

**STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION**

**Project: HAWAII BELT ROAD
REHABILITATION OF UMAUMA STREAM BRIDGE
FAP NO. BR-019-2(61)**

FTP SITE AS-BUILT LIST

- Plans_Seismic Retrofit of Umauma_1999
- 19H-02-97M_1997 Clean & Prime
- BR-019-2(46)_1997 Clean & Prime
- Kapue Abut 5415.17_sheet 10 of 13 (1949)
- Nanue Abut 5468.65_sheet 2 of 11 (1949)
- General Bridge Details 5468.55-5468.63 (1949)
- Standard Details 5468.11-5468.13 (1949)
- Standard Bridge Details 5468.29
- Umauma Bridge 5468.143-5468.191

(ALL AS-BUILT DRAWINGS ARE
FOR INFORMATION ONLY)

INDEX TO DRAWINGS	
SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	STANDARD PLANS SUMMARY
3	GENERAL NOTES
4	UMALUMA BRIDGE PLAN & ELEVATION
5	CONSTRUCTION SIGN PLAN

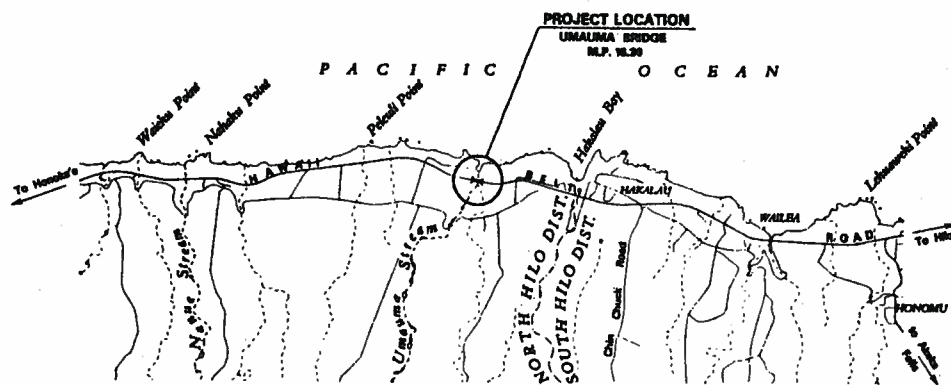
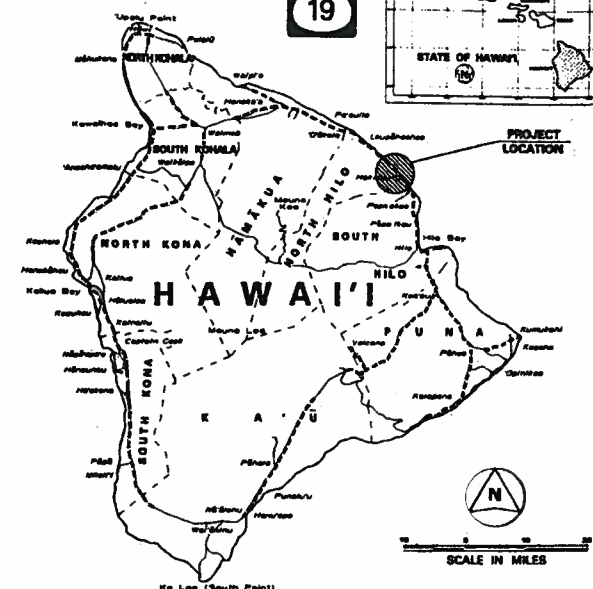
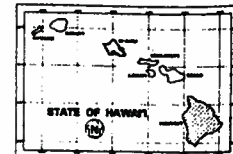
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
HONOLULU, HAWAII

PLANS FOR
**HAWAII BELT ROAD
CLEAN AND PRIME STEEL MEMBERS
UMAUMA BRIDGE**

PROJECT NO. 19H-02-97M

DISTRICT OF NORTH HILO
ISLAND OF HAWAII

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	19H-02-97M	1997	1	5



LOCATION PLAN



DEPARTMENT OF TRANSPORTATION STATE OF HAWAII	
APPROVED:	DATE
<i>[Signature]</i>	5/2/97
DIR. OF TRANSPORTATION	

FOR INFORMATION ONLY

STANDARD PLANS SUMMARY

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	19H-02-97M	1997	2	5

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B-04		
B-05		
B-06	Concrete Box Girder	07/01/86
B-07	Concrete Box Girder	07/01/86
B-08	Concrete Box Girder	07/01/86
B-09		
B-10		
B-11		
B-12	Prestressed Concrete Piles	r07/16/90
B-13	Prestressed Concrete Piles	r07/16/90

D-01	Chain Link Fence With Toprail	r03/06/87
D-02	Chain Link Fence Without Toprail	r07/26/90
D-03	Wire Fence With Metal Posts	07/01/86
D-04	Typical Details of Curbs and/or Outlets	07/01/86
D-05	Typical Details of Reinforced Concrete Drop Driveway	07/01/86
D-06	Centerline and Reference Survey Monument	07/01/86
D-07	Street Survey Monument	07/01/86
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D-09	Field Office	07/01/86
D-10	Field Office	07/01/86
D-11	Project Site Laboratory	07/01/86
D-12	Project Site Laboratory	07/01/86
D-13	Field Office & Project Site Laboratory	07/01/86

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H-04	Typical Reinforcing Details for Catch Basins	07/01/86
H-05	Type A, B and C Storm Drain Manhole	07/01/86
H-06	Type D and E Storm Drain Manhole	07/01/86
H-07	Type F Storm Drain Manhole	07/01/86
H-08	Catch Basin and Manhole Casting	07/01/86
H-09	Type A-9 and A-9P Frames and Grates	07/01/86
H-10	Type A-9B Frames and Grates	07/01/86
H-11	Type 61614 and 61214 Grated Drop Inlet	07/01/86
H-12	Type 61616 Grated Drop Inlet	07/01/86
H-13	61214, 61614 & 61616 Steel Frames and Grates	07/01/86
H-14	61214B Steel Frame and Grates	07/01/86
H-15	61614B Steel Frame and Grates	07/01/86
H-16	Concrete and Cement Rubble Masonry Structures	r10/16/90
H-17	Inlet Structures	r10/16/90
H-18	Flared End Section for Culverts	07/01/86
H-19	Outlet Structures	r02/15/91
H-20	Concrete Spillway Inlet	07/01/86
H-21	18" Slotted C.W.P. Drain	07/01/86
H-22	C.W.P. Coupling Details Standard Joint	r10/16/90
H-23	Hot Shaped Coupling Band	r10/16/90

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TE-16	Miscellaneous Reflector Markers	07/01/86
TE-17	Type II Object Markers	07/01/86
TE-18	Wilepate	07/01/86
TE-19	Reserved	07/01/86
TE-20	Overhead Sign Supports	07/01/86
TE-21	Overhead Sign Support, Box Truss Type, Aluminum	07/01/86
TE-22	Foundation Details and Schedules	07/01/86
TE-23	Supports for Ground Mounted Guide Sign	r11/03/89
TE-24	Breakaway Sign Supports for Ground Mounted Guide Signs	07/01/86
TE-25	Laminated Aluminum Sign Panels (Overhead)	07/01/86
TE-26	Laminated Aluminum Sign Panels (Ground Mounted)	07/01/86
TE-27	Solid Aluminum Extruded Sign Panel and Accessory Details	07/01/86
TE-28	Guide Signs Luminaire Mountings	07/01/86
TE-29	Reserved	07/01/86
TE-30	Raised Pavement Markers and Striping	r05/09/90
TE-31	Miscellaneous Pavement Markings	r05/09/90
TE-32	Miscellaneous Pavement Markings	r05/09/90
TE-33	Miscellaneous Pavement Markings	r11/03/89
TE-34	Reserved	07/01/86
TE-35	Pavement Alphabets, Numbers & Symbols	07/01/86
TE-36	Pavement Alphabets, Numbers & Symbols	07/01/86
TE-37	Reserved	07/01/86
TE-38	Traffic Signal System, Miscellaneous Details	r11/03/89
TE-39	Traffic Signal System, Miscellaneous Details	07/01/86
TE-40	Loop Detectors	r11/03/89
TE-41	Pullboxes	07/01/86
TE-42	Type III Traffic Signal Standard	07/01/86
TE-43	Concrete Pullbox 12' x 3'	07/01/86
TE-44	Reserved	07/01/86

STANDARD PLAN NO.	TITLE	DATE
TE-45	Reserved	07/01/86
TE-46	Reserved	07/01/86
TE-47	Reserved	07/01/86
TE-48	Reserved	07/01/86
TE-49	Reserved	07/01/86
TE-50	Metal Guardrail	r03/06/87
TE-51	Metal Guardrail	r09/01/87
TE-52	Metal Guardrail with Rubrail	r11/03/89
TE-53	Metal Guardrail with Rubrail at Obstruction	r09/01/87
TE-54	Beam Type Guardrail with Rubrail at Obstruction (Shoulder Installation)	r11/03/89
TE-55	Metal Guardrail Connection to Concrete Barrier	r11/03/89
TE-56	Concrete Barrier Transition	07/01/86
TE-57	Guardrail Type 3, Thrie Beam	r11/03/89
TE-57A	Guardrail Type 3, Modified Thrie Beam	r11/03/89
TE-58	Approach End Flare, One & Two Way Roadway	07/01/86
TE-59	Trailing End Flare, One & Two Way Roadway	r11/03/89
TE-60	Anchor Block Details	07/01/86
TE-61	Breakaway Cable Terminal (BCT)	r11/03/89
TE-62	Breakaway Cable Terminal (BCT)	r09/01/87
TE-63	Guardrail Type 4 (Rigid Barrier)	r09/01/87
TE-64	Portable Concrete Barrier	r11/03/89
TE-65	Guardrail Type 4, Miscellaneous	r09/01/87
TE-66	Barriocades	07/01/86
TE-67	Delineation & Pavement Markings at Bridges	07/01/86
TE-68	Wheelchair Ramps	r11/03/89
TE-69	Wheelchair Ramps	r11/03/89

NOTE:
STANDARD PLANS APPLICABLE TO THIS PROJECT ARE INDICATED BY A "●" NEXT TO THE STANDARD PLAN NO.
(D-07 ●)

02/15/91	REVISED STANDARD PLAN H-19
10/16/90	REVISED STANDARD PLANS H-16, H-17, H-22 & H-23
07/26/90	REVISED STANDARD PLANS D-02
07/16/90	REVISED STANDARD PLANS B-12, B-13
05/09/90	REVISED STANDARD PLANS TE-30, TE-31, & TE-32
11/03/89	REVISED STANDARD PLANS TE-06, TE-23, TE-30, TE-31, TE-32, TE-33, TE-38, TE-40, TE-52, TE-54, TE-55, TE-57, TE-59, TE-61, TE-64, TE-68 & TE-69
09/01/87	ADDED TE-57A TO STANDARD PLANS
09/01/87	REVISED STANDARD PLANS TE-04, TE-06, TE-08, TE-32, TE-51, TE-53, TE-54, TE-55, TE-57, TE-59, TE-62, TE-63, TE-65 & TE-69
03/06/87	REVISED STANDARD PLANS D-01, TE-09, TE-40, TE-50, TE-51, TE-57, TE-59, TE-61, TE-63 & TE-64
DATE	REVISION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD PLANS SUMMARY

**HAWAII BELT ROAD
CLEAN AND PRIME STEEL MEMBERS
UMAUMA BRIDGE**
PROJECT NO. 19H-02-97M

Scale: None Date: May, 1997

SHEET No. 1 OF 1 SHEETS

GENERAL NOTES

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	19H-02-97M	1997	3	5

1. This project consists of cleaning and prime coat painting the Umauma Bridge's structural steel members. Cleaning of the structural steel members shall include removal and disposal of lead-containing/lead-based paint; baseline environmental testing for lead; worker and environmental protection; debris disposal.
2. All exposed super and substructure steel members are to have the lead containing paint removed, cleaned and repainted in accordance with these plans and specifications.
3. Removal of existing paint shall be done with recyclable steel abrasive, high pressure blasting. (Greater than 100 p.s.i.)
4. Appropriate hand tooling methods shall be utilized in areas not adequately prepared by blasting.
5. Level of steel member surface preparation, prior to painting shall be consistent with SSPC-VSI0 standards.
6. Bridge paint lead content analysis report, prepared for the State and dated 2/13/96, indicates that paint samples taken from these bridges had lead contents of:
Umauma Bridge: 150,000 mg/kg, or 15%
7. Contractor shall utilize all appropriate methods, procedures and precautions necessary when performing lead paint removal and when working with lead paint and lead paint debris. Refer to specifications for more information.
8. The Contractor shall dispose of the lead paint, spent abrasives and removal debris in an approved manner, meeting all applicable Federal, State and local regulations.
9. When performing work within the State ROW, nearby, adjacent to, or on the travel way, the Contractor shall refer to Section 645 "Traffic Control" of these specifications.
10. The bridge plans in these plans are for illustration only and show the most general of information. Partial construction plans for the Umauma Bridge are available for viewing at:

State of Hawai'i
Department of Transportation
Highways Division
50 Makena Street
Hilo, Hawai'i 96720

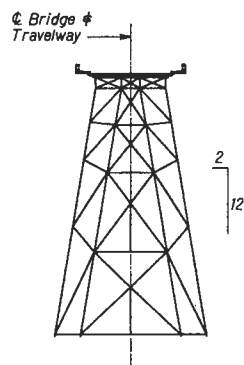
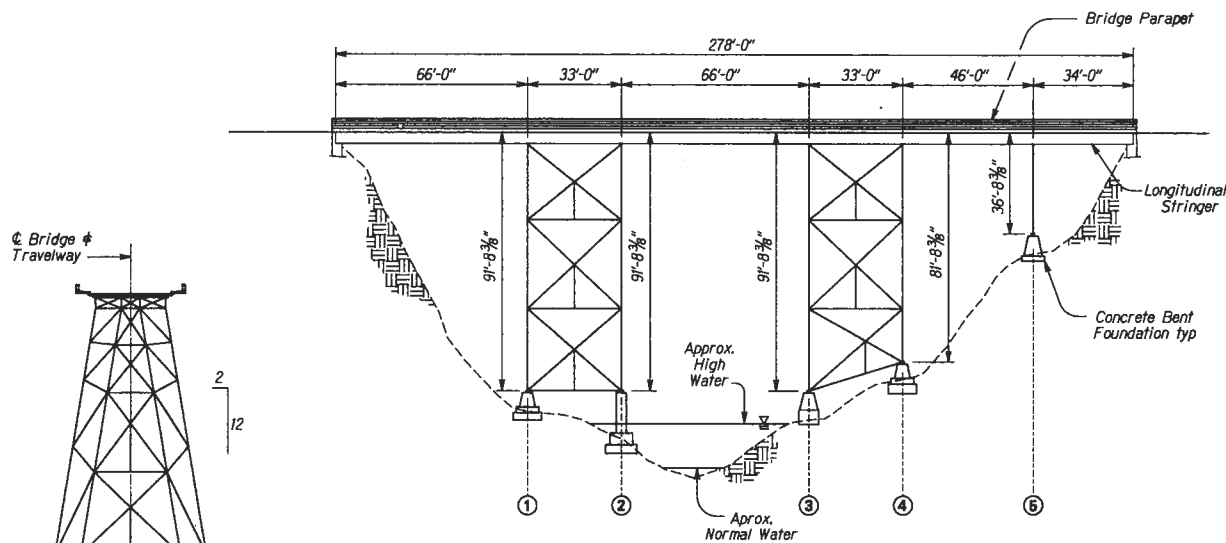
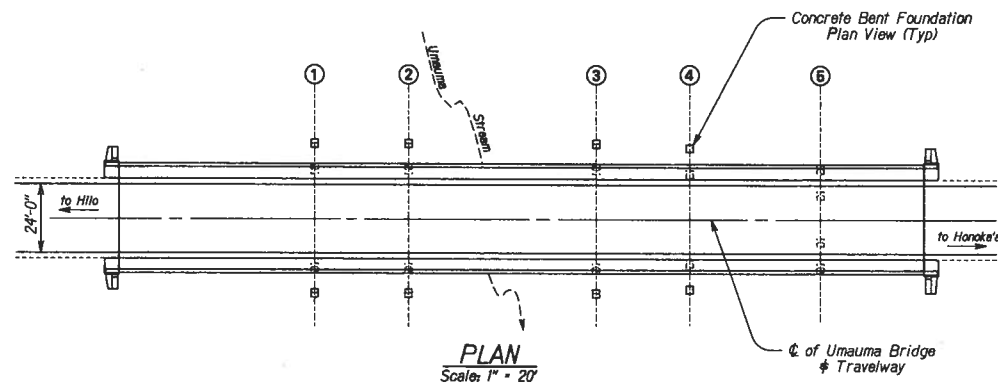
during normal working hours.

11. The Contractor is reminded of the requirements of Subsection 108.01 - Subletting of Contract, which requires him to perform work amounting to but not less than 50 percent of the total contract cost less deductible items. Non-compliance with this Subsection may be grounds for rejection of bid.
12. The Contractor's attention is directed to the following Sections of the Special Provisions: Subsection 107.13 - Public Convenience and Safety; Subsection 107.21 - Contractor's Responsibility for Utility Property and Services; and Section 645 - Traffic Control.

13. At the end of each day's work, the Contractor shall remove all equipment and other obstructions to permit free and safe passage of public traffic.
14. The Contractor's attention is directed to Special Provisions Section 695 - "Clean and Paint Structural Bridge Steel" and Section 696 - "Removal and Disposal of Lead-Base Paint", for a partial list of environmental, legal, and administrative requirements.
15. The Contractor is hereby directed to the General Provisions of this Contract. The Contractor shall visit and confirm all site conditions and structural features of the work prior to submittal of bid. Any claims for additional payment, based upon undiscovered work difficulties that should have been detected by a person with experience in this type of construction project during the prebid process, shall be denied by the Engineer.
16. Contractor shall obtain necessary permits and comply with State Law regarding noise.

STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION	
GENERAL NOTES	
HAWAII BELT ROAD CLEAN AND PRIME STEEL MEMBERS UMAUMA BRIDGE PROJECT NO. 19H-02-97M	
Scale: None	Date: May, 1997
SHEET No. 1 OF 1 SHEETS	

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	19H-02-97M	1997	4	5



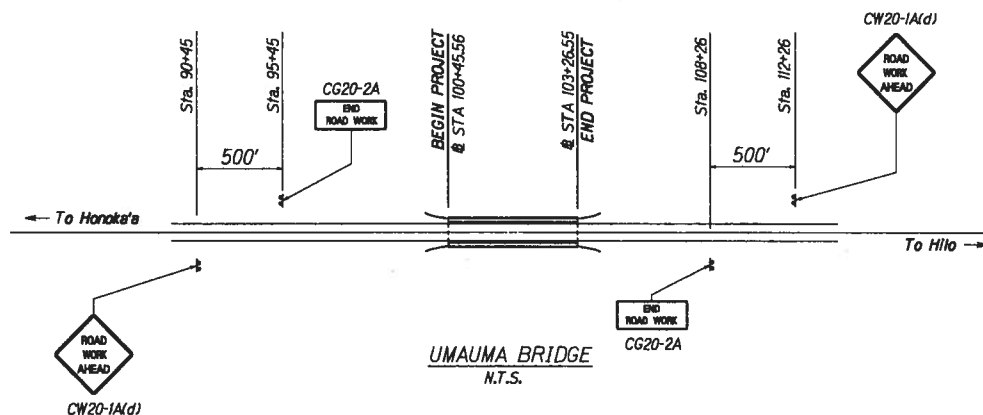
NOTES:

1. Bridge Superstructure and Bents are built up members and are represented by lines in these Plans. Details omitted for clarity.
2. Plans are for illustration only.
3. Remove & trim vegetation under Bridge superstructure & Bent to the approval of the Engineer. Cost shall be incidental to other Contract Items.

③ - Typical Bent Number as per Plans

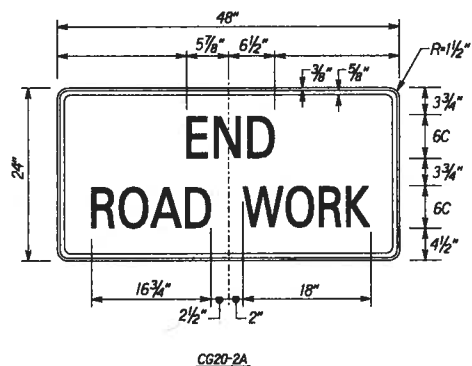
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION UMAUMA BRIDGE PLAN AND ELEVATION HAWAII BELT ROAD CLEAN AND PRIME STEEL MEMBERS UMAUMA BRIDGE PROJECT NO. 19H-02-97M Scale: Noted Date: May, 1997 SHEET No. 4 OF 5 SHEETS
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FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
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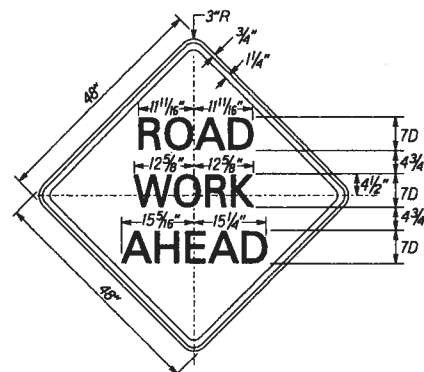


CONSTRUCTION SIGN SCHEDULE-UMAUMA BRIDGE				
ROAD AND LOCATION	STATION	ITEM No. 621.7121 (no posts)		ITEM No. 621.7120 (two posts)
		LEFT	RIGHT	
HAWAII BELT ROAD	90+45		●	CW20-1A(d)
	95+45	●		CG20-2A
	108+26		●	CG20-2A
	112+26	●		CW20-1A(d)
Total Construction Signs		0		4

Final locations of all signs to be determined in the field by the Engineer .



CG20-2A



CW20-1A(d)

SIGN DETAILS
Not To Scale

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
CONSTRUCTION SIGN
PLAN & SCHEDULE
HAWAII BELT ROAD
CLEAN AND PRIME STEEL MEMBERS
UMAUMA BRIDGE
PROJECT NO. 19H-02-97M
Scale: None Date: May, 1997
SHEET No. 1 OF 1 SHEETS

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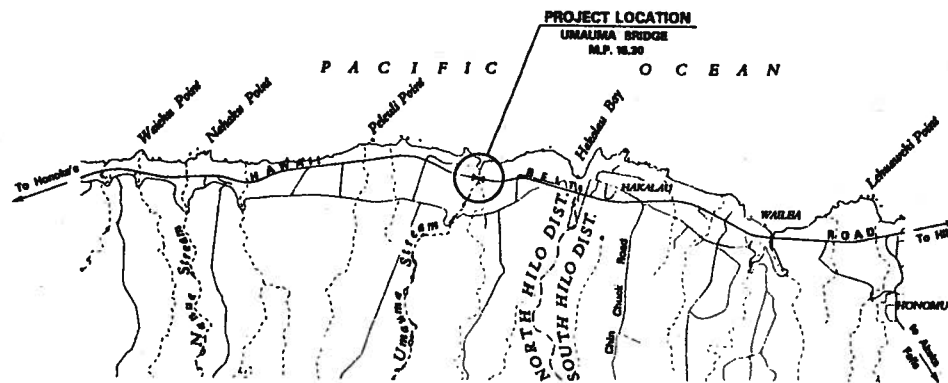
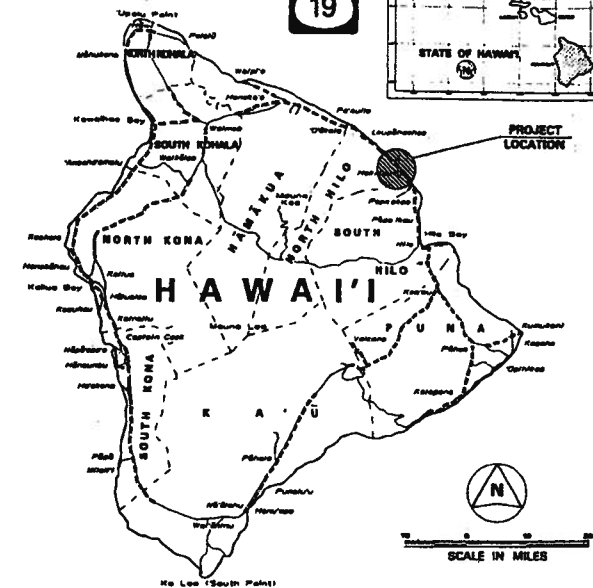
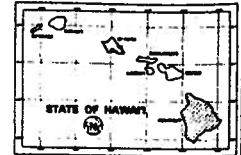
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HAWAII BELT ROAD
CLEAN AND PRIME STEEL MEMBERS
UMAUMA BRIDGE

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DISTRICT OF NORTH HILO
ISLAND OF HAWAII

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LOCATION PLAN



FOR INFORMATION
ONLY

DEPARTMENT OF TRANSPORTATION STATE OF HAWAII	
APPROVED:	DATE
<i>[Signature]</i>	5/2/99
DIV. OF TRANSPORTATION	

HAWAII DISTRICT
DESIGNED BY
J. E. HANAKO
P.E. & E.V.
BEL-2148
PHONE
May 1997
DATE

STANDARD PLANS SUMMARY

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TE-48	Reserved	07/01/86
TE-49	Reserved	07/01/86
TE-50	Metal Guardrail	r03/06/87
TE-51	Metal Guardrail	r09/01/87
TE-52	Metal Guardrail with Rubrail	r11/03/89
TE-53	Metal Guardrail with Rubrail at Obstruction	r09/01/87
TE-54	Beam Type Guardrail with Rubrail at Obstruction (Shoulder Installation)	r11/03/89
TE-55	Metal Guardrail Connection to Concrete Barrier	r11/03/89
TE-56	Concrete Barrier Transition	07/01/86
TE-57	Guardrail Type 3, Thrie Beam	r11/03/89
TE-57A	Guardrail Type 3, Modified Thrie Beam	11/03/89
TE-58	Approach End Flare, One & Two Way Roadway	07/01/86
TE-59	Trailing End Flare, One & Two Way Roadway	r11/03/89
TE-60	Anchor Block Details	07/01/86
TE-61	Breakaway Cable Terminal (BCT)	r11/03/89
TE-62	Breakaway Cable Terminal (BCT)	r09/01/87
TE-63	Guardrail Type 4 (Rigid Barrier)	r09/01/87
TE-64	Portable Concrete Barrier	r11/03/89
TE-65	Guardrail Type 4, Miscellaneous	r09/01/87
TE-66	Barricades	07/01/86
TE-67	Delineation and Pavement Markings at Bridges	07/01/86
TE-68	Wheelchair Ramps	r11/03/89
TE-69	Wheelchair Ramps	r11/03/89

NOTE:
STANDARD PLANS APPLICABLE TO THIS PROJECT ARE INDICATED BY A "●" NEXT TO THE STANDARD PLAN NO.
(D-07 ●)

02/15/91	REVISED STANDARD PLAN H-19
10/16/90	REVISED STANDARD PLANS H-16, H-17, H-22 & H-23.
07/26/90	REVISED STANDARD PLANS D-02.
07/16/90	REVISED STANDARD PLANS B-12, B-13.
05/09/90	REVISED STANDARD PLANS TE-30, TE-31, & TE-32.
11/03/89	REVISED STANDARD PLANS TE-06, TE-23, TE-30, TE-31, TE-32, TE-33, TE-38, TE-40, TE-52, TE-54, TE-55, TE-57, TE-59, TE-61, TE-64, TE-68 & TE-69. ADDED TE-57A TO STANDARD PLANS
09/01/87	REVISED STANDARD PLANS TE-04, TE-06, TE-08, TE-39, TE-51, TE-53, TE-54, TE-55, TE-57, TE-59, TE-62, TE-63, TE-65 & TE-69.
03/06/87	REVISED STANDARD PLANS D-01, TE-09, TE-40, TE-50, TE-51, TE-57, TE-59, TE-61, TE-63 & TE-64.
DATE	REVISION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD PLANS SUMMARY

**HAWAII BELT ROAD
CLEAN AND PRIME STEEL MEMBERS
UMAUMA BRIDGE**

PROJECT NO. 19H-02-97M

Scale: None Date: May, 1997

SHEET NO. 1 OF 1 SHEETS

STANDARD PLANS SUMMARY

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HA	BR-019-2(46)	2000	2	26

STANDARD PLAN NO.	TITLE	DATE
B-01	NOTES AND MISCELLANEOUS DETAILS	07/01/88
B-02		
B-03	TYPICAL STRUCTURE EXCAVATION AND BACKFILL PAY LIMITS	07/01/88
B-04		
B-05		
B-06	CONCRETE BOX GIRDER	07/01/88
B-07	CONCRETE BOX GIRDER	07/01/88
B-08	CONCRETE BOX GIRDER	07/01/88
B-09		
B-10		
B-11		
B-12	PRESTRESSED CONCRETE PILES	10/18/90
B-13	PRESTRESSED CONCRETE PILES	10/18/90

D-01	CHAIN LINK FENCE WITH TOPRAIL	10/08/87
D-02	CHAIN LINK FENCE WITHOUT TOPRAIL	10/28/90
D-03	WIRE FENCE WITH METAL POSTS	07/01/88
D-04	TYPICAL DETAILS OF CURBS AND/OR GUTTERS	07/01/88
D-05	TYPICAL DETAILS OF REINFORCED CONCRETE DROP DRIVEWAY	07/01/88
D-06	CENTERLINE AND REFERENCE SURVEY MONUMENT	07/01/88
D-07	STREET SURVEY MONUMENT	07/01/88
D-08	LANDSCAPING SHRUB AND TREE PLANTING	07/01/88
D-09	FIELD OFFICE	07/01/88
D-10	FIELD OFFICE	07/01/88
D-11	PROJECT SITE LABORATORY	07/01/88
D-12	PROJECT SITE LABORATORY	07/01/88
D-13	FIELD OFFICE AND PROJECT SITE LABORATORY	07/01/88

H-01	TYPE A, B, C, AND D CATCH BASIN	07/01/88
H-02	TYPE A1, B1, C1 AND D1 CATCH BASIN	07/01/88
H-03	TYPE A2, B2, C2 AND D2 CATCH BASIN	07/01/88
H-04	TYPICAL REINFORCING DETAILS FOR CATCH BASINS	07/01/88
H-05	TYPE A, B AND C STORM DRAIN MANHOLE	07/01/88
H-06	TYPE D AND E STORM DRAIN MANHOLE	07/01/88
H-07	TYPE F STORM DRAIN MANHOLE	07/01/88
H-08	CATCH BASIN AND MANHOLE CASTING	07/01/88
H-09	TYPE A-8 AND A-8P FRAMES AND GRATES	07/01/88
H-10	TYPE A-9B FRAMES AND GRATES	07/01/88
H-11	TYPE 61814 AND 61214 GRATED DROP INLET	07/01/88
H-12	TYPE 61818 GRATED DROP INLET	07/01/88
H-13	61214, 61814 & 61818 STEEL FRAMES AND GRATES	07/01/88
H-14	61214B STEEL FRAMES AND GRATES	07/01/88
H-15	61814B STEEL FRAMES AND GRATES	07/01/88
H-16	CONCRETE AND CEMENT RUBBLE MASONRY STRUCTURES	10/18/90
H-17	INLET STRUCTURES	10/18/90
H-18	FLARED END SECTION FOR CULVERTS	07/01/88
H-19	OUTLET STRUCTURES	10/21/91
H-20	CONCRETE SPILLWAY INLET	07/01/88
H-21	18" SLOTTED C.M.P. DRAIN	07/01/88
H-22	C.M.P. COUPLING DETAILS STANDARD JOINT	10/18/90
H-23	HAT SHAPED COUPLING BAND	10/18/90

STANDARD PLAN NO.	TITLE	DATE
TE-01	MISCELLANEOUS SIGN DETAILS	07/01/88
TE-02	GALVANIZED FLANGED CHANNEL SIGN POST MOUNTING	07/01/88
TE-03	GALVANIZED SQUARE TUBE SIGN POST MOUNTING	07/01/88
TE-04	REGULATORY SIGNS	10/08/87
TE-05	WARNING SIGNS	07/01/88
TE-06	MISCELLANEOUS SIGNS	11/03/88
TE-07	RESERVED	07/01/88
TE-08	CONSTRUCTION SIGNS	10/08/87
TE-09	MISCELLANEOUS INTERSECTION SIGNS	10/08/87
TE-10	RESERVED	07/01/88
TE-11	BIKE ROUTE SIGN AND SUPPLEMENTARY PLATES	07/01/88
TE-12	STATE ROUTE MARKER AND AUXILIARY MARKERS	07/01/88
TE-13	INTERSTATE ROUTE MARKER	07/01/88
TE-14	STATE ROUTE MARKER AND BORDER DETAIL FOR GUIDE SIGNS	07/01/88
TE-15	ROUTE MARKER ASSEMBLIES	07/01/88
TE-16	MISCELLANEOUS REFLECTOR MARKERS	07/01/88
TE-17	TYPE II OBJECT MARKERS	07/01/88
TE-18	MILEPOSTS	07/01/88
TE-19	RESERVED	07/01/88
TE-20	OVERHEAD SIGN SUPPORTS	07/01/88
TE-21	OVERHEAD SIGN SUPPORT, BOX TRUSS TYPE, ALUMINUM	07/01/88
TE-22	FOUNDATION DETAILS AND SCHEDULES	07/01/88
TE-23	SUPPORTS FOR GROUND MOUNTED GUIDE SIGN	11/03/88
TE-24	BREAKAWAY SIGN SUPPORTS FOR GROUND MOUNTED SIGNS	07/01/88
TE-25	LAMINATED ALUMINUM SIGN PANELS (OVERHEAD)	07/01/88
TE-26	LAMINATED ALUMINUM SIGN PANELS (GROUND MOUNTED)	07/01/88
TE-27	SOLID ALUMINUM EXTRUDED SIGN PANEL AND ACCESSORY DETAILS	07/01/88
TE-28	GUIDE SIGNS LUMINAIRE MOUNTINGS	07/01/88
TE-29	RESERVED	07/01/88
TE-30	RAISED PAVEMENT MARKERS AND STRIPING	10/08/90
TE-31	MISCELLANEOUS PAVEMENT MARKINGS	10/08/90
TE-32	MISCELLANEOUS PAVEMENT MARKINGS	10/08/90
TE-33	MISCELLANEOUS PAVEMENT MARKINGS	11/03/88
TE-34	RESERVED	07/01/88
TE-35	PAVEMENT ALPHABETS, NUMBERS & SYMBOLS	07/01/88
TE-36	PAVEMENT ALPHABETS, NUMBERS & SYMBOLS	07/01/88
TE-37	RESERVED	07/01/88
TE-38	TRAFFIC SIGNAL SYSTEM, MISCELLANEOUS DETAILS	11/03/88
TE-39	TRAFFIC SIGNAL SYSTEM, MISCELLANEOUS DETAILS	07/01/88
TE-40	LOOP DETECTORS	11/03/88
TE-41	PULLBOXES	07/01/88
TE-42	TYPE III TRAFFIC SIGNAL STANDARD	07/01/88
TE-43	CONCRETE PULLBOX (2'x3')	07/01/88
TE-44	RESERVED	07/01/88

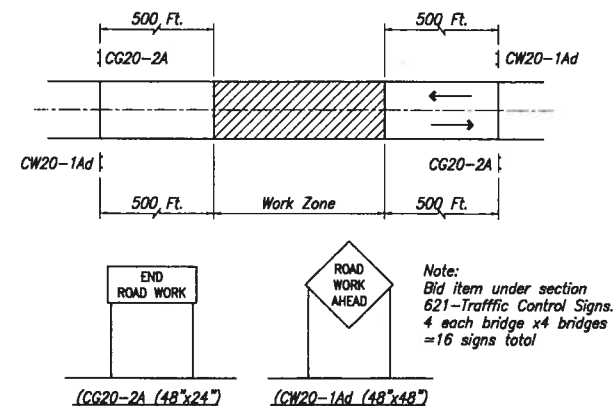
STANDARD PLAN NO.	TITLE	DATE
TE-45	RESERVED	07/01/88
TE-46	RESERVED	07/01/88
TE-47	RESERVED	07/01/88
TE-48	RESERVED	07/01/88
TE-49	RESERVED	07/01/88
TE-50	METAL GUARD RAIL	10/08/87
TE-51	METAL GUARD RAIL	10/08/87
TE-52	METAL GUARD RAIL WITH RUBRAIL	11/03/88
TE-53	METAL GUARD RAIL WITH RUBRAIL AT OBSTRUCTION	10/08/87
TE-54	BEAM TYPE GUARDRAIL WITH RUBRAIL AT OBSTRUCTION (SHOULDER INSTALLATION)	11/03/88
TE-55	METAL GUARDRAIL CONNECTION TO CONCRETE BARRIER	11/03/88
TE-56	CONCRETE BARRIER TRANSITION	07/01/88
TE-57	GUARDRAIL TYPE 3, THREE BEAM	11/03/88
TE-57A	GUARDRAIL TYPE 3, MODIFIED THREE BEAM	11/03/88
TE-58	APPROACH END FLARE, ONE & TWO WAY ROADWAY	07/01/88
TE-59	TRAILING END FLARE, ONE & TWO WAY ROADWAY	11/03/88
TE-60	ANCHOR BLOCK DETAILS	07/01/88
TE-61	BREAKAWAY CABLE TERMINAL (BCT)	11/03/88
TE-62	BREAKAWAY CABLE TERMINAL (BCT)	10/08/87
TE-63	GUARDRAIL TYPE 4 (RIGID BARRIER)	10/08/87
TE-64	PORTABLE CONCRETE BARRIER	11/03/88
TE-65	GUARDRAIL TYPE 4, MISCELLANEOUS	10/08/87
TE-66	BARRICADES	07/01/88
TE-67	DELINEATION & PAVEMENT MARKINGS AT BRIDGES	07/01/88
TE-68	WHEELCHAIR RAMPS	10/18/94
TE-69	WHEELCHAIR RAMPS	10/18/94

DATE	REVISION
	STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION
	STANDARD PLANS SUMMARY
	SEISMIC RETROFIT OF VARIOUS BRIDGES EAST OF NINOLE, HAWAII F.A. PROJECT NO. BR-019-2(46)
Scale: As Noted	Date: AUG. 17, 1999
SHEET No. T-2 OF 3 SHEETS	

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FED. AID YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-018-2(48)	2000	3	26

GENERAL NOTES

1. The scope of work for this project consists of retrofitting superstructures and substructure of Nanue Bridge, Opea Bridge, Umauma Bridge, and Waikamalo Bridge.
2. The Contractor is reminded of the requirements of Subsection 108.01 - Subletting of Contract, which requires him to perform work amounting to no less than 50 percent of the total contract cost, less deductible items. Non-compliance with this subsection may be grounds for rejection of bid.
3. The Contractor's attention is directed to the following sections of the special provisions: Subsection 107.13 - Public Convenience and Safety; Subsection 107.21 - Contractor's Responsibility for Utility Property and Services; and Section 645 - Traffic Control.
4. At the end of each day's work, the Contractor shall remove all equipment and other obstructions to permit free and safe passage of public traffic.
5. The existence and location of underground utilities, manholes, monuments and structures as shown on the plans are from the latest available data, but the accuracy is not guaranteed. The encountering of other obstacles during the course of work is possible. The Contractor shall be held liable for any damages incurred to the existing facilities and/or improvements as a result of his operations.
6. The Contractor shall notify the Engineer in writing, two (2) weeks prior to the start of retrofitting operations.
7. The Contractor shall erect construction warning signs approximately 500 feet before the beginning of project and 500 feet after the end of project, or, as directed by the Engineer.



WORK ZONE PLAN - CONSTRUCTION SIGNS

Not to Scale

DESIGNED BY	DATE
DRAWN BY	
CHECKED BY	
APPROVED BY	
DATE	

08/28/99 2:58 L:\V\1041-01\PROJECT

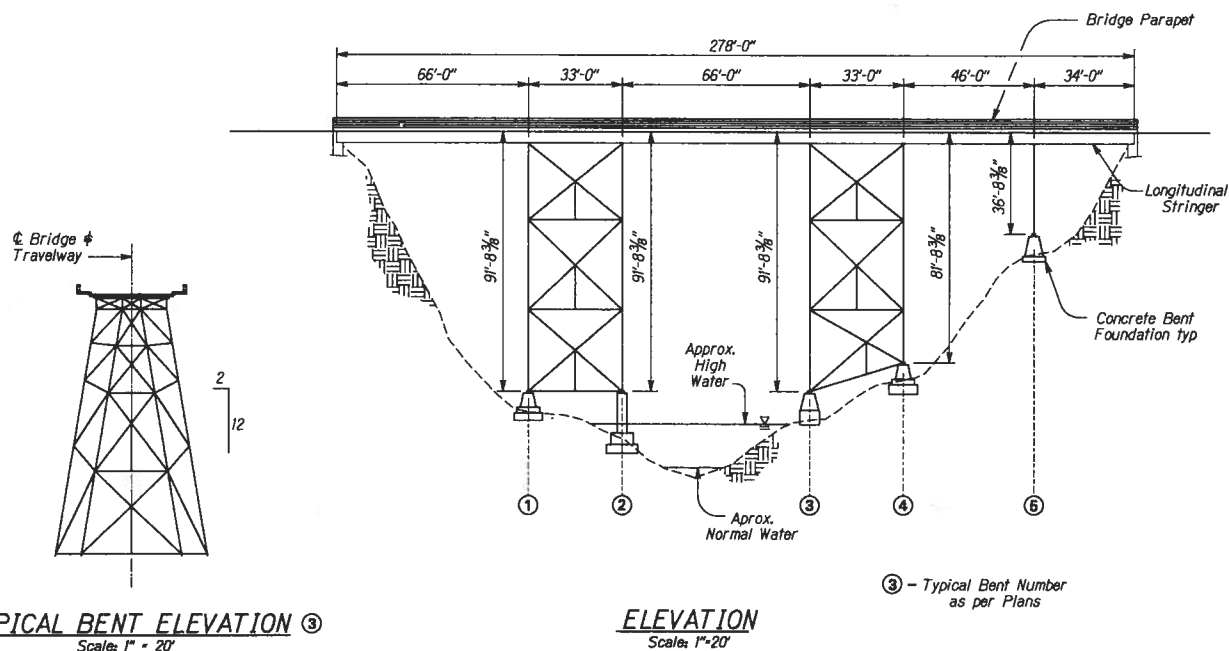
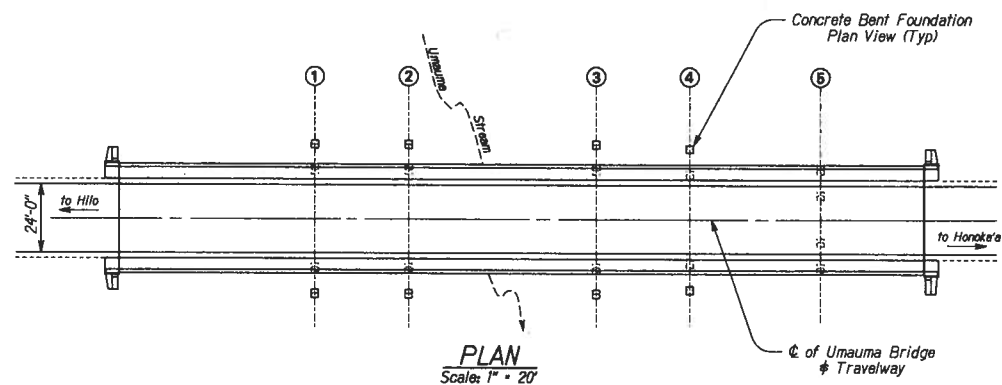


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Shun-Chun Chin

DATE	REVISION
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION	
GENERAL NOTES	
SEISMIC RETROFIT OF VARIOUS BRIDGES EAST OF NIMOLE, HAWAII F.A. PROJECT NO. BR-018-2(48)	
Scale: As Noted	Date: AUG. 17, 1999
SHEET No. T-3 OF 3 SHEETS	

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	19H-02-97M	1997	4	5



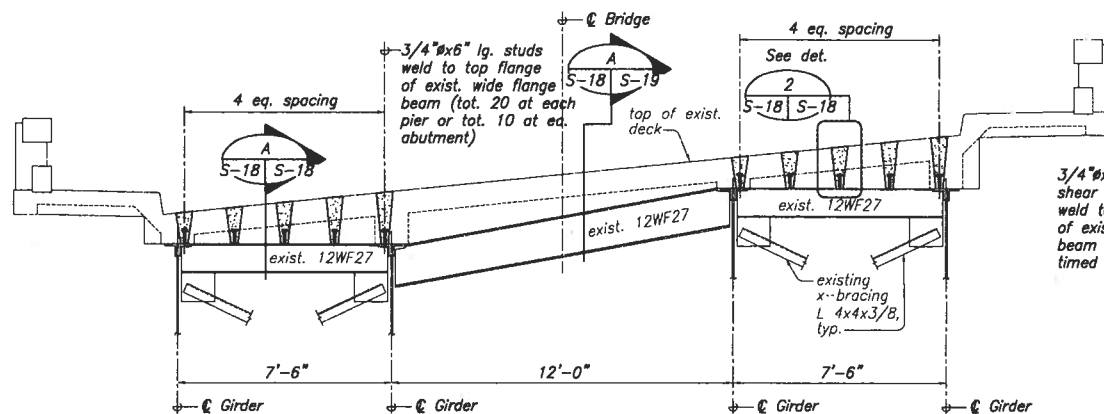
NOTES:

1. Bridge Superstructure and Bents are built up members and are represented by lines in these Plans. Details omitted for clarity.
2. Plans are for illustration only.
3. Remove & trim vegetation under Bridge superstructure & Bent to the approval of the Engineer. Cost shall be incidental to other Contract Items.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
UMAUMA BRIDGE
PLAN AND ELEVATION
HAWAII BELT ROAD
CLEAN AND PRIME STEEL MEMBERS
UMAUMA BRIDGE
PROJECT NO. 19H-02-97M
Scale: Noted Date: May, 1997
SHEET No. 4 OF 5 SHEETS

20

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(46)	2000	21	26



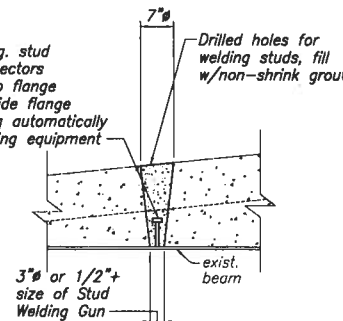
TYPICAL ELEVATION - GIRDER END AT BEARING FIXED & EXPANSION

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

1
S-18 S-18

S-17

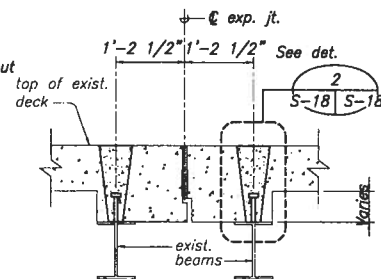
3/4" x 6" lg. stud shear connectors weld to top flange of exist. wide flange beam using automatically timed welding equipment



SECTION 2

Scale: 1"=1'-0"

2
S-18 S-18



SECTION A

Scale: 1"=1'-0"

A
S-18 S-18

DESIGNED BY	DATE
DRAWN BY	DATE
CHECKED BY	DATE
APPROVED BY	DATE
NO.	

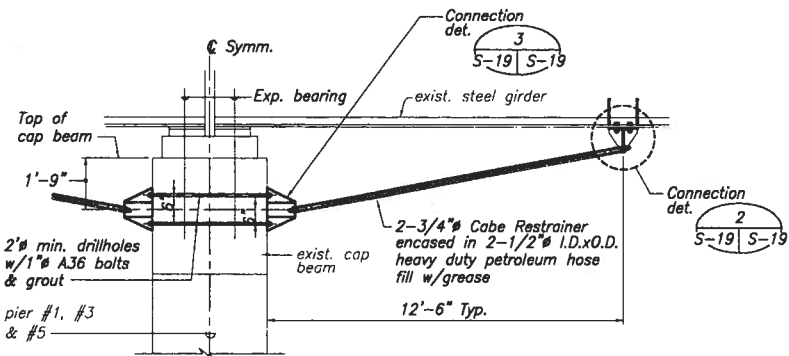
OS1-2.DWG 08/04/99 16:30 FINAL L:\DWG\6041-01\NEWSTRUCT.OPEA



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Sheng-Hsin Chen

DATE	REVISION
	STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION OPEA BRIDGE SUPERSTRUCT. & SUBSTRUCT. RETROFIT SECTIONS AND DETAILS SEISMIC RETROFIT OF VARIOUS BRIDGES EAST OF NINOLE, HAWAII F.A. PROJECT NO. BR-019-2(46) Scale: As Noted Date: AUG. 17, 1999 SHEET No. S-18 OF 23 SHEETS

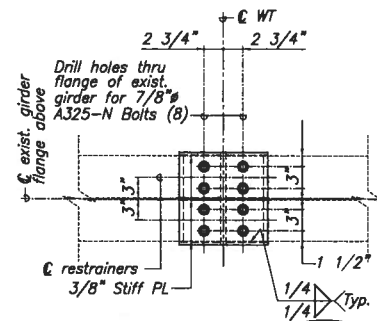
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FED. AID YEAR	SHEET	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(46)	2000	22	26



RESTRAINER LAYOUT - TYPICAL SECTION

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

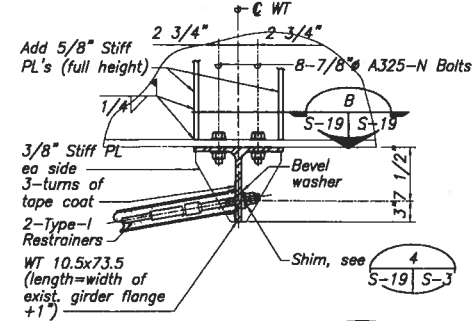
S-19 S-19
S-17, S-18



SECTION B

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

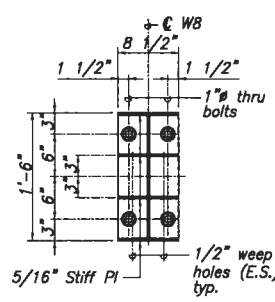
S-19 S-19



CONNECTION DETAIL 2

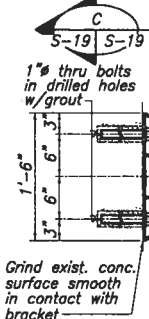
Scale: 1 1/2"=1'-0"

S-19 S-19
S-23



SECTION C

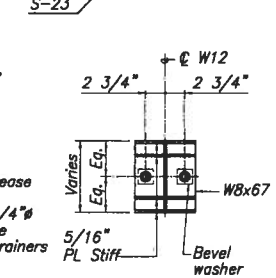
Scale: 1 1/2"=1'-0"



CONNECTION DETAIL 3

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

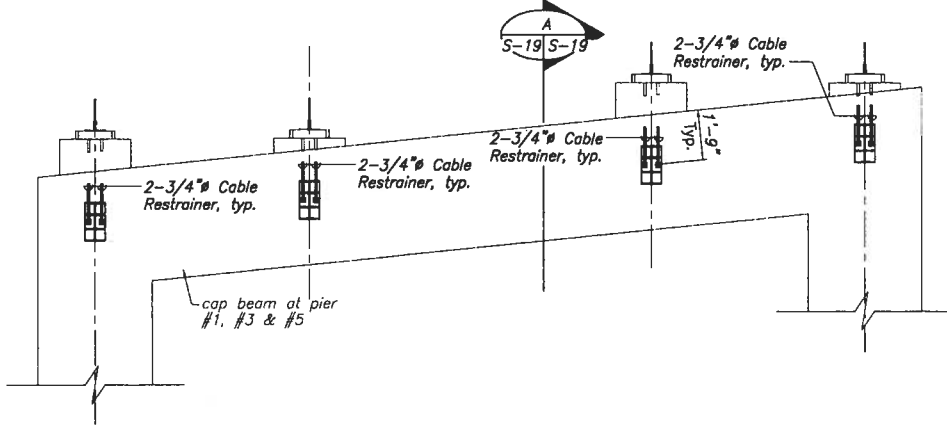
S-19 S-19
S-23



SECTION D

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

S-19 S-19



ELEVATION

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

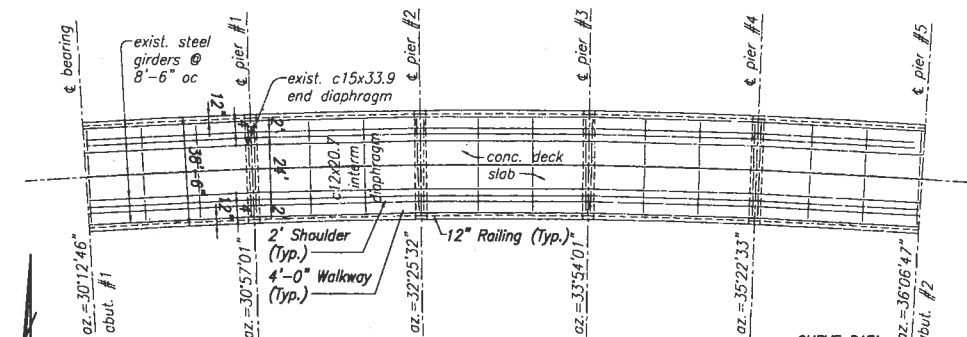
S-19 S-19



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Charmaine Chin

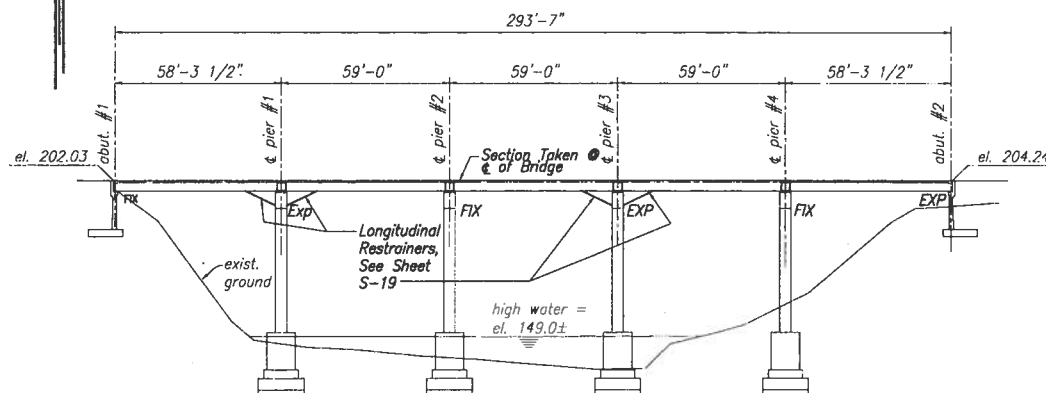
DATE	REVISION
	STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION OPEA BRIDGE SUPERSTRUCT. & SUBSTRUCT. RETROFIT PLAN OF LONGITUDINAL RESTRAINERS SEISMIC RETROFIT OF VARIOUS BRIDGES EAST OF NINOLE, HAWAII F.A. PROJECT NO. BR-019-2(46) Scale: As Noted Date: AUG. 17, 1999 SHEET No. S-19 OF 23 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(46)	2000	23	26



LAYOUT PLAN
Scale: 1"=20'-0"

CURVE DATA
 $\Delta = 07^{\circ}20'24''$
 $R = 2291.6931$
 $T = 146.9928$
 $L = 293.5833$



LONGITUDINAL SECTION
Scale: 1"=20'-0"

NOTES: RETROFIT OF SUPERSTRUCTURE TO SUBSTRUCTURE

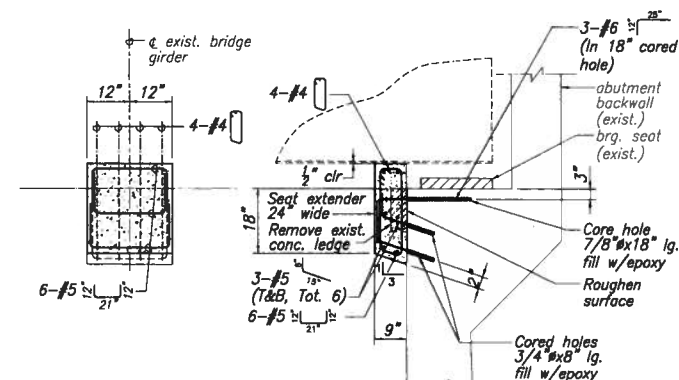
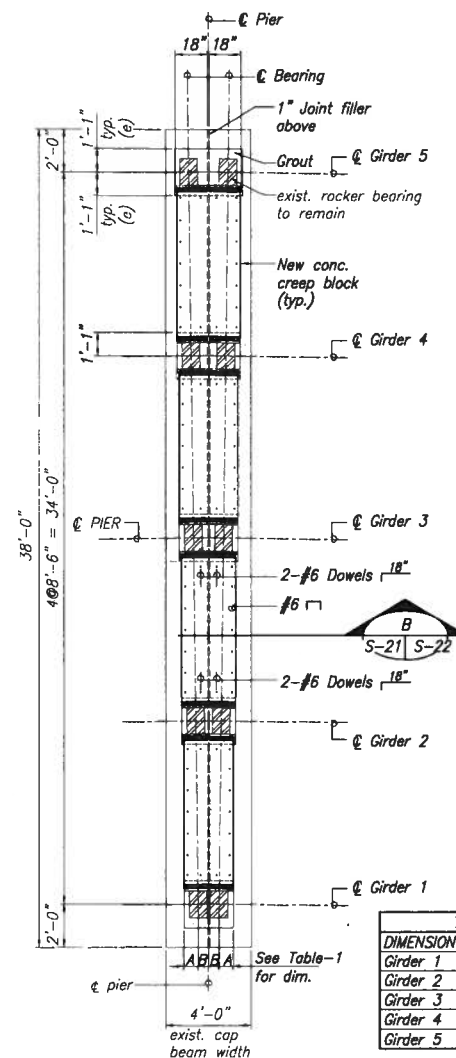
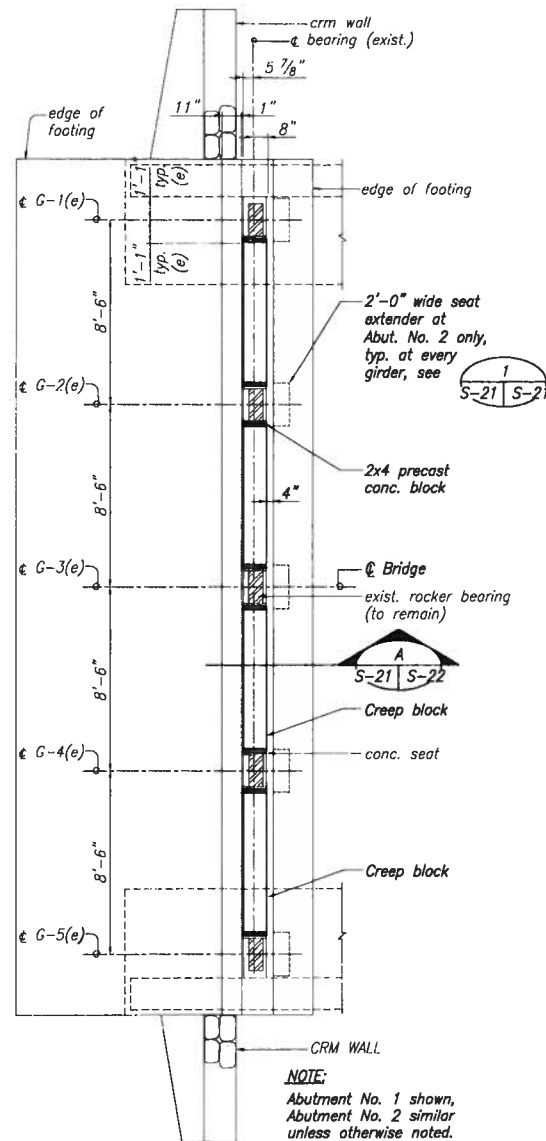
1. Provide creep blocks at each Abutment and Pier Cap Beam, see Sheet No. S-21 & S-22.
2. Provide longitudinal restrainers at expansion joint adjacent to Piers #1 & #3.
3. Add expansion bolts to strengthen shear transfer of concrete deck and diaphragms at each span, see Section A/S-22.
4. Add diagonal struts to end diaphragms at each span to prevent girder web from buckling, see Section C/S-22.



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Chun-Chin

DATE	REVISION
	STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION WAIKAMALO BRIDGE SUPERSTRUCT. & SUBSTRUCT. RETROFIT PLAN AND SECTION SEISMIC RETROFIT OF VARIOUS BRIDGES EAST OF NINOLE, HAWAII P.A. PROJECT NO. BR-019-2(46) Scale: As Noted Date: AUG. 17, 1999 SHEET No. S-20 OF 23 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HA	BR-019-2(46)	2000	24	26



DIMENSION	A	B
Girder 1	8"	5 7/8"
Girder 2	8"	7 3/16"
Girder 3	8"	8 1/2"
Girder 4	8"	9 13/16"
Girder 5	8"	11 1/8"

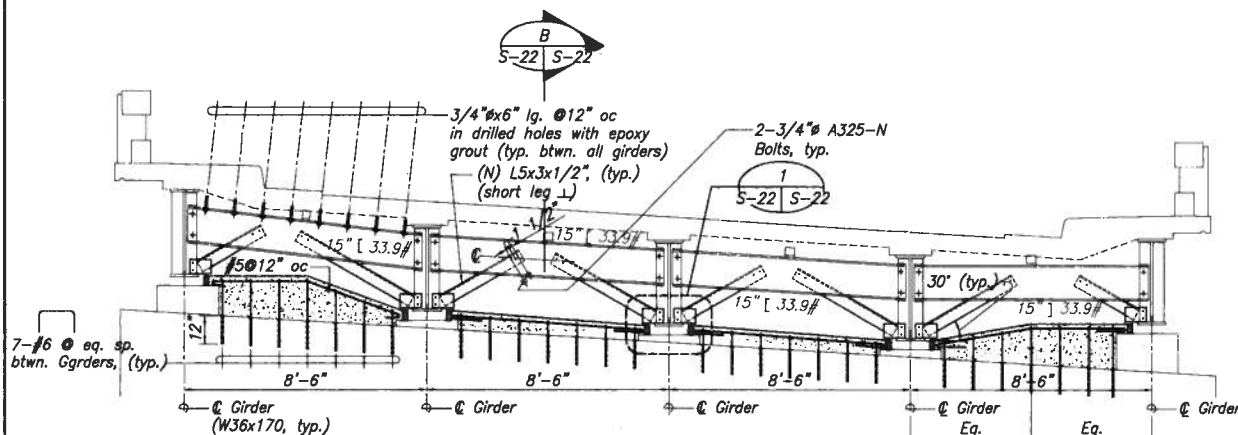


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Chen Chien Chiu

DATE	REVISION
	STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION WAIKAUMALO BRIDGE SUPERSTRUCT. & SUBSTRUCT. RETROFIT ABUTMENT 2 CAP BEAM PLAN SEISMIC RETROFIT OF VARIOUS BRIDGES EAST OF HINOLE, HAWAII F.A. PROJECT NO. BR-019-2(46)
Scale: As Noted	Date: AUG. 17, 1999
SHEET No. S-21 OF 23 SHEETS	

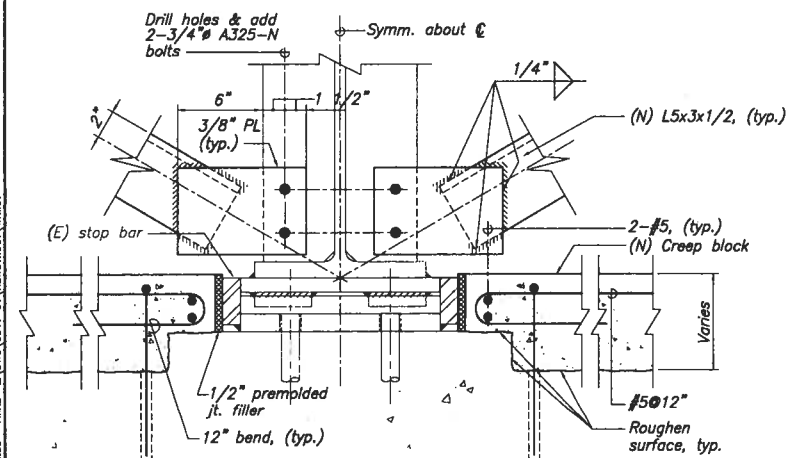
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FED. ROAD DIST. NO.	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(46)	2000	25	26



TYPICAL ELEVATION - GIRDER END @ BEARING (FIXED & EXPANSION)

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

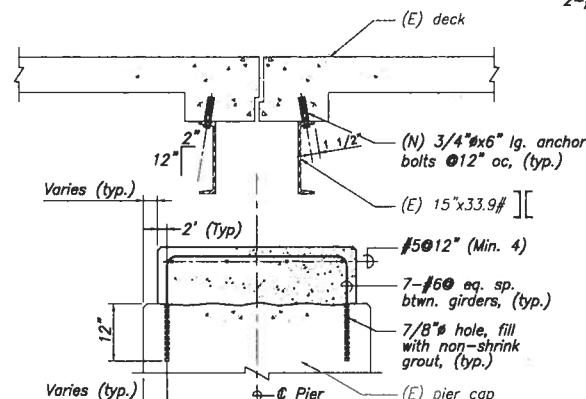
S-22 S-22



DETAIL 1

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

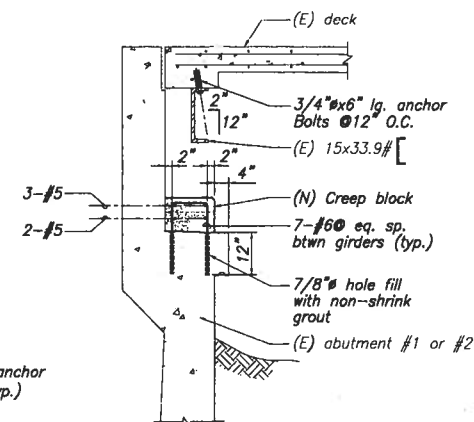
S-22 S-22



SECTION @ PIER B

Scale: 1"=1'-0"

S-22 S-22



SECTION @ ABUTMENT A

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

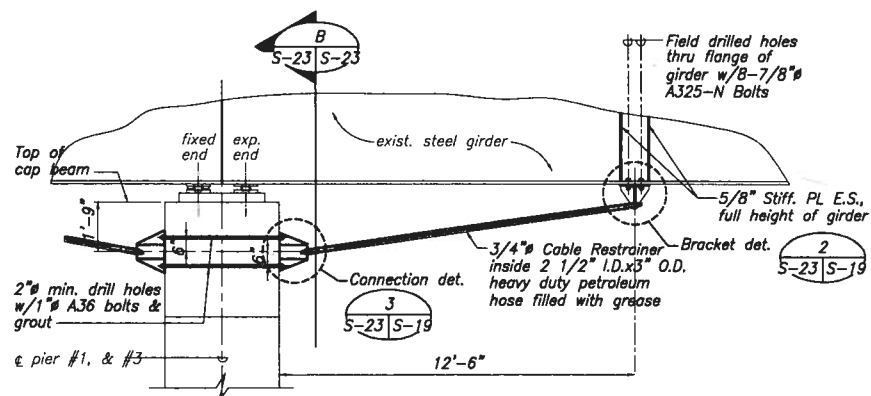
S-22 S-22



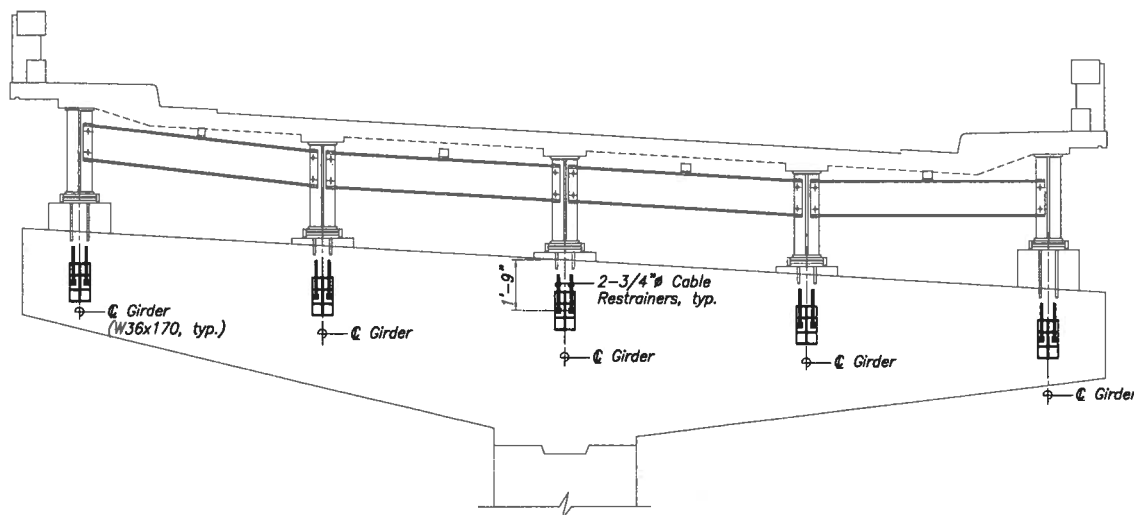
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION
John Chen

DATE	REVISION
	STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION WAIKAUMALO BRIDGE SUPERSTRUCT. & SUBSTRUCT. RETROFIT SECTIONS AND DETAILS SEISMIC RETROFIT OF VARIOUS BRIDGES EAST OF HINOLE, HAWAII F.A. PROJECT NO. BR-019-2(46) Scale: As Noted Date: AUG. 17, 1999 SHEET No. S-22 OF 23 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FED. AID YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(46)	2000	26	26



RESTRAINER LAYOUT - TYPICAL SECTION
Scale: 1/2"=1'-0"

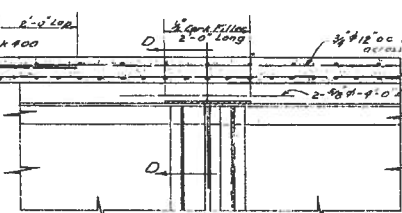
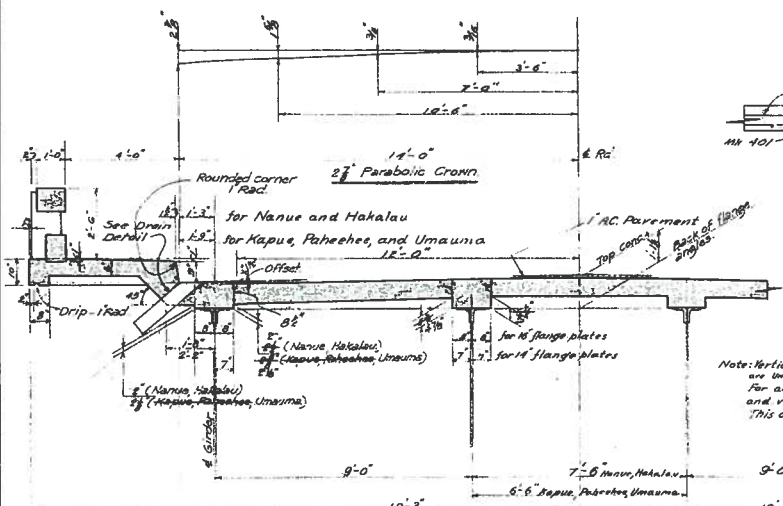


SECTION - CAP BEAM AT PIER #1 & #3
Scale: 1/2"=1'-0"



THIS WORK WAS PREPARED BY
ME OR UNDER MY SUPERVISION
Shen-chen Chiu

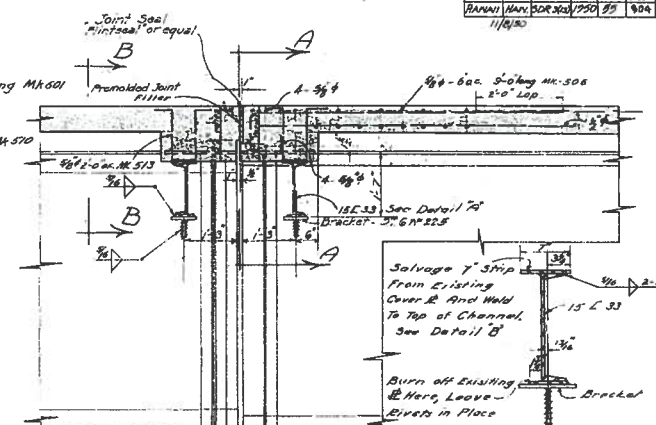
DATE	REVISION
	STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION WAIKAUMALO BRIDGE SUPERSTRUCT. & SUBSTRUCT. RETROFIT RESTRAINER LAYOUT SEISMIC RETROFIT OF VARIOUS BRIDGES EAST OF NINOLE, HAWAII P.A. PROJECT NO. BR-019-2(46) Scale: As Noted Date: AUG. 17, 1999 SHEET No. S-23 OF 23 SHEETS



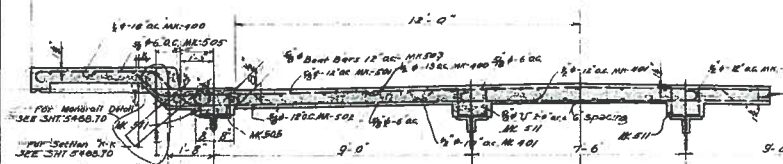
DETAIL AT FIXED BEARINGS

Note: Vertical dimensions of bolsters on girders as shown here are uniform for entire length for Nanue and Hakalau Bridges. For all other bridges they hold for the rest of the steel girders only and vary over their length as shown elsewhere. This applies also to the distance from fill to back of flange angles.

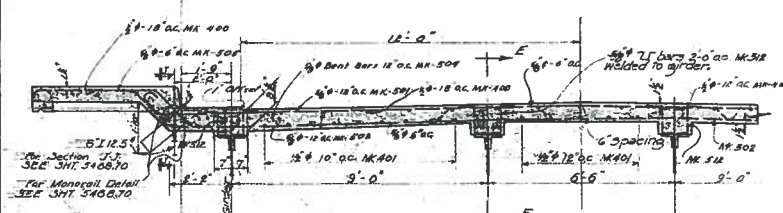
Note: Kapue and Paheehoe Bridges are not in this contract.



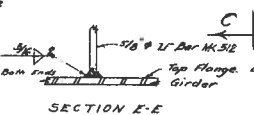
DETAIL AT EXPANSION BEARINGS



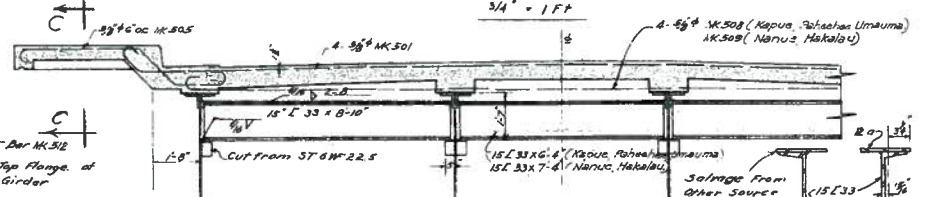
DECK SLAB REINF - NANUE & HAKALAU BRIDGES



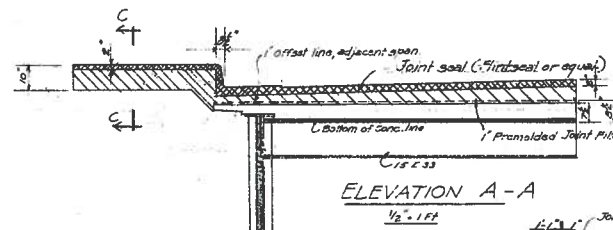
DECK SLAB REINF - KAPUE, PAHEEHOE AND UMAUMA BRIDGES



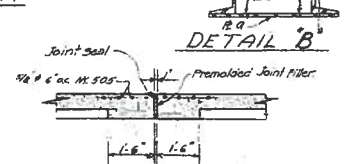
SECTION E-E



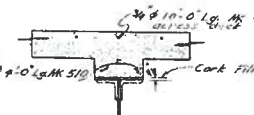
SECTION B-B



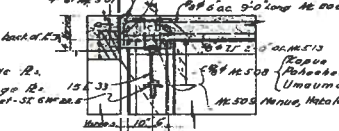
ELEVATION A-A



DETAIL B



SECTION D-D



DETAIL AT ABUT BEARINGS

SECTION C-C
1/2" = 1'-0"
Note: All concrete in Deck is to be Class A-1.

TERRITORIAL HIGHWAY DEPARTMENT
HAWAII BELT ROAD
GENERAL DETAILS
March 1939
SHEET No. 1 OF 3 SHEETS

SCALE 1/2" = 1'-0"

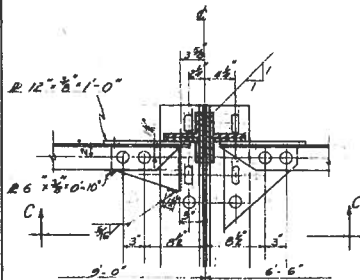
See Std. Details for further details

DRAIN DETAIL

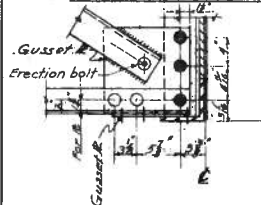
FOR INFORMATION ONLY

5468.55

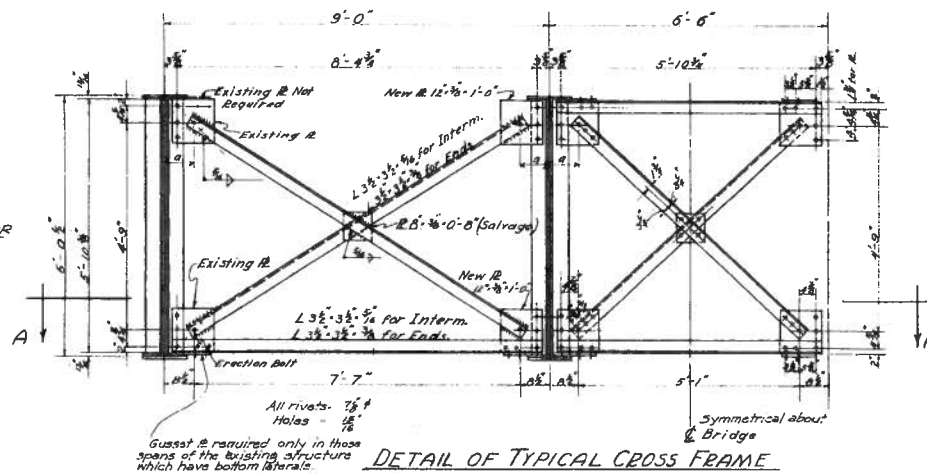
DESIGN NO.	DATE	BY	CHECKED	APPROVED	REVISION
HAWAII	NAVA	SPR/10/28	26	904	



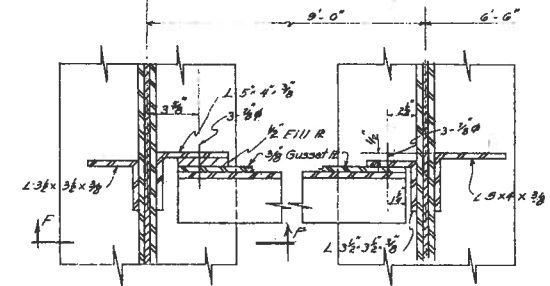
END CROSS FRAME CONNECTION FOR SPANS WITH BOTTOM GUSSET PLATES



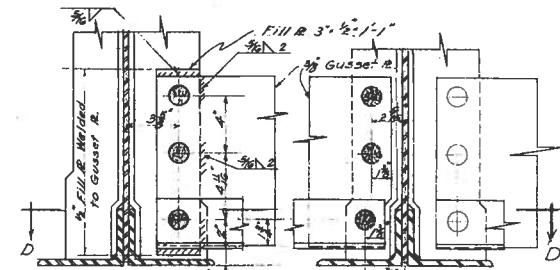
SECTION C-C
1 1/2' - 1 FT.



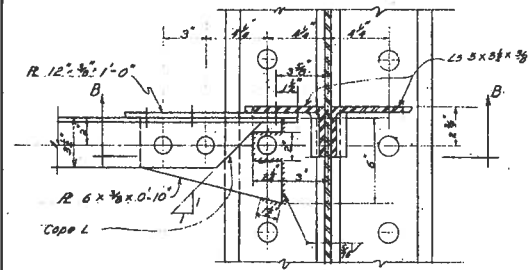
DETAIL OF TYPICAL CROSS FRAME



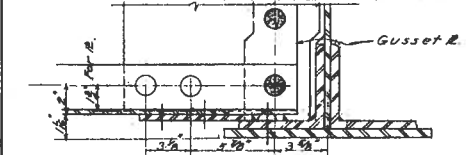
PLAN D-D
DETAIL OF INTERM. CROSS FRAME CONNECTION FOR 33' AND 34' SPANS
3' - 1 FT.



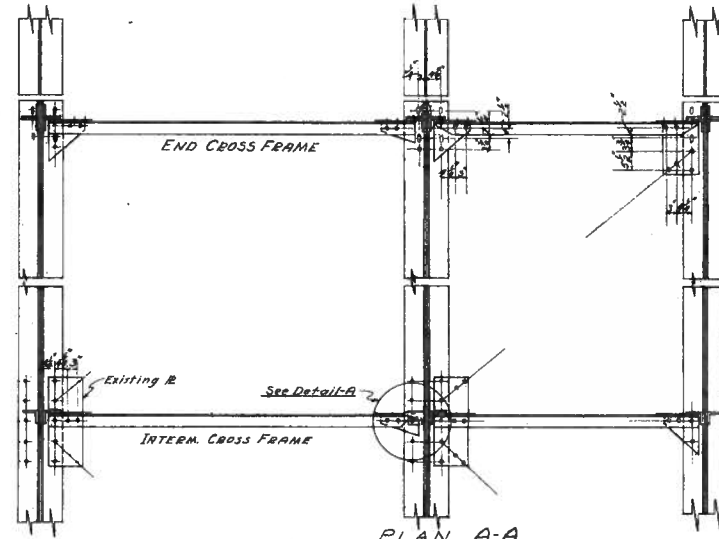
SECTION F-F
3' - 1 FT.



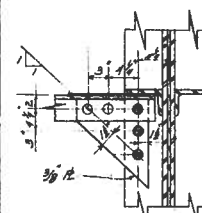
DETAIL A
INTERM. CROSS FRAMES FOR SPANS WITH BOTTOM GUSSET PLATES



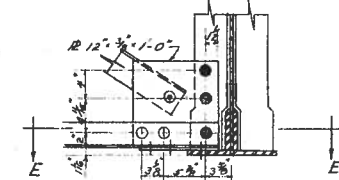
SECTION B-B
3' - 1 FT.



PLAN A-A
3' - 1 FT.



SECTION E-E



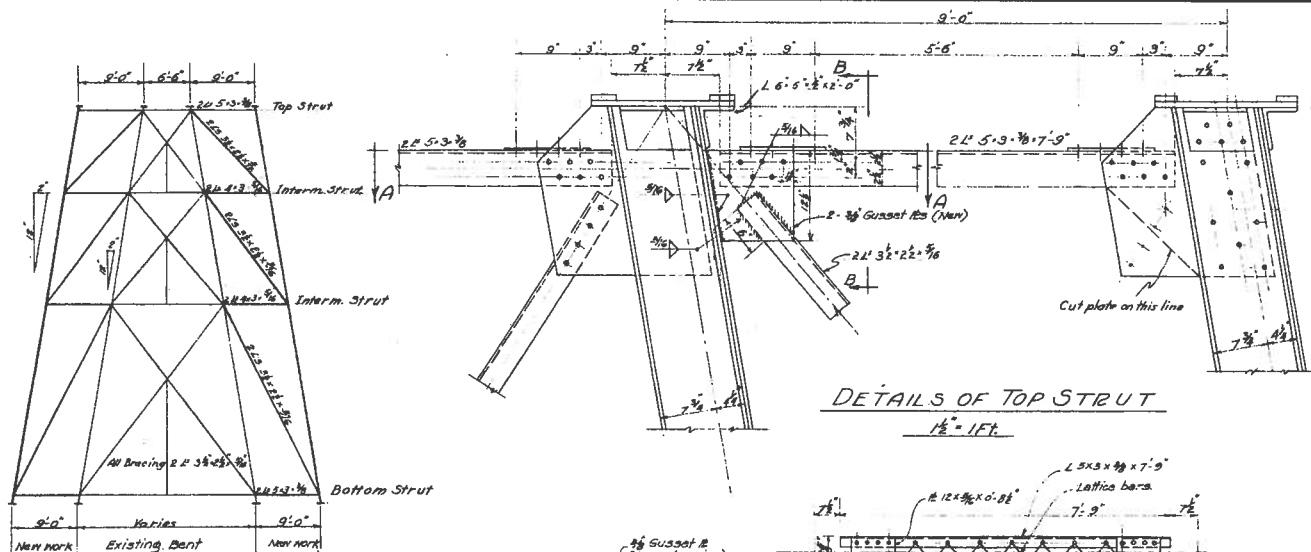
DETAIL OF CROSS FRAME CONNECTION AT ENDS OF BRIDGE
18' - 1 FT.

TERRITORIAL HIGHWAY DEPARTMENT
GENERAL DETAILS
UMAUMA BRIDGE
Hawaii Belt Road SDB-3(13)
April 1949

SHEET No. 2 OF 9 SHEETS

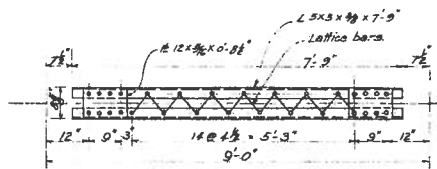
5468.56

DATE	BY	CHKD	APP'D	REVISION	TOTAL
1944	W. H. HARRIS	W. H. HARRIS	W. H. HARRIS	1	1



DETAILS OF TOP STRUT

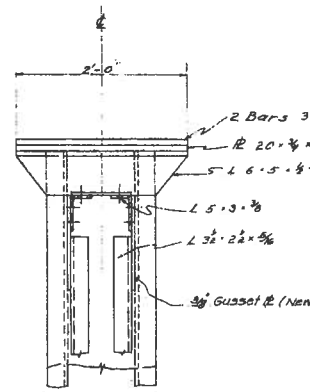
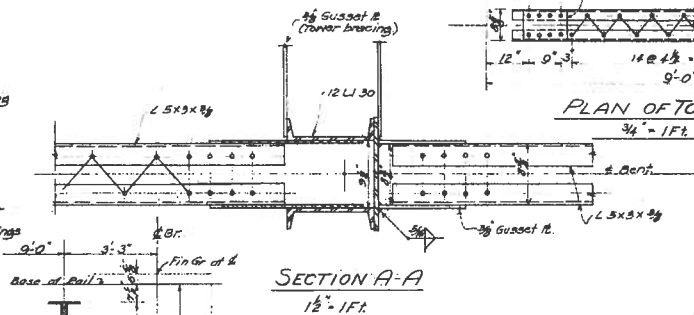
1 1/2" - 1 FT.



PLAN OF TOP STRUT

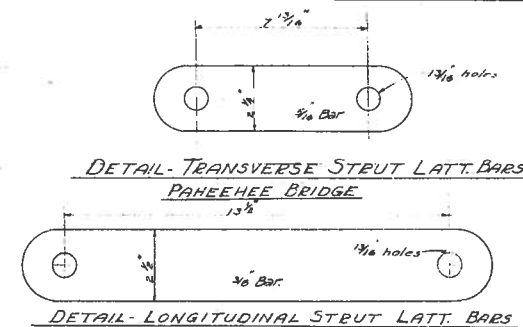
SECTION A-A

1 1/2" - 1 FT.



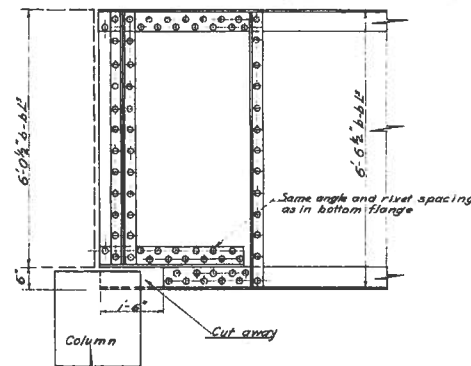
SECTION B-B

1 1/2" - 1 FT.



DETAIL- TRANSVERSE STRUT LATT. BARS
PAHEEHEE BRIDGE

DETAIL- LONGITUDINAL STRUT LATT. BARS
PAHEEHEE BRIDGE



METHOD OF ADJUSTING ENDS OF 78 WEB
GIRDERS TO BE USED WITH 72 WEB GIRDERS

1 1/2" - 1 FT.

NOTE: Where a 78 web girder rests on
an abutment lower abutment
seat 6' and use girder as is

TERRITORIAL HIGHWAY DEPARTMENT
TERRITORY OF HAWAII
GENERAL DETAILS
UMAUMA BRIDGE

Hawaii Belt Road SDR-3(13)

April 1949

SHEET No. 3 OF 3 SHEETS

5468.51

TYPICAL BENT ELEVATION

Note: All struts and diagonals to have
the plate and lattice bar arrangement
and outside column to have tower
bracing similar to those in the existing
structure.

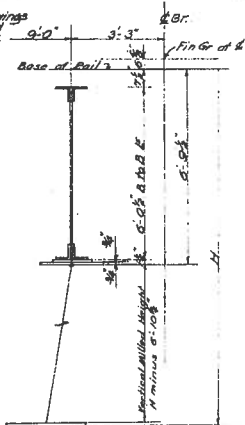
All rivets - 7/8"

Holes - 1 1/8"

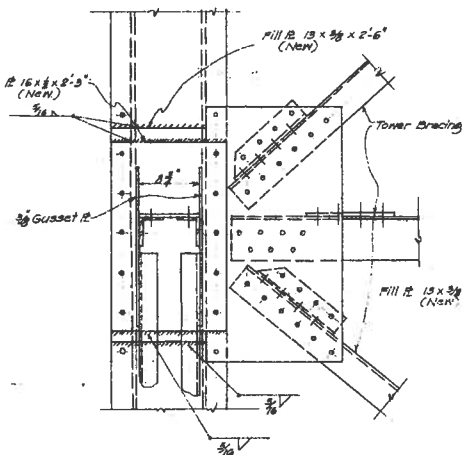
In case of discrepancy between bent
elevation as shown here and as shown on
shop drawings, the latter shall govern.

General Details sheets #1-#7 have served as a
guide to the supplier of Salvaged steel for
the making of the shop drawings. These
sheets in conjunction with the shop drawings
shall serve the purpose of fabricating and
erecting all steel, both salvaged and new.

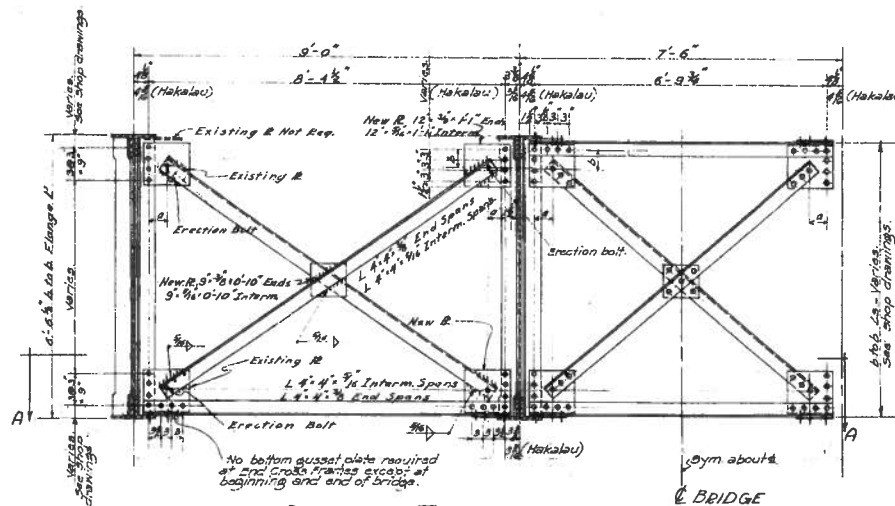
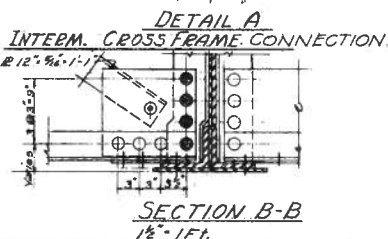
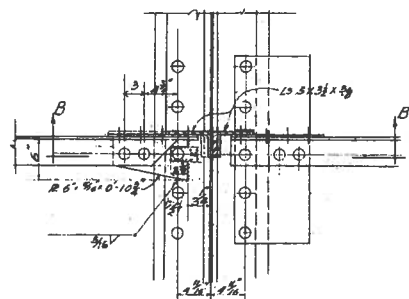
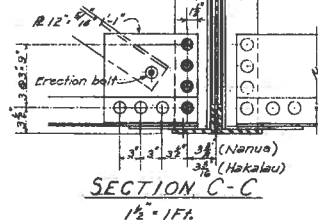
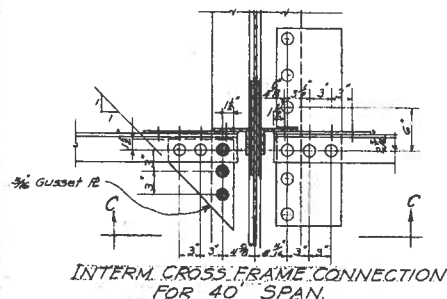
COLUMN LENGTHS



NO.	REVISION	DATE	BY	CHKD	APP'D
1	REVISED	1944	W. H. HARRIS	W. H. HARRIS	W. H. HARRIS

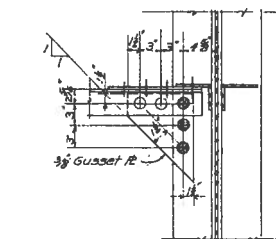
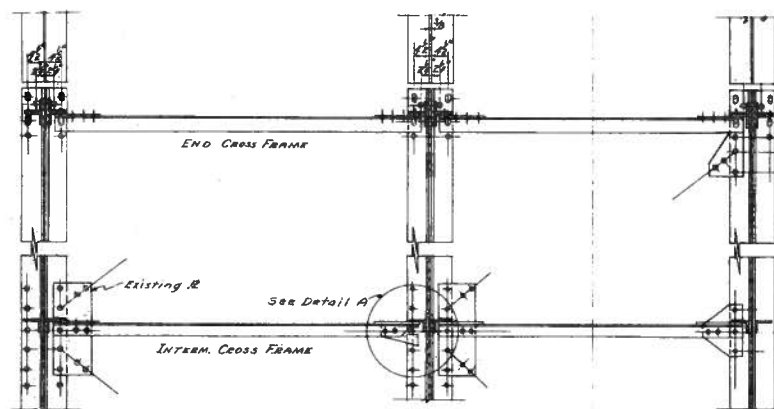


DESIGN	DATE	REV.	BY	CHK.	APP.	TOTAL
1/10/49	1/10/49	1	1/10/49	1/10/49	1/10/49	1/10/49

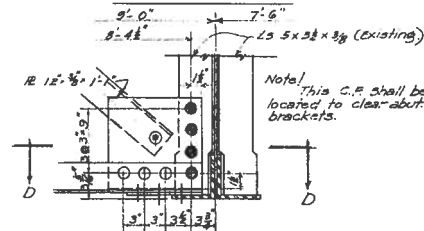


DETAIL OF TYPICAL CROSS FRAME

Shown for Nanue. Detail of Cross Frame for Hakalau same except where shown otherwise.
All rivets - $\frac{3}{8}$ "
Holes - $\frac{1}{2}$ "



SECTION D-D



CROSS FRAME CONNECTION AT BEG. AND END OF BRIDGE.

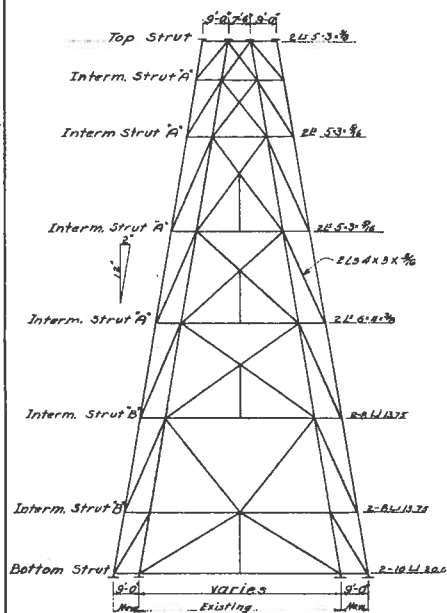
1 1/2" IF.

TERRITORIAL HIGHWAY DEPARTMENT
TERRITORY OF HAWAII
GENERAL DETAILS FOR NANUE
AND HAKALAU BRIDGES
Hawaii Belt Road SDR-3(9)
April 1949

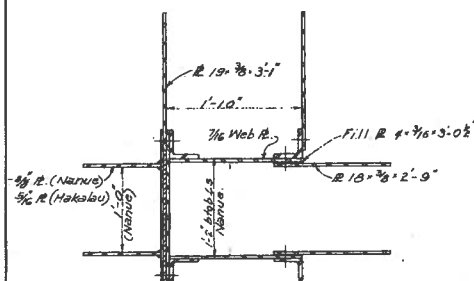
SHEET No. 5 OF 9 SHEETS

5468.59

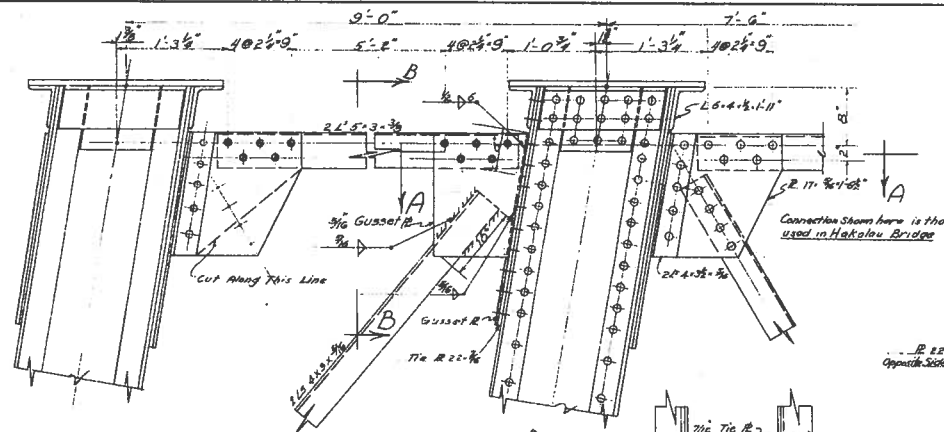
DES. NO.	DATE	DES. BY	CHECKED BY	APPROVED BY	TOTAL SHEETS
100-1001	1949	W. H. HARRIS	W. H. HARRIS	W. H. HARRIS	9



TYPICAL BENT ELEVATION
Scale: 1" = 20'



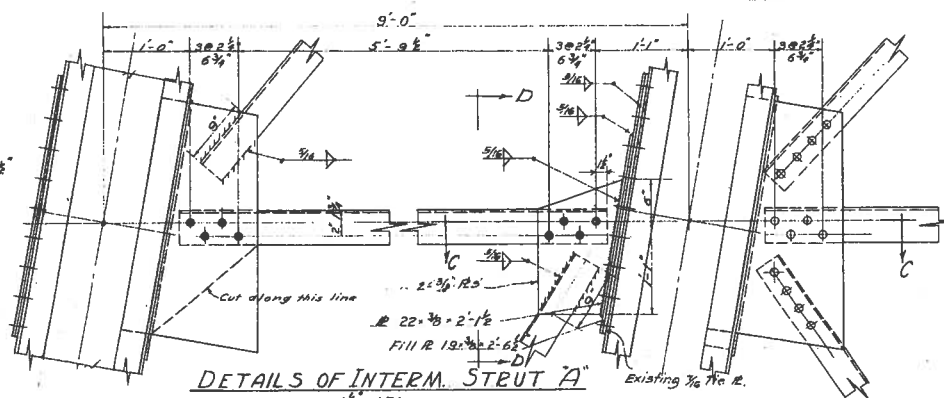
SECTION C-C



DETAILS OF TOP STRUT

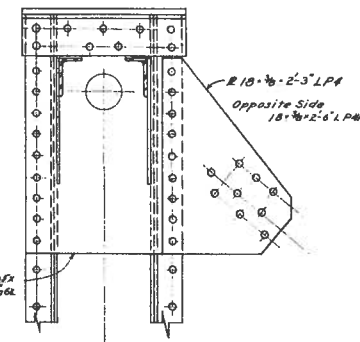
1 1/2" IF 1

Note:
All struts and diagonals to have tie plates and lattice bar arrangement similar to those in existing structure.
All diagonals - 24" x 3" x 3/8"
Thickness of gusset plates to be same as in existing structure.
Outside columns to have tower bracing similar to those in the existing structure.
All rivets - 3/4"
Holes - 1/2"

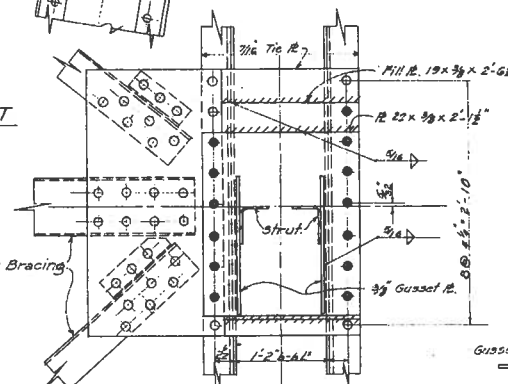


DETAILS OF INTERM. STRUT A

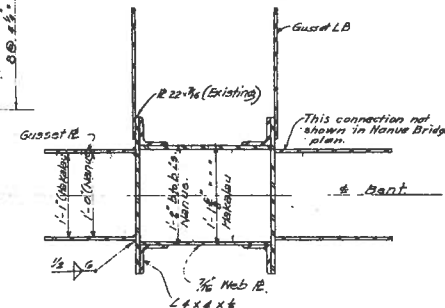
1 1/2" IF 1



SECTION B-B



SECTION D-D

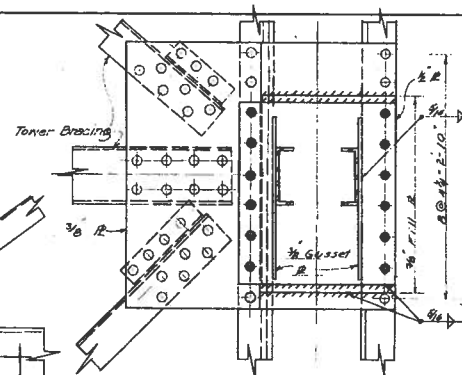


SECTION A-A

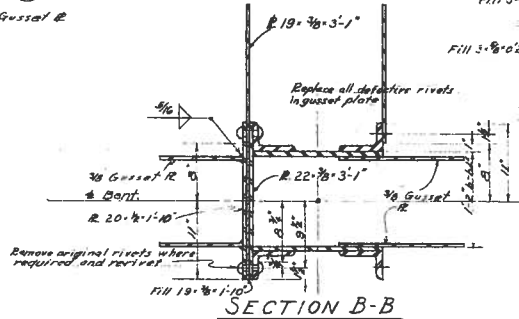
TERRITORIAL HIGHWAY DEPARTMENT
Territory of Hawaii
GENERAL DETAILS FOR NANUE
AND HAKALAU BRIDGES
Hawaii Belt Road SDR-3(9)
April 11, 1949

SHEET No. 6 OF 9 SHEETS

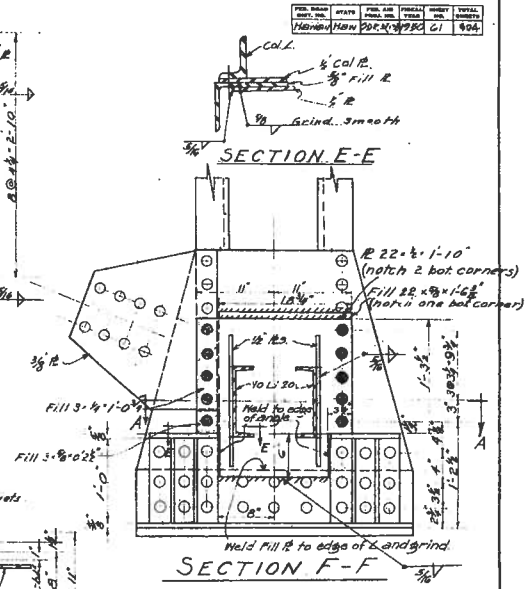
5468.60



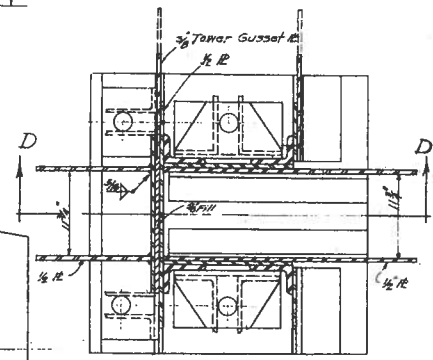
SECTION C-C



SECTION B-B

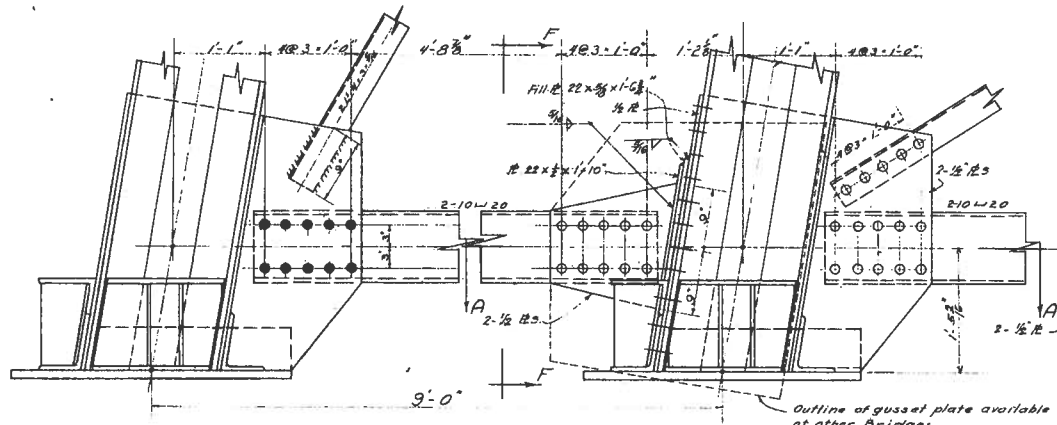


SECTION F-F

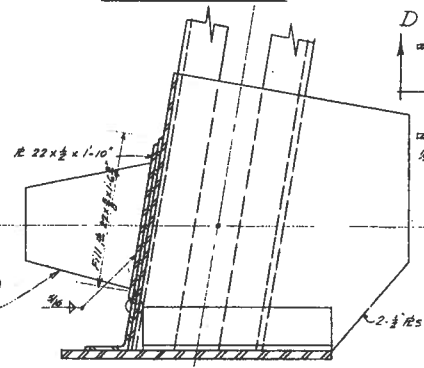


SECTION A-A

TERRITORIAL HIGHWAY DEPARTMENT
TERRITORY OF HAWAII
GENERAL DETAILS FOR NANUE
AND HAKALAU BRIDGES
Hawaii Belt Road SDR-3(9)
April 1949

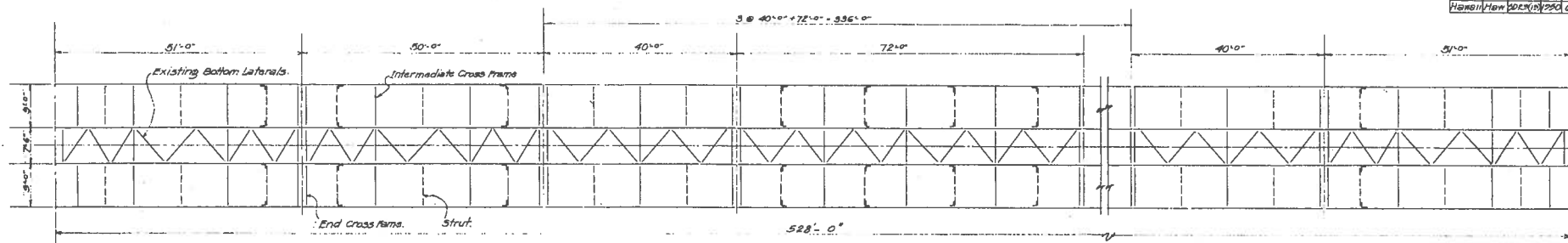


DETAILS OF BOTTOM STRUT
1 1/2" - 1 Ft.



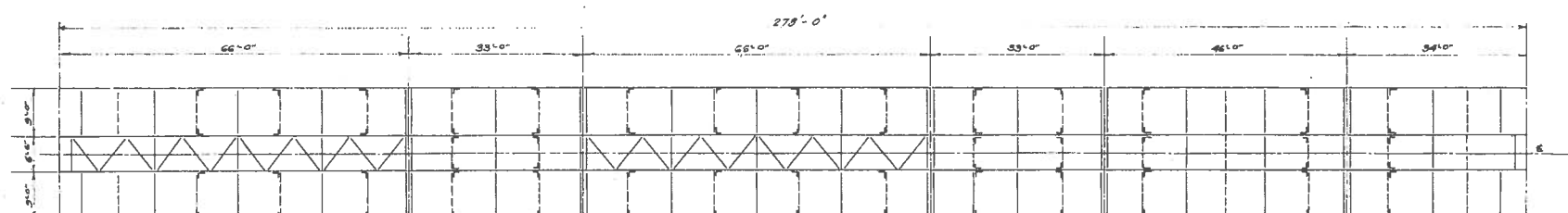
SECTION D-D

PROJ. NAME	STATE	PROJ. NO.	PROJ. YEAR	SHEET NO.	TOTAL SHEETS
HAWAIIAN BELT RD.	HAWAII	2021	2021	62	906



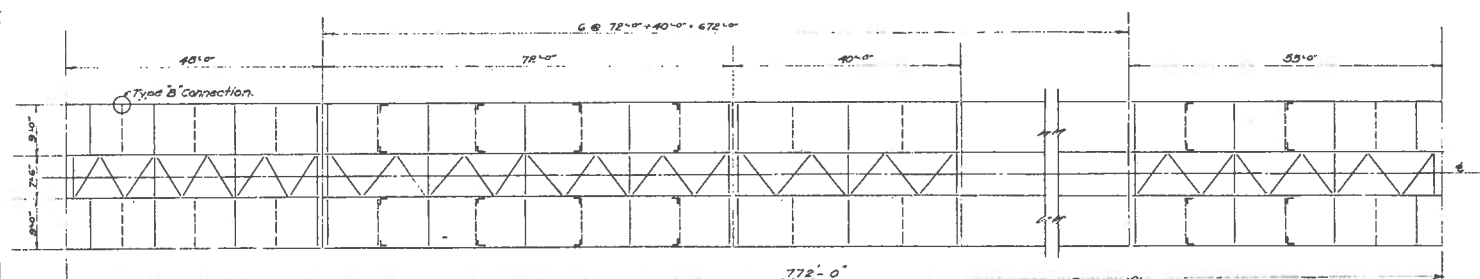
NANUE BRIDGE

FOR NANUE AND HAKALAU
All Struts ——— $L 3\frac{1}{2} \times 3\frac{1}{2} \times \frac{3}{8}$
Angles in End C.F. ——— $4 \times 4 \times \frac{3}{8}$
Angles in Intern. C.F. ——— $4 \times 4 \times \frac{3}{8}$



UMAUMA BRIDGE

All Struts ——— $L 3\frac{1}{2} \times 3\frac{1}{2} \times \frac{3}{8}$
Angles in End C.F. ——— $3\frac{1}{2} \times 3\frac{1}{2} \times \frac{3}{8}$
Angles in Intern. C.F. ——— $3\frac{1}{2} \times 3\frac{1}{2} \times \frac{3}{8}$



HAKALAU BRIDGE

FRAMING PLAN
Scale: 1" = 10'-0"

——— Cross Frame
----- Strut

TERRITORIAL HIGHWAY DEPARTMENT
Territory of Hawaii
NANUE, HAKALAU AND
UMAUMA BRIDGES

HAWAII BELT RD. S.D.R. 3(3)
APR 1942

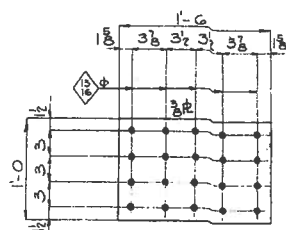
SHEET No. 8 OF 9 SHEETS

5468.62

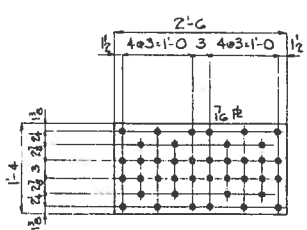
BILL OF MATERIAL INDUSTRIAL DEVELOPMENT CO.

No.	Description	Length	Area	Mark	REMARKS
30	R 12 x 3	1	6	SPI	SALV. FROM HONOLULU
60	R 12 x 3	1	0	SP2	D.
30	R 18 x 3	1	6	SP3	D.
14	R 12 x 3	1	6	SP1	KOLEKOLE
28	R 12 x 3	1	0	SP2	D.
20	R 18 x 3	1	6	SP3	D.
88	R 16 x 16	2	6	SP6	MAULUA
152	R 22 x 16	2	9	SP7	D.
136	R 16 x 16	2	0	SP8	D.
80	R 16 x 16	2	3	SP9	D.
84	R 22 x 16	2	9	SP5	New
112	R 16 x 16	2	0	SP7	DO
24	R 16 x 16	2	6	SP8	DO
32	R 16 x 16	2	3	SP9	DO
4	R 18 x 3	1	6	SP3	New

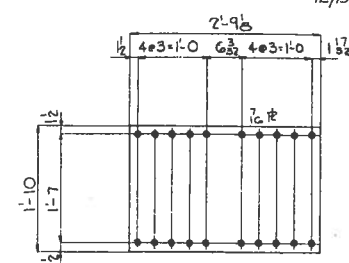
NOTE:
SEE DETAILS FOR NAMES OF BRIDGES TO WHICH THESE R ARE TO BE SHIPPED.



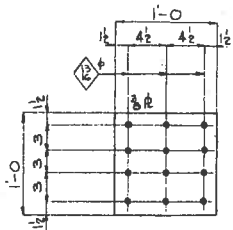
SALV 30 FROM HONOLULU (SP1)
SALV 14 FROM KOLEKOLE (SP1)
SHIP 20 TO KAPUE
SHIP 10 TO PAHEHEE
SHIP 14 TO UMAUMA



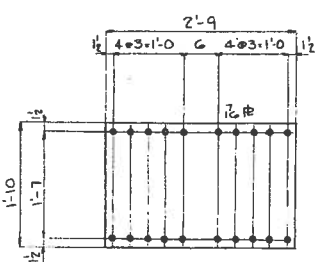
SALV 88 FROM MAULUA (SP6)
SHIP 88 TO HAKALAU



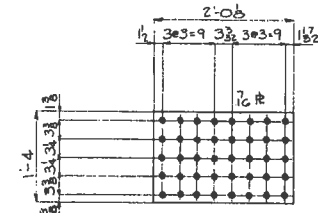
MAKE 84 NEW R - MK SP5
SALV 64 FROM KEALAHAKA (SP5)
SALV 20 FROM MALE (SP5)
SHIP 84 TO NANUE



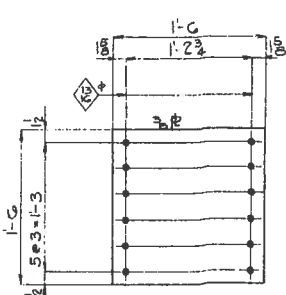
SALV 60 FROM HONOLULU (SP2)
SALV 28 FROM KOLEKOLE (SP2)
SHIP 40 TO KAPUE
SHIP 20 TO PAHEHEE
SHIP 28 TO UMAUMA



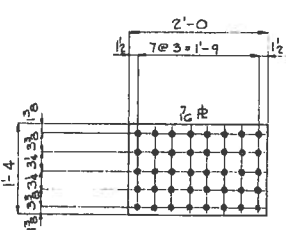
SALV 152 FROM MAULUA (SP7)
SHIP 152 TO HAKALAU



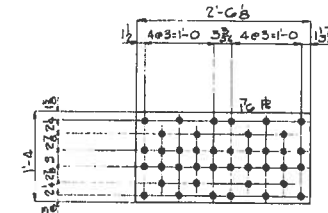
MAKE 112 NEW R - MK SP7
SALV 72 FROM KEALAHAKA (SP7)
SALV 40 FROM MALE (SP7)
SHIP 112 TO NANUE



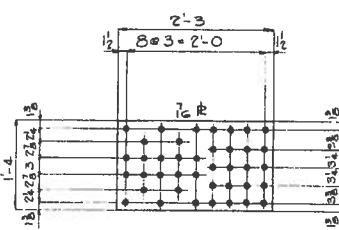
MAKE 4 NEW R - MK SP3
SALV 30 FROM HONOLULU (SP3)
SALV 20 FROM KOLEKOLE (SP3)
SHIP 30 TO KAPUE
SHIP 10 TO PAHEHEE
SHIP 14 TO UMAUMA



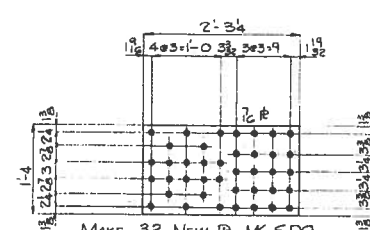
SALV 136 FROM MAULUA (SP8)
SHIP 136 TO HAKALAU



MAKE 24 NEW R - MK SP8
SALV 64 FROM KEALAHAKA (SP8)
SHIP 24 TO NANUE



SALV 80 FROM MAULUA (SP9)
SHIP 80 TO HAKALAU

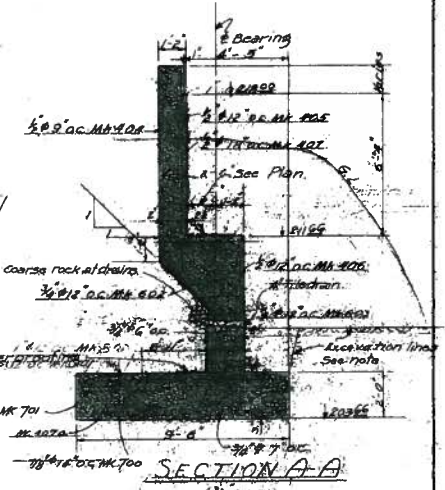
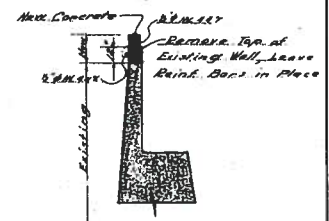
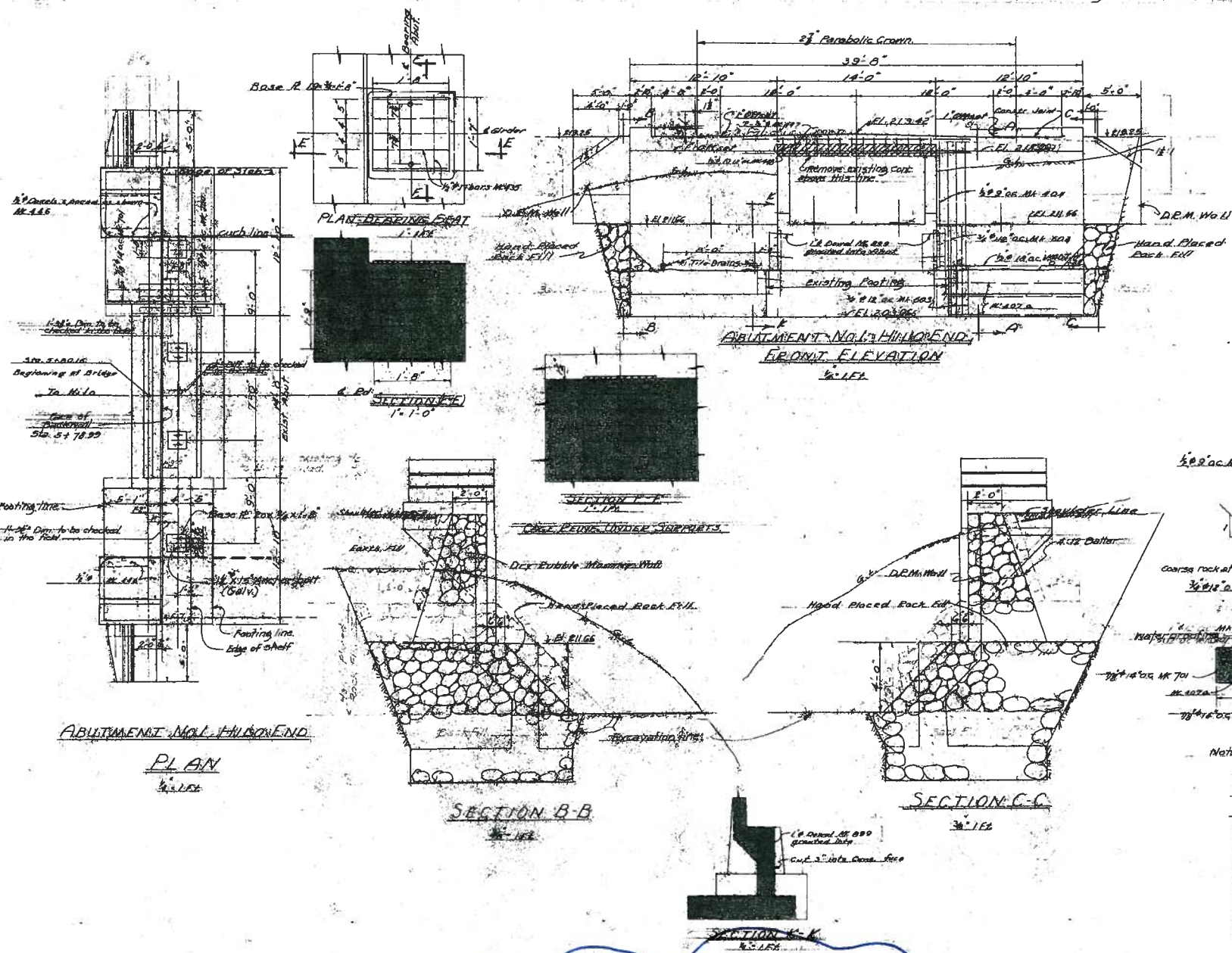


MAKE 32 NEW R - MK SP9
SALV 32 FROM KEALAHAKA (SP9)
SHIP 32 TO NANUE

Notes:
Notes: 1/2" x 1/2" UN.

INDUSTRIAL DEVELOPMENT COMPANY
SPICE R FOR THE KAPUE, PAHEHEE, UMAUMA, HAKALAU, & NANUE BRIDGES -- HAWAII
INDEPENDENT IRON WORKS, INC. OAKLAND, CALIF.

MADE BY DAL 2-C-50
CHECKED BY SHEET SP1



Notes: See 3rd details for treatment at constr. joint and method of applying waterproofing.

Original Ground Outside Excavation Lines Not to be Restored.

All concrete in Abutments to be Class A-1.

TERRITORIAL HIGHWAY DEPARTMENT
 TERRITORY OF HAWAII
NANI BRIDGE
 Sta 0+488.7 to 5+89.13
 Hawaii Belt Road S.D.R. 3(19)
 May 1949
 SHEET NO. 2 OF 11 SHEETS

FOR INFORMATION ONLY

SUMMARY OF ESTIMATED QUANTITIES

ITEM NO.	ITEM	QUANTITY	UNIT
501.1230	STRUCTURAL STEEL-BRACKETS AND BRACING FOR RESTRAINERS AND CREEP BLOCKS (14,710 LBS), NANUE BRIDGE.	L.S.	L.S.
501.1231	STRUCTURAL STEEL-STRENGTHEN EXISTING STEEL TOWERS AND BENTS WITH ADDITIONAL BRACING AND ENLARGED MEMBERS (128,000 LBS), NANUE BRIDGE.	L.S.	L.S.
501.1240	STRUCTURAL STEEL-REPAIR DAMAGED MEMBERS IN EXISTING STEEL TOWERS AND BENTS, NANUE BRIDGE.	F.A.	F.A.
501.2230	STRUCTURAL STEEL-BRACKETS AND BRACING FOR RESTRAINERS AND CREEP BLOCKS (8,930 LBS), UAAUMUA BRIDGE.	L.S.	L.S.
501.2231	STRUCTURAL STEEL-STRENGTHEN EXISTING STEEL TOWERS AND BENTS WITH ADDITIONAL BRACING AND ENLARGED MEMBERS (30,000 LBS), UAAUMUA BRIDGE.	L.S.	L.S.
501.2240	STRUCTURAL STEEL-REPAIR DAMAGED MEMBERS IN EXISTING STEEL TOWERS AND BENTS, UAAUMUA BRIDGE.	F.A.	F.A.
501.3230	STRUCTURAL STEEL-BRACKETS AND BRACING FOR RESTRAINERS (11,760 LBS), OPEA BRIDGE.	L.S.	L.S.
501.4230	STRUCTURAL STEEL-BRACKETS AND BRACING FOR RESTRAINERS (7,940 LBS), WAKAUMALO BRIDGE.	L.S.	L.S.
503.1100	CONCRETE FOR CREEP BLOCKS (CLASS 80), NANUE BRIDGE. (2.8 C.Y.)	L.S.	L.S.
503.2100	CONCRETE FOR CREEP BLOCKS (CLASS 80), UAAUMUA BRIDGE. (2.5 C.Y.)	L.S.	L.S.
503.4100	CONCRETE FOR CREEP BLOCKS (CLASS 80), WAKAUMALO BRIDGE. (10.7 C.Y.)	L.S.	L.S.
602.1100	REINFORCING STEEL (300 LBS), NANUE BRIDGE.	L.S.	L.S.
602.2100	REINFORCING STEEL (330 LBS), UAAUMUA BRIDGE.	L.S.	L.S.
602.4100	REINFORCING STEEL (1,870 LBS), WAKAUMALO BRIDGE.	L.S.	L.S.
654.1100	3/4" CABLE RESTRAINERS AT 8 FEET LONG ENCASED IN 2-1/2" I.D. HEAVY DUTY PETROLEUM HOSE WITH GREASE FOR PROTECTION, NANUE BRIDGE.	20	EACH
654.1200	3/4" CABLE RESTRAINERS AT 10 FEET LONG ENCASED IN 2-1/2" I.D. HEAVY DUTY PETROLEUM HOSE WITH GREASE FOR PROTECTION, NANUE BRIDGE.	16	EACH
654.2100	3/4" CABLE RESTRAINERS AT 8 FEET LONG ENCASED IN 2-1/2" I.D. HEAVY DUTY PETROLEUM HOSE WITH GREASE FOR PROTECTION, UAAUMUA BRIDGE.	14	EACH
654.3300	3/4" CABLE RESTRAINERS AT 12.5 FEET LONG ENCASED IN 2-1/2" I.D. HEAVY DUTY PETROLEUM HOSE WITH GREASE FOR PROTECTION, OPEA BRIDGE.	48	EACH
654.4300	3/4" CABLE RESTRAINERS AT 12.5 FEET LONG ENCASED IN 2-1/2" I.D. HEAVY DUTY PETROLEUM HOSE WITH GREASE FOR PROTECTION, WAKAUMALO BRIDGE.	20	EACH
655.1100	DRILLING HOLES AND INSTALLING DOWELS, #5 REBAR x 12" DEEP, NANUE BRIDGE.	192	EACH
655.1110	DRILLING HOLES AND INSTALLING 7/8" DIAMETER ANCHOR BOLTS THROUGH CONCRETE DECK SLAB, NANUE BRIDGE.	432	EACH
655.2100	DRILLING HOLES AND INSTALLING DOWELS, #5 REBAR x 12" DEEP, UAAUMUA BRIDGE.	192	EACH
655.2110	DRILLING HOLES AND INSTALLING 7/8" DIAMETER ANCHOR BOLTS THROUGH CONCRETE DECK SLAB, UAAUMUA BRIDGE.	198	EACH
655.3120	DRILLING HOLES AND INSTALLING 1" DIAMETER BOLTS THROUGH 4 FEET THICK CONCRETE CAP BEAM, OPEA BRIDGE.	96	EACH
655.3150	DRILLING HOLES AND INSTALLING SHEAR CONNECTIONS 3/4" DIAMETER x 8" LONG THROUGH CONCRETE DECK SLAB TO STEEL BEAMS, OPEA BRIDGE.	120	EACH
655.4100	DRILLING HOLES AND INSTALLING DOWELS, #5 REBAR x 12" DEEP, WAKAUMALO BRIDGE.	208	EACH
655.4120	DRILLING HOLES AND INSTALLING 1" DIAMETER BOLTS THROUGH 4 FEET THICK CONCRETE CAP BEAM, WAKAUMALO BRIDGE.	40	EACH
655.4130	DRILLING HOLES AND INSTALLING 3/4" x 8" LONG EXPANSION BOLTS THROUGH STEEL CHANNELS TO CONCRETE DECK SLAB, WAKAUMALO BRIDGE.	320	EACH
655.4140	DRILLING HOLES AND INSTALLING DOWELS, #6 x 24" DEEP, WAKAUMALO BRIDGE.	12	EACH

GENERAL STRUCTURAL NOTES

- General Specifications:
Hawaii Standard Specifications for Road, Bridge, and Public Work Construction, 1994, and Special Provisions prepared for this project.
- Design specification: ASSHTO LRFD, Bridge Design Specification, First Edition, 1994.
- Contractor shall verify all dimensions, elevations and conditions shown for the existing bridges. Any discrepancies between field dimensions and plan dimensions shall be immediately reported to the Engineer prior to the fabrication or installation of any parts that are related to the dimensions in dispute.
- In the event certain features of the construction are not fully shown on drawings, or called for in the notes or specifications, their construction shall be of the same character as for similar conditions that are shown or called for. The construction shall be reviewed and approved by the Engineer.
- Removal or cutting of concrete and steel in slabs and girders will not be allowed unless shown on the drawings, or approved by the Engineer in writing.
- The Contractor shall be solely responsible to provide all measures to protect the existing structures, workmen, and other persons during construction. Such measures shall include, but are not limited to, shoring and support of existing bridges, shoring for excavation, bracing for forms and scaffolding, shoring for construction equipment.
- Design Loads:
(A) Dead Loads: Weight of existing bridge
Concrete = 160 PCF
Steel = 490 PCF
A/C paving = 20 PSF Wearing surface
(B) Earthquake (EQ): A (Acceleration Coefficient) = 0.41
Seismic performance category = D
Soil profile type = 1
- Materials
(A) Existing deck slabs, abutments, piers, walls, and footings are assumed to have f_c of 3000 PSI concrete.
(B) Existing Reinforcing steel assumed to consists of steel of intermediate grade, deformed bars with $f_y=40$ KSI.
(C) Existing structural steel girders, cross braces, diaphragms, and members in steel trestles, bents and towers are ASTM A7 steel with $f_y=33$ KSI.
(D) New concrete for diaphragms, creep blocks, and abutment backwalls shall have $f_c=4000$ PSI.
(E) New reinforcing steel shall conform to ASTM A615, Grade 60.
(F) All rolled shapes, bars, strips, and plates shall conform to ASTM A36 steel, and shall be zinc hot-dip galvanized in accordance with ASTM A123 unless otherwise noted.
(G) High strength, low alloy structural steel of a weldable quality conforming to ASTM A588 shall be used whenever $f_y=50$ KSI is indicated for a steel member.

- Welding electrodes shall conform to E70XX series or equivalent.
 - Bolts shall conform to ASTM A325N. All bolts, nuts washers and shop welds shall be zinc hot-dip galvanized.
 - Elastomer for the elastomeric bearing pad shall be the minimum temperature elastomer, grade 0, with shore-A hardness of 60, and shear modulus $G=130$ PSI at 73 degrees F.
- Reinforcement:
- The minimum clear cover, measured from the surface of the concrete to the face of any reinforcing bar, shall be as follows:
(1) Concrete cast against Earth 3"
(2) Formed concrete exposed to earth and weather 2"
(3) Beam - clear to tie or stirrup . . . 1 1/2"
(4) Column - clear to tie or spiral 2"
(5) Abutment, piers and retaining wall . . . 2"
(6) Others . . In accordance with AASHTO standard specifications for highway bridges.
 - Reinforcing bars shall be detailed in accordance with ACI manual of standard practice for detailing reinforced concrete highway structures, unless otherwise noted.
 - Minimum clear spacing between parallel bars shall be 1 1/2 times the diameter of the bars (for non bundled bars). In no case shall the clear distance between the bars be less than 1 1/2 times the maximum size of the coarse aggregate.
 - All dimensions relating to reinforcing bars (eg, spacing of bars, etc) are to centers of bars, unless otherwise noted.
9. Reference drawings for projects SDR 3(13) and SDR 3(14) have been used to prepare these plans. The contractor shall verify dimensions, member configurations, and member sizes prior to ordering and fabricating materials for the project. Conditions may be different than those shown.
10. Contractor is to restore all permanent pavement markers, lane striping, asphalt concrete pavement, guardrails and other miscellaneous roadway and bridge items affected by the work. These costs shall be considered incidental to the other contract items.

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(46)	2000	4	26



THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION
[Signature]
 PROFESSIONAL ENGINEER

DATE	REVISION
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION	
GENERAL STRUCT. NOTES SUMMARY OF ESTIMATED QUANTITIES SEISMIC RETROFIT OF VARIOUS BRIDGES EAST OF NINOLE, HAWAII F.A. PROJECT NO. BR-019-2(46)	
Scale: As Noted	Date: AUG. 17, 1999
SHEET No. 5-1 OF 23 SHEETS	

FOR INFORMATION ONLY

ABBREVIATIONS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(46)	2000	5	26

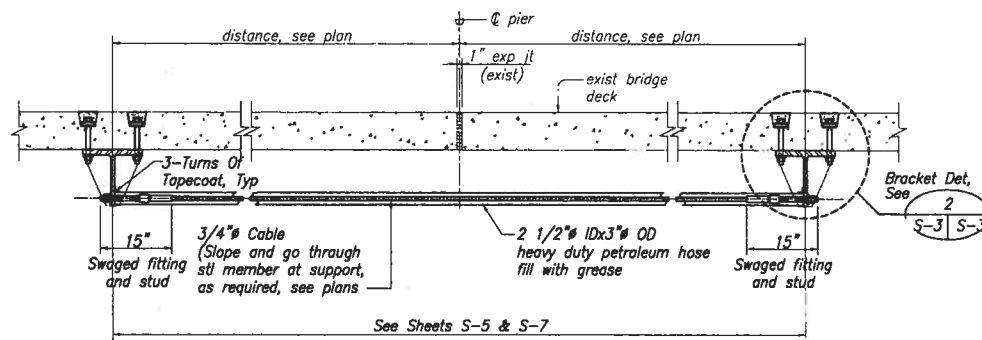
Abbr	Description	Abbr	Description	Abbr	Description	Abbr	Description
A		F		P		W	
Abut	Abutment	FF	Far Face	Pav't	Pavement	WWF	Welded Wire Fabric
Abbr	Abbreviate, Abbreviation	F'c	Specified Strength of Concrete	Perf	Perforated	WW	Wing Wall
Alt	Alternate	F'ci	Strength of Concrete at Time of Initial Prestress	PL	Plate	WP	Work Point
&	And			PCC	Point of Curvature		
Approx	Approximate	Ft	Feet, Foot	PCF	Pounds Per Cubic Foot	Y	YR
AC	Asphalt Concrete	Fig	Figure	PSF	Pounds Per Square Foot		Year
AZ	Azimuth	Fin Gr	Finished Grade	PSI	Pounds Per Square Inch		
		F	Fixed	PLF	Pounds Per Linear Foot		
B		Ftg	Footing	PI	Point of Intersection of Tangents		
BK	Back	FA	Force Account	PVC	Point of Intersection of Vertical Curve		
Bal	Balance	FF	Front Face				
B	Baseline			PT	Point of Tangency		
BM	Beam	G		PT, PTS	Point, Points		
Brg, Brgs	Bearing, Bearings	GA	Gauge, Gage	PRC	Point of Reverse Curvature		
BVC	Beginning of Vertical Curve	Gav	Galvanized	PVC	Polyvinyl Chloride		
Bet	Between	Gen	General	Prestr	Prestressed		
BF	Both Faces	Gir	Girder	P/S	Prestressed Strands		
BW	Bothways			PB	Pull Box		
B, Bott	Bottom	H					
Br	Bridge	H, Ht	Height	R			
BW	Backwall	H	Hinge	R	Radius		
		Horiz	Horizontal	RF	Rear Face		
C				Ref	Reference		
Cant	Contilever	I		Reinf	Reinforcement		
CIP	Cast in Place	IB	Inbound	Req'd	Required		
CIP	Cast Iron Pipe	In	Inch	RWLOL	Retaining Wall Layout Line		
C	Centerline	ID	Inside Diameter				
CC	Center to Center	IF	Inside Face	S			
Cl, Clr	Class, Clearance	Int	Interior	Sect	Section		
Col	Column	Inv	Invert	Sht	Sheet		
CC	Compound Curve	J		S	South		
Conc	Concrete	Jt	Joint	Spc, Sp	Spaces		
Conn	Connection	K		Spec	Specification		
Const	Construction	K	Kips	SF	Square Feet		
CJ	Construction Joint	KFT	Kip Foot	SY	Square Yard		
Cont	Continuous	KSI	Kips Per Square Inch	SS	Stainless Steel		
CF	Cubic Feet			Std	Standard		
CY	Cubic Yard	L		Sta	Station		
		L	Length	Stiff	Stiffener		
D		LB, LBS	Pound, Pounds	Stirr	Stirrup		
Det	Detail	Ltg Std	Lighting Standard	Str	Straight		
Dia, Ø	Diameter	LF	Linear Feet	Struct	Structural		
Dim	Dimension	Longit	Longitudinal	SE	Superelevation		
Dist	Distance	LS	Lump Sum	Symm	Symmetrical		
Dwls	Dowels	M		I			
DI	Drain Inlet	MH	Manhole	TS	Structural Tubing		
Dwg, Dwgs	Drawing, Drawings	Max	Maximum	Tan	Tangent		
		Mech	Mechanical	Temp	Temporary		
E		Min	Minimum	Thk	Thick		
Ea	Each	Misc	Miscellaneous	T	Top		
EF	Each Face	MPH	Miles Per Hour	T&B	Top and Bottom		
EFH	Each Face Horizontal	N		TOD	Top of Deck		
EFV	Each Face Vertical	NF	Near Face	Tot	Total		
EW	Each Way	N	North	Transv	Transverse		
EP	Edge of Pavement	NIC	Not in Contract	Typ	Typical		
E	East	NTS	Not to Scale				
Elec	Electrical	No, Nos, #	Number, Numbers	V			
El, Elev	Elevation			Var	Varies		
Emb	Embankment	O		Vert	Vertical		
EVC	End of Vertical Curve	O/S	Offset	VC	Vertical Curve		
Eq	Equal	OC	On Center				
Est	Estimated	Opn'g	Opening				
Exc	Excavation	OB	Outbound				
Excl	Excluding	OD	Outside Diameter				
Exist	Existing						
Exp, E	Expansion						
Ext	Exterior						
ES	Each Side						



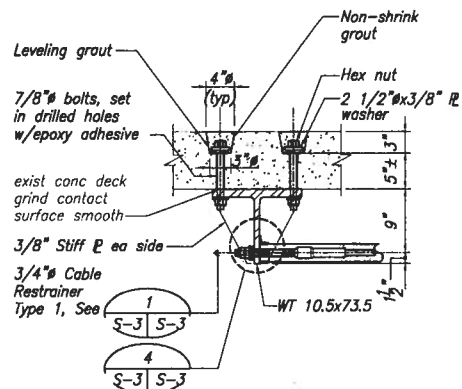
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION
Shen-Chien Chou

DATE	REVISION
	STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION
	ABBREVIATIONS
	SEISMIC RETROFIT OF VARIOUS BRIDGES EAST OF NINOLE, HAWAII F.A. PROJECT NO. BR-019-2(46)
Scale: As Noted	Date: AUG. 17, 1999
	SHEET No. S-2 OF 23 SHEETS

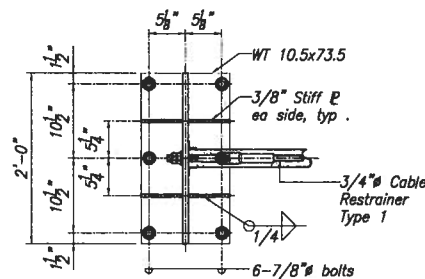
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-018-2(46)	2000	6	26



TYPE I RESTRAINER 1
Scale: 1"=1'-0"



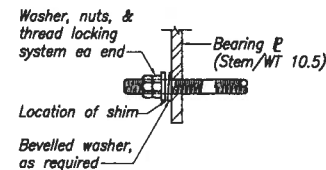
CONNECTION DETAIL 2
Scale: 1 1/2"=1'-0"



BOTTOM VIEW 3
Scale: 1 1/2"=1'-0"

TABLE 1

Ambient Temp (F)	Shim Thickness (in)
<40	1/2
40 TO 80	1 1/8
80>	1 3/4



Notes
Place shims between bearing plate and washer. Tighten nuts to remove slack from system. Remove shims. Shim thickness to be in accordance with Table 1. Both anchorage of a unit shall be adjusted simultaneously.

CABLE END ANCHOR 4
Scale: 3"=1'-0"

Section (Alpha) "A" "B"
Detail (No.) "1", "2"
Sheet No. where section is cut or detail taken from

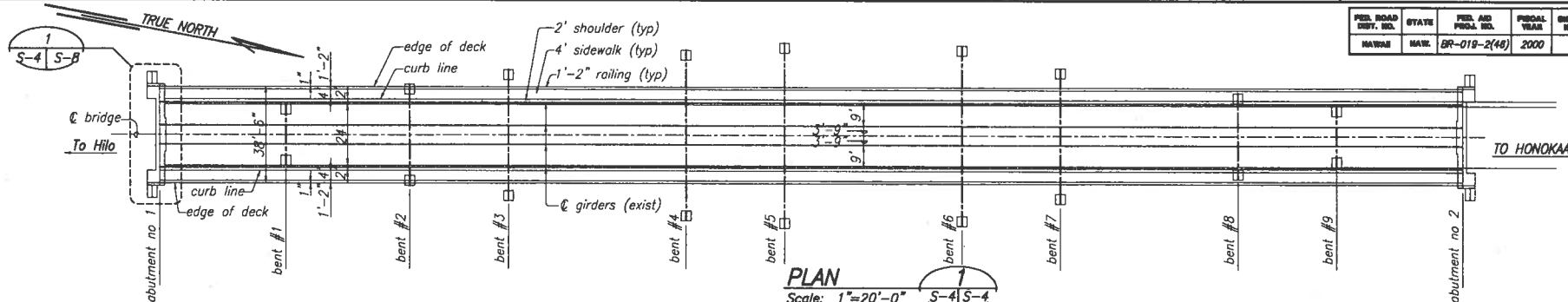
Detail or section designation
Sheet No. where section or detail is drawn



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Shen-Chen Chen

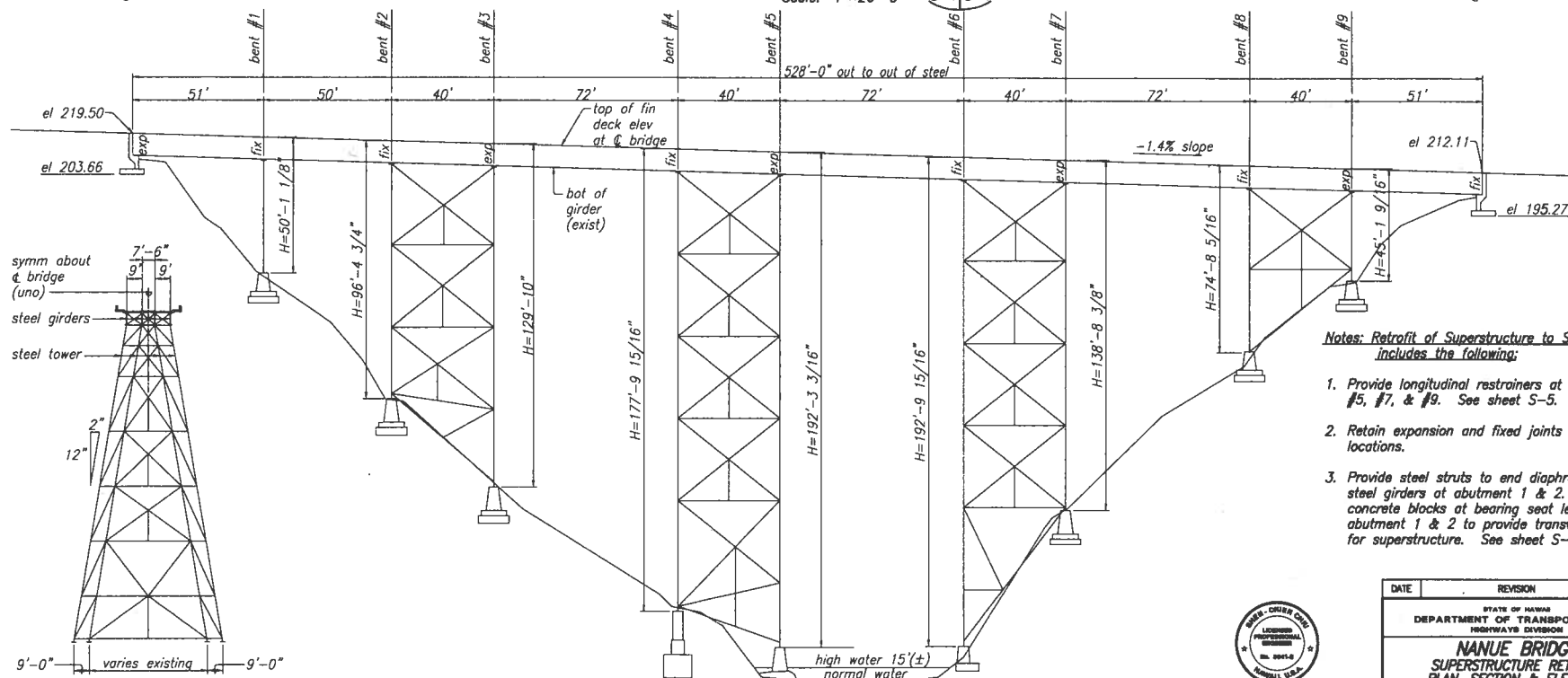
DATE	REVISION
	STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION
	TYPICAL DETAILS
	SEISMIC RETROFIT OF VARIOUS BRIDGES EAST OF NINOLE, HAWAII F.A. PROJECT NO. BR-018-2(46)
Scale: As Noted	Date: AUG. 17, 1999
SHEET No. S-3 OF 23 SHEETS	

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FED. YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HA	BR-019-2(46)	2000	7	26



PLAN

Scale: 1"=20'-0"



Notes: Retrofit of Superstructure to Substructure includes the following:

1. Provide longitudinal restrainers at bents #3, #5, #7, & #9. See sheet S-5.
2. Retain expansion and fixed joints at existing locations.
3. Provide steel struts to end diaphragms of steel girders at abutment 1 & 2. Add concrete blocks at bearing seat level of abutment 1 & 2 to provide transverse restraint for superstructure. See sheet S-7.

TYPICAL BENT ELEVATION B

Scale: 1"=30'-0"

Note: Existing Condition Shown

EXISTING CONDITION SECTION A

Scale: 1"=20'-0"

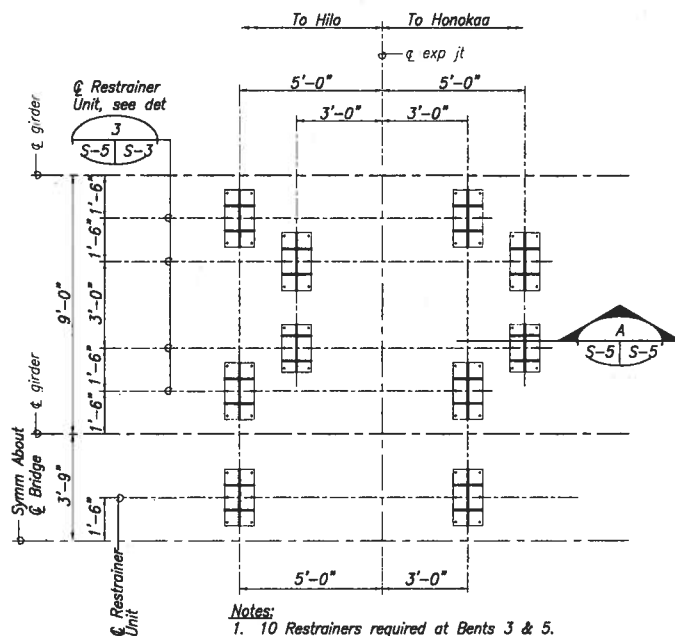
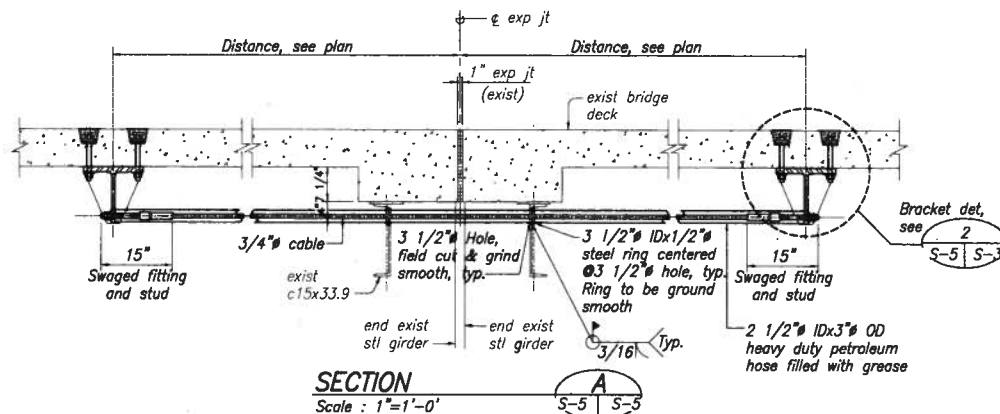
Note: Section Taken at @ of Bridge



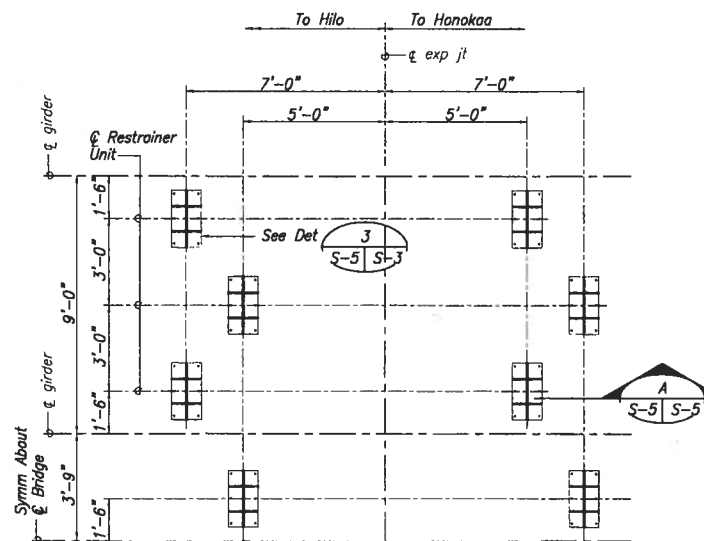
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION
Shun-Chuan Chien

DATE	REVISION
	STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION NANUE BRIDGE SUPERSTRUCTURE RETROFIT PLAN, SECTION & ELEVATION SEISMIC RETROFIT OF VARIOUS BRIDGES EAST OF NINOLE, HAWAII F.A. PROJECT NO. BR-019-2(46) Scale: As Noted Date: AUG. 17, 1999 SHEET NO. S-4 OF 23 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(46)	2000	8	26



- Notes:
1. 10 Restrainers required at Bents 3 & 5.
 2. Cable Restrainers not shown.



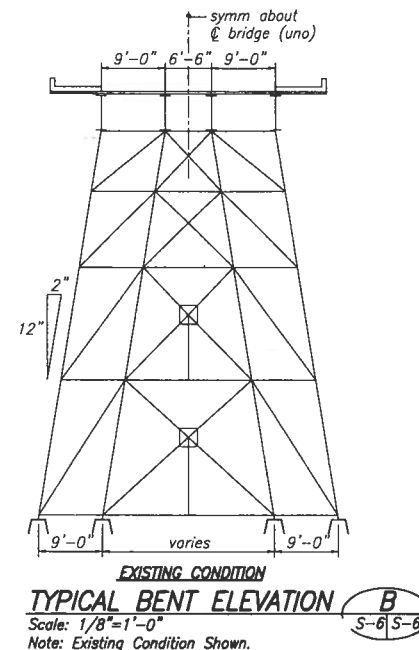
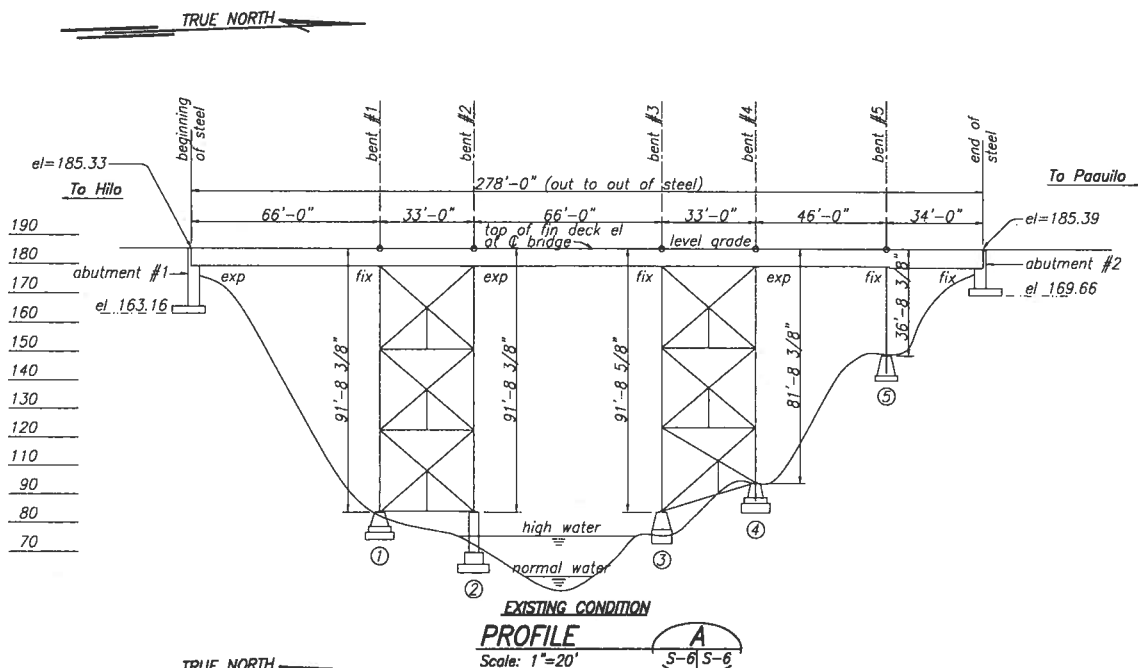
- Notes:
1. 8 Restrainers required at Bents 7 & 9.
 2. Cable Restrainers not shown.



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Lucas Green

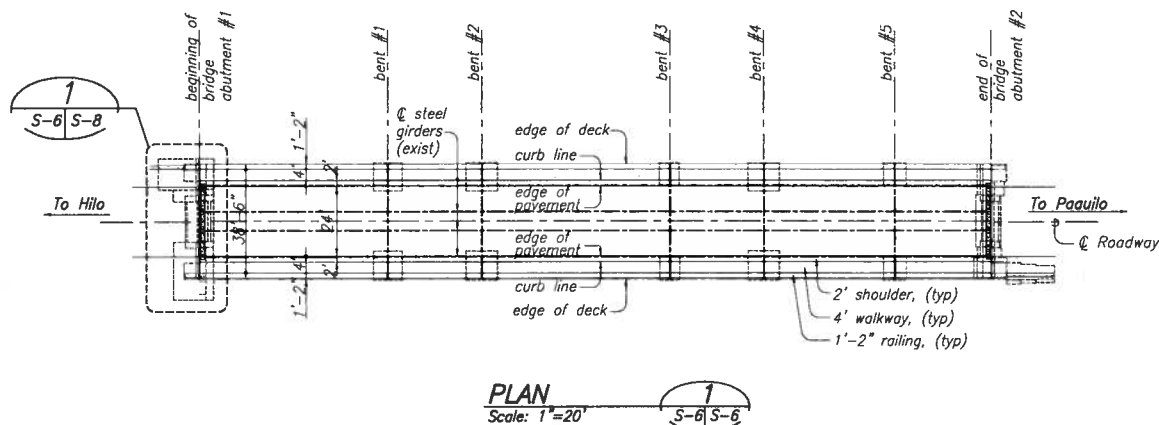
DATE	REVISION
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION	
NANUE BRIDGE SUPERSTRUCTURE RETROFIT PLAN OF LONGITUDINAL RESTRAINERS	
SEISMIC RETROFIT OF VARIOUS BRIDGES EAST OF NINOLE, HAWAII	
F.A. PROJECT NO. BR-019-2(46)	
Scale: As Noted	Date: AUG. 17, 1999
SHEET No. S-5 OF 23 SHEETS	

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(46)	2000	9	26



Notes: Retrofit of Superstructure to Substructure include the following:

1. Provide longitudinal restrainers at bents #2 & #4, see sheet S-7.
2. Retain expansion and fixed joints at existing locations.
3. Provide steel struts to end diaphragms of steel girders at abutment 1 & 2 and add concrete blocks at bearing seat level of abutment 1&2 to provide transverse restraint for superstructure. See sheet S-8.



THIS WORK WAS PREPARED BY
ME OR UNDER MY SUPERVISION
Shu-Chin Chin

DATE	REVISION
	STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION UMAUMA BRIDGE SUPERSTRUCTURE RETROFIT PLAN, SECTION & ELEVATION SEISMIC RETROFIT OF VARIOUS BRIDGES EAST OF NINOLE, HAWAII F.A. PROJECT NO. BR-019-2(46) Scale: As Noted Date: AUG. 17, 1999 SHEET No. S-6 OF 23 SHEETS

Distance, see plan

Distance, see plan

1" exp jt (exist)

exist bridge deck

15"

Swaged fitting and stud

2 1/2" ID x 3" OD heavy duty petroleum hose filled with grease

3/4" cable

exist c15x33.9

3 1/2" hole, field cut & grind smooth, typ.

end exist sti girder

3 1/2" ID x 1 1/2" steel ring centered 3 1/2" hole, typ. ring to be ground smooth

end exist sti girder

3/16" typ.

15"

Swaged fitting and stud

Bracket det. see 2 S-7 S-3

SECTION A

Scale: 1"=1'-0"

S-7 S-7

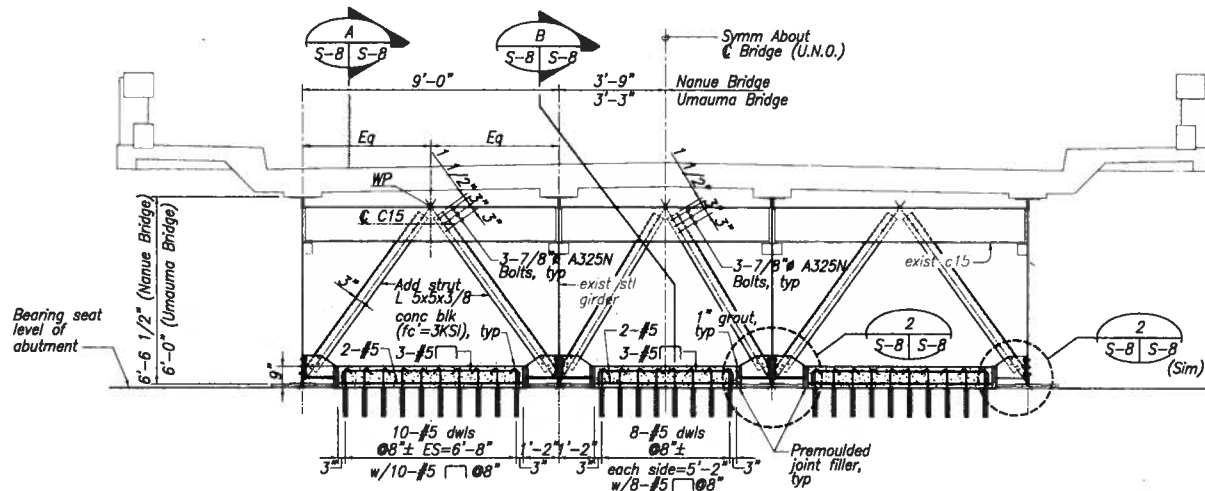


Scale: $1/2' = 1' - 0''$

THIS WORK WAS PREPARED BY
ME OR UNDER MY SUPERVISION
Shen-Chien Chiu

10

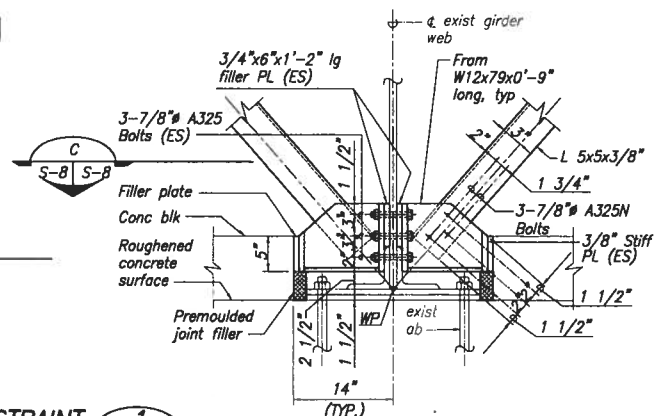
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(46)	2000	11	26



ELEVATION

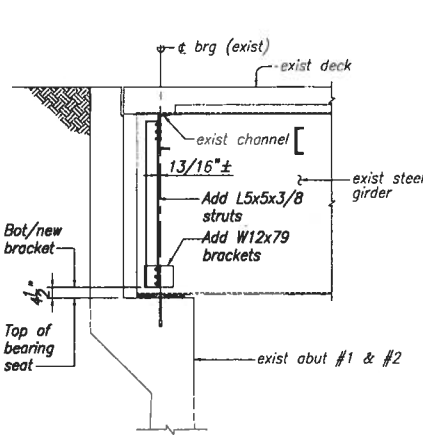
DETAIL OF ADDITIONAL STRUT TO EXIST. END DIAPHRAGM & CONCRETE BLOCK RESTRAINT

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



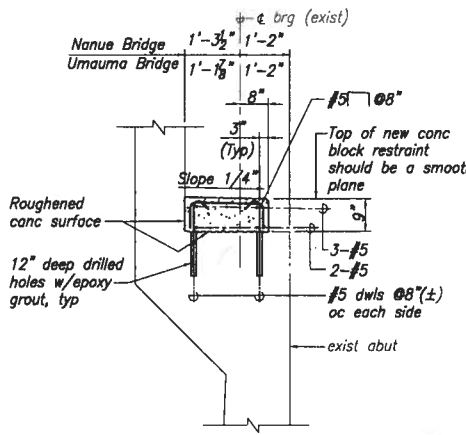
CONNECTION DETAIL

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



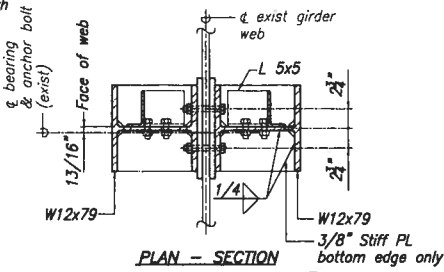
SECTION AT ABUTMENT A

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



SECTION AT ABUTMENT B

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



PLAN - SECTION C

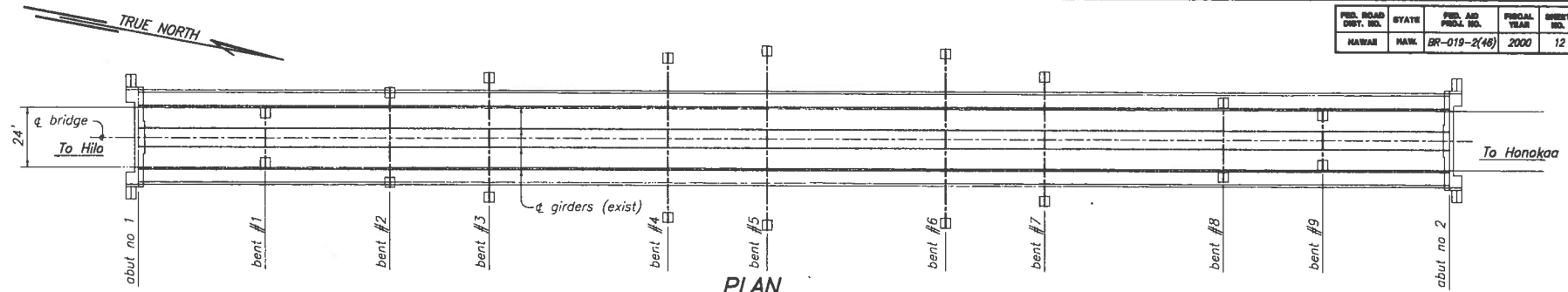
Scale: 1 1/2"=1'-0"



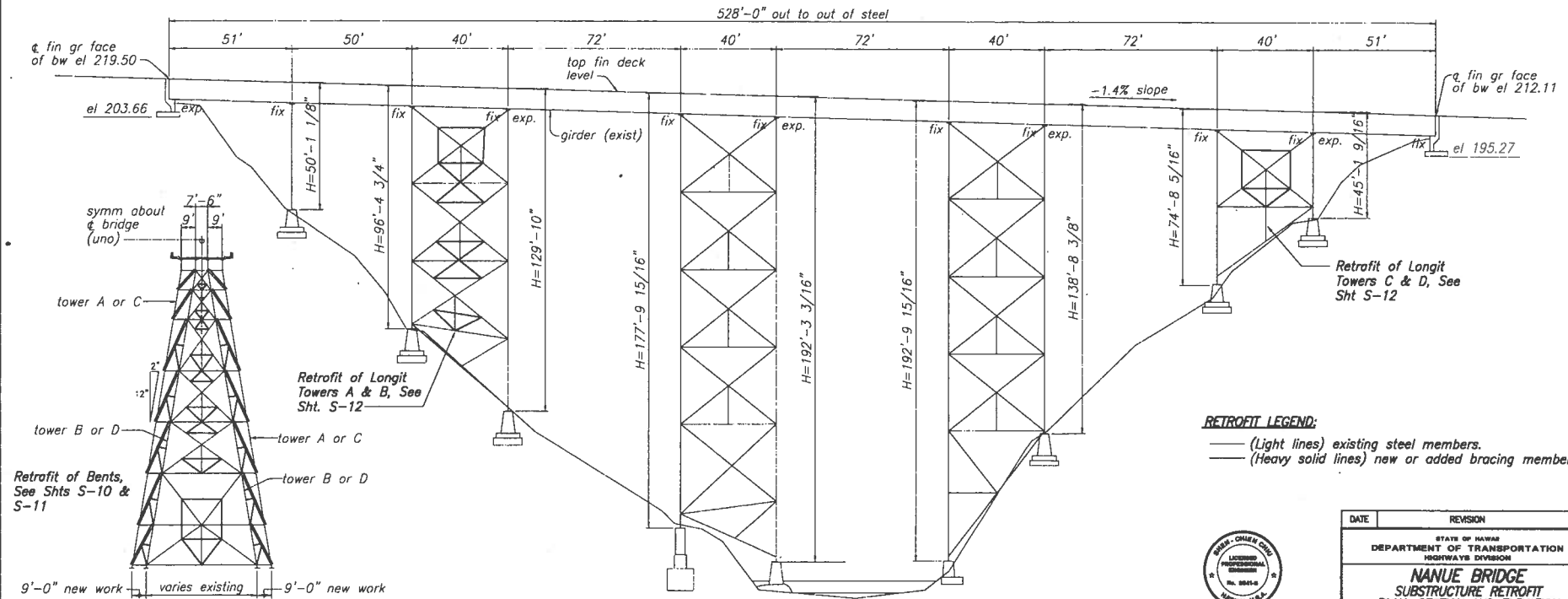
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION
Shen-Chuan Chiu

DATE	REVISION
	STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION NANUE & UMAUMA BRIDGE SUPERSTRUCTURE RETROFIT SECTIONS AND DETAILS SEISMIC RETROFIT OF VARIOUS BRIDGES EAST OF NINOLE, HAWAII F.A. PROJECT NO. BR-019-2(46) Scale: As Noted Date: AUG. 17, 1999 SHEET No. S-8 OF 23 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAWAII	BR-019-2(46)	2000	12	26



PLAN
Scale: 1"=20'-0"



TYPICAL BENT ELEVATION
Scale: 1"=30'-0"

EXISTING CONDITION SECTION
Scale: 1"=20'-0"

RETROFIT LEGEND:
 — (Light lines) existing steel members.
 — (Heavy solid lines) new or added bracing members.

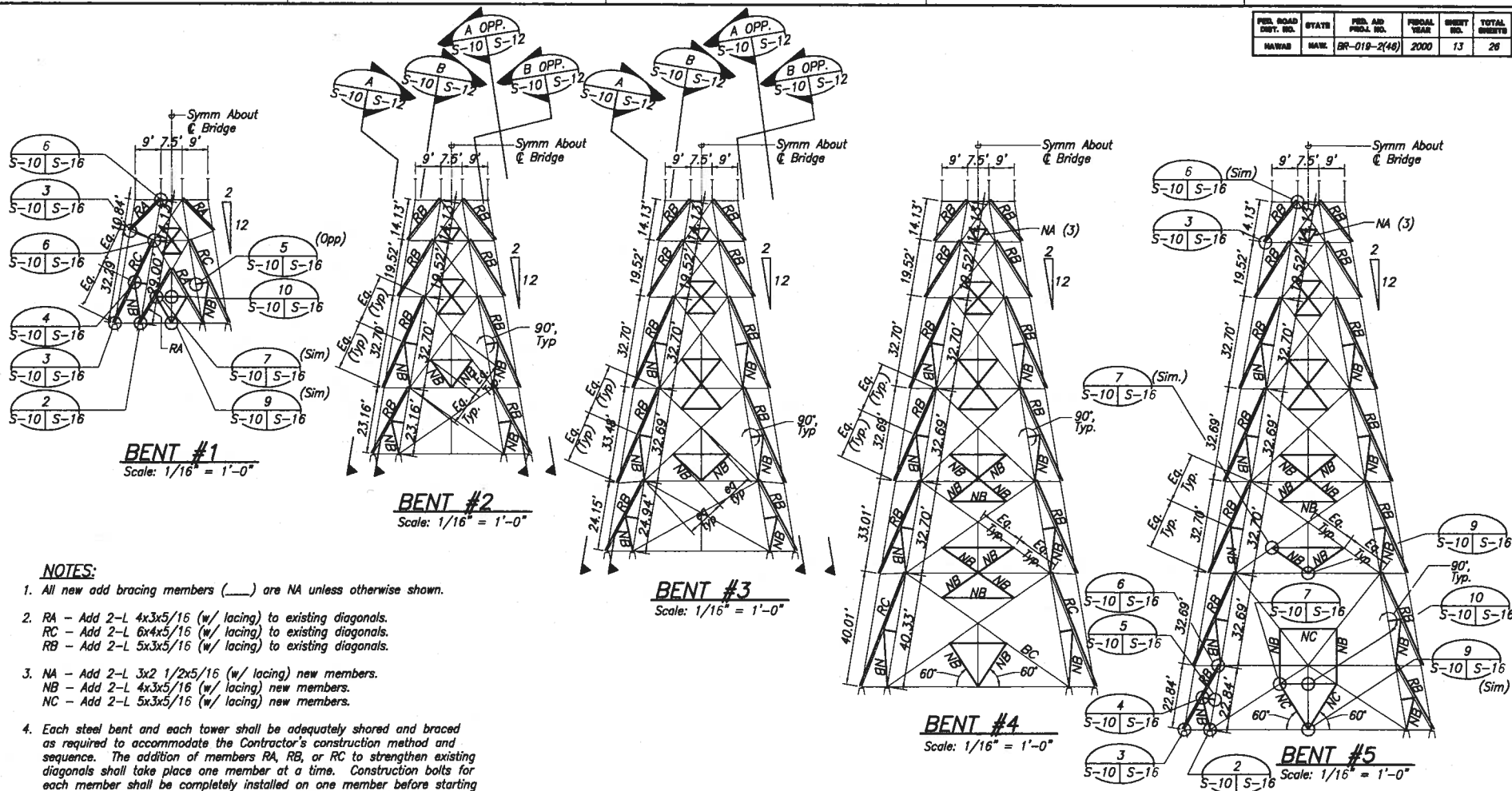


THIS WORK WAS PREPARED BY
ME OR UNDER MY SUPERVISION
John Chua-Chin

DATE	REVISION
	STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION MAUIE BRIDGE SUBSTRUCTURE RETROFIT PLAN, SECTION AND ELEVATION SEISMIC RETROFIT OF VARIOUS BRIDGES EAST OF HINOLE, HAWAII F.A. PROJECT NO. BR-019-2(46) Scale: As Noted Date: AUG. 17, 1999 SHEET No. 5-9 OF 23 SHEETS

N452-1.DWG 08/04/99 15:57 FINAL L:\DWG\6041-01\VIEWSTRUCT\MAUIE
 SURVEY PLANNED BY: _____ DATE: _____
 DESIGNED BY: _____
 CHECKED BY: _____
 APPROVED BY: _____
 IN CHARGE: _____

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(48)	2000	13	26



NOTES:

- All new add bracing members (—) are NA unless otherwise shown.
- RA - Add 2-L 4x3x5/16 (w/ lacing) to existing diagonals.
RC - Add 2-L 6x4x5/16 (w/ lacing) to existing diagonals.
RB - Add 2-L 5x3x5/16 (w/ lacing) to existing diagonals.
- NA - Add 2-L 3x2 1/2x5/16 (w/ lacing) new members.
NB - Add 2-L 4x3x5/16 (w/ lacing) new members.
NC - Add 2-L 5x3x5/16 (w/ lacing) new members.
- Each steel bent and each tower shall be adequately shored and braced as required to accommodate the Contractor's construction method and sequence. The addition of members RA, RB, or RC to strengthen existing diagonals shall take place one member at a time. Construction bolts for each member shall be completely installed on one member before starting work on another member. The addition of members NA, NB, and NC for interior diagonals shall take place one member at a time, either during or after the addition of members RA, RB, or RC at each connection.
- All surfaces of each existing diagonal to be strengthened by members RA, RB, or RC shall be cleaned and prepared to accept the paint system indicated in the Special Provisions. In addition the surface of each gusset plate and all surfaces of each member a minimum of 6 inches around the connections affected by the work shall be cleaned and prepared for painting. Areas cleaned shall receive the paint system indicated in the Special Provisions. Cleaning and painting shall be considered incidental to Structural Steel.

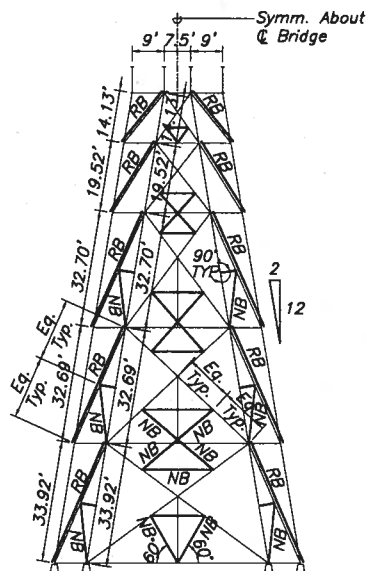


THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION
Chen-Ming Chen

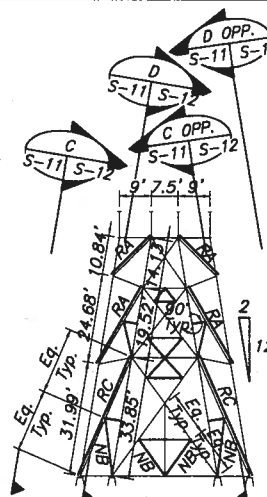
DATE	REVISION
	STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION NANUE BRIDGE SUBSTRUCTURE RETROFIT TRANSV. BENTS #1, #2, #3, #4 & #5 SEISMIC RETROFIT OF VARIOUS BRIDGES EAST OF NINOLE, HAWAII F.A. PROJECT NO. BR-019-2(48)
Scale: As Noted	Date: AUG. 17, 1999
SHEET No. S-10 OF 23 SHEETS	

[illegible]

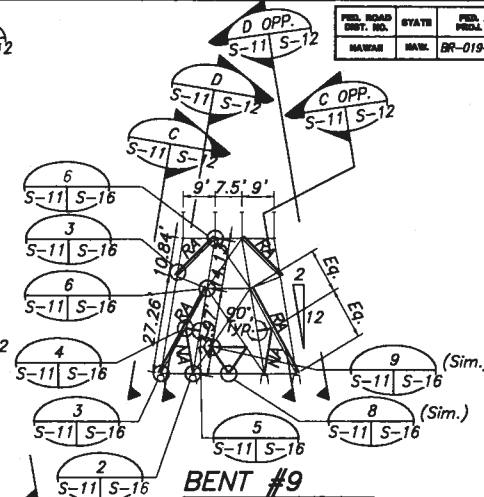
Scale: $1/16" = 1'-0"$



Scale: $1/16'' = 1'-0''$



Scale: $1/16'' = 1'-0''$



Scale: $1/16" = 1'-0"$

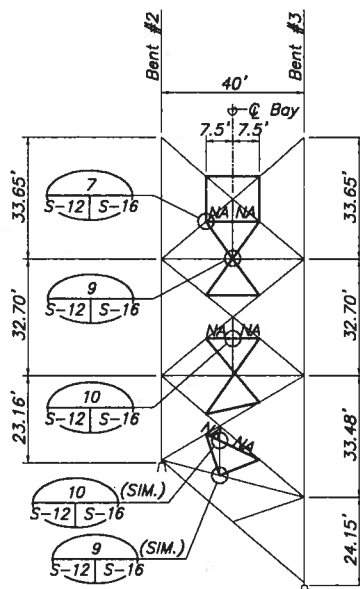
1. All new odd bracing members are NA unless otherwise shown.

2. RA - Add 2-L 4x3x5/16 (w/lacing) to existing diagonals.
RC - Add 2-L 6x4x5/16 (w/lacing) to existing diagonals.
RB - Add 2-L 5x3x5/16 (w/lacing) to existing diagonals.
3. NA - Add 2-L 3x2 1/2x5/16 (w/lacing) new members.
NB - Add 2-L 4x3x5/16 (w/lacing) new members.
NC - Add 2-L 5x3x5/16 (w/lacing) new members.
4. Each steel bent and each tower shall be adequately shored and braced as required to accommodate the Contractor's construction method and sequence. The addition of members RA, RB, or RC to strengthen existing diagonals shall take place one member at a time. Connection bolts for each member shall be completely installed on one member before starting work on another member. The addition of members NA, NB, and NC for interior diagonals shall take place one member at a time, either during or after the addition of members RA, RB, or RC at each connection.
5. All surfaces of each existing diagonal to be strengthened by members RA, RB, or RC shall be cleaned and prepared to accept the paint system indicated in the Special Provisions. In addition the surface of each gusset plate and all surfaces of each member a minimum of 5 inches around the connections affected by the work shall be cleaned and prepared for painting. Areas cleaned shall receive the paint system indicated in the Special Provisions. Cleaning and painting shall be considered incidental to Structural Steel.

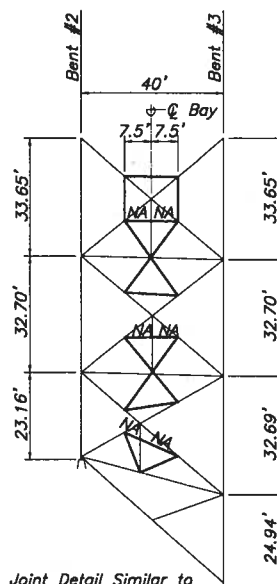


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ME OR UNDER MY SUPERVISION
Sue-Ching Chiu

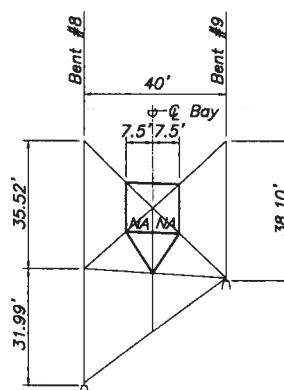
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FED. YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAWAII	BR-019-2(46)	2000	15	26



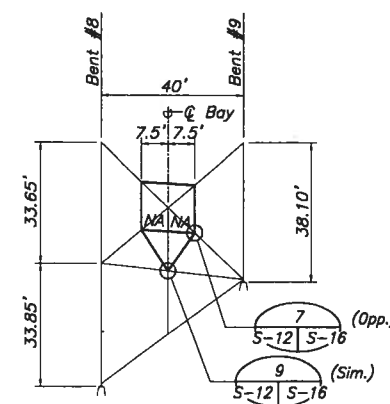
Note: Joint Detail Similar to



Note: Joint Detail Similar to



Note: Joint Detail Similar to



Note: Joint Detail Similar to

ELE.-TOWER A
Scale: 1/16"=1'-0"
S-10

ELE.-TOWER B
Scale: 1/16"=1'-0"
S-10

ELE.-TOWER C
Scale: 1/16"=1'-0"
S-11

ELE.-TOWER D
Scale: 1/16"=1'-0"
S-11

NOTES:

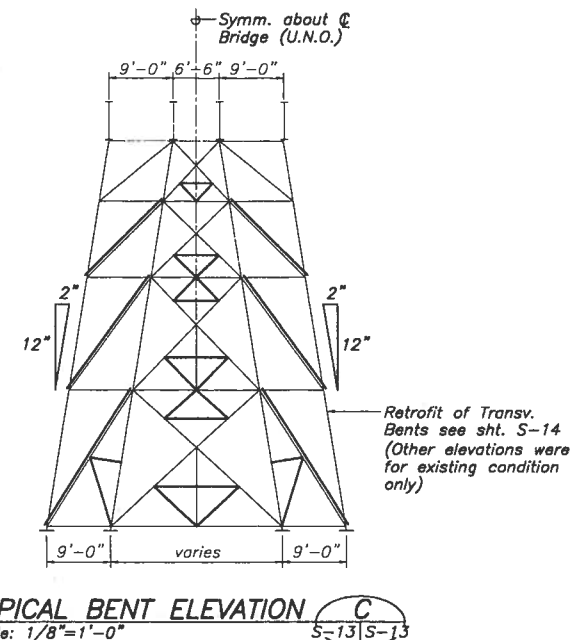
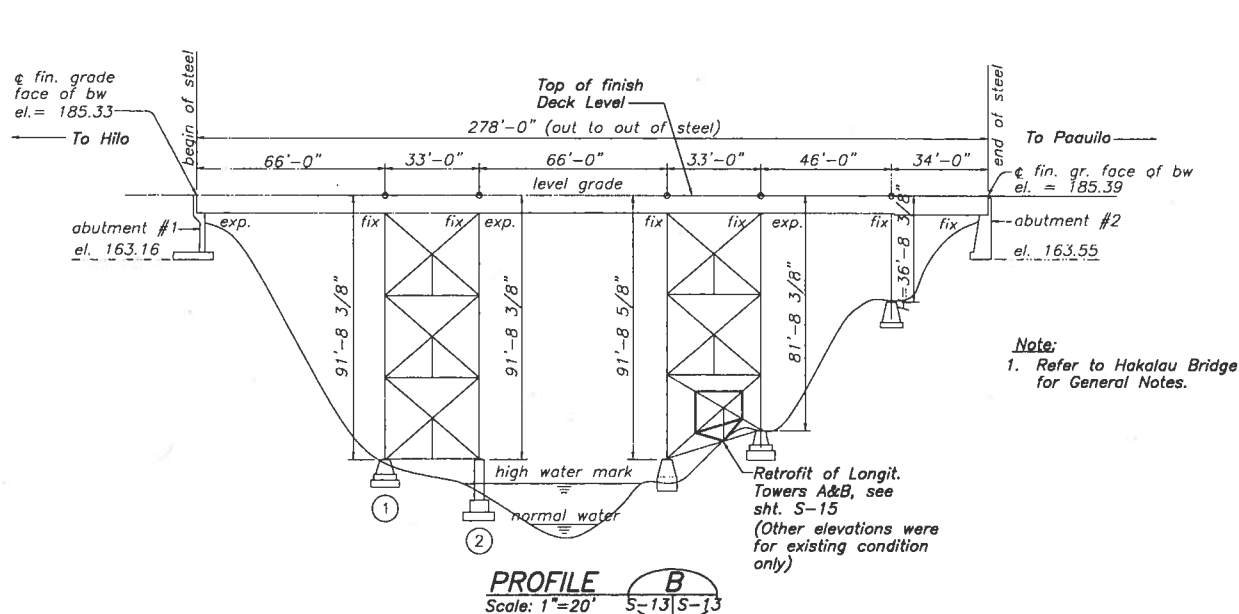
- See Retrofit Legends on Sheet S-9
- All new members are "NB", unless otherwise indicated.
- See Note 3 on Sheet S-10 for size of new members.
- Each steel bent and each tower shall be adequately shored and braced as required to accommodate the Contractor's construction method and sequence. The addition of members RA, RB, or RC to strengthen existing diagonals shall take place one member at a time. Connection bolts for each member shall be completely installed on one member before starting work on another member. The addition of members NA, NB, and NC for interior diagonals shall take place one member at a time, either during or after the addition of members RA, RB, or RC at each connection.
- All surfaces of each existing diagonal to be strengthened by members RA, RB, or RC shall be cleaned and prepared to accept the paint system indicated in the Special Provisions. In addition the surface of each gusset plate and all surfaces of each member a minimum of 6 inches around the connections affected by the work shall be cleaned and prepared for painting. Areas cleaned shall receive the paint system indicated in the Special Provisions. Cleaning and painting shall be considered incidental to Structural Steel.



THIS WORK WAS PREPARED BY
ME OR UNDER MY SUPERVISION
Chen-Chin-Chen

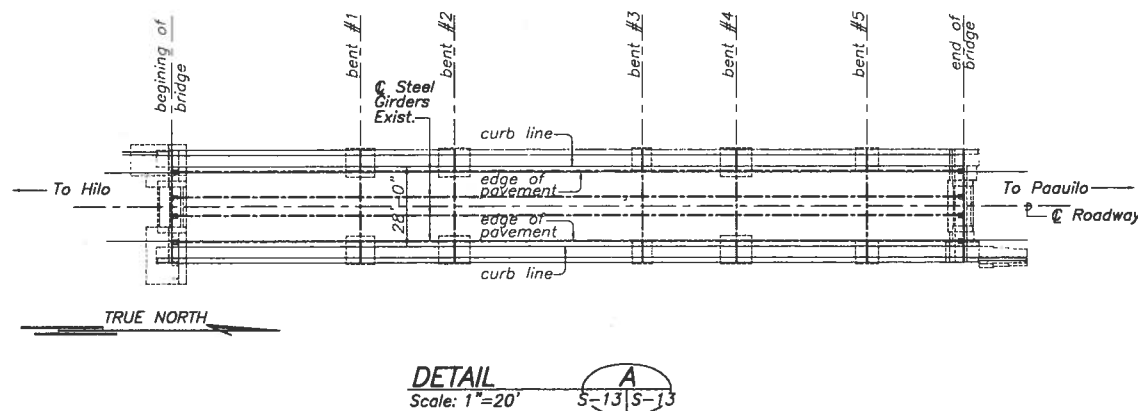
DATE	REVISION
	STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION NANUE BRIDGE SUBSTRUCTURE RETROFIT TRANSVERSE TOWERS A-D SEISMIC RETROFIT OF VARIOUS BRIDGES EAST OF HINOLE, HAWAII P.A. PROJECT NO. BR-019-2(46) Scale: As Noted Date: AUG. 17, 1999 SHEET No. S-12 OF 23 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(46)	2000	16	26



RETROFIT LEGEND:

- (Light lines) Existing steel members.
- (Heavy solid lines) New or added bracing members.

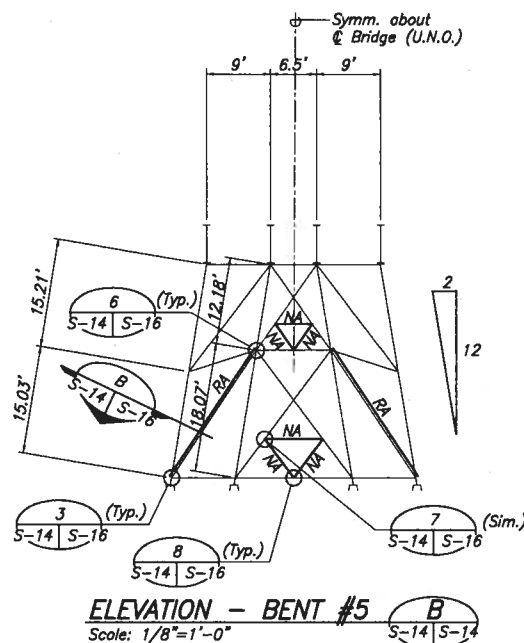


THIS WORK WAS PREPARED BY
ME OR UNDER MY SUPERVISION
John Chinn

DATE	REVISION
	STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION UMAUMA BRIDGE SUBSTRUCTURE RETROFIT PLAN, SECTION AND ELEVATION SEISMIC RETROFIT OF VARIOUS BRIDGES EAST OF NINOLE, HAWAII F.A. PROJECT NO. BR-019-2(46) Scale: As Noted Date: AUG. 17, 1999 SHEET No. S-13 OF 23 SHEETS

ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
NOTED/DONE	DRAWN BY	
	TRACKED BY	
	DESIGNED BY	
No.	QUANTITIES BY	
	CHECKED BY	

08/04/99 09:08 FINAL L:\DWG\6041-01\NEW



ELEVATION - BENT #5

Scale: $1/8" = 1' - 0"$

NOTES:

1. Each steel bent and each tower shall be adequately shored and braced as required to accommodate the Contractor's construction method and sequence. The addition of members RA, RB, or RC to strengthen existing diagonals shall take place one member at a time. Connection bolts for each member shall be completely installed on one member before starting work on another member. The addition of members NA, NB, and NC for interior diagonals shall take place one member at a time, either during or after the addition of members RA, RB, or RC at each connection.
2. All surfaces of each existing diagonal to be strengthened by members RA, RB, or RC shall be cleaned and prepared to accept the paint system indicated in the Special Provisions. In addition the surface of each gusset plate and all surfaces of each member a minimum of 6 inches around the connections affected by the work shall be cleaned and prepared for painting. Areas cleaned shall receive the paint system indicated in the Special Provisions. Cleaning and painting shall be considered incidental to Structural Steel.

RETROFIT LEGEND:

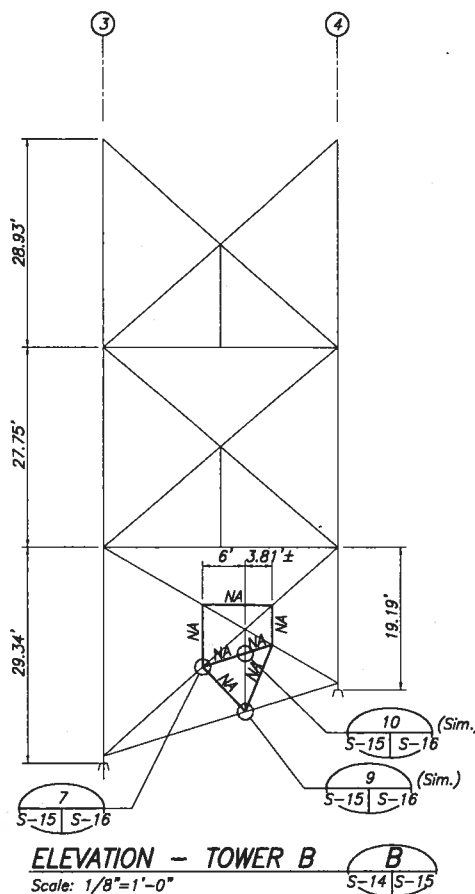
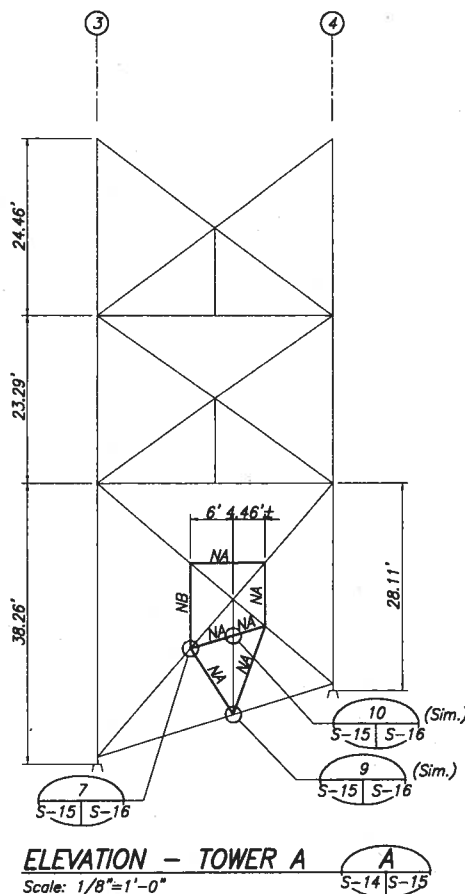
- (Light lines) Existing steel members.
 ————— (Heavy solid lines) Add bracing members.
 RA Add 2-L 4x3x5/16 (w/lacing) to existing members.
 NA Add 2-L 3x2 1/2x5/16 (w/lacing) new members.
 NB Add 2-L 4x3x5/16 new members.



THIS WORK WAS PREPARED BY
ME OR UNDER MY SUPERVISION
Shen-Chin Chien

DATE	REVISION
STATE OF HAWAII	
DEPARTMENT OF TRANSPORTATION	
HIGHWAYS DIVISION	
UMAUMA BRIDGE SUBSTRUCTURE RETROFIT RETROFIT OF BENTS #1, #2, #3 & #4 SEISMIC RETROFIT OF VARIOUS BRIDGES EAST OF NINOLE, HAWAII F.A. PROJECT NO. BR-019-2(46)	
Scale: As Noted	Date: AUG. 17, 1981
SHEET NO. 5-14 OF 23 SHEETS	

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(46)	2000	18	26



NOTES:

- Each steel bent and each tower shall be adequately shored and braced as required to accommodate the Contractor's construction method and sequence. The addition of members RA, RB, or RC to strengthen existing diagonals shall take place one member at a time. Connection bolts for each member shall be completely installed on one member before starting work on another member. The addition of members NA, NB, and NC for interior diagonals shall take place one member at a time, either during or after the addition of members RA, RB, or RC at each connection.
- All surfaces of each existing diagonal to be strengthened by members RA, RB, or RC shall be cleaned and prepared to accept the paint system indicated in the Special Provisions. In addition the surface of each gusset plate and all surfaces of each member a minimum of 6 inches around the connections affected by the work shall be cleaned and prepared for painting. Areas cleaned shall receive the paint system indicated in the Special Provisions. Cleaning and painting shall be considered incidental to Structural Steel.

RETROFIT LEGEND:

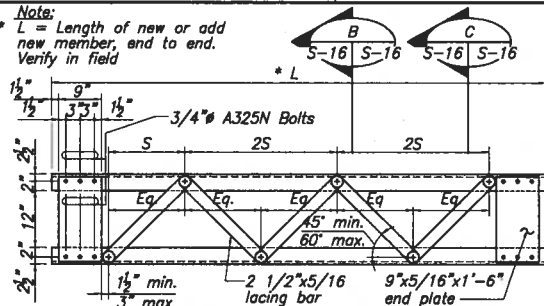
- (Light lines) Existing steel members.
- (Heavy solid lines) Add bracing members.
- NA Add 2-L 3x2 1/2x5/16 (w/lacing) new members.
- NB Add 2-L 4x3x5/16 (w/lacing) new members.



THIS WORK WAS PREPARED BY
ME OR UNDER MY SUPERVISION
Chen-Chin-Chin

DATE	REVISION
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION	
UMAUMA BRIDGE SUBSTRUCTURE RETROFIT RETROFIT OF TOWERS A,B,C & D	
SEISMIC RETROFIT OF VARIOUS BRIDGES EAST OF NINOLE, HAWAII F.A. PROJECT NO. BR-019-2(46)	
Scale: As Noted	Date: AUG. 17, 1999
SHEET No. S-15 OF 23 SHEETS	

Note:
* L = Length of new or add
new member, and to end.
Verify in field

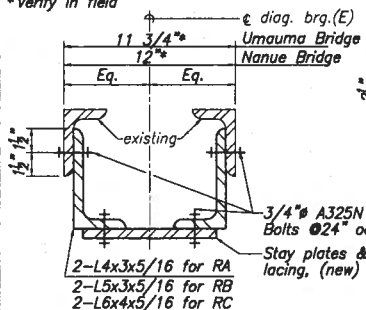


BOTTOM PLAN (Looking up)

**LACING & STAY PLATE LAYOUT PLAN
OF NA, NB, RA, RB, & RC**

Scale: None

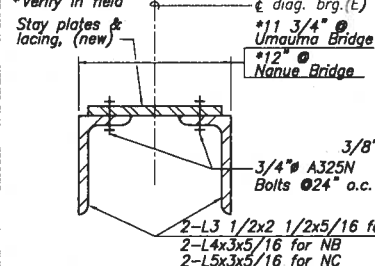
Note:
* Verify in field



SECTION B

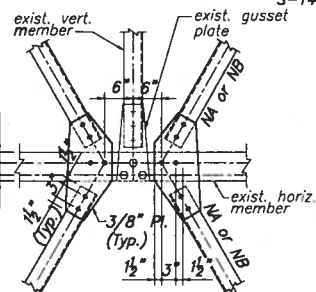
Scale: None

Note:
* Verify in field



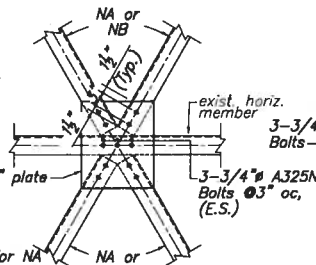
SECTION C

Scale: None



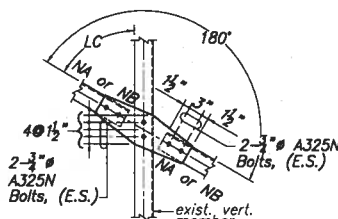
DETAIL 9

Scale: 1"=1'-0"
S-10, S-11, S-12
S-14, S-15



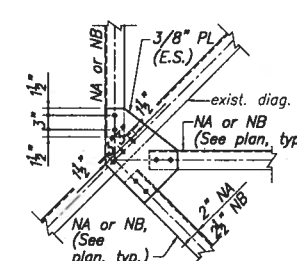
DETAIL 8

Scale: 1"=1'-0"
S-11, S-14



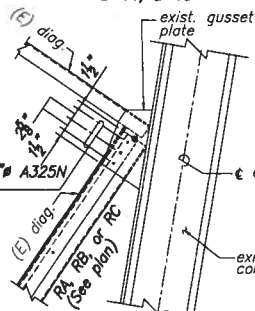
DETAIL 10

Scale: 1"=1'-0"
S-10, S-11, S-12
S-14, S-15



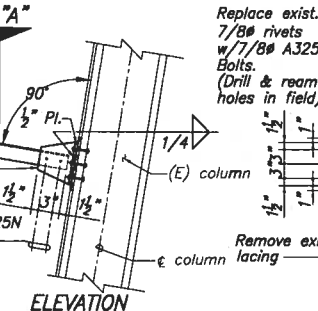
DETAIL 7

Scale: 1"=1'-0"
S-10, S-11, S-12
S-14, S-15



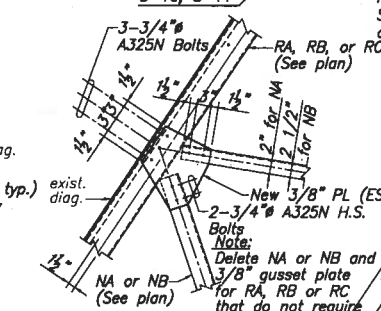
DETAIL 6

Scale: 1"=1'-0"
S-10, S-11, S-14



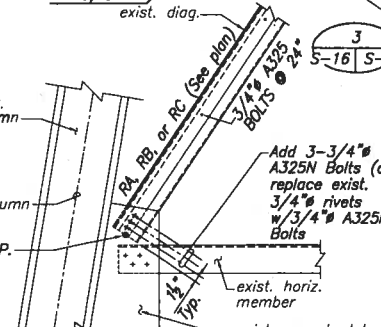
ELEVATION DETAIL 5

Scale: 1"=1'-0"
S-10, S-11



DETAIL 4

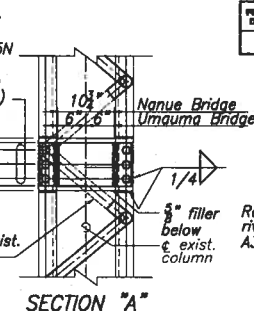
Scale: 1"=1'-0"
S-10, S-11



DETAIL 3

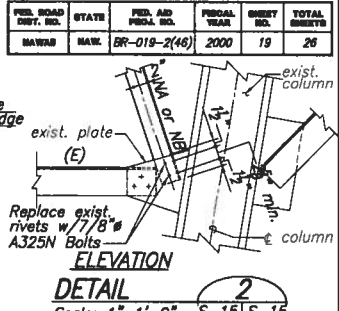
Scale: 1"=1'-0"
S-10, S-11, S-14

Replace exist.
7/8" rivets
w/ 7/8" A325N
Bolts.
(Drill & ream
holes in field)



SECTION "A"

Note:
* See General Structural
Note, #10 on sheet
S-1 for information to
determine the W.P.



ELEVATION DETAIL 2

Scale: 1"=1'-0"
S-9, S-10, S-11

**STRENGTHENING OF
EXIST. DIAG. BRACING**

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



THIS WORK WAS PREPARED BY
ME OR UNDER MY SUPERVISION
Chiu-Chiu Chiu

DATE	REVISION
	STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION NANUE AND UMAUMA BRIDGES SUBSTRUCTURE RETROFIT SECTIONS & DETAILS SEISMIC RETROFIT OF VARIOUS BRIDGES EAST OF HINOLE, HAWAII F.A. PROJECT NO. BR-019-2(46) Scale: As Noted Date: AUG. 17, 1999

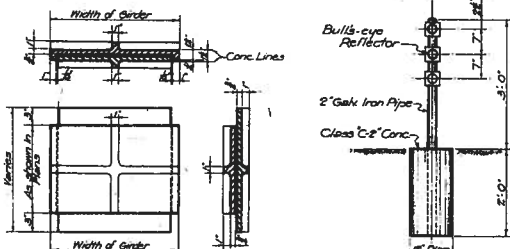
SHEET No. S-16 OF 23 SHEETS

NAME DATE

Use correct name of stream
LEFT HAND SIDE
Date of year built
RIGHT HAND SIDE

DETAIL OF LETTERS AND FIGURES AT BOTH APPROACHES

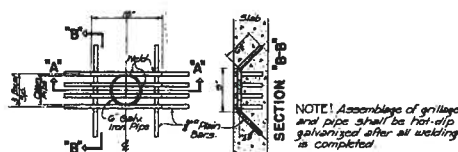
NOTE: Name of stream to be placed in left end post panels and date in right post panels in entering bridge using modified block letters 3" in height.



ST'D. REFLECTOR POST
Scale: 1/2" = 1'-0"

EXPANSION PLATES
Scale: 1/2" = 1'-0"

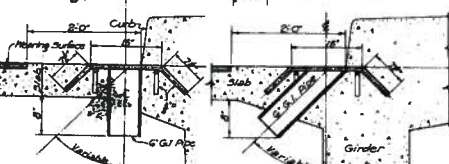
NOTE: Plates to be of Phosphor Bronze conforming to A.S.T.M. Spec. Class C. Contact areas to have medium plated finish with finishing strokes parallel to longitudinal direction of bridge.



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

SECTION "A-A"

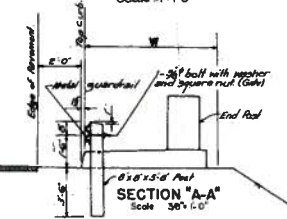
NOTE: Assembly of grillage and pipe shall be hot-dip galvanized after all welding is completed.



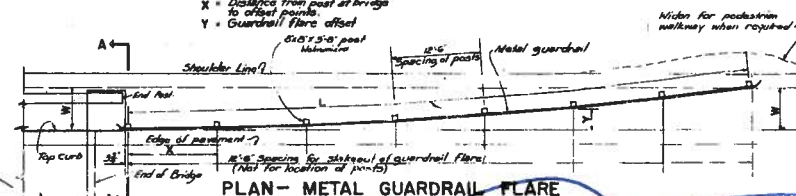
GUARDRAIL OFFSET

X	W-3	W-4	W-5	W-6	W-7	W-8
12.5	0.75	0.75	0.75	0.75	0.75	0.75
15.0	0.75	0.75	0.75	0.75	0.75	0.75
17.5	0.75	0.75	0.75	0.75	0.75	0.75
20.0	0.75	0.75	0.75	0.75	0.75	0.75
22.5	0.75	0.75	0.75	0.75	0.75	0.75
25.0	0.75	0.75	0.75	0.75	0.75	0.75
27.5	0.75	0.75	0.75	0.75	0.75	0.75
30.0	0.75	0.75	0.75	0.75	0.75	0.75
32.5	0.75	0.75	0.75	0.75	0.75	0.75
35.0	0.75	0.75	0.75	0.75	0.75	0.75
37.5	0.75	0.75	0.75	0.75	0.75	0.75
40.0	0.75	0.75	0.75	0.75	0.75	0.75
42.5	0.75	0.75	0.75	0.75	0.75	0.75
45.0	0.75	0.75	0.75	0.75	0.75	0.75
47.5	0.75	0.75	0.75	0.75	0.75	0.75
50.0	0.75	0.75	0.75	0.75	0.75	0.75
52.5	0.75	0.75	0.75	0.75	0.75	0.75
55.0	0.75	0.75	0.75	0.75	0.75	0.75
57.5	0.75	0.75	0.75	0.75	0.75	0.75
60.0	0.75	0.75	0.75	0.75	0.75	0.75
62.5	0.75	0.75	0.75	0.75	0.75	0.75
65.0	0.75	0.75	0.75	0.75	0.75	0.75
67.5	0.75	0.75	0.75	0.75	0.75	0.75
70.0	0.75	0.75	0.75	0.75	0.75	0.75
72.5	0.75	0.75	0.75	0.75	0.75	0.75
75.0	0.75	0.75	0.75	0.75	0.75	0.75
77.5	0.75	0.75	0.75	0.75	0.75	0.75
80.0	0.75	0.75	0.75	0.75	0.75	0.75
82.5	0.75	0.75	0.75	0.75	0.75	0.75
85.0	0.75	0.75	0.75	0.75	0.75	0.75
87.5	0.75	0.75	0.75	0.75	0.75	0.75
90.0	0.75	0.75	0.75	0.75	0.75	0.75
92.5	0.75	0.75	0.75	0.75	0.75	0.75
95.0	0.75	0.75	0.75	0.75	0.75	0.75
97.5	0.75	0.75	0.75	0.75	0.75	0.75
100.0	0.75	0.75	0.75	0.75	0.75	0.75

W = Guardrail flange
X = Distance from post at bridge to offset points
Y = Guardrail flange offset



SECTION "A-A"
Scale: 3/8" = 1'-0"



PLAN - METAL GUARDRAIL FLANGE
Scale: 1/8" = 1'-0"

GENERAL NOTES

CONCRETE: Class of concrete to be used in different parts of the structure are as noted on the plans.

REINFORCING STEEL: Intermediate grade. All steel to be round or square deformed bars of approved design. All dimensions relating to reinforcing are to centers of bars unless otherwise noted.

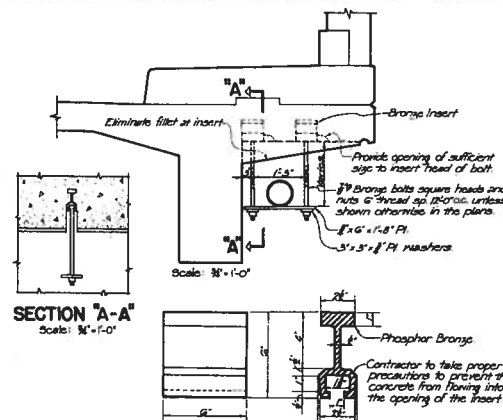
Splicing of reinforcing other than main deck slab, girder and frame bars shall be done by lapping 40 diameters. Splices are to be staggered. Splices in main girder and frame bars are permitted only in bars exceeding 60'-0" in length at points to be indicated by the Engineer. These splices to be electrically arc welded according to detail and specifications. No allowance will be made in the quantities for extra weight of steel required for splices not shown on the plans.

Minimum spacing between parallel bars shall be 2 1/2 times the diameter of round or 3 times the side dimension of square bars, but in no case shall the clear distance between the bars be less than 1 1/2 times the maximum size of the coarse aggregate.

Minimum covering, measured from the surface of the concrete to the face of any reinforcing bar, shall be not less than 2 inches except in slabs where the minimum covering shall be 1 inch. In the footings of abutments and retaining walls and in piers the minimum covering shall be 3 inches. In work exposed to the action of sea water the minimum covering shall be 4 inches except in precast concrete piles where a minimum of 3" may be used.

WATERPROOFING: Apply waterproofing as specified in Section 34, Pamphlet "N" of the Specifications, and as shown in the plans. Waterproofing is incidental to the concrete and will not be paid for separately.

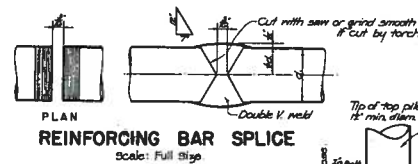
CONSTRUCTION JOINTS: All construction joints to have surface roughened and 1/2" cement grout applied immediately before the second pour. Construction joints to be located at places indicated in the plans.



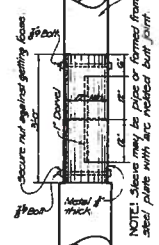
SECTION "A-A"
Scale: 1/2" = 1'-0"

DETAIL OF PIPE HANGERS AND INSERTS

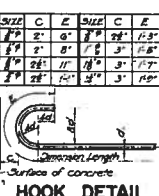
NOTE: Inserts, bolts, plates, nuts & washers to be Phosphor Bronze conforming to the A.S.T.M. Standards, Serial Designation B22 or the latest revision thereof, and shall be Class D grade.



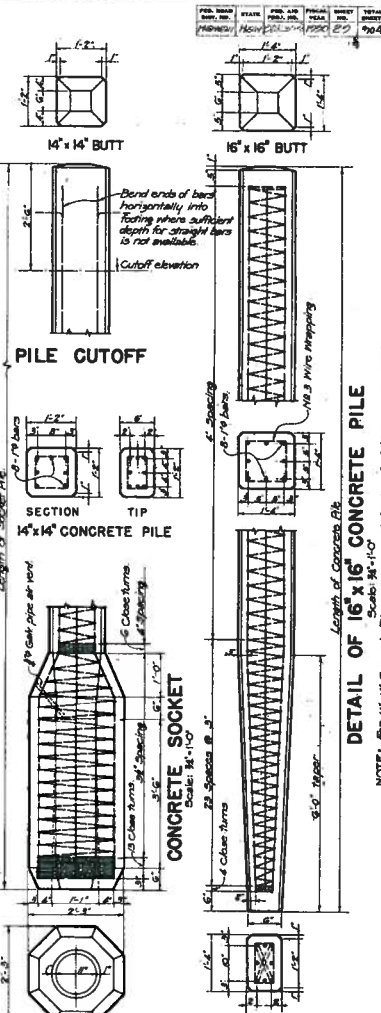
REINFORCING BAR SPLICE
Scale: Full Size



TIMBER PILE SPLICE
Scale: 3/8" = 1'-0"



HOOK DETAIL



PILE CUTOFF

SECTION TIP
14"x14" CONCRETE PILE

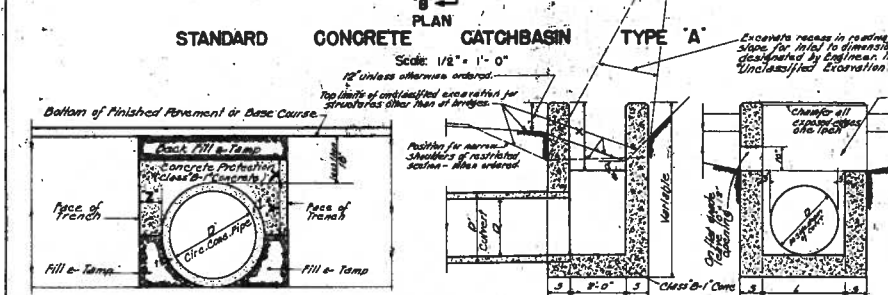
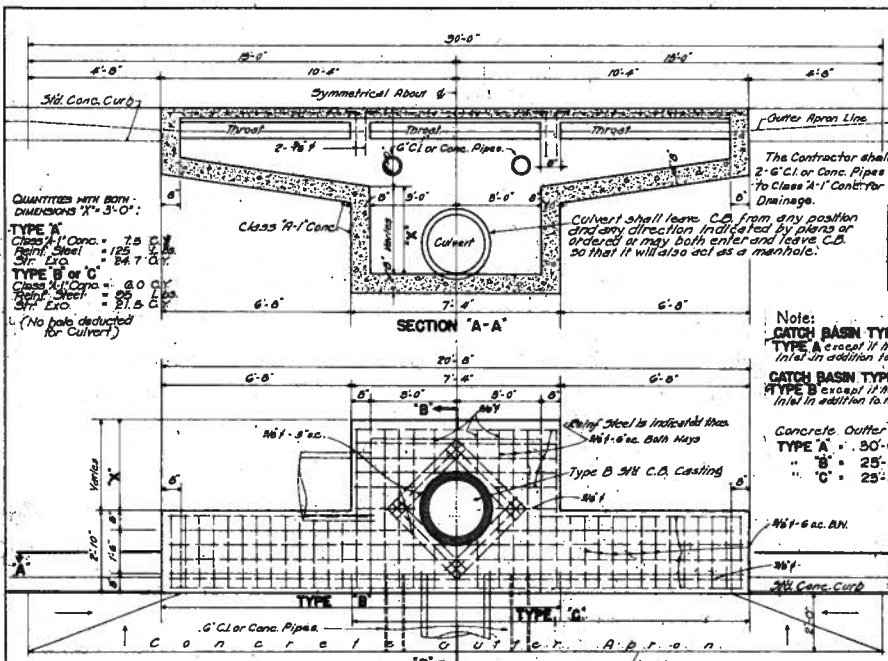
CONCRETE SOCKET
Scale: 3/8" = 1'-0"

TERRITORIAL HIGHWAY DEPARTMENT
TERRITORY OF HAWAII
STANDARD BRIDGE DETAILS
Scale as Noted

APPROVED BY: _____
TERRITORIAL HIGHWAY ENGINEER
SHEET No. 1 OF 1 SHEETS

FOR INFORMATION ONLY

5468.29

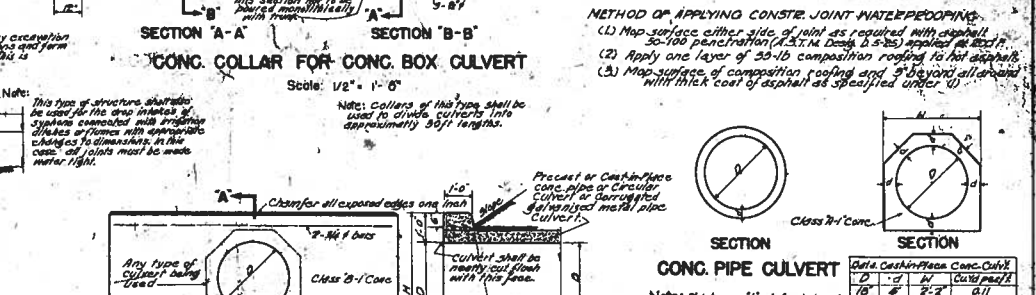
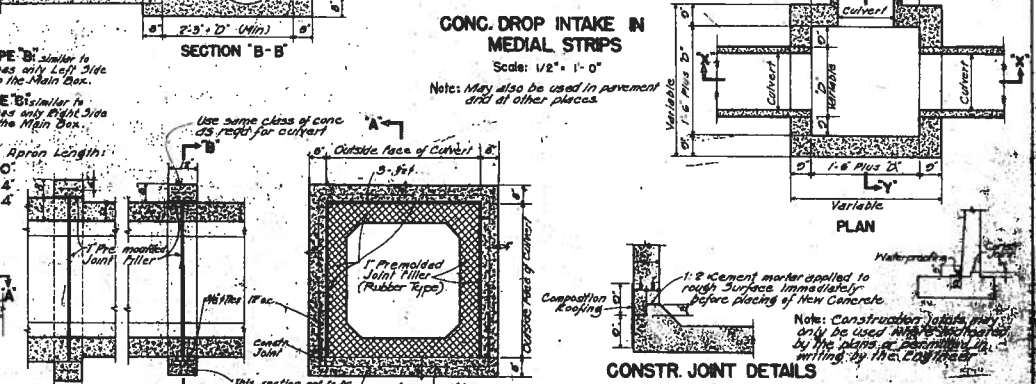
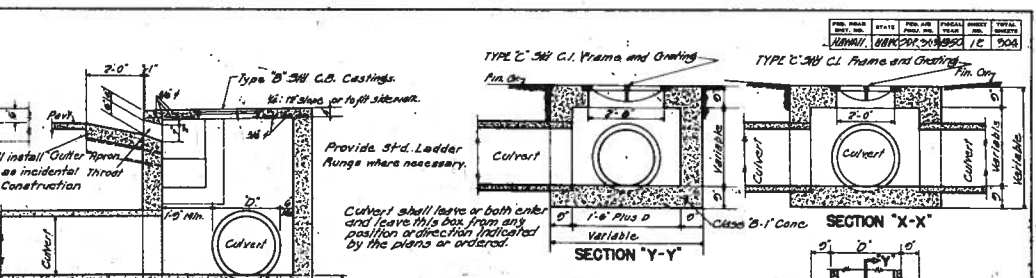


DATA: CONCRETE PROTECTION OVER CULVERTS

X	Y	Z
6" for 18" D		
7" - 24" D		
8" - 30" D		
9" - 36" D		
10" - 42" D		
11" - 48" D		
12" - 54" D		

Notes:

- Z must be from pipe to face of trench.
- Minimum - X.
- Maximum pay quantity will be Z + 10".

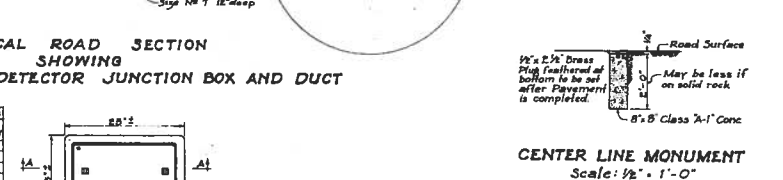
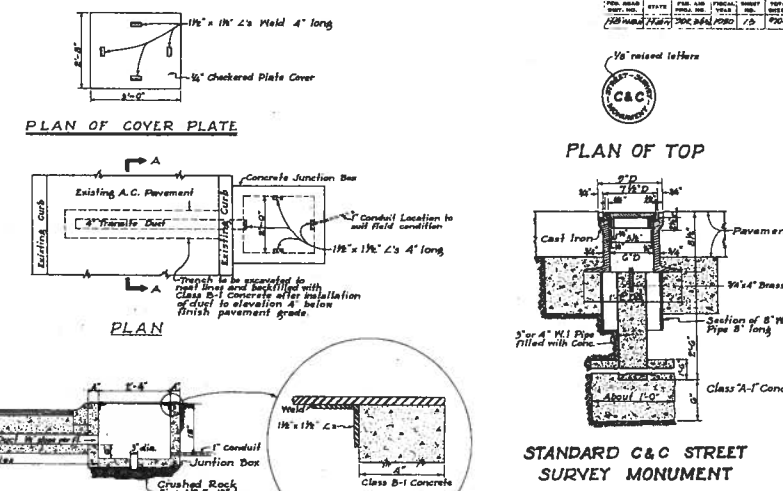
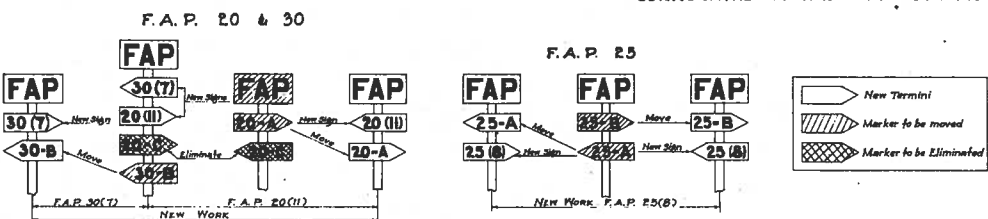
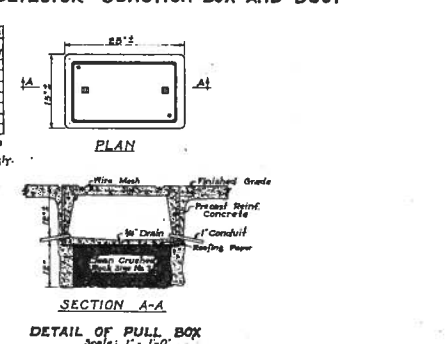
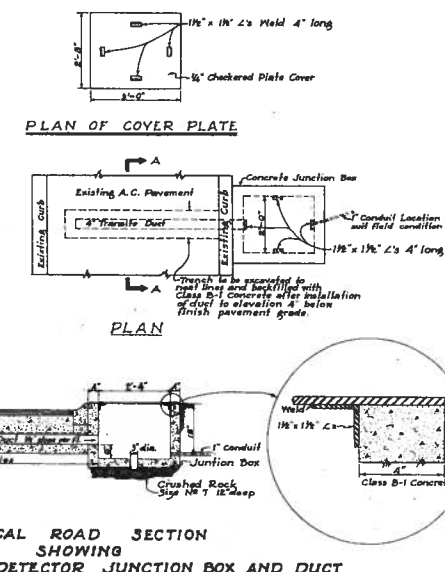
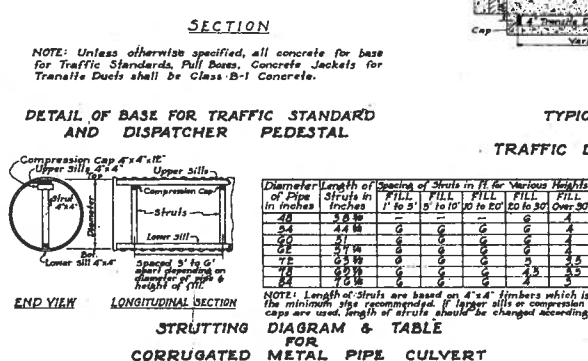
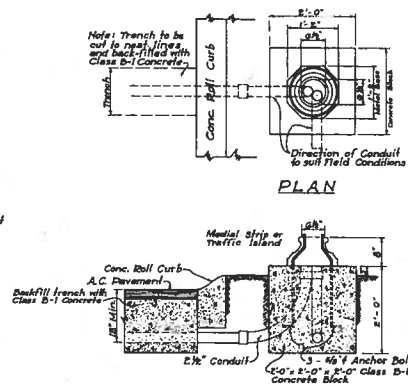
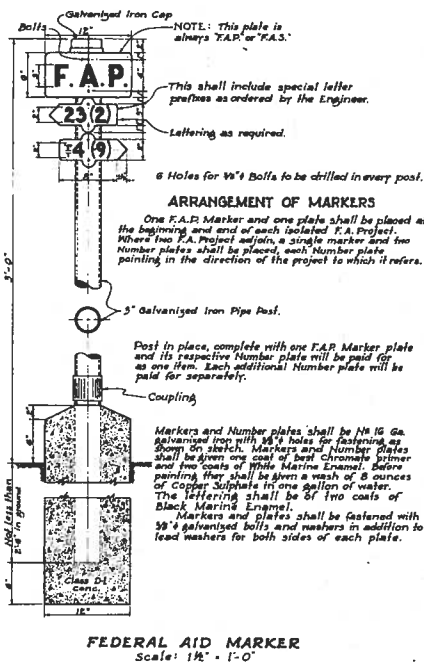


DATA: STANDARD OPERATING HEADWALL

Cul. Yds.	D	B	L	H	Concrete Headwall	Steel Pipe Headwall
100	18"	18"	8'-0"	2'-0"	100' Concrete	4" - 30"
125	18"	18"	7'-0"	2'-0"	125' Concrete	4" - 30"
150	18"	18"	6'-0"	2'-0"	150' Concrete	4" - 30"

TERRITORIAL HIGHWAY DEPARTMENT
TERRITORY OF HAWAII
STANDARD DETAILS
APR 15, 1948
SHEET NO. 2 OF 2 SHEETS

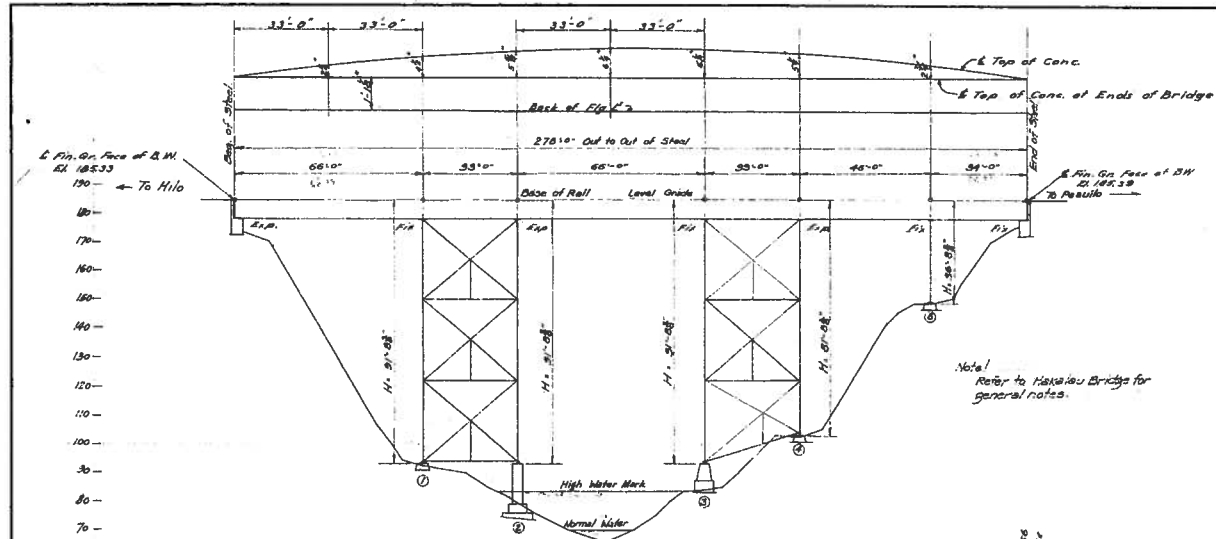
5468.12



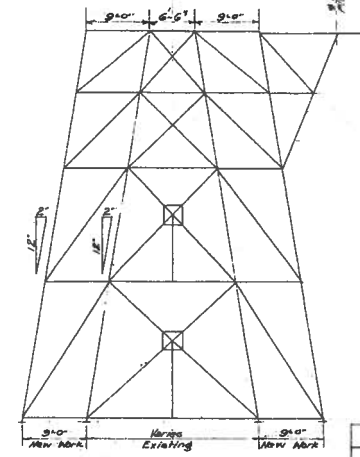
TERRITORIAL HIGHWAY DEPARTMENT
TERRITORY OF HAWAII
STANDARD DETAILS
SCALES AS NOTED
APPROVED: *[Signature]*
Territorial Highway Engineer
May 31, 1949
SHEET No. 3 OF 3 SHEETS

5468.13

DESIGNED BY
CHECKED BY
APPROVED BY
DATE



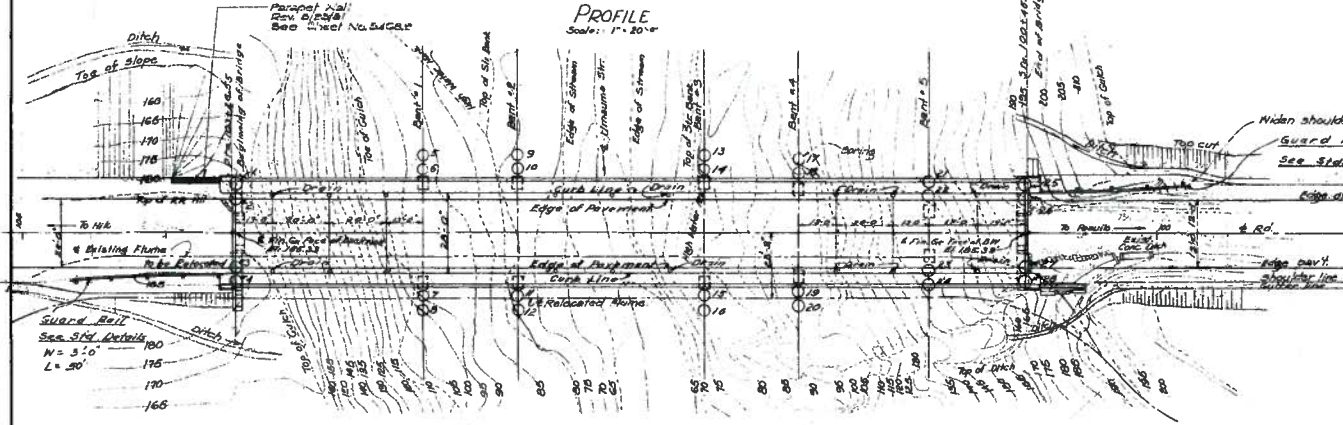
PROFILE
Scale: 1" = 20'



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

REVISIONS
1. Rev. 4-5-51 Quantity for cleaning, fabricating and erecting substructure changed.
2. Rev. 4-5-51 Reinf. steel Quant. changed. Hooks eliminated. Bottom rail reinf. must conform to ASTM A805.
3. Rev. 4-5-51 End Pier wall added at Abut. 1 Left.

ESTIMATED QUANTITIES	
Item	Total
Furnishing, fabricating and erecting new steel	119,650 ⁰⁰
Cleaning, fabricating and erecting existing steel	22,100 ⁰⁰
Painting and applying 1st coat of paint to steel structure	343,000 ⁰⁰
Painting entire structure with two field coats of paint	Lumpsum
Removal and replacing of rivets in lower bracing system	2000 pcs.
Removal and replacing of rivets in upper bracing system	4600 pcs.
Reinforcing damaged members	1025 ⁰⁰



PLAN
Scale: 1" = 20'

ESTIMATED QUANTITIES (CONTINUED)					
Item	Super-structure	Railing & End Posts	Abutments No. 1	Abutments No. 2	PIERS TOTAL
Class A-1 Conc.	32 cu yds.	38 cu yds.			47 cu yds.
Class B-2 Conc.					19 cu yds.
Class C-1 Conc.				50 cu yds.	80 cu yds.
Class C-1 Concrete				73 cu yds.	73 cu yds.
Struct. Ex.					398 cu yds.
Reinforcing Steel	38,442 lbs.	4,453 lbs.	15,302 lbs.	1,158 lbs.	55,355 lbs.
Dry Rubble Masonry				75 cu yds.	6 cu yds.
Reinforcing Steel				20 cu yds.	12 cu yds.
A.C. Paving	43.79				62.28 sq. yds.
Reinf. Steel	56,465 lbs.	6,762 lbs.	10,890 lbs.	1,087 lbs.	75,204 lbs.

REV. 5-10-51

- Backfill
- Soft Rock
- Asphalt
- Hard Rock
- Decomposed Rock

BORING LEGEND
Two (2) shown on the borings is the ground surface elevation of each boring.

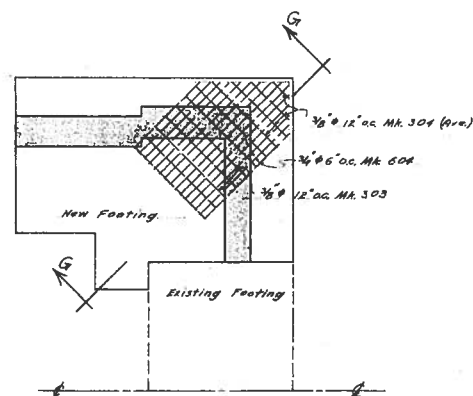
TERRITORIAL HIGHWAY DEPARTMENT
Territory of Hawaii
ULUMU BRIDGE
Sta. 100+45.56 to 103+26.85
HAWAII BELT ROAD SDR 3(13)
Apr. 1949

SHEET NO. 1 OF 12 SHEETS

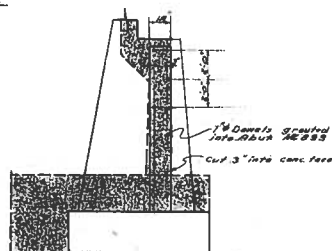
5468.148

FOR INFORMATION ONLY

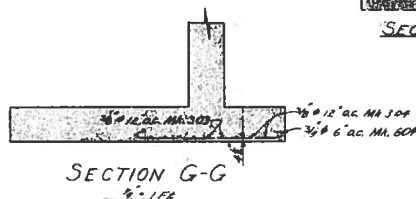
DES. NO.	DATE	REV. NO.	REVISION	BY	CHK.
100-100-100	10/1/49	1	10/1/49	10/1/49	10/1/49



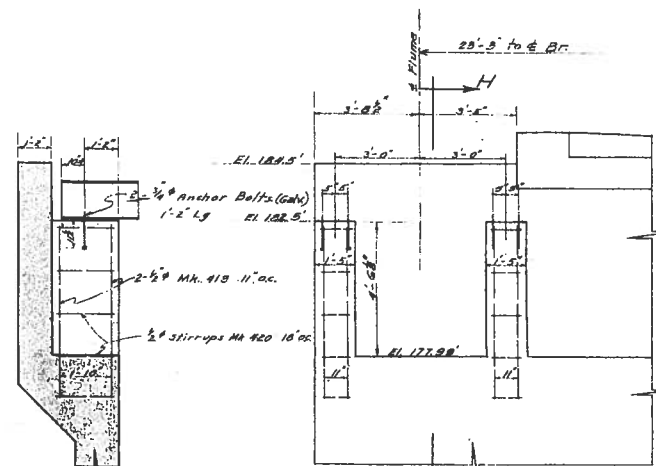
HALF PLAN OF FOOTING ABUT. NO. 1
SHOWING BOTTOM FACE REINF.
1/2" - 1 FT.



SECTION X-X (See S&H #2)
1/2" - 1 FT.

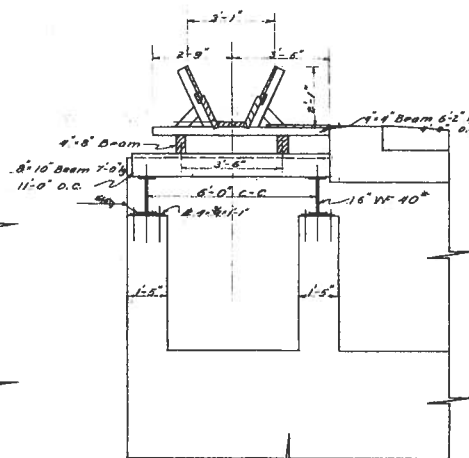


SECTION G-G
1/2" - 1 FT.

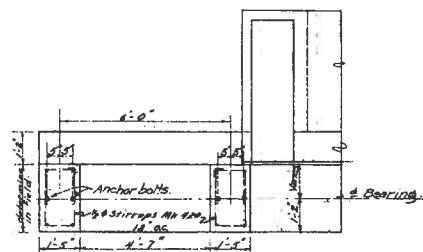


SECTION H-H

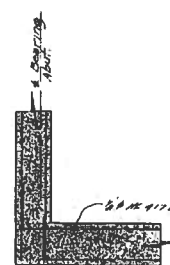
FRONT ELEVATION



CANE FLUME DETAIL
1/2" - 1 FT.



PLAN



SECTION J-J (See S&H #2)
1/2" - 1 FT.

DETAILS OF ANCHORAGE
FOR CANE FLUME GIRDERS
1/2" - 1 FT.

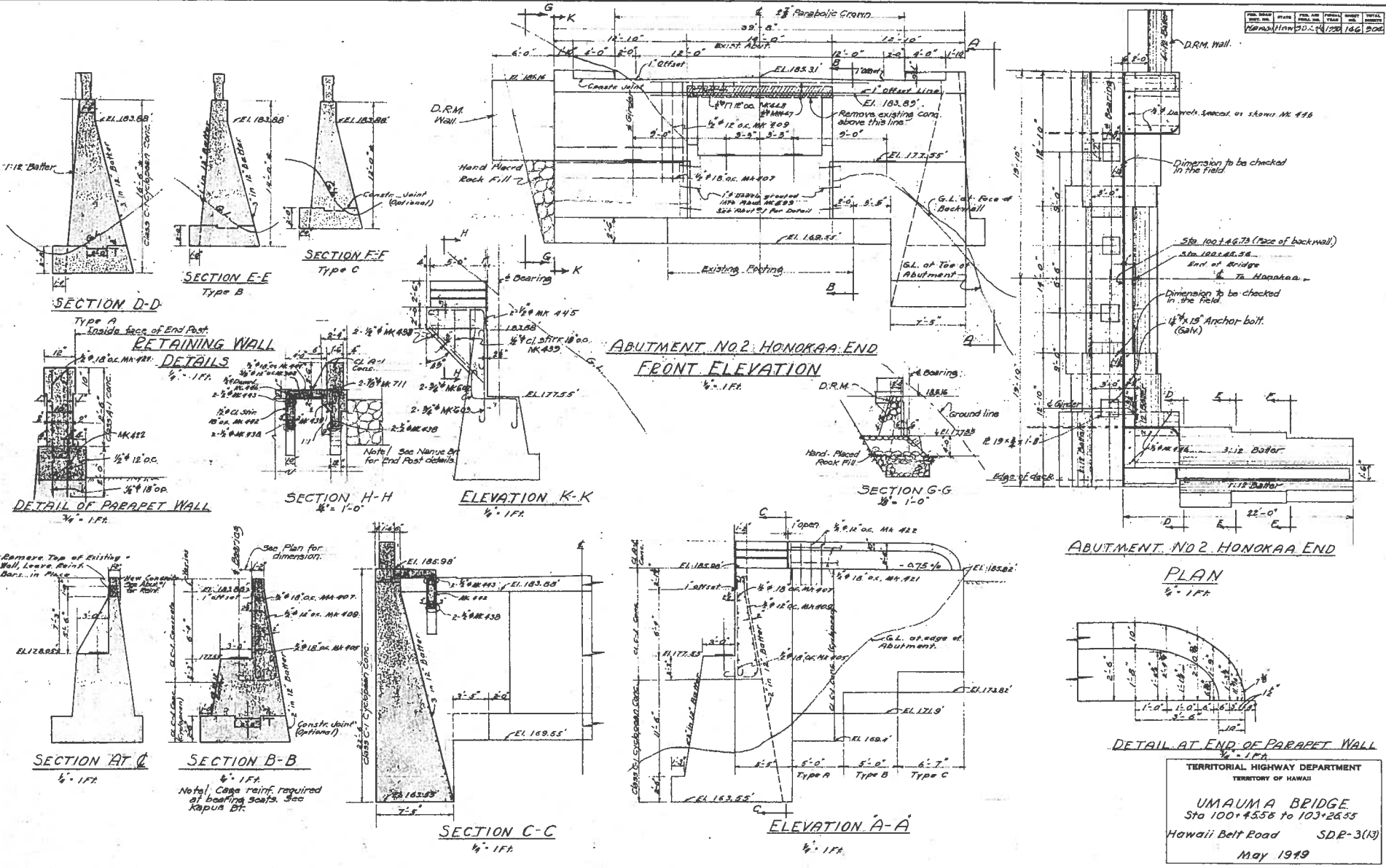
TERRITORIAL HIGHWAY DEPARTMENT
TERRITORY OF HAWAII
UMAUMA BRIDGE
Sta. 100+45.56 to 103+25.55
Hawaii Belt Road SDR-3(13)
May 1949

SHEET No. 3 OF 12 SHEETS

5468.115

DESIGNED BY	10/1/49
CHECKED BY	10/1/49
APPROVED BY	10/1/49
DATE	10/1/49
BY	10/1/49
FOR	10/1/49

DATE	BY	CHKD BY	APP'D BY	REVISION
10/20/55	J. H. HARRIS	J. H. HARRIS	J. H. HARRIS	1

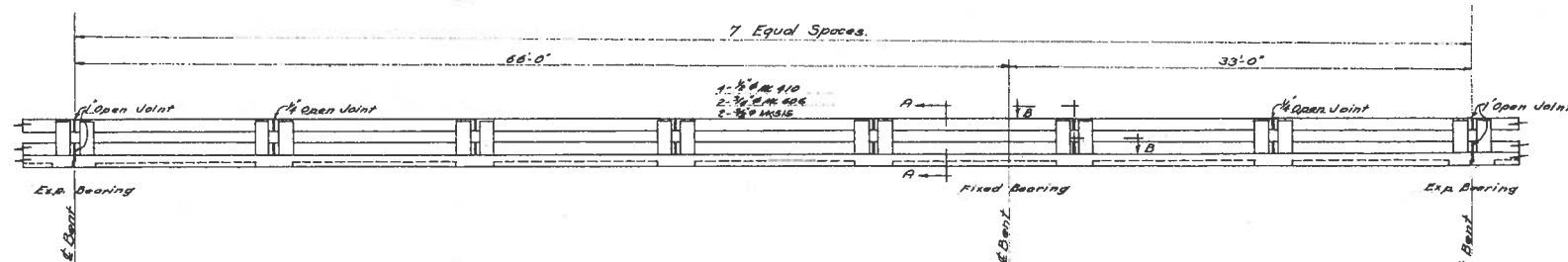
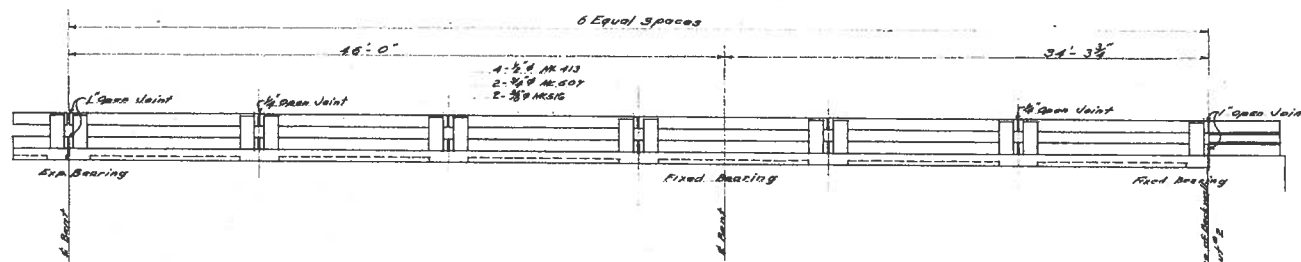


TERRITORIAL HIGHWAY DEPARTMENT
TERRITORY OF HAWAII

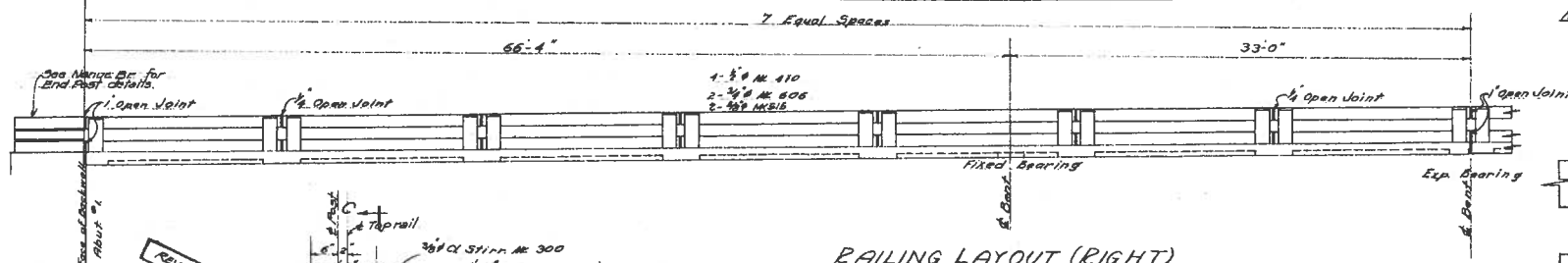
UMAUMA BRIDGE
Sta 100+4555 to 103+2555
Hawaii Belt Road S.D.P.-3(13)
May 1949

SHEET NO. 4 OF 12 SHEETS
546S.146

REV. 5-16-'81 : Railing Posts shortened 2".
Bottom Rail revised.

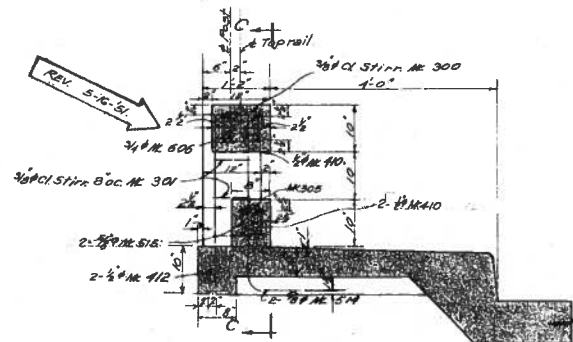


RAILING LAYOUT (RIGHT)

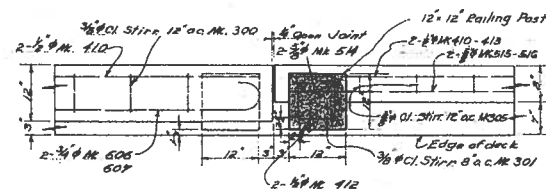


RAILING LAYOUT (RIGHT)

(Left Railing similar)

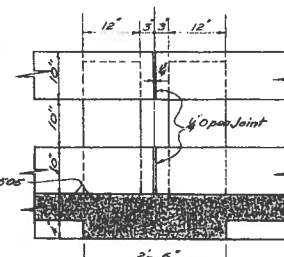


SECTION A-A

 $1^{\circ} = 1 \text{ FT}$ 

SECTION B-B

1. 15%



SECTION C-C

1.15

TERRITORIAL HIGHWAY DEPARTMENT
TERRITORY OF HAWAII

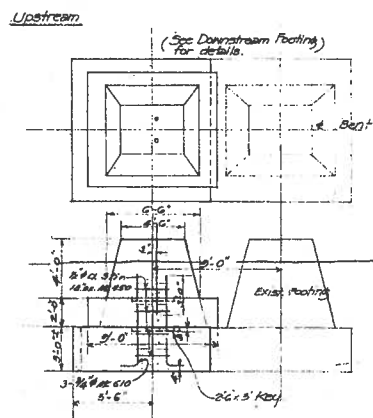
UMAUMA BRIDGE
Sta. 100+45.56 to 103+26.55
Hawaii Belt Road SDR-3(13)
March 1950

SHEET No. 5 OF 12 SHEETS

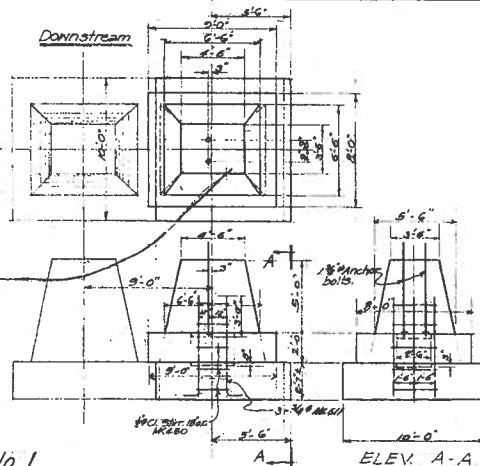
5468.14

1997

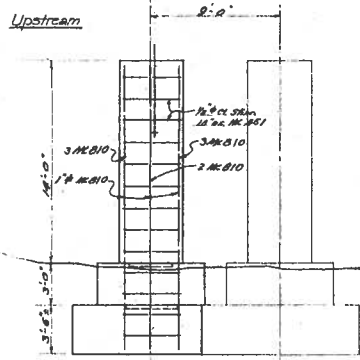
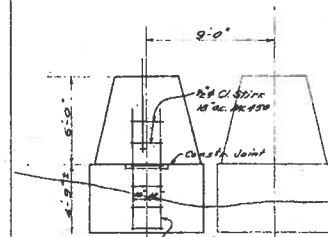
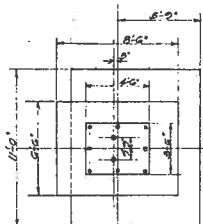
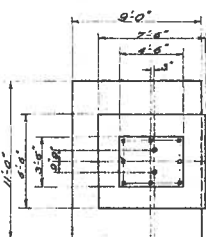
DESIGNED BY	W. H. HARRIS
CHECKED BY	J. H. HARRIS
APPROVED BY	J. H. HARRIS
DATE	1950



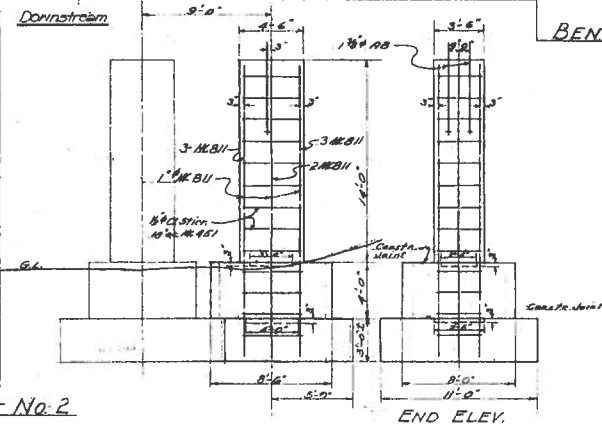
BENT No. 1
1/4" = 1'-0"



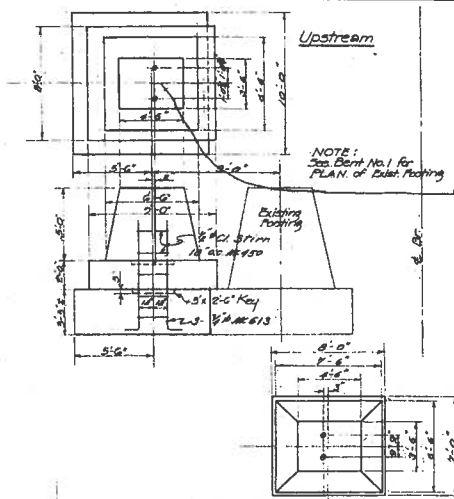
ELEV. A-A



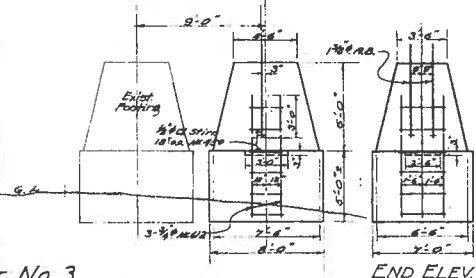
BENT No. 2



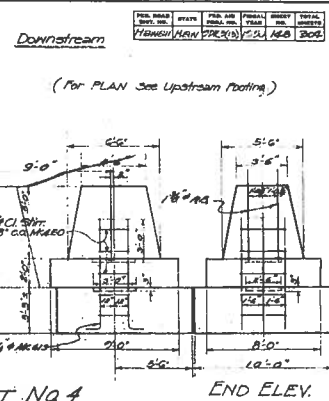
END ELEV.



BENT No. 3

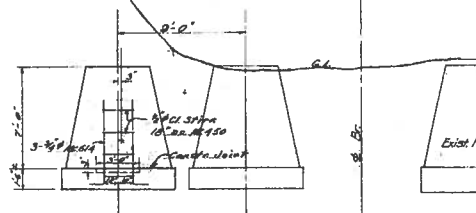


END ELEV.



BENT No. 4

END ELEV.



BENT No. 5

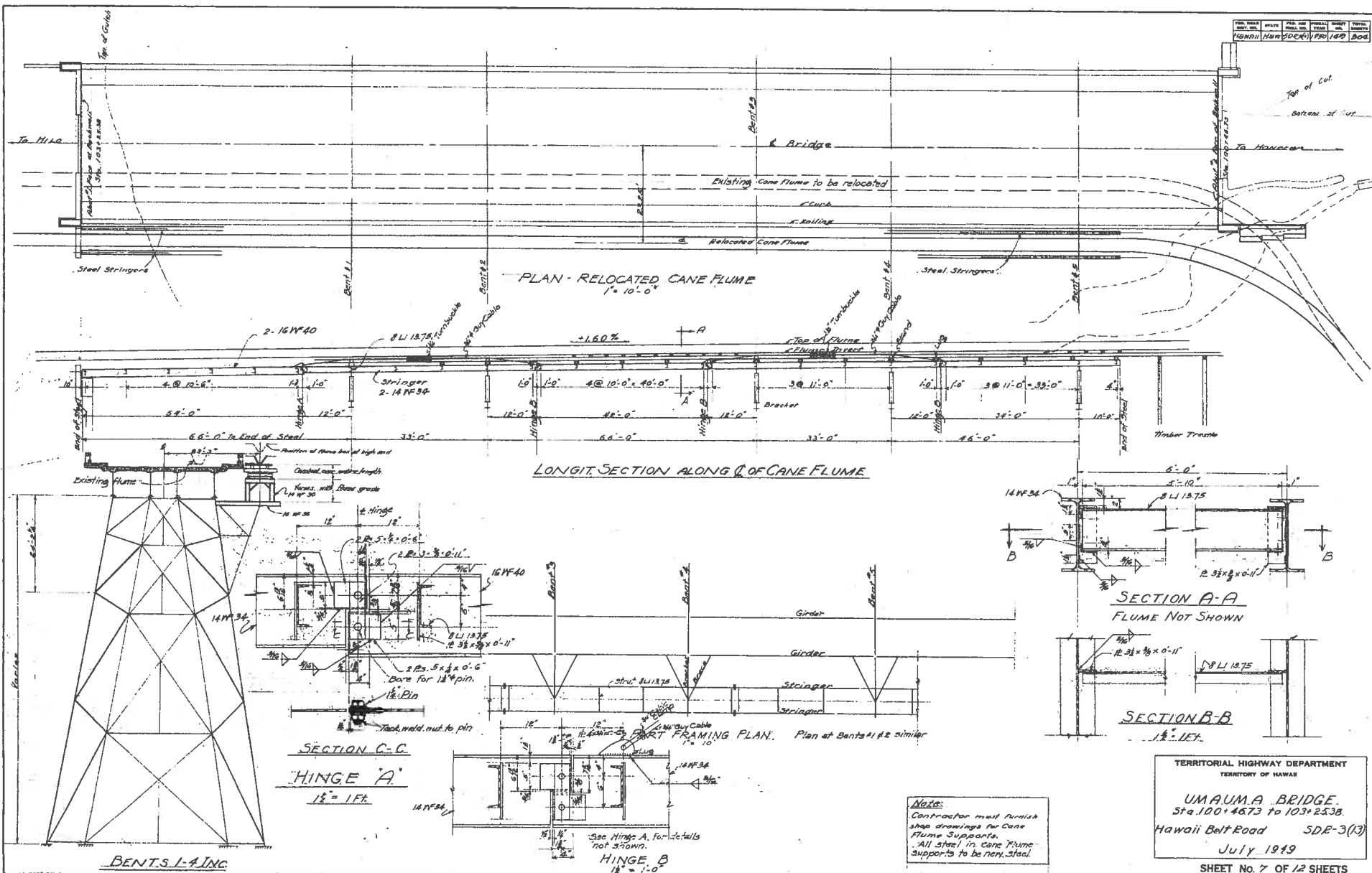
NOTE: All concrete in Piers to be Class B-2.

TERRITORIAL HIGHWAY DEPARTMENT
TERRITORY OF HAWAII
UMAUMA BRIDGE
Sta 100+45.56 to 103+26.48
Hawaii Belt Road SDR-3(13)
March 1950

SHEET No. 6 OF 12 SHEETS

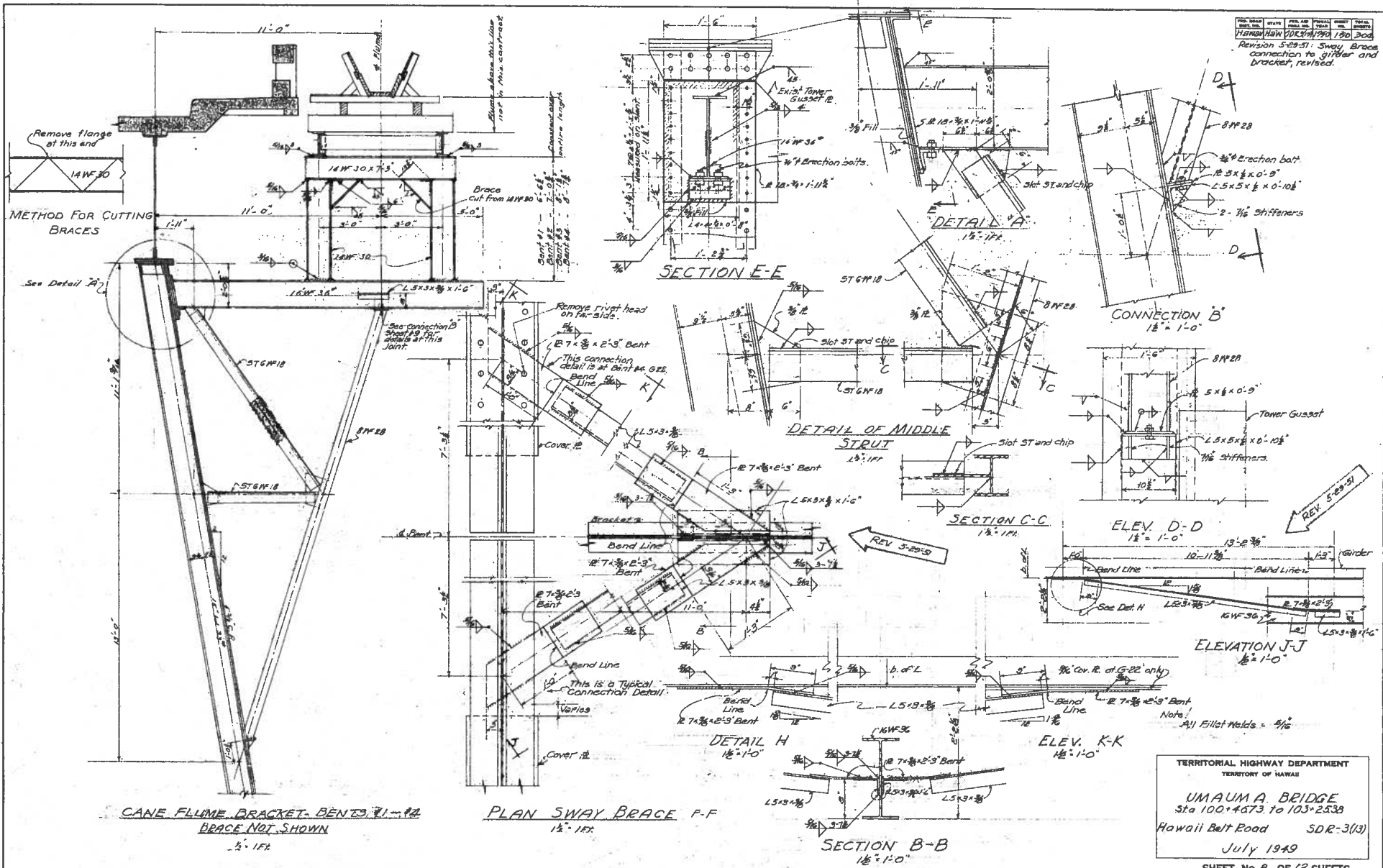
5468.148

REV.	DATE	BY	CHK.	APP.	REMARKS
1	7/1/19	W. J. [illegible]	[illegible]	[illegible]	Initial Design
2	7/1/19	[illegible]	[illegible]	[illegible]	Revised Design
3	7/1/19	[illegible]	[illegible]	[illegible]	Final Design



TERRITORIAL HIGHWAY DEPARTMENT
 TERRITORY OF HAWAII
UMAUMA BRIDGE
 Sta. 100+4673 to 103+2538
 Hawaii Belt Road SDE-3(13)
 July 1919

SHEET NO. 7 OF 12 SHEETS
5468.110

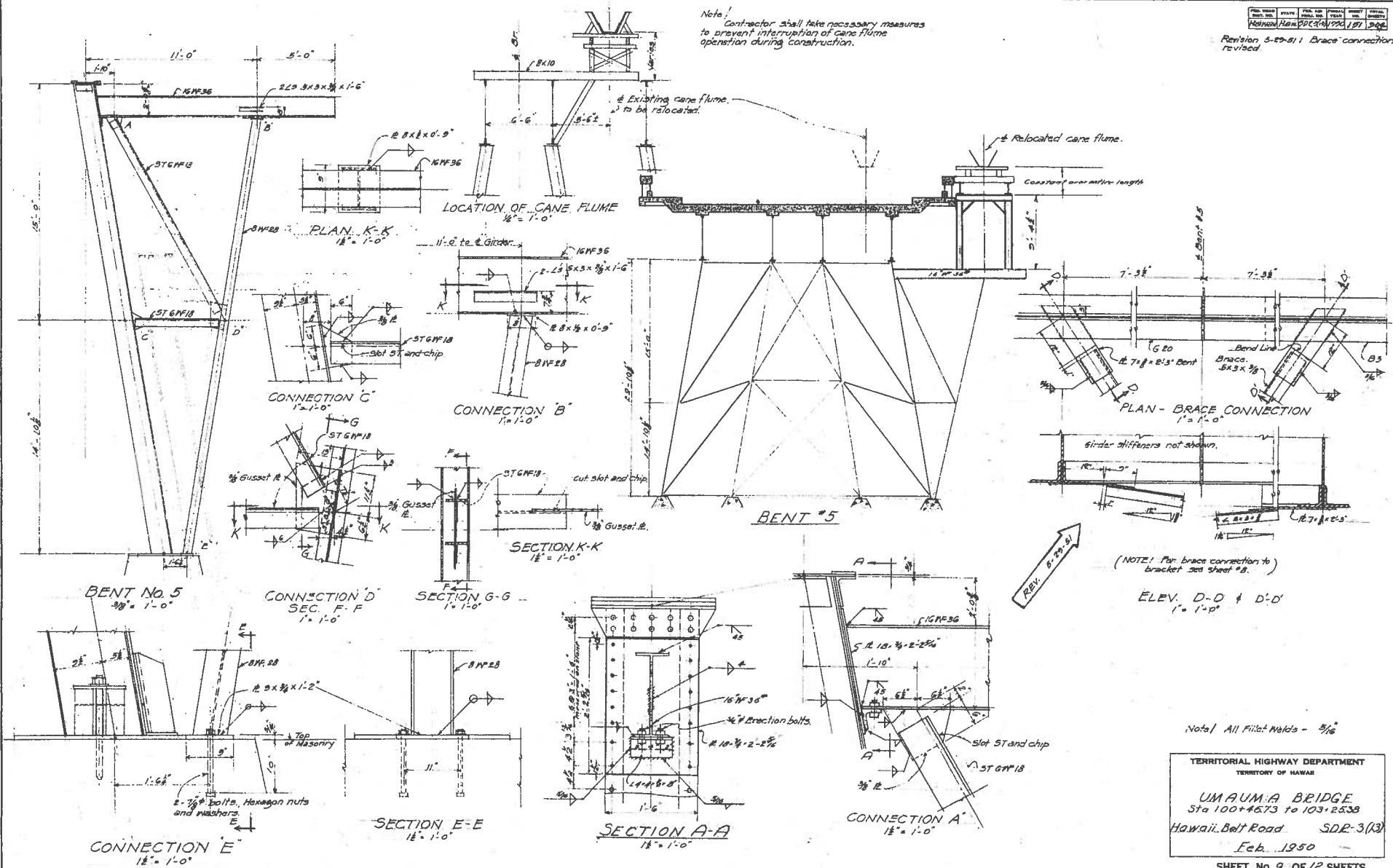


REVISION 5-29-51: Sway Brace connection to girder and bracket, revised.

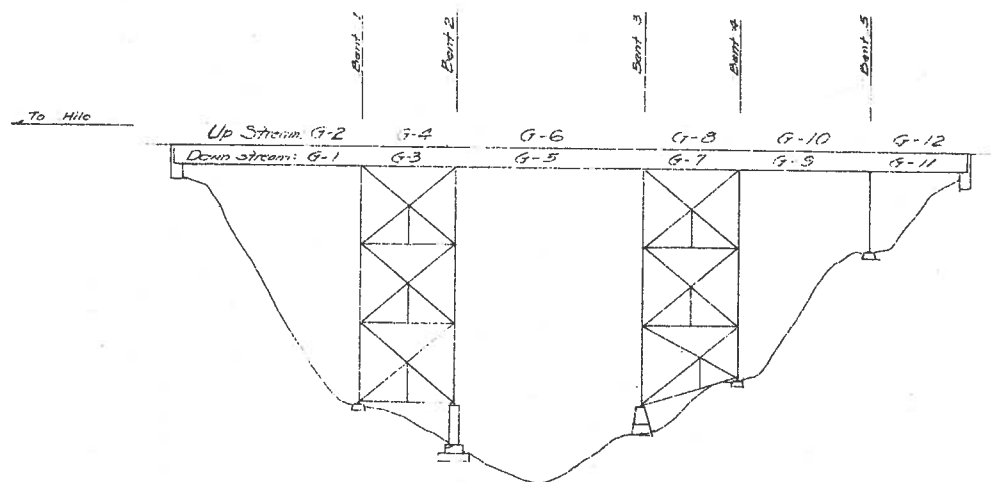
TERRITORIAL HIGHWAY DEPARTMENT
TERRITORY OF HAWAII
UMAUMA BRIDGE
Sta 100+673 to 103+2538
Hawaii Belt Road SDR-3(13)
July 1949

SHEET NO. 8 OF 12 SHEETS

5468.150



FILE NO.	STATE	FILE NO.	FILE NO.	FILE NO.	FILE NO.
100-100	100-100	100-100	100-100	100-100	100-100



ELEVATION - LOOKING UP STREAM

DESIGNED BY	DATE
CHECKED BY	DATE
APPROVED BY	DATE
REVISIONS	
1. AS NOTED	
2. AS NOTED	
3. AS NOTED	
4. AS NOTED	
5. AS NOTED	
6. AS NOTED	
7. AS NOTED	
8. AS NOTED	
9. AS NOTED	
10. AS NOTED	

Condition survey of Bridge

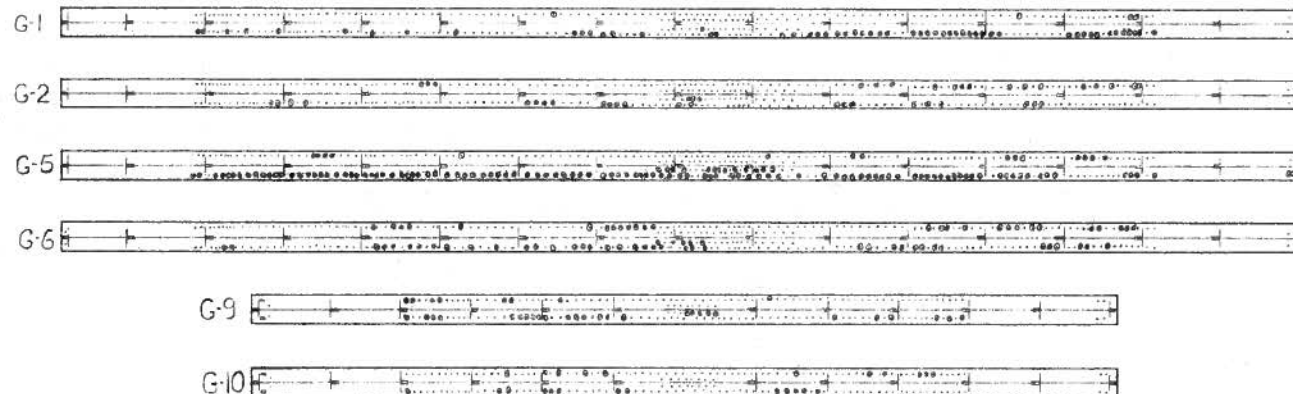
TERRITORIAL HIGHWAY DEPARTMENT
TERRITORY OF HAWAII
UMAUMA BRIDGE
Sta 100+45.56 to 103+26.58
HAWAII BELT ROAD SDR 3(10)
MAY 1950

SHEET No. 10 OF 12 SHEETS

5468.154

PLAN - BOTTOM FLANGE

TO HILO



SUMMARY OF RIVETS TO BE REPLACED

Dia.	Length	Grp.	No.	Qty.
3/8"	2 3/4"	1 1/2"	150	200
3/8"	3 1/4"	1 1/2"	155	200
3/8"	3 1/4"	2 1/2"	36	50
3/8"	4"	2 1/2"	17	30
3/8"	5 1/4"	3 1/4"	27	40

Use Last Col. Qty.
for estimating in
Contract

All Rivets and Bolts at base plates of girders
at Column connections on entire structure
must be replaced. (These are not shown)

Approximate no. of rivets for G-1 to
Girder Connection

Dia.	Length	Grp.	No.
3/8"	3"	1 1/2"	80

The top flanges rivets are not readily accessible
to inspection but they are assumed to be entirely bad
and should be figured on being replaced.
approximate quantities are:

Dia.	Length	Grp.	No.
3/8"	2 3/4"	1 1/2"	800
3/8"	3 1/4"	1 1/2"	350
3/8"	3 1/4"	2 1/2"	100
3/8"	4"	2 1/2"	180
3/8"	5 1/4"	3 1/4"	112

-Legend-

- (dot) indicates rivet
- o (circled dots) indicates condemned rivet

Girders not shown have no
cover plates - no rivets -

Condition survey of Bridge

TERRITORIAL HIGHWAY DEPARTMENT
TERRITORY OF HAWAII

UMAUMA BRIDGE

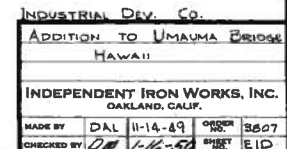
Sta 100+45.56 to 103+26.53

HAWAII BELT ROAD SDR 3(13)

MAY 1950

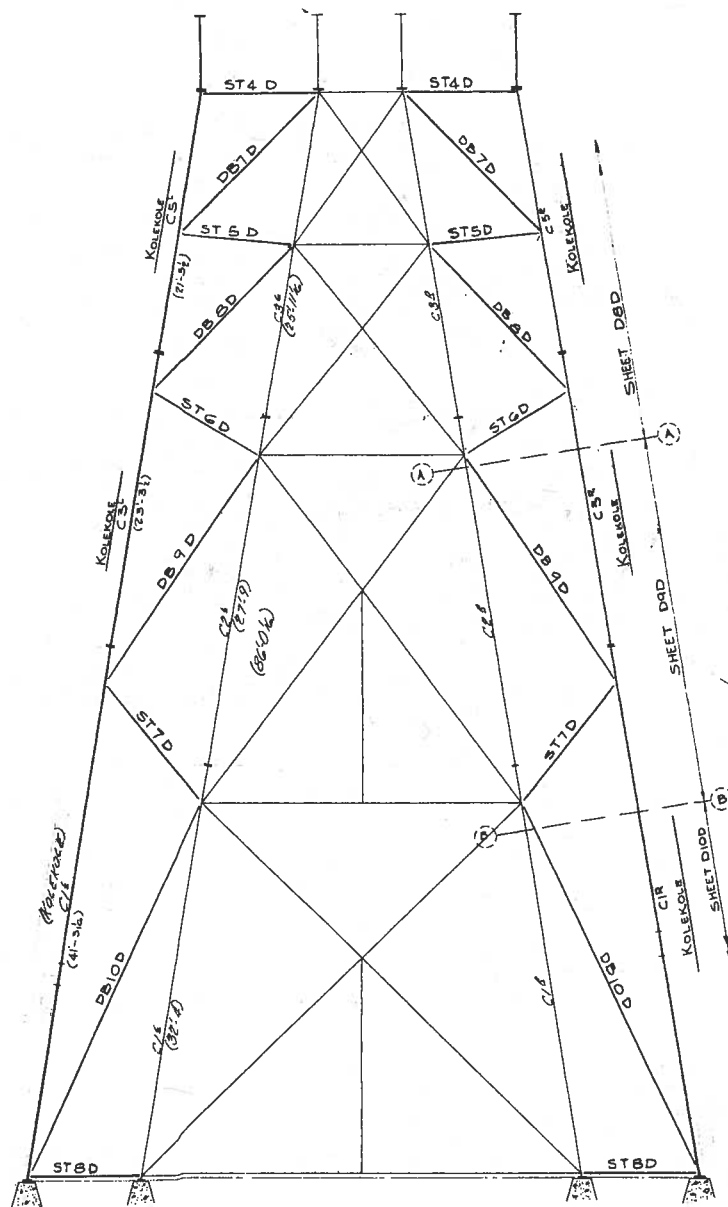
SHEET No. 12 OF 12 SHEETS

5468.154

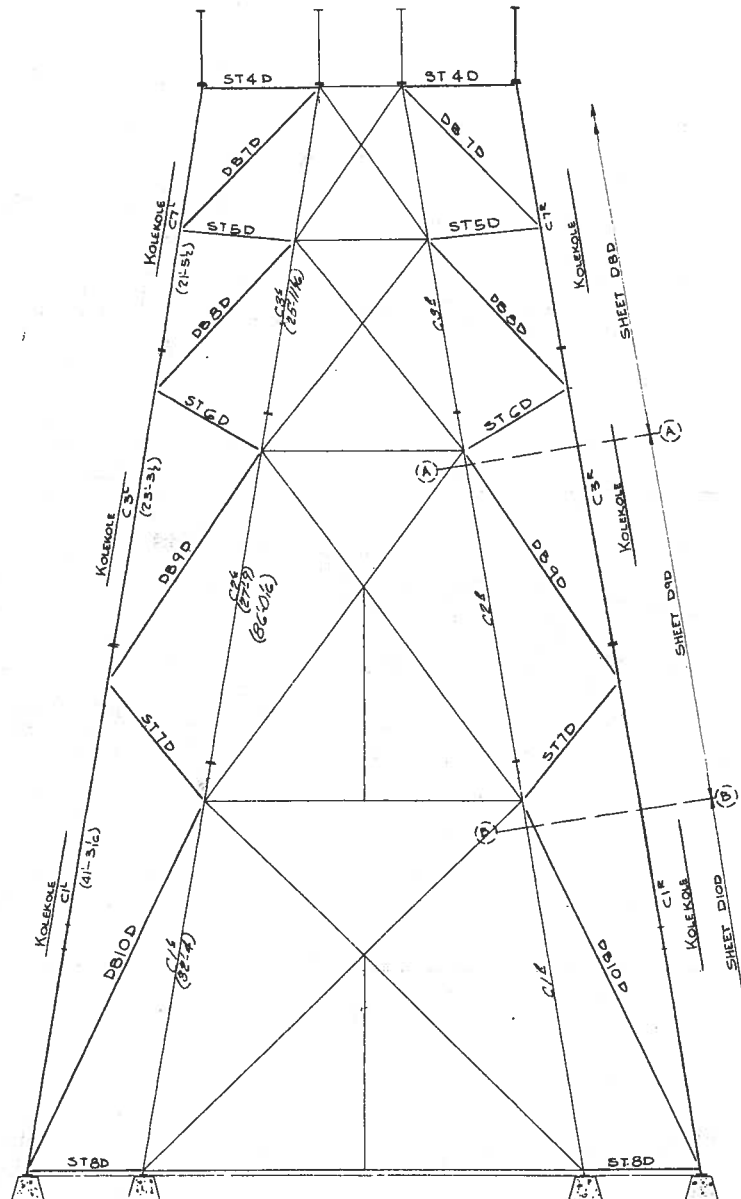


FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FED. PROJ. NO.	SHEET NO.	TOTAL SHEETS
HAWAII	HAWAII	DDC-49	156	156	208

Order No. 3807 Sheet No. EE-D



BENT #1
(LOOKING NORTH)



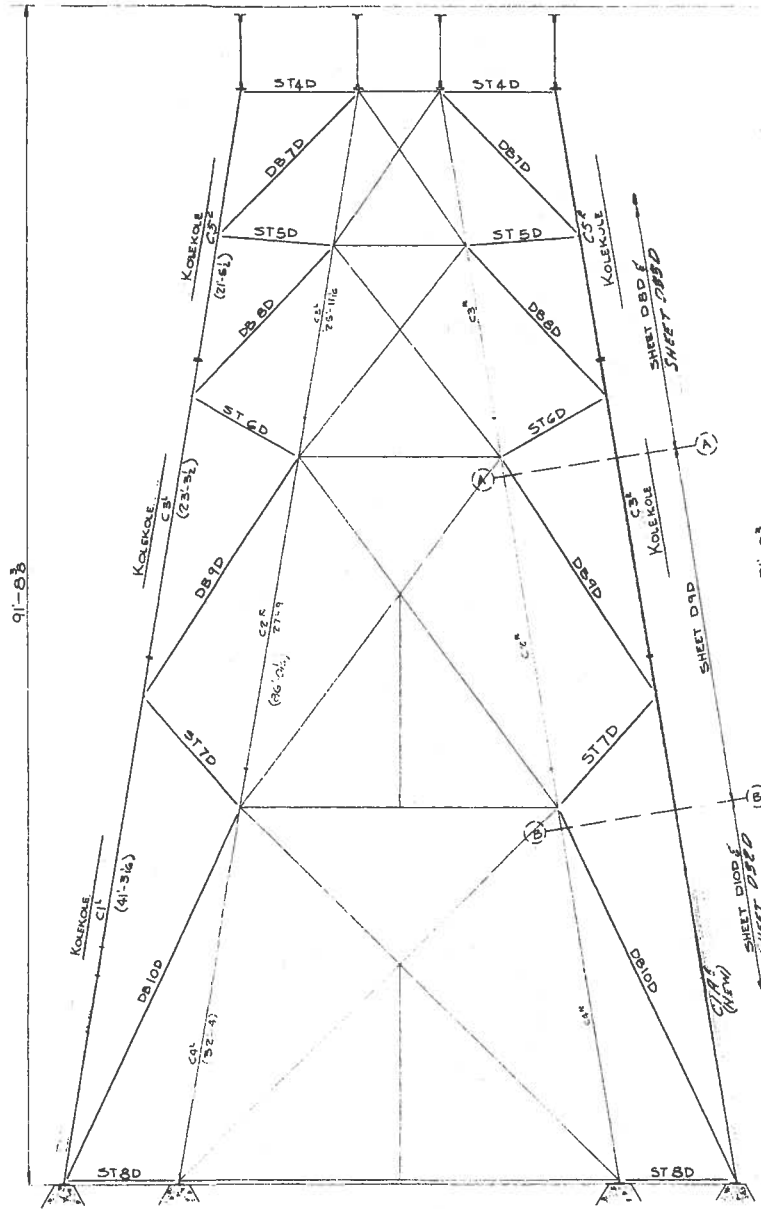
BENT #2
(LOOKING SOUTH)

Drawn: *9/8*
 Notes: *1/2" = 1' ED UN.*
 Plate:
 INDUSTRIAL DEK CO
 ADDITION TO THE LIMPUNAP
 BRIDGE - HAWAII -
 INDEPENDENT IRON WORKS, INC.
 OAKLAND, CALIF.
 MADE BY: *DD* 12-49 ORDER: *3807*
 CHECKED BY: *V-13-50* SHEET: *EE-D*

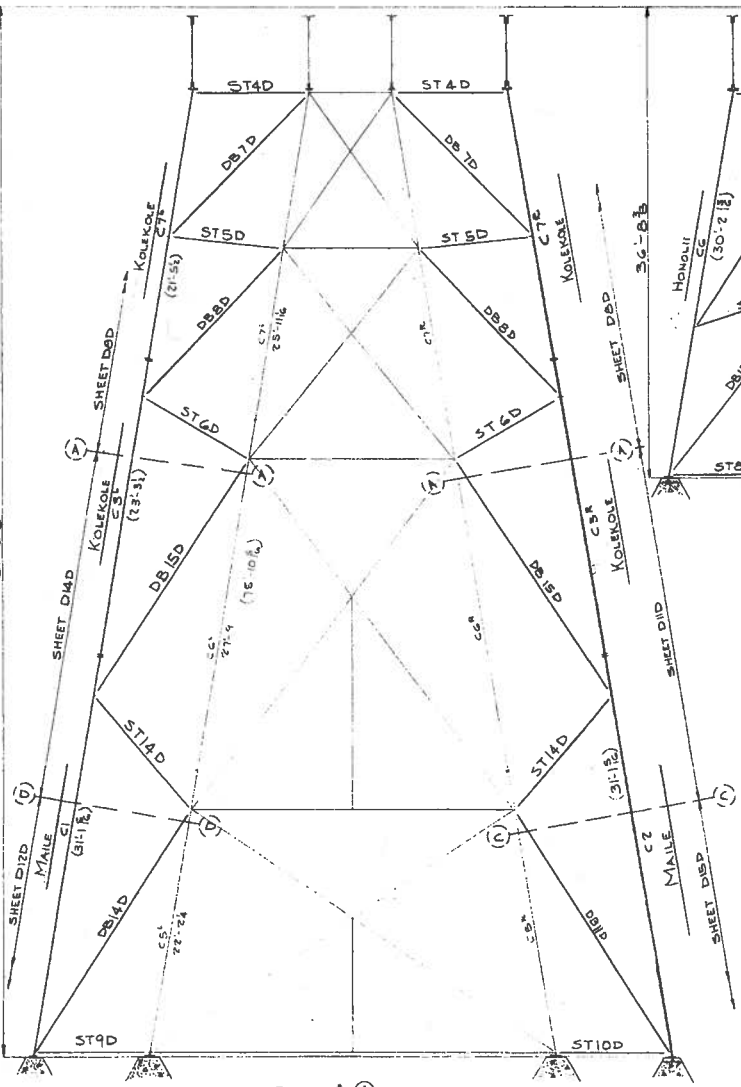
3468.156

FED. ROAD DIST. NO.	STATE	FED. AID FUND NO.	FISCAL YEAR	IN. 111' NO.
HAWAII	HAWAII	1000	197	308

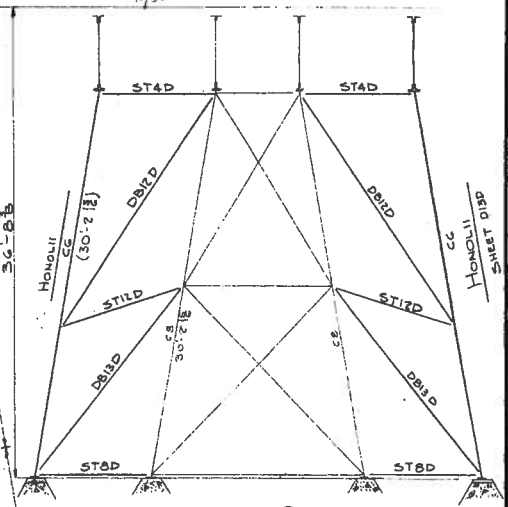
Order No. 3807 Sheet No. E3-D



BENT # 3
LOOKING NORTH



BENT # 4
LOOKING SOUTH



BENT # 5
LOOKING SOUTH

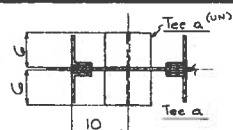
Notes: 3
Notes: 124 1/2 ED-UN.
Paint:
INDUSTRIAL DEV. CO.
ADDITION TO THE UMAUMA
BRIDGE - HAWAII.
INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.
MADE BY DAL 11-14-49 ORDER 3807
CHECKED BY DP 1-16-50 SHEET E3-D

5468.158

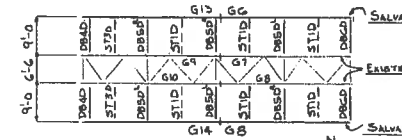
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	INVEST. NO.	TOTAL SHEETS
HAWAIIAN	HAWAII	202	1950	157	302

BILL OF MATERIAL

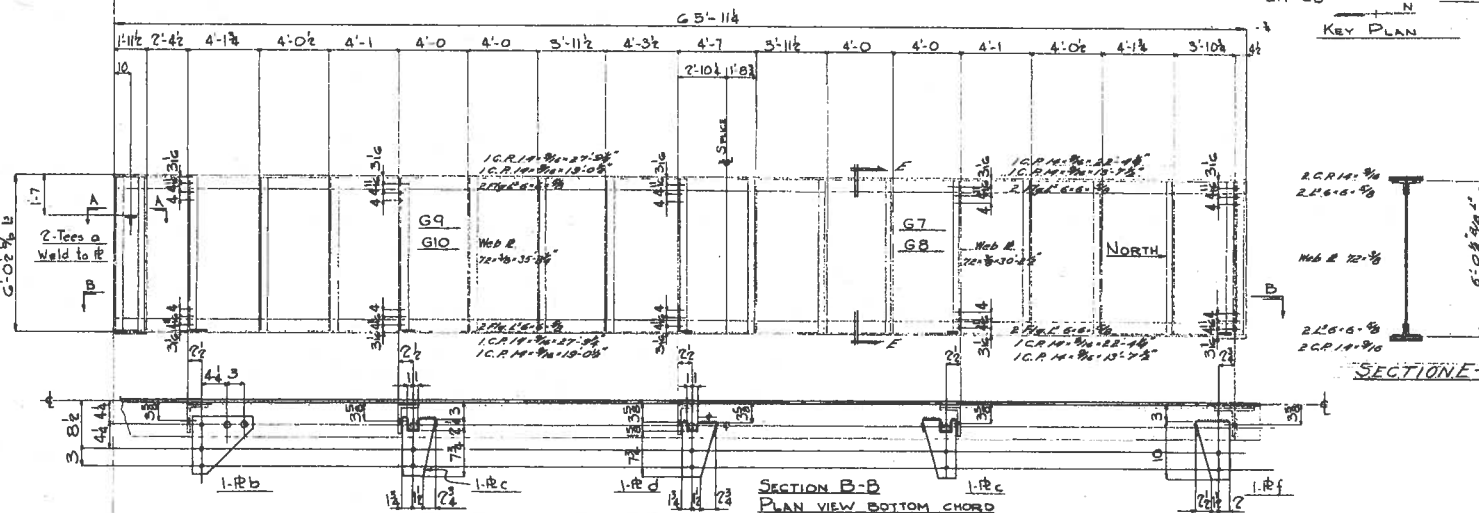
No.	Description	Length	Mark	REMARKS
2	EXISTING GIRDERS G10 & G8			REVAMP AS ON DET.
2	EXISTING GIRDERS G9 & G7			REVAMP AS ON DET.
2	SALVAGE GIRDERS G13 & G6			TO BE TAKEN FROM THE KOLEKOLE BRIDGE
2	SALVAGE GIRDERS G14 & G8			REVAMP AS ON DET.
6	ST. 6x6x10	0	a	Plan-New
4	R 10x4x10	0	b	Temp
4	R 6x4x10	0	c	
2	R 6x4x10	0	d	
2	R 6x4x10	0	e	
16	R 3x4x10	0	f	
4	R 5x4x10	0	g	
2	L 4x4x8	6	h	STSD SALVAGE SEE 3807D



SECTION A-A (ASB)

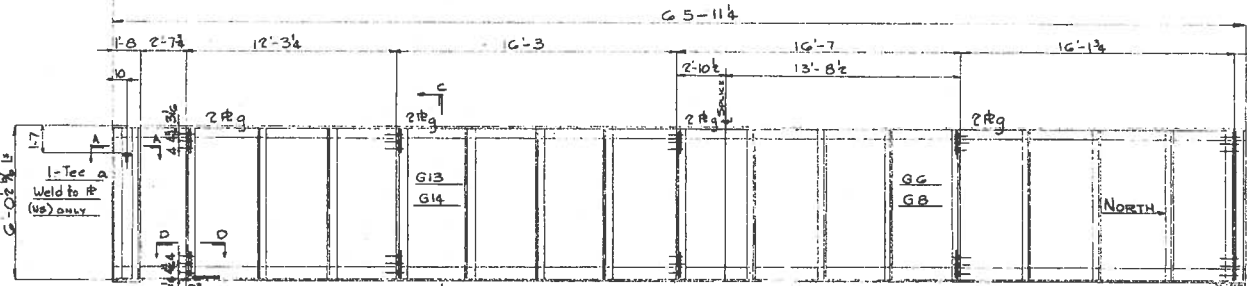


KEY PLAN



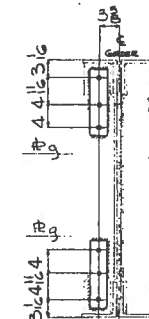
SECTION B-B
PLAN VIEW BOTTOM CHORD

REVAMP 2 EXISTING GIRDERS AS&N Mk. G10 & G8
REVAMP 2 EXISTING GIRDERS OH&N Mk. G9 & G7 } ONE EACH

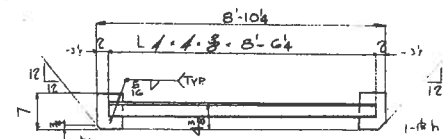


SECTION D-D

REVAMP 2 SALVAGE GIRDERS AS&N Mk. G13 & G6
REVAMP 2 SALVAGE GIRDERS OH&N Mk. G14 & G8 } FROM KOLEKOLE BRIDGE ONE EACH



SECTION C-C-TYP.



2 STRUTS RECD Mk. STSD

Shrink 3/4
Holes 1 1/2
Paint:

INDUSTRIAL DEV. CO.
ADDITION TO THE UMAUMA
BRIDGE - HAWAII

INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.
MADE BY DAL 11-15-49 ORDER 3807
CHECKED BY DB 1-5-50 DTD

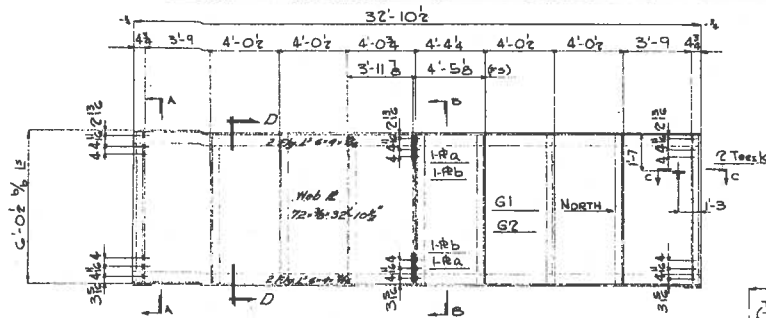
3468.159

PRO. NO.	DATE	PRO. BY	CHK. BY	DATE	TOTAL
160	11-16-49	11-16-49	11-16-49	11-16-49	160

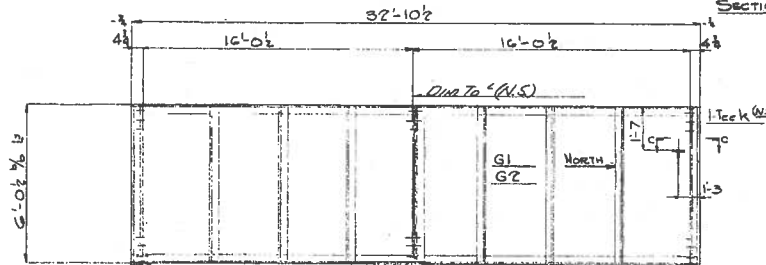
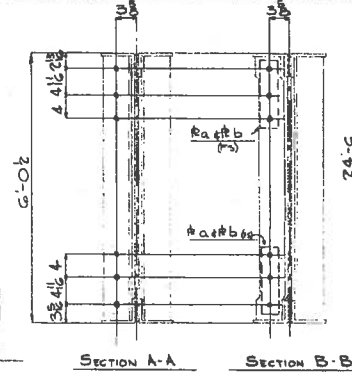
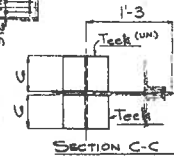
Order No. 3807 Sheet No. 020

BILL OF MATERIAL INCHES

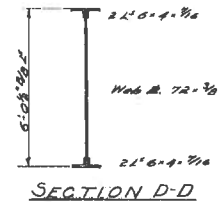
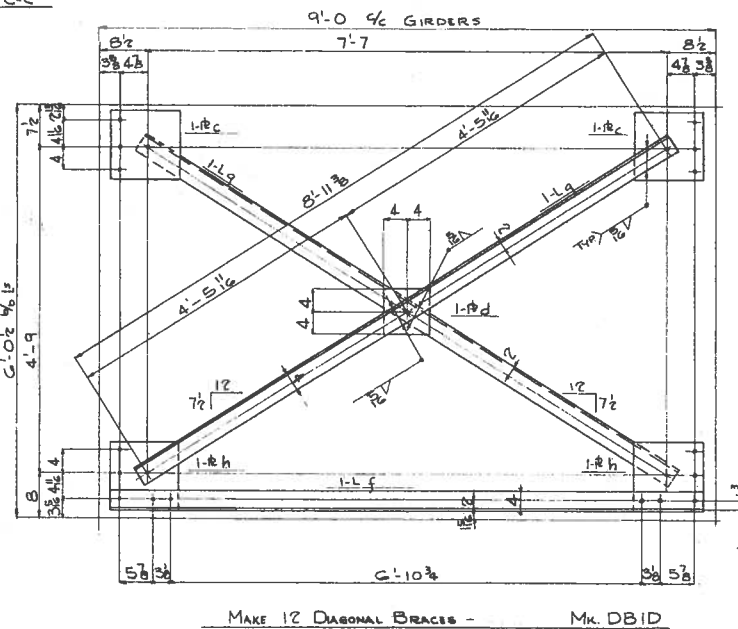
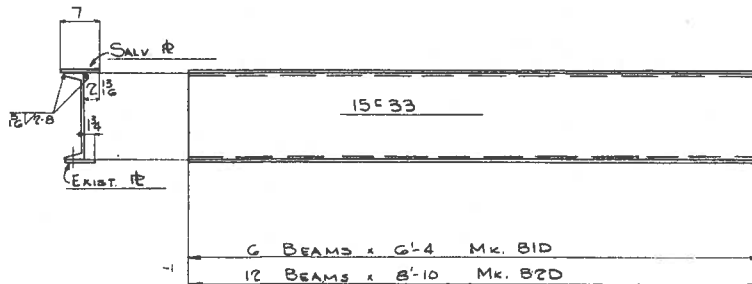
No.	Description	Length	Mark	REMARKS
4	EXISTING GIRDER G1			
	REVAMP AS ON DET.			
4	SALVAGE GIRDER G1			FROM THE KOLEMOLE BRIDGE
	REVAMP AS ON DET.			
8	# 3 x 1/2	0 1/2	a	TEMP NEW
8	# 3 x 1/2	0 1/2	b	
24	# 12 x 3	1 0	c	
12	# 8 x 3	0 8	d	
24	# 12 x 3	1 0	h	
12	STG 22#	0 6	k	Main
6	BEAMS	6 4	BID	
12	BEAMS	8 10	B2D	
	SALVAGE FROM COLUMNS			
	(SEE SHEET D7D)			
12	DIAG. BRACE	DBID		
22	L 1/2 x 3/8	8 10	STID	
	(PLAIN NOT PAINTED)			
12	L 1/2 x 3/8	8 7 1/2	f	
24	L 1/2 x 3/8	9 2 1/2	g	



REVAMP 2 EXISTING GIRDERS AS&N MK G2
REVAMP 2 EXISTING GIRDERS OH&N MK G1



REVAMP 2 SALVAGE GIRDERS AS&N MK G1 FROM THE KOLEMOLE BRIDGE
REVAMP 2 SALVAGE GIRDERS OH&N MK G2



Reverts: 7/8
Reverts: 1/2
Paint:

INDUSTRIAL DEV. CO.
ADDITION TO THE UMAUMA
BRIDGE - HAWAII
INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.
MADE BY DAL 11-16-49 ORDER 3807
CHECKED BY 11-16-49 SHEET 020

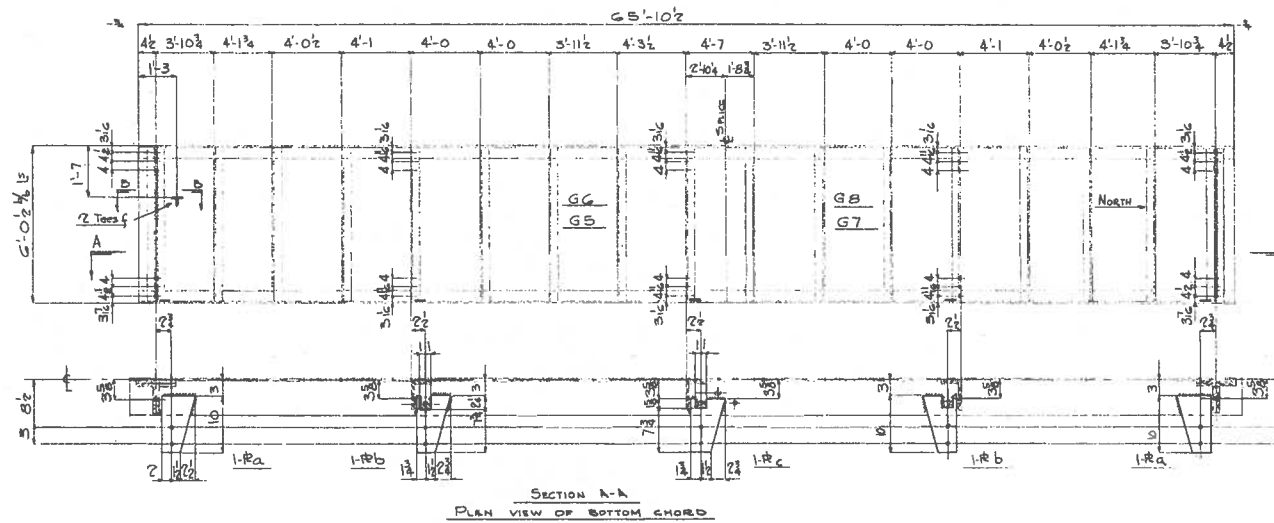
5468.160

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FED. AID DIST. NO.	FED. AID SUB-DIST. NO.	TOTAL SHEETS
HAWAII	HAWAII	11	1	1	304

Order No. 3807, Sheet No. 030

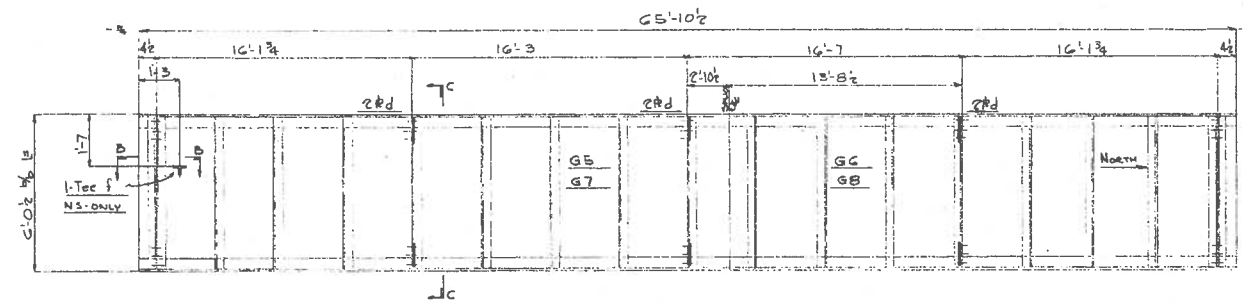
BILL OF MATERIAL INDUS. DEVL. CO.

No.	Description	Length Ft.	Mark	REMARKS
2	EXISTING GIRDERS G6 & G8			
	REVAMP AS ON DETL.			
2	EXISTING GIRDERS G5 & G7			
	REVAMP AS ON DETL.			
2	SALVAGE GIRDERS G5 & G6			TO BE TAKEN FROM THE KOLEKOLE BRIDGE
	REVAMP AS ON DETL.			
2	SALVAGE GIRDERS G7 & G8			TO BE TAKEN FROM THE KOLEKOLE BRIDGE
	REVAMP AS ON DETL.			
4	PLATE 6x8	0 10	a	Temp New
4	PLATE 6x8	0 10	b	
2	PLATE 6x8	0 9	c	
12	PLATE 3x4	0 11	d	
6	STG. 225	0 6	f	Plain

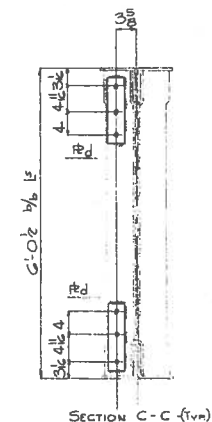


SECTION A-A
PLAN VIEW OF BOTTOM CHORD

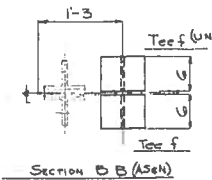
REVAMP 2 EXISTING GIRDERS A5 & N Mk. G6 & G8 } ONE EACH
REVAMP 2 EXISTING GIRDERS OH & N Mk. G5 & G7 } ONE EACH



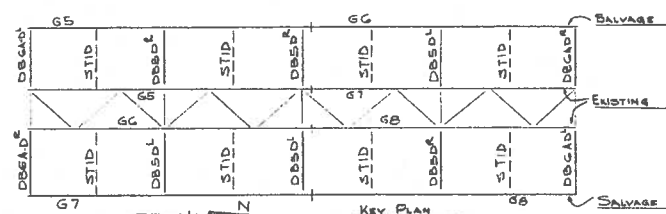
REVAMP 2 SALVAGE GIRDERS A5 & N Mk. G5 & G6 } FROM KOLEKOLE BRIDGE
REVAMP 2 SALVAGE GIRDERS OH & N Mk. G7 & G8 } ONE EACH



SECTION C-C (typ)



SECTION B-B (As Shown)



KEY PLAN

Notes: 3b
Notes: 1/2b
Notes:

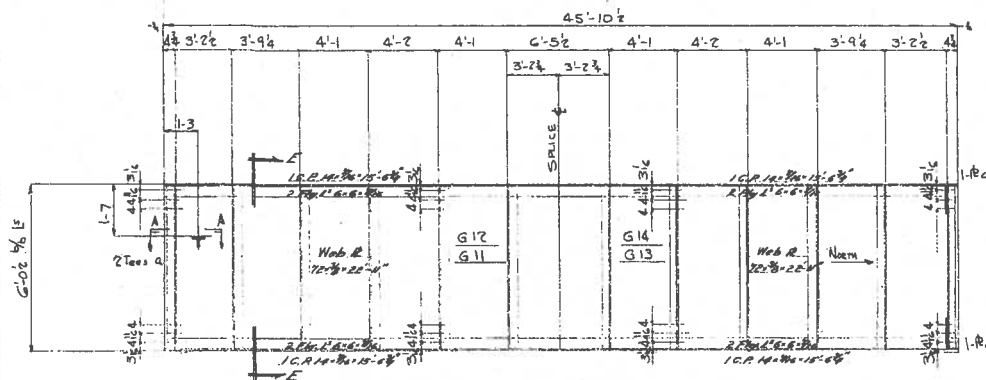
INDUSTRIAL DEVELOPMENT CO.
ADDITION TO UMAUMA BRIDGE
HAWAII
INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.
MADE BY DAL 11-17-49 ORDER NO. 3807
CHECKED BY DB 1-6-50 1187 D30

3468.161

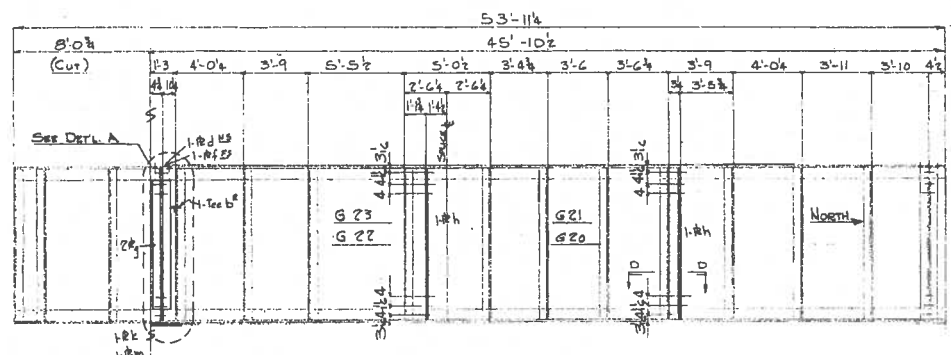
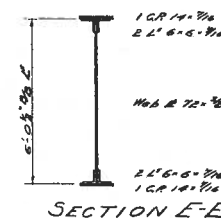
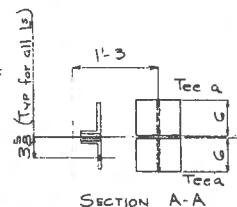
PRO. NO.	DATE	PRO. AID	PRO. AID	PRO. AID	PRO. AID
HAWAII	1/10/62	1/10/62	1/10/62	1/10/62	1/10/62

BILL OF MATERIAL

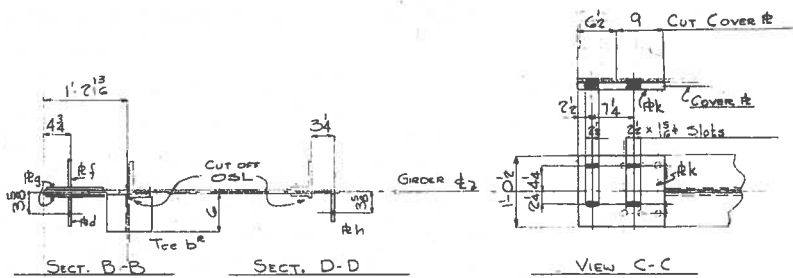
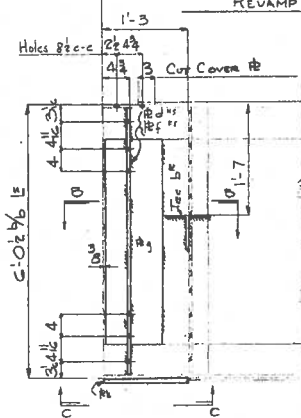
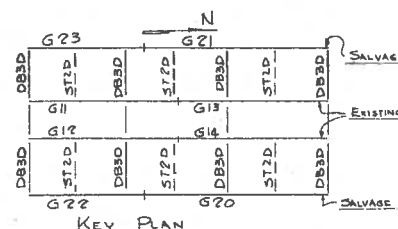
No.	Description	Length	Mark	REMARKS
2	EXISTING GIRDERS G12&G14			
2	REVAMP AS ON DET'L			
2	EXISTING GIRDERS G13&G15			
2	REVAMP AS ON DET'L			
2	SALVAGE GIRDERS G23&G21			FROM THE
2	REVAMP AS ON DET'L			KNOWLEDGE
2	SALVAGE GIRDERS G20&G22			BRIDGE
2	REVAMP AS ON DET'L			
4	Tee 6x2 1/2	0	G	Plain New
2	Tee 6x2 1/2	0	G	Temp
4	R 3x 1/2	0	11	Do
2	R 4x 1/2	5	11	Do
2	R 4x 1/2	5	11	Plain
4	R 10x 1/2	5	04	Plain
4	R 5x 1/2	5	11	h
2	R 18x 1/2	1	3	k



REVAMP 2 EXISTING GIRDERS AS&N MK G12&G14 } ONE EACH
REVAMP 2 EXISTING GIRDERS OH&N MK G13&G15 } ONE EACH



REVAMP 2 SALVAGE GIRDERS AS&N MK G23&G21 } FROM THE KOLE KOLE
REVAMP 2 SALVAGE GIRDERS OH&N MK G20&G22 } BRIDGE - ONE EACH

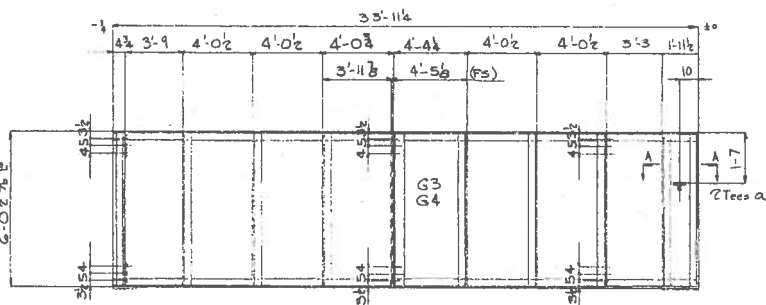


NOTE:
PLUG WELD ALL EXISTING HOLES BEFORE COVERING
WITH FILL R'S OR SOLE R'S.

Revised: 7/4
Holes: 12 x 1/4
Paint:

INDUSTRIAL DEVELOPMENT CO.
ADDITION TO UMAUMA BRIDGE
HAWAII
INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.
MADE BY: DAL 11-10-62
CHECKED BY: DE 1/6/62
DESIGN: 3807
DRAWN: D4D

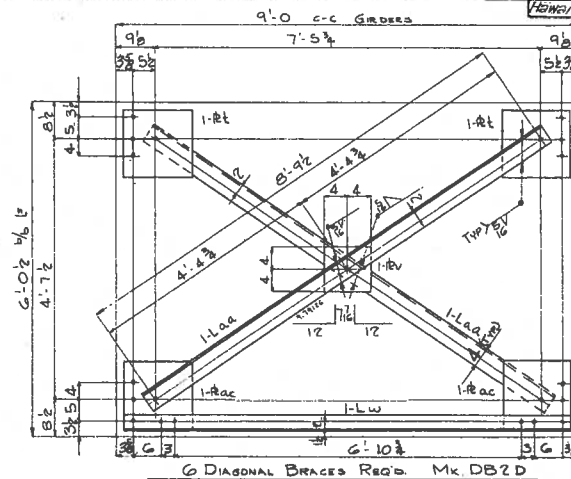
5468.162



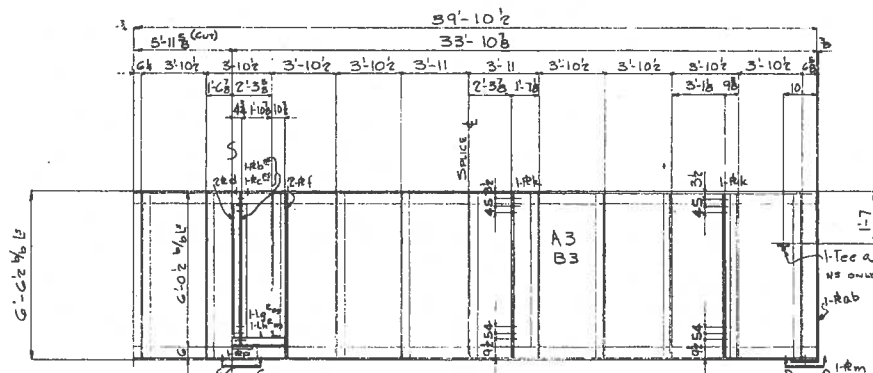
ALL NEW HOLES ARE 3/8" OFF & A.S.

REVAMP ONE EXISTING GIRDER --- A.S. & N. MK. G4

REVAMP ONE EXISTING GIRDER --- O.H. & N. MK. G3



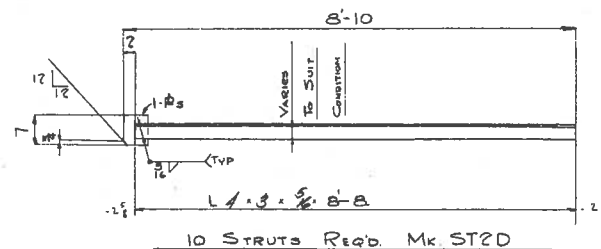
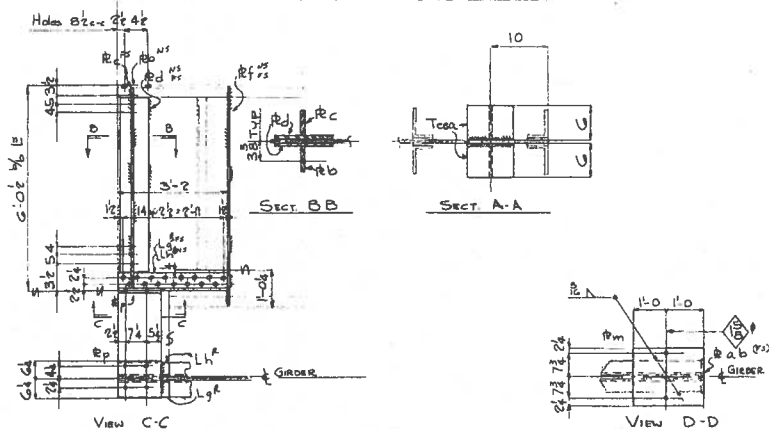
G DIAGONAL BRACES REQ'D MK. DB2D



REVAMP ONE SALVAGE GIRDER --- A.S. & N. MK. A3

REVAMP ONE SALVAGE GIRDER --- O.H. & N. MK. B3

FROM KAULA BRIDGE



Notes: 3/8"
Holes: 1/8" & 1/4"
Paint:

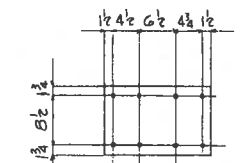
INDUSTRIAL DEVELOPMENT CO.
ADDITION TO UNAUMA BRIDGE
HAWAII

INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY DAL 11-21-49 ORDER 3807
CHECKED BY DE 1-6-50

BILL OF MATERIAL					INDUSTRIAL DEVELOPMENT
No.	Description	Length	Mark	REMARKS	
2	EXISTING GIRDERS G3 & G4				
	REVAMP AS ON DET'L				
2	SALVAGE GIRDERS A3 & B3			SALV. FROM KAULA BRIDGE	
	REVAMP AS ON DET'L				
6	Tee 6W28	0	G	a	Plain New
2	R 4 1/2 x 3	5	11	b	
2	R 4 1/2 x 3	5	11	c	Plain
4	R 10 x 8	5	28	d	Plain
4	R 5 x 8	6	58	f	
2	L 6 x 6 x 3/8	3	2	g	
2	L 6 x 6 x 3/8	3	2	h	
4	R 5 x 8	6	58	k	
2	R 20 x 8	2	0	m	Temp
2	R 12 x 3	1	3	p	Temp
10	R 5 x 3	0	7	j	
12	R 12 x 3	1	0	i	Temp
6	R 8 x 8	0	8	v	Temp
2	R 11 x 8	6	61	ab	Plain
12	R 12 x 3	1	0	ac	Temp
6	Diag. Braces			DB2D	
10	L 4 x 3 x 3/8	8	8	ST2D	
6	L 4 x 3 x 3/8	8	7 1/2	w	
12	L 4 x 3 x 3/8	9	0 1/2	aa	

3468.163



$\frac{1}{2}$ 4 1/2 6 4 8 6
 $\frac{1}{2}$ 8 6 $\times \frac{15}{16}$ Slot
 $\frac{1}{2}$ 1 3/8 2

Diagram of a beam with three supports. The beam is divided into two equal spans of length l . The left support is labeled $2b \ 4 \ 3$ and the right support is labeled $3 \ 4 \ 2b$. The beam is supported by three vertical columns. The beam is labeled $b.d$ at the bottom.

SECTION A-A FOR DBAD

A cross-section diagram of a road. The road surface is sloped at 12% (labeled as 12/12 TYP). The total width of the road is 7'-1". The width of the paved area is 3'-4 1/8". The width of the shoulder is 3'-0". The diagram also shows a 12% slope on the shoulder. The road is labeled "ROAD" and "OTHERS".

SECTION A-A FOR DB5DL

Diagram of a continuous beam with three supports. The beam is divided into two equal spans of 7.1 units each. The total length is 14.2 units. The beam is labeled "6B 3" at both ends. The supports are labeled "3" and "3". The beam is labeled "2" at the left end. The beam is labeled "(FOR DBGD - Lq)" and "(FOR DBGD - Lm)" below the spans.

SECTION AA FOR DB 6D & DB 6AD^R

Rivets: 7 ϕ
Holes: 13 ϕ U.N.
Paint:

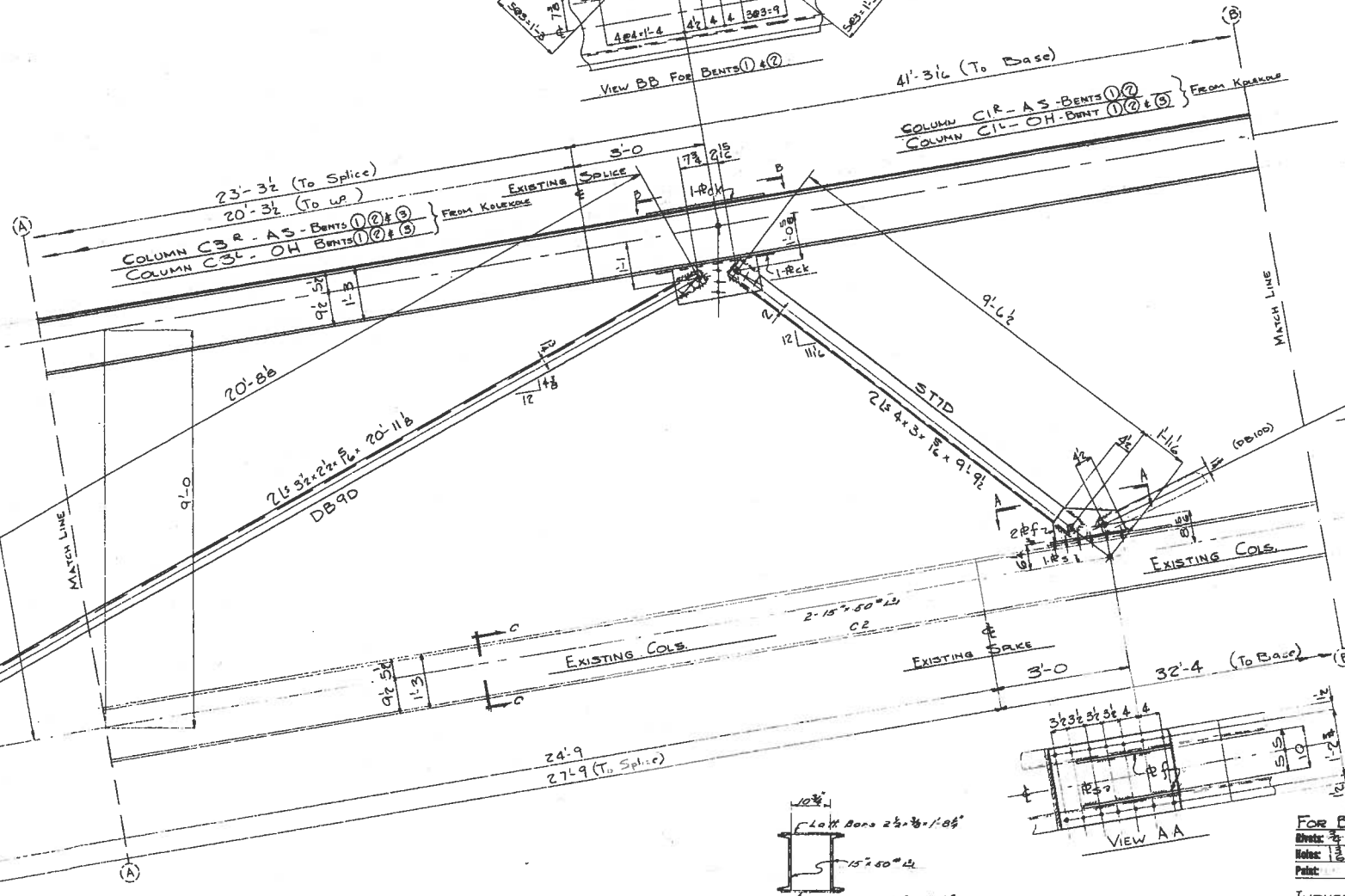
INDUSTRIAL DEVELOPMENT CO.
ADDITION TO UMAUMA BRIDGE
HAWAII

INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY	DAL	11-23-49	ORDER NO.	3807
CHECKED BY	DP	1-6-50	SHEET NO.	060

5468.164

11/8/50



ELEVATION AT RIGHT SIDE OF
BENTS ① & ③ LOOKING NORTH & of
BENT ② LOOKING SOUTH

FOR BILL OF MAT'L. SEE DIOD

Divs: 2
Notes: 1
Paint: 1

INDUSTRIAL DEVELOPMENT CO.
ADDITION TO UMAUMA BRIDGE
HAWAII

INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY	DAL	12-6-49	CHECKED NO.	5807
CHECKED BY	DP	1-13-50	SHEET NO.	090

100

65-16634-34 10

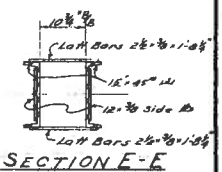
SECTION C-C

5468.165

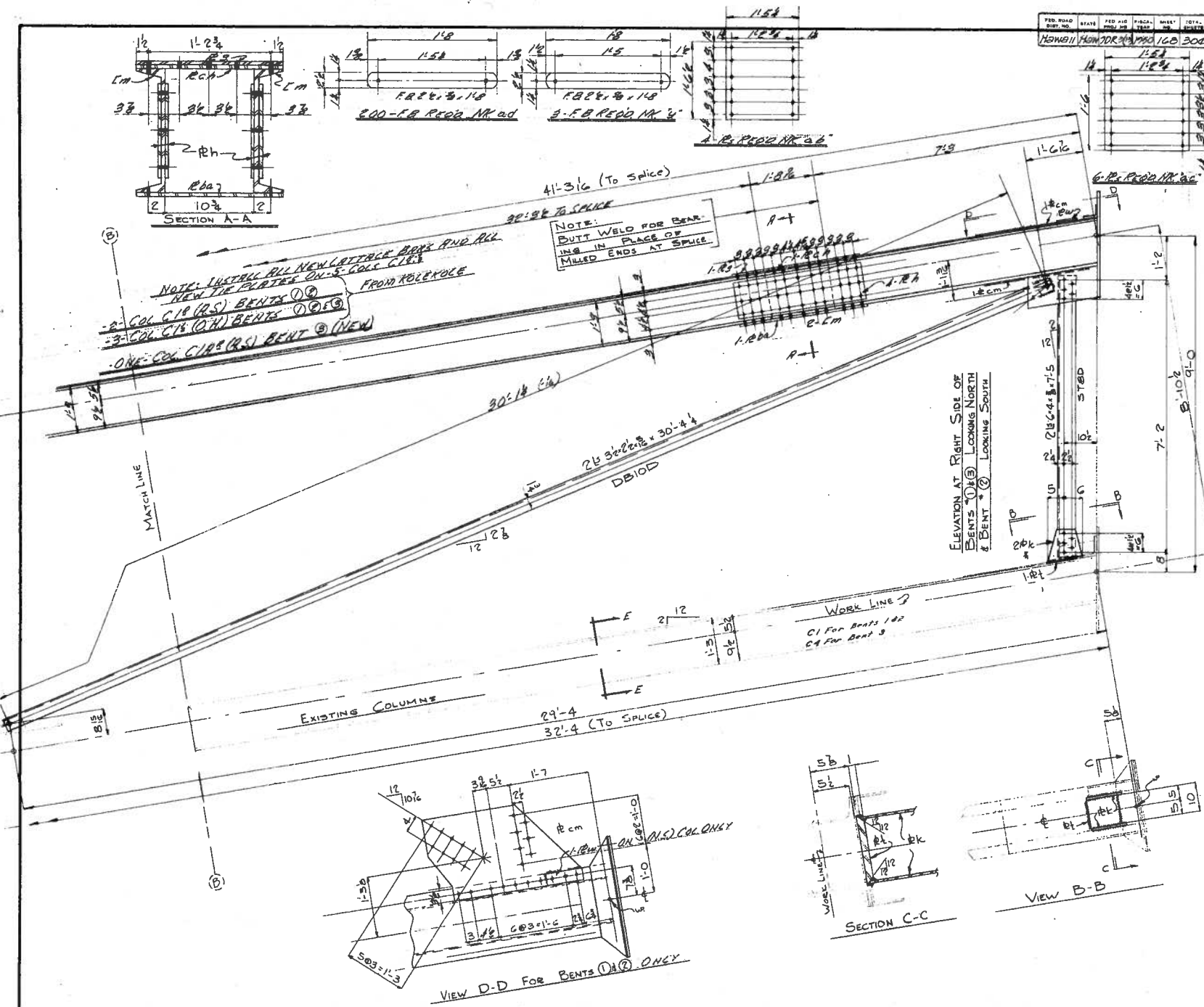
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAWAII	7DR-1190	1960	100	300

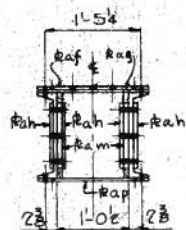
BILL OF MATERIAL					INDUS. DEV. CO.
No.	Description	Length	Mark	REMARKS	
4	COLUMNS		C78	KOLEMOLE	
2	Do		C58	Do	
10	Do		C38	Do	
5	COLUMNS		C115	KOLEMOLE	
10	STRUT	7 5/8	STAD		
8	Do	7 3	STSD		
8	Do	7 7	STGD		
6	Do	9 4/5	STTD		
8	Do	7 5	STSD		
6	R 8 1/2 x 8	0 8 1/2	w	TEMP NEW	
8	DIAG BRACE	13 0	DBTD		
8	Do	14 5/8	DBSD		
6	Do	20 11/8	DBTD		
6	Do	30 4 1/2	DBTD		
5	R 11 1/2 x 8	9 7 1/2	ba		
4	R 17 1/2 x 8	1 4 1/2	ab	TEMP NEW	
6	R 17 1/2 x 8	1 6	ac		
16	R 11 1/2 x 8	1 0 1/2	a	Temp New	
16	R 9 x 8	1 8 1/2	b	Do	
8	R 17 1/2 x 8	1 8 1/2	c		
12	R 9 x 8	1 7 1/2	d		
5	R 11 1/2 x 8	3 7 1/2	g		
20	R 11 1/2 x 8	3 7 1/2	h		
12	R 11 x 8	0 11	k		
10	R 11 x 8	1 8 1/2	m		
8	R 17 1/2 x 8	1 6	p		
6	R 17 1/2 x 8	2 0 1/2	s		
6	R 9 x 11	0 10 1/2	t	Plain	
5	R 13 x 8	1 8 1/2	ch	TEMP	
200	FACE PLATE	1 8	ad	Do	
8	R 21 1/2 x 8	1 8	y	Do	
8	R 21 1/2 x 8	3 4 1/2	ck	TEMP	
8	R 20 1/2 x 8	3 0	cm	Do	

NOTES: SEE SHEETS D10D-D30D INC. FOR DETAILS OF DIAG BRACES & STRUTS.

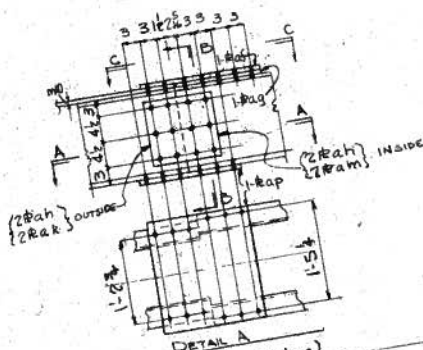


Revised: 3
 Notes: 12 x 12 EDUN.
 Paint:
 INDUSTRIAL DEVELOPMENT CO
 ADDITION TO UHAMA BRIDGE
 HAWAII
 INDEPENDENT IRON WORKS, INC.
 OAKLAND, CALIF.
 MADE BY: DAL 12-7-49 ORDER: 3807
 CHECKED BY: DE 1-19-50 SHEET: D10D

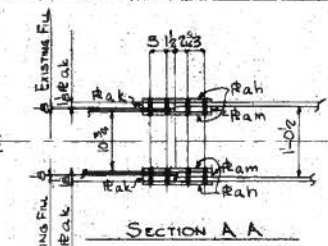




SECTION BB

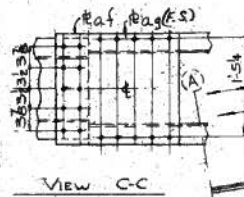


DETAIL A
23'-3/8 (To Splice)
20'-9/8 (To up)



SECTION A A

NOTE: SPICE IS TO BE BUTT
WELDED IN PLACE OF MILD
STEEL



VIEW C-C

COL. C3 FROM KOLEKOLE

COL. C2 FROM MAILE

MATCH LINE 7

MATCH LINE 2

ELEVATION AT RIGHT SIDE OF
BENT 4 LOOKING SOUTH

20'-8/8

DBSD
23'-3/8 x 24'-1/8, 20'-11/8

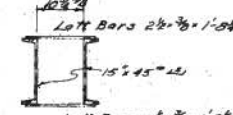
STHD
23'-4 x 3'-1/8 x 9'-9/8

EXISTING COLS

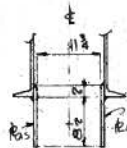
EXISTING COLS

EXISTING SPACE

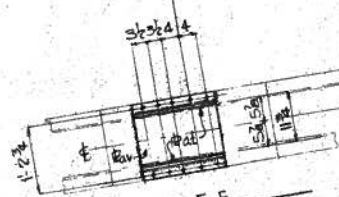
24'-9
27'-9 (To Splice)



SECTION F-F



SECTION D-D



VIEW E-E

FOR BILL OF MATL. SEE D15D
Drawn by: CH
Revised by: CH
Checked by: CH

INDUSTRIAL DEVELOPMENT CO
ADDISON TO UHAINA BRIDGE
HAWAII

INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY: CAL 12-4-50
CHECKED BY: CH 1-10-50

5468.169

BILL OF MATERIAL INDUS. DEV

ELEVATION AT RIGHT SIDE OF
BENT #4 LOOKING NORTH

Rivets: $\frac{5}{4}$
Holes: $1\frac{3}{4}$
Paint:

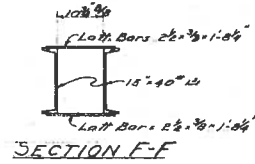
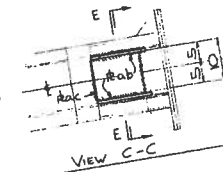
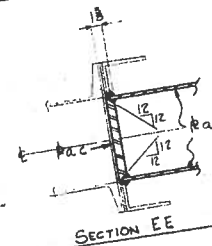
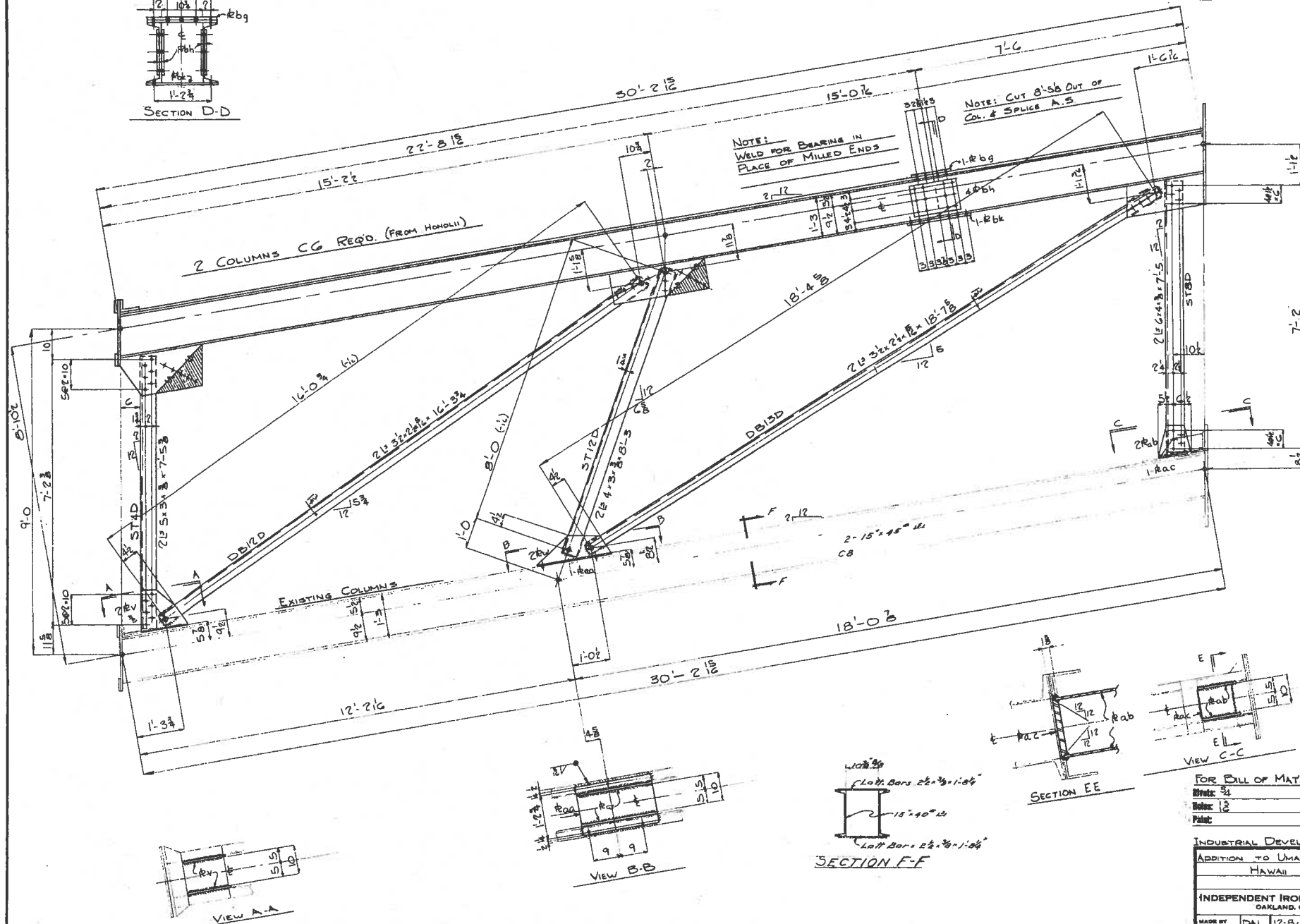
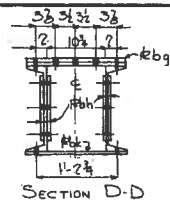
INDUSTRIAL DEVELOPMENT CO.
ADDITION TO UMAUMA BRIDGE
HAWAII

INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY	DAL	12-9-49	ORDER NO.	3807
CHECKED BY	DM	1-16-50	SHEET NO.	D120

5468.170

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HS HW 11	MAIN	20R31N750	171	300	



FOR BILL OF MAT'L SEE DISD

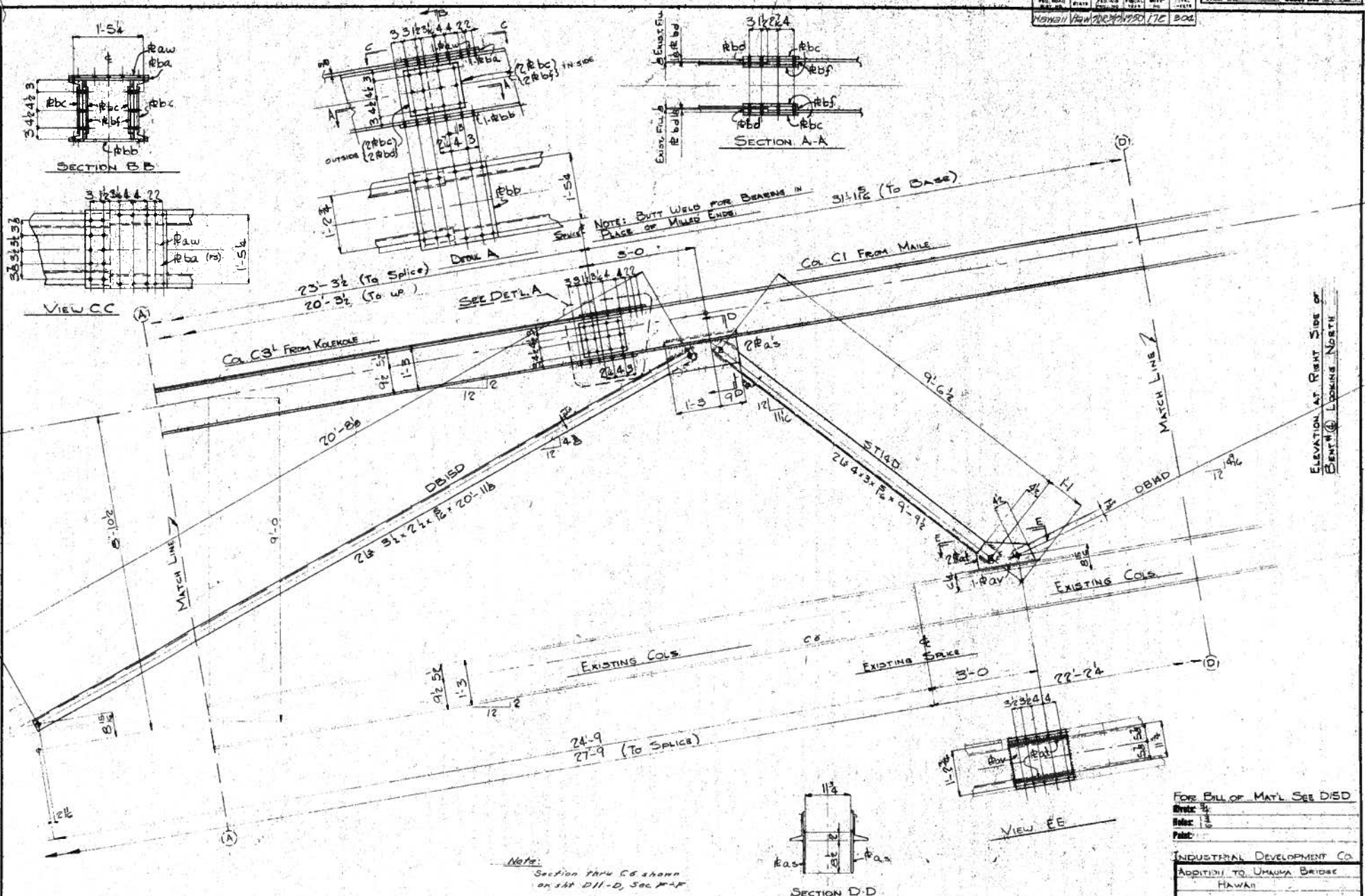
Notes: 34
12
Paint:

INDUSTRIAL DEVELOPMENT CO.
ADDITION TO UMAUMA BRIDGE
HAWAII

INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY	DAL	12-8-49	ORDER NO.	3807
CHECKED BY	DB	4-13-51	SHEET	D190

NO. 51



FOR BILL OF MAT'L SEE DISD

Drawn by: **DALE**
 Made by: **DALE**
 Date: **1-16-50**

INDUSTRIAL DEVELOPMENT CO.
 ADDITION TO UHAKUA BRIDGE
 HAWAII

INDEPENDENT IRON WORKS, INC.
 OAKLAND, CALIF.

MADE BY: **DALE** 12-12-49
 CHECKED BY: **DALE** 1-16-50

SHEET: **3807**
 D11-D

5468.172

BILL OF MATERIAL

No.	Description	Length ft.	Unit	REMARKS
1	COLUMN		C1	MAILE
2	COLUMNS		C2	HONOLULU
1	COLUMN		C2	MAILE
1	STRUT	7 5/8	ST90	
1	Do	7 5/8	ST100	
2	Do	8 3/8	ST120	
2	Do	9 1/4	ST140	
1	DIAG. BRACE	20 1/8	DB11D	
2	Do	16 3/8	DB12D	
2	Do	18 7/8	DB13D	
1	Do	20 1/8	DB14D	
2	Do	20 1/8	DB15D	
4	PL 13/4 x 1/2	1 4	Y	Temp New
4	PL 10 x 3/8	2 0/8	W	Do Do
2	PL 17 1/2 x 3/8	2 0/8	Q	Q
4	PL 12 x 3/8	1 0/8	A	A
2	PL 10 1/2 x 3/8	0 10/8	C	C
2	PL 11 x 3/8	0 11/8	D	D
1	PL 11 1/2 x 3/8	1 9/8	F	F
1	PL 15 1/2 x 3/8	1 7/8	G	G
4	PL 11 1/2 x 3/8	1 0/8	H	H
2	PL 5 1/2 x 3/8	0 11/8	I	I
2	PL 6 1/2 x 3/8	0 11/8	J	J
4	PL 10 1/2 x 3/8	1 7/8	K	K
4	PL 7 1/2 x 3/8	2 0/8	L	L
2	PL 17 1/2 x 3/8	1 6/8	M	M
1	PL 22 x 3/8	1 7/8	N	N
1	PL 16 1/2 x 3/8	1 7/8	O	O
1	PL 19 1/2 x 3/8	1 7/8	P	P
4	PL 11 1/2 x 3/8	1 1/8	Q	Q
2	PL 5 1/2 x 3/8	0 11/8	R	R
2	PL 7 1/2 x 3/8	0 11/8	S	S
2	PL 12 1/2 x 3/8	1 5/8	T	T
2	PL 17 1/2 x 3/8	1 9/8	U	U
2	PL 11 x 3/8	0 11/8	V	V
2	PL 11 x 3/8	1 6/8	W	W

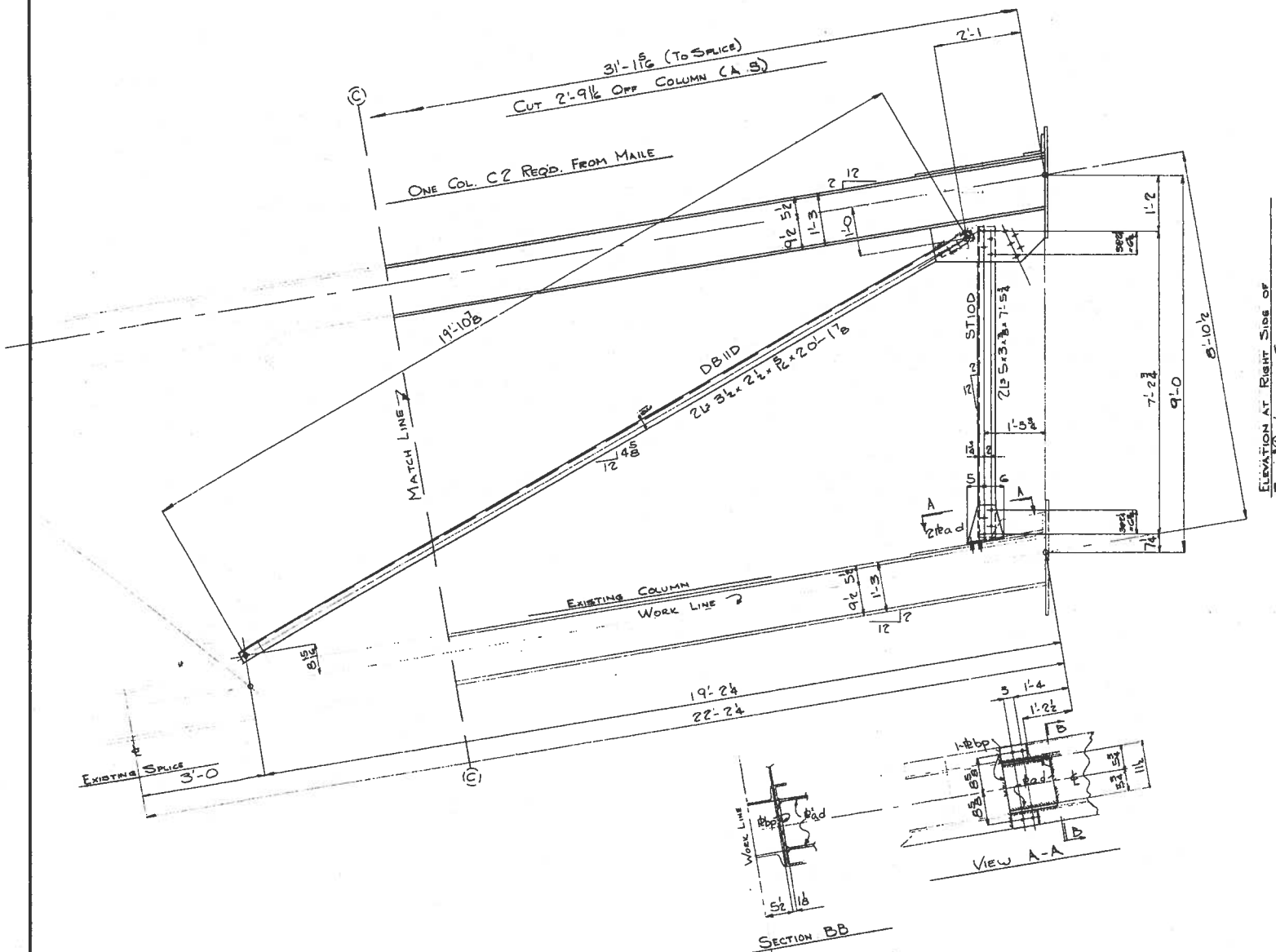
NOTE: SEE SHEETS D15D-D15D INC FOR DETAILS OF DIAGONAL BRACES & STRUTS.

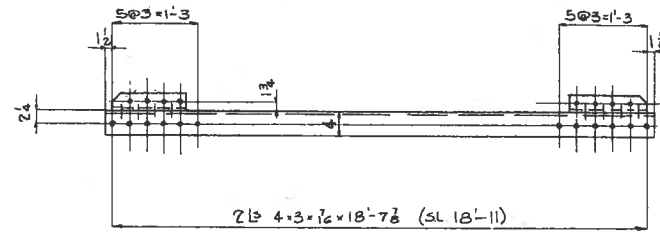
Revised: 3/4
Notes: 2/2
Paint:

INDUSTRIAL DEVELOPMENT CO
ADDITION TO UMAUMA BRIDGE
HAWAII

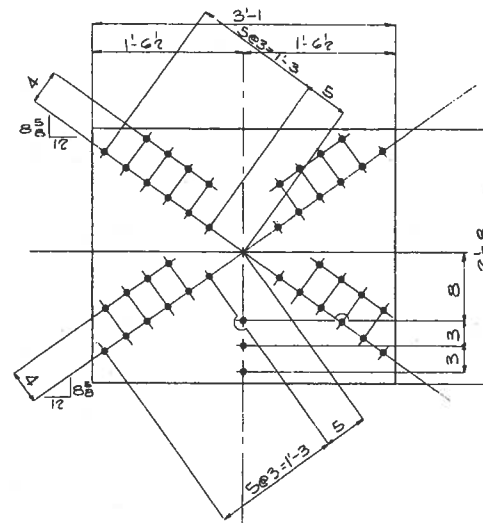
INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY DAL 12-9-49 ORDER 3807
CHECKED BY 1/16/50 SHEET D15D

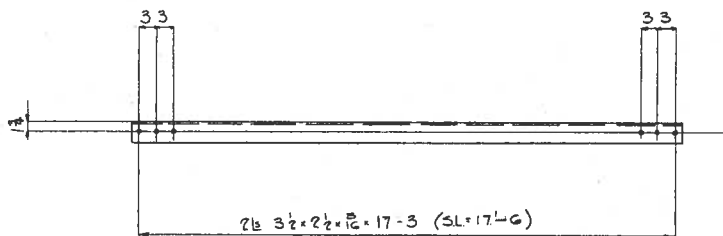




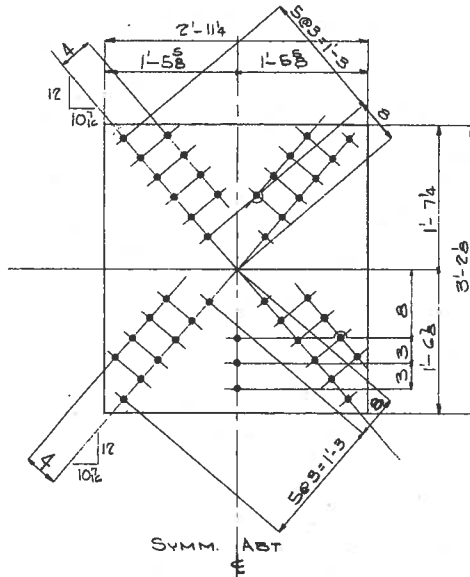
22 DIAGONAL BRACES REQ'D MK. DB18D



16 PL REQ'D MK LPI - SALVAGE FROM KOLEKOLE



2 BRACES REQ'D MK DB17D



4 PLATES REQ'D MK PI-D

BILL OF MATERIAL					INDUSTRIAL DEVELOPMENT
No.	Description	Length	Mark	REMARKS	
16	2 3/2 x 3	3	1	LPI	SALV. FROM KOLEKOLE
4	2 3/4 x 3	3	2	PI-D	Temp. New
2	DIAG BRACE	17	6	DB17D	
22	DIAG BRACE	18	11	DB18D	
1		31	3	DB19D	
2		19	2	DB20D	
2		22	11	DB21D	
2		22	7 1/2	DB22D	
2		16	2	DB23D	
2		14	7	DB24D	
2		32	1	DB25D	
2	2 2 1/2 x 3	3	9	bv	Temp. New
2	2 2 1/2 x 3	3	8 1/2	bw	D.S.
4	2 2 1/2 x 3	2	9 1/2	cq	
4	2 2 1/2 x 3	1	6 1/2	cb	
4	2 2 1/2 x 3	2	9 1/2	cc	
4	2 2 1/2 x 3	2	11 1/2	cd	
4	2 2 1/2 x 3	3	6 1/2	cf	
4	2 2 1/2 x 3	1	3 1/2	cg	
1	2 2 1/2 x 3	3	9	cp	
1	2 2 1/2 x 3	3	8 1/2	cs	
2	2 2 1/2 x 3	2	8 1/2	cu	

NOTE: SEE SHEETS D1G0-D300 INC. FOR DETAILS OF DIAGONAL BRACES.

Revised: 3/2
Notes: 12 1/2 ED UN
Print:

INDUSTRIAL DEVELOPMENT CO.
ADDITION TO UMAUMA BRIDGE
HAWAII

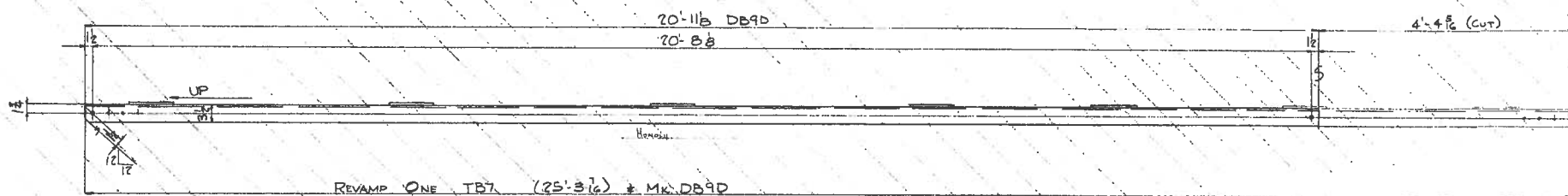
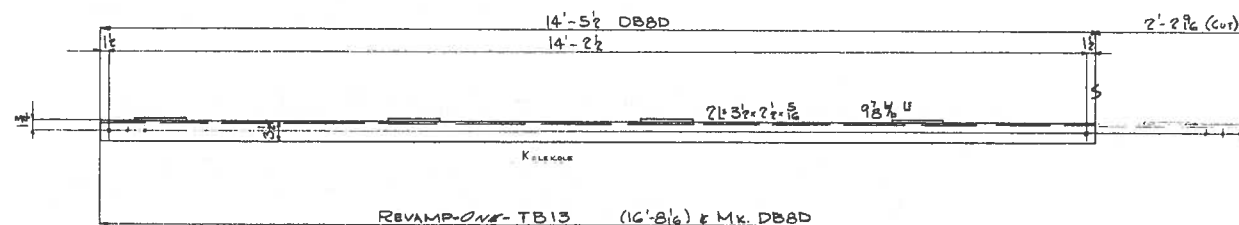
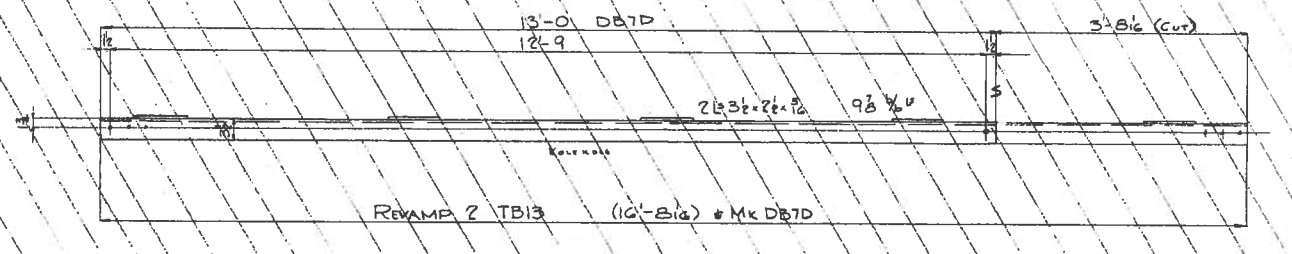
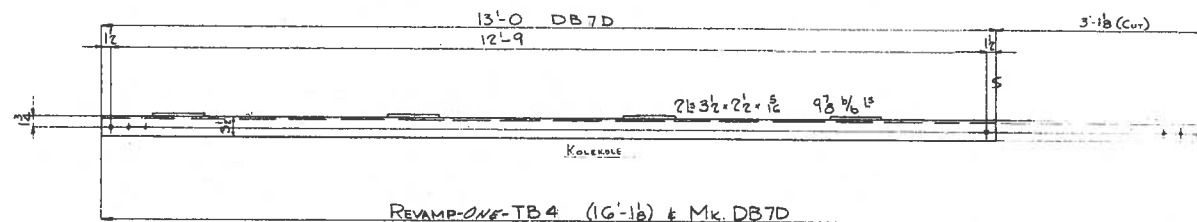
INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY DAL 12-13-49
CHECKED BY 12-16-50
SHOWN 3807
D1G0

5468.174

BILL OF MATERIAL INDUSTRIAL DIV. G

No.	Description	Length	Mark	REMARKS
NOTE: REVAMP THE BRACES LISTED BELOW AS SHOWN ON DETAILS.				
1	BRACE	16' 1 1/2"	TB4	SALVAGE FOR KOLEKOLE
1	Do.	16' 8 1/2"	TB13	KOLEKOLE



Rivets: 3/4
Nuts: 1 1/2 x 1 1/2 ED
Paint:

INDUSTRIAL DEVELOPMENT COMPANY
ADDITION TO UHAUMA BRIDGE
HAWAII

INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY DAL 12-21-60 ORDER NO. 3807
CHECKED BY DB 1-17-61 1181 D18D

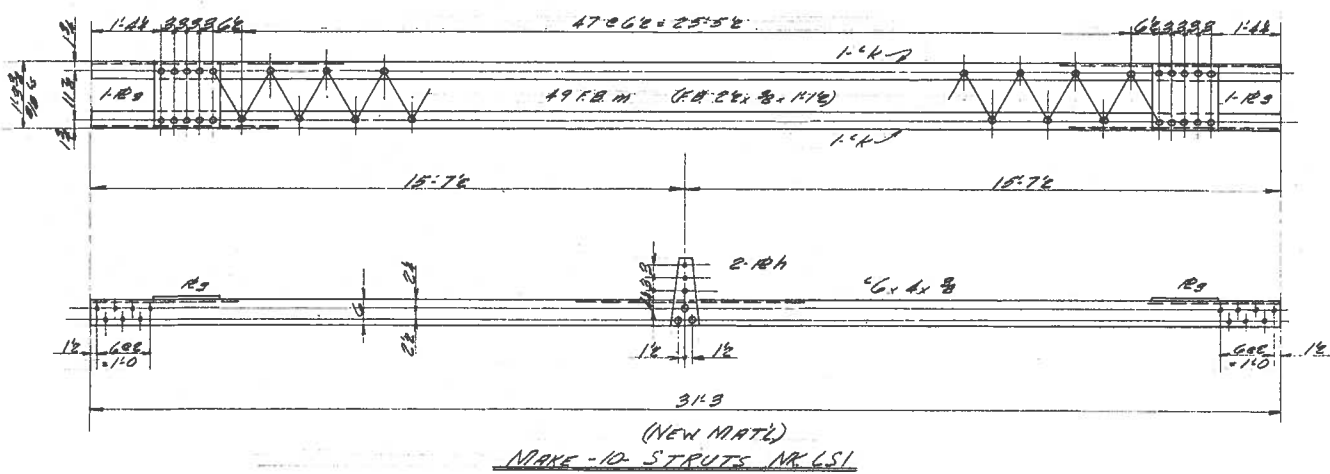
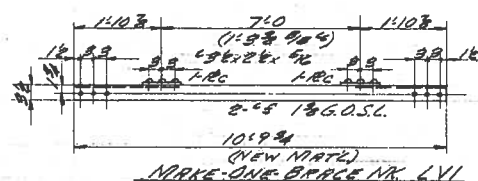
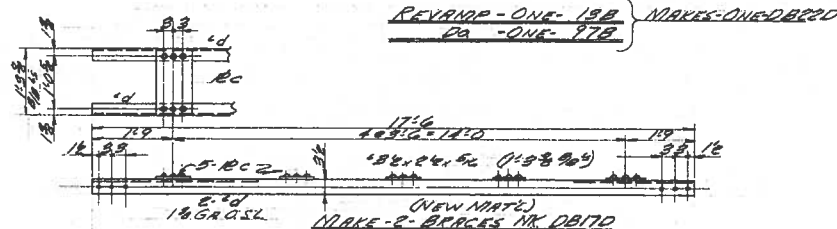
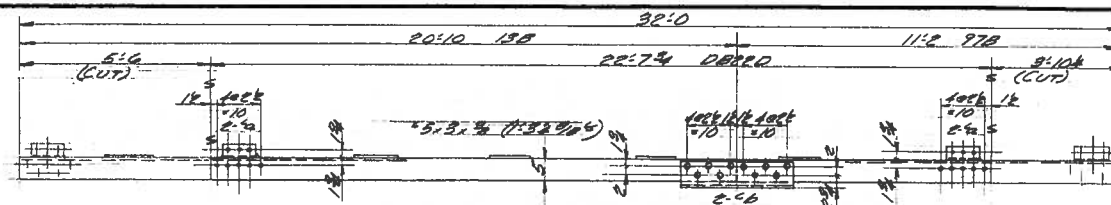
5468.176

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAWAII	200-1-1000	1977	3008	

Order No. 3807 Sheet No. 2190

BILL OF MATERIAL, UNRAUNER BRIDGE

No.	Description	Length	Mark	REMARKS
NOTE: REPAIR THE PIECES LISTED BELOW AS SHOWN ON THE DETAILS				
1	BRACE	19B		
1	CA	97B		
NEW MATERIAL LISTED BELOW				
2	BRACES	DB17D		
1	CA	LVI		
10	STRUTS	LSI		
4	3/8" x 8" x 0.86	a	TEMP	
2	6" x 4" x 2.2	b	CA	
12	2" x 2" x 1.5	c	CA	
4	3/4" x 8" x 17.4	d		
2	3/4" x 8" x 10.9	e		
20	2" x 2" x 1.2	f	TEMP	
20	2" x 2" x 1.0	h	CA	
20	6" x 4" x 3.1	k		
40	1/2" x 2" x 1	m		
750 3/4" RIVETS (SHOP)				



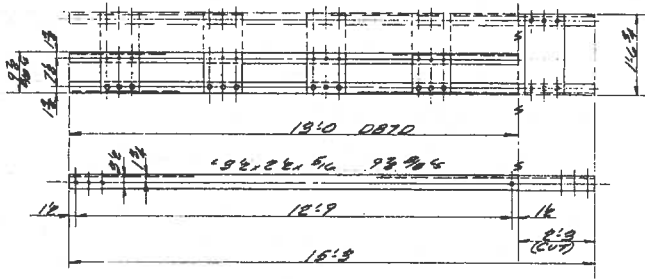
Rivets: 3/4"
 Plates: 1/2"
 Paint: (SEE SPEC)
 INDUSTRIAL DEW CO.
 ADDITION TO THE
 UNRAUNER BRIDGE
 - HAWAII -
 INDEPENDENT IRON WORKS, INC.
 OAKLAND, CALIF.
 MADE BY: CD 382-32 ORDER: 3807
 CHECKED BY: SHEET: 2190

FED. ROAD DIST. NO.	STATE	FED. AID FUND NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAWAII	20000000	1960	170	300

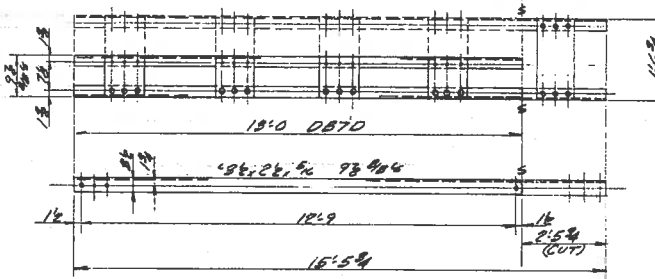
Order No. 3807 Sheet No. 2000

BILL OF MATERIAL UNARUNA BRIDGE

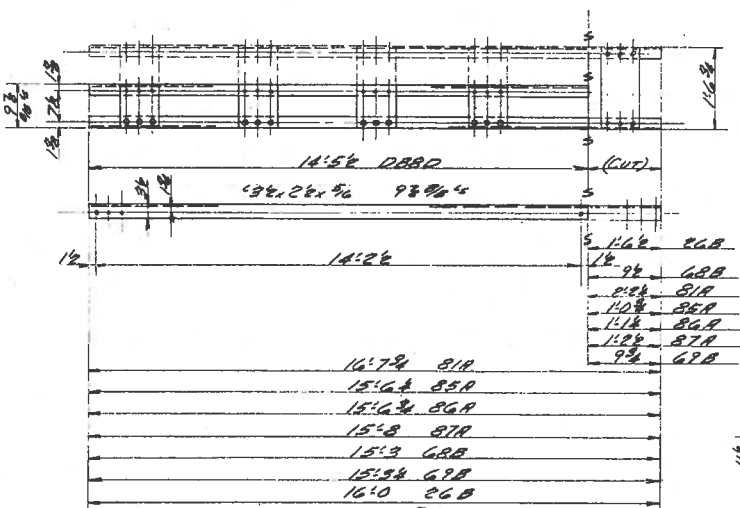
No.	Description	Length Ft.	Qty.	Mark	REMARKS
NOTE: REPAIR THE BRIDGES LISTED BELOW AS SHOWN ON THE DETAILS					
3	BRIDGES			86R	
9	Do			83R	
1	Do			84R	
1	Do			74B	
1	Do			75B	
1	Do			81R	
1	Do			85R	
1	Do			86R	
1	Do			87R	
1	Do			68B	
1	Do			69B	
1	Do			76B	
2	4.5x8	16	a	THUR	(NEW WARE)



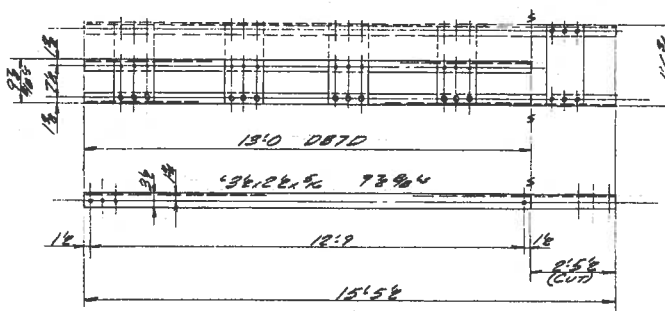
REVAMP-3-82R (MAKES 3 DBTD)



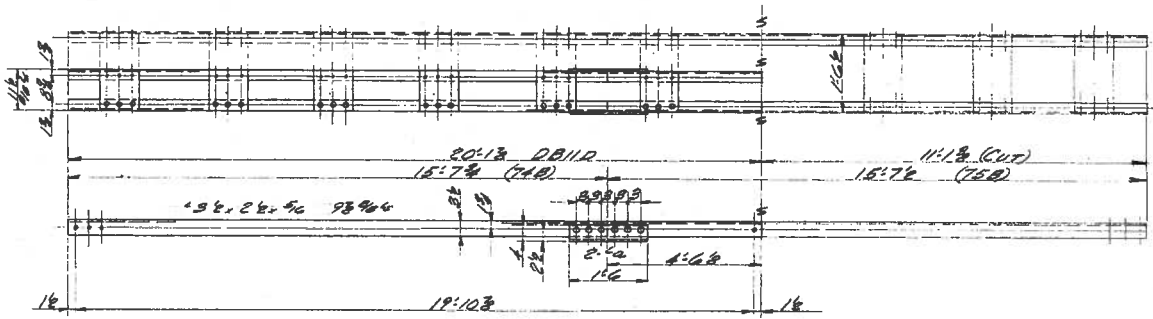
REVAMP-3-83R (MAKES 3 DBTD)



REVAMP-ONE-81R (MAKES 7 DBRD)



REVAMP-ONE-84R (MAKES ONE DBTD)



REVAMP-ONE-74B (MAKES ONE DBRD)

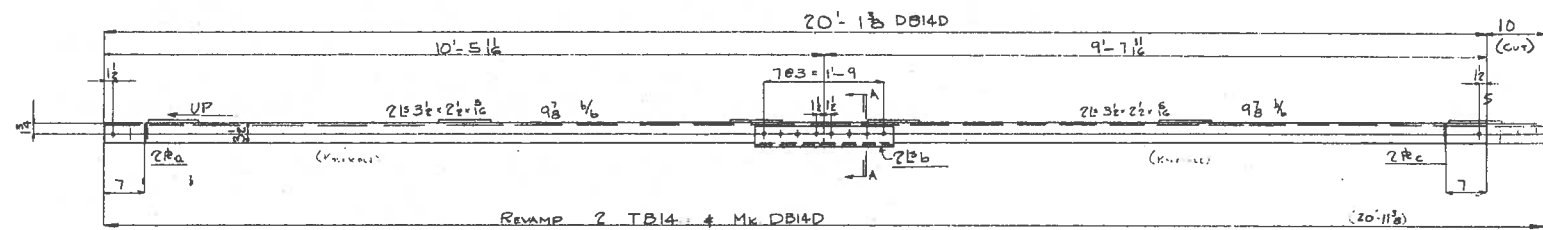
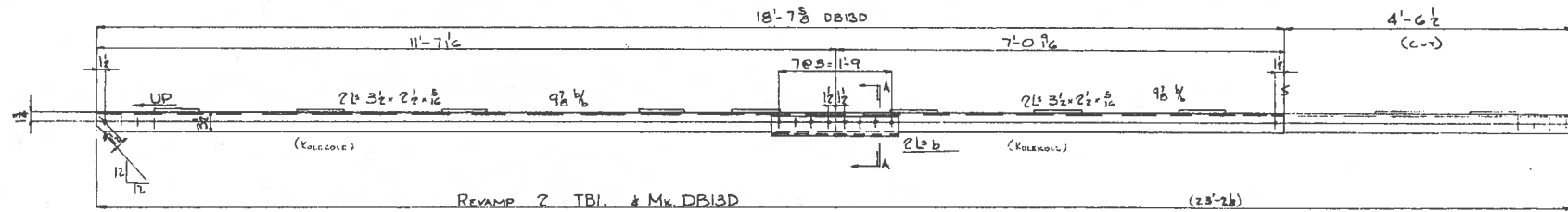
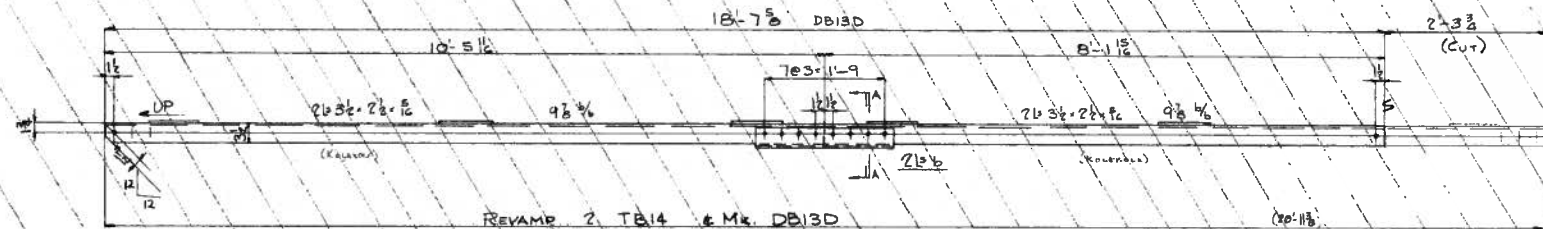
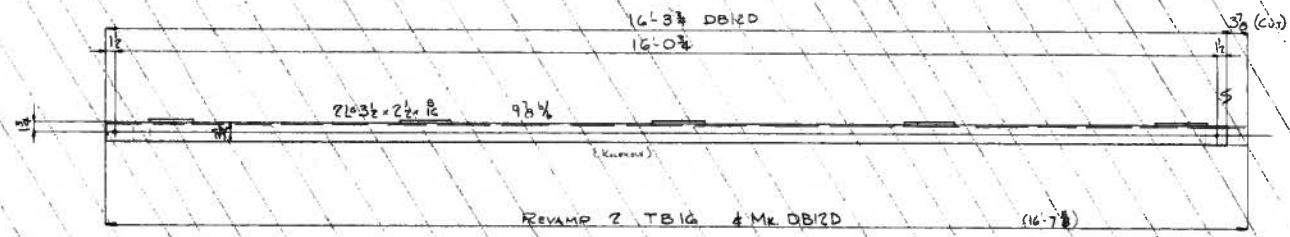
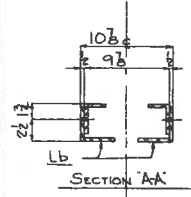
Sheets: 3-4
 Notes: 12-0
 Paint: (SEE SPECS)
 INDUSTRIAL DEK CO
 ADDITION TO THE
 UNARUNA BRIDGE
 -HAWAII-
 INDEPENDENT IRON WORKS, INC.
 OAKLAND, CALIF.
 MADE BY: DA 5-1952 ORDER NO: 3807
 CHECKED BY: WJH LIST 12000

5468.178

FED. ROAD DIST. NO.	STATE	FED. AID FUND NO.	FISCAL YEAR	PROJECT NO.	TOTAL SHEETS
HAWAIIAN	20	11	1950	172	200

BILL OF MATERIAL

No.	Description	Length ft. in.	Unit	REMARKS
NOTE: BRACES LISTED BELOW ARE TO BE REVAMPED AS SHOWN ON DETAILS				
2	BRACE	11 7/8	TB1	SAV. FROM
2	Do	10 5/8	TB14	Do
2	#3 1/2 x 3	0 7	a	Temp. New
1	L4 x 4 x 1/2	2 0	b	Temp. New
2	#3 1/2 x 3	0 7	c	Temp. New

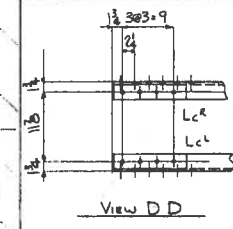
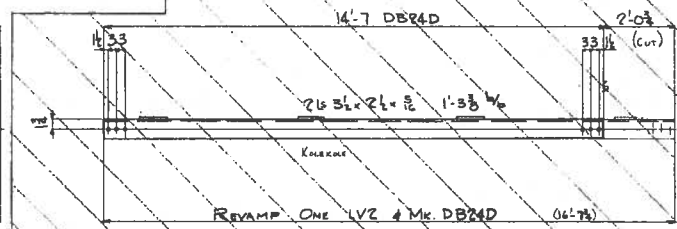
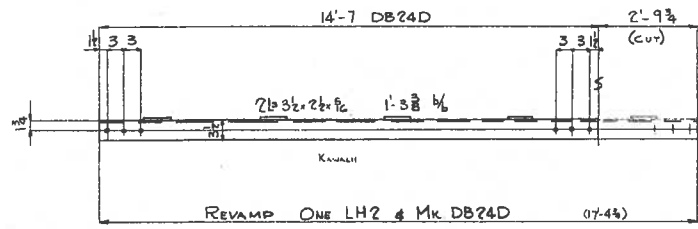
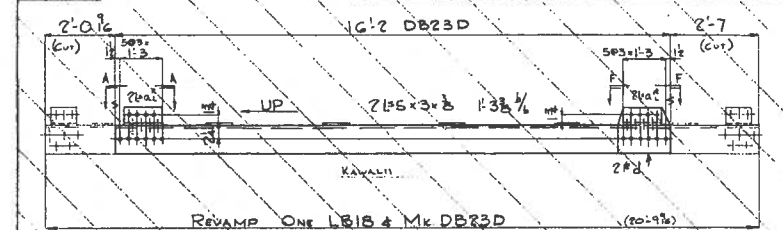
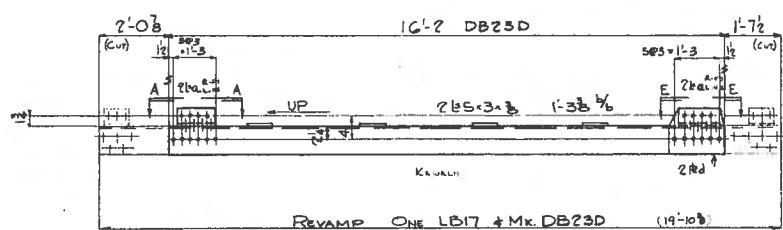
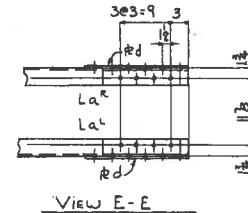
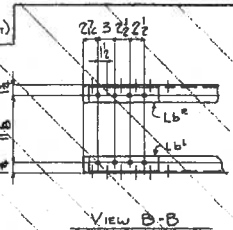
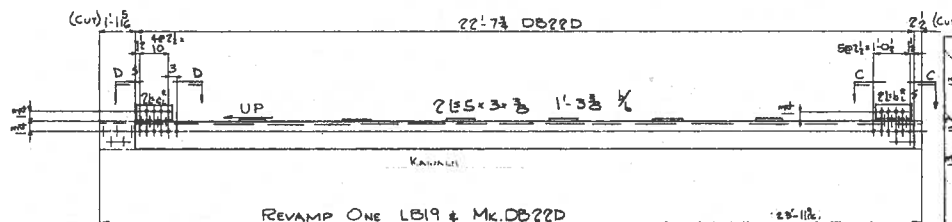
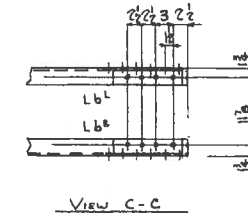
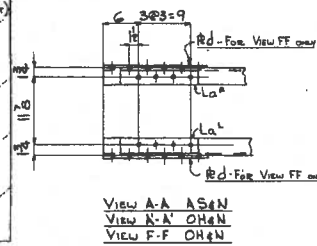
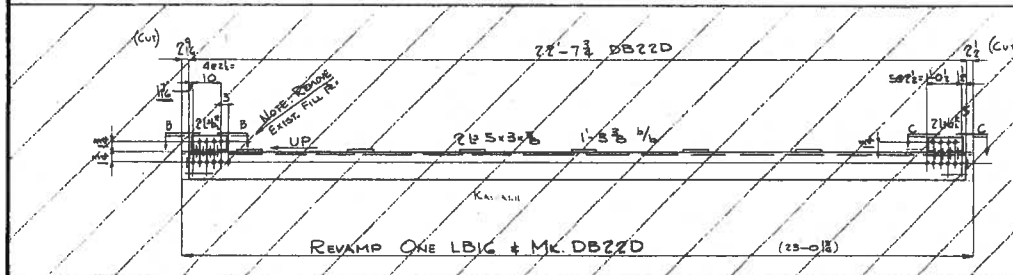
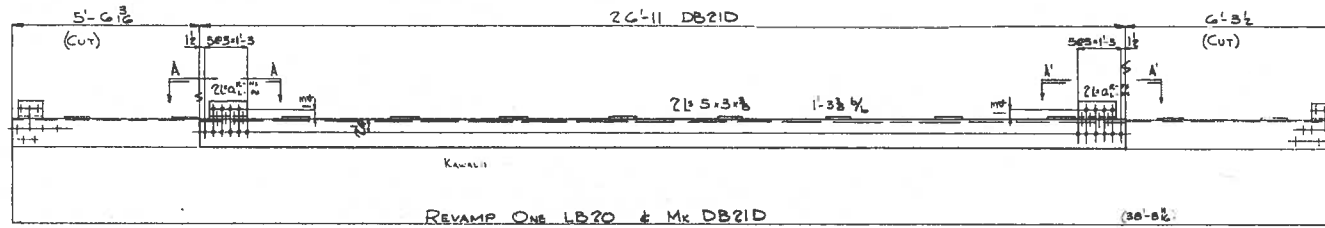


Notes: 3/4
Notes: 1 1/2
Notes: 1 1/2

INDUSTRIAL DEVELOPMENT CO.
ADDITION TO UHAUMA BRIDGE
HAWAII

INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY DAL 12-23-49 ORDER 3807
CHECKED BY DAL 1-18-50 SHEET D21D

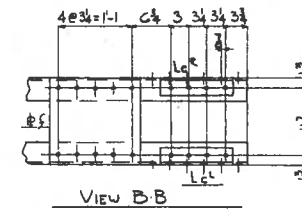
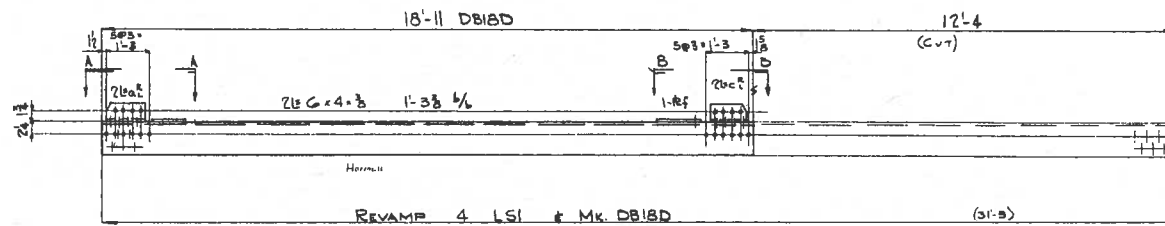


BILL OF MATERIAL				
No.	Description	Length	Mark	REMARKS
NOTE: BRACES LISTED BELOW ARE TO BE REVAMPED AS SHOWN IN DETAILS				
1	BRIDGE	38	11	LB20 KAWAII
1	Do	23	11	LB19 Do
1	Do	19	10	LB17 Do
1	Do	17	4	LH2 Do
8	13x3x3/8	1	12	a Temp-New
2	13x3x3/8	1	0	b Do Do
2	13x3x3/8	1	0	c Do Do
2	2x8x4	1	6	d Do Do

Struct: 3/4"	Notes: 1/2"	Paint: 1/2 EDUN
INDUSTRIAL DEVELOPMENT CO		
ADDITION TO UHAUMA BRIDGE		
HAWAII		
INDEPENDENT IRON WORKS, INC.		
OAKLAND, CALIF.		
MADE BY	DAL	12-28-49
CHECKED BY	DP	1-18-50
DESIGNED BY	DP	1-18-50
ORDER NO.	3807	
SHEET	D23D	

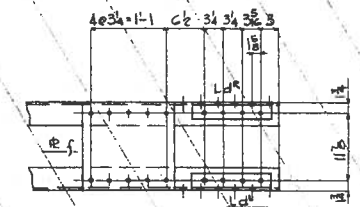
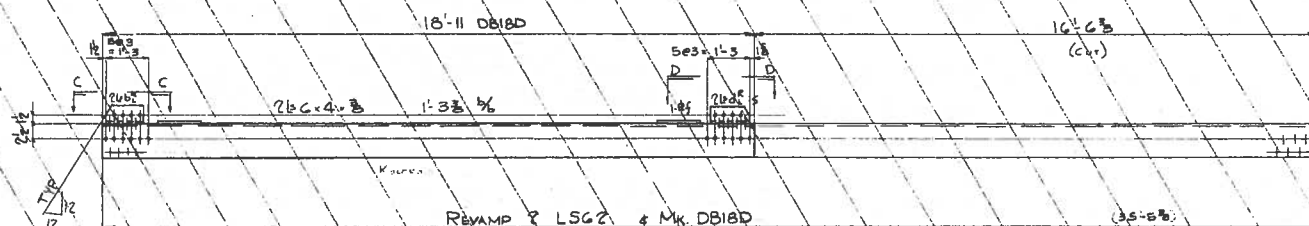
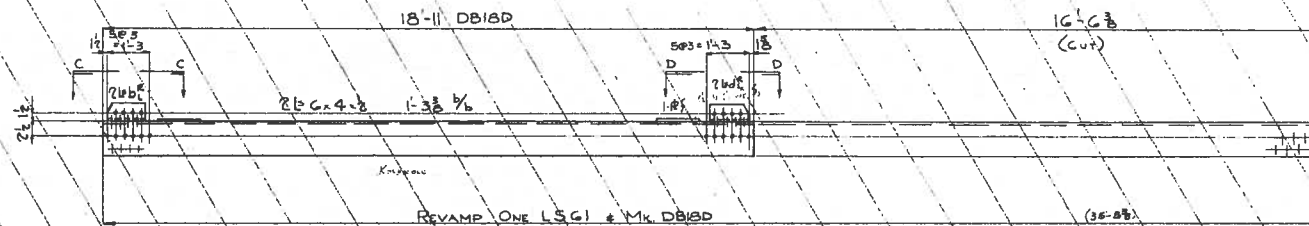
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAWAII	302 34 35	1950	183	300

Order No. 3807 Sheet No. D25D

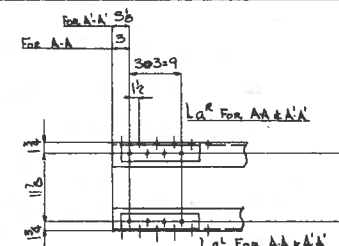
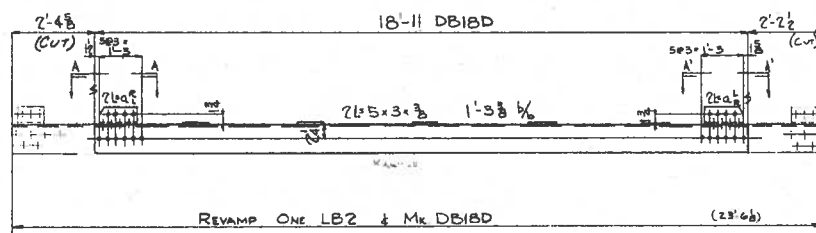


VIEW BB

BILL OF MATERIAL					INDUSTRIAL DEVELOPMENT COMPANY
No.	Description	Length ft. in.	Mark	REMARKS	
NOTE BRACES LISTED BELOW ARE TO BE REVAMPED AS SHOWN ON DETAILS.					
4	BRACES	31 3	LSI	SALV. FROM HONOLULU	
1	DO	23 6 1/2	LB2	KAWAII	
1	2 L3 x 3 x 3/8	1 1/2	CL	Temp. New	
8	L3 x 3 x 3/8	1 0 1/2	CL	Do Do	
7	R13 x 3/8	1 4	S	Do Do	



VIEW DD



VIEW A-A AS SHOWN
VIEW A-A OH SHOWN

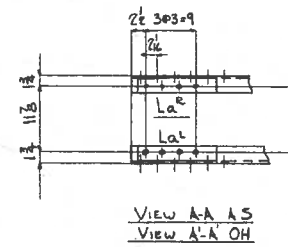
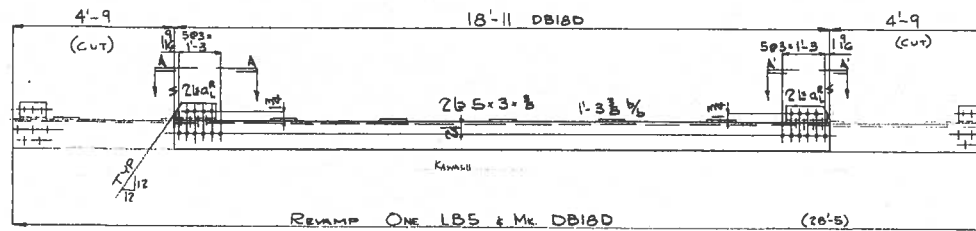
Revised: 3/4
Notes: 1 1/2 ED UN
Paint:

INDUSTRIAL DEVELOPMENT COMPANY
ADDITION TO UMAUMA BRIDGE
HAWAII

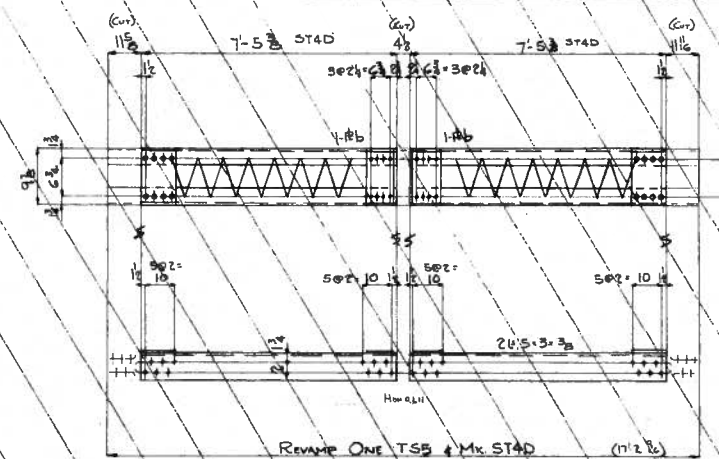
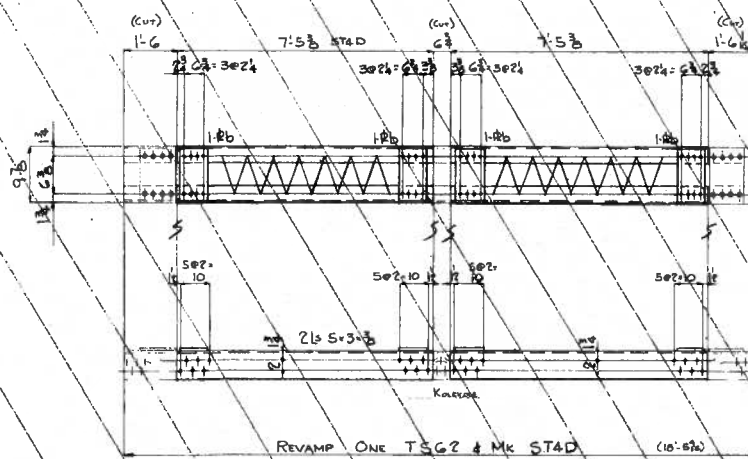
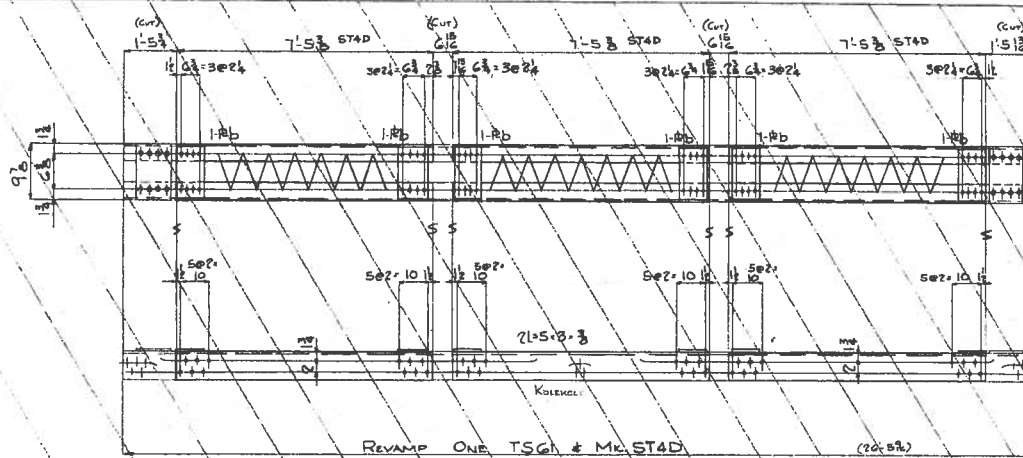
INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY: DAL 1-3-50
CHECKED BY: DAL 1-3-50
DESIGNED BY: DAL 1-3-50

5468.183



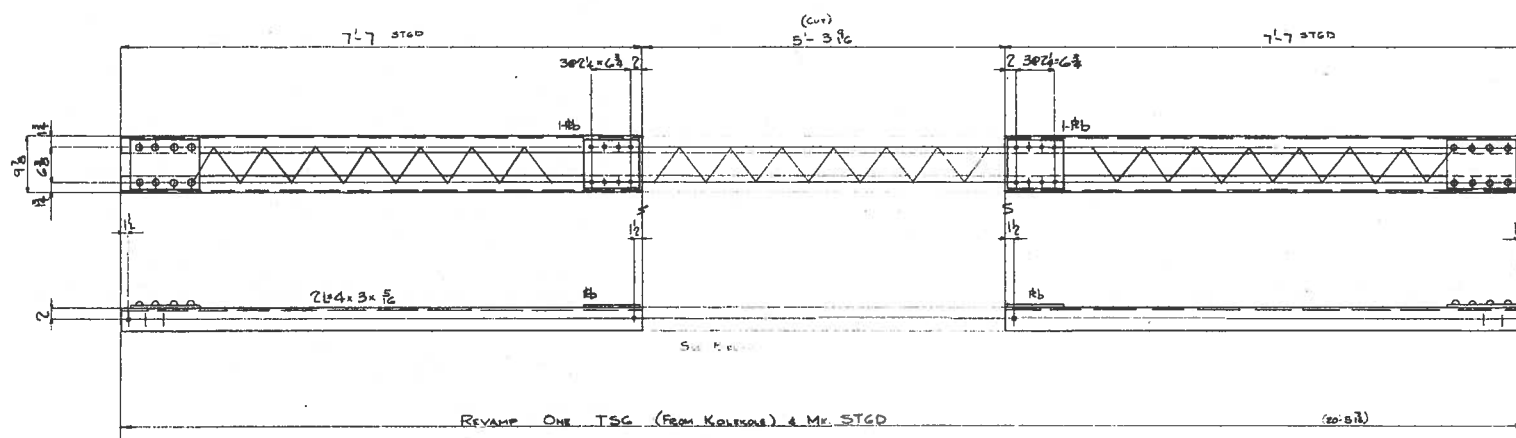
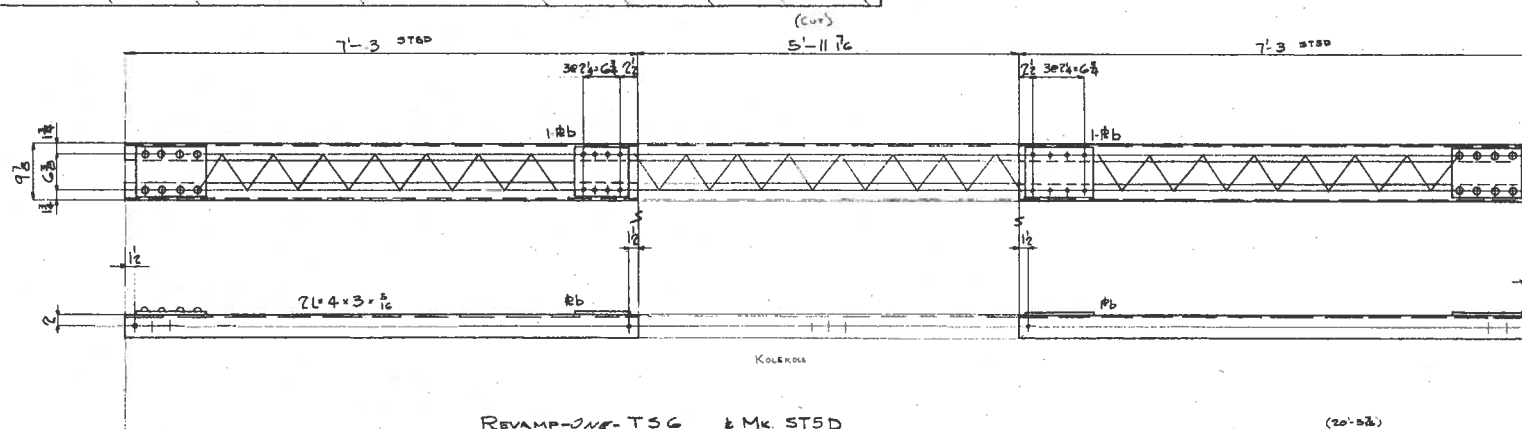
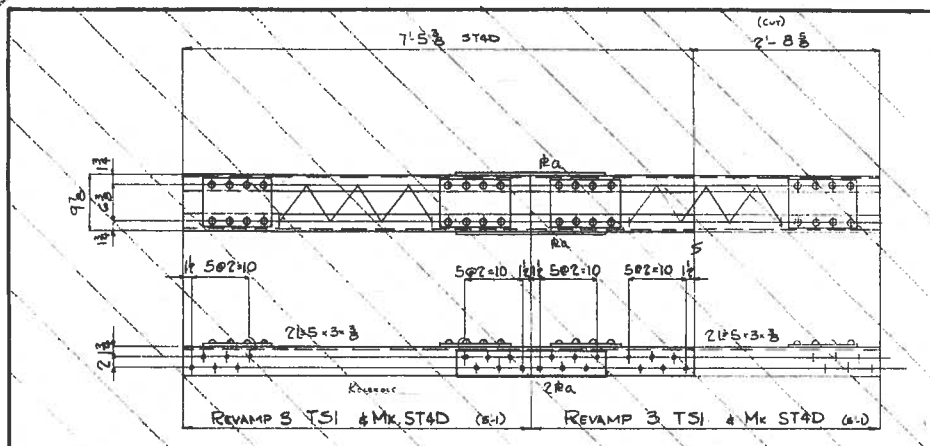
BILL OF MATERIAL				
No.	Description	Length	Mark	REMARKS
	NOTE: BRACES LISTED BELOW ARE TO BE REVAMPED AS SHOWN ON DETAIL.			
1	BRACE	23'5"	LBS	SALV. FROM KAWAII
4	LBS x 3" x 1/2"	11'	QF	Temp-New



Notes:	3/4"
Notes:	1/2" ED UN
Notes:	
INDUSTRIAL DEVELOPMENT COMPANY	
ADDITION TO UMAUMA BRIDGE	
HAWAII	
INDEPENDENT IRON WORKS, INC.	
OAKLAND, CALIF.	
MADE BY	DAL 1-4-50
CHECKED BY	DE 1-2-50
ORDER NO.	3807
SHEET NO.	D26D

HILL OF MATERIAL

No.	Description	Length ft.	Mark	REMARKS
NOTE BRACES LISTED BELOW ARE TO BE REVAMPED AS SHOWN ON DETAILS.				
				SALV. FROM:
1	BRACES	20 5 1/2	TSG	KOLEKOLE
1	DO	20 5 1/2	TSG	HONOLULU
4	DO	0 9 3/4	b	From (Kolekole)



Notes: 1. 1/2 ED UN.
2. 1/2 ED UN.
3. 1/2 ED UN.

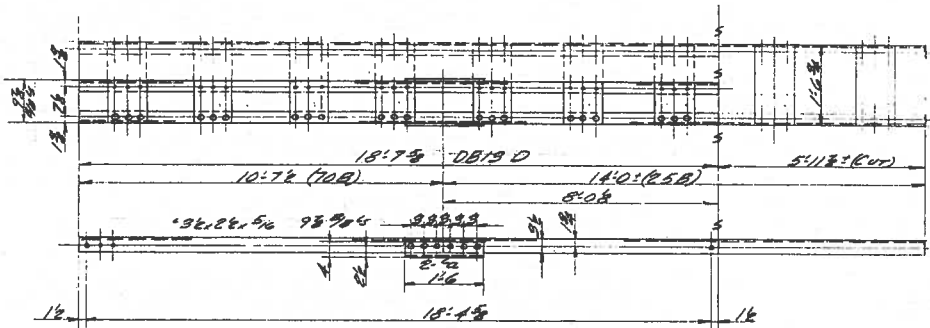
INDUSTRIAL DEVELOPMENT COMPANY
ADDITION TO UMAUMA BRIDGE
HAWAII

INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY DAL 1-5-50 ORDER 5807
CHECKED BY D.D. 1-18-50 SHEET D27D

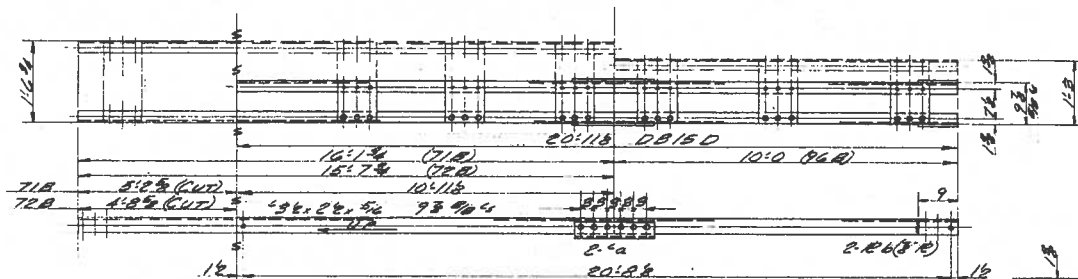
5468.188

No.	Description	Length	Mark	REMARKS
1	BRACE	70B		
1	Ca	25B		
2	Ca	76B		
1	Ca	71B		
1	Ca	72B		
2	Ca	18B		
NEW MARKS LISTED BELOW				
6	BRACES	DB9D		
6	Ca	DB9D		
6	4.8x3/4	16	a	TRAMP
4	R34x3/4	09	b	Ca
100	R34x3/4	093	c	Ca
12	34x24x3/4	20118	d	
12	34x24x3/4	3044	e	
735	3/4" RIVETS (5000)			



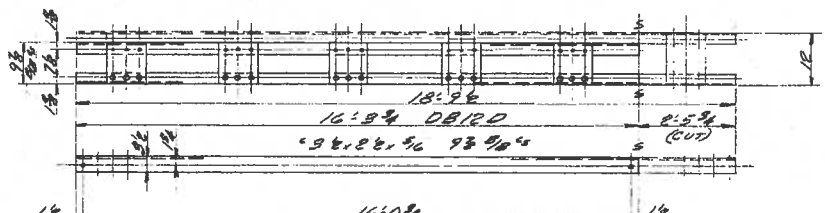
REPAIR - DBE - 70B
Ca - ONE - 25B

MAKES ONE DB19D



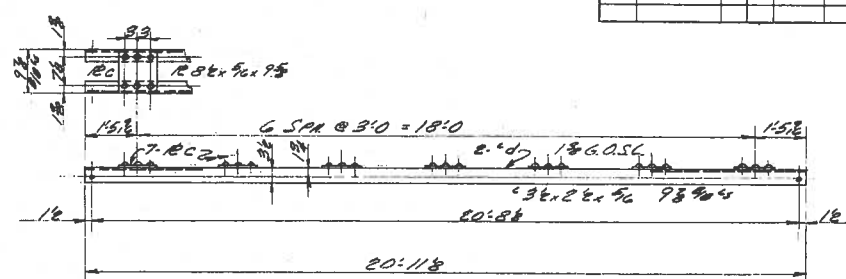
REPAIR - 2 - 96B
Ca - ONE - 71B
Ca - ONE - 72B

MAKES 2 DB15D

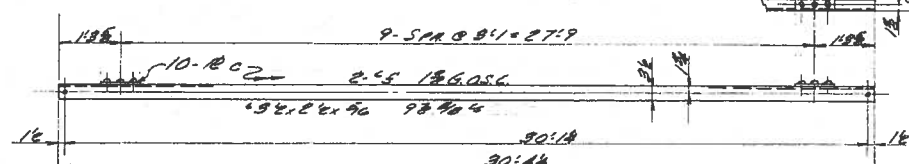


REPAIR - 2 - 18B

MAKES 2 DB12D



MAKE 6 BRACES NR DB10D (NEW MARKS)



MAKE 6 BRACES NR DB10D (NEW MARKS)

Notes: 1/2" = 1'-0"

Paint: (SEE SPECS)

INDUSTRIAL DEK CO.

ADDITION TO THE

UNAWA BRIDGE

- HWY 11 -

INDEPENDENT IRON WORKS, INC.

OAKLAND, CALIF.

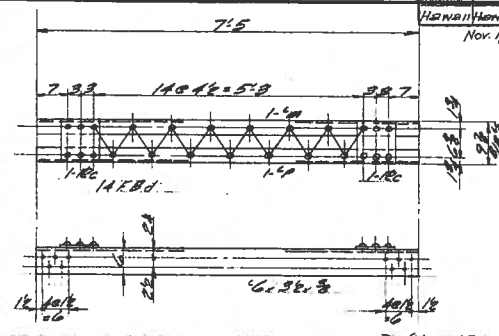
MADE BY: DP 8-20-50

CHECKED BY: DP 8-20-50

ORDER NO: 3807

SHEET NO: 0290

5468.187

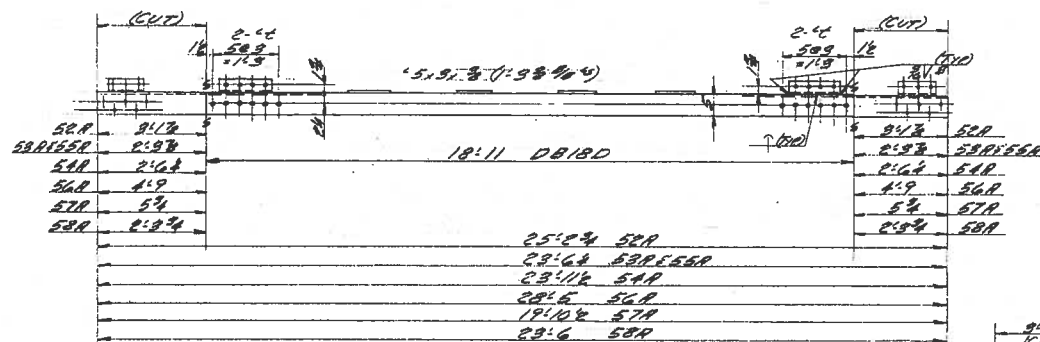


MAKE-8 STRUTS NK 5780 (NEW MATL)

No.	Description	Length ft. in.	Mark	REMARKS
NOTE: REPAIR THE BRACES LISTED BELOW AS SHOWN ON THE DETAIL				
1	BRIDGE		589	
2	Do		589	
1	Do		589	
1	Do		589	
1	Do		569	
1	Do		579	
1	Do		584	
1	Do		988	
1	Do		469	

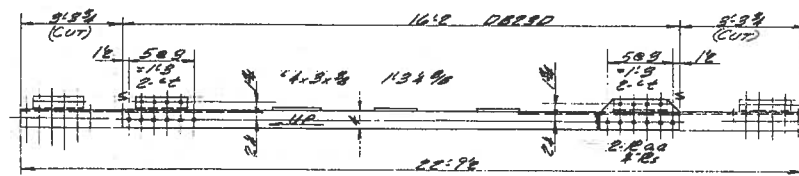
NEW MAPS LISTED BELOW

10	STEPS		STAC
6	Ca		STBC
6	Ca		STGC
6	Ca		STAP
5	BACKS		STBR
900	2 BACKS	(STBR)	
10	2 BACKS		a
10	2 BACKS		b
60	2 BACKS		c
420	2 BACKS		d
6	2 BACKS		e
6	2 BACKS		f
6	2 BACKS		g
6	2 BACKS		h
6	2 BACKS		i
6	2 BACKS		j
6	2 BACKS		k
6	2 BACKS		l
6	2 BACKS		m
6	2 BACKS		n
6	2 BACKS		o
6	2 BACKS		p
6	2 BACKS		q
6	2 BACKS		r
6	2 BACKS		s
6	2 BACKS		t
6	2 BACKS		u
6	2 BACKS		v
6	2 BACKS		w
6	2 BACKS		x
6	2 BACKS		y
6	2 BACKS		z
6	2 BACKS		0
6	2 BACKS		1
6	2 BACKS		2
6	2 BACKS		3
6	2 BACKS		4
6	2 BACKS		5
6	2 BACKS		6
6	2 BACKS		7
6	2 BACKS		8
6	2 BACKS		9
6	2 BACKS		+
6	2 BACKS		-
6	2 BACKS		*
6	2 BACKS		/
6	2 BACKS		%
6	2 BACKS		^
6	2 BACKS		~
6	2 BACKS		!@#\$%^&*~
6	2 BACKS		ABCDEFGHIJKLMNOPQRSTUVWXYZ
6	2 BACKS		abcdefghijklmnopqrstuvwxyz
6	2 BACKS		0123456789
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6	2 BACKS		!@#\$%^&*~
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6	2 BACKS		0123456789
6	2 BACKS		!@#\$%^&*~
6	2 BACKS		ABCDEFGHIJKLMNOPQRSTUVWXYZ
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6			

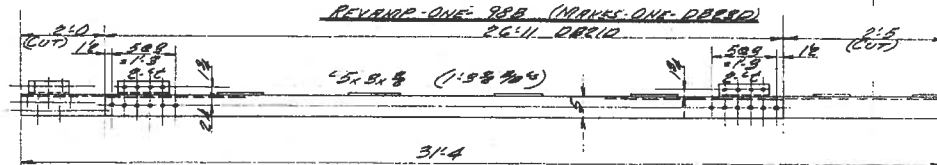


REVENUE - ONE - 58P (H.N.)
 DO - 2 - 58P DO
 DO - ONE - 54P DO
 DO - ONE - 55P DO
 DO - ONE - 56P DO
 DO - ONE - 57P DO
 DO - ONE - 58P DO

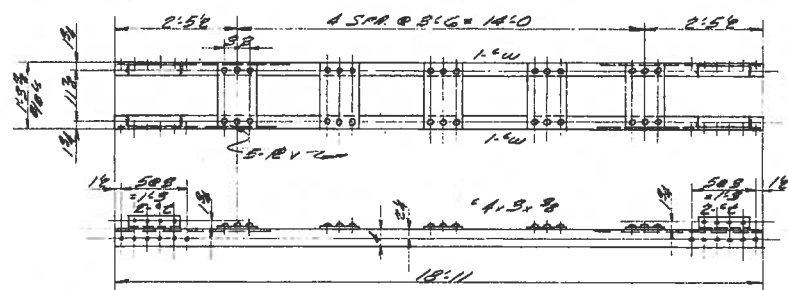
NRKES-8-DB180



REVAMP-ONE- 98B (NRAKS-ONE-DBSD)



REVIEW - ONE - 46A (MARKS - ONE - DB212)



(NEW MAT'L.)
MAKE-5- BRACES NK DB180

Rivets: 84
Nuts: 16 1/2
Paint: (G. R. SARGENT)

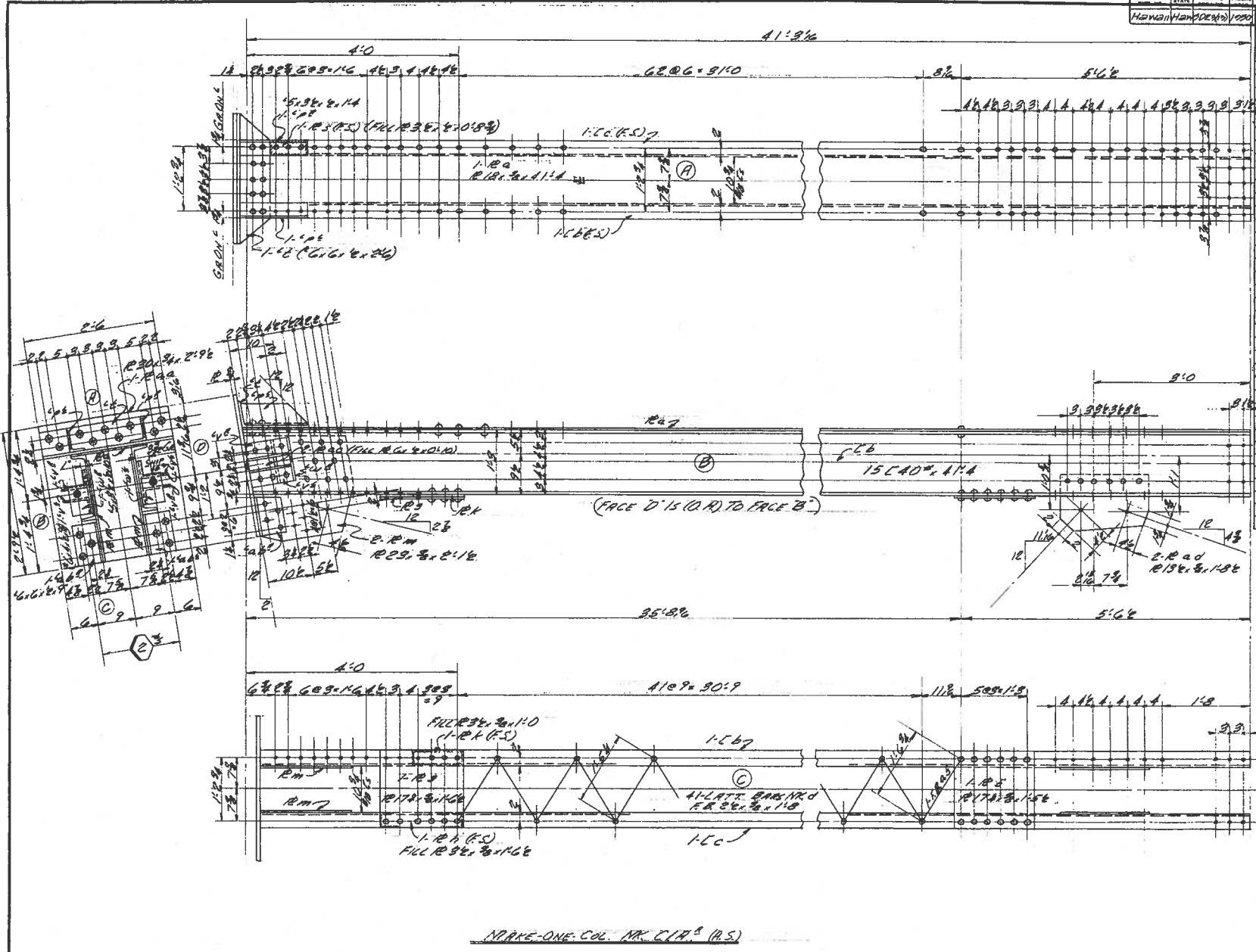
INDUSTRIAL DEV CO

ADDITION TO THE
UMRUMU BRIDGE

INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY	<i>20</i>	<i>8-21-58</i>	ORDER NO.	<i>2207</i>
CHECKED BY			SHEET	<i>291</i>

FED. ROAD DIST. CT.				STATE		FED. AID		FISCAL		SHEET		TOTAL	
HAWAII				HAWAII		HAWAII		HAWAII		1950		1950	
Order No. 3307 Sheet No. 0320												BILL OF MATERIAL	
												UNRUHA BRIDGE	
No.	Description	Length	Unit	Mark	REMARKS								
1	COLUMN			CIP	(NEW)								
1	R18x3	11.4	a	a	SHOE TEMP								
1	12x10	11.4	b	a	Da Da								
1	12x10	11.4	c	a	Da Da								
41	R24x3	1.8	d										
1	R17x3	1.56	e		TEMP								
1	R17x3	1.66	f		Da								
1	R24x3	1.66	h		Da								
1	R24x3	1.0	k		Da								
2	R23x3	2.12	m		Da								
2	5x3x1/2	1.4	p		Da								
1	R24x3	0.88	s		Da								
1	5x1/2x1/2	2.6	t		Da								
4	5x1/2x1/2	0.96	v		Da								
2	5x3x1/2	0.10	w		Da								
1	R20x3	2.96	aa		Da								
2	5x1/2x1/2	0.9	ab		Da								
2	R6x3	0.10	ac		Da								
2	R18x3	1.86	ad		Da								
1	R24x3	1.72	ae		Da								
335 3/4 RIVETS (SHOP)													
Rivets: 3/4" Bolts: 1 1/2" UN Paint: (SEE SPEC'S) INDUSTRIAL DEK CO. ADDITION TO THE UNRUHA BRIDGE - HAWAII - INDEPENDENT IRON WORKS, INC. OAKLAND, CALIF. MADE BY: DA 8-18-50 ORDER NO: 3307 CHECKED BY: SHIRLEY SHEET: 0320													



5468.190

BILL OF MATERIAL UNARUMA BRIDGE

No.	Description	Length ft.	Remarks
2	COLUMNS	13.8	KNEXHOLE
1	REVAMP R.S. IN DET.		
NEW MATERIAL LISTED BELOW			
1	FRANKLIN	2.0	a
2	R.R. 2.0	b	TEMP
2	6x6x6	0.11	c
2	6x6x6	2.0	d
1	R. 18.3	1.10	e
2	R. 20.3	2.6	f
2	R. 20.3	0.8	g
2	R. 20.3	2.1	h
1	R. 12.3	1.11	m
1	R. 15.3	1.9	p
			PLAIN

FINAL DRAWING

REVAMP - 2 COLS C. 3 E FROM KNEXHOLE
MAKES - 2 COLS C. 5 E - 13.8

Drawn: 8-10
Scale: 1/8" = 1'-0"
Point: (SEE SPEC)

INDUSTRIAL DEV. CO.
ADDITION TO THE
UNARUMA BRIDGE
- HAWAII -
INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY: RM 10-4-30
CHECKED BY: 10-4-30
ORDER NO.: 2802
SHEET NO.: 0330

5468.191