

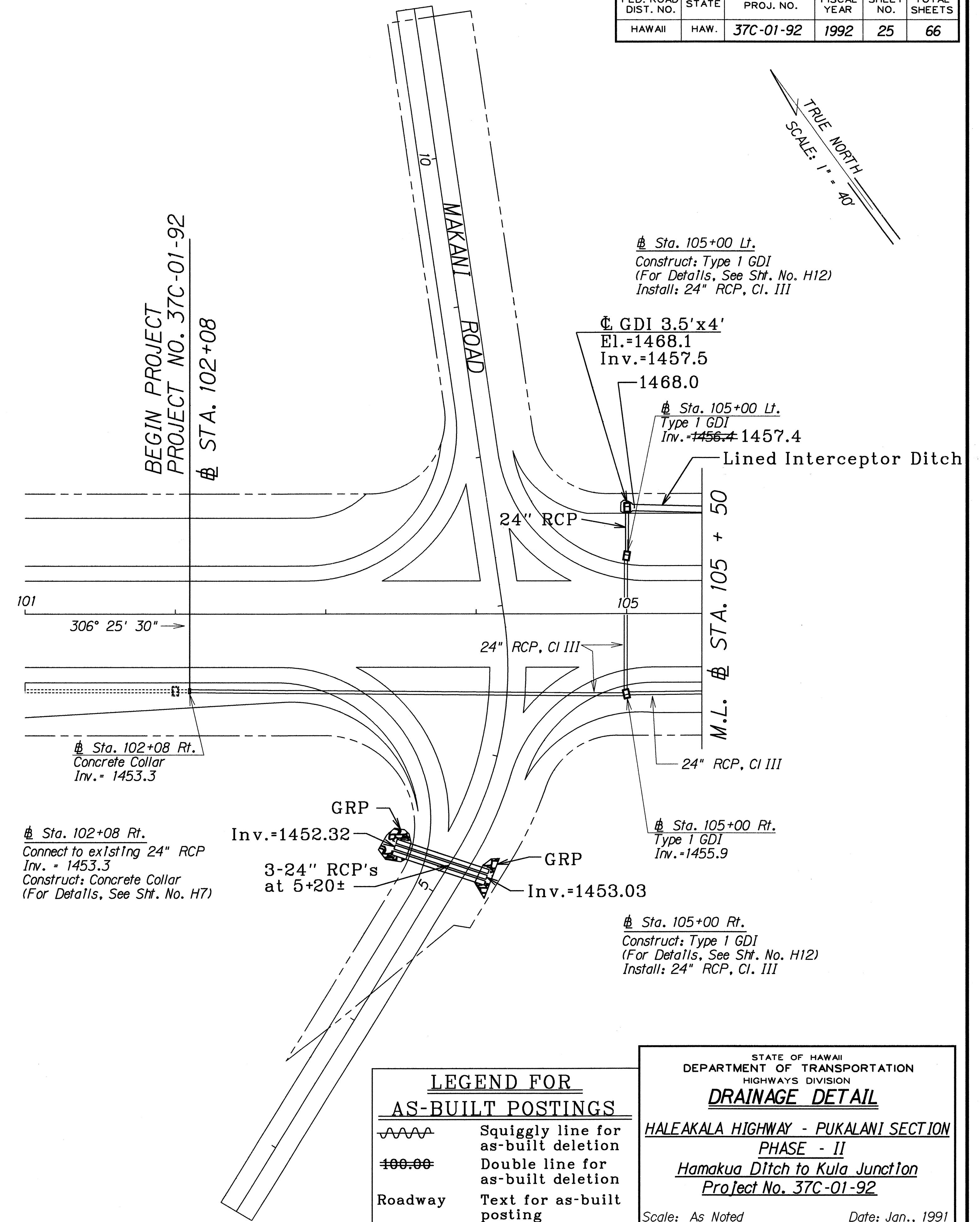
DRAINAGE SUMMARY

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	37C-01-92	1992	25	66

ITEM NO.		206.	207.	503.	602.	603.	603.	603.	604.	604.	604.	604.	604.	604.	612.	640.
UNIT USED		1000	0100	0000	1000	1010	1014	1020	0373	5004	5005	5016	5024	5030	0200	7500
		CY	CY	CY	Lb	LF	LF	LF	EA	EA	EA	EA	EA	EA	CY	LF
STRUCTURE	STATION															
		STRUCTURE EXCAVATION OTHER THAN AT BRIDGES	DITCH & CHANNEL EXCAVATION	CLASS A CONCRETE OTHER THAN IN BRIDGES	REINFORCING STEEL OTHER THAN IN BRIDGES	24-INCH RCP, CL III	36-INCH RCP, CL III	54-INCH RCP, CL III	TYPE C STORMDRAIN MANHOLE 6.00 FT. TO 6.99 FT.	TYPE 1 GRATED DROP INLET 4.00 FT. TO 4.99 FT.	TYPE 1 GRATED DROP INLET 5.00 FT. TO 5.99 FT.	TYPE 2 CONCRETE DROP INLET 5.00 FT. TO 5.99 FT.	TYPE 3 GRATED DROP INLET 5.00 FT. TO 5.99 FT.	TYPE M CONCRETE DROP INLET 9.00 FT. TO 9.99 FT.	GROUTED RUBBLE PAVING SLOPE PROTECTION	LINED RECTANGULAR DRAINAGE DITCH
CONC. COLLAR	Sta. 102+08 RT			1	32											
TYPE 1 GDI	Sta. 105+00 RT	293				240					1					
TYPE 1 GDI	Sta. 105+00 LT	96				82			1							
TYPE 1 GDI	Sta. 107+00 RT	303				248				1						
TYPE 1 GDI	Sta. 107+00 LT	96				82			1							
TYPE M CDI	Sta. 130+60 o/s 99' LT	162	15	2	45	140								1		
54" CROSSING	Sta. 138+10	531		5	418			239							30	
TYPE 2 CDI	Sta. 158+83 o/s 198' LT	203				166					1					
TYPE C SDMH	Sta. 159+05 o/s 30' LT	269	76	1	107		186		1							150
TYPE 3 GDI	Sta. 160+05 o/s 65' LT	117				102							1			

GENERAL NOTES:

- Existing drainage systems will be functional at all times during construction. The Contractor is to furnish materials, equipment, labor, tools and incidentals necessary to maintain flow. The cost for this work shall be incidental to the various Contract Items.
- The Contractor shall verify the locations of all existing culverts and utilities in the field. Any existing culverts and utilities damaged during construction shall be repaired or replaced by the Contractor at his own expense.
- Concrete shall be Class A unless otherwise noted.
- For added reinforcing around existing and new culverts, see Standard Plan H-04.
- Chamfer all exposed concrete edges 1".
- The alignment and length of the grass spillway shall be constructed to the satisfaction of the Engineer. Payment shall be considered incidental to the various Contract Items.
- Culverts within the GDI & Manholes shall be cut flush with the inside face of the wall. Above work shall be considered incidental to the various Contract Items.
- Concrete Collar shall be considered incidental to 24" RCP, Cl. III.



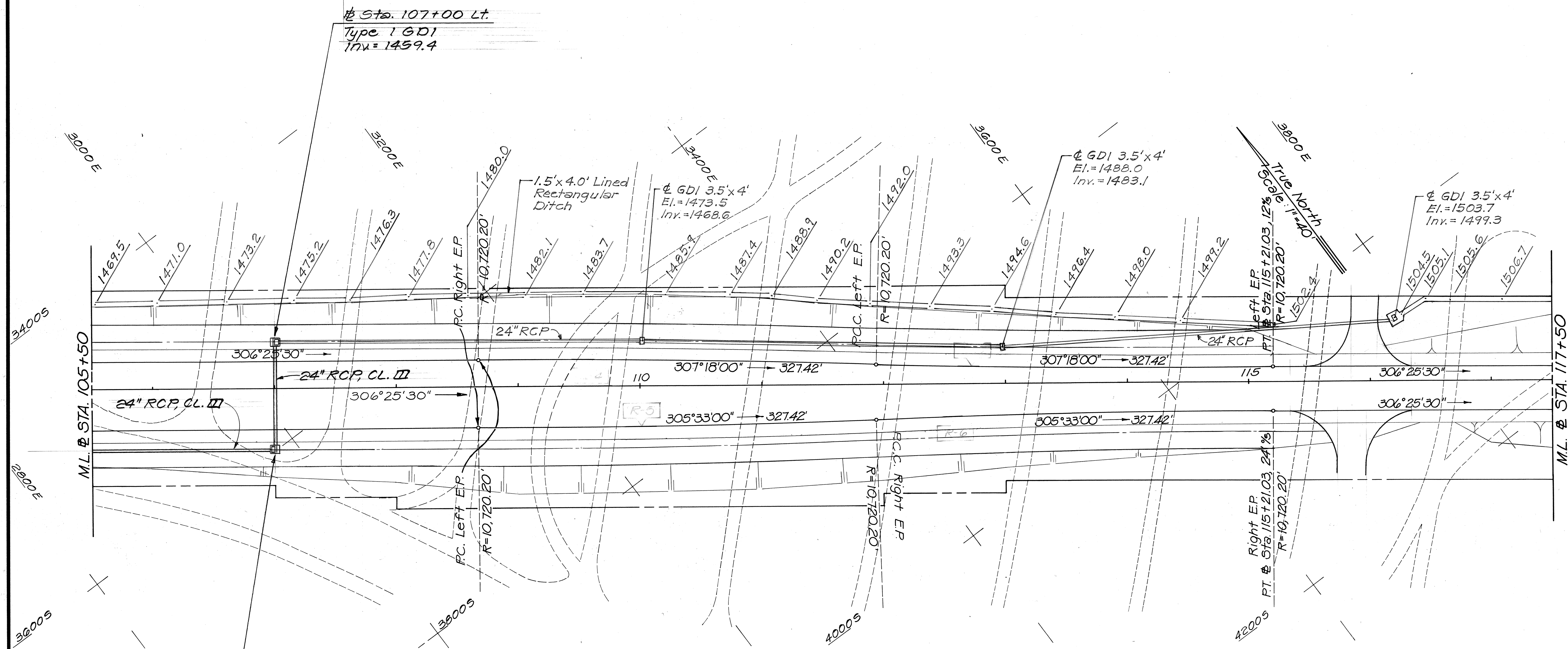
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	37C-01-92	1992	26	66

Sta. 107+00 Lt.
Construct: Type 1 GDI
(For Details, See Sht. No. H12)
Install: 24" RCP, Cl. III

Sta. 107+00 Lt.
Type 1 GDI
Inv. = 1459.4

Sta. 107+00 Rt.
Type 1 GDI
Inv. = 1458.9

Sta. 107+00 Rt.
Construct: Type 1 GDI
(For Details, See Sht. No. H12)
Install: 24" RCP, Cl. III



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

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DRAINAGE PLAN

HALEAKALA HWY. - PUKALANI SECT.

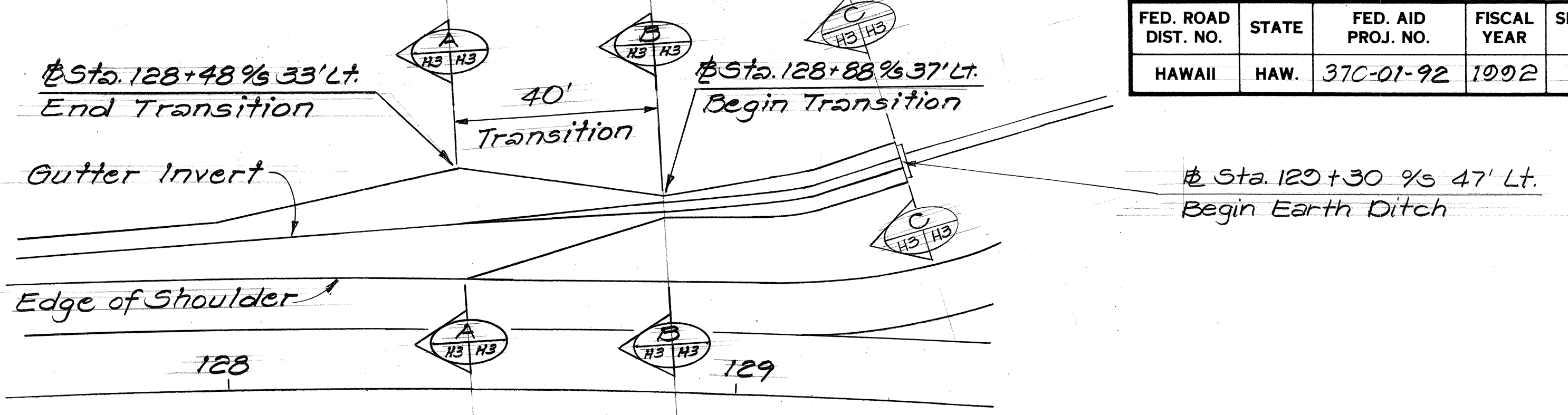
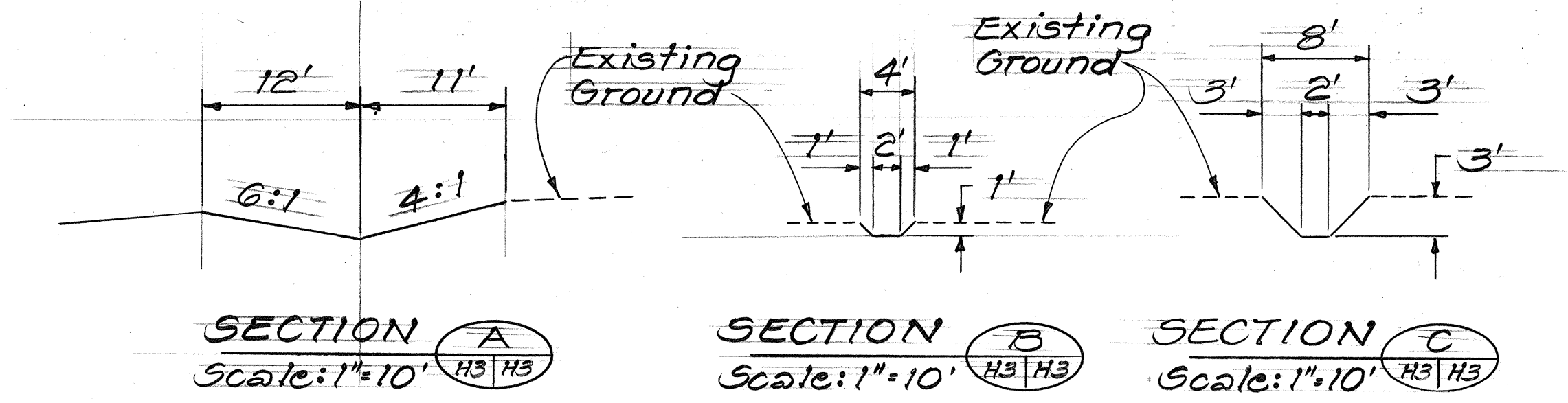
PHASE - II

Hamakua Ditch to Kula Junction
Project No. 37C-01-92

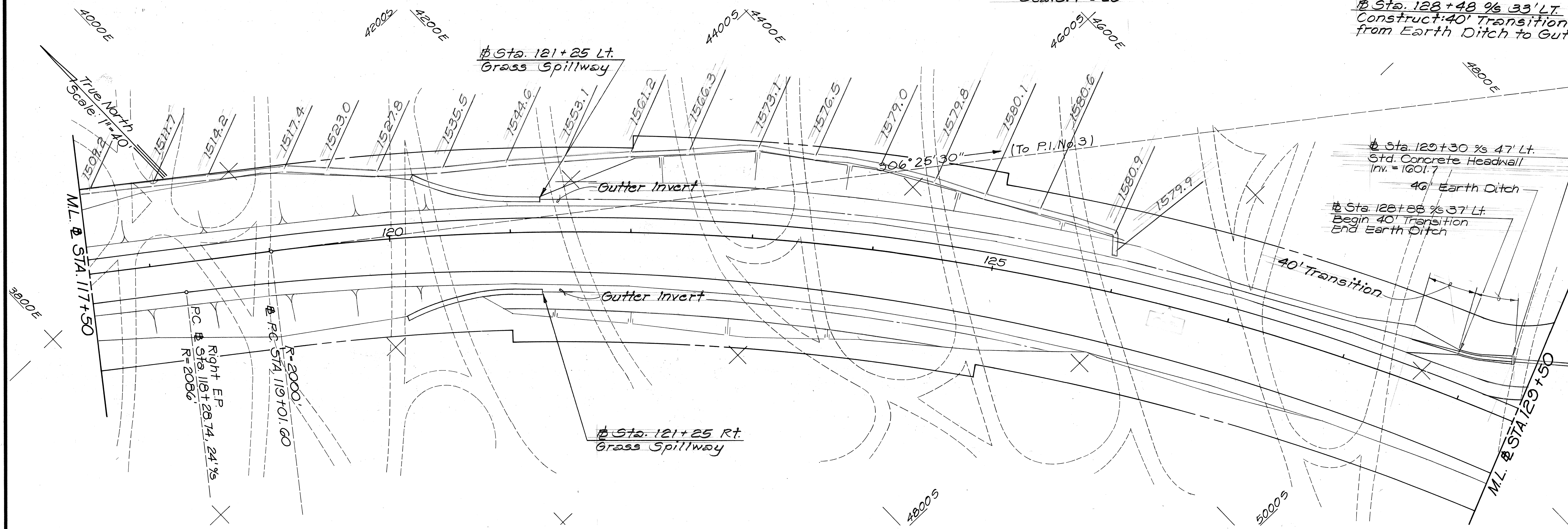
Scale: 1" = 40' Date: Jan. 1991

SHEET NO. H2 OF 15 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	37C-01-92	1992	27	66



EARTH DITCH TO GUTTER TRANSITION



DATE	
DESIGNED BY	
DRAWN BY	
CHECKED BY	
NOTED BY	
ORIGINAL PLAN	

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DRAINAGE PLAN

HALEAKALA HWY-PUKALANI SECT.

PHASE - II

Hamakua Ditch to Kula Junction
Project No. 37C-01-92
Scale: 1"=40' Date: Jan. 1991

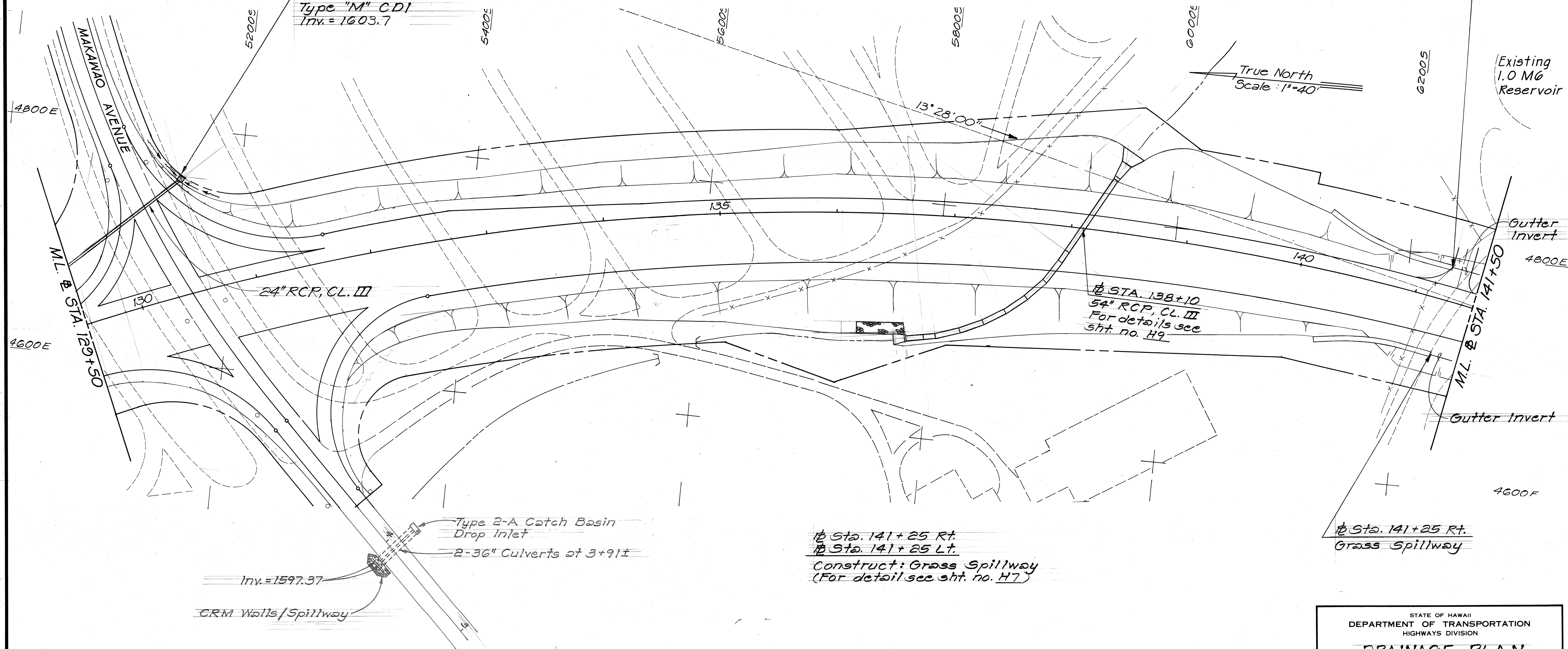
SHEET No. H3 OF 15 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	37C-01-92	1992	28	66

Sta. 130+60 1/2 99' Lt.
Construct: Type "M" C.D.I.
Earth Ditch
(For Details, See Sht. No. H8)
Std. Conc. Headwall
Install: 24" RCP, CL. III

Sta. 130+60 1/2 99' Lt.
Type "M" C.D.I.
Inv. = 1603.7

Sta. 141+25 Lt.
Grass Spillway



Sta. 141+25 Rt.
Sta. 141+25 Lt.
Construct: Grass Spillway
(For detail see sht. no. H7)

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DRAINAGE PLAN

HALEAKALA HWY - PUKALANI SECT.

PHASE - II

Hamakua Ditch to Kula Junction

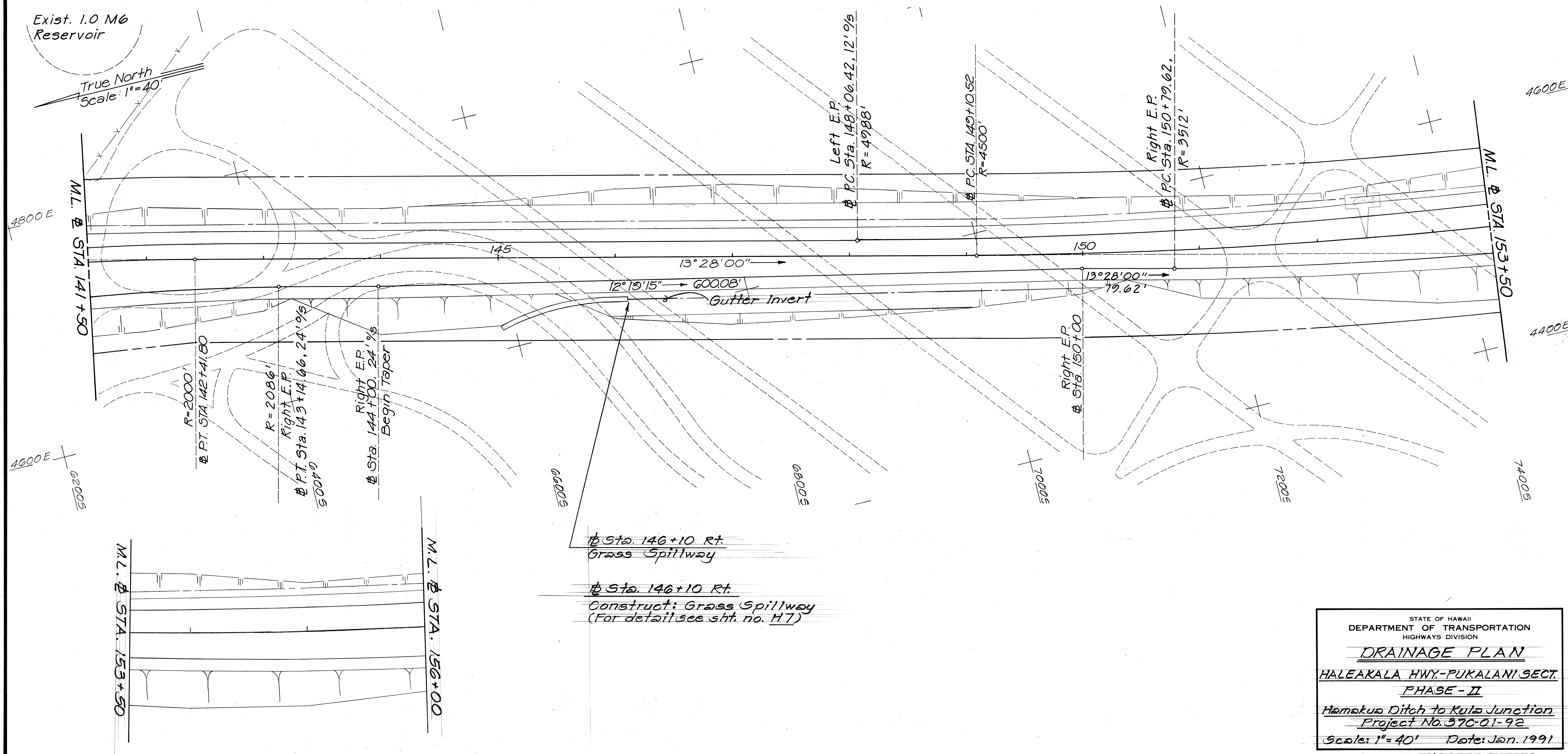
Project No. 37C-01-92

Scale: 1"=40' Date: Jan. 1991

SHEET No. H4 OF 15 SHEETS

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

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	37C-01-92	1992	29	60



DATE	_____
DESIGNED BY	_____
DRAWN BY	_____
CHECKED BY	_____
ORIGINAL PLAN	_____
NOTE BOOK	_____
QUANTITIES BY	_____
CHECKED BY	_____

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DRAINAGE PLAN

HALEAKALA HWY.-PUKALANI SECT.

PHASE - II

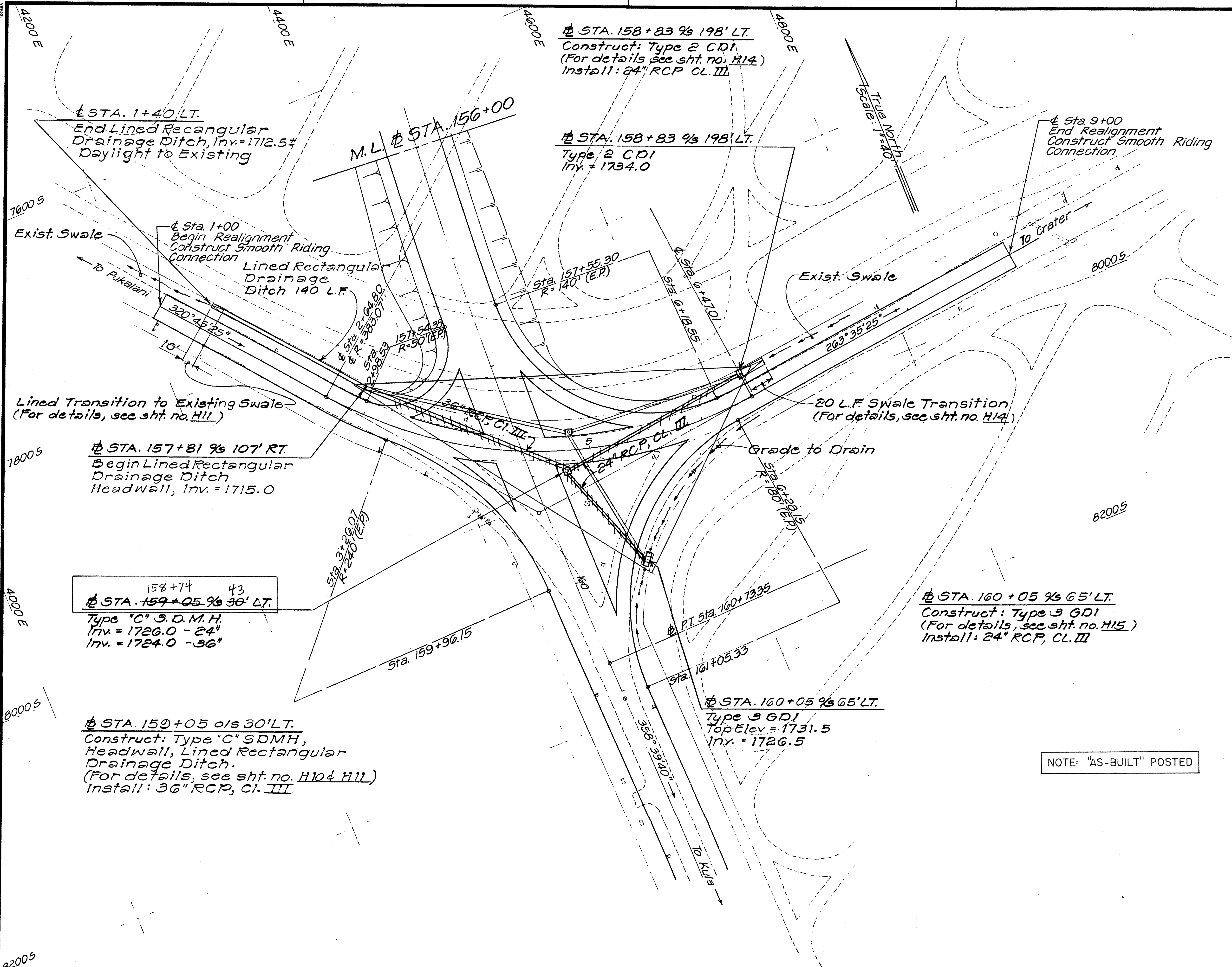
Hamakua Ditch to Kula Junction

Project No. 37C-01-92

Scale: 1" = 40' Date: Jan. 1991

SHEET No. H5 OF 15 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	37C-01-92	1992	30	60



DATE	1/1/92
DESIGNED BY	...
CHECKED BY	...
NOTED BY	...
NO.	...

NOTE: "AS-BUILT" POSTED

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DRAINAGE PLAN

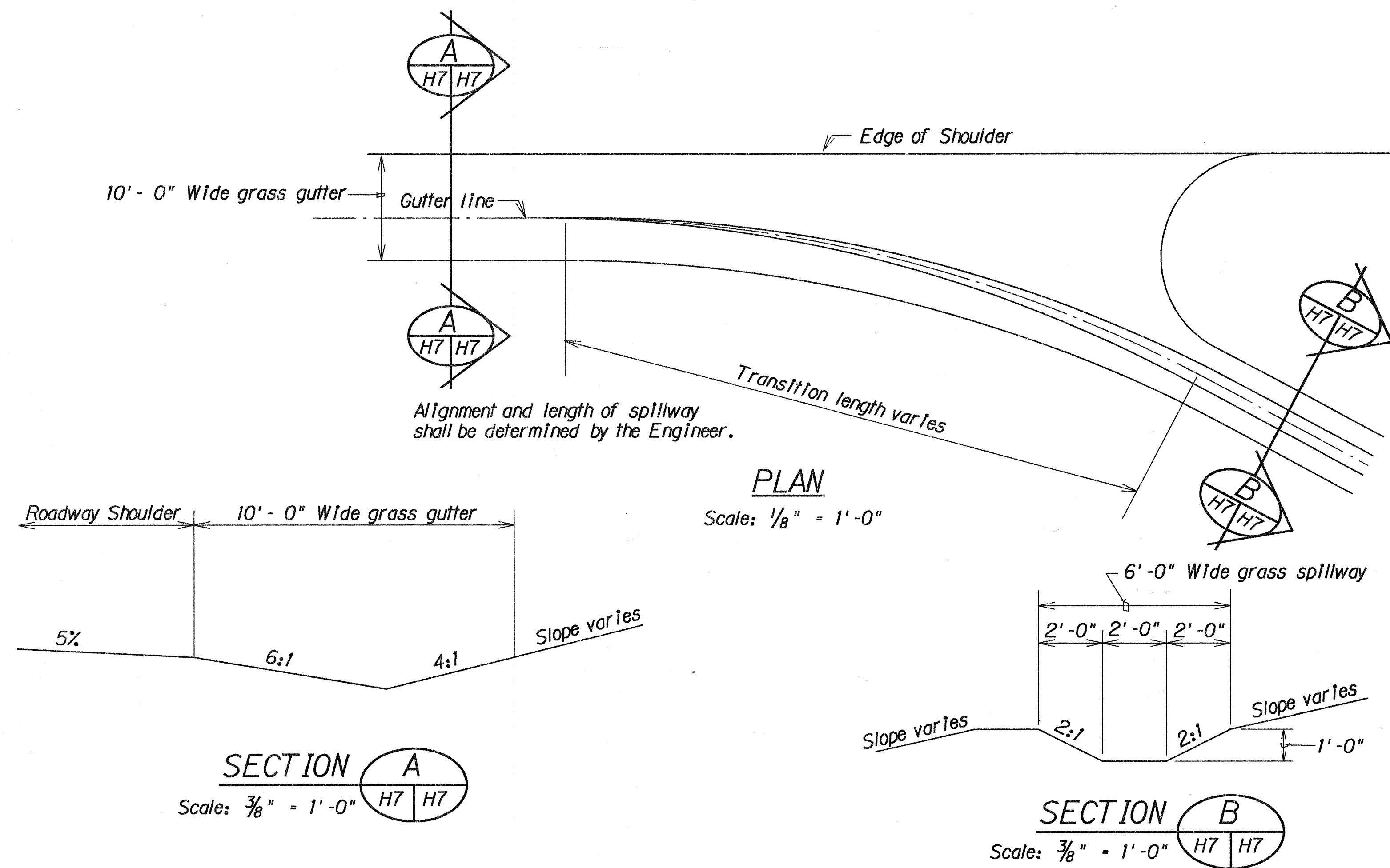
HALEAKALA HWY-PUKALANI SECT.
PHASE - II

Hamakua Ditch to Kula Junction
Project No. 37C-01-92

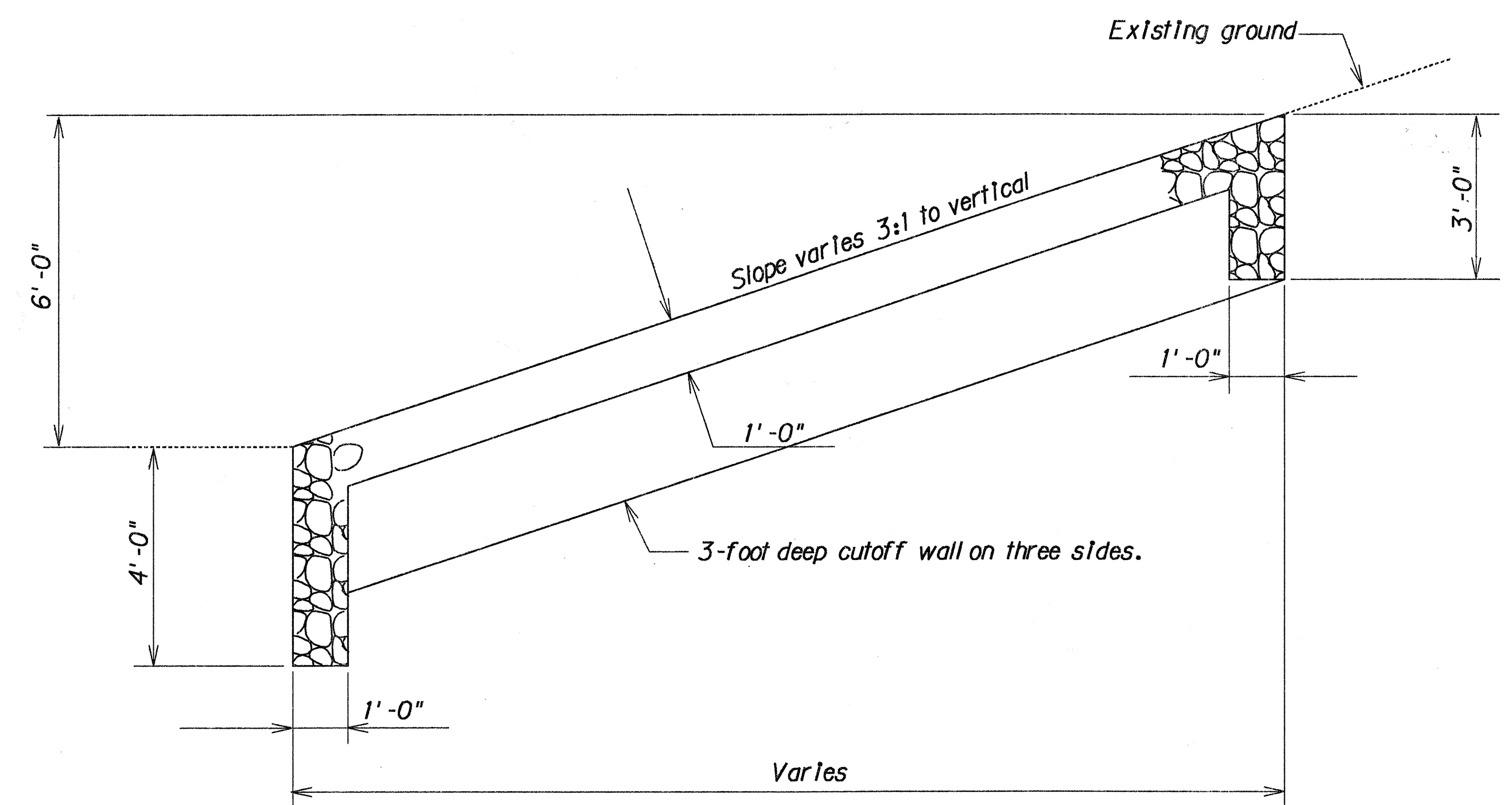
Scale: 1"=40' Date: Jan. 1992

SHEET No. 30 OF 15 SHEETS

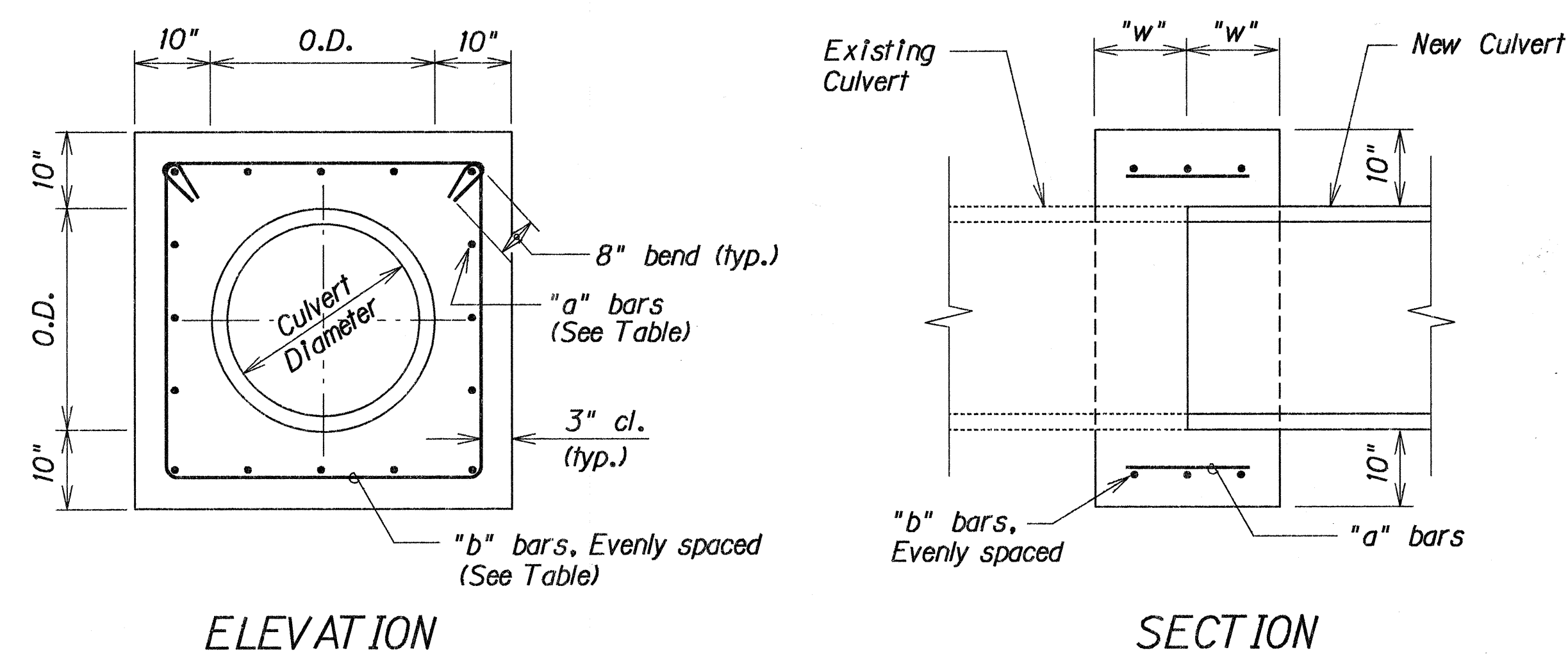
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	37C-01-92	1992	31	66



DETAIL OF GRASS SPILLWAY



TYPICAL DETAIL OF GRP SLOPE PROTECTION



Culvert Diameter	"a" bars	"b" bars	"w"
18" to 30"	#4 @ 9"	3- #4	12"
36" to 48"	#5 @ 9"	4- #4	15"

Note: Reinforcing Steel for Concrete Collar shall conform to the requirements of ASTM 615-Grade 60.

TYPICAL DETAILS OF REINFORCED CONCRETE COLLAR

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

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DRAINAGE DETAIL
HALEAKALA HIGHWAY - PUKALANI SECTION
PHASE - II
Hamakua Ditch to Kula Junction
Project No. 37C-01-92
Scale: As Noted Date: Jan., 1991
SHEET No. H7 OF 15 SHEETS

DESIGNED BY	DATE
CHECKED BY	
NOTED BY	
QUANTITIES BY	
PLANNED BY	
REVIEWED BY	
APPROVED BY	
ORIGINAL	

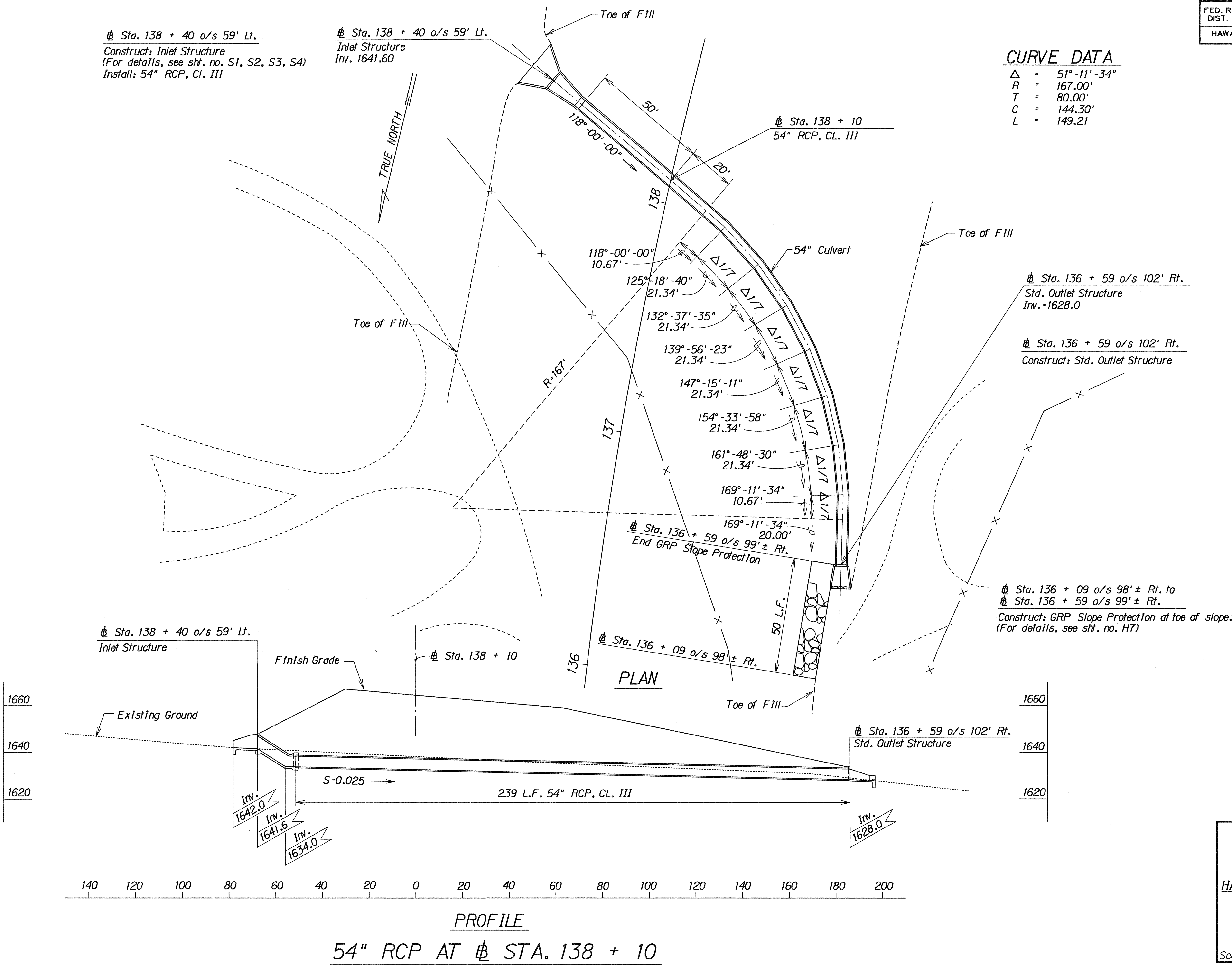
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	37C-01-92	1992	33	66

Sta. 138 + 40 o/s 59' Lt.
Construct: Inlet Structure
(For details, see sht. no. S1, S2, S3, S4)
Install: 54" RCP, CL. III

Sta. 138 + 40 o/s 59' Lt.
Inlet Structure
Inv. 1641.60

CURVE DATA

Δ = 51°-11'-34"
R = 167.00'
T = 80.00'
C = 144.30'
L = 149.21



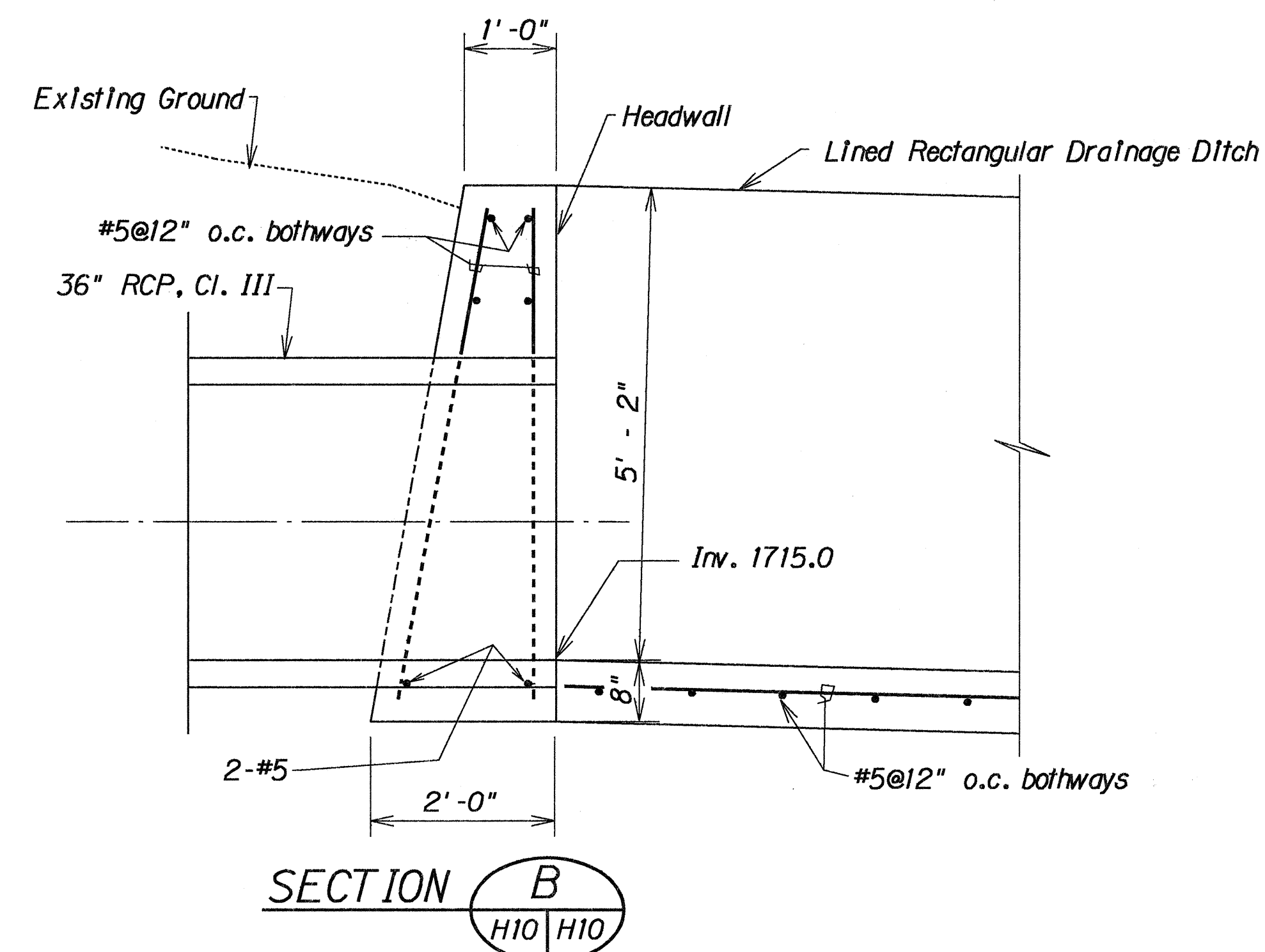
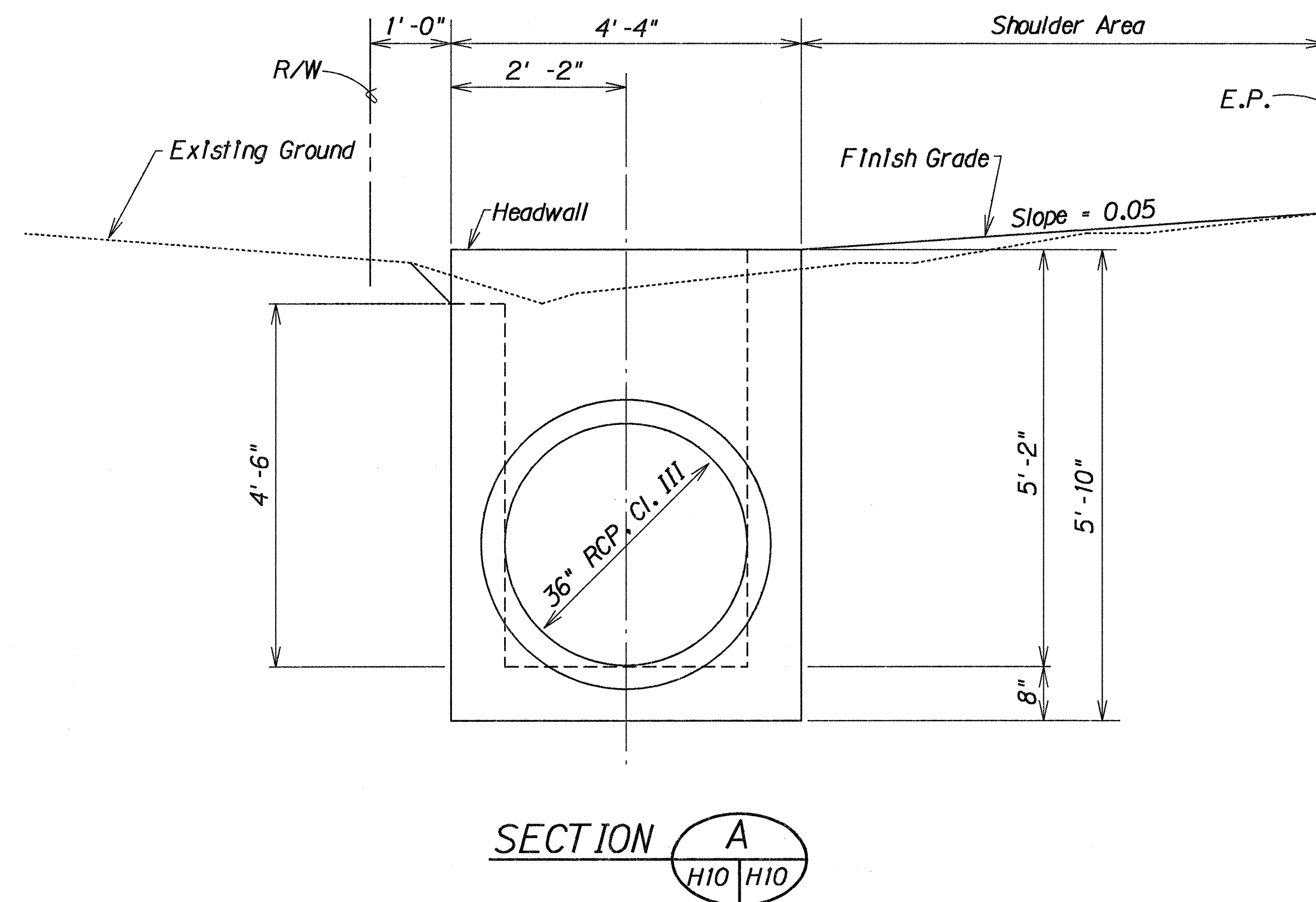
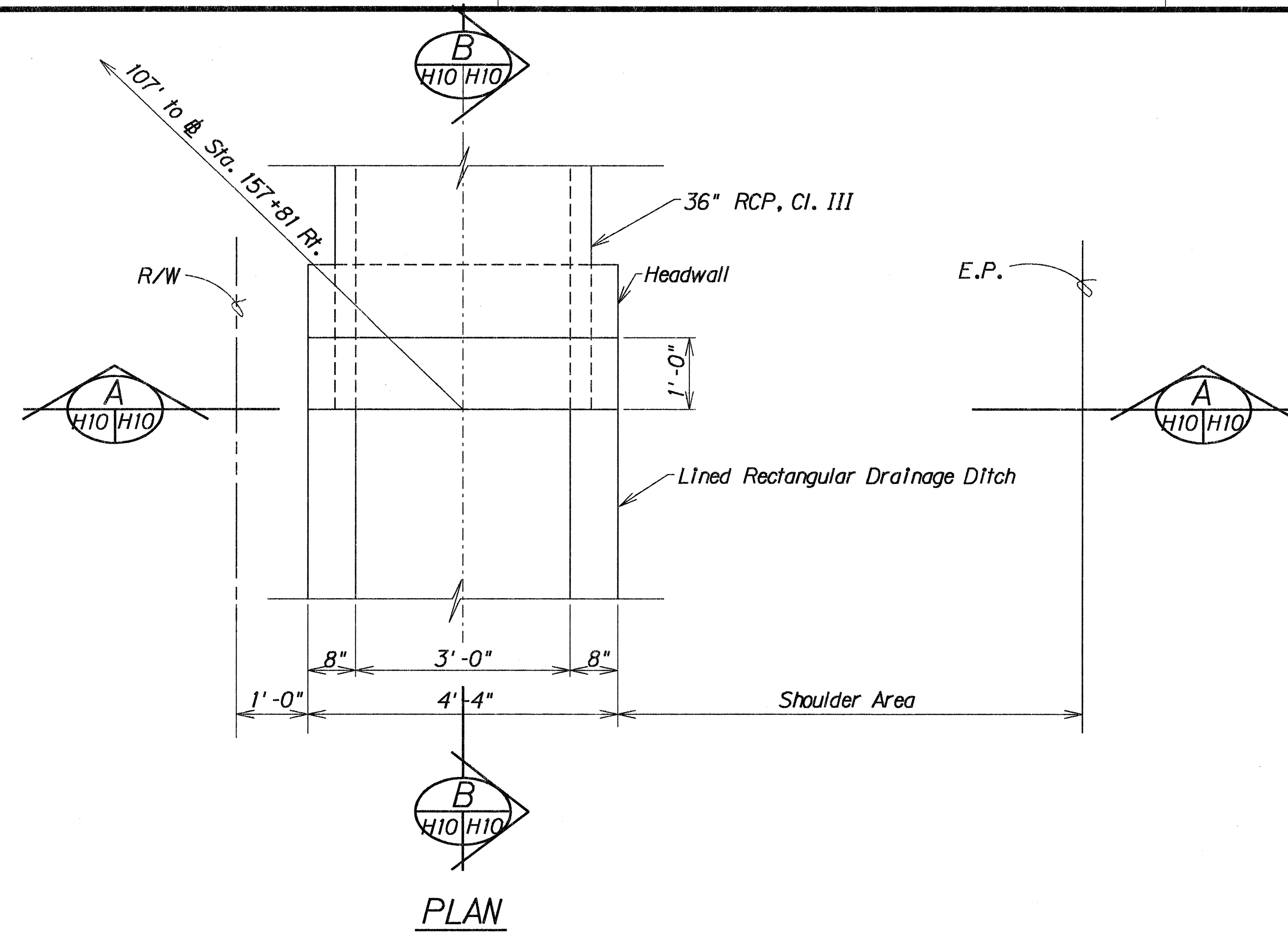
SURVEY PLOTTED BY	DATE
DRAWN BY	
CHECKED BY	
DESIGNED BY	
NOTED BY	
QUANTITIES BY	
CHECKED BY	
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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
DRAINAGE DETAIL

HALEAKALA HIGHWAY - PUKALANI SECTION
PHASE - II
Hamakua Ditch to Kula Junction
Project No. 37C-01-92

Scale: 1" = 20'
Date: Jan., 1991
SHEET No. H9 OF 15 SHEETS

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	37C-01-92	1992	34	66



DETAILS OF HEADWALL AT B STA. 157 + 81 o/s 107' RT

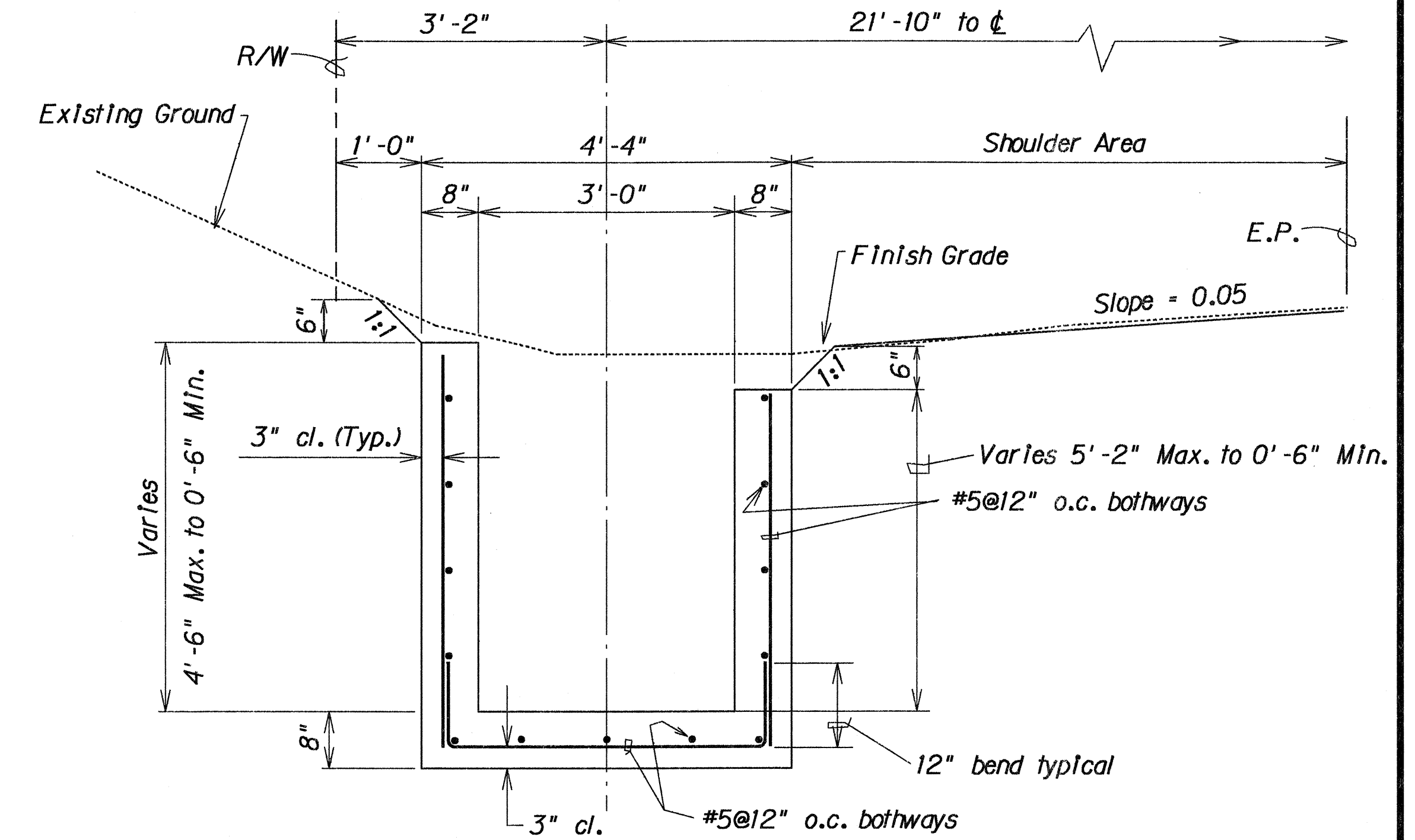
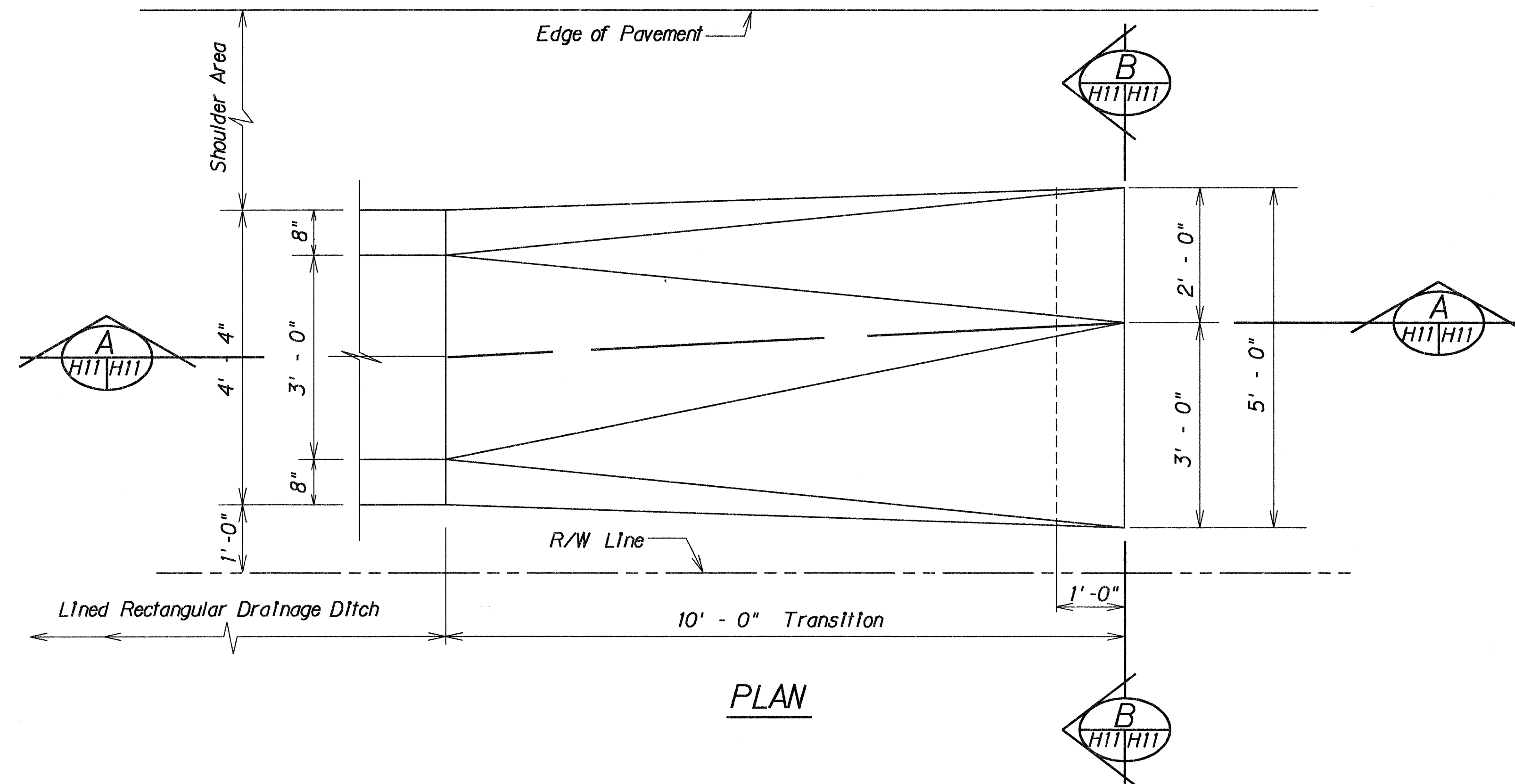
Scale: $\frac{3}{4}" = 1' - 0"$

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

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
DRAINAGE DETAIL
HALEAKALA HIGHWAY - PUKALANI SECTION
PHASE - II
Hamakua Ditch to Kula Junction
Project No. 37C-01-92

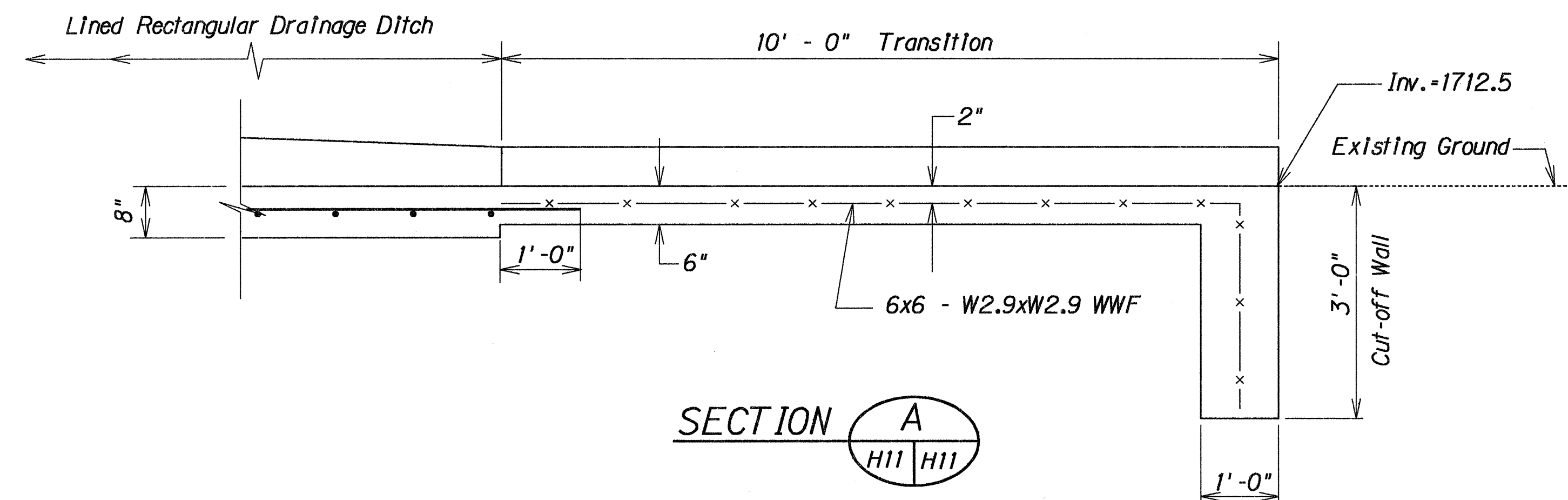
Scale: As Noted Date: Jan., 1991
SHEET No. H10 OF 15 SHEETS

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	37C-01-92	1992	35	66



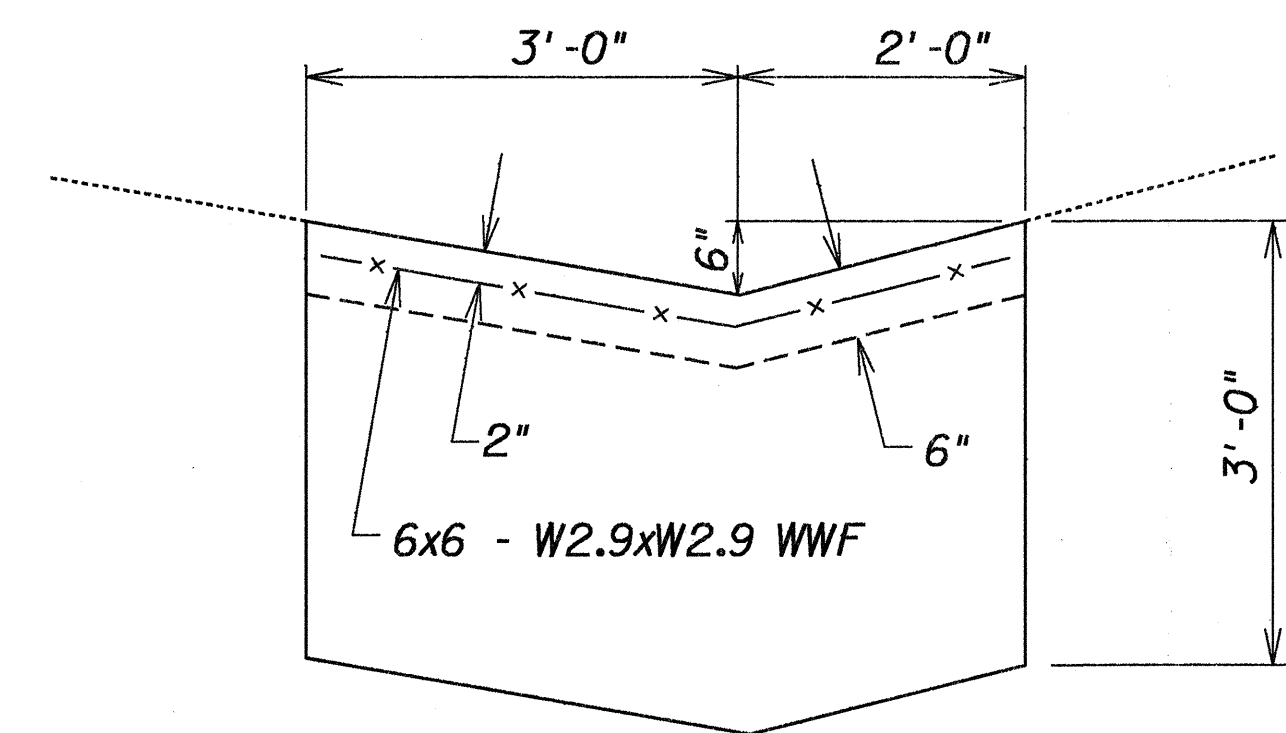
DETAIL OF LINED RECTANGULAR DRAINAGE DITCH

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

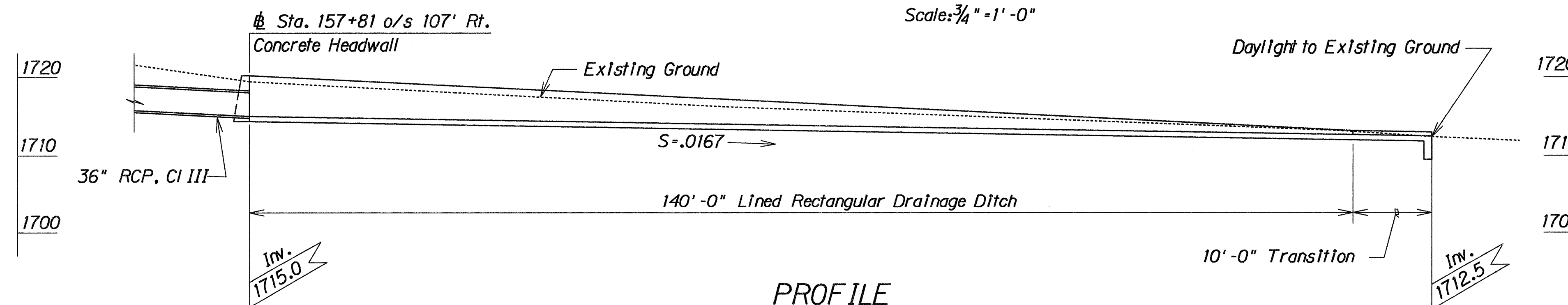


DETAIL OF TRANSITION

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



SECTION B



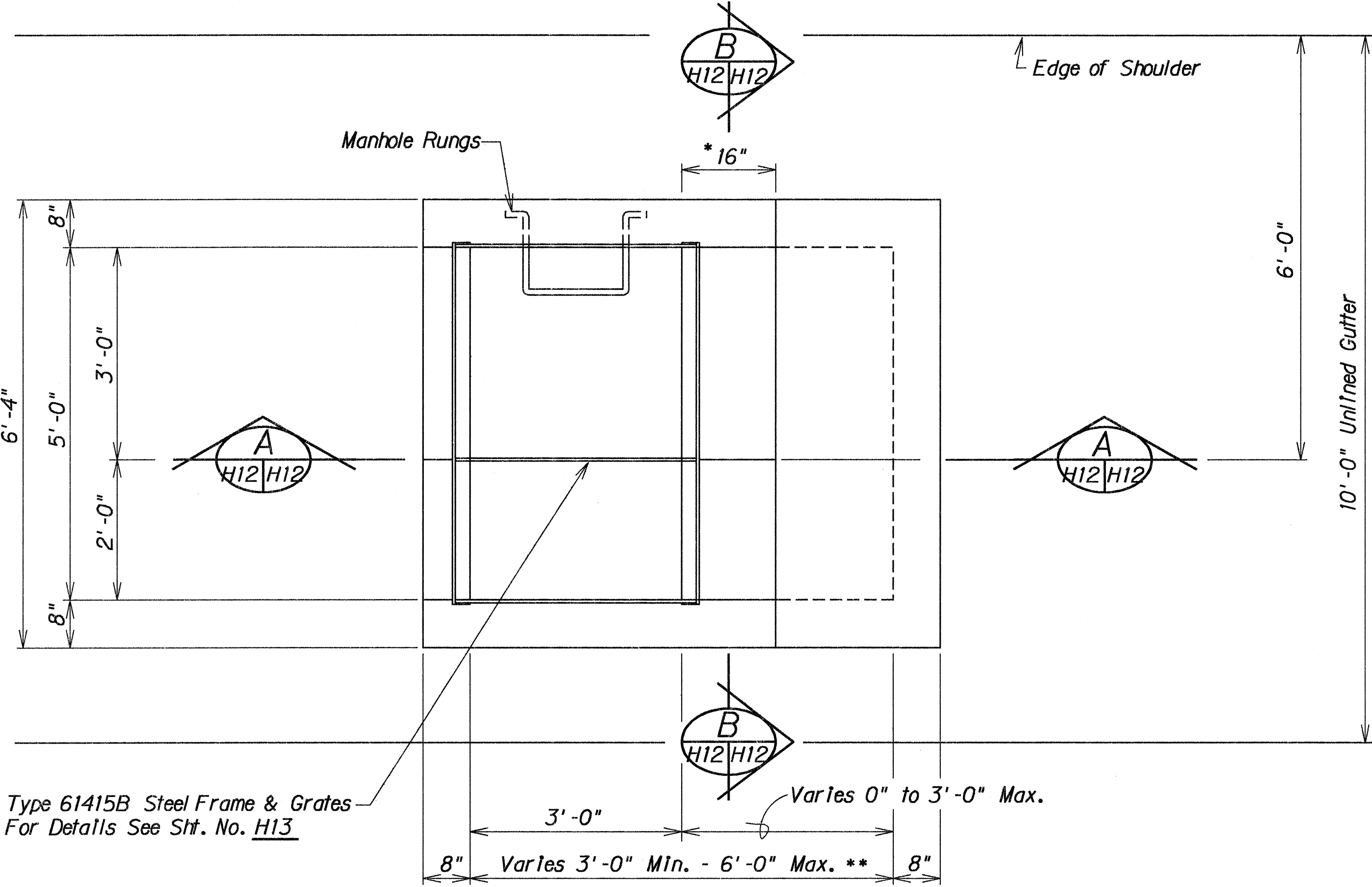
PROFILE

LINED RECTANGULAR DRAINAGE DITCH AT STA. 157 + 81 o/s 107' RT

Scale: 1" = 10'

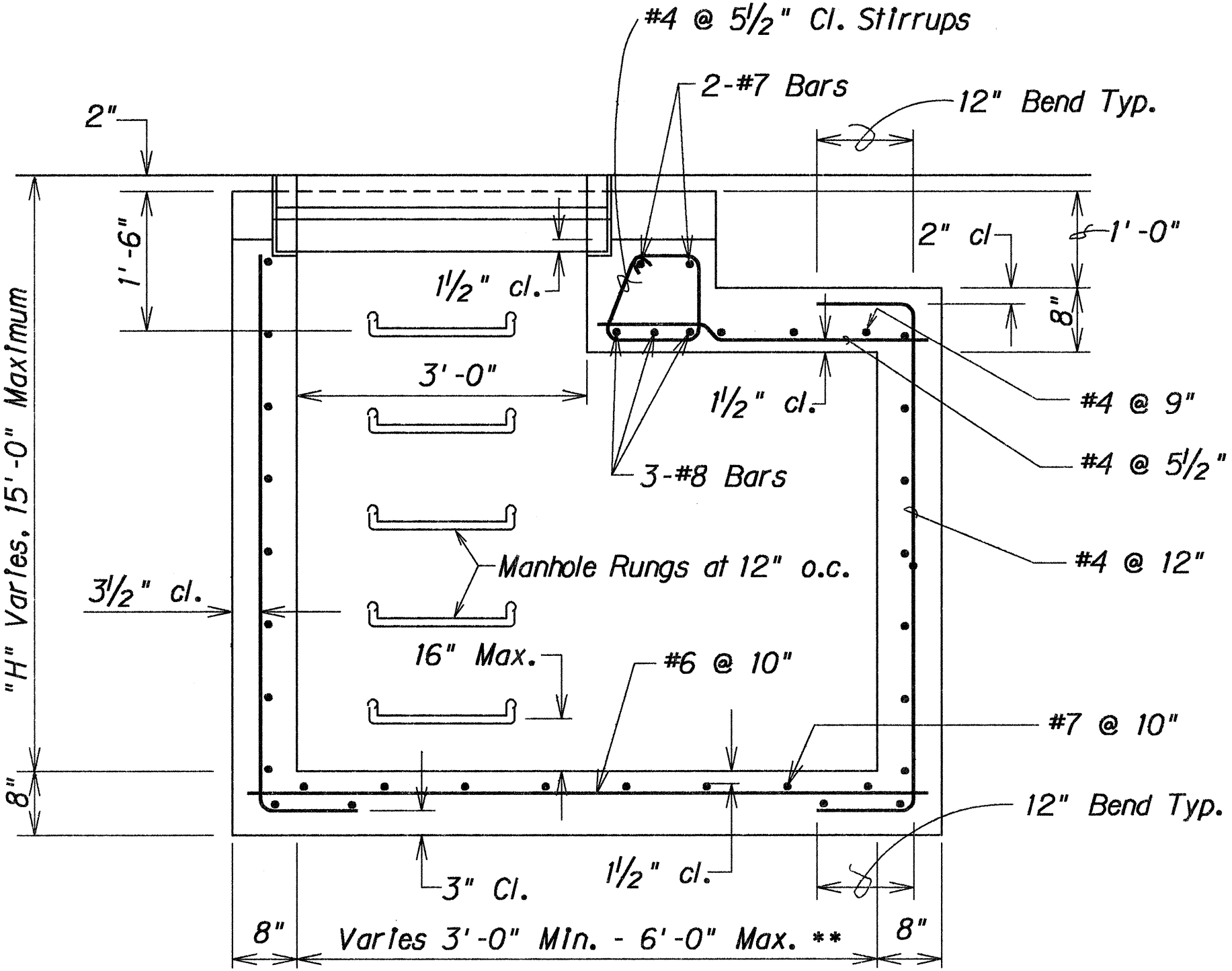
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION
DRAINAGE DETAIL
HALEAKALA HIGHWAY - PUKALANI SECTION PHASE - II Hamakua Ditch to Kula Junction Project No. 37C-01-92
Scale: As Noted Date: Jan., 1991
SHEET No. H11 OF 15 SHEETS

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	37C-01-92	1992	36	66



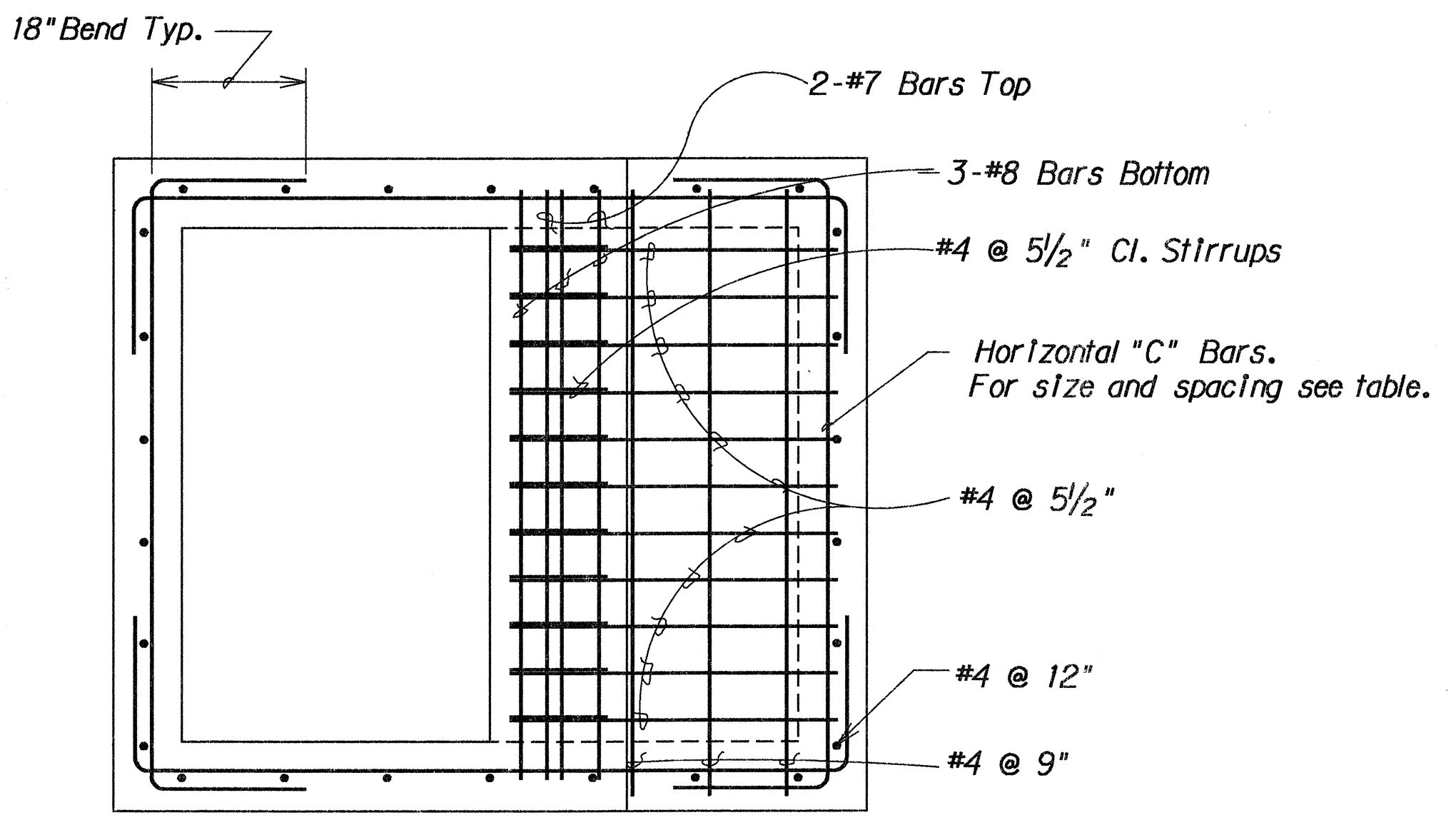
Type 61415B Steel Frame & Grates
For Details See Sht. No. H13

PLAN

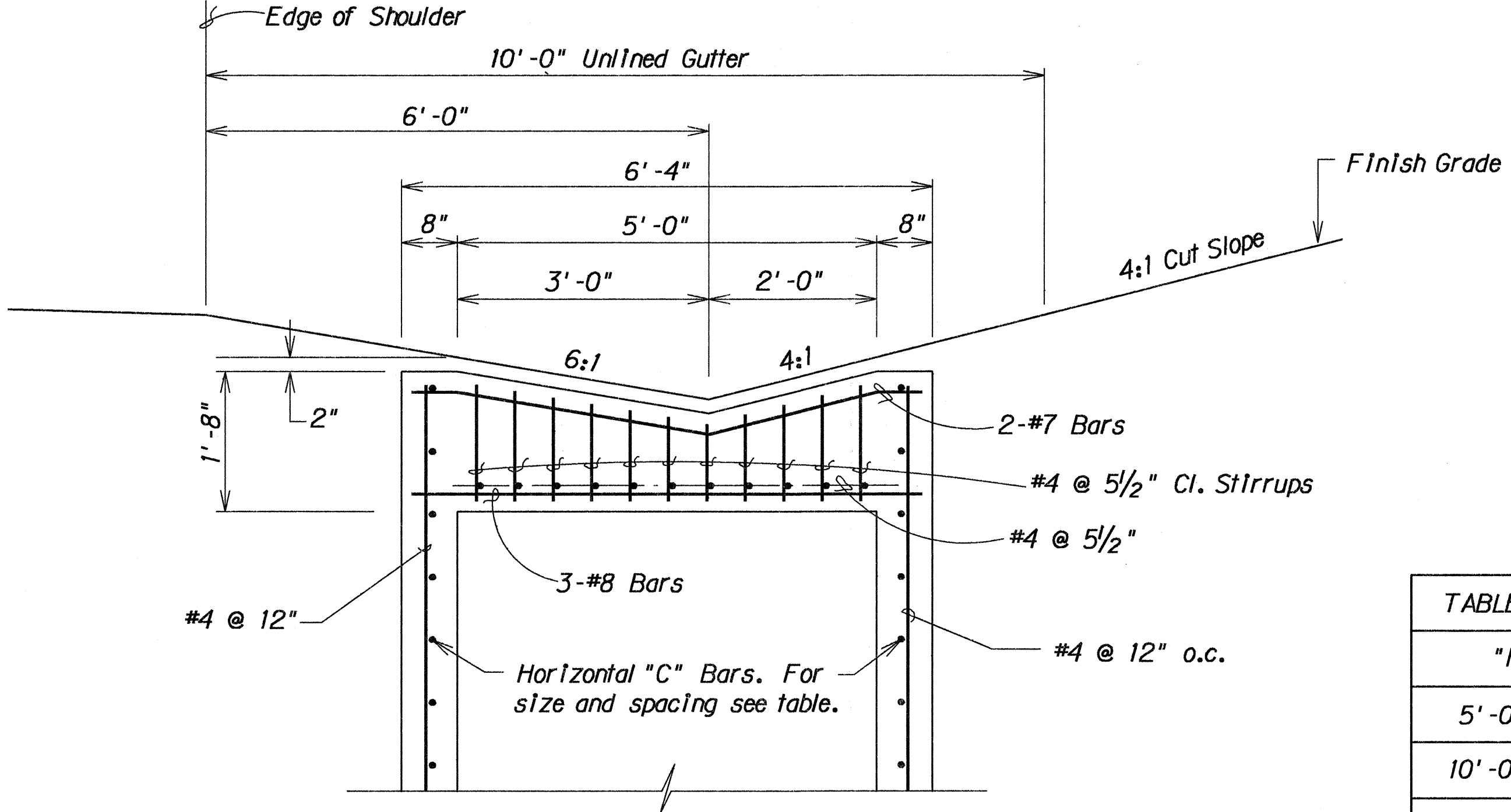


SECTION A
H12 H12

* For minimum size box, eliminate beam and use typical wall and wall reinforcing.
** For culverts larger than 30", the minimum dimension shall be D'.



PLAN VIEW OF REINFORCING STEEL



SECTION B
H12 H12

TABLE: GRATED DROP INLET	
"H"	"C" BARS
5'-0" Max.	#4 @ 10" o.c.
10'-0" Max.	#5 @ 9" o.c.
15'-0" Max.	#5 @ 6" o.c.

NOTE
Construct culvert seat @ GDI's as required.
For Detail, see Standard Plan Sht H-04

DETAILS OF TYPE 1 GDI

STATE OF HAWAII

DEPARTMENT OF TRANSPORTATION

HIGHWAYS DIVISION

DRAINAGE DETAIL

HALEAKALA HIGHWAY - PUKALANI SECTION

PHASE II

Hamakua Ditch to Kula Junction

Project No. 37C-01-92

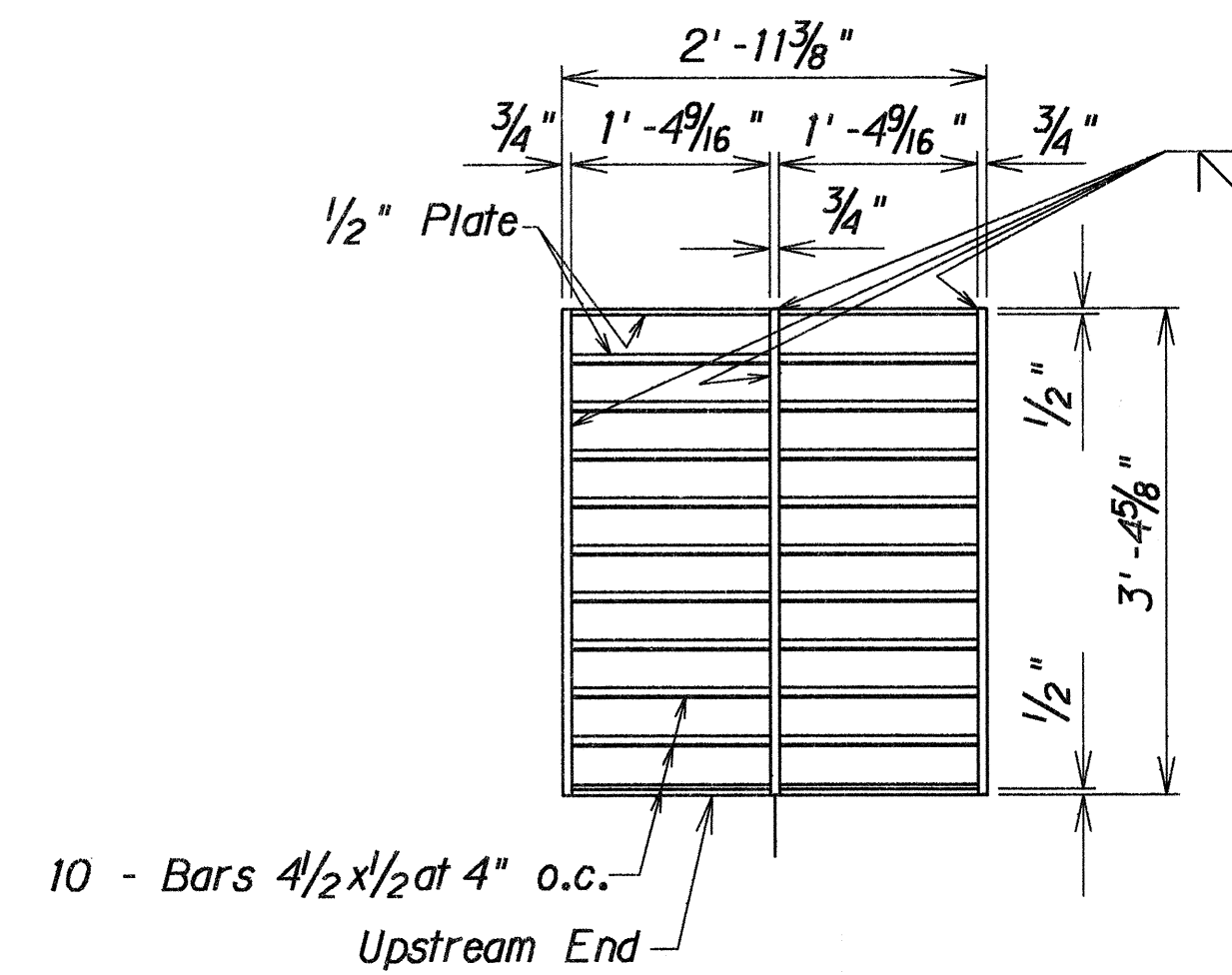
Scale: 3/4" = 1'-0"

Date: Jan., 1991

SHEET No. H12 OF 15 SHEETS

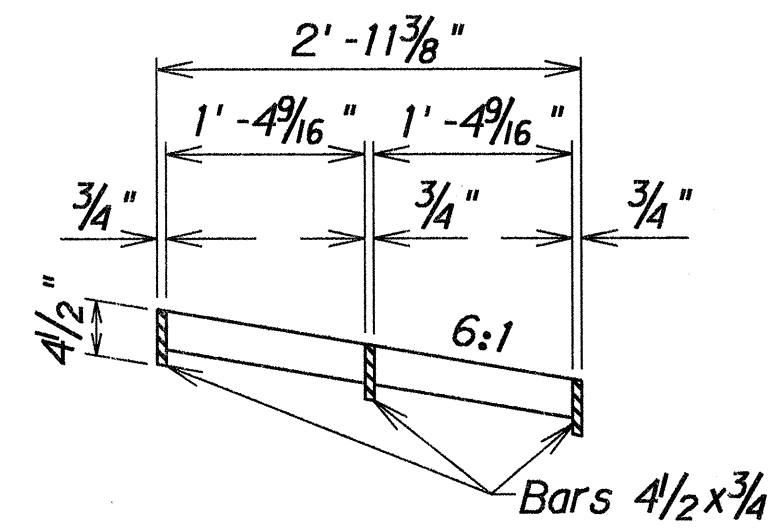
SURVEY PLOTTED BY	DATE
DESIGNED BY	
TRACED BY	
NOTE BOOK	
QUANTITIES BY	
CHECKED BY	

ORIGINAL PLAN	SURVEY PLOTTED BY _____		DATE _____
NOTE BOOK	DRAWN BY _____	* _____	
	TRACED BY _____	* _____	
	DESIGNED BY _____	* _____	
	QUANTITIES BY _____	* _____	
N _e _____	CHECKED BY _____	* _____	



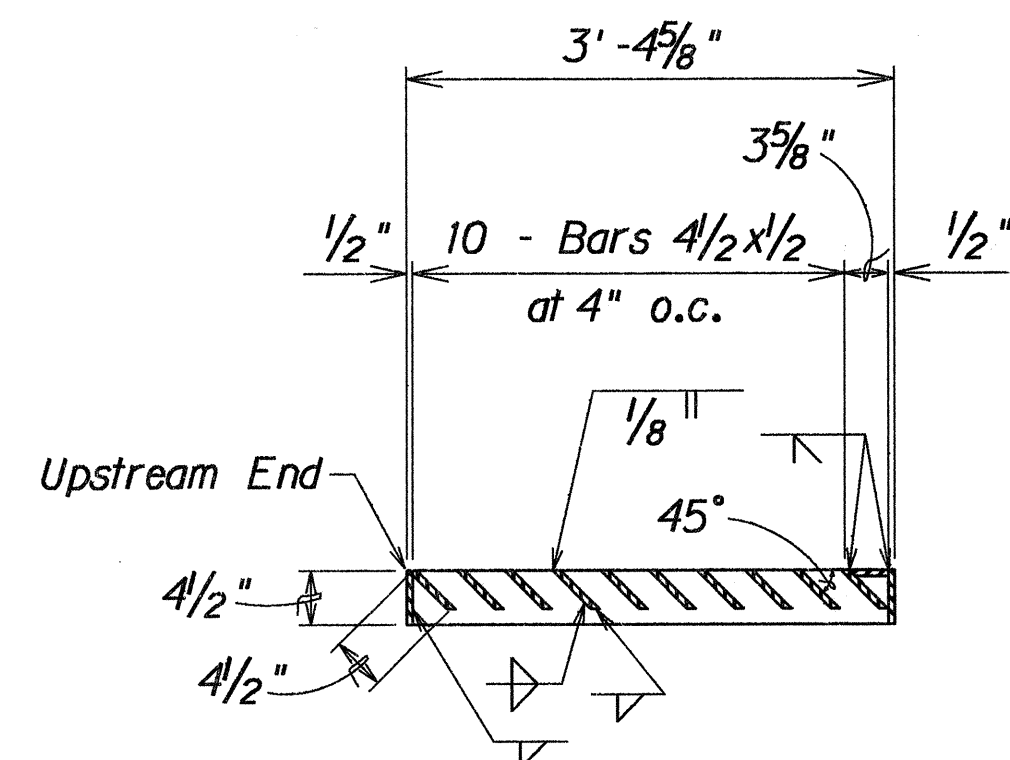
PLAN - GRATE

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



CROSS SECTION

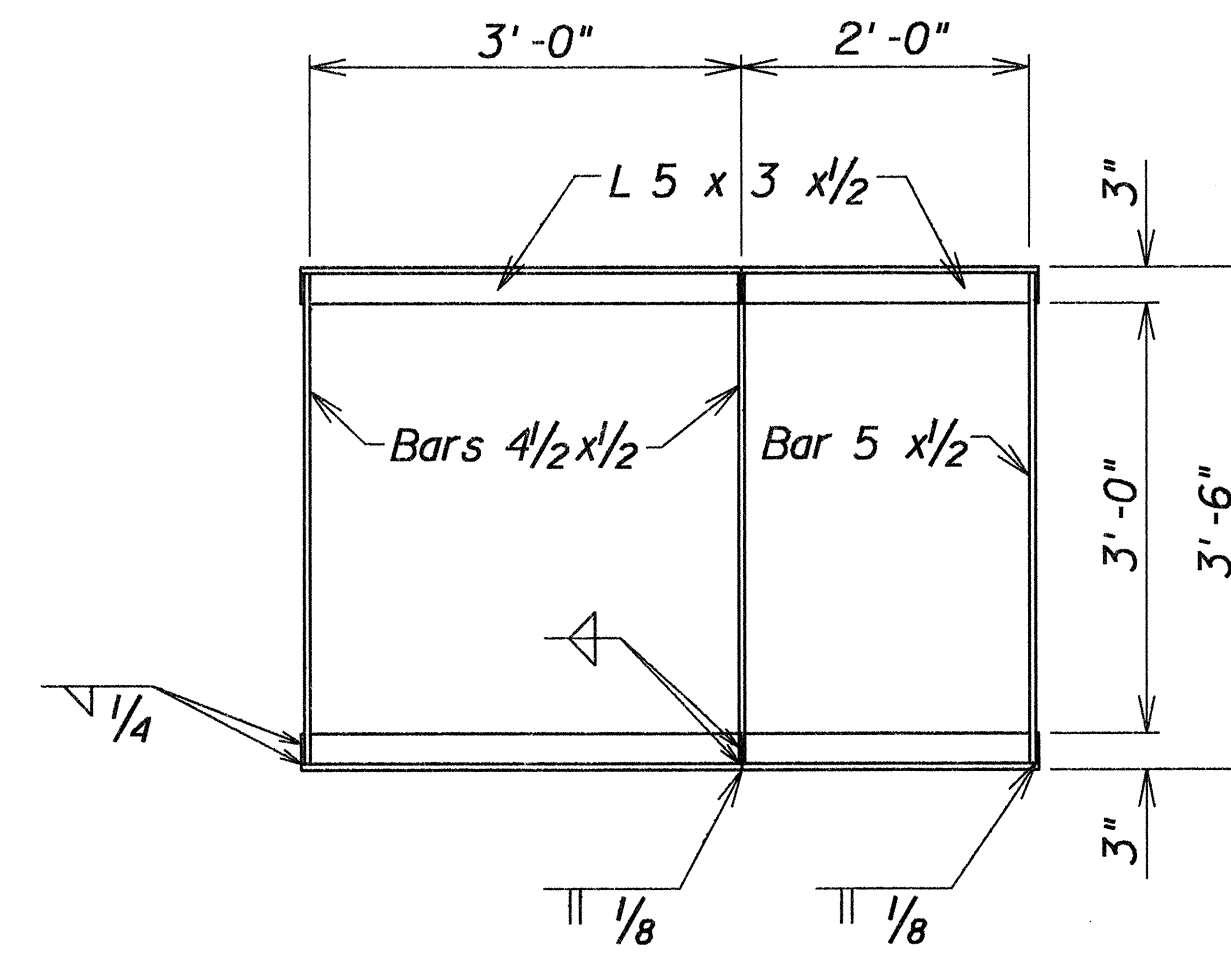
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LONGITUDINAL SECTION

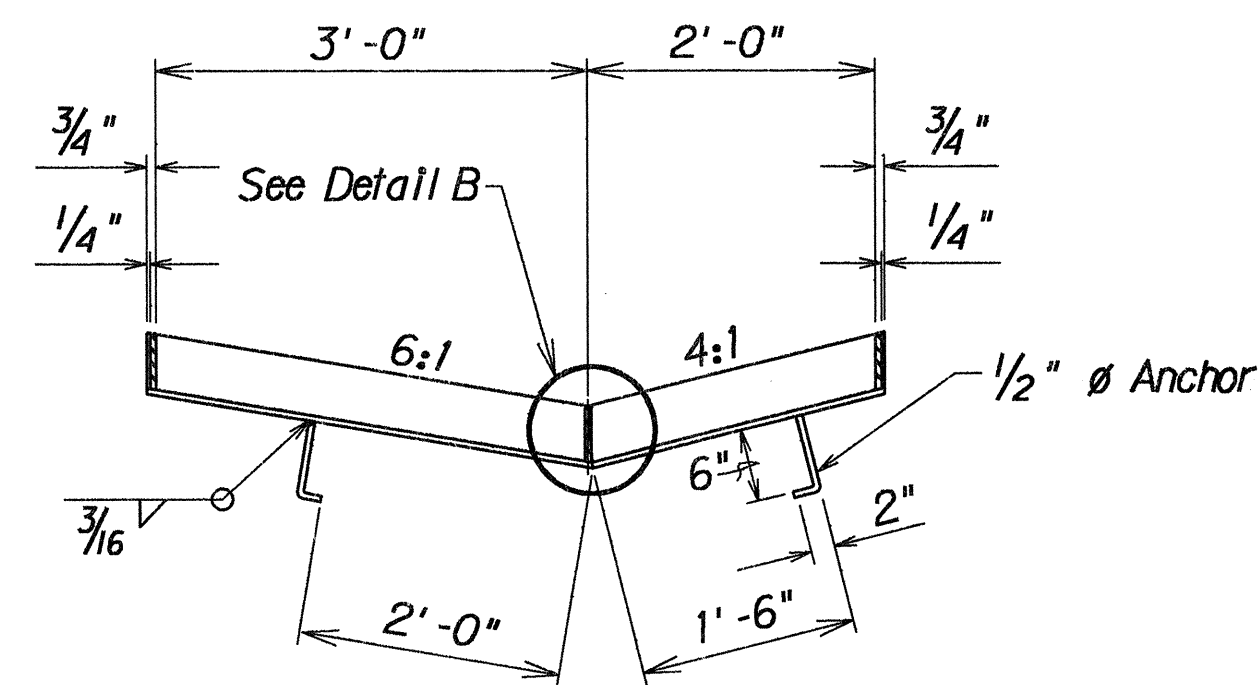
Scale: $\frac{3}{4}" = 1' - 0"$

DETAIL OF 6:1 GRATE



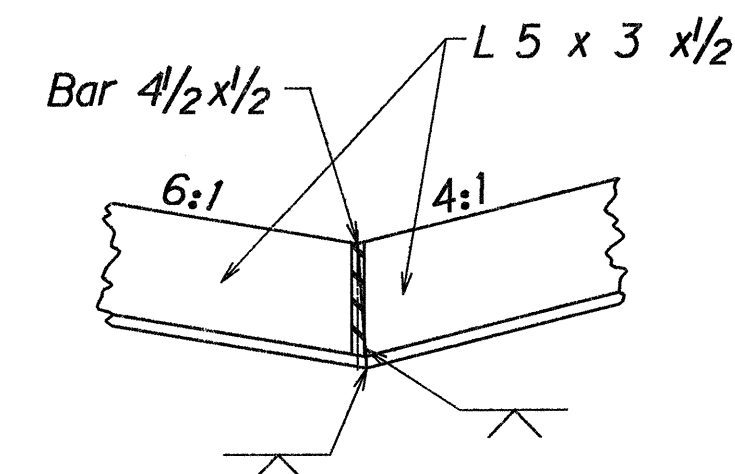
PLAN

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



LONGITUDINAL SECTION

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

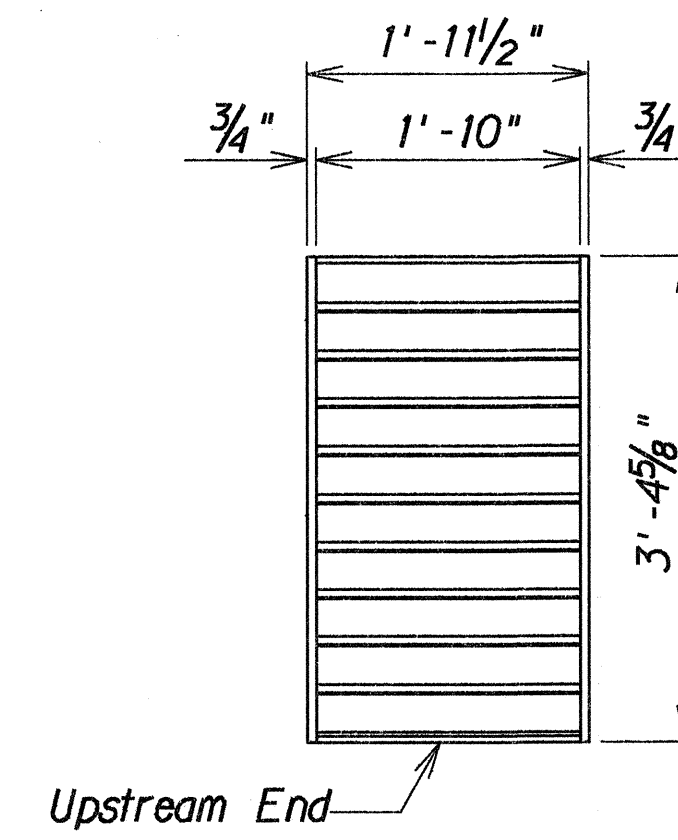


DETAIL B

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

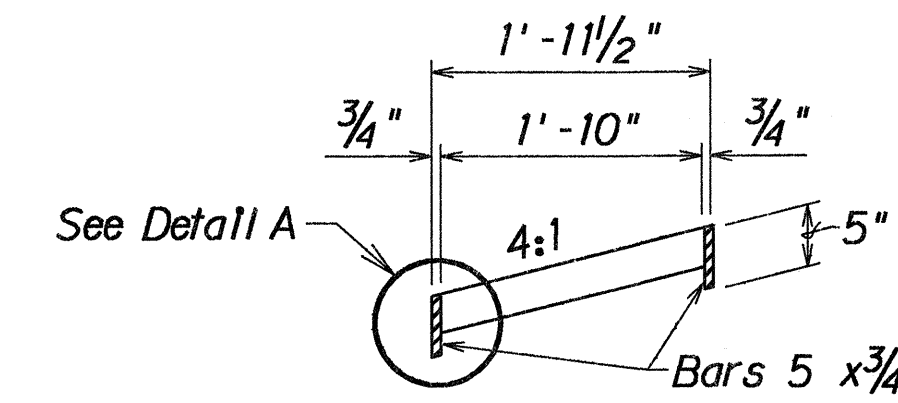
DETAIL OF FRAME

TYPE 61415B FRAME AND GRATES



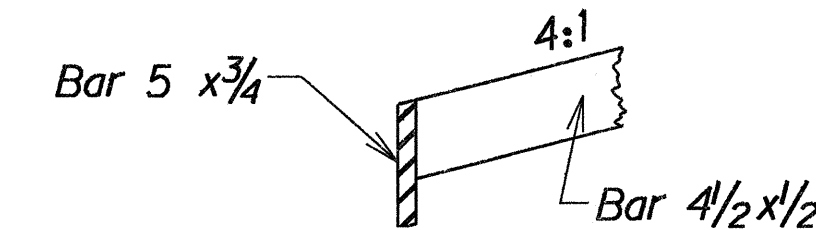
PLAN - GRATE

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



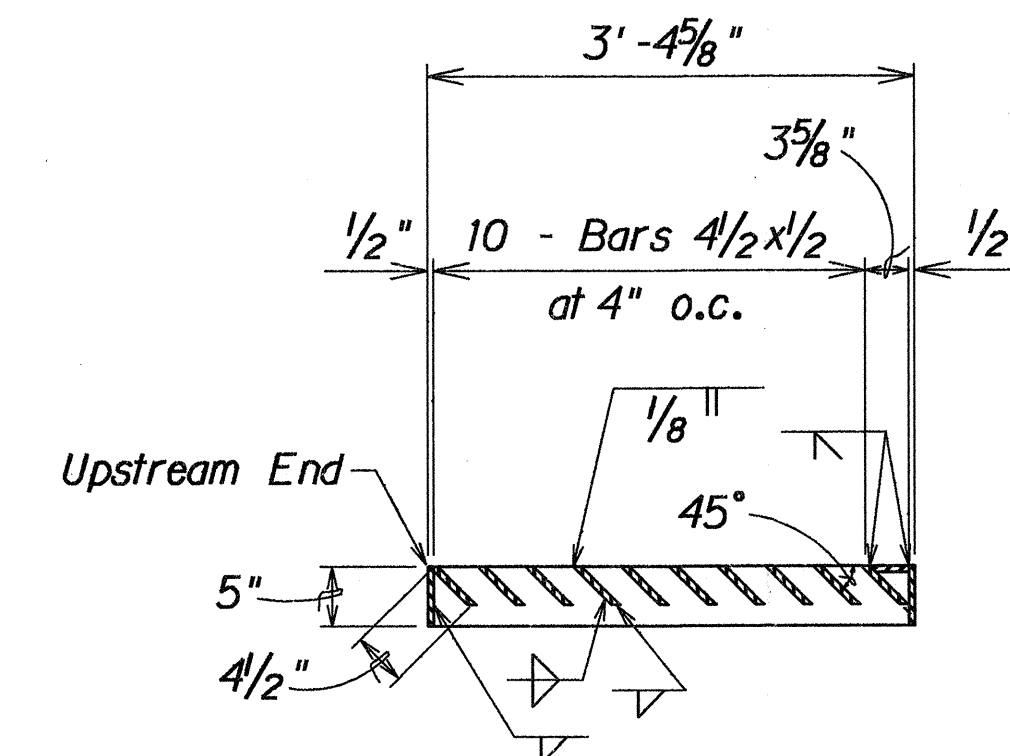
CROSS SECTION

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



DETAIL A

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



LONGITUDINAL SECTION

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

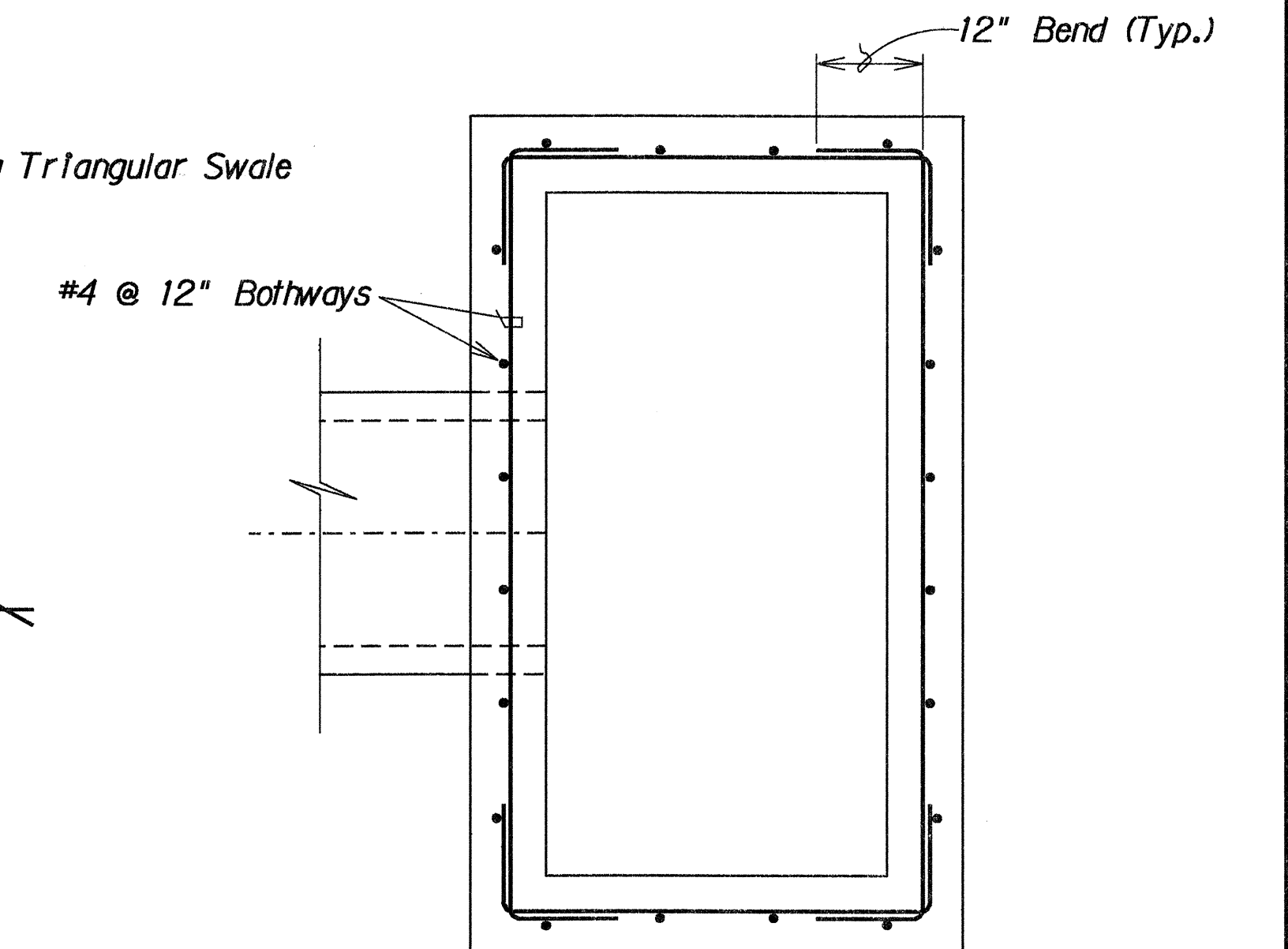
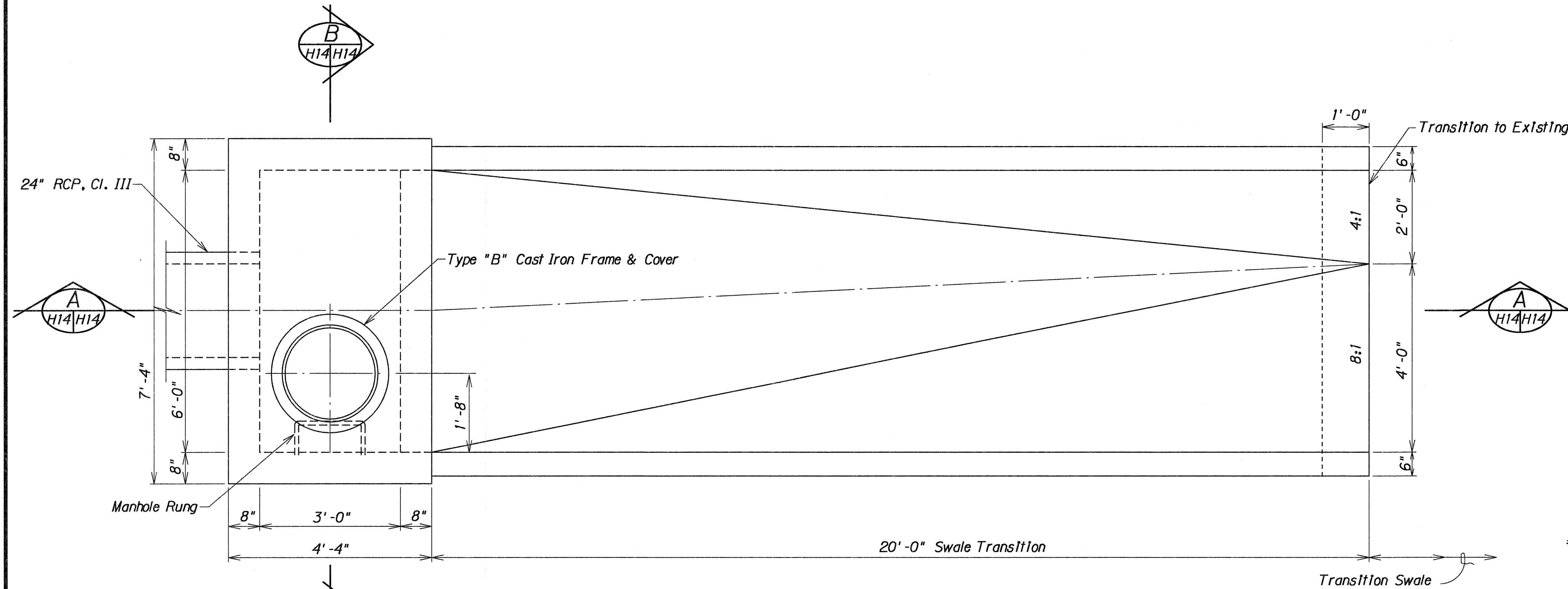
DETAIL OF 4:1 GRATE

GENERAL NOTES

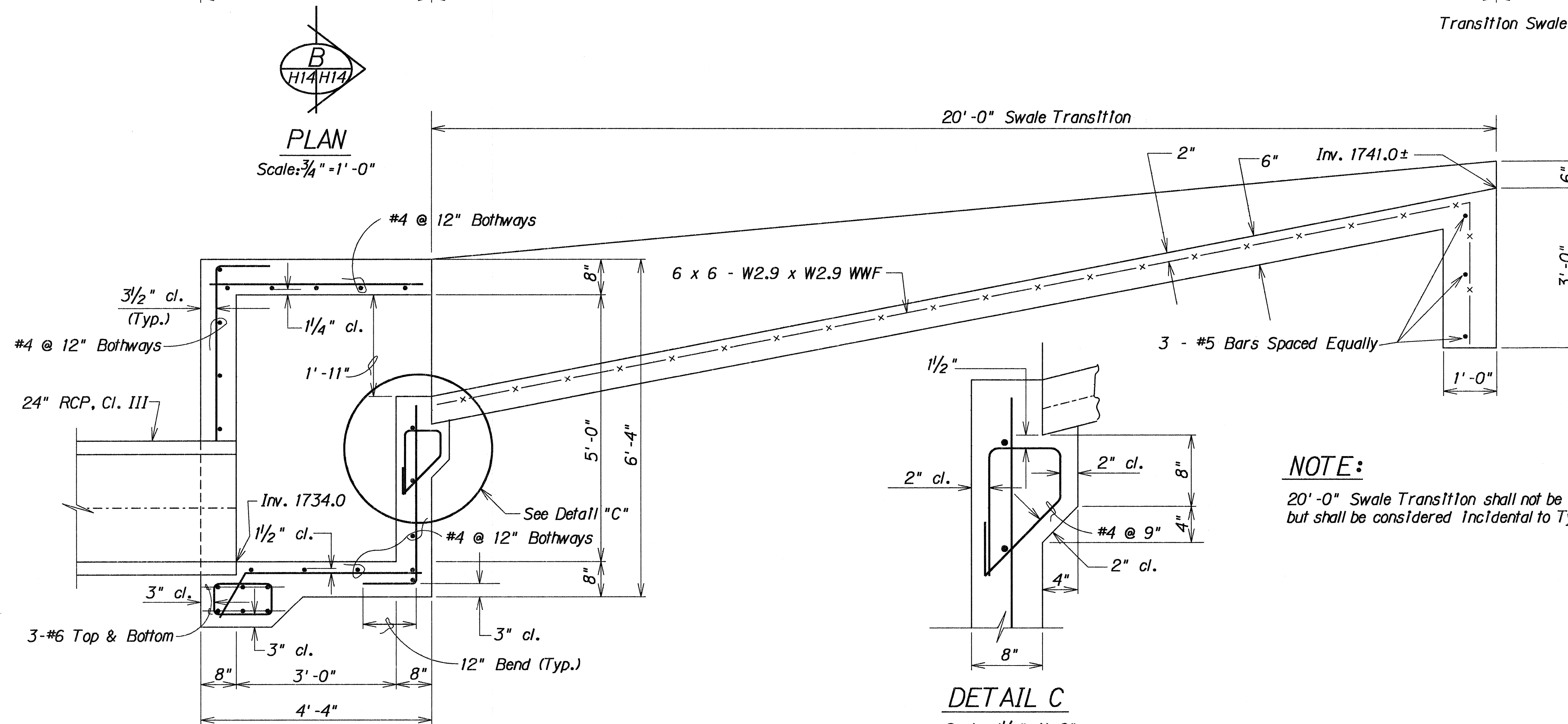
1. All welds $\frac{5}{16}$ " unless otherwise noted.
2. Grates and Frames shall be hot dip galvanized after fabrication.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
DRAINAGE DETAIL
HALEAKALA HIGHWAY - PUKALANI SECTION
PHASE II
Hamakua Ditch to Kula Junction
Project No. 37C-01-92
Scale: As Noted Date: Jan., 1991
SHEET No. 113 OF 15 SHEETS

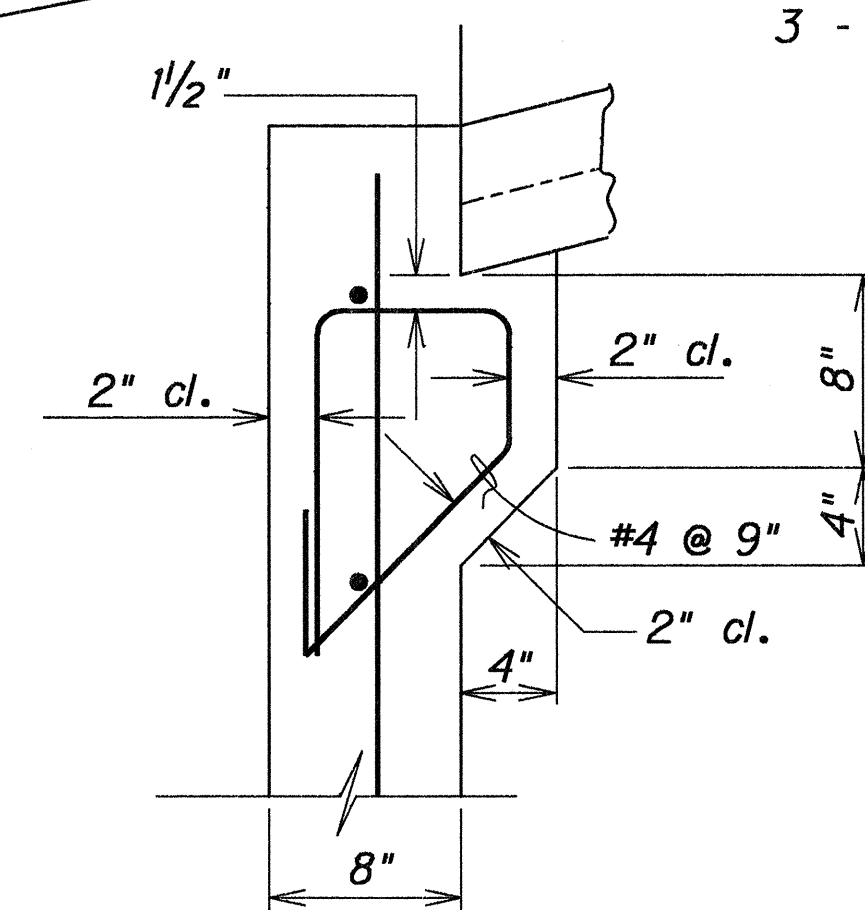
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	37C-01-92	1992	38	66



PLAN VIEW OF WALL REINFORCING



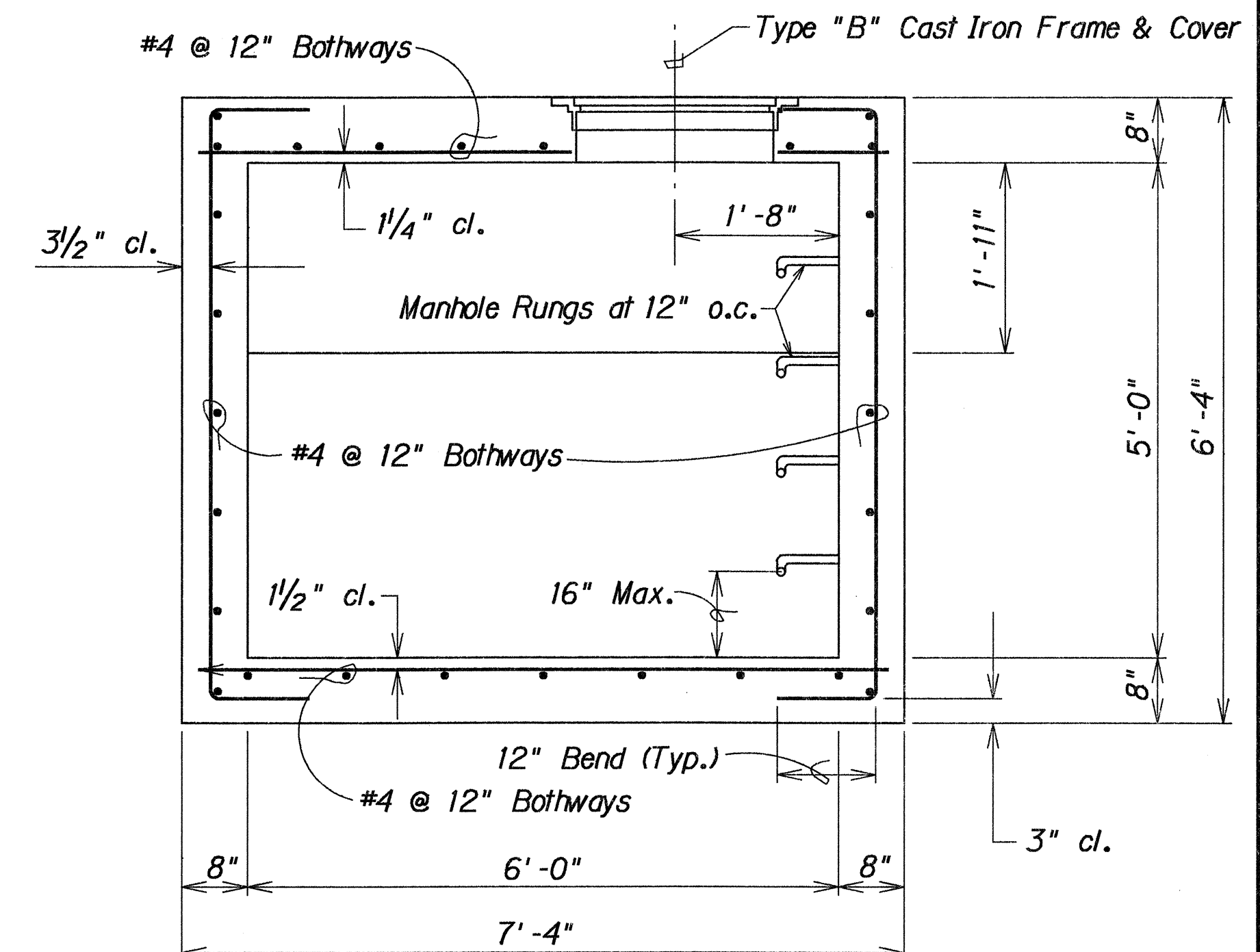
SECTION A
Scale: 3/4" = 1'-0"



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

NOTE:

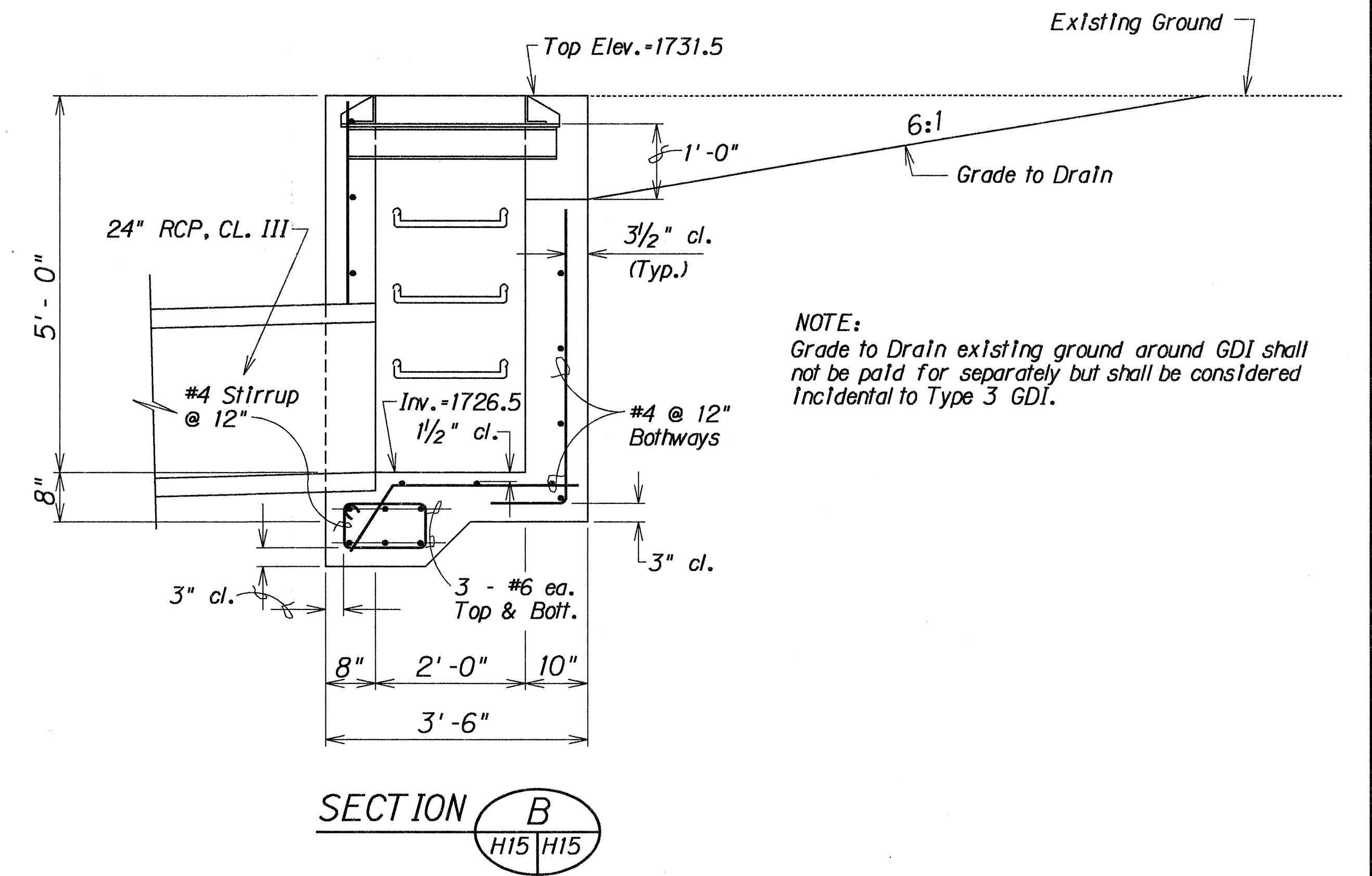
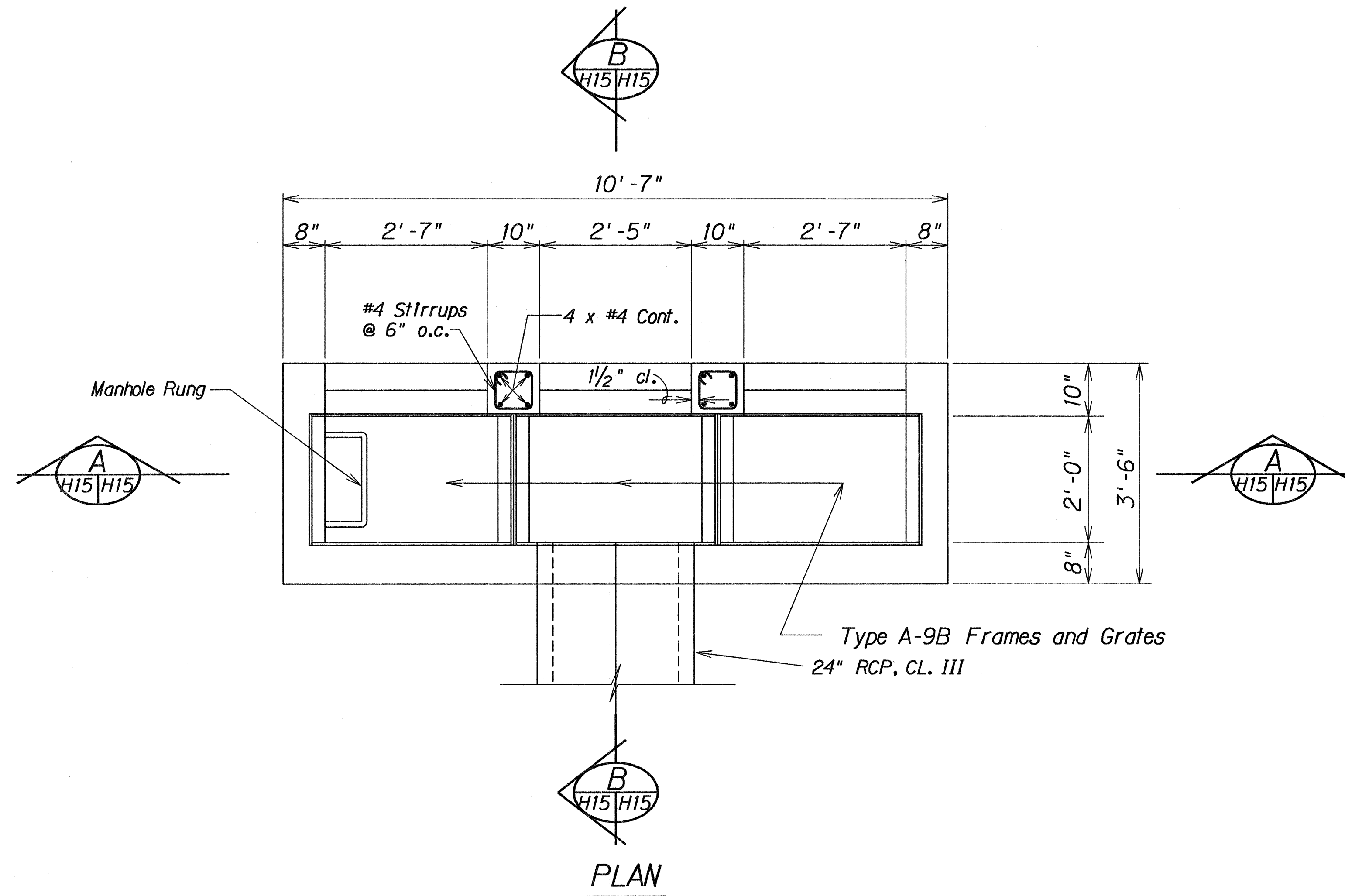
20'-0" Swale Transition shall not be paid for separately but shall be considered Incidental to Type 2 CDI.



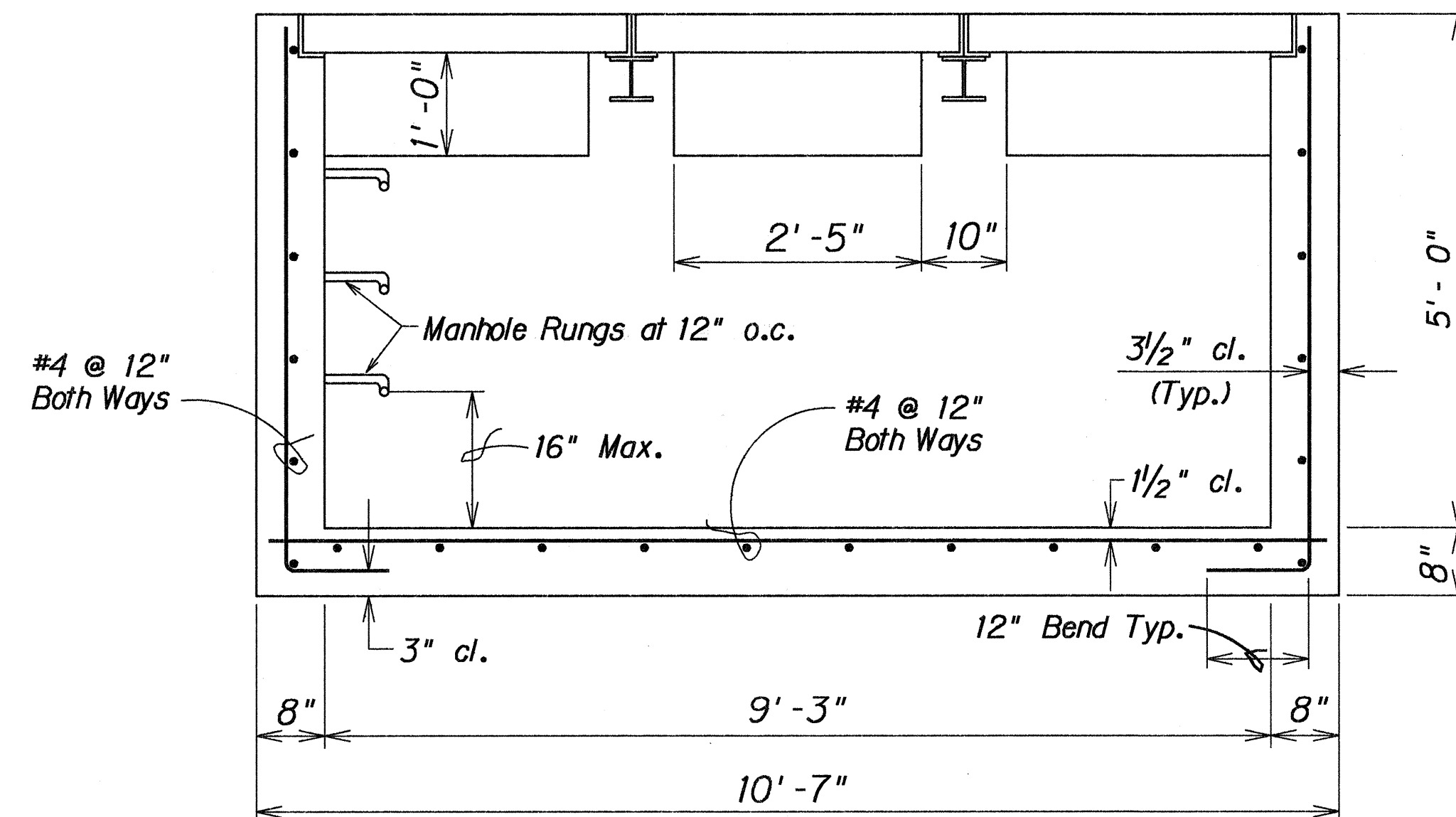
SECTION B
Scale: 3/4" = 1'-0"

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
DRAINAGE DETAIL
HALEAKALA HIGHWAY - PUKALANI SECTION
PHASE - II
Hamakua Ditch to Kula Junction
Project No. 37C-01-92
Scale: As Noted Date: Jan., 1991
SHEET No. H14 OF 15 SHEETS

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	37C-01-92	1992	39	66



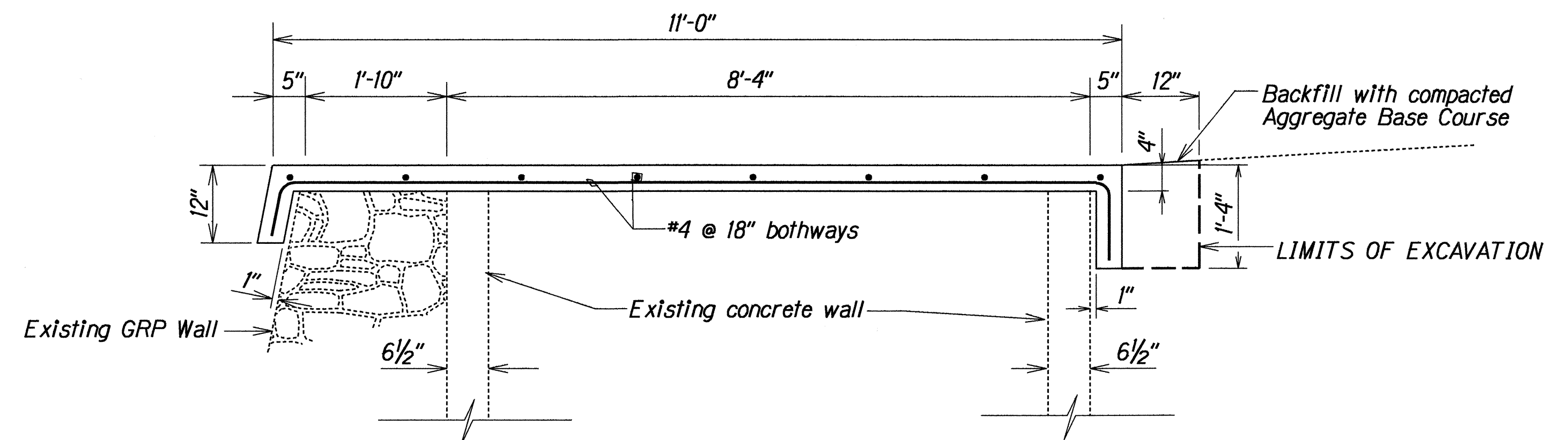
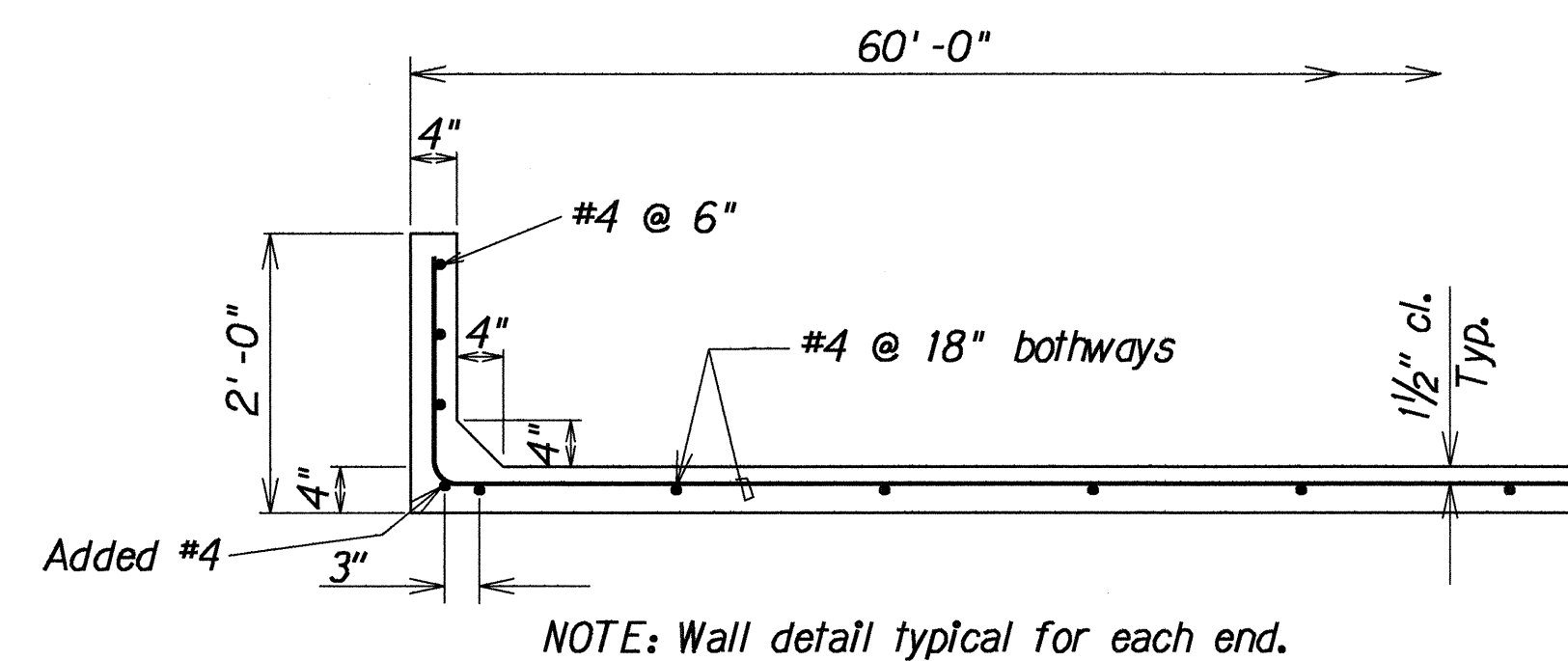
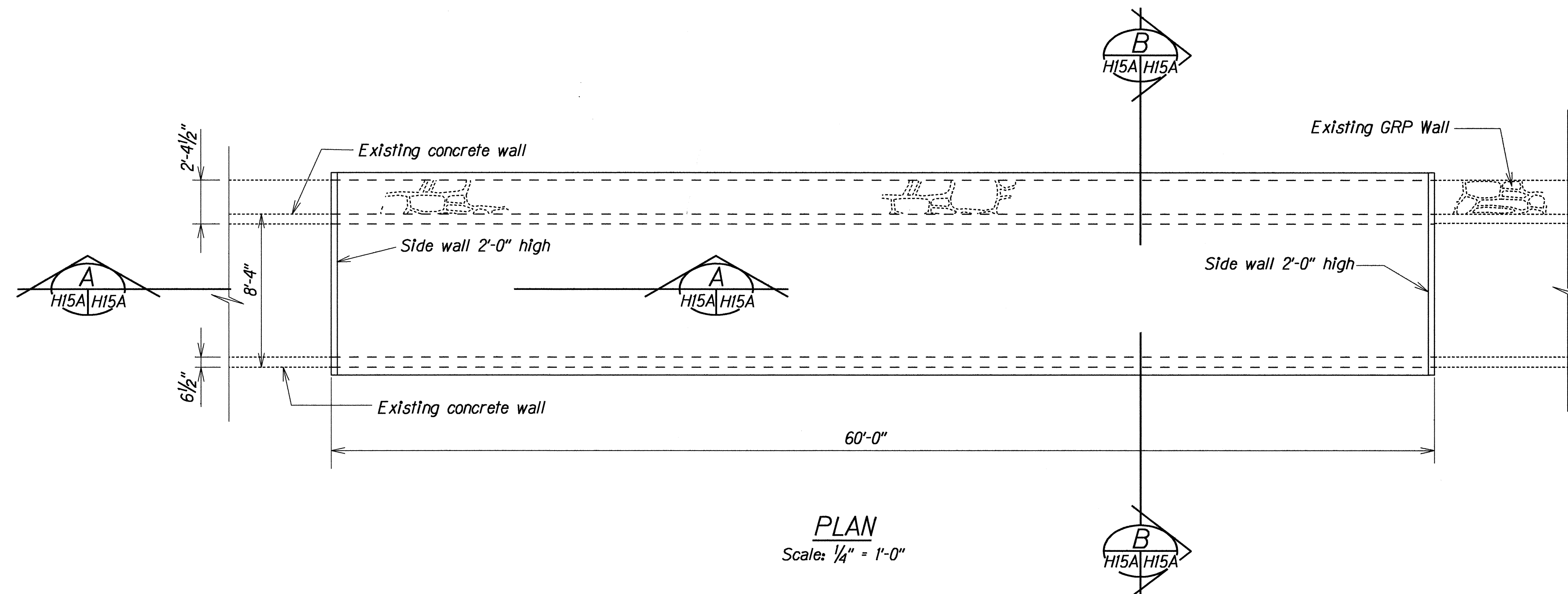
NOTE:
Grade to Drain existing ground around GDI shall not be paid for separately but shall be considered incidental to Type 3 GDI.



TYPE 3 GDI AT STA. 160 + 05 o/s 65' LT.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
DRAINAGE DETAIL
HALEAKALA HIGHWAY - PUKALANI SECTION
PHASE - II
Hamakua Ditch to Kula Junction
Project No. 37C-01-92
Scale: 3/4" = 1'-0" Date: Jan., 1991
SHEET No. H15 OF 15 SHEETS

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	37C-01-92	1992	C039S-1	66



- NOTE:**
1. The irrigation ditch shall be operational at all times. The Contractor shall protect the ditch from contaminants and falling debris caused by his work from entering the ditch during the length of this contract.
 2. The Contractor shall meet with Hawaiian Commercial and Sugar Co. (HC&S) before any work affecting the irrigation ditch begins. At this time procedures for emergency shut down, if necessary, will be made to the satisfaction of the Engineer and HC&S.
 3. Any damage to the existing ditch caused by the Contractor shall be repaired to the satisfaction of the Engineer and HC&S at the Contractor's expense.
 4. The Contractor shall verify the exact location of the ditch cover with the Engineer and HC&S.

DETAILS OF CONCRETE COVER FOR HAMAKUA DITCH AT STA. 47+00 O/S 60' RT.±

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

10/27/93	Detail of concrete cover to replace existing plywood cover at Hamakua Ditch.
DATE	REVISION

STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION DRAINAGE DETAIL HALEAKALA HIGHWAY - PUKalani SECTION PHASE - II Hamakua Ditch to Kula Junction Project No. 37C-01-92 Scale: As Shown Date: Aug., 1993 SHEET No. H15A OF 15 SHEETS
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