

INDEX
DESCRIPTION

GENERAL NOTES

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	HE5-R05-083-1(12)	1984	7	63

ESTIMATED QUANTITIES

CULVERT WIDENING

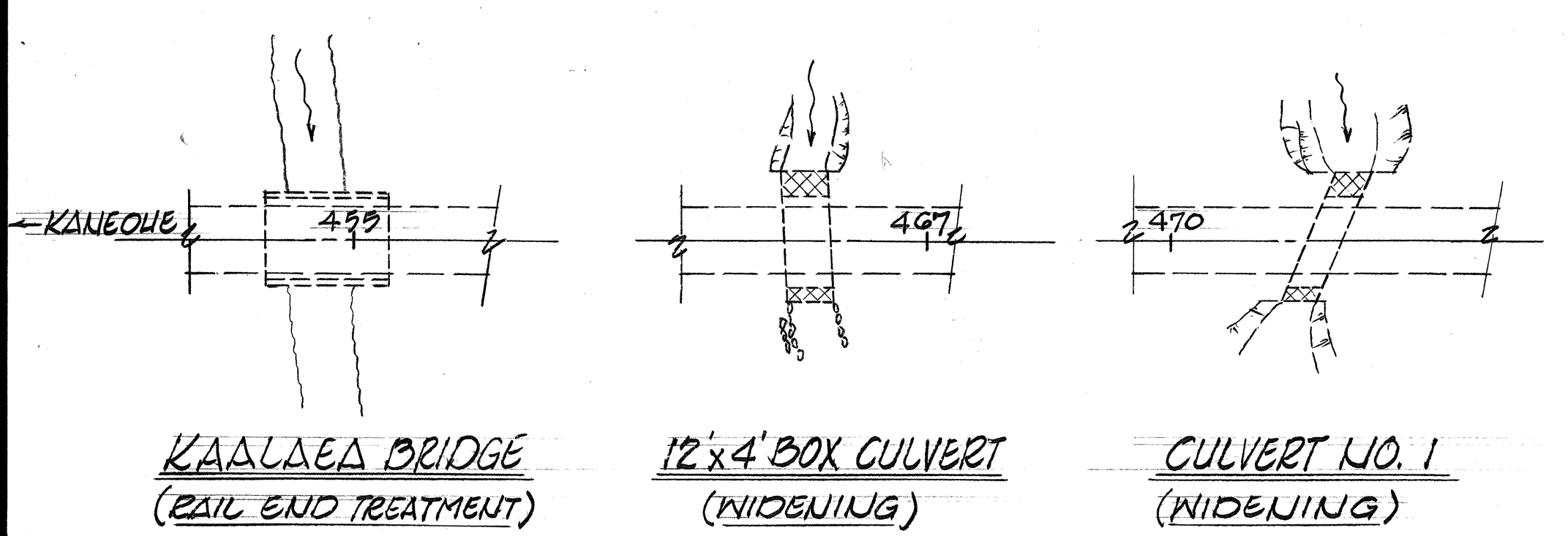
ITEM NO.	ITEM	12'x4' BOX CULVERT	CULVERT #1	UNIT	TOTAL
202.0100	REMOVAL OF STRUCTURES AND OBSTRUCTIONS	(11 CY)	(5 CY)	LUMP SUM	(16 CY)
202.0440	REMOVAL OF PORTION OF EXISTING CULVERTS	(2 CY)	(1 CY)	LUMP SUM	(3 CY)
206.4200	STRUCTURE EXCAVATION FOR CULVERTS	39 CY	76 CY	CU.YD	115 CY
206.7050	STRUCTURE BACKFILL FOR CULVERTS (INCL. WING WALLS)	25 CY	46 CY	CU.YD.	71 CY
207.0200	CHANNEL EXCAVATION	44 CY	—	CU.YD.	44 CY
503.1032	CONCRETE IN CULVERT (INCLUDING WING WALLS)	(34 CY)	(41 CY)	LUMP SUM	(75 CY)
503.1910	PRECAST CONCRETE PLANKS (1'-3" WIDE)	—	96 S.F.	SQ. FT.	96 S.F.
503.1911	PRECAST CONCRETE PLANKS (5'-3" WIDE)	—	70 S.F.	SQ. FT.	70 S.F.
507.6000	CONCRETE RAILING AND END POST	75 L.F.	73 L.F.	LIN. FT.	148 L.F.
602.0032	REINF. STEEL IN CONCRETE CULVERT (INCL. WING WALLS)	(6,010 LBS.)	(1,410 LBS.)	LUMP SUM	(7,420 LBS.)

RETAINING WALL NO. 1

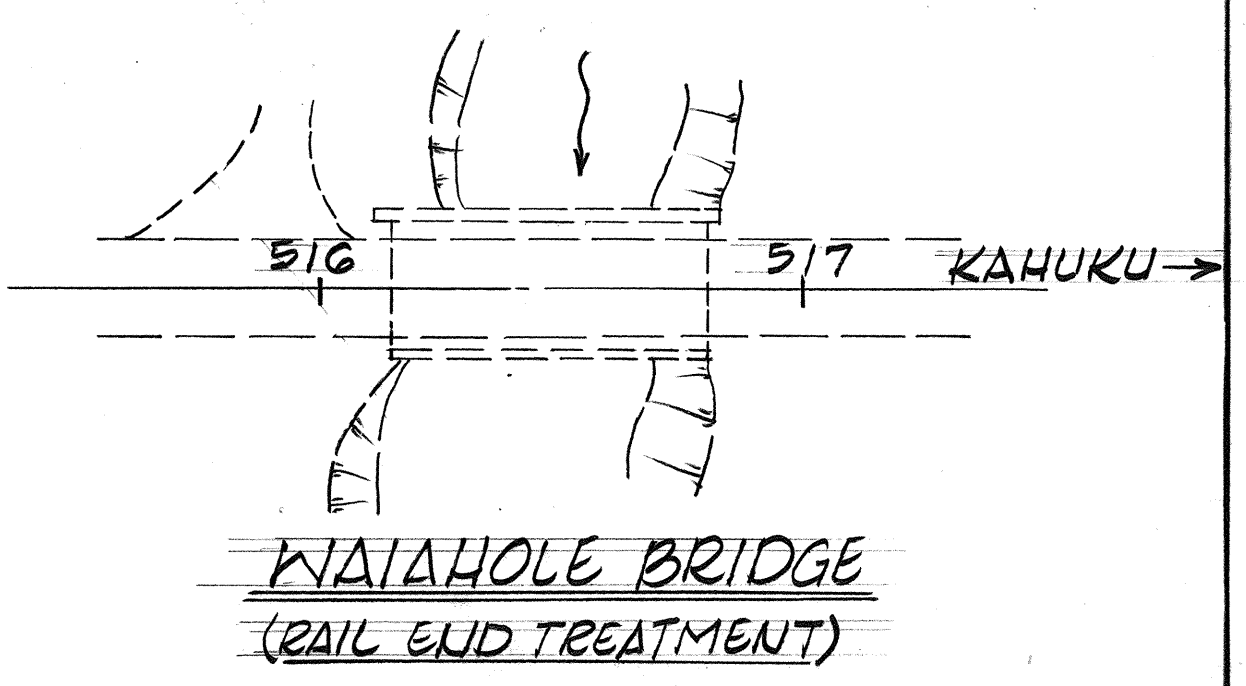
206.5000	STRUCTURE EXCAVATION FOR RETAINING WALL	CU.YD.	365 CY
206.7250	STRUCTURE BACKFILL FOR RETAINING WALL	CU.YD.	80 CY
206.8300	FILTER MATERIAL FOR RETAINING WALL	CU.YD.	45 CY
503.1051	CONCRETE IN RETAINING WALL	LUMP SUM	(212 CY)
602.0051	REINFORCING STEEL IN RETAINING WALL	LUMP SUM	(11,500 LBS.)

- DESIGN SPECIFICATION:**
ADSHO, standard specifications for Highway Bridges (12th Edition), including interim specifications Bridges, 1978 to 1982.
- DESIGN LIVE LOAD:**
HS-20-44
- DESIGN STRESSES:**
1. Reinforced Concrete $f_c = 1200 \text{ psi}$ and 1800 psi (0.4 f'_c)
2. Reinforcing Steel $f_s = 20,000 \text{ psi}$
- MATERIALS:**
1. Concrete: - Class A (Except as noted otherwise)
- Class E (For precast planks, see sht. #5 & 8)
2. Reinforcing Steel: - ASTM-A616, Grade 40.
3. Epoxy Grout: - Shall be high early strength type (1,000 psi min. compressive strength at 4 hrs) approved by the Engineer and applied in strict accordance with the manufacturer's recommendations.
- CONSTRUCTION REQUIREMENTS:**
1. See Standard Specifications for Road & Bridge Construction, (Hawaii 1976) & Special Provisions.
2. Preformed fabric pads shall be secured against displacement to the abutments with adhesives approved by the Engineer before placement of the precast planks.
3. The face of the existing slab to be epoxy bonded with the new slab shall be thoroughly wetted with clear water and scrubbed with a solution of not more than one part hydrochloric (muriatic) acid to nine parts water, followed immediately by thorough rinsing with clear water.
4. Except as noted otherwise, all vertical dimensions are measured on the plumb.
5. 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.
6. All items designated for removal shall be removed in such a manner as to preclude any damage 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.
7. Where reinforcing bars are cut in the removal of existing concrete, all exposed ends shall be undercut a minimum of 1" below the surface of the concrete and patched with mortar. Cutting of reinforcing and patching with mortar shall be incidental to concrete removal.
8. See Special Provisions for concrete finish.
9. The Contractor shall be solely responsible for the protection of the adjacent property, utilities and existing and new structures from damage due to construction and shall repair any damage at his own expense, to the satisfaction of the Engineer. He shall conduct his work in such a manner and provide such temporary shoring or other measures as may be necessary to insure the safety of all concerned.
10. The Contractor shall make provisions to close the lane adjacent to the new deck during epoxying operation and may reopen the lane 4 hours after epoxying is finished.

- GENERAL:**
1. All items noted incidental will not be paid for separately.
2. The Contractor shall verify all dimensions in field before commencing with work.
3. The Contractor shall verify the locations of all existing utility lines near bridge and notify their respective owners before commencing with work.
4. The connection of guard rail to concrete end posts, including special end shoes and other incidentals shall be measured and paid for under Concrete Barrier Rail.
5. SAC and #2 or #4 coarse rock backfill material shall be incidental to structural excavation.



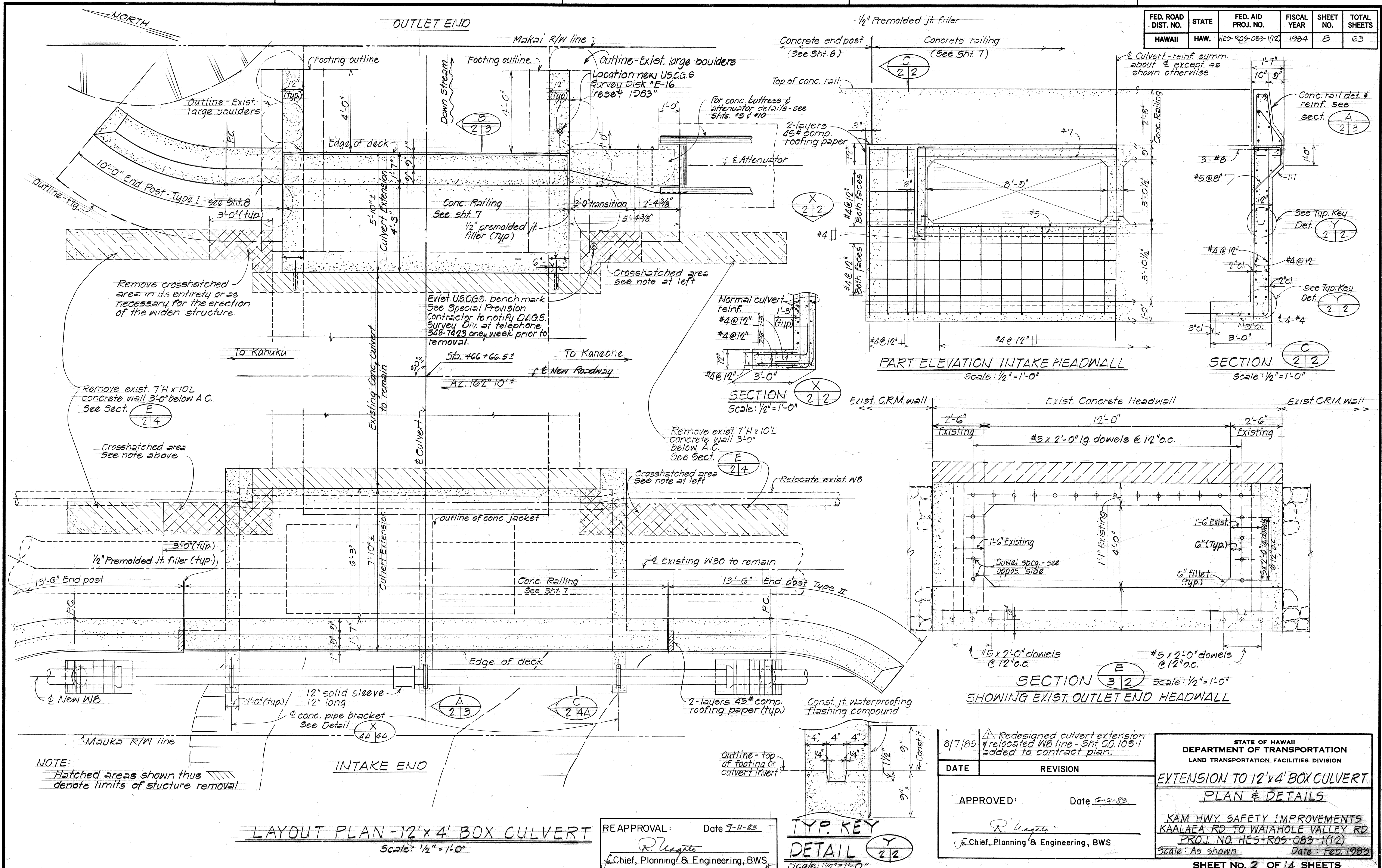
Note:
Retaining wall (Sta. 489+66 to 493+45) construction of new wall not shown.



STRUCTURAL WORK SITES Not To Scale

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
LAND TRANSPORTATION FACILITIES DIVISION
INDEX, GENERAL NOTES AND ESTIMATED QUANTITIES
KAM. HWY. SAFETY IMPROVEMENTS
KAALAE RD TO NAIHAHOLE VALLEY RD
Proj. No. HE5-R05-083-1(12)
Scale: As Noted Date: Feb. 1983

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	HES-R05-083-1(12)	1984	8	63



SURVEY PLOTTED BY	DATE
DRAWN BY	2/83
DESIGNED BY	2/83
CHECKED BY	2/83
ORIGINAL PLAN	
NOTE BOOK	
No.	

REAPPROVAL: Date 7-11-85
R. Ungaro
Chief, Planning & Engineering, BWS

8/7/85	Redesigned culvert extension & relocated WB line - Sht. CO.105-1 added to contract plan.
DATE	REVISION
APPROVED:	Date 6-2-88
R. Ungaro	
Chief, Planning & Engineering, BWS	

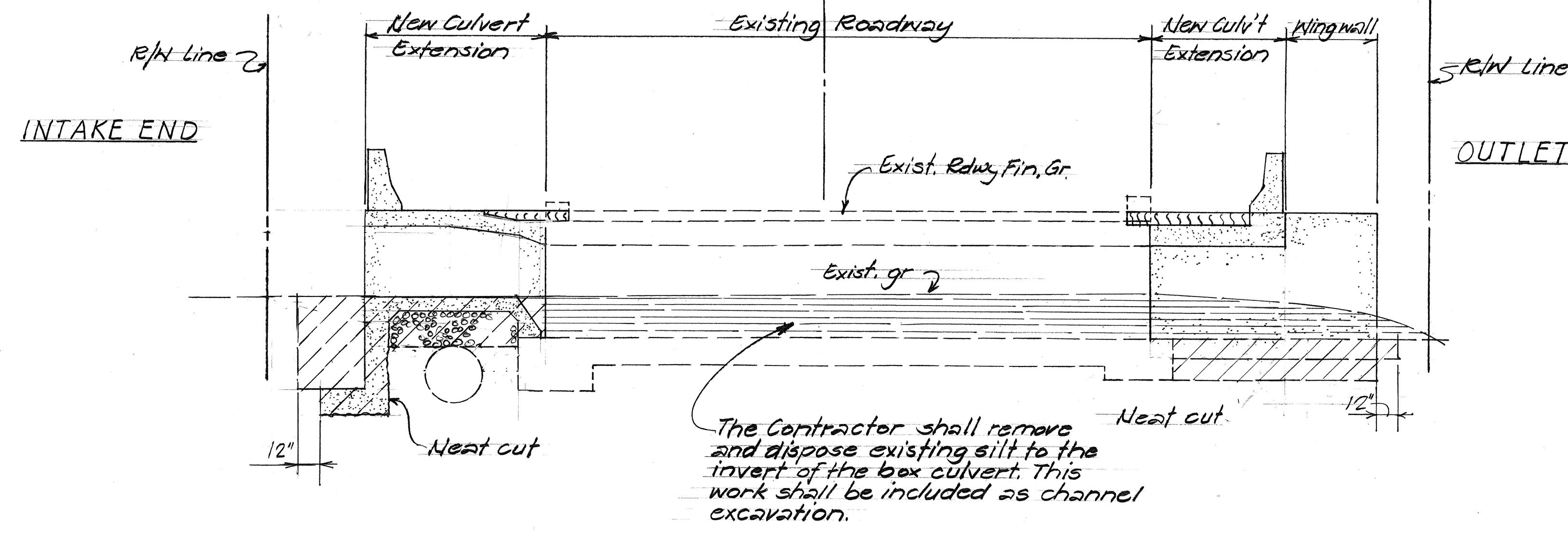
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
LAND TRANSPORTATION FACILITIES DIVISION

EXTENSION TO 12' x 4' BOX CULVERT
PLAN & DETAILS

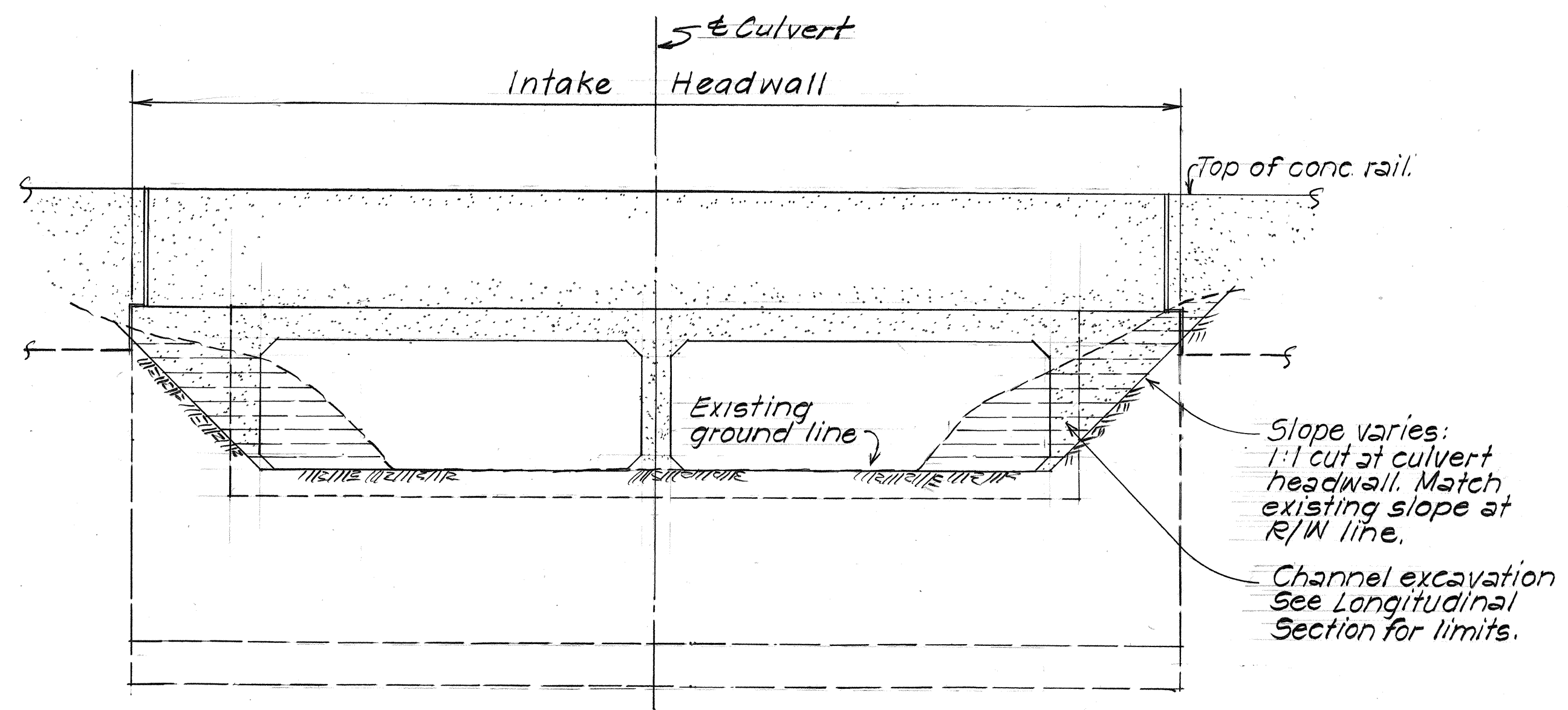
KAM HWY. SAFETY IMPROVEMENTS
KAALAEA RD. TO WAIHOLE VALLEY RD.
PROJ. NO. HES-R05-083-1(12)
Scale: As shown Date: Feb. 1983

SHEET NO. 2 OF 14 SHEETS

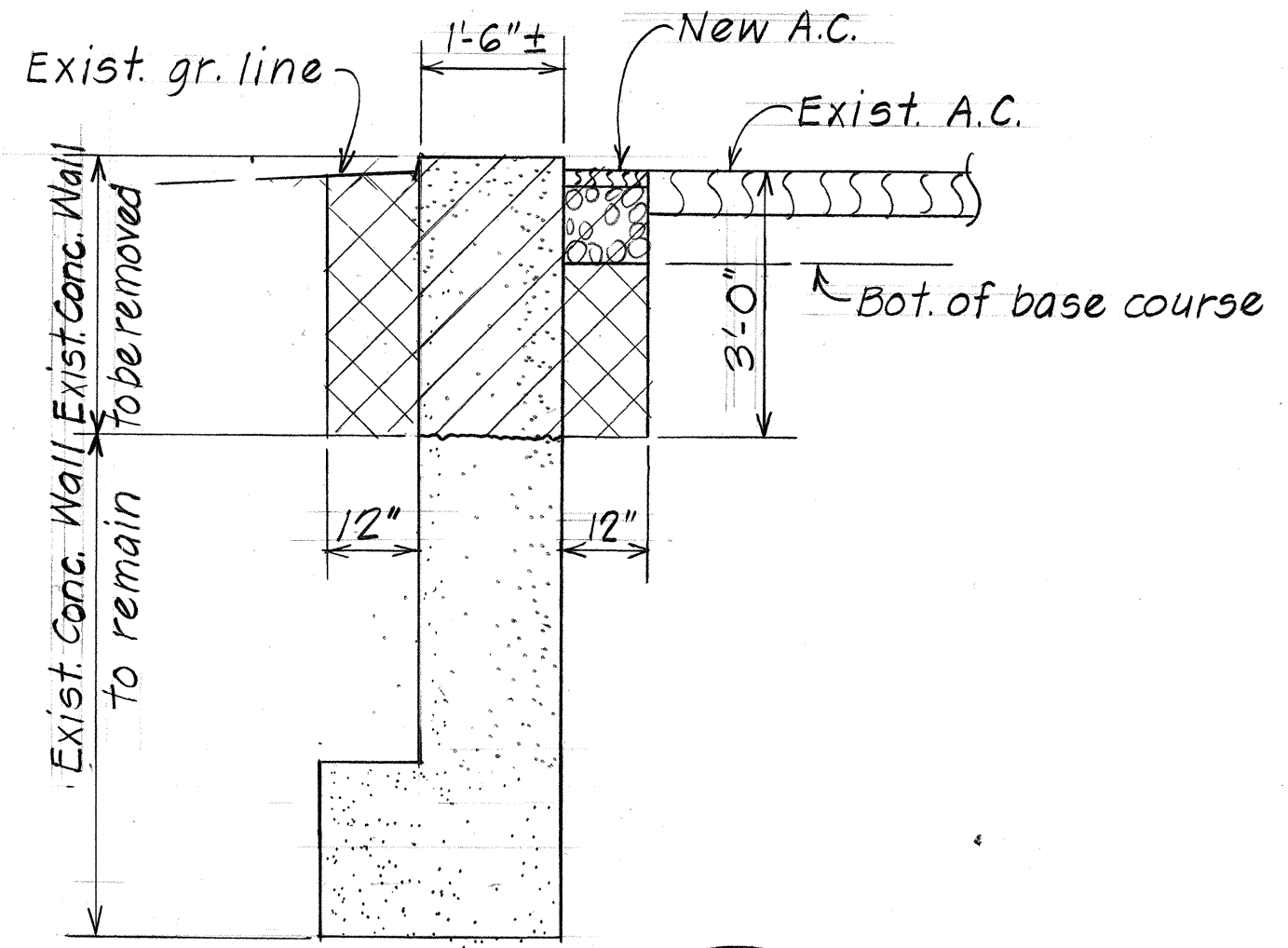
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HAWAII	HAW.	HES-R05-083-1(12)	1984	10	63



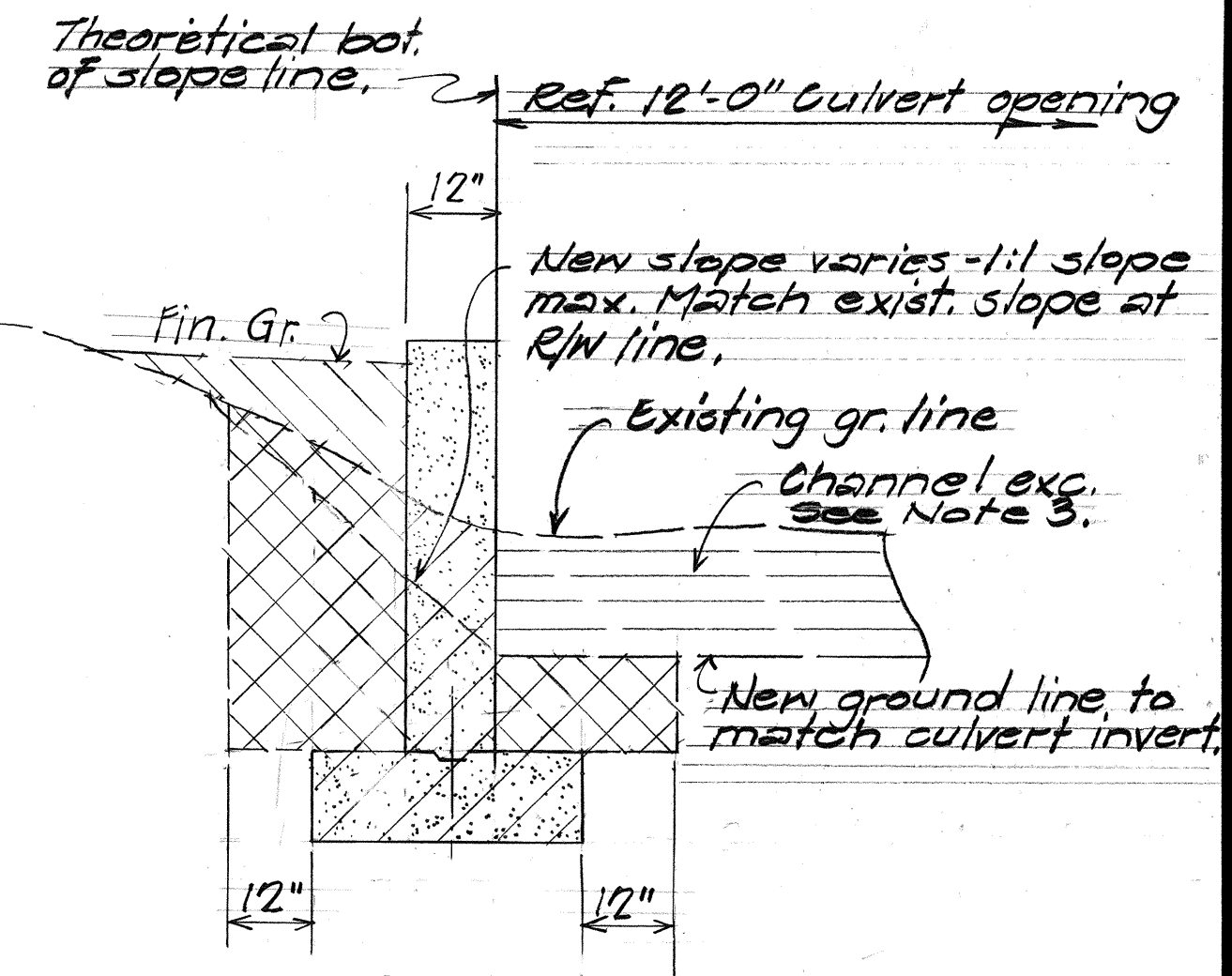
△ LONGITUDINAL SECTION
Scale: 1/4" = 1'-0"



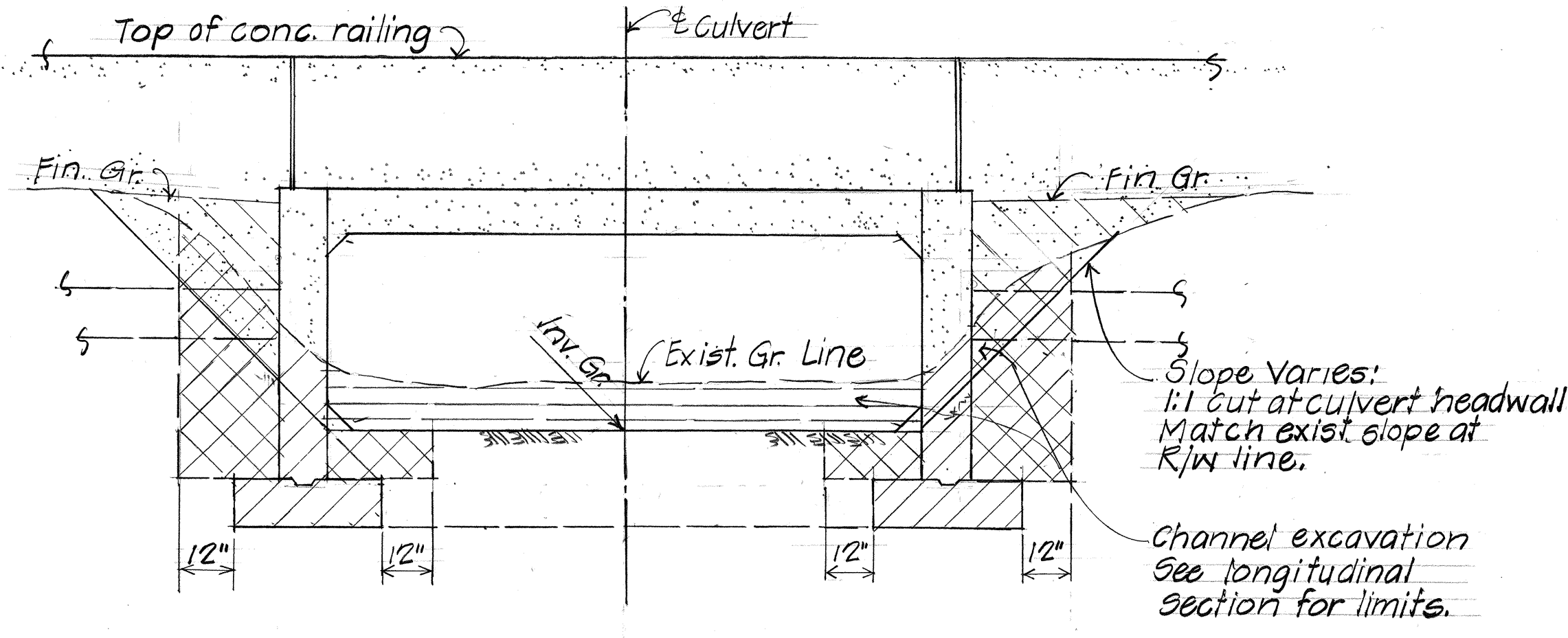
△ TYPICAL PAY LIMITS AT INTAKE END
Scale: 3/8" = 1'-0"



△ SECTION 24
Scale: 1/2" = 1'-0"



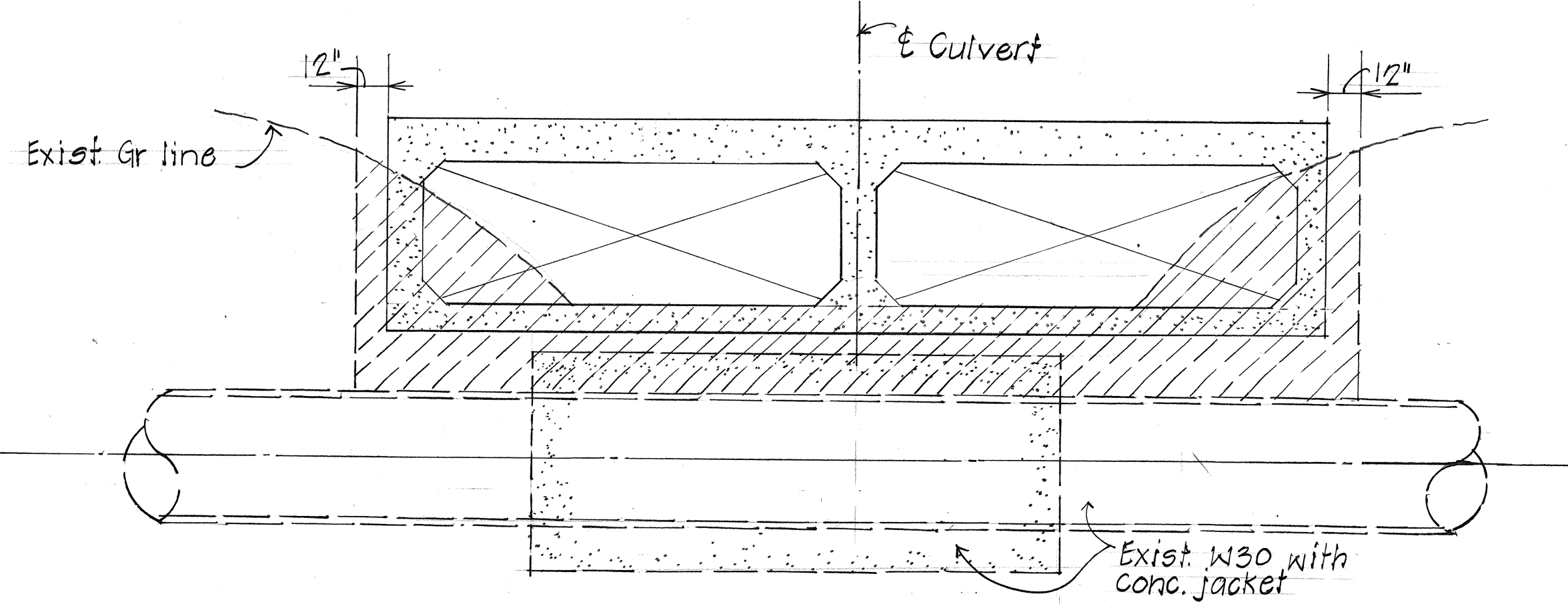
△ PAY LIMIT AT OUTLET WINGWALLS
Scale: 1/2" = 1'-0"



△ TYPICAL PAY LIMITS AT OUTLET END
Scale: 3/8" = 1'-0"

NOTES:

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

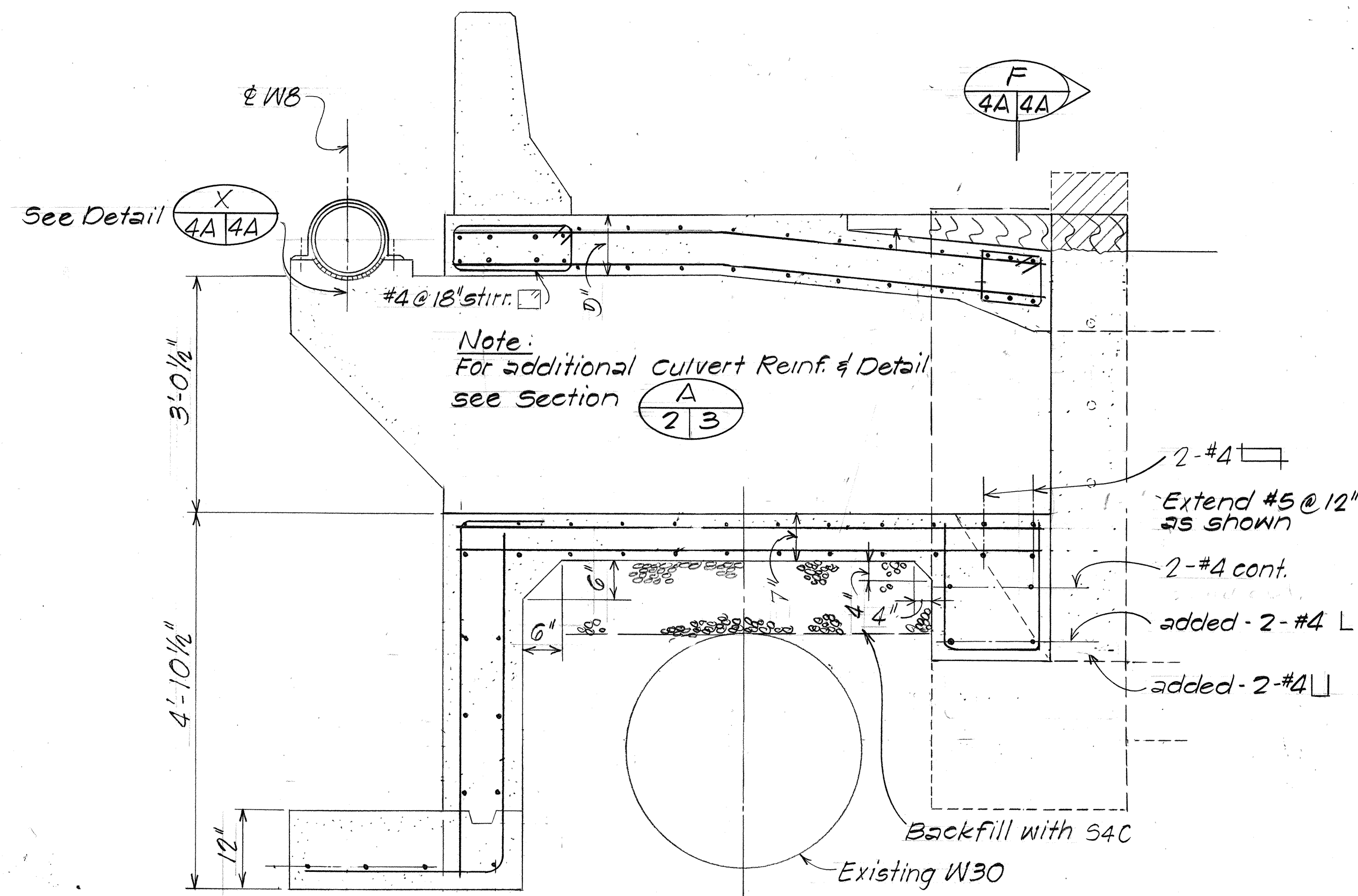


△ TYPICAL PAY LIMITS AT INTAKE EXTENSION
Scale: 3/8" = 1'-0"

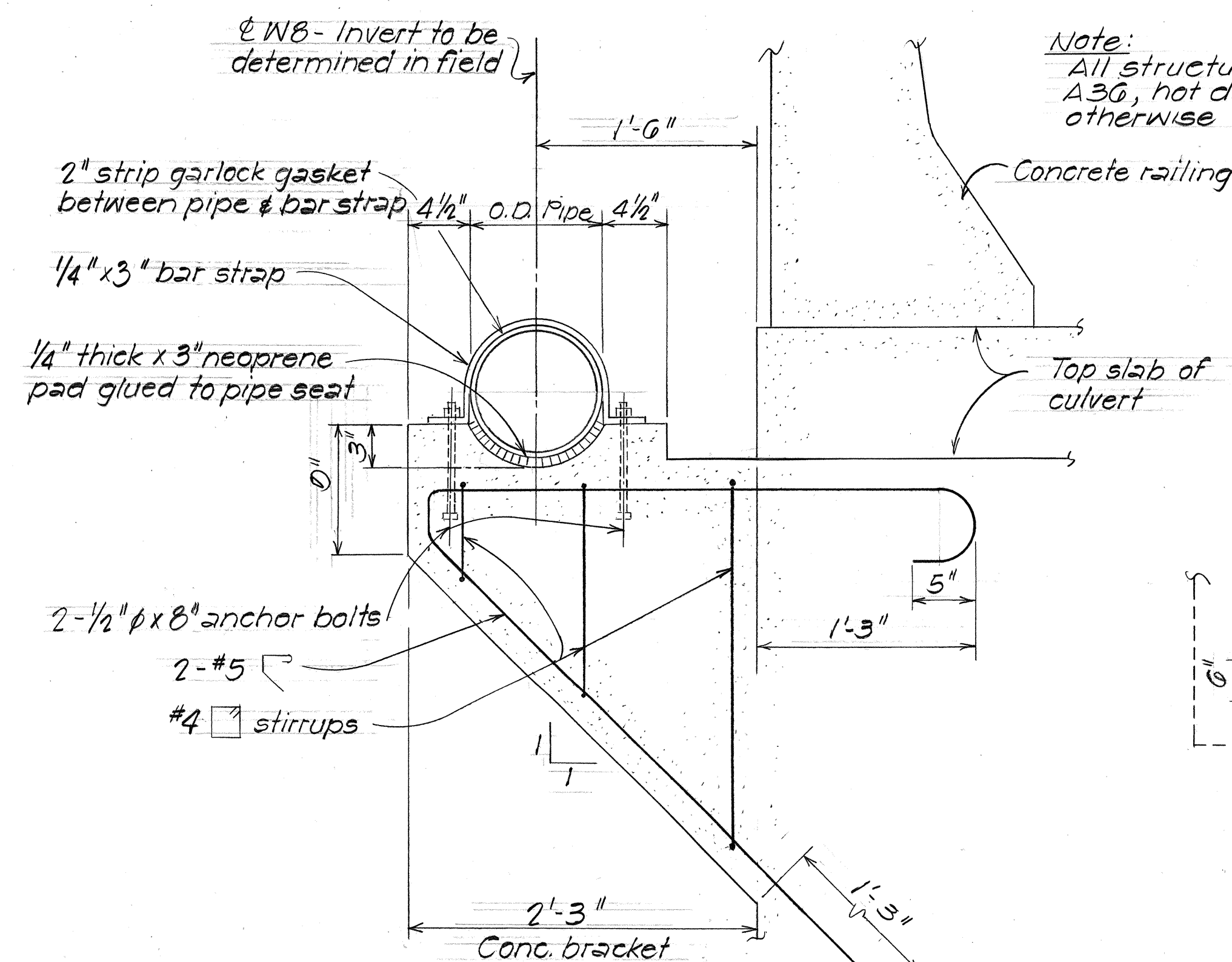
ORIGINAL PLAN	DATE
SURVEY PLOTTED BY	2/83
DRAWN BY	2/83
TRACED BY	2/83
DESIGNED BY	2/83
QUANTITIES BY	2/83
CHECKED BY	2/83

7/15/85	△ Revised excavation details.
DATE	REVISION
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION LAND TRANSPORTATION FACILITIES DIVISION EXTENSION TO 12x4 BOX CULVERT EXCAVATION DETAILS KAM. HWY. SAFETY IMPROVEMENTS KAALAEA RD TO WAIHOLE VALLEY RD Proj. No. HES-R05-083-1(12) Scale: As Noted Date: Feb. 1983	
SHEET NO. 4 OF 14 SHEETS	

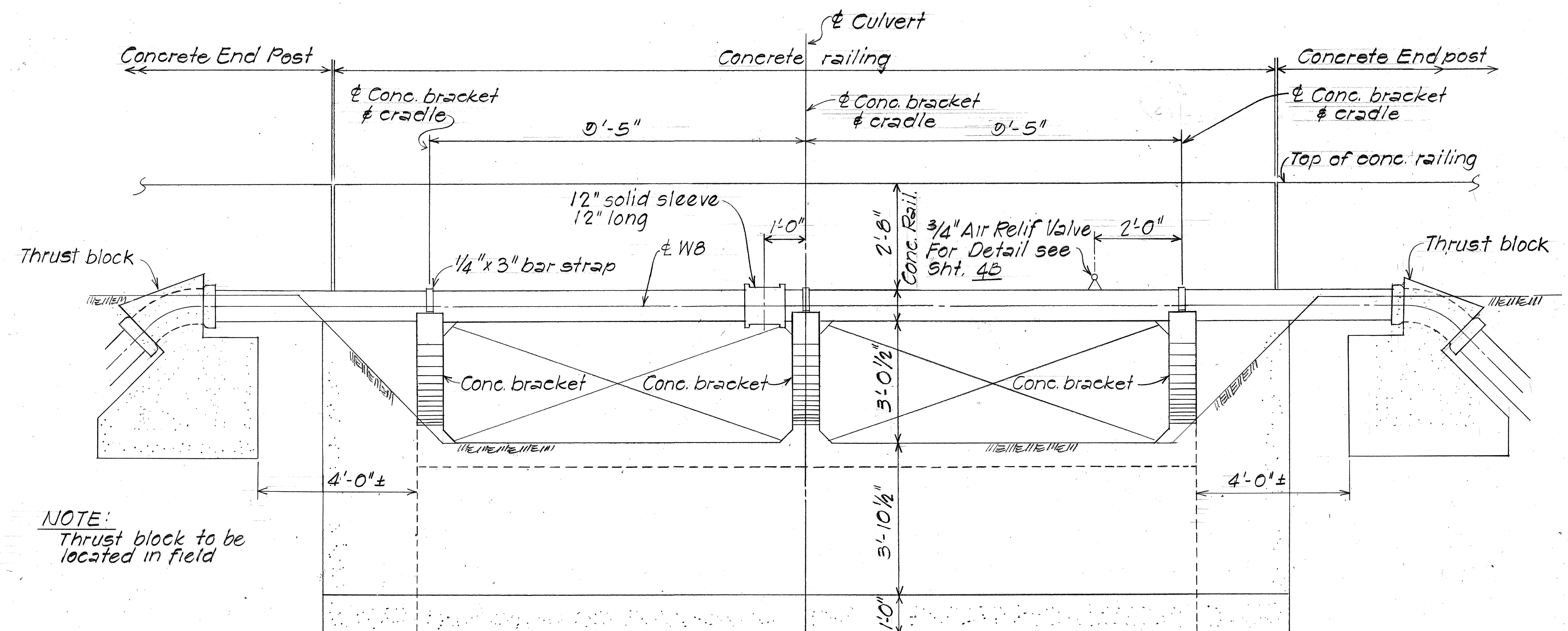
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	HE5-R05-083-K(12)	1984	00105-1	63



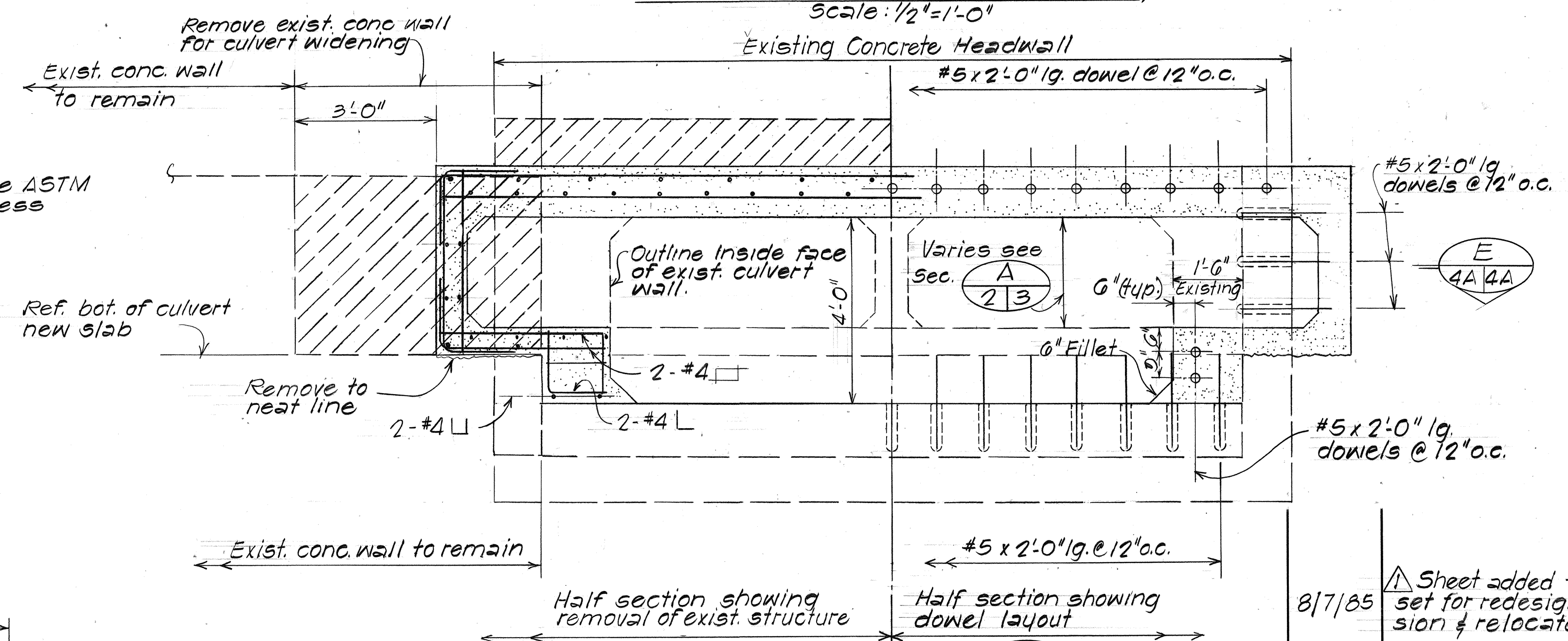
SECTION 
Scale: $\frac{3}{4}" = 1'-0"$



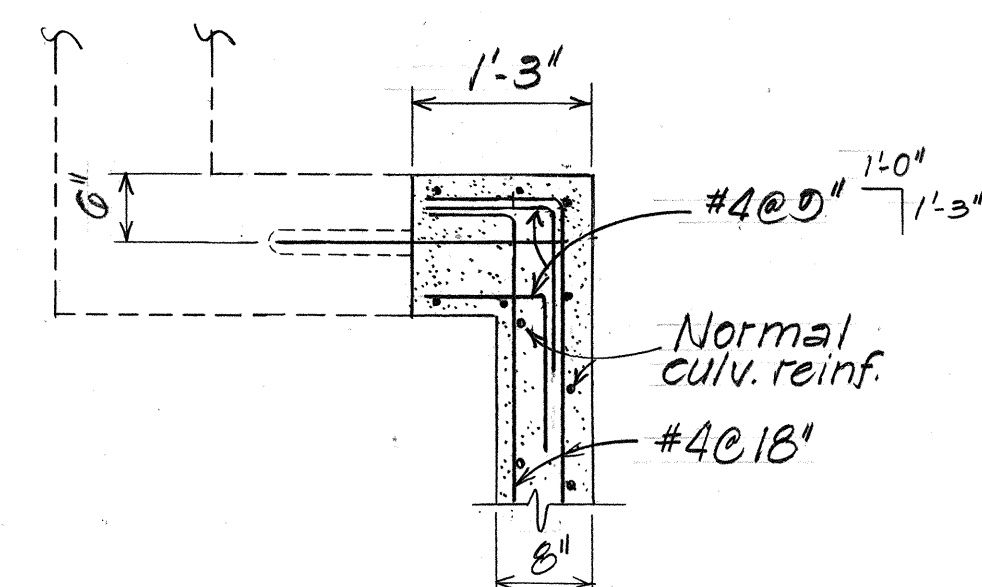
DETAIL  Scale: $1\frac{1}{2}'' = 1'-0''$



ELEVATION-INTAKE END
(SHOWING W8 CONNECTION)
Scale: $\frac{1}{2}" = 1'-0"$



SECTION 
SHOWING EXIST. INTAKE END HEADWALL
Scale: $\frac{1}{2}" = 1'-0"$



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

APPROVED: _____ Date 9-11-85

R. Nagato

 For Chief, Planning & Engineering, BWS

8/7/85 Δ Sheet added to contract plan set for redesigned culvert extension & relocated WB line.

DATE	REVISION
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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

EXTENSION TO 12'x4' BOX CULVERT

W8 CONNECTION DETAILS

KAM. HWY. SAFETY IMPROVEMENTS
KAALAEA RD. TO WAIHAOLE VALLEY RD.

Proj. No. HES-ROS-083-1(12)

Scale: As Noted Date: July 1985

SHEET No. 44 OF 14 SHEETS

CO | OS- |

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

A technical drawing of a strap assembly. The drawing shows a horizontal strap with a vertical end on the left and a circular end on the right. Dimensions are indicated with arrows: a total length of 1'-7" and a distance of 2 1/4" from the vertical end to the start of the main strap section. Components are labeled with handwritten notes: "2-1/2\" \phi bolts" at the vertical end, "2\" x 1/4\" r" along the main strap, "1/4\" felt for full width of strap" near the circular end, and "3/8\" \phi bolt with hex. nut & lock washer" at the circular end.

1'-6"

2-1/2" ϕ
x 4" bolts

Lateral brace

Air relief valve

3/4" brass
nipple 6" long

Vertical check valve

Corp. stop

Bronze union

E W 8

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

NORTH

To Kaula

26'-0"

1'-0" 12'-0" 12'-0" 1'-0"

& Roadway

"C" 3.0 #5 S.S.
2.0 #5 S.S.

2.0 #5 S.S.

2.0 #5 S.S.

5.0 #5 S.S.

"C"

2.0 #5 S.S.

Ref. - Inside face
of wall

& Culvert

INTAKE END

C
4B/4B

"C"

2 deep
3 deep

21.0 #5 S.S.
w/exposed rebar

21.0 #5 S.S.
w/exposed rebar

1.0 #5 S.S.

1.0 #5 S.S.

1.0 #5 S.S.

2.0 #5 S.S.

OUTLET END

Ref. - Inside face
of wall

FED. AID DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	HES-R05-083-1(12)	1984	CO 1052	63

Diagram showing a cross-section of a concrete structure with dimensions and reinforcement details:

- Overall width: 26'-0"
- Side fillet width: 1'-0" (each side)
- Central section width: 12'-0" (each side of the centerline)
- Reinforcement details:
 - 2.0 #5.5 on face of fillet (indicated by arrows pointing to the fillet area)
 - Total = 4.0 #5.5 w/ exposed rebar on face of fillet (indicated by arrows pointing to the central section)
- Labels: OUTLET END (left) and INTAKE END (right)

ORIGINAL PLAN	SURVEY PLOTTED BY _____ DATE _____
	DRAWN BY <u>T. K. M.</u> _____
	TRACED BY _____
NOTE BOOK	DESIGNED BY <u>M. S. T.</u> _____
	QUANTITIES BY _____
No. _____	CHECKED BY <u>L. A., G. T.</u> _____

8/7/85	Sht. # CO 10 S-2 added to contract plans. Addition of repair work to soffit.
DATE	REVISION

APPROVED: _____ Date 9-11-85

R. Nagato
for Chief, Planning & Engineering, BWS

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

EXTENSION TO 12'x4' BOX CULVERT
REPAIR WORK TO SOFFIT

KAM. HWY. SAFETY IMPROVEMENTS
KAALAEA RD. TO WAIAHOLE VALLEY RD.
Proj. No. HES-R05-083-1(12)
Scale: As Noted Date: July 1985

SHEET No. 45 OF 14 SHEETS

SHEET No.4B OF 14 SHEETS

CO | OS-2

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	HES-205-083-1(12)	1984	00105-3	63

GENERAL NOTES

REPAIR NOTES:

- Face of exist. concrete
- Provide min. 2" conc. cover over reinforcement or welded wire fabric. See specifications for welded wire fabric requirements.
- 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.
- Efflorescence shall be inspected and repaired as directed by the Engineer.
- All cracks shall be repaired by applying epoxy under pressure. See Specifications.
- The Engineer shall determine all areas to be repaired & the limits of repair at each area.

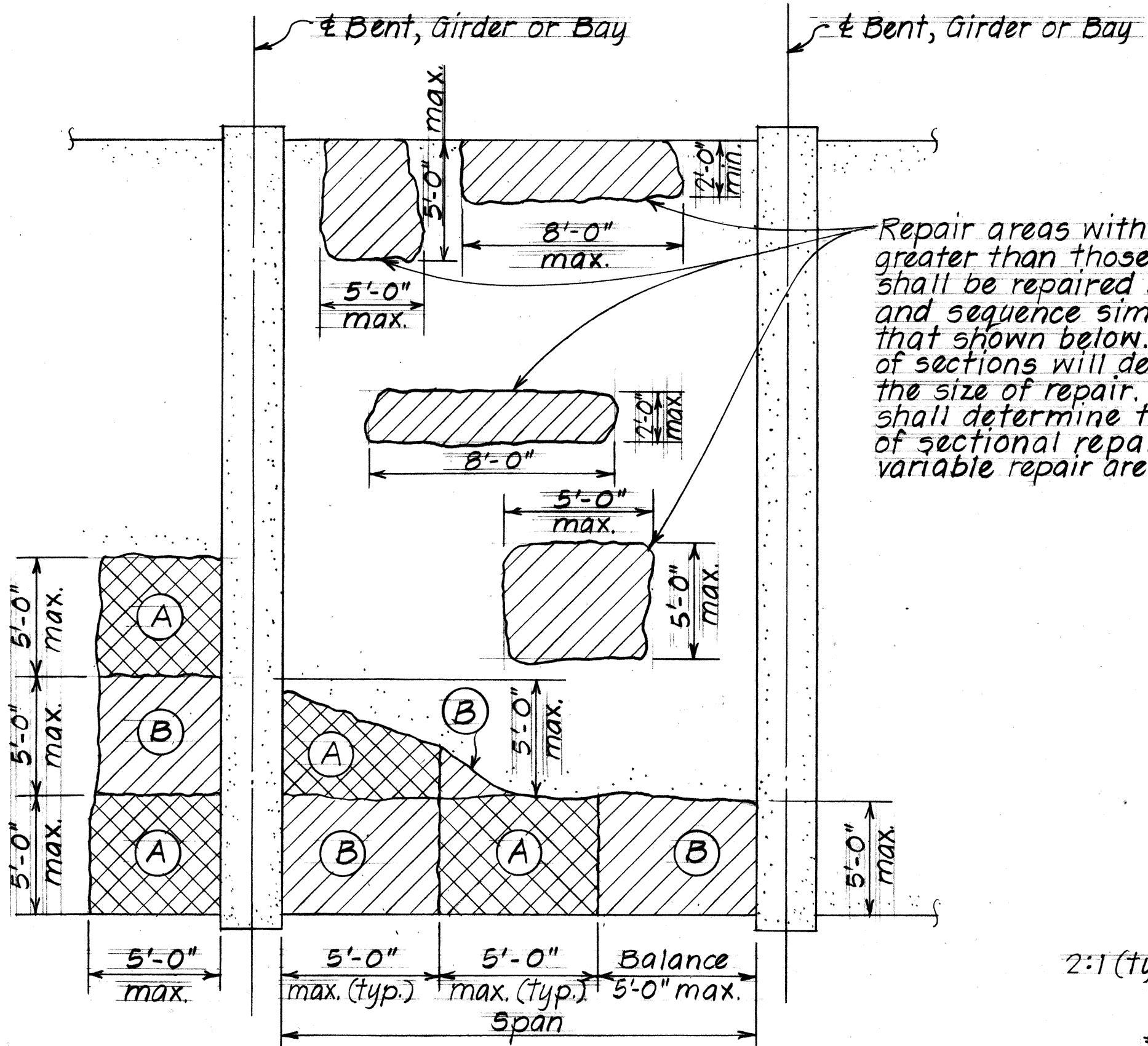
- ## INCIDENTAL ITEMS
- The following items shall be considered incidental to the various pay items of repairs & shall not be paid for separately.
- Expansion bolts & other miscellaneous hardware including hot-dipped galvanized and welded wire fabric.
 - Cleaning of all exposed, corroded reinforcing steel to sound metal.
 - Reinforcing bars of repair splice for strengthening corroded bars.

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

SYMBOLS & ABBREVIATIONS

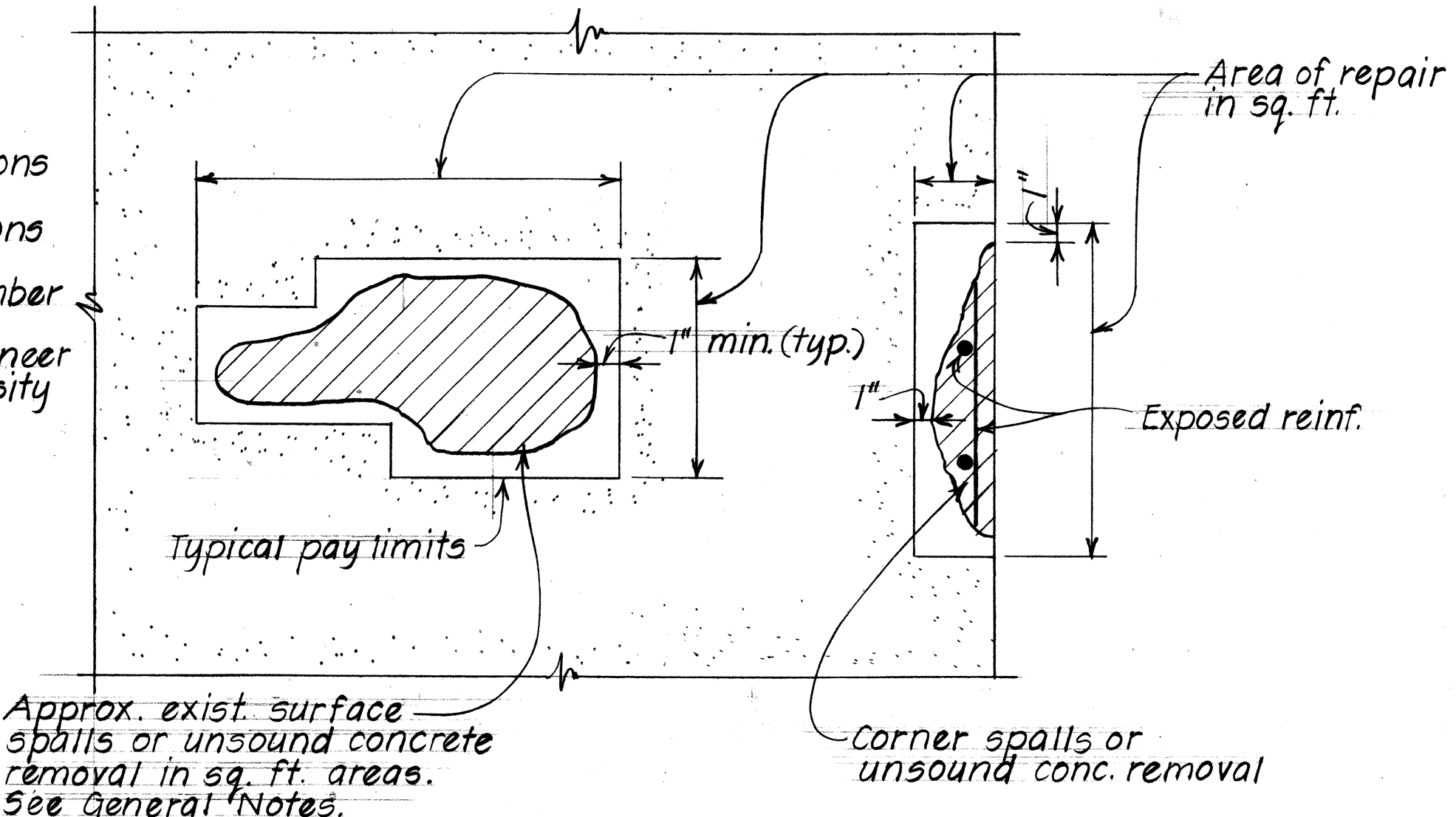
- Exposed reinf. bars where occurs.
- SS - Surface spall (Concrete)
S.C. - Surface crack (Concrete)
H.C. - Hairline crack
#; sq. ft.; S.F. - Square feet
L.F. - Linear feet

8/7/85	Sheet added to contract plan set for spalls repair.
DATE	REVISION
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION TYPICAL DETAILS REHABILITATION & REPAIRS TO BRIDGES PROJ. NO. HES-205-083-1(12) Scale: As Shown Date: July 1985 SHEET No. 4C OF 14 SHEETS	

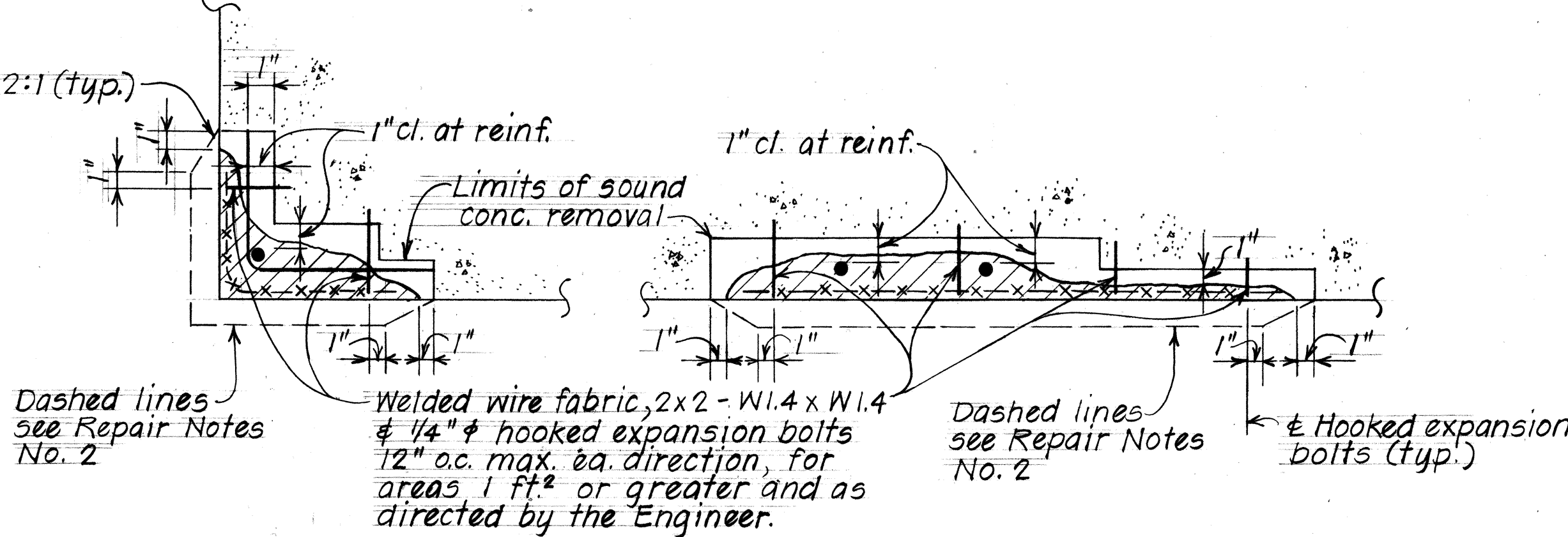


REFLECTED SPAN CEILING PLAN
 Not to scale

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.

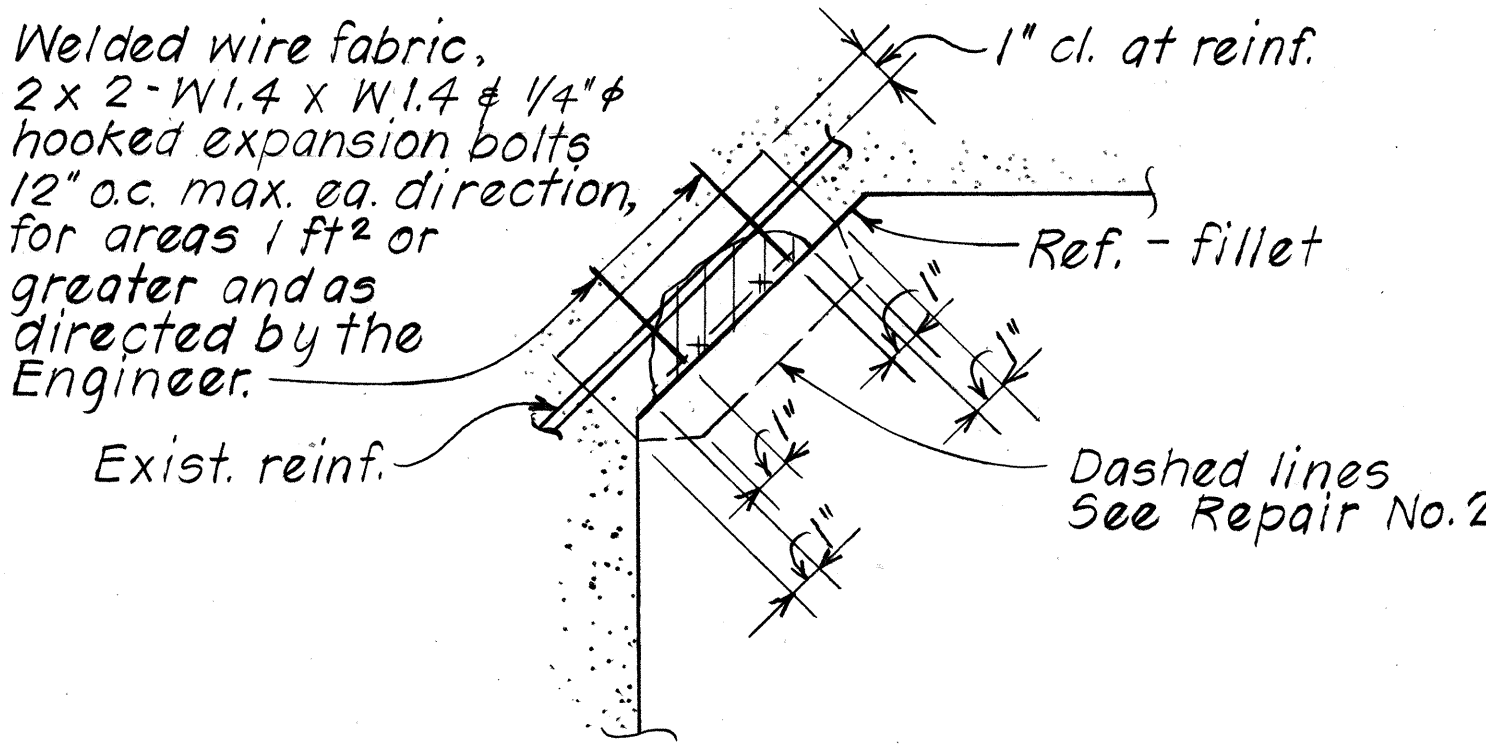


PLAN OR ELEVATION



AT CORNER

AT SURFACE



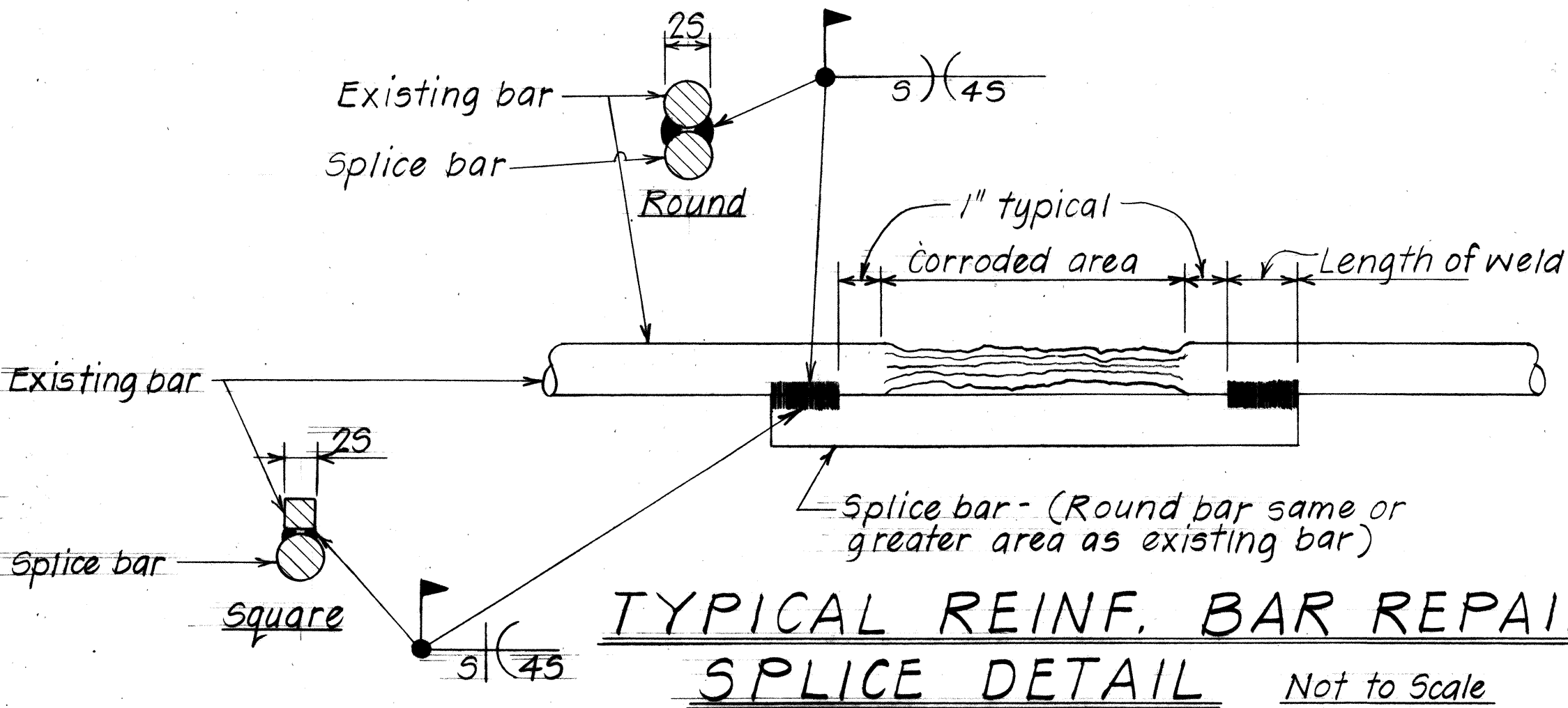
AT FILLET

TYPICAL SECTIONS

TYPICAL REPAIRS

AT CONCRETE SPALLS

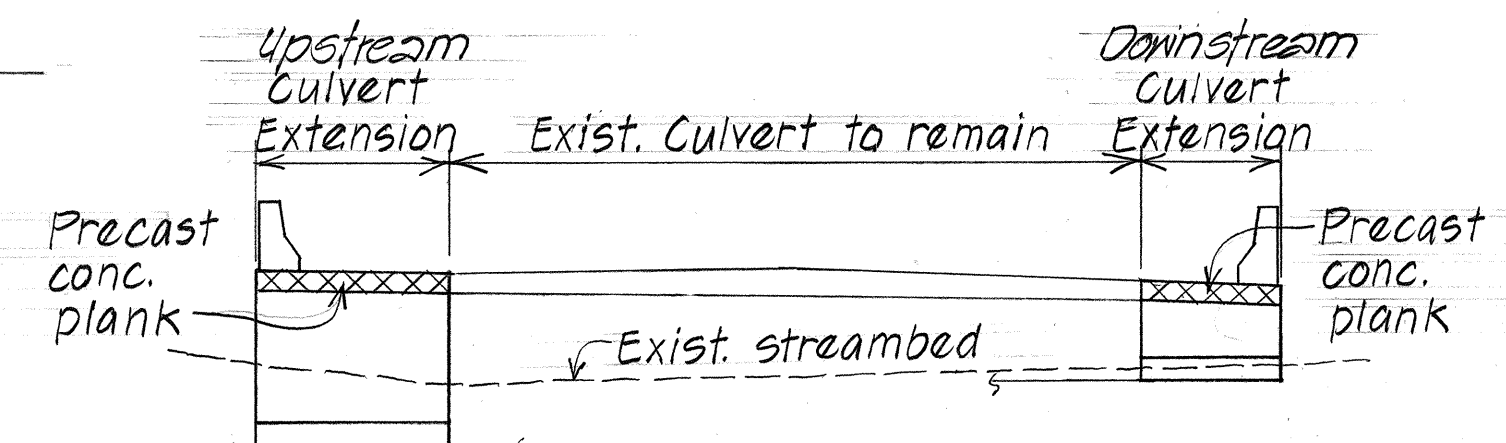
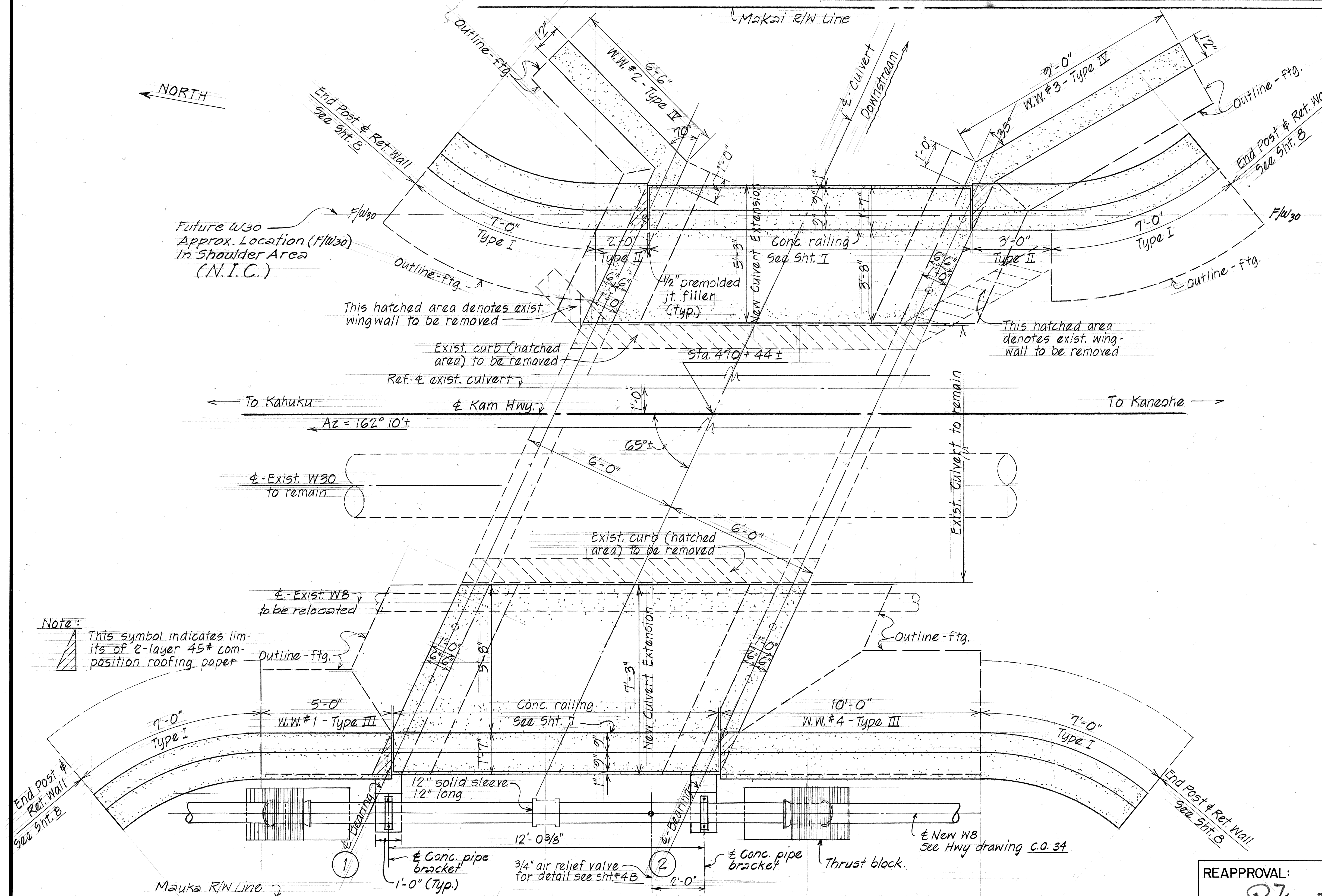
Not to scale



TYPICAL REINF. BAR REPAIR
 SPLICE DETAIL
 Not to scale

ORIGINAL PLAN	DATE
SURVEY PLOTTED BY	
DRAWN BY	
DESIGNED BY	
NOTED BY	
CHECKED BY	
QUANTITIES BY	
NO.	

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	HES-R05-083-1(12)	1984	11	63



Note:
 This symbol indicates concrete of 4500 psi compressive strength at 28 days.

LONGITUDINAL SECTION
Not To Scale

Note: This symbol indicates limits of 2-layer 45# composition roofing paper—

ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
	DRAWN BY <u>G. H.</u>	" <u>4/53</u>
	TRACED BY	"
NOTE BOOK	DESIGNED BY <u>M. M. Y.</u>	" <u>3/53</u>
	QUANTITIES BY <u>G. H.</u>	" <u>2/53</u>
No.	CHECKED BY <u>L. A. & C. R. Y.</u>	" <u>2/53</u>

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

REAPPROVAL: _____ Date 7-11-85

R. Nagato
for Chief, Planning & Engineering, BWS

REAPPROVAL: _____ Date 5/29/85

Robert H. Mendenhall
Chief, Planning & Engineering, BWS

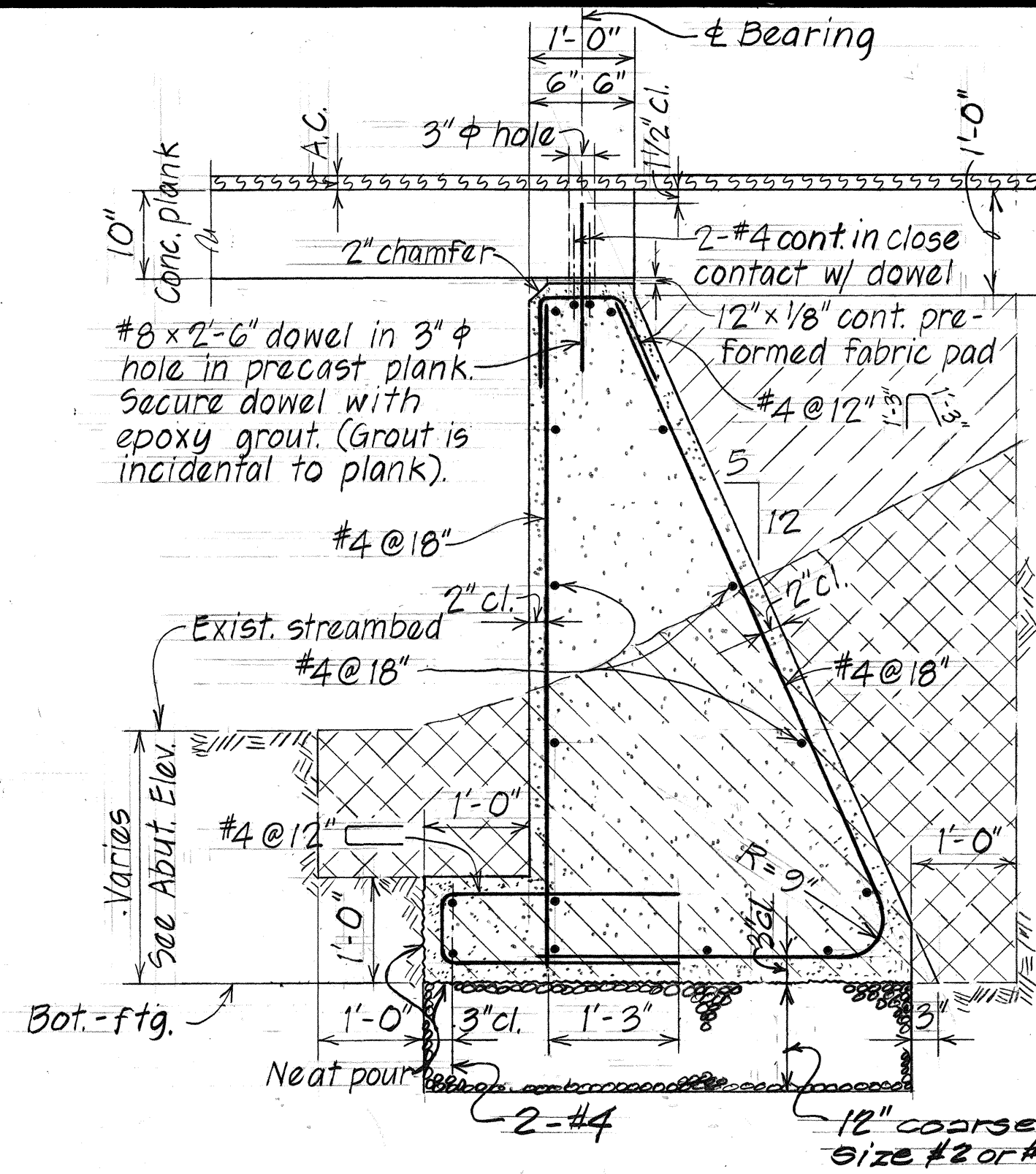
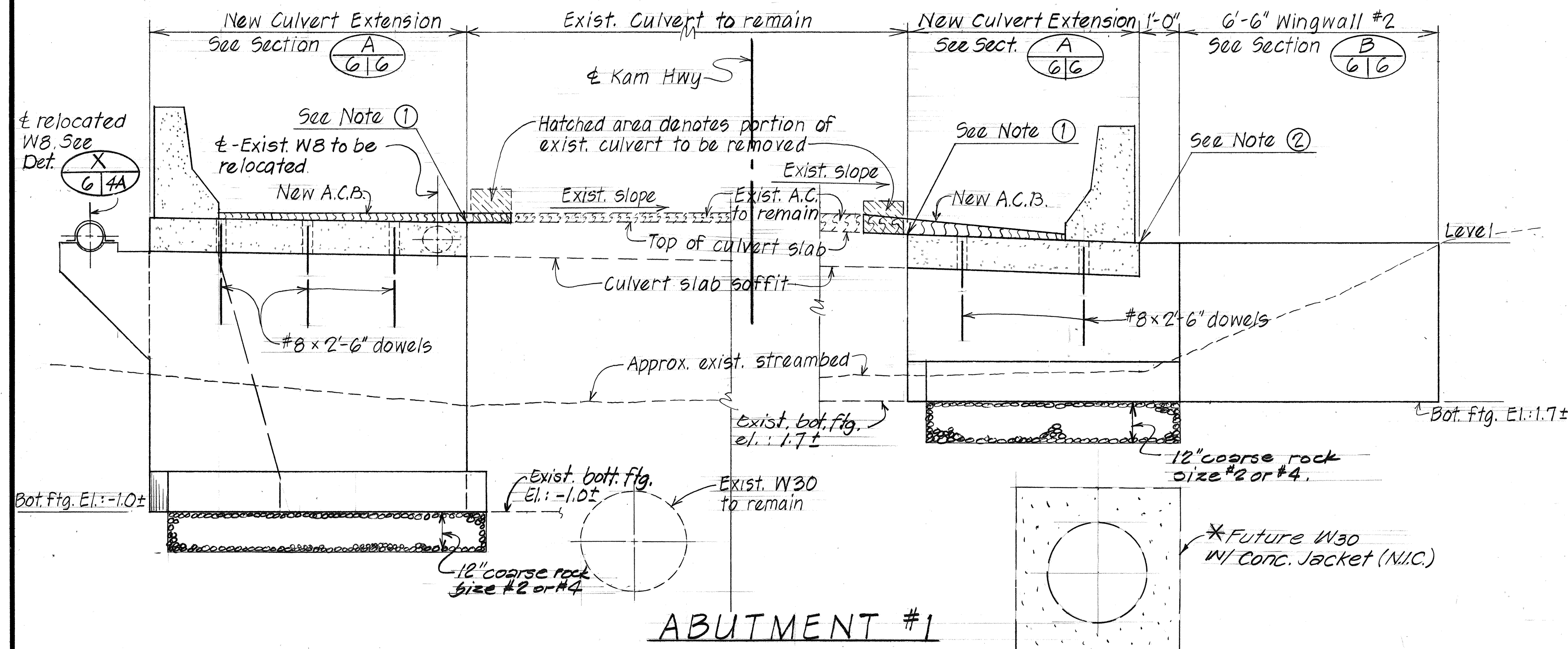
APPROVED: _____ Date 6-2-83

R. Nagato
for Chief, Planning & Engineering, BWS

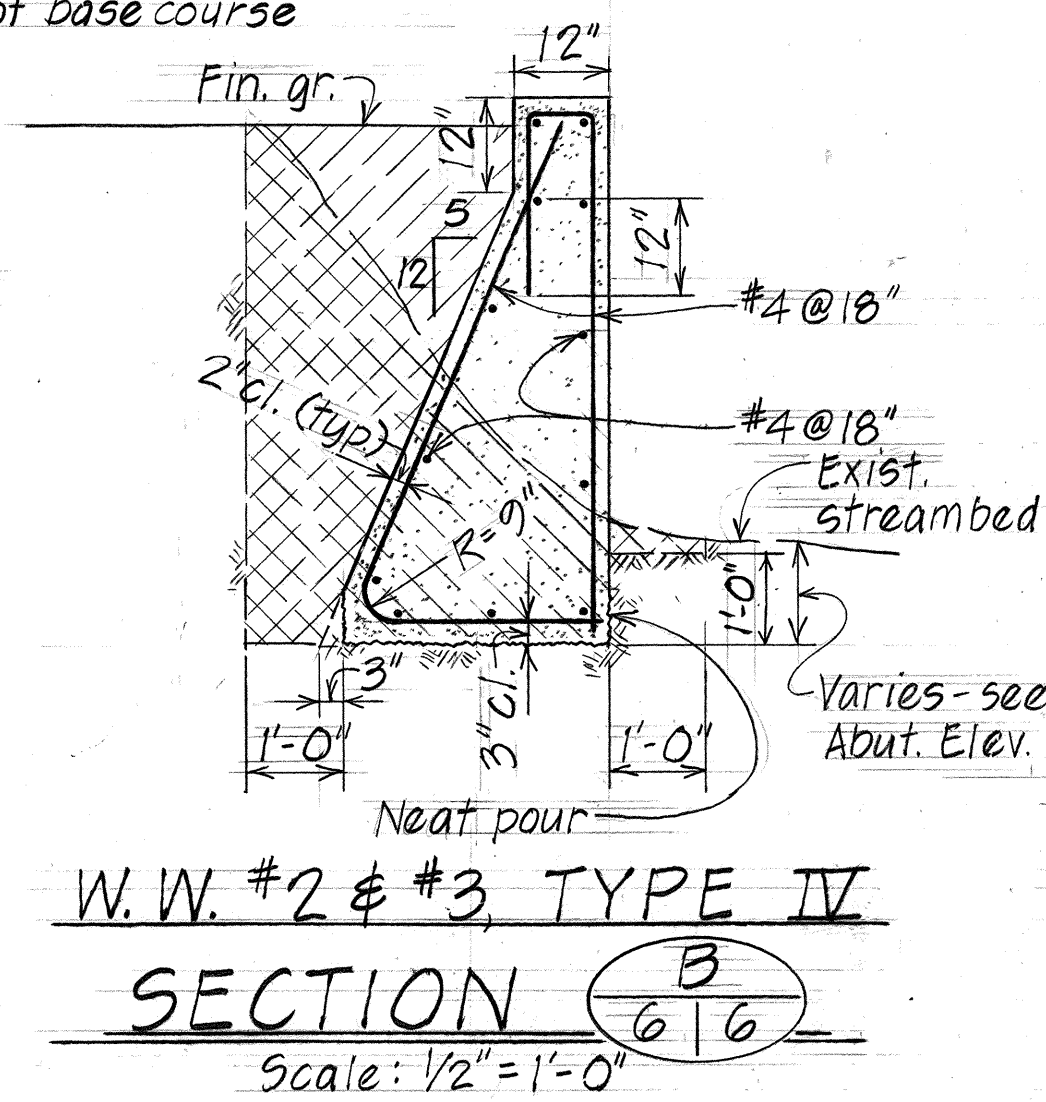
8/7/85	△ Relocate WB on conc. bracket
DATE	REVISION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
LAND TRANSPORTATION FACILITIES DIVISION
CULVERT NO. 1
PLAN, LONGITUDINAL SECTION
KAM HWY SAFETY IMPROVEMENTS
KAA LAEA RD TO WAI AHOLE VALLEY RD
Proj. No. HES-R05-083-1(12)
Scale: As Noted Date: Feb. 1983
SHEET NO. 5 OF 14 SHEETS

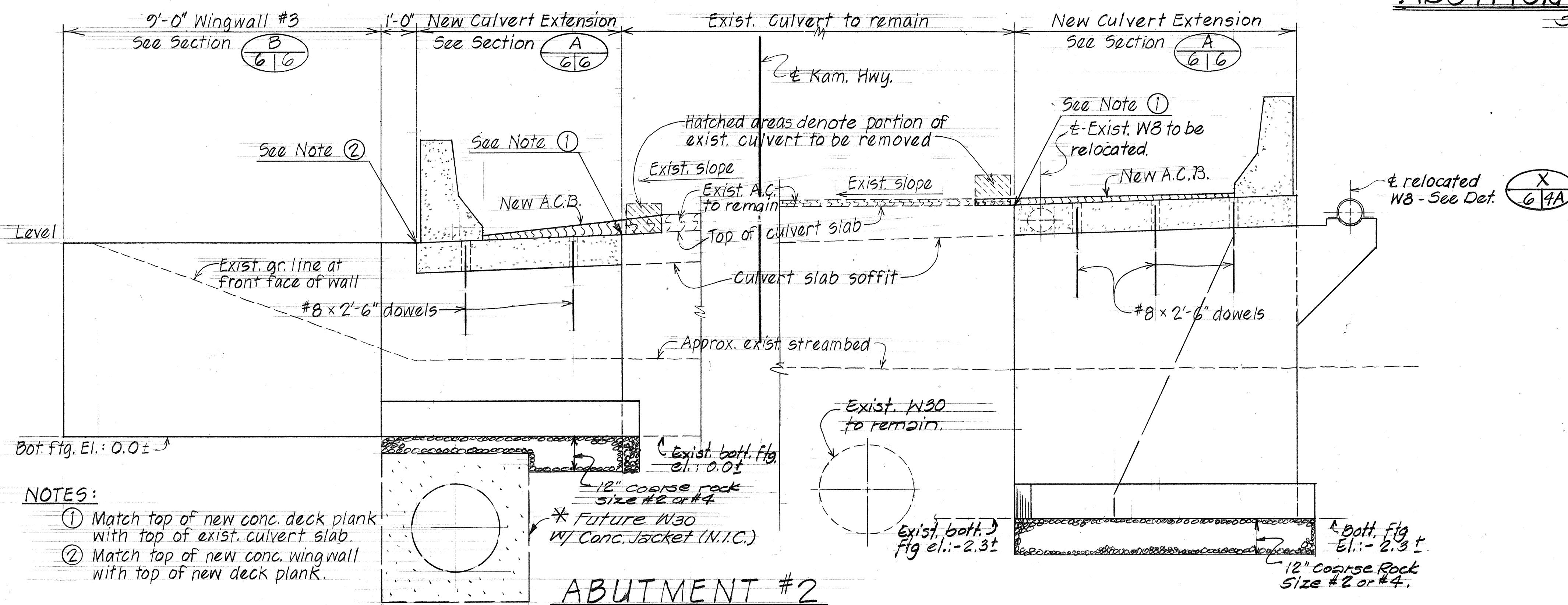
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	HE5-R05-083-1(12)	1984	12	63



- Notes:
1. Hatched area shown thus denotes limits of structure excavation payline. All other excavation shall be roadway excavation.
 2. Hatched area shown thus denotes limits of structure backfill or ordinary backfill.



ABUTMENT SECTION A 6/6
Scale: 3/4" = 1'-0"



- NOTES:
1. Match top of new conc. deck plank with top of exist. culvert slab.
 2. Match top of new conc. wingwall with top of new deck plank.

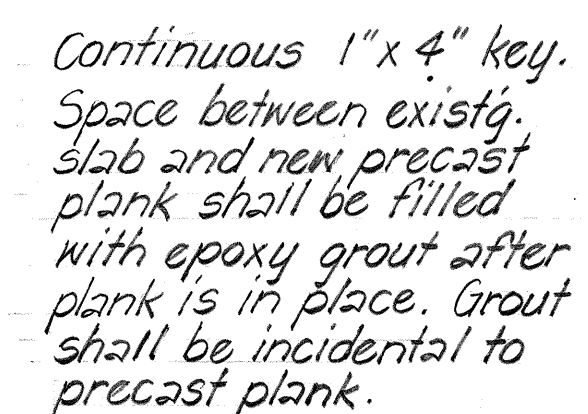
ABUTMENT #2
ELEVATIONS
Scale: 1/2" = 1'-0"

* The plans show the location of a future 30-inch water main for the information of the Contractor only and not considered a part of this contract. The exact location and alignment is still pending review and approval by the State Dept. of Transportation.

REAPPROVAL: Date 9-11-85
 Chief, Planning & Engineering, BWS
 REAPPROVAL: Date 5-3-85
 Chief, Planning & Engineering, BWS
 APPROVED: Date 6-2-83
 Chief, Planning & Engineering, BWS

8/7/85 Δ Relocate WB on conc. bracket
 DATE REVISION
 STATE OF HAWAII
 DEPARTMENT OF TRANSPORTATION
 LAND TRANSPORTATION FACILITIES DIVISION
 CULVERT NO. 1
 ABUTMENT ELEVATIONS & SECTIONS
 KAM HWY SAFETY IMPROVEMENTS
 KAALAEA RD. TO WAIHAOLE VALLEY RD.
 Proj. No. HE5-R05-083-1(12)
 Scale: As Noted Date: Feb. 1983
 SHEET NO. 6 OF 14 SHEETS

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
LAND TRANSPORTATION FACILITIES DIVISION
CULVERT NO. 1
PRECAST CONCRETE PLANK
NORMAL DECK SECTION
Proj. No. HES-ROS-083-1(12)



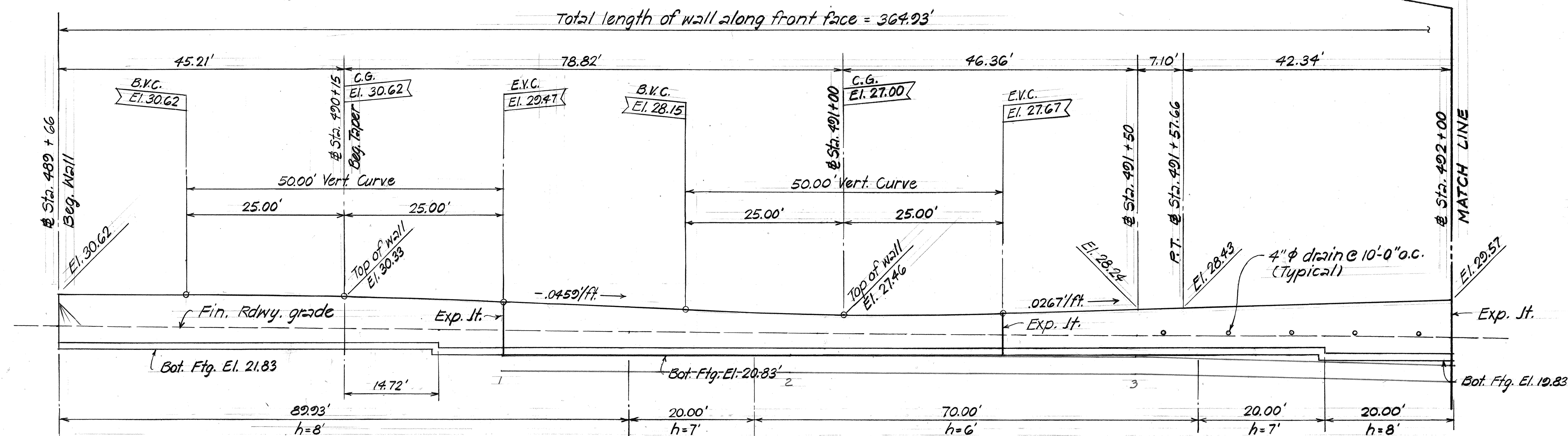
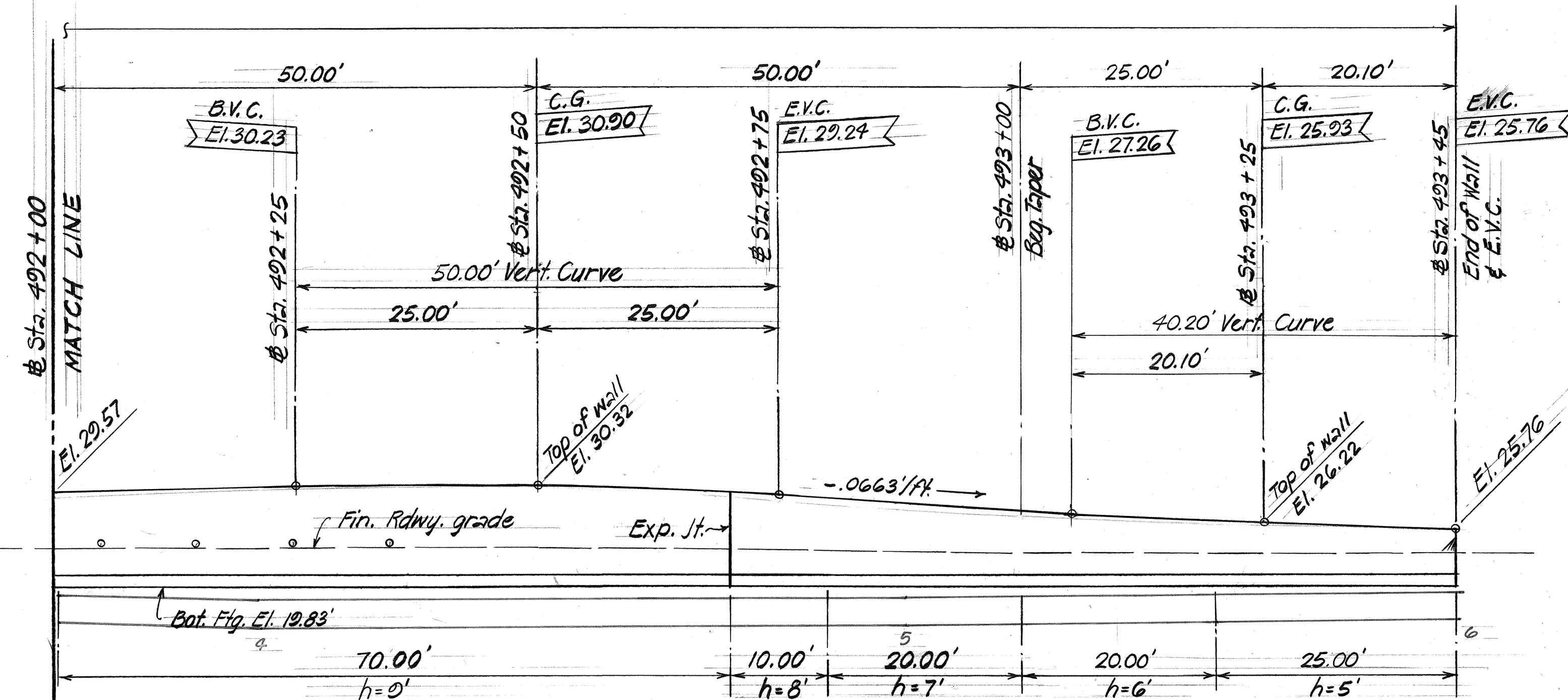
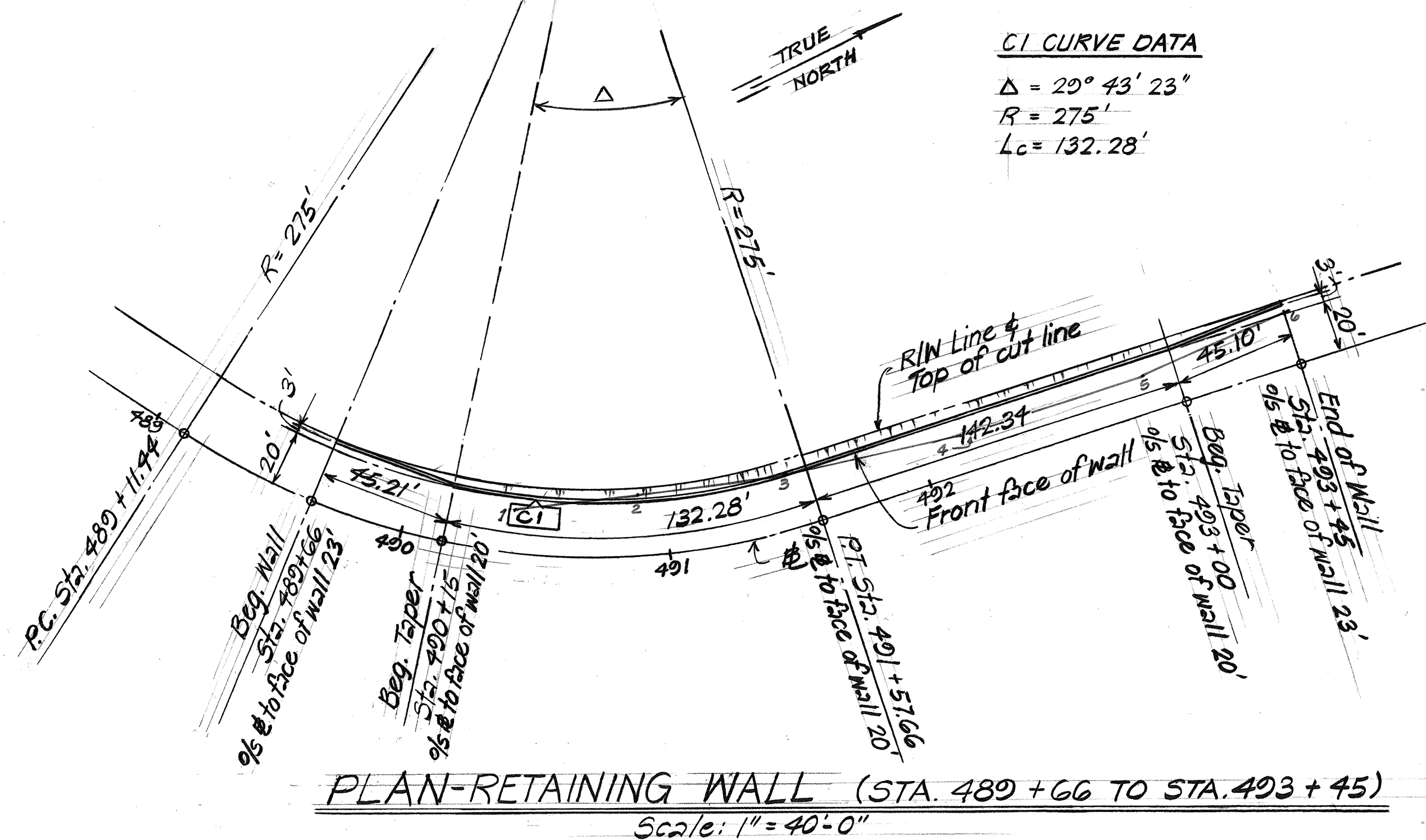
SHEAR KEY DETAIL
Scale: 3" = 1'-0"

[illegible]

LOCATION	Spacing - "5"		
	PC-1		PC-2
	Top Layer	Bottom Layer	Top & Bottom Layers
Sta. 470 + 44 ±	8 spcs. @ 3"	8 spcs. @ 3"	6 spcs. @ 3"

Scale: As Shown Date: Feb. 1983
SHEET NO. 7 OF 14 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	HE5-ROS-083-1(12)	1984	15	63



ELEVATION of EXISTING 30" WATERLINE

Shot #	Sta.	% ϕ Lt.	TOP 30" ELEV.
1	490+41.1	17.24'	20.76
2	490+91.2	22.33'	20.83
3	491+49.2	20.06'	20.79
4	492+21.2	13.42'	18.47
5	492+88.2	13.03'	18.58
6	493+45.2	21.04'	19.06

Type "L-2" Wall thruout. See Typical Section on Sht. #TD1

ELEVATION-RETAINING WALL (STA. 489+66 TO STA. 493+45)
 Scale: 1" = 10'-0"

RETAINING WALL DELETED
 C.C.O. No. 8

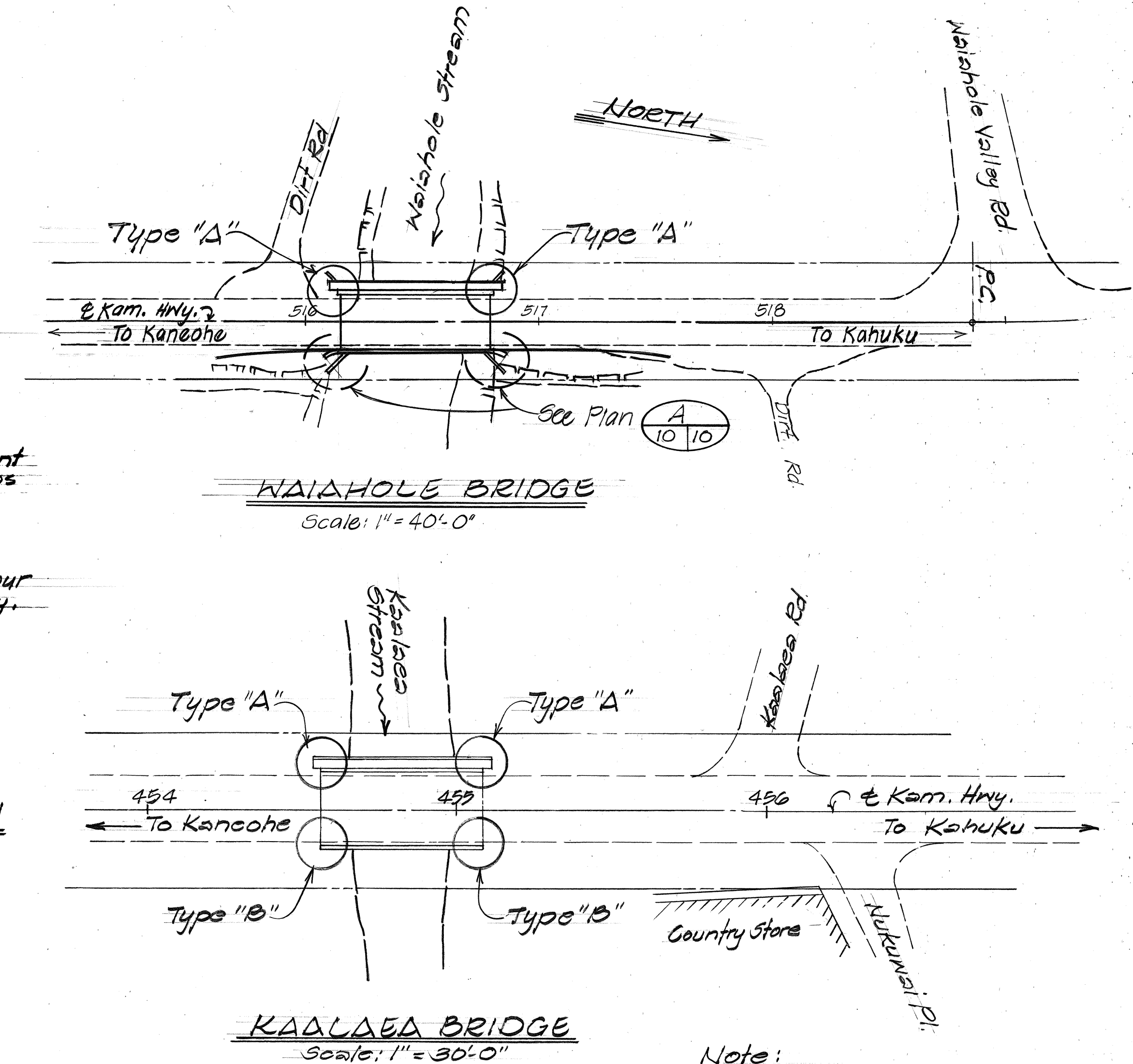
STATE OF HAWAII
 DEPARTMENT OF TRANSPORTATION
 LAND TRANSPORTATION FACILITIES DIVISION

RETAINING WALL
 PLAN AND ELEVATION

KAM HWY SAFETY IMPROVEMENTS
 KAALAEA RD TO HAIHOLE VALLEY RD
 Proj. No. HE5-ROS-083-1(12)
 Scale: As Noted Date: FEB. 1983
 SHEET NO. 9 OF 14 SHEETS

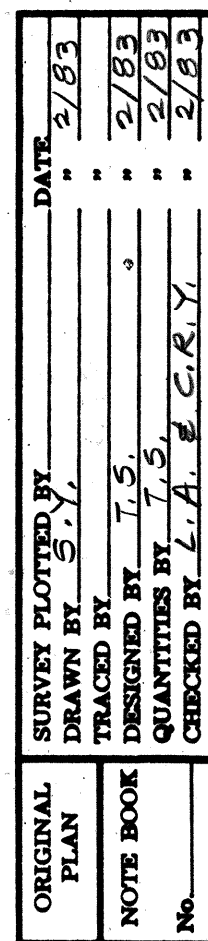
ORIGINAL PLAN	DATE
DESIGNED BY	4/83
DESIGNED BY	2/83
QUANTITIES BY	2/83
CHECKED BY	2/83
NO.	

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
LAND TRANSPORTATION FACILITIES DIVISION
END POST CONNECTION AT
WAIAHOLE BRIDGE & KAALAEA BRIDGE
KAM HWY SAFETY IMPROVEMENTS
KAALAEA RD. TO WAIAHOLE VALLEY RD.
Proj. No. HES-ROS-083-1(12)
Scale: As Noted Date: Feb. 1983
SHEET NO. 10 OF 14 SHEETS

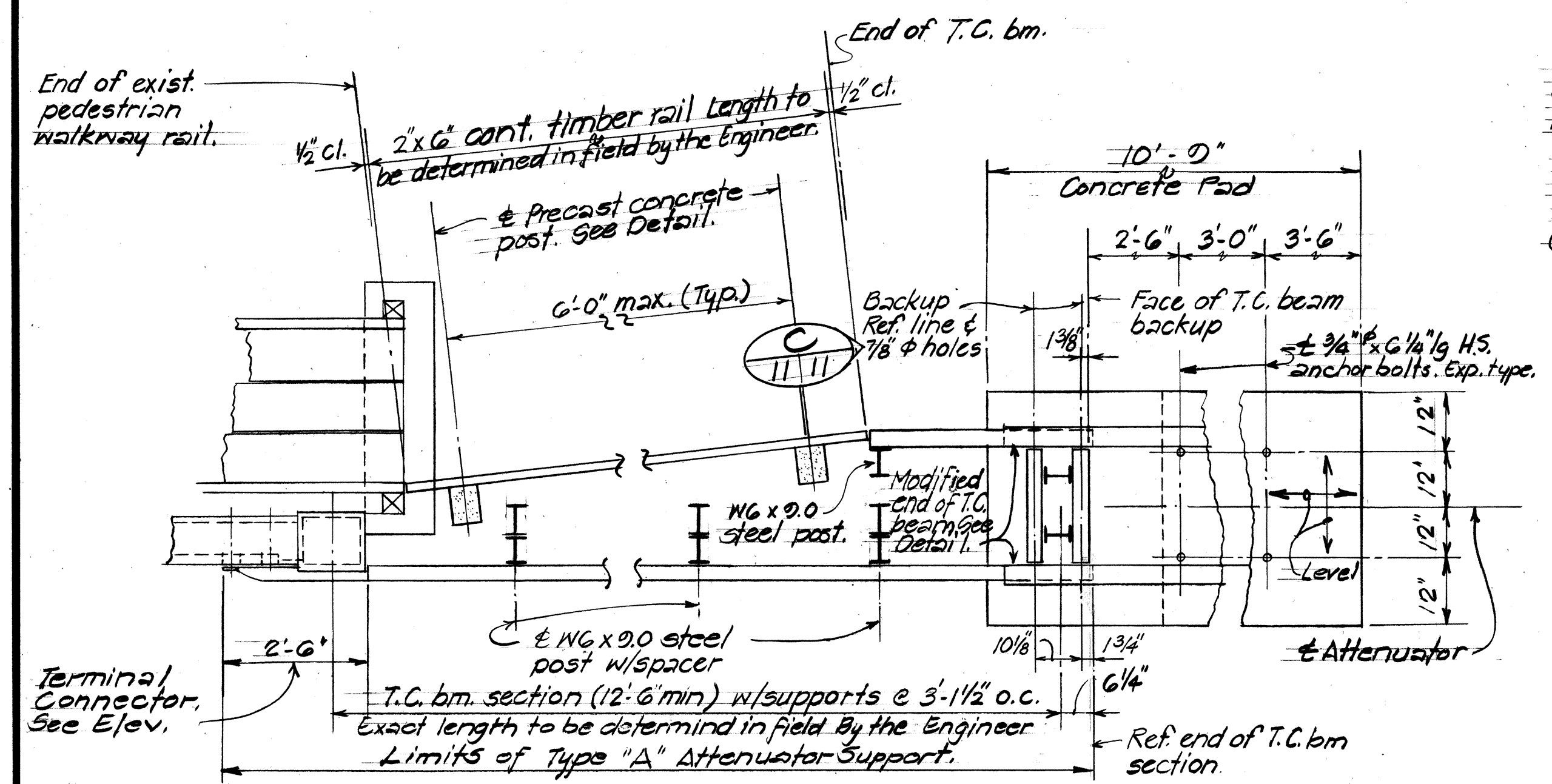


Note:

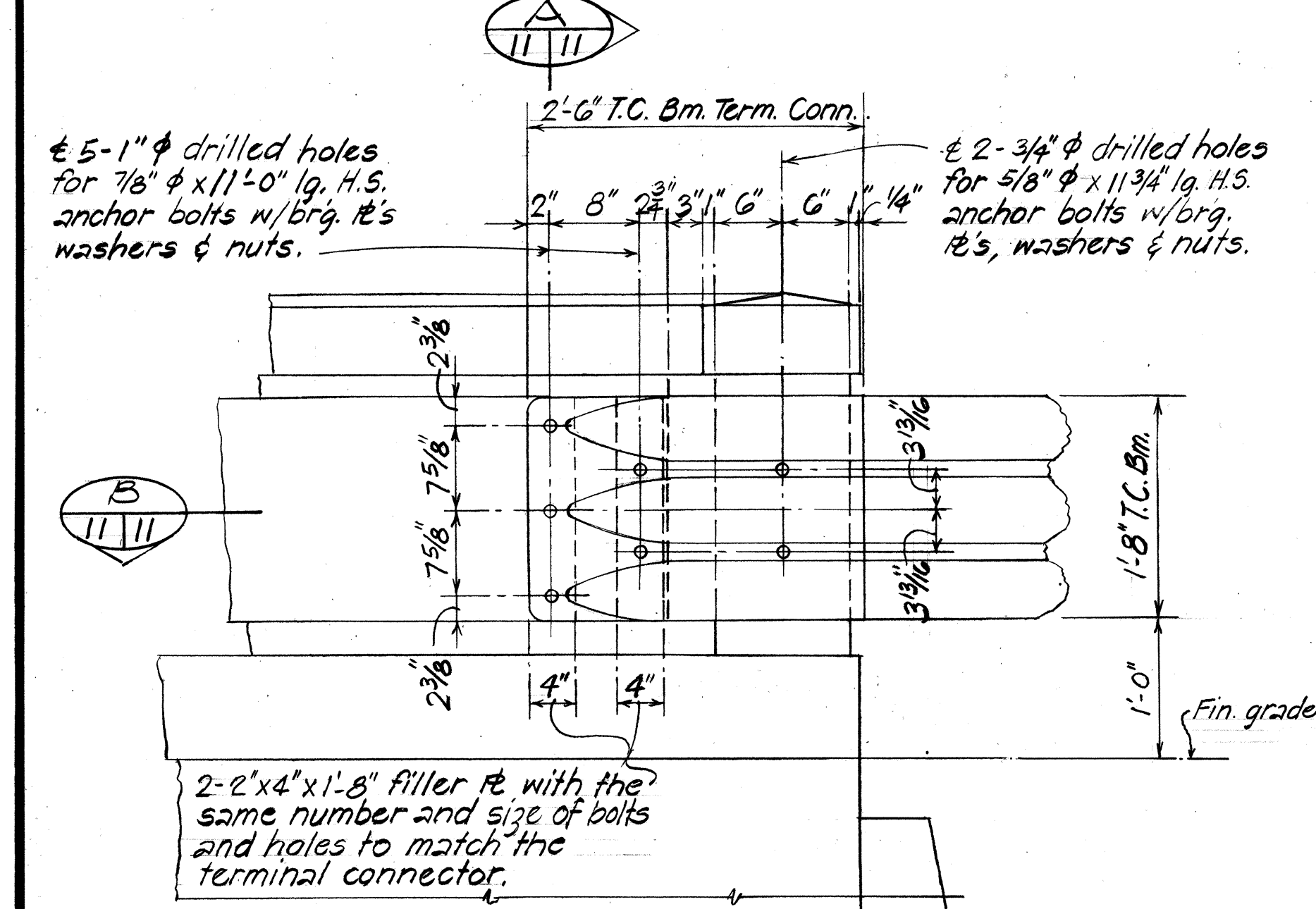
1. Type "A" or "B" refers to the support for attenuator system.
2. See sheets #11 & #12 for details.



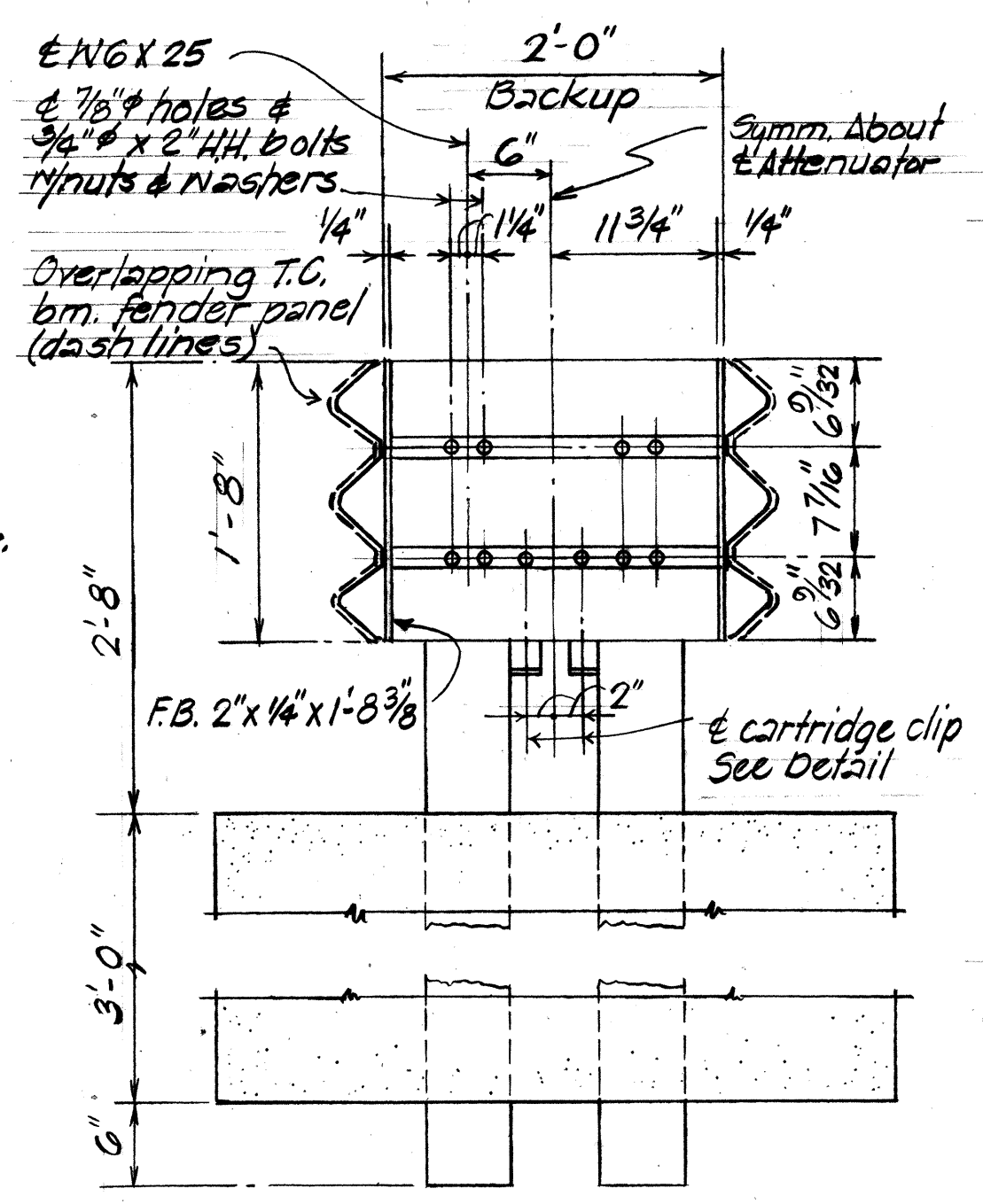
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	HES-R05-083-1(12)	1984	17	63



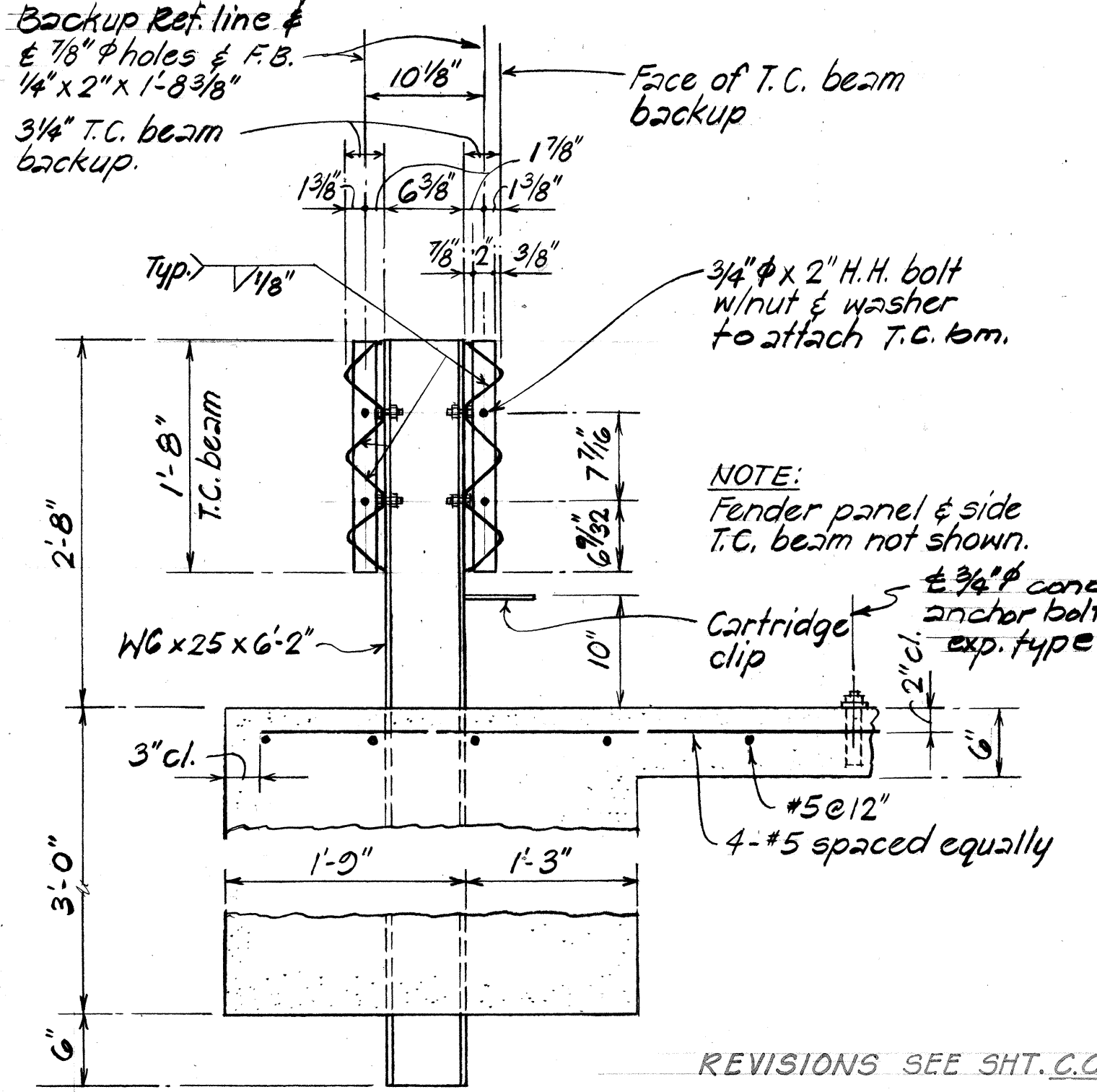
PLAN
Scale: 1/2" = 1'-0"



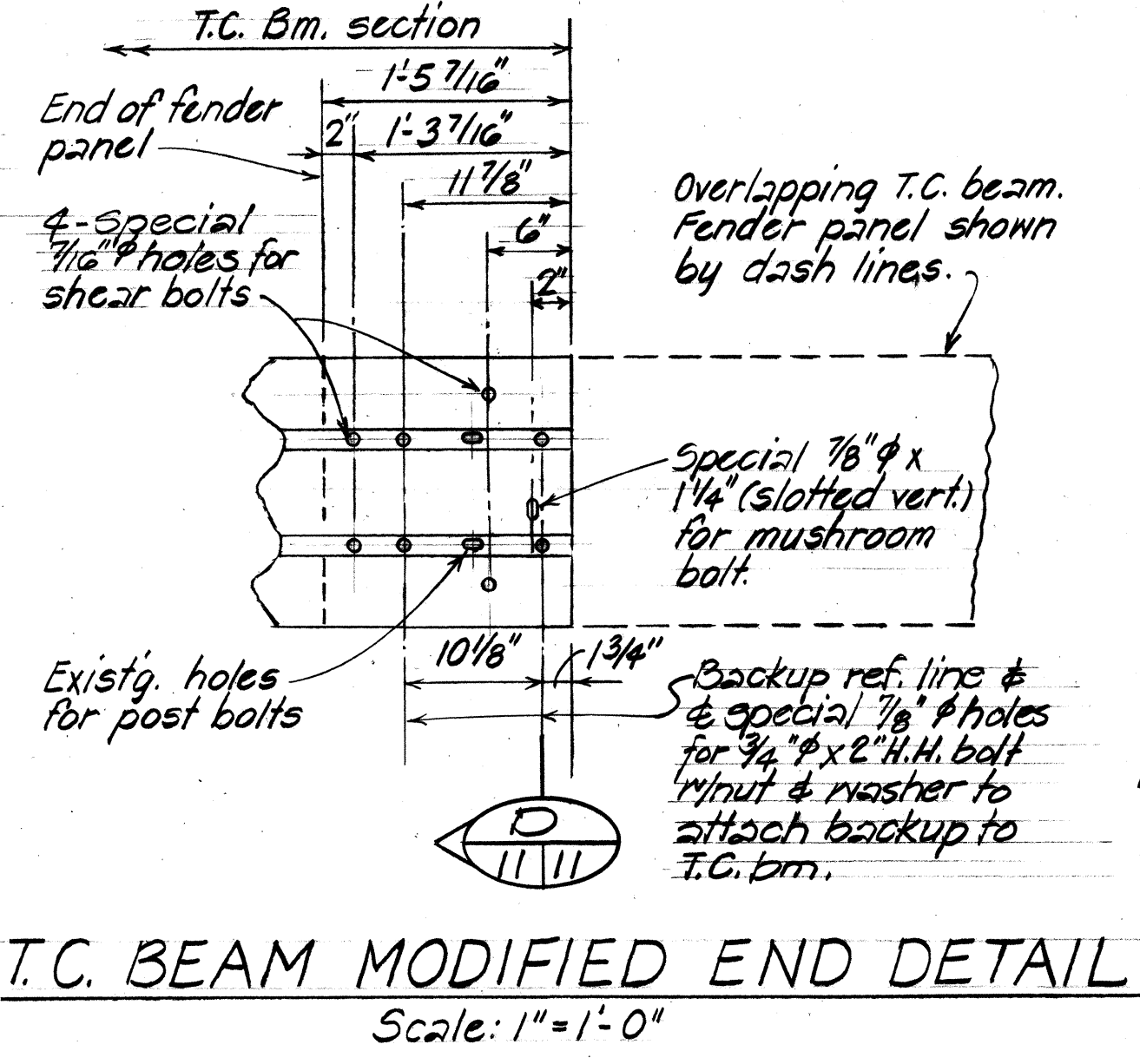
PARTIAL ELEVATION
Scale: 1" = 1'-0"



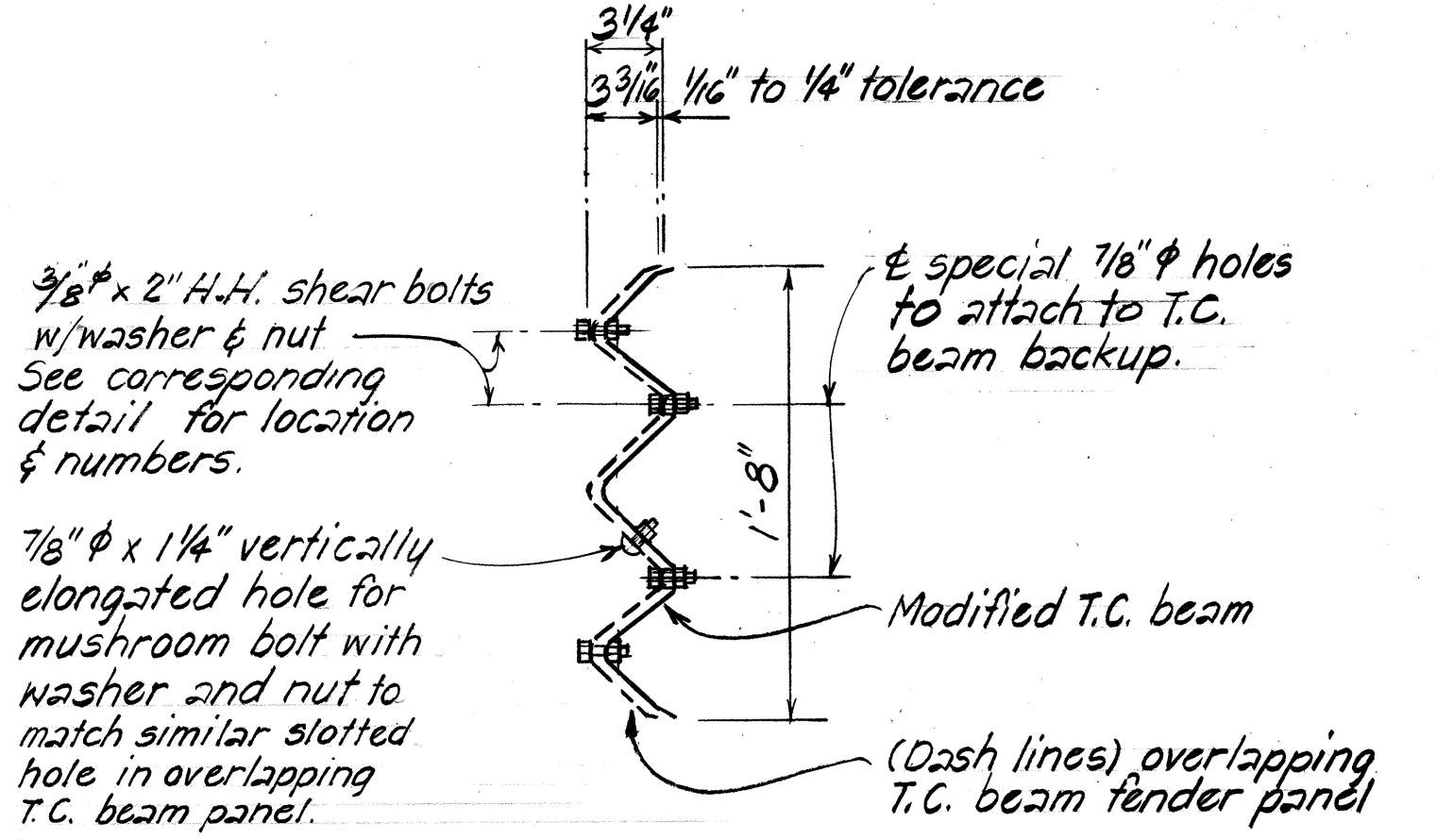
FRONT VIEW
T.C. BACKUP
Scale: 1" = 1'-0"



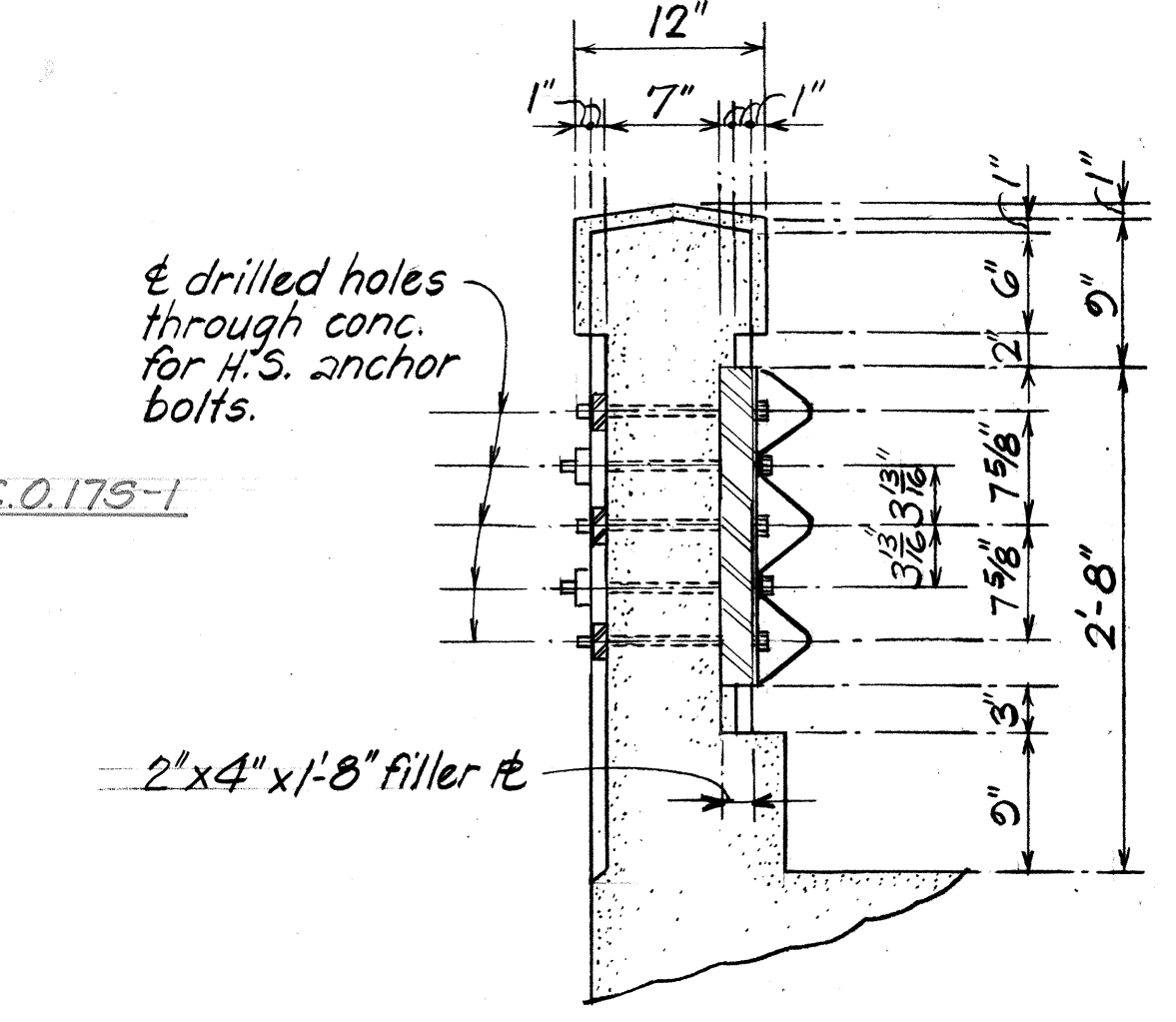
SIDE VIEW
T.C. BACKUP
Scale: 1" = 1'-0"



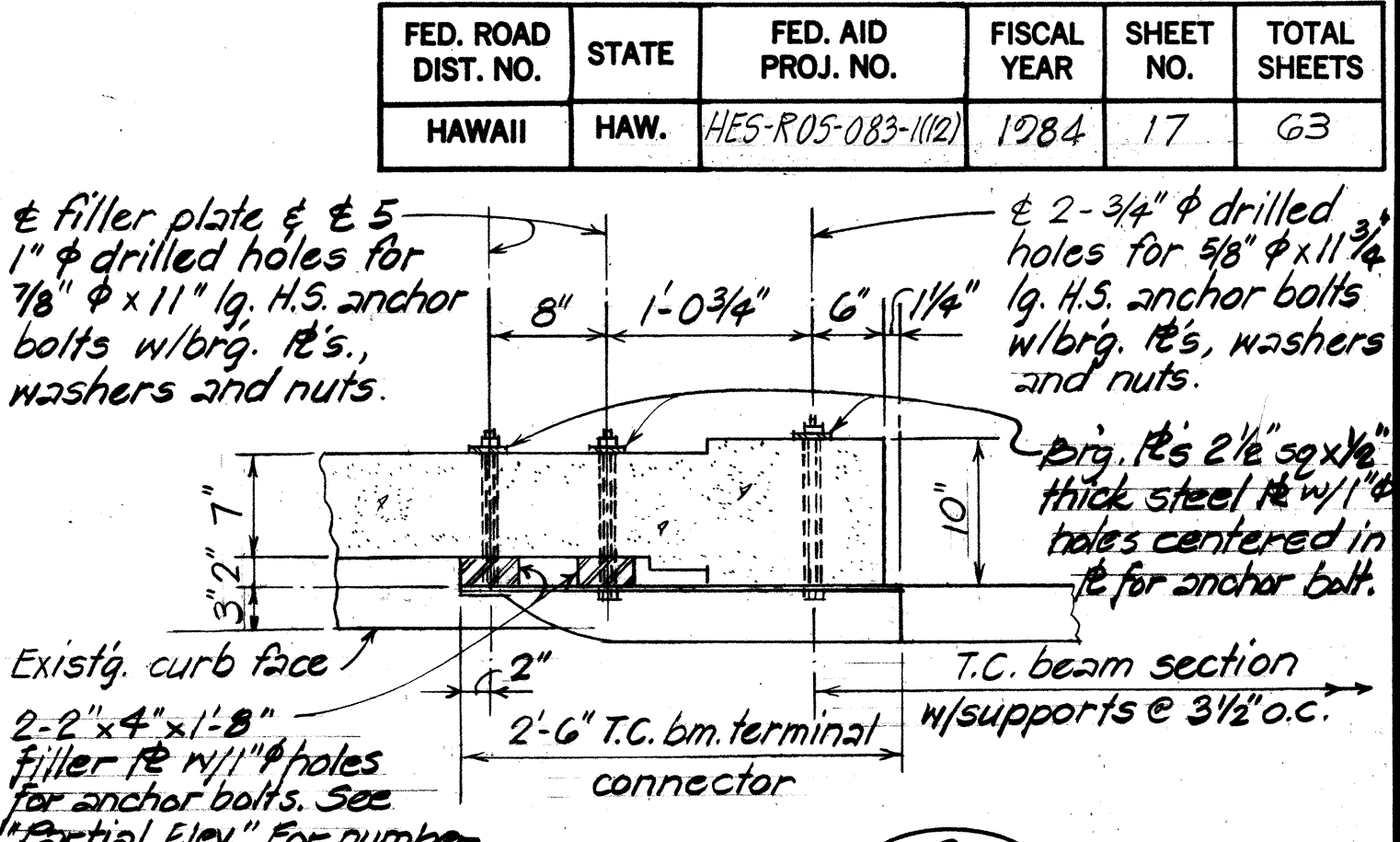
T.C. BEAM MODIFIED END DETAIL
Scale: 1" = 1'-0"



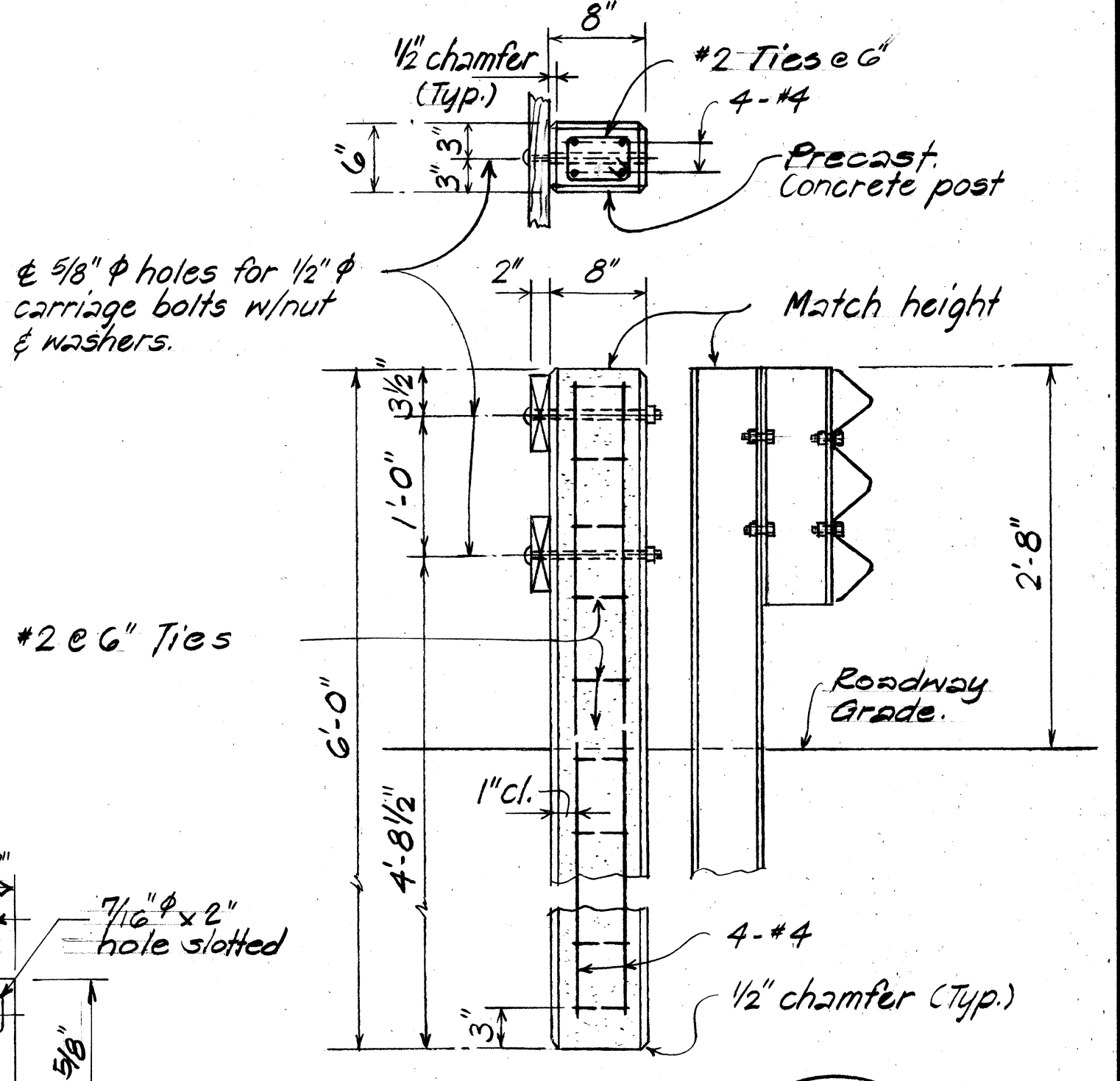
SECTION D
Scale: 3" = 1'-0"



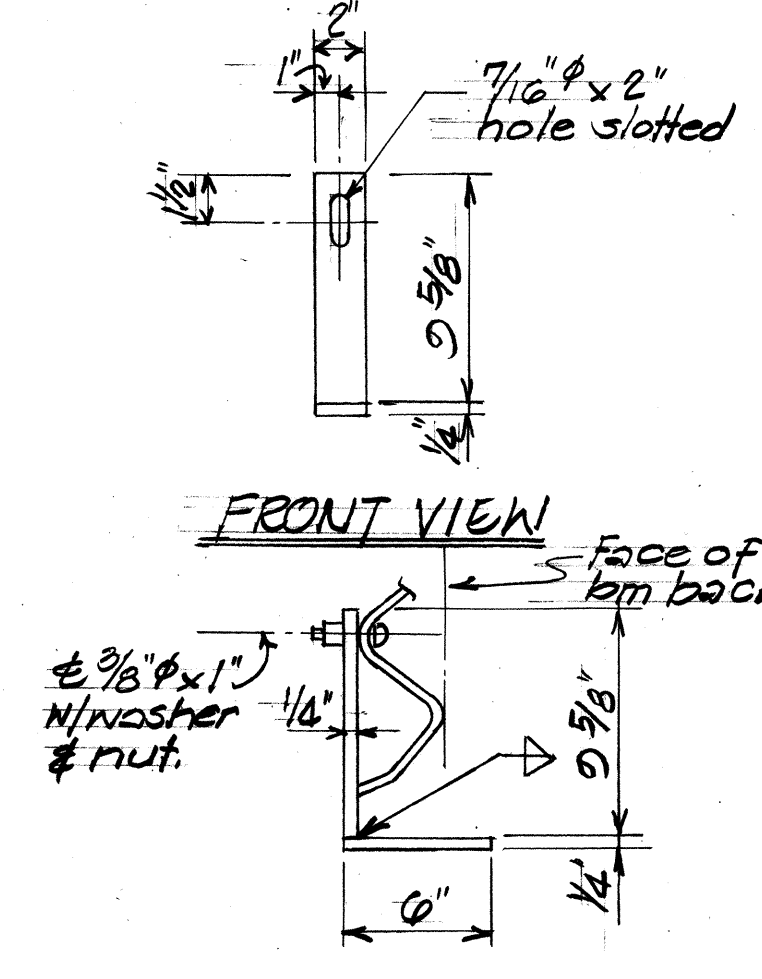
SECTION A
Scale: 1" = 1'-0"



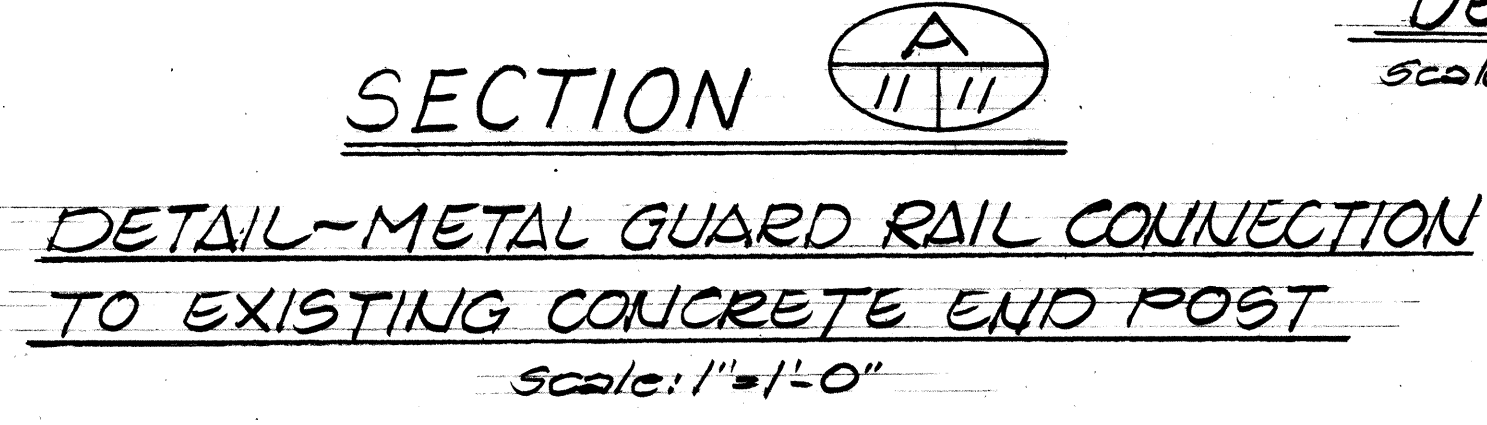
SECTION B
Scale: 1" = 1'-0"



SECTION C
Scale: 1" = 1'-0"



FRONT VIEW
CARTRIDGE CLIP DETAIL
Scale: 1 1/2" = 1'-0"



SECTION A
DETAIL-METAL GUARD RAIL CONNECTION TO EXISTING CONCRETE END POST
Scale: 1" = 1'-0"

- NOTES:**
1. Triple corrugated beam fender panel, back-up panel, and terminal connector shall conform to the requirements of AASHTO 180, Class B, Type 2.
 2. Bolts & nuts shall conform to the requirements of ASTM A325, A307 & A563, Grade A respectively, and shall be galvanized in accordance with the requirements of ASTM A153.
 3. Structural steel shall conform to the requirements of ASTM A36.
 4. Lumber shall be Douglas Fir, Select Structural grade, S4S and wolmanized.
 5. Holes drilled in corrugated beam in the field shall be sprayed with galvanizing compound.

6. Timber rail shall be painted 3 coats of oil based exterior white paint in accordance with the Standard Specifications.
7. Type "A" attenuator support system, including all appurtenances and required work shall be paid for per each.
8. Concrete pad for the impact attenuator unit, including site preparation, shall be paid for per each. Anchor bolts within the pad shall be incidental to the attenuator unit.
9. Damages to any facilities, due to the Contractors operation, shall be repaired at his expense to the satisfaction of the Engineer.

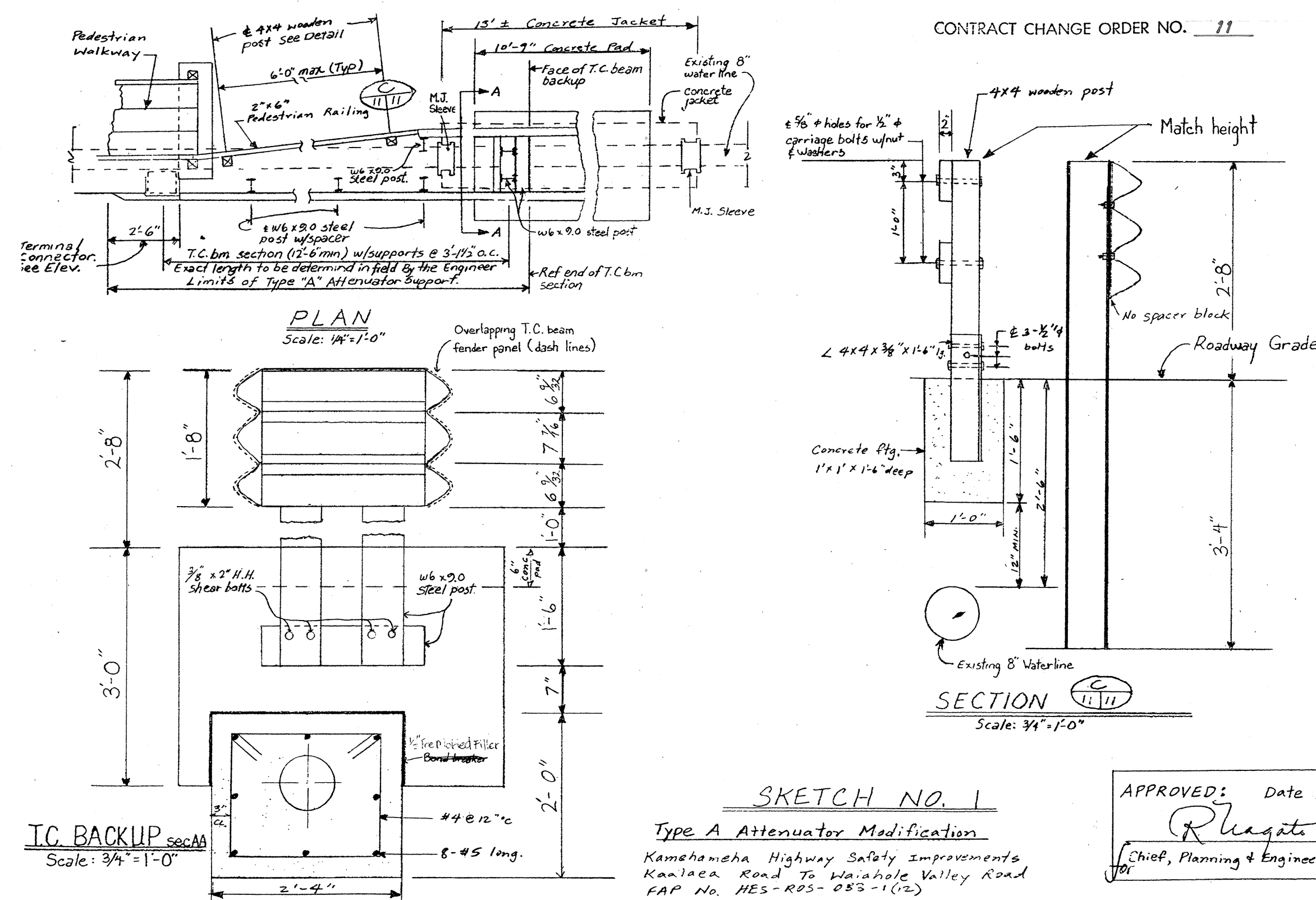
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
LAND TRANSPORTATION FACILITIES DIVISION

TYPE "A"
SUPPORT FOR ATTENUATOR

KAM HAY SAFETY IMPROVEMENTS
KAALAE RD. TO NAIHAOLE VALLEY RD.
Proj. No. HES-R05-083-1(12)
Scale: As Shown Date: Feb. 1983
SHEET NO. 11 OF 14 SHEETS

DATE	2/18/83
DRAWN BY	T.K.M. & S.Y.
TRACED BY	T.K.M. & S.Y.
DESIGNED BY	T.K.M. & S.Y.
CHECKED BY	T.K.M. & S.Y.
APPROVED BY	T.K.M. & S.Y.

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	HES-ROS- 083-1(12)	1984	CC0179-1	63



SKETCH NO. 1
Type A Attenuator Modification
Kamehameha Highway Safety Improvements
Kaalaea Road To Waiahole Valley Road
FAP No. HES-RPS-083-(12)

APPROVED: Date 7/18/86
R. Magato
 Chief, Planning & Engineering, BWS
 for #

Note: This tracing prepared during "As-Built" posting

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TYPE "A"

SUPPORT FOR ATTENUATOR

KAM HWY SAFETY IMPROVEMENTS
KAALAEA RD. TO WAIHAOLE VALLEY RD.
PROJ. NO. HES-ROS-083-1(12)

Scale: As Noted Date: July, 1986

SHEET No. 1 OF 1 SHEETS

CCO17S-1

[illegible]

#5 - 1" ϕ holes for $\frac{1}{2}$ " ϕ 4.2 anchor bolts. See "Elevation" for spacing.
 2'-7" Conc. Buttress
 1'-4 $\frac{3}{8}$ " B"
 2-#5 $\sqrt{}$ top
 #4 safe @ 0"
 3-#5 $\times$ 1'-8" lg
 1'-11" See Sect. (1712)
 1'-0" See Sect. (1712)
 #4 - 3/4" ϕ bolts. See "Front View"
 6" embed
 1" 6" 3" 2" c/l (TYP)
 #40 @ 0" cl. ties
 1'-0"
 1" preformed ft. filler.
 Exist. bridge rail.
 #5 cont. vert. bars. See Sect. (1712) for arrangement and number of bars.
 Top of curb
 Roadway finish grade
 9-#4 $\times$ 3'-4" lg vert. bars. See Sect. (1712) for location.

Ref. face of buttress.
 1'-3" 1'-5" 1" Premolded jt filler
 3-#5 x 1'-8" lg spaced equally.
 #4 set @ 0"
 4-3/4" x 7" lg H.S. anchor bolts.
 1" holes for A.B.
 2'-0" buttress 12" 1/2" 7 1/4" 256t 3/4" 3/4"
 Attenuator
 8" 10-#5 cont. vert. bars spaced as shown.
 curb face

Ref. face of conc buttress.

$\pm 1/8"$ ϕ holes for $3/4"$ $\times$ 2" lg H.H. bolts w/ nut & washer for attaching to T.C. brn backup.

T.C. brn backup. See Detail

4'-6" Fender Panel

2'-7"

1'-2"

Conc. Buttress

1'-4 3/8"

8" 3 3/8"

1 1/8"

3 3/8"

27 1/2"

2 3/8"

$\pm 3/8"$ ϕ $\times$ 2" lg. H.H. shear bolts

Match height with exist.

$\pm 5-7/8"$ ϕ $\times$ 1'-4" lg #5 anchor bolts

7"

2'-1"

Top of curb

Roadway finish grade

9"

1'-5"

12"

5"

1" premolded ft. filler between exist. bridge & new conc. pour.

6"

1'-6"

2'-6"

2'-6" modified T.C. brn terminal connector

4- #5 spaced equally.

#5 @ 12"

3'-0" (typ)

$\pm 3/4"$ ϕ $\times$ 6 1/4" H.S. anchor bolts, exp. type.

10'-6 1/4" Concrete Pad

[illegible]

Reference:
1. Refer to Sheets 11 & 13 for applicable notes.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
LAND TRANSPORTATION FACILITIES DIVISION

TYPE "B"

SUPPORT FOR ATTENUATOR

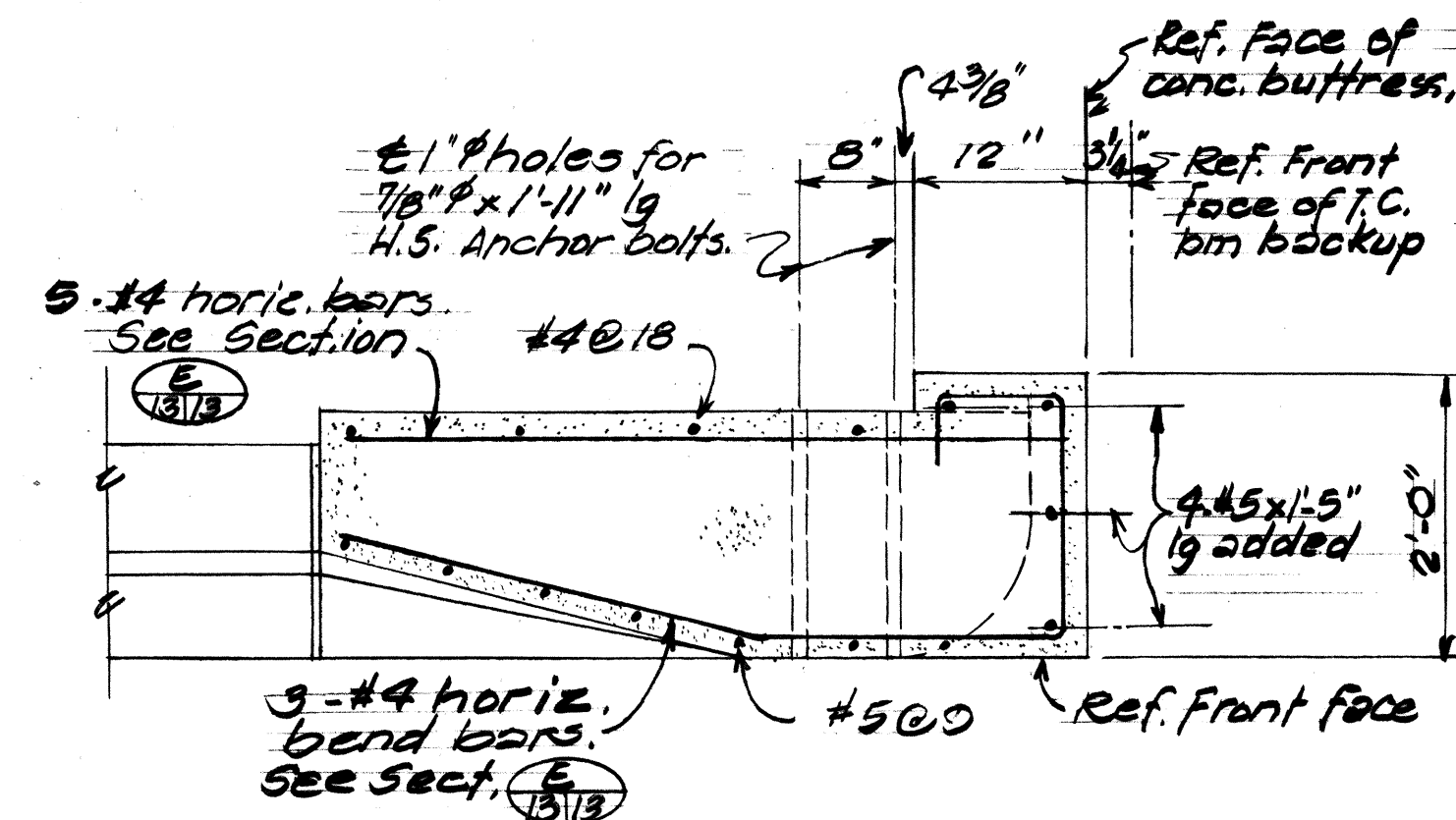
KAM. HWY. SAFETY IMPROVEMENTS
KAA LAEA RD TO WAI'AHOLE VALLEY RD
Proj. No. HES-ROS-083-1(1/2)
Scale: As Noted Date: Feb. 1983

SHEET NO. 12 OF 14 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	HES-R05-083-1(12)	1984	19	63

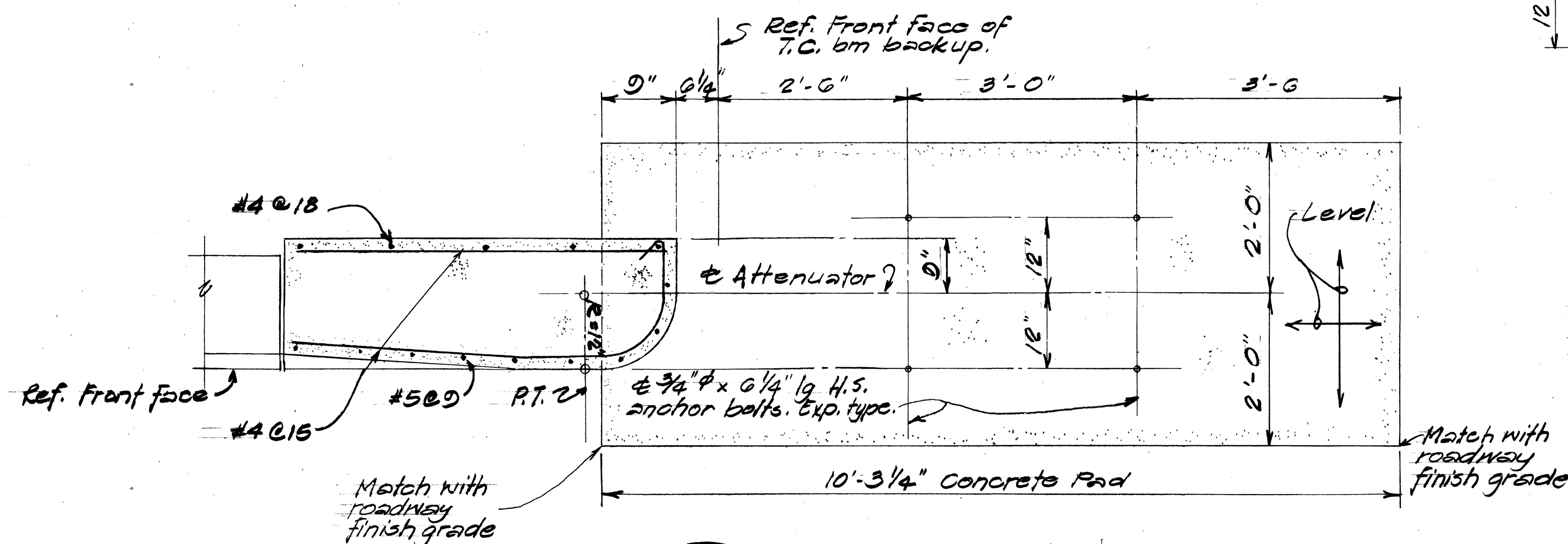
NOTES

- Concrete shall be Class A.
- Reinforcing steel shall conform to the requirements of ASTM A615 Grade 40.
- The concrete buttress for the impact attenuator units, including anchor bolts, structural steel plates and bars, triple corrugated (T.C.) beam elements, modified T.C. beam terminal connectors, and other appurtenances shall be paid for per each.
- Concrete pads for the impact attenuator units shall be paid for per each. Anchor bolts within pads shall be incidental to the attenuator system.



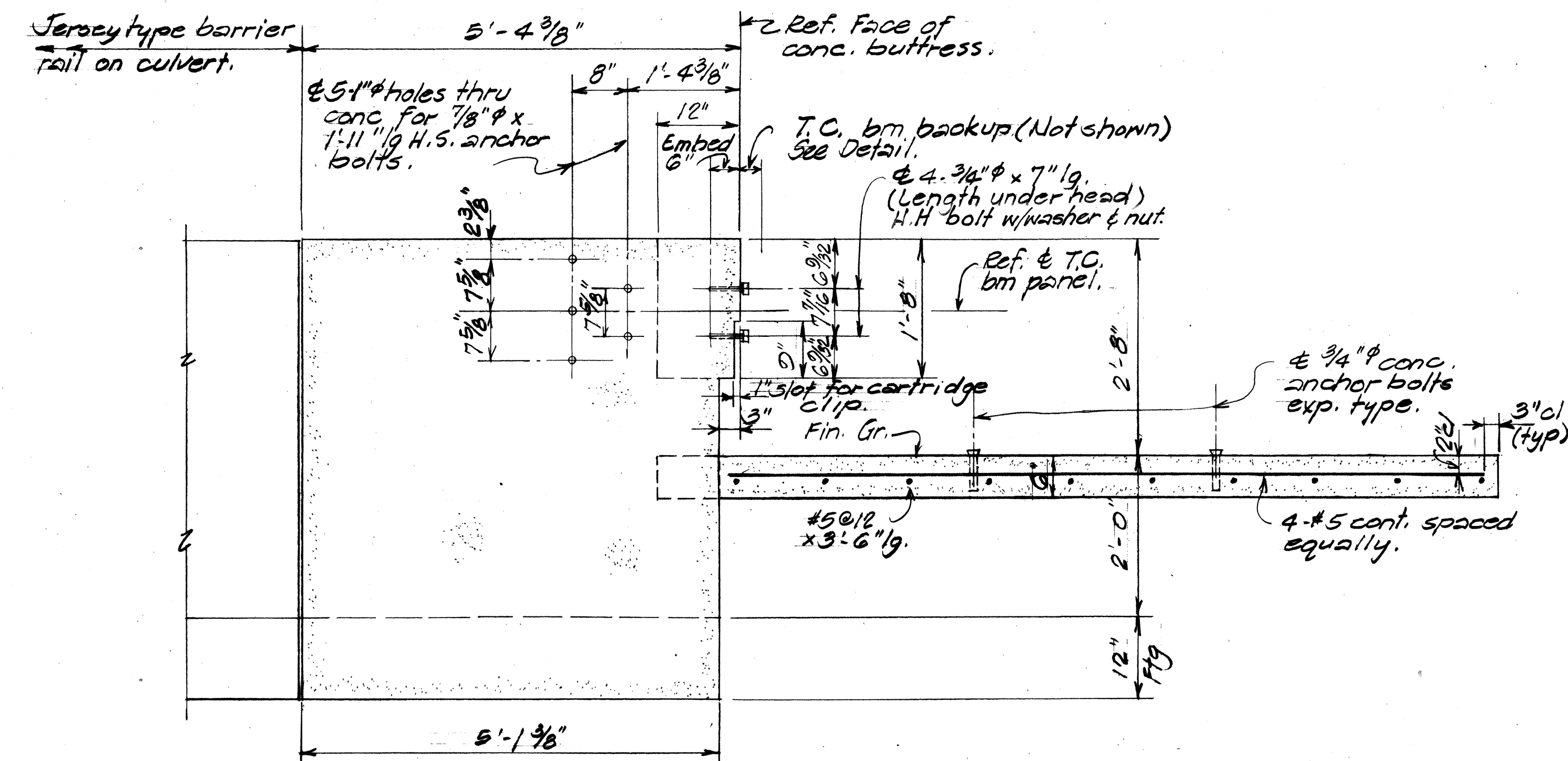
SECTION 13/13

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



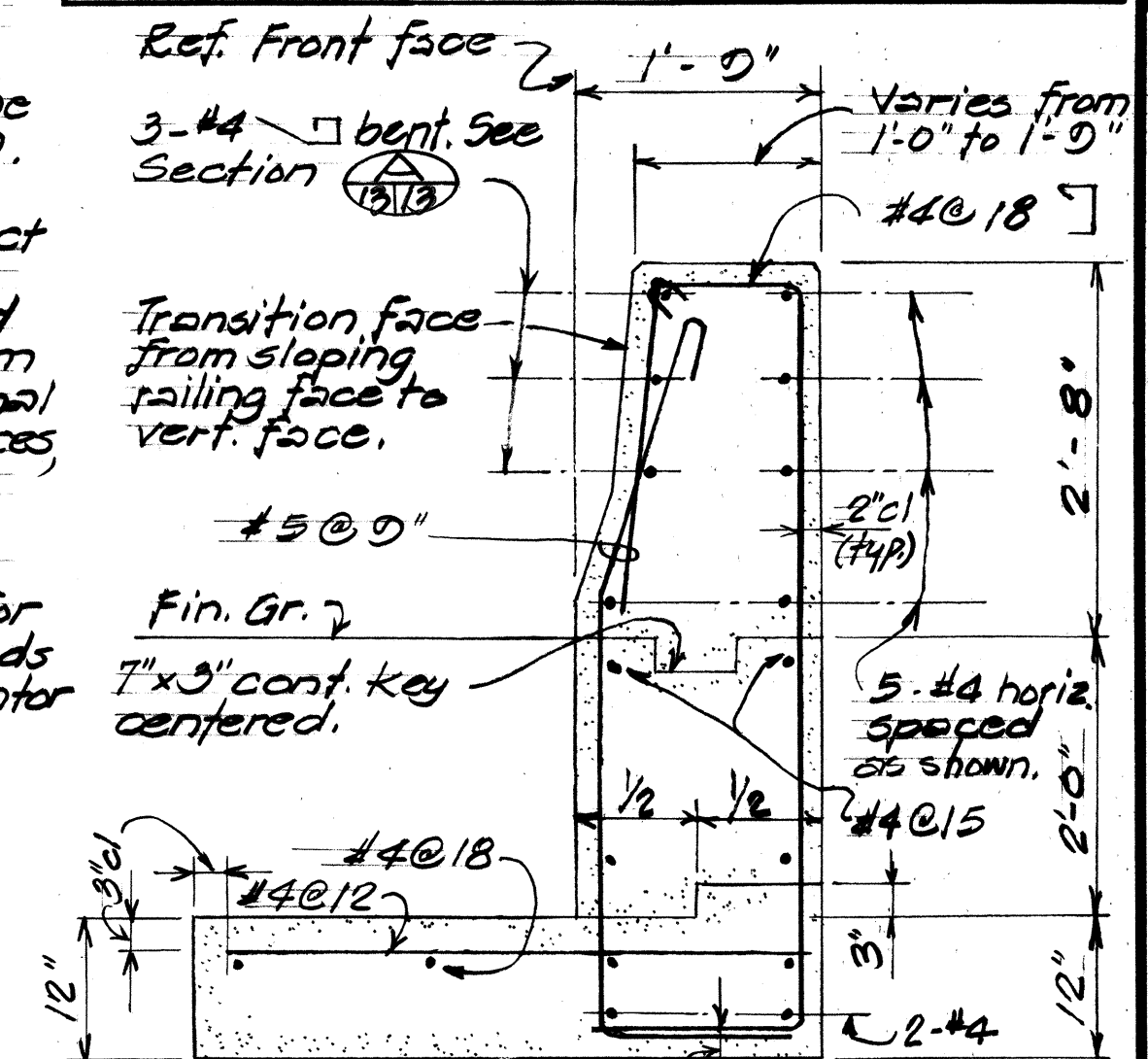
SECTION 13/13

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



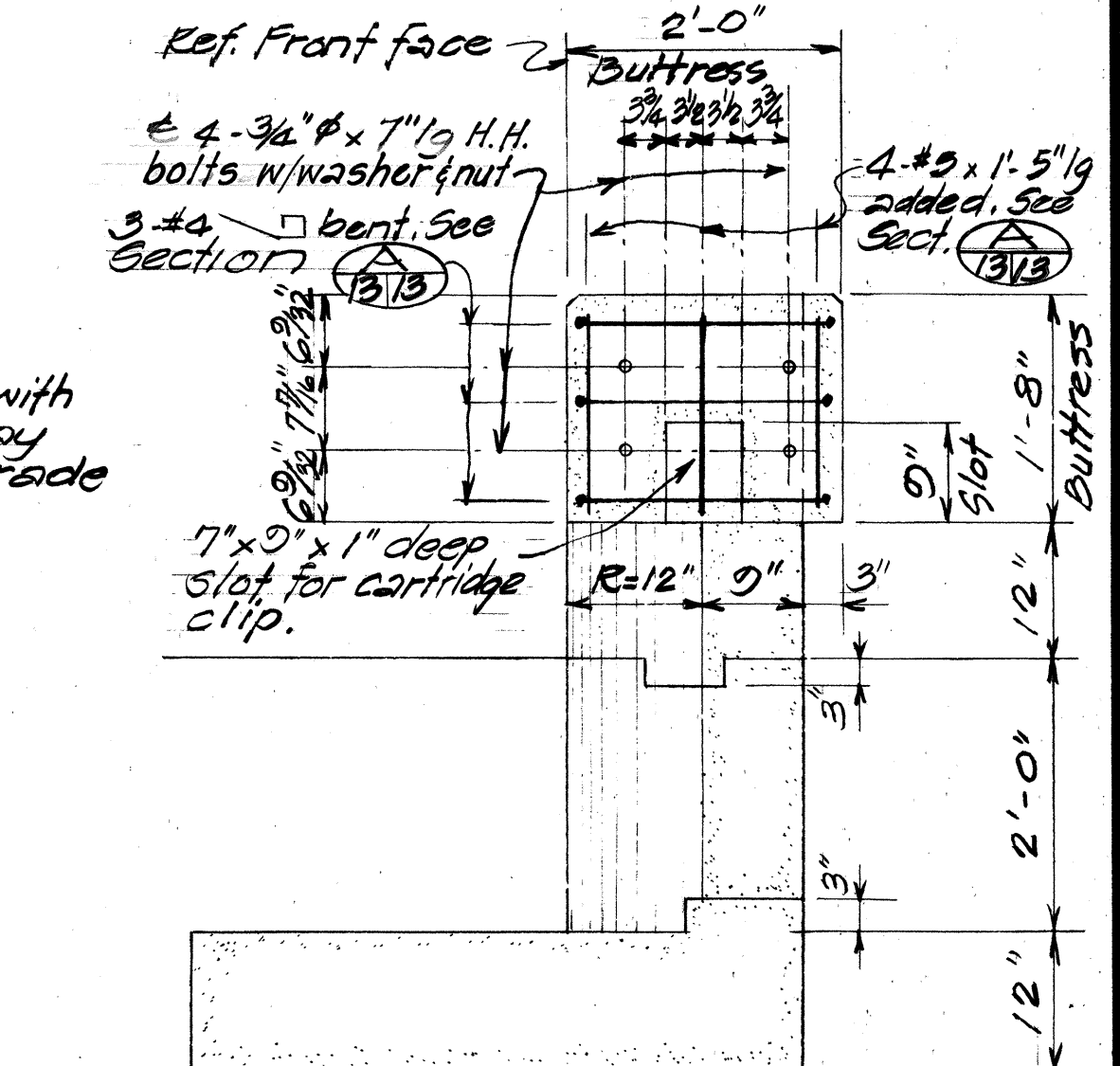
SECTION 13/13

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



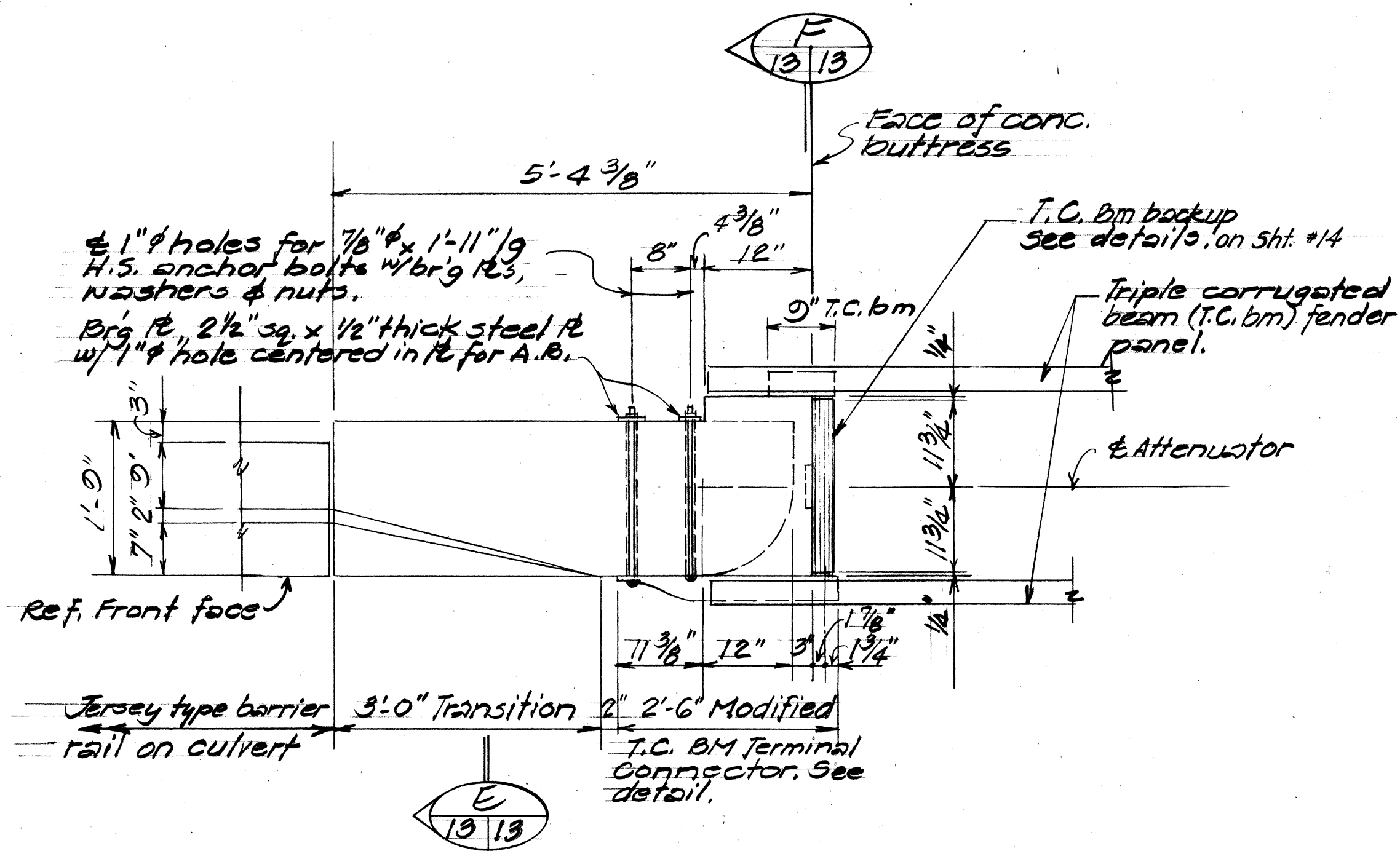
SECTION 13/13

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



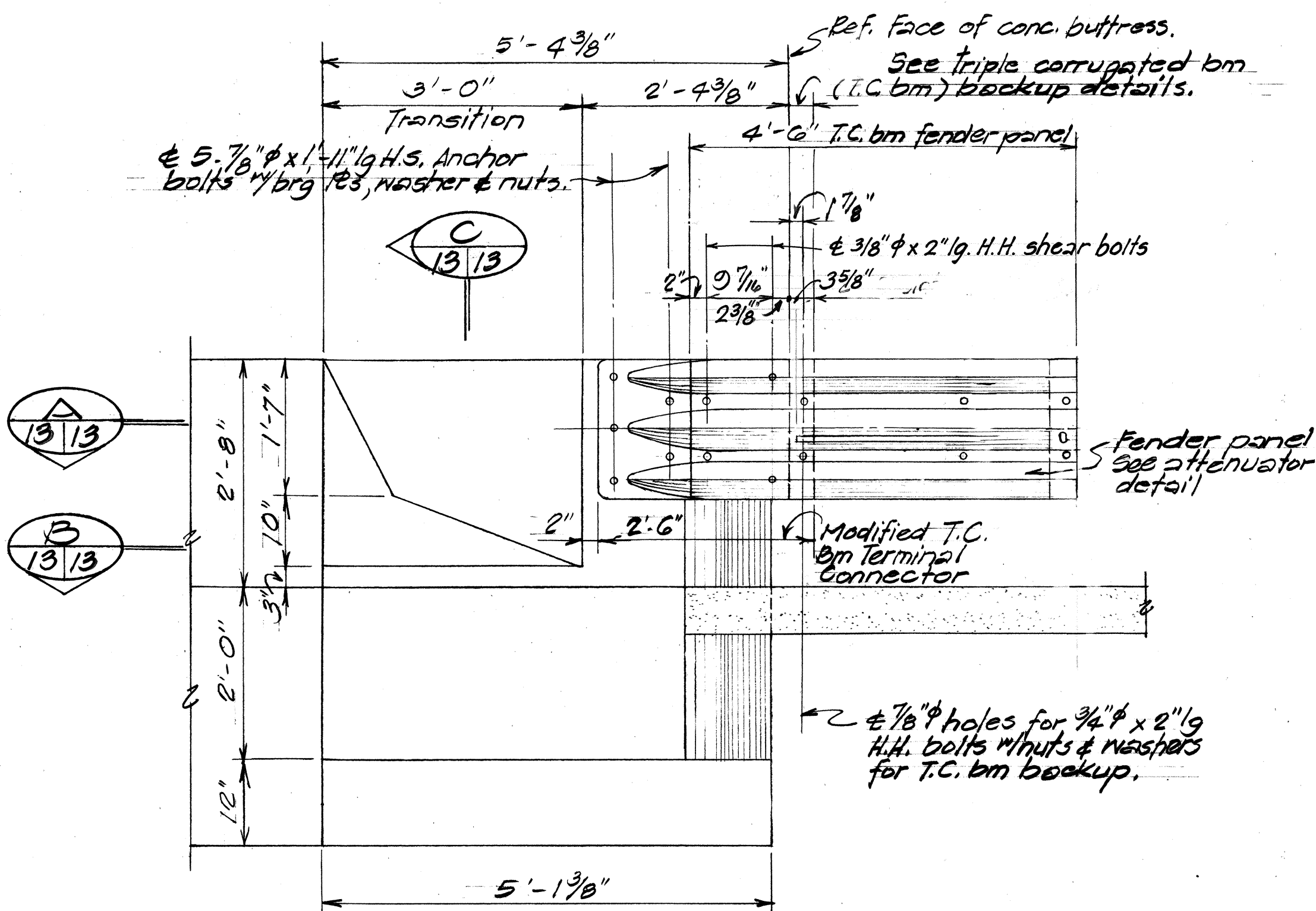
SECTION 13/13

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



PLAN 13/13

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

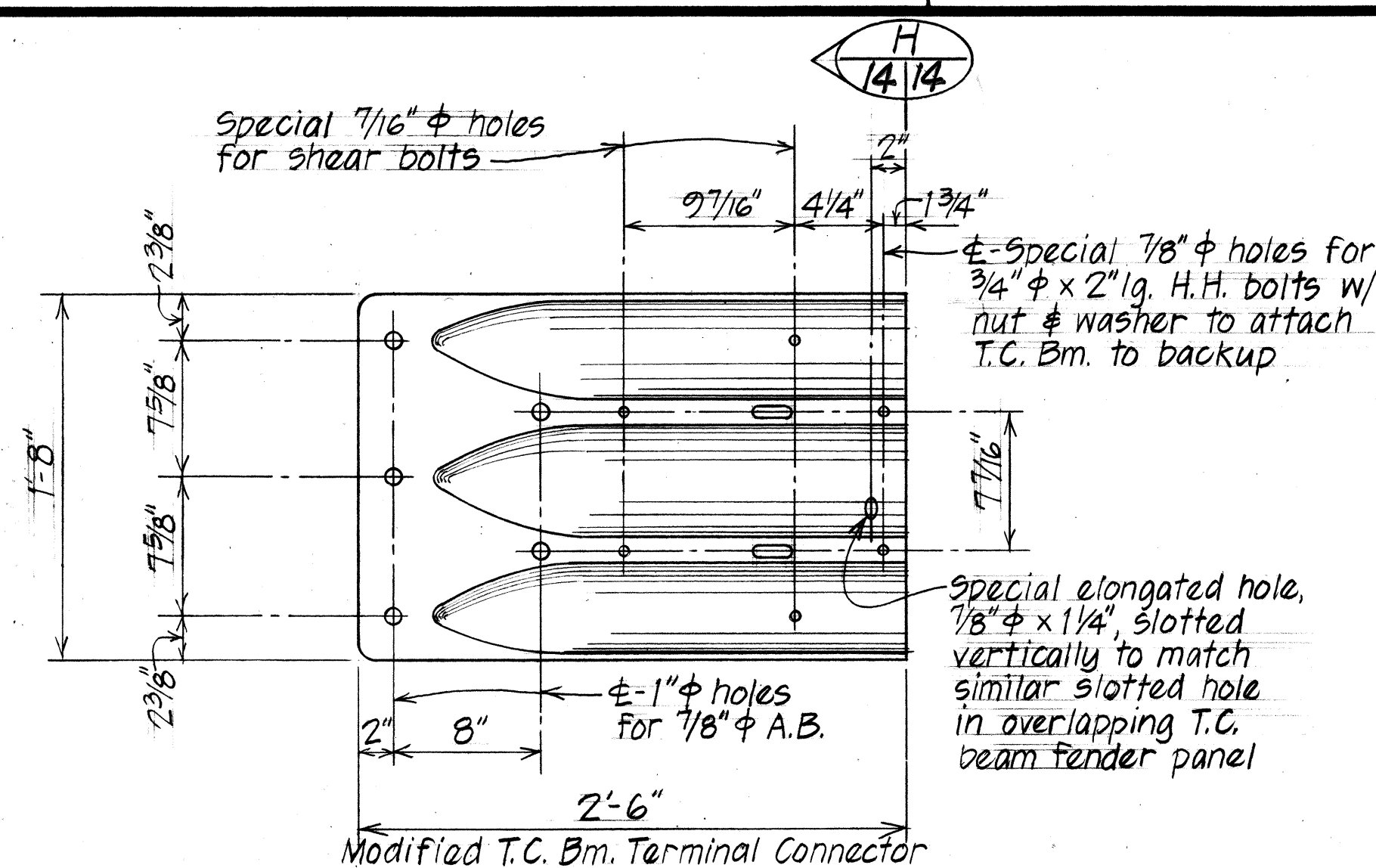


ELEVATION 13/13

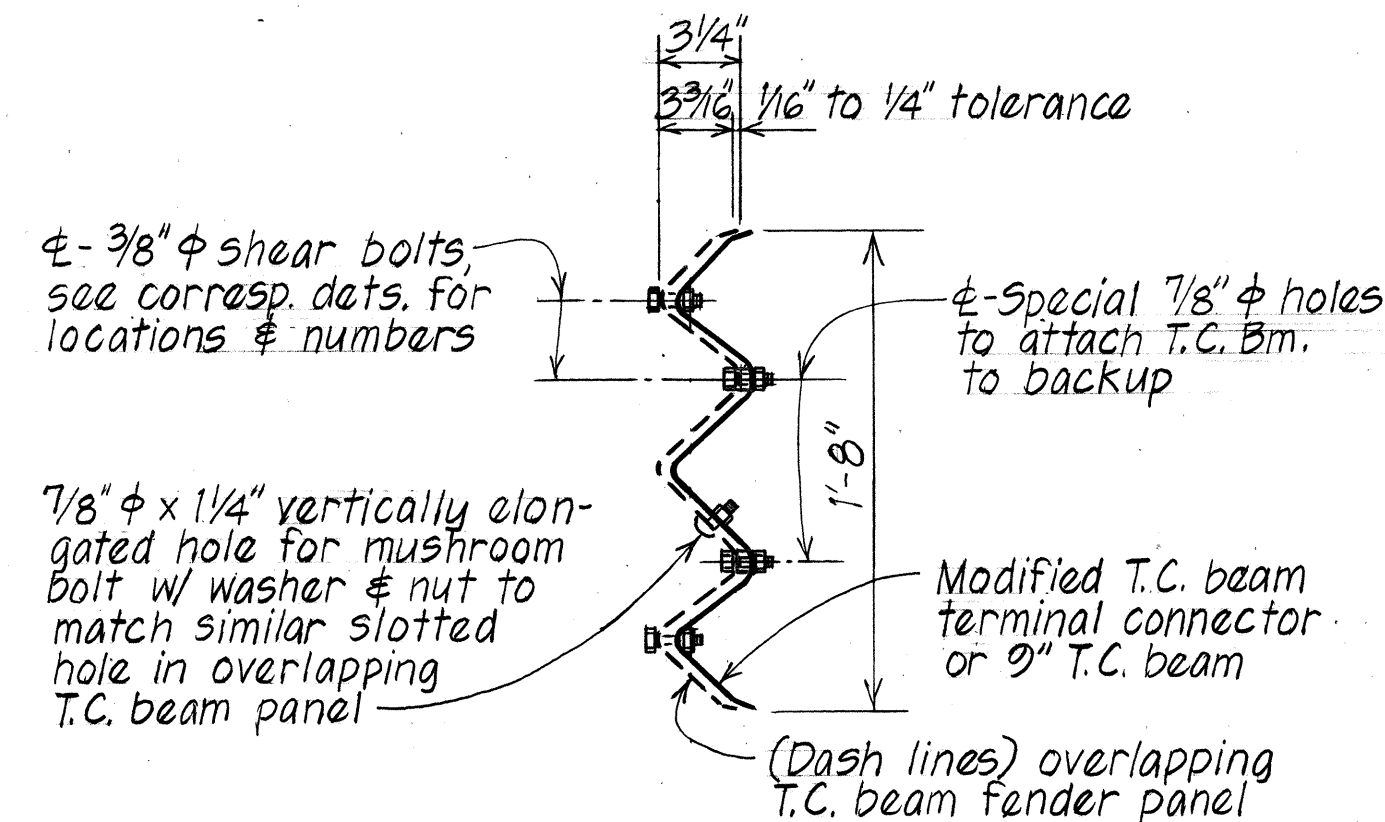
Scale: 3/4" = 1'-0"

STATE OF HAWAII DEPARTMENT OF TRANSPORTATION LAND TRANSPORTATION FACILITIES DIVISION
TYPE "C"
SUPPORT FOR ATTENUATOR
KAM. HNN. SAFETY IMPROVEMENTS KAALAEA RD TO WAIHOLE VALLEY RD Proj. No. HES-R05-083-1(12) Scale: As Noted Date: Feb. 1983
SHEET NO. 13 OF 14 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	4E5-R05-083-1(12)	1984	20	63

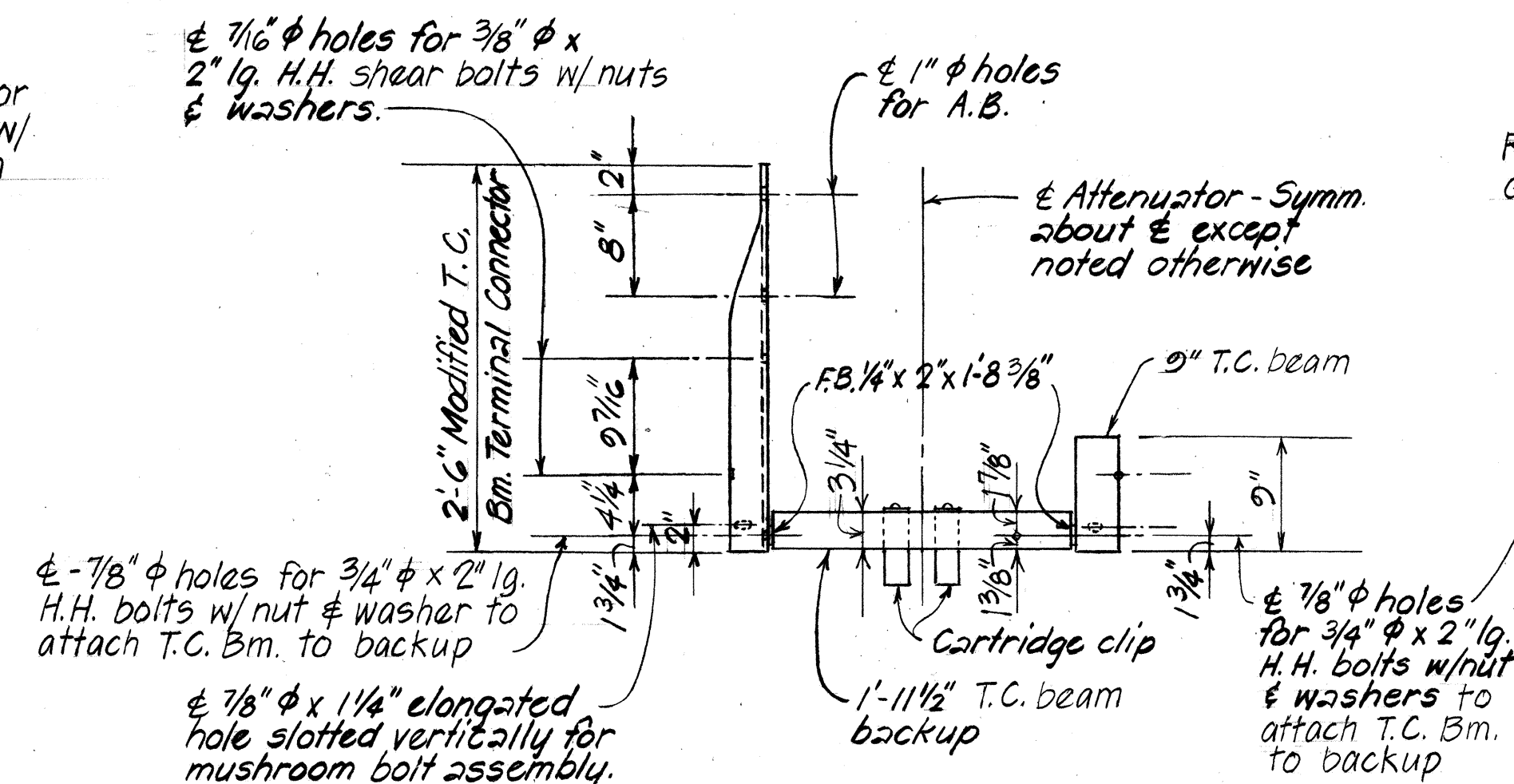


ELEVATION
Scale: 1 1/2" = 1'-0"

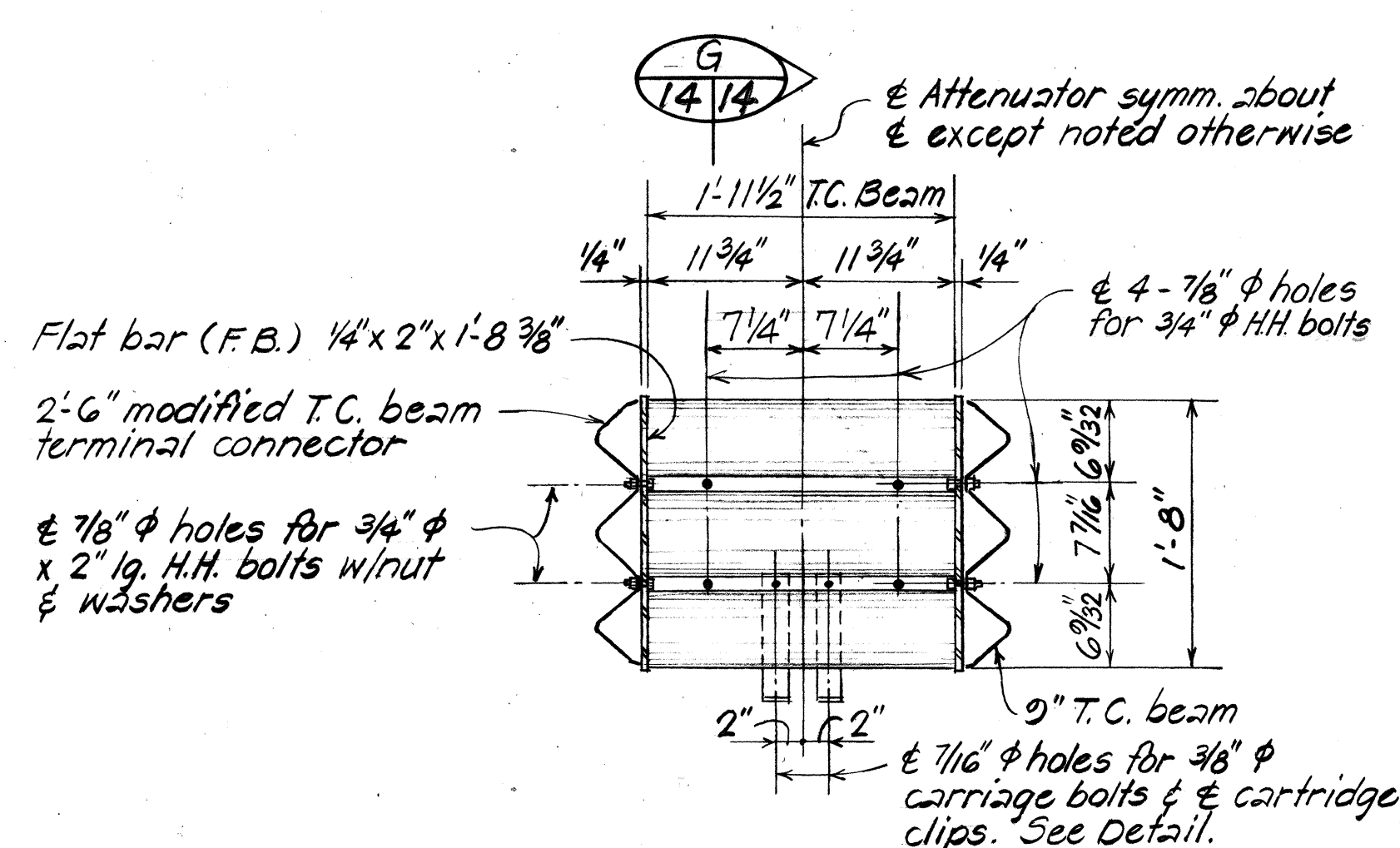


SECTION H
14/14 AT MODIFIED T.C. BEAM TERMINAL CONNECTOR

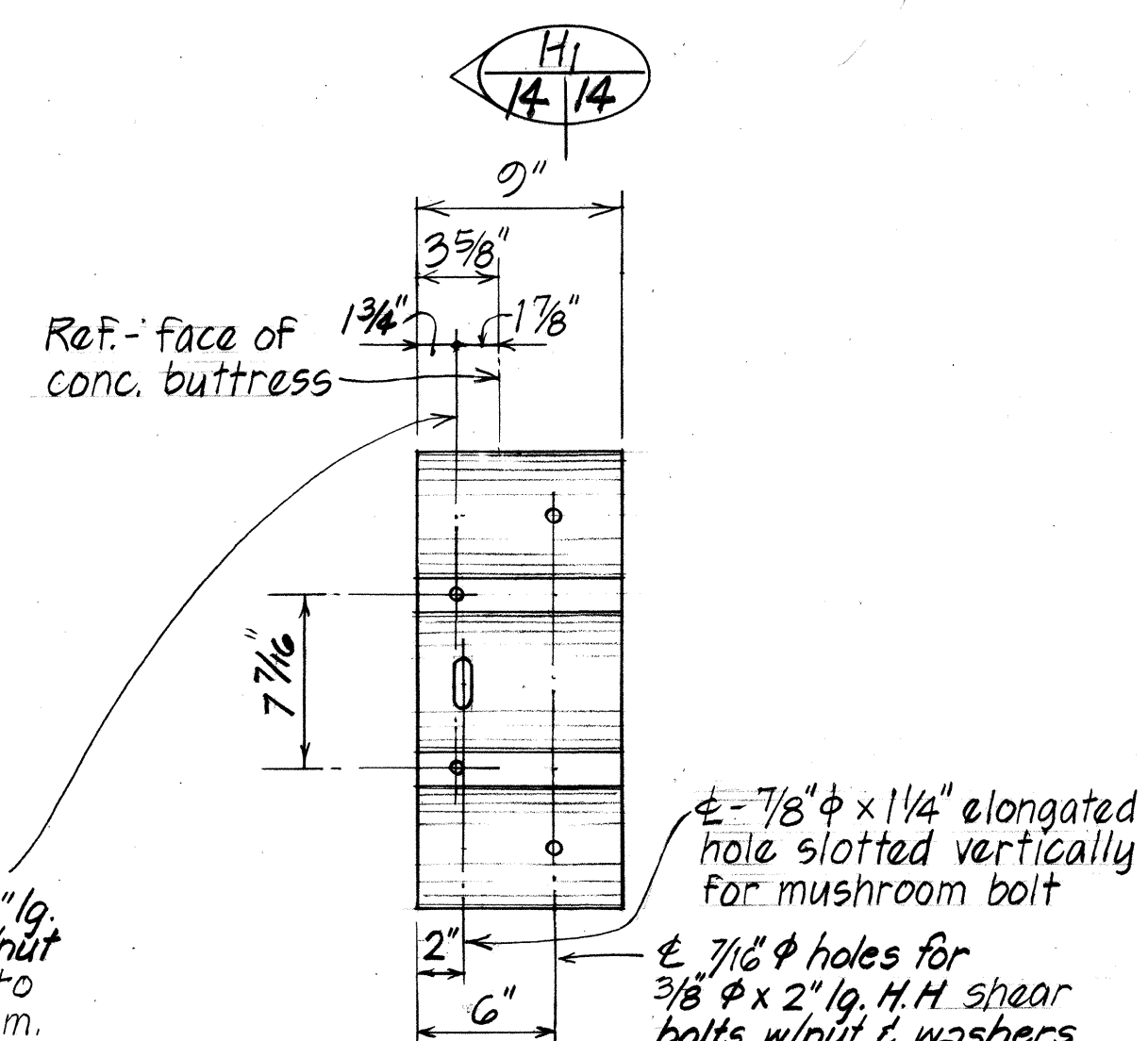
SECTION H1
14/14 AT 9" T.C. BEAM
Scale: 1 1/2" = 1'-0"



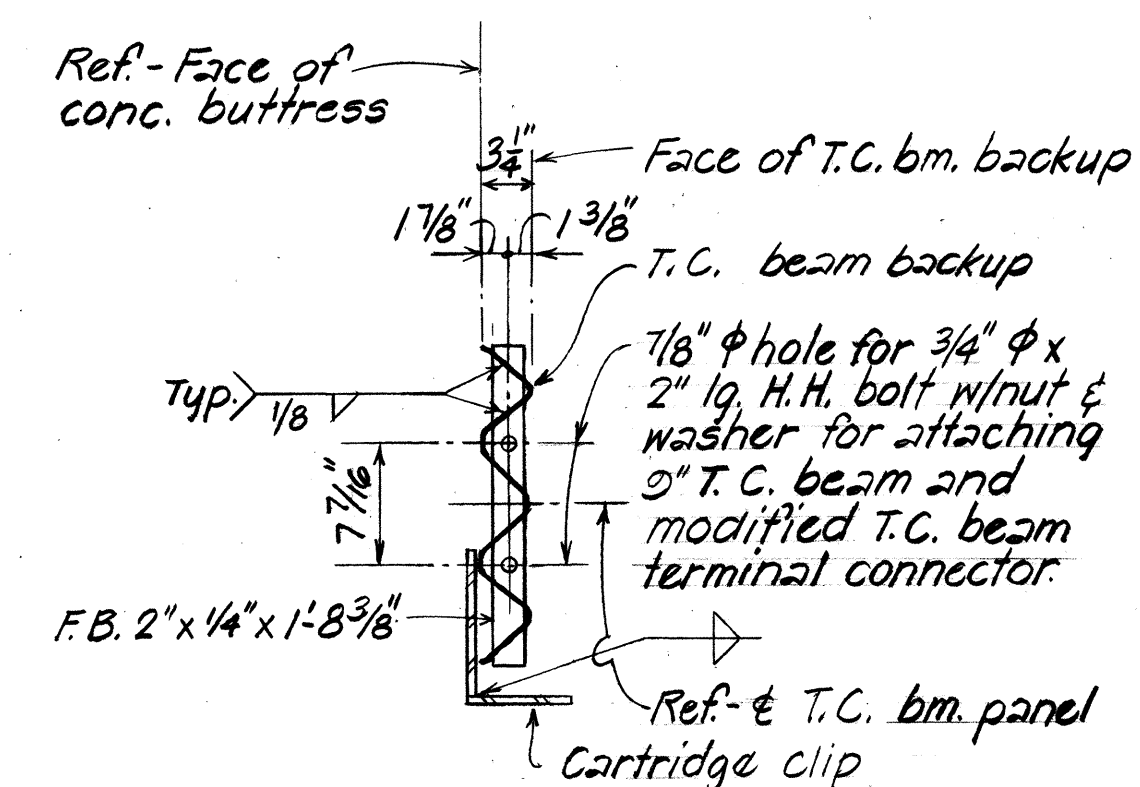
PLAN
Scale: 1" = 1'-0"



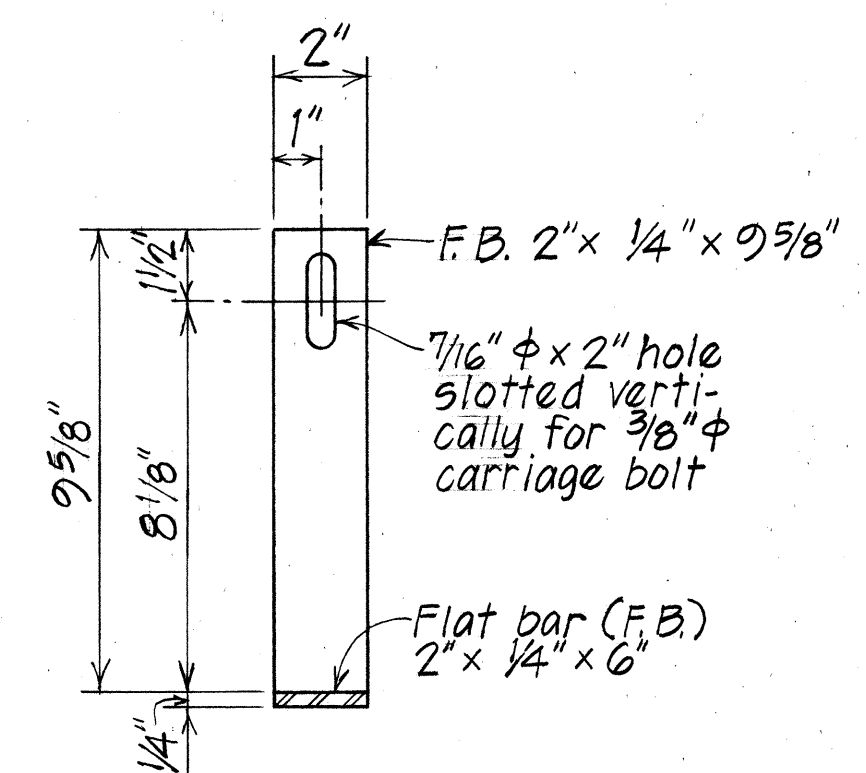
FRONT VIEW
Scale: 1" = 1'-0"



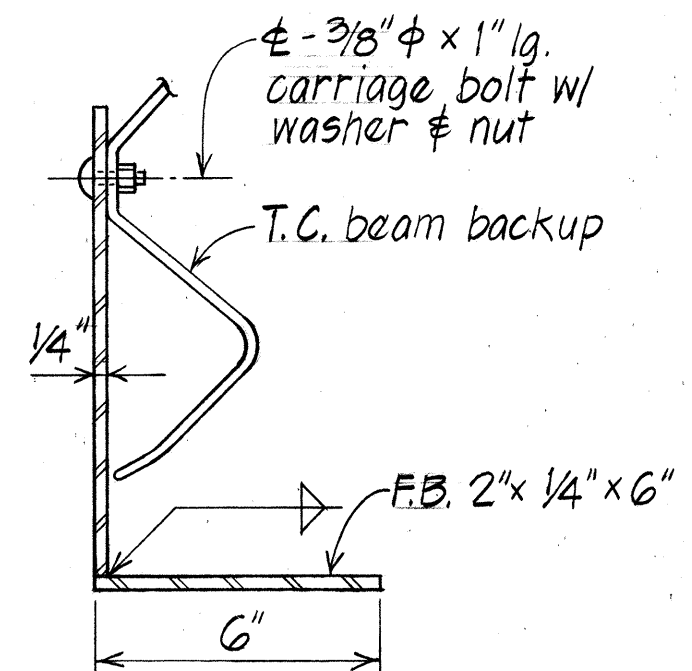
9" T.C. BEAM
Scale: 1 1/2" = 1'-0"



SECTION G
14/14
Scale: 1" = 1'-0"



FRONT VIEW



SIDE VIEW

CARTRIDGE CLIP DETAIL
Scale: 3" = 1'-0"

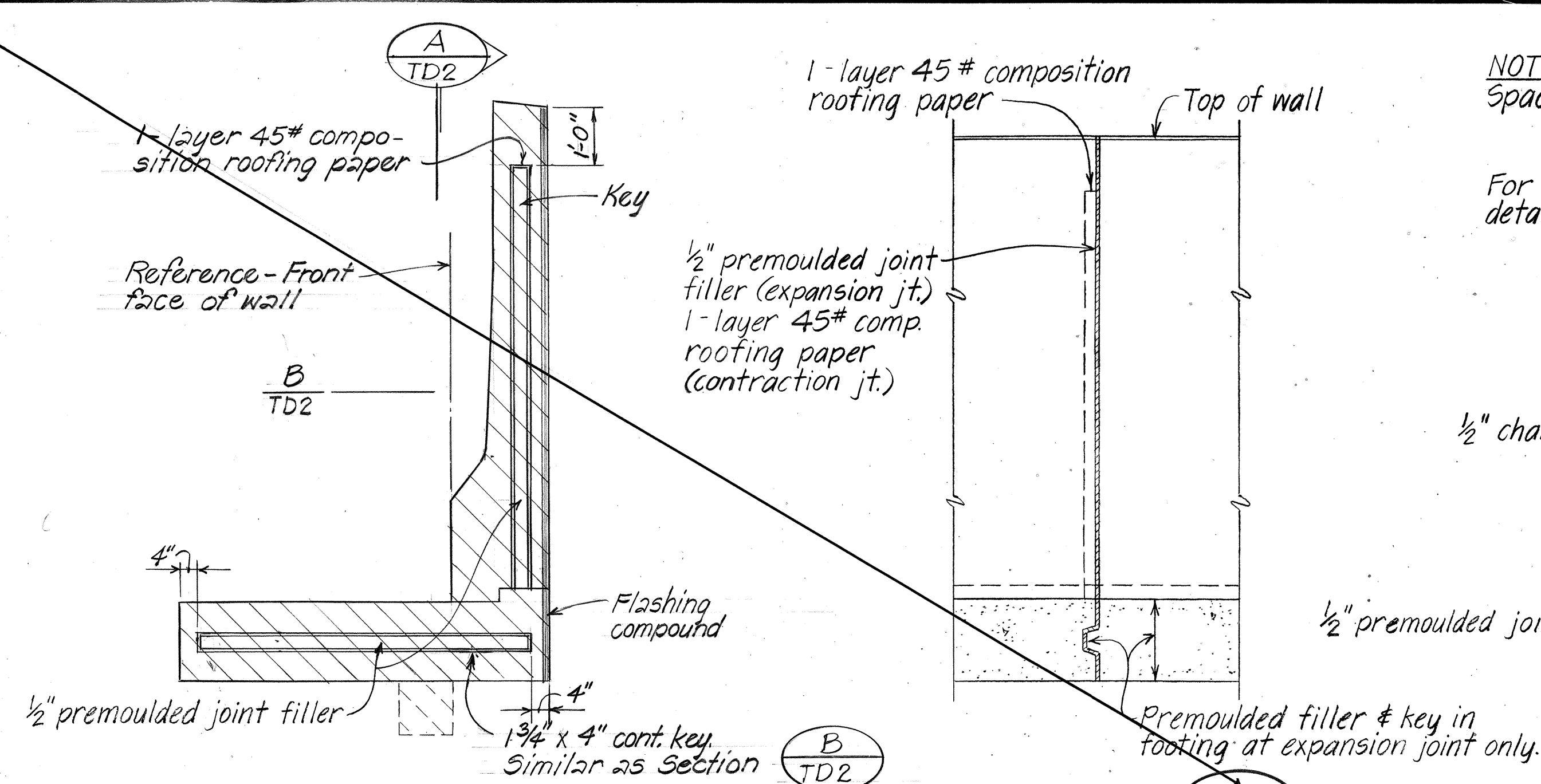
DETAILS - TRIPLE CORRUGATED BEAM (T.C. BM.) BACKUP

Reference:
1. Refer to Sheet 11 for applicable notes.

ORIGINAL PLAN	DATE
DESIGNED BY	2/83
NOTED BY	2/83
CHECKED BY	2/83

STATE OF HAWAII DEPARTMENT OF TRANSPORTATION LAND TRANSPORTATION FACILITIES DIVISION HARDWARE DETAIL FOR TYPE "B+C" SUPPORT FOR ATTENUATOR KAM. HWY. SAFETY IMPROVEMENTS KAALAE RD. TO WAIHOLE VALLEY RD Proj. No. HES-R05-083-1(12) Scale: As Noted Date Feb. 1983 SHEET NO. 14 OF 14 SHEETS
--

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	HES-ROS- 083-(112)	1984	22	63

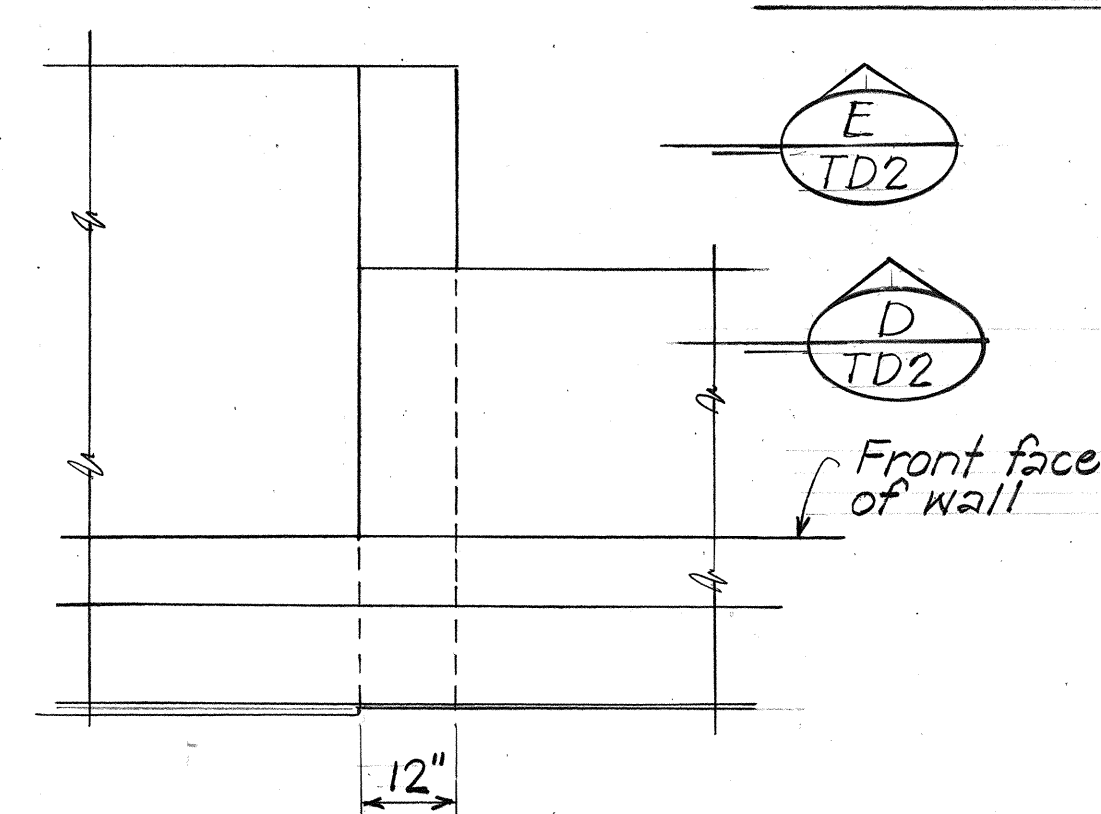


JOINT ELEVATION

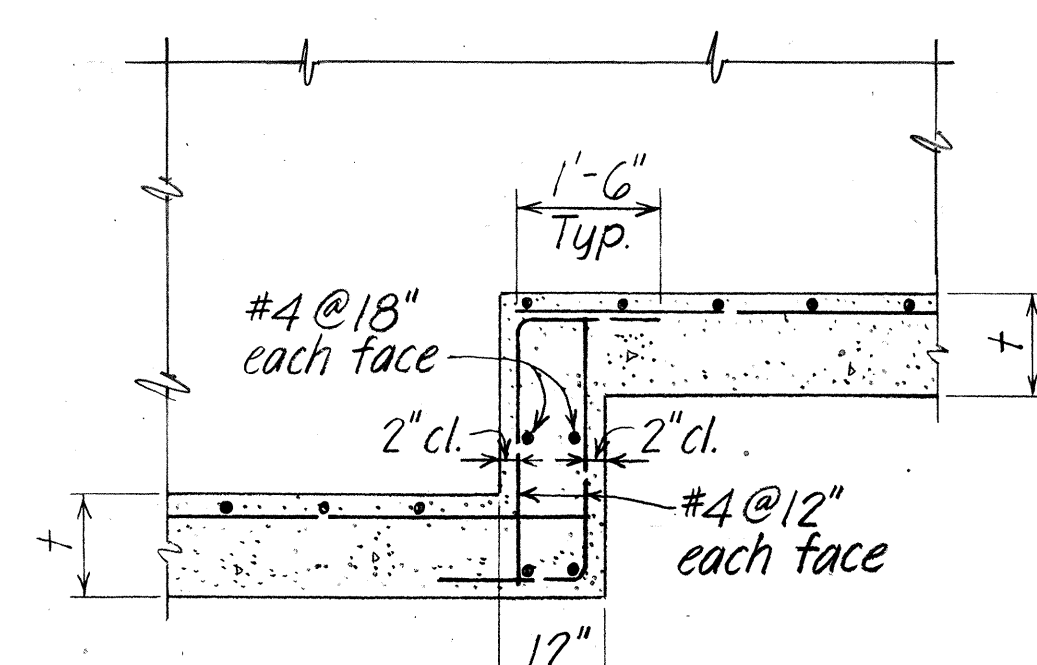
SECTION SECTION 

TYPICAL EXPANSION JOINT DETAILS

Not to Scale

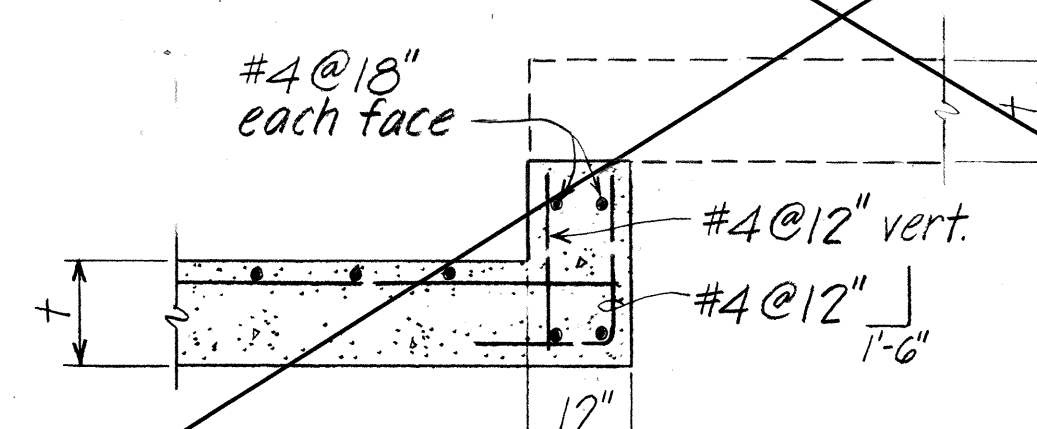


PLAN



SECTION 

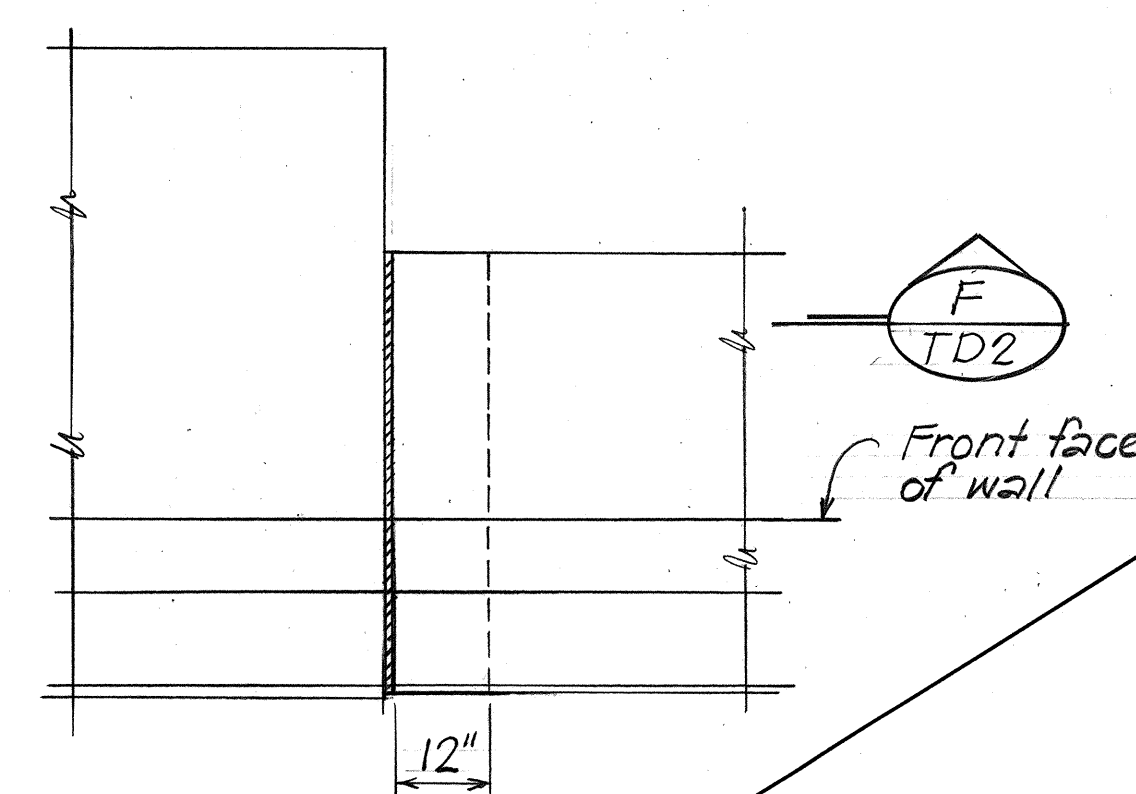
AT CONTINUOUS FOOTING



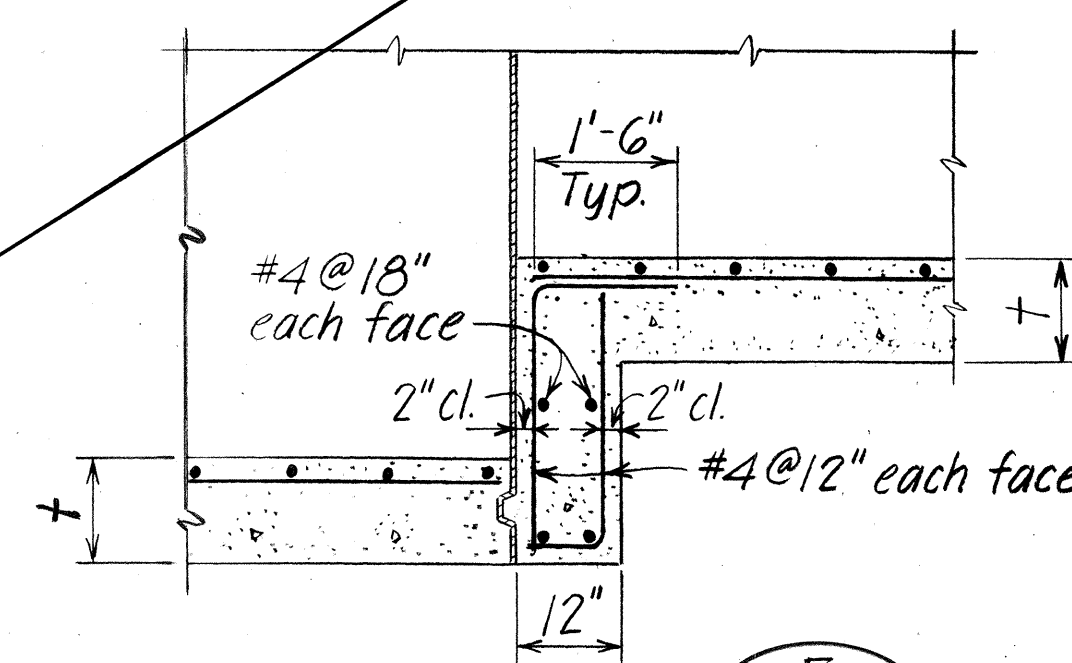
SECTION 

SECTION

RETAINING WALL DELETED
C.C.O. NO. 8



PLAN

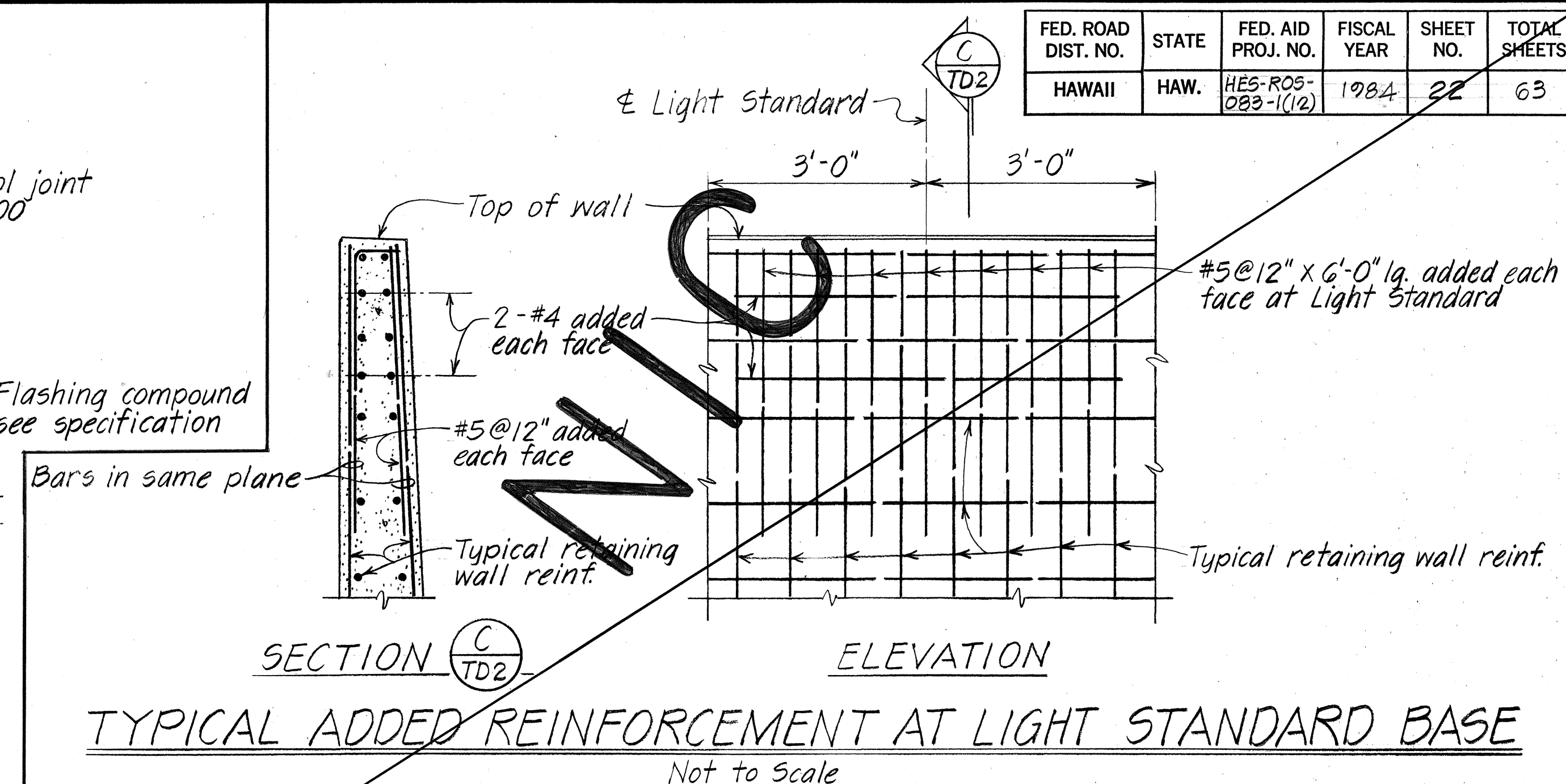


SECTION 

AT EXPANSION JOINT

TYPICAL FOOTING STEP-UP DETAILS

Not to Scale



SECTION C
TD2

ELEVATION

TYPICAL ADDED REINFORCEMENT AT LIGHT STANDARD BASE

Not to Scale

ORIGINAL PLAN	SURVEY PLOTTED BY _____	DATE _____
	DRAWN BY _____	" _____
	TRACED BY _____	" _____
NOTE BOOK	DESIGNED BY _____	" _____
	" _____	" _____
	QUANTITIES BY _____	" _____
No. _____	CHECKED BY <u>L.A. DERRY.</u>	" <u>21/3</u>

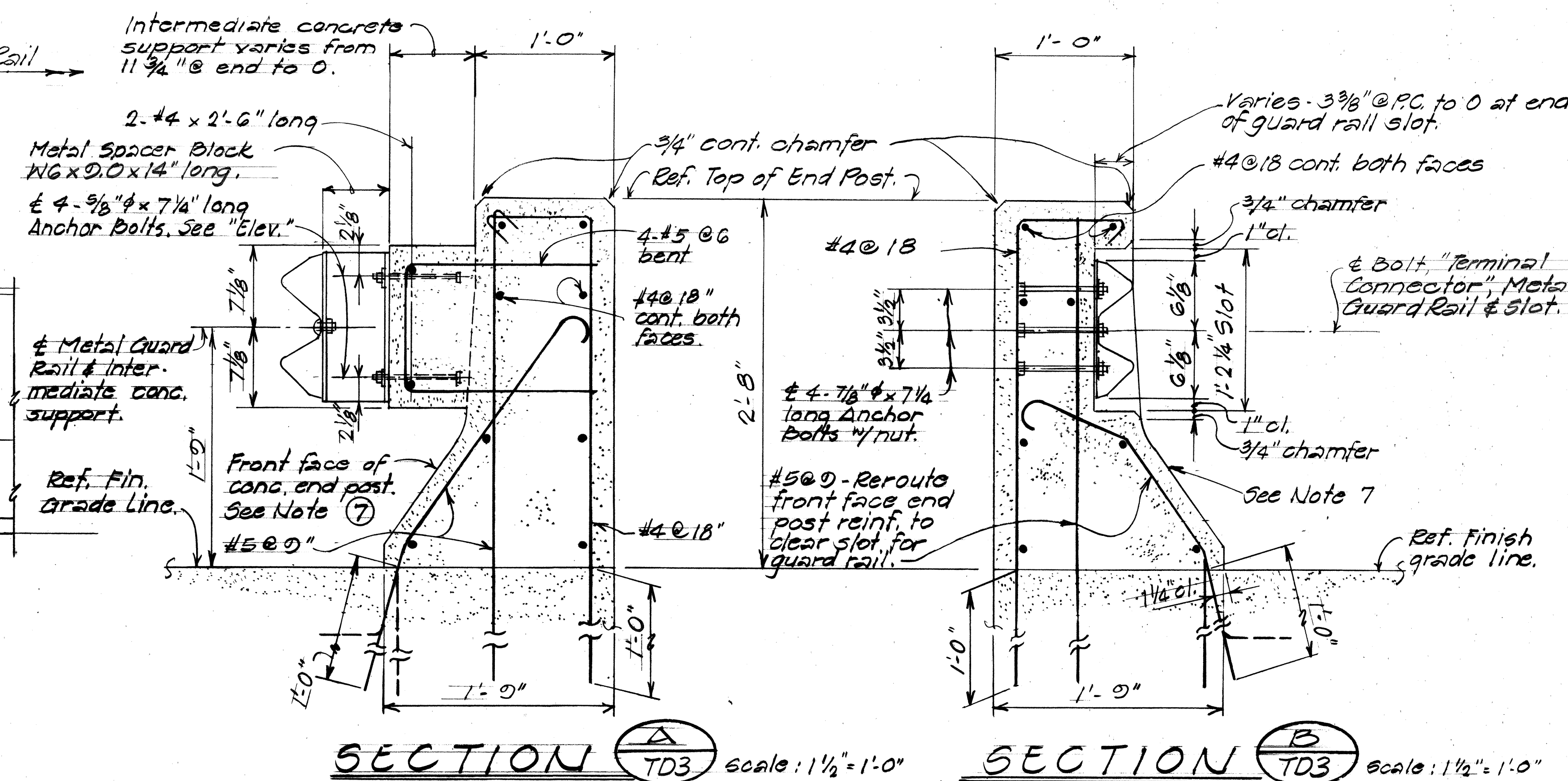
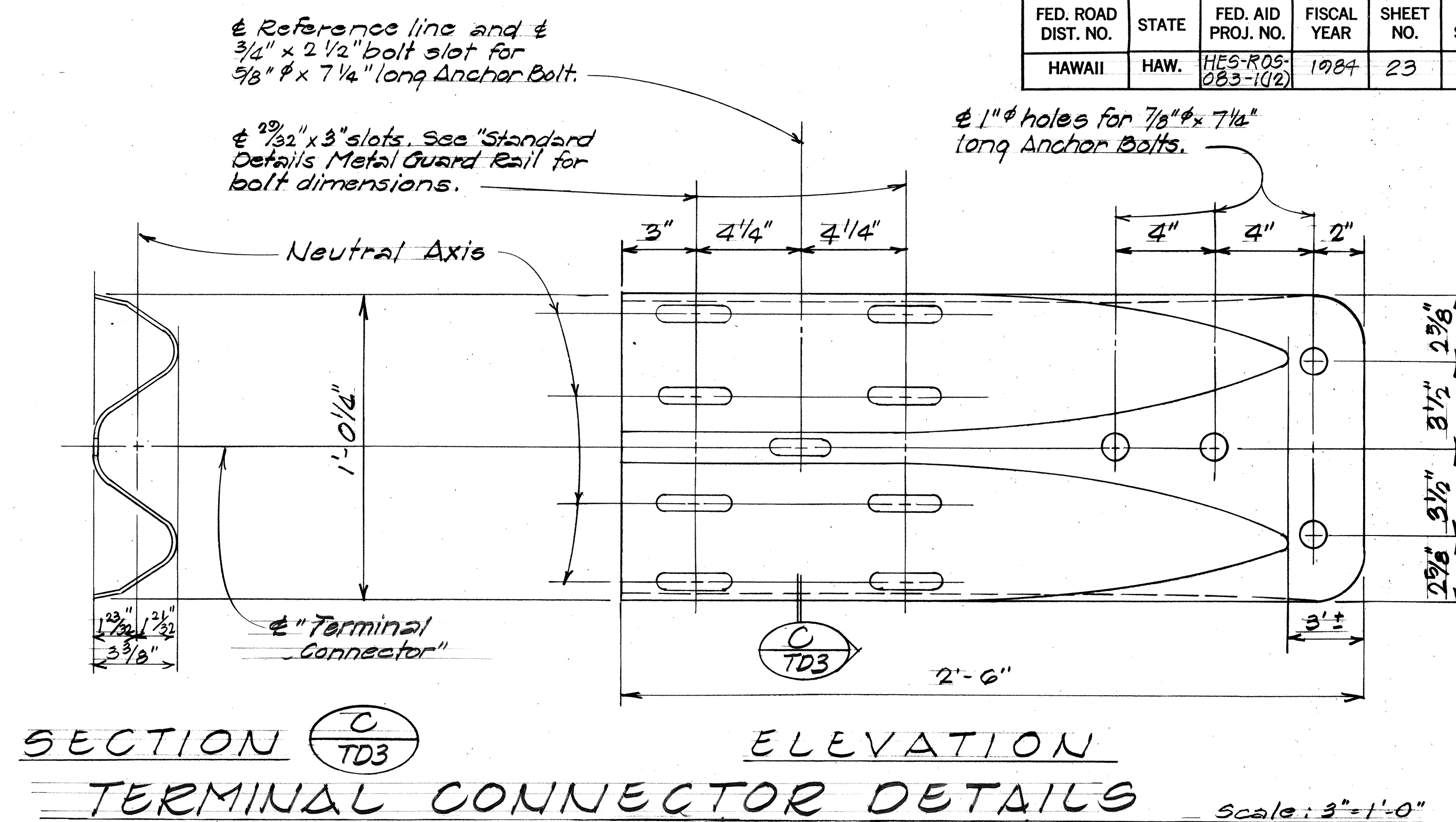
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
LAND AND TRANSPORTATION FACILITIES DIVISION

TYPICAL DETAILS
TYPE "L-2" WALL

PROJ. NO. HES-ROS-083-1(12)
Scale: As Shown Date: Feb. 1983

SHEET No. *TP2* OF *4* SHEETS

ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
	DRAWN BY	
	TRACED BY	
NOTE BOOK	DESIGNED BY	
	QUANTITIES BY	
No.	CHECKED BY	7/33

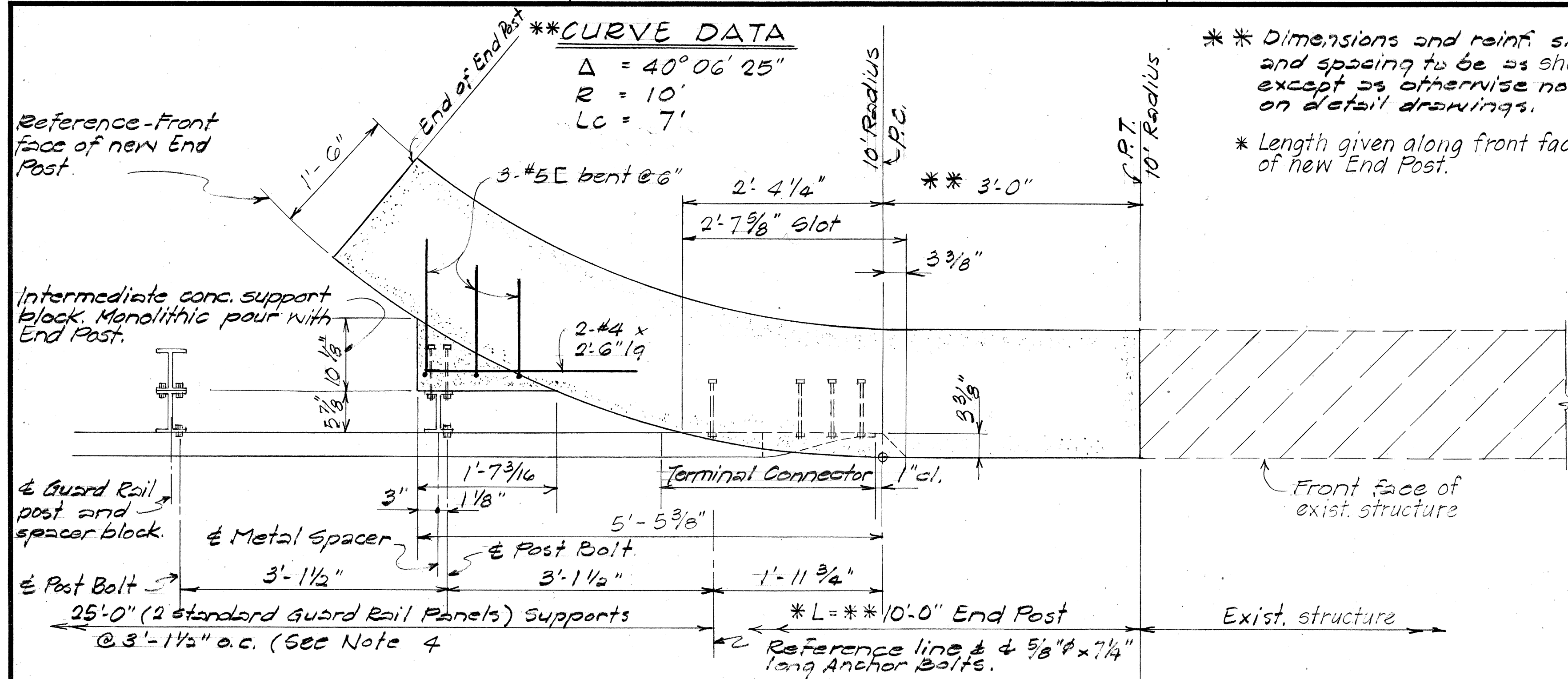


NOTES:

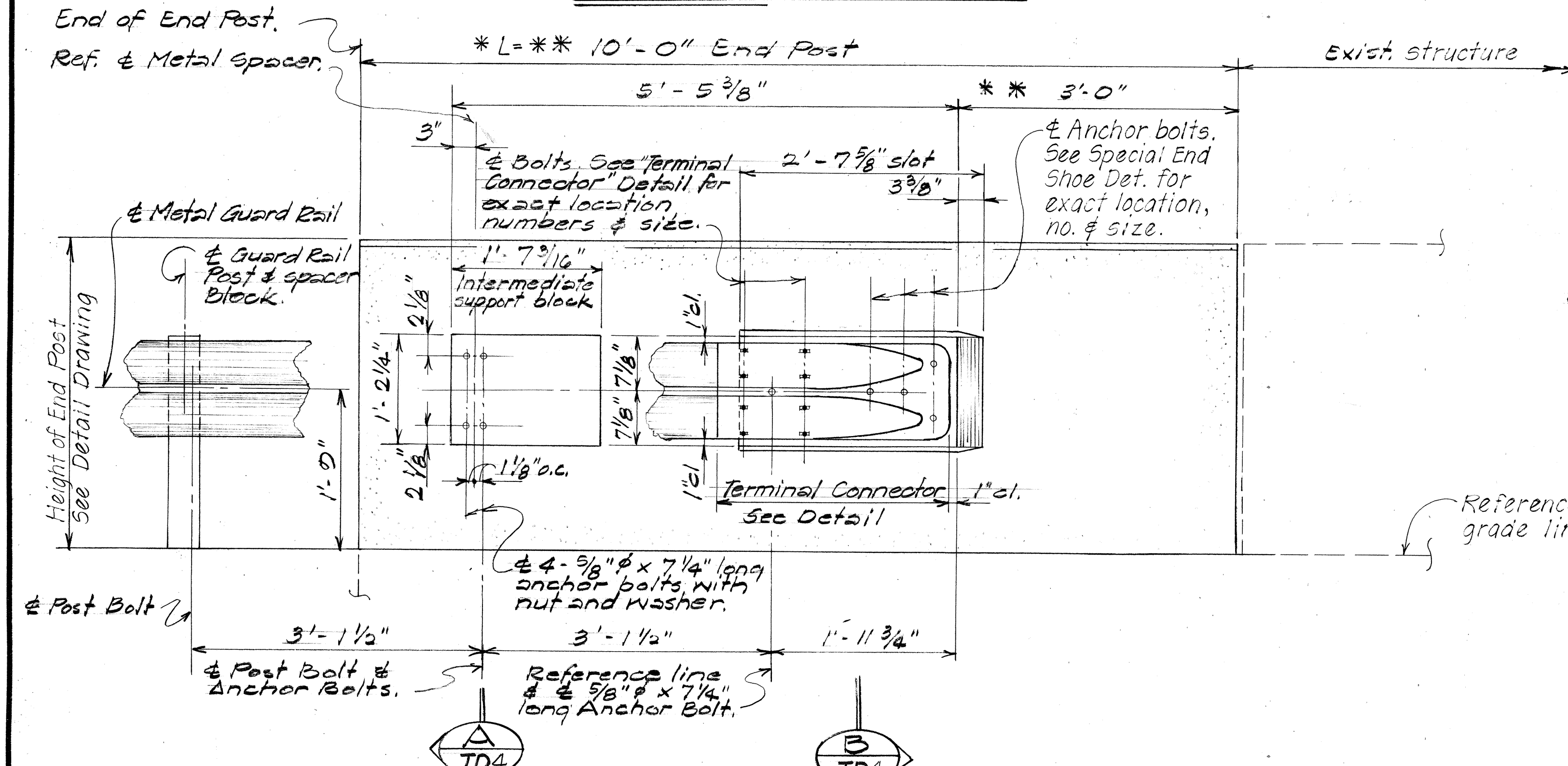
- ① All Anchor Bolts shall be High Strength bolts conforming to the requirements of ASTM A325.
- ② All "Terminal Connector," including anchor bolts, nuts and washers, shall be galvanized.
- ③ "Terminal Connector" shall be fabricated from 10 gage Steel conforming to the requirements of AASHTO M180
- ④ First 25' 0" of guard rail adjoining "Terminal Connector" shall be galvanized steel.
- ⑤ Anchor Bolt length given from under bolt head.
- ⑥ Place name of structure as shown. For location, see "Plan" on Contract Drawing. Date shown will be year structure is completed. Letter size and detail see Standard Drawing DB-100.
- ⑦ Front face of End Post to match front face of typical conc. bridge rail.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
LAND TRANSPORTATION FACILITIES DIVISION
TYPICAL DETAILS
METAL GUARD RAIL CONNECTION
AT CONCRETE END POST
CORNER BRIDGE RAILING TRAFFIC TYPE
Proj. No. HES - R05 - 083 - 1(12)
Scale: As shown Date: Feb. 1983
SHEET No. 703 OF 4 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	HES-R05-083-1(12)	1984	24	63

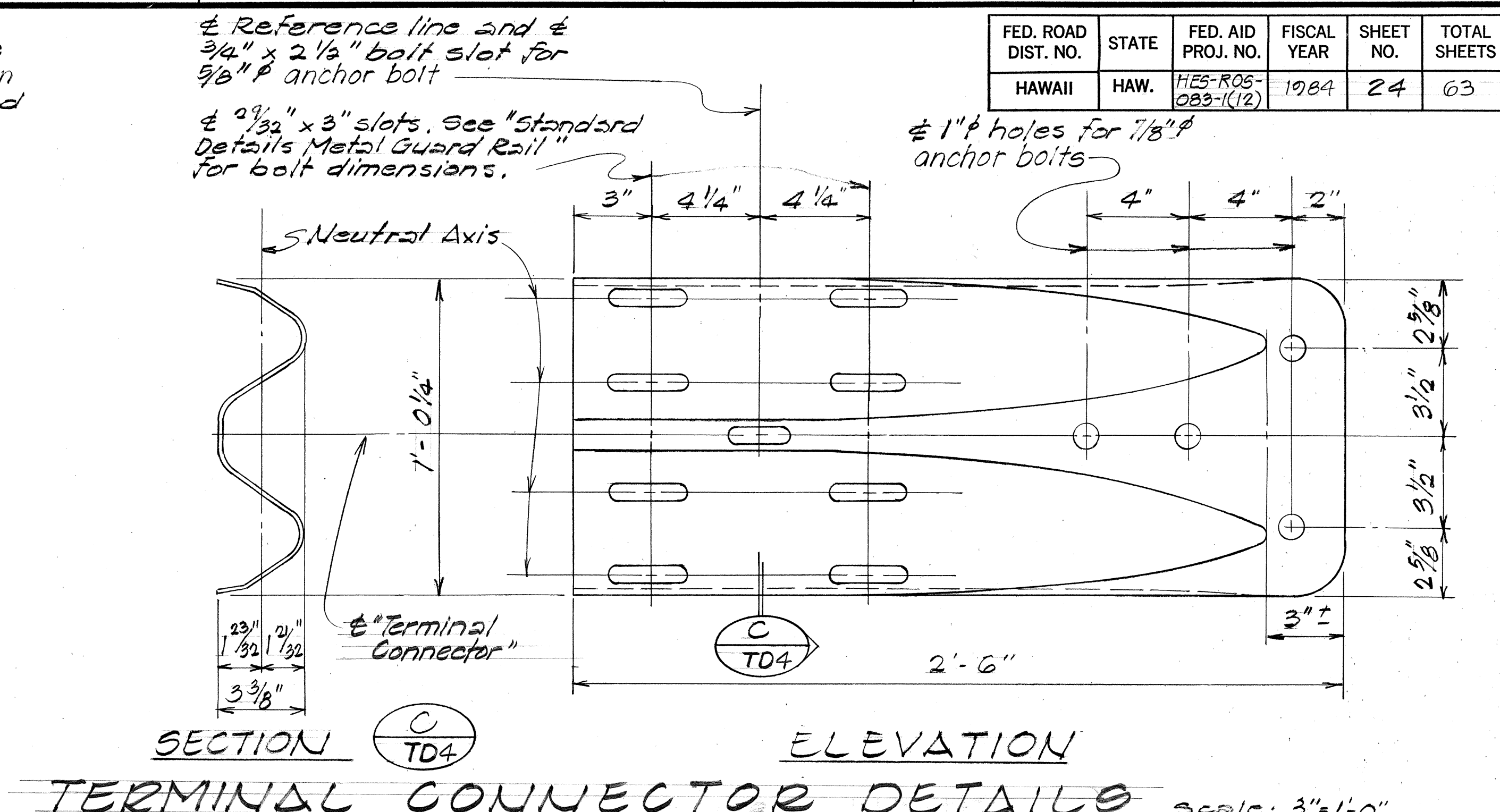


PLAN scale: 1" = 1'-0"

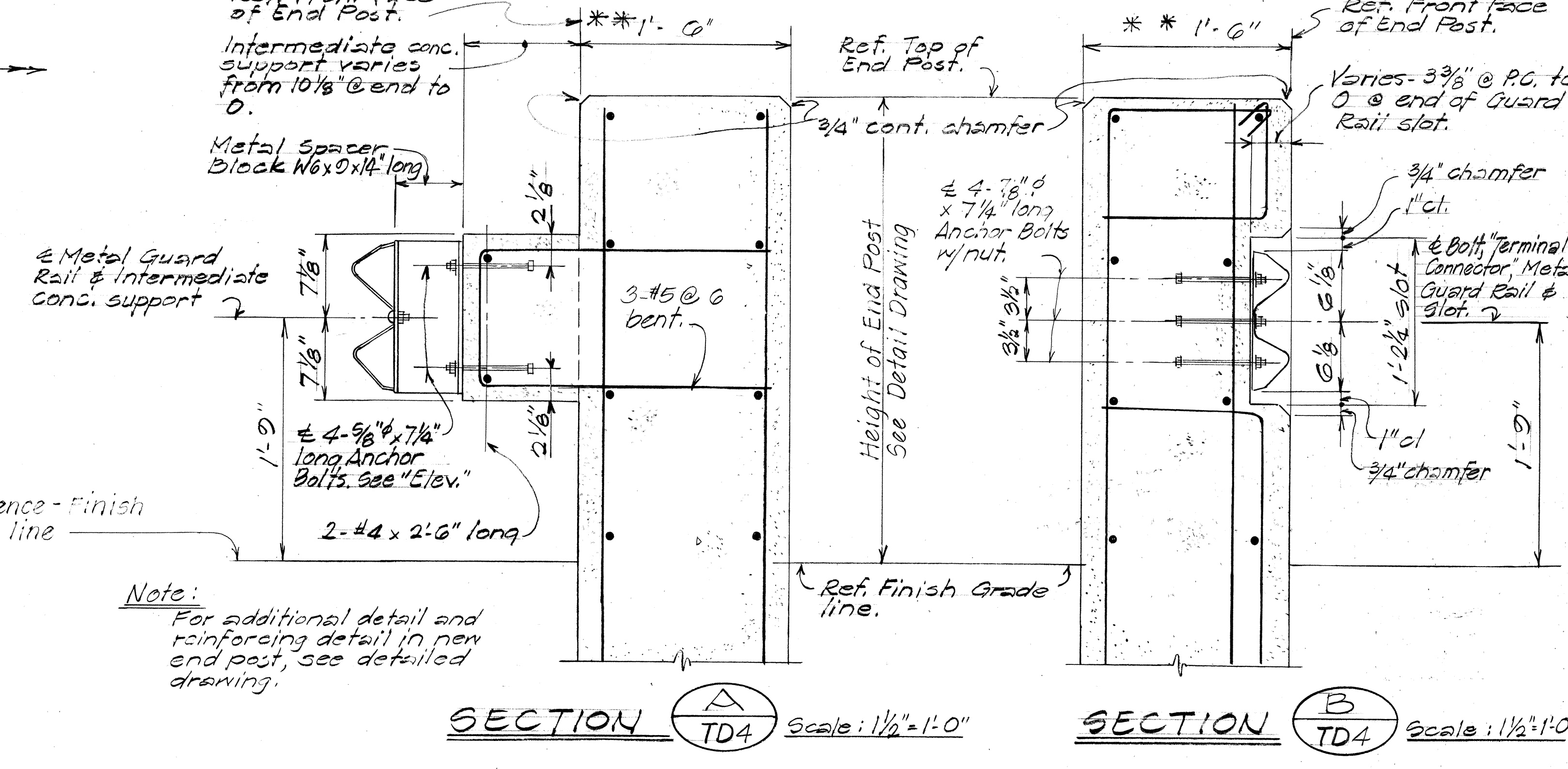


ELEVATION scale: 1" = 1'-0"

- NOTES:**
- All Anchor Bolts shall be high strength bolts conforming to the requirements of ASTM A325.
 - All "Terminal Connector" including anchor bolts, nuts and washers shall be galvanized.
 - "Terminal Connector" shall be fabricated from 10 gage steel conforming to the requirements of AASHTO M180.
 - First 25'-0" of guard rail adjoining "Terminal Connector" shall be galvanized steel.
 - Anchor Bolt length given from under bolt head.
 - Pneumatic type of equipment for drilling of holes through existing concrete for anchor bolts will not be permitted.
 - Any damage to the existing structures due to the Contractor's operation shall be repaired, at his expense, to the satisfaction of the Engineer.
 - The work necessary to connect guard rails to bridge end posts shall include all labor, materials, tools, equipment and incidentals necessary to complete the work. This work will be measured and paid for in units of one for each guard rail to end post connection.



SECTION ELEVATION scale: 3" = 1'-0"



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

STATE OF HAWAII
 DEPARTMENT OF TRANSPORTATION
 LAND TRANSPORTATION FACILITIES DIVISION

TYPICAL DETAILS

METAL GUARD RAIL CONNECTION

AT VERTICAL FACE TYPE END POST

Proj. No. HES-R05-083-1(12)

Scale: As shown Date: Feb. 1983

SHEET NO. TD4 OF 4 SHEETS