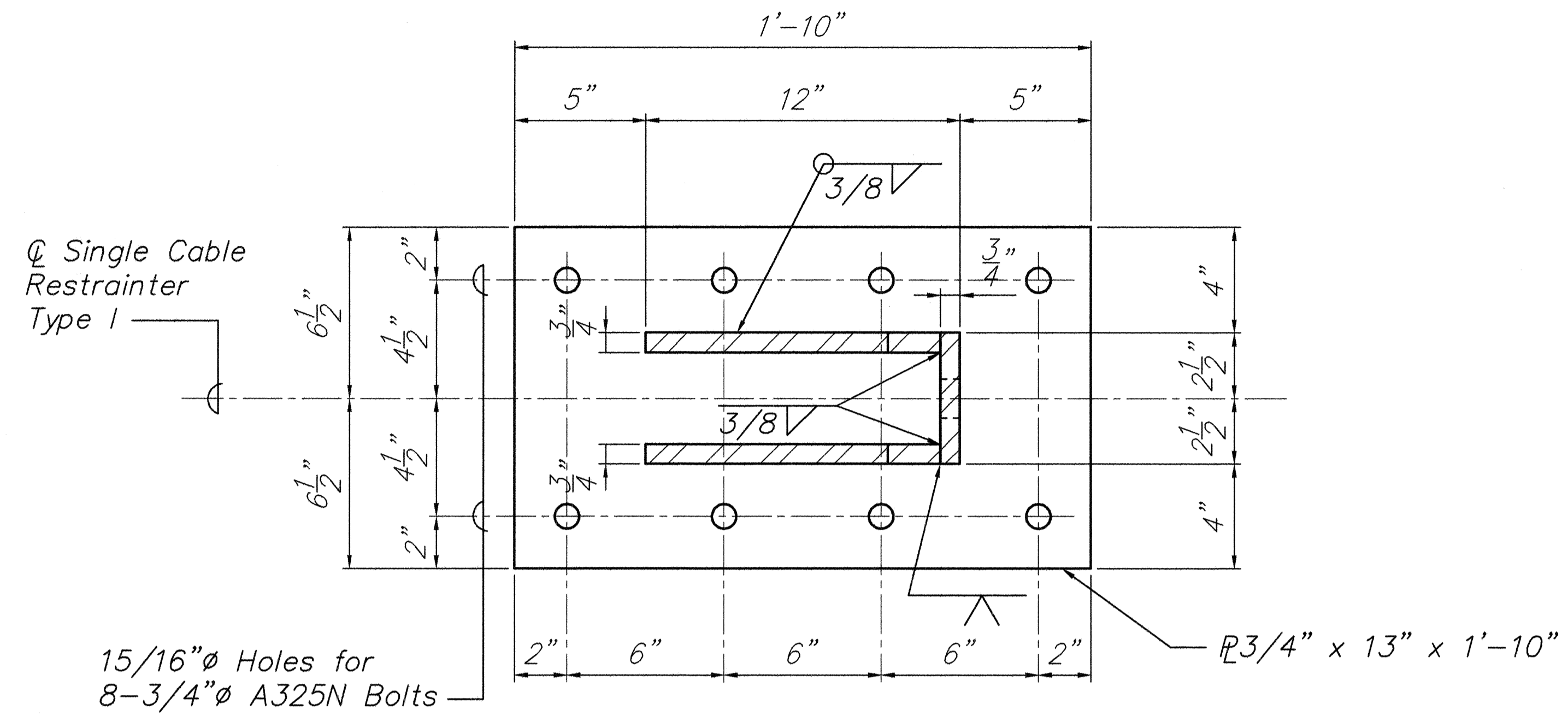
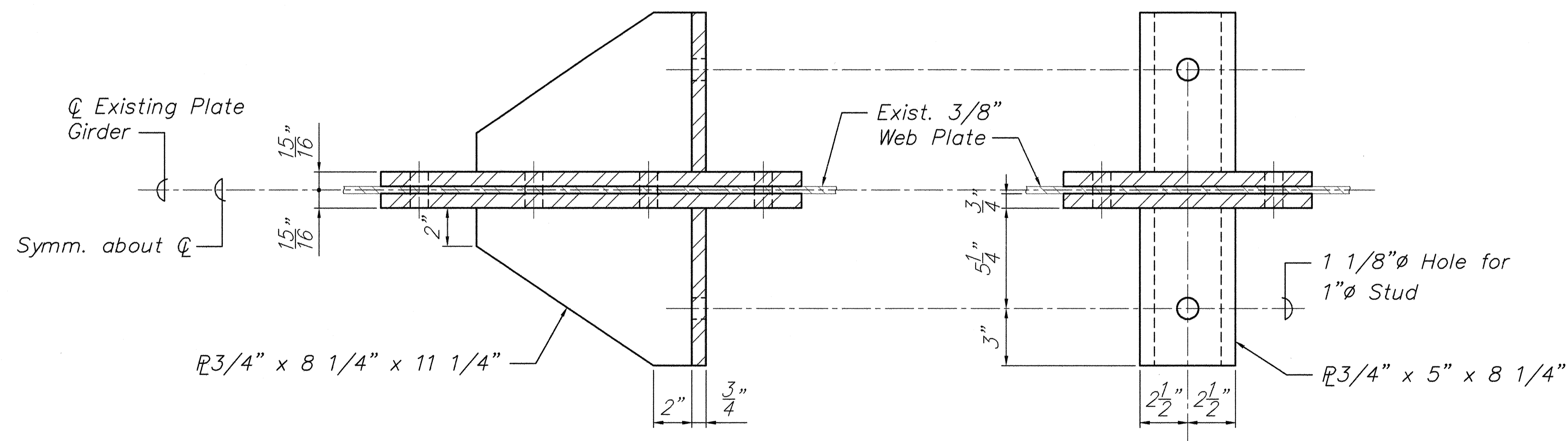


FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(43)	2000	ADD.61	65



ELEVATION

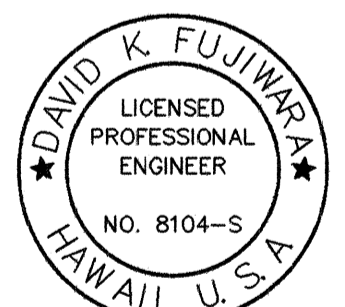


PLAN

ANCHORAGE BRACKET FOR
TYPE I SINGLE CABLE RESTRAINER ASSEMBLY

Scale: 3" = 1'-0"

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



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DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
KAPUE BRIDGE
ANCHORAGE BRACKET FOR
TYPE I SINGLE CABLE RESTRAINER
HAWAII BELT ROAD
SEISMIC RETROFIT OF VARIOUS BRIDGES
VICINITY OF PAPAIKOU, HAWAII
PROJECT NO. BR-019-2(43)

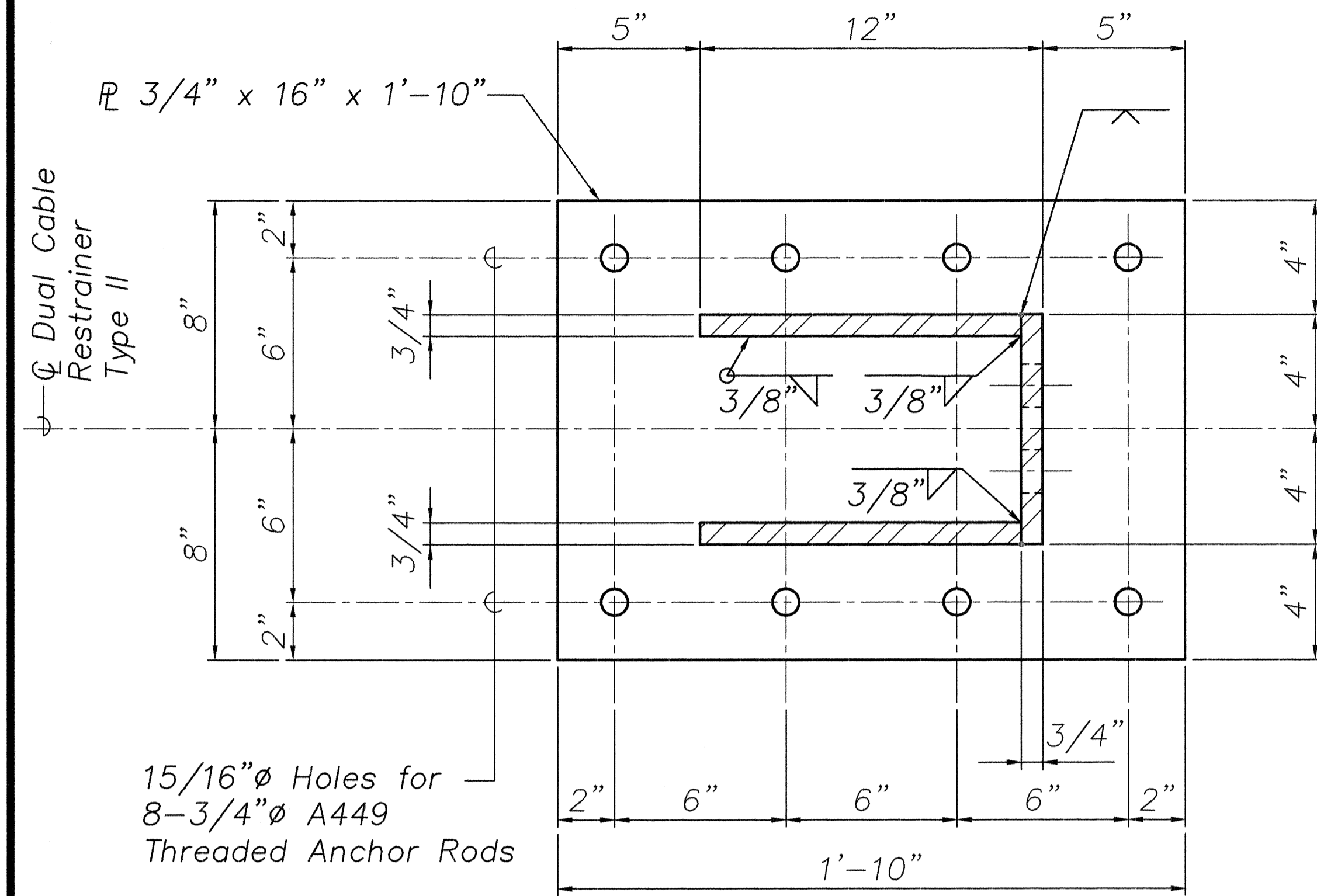
SCALE: AS NOTED DATE: August 12, 1999

SHEET No. S5.1 OF 59 SHEETS

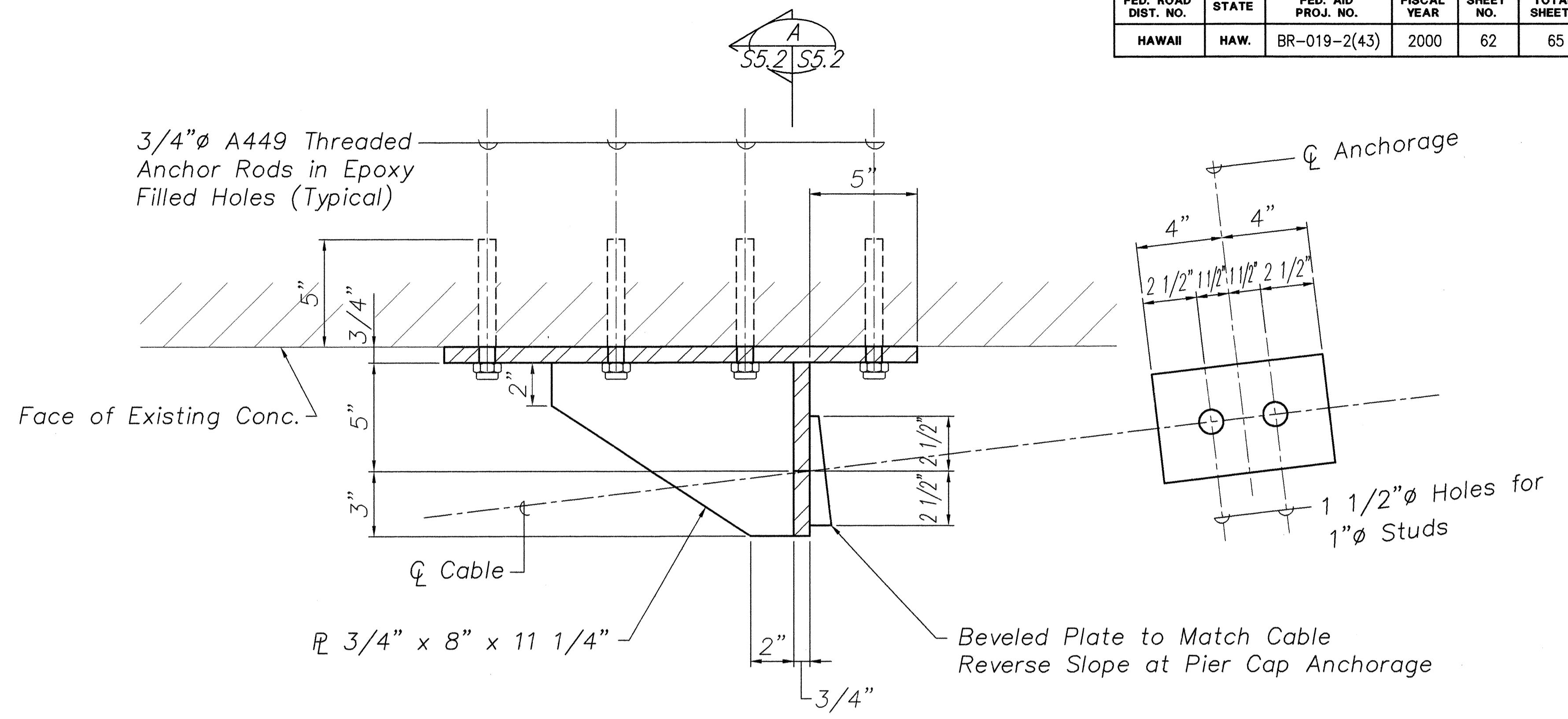
9/17/99	Dimensions added.
DATE	REVISION

ADD. 61

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(43)	2000	62	65



PLAN



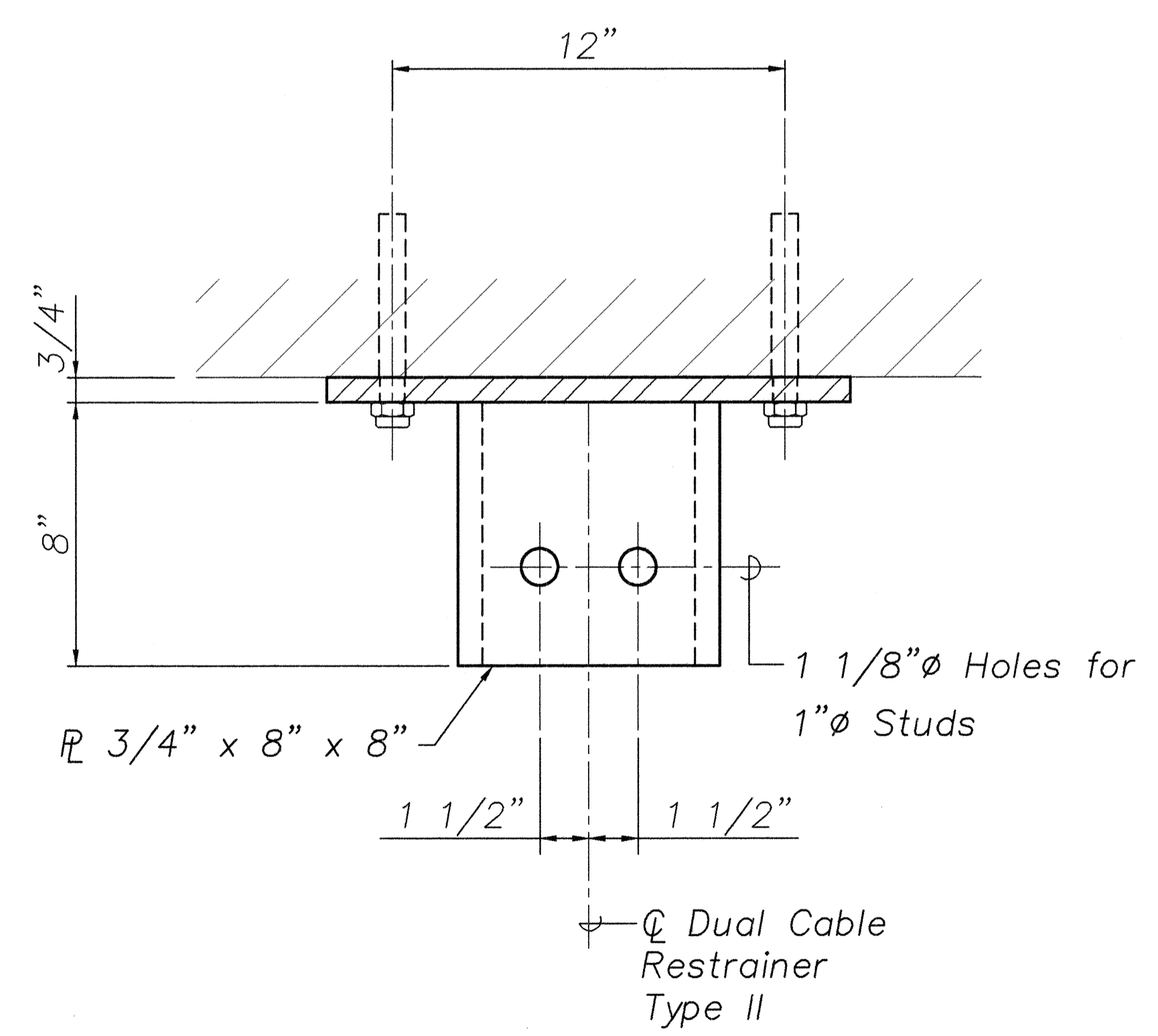
ELEVATION

NOTES:

1. The Contractor Shall Verify All Controlling Field Dimensions Before Ordering or Fabricating Material.
2. Location of Drilled Dowel Holes Shown in Plans are Approximate. Prior to Placing Holes in Concrete, the Contractor Shall Locate All Reinforcing Steel and Adjust the Location of the Holes to Clear All Reinforcing Bars. Final Hole Locations are Subject to the Approval of the Engineer.

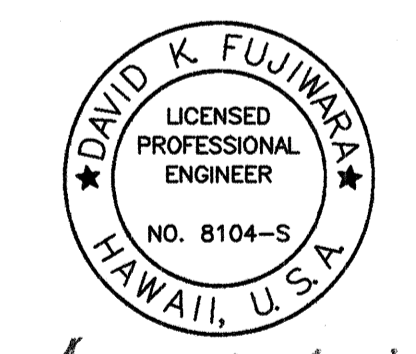
ANCHORAGE BRACKET FOR TYPE II DUAL CABLE RESTRAINER ASSEMBLY

Scale: 3" = 1'-0"



SECTION
Scale: 3" = 1'-0" A
S5.2/S5.2

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QUANTITIES BY	
CHECKED BY	
ORIGINAL PLAN	
NOTE BOOK	
No.	

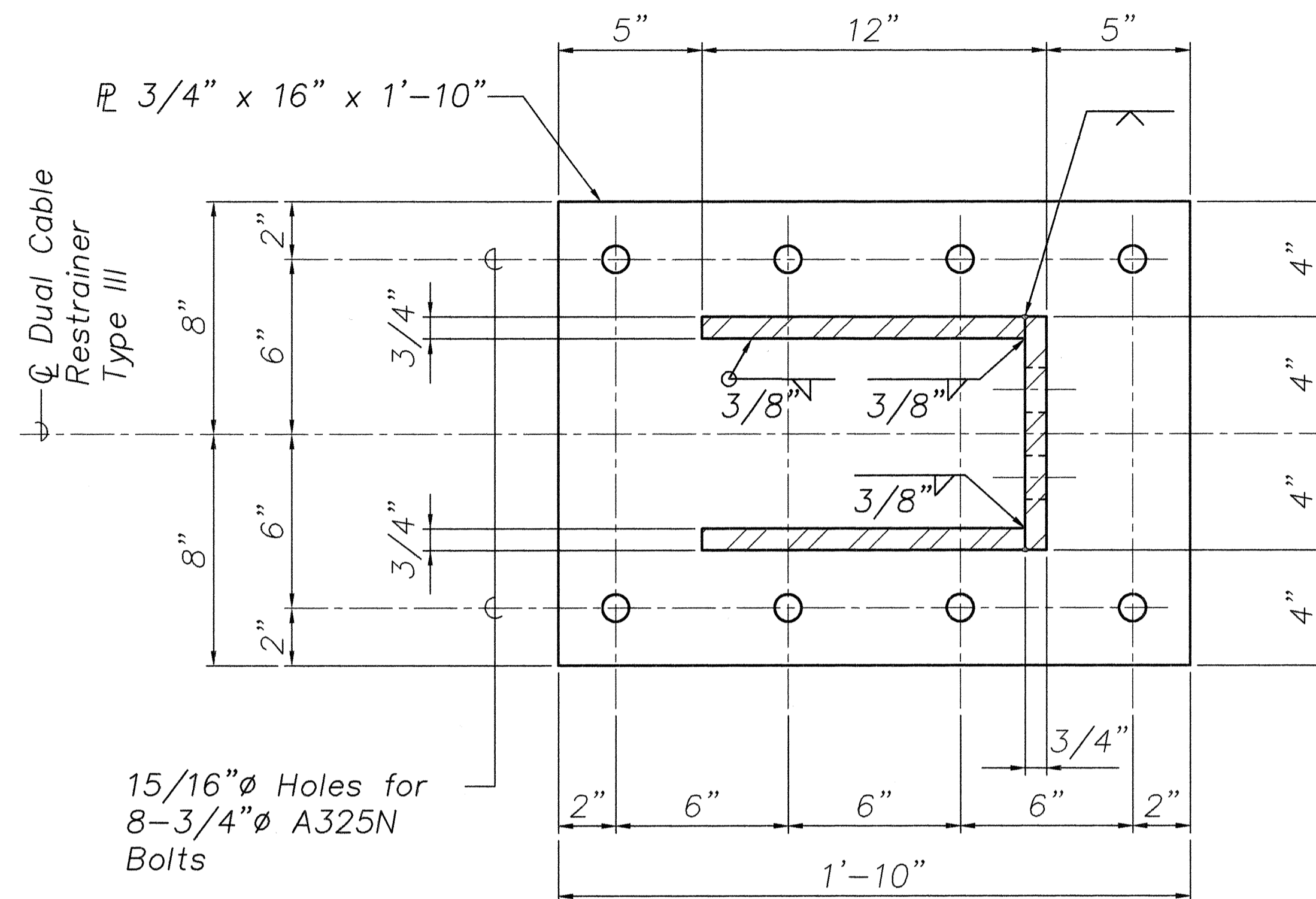


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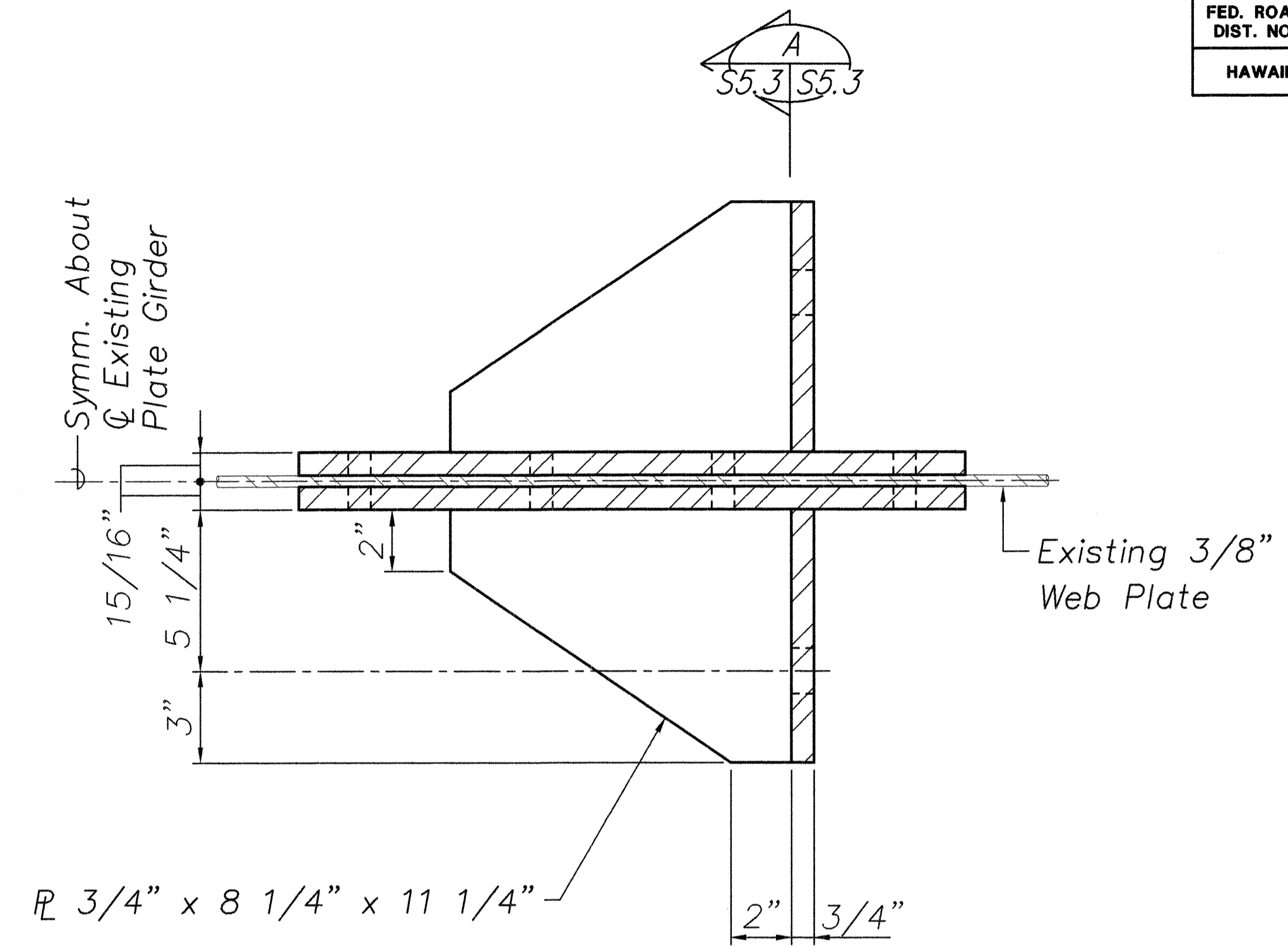
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
KAIEIE AND KALAOA BRIDGES
ANCHORAGE BRACKET FOR TYPE II DUAL CABLE RESTRAINER
HAWAII BELT ROAD
SEISMIC RETROFIT OF VARIOUS BRIDGES
VICINITY OF PAPAIKOU, HAWAII
PROJECT NO. BR-019-2(43)
SCALE: AS NOTED DATE: August 12, 1999

SHEET No. S5.2 OF 59 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(43)	2000	63	65



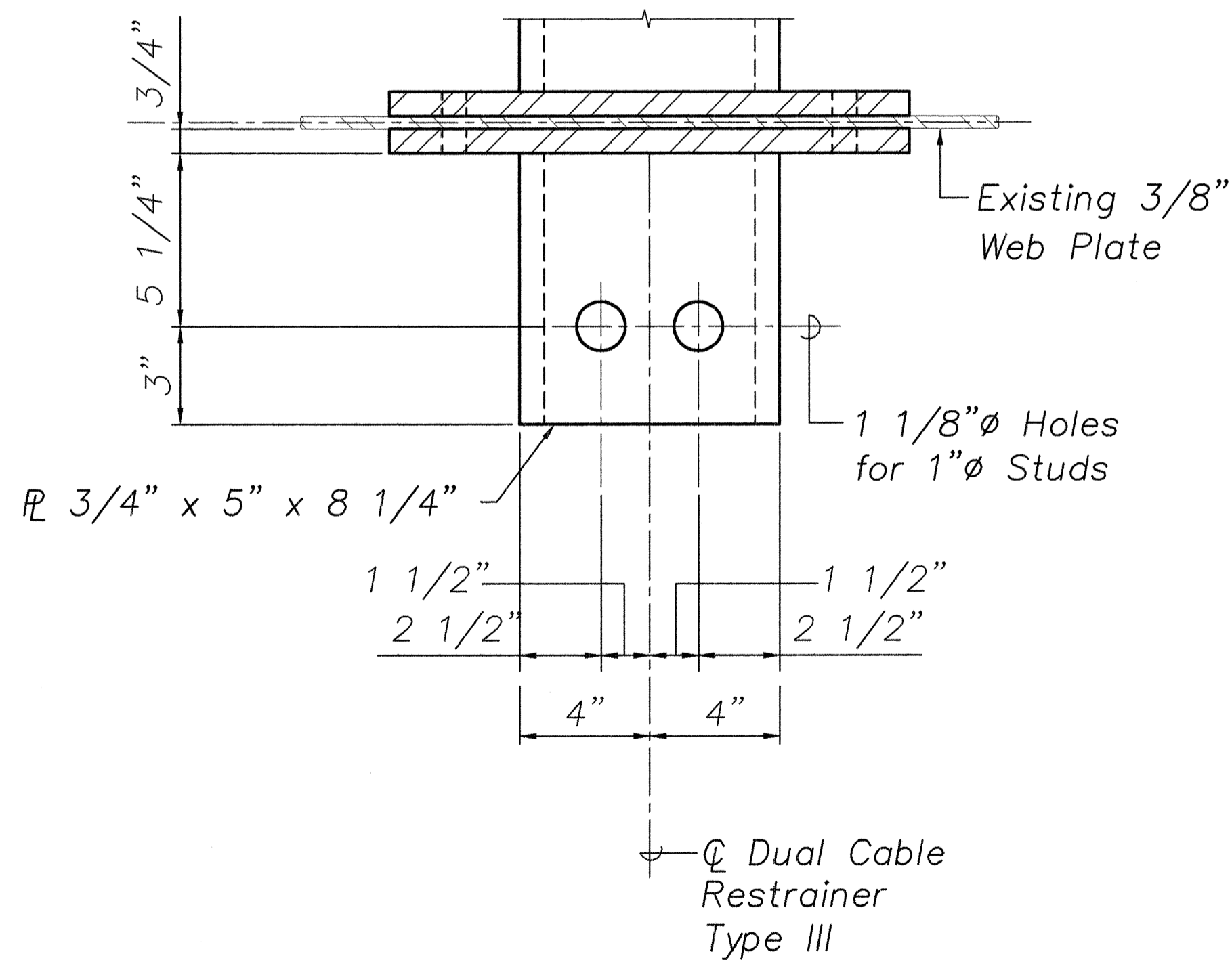
ELEVATION



PLAN

ANCHORAGE BRACKET FOR TYPE III
DUAL CABLE RESTRAINER ASSEMBLY

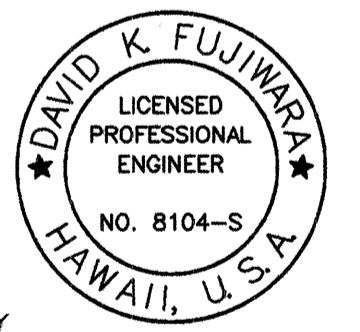
Scale: 3" = 1'-0"



SECTION

Scale: 3" = 1'-0" A
S5.3|S5.3

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



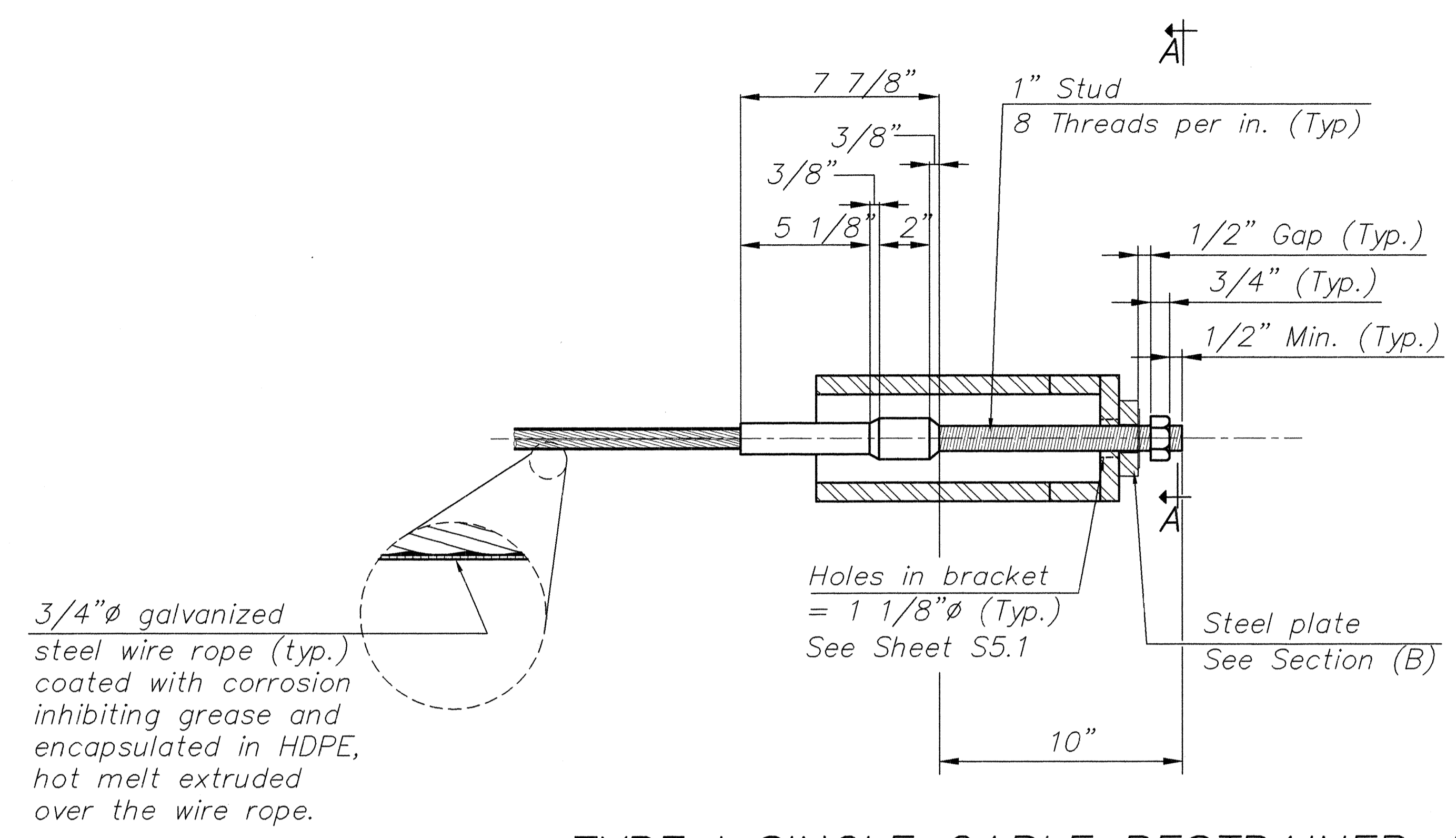
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HIGHWAYS DIVISION
HAKALAU BRIDGE
**ANCHORAGE BRACKET FOR
TYPE III DUAL CABLE RESTRAINER**
HAWAII BELT ROAD
SEISMIC RETROFIT OF VARIOUS BRIDGES
VICINITY OF PAPAIKOU, HAWAII
PROJECT NO. BR-019-2(43)

SCALE: AS NOTED DATE: August 12, 1999

SHEET No. S5.3 OF 59 SHEETS

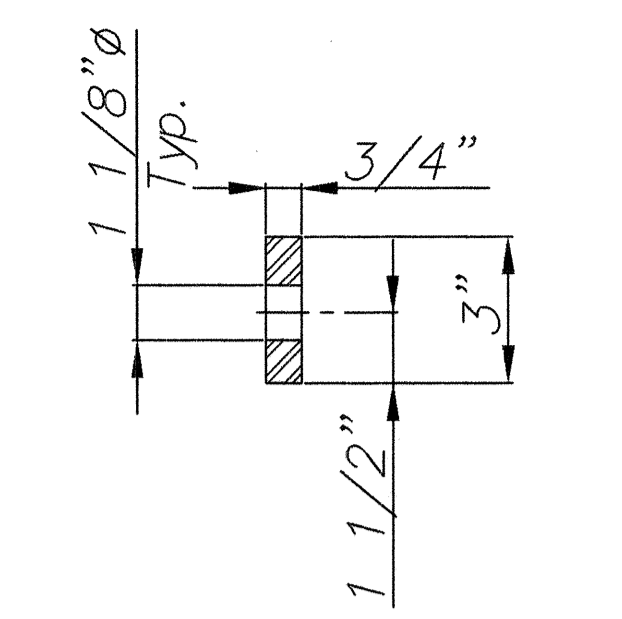
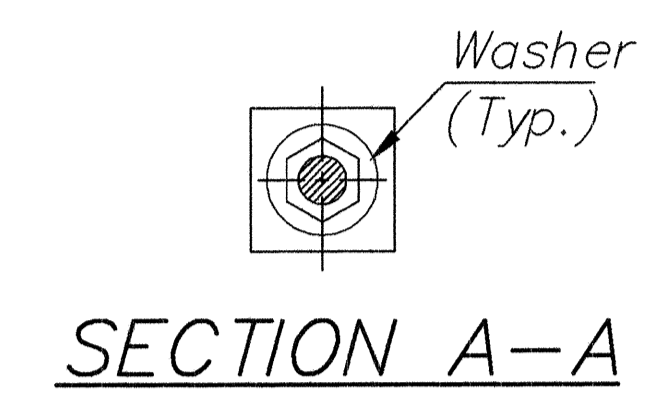
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(43)	2000	64	65



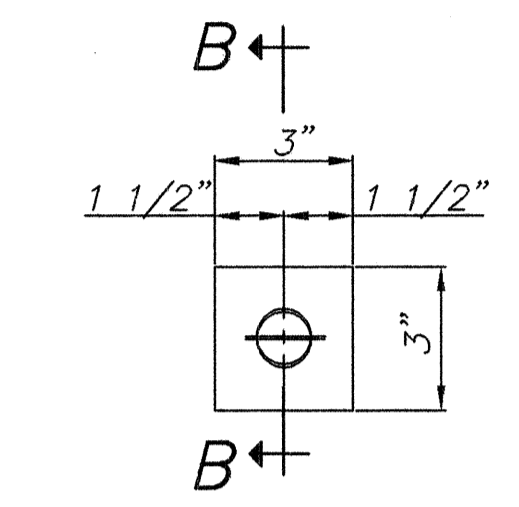
3/4" ϕ galvanized steel wire rope (typ.) coated with corrosion inhibiting grease and encapsulated in HDPE, hot melt extruded over the wire rope.

TYPE I SINGLE CABLE RESTRAINER ASSEMBLY

Scale: 3" = 1'-0"



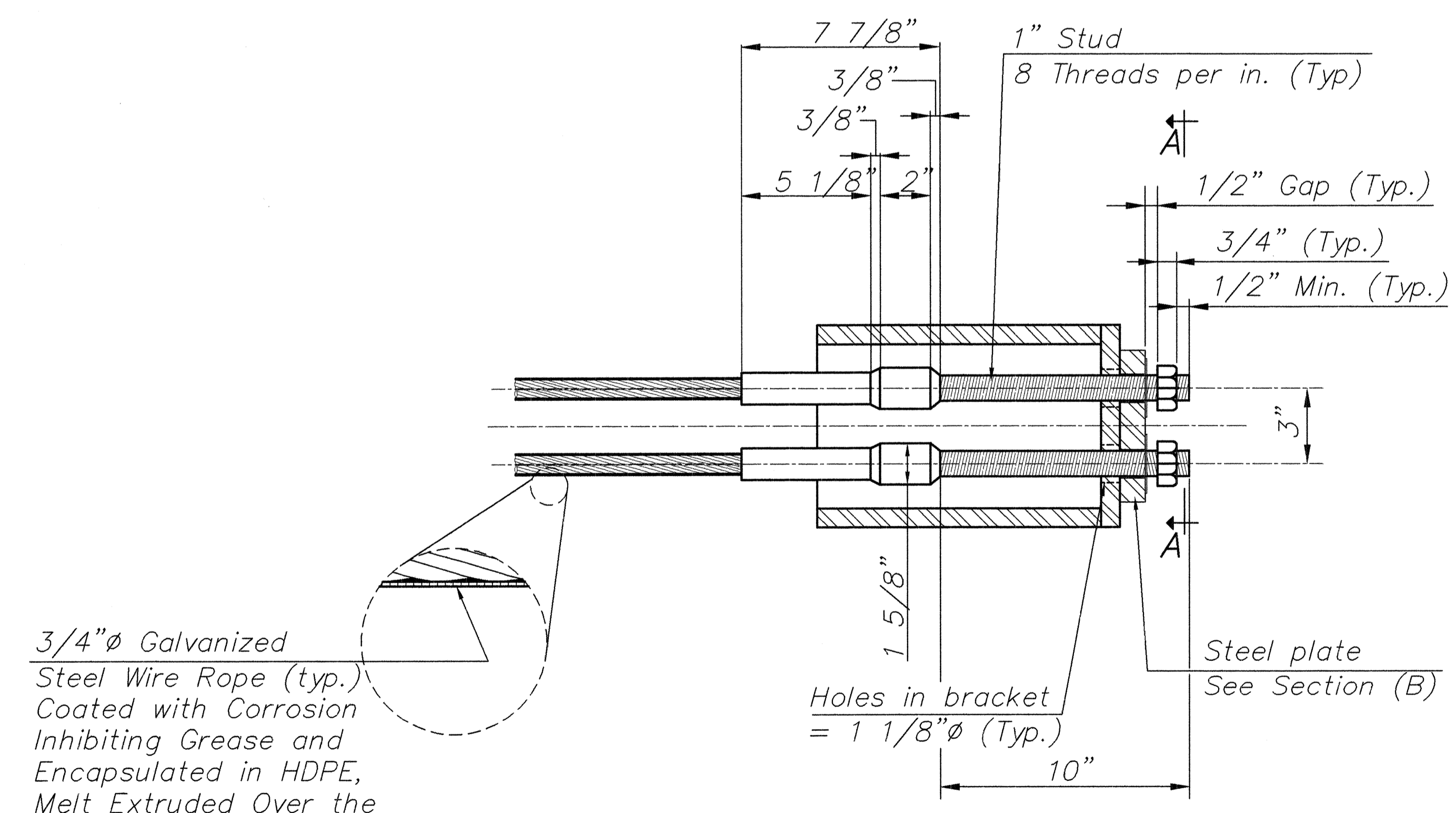
SECTION B-B



PLAN VIEW

STEEL PLATE DETAIL

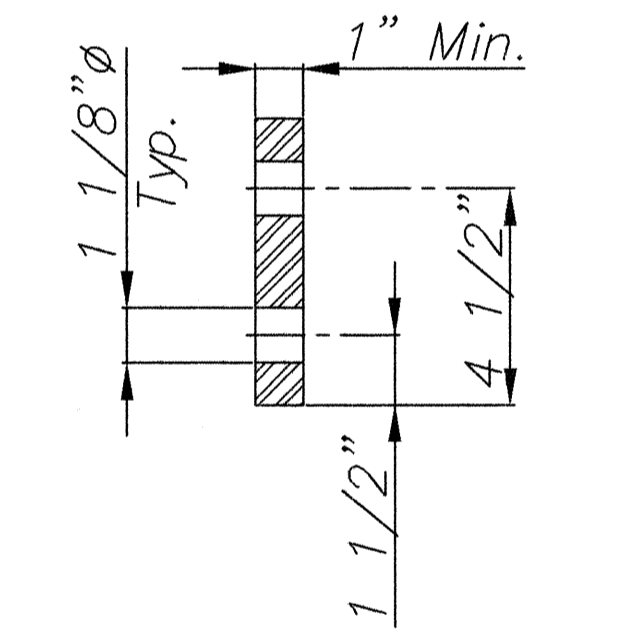
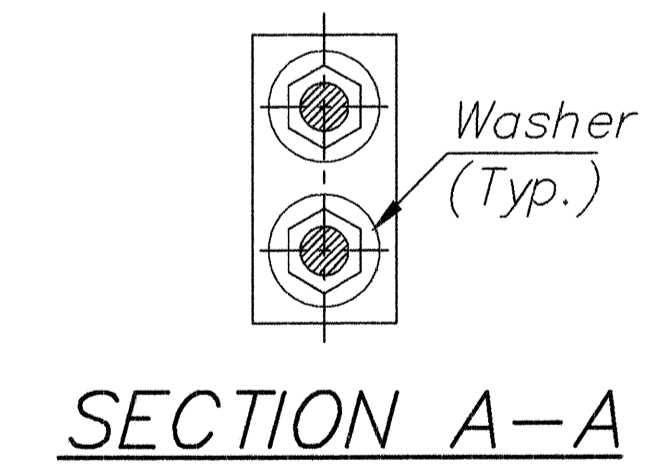
Scale: 3" = 1'-0"



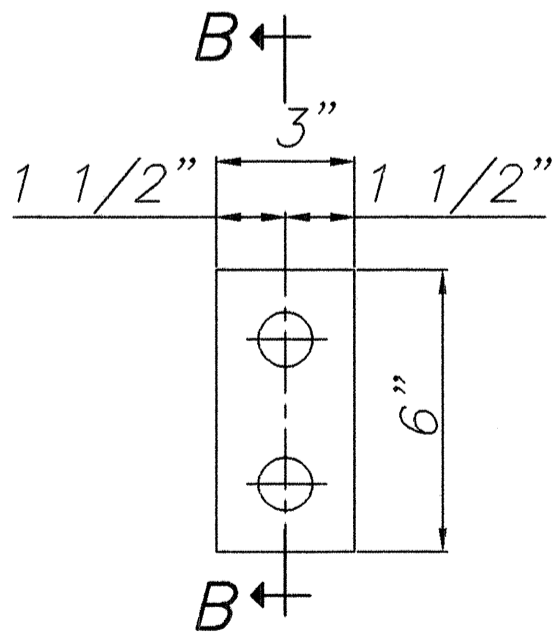
3/4" ϕ Galvanized Steel Wire Rope (typ.) Coated with Corrosion Inhibiting Grease and Encapsulated in HDPE, Melt Extruded Over the Wire Rope

TYPE II AND TYPE III DUAL CABLE RESTRAINER ASSEMBLIES

Scale: 3" = 1'-0"



SECTION B-B



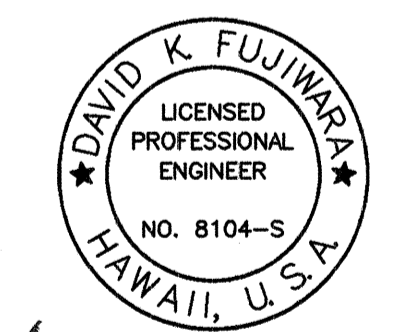
PLAN VIEW

STEEL PLATE DETAIL

Scale: 3" = 1'-0"

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NOTE BOOK	
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NOTE: Type II and Type III Restrainers are Identical Except for Their Anchorage Brackets (See Sheet S5.2, S5.3).



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STATE OF HAWAII
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CABLE RESTRAINER DETAILS

HAWAII BELT ROAD
SEISMIC RETROFIT OF VARIOUS BRIDGES
VICINITY OF PAPAIKOU, HAWAII
PROJECT NO. BR-019-2(43)

SCALE: AS NOTED DATE: August 12, 1999

SHEET No. S5.4 OF 59 SHEETS

CABLE RESTRAINER MATERIAL SPECIFICATIONS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(43)	2000	65	65

PERFORMANCE SPECIFICATION FOR CORROSION INHIBITING GREASE

TEST	TEST METHOD	ACCEPTANCE CRITERIA
1. DROPPING POINT	ASTM D-566 OR ASTM D-2265	Minimum 300 Degree F.
2. OIL SEPARATION @ 160 Degree Fahrenheit % By Weight	FTMS 791B Method 321.2	Maximum 0.5
3. WATER, % MAXIMUM	ASTM D-95	0.1
4. FLASH POINT (Refers to oil component)	ASTM D-92	Minimum 300 Degree F.
5. CORROSION TEST 5% Salt fog @ 100 degree F 5 mils, Minimum Hours (Q Panel Type S)	ASTM B-117	For normal environments: Rust Grade 7 or better after 720 hours of exposure according to ASTM D-610. For corrosive environments: Rust Grade 7 or better after 1000 hours of exposure according to ASTM D-610.
6. WATER SOLUBLE IONS (2) A. Chlorides, PPM Maximum B. Nitrates, PPM Maximum C. Sulfides, PPM Maximum	ASTM D-512 ASTM D-992 APHA 427D(15TH ED.)	10 10 10
7. SOAK TEST 5% Salt Fog @ 100 Degree F 5 mils Coating, Q Panels, Type S. Immerse panels 50% in a 5% salt solution and expose to salt fog	ASTM B-117 (MODIFIED)	No emulsion of the coating after 720 hours of exposure.
8. COMPATIBILITY WITH SHEATHING A. Hardness and volume change of polymer after exposure to grease, 40 days @ 150 degree F. B. Tensile strength change of polymer after exposure to grease, 40 days @ 150 degree F.	ASTM D-4289 ASTM D-638	Permissible change in hardness 15 % Permissible change in volume 10% Permissible change in tensile strength 30%

- (1) Extension of exposure time to 1000 hours for greases used in corrosive environments requires use of more or better corrosion inhibiting additives.
- (2) Procedure: The inside (bottom and sides) of a 1l pyrex breaker, approximate O.D. 105mm, height 145mm, is thoroughly coated with 100 +/- 10g of corrosion preventive coating material. The coated breaker is filled with approximately 900cc of distilled water and heated in an oven at a controlled temperature of 100 degree F for 4 hours. The water extraction is tested by the noted test procedures for the appropriate water soluble ions. Results are reported as PPM in the extracted water.

WIRE ROPE

Wire rope shall be 6 x 19 IRWC galvanized in accordance with Fed spec. RR-W-41od, right regular lay with a minimum breaking strength at 46 kips.

SWAGE FITTING

The swage fitting shall be machined from 1-5/8" diameter C1035 hot rolled annealed bar stock suitable for cold swaging galvanized per ASTM A153.

THREADED STUD

Threaded stud of the restrainer system shall be 1" diameter (8 Threads per inch) x 10" long A449 threaded stud, Class 2A thread before galvanizing per ASTM 153.

NUTS AND WASHERS

Nuts and washers shall conform to ASTM A325, galvanized.

SHEATHING

The sheathing covering the wire rope shall be high density polyethylene with ultraviolet protection. The polyethylene shall be Cell Classification 334413 by ASTM D 3350. The sheathing shall be hot melt extruded over the grease coated wire rope. No other methods of applying the HDPE sheathing over the wire rope will be allowed. The minimum thickness of the HDPE sheathing shall not be less than 0.060 inches.

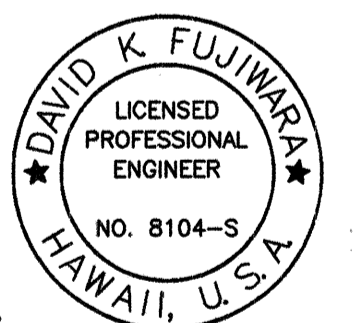
CORROSION INHIBITING GREASE

The corrosion inhibiting grease shall provide corrosion protection to the wire rope, provide a continuous non-brittle film at the lowest anticipated temperature of exposure and shall chemically stable and non-reactive with the wire rope, the sheathing and other components of the restrainer cable system. The grease shall be an organic coating with appropriate polar, moisture displacing and corrosion preventive additives.

The amount of corrosion inhibiting grease used on the wire rope shall be sufficient to ensure essentially complete filling the annular space between the wire rope and the HDPE sheathing.

Test results in accordance with the performance specification shall be provided for the corrosion inhibiting grease.

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CABLE RESTRAINER NOTES

HAWAII BELT ROAD
SEISMIC RETROFIT OF VARIOUS BRIDGES
VICINITY OF PAPAIKOU, HAWAII
PROJECT NO. BR-019-2(43)

SCALE: AS NOTED DATE: August 12, 1999

SHEET No. 55.5 OF 59 SHEETS