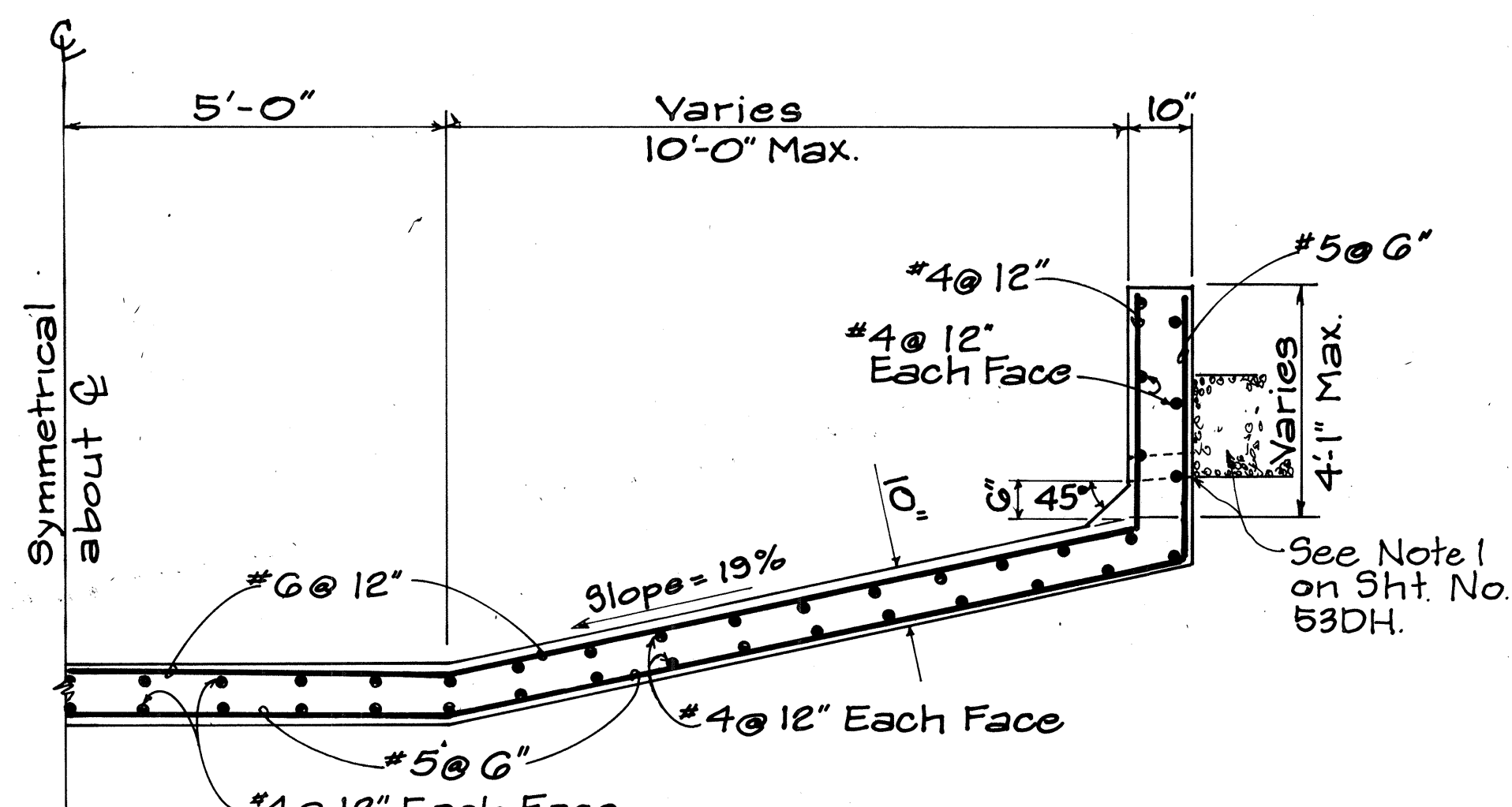
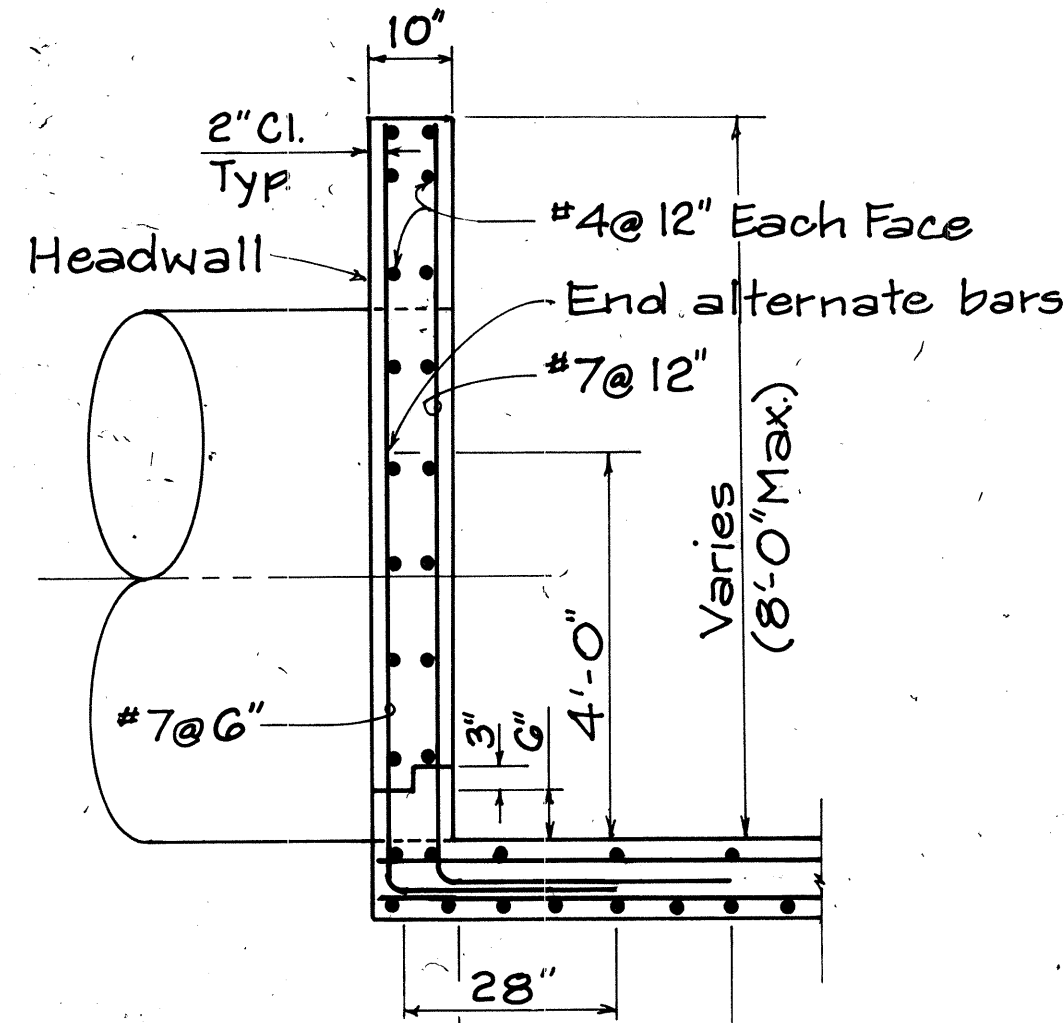
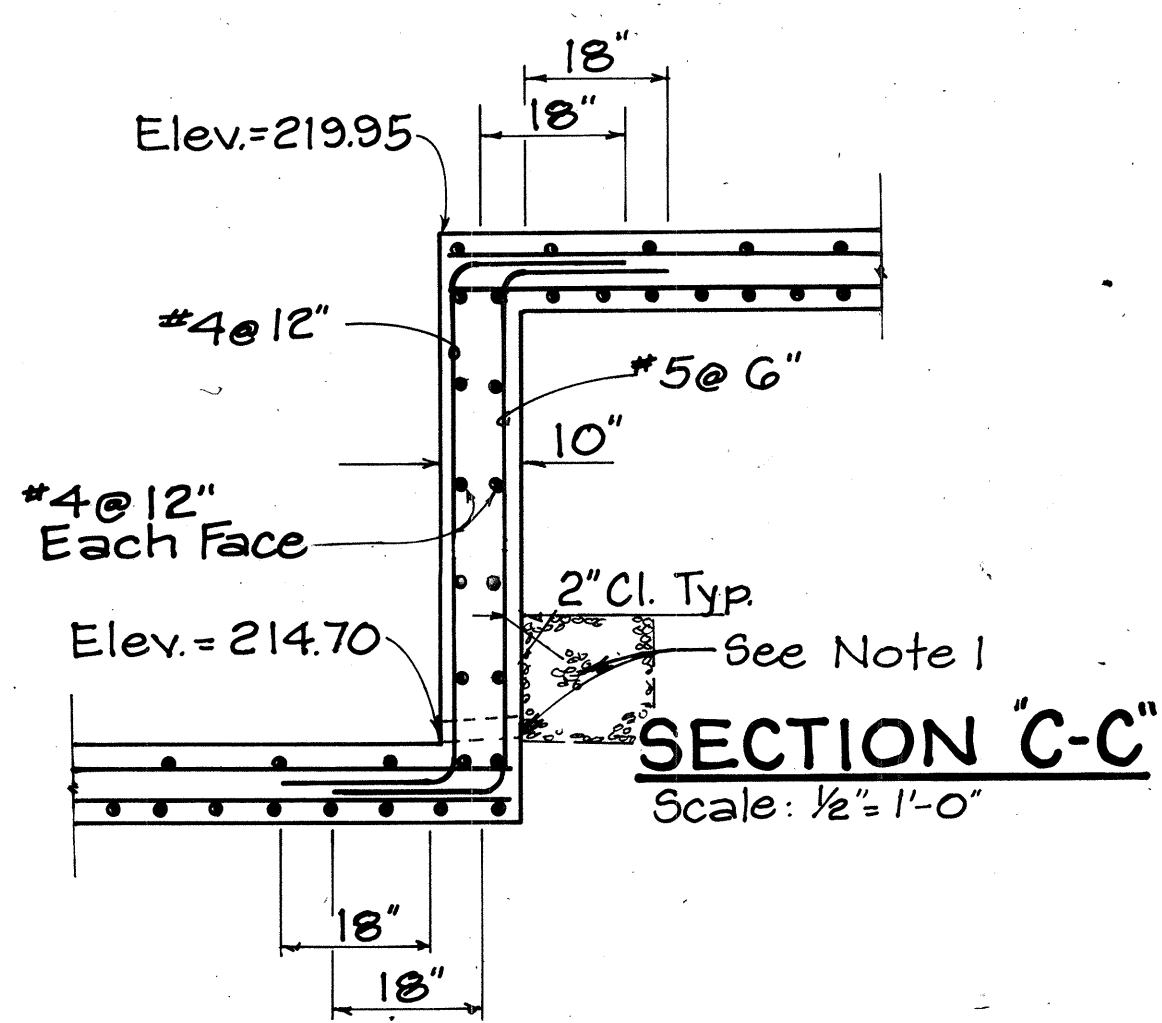
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DEPARTMENT OF TRANSPORTATION
LAND TRANSPORTATION FACILITIES DIVISION

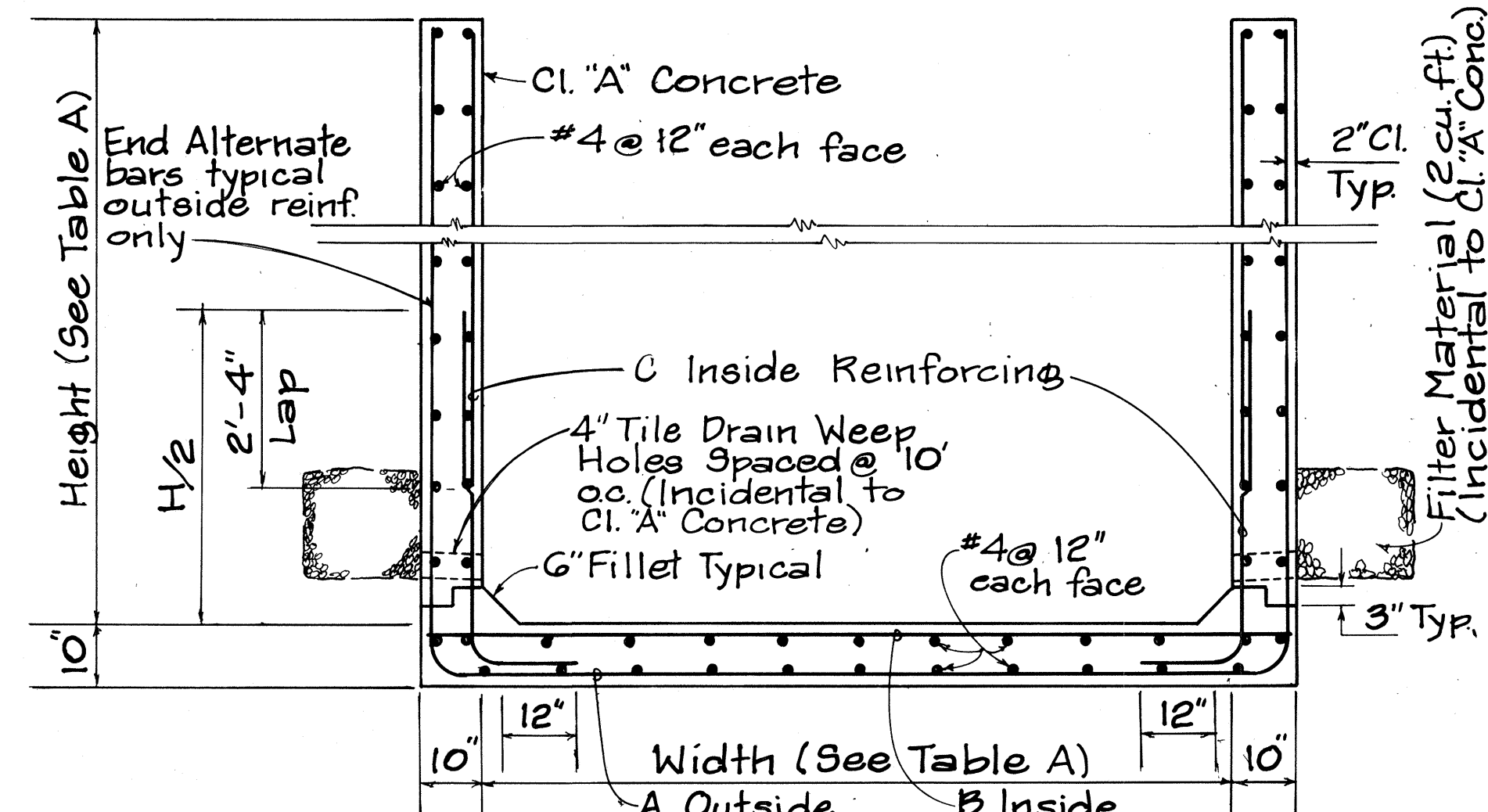
DRAINAGE DETAILS
PIILANI HIGHWAY
VICINITY OF MOKULELE HIGHWAY TO
VICINITY OF KIOHANA STREET
F.A. PROJECT NO. F-RF-031-1(6)
SCALE: AS SHOWN DATE SEP 1978

SHEET No. 27 OF 50 SHEETS

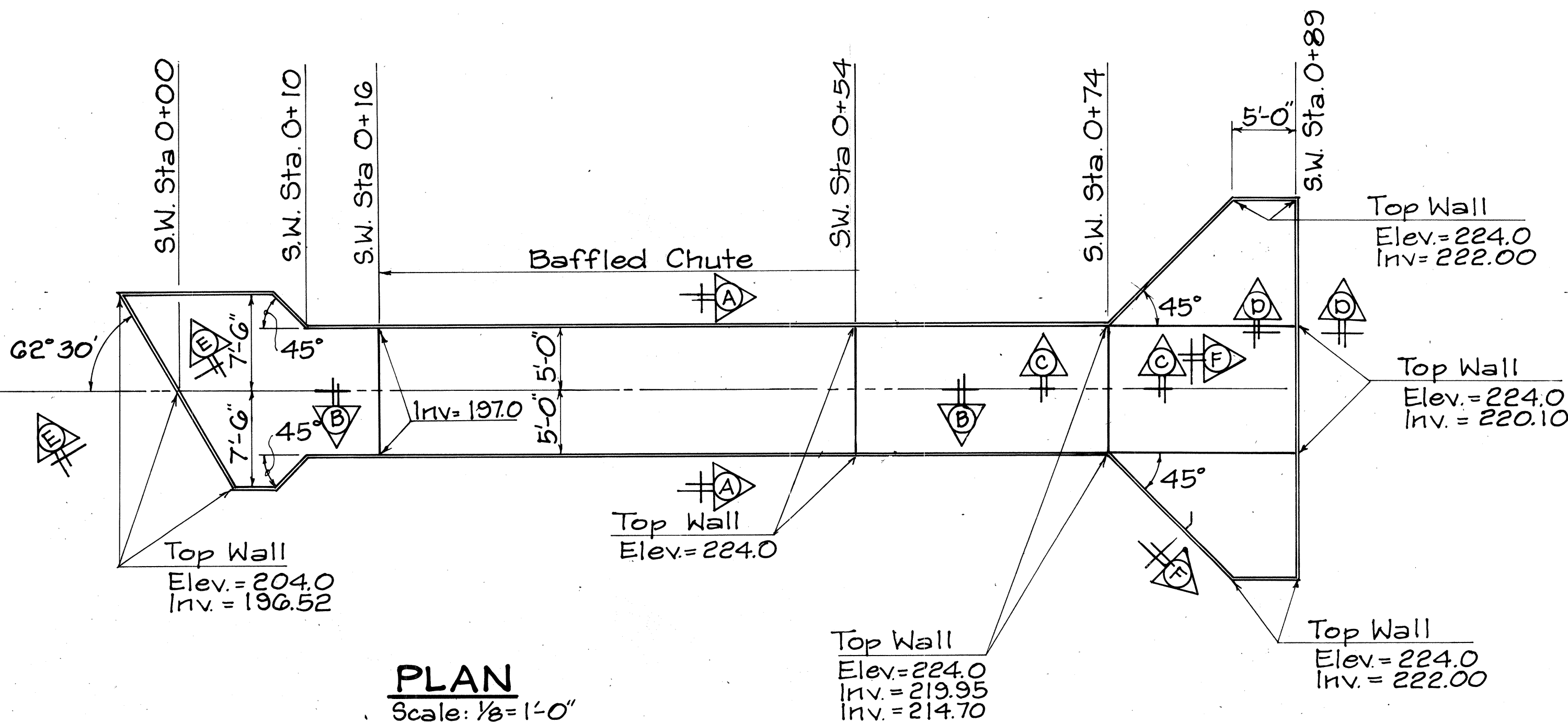
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-RF-031-1(6)	1978	135	262



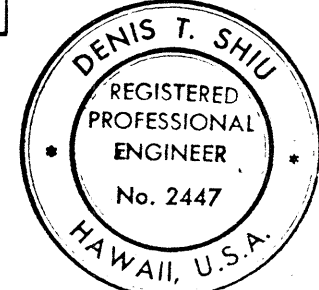
- Note:**
1. Provide 4" Tile Drain Weep Holes Spaced @ 10'-0" C.C. with 2 cu. ft. of Filter Material. (Incidental to Class A Concrete)
 2. All Concrete shall be Class A.
 3. Refer to Sheet No. 136 for additional details.



FROM STATION	TO STATION	WIDTH (FT.)	HEIGHT (FT.)	A Outside Reinforcing	B Inside Reinforcing	C Inside Reinforcing
0+00	0+16	SEE PLAN	SEE PLAN	#7 @ 7"	#8 @ 14"	#7 @ 14"
0+16	0+74	SEE PLAN	SEE PLAN	#7 @ 6"	#9 @ 12"	#7 @ 12"



**CULVERT @ STA. 79+25
SPILLWAY DETAILS**
Scale as shown



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
LAND TRANSPORTATION FACILITIES DIVISION

DRAINAGE DETAILS

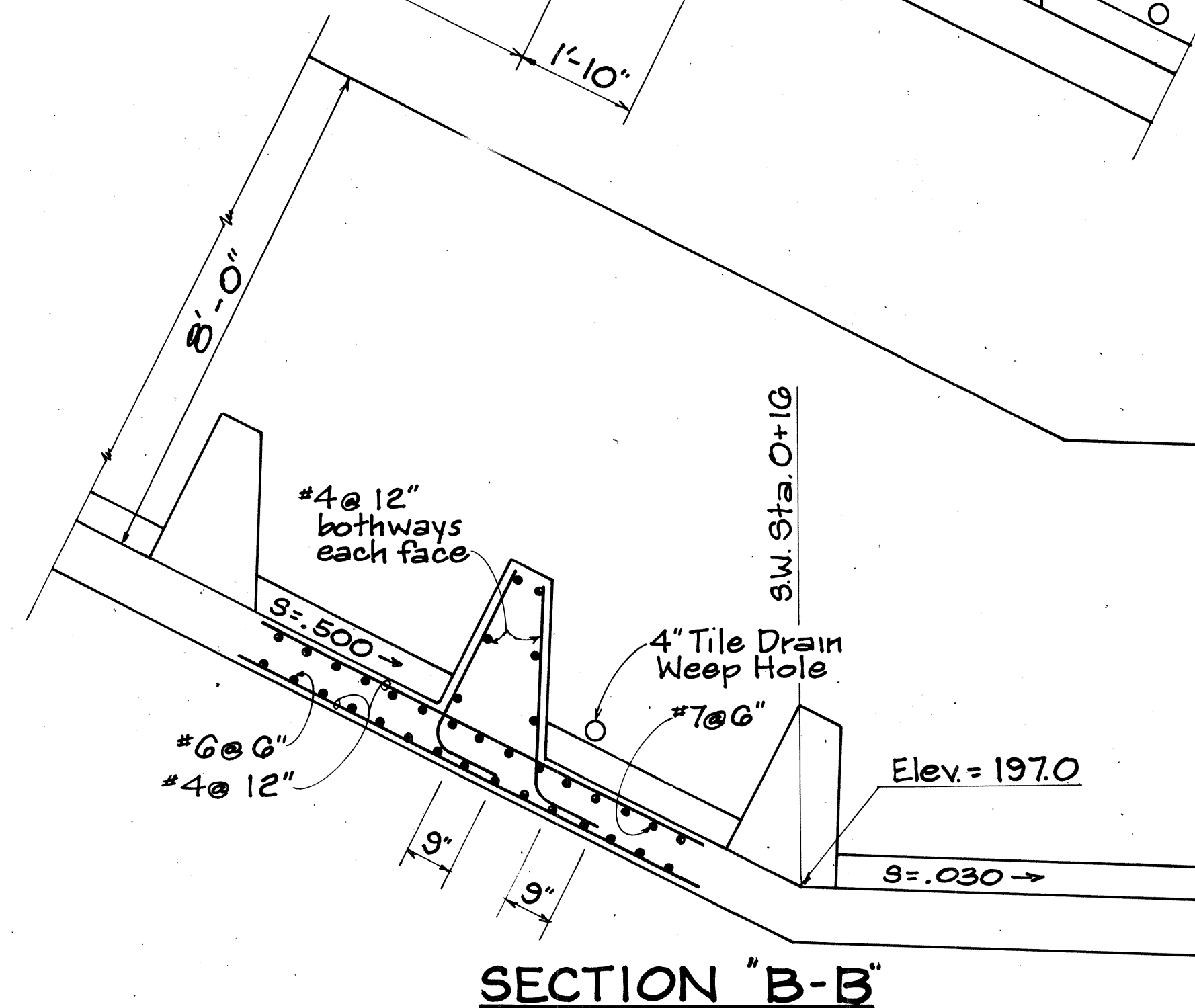
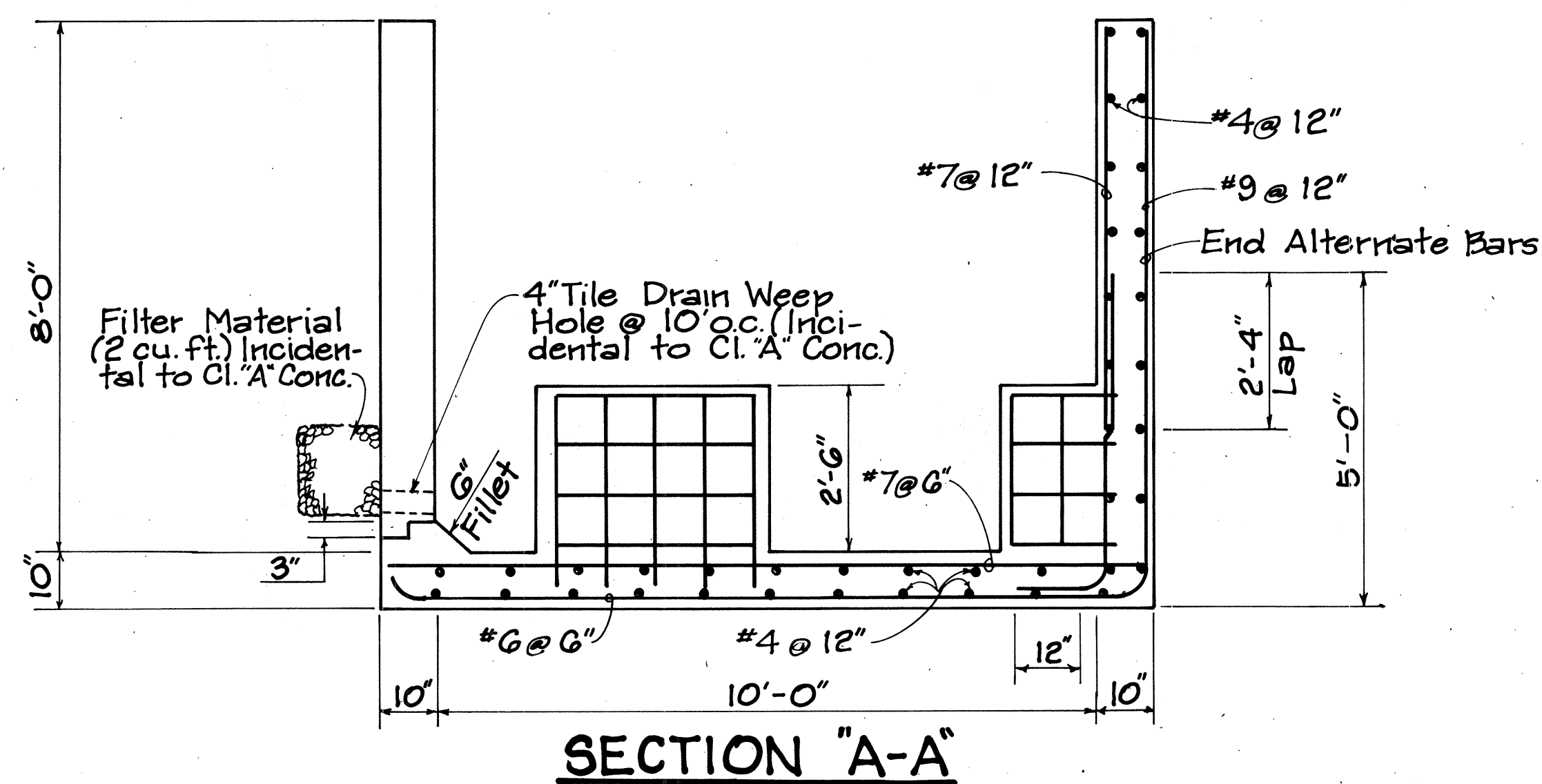
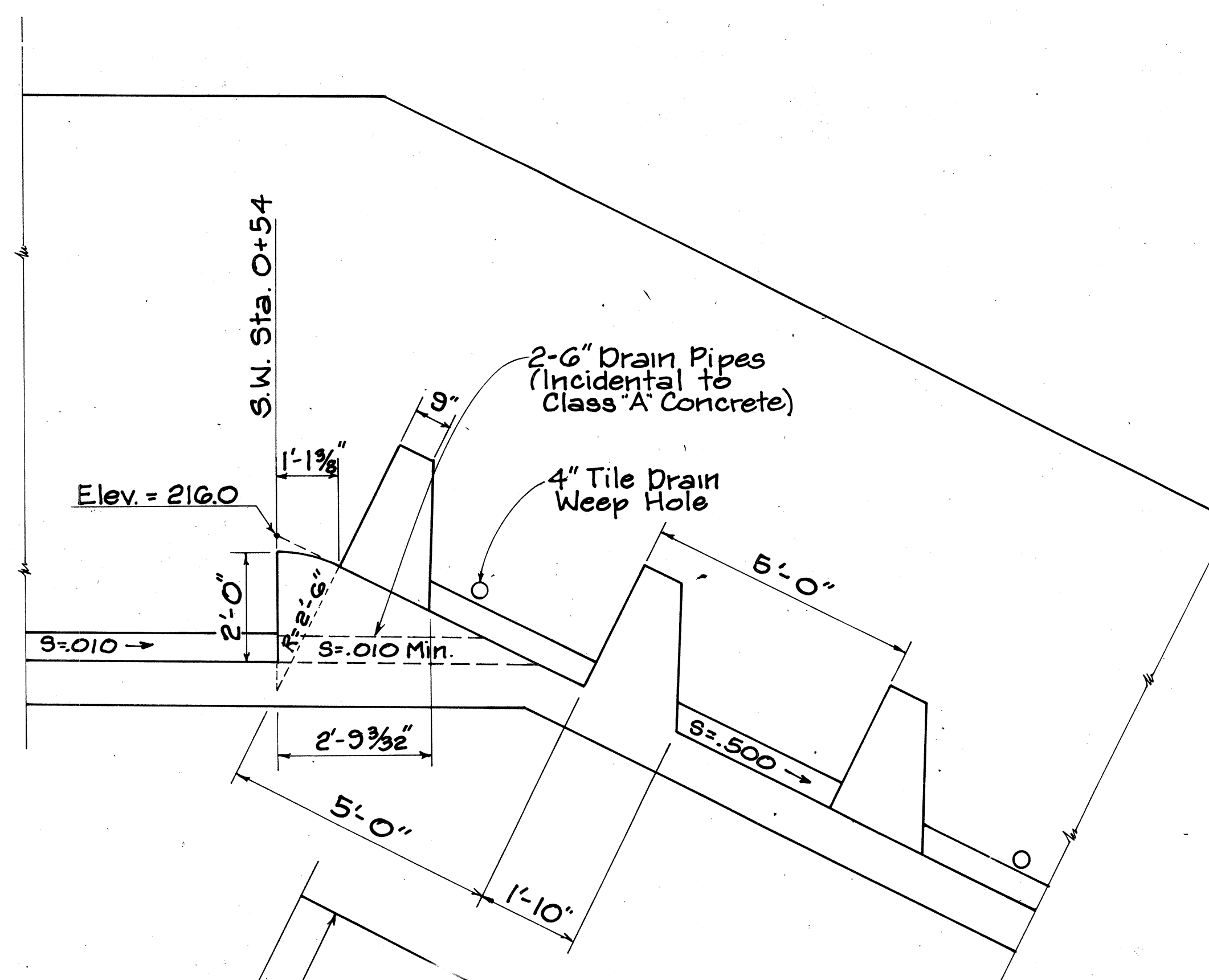
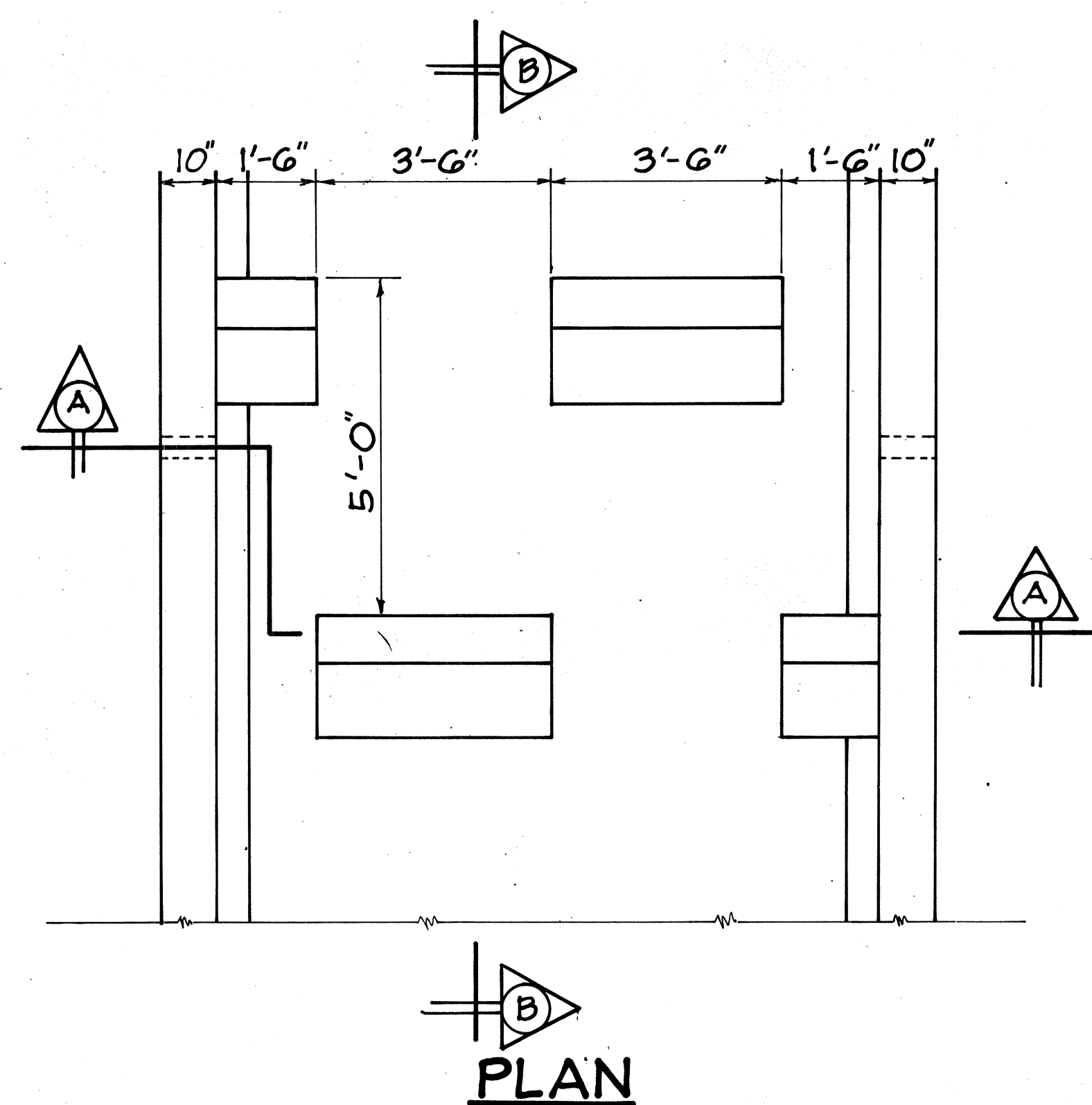
PIILANI HIGHWAY
VICINITY OF MOKULELE HIGHWAY TO
VICINITY OF KILOHANA STREET
F.A. PROJECT NO. F-RF-031-1(6)

SCALE: AS SHOWN DATE SEP 1978

SHEET No. 28 OF 50 SHEETS

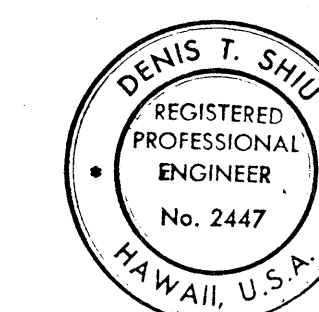
DESIGNED BY	DATE
CHECKED BY	
NOTED BY	
APPROVED BY	

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-RF-031- 1(6)	1978	136	262



**CULVERT @ STA. 79+25
SPILLWAY DETAILS**
Scale: 1/2" = 1'-0"

Note:
For additional details,
see Sheet No. 135.



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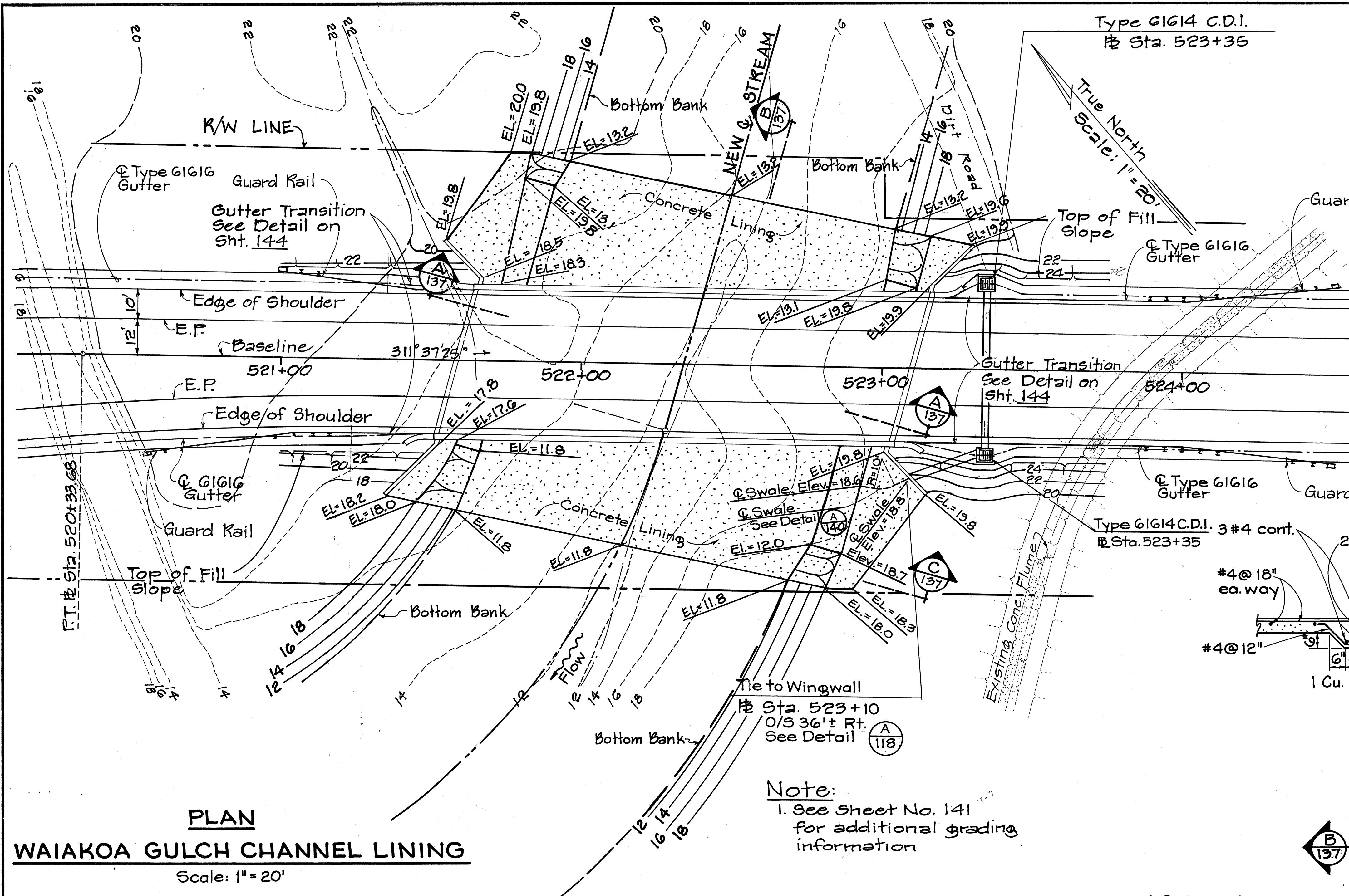
DRAINAGE DETAILS
PIILANI HIGHWAY
VICINITY OF MOKULELE HIGHWAY TO
VICINITY OF KILOHANA STREET
F.A. PROJECT NO. F-RF-031-1(6)

SCALE: AS SHOWN DATE SEP 1978

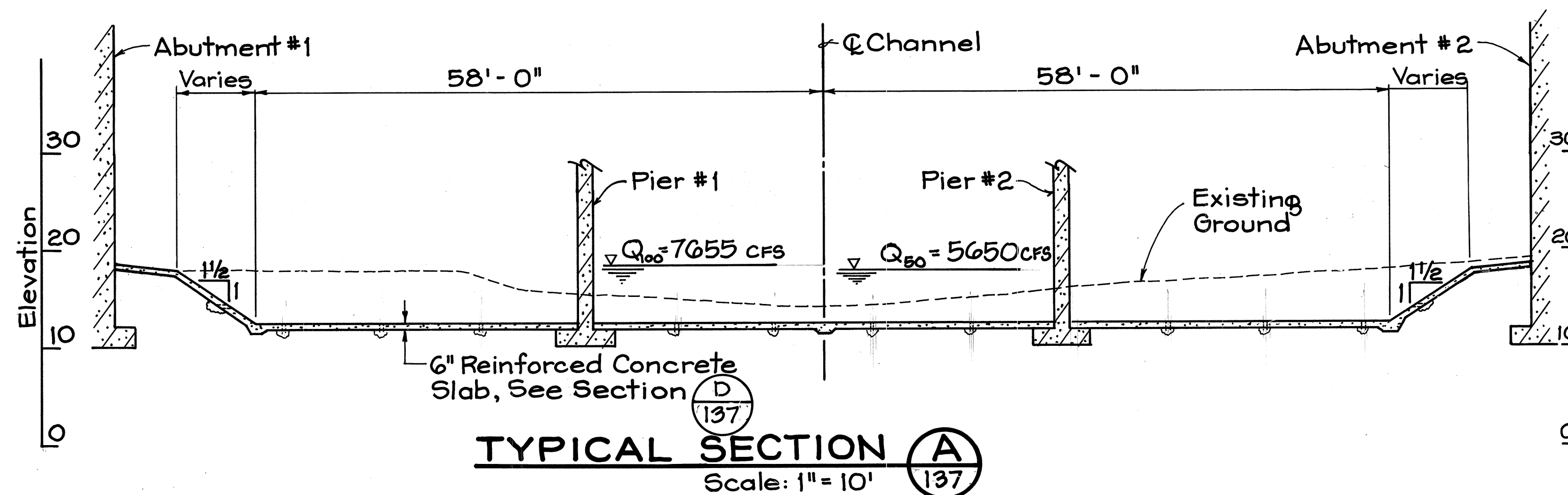
SHEET No. 29 OF 50 SHEETS

DATE	.....
SURVEY PLOTTED BY	.....
DRAWN BY	.....
DESIGNED BY	.....
CHECKED BY	.....
NOTE BOOK	.....
No.	.....

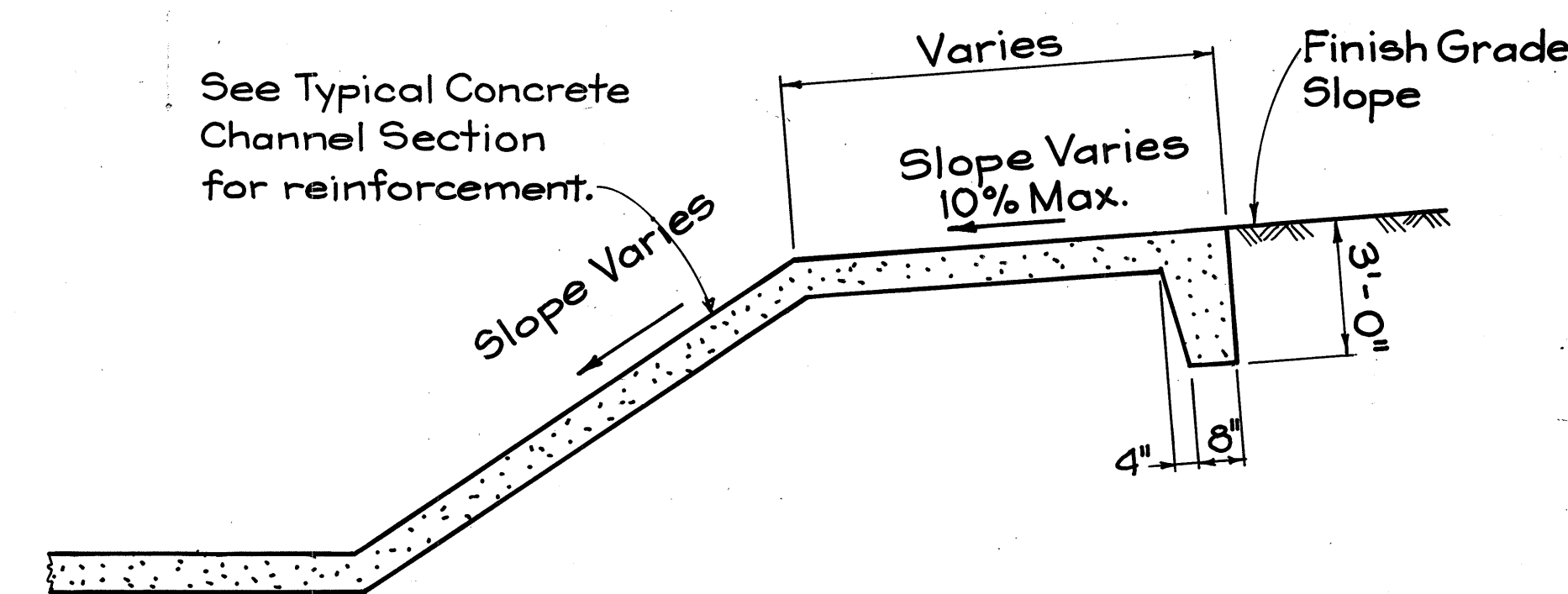
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-RF-031-1(6)	1978	137	262



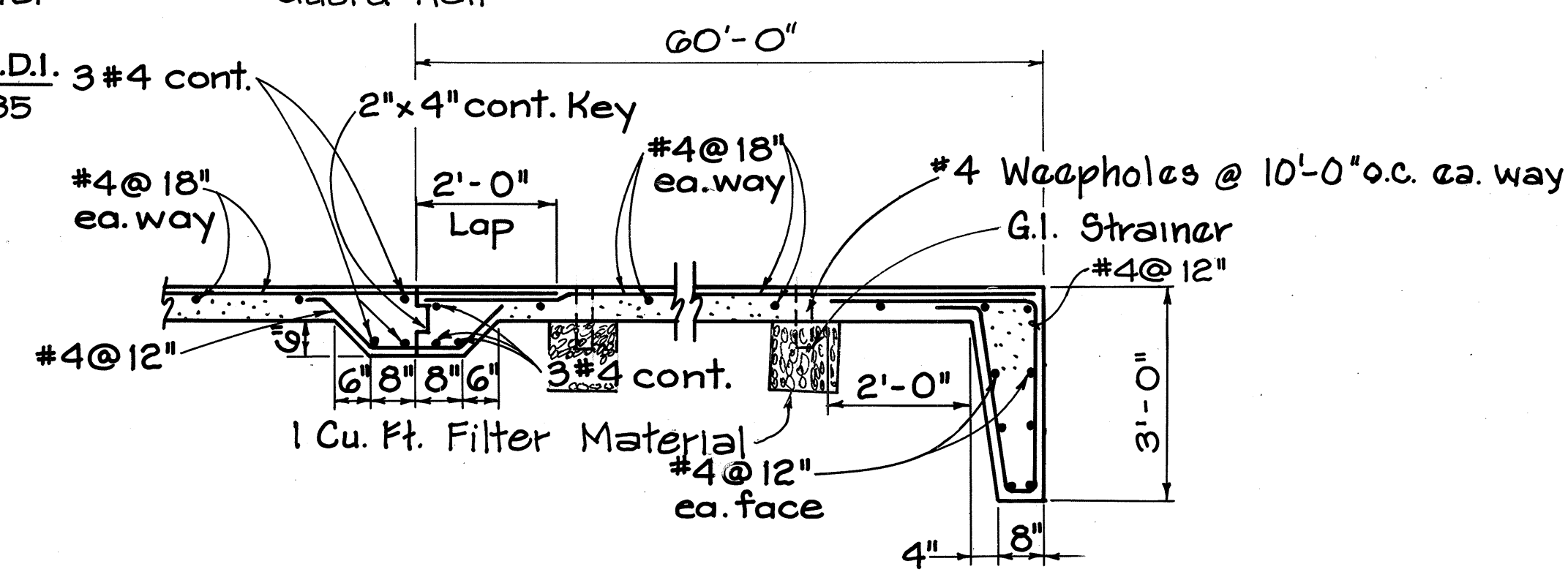
PLAN
WAIAKOA GULCH CHANNEL LINING
Scale: 1" = 20'



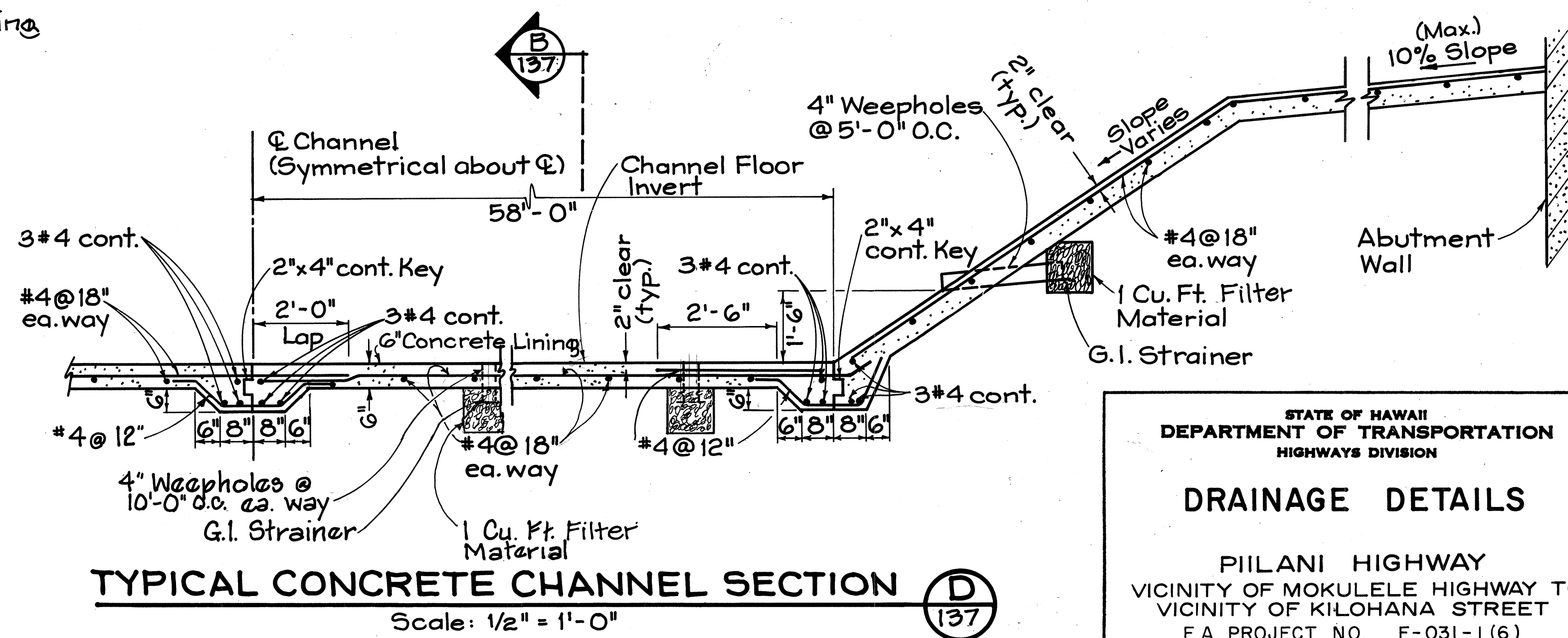
TYPICAL SECTION A
Scale: 1" = 10'



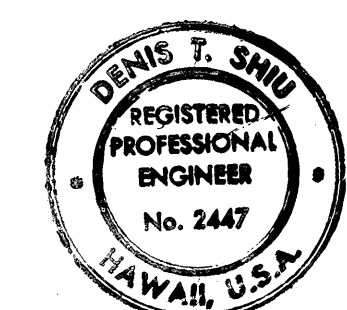
TYPICAL TRANSITION OF CHANNEL LINING C
Not to Scale



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



TYPICAL CONCRETE CHANNEL SECTION D
Scale: 1/2" = 1'-0'



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DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DRAINAGE DETAILS

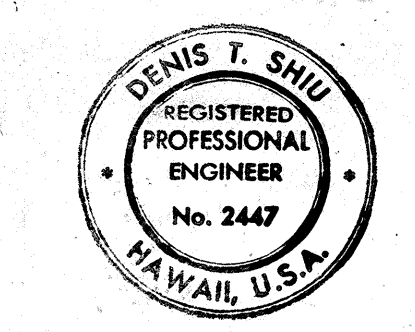
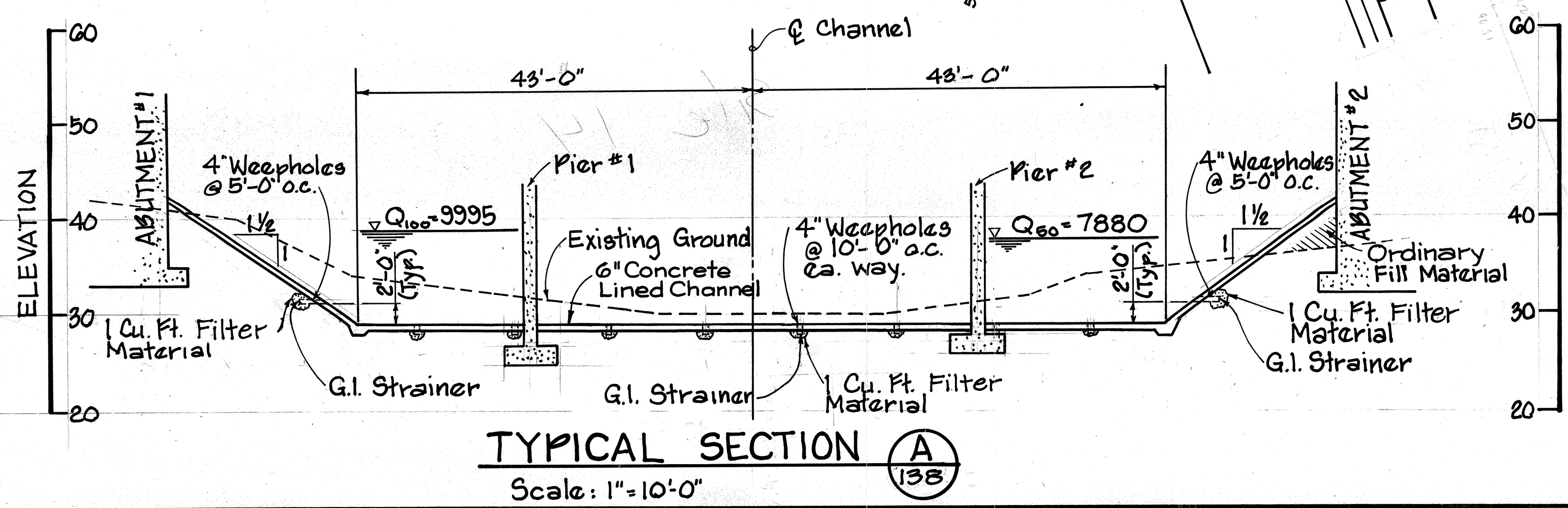
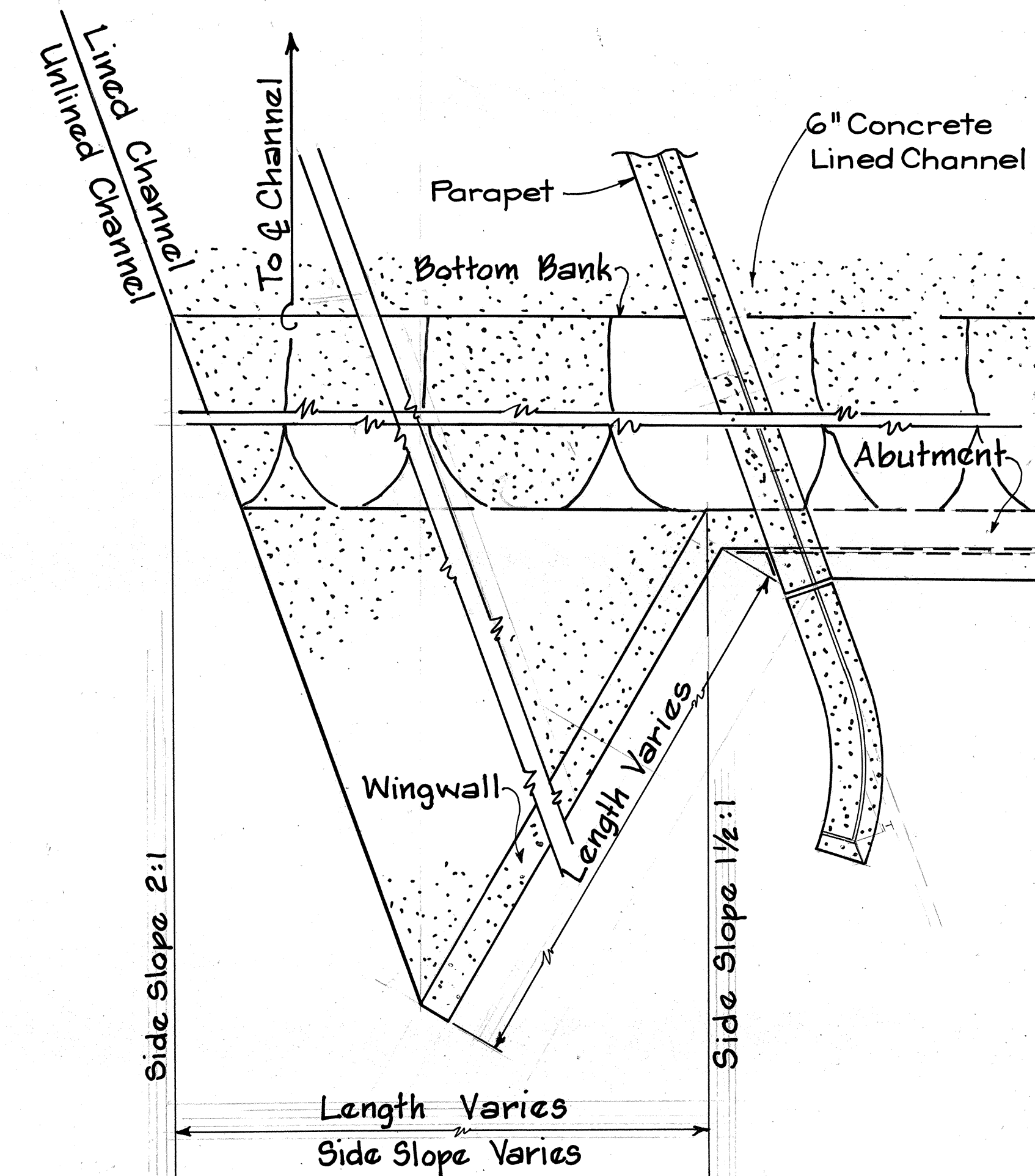
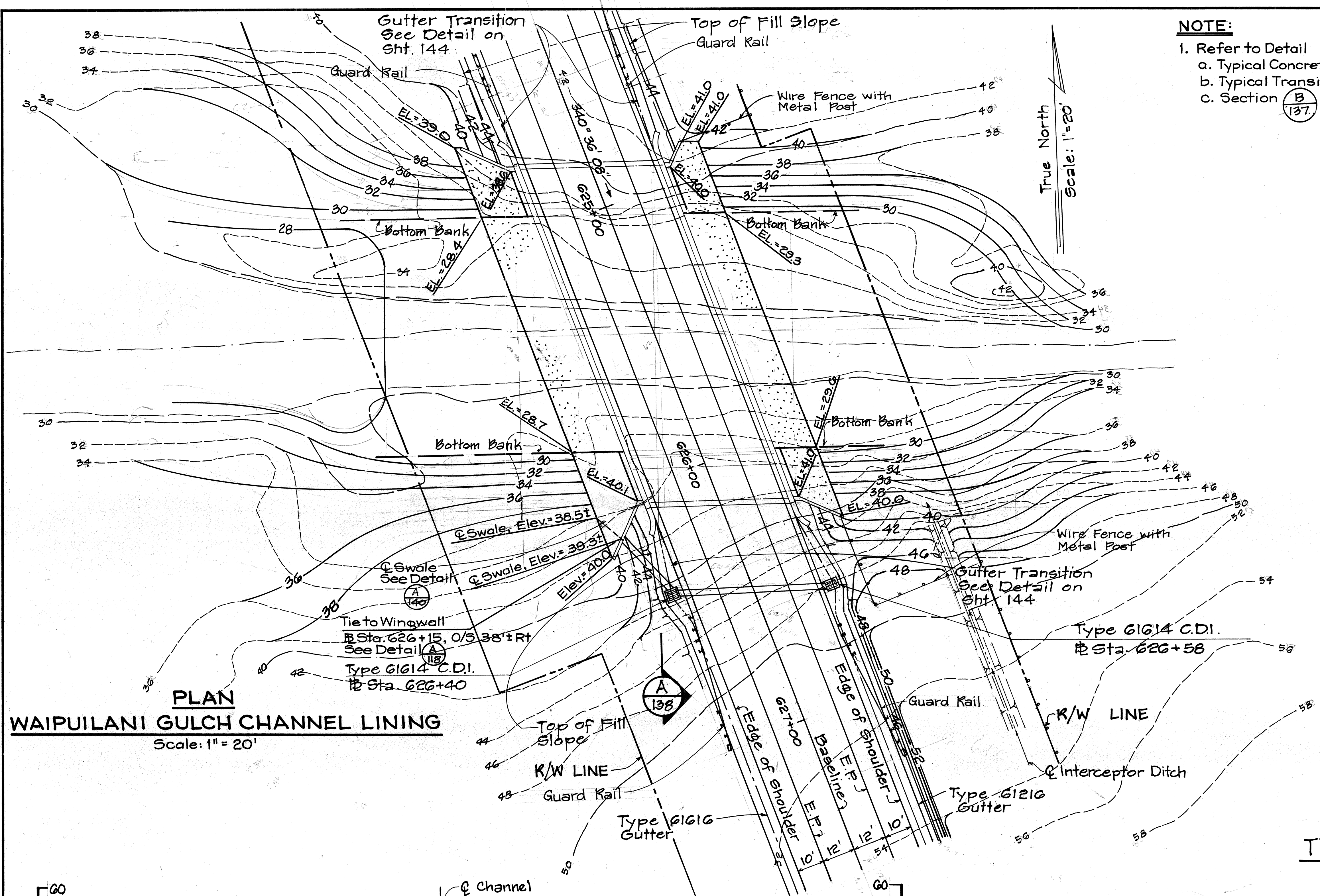
PIILANI HIGHWAY
VICINITY OF MOKULELE HIGHWAY TO
VICINITY OF KILOHANA STREET
F.A. PROJECT NO. F-031-1(6)
SCALE: AS SHOWN DATE SEP 1978

SHEET No. 30 OF 50 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-RF-031-1(6)	1978	138	262

NOTE:

1. Refer to Detail
 - a. Typical Concrete Channel Section C 137
 - b. Typical Transition of Channel Lining D 137
 - c. Section B 137



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DRAINAGE DETAILS

PIILANI HIGHWAY
 VICINITY OF MOKULELE HIGHWAY TO
 VICINITY OF KILOHANA STREET
 F.A. PROJECT NO. F-031-1(6)
 SCALE: AS SHOWN DATE SEP 1978
 SHEET No. 31 OF 50 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-RF-031-1(6)	1978	139	262

- NOTE:
1. Refer to Detail

a. Typical Concrete Channel Section

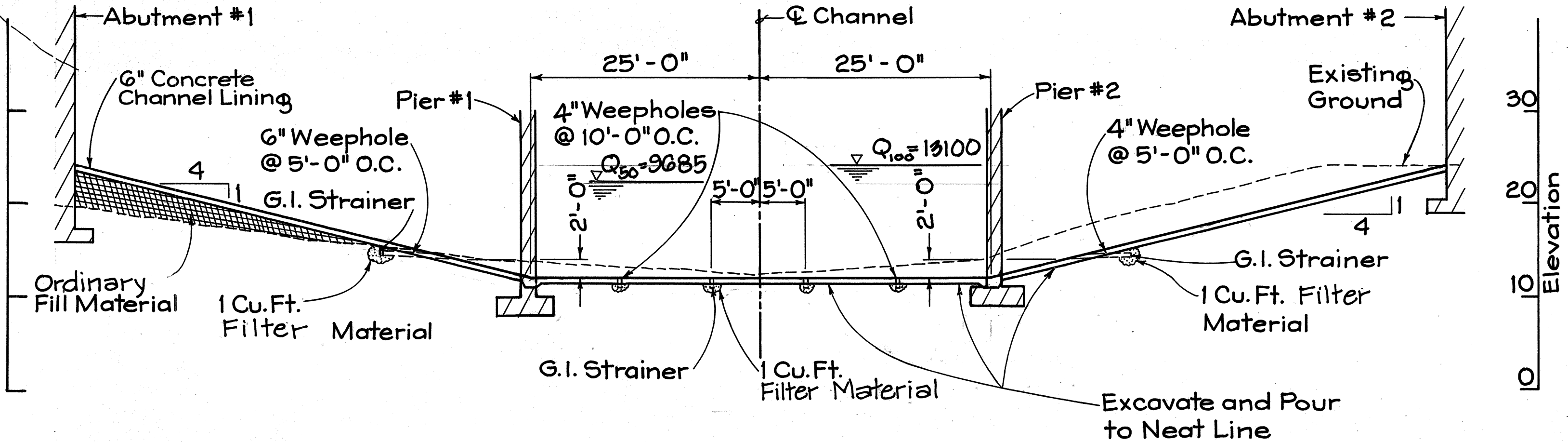
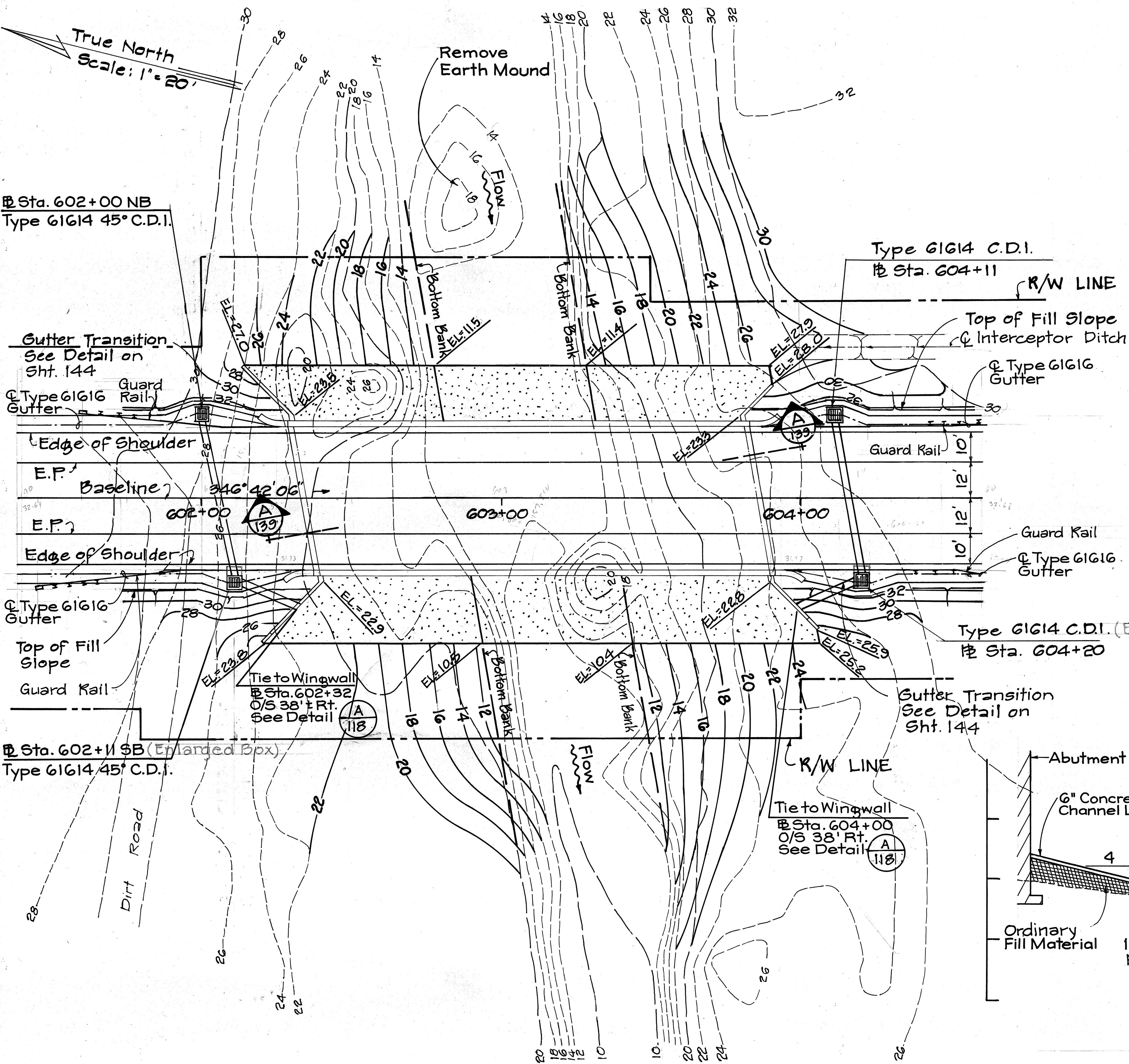
b. Typical Transition of Channel Lining

c. Section
- C

137

D

137

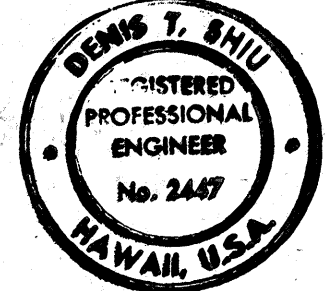


TYPICAL SECTION

A

139

Scale: 1"=10'-0"



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DEPARTMENT OF TRANSPORTATION

LAND TRANSPORTATION FACILITIES DIVISION

DRAINAGE PLAN

PIILANI HIGHWAY

VICINITY OF MOKULELE HIGHWAY TO

VICINITY OF KILOHANA STREET

F.A. PROJECT NO. F-031-1 (6)

SCALE: 1"= 50'

DATE SEP 1978

SHEET No.32 OF 50 SHEETS

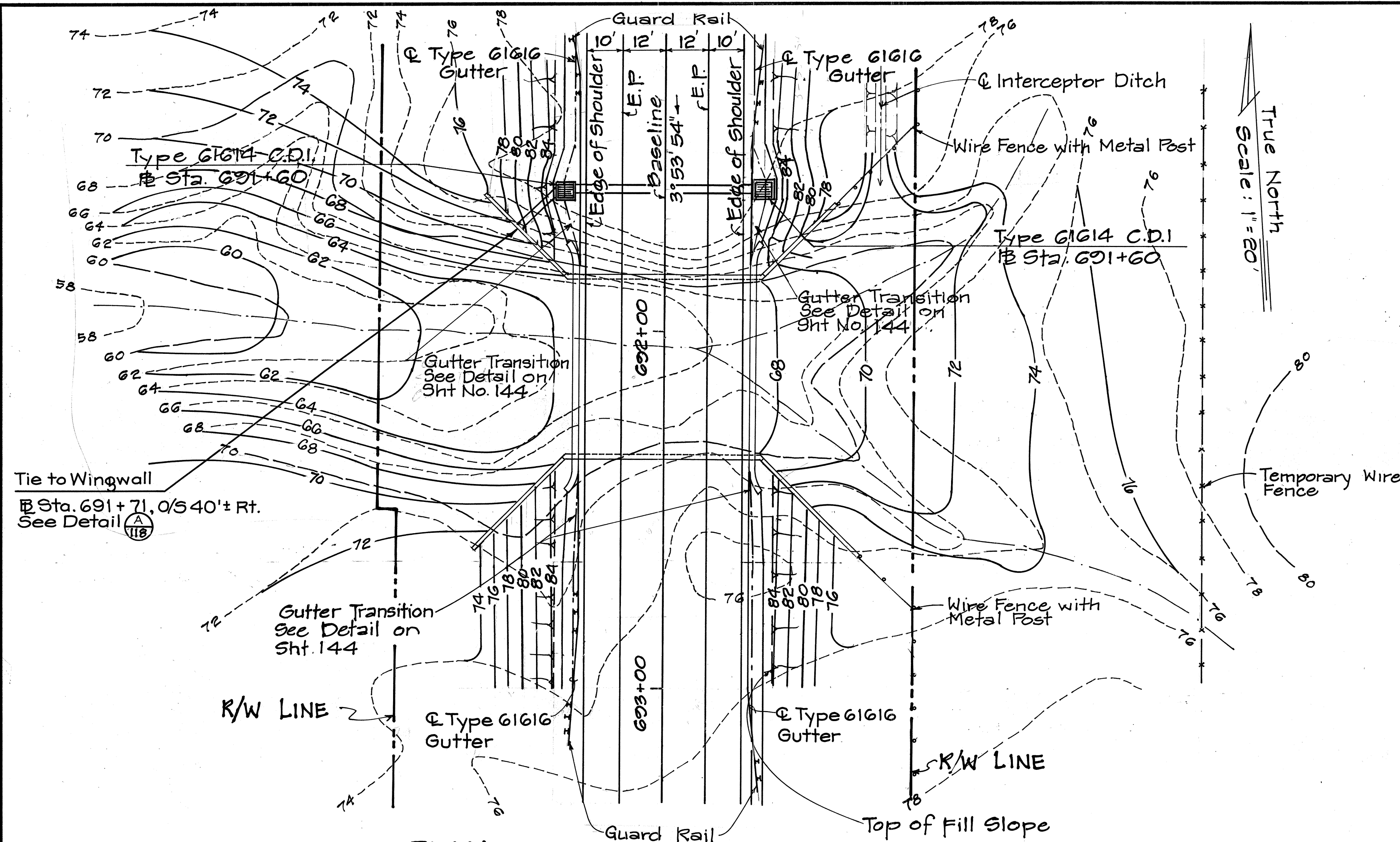
ORIGINAL PLAN	DATE
SURVEY PLOTTED BY	.....
DRAWN BY	.....
DESIGNED BY	.....
CHECKED BY	.....
NOTE BOOK	.....
No.	.....

PLAN

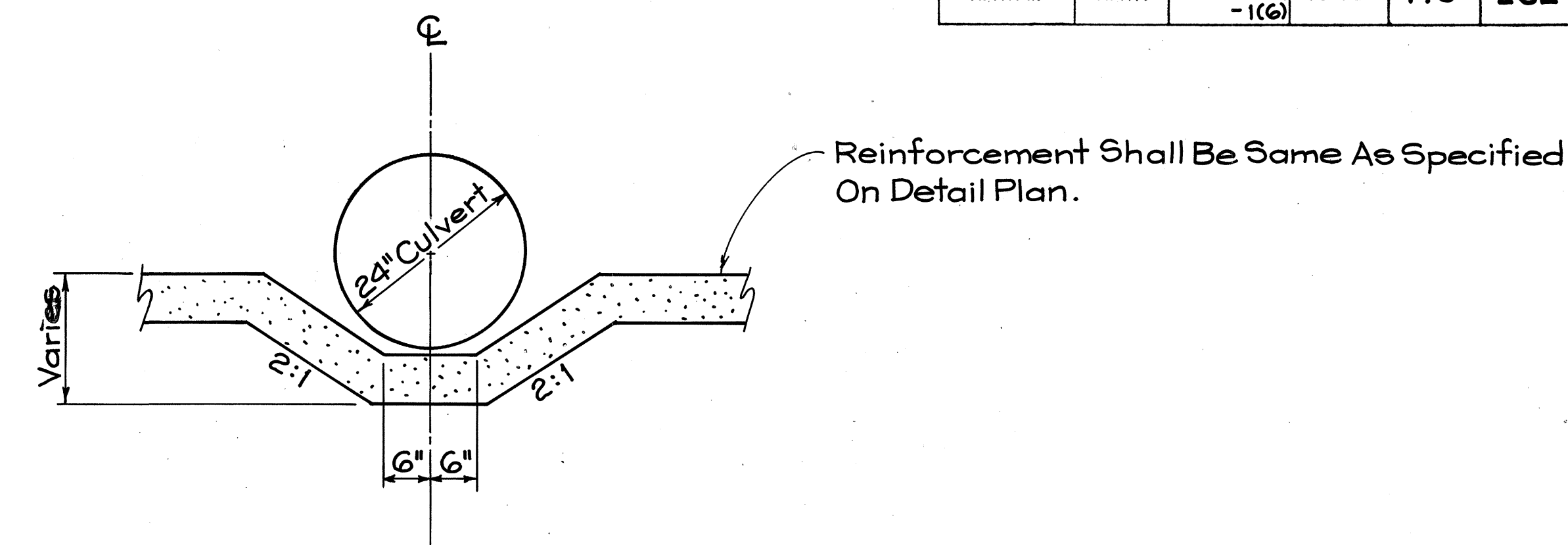
KULANIHAKOI GULCH CHANNEL LINING

Scale: 1"= 20'

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-RF-031-1(6)	1978	140	262

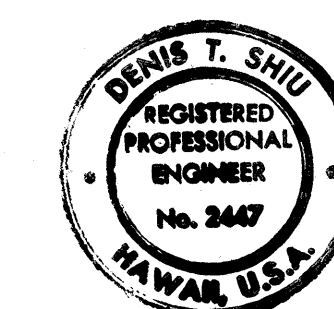


PLAN
KEOKEA GULCH CHANNEL
 Scale: 1" = 20'



TYPICAL SWALE SECTION ON LINED CHANNEL
 Scale: 3/4" = 1'-0"

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



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 HIGHWAYS DIVISION

DRAINAGE DETAILS

PIILANI HIGHWAY
 VICINITY OF MOKULELE HIGHWAY TO
 VICINITY OF KILOHANA STREET
 F.A. PROJECT NO. F-031-1(6)

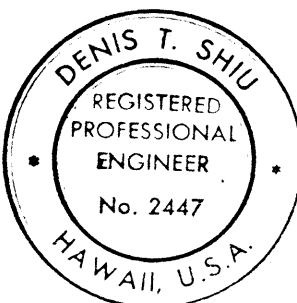
SCALE: AS SHOWN DATE SEP 1978

SHEET No. 33 OF 50 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-RF-031-1(6)	1978	141	262

NOTE:
The Contractor shall notify Ameron H&D Maui, Mr. Tom Bastis at 877-5068, of intention to begin grading work on Construction Parcel C-40 14 days prior to commencing grading work.

CURVE DATA				
CURVE	Δ	R	T	L
A	45°00'00"	25000	103.553	106.350

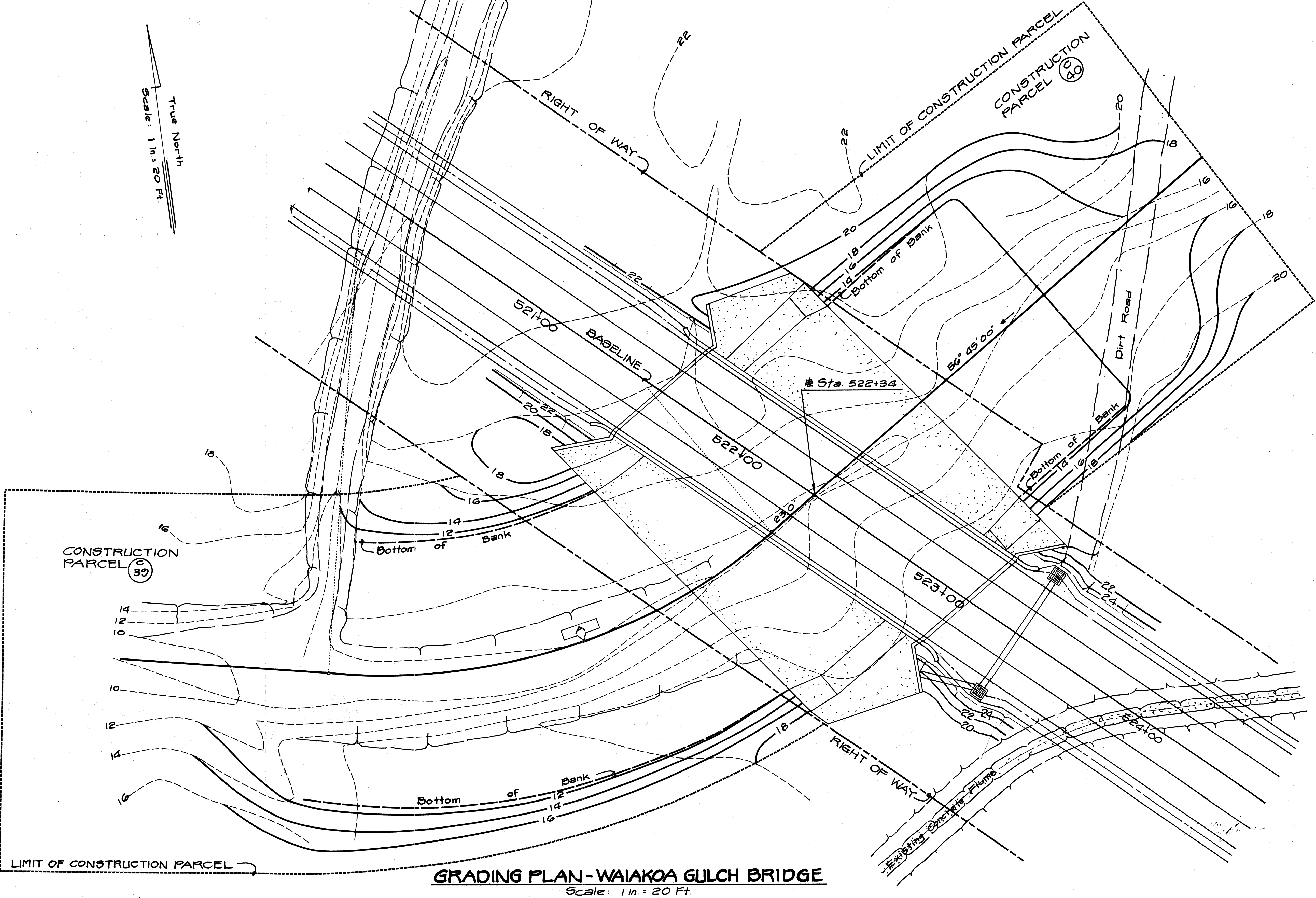


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LAND TRANSPORTATION FACILITIES DIVISION

DRAINAGE DETAILS
PIILANI HIGHWAY
VICINITY OF MOKULELE HIGHWAY TO
VICINITY OF KILOHANA STREET
F.A. PROJECT NO. F-RF-031-1(6)
SCALE: AS SHOWN DATE: SEP 1978
SHEET No. 34 OF 50 SHEETS

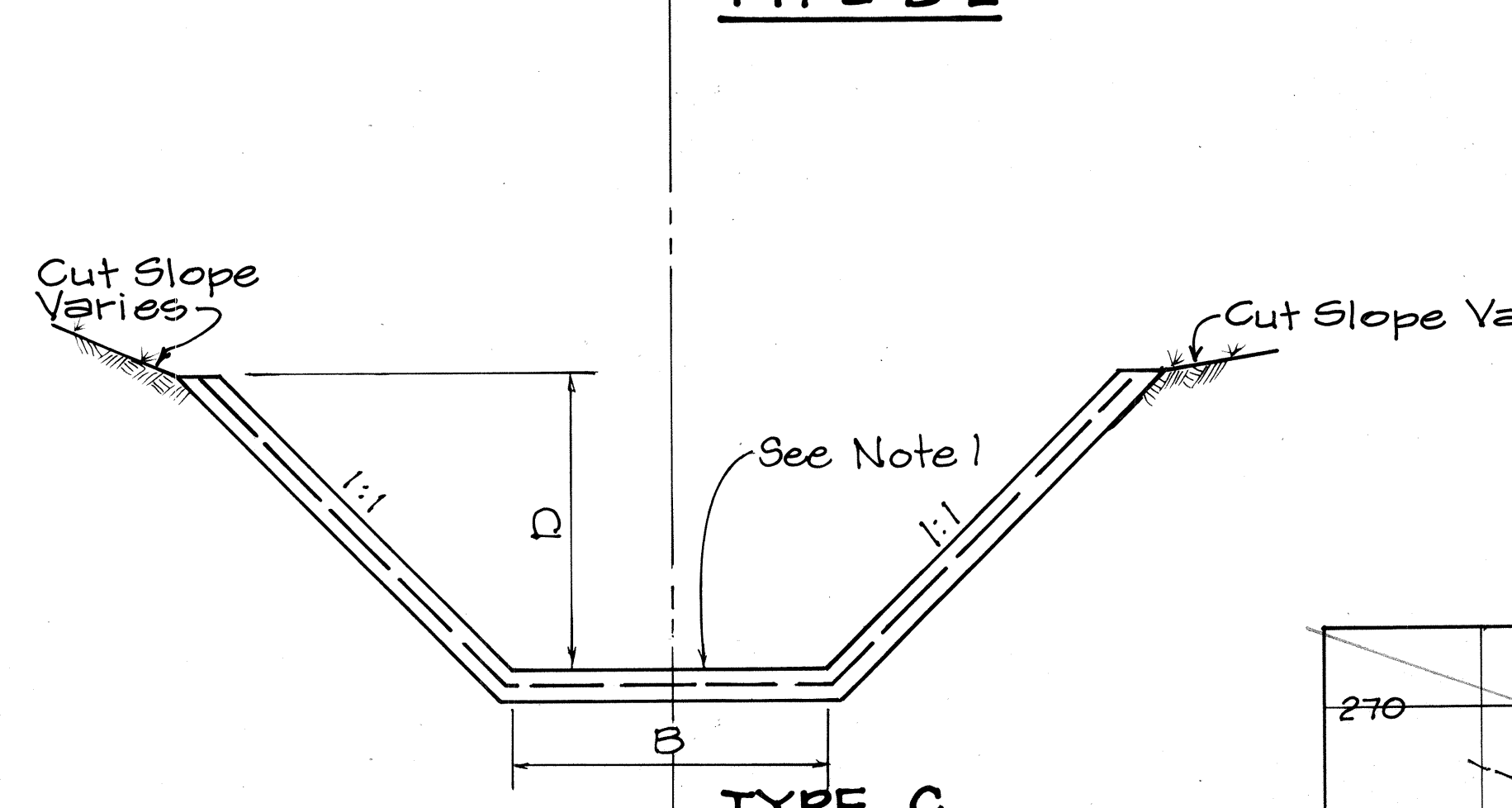
ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
TRACED BY	DRAWN BY	.....
DESIGNED BY	CHECKED BY	.....
NOTED BY	CHECKED BY	.....
No.		



True North
Scale: 1 in. = 20 Ft.

GRADING PLAN-WAIAKOA GULCH BRIDGE
Scale: 1 in. = 20 Ft.

INTERCEPTOR DITCH NO.	STATION		TYPE DITCH	MIN. SLOPE	TRIANGULAR		TRAPEZOIDAL
	FROM	TO			T	B	D
1-A	571+80	568+50	B-2	.010	6.0	-	-
	568+50	563+44.0±	B-2	.005	8.0	-	-
1-B	571+80	575+50	B-2	.005	8.0	-	-
	575+50	579+25±	C	.005	-	2.5	1.5
2-A	581+00	579+65±	A-1	.005	8.0	-	-
2-B	581+00	585+15	A-1	.005	10.0	-	-
	585+15	589+50±	A-2	.005	10.0	-	-
3-A	610+50	604+00±	A-1	.003	8.0	-	-
3-B	610+50	615+80±	A-1	.020	6.0	-	-
4	635+00	632+00±	B-2	.005	6.0	-	-
	632+00	626+50±	C	.005	-	2.0	2.0
5-A	646+15	642+50	B-2	.003	9.0	-	-
	642+50	638+21.8±	C	.003	-	2.0	2.0
5-B	646+15	648+50±	B-1	.005	6.0	-	-
6-A	658+15	655+00±	A-1	.027	4.0	-	-
6-B	658+15	661+50±	A-1	.020	8.0	-	-
7-A	662+50	662+10±	A-1	.070	6.0	-	-
7-B	662+50	664+50±	A-1	.010	8.0	-	-
8-A	668+35	664+50±	A-1	.030	8.0	-	-
8-B	668+35	669+50±	A-1	.020	8.0	-	-
9-A	672+00	670+40	A-1	.010	4.0	-	-
9-B	672+00	673+25	A-1	.060	4.0	-	-
10-A	681+90	680+00	A-1	.011	6.0	-	-
	680+00	676+50±	A-1	.016	8.0	-	-
10-B	681+90	684+50	A-1	.005	6.0	-	-
	684+50	691+50±	C	.009	-	3.0	3.0
11-A	700+00	693+50±	A-2	.005	9.0	-	-
11-B	700+00	703+50	A-2	.005	8.0	-	-
	703+50	706+90±	A-2	.005	9.0	-	-
12-A	727+20	724+50±	A-1	.052	3.0	-	-
12-B	727+20	727+84±	A-1	.010	3.0	-	-
12-Z-1	727+84	729+00±	A-2	.010	6.0	-	-
13	739+43.67	735+00	C	.010	-	2.0	1.5
	735+00	731+50±	C	.006	-	2.0	2.0
13-Z-1	747+00	740+75	C	.004	-	2.0	3.0
13-Z-2	747+00	752+30	B-1	.004	8.0	-	-
14-A	764+90	759+40±	C	.005	-	6.0	4.0
14-B	764+90	768+70	C	.005	-	3.0	3.0
15-A	774+50	770+40	B-1	.006	6.0	-	-
	770+40	769+00±	C	.005	-	3.0	3.0
15-B	774+50	776+10	B-1	.018	6.0	-	-
16-A	784+50	776+80	C	.005	-	2.0	2.0
16-B	784+50	786+90	B-1	.006	6.0	-	-
17-A	790+00	787+40	B-1	.005	6.0	-	-
17-B	790+00	55+80	C	.010	-	4.0	4.0
18	Access Rd. 2+23.29	Access Rd. 2+75	B-1	.050	6.0	-	-
	Access Rd. 2+75	1+70	C	.020	-	2.0	2.5
	71+70	56+90	C	.010	-	3.0	3.0
	67+00	56.30	C	.012	-	4.75	2.5



Note

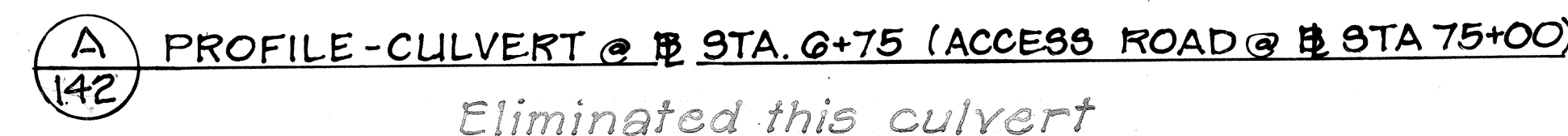
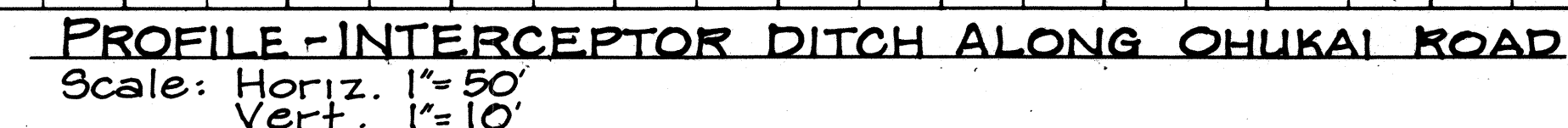
1. All Lined Interceptor Ditches shall be 4" Class "B" Concrete or Shotcrete w/ 6"x6"x 1/2" wire mesh reinforcing (wire mesh incidental to Class "B" Concrete and Shotcrete).
2. For additional details, see Sht. No. 143.



Note:

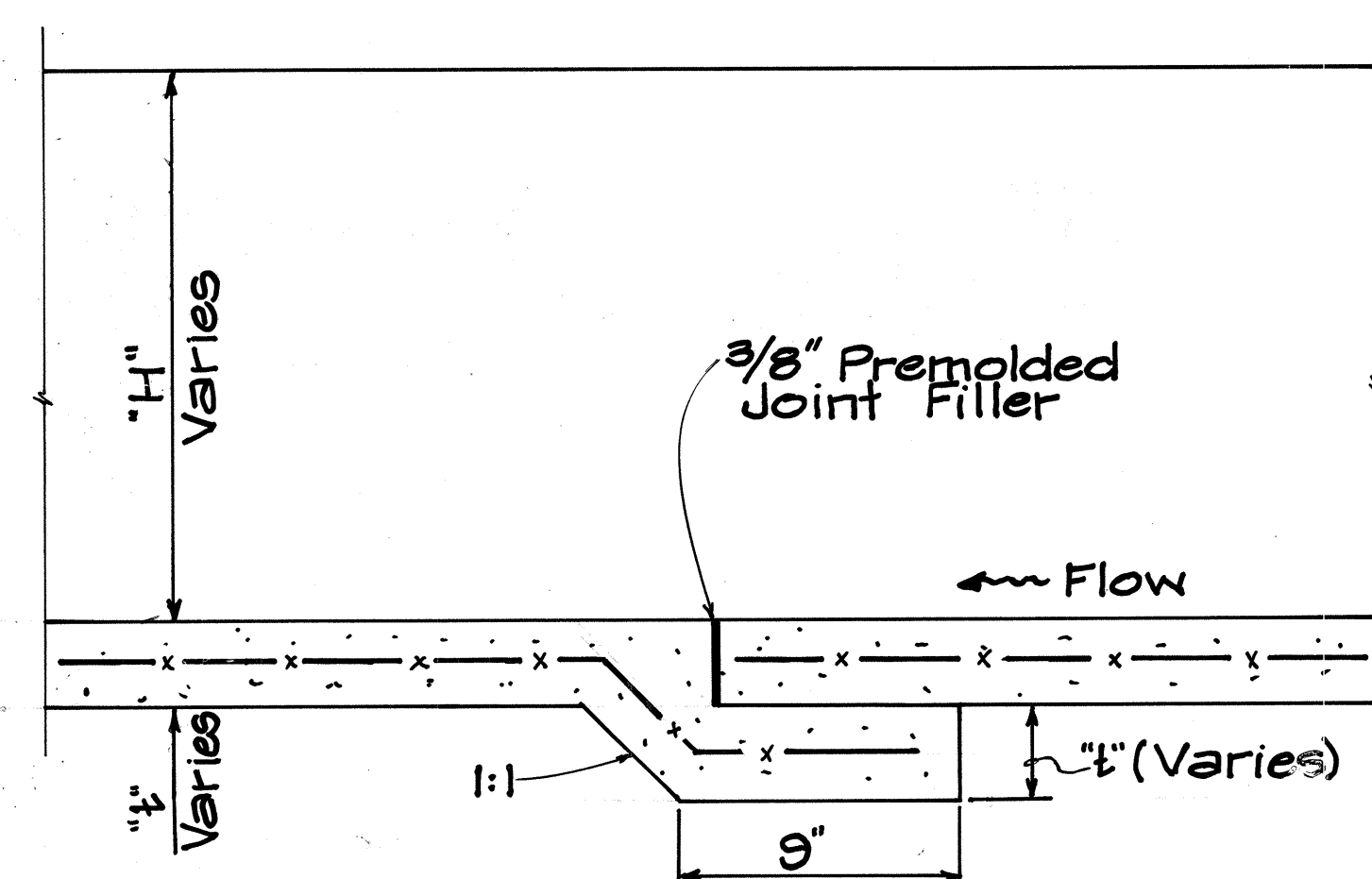
1. * For information, refer to "Profile: Interceptor Ditch Along Ohukai Road."
2. * Transition from 7'-0" to 4'-0"

3. For additional details, see
Sht. No. 143.

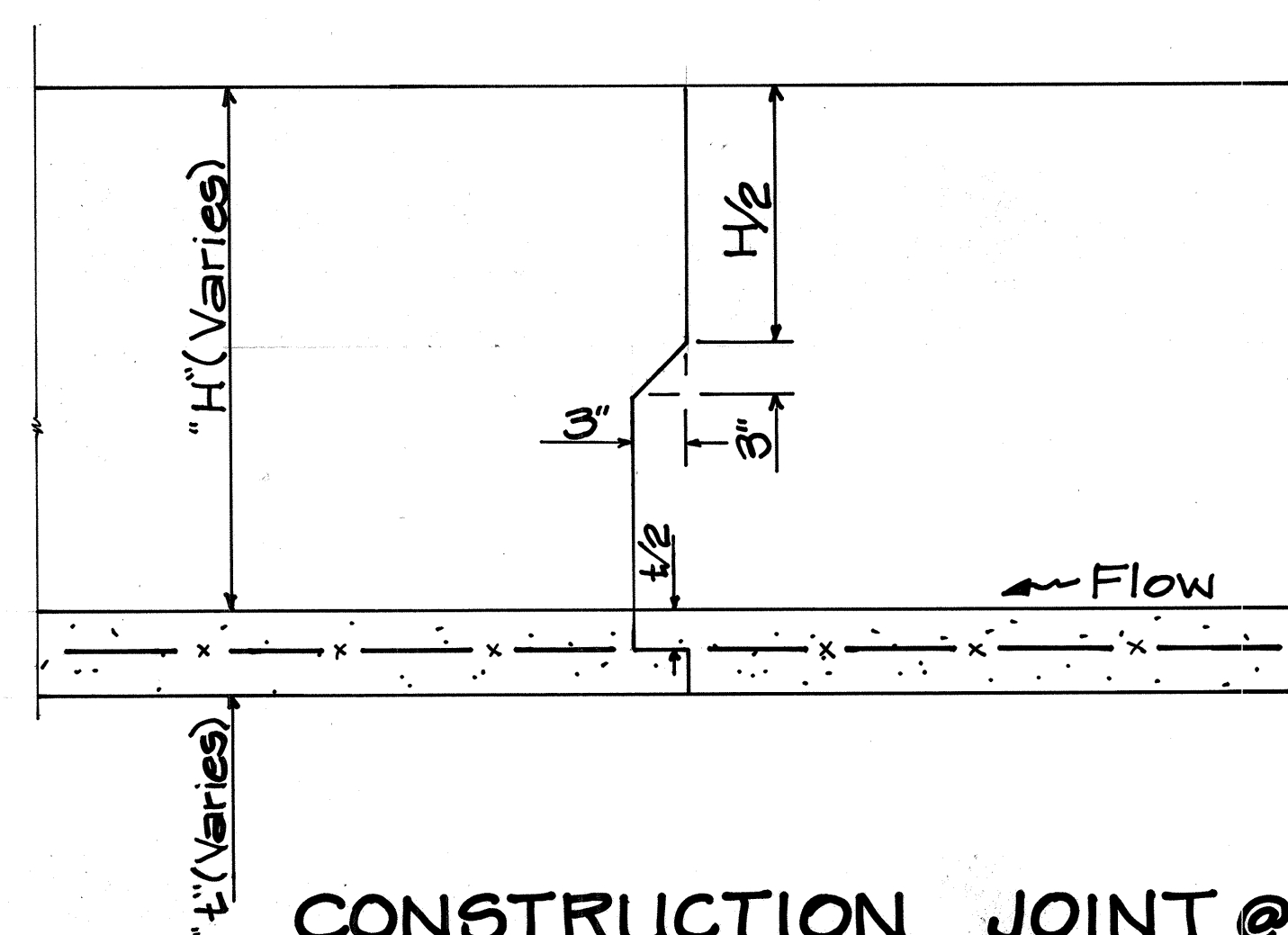


SHEET No.35 OF 50 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-RF-031-1(6)	1978	143	262



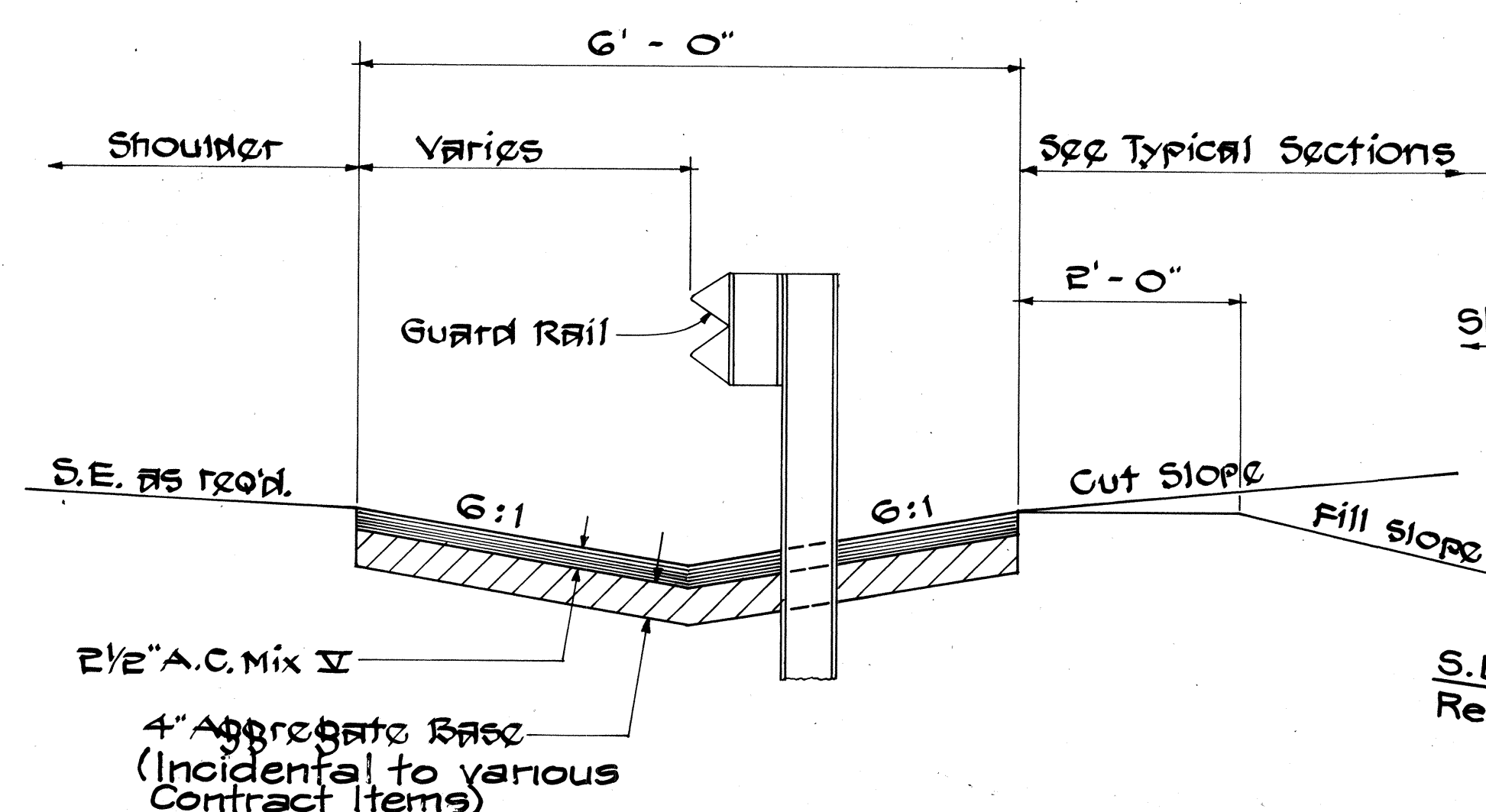
EXPANSION JOINT @ 75' o.c.
Not to Scale



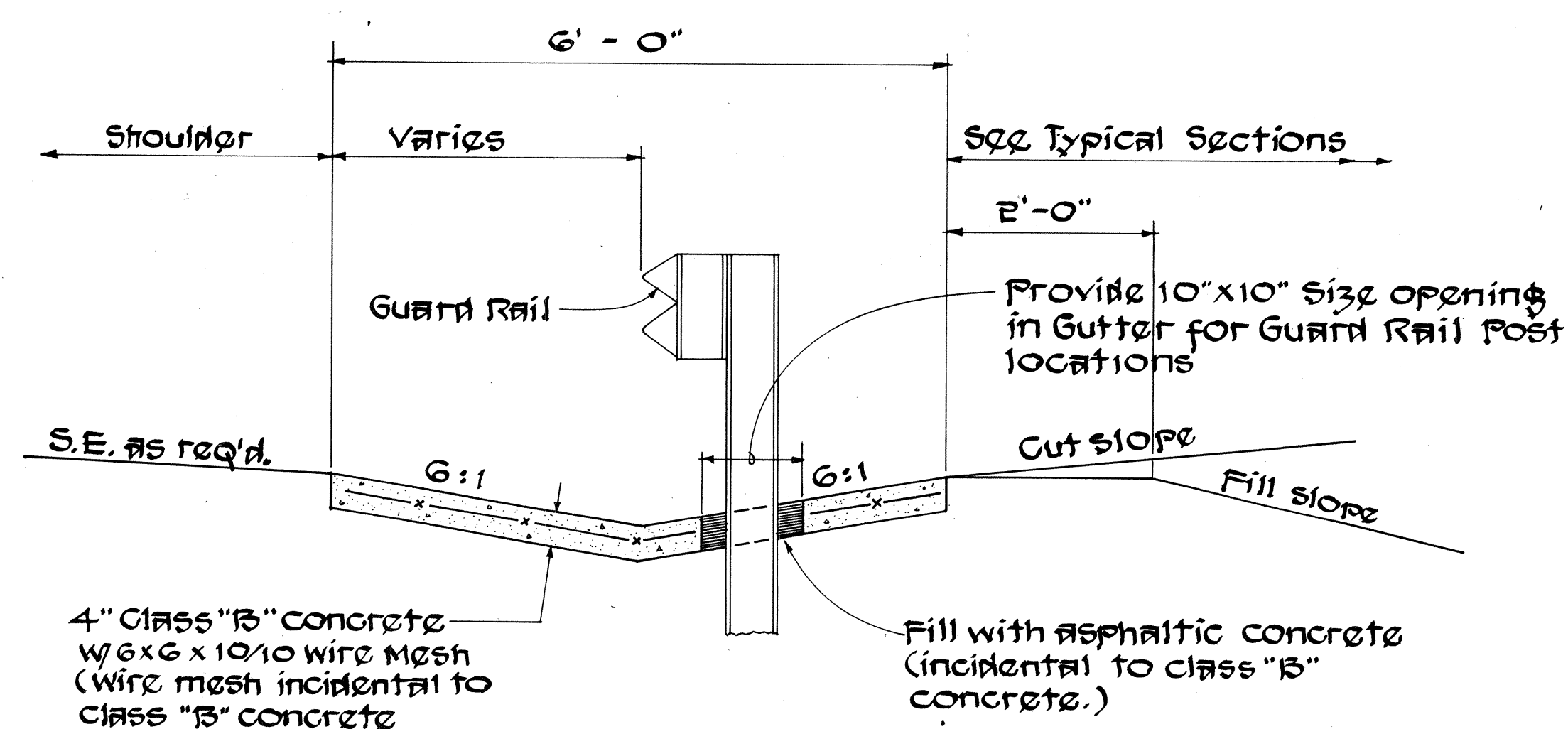
CONSTRUCTION JOINT @ 25' o.c.
Not to Scale

INTERCEPTOR DITCH DETAILS

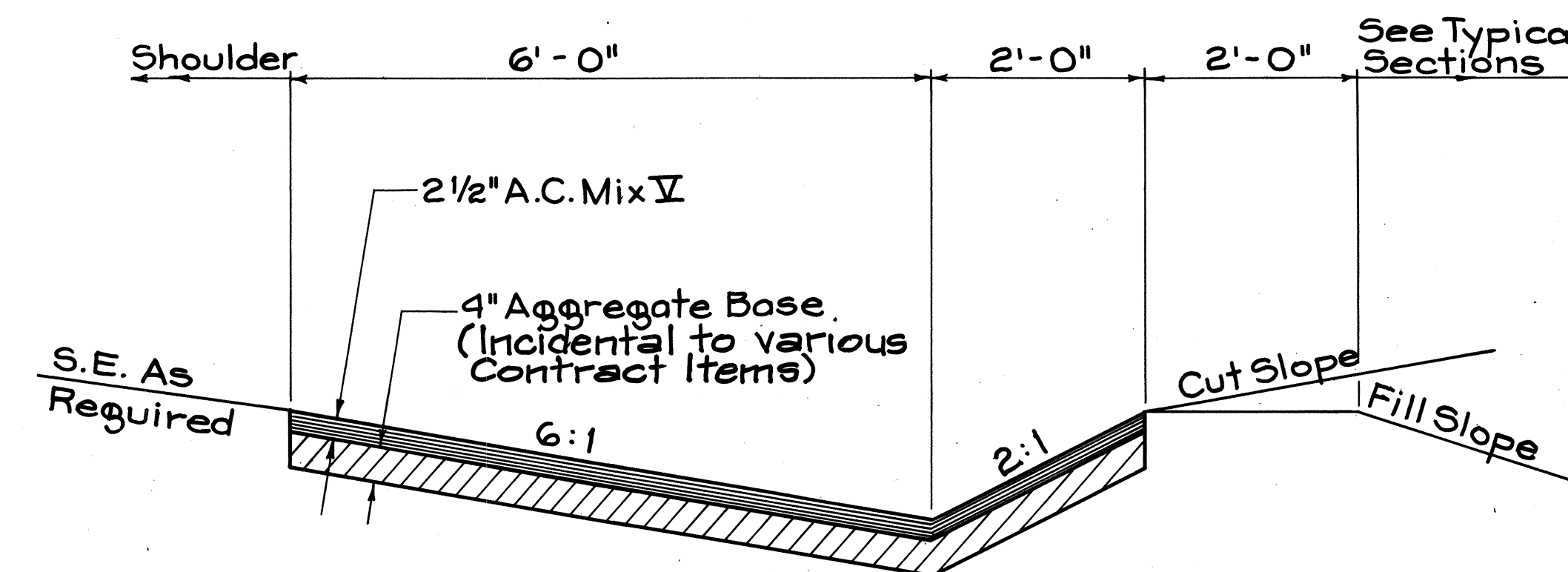
Scale As Shown



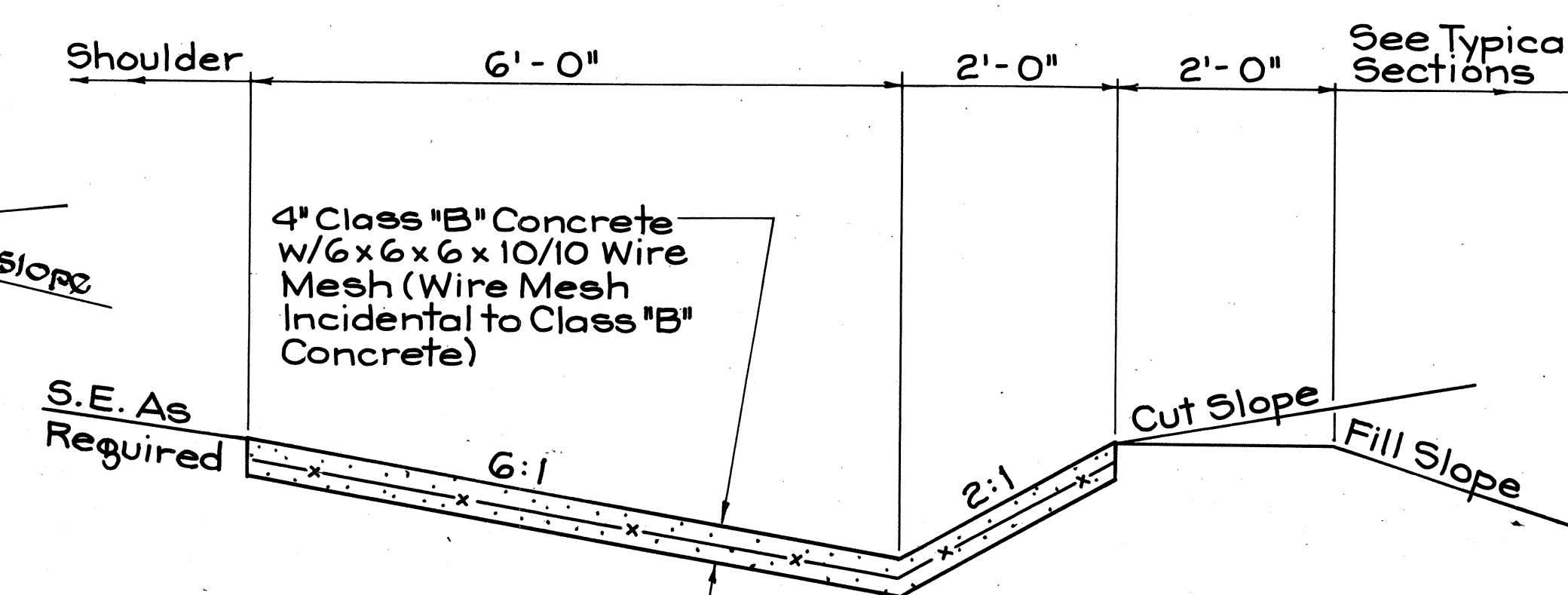
TYPE 7 (61616) BITUMINOUS GUTTER
Scale: 3/4" = 1'-0"



TYPE 2 (61616) CONCRETE GUTTER
Scale: 3/4" = 1'-0"



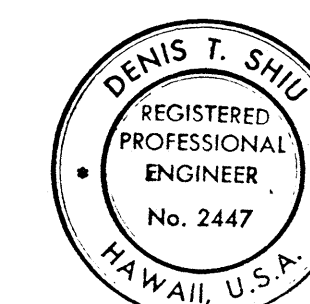
TYPE 7 (61218) BITUMINOUS GUTTER
Scale: 3/4" = 1'-0"



TYPE 2 (61218) CONCRETE GUTTER
Scale: 3/4" = 1'-0"

NOTE:

1. CONCRETE GUTTERS: For Construction Joint Details, See Sht. No. 66



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LAND TRANSPORTATION FACILITIES DIVISION

DRAINAGE DETAILS

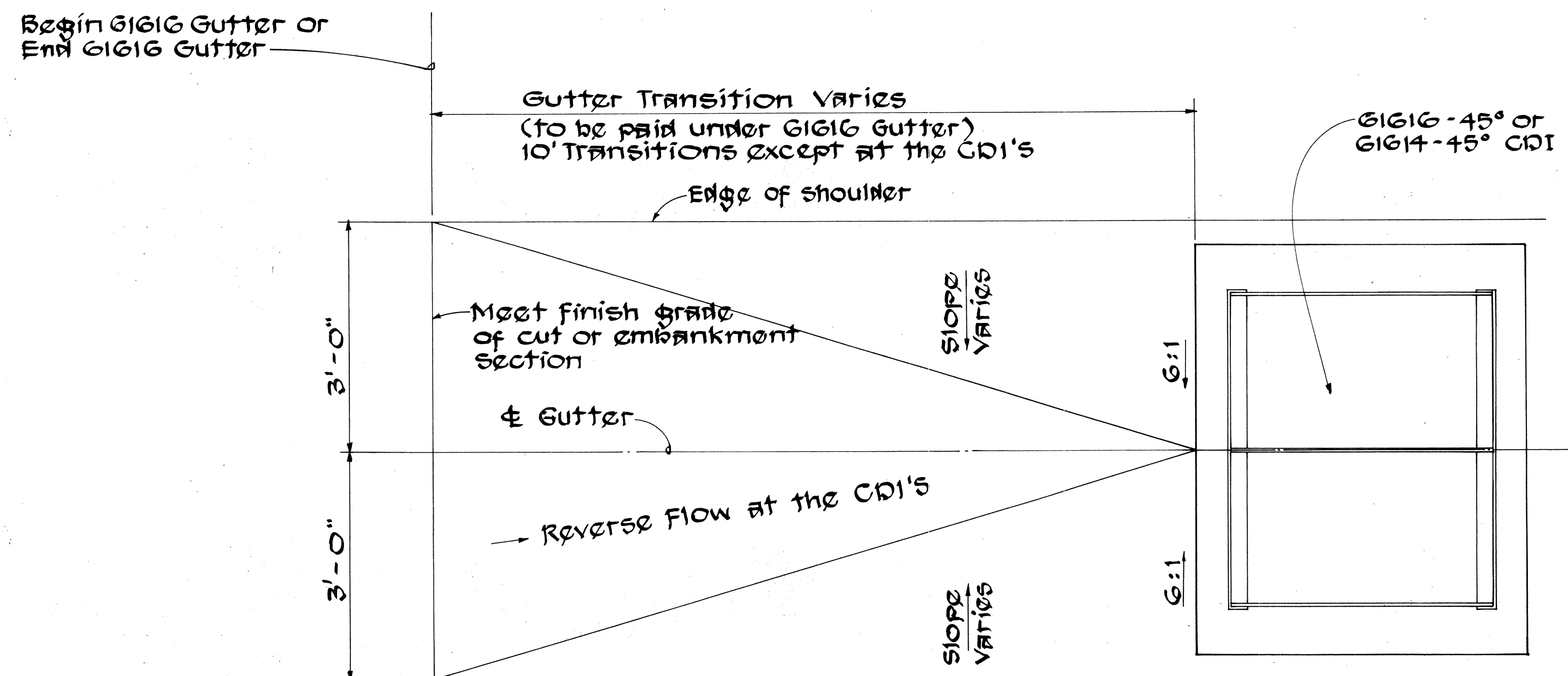
PIILANI HIGHWAY
VICINITY OF MOKULELE HIGHWAY TO
VICINITY OF KILOHANA STREET
F.A. PROJECT NO. F-RF-031-1(6)

SCALE: AS SHOWN DATE SEP 1978

SHEET No. 36 OF 50 SHEETS

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

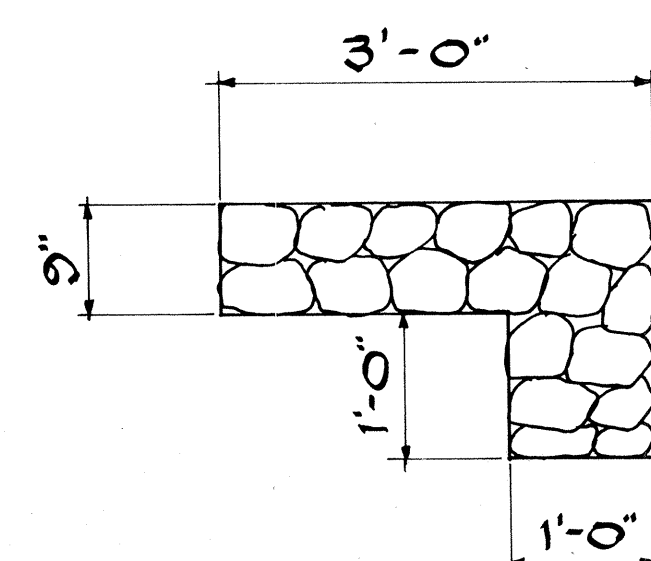
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-RF-031-1(6)	1978	144	262



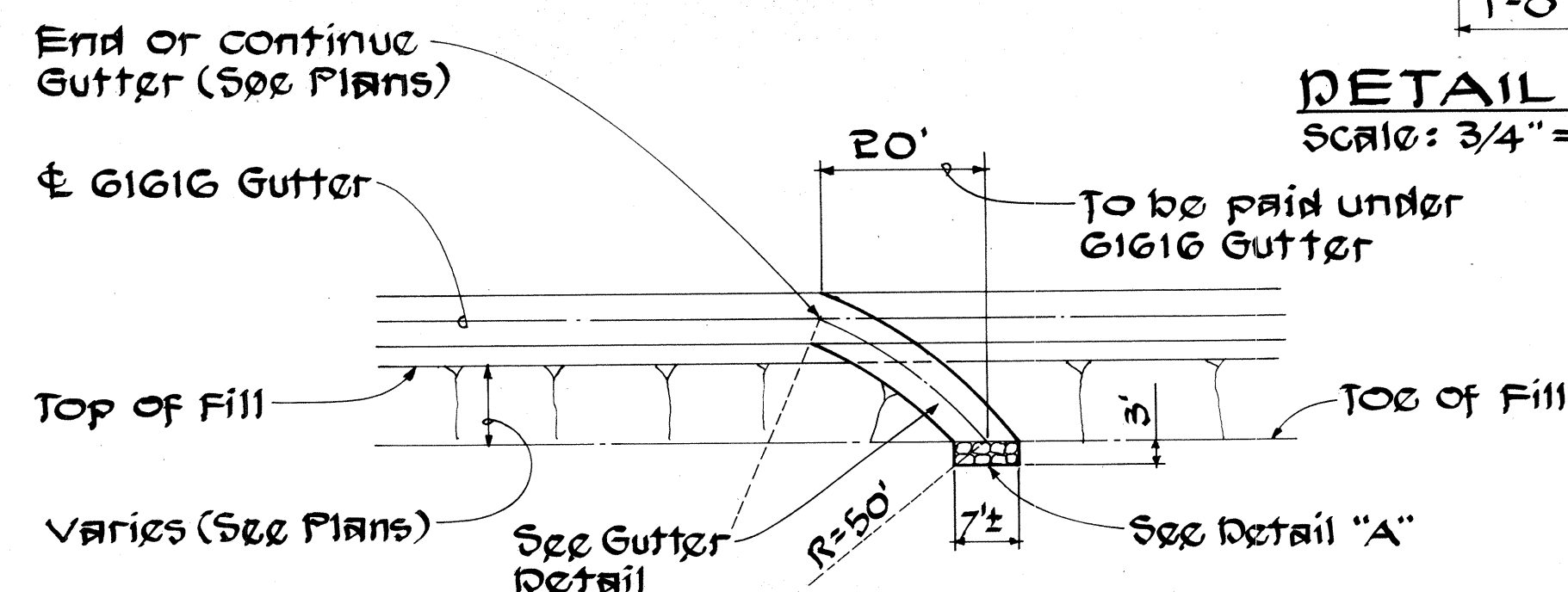
TYPICAL GUTTER TRANSITION AT TERMINATION OR BEGINNING OF GIGIG GUTTER
Scale: 3/4" = 1'-0"

NOTE:

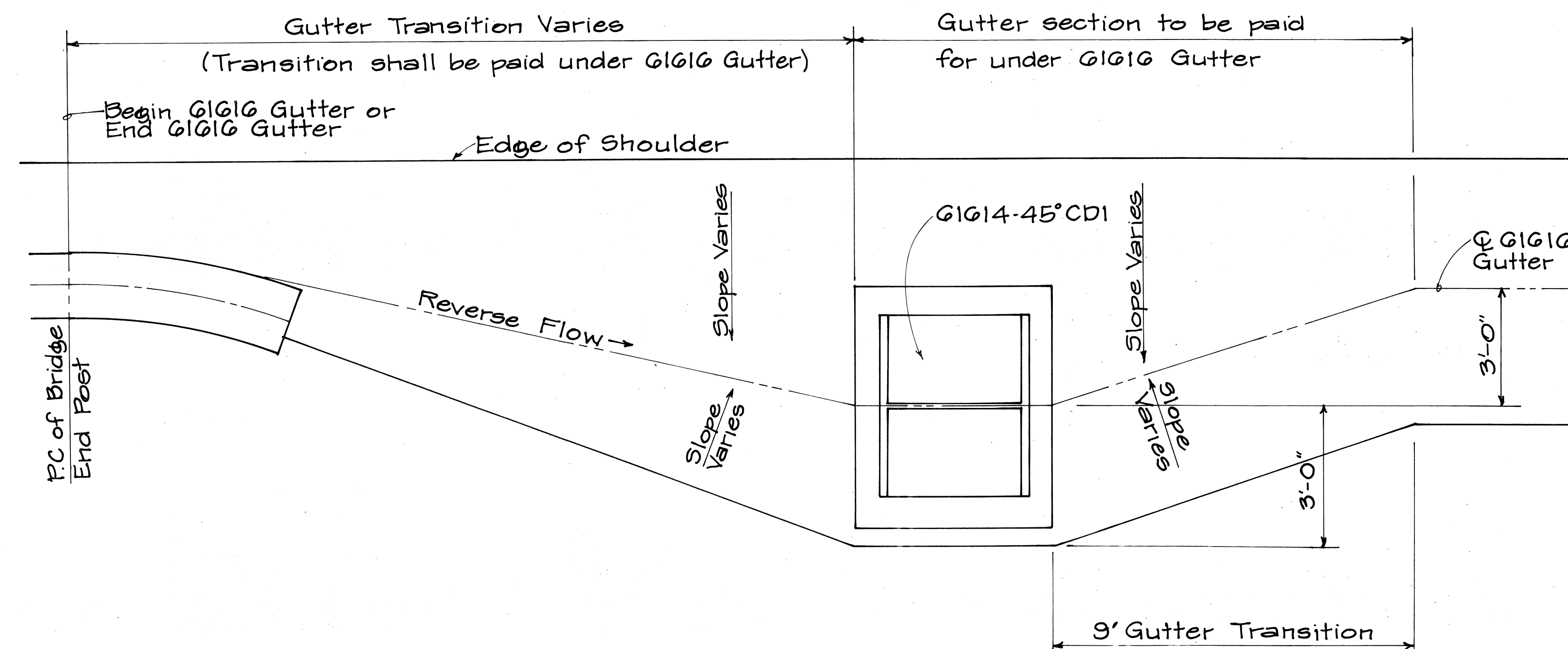
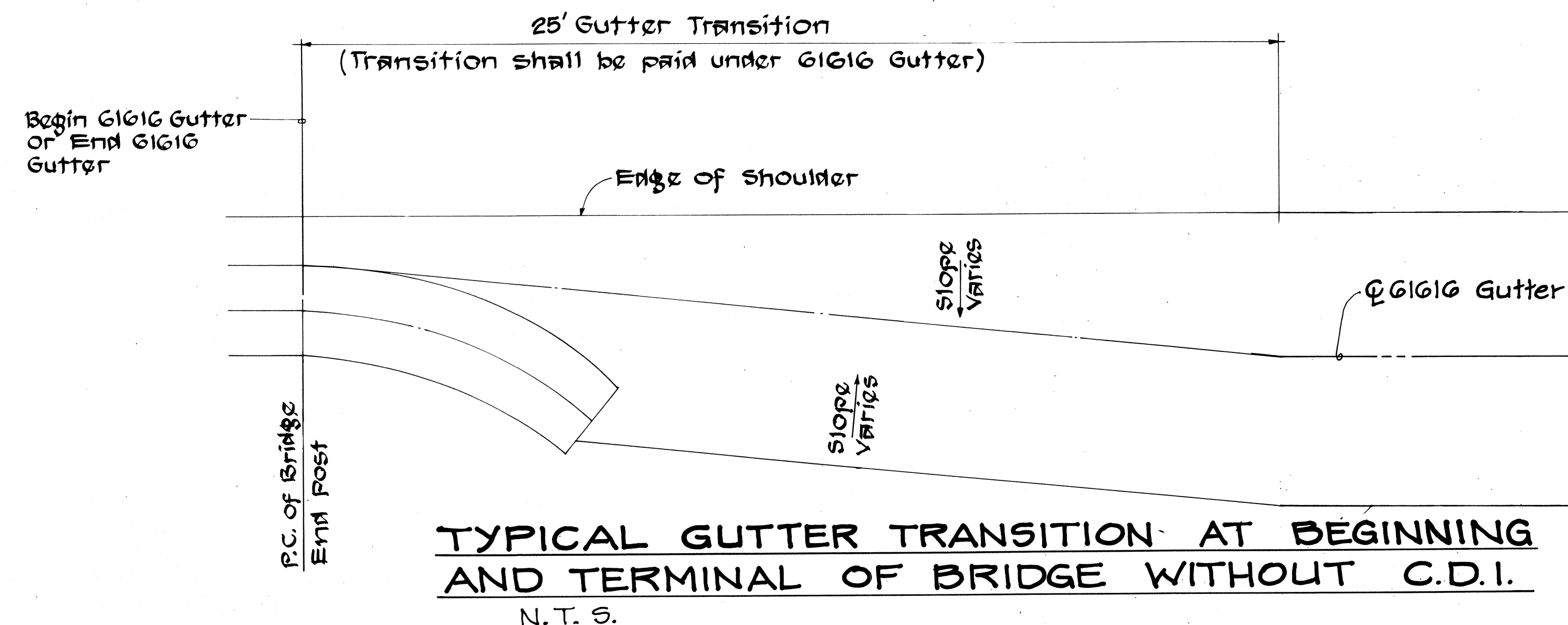
All Lined Drainage Ditches Shall be 4" Class "B" Concrete or Shotcrete w/6"x6"x10/10 wire mesh reinforcing (wire mesh incidental to class "B" concrete and shotcrete.)



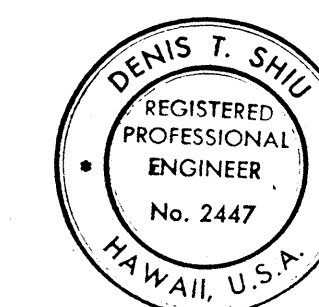
DETAIL "A"
Scale: 3/4" = 1'-0"



SPILLWAY DETAIL
Scale: 1" = 20'



TYPICAL GUTTER TRANSITION AT BEGINNING AND TERMINAL OF BRIDGES WITH C.D.I.
N.T.S.



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Denis T. Shu

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
LAND TRANSPORTATION FACILITIES DIVISION

DRAINAGE DETAILS
PILANI HIGHWAY
VICINITY OF MOKULELE HIGHWAY TO
VICINITY OF KILOHANA STREET
F.A. PROJECT NO. F-RF-031-1(6)

SCALE: AS SHOWN DATE: SEP 1978

SHEET No. 37 OF 50 SHEETS

GENERAL NOTES

- 

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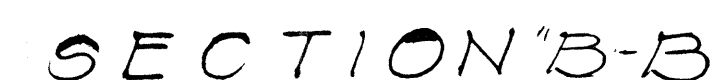
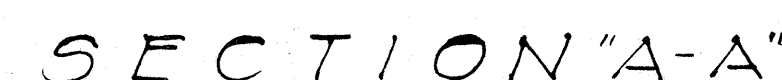
Arnis L. Shu



PIILANI HIGHWAY
VICINITY OF MOKULELE HIGHWAY TO
VICINITY OF KILOHANA STREET
F.A. PROJECT NO. F-031-1(6)

SCALE : AS SHOWN DATE SEP 1978

SHEET No. 38 OF 50 SHEETS



- * 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.

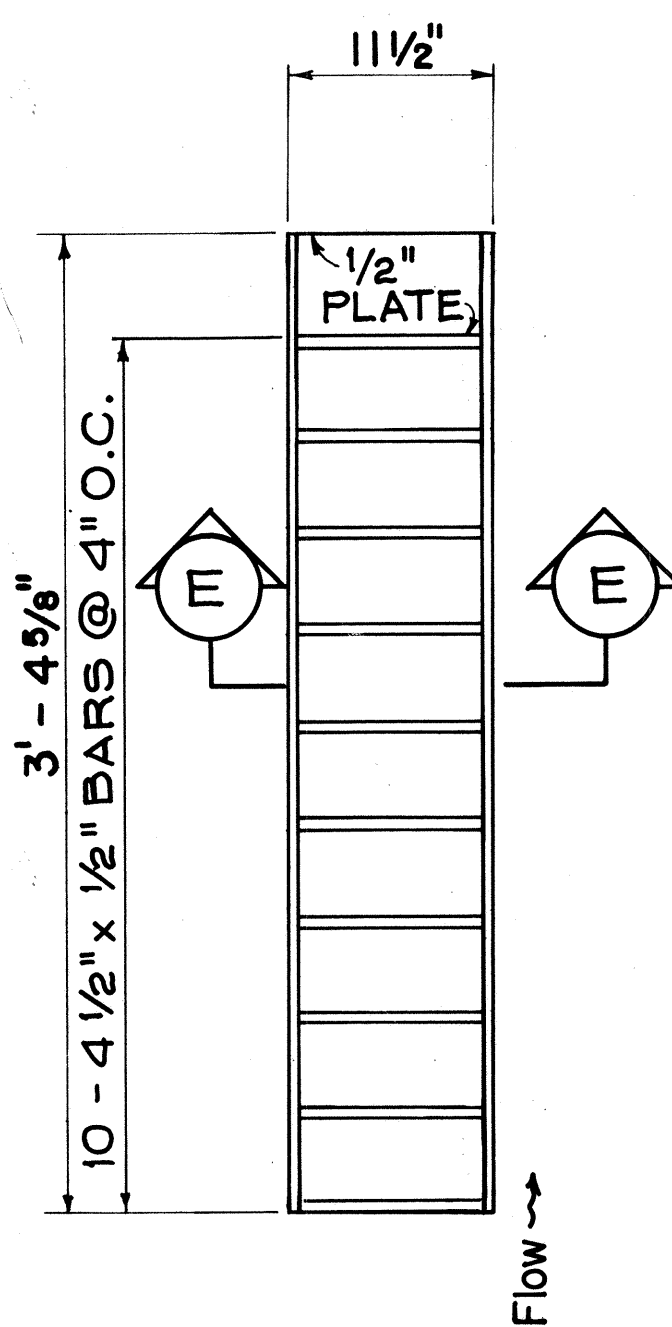
DETAILS OF TYPE 61614-45°
STEEL FRAME AND GRATES AND DROP INTAKE

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

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-RF-031-1(6)	1978	146	262

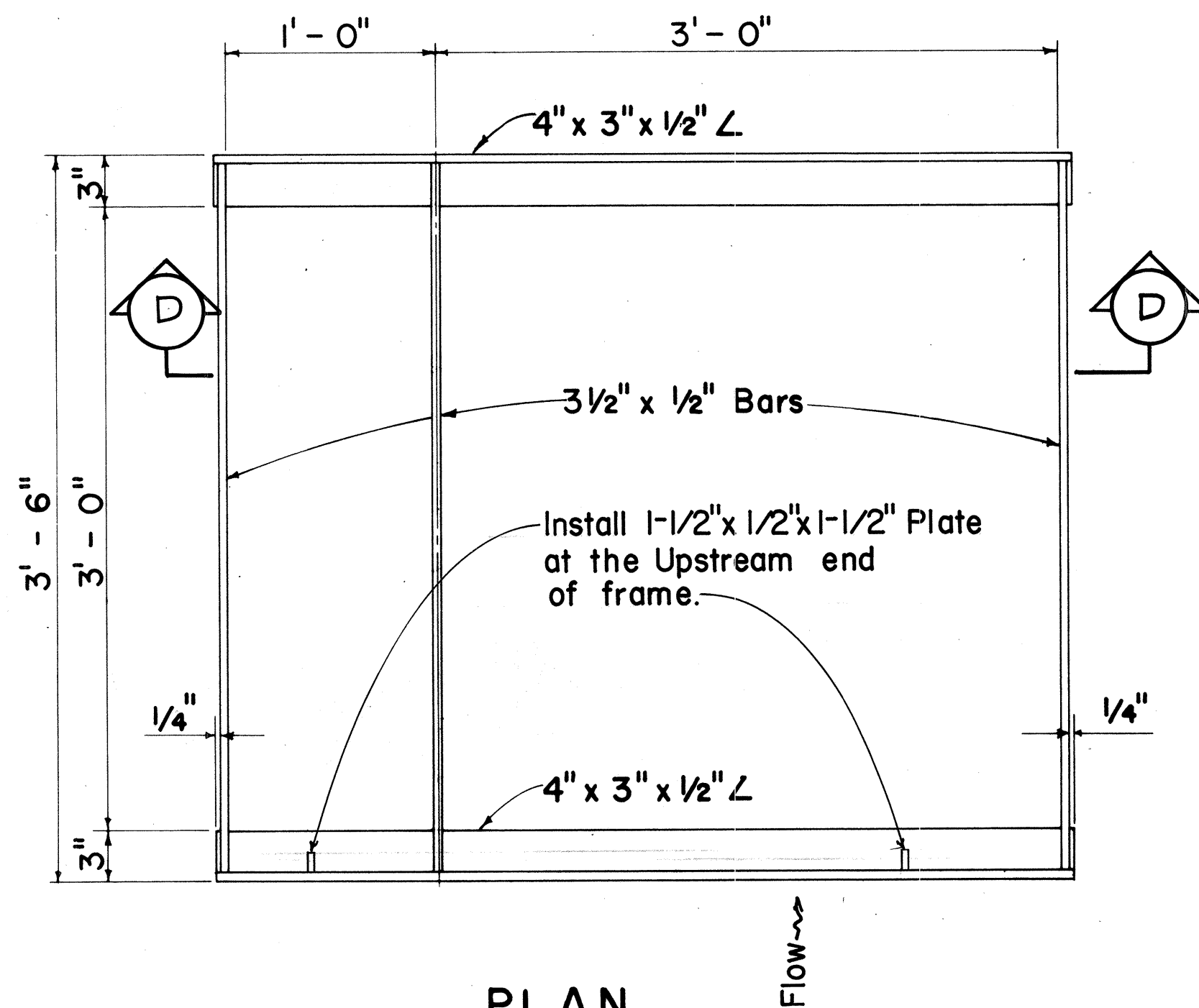
GENERAL NOTES

- Grates and Frames shall be hot dip galvanized after fabrication, see specifications.
- All welds $\frac{3}{8}$ " unless otherwise noted.
- 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. The Manhole Rungs may be placed at any location as ordered by the Engineer.
- Bituminous-Gutter Type 7 (61218)
Top of concrete wall for Drop Intake shall be 2" below top of steel frame for grates.
Concrete-Gutter Type 2 (61218)
Top of concrete wall for Drop Intake shall be flush with top of steel frame for grates.



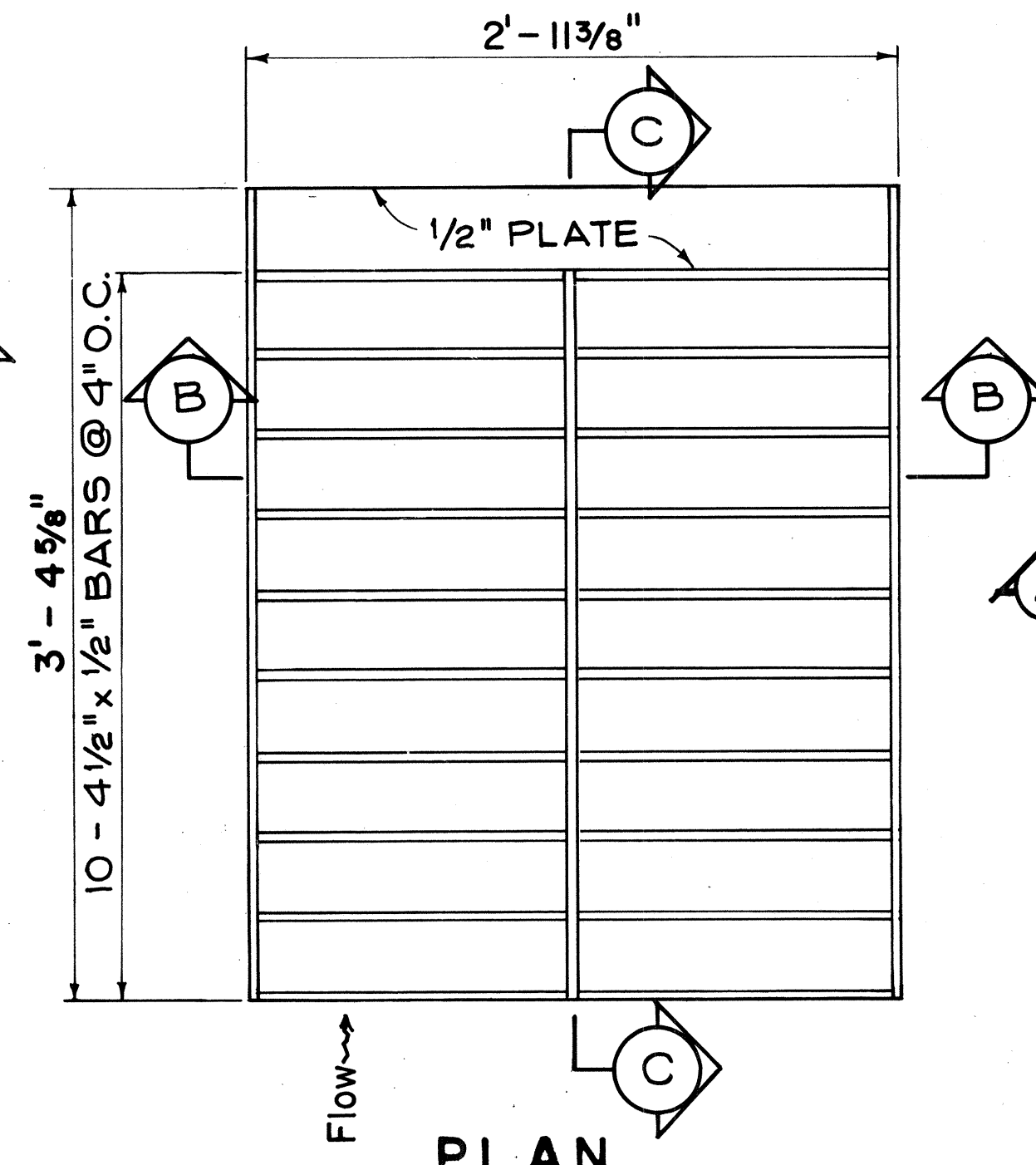
PLAN

Scale: $1\frac{1}{2}'' = 1' - 0''$



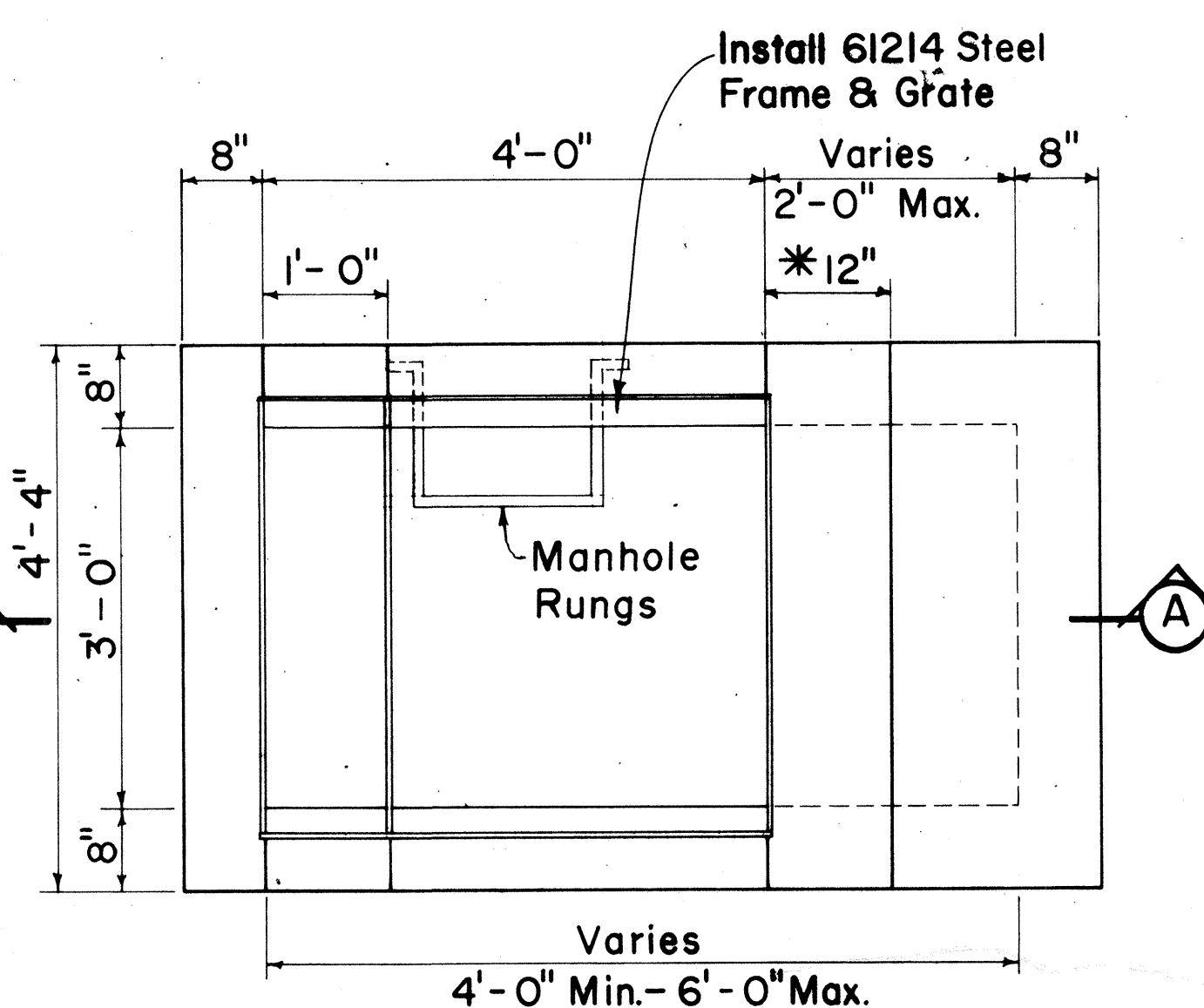
PLAN

Scale: $1\frac{1}{2}'' = 1' - 0''$

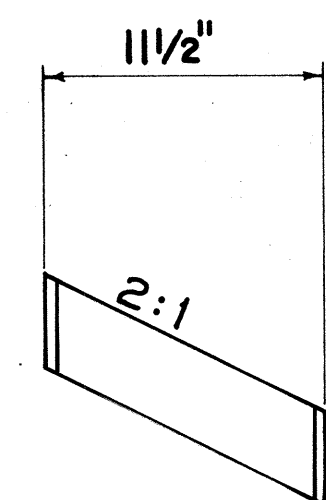


PLAN

Scale: $1\frac{1}{2}'' = 1' - 0''$

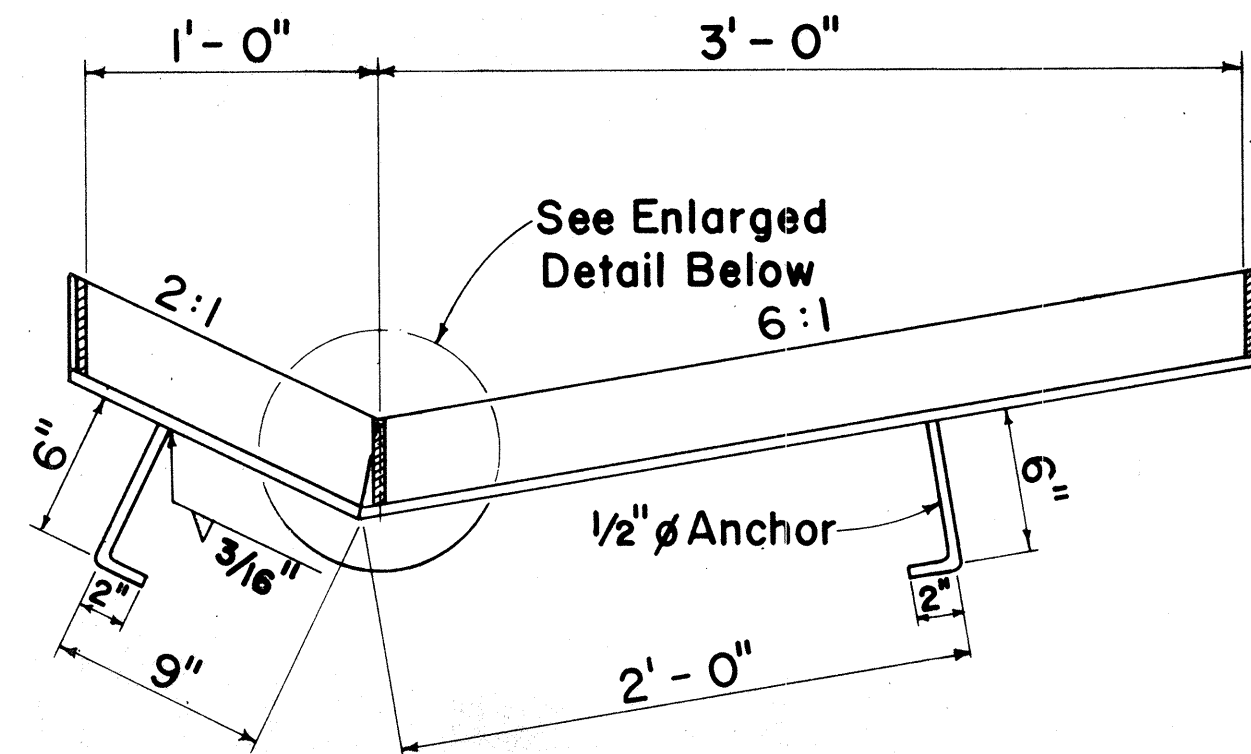


PLAN



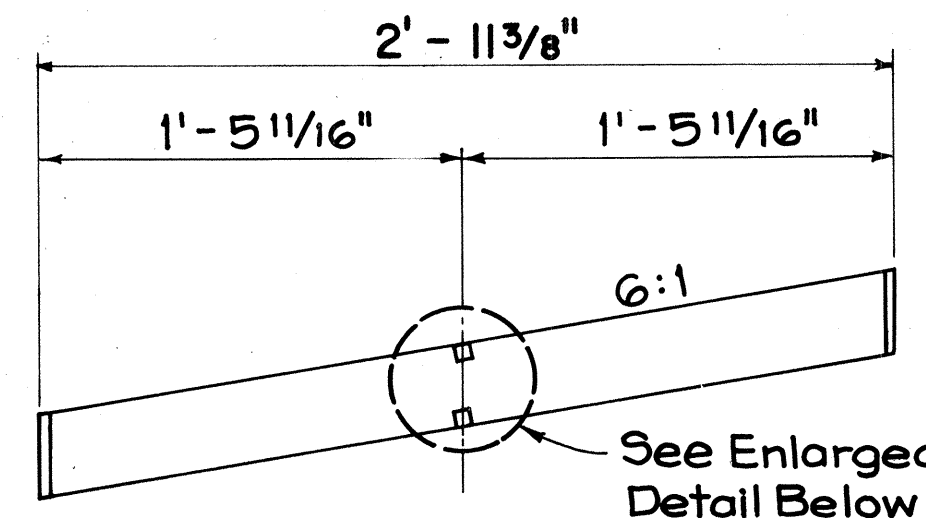
SECTION E-E

Scale: $1\frac{1}{2}'' = 1' - 0''$



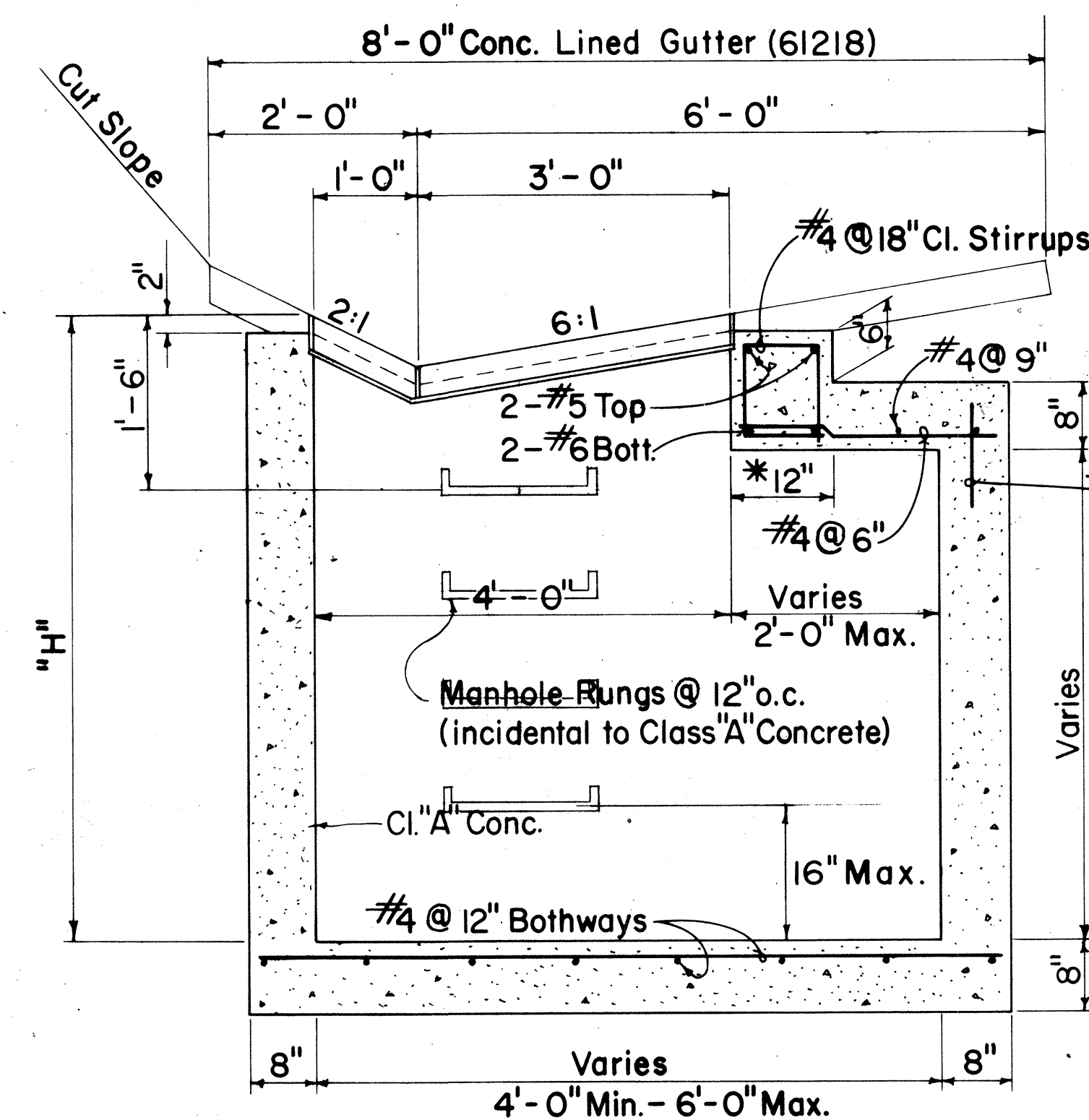
SECTION D-D

Scale: $1\frac{1}{2}'' = 1' - 0''$



SECTION B-B

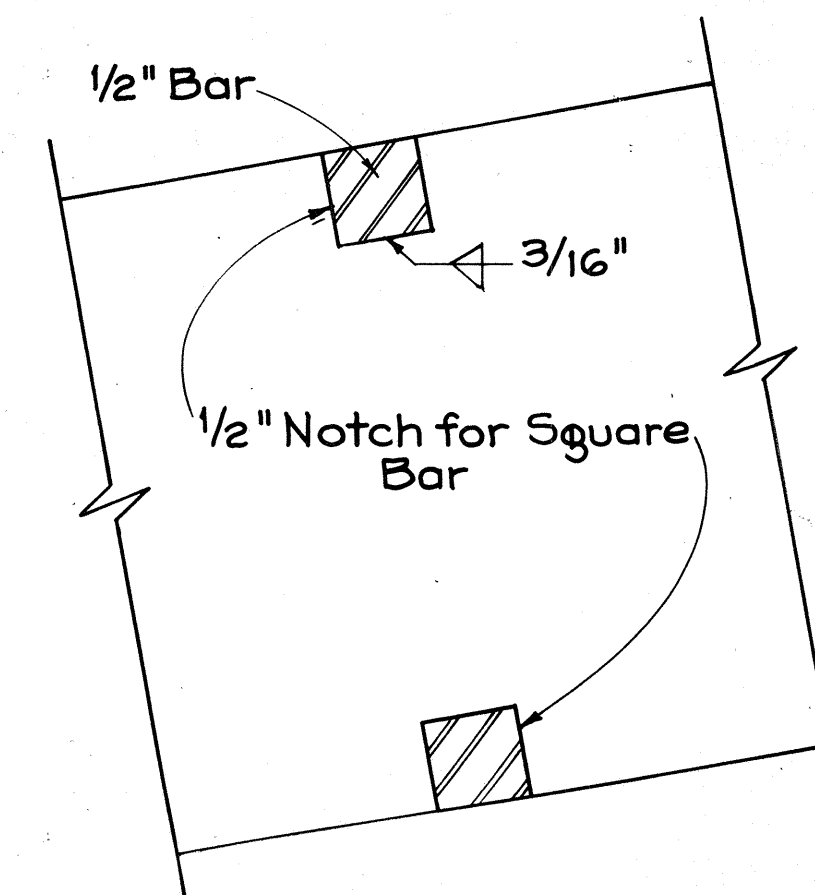
Scale: $1\frac{1}{2}'' = 1' - 0''$



SECTION A-A

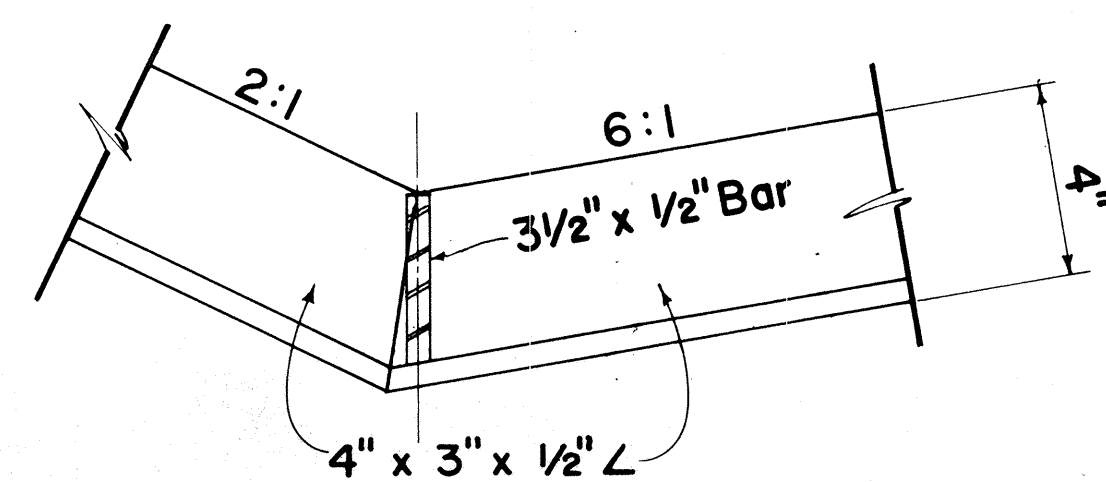
DETAIL OF 61214-45° DROP INTAKE

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



GRATE

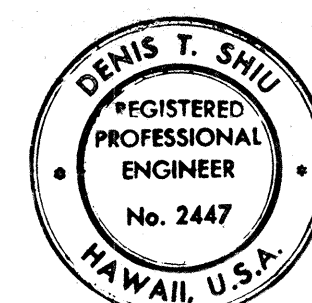
Scale: $1'' = 0' - 1''$



FRAME

Scale: $3'' = 1' - 0''$

DETAILS OF TYPE 61214-45° STEEL FRAME AND GRATES



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*For Minimum size box of 4'-0" only, use 8" and eliminate reinforcing steel shown in top portion.

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HIGHWAYS DIVISION

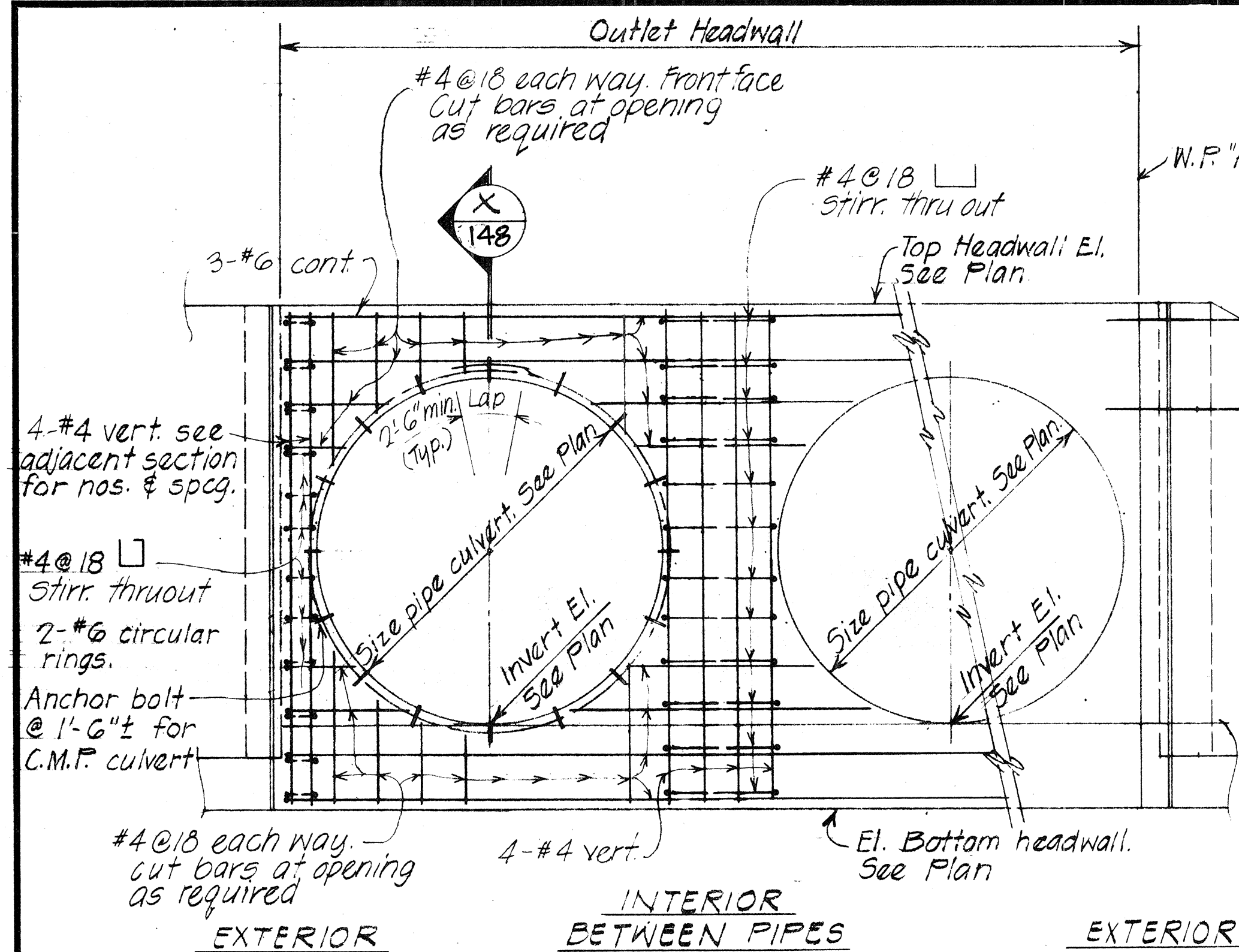
DRAINAGE DETAILS

PIILANI HIGHWAY
VICINITY OF MOKULELE HIGHWAY TO
VICINITY OF KIOHANA STREET
F.A. PROJECT NO. F-031-1(6)

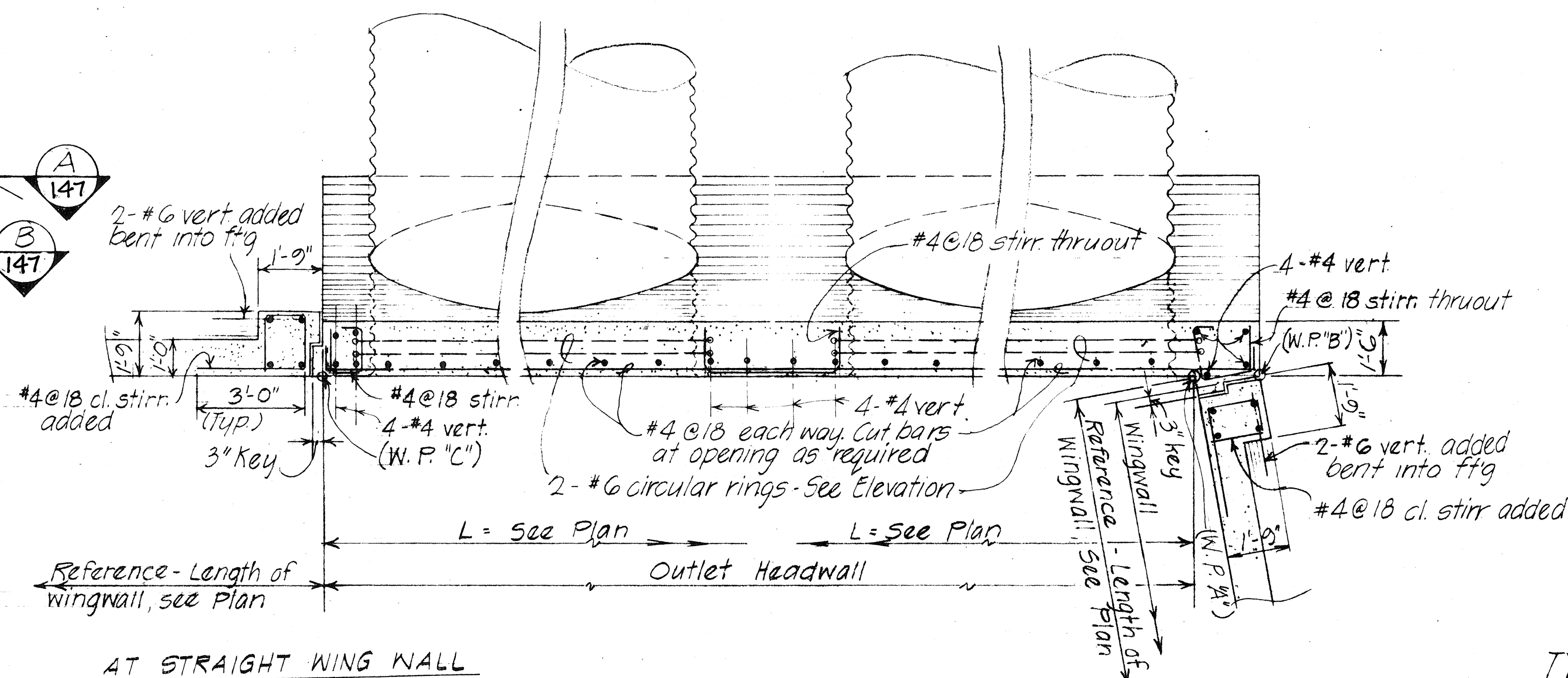
SCALE: AS SHOWN DATE SEP 1978

SHEET No. 39 OF 50 SHEETS

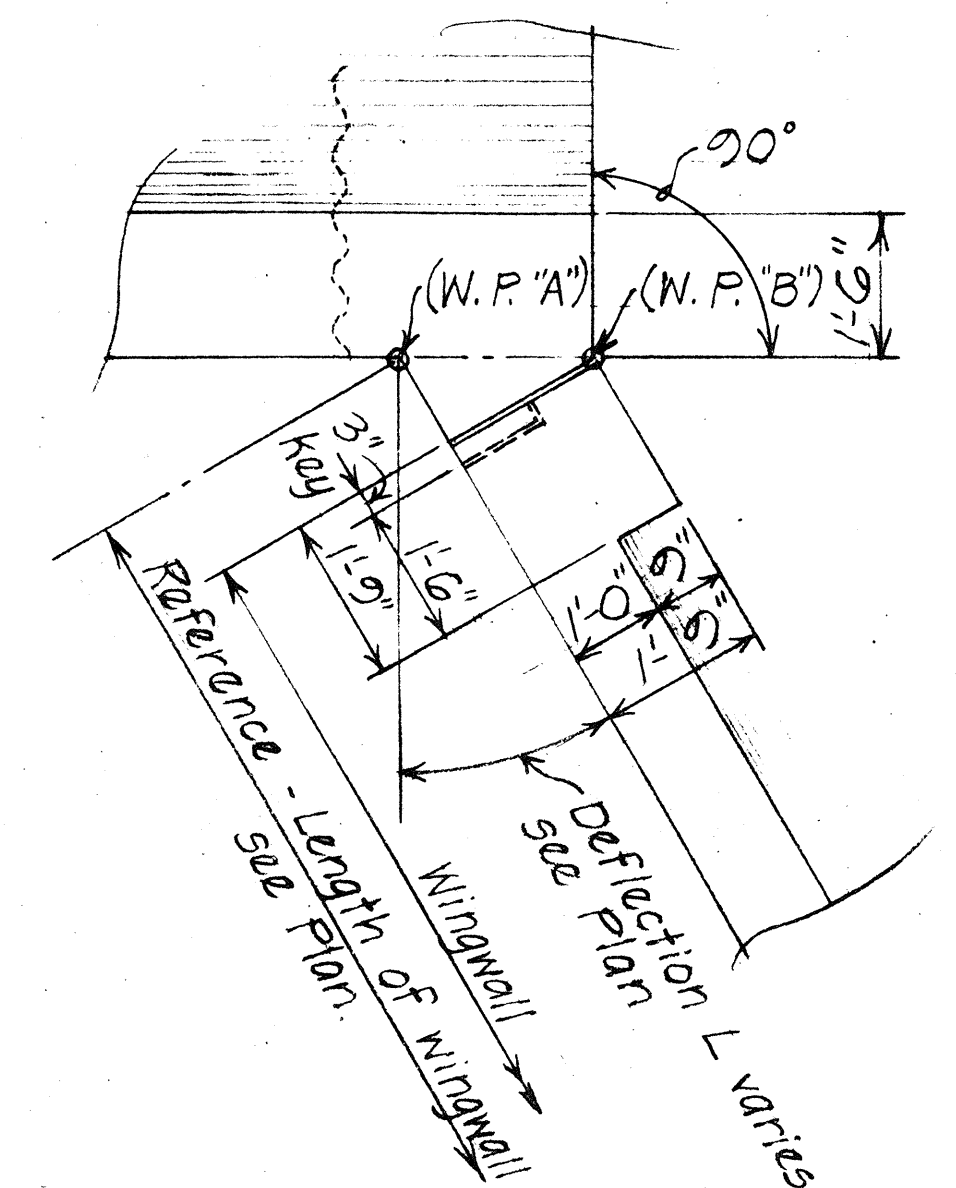
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-RF-031-1(6)	1978	147	262



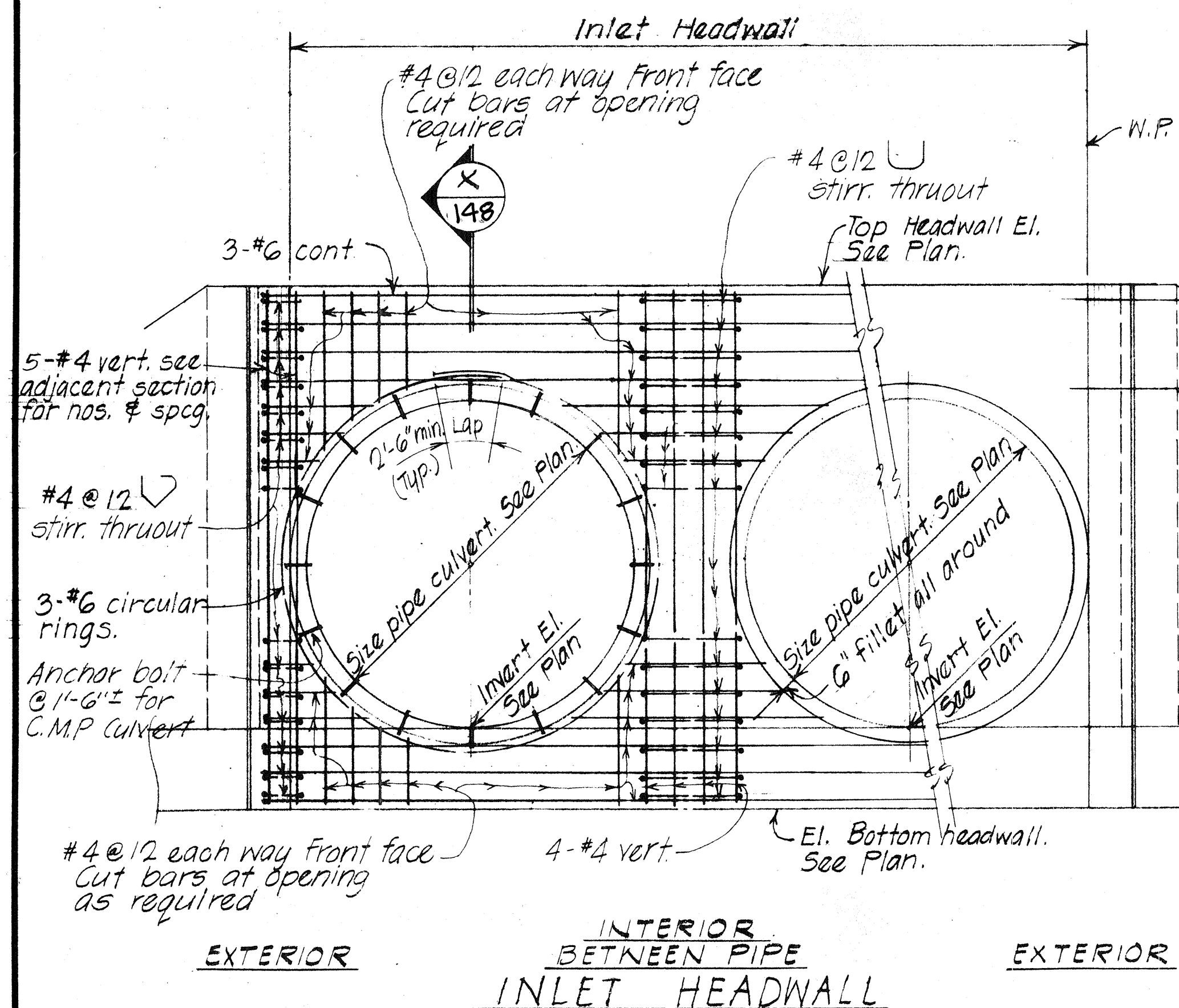
OUTLET HEADWALL



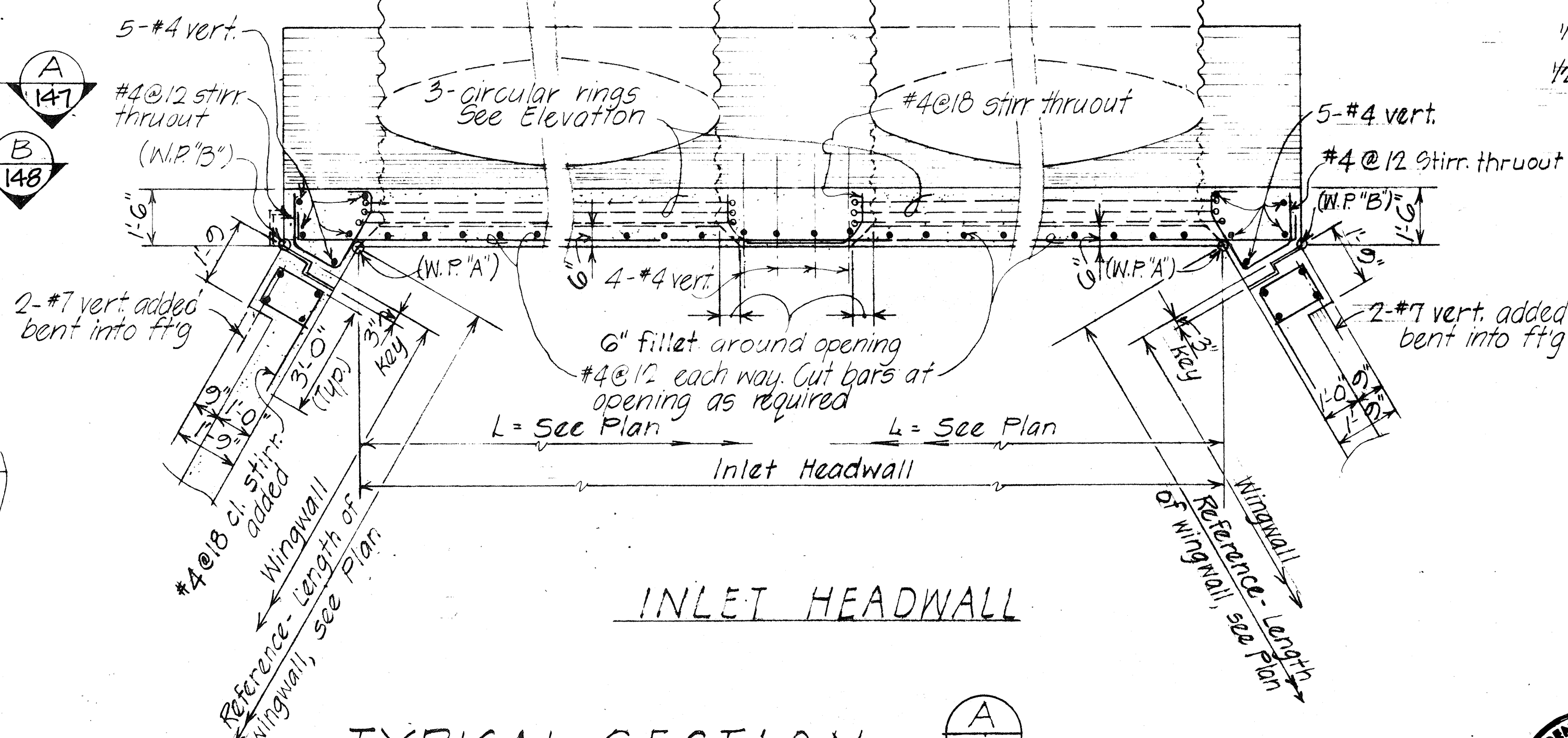
OUTLET HEADWALL



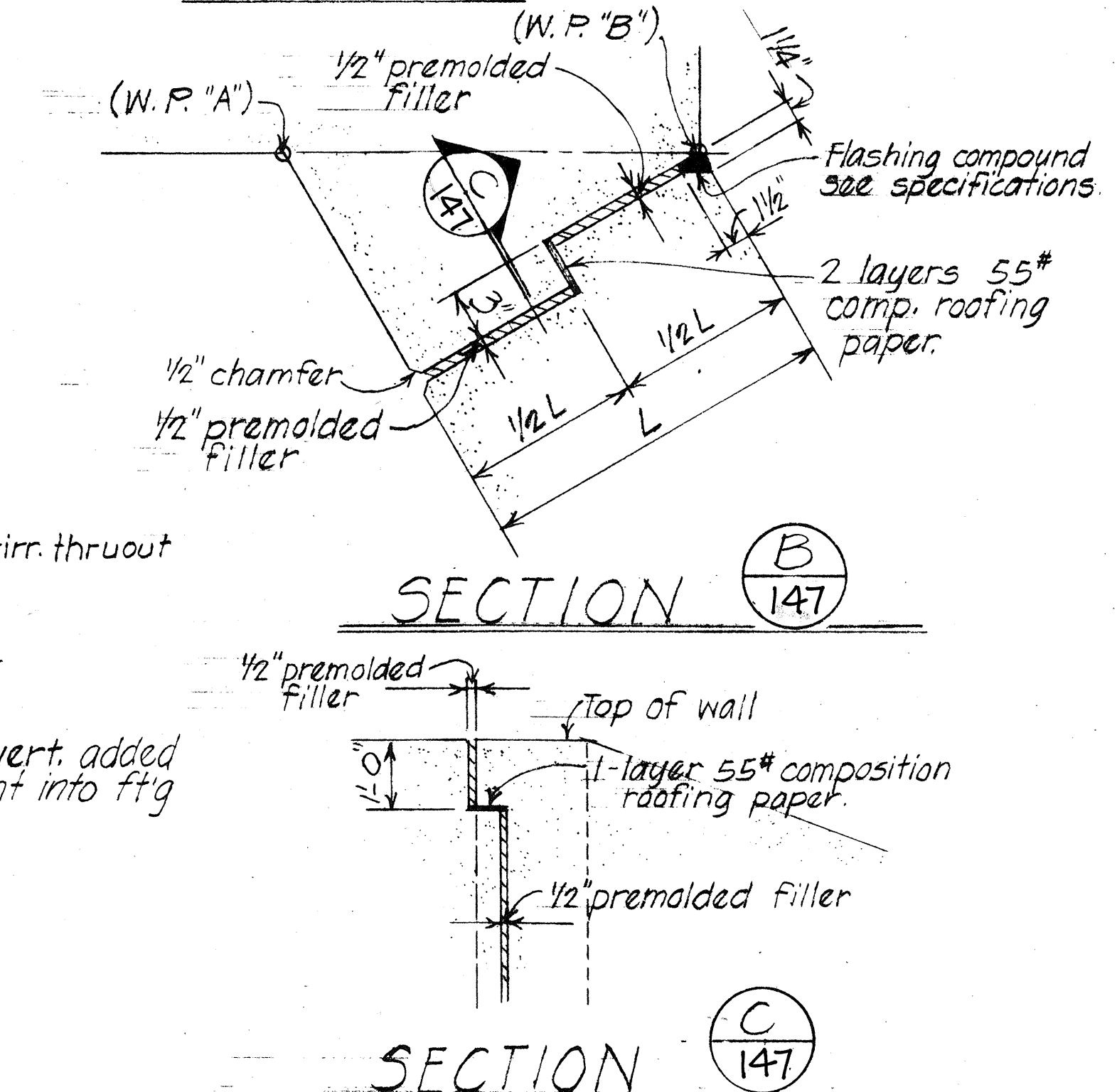
TYPICAL WINGWALL CONNECTION DETAIL AT HEADWALL Scale: 1/2" = 1'-0"



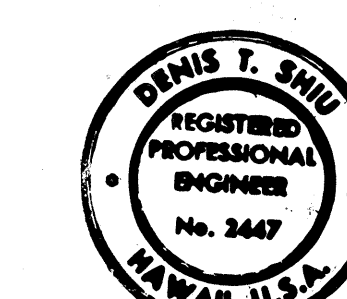
INLET HEADWALL



INLET HEADWALL



TYPICAL SECTION A 147 Scale: 3/8" = 1'-0"



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DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

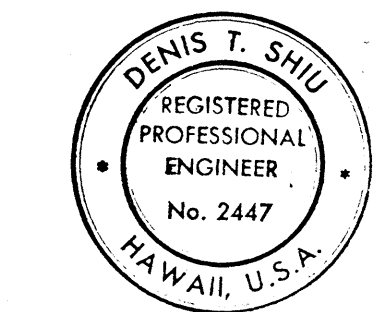
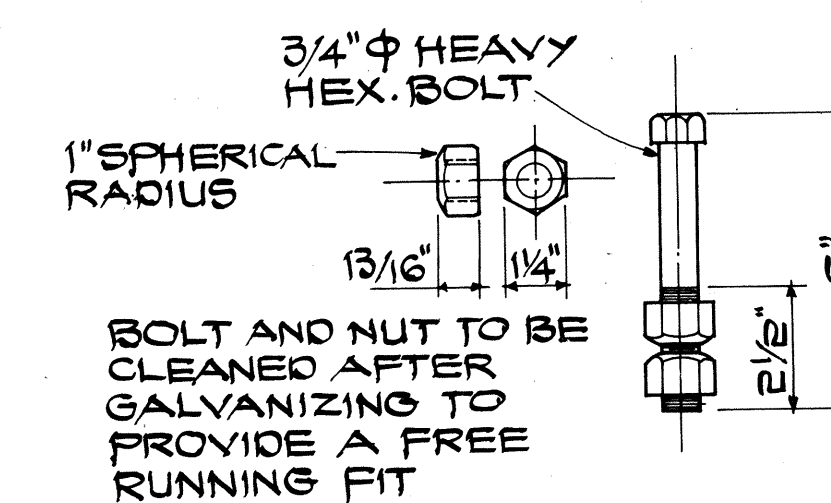
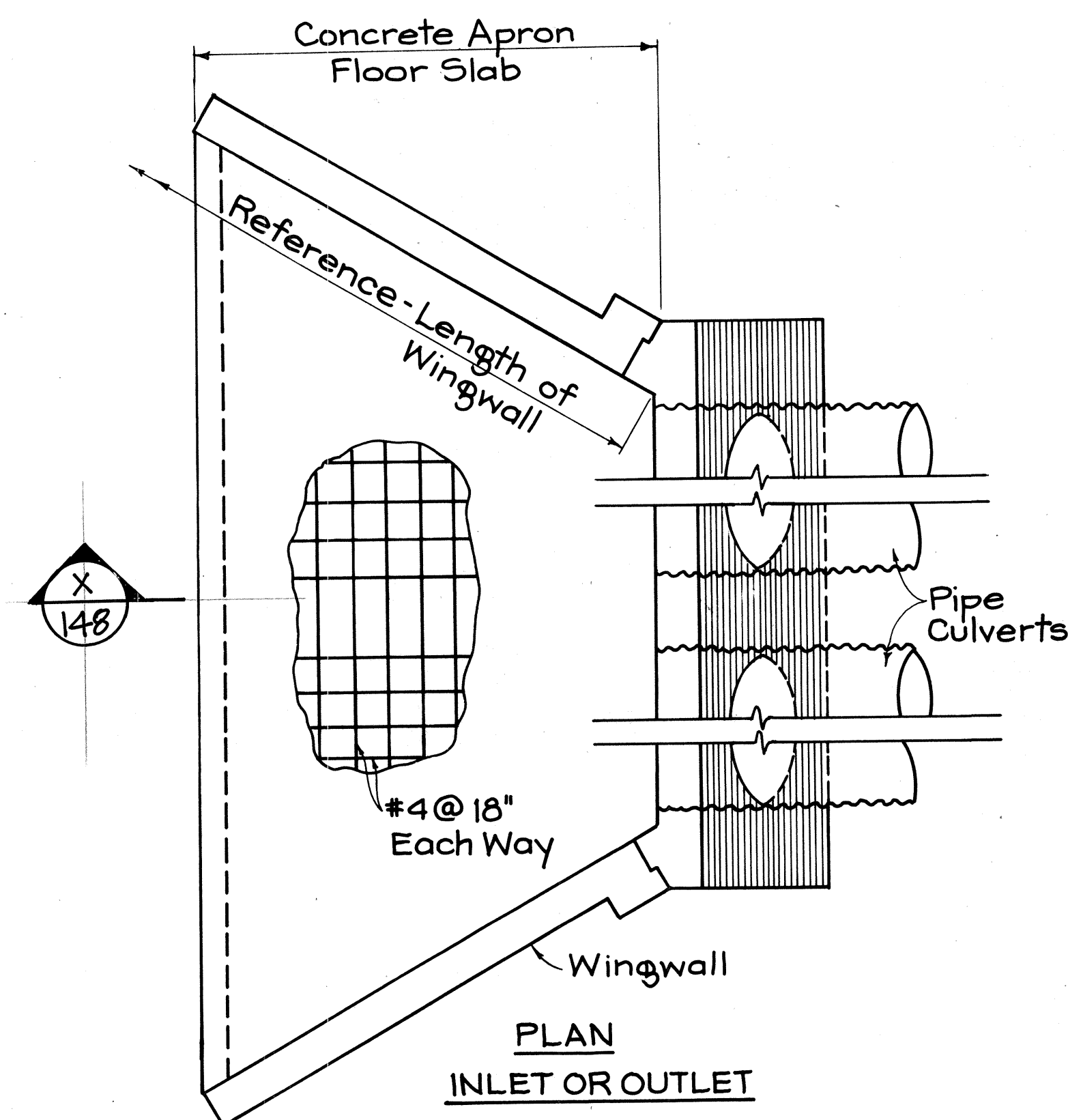
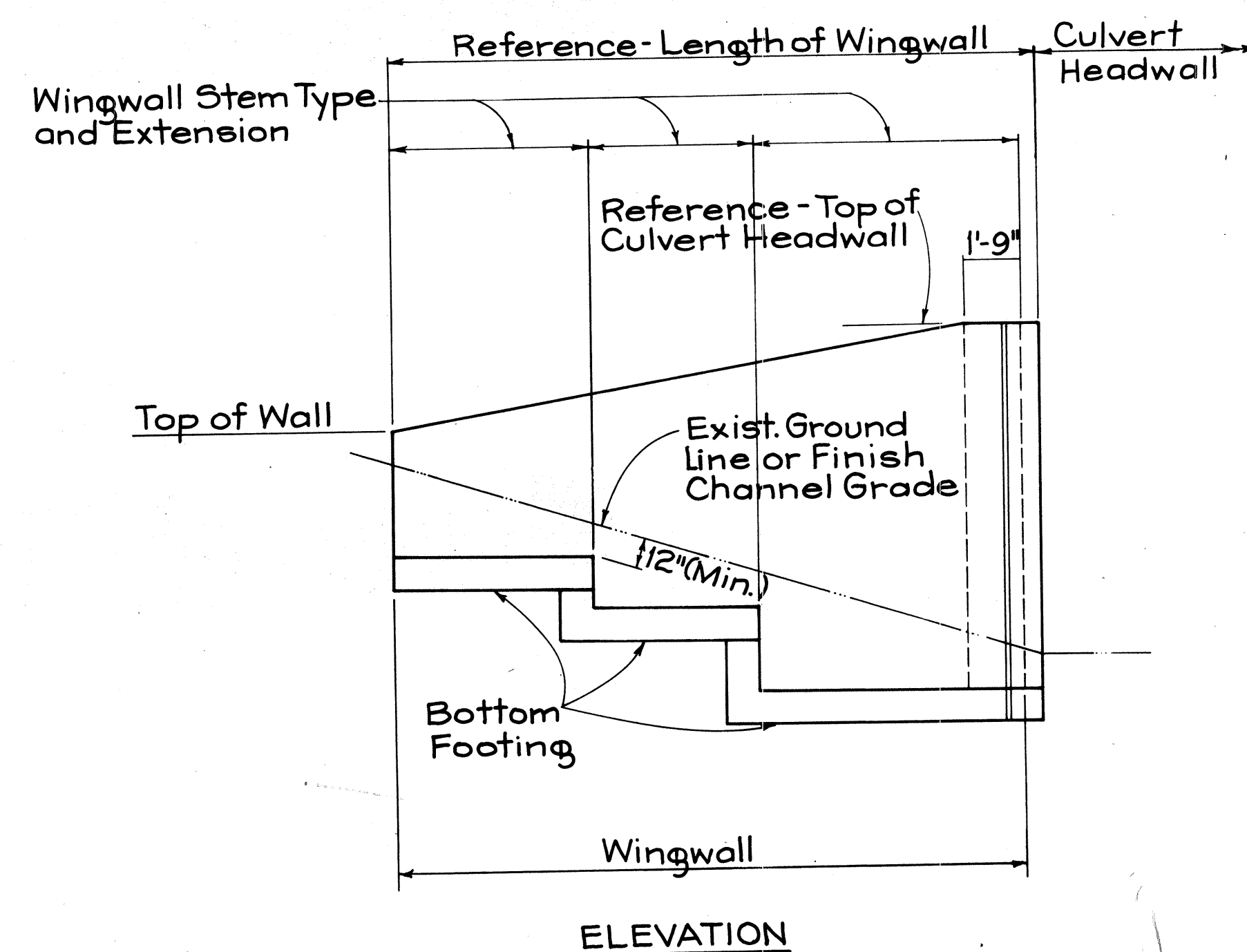
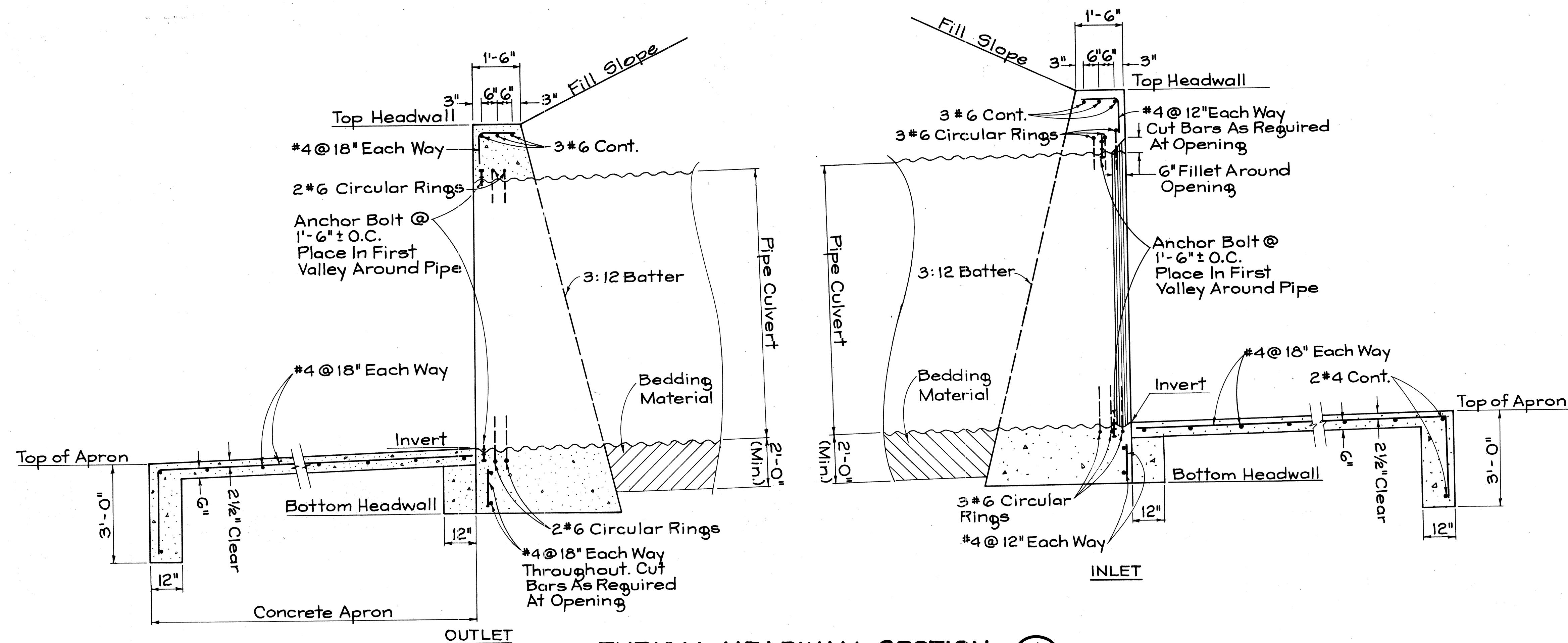
DRAINAGE DETAILS

PILANI HIGHWAY
VICINITY OF MOKULELE HIGHWAY TO
VICINITY OF KILOHANA STREET
F.A. PROJECT NO. F-031-1(6)
SCALE: AS SHOWN DATE SEP 1978
SHEET NO 40 OF 50 SHEETS

DATE	DESIGNED BY	CHECKED BY
PLANNED BY	NOTED BY	QUANTITIES BY
ORIGINAL PLAN	NO.	

TYPICAL HEADWALL ELEVATION Not to Scale

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-RF-031-1(6)	1978	148	262

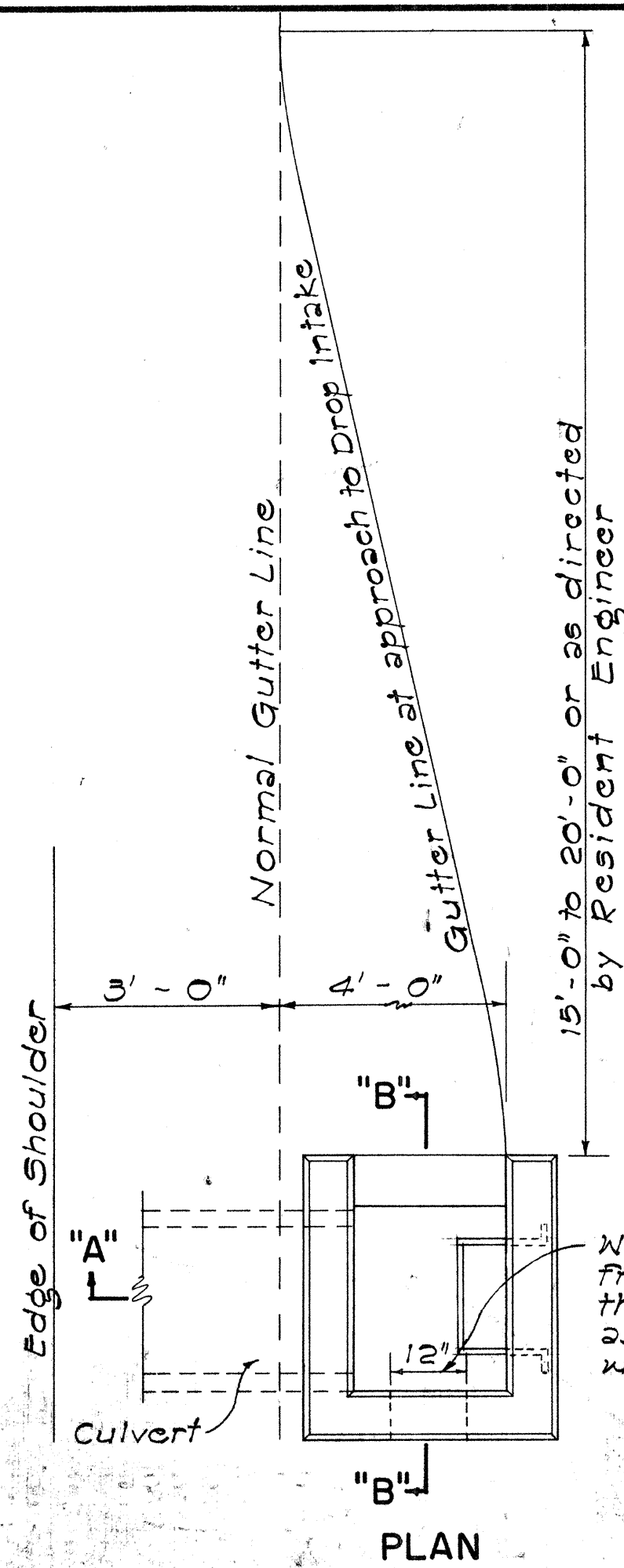


STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
LAND TRANSPORTATION FACILITIES DIVISION

DRAINAGE DETAILS
PIILANI HIGHWAY
VICINITY OF MOKULELE HIGHWAY TO
VICINITY OF KILOHANA STREET
F.A. PROJECT NO. F-RF-031-1(6)
SCALE: AS SHOWN DATE SEP 1978

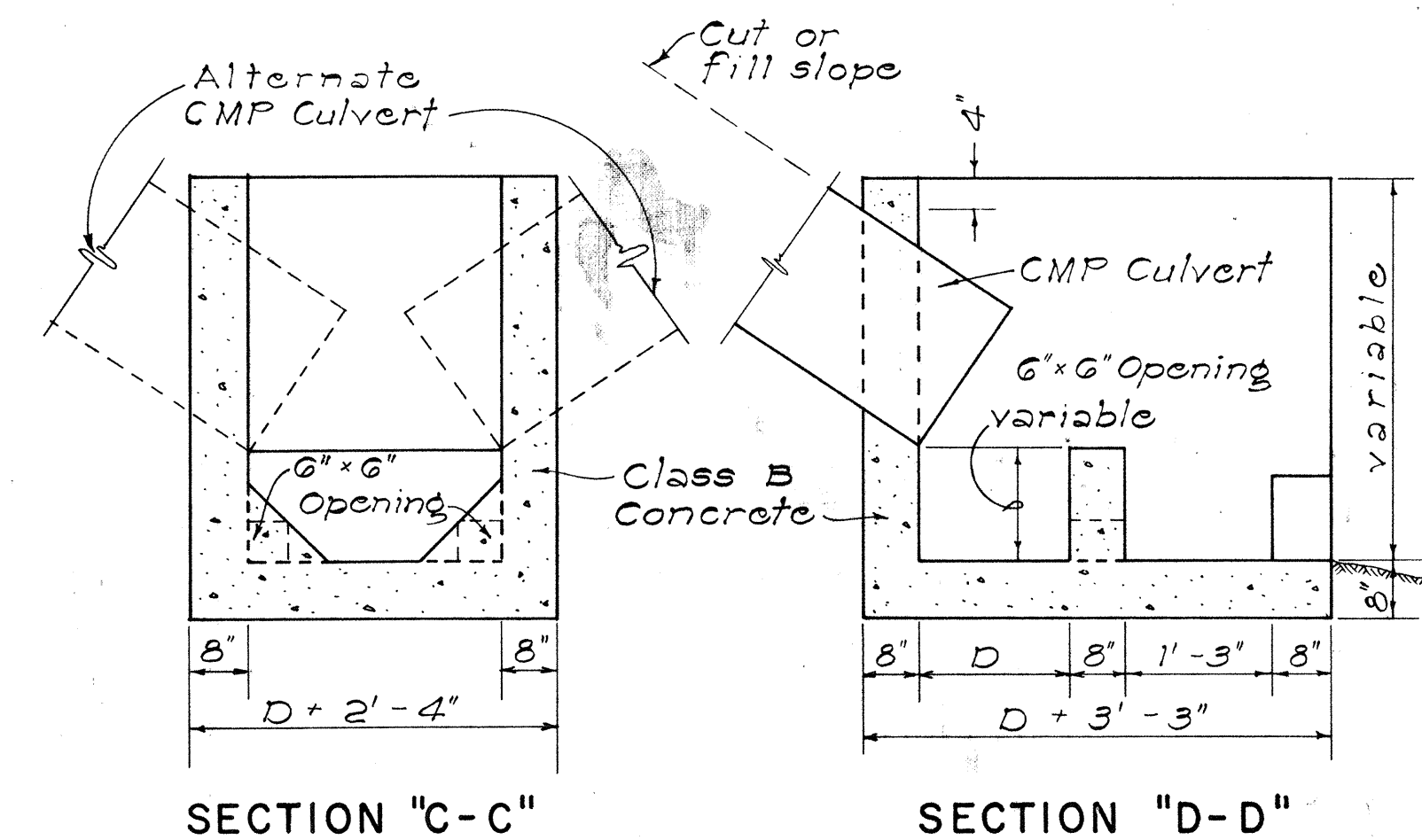
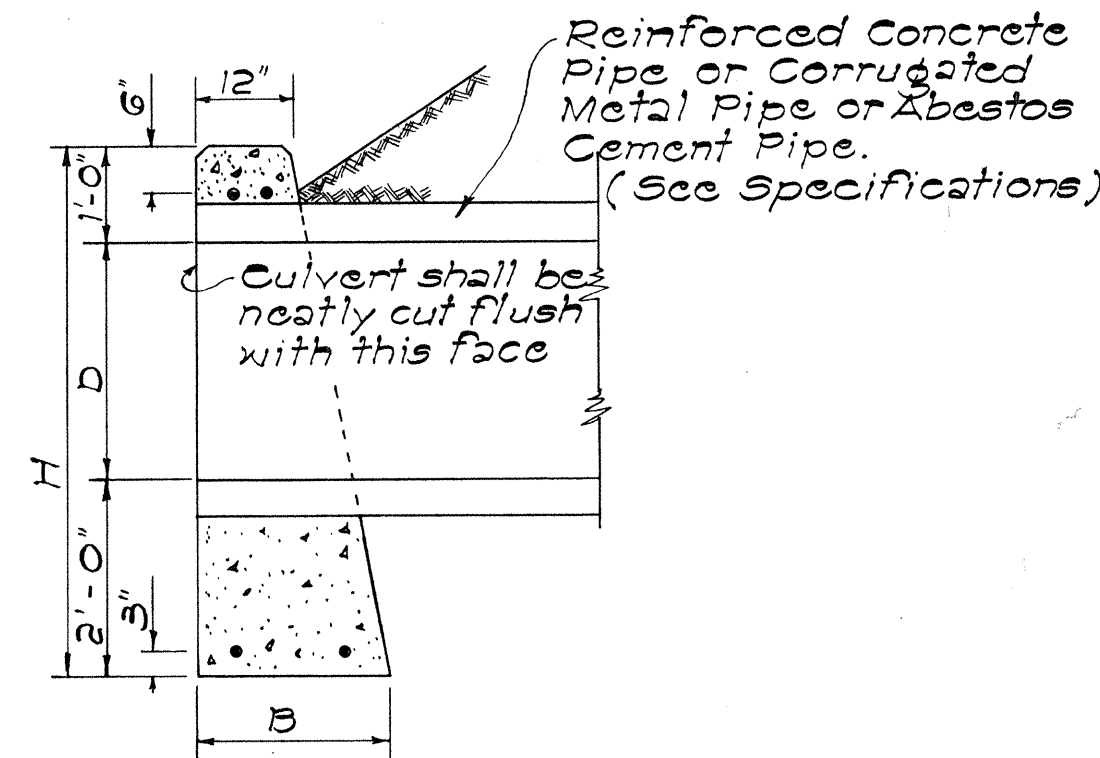
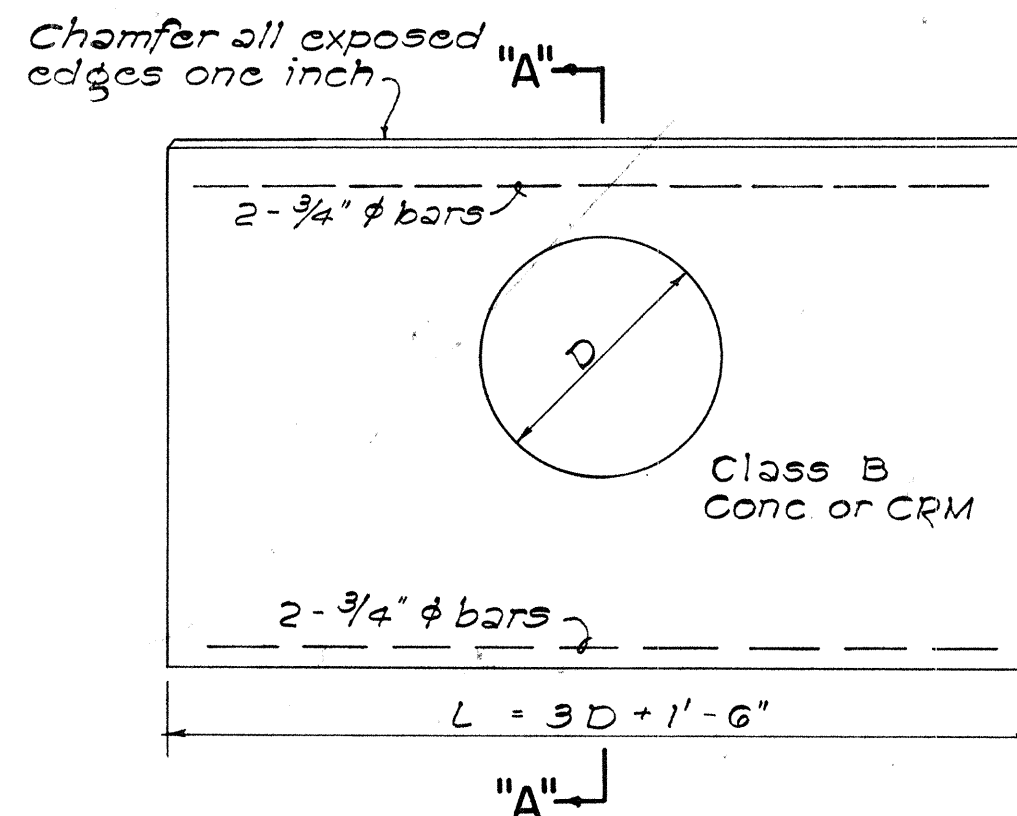
SHEET No. 41 OF 50 SHEETS

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DATA - CONC. DROP INTAKE	Where Variable Equals
D' D L' D'+6" S Cu. Yds.	
23" 18" 2'-5" 8" 1.41	4'-0"
30" 24" 3'-0" 8" 1.72	5'-0"
37" 30" 3'-7" 9" 2.32	5'-6"
44" 36" 4'-2" 9" 2.73	6'-0"
51" 42" 4'-9" 10" 3.54	6'-6"
58" 48" 5'-4" 10" 4.01	7'-0"

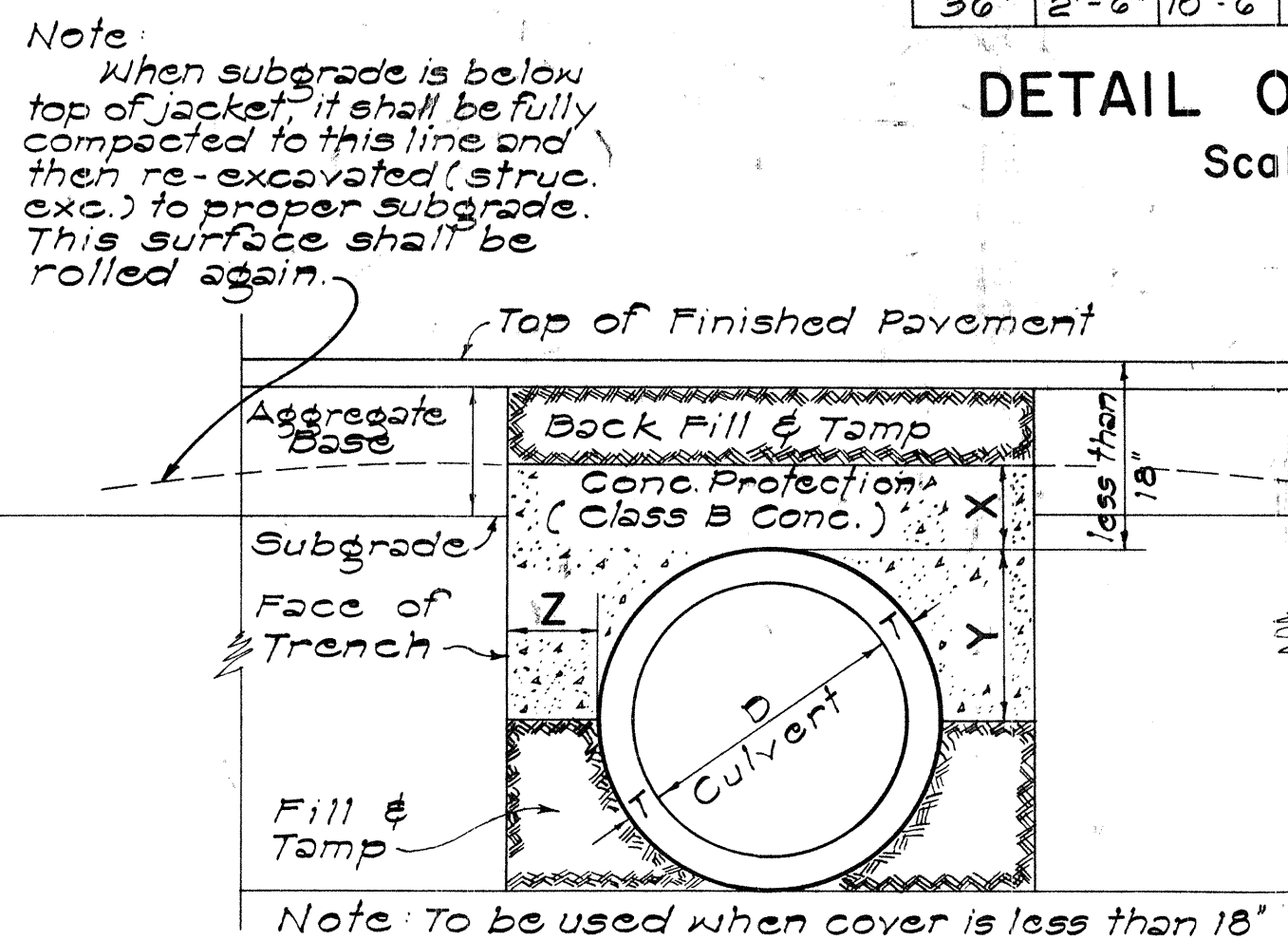
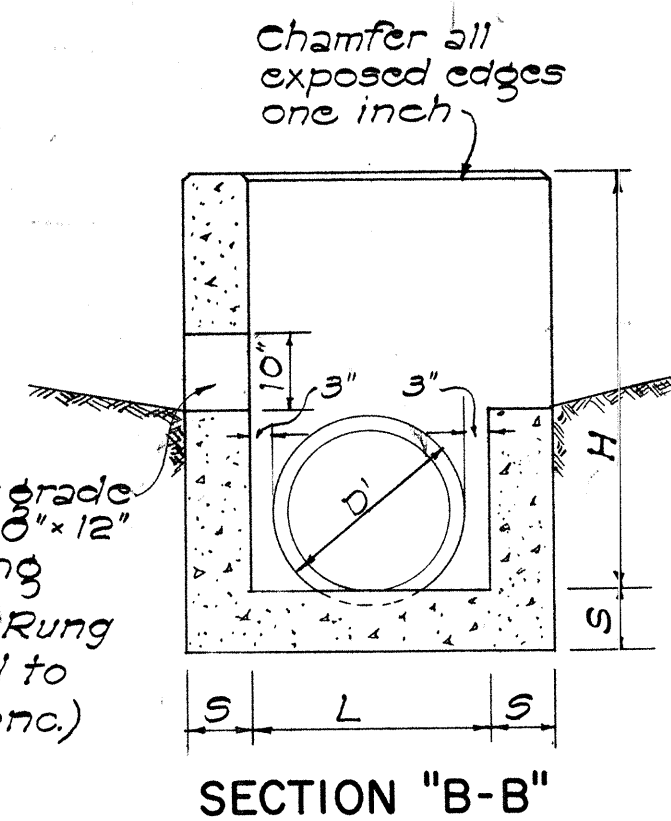
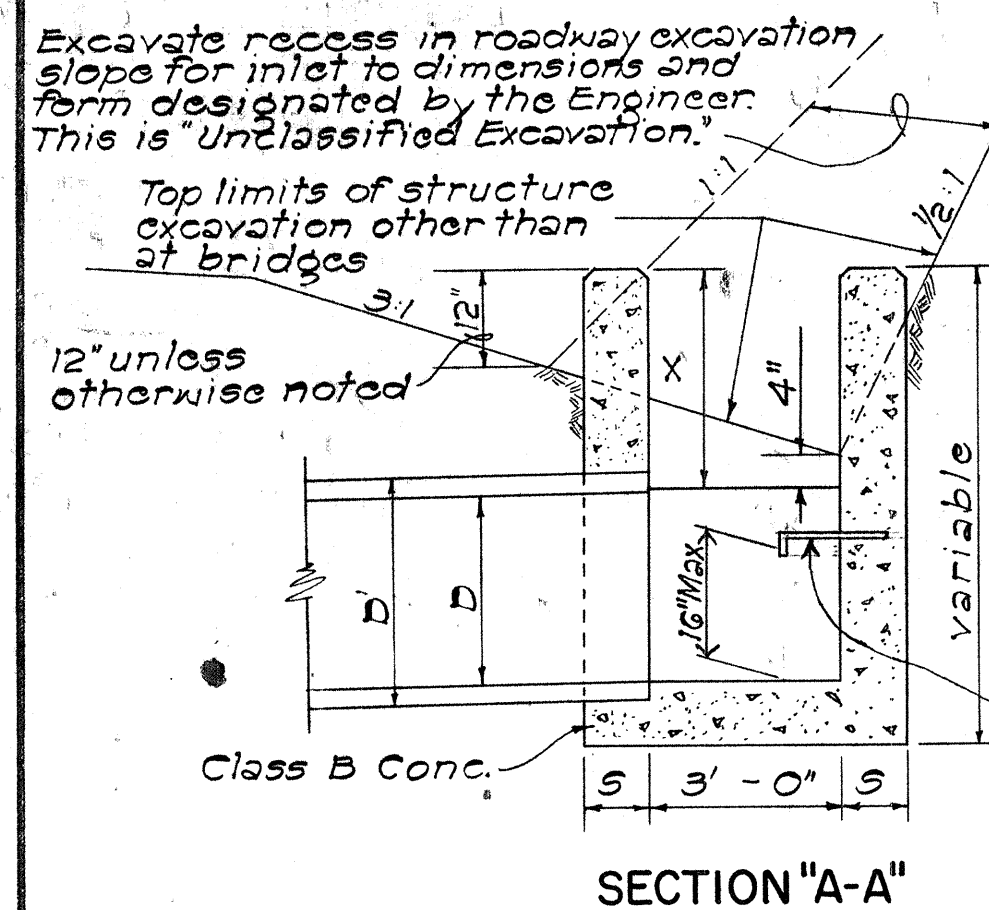
Note: Dimension "X" is assumed as 2'-4" in figuring the above quantities.



DATA FOR CONC. HEADWALL	CL. B CONC. FOR R.C.P.	CL. B CONC. FOR C.M.P.	Steel For One Headwall
D B L H Cu. Yd.	Cu. Yd.	Cu. Yd.	No. of bars Size Length Lbs.
18" 1'-6" 6'-0" 4'-6" 1.12	1.17	1.17	4 3/4" ϕ 5'-6" 33
24" 2'-0" 7'-6" 5'-0" 1.52	1.60	1.60	4 3/4" ϕ 7'-0" 42
30" 2'-6" 9'-0" 5'-6" 2.06	2.49	2.49	4 3/4" ϕ 8'-6" 51
36" 3'-0" 10'-6" 6'-0" 2.94	3.13	3.13	4 3/4" ϕ 10'-0" 60
42" 3'-6" 12'-0" 6'-6" 4.19	4.47	4.47	4 3/4" ϕ 11'-6" 69
48" 4'-0" 13'-6" 7'-0" 5.01	5.36	5.36	4 3/4" ϕ 13'-0" 78

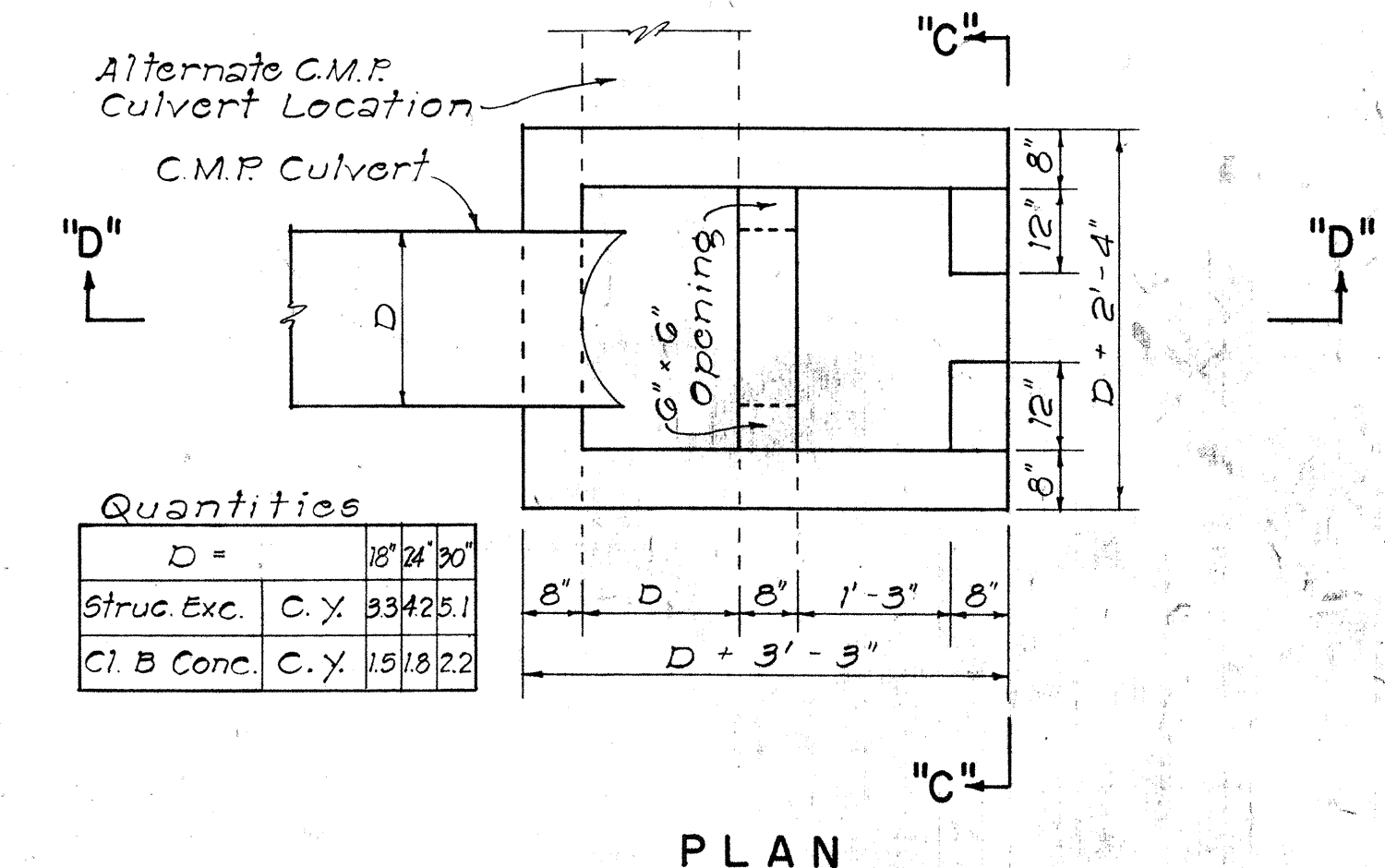
DATA - MASONRY HEADWALL	CRM FOR R.C.P.	CRM FOR C.M.P.
D B L H Cu. Yd.	Cu. Yd.	Cu. Yd.
18" 1'-9" 6'-0" 4'-6" 1.24	1.29	1.29
24" 2'-0" 7'-6" 5'-0" 1.83	1.92	1.92
30" 2'-6" 9'-0" 5'-6" 2.56	2.70	2.70
36" 3'-0" 10'-6" 6'-0" 3.45	3.66	3.66

DETAIL OF HEADWALL
Scale: 1/2" = 1'-0"



DATA FOR CONCRETE PROTECTION OVER CULVERTS		
X	Y	Z
6" for 18" D.	$\frac{D}{2} + T$	Z must be from pipe to face of trench
7" for 24" D.		Minimum = X
8" for 30" D.		Maximum pay quantity will be Z = 12"
9" for 36" D.		
10" for 42" D.		
11" for 48" D.		
12" for 54" D.		

SECT. OF CULVERT WITH CONC. PROTECTION
Scale: 1" = 1'-0"



DETAILS OF CONC. DROP BOX AT OUTLET OF CULVERT PIPE
NOT TO SCALE

DETAIL OF CONCRETE DROP INTAKE
Scale: 1/2" = 1'-0"

GENERAL NOTES

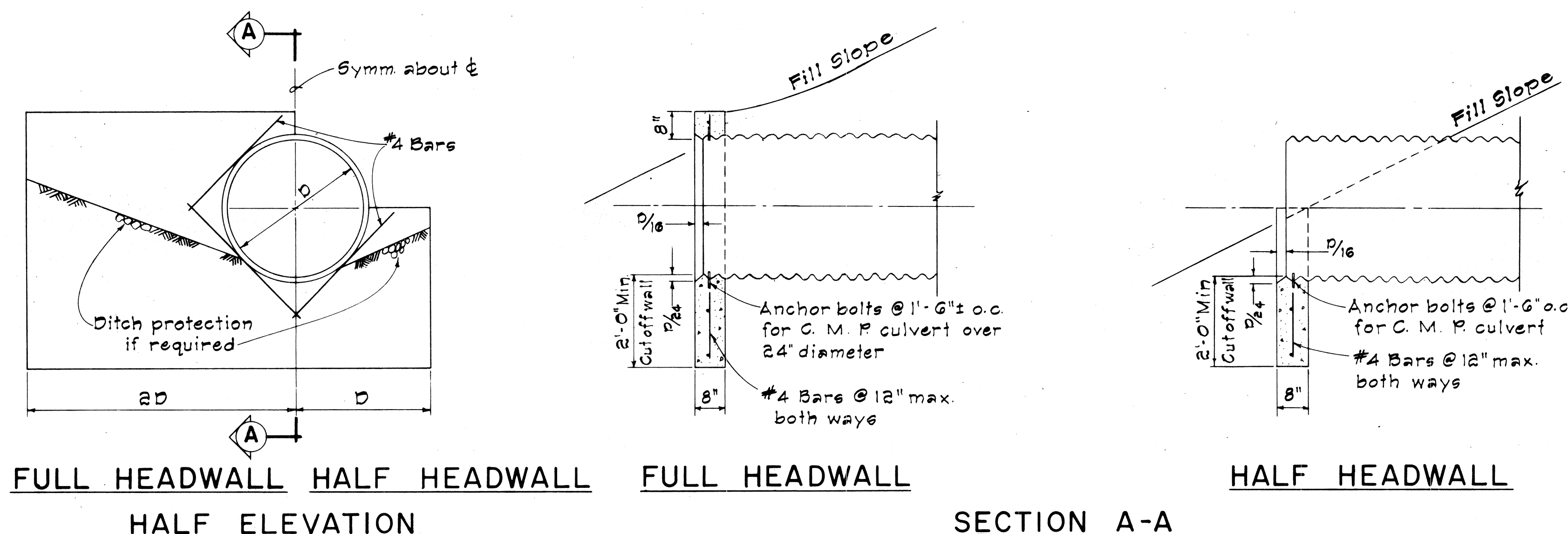
- Culvert shall enter and leave Drop Intake from any position and in the direction indicated by the plans or ordered by the Engineer.
- D' shall be the maximum outside dimension of the culvert at the Drop Intake wall.
- Manhole Rungs (12" o.c.) are required when "H" is greater than 4 feet 6 inches. Only 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.

APPROVAL, RECOMMENDED:
HYDRAULIC DESIGN ENGINEER
12-17-69
DATE

APPROVED:
ASSISTANT CHIEF, ENGINEERING
12-17-69
DATE

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

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
STANDARD DETAILS
DROP INTAKE, HEADWALL & CONCRETE PROTECTION
Scale: As Noted. Date: Aug. 1967
SHEET No. 45 OF 50 SHEETS DH 10



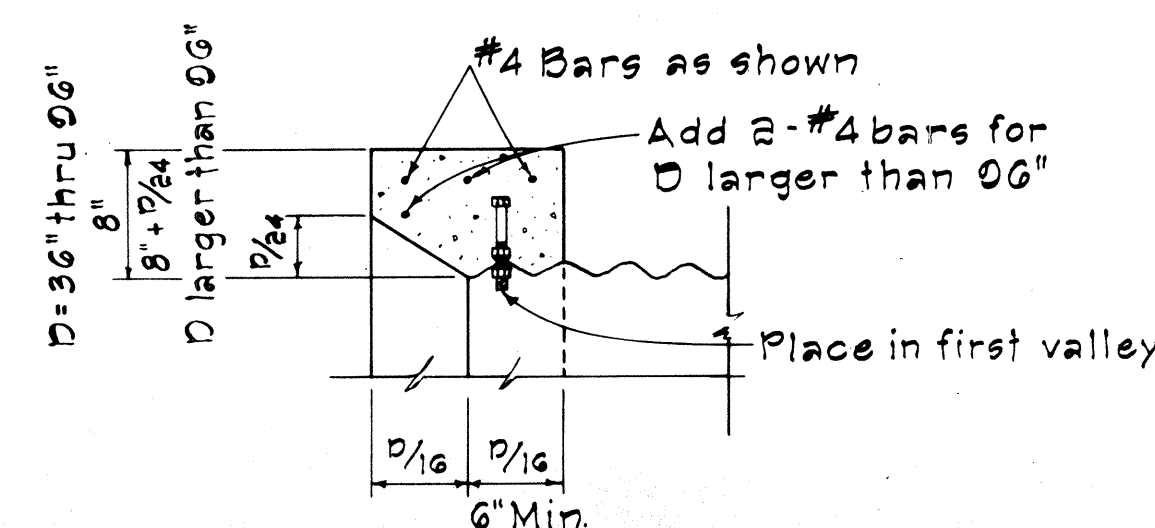
SUMMARY OF QUANTITIES				
Culvert Dia. (inches)	Full Headwall		Half Headwall	
	Concrete (Cu. Yd.)	Reinf. Steel (Lbs)	Concrete (Cu. Yd.)	Reinf. Steel (Lbs)
18	0.97	45	0.18	15
24	0.85	65	0.26	20
30	1.15	85	0.34	25
36	1.50	115	0.43	35

Note: Quantities shown are for C.M.P. culvert.

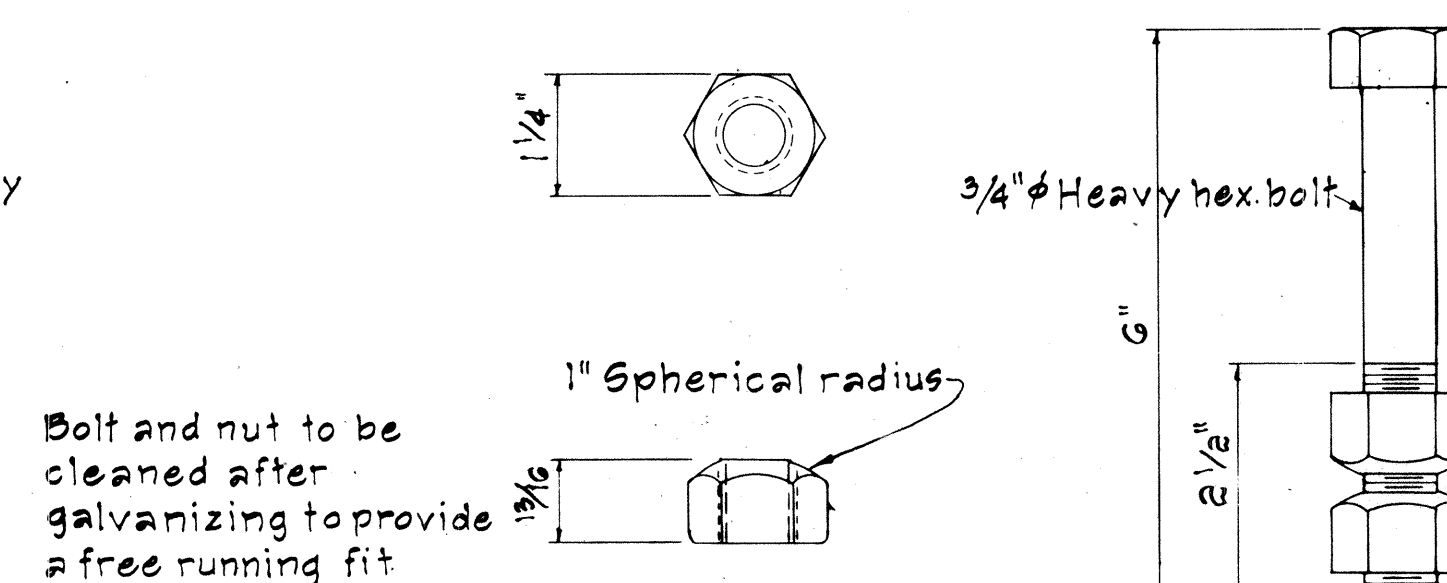
GENERAL NOTES

- Concrete: All concrete shall be Class A.
- Cutoff Wall: The depth of wall shown on the plan may be reduced if rock is encountered at a higher elevation.
- Multiple Pipe Installations: To permit careful placing and tamping of back fill material, clear spacing for multiple pipe installations shall be not less than one-half the diameter of the larger pipe between sides of adjacent pipes, but not required to exceed three feet, and in no case less than one foot.
- Anchor Bolts: Anchor bolts are not required for concrete pipe.

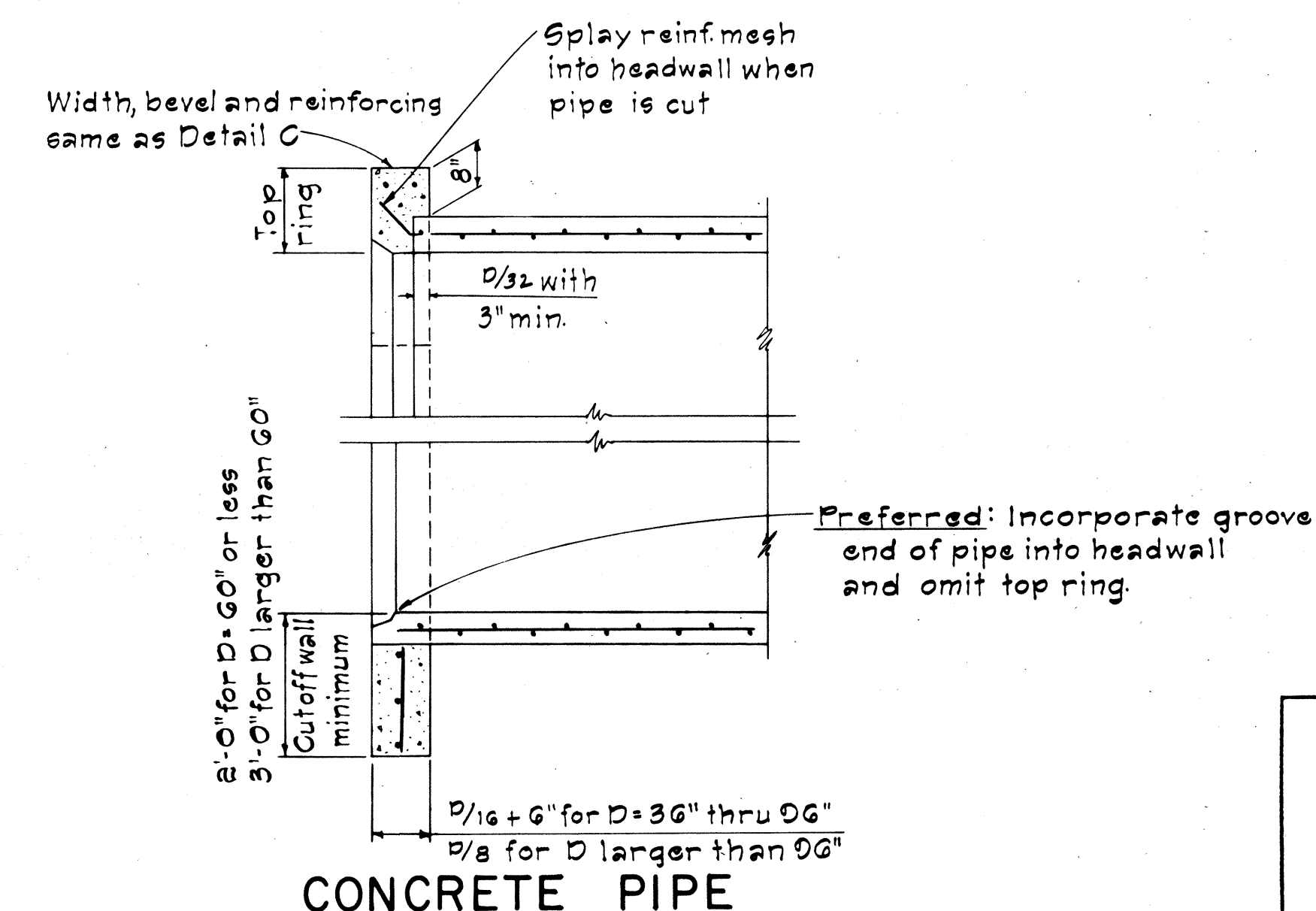
INLET AND OUTLET STRUCTURES FOR CULVERT SIZES 18 IN. TO 36 IN. DIAMETER



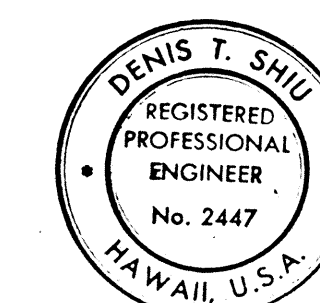
DETAIL C



ANCHOR BOLT DETAIL



CONCRETE PIPE



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DEPARTMENT OF TRANSPORTATION
LAND TRANSPORTATION FACILITIES DIVISION

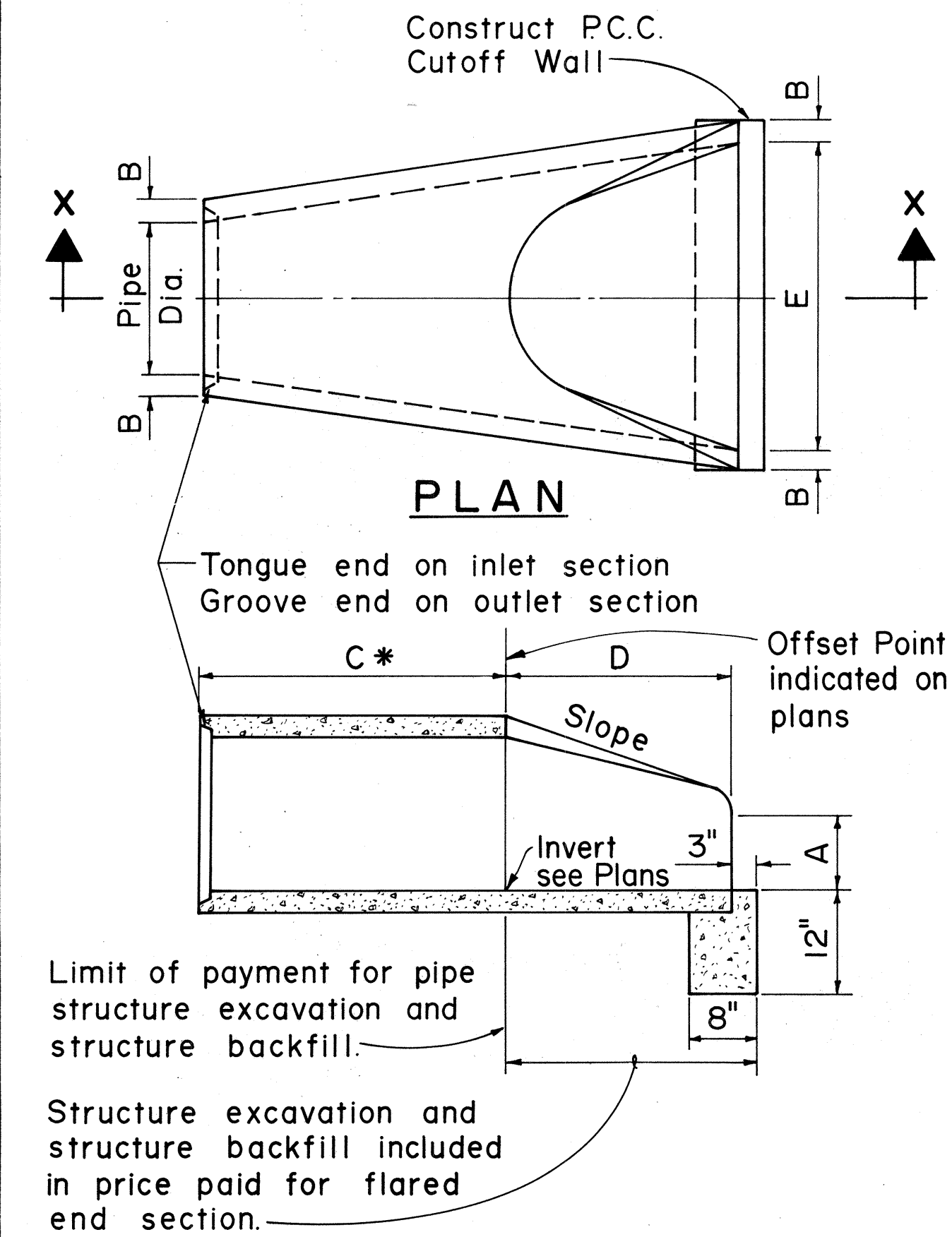
DRAINAGE DETAILS

PIILANI HIGHWAY
VICINITY OF MOKULELE HIGHWAY TO
VICINITY OF KIOHANA STREET
F.A. PROJECT NO. F-RF-031-1(6)

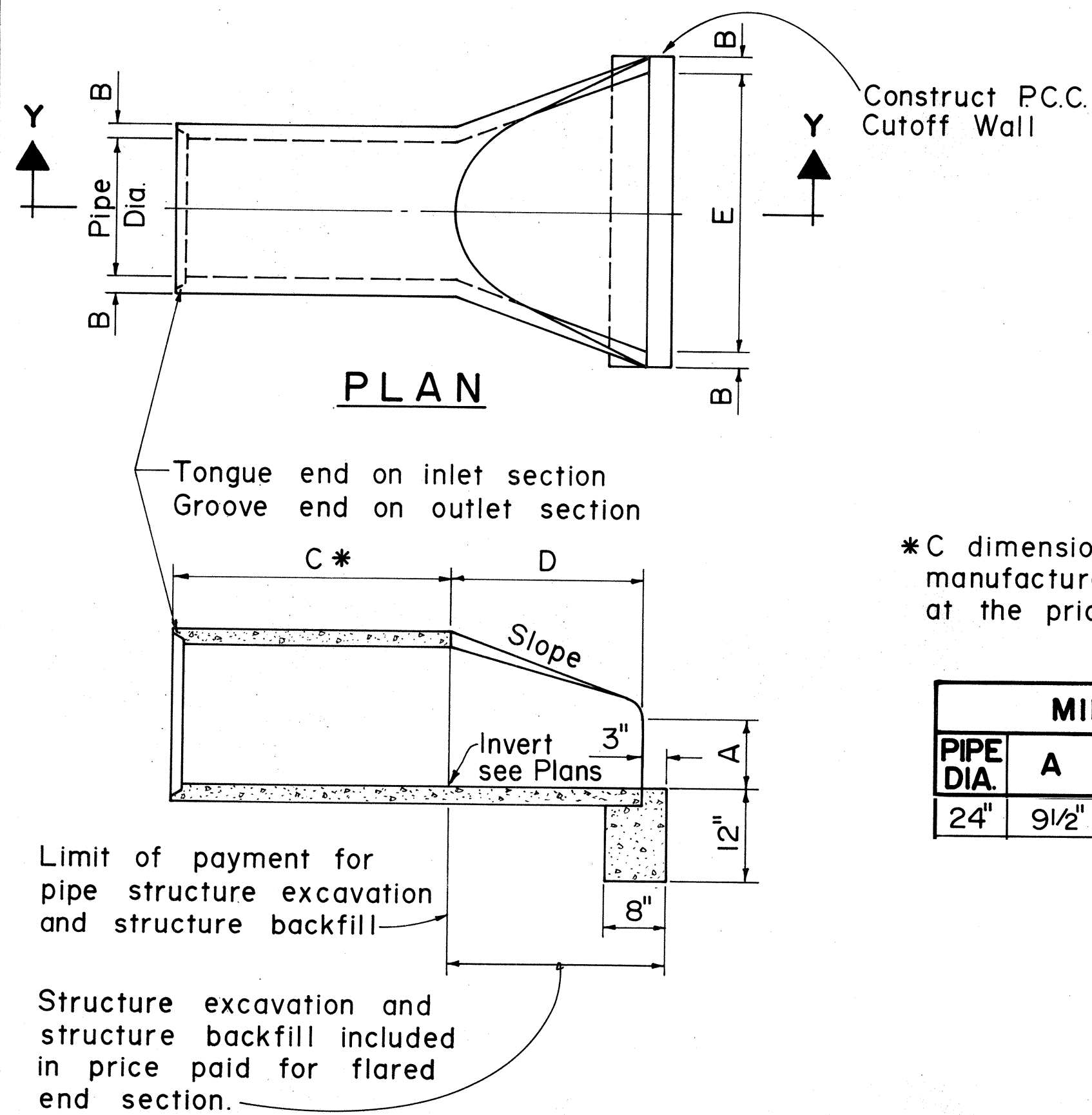
SCALE: AS SHOWN DATE SEP 1978

SHEET No. 46 OF 50 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	TQF-RF-031-1(6)	1978		



PRECAST CONCRETE FLARED END SECTION TYPE A



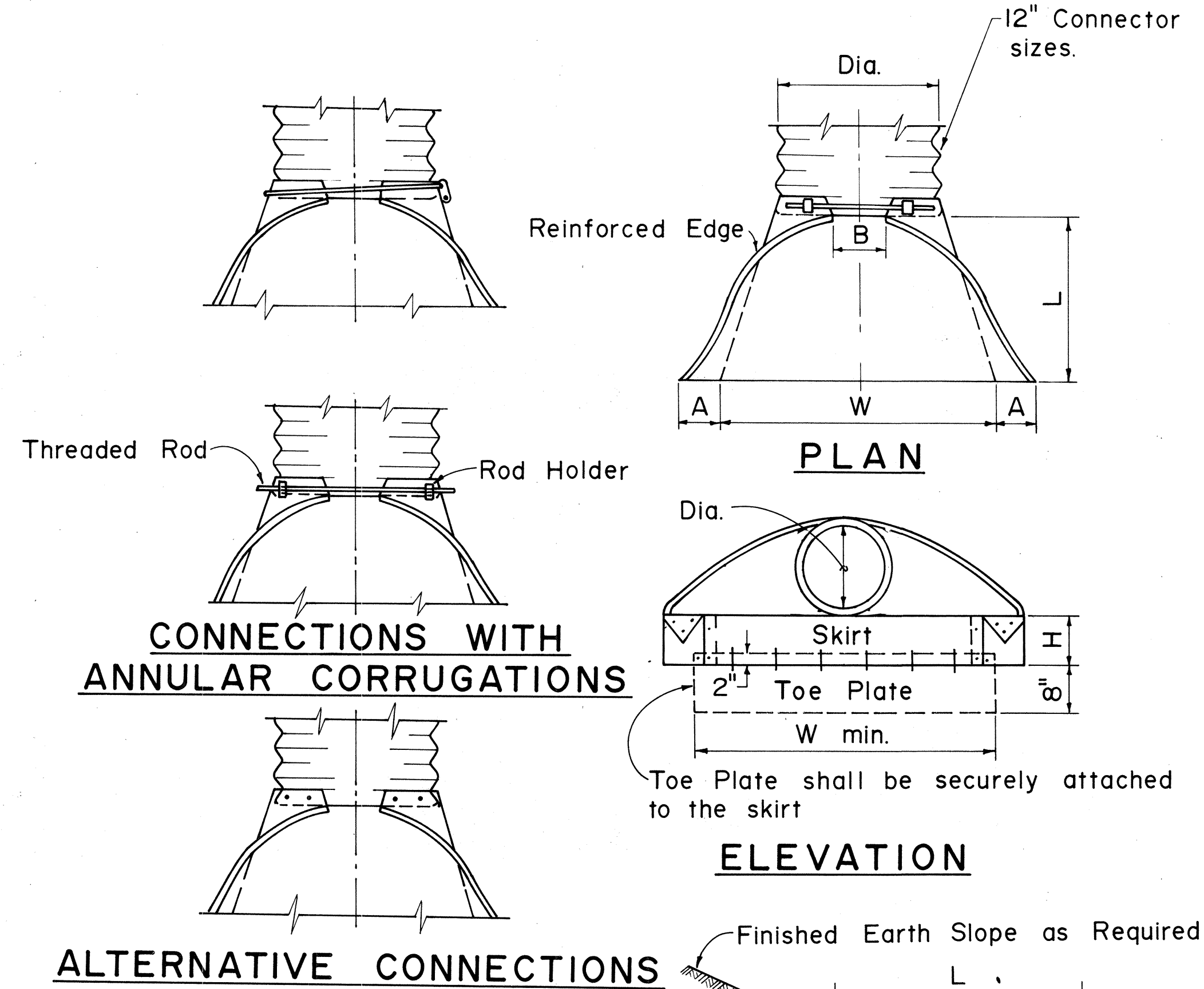
PRECAST CONCRETE FLARED END SECTION TYPE B

*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
24"	9 1/2"	3"		3'-7 1/2"	4'-0"	2:1 or Flatter

*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
24"	9 1/2"	2 1/2"		3'-6"	4'-0"	2:1 or Flatter



TYPICAL CROSS-SECTION

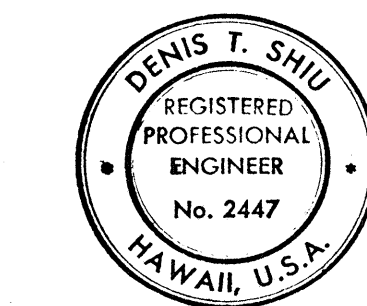
CIRCULAR PIPES						
PIPE DIA.	THICKNESS	DIMENSIONS-INCHES				
		A	B	H	L	W
24"	0.064"	10	13	6	41	48

FLARED END SECTIONS FOR C.M.P. CULVERTS

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 3/8" galvanized rivets or bolts.
- 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".

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



THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION
Denis T. Shiu

DATE	REVISION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
LAND TRANSPORTATION FACILITIES DIVISION

DRAINAGE DETAILS

PILANI HIGHWAY
VICINITY OF MOKULELE HIGHWAY TO
VICINITY OF KILOHANA STREET
F.A. PROJECT NO.

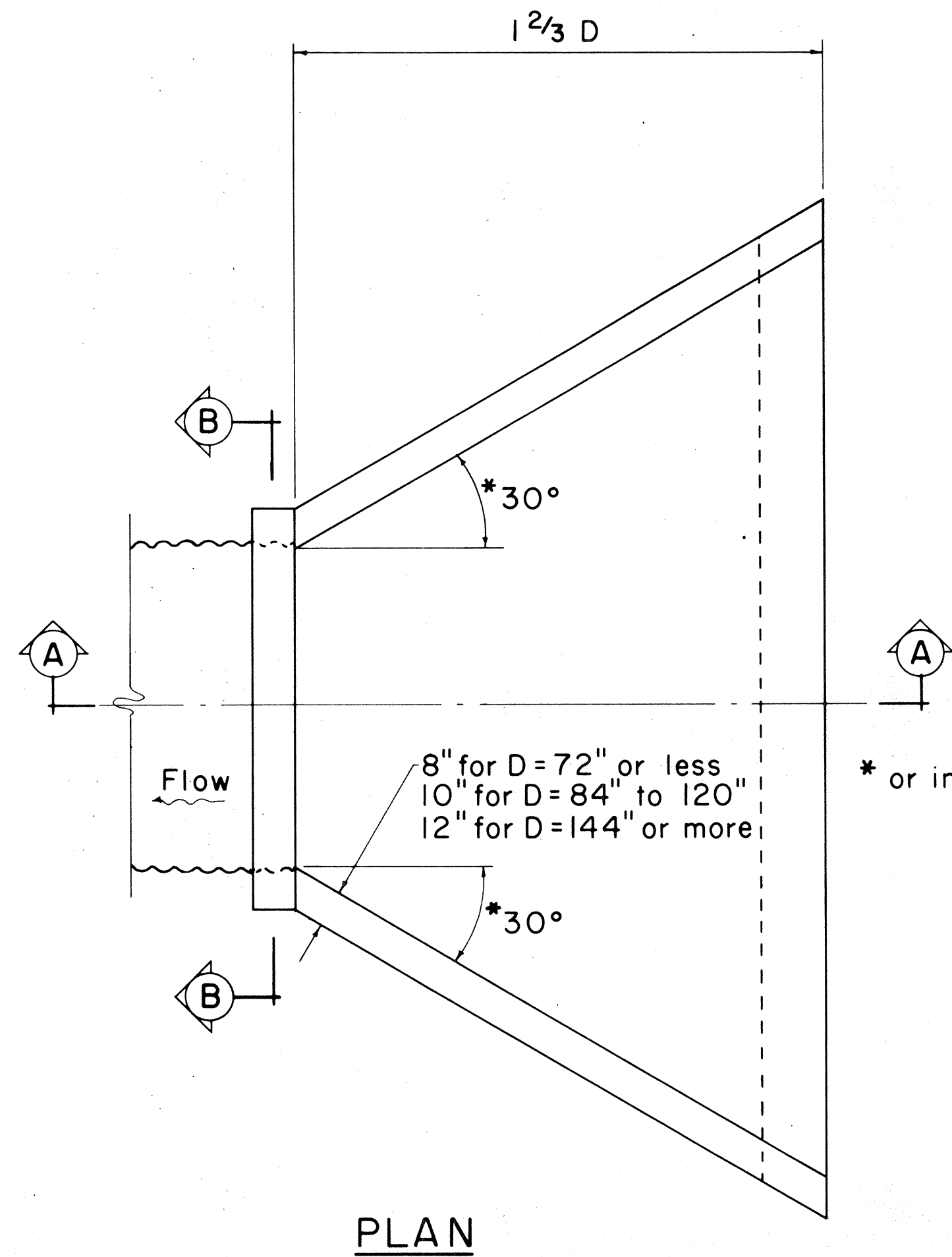
SCALE: AS SHOWN DATE SEPT. 1978

SHEET No. 46AOF 50 SHEETS

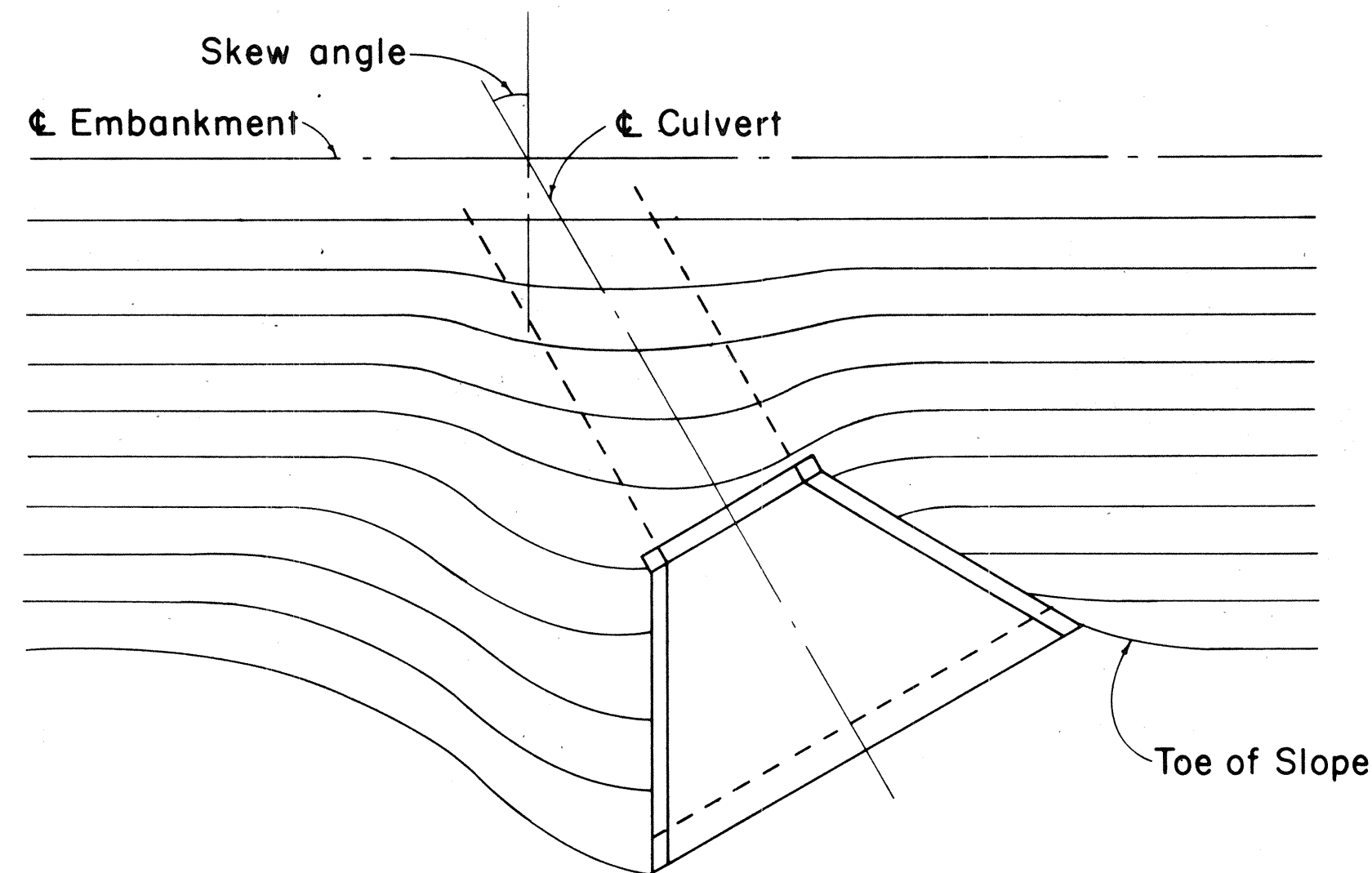
ADD. 153A

GENERAL NOTES

1. Concrete: All concrete shall be Class A.
2. Cut-off Wall: The depth of wall shown on the plan may be reduced if rock is encountered at a higher elevation.
3. Multiple Pipe Installations: To permit careful placing and tamping of backfill material, clear spacing for multiple pipe installations shall be not less than one-half the diameter of the larger pipe between sides of adjacent pipes, but not required to exceed three feet.
4. Anchor Bolts: Anchor bolts are not required for concrete pipe.

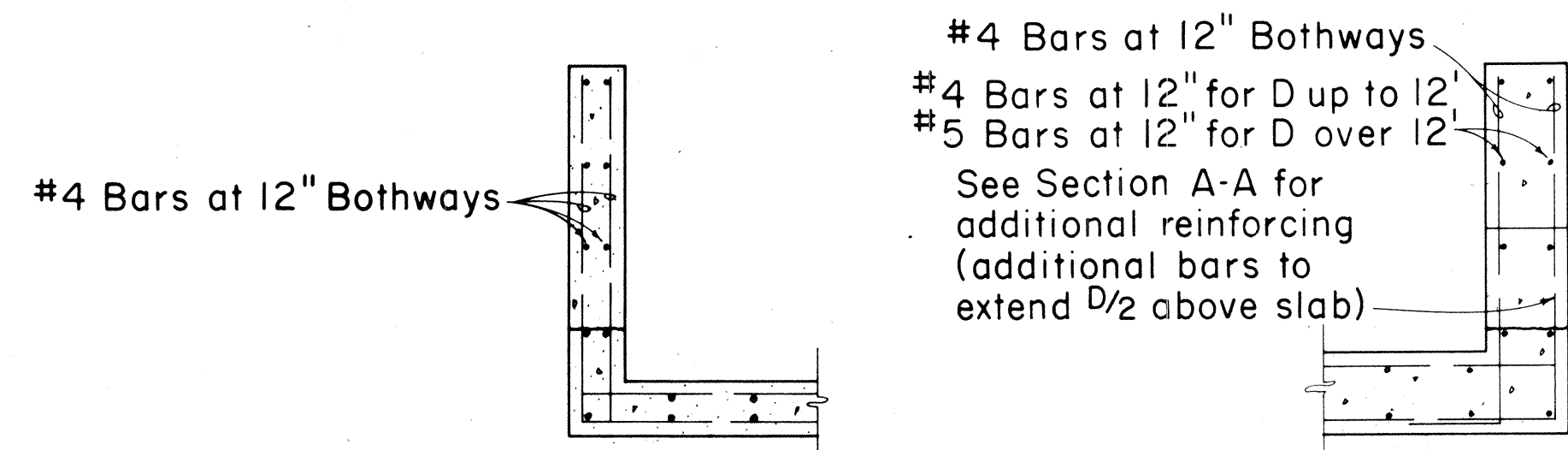


PLAN



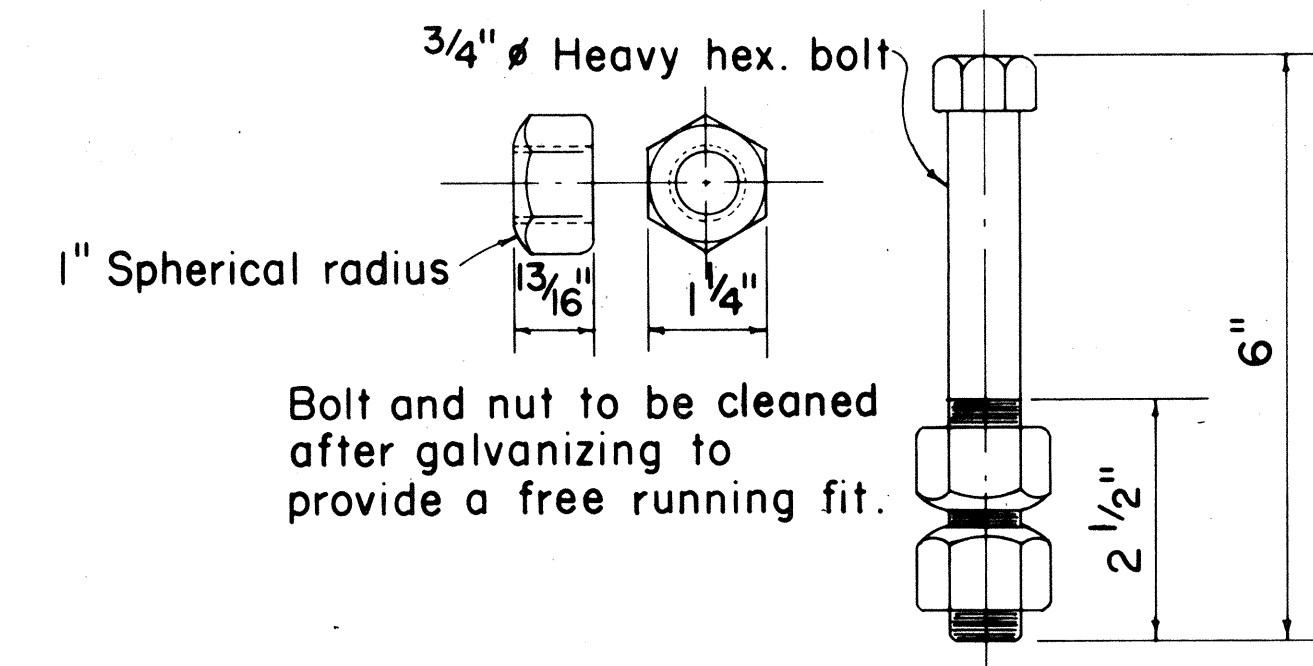
EMBANKMENT CONTOURS FOR SKEWED INLET

When Inlet is skewed to embankment slope, the embankment may be contoured to cover the exposed section of wall and pipe.

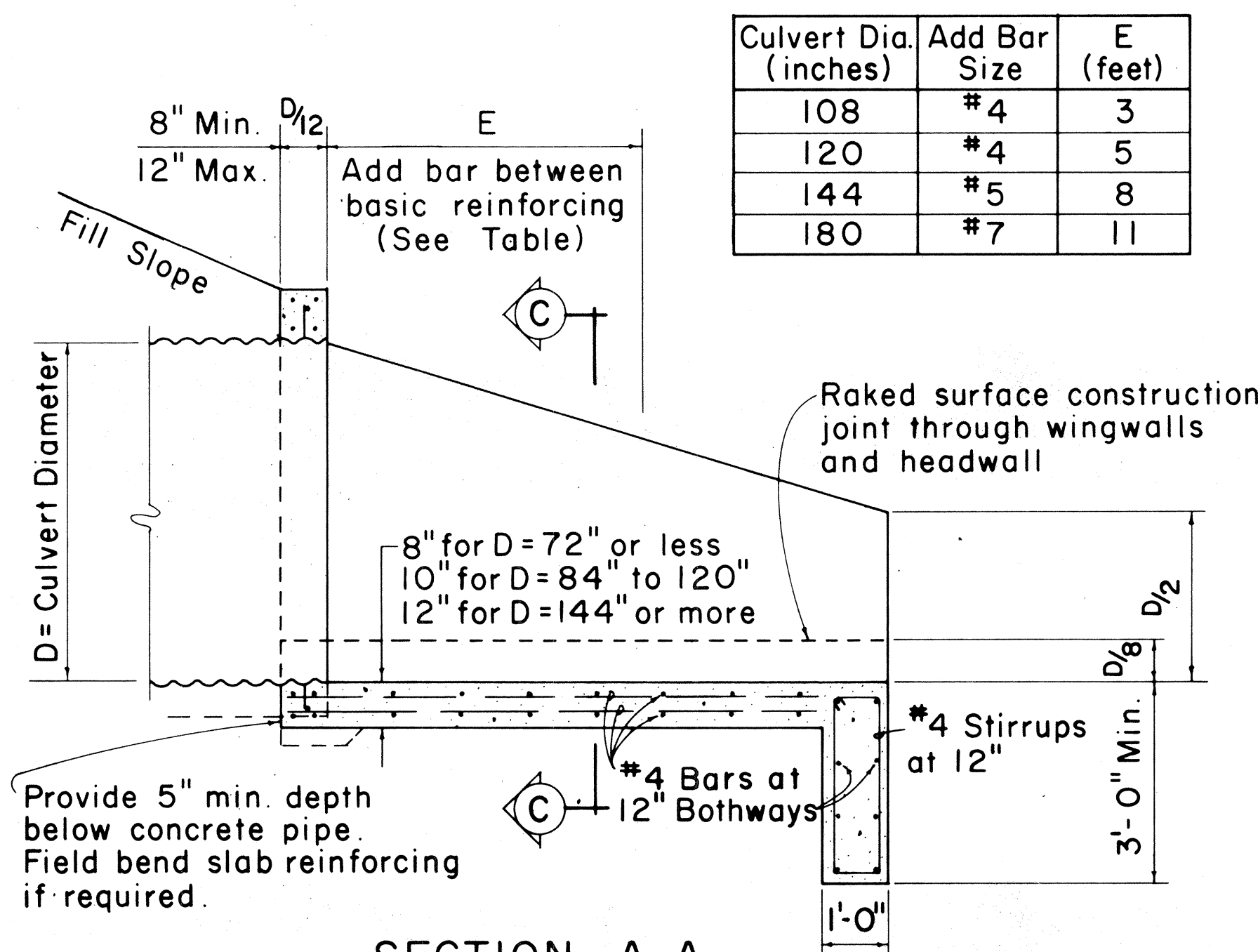


8" WING WALL 10" TO 12" WING WALLS

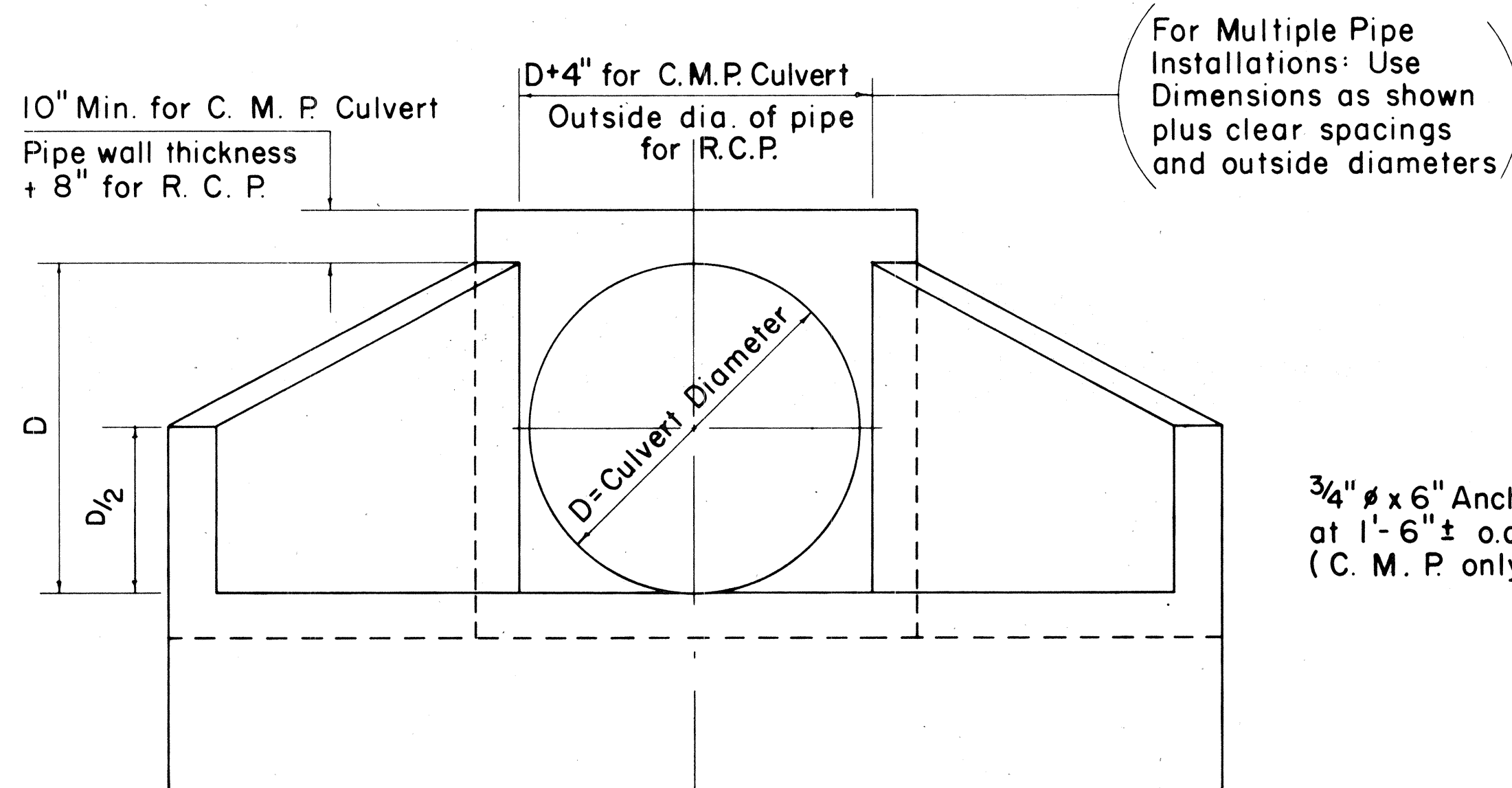
SECTION C-C



ANCHOR BOLT DETAIL



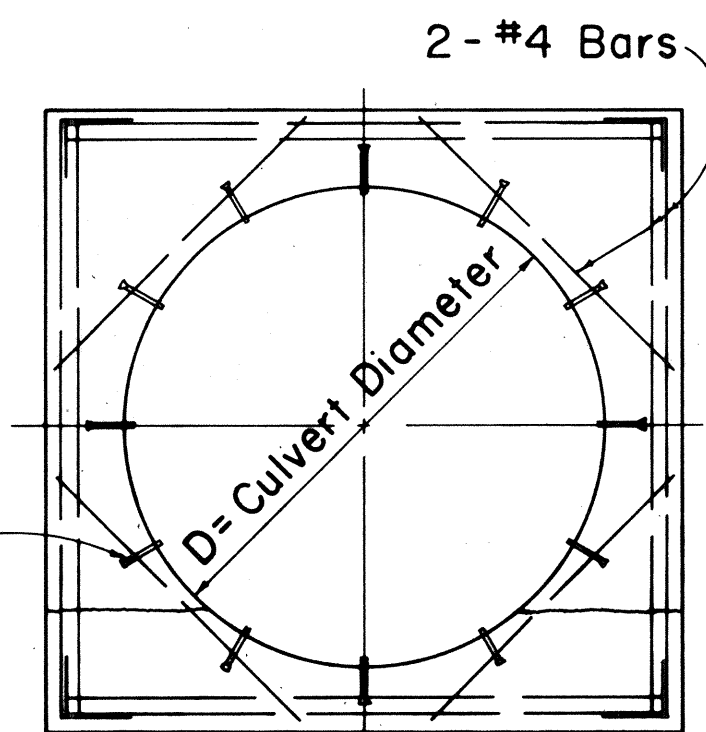
SECTION A-A



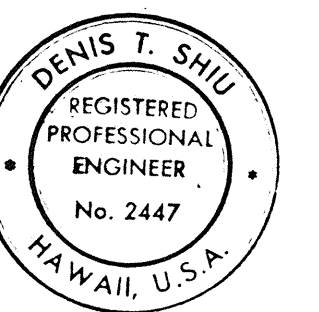
FRONT ELEVATION

TYPE A INLET AND OUTLET

STRUCTURE FOR CULVERT SIZES 24 IN. TO 180 IN. DIAMETER



SECTION B-B



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Denis T. Shu

STATE OF HAWAII
 DEPARTMENT OF TRANSPORTATION
 LAND TRANSPORTATION FACILITIES DIVISION

DRAINAGE DETAILS

PIILANI HIGHWAY
 VICINITY OF MOKULELE HIGHWAY TO
 VICINITY OF KILOHANA STREET
 F.A. PROJECT NO. F-RF-031-1(6)

SCALE: AS SHOWN DATE SEP 1978

SHEET No. 47 OF 50 SHEETS

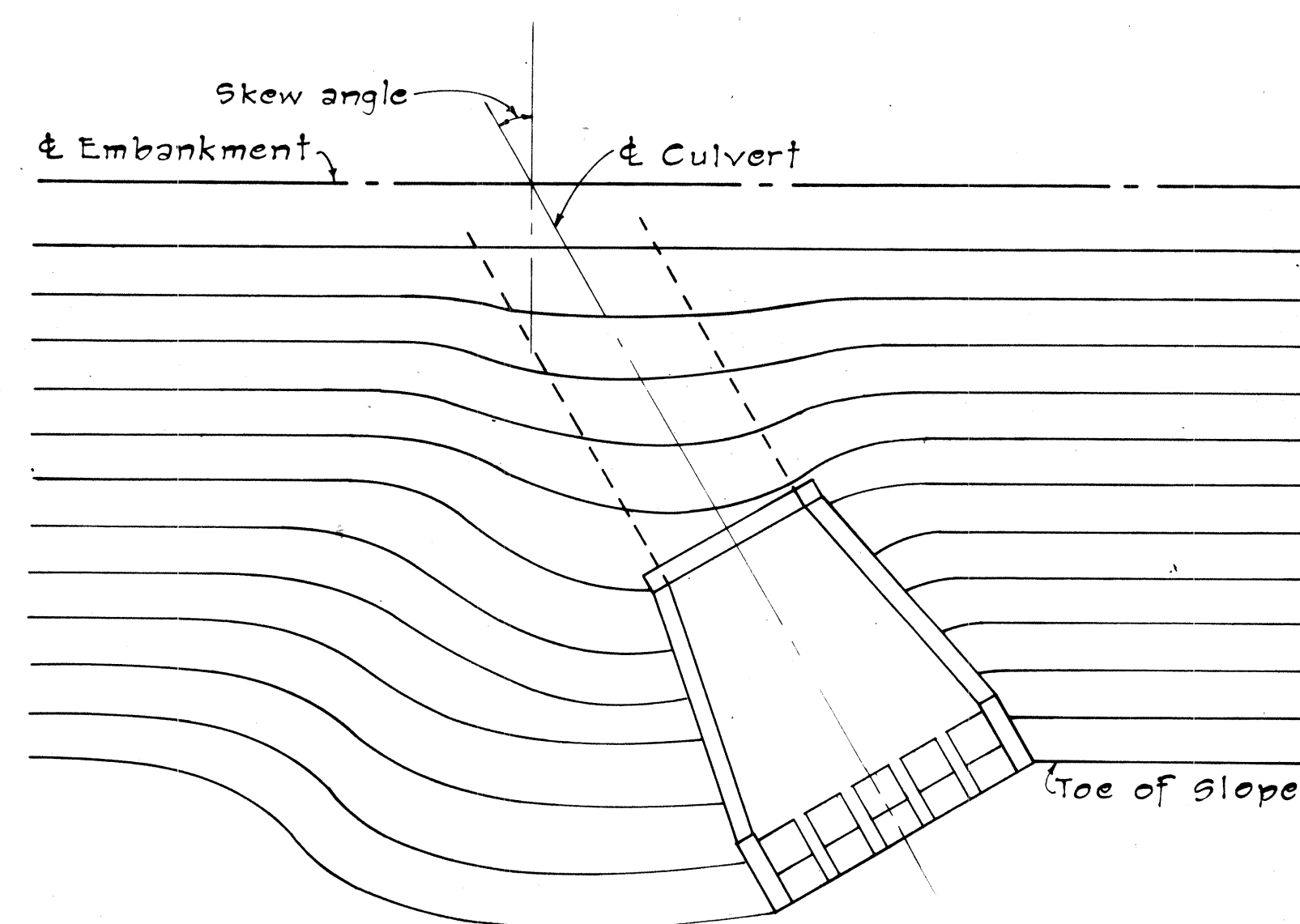
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-RF-031-1(6)	1978	155	262

GENERAL NOTES

- Concrete: All concrete shall be Class A.
- Cutoff Wall: The depth of wall shown on the plan may be reduced if rock is encountered at a higher elevation.
- Multiple Pipe Installations: To permit careful placing and tamping of back fill material, clear spacing for multiple pipe installations shall be not less than one-half the diameter of the larger pipe between sides of adjacent pipes, but not required to exceed three feet.
- Anchor Bolts: Anchor bolts are not required for concrete pipe.

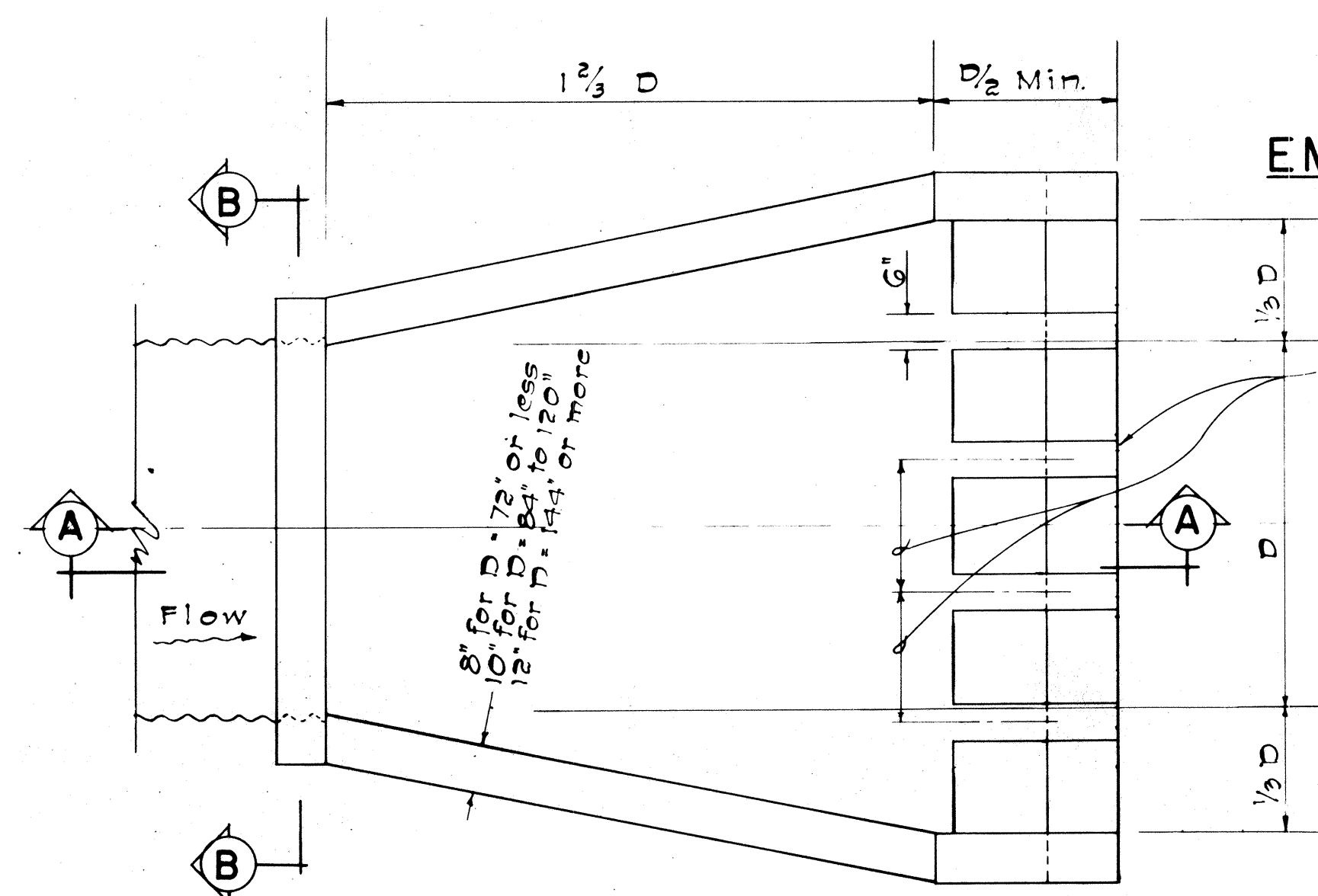
SUMMARY OF QUANTITIES		
Culvert Dia. (inches)	Concrete (Cu. Yd.)	Reinf. Steel (Lbs.)
48		
54		
60		
72		
84	12.7	1270
96	16.2	1570
108	20.3	2010
120	24.8	2460
144	41.8	3610
180	63.8	7090

Note: Quantities shown are for C.M.P. culvert.



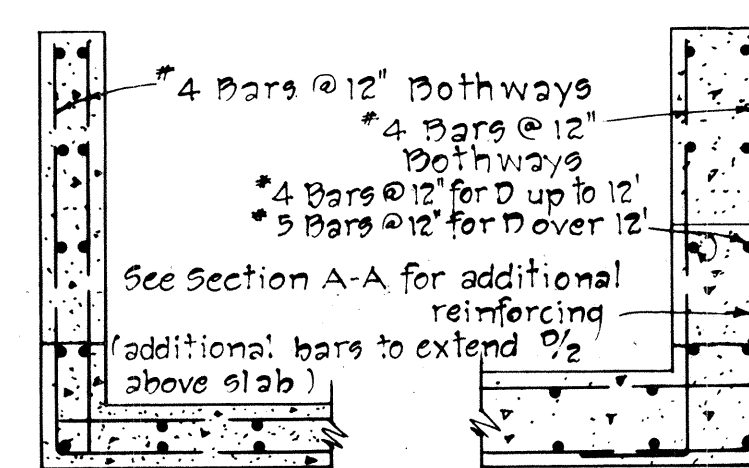
EMBANKMENT CONTOURS FOR SKEWED OUTLET

When outlet is skewed to embankment slope, the embankment may be contoured to cover the exposed section of wall and pipe.



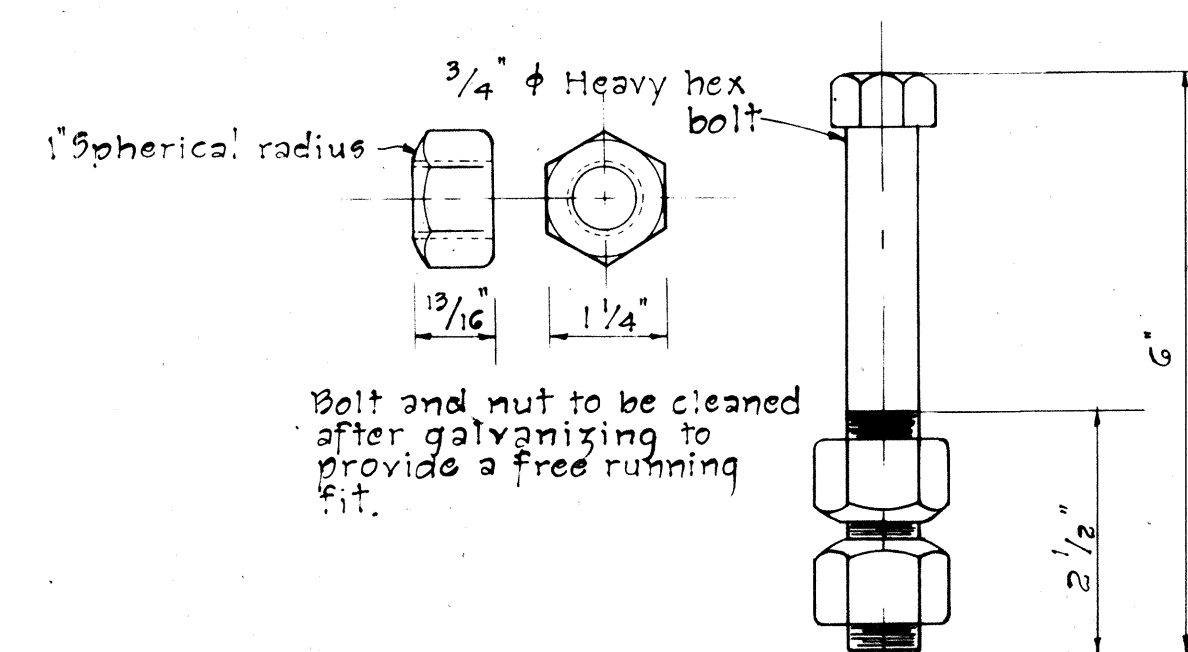
PLAN

Openings at 2'-0" ± o.c.

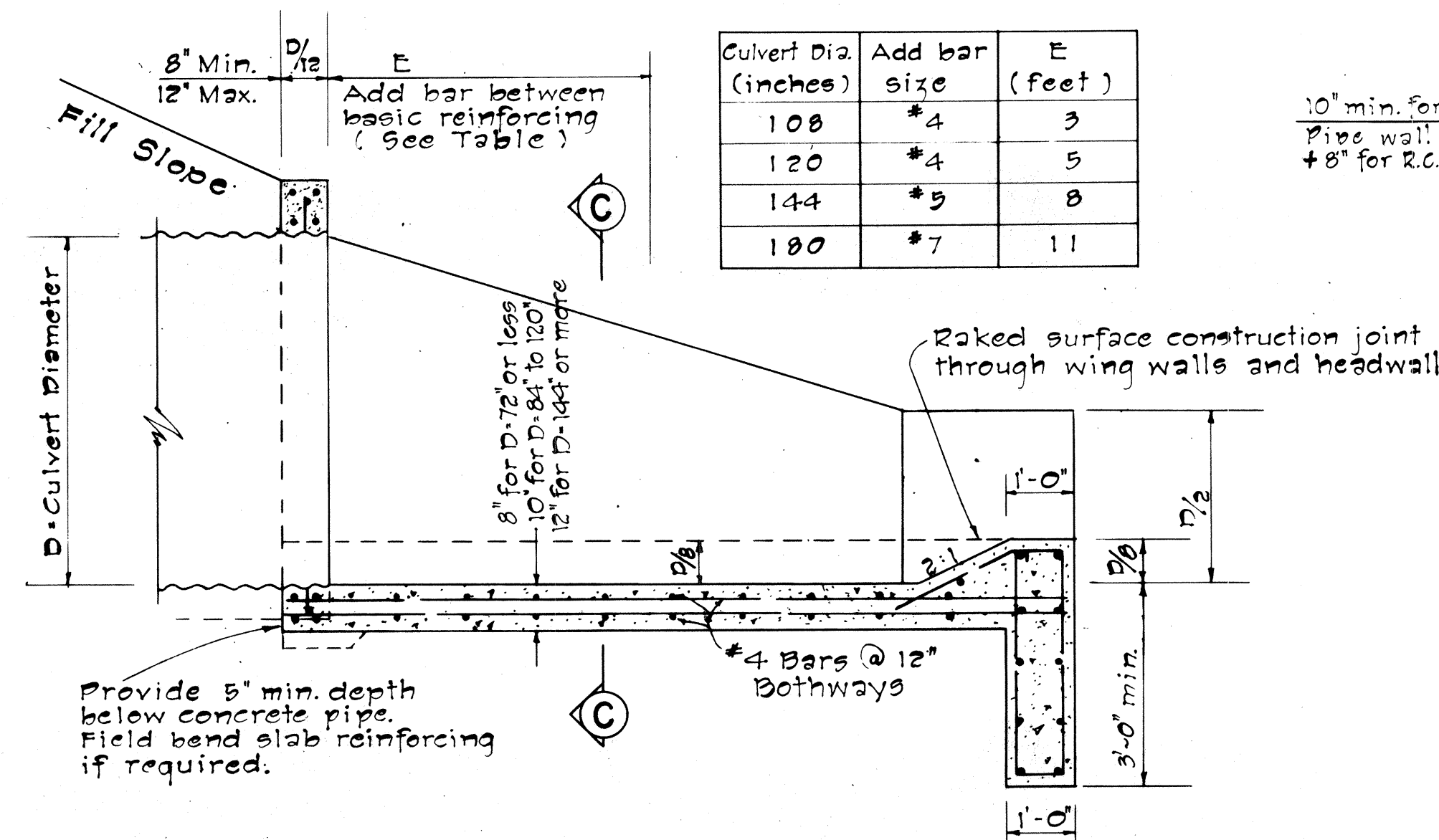


8" WING WALL 10" TO 12" WING WALLS

SECTION C-C

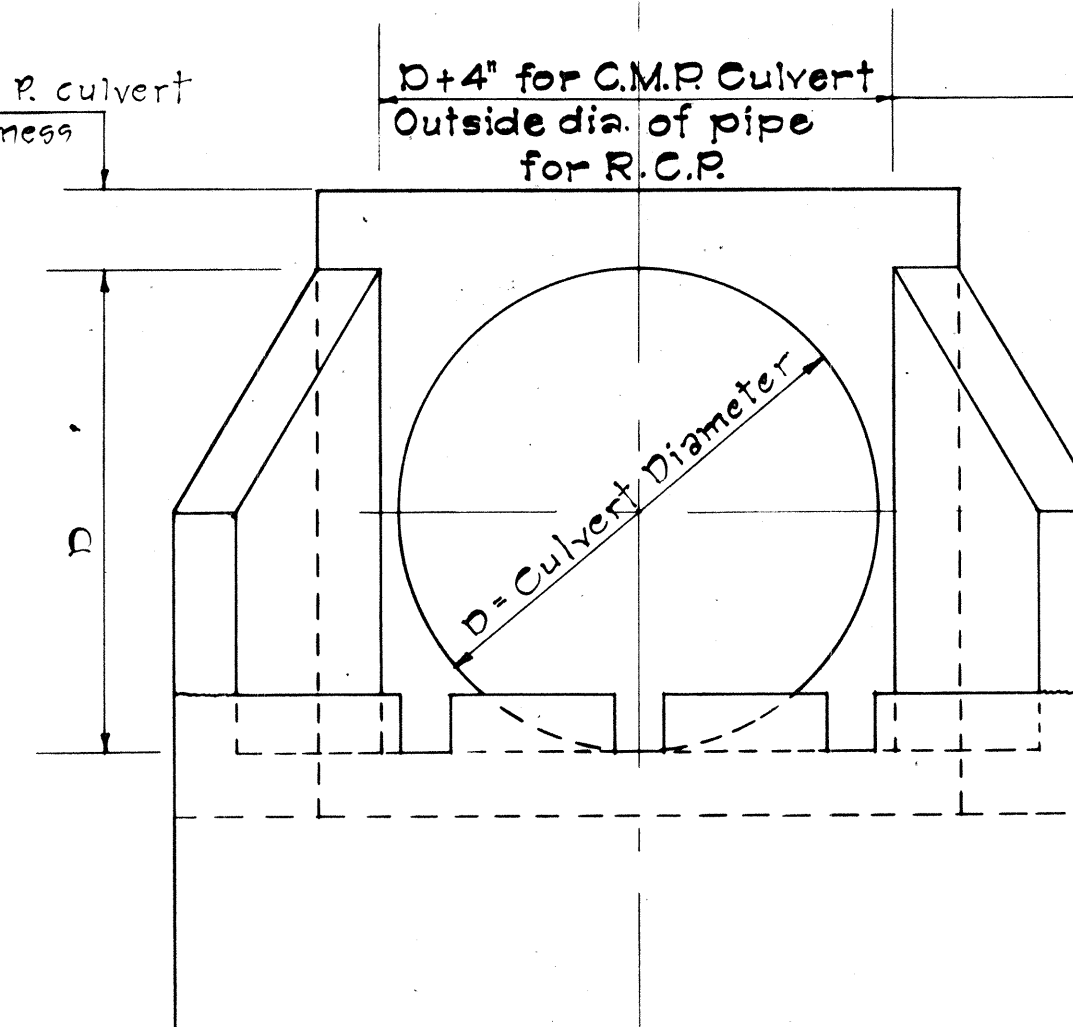


ANCHOR BOLT DETAIL



SECTION A-A

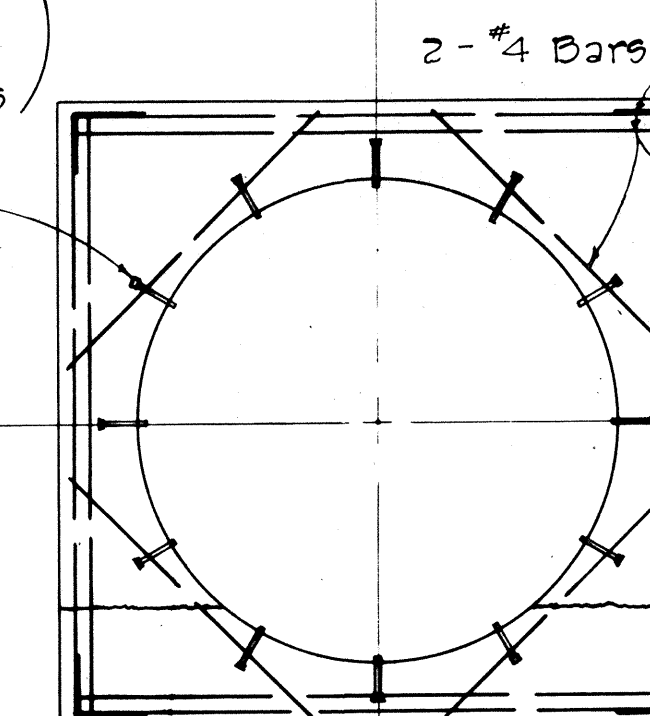
10" min. for C.M.P. culvert
Pipe wall thickness
+8" for R.C.P.



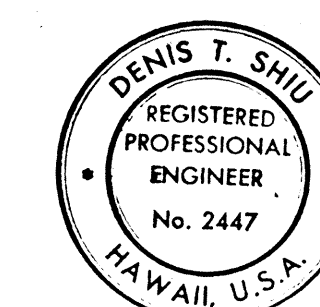
FRONT ELEVATION

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

3/4 inch x 6 inch Anchor Bolts @ 1'-6" ± o.c. (C.M.P. only)



SECTION B-B



THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.
Denis T. Shin

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
LAND TRANSPORTATION FACILITIES DIVISION

DRAINAGE DETAILS

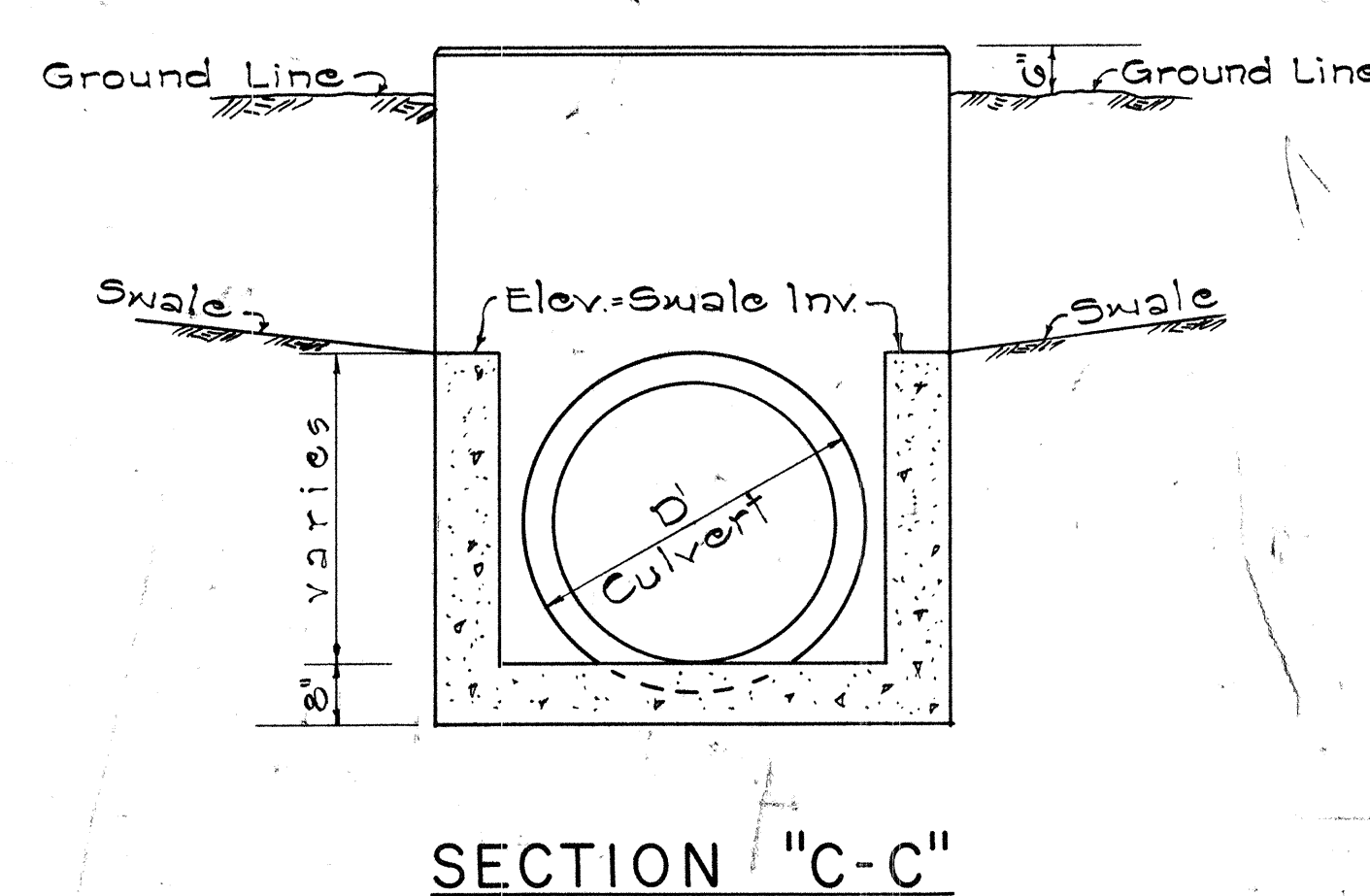
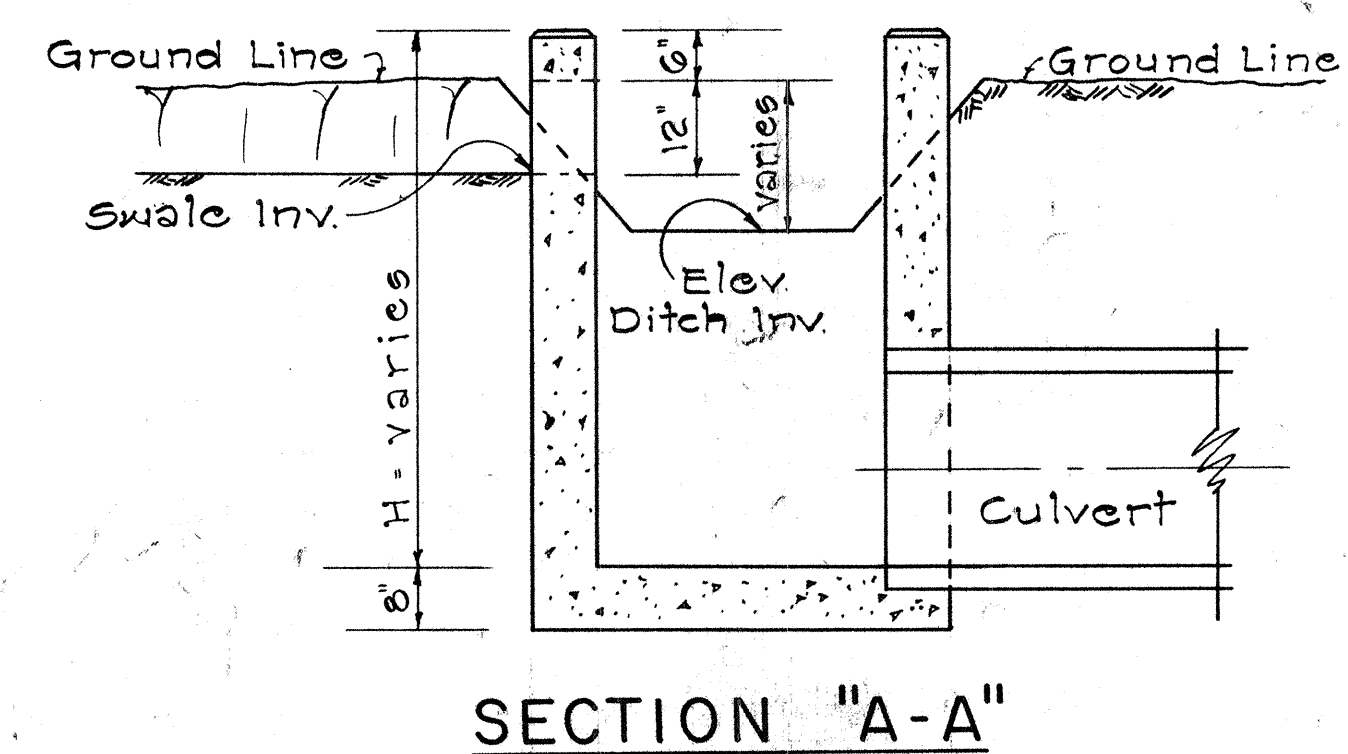
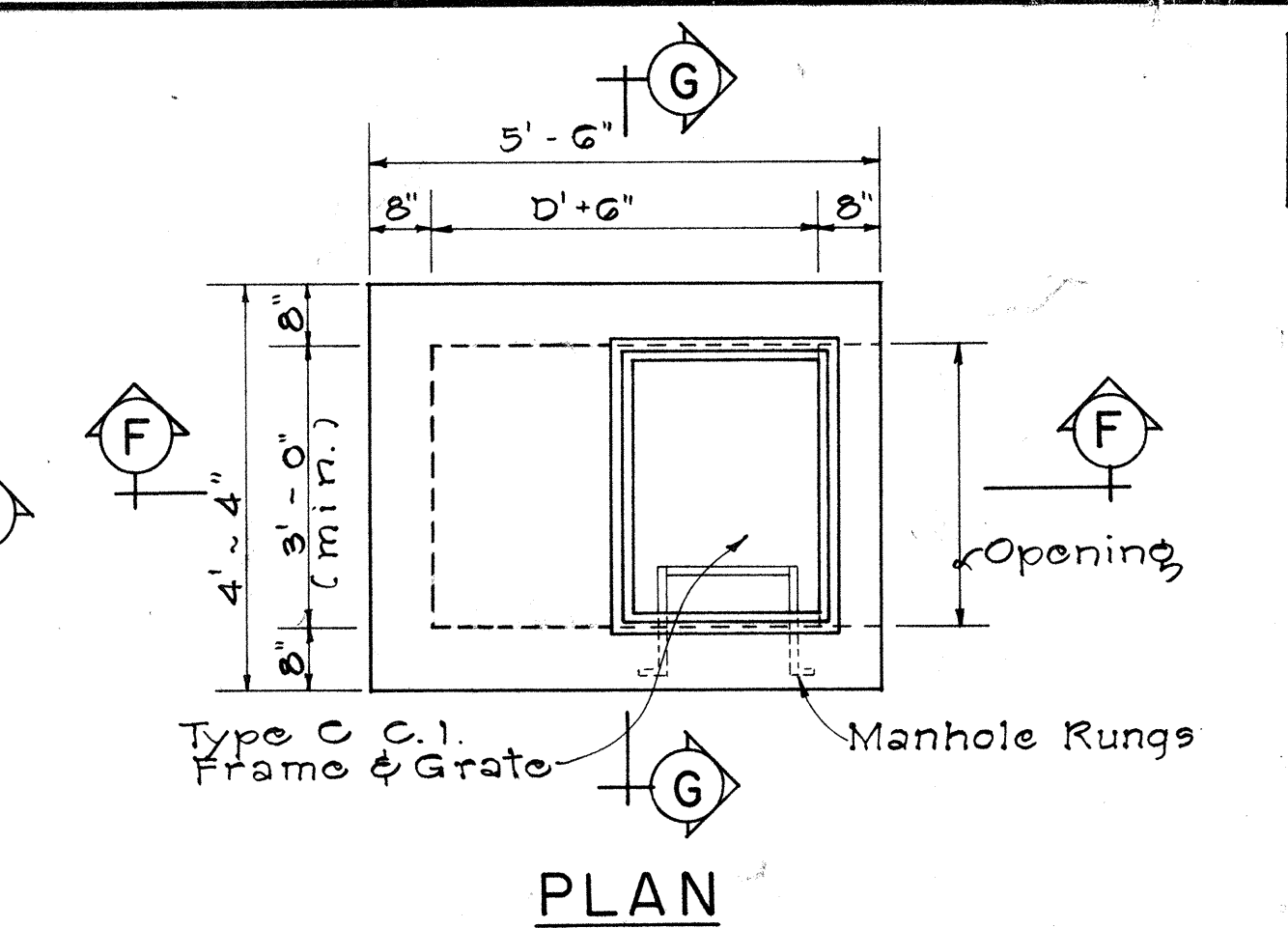
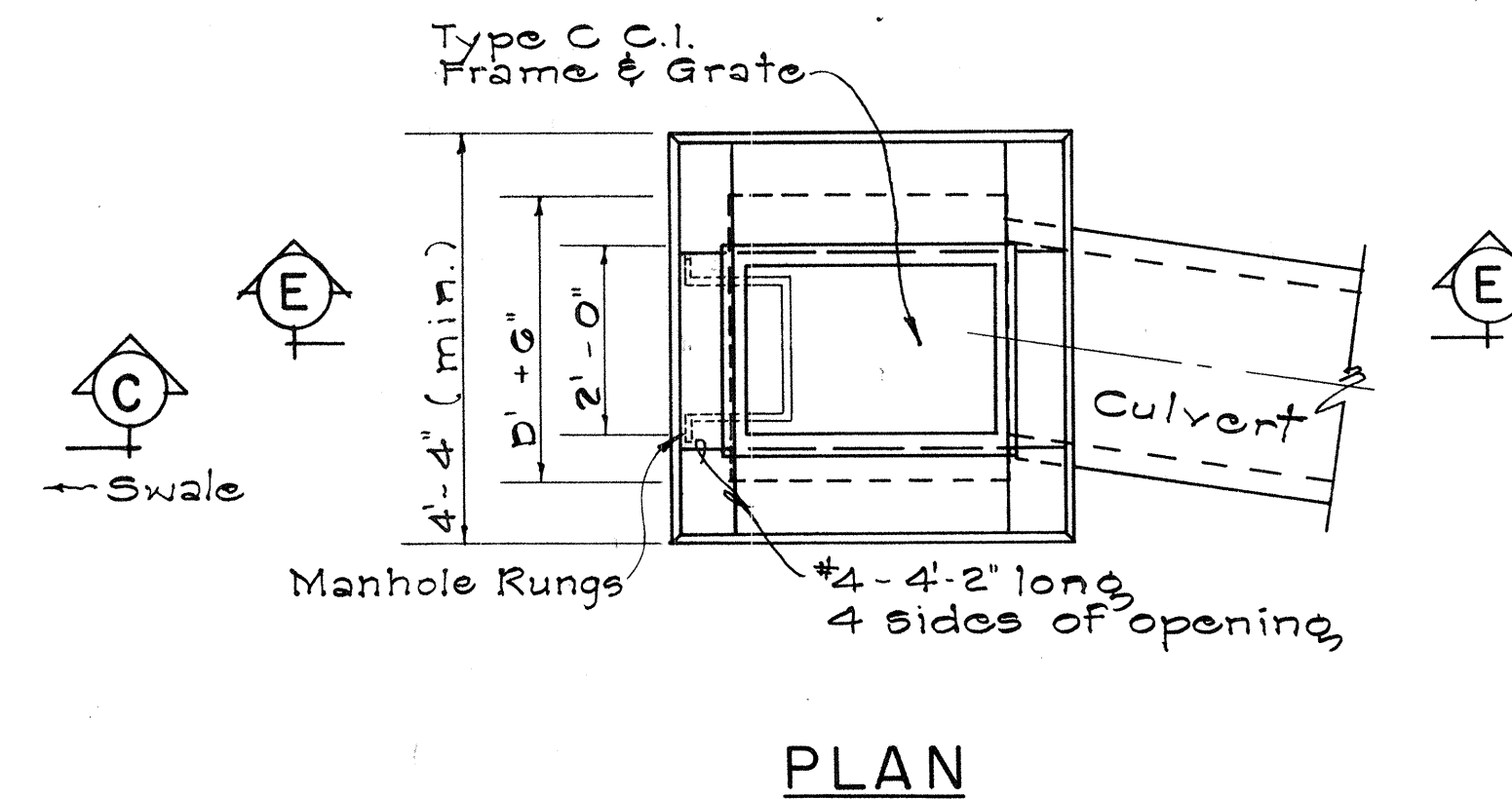
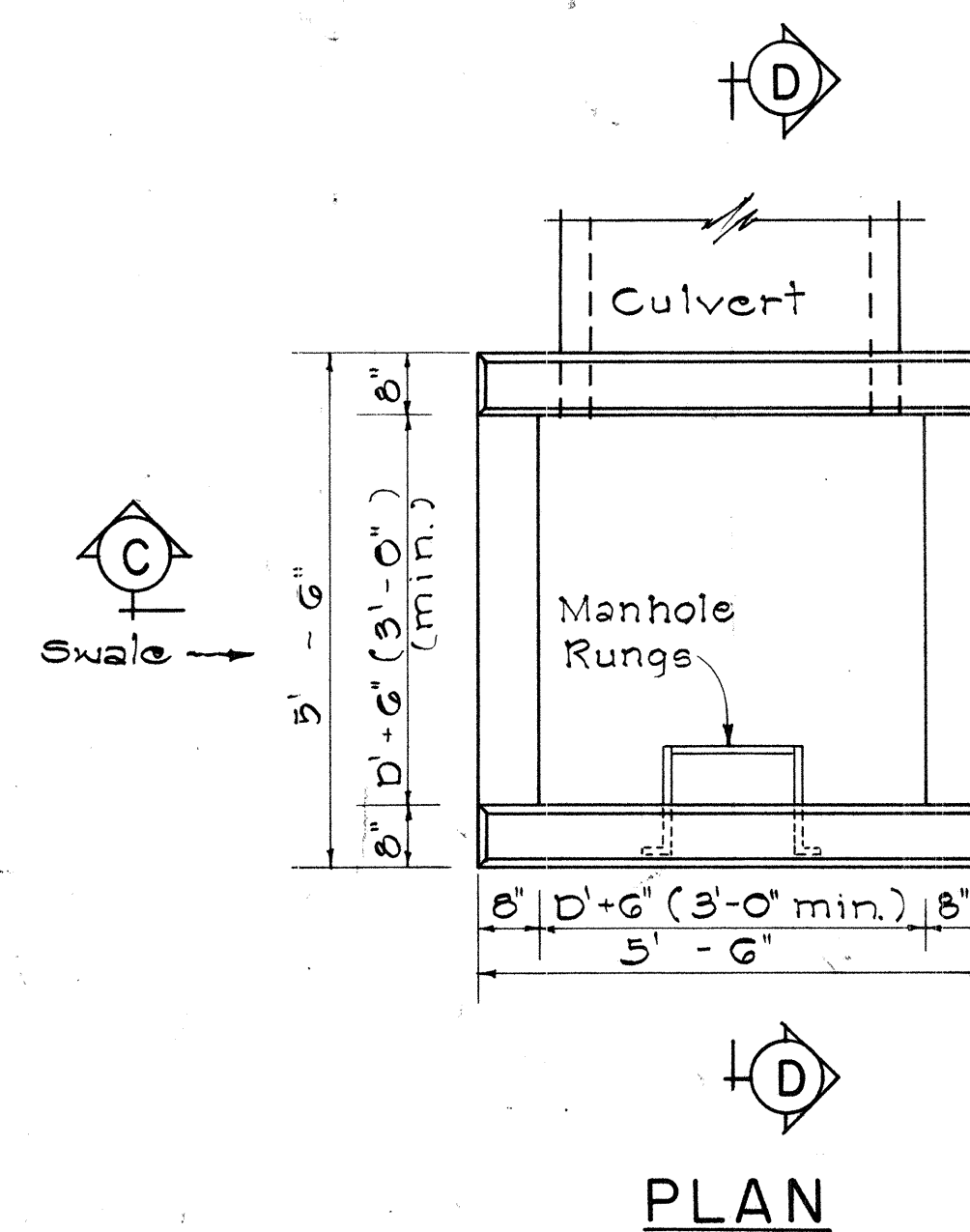
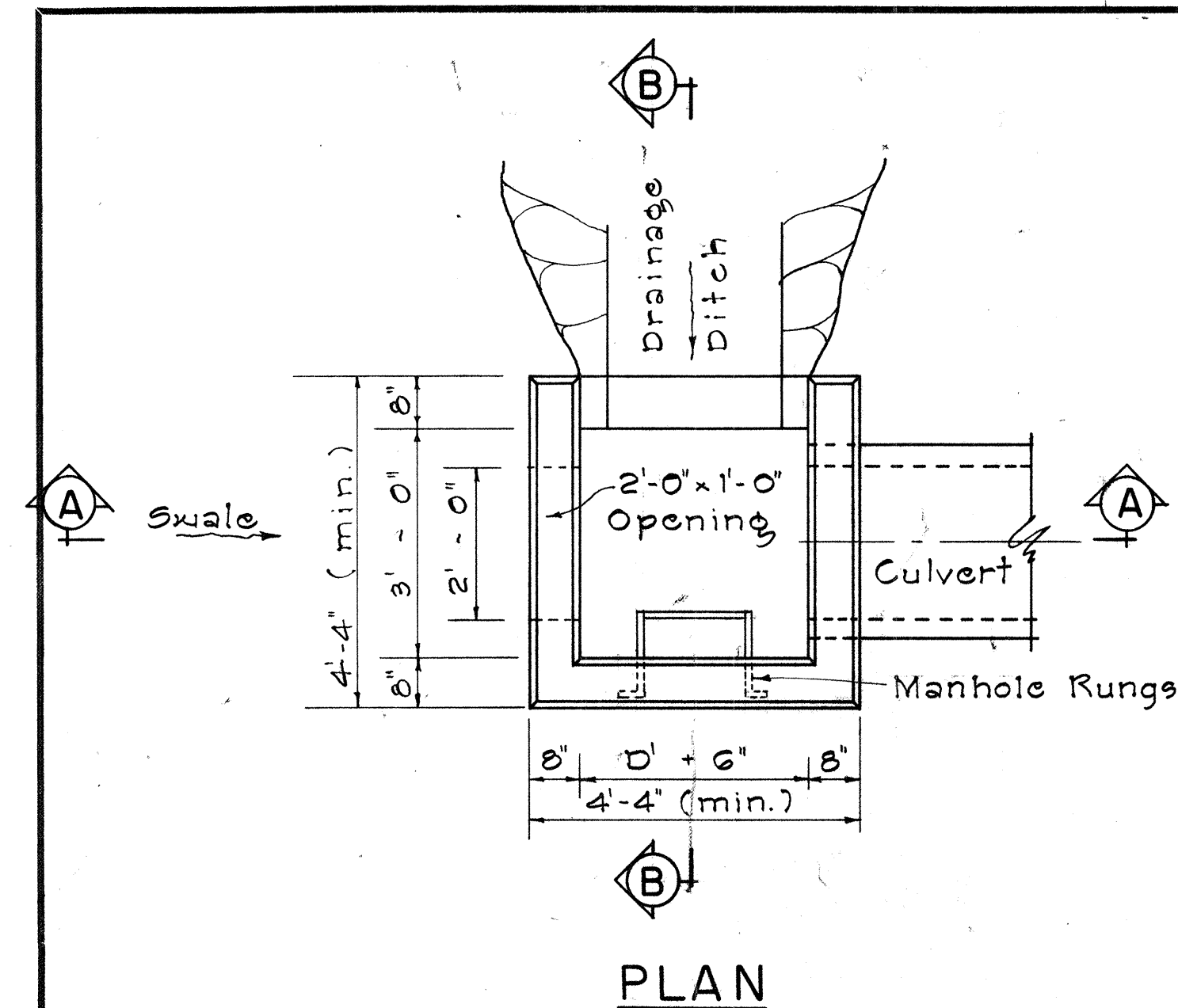
PIILANI HIGHWAY
VICINITY OF MOKULELE HIGHWAY TO
VICINITY OF KILOHANA STREET
F.A. PROJECT NO. F-RF-031-1(6)
SCALE: AS SHOWN DATE SEP 1978

SHEET No. 48 OF 50 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-RF-031-1(6)	1975	156	262

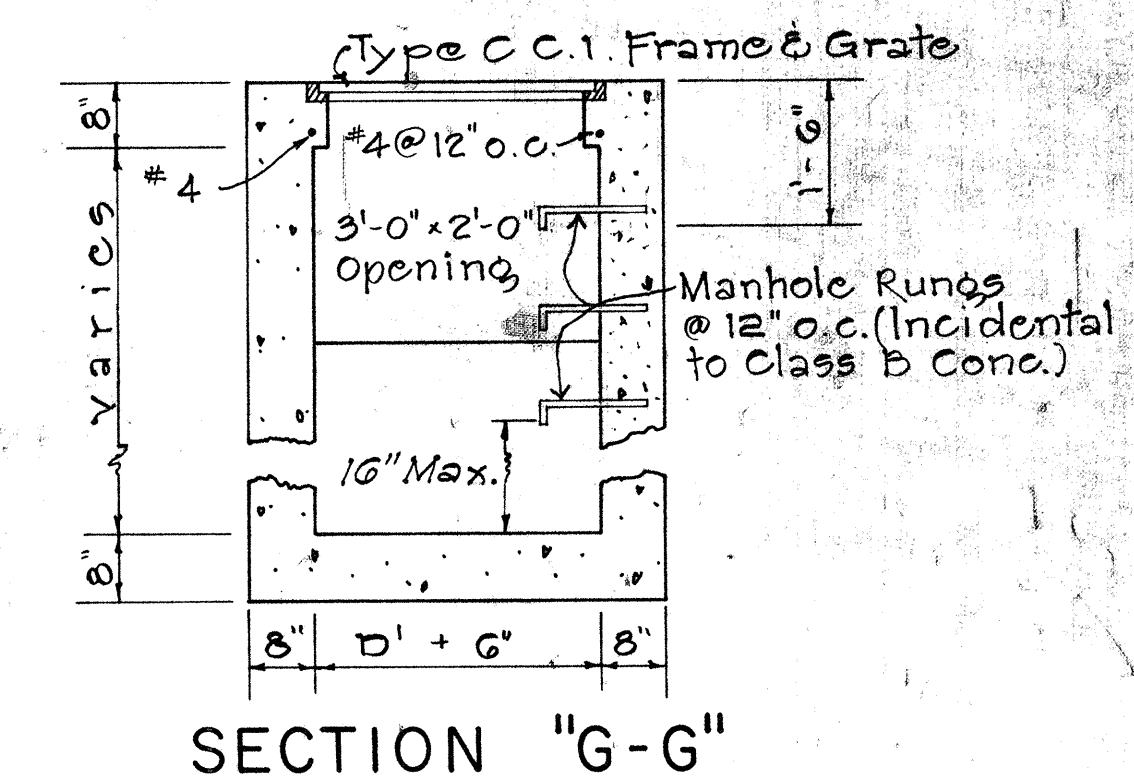
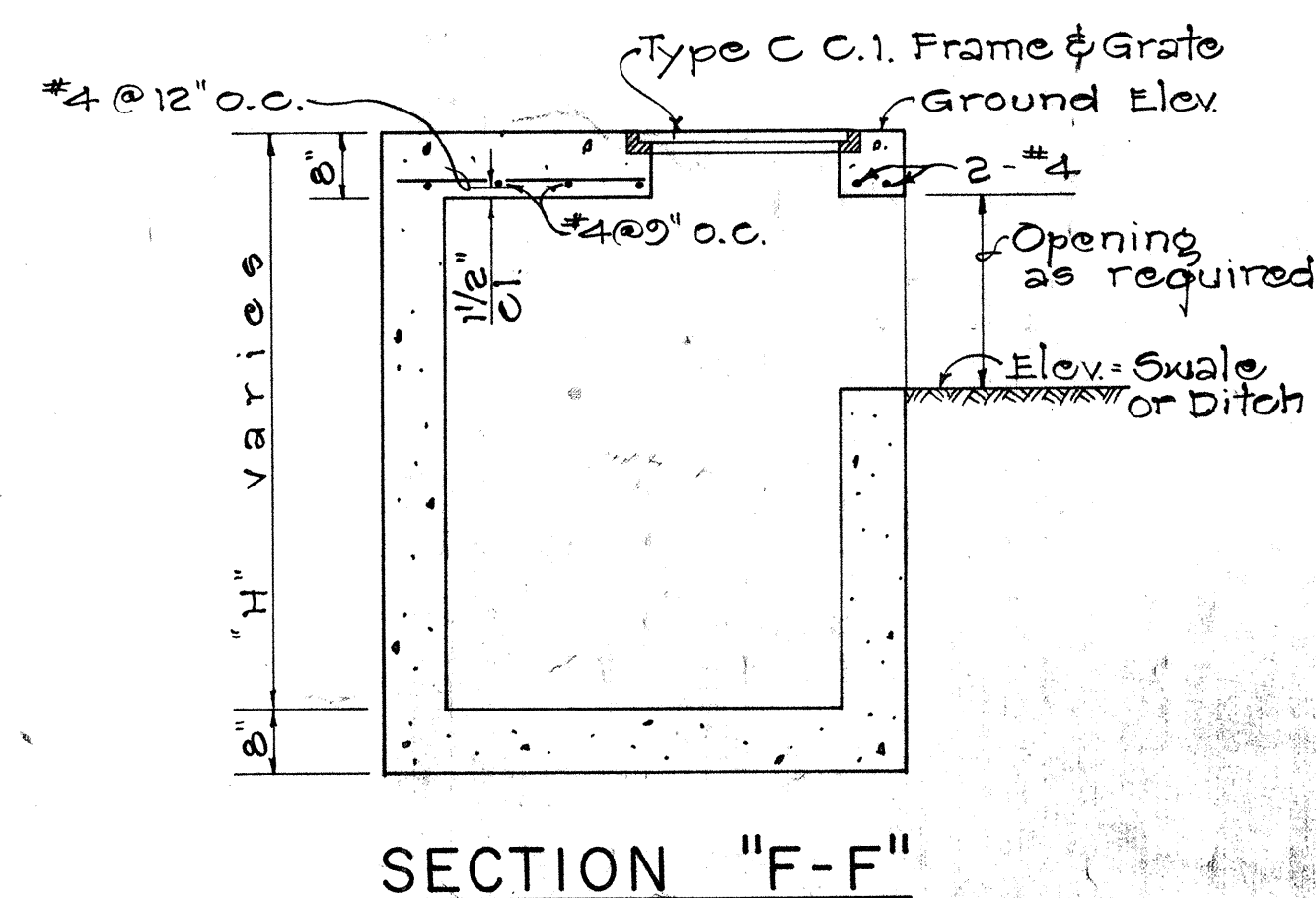
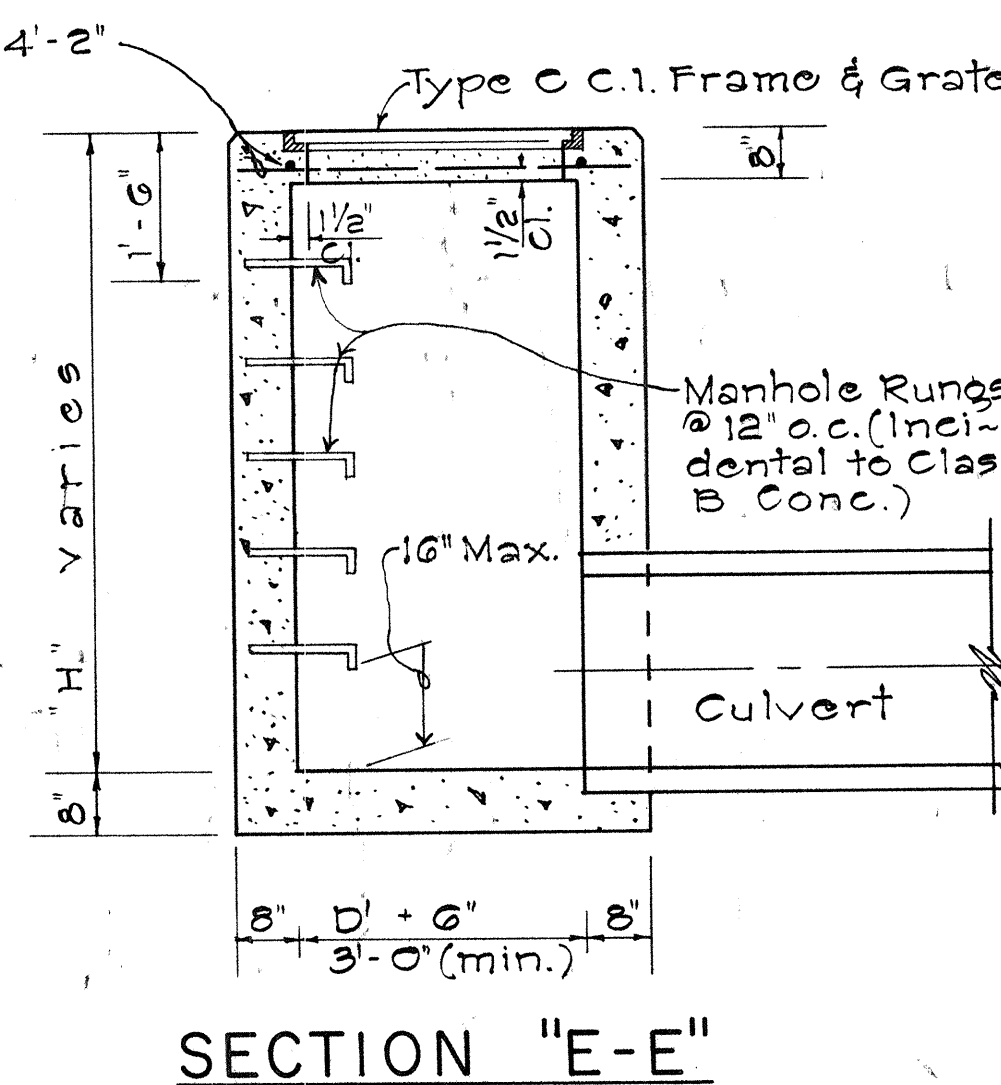
GENERAL NOTES

- All concrete shall be Class "B" unless otherwise noted.
- Exposed edges of all drainage structures shall be chamfered one inch.
- Culvert shall enter and leave Drop Intake from any position and in the direction indicated by the plans or ordered by the Engineer.
- Manhole Rungs (12" o.c.) are req'd. when "H" is greater than 4'-6". Only one rung (16 inches from the bottom) is required if "H" is 4'-6" or less. Manhole Rungs may be placed at any location as ordered by the Engineer.



TYPE "C" GRATED CONCRETE DROP INTAKE

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



TYPE "D" GRATED CONCRETE DROP INTAKE

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

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

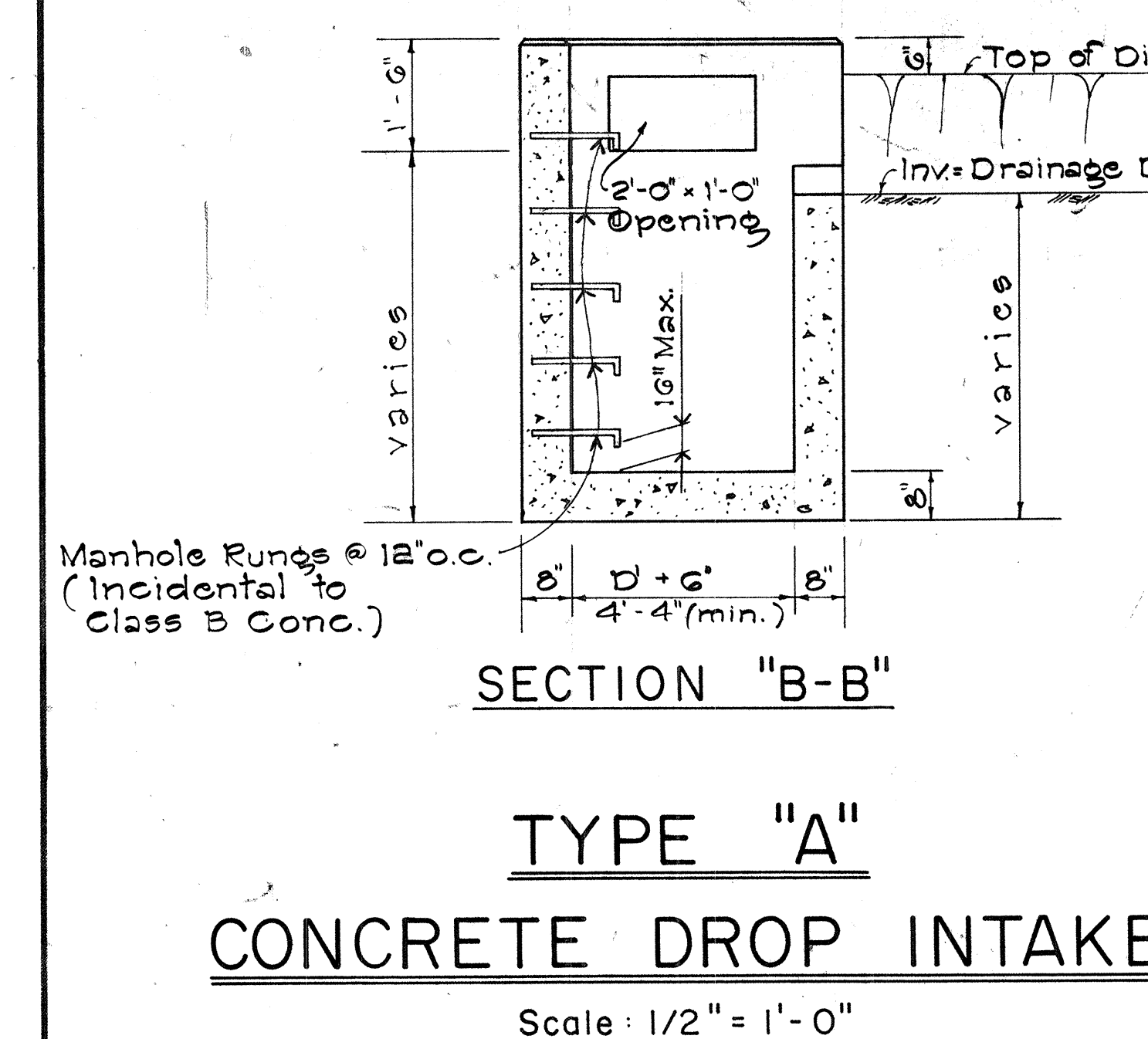
APPROVED: 2.2.2.2 12-17-69
ASSISTANT CHIEF, ENGINEERING DATE

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

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
STANDARD DETAILS
TYPE "A", "B", "C", AND "D"
CONCRETE DROP INTAKE

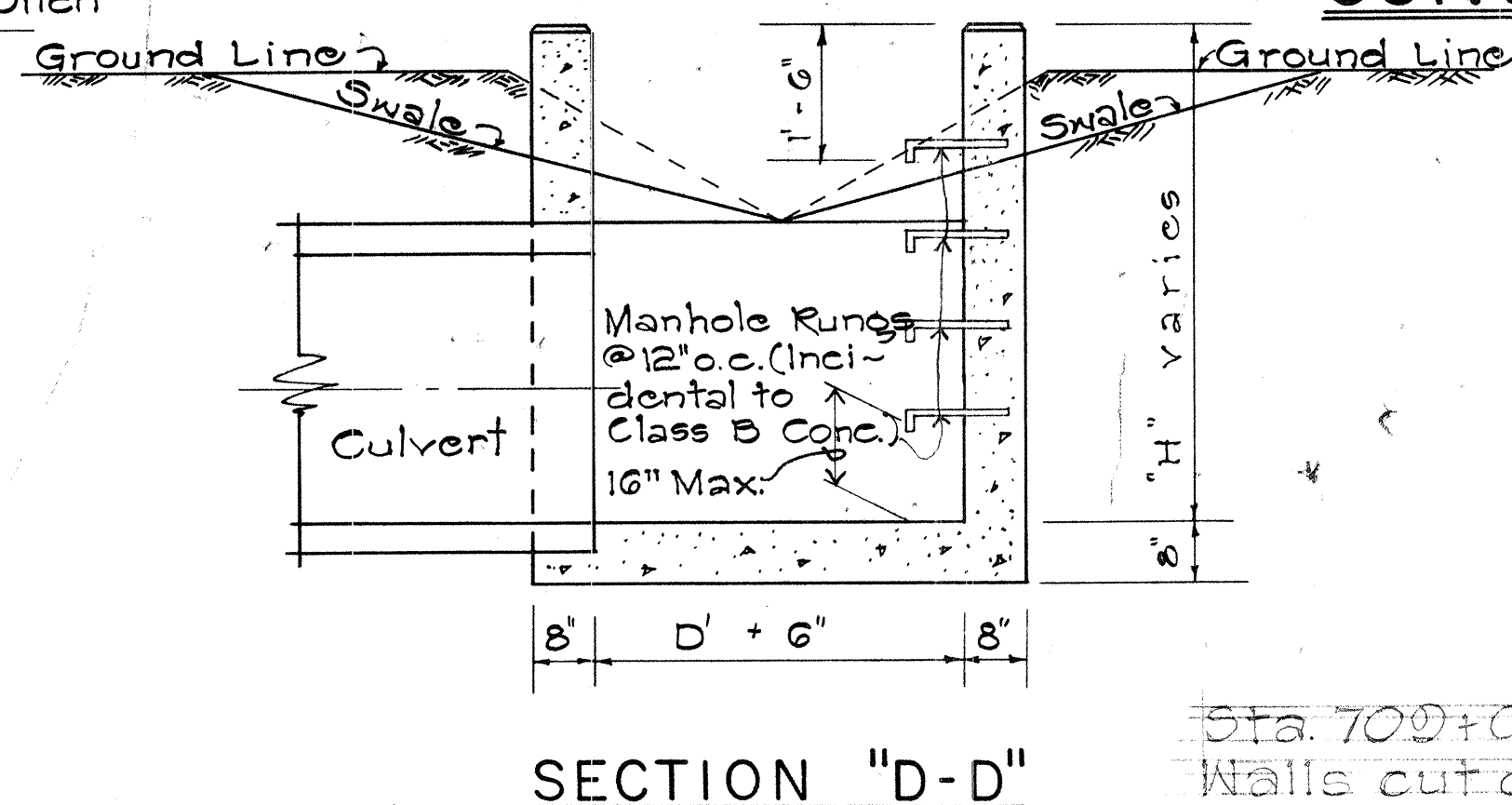
Scale: As Noted Date: July, 1969
SHEET No. 49 OF 50 SHEETS DH19

DATE: _____
DESIGNED BY: _____
CHECKED BY: _____
NOTE BOOK: _____
No. _____



TYPE "A" CONCRETE DROP INTAKE

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

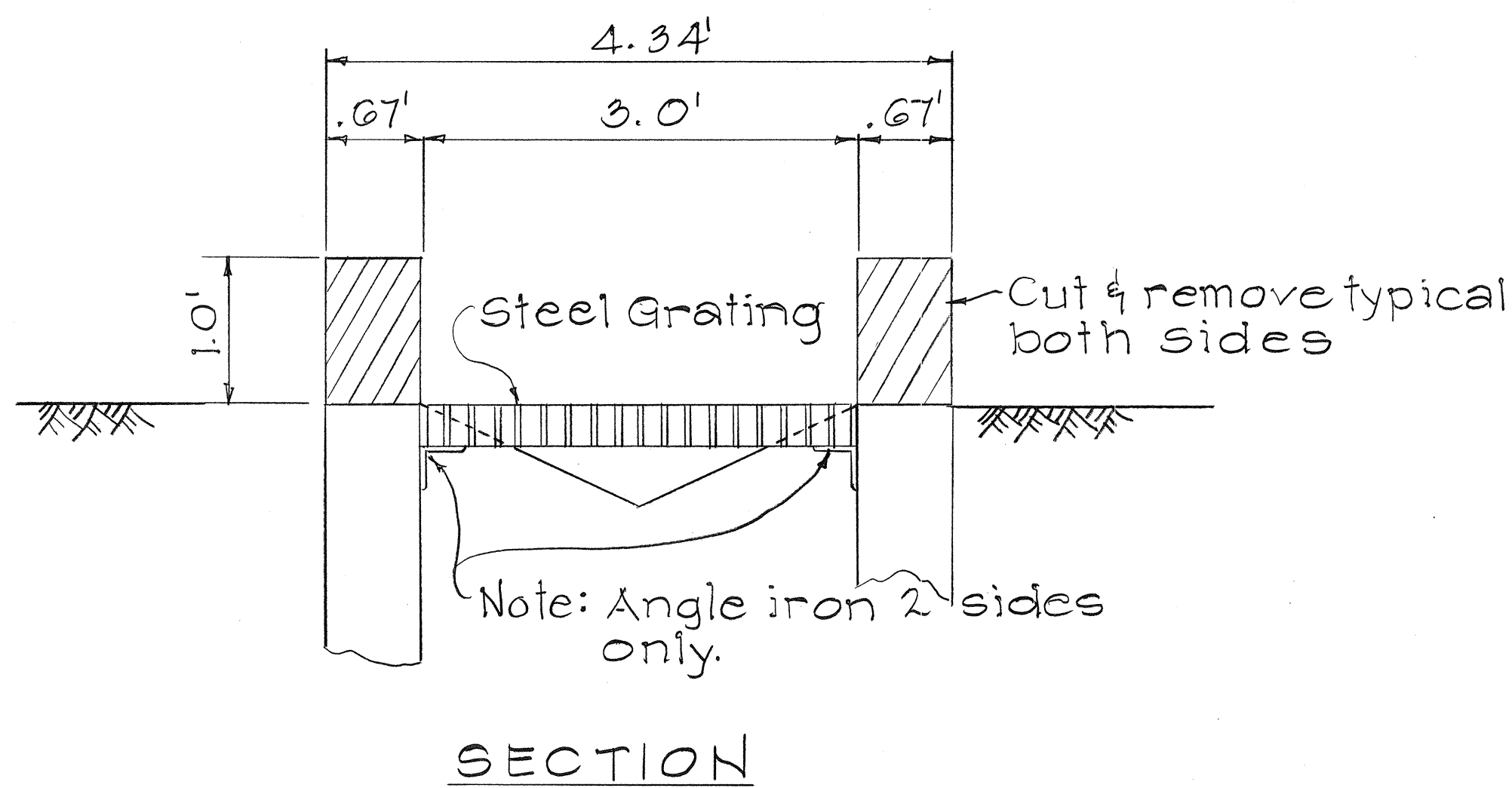
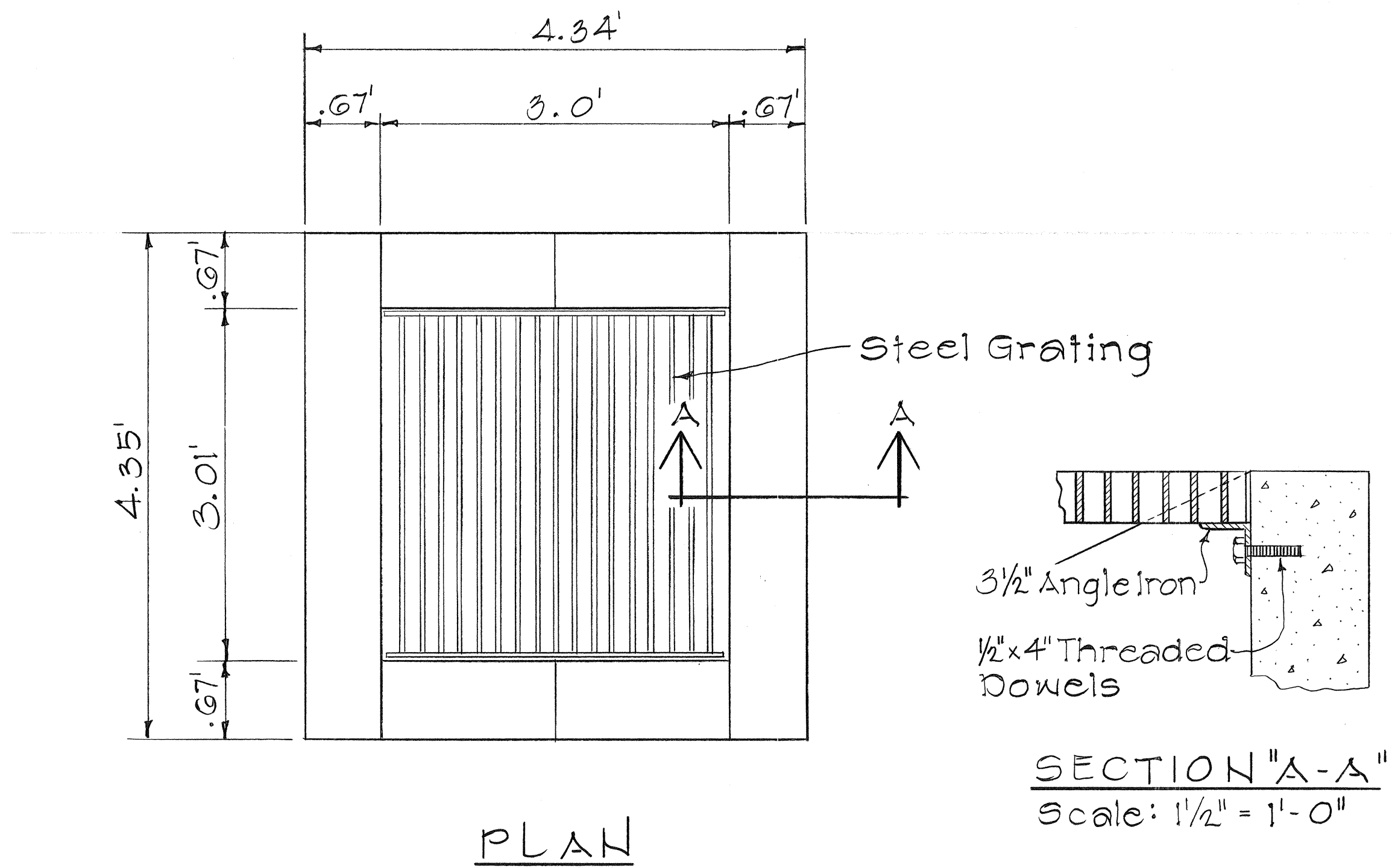


TYPE "B" CONCRETE DROP INTAKE

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

Sta. 700+05.14 N/S 48.54' L.
Walls cut down to grade and
1614 Grate adjusted to fit.
Details are shown on sht. no. 156 S-1

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.				



DETAIL OF C.D.I. AT STA. 700+05.14 ± o/s 48.54' LT.
Scale: 1" = 1'

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

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
LAND TRANSPORTATION FACILITIES DIVISION

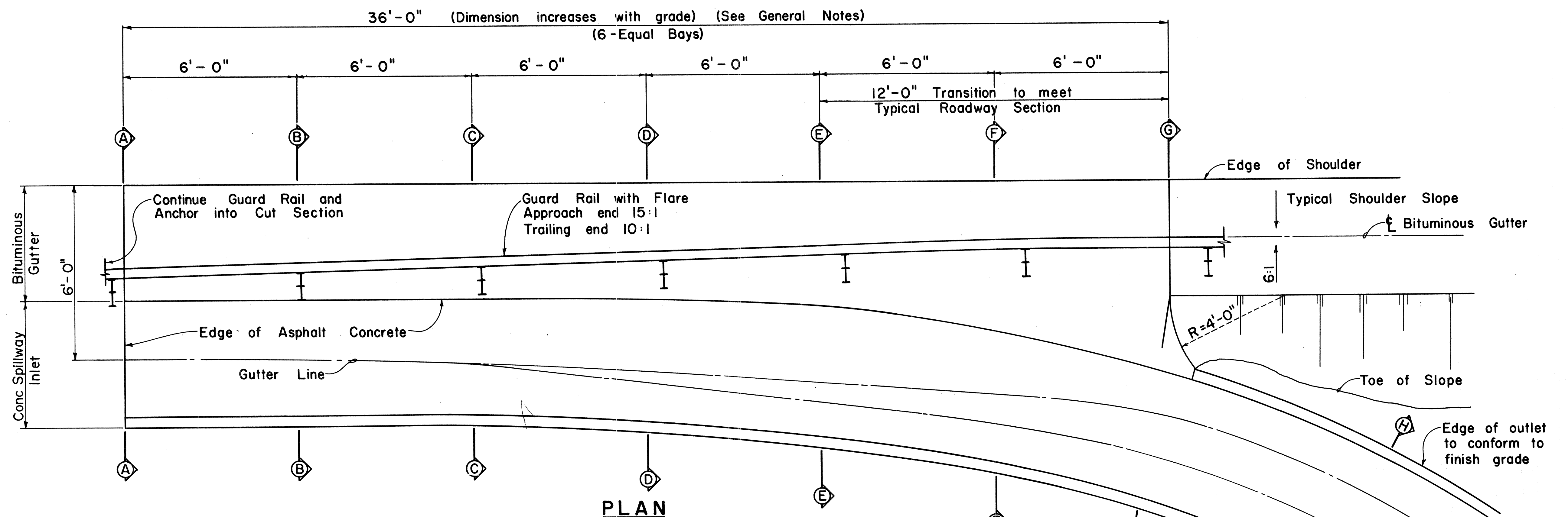
DRAINAGE DETAILS
PILANI HIGHWAY
VICINITY OF MOKULELE HIGHWAY TO
VICINITY OF KILOHANA STREET
FA PROJECT NO F-RF-031-1(G)
SCALE: AS NOTED DATE: MAR, 1983

SHEET NO. OF SHEETS

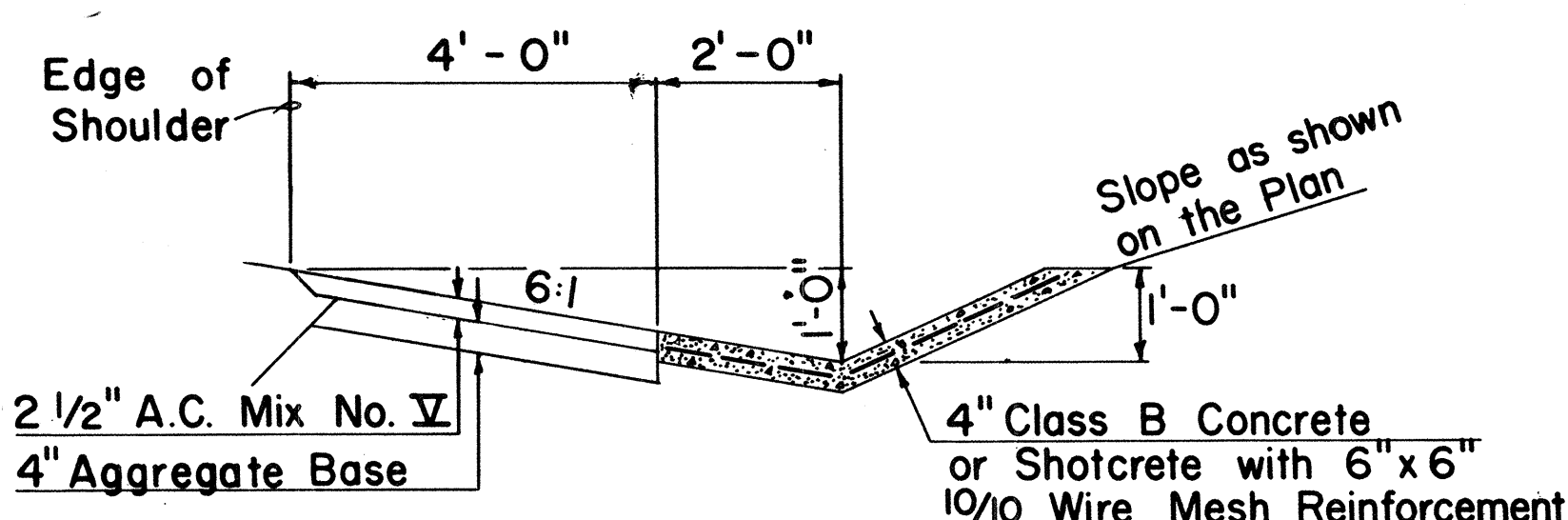
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-87-001-1(5)	1976	157	262

GENERAL NOTES

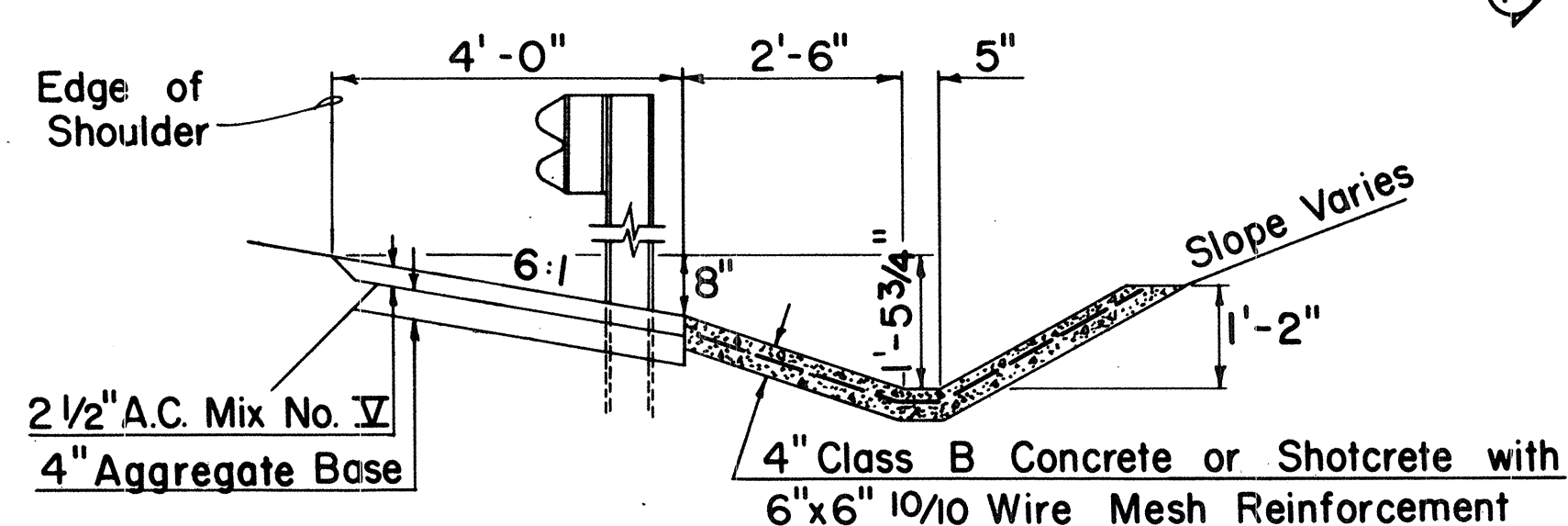
- If the average grade of pavement for the length from Section A-A to Section G-G exceeds 2%, this length shall be increased in increments of 6' for each 1% increase in average grade of pavement in excess of 2%.



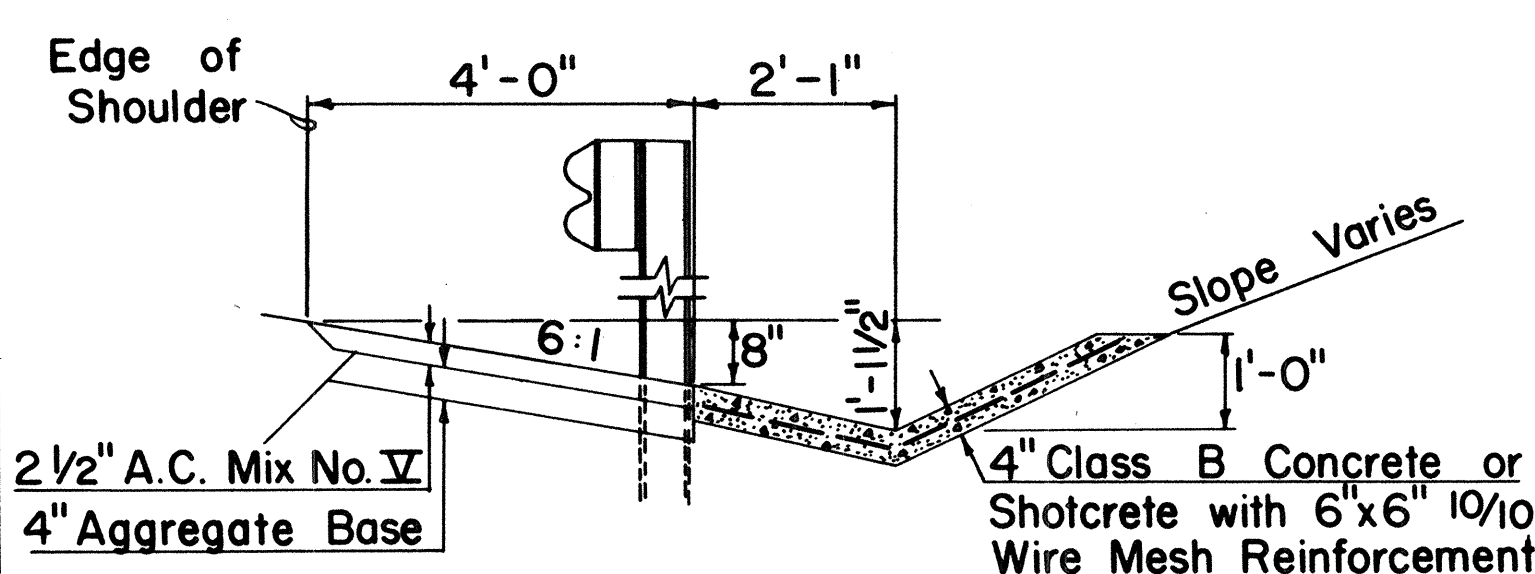
PLAN



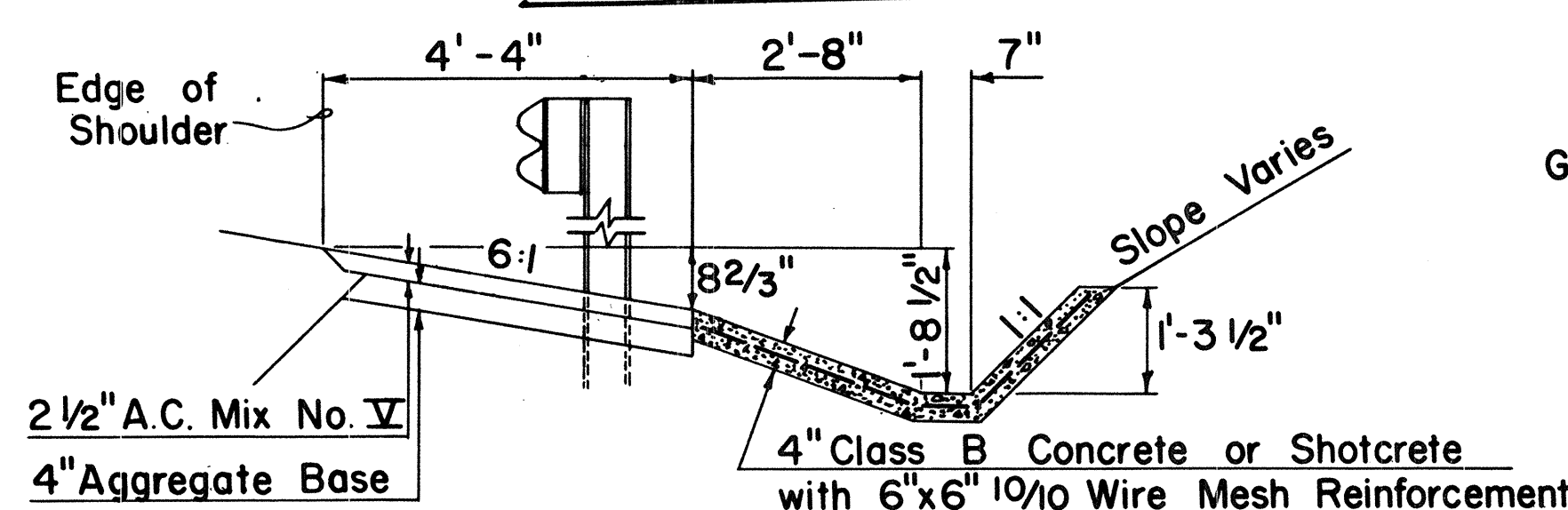
SECTION A-A



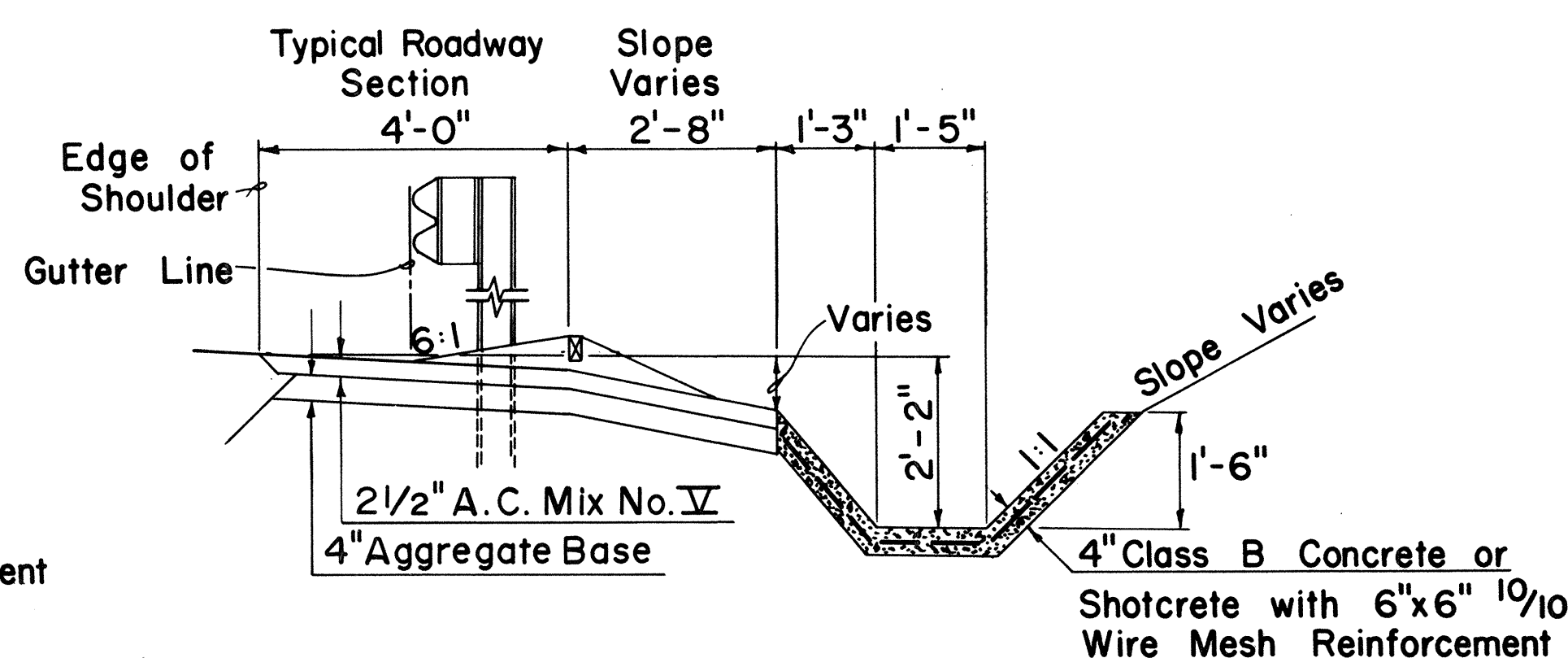
SECTION D-D



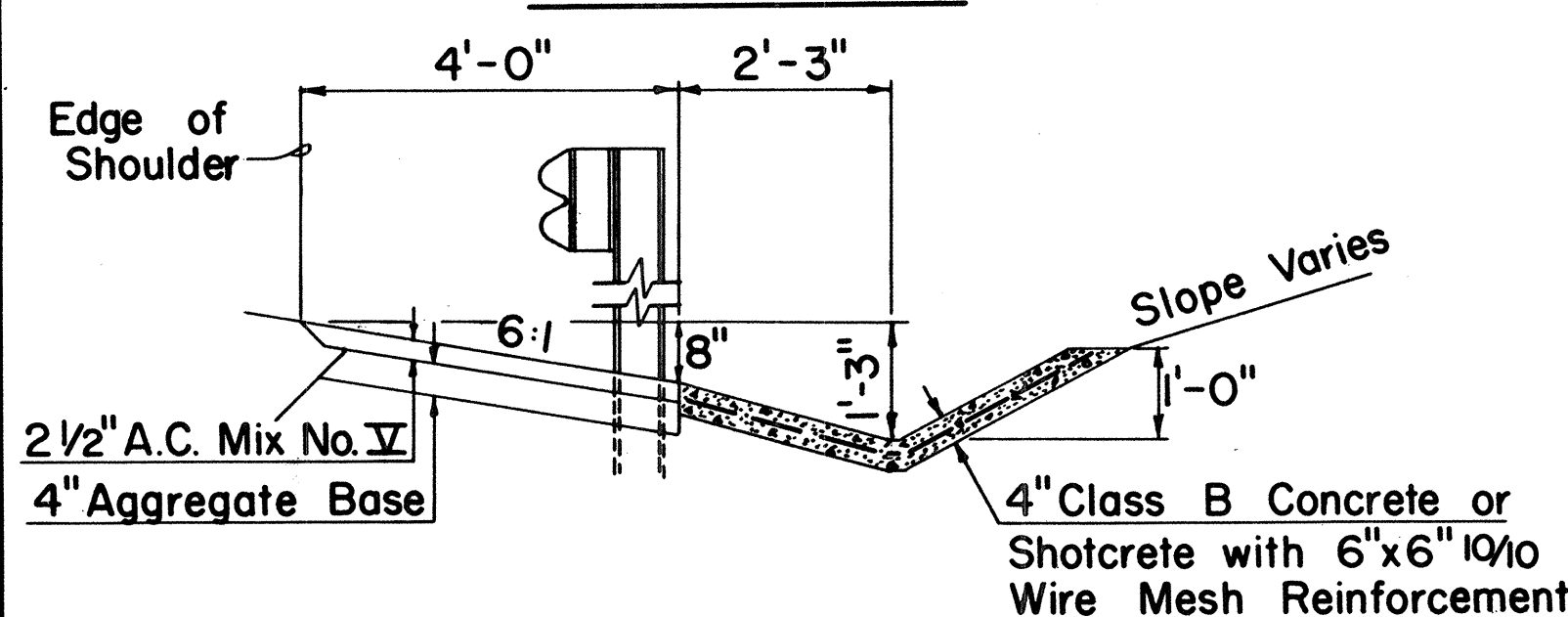
SECTION B-B



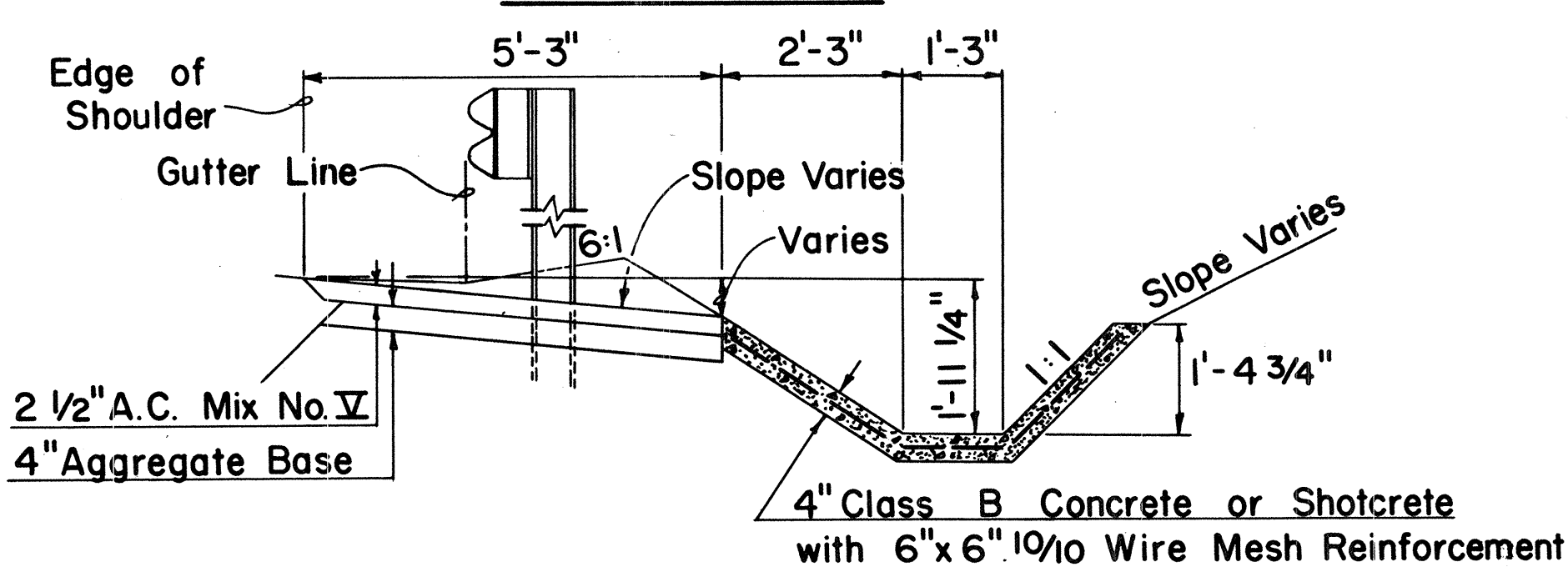
SECTION E-E



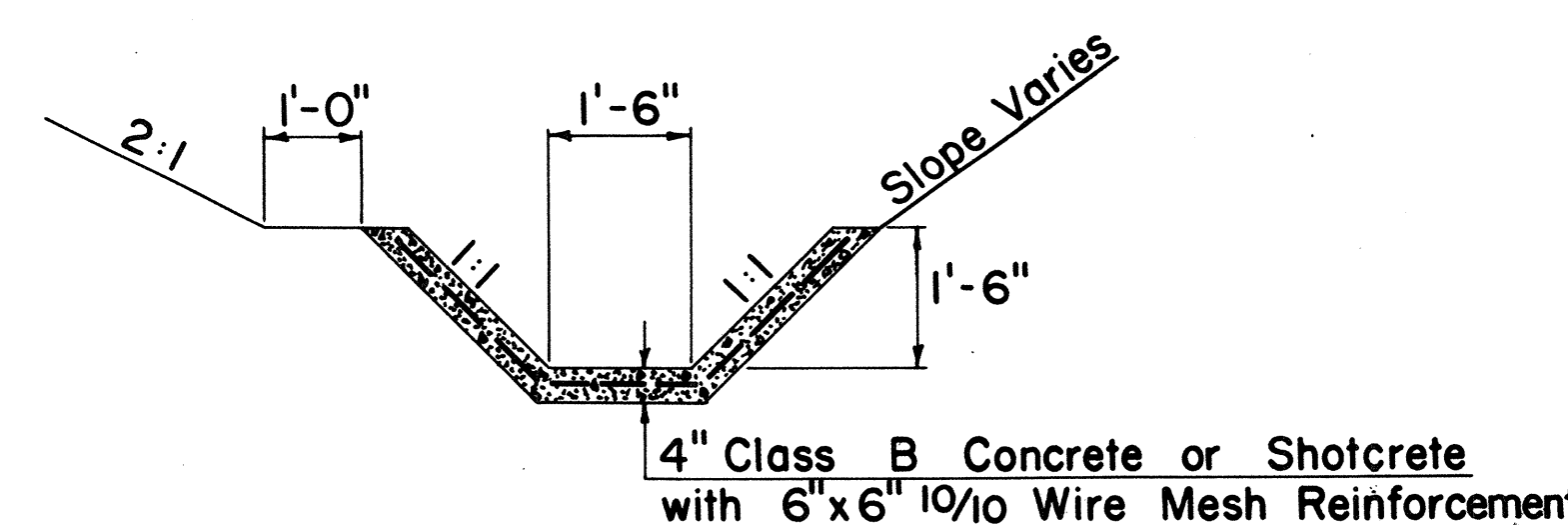
SECTION G-G



SECTION C-C



SECTION F-F



SECTION H-H

NO.	REVISION	APPROVED BY	DATE

APPROVAL RECOMMENDED:

G. Pakano
HYDRAULIC DESIGN ENGINEER

10-13-76
DATE

APPROVED:

Harold S. Zaksch
ASSISTANT CHIEF, ENGINEERING

10-14-76
DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
STANDARD DETAILS
CONCRETE SPILLWAY INLET

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

Date: October, 1976

SHEET No. 50 OF 50 SHEETS DH 20