

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
LAND TRANSPORTATION FACILITIES DIVISION

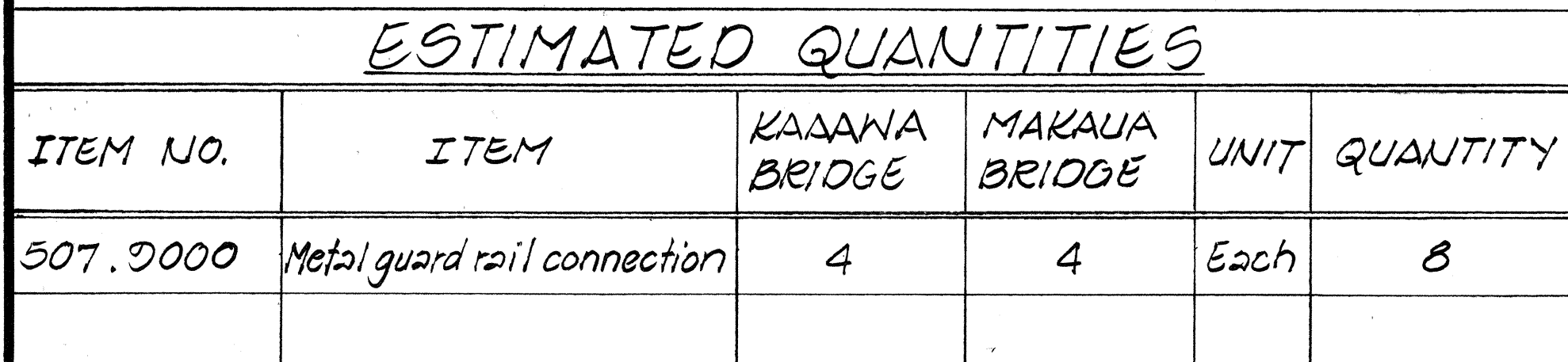
METAL GUARD RAIL CONNECTION

TO KAAHNA BRIDGE & MAKAAU BRIDGE
KAMEHAMEHA HIGHWAY RESURFACING
KUALOA TO LAU PLACE

Proj. No. 83D-01-86M

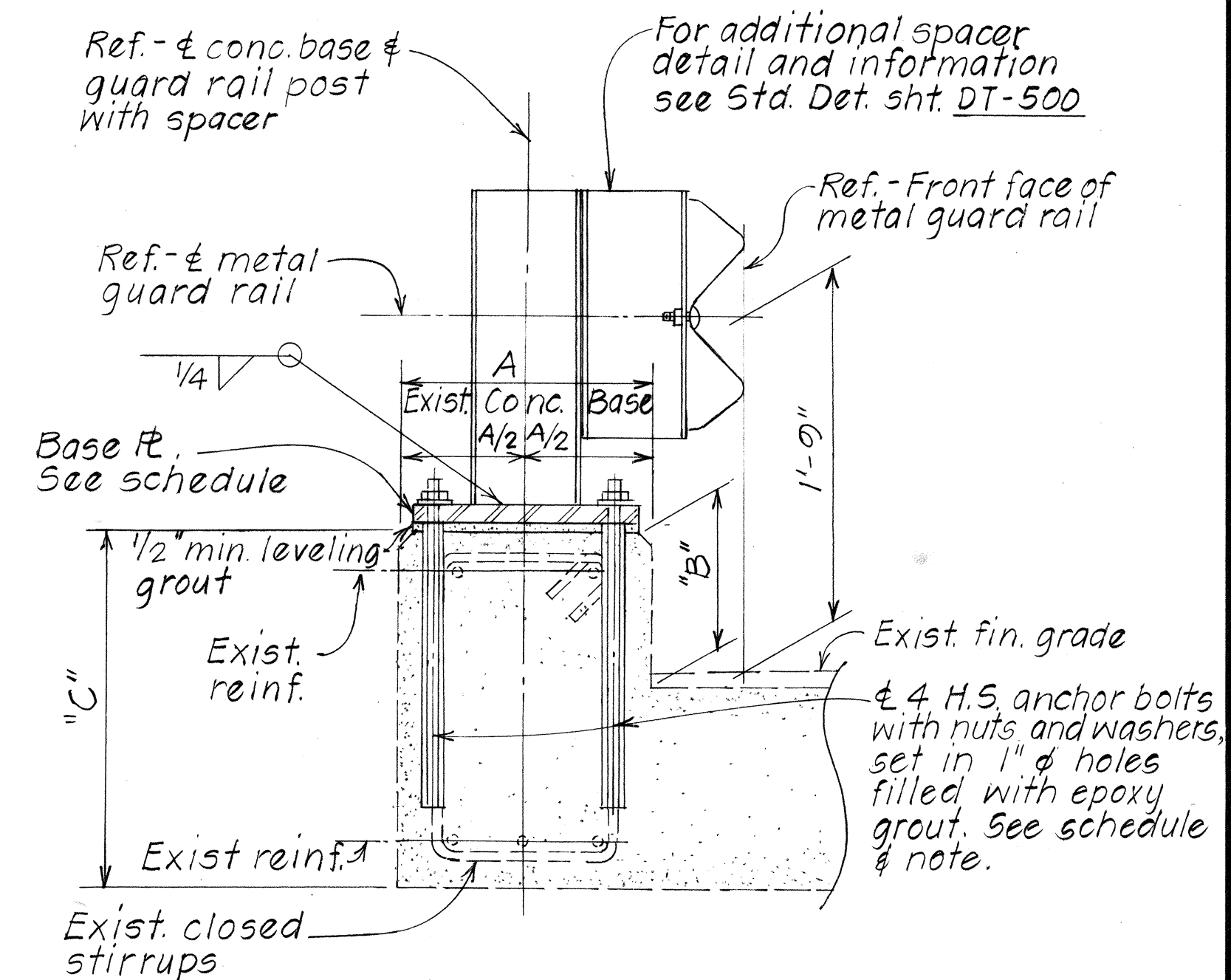
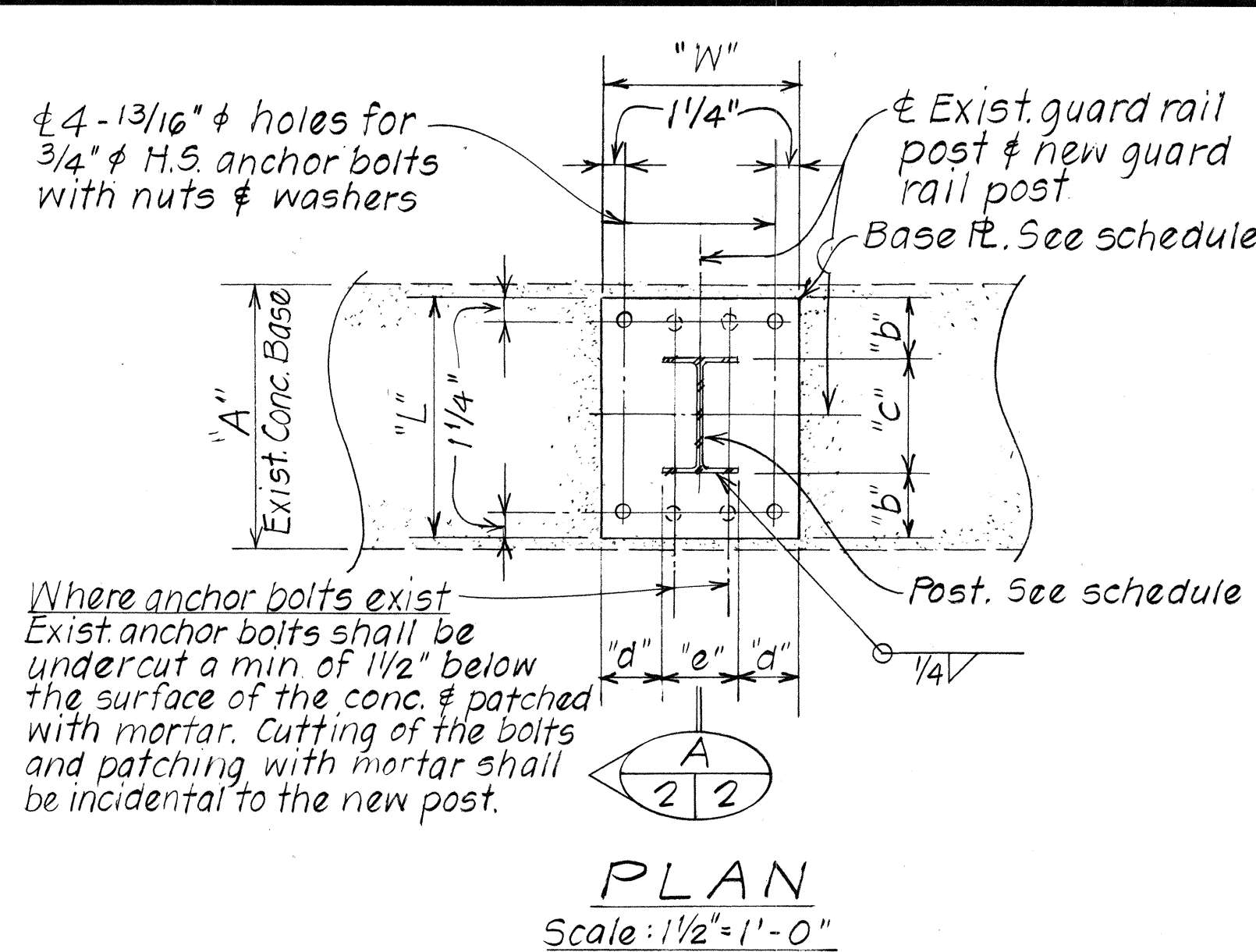
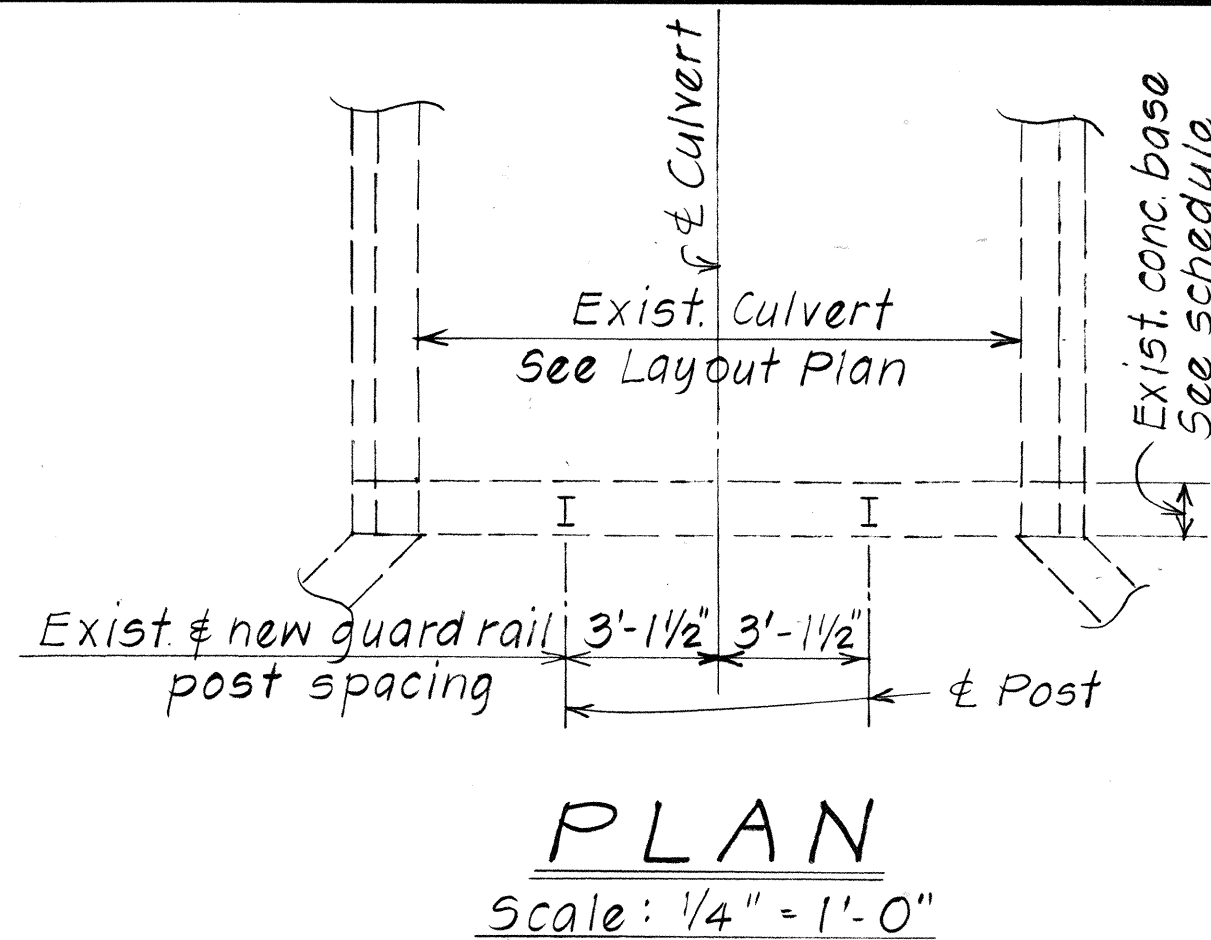
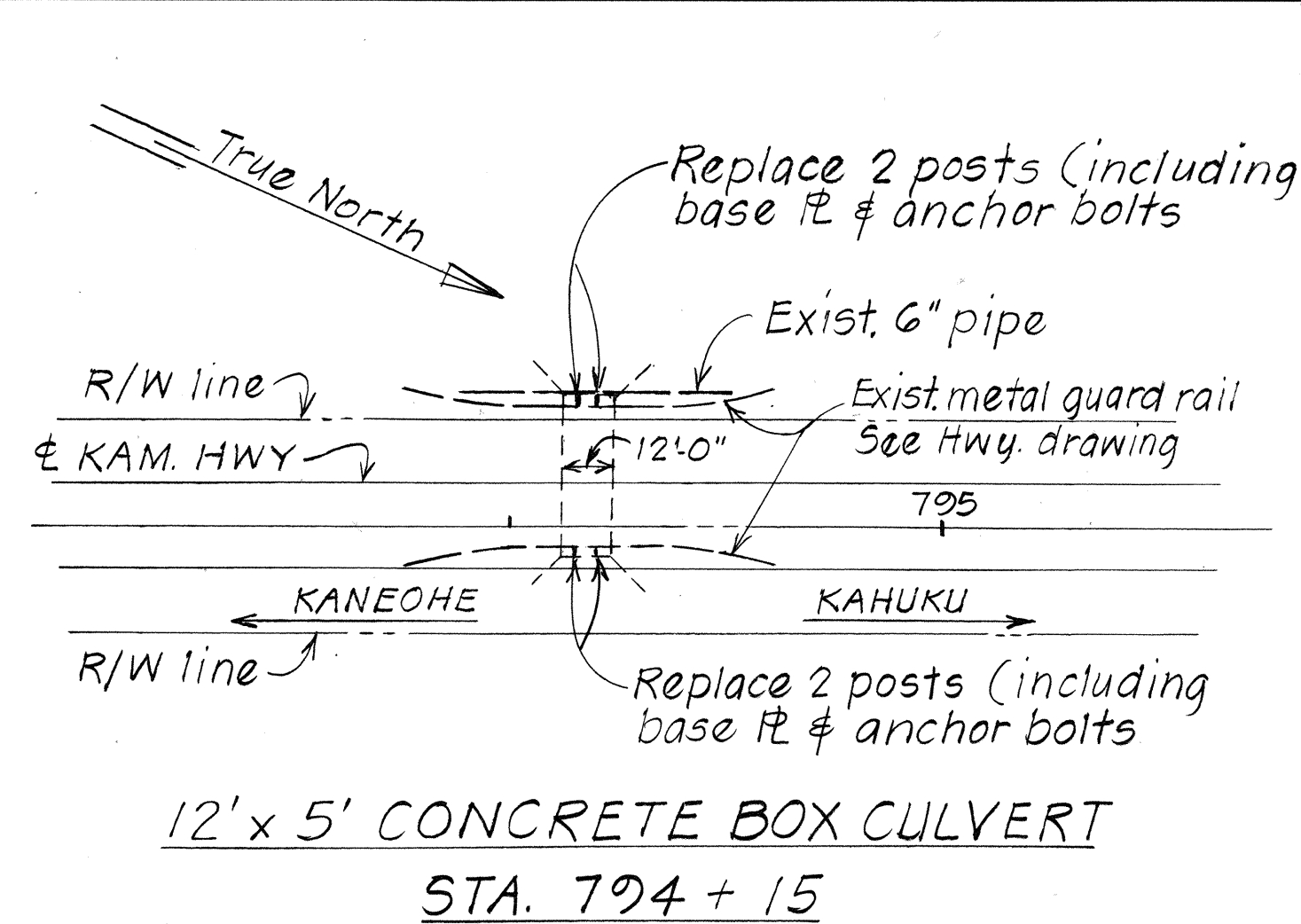
Scale: As Shown Date: March 1986

SHEET NO. 1 OF 6 SHEETS

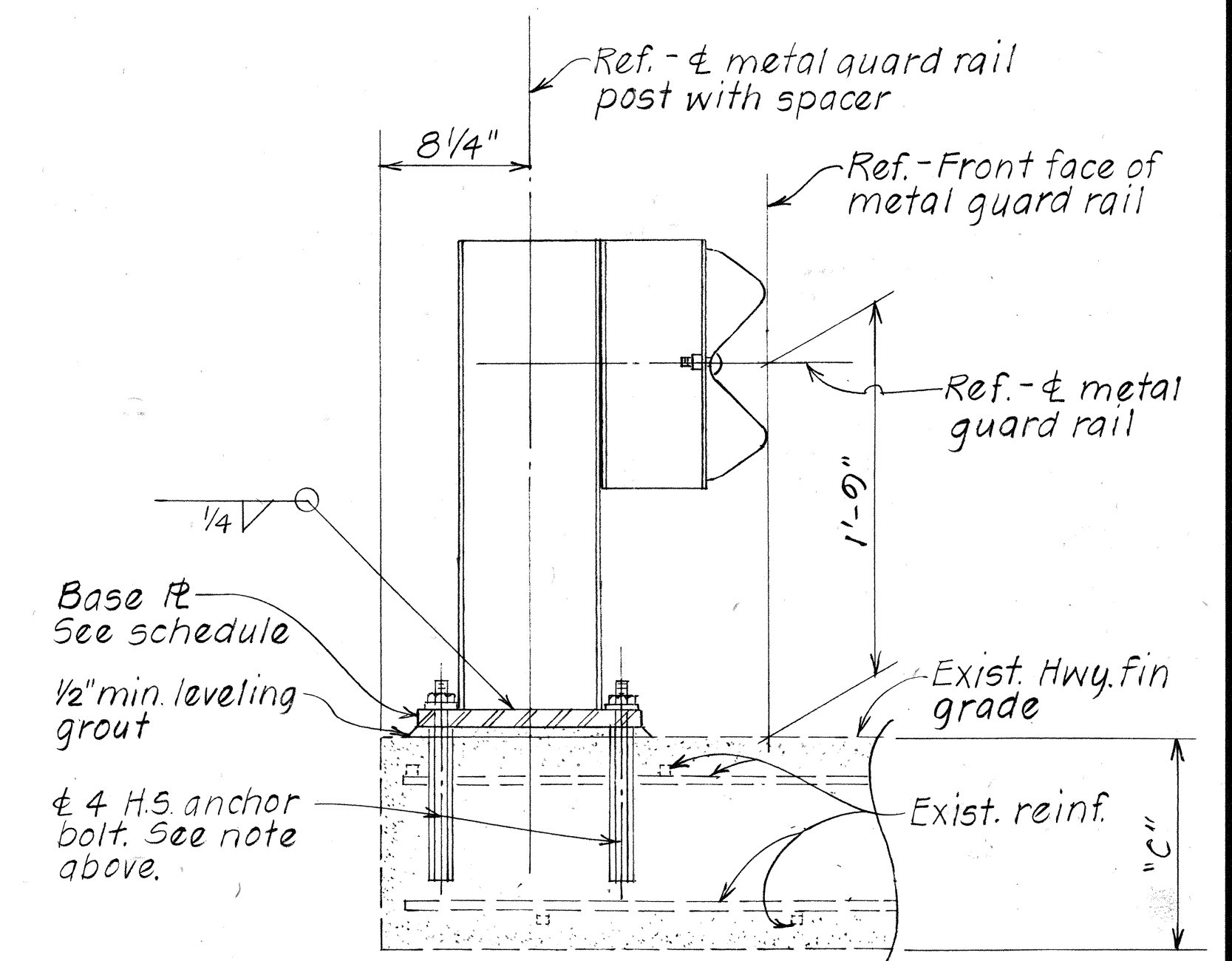


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FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	83D-01-86M	1986	26	57



TYPE (A) - BASE PLATE ON CONC. BASE



TYPE (B) - BASE PLATE ON CONC. SLAB

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

GUARD RAIL CONNECTION - TYPE & DIMENSION FOR EXIST. CONC. BASE, BASE PL, POST, ANCHOR BOLTS, DRILLED HOLES												
STRUCTURE	TYPE	EXIST. CONC. BASE			BASE PL SIZE t x W x L	ANCHOR BOLTS SIZE	DRILLED HOLE SIZE	POST				
		"A"	"B"	"C"				TYPE	"b"	"c"	"d"	"e"
12 x 5 Box Culvert Sta. 794 + 15	(A)	1'-2"	0" ±	1'-8½"	7/8" x 10½" x 1'-0½"	¾" φ x 1'-7"	1" φ x 1'-4"	W6 x 9	3⅝"	5⅞"	3¼"	4"
12 x 5 Box Culvert Sta. 826 + 80	(A)	1'-0"	12" ±	2'-1" ±	7/8" x 10½" x 0'-0"	¾" φ x 1'-10"	1" φ x 1'-7"	W6 x 9	1⅞"	5⅞"	2¾"	4"
6 x 4 Box Culvert Sta. 853 + 00	(B)	--	0"	1'-0" ±	7/8" x 10½" x 1'-0½"	¾" φ x 0'-11"	1" φ x 0'-8"	W8 x 17	2¼"	8"	2⅝"	5¼"

⊗ - Depth of drilled hole.

TYPICAL GUARD RAIL BASE DETAILS

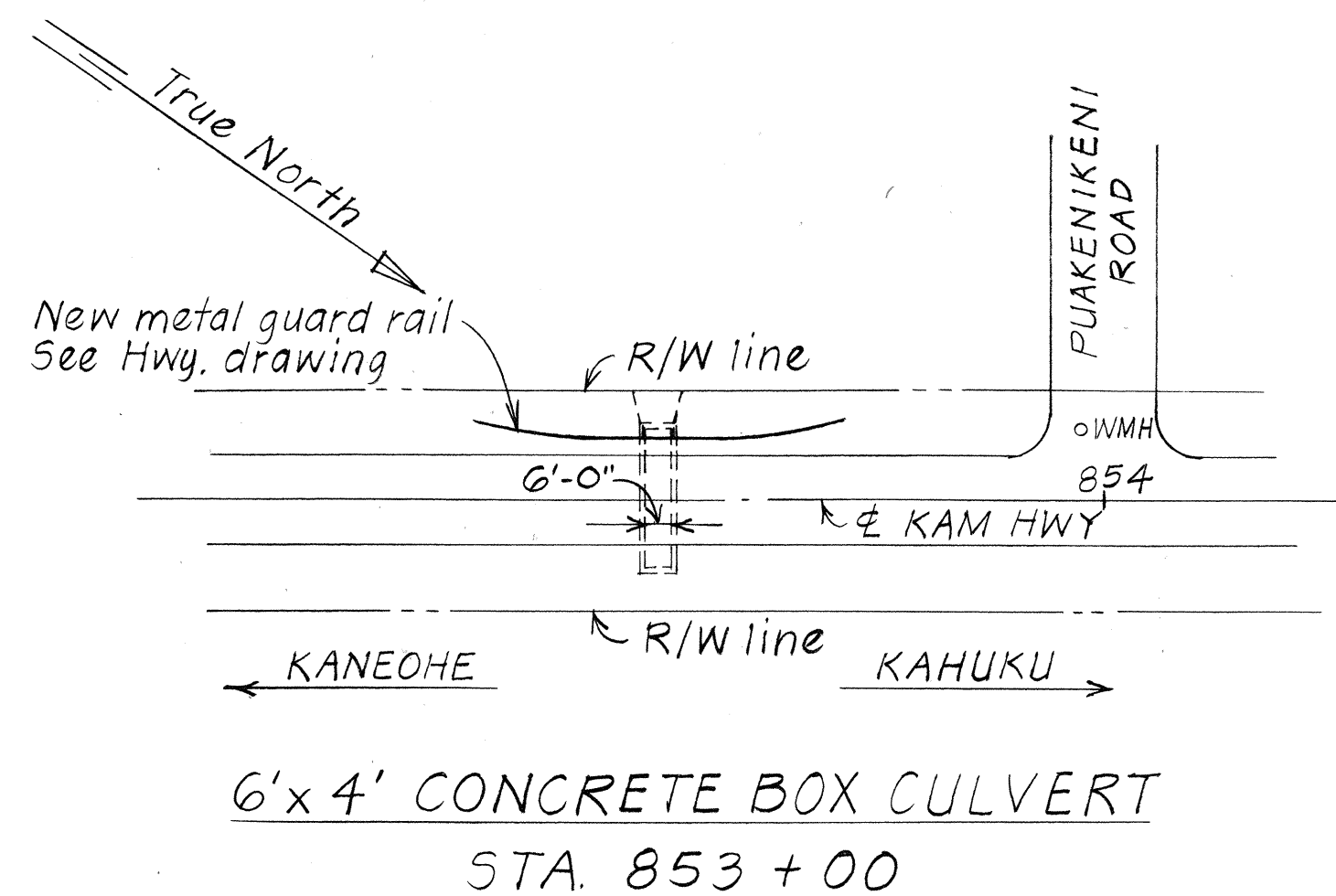
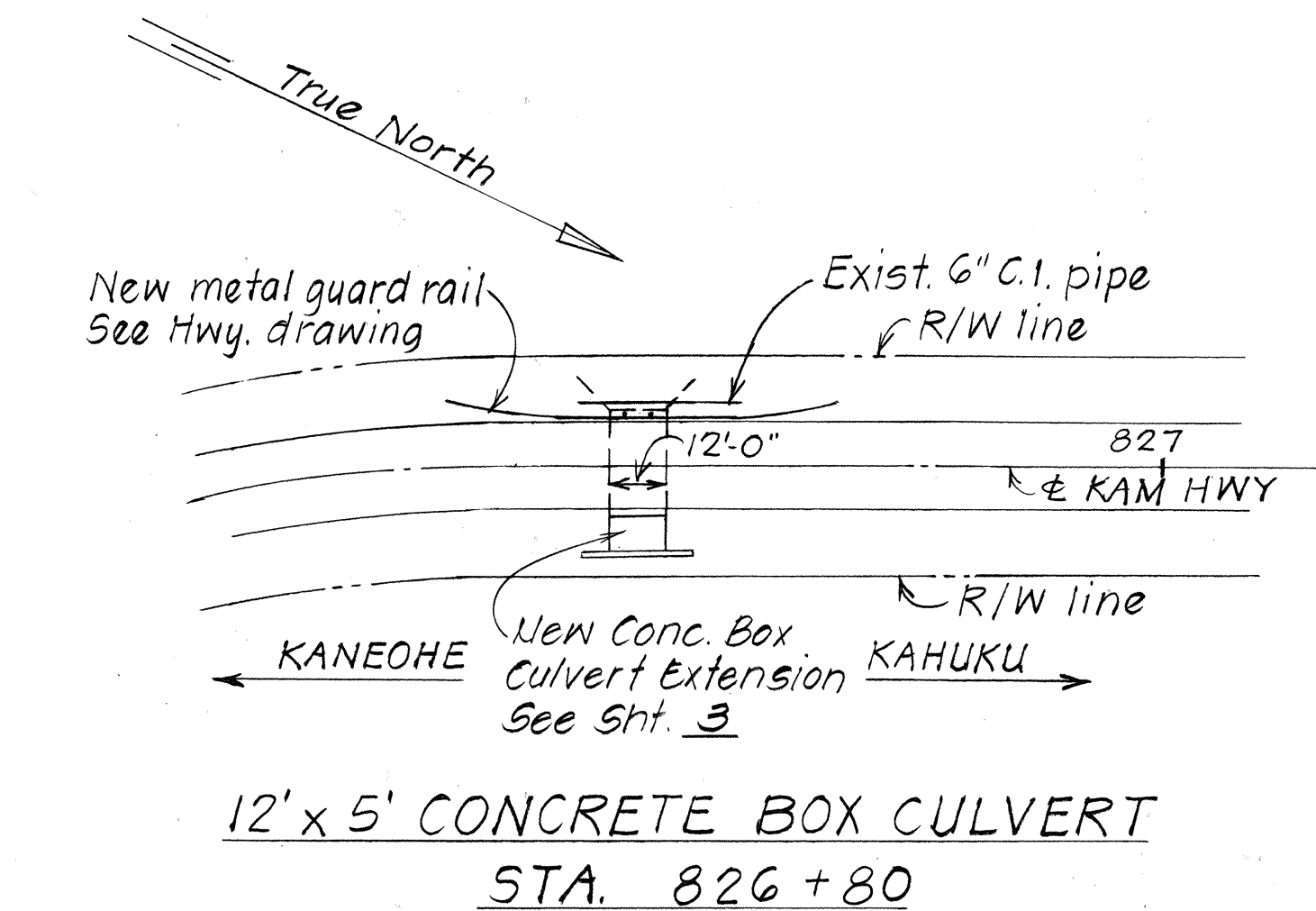
NOTES

(For additional notes, see sht. #1.)

- Epoxy Grout - High early strength type (1,000 psi min. compressive strength @ 4 hrs) approved by the Engineer and applied in strict accordance with the manufacturer's recommendations.
- Structural Steel - ASTM A-36.
- H.S. Anchor Bolt - ASTM A193 Grade B8 Class 2 with nuts conforming to ASTM A194 Grade 8A. Bolt shall be headless and threaded its full length. Bolts and nuts shall be ungalvanized.
- Structural steel shapes and plates shall be hot-dipped galvanized after fabrication.

ESTIMATED QUANTITIES

ITEM NO.	ITEM	CONC. CULVERT STA. 794 + 15	CONC. CULVERT STA. 826 + 80	CONC. CULVERT STA. 853 + 00	UNIT	QUANTITY
501.0310	3/4" Anchor Bolts For Guard Rail Post	16	16	8	Each	40
503.1035	1" Drilled Holes For Anchor Bolts	16	16	8	Each	40



LAYOUT PLAN
Scale: 1" = 40'

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

METAL GUARD RAIL ON CULVERT
@ STA. 794+15, STA. 826+80 & STA. 853+00

KAMEHAMEHA HIGHWAY RESURFACING
KUALOA TO LAU PLACE
Proj. No. 83D-01-86M

Scale: As Shown Date: March 1986
SHEET No. 2 OF 6 SHEETS

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	83D-01-86M	1986	27	57

NOTES

(For additional notes, see sht. #1)

DESIGN SPECIFICATION:

AASHTO Standard Specification for Highway Bridges (13th Edition)
including Interim Specifications Bridges 1984.

DESIGN LIVE LOAD:

HS20-44

DESIGN STRESSES:

1. Reinforced Concrete $f_c = 1200 \text{ psi}$
2. Reinforcing Steel $f_s = 20,000 \text{ psi}$

MATERIALS:

- 1. Reinforced Concrete - Class A
- 2. Reinforced Steel - ASTM - A615 Grade 40
- 3. Epoxy Grout - High early strength type (1000 psi min. compressive strength @ 4 hrs.) approved by the Engineer and applied in strict accordance with the manufacturer's recommendations.

CONSTRUCTION REQUIREMENTS

1. All items designated for removal shall be removed in such a manner as to preclude any damages to the existing structure. Large impacting or vibratory types of equipment will not be permitted in the removal operation, nor in drilling holes for dowels. Small vibratory tools, approved by the Engineer, will be permitted.
2. All footings shall be excavated and poured neat against undisturbed ground. In case of over-excavation the space between the footing and the ground shall be filled with concrete of Class D, minimum quality as directed by the Engineer, at the Contractor's expense.
3. The Contractor shall be solely responsible for the maintenance of the roadway prism and the protection of the adjacent property, utilities and existing and new structures from damage due to construction and shall repair any damage at his expense, to the satisfaction of the Engineer.

ESTIMATED QUANTITIES

<u>ITEM NO</u>	<u>ITEM</u>	<u>UNIT</u>	<u>QUANTITIES</u>
202.0100	Removal Of Portion Of Concrete Box Culvert	Lump Sum	8 C.Y.
206.4200	Structure Excavation For Box Culvert	C.Y.	25 C.Y.
206.7000	Structure Backfill	C.Y.	19 C.Y.
207.0100	Channel Excavation	C.Y.	78 C.Y.
503.1030	Concrete In Box Culvert	Lump Sum	62 C.Y.
503.1036	2" ϕ Drilled Holes For Dowels	Each	43 Ea.
602.0030	Reinforcing Steel In Box Culvert	Lump Sum	2300 Lbs.
603.0010	Bed Course Material	C.Y.	4 C.Y.
675.0500	Repairs To Concrete Box Culvert @ Sta. 826+80	Sq. Ft.	110 S.F.
675.0600	Repairs To Concrete Box Culvert @ Sta. 466+66.5	Sq. Ft.	76 S.F.

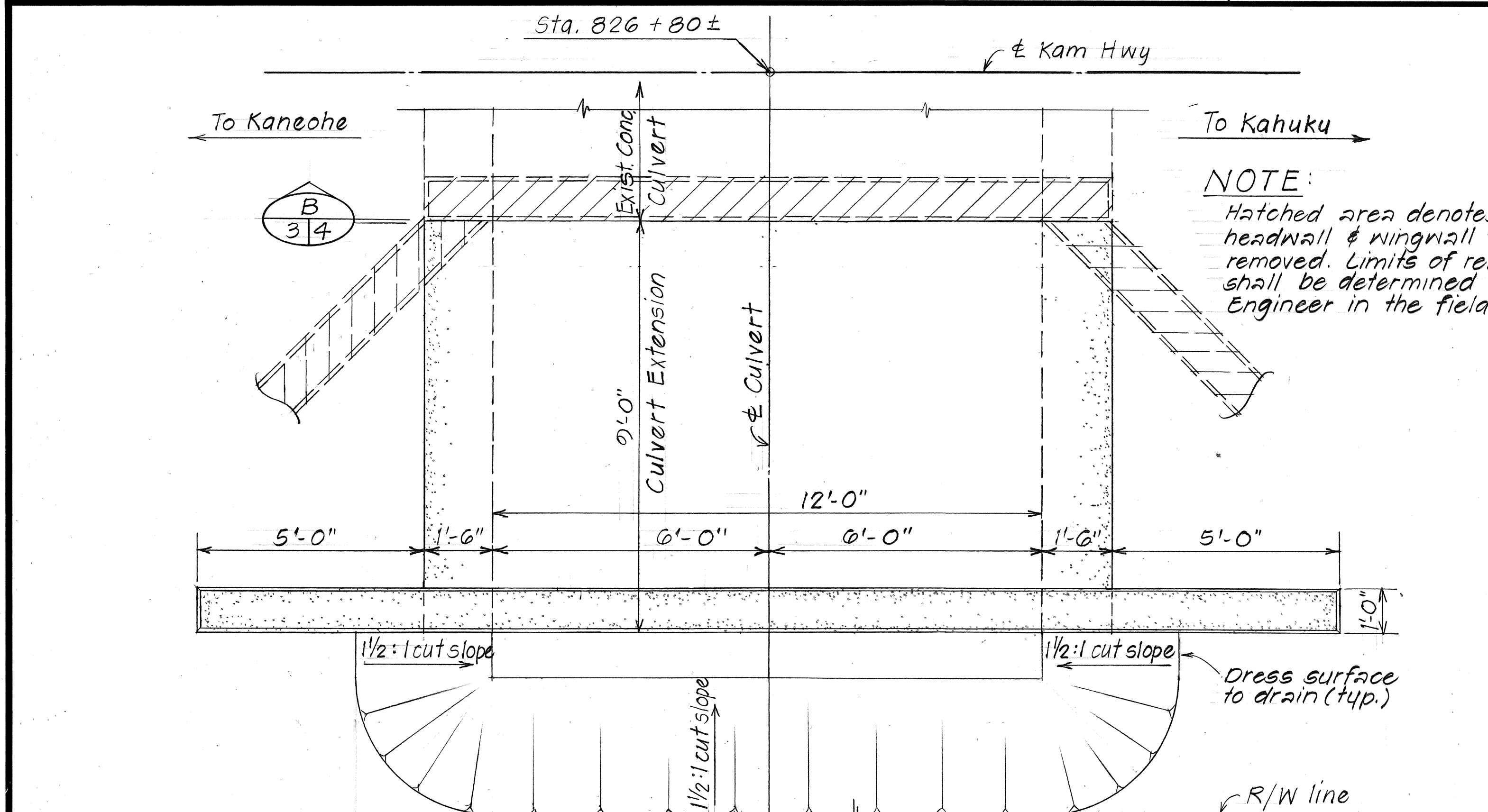
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

12'-0" x 5'-0" CONC. BOX CULVERT
EXTENSION @ STA. 826 + 80

KAMEHAMEHA HIGHWAY RESURFACING
KUALOA TO LAU PLACE
Proj. No. 83D-01-86M

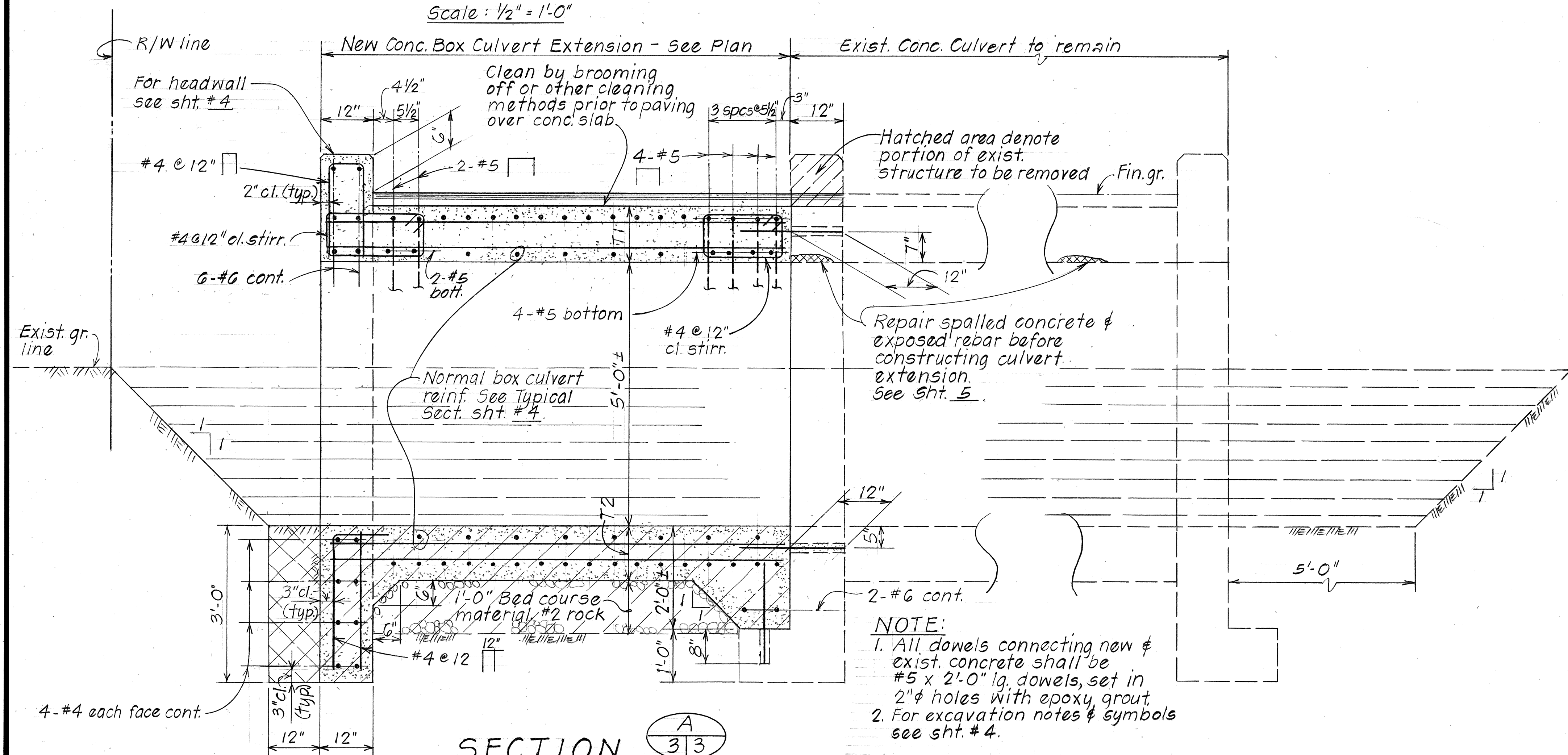
Scale: As Shown Date: March 1986

SHEET No. 3 OF 6 SHEETS



PLAN

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



SECTION

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

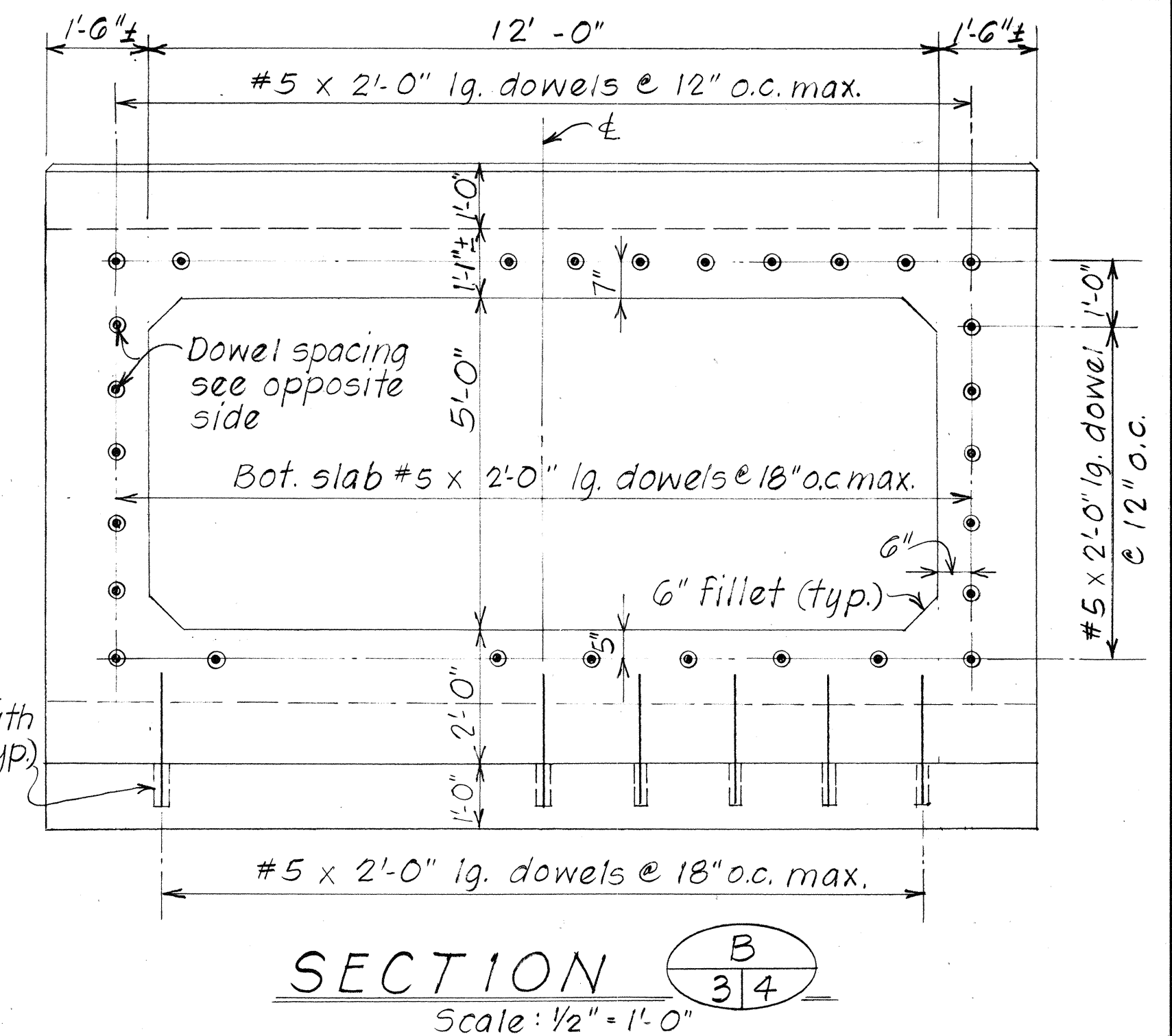
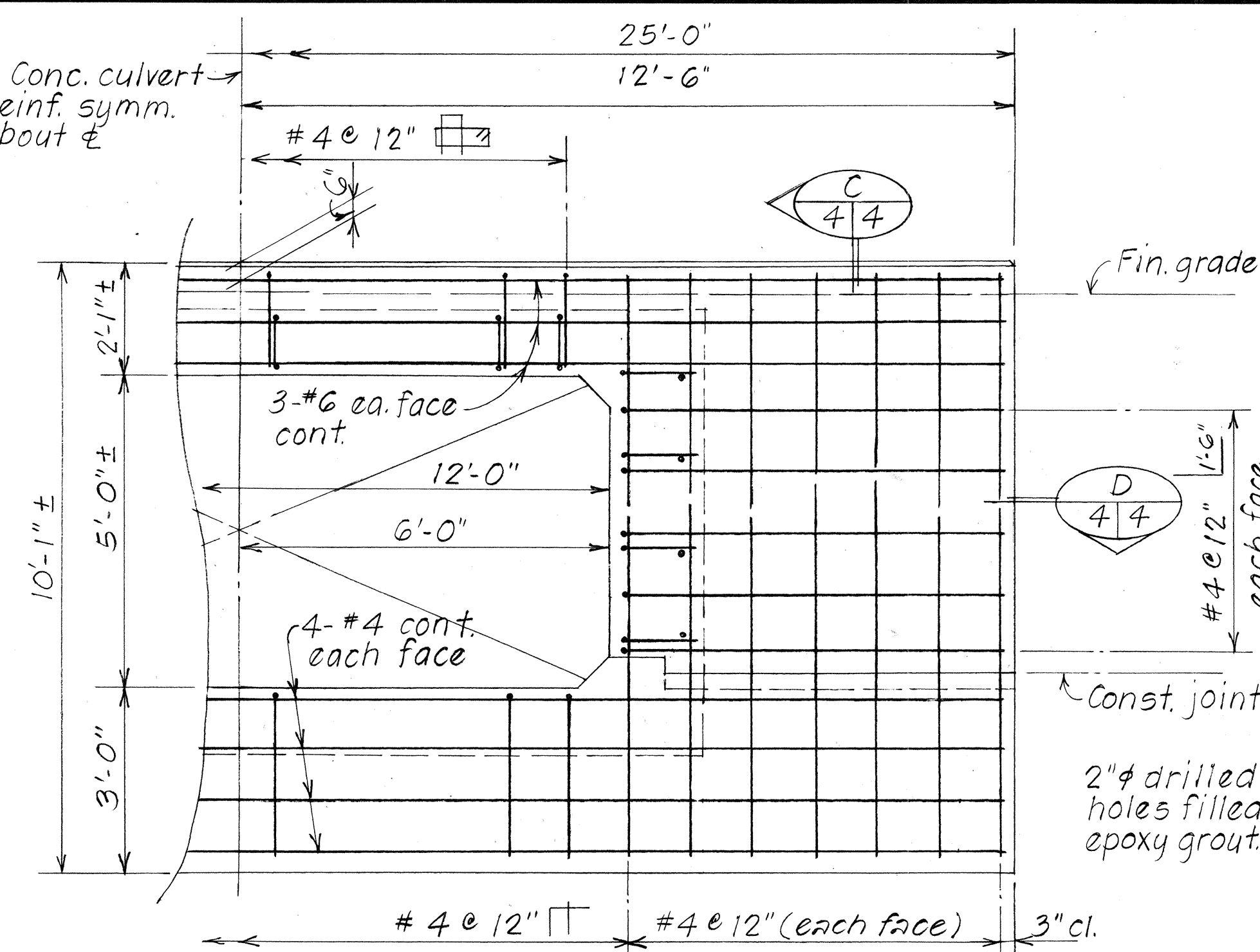
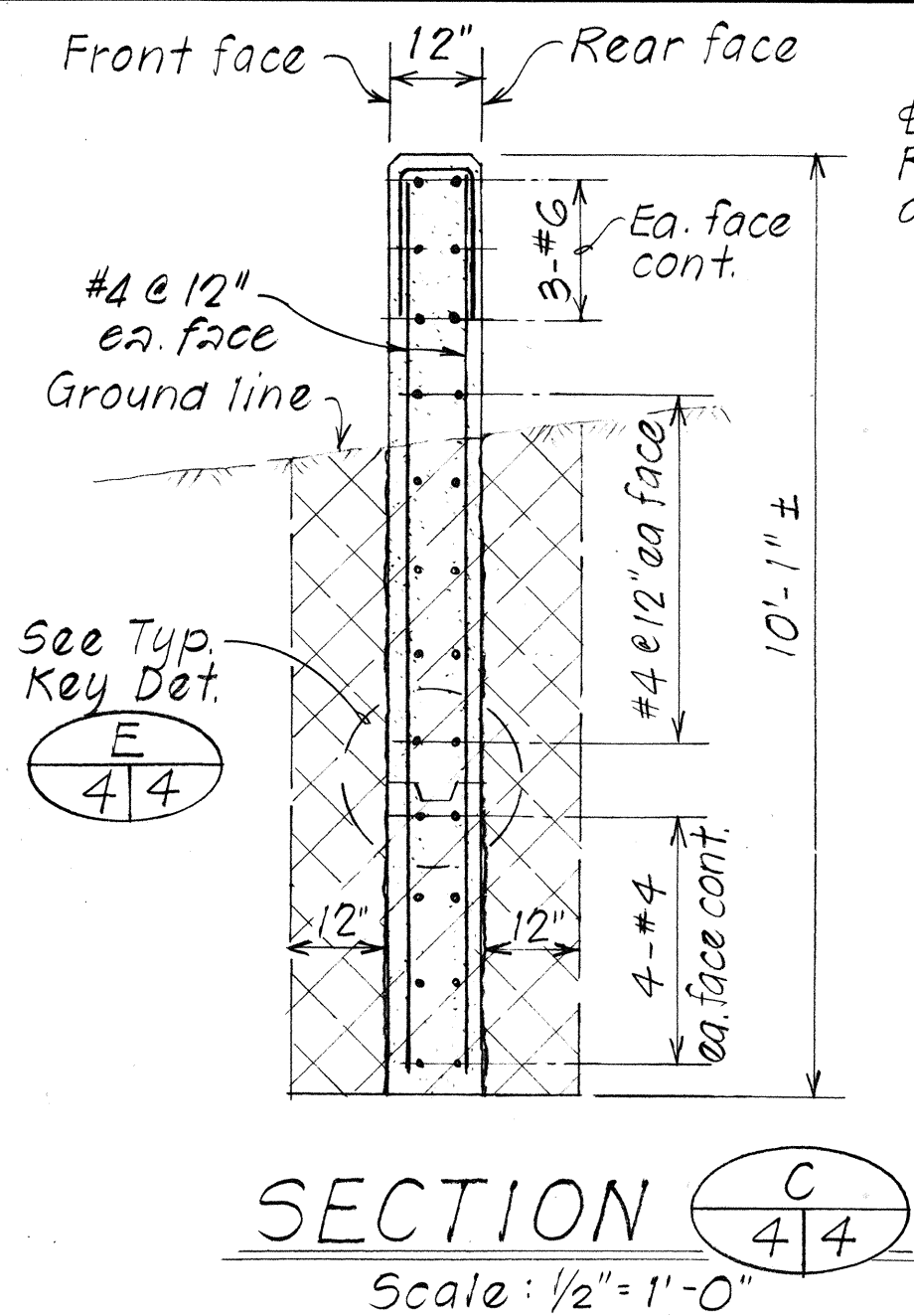
NOTE:

1. All dowels connecting new & exist. concrete shall be #5 x 2'-0" lg. dowels, set in 2" ϕ holes with epoxy grout.
2. For excavation notes & symbols see sht. #4.

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

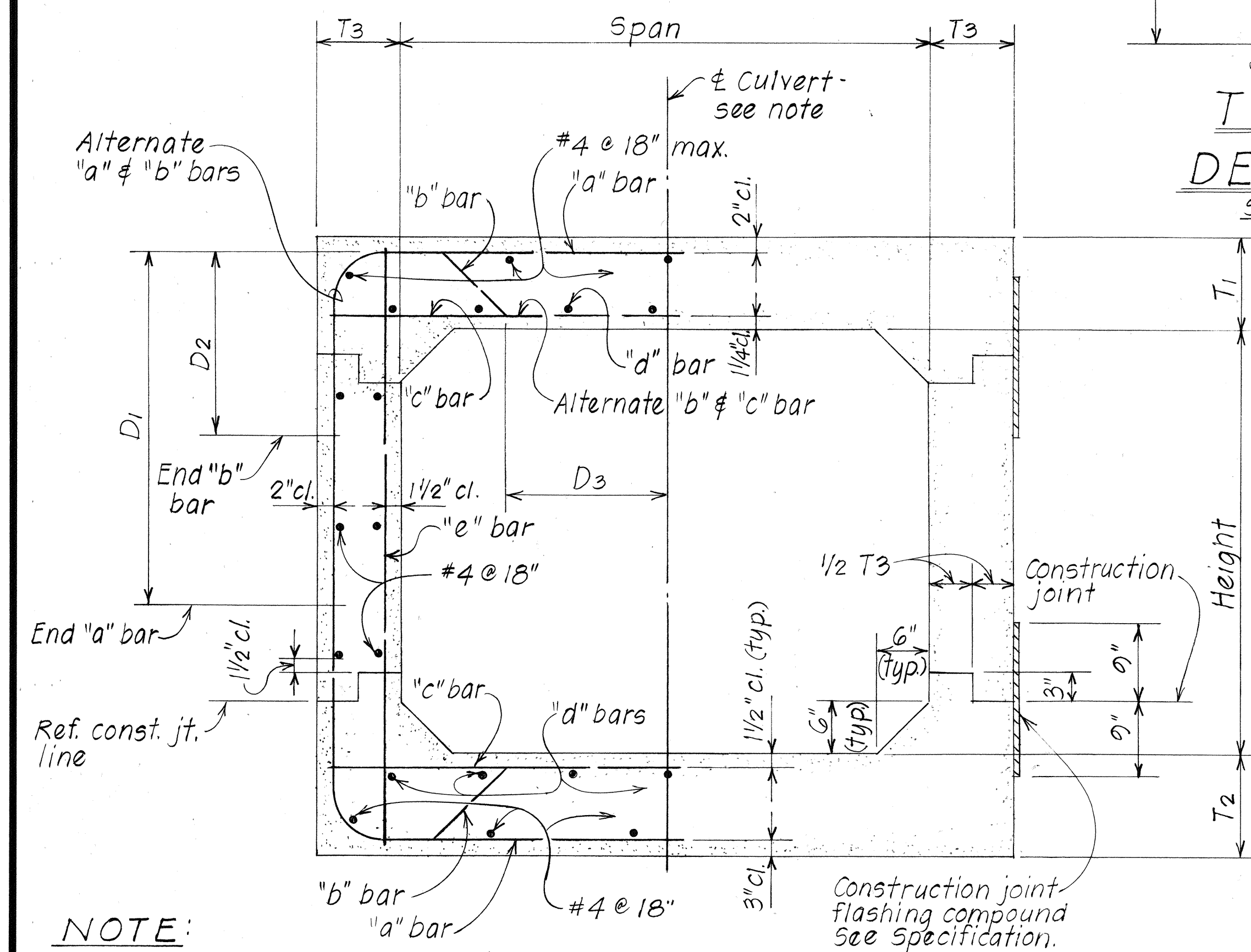
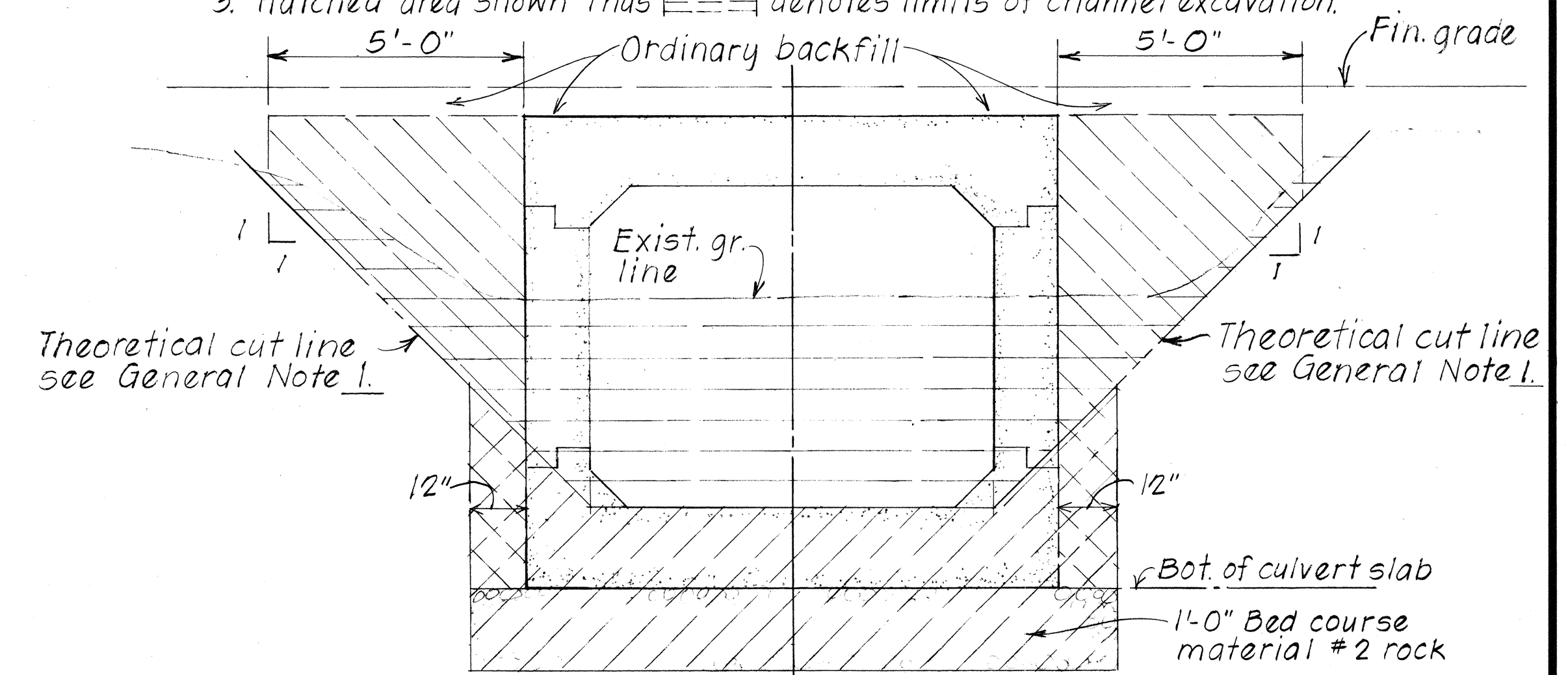
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	83D-01-86M	1986	28	57

SPAN & HEIGHT		12'-0" x 5'-0"
TYPE		
CONC.	TOP SLAB	T ₁
	BOTTOM SLAB	T ₂
	SIDE WALLS	T ₃
REINFORCING STEEL	BAR SIZE AND SPACING	
	DIMENSION	D ₁
	DIMENSION	D ₂
	DIMENSION	D ₃
	"a" bar	#4 @ 11"
	"b" bar	#5 @ 11"
	"c" bar	#5 @ 11"
	cont. "d" bar	#4 @ 12"
	"a" bar	#4 @ 11"
	"b" bar	#5 @ 11"
	"c" bar	#5 @ 11"
	cont. "d" bar	#4 @ 12"
	vert. "e" bar	#4 @ 18"
QUAN.	CONCRETE: C.Y. PER LIN. FT.	
	REINFORCING STEEL: LBS PER LIN. FT.	



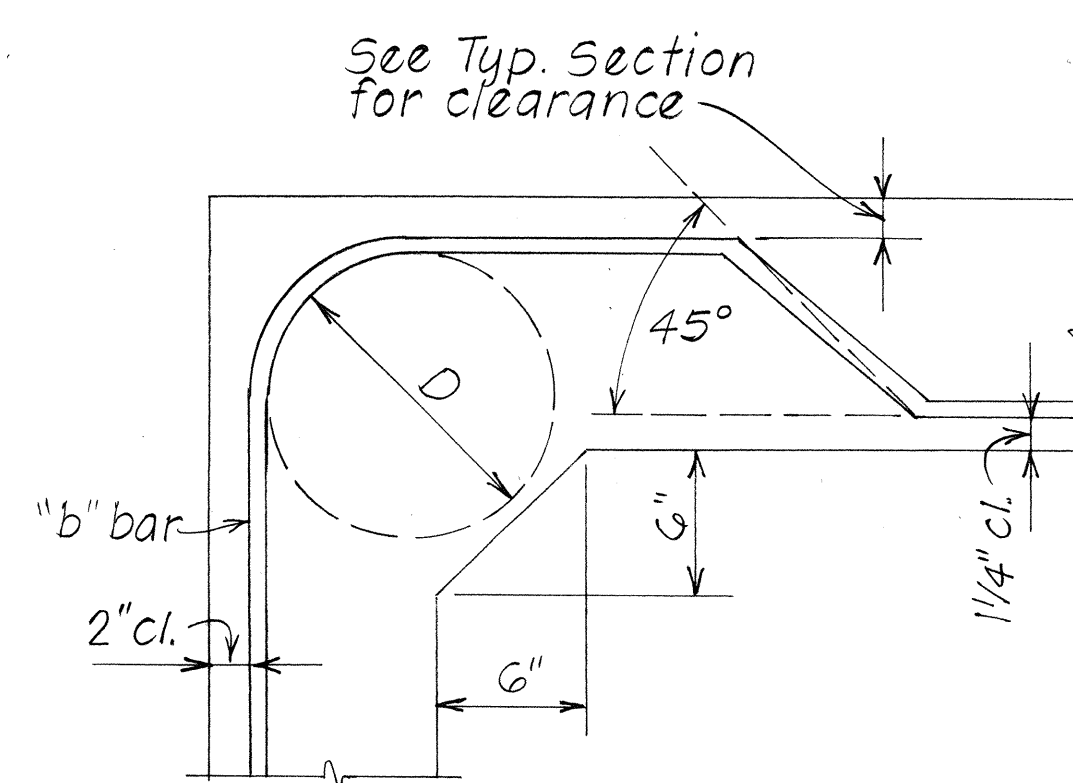
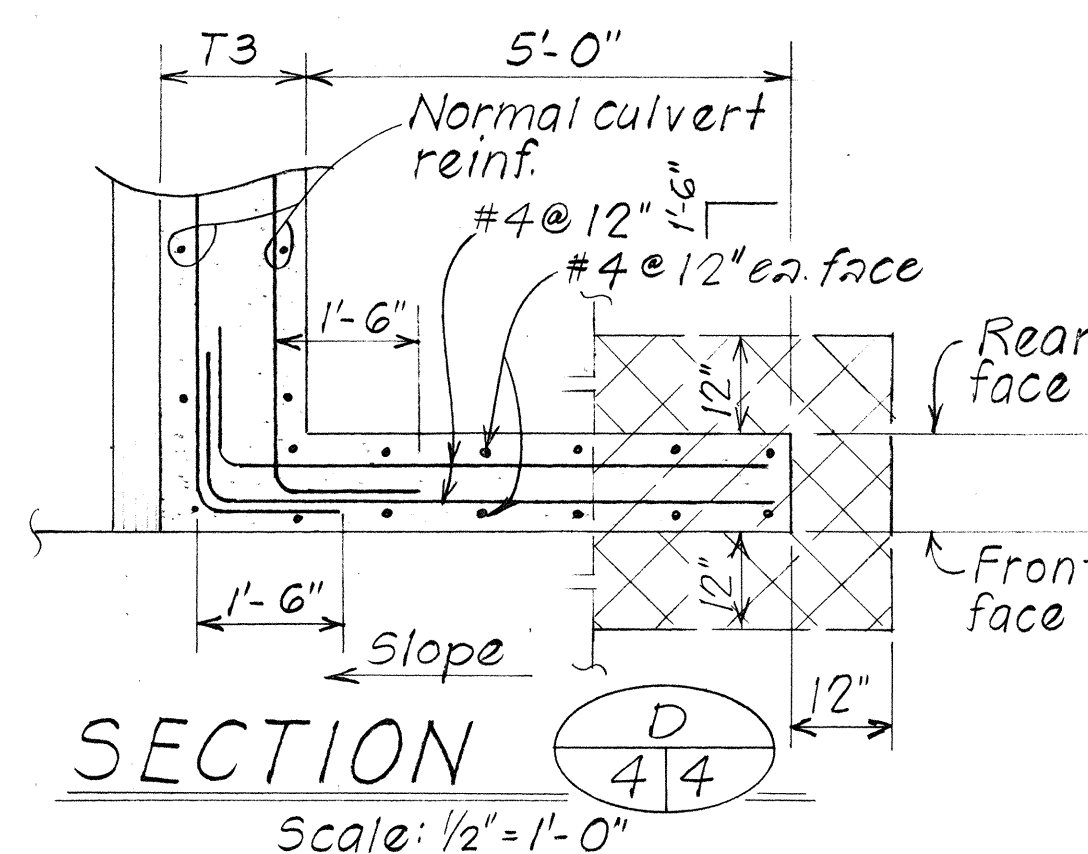
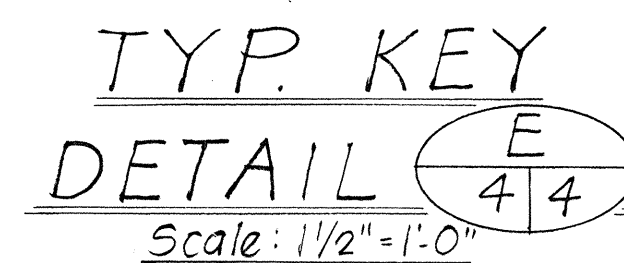
NOTE:

1. Hatched area shown thus denotes limits of structure excavation.
2. Hatched area shown thus denotes limits of structure backfill.
3. Hatched area shown thus denotes limits of channel excavation.



NOTE:

Culvert details are symmetrical about the vertical and horizontal axis at center of culvert except where shown otherwise.



BAR SIZE	D
#4	3"
#5	3 3/4"
#6	4 1/2"
#7	5 1/4"
#8	6"
#9	9"

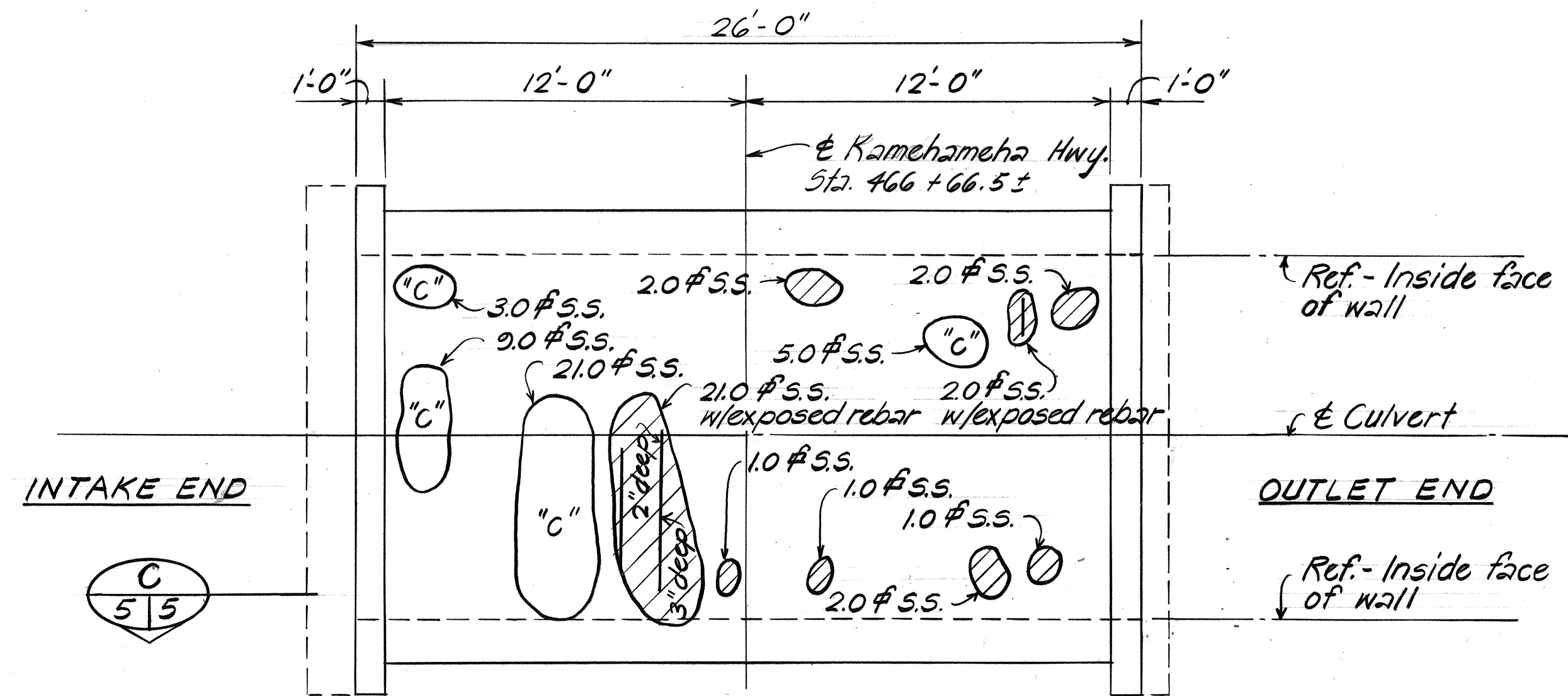
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

12'-0" x 5'-0" CONC. BOX CULVERT
EXTENSION @ STA. 826 + 80
KAMEHAMEHA HIGHWAY RESURFACING
KUALOA TO LAU PLACE
Proj. No. 83D-01-86M

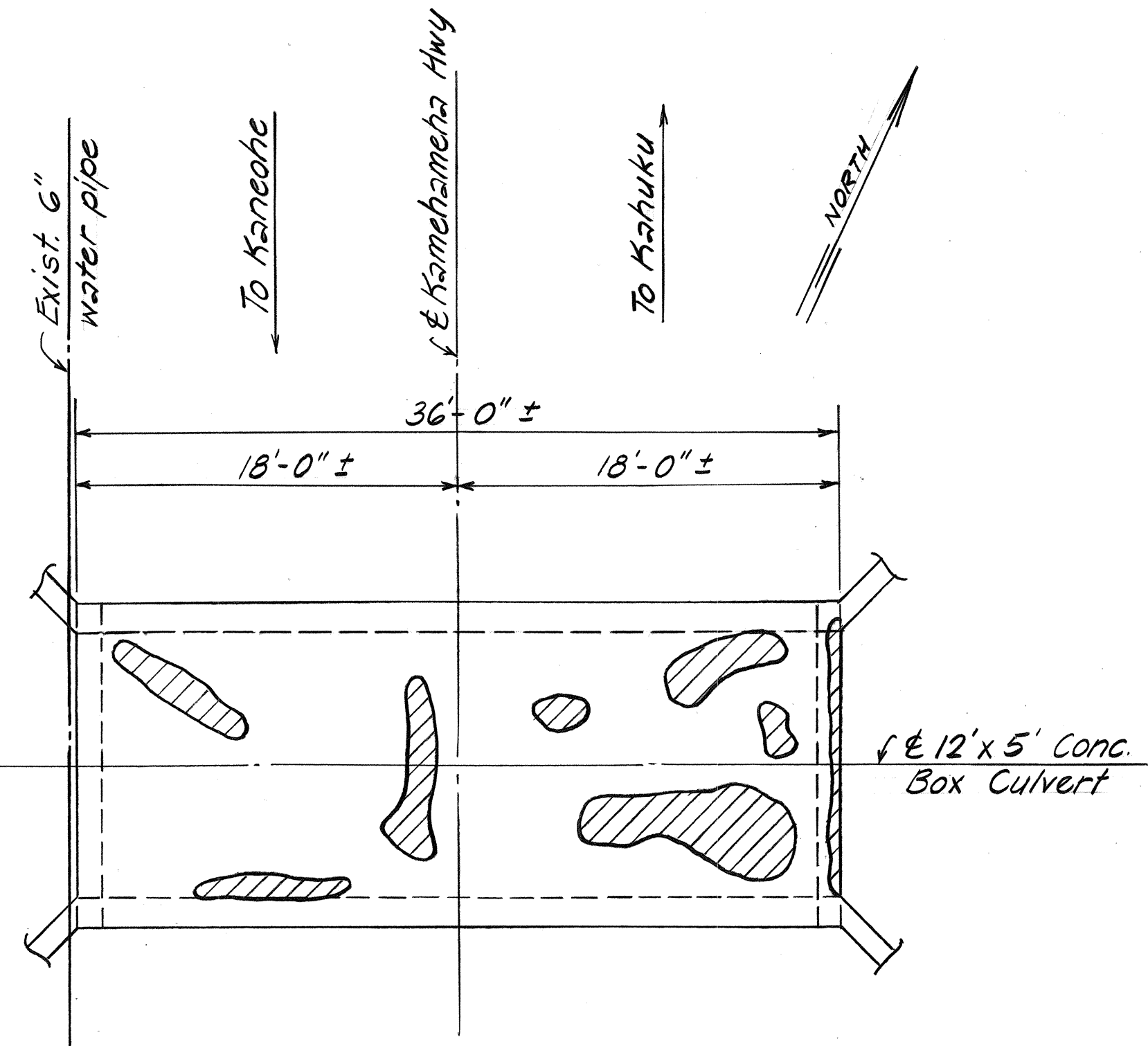
Scale: As Noted Date: March 1986

SHEET NO. 4 OF 6 SHEETS

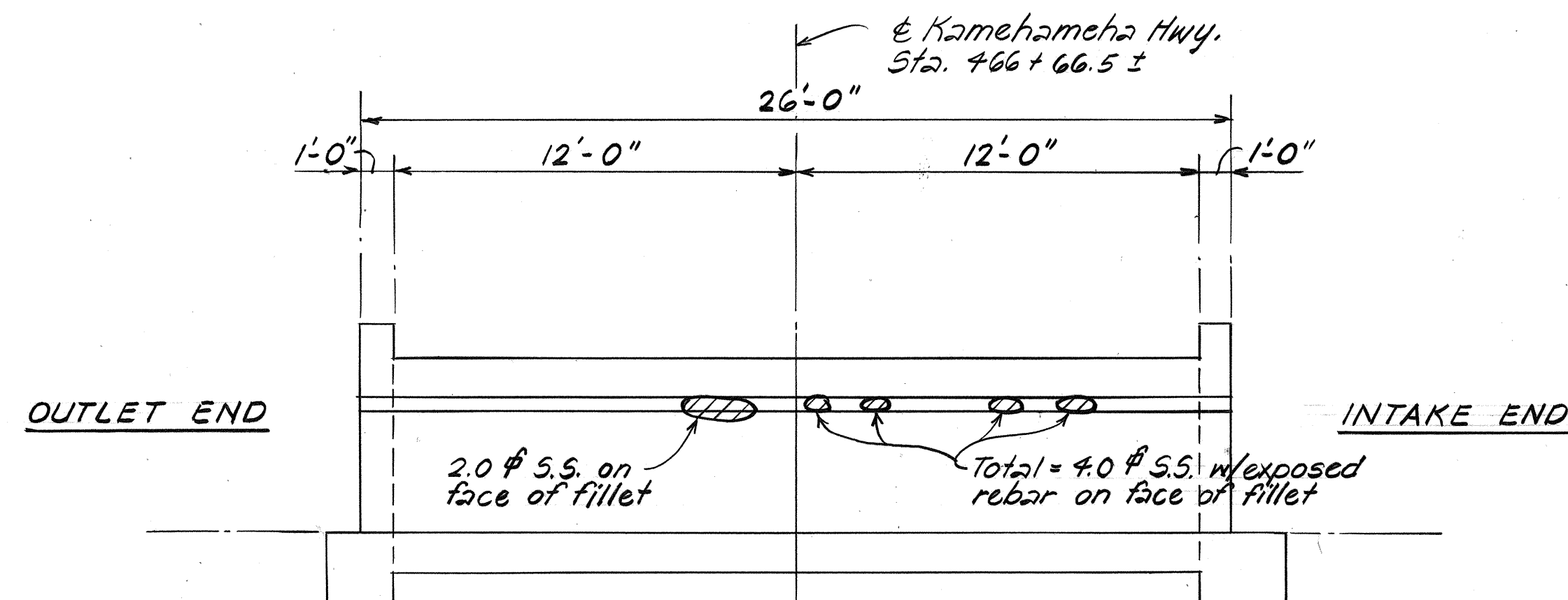
NOTE:
All areas with "C"
marking have cracks
in concrete and ready
to spall. Treat "C" areas
as surface spalls.



REFLECTED CEILING PLAN
(EXISTING 12'x4' CONCRETE BOX CULVERT)
Scale: 1/4" = 1'-0"

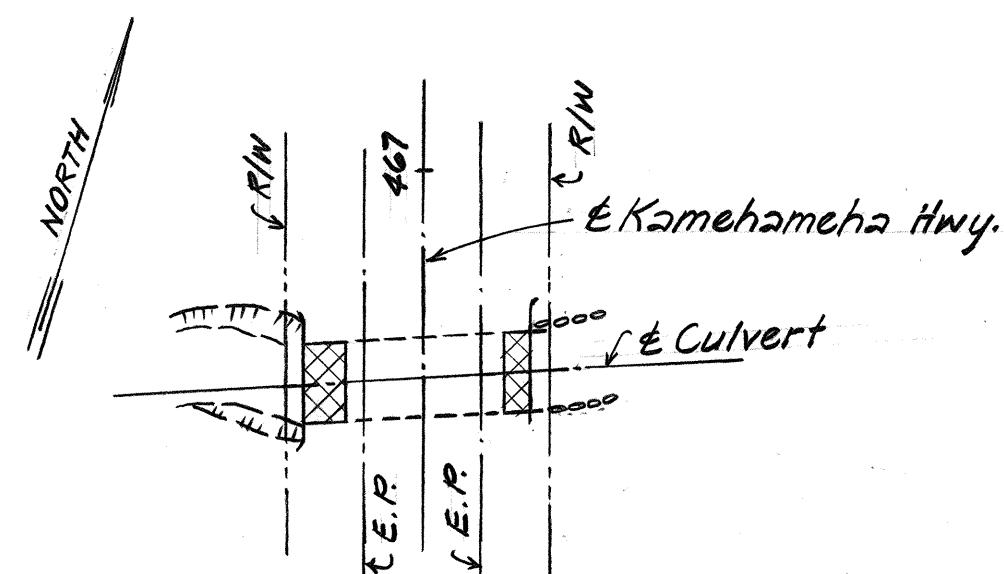


REFLECTED CEILING PLAN
(12'x5' CONCRETE BOX CULVERT AT STA. 826 + 80)
Not to Scale (Estimated)



ELEVATION
(LOOKING FROM INSIDE)
Scale: 1/4" = 1'-0"

NOTE:
Culvert widening
by others.

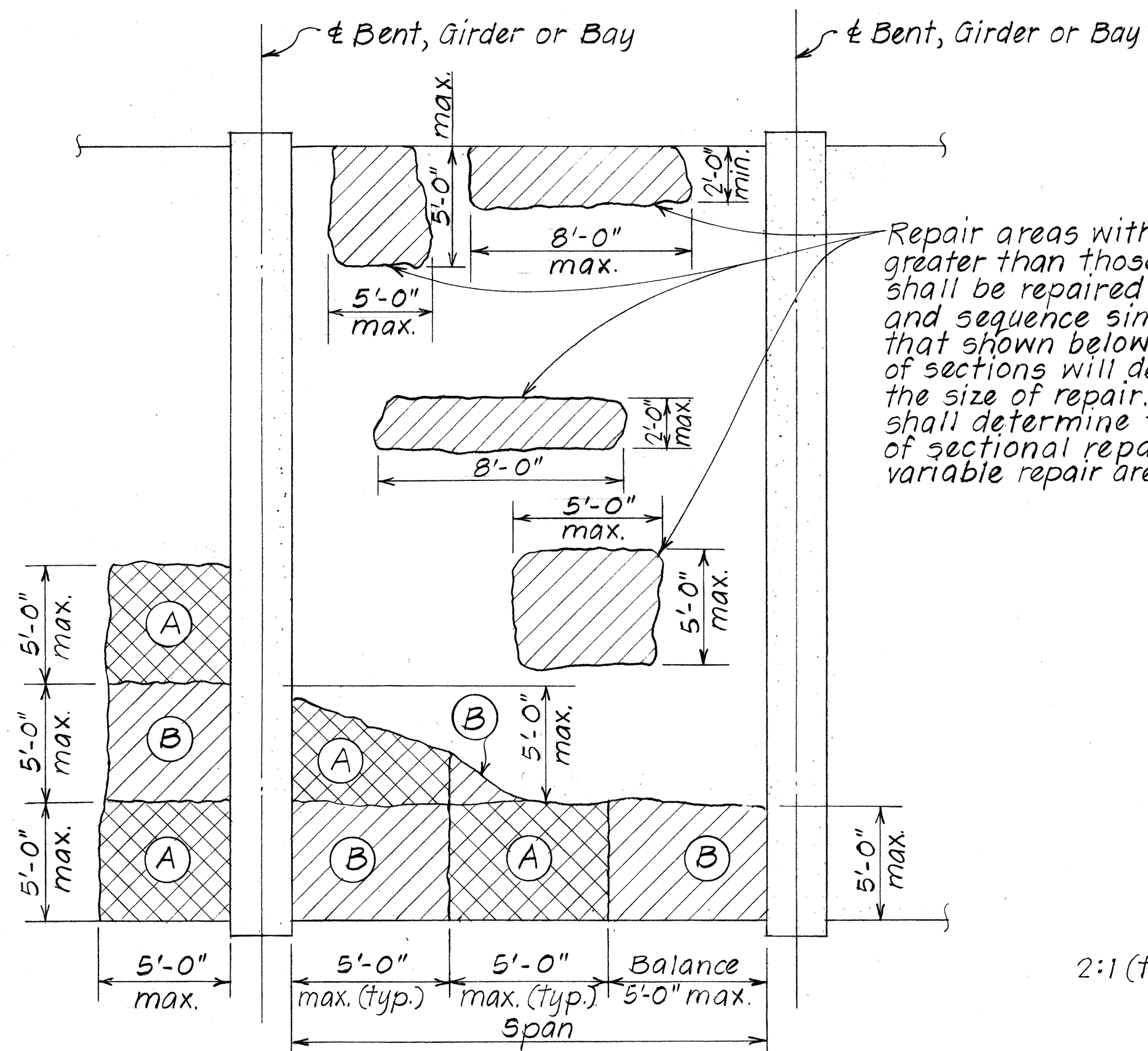


12'x4' BOX CULVERT
(AT SECTION 83E M.P. 35.54)
Not to Scale

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	83D-01-86M	1986	29	57

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
REHABILITATION & REPAIRS
TO CONCRETE BOX CULVERTS
KAMEHAMEHA HIGHWAY RESURFACING
KUALOA TO LAU PLACE
Proj. No. 83D-01-86M
Scale: As Shown Date: April 1986
SHEET NO. 5 OF 6 SHEETS

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	83D-01-86M	1986	30	57



REFLECTED SPAN CEILING PLAN
Not to Scale

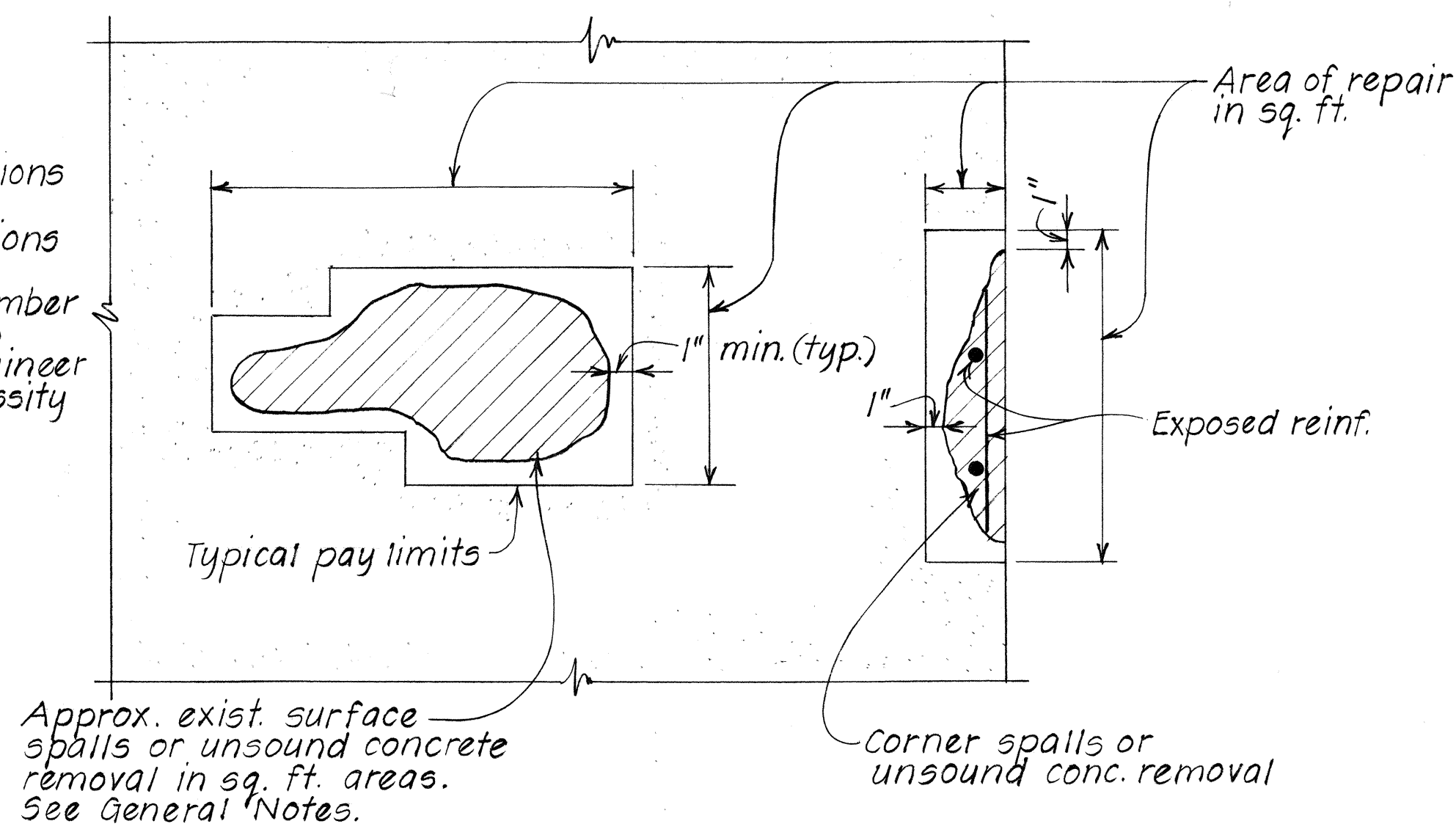
NOTE!

Slab damaged over a large area shall be repaired in sections (A) & (B) as shown. The sequence of repair for each section shall be as follows:

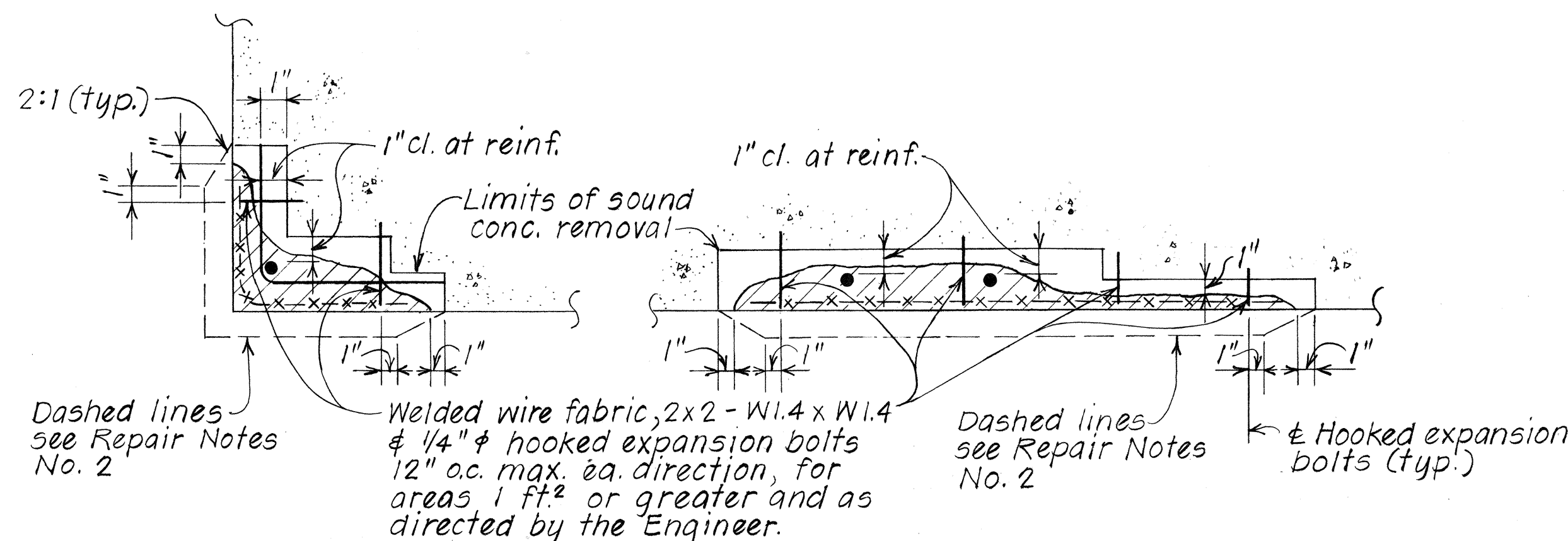
1. Repair section (A).
2. Start repair of section (B) 7 days after placing mortar for section (A).

The necessity for sectional repairs will depend on the amount of reinforcing bars that has to be exposed and cleaned. The Engineer shall determine the necessity for sectional repairs after portions of the steel have been exposed.

Repair areas with dimensions greater than those shown shall be repaired by sections and sequence similar to that shown below. The number of sections will depend on the size of repair. The Engineer shall determine the necessity of sectional repair for variable repair areas.

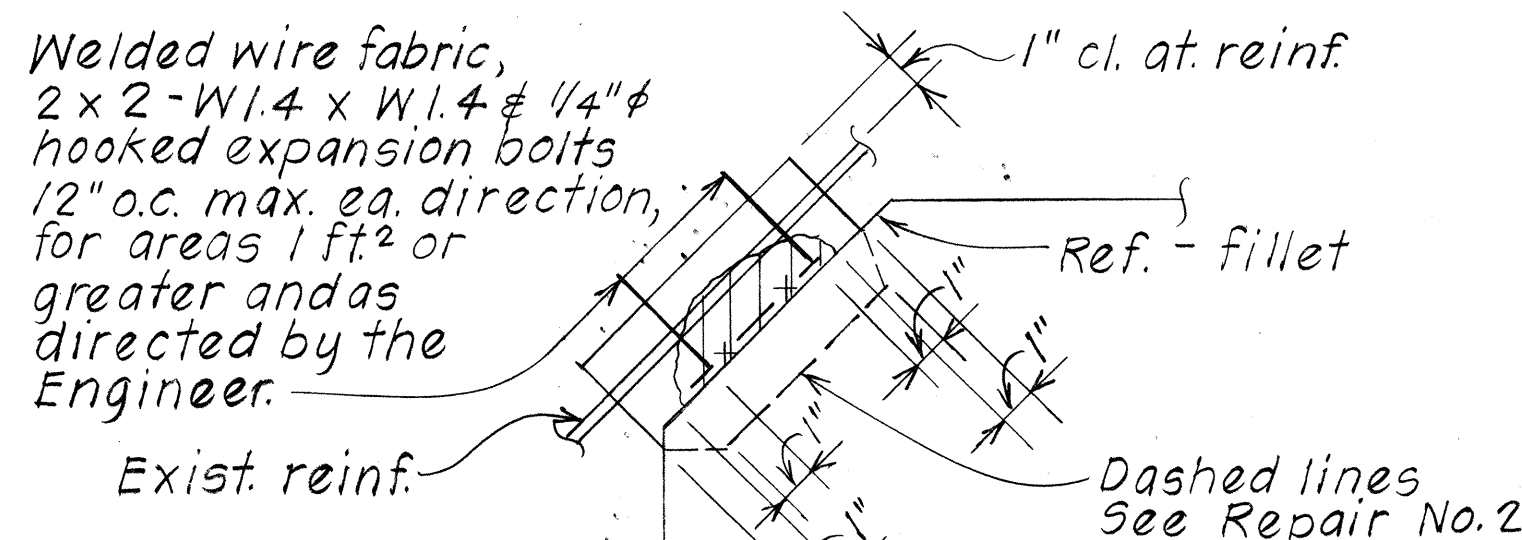


PLAN OR ELEVATION



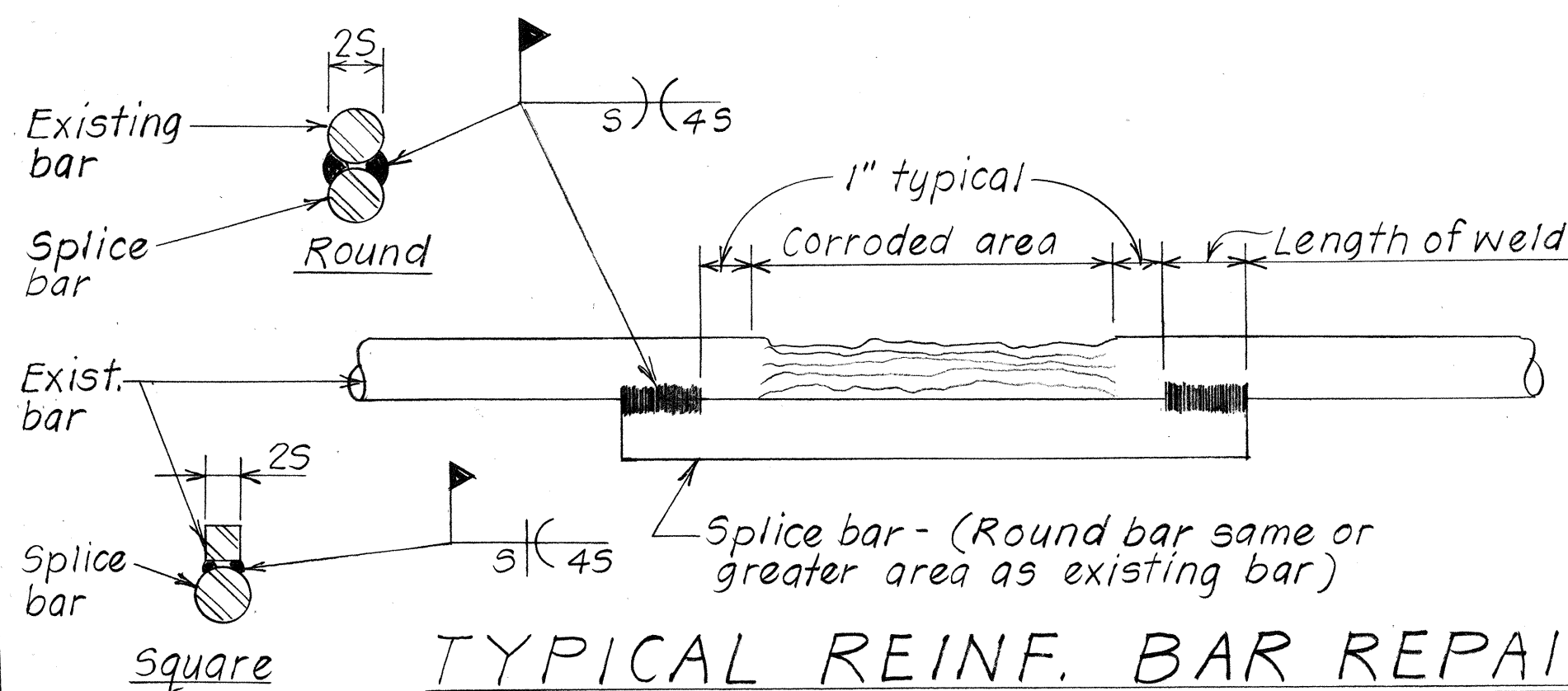
AT CORNER

AT SURFACE



AT FILLET

TYPICAL REPAIRS AT CONC. SPALLS
N.T.S.



TYPICAL REINF. BAR REPAIR SPLICE DETAIL
Not to Scale

NOTES

(For additional notes see sht. # 1.)

REPAIR NOTES:

1. Face of exist. concrete
2. Provide min. 2" conc. cover over reinforcement or welded wire fabric. See specifications for welded wire fabric requirements.
3. Reinforcing bars that have rusted more than 25% of their original cross sectional area shall be strengthened as shown on Repair Splice Detail this sheet.
4. Efflorescence shall be inspected and repaired as directed by the Engineer.
5. All cracks shall be repaired by applying epoxy under pressure. See Specifications.
6. The Engineer shall determine all areas to be repaired & the limits of repair at each area.

INCIDENTAL ITEMS

The following items shall be considered incidental to the various pay items of repairs & shall not be paid for separately.

1. Expansion bolts & other miscellaneous hardware including hot-dipped galvanized and welded wire fabric.
2. Cleaning of all exposed, corroded reinforcing steel to sound metal.
3. Reinforcing bars of repair splice for strengthening corroded bars.

GENERAL:

1. All reinforcing steel to be ASTM A615 Grade 40.
2. All welding shall be done in accordance with the Reinforcing Steel Welding Code AWS D12.1.
3. Maintenance & control of traffic - see Special Provisions sub-section 104.04 & sub-section 676.03(A).
4. Repairs to the underside of slab shall be made in sections & sequences as indicated in note at left.

SYMBOLS & ABBREVIATIONS

Exposed reinf. bars where occurs.
 S.S. - Surface spall (Concrete)
 S.C. - Surface crack (Concrete)
 H.C. - Hairline crack
 #, sq.ft.; S.F. - Square feet
 L.F. - Linear feet

DATE REVISION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TYPICAL DETAILS
REHABILITATION & REPAIRS
TO CONCRETE BOX CULVERT
Proj. No. 83D-01-86M

Scale: As Shown Date: March 1986
SHEET No 6 OF 6 SHEETS