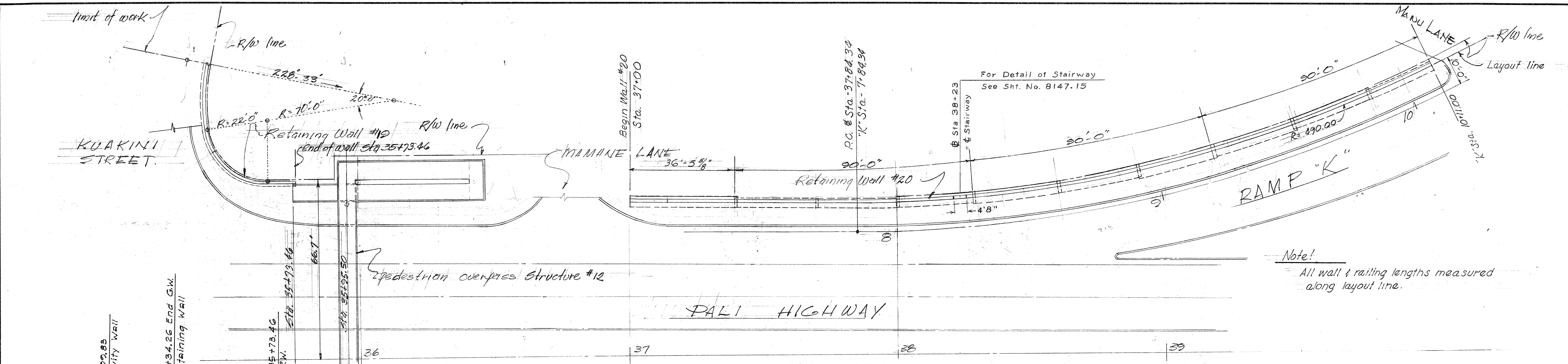
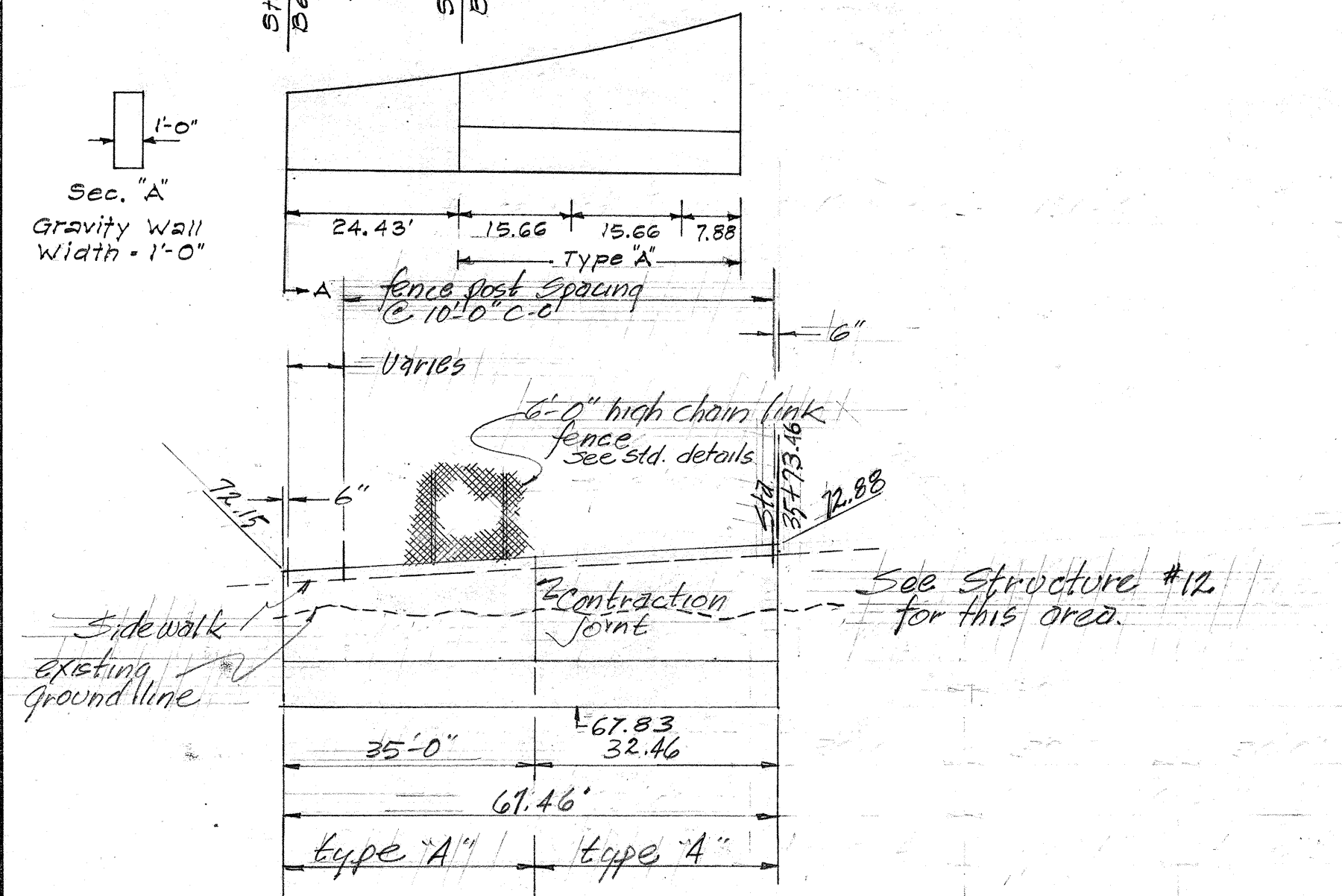


FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAWAII	BU-061-1(7)	1960	30	170

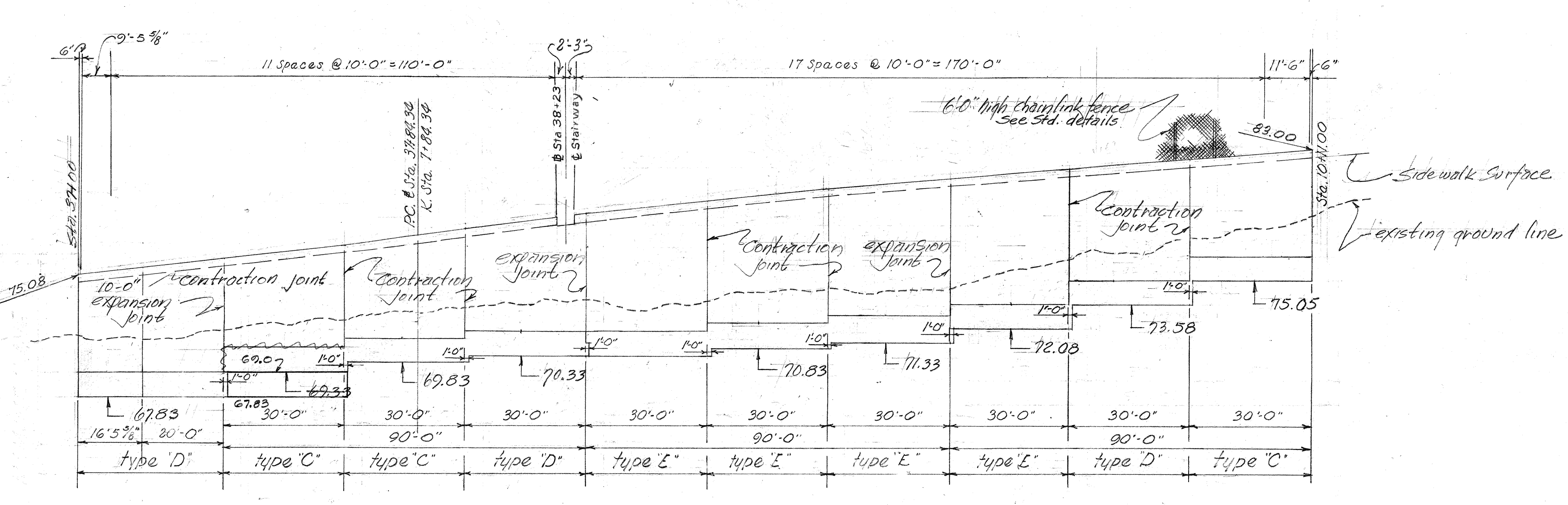
6/14/60



PLAN - RETAINING WALL #19 & #20
SCALE: 1"=20'-0"



ELEVATION - RETAINING WALL #19
SCALE: 1"=20'-0" HORIZONTAL
1"=5'-0" VERTICAL



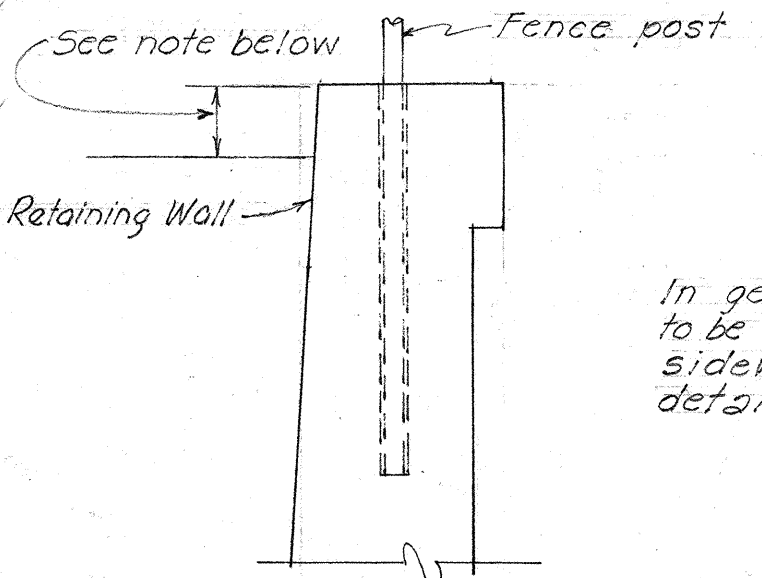
ELEVATION - RETAINING WALL #20
SCALE: 1"=20'-0" HORIZONTAL
1"=5'-0" VERTICAL

RETAINING WALL #19

Class A-1 concrete	13.2	+7.0	c.y.
Reinforcing steel	721	+48.0	lbs.
Structural exc.	12.2	+4.0	c.y.
Filter Material	0	+5.0	c.y.

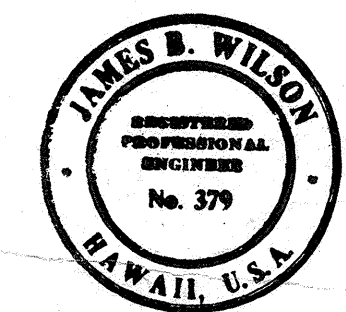
RETAINING WALL #20

Class A-1 concrete	140.9	+35.0	c.y.
Reinforcing steel	7973	7003	lbs.
Structural exc.	218.6	+76.0	c.y.
Filter material	36.4	+36.0	c.y.



FOR DRAINAGE, REINFORCEMENTS & OTHER DETAILS - SEE STANDARD DETAILS FOR RETAINING WALLS.

In general, top of retaining walls to be 6" above & follow adjacent sidewalk grade. See typical details.

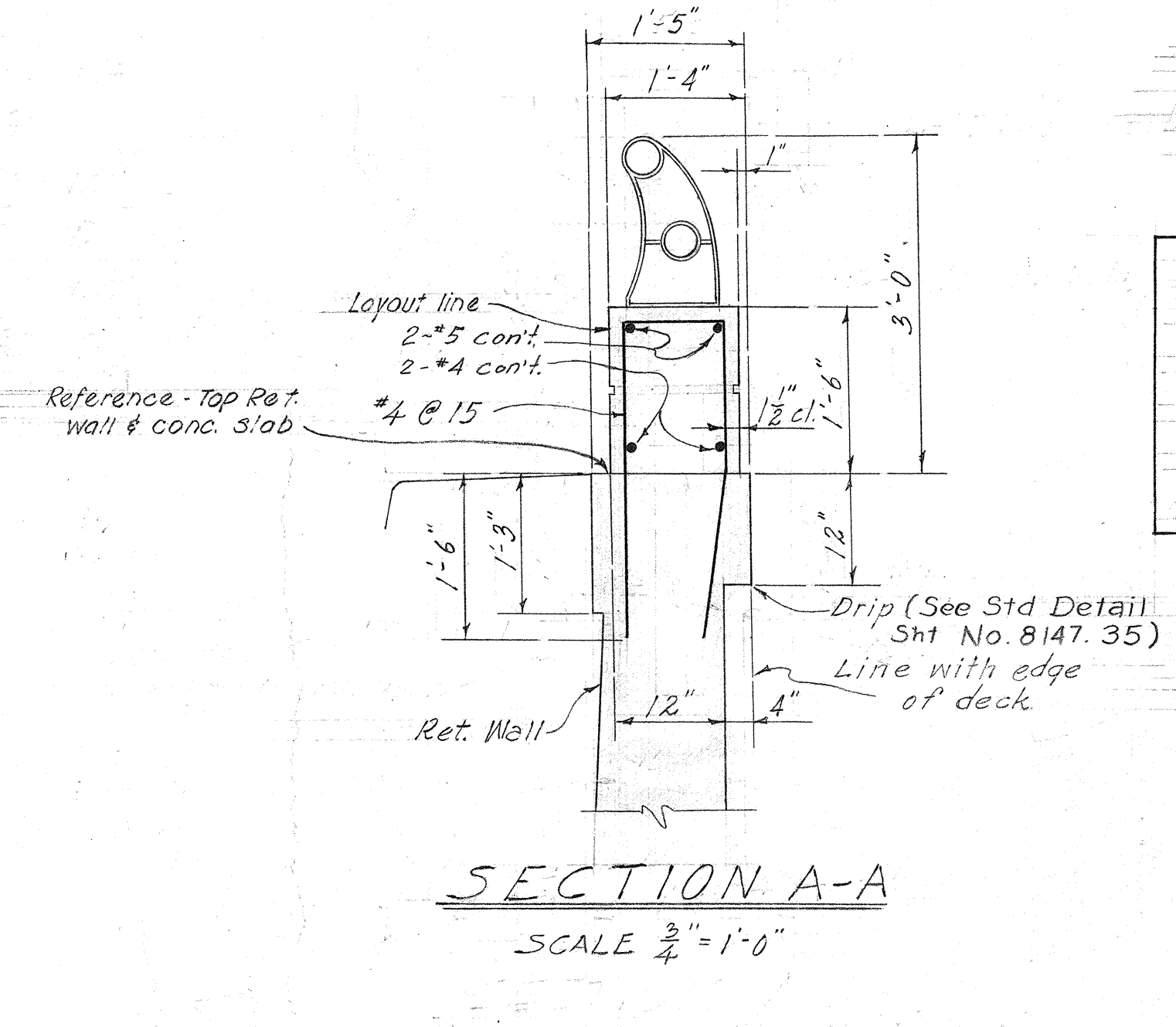
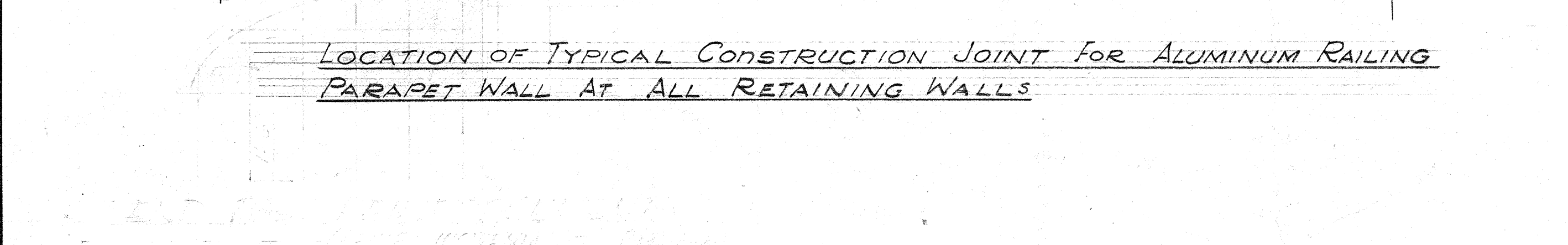
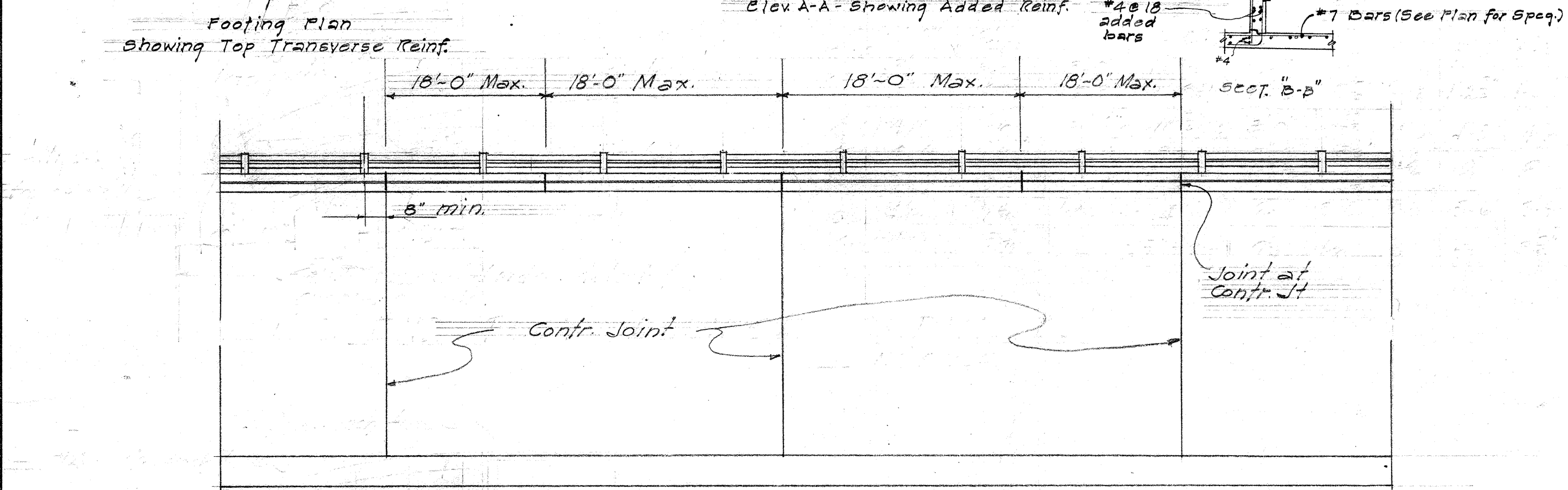
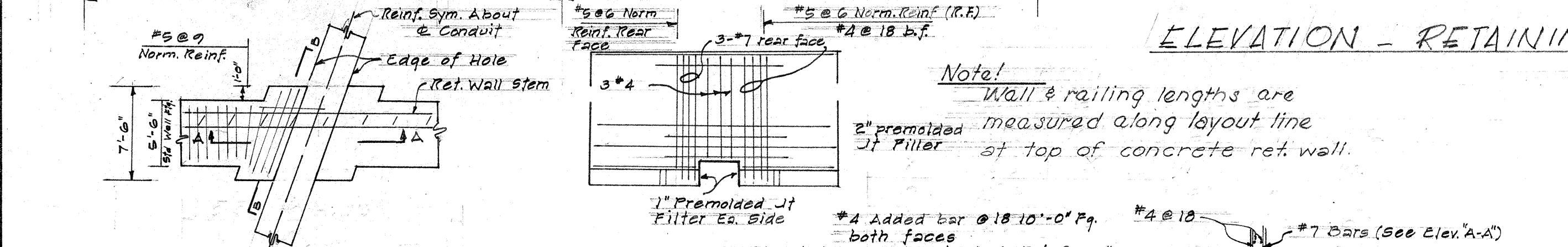
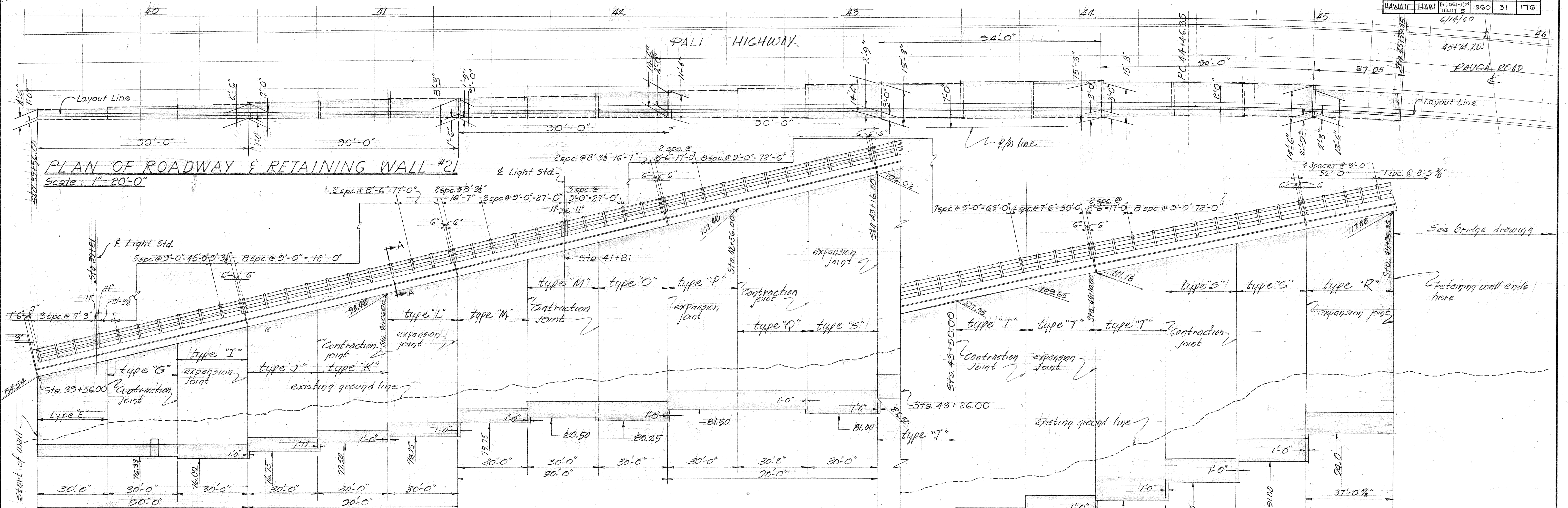


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DATE JUL 3 1957

HAWAII STATE HIGHWAY DEPARTMENT
STATE OF HAWAII

PALI HIGHWAY
PROJECT NO. BU-061-1(7) UNITS
RETAINING WALL
STRUCTURAL DETAILS
SCALE: AS SHOWN
SEPT. 1957

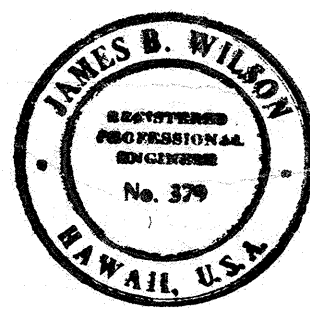
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW	BU061-1(7)	1960	31	176



FOR DRAINAGE, REINFORCEMENTS & OTHER DETAILS - SEE RETAINING WALL STANDARDS.

RETAINING WALL # 21	
Class A-1 concrete	1092 +097 C.Y.
Reinforcing steel	110,153.8 Hb, 002 lbs.
Filter material	267 312 C.Y.
Structural exc.	12743 +271 C.Y.
Alum. railing	585 577 Lin. Ft.

Note:
Top of Ret. Wall same as adjacent conc. slab grade. See adj. detail.
for additional details of aluminum railing & parapet, see sht. #. 83



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DATE JUL 3 1957

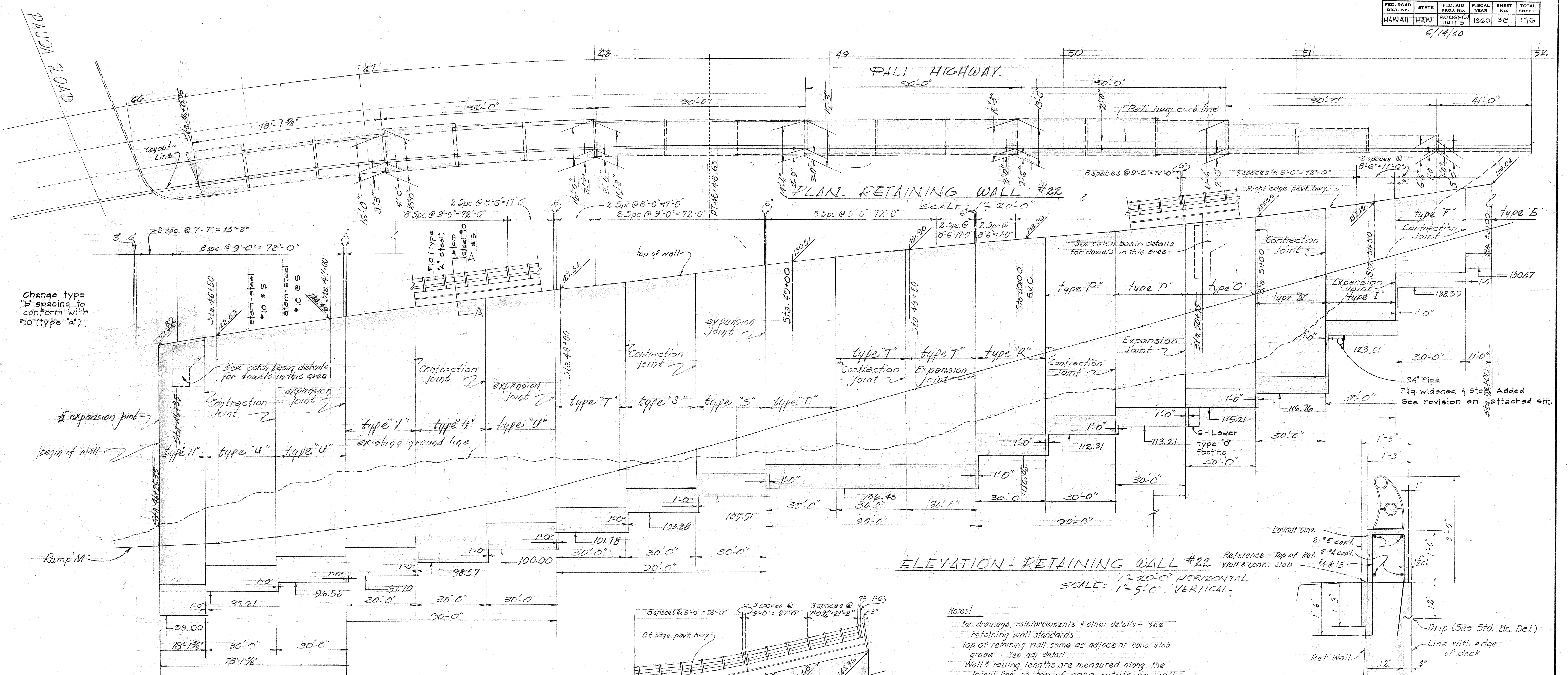
HAWAII STATE HIGHWAY DEPARTMENT
STATE OF HAWAII
PALI HIGHWAY
PROJECT NO BU061-1(7) UNIT 5
RETAINING WALL
STRUCTURAL DETAILS
SCALE: AS SHOWN SEPT. 1957

SHEET NO. 2 OF 6 SHEETS

B.S147.31

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

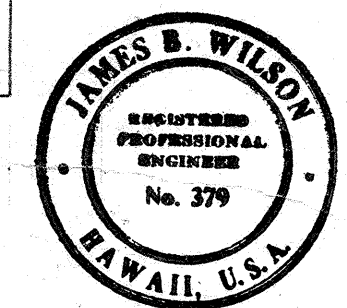
6/14/60



ELEVATION - RETAINING WALL #22
SCALE: 1" = 20'-0" HORIZONTAL
1" = 5'-0" VERTICAL

Notes:
For drainage, reinforcements & other details - see retaining wall standards.
Top of retaining wall same as adjacent conc. slab grade. - See adj. detail.
Wall & railing lengths are measured along the layout line at top of conc. retaining wall.
For additional details of aluminum railing & parapet - See Standard Aluminum Railing Details.
For Aluminum Railing, Parapet Constr. - See Sht. D. 8147.31

RETAINING WALL #22	
Class A-1 concrete	1466 #403 C.Y.
Reinforcing steel	172271 #57023 lbs.
Filter material	270 328 C.Y.
Structural exc.	2150 1963 C.Y.
Alum. railing	676 -678 Lin. Ft.



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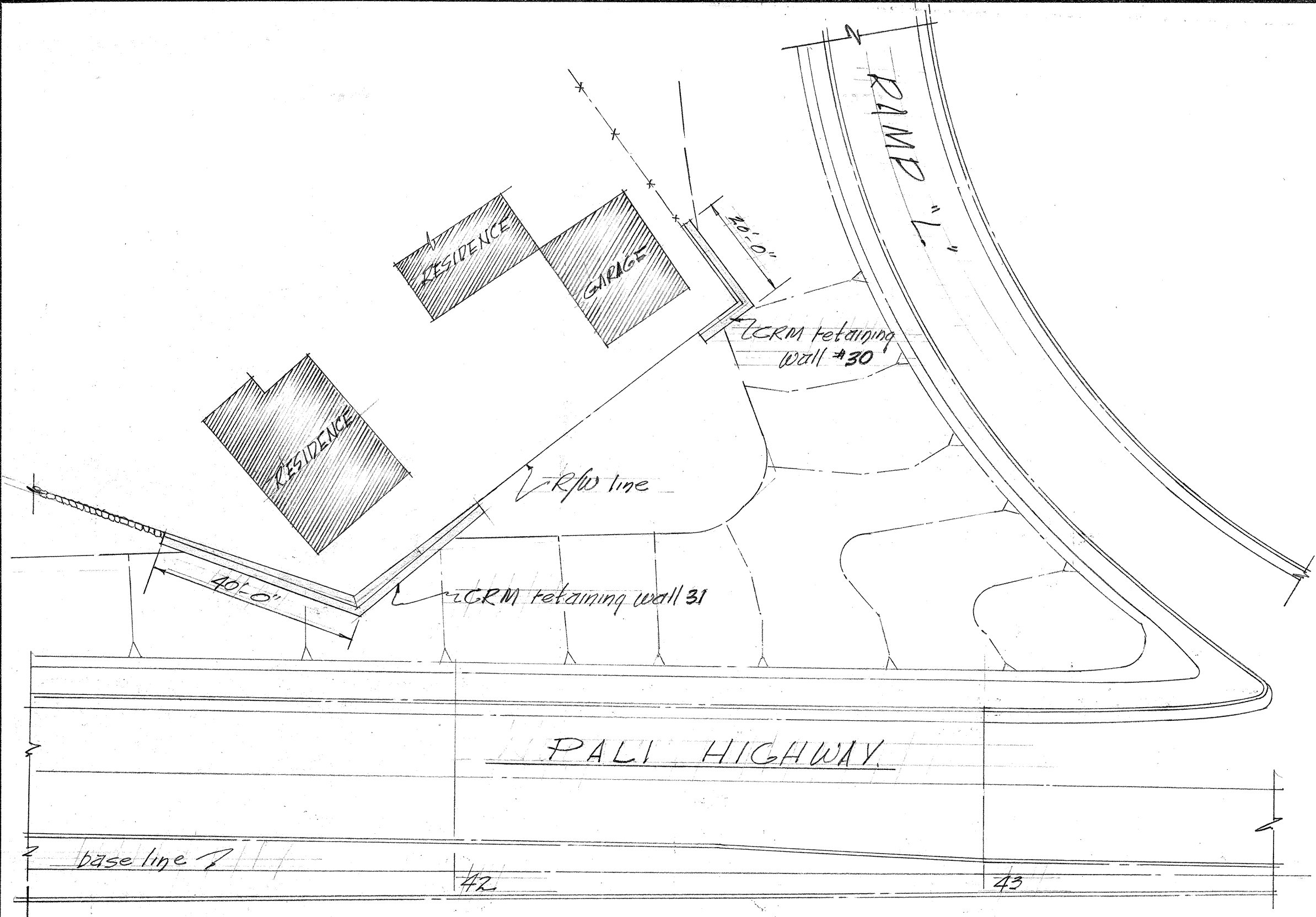
SECTION A-A
SCALE 3/4" = 1'-0"

HAWAII STATE HIGHWAY DEPARTMENT
STATE OF HAWAII
PALI HIGHWAY
PROJECT NO. BU-OGI-1(7) UNIT 5
RETAINING WALL
STRUCTURAL DETAILS
SCALE: AS SHOWN SEPT 1957

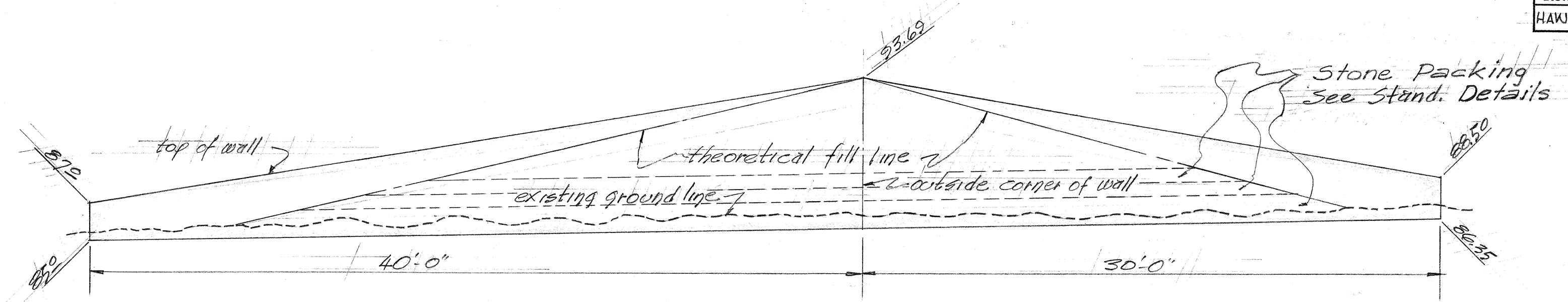
DATE	
SURVEY PLOTTED BY	
DESIGNED BY	
TRACED BY	
QUANTITIES BY	
NOTES CHECKED BY	
ORIGINAL PLAN	No.
NOTE BOOK	No.

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW	BUOG-17 UNIT 5	1960	33	176

6/15/60

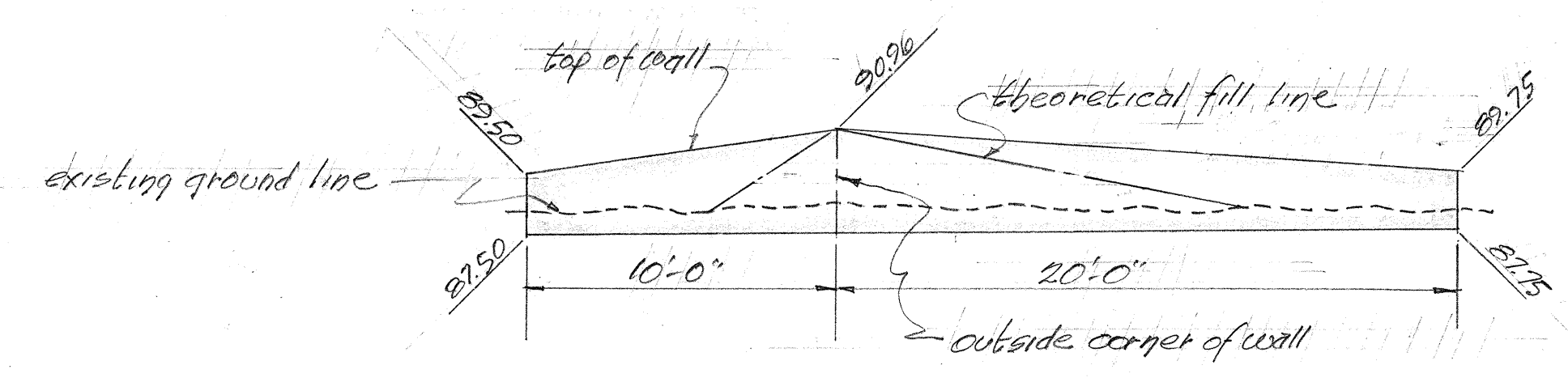


PLAN - CRM RETAINING WALL #30 & #31
SCALE: 1" = 20'-0"



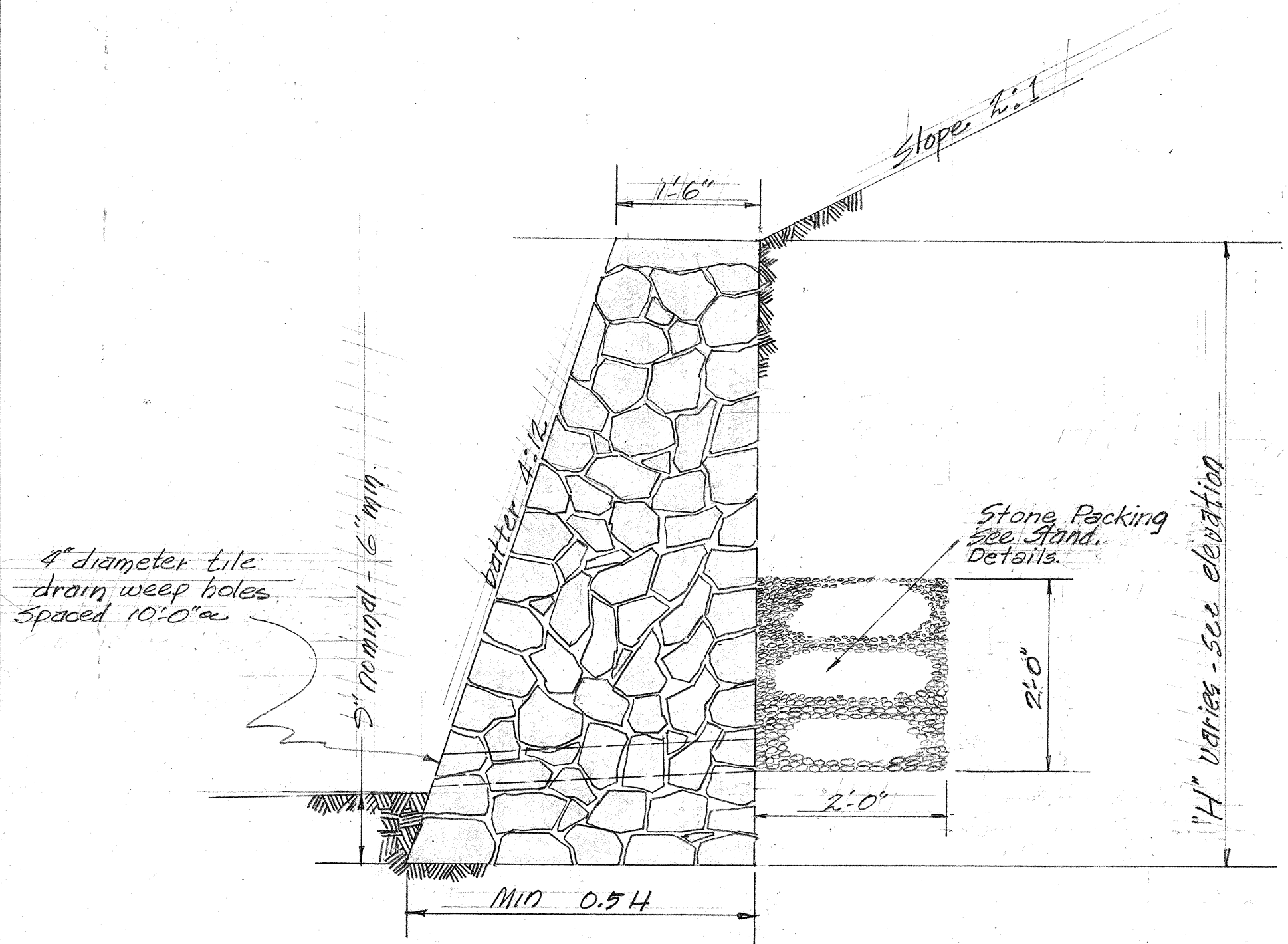
ELEVATION - CRM RETAINING WALL #31
SCALE: 1" = 5'-0"

RETAINING WALL #31	
C.R.M.	40.3 ± CY
Struct. Exc.	7 ± CY

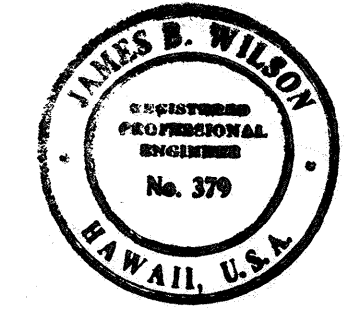


ELEVATION - CRM RETAINING WALL #30
SCALE: 1" = 5'-0"

RETAINING WALL #30	
C.R.M.	7.1 ± CY
Struct. Exc.	3 ± CY



TYPICAL CROSS SECTION OF CRM RETAINING WALL
SCALE 3/4" = 1'-0"



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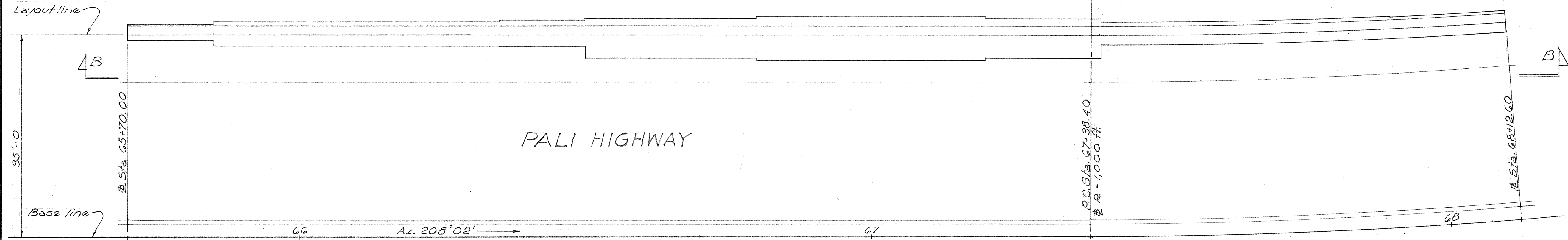
HAWAII STATE HIGHWAY DEPARTMENT
STATE OF HAWAII
PALI HIGHWAY
PROJECT NO. BUOG-17(7) UNIT 5
CRM RETAINING WALL
STRUCTURAL DETAILS
SCALE: AS SHOWN SEPT 1957

SHEET NO. 4 OF 6 SHEETS

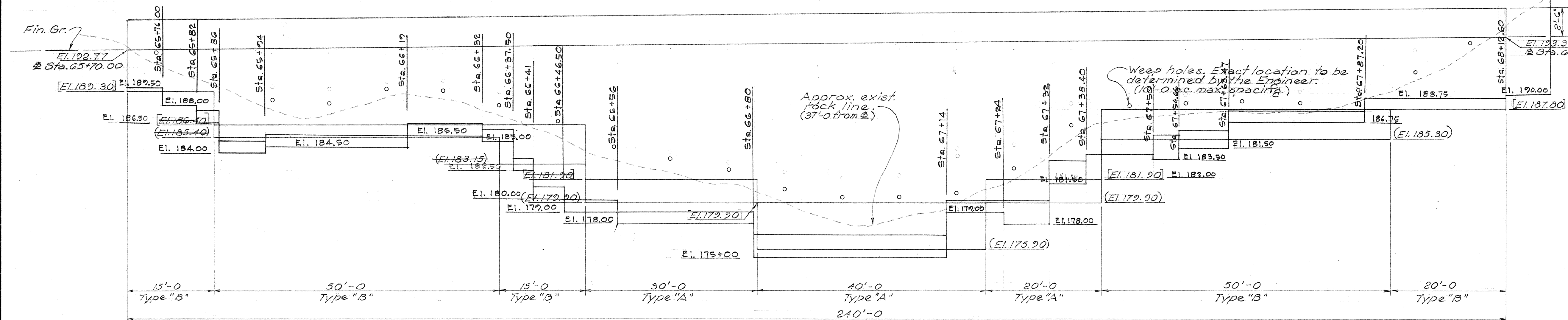
B.S147.33

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

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BU-061-1(7) UNIT 2	1960	34	176

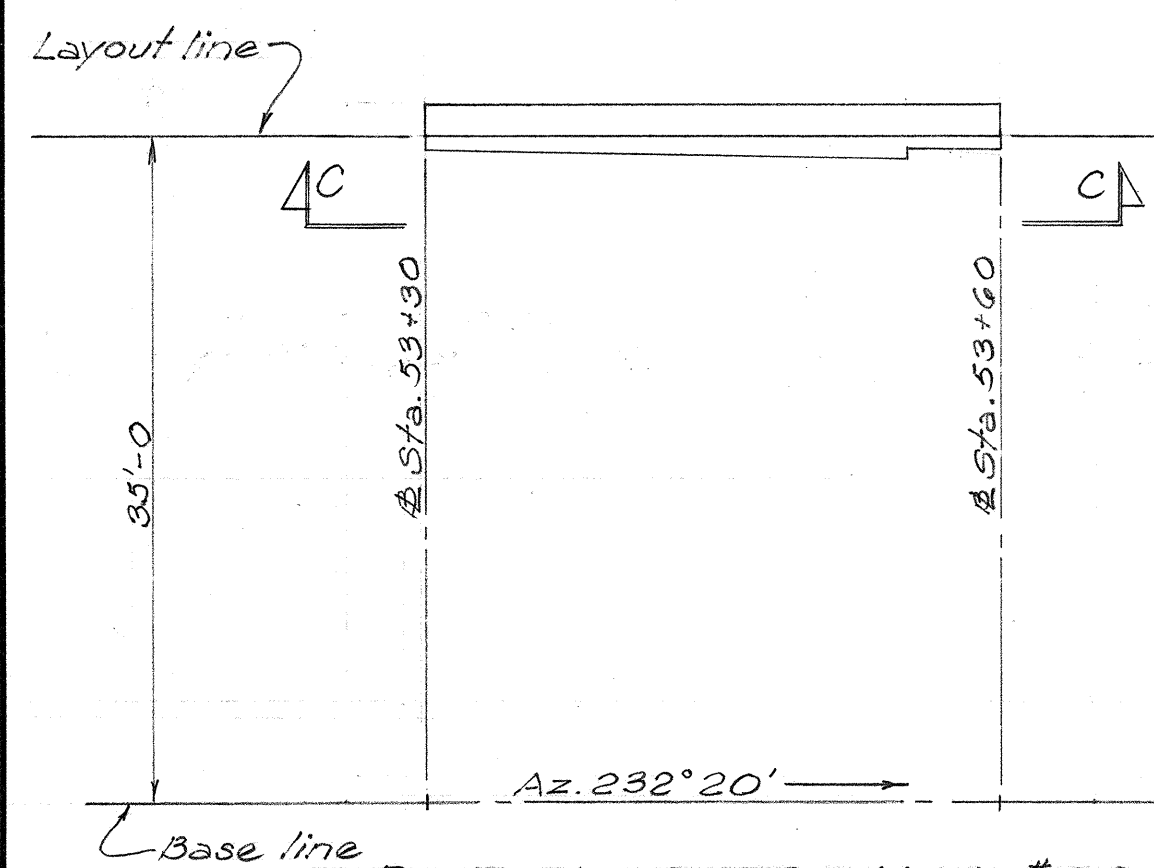


PLAN - RETAINING WALL # 33
Scale: 1"=10'-0"

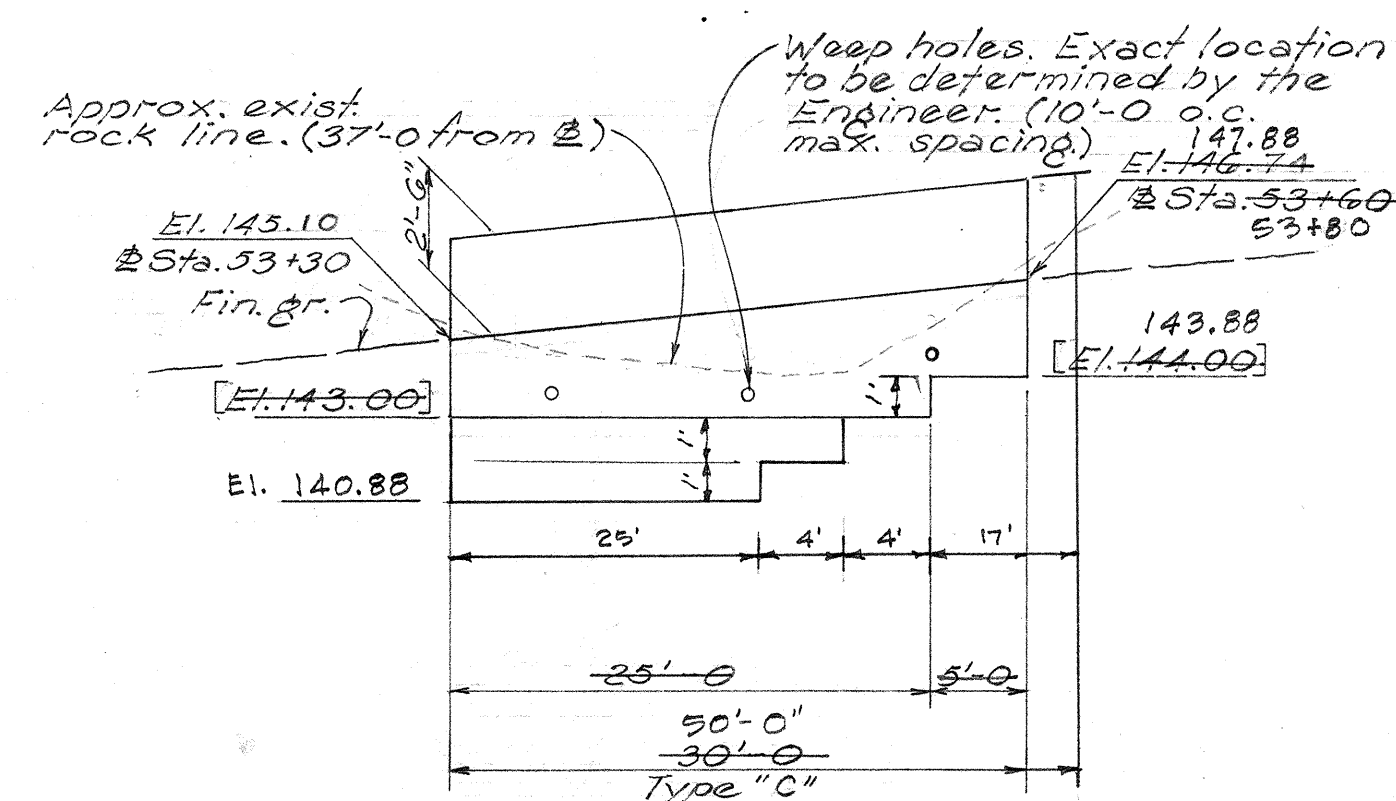


ELEVATION "B-B"
Scale: Horiz. 1"=10'-0" Vert. 1"=5'-0"

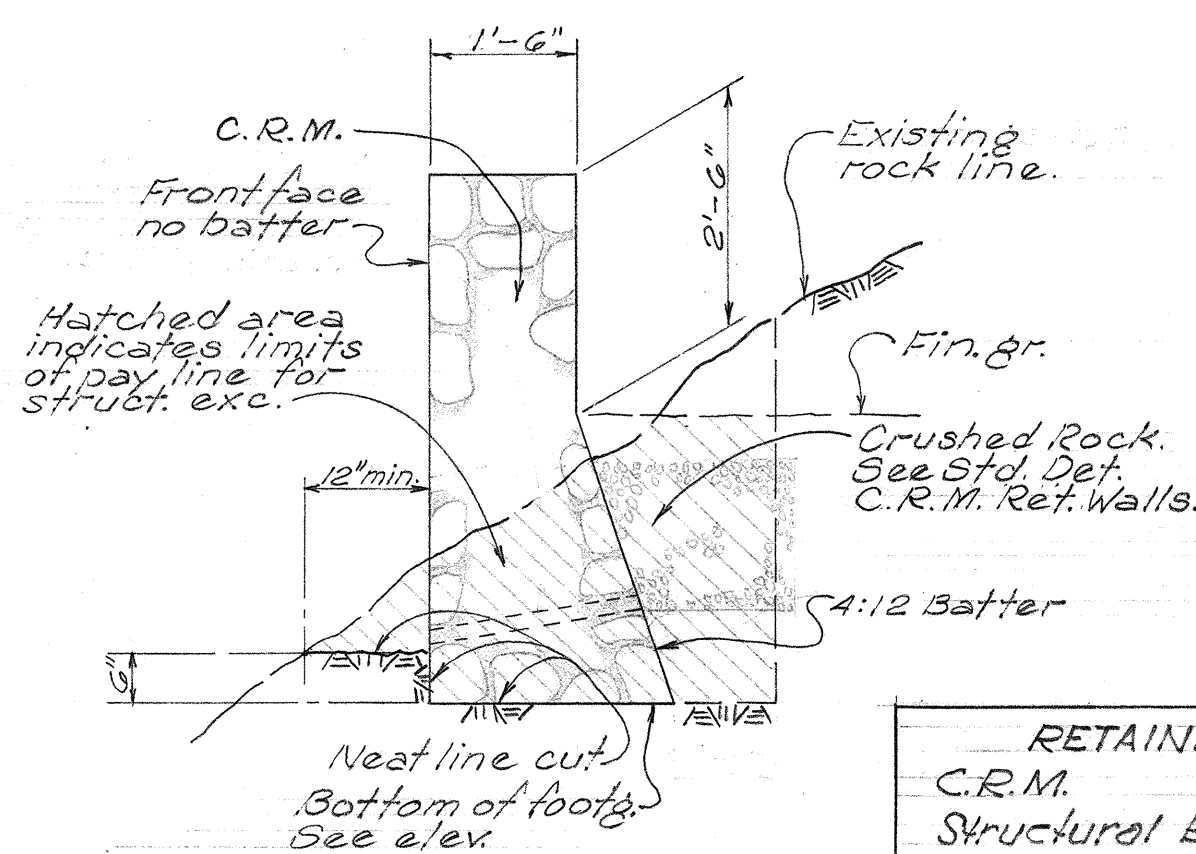
NOTE: [Elevation] denotes Bottom of footing elevation.
[Elevation] denotes Bottom of Cutoff Wall elevation.



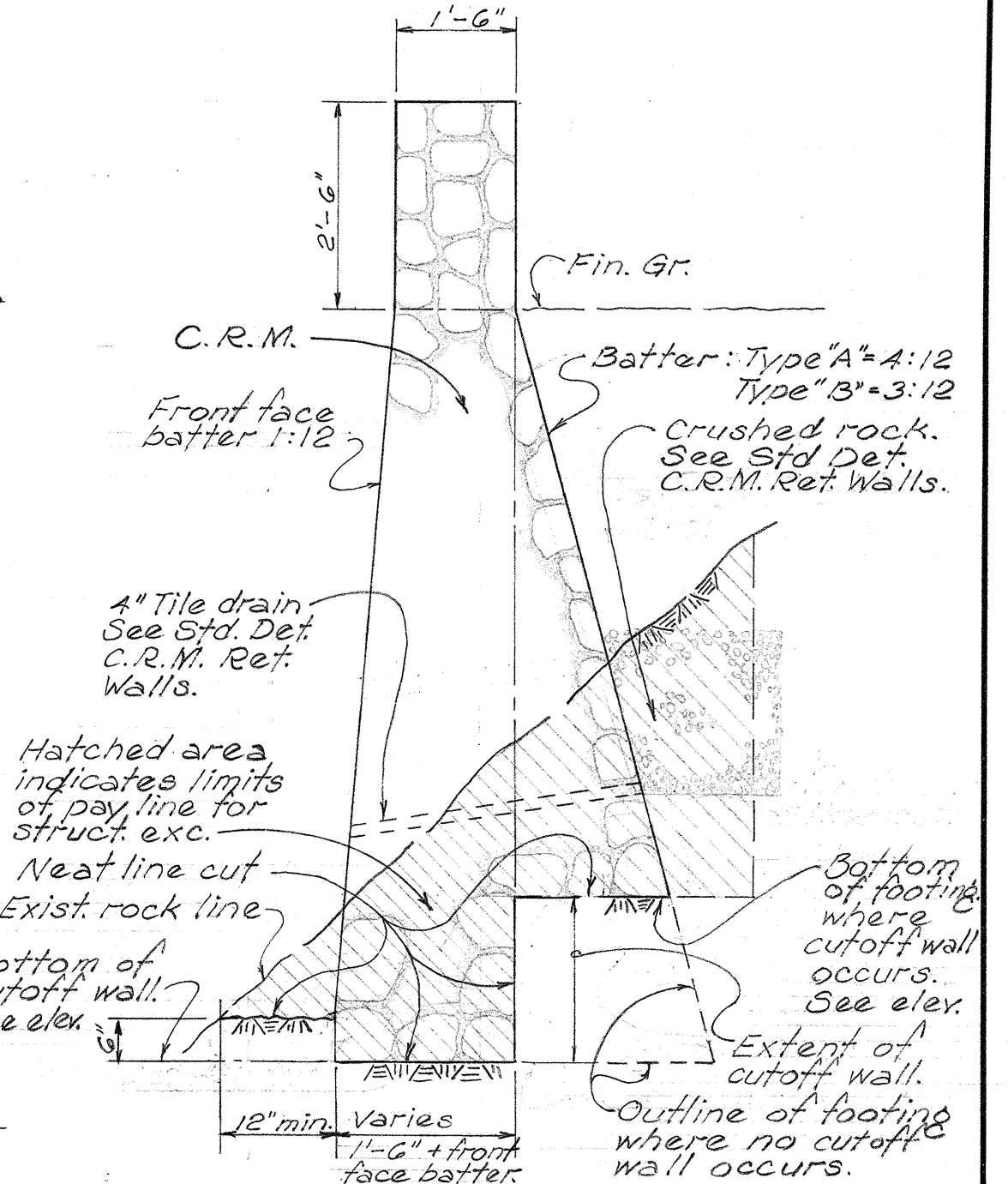
PLAN - RET. WALL # 32
Scale: 1"=10'-0"



ELEVATION "C-C"
Scale: Horiz. 1"=10'-0" Vert. 1"=5'-0"



RETAINING WALL # 32
C.R.M. 300 C.Y.
Structural Exc. 220 C.Y.



TYP. SEC. THRU TYPE "A" & "B" WALL
Scale: 1/2"=1'-0"

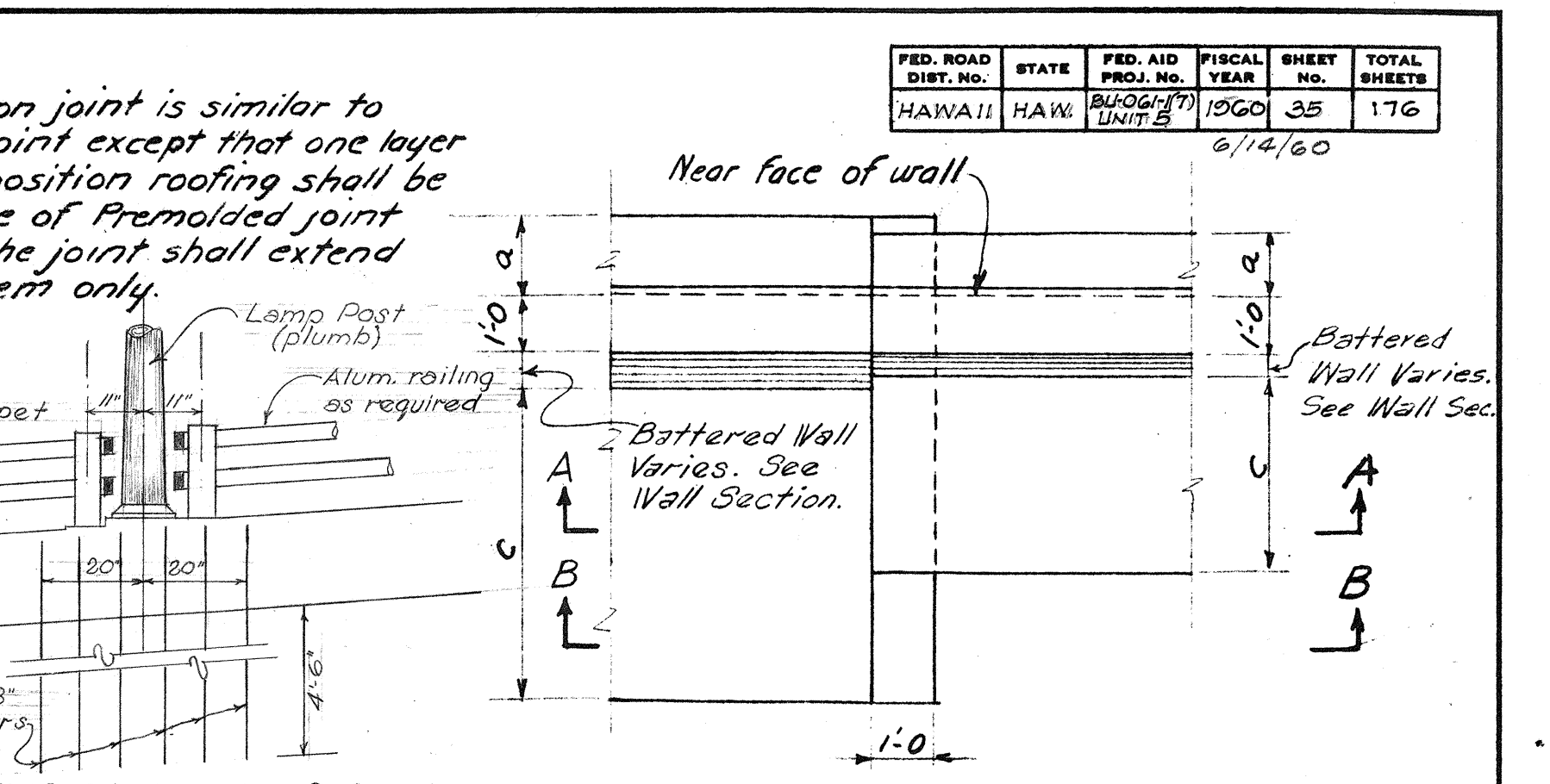
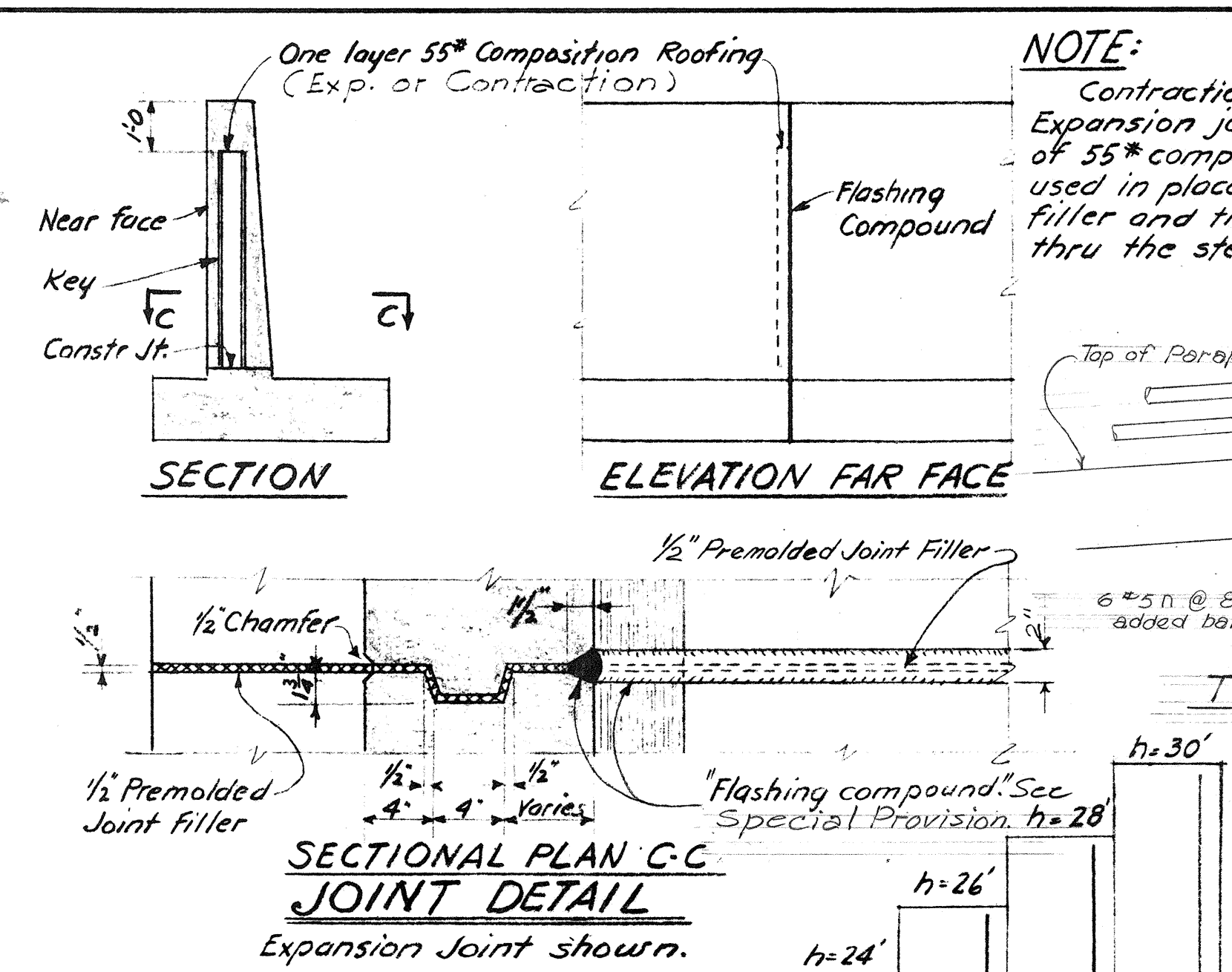
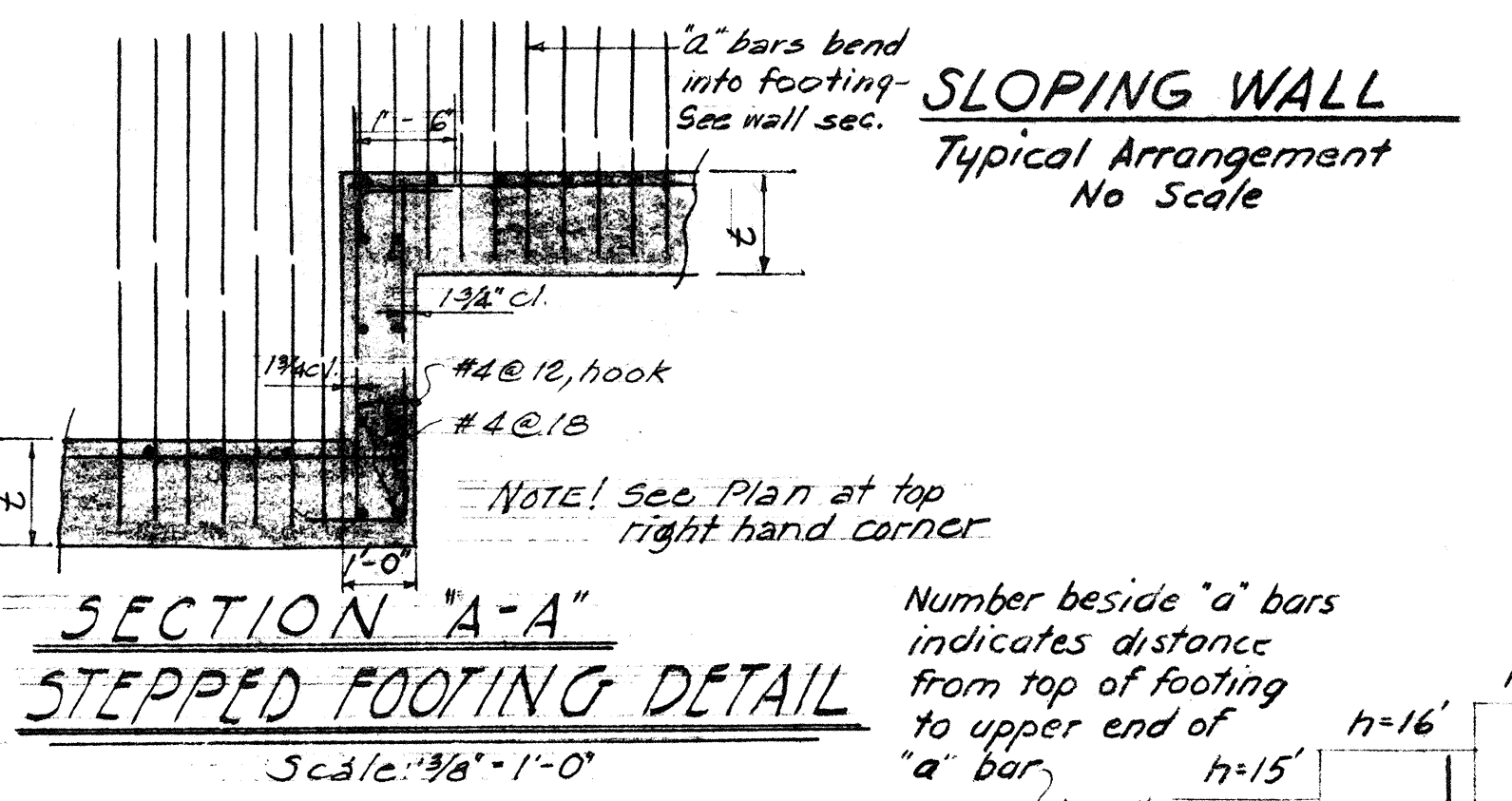
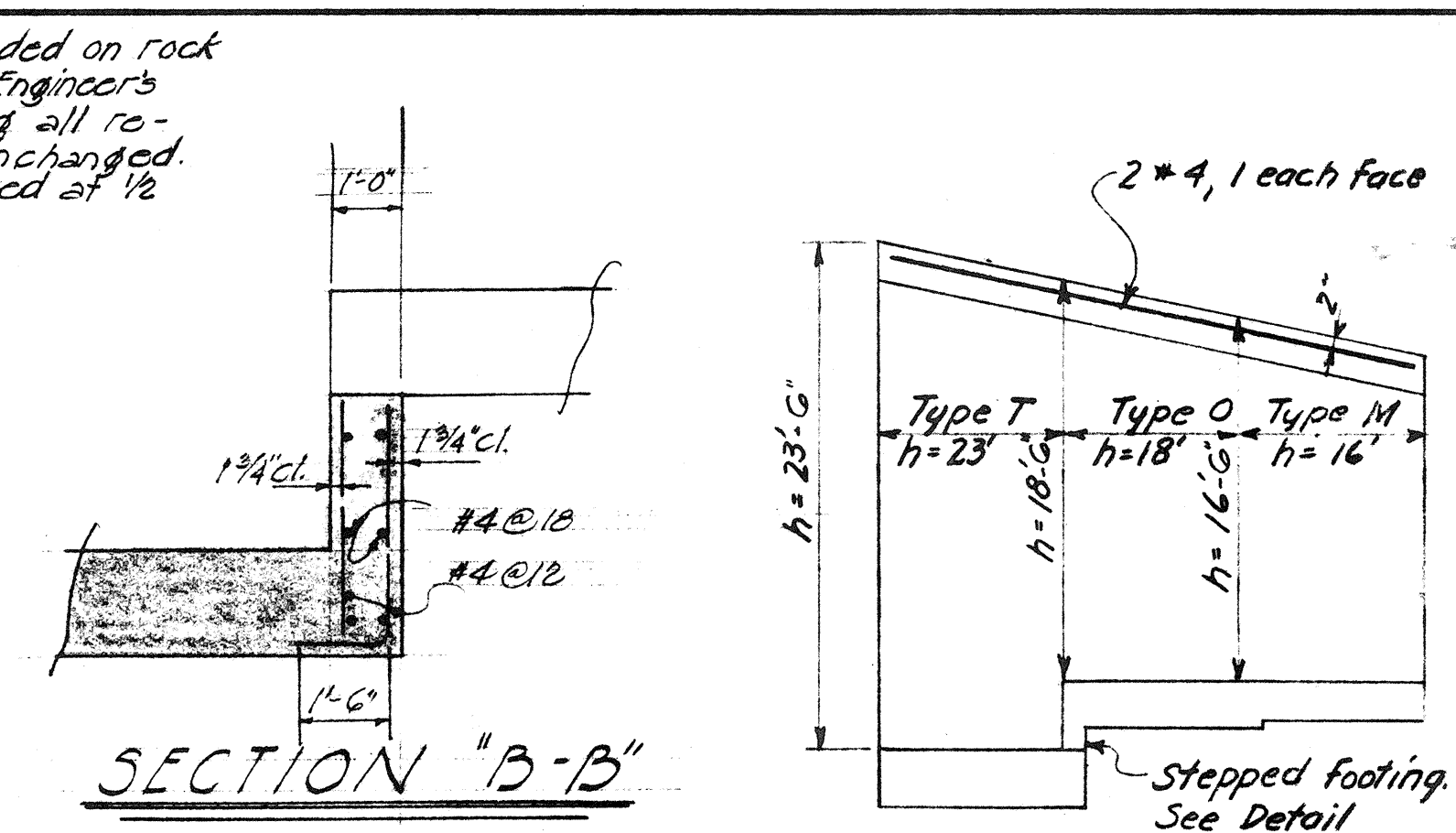
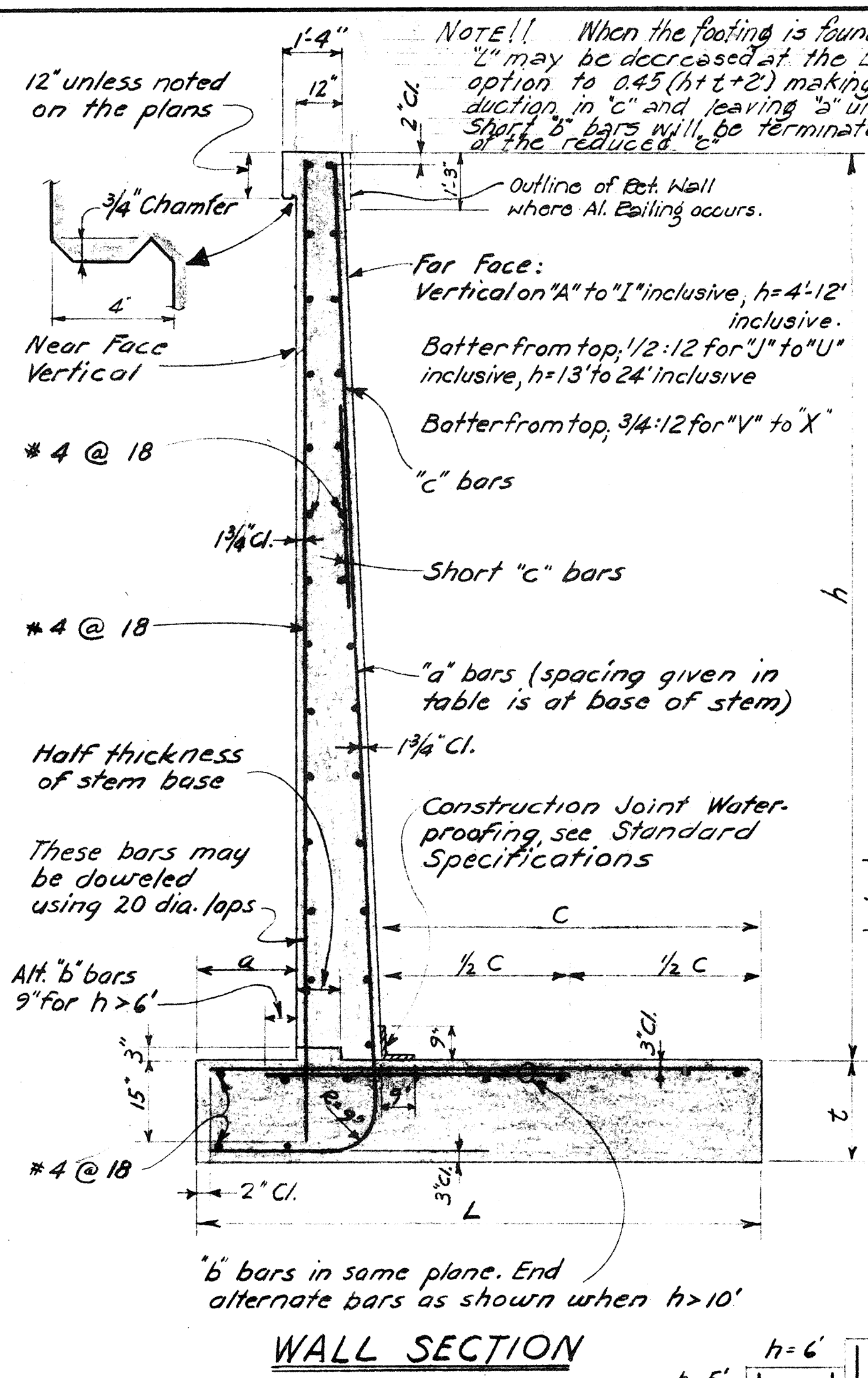
RETAINING WALL # 33
C.R.M. 300 C.Y.
Structural Exc. 220 C.Y.

GENERAL NOTE

Where location of rock line is such that a modification to the height of wall is required, the Engineer shall be promptly notified.

HAWAII STATE HIGHWAY DEPARTMENT
STATE OF HAWAII

PALI HIGHWAY
PROJECT NO. BU-061-1(7) UNIT 5
RETAINING WALL
STRUCTURAL DETAILS
SCALE: AS SHOWN
SEPT. 1959



DESIGN CRITERIA

$f_s = 20,000 \text{ psi}$
 $f_c = 1,200 \text{ psi}$
 $n = 10$
 Soil Pressure = 4100 psf
 2' Surcharge
 Equivalent Fluid Pressure 30 psf

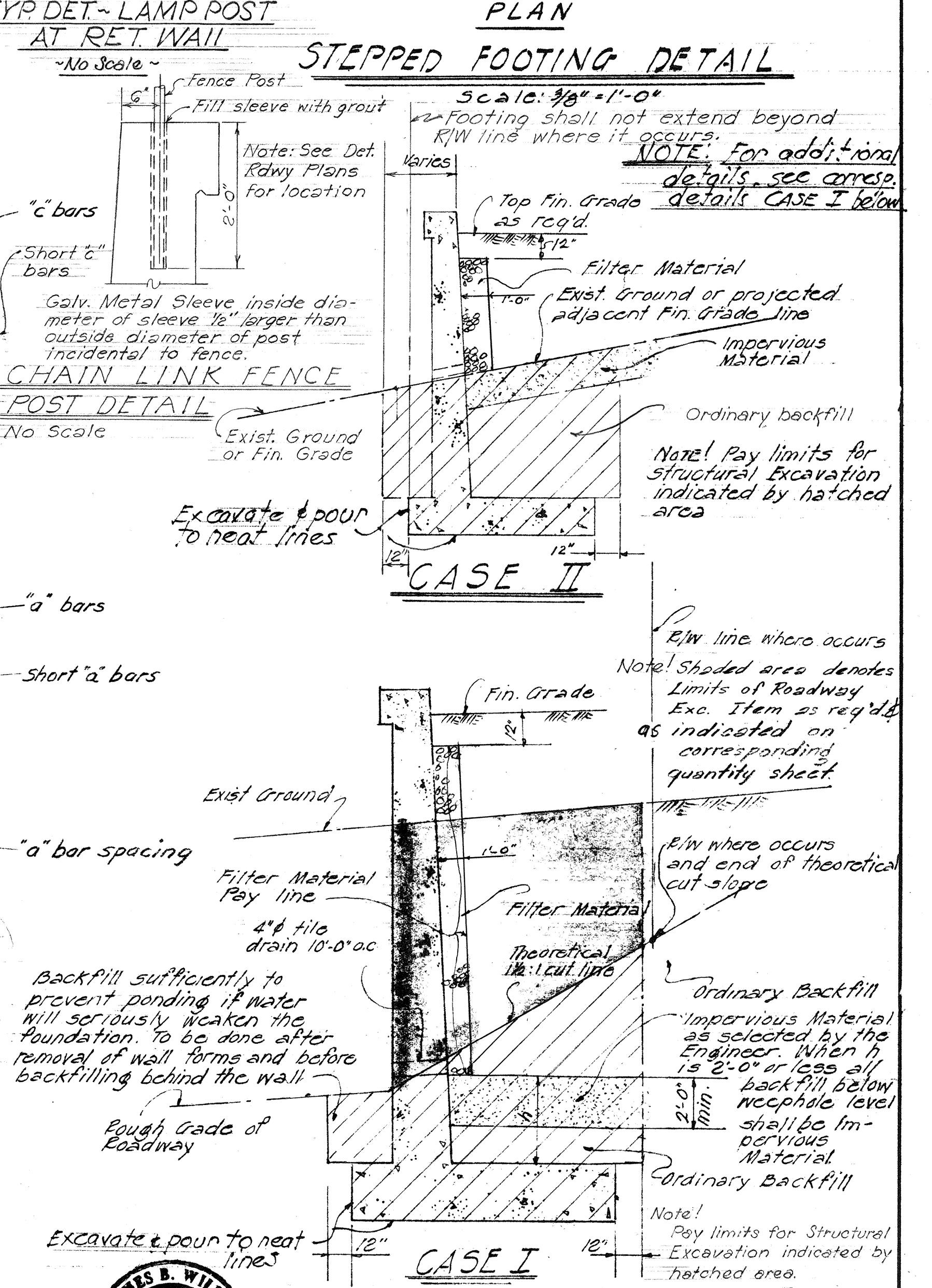
Note: Premolded joint filler for retaining walls shall conform to AASHTO Designation M33 or AASHTO Designation M153.

VERTICAL REINFORCING STEEL ARRANGEMENT

Note: See Special Provisions for admixture for all retaining walls.
 Forms for all exposed surfaces of retaining walls shall be plywood.

Type	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
Maximum h	4'	5'	6'	7'	8'	9'	10'	11'	12'	13'	14'	15'	16'	17'	18'	19'	20'	21'	22'	23'	24'	26'	28'	30'
a	6"	6"	6"	12"	12"	12"	12"	12"	12"	15"	18"	21"	24"	24"	24"	27"	30"	33"	36"	39"	54"	60"	72"	72"
c	1.0'	1.5'	2.0'	2.0'	2.5'	3.0'	3.5'	4.0'	4.5'	4.4'	4.92'	5.13'	5.58'	6.04'	6.75'	7.71'	8.42'	9.13'	9.83'	10.29'	10.75'	10.88'	12.25'	12.12'
L	2.5'	3.0'	3.5'	4.0'	4.5'	5.0'	5.5'	6.0'	6.5'	7.0'	7.75'	8.25'	9.0'	9.75'	10.5'	11.5'	12.5'	13.5'	14.5'	15.25'	16.0'	18.0'	20.0'	21.0'
t	14"	14"	14"	14"	14"	14"	14"	18"	18"	18"	18"	21"	21"	21"	24"	24"	24"	27"	30"	31"	33"	36"	39"	42"
"a" bars	*3@12	*3@12	*4@12	*3@6	*4@6	*4@5 1/2	*5@6	*5@5	*6@6	*6@8	*6@6	*6@5 1/2	*6@5	*7@6	*7@5	*8@6	*8@5	*9@6	*9@5 1/2	*10@6	*10@5 1/2	*10@5 1/2	*10@5	*11@5
"b" bars	*3@12	*3@12	*3@12	*3@12	*4@12	*5@11	*5@10	*5@10	*5@6	*6@8	*6@6	*6@5 1/2	*6@5	*7@6	*7@5	*9@6	*9@5	*10@6	*10@5 1/2	*11@6	*11@5 1/2	*11@5 1/2	*11@5	*11@5
"c" bars	—	—	—	—	—	—	—	*4	*4	*4	*4	*4	*4	*4	*4	*4	*5	*6	*6	*7	*7	*7	*7	*7
F.S. Sliding *	1.30	1.29	1.28	1.16	1.17	1.18	1.17	1.17	1.20	1.23	1.25	1.21	1.25	1.26	1.33	1.39	1.42	1.48	1.53	1.53	1.54	1.63	1.62	1.61
F.S. Overturning	1.38	1.45	1.50	1.54	1.61	1.64	1.63	1.71	1.76	1.81	1.96	1.97	2.05	2.19	2.47	2.49	2.70	2.85	3.02	3.06	3.11	3.70	3.61	3.60
Concrete c/y/ft.	0.29	0.35	0.42	0.48	0.55	0.61	0.68	0.74	0.81	1.00	1.10	1.19	1.37	1.49	1.69	1.83	1.97	2.26	2.53	2.72	2.97	3.75	4.36	4.87
Steel lbs/ft.	11.1	13.8	18.3	20.5	27.8	33.4	44.7	51.0	67.7	59.6	76.2	87.8	103.7	125.8	145.4	178.3	222.7	249.2	278.4	339.0	376.6	426.0	564.0	622.0
Eccentricity e	0.88'	1.01'	1.14'	1.21'	1.20	1.42	1.63	1.63	1.74	1.83	1.89	1.93	1.89	1.98	1.94	1.86	2.00	1.75	1.82	1.82	1.29	1.52	1.31	1.31
Toe Pressure	2800	2600	3200	2800	2900	3200	3700	3600	3800	4100	3800	3900	3900	3800	3800	4000	3900	4100	3900	4100	4100	3850	3960	4030

* F.S. Against sliding based on friction factor of 0.40



HAWAII STATE HIGHWAY DEPARTMENT
 STATE OF HAWAII
PALI HIGHWAY
 PROJECT NO. BU-061-1(7) UNIT 5
STANDARD DETAILS
 RETAINING WALL DETAILS
 SCALE: AS SHOWN
 SEPT. 1957