Underwater Bridge Inspection Report
NANUE STRM Bridge
Bridge ID: 001000190308146

March 1, 2023



Developed For: State of Hawai'i Department of Transportation

Prepared By:

This Work Has Been Prepared Under My Supervision

consor

Job No. 220128HI.03

Team Leader – Joshua Steiner, PE

Location Map

Bridge Name: NANUE STRM Bridge

Bridge ID: 001000190308146

GPS Coordinates

N: 19° 55’ 38.30”

W: 155° 09’ 22.55”



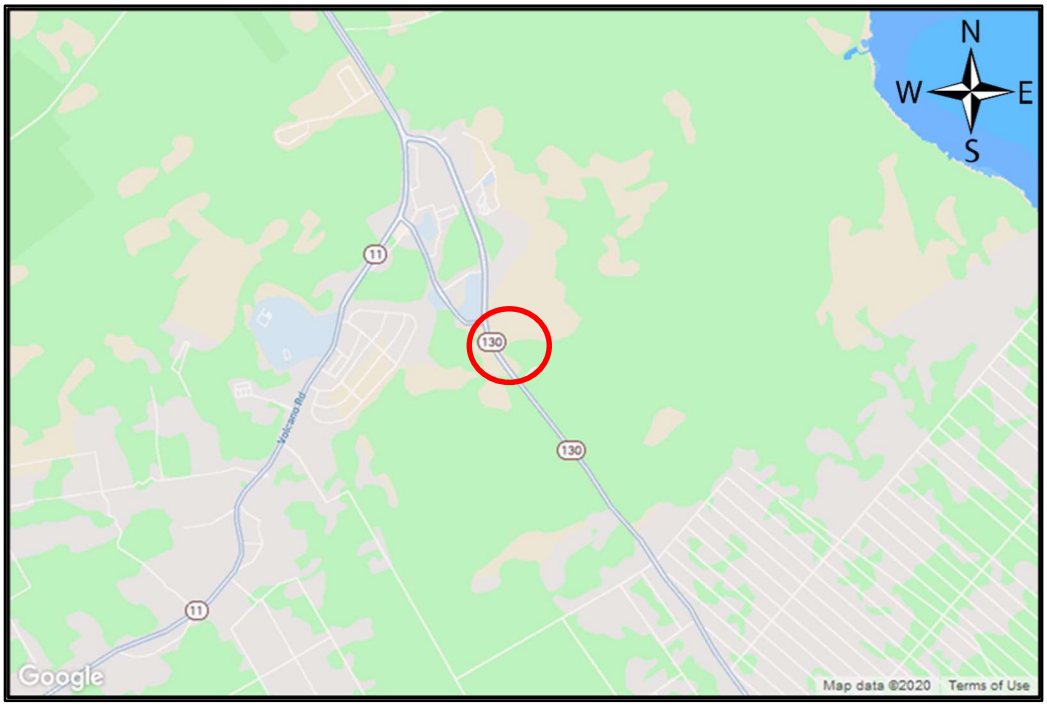


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Inspection Report

001000190308146
NANUE STRM
Inspector: Josh Steiner
03/01/2023

IDENTIFICATION

Bridge Key:	001000190308146
NBI Number:	NANUE STRM
Structure Name:	NANUE STRM
Location (9):	1.66MI W/KAUNIHO RD
Carries (7):	HAWAII BELT RD
Type of Service (42A):	5 Highway-pedestrian
Feature Crossed (6):	NANUE STRM
Type of Service (42B):	5 Waterway
Placecode (4):	
County (3):	Hawaii
State (1):	15 Hawaii
Station:	
Region (2):	10 Hawaii
Latitude (16):	19.93
Longitude (17):	-155.16
Owner (22):	State Highway Agency
Custodian (21):	State Highway Agency
Year Built (27):	1952
Year Recon (106):	
Historical (37):	5 Not eligible for NRHP

Border State: Unknown (P)
Border Struct No (99): -2
% Responsibility: 0
Border FHWA Reg (98): Not Applicable

INSPECTION

Date of Inspection (90): 3/1/2023
Frequency (91): 24
Next Inspection: 3/1/2025

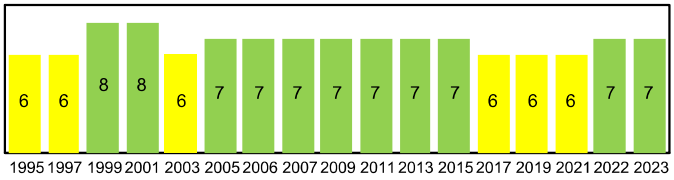
Inspection Type	Freq (92)	Last Insp (93)	Next Insp
Element	24	03/01/2023	03/01/2025
Fracture Critical (A)		N/A	N/A
Underwater (B)	48	03/01/2023	03/01/2027
Special Insp (C)		02/07/2022	N/A

LOAD RATING AND POSTING

Posting Status (41):	A - Open, no restriction
Posting % (70):	5 At/Above Legal Loads
Rating Date:	8/19/2017
Design Load (31):	4 M 18 (H 20)
Opr Method (63):	8 LRFR (HL93)
Opr Rating (64):	41.00 Tons
Inv Method (65):	8 LRFR (HL93)
Inv Rating (66):	25.00 Tons

DECK GEOMETRY

Deck Geometry (68):	4 Tolerable
Deck Area:	20,501.90
Deck Type (107):	1 Concrete-Cast-in-Place
Wearing Surface (108A):	6 Bituminous
Membrane (108B):	0 None
Deck Protection (108C):	None
O. to O. Width (52):	38.20
Curb / Sidewalk Width L (50A):	4.00
Curb / Sidewalk Width R (50B):	4.00
Median (33):	0 No median

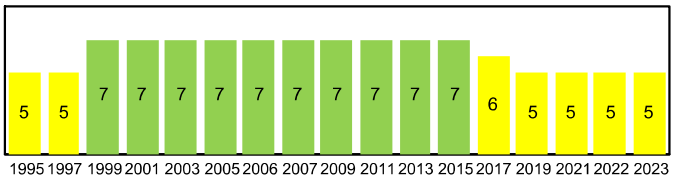


DECK CONDITION

Deck Rating (58):	7 Good
Bridge Rail (36A):	0 Substandard
Transition (36B):	1 Meets Standards
Approach Rail (36C):	1 Meets Standards
Approach Rail Ends (36D):	1 Meets Standards

SUPERSTRUCTURE GEOMETRY

# of Main Spans (45):	10
# of Approach Spans (46):	0
Main Material (43 A):	3 Steel
Main Design (43 B):	02 Stringer/Girder
Max Span Length (48):	72.00
Structure Length (49):	536.70
NBIS Length (112):	Long Enough
Temp Structure (103):	[blank] Not temporary
Skew (34):	0
Structure Flared (35):	0 No flare
Parallel Structure (101):	No || bridge exists
Approach Alignment (72):	5 Above Tolerable

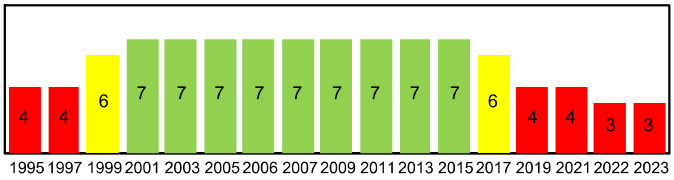


SUPERSTRUCTURE CONDITION

Superstructure Rating (59):	5 Fair
Structure Evaluation (67):	3 Intolerable - Correct

SUBSTRUCTURE GEOMETRY

Navigation Control (38):	Permit Not Required
Nav Vert Clearance (39):	0.00
Nav Horiz Clearance (40):	0.00
Pier Protection (111):	Unknown (NBI)
Lift Bridge Vertical Clearance (116):	
Scour Rating (113):	8 Stable Above Footing
Waterway Adequacy (71):	9 Above Desirable

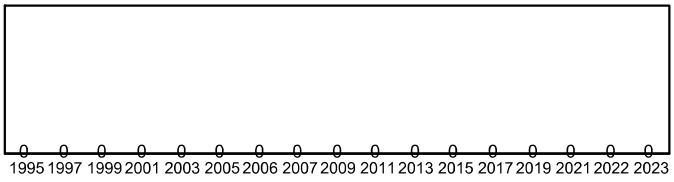


SUBSTRUCTURE CONDITION

Substructure Rating (60):	3 Serious
Channel Rating (61):	7 Minor Damage

CULVERT CONDITION

Culvert Rating (62): N N/A (NBI)



ROUTE ON STRUCTURE: Hawaii Belt Rd (HI Route 19)

ROADWAY LOCATION

Pos Prefix (5A):	Route On Structure
Kind of Hwy (5B):	2 U.S. Numbered H
Route Num (5D):	00019
LRS Route (13A/B):	0000000019/00
Milepost (11):	17.99 mi (28.95 km)
Suffix (5E):	2 East
Lanes On (28A):	2
Detour Length (19):	1.24 mi (2.00 km)

ROADWAY CLASSIFICATION

Funct Class (26):	06 Rural Minor Arterial
Level Service (5C):	1 Mainline
NHS (104):	1 On the NHS
Defense Hwy (100):	0 Not a STRAHNET hwy
Toll Facility (20):	3 On free road
ADT (29):	6,700 Cars/Day
Pct Trucks (109):	9.00%
ADT Year (30):	2019
Traffic Dir (102):	2 2-way traffic
Nat. Truck Net(110):	0 Not part of natl netwo

CLEARANCES

Vertical (10):	99.99
Min Vert Over (53):	99.99
Vert Ref (54A):	N Feature not hwy or RR
Under Clear (54B):	0.00
Horizontal (47):	28.00
Min Lat Left (56):	1,075.31
Min Lat Right (55B):	0.00
Horiz Ref (55A):	N Feature not hwy or RR
Underclearance (69):	N Not applicable (NBI)
Appr Rd Width (32):	34.12
Roadway Width (51):	27.89

PROPOSED IMPROVEMENTS

Bridge Cost (94):	**Year of Cost Estimate (97):** 1999	**Future ADT (114):** 6,781
Roadway Cost (95):	**Type of Work (75):** 38 Other Structural	
Total Cost (96): $21,528,000	**Length of Improvement (76):** 1,830.9 ft	**Year of Future ADT (115):** 2025

BRIDGE NOTES

NANUE STRM was built in 1952. The bridge carries two-lanes of traffic on Hawaii Belt Road (Hawaii Route 19) over Nanue Stream. The structure is a ten-span, reinforced concrete deck bridge on four built-up steel plate girders supported by two reinforced concrete abutments, four steel trestle towers, and one steel bent.

The structure is oriented from south to north, in the direction of advancing milepost. The channel flows from west (upstream) to east (downstream). Girders are numbered from east (Girder 1) to west (Girder 4). The trestle tower and bent columns are numbered from east (Column 1) to west (Column 4).

INSPECTION NOTES

On March 1, 2023, Consor Engineers, LLC performed an underwater inspection for NANUE STRM. A three person team of NBIS qualified bridge engineer-inspectors performed the inspection. Only Bent 5 (all columns) and Bent 6 (Columns 1 and 2 only) are in the water and were included in this underwater inspection. The water depth was approximately 6' at Bent 5. The visibility was 3 feet and the water velocity was approximately 2 feet per second.

Access Method:
The inspection team accessed the bridge on foot from the northwest and northeast embankments.

Item 220
Tops of Bent 5 and Bent 6 footings are intermittently exposed. Footings are keyed into hard bedrock and/ or protected by concrete overpour. At Bent 5, the Column D foundation has a void up to 8' W x 3' H x 4.8' D (compared to 6' W at last UW inspection in 2019). The Column D footer is exposed, 1' W x 3'H x 1.5' D in the voided area (compared to 1' H at last UW inspection). Bent 6 has undermining at Columns A and B.

Item 113
The current rating for Item 113 - Scour Critical Bridge is an 8 - Stable Above Footing. However, based on this current Underwater Inspection Report, the recommended Scour Critical Bridge Rating for Item 113 a 5. The bridge foundations are determined to be stable for the assessed or calculated scour conditions. Scour is determined to be within the limits of the footing or piles. At Bent 5, the Column D footing is exposed, full height (29") with lava rock outcrop visible sticking out 2' from footing x 4' H and outcrop undermined up to 5' L x 42" H x up to 36" penetration. The Column Pedestals A, B, and C of Bent 5 and all the Column Pedestals of Bent 6 are not exposed to the flow of the channel. The void in Column Pedestal D should be filled/repaired and monitored during future inspections.

ELEMENT CONDITION SUMMARY

Str Unit	Elm/Env	Description	Total Qty	% in 1	Qty. St. 1	% in 2	Qty. St. 2	% in 3	Qty. St. 3	% in 4	Qty. St. 4
0	**12/1**	**Re Concrete Deck**	**20,501.00**	**98%**	**20,153.00**	**1%**	**135.00**	**1%**	**213.00**	**0%**	**0.00**
0	510/1	Wearing Surfaces	14,867.00	85%	12,560.00	0%	18.00	15%	2,288.00	0%	1.00
0	*3210/1*	*Del/Spall/Patch/Pot(Wear Surf)*	*51.00*	*0%*	*0.00*	*35%*	*18.00*	*63%*	*32.00*	*2%*	*1.00*
0	*3220/1*	*Crack (Wearing Surface)*	*2,256.00*	*0%*	*0.00*	*0%*	*0.00*	*100%*	*2,256.00*	*0%*	*0.00*
0	1080/1	Delamination/Spall/Patched Area	7.00	0%	0.00	100%	7.00	0%	0.00	0%	0.00
0	1120/1	Efflorescence/Rust Staining	149.00	0%	0.00	43%	64.00	57%	85.00	0%	0.00
0	1130/1	Cracking (RC and Other)	192.00	0%	0.00	33%	64.00	67%	128.00	0%	0.00
0	**107/1**	**Steel Opn Girder/Beam**	**2,268.00**	**23%**	**517.00**	**3%**	**60.00**	**75%**	**1,691.00**	**0%**	**0.00**
0	515/1	Steel Protective Coating	25,344.00	0%	0.00	85%	21,542.00	15%	3,802.00	0%	0.00
0	*3420/1*	*Peel/Bub/Crack(Stl Protect Coat)*	*3,802.00*	*0%*	*0.00*	*0%*	*0.00*	*100%*	*3,802.00*	*0%*	*0.00*
0	*3440/1*	*Eff (Stl Protect Coat)*	*21,542.00*	*0%*	*0.00*	*100%*	*21,542.00*	*0%*	*0.00*	*0%*	*0.00*
0	1000/1	Corrosion	1,688.00	0%	0.00	0%	0.00	100%	1,688.00	0%	0.00
0	1020/1	Connection	6.00	0%	0.00	50%	3.00	50%	3.00	0%	0.00
0	7000/1	Damage	57.00	0%	0.00	100%	57.00	0%	0.00	0%	0.00
0	**207/1**	**Stl Tower**	**591.00**	**0%**	**0.00**	**0%**	**0.00**	**81%**	**476.00**	**19%**	**115.00**
0	515/1	Steel Protective Coating	8,149.00	0%	0.00	73%	5,966.00	27%	2,183.00	0%	0.00
0	*3410/1*	*Chalk(Steel Protect Coatings)*	*204.00*	*0%*	*0.00*	*0%*	*0.00*	*100%*	*204.00*	*0%*	*0.00*
0	*3440/1*	*Eff (Stl Protect Coat)*	*7,944.00*	*0%*	*0.00*	*75%*	*5,966.00*	*25%*	*1,978.00*	*0%*	*0.00*
0	1000/1	Corrosion	587.00	0%	0.00	0%	0.00	81%	473.00	19%	114.00
0	1020/1	Connection	4.00	0%	0.00	0%	0.00	75%	3.00	25%	1.00
0	**215/1**	**Re Conc Abutment**	**104.00**	**57%**	**59.00**	**38%**	**40.00**	**5%**	**5.00**	**0%**	**0.00**
0	1080/1	Delamination/Spall/Patched Area	4.00	0%	0.00	0%	0.00	100%	4.00	0%	0.00
0	1190/1	Abrasion(PSC/RC)	41.00	0%	0.00	98%	40.00	2%	1.00	0%	0.00
0	**220/1**	**Re Conc Pile Cap/Ftg**	**80.00**	**74%**	**59.00**	**11%**	**9.00**	**15%**	**12.00**	**0%**	**0.00**
0	1080/1	Delamination/Spall/Patched Area	6.00	0%	0.00	0%	0.00	100%	6.00	0%	0.00
0	1190/1	Abrasion(PSC/RC)	3.00	0%	0.00	0%	0.00	100%	3.00	0%	0.00
0	6000/1	Scour	12.00	0%	0.00	75%	9.00	25%	3.00	0%	0.00
0	**301/1**	**Pourable Joint Seal**	**269.00**	**88%**	**237.00**	**1%**	**3.00**	**11%**	**29.00**	**0%**	**0.00**
0	2310/1	Leakage	28.00	0%	0.00	0%	0.00	100%	28.00	0%	0.00
0	2330/1	Seal Damage	1.00	0%	0.00	0%	0.00	100%	1.00	0%	0.00
0	**311/1**	**Moveable Bearing**	**20.00**	**0%**	**0.00**	**40%**	**8.00**	**60%**	**12.00**	**0%**	**0.00**
0	515/1	Steel Protective Coating	40.00	0%	0.00	100%	40.00	0%	0.00	0%	0.00
0	*3420/1*	*Peel/Bub/Crack(Stl Protect Coat)*	*40.00*	*0%*	*0.00*	*100%*	*40.00*	*0%*	*0.00*	*0%*	*0.00*
0	1000/1	Corrosion	14.00	0%	0.00	57%	8.00	43%	6.00	0%	0.00
0	1020/1	Connection	6.00	0%	0.00	0%	0.00	100%	6.00	0%	0.00
0	**313/1**	**Fixed Bearing**	**24.00**	**0%**	**0.00**	**63%**	**15.00**	**38%**	**9.00**	**0%**	**0.00**
0	515/1	Steel Protective Coating	48.00	0%	0.00	100%	48.00	0%	0.00	0%	0.00
0	*3420/1*	*Peel/Bub/Crack(Stl Protect Coat)*	*48.00*	*0%*	*0.00*	*100%*	*48.00*	*0%*	*0.00*	*0%*	*0.00*
0	1000/1	Corrosion	23.00	0%	0.00	65%	15.00	35%	8.00	0%	0.00
0	1020/1	Connection	1.00	0%	0.00	0%	0.00	100%	1.00	0%	0.00
0	**331/1**	**Re Conc Bridge Railing**	**1,073.00**	**0%**	**0.00**	**100%**	**1,073.00**	**0%**	**0.00**	**0%**	**0.00**
0	7000/1	Damage	1,073.00	0%	0.00	100%	1,073.00	0%	0.00	0%	0.00

ELEMENT NOTES

STRUCTURE UNIT: 0

ELEM	ELEMENT NAME	ENV	QUANTITY	UNITS	CS1	CS2	CS3	CS 4
12	**Re Concrete Deck**	**1**	**20,501.00**	**sq.ft**	**20,153.00**	**135.00**	**213.00**	**0.00**

NOTE: Ratings for element 12 reflect conditions observed during the previous routine and element inspections performed.

Total quantity changed from 20382 SF to 20502 SF due to 536.7' structure length x 38.2' out-to-out per field measurements.

-The deck has 16 drains on each side, 32 total; all deck drains are clear with minor corrosion on the grating.
-Span 2, east overhang, 1st scupper south of Bent 2, vegetation growth and almost full of debris.
-The sidewalks are scaled throughout, typically 1/8" deep.

510	Wearing Surfaces	1	14,867.00	sq.ft	12,560.00	18.00	2,288.00	1.00

Total quantity changed from 14809 SF to 14867 SF due to 536.7' structure length x 27.7' curb-to-curb per field measurements.

3210	*Del/Spall/Patch/Pot(We*	*1*	*51.00*	*sq.ft*	*0.00*	*18.00*	*32.00*	*1.00*

-South Abutment Joint, NB lane, 6" diameter x 1" deep spall adjacent to crack, 1 SF CS3, (See Photo 15).
-Bent 3 Joint, both lanes, 2' 4" L x 4' W area of settled patches with a 6" Dia. x 1" D spall within. The rest of the paved over joint is rutted up to 1" deep, 8 SF CS3, (See Photo 16).
-Span 4, NB lane, 20' north of Bent 3, 3' L x 3' W area of gouges (largest is 1' 1" L x 2' W x 1/2" deep), 5 SF CS3, (See Photo 17).
-Bent 5 Joint, NB lane, 2' 4" L x 4' W x 1/2" deep cracked and settled pothole with ponding water, 8 SF CS3, (See Photo 18).
-Bent 5 Joint, SB lane, 2' L x 4' 5" W x 2" deep settled patch with a 11" L x 11" W x 1" deep spall within with exposure of deck and joint, 2 SF CS3, (See Photo 19).
-Span 8, NB lane, 15' north of Bent 7 Joint, 8" L x 15" W x 1/2" deep patched pothole that is failing and has ponding water, 1 SF CS3, (See Photo 20).
-Bent 7 Joint, SB lane, previous cracked and settled patch has been re-patched, 8 SF CS2, (See Photo 51).
-Bent 9 Joint, SB lane, wearing surface, 16" L x 21" W x 1" deep cracked and settled patch with 5" L x 11" W x 1" deep pothole within with exposure of steel plate and joint material, 4 SF CS2, 1 SF CS4, (See Photo 21).
-Bent 9 Joint, NB right wheel line, cracked and settled potholes with ponding water, 6 SF CS3, (See Photo 22).
-North Abutment Joint, SB lane, (3) potholes, (2) are patched 2' L x up to 4' W and (1) is 8" diameter x 1" deep, 8 SF CS2, 1 SF CS3, (Similar to Photo 21).
-North Abutment Joint, NB lane, left wheel line, 2' L x 3' W patch, 6 SF CS2.

3220	*Crack (Wearing Surfac*	*1*	*2,256.00*	*sq.ft*	*0.00*	*0.00*	*2,256.00*	*0.00*

-Wearing surface, full length cracking with associated map cracking and rutting in the wheel lines of both NB and SB lanes throughout approximately 15% of the entire wearing surface, typically 1/8" W to 1/4"W, 2230 SF CS3, (Similar to Photo 15).
-South Abutment Joint, NB lane, 12' L x up to 1/8" W transverse crack with adjacent spall, 11 SF CS3, (See Photo 15).
-North Abutment Joint, transverse cracking up to 1/8" W throughout, 15 SF CS3, (Similar to Photo 15).

1080	Delamination/Spall/Patche	1	7.00	sq.ft	0.00	7.00	0.00	0.00

Underside of Deck:
-West overhang at Bent 3 Joint, edge spalling along the joint with (1) exposed reinforcing bar above Girder 4, 7 SF CS2.

1120	Efflorescence/Rust Staining	1	149.00	sq.ft	0.00	64.00	85.00	0.00

Underside of Deck:
-All spans, both overhangs, transverse cracking with efflorescence throughout, typically 3'-4' apart x up to 1/8" W, 85 SF CS3.
-All spans, Bays 1 and 3, transverse cracking with efflorescence throughout, typically 2'-3' apart x up to 1/32" W, 64 SF CS2.

STRUCTURE UNIT: 0

ELEM	ELEMENT NAME	ENV	QUANTITY	UNITS	CS1	CS2	CS3	CS 4
1130	Cracking (RC and Other)	1	192.00	sq.ft	0.00	64.00	128.00	0.00
	Underside of Deck: -All spans, Bays 1 and 3, transverse cracking throughout, typically 2'-3' apart x up to 1/32" W, with and without efflorescence, 64 SF CS2. -All spans, Bay 2, map cracking throughout, up to 1/16" W, 128 SF CS3.							
107	**Steel Opn Girder/Beam**	**1**	**2,268.00**	**ft**	**517.00**	**60.00**	**1,691.00**	**0.00**
	NOTE: Ratings for element 107 reflect conditions observed during the previous routine and element inspections performed. **Four (4) built-up steel girders, numbered from east (downstream) to west (upstream).** **-The cross frames typically have painted over pitting 1/16" deep with isolated areas up to 1/4" deep and areas of reactivating corrosion.** **-Bent 3, Bay 2, both cross frames, laminar corrosion throughout with up to 25% section loss of member.** **-Span 4, Bay 2, 2nd diaphragm, lower horizontal member, 3" diameter corrosion hole at both girder connections and impact damage to angle 1 1/2" over 10" L.** **-Span 4, Bay 2, lateral bracing, lower gusset plates at 2nd and 3rd cross frames have pack rust and corrosion holes up to 6" L x 2" W adjacent to Girder 3.** **-Span 4, Bay 2, lower gusset plates at 2nd and 3rd cross frames, pack rust and corrosion holes up to 6" L x 2" W adjacent to Girder 3.** **-Span 6, Bay 1 at Bent 5, adjacent to Girder 1, lower bracing, 100% section loss on bottom flange over 10" L x up to 1 1/2" deep.** **-Span 6, Bay 2, 2nd cross frame lower strut adjacent to Girder 3, (2) corrosion holes up to 3" diameter and there are small corrosion holes adjacent to Girder 2 at the 2nd and 3rd cross frame.** **-Span 8, Bay 2, 2nd lower strut, (2) missing bolts and (1) corrosion hole, 5" L x 2" W.** **-Span 8, Bay 2, 3rd lower strut, missing bolts and (1) corrosion hole, 4" L x 1 1/2" W.** **-Span 9, Bay 1 at Bent 9, adjacent to Girder 1, lower bracing, 100% section loss on bottom flange over 1' L x up to 1" W.** **-North Abutment, Girder 3, Bay 2, lateral bracing has (3) missing/ loose anchor bolts and a deformed gusset plate.**							
515	Steel Protective Coating	1	25,344.00	sq.ft	0.00	21,542.00	3,802.00	0.00
3420	*Peel/Bub/Crack(Stl Prc*	*1*	*3,802.00*	*sq.ft*	*0.00*	*0.00*	*3,802.00*	*0.00*
	Approximately 15% of the steel protective coating exhibits peeling/ bubbling, 3802 SF CS3.							
3440	*Eff (Stl Protect Coat)*	*1*	*21,542.00*	*sq.ft*	*0.00*	*21,542.00*	*0.00*	*0.00*
	The steel protective coating is substantially effective throughout, 21542 SF CS2.							
1000	Corrosion	1	1,688.00	ft	0.00	0.00	1,688.00	0.00

STRUCTURE UNIT: 0

ELEM	ELEMENT NAME	ENV	QUANTITY	UNITS	CS1	CS2	CS3	CS 4
	-The bottom flange (top and bottom faces) of the exterior girders have peeling paint and moderate corrosion along the ends in each span, typically 4' L x 5" W, with up to 3/16" deep section loss, 160 LF CS3. -The interior girder webs exhibit peeling paint and laminar corrosion randomly throughout (roughly 40%) with isolated areas of pitting up to 1/8" deep. The interior girder webs are similarly affected for 5% of it's area, 478 LF CS3. -The exterior webs of the exterior girders have intermittent areas (roughly 15%) of painted over pitting up to 1/8" deep, 160 LF CS3,. -The rivets along the bottom of the girder webs have painted over section loss and areas of peeling paint with moderate corrosion and section loss, typically up to 15%, 840 LF CS3. -Span 2, Bay 1, top flange plate of Girder 1, intermittent areas of up to 2' L x 2" W x 1/2" deep painted over pitting, 10 LF CS3. -Span 2, Girder 1, west face, 25' L section of painted over pitting up to 1/8" deep, 25 LF CS3. -Span 2, Girder 3, east face bottom flange, (2) missing rivets in 1' L area of up to 1" thick pack rust, 1 LF CS3. -Bent 3, Bay 1, Girder 1 and 2 bottom flange connection, rivet heads have corrosion with up to 50% section loss, 2 LF CS3. -Bent 3, Bay 1, Girder 2, web sliding plate, (3) missing bolts with heavy laminar corrosion, 1 LF CS3. -Bent 3, Girder 1, top of sliding web plate, 5" H x 2" W area of 1/8" to 100% section loss, area of 100% loss is 1" W, 1 LF CS3, (See Photo 35). -Span 4, Girder 3 splice and bottom flange, 3' L x up to 1/8" W pitting and rivet head corrosion with up to 25% section loss, as well as peeling paint, 3 LF CS3. -Span 4, Girder 4 east face, near Bent 3, bearing stiffener, pack rust up to 1" thick at the base with four missing rivets, 1 LF CS3. -Bent 5, Girder 1 web sliding plate, corrosion induced crack at the top 1" with heavy laminar corrosion around the crack, 1 LF CS3. -Span 6, Bent 5, web stiffener above Girder 1 bearing, 3/16" thick pack rust causing a 1' 11" H x 1" deflection, 1 LF CS3. -Span 8, Girder 3 at Bent 7, east face bearing stiffener, pack rust up to 3/4" and 100% section loss for bottom 5" x 1/2" W, 1 LF CS3. -Span 10, Girder 1, east face at North Abutment, 3" L x 1/2" W area of 100% section loss, 1 LF CS3. -Span 10, Girder 1, east face at North Abutment, (2) bearing stiffeners have effectively no remaining section at the lower 2" at the base. The eastern bottom flange has 2" L knife edging. This condition is similar at the Girder 4 East face, 2 LF CS3.							
1020	Connection	1	6.00	ft	0.00	3.00	3.00	0.00
	-Span 2, Girder 4, east face stiffeners, (3) abandoned plates with missing connection bolts, 3 LF CS2. -Bent 3, Girder 2 web sliding plate, missing bolts and nuts and heavy laminar corrosion, 1 LF CS3. -Bent 3, Girder 4 web sliding plate, heavy corrosion at the bolt slots and (2) missing bolts at the bottom, with a 2" H x 3" W area of 100% section loss, 1 LF CS3. -Bent 5, Girder 2 web sliding plate, (1) missing connection bolt, 1 LF CS3.							
7000	Damage	1	57.00	ft	0.00	57.00	0.00	0.00
	-There are approximately 30 bent transverse stiffeners throughout the structure (see below for specific locations), 30 LF CS2. -South and North Abutment girder seats, all the girder bottom flanges have deformations up to 1' 6" L x 1" deflection, 16 LF CS2. -Span 1, Girder 4, east face, between 2nd and 3rd cross frame, (1) stiffener has a 1" deflection to the south, 1 LF CS2. -Bent 8, Girder 1 exterior web stiffener, 2' 6" H x 1" deflection and the third stiffener to the north has a 8" H x 1" deflection, 4 LF CS2. -Bent 9, Girder 1 exterior stiffeners, deflections, up to 1" in intermittent locations, 5 LF CS2. -Span 9, Girder 4, east top flange near midspan, deformation, 6" L x 1" H, 1 LF CS2.							
207	**Stl Tower**	**1**	**591.00**	**ft**	**0.00**	**0.00**	**476.00**	**115.00**

STRUCTURE UNIT: 0

ELEM	ELEMENT NAME	ENV	QUANTITY	UNITS	CS1	CS2	CS3	CS 4

NOTE: Ratings for element 207 reflect conditions observed during the previous routine and element inspections performed.

Typical defects for all Towers (unless otherwise noted, refer to the attached drawings for specific defects and their locations):

All original members typically have failing paint and laminar corrosion throughout with knife edging and section loss up to 10% of total cross-sectional area. Gusset plates typically have laminar corrosion around the incoming members with 1/8" deep section loss to the plate and incoming member. There is also pack rust up to 3/8" thick between the gusset plates and incoming members. Isolated rivet heads exhibit up to 25% section loss. There are random instances of distorted members, typically up to 1".

All trestle towers typically have more advanced deterioration at the top level (Level 1) and throughout the lower levels from Towers 2 through 4. There is light to moderate vegetation throughout the bottom of Towers 2 through 4. All trestle towers have been retrofitted with bolted bracing members.

High Priority Findings:

-Tower 3, Bent 4 to 5, Column A, Level 3 - Vertical in Level 3 is completely detached from the upper horizontal member of Level 4. - Repaired.

The following "Damage" defects have been repaired:

Tower 3, Bent 4, Column A, Level 3 was impacted by a vehicle and exhibits the following:
-Up to 4" out of plane distortion to the north over the full height of Level 3 and up to 1" to the west over the lower 10' of Level 3.
-Lower two previously cut lacing bars on the makai face have been bent towards makai up to 12".
-62" above the top edge of the bottom batten plate is a 1 7/8" L crack in the northwest flange.
-There is a deformed lacing bar pair which exhibits a cracked weld at the northeast flange in the upper half of the column on the makai face.
-The connection plates to Bent 4, Column A from the diagonal bracing are bowing outward.
-The diagonal bracing is bucked at the Bent 4, Column A connection plate and is damaged and severed near midspan.
-The vertical bracing at midspan that connects to the diagonal bracing exhibits two severed connection plates at the base connection to a horizontal bracing.

515	Steel Protective Coating	1	8,149.00	sq.ft	0.00	5,966.00	2,183.00	0.00
3410	*Chalk(Steel Protect Co*	*1*	*204.00*	*sq.ft*	*0.00*	*0.00*	*204.00*	*0.00*
	The towers exhibit chalking in isolated locations throughout, 204 SF CS3.							
3440	*Eff (Stl Protect Coat)*	*1*	*7,944.00*	*sq.ft*	*0.00*	*5,966.00*	*1,978.00*	*0.00*
	The steel protective coating on the trestle tower members range from substantially effective to limited effectiveness, 5966 SF CS2, 1978 SF CS3.							
1000	Corrosion	1	587.00	ft	0.00	0.00	473.00	114.00

STRUCTURE UNIT: 0

ELEM	ELEMENT NAME	ENV	QUANTITY	UNITS	CS1	CS2	CS3	CS 4

Priority 2 (High) Findings (repair within 3 years) (Total 114 LF CS4):

-Bent 4, Level 2, Column C, 50% of lacing bars on west face have 100% section loss, remaining bars on both faces have average 30% section loss, 32 LF CS4.

-Bent 4, Level 3, horizontal bracing at gusset plates at Column A, horizontal bracing gusset plate has 100% section loss on all sides. This member is not connected to column A anymore, 1 LF CS4.

-Bent 5, Level 2, between Columns B and C, lower west diagonal bracing, connection to Column C, north angle exhibits two 10" L x up to 4" H holes with 1" x 3" remaining section. Remaining length of diagonal exhibits knife edging and pitting, 16 LF CS4.

-Bent 5, Level 2, Column D, horizontal bracing gusset plates, heavy laminar corrosion with up to 100% section loss with 15% section remaining of the north gusset plate and repair plates becoming ineffective, 1 LF CS4.

-Bent 6, Level 4, between Columns B and C, vertical bracing, severe corrosion throughout this member with up to 60% cross sectional loss, 9 LF CS4.

-Bent 6, Level 5, Column B, almost all lacing bars on the west side of the column have 100% section loss; (6) bars with section loss remaining intact at time of inspection, 28 LF CS4.

-Bent 6, Level 4 and 5, Column C, all top lacing bars on the west side have 100% section loss. Remaining lacing bars on this column from here to the bottom have severe laminar corrosion with an average 75% section loss, 23 LF CS4, (Similar to Photo 131). (41 LF overlapping)

-Tower 4, Level 1, Column B, lower south diagonal bracing, exterior angle of diagonal has 100% section loss to vertical leg and only 2 1/2" of section remaining on horizontal leg; angle is deformed 1/4" over 10" near section loss, 1 LF CS4, (See Photo 133).

-Tower 4, Level 1, Column B, upper north diagonal bracing, 3" diameter corrosion hole in vertical leg of angle at connection, 1 LF CS4.

-Tower 4, Level 1, Column B, upper south diagonal bracing, exterior angle of diagonal has 100% section loss to vertical leg and only 2" of section remaining on horizontal leg; angle is deformed 1/4" over 10" near section loss, CS4. (overlapping)

-Tower 4, Level 3, Column C, lower south diagonal bracing, west angle has 4” H x 2” L area of 100% section loss adjacent to the gusset plate, and the east angle has 1/4” loss in same location. Combined for 50% loss of member cross sectional area, 1 LF CS4.

-Bent 7, Level 2, Column D, gusset plates, corrosion, heavy laminar corrosion with diagonal lateral bracing corroded away and detached, 1 LF CS4.

NOTE: The defects in the attached drawings account for 473 LF CS3. This quantity typically includes laminar corrosion and knife edging throughout the members.

1020	Connection	1	4.00	ft	0.00	0.00	3.00	1.00

NOTE: The defects in the attached drawings account for 3 LF CS3, 1 LF CS4. This quantity typically includes deteriorated or missing rivet heads at connections throughout the towers.

215	**Re Conc Abutment**	**1**	**104.00**	**ft**	**59.00**	**40.00**	**5.00**	**0.00**

NOTE: Ratings for element 215 reflect conditions observed during the previous routine and element inspections performed.

-South Abutment has moss growth on both east and west ends.
-The stone masonry wingwalls are covered in vegetation.

STRUCTURE UNIT: 0

ELEM	ELEMENT NAME	ENV	QUANTITY	UNITS	CS1	CS2	CS3	CS 4
1080	Delamination/Spall/Patche	1	4.00	ft	0.00	0.00	4.00	0.00
	-South Abutment, Bay 3, center section, spall, 1' 4" H x 8" W x 1" deep, 1 LF CS3. -North Abutment, Girder 3 seat, failed repair, 2' 11" L x 10" H x 3" deep exposing (2) reinforcing bars with no section loss, 3 LF CS3.							
1190	Abrasion(PSC/RC)	1	41.00	ft	0.00	40.00	1.00	0.00
	-North Abutment, center section, up to 1/4" deep scaling throughout, 40 LF CS2. -North Abutment, west end of center section, honeycombing, up to 2' H x 1" W x 1" deep, 1 LF CS3.							
220	**Re Conc Pile Cap/Ftg**	**1**	**80.00**	**ft**	**59.00**	**9.00**	**12.00**	**0.00**
	NOTE: Ratings for element 220 reflect conditions observed during the previous routine and element inspections performed. **Four (4) tower columns that are labeled from downstream (Column A) to upstream (Column D).** **UWI Notes 01/03/2023:** **Bent 5, Column A, Footing - Exposed, up to 4' H, founded on rock (See Photo 9).** **Bent 5, Column B, Footing - Exposed up to 1.4' H and a bottom rock layer of 1.6' H (See Photo 10).** **Bent 5, Column D, Footing - Exposed, up to 1' W X 3' H x 1.5' D.**							
1080	Delamination/Spall/Patche	1	6.00	ft	0.00	0.00	6.00	0.00
	-Bent 4, Column D, footing, southeast corner, 11" W x 1' 7" H x 2 1/2" deep corner spall, 1 LF CS3. -Bent 5, Column C, footing, southwest corner, 5' W x 1' 4" H x 1' deep spall, 5 LF CS3.							
1190	Abrasion(PSC/RC)	1	3.00	ft	0.00	0.00	3.00	0.00
	-Bent 5, Column C, footing, base of pedestal on west side, 3' x 2' abrasion with course aggregate exposed and missing, 3 LF CS3.							
6000	Scour	1	12.00	ft	0.00	9.00	3.00	0.00
	UWI Notes 01/03/2023: Bent 5, Column D, Footing - Void, 8'W x 3' H x 4.8' D on upstream end and 3' D at exposed footing, 8 LF CS2. Bent 6, Column A, Footing - Undermined, 3' L x 2' H x 1.5' D, 3 LF CS3 (See Photo 14). Bent 6, Column A, Footing - Void below southwest corner, 8" L x 6" H x 9" D, 1 LF Cs2 (See Photo 15). Bent 6, Column B, Footing - Undermined, up to 4" H x 6" D, 1 LF CS2 (See Photo 16).							
301	**Pourable Joint Seal**	**1**	**269.00**	**ft**	**237.00**	**3.00**	**29.00**	**0.00**
	NOTE: Ratings for element 301 reflect conditions observed during the previous routine and element inspections performed. **-All deck joints have been paved over for the full-length of the travel lanes, the condition of these joints from the top of deck was unobservable during the inspection (excluding the areas of metal exposure due to potholes in the asphalt overlay).** **-Bent 3, center joint, vegetation growth into the joint from the underdeck at the east overhang.** **-North Abutment Joint, NB lane, exposure of steel plate with minor corrosion through pothole has been patched. (3 LF overlapping).**							
2310	Leakage	1	28.00	ft	0.00	0.00	28.00	0.00
	-Both abutments, below the joints, moisture staining, 20 LF CS3. -Bent 3 Joint, Bay 2, active leakage, 8 LF CS3, (See Photo 46).							
2330	Seal Damage	1	1.00	ft	0.00	0.00	1.00	0.00
	-Bent 9 Joint, SB lane, exposure of partially pulled out joint material through pothole, 1 LF CS3, (See Photo 21).							
311	**Moveable Bearing**	**1**	**20.00**	**each**	**0.00**	**8.00**	**12.00**	**0.00**
	NOTE: Ratings for element 311 reflect conditions observed during the previous routine and element inspections performed. **Moveable Bearing Locations (Based on Design Plans): South Abutment, Bent 3, Bent 5, Bent 7, Bent 9**							

STRUCTURE UNIT: 0

ELEM	ELEMENT NAME	ENV	QUANTITY	UNITS	CS1	CS2	CS3	CS 4
515	Steel Protective Coating	1	40.00	sq.ft	0.00	40.00	0.00	0.00
3420	*Peel/Bub/Crack(Stl Prc*	*1*	*40.00*	*sq.ft*	*0.00*	*40.00*	*0.00*	*0.00*

The steel protective coating of all moveable bearings is in satisfactory condition, 40 SF CS2.

1000	Corrosion	1	14.00	each	0.00	8.00	6.00	0.00

-All moveable bearings typically have light to moderate peeling paint with minor corrosion at the exposed surfaces and typically negligible section loss throughout, 8 EA CS2.
-South Abutment bearings, moderate corrosion with minor section loss, 4 EA CS3.
-Bent 3, Span 4, Girder 2 bearing, four bolts with 100% section loss, 1 EA CS3.
-Bent 3, Span 4, Girder 4 bearing, peeling paint and heavy corrosion throughout. The bottom plate has 10% section loss along the edges and pack rust on the north side, 1 EA CS3.

1020	Connection	1	6.00	each	0.00	0.00	6.00	0.00

-Bent 3, Span 4, Girder 2 bearing, missing southeast and northwest anchor bolts, 1 EA CS3.
-Bent 3, Span 4, Girder 3 bearing, missing northeast anchor bolt, 1 EA CS3.
-Bent 3, Span 4, Girder 4 bearing, missing west anchor bolt, 1 EA CS3.
-Bent 7, Span 8, Girder 2 bearing, missing southeast anchor bolt, 1 EA CS3.
-Bent 7, Span 8, Girder 3 bearing, missing SE, SW & NW anchor bolts, missing NE anchor nut, 1 EA CS3,.
-Bent 7, Span 8, Girder 4 bearing, missing east anchor bolt, 1 EA CS3.

313	**Fixed Bearing**	**1**	**24.00**	**each**	**0.00**	**15.00**	**9.00**	**0.00**

NOTE: Ratings for element 313 reflect conditions observed during the previous routine and element inspections performed.

Fixed Bearing Locations (Based on Design Plans): Bent 1, Bent 2, Bent 4, Bent 6, Bent 8, North Abutment

515	Steel Protective Coating	1	48.00	sq.ft	0.00	48.00	0.00	0.00
3420	*Peel/Bub/Crack(Stl Prc*	*1*	*48.00*	*sq.ft*	*0.00*	*48.00*	*0.00*	*0.00*

The steel protective coating of all fixed bearings is in satisfactory condition, 48 SF CS2.

1000	Corrosion	1	23.00	each	0.00	15.00	8.00	0.00

-All fixed bearings typically have light to moderate peeling paint with minor corrosion at the exposed surfaces and typically negligible section loss throughout, 14 EA CS2.
-Bent 4, Span 5, Girder 1 bearing, peeling paint and heavy corrosion throughout. The bottom plates have 10% section loss, 1 EA CS3.
-Bent 4, Girder 4 bearing, heavy corrosion on the anchor bolts with up to 30% section loss, 1 EA CS3.
-Bent 8, Girder 1 bearing, minor surface corrosion around the bearing and anchor bolts, 1 EA CS2.
-Bent 8, Girder 4 bearing, up to 1/8” laminar corrosion, 1 EA CS3.
-Bent 9, Span 9, Girder 1 bearing, up to 1/4" thick laminar corrosion, 1 EA CS3.
-North Abutment bearings, up to 1/8” thick laminar corrosion, 4 EA CS3.

1020	Connection	1	1.00	each	0.00	0.00	1.00	0.00

-Bent 3, Span 3, Girder 2 bearing, missing south anchor bolt, 1 EA CS3.

331	**Re Conc Bridge Railing**	**1**	**1,073.00**	**ft**	**0.00**	**1,073.00**	**0.00**	**0.00**

NOTE: Ratings for element 331 reflect conditions observed during the previous routine and element inspections performed.

Total quantity changed from 1062 LF to 1074 SF due to 536.7' structure length x 2 railings per field measurements.

The bridge railings are composed of concrete and are 30” H, failing to meet FHWA minimum height requirements.

STRUCTURE UNIT: 0

ELEM	ELEMENT NAME	ENV	QUANTITY	UNITS	CS1	CS2	CS3	CS 4
7000	Damage	1	1,073.00	ft	0.00	1,073.00	0.00	0.00

NOTE: The following note should be coded under 1190 Abrasion, however this defect type is not included in Element 331. It is coded here as 7000 Damage instead.

The railings are scaled throughout, typically 1/8” D, and are covered with moss on the vertical faces, 1062 LF CS2.



Photo 1. Upstream (west) elevation, looking east



Photo 2. Downstream (east) elevation, looking west



Photo 3. Looking upstream (west)



Photo 4. Looking downstream (east)



Photo 5. Typical channel overview



Photo 6. South embankment and channel alignment, looking south



Photo 7. North embankment and channel alignment, looking north



Photo 8. Bent 5, Columns C and D, looking south



Photo 9. Bent 5, Column A footing, looking south. Exposure, up to 4' H



Photo 10. Bent 5, Column B footing, looking south. Exposure with grouted rocks exposed below, up to 1.4' H and a bottom rock layer of 1.6' H



Photo 11. Bent 5, Columns C and D, looking south



Photo 12. Bent 5, Column D, looking south. Scour below rock formation, 3' H x 1.5" D, CS3



Photo 13. Bent 6, Columns A and B, looking north



Photo 14. Bent 6, Column A, looking north. Undermined, 3' L x 2' H x 1.5" D, CS3



Photo 15. Bent 6, Column A Footing, looking north. Void below southwest corner, 8" L x 6" H x 9" D, CS2



Photo 16. Bent 6, Column B footing, looking north. Undermined, up to 4" H x 6" D, CS2



Photo 17. Bent 6, Columns C and D, looking north

Work Candidates

Assigned to In-House Maintenance

Status	Priority	Action	Date Proposed	Notes
Unknown	3 - Medium		03/01/2023	Replace/repair missing or heavily weathered delineators at the top of the bridge railing.
Unknown	3 - Medium		03/22/2022	Resurface approach roadways.

Assigned to Maintenance Contract

Status	Priority	Action	Date Proposed	Notes
Unknown	3 - Medium		03/19/2021	Fill voids and undermined areas at Bent 5 and Bent 6 foundations.
Unknown	3 - Medium		03/21/2022	Replace missing/decayed inspection/maintenance access planks.
Unknown	3 - Medium		03/19/2021	Repair deck joints.

Assigned to Project(not Maintenance)

Status	Priority	Action	Date Proposed	Notes
Unknown	2 - High		03/21/2022	Conduct a load rating and seismic load rating analysis on the steel tower to determine the current capacity and the susceptibility of the bridge under seismic conditions.
Unknown	2 - High		03/01/2023	The current load rating from 8/19/2017 was completed using rating of; Item 58, Deck: 7, Item 59, Superstructure: 7, and Item 60, Substructure: 7 with a condition factor of: 1.00. Based on the current inspection and current ratings of; Item 58, Deck: 7, Item 59, Superstructure: 5, and Item 60, Substructure: 3 an updated load rating is recommended. The current load rating summary sheet from 8/19/2017 is included in this report.

WORK DONE SINCE LAST INSPECTION

NOTES RTN 03/01/2023:

Top of deck:
-Bent 7 Joint, SB lane, previous cracked and settled patch has been re-patched.
-North Abutment Joint, NB lane, exposure of steel plate with minor corrosion through pothole has been patched.

Towers:
-Bent 5, Level 1, lower section, between Columns A and B, lower horizontal bracing, Column A lower gusset plates exhibit up to 100% section loss above and below horizontal member with 5" L segments of 25% section left holding members. - Repaired.
-Tower 4, Level 3, Column A, vertical bracing, section loss, exterior leg with 80% loss. - Repaired.
-Bent 7, Level 2, between Columns A and B, horizontal bracing and gusset plate at Column A, no longer attached with multiple corrosion holes up to 2" x 3" in horizontal bracing interior gusset plate. - Repaired.
-Tower 3, Level 3, Column A, lower south diagonal, and vertical bracing, 2022 damages - Repaired.

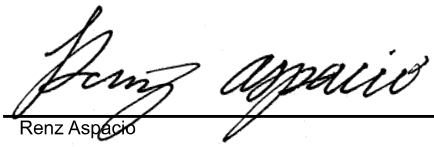
TRAFFIC SAFETY FEATURES NOTES

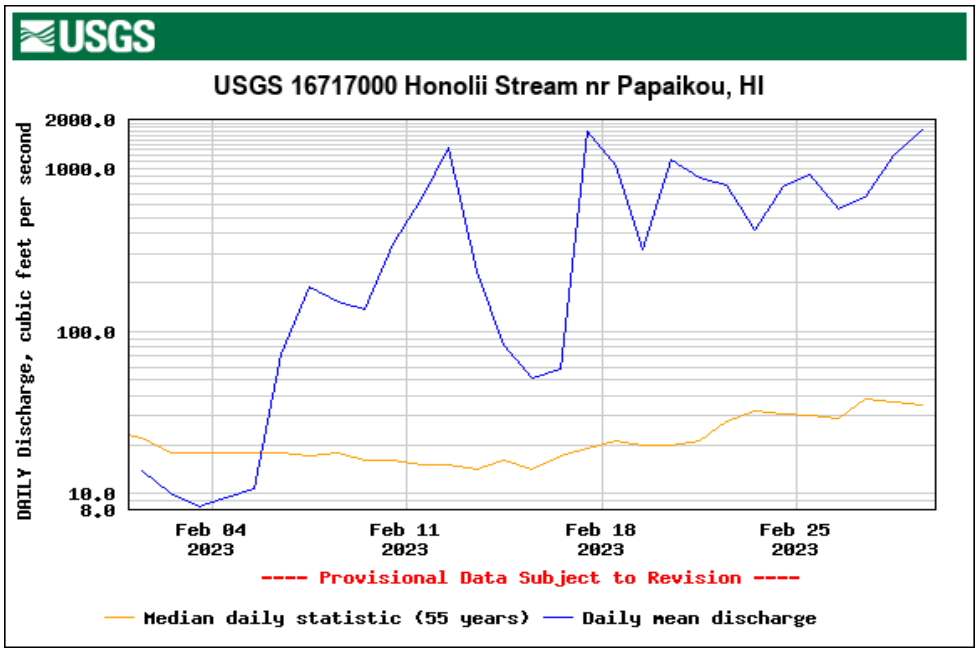
NOTE: Ratings for traffic safety features reflect conditions observed during the previous routine and element inspections performed.

36A - Bridge Railings: 2'-6" H bridge railings and a 10" H curb.
36B - Transitions: W-beam with 3' post spacing and metal offsets.
36C - Approach Guardrail: 28.5" H W-beams with 6'-3" post spacing and metal offsets.
36D - Approach Guardrail Ends: Southwest, northwest, and northeast ends are flared and anchored into the embankment. Southeast end is a FLEAT end terminal.

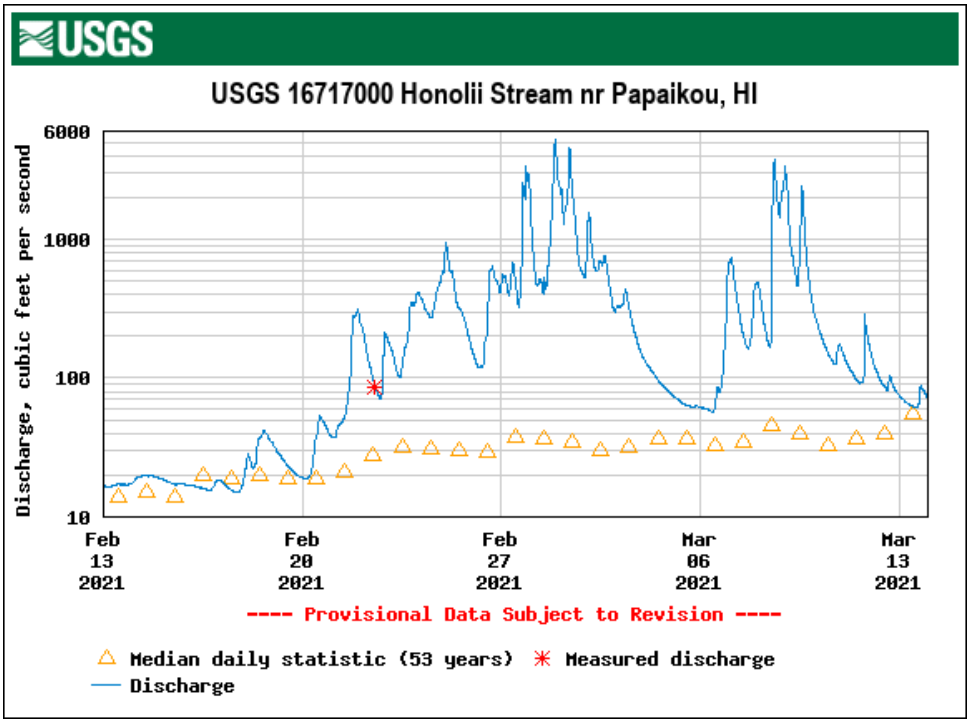
-North and south approach roadways, depressed and worn surface in wheel lines of both lanes; up to 1/2" wide map cracks throughout, some with vegetation growth, (See Photo 52).

-East railing, south end, (2) reinforcing bars sticking out of concrete towards NB traffic, (See Photo 53).
-Southwest, northwest, and northeast approach guardrails, minor corrosion throughout.
-Southwest guardrail, (3) areas of impact damage, typically 1' 1" L x 1" deflection.
-Southeast guardrail, (1) rotated post.
-Northwest guardrail, 2' L x 1" deflection area of impact damage at the abutment.
-Northeast guardrail, (2) areas of impact damage, (1) 10' L x 3" deflection and (1) 2' L x 2" deflection, (See Photo 54).
-Delineators at the top of the bridge rail are heavily weathered or missing.

Inspector:	**Signature:**	 Renz Aspacio	**Phone:**	888-451-6822
Inspector:	**Signature:**	 Chad Barga	**Phone:**	
Team Leader:	**Signature:**	 Joshua Steiner	**Phone:**	888-451-6822
	Office:	Consor Engineers, LLC	**Certification Date:**	05/19/2022
BIP Leader:	**Signature:**		**QC Date:**	
	Office:			



Stream Gauge Results from Feb 2023

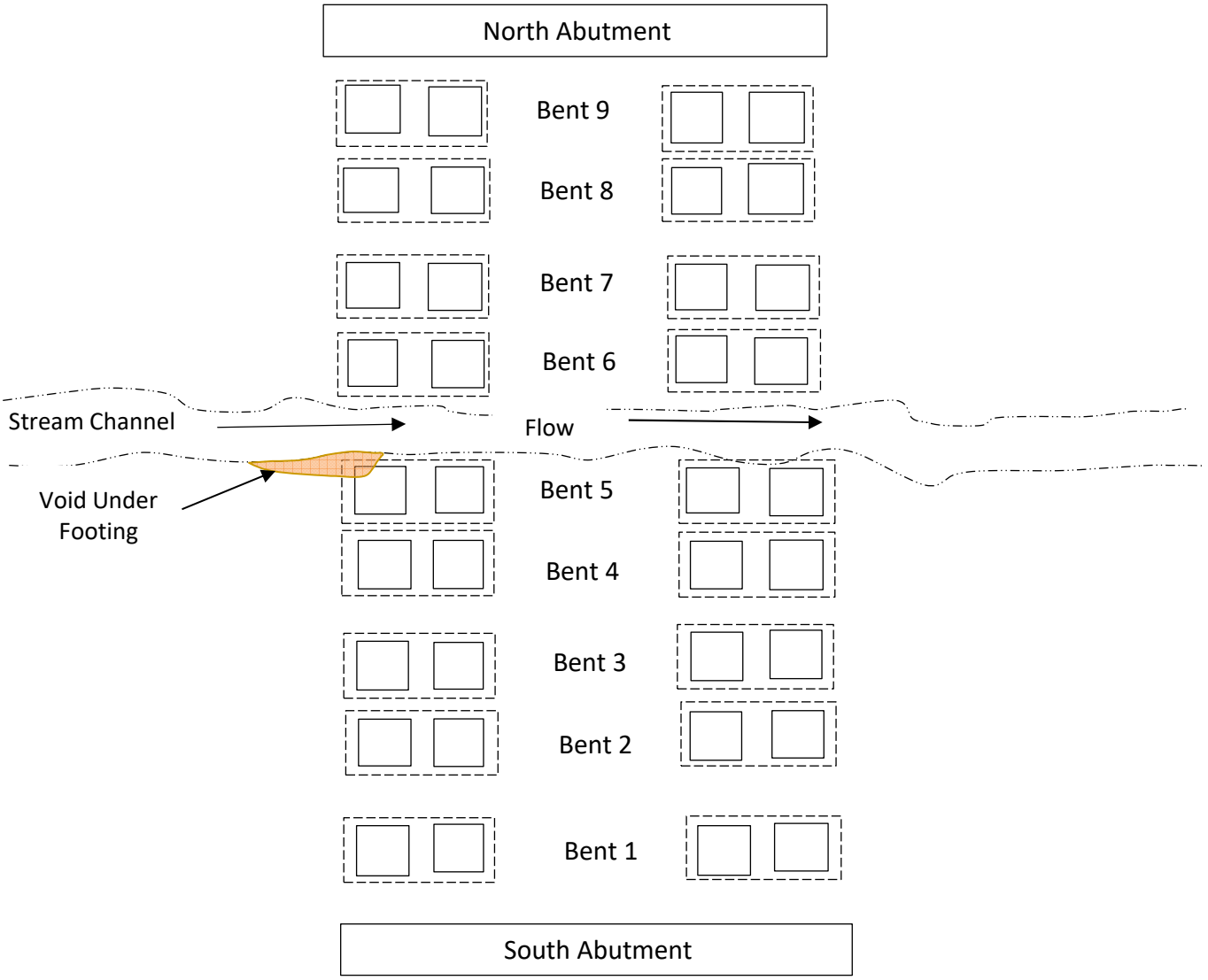


Stream Gauge Results from Feb 2021

Bridge No. 001000190308146 - Nanue Stream Bridge

2023 BRIDGE PLAN VIEW SHEET

North



Streambed Composition:

Mainly hard rock with boulders, medium stones, and sediment. The banks upstream and downstream are heavily vegetated and stable.

Hawaii Department of Transportation
Bridge Load Rating Summary

Existing Bridge Data

Bridge Number:	001000190308146	Last Load Rating Date:	N/A
Bridge Name:	Nanue Stream Bridge	Last Inspection Date:	5-May-15
Route:	00019 Hawaii Belt Road	Inspected By:	WV and LL
District:	Hawaii	Fracture Critical Member (Y/N):	N/A
Span Type:	Steel Plate Girder	Item 58, Deck Rating:	7
Bridge Plans Available (Y/N):	Y	Item 59, Superstructure Rating:	7
Design Loading:	H20-44	Item 60, Substructure Rating:	7
Past Inventory Rating (HS20):	N/A	Bridge Load Posted (Y/N):	N
Past Operating Rating (HS20):	N/A	Posted Weight Limit:	N/A

Bridge Load Rating Summary

Dead Load Data

Overlay Type:	Asphalt
Overlay Depth (IN):	1.5 (assumed)
Was Overlay Depth Measured (Y/N):	N
Weight of Utilities:	0.224 klf
Weight of other Non-Structural Attachments:	Monorail 0.016 klf

LRFR Evaluation Factors

Surface Roughness Rating:	3 (asumed)
Condition Factor:	1.00
System Factor:	1.00
ADTT (one way):	N/A

Superstructure/Deck Rating Summary

	Vehicle Type	Vehicle GVW (Kips)	Rating Factor	Controlling Member	Controlling Load Effect	IM	Live Load Distribution Factor
Design Load	HL-93 (INV)	N/A	1.49	G4-2	Shear	33%	0.717 (M)
	HL-93 (OPR)	N/A	1.93	G4-2	Shear	33%	0.717 (M)
Legal Load	Type 3	50.0	2.97	G4-2	Shear	33%	0.717 (M)
	Type 3S2	72.0	2.82	G4-2	Shear	33%	0.717 (M)
	Type 3-3	80.0	2.95	G4-2	Shear	33%	0.717 (M)
	NRL	80.0	2.19	G4-2	Shear	33%	0.717 (M)
	SU4	54.0	2.69	G4-2	Shear	33%	0.717 (M)
	SU5	62.0	2.42	G4-2	Shear	33%	0.717 (M)
	SU6	69.5	2.30	G4-2	Shear	33%	0.717 (M)
	SU7	77.5	2.21	G4-2	Shear	33%	0.717 (M)
	EV2	57.5	2.51	G4-2	Shear	33%	0.717 (M)
	EV3	86.0	1.70	G4-2	Shear	33%	0.717 (M)
Permit Load	HP1	120.0	2.54	G4-4	Shear	33%	0.534 (0.641/1.2)
	HP2	157.0	2.34	G4-4	Shear	33%	0.534 (0.641/1.2)
	HP3	209.9	3.02	G4-4	Shear	33%	0.534 (0.641/1.2)

Substructure Rating Summary

Substructure Rated (Y/N): N

Vehicle Type	Vehicle GVW (Kips)	Rating Factor	Controlling Member	Controlling Load Effect	IM	Live Load Distribution Factor
HL-93 (INV)	N/A					
HL-93 (OPR)	N/A					
Legal Load						
Permit Load						

Posting Analysis Summary

Governing Legal Load Rating Factor:	1.70
Governing Legal Load Model:	EV3
Posting Recommended (Y/N):	N
Recommended Posting Load:	N/A

Please check the following boxes that apply:

	Bridge load rating is not governed by deck rating
	Bridge load rating is not governed by substructure rating
X	Connections do not control the bridge load rating
X	Exterior girder controls the bridge load rating
X	Bridge plans do not exist - Rating based on judgement and current loading

Quality Control/Quality Assurance

Load Rating Engineer	
- Name:	Dean Kokubun, S.E.
- License No.:	10973-S
- Signature:	
Load Rating Checked By:	Christina Thung, P.E.
Quality Assurance By:	Gary Smith, P.E.
Load Rating Date:	8/19/2017

Remarks/Recommendations for Bridges without Plans

Deck was not rated due to unavailable information and was assumed not to control the bridge load rating.
Substructure Rating was not load rated.
Where existing girder information was not provided, simliar girder section properties from other girders were used.

SUMMARY OF LOAD AND RESISTANCE FACTOR RATINGS (LRFR)

Structure Name: Nanue Stream Bridge
Bridge No.: 001000190308146
Route No.: 19 (Hawaii Belt Road)

Date: 8/19/2017

Load Type			Exterior Steel Girder Span 1 (Girder G4-1) Strength Limit State	
			Rating Factor	Load Rating (Tons)
Design Load	Inventory Level	HL-93 Truck + HL-93 Lane	2.18	-
		HL-93 Tandem + HL-93 Lane	2.54	-
		HL-93 Fatigue Truck	5.91	-
	Operating Level	HL-93 Truck + HL-93 Lane	2.83	-
		HL-93 Tandem + HL-93 Lane	3.30	-
Legal Load	Type 3		3.92	97.98
	Type 3S2		4.19	150.97
	Type 3-3		4.44	177.64
	NRL		2.50	99.89
	SU4		3.42	92.27
	SU5		3.15	97.55
	SU6		2.83	98.33
	SU7		2.62	101.40
	EV2		3.42	98.33
	EV3		2.22	95.31
Permit Load	HP1		2.72	163.26
	HP2		2.89	227.15
	HP3		3.70	388.08

Load Type			Interior Steel Girder Span 1 (Girder G3-1) Strength Limit State	
				Load Rating (Tons)
Design Load	Inventory Level	HL-93 Truck + HL-93 Lane	2.02	-
		HL-93 Tandem + HL-93 Lane	2.35	-
		HL-93 Fatigue Truck	6.87	-
	Operating Level	HL-93 Truck + HL-93 Lane	2.62	-
		HL-93 Tandem + HL-93 Lane	3.05	-
Legal Load	Type 3		4.01	100.20
	Type 3S2		3.93	141.32
	Type 3-3		4.14	165.52
	NRL		2.73	109.01
	SU4		3.61	97.59
	SU5		3.28	101.75
	SU6		3.09	107.32
	SU7		2.86	110.66
	EV2		3.37	97.00
	EV3		2.29	98.41
Permit Load	HP1		3.32	199.19
	HP2		3.24	254.50
	HP3		4.13	433.49

SUMMARY OF LOAD AND RESISTANCE FACTOR RATINGS (LRFR)

Load Type			Exterior Steel Girder Span 2 (Girder G4-2) Strength Limit State	
			Rating Factor	Load Rating (Tons)
Design Load	Inventory Level	HL-93 Truck + HL-93 Lane	1.49	-
		HL-93 Tandem + HL-93 Lane	1.74	-
		HL-93 Fatigue Truck	8.35	-
	Operating Level	HL-93 Truck + HL-93 Lane	1.93	-
		HL-93 Tandem + HL-93 Lane	2.25	-
Legal Load	Type 3		2.97	74.24
	Type 3S2		2.82	101.54
	Type 3-3		2.95	117.95
	NRL		2.19	87.62
	SU4		2.69	72.52
	SU5		2.42	75.17
	SU6		2.30	80.08
	SU7		2.21	85.64
	EV2		2.51	72.16
	EV3		1.70	73.04
Permit Load	HP1		2.83	170.02
	HP2		3.24	254.60
	HP3		3.97	216.91

Load Type			Interior Steel Girder Span 2 (Girder G3-2) Strength Limit State	
				Load Rating (Tons)
Design Load	Inventory Level	HL-93 Truck + HL-93 Lane	2.08	-
		HL-93 Tandem + HL-93 Lane	2.43	-
		HL-93 Fatigue Truck	11.02	-
	Operating Level	HL-93 Truck + HL-93 Lane	2.70	-
		HL-93 Tandem + HL-93 Lane	3.16	-
Legal Load	Type 3		3.99	99.83
	Type 3S2		3.95	142.31
	Type 3-3		4.13	165.31
	NRL		2.55	101.82
	SU4		3.47	93.77
	SU5		3.21	99.50
	SU6		2.88	100.21
	SU7		2.67	103.50
	EV2		3.48	99.91
	EV3		2.26	97.14
Permit Load	HP1		3.74	224.64
	HP2		4.28	336.40
	HP3		5.22	547.97

Load Type			Exterior Steel Girder Span 3 (Girder G4-3) Strength Limit State	
			Rating Factor	Load Rating (Tons)
Design Load	Inventory Level	HL-93 Truck + HL-93 Lane	2.10	-
		HL-93 Tandem + HL-93 Lane	2.36	-
		HL-93 Fatigue Truck	11.56	-
	Operating Level	HL-93 Truck + HL-93 Lane	2.72	-
		HL-93 Tandem + HL-93 Lane	3.06	-
Legal Load	Type 3		4.05	101.28
	Type 3S2		4.22	151.88
	Type 3-3		4.50	180.18
	NRL		2.79	111.52
	SU4		3.62	97.61
	SU5		3.30	102.31
	SU6		3.14	109.05
	SU7		2.94	113.96
	EV2		3.39	97.58
	EV3		2.31	99.13
Permit Load	HP1		2.85	170.75
	HP2		2.89	226.70
	HP3		3.64	382.31

SUMMARY OF LOAD AND RESISTANCE FACTOR RATINGS (LRFR)

Load Type			Interior Steel Girder Span 3 (Girder G3-3) Strength Limit State	
				Load Rating (Tons)
Design Load	Inventory Level	HL-93 Truck + HL-93 Lane	1.94	-
		HL-93 Tandem + HL-93 Lane	2.18	-
		HL-93 Fatigue Truck	12.58	-
	Operating Level	HL-93 Truck + HL-93 Lane	2.52	-
		HL-93 Tandem + HL-93 Lane	2.83	-
Legal Load	Type 3		3.75	93.66
	Type 3S2		3.90	140.45
	Type 3-3		4.17	166.62
	NRL		2.88	115.39
	SU4		3.34	90.27
	SU5		3.05	94.61
	SU6		2.96	102.90
	SU7		2.91	112.70
	EV2		3.14	90.24
	EV3		2.13	91.67
Permit Load	HP1		3.17	190.38
	HP2		3.22	252.76
	HP3		4.06	426.26

Load Type			Exterior Steel Girder Span 4 (Girder G4-4) Strength Limit State	
			Rating Factor	Load Rating (Tons)
Design Load	Inventory Level	HL-93 Truck + HL-93 Lane	1.83	-
		HL-93 Tandem + HL-93 Lane	2.19	-
		HL-93 Fatigue Truck	4.41	-
	Operating Level	HL-93 Truck + HL-93 Lane	2.38	-
		HL-93 Tandem + HL-93 Lane	2.84	-
Legal Load	Type 3		3.79	94.64
	Type 3S2		3.37	121.34
	Type 3-3		3.52	140.61
	NRL		2.57	102.91
	SU4		3.45	93.24
	SU5		3.08	95.45
	SU6		2.91	101.24
	SU7		2.68	103.98
	EV2		3.24	93.07
	EV3		2.17	93.35
Permit Load	HP1		2.54	152.31
	HP2		2.34	183.51
	HP3		3.02	317.40

Load Type			Interior Steel Girder Span 4 (Girder G3-4) Strength Limit State	
				Load Rating (Tons)
Design Load	Inventory Level	HL-93 Truck + HL-93 Lane	1.75	-
		HL-93 Tandem + HL-93 Lane	2.09	-
		HL-93 Fatigue Truck	5.42	-
	Operating Level	HL-93 Truck + HL-93 Lane	2.27	-
		HL-93 Tandem + HL-93 Lane	2.71	-
Legal Load	Type 3		3.61	90.16
	Type 3S2		3.21	115.60
	Type 3-3		3.35	133.95
	NRL		2.58	103.04
	SU4		3.29	88.83
	SU5		2.93	90.93
	SU6		2.78	96.45
	SU7		2.61	101.12
	EV2		3.08	88.66
	EV3		2.07	88.93
Permit Load	HP1		2.92	174.95
	HP2		2.68	210.79
	HP3		3.47	364.58

Design References:

AASHTO LRFD Bridge Design Specifications, 2014 with 2015 Interim Revisions	(LRFD)
HDOT Design Criteria for Bridges and Structures, Second Edition, 2011	(HDOT)
AASHTO Manual for Bridge Evaluation, 2014	(MBE)
Nanue Bridge Record Drawings, April 1949	(RD 1949)
Nanue Bridge Erection Drawings, January 1950	(ED 1950)
Nanue Bridge Record Drawings, May 1996	(RD 1996)
Nanue Bridge Record Drawings, August 1999	(RD 1999)
Nanue Bridge Inspection Report, May 2015	(BIR 2015)
Hawaii State Historic Bridge Inventory and Evaluation, November 2013	(SHBIE 2013)

Summary

The Nanue Stream Bridge is a steel girder bridge with reinforced concrete deck constructed circa 1949. The steel girders were salvaged from the Kaula Bridge, Kealahaka Bridge, Laupahoehoe Bridge, and Maile Bridge according to erection drawings dated 1950. Drawings for the bridges where the steel girders were salvaged from were not provided. According to the Hawaii State Historic Bridge Inventory and Evaluation, Kaula Bridge was constructed circa 1928. There are no records for the other bridges but it is assumed that they were built around the same timeframe due to similarities in the salvaged girders. From the 1949 Record Drawings, the Salvaged Girders were constructed out of the following members:

40 ft Girders A3, B3, G5, and G6
Top Flange: 2-L6x4x5/8; Web: PL 78x3/8; Bottom Flange: 2-L6x4x5/8
Girders G5 and G6 are indicated to have the same section properties as Girders A3 and B3.

50 ft Span Girders A2/A2X, A4/A4X, B2/B2X, B4/B4X;
51 ft Span Girders A1/A1X, B1/B1X, A1/A2, B1/B2, A5/A5X, B5/B5X
Top Flange: 2-L6x6x7/16; Web: PL 78x3/8; Bottom Flange: 2-L6x6x7/16
Top and Bottom Flange Cover Plates: PL 16x1/2 (The flange cover plates extend different lengths along both the top and bottom flanges.)
Section properties for girders A4/A4X and B4/B4X are provided in the 72 ft span girders.
Girders A1/A1X, A2X, A5/A5X, B1/B1X, B2X, and B5/B5X are indicated to have the same section properties as Girders A2 and B2.

72 ft Span Girders A4/A4X and B4/B4X
Top Flange: 2-L6x6x3/4; Web: PL 78x3/8; Bottom Flange: 2-L6x6x3/4
Top and Bottom Flange Cover Plates: 2-PL 16x1/2 (The flange cover plates extend different lengths along both the top and bottom flanges.)
Assumed section properties for A4X and B4X are the same as A4 and B4.

The drawings also indicate 7/8" diameter rivets were used for the connection in the salvaged girders.

The 2015 Bridge Inspection Report indictes a Superstructurer rating of 7 (GOOD CONDITION - no problems noted). The deficiencies noted are for the protective coatings. It was assumed that there is little to no section loss and full section properties were used.

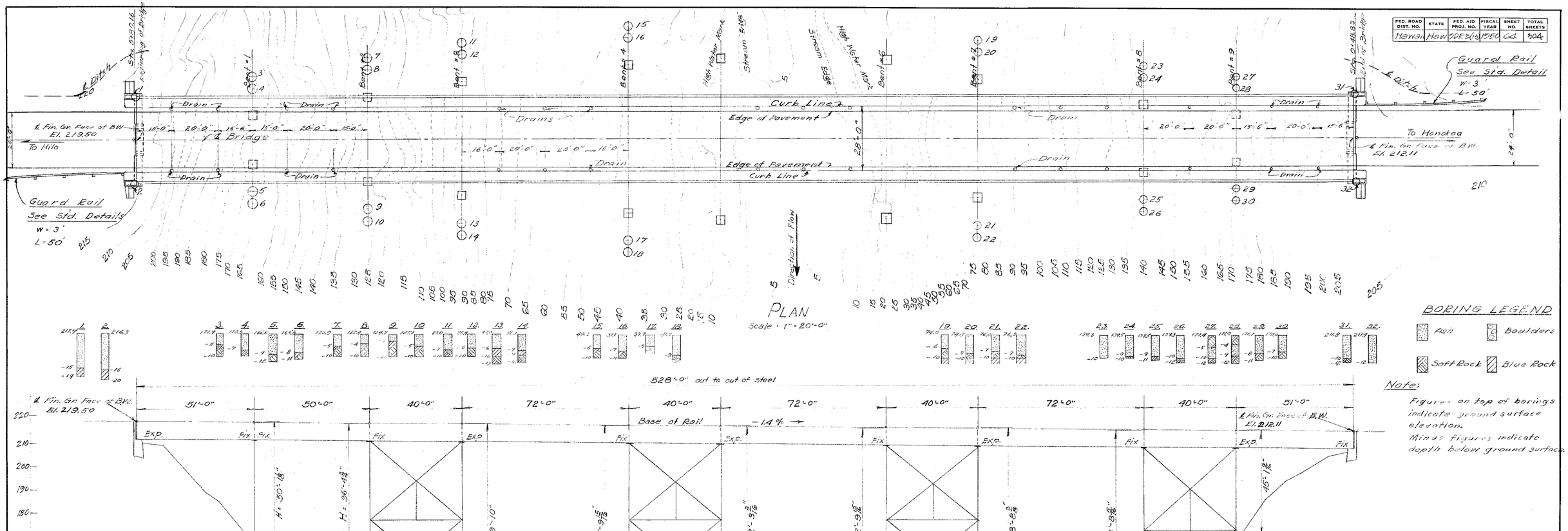
The deck is not analyzed to be composite with the girders.

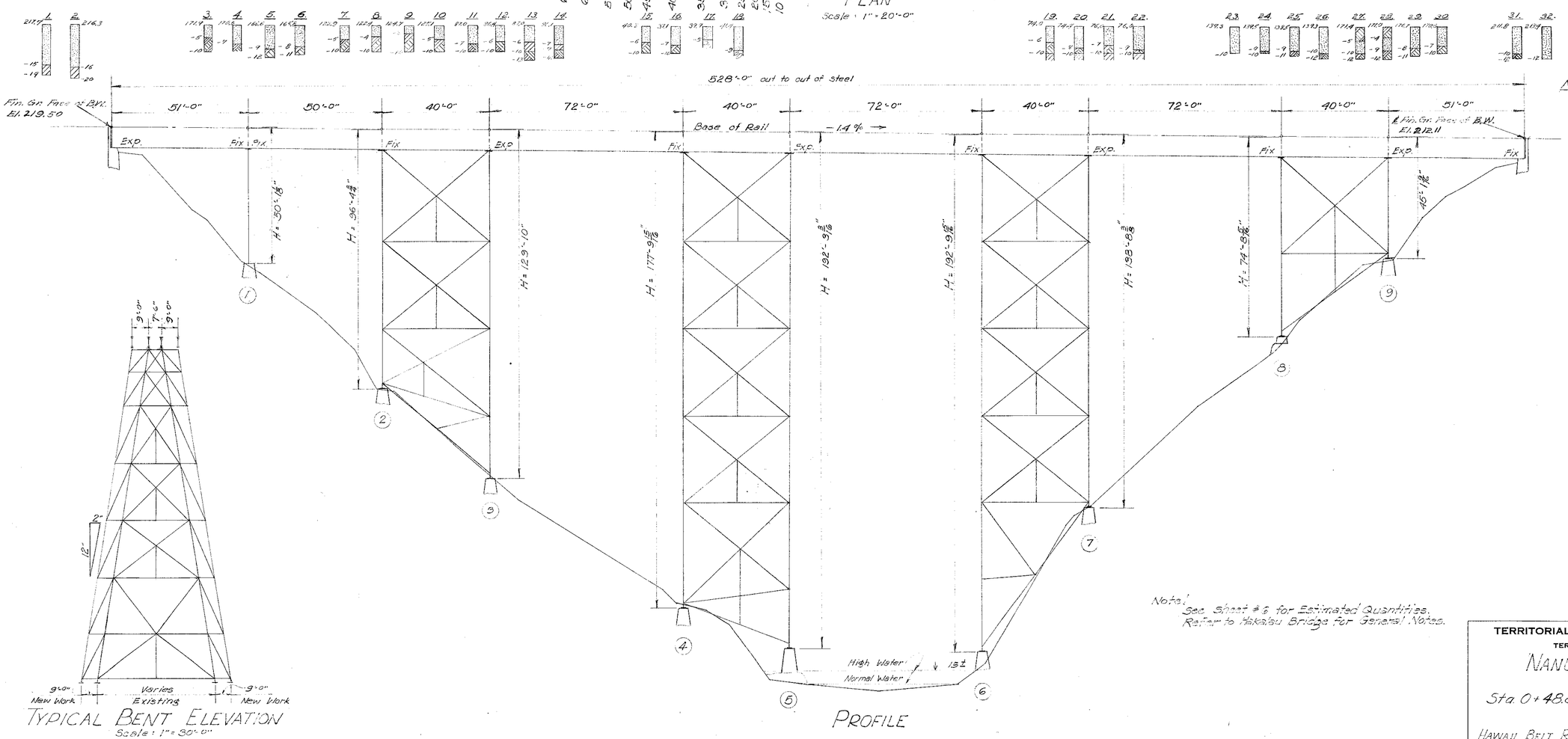
Two waterlines not indicated on the Record or Erection Drawings are visible in the 2015 Bridge Inspection Report. In past Load Ratings, HDOT has indicated that all utility pipes are assumed to be schedule 80 (thickness = 1/2 inch) steel pipes.

The substructure was not load rated. Per AASHTO MBE Section 6.1.5.2, Members of substructures need not be routinely checked for load capacity. Substructure elements such as pier caps and columns should be checked in situations where the Owner has reason to believe that their capacity may govern the load capacity of the entire bridge. The 2015 Bridge Inspection Report indicates a Substructure rating of 7 (GOOD CONDITION - no problems noted) with no comments on deficiences to the substructure. HDOT has not indicated the substructure requires a load rating.

The Load Rating assumed that the bridge was under a newly constructed condition adjusted by the NBI condition rating for the bridge superstructure. HDOT will need to adjust the bridge load rating as necessary to account for the current localized deterioration as reported in the provided Bridge Inspection Report and field observations.

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
Hawaii	Haw	SDR 3(13)	1950	64	304





BORING LEGEND

Ash — Boulders — Soft Rock — Blue Rock

Note:

Figures on top of borings indicate ground surface elevation.
Minus figures indicate depth below ground surface.

Note: See Sheet # 3 for Estimated Quantities. Refer to Hakalau Bridge for General Notes.

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

TERRITORIAL HIGHWAY DEPARTMENT
TERRITORY OF HAWAII

NANUE BRIDGE

Sta. 0+48.83 to 5+80.16

HAWAII BELT ROAD — SDR 3(13)

Apr. 1949

SHEET No. 1 OF 11 SHEETS

5465.64

Wyoming Department of Transportation

BRASS-GIRDER™ Input Parameters

Version Information

Girder UI:	7.8.0.3001
Girder XML:	7.8.0.3001
BRASS™ XML:	1.8.0.3001

Administration

Project ID:	8780-06
Project Title:	HDOT Statewide Bridge Load Ratings
Bridge ID:	1000190308146
Bridge Name:	Nanue Stream
Route Name:	00019 Hawaii Belt Road
Reference Marker:	18
Title 1:	Nanue Stream Bridge
Title 2:	Load Rating for Steel Exterior Girder Span 1 (G4-1)
Date:	2017 4 21
Agency:	HDOT Highways Division
Designer/Rater:	Moffatt & Nichol (JU)
Reviewer:	
Comments:	

Bridge Notes

MATERIAL PROPERTIES
Concrete
Weight = 0.160 kcf (HDOT Design Criteria for Bridges and Structures [HDOT] 5.01)
Strength = 3 ksi (Record Drawings: Class A-1)
Elastic Modulus = 3,880 ksi (AASHTO LRFD [LRFD] Eqn 5.4.2.4-1, Use 0.150 kcf per HDOT 5.01)
Reinforcing Steel
Yield Strength = 33 ksi (Unknown, Manual for Bridge Evaluation [MBE] Table 6A.5.2.2-1)
Elastic Modulus = 29,000 ksi (LRFD 5.4.3.2)

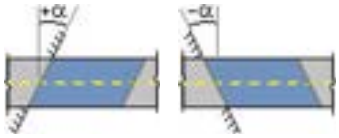
BRIDGE PROPERTIES (RECORD DRAWINGS)
Span 1 = 51 ft
Span 2 = 50 ft
Span 3 = 40 ft
Span 4 = 72 ft
Span 5 = 40 ft
Span 6 = 72 ft
Span 7 = 40 ft
Span 8 = 72 ft
Span 9 = 40 ft
Span 10 = 51 ft
Width = 38.5 ft
Deck Thickness = 9 in min
No. of Griders = 4
Girder Spacing = 9 ft, 7.5 ft, 9 ft
Girder Width = 12 3/8"
Girder Depth = 6'-6 1/2"
Surface Roughness = 3.0 (2015 Bridge Inspectinon Report)
Condition Factor = 1.0 (HDOT 5.04, 2015 Bridge Inspection Report indicates Condition Rating of 7)
System Factor = 1.0 (HDOT 5.05,)

LIVE LOADS
LRFD Live Load (MBE Appendix C6A)
Truck and Tandem Lane Load = 0.64 klf
AASHTO Legal Loads (MBE Appendix D6A)
Type 3
Type 3S2
Type 3-3
Notional Rating Load [NRL]
Legal Lane Load = 0.2 klf
SU4
SU5
SU6
SU7
HDOT Hawaii Standard Single Trip Permit Loads (HDOT 5.06)
No lane load provided, vehicles allowed to trave in any lane
HP1
HP2
HP3
Dynamic Load Allowance (HDOT 5.03)
Spans > 40 ft
Wearing Surface: 3 (Assumed)
Design Loads: 33%
Legal Loads: 10%
Permit Loads: 10%
Scale Factor (HDOT 5.06)
Hawaii Standard Single Trip Permit Vehicle analysis assumes only one permit load on the bridge which allows the use of a single-lane distribution factor. When using the single-lane LRFD distribution factor, the 1.2 multiple prescence factor may shall be divided out from the distribtion factor equations.

Control

Structure

Structure Type:	GirderLine
Define Deck Cross Section:	Yes
Number of Members:	4
Skew Angle:	0 °



Analysis Model Type:	Beam
Number of Top Spans:	1



Spans

Span	Length
1	51 ft

Structure Material:	Steel
Beam Type:	Builtup
Composite Structure:	No
Deck Material:	Concrete

Analysis

Unit System:	US
Analysis Method:	LRFD
Analysis Type:	Rating
Number of Stages:	1
Member of Interest:	4
Model Element Type:	Stepped
Point of Interest Generation Control:	Tenth
Live-load Distribution Factor Application:	AnalysisPoint

Interpolate Reinforcement: No
Calculate Effective Width: No

Input

Symmetry

Component	Symmetric
Beam Profile	No
Deck Profile	No
Shear Connectors	No
Transverse Stiffeners	No
Bearing Stiffeners	No
Longitudinal Stiffeners	No
Bracing (Member)	No
Lateral Support	No
Cb Factors (Std)	No
Cb Factors (LRFD)	No
Fatigue Stress (Std)	No
Beam Wheel Fractions (Std)	No
Reaction Wheel Fractions (Std)	No
Beam Distribution Factors (LRFD)	No
Reaction Distribution Factors (LRFD)	No

Simplified Standard Wheel Fractions: No
Merge Beam/Deck Profile Schedules: Yes

Distribution

Perform Dead Load Distribution: Yes
Calculate LRFD Live Load Distribution Factors: Yes

Dead Load Distribution Methods

Stage	Method
1	Tributary area

Live Load Distribution (LRFD)

Distribution Method: AASHTO LRFD
Cross Section Code: a1
Max. Number of Lanes Loaded: Computed
Consider Rigid Method: No
Slab Thickness Type: Structural
Set eg = 0 for Non-composite: Yes
Apply Skew to Lever Rule Override: Yes
Apply Skew to Ridgid Rule Override: No
Use Constants from Table 4.6.2.2.1-2: No

Libraries

Section Library: C:\BRASS\Girder_7.8\Girder\Libraries\BRASS-Sections.bls
Vehicle Library: C:\BRASS\Girder_7.8\Girder\Libraries\BRASS-Vehicles.blv

Output

Primary Output

Action Output Level: DL+LL+CONC
Action Locations: 10thPoints

General

Member Properties:	Yes
Load Combinations:	Yes
Load and Resistance Factors:	Yes
Warnings:	Yes
Camber:	No
Critical Design Ratios / Rating Factors:	Expanded

Live Load

Truck Positions:	Yes
Variable Axle Spacing:	Yes
Live Load Settings:	Yes
Live Load Combinations:	Yes
Live Load Details:	Yes
Impact (LFD):	No

Stage

Stage	Output
1	Yes

Dead Load

Member Self Load:	Yes
Distributed Dead Loads:	Yes
Concentrated Dead Loads:	Yes
Temperature Change:	No
Settlements:	No

Load Distribution

Dead Load Distribution:	Yes
Live Load Distribution:	Yes

Intermediate Output

Intermediate Output Level:	Full
Effective Width:	Yes
Floorbeam Lane Position:	Yes

Points of Interest

Specification Checks:	Yes
Load Factoring/Combinations:	No

Load Distribution

Dead Load:	Yes
Live Load:	Yes

Limit State Output (LRFD)

Limit State	Specification Check	Load Combination
Strength I	Yes	Yes
Strength II	Yes	Yes
Strength IV	No	No
Service I	No	No
Service II	No	No
Fatigue I	No	No
Fatigue II	No	No

Load Combination Output (LFD)

LFD Load Combo	Specification Check	Load Combination

Combo I	No	No
Combo IB	No	No
Combo I Overload	No	No
Combo IB Overload	No	No
Combo I Service	No	No
Combo IB Service	No	No
Combo Fatigue	Yes	Yes

Intermediate Output (cont.)

Steel

Transverse Stiffeners: No
Bearing Stiffeners: No
Longitudinal Stiffeners: No

Results Tables

X-Y Plot Action Tables: No
Specification Check Results Tables: No
Mesh Plot Files: No

BRASS-PAD™ Data Transfer File: No

Influence

Output influence lines for: None
Ordinate Divisor: 1

Factors

Load Factors (LRFD)

Limit State	DC		DW		DU		TU	
	max	min	max	min	max	min	max	min
Strength I	1.25	0.9	1.5	0.65	1.5	0.65	-	-
Strength II	1.25	0.9	1.5	0.65	1.5	0.65	-	-
Strength IV	-	-	-	-	-	-	-	-
Service I	-	-	-	-	-	-	-	-
Service II	1	1	1	1	1	1	-	-
Fatigue I	-	-	-	-	-	-	-	-
Fatigue II	-	-	-	-	-	-	-	-

Load Factors (LRFD) (continued)

Limit State	LL				SE		PS		DS	
	Design		Legal	Permit						
	Inventory	Operating			max	min	max	min	max	min
Strength I	1.75	1.35	1.45	0	-	-	-	-	-	-
Strength II	-		0	1.2	-	-	-	-	-	-
Strength IV	-		-	-	-	-	-	-	-	-
Service I	-		-	-	-	-	-	-	-	-
Service II	1.3	1	1.3	1	-	-	-	-	-	-
Fatigue I	0.75		-	-	-	-	-	-	-	-

Fatigue II	-	-	-	-	-	-	-	-	-

Load Modifiers (LRFD)

Limit State	Ductility	Redundancy	Importance	Combined Product	
				max	min
Strength I	1	1	1	-	-
Strength II	1	1	1	-	-
Strength IV	1	1	1	-	-
Service I	1	1	1	-	-
Service II	1	1	1	-	-
Fatigue I	1	1	1	-	-
Fatigue II	1	1	1	-	-

Resistance Factors (LRFD)

Resistance Factors

Type	Value
φ Flexure	1
φ Shear	1
φ Bearing	1
φ Compression	0.95
φ Shear Connectors	0.85
φ Fatigue	1

System/Total Modifiers

Limit State	Resistance Type	System	Total
Strength	Flexure	1	-
Strength	Shear	1	-
Strength	Bearing	1	-
Strength	Compression	1	-
Strength	Shear Connectors	1	-
Strength	Longitudinal Reinforcement	1	-
Service	Flexure	1	-
Fatigue	Fatigue	1	-

Condition Modifiers

Limit State	Condition
Strength	1
Service	1
Fatigue	1

Load Factors (LFD)

Load Combo	γ	LL	DC	DW	DU	TU	SE	PS	DS
I	-	-	-	-	-	-	-	1	1
IB	-	-	-	-	-	-	-	1	1
I-Overload	-	-	-	-	-	-	-	1	1

IB-Overload	-	-	-	-	-	-	-	1	1
I-Service	-	-	-	-	-	-	-	1	1
IB-Service	-	-	-	-	-	-	-	1	1
Fatigue	-	-	-	-	-	-	-	1	1

Capacity Reduction Factors (LFD)

Factor	Value
φ Flexure	-
φ Shear	-
φ Fatigue	-

Materials

Steel

ID	Name	Yield Stress	Tensile Strength	Modulus of Elasticity	Density	Thermal Expansion Coefficient
1	Salvaged Girder	30 ksi	60 ksi	29000 ksi	0.49 kcf	6.5E-06 °F^{-1}

Concrete

ID	Name	28 Day Compressive Strength	Modulus of Elasticity	Density	Modulus of Rupture	Modulus of Rupture (VCI Method)	Thermal Expansion Coefficient
1	1949 Class A-1	3 ksi	3880 ksi	0.16 kcf	-	-	6E-06 °F^{-1}

Dead Load Groups

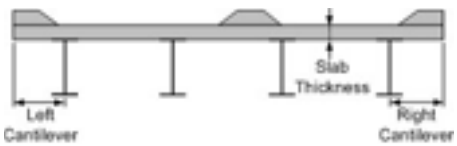
Groups

ID	Name	Stage	Type	Description
1	Concrete Railing	1	DC	Top Rail, Bottom Rail, Post
2	Sidewalk / Shoulder	1	DC	
3	AC Pavement	1	DW	
4	Girder Bracing	1	DC	X-Bracing with Steel Angles in the Outer Bays
5	Bottom Flange Bracing	1	DC	Steel Angles Diagonal Bracing in the Interior Bay
6	Vertical Web Angles	1	DC	Steel Angles Spaced at Intervals
7	Waterlines	1	DU	Assumed 8" Waterlines
8	Monorail	1	DC	6" Monorail
9	Bottom Flange Struts	1	DC	Bottom Flange Struts out of Steel Angles and Plates in Outer Bays

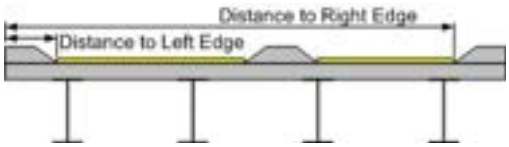
Deck Geometry

Deck

Deck Thickness: 9 in.
Left Cantilever Length: 6.5 ft
Right Cantilever Length: 6.5 ft
Equal Member Spacing: No



Travelway Locations



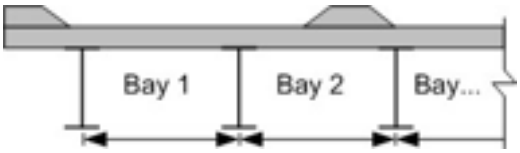
Distance to Left Edge: 5.25 ft
Distance to Right Edge: 33.25 ft

Sacrificial Topping

Thickness: -
Dead Load Type: DC

Member Spacing

Bay #	Spacing
1	9 ft
2	7.5 ft
3	9 ft



Soffits

No soffits have been defined.

Appurtenances

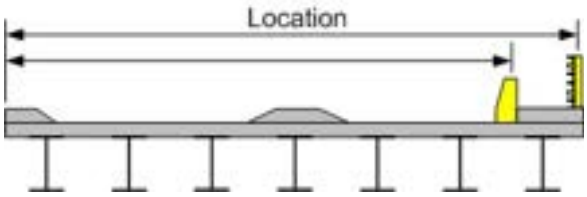
No appurtenances have been defined.

Deck Loads

Materials/Stages

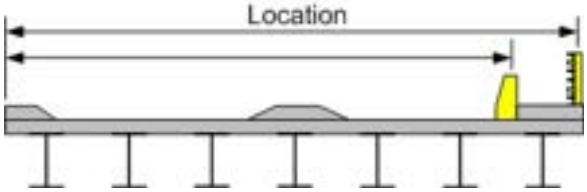
Deck Material: 1949 Class A-1
Curb & Median Material: Not Assigned
Wearing Surface Weight: -
Slab Stage: 1
Curb Stage: 1
Median Stage: 1
Wearing Surface Stage: 1

Line Loads



Dead Load Group	Line Load	Load Location
Concrete Railing	0.319 kip / ft	0.923 ft
Concrete Railing	0.319 kip / ft	37.577 ft
Waterlines	0.224 kip / ft	38.5 ft
Monorail	0.016 kip / ft	34 ft

Uniform Loads



Dead Load Group	Uniform Load	Load Location	Load Width
Sidewalk / Shoulder	0.007 ksf	0 ft	5.25 ft
Sidewalk / Shoulder	0.003 ksf	5.25 ft	2 ft
AC Pavement	0.018 ksf	7.25 ft	24 ft
Sidewalk / Shoulder	0.003 ksf	31.25 ft	2 ft
Sidewalk / Shoulder	0.007 ksf	33.25 ft	5.25 ft

Live Loads

Live Load Control

Direction Control: Up+Down
Standard Live Loads: None
Wheel Advancement Denominator: 100
ADTT: 5000
ADTT for Single Lane: 2000
Multiple Presence Adjustment: -
% of Dynamic Load Allowance (Impact): 100 %
Fixed Impact (STD): -

Dynamic Load Allowance (LRFD)

Design/Rating Procedure	Truck	Lane	Fatigue
Design	33 %	0 %	15 %
Legal	33 %	0 %	0 %
Permit	33 %	0 %	0 %

Special Vehicles

Axle Vehicles

No axle vehicles have been defined.

Lane Vehicles

No lane vehicles have been defined.

Definitions (STD)

No standard live load definitions have been defined.

Definitions (LRFD)

Definition 1

Code: HL-93-TRUCK
Type: DesignTruck
Design Rating: Design
% of Dynamic Load Allowance: -
Scale Factor: -
Lanes Loaded: Critical
Notional Load: Yes
Fixed DLA: -

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 2

Code: HL-93-TANDEM
Type: DesignTruck
Design Rating: Design
% of Dynamic Load Allowance: -

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating

Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	Yes
Fixed DLA:	-

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 3

Code:	HL-93-LANE
Type:	DesignLane
Design Rating:	Design
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	Yes
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 4

Code:	TYPE3
Type:	GeneralTruck
Design Rating:	Legal
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 5

Code:	TYPE3S2
Type:	GeneralTruck
Design Rating:	Legal
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 6

Code:	TYPE3-3
Type:	GeneralTruck
Design Rating:	Legal
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-

Fatigue I	-	-
Fatigue II	-	-

Definition 7

Code:	NRL-MIN
Type:	GeneralTruck
Design Rating:	Legal
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 8

Code:	NRL-MAX
Type:	GeneralTruck
Design Rating:	Legal
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 9

Code:	SU4
Type:	GeneralTruck
Design Rating:	Legal
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 10

Code:	SU5
Type:	GeneralTruck
Design Rating:	Legal
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 11

Code:	SU6

Type:	GeneralTruck
Design Rating:	Legal
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 12

Code:	SU7
Type:	GeneralTruck
Design Rating:	Legal
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 13

Code:	HP1
Type:	PermitTruck
Design Rating:	Permit
% of Dynamic Load Allowance:	-
Scale Factor:	0.833
Lanes Loaded:	Single
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 14

Code:	HP2
Type:	PermitTruck
Design Rating:	Permit
% of Dynamic Load Allowance:	-
Scale Factor:	0.833
Lanes Loaded:	Single
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 15

Code:	HP3
Type:	PermitTruck
Design Rating:	Permit
% of Dynamic Load Allowance:	-
Scale Factor:	0.833
Lanes Loaded:	Single

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-

Notional Load:	No
Fixed DLA:	-

Limit State	gamma LL	gamma LL Operating
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 16

Code:	HL-93-FAT
Type:	FatigueTruck
Design Rating:	Design
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 17

Code:	EV2
Type:	GeneralTruck
Design Rating:	Legal
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 18

Code:	EV3
Type:	GeneralTruck
Design Rating:	Legal
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

General Combinations (LRFD)

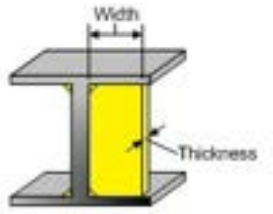
Standard Combo	Truck	Lane	Combination Factors	
			Truck	Lane
No	**HL-93-TRUCK**	**HL-93-LANE**	1	1
No	**HL-93-TANDEM**	**HL-93-LANE**	1	1

Deflection Combinations (LRFD)

No Deflection Combinations (LRFD) have been defined.

Component Groups

Transverse Stiffeners



ID	Name	Width	Thickness	Type	Type Factor	Material
1	Web Stiffeners	5 in.	0.375 in.	Single Angles	-	**Salvaged Girder**

Bearing Stiffeners

No bearing stiffener groups have been defined.

Longitudinal Stiffeners

No longitudinal stiffener groups have been defined.

Specification Control

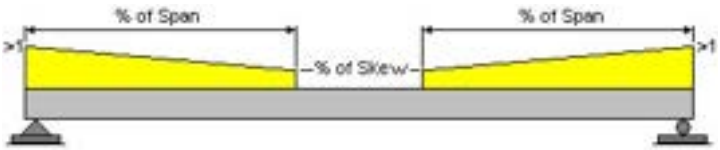
General

Lane Geometry

Design Vehicle Lane Width: 12 ft
Vehicle Width: 10 ft
Wheel Spacing: 6 ft
Encroachment Distance: -

Load Factors Control (LRFD): Use maximum and minimum load factors

Skew Factors



Span #	% of Span	% of Skew
1	-	-

Steel

Use Appendix A6 (LRFD): No
Allow Plastic Analysis: No
Override Longitudinal Stiffeners: No
Slab thickness for longitudinal shear force: Structural
Slab thickness for minimum negative flexure concrete deck reinforcement: Structural

Fatigue

AASHTO LRFD Table 6.6.1.2.5-2

% of Span: -
Span Length: 40 ft

Stress Range in Longitudinal Reinforcement Over the Piers: 10 ksi

Detail Categories (LRFD)

Detail Category	Constant, A x 10^8	Constant Amplitude Fatigue Threshold
A	-	-

B	-	-
B'	-	-
C	-	-
C'	-	-
D	-	-
E	-	-
E'	-	-

Limit State Map

Limit State Maps (LRFD)

Limit State	Design Review			Rating		
	Design Load	Legal Load	Permit Load	Design Load	Legal Load	Permit Load
Strength I	No	No	No	Inventory/Operating	Yes	No
Strength II	No	No	No	Exclude	No	Yes
Strength IV	No	No	No	Exclude	No	No
Service I	No	No	No	Exclude	No	No
Service II	No	No	No	Inventory/Operating	Yes	Yes
Service III	No	No	No	Exclude	No	No
Fatigue I	No	No	No	Inventory	No	No
Fatigue II	No	No	No	Exclude	No	No

Load Combo Maps (LFD)

Load Combo	Design Review	Rating
I	No	Inventory
IB	No	Operating
I-Overload	No	Exclude
IB-Overload	No	Exclude
I-Service	No	Exclude
IB-Service	No	Exclude
Fatigue	No	Exclude

Spec. Check Map (Strength)

LRFD Specification Check Maps

Design Load Review

Spec Check	Strength I	Strength II	Strength IV
Flexure	No	No	No
Shear	No	No	No
Bearing	No	No	No
Flexural Stress In Longitudinal Stiffener	No	No	No

Legal Load Review

Spec Check	Strength I	Strength II	Strength IV
Flexure	No	No	No

Shear	No	No	No
Bearing	No	No	No
Flexural Stress In Longitudinal Stiffener	No	No	No

Permit Load Review

Spec Check	Strength I	Strength II	Strength IV
Flexure	No	No	No
Shear	No	No	No
Bearing	No	No	No
Flexural Stress In Longitudinal Stiffener	No	No	No

Design Load Rating

Spec Check	Strength I	Strength II	Strength IV
Flexure	Yes	No	No
Shear	Yes	No	No
Bearing	Yes	No	No
Flexural Stress In Longitudinal Stiffener	No	No	No

Legal Load Rating

Spec Check	Strength I	Strength II	Strength IV
Flexure	Yes	No	No
Shear	Yes	No	No
Bearing	Yes	No	No
Flexural Stress In Longitudinal Stiffener	No	No	No

Permit Load Rating

Spec Check	Strength I	Strength II	Strength IV
Flexure	No	Yes	No
Shear	No	Yes	No
Bearing	No	Yes	No
Flexural Stress In Longitudinal Stiffener	No	No	No

LFD Specification Check Maps

Design Review

LFD Spec Check	I	IB	I-Overload	IB-Overload
Flexure	No	No	No	No
Shear	No	No		
Bearing	No	No		
Flexural Stress In Longitudinal Stiffener	No	No		

Rating

LFD Spec Check	I	IB	I-Overload	IB-Overload
Flexure	No	No	No	No
Shear	No	No		
Bearing	No	No		

Flexural Stress In Longitudinal Stiffener	No	No

Spec. Check Map (Service)

LRFD Specification Check Maps

Design Load Review

Spec Check	Service I	Service II
Crack Control	No	No
Flexural Stress In Flanges	No	No
Live Load Deflection	No	No

Legal Load Review

Spec Check	Service I	Service II
Crack Control	No	No
Flexural Stress In Flanges	No	No
Live Load Deflection	No	No

Permit Load Review

Spec Check	Service I	Service II
Crack Control	No	No
Flexural Stress In Flanges	No	No
Live Load Deflection	No	No

Design Load Rating

Spec Check	Service I	Service II
Crack Control	No	No
Flexural Stress In Flanges	No	Yes
Live Load Deflection	No	Yes

Legal Load Rating

Spec Check	Service I	Service II
Crack Control	No	No
Flexural Stress In Flanges	No	Yes
Live Load Deflection	No	Yes

Permit Load Rating

Spec Check	Service I	Service II
Crack Control	No	No
Flexural Stress In Flanges	No	Yes
Live Load Deflection	No	Yes

LFD Specification Check Maps

Design Review

LFD Spec Check	I-Overload	IB-Overload
Flexural Stress In Flanges	No	No

Rating

LFD Spec Check	I-Overload	IB-Overload
Flexural Stress In Flanges	No	No

Spec. Check Map (Fatigue)

LRFD Specification Check Maps

Design Load Review

Spec Check	Fatigue I	Fatigue II
Fatigue of Reinforcement	No	No
Fatigue of Shear Connectors	No	No
Fatigue Shear Range of Shear Connectors	No	No
Fatigue of Special Points	No	No
Fatigue Shear	No	No

Legal Load Review

Spec Check	Fatigue I	Fatigue II
Fatigue of Reinforcement	No	No
Fatigue of Shear Connectors	No	No
Fatigue Shear Range of Shear Connectors	No	No
Fatigue of Special Points	No	No
Fatigue Shear	No	No

Permit Load Review

Spec Check	Fatigue I	Fatigue II
Fatigue of Reinforcement	No	No
Fatigue of Shear Connectors	No	No
Fatigue Shear Range of Shear Connectors	No	No
Fatigue of Special Points	No	No
Fatigue Shear	No	No

Design Load Rating

Spec Check	Fatigue I	Fatigue II
Fatigue of Reinforcement	Yes	No
Fatigue of Shear Connectors	Yes	No
Fatigue Shear Range of Shear Connectors	Yes	No
Fatigue of Special Points	Yes	No
Fatigue Shear	Yes	No

Legal Load Rating

Spec Check	Fatigue I	Fatigue II
Fatigue of Reinforcement	No	No
Fatigue of Shear Connectors	No	No
Fatigue Shear Range of Shear Connectors	No	No
Fatigue of Special Points	No	No

Fatigue Shear	No	No

Permit Load Rating

Spec Check	Fatigue I	Fatigue II
Fatigue of Reinforcement	No	No
Fatigue of Shear Connectors	No	No
Fatigue Shear Range of Shear Connectors	No	No
Fatigue of Special Points	No	No
Fatigue Shear	No	No

LFD Specification Check Maps

Design Review

LFD Spec Check	Fatigue
Fatigue of Special Points	No

Rating

LFD Spec Check	Fatigue
Fatigue of Special Points	No

Member

Member Notes

No member notes have been defined.

Member Materials

Beam

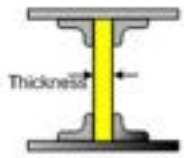
Beam Material: Salvaged Girder

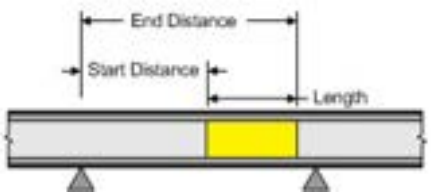
Beam Profile

Web

Apply to Entire Structure: Yes
Web Angle: -





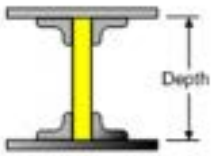


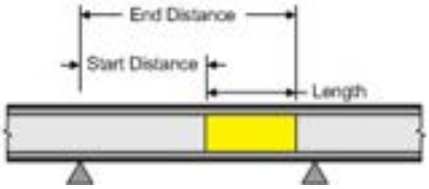
Thickness	Material	Support Number	Start Distance	Length

0.375 in.	**Salvaged Girder**	1	0 ft	51 ft	

Web Depth

Apply to Entire Structure: Yes

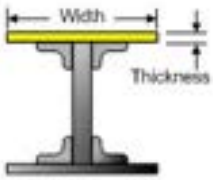


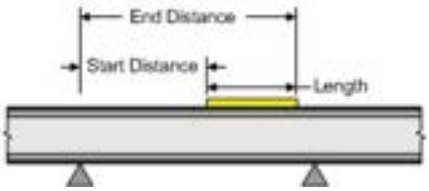


Start Depth	Web Variation	End Depth	Support Number	Start Distance	Length
78 in.	Linear	78 in.	1	0 ft	51 ft

Top Cover Plate

Apply to Entire Structure: No

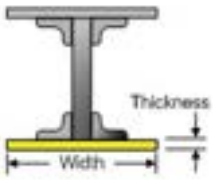




Start of Range			End of Range						
Width	Thickness	Gap Thickness	Width	Thickness	Gap Thickness	Material	Support Number	Start Distance	Length
16 in.	0.438 in.	-	-	-	-	**Salvaged Girder**	1	8.354 ft	35.417 ft

Bottom Cover Plate

Apply to Entire Structure: No

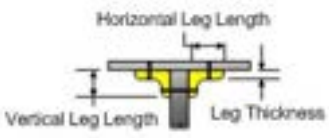




Start of Range			End of Range						
Width	Thickness	Gap Thickness	Width	Thickness	Gap Thickness	Material	Support Number	Start Distance	Length
16 in.	0.438 in.	-	-	-	-	**Salvaged Girder**	1	8.354 ft	35.417 ft

Top Angles

Apply to Entire Structure: Yes



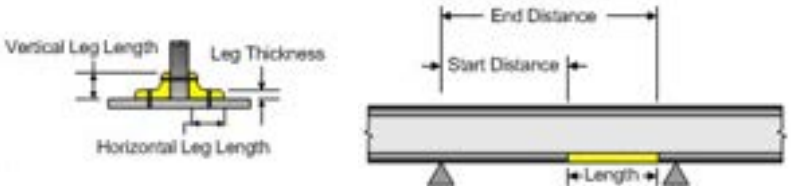


Vertical Leg Length	Horizontal Leg Length	Leg Thickness	Material	Support Number	Start Distance	Length

6 in.	6 in.	0.438 in.	**Salvaged Girder**	1	0 ft	51 ft

Bottom Angles

Apply to Entire Structure: Yes



Vertical Leg Length	Horizontal Leg Length	Leg Thickness	Material	Support Number	Start Distance	Length
6 in.	6 in.	0.438 in.	**Salvaged Girder**	1	0 ft	51 ft

Hinges

No hinges have been defined.

Special Locations

No special locations have been defined.

Supports

Support Conditions

Support	Support Restraint		
	Horizontal	Vertical	Rotational
1	Free	Restrained	Free
2	Restrained	Restrained	Free

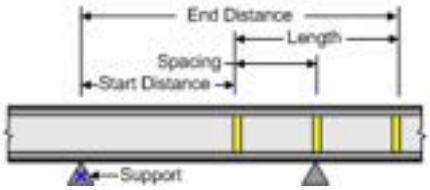
Spring Constants

Support	Spring Constants		
	Horizontal	Vertical	Rotational
1	-	-	-
2	-	-	-

Schedules

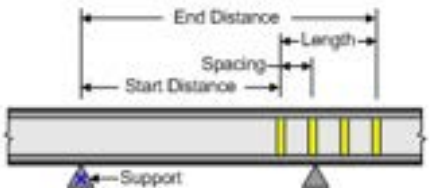
Bracing

Apply to Entire Structure: No



Spacing	Support	Start Distance	Length
11.167 ft	1	4.906 ft	11.167 ft
14.438 ft	1	35.99 ft	14.438 ft

Transverse Stiffeners



Stiffener Group	Spacing	Support	Start Distance	Length
Web Stiffeners	1.333 ft	1	0.031 ft	1.333 ft
Web Stiffeners	3.75 ft	1	8.573 ft	3.75 ft
Web Stiffeners	3.917 ft	1	19.99 ft	3.917 ft
Web Stiffeners	3.917 ft	1	28.156 ft	3.917 ft
Web Stiffeners	3.656 ft	1	39.74 ft	7.313 ft

Bearing Stiffeners

Apply to Entire Structure: No

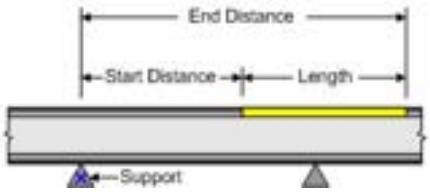
Support	Stiffener Group
1	Not Assigned
2	Not Assigned

Longitudinal Stiffeners

No longitudinal stiffener schedules have been defined.

Lateral Support

Apply to Entire Structure: Yes



Support	Start Distance	Length
1	0 ft	51 ft

Cb Factors (Standard)

No Cb factors (LRFD) have been defined.

Cb Factors (LRFD)

No Cb factors (LRFD) have been defined.

Fatigue Stress (Standard)

No fatigue stress (standard) schedules have been defined.

Member Control

Steel

Flexural Resistance

Span	Compact Piers (Standard)	Ignore Eq. 6.10.7.1.2-3 (LRFD)
1	No	No

End Panel Distances

Top Span



Left of Top Span: -
Right of Top Span: -

Flange Local Buckling Resistance Adjustment

Standard Specifications: -
LRFD Specifications: -

Points of Interest

No points of interest have been defined.

Dead Loads

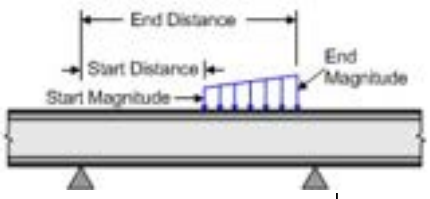
Uniform

Dead Load Type	Stage	Uniform Load
DC	1	-
DW	1	-
DU	1	-

Additional Self-weight

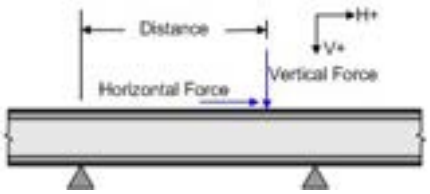
No additional self-weight dead loads have been defined.

Distributed



Dead Load Group	Support	Distributed Load (Start)		Distributed Load (End)	
		Distance	Magnitude	Distance	Magnitude
Vertical Web Angles	1	0.031 ft	0.019 kip / ft	50.938 ft	-

Concentrated



Dead Load Group	Support	Concentrated Load		
		Distance	Horizontal Force	Vertical Force
Girder Bracing	1	4.906 ft	-	0.17 kip
Girder Bracing	1	16.073 ft	-	0.164 kip

Girder Bracing	1	35.99 ft	-	0.164 kip
Girder Bracing	1	50.427 ft	-	0.169 kip
Bottom Flange Struts	1	5.583 ft	-	0.044 kip
Bottom Flange Struts	1	26.031 ft	-	0.046 kip
Bottom Flange Struts	1	43.208 ft	-	0.046 kip

Temperature

No temperature dead loads have been defined.

Settlement

Stage: 1

No settlement loads have been defined.

Pedestrian Load

Pedestrian Load: -

Wheel Fractions (Standard)

Moment

No moment wheel fractions have been defined.

Shear

No shear wheel fractions have been defined.

Deflection

No deflection wheel fractions have been defined.

Reaction

Apply to entire structure: No

Support	mg Single-Lane			mg Multi-Lane		
	Moment	Shear	Deflection	Moment	Shear	Deflection
1	-	-	-	-	-	-
2	-	-	-	-	-	-

Nanue Stream Bridge
Load Rating for Steel Exterior Girder Span 1 (G4-1)

CRITICAL RATING FACTOR SUMMARY: Design Load Inventory

Live Load No.	Combination Description		Total Vehicle Wt. (tons)	Controlling Point of Interest	Limit State Action Location	Rating Factor	Load Rating (tons)
1	HL-93-TRUCK + HL-93-LANE	(DTK)	36.00	101.0000	STRENGTH I Shear Maximum Effects	2.18	78.60
2	HL-93-TANDEM + HL-93-LANE	(DTK)	25.00	105.0000	SERVICE II Flange Stress Maximum Effects Top Flange	2.54	63.40
15	HL-93-FAT	(FAT)	36.00	101.0000	FATIGUE I Shear Stress Maximum Effects	5.91	212.60
Crit	HL-93-TRUCK + HL-93-LANE	(DTK)	36.00	101.0000	STRENGTH I	2.18	78.60

CRITICAL RATING FACTOR SUMMARY: Design Load Operating

Live Load No.	Combination Description		Total Vehicle Wt. (tons)	Controlling Point of Interest	Limit State Action Location	Rating Factor	Load Rating (tons)
1	HL-93-TRUCK + HL-93-LANE	(DTK)	36.00	101.0000	STRENGTH I-O Shear Maximum Effects	2.83	101.89
2	HL-93-TANDEM + HL-93-LANE	(DTK)	25.00	101.0000	STRENGTH I-O Shear Maximum Effects	3.30	82.38
Crit	HL-93-TRUCK + HL-93-LANE	(DTK)	36.00	101.0000	STRENGTH I-O	2.83	101.89

CRITICAL RATING FACTOR SUMMARY: Legal Load

Live Load No.	Combination Description		Total Vehicle Wt. (tons)	Controlling Point of Interest	Limit State Action Location	Rating Factor	Load Rating (tons)
3	TYPE3	(TRK)	25.00	105.0000	SERVICE II Flange Stress Maximum Effects Top Flange	3.92	97.98
4	TYPE3S2	(TRK)	36.00	104.0000	SERVICE II Flange Stress Maximum Effects Top Flange	4.19	150.97
5	TYPE3-3	(TRK)	40.00	110.0000	STRENGTH I Shear Minimum Effects	4.44	177.64
6	NRL-MIN	(TRK)	40.00	105.0000	SERVICE II Flange Stress Maximum Effects Top Flange	2.50	99.89
7	NRL-MAX	(TRK)	40.00	105.0000	SERVICE II Flange Stress Maximum Effects Top Flange	2.58	103.17
8	SU4	(TRK)	27.00	105.0000	SERVICE II Flange Stress Maximum Effects Top Flange	3.42	92.27

9	SU5	(TRK)	31.00	105.0000	SERVICE II Flange Stress Maximum Effects Top Flange	3.15	97.55
10	SU6	(TRK)	34.75	105.0000	SERVICE II Flange Stress Maximum Effects Top Flange	2.83	98.33
11	SU7	(TRK)	38.75	105.0000	SERVICE II Flange Stress Maximum Effects Top Flange	2.62	101.40
16	EV2	(TRK)	28.75	105.0000	SERVICE II Flange Stress Maximum Effects Top Flange	3.42	98.33
17	EV3	(TRK)	43.00	105.0000	SERVICE II Flange Stress Maximum Effects Top Flange	2.22	95.31
Crit	EV3	(TRK)	43.00	105.0000	SERVICE II	2.22	95.31

CRITICAL RATING FACTOR SUMMARY: Permit Load

Live Load No.	Combination Description		Total Vehicle Wt. (tons)	Controlling Point of Interest	Limit State Action Location	Rating Factor	Load Rating (tons)
12	HP1	(PTK)	60.00	105.0000	SERVICE II Flange Stress Maximum Effects Top Flange	2.72	163.26
13	HP2	(PTK)	78.55	110.0000	STRENGTH II Shear Minimum Effects	2.89	227.15
14	HP3	(PTK)	104.95	101.0000	STRENGTH II Shear Maximum Effects	3.70	388.08
Crit	HP1	(PTK)	60.00	105.0000	SERVICE II	2.72	163.26

Wyoming Department of Transportation

BRASS-GIRDER™ Input Parameters

Version Information

Girder UI:	7.8.0.3001
Girder XML:	7.8.0.3001
BRASS™ XML:	1.8.0.3001

Administration

Project ID:	8780-06
Project Title:	HDOT Statewide Bridge Load Ratings
Bridge ID:	1000190308146
Bridge Name:	Nanue Stream
Route Name:	00019 Hawaii Belt Road
Reference Marker:	18
Title 1:	Nanue Stream Bridge
Title 2:	Load Rating for Steel Interior Girder Span 1 (G3-1)
Date:	2017 4 21
Agency:	HDOT Highways Division
Designer/Rater:	Moffatt & Nichol (JU)
Reviewer:	
Comments:	

Bridge Notes

MATERIAL PROPERTIES
Concrete
Weight = 0.160 kcf (HDOT Design Criteria for Bridges and Structures [HDOT] 5.01)
Strength = 3 ksi (Record Drawings: Class A-1)
Elastic Modulus = 3,880 ksi (AASHTO LRFD [LRFD] Eqn 5.4.2.4-1, Use 0.150 kcf per HDOT 5.01)
Reinforcing Steel
Yield Strength = 33 ksi (Unknown, Manual for Bridge Evaluation [MBE] Table 6A.5.2.2-1)
Elastic Modulus = 29,000 ksi (LRFD 5.4.3.2)

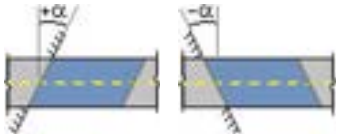
BRIDGE PROPERTIES (RECORD DRAWINGS)
Span 1 = 51 ft
Span 2 = 50 ft
Span 3 = 40 ft
Span 4 = 72 ft
Span 5 = 40 ft
Span 6 = 72 ft
Span 7 = 40 ft
Span 8 = 72 ft
Span 9 = 40 ft
Span 10 = 51 ft
Width = 38.5 ft
Deck Thickness = 9 in min
No. of Griders = 4
Girder Spacing = 9 ft, 7.5 ft, 9 ft
Girder Width = 12 3/8"
Girder Depth = 6'-6 1/2"
Surface Roughness = 3.0 (2015 Bridge Inspectinon Report)
Condition Factor = 1.0 (HDOT 5.04, 2015 Bridge Inspection Report indicates Condition Rating of 7)
System Factor = 1.0 (HDOT 5.05,)

LIVE LOADS
LRFD Live Load (MBE Appendix C6A)
Truck and Tandem Lane Load = 0.64 klf
AASHTO Legal Loads (MBE Appendix D6A)
Type 3
Type 3S2
Type 3-3
Notional Rating Load [NRL]
Legal Lane Load = 0.2 klf
SU4
SU5
SU6
SU7
HDOT Hawaii Standard Single Trip Permit Loads (HDOT 5.06)
No lane load provided, vehicles allowed to trave in any lane
HP1
HP2
HP3
Dynamic Load Allowance (HDOT 5.03)
Spans > 40 ft
Wearing Surface: 3 (Assumed)
Design Loads: 33%
Legal Loads: 10%
Permit Loads: 10%
Scale Factor (HDOT 5.06)
Hawaii Standard Single Trip Permit Vehicle analysis assumes only one permit load on the bridge which allows the use of a single-lane distribution factor. When using the single-lane LRFD distribution factor, the 1.2 multiple prescence factor may shall be divided out from the distribtion factor equations.

Control

Structure

Structure Type:	GirderLine
Define Deck Cross Section:	Yes
Number of Members:	4
Skew Angle:	0 °



Analysis Model Type:	Beam
Number of Top Spans:	1



Spans

Span	Length
1	51 ft

Structure Material:	Steel
Beam Type:	Builtup
Composite Structure:	No
Deck Material:	Concrete

Analysis

Unit System:	US
Analysis Method:	LRFD
Analysis Type:	Rating
Number of Stages:	1
Member of Interest:	3
Model Element Type:	Stepped
Point of Interest Generation Control:	Tenth
Live-load Distribution Factor Application:	AnalysisPoint

Interpolate Reinforcement: No
Calculate Effective Width: No

Input

Symmetry

Component	Symmetric
Beam Profile	No
Deck Profile	No
Shear Connectors	No
Transverse Stiffeners	No
Bearing Stiffeners	No
Longitudinal Stiffeners	No
Bracing (Member)	No
Lateral Support	No
Cb Factors (Std)	No
Cb Factors (LRFD)	No
Fatigue Stress (Std)	No
Beam Wheel Fractions (Std)	No
Reaction Wheel Fractions (Std)	No
Beam Distribution Factors (LRFD)	No
Reaction Distribution Factors (LRFD)	No

Simplified Standard Wheel Fractions: No
Merge Beam/Deck Profile Schedules: Yes

Distribution

Perform Dead Load Distribution: Yes
Calculate LRFD Live Load Distribution Factors: Yes

Dead Load Distribution Methods

Stage	Method
1	Tributary area

Live Load Distribution (LRFD)

Distribution Method: AASHTO LRFD
Cross Section Code: a1
Max. Number of Lanes Loaded: Computed
Slab Thickness Type: Structural
Set eg = 0 for Non-composite: Yes
Apply Skew to Lever Rule Override: Yes
Apply Skew to Ridgid Rule Override: No
Use Constants from Table 4.6.2.2.1-2: No

Libraries

Section Library: C:\BRASS\Girder_7.8\Girder\Libraries\BRASS-Sections.bls
Vehicle Library: C:\BRASS\Girder_7.8\Girder\Libraries\BRASS-Vehicles.blv

Output

Primary Output

Action Output Level: DL+LL+CONC
Action Locations: 10thPoints

General

Member Properties:	Yes
Load Combinations:	Yes
Load and Resistance Factors:	Yes
Warnings:	Yes
Camber:	No
Critical Design Ratios / Rating Factors:	Expanded

Live Load

Truck Positions:	Yes
Variable Axle Spacing:	Yes
Live Load Settings:	Yes
Live Load Combinations:	Yes
Live Load Details:	Yes
Impact (LFD):	No

Stage

Stage	Output
1	Yes

Dead Load

Member Self Load:	Yes
Distributed Dead Loads:	Yes
Concentrated Dead Loads:	Yes
Temperature Change:	No
Settlements:	No

Load Distribution

Dead Load Distribution:	Yes
Live Load Distribution:	Yes

Intermediate Output

Intermediate Output Level:	Full
Effective Width:	Yes
Floorbeam Lane Position:	Yes

Points of Interest

Specification Checks:	Yes
Load Factoring/Combinations:	No

Load Distribution

Dead Load:	Yes
Live Load:	Yes

Limit State Output (LRFD)

Limit State	Specification Check	Load Combination
Strength I	Yes	Yes
Strength II	Yes	Yes
Strength IV	No	No
Service I	No	No
Service II	No	No
Fatigue I	No	No
Fatigue II	No	No

Load Combination Output (LFD)

LFD Load Combo	Specification Check	Load Combination

Combo I	No	No
Combo IB	No	No
Combo I Overload	No	No
Combo IB Overload	No	No
Combo I Service	No	No
Combo IB Service	No	No
Combo Fatigue	Yes	Yes

Intermediate Output (cont.)

Steel

Transverse Stiffeners: No
Bearing Stiffeners: No
Longitudinal Stiffeners: No

Results Tables

X-Y Plot Action Tables: No
Specification Check Results Tables: No
Mesh Plot Files: No

BRASS-PAD™ Data Transfer File: No

Influence

Output influence lines for: None
Ordinate Divisor: 1

Factors

Load Factors (LRFD)

Limit State	DC		DW		DU		TU	
	max	min	max	min	max	min	max	min
Strength I	1.25	0.9	1.5	0.65	1.5	0.65	-	-
Strength II	1.25	0.9	1.5	0.65	1.5	0.65	-	-
Strength IV	-	-	-	-	-	-	-	-
Service I	-	-	-	-	-	-	-	-
Service II	1	1	1	1	1	1	-	-
Fatigue I	-	-	-	-	-	-	-	-
Fatigue II	-	-	-	-	-	-	-	-

Load Factors (LRFD) (continued)

Limit State	LL				SE		PS		DS	
	Design		Legal	Permit						
	Inventory	Operating			max	min	max	min	max	min
Strength I	1.75	1.35	1.45	0	-	-	-	-	-	-
Strength II	-		0	1.2	-	-	-	-	-	-
Strength IV	-		-	-	-	-	-	-	-	-
Service I	-		-	-	-	-	-	-	-	-
Service II	1.3	1	1.3	1	-	-	-	-	-	-
Fatigue I	0.75		-	-	-	-	-	-	-	-
Fatigue II	-		-	-	-	-	-	-	-	-

Load Modifiers (LRFD)

Limit State	Ductility	Redundancy	Importance	Combined Product	
				max	min
Strength I	1	1	1	-	-
Strength II	1	1	1	-	-
Strength IV	1	1	1	-	-
Service I	1	1	1	-	-
Service II	1	1	1	-	-
Fatigue I	1	1	1	-	-
Fatigue II	1	1	1	-	-

Resistance Factors (LRFD)

Resistance Factors

Type	Value
φ Flexure	1
φ Shear	1
φ Bearing	1
φ Compression	0.95
φ Shear Connectors	0.85
φ Fatigue	1

System/Total Modifiers

Limit State	Resistance Type	System	Total
Strength	Flexure	1	-
Strength	Shear	1	-
Strength	Bearing	1	-
Strength	Compression	1	-
Strength	Shear Connectors	1	-
Strength	Longitudinal Reinforcement	1	-
Service	Flexure	1	-
Fatigue	Fatigue	1	-

Condition Modifiers

Limit State	Condition
Strength	1
Service	1
Fatigue	1

Load Factors (LFD)

Load Combo	γ	LL	DC	DW	DU	TU	SE	PS	DS
I	-	-	-	-	-	-	-	1	1
IB	-	-	-	-	-	-	-	1	1
I-Overload	-	-	-	-	-	-	-	1	1
IB-Overload	-	-	-	-	-	-	-	1	1

I-Service	-	-	-	-	-	-	-	1	1
IB-Service	-	-	-	-	-	-	-	1	1
Fatigue	-	-	-	-	-	-	-	1	1

Capacity Reduction Factors (LFD)

Factor	Value
φ Flexure	-
φ Shear	-
φ Fatigue	-

Materials

Steel

ID	Name	Yield Stress	Tensile Strength	Modulus of Elasticity	Density	Thermal Expansion Coefficient
1	Salvaged Girder	30 ksi	60 ksi	29000 ksi	0.49 kcf	6.5E-06 °F^{-1}

Concrete

ID	Name	28 Day Compressive Strength	Modulus of Elasticity	Density	Modulus of Rupture	Modulus of Rupture (VCI Method)	Thermal Expansion Coefficient
1	1949 Class A-1	3 ksi	3880 ksi	0.16 kcf	-	-	6E-06 °F^{-1}

Dead Load Groups

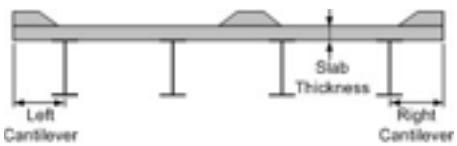
Groups

ID	Name	Stage	Type	Description
1	Concrete Railing	1	DC	Top Rail, Bottom Rail, Post
2	Sidewalk / Shoulder	1	DC	
3	AC Pavement	1	DW	
4	Girder Bracing	1	DC	X-Bracing with Steel Angles in the Outer Bays
5	Bottom Flange Bracing	1	DC	Steel Angles Diagonal Bracing in the Interior Bay
6	Vertical Web Angles	1	DC	Steel Angles Spaced at Intervals
7	Waterlines	1	DU	Assumed 8" Waterlines
8	Monorail	1	DC	6" Monorail
9	Bottom Flange Struts	1	DC	Bottom Flange Struts out of Steel Angles and Plates in Outer Bays

Deck Geometry

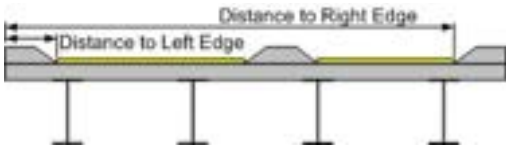
Deck

Deck Thickness: 9 in.
Left Cantilever Length: 6.5 ft
Right Cantilever Length: 6.5 ft
Equal Member Spacing: No



Travelway Locations

Distance to Left Edge: 5.25 ft
Distance to Right Edge: 33.25 ft

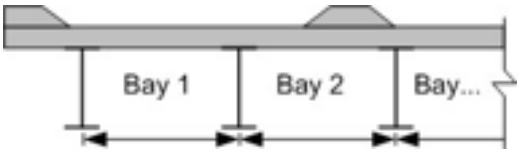


Sacrificial Topping

Thickness: -
Dead Load Type: DC

Member Spacing

Bay #	Spacing
1	9 ft
2	7.5 ft
3	9 ft



Soffits

No soffits have been defined.

Appurtenances

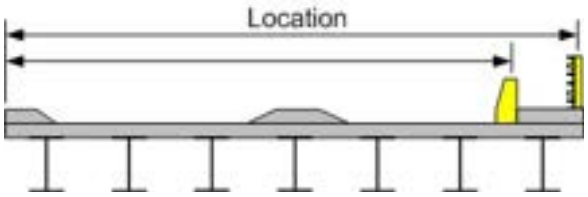
No appurtenances have been defined.

Deck Loads

Materials/Stages

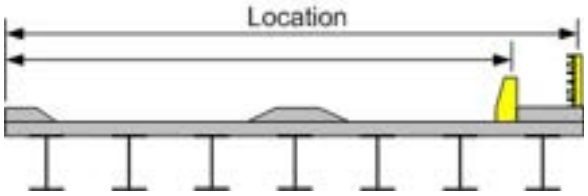
Deck Material: **1949 Class A-1**
Curb & Median Material: Not Assigned
Wearing Surface Weight: -
Slab Stage: 1
Curb Stage: 1
Median Stage: 1
Wearing Surface Stage: 1

Line Loads



Dead Load Group	Line Load	Load Location
Concrete Railing	0.319 kip / ft	0.923 ft
Concrete Railing	0.319 kip / ft	37.577 ft
Monorail	0.016 kip / ft	34 ft
Waterlines	0.224 kip / ft	38.5 ft

Uniform Loads



Dead Load Group	Uniform Load	Load Location	Load Width
Sidewalk / Shoulder	0.007 ksf	0 ft	5.25 ft
Sidewalk / Shoulder	0.003 ksf	5.25 ft	2 ft
AC Pavement	0.018 ksf	7.25 ft	24 ft
Sidewalk / Shoulder	0.003 ksf	31.25 ft	2 ft
Sidewalk / Shoulder	0.007 ksf	33.25 ft	5.25 ft

Live Loads

Live Load Control

Direction Control: Up+Down
Standard Live Loads: None
Wheel Advancement Denominator: 100
ADTT: 5000
ADTT for Single Lane: 2000
Multiple Presence Adjustment: -
% of Dynamic Load Allowance (Impact): 100 %
Fixed Impact (STD): -

Dynamic Load Allowance (LRFD)

Design/Rating Procedure	Truck	Lane	Fatigue
Design	33 %	0 %	15 %
Legal	33 %	0 %	0 %
Permit	33 %	0 %	0 %

Special Vehicles

Axle Vehicles

No axle vehicles have been defined.

Lane Vehicles

No lane vehicles have been defined.

Definitions (STD)

No standard live load definitions have been defined.

Definitions (LRFD)

Definition 1

Code: HL-93-TRUCK
Type: DesignTruck
Design Rating: Design
% of Dynamic Load Allowance: -
Scale Factor: -
Lanes Loaded: Critical
Notional Load: Yes
Fixed DLA: -

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 2

Code: HL-93-TANDEM
Type: DesignTruck
Design Rating: Design
% of Dynamic Load Allowance: -
Scale Factor: -

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-

Lanes Loaded:	Critical
Notional Load:	Yes
Fixed DLA:	-

Limit State	gamma LL	gamma LL Operating
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 3

Code:	HL-93-LANE
Type:	DesignLane
Design Rating:	Design
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	Yes
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 4

Code:	TYPE3
Type:	GeneralTruck
Design Rating:	Legal
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 5

Code:	TYPE3S2
Type:	GeneralTruck
Design Rating:	Legal
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 6

Code:	TYPE3-3
Type:	GeneralTruck
Design Rating:	Legal
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-

Fatigue II	-	-

Definition 7

Code: NRL-MIN
Type: GeneralTruck
Design Rating: Legal
% of Dynamic Load Allowance: -
Scale Factor: -
Lanes Loaded: Critical
Notional Load: No
Fixed DLA: -

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 8

Code: NRL-MAX
Type: GeneralTruck
Design Rating: Legal
% of Dynamic Load Allowance: -
Scale Factor: -
Lanes Loaded: Critical
Notional Load: No
Fixed DLA: -

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 9

Code: SU4
Type: GeneralTruck
Design Rating: Legal
% of Dynamic Load Allowance: -
Scale Factor: -
Lanes Loaded: Critical
Notional Load: No
Fixed DLA: -

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 10

Code: SU5
Type: GeneralTruck
Design Rating: Legal
% of Dynamic Load Allowance: -
Scale Factor: -
Lanes Loaded: Critical
Notional Load: No
Fixed DLA: -

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 11

Code: SU6
Type: GeneralTruck

Live Load Factor Overrides

Design Rating:	Legal
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 12

Code:	SU7
Type:	GeneralTruck
Design Rating:	Legal
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 13

Code:	HP1
Type:	PermitTruck
Design Rating:	Permit
% of Dynamic Load Allowance:	-
Scale Factor:	0.833
Lanes Loaded:	Single
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 14

Code:	HP2
Type:	PermitTruck
Design Rating:	Permit
% of Dynamic Load Allowance:	-
Scale Factor:	0.833
Lanes Loaded:	Single
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 15

Code:	HP3
Type:	PermitTruck
Design Rating:	Permit
% of Dynamic Load Allowance:	-
Scale Factor:	0.833
Lanes Loaded:	Single
Notional Load:	No

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-

Fixed DLA: -

Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 16

Code: HL-93-FAT
Type: FatigueTruck
Design Rating: Design
% of Dynamic Load Allowance: -
Scale Factor: -
Lanes Loaded: Critical
Notional Load: No
Fixed DLA: -

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 17

Code: EV2
Type: GeneralTruck
Design Rating: Legal
% of Dynamic Load Allowance: -
Scale Factor: -
Lanes Loaded: Critical
Notional Load: No
Fixed DLA: -

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 18

Code: EV3
Type: GeneralTruck
Design Rating: Legal
% of Dynamic Load Allowance: -
Scale Factor: -
Lanes Loaded: Critical
Notional Load: No
Fixed DLA: -

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

General Combinations (LRFD)

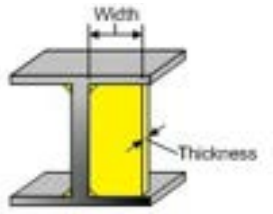
Standard Combo	Truck	Lane	Combination Factors	
			Truck	Lane
No	HL-93-TRUCK	HL-93-LANE	1	1
No	HL-93-TANDEM	HL-93-LANE	1	1

Deflection Combinations (LRFD)

No Deflection Combinations (LRFD) have been defined.

Component Groups

Transverse Stiffeners



ID	Name	Width	Thickness	Type	Type Factor	Material
1	Web Stiffeners	5 in.	0.375 in.	Single Angles	-	**Salvaged Girder**

Bearing Stiffeners

No bearing stiffener groups have been defined.

Longitudinal Stiffeners

No longitudinal stiffener groups have been defined.

Specification Control

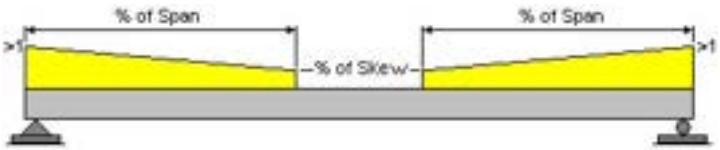
General

Lane Geometry

Design Vehicle Lane Width: 12 ft
Vehicle Width: 10 ft
Wheel Spacing: 6 ft
Encroachment Distance: -

Load Factors Control (LRFD): Use maximum and minimum load factors

Skew Factors



Span #	% of Span	% of Skew
1	-	-

Steel

Use Appendix A6 (LRFD): No
Allow Plastic Analysis: No
Override Longitudinal Stiffeners: No
Slab thickness for longitudinal shear force: Structural
Slab thickness for minimum negative flexure concrete deck reinforcement: Structural

Fatigue

AASHTO LRFD Table 6.6.1.2.5-2

% of Span: -
Span Length: 40 ft

Stress Range in Longitudinal Reinforcement Over the Piers: 10 ksi

Detail Categories (LRFD)

Detail Category	Constant, A x 10^8	Constant Amplitude Fatigue Threshold
A	-	-

B	-	-
B'	-	-
C	-	-
C'	-	-
D	-	-
E	-	-
E'	-	-

Limit State Map

Limit State Maps (LRFD)

Limit State	Design Review			Rating		
	Design Load	Legal Load	Permit Load	Design Load	Legal Load	Permit Load
Strength I	No	No	No	Inventory/Operating	Yes	No
Strength II	No	No	No	Exclude	No	Yes
Strength IV	No	No	No	Exclude	No	No
Service I	No	No	No	Exclude	No	No
Service II	No	No	No	Inventory/Operating	Yes	Yes
Service III	No	No	No	Exclude	No	No
Fatigue I	No	No	No	Inventory	No	No
Fatigue II	No	No	No	Exclude	No	No

Load Combo Maps (LFD)

Load Combo	Design Review	Rating
I	No	Inventory
IB	No	Operating
I-Overload	No	Exclude
IB-Overload	No	Exclude
I-Service	No	Exclude
IB-Service	No	Exclude
Fatigue	No	Exclude

Spec. Check Map (Strength)

LRFD Specification Check Maps

Design Load Review

Spec Check	Strength I	Strength II	Strength IV
Flexure	No	No	No
Shear	No	No	No
Bearing	No	No	No
Flexural Stress In Longitudinal Stiffener	No	No	No

Legal Load Review

Spec Check	Strength I	Strength II	Strength IV
Flexure	No	No	No

Shear	No	No	No
Bearing	No	No	No
Flexural Stress In Longitudinal Stiffener	No	No	No

Permit Load Review

Spec Check	Strength I	Strength II	Strength IV
Flexure	No	No	No
Shear	No	No	No
Bearing	No	No	No
Flexural Stress In Longitudinal Stiffener	No	No	No

Design Load Rating

Spec Check	Strength I	Strength II	Strength IV
Flexure	Yes	No	No
Shear	Yes	No	No
Bearing	Yes	No	No
Flexural Stress In Longitudinal Stiffener	No	No	No

Legal Load Rating

Spec Check	Strength I	Strength II	Strength IV
Flexure	Yes	No	No
Shear	Yes	No	No
Bearing	Yes	No	No
Flexural Stress In Longitudinal Stiffener	No	No	No

Permit Load Rating

Spec Check	Strength I	Strength II	Strength IV
Flexure	No	Yes	No
Shear	No	Yes	No
Bearing	No	Yes	No
Flexural Stress In Longitudinal Stiffener	No	No	No

LFD Specification Check Maps

Design Review

LFD Spec Check	I	IB	I-Overload	IB-Overload
Flexure	No	No	No	No
Shear	No	No		
Bearing	No	No		
Flexural Stress In Longitudinal Stiffener	No	No		

Rating

LFD Spec Check	I	IB	I-Overload	IB-Overload
Flexure	No	No	No	No
Shear	No	No		
Bearing	No	No		

Flexural Stress In Longitudinal Stiffener	No	No

Spec. Check Map (Service)

LRFD Specification Check Maps

Design Load Review

Spec Check	Service I	Service II
Crack Control	No	No
Flexural Stress In Flanges	No	No
Live Load Deflection	No	No

Legal Load Review

Spec Check	Service I	Service II
Crack Control	No	No
Flexural Stress In Flanges	No	No
Live Load Deflection	No	No

Permit Load Review

Spec Check	Service I	Service II
Crack Control	No	No
Flexural Stress In Flanges	No	No
Live Load Deflection	No	No

Design Load Rating

Spec Check	Service I	Service II
Crack Control	No	No
Flexural Stress In Flanges	No	Yes
Live Load Deflection	No	Yes

Legal Load Rating

Spec Check	Service I	Service II
Crack Control	No	No
Flexural Stress In Flanges	No	Yes
Live Load Deflection	No	Yes

Permit Load Rating

Spec Check	Service I	Service II
Crack Control	No	No
Flexural Stress In Flanges	No	Yes
Live Load Deflection	No	Yes

LFD Specification Check Maps

Design Review

LFD Spec Check	I-Overload	IB-Overload
Flexural Stress In Flanges	No	No

Rating

LFD Spec Check	I-Overload	IB-Overload
Flexural Stress In Flanges	No	No

Spec. Check Map (Fatigue)

LRFD Specification Check Maps

Design Load Review

Spec Check	Fatigue I	Fatigue II
Fatigue of Reinforcement	No	No
Fatigue of Shear Connectors	No	No
Fatigue Shear Range of Shear Connectors	No	No
Fatigue of Special Points	No	No
Fatigue Shear	No	No

Legal Load Review

Spec Check	Fatigue I	Fatigue II
Fatigue of Reinforcement	No	No
Fatigue of Shear Connectors	No	No
Fatigue Shear Range of Shear Connectors	No	No
Fatigue of Special Points	No	No
Fatigue Shear	No	No

Permit Load Review

Spec Check	Fatigue I	Fatigue II
Fatigue of Reinforcement	No	No
Fatigue of Shear Connectors	No	No
Fatigue Shear Range of Shear Connectors	No	No
Fatigue of Special Points	No	No
Fatigue Shear	No	No

Design Load Rating

Spec Check	Fatigue I	Fatigue II
Fatigue of Reinforcement	Yes	No
Fatigue of Shear Connectors	Yes	No
Fatigue Shear Range of Shear Connectors	Yes	No
Fatigue of Special Points	Yes	No
Fatigue Shear	Yes	No

Legal Load Rating

Spec Check	Fatigue I	Fatigue II
Fatigue of Reinforcement	No	No
Fatigue of Shear Connectors	No	No
Fatigue Shear Range of Shear Connectors	No	No
Fatigue of Special Points	No	No

Fatigue Shear	No	No

Permit Load Rating

Spec Check	Fatigue I	Fatigue II
Fatigue of Reinforcement	No	No
Fatigue of Shear Connectors	No	No
Fatigue Shear Range of Shear Connectors	No	No
Fatigue of Special Points	No	No
Fatigue Shear	No	No

LFD Specification Check Maps

Design Review

LFD Spec Check	Fatigue
Fatigue of Special Points	No

Rating

LFD Spec Check	Fatigue
Fatigue of Special Points	No

Member

Member Notes

No member notes have been defined.

Member Materials

Beam

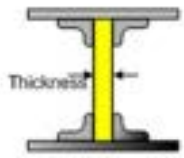
Beam Material: Salvaged Girder

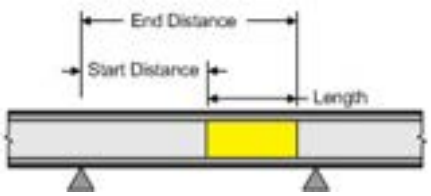
Beam Profile

Web

Apply to Entire Structure: Yes
Web Angle: -





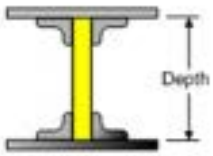


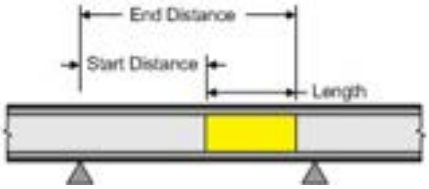
Thickness	Material	Support Number	Start Distance	Length

0.375 in.	**Salvaged Girder**	1	0 ft	51 ft	

Web Depth

Apply to Entire Structure: Yes

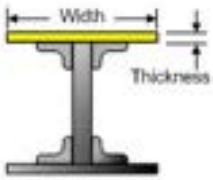


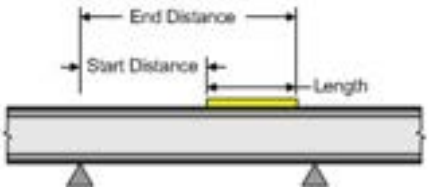


Start Depth	Web Variation	End Depth	Support Number	Start Distance	Length
78 in.	Linear	78 in.	1	0 ft	51 ft

Top Cover Plate

Apply to Entire Structure: No

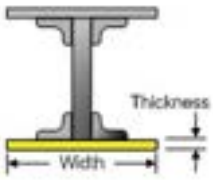




Start of Range			End of Range						
Width	Thickness	Gap Thickness	Width	Thickness	Gap Thickness	Material	Support Number	Start Distance	Length
16 in.	0.438 in.	-	-	-	-	**Salvaged Girder**	1	8.354 ft	35.417 ft

Bottom Cover Plate

Apply to Entire Structure: No

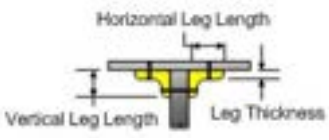




Start of Range			End of Range						
Width	Thickness	Gap Thickness	Width	Thickness	Gap Thickness	Material	Support Number	Start Distance	Length
16 in.	0.438 in.	-	-	-	-	**Salvaged Girder**	1	8.354 ft	35.417 ft

Top Angles

Apply to Entire Structure: Yes



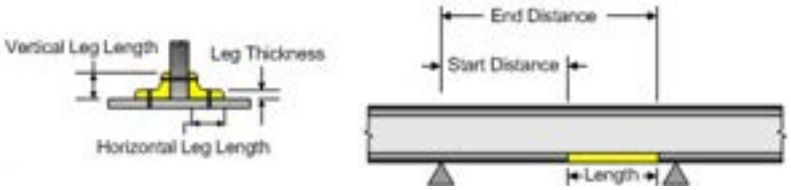


Vertical Leg Length	Horizontal Leg Length	Leg Thickness	Material	Support Number	Start Distance	Length

6 in.	6 in.	0.438 in.	**Salvaged Girder**	1	0 ft	51 ft

Bottom Angles

Apply to Entire Structure: Yes



Vertical Leg Length	Horizontal Leg Length	Leg Thickness	Material	Support Number	Start Distance	Length
6 in.	6 in.	0.438 in.	**Salvaged Girder**	1	0 ft	51 ft

Hinges

No hinges have been defined.

Special Locations

No special locations have been defined.

Supports

Support Conditions

Support	Support Restraint		
	Horizontal	Vertical	Rotational
1	Free	Restrained	Free
2	Restrained	Restrained	Free

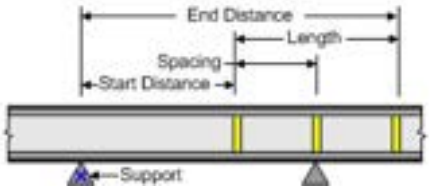
Spring Constants

Support	Spring Constants		
	Horizontal	Vertical	Rotational
1	-	-	-
2	-	-	-

Schedules

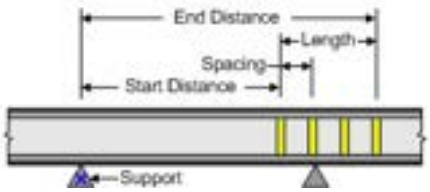
Bracing

Apply to Entire Structure: No



Spacing	Support	Start Distance	Length
11.167 ft	1	4.906 ft	11.167 ft
14.438 ft	1	35.99 ft	14.438 ft

Transverse Stiffeners



Stiffener Group	Spacing	Support	Start Distance	Length
Web Stiffeners	1.333 ft	1	0.031 ft	1.333 ft
Web Stiffeners	3.75 ft	1	8.573 ft	3.75 ft
Web Stiffeners	3.917 ft	1	19.99 ft	3.917 ft
Web Stiffeners	3.917 ft	1	28.156 ft	3.917 ft
Web Stiffeners	3.656 ft	1	39.74 ft	7.313 ft

Bearing Stiffeners

Apply to Entire Structure: No

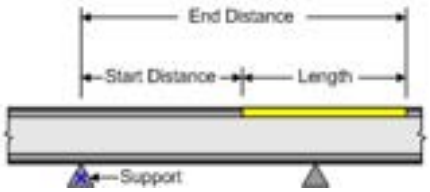
Support	Stiffener Group
1	Not Assigned
2	Not Assigned

Longitudinal Stiffeners

No longitudinal stiffener schedules have been defined.

Lateral Support

Apply to Entire Structure: Yes



Support	Start Distance	Length
1	0 ft	51 ft

Cb Factors (Standard)

No Cb factors (LRFD) have been defined.

Cb Factors (LRFD)

No Cb factors (LRFD) have been defined.

Fatigue Stress (Standard)

No fatigue stress (standard) schedules have been defined.

Member Control

Steel

Flexural Resistance

Span	Compact Piers (Standard)	Ignore Eq. 6.10.7.1.2-3 (LRFD)
1	No	No

End Panel Distances

Top Span



Left of Top Span: -
Right of Top Span: -

Flange Local Buckling Resistance Adjustment

Standard Specifications: -
LRFD Specifications: -

Points of Interest

No points of interest have been defined.

Dead Loads

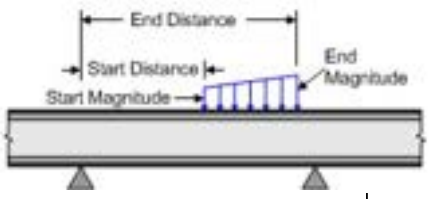
Uniform

Dead Load Type	Stage	Uniform Load
DC	1	-
DW	1	-
DU	1	-

Additional Self-weight

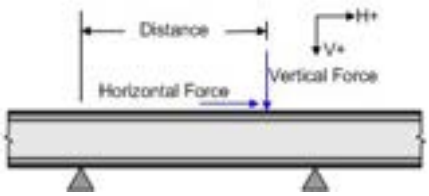
No additional self-weight dead loads have been defined.

Distributed



Dead Load Group	Support	Distributed Load (Start)		Distributed Load (End)	
		Distance	Magnitude	Distance	Magnitude
Bottom Flange Bracing	1	0.063 ft	0.009 kip / ft	50.938 ft	-
Vertical Web Angles	1	0.063 ft	0.019 kip / ft	50.938 ft	-

Concentrated



Dead Load Group	Support	Concentrated Load		
		Distance	Horizontal Force	Vertical Force
Girder Bracing	1	4.906 ft	-	0.17 kip

Girder Bracing	1	16.073 ft	-	0.164 kip
Girder Bracing	1	35.99 ft	-	0.164 kip
Girder Bracing	1	50.427 ft	-	0.169 kip
Bottom Flange Struts	1	5.583 ft	-	0.044 kip
Bottom Flange Struts	1	26.031 ft	-	0.044 kip
Bottom Flange Struts	1	43.208 ft	-	0.044 kip

Temperature

No temperature dead loads have been defined.

Settlement

Stage: 1

No settlement loads have been defined.

Pedestrian Load

Pedestrian Load: -

Wheel Fractions (Standard)

Moment

No moment wheel fractions have been defined.

Shear

No shear wheel fractions have been defined.

Deflection

No deflection wheel fractions have been defined.

Reaction

Apply to entire structure: No

Support	mg Single-Lane			mg Multi-Lane		
	Moment	Shear	Deflection	Moment	Shear	Deflection
1	-	-	-	-	-	-
2	-	-	-	-	-	-

Nanue Stream Bridge
Load Rating for Steel Interior Girder Span 1 (G3-1)

CRITICAL RATING FACTOR SUMMARY: Design Load Inventory

Live Load No.	Combination Description		Total Vehicle Wt. (tons)	Controlling Point of Interest	Limit State Action Location	Rating Factor	Load Rating (tons)
1	HL-93-TRUCK + HL-93-LANE	(DTK)	36.00	101.0000	STRENGTH I Shear Maximum Effects	2.02	72.82
2	HL-93-TANDEM + HL-93-LANE	(DTK)	25.00	101.0000	STRENGTH I Shear Maximum Effects	2.35	58.87
15	HL-93-FAT	(FAT)	36.00	101.0000	FATIGUE I Shear Stress Maximum Effects	6.87	247.50
Crit	HL-93-TRUCK + HL-93-LANE	(DTK)	36.00	101.0000	STRENGTH I	2.02	72.82

CRITICAL RATING FACTOR SUMMARY: Design Load Operating

Live Load No.	Combination Description		Total Vehicle Wt. (tons)	Controlling Point of Interest	Limit State Action Location	Rating Factor	Load Rating (tons)
1	HL-93-TRUCK + HL-93-LANE	(DTK)	36.00	101.0000	STRENGTH I-O Shear Maximum Effects	2.62	94.40
2	HL-93-TANDEM + HL-93-LANE	(DTK)	25.00	101.0000	STRENGTH I-O Shear Maximum Effects	3.05	76.32
Crit	HL-93-TRUCK + HL-93-LANE	(DTK)	36.00	101.0000	STRENGTH I-O	2.62	94.40

CRITICAL RATING FACTOR SUMMARY: Legal Load

Live Load No.	Combination Description		Total Vehicle Wt. (tons)	Controlling Point of Interest	Limit State Action Location	Rating Factor	Load Rating (tons)
3	TYPE3	(TRK)	25.00	101.0000	STRENGTH I Shear Maximum Effects	4.01	100.20
4	TYPE3S2	(TRK)	36.00	110.0000	STRENGTH I Shear Minimum Effects	3.93	141.32
5	TYPE3-3	(TRK)	40.00	110.0000	STRENGTH I Shear Minimum Effects	4.14	165.52
6	NRL-MIN	(TRK)	40.00	105.0000	SERVICE II Flange Stress Maximum Effects Top Flange	2.73	109.01
7	NRL-MAX	(TRK)	40.00	105.0000	SERVICE II Flange Stress Maximum Effects Top Flange	2.81	112.59
8	SU4	(TRK)	27.00	101.0000	STRENGTH I Shear Maximum Effects	3.61	97.59
9	SU5	(TRK)	31.00	101.0000	STRENGTH I Shear Maximum Effects	3.28	101.75

10	SU6	(TRK)	34.75	105.0000	SERVICE II Flange Stress Maximum Effects Top Flange	3.09	107.32
11	SU7	(TRK)	38.75	105.0000	SERVICE II Flange Stress Maximum Effects Top Flange	2.86	110.66
16	EV2	(TRK)	28.75	101.0000	STRENGTH I Shear Maximum Effects	3.37	97.00
17	EV3	(TRK)	43.00	101.0000	STRENGTH I Shear Maximum Effects	2.29	98.41
Crit	EV3	(TRK)	43.00	101.0000	STRENGTH I	2.29	98.41

CRITICAL RATING FACTOR SUMMARY: Permit Load

Live Load No.	Combination Description		Total Vehicle Wt. (tons)	Controlling Point of Interest	Limit State Action Location	Rating Factor	Load Rating (tons)
12	HP1	(PTK)	60.00	101.0000	STRENGTH II Shear Maximum Effects	3.32	199.19
13	HP2	(PTK)	78.55	101.0000	STRENGTH II Shear Maximum Effects	3.24	254.50
14	HP3	(PTK)	104.95	101.0000	STRENGTH II Shear Maximum Effects	4.13	433.49
Crit	HP2	(PTK)	78.55	101.0000	STRENGTH II	3.24	254.50

Wyoming Department of Transportation

BRASS-GIRDER™ Input Parameters

Version Information

Girder UI:	7.8.0.3001
Girder XML:	7.8.0.3001
BRASS™ XML:	1.8.0.3001

Administration

Project ID:	8780-06
Project Title:	HDOT Statewide Bridge Load Ratings
Bridge ID:	1000190308146
Bridge Name:	Nanue Stream
Route Name:	00019 Hawaii Belt Road
Reference Marker:	18
Title 1:	Nanue Stream Bridge
Title 2:	Load Rating for Steel Exterior Girder Span 2 (G4-2)
Date:	2017 4 21
Agency:	HDOT Highways Division
Designer/Rater:	Moffatt & Nichol (JU)
Reviewer:	
Comments:	

Bridge Notes

MATERIAL PROPERTIES
Concrete
Weight = 0.160 kcf (HDOT Design Criteria for Bridges and Structures [HDOT] 5.01)
Strength = 3 ksi (Record Drawings: Class A-1)
Elastic Modulus = 3,880 ksi (AASHTO LRFD [LRFD] Eqn 5.4.2.4-1, Use 0.150 kcf per HDOT 5.01)
Reinforcing Steel
Yield Strength = 33 ksi (Unknown, Manual for Bridge Evaluation [MBE] Table 6A.5.2.2-1)
Elastic Modulus = 29,000 ksi (LRFD 5.4.3.2)

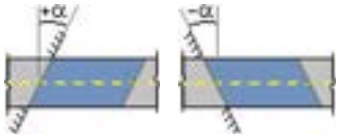
BRIDGE PROPERTIES (RECORD DRAWINGS)
Span 1 = 51 ft
Span 2 = 50 ft
Span 3 = 40 ft
Span 4 = 72 ft
Span 5 = 40 ft
Span 6 = 72 ft
Span 7 = 40 ft
Span 8 = 72 ft
Span 9 = 40 ft
Span 10 = 51 ft
Width = 38.5 ft
Deck Thickness = 9 in min
No. of Griders = 4
Girder Spacing = 9 ft, 7.5 ft, 9 ft
Girder Width = 12 3/8"
Girder Depth = 6'-6 1/2"
Surface Roughness = 3.0 (2015 Bridge Inspectinon Report)
Condition Factor = 1.0 (HDOT 5.04, 2015 Bridge Inspection Report indicates Condition Rating of 7)
System Factor = 1.0 (HDOT 5.05,)

LIVE LOADS
LRFD Live Load (MBE Appendix C6A)
Truck and Tandem Lane Load = 0.64 klf
AASHTO Legal Loads (MBE Appendix D6A)
Type 3
Type 3S2
Type 3-3
Notional Rating Load [NRL]
Legal Lane Load = 0.2 klf
SU4
SU5
SU6
SU7
HDOT Hawaii Standard Single Trip Permit Loads (HDOT 5.06)
No lane load provided, vehicles allowed to trave in any lane
HP1
HP2
HP3
Dynamic Load Allowance (HDOT 5.03)
Spans > 40 ft
Wearing Surface: 3 (Assumed)
Design Loads: 33%
Legal Loads: 10%
Permit Loads: 10%
Scale Factor (HDOT 5.06)
Hawaii Standard Single Trip Permit Vehicle analysis assumes only one permit load on the bridge which allows the use of a single-lane distribution factor. When using the single-lane LRFD distribution factor, the 1.2 multiple prescence factor may shall be divided out from the distribtion factor equations.

Control

Structure

Structure Type: GirderLine
Define Deck Cross Section: Yes
Number of Members: 4
Skew Angle: 0 °



Analysis Model Type: Beam
Number of Top Spans: 1



Spans

Span	Length
1	50 ft

Structure Material: Steel
Beam Type: Builtup
Composite Structure: No
Deck Material: Concrete

Analysis

Unit System: US
Analysis Method: LRFD
Analysis Type: Rating
Number of Stages: 1
Member of Interest: 4
Model Element Type: Stepped
Point of Interest Generation Control: Tenth
Live-load Distribution Factor Application: AnalysisPoint

Interpolate Reinforcement: No
Calculate Effective Width: No

Input

Symmetry

Component	Symmetric
Beam Profile	No
Deck Profile	No
Shear Connectors	No
Transverse Stiffeners	No
Bearing Stiffeners	No
Longitudinal Stiffeners	No
Bracing (Member)	No
Lateral Support	No
Cb Factors (Std)	No
Cb Factors (LRFD)	No
Fatigue Stress (Std)	No
Beam Wheel Fractions (Std)	No
Reaction Wheel Fractions (Std)	No
Beam Distribution Factors (LRFD)	No
Reaction Distribution Factors (LRFD)	No

Simplified Standard Wheel Fractions: No
Merge Beam/Deck Profile Schedules: Yes

Distribution

Perform Dead Load Distribution: Yes
Calculate LRFD Live Load Distribution Factors: Yes

Dead Load Distribution Methods

Stage	Method
1	Tributary area

Live Load Distribution (LRFD)

Distribution Method: AASHTO LRFD
Cross Section Code: a1
Max. Number of Lanes Loaded: Computed
Consider Rigid Method: Yes
Slab Thickness Type: Structural
Set eg = 0 for Non-composite: No
Apply Skew to Lever Rule Override: Yes
Apply Skew to Ridgid Rule Override: Yes
Use Constants from Table 4.6.2.2.1-2: No

Libraries

Section Library: C:\BRASS\Girder_7.8\Girder\Libraries\BRASS-Sections.bls
Vehicle Library: C:\BRASS\Girder_7.8\Girder\Libraries\BRASS-Vehicles.blv

Output

Primary Output

Action Output Level: DL+LL+CONC
Action Locations: 10thPoints

General

Member Properties:	Yes
Load Combinations:	Yes
Load and Resistance Factors:	Yes
Warnings:	Yes
Camber:	No
Critical Design Ratios / Rating Factors:	Expanded

Live Load

Truck Positions:	Yes
Variable Axle Spacing:	Yes
Live Load Settings:	Yes
Live Load Combinations:	Yes
Live Load Details:	Yes
Impact (LFD):	No

Stage

Stage	Output
1	Yes

Dead Load

Member Self Load:	Yes
Distributed Dead Loads:	Yes
Concentrated Dead Loads:	Yes
Temperature Change:	No
Settlements:	No

Load Distribution

Dead Load Distribution:	Yes
Live Load Distribution:	Yes

Intermediate Output

Intermediate Output Level:	Full
Effective Width:	Yes
Floorbeam Lane Position:	Yes

Points of Interest

Specification Checks:	Yes
Load Factoring/Combinations:	Yes

Load Distribution

Dead Load:	Yes
Live Load:	Yes

Limit State Output (LRFD)

Limit State	Specification Check	Load Combination
Strength I	Yes	Yes
Strength II	Yes	Yes
Strength IV	No	No
Service I	No	No
Service II	Yes	Yes
Fatigue I	Yes	Yes
Fatigue II	No	No

Load Combination Output (LFD)

LFD Load Combo	Specification Check	Load Combination

Combo I	No	No
Combo IB	No	No
Combo I Overload	No	No
Combo IB Overload	No	No
Combo I Service	No	No
Combo IB Service	No	No
Combo Fatigue	No	No

Intermediate Output (cont.)

Steel

Transverse Stiffeners: No
Bearing Stiffeners: No
Longitudinal Stiffeners: No

Results Tables

X-Y Plot Action Tables: No
Specification Check Results Tables: No
Mesh Plot Files: No

BRASS-PAD™ Data Transfer File: No

Influence

Output influence lines for: None
Ordinate Divisor: 1

Factors

Load Factors (LRFD)

Limit State	DC		DW		DU		TU	
	max	min	max	min	max	min	max	min
Strength I	1.25	0.9	1.5	0.65	1.5	0.65	-	-
Strength II	1.25	0.9	1.5	0.65	1.5	0.65	-	-
Strength IV	-	-	-	-	-	-	-	-
Service I	-	-	-	-	-	-	-	-
Service II	1	1	1	1	1	1	-	-
Fatigue I	-	-	-	-	-	-	-	-
Fatigue II	-	-	-	-	-	-	-	-

Load Factors (LRFD) (continued)

Limit State	LL				SE		PS		DS	
	Design		Legal	Permit						
	Inventory	Operating			max	min	max	min	max	min
Strength I	1.75	1.35	1.45	0	-	-	-	-	-	-
Strength II	-		0	1.2	-	-	-	-	-	-
Strength IV	-		-	-	-	-	-	-	-	-
Service I	-		-	-	-	-	-	-	-	-
Service II	1.3	1	1.3	1	-	-	-	-	-	-
Fatigue I	0.75		-	-	-	-	-	-	-	-

Fatigue II	-	-	-	-	-	-	-	-	-

Load Modifiers (LRFD)

Limit State	Ductility	Redundancy	Importance	Combined Product	
				max	min
Strength I	1	1	1	-	-
Strength II	1	1	1	-	-
Strength IV	1	1	1	-	-
Service I	1	1	1	-	-
Service II	1	1	1	-	-
Fatigue I	1	1	1	-	-
Fatigue II	1	1	1	-	-

Resistance Factors (LRFD)

Resistance Factors

Type	Value
φ Flexure	1
φ Shear	1
φ Bearing	1
φ Compression	0.95
φ Shear Connectors	0.85
φ Fatigue	1

System/Total Modifiers

Limit State	Resistance Type	System	Total
Strength	Flexure	1	-
Strength	Shear	1	-
Strength	Bearing	1	-
Strength	Compression	1	-
Strength	Shear Connectors	1	-
Strength	Longitudinal Reinforcement	1	-
Service	Flexure	1	-
Fatigue	Fatigue	1	-

Condition Modifiers

Limit State	Condition
Strength	1
Service	1
Fatigue	1

Load Factors (LFD)

Load Combo	γ	LL	DC	DW	DU	TU	SE	PS	DS
I	-	-	-	-	-	-	-	1	1
IB	-	-	-	-	-	-	-	1	1
I-Overload	-	-	-	-	-	-	-	1	1

IB-Overload	-	-	-	-	-	-	-	1	1
I-Service	-	-	-	-	-	-	-	1	1
IB-Service	-	-	-	-	-	-	-	1	1
Fatigue	-	-	-	-	-	-	-	1	1

Capacity Reduction Factors (LFD)

Factor	Value
φ Flexure	-
φ Shear	-
φ Fatigue	-

Materials

Steel

ID	Name	Yield Stress	Tensile Strength	Modulus of Elasticity	Density	Thermal Expansion Coefficient
1	Salvaged Girder	30 ksi	60 ksi	29000 ksi	0.49 kcf	6.5E-06 °F^{-1}

Concrete

ID	Name	28 Day Compressive Strength	Modulus of Elasticity	Density	Modulus of Rupture	Modulus of Rupture (VCI Method)	Thermal Expansion Coefficient
1	1949 Class A-1	3 ksi	3880 ksi	0.16 kcf	-	-	6E-06 °F^{-1}

Dead Load Groups

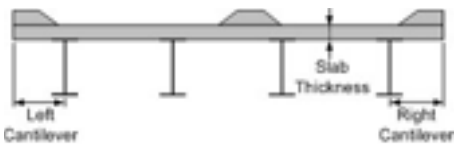
Groups

ID	Name	Stage	Type	Description
1	Concrete Railing	1	DC	Top Rail, Bottom Rail, Post
2	Sidewalk / Shoulder	1	DC	
3	AC Pavement	1	DW	
4	Girder Bracing	1	DC	X-Bracing with Steel Angles in the Outer Bays
5	Bottom Flange Bracing	1	DC	Steel Angles Diagonal Bracing in the Interior Bay
6	Vertical Web Angles	1	DC	Steel Angles Spaced at Intervals
7	Waterlines	1	DU	Assumed 8" Waterlines
8	Monorail	1	DC	6" Monorail
9	Bottom Flange Struts	1	DC	Bottom Flange Struts out of Steel Angles and Plates in Outer Bays

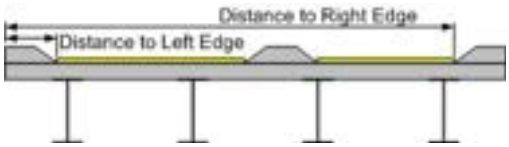
Deck Geometry

Deck

Deck Thickness: 9 in.
Left Cantilever Length: 6.5 ft
Right Cantilever Length: 6.5 ft
Equal Member Spacing: No



Travelway Locations



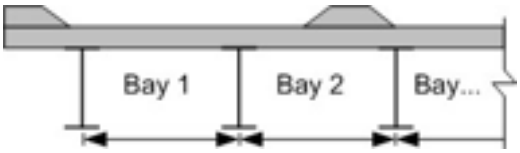
Distance to Left Edge: 5.25 ft
Distance to Right Edge: 33.25 ft

Sacrificial Topping

Thickness: -
Dead Load Type: DC

Member Spacing

Bay #	Spacing
1	9 ft
2	7.5 ft
3	9 ft



Soffits

No soffits have been defined.

Appurtenances

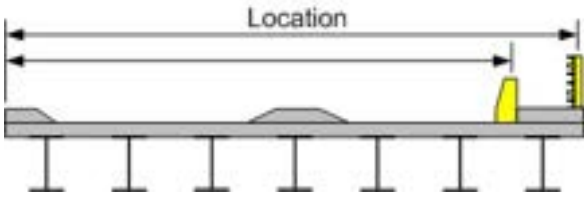
No appurtenances have been defined.

Deck Loads

Materials/Stages

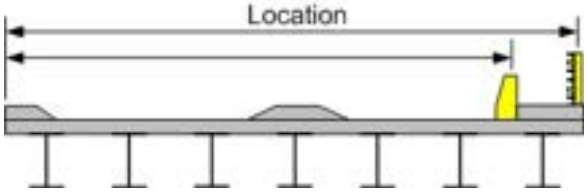
Deck Material: 1949 Class A-1
Curb & Median Material: Not Assigned
Wearing Surface Weight: -
Slab Stage: 1
Curb Stage: 1
Median Stage: 1
Wearing Surface Stage: 1

Line Loads



Dead Load Group	Line Load	Load Location
Concrete Railing	0.319 kip / ft	0.923 ft
Concrete Railing	0.319 kip / ft	37.577 ft
Waterlines	0.224 kip / ft	38.5 ft
Monorail	0.016 kip / ft	34 ft

Uniform Loads



Dead Load Group	Uniform Load	Load Location	Load Width
Sidewalk / Shoulder	0.007 ksf	0 ft	5.25 ft
Sidewalk / Shoulder	0.003 ksf	5.25 ft	2 ft
AC Pavement	0.018 ksf	7.25 ft	24 ft
Sidewalk / Shoulder	0.003 ksf	31.25 ft	2 ft
Sidewalk / Shoulder	0.007 ksf	33.25 ft	5.25 ft

Live Loads

Live Load Control

Direction Control: Up+Down
Standard Live Loads: None
Wheel Advancement Denominator: 100
ADTT: 5000
ADTT for Single Lane: 2000
Multiple Presence Adjustment: -
% of Dynamic Load Allowance (Impact): 100 %
Fixed Impact (STD): -

Dynamic Load Allowance (LRFD)

Design/Rating Procedure	Truck	Lane	Fatigue
Design	33 %	0 %	15 %
Legal	33 %	0 %	0 %
Permit	33 %	0 %	0 %

Special Vehicles

Axle Vehicles

No axle vehicles have been defined.

Lane Vehicles

No lane vehicles have been defined.

Definitions (STD)

No standard live load definitions have been defined.

Definitions (LRFD)

Definition 1

Code: HL-93-TRUCK
Type: DesignTruck
Design Rating: Design
% of Dynamic Load Allowance: -
Scale Factor: -
Lanes Loaded: Critical
Notional Load: Yes
Fixed DLA: -

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 2

Code: HL-93-TANDEM
Type: DesignTruck
Design Rating: Design
% of Dynamic Load Allowance: -

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating

Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	Yes
Fixed DLA:	-

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 3

Code:	HL-93-LANE
Type:	DesignLane
Design Rating:	Design
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	Yes
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 4

Code:	TYPE3
Type:	GeneralTruck
Design Rating:	Legal
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 5

Code:	TYPE3S2
Type:	GeneralTruck
Design Rating:	Legal
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 6

Code:	TYPE3-3
Type:	GeneralTruck
Design Rating:	Legal
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-

Fatigue I	-	-
Fatigue II	-	-

Definition 7

Code:	NRL-MIN
Type:	GeneralTruck
Design Rating:	Legal
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 8

Code:	NRL-MAX
Type:	GeneralTruck
Design Rating:	Legal
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 9

Code:	SU4
Type:	GeneralTruck
Design Rating:	Legal
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 10

Code:	SU5
Type:	GeneralTruck
Design Rating:	Legal
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 11

Code:	SU6

Type:	GeneralTruck
Design Rating:	Legal
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 12

Code:	SU7
Type:	GeneralTruck
Design Rating:	Legal
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 13

Code:	HP1
Type:	PermitTruck
Design Rating:	Permit
% of Dynamic Load Allowance:	-
Scale Factor:	0.833
Lanes Loaded:	Single
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 14

Code:	HP2
Type:	PermitTruck
Design Rating:	Permit
% of Dynamic Load Allowance:	-
Scale Factor:	0.833
Lanes Loaded:	Single
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 15

Code:	HP3
Type:	PermitTruck
Design Rating:	Permit
% of Dynamic Load Allowance:	-
Scale Factor:	0.833
Lanes Loaded:	Single

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-

Notional Load:	No
Fixed DLA:	-

Limit State	gamma LL	gamma LL Operating
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 16

Code:	HL-93-FAT
Type:	FatigueTruck
Design Rating:	Design
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 17

Code:	EV2
Type:	GeneralTruck
Design Rating:	Legal
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 18

Code:	EV3
Type:	GeneralTruck
Design Rating:	Legal
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

General Combinations (LRFD)

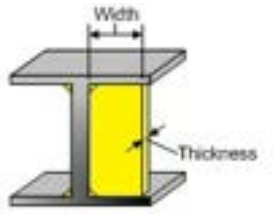
Standard Combo	Truck	Lane	Combination Factors	
			Truck	Lane
No	**HL-93-TRUCK**	**HL-93-LANE**	1	1
No	**HL-93-TANDEM**	**HL-93-LANE**	1	1

Deflection Combinations (LRFD)

No Deflection Combinations (LRFD) have been defined.

Component Groups

Transverse Stiffeners



ID	Name	Width	Thickness	Type	Type Factor	Material
1	Web Stiffeners	5 in.	0.375 in.	Single Angles	-	**Salvaged Girder**

Bearing Stiffeners

No bearing stiffener groups have been defined.

Longitudinal Stiffeners

No longitudinal stiffener groups have been defined.

Specification Control

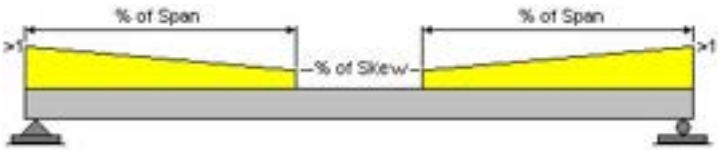
General

Lane Geometry

Design Vehicle Lane Width: 12 ft
Vehicle Width: 10 ft
Wheel Spacing: 6 ft
Encroachment Distance: -

Load Factors Control (LRFD): Use maximum and minimum load factors

Skew Factors



Span #	% of Span	% of Skew
1	-	-

Steel

Use Appendix A6 (LRFD): No
Allow Plastic Analysis: No
Override Longitudinal Stiffeners: No
Slab thickness for longitudinal shear force: Structural
Slab thickness for minimum negative flexure concrete deck reinforcement: Structural

Fatigue

AASHTO LRFD Table 6.6.1.2.5-2

% of Span: -
Span Length: 40 ft

Stress Range in Longitudinal Reinforcement Over the Piers: 10 ksi

Detail Categories (LRFD)

Detail Category	Constant, A x 10^8	Constant Amplitude Fatigue Threshold
A	-	-

B	-	-
B'	-	-
C	-	-
C'	-	-
D	-	-
E	-	-
E'	-	-

Limit State Map

Limit State Maps (LRFD)

Limit State	Design Review			Rating		
	Design Load	Legal Load	Permit Load	Design Load	Legal Load	Permit Load
Strength I	No	No	No	Inventory/Operating	Yes	No
Strength II	No	No	No	Exclude	No	Yes
Strength IV	No	No	No	Exclude	No	No
Service I	No	No	No	Exclude	No	No
Service II	No	No	No	Inventory/Operating	Yes	Yes
Service III	No	No	No	Exclude	No	No
Fatigue I	No	No	No	Inventory	No	No
Fatigue II	No	No	No	Exclude	No	No

Load Combo Maps (LFD)

Load Combo	Design Review	Rating
I	No	Inventory
IB	No	Operating
I-Overload	No	Exclude
IB-Overload	No	Exclude
I-Service	No	Exclude
IB-Service	No	Exclude
Fatigue	No	Exclude

Spec. Check Map (Strength)

LRFD Specification Check Maps

Design Load Review

Spec Check	Strength I	Strength II	Strength IV
Flexure	No	No	No
Shear	No	No	No
Bearing	No	No	No
Flexural Stress In Longitudinal Stiffener	No	No	No

Legal Load Review

Spec Check	Strength I	Strength II	Strength IV
Flexure	No	No	No

Shear	No	No	No
Bearing	No	No	No
Flexural Stress In Longitudinal Stiffener	No	No	No

Permit Load Review

Spec Check	Strength I	Strength II	Strength IV
Flexure	No	No	No
Shear	No	No	No
Bearing	No	No	No
Flexural Stress In Longitudinal Stiffener	No	No	No

Design Load Rating

Spec Check	Strength I	Strength II	Strength IV
Flexure	Yes	Yes	No
Shear	Yes	No	No
Bearing	Yes	Yes	No
Flexural Stress In Longitudinal Stiffener	No	No	No

Legal Load Rating

Spec Check	Strength I	Strength II	Strength IV
Flexure	Yes	Yes	No
Shear	Yes	No	No
Bearing	Yes	Yes	No
Flexural Stress In Longitudinal Stiffener	No	No	No

Permit Load Rating

Spec Check	Strength I	Strength II	Strength IV
Flexure	Yes	Yes	No
Shear	Yes	No	No
Bearing	Yes	Yes	No
Flexural Stress In Longitudinal Stiffener	No	No	No

LFD Specification Check Maps

Design Review

LFD Spec Check	I	IB	I-Overload	IB-Overload
Flexure	No	No	No	No
Shear	No	No		
Bearing	No	No		
Flexural Stress In Longitudinal Stiffener	No	No		

Rating

LFD Spec Check	I	IB	I-Overload	IB-Overload
Flexure	No	No	No	No
Shear	No	No		
Bearing	No	No		

Flexural Stress In Longitudinal Stiffener	No	No

Spec. Check Map (Service)

LRFD Specification Check Maps

Design Load Review

Spec Check	Service I	Service II
Crack Control	No	No
Flexural Stress In Flanges	No	No
Live Load Deflection	No	No

Legal Load Review

Spec Check	Service I	Service II
Crack Control	No	No
Flexural Stress In Flanges	No	No
Live Load Deflection	No	No

Permit Load Review

Spec Check	Service I	Service II
Crack Control	No	No
Flexural Stress In Flanges	No	No
Live Load Deflection	No	No

Design Load Rating

Spec Check	Service I	Service II
Crack Control	No	No
Flexural Stress In Flanges	No	Yes
Live Load Deflection	No	Yes

Legal Load Rating

Spec Check	Service I	Service II
Crack Control	No	No
Flexural Stress In Flanges	No	Yes
Live Load Deflection	No	Yes

Permit Load Rating

Spec Check	Service I	Service II
Crack Control	No	No
Flexural Stress In Flanges	No	Yes
Live Load Deflection	No	Yes

LFD Specification Check Maps

Design Review

LFD Spec Check	I-Overload	IB-Overload
Flexural Stress In Flanges	No	No

Rating

LFD Spec Check	I-Overload	IB-Overload
Flexural Stress In Flanges	Yes	Yes

Spec. Check Map (Fatigue)

LRFD Specification Check Maps

Design Load Review

Spec Check	Fatigue I	Fatigue II
Fatigue of Reinforcement	No	No
Fatigue of Shear Connectors	No	No
Fatigue Shear Range of Shear Connectors	No	No
Fatigue of Special Points	No	No
Fatigue Shear	No	No

Legal Load Review

Spec Check	Fatigue I	Fatigue II
Fatigue of Reinforcement	No	No
Fatigue of Shear Connectors	No	No
Fatigue Shear Range of Shear Connectors	No	No
Fatigue of Special Points	No	No
Fatigue Shear	No	No

Permit Load Review

Spec Check	Fatigue I	Fatigue II
Fatigue of Reinforcement	No	No
Fatigue of Shear Connectors	No	No
Fatigue Shear Range of Shear Connectors	No	No
Fatigue of Special Points	No	No
Fatigue Shear	No	No

Design Load Rating

Spec Check	Fatigue I	Fatigue II
Fatigue of Reinforcement	Yes	No
Fatigue of Shear Connectors	Yes	No
Fatigue Shear Range of Shear Connectors	Yes	No
Fatigue of Special Points	Yes	No
Fatigue Shear	Yes	No

Legal Load Rating

Spec Check	Fatigue I	Fatigue II
Fatigue of Reinforcement	No	No
Fatigue of Shear Connectors	No	No
Fatigue Shear Range of Shear Connectors	No	No
Fatigue of Special Points	No	No

Fatigue Shear	No	No

Permit Load Rating

Spec Check	Fatigue I	Fatigue II
Fatigue of Reinforcement	No	No
Fatigue of Shear Connectors	No	No
Fatigue Shear Range of Shear Connectors	No	No
Fatigue of Special Points	No	No
Fatigue Shear	No	No

LFD Specification Check Maps

Design Review

LFD Spec Check	Fatigue
Fatigue of Special Points	No

Rating

LFD Spec Check	Fatigue
Fatigue of Special Points	No

Member

Member Notes

No member notes have been defined.

Member Materials

Beam

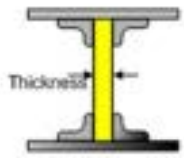
Beam Material: Salvaged Girder

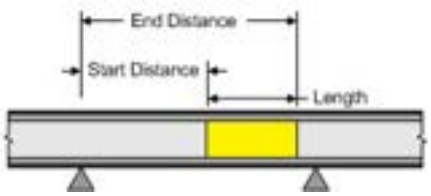
Beam Profile

Web

Apply to Entire Structure: Yes
Web Angle: -





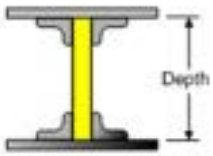


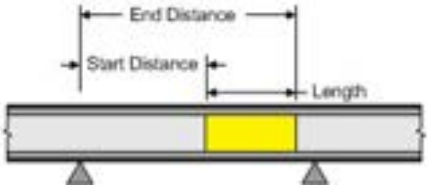
Thickness	Material	Support Number	Start Distance	Length

0.375 in.	**Salvaged Girder**	1	0 ft	50 ft

Web Depth

Apply to Entire Structure: Yes

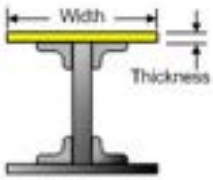


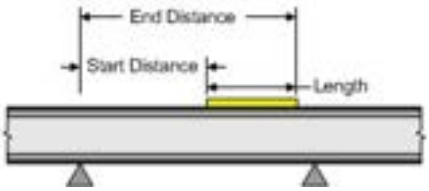


Start Depth	Web Variation	End Depth	Support Number	Start Distance	Length
78 in.	Linear	78 in.	1	0 ft	50 ft

Top Cover Plate

Apply to Entire Structure: No

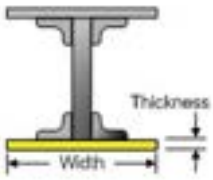




Start of Range			End of Range			Material	Support Number	Start Distance	Length
Width	Thickness	Gap Thickness	Width	Thickness	Gap Thickness				
16 in.	0.438 in.	-	-	-	-	**Salvaged Girder**	1	7.292 ft	35.417 ft

Bottom Cover Plate

Apply to Entire Structure: No

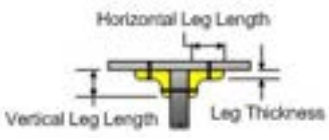




Start of Range			End of Range			Material	Support Number	Start Distance	Length
Width	Thickness	Gap Thickness	Width	Thickness	Gap Thickness				
16 in.	0.438 in.	-	-	-	-	**Salvaged Girder**	1	7.292 ft	35.417 ft

Top Angles

Apply to Entire Structure: Yes



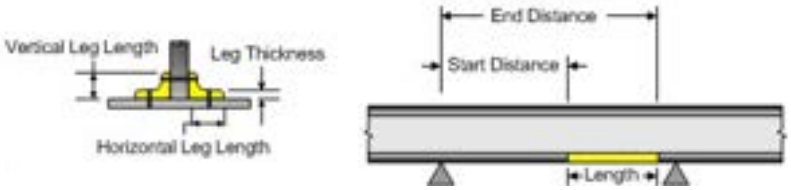


Vertical Leg Length	Horizontal Leg Length	Leg Thickness	Material	Support Number	Start Distance	Length

6 in.	6 in.	0.438 in.	**Salvaged Girder**	1	0 ft	50 ft

Bottom Angles

Apply to Entire Structure: Yes



Vertical Leg Length	Horizontal Leg Length	Leg Thickness	Material	Support Number	Start Distance	Length
6 in.	6 in.	0.438 in.	**Salvaged Girder**	1	0 ft	50 ft

Hinges

No hinges have been defined.

Special Locations

No special locations have been defined.

Supports

Support Conditions

Support	Support Restraint		
	Horizontal	Vertical	Rotational
1	Restrained	Restrained	Free
2	Restrained	Restrained	Free

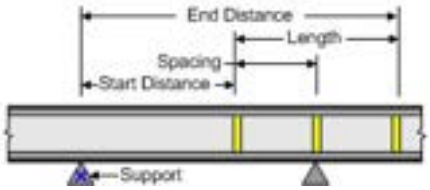
Spring Constants

Support	Spring Constants		
	Horizontal	Vertical	Rotational
1	-	-	-
2	-	-	-

Schedules

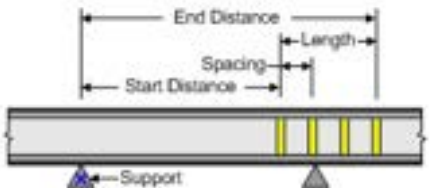
Bracing

Apply to Entire Structure: No



Spacing	Support	Start Distance	Length
14.438 ft	1	0.688 ft	14.438 ft
14.438 ft	1	34.875 ft	14.438 ft

Transverse Stiffeners



Stiffener Group	Spacing	Support	Start Distance	Length
Web Stiffeners	3 ft	1	3.104 ft	3 ft
Web Stiffeners	4 ft	1	6.604 ft	4 ft
Web Stiffeners	4.507 ft	1	18.042 ft	27.042 ft

Bearing Stiffeners

Apply to Entire Structure: No

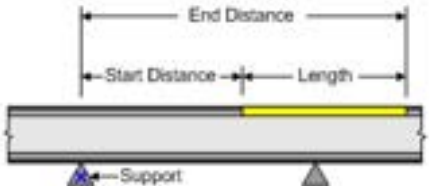
Support	Stiffener Group
1	Not Assigned
2	Not Assigned

Longitudinal Stiffeners

No longitudinal stiffener schedules have been defined.

Lateral Support

Apply to Entire Structure: Yes



Support	Start Distance	Length
1	0 ft	50 ft

Cb Factors (Standard)

No Cb factors (LRFD) have been defined.

Cb Factors (LRFD)

No Cb factors (LRFD) have been defined.

Fatigue Stress (Standard)

No fatigue stress (standard) schedules have been defined.

Member Control

Steel

Flexural Resistance

Span	Compact Piers (Standard)	Ignore Eq. 6.10.7.1.2-3 (LRFD)
1	No	No

End Panel Distances

Top Span



Left of Top Span: -
Right of Top Span: -

Flange Local Buckling Resistance Adjustment

Standard Specifications: -
LRFD Specifications: -

Points of Interest

No points of interest have been defined.

Dead Loads

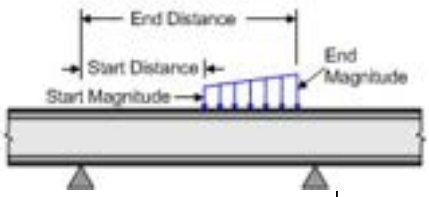
Uniform

Dead Load Type	Stage	Uniform Load
DC	1	-
DW	1	-
DU	1	-

Additional Self-weight

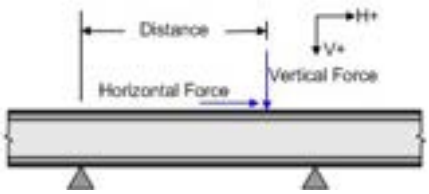
No additional self-weight dead loads have been defined.

Distributed



Dead Load Group	Support	Distributed Load (Start)		Distributed Load (End)	
		Distance	Magnitude	Distance	Magnitude
Vertical Web Angles	1	0.063 ft	0.019 kip / ft	49.875 ft	-

Concentrated



Dead Load Group	Support	Concentrated Load		
		Distance	Horizontal Force	Vertical Force
Girder Bracing	1	0.573 ft	-	0.169 kip
Girder Bracing	1	11.229 ft	-	0.169 kip
Girder Bracing	1	35.438 ft	-	0.169 kip

Girder Bracing	1	49.875 ft	-	0.169 kip
Bottom Flange Struts	1	5.328 ft	-	0.046 kip
Bottom Flange Struts	1	23.333 ft	-	0.046 kip
Bottom Flange Struts	1	42.656 ft	-	0.046 kip

Temperature

No temperature dead loads have been defined.

Settlement

Stage: 1

No settlement loads have been defined.

Pedestrian Load

Pedestrian Load: -

Wheel Fractions (Standard)

Moment

No moment wheel fractions have been defined.

Shear

No shear wheel fractions have been defined.

Deflection

No deflection wheel fractions have been defined.

Reaction

Apply to entire structure: No

Support	mg Single-Lane			mg Multi-Lane		
	Moment	Shear	Deflection	Moment	Shear	Deflection
1	-	-	-	-	-	-
2	-	-	-	-	-	-

Nanue Stream Bridge
Load Rating for Steel Exterior Girder Span 2 (G4-2)

CRITICAL RATING FACTOR SUMMARY: Design Load Inventory

Live Load No.	Combination Description		Total Vehicle Wt. (tons)	Controlling Point of Interest	Limit State Action Location	Rating Factor	Load Rating (tons)
1	HL-93-TRUCK + HL-93-LANE	(DTK)	36.00	110.0000	STRENGTH I Shear Minimum Effects	1.49	53.47
2	HL-93-TANDEM + HL-93-LANE	(DTK)	25.00	110.0000	STRENGTH I Shear Minimum Effects	1.74	43.41
15	HL-93-FAT	(FAT)	36.00	110.0000	FATIGUE I Shear Stress Minimum Effects	8.35	300.68
Crit	HL-93-TRUCK + HL-93-LANE	(DTK)	36.00	110.0000	STRENGTH I	1.49	53.47

CRITICAL RATING FACTOR SUMMARY: Design Load Operating

Live Load No.	Combination Description		Total Vehicle Wt. (tons)	Controlling Point of Interest	Limit State Action Location	Rating Factor	Load Rating (tons)
1	HL-93-TRUCK + HL-93-LANE	(DTK)	36.00	110.0000	STRENGTH I-O Shear Minimum Effects	1.93	69.32
2	HL-93-TANDEM + HL-93-LANE	(DTK)	25.00	110.0000	STRENGTH I-O Shear Minimum Effects	2.25	56.28
Crit	HL-93-TRUCK + HL-93-LANE	(DTK)	36.00	110.0000	STRENGTH I-O	1.93	69.32

CRITICAL RATING FACTOR SUMMARY: Legal Load

Live Load No.	Combination Description		Total Vehicle Wt. (tons)	Controlling Point of Interest	Limit State Action Location	Rating Factor	Load Rating (tons)
3	TYPE3	(TRK)	25.00	110.0000	STRENGTH I Shear Minimum Effects	2.97	74.24
4	TYPE3S2	(TRK)	36.00	110.0000	STRENGTH I Shear Minimum Effects	2.82	101.54
5	TYPE3-3	(TRK)	40.00	110.0000	STRENGTH I Shear Minimum Effects	2.95	117.95
6	NRL-MIN	(TRK)	40.00	110.0000	STRENGTH I Shear Minimum Effects	2.19	87.62
7	NRL-MAX	(TRK)	40.00	110.0000	STRENGTH I Shear Minimum Effects	2.23	89.20
8	SU4	(TRK)	27.00	110.0000	STRENGTH I Shear Minimum Effects	2.69	72.52
9	SU5	(TRK)	31.00	110.0000	STRENGTH I Shear Minimum Effects	2.42	75.17
10	SU6	(TRK)	34.75	110.0000	STRENGTH I	2.30	80.08

					Shear Minimum Effects		
11	SU7	(TRK)	38.75	110.0000	STRENGTH I Shear Minimum Effects	2.21	85.64
16	EV2	(TRK)	28.75	110.0000	STRENGTH I Shear Minimum Effects	2.51	72.16
17	EV3	(TRK)	43.00	110.0000	STRENGTH I Shear Minimum Effects	1.70	73.04
Crit	EV3	(TRK)	43.00	110.0000	STRENGTH I	1.70	73.04

CRITICAL RATING FACTOR SUMMARY: Permit Load

Live Load No.	Combination Description		Total Vehicle Wt. (tons)	Controlling Point of Interest	Limit State Action Location	Rating Factor	Load Rating (tons)
12	HP1	(PTK)	60.00	105.0000	SERVICE II Flange Stress Maximum Effects Top Flange	2.83	170.02
13	HP2	(PTK)	78.55	105.0000	SERVICE II Flange Stress Maximum Effects Top Flange	3.24	254.60
14	HP3	(PTK)	104.95	104.0000	SERVICE II Flange Stress Maximum Effects Top Flange	3.97	416.91
Crit	HP1	(PTK)	60.00	105.0000	SERVICE II	2.83	170.02

Wyoming Department of Transportation

BRASS-GIRDER™ Input Parameters

Version Information

Girder UI:	7.8.0.3001
Girder XML:	7.8.0.3001
BRASS™ XML:	1.8.0.3001

Administration

Project ID:	8780-06
Project Title:	HDOT Statewide Bridge Load Ratings
Bridge ID:	1000190308146
Bridge Name:	Nanue Stream
Route Name:	00019 Hawaii Belt Road
Reference Marker:	18
Title 1:	Nanue Stream Bridge
Title 2:	Load Rating for Steel Interior Girder Span 2 (G3-2)
Date:	2017 4 21
Agency:	HDOT Highways Division
Designer/Rater:	Moffatt & Nichol (JU)
Reviewer:	
Comments:	

Bridge Notes

MATERIAL PROPERTIES
Concrete
Weight = 0.160 kcf (HDOT Design Criteria for Bridges and Structures [HDOT] 5.01)
Strength = 3 ksi (Record Drawings: Class A-1)
Elastic Modulus = 3,880 ksi (AASHTO LRFD [LRFD] Eqn 5.4.2.4-1, Use 0.150 kcf per HDOT 5.01)
Reinforcing Steel
Yield Strength = 33 ksi (Unknown, Manual for Bridge Evaluation [MBE] Table 6A.5.2.2-1)
Elastic Modulus = 29,000 ksi (LRFD 5.4.3.2)

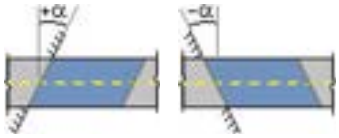
BRIDGE PROPERTIES (RECORD DRAWINGS)
Span 1 = 51 ft
Span 2 = 50 ft
Span 3 = 40 ft
Span 4 = 72 ft
Span 5 = 40 ft
Span 6 = 72 ft
Span 7 = 40 ft
Span 8 = 72 ft
Span 9 = 40 ft
Span 10 = 51 ft
Width = 38.5 ft
Deck Thickness = 9 in min
No. of Griders = 4
Girder Spacing = 9 ft, 7.5 ft, 9 ft
Girder Width = 12 3/8"
Girder Depth = 6'-6 1/2"
Surface Roughness = 3.0 (2015 Bridge Inspectinon Report)
Condition Factor = 1.0 (HDOT 5.04, 2015 Bridge Inspection Report indicates Condition Rating of 7)
System Factor = 1.0 (HDOT 5.05,)

LIVE LOADS
LRFD Live Load (MBE Appendix C6A)
Truck and Tandem Lane Load = 0.64 klf
AASHTO Legal Loads (MBE Appendix D6A)
Type 3
Type 3S2
Type 3-3
Notional Rating Load [NRL]
Legal Lane Load = 0.2 klf
SU4
SU5
SU6
SU7
HDOT Hawaii Standard Single Trip Permit Loads (HDOT 5.06)
No lane load provided, vehicles allowed to trave in any lane
HP1
HP2
HP3
Dynamic Load Allowance (HDOT 5.03)
Spans > 40 ft
Wearing Surface: 3 (Assumed)
Design Loads: 33%
Legal Loads: 10%
Permit Loads: 10%
Scale Factor (HDOT 5.06)
Hawaii Standard Single Trip Permit Vehicle analysis assumes only one permit load on the bridge which allows the use of a single-lane distribution factor. When using the single-lane LRFD distribution factor, the 1.2 multiple prescence factor may shall be divided out from the distribtion factor equations.

Control

Structure

Structure Type: GirderLine
Define Deck Cross Section: Yes
Number of Members: 4
Skew Angle: 0 °



Analysis Model Type: Beam
Number of Top Spans: 1



Spans

Span	Length
1	50 ft

Structure Material: Steel
Beam Type: Builtup
Composite Structure: No
Deck Material: Concrete

Analysis

Unit System: US
Analysis Method: LRFD
Analysis Type: Rating
Number of Stages: 1
Member of Interest: 3
Model Element Type: Stepped
Point of Interest Generation Control: Tenth
Live-load Distribution Factor Application: AnalysisPoint

Interpolate Reinforcement: No
Calculate Effective Width: No

Input

Symmetry

Component	Symmetric
Beam Profile	No
Deck Profile	No
Shear Connectors	No
Transverse Stiffeners	No
Bearing Stiffeners	No
Longitudinal Stiffeners	No
Bracing (Member)	No
Lateral Support	No
Cb Factors (Std)	No
Cb Factors (LRFD)	No
Fatigue Stress (Std)	No
Beam Wheel Fractions (Std)	No
Reaction Wheel Fractions (Std)	No
Beam Distribution Factors (LRFD)	No
Reaction Distribution Factors (LRFD)	No

Simplified Standard Wheel Fractions: No
Merge Beam/Deck Profile Schedules: Yes

Distribution

Perform Dead Load Distribution: Yes
Calculate LRFD Live Load Distribution Factors: Yes

Dead Load Distribution Methods

Stage	Method
1	Tributary area

Live Load Distribution (LRFD)

Distribution Method: AASHTO LRFD
Cross Section Code: a1
Max. Number of Lanes Loaded: Computed
Slab Thickness Type: Structural
Set eg = 0 for Non-composite: No
Apply Skew to Lever Rule Override: Yes
Apply Skew to Ridgid Rule Override: Yes
Use Constants from Table 4.6.2.2.1-2: No

Libraries

Section Library: C:\BRASS\Girder_7.8\Girder\Libraries\BRASS-Sections.bls
Vehicle Library: C:\BRASS\Girder_7.8\Girder\Libraries\BRASS-Vehicles.blv

Output

Primary Output

Action Output Level: DL+LL+CONC
Action Locations: 10thPoints

General

Member Properties:	Yes
Load Combinations:	Yes
Load and Resistance Factors:	Yes
Warnings:	Yes
Camber:	No
Critical Design Ratios / Rating Factors:	Expanded

Live Load

Truck Positions:	No
Variable Axle Spacing:	No
Live Load Settings:	Yes
Live Load Combinations:	Yes
Live Load Details:	Yes
Impact (LFD):	No

Stage

Stage	Output
1	Yes

Dead Load

Member Self Load:	Yes
Distributed Dead Loads:	Yes
Concentrated Dead Loads:	Yes
Temperature Change:	No
Settlements:	No

Load Distribution

Dead Load Distribution:	Yes
Live Load Distribution:	Yes

Intermediate Output

Intermediate Output Level:	Full
Effective Width:	Yes
Floorbeam Lane Position:	No

Points of Interest

Specification Checks:	Yes
Load Factoring/Combinations:	Yes

Load Distribution

Dead Load:	Yes
Live Load:	Yes

Limit State Output (LRFD)

Limit State	Specification Check	Load Combination
Strength I	Yes	Yes
Strength II	Yes	Yes
Strength IV	No	No
Service I	No	No
Service II	Yes	Yes
Fatigue I	Yes	Yes
Fatigue II	No	No

Load Combination Output (LFD)

LFD Load Combo	Specification Check	Load Combination

Combo I	No	No
Combo IB	No	No
Combo I Overload	No	No
Combo IB Overload	No	No
Combo I Service	No	No
Combo IB Service	No	No
Combo Fatigue	No	No

Intermediate Output (cont.)

Steel

Transverse Stiffeners: No
Bearing Stiffeners: No
Longitudinal Stiffeners: No

Results Tables

X-Y Plot Action Tables: No
Specification Check Results Tables: No
Mesh Plot Files: No

BRASS-PAD™ Data Transfer File: No

Influence

Output influence lines for: None
Ordinate Divisor: 1

Factors

Load Factors (LRFD)

Limit State	DC		DW		DU		TU	
	max	min	max	min	max	min	max	min
Strength I	1.25	0.9	1.5	0.65	1.5	0.65	-	-
Strength II	1.25	0.9	1.5	0.65	1.5	0.65	-	-
Strength IV	-	-	-	-	-	-	-	-
Service I	-	-	-	-	-	-	-	-
Service II	1	1	1	1	1	1	-	-
Fatigue I	-	-	-	-	-	-	-	-
Fatigue II	-	-	-	-	-	-	-	-

Load Factors (LRFD) (continued)

Limit State	LL				SE		PS		DS	
	Design		Legal	Permit						
	Inventory	Operating			max	min	max	min	max	min
Strength I	1.75	1.35	1.45	0	-	-	-	-	-	-
Strength II	-		0	1.2	-	-	-	-	-	-
Strength IV	-		-	-	-	-	-	-	-	-
Service I	-		-	-	-	-	-	-	-	-
Service II	1.3	1	1.3	1	-	-	-	-	-	-
Fatigue I	0.75		-	-	-	-	-	-	-	-
Fatigue II	-		-	-	-	-	-	-	-	-

Load Modifiers (LRFD)

Limit State	Ductility	Redundancy	Importance	Combined Product	
				max	min
Strength I	1	1	1	-	-
Strength II	1	1	1	-	-
Strength IV	1	1	1	-	-
Service I	1	1	1	-	-
Service II	1	1	1	-	-
Fatigue I	1	1	1	-	-
Fatigue II	1	1	1	-	-

Resistance Factors (LRFD)

Resistance Factors

Type	Value
φ Flexure	1
φ Shear	1
φ Bearing	1
φ Compression	0.95
φ Shear Connectors	0.85
φ Fatigue	1

System/Total Modifiers

Limit State	Resistance Type	System	Total
Strength	Flexure	1	-
Strength	Shear	1	-
Strength	Bearing	1	-
Strength	Compression	1	-
Strength	Shear Connectors	1	-
Strength	Longitudinal Reinforcement	1	-
Service	Flexure	1	-
Fatigue	Fatigue	1	-

Condition Modifiers

Limit State	Condition
Strength	1
Service	1
Fatigue	1

Load Factors (LFD)

Load Combo	γ	LL	DC	DW	DU	TU	SE	PS	DS
I	-	-	-	-	-	-	-	1	1
IB	-	-	-	-	-	-	-	1	1
I-Overload	-	-	-	-	-	-	-	1	1
IB-Overload	-	-	-	-	-	-	-	1	1

I-Service	-	-	-	-	-	-	-	1	1
IB-Service	-	-	-	-	-	-	-	1	1
Fatigue	-	-	-	-	-	-	-	1	1

Capacity Reduction Factors (LFD)

Factor	Value
φ Flexure	-
φ Shear	-
φ Fatigue	-

Materials

Steel

ID	Name	Yield Stress	Tensile Strength	Modulus of Elasticity	Density	Thermal Expansion Coefficient
1	Salvaged Girder	30 ksi	60 ksi	29000 ksi	0.49 kcf	6.5E-06 °F^{-1}

Concrete

ID	Name	28 Day Compressive Strength	Modulus of Elasticity	Density	Modulus of Rupture	Modulus of Rupture (VCI Method)	Thermal Expansion Coefficient
1	1949 Class A-1	3 ksi	3880 ksi	0.16 kcf	-	-	6E-06 °F^{-1}

Dead Load Groups

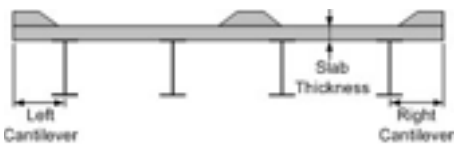
Groups

ID	Name	Stage	Type	Description
1	Concrete Railing	1	DC	Top Rail, Bottom Rail, Post
2	Sidewalk / Shoulder	1	DC	
3	AC Pavement	1	DW	
4	Girder Bracing	1	DC	X-Bracing with Steel Angles in the Outer Bays
5	Bottom Flange Bracing	1	DC	Steel Angles Diagonal Bracing in the Interior Bay
6	Vertical Web Angles	1	DC	Steel Angles Spaced at Intervals
7	Waterlines	1	DU	Assumed 8" Waterlines
8	Monorail	1	DC	6" Monorail
9	Bottom Flange Struts	1	DC	Bottom Flange Struts out of Steel Angles and Plates in Outer Bays

Deck Geometry

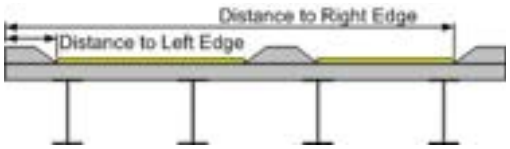
Deck

Deck Thickness: 9 in.
Left Cantilever Length: 6.5 ft
Right Cantilever Length: 6.5 ft
Equal Member Spacing: No



Travelway Locations

Distance to Left Edge: 5.25 ft
Distance to Right Edge: 33.25 ft

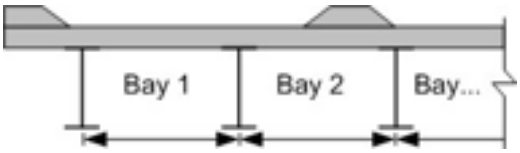


Sacrificial Topping

Thickness: -
Dead Load Type: DC

Member Spacing

Bay #	Spacing
1	9 ft
2	7.5 ft
3	9 ft



Soffits

No soffits have been defined.

Appurtenances

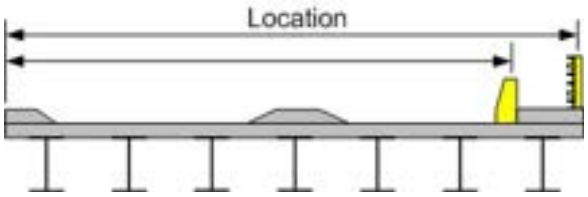
No appurtenances have been defined.

Deck Loads

Materials/Stages

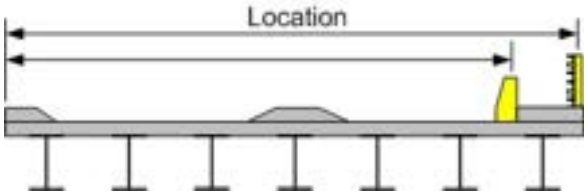
Deck Material: **1949 Class A-1**
Curb & Median Material: Not Assigned
Wearing Surface Weight: -
Slab Stage: 1
Curb Stage: 1
Median Stage: 1
Wearing Surface Stage: 1

Line Loads



Dead Load Group	Line Load	Load Location
Concrete Railing	0.319 kip / ft	9.232 ft
Concrete Railing	0.319 kip / ft	37.577 ft
Waterlines	0.224 kip / ft	38.5 ft
Monorail	0.016 kip / ft	34 ft

Uniform Loads



Dead Load Group	Uniform Load	Load Location	Load Width
Sidewalk / Shoulder	0.007 ksf	0 ft	5.25 ft
Sidewalk / Shoulder	0.003 ksf	5.25 ft	2 ft
AC Pavement	0.018 ksf	7.25 ft	24 ft
Sidewalk / Shoulder	0.003 ksf	31.25 ft	2 ft
Sidewalk / Shoulder	0.007 ksf	33.25 ft	5.25 ft

Live Loads

Live Load Control

Direction Control: Up+Down
Standard Live Loads: None
Wheel Advancement Denominator: 100
ADTT: 5000
ADTT for Single Lane: 2000
Multiple Presence Adjustment: -
% of Dynamic Load Allowance (Impact): 100 %
Fixed Impact (STD): -

Dynamic Load Allowance (LRFD)

Design/Rating Procedure	Truck	Lane	Fatigue
Design	33 %	0 %	15 %
Legal	33 %	0 %	0 %
Permit	33 %	0 %	0 %

Special Vehicles

Axle Vehicles

No axle vehicles have been defined.

Lane Vehicles

No lane vehicles have been defined.

Definitions (STD)

No standard live load definitions have been defined.

Definitions (LRFD)

Definition 1

Code: HL-93-TRUCK
Type: DesignTruck
Design Rating: Design
% of Dynamic Load Allowance: -
Scale Factor: -
Lanes Loaded: Critical
Notional Load: Yes
Fixed DLA: -

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 2

Code: HL-93-TANDEM
Type: DesignTruck
Design Rating: Design
% of Dynamic Load Allowance: -
Scale Factor: -

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-

Lanes Loaded:	Critical
Notional Load:	Yes
Fixed DLA:	-

Limit State	gamma LL	gamma LL Operating
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 3

Code:	HL-93-LANE
Type:	DesignLane
Design Rating:	Design
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	Yes
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 4

Code:	TYPE3
Type:	GeneralTruck
Design Rating:	Legal
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 5

Code:	TYPE3S2
Type:	GeneralTruck
Design Rating:	Legal
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 6

Code:	TYPE3-3
Type:	GeneralTruck
Design Rating:	Legal
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-

Fatigue II	-	-

Definition 7

Code: NRL-MIN
Type: GeneralTruck
Design Rating: Legal
% of Dynamic Load Allowance: -
Scale Factor: -
Lanes Loaded: Critical
Notional Load: No
Fixed DLA: -

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 8

Code: NRL-MAX
Type: GeneralTruck
Design Rating: Legal
% of Dynamic Load Allowance: -
Scale Factor: -
Lanes Loaded: Critical
Notional Load: No
Fixed DLA: -

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 9

Code: SU4
Type: GeneralTruck
Design Rating: Legal
% of Dynamic Load Allowance: -
Scale Factor: -
Lanes Loaded: Critical
Notional Load: No
Fixed DLA: -

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 10

Code: SU5
Type: GeneralTruck
Design Rating: Legal
% of Dynamic Load Allowance: -
Scale Factor: -
Lanes Loaded: Critical
Notional Load: No
Fixed DLA: -

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 11

Code: SU6
Type: GeneralTruck

Live Load Factor Overrides

Design Rating:	Legal
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 12

Code:	SU7
Type:	GeneralTruck
Design Rating:	Legal
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 13

Code:	HP1
Type:	PermitTruck
Design Rating:	Permit
% of Dynamic Load Allowance:	-
Scale Factor:	0.833
Lanes Loaded:	Single
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 14

Code:	HP2
Type:	PermitTruck
Design Rating:	Permit
% of Dynamic Load Allowance:	-
Scale Factor:	0.833
Lanes Loaded:	Single
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 15

Code:	HP3
Type:	PermitTruck
Design Rating:	Permit
% of Dynamic Load Allowance:	-
Scale Factor:	0.833
Lanes Loaded:	Single
Notional Load:	No

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-

Fixed DLA: -

Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 16

Code: HL-93-FAT
Type: FatigueTruck
Design Rating: Design
% of Dynamic Load Allowance: -
Scale Factor: -
Lanes Loaded: Critical
Notional Load: No
Fixed DLA: -

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 17

Code: EV2
Type: GeneralTruck
Design Rating: Legal
% of Dynamic Load Allowance: -
Scale Factor: -
Lanes Loaded: Critical
Notional Load: No
Fixed DLA: -

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 18

Code: EV3
Type: GeneralTruck
Design Rating: Legal
% of Dynamic Load Allowance: -
Scale Factor: -
Lanes Loaded: Critical
Notional Load: No
Fixed DLA: -

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

General Combinations (LRFD)

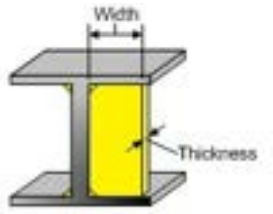
Standard Combo	Truck	Lane	Combination Factors	
			Truck	Lane
No	HL-93-TRUCK	HL-93-LANE	1	1
No	HL-93-TANDEM	HL-93-LANE	1	1

Deflection Combinations (LRFD)

No Deflection Combinations (LRFD) have been defined.

Component Groups

Transverse Stiffeners



ID	Name	Width	Thickness	Type	Type Factor	Material
1	Web Stiffeners	5 in.	0.375 in.	Single Angles	-	**Salvaged Girder**

Bearing Stiffeners

No bearing stiffener groups have been defined.

Longitudinal Stiffeners

No longitudinal stiffener groups have been defined.

Specification Control

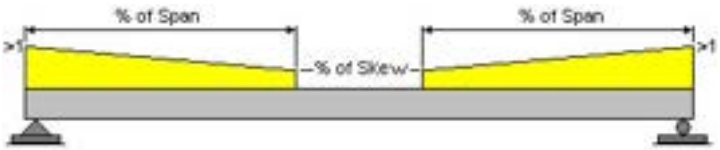
General

Lane Geometry

Design Vehicle Lane Width: 12 ft
Vehicle Width: 10 ft
Wheel Spacing: 6 ft
Encroachment Distance: -

Load Factors Control (LRFD): Use maximum and minimum load factors

Skew Factors



Span #	% of Span	% of Skew
1	-	-

Steel

Use Appendix A6 (LRFD): No
Allow Plastic Analysis: No
Override Longitudinal Stiffeners: No
Slab thickness for longitudinal shear force: Structural
Slab thickness for minimum negative flexure concrete deck reinforcement: Structural

Fatigue

AASHTO LRFD Table 6.6.1.2.5-2

% of Span: -
Span Length: 40 ft

Stress Range in Longitudinal Reinforcement Over the Piers: 10 ksi

Detail Categories (LRFD)

Detail Category	Constant, A x 10^8	Constant Amplitude Fatigue Threshold
A	-	-

B	-	-
B'	-	-
C	-	-
C'	-	-
D	-	-
E	-	-
E'	-	-

Limit State Map

Limit State Maps (LRFD)

Limit State	Design Review			Rating		
	Design Load	Legal Load	Permit Load	Design Load	Legal Load	Permit Load
Strength I	No	No	No	Inventory/Operating	Yes	No
Strength II	No	No	No	Exclude	No	Yes
Strength IV	No	No	No	Exclude	No	No
Service I	No	No	No	Exclude	No	No
Service II	No	No	No	Inventory/Operating	Yes	Yes
Service III	No	No	No	Exclude	No	No
Fatigue I	No	No	No	Inventory	No	No
Fatigue II	No	No	No	Exclude	No	No

Load Combo Maps (LFD)

Load Combo	Design Review	Rating
I	No	Exclude
IB	No	Exclude
I-Overload	No	Exclude
IB-Overload	No	Exclude
I-Service	No	Exclude
IB-Service	No	Exclude
Fatigue	No	Exclude

Spec. Check Map (Strength)

LRFD Specification Check Maps

Design Load Review

Spec Check	Strength I	Strength II	Strength IV
Flexure	No	No	No
Shear	No	No	No
Bearing	No	No	No
Flexural Stress In Longitudinal Stiffener	No	No	No

Legal Load Review

Spec Check	Strength I	Strength II	Strength IV
Flexure	No	No	No

Shear	No	No	No
Bearing	No	No	No
Flexural Stress In Longitudinal Stiffener	No	No	No

Permit Load Review

Spec Check	Strength I	Strength II	Strength IV
Flexure	No	No	No
Shear	No	No	No
Bearing	No	No	No
Flexural Stress In Longitudinal Stiffener	No	No	No

Design Load Rating

Spec Check	Strength I	Strength II	Strength IV
Flexure	Yes	Yes	No
Shear	Yes	No	No
Bearing	Yes	Yes	No
Flexural Stress In Longitudinal Stiffener	No	No	No

Legal Load Rating

Spec Check	Strength I	Strength II	Strength IV
Flexure	Yes	Yes	No
Shear	Yes	No	No
Bearing	Yes	Yes	No
Flexural Stress In Longitudinal Stiffener	No	No	No

Permit Load Rating

Spec Check	Strength I	Strength II	Strength IV
Flexure	Yes	Yes	No
Shear	Yes	No	No
Bearing	Yes	Yes	No
Flexural Stress In Longitudinal Stiffener	No	No	No

LFD Specification Check Maps

Design Review

LFD Spec Check	I	IB	I-Overload	IB-Overload
Flexure	No	No	No	No
Shear	No	No		
Bearing	No	No		
Flexural Stress In Longitudinal Stiffener	No	No		

Rating

LFD Spec Check	I	IB	I-Overload	IB-Overload
Flexure	No	No	No	No
Shear	No	No		
Bearing	No	No		

Flexural Stress In Longitudinal Stiffener	No	No

Spec. Check Map (Service)

LRFD Specification Check Maps

Design Load Review

Spec Check	Service I	Service II
Crack Control	No	No
Flexural Stress In Flanges	No	No
Live Load Deflection	No	No

Legal Load Review

Spec Check	Service I	Service II
Crack Control	No	No
Flexural Stress In Flanges	No	No
Live Load Deflection	No	No

Permit Load Review

Spec Check	Service I	Service II
Crack Control	No	No
Flexural Stress In Flanges	No	No
Live Load Deflection	No	No

Design Load Rating

Spec Check	Service I	Service II
Crack Control	No	No
Flexural Stress In Flanges	No	Yes
Live Load Deflection	No	Yes

Legal Load Rating

Spec Check	Service I	Service II
Crack Control	No	No
Flexural Stress In Flanges	No	Yes
Live Load Deflection	No	Yes

Permit Load Rating

Spec Check	Service I	Service II
Crack Control	No	No
Flexural Stress In Flanges	No	Yes
Live Load Deflection	No	Yes

LFD Specification Check Maps

Design Review

LFD Spec Check	I-Overload	IB-Overload
Flexural Stress In Flanges	No	No

Rating

LFD Spec Check	I-Overload	IB-Overload
Flexural Stress In Flanges	No	No

Spec. Check Map (Fatigue)

LRFD Specification Check Maps

Design Load Review

Spec Check	Fatigue I	Fatigue II
Fatigue of Reinforcement	No	No
Fatigue of Shear Connectors	No	No
Fatigue Shear Range of Shear Connectors	No	No
Fatigue of Special Points	No	No
Fatigue Shear	No	No

Legal Load Review

Spec Check	Fatigue I	Fatigue II
Fatigue of Reinforcement	No	No
Fatigue of Shear Connectors	No	No
Fatigue Shear Range of Shear Connectors	No	No
Fatigue of Special Points	No	No
Fatigue Shear	No	No

Permit Load Review

Spec Check	Fatigue I	Fatigue II
Fatigue of Reinforcement	No	No
Fatigue of Shear Connectors	No	No
Fatigue Shear Range of Shear Connectors	No	No
Fatigue of Special Points	No	No
Fatigue Shear	No	No

Design Load Rating

Spec Check	Fatigue I	Fatigue II
Fatigue of Reinforcement	Yes	No
Fatigue of Shear Connectors	Yes	No
Fatigue Shear Range of Shear Connectors	Yes	No
Fatigue of Special Points	Yes	No
Fatigue Shear	Yes	No

Legal Load Rating

Spec Check	Fatigue I	Fatigue II
Fatigue of Reinforcement	No	No
Fatigue of Shear Connectors	No	No
Fatigue Shear Range of Shear Connectors	No	No
Fatigue of Special Points	No	No

Fatigue Shear	No	No

Permit Load Rating

Spec Check	Fatigue I	Fatigue II
Fatigue of Reinforcement	No	No
Fatigue of Shear Connectors	No	No
Fatigue Shear Range of Shear Connectors	No	No
Fatigue of Special Points	No	No
Fatigue Shear	No	No

LFD Specification Check Maps

Design Review

LFD Spec Check	Fatigue
Fatigue of Special Points	No

Rating

LFD Spec Check	Fatigue
Fatigue of Special Points	No

Member

Member Notes

No member notes have been defined.

Member Materials

Beam

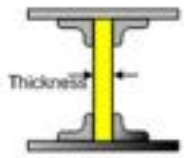
Beam Material: Salvaged Girder

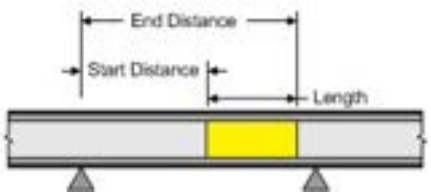
Beam Profile

Web

Apply to Entire Structure: Yes
Web Angle: -





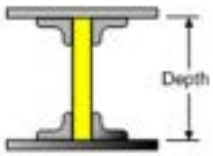


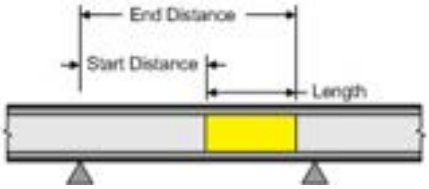
Thickness	Material	Support Number	Start Distance	Length

0.375 in.	**Salvaged Girder**	1	0 ft	50 ft

Web Depth

Apply to Entire Structure: Yes

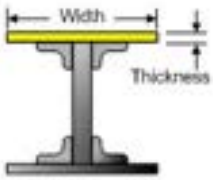


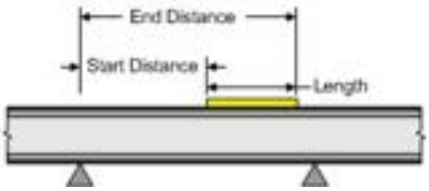


Start Depth	Web Variation	End Depth	Support Number	Start Distance	Length
78 in.	Linear	78 in.	1	0 ft	50 ft

Top Cover Plate

Apply to Entire Structure: No

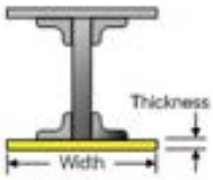




Start of Range			End of Range			Material	Support Number	Start Distance	Length
Width	Thickness	Gap Thickness	Width	Thickness	Gap Thickness				
16 in.	0.438 in.	-	-	-	-	**Salvaged Girder**	1	7.292 ft	35.417 ft

Bottom Cover Plate

Apply to Entire Structure: No

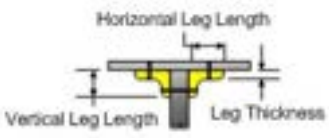




Start of Range			End of Range			Material	Support Number	Start Distance	Length
Width	Thickness	Gap Thickness	Width	Thickness	Gap Thickness				
16 in.	0.438 in.	-	-	-	-	**Salvaged Girder**	1	7.292 ft	35.417 ft

Top Angles

Apply to Entire Structure: Yes



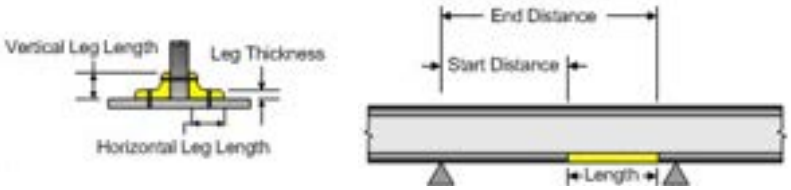


Vertical Leg Length	Horizontal Leg Length	Leg Thickness	Material	Support Number	Start Distance	Length

6 in.	6 in.	0.438 in.	**Salvaged Girder**	1	0 ft	50 ft

Bottom Angles

Apply to Entire Structure: Yes



Vertical Leg Length	Horizontal Leg Length	Leg Thickness	Material	Support Number	Start Distance	Length
6 in.	6 in.	0.438 in.	**Salvaged Girder**	1	0 ft	50 ft

Hinges

No hinges have been defined.

Special Locations

No special locations have been defined.

Supports

Support Conditions

Support	Support Restraint		
	Horizontal	Vertical	Rotational
1	Restrained	Restrained	Free
2	Restrained	Restrained	Free

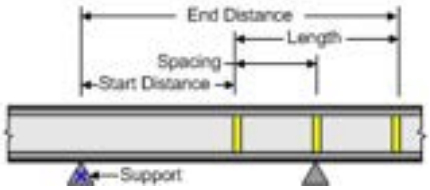
Spring Constants

Support	Spring Constants		
	Horizontal	Vertical	Rotational
1	-	-	-
2	-	-	-

Schedules

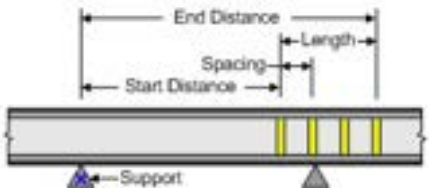
Bracing

Apply to Entire Structure: No



Spacing	Support	Start Distance	Length
14.438 ft	1	0.688 ft	14.438 ft
14.438 ft	1	34.875 ft	14.438 ft

Transverse Stiffeners



Stiffener Group	Spacing	Support	Start Distance	Length
Web Stiffeners	3.656 ft	1	3.979 ft	7.313 ft
Web Stiffeners	3.917 ft	1	18.958 ft	3.917 ft
Web Stiffeners	3.917 ft	1	27.125 ft	3.917 ft
Web Stiffeners	3.656 ft	1	38.708 ft	7.313 ft

Bearing Stiffeners

Apply to Entire Structure: No

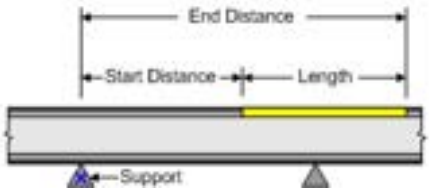
Support	Stiffener Group
1	Not Assigned
2	Not Assigned

Longitudinal Stiffeners

No longitudinal stiffener schedules have been defined.

Lateral Support

Apply to Entire Structure: Yes



Support	Start Distance	Length
1	0 ft	50 ft

Cb Factors (Standard)

No Cb factors (LRFD) have been defined.

Cb Factors (LRFD)

No Cb factors (LRFD) have been defined.

Fatigue Stress (Standard)

No fatigue stress (standard) schedules have been defined.

Member Control

Steel

Flexural Resistance

Span	Compact Piers (Standard)	Ignore Eq. 6.10.7.1.2-3 (LRFD)
1	No	No

End Panel Distances

Top Span



Left of Top Span: -
Right of Top Span: -

Flange Local Buckling Resistance Adjustment

Standard Specifications: -
LRFD Specifications: -

Points of Interest

No points of interest have been defined.

Dead Loads

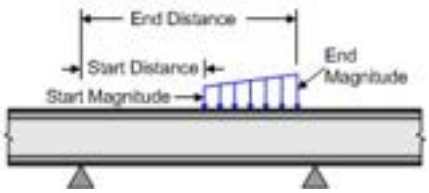
Uniform

Dead Load Type	Stage	Uniform Load
DC	1	-
DW	1	-
DU	1	-

Additional Self-weight

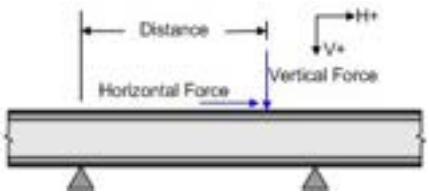
No additional self-weight dead loads have been defined.

Distributed



Dead Load Group	Support	Distributed Load (Start)		Distributed Load (End)	
		Distance	Magnitude	Distance	Magnitude
Bottom Flange Bracing	1	0.063 ft	0.009 kip / ft	49.875 ft	-
Vertical Web Angles	1	0.063 ft	0.019 kip / ft	49.875 ft	-
Bottom Flange Struts	1	0.063 ft	0.009 kip / ft	49.875 ft	-

Concentrated



Dead Load Group	Support	Concentrated Load		
		Distance	Horizontal Force	Vertical Force
Girder Bracing	1	0.573 ft	-	0.169 kip

Girder Bracing	1	11.229 ft	-	0.169 kip
Girder Bracing	1	35.438 ft	-	0.169 kip
Girder Bracing	1	49.875 ft	-	0.169 kip
Bottom Flange Struts	1	5.328 ft	-	0.046 kip
Bottom Flange Struts	1	23.333 ft	-	0.046 kip
Bottom Flange Struts	1	42.656 ft	-	0.046 kip

Temperature

No temperature dead loads have been defined.

Settlement

Stage: 1

No settlement loads have been defined.

Pedestrian Load

Pedestrian Load: -

Wheel Fractions (Standard)

Moment

No moment wheel fractions have been defined.

Shear

No shear wheel fractions have been defined.

Deflection

No deflection wheel fractions have been defined.

Reaction

Apply to entire structure: No

Support	mg Single-Lane			mg Multi-Lane		
	Moment	Shear	Deflection	Moment	Shear	Deflection
1	-	-	-	-	-	-
2	-	-	-	-	-	-

Nanue Stream Bridge
Load Rating for Steel Interior Girder Span 2 (G3-2)

CRITICAL RATING FACTOR SUMMARY: Design Load Inventory

Live Load No.	Combination Description		Total Vehicle Wt. (tons)	Controlling Point of Interest	Limit State Action Location	Rating Factor	Load Rating (tons)
1	HL-93-TRUCK + HL-93-LANE	(DTK)	36.00	100.0000	STRENGTH I Shear Maximum Effects	2.08	74.94
2	HL-93-TANDEM + HL-93-LANE	(DTK)	25.00	110.0000	STRENGTH I Shear Minimum Effects	2.43	60.85
15	HL-93-FAT	(FAT)	36.00	103.0000	FATIGUE I Shear Stress Maximum Effects	11.02	396.61
Crit	HL-93-TRUCK + HL-93-LANE	(DTK)	36.00	100.0000	STRENGTH I	2.08	74.94

CRITICAL RATING FACTOR SUMMARY: Design Load Operating

Live Load No.	Combination Description		Total Vehicle Wt. (tons)	Controlling Point of Interest	Limit State Action Location	Rating Factor	Load Rating (tons)
1	HL-93-TRUCK + HL-93-LANE	(DTK)	36.00	100.0000	STRENGTH I-O Shear Maximum Effects	2.70	97.14
2	HL-93-TANDEM + HL-93-LANE	(DTK)	25.00	110.0000	STRENGTH I-O Shear Minimum Effects	3.16	78.88
Crit	HL-93-TRUCK + HL-93-LANE	(DTK)	36.00	100.0000	STRENGTH I-O	2.70	97.14

CRITICAL RATING FACTOR SUMMARY: Legal Load

Live Load No.	Combination Description		Total Vehicle Wt. (tons)	Controlling Point of Interest	Limit State Action Location	Rating Factor	Load Rating (tons)
3	TYPE3	(TRK)	25.00	105.0000	SERVICE II Flange Stress Maximum Effects Top Flange	3.99	99.83
4	TYPE3S2	(TRK)	36.00	100.0000	STRENGTH I Shear Maximum Effects	3.95	142.31
5	TYPE3-3	(TRK)	40.00	100.0000	STRENGTH I Shear Maximum Effects	4.13	165.31
6	NRL-MIN	(TRK)	40.00	105.0000	SERVICE II Flange Stress Maximum Effects Top Flange	2.55	101.82
7	NRL-MAX	(TRK)	40.00	105.0000	SERVICE II Flange Stress Maximum Effects Top Flange	2.63	105.02
8	SU4	(TRK)	27.00	105.0000	SERVICE II Flange Stress Maximum Effects Top Flange	3.47	93.77
9	SU5	(TRK)	31.00	105.0000	SERVICE II	3.21	99.50

					Flange Stress Maximum Effects Top Flange		
10	SU6	(TRK)	34.75	105.0000	SERVICE II Flange Stress Maximum Effects Top Flange	2.88	100.21
11	SU7	(TRK)	38.75	105.0000	SERVICE II Flange Stress Maximum Effects Top Flange	2.67	103.50
16	EV2	(TRK)	28.75	106.0000	SERVICE II Flange Stress Maximum Effects Top Flange	3.48	99.91
17	EV3	(TRK)	43.00	105.0000	SERVICE II Flange Stress Maximum Effects Top Flange	2.26	97.14
Crit	EV3	(TRK)	43.00	105.0000	SERVICE II	2.26	97.14

CRITICAL RATING FACTOR SUMMARY: Permit Load

Live Load No.	Combination Description		Total Vehicle Wt. (tons)	Controlling Point of Interest	Limit State Action Location	Rating Factor	Load Rating (tons)
12	HP1	(PTK)	60.00	105.0000	SERVICE II Flange Stress Maximum Effects Top Flange	3.74	224.64
13	HP2	(PTK)	78.55	105.0000	SERVICE II Flange Stress Maximum Effects Top Flange	4.28	336.40
14	HP3	(PTK)	104.95	104.0000	SERVICE II Flange Stress Maximum Effects Top Flange	5.22	547.97
Crit	HP1	(PTK)	60.00	105.0000	SERVICE II	3.74	224.64

Wyoming Department of Transportation

BRASS-GIRDER™ Input Parameters

Version Information

Girder UI:	7.8.0.3001
Girder XML:	7.8.0.3001
BRASS™ XML:	1.8.0.3001

Administration

Project ID:	8780-06
Project Title:	HDOT Statewide Bridge Load Ratings
Bridge ID:	1000190308146
Bridge Name:	Nanue Stream
Route Name:	00019 Hawaii Belt Road
Reference Marker:	18
Title 1:	Nanue Stream Bridge
Title 2:	Load Rating for Steel Exterior Girder Span 3 (G4-3)
Date:	2017 4 21
Agency:	HDOT Highways Division
Designer/Rater:	Moffatt & Nichol (JU)
Reviewer:	
Comments:	

Bridge Notes

MATERIAL PROPERTIES
Concrete
Weight = 0.160 kcf (HDOT Design Criteria for Bridges and Structures [HDOT] 5.01)
Strength = 3 ksi (Record Drawings: Class A-1)
Elastic Modulus = 3,880 ksi (AASHTO LRFD [LRFD] Eqn 5.4.2.4-1, Use 0.150 kcf per HDOT 5.01)
Reinforcing Steel
Yield Strength = 33 ksi (Unknown, Manual for Bridge Evaluation [MBE] Table 6A.5.2.2-1)
Elastic Modulus = 29,000 ksi (LRFD 5.4.3.2)

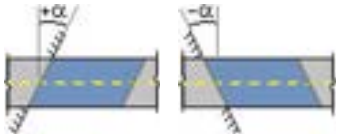
BRIDGE PROPERTIES (RECORD DRAWINGS)
Span 1 = 51 ft
Span 2 = 50 ft
Span 3 = 40 ft
Span 4 = 72 ft
Span 5 = 40 ft
Span 6 = 72 ft
Span 7 = 40 ft
Span 8 = 72 ft
Span 9 = 40 ft
Span 10 = 51 ft
Width = 38.5 ft
Deck Thickness = 9 in min
No. of Griders = 4
Girder Spacing = 9 ft, 7.5 ft, 9 ft
Girder Width = 12 3/8"
Girder Depth = 6'-6 1/2"
Surface Roughness = 3.0 (2015 Bridge Inspectinon Report)
Condition Factor = 1.0 (HDOT 5.04, 2015 Bridge Inspection Report indicates Condition Rating of 7)
System Factor = 1.0 (HDOT 5.05,)

LIVE LOADS
LRFD Live Load (MBE Appendix C6A)
Truck and Tandem Lane Load = 0.64 klf
AASHTO Legal Loads (MBE Appendix D6A)
Type 3
Type 3S2
Type 3-3
Notional Rating Load [NRL]
Legal Lane Load = 0.2 klf
SU4
SU5
SU6
SU7
HDOT Hawaii Standard Single Trip Permit Loads (HDOT 5.06)
No lane load provided, vehicles allowed to trave in any lane
HP1
HP2
HP3
Dynamic Load Allowance (HDOT 5.03)
Spans > 40 ft
Wearing Surface: 3 (Assumed)
Design Loads: 33%
Legal Loads: 10%
Permit Loads: 10%
Scale Factor (HDOT 5.06)
Hawaii Standard Single Trip Permit Vehicle analysis assumes only one permit load on the bridge which allows the use of a single-lane distribution factor. When using the single-lane LRFD distribution factor, the 1.2 multiple prescence factor may shall be divided out from the distribtion factor equations.

Control

Structure

Structure Type: GirderLine
Define Deck Cross Section: Yes
Number of Members: 4
Skew Angle: 0 °



Analysis Model Type: Beam
Number of Top Spans: 1



Spans

Span	Length
1	40 ft

Structure Material: Steel
Beam Type: Builtup
Composite Structure: No
Deck Material: Concrete

Analysis

Unit System: US
Analysis Method: LRFD
Analysis Type: Rating
Number of Stages: 1
Member of Interest: 4
Model Element Type: Stepped
Point of Interest Generation Control: Tenth
Live-load Distribution Factor Application: AnalysisPoint

Interpolate Reinforcement: No
Calculate Effective Width: No

Input

Symmetry

Component	Symmetric
Beam Profile	No
Deck Profile	No
Shear Connectors	No
Transverse Stiffeners	No
Bearing Stiffeners	No
Longitudinal Stiffeners	No
Bracing (Member)	No
Lateral Support	No
Cb Factors (Std)	No
Cb Factors (LRFD)	No
Fatigue Stress (Std)	No
Beam Wheel Fractions (Std)	No
Reaction Wheel Fractions (Std)	No
Beam Distribution Factors (LRFD)	No
Reaction Distribution Factors (LRFD)	No

Simplified Standard Wheel Fractions: No
Merge Beam/Deck Profile Schedules: Yes

Distribution

Perform Dead Load Distribution: Yes
Calculate LRFD Live Load Distribution Factors: Yes

Dead Load Distribution Methods

Stage	Method
1	Tributary area

Live Load Distribution (LRFD)

Distribution Method: AASHTO LRFD
Cross Section Code: a1
Max. Number of Lanes Loaded: Computed
Consider Rigid Method: No
Slab Thickness Type: Structural
Set eg = 0 for Non-composite: Yes
Apply Skew to Lever Rule Override: Yes
Apply Skew to Ridgid Rule Override: No
Use Constants from Table 4.6.2.2.1-2: No

Libraries

Section Library: C:\BRASS\Girder_7.8\Girder\Libraries\BRASS-Sections.bls
Vehicle Library: C:\BRASS\Girder_7.8\Girder\Libraries\BRASS-Vehicles.blv

Output

Primary Output

Action Output Level: DL+LL+CONC
Action Locations: 10thPoints

General

Member Properties:	Yes
Load Combinations:	Yes
Load and Resistance Factors:	Yes
Warnings:	Yes
Camber:	No
Critical Design Ratios / Rating Factors:	Expanded

Live Load

Truck Positions:	Yes
Variable Axle Spacing:	Yes
Live Load Settings:	Yes
Live Load Combinations:	Yes
Live Load Details:	Yes
Impact (LFD):	No

Stage

Stage	Output
1	Yes

Dead Load

Member Self Load:	Yes
Distributed Dead Loads:	Yes
Concentrated Dead Loads:	Yes
Temperature Change:	No
Settlements:	No

Load Distribution

Dead Load Distribution:	Yes
Live Load Distribution:	Yes

Intermediate Output

Intermediate Output Level:	Full
Effective Width:	Yes
Floorbeam Lane Position:	Yes

Points of Interest

Specification Checks:	Yes
Load Factoring/Combinations:	No

Load Distribution

Dead Load:	Yes
Live Load:	Yes

Limit State Output (LRFD)

Limit State	Specification Check	Load Combination
Strength I	Yes	Yes
Strength II	Yes	Yes
Strength IV	No	No
Service I	No	No
Service II	No	No
Fatigue I	No	No
Fatigue II	No	No

Load Combination Output (LFD)

LFD Load Combo	Specification Check	Load Combination

Combo I	No	No
Combo IB	No	No
Combo I Overload	No	No
Combo IB Overload	No	No
Combo I Service	No	No
Combo IB Service	No	No
Combo Fatigue	Yes	Yes

Intermediate Output (cont.)

Steel

Transverse Stiffeners: No
Bearing Stiffeners: No
Longitudinal Stiffeners: No

Results Tables

X-Y Plot Action Tables: No
Specification Check Results Tables: No
Mesh Plot Files: No

BRASS-PAD™ Data Transfer File: No

Influence

Output influence lines for: None
Ordinate Divisor: 1

Factors

Load Factors (LRFD)

Limit State	DC		DW		DU		TU	
	max	min	max	min	max	min	max	min
Strength I	1.25	0.9	1.5	0.65	1.5	0.65	-	-
Strength II	1.25	0.9	1.5	0.65	1.5	0.65	-	-
Strength IV	-	-	-	-	-	-	-	-
Service I	-	-	-	-	-	-	-	-
Service II	1	1	1	1	1	1	-	-
Fatigue I	-	-	-	-	-	-	-	-
Fatigue II	-	-	-	-	-	-	-	-

Load Factors (LRFD) (continued)

Limit State	LL				SE		PS		DS	
	Design		Legal	Permit						
	Inventory	Operating			max	min	max	min	max	min
Strength I	1.75	1.35	1.45	0	-	-	-	-	-	-
Strength II	-		0	1.2	-	-	-	-	-	-
Strength IV	-		-	-	-	-	-	-	-	-
Service I	-		-	-	-	-	-	-	-	-
Service II	1.3	1	1.3	1	-	-	-	-	-	-
Fatigue I	0.75		-	-	-	-	-	-	-	-

Fatigue II	-	-	-	-	-	-	-	-	-

Load Modifiers (LRFD)

Limit State	Ductility	Redundancy	Importance	Combined Product	
				max	min
Strength I	1	1	1	-	-
Strength II	1	1	1	-	-
Strength IV	1	1	1	-	-
Service I	1	1	1	-	-
Service II	1	1	1	-	-
Fatigue I	1	1	1	-	-
Fatigue II	1	1	1	-	-

Resistance Factors (LRFD)

Resistance Factors

Type	Value
φ Flexure	1
φ Shear	1
φ Bearing	1
φ Compression	0.95
φ Shear Connectors	0.85
φ Fatigue	1

System/Total Modifiers

Limit State	Resistance Type	System	Total
Strength	Flexure	1	-
Strength	Shear	1	-
Strength	Bearing	1	-
Strength	Compression	1	-
Strength	Shear Connectors	1	-
Strength	Longitudinal Reinforcement	1	-
Service	Flexure	1	-
Fatigue	Fatigue	1	-

Condition Modifiers

Limit State	Condition
Strength	1
Service	1
Fatigue	1

Load Factors (LFD)

Load Combo	γ	LL	DC	DW	DU	TU	SE	PS	DS
I	-	-	-	-	-	-	-	1	1
IB	-	-	-	-	-	-	-	1	1
I-Overload	-	-	-	-	-	-	-	1	1

IB-Overload	-	-	-	-	-	-	-	1	1
I-Service	-	-	-	-	-	-	-	1	1
IB-Service	-	-	-	-	-	-	-	1	1
Fatigue	-	-	-	-	-	-	-	1	1

Capacity Reduction Factors (LFD)

Factor	Value
φ Flexure	-
φ Shear	-
φ Fatigue	-

Materials

Steel

ID	Name	Yield Stress	Tensile Strength	Modulus of Elasticity	Density	Thermal Expansion Coefficient
1	Salvaged Girder	30 ksi	60 ksi	29000 ksi	0.49 kcf	6.5E-06 °F^{-1}

Concrete

ID	Name	28 Day Compressive Strength	Modulus of Elasticity	Density	Modulus of Rupture	Modulus of Rupture (VCI Method)	Thermal Expansion Coefficient
1	1949 Class A-1	3 ksi	3880 ksi	0.16 kcf	-	-	6E-06 °F^{-1}

Dead Load Groups

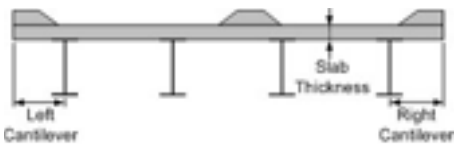
Groups

ID	Name	Stage	Type	Description
1	Concrete Railing	1	DC	Top Rail, Bottom Rail, Post
2	Sidewalk / Shoulder	1	DC	
3	AC Pavement	1	DW	
4	Girder Bracing	1	DC	X-Bracing with Steel Angles in the Outer Bays
5	Bottom Flange Bracing	1	DC	Steel Angles Diagonal Bracing in the Interior Bay
6	Vertical Web Angles	1	DC	Steel Angles Spaced at Intervals
7	Waterlines	1	DU	Assumed 8" Waterlines
8	Monorail	1	DC	6" Monorail
9	Bottom Flange Struts	1	DC	Bottom Flange Struts out of Steel Angles and Plates in Outer Bays

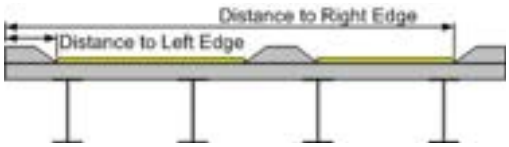
Deck Geometry

Deck

Deck Thickness: 9 in.
Left Cantilever Length: 6.5 ft
Right Cantilever Length: 6.5 ft
Equal Member Spacing: No



Travelway Locations



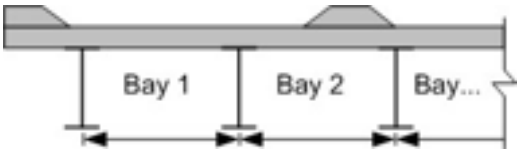
Distance to Left Edge: 5.25 ft
Distance to Right Edge: 33.25 ft

Sacrificial Topping

Thickness: -
Dead Load Type: DC

Member Spacing

Bay #	Spacing
1	9 ft
2	7.5 ft
3	9 ft



Soffits

No soffits have been defined.

Appurtenances

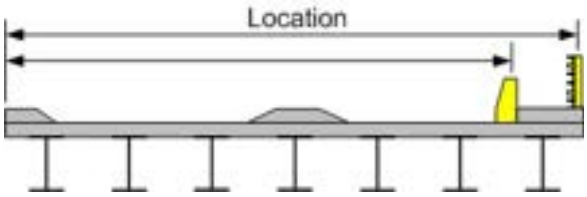
No appurtenances have been defined.

Deck Loads

Materials/Stages

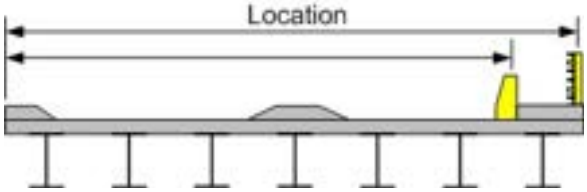
Deck Material: 1949 Class A-1
Curb & Median Material: Not Assigned
Wearing Surface Weight: -
Slab Stage: 1
Curb Stage: 1
Median Stage: 1
Wearing Surface Stage: 1

Line Loads



Dead Load Group	Line Load	Load Location
Concrete Railing	0.319 kip / ft	0.923 ft
Concrete Railing	0.319 kip / ft	37.577 ft
Waterlines	0.224 kip / ft	38.5 ft
Monorail	0.016 kip / ft	34 ft

Uniform Loads



Dead Load Group	Uniform Load	Load Location	Load Width
Sidewalk / Shoulder	0.007 ksf	0 ft	5.25 ft
Sidewalk / Shoulder	0.003 ksf	5.25 ft	2 ft
AC Pavement	0.018 ksf	7.25 ft	24 ft
Sidewalk / Shoulder	0.003 ksf	31.25 ft	2 ft
Sidewalk / Shoulder	0.007 ksf	33.25 ft	5.25 ft

Live Loads

Live Load Control

Direction Control: Up+Down
Standard Live Loads: None
Wheel Advancement Denominator: 100
ADTT: 5000
ADTT for Single Lane: 2000
Multiple Presence Adjustment: -
% of Dynamic Load Allowance (Impact): 100 %
Fixed Impact (STD): -

Dynamic Load Allowance (LRFD)

Design/Rating Procedure	Truck	Lane	Fatigue
Design	33 %	0 %	15 %
Legal	33 %	0 %	0 %
Permit	33 %	0 %	0 %

Special Vehicles

Axle Vehicles

No axle vehicles have been defined.

Lane Vehicles

No lane vehicles have been defined.

Definitions (STD)

No standard live load definitions have been defined.

Definitions (LRFD)

Definition 1

Code: HL-93-TRUCK
Type: DesignTruck
Design Rating: Design
% of Dynamic Load Allowance: -
Scale Factor: -
Lanes Loaded: Critical
Notional Load: Yes
Fixed DLA: -

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 2

Code: HL-93-TANDEM
Type: DesignTruck
Design Rating: Design
% of Dynamic Load Allowance: -

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating

Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	Yes
Fixed DLA:	-

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 3

Code:	HL-93-LANE
Type:	DesignLane
Design Rating:	Design
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	Yes
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 4

Code:	TYPE3
Type:	GeneralTruck
Design Rating:	Legal
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 5

Code:	TYPE3S2
Type:	GeneralTruck
Design Rating:	Legal
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 6

Code:	TYPE3-3
Type:	GeneralTruck
Design Rating:	Legal
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-

Fatigue I	-	-
Fatigue II	-	-

Definition 7

Code:	NRL-MIN
Type:	GeneralTruck
Design Rating:	Legal
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 8

Code:	NRL-MAX
Type:	GeneralTruck
Design Rating:	Legal
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 9

Code:	SU4
Type:	GeneralTruck
Design Rating:	Legal
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 10

Code:	SU5
Type:	GeneralTruck
Design Rating:	Legal
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 11

Code:	SU6

Type:	GeneralTruck
Design Rating:	Legal
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 12

Code:	SU7
Type:	GeneralTruck
Design Rating:	Legal
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 13

Code:	HP1
Type:	PermitTruck
Design Rating:	Permit
% of Dynamic Load Allowance:	-
Scale Factor:	0.833
Lanes Loaded:	Single
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 14

Code:	HP2
Type:	PermitTruck
Design Rating:	Permit
% of Dynamic Load Allowance:	-
Scale Factor:	0.833
Lanes Loaded:	Single
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 15

Code:	HP3
Type:	PermitTruck
Design Rating:	Permit
% of Dynamic Load Allowance:	-
Scale Factor:	0.833
Lanes Loaded:	Single

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-

Notional Load:	No
Fixed DLA:	-

Limit State	gamma LL	gamma LL Operating
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 16

Code:	HL-93-FAT
Type:	FatigueTruck
Design Rating:	Design
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 17

Code:	EV2
Type:	GeneralTruck
Design Rating:	Legal
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 18

Code:	EV3
Type:	GeneralTruck
Design Rating:	Legal
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

General Combinations (LRFD)

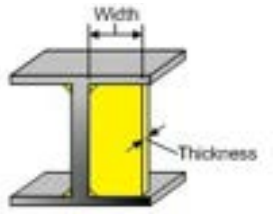
Standard Combo	Truck	Lane	Combination Factors	
			Truck	Lane
No	**HL-93-TRUCK**	**HL-93-LANE**	1	1
No	**HL-93-TANDEM**	**HL-93-LANE**	1	1

Deflection Combinations (LRFD)

No Deflection Combinations (LRFD) have been defined.

Component Groups

Transverse Stiffeners



ID	Name	Width	Thickness	Type	Type Factor	Material
1	Web Stiffeners	5 in.	0.375 in.	Single Angles	-	**Salvaged Girder**

Bearing Stiffeners

No bearing stiffener groups have been defined.

Longitudinal Stiffeners

No longitudinal stiffener groups have been defined.

Specification Control

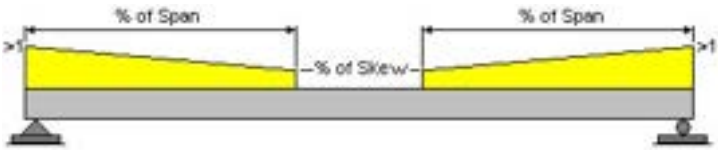
General

Lane Geometry

Design Vehicle Lane Width: 12 ft
Vehicle Width: 10 ft
Wheel Spacing: 6 ft
Encroachment Distance: -

Load Factors Control (LRFD): Use maximum and minimum load factors

Skew Factors



Span #	% of Span	% of Skew
1	-	-

Steel

Use Appendix A6 (LRFD): No
Allow Plastic Analysis: No
Override Longitudinal Stiffeners: No
Slab thickness for longitudinal shear force: Structural
Slab thickness for minimum negative flexure concrete deck reinforcement: Structural

Fatigue

AASHTO LRFD Table 6.6.1.2.5-2

% of Span: -
Span Length: 40 ft

Stress Range in Longitudinal Reinforcement Over the Piers: 10 ksi

Detail Categories (LRFD)

Detail Category	Constant, A x 10^8	Constant Amplitude Fatigue Threshold
A	-	-

B	-	-
B'	-	-
C	-	-
C'	-	-
D	-	-
E	-	-
E'	-	-

Limit State Map

Limit State Maps (LRFD)

Limit State	Design Review			Rating		
	Design Load	Legal Load	Permit Load	Design Load	Legal Load	Permit Load
Strength I	No	No	No	Inventory/Operating	Yes	No
Strength II	No	No	No	Exclude	No	Yes
Strength IV	No	No	No	Exclude	No	No
Service I	No	No	No	Exclude	No	No
Service II	No	No	No	Inventory/Operating	Yes	Yes
Service III	No	No	No	Exclude	No	No
Fatigue I	No	No	No	Inventory	No	No
Fatigue II	No	No	No	Exclude	No	No

Load Combo Maps (LFD)

Load Combo	Design Review	Rating
I	No	Inventory
IB	No	Operating
I-Overload	No	Exclude
IB-Overload	No	Exclude
I-Service	No	Exclude
IB-Service	No	Exclude
Fatigue	No	Exclude

Spec. Check Map (Strength)

LRFD Specification Check Maps

Design Load Review

Spec Check	Strength I	Strength II	Strength IV
Flexure	No	No	No
Shear	No	No	No
Bearing	No	No	No
Flexural Stress In Longitudinal Stiffener	No	No	No

Legal Load Review

Spec Check	Strength I	Strength II	Strength IV
Flexure	No	No	No

Shear	No	No	No
Bearing	No	No	No
Flexural Stress In Longitudinal Stiffener	No	No	No

Permit Load Review

Spec Check	Strength I	Strength II	Strength IV
Flexure	No	No	No
Shear	No	No	No
Bearing	No	No	No
Flexural Stress In Longitudinal Stiffener	No	No	No

Design Load Rating

Spec Check	Strength I	Strength II	Strength IV
Flexure	Yes	No	No
Shear	Yes	No	No
Bearing	Yes	No	No
Flexural Stress In Longitudinal Stiffener	No	No	No

Legal Load Rating

Spec Check	Strength I	Strength II	Strength IV
Flexure	Yes	No	No
Shear	Yes	No	No
Bearing	Yes	No	No
Flexural Stress In Longitudinal Stiffener	No	No	No

Permit Load Rating

Spec Check	Strength I	Strength II	Strength IV
Flexure	No	Yes	No
Shear	No	Yes	No
Bearing	No	Yes	No
Flexural Stress In Longitudinal Stiffener	No	No	No

LFD Specification Check Maps

Design Review

LFD Spec Check	I	IB	I-Overload	IB-Overload
Flexure	No	No	No	No
Shear	No	No		
Bearing	No	No		
Flexural Stress In Longitudinal Stiffener	No	No		

Rating

LFD Spec Check	I	IB	I-Overload	IB-Overload
Flexure	No	No	No	No
Shear	No	No		
Bearing	No	No		

Flexural Stress In Longitudinal Stiffener	No	No

Spec. Check Map (Service)

LRFD Specification Check Maps

Design Load Review

Spec Check	Service I	Service II
Crack Control	No	No
Flexural Stress In Flanges	No	No
Live Load Deflection	No	No

Legal Load Review

Spec Check	Service I	Service II
Crack Control	No	No
Flexural Stress In Flanges	No	No
Live Load Deflection	No	No

Permit Load Review

Spec Check	Service I	Service II
Crack Control	No	No
Flexural Stress In Flanges	No	No
Live Load Deflection	No	No

Design Load Rating

Spec Check	Service I	Service II
Crack Control	No	No
Flexural Stress In Flanges	No	Yes
Live Load Deflection	No	Yes

Legal Load Rating

Spec Check	Service I	Service II
Crack Control	No	No
Flexural Stress In Flanges	No	Yes
Live Load Deflection	No	Yes

Permit Load Rating

Spec Check	Service I	Service II
Crack Control	No	No
Flexural Stress In Flanges	No	Yes
Live Load Deflection	No	Yes

LFD Specification Check Maps

Design Review

LFD Spec Check	I-Overload	IB-Overload
Flexural Stress In Flanges	No	No

Rating

LFD Spec Check	I-Overload	IB-Overload
Flexural Stress In Flanges	No	No

Spec. Check Map (Fatigue)

LRFD Specification Check Maps

Design Load Review

Spec Check	Fatigue I	Fatigue II
Fatigue of Reinforcement	No	No
Fatigue of Shear Connectors	No	No
Fatigue Shear Range of Shear Connectors	No	No
Fatigue of Special Points	No	No
Fatigue Shear	No	No

Legal Load Review

Spec Check	Fatigue I	Fatigue II
Fatigue of Reinforcement	No	No
Fatigue of Shear Connectors	No	No
Fatigue Shear Range of Shear Connectors	No	No
Fatigue of Special Points	No	No
Fatigue Shear	No	No

Permit Load Review

Spec Check	Fatigue I	Fatigue II
Fatigue of Reinforcement	No	No
Fatigue of Shear Connectors	No	No
Fatigue Shear Range of Shear Connectors	No	No
Fatigue of Special Points	No	No
Fatigue Shear	No	No

Design Load Rating

Spec Check	Fatigue I	Fatigue II
Fatigue of Reinforcement	Yes	No
Fatigue of Shear Connectors	Yes	No
Fatigue Shear Range of Shear Connectors	Yes	No
Fatigue of Special Points	Yes	No
Fatigue Shear	Yes	No

Legal Load Rating

Spec Check	Fatigue I	Fatigue II
Fatigue of Reinforcement	No	No
Fatigue of Shear Connectors	No	No
Fatigue Shear Range of Shear Connectors	No	No
Fatigue of Special Points	No	No

Fatigue Shear	No	No

Permit Load Rating

Spec Check	Fatigue I	Fatigue II
Fatigue of Reinforcement	No	No
Fatigue of Shear Connectors	No	No
Fatigue Shear Range of Shear Connectors	No	No
Fatigue of Special Points	No	No
Fatigue Shear	No	No

LFD Specification Check Maps

Design Review

LFD Spec Check	Fatigue
Fatigue of Special Points	No

Rating

LFD Spec Check	Fatigue
Fatigue of Special Points	No

Member

Member Notes

No member notes have been defined.

Member Materials

Beam

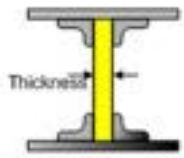
Beam Material: Salvaged Girder

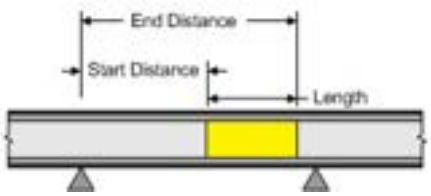
Beam Profile

Web

Apply to Entire Structure: Yes
Web Angle: -





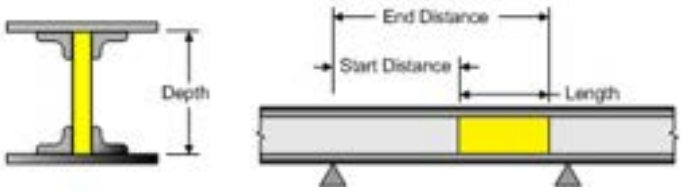


Thickness	Material	Support Number	Start Distance	Length

0.375 in.	**Salvaged Girder**	1	0 ft	40 ft

Web Depth

Apply to Entire Structure: Yes



Start Depth	Web Variation	End Depth	Support Number	Start Distance	Length
78 in.	Linear	78 in.	1	0 ft	40 ft

Top Cover Plate

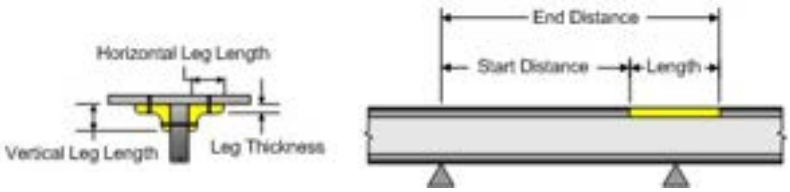
No top cover plate schedules have been defined.

Bottom Cover Plate

No bottom cover plate schedules have been defined.

Top Angles

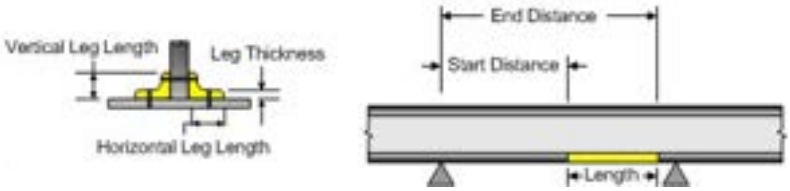
Apply to Entire Structure: Yes



Vertical Leg Length	Horizontal Leg Length	Leg Thickness	Material	Support Number	Start Distance	Length
4 in.	6 in.	0.625 in.	**Salvaged Girder**	1	0 ft	40 ft

Bottom Angles

Apply to Entire Structure: Yes



Vertical Leg Length	Horizontal Leg Length	Leg Thickness	Material	Support Number	Start Distance	Length
4 in.	6 in.	0.625 in.	**Salvaged Girder**	1	0 ft	40 ft

Hinges

No hinges have been defined.

Special Locations

No special locations have been defined.

Supports

Support Conditions

Support	Support Restraint		
	Horizontal	Vertical	Rotational
1	Free	Restrained	Free
2	Restrained	Restrained	Free

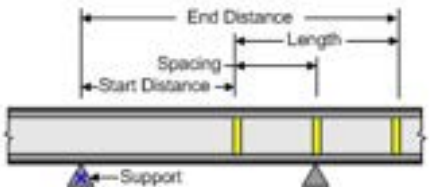
Spring Constants

Support	Spring Constants		
	Horizontal	Vertical	Rotational
1	-	-	-
2	-	-	-

Schedules

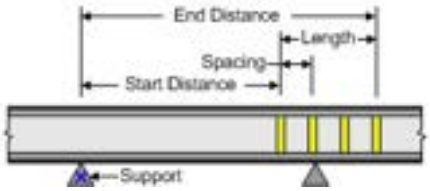
Bracing

Apply to Entire Structure: No



Spacing	Support	Start Distance	Length
19.417 ft	1	0.583 ft	38.833 ft

Transverse Stiffeners



Stiffener Group	Spacing	Support	Start Distance	Length
Web Stiffeners	3.875 ft	1	4.458 ft	11.625 ft
Web Stiffeners	3.875 ft	1	23.885 ft	11.625 ft

Bearing Stiffeners

Apply to Entire Structure: No

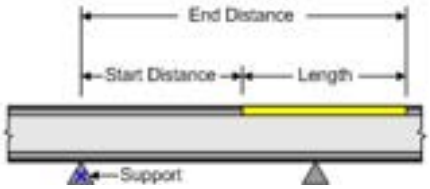
Support	Stiffener Group
1	Not Assigned
2	Not Assigned

Longitudinal Stiffeners

No longitudinal stiffener schedules have been defined.

Lateral Support

Apply to Entire Structure: Yes



Support	Start Distance	Length
1	0 ft	40 ft

Cb Factors (Standard)

No Cb factors (LRFD) have been defined.

Cb Factors (LRFD)

No Cb factors (LRFD) have been defined.

Fatigue Stress (Standard)

No fatigue stress (standard) schedules have been defined.

Member Control

Steel

Flexural Resistance

Span	Compact Piers (Standard)	Ignore Eq. 6.10.7.1.2-3 (LRFD)
1	No	No

End Panel Distances

Top Span



Left of Top Span: -
Right of Top Span: -

Flange Local Buckling Resistance Adjustment

Standard Specifications: -
LRFD Specifications: -

Points of Interest

No points of interest have been defined.

Dead Loads

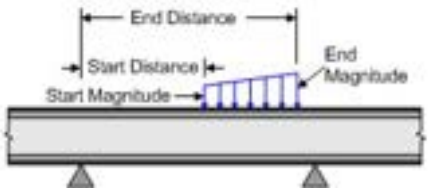
Uniform

Dead Load Type	Stage	Uniform Load
DC	1	-
DW	1	-
DU	1	-

Additional Self-weight

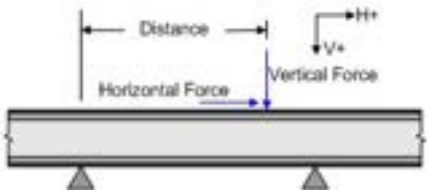
No additional self-weight dead loads have been defined.

Distributed



Dead Load Group	Support	Distributed Load (Start)		Distributed Load (End)	
		Distance	Magnitude	Distance	Magnitude
Vertical Web Angles	1	0.063 ft	0.019 kip / ft	39.875 ft	-

Concentrated



Dead Load Group	Support	Concentrated Load		
		Distance	Horizontal Force	Vertical Force
Girder Bracing	1	0.583 ft	-	0.131 kip
Girder Bracing	1	20 ft	-	0.131 kip
Girder Bracing	1	39.938 ft	-	0.131 kip
Bottom Flange Struts	1	9.708 ft	-	0.046 kip
Bottom Flange Struts	1	29.969 ft	-	0.046 kip

Temperature

No temperature dead loads have been defined.

Settlement

Stage: 1

No settlement loads have been defined.

Pedestrian Load

Pedestrian Load: -

Wheel Fractions (Standard)

Moment

No moment wheel fractions have been defined.

Shear

No shear wheel fractions have been defined.

Deflection

No deflection wheel fractions have been defined.

Reaction

Apply to entire structure: No

Support	mg Single-Lane	mg Multi-Lane

	Moment	Shear	Deflection	Moment	Shear	Deflection
1	-	-	-	-	-	-
2	-	-	-	-	-	-

Nanue Stream Bridge
Load Rating for Steel Exterior Girder Span 3 (G4-3)

CRITICAL RATING FACTOR SUMMARY: Design Load Inventory

Live Load No.	Combination Description		Total Vehicle Wt. (tons)	Controlling Point of Interest	Limit State Action Location	Rating Factor	Load Rating (tons)
1	HL-93-TRUCK + HL-93-LANE	(DTK)	36.00	110.0000	STRENGTH I Shear Minimum Effects	2.10	75.54
2	HL-93-TANDEM + HL-93-LANE	(DTK)	25.00	110.0000	STRENGTH I Shear Minimum Effects	2.36	59.07
15	HL-93-FAT	(FAT)	36.00	110.0000	FATIGUE I Shear Stress Minimum Effects	11.56	416.31
Crit	HL-93-TRUCK + HL-93-LANE	(DTK)	36.00	110.0000	STRENGTH I	2.10	75.54

CRITICAL RATING FACTOR SUMMARY: Design Load Operating

Live Load No.	Combination Description		Total Vehicle Wt. (tons)	Controlling Point of Interest	Limit State Action Location	Rating Factor	Load Rating (tons)
1	HL-93-TRUCK + HL-93-LANE	(DTK)	36.00	110.0000	STRENGTH I-O Shear Minimum Effects	2.72	97.93
2	HL-93-TANDEM + HL-93-LANE	(DTK)	25.00	110.0000	STRENGTH I-O Shear Minimum Effects	3.06	76.57
Crit	HL-93-TRUCK + HL-93-LANE	(DTK)	36.00	110.0000	STRENGTH I-O	2.72	97.93

CRITICAL RATING FACTOR SUMMARY: Legal Load

Live Load No.	Combination Description		Total Vehicle Wt. (tons)	Controlling Point of Interest	Limit State Action Location	Rating Factor	Load Rating (tons)
3	TYPE3	(TRK)	25.00	110.0000	STRENGTH I Shear Minimum Effects	4.05	101.28
4	TYPE3S2	(TRK)	36.00	110.0000	STRENGTH I Shear Minimum Effects	4.22	151.88
5	TYPE3-3	(TRK)	40.00	110.0000	STRENGTH I Shear Minimum Effects	4.50	180.18
6	NRL-MIN	(TRK)	40.00	105.0000	SERVICE II Flange Stress Maximum Effects Top Flange	2.79	111.52
7	NRL-MAX	(TRK)	40.00	105.0000	SERVICE II Flange Stress Maximum Effects Top Flange	2.82	112.98
8	SU4	(TRK)	27.00	110.0000	STRENGTH I Shear Minimum Effects	3.62	97.61
9	SU5	(TRK)	31.00	110.0000	STRENGTH I Shear Minimum Effects	3.30	102.31

10	SU6	(TRK)	34.75	105.0000	SERVICE II Flange Stress Maximum Effects Top Flange	3.14	109.05
11	SU7	(TRK)	38.75	105.0000	SERVICE II Flange Stress Maximum Effects Top Flange	2.94	113.96
16	EV2	(TRK)	28.75	110.0000	STRENGTH I Shear Minimum Effects	3.39	97.58
17	EV3	(TRK)	43.00	110.0000	STRENGTH I Shear Minimum Effects	2.31	99.13
Crit	EV3	(TRK)	43.00	110.0000	STRENGTH I	2.31	99.13

CRITICAL RATING FACTOR SUMMARY: Permit Load

Live Load No.	Combination Description		Total Vehicle Wt. (tons)	Controlling Point of Interest	Limit State Action Location	Rating Factor	Load Rating (tons)
12	HP1	(PTK)	60.00	110.0000	STRENGTH II Shear Minimum Effects	2.85	170.75
13	HP2	(PTK)	78.55	110.0000	STRENGTH II Shear Minimum Effects	2.89	226.70
14	HP3	(PTK)	104.95	110.0000	STRENGTH II Shear Minimum Effects	3.64	382.31
Crit	HP1	(PTK)	60.00	110.0000	STRENGTH II	2.85	170.75

Wyoming Department of Transportation

BRASS-GIRDER™ Input Parameters

Version Information

Girder UI:	7.8.0.3001
Girder XML:	7.8.0.3001
BRASS™ XML:	1.8.0.3001

Administration

Project ID:	8780-06
Project Title:	HDOT Statewide Bridge Load Ratings
Bridge ID:	1000190308146
Bridge Name:	Nanue Stream
Route Name:	00019 Hawaii Belt Road
Reference Marker:	18
Title 1:	Nanue Stream Bridge
Title 2:	Load Rating for Steel Interior Girder Span 3 (G3-3)
Date:	2017 4 21
Agency:	HDOT Highways Division
Designer/Rater:	Moffatt & Nichol (JU)
Reviewer:	
Comments:	

Bridge Notes

MATERIAL PROPERTIES
Concrete
Weight = 0.160 kcf (HDOT Design Criteria for Bridges and Structures [HDOT] 5.01)
Strength = 3 ksi (Record Drawings: Class A-1)
Elastic Modulus = 3,880 ksi (AASHTO LRFD [LRFD] Eqn 5.4.2.4-1, Use 0.150 kcf per HDOT 5.01)
Reinforcing Steel
Yield Strength = 33 ksi (Unknown, Manual for Bridge Evaluation [MBE] Table 6A.5.2.2-1)
Elastic Modulus = 29,000 ksi (LRFD 5.4.3.2)

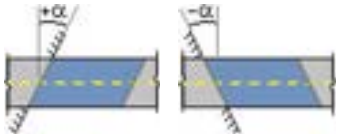
BRIDGE PROPERTIES (RECORD DRAWINGS)
Span 1 = 51 ft
Span 2 = 50 ft
Span 3 = 40 ft
Span 4 = 72 ft
Span 5 = 40 ft
Span 6 = 72 ft
Span 7 = 40 ft
Span 8 = 72 ft
Span 9 = 40 ft
Span 10 = 51 ft
Width = 38.5 ft
Deck Thickness = 9 in min
No. of Griders = 4
Girder Spacing = 9 ft, 7.5 ft, 9 ft
Girder Width = 12 3/8"
Girder Depth = 6'-6 1/2"
Surface Roughness = 3.0 (2015 Bridge Inspectinon Report)
Condition Factor = 1.0 (HDOT 5.04, 2015 Bridge Inspection Report indicates Condition Rating of 7)
System Factor = 1.0 (HDOT 5.05,)

LIVE LOADS
LRFD Live Load (MBE Appendix C6A)
Truck and Tandem Lane Load = 0.64 klf
AASHTO Legal Loads (MBE Appendix D6A)
Type 3
Type 3S2
Type 3-3
Notional Rating Load [NRL]
Legal Lane Load = 0.2 klf
SU4
SU5
SU6
SU7
HDOT Hawaii Standard Single Trip Permit Loads (HDOT 5.06)
No lane load provided, vehicles allowed to trave in any lane
HP1
HP2
HP3
Dynamic Load Allowance (HDOT 5.03)
Spans > 40 ft
Wearing Surface: 3 (Assumed)
Design Loads: 33%
Legal Loads: 10%
Permit Loads: 10%
Scale Factor (HDOT 5.06)
Hawaii Standard Single Trip Permit Vehicle analysis assumes only one permit load on the bridge which allows the use of a single-lane distribution factor. When using the single-lane LRFD distribution factor, the 1.2 multiple prescence factor may shall be divided out from the distribtion factor equations.

Control

Structure

Structure Type: GirderLine
Define Deck Cross Section: Yes
Number of Members: 4
Skew Angle: 0 °



Analysis Model Type: Beam
Number of Top Spans: 1



Spans

Span	Length
1	40 ft

Structure Material: Steel
Beam Type: Builtup
Composite Structure: No
Deck Material: Concrete

Analysis

Unit System: US
Analysis Method: LRFD
Analysis Type: Rating
Number of Stages: 1
Member of Interest: 3
Model Element Type: Stepped
Point of Interest Generation Control: Tenth
Live-load Distribution Factor Application: AnalysisPoint

Interpolate Reinforcement: No
Calculate Effective Width: No

Input

Symmetry

Component	Symmetric
Beam Profile	No
Deck Profile	No
Shear Connectors	No
Transverse Stiffeners	No
Bearing Stiffeners	No
Longitudinal Stiffeners	No
Bracing (Member)	No
Lateral Support	No
Cb Factors (Std)	No
Cb Factors (LRFD)	No
Fatigue Stress (Std)	No
Beam Wheel Fractions (Std)	No
Reaction Wheel Fractions (Std)	No
Beam Distribution Factors (LRFD)	No
Reaction Distribution Factors (LRFD)	No

Simplified Standard Wheel Fractions: No
Merge Beam/Deck Profile Schedules: Yes

Distribution

Perform Dead Load Distribution: Yes
Calculate LRFD Live Load Distribution Factors: Yes

Dead Load Distribution Methods

Stage	Method
1	Tributary area

Live Load Distribution (LRFD)

Distribution Method: AASHTO LRFD
Cross Section Code: a1
Max. Number of Lanes Loaded: Computed
Slab Thickness Type: Structural
Set eg = 0 for Non-composite: Yes
Apply Skew to Lever Rule Override: Yes
Apply Skew to Ridgid Rule Override: No
Use Constants from Table 4.6.2.2.1-2: No

Libraries

Section Library: C:\BRASS\Girder_7.8\Girder\Libraries\BRASS-Sections.bls
Vehicle Library: C:\BRASS\Girder_7.8\Girder\Libraries\BRASS-Vehicles.blv

Output

Primary Output

Action Output Level: DL+LL+CONC
Action Locations: 10thPoints

General

Member Properties:	Yes
Load Combinations:	Yes
Load and Resistance Factors:	Yes
Warnings:	Yes
Camber:	No
Critical Design Ratios / Rating Factors:	Expanded

Live Load

Truck Positions:	Yes
Variable Axle Spacing:	Yes
Live Load Settings:	Yes
Live Load Combinations:	Yes
Live Load Details:	Yes
Impact (LFD):	No

Stage

Stage	Output
1	Yes

Dead Load

Member Self Load:	Yes
Distributed Dead Loads:	Yes
Concentrated Dead Loads:	Yes
Temperature Change:	No
Settlements:	No

Load Distribution

Dead Load Distribution:	Yes
Live Load Distribution:	Yes

Intermediate Output

Intermediate Output Level:	Full
Effective Width:	Yes
Floorbeam Lane Position:	Yes

Points of Interest

Specification Checks:	Yes
Load Factoring/Combinations:	No

Load Distribution

Dead Load:	Yes
Live Load:	Yes

Limit State Output (LRFD)

Limit State	Specification Check	Load Combination
Strength I	Yes	Yes
Strength II	Yes	Yes
Strength IV	No	No
Service I	No	No
Service II	No	No
Fatigue I	No	No
Fatigue II	No	No

Load Combination Output (LFD)

LFD Load Combo	Specification Check	Load Combination

Combo I	No	No
Combo IB	No	No
Combo I Overload	No	No
Combo IB Overload	No	No
Combo I Service	No	No
Combo IB Service	No	No
Combo Fatigue	Yes	Yes

Intermediate Output (cont.)

Steel

Transverse Stiffeners: No
Bearing Stiffeners: No
Longitudinal Stiffeners: No

Results Tables

X-Y Plot Action Tables: No
Specification Check Results Tables: No
Mesh Plot Files: No

BRASS-PAD™ Data Transfer File: No

Influence

Output influence lines for: None
Ordinate Divisor: 1

Factors

Load Factors (LRFD)

Limit State	DC		DW		DU		TU	
	max	min	max	min	max	min	max	min
Strength I	1.25	0.9	1.5	0.65	1.5	0.65	-	-
Strength II	1.25	0.9	1.5	0.65	1.5	0.65	-	-
Strength IV	-	-	-	-	-	-	-	-
Service I	-	-	-	-	-	-	-	-
Service II	1	1	1	1	1	1	-	-
Fatigue I	-	-	-	-	-	-	-	-
Fatigue II	-	-	-	-	-	-	-	-

Load Factors (LRFD) (continued)

Limit State	LL				SE		PS		DS	
	Design		Legal	Permit						
	Inventory	Operating			max	min	max	min	max	min
Strength I	1.75	1.35	1.45	0	-	-	-	-	-	-
Strength II	-		0	1.2	-	-	-	-	-	-
Strength IV	-		-	-	-	-	-	-	-	-
Service I	-		-	-	-	-	-	-	-	-
Service II	1.3	1	1.3	1	-	-	-	-	-	-
Fatigue I	0.75		-	-	-	-	-	-	-	-
Fatigue II	-		-	-	-	-	-	-	-	-

Load Modifiers (LRFD)

Limit State	Ductility	Redundancy	Importance	Combined Product	
				max	min
Strength I	1	1	1	-	-
Strength II	1	1	1	-	-
Strength IV	1	1	1	-	-
Service I	1	1	1	-	-
Service II	1	1	1	-	-
Fatigue I	1	1	1	-	-
Fatigue II	1	1	1	-	-

Resistance Factors (LRFD)

Resistance Factors

Type	Value
φ Flexure	1
φ Shear	1
φ Bearing	1
φ Compression	0.95
φ Shear Connectors	0.85
φ Fatigue	1

System/Total Modifiers

Limit State	Resistance Type	System	Total
Strength	Flexure	1	-
Strength	Shear	1	-
Strength	Bearing	1	-
Strength	Compression	1	-
Strength	Shear Connectors	1	-
Strength	Longitudinal Reinforcement	1	-
Service	Flexure	1	-
Fatigue	Fatigue	1	-

Condition Modifiers

Limit State	Condition
Strength	1
Service	1
Fatigue	1

Load Factors (LFD)

Load Combo	γ	LL	DC	DW	DU	TU	SE	PS	DS
I	-	-	-	-	-	-	-	1	1
IB	-	-	-	-	-	-	-	1	1
I-Overload	-	-	-	-	-	-	-	1	1
IB-Overload	-	-	-	-	-	-	-	1	1

I-Service	-	-	-	-	-	-	-	1	1
IB-Service	-	-	-	-	-	-	-	1	1
Fatigue	-	-	-	-	-	-	-	1	1

Capacity Reduction Factors (LFD)

Factor	Value
φ Flexure	-
φ Shear	-
φ Fatigue	-

Materials

Steel

ID	Name	Yield Stress	Tensile Strength	Modulus of Elasticity	Density	Thermal Expansion Coefficient
1	Salvaged Girder	30 ksi	60 ksi	29000 ksi	0.49 kcf	6.5E-06 °F^{-1}

Concrete

ID	Name	28 Day Compressive Strength	Modulus of Elasticity	Density	Modulus of Rupture	Modulus of Rupture (VCI Method)	Thermal Expansion Coefficient
1	1949 Class A-1	3 ksi	3880 ksi	0.16 kcf	-	-	6E-06 °F^{-1}

Dead Load Groups

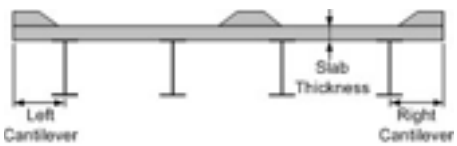
Groups

ID	Name	Stage	Type	Description
1	Concrete Railing	1	DC	Top Rail, Bottom Rail, Post
2	Sidewalk / Shoulder	1	DC	
3	AC Pavement	1	DW	
4	Girder Bracing	1	DC	X-Bracing with Steel Angles in the Outer Bays
5	Bottom Flange Bracing	1	DC	Steel Angles Diagonal Bracing in the Interior Bay
6	Vertical Web Angles	1	DC	Steel Angles Spaced at Intervals
7	Waterlines	1	DU	Assumed 8" Waterlines
8	Monorail	1	DC	6" Monorail
9	Bottom Flange Struts	1	DC	Bottom Flange Struts out of Steel Angles and Plates in Outer Bays

Deck Geometry

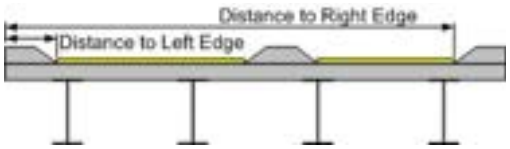
Deck

Deck Thickness: 9 in.
Left Cantilever Length: 6.5 ft
Right Cantilever Length: 6.5 ft
Equal Member Spacing: No



Travelway Locations

Distance to Left Edge: 5.25 ft
Distance to Right Edge: 33.25 ft

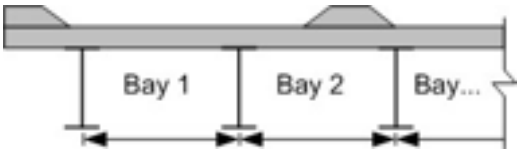


Sacrificial Topping

Thickness: -
Dead Load Type: DC

Member Spacing

Bay #	Spacing
1	9 ft
2	7.5 ft
3	9 ft



Soffits

No soffits have been defined.

Appurtenances

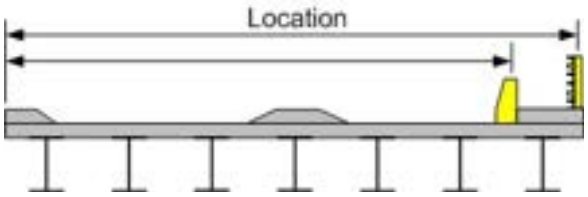
No appurtenances have been defined.

Deck Loads

Materials/Stages

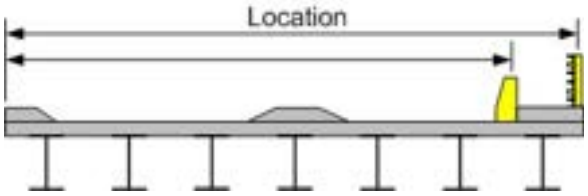
Deck Material: **1949 Class A-1**
Curb & Median Material: Not Assigned
Wearing Surface Weight: -
Slab Stage: 1
Curb Stage: 1
Median Stage: 1
Wearing Surface Stage: 1

Line Loads



Dead Load Group	Line Load	Load Location
Concrete Railing	0.319 kip / ft	0.923 ft
Concrete Railing	0.319 kip / ft	37.577 ft
Waterlines	0.224 kip / ft	38.5 ft
Monorail	0.016 kip / ft	34 ft

Uniform Loads



Dead Load Group	Uniform Load	Load Location	Load Width
Sidewalk / Shoulder	0.007 ksf	0 ft	5.25 ft
Sidewalk / Shoulder	0.003 ksf	5.25 ft	2 ft
AC Pavement	0.018 ksf	7.25 ft	24 ft
Sidewalk / Shoulder	0.003 ksf	31.25 ft	2 ft
Sidewalk / Shoulder	0.007 ksf	33.25 ft	5 ft

Live Loads

Live Load Control

Direction Control: Up+Down
Standard Live Loads: None
Wheel Advancement Denominator: 100
ADTT: 5000
ADTT for Single Lane: 2000
Multiple Presence Adjustment: -
% of Dynamic Load Allowance (Impact): 100 %
Fixed Impact (STD): -

Dynamic Load Allowance (LRFD)

Design/Rating Procedure	Truck	Lane	Fatigue
Design	33 %	0 %	15 %
Legal	33 %	0 %	0 %
Permit	33 %	0 %	0 %

Special Vehicles

Axle Vehicles

No axle vehicles have been defined.

Lane Vehicles

No lane vehicles have been defined.

Definitions (STD)

No standard live load definitions have been defined.

Definitions (LRFD)

Definition 1

Code: HL-93-TRUCK
Type: DesignTruck
Design Rating: Design
% of Dynamic Load Allowance: -
Scale Factor: -
Lanes Loaded: Critical
Notional Load: Yes
Fixed DLA: -

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 2

Code: HL-93-TANDEM
Type: DesignTruck
Design Rating: Design
% of Dynamic Load Allowance: -
Scale Factor: -

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-

Lanes Loaded:	Critical
Notional Load:	Yes
Fixed DLA:	-

Limit State	gamma LL	gamma LL Operating
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 3

Code:	HL-93-LANE
Type:	DesignLane
Design Rating:	Design
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	Yes
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 4

Code:	TYPE3
Type:	GeneralTruck
Design Rating:	Legal
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 5

Code:	TYPE3S2
Type:	GeneralTruck
Design Rating:	Legal
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 6

Code:	TYPE3-3
Type:	GeneralTruck
Design Rating:	Legal
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-

Fatigue II	-	-

Definition 7

Code: NRL-MIN
Type: GeneralTruck
Design Rating: Legal
% of Dynamic Load Allowance: -
Scale Factor: -
Lanes Loaded: Critical
Notional Load: No
Fixed DLA: -

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 8

Code: NRL-MAX
Type: GeneralTruck
Design Rating: Legal
% of Dynamic Load Allowance: -
Scale Factor: -
Lanes Loaded: Critical
Notional Load: No
Fixed DLA: -

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 9

Code: SU4
Type: GeneralTruck
Design Rating: Legal
% of Dynamic Load Allowance: -
Scale Factor: -
Lanes Loaded: Critical
Notional Load: No
Fixed DLA: -

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 10

Code: SU5
Type: GeneralTruck
Design Rating: Legal
% of Dynamic Load Allowance: -
Scale Factor: -
Lanes Loaded: Critical
Notional Load: No
Fixed DLA: -

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 11

Code: SU6
Type: GeneralTruck

Live Load Factor Overrides

Design Rating:	Legal
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 12

Code:	SU7
Type:	GeneralTruck
Design Rating:	Legal
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 13

Code:	HP1
Type:	PermitTruck
Design Rating:	Permit
% of Dynamic Load Allowance:	-
Scale Factor:	0.833
Lanes Loaded:	Single
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 14

Code:	HP2
Type:	PermitTruck
Design Rating:	Permit
% of Dynamic Load Allowance:	-
Scale Factor:	0.833
Lanes Loaded:	Single
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 15

Code:	HP3
Type:	PermitTruck
Design Rating:	Permit
% of Dynamic Load Allowance:	-
Scale Factor:	0.833
Lanes Loaded:	Single
Notional Load:	No

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-

Fixed DLA: -

Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 16

Code: HL-93-FAT
Type: FatigueTruck
Design Rating: Design
% of Dynamic Load Allowance: -
Scale Factor: -
Lanes Loaded: Critical
Notional Load: No
Fixed DLA: -

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 17

Code: EV2
Type: GeneralTruck
Design Rating: Legal
% of Dynamic Load Allowance: -
Scale Factor: -
Lanes Loaded: Critical
Notional Load: No
Fixed DLA: -

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 18

Code: EV3
Type: GeneralTruck
Design Rating: Legal
% of Dynamic Load Allowance: -
Scale Factor: -
Lanes Loaded: Critical
Notional Load: No
Fixed DLA: -

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

General Combinations (LRFD)

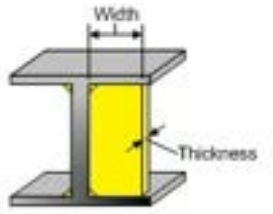
Standard Combo	Truck	Lane	Combination Factors	
			Truck	Lane
No	HL-93-TRUCK	HL-93-LANE	1	1
No	HL-93-TANDEM	HL-93-LANE	1	1

Deflection Combinations (LRFD)

No Deflection Combinations (LRFD) have been defined.

Component Groups

Transverse Stiffeners



ID	Name	Width	Thickness	Type	Type Factor	Material
1	Web Stiffeners	5 in.	0.375 in.	Single Angles	-	**Salvaged Girder**

Bearing Stiffeners

No bearing stiffener groups have been defined.

Longitudinal Stiffeners

No longitudinal stiffener groups have been defined.

Specification Control

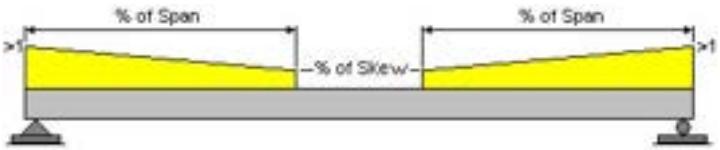
General

Lane Geometry

Design Vehicle Lane Width: 12 ft
Vehicle Width: 10 ft
Wheel Spacing: 6 ft
Encroachment Distance: -

Load Factors Control (LRFD): Use maximum and minimum load factors

Skew Factors



Span #	% of Span	% of Skew
1	-	-

Steel

Use Appendix A6 (LRFD): No
Allow Plastic Analysis: No
Override Longitudinal Stiffeners: No
Slab thickness for longitudinal shear force: Structural
Slab thickness for minimum negative flexure concrete deck reinforcement: Structural

Fatigue

AASHTO LRFD Table 6.6.1.2.5-2

% of Span: -
Span Length: 40 ft

Stress Range in Longitudinal Reinforcement Over the Piers: 10 ksi

Detail Categories (LRFD)

Detail Category	Constant, A x 10^8	Constant Amplitude Fatigue Threshold
A	-	-

B	-	-
B'	-	-
C	-	-
C'	-	-
D	-	-
E	-	-
E'	-	-

Limit State Map

Limit State Maps (LRFD)

Limit State	Design Review			Rating		
	Design Load	Legal Load	Permit Load	Design Load	Legal Load	Permit Load
Strength I	No	No	No	Inventory/Operating	Yes	No
Strength II	No	No	No	Exclude	No	Yes
Strength IV	No	No	No	Exclude	No	No
Service I	No	No	No	Exclude	No	No
Service II	No	No	No	Inventory/Operating	Yes	Yes
Service III	No	No	No	Exclude	No	No
Fatigue I	No	No	No	Inventory	No	No
Fatigue II	No	No	No	Exclude	No	No

Load Combo Maps (LFD)

Load Combo	Design Review	Rating
I	No	Inventory
IB	No	Operating
I-Overload	No	Exclude
IB-Overload	No	Exclude
I-Service	No	Exclude
IB-Service	No	Exclude
Fatigue	No	Exclude

Spec. Check Map (Strength)

LRFD Specification Check Maps

Design Load Review

Spec Check	Strength I	Strength II	Strength IV
Flexure	No	No	No
Shear	No	No	No
Bearing	No	No	No
Flexural Stress In Longitudinal Stiffener	No	No	No

Legal Load Review

Spec Check	Strength I	Strength II	Strength IV
Flexure	No	No	No

Shear	No	No	No
Bearing	No	No	No
Flexural Stress In Longitudinal Stiffener	No	No	No

Permit Load Review

Spec Check	Strength I	Strength II	Strength IV
Flexure	No	No	No
Shear	No	No	No
Bearing	No	No	No
Flexural Stress In Longitudinal Stiffener	No	No	No

Design Load Rating

Spec Check	Strength I	Strength II	Strength IV
Flexure	Yes	No	No
Shear	Yes	No	No
Bearing	Yes	No	No
Flexural Stress In Longitudinal Stiffener	No	No	No

Legal Load Rating

Spec Check	Strength I	Strength II	Strength IV
Flexure	Yes	No	No
Shear	Yes	No	No
Bearing	Yes	No	No
Flexural Stress In Longitudinal Stiffener	No	No	No

Permit Load Rating

Spec Check	Strength I	Strength II	Strength IV
Flexure	No	Yes	No
Shear	No	Yes	No
Bearing	No	Yes	No
Flexural Stress In Longitudinal Stiffener	No	No	No

LFD Specification Check Maps

Design Review

LFD Spec Check	I	IB	I-Overload	IB-Overload
Flexure	No	No	No	No
Shear	No	No		
Bearing	No	No		
Flexural Stress In Longitudinal Stiffener	No	No		

Rating

LFD Spec Check	I	IB	I-Overload	IB-Overload
Flexure	No	No	No	No
Shear	No	No		
Bearing	No	No		

Flexural Stress In Longitudinal Stiffener	No	No

Spec. Check Map (Service)

LRFD Specification Check Maps

Design Load Review

Spec Check	Service I	Service II
Crack Control	No	No
Flexural Stress In Flanges	No	No
Live Load Deflection	No	No

Legal Load Review

Spec Check	Service I	Service II
Crack Control	No	No
Flexural Stress In Flanges	No	No
Live Load Deflection	No	No

Permit Load Review

Spec Check	Service I	Service II
Crack Control	No	No
Flexural Stress In Flanges	No	No
Live Load Deflection	No	No

Design Load Rating

Spec Check	Service I	Service II
Crack Control	No	No
Flexural Stress In Flanges	No	Yes
Live Load Deflection	No	Yes

Legal Load Rating

Spec Check	Service I	Service II
Crack Control	No	No
Flexural Stress In Flanges	No	Yes
Live Load Deflection	No	Yes

Permit Load Rating

Spec Check	Service I	Service II
Crack Control	No	No
Flexural Stress In Flanges	No	Yes
Live Load Deflection	No	Yes

LFD Specification Check Maps

Design Review

LFD Spec Check	I-Overload	IB-Overload
Flexural Stress In Flanges	No	No

Rating

LFD Spec Check	I-Overload	IB-Overload
Flexural Stress In Flanges	No	No

Spec. Check Map (Fatigue)

LRFD Specification Check Maps

Design Load Review

Spec Check	Fatigue I	Fatigue II
Fatigue of Reinforcement	No	No
Fatigue of Shear Connectors	No	No
Fatigue Shear Range of Shear Connectors	No	No
Fatigue of Special Points	No	No
Fatigue Shear	No	No

Legal Load Review

Spec Check	Fatigue I	Fatigue II
Fatigue of Reinforcement	No	No
Fatigue of Shear Connectors	No	No
Fatigue Shear Range of Shear Connectors	No	No
Fatigue of Special Points	No	No
Fatigue Shear	No	No

Permit Load Review

Spec Check	Fatigue I	Fatigue II
Fatigue of Reinforcement	No	No
Fatigue of Shear Connectors	No	No
Fatigue Shear Range of Shear Connectors	No	No
Fatigue of Special Points	No	No
Fatigue Shear	No	No

Design Load Rating

Spec Check	Fatigue I	Fatigue II
Fatigue of Reinforcement	Yes	No
Fatigue of Shear Connectors	Yes	No
Fatigue Shear Range of Shear Connectors	Yes	No
Fatigue of Special Points	Yes	No
Fatigue Shear	Yes	No

Legal Load Rating

Spec Check	Fatigue I	Fatigue II
Fatigue of Reinforcement	No	No
Fatigue of Shear Connectors	No	No
Fatigue Shear Range of Shear Connectors	No	No
Fatigue of Special Points	No	No

Fatigue Shear	No	No

Permit Load Rating

Spec Check	Fatigue I	Fatigue II
Fatigue of Reinforcement	No	No
Fatigue of Shear Connectors	No	No
Fatigue Shear Range of Shear Connectors	No	No
Fatigue of Special Points	No	No
Fatigue Shear	No	No

LFD Specification Check Maps

Design Review

LFD Spec Check	Fatigue
Fatigue of Special Points	No

Rating

LFD Spec Check	Fatigue
Fatigue of Special Points	No

Member

Member Notes

No member notes have been defined.

Member Materials

Beam

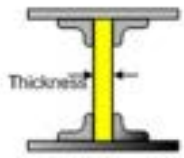
Beam Material: Salvaged Girder

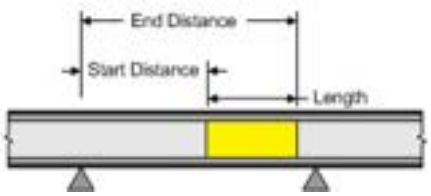
Beam Profile

Web

Apply to Entire Structure: Yes
Web Angle: -





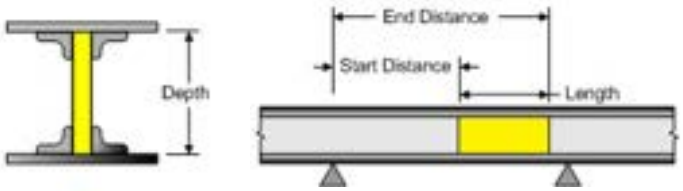


Thickness	Material	Support Number	Start Distance	Length

0.375 in.	**Salvaged Girder**	1	0 ft	40 ft

Web Depth

Apply to Entire Structure: Yes



Start Depth	Web Variation	End Depth	Support Number	Start Distance	Length
78 in.	Linear	78 in.	1	0 ft	40 ft

Top Cover Plate

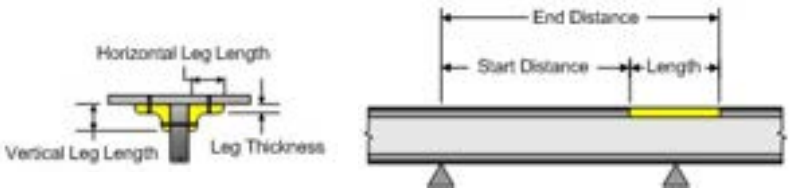
No top cover plate schedules have been defined.

Bottom Cover Plate

No bottom cover plate schedules have been defined.

Top Angles

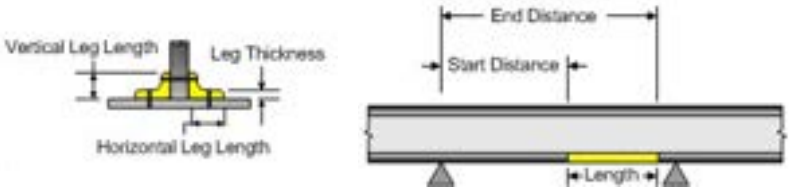
Apply to Entire Structure: Yes



Vertical Leg Length	Horizontal Leg Length	Leg Thickness	Material	Support Number	Start Distance	Length
4 in.	6 in.	0.625 in.	**Salvaged Girder**	1	0 ft	40 ft

Bottom Angles

Apply to Entire Structure: Yes



Vertical Leg Length	Horizontal Leg Length	Leg Thickness	Material	Support Number	Start Distance	Length
4 in.	6 in.	0.625 in.	**Salvaged Girder**	1	0 ft	40 ft

Hinges

No hinges have been defined.

Special Locations

No special locations have been defined.

Supports

Support Conditions

Support	Support Restraint		
	Horizontal	Vertical	Rotational
1	Free	Restrained	Free
2	Restrained	Restrained	Free

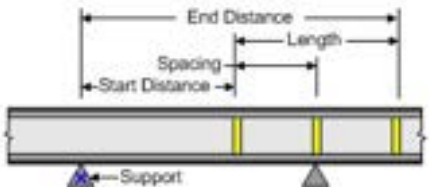
Spring Constants

Support	Spring Constants		
	Horizontal	Vertical	Rotational
1	-	-	-
2	-	-	-

Schedules

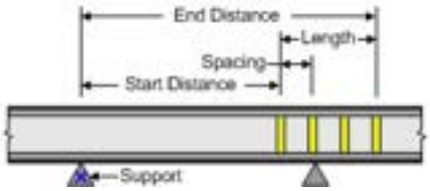
Bracing

Apply to Entire Structure: No



Spacing	Support	Start Distance	Length
19.417 ft	1	0.583 ft	38.333 ft

Transverse Stiffeners



Stiffener Group	Spacing	Support	Start Distance	Length
Web Stiffeners	3.875 ft	1	4.458 ft	11.625 ft
Web Stiffeners	3.875 ft	1	23.885 ft	11.625 ft

Bearing Stiffeners

Apply to Entire Structure: No

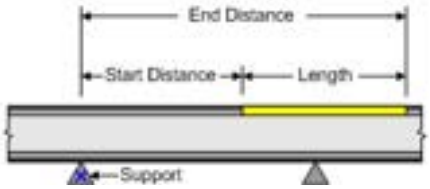
Support	Stiffener Group
1	Not Assigned
2	Not Assigned

Longitudinal Stiffeners

No longitudinal stiffener schedules have been defined.

Lateral Support

Apply to Entire Structure: Yes



Support	Start Distance	Length
1	0 ft	40 ft

Cb Factors (Standard)

No Cb factors (LRFD) have been defined.

Cb Factors (LRFD)

No Cb factors (LRFD) have been defined.

Fatigue Stress (Standard)

No fatigue stress (standard) schedules have been defined.

Member Control

Steel

Flexural Resistance

Span	Compact Piers (Standard)	Ignore Eq. 6.10.7.1.2-3 (LRFD)
1	No	No

End Panel Distances

Top Span



Left of Top Span: -
Right of Top Span: -

Flange Local Buckling Resistance Adjustment

Standard Specifications: -
LRFD Specifications: -

Points of Interest

No points of interest have been defined.

Dead Loads

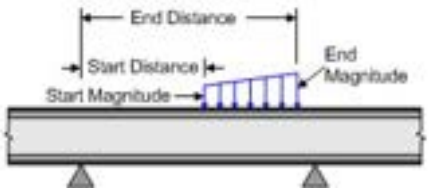
Uniform

Dead Load Type	Stage	Uniform Load
DC	1	-
DW	1	-
DU	1	-

Additional Self-weight

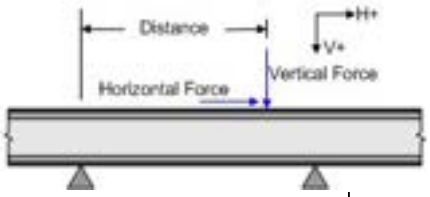
No additional self-weight dead loads have been defined.

Distributed



Dead Load Group	Support	Distributed Load (Start)		Distributed Load (End)	
		Distance	Magnitude	Distance	Magnitude
Bottom Flange Bracing	1	0.063 ft	0.008 kip / ft	39.875 ft	-
Vertical Web Angles	1	0.063 ft	0.019 kip / ft	39.875 ft	-

Concentrated



Dead Load Group	Support	Concentrated Load		
		Distance	Horizontal Force	Vertical Force
Girder Bracing	1	0.583 ft	-	0.131 kip
Girder Bracing	1	20 ft	-	0.131 kip
Girder Bracing	1	39.938 ft	-	0.131 kip
Bottom Flange Struts	1	9.708 ft	-	0.046 kip
Bottom Flange Struts	1	29.969 ft	-	0.046 kip

Temperature

No temperature dead loads have been defined.

Settlement

Stage: 1

No settlement loads have been defined.

Pedestrian Load

Pedestrian Load: -

Wheel Fractions (Standard)

Moment

No moment wheel fractions have been defined.

Shear

No shear wheel fractions have been defined.

Deflection

No deflection wheel fractions have been defined.

Reaction

Apply to entire structure: No

Support	mg Single-Lane			mg Multi-Lane		
	Moment	Shear	Deflection	Moment	Shear	Deflection
1	-	-	-	-	-	-
2	-	-	-	-	-	-

Nanue Stream Bridge
Load Rating for Steel Interior Girder Span 3 (G3-3)

CRITICAL RATING FACTOR SUMMARY: Design Load Inventory

Live Load No.	Combination Description		Total Vehicle Wt. (tons)	Controlling Point of Interest	Limit State Action Location	Rating Factor	Load Rating (tons)
1	HL-93-TRUCK + HL-93-LANE	(DTK)	36.00	110.0000	STRENGTH I Shear Minimum Effects	1.94	69.86
2	HL-93-TANDEM + HL-93-LANE	(DTK)	25.00	110.0000	STRENGTH I Shear Minimum Effects	2.18	54.62
15	HL-93-FAT	(FAT)	36.00	110.0000	FATIGUE I Shear Stress Minimum Effects	12.58	452.98
Crit	HL-93-TRUCK + HL-93-LANE	(DTK)	36.00	110.0000	STRENGTH I	1.94	69.86

CRITICAL RATING FACTOR SUMMARY: Design Load Operating

Live Load No.	Combination Description		Total Vehicle Wt. (tons)	Controlling Point of Interest	Limit State Action Location	Rating Factor	Load Rating (tons)
1	HL-93-TRUCK + HL-93-LANE	(DTK)	36.00	110.0000	STRENGTH I-O Shear Minimum Effects	2.52	90.56
2	HL-93-TANDEM + HL-93-LANE	(DTK)	25.00	110.0000	STRENGTH I-O Shear Minimum Effects	2.83	70.80
Crit	HL-93-TRUCK + HL-93-LANE	(DTK)	36.00	110.0000	STRENGTH I-O	2.52	90.56

CRITICAL RATING FACTOR SUMMARY: Legal Load

Live Load No.	Combination Description		Total Vehicle Wt. (tons)	Controlling Point of Interest	Limit State Action Location	Rating Factor	Load Rating (tons)
3	TYPE3	(TRK)	25.00	110.0000	STRENGTH I Shear Minimum Effects	3.75	93.66
4	TYPE3S2	(TRK)	36.00	110.0000	STRENGTH I Shear Minimum Effects	3.90	140.45
5	TYPE3-3	(TRK)	40.00	110.0000	STRENGTH I Shear Minimum Effects	4.17	166.62
6	NRL-MIN	(TRK)	40.00	110.0000	STRENGTH I Shear Minimum Effects	2.89	115.72
7	NRL-MAX	(TRK)	40.00	110.0000	STRENGTH I Shear Minimum Effects	2.88	115.39
8	SU4	(TRK)	27.00	110.0000	STRENGTH I Shear Minimum Effects	3.34	90.27
9	SU5	(TRK)	31.00	110.0000	STRENGTH I Shear Minimum Effects	3.05	94.61
10	SU6	(TRK)	34.75	110.0000	STRENGTH I	2.96	102.90

					Shear Minimum Effects		
11	SU7	(TRK)	38.75	110.0000	STRENGTH I Shear Minimum Effects	2.91	112.71
16	EV2	(TRK)	28.75	110.0000	STRENGTH I Shear Minimum Effects	3.14	90.24
17	EV3	(TRK)	43.00	110.0000	STRENGTH I Shear Minimum Effects	2.13	91.67
Crit	EV3	(TRK)	43.00	110.0000	STRENGTH I	2.13	91.67

CRITICAL RATING FACTOR SUMMARY: Permit Load

Live Load No.	Combination Description		Total Vehicle Wt. (tons)	Controlling Point of Interest	Limit State Action Location	Rating Factor	Load Rating (tons)
12	HP1	(PTK)	60.00	110.0000	STRENGTH II Shear Minimum Effects	3.17	190.38
13	HP2	(PTK)	78.55	110.0000	STRENGTH II Shear Minimum Effects	3.22	252.76
14	HP3	(PTK)	104.95	110.0000	STRENGTH II Shear Minimum Effects	4.06	426.26
Crit	HP1	(PTK)	60.00	110.0000	STRENGTH II	3.17	190.38

Wyoming Department of Transportation

BRASS-GIRDER™ Input Parameters

Version Information

Girder UI:	7.8.0.3001
Girder XML:	7.8.0.3001
BRASS™ XML:	1.8.0.3001

Administration

Project ID:	8780-06
Project Title:	HDOT Statewide Bridge Load Ratings
Bridge ID:	1000190308146
Bridge Name:	Nanue Stream
Route Name:	00019 Hawaii Belt Road
Reference Marker:	18
Title 1:	Nanue Stream Bridge
Title 2:	Load Rating for Steel Exterior Girder Span 4 (G4-4)
Date:	2017 4 21
Agency:	HDOT Highways Division
Designer/Rater:	Moffatt & Nichol (JU)
Reviewer:	
Comments:	

Bridge Notes

MATERIAL PROPERTIES
Concrete
Weight = 0.160 kcf (HDOT Design Criteria for Bridges and Structures [HDOT] 5.01)
Strength = 3 ksi (Record Drawings: Class A-1)
Elastic Modulus = 3,880 ksi (AASHTO LRFD [LRFD] Eqn 5.4.2.4-1, Use 0.150 kcf per HDOT 5.01)
Reinforcing Steel
Yield Strength = 33 ksi (Unknown, Manual for Bridge Evaluation [MBE] Table 6A.5.2.2-1)
Elastic Modulus = 29,000 ksi (LRFD 5.4.3.2)

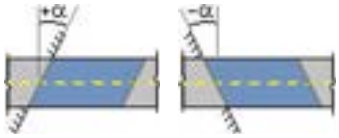
BRIDGE PROPERTIES (RECORD DRAWINGS)
Span 1 = 51 ft
Span 2 = 50 ft
Span 3 = 40 ft
Span 4 = 72 ft
Span 5 = 40 ft
Span 6 = 72 ft
Span 7 = 40 ft
Span 8 = 72 ft
Span 9 = 40 ft
Span 10 = 51 ft
Width = 38.5 ft
Deck Thickness = 9 in min
No. of Griders = 4
Girder Spacing = 9 ft, 7.5 ft, 9 ft
Girder Width = 12 3/8"
Girder Depth = 6'-6 1/2"
Surface Roughness = 3.0 (2015 Bridge Inspectinon Report)
Condition Factor = 1.0 (HDOT 5.04, 2015 Bridge Inspection Report indicates Condition Rating of 7)
System Factor = 1.0 (HDOT 5.05,)

LIVE LOADS
LRFD Live Load (MBE Appendix C6A)
Truck and Tandem Lane Load = 0.64 klf
AASHTO Legal Loads (MBE Appendix D6A)
Type 3
Type 3S2
Type 3-3
Notional Rating Load [NRL]
Legal Lane Load = 0.2 klf
SU4
SU5
SU6
SU7
HDOT Hawaii Standard Single Trip Permit Loads (HDOT 5.06)
No lane load provided, vehicles allowed to trave in any lane
HP1
HP2
HP3
Dynamic Load Allowance (HDOT 5.03)
Spans > 40 ft
Wearing Surface: 3 (Assumed)
Design Loads: 33%
Legal Loads: 10%
Permit Loads: 10%
Scale Factor (HDOT 5.06)
Hawaii Standard Single Trip Permit Vehicle analysis assumes only one permit load on the bridge which allows the use of a single-lane distribution factor. When using the single-lane LRFD distribution factor, the 1.2 multiple prescence factor may shall be divided out from the distribtion factor equations.

Control

Structure

Structure Type: GirderLine
Define Deck Cross Section: Yes
Number of Members: 4
Skew Angle: 0 °



Analysis Model Type: Beam
Number of Top Spans: 1



Spans

Span	Length
1	72 ft

Structure Material: Steel
Beam Type: Builtup
Composite Structure: No
Deck Material: Concrete

Analysis

Unit System: US
Analysis Method: LRFD
Analysis Type: Rating
Number of Stages: 1
Member of Interest: 4
Model Element Type: Stepped
Point of Interest Generation Control: Tenth
Live-load Distribution Factor Application: AnalysisPoint

Interpolate Reinforcement: No
Calculate Effective Width: No

Input

Symmetry

Component	Symmetric
Beam Profile	No
Deck Profile	No
Shear Connectors	No
Transverse Stiffeners	No
Bearing Stiffeners	No
Longitudinal Stiffeners	No
Bracing (Member)	No
Lateral Support	No
Cb Factors (Std)	No
Cb Factors (LRFD)	No
Fatigue Stress (Std)	No
Beam Wheel Fractions (Std)	No
Reaction Wheel Fractions (Std)	No
Beam Distribution Factors (LRFD)	No
Reaction Distribution Factors (LRFD)	No

Simplified Standard Wheel Fractions: No
Merge Beam/Deck Profile Schedules: Yes

Distribution

Perform Dead Load Distribution: Yes
Calculate LRFD Live Load Distribution Factors: Yes

Dead Load Distribution Methods

Stage	Method
1	Tributary area

Live Load Distribution (LRFD)

Distribution Method: AASHTO LRFD
Cross Section Code: a1
Max. Number of Lanes Loaded: Computed
Consider Rigid Method: No
Slab Thickness Type: Structural
Set eg = 0 for Non-composite: Yes
Apply Skew to Lever Rule Override: Yes
Apply Skew to Ridgid Rule Override: No
Use Constants from Table 4.6.2.2.1-2: No

Libraries

Section Library: C:\BRASS\Girder_7.8\Girder\Libraries\BRASS-Sections.bls
Vehicle Library: C:\BRASS\Girder_7.8\Girder\Libraries\BRASS-Vehicles.blv

Output

Primary Output

Action Output Level: DL+LL+CONC
Action Locations: 10thPoints

General

Member Properties:	Yes
Load Combinations:	Yes
Load and Resistance Factors:	Yes
Warnings:	Yes
Camber:	No
Critical Design Ratios / Rating Factors:	Expanded

Live Load

Truck Positions:	Yes
Variable Axle Spacing:	Yes
Live Load Settings:	Yes
Live Load Combinations:	Yes
Live Load Details:	Yes
Impact (LFD):	No

Stage

Stage	Output
1	Yes

Dead Load

Member Self Load:	Yes
Distributed Dead Loads:	Yes
Concentrated Dead Loads:	Yes
Temperature Change:	No
Settlements:	No

Load Distribution

Dead Load Distribution:	Yes
Live Load Distribution:	Yes

Intermediate Output

Intermediate Output Level:	Full
Effective Width:	Yes
Floorbeam Lane Position:	Yes

Points of Interest

Specification Checks:	Yes
Load Factoring/Combinations:	No

Load Distribution

Dead Load:	Yes
Live Load:	Yes

Limit State Output (LRFD)

Limit State	Specification Check	Load Combination
Strength I	Yes	Yes
Strength II	Yes	Yes
Strength IV	No	No
Service I	No	No
Service II	No	No
Fatigue I	No	No
Fatigue II	No	No

Load Combination Output (LFD)

LFD Load Combo	Specification Check	Load Combination

Combo I	No	No
Combo IB	No	No
Combo I Overload	No	No
Combo IB Overload	No	No
Combo I Service	No	No
Combo IB Service	No	No
Combo Fatigue	Yes	Yes

Intermediate Output (cont.)

Steel

Transverse Stiffeners: No
Bearing Stiffeners: No
Longitudinal Stiffeners: No

Results Tables

X-Y Plot Action Tables: No
Specification Check Results Tables: No
Mesh Plot Files: No

BRASS-PAD™ Data Transfer File: No

Influence

Output influence lines for: None
Ordinate Divisor: 1

Factors

Load Factors (LRFD)

Limit State	DC		DW		DU		TU	
	max	min	max	min	max	min	max	min
Strength I	1.25	0.9	1.5	0.65	1.5	0.65	-	-
Strength II	1.25	0.9	1.5	0.65	1.5	0.65	-	-
Strength IV	-	-	-	-	-	-	-	-
Service I	-	-	-	-	-	-	-	-
Service II	1	1	1	1	1	1	-	-
Fatigue I	-	-	-	-	-	-	-	-
Fatigue II	-	-	-	-	-	-	-	-

Load Factors (LRFD) (continued)

Limit State	LL				SE		PS		DS	
	Design		Legal	Permit						
	Inventory	Operating			max	min	max	min	max	min
Strength I	1.75	1.35	1.45	0	-	-	-	-	-	-
Strength II	-		0	1.2	-	-	-	-	-	-
Strength IV	-		-	-	-	-	-	-	-	-
Service I	-		-	-	-	-	-	-	-	-
Service II	1.3	1	1.3	1	-	-	-	-	-	-
Fatigue I	0.75		-	-	-	-	-	-	-	-

Fatigue II	-	-	-	-	-	-	-	-	-

Load Modifiers (LRFD)

Limit State	Ductility	Redundancy	Importance	Combined Product	
				max	min
Strength I	1	1	1	-	-
Strength II	1	1	1	-	-
Strength IV	1	1	1	-	-
Service I	1	1	1	-	-
Service II	1	1	1	-	-
Fatigue I	1	1	1	-	-
Fatigue II	1	1	1	-	-

Resistance Factors (LRFD)

Resistance Factors

Type	Value
φ Flexure	1
φ Shear	1
φ Bearing	1
φ Compression	0.95
φ Shear Connectors	0.85
φ Fatigue	1

System/Total Modifiers

Limit State	Resistance Type	System	Total
Strength	Flexure	1	-
Strength	Shear	1	-
Strength	Bearing	1	-
Strength	Compression	1	-
Strength	Shear Connectors	1	-
Strength	Longitudinal Reinforcement	1	-
Service	Flexure	1	-
Fatigue	Fatigue	1	-

Condition Modifiers

Limit State	Condition
Strength	1
Service	1
Fatigue	1

Load Factors (LFD)

Load Combo	γ	LL	DC	DW	DU	TU	SE	PS	DS
I	-	-	-	-	-	-	-	1	1
IB	-	-	-	-	-	-	-	1	1
I-Overload	-	-	-	-	-	-	-	1	1

IB-Overload	-	-	-	-	-	-	-	1	1
I-Service	-	-	-	-	-	-	-	1	1
IB-Service	-	-	-	-	-	-	-	1	1
Fatigue	-	-	-	-	-	-	-	1	1

Capacity Reduction Factors (LFD)

Factor	Value
φ Flexure	-
φ Shear	-
φ Fatigue	-

Materials

Steel

ID	Name	Yield Stress	Tensile Strength	Modulus of Elasticity	Density	Thermal Expansion Coefficient
1	Salvaged Girder	30 ksi	60 ksi	29000 ksi	0.49 kcf	6.5E-06 °F^{-1}

Concrete

ID	Name	28 Day Compressive Strength	Modulus of Elasticity	Density	Modulus of Rupture	Modulus of Rupture (VCI Method)	Thermal Expansion Coefficient
1	1949 Class A-1	3 ksi	3880 ksi	0.16 kcf	-	-	6E-06 °F^{-1}

Dead Load Groups

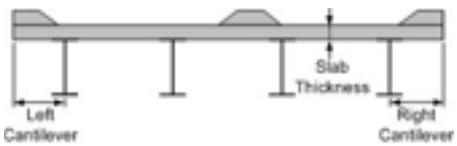
Groups

ID	Name	Stage	Type	Description
1	Concrete Railing	1	DC	Top Rail, Bottom Rail, Post
2	Sidewalk / Shoulder	1	DC	
3	AC Pavement	1	DW	
4	Girder Bracing	1	DC	X-Bracing with Steel Angles in the Outer Bays
5	Bottom Flange Bracing	1	DC	Steel Angles Diagonal Bracing in the Interior Bay
6	Vertical Web Angles	1	DC	Steel Angles Spaced at Intervals
7	Waterlines	1	DU	Assumed 8" Waterlines
8	Monorail	1	DC	6" Monorail
9	Bottom Flange Struts	1	DC	Bottom Flange Struts out of Steel Angles and Plates in Outer Bays

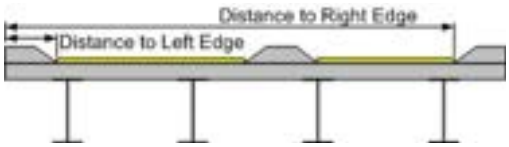
Deck Geometry

Deck

Deck Thickness: 9 in.
Left Cantilever Length: 6.5 ft
Right Cantilever Length: 6.5 ft
Equal Member Spacing: No



Travelway Locations



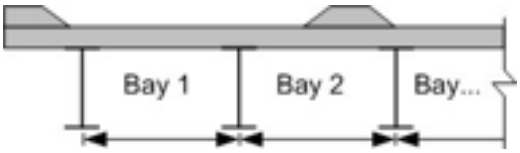
Distance to Left Edge: 5.25 ft
Distance to Right Edge: 33.25 ft

Sacrificial Topping

Thickness: -
Dead Load Type: DC

Member Spacing

Bay #	Spacing
1	9 ft
2	7.5 ft
3	9 ft



Soffits

No soffits have been defined.

Appurtenances

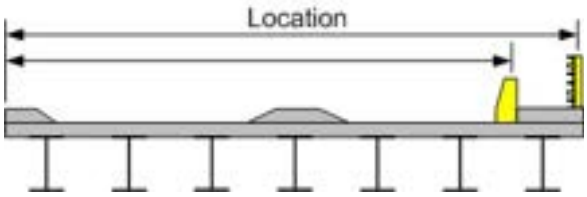
No appurtenances have been defined.

Deck Loads

Materials/Stages

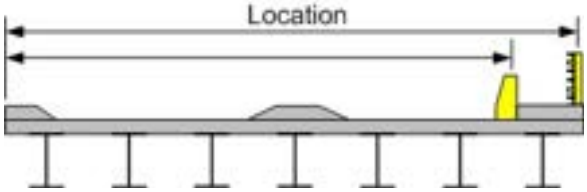
Deck Material: 1949 Class A-1
Curb & Median Material: Not Assigned
Wearing Surface Weight: -
Slab Stage: 1
Curb Stage: 1
Median Stage: 1
Wearing Surface Stage: 1

Line Loads



Dead Load Group	Line Load	Load Location
Concrete Railing	0.319 kip / ft	0.923 ft
Concrete Railing	0.319 kip / ft	37.577 ft
Waterlines	0.224 kip / ft	38.5 ft
Monorail	0.016 kip / ft	34 ft

Uniform Loads



Dead Load Group	Uniform Load	Load Location	Load Width
Sidewalk / Shoulder	0.007 ksf	0 ft	5.25 ft
Sidewalk / Shoulder	0.003 ksf	5.25 ft	2 ft
AC Pavement	0.018 ksf	7.25 ft	24 ft
Sidewalk / Shoulder	0.003 ksf	31.25 ft	2 ft
Sidewalk / Shoulder	0.007 ksf	33.25 ft	5.25 ft

Live Loads

Live Load Control

Direction Control: Up+Down
Standard Live Loads: None
Wheel Advancement Denominator: 100
ADTT: 5000
ADTT for Single Lane: 2000
Multiple Presence Adjustment: -
% of Dynamic Load Allowance (Impact): 100 %
Fixed Impact (STD): -

Dynamic Load Allowance (LRFD)

Design/Rating Procedure	Truck	Lane	Fatigue
Design	33 %	0 %	15 %
Legal	33 %	0 %	0 %
Permit	33 %	0 %	0 %

Special Vehicles

Axle Vehicles

No axle vehicles have been defined.

Lane Vehicles

No lane vehicles have been defined.

Definitions (STD)

No standard live load definitions have been defined.

Definitions (LRFD)

Definition 1

Code: HL-93-TRUCK
Type: DesignTruck
Design Rating: Design
% of Dynamic Load Allowance: -
Scale Factor: -
Lanes Loaded: Critical
Notional Load: Yes
Fixed DLA: -

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 2

Code: HL-93-TANDEM
Type: DesignTruck
Design Rating: Design
% of Dynamic Load Allowance: -

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating

Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	Yes
Fixed DLA:	-

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 3

Code:	HL-93-LANE
Type:	DesignLane
Design Rating:	Design
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	Yes
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 4

Code:	TYPE3
Type:	GeneralTruck
Design Rating:	Legal
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 5

Code:	TYPE3S2
Type:	GeneralTruck
Design Rating:	Legal
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 6

Code:	TYPE3-3
Type:	GeneralTruck
Design Rating:	Legal
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-

Fatigue I	-	-
Fatigue II	-	-

Definition 7

Code:	NRL-MIN
Type:	GeneralTruck
Design Rating:	Legal
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 8

Code:	NRL-MAX
Type:	GeneralTruck
Design Rating:	Legal
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 9

Code:	SU4
Type:	GeneralTruck
Design Rating:	Legal
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 10

Code:	SU5
Type:	GeneralTruck
Design Rating:	Legal
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 11

Code:	SU6

Type:	GeneralTruck
Design Rating:	Legal
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 12

Code:	SU7
Type:	GeneralTruck
Design Rating:	Legal
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 13

Code:	HP1
Type:	PermitTruck
Design Rating:	Permit
% of Dynamic Load Allowance:	-
Scale Factor:	0.833
Lanes Loaded:	Single
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 14

Code:	HP2
Type:	PermitTruck
Design Rating:	Permit
% of Dynamic Load Allowance:	-
Scale Factor:	0.833
Lanes Loaded:	Single
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 15

Code:	HP3
Type:	PermitTruck
Design Rating:	Permit
% of Dynamic Load Allowance:	-
Scale Factor:	0.833
Lanes Loaded:	Single

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-

Notional Load:	No
Fixed DLA:	-

Limit State	gamma LL	gamma LL Operating
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 16

Code:	HL-93-FAT
Type:	FatigueTruck
Design Rating:	Design
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 17

Code:	EV2
Type:	GeneralTruck
Design Rating:	Legal
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 18

Code:	EV3
Type:	GeneralTruck
Design Rating:	Legal
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

General Combinations (LRFD)

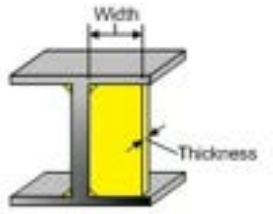
Standard Combo	Truck	Lane	Combination Factors	
			Truck	Lane
No	**HL-93-TRUCK**	**HL-93-LANE**	1	1
No	**HL-93-TANDEM**	**HL-93-LANE**	1	1

Deflection Combinations (LRFD)

No Deflection Combinations (LRFD) have been defined.

Component Groups

Transverse Stiffeners



ID	Name	Width	Thickness	Type	Type Factor	Material
1	Web Stiffeners	5 in.	0.375 in.	Single Angles	-	**Salvaged Girder**

Bearing Stiffeners

No bearing stiffener groups have been defined.

Longitudinal Stiffeners

No longitudinal stiffener groups have been defined.

Specification Control

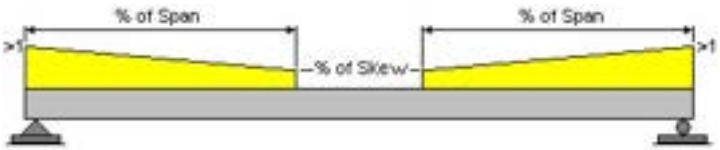
General

Lane Geometry

Design Vehicle Lane Width: 12 ft
Vehicle Width: 10 ft
Wheel Spacing: 6 ft
Encroachment Distance: -

Load Factors Control (LRFD): Use maximum and minimum load factors

Skew Factors



Span #	% of Span	% of Skew
1	-	-

Steel

Use Appendix A6 (LRFD): No
Allow Plastic Analysis: No
Override Longitudinal Stiffeners: No
Slab thickness for longitudinal shear force: Structural
Slab thickness for minimum negative flexure concrete deck reinforcement: Structural

Fatigue

AASHTO LRFD Table 6.6.1.2.5-2

% of Span: -
Span Length: 40 ft

Stress Range in Longitudinal Reinforcement Over the Piers: 10 ksi

Detail Categories (LRFD)

Detail Category	Constant, A x 10^8	Constant Amplitude Fatigue Threshold
A	-	-

B	-	-
B'	-	-
C	-	-
C'	-	-
D	-	-
E	-	-
E'	-	-

Limit State Map

Limit State Maps (LRFD)

Limit State	Design Review			Rating		
	Design Load	Legal Load	Permit Load	Design Load	Legal Load	Permit Load
Strength I	No	No	No	Inventory/Operating	Yes	No
Strength II	No	No	No	Exclude	No	Yes
Strength IV	No	No	No	Exclude	No	No
Service I	No	No	No	Exclude	No	No
Service II	No	No	No	Inventory/Operating	Yes	Yes
Service III	No	No	No	Exclude	No	No
Fatigue I	No	No	No	Inventory	No	No
Fatigue II	No	No	No	Exclude	No	No

Load Combo Maps (LFD)

Load Combo	Design Review	Rating
I	No	Inventory
IB	No	Operating
I-Overload	No	Exclude
IB-Overload	No	Exclude
I-Service	No	Exclude
IB-Service	No	Exclude
Fatigue	No	Exclude

Spec. Check Map (Strength)

LRFD Specification Check Maps

Design Load Review

Spec Check	Strength I	Strength II	Strength IV
Flexure	No	No	No
Shear	No	No	No
Bearing	No	No	No
Flexural Stress In Longitudinal Stiffener	No	No	No

Legal Load Review

Spec Check	Strength I	Strength II	Strength IV
Flexure	No	No	No

Shear	No	No	No
Bearing	No	No	No
Flexural Stress In Longitudinal Stiffener	No	No	No

Permit Load Review

Spec Check	Strength I	Strength II	Strength IV
Flexure	No	No	No
Shear	No	No	No
Bearing	No	No	No
Flexural Stress In Longitudinal Stiffener	No	No	No

Design Load Rating

Spec Check	Strength I	Strength II	Strength IV
Flexure	Yes	No	No
Shear	Yes	No	No
Bearing	Yes	No	No
Flexural Stress In Longitudinal Stiffener	No	No	No

Legal Load Rating

Spec Check	Strength I	Strength II	Strength IV
Flexure	Yes	No	No
Shear	Yes	No	No
Bearing	Yes	No	No
Flexural Stress In Longitudinal Stiffener	No	No	No

Permit Load Rating

Spec Check	Strength I	Strength II	Strength IV
Flexure	No	Yes	No
Shear	No	Yes	No
Bearing	No	Yes	No
Flexural Stress In Longitudinal Stiffener	No	No	No

LFD Specification Check Maps

Design Review

LFD Spec Check	I	IB	I-Overload	IB-Overload
Flexure	No	No	No	No
Shear	No	No		
Bearing	No	No		
Flexural Stress In Longitudinal Stiffener	No	No		

Rating

LFD Spec Check	I	IB	I-Overload	IB-Overload
Flexure	No	No	No	No
Shear	No	No		
Bearing	No	No		

Flexural Stress In Longitudinal Stiffener	No	No

Spec. Check Map (Service)

LRFD Specification Check Maps

Design Load Review

Spec Check	Service I	Service II
Crack Control	No	No
Flexural Stress In Flanges	No	No
Live Load Deflection	No	No

Legal Load Review

Spec Check	Service I	Service II
Crack Control	No	No
Flexural Stress In Flanges	No	No
Live Load Deflection	No	No

Permit Load Review

Spec Check	Service I	Service II
Crack Control	No	No
Flexural Stress In Flanges	No	No
Live Load Deflection	No	No

Design Load Rating

Spec Check	Service I	Service II
Crack Control	No	No
Flexural Stress In Flanges	No	Yes
Live Load Deflection	No	Yes

Legal Load Rating

Spec Check	Service I	Service II
Crack Control	No	No
Flexural Stress In Flanges	No	Yes
Live Load Deflection	No	Yes

Permit Load Rating

Spec Check	Service I	Service II
Crack Control	No	No
Flexural Stress In Flanges	No	Yes
Live Load Deflection	No	Yes

LFD Specification Check Maps

Design Review

LFD Spec Check	I-Overload	IB-Overload
Flexural Stress In Flanges	No	No

Rating

LFD Spec Check	I-Overload	IB-Overload
Flexural Stress In Flanges	No	No

Spec. Check Map (Fatigue)

LRFD Specification Check Maps

Design Load Review

Spec Check	Fatigue I	Fatigue II
Fatigue of Reinforcement	No	No
Fatigue of Shear Connectors	No	No
Fatigue Shear Range of Shear Connectors	No	No
Fatigue of Special Points	No	No
Fatigue Shear	No	No

Legal Load Review

Spec Check	Fatigue I	Fatigue II
Fatigue of Reinforcement	No	No
Fatigue of Shear Connectors	No	No
Fatigue Shear Range of Shear Connectors	No	No
Fatigue of Special Points	No	No
Fatigue Shear	No	No

Permit Load Review

Spec Check	Fatigue I	Fatigue II
Fatigue of Reinforcement	No	No
Fatigue of Shear Connectors	No	No
Fatigue Shear Range of Shear Connectors	No	No
Fatigue of Special Points	No	No
Fatigue Shear	No	No

Design Load Rating

Spec Check	Fatigue I	Fatigue II
Fatigue of Reinforcement	Yes	No
Fatigue of Shear Connectors	Yes	No
Fatigue Shear Range of Shear Connectors	Yes	No
Fatigue of Special Points	Yes	No
Fatigue Shear	Yes	No

Legal Load Rating

Spec Check	Fatigue I	Fatigue II
Fatigue of Reinforcement	No	No
Fatigue of Shear Connectors	No	No
Fatigue Shear Range of Shear Connectors	No	No
Fatigue of Special Points	No	No

Fatigue Shear	No	No

Permit Load Rating

Spec Check	Fatigue I	Fatigue II
Fatigue of Reinforcement	No	No
Fatigue of Shear Connectors	No	No
Fatigue Shear Range of Shear Connectors	No	No
Fatigue of Special Points	No	No
Fatigue Shear	No	No

LFD Specification Check Maps

Design Review

LFD Spec Check	Fatigue
Fatigue of Special Points	No

Rating

LFD Spec Check	Fatigue
Fatigue of Special Points	No

Member

Member Notes

No member notes have been defined.

Member Materials

Beam

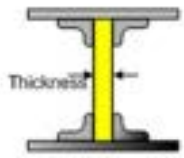
Beam Material: Salvaged Girder

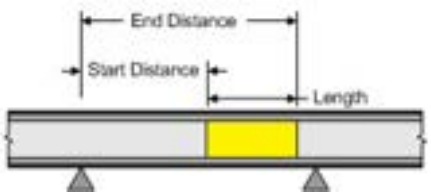
Beam Profile

Web

Apply to Entire Structure: Yes
Web Angle: -





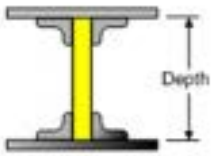


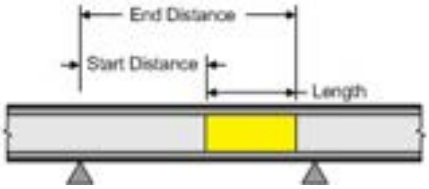
Thickness	Material	Support Number	Start Distance	Length

0.375 in.	**Salvaged Girder**	1	0 ft	72 ft	

Web Depth

Apply to Entire Structure: Yes

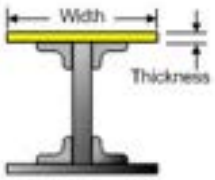


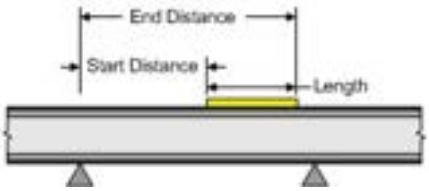


Start Depth	Web Variation	End Depth	Support Number	Start Distance	Length
78 in.	Linear	78 in.	1	0 ft	72 ft

Top Cover Plate

Apply to Entire Structure: No

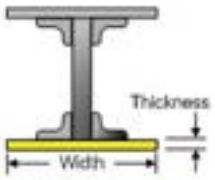




Start of Range			End of Range						
Width	Thickness	Gap Thickness	Width	Thickness	Gap Thickness	Material	Support Number	Start Distance	Length
16 in.	0.5 in.	-	-	-	-	**Salvaged Girder**	1	8.5 ft	9.438 ft
16 in.	1 in.	-	-	-	-	**Salvaged Girder**	1	17.938 ft	40.875 ft
16 in.	0.5 in.	-	-	-	-	**Salvaged Girder**	1	58.813 ft	4.688 ft

Bottom Cover Plate

Apply to Entire Structure: No

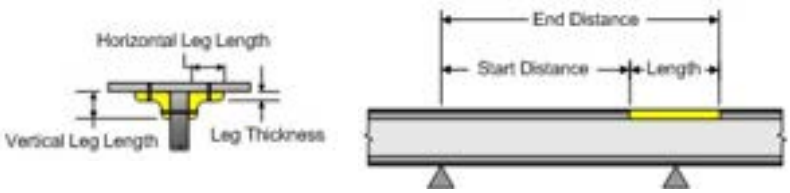




Start of Range			End of Range						
Width	Thickness	Gap Thickness	Width	Thickness	Gap Thickness	Material	Support Number	Start Distance	Length
16 in.	0.5 in.	-	-	-	-	**Salvaged Girder**	1	8.5 ft	9.438 ft
16 in.	1 in.	-	-	-	-	**Salvaged Girder**	1	17.938 ft	40.875 ft
16 in.	0.5 in.	-	-	-	-	**Salvaged Girder**	1	58.813 ft	4.688 ft

Top Angles

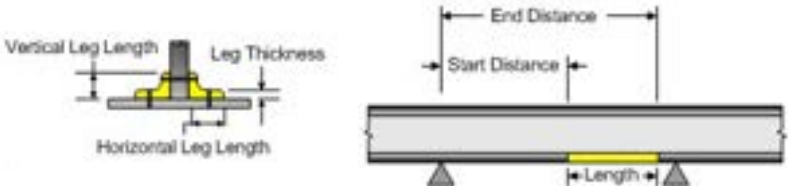
Apply to Entire Structure: Yes



Vertical Leg Length	Horizontal Leg Length	Leg Thickness	Material	Support Number	Start Distance	Length
6 in.	6 in.	0.75 in.	**Salvaged Girder**	1	0 ft	72 ft

Bottom Angles

Apply to Entire Structure: Yes



Vertical Leg Length	Horizontal Leg Length	Leg Thickness	Material	Support Number	Start Distance	Length
6 in.	6 in.	0.75 in.	**Salvaged Girder**	1	0 ft	72 ft

Hinges

No hinges have been defined.

Special Locations

No special locations have been defined.

Supports

Support Conditions

Support	Support Restraint		
	Horizontal	Vertical	Rotational
1	Free	Restrained	Free
2	Restrained	Restrained	Free

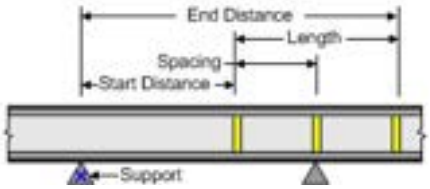
Spring Constants

Support	Spring Constants		
	Horizontal	Vertical	Rotational
1	-	-	-
2	-	-	-

Schedules

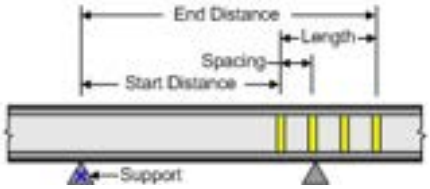
Bracing

Apply to Entire Structure: No



Spacing	Support	Start Distance	Length
17.427 ft	1	0.573 ft	34.854 ft
17.438 ft	1	53.958 ft	17.438 ft

Transverse Stiffeners



Stiffener Group	Spacing	Support	Start Distance	Length
Web Stiffeners	3 ft	1	3.104 ft	3 ft
Web Stiffeners	4 ft	1	9.573 ft	4 ft
Web Stiffeners	4.417 ft	1	22.469 ft	8.833 ft
Web Stiffeners	4.396 ft	1	40.677 ft	8.792 ft
Web Stiffeners	4 ft	1	58.365 ft	4 ft
Web Stiffeners	3 ft	1	65.865 ft	3 ft

Bearing Stiffeners

Apply to Entire Structure: No

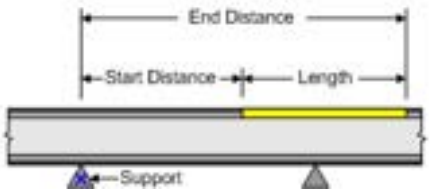
Support	Stiffener Group
1	Not Assigned
2	Not Assigned

Longitudinal Stiffeners

No longitudinal stiffener schedules have been defined.

Lateral Support

Apply to Entire Structure: Yes



Support	Start Distance	Length
1	0 ft	72 ft

Cb Factors (Standard)

No Cb factors (LRFD) have been defined.

Cb Factors (LRFD)

No Cb factors (LRFD) have been defined.

Fatigue Stress (Standard)

No fatigue stress (standard) schedules have been defined.

Member Control

Steel

Flexural Resistance

Span	Compact Piers (Standard)	Ignore Eq. 6.10.7.1.2-3 (LRFD)
1	No	No

End Panel Distances

Top Span



Left of Top Span: -
Right of Top Span: -

Flange Local Buckling Resistance Adjustment

Standard Specifications: -
LRFD Specifications: -

Points of Interest

No points of interest have been defined.

Dead Loads

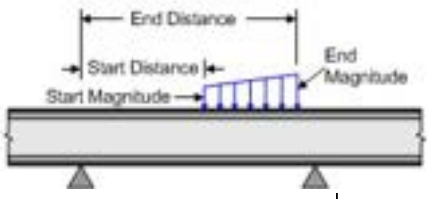
Uniform

Dead Load Type	Stage	Uniform Load
DC	1	-
DW	1	-
DU	1	-

Additional Self-weight

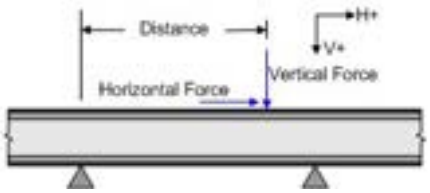
No additional self-weight dead loads have been defined.

Distributed



Dead Load Group	Support	Distributed Load (Start)		Distributed Load (End)	
		Distance	Magnitude	Distance	Magnitude
Vertical Web Angles	1	0.063 ft	0.018 kip / ft	71.875 ft	-

Concentrated



Dead Load Group	Support	Concentrated Load		
		Distance	Horizontal Force	Vertical Force
Girder Bracing	1	0.573 ft	-	0.169 kip
Girder Bracing	1	18.01 ft	-	0.164 kip
Girder Bracing	1	35.427 ft	-	0.164 kip
Girder Bracing	1	53.927 ft	-	0.164 kip
Girder Bracing	1	71.365 ft	-	0.169 kip
Bottom Flange Struts	1	8.719 ft	-	0.045 kip
Bottom Flange Struts	1	26.719 ft	-	0.047 kip
Bottom Flange Struts	1	44.677 ft	-	0.047 kip
Bottom Flange Struts	1	62.646 ft	-	0.045 kip

Temperature

No temperature dead loads have been defined.

Settlement

Stage: 1

No settlement loads have been defined.

Pedestrian Load

Pedestrian Load: -

Wheel Fractions (Standard)

Moment

No moment wheel fractions have been defined.

Shear

No shear wheel fractions have been defined.

Deflection

No deflection wheel fractions have been defined.

Reaction

Apply to entire structure: No

Support	mg Single-Lane			mg Multi-Lane		
	Moment	Shear	Deflection	Moment	Shear	Deflection
1	-	-	-	-	-	-
2	-	-	-	-	-	-

Nanue Stream Bridge
Load Rating for Steel Exterior Girder Span 4 (G4-4)

CRITICAL RATING FACTOR SUMMARY: Design Load Inventory

Live Load No.	Combination Description		Total Vehicle Wt. (tons)	Controlling Point of Interest	Limit State Action Location	Rating Factor	Load Rating (tons)
1	HL-93-TRUCK + HL-93-LANE	(DTK)	36.00	102.0000	STRENGTH I Shear Maximum Effects	1.83	66.04
2	HL-93-TANDEM + HL-93-LANE	(DTK)	25.00	102.0000	STRENGTH I Shear Maximum Effects	2.19	54.78
15	HL-93-FAT	(FAT)	36.00	108.0000	FATIGUE I Shear Stress Minimum Effects	4.41	158.87
Crit	HL-93-TRUCK + HL-93-LANE	(DTK)	36.00	102.0000	STRENGTH I	1.83	66.04

CRITICAL RATING FACTOR SUMMARY: Design Load Operating

Live Load No.	Combination Description		Total Vehicle Wt. (tons)	Controlling Point of Interest	Limit State Action Location	Rating Factor	Load Rating (tons)
1	HL-93-TRUCK + HL-93-LANE	(DTK)	36.00	102.0000	STRENGTH I-O Shear Maximum Effects	2.38	85.61
2	HL-93-TANDEM + HL-93-LANE	(DTK)	25.00	102.0000	STRENGTH I-O Shear Maximum Effects	2.84	71.01
Crit	HL-93-TRUCK + HL-93-LANE	(DTK)	36.00	102.0000	STRENGTH I-O	2.38	85.61

CRITICAL RATING FACTOR SUMMARY: Legal Load

Live Load No.	Combination Description		Total Vehicle Wt. (tons)	Controlling Point of Interest	Limit State Action Location	Rating Factor	Load Rating (tons)
3	TYPE3	(TRK)	25.00	108.0000	STRENGTH I Shear Minimum Effects	3.79	94.64
4	TYPE3S2	(TRK)	36.00	108.0000	STRENGTH I Shear Minimum Effects	3.37	121.34
5	TYPE3-3	(TRK)	40.00	108.0000	STRENGTH I Shear Minimum Effects	3.52	140.61
6	NRL-MIN	(TRK)	40.00	105.0000	SERVICE II Flange Stress Maximum Effects Top Flange	2.57	102.91
7	NRL-MAX	(TRK)	40.00	105.0000	SERVICE II Flange Stress Maximum Effects Top Flange	2.63	105.05
8	SU4	(TRK)	27.00	108.0000	STRENGTH I Shear Minimum Effects	3.45	93.24
9	SU5	(TRK)	31.00	108.0000	STRENGTH I Shear Minimum Effects	3.08	95.45

10	SU6	(TRK)	34.75	108.0000	STRENGTH I Shear Minimum Effects	2.91	101.24
11	SU7	(TRK)	38.75	105.0000	SERVICE II Flange Stress Maximum Effects Top Flange	2.68	103.98
16	EV2	(TRK)	28.75	108.0000	STRENGTH I Shear Minimum Effects	3.24	93.07
17	EV3	(TRK)	43.00	108.0000	STRENGTH I Shear Minimum Effects	2.17	93.35
Crit	EV3	(TRK)	43.00	108.0000	STRENGTH I	2.17	93.35

CRITICAL RATING FACTOR SUMMARY: Permit Load

Live Load No.	Combination Description		Total Vehicle Wt. (tons)	Controlling Point of Interest	Limit State Action Location	Rating Factor	Load Rating (tons)
12	HP1	(PTK)	60.00	108.0000	STRENGTH II Shear Minimum Effects	2.54	152.31
13	HP2	(PTK)	78.55	108.0000	STRENGTH II Shear Minimum Effects	2.34	183.51
14	HP3	(PTK)	104.95	108.0000	STRENGTH II Shear Minimum Effects	3.02	317.40
Crit	HP2	(PTK)	78.55	108.0000	STRENGTH II	2.34	183.51

Wyoming Department of Transportation

BRASS-GIRDER™ Input Parameters

Version Information

Girder UI:	7.8.0.3001
Girder XML:	7.8.0.3001
BRASS™ XML:	1.8.0.3001

Administration

Project ID:	8780-06
Project Title:	HDOT Statewide Bridge Load Ratings
Bridge ID:	1000190308146
Bridge Name:	Nanue Stream
Route Name:	00019 Hawaii Belt Road
Reference Marker:	18
Title 1:	Nanue Stream Bridge
Title 2:	Load Rating for Steel Interior Girder Span 4 (G3-4)
Date:	2017 4 21
Agency:	HDOT Highways Division
Designer/Rater:	Moffatt & Nichol (JU)
Reviewer:	
Comments:	

Bridge Notes

MATERIAL PROPERTIES
Concrete
Weight = 0.160 kcf (HDOT Design Criteria for Bridges and Structures [HDOT] 5.01)
Strength = 3 ksi (Record Drawings: Class A-1)
Elastic Modulus = 3,880 ksi (AASHTO LRFD [LRFD] Eqn 5.4.2.4-1, Use 0.150 kcf per HDOT 5.01)
Reinforcing Steel
Yield Strength = 33 ksi (Unknown, Manual for Bridge Evaluation [MBE] Table 6A.5.2.2-1)
Elastic Modulus = 29,000 ksi (LRFD 5.4.3.2)

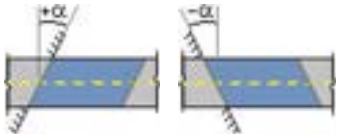
BRIDGE PROPERTIES (RECORD DRAWINGS)
Span 1 = 51 ft
Span 2 = 50 ft
Span 3 = 40 ft
Span 4 = 72 ft
Span 5 = 40 ft
Span 6 = 72 ft
Span 7 = 40 ft
Span 8 = 72 ft
Span 9 = 40 ft
Span 10 = 51 ft
Width = 38.5 ft
Deck Thickness = 9 in min
No. of Griders = 4
Girder Spacing = 9 ft, 7.5 ft, 9 ft
Girder Width = 12 3/8"
Girder Depth = 6'-6 1/2"
Surface Roughness = 3.0 (2015 Bridge Inspectinon Report)
Condition Factor = 1.0 (HDOT 5.04, 2015 Bridge Inspection Report indicates Condition Rating of 7)
System Factor = 1.0 (HDOT 5.05,)

LIVE LOADS
LRFD Live Load (MBE Appendix C6A)
Truck and Tandem Lane Load = 0.64 klf
AASHTO Legal Loads (MBE Appendix D6A)
Type 3
Type 3S2
Type 3-3
Notional Rating Load [NRL]
Legal Lane Load = 0.2 klf
SU4
SU5
SU6
SU7
HDOT Hawaii Standard Single Trip Permit Loads (HDOT 5.06)
No lane load provided, vehicles allowed to trave in any lane
HP1
HP2
HP3
Dynamic Load Allowance (HDOT 5.03)
Spans > 40 ft
Wearing Surface: 3 (Assumed)
Design Loads: 33%
Legal Loads: 10%
Permit Loads: 10%
Scale Factor (HDOT 5.06)
Hawaii Standard Single Trip Permit Vehicle analysis assumes only one permit load on the bridge which allows the use of a single-lane distribution factor. When using the single-lane LRFD distribution factor, the 1.2 multiple prescence factor may shall be divided out from the distribtion factor equations.

Control

Structure

Structure Type: GirderLine
Define Deck Cross Section: Yes
Number of Members: 4
Skew Angle: 0 °



Analysis Model Type: Beam
Number of Top Spans: 1



Spans

Span	Length
1	72 ft

Structure Material: Steel
Beam Type: Builtup
Composite Structure: No
Deck Material: Concrete

Analysis

Unit System: US
Analysis Method: LRFD
Analysis Type: Rating
Number of Stages: 1
Member of Interest: 3
Model Element Type: Stepped
Point of Interest Generation Control: Tenth
Live-load Distribution Factor Application: AnalysisPoint

Interpolate Reinforcement: No
Calculate Effective Width: No

Input

Symmetry

Component	Symmetric
Beam Profile	No
Deck Profile	No
Shear Connectors	No
Transverse Stiffeners	No
Bearing Stiffeners	No
Longitudinal Stiffeners	No
Bracing (Member)	No
Lateral Support	No
Cb Factors (Std)	No
Cb Factors (LRFD)	No
Fatigue Stress (Std)	No
Beam Wheel Fractions (Std)	No
Reaction Wheel Fractions (Std)	No
Beam Distribution Factors (LRFD)	No
Reaction Distribution Factors (LRFD)	No

Simplified Standard Wheel Fractions: No
Merge Beam/Deck Profile Schedules: Yes

Distribution

Perform Dead Load Distribution: Yes
Calculate LRFD Live Load Distribution Factors: Yes

Dead Load Distribution Methods

Stage	Method
1	Tributary area

Live Load Distribution (LRFD)

Distribution Method: AASHTO LRFD
Cross Section Code: a1
Max. Number of Lanes Loaded: Computed
Slab Thickness Type: Structural
Set eg = 0 for Non-composite: Yes
Apply Skew to Lever Rule Override: Yes
Apply Skew to Ridgid Rule Override: No
Use Constants from Table 4.6.2.2.1-2: No

Libraries

Section Library: C:\BRASS\Girder_7.8\Girder\Libraries\BRASS-Sections.bls
Vehicle Library: C:\BRASS\Girder_7.8\Girder\Libraries\BRASS-Vehicles.blv

Output

Primary Output

Action Output Level: DL+LL+CONC
Action Locations: 10thPoints

General

Member Properties:	Yes
Load Combinations:	Yes
Load and Resistance Factors:	Yes
Warnings:	Yes
Camber:	No
Critical Design Ratios / Rating Factors:	Expanded

Live Load

Truck Positions:	Yes
Variable Axle Spacing:	Yes
Live Load Settings:	Yes
Live Load Combinations:	Yes
Live Load Details:	Yes
Impact (LFD):	No

Stage

Stage	Output
1	Yes

Dead Load

Member Self Load:	Yes
Distributed Dead Loads:	Yes
Concentrated Dead Loads:	Yes
Temperature Change:	No
Settlements:	No

Load Distribution

Dead Load Distribution:	Yes
Live Load Distribution:	Yes

Intermediate Output

Intermediate Output Level:	Full
Effective Width:	Yes
Floorbeam Lane Position:	Yes

Points of Interest

Specification Checks:	Yes
Load Factoring/Combinations:	No

Load Distribution

Dead Load:	Yes
Live Load:	Yes

Limit State Output (LRFD)

Limit State	Specification Check	Load Combination
Strength I	Yes	Yes
Strength II	Yes	Yes
Strength IV	No	No
Service I	No	No
Service II	No	No
Fatigue I	No	No
Fatigue II	No	No

Load Combination Output (LFD)

LFD Load Combo	Specification Check	Load Combination

Combo I	No	No
Combo IB	No	No
Combo I Overload	No	No
Combo IB Overload	No	No
Combo I Service	No	No
Combo IB Service	No	No
Combo Fatigue	Yes	Yes

Intermediate Output (cont.)

Steel

Transverse Stiffeners: No
Bearing Stiffeners: No
Longitudinal Stiffeners: No

Results Tables

X-Y Plot Action Tables: No
Specification Check Results Tables: No
Mesh Plot Files: No

BRASS-PAD™ Data Transfer File: No

Influence

Output influence lines for: None
Ordinate Divisor: 1

Factors

Load Factors (LRFD)

Limit State	DC		DW		DU		TU	
	max	min	max	min	max	min	max	min
Strength I	1.25	0.9	1.5	0.65	1.5	0.65	-	-
Strength II	1.25	0.9	1.5	0.65	1.5	0.65	-	-
Strength IV	-	-	-	-	-	-	-	-
Service I	-	-	-	-	-	-	-	-
Service II	1	1	1	1	1	1	-	-
Fatigue I	-	-	-	-	-	-	-	-
Fatigue II	-	-	-	-	-	-	-	-

Load Factors (LRFD) (continued)

Limit State	LL				SE		PS		DS	
	Design		Legal	Permit						
	Inventory	Operating			max	min	max	min	max	min
Strength I	1.75	1.35	1.45	0	-	-	-	-	-	-
Strength II	-		0	1.2	-	-	-	-	-	-
Strength IV	-		-	-	-	-	-	-	-	-
Service I	-		-	-	-	-	-	-	-	-
Service II	1.3	1	1.3	1	-	-	-	-	-	-
Fatigue I	0.75		-	-	-	-	-	-	-	-
Fatigue II	-		-	-	-	-	-	-	-	-

Load Modifiers (LRFD)

Limit State	Ductility	Redundancy	Importance	Combined Product	
				max	min
Strength I	1	1	1	-	-
Strength II	1	1	1	-	-
Strength IV	1	1	1	-	-
Service I	1	1	1	-	-
Service II	1	1	1	-	-
Fatigue I	1	1	1	-	-
Fatigue II	1	1	1	-	-

Resistance Factors (LRFD)

Resistance Factors

Type	Value
φ Flexure	1
φ Shear	1
φ Bearing	1
φ Compression	0.95
φ Shear Connectors	0.85
φ Fatigue	1

System/Total Modifiers

Limit State	Resistance Type	System	Total
Strength	Flexure	1	-
Strength	Shear	1	-
Strength	Bearing	1	-
Strength	Compression	1	-
Strength	Shear Connectors	1	-
Strength	Longitudinal Reinforcement	1	-
Service	Flexure	1	-
Fatigue	Fatigue	1	-

Condition Modifiers

Limit State	Condition
Strength	1
Service	1
Fatigue	1

Load Factors (LFD)

Load Combo	γ	LL	DC	DW	DU	TU	SE	PS	DS
I	-	-	-	-	-	-	-	1	1
IB	-	-	-	-	-	-	-	1	1
I-Overload	-	-	-	-	-	-	-	1	1
IB-Overload	-	-	-	-	-	-	-	1	1

I-Service	-	-	-	-	-	-	-	1	1
IB-Service	-	-	-	-	-	-	-	1	1
Fatigue	-	-	-	-	-	-	-	1	1

Capacity Reduction Factors (LFD)

Factor	Value
φ Flexure	-
φ Shear	-
φ Fatigue	-

Materials

Steel

ID	Name	Yield Stress	Tensile Strength	Modulus of Elasticity	Density	Thermal Expansion Coefficient
1	Salvaged Girder	30 ksi	60 ksi	29000 ksi	0.49 kcf	6.5E-06 °F^{-1}

Concrete

ID	Name	28 Day Compressive Strength	Modulus of Elasticity	Density	Modulus of Rupture	Modulus of Rupture (VCI Method)	Thermal Expansion Coefficient
1	1949 Class A-1	3 ksi	3880 ksi	0.16 kcf	-	-	6E-06 °F^{-1}

Dead Load Groups

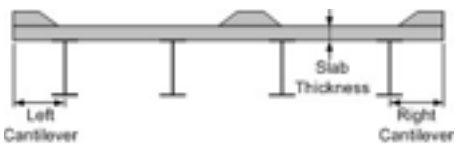
Groups

ID	Name	Stage	Type	Description
1	Concrete Railing	1	DC	Top Rail, Bottom Rail, Post
2	Sidewalk / Shoulder	1	DC	
3	AC Pavement	1	DW	
4	Girder Bracing	1	DC	X-Bracing with Steel Angles in the Outer Bays
5	Bottom Flange Bracing	1	DC	Steel Angles Diagonal Bracing in the Interior Bay
6	Vertical Web Angles	1	DC	Steel Angles Spaced at Intervals
7	Waterlines	1	DU	Assumed 8" Waterlines
8	Monorail	1	DC	6" Monorail
9	Bottom Flange Struts	1	DC	Bottom Flange Struts out of Steel Angles and Plates in Outer Bays

Deck Geometry

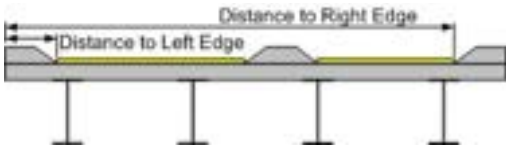
Deck

Deck Thickness: 9 in.
Left Cantilever Length: 6.5 ft
Right Cantilever Length: 6.5 ft
Equal Member Spacing: No



Travelway Locations

Distance to Left Edge: 5.25 ft
Distance to Right Edge: 33.25 ft

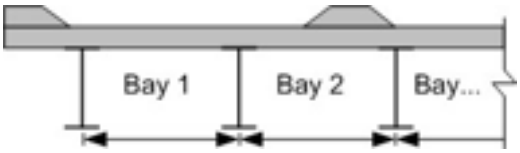


Sacrificial Topping

Thickness: -
Dead Load Type: DC

Member Spacing

Bay #	Spacing
1	9 ft
2	7.5 ft
3	9 ft



Soffits

No soffits have been defined.

Appurtenances

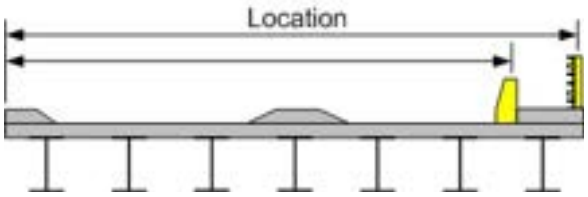
No appurtenances have been defined.

Deck Loads

Materials/Stages

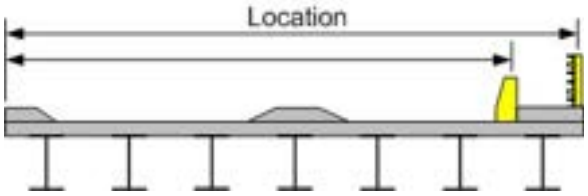
Deck Material: **1949 Class A-1**
Curb & Median Material: Not Assigned
Wearing Surface Weight: -
Slab Stage: 1
Curb Stage: 1
Median Stage: 1
Wearing Surface Stage: 1

Line Loads



Dead Load Group	Line Load	Load Location
Concrete Railing	0.319 kip / ft	0.923 ft
Concrete Railing	0.319 kip / ft	37.577 ft
Waterlines	0.224 kip / ft	38.5 ft
Monorail	0.016 kip / ft	34 ft

Uniform Loads



Dead Load Group	Uniform Load	Load Location	Load Width
Sidewalk / Shoulder	0.007 ksf	0 ft	5.25 ft
Sidewalk / Shoulder	0.003 ksf	5.25 ft	2 ft
AC Pavement	0.018 ksf	7.25 ft	24 ft
Sidewalk / Shoulder	0.003 ksf	31.25 ft	2 ft
Sidewalk / Shoulder	0.007 ksf	33.25 ft	5.25 ft

Live Loads

Live Load Control

Direction Control: Up+Down
Standard Live Loads: None
Wheel Advancement Denominator: 100
ADTT: 5000
ADTT for Single Lane: 2000
Multiple Presence Adjustment: -
% of Dynamic Load Allowance (Impact): 100 %
Fixed Impact (STD): -

Dynamic Load Allowance (LRFD)

Design/Rating Procedure	Truck	Lane	Fatigue
Design	33 %	0 %	15 %
Legal	33 %	0 %	0 %
Permit	33 %	0 %	0 %

Special Vehicles

Axle Vehicles

No axle vehicles have been defined.

Lane Vehicles

No lane vehicles have been defined.

Definitions (STD)

No standard live load definitions have been defined.

Definitions (LRFD)

Definition 1

Code: HL-93-TRUCK
Type: DesignTruck
Design Rating: Design
% of Dynamic Load Allowance: -
Scale Factor: -
Lanes Loaded: Critical
Notional Load: Yes
Fixed DLA: -

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 2

Code: HL-93-TANDEM
Type: DesignTruck
Design Rating: Design
% of Dynamic Load Allowance: -
Scale Factor: -

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-

Lanes Loaded:	Critical
Notional Load:	Yes
Fixed DLA:	-

Limit State	gamma LL	gamma LL Operating
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 3

Code:	HL-93-LANE
Type:	DesignLane
Design Rating:	Design
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	Yes
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 4

Code:	TYPE3
Type:	GeneralTruck
Design Rating:	Legal
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 5

Code:	TYPE3S2
Type:	GeneralTruck
Design Rating:	Legal
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 6

Code:	TYPE3-3
Type:	GeneralTruck
Design Rating:	Legal
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-

Fatigue II	-	-

Definition 7

Code: NRL-MIN
Type: GeneralTruck
Design Rating: Legal
% of Dynamic Load Allowance: -
Scale Factor: -
Lanes Loaded: Critical
Notional Load: No
Fixed DLA: -

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 8

Code: NRL-MAX
Type: GeneralTruck
Design Rating: Legal
% of Dynamic Load Allowance: -
Scale Factor: -
Lanes Loaded: Critical
Notional Load: No
Fixed DLA: -

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 9

Code: SU4
Type: GeneralTruck
Design Rating: Legal
% of Dynamic Load Allowance: -
Scale Factor: -
Lanes Loaded: Critical
Notional Load: No
Fixed DLA: -

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 10

Code: SU5
Type: GeneralTruck
Design Rating: Legal
% of Dynamic Load Allowance: -
Scale Factor: -
Lanes Loaded: Critical
Notional Load: No
Fixed DLA: -

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 11

Code: SU6
Type: GeneralTruck

Live Load Factor Overrides

Design Rating:	Legal
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 12

Code:	SU7
Type:	GeneralTruck
Design Rating:	Legal
% of Dynamic Load Allowance:	-
Scale Factor:	-
Lanes Loaded:	Critical
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 13

Code:	HP1
Type:	PermitTruck
Design Rating:	Permit
% of Dynamic Load Allowance:	-
Scale Factor:	0.833
Lanes Loaded:	Single
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 14

Code:	HP2
Type:	PermitTruck
Design Rating:	Permit
% of Dynamic Load Allowance:	-
Scale Factor:	0.833
Lanes Loaded:	Single
Notional Load:	No
Fixed DLA:	-

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 15

Code:	HP3
Type:	PermitTruck
Design Rating:	Permit
% of Dynamic Load Allowance:	-
Scale Factor:	0.833
Lanes Loaded:	Single
Notional Load:	No

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-

Fixed DLA: -

Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 16

Code: HL-93-FAT
Type: FatigueTruck
Design Rating: Design
% of Dynamic Load Allowance: -
Scale Factor: -
Lanes Loaded: Critical
Notional Load: No
Fixed DLA: -

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 17

Code: EV2
Type: GeneralTruck
Design Rating: Legal
% of Dynamic Load Allowance: -
Scale Factor: -
Lanes Loaded: Critical
Notional Load: No
Fixed DLA: -

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

Definition 18

Code: EV3
Type: GeneralTruck
Design Rating: Legal
% of Dynamic Load Allowance: -
Scale Factor: -
Lanes Loaded: Critical
Notional Load: No
Fixed DLA: -

Live Load Factor Overrides

Limit State	gamma LL	gamma LL Operating
Strength I	-	-
Strength II	-	-
Strength IV	-	-
Service I	-	-
Service II	-	-
Service III	-	-
Fatigue I	-	-
Fatigue II	-	-

General Combinations (LRFD)

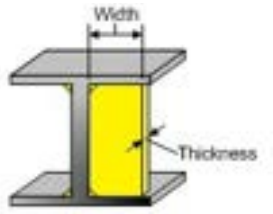
Standard Combo	Truck	Lane	Combination Factors	
			Truck	Lane
No	HL-93-TRUCK	HL-93-LANE	1	1
No	HL-93-TANDEM	HL-93-LANE	1	1

Deflection Combinations (LRFD)

No Deflection Combinations (LRFD) have been defined.

Component Groups

Transverse Stiffeners



ID	Name	Width	Thickness	Type	Type Factor	Material
1	Web Stiffeners	5 in.	0.375 in.	Single Angles	-	**Salvaged Girder**

Bearing Stiffeners

No bearing stiffener groups have been defined.

Longitudinal Stiffeners

No longitudinal stiffener groups have been defined.

Specification Control

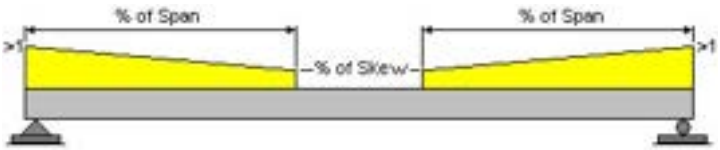
General

Lane Geometry

Design Vehicle Lane Width: 12 ft
Vehicle Width: 10 ft
Wheel Spacing: 6 ft
Encroachment Distance: -

Load Factors Control (LRFD): Use maximum and minimum load factors

Skew Factors



Span #	% of Span	% of Skew
1	-	-

Steel

Use Appendix A6 (LRFD): No
Allow Plastic Analysis: No
Override Longitudinal Stiffeners: No
Slab thickness for longitudinal shear force: Structural
Slab thickness for minimum negative flexure concrete deck reinforcement: Structural

Fatigue

AASHTO LRFD Table 6.6.1.2.5-2

% of Span: -
Span Length: 40 ft

Stress Range in Longitudinal Reinforcement Over the Piers: 10 ksi

Detail Categories (LRFD)

Detail Category	Constant, A x 10^8	Constant Amplitude Fatigue Threshold
A	-	-

B	-	-
B'	-	-
C	-	-
C'	-	-
D	-	-
E	-	-
E'	-	-

Limit State Map

Limit State Maps (LRFD)

Limit State	Design Review			Rating		
	Design Load	Legal Load	Permit Load	Design Load	Legal Load	Permit Load
Strength I	No	No	No	Inventory/Operating	Yes	No
Strength II	No	No	No	Exclude	No	Yes
Strength IV	No	No	No	Exclude	No	No
Service I	No	No	No	Exclude	No	No
Service II	No	No	No	Inventory/Operating	Yes	Yes
Service III	No	No	No	Exclude	No	No
Fatigue I	No	No	No	Inventory	No	No
Fatigue II	No	No	No	Exclude	No	No

Load Combo Maps (LFD)

Load Combo	Design Review	Rating
I	No	Inventory
IB	No	Operating
I-Overload	No	Exclude
IB-Overload	No	Exclude
I-Service	No	Exclude
IB-Service	No	Exclude
Fatigue	No	Exclude

Spec. Check Map (Strength)

LRFD Specification Check Maps

Design Load Review

Spec Check	Strength I	Strength II	Strength IV
Flexure	No	No	No
Shear	No	No	No
Bearing	No	No	No
Flexural Stress In Longitudinal Stiffener	No	No	No

Legal Load Review

Spec Check	Strength I	Strength II	Strength IV
Flexure	No	No	No

Shear	No	No	No
Bearing	No	No	No
Flexural Stress In Longitudinal Stiffener	No	No	No

Permit Load Review

Spec Check	Strength I	Strength II	Strength IV
Flexure	No	No	No
Shear	No	No	No
Bearing	No	No	No
Flexural Stress In Longitudinal Stiffener	No	No	No

Design Load Rating

Spec Check	Strength I	Strength II	Strength IV
Flexure	Yes	No	No
Shear	Yes	No	No
Bearing	Yes	No	No
Flexural Stress In Longitudinal Stiffener	No	No	No

Legal Load Rating

Spec Check	Strength I	Strength II	Strength IV
Flexure	Yes	No	No
Shear	Yes	No	No
Bearing	Yes	No	No
Flexural Stress In Longitudinal Stiffener	No	No	No

Permit Load Rating

Spec Check	Strength I	Strength II	Strength IV
Flexure	No	Yes	No
Shear	No	Yes	No
Bearing	No	Yes	No
Flexural Stress In Longitudinal Stiffener	No	No	No

LFD Specification Check Maps

Design Review

LFD Spec Check	I	IB	I-Overload	IB-Overload
Flexure	No	No	No	No
Shear	No	No		
Bearing	No	No		
Flexural Stress In Longitudinal Stiffener	No	No		

Rating

LFD Spec Check	I	IB	I-Overload	IB-Overload
Flexure	No	No	No	No
Shear	No	No		
Bearing	No	No		

Flexural Stress In Longitudinal Stiffener	No	No

Spec. Check Map (Service)

LRFD Specification Check Maps

Design Load Review

Spec Check	Service I	Service II
Crack Control	No	No
Flexural Stress In Flanges	No	No
Live Load Deflection	No	No

Legal Load Review

Spec Check	Service I	Service II
Crack Control	No	No
Flexural Stress In Flanges	No	No
Live Load Deflection	No	No

Permit Load Review

Spec Check	Service I	Service II
Crack Control	No	No
Flexural Stress In Flanges	No	No
Live Load Deflection	No	No

Design Load Rating

Spec Check	Service I	Service II
Crack Control	No	No
Flexural Stress In Flanges	No	Yes
Live Load Deflection	No	Yes

Legal Load Rating

Spec Check	Service I	Service II
Crack Control	No	No
Flexural Stress In Flanges	No	Yes
Live Load Deflection	No	Yes

Permit Load Rating

Spec Check	Service I	Service II
Crack Control	No	No
Flexural Stress In Flanges	No	Yes
Live Load Deflection	No	Yes

LFD Specification Check Maps

Design Review

LFD Spec Check	I-Overload	IB-Overload
Flexural Stress In Flanges	No	No

Rating

LFD Spec Check	I-Overload	IB-Overload
Flexural Stress In Flanges	No	No

Spec. Check Map (Fatigue)

LRFD Specification Check Maps

Design Load Review

Spec Check	Fatigue I	Fatigue II
Fatigue of Reinforcement	No	No
Fatigue of Shear Connectors	No	No
Fatigue Shear Range of Shear Connectors	No	No
Fatigue of Special Points	No	No
Fatigue Shear	No	No

Legal Load Review

Spec Check	Fatigue I	Fatigue II
Fatigue of Reinforcement	No	No
Fatigue of Shear Connectors	No	No
Fatigue Shear Range of Shear Connectors	No	No
Fatigue of Special Points	No	No
Fatigue Shear	No	No

Permit Load Review

Spec Check	Fatigue I	Fatigue II
Fatigue of Reinforcement	No	No
Fatigue of Shear Connectors	No	No
Fatigue Shear Range of Shear Connectors	No	No
Fatigue of Special Points	No	No
Fatigue Shear	No	No

Design Load Rating

Spec Check	Fatigue I	Fatigue II
Fatigue of Reinforcement	Yes	No
Fatigue of Shear Connectors	Yes	No
Fatigue Shear Range of Shear Connectors	Yes	No
Fatigue of Special Points	Yes	No
Fatigue Shear	Yes	No

Legal Load Rating

Spec Check	Fatigue I	Fatigue II
Fatigue of Reinforcement	No	No
Fatigue of Shear Connectors	No	No
Fatigue Shear Range of Shear Connectors	No	No
Fatigue of Special Points	No	No

Fatigue Shear	No	No

Permit Load Rating

Spec Check	Fatigue I	Fatigue II
Fatigue of Reinforcement	No	No
Fatigue of Shear Connectors	No	No
Fatigue Shear Range of Shear Connectors	No	No
Fatigue of Special Points	No	No
Fatigue Shear	No	No

LFD Specification Check Maps

Design Review

LFD Spec Check	Fatigue
Fatigue of Special Points	No

Rating

LFD Spec Check	Fatigue
Fatigue of Special Points	No

Member

Member Notes

No member notes have been defined.

Member Materials

Beam

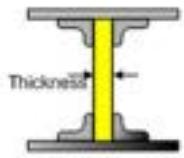
Beam Material: Salvaged Girder

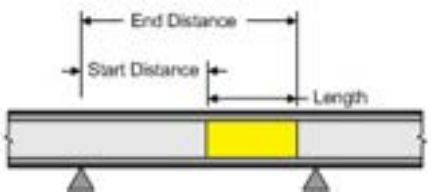
Beam Profile

Web

Apply to Entire Structure: Yes
Web Angle: -





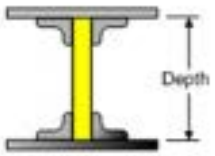


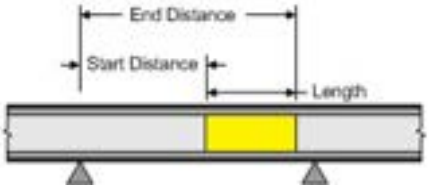
Thickness	Material	Support Number	Start Distance	Length

0.375 in.	**Salvaged Girder**	1	0 ft	72 ft	

Web Depth

Apply to Entire Structure: Yes

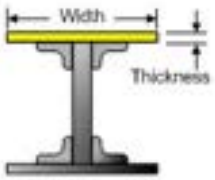


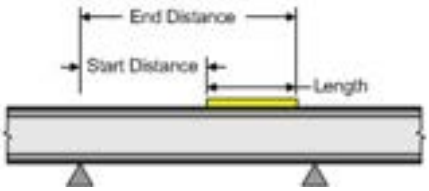


Start Depth	Web Variation	End Depth	Support Number	Start Distance	Length
78 in.	Linear	78 in.	1	0 ft	72 ft

Top Cover Plate

Apply to Entire Structure: No

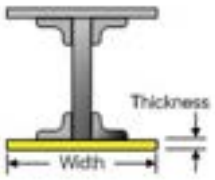




Start of Range			End of Range						
Width	Thickness	Gap Thickness	Width	Thickness	Gap Thickness	Material	Support Number	Start Distance	Length
16 in.	0.5 in.	-	-	-	-	**Salvaged Girder**	1	8.5 ft	9.438 ft
16 in.	1 in.	-	-	-	-	**Salvaged Girder**	1	17.938 ft	40.875 ft
16 in.	0.5 in.	-	-	-	-	**Salvaged Girder**	1	58.813 ft	4.688 ft

Bottom Cover Plate

Apply to Entire Structure: No

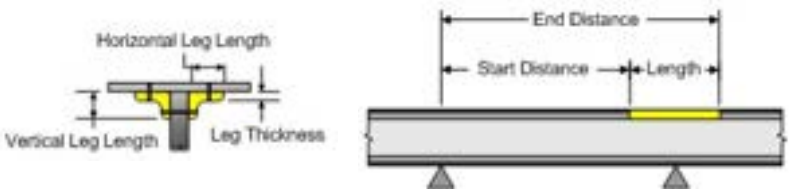




Start of Range			End of Range						
Width	Thickness	Gap Thickness	Width	Thickness	Gap Thickness	Material	Support Number	Start Distance	Length
16 in.	0.5 in.	-	-	-	-	**Salvaged Girder**	1	8.5 ft	9.438 ft
16 in.	1 in.	-	-	-	-	**Salvaged Girder**	1	17.938 ft	40.875 ft
16 in.	0.5 in.	-	-	-	-	**Salvaged Girder**	1	58.813 ft	4.688 ft

Top Angles

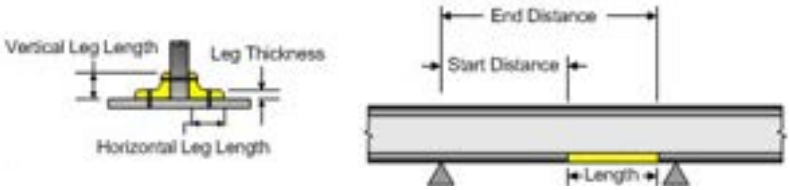
Apply to Entire Structure: Yes



Vertical Leg Length	Horizontal Leg Length	Leg Thickness	Material	Support Number	Start Distance	Length
6 in.	6 in.	0.75 in.	**Salvaged Girder**	1	0 ft	72 ft

Bottom Angles

Apply to Entire Structure: Yes



Vertical Leg Length	Horizontal Leg Length	Leg Thickness	Material	Support Number	Start Distance	Length
6 in.	6 in.	0.75 in.	**Salvaged Girder**	1	0 ft	72 ft

Hinges

No hinges have been defined.

Special Locations

No special locations have been defined.

Supports

Support Conditions

Support	Support Restraint		
	Horizontal	Vertical	Rotational
1	Free	Restrained	Free
2	Restrained	Restrained	Free

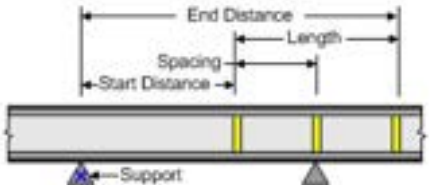
Spring Constants

Support	Spring Constants		
	Horizontal	Vertical	Rotational
1	-	-	-
2	-	-	-

Schedules

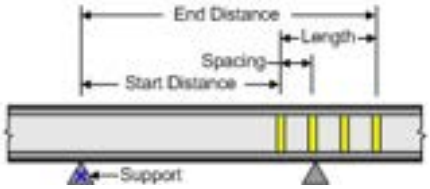
Bracing

Apply to Entire Structure: No



Spacing	Support	Start Distance	Length
17.427 ft	1	0.573 ft	34.854 ft
17.438 ft	1	53.958 ft	17.438 ft

Transverse Stiffeners



Stiffener Group	Spacing	Support	Start Distance	Length
Web Stiffeners	3 ft	1	3.104 ft	3 ft
Web Stiffeners	4 ft	1	9.573 ft	4 ft
Web Stiffeners	4.417 ft	1	22.469 ft	8.833 ft
Web Stiffeners	4.396 ft	1	40.677 ft	8.792 ft
Web Stiffeners	4 ft	1	58.365 ft	4 ft
Web Stiffeners	3 ft	1	65.865 ft	3 ft

Bearing Stiffeners

Apply to Entire Structure: No

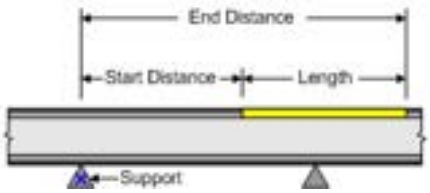
Support	Stiffener Group
1	Not Assigned
2	Not Assigned

Longitudinal Stiffeners

No longitudinal stiffener schedules have been defined.

Lateral Support

Apply to Entire Structure: No



Support	Start Distance	Length
1	0 ft	72 ft

Cb Factors (Standard)

No Cb factors (LRFD) have been defined.

Cb Factors (LRFD)

No Cb factors (LRFD) have been defined.

Fatigue Stress (Standard)

No fatigue stress (standard) schedules have been defined.

Member Control

Steel

Flexural Resistance

Span	Compact Piers (Standard)	Ignore Eq. 6.10.7.1.2-3 (LRFD)
1	No	No

End Panel Distances

Top Span



Left of Top Span: -
Right of Top Span: -

Flange Local Buckling Resistance Adjustment

Standard Specifications: -
LRFD Specifications: -

Points of Interest

No points of interest have been defined.

Dead Loads

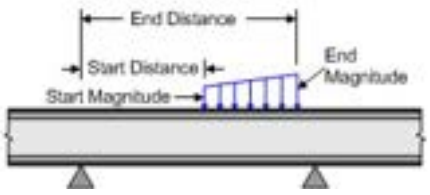
Uniform

Dead Load Type	Stage	Uniform Load
DC	1	-
DW	1	-
DU	1	-

Additional Self-weight

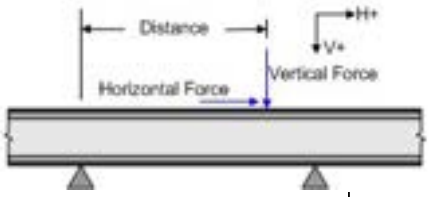
No additional self-weight dead loads have been defined.

Distributed



Dead Load Group	Support	Distributed Load (Start)		Distributed Load (End)	
		Distance	Magnitude	Distance	Magnitude
Bottom Flange Bracing	1	0.063 ft	0.009 kip / ft	71.875 ft	-
Vertical Web Angles	1	0.063 ft	0.018 kip / ft	71.875 ft	-

Concentrated



Dead Load Group	Support	Concentrated Load		
		Distance	Horizontal Force	Vertical Force
Girder Bracing	1	0.573 ft	-	0.169 kip
Girder Bracing	1	18.01 ft	-	0.164 kip
Girder Bracing	1	35.427 ft	-	0.164 kip
Girder Bracing	1	53.927 ft	-	0.164 kip
Girder Bracing	1	71.365 ft	-	0.169 kip
Bottom Flange Struts	1	8.719 ft	-	0.045 kip
Bottom Flange Struts	1	26.719 ft	-	0.047 kip
Bottom Flange Struts	1	44.677 ft	-	0.047 kip
Bottom Flange Struts	1	62.646 ft	-	0.045 kip

Temperature

No temperature dead loads have been defined.

Settlement

Stage: 1

No settlement loads have been defined.

Pedestrian Load

Pedestrian Load: -

Wheel Fractions (Standard)

Moment

No moment wheel fractions have been defined.

Shear

No shear wheel fractions have been defined.

Deflection

No deflection wheel fractions have been defined.

Reaction

Apply to entire structure: No

Support	mg Single-Lane			mg Multi-Lane		
	Moment	Shear	Deflection	Moment	Shear	Deflection
1	-	-	-	-	-	-
2	-	-	-	-	-	-

Nanue Stream Bridge
Load Rating for Steel Interior Girder Span 4 (G3-4)

CRITICAL RATING FACTOR SUMMARY: Design Load Inventory

Live Load No.	Combination Description		Total Vehicle Wt. (tons)	Controlling Point of Interest	Limit State Action Location	Rating Factor	Load Rating (tons)
1	HL-93-TRUCK + HL-93-LANE	(DTK)	36.00	102.0000	STRENGTH I Shear Maximum Effects	1.75	62.91
2	HL-93-TANDEM + HL-93-LANE	(DTK)	25.00	102.0000	STRENGTH I Shear Maximum Effects	2.09	52.18
15	HL-93-FAT	(FAT)	36.00	108.0000	FATIGUE I Shear Stress Minimum Effects	5.42	195.13
Crit	HL-93-TRUCK + HL-93-LANE	(DTK)	36.00	102.0000	STRENGTH I	1.75	62.91

CRITICAL RATING FACTOR SUMMARY: Design Load Operating

Live Load No.	Combination Description		Total Vehicle Wt. (tons)	Controlling Point of Interest	Limit State Action Location	Rating Factor	Load Rating (tons)
1	HL-93-TRUCK + HL-93-LANE	(DTK)	36.00	102.0000	STRENGTH I-O Shear Maximum Effects	2.27	81.55
2	HL-93-TANDEM + HL-93-LANE	(DTK)	25.00	102.0000	STRENGTH I-O Shear Maximum Effects	2.71	67.64
Crit	HL-93-TRUCK + HL-93-LANE	(DTK)	36.00	102.0000	STRENGTH I-O	2.27	81.55

CRITICAL RATING FACTOR SUMMARY: Legal Load

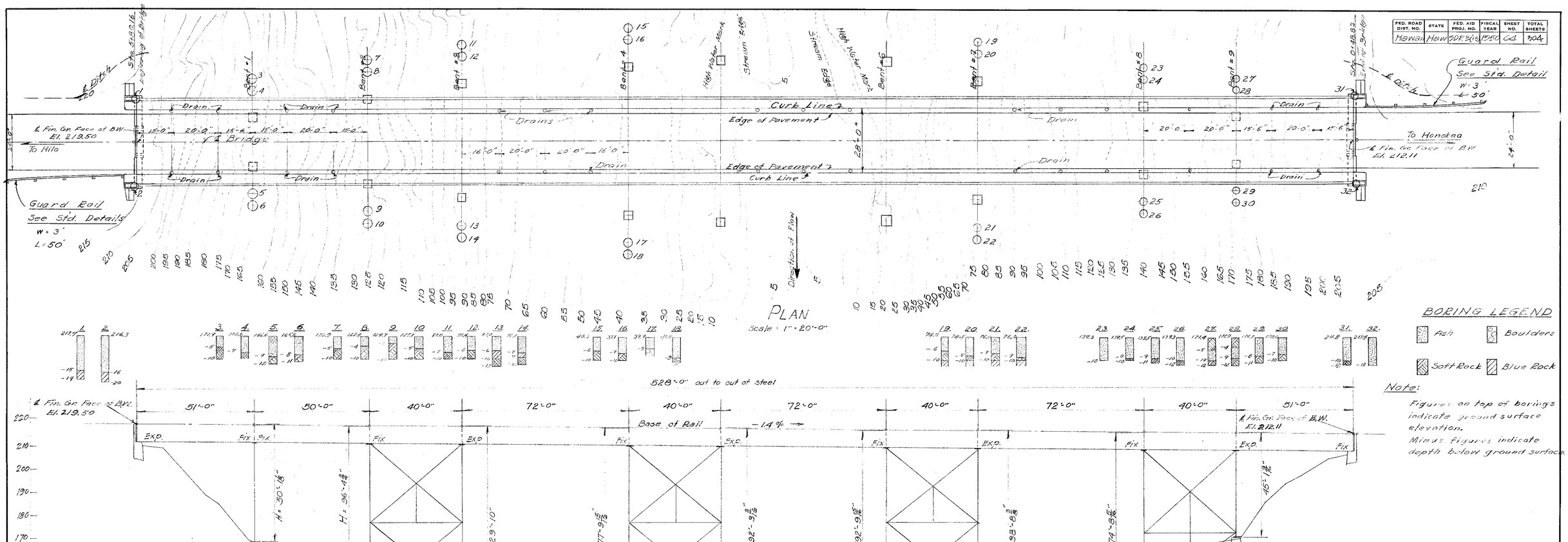
Live Load No.	Combination Description		Total Vehicle Wt. (tons)	Controlling Point of Interest	Limit State Action Location	Rating Factor	Load Rating (tons)
3	TYPE3	(TRK)	25.00	108.0000	STRENGTH I Shear Minimum Effects	3.61	90.16
4	TYPE3S2	(TRK)	36.00	108.0000	STRENGTH I Shear Minimum Effects	3.21	115.60
5	TYPE3-3	(TRK)	40.00	108.0000	STRENGTH I Shear Minimum Effects	3.35	133.95
6	NRL-MIN	(TRK)	40.00	108.0000	STRENGTH I Shear Minimum Effects	2.58	103.04
7	NRL-MAX	(TRK)	40.00	108.0000	STRENGTH I Shear Minimum Effects	2.61	104.47
8	SU4	(TRK)	27.00	108.0000	STRENGTH I Shear Minimum Effects	3.29	88.83
9	SU5	(TRK)	31.00	108.0000	STRENGTH I Shear Minimum Effects	2.93	90.93
10	SU6	(TRK)	34.75	108.0000	STRENGTH I	2.78	96.45

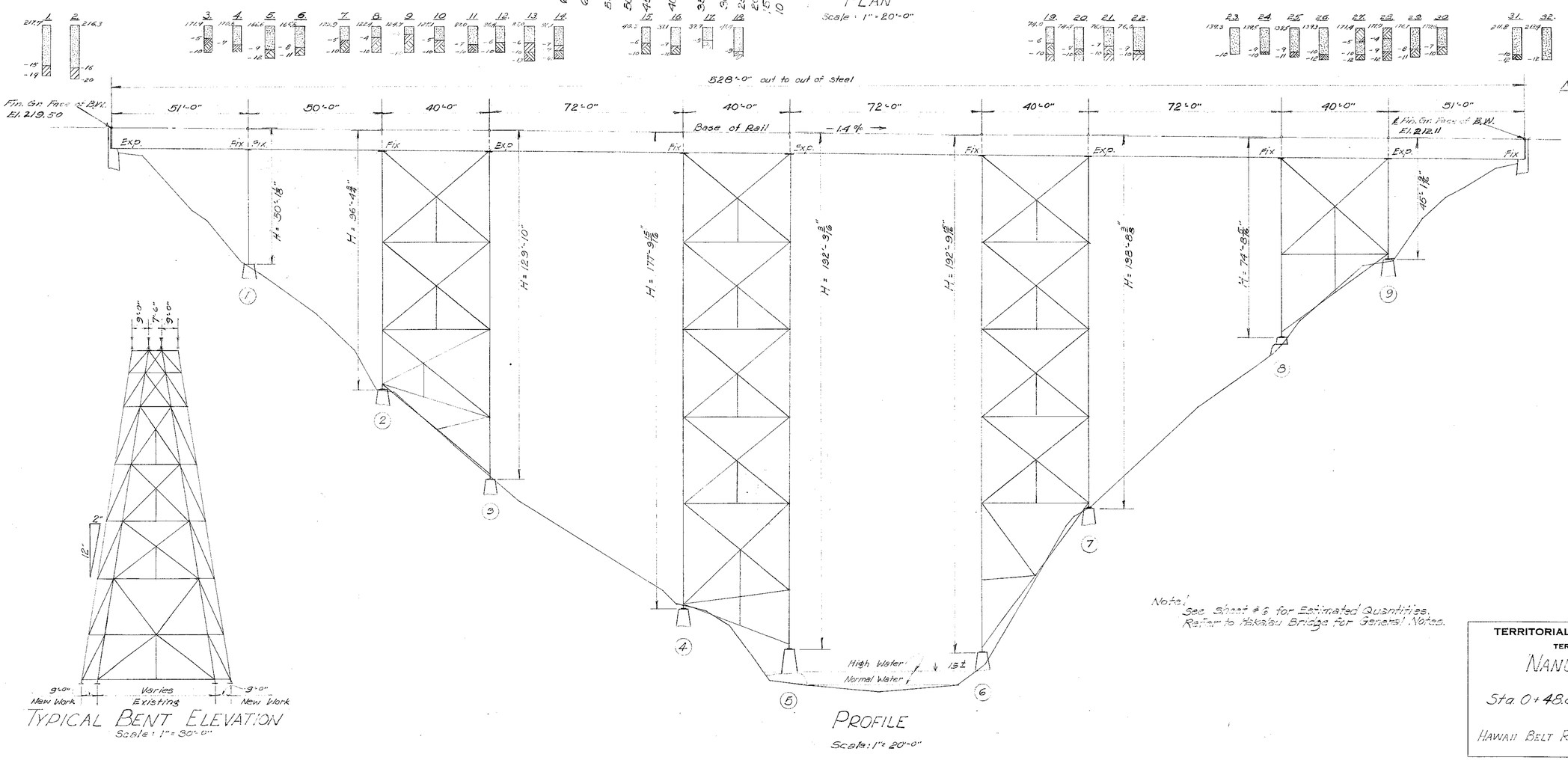
					Shear Minimum Effects		
11	SU7	(TRK)	38.75	108.0000	STRENGTH I Shear Minimum Effects	2.61	101.12
16	EV2	(TRK)	28.75	108.0000	STRENGTH I Shear Minimum Effects	3.08	88.66
17	EV3	(TRK)	43.00	108.0000	STRENGTH I Shear Minimum Effects	2.07	88.93
Crit	EV3	(TRK)	43.00	108.0000	STRENGTH I	2.07	88.93

CRITICAL RATING FACTOR SUMMARY: Permit Load

Live Load No.	Combination Description		Total Vehicle Wt. (tons)	Controlling Point of Interest	Limit State Action Location	Rating Factor	Load Rating (tons)
12	HP1	(PTK)	60.00	108.0000	STRENGTH II Shear Minimum Effects	2.92	174.95
13	HP2	(PTK)	78.55	108.0000	STRENGTH II Shear Minimum Effects	2.68	210.79
14	HP3	(PTK)	104.95	108.0000	STRENGTH II Shear Minimum Effects	3.47	364.58
Crit	HP2	(PTK)	78.55	108.0000	STRENGTH II	2.68	210.79

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
Hawaii	Haw	SDR 3(13)	1950	64	304





BORING LEGEND

Ash — Boulders

Soft Rock — Blue Rock

Note:

Figures on top of borings indicate ground surface elevation.
Minus figures indicate depth below ground surface.

Note: See Sheet # 3 for Estimated Quantities. Refer to Hakalau Bridge for General Notes.

ORIGINAL PLAN	SURVEY PLOTTED BY: K.K. Tsuda, DATE: 3-49
	DESIGNED BY: T. Umeda, " 4-49
	DRAWN BY: "
	TRACED BY: A. Yee Leong, "
NOTE BOOK No.	QUANTITIES BY: "
	QUANTITIES CHECKED BY: "
	CHECKED BY: E. Pasalich, " 4-49

TERRITORIAL HIGHWAY DEPARTMENT
TERRITORY OF HAWAII

NANUE BRIDGE

Sta. 0+48.83 to 5+80.16

HAWAII BELT ROAD — SDR 3(13)

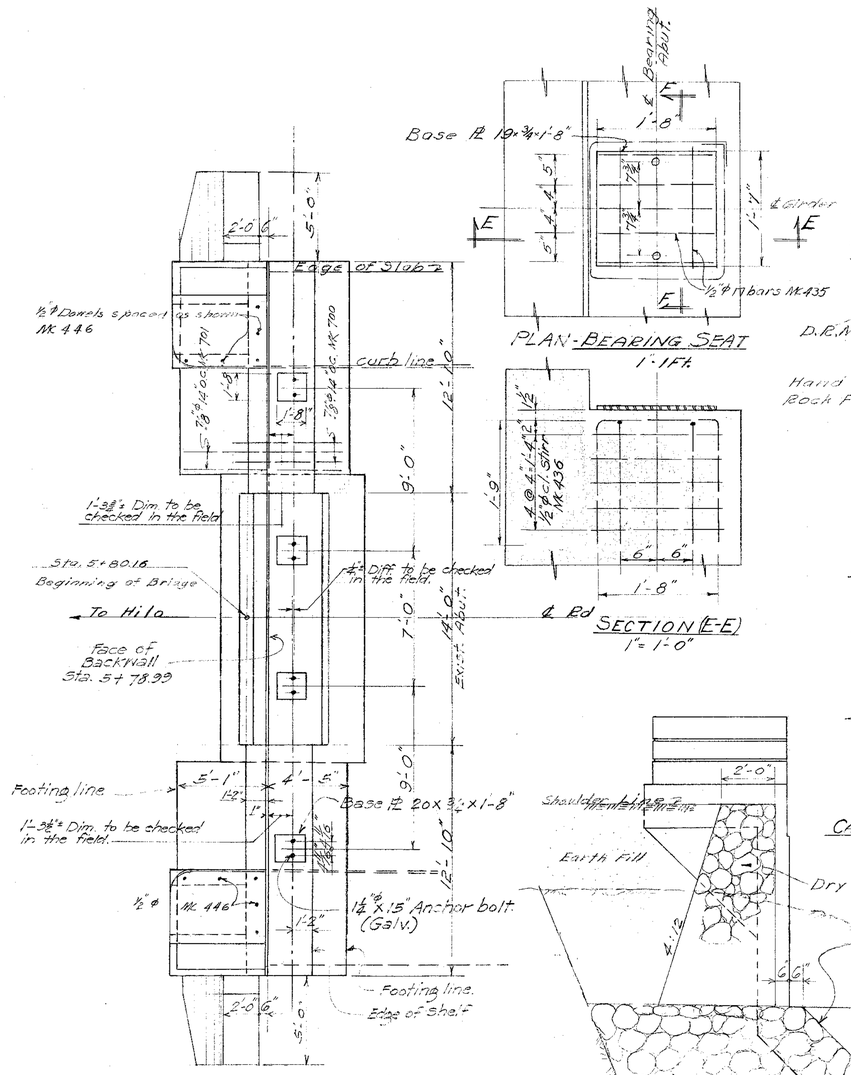
Apr. 1949

SHEET No. 1 OF 11 SHEETS

54GS.64

KEUFFEL & ESSER CO., N.Y.

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW	SDL 3(13)	1950	65	904



Note! See Std. Details for treatment at constr. joint and method of applying waterproofing.
Original Ground Outside Excavation Lines Not to be Removed.
All concrete in abutments to be Class A-1.

ORIGINAL PLAN	SURVEY PLOTTED BY: K. Kasuga DATE: 2-49
	DESIGNED BY: K. Kasuga
	DRAWN BY: A. Van De Mark
	TRACED BY: " "
NOTE BOOK No.	QUANTITIES BY: " "
	QUANTITIES CHECKED BY: " "
	CHECKED BY: " "

TERRITORIAL HIGHWAY DEPARTMENT
TERRITORY OF HAWAII

NANUE BRIDGE
Sta. 0+48.83 to 5+80.16

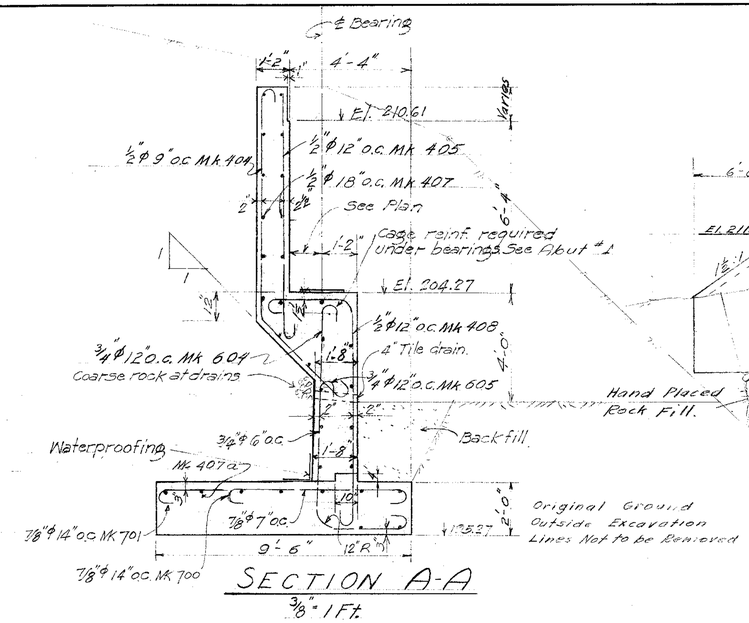
Hawaii Belt Road SDR-3(13)

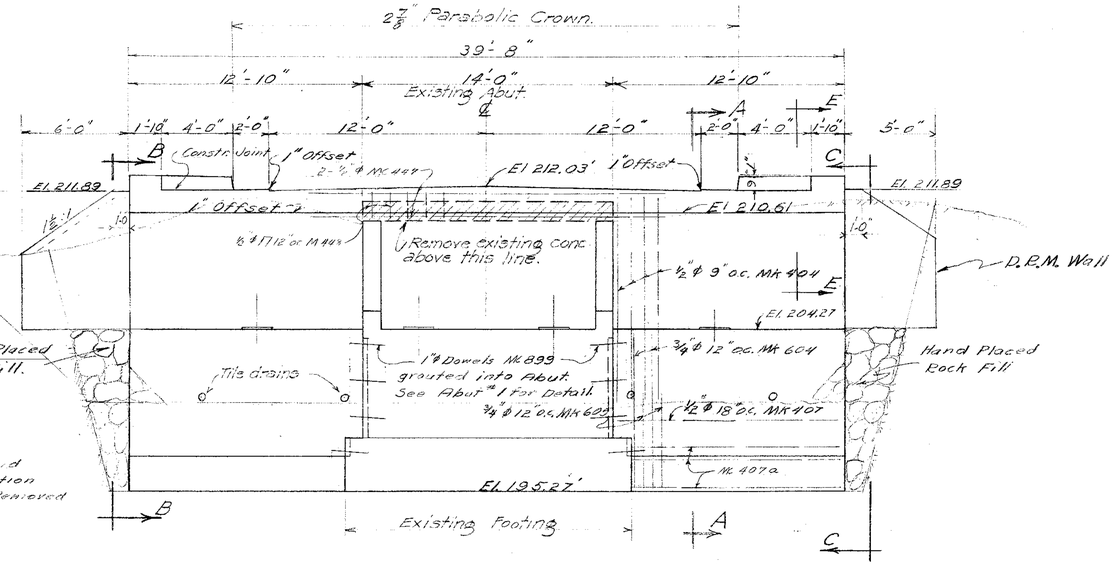
May 1949

SHEET No. 2 OF 11 SHEETS

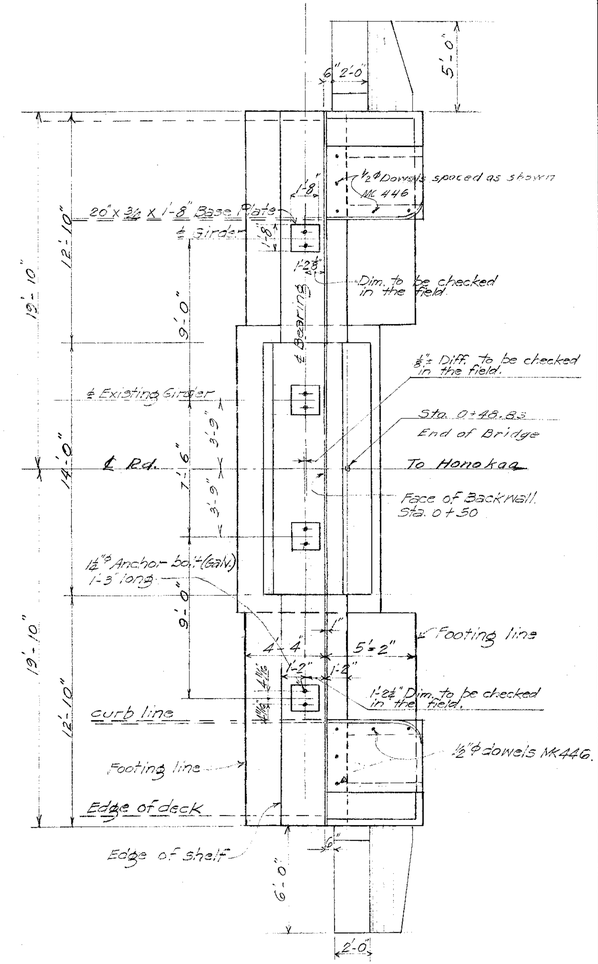
5468.65

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAWAII	SDR-3(13)	1950	66	304



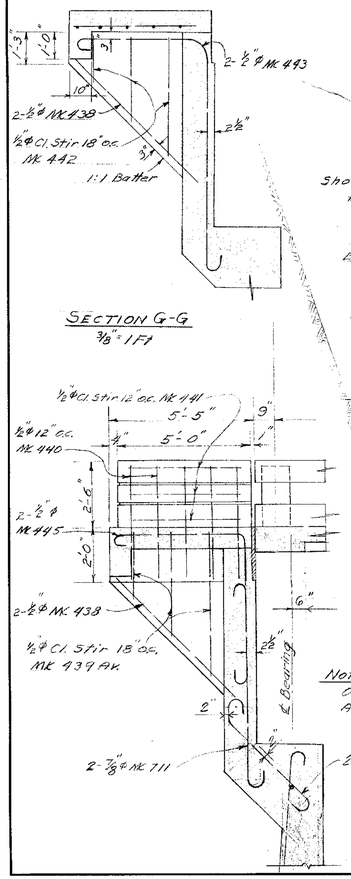


ABUTMENT NO 2 HONOKAA END
FRONT ELEVATION
¼" = 1 Ft.



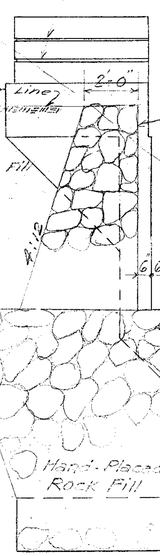
ABUTMENT NO 2 HONOKAA END
PLAN
¼" = 1 Ft.

Note: All concrete in Abutments to be Class A-1.

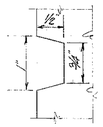


Note: Omit Bar 405 At This Section

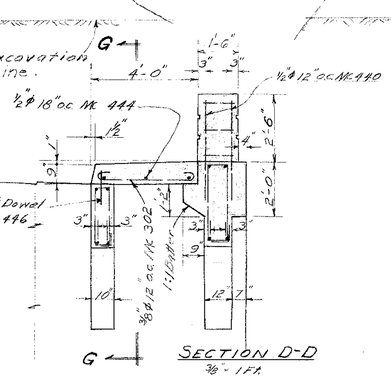
SECTION B-B
⅜" = 1 Ft.



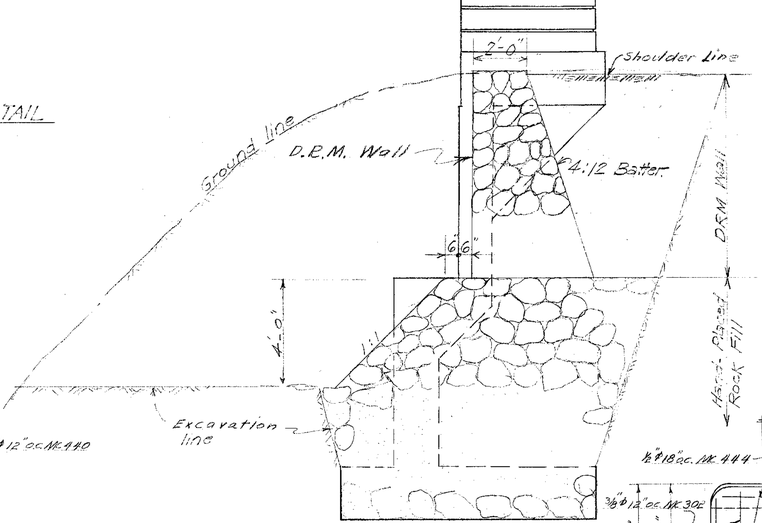
SECTION G-G
⅜" = 1 Ft.



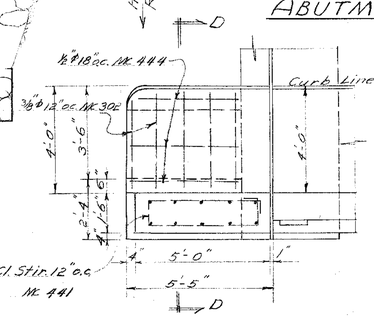
GROOVE DETAIL
¾" = 1'-0"



SECTION D-D
⅜" = 1 Ft.



SECTION C-C
⅜" = 1 Ft.



PLAN - END POST DETAIL
⅜" = 1 Ft.

TERRITORIAL HIGHWAY DEPARTMENT
TERRITORY OF HAWAII

NANUE BRIDGE
Sta. 0+48.83 to 5+80.16

Hawaii Belt Road SDR-3(13)

June 1949

SHEET No. 3 OF 11 SHEETS

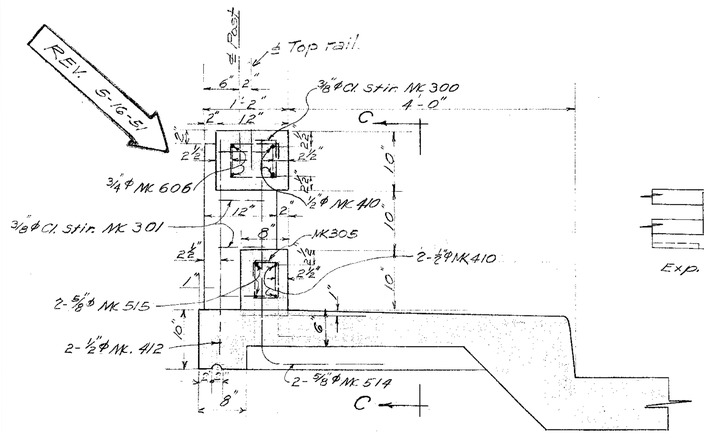
5468.66

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

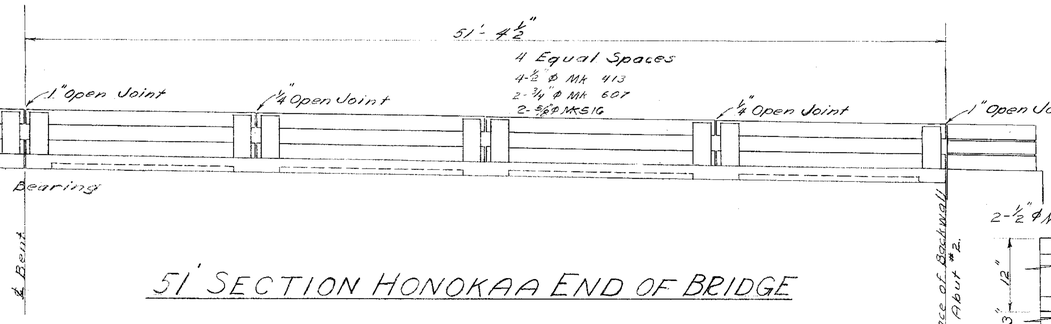
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAWAII	SDR-3(13)	1950	67	404

REV. 5-16-51 : Railing Posts shortened 2": Bottom Rail revised.

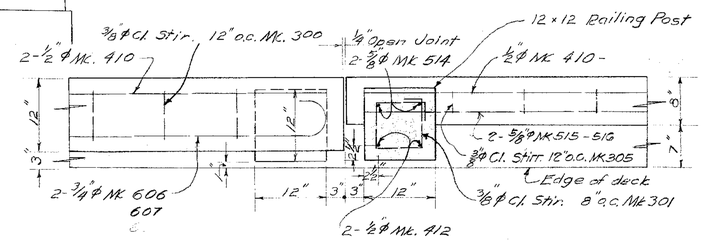
REV. 5-16-51



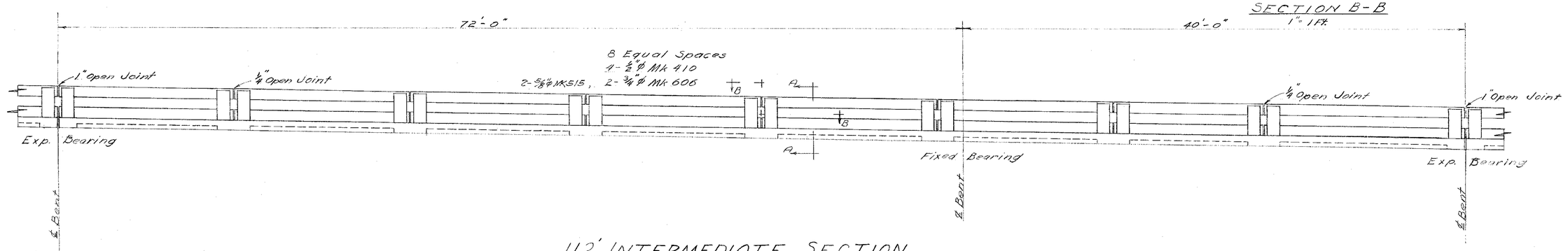
SECTION A-A
1" = 1 Ft.



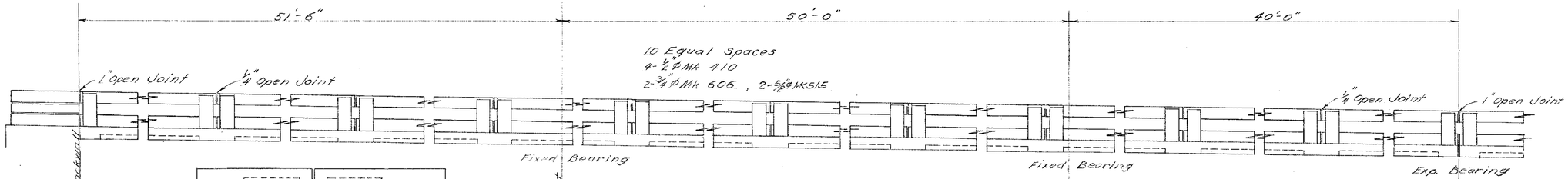
51' SECTION HONOKAA END OF BRIDGE



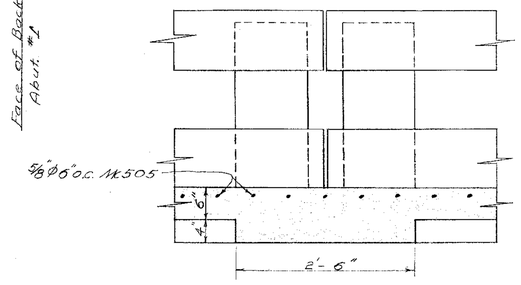
SECTION B-B
1" = 1 Ft.



112' INTERMEDIATE SECTION



141' SECTION HILO END OF BRIDGE



SECTION C-C
1" = 1 Ft.

RAILING LAYOUT (RIGHT)
1/4" = 1 Ft.

LEFT RAILING SIMILAR

Note: All concrete in Handrails and Posts to be Class A-1.

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

TERRITORIAL HIGHWAY DEPARTMENT
TERRITORY OF HAWAII

NANUE BRIDGE
Sta. 0+48.83 to 5+80.16

Hawaii Belt Road SDR-3(13)

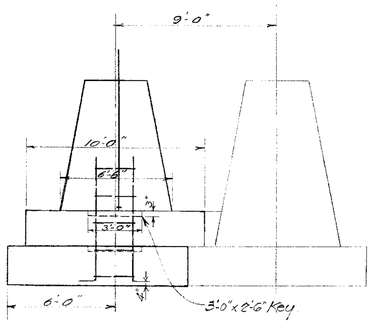
June 1949

SHEET No. 4 OF 11 SHEETS

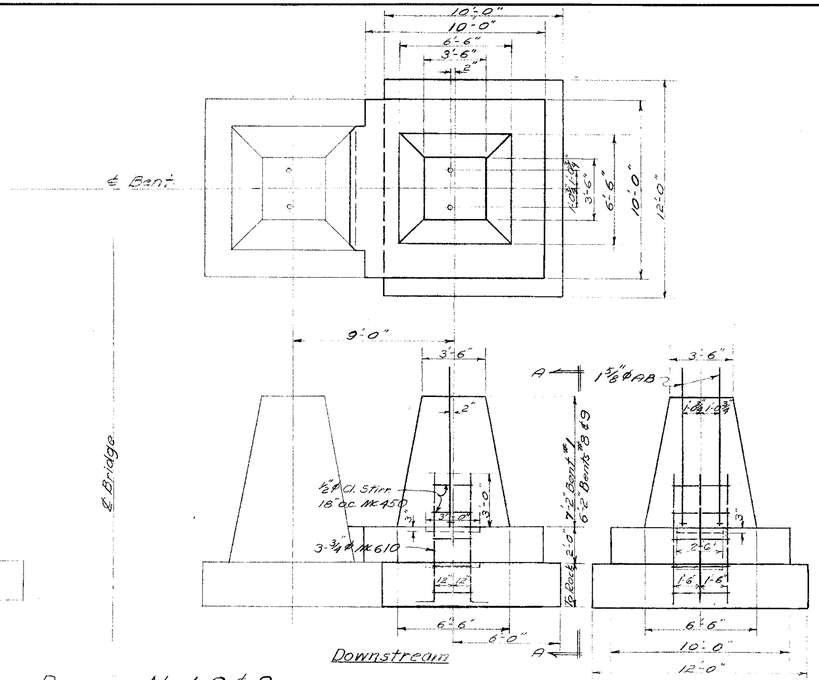
5468.67

67

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
Hawaii	Hawaii	SDR-3(13)	1950	68	104



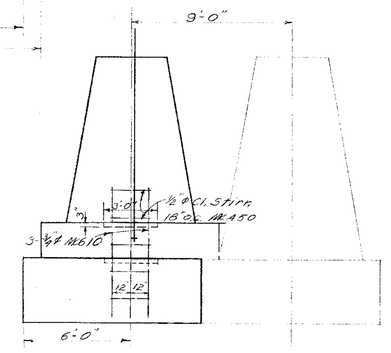
Upstream



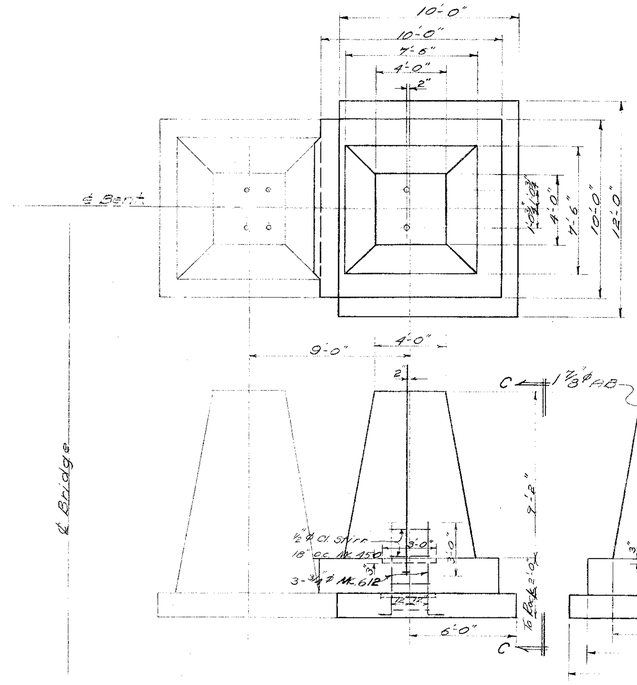
Downstream

ELEV. A-A

BENTS No 1, 8 & 9



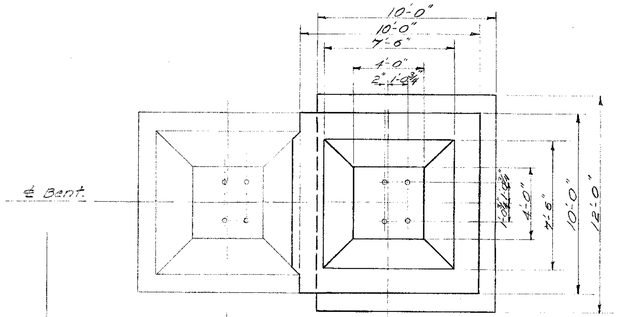
Upstream

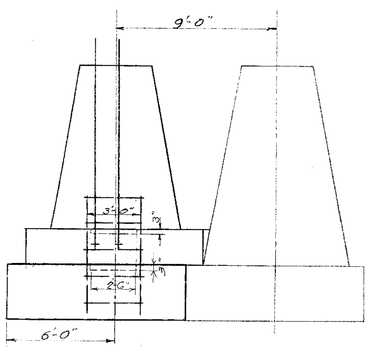


Downstream

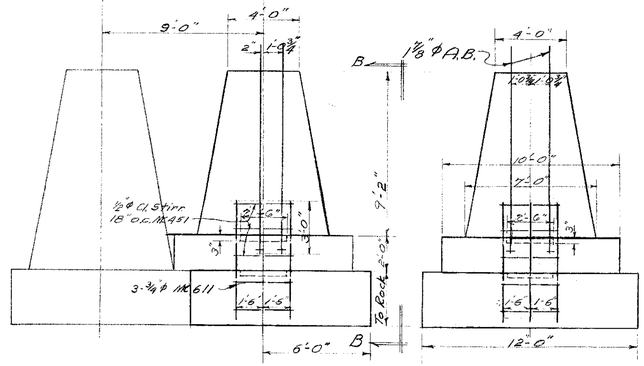
ELEV. C-C

BENT No. 7





Upstream



Downstream

ELEV. B-B

BENTS No. 2, 3 & 5

Note: All concrete in Piers to be Class B-2

TERRITORIAL HIGHWAY DEPARTMENT
TERRITORY OF HAWAII

NANUE BRIDGE
Sta. 0+48.83 to 5+80.16

Hawaii Belt Road SDR-3(13)

March 1950

SHEET No. 5 OF 11 SHEETS

546S.6S

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

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
Hawaii	Haw	(Deleted)	1950	6	304

REV. 5-16-51 ; Reinf. Steel Quant. changed. Hooks eliminated. Bottom rail reinf. revised. All bar deformations must conform to A.S.T.M.-A 305 12/12/50 1-5-51

ESTIMATED QUANTITIES

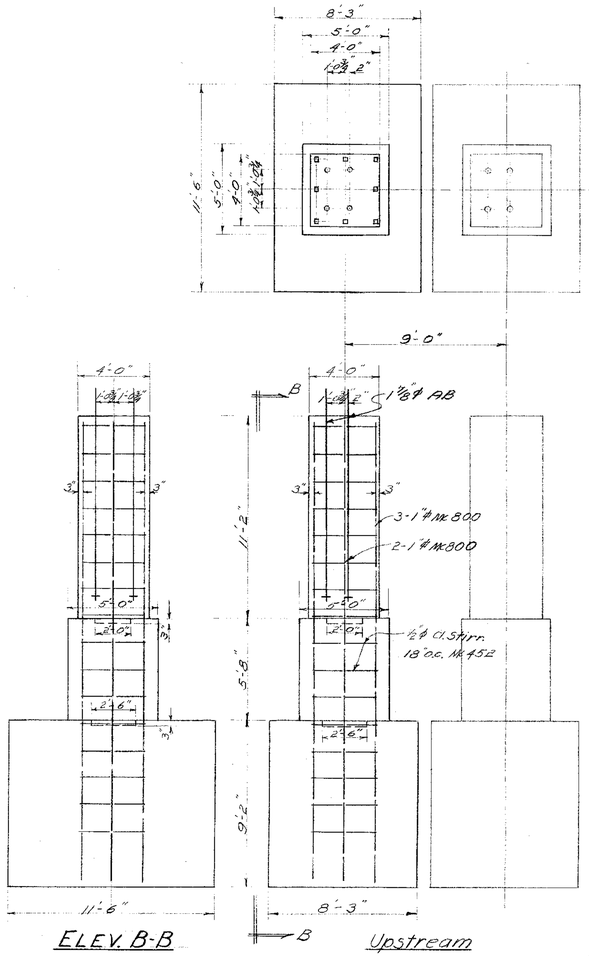
Item	Super-Structure	Railing & End Posts	Abutments No. 1	Abutments No. 2	PIERS	TOTAL
Class A-1 Conc.	580 cu. yds	69 cu. yds	42 cu. yds	42 cu. yds		733 cu. yds
Class B-2 Conc.					547 cu. yds	547 cu. yds
Struct. Excav.			200 cu. yds	265 cu. yds	1134 cu. yds	1599 cu. yds
Reinf. Steel	110,707 lbs	13,065 lbs	3,966 lbs	3,496 lbs	2,520 lbs	~~133,754~~ lbs
Dry Rubble Mas.			7.5 cu. yds	8 cu. yds		15.5 cu. yds
Hand placed Rock Fill			13 cu. yds	12 cu. yds		25 cu. yds
A. C. Pavement	82.21 Tons					82.21 Tons
REINF. STEEL	105,801 Lbs.	12,992 Lbs.	2,985 Lbs.	3,046 Lbs.	2,520 Lbs.	127,344 Lbs.

REV. 5-16-51

ESTIMATED QUANTITIES (Continued)

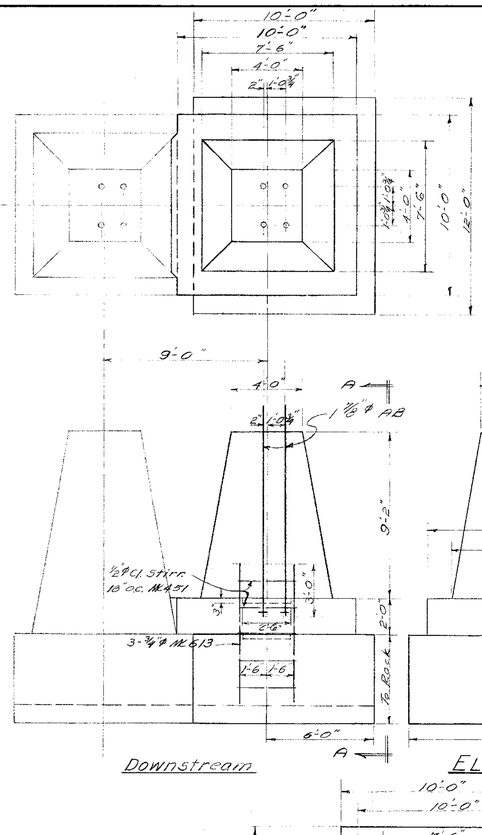
Item	Total
Furnishing, fabricating and erecting new steel.	122,870 #
Cleaning, fabricating and erecting salvaged steel.	969,250 #
Cleaning and applying 1st. coat of paint to steel in existing R.R. Bridge	1,046,000 #
Painting entire structure with two field coats of paint.	Lump sum
Removing and replacing ¾ ø x 2⅜ (Fire) rivets in tower bracing system	2000 pcs.
Removing and replacing ⅞ ø x 3⅛ (Fire) rivets	9200 pcs.
Removing damaged members from towers.	700 #

1-5-51



ELEV. B-B

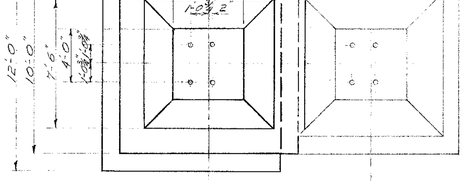
Upstream

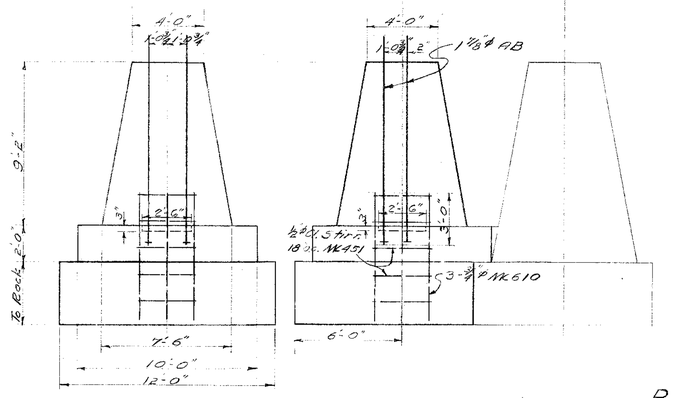


Downstream

ELEV. A-A

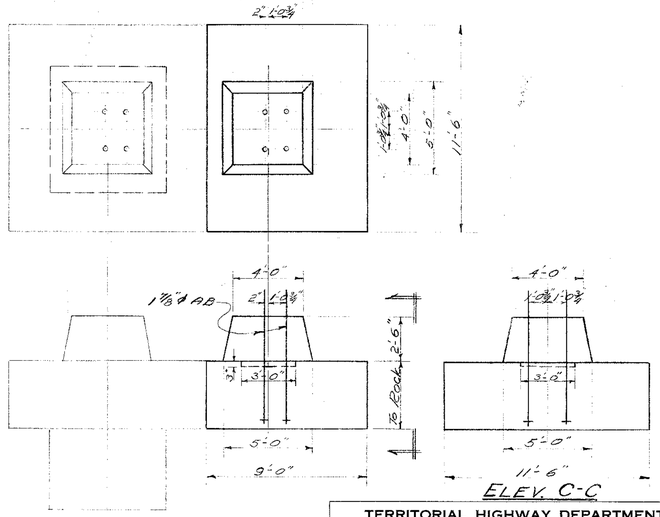
BENT No. 4





Upstream
Downstream

BENT No. 6



Downstream
Upstream

ELEV. C-C

TERRITORIAL HIGHWAY DEPARTMENT
TERRITORY OF HAWAII

NANUE BRIDGE
Sta. 0+48.83 to 5+80.16

Hawaii Belt Road SDR-3(13)

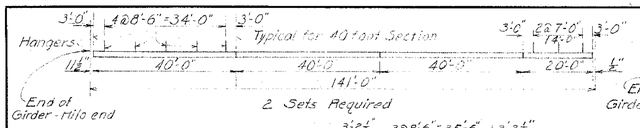
March 1950

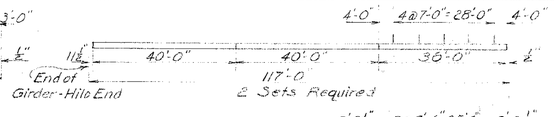
SHEET No. 6 OF 11 SHEETS

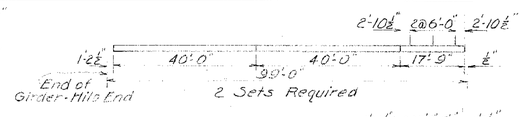
5468.69

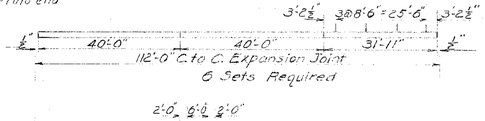
ORIGINAL PLAN	SURVEY PLOTTED BY ..... DATE .....
	TRACING CHECKED BY ..... " "
	DRAWN BY ..... " "
NOTE BOOK No.	TRACED BY ..... " "
	QUANTITIES BY ..... " "
	QUANTITIES CHECKED BY .....
	CHECKED BY .....

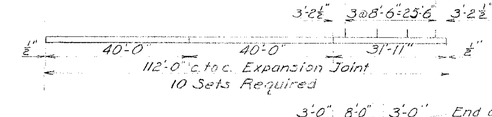
"KEUFFEL & ESSER" No. 1507 K & E CO., N. Y.
MADE IN U.S.A.



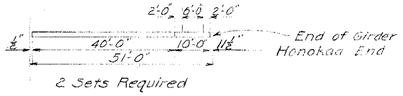


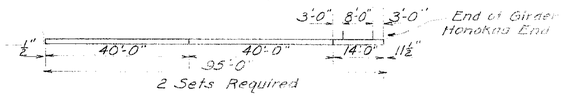


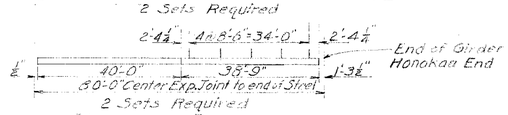












NANUE BRIDGE
Scale 1"=20'-0"

HAKALAU BRIDGE
Scale 1"=20'-0"

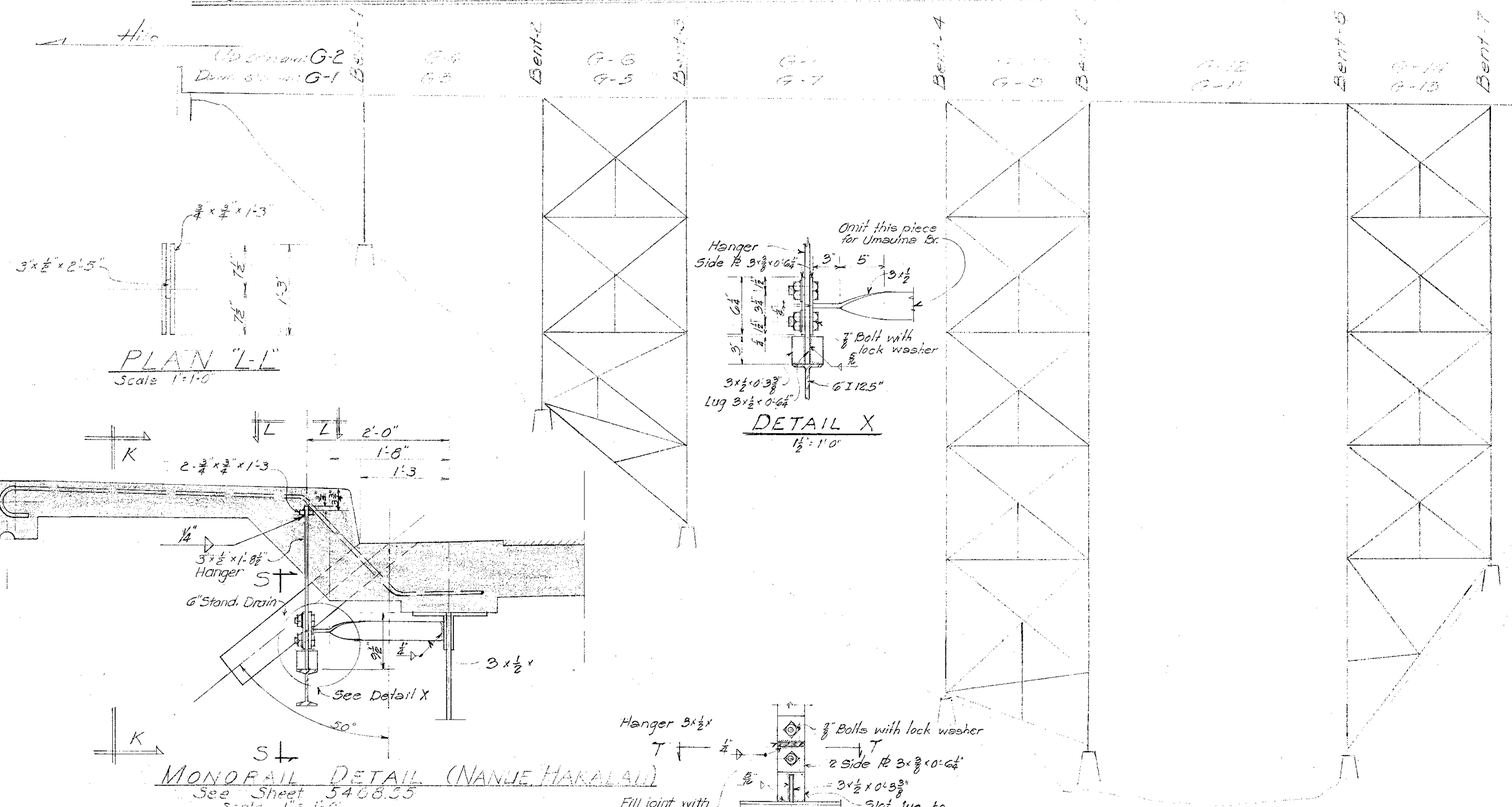
UMAUMA BRIDGE
Scale 1"=20'

LIST OF 6"I 12.5#				HANGERS	
BRIDGE	NO.	LENGTH	TOTAL LENGTH	No.	No.
UMAUMA	10	40'-0"	400'-0"		
"	2	18'-11"	37'-10"		
"	2	38'-9"	77'-6"		
"	2	17'-9"	35'-6"	72	
NANUE	20	40'-0"	800'-0"		
"	2	20'-0"	40'-0"		
"	6	31'-11"	191'-6"		
"	2	10'-0"	20'-0"		134
HAKALAU	28	40'-0"	1120'-0"		
"	2	36'-0"	72'-0"		
"	10	31'-11"	319'-2"		
"	2	14'-0"	28'-0"		194

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
Hawaii	Haw.	DR 3(13)	1950	70	904

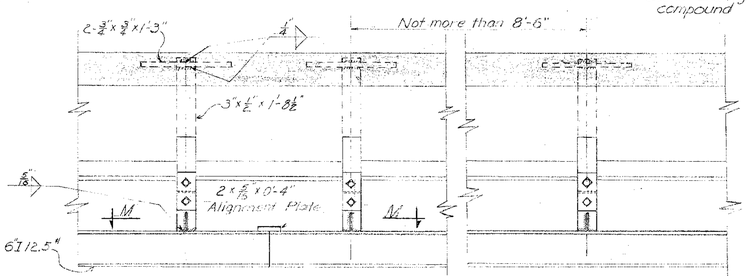
11/3/50
1/3/51

MONORAIL LENGTHS AND LOCATION OF HANGERS



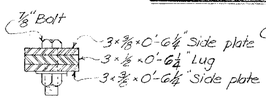
MONORAIL DETAIL (NANUE HAKALAU)
See Sheet 5468.35
Scale 1"=1'-0"

ELEV. S-S
1½"=1'-0"



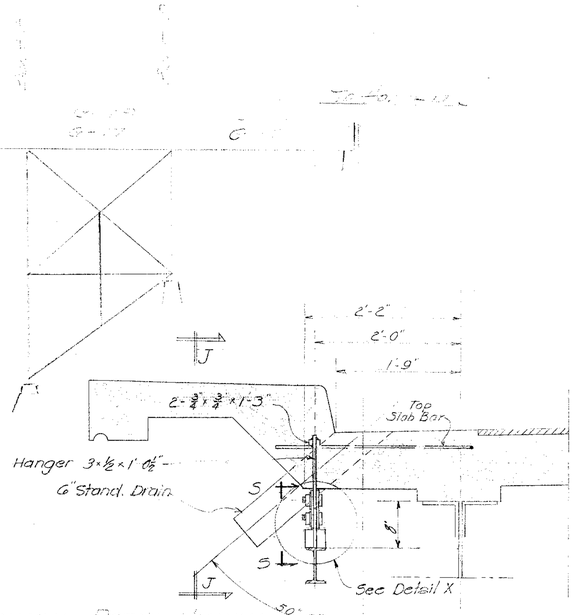
ELEVATION K-K
Scale 1"=1'-0"

ELEVATION - LOOKING UP STREAM

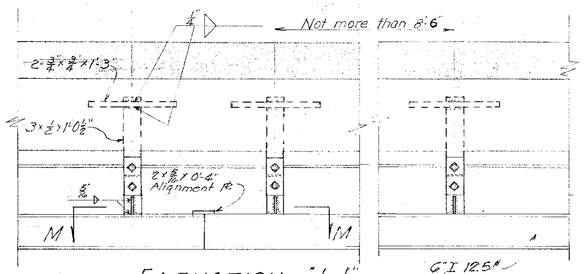


Condition survey of Bridge

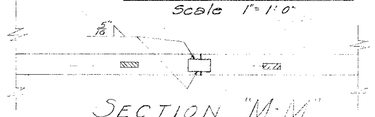
SECT. T-T
3"=1'-0"



MONORAIL DETAIL - UMAUMA
See Sheet 5468.35
Scale 1"=1'-0"



ELEVATION "J-J"
Scale 1"=1'-0"



SECTION "M-M"
Scale 1"=1'-0"

TERRITORIAL HIGHWAY DEPARTMENT
TERRITORY OF HAWAII

NANUE BRIDGE
Sta. 0+48.83 to 5+80.16

Hawaii Belt Road SDR 3(13)

May 1950

SHEET No. 7 OF 11 SHEETS

5468.70

ORIGINAL PLAN	NOTE BOOK No.	
SURVEY PLOTTED BY		DATE
DESIGNED BY		
DRAWN BY	J. Fujimoto	Aug. 1950
TRACED BY		
QUANTITIES BY	H. Dickinson	
QUANTITIES CHECKED BY		
CHECKED BY		11/3/50

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAWAII	SDI(3)3	1950	71	304

a To Hilo

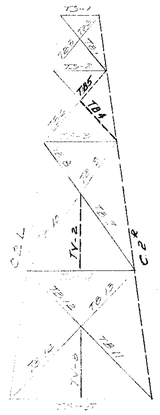
Bents: View looking Hilo

Tower Bracing: looking upstream

Bent 1

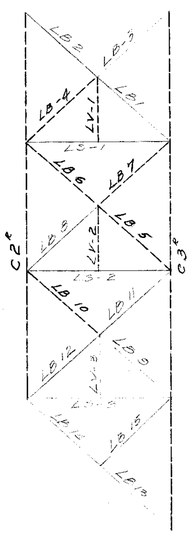


Bent 2

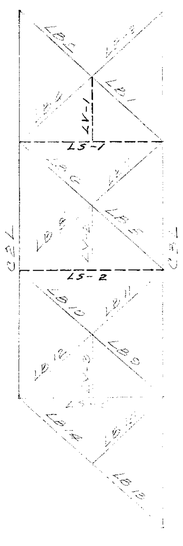


Tower Bracing – bent 2 - 3

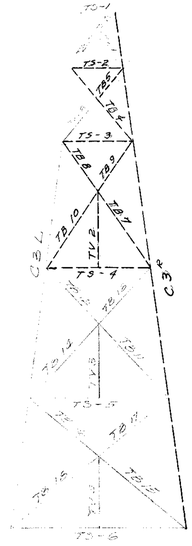
Down stream



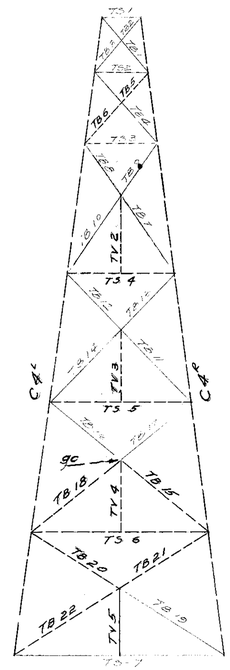
Up stream



Bent 3

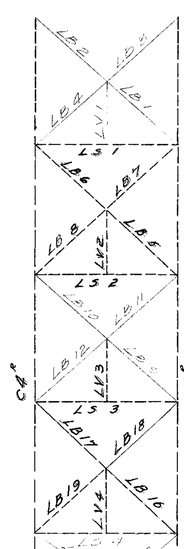


Bent 4

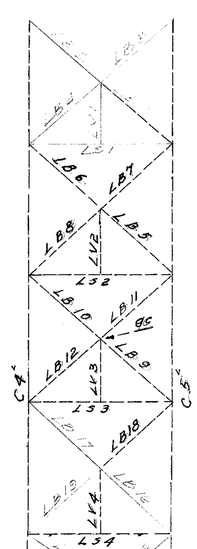


Tower Bracing – bent 4 - 5

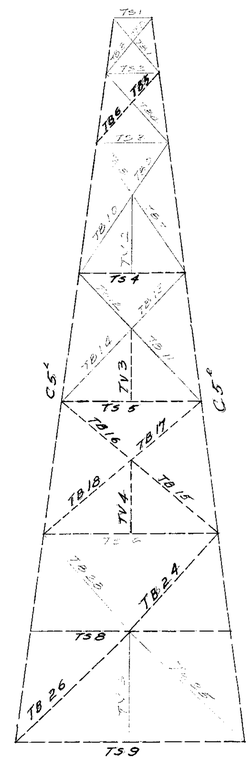
Down stream



Up stream



Bent 5



LIST OF CONDEMNED MEMBERS & PARTS

Bent 1

TS-1	3 rivets	3/4"	1 grip
	15 rivets	3/4"	2 grip
TS-2	3 "	3/4"	1 "
TS-3	10 "	"	"
TB-6	3 "	"	"

Bent 2

TS-4	2 rivets	3/4"	2 grip
TB-5	5 "	"	"
TV-2	2 "	"	"
C2R	6 "	7/8"	1 grip

Down stream

LB-4	3 rivets	7/8"	1 grip
LB-5	4 "	"	"
LB-6	4 "	"	"
LB-7	30 "	"	"
LB-10	4 "	"	"
LV-1	4 "	"	"
LV-2	4 "	"	"

Up stream

LV-1	5 rivets	7/8"	1 grip
LS-1	12 "	7/8"	1 grip
LS-2	20 "	"	"

Bent 3

TS-2	14 rivets	7/8"	1 grip
	4 "	3/4"	1 "
TS-3	5 "	3/4"	1 grip
TS-4	10 "	"	"
TB-4	6 "	3/4"	1 "
TB-5	4 "	"	"
TB-7	3 "	"	"
TB-8	1 "	"	"
TB-9	1 "	"	"
TB-10	2 "	"	"
TV-2	3 "	"	"
C3R	6 "	7/8"	1 grip

Bent 4

TS-4	20 rivets	7/8"	1 grip
TS-5	30 "	"	"
TS-6	40 "	"	"
TB-4	12 "	3/4"	2 grip
TB-6	10 "	"	"
TB-12	5 "	"	"
TB-13	10 "	"	"
TB-20	10 "	"	"
TB-21	10 "	"	"
TB-22	Entirely Bent		
TV-2	12 rivets	7/8"	1 grip
TV-3	10 "	"	"
TV-4	2 "	"	"
TV-5	Replace entire member		
C4R	50 rivets	7/8"	1 grip
C4L	66 "	7/8"	2 grip
	20 "	3/4"	1 grip

Down stream

LS-1	30 rivets	7/8"	1 grip
LS-2	40 "	"	"
LS-3	50 "	"	"
LS-4	30 "	"	"
LS-5	3 "	"	"
LB-5	30 "	7/8"	2 grip
LB-6	20 "	"	"
LB-7	22 "	"	"
LB-8	30 "	"	"
LB-16	15 "	"	"
LB-17	15 "	"	"
LB-18	15 "	"	"
LB-24	10 "	"	1 grip
LB-25	10 "	"	1 grip
LV-2	10 "	"	2 grip
LV-3	10 "	"	"
LV-4	12 "	"	"
gc	replace gusset plates		

Up stream

LB-1	6 rivets	7/8"	1 grip
LB-5	22 "	"	"
LB-6	18 "	"	"
LB-7	16 "	"	"
LB-8	22 "	"	"
LB-9	10 "	"	"
LB-10	18 "	"	"
LB-11	23 "	"	"
LB-12	9 "	"	"
LB-18	4 "	"	"
LB-19	6 "	3/4"	1 grip
LB-20	6 "	"	"
LS-2	40 "	"	1 grip
LS-3	40 "	"	"
LS-4	40 "	"	"
LV-3	7 "	"	"
LV-4	6 "	"	"
gc	replace gusset plates		

Bent 5

TB-5	6 rivets	7/8"	1 grip
TB-6	6 rivets	"	"
TB-15	10 rivets	"	"
TB-16	6 "	"	"
TB-17	4 "	"	"
TB-18	10 "	"	"
TB-24	5 "	"	"
TB-25	1 "	"	"
TB-26	12 "	"	"
TS-5	20 "	"	"
	13 rivets	7/8"	2 grip
	4 "	3/4"	1 grip
TS-6	30 "	"	"
TS-8	36 "	"	"
C5L	14 "	7/8"	1 grip
	20 "	1"	1 1/4" grip
C5R	85 "	1"	"
	20 "	7/8"	2 grip

Condition survey of Bridge

TERRITORIAL HIGHWAY DEPARTMENT
TERRITORY OF HAWAII

NANUE BRIDGE
Sta. 0+48.83 to 5+80.16

Hawaii Belt Road SDR 3(13)

May 1950

SHEET No. 8 OF 11 SHEETS

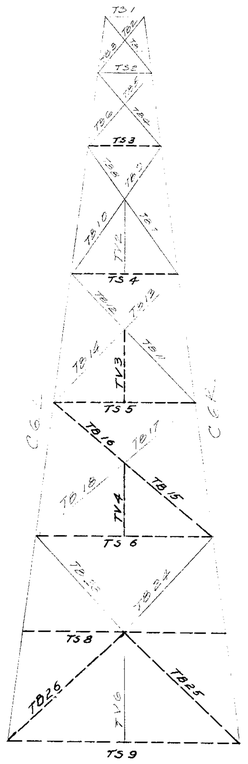
ORIGINAL PLAN	
	SURVEY PLOTTED BY:
	DESIGNED BY:
	DRAWN BY:
	TRACED BY:
NOTE BOOK	QUANTITIES BY:
No.	QUANTITIES CHECKED BY:
	CHECKED BY:
	DATE

5468.71

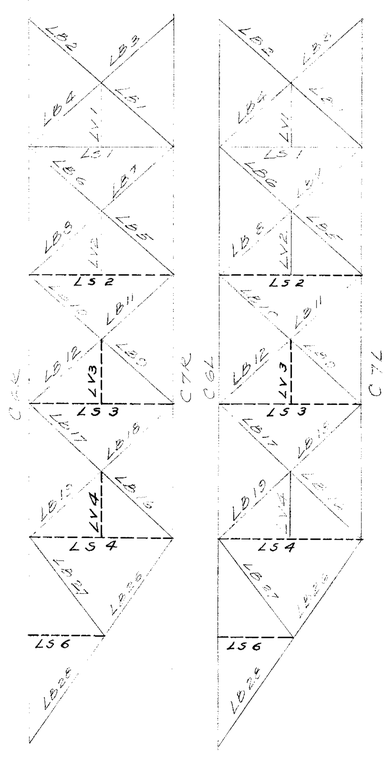
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
Hawaii	Hawaii	SDR 3(13)	1950	72	704

← To Hilo

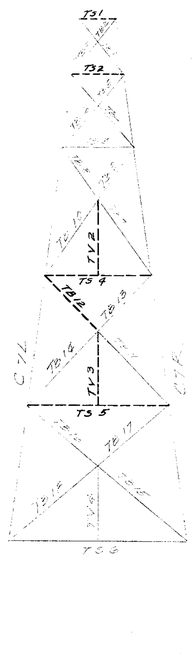
Bent 8



Tower Bracing Bent 6 & 7
Down stream Up stream



Bent 7



Bent 6

TS - 3	6 rivets	7/8"	- 1 grip
TS - 4	20 "	"	"
TS - 5	12 "	"	"
TS - 6	60 "	"	"
TS - 8	75 "	"	"
TS - 9	40 "	"	"
TB - 15	slightly bent		
TB - 16			
TB - 25	4 rivets	7/8"	- 3/4 grip
TB - 26	6 "	"	"
TV - 3	4 "	"	"
TV - 4	6 "	"	"

Down stream

LB - 2	16 rivets	1"	grip
LB - 3	24 "	"	"
LB - 4	24 "	"	"
LB - 6	12 "	"	"
LV - 3	6 "	3/4"	grip
LV - 4	6 "	"	"

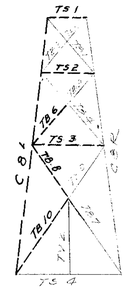
Up stream

LB - 2	8 rivets	1"	grip
LB - 3	20 "	"	"
LB - 4	20 "	"	"
LB - 6	12 "	"	"
LV - 3	6 "	3/4"	grip

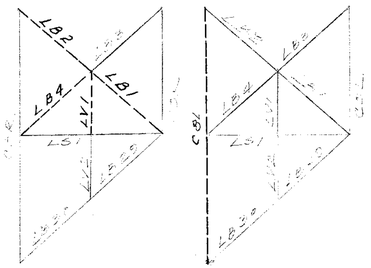
Bent 7

TS - 1	4 rivets	3/4"	- 1 grip
TS - 2	6 "	"	"
TS - 4	30 "	"	"
TS - 5	12 "	"	"
TV - 3	4 "	"	"
TV - 4	6 "	"	"

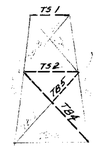
Bent 9



Down stream Up stream



Bent 9



Bent 8

TS-1	6 rivets	7/8"	- 1 grip
TS-2	12 rivets	"	"
TS-3	10 "	"	"
TS-6	6 "	7/8"	- 3/4 grip
TB-8	10 "	"	"
TB-10	4 "	"	"
C8L	10 - 7/8 - 1" grip		

Down stream

LB-1	6 rivets	7/8"	- 3/4" grip
LB-2	4 "	"	"
LB-4	6 "	"	"
LV-1	4 "	"	"

Up stream

None

Bent 9

TS-1	6 rivets	7/8"	- 1 grip
TB-2	30 rivets	"	"
TB-5	15 "	"	3/4" grip
TB-5	6 "	"	"

ORIGINAL PLAN

NOTE BOOK No.

SURVEY PLOTTED BY ..... DATE .....
TRACED BY .....
DRAWN BY .....
CHECKED BY .....
QUANTITIES BY .....
QUANTITIES CHECKED BY .....
CHECKED BY .....

Condition survey of Bridge

TERRITORIAL HIGHWAY DEPARTMENT
TERRITORY OF HAWAII

NANUE BRIDGE
Sta. 0+48.83 to 5+80.16

Hawaii Belt Road SDR 3(13)

May 1950

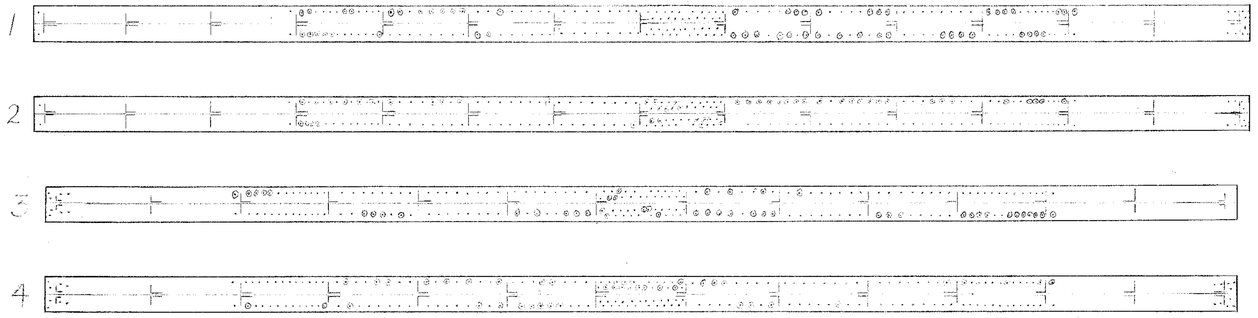
SHEET No. 9 OF 11 SHEETS

54GS.72

72

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	SDR(3)	1950	73	304

To Hilo



PLAN - BOTTOM FLANGE

GIRDERS NOT SHOWN FOR INC COVER PLATES - NO CHANGE -

SUMMARY OF RIVETS TO BE REPLACED

Dia.	Length	Grip	No.	Sav.
7/8"	2 3/8"	1 1/8"	328	410
7/8"	3 1/4"	1 7/8"	148	180
7/8"	3 7/8"	2 1/4"	71	90
7/8"	4"	2 1/4"	44	60
7/8"	5 1/8"	3 1/4"	38	70

Use Last Col. (sav) 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 Col to Girder Connection

Dia	Length	Grip	No
7/8"	3"	1 5/8	120

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	Grip	No
7/8"	2 5/8"	1 1/8"	1020
7/8"	3 1/4"	1 5/8"	1010
7/8"	3 7/8"	2 1/8"	230
7/8"	4"	2 1/4"	120
7/8"	5 1/8"	3 1/4"	290

- Legend -

• (circle) indicates rivet

⊙ (circled dot) is, for this condemned rivet

Condition survey of Bridge

TERRITORIAL HIGHWAY DEPARTMENT
TERRITORY OF HAWAII
NANUE BRIDGE
Sta. 0+48.33 to 5+80.16
Hawaii Belt Road SDR 3(13)
May 1950

SHEET No. 10 OF 11 SHEETS

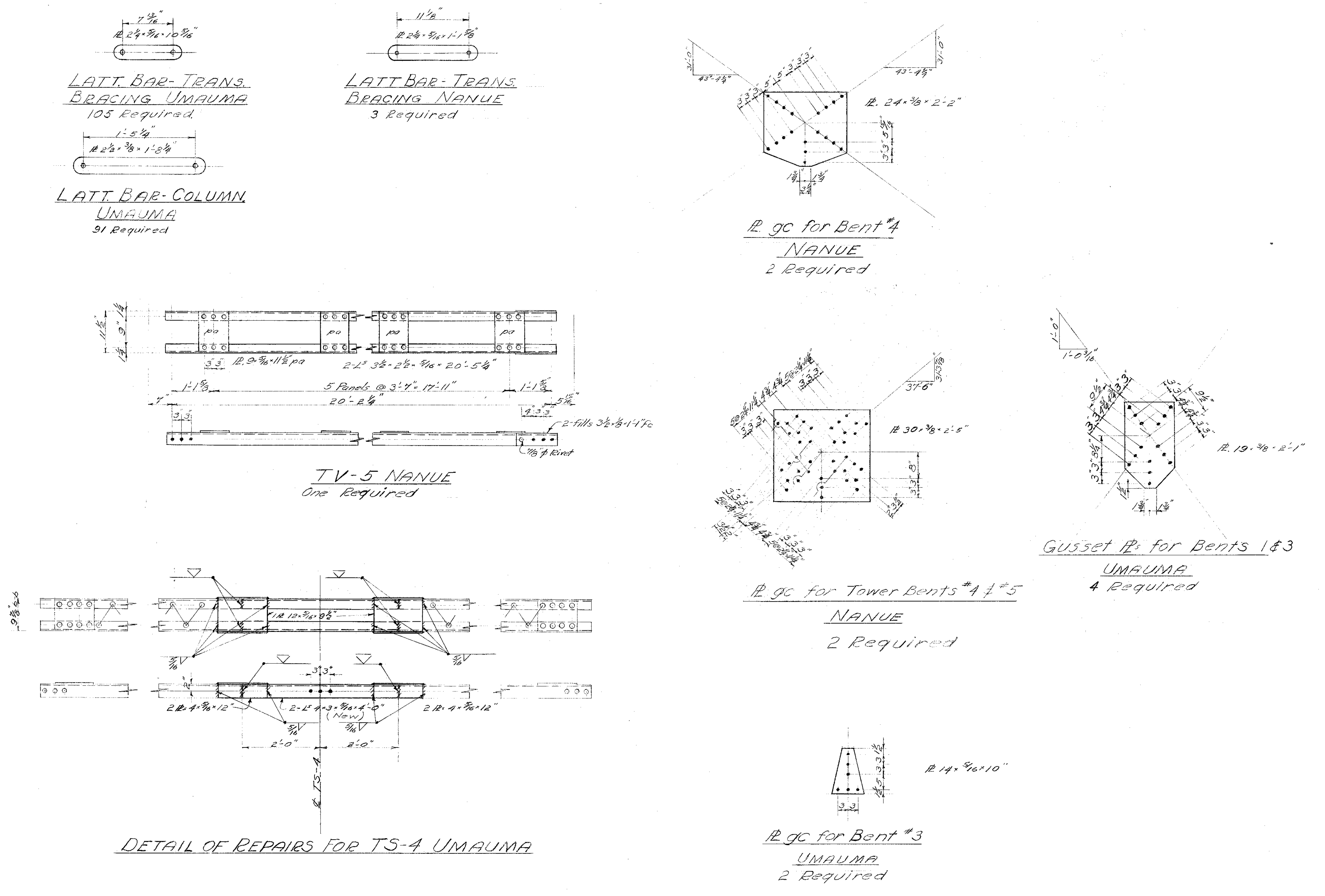
5468.73

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

KEUFFEL & ESSER CO., N.Y. No. 1967

73

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
Hawaii	Haw	[illegible]	1950	74	304



Note! All replacements for condemned pieces and members, and repairs shall be new steel.

TERRITORIAL HIGHWAY DEPARTMENT
TERRITORY OF HAWAII
NANUE BRIDGE
Sta. 0+48.83 to 5+80.16
UMAUMA BRIDGE
Sta. 100+46.73 to 103+25.38
Hawaii Belt Road SDR-3(13)
Feb. 1950

SHEET No. 11 OF 11 SHEETS

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

5468.74

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
Hawaii	Haw	702(3)(4)	1950	75	304

Nov. 1, 1950 12/15/50

Order No. 3807 Sheet No. E1E

528'-0"

51'-0" | 50'-0" | 40'-0" | 72'-0" | 40'-0" | 72'-0" | 40'-0" | 72'-0" | 40'-0" | 51'-0"

TO HILO

TO DAAUILO

A1X | A1 | B4 | B4X | G6 | G9 | G7 | G6 | B4 | B4X | G6 | G9 | G7 | G6 | A2 | A1

EXP. FIX. FIX. FIX. 2-CPI EXP. FIX. 2-CPI EXP. FIX. 2-CPI EXP. FIX. 2-CPI EXP. FIX.

C2E C1E C1W C2W

4-SP5 / 8-SP7 — TC2E, TC3E, TC4E, TC1E, TC1W

4-SP5 / 8-SP7 — MD2E, MD3E, MD4E, MD3W

4-SP5 / 8-SP9 — MC3E

4-SP5 / 8-SP8 — BC4 (INT) BC4 (EXT)

4-SP5 / 8-SP7 — MC4E

4-SP5 / 8-SP9 — MC4W

4-SP5 / 8-SP8 — MB5E

4-SP5 / 8-SP8 — BC4E

4-SP5 / 8-SP9 — BC3E

DB31-E DB33-E DB34-E DB35-E DB36-E DB37-E DB38-E DB39-E DB40-E DB41-E DB42-E DB43-E DB44-E DB45-E DB46-E DB47-E DB48-E DB49-E DB50-E DB51-E DB52-E DB53-E DB54-E DB55-E DB56-E DB57-E DB58-E DB59-E DB60-E DB61-E DB62-E DB63-E DB64-E DB65-E DB66-E DB67-E

LB5A LB5 LB4 LP28 LP27 LH3 LH2 LS4

TO BE FLUSH WITH EDGE OF VERTICAL LEG IN INTERMEDIATE CROSS FRAMES

CONN DET FOR STRUT — STS-E, TYP

CONN DET FOR STRUT — STS-E, TYP

NEW PL — 2-NEW PL

EAST ELEVATION

NOTE: These pieces are not available. See sheets 5468.75A, 5468.75B and 5468.75C for details.

NOTE: PIECES LISTED BELOW ARE LOCATED ON THE EAST & WEST SIDES OF THE TOWERS. NO REVAMPING IS REQ'D ON THIS MAT'L.

No. REQ'D	PIECE MARK	BRIDGE TAKEN FROM:
48	LB4	32 - KEALAHAKA 16 - MAILE
12	LB5	4 - KEALAHAKA 8 - MAILE
12	LB5A	4 - KEALAHAKA 8 - MAILE
18	LS4	10 - KEALAHAKA 8 - MAILE
12	LH2	8 - KEALAHAKA 4 - MAILE
6	LH3	2 - KEALAHAKA 4 - MAILE
24	LP27	16 - KEALAHAKA 8 - MAILE
12	LP28	8 - KEALAHAKA 4 - MAILE
84	SP5	64 - KEALAHAKA 20 MAILE
112	SP7	72 KEALAHAKA 40 MAILE
24	SP8	24 KEALAHAKA
32	SP9	32 KEALAHAKA

NOTE: BEAMS B1-E & B2-E ARE TO BE FIELD WELDED TO GIRDER AT EXPANSION JOINTS & AT ENDS OF BRIDGE ONLY.

HIGH WATER

NORMAL WATER

(EXCAVATION)

1 2 3 4 5 6 7 8 9

KAULA — HALE — KAULA — MAILE

A1X | A1 | B4 | B4X | G6 | G9 | G7 | G6 | B4 | B4X | G6 | G9 | G7 | G6 | B2 | B1

A-4 | A4X | G5 | G10 | G8 | G5 | A4 | A4X | G5 | G10 | G8 | G5 | B-2 | B-1

1 BEAM B1-E
2 BEAMS B2-E

2 BEAMS B1-E
4 BEAMS B2-E

1 BEAM B1-E
2 BEAMS B1-E & 4 BEAMS B2-E

PLAN

2 BEAMS B1-E
4 BEAMS B2-E

2 BEAMS B1-E
4 BEAMS B2-E

4 #8's FP | 4 #8's FP | 4 #8's EP | 4 #8's FP | 4 #8's EP | 4 #8's FP | 4 #8's EP | 4 #8's FP | 4 #8's EP

Rivets: A-2 / A-1
Holes:
Paint:

ERECTION PLAN
NANUE BRIDGE
HAWAII ISLAND, T. H.

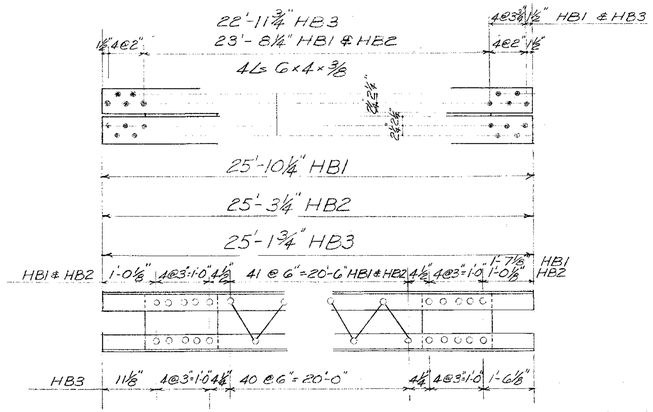
INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY	[illegible]	1-20-50	ORDER NO.	3807
CHECKED BY	RA	2-20-50	SHEET NO.	E1E

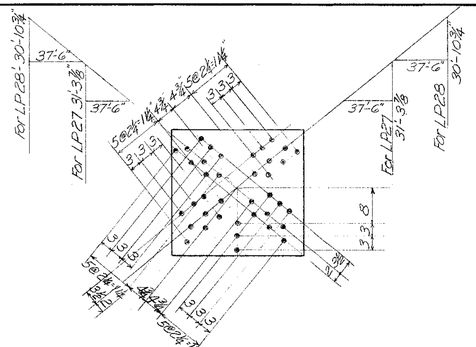
5468.75

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HWA-1	Hawaii	SDR-3(13)	1980	75A	304

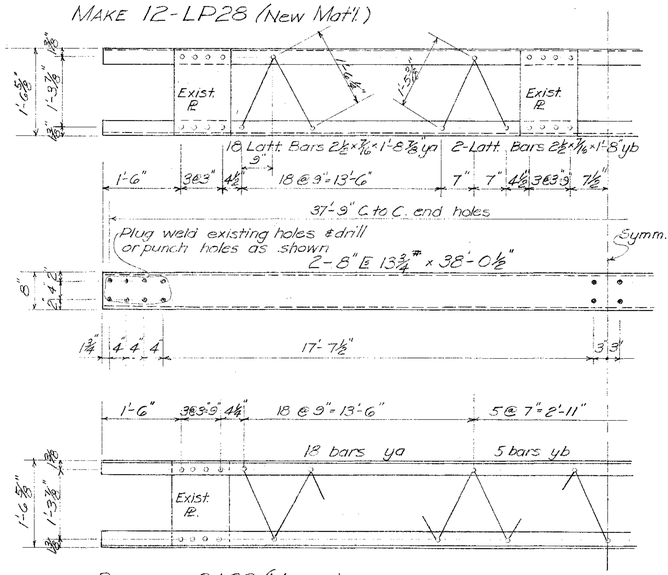
Inserted 12/19/80



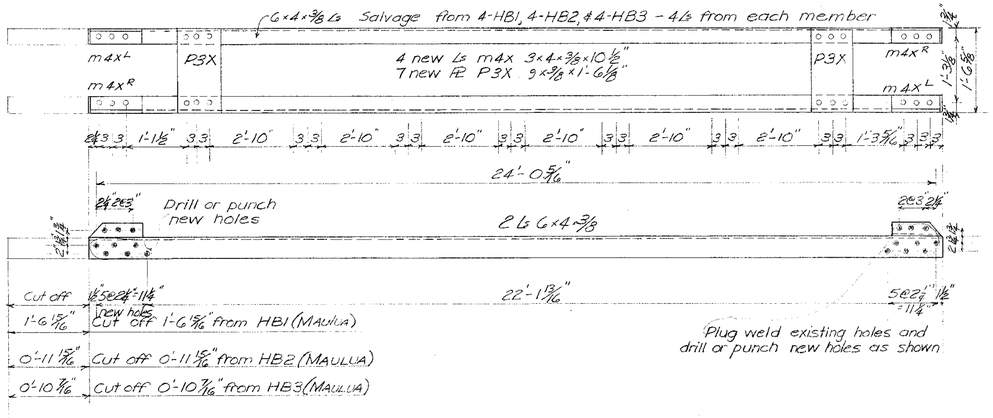
REVAMP 4-HB1, 4-HB2, 4-HB3 (MAULUA) AS SHOWN BELOW



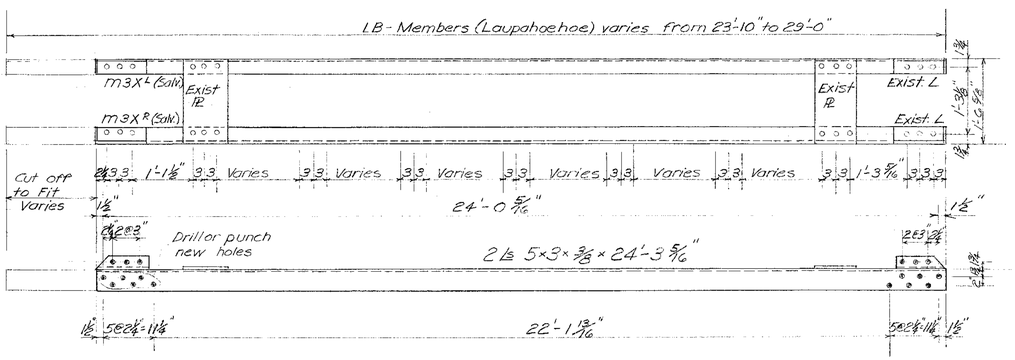
MAKE 24-LP27 (New Mat'l.)
MAKE 12-LP28 (New Mat'l.)



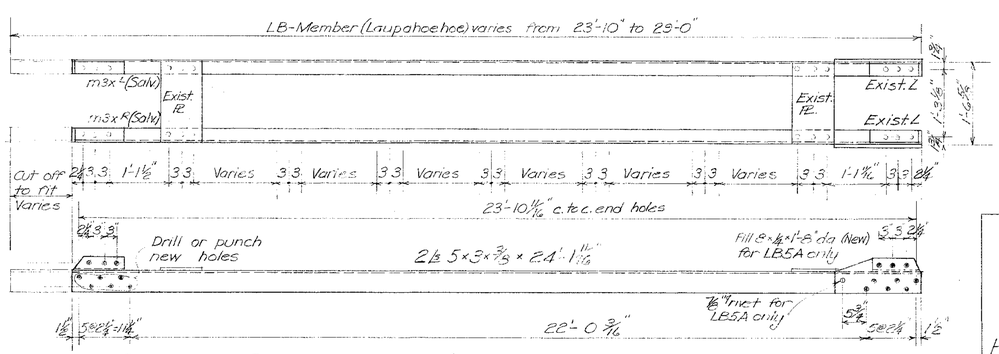
REVAMP 2 LS3 (MAULUA)
DO 2 LS7 (LAUPAHOEHOE) } MAKES 10 LS4
DO 6 LS3 (LAUPAHOEHOE)



REVAMP 4-HB1 (MAULUA)
REVAMP 4-HB2 (MAULUA) } MAKES-24- LB4
REVAMP 4-HB3 (MAULUA)



REVAMP 15-LB-MEMBERS (LAUPAHOEHOE) MAKES 15-LB4



REVAMP 12 LB-MEMBERS (LAUPAHOEHOE) MAKES 12-LB5
DO DO DO DO DO MAKES 12-LB5A

NOTE: For LB Members that are 23'-10" c. to c. end holes, butt-weld a required length of angle & revamp as shown.

BILL OF MATERIAL

NO.	Description	Length Ft.	In.	Mark	Remarks
NOTE: REVAMP THE MATERIAL LISTED BELOW AS ON THE DETAILS					
4	BRACE	25	10¼	HB1	MAULUA
4	DC	25	3¼	HB2	
4	DO	25	1¾	HB3	
39	DO			LB Members (LAUP.)	
2	STRUT	40	0⅛	LS3	MAULUA
2	DO	40	0⅛	LS7	LAUPAHOEHOE
6	DO	40	0⅛	LS3	DO
78	L 3×3×⅜	0	10⅛	m3X[L]	
NEW MATERIAL IS LISTED BELOW.					
168	PL 9×⅜	1	6⅛	P3X	
96	L 3×4×⅜	0	10⅛	m4X	
24	PL 8×½	1	8	da	
24	PL 30×⅜	2	5	LP27	
12	PL 30×⅜	2	6	LP28	

THE FOLLOWING SALVAGED MATERIAL REQUIRES NO REVAMPING:
9 LB4 (KEALAKAHA) - MAKES 9-LB4
3 LS1 (MAULUA) - MAKES 3-LS4
5 LS4 (LAUPAHOEHOE) MAKES 5-LS4

NOTE:
Rivets ¾" ℄
Holes 13/16" ℄
All typical holes 13/16" ℄

TERRITORIAL HIGHWAY DEPARTMENT
TERRITORY OF HAWAII

NANUE BRIDGE
STA. 0+48.23 TO 5+80.16
HAWAII BELT ROAD SDR 3(13)

SHEET No. OF SHEETS

5468.75A

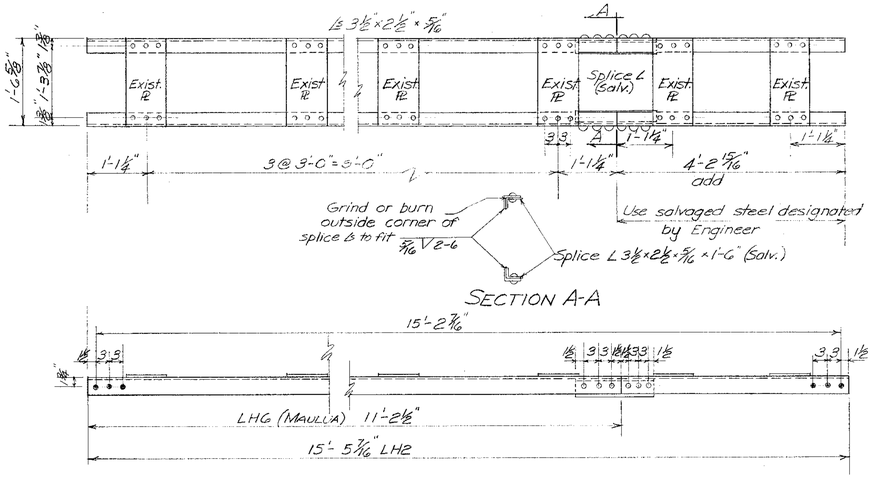
ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
	DESIGNED BY	" "
	DRAWN BY	" "
	TRACED BY	" "
NOTE BOOK	QUANTITIES BY	" "
No.	CHECKED BY	" "

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	SDR3(13)	1950	75B	304

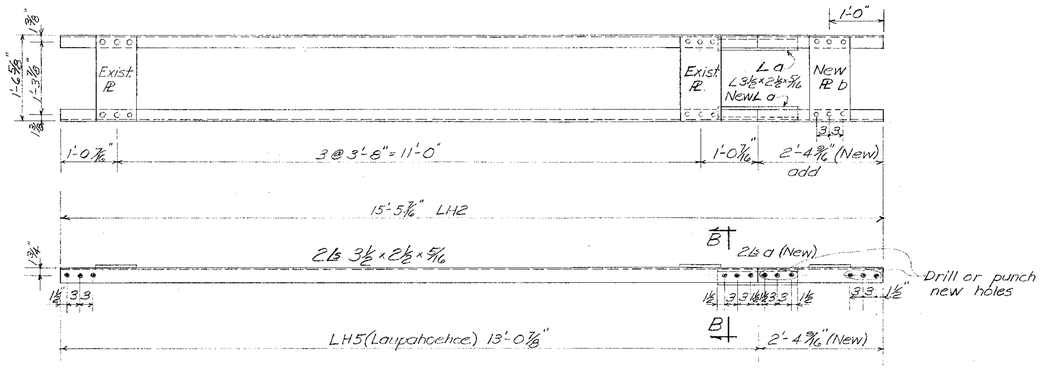
Inserted 12/19/50

BILL OF MATERIAL

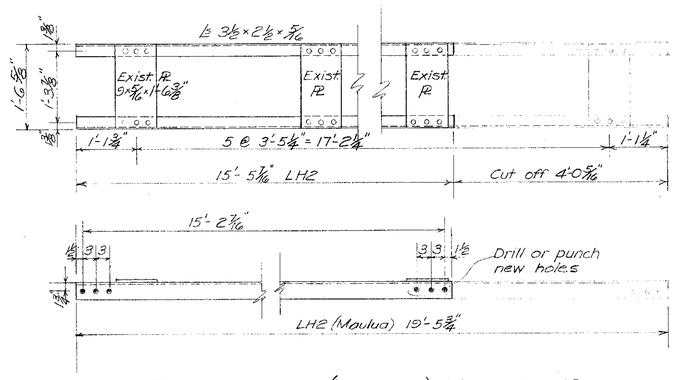
NO.	DESCRIPTION	LENGTH FT.	LENGTH IN.	MARK	REMARKS
NOTE: REVAMP THE MATERIAL LISTED BELOW AS ON THE DETAILS					
2	HANGARS	11	2½	LHG	MAULUA
1	DO	19	5¾	LH2	DO
6	DO	12	7¼	LH2	LAUPAHOEHOE
2	DO	13	0⅞	LH5	DO
1	DO	15	6⅛	LHG	DO
2	BRACE	18	3⅜	TB28H	MAULUA
2	DO	32	4⅛	TB31H	DO
2	DO	12	8⅝	TBGH	DO
NEW MATERIAL IS LISTED BELOW:					
16	L 3½×2½×5/16	1	6	a	
8	PL 9×5/16	1	6⅛	b	
6	L 4×3×5/16	2	0	c	



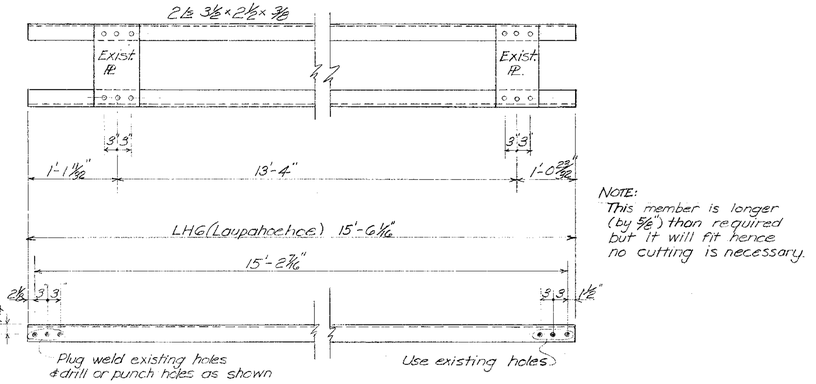
REVAMP 2 LHG (MAULUA) - MAKES 2-LH2



REVAMP 2-LH5 (LAUP.) - MAKES 2-LH2

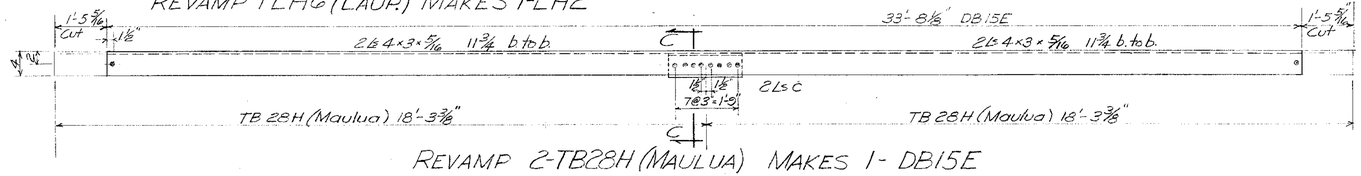


REVAMP 1 LH2 (MAULUA) - MAKES 1 LH2

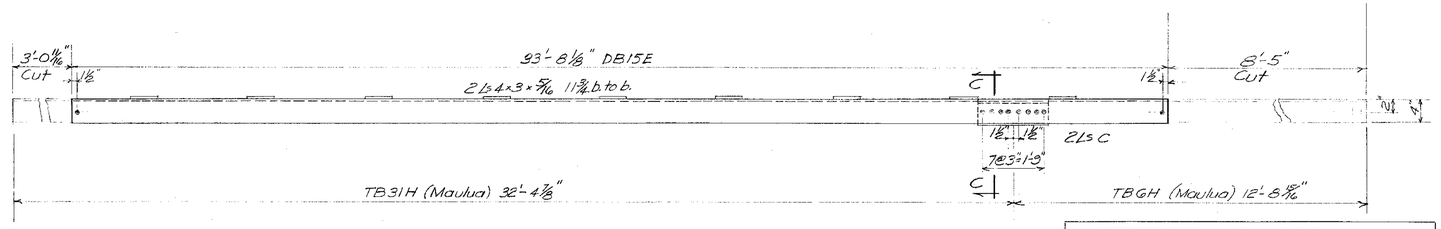


REVAMP 1 LHG (LAUP.) MAKES 1-LH2

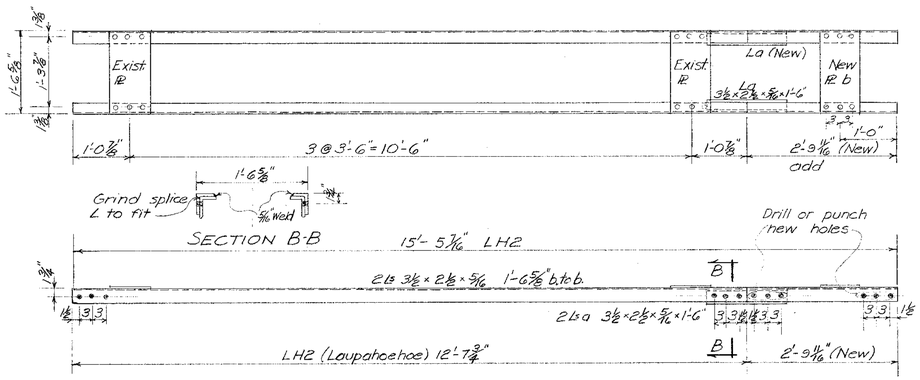
Rivets ¾" ϕ
Holes 13/16" ϕ
All open holes 13/13" ϕ



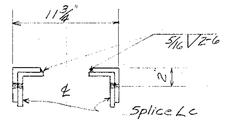
REVAMP 2-TB28H (MAULUA) MAKES 1- DB15E



REVAMP 2-TB31H & TBGH (MAULUA) MAKES 2-DB15E



REVAMP 6 LH2 (LAUPAHOEHOE) - MAKES 6-LH2



SECTION C-C

SURVEY PLOTTED BY
DESIGNED BY
DRAWN BY
TRACED BY
QUANTITIES BY
QUANTITIES CHECKED BY
CHECKED BY
DATE

ORIGINAL PLAN
NOTE BOOK No.

TERRITORIAL HIGHWAY DEPARTMENT
TERRITORY OF HAWAII

NANUE BRIDGE

STA. 0+48.83 TO 5+80.16

HAWAII BELT ROAD SDR3(13)

SHEET No. OF SHEETS

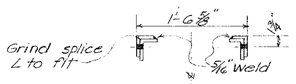
5468.75B

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
Hawaii	Hawaii	SDR3(13)	1960	78C	204

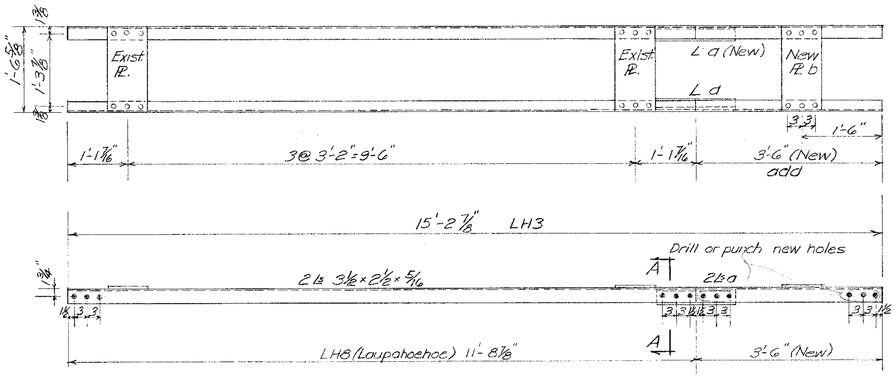
Inserted 12/19/60

BILL OF MATERIAL

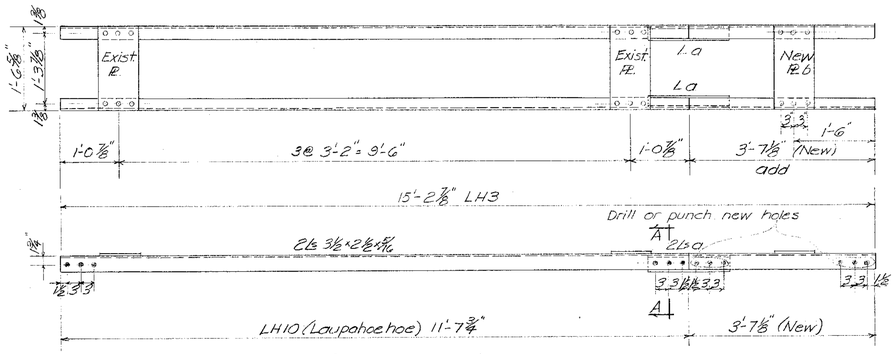
NO	DESCRIPTION	LENGTH Ft.	LENGTH In.	MARK	REMARKS
NOTE: REVAMP THE MATERIAL LISTED BELOW A.S. ON THE DETAILS					
1	HANGAR	11	6⅜	LH8	LAUPAHOEHOE
1	DO	11	7¼	LH10	DO
2	DO	15	2⅜	TH7	DO
1	DO	10	6	LH7	DO
1	DO	7	8	LH9	DO
1	DO	15	2⅜	TH7	DO
NEW MATERIAL IS LISTED BELOW:					
4	L 3½×2½×5/16	1	6	a	
22	Pl. 9×5/16	1	6⅜	b	
2	P.BRACE			DB48E	
8	L 3×3×⅜	0	9	c	
4	L 5×3×⅜	23	10	d	



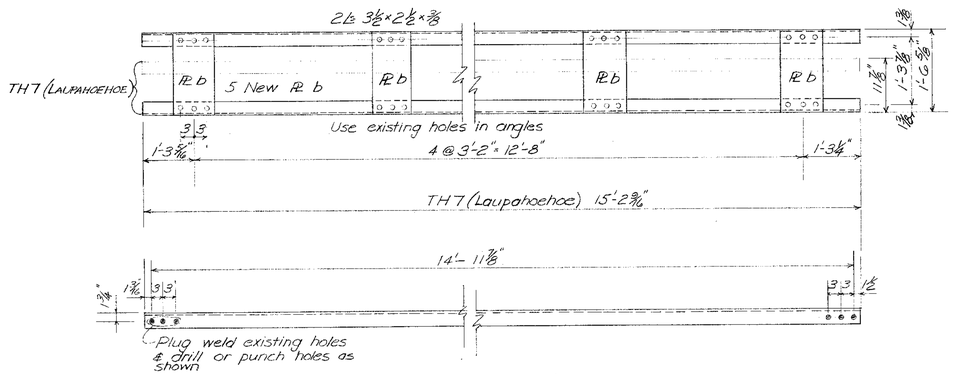
SECTION AA



REVAMP 1 LH8 (LAUPAHOEHOE) MAKES 1 - LH3

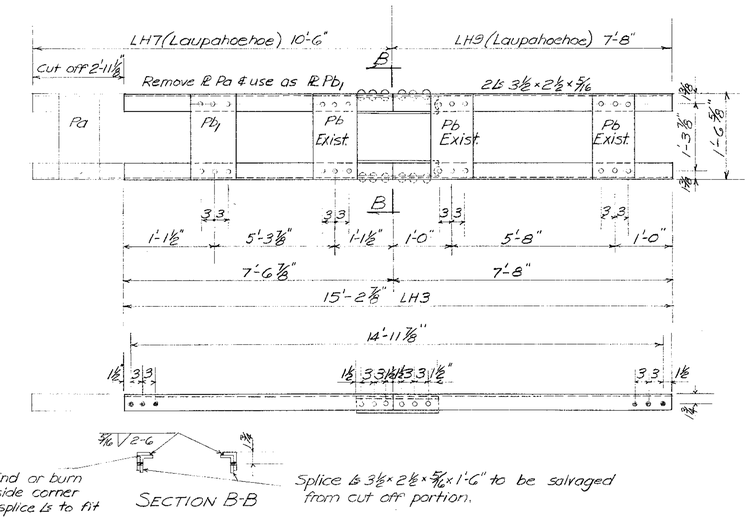


REVAMP 1-LH10 (LAUPAHOEHOE) MAKES 1-LH3



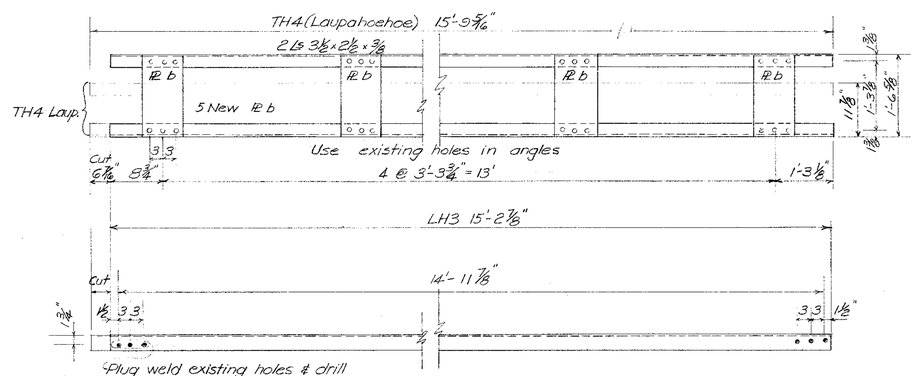
WORK TO BE DONE: Remove tie Pl from TH7 (Laupahoehoe) & change b. to b. dist. as shown
Revamp end connection holes as shown
Add new tie plates

REVAMP 2-TH7 (LAUPAHOEHOE) MAKES 2-LH3



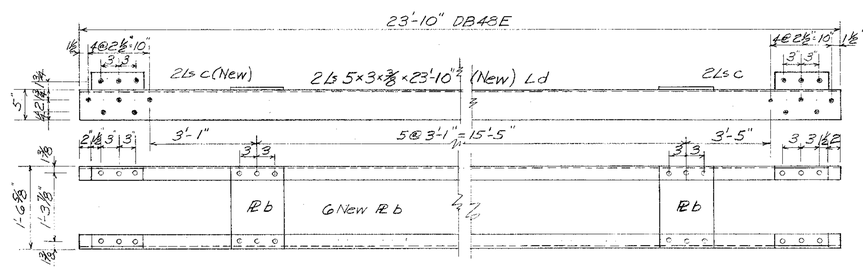
SECTION B-B

REVAMP 1 LH7 & 1 LH9 (LAUP.) MAKES 1-LH3



WORK TO BE DONE: Remove tie Pl from TH4 (Laupahoehoe) & change b. to b. distance as shown
Cut off 6⅞" from TH4 (Laupahoehoe) & revamp connection holes at cut end
Add new tie plates.

REVAMP 1-TH4 (LAUPAHOEHOE) MAKES 1-LH3



MAKE 2 BRACES MK DB48E (New Mat'l.)

Rivets ¾" ϕ
Holes 13/16" ϕ
All open holes 15/16" ϕ

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

TERRITORIAL HIGHWAY DEPARTMENT
TERRITORY OF HAWAII

NANUE BRIDGE

STA. 0+48.83 TO 5+80.16

HAWAII BELT ROAD SDR3(13)

SHEET No. OF SHEETS

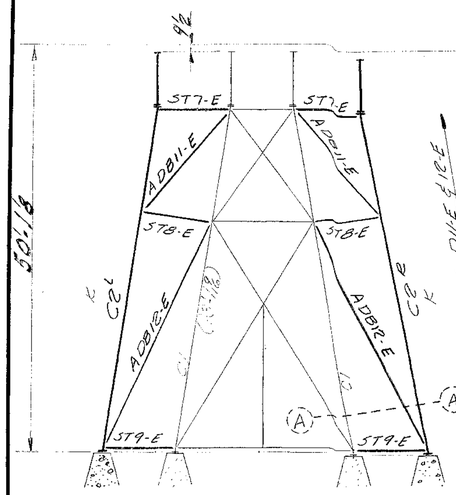
54GS.75C

54:51.75C

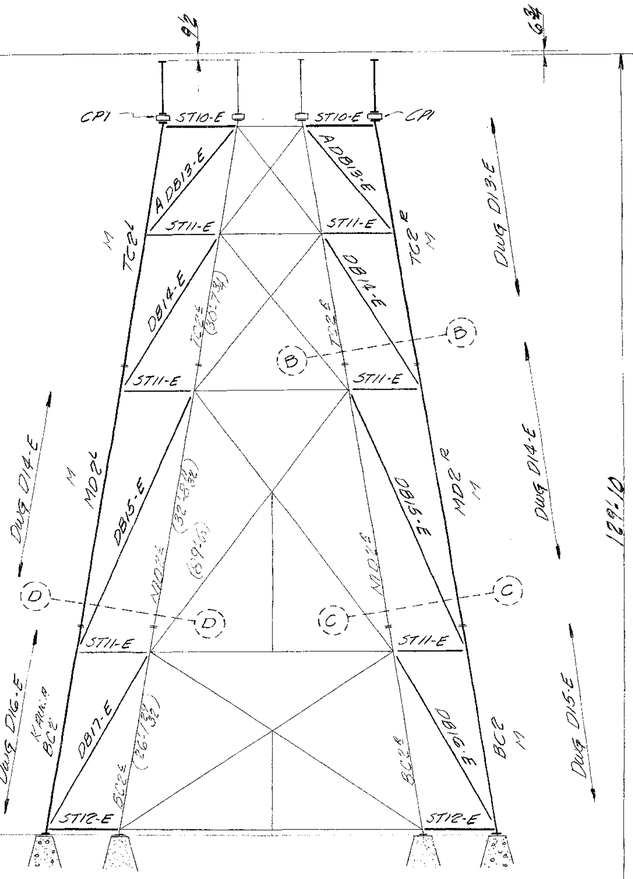
"KEUFFEL & ESSER CO., N.Y. MADE IN U.S.A."

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	ADD'L SHEETS
HAWAII	HAW	SDR 2(12)	1950	76	704

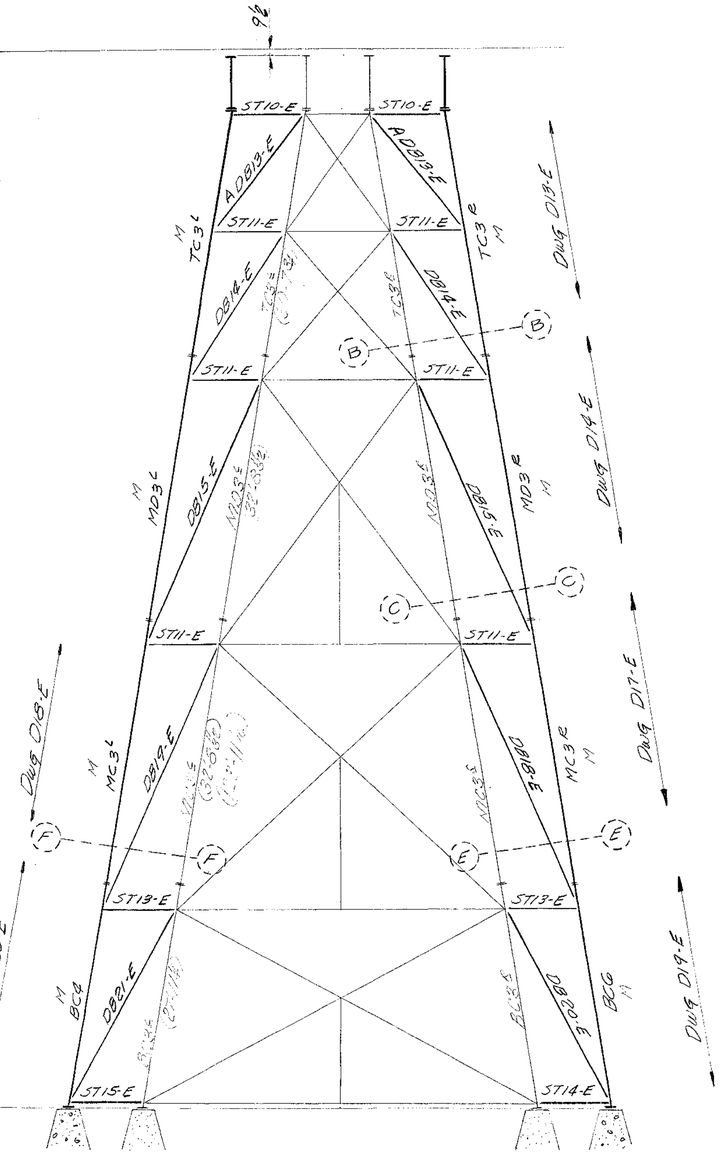
Order No. 3807 Sheet No. E2-E



BENT #1
(LOOKING NORTH)



BENT #2
(LOOKING NORTH)



BENT #3
(LOOKING SOUTH)

Rivets: 3/4"
Holes: 13/16"
Paint:

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

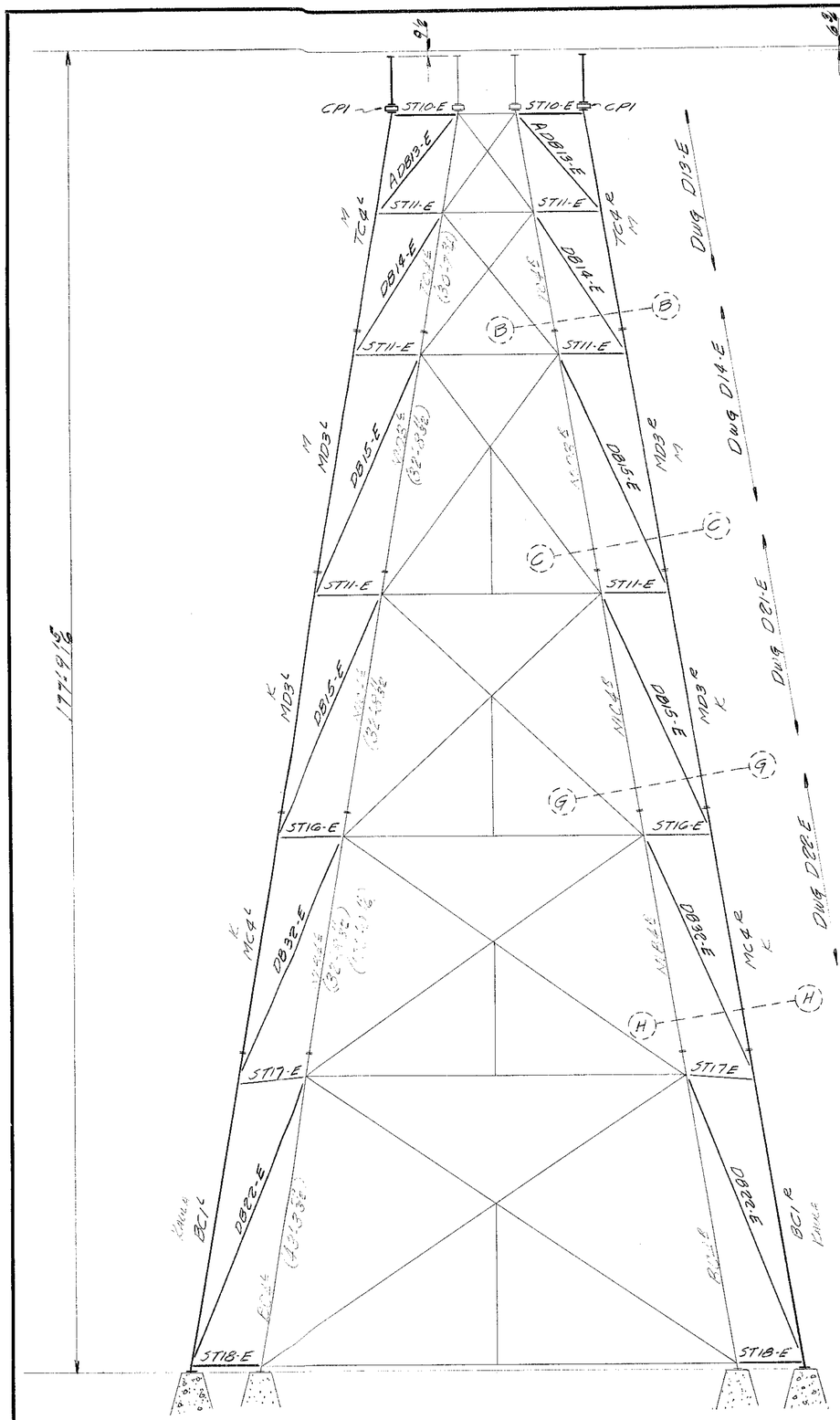
INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY	SEE DIC	11-15-49	ORDER NO.	3807
CHECKED BY	RA	2-20-50	SHEET NO.	E2-E

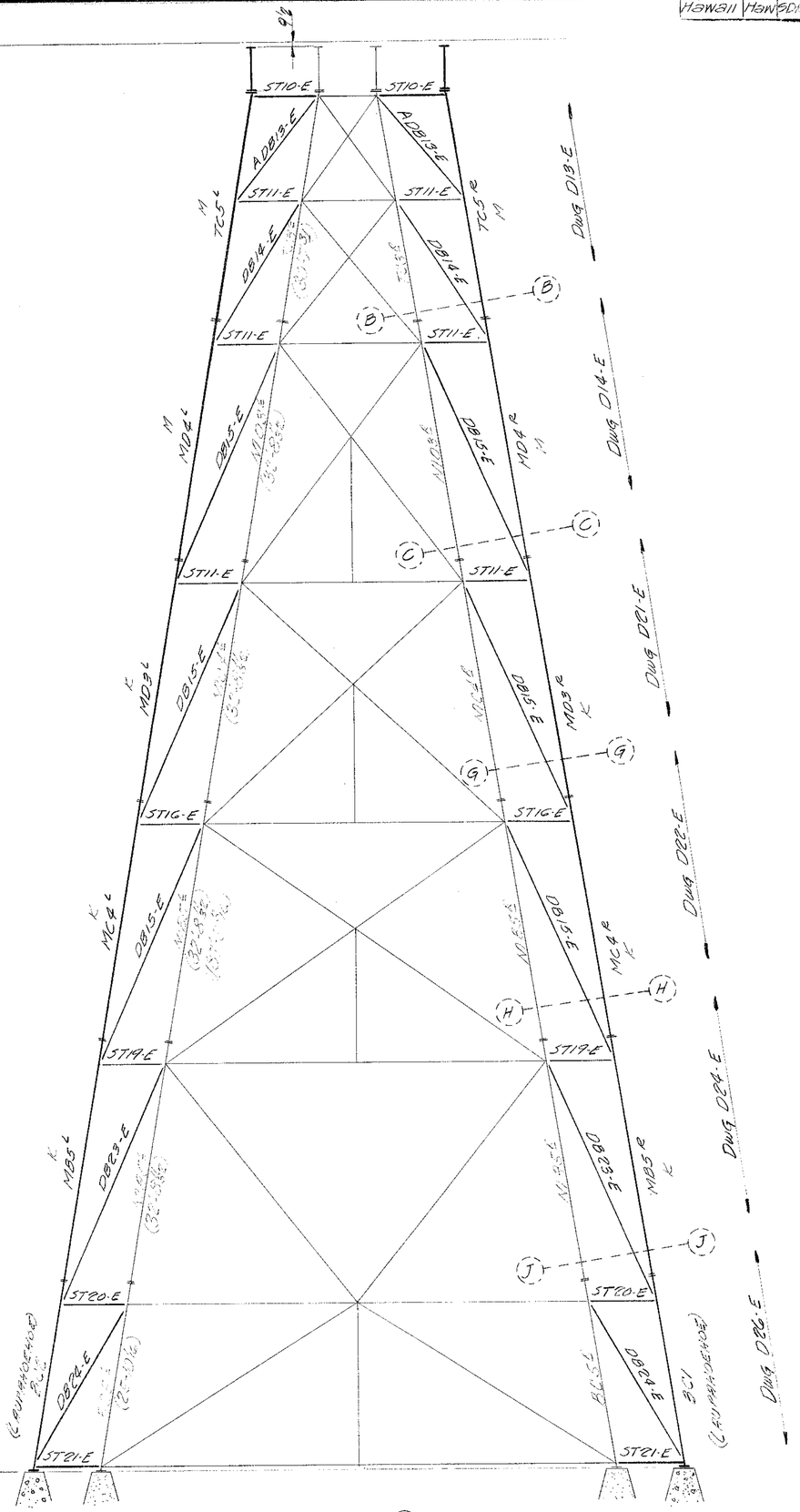
5465.76

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HSWS11	HSW	BRF 3(3)950	77	1104	

Order No. 3807 Sheet No. E3-E



BENT # 4
(LOOKING NORTH)



BENT # 6
(LOOKING SOUTH)

Rivets: 7/8"
Holes: 15/16"
Paint:

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

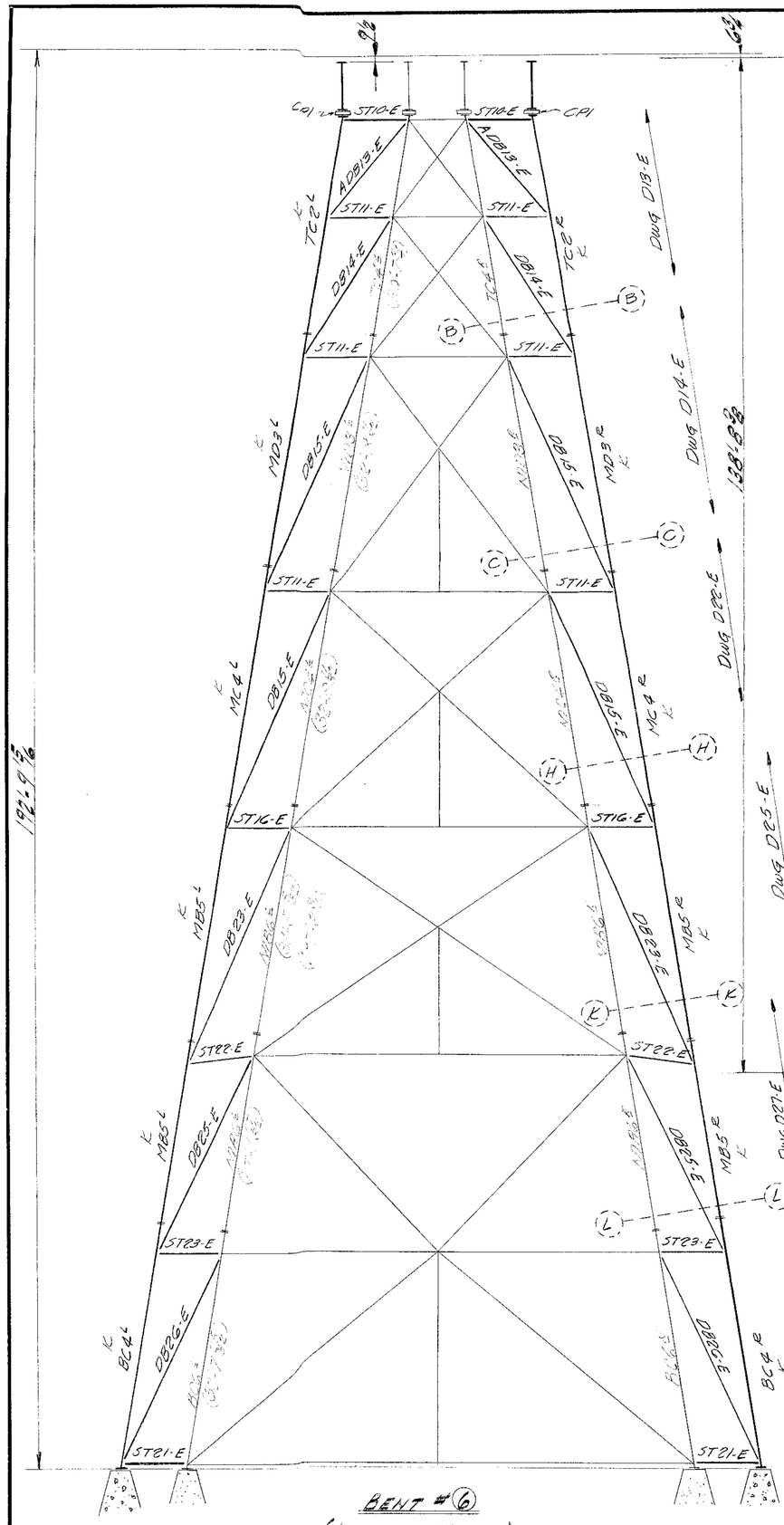
INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY	SEE DD	11-15-49	ORDER NO.	3807
CHECKED BY	RA	2-20-50	SHEET NO.	E3-E

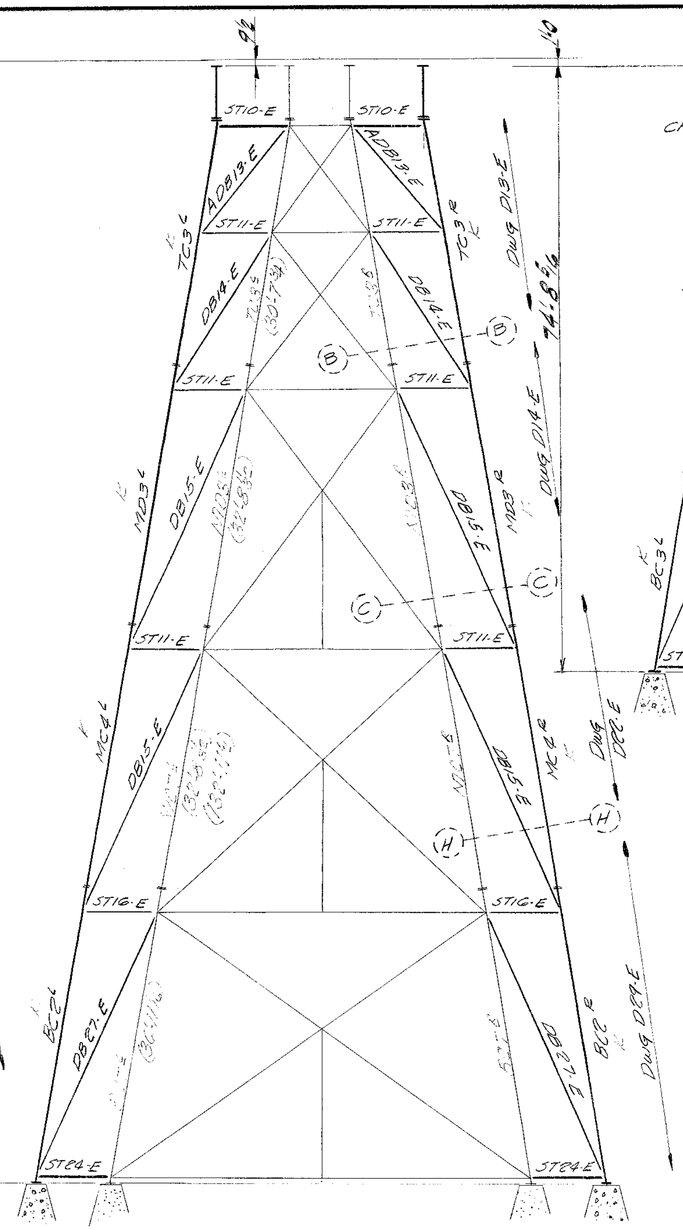
5468.77

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW	SDR 3(19)	1950	78	304

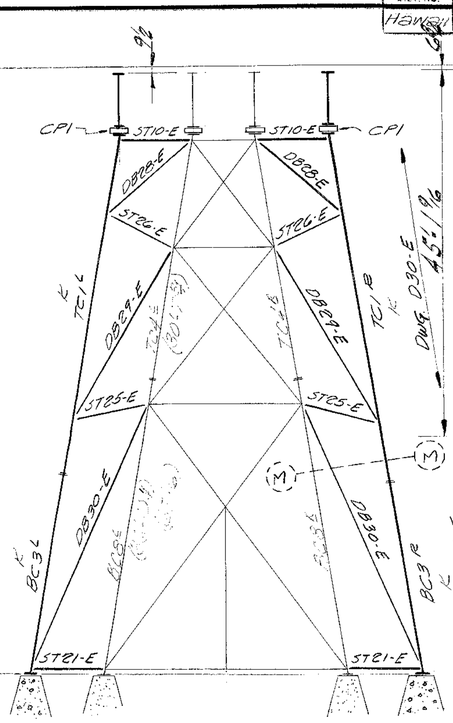
Order No. 3807 Sheet No. E4-E



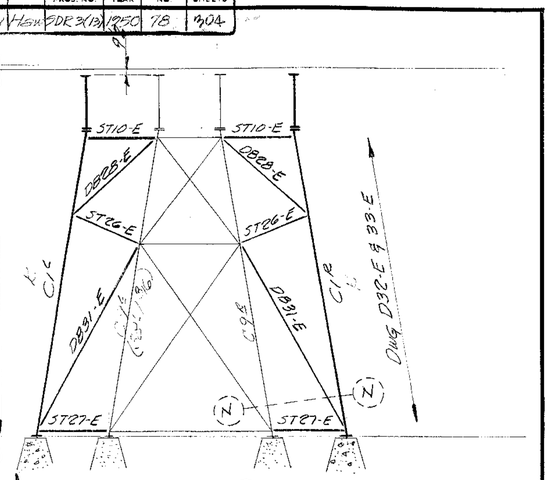
BENT #(6)
(LOOKING NORTH)



BENT #(7)
(LOOKING SOUTH)



BENT #(8)
(LOOKING NORTH)



BENT #(9)
(LOOKING SOUTH)

Rivets: 3/4
Holes: 15/16
Paint:

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

INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY	See Qw	11-16-49	ORDER NO.	3807
CHECKED BY	RA	2-20-50	SHEET NO.	E4-E

54GS.7S TD 73

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW	PDR-3(13)	1950	79	304

Order No. 3807 Sheet No. E5-E

528:0 OUT TO OUT OF STEEL

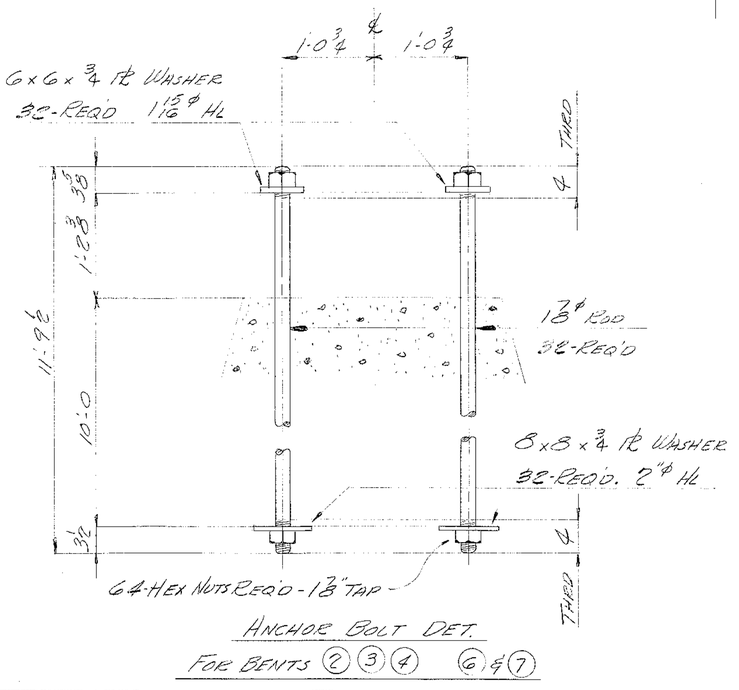
51:0 | 50:0 | 40:0 | 72:0 | 40:0 | 72:0 | 40:0 | 72:0 | 40:0 | 51:0

ABUTMENT I — BENT 1 — BENT 2 — BENT 3 — BENT 4 — BENT 5 — BENT 6 — BENT 7 — BENT 8 — BENT 9 — ABUTMENT II

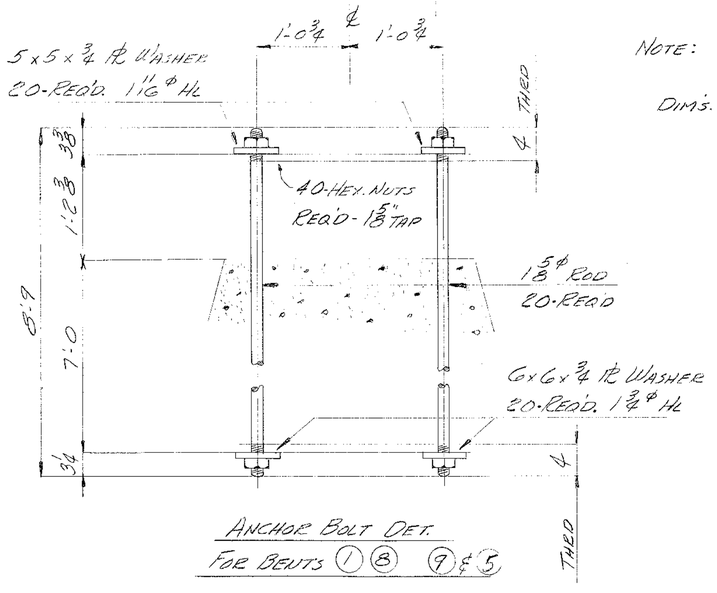
C2L C2R | BG2 BG2 (A.F.) | BG6 BG4 | BG1L BG1R | BG1 BG2 | BG4L BG4R | BG2R BG2L | BG3L BG3R | C1R C1L

← TO HILO — TO PAAUILO →

℄ GIRDERS — ℄ BRIDGE — ℄ LP.E — 4 1/2 — 4 1/16 — 10 — 9:0 — 3:9 — 10:10 1/2 — 18:5 1/2 — 24:1 1/2 — 32:0 1/2 — 34:6 1/2 — 25:7 1/2 — 14:10 1/2 — 10:0 1/2 — N



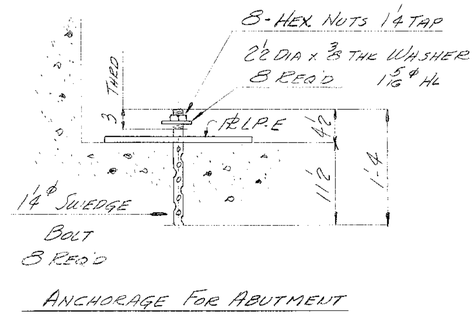
ANCHOR BOLT DET.
FOR BENTS (2) (3) (4) (6) & (7)



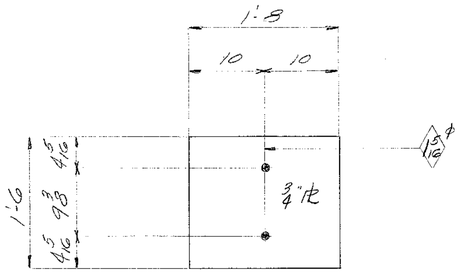
ANCHOR BOLT DET.
FOR BENTS (1) (8) (9) & (5)

NOTE:

DIM'S. GIVEN ON PLAN ARE FOR COL. BASE ℄'S.



ANCHORAGE FOR ABUTMENT



4 - ℄'S REQ'D MK LP-E

Rivets:
Holes:
Paint:

INDUSTRIAL DEVELOPMENT CO
ADDITION TO NAHUE BRIDGE
HAWAII

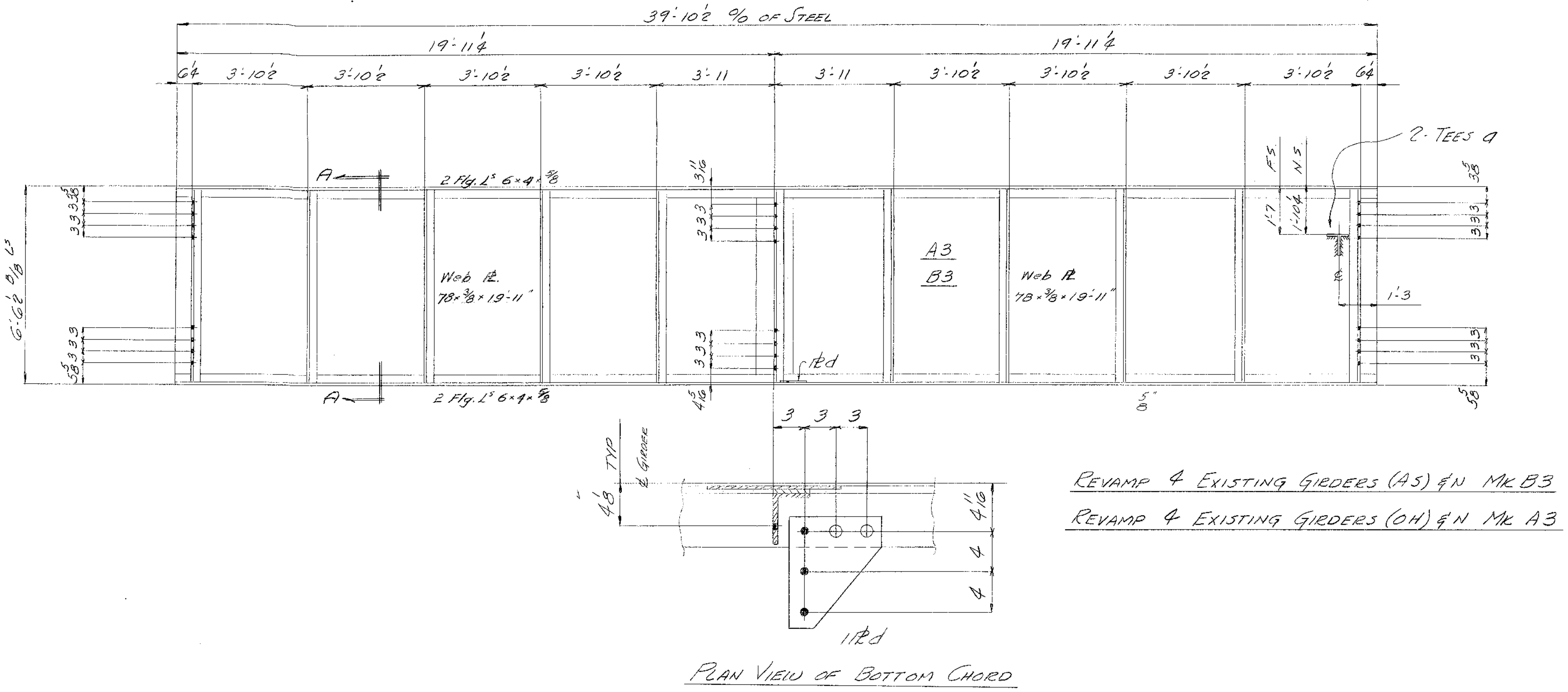
INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY	[illegible]	1-17-50	ORDER NO.	3807
CHECKED BY	RA	2-20-50	SHEET NO.	E5-E

5 4 6 8 . 7 9

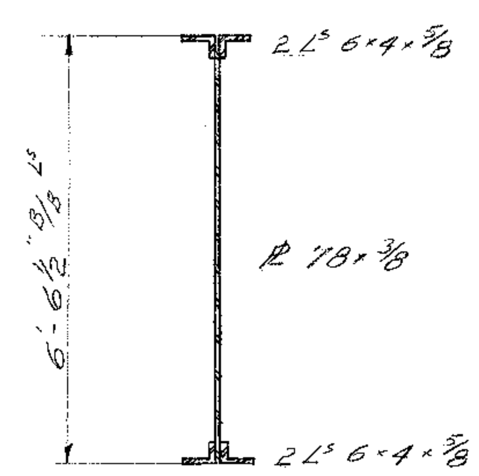
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
Hawaii	Haw	DDR3(13)	1950	80	304

Order No. 3807 Sheet No. D1-E

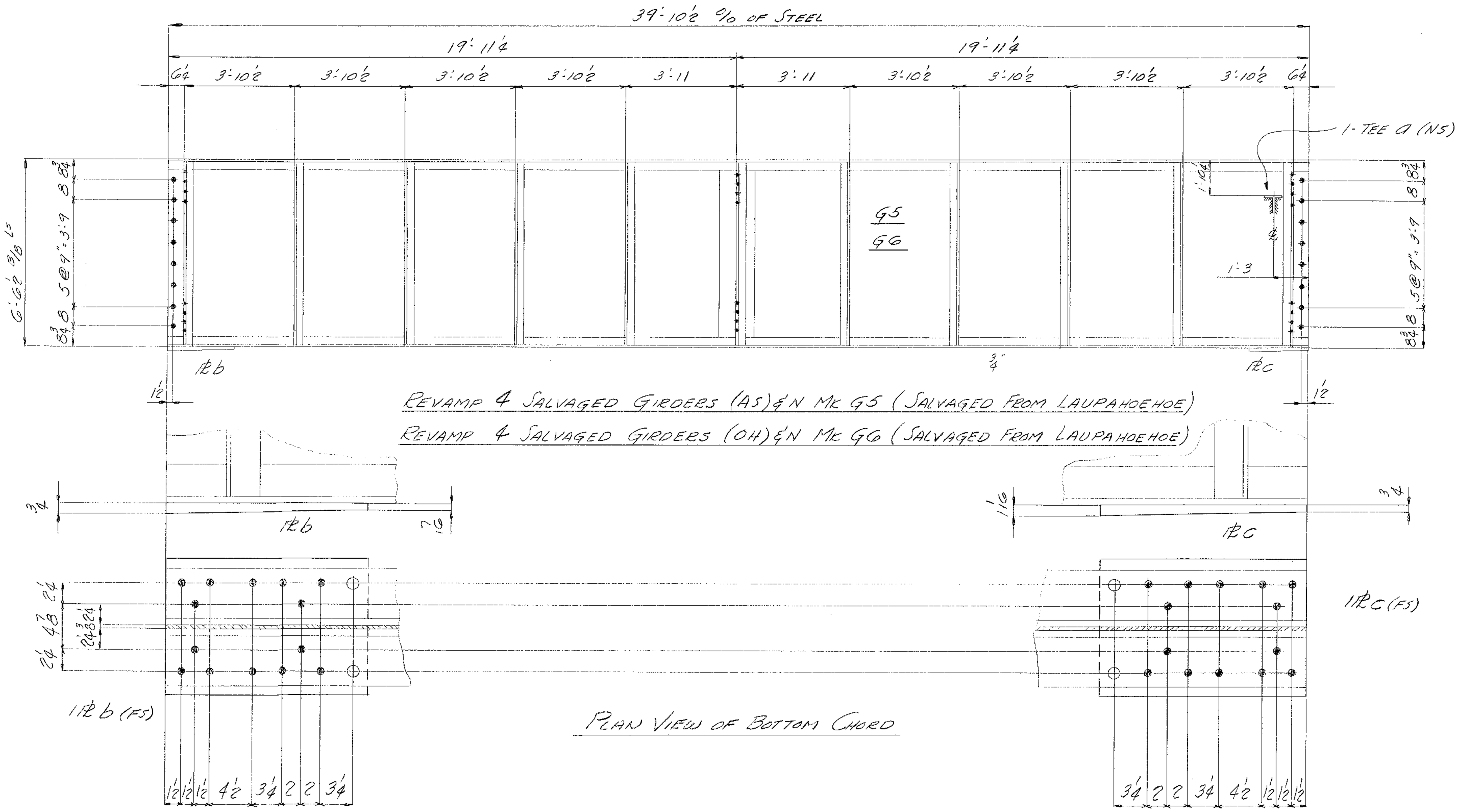


Revamp 4 Existing Girders (AS) & N Mk B3

Revamp 4 Existing Girders (OH) & N Mk A3



SECTION A-A



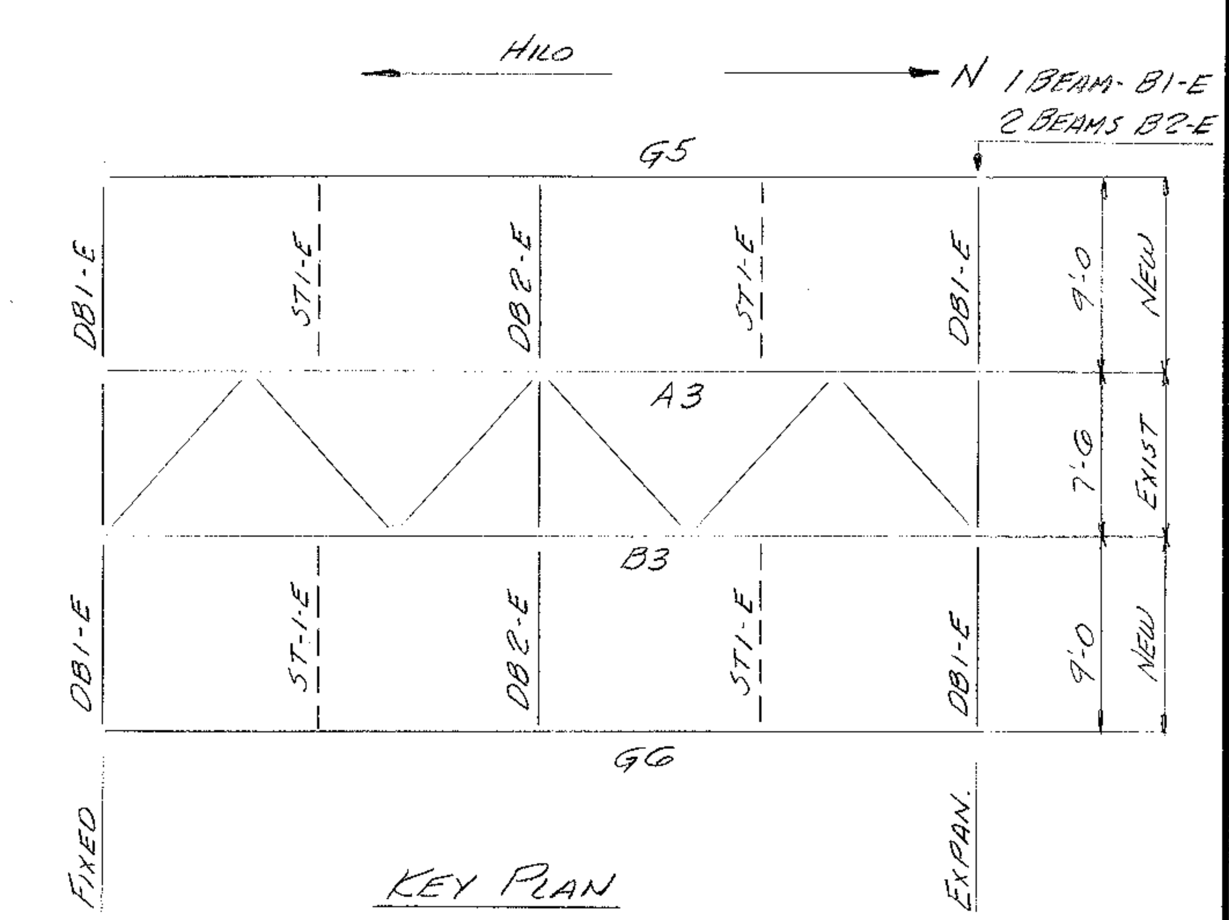
Revamp 4 Salvaged Girders (AS) & N Mk G5 (Salvaged From Laupahoehoe)

Revamp 4 Salvaged Girders (OH) & N Mk G6 (Salvaged From Laupahoehoe)

BILL OF MATERIAL

Industrial Development Company

No.	Description	Length Ft.	Length Ins.	Mark	REMARKS
8	Exist. Girders			A3 & B3	
	Revamp A.S. On Detail				
8	Salv. Girders			G5 & G6	
	Revamp A.S. On Detail				
	Salvage From Laupahoehoe				
24	S.T. 6WF22.5		6	a	Plain (New)
8	Pl 14×¾	1	9	b	Bevel Temp (New)
8	Pl 13×1⁄16	1	9	c	Bevel Temp (New)
8	Pl 9×7⁄16		11	d	Temp (New)



KEY PLAN

Rivets: ⅞ ϕ

Holes: 15⁄16 ϕ

Paint:

Industrial Development Co

Addition To Nanue Bridge
Hawaii

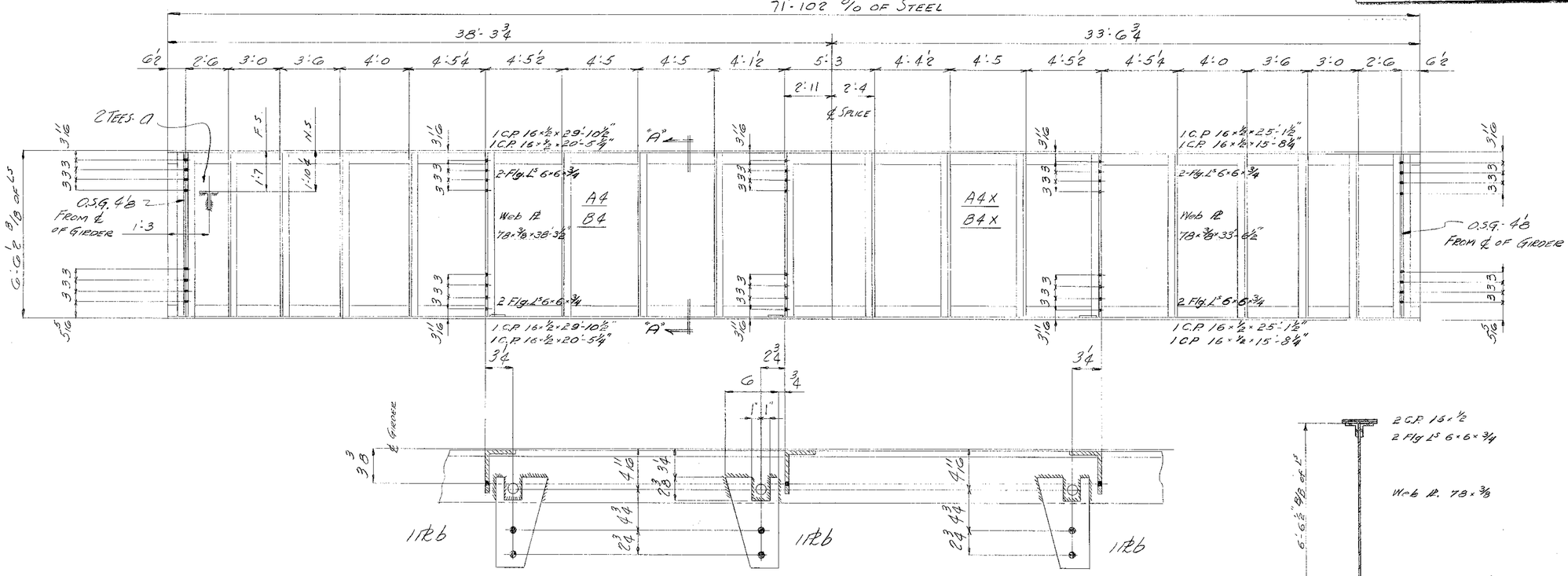
INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY	[illegible]	11-23-49	ORDER NO.	3807
CHECKED BY	[illegible]	1-23-50	SHEET NO.	D1-E

5468.80

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HI-SW-11	HAW.	SDK-2(13)	1950	61	304

Order No. 3807 Sheet No. D2.E



PLAN VIEW OF BOTTOM CHORD

REVAMP 6 EXISTING GIRDERS (A5) & N MK B4 & B4X

REVAMP 6 EXISTING GIRDERS (OH) & N MK A4 & A4X

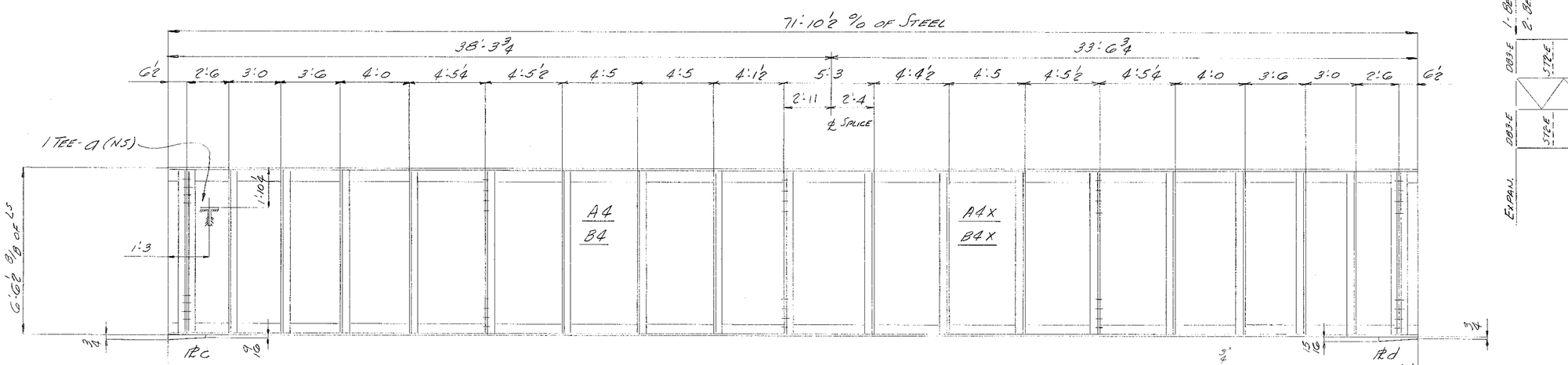
SECTION A-A

BILL OF MATERIAL

INDUSTRIAL DEVELOPMENT COMPANY

No.	Description	Length Ft.	Length Ins.	Mark	REMARKS
6	EXIST. GIRDERS		B4 & B4X		
	REVAMP AS. ON DET.				
6	EXIST. GIRDERS		A4 & A4X		
	REVAMP AS. ON DET.				
2	SALV. GIRDER		A4 & A4X		
	REVAMP AS ON DET				
	SALVAGE FROM ~~HALE~~ KAULA				
2	SALV GIRDER		B4 & B4X		
	REVAMP AS ON DET				
	SALVAGE FROM ~~HALE~~ KAULA				
14	ST. GUIDE 22.5		6	a	PLAIN
18	PL G × 5/16		10½	b	TEMP
2	PL 14½ × ¾	1	4	c	BEVEL TEMP
2	PL 14 × 15/16	1	2½	d	BEVEL TEMP

NEW

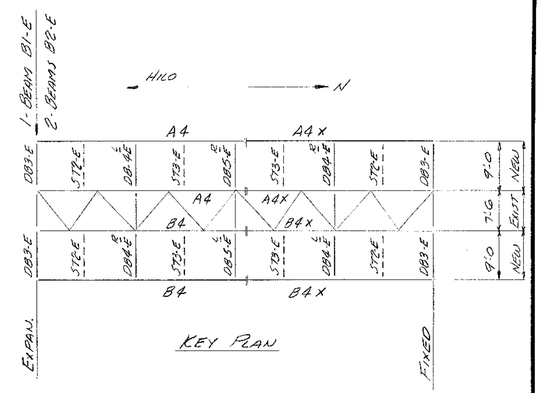


REVAMP 2 SALVAGED GIRDERS (A5) & N MK A4 & A4X (SALVAGED FROM ~~HALE~~ KAULA)

REVAMP 2 SALVAGED GIRDERS (OH) & N MK B4 & B4X (SALVAGED FROM ~~HALE~~ KAULA)

PLAN VIEW OF BOTT CHORD

PLAN VIEW OF BOTT CHORD



Rivets: ⅞ @
Holes: 15/16 @ U.N
Paint:

INDUSTRIAL DEVELOPMENT CO

ADDITION TO NANUE BRIDGE
HAWAII

INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY	[illegible]	11-25-49	ORDER NO.	3807
CHECKED BY	DM	1-24-50	SHEET NO.	D2.E

5468.81

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAWAII			82	204

Order No. 3807 Sheet No. D3-E

BILL OF MATERIAL — INDUSTRIAL DEVELOPMENT COMPANY

No.	Description	Length Ft.	Length In.	Mark	REMARKS
2	EXIST. GIRDER			A2 & A2X	
	REVAMP A.S. ON DET				
2	EXIST. GIRDER			B2 & B2X	
	REVAMP A.S. ON DET				
2	SALV. GIRDER			A4 & A4X	
	REVAMP A.S. ON DET.				
	SALVAGE FROM ~~KEALAHAKA~~ MAILE				
2	SALV. GIRDER			B4 & B4X	
	REVAMP A.S. ON DET				
	SALVAGE FROM ~~KEALAHAKA~~ MAILE				
4	PL 6 x 5/8		10½	a	TEMP
4	PL 5½ x 3/8	6	4¾	b	FITTED
2	PL 4 x 5/16		10½	c	TEMP
2	PL 5 x 5/16		10	d	TEMP
2	PL 14½ x 3/4	1	4	f	BEVEL TEMP
2	PL 14 x 15/16	1	2½	g	BEVEL TEMP
8	PL 3 x 5/8	1	0	h	TEMP

NEW

49'-10½" % OF STEEL

24'-11¼" 24'-11¼"

6½" 3'-4½" 3'-6¾" 3'-9" 3'-9" 3'-11" 3'-11" 4'-3" 3'-11" 3'-11" 3'-9" 3'-9" 3'-6¾" 3'-4½" 6½"

2'-1½" 2'-1½" ℄ SPLICE

G:6½ @ 8" OR C.S.

1 C.P. 16 - 11/16 - 17-8½"

2 Flg. L 6 x 6 x 11/16

Web PL 78 x 3/8 x 24'-11"

Web PL 78 x 3/8 x 24'-11"

056 - 46

056 - 48

A2 / B2

A2X / B2X

PLAN VIEW OF BOTTOM CHORD

REVAMP 2 EXISTING GIRDERS (AS) & N MK B2 & B2X

REVAMP 2 EXISTING GIRDERS (OH) & N MK A2 & A2X

1 C.P. 16 x 11/16
2 Flg L 6 x 6 x 11/16
Web PL 78 x 3/8
2 Flg L 6 x 6 x 11/16
1 C.P. 16 - 11/16

SECTION B-B

4'-8"

2 PLS h

3 9/16"

2 PLS h

SECTION A-A

G.O.'s 71,102 % OF STEEL - ORIGINAL GIRDER

49'-10½" % OF STEEL - REVAMPED GIRDER

38'-3¾" 11'-6¾" ~~22'-0~~

6½" 2'-6 3'-0 3'-6 4'-0 4'-5¼ 4'-5½ 4'-5 4'-5 4'-1½ 5'-3 4'-4½ 4'-5 CUT THIS LINE ~~4'-5½~~ ~~4'-5¼~~ ~~4'-0~~ ~~3'-6~~ ~~3'-0~~ ~~2'-6~~ 6½"

1'-5¼ 3'-0 3'-7½ 6 2'-11 2'-4 ℄ SPLICE

14'-1¾" 34'-10¾" ~~54~~ 0½"

G:6½ @ 8" OR C.S.

A4 / B4

A4X / B4X

SEE DET "A"

DETAIL "A"

Cover PLs 2'-½" 1" Cut Cover PLs 1'-3½"

KEY PLAN — HILO — N — FIXED — FIXED

A4 A4X B2 B2X

PLAN VIEW OF BOTTOM CHORD

REVAMP 2 SALVAGED GIRDERS (AS) & N MK A4 & A4X
(SALVAGE FROM ~~KEALAHAKA~~ MAILE)

REVAMP 2 SALVAGED GIRDERS (OH) & N MK B4 & B4X
(SALVAGE FROM ~~KEALAHAKA~~ MAILE)

Rivets: 7/8
Holes: 15/16
Paint:

INDUSTRIAL DEVELOPMENT CO

ADDITION TO NANUE BRIDGE
HAWAII

INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY	[illegible]	11-28-49	ORDER NO.	3807
CHECKED BY	[illegible]	1-24-50	SHEET NO.	D3-E

5465.82

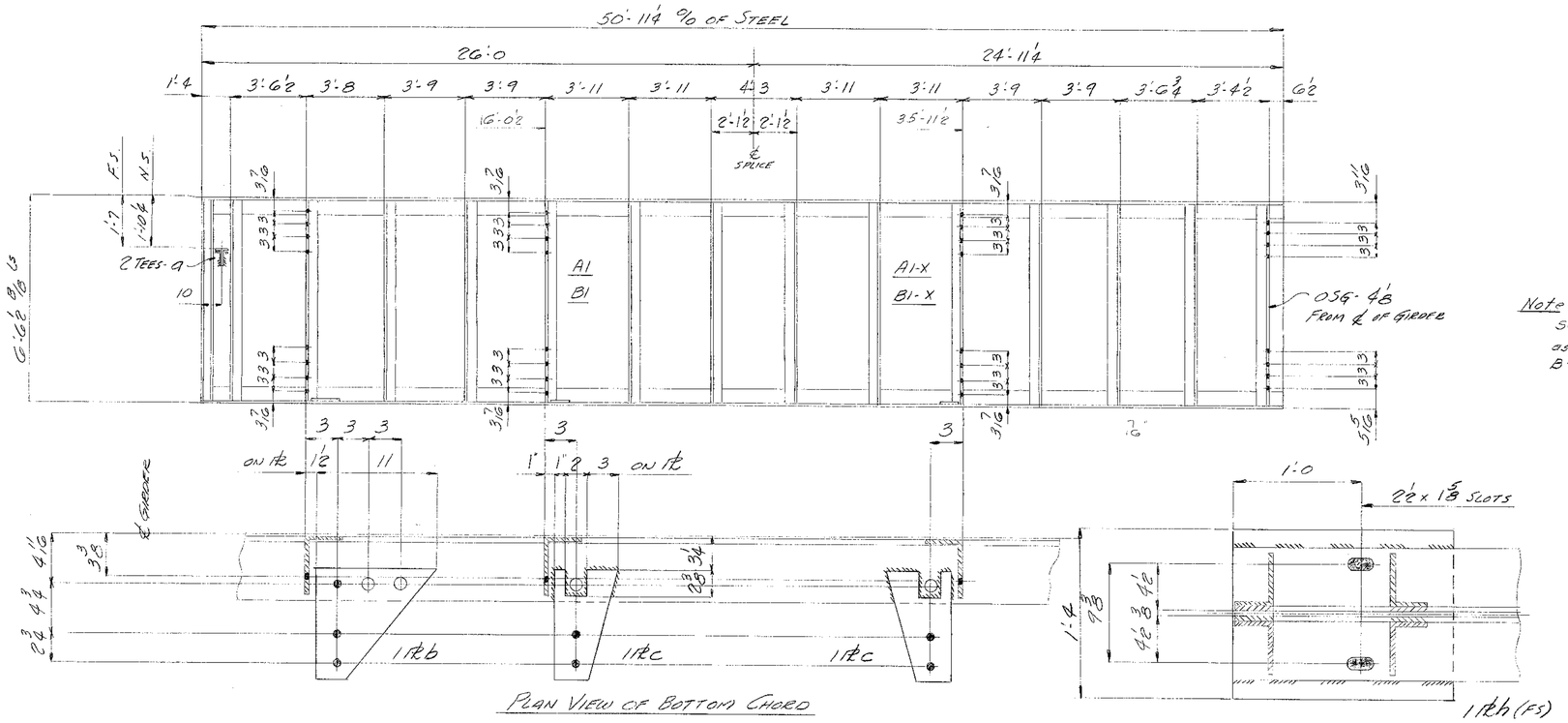
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
Hawaii	Haw	SDR-2(3)	1950	83	204

Order No. 3807 Sheet No. 04-E

BILL OF MATERIAL — INDUSTRIAL DEVELOPMENT COMPANY

No.	Description	Length Ft.	Length Ins.	Mark	REMARKS
2	EXIST. GIRDER			A1 & A1X	
	REVAMP A5 ON DET.				
2	EXIST. GIRDER			B1 & B1X	
	REVAMP A5. ON DET				
2	SALV. GIRDER			A1 & A1X	
	REVAMP A5 ON DET				
	SALVAGE FROM KAULA				
2	SALV. GIRDER			B1 & B1X	
	REVAMP A5 ON DET				
	SALVAGE FROM KAULA				
6	ST GUF 225		6	a	PLAIN
2	PL 10½ x ⅜		11	b	TEMP
4	PL 6 x ⅜		10½	c	TEMP
2	PL 6 x ⅝		10½	d	TEMP
2	PL 6 x 1⅛		10½	f	TEMP
2	PL 13 x 1⅜	1	2½	g	BEVEL TEMP
2	PL 16 x ⅜	1	8¾	h	BEVEL TEMP
6	PL 5½ x ⅜	6	5¼	k	NEW
2	PL 5½ x ⅜	6	5¼	m	
2	PL 10½ x ⅝		11	p	TEMP
2	PL 5½ x ⅜	6	5¼	s	
4	PL 4 x ½	5	6¼	t	PLAIN

Note: Section thru girder same as for 49'-10½" girder, section B-B Sht. D3-E.

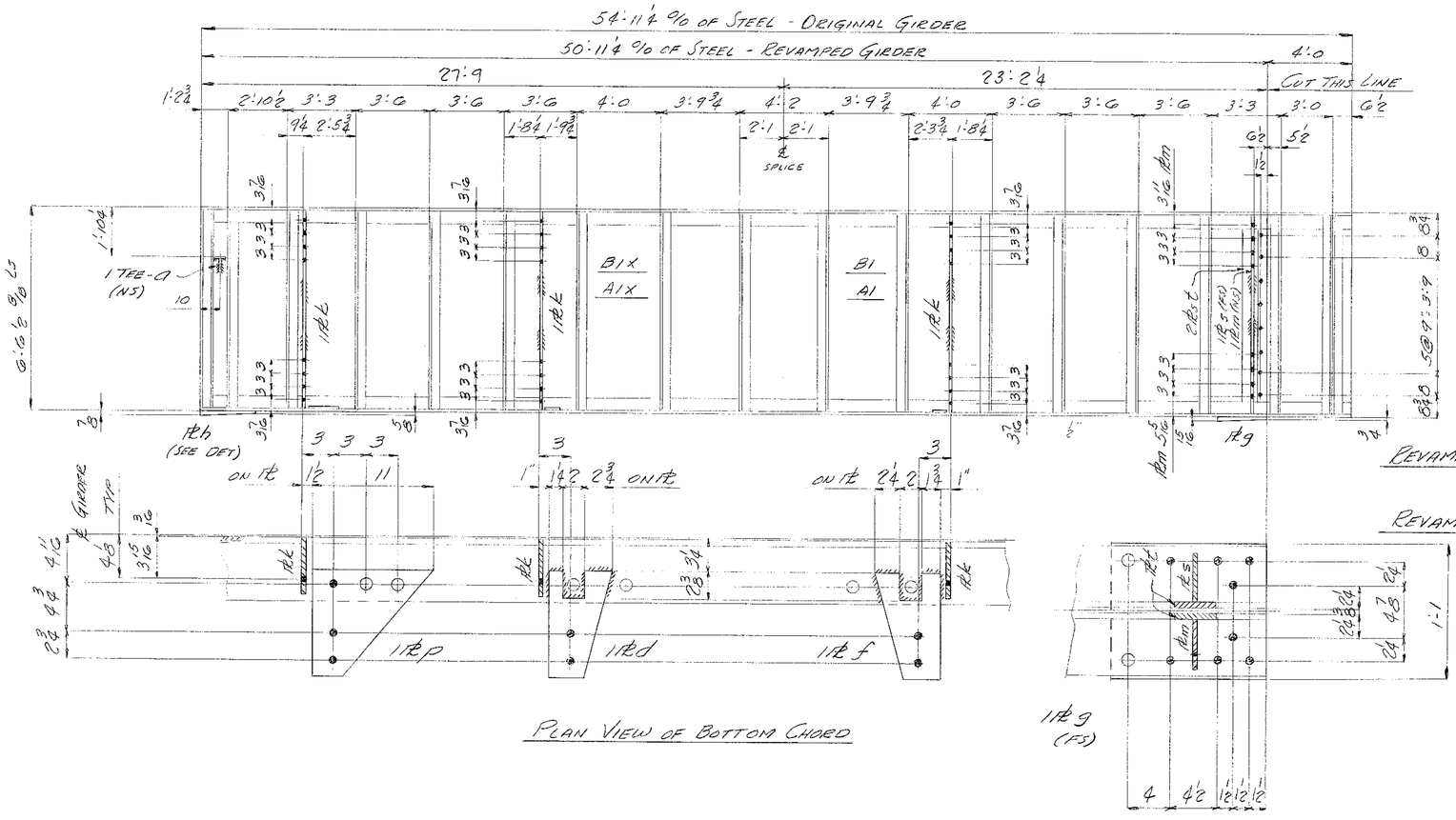


PLAN VIEW OF BOTTOM CHORD

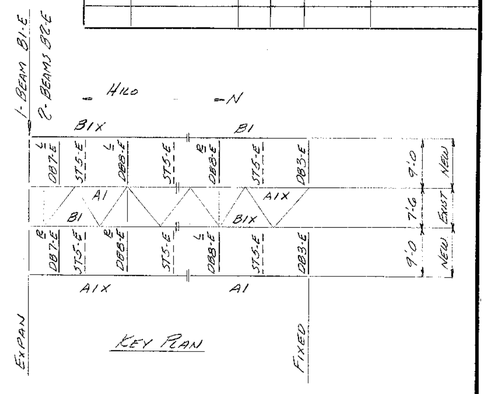
DETAIL OF PL h

REVAMP 2 EXISTING GIRDERS (A5) & N MK B1 & B1X

REVAMP 2 EXISTING GIRDERS (OH) & N MK A1 & A1X



PLAN VIEW OF BOTTOM CHORD



REVAMP 2 SALVAGED GIRDERS (A5) & N) MK B1X & B1
(SALVAGE FROM KAULA)

REVAMP 2 SALVAGED GIRDERS (OH) & N MK A1X & A1
(SALVAGE FROM KAULA)

Rivets: ⅞
Holes: 15/16 U.N.
Paint:

INDUSTRIAL DEVELOPMENT CO
ADDITION TO NANUE BRIDGE
HAWAII

INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY	[illegible]	11-30-49	ORDER NO.	3807
CHECKED BY	DB	1-24-50	SHEET NO.	04-E

54GS.83 FS 1

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW	DK-3(13)	1950	84	404

BILL OF MATERIAL

INDUSTRIAL DEVELOPMENT COMPANY

No.	Description	Length Ft.	Length Ins.	Mark	REMARKS
2	EXIST. GIRDER			B5 & B5X	
	REVAMP A.S. ON DET				
2	EXIST GIRDER			A5 & A5X	
	REVAMP A.S. ON DET				
2	SALV. GIRDER			B2 & B1	
	REVAMP A.S. ON DET				
	SALVAGE FROM KEALAHAKA				
2	SALV. GIRDER			A2 & A1	
	REVAMP A.S. ON DET.				
	SALVAGE FROM KEALAHAKA				
20	BEAMS			B2E	
	SALV. FROM KAALA			(SEE SHT D10E)	
12	ST GWF 22.5		6	a	PLAIN
4	PL 6 x ½		10½	b	TEMP
2	PL 10½ x ½		11	c	TEMP
2	PL 6 x 5/16		10	d	TEMP
2	PL 10½ x 5/16		11	f	TEMP
2	PL 16 x ¾	1	4¾	g	BEVEL TEMP
2	PL 16 x ⅜	1	8¾	h	BEVEL TEMP
6	PL 5½ x ⅜	6	5	k	
20	PL 7⅞ x ⅜	8	10	m	PLAIN
20	PL 6¾ x ⅜	8	10	p	PLAIN
2	PL 4 x ⅝		10½	s	TEMP

NEW

50'-11¼ % OF STEEL

24'-11¼ | 26'-0

6½ | 3'-4½ | 3'-6¾ | 3'-9 | 3'-9 | 3'-11 | 3'-11 | 4'-3 | 3'-11 | 3'-11 | 3'-9 | 3'-9 | 3'-8 | 3'-6½ | 1'-4

14'-11¾ | 2'-1½ | 2'-1½ | 34'-10¾

℄ SPLICE

N.S. 1:10½ F.S. 1:7

2 TEES - a

OSG - 4½ FROM ℄ OF GIRDER 1:3

A5 B5 | A5X B5X

G.G. ⅜ LS

10

Note: Section thru girder same as for 49'-10½ girder, section B-B Sht. D3-E.

℄ GIRDER

1 PL b | 1 PL b | 1 PL c

PLAN VIEW OF BOTTOM CHORD

REVAMP 2 EXISTING GIRDERS (A5) & N MK B5 & B5X

REVAMP 2 EXISTING GIRDERS (OH) & N MK A5 & A5X

1 PL m

TOP

4 x 4 x ¾ LS

7/16" THK PL

1 PL p

B2-E 20 - BEAMS REQ'D x 8'-10

65'-11¼ % OF STEEL - ORIGINAL GIRDER

50'-11¼ % OF STEEL - REVAMPED GIRDER

15'-0 | 19'-9 | 31'-2¼

CUT THIS LINE

6½ | 3'-0 | 4'-0 | 4'-0 | 4'-0 | 4'-0 | 4'-0 | 4'-3½ | 4'-0 | 5'-3 | 4'-3½ | 4'-0 | 4'-0 | 4'-0 | 4'-0 | 4'-0 | 3'-2½ | 1'-4½

2'-1¾ | 1'-10½ | 2'-11 | 2'-4

℄ SPLICE

6½ | 3'-5¾ | 3'-8¼ | 3¾

1 TEE - a (NS)

1 TEE - a (NS)

A2 B2 | A1 B1

1-3

5 @ 9" = 3'-9

G.G. ⅜ LS

10

1 PL g | 1 PL h

2½ x 15/16 SLOTS

CUT COVER PL

1'-5½

PLAN VIEW BOTTOM CHORD

1 PL d | 1 PL s | 1 PL f

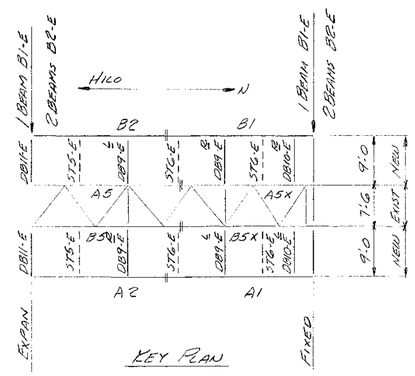
1 PL h (FS)

REVAMP 2 SALVAGED GIRDERS (A5) & N MK B2 & B1

(SALVAGE FROM KEALAHAKA)

REVAMP 2 SALVAGED GIRDERS (OH) & N MK A2 & A1

(SALVAGE FROM KEALAHAKA)



KEY PLAN

Rivets: ⅞ ϕ
Holes: 15/16 ϕ U.N.
Paint:

INDUSTRIAL DEVELOPMENT CO

ADDITION TO NANUE BRIDGE
HAWAII

INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY	[illegible]	12-1-49	ORDER NO.	3807
CHECKED BY	OB	1-25-50	SHEET NO.	D5-E

5468.84

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HBW-3(11)	HAW	S0R3(13)	1950	85	904

Order No. 3807 Sheet No. DG-E

BILL OF MATERIAL

INDUSTRIAL DEVELOPMENT COMPANY

No.	Description	Length Ft.	Length Ins.	Mark	REMARKS
4	SALV GIRDERS			G7 & G9	
	REVAMP AS ON DET				
	SALVAGE FROM LAUPAHOEHOE				
4	SALV GIRDERS			G8 & G10	
	REVAMP AS ON DET				
	SALVAGE FROM LAUPAHOEHOE				
4	ST GUSSETS		6	a	PLAN
4	PL 6 x ¾	5	6⅜	b	PLAN
2	PL 4¾ x ¾	6	4¾	c	
2	PL 4¾ x ¾	6	4¾	d	
8	PL 5½ x ⅜	6	4¾	f	
4	PL 14½ x ¾	1	4	g	BEVEL TEMP
2	PL 5⅜ x 16/16		10½	h	TEMP
2	PL 6 x 15/16		9¾	k	TEMP
2	PL 6 x 15/16		10½	m	TEMP
4	PL 14 x 15/16	1	2½	p	BEVEL TEMP
2	PL 5¾ x ⅜	6	5	s	
4	L 6 x 6 x ¾		5¾	t	PLAN
2	PL 5½ x ¾	6	4¾	v	
2	PL 5½ x ¾	6	4¾	w	
4	PL 5½ x ⅜	6	4¾	aa	
2	PL 6 x 15/16		10½	ab	TEMP
2	PL 6 x 15/16		9¾	ac	TEMP
2	PL 6 x ¾		10½	ad	TEMP
4	L 6 x 6 x ¾		5¾	af & ae	TEMP

NEW

REVAMP 4 SALVAGED GIRDERS (O.H.) & N MK G7 & G9 (SALVAGE FROM LAUPAHOEHOE)

72:6¾ % OF STEEL - ORIGINAL GIRDER

71:10½ % OF STEEL - REVAMPED GIRDER

CUT THIS LINE

33:2⅝ — 38:7⅞

2:11⅛ 3:0¼ 3:0¾ 4:8 4:10 4:0 4:3 4:1½ 5:3 4:0½ 4:3 4:3 4:0 4:10 4:8 3:0¾ 3:0¼ 3:0¾ 6⅝

4:3⅝ 6⅜ 17:11¾ 2:4 2:11 8⅜ ℄ SPLICE 53:10⅝ 1:2⅝ 3:7⅞ 1½

G9 G7

1 TEE-G

PL 6 x ¾ x 1'-10½

PL 14½ x ¾ x 1'-1⅜

PL 5⅜ x 16/16 x 1'-10¼

PL 6 x 15/16 x 1'-10¼

PL 14 x 15/16 x 1'-10¼

PL 5¾ x ⅜ x 1'-10¼

PL 5½ x ¾ x 1'-10¼

PL 5½ x ⅜ x 1'-10¼

PL 6 x 15/16 x 1'-10¼

PL 6 x ¾ x 1'-10¼

PL 6 x 6 x ¾ x 1'-10¼

5 @ 9" = 3'-9

G-G2 & G3 G4 G5

ON PL 2 4 1¼ ℄ GIRDERS

REMOVE RIV TO CLEAR BRACE

PLAN VIEW OF BOTTOM CHORD

2½ x 15/16 SLOTS

REVAMP 4 SALVAGED GIRDERS (A.S.) & N MK G8 & G10 (SALVAGE FROM LAUPAHOEHOE)

71:4¾ % OF STEEL - ORIGINAL GIRDER

71:10½ % OF STEEL - REVAMPED GIRDER

33:9⅝ — 38:0⅞

3:6⅜ 3:0¼ 3:0¾ 4:8 4:10 4:0 4:3 4:1½ 5:3 4:0½ 4:3 4:3 4:0 4:10 4:8 3:0¾ 3:0¼ 2:5¾ 6⅝

3:8⅝ 1:1⅜ 2:4 2:11 1:3⅞ ℄ SPLICE 7⅞ 4:2⅜ 1½

G10 G8

1 TEE-G

PL 6 x ¾ x 1'-1⅜

PL 14½ x ¾ x 1'-1⅜

PL 5⅜ x 16/16 x 1'-1⅜

PL 6 x 15/16 x 1'-1⅜

PL 14 x 15/16 x 1'-1⅜

PL 5¾ x ⅜ x 1'-1⅜

PL 5½ x ¾ x 1'-1⅜

PL 5½ x ⅜ x 1'-1⅜

PL 6 x 15/16 x 1'-1⅜

PL 6 x ¾ x 1'-1⅜

PL 6 x 6 x ¾ x 1'-1⅜

5 @ 9" = 3'-9

G-G2 & G3 G4 G5

ON PL 5⅞ 4 2 ℄ GIRDERS

ON PL 2 2 2 7⅞

ON PL 3 3 7⅞

PLAN VIEW OF BOTTOM CHORD

2½ x 15/16 SLOTS

Note: Section thru girder shown on sht DZ-E

HILO — N

G10 G8 G9 G7

2 BEAMS B'-E

1 BEAM B-E

KEY PLAN

NEW FIXED

Rivets: ⅞"ϕ

Holes: 15/16"ϕ U.N

Paint:

INDUSTRIAL DEVELOPMENT CO

ADDITION TO NANUE BRIDGE HAWAII

INDEPENDENT IRON WORKS, INC. OAKLAND, CALIF.

MADE BY	[illegible]	12-6-49	ORDER NO.	3807
CHECKED BY	OD	1-25-50	SHEET NO.	DG-E

5468.85

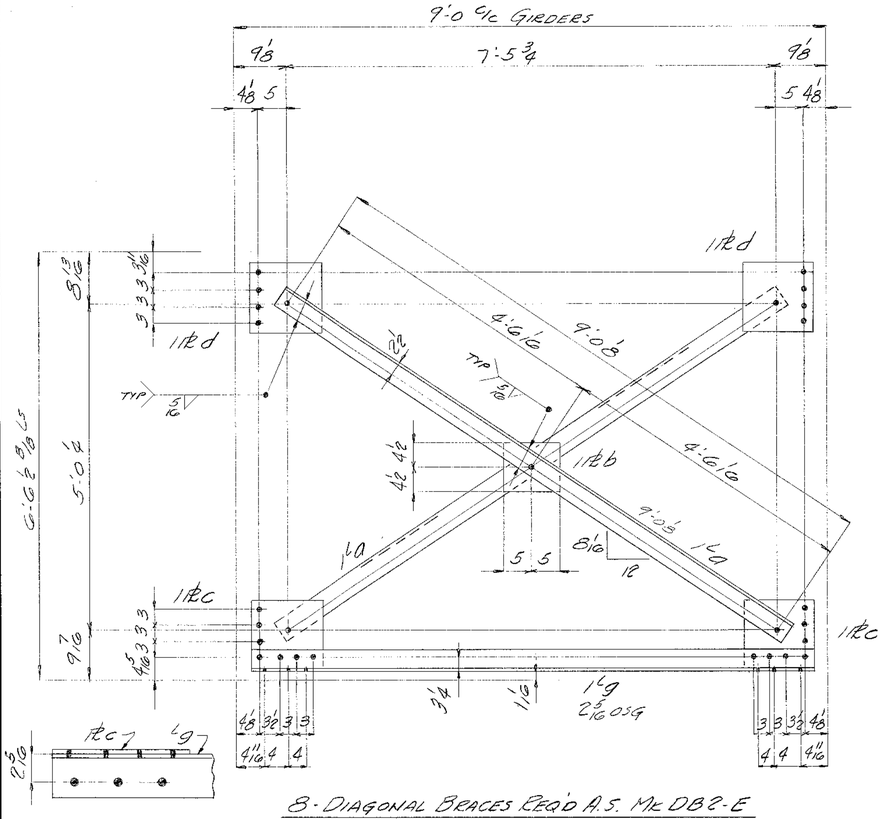
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HEW	[illegible]	1950	86	304

Order No. 3807 Sheet No. D7-E

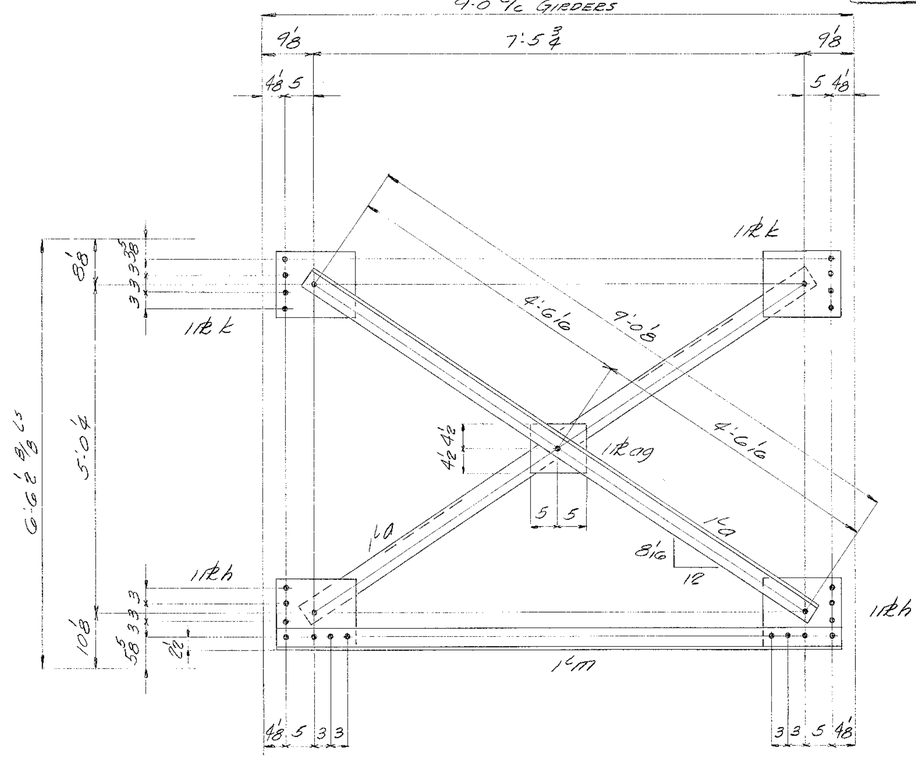
BILL OF MATERIAL — INDUSTRIAL DEVELOPMENT COMPANY

No.	Description	Length Ft.	Length Ins.	Mark	REMARKS
16	DIAG BRACES			DB1-E	
8	Do Do			DB2-E	
18	Do Do			DB3-E	
4	Do Do			DB4-E R L	
2	Do Do			DB5-E R L	
4	Do Do			DB6-E R L	
48	L 4 x 4 x 3/8	9	3 3/8	a	SEE PAINT TABLE FOR PAINTING OF MEMBERS
8	L 4 x 4 x 3/8	8	6 3/4	g	
16	L 4 x 4 x 3/8	8	6 3/4	m	
20	L 4 x 4 x 3/8	9	3 3/4	t	
4	L 4 x 4 x 3/8	8	7 1/2	v R	
2	L 4 x 4 x 3/8	8	7 1/2	w L	
4	L 4 x 4 x 3/8	8	7 1/2	aa	
36	L 4 x 4 x 3/8	9	2 5/8	ad	
18	L 4 x 4 x 3/8	8	6 3/4	af	
18	PL 9 x 5/16		10	b	TEMP
16	PL 12 x 5/16	1	0 1/2	c	TEMP
16	PL 12 x 5/16	1	0 1/2	d	TEMP
32	PL 12 x 3/8	1	2	h	TEMP
32	PL 12 x 3/8	1	2	k	TEMP
10	PL 12 x 5/16	1	0 1/2	p	TEMP
10	PL 12 x 5/16	1	0 1/2	s	TEMP
36	PL 12 x 3/8	1	0 1/2	ab	TEMP
36	PL 12 x 3/8	1	0 1/2	ac	TEMP
34	PL 9 x 3/8		10	ag	TEMP
10	PL 12 x 5/16	1	0 1/2	ah	TEMP
10	PL 12 x 5/16	1	0 1/2	ak	TEMP

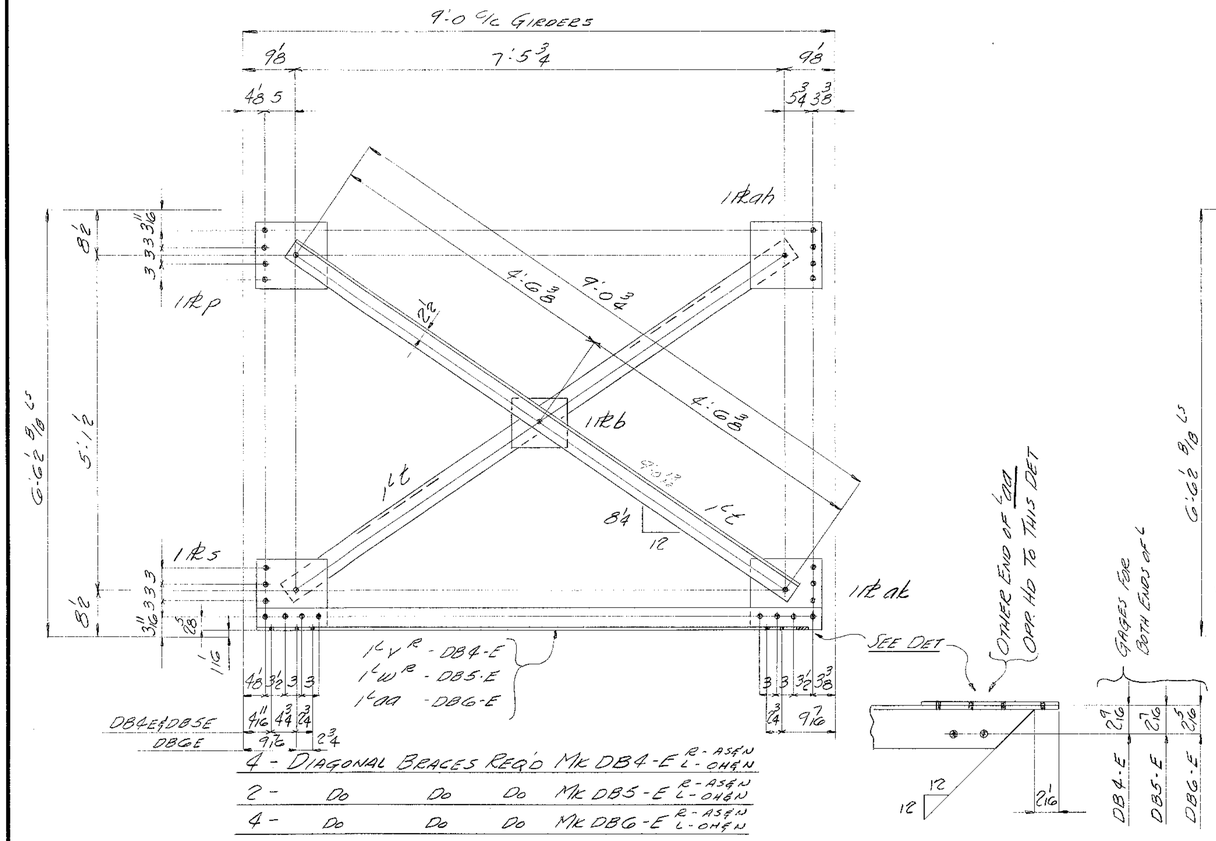
NEW PART 2



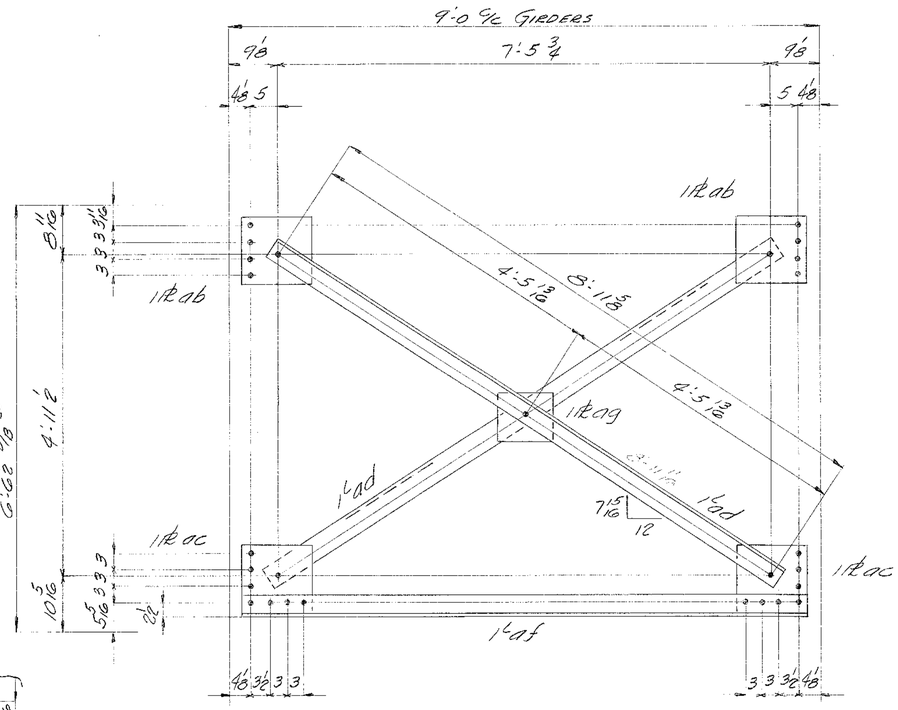
8 - DIAGONAL BRACES REQ'D A.S. MK DB2-E



16 - DIAGONAL BRACES REQ'D A S MK DB1-E



4 -	DIAGONAL BRACES REQ'D MK DB4-E	R - ASH'N	L - OH&N	
2 -	Do Do Do	MK DB5-E	R - ASH'N	L - OH&N
4 -	Do Do Do	MK DBG-E	R - ASH'N	L - OH&N



18 - DIAGONAL BRACES REQ'D A S MK DB3-E

Rivets: 7/8
Holes: 15/16 ϕ
Paint:

INDUSTRIAL DEVELOPMENT CO
ADDITION TO NANUE BRIDGE
HAWAII

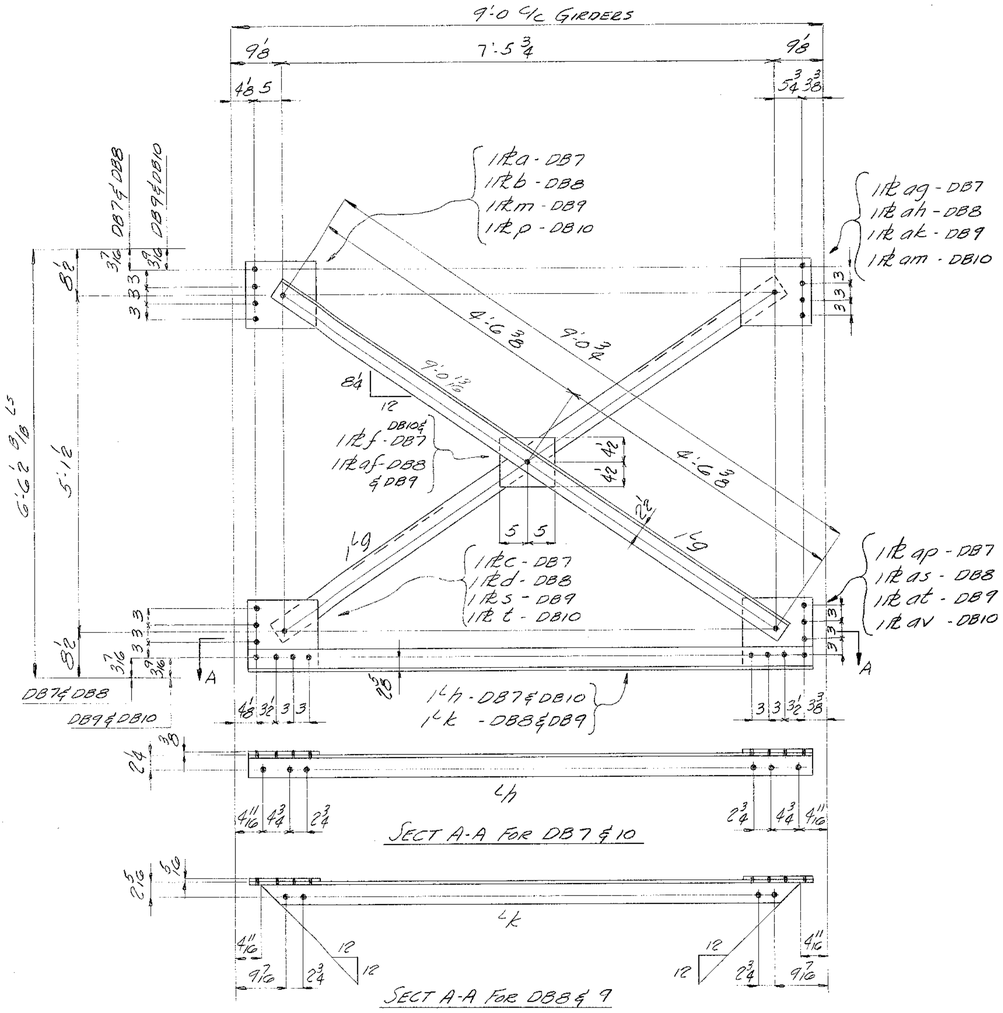
INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

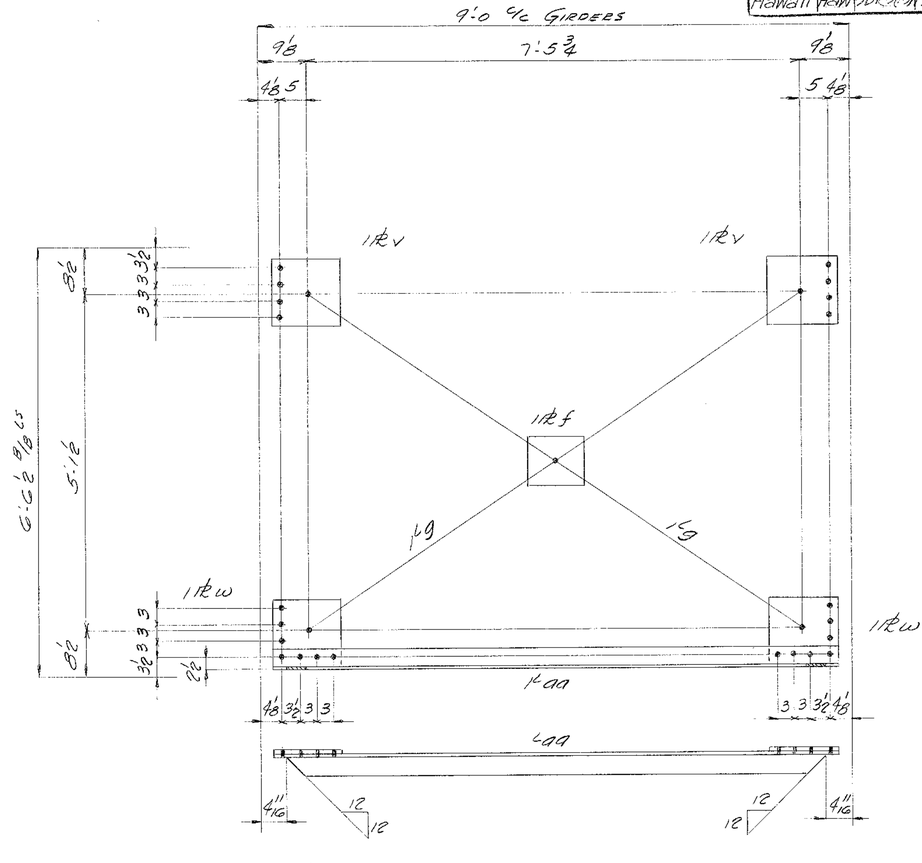
MADE BY	[illegible]	12-7-49	ORDER NO.	3807
CHECKED BY	DRD	1-25-50	SHEET NO.	D7-E

5465.SG

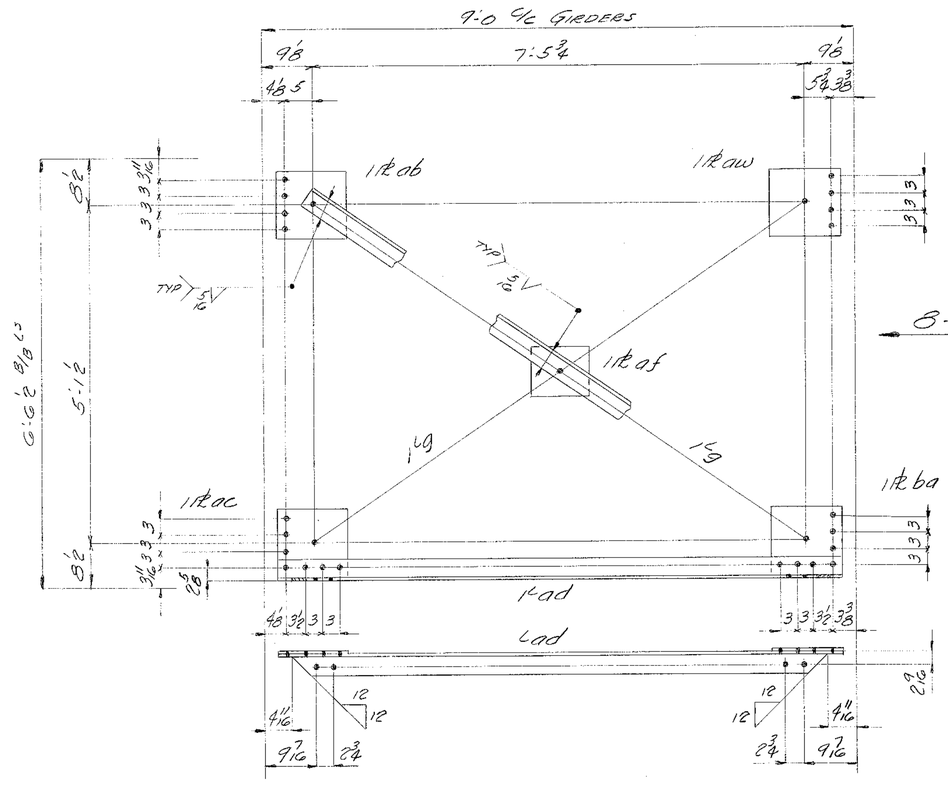
FED. ROAD DIV. NO.	STATE	FED. AID PROJECT NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW	BDK-3(2)	1950	87	304

Order No. 3807 Sheet No. DB-E





2 - DIAGONAL BRACES REQ'D A.S. MK DB11-E



8 - DIAGONAL BRACES REQ'D A.S MK DB12-E R-AS L-OH

2 - DIAGONAL BRACES REQ'D				MK DB7-E R-AS&N L-OH&N
4 -	Do	Do	Do	MK DB8-E R-AS&N L-OH&N
4 -	Do	Do	Do	MK DB9-E R-AS&N L-OH&N
2 -	Do	Do	Do	MK DB10 E R-AS&N L-OH&N

BILL OF MATERIAL

INDUSTRIAL DEVELOPMENT COMPANY

No.	Description	Length Ft.	Length Ins.	Mark	REMARKS
2	DIAG. BRACES			DB7-E R L	
4	Do Do			DB8-E R L	
4	Do Do			DB9-E R L	
2	Do Do			DB10-E R L	
2	Do Do			DB11-E	
8	Do Do			DB12-E R L	
44	L 4 x 4 x 3/8	9	3 3/4	g	SEE X-SECT. TABLE
4	L 4 x 4 x 3/8	8	7 1/2	h	BEARING DET.
8	L 4 x 4 x 3/8	8	7 1/2	k	SAT DIO-E
2	L 4 x 4 x 3/8	8	6 3/4	aa	
8	L 4 x 4 x 3/8	8	7 1/2	ad	
2	PL 12 x 3/8	1	0 1/2	a	TEMP
4	PL 12 x 5/16	1	0 1/2	b	
2	PL 12 x 3/8	1	0 1/2	c	
4	PL 12 x 5/16	1	0 1/2	d	
6	PL 9 x 3/8		10	f	
4	PL 12 x 5/16	1	0 1/2	m	
2	PL 12 x 3/8	1	0 1/2	p	
4	PL 12 x 5/16	1	0 1/2	s	
2	PL 12 x 3/8	1	0 1/2	t	
4	PL 12 x 3/8	1	0 1/2	v	
4	PL 12 x 3/8	1	0 1/2	w	
8	PL 12 x 5/16	1	0 1/2	ab	
8	PL 12 x 5/16	1	0 1/2	ac	
16	PL 9 x 5/16		10	af	
2	PL 12 x 3/8	1	0 1/2	ag	
4	PL 12 x 5/16	1	0 1/2	ah	
4	PL 12 x 5/16	1	0 1/2	ak	
2	PL 12 x 3/8	1	0 1/2	am	
2	PL 12 x 3/8	1	0 1/2	ap	
4	PL 12 x 5/16	1	0 1/2	as	
4	PL 12 x 5/16	1	0 1/2	at	
2	PL 12 x 3/8	1	0 1/2	av	
8	PL 12 x 5/16	1	0 1/2	aw	NEW MATL
8	PL 12 x 5/16	1	0 1/2	ba	

Rivets: 7/8
Holes: 15/16
Paint:

INDUSTRIAL DEVELOPMENT CO

ADDITION TO NANUE BRIDGE
HAWAII

INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY	[illegible]	12-8-49	ORDER NO.	3807
CHECKED BY	DM	1-25-50	SHEET NO.	DB-E

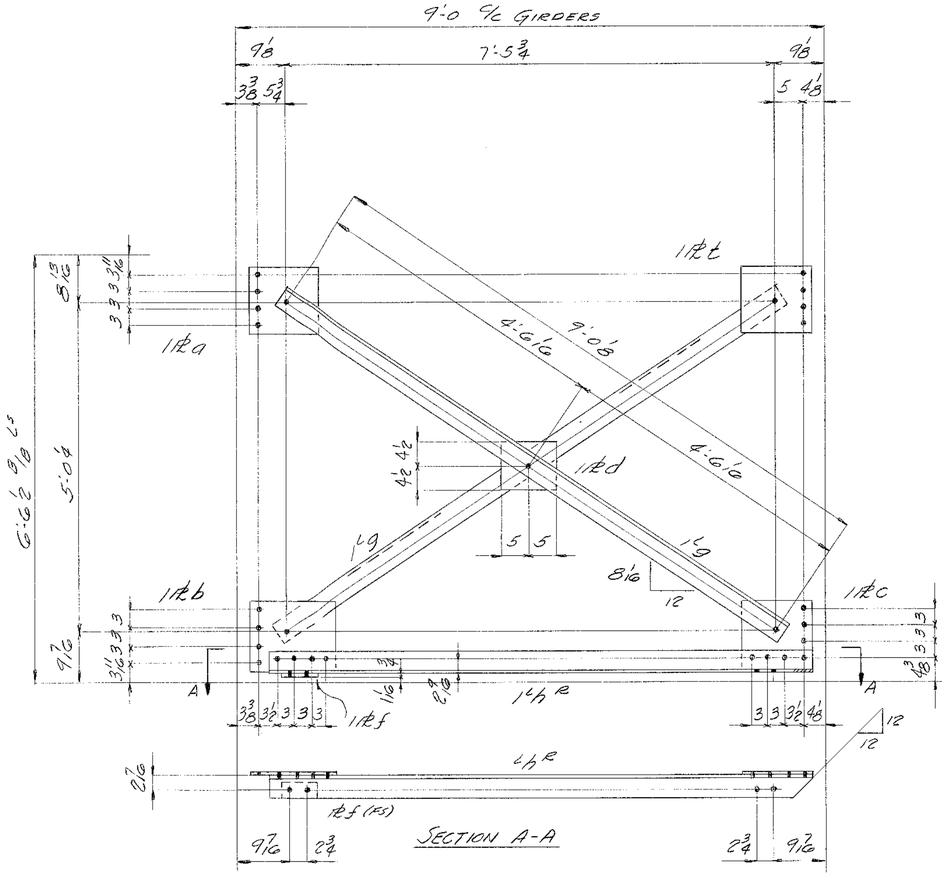
54 GS. 87

FED. ROAD DIST. NO.	STATE	FED. A'C SEC. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHTS.
HSHWY-1	VISN 5	DR 23(3)	1950	88	304

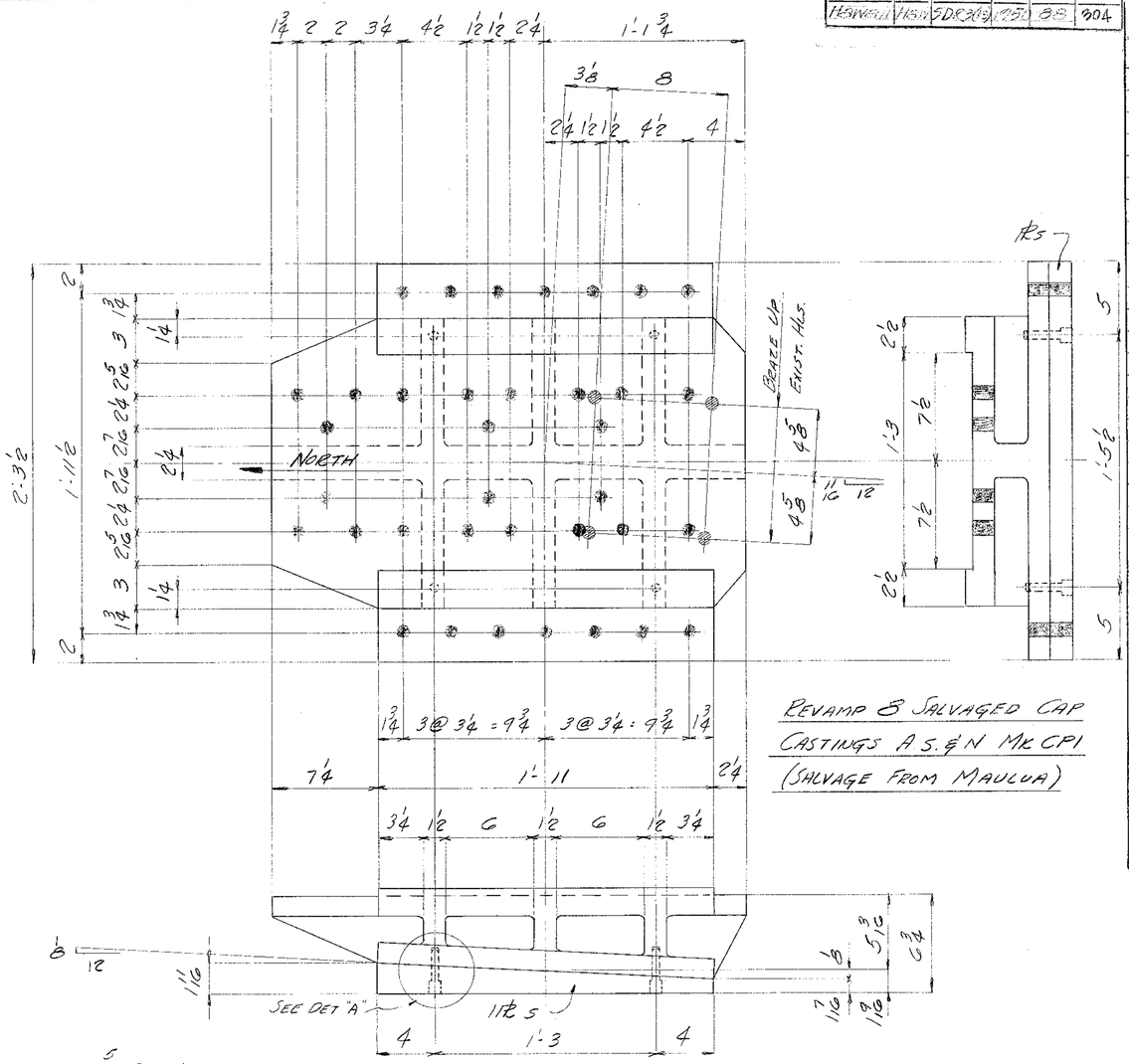
Order No. 3807 Sheet No. D9-E

BILL OF MATERIAL — INDUSTRIAL DEVELOPMENT COMPANY

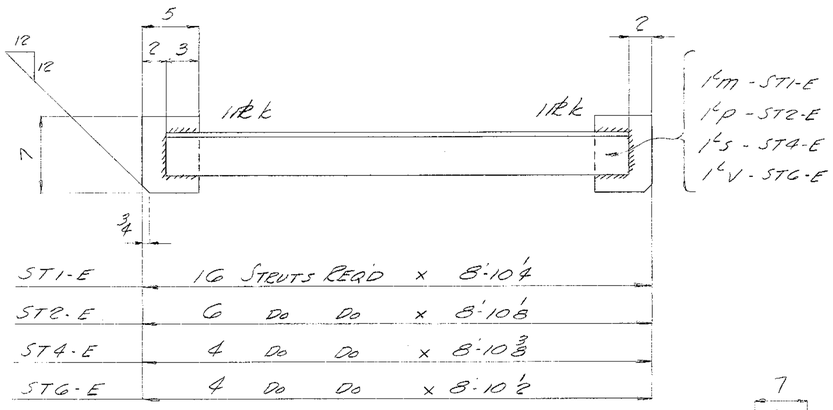
No.	Description	Length Ft.	Length Ins.	Mark	REMARKS
4	DIAG BRACES			DB13-E	
16	STRUTS			ST1-E	
6	STRUTS			ST2-E	
8	L 4 x 4 x 3/8	8	9	ST3-E	PLAIN
4	STRUTS			ST4-E	
20	STRUTS			ST5-E	
4	STRUTS			ST6-E	
10	BEAMS	7	4	B1-E	SALV. FROM CAL. FACTAUS SEE SHT D10-E
8	CAP CASTINGS (SALV. FROM MAULUA)			CPI	REVAMP AS PER DET.
8	L 4 x 4 x 3/8	9	3½	9	SALV FROM TOWER BRIDGE SEE SHT D10-E
4	L 4 x 4 x 3/8	8	7½	h	
16	L 4 x 4 x 3/8	8	6¼	m	
6	L 4 x 4 x 3/8	8	6½	p	
4	L 4 x 4 x 3/8	8	6¾	s	
20	L 4 x 4 x 3/8	8	7½	t	
4	L 4 x 4 x 3/8	8	6½	v	
4	PL 12 x 5/16	1	0½	a	TEMP
4	PL 12 x 5/16	1	3½	b	NEW
4	PL 12 x 5/16	1	0½	c	
4	PL 9 x 5/16		10	d	
4	PL 3 x 3/4		5¾	f	
80	PL 5 x 3/8		7	k	
32	3/8 ϕ SOCKET HD CAP SCREWS x 2" (FOR CPI) N.C. THRD 16 THRDS PER IN.				
4	PL 7 x 3/8 (SALV. FROM KEALAHAKA)	5	4	FP	
16	PL 7 x 3/8 (SALV FROM MAILE)	5	4	FP	
8	PL 8 x 3/8 (SALV FROM MAILE)	5	4	EP	
8	PL 8 x 3/8	5	4	EP	NEW
10	PL 7 x 3/8	7	4	m	PLAIN (NEW)
10	PL 6 x 3/8	7	4	P	PLAIN (NEW)
8	PL 23 x 11/16	2	3½	S	BEVEL TEMP (NEW)
4	PL 12 x 5/16	1	0½	t	TEMP (NEW)



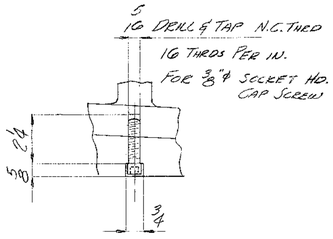
4 - DIAGONAL BRACES REQ'D MK DB13 E-A3 E-OH



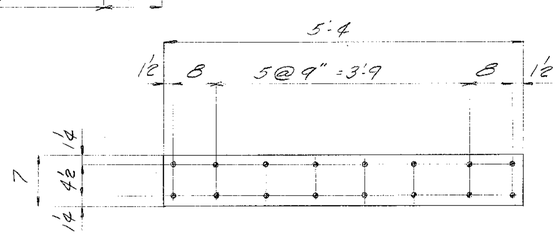
REVAMP & SALVAGED CAP CASTINGS A S. & N MK CPI (SALVAGE FROM MAULUA)



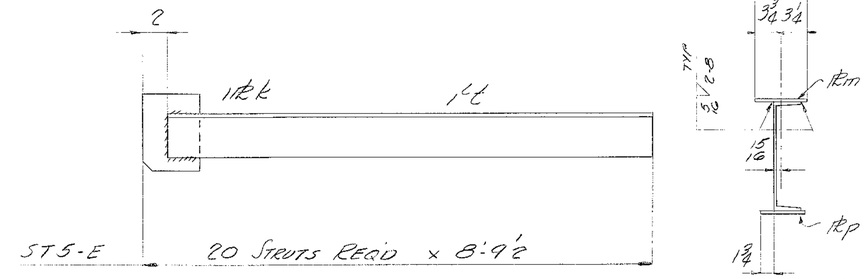
ST1-E	16 STRUTS REQ'D	×	8'-10¼
ST2-E	6 Do Do	×	8'-10⅜
ST4-E	4 Do Do	×	8'-10⅜
ST6-E	4 Do Do	×	8'-10½



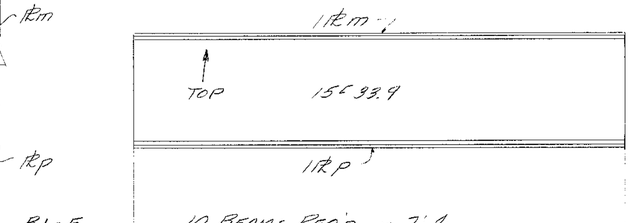
DETAIL "A" (TYP.)



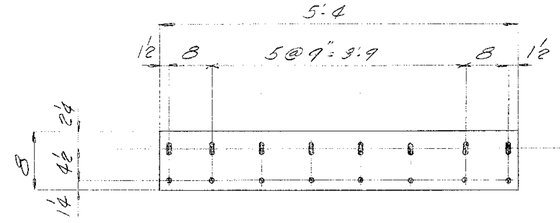
20 - SALVAGED PLS REQ'D MK FP & FP1



ST5-E 20 STRUTS REQ'D × 8'-9½



B1-E 10 BEAMS REQ'D × 7'-4



8 - SALVAGED PLS REQ'D MK EP

8 - NEW PLS REQ'D MK EP

Rivets: ⅞ ϕ
Holes: 15/16 ϕ
Paint:

INDUSTRIAL DEVELOPMENT CO
ADDITION TO NANUE BRIDGE
HAWAII

INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY	[illegible]	12-9-49	ORDER NO.	3807
CHECKED BY	DD	1-26-50	SHEET NO.	D9-E

54GS.SS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW	SDE 2(13)	1950	87	104

Order No. 3807 Sheet No. D10E

MATERIAL REQD. FOR DIAG. BRACES & STRUTS LISTED BELOW — MATL. LISTED BELOW IS TO BE USED FOR STRUTS & DIAG BRACES (ALL MATL REVARIOED)

No.	SIZE	LENGTH	MARK	SHT NO.	No.	P. MK.	SIZE	LENGTH	BRACE	SHT NO.
38	L 5 4x4x⅜	9 3⅜	a	D7-E	2	TS2	2 L 5x3½x5/16	11 2½	LAUPAHOEHOE	36
					5	TS7	2 L 5x3x5/16	10 1⅝	Do.	36
					6	TS8	Do.	15 1⅝	Do.	36
					1	TS22	2 L 5x3½x⅜	10 1⅝	Do.	36
					1	TS3	Do.	18 11⅛	Do.	36
					2	TS9	2 L 5x3x5/16	24 2⅝	Do.	36
8	L 4x4x⅜	8 6¾	9		2	TS9	Do.	24 2⅝	Do.	36
					1	TS16	Do.	23 3⅜	Do.	36
20	L 4x4x⅜	9 3½	t		1	TS18	Do.	28 3⅜	Do.	36
					1	TS20	2 L 5x3½x⅜	16 0⅜	Do.	36
					3	L85	2 L 5x3x⅜	22 2⅜	Do.	38
16	L 4x4x⅜	8 6¾	m		1	TS16	2 L 5x3x5/16	23 3⅜	Do.	36
					1	L83	2 L 5x3x⅜	22 5⅜	Do.	38
					2	L826	Do.	22 2⅜	Do.	38
4	L 4x4x⅜	8 7½	v &		1	L86	Do.	24 3	Do.	38
2	Do.	8 7½	w &		1	L87	Do.	22 8½	Do.	39
4	Do.	8 7½	aa		1	L86	Do.	24 3	Do.	38
36	Do.	9 2⅜	ad		4	L87	Do.	22 8½	Do.	39
					1	L59	Do.	19 9¼	Do.	39
					4	L816	Do.	21 9⅞	Do.	40
18	L 4x4x⅜	8 6¾	af		1	L818	Do.	12 2⅛	Do.	40
					1	L819	Do.	14 6⅜	Do.	40
					1	L820	Do.	28 11⅜	Do.	40
					2	L821	Do.	22 0⅞	Do.	40
					1	L822	Do.	21 7⅜	Do.	40
44	L 4x4x⅜	9 3¾	9	D8-E	1	L823	Do.	21 7⅜	Do.	40
					1	TS11	2 C 6x4x⅜	37 10⅜	Do.	36
					2	TS13	Do.	33 3⅞	Do.	36
					2	HB1	4 C 6x4x⅜	24 4	Do.	43
					1	HB2	Do.	23 8¼	Do.	43
4	L 4x4x⅜	8 7½	h		1	HB2	Do.	23 8¼	Do.	43
8	Do.	8 7½	k		1	HB3	Do.	24 6	Do.	43
2	Do.	8 6¾	aa		1	HB4	Do.	23 10¼	Do.	43
8	Do.	8 7½	ad		1	HB3	Do.	24 6	Do.	43
8	Do.	9 3⅜	9	D9-E	1	HB4	Do.	23 10¼	Do.	43
2	Do.	8 7½	h &		1	HB6	2 C 5x3½x5/16	11 3	Do.	44
16	Do.	8 6¾	m		2	HB6	Do.	11 3	Do.	44
6	Do.	8 6⅜	p		3	HB6	Do.	11 3	Do.	42
8	Do.	8 9	ST3-E		3	HB5	Do.	23 4¼	Do.	44
4	Do.	8 6⅜	s		1	HB5	Do.	23 4¼	Do.	44
4	Do.	8 6½	v		1	HB5	Do.	23 4¼	Do.	44
4	Do.	8 7½	t		1	HB5	Do.	23 4¼	Do.	44
10	BEAMS	7 4	B1-E		2	C3E	15'E Col.	23 11	MAILE	13
20	BEAMS	8 10	B2-E	D8-E	4	MC4E	H6 DEEP Col.	32 8½	KAULA	16
C	L 4x4x⅜	8 7½	h	D9-E	1	L 5 H 3½x3½x⅜		21 11½		
D	L 4x4x⅜	7 9⅜	d	D7-E	1	L 4 H 2½x3½x⅜		23 7¼		
					1	L 5 H A	Do.	23 7¼		
U	L 4x4x⅜	8 7½	u	D9-E	2	L 5 2 H	5½x3½x⅜	27 0½		
					1	L 5 4 H	Do.	22 1½		
					1	L 5 H A	Do.	22 1½		

BILL OF MATERIAL INDUSTRIAL DEV. CO.

No.	Description	Length Ft.	Length Ins.	Mark	REMARKS

Rivets:

Holes:

Paint:

INDUSTRIAL DEV. CO.

ADDITION TO THE WAINUE BRIDGE - HAWAII -

INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY	SEE DWG	10-12-49	ORDER NO.	3807
CHECKED BY	[illegible]	1-26-50	SHEET NO.	D10-E

5468.89 = 87

FED ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HI.	2DR(2)(3)	1950	90	304

Order No. 3807 Sheet No. D11-E

NOTE:
CUT 2'-11⅞ SECTION OUT OF COL. ℄ PROVIDE SPLICE A S. ℄ N.

43'-1 9/16 P/P on ℄ Col.

11'-2 9/16 to ⌀ CGP ONLY

21'-0 31/32 CGP ONLY

℄ SPLICE

(A)

FOR REST OF COL. SEE D12E

NOTE:
NEW SPLICE IS TO BE WELDED FOR BEARING IN PLACE OF MILLED ENDS

10'-10 1/2

-ONE- COL. CGP (R.S.E.N.) FOR BENT ℄ ①
-ONE- COL. CGP (O.H.E.N.) FOR BENT ℄ ①

8 3/4 2 3/8

3 3 3 2 4 5/16 6 3 3

1-PLd

4-PLg

2-PLf

1-PLd

3 3 3 3 4 6 4 3 3

7/16

NOTE: THIS SPLICE DETAIL IS FOR COL. CGP ONLY
SEE SHT. NO. D12E FOR SPLICE DET. OF CGP'S

28'-8 3/8

ELEV AT RIGHT SIDE OF BENT ℄ ① LOOKING NORTH

SPLICE LINE (DRAWING)

ADBIE

ST 7E

2 L's 4 x 3 x 5/16 x 12'-4 1/4

2 L's 4 x 3 x 5/16 x 28'-11 3/8

2 PLa

2 PLb

1-PLc

1-PLd

6@24-1½

1'-2 3/8

9'-0

6'-7 3/4

6'-10 3/4

1'-2 3/8

90°

1'-7

EXISTING COLUMNS

14'-1 9/16

29'-0

43'-1 9/16 P/P on ℄ Col.

NOTE:
FOR BILL OF MAT'L. SEE D12E

VIEW B-B

Note:
For section thru existing column see Sec. D-D, sht. D13-E.

VIEW A-A

1'-10
1'-7
½ PLd
½ PLg
11/16 PLf
PLg
PLf
PLd

SECTION C-C (CGP ONLY)

Rivets: 34
Holes: 15/16 ϕ
Paint:

INDUSTRIAL DEV. CO.

ADDITION TO NANUE BRIDGE
HAWAII

INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY	DAL	11-29-49	ORDER NO.	3807
CHECKED BY	RA	2-8-50	SHEET NO.	D11-E

5468.90 sq ft

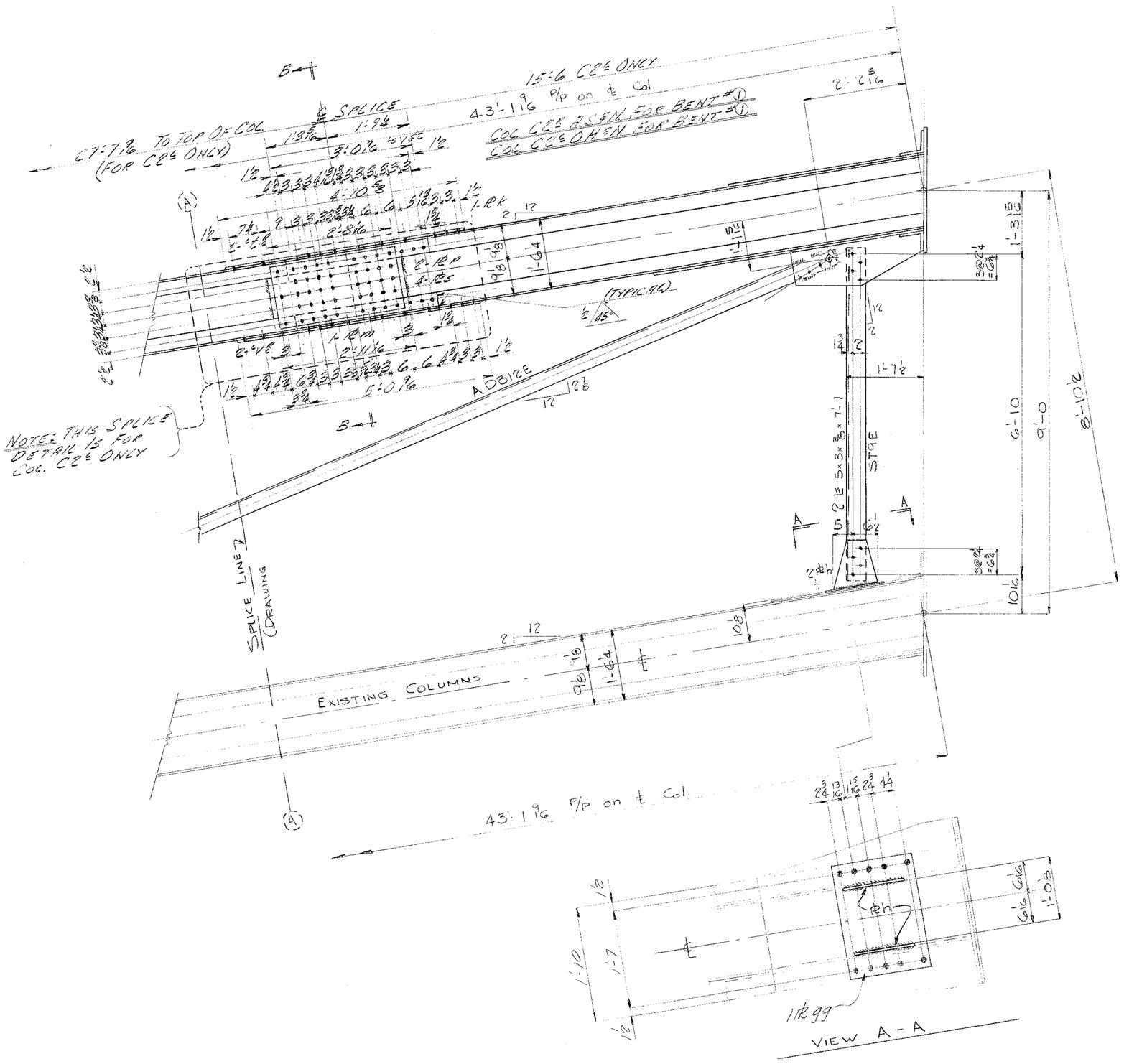
FED. ROAD DIV. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	16	RDS-2(6)	1950	91	304

11/6/50

Order No. 3807 Sheet No. D12-E

BILL OF MATERIAL INDUS. DEV. CO.

No.	Description	Length Ft.	Length Ins.	Mark	REMARKS
1	COLUMN			$C2^R$	KEALAHAKA
	SHEET D11E & D12E				
1	COLUMN			$C2^L$	Do
	SHEET D11E & D12E				
2	STRUTS	6	10¾	ST7E	
2	Do	7	2¾	ST8E	
2	Do	7	1	ST9E	
2	DIAG BRACE	12	4¼	ADB11E	
2	Do	28	11⅞	ADB12E	
4	PL 16½ × ⅜	1	6½	a	Temp New
4	PL 6 × ⅜	1	4	b	Do Do
2	PL 18 × ⅜	1	10	c	
2	PL 22 × ½	3	0½	d	
2	PL 9½ × 1/16	2	9½	f	
4	PL 16½ × ½	2	6½	g	
4	PL 11½ × ½	1	1	h	
2	PL 15½ × ½	1	10	gg	
1	PL 22 × ½	4	10⅝	k	
1	PL 22 × ½	5	0½	m	
2	PL 9½ × 1/16	2	11	p	
4	PL 16½ × ½	2	8	s	
2	L 4 × 4 × 1/16	3	0½	s^2	
2	L 4 × 4 × 1/16	5	0½	v^2	1 1
	SEE SHT. D12E FOR DETAILS OF DIAG. BRACES & STRUTS				



ELEVATION AT RIGHT SIDE OF BENT #1 - LOOKING NORTH

Rivets: ⅞ ϕ
Holes: 15/16 ϕ
Paint:

INDUSTRIAL DEV. CO.

ADDITION TO NANUE BRIDGE
HAWAII

INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

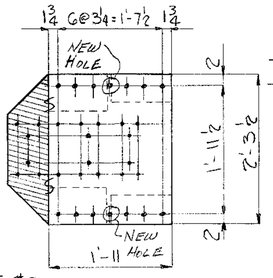
MADE BY	DAL	11-30 49	ORDER NO.	3807
CHECKED BY	RA	2-8-50	SHEET NO.	D12-E

5468.91

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	SDR 26(1)	1950	72	304

Order No. 3807 Sheet No. D13E

NOTE:
REVISE EXISTING CAP ℄ BY REMOVING FILLS, CUTTING A.S., & DRILLING TWO NEW HOLES.



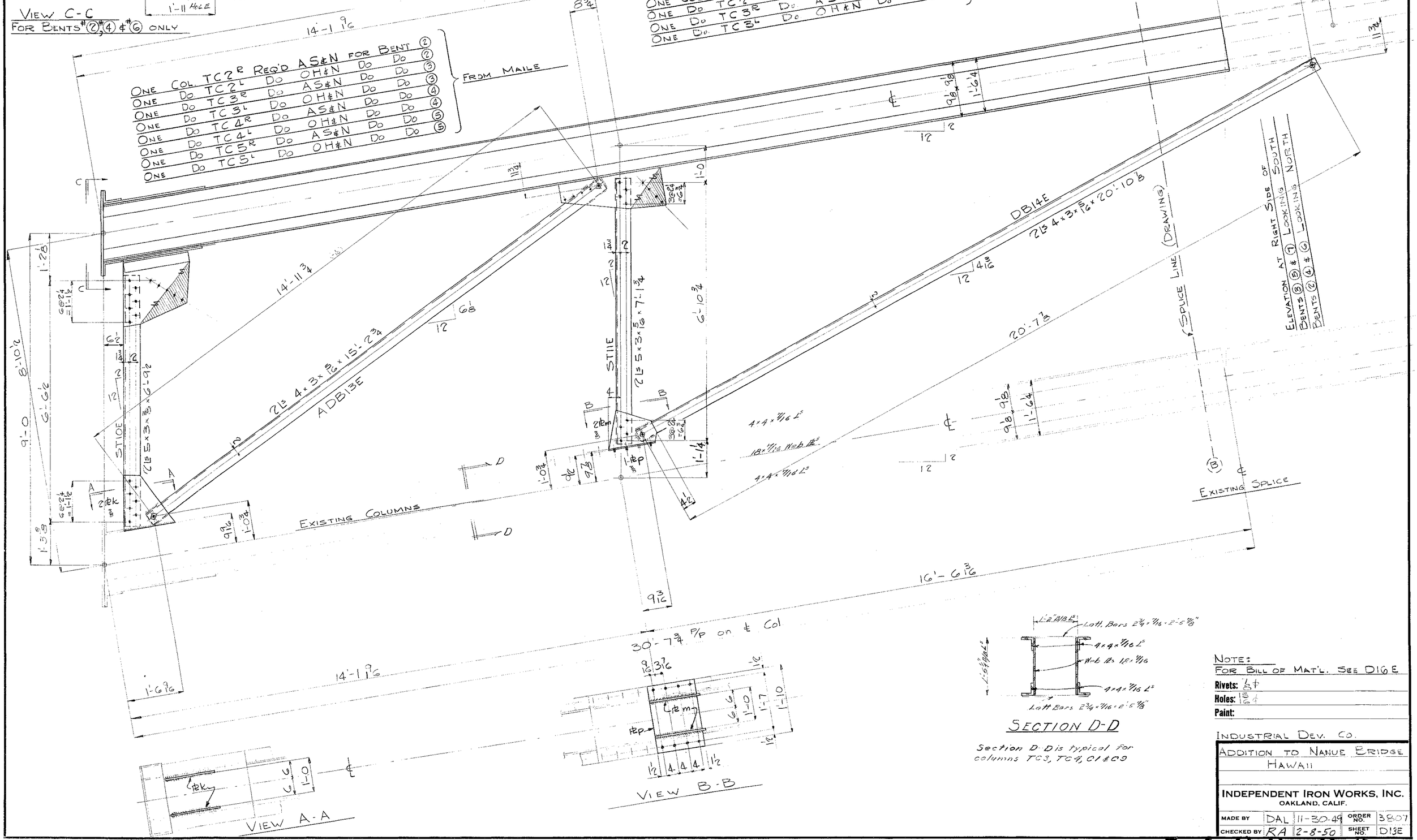
VIEW C-C
FOR BENTS #②,④ & #⑥ ONLY

ONE COL.	TC2R	REQ'D	AS&N	FOR BENT	②
ONE Do	TC2L	Do	OH&N	Do	Do ②
ONE Do	TC3R	Do	AS&N	Do	Do ③
ONE Do	TC3L	Do	OH&N	Do	Do ③
ONE Do	TC4R	Do	AS&N	Do	Do ④
ONE Do	TC4L	Do	OH&N	Do	Do ④
ONE Do	TC5R	Do	AS&N	Do	Do ⑤
ONE Do	TC5L	Do	OH&N	Do	Do ⑤

FROM MAILE

ONE COL.	TC2R	REQ'D	AS&N	FOR BENT	⑥
ONE Do	TC2L	Do	OH&N	Do	Do ⑥
ONE Do	TC3R	Do	AS&N	Do	Do ⑦
ONE Do	TC3L	Do	OH&N	Do	Do ⑦

FROM KEALAHAKA



SECTION D-D

Section D-D is typical for columns TC3, TC4, C1 & C9

NOTE:
FOR BILL OF MAT'L. SEE D16E
Rivets: ⅞
Holes: 15/16
Paint:

INDUSTRIAL DEV. CO.
ADDITION TO NANUE BRIDGE
HAWAII

INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY	DAL	11-30-49	ORDER NO.	3807
CHECKED BY	RA	2-8-50	SHEET NO.	D13E

5468.92

FED. ROAD DIV. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HIGHWAYS	HAWAII	SDE 2(13)	1950	93	404

Order No. 3807 Sheet No. D14E

ONE COL. MD2R REQ'D AS FOR BENT ②
ONE DO. MD2L DO OH DO DO ②
ONE DO. MD3R DO AS DO DO ③
ONE DO. MD3L DO OH DO DO ③
ONE DO. MD3R DO AS DO DO ④
ONE DO. MD3L DO OH DO DO ④
ONE DO. MD4R DO AS DO DO ⑤
ONE DO. MD4L DO OH DO DO ⑤
} FROM MAILE

ONE COL MD3R REQ'D AS FOR BENT ⑥
ONE DO. MD3L DO OH DO DO ⑥
ONE DO. MD3R DO AS DO DO ⑦
ONE DO. MD3L DO OH DO DO ⑦
} FROM KEALAHAKA

NOTE:
REMOVE EXISTING INSIDE FILLS FROM MD3R & MD3L BENTS 4, 6 & 7

EXISTING SPLICE

32'-8 11/32

33'-5 5/8

DB14E

DB15E

2 L's 4 x 3 x 5/16 x 33'-8 1/8

2 L's 5 x 3 x 5/16 x 7'-1 3/4

STIFF

SPLICE LINE

SPLICE LINE (DRAWING)

4 x 4 x 3/16 L's

18 x 7/16 Webs

EXISTING COLUMNS

FOR OTHERS (C)

FOR MD2L (D)

ELEVATION AT RIGHT SIDE OF
BENTS ③ ⑤ & ⑦ LOOKING SOUTH
BENTS ② ④ & ⑥ LOOKING NORTH

VIEW A-A

SECTION B-B
Latt. Bars 2 3/4 x 7/16 x 2'-5 7/8
4 x 4 x 3/16 L's
Webs 18 x 7/16
4 x 4 x 3/16 L's
Latt. Bars 2 3/4 x 7/16 x 2'-5 7/8

NOTE:
FOR BILL OF MAT'L. SEE D16E

Rivets: 7/8φ
Holes: 15/16φ
Paint:

INDUSTRIAL DEV. CO.

ADDITION TO NANUE BRIDGE
HAWAII

INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY	DAL	12-7-49	ORDER NO.	3807
CHECKED BY	RA	2-8-50	SHEET NO.	D14E

5468.93

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAWAII	[illegible]	1950	92	304

Order No. 3807 Sheet No. D15E

VIEW CC

SECTION B-B

NOTE:
CUT 12'-3 15/16 SECTION OUT OF COL. & PROVIDE SPLICE A.S
26'-1 29/32 P/P on ℄ Col.

16'-3 7/8

3'-0

ONE COL. BC2 REQ'D. — FROM MAILE

NOTE:
NEW SPLICE IS TO BE WELDED FOR BEARING IN PLACE OF MILLED ENDS.

EXISTING SPLICE

DB15E

SPLICE LINE (DRAWING)

EXISTING SPLICE

STIFF

2 L's 6×4×⅜×16'-5⅜

2 L's 5×3½×⅜×7'-1¾

22'-2 3/8 (+)

4×4×½ L's

18×⅜ Webs

EXISTING COLUMN

26'-1 29/32 P/P on ℄ Col.

VIEW A-A

VIEW D-D

SECTION E-E

Section E-E is typical for columns BC2, BC8, MD2 & TC2

ELEV. AT RIGHT SIDE OF BENT ② LOOKING NORTH

FOR BILL OF MAT'L SEE D1G-E

Rivets: ⅞ ϕ
Holes: 15/16 ϕ
Paint:

INDUSTRIAL DEVELOPMENT CO.

ADDITION TO NANUE BRIDGE
HAWAII

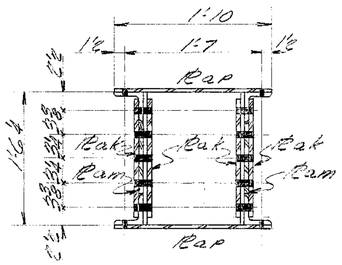
INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY	DAL	12-2-49	ORDER NO.	3807
CHECKED BY	RA	2-8-50	SHEET NO.	D15E

5468.94

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW	DR-3(13)	1950	95	404

Order No. 3807 Sheet No. D16E



Note:
For location mark BC2 see Sec. E-E Sht. D15-E

BILL OF MATERIAL — INDUS. DEV. CO.

No.	Description	Length Ft.	Length Ins.	Mark	REMARKS
1	COLUMN			TC2R	MAILE D13-E
1				TC2L	
1				TC3R	
1				TC3L	
1				TC4R	
1				TC4L	
1				TC5R	
1				TC5L	MAILE 1
1				TC2R	KEALAHAKA
1				TC2L	
1				TC3R	
1				TC3L	KEALAHAKA D13-E
1				MD2R	MAILE D14-E
1				MD2L	
2				MD3R	
2				MD3L	
1				MD4R	
1				MD4L	MAILE
2				MD3R	KEALAHAKA
2				MD3L	KEALAHAKA D14-E
1				BC2	MAILE D15-E
1	COLUMN			BC2	KAULA
16	STRUTS			ST10-E	
36	STRUTS			ST11-E	
2	STRUTS			ST12-E	
12	DIAG BRACE			ADB13-E	
12				DB14-E	
22				DB15-E	
1				DB16-E	
1	DIAG BRACE			DB17-E	
24	Pl 16 2 x ⅜	1	6	k	TEMP
24	Pl 12 x ⅜	1	22	m	
12	Pl 15 x ⅜	1	10	p	
12	Pl 15¾ x ⅜	1	10	s	
28	Pl 11½ x ⅜	1	3¾	w	
2	Pl 15¾ x ⅜	1	10	aa	
2	Pl 22 x ½	2	11½	ab	
2	Pl 9½ x ¾	2	6	ac	
4	Pl 16 x ½	2	5⅛	ad	
2	Pl 12 x ½	1	1	af	
14	Pl 16¾ x ⅜	1	6	ag	
2	Pl 12 x ½	1	3	ah	
4	Pl 16 x ½	2	0⅝	ak	
2	Pl 9½ x ¾	2	3¾	am	
2	Pl 22 x ½	3	0⅝	ap	
1	Pl 14¼ x ½	1	10	gv	
1	Pl 15¼ x ⅜	1	6	gw	
1	Pl 3 x ¼		11¼	ha	
1	Pl 18¾ x ⅝	1	6¾	hb	
1	Pl 20 x ½	1	10	hc	
1	Pl 1¾ x ⅝		3	fw	TEMP

NEW MAT'L

Rivets: 78 ϕ
Holes: 15/16 ϕ
Paint:

INDUSTRIAL DEVELOPMENT CO.

ADDITION TO MAUI BRIDGES
HAWAII

INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY	[illegible]	12-15-49	ORDER NO.	3807
CHECKED BY	RA	2-9-50	SHEET NO.	D16E

5468.95

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW	SDR3(13)	1950	96	304

Order No. 3807 Sheet No. D17E

ONE COLUMN MC3R - FROM MAILE

EXIST. ℄ SPLICE

3:0

8¾

32'-11 27/32

1'-6½

9⅝

9⅝

12 : 2

1:0

1¼

1:0 INSIDE FCS

3824

10¾

22' 12

DB 15-E

2 L⁵ 5×3×5/16 × 7'-1¾

ST 11-E

6'-10¾

8'-10½

SPLICE LINE (DRAWING)

9'-0

34'-1⅛

DB 18 E

2 - L⁵ 4×3×5/16 × 34'-4⅛

12 : 2 3/8

12 : 2

A

A

3¼

2 FCS W

3824

10¾

1'-1½

1'-6½

9⅝

9⅝

12 : 2

32'-8 11/32

4'2

(C) ℄ EXIST SPLICE

3:0

8'2

(E)

EXIST. ℄ SPLICE

3:6

TO WP ON ℄ OF COL

9¾

1'-9¼

B

B

EXIST. FILL

1:0½

2 FCS W

4@3" = 1'0

1'2

MATCH LINE

ELEVATION AT RIGHT SIDE OF BENT (3) LOOKING SOUTH

1163R

EXIST. SPLICE

6 4⅛

1¼ av

6

6

1'-0

1'-10

1'-7

1¼ w

1¼ av

1'2

4'4 4'4 4'4

VIEW A-A

1¼ av

1¼ av ½

1'-6½

2 2¼ 3 2¼ 2¼

SECTION B-B

Note:

For section thru existing column
see Sec. B-B Sht D 22-E.

NOTE

FOR BILL OF MATL SEE D 20-E

Rivets: ⅞ ϕ

Holes: 15/16 ϕ

Paint:

INDUSTRIAL DEVELOPMENT CO

ADDITION TO NANUE BRIDGE
HAWAII

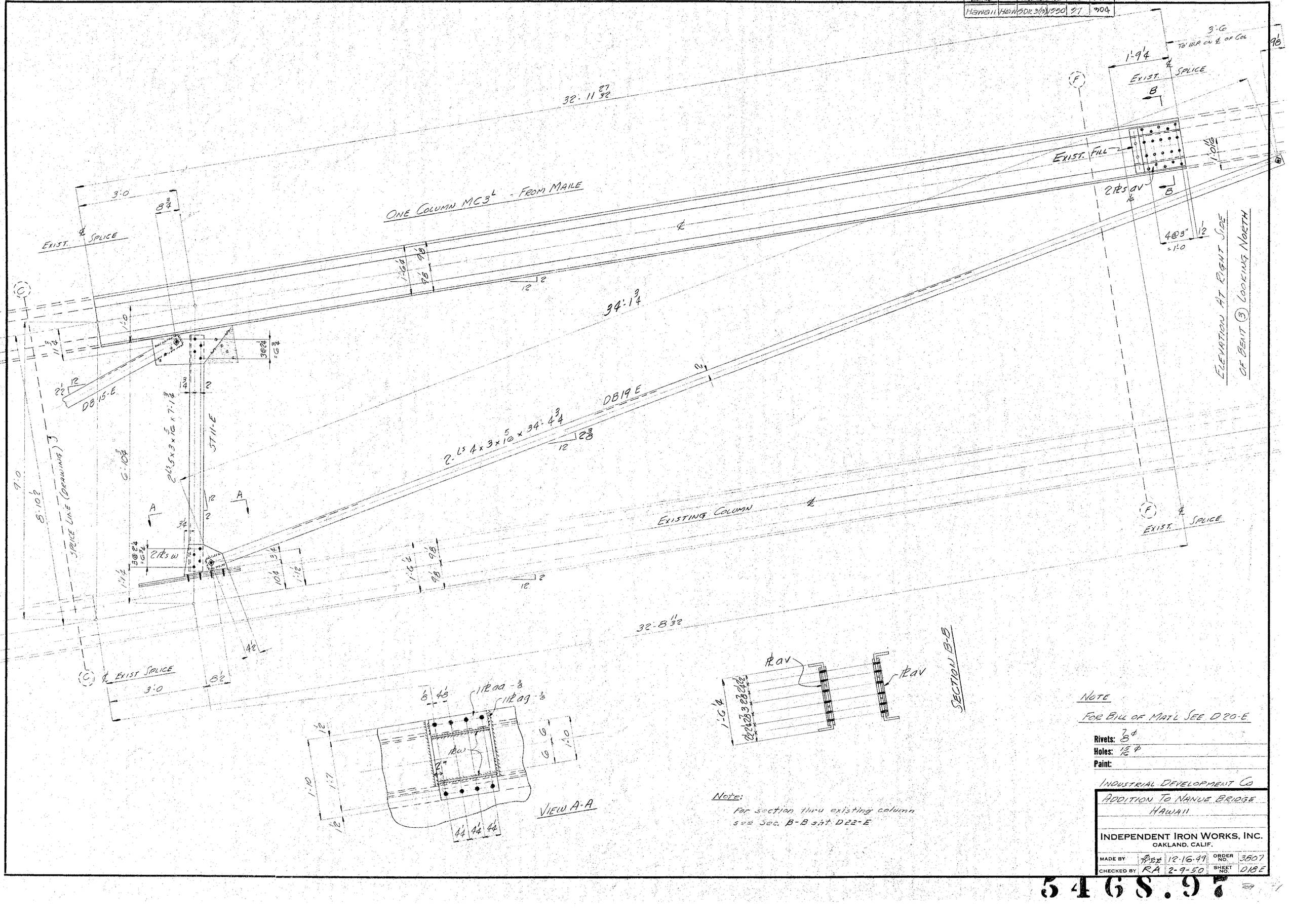
INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY	[illegible]	12-16-49	ORDER NO.	3807
CHECKED BY	RA	2-9-50	SHEET NO.	D17E

5468.96

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	NO. SHEETS
HAWAII	HAW	BR 3(6)	1950	217	304

Order No. 3807 Sheet No. D18E



Note:

For section thru existing column see Sec. B-B sht. D22-E

NOTE

FOR BILL OF MATL SEE D20-E

Rivets: 3 ϕ

Holes: 12 ϕ

Paint:

INDUSTRIAL DEVELOPMENT CO

ADDITION TO NANUE BRIDGE HAWAII

INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY	[illegible]	12-16-49	ORDER NO.	3807
CHECKED BY	RA	2-9-50	SHEET NO.	D18E

5468.97

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HEN911	HAWN	SUE 2(13)	1950	99	304

Order No. 3807 Sheet No. D19-E

aw
ba
bb
bc
bd
bf
bg
ft
fw
gk
gm

SECTION C-C

NOTE: ONE COL. BC6 REQ'D - FROM MAILE
CUT 10: 3 19/32 SECTION OUT OF COL. & PROVIDE SPLICE A.S.
NEW SPLICE IS TO BE WELDED FOR BEARING IN PLACE OF MILLED ENDS

ELEVATION AT RIGHT SIDE OF BENT (3) - LOOKING SOUTH

EXIST. SPLICE

MC3E MAILE

DB18E

DB20E

SPLICE LINE (DRAWING)

EXIST SPLICE

BC3E EXISTING COLUMN

2-L 6x4x⅜x7'-3 ST13-E

2-L 4x3x5/16x24'-5⅞ ST14-E

2-L 3½x3½x5/16x6'-9⅝ ST15-E

VIEW A-A

VIEW B-B

Note: For section thru BC3E see Sec. B-B sht D22-E

NOTE: FOR BILL OF MATL SEE D20-E

Rivets: ⅞ φ
Holes: 15/16 φ
Paint:

INDUSTRIAL DEVELOPMENT CO

ADDITION TO NANUE BRIDGE
HAWAII

INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY	[illegible]	12-19-49	ORDER NO.	3807
CHECKED BY	RA	2-9-50	SHEET NO.	D19-E

5465.98

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HEW 511	HEW	SDR 3(6)	1950	95	304

11/16/50

Order No. 3807 Sheet No. D20-E

BILL OF MATERIAL

INDUSTRIAL DEVELOPMENT COMPANY

No.	Description	Length Ft.	Length Ins.	Mark	REMARKS
1	COLUMN			MC3 R	MAILE D18E
1	COLUMN			MC3 L	MAILE D18E
1	COLUMN			BC6	MAILE D19E
1	COLUMN			BC4	MAILE
2	STRUTS			ST13E	
1	STRUT			ST14-E	
1	STRUT			ST15-E	
1	DIAG BRACE			DB18-E	
1	" "			DB19-E	
1	" "			DB20-E	
1	" "			DB21-E	
1	PL 15 × ½	1	10	hd	TEMP
1	PL 16 × ⅜	1	6¾	hf	—
1	PL 3 × ¼	1	0	ft	
1	PL 1¼ × ⅜		3	fw	
1	PL 20⅜ × ½	1	10	gk	
4	PL 11½ × ⅜	1	3¾	w	
2	PL 15¾ × ⅜	1	10	aa	
2	PL 16¾ × ⅜	1	6	ag	
4	PL 15 × ½	1	4	av	
4	PL 6¾ × ⅜	1	7	aw	
2	PL 19 × ⅜	1	10	ba	
2	PL 20 × ⅜	1	6	bb	X
					NEW MATL
4	PL 16 × 7/16	3	0¼	bd	
2	PL 5¾ × ⅜	3	1¼	bf	
2	PL 22 × 7/16	2	10½	bg	
4	PL 16 × 7/16	3	1¼	bh	
2	PL 5¾ × ¾	3	2¼	bk	
2	PL 22 × 7/16	2	9¾	bm	
2	PL 12 × 12	1	0¼	pc	
1	PL 18¼ × ⅝	1	8	gm	TEMP
MATERIAL LISTED ABOVE IS FOR DWG'S- D17E, 18-E, & 19-E, D20-E					
MATERIAL LISTED BELOW IS FOR DWG'S D21-E, 22-E, & 23-E					
4	COLUMNS			MD3 R	KEALAHAKA D21-E
8	COLUMNS			MC4 R	KEALAHAKA D22-E
2	COLUMNS			BC1 R	KAULA D23-E
8	STRUTS			ST16-E	
2	STRUTS			ST17-E	
2	STRUTS			ST18-E	
2	DIAG BRACE			DB22-E	
2	DIAG BRACE			DB32-E	
24	PL 11½ × ⅜	1	3¾	w	TEMP
14	PL 15¾ × ⅜	1	10	aa	
14	PL 16¾ × ⅜	1	6	ag	
8	PL 12 × ⅝	1	4	bp	
4	PL 11½ × ⅜	1	4	bs	
4	PL 22 × 7/16	2	10	pa	
8	PL 16 × 7/16	2	4	pb	
4	FLL 15⅞ × 7/16	1	4	bw	
8	PL 3 15/16 × 7/16		4	ca	
4	PL 3 15/16 × ⅛	1	4⅞	cb	
4	PL 12 × ½	1	1	gh	
2	PL 1¾ × ⅜		3	fw	
8	PL 3 × ¼		11¼	ha	
2	PL 18¾ × ⅝	1	8	bb	
8	PL 20 × ½	1	10	ac	TEMP
					NEW MATL

Rivets: ⅞"

Holes: 15/16"

Paint:

INDUSTRIAL DEVELOPMENT CO

ADDITION TO NAHUE BRIDGE

HAWAII

INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY	[illegible]	12-20-49	ORDER NO.	3807
CHECKED BY	RA	2-9-50	SHEET NO.	D20-E

54GS.99

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW	BDR 3(13)	1950	100	404

Order No. 3807 Sheet No. D21-E

w
aa
ag
bp

1-1¼ bp - For Cols. MD3ᴿ L on Bent (4)

SECTION B-B

Exist. Fills

1 1¼ bp - For Cols MD3ᴱ on Bent (4) & (5)

Exist Splice

3'-0

8¾

32'-8 11/32

ONE COL MD3ᴿ A S&N - BENT (4)
ONE COL MD3ᴸ O H&N - BENT (4)
ONE COL MD3ᴿ A S&N - BENT (5)
ONE COL MD3ᴸ O H&N - BENT (5)
} FROM KEALAHAKA

(G) REMOVE ⅝" FILLS (EXIST.) INSIDE — FOR BENT (4) ONLY

2 1¼s bp

DB15-E

2 Ls 4 x 3 x 5/16 x 33'-8⅛

2 Ls 5 x 3 x 5/16 x 7'-1¾

ST11-E

MC4ᴱ

Splice Line Debonding

2 1¼s w

1¼ aa

1¼ ag

VIEW A-A

Exist Splice

(C)

3'-0

8'-2

Exist Splice

(G)

33'-5⅛

Existing Column

Exist Splice

ELEVATION AT EIGHT SIDE OF BENT (4) LOOKING NORTH
BENT (5) LOOKING SOUTH

Note:
For section thru MC4 see Sec. B-B, sht D22-E

NOTE
FOR BILL OF MAT'L SEE D20-E

Rivets: 7/8 ϕ
Holes: 15/16 ϕ
Paint:

INDUSTRIAL DEVELOPMENT CO

ADDITION TO NANUE BRIDGE
HAWAII

INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY	[illegible]	12-21-49	ORDER NO.	3807
CHECKED BY	RA	2-9-50	SHEET NO.	D21-E

5468.100

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
Hawaii	Haw	ODR-2(6)	1950	101	304

Order No. 3807 Sheet No. D22-E

ONE COL MC4R A.S.⅝N - BENT (4)
ONE COL MC4L OH⅝N - BENT (4)
ONE COL MC4R AS⅝N - BENT (5)
ONE COL MC4L OH⅝N - BENT (5)
ONE COL MC4R AS⅝N - BENT (6)
ONE COL MC4L OH⅝N - BENT (6)
ONE COL MC4R AS⅝N - BENT (7)
ONE COL MC4L OH⅝N - BENT (7)
FROM KEALAHAKA

32'-8 11/32

3'-0
8¾
EXIST ℄ SPLICE
1'-0
11¾
2'-2
12
DB15-E
2
12
ST11-E - BENTS G&7
ST16-E - BENTS 4&5
12
2 L 5 x 3 x 5/16 x 7'-1⅛ ST11-E
2 L 6 x 4 x ⅜ x 7'-1⅛ ST16-E
A
A
G'-10¾
3@12 = 6¾
1'-1¾
10¾
1'-1¾
2 L 4 x 3 x 5/16 x 33'-11⅞ DB32-E - FOR BENT (4)
2 L 4 x 3 x 5/16 x 33'-8½ DB15-E - FOR OTHERS
12 2⅞ - DB15-E
12 2⅞ - DB32-E
B
B
4 x 4 x ¾ L^S
18 x 7/16 Web Pl^S
4 x 4 x ¾ L^S
9'-0
8'-10½
SPLICE LINE (ORMWING)
42
34
8'2
3'-0
EXIST ℄ SPLICE
BENT 4&5 (G)
BENT G&7 (C)

33'-8⅞ -1/16 FOR BENT (4)
33'-5½ -1/16 FOR OTHERS
EXISTING COLUMN
1'-1¼
9⅞
9⅞
12
2
(H)
EXIST ℄ SPLICE
(H)
3'-0
3'-3 13/16
8¾
FOR OTHERS
FOR BENT (4)
EXIST ℄ SPLICE
11¾
2
12
4
4
4
4

ELEVATION AT RIGHT SIDE OF
BENT (4) & (G) - LOOKING NORTH
BENT (5) & (7) - LOOKING SOUTH

1'-2 7/8 L^S
Latt. Bars 2¾ x 7/16 x 2'-5 7/8"
4 x 4 x ¾ L^S
Web Pl^S 18 x 7/16
4 - 4 x ¾ L^S
Latt Bars 2¾ x 7/16 x 2'-5 7/8"
1'-6 3/8 L^S

SECTION B-B

Section B-B is typical for columns MC3, MC4, MC7 & BC3. For section thru columns MB4 & MB5 see Sec. B-B, sht. D25E.

48
BENT G&7
BENTS 4&5
BENTS G&7
BENTS 4&5
12
1'-10
1'-7
12
G
5/16
5/16
1'-0
11/8
1'-1¾ ag
1'-1¾ ag
4¼ 4¼ 4¼
VIEW A-A

NOTE

FOR BILL OF MAT'L SEE D20-E

Rivets: ¾"
Holes: 13/16"
Paint:

INDUSTRIAL DEVELOPMENT Co

ADDITION TO NANUE BRIDGE
HAWAII

INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY	[illegible]	12-22-49	ORDER NO.	3807
CHECKED BY	RA	2-9-50	SHEET NO.	D22-E

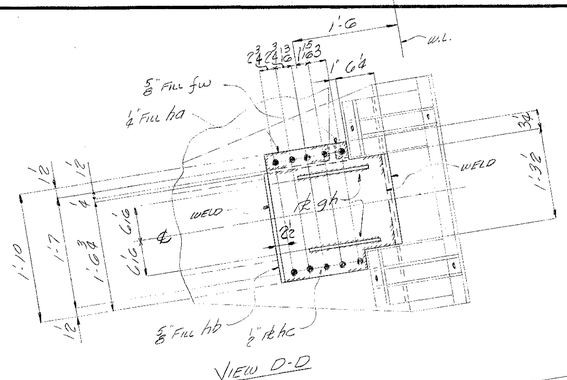
5468.101

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HI	HWY-1	HSM-0CR-1(16)	1950	102	1004

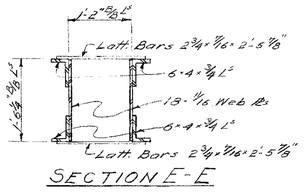
bc
bs
bt
bv
bw
cq
cb

gh

fw
ha
hb
hc

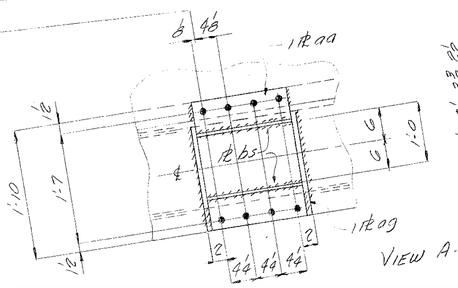


VIEW D-D

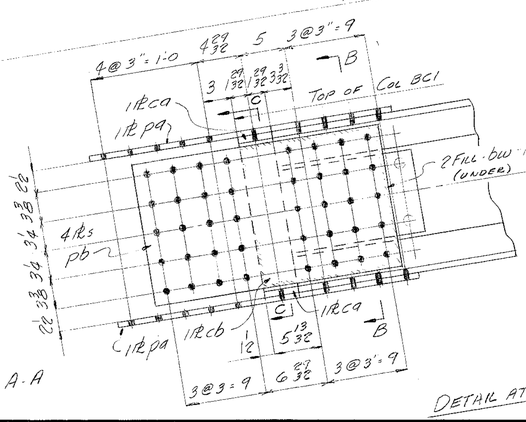


SECTION E-E

NOTE: ? COLS BC1 L-AS L-OH - FROM KAULA
ADD 3 13/16 SECTION TO TOP OF COL. & PROVIDE SPLICE A.S.
NEW SPLICE IS TO BE WELDED FOR BEARING IN PLACE OF MILLED ENDS



VIEW A-A



DETAIL AT TOP OF COL

SECTION B-B

SECTION C-C

NOTE
FOR BILL OF MATL SEE DWG. D20-E

ELEVATION AT RIGHT SIDE OF BENT (4) - LOOKING NORTH

REVISIONS	ITEM ADDITION TO NAHUE BRIDGE HAWAII					
	CUSTOMER INDUSTRIAL DEVELOPMENT CO					JOB NO. 3807
	DR'FTE'M'N	CHECKED	APPRV'D	NEXT ASSEMBLY	SCALE	DRWG. NO.
	1-13-50	RA	2-9-50			D23-E

INDUSTRIAL IRON WORKS INC. OAKLAND, CALIFORNIA

THIS PRINT MUST NOT BE COPIED IN WHOLE OR IN PART OR USED DETRIMENTALLY TO OUR INTEREST

5468.102

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HSHW-11	HAW	SDR 2(13)	1950	103	704

Order No. 3807 Sheet No. D24-E

bt
bv
cd

ONE COL. MB5R A.S.
ONE COL. MB5L O.H.
} FROM KEALAHAKA

32'-8 11/32

3'-0

9 9/16

EXIST. ℄ SPLICE

(J)

2 12

1'-0 1/4

9 9/16

11 1/16

3'-0

8 3/4

EXIST. ℄ SPLICE

11 1/4

11 1/4

DB15-E

22' 12

24' 24'

12

2 12

G 1'-1 3/8

2 PL 13/16 x 7'-2 1/2

ST 19-E

A

A

2.2

2 1/2 cd

3.3

1'-1 3/8

3

10 1/4

1'-1 1/4

2 L's 4 x 3 x 5/16 x 33'-6 7/8

DB23-E

22' 12

12

2

8'-10 1/2

33'-3 7/8

1'-6 1/4

9 6

9 6

℄

EXIST. ℄ SPLICE

(J)

(H)

SPLICE LINE (DRAWING)

19A5R EXISTING COL.

12 2

32'-8 11/32

4 1/2

7 1/2

EXIST ℄ SPLICE

3'-0

9'-8

9'-0

ELEVATION AT EIGHT SIDE OF BENT (5) - LOOKING SOUTH

1/8 48

11/2 bt

1 1/2

1'-10

1'-7

1 1/2

6

6

1'-0

11/2 cd

2

11/2 bv

44 44 44 44

VIEW A-A

NOTE

FOR BILL OF MAT'L SEE D26-E

Rivets: 7/8 ϕ

Holes: 15/16 ϕ

Paint:

INDUSTRIAL DEVELOPMENT CO

ADDITION TO NAHUE BRIDGE
HAWAII

INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY	✱✱✱	12-28-49	ORDER NO.	3807
CHECKED BY	RA	2-9-50	SHEET NO.	D24-E

Notes:

For Section thru MA5R see Sec. B-B, Sht. D21-E.

5465.103

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HBWS11	HBW	BRS(3)	1950	101	104

Order No. 3807 Sheet No. D25-E

aa
ag
cf

ONE COL MB5^{R} A.S.
ONE COL MB5^{L} OH
} FROM KEALAHAKA

32-8 11/32

3:0
8 3/4
EXIST SPLICE

3:0
8 3/4
EXIST SPLICE

DB15-E

DB23-E

2-L's 4×3×5/16 × 33-6 7/8

2-L's 6×4×3/8 × 7-1 3/4

ST16-E

2 PLs cf

6×4-5/8 L's

18-3/16 Web PL

6×4-5/8 L's

MB6^{R} EXISTING COL.

33-3 7/8

EXIST SPLICE

(K)

(H)

SPACE LINE (OPENING)

31-5 5/32

EXIST SPLICE

3:0

9 15/16

ELEVATION AT EIGHT SIDE OF BENT (G) - LOOKING NORTH

12"@15.5#

Latt. Bars 2 3/4 × 7/16 × 2'-5 7/8"

6×4×5/8 L's

18×3/16 Web PL

6×4×5/8 L's

Latt. Bars 2 3/4 × 7/16 × 2'-5 7/8"

SECTION B-B

Section B-B is typical for columns MB4, MB5 & MB6

11R09

11R09

VIEW A-A

NOTE

FOR BILL OF MATL SEE D26-E

Rivets: 7/8 ϕ

Holes: 15/16 ϕ

Paint:

INDUSTRIAL DEVELOPMENT CO

ADDITION TO NANUE BRIDGE
HAWAII

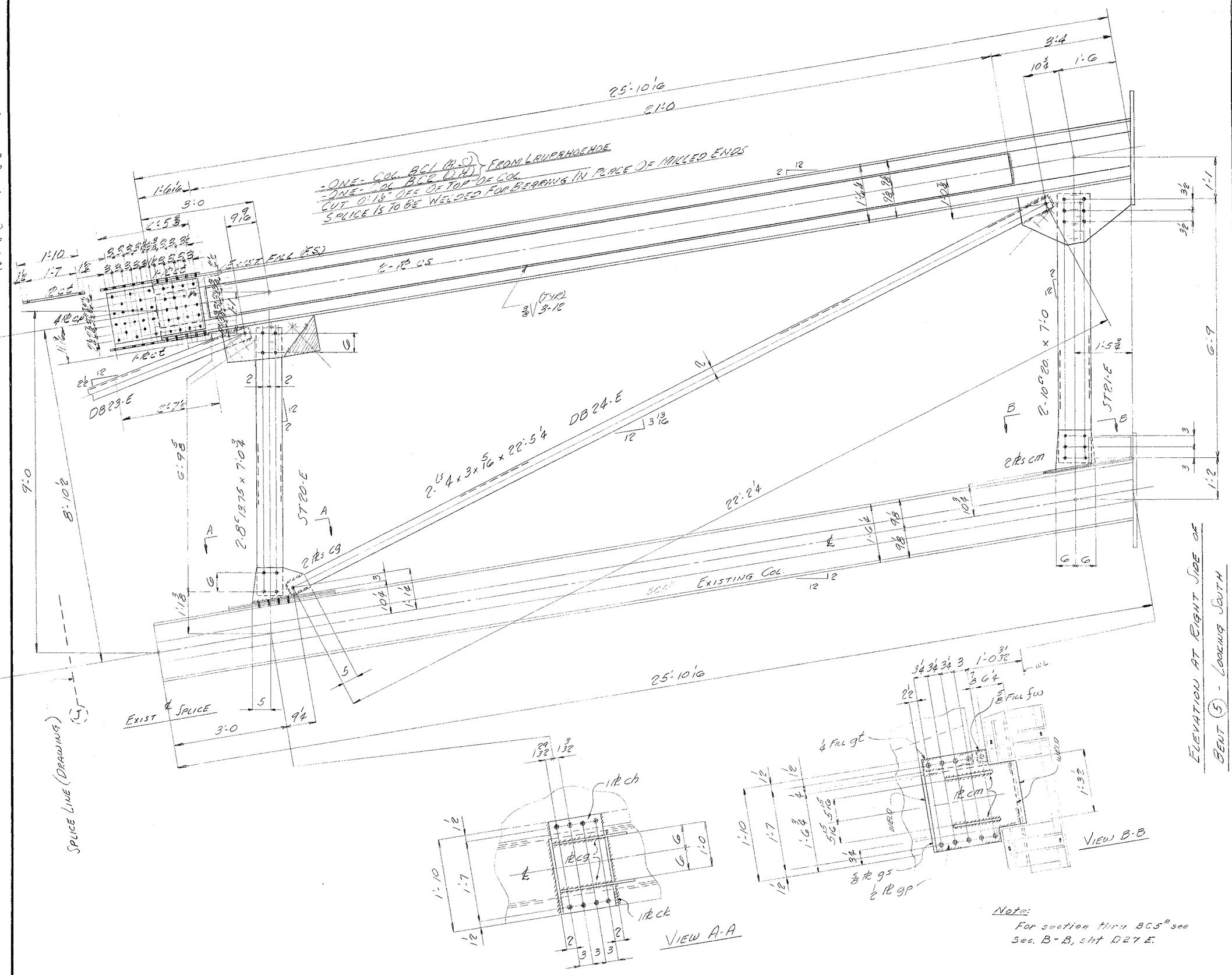
INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY	[illegible]	12-28-49	ORDER NO.	3807
CHECKED BY	RA	2-9-50	SHEET NO.	D25-E

5468.104

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW	FDR-3(12)	1950	105	704

Order No. 3807 Sheet No. D26-E



BILL OF MATERIAL

INDUSTRIAL DEVELOPMENT COMPANY

No.	Description	Length Ft.	Length Ins.	Mark	REMARKS
2	COLUMNS			MB5 R	KEAHAHAKA D24-E
1	COLUMN			BC1	LAUPAHOEHOE
2	STRUTS			ST19-E	
2	STRUTS			ST20-E	
6	STRUTS			ST21-E	
4	DIAG BRACE			DB23-E	
2	DIAG BRACE			DB24-E	
	COLUMN			BC1	LAUPAHOEHOE
2	PL 21 3/8 x 1/2	1	10	gp	TEMP
2	PL 18 3/4 x 5/8	1	9	gs	
2	PL 3 x 1/4	1	0 3/4	gt	
2	PL 20 x 3/8	1	10	bt	
2	PL 18 x 3/8	1	9	bv	
4	PL 11 x 3/8	1	8	cd	
4	PL 11 x 3/8	1	6 1/4	cg	
2	PL 12 x 3/8	1	10	ch	
2	PL 13 x 3/8	1	6	ck	NEW MAT'L
4	PL 12 x 1/2	1	0	cm	
8	PL 16 x 1/2	2	1 3/8	cp	
4	PL 18 3/8 x 3/8	2	0	cs	
4	PL 22 x 1/2	2	7 1/4	ct	TEMP
2	PL 1 3/4 x 5/8		3	fw	TEMP
MATL LISTED ABOVE ARE FOR DWG'S-D24-E & D26-E					
MATL LISTED BELOW ARE FOR DWG'S-D25-E, D27-E & D28-E					
2	COLUMNS			MB5 R	KEAHAHAKA D25-E
2	COLUMNS			MB5 R	DO D27E
2	COLUMNS			BC4 R	DO D28-E
2	STRUTS			ST22-E	
2	STRUTS			ST23-E	
2	DIAG BRACE			DB25-E	
2	DIAG BRACE			DB26-E	
2	PL 15 3/4 x 3/8	1	10	cn	TEMP
2	PL 16 3/4 x 3/8	1	6	gg	
2	PL 20 x 3/8	1	10	bt	
2	PL 18 x 3/8	1	9	bv	
4	PL 11 1/2 x 3/8	1	3 3/4	cf	
4	PL 12 x 1/2	1	0	cm	
4	PL 11 3/4 x 3/8	1	8	cv	
4	PL 5 3/4 x 5/8	3	1 3/4	cw	
8	PL 16 x 1/2	3	0 3/4	da	
4	PL 22 x 1/2	2	9 5/8	db	
2	PL 15 x 3/8	1	10	dc	
2	PL 16 x 3/8	1	6	dd	
4	PL 10 3/4 x 3/8	1	3	df	NEW MAT'L
2	PL 5/8 x 1 3/4	0	3	fw	TEMP
2	PL 4 x 3	1	0 3/4	st	Da
2	PL 2 x 21 3/8	1	10	gk	Da
2	PL 5/8 x 18 3/4	1	10	gm	Da

Rivets: 3 ϕ
Holes: 13/16 ϕ
Paint:

INDUSTRIAL DEVELOPMENT CO

ADDITION TO NAUUE BRIDGE
HAWAII

INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY	[illegible]	12-29-49	ORDER NO.	3807
CHECKED BY	RA	2-9-50	SHEET NO.	D26-E

5465.105

Order No. 3807 Sheet No. D27-E

FED ROAD DIST. NO.	STATE	FED AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII		SDR-26(1)	1950	106	904

bt
bv
cv
cw
da
db

SECTION B-B

NOTE: 2-COLS. MB5 12-LB 5 L-OH - FROM KEALAHAKA
CUT 7:1 SECTION OUT OF COL. & PROVIDE SPLICE A.S.
NEW SPLICE IS TO BE WELDED FOR BEARING IN PLACE OF MILLED ENDS

EXIST. ℄ SPLICE

DB23-E

DB25-E

2-L5 4×3×5/16×27'-6 3/8

STEP-E

2-PLS 13.75×7:2 1/2

2 PLS CV

6×4×3/4 L5

18×3/8 WEB PL

MAG^R EXISTING COL.

EXIST ℄ SPLICE

℄ SPLICE LINE (DRAWING)

EXIST ℄ SPLICE

ELEVATION AT RIGHT SIDE OF BENT (6) - LOOKING NORTH

SECTION C-C

Section C-C is typical for columns BC5, MA5, MA6 & BC7.

VIEW A-A

NOTE

FOR BILL OF MAT'L SEE D26-E

Rivets: 78 ϕ
Holes: 15/16 ϕ
Paint:

INDUSTRIAL DEVELOPMENT CO

ADDITION TO NAHUE BRIDGE
HAWAII

INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY	[illegible]	1-3-50	ORDER NO.	3807
CHECKED BY	RA	2-9-50	SHEET NO.	D27-E

5468.106-E

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAWAII	DR 36(2)	1950	107	304

Order No. 3807 Sheet No. D28-E

cm
dc
dd
df
st
fw
gk
gm

2- Cols BC4 R:AS L-OH - From KEALAHAKA

32'-11 3/32

10 3/4 1'-6

2 12

EXIST ℄ SPLICE

1'-2 7/16 3'-0 9/16

11/16

5

3 1/16 12

DB 25·E

2 2

12 5/16

G 1'-11 1/4

2-8"x.375 x 7'-2 3/8

ST 23·E

A A

2 Pls df

G 1'-1 1/4

3 1/64 1'-1 1/4

(L) — — — — Splice Line (Looking)

EXIST ℄ SPLICE 3'-0 8 3/4

2. L 4 x 3 x 5/16 x 29'-0 1/2

DB 26·E

12 28

11

8'-10 1/2

9'-0

28'-9 1/2

6 x 4 x 3/4 L

18 x 5/16 Webs

6 x 4 x 3/4 L

BCG R Existing Cols.

12 2

1'-6 1/4 9/16

32'-7 35/32

2-10 20 x 7/16

STI·E

3 3

B B

2 Pls cm

G G

1'-1 3/4

3/4 1'-1

6'-9

1'-2

ELEVATION AT RIGHT SIDE OF BENT (G) - LOOKING NORTH

3 3 3 3/4 1'-0 15/16 W.L.

7/8 G4

5/8" Fill fw (under)

2 1/2

1/4" Fill ft (under)

12 12

1'-10 1'-7 1'-6 3/4 11/16

5/16 5/16

℄ 11/16 weld

12 cm

weld

3/4

1'-3 1/2

1/2" R gk

5/8" Fill gm (under)

VIEW B-B

1'-2 7/8 L 8

Lath Bars 2 3/4 x 11/16 x 2'-5 7/8"

6 x 4 x 3/4 L

18 x 5/16 Web Pls

6 x 4 x 3/4 L

L 6 x 4 x 3/4

Lath Bars 2 3/4 x 11/16 x 2'-5 7/8"

SECTION C-C

13/32 19/32

11/2 dc

12 12

1'-10 1'-7

12 df

2

11/2 dd

6 6 1'-0

3 3 3 3

VIEW A-A

NOTE

FOR BILL OF MAT'L SEE D26-E

Rivets: 7/8 ϕ

Holes: 15/16 ϕ

Paint:

INDUSTRIAL DEVELOPMENT CO

ADDITION TO NANUE BRIDGE HAWAII

INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY	[illegible]	1-4-50	ORDER NO.	3507
CHECKED BY	RA	2-9-50	SHEET NO.	D28-E

5468.107

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW	SDE 249(3)	1950	108	304

Order No. 3807 Sheet No. D29-E

w
oa
og
dg
dh
dk
dm
dp
ft
fv
fw
ga

SECTION B-B

SECTION D-D

NOTE: 2 COLS. BC2L 8-AS / 1-OH - FROM KEALAHAKA
CUT 3-1 17/32 SECTION OUT OF COL. & PROVIDE SPLICE P.S.
NEW SPLICE IS TO BE WELDED FOR BEARING IN PLACE OF MILLED ENDS

EXIST ℄ SPLICE

DB 15-E

DB 27-E

2-L 4×3×5/16 × 33-4 7/8

2-L 6×4×3/8 × 7-1 3/4

STIG-E

2 Pls W

2 Pls dg

2-B 13.75 × G-11 1/4

STIG-E

BC7R EXISTING COL

EXIST ℄ SPLICE

VIEW A-A

VIEW C-C

Note:
For Section thru BC7R see Sec. B-B, Sht. D27-E

Note:
For Bill of Matl See D33-E

ELEVATION AT RIGHT SIDE OF BENT (7) LOOKING SOUTH

Rivets: 7/8 ϕ
Holes: 15/16 ϕ
Paint:

INDUSTRIAL DEVELOPMENT CO.
ADDITION TO NANUE BRIDGE
HAWAII

INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY	[illegible]	1-5-50	ORDER NO.	3807
CHECKED BY	RA	2-9-50	SHEET NO.	D29-E

5468.105

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
					804

Order No. 3807 Sheet No. D30-E

ds
dt
dv
dw
fa
fb
fc
fd

VIEW A-A

SECTION D-D

2 COLS TC1 R-AS L-OH - FROM KEALAHAKA

EXIST. COL.

EXISTING COL

EXIST SPLICE

TC4R

DB28-E

DB29-E

ST10-E

ST26-E

ST25-E

2 PLS ds

2 PLS dt

2 PLS fc

2 FILLS fd

2 PLS fb

1 PL dw

1 PL fa

1 PL dv

1 PL dt

1 PL ds

VIEW B-B

VIEW C-C

Note:
For section thru TC4R see Sec. D-D, sht. D13-E.

NOTE:-
FOR BILL OF MAT'L. SEE D33-E

Rivets: 7/8 ϕ
Holes: 15/16 ϕ
Paint:

ELEVATION AT RIGHT SIDE OF BENT (8) - LOOKING NORTH

INDUSTRIAL DEVELOPMENT CO

ADDITION TO NAVUE BRIDGE
HAWAII

INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY	[illegible]	1-6-50	ORDER NO.	3807
CHECKED BY	RA	2-9-50	SHEET NO.	D30-E

5468.109

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWS11	HAW	SDR3(13)	1950	110	304

Order No. 3807 Sheet No. D31-E

SECTION A-A

1k fh, 1k fff, 1k ff, 1k fg, 1k fh

NOTE: 2 COLS. BC3 2-AS L-OH - FROM KEALAHAKA CUT 10 3/32 SECTION OUT OF COL. 5 PROVIDE SPLICE A.S. NEW SPLICE IS TO BE WELDED FOR BEARING IN PLACE OF MILLED ENDS

35:6 3/16 TO TOP OF COL.

8:0 5/16

8:6 3/32

31:11 13/16

23:11 1/2

15:5 13/32

10 3/4

1:6

4 1k s pf { 2 INSIDE COL 2 OUTSIDE COL

TC1 12

4@3" = 1:0

4@3" = 1:0

1 1/4

BC3 12

4 1k s ff - 2

2 1k s fg - 3/4

1k fh

3@4 3/4 = 1:2 4

3@4 3/4 = 1:2 4 29/32

12

2

1:0

1:5 3/4

2 - 10" x 20 x 7:0

STZ1-E

2 1k s pd

G:9

1:1

1:2

DB30-E

2 - L's 4 x 3 x 5/16 x 32:10 1/4

ST23-E (SEE DWG. D30-E)

4:2

9:0

8:10 1/2

32:7 1/4 - 1/16

EXISTING COL. BC8 12

1k fb

1:6 1/4

1:0 1/4

3:0 TO EXIST. SPLICE

33:10 1/4

ELEVATION AT RIGHT SIDE OF BENT (8) - LOOKING NORTH

3" 3/16 3/16 3 1/4 4 1/4

3 1/4

1k gf

1k pd

2"

1k gd

VIEW B-B

NOTE

FOR BILL OF MAT'L SEE D33-E

Note:
For section thru BC8 12 see Sec. E-E, sht. D15-E.

Rivets: 78 ϕ
Holes: 15/16 ϕ
Paint:

INDUSTRIAL DEVELOPMENT CO.

ADDITION TO NANUE BRIDGE
HAWAII

INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY	[illegible]	1-9-50	ORDER NO.	3807
CHECKED BY	RA	2-9-50	SHEET NO.	D31-E

5468.110

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
HAWAII	HAW	50L3(3)	111	404

Order No. 3807 Sheet No. D32-E

NOTE: 2 COLS. C1 $^{R\text{-}AS}_{L\text{-}OH}$ - FROM KEALAHAKA
CUT 11'-0 $\frac{5}{16}$ SECTION OUT OF COL. & PROVIDE SPLICE A.S.
NEW SPLICE IS TO BE WELDED FOR BEARING IN PLACE OF MILLED ENDS

WELD UP EXIST HLS & DRILL NEW HLS A.S.

VIEW C-C

ELEVATION AT RIGHT SIDE OF BENT ⑨ - LOOKING SOUTH

SECTION A-A

VIEW B-B

NOTE: FOR BILL OF MATL SEE D33-E

Rivets: 78 ϕ
Holes: 15 ϕ
Paint:

INDUSTRIAL DEVELOPMENT CO

ADDITION TO NANUE BRIDGE
HAWAII

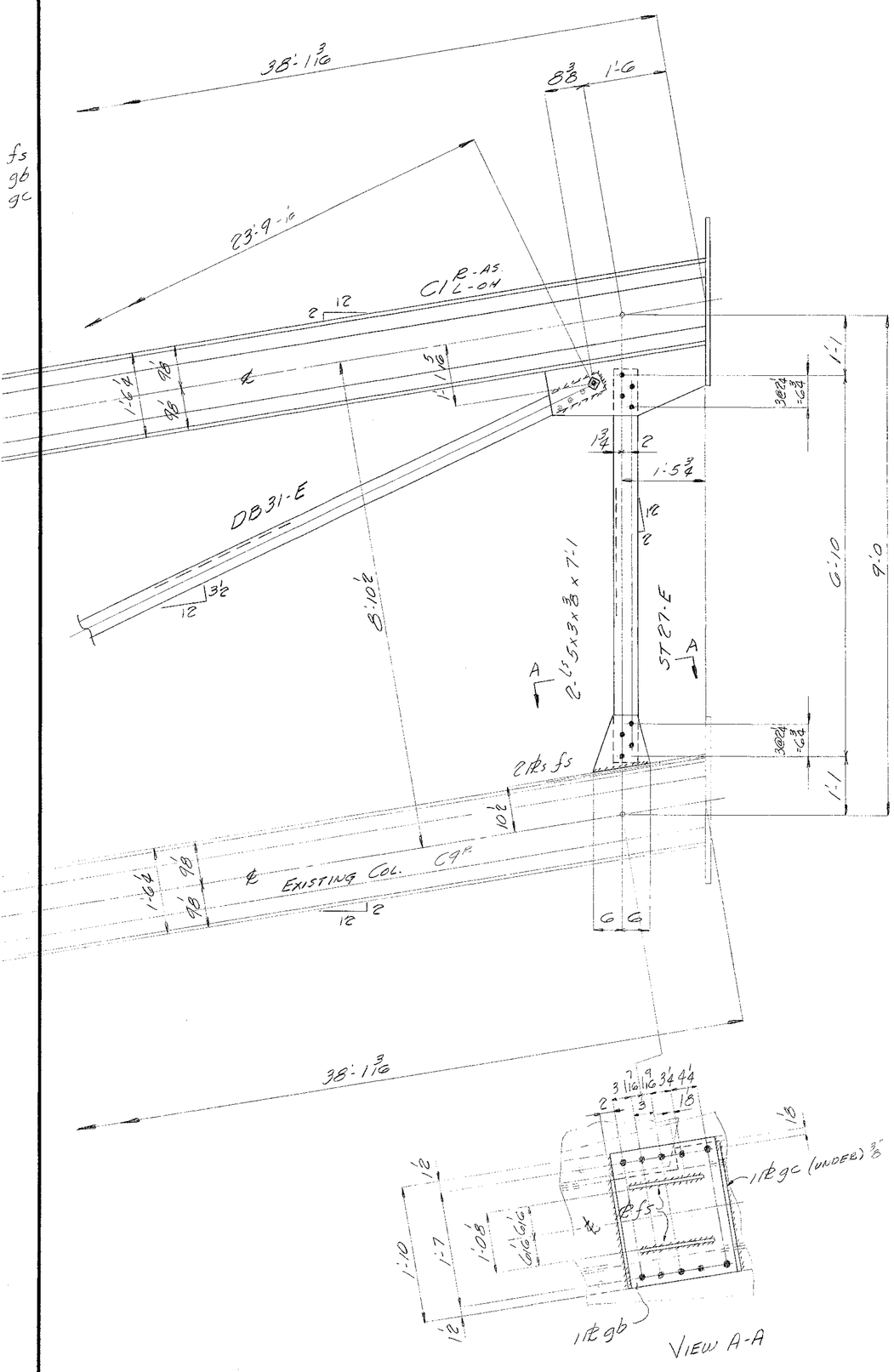
INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY	[illegible]	1-10-50	ORDER NO.	3807
CHECKED BY	RA	2-9-50	SHEET NO.	D32-E

5468.111

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW	SOR-2(13)	1950	112	904

Order No. 3807 Sheet No. D33-E



ELEVATION AT EIGHT SIDE OF BENT (9) - LOOKING SOUTH

fs
gb
gc

BILL OF MATERIAL — INDUSTRIAL DEVELOPMENT COMPANY

No.	Description	Length Ft.	Length Ins.	Mark	REMARKS
2	COLUMNS			BC2 R E	KAALAHAKA D29-E
2	Do			TC1 R E	Do D32-E
2	Do			BC3 R E	Do D31-E
2	Do			C1 R L	Do D32-E Do D33-E
2	STRUTS			ST24-E	
2	Do			ST25-E	
4	Do			ST26-E	
2	Do			ST27-E	
2	DIAG BRACES			DB27-E	
4	Do			DB28-E	
2	Do			DB29-E	
2	Do			DB30-E	
2	Do			DB31-E	
MATL LISTED BELOW IS FOR SHTS. D29-E THRO D33-E					
4	℄ 1 1/2 x 3/8	1	3 3/4	w	TEMP
2	℄ 15 3/4 x 3/8	1	10	aa	
2	℄ 16 3/4 x 3/8	1	6	ag	
4	℄ 12 x 1/2	1	0	dg	
8	℄ 12 x 5/8	1	4	dh	
4	℄ 22 x 7/16	2	9 1/2	dt	
4	℄ 9 1/2 x 5/8	2	2 1/2	dm	
8	℄ 16 x 7/16	2	1 1/2	dp	
8	℄ 14 x 3/8	1	7 3/4	ds	
8	℄ 6 x 3/8	1	3 3/4	dt	
4	℄ 15 x 3/8	1	10	dv	
2	℄ 16 x 3/8	1	10	dw	
2	℄ 17 x 3/8	1	10	fa	
4	℄ 12 1/2 x 3/8	1	4	fb	
4	℄ 16 x 3/8	1	6	fc	
4	℄ 3 x 1/4	1	6	fd	
8	℄ 16 x 7/16	2	11 5/8	ff	
4	℄ 6 x 3/4	3	0 1/2	fg	
4	℄ 22 x 7/16	2	8 3/8	fh	
8	℄ 16 x 7/16	2	3 1/2	fk	
4	℄ 9 1/2 x 7/16	2	4 1/2	fm	
4	℄ 22 x 7/16	2	7 1/4	fp	
4	℄ 12 x 1/2	1	1	fs	
2	℄ 3 x 1/4	1	0	ft	
2	℄ 18 3/4 x 5/8	1	8 1/2	fv	
2	℄ 1 3/4 x 5/8		3	fw	
2	℄ 21 3/8 x 1/2	1	10	ga	
2	℄ 16 1/2 x 1/2	1	10	gb	
2	℄ 17 1/2 x 3/8	1	9 5/8	gc	
2	℄ 16 1/4 x 1/2	1	10	gd	
2	℄ 17 1/4 x 3/8	1	10	gf	
4	℄ 12 x 1/2	1	0	pd	
8	℄ 12 x 5/8	1	4	pf	TEMP

NEW MATL

Rivets: 78 ϕ
Holes: 13/16 ϕ
Paint:

INDUSTRIAL DEVELOPMENT CO

ADDITION TO NANUE BRIDGE
HAWAII

INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY	[illegible]	1-10-50	ORDER NO.	3507
CHECKED BY	RA	2-9-50	SHEET NO.	D33-E

5468.112

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
	HAWAII			113	704

67:6

49:6½ TC1L

23:11

19:7½

23:11½ BC3L

E EXIST SPLICE

COL TC1L (AS)
COL TC1R (OH)

COL BC3L (AS)
COL BC3R (OH)

2 PL 3 x 3/8 x 17:6¼

2 PL 3 x 3/8 x G:10¾ DBG3-E

DBG5-E 2 PL 3 x 2½ x 5/16 x 13:3⅞

DBG6-E 2 PL 3 x 2½ x 5/16 x 23:8¼

DBG7-E 2 PL 20 x 18:7¾

DBG2-E 2 PL 3 x 3/8 x 25:11

DBG1-E 2 PL 3 x 3 x 38:2

DBG4-E 2 PL 13½ x 3/8 x 38:10

DBG8-E 2 PL 20 x 28:3⅜

2 PL hh
2 PL hk
2 PL hm
2 PL hn
2 PL hs
2 PL mt
2 PL mv

DETAIL "A"

SEE DETAIL "A" FOR OFFSET REQ'D

NOTE
FOR BILL OF MAT'L SEE DWG D37-E

WEST ELEV. (AS) AT BENT ⑧ & ⑨
EAST ELEV. (OH) AT Do Do Do

RIVS ⅞" HOLES 15/16" U.N.

REVISIONS	ITEM ADDITION TO NAHUE BRIDGE HAWAII					
	CUSTOMER INDUSTRIAL DEV. CO.					JOB NO. 3807
	DR'FTS'M'N	CHECKED	APPR'V'D	NEXT ASSEMBLY	SCALE	DRWG. NO.
	[illegible]	QW				D34-E
	1-24-50/1-15-50					

OAKLAND, CALIFORNIA

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5465.113

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
	HI	BRSTP-0929(12)	1950	112	904

hv
hw
ka
kb
kc
kd
kf
kg
kh

BENT (3)

32'-11 27/32

1'-6 27/32 8@4 4 = 2'-10

5@2 1/4 = 1'-1

3 3/4 12

3/32

MC3L - EAST ELEV (AS)

R - WEST ELEV (OH)

1'-1 1/2

1'-0

3@4 = 1'-0

2 ℄ hw

1'-3

1'-6

82° 9'

1'-3

1'-1 1/2

2 ℄ ka

2 ℄ kb

2 ℄ kc

2 ℄ kd

2 ℄ kf

2 ℄ kg

2 ℄ kh

L54

10 12

2 L 5 x 3 1/2 x 5/16 x 22'-11 3/8

DB33-E

4'-1 7/16 PIP

6 3/8 12

EXISTING SPLICE LINE

25'-10 1/16

40'-0 9/16 CLS

37'-0 1/16 PIL

LH2

L54

3'-0

2 L 5 x 3 x 3/8 x 29'-9 1/2

TAN 9.99542

DB35-E

48'-4 1/2 PIP

12'-8 3/8

8 1/2

11'-4 5/8

7 1/4

33

33

2 L 5 3/4 x 2 1/2 x 5/16 x 11'-7 5/8

DB36-E

2 ℄ kd

39'-0 3/8 PIP

SEE DETAIL "A" FOR GUSSET PLATE

2 L 5 x 3 x 3/8 x 41'-10 1/2

TAN 9.47092

DB41-E

2 L 5 x 3 x 3/8 x 18'-3 3/4

DB34-E

10 12

10'-8

14'-10 5/8

15'-9

5@2 1/4 = 1'-1

2 ℄ ka

2 ℄ kb

3@3 = 1'-9

1'-9

1'-1 1/2

1'-6 27/32 8@4 4 = 2'-10

(DETAILS) BC2 - EAST ELEV (AS)

(KEYED) BC2 - WEST ELEV (OH)

7@3 = 1'-9

1'-4 1/2

26'-1 29/32

1'-10 1/2

1'-11 3/32

1'-0 3/4 8 1/2

EXIST SPLICE

7@4 4 = 2'-5 3/4

BC6 - WEST ELEV (OH)

BC4 - EAST ELEV (AS)

27'-7 3/4

2'-1 1/2

7@3 = 1'-9

2 ℄ kg

3@3 = 1'-9

2 L 5 x 3 x 5/8 x 18'-5

DB38-E

2 BC 13.75 x 39'-3 1/2

TAN 9.52671

DB37-E

24'-3 1/16

2 L 10" 20 x 25'-1 1/4

TAN 9.97241

DB39-E

50'-0 7/16 PIP

25'-0

18'-2

19'-1

2 ℄ kh

2 DM IV

2 WM 7

2 WM IV

12 3/16

3@3 = 1'-9

10'-8

12

DETAIL "A"

8 1/2 3 3

14 3/4 14 3/4

2 ℄ hv

25'-10 1/16

5@2 4 1/4 = 1'-9

5@2 4 1/4 = 1'-9

15'-9

15'-3 1/16

30'-0 1/16

24'-5

25'-0 7/16

2 L 10" 20 x 24'-6 1/4

DB40-E

34'-5 11/16

EAST ELEVATION (AS & N) AT BENTS (2) & (3)

WEST ELEVATION (OH & N) AT Do. Do Do

RNS. 7 # HOLES 15 # U.N.

NOTE

FOR BILL OF MATL SEE DWG D37-E

REVISIONS	ITEM ADDITION TO NANUE BRIDGE HAWAII					
	CUSTOMER INDUSTRIAL DEVELOPMENT CO					JOB NO. 3807
	DR'FTS'M'N	CHECKED	APPR'V'D	NEXT ASSEMBLY	SCALE	DRWG. NO.
	[illegible]	[illegible]				D35-E
	1-27-50	1-15-50				

OAKLAND, CALIFORNIA

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5468.114

FED. ROAD	STATE	FED. AID	FISCAL	SHEET	TOTAL
HSWB11	HSHW	DK-2(13)	1950	113	704

Col MB5E OH FROM KEALAHAKA AS

Col BC2 (AS) Col BC1 (O.H.) } LAUPAHOEHOE

NEW SPLICE

BENT 5

BENT 4

EAST ELEVATION A.S. - WEST ELEVATION O.H.

FOR BILL OF MATERIAL SEE SHEET D37A-E

RIVETS: 7/8" HOLES: 15/16"

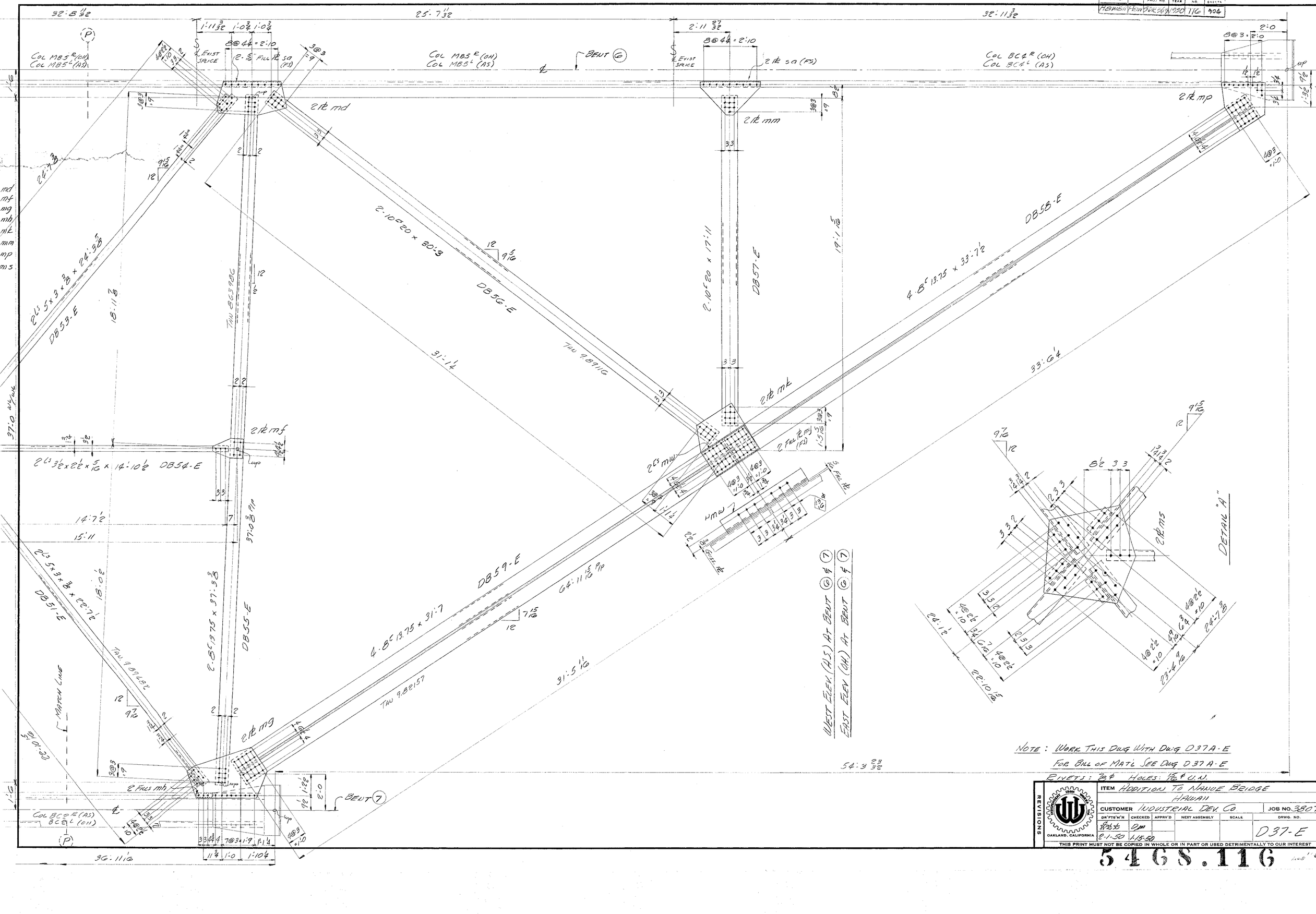
ITEM ADDITION TO THE NANUE BRIDGE HAWAII					
CUSTOMER INDUSTRIAL DEVELOPMENT CO.					JOB NO. 3807
DR'FTS'M'N	CHECKED	APPR'D	NEXT ASSEMBLY	SCALE	DRWG. NO.
LANDMUER	DD				D-36E
1-27-50	1-15-50				

REVISIONS

THIS PRINT MUST NOT BE COPIED IN WHOLE OR IN PART OR USED DETRIMENTALLY TO OUR INTEREST

5468.115

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
				116	404



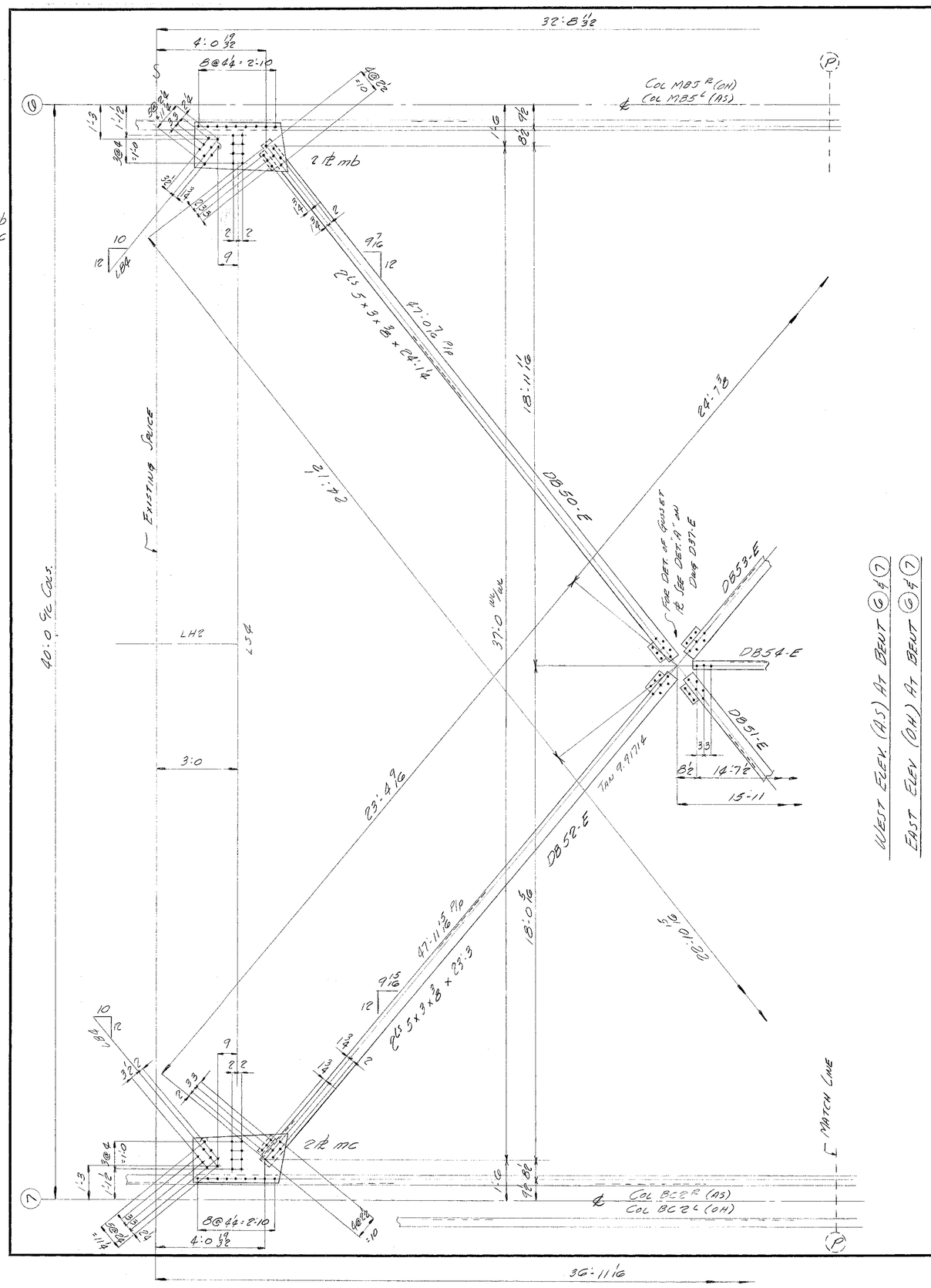
REVISIONS	ITEM ADDITION TO NAHALE BRIDGE HAWAII					
	CUSTOMER INDUSTRIAL DEV. CO.					JOB NO. 3807
	DR'FTS'M'N	CHECKED	APPR'D	NEXT ASSEMBLY	SCALE	DRWG. NO.
	8-1-50	11-15-50				D37-E

OAKLAND, CALIFORNIA

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54GS.116

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
				117	304



WEST ELEV. (AS) AT BENT ⑥ & ⑦

EAST ELEV. (OH) AT BENT ⑥ & ⑦

MATERIAL LISTED BELOW DETAILED ON D34-E

No.	Description	Length Ft	Ins	Mark	Remarks
2	Diag Braces	19	6½	DB60-E	SEE DWGS: D37-E, D58 & D59-E & D58G-E FOR DETAILS OF DIAG. BRACES
2		29	6¾	DB61-E	
2		25	11	DB62-E	
2		16	10 3/8	DB63-E	
2		38	10	DB64-E	
2		13	3 3/8	DB65-E	
2		23	8¼	DB66-E	
2		18	7¾	DB67-E	
2		28	3 3/8	DB68-E	

4	℄	30 x 3/8	2	7	hg
4	℄	23 x 3/8	2	3	hh
4	℄	25 x 3/8	3	1	ht
4	℄	11 x 3/8	2	6	hm
4	℄	24 x ½	3	4	hp
4	℄	20 x 3/8	2	6½	hs
4	℄	21 x ½	2	3	ht
4	℄	23 x 3/8	2	3	mt
4	℄	10 C 20	2	6½	mv

TEMP — NEW MATL

MATERIAL LISTED BELOW DETAILED ON D35-E

No.	Description	Length Ft	Ins	Mark	Remarks
2	Diag Braces	25	6½	DB33-E	SEE DWGS D00-E, D01-E & D64-E FOR DETAILS OF DIAG. BRACES
2		18	3¾	DB34-E	
2		29	9½	DB35-E	
2		11	7 5/8	DB36-E	
2		39	3½	DB37-E	
2		18	5	DB38-E	
2		25	1¼	DB39-E	
2		24	6¼	DB40-E	
2		15	5	DB41-E	

4	℄	30 x 3/8	3	0	hv
4	℄	22 x 3/8	3	1	hw
4	℄	21 x 3/8	3	2	hq
4	℄	30 x ½	3	6	hb
4	℄	3 x ½		10	hc
4	℄	12 x 3/8	1	8	hd
4	℄	24 x 3/8	3	2	hf
4	℄	24 x ½	2	0	hg
4	℄	21 x 3/8	2	6½	hh
4	℄	10 C 20	2	6½	mv

TEMP — NEW MATL

MATERIAL LISTED BELOW DETAILED ON D36-E (Outside Bk.)

No.	Description	Length Ft	Ins	Mark	Remarks
2	Diag Braces	16	11	DB42-E	SEE DWGS D50-E, D55-E FOR DET. OF DIAG BRACES
2		37	7	DB43-E	
2		39	5 3/8	DB44-E	
2		26	1	DB45-E	
2		22	0½	DB46-E	
2		28	0	DB47-E	
2		23	10	DB48-E	
2		9	11	DB49-E	

4	℄	19 x 3/8	3	1	hk
4	℄	19 x 3/8	3	2	hm
4	℄	28 x 3/8	2	6½	hp
4	℄	21 x 3/8	3	1	hs
4	℄	9 x 3/8	2	6	ht
4	℄	25 x ½	3	7	hv
4	℄	12 x 3/8	1	9	hw
4	℄	22 x ½	2	3	ma

TEMP — NEW MATL

MATERIAL LISTED BELOW DET. ON D37-E & D37A-E

No.	Description	Length Ft	Ins	Mark	Remarks
2	Diag Braces	24	1¼	DB50-E	SEE DWGS D37-E, D62-E, D63-E & D64-E FOR DETAILS OF DIAG BRACES
2		22	7½	DB51-E	
2		23	3	DB52-E	
2		24	3 3/8	DB53-E	
2		14	10½	DB54-E	
2		37	3 3/8	DB55-E	
2		29	11	DB56-E	
2		17	11	DB57-E	
2		33	7½	DB58-E	
2		31	7	DB59-E	

4	℄	23 x 3/8	3	5	mb
4	℄	22 x 3/8	3	6	mc
4	℄	21 x 3/8	3	11	md
4	℄	11 x 3/8	1	8	mf
4	℄	34 x ½	4	4	mg
4	℄	3 x ½		9	mh
4	℄	31 x 3/8	2	11	mk
4	℄	20½ x 3/8	3	1	mm
4	℄	27 x ½	2	7	mp
4	℄	29 x 3/8	2	8	ms
4	℄	18 C 42.7	2	6½	mw
4	℄	18 x 7/16	2	6½	my
8	℄	32 x 7/16	3	1	sa

TEMP — NEW MATL

NOTE: RIVETS 7/8 ℄ HOLES 15/16 ℄

WORK THIS DWG WITH DWG D37-E

REVISIONS	ITEM ADDITION TO NAHUE BRIDGE, HAWAII					
	CUSTOMER INDUSTRIAL DEV. CO.					JOB NO. 3807
	DR'FTS'M'N	CHECKED	APPRV'D	NEXT ASSEMBLY	SCALE	DRWG. NO.
	[illegible]	DW				D37A-E
	2-1-50	1-16-50				

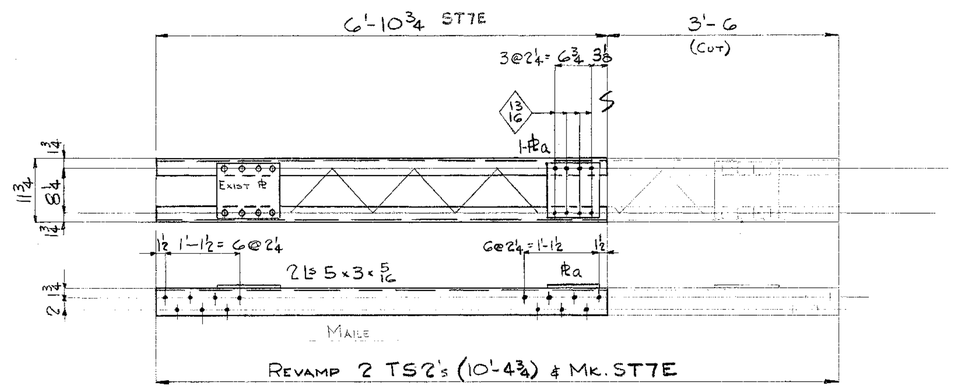
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OAKLAND, CALIFORNIA

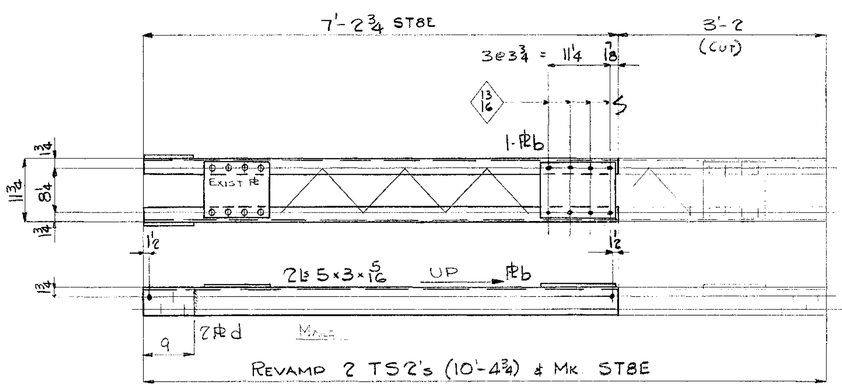
54GS.117

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
Hawaii Haw.			1950	118	304

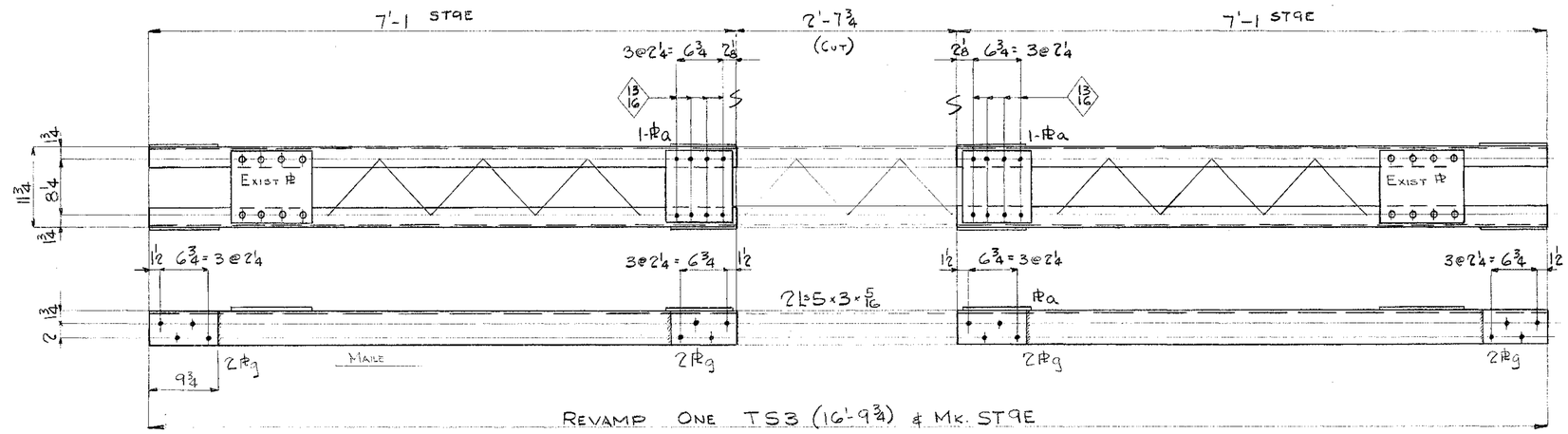
Order No. 3807 Sheet No. D38E



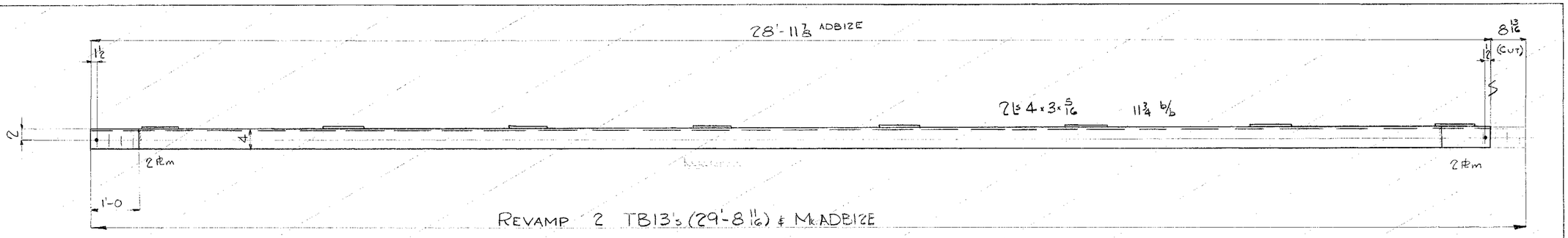
REVAMP 2 TS2's (10'-4¾) & MK. ST7E



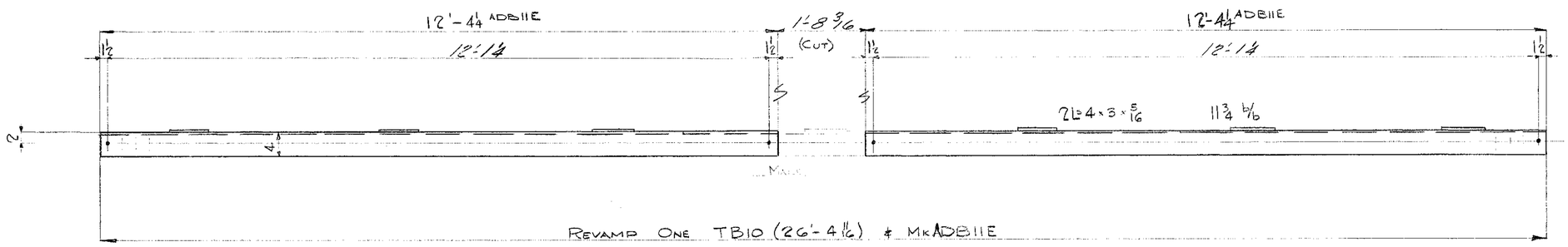
REVAMP 2 TS2's (10'-4¾) & MK. ST8E



REVAMP ONE TS3 (16'-9¾) & MK. ST9E



REVAMP 2 TB13's (29'-8 11/16) & MkADBIZE



REVAMP ONE TB10 (26'-4 1/16) & MkADBIIE

BILL OF MATERIAL

INDUSTRIAL DEVELOPMENT CO.

No.	Description	Length Ft.	Length Ins.	Mark	REMARKS
NOTE: BRACES LISTED BELOW ARE TO BE REVAMPED AS SHOWN ON DETAILS.					
					SALV FROM
4	BRACES	10	4¾	TS2	MAILE
1	Do	16	9¾	TS3	MAILE
1	Do	26	4 1/16	TB10	MAILE
4	Ⓟ 9¼ x ⅜	0	10¾	a	Temp. New
2	Ⓟ 10¾ x ⅜	1	1¾	b	Temp. New
4	Ⓟ 5 x ⅝	0	9	d	Temp. New
8	Ⓟ 5 x ⅝	0	9¾	g	Temp. New

Rivets: ¾ FOR 13/16 ϕ HOLES
Holes: 13/16 ϕ UN.
Paint:

INDUSTRIAL DEVELOPMENT COMPANY
ADDITION TO NANUE BRIDGE
HAWAII

INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY	DAL	1-11-50	ORDER NO.	3807
CHECKED BY	RA	2-17-50	SHEET NO.	D38E

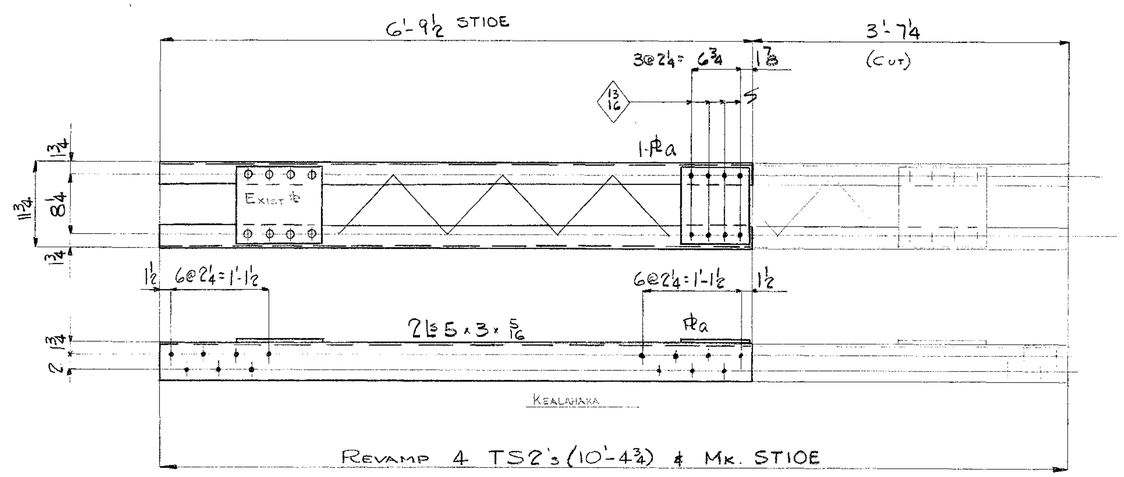
5468.118

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW	3DRS(12)	1950	119	204

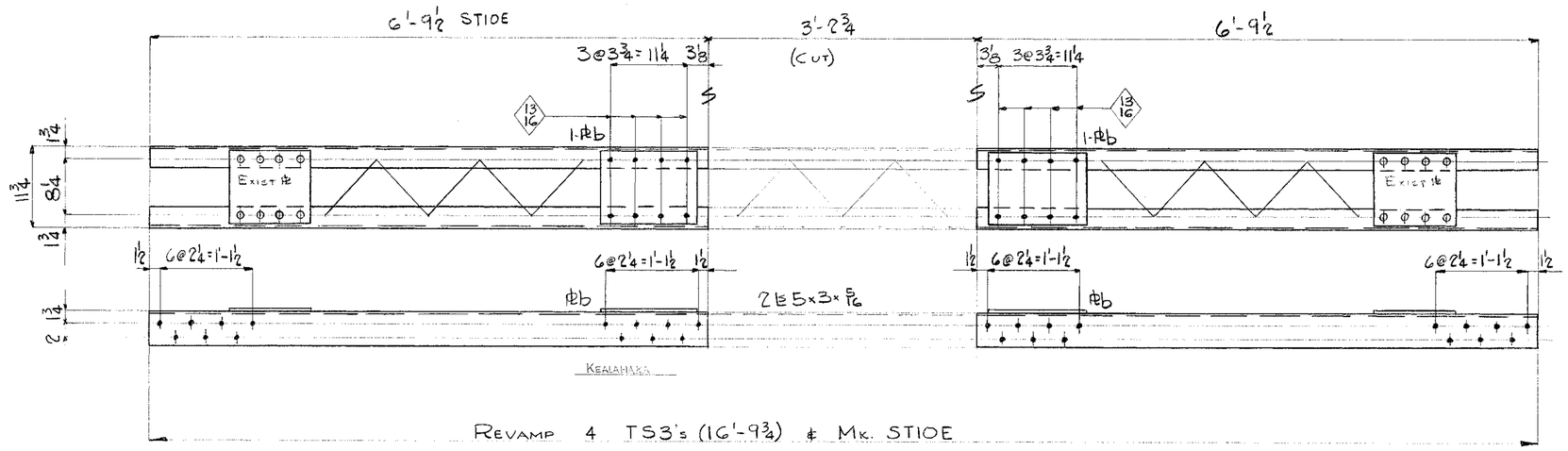
Order No. 3807 Sheet No. D39E

BILL OF MATERIAL — Industrial Development Co.

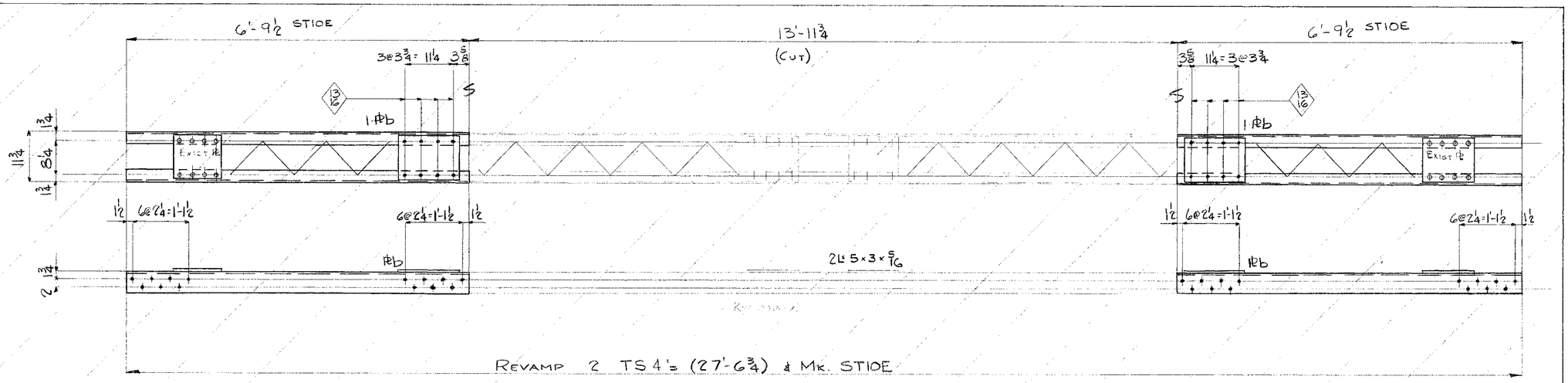
No.	Description	Length Ft.	Length Ins.	Mark	REMARKS
NOTE: BRACES LISTED BELOW ARE TO BE REVAMPED AS SHOWN ON DETAIL					
					SALV FROM:
4	BRACES	10	4¾	TS2	KEALAHAKA
4	Do	16	9¾	TS3	Do
4	PL 9¼ x ⅜	0	10¾	a	Temp. New
8	PL 10¾ x ⅜	1	1¾	b	Temp. New



REVAMP 4 TS2's (10'-4¾) & MK. STIOE



REVAMP 4 TS3's (16'-9¾) & MK. STIOE



REVAMP 2 TS4's (27'-6¾) & MK. STIOE

Rivets: ¾ ϕ FOR 13/16 ϕ Holes
Holes: 15/16 ϕ UN.
Paint:

INDUSTRIAL DEVELOPMENT COMPANY

ADDITION TO THE NANUE BRIDGE
HAWAII

INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY	DAL	1-12-50	ORDER NO.	3807
CHECKED BY	RA	2-17-50	SHEET NO.	D39E

5468.119

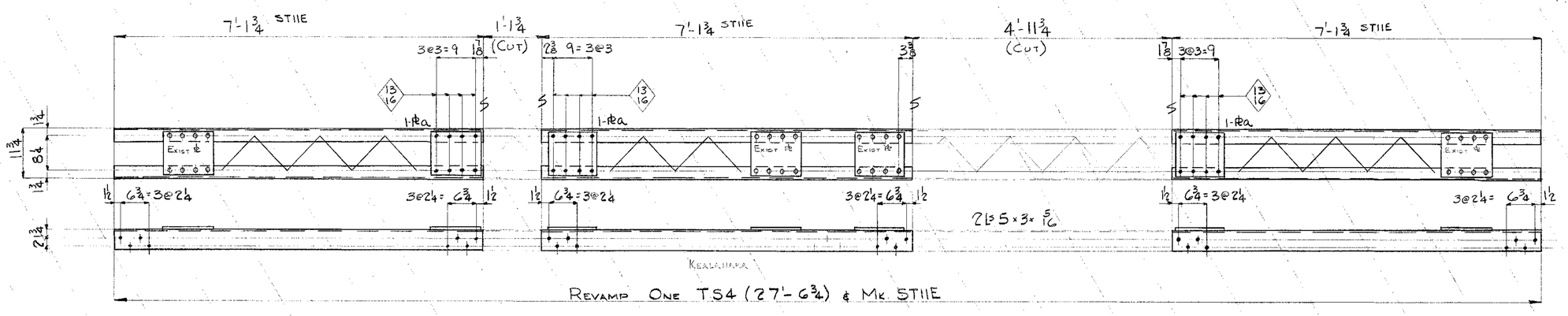
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAWAII	FDR-2(10)	1950	120	904

Order No. 3807 Sheet No. D40E

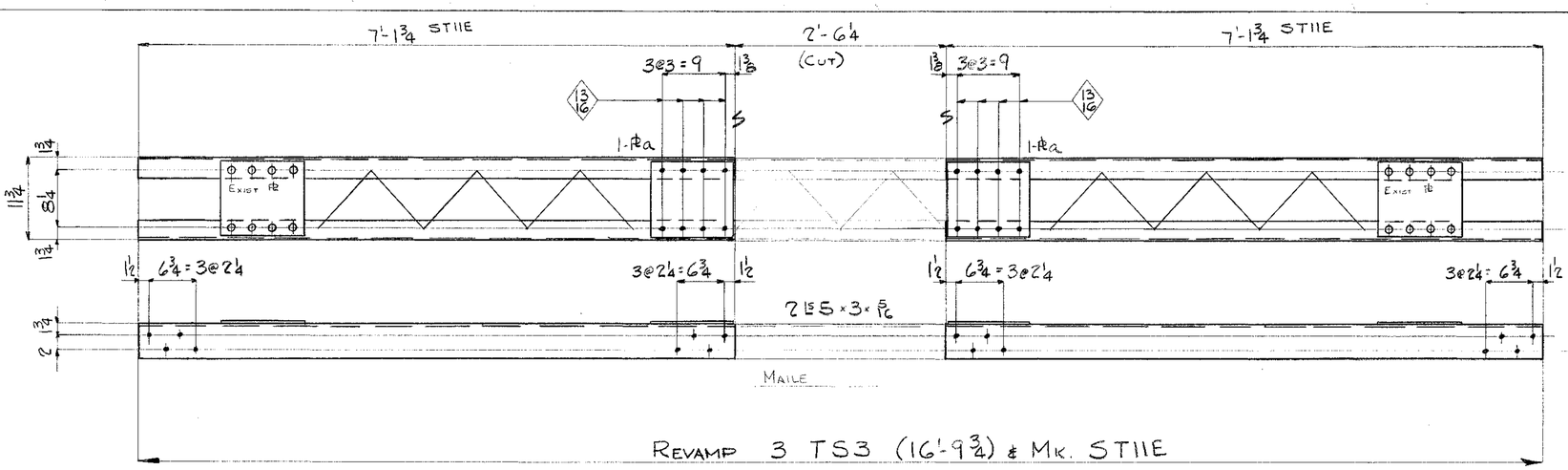
BILL OF MATERIAL

INDUSTRIAL DEVELOPMENT CO.

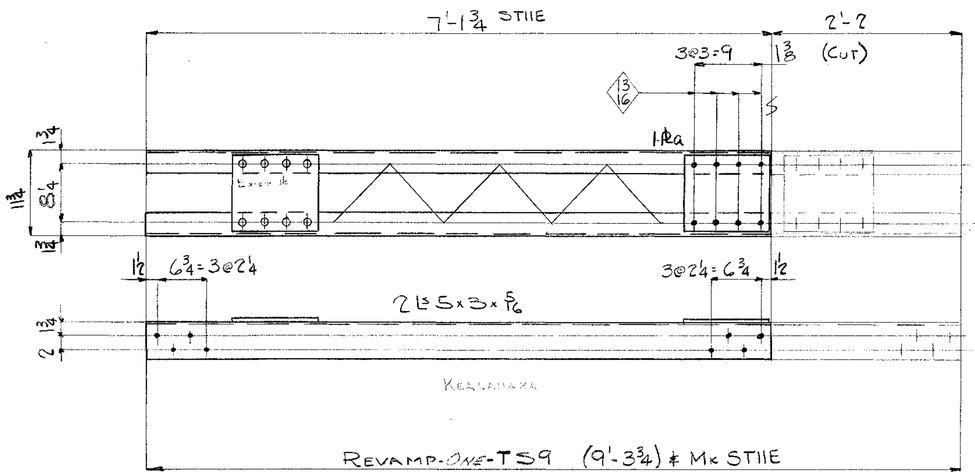
No.	Description	Length Ft.	Length Ins.	Mark	REMARKS
NOTE:	BRACES LISTED BELOW ARE TO BE				
	REVAMPED AS SHOWN ON DETAILS				
					SALV. FROM:
3	BRACES	16	9 3/4	TS3	MAILE
1	Do	9	3 3/4	TS9	KEALAHAKA
1	Do	13	7 3/8	TS10	Do
7	PL 10 3/4 x 3/8	0	11 1/2	a	Temp-New
1	PL 9 1/4 x 3/8	0	10 3/4	b	Temp-New



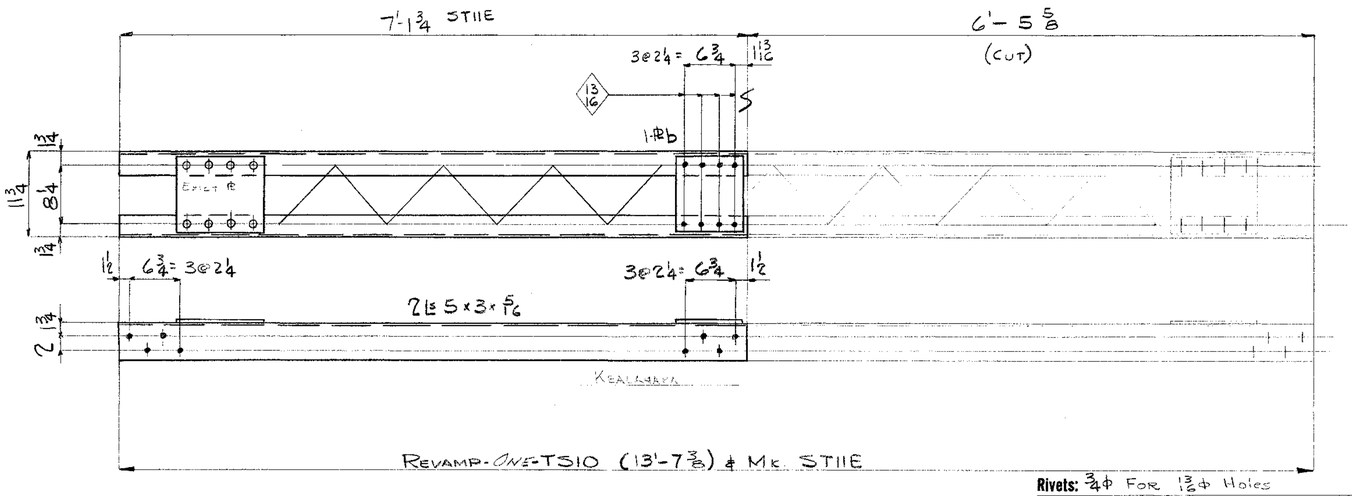
REVAMP ONE TS4 (27'-6 3/4) & MK. STIIE



REVAMP 3 TS3 (16'-9 3/4) & MK. STIIE



REVAMP-ONE-TS9 (9'-3 3/4) & MK STIIE



REVAMP-ONE-TS10 (13'-7 3/8) & MK. STIIE

Rivets: 3/4φ FOR 13/16φ Holes
Holes: 15/16φ UN
Paint:

INDUSTRIAL DEVELOPMENT COMPANY

ADDITION TO THE NANUE BRIDGE
HAWAII

INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY	DAL	1-13-50	ORDER NO.	3807
CHECKED BY	RA	2-17-50	SHEET NO.	D40E

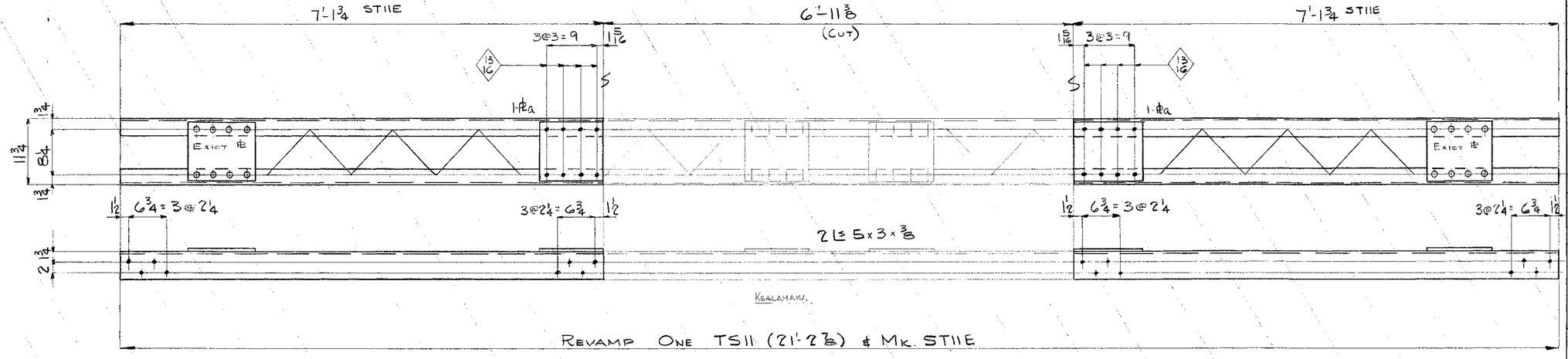
5468.120

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	ALT. NO.
HAWAII	HAWSDC 3(6)	1950	121	304	

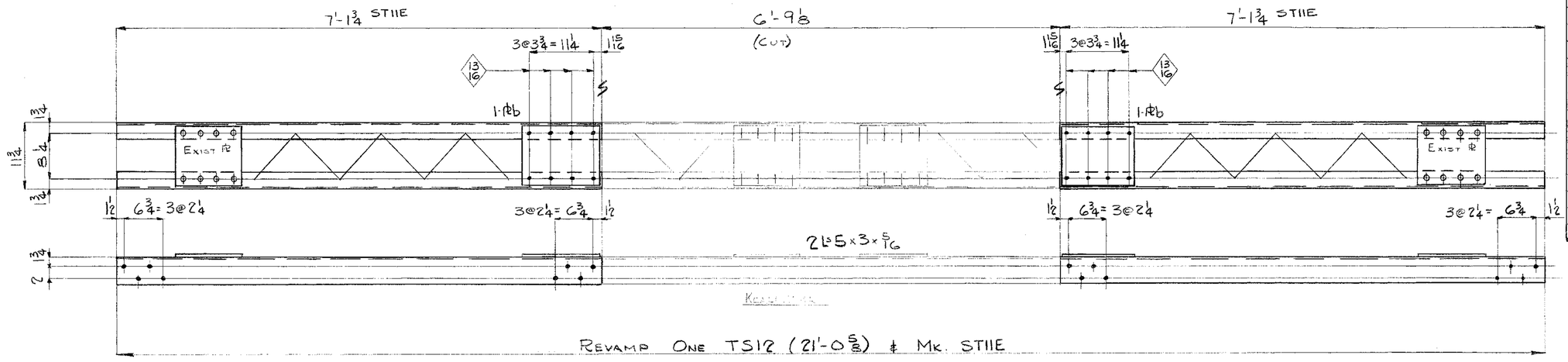
Order No. 3807 Sheet No. D41E

BILL OF MATERIAL — INDUSTRIAL DEVELOPMENT CO

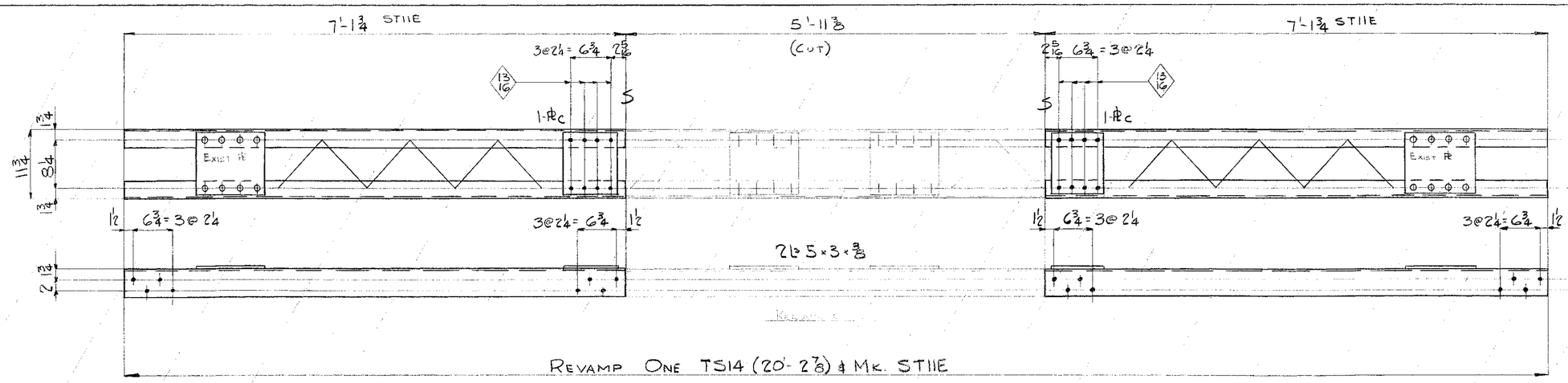
No.	Description	Length Ft.	Length Ins.	Mark	REMARKS
NOTE: BRACES LISTED BELOW ARE TO BE REVAMPED AS SHOWN ON DETAILS.					
1	BRACE	21	0 5/8	TS1/2	SALV FROM KEALAHAKA
2	PL 10 3/4 x 3/8	1	1 3/4	b	Temp-New



REVAMP ONE TS11 (21'-2 3/8) & MK. STIIE



REVAMP ONE TS12 (21'-0 5/8) & MK. STIIE



REVAMP ONE TS14 (20'-2 7/8) & MK. STIIE

Rivets: 3/4 ϕ FOR 13/16 ϕ Holes
Holes: 15/16 ϕ ON
Paint:

INDUSTRIAL DEVELOPMENT COMPANY

ADDITION TO THE NANUE BRIDGE
HAWAII

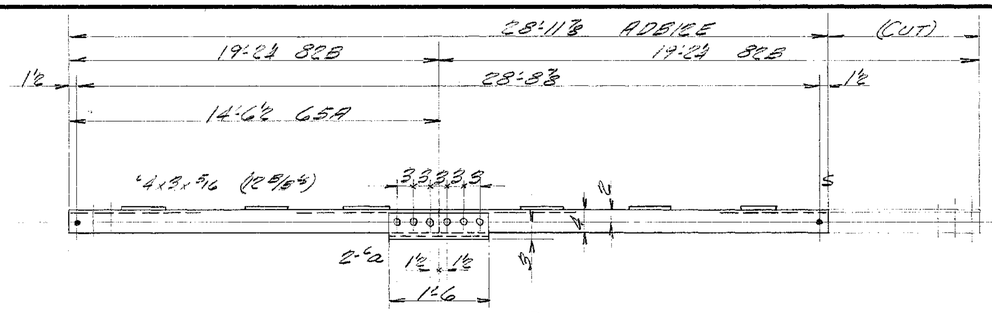
INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY	DAL	1-13-50	ORDER NO.	3807
CHECKED BY	RA	2-17-50	SHEET NO.	D41E

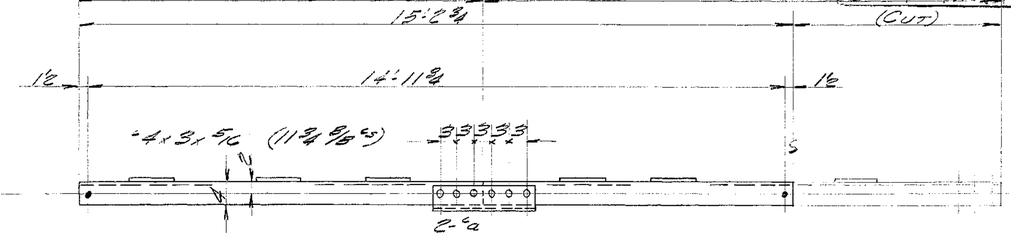
5465.121

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
	HAWAII	(2)	1950	102	304

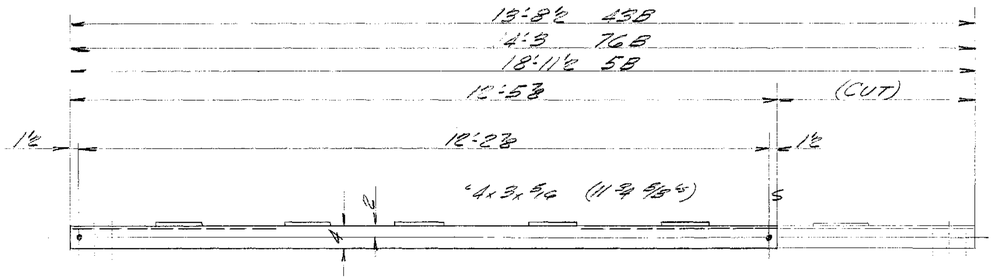
Order No. 3807 Sheet No. D42E



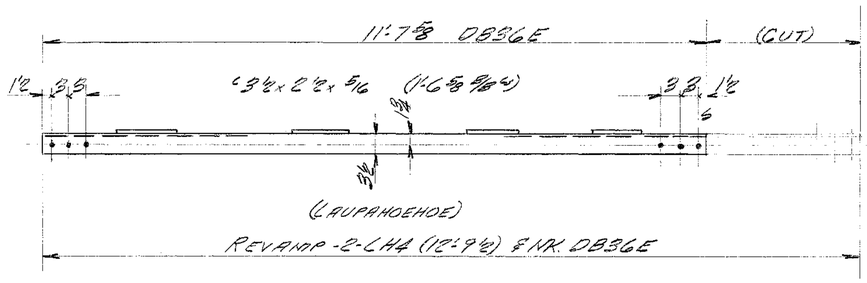
REVAMP - 3 - 82B
Do - ONE - 65A
} MAKES - 2 - ADBIEE



REVAMP - 2 - 28B (MAKES - ONE - ADBIBE)

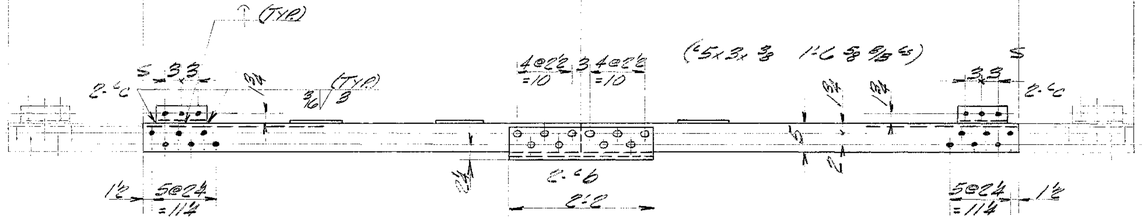


REVAMP - ONE - 43B
Do - ONE - 76B
Do - ONE - 5B
} MAKES - 3 - DB28E

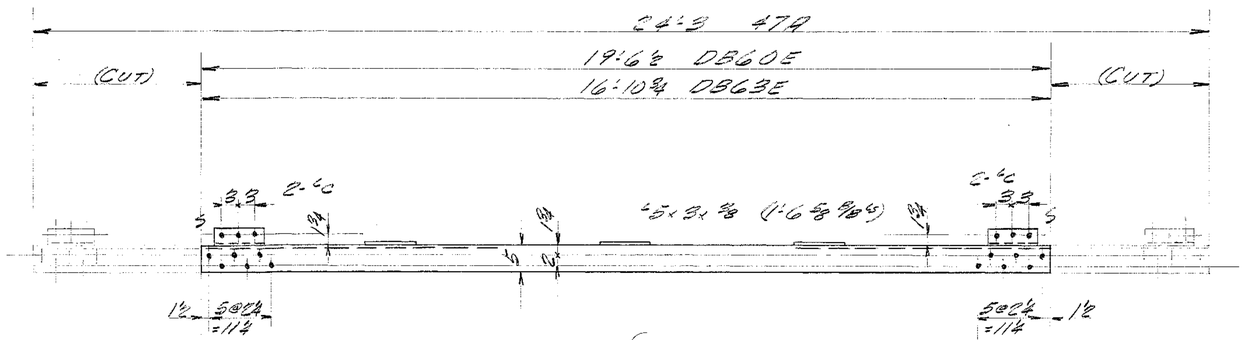


REVAMP - 2 - LH4 (12:9½) & INK. DB36E

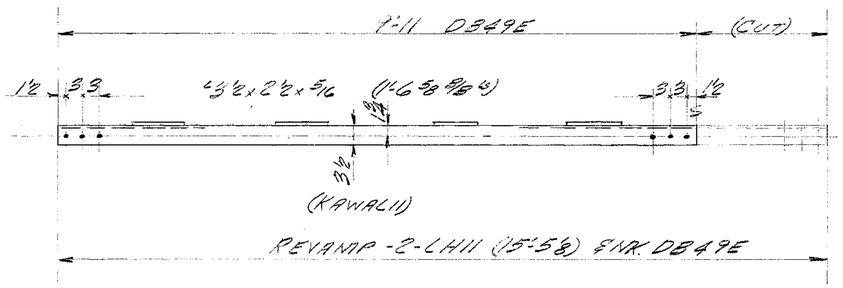
No.	Description	Length Ft.	Length In.	Mark	REMARKS
NOTE: REVAMP THE BRACES LISTED BELOW AS SHOWN ON THE DETAILS					
2	BRACES			LH4	(LAUPAHOEHOE)
2	Do.			LH11	(KAWAILI)
3	Do.			82B	
1	Do.			65A	
2	Do.			28B	
1	Do.			43B	
1	Do.			76B	
1	Do.			5B	
4	Do.			44A	
4	Do.			47A	
NEW MAT'L. IS LISTED BELOW					
6	5"x3"x⅜	1	6	a	TEMP.
4	6"x3⅜"x⅜	2	2	b	Do.
24	3"x3"x⅜	0	9	c	Do.
76	¾" ø RIVETS				



REVAMP - 4 - 44A (MAKES - 2 - DB62E)



REVAMP - 4 - 47A
MAKES - 2 - DB60E
MAKES - 2 - DB63E



REVAMP - 2 - LH11 (15:5⅜) & INK. DB49E

Rivets: ⅞"ø
Holes: 15/16"ø
Paint: (SEE SPECS.)

INDUSTRIAL DEV. CO.

ADDITION TO THE NANUE BRIDGE - HAWAII -

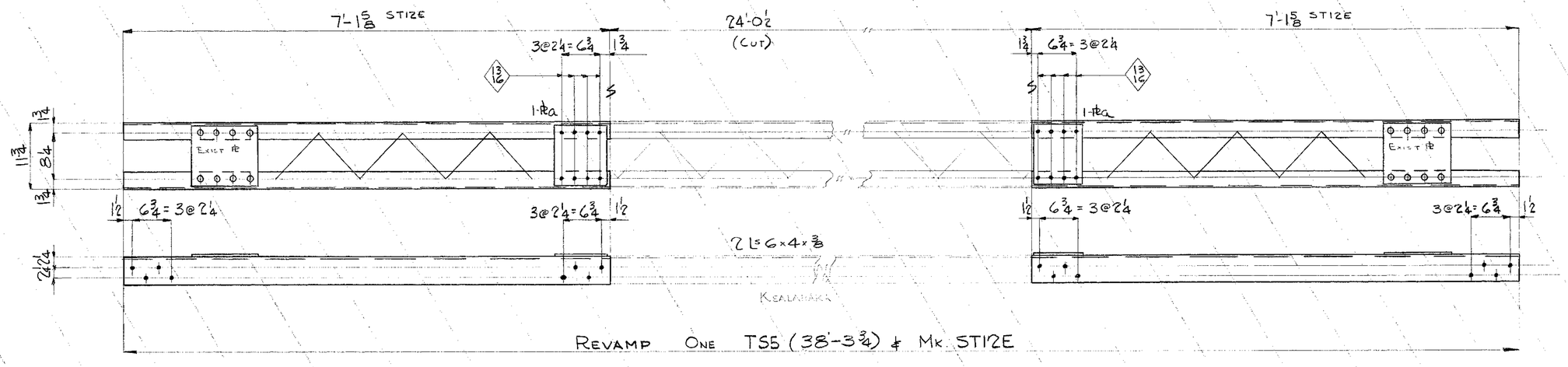
INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY	DD	3-26-50	ORDER NO.	3807
CHECKED BY			SHEET NO.	D42E

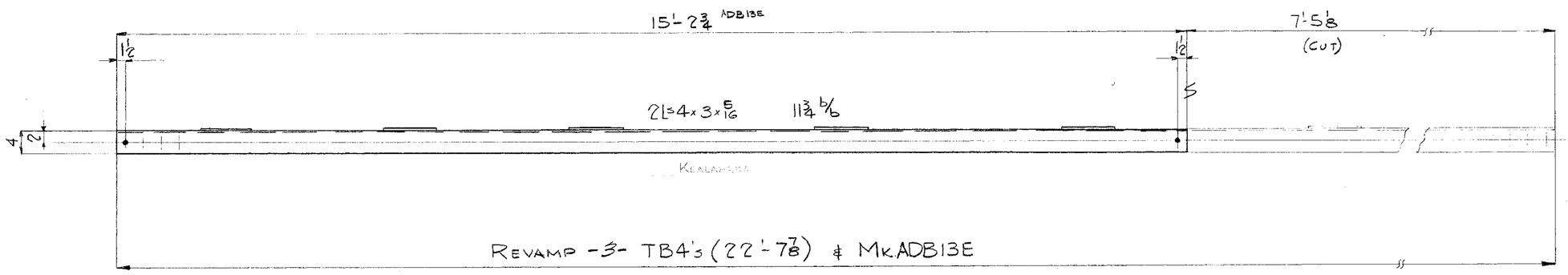
5468.122

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW	SDR 3(12)N 950	123	304	

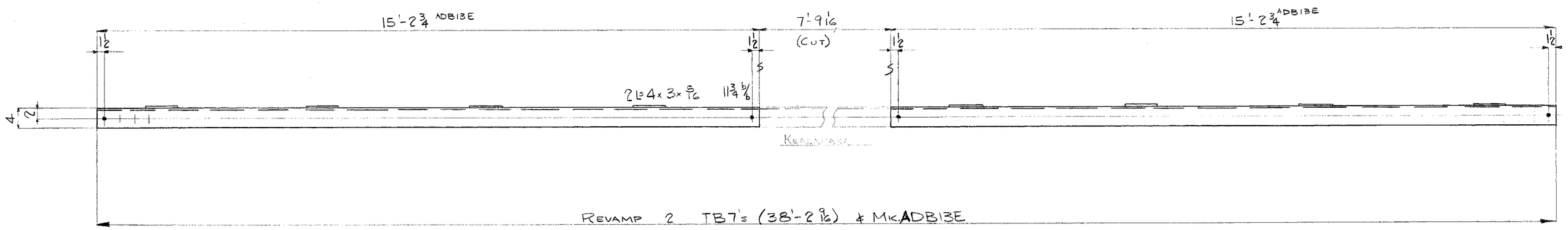
Order No. 3807 Sheet No. D43E



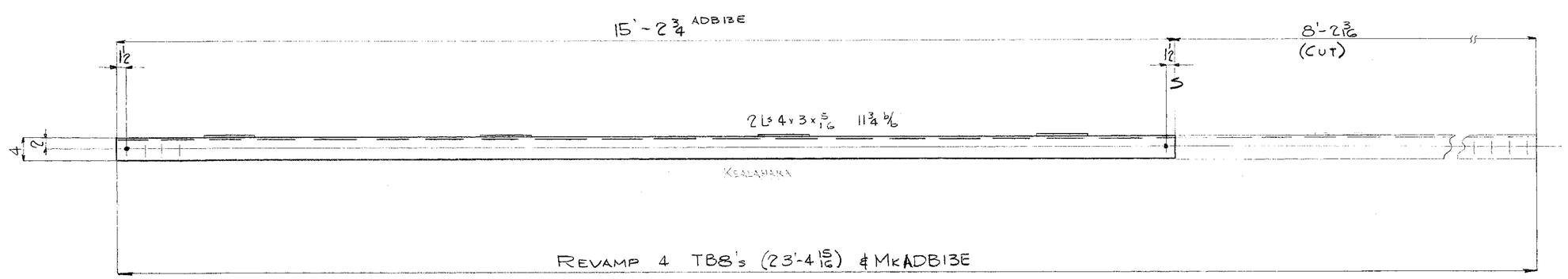
REVAMP ONE TS5 (38'-3 3/4) & MK. STIZE



REVAMP -3- TB4's (22'-7 7/8) & MK. ADBIZE



REVAMP 2 TB7's (38'-2 9/16) & MK. ADBIZE



REVAMP 4 TB8's (23'-4 15/16) & MK. ADBIZE

BILL OF MATERIAL

INDUSTRIAL DEVELOPMENT CO.

No.	Description	Length Ft.	Length Ins.	Mark	REMARKS
NOTE:	BRACES LISTED BELOW ARE TO BE				
REVAMPED AS SHOWN ON DETAILS.					
					SALV. FROM
3	BRACES	22	7 7/8	TB4	KEALAHOU
2	Do	38	2 9/16	TB7	Do
4	Do	23	4 15/16	TB8	Do

Rivets: 3/4 Ø FOR 13/16 Ø HOLES
Holes: 15/16 Ø UN
Paint:

INDUSTRIAL DEVELOPMENT COMPANY

ADDITION TO THE NANUE BRIDGE
HAWAII

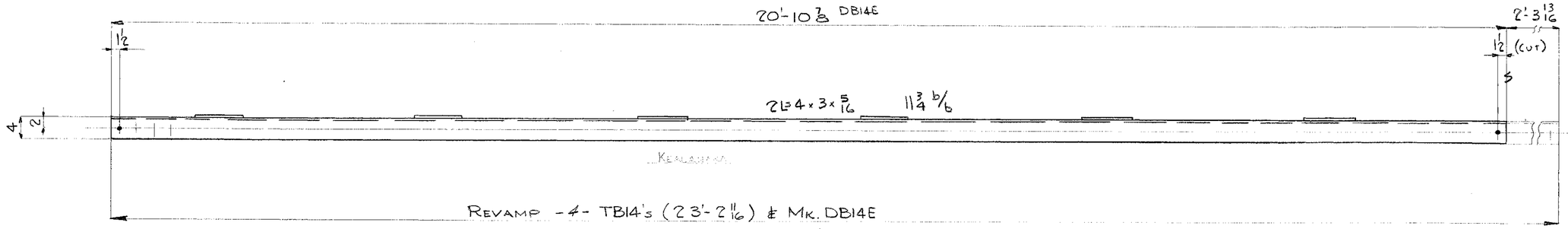
INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY	DAL	1-16-50	ORDER NO.	3807
CHECKED BY	RA	2-17-50	SHEET NO.	D43E

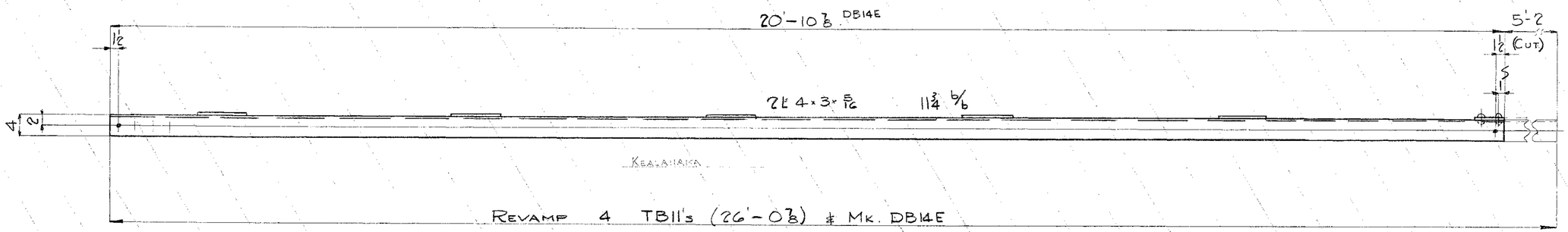
5468.123

Order No. 3807 Sheet No. D44E

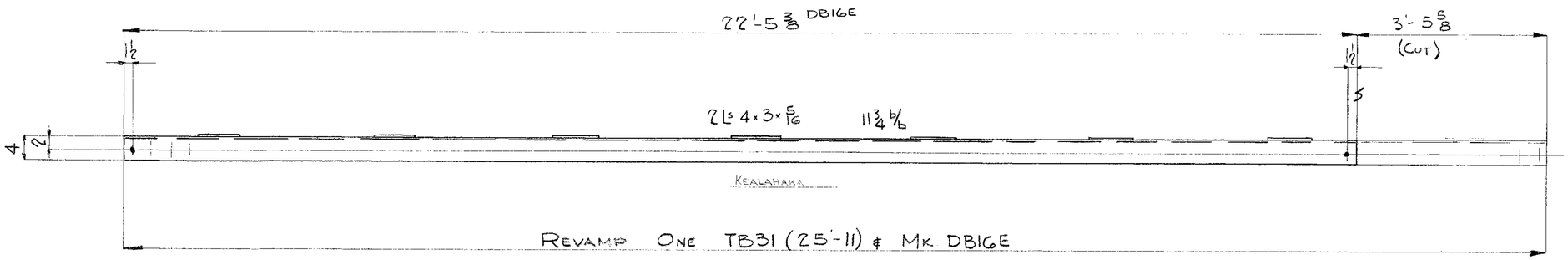
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
Hawaii	Haw	SDR 30(3)	1950	124	302



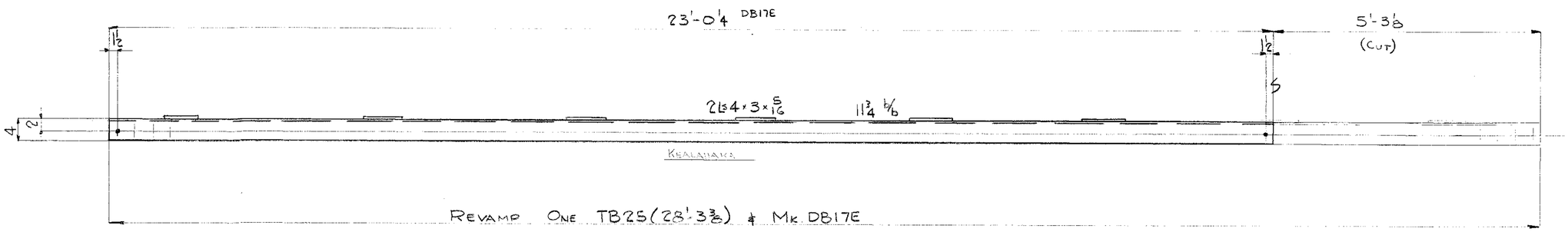
REVAMP -4- TB14's (23'-2 11/16) & MK. DB14E



REVAMP 4 TB11's (26'-0 7/8) & MK. DB14E



REVAMP ONE TB31 (25'-11) & MK DB16E



REVAMP ONE TB25 (28'-3 3/8) & MK DB17E

BILL OF MATERIAL INDUSTRIAL DEVELOPMENT CO.

No.	Description	Length Ft.	Length Ins.	Mark	REMARKS
NOTE: BRACES LISTED BELOW ARE TO BE REVAMPED AS SHOWN ON DETAILS.					
					SALV. FROM:
4	BRACES	23	2 11/16	TB14	KEALAHAKA
1	Do	28	3 3/8	TB25	Do
1	Do	25	11	TB31	Do

Rivets:
Holes: 15/16 ϕ
Paint:

INDUSTRIAL DEVELOPMENT COMPANY

ADDITION TO THE NANUE BRIDGE
HAWAII

INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY	DAL	1-16-50	ORDER NO.	3807
CHECKED BY	RA	2-17-50	SHEET NO.	D44E

5468.124

Order No. 3807 Sheet No. D45E

FED. ROAD	STATE	FED. AID	FISCAL	SHEET	TOTAL
HAWAII	HAW.		1950	125	304

BILL OF MATERIAL — NANUE BRIDGE

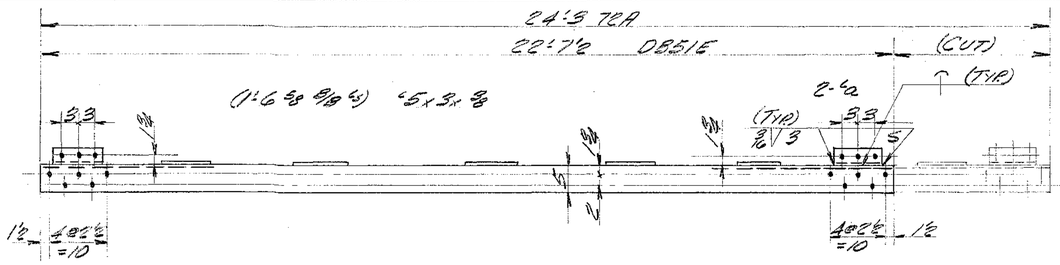
Nov. 1, 1950

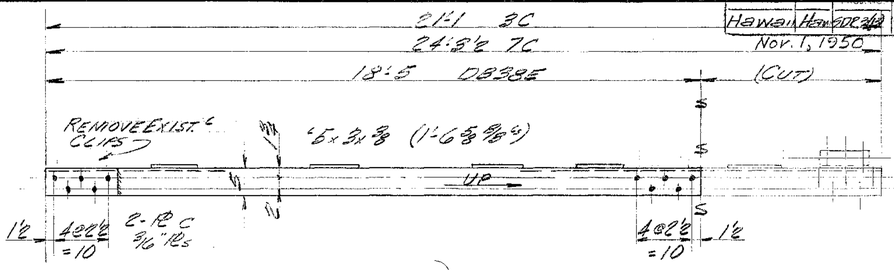
NO.	DESCRIPTION	LENGTH FT.	INS.	PC. MK.	REMARKS
NOTE: THE PIECES LISTED BELOW ARE TO BE REVAMPED AS SHOWN ON THE DETAILS					
2	BRACES			72A	
4				21A	
2				52B	
2				54B	
4				45B	
1				3C	
1				7C	
2				8C	
1				51B	
1				2C	
1				53B	
1				55B	
1				1C	
1				56B	
1				57B	
1				50B	
1				-6B	
1				47B	
1				48B	
1				49B	
4				45B	
4				15B	

NEW MAT'L. IS LISTED BELOW

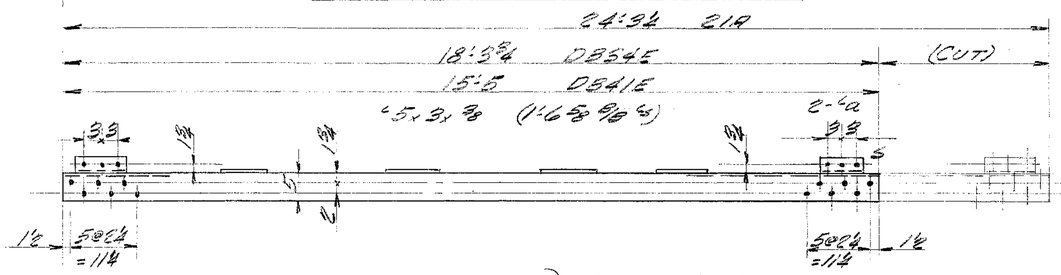
NO	SIZE	O	9	a	TEMP.
12	L 6 x 3½ x 5/8	1	6	b	Do.
4	PL 5 x 3/16	1	1	C	Do.
8	PL 8 x 3/16	1	1	d	Do.
16	L 6 x 3½ x 5/8	1	5	5	Do.

168 ¾" RIVETS

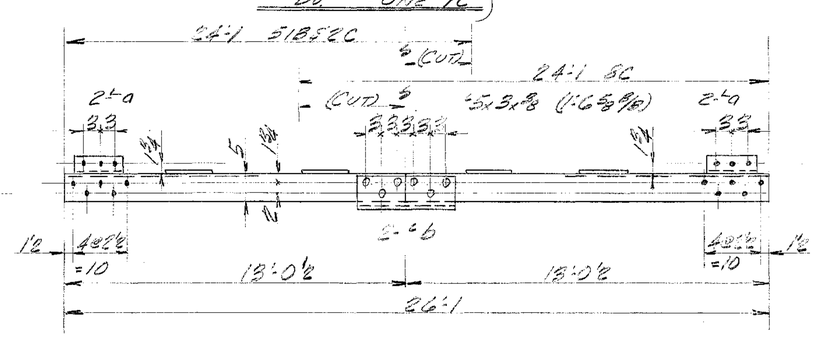




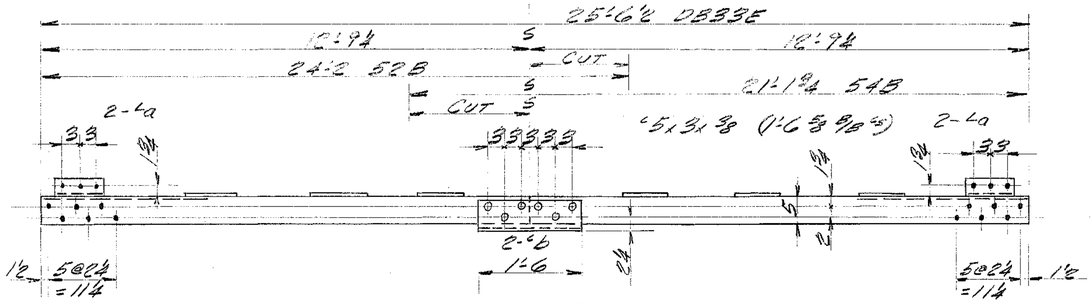
REVAMP - 2 - 72A (MAKES - 2 - D851E)



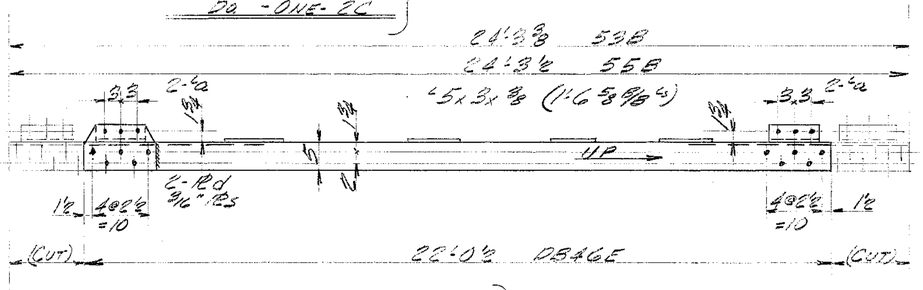
REVAMP - ONE - 3C
Do - ONE - 7C
} MAKES - 2 - D838E



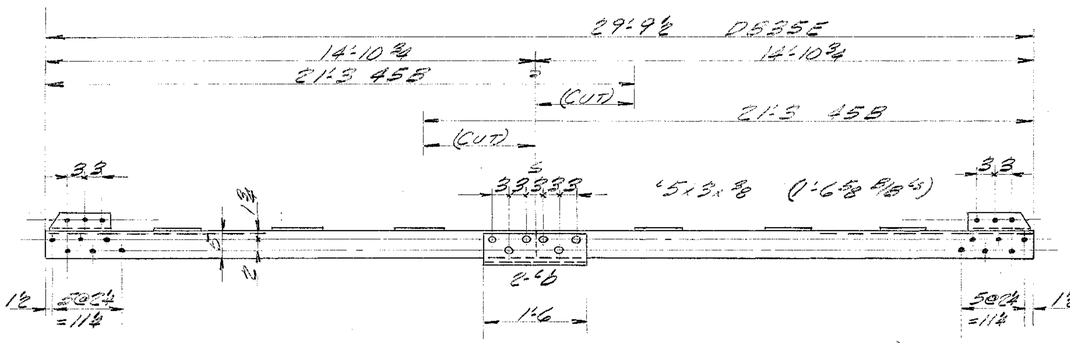
REVAMP - 4 - 21A
} MAKES - 2 - D834E
MAKES - 2 - D841E



REVAMP - ONE - 8C
Da - ONE - 51B
2a - ONE - 2C
} MAKES - 2 - D845E

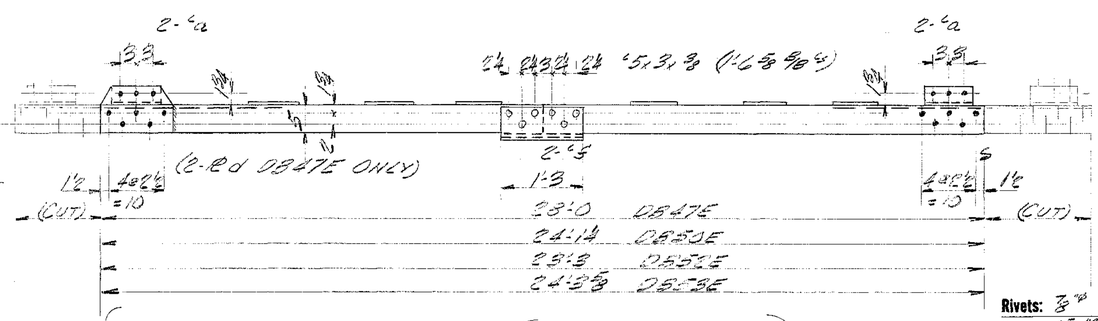


REVAMP - 2 - 52B
Da - 2 - 54B
} MAKES - 2 - D833E



REVAMP - 4 - 45B (MAKES - 2 - D835E)

REVAMP - ONE - 53B
Da - ONE - 55B
} MAKES - 2 - D846E



MAKES - 2 - D847E
- REVAMP - ONE - 1C (21'-10½)
- Do. - ONE - 56B (24'-1)
- Do. - ONE - 57B (24'-4⅜)
- Do. - ONE - 50B (13'-2¾)

MAKES - 2 - D850E
- REVAMP - ONE - 46B (21'-3½)
- Do. - ONE - 47B (21'-6¾)
- Do. - ONE - 48B (18'-7)
- Do. - ONE - 49B (16'-7¾)

REVAMP - 4 - 45B (21'-3) MAKES - 2 - D855E

REVAMP - 4 - 15B (24'-3) MAKES - 2 - D856E

Rivets: ⅞"
Holes: 15/16"
Paint: (SEE SPECS.)

INDUSTRIAL DEV. CO.

ADDITION TO THE NANUE BRIDGE -HAWAII-

INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY	JW	8-27-50	ORDER NO.	3807
CHECKED BY			SHEET NO.	D45E

5468.125

Order No. 3807 Sheet No. 046E

FED. ROAD PROJECT	STATE	FED. AID	PERCENT	SHEET	TOTAL
Hawaii	HEW-SDR-3(9)	1960	126	304	

BILL OF MATERIAL NANUE BRIDGE

No.	Description	Length Ft.	Length Ins.	Mark	REMARKS
NOTE: REVAMP THE BRACES LISTED BELOW AS SHOWN ON THE DETAILS					
2	BRACES			TB7H	MANUA
3				TB35H	
5				TB29H	
2				TB33H	
5				TB34H	
3				TB9H	
1				TB4H	
1				TB17H	
4				TB28H	
4				TB12H	
NEW MATL. LISTED BELOW					
14	L 5x3x 3/8	1	6	a	TEMP.
8	PL 4x 1/4	0	6	b	Do.
4	PL 4x 3/8	0	6	c	Do.

34'-4 3/8 DB18E

2-L 4x3x 5/16 11# 9/16

2'-10 7/16 (CUT)

REVAMP-ONE-TB7H 37'-2 1/8 (MAKES-ONE-DB18E)

34'-4 3/4 DB19E

2-L 4x3x 5/16 11# 9/16

2'-10 7/16 (CUT)

REVAMP-ONE-TB7H 37'-2 1/8 (MAKES-ONE-DB19E)

25'-11 1/2 DB21E

24'-5 3/8 DB20E (CUT)

2-L 4x3x 5/16 11# 9/16

REVAMP-2-TB35H 26'-5 3/8 { MAKES-ONE-DB21E / MAKES-ONE-DB20E }

22'-5 1/4 DB24E

2-L 4x3x 5/16 11# 9/16

2'-8 3/8 (CUT)

REVAMP-2-TB29H 25'-2 3/8 (MAKES-2-DB24E)

27'-6 5/8 DB25E

2-L 4x3x 5/16 11# 9/16

1'-5 3/8 (CUT)

REVAMP-2-TB33H 28'-9 3/4 (MAKES-2-DB25E)

33'-4 3/8 DB27E (CUT)

2-L 4x3x 5/16 11# 9/16

3 3/8 3 3/8 3 3/8 3 3/8

2-L a 5x3x 3/8

1'-6

11'-10 3/8

21'-6 3/4 TB34H

21'-6 3/4 TB34H

REVAMP-4-TB34H (MAKES-2-DB27E)

20'-10 3/8 DB14E (CUT)

2-L 4x3x 5/16 11# 9/16

2'-7 1/2 TB9H

21'-7 5/16 TB4H

26'-4 3/4 TB17H

25'-2 3/8 TB29H

REVAMP-3-TB9H
Do -ONE-TB4H
Do -ONE-TB17H
Do -3-TB29H
} MAKES-8-DB14E

33'-11 3/8 DB32E (CUT)

2-L 4x3x 5/16 11# 9/16

3 3/8 3 3/8 3 3/8 3 3/8

2-L a

15'-8 1/2

18'-3 5/8 TB28H

18'-3 5/8 TB28H

REVAMP-4-TB28H (MAKES-2-DB32E)

33'-6 3/8 DB23E (CUT)

2-L 4x3x 5/16 11# 9/16

3 3/8 3 3/8 3 3/8 3 3/8

2-PL b 4"R

2-L a

2-PL b

8'-5 1/2

25'-1 3/8 TB12H

25'-1 3/8 TB12H

REVAMP-4-TB12H (MAKES-2-DB23E)

39'-7 3/8 DB22E (CUT)

2-L 4x3x 5/16 11# 9/16

3 3/8 3 3/8 3 3/8 3 3/8

2-PL c 8"R

2-L a

18'-0 5/8

2-PL c

21'-6 3/4 TB34H

26'-5 5/8 TB35H

REVAMP-ONE-TB34H
Do -ONE-TB35H
} MAKES-ONE-DB22E

Rivets: 3/8"ø
Holes: 13/16"ø
Paint: (SEE SPECS)

INDUSTRIAL DEV. CO.

ADDITION TO THE NANUE BRIDGE - HAWAII -

INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY	DD	9-23-50	ORDER NO.	3807
CHECKED BY			SHEET NO.	046E

5468.126

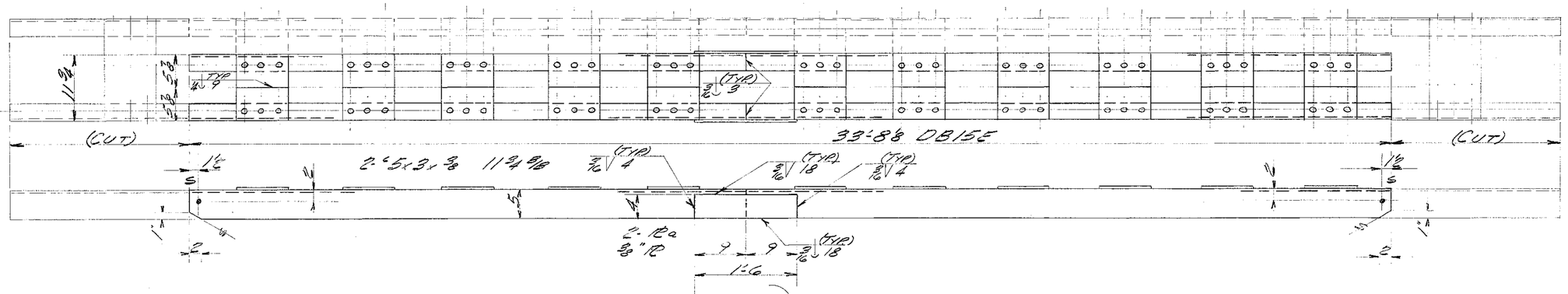
Order No. 3807 Sheet No. 0475

FED. ROAD DIST. NO.	STATE	FED. AID PROJECT NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
Hawaii	Hawaii	SDR 3(13)	1950	127	304

12/19/50

BILL OF MATERIAL — NANUE BRIDGE

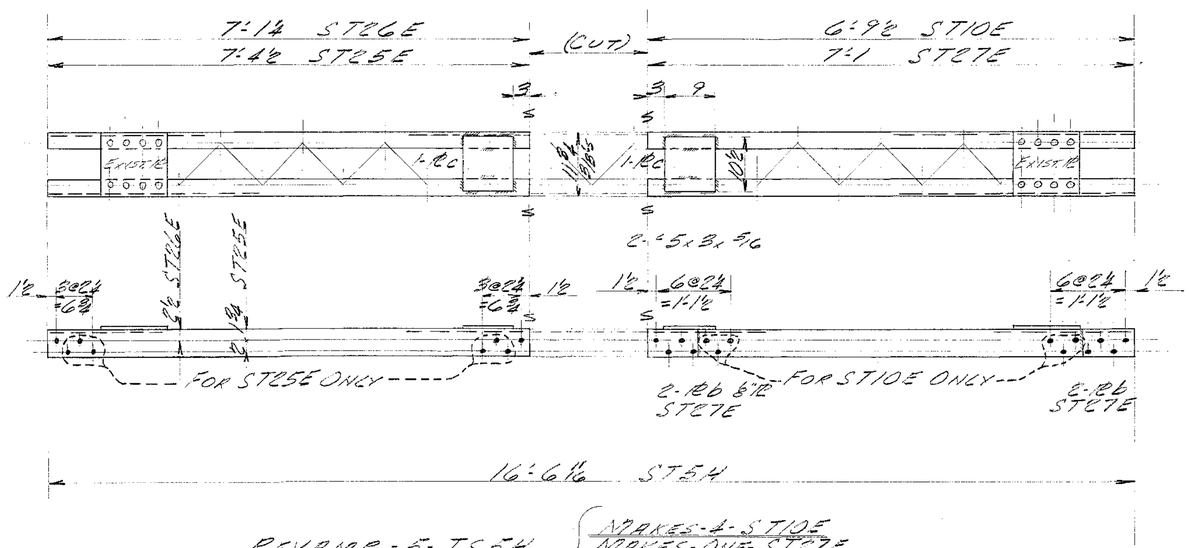
No.	Description	Length Ft.	Length Ins.	Mark	REMARKS
NOTE: REVAMP THE BRACES					
LISTED BELOW AS SHOWN					
ON THE DETAILS					
1	BRACE			89A	
1				8B	
1				9B	
1				10B	
2				11B	
1				12B	
1				14B	
2				16B	
1				21B	
1				22B	
1				23B	
1				24B	
1				52B	
2				3A	
2				18A	
4				21A	
3				25A	
5				TS5H	NANUA
2				TS4H	Do.
NEW MAT'L. IS LISTED BELOW					
26	PL 4 x 3/8	1	6	a	PLAIN
4	PL 5 x 3/8	0	9 1/2	b	TEMP
12	PL 9 x 3/8	0	10 1/2	c	PLAIN



REVAMP - ONE -	89A	24'-2 1/2
Do - ONE -	8B	24'-1
Do - ONE -	9B	24'-3
Do - ONE -	10B	24'-2
Do - 2 -	11B	24'-3 1/2
Do - ONE -	12B	24'-0
Do - ONE -	14B	24'-3
Do - 2 -	16B	24'-3 1/2
Do - ONE -	21B	21'-3 1/2
Do - ONE -	22B	24'-4
Do - ONE -	23B	24'-2
Do - ONE -	24B	24'-11 1/2
Do - ONE -	52B	24'-2
Do - 2 -	3A	24'-3 1/4
Do - 2 -	18A	24'-3 3/4
Do - 4 -	21A	24'-2
Do - 3 -	25A	24'-3 3/4

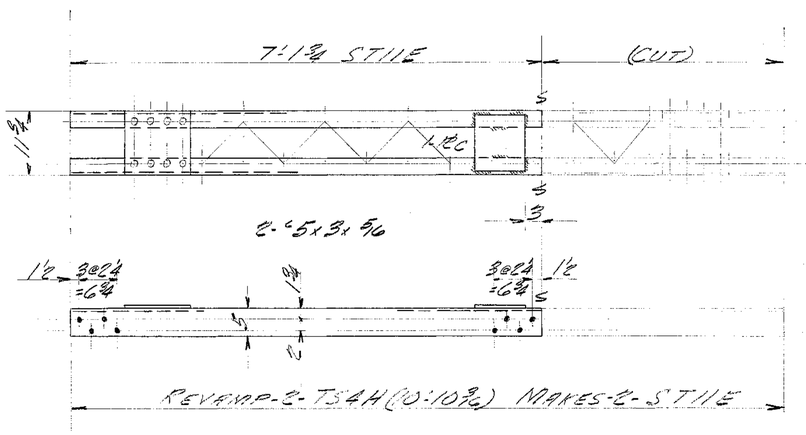
MAKES -13- DB15E

See sheet 5468.75B for details of 3 more DB15E



REVAMP - 5 - TS5H

MAKES - 4 - STI0E
MAKES - ONE - STG7E
MAKES - 2 - STG6E
MAKES - 2 - STS5E



Rivets: WELD
Holes: 1/16 in
Paint: (SEE SPECS)

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

INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY	DD	9-24-50	ORDER NO.	3807
CHECKED BY			SHEET NO.	0475

5468.127

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
Hawaii	Haw	SDR(4)3	1950	128	304

Order No. 3807 Sheet No. 048E

BILL OF MATERIAL — NANUE BRIDGE

No.	Description	Length Ft.	Length Ins.	Mark	REMARKS
NOTE: REVAMP THE PIECES LISTED BELOW AS ON THE DETAILS					
1	BRACE			75E	
1				81E	
1				79E	
1				83E	
1				78E	
NEW MATL. IS LISTED BELOW					
1	BRACE			OB65E	
2				OB42E	
2				OB54E	
8				STILE	
4	PL 3/8 x 4	0	9	a	TEMP.
24	PL 9 x 3/8	1	6 3/8	b	Do.
2	L 3 1/2 x 2 1/2 x 5/16	13	3/8	c	
4	L 3 1/2 x 2 1/2 x 5/16	16	11	d	
4	L 3 1/2 x 2 1/2 x 5/16	14	10 1/2	f	
16	L 5 x 3 x 5/16	7	1 3/4	g	
16	PL 10 3/4 x 5/16	1	0	h	TEMP.
48	F.B. 2 1/4 x 5/16	1	1 5/8	k	Do.
312	3/4" ø RIVETS				
36	PL 9 x 3/8	0	11	m	PLAIN

OB65E 2'-1 1/2" | 3 SPA. @ 3'-0 = 9'-0 | 2'-1 1/2"
OB42E 1'-11 1/2" | 4 SPA. @ 3'-3 = 13'-0 | 1'-11 1/2"
OB54E 1'-5 1/4" | 4 SPA. @ 3'-0 = 12'-0 | 1'-5 1/4"

4-PL 6 OB65E
5-PL 6 OB42E & OB54E
-2-"c OB65E
-2-"d OB42E
-2-"f OB54E
2-PL a OB54E ONLY
4" PL
L 3 1/2 x 2 1/2 x 5/16
1'-6 3/8"
PL 6
(12) ø 3/4" RIVETS

OB65E 13'-5 3/8"
OB42E 16'-11"
OB54E 14'-10 1/2"

MAKE-ONE-BRACE(A.S.E.N.) OB65E
Do. -2- Do. OB42E
Do. -2- Do. OB54E
} NEW MATERIAL

6 @ 7 1/2" = 3'-9
(F.B. 2 1/4 x 5/16 x 1'-1 3/8")
6-F.B.K
1-PL h
PL 5/16 x 11 3/4"
PL f
2"-"g
L 5 x 3 x 5/16

MAKE-8-BRACES NK. STILE — (NEW MAT'L.)

7'-1 3/4" STILE (CUT) 7'-1 3/4" STILE (CUT) 7'-1 3/4" STILE
2"-L 5 x 3 x 3/8 11 3/4 3/8
9 @ (TYP.)
EXIST. PL
1-PL m
3 @ 2 1/4 = 6 3/4
1 1/2

REVAMP-ONE-75E (27'-7 1/4") MAKES-3-STILE
REVAMP-ONE-81E (27'-7") MAKES-3-STILE

(CUT) 7'-1 3/4" STILE 7'-1 3/4" STILE 7'-1 3/4" STILE 7'-1 3/4" STILE 7'-1 3/4" STILE (CUT)
9 @ (TYP.)
10-PL m
2"-L 6 x 4 x 3/8 11 3/4 3/8
3 @ 2 1/4 = 6 3/4
1 1/2

REVAMP-ONE-79E (38'-10") MAKES-5-STILE
REVAMP-ONE-83E (38'-4") MAKES-5-STILE

(CUT) 7'-1 3/4" STILE 7'-1 3/4" STILE 7'-3" STILE 7'-3" STILE (CUT)
9 @ (TYP.)
8-PL m
2"-L 6 x 4 x 3/8 11 3/4 3/8
3 @ 2 1/4 = 6 3/4
1 1/2

REVAMP-ONE-78E (36'-3") MAKES-2-STILE'S-1-STILE

Rivets: 3/4" ø FOR 13/16" H.S.
Holes: 15/16" ø U.N.
Paint: (SEE SPECS.)

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

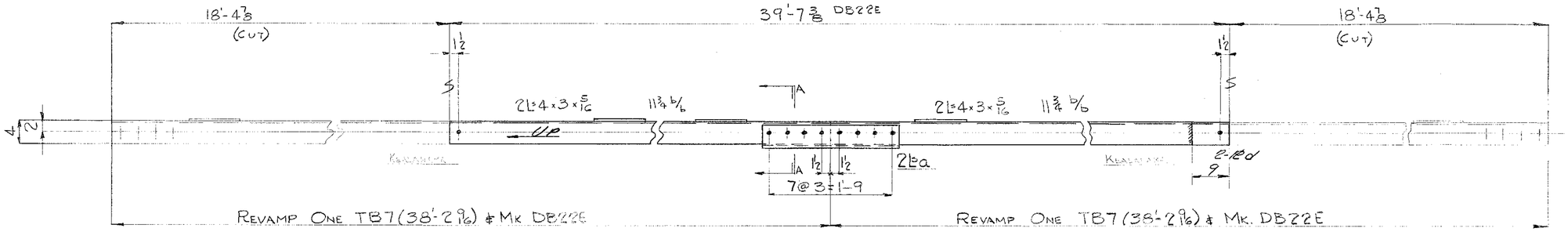
INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

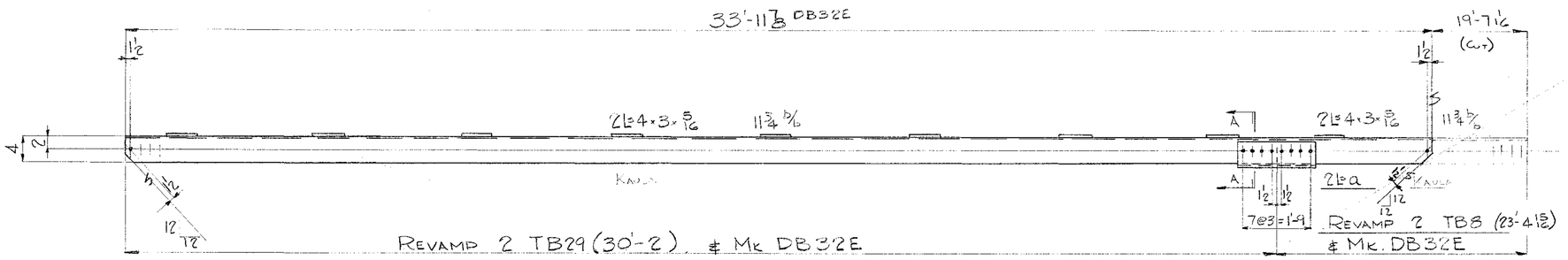
MADE BY	JD	10-8-50	ORDER NO.	3807
CHECKED BY			SHEET NO.	048E

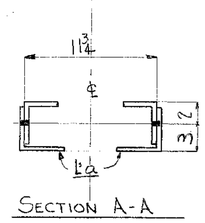
54 68.128

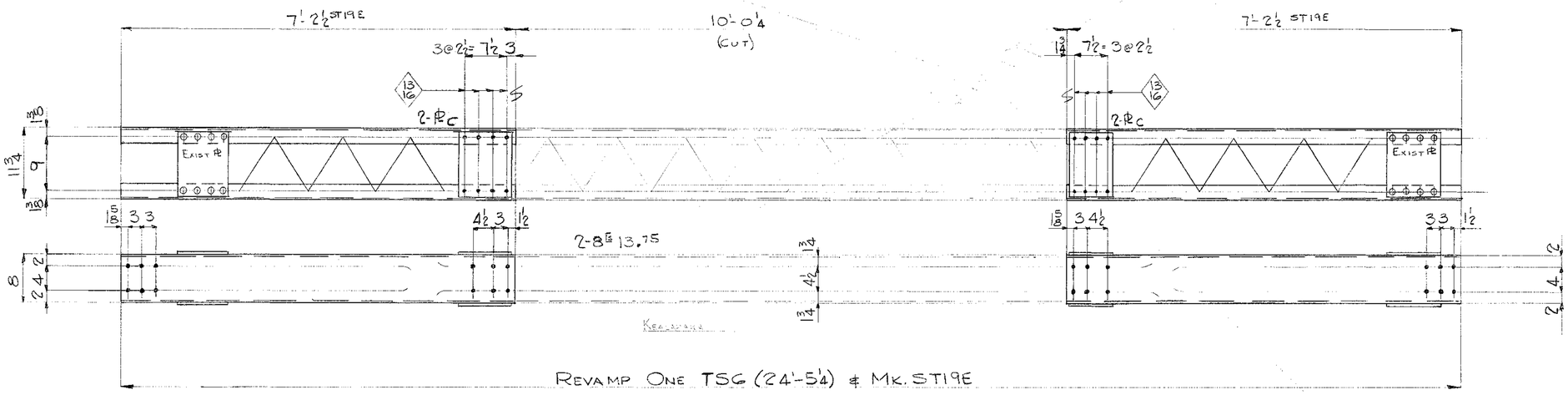
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW	SDR 9(6)	1950	129	304

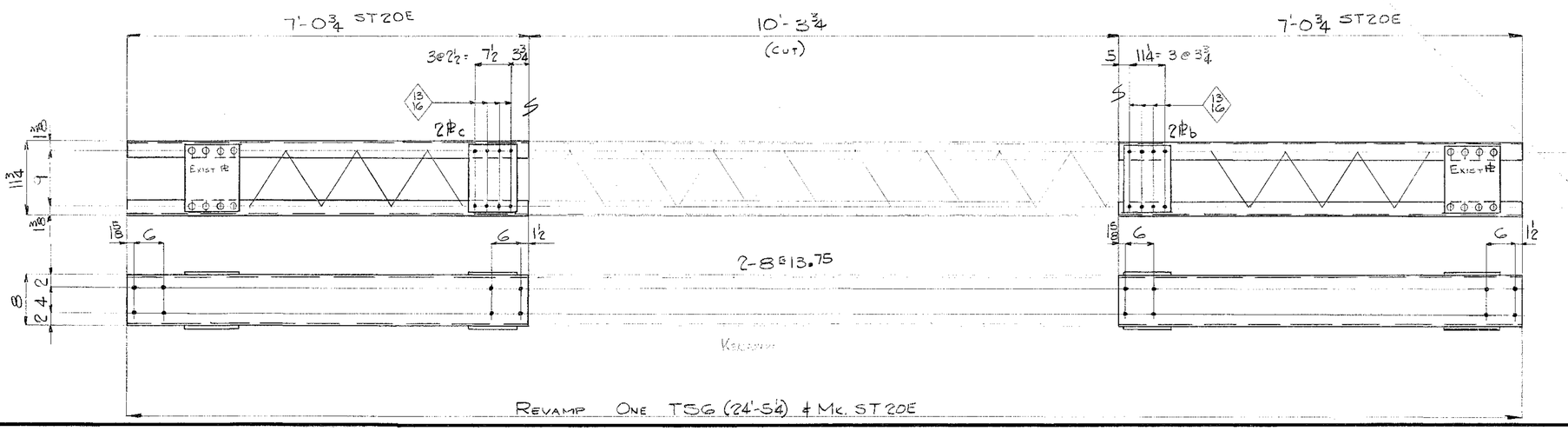
Order No. 3807 Sheet No. D49E











BILL OF MATERIAL

INDUSTRIAL DEVELOPMENT CO.

No.	Description	Length Ft.	Length Ins.	Mark	REMARKS
NOTE:	BRACES LISTED BELOW ARE TO BE REVAMPED AS SHOWN ON DETAILS.				
2	BRACES	38	2 9/16	TB7	KEARSARGE
2	5"x3"x 1/2	2	0	a	TENAR (NEW)
2	PL 4 x 8	0	9	d	Do. Ea

Rivets: 3/4 ϕ FOR 13/16 ϕ HOLES
Holes: 15/16 ϕ
Paint:

INDUSTRIAL DEVELOPMENT COMPANY

ADDITION TO THE NANUE BRIDGE
HAWAII

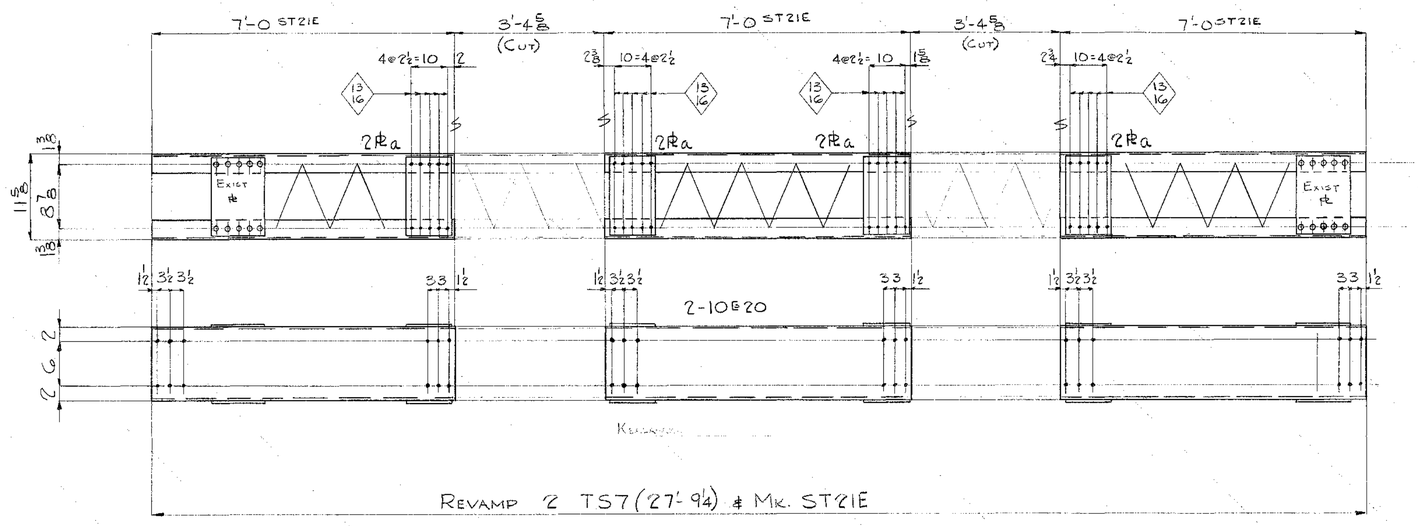
INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY	DAL	1-19-50	ORDER NO.	3807
CHECKED BY	RA	2-17-50	SHEET NO.	D49E

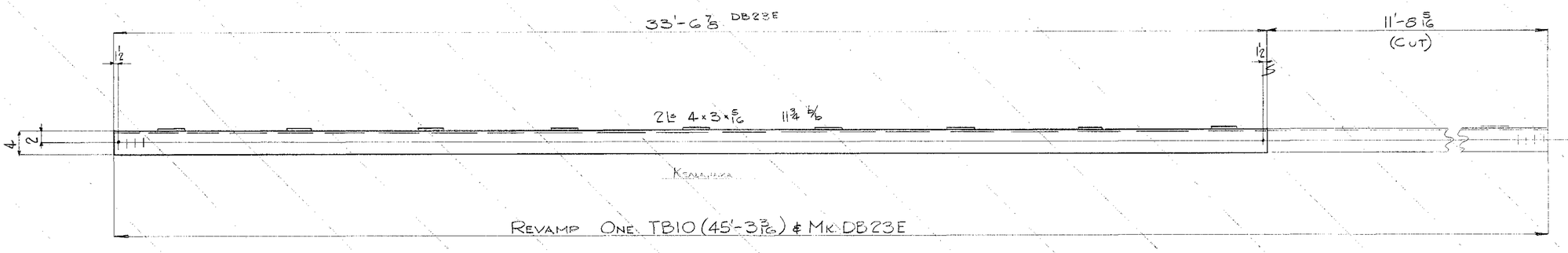
5465.129

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HI(3)11	HAW	SDR 2(13)/250	130	304

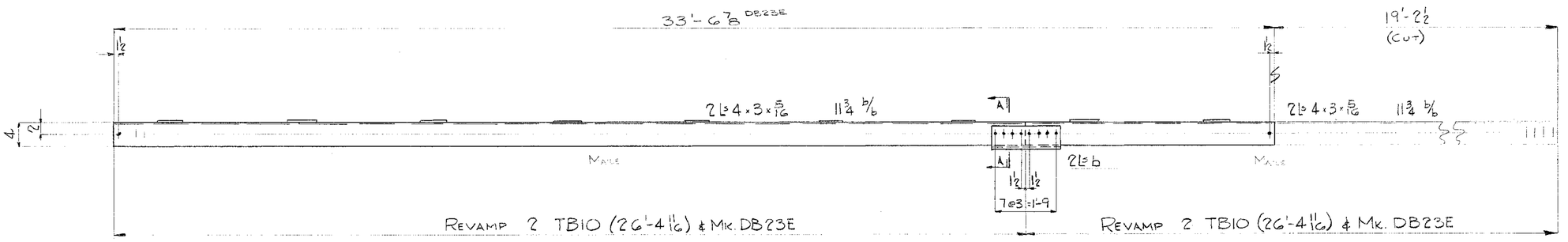
Order No. 3807 Sheet No. D50E



REVAMP 2 TS7 (27'-9¼) & MK. ST2IE

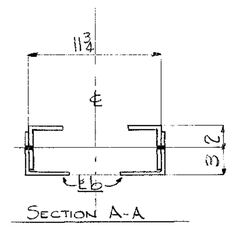


REVAMP ONE TB10 (45'-3 3/16) & MK. DB23E

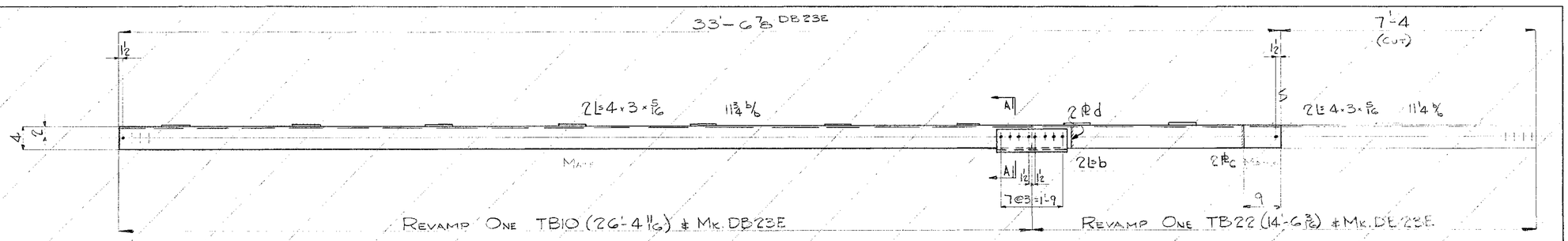


REVAMP 2 TB10 (26'-4 11/16) & MK. DB23E

REVAMP 2 TB10 (26'-4 11/16) & MK. DB23E



SECTION A-A



REVAMP ONE TB10 (26'-4 11/16) & MK. DB23E

REVAMP ONE TB22 (14'-6 3/16) & MK. DB23E

BILL OF MATERIAL

INDUSTRIAL DEVELOPMENT CO.

No.	Description	Length Ft.	Length Ins.	Mark	REMARKS
NOTE: BRACES LISTED BELOW ARE TO BE REVAMPED AS SHOWN ON DETAILS.					
4	BRACES	26	4 11/16	TB10	MAILE
4	L 5×3×½	2	0	b	TEMP. NEW

Rivets: ¾ ϕ FOR 13/16 HOLES
Holes: 15/16 ϕ UN
Paint:

INDUSTRIAL DEVELOPMENT COMPANY

ADDITION TO THE NANUE BRIDGE
HAWAII

INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY	DAL	1-23-50	ORDER NO.	3807
CHECKED BY	RA	2-17-50	SHEET NO.	D50E

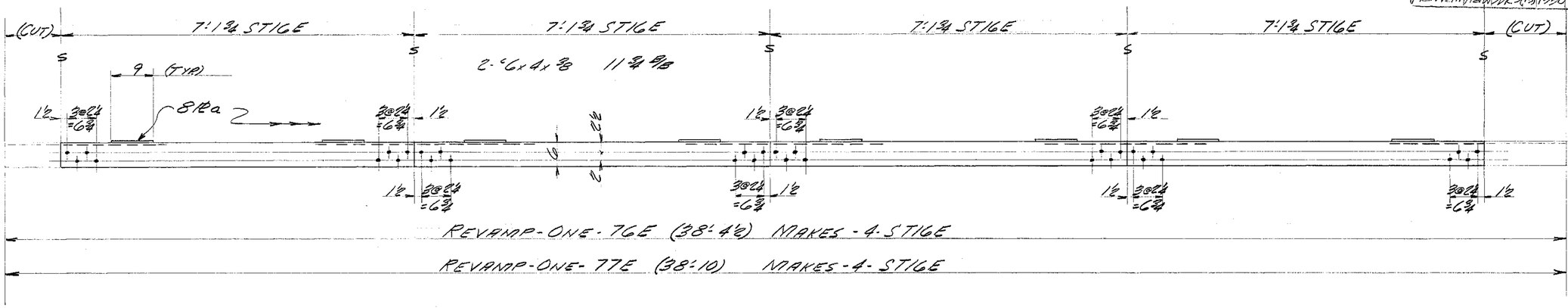
5468.130/30

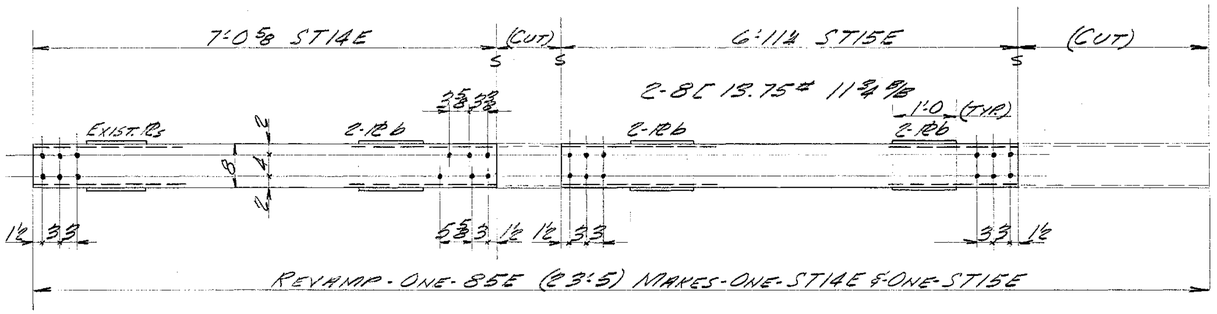
Order No. 3807 Sheet No. 051E

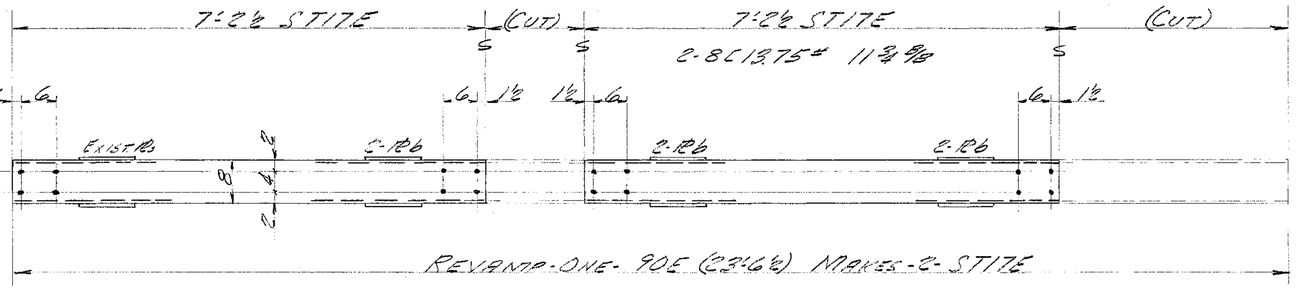
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
Hawaii	Hawaii	RF-2(13)	1950	131	304

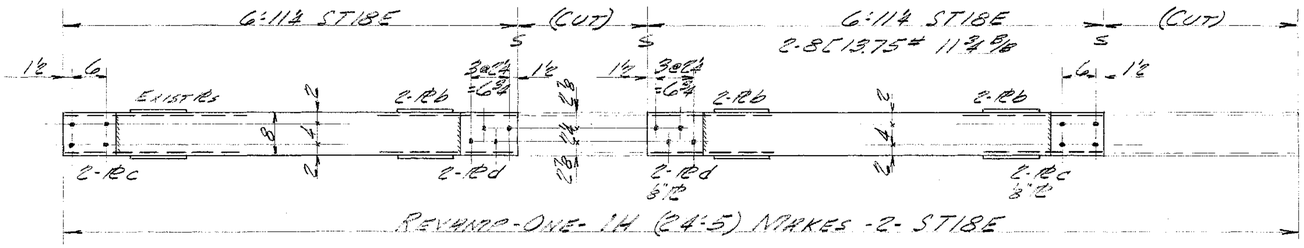
BILL OF MATERIAL NANUE BRIDGE

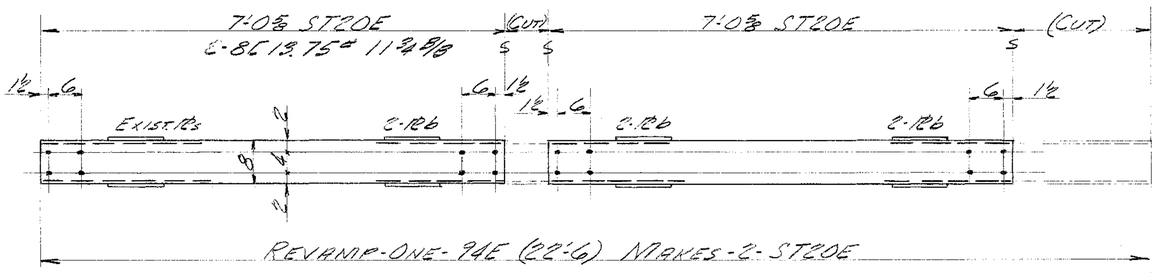
No.	Description	Length Ft.	Length Ins.	Mark	REMARKS
NOTE: THE MATERIAL LISTED BELOW IS TO BE REVAMPED AS ON THE DETAILS					
1	BRACE			76E	
1				77E	
1				85E	
1				90E	
1				1H	
1				93E	
1				94E	
NEW MATL. IS LISTED BELOW					
16	PL 9 x 3/8	0	11	a	PLAIN
30	PL 11 x 3/8	1	0	b	Do
4	PL 8 x 1/2	0	9	c	TENAR
4	PL 8 x 1/2	0	9 3/4	d	Do

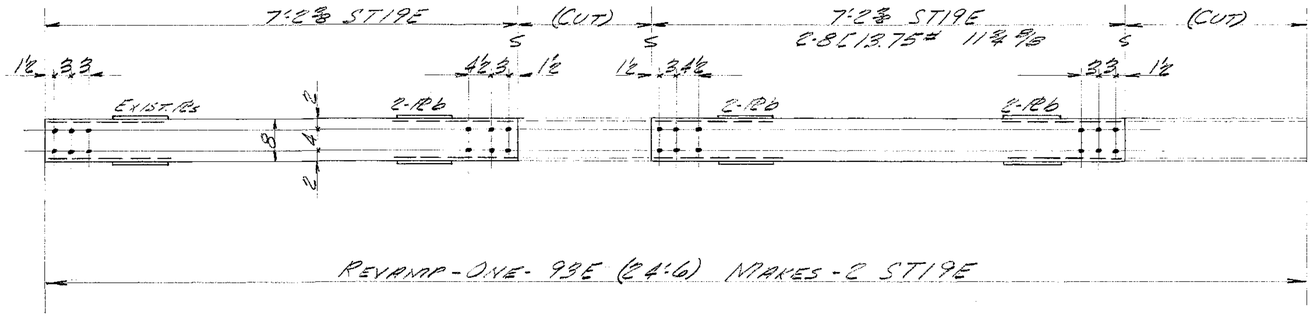












~~Rivets~~: WELD
Holes: 15/16"ø
Paint: (SEE SPECS)

INDUSTRIAL DEV. CO.

ADDITION TO THE NANUE BRIDGE -HAWAII-

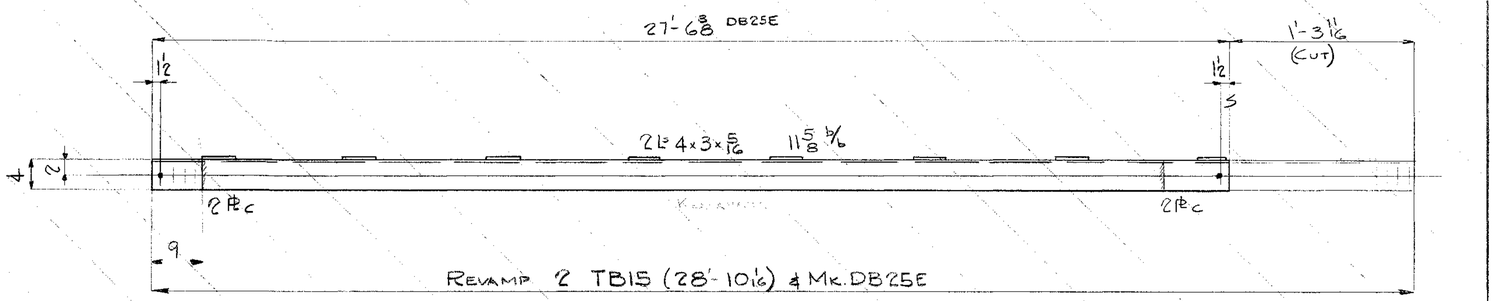
INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

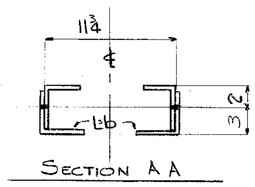
MADE BY	DD	10-9-50	ORDER NO.	3807
CHECKED BY			SHEET NO.	051E

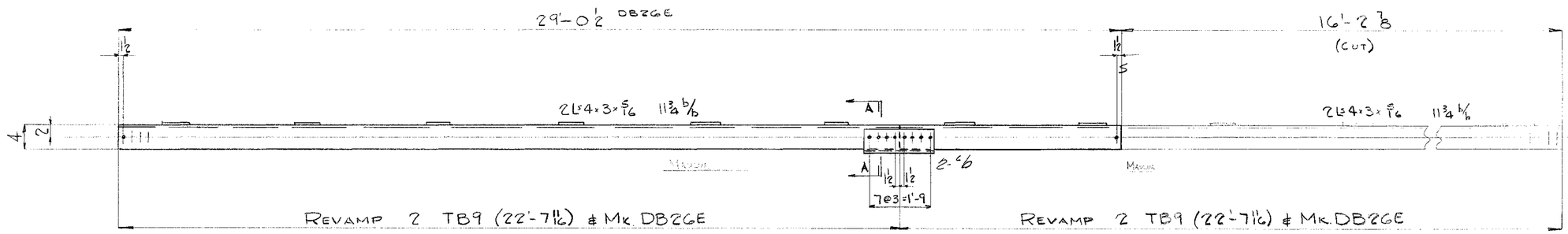
54 68.131

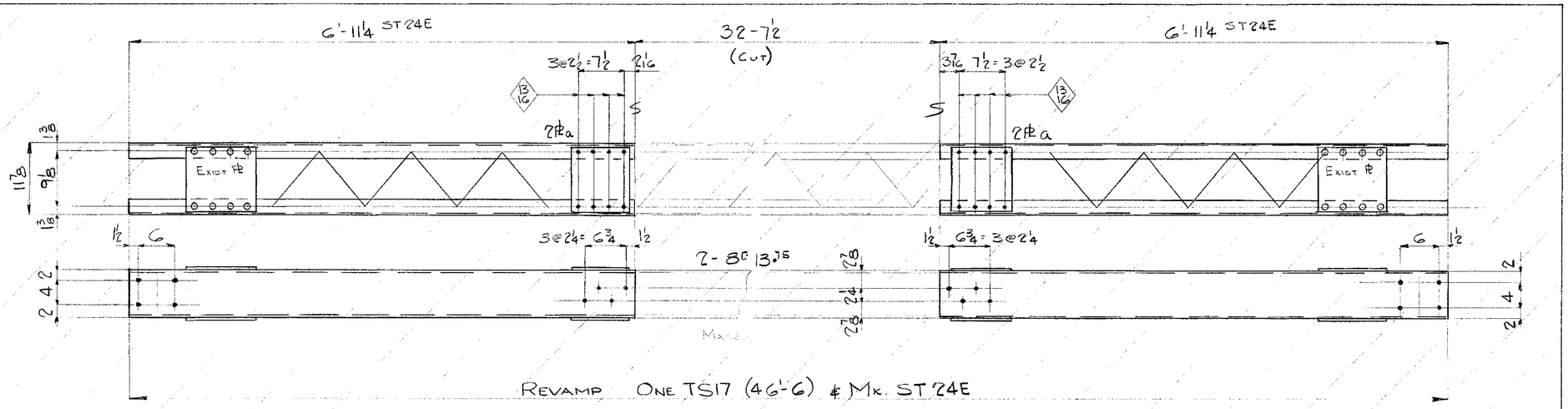
FED ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAWAII	SDR 3(6)	1950	132	304

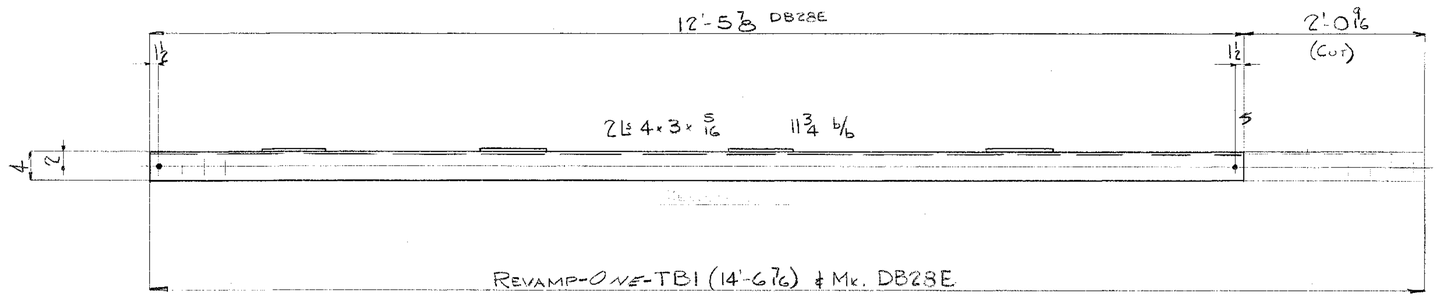
Order No. 3807 Sheet No. D52E











BILL OF MATERIAL

INDUSTRIAL DEVELOPMENT CO.

No.	Description	Length Ft.	Length Ins.	Mark	REMARKS
NOTE: BRACES LISTED BELOW ARE TO BE REVAMPED AS SHOWN ON DETAILS.					
					SALV FROM:
4	BRACES	22	7 1/16	TB9	MAULUA
1	DO	14	6 7/16	TB1	KEALAHAKA
4	L 5x3x½	2	0	b	TEMP (NEW)

Rivets: ¾ ø FOR 13/16 ø HOLES
Holes: 15/16 ø UN
Paint:

INDUSTRIAL DEVELOPMENT COMPANY

ADDITION TO THE NANUE BRIDGE
HAWAII

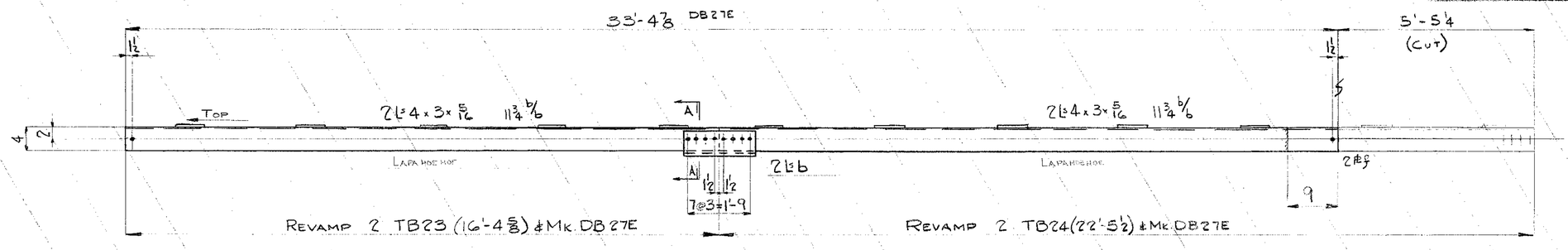
INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY	DAL	1-25-50	ORDER NO.	3807
CHECKED BY	RA	2-17-50	SHEET NO.	D52E

5468.132

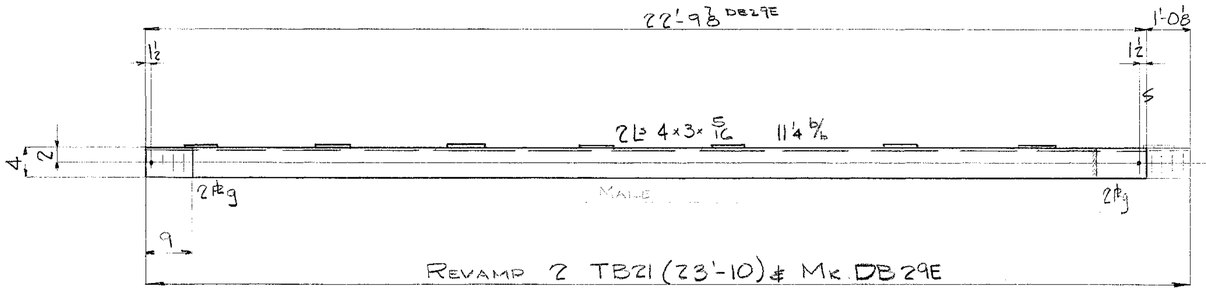
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HBW811	HAW	DF-3(12)	1950	133	304

Order No. 3807 Sheet No. D53E

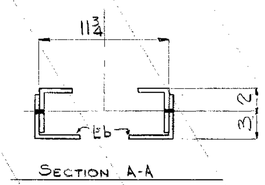


REVAMP 2 TB23 (16'-4⅝) & MK. DB27E

REVAMP 2 TB24 (22'-5½) & MK. DB27E

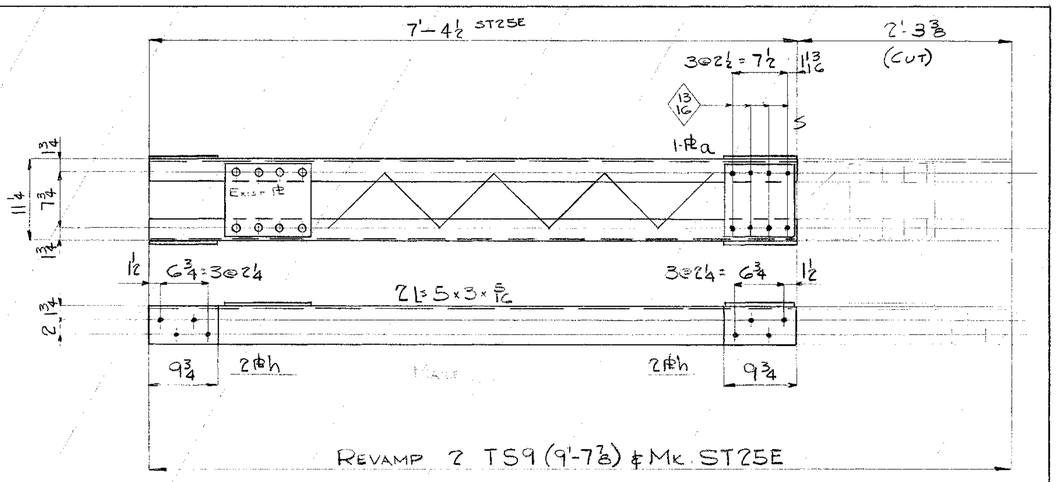


REVAMP 2 TB21 (23'-10) & MK. DB29E

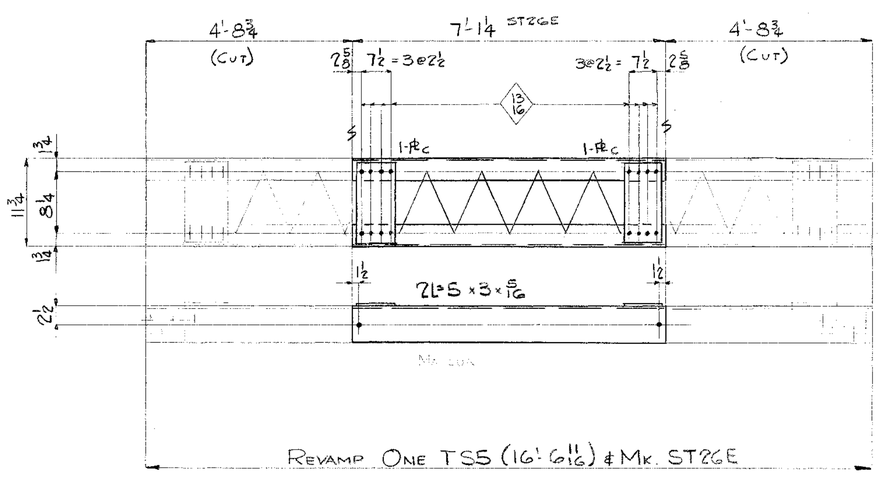


SECTION A-A

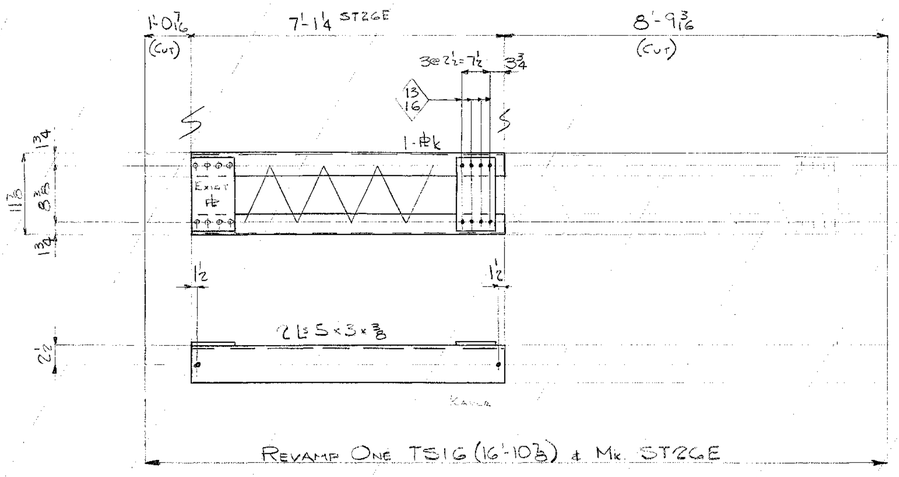
No.	Description	Length Ft.	Length Ins.	Mark	REMARKS
NOTE: BRACES LISTED BELOW ARE TO BE REVAMPED AS SHOWN ON DETAIL.					
					SALV. FROM
2	BRACES	23	10	TB21	MAILE
1	DO	16	6 11/16	TS5	MAULUA
2	Pl 10 x ⅜	0	10⅜	C	TEMP (NEW)
8	Pl 4 x 5/16	0	9	g	DO



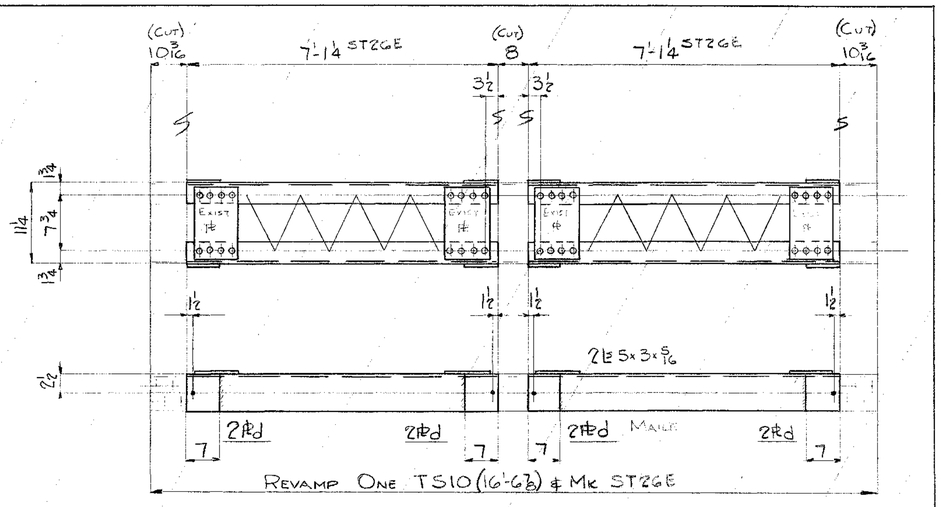
REVAMP 2 TS9 (9'-7⅞) & MK. ST25E



REVAMP ONE TS5 (16'-6 11/16) & MK. ST26E



REVAMP ONE TS16 (16'-10⅜) & MK. ST26E



REVAMP ONE TS10 (16'-6⅜) & MK. ST26E

Rivets: ¾ϕ FOR 13/16ϕ HOLES.
Holes: 15/16ϕ UN
Paint:

INDUSTRIAL DEVELOPMENT COMPANY

ADDITION TO THE NANUE BRIDGE
HAWAII

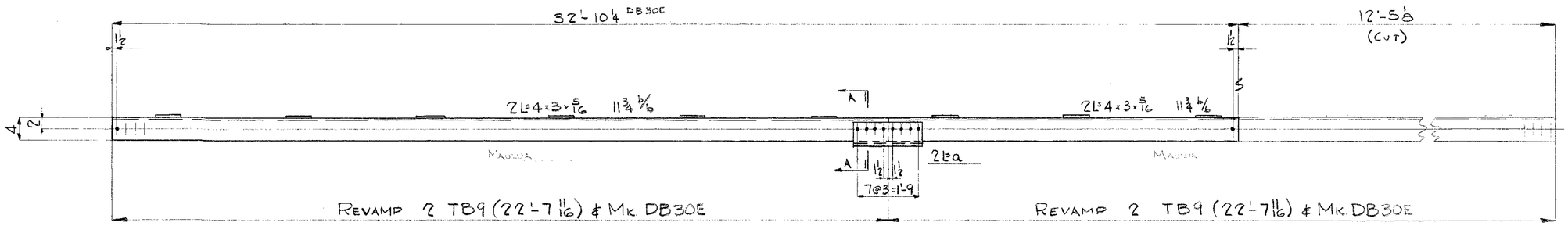
INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

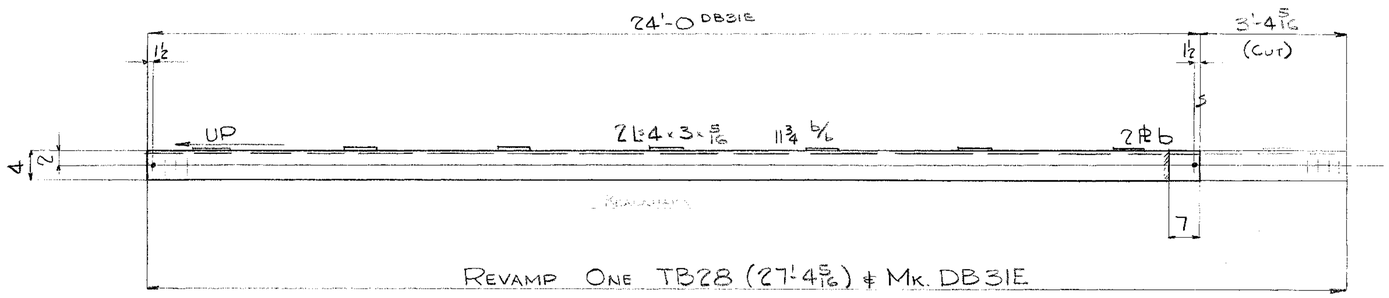
MADE BY	DAL	1-25-50	ORDER NO.	3807
CHECKED BY	RA	2-17-50	SHEET NO.	D53E

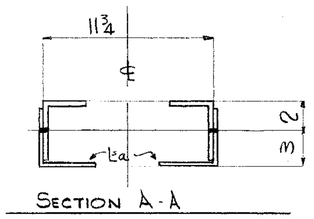
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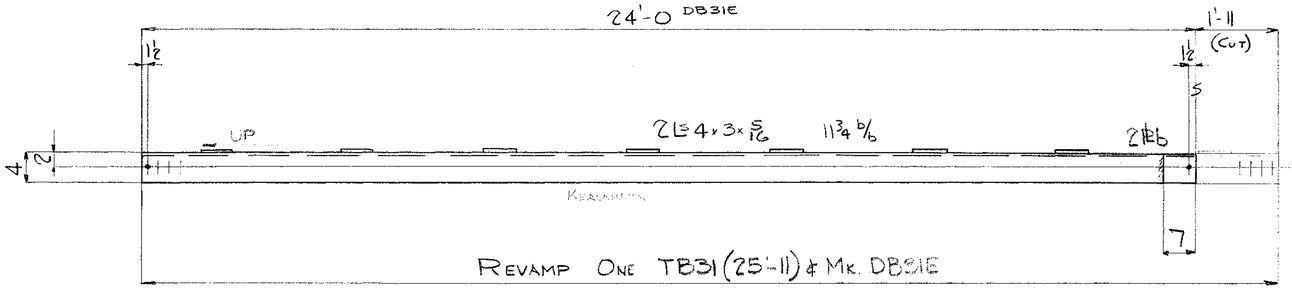
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HSWY 11	HSW	BOR 3(6)	1950	134	304

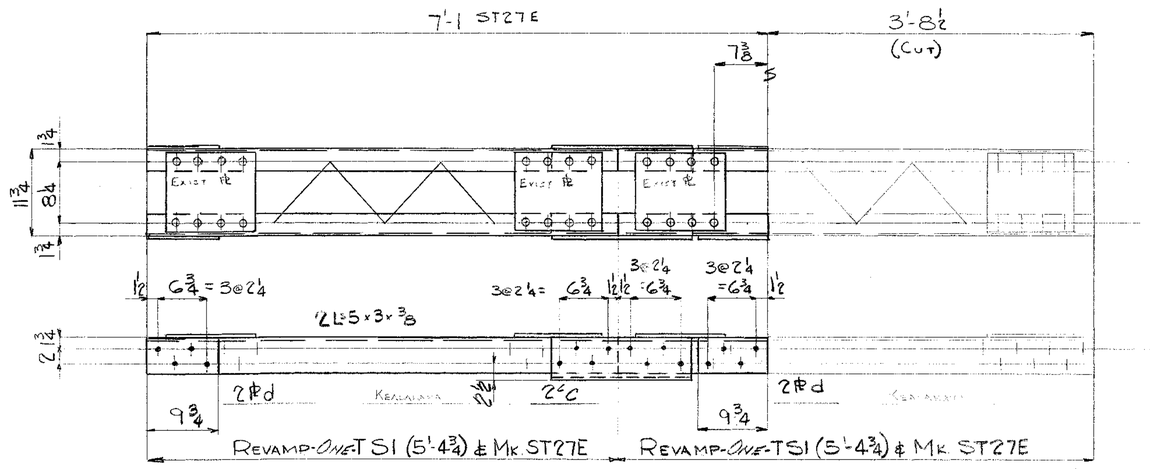
Order No. 3807 Sheet No. DS4E











BILL OF MATERIAL

INDUSTRIAL DEVELOPMENT CO.

No.	Description	Length Ft.	Length Ins.	Mark	REMARKS
NOTE:	BRACES LISTED BELOW ARE TO BE REVAMPED AS SHOWN ON DETAILS.				
					SALV FROM:
4	BRACES	22	7 11/16	TB9	MAULUA
1	DO	27	4 5/16	TB28	KEALAHAKA
1	DO	25	11	TB31	DO
2	DO	5	4¾	TS1	DO
4	L 5 x 3 x ½	2	0	a	TEMP. NEW
4	PL 4 x ⅜	0	7	b	DO DO
2	PL 6 x 4 x ½	1	7½	c	DO DO
4	PL 5 x ⅜	0	9¾	d	DO DO

Rivets:
Holes: 15/16 ϕ
Paint:

INDUSTRIAL DEVELOPMENT COMPANY

ADDITION TO THE NANUE BRIDGE
HAWAII

INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY	DAL	1-26-50	ORDER NO.	3807
CHECKED BY	RA	2-17-50	SHEET NO.	DS4E

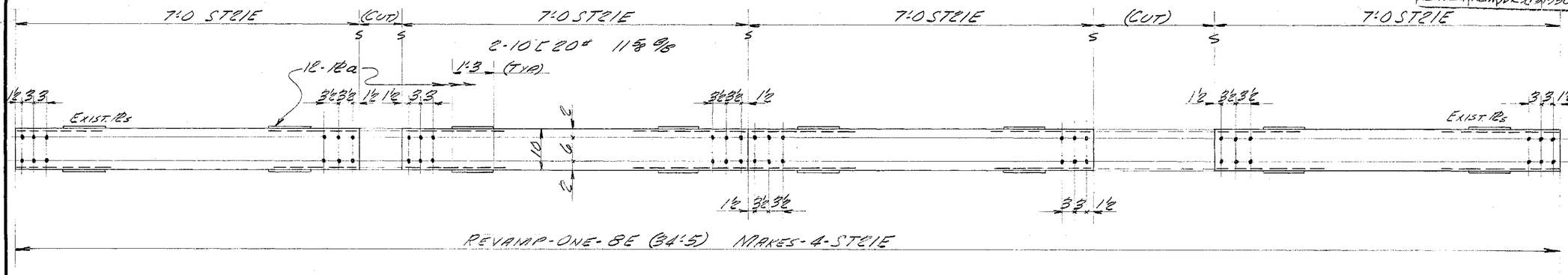
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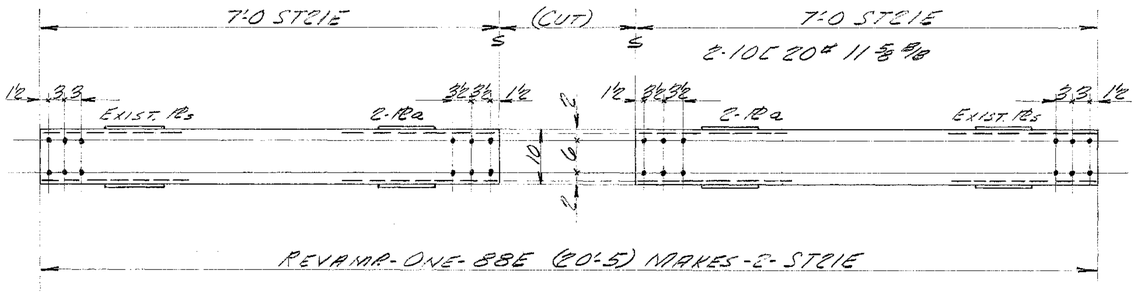
Order No. 3807 Sheet No. 055E

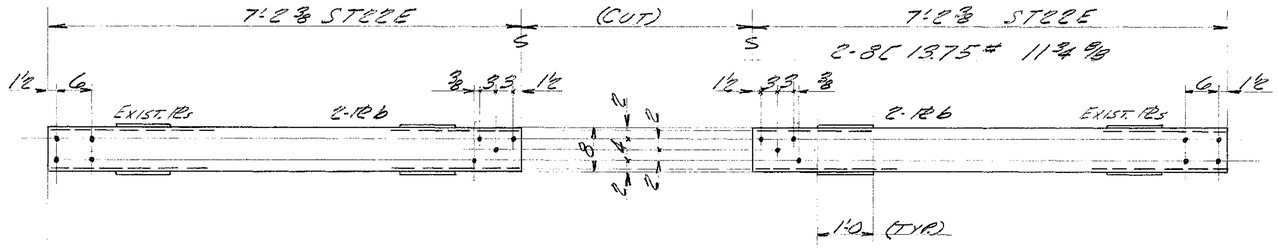
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET	TOTAL
Hawaii	Hon	BR 2(13)1950	135	304	

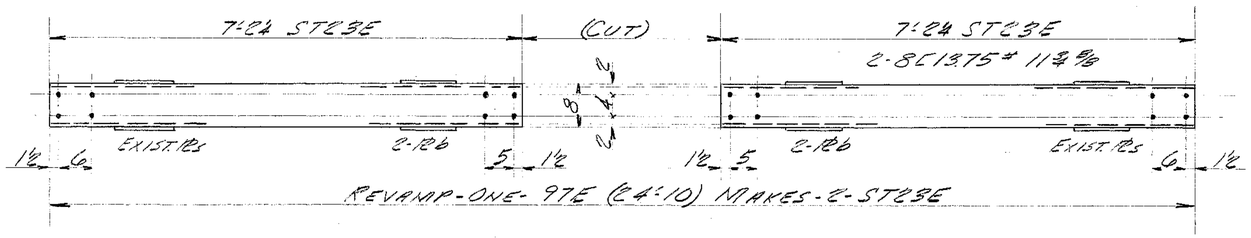
BILL OF MATERIAL NANUE BRIDGE

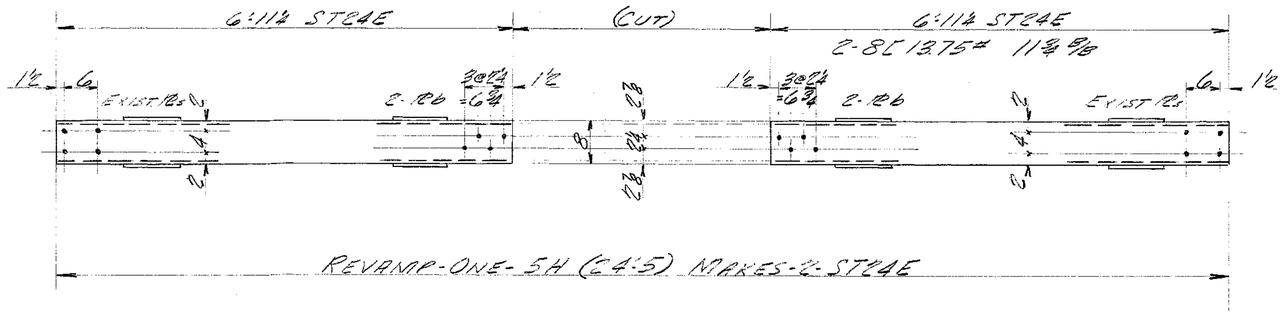
No.	Description	Length Ft.	Length Ins.	Mark	REMARKS
NOTE: REVAMP THE MATERIAL LISTED BELOW AS ON THE DETAILS					
1	BRACE			8E	
1				88E	
1				96E	
1				97E	
1				5H	
NEW MAT'L. IS LISTED BELOW					
16	PL 11 x 3/8	1	3	a	PLAIN
12	PL 11 x 3/8	1	0	b	Oa











Rivets: WELD
Holes: 15/16" ø
Paint: (SEE SPECS)

INDUSTRIAL DEV. CO.

ADDITION TO THE NANUE BRIDGE -HAWAII-

INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

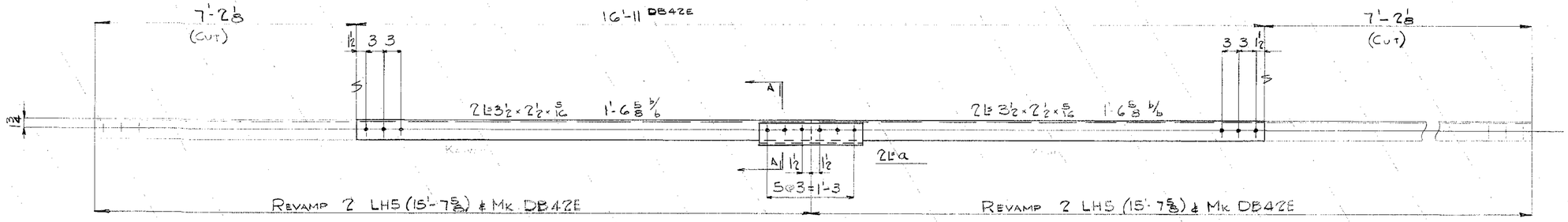
MADE BY	DD	10-9-50	ORDER NO.	3807
CHECKED BY			SHEET NO.	055E

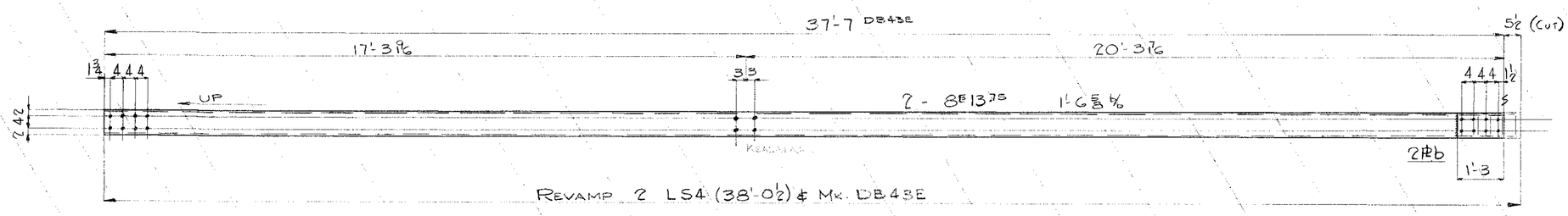
135

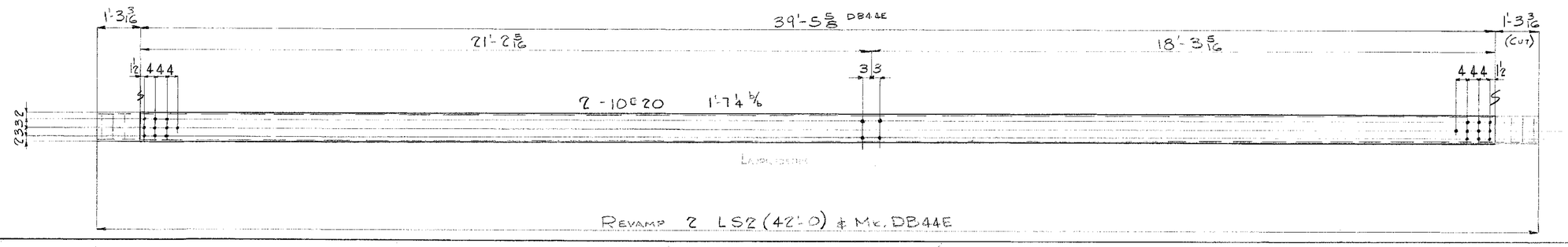
5468.135

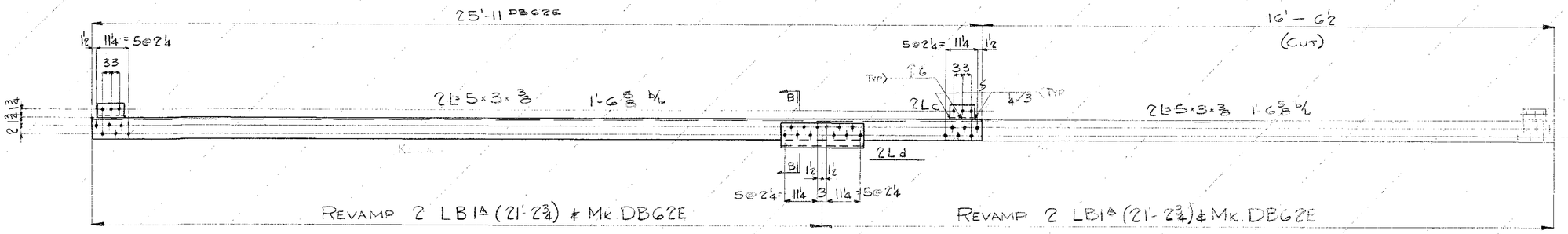
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
Hawaii	Haw	SDR-3(9)	1950	136	304

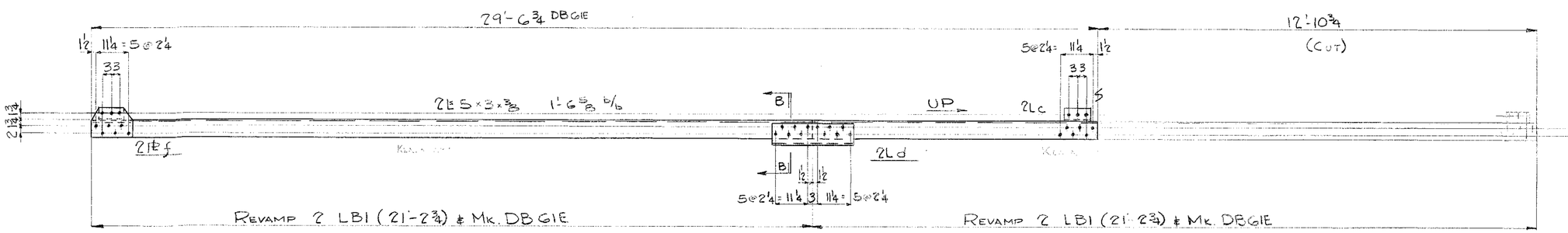
Order No. 3807 Sheet No. D56E

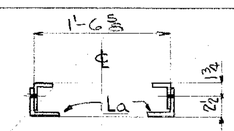


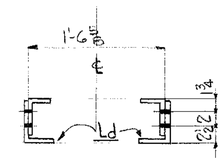












BILL OF MATERIAL — INDUSTRIAL DEVELOPMENT

No.	Description	Length Ft.	Length Ins.	Mark	REMARKS
NOTE: BRACES LISTED BELOW ARE TO BE REVAMPED AS SHOWN ON DETAILS.					
2	[illegible]	42	0	LS2	LAUPAHOEHOE
4	Do	21	2¾	LB1	Do
4	L 6×4×½	2	4½	d	TEMP (NEW)
4	PL 8×4	1	2¼	f	Do Do

Rivets: ⅞ Φ
Holes: 15/16 Φ
Paint:

INDUSTRIAL DEVELOPMENT COMPANY
ADDITION TO THE NANUE BRIDGE.
HAWAII

INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY	DAL	2-1-50	ORDER NO.	3807
CHECKED BY	RA	2-17-50	SHEET NO.	D56E

5468.136

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	DEPT.	1950	157	304

Order No. 3807 Sheet No. D57E

(CUT) 38:9⅞ DB64E (CUT)

19:4 15/16 19:4 15/16

2-8"C 13.75# 1:6 5/8 9/16

23:4 1/16 15:5 1/16

1½ 3/16 3½ 3/16 1'3 (TYP) 2-Rc EXIST Rs 4 4 4 3 4 4 4 4 4 3 3 3 1½ EXIST Rs 2-Rc UP

8 2 4 2

2-Ra 4"12 2-Eb 8C 13.75#

1½ 1½ 1½ 1½ 2'6

38:0½ 4E 38:0⅛ 4E

REVAMP-4-"4E" (38:0⅛) MAKES-2-DB64E

37:6¾ DB43E

17:3 5/16 20:3 7/16

1½ 4 4 4 EXIST Rs UP 3 3 2-8C 13.75# 1:6 5/8 9/16 EXIST Rs 4 4 4 1½

8 2 4 2

2-Rs 3/16"12

REVAMP-2-15E (38:1) MAKES-2-DB43E

18:7¾ DB67E (CUT)

2-10C 20# 1:7¼ 9/16

1½ 3 3 3 3 3 EXIST Rs 3 6 3 6 3 6 1½ 2-Rd

10 6 2 3 3/8

REVAMP-2-17E (26:0⅛) MAKES-2-DB67E

28:3⅜ DB68E (CUT)

2-10C 20# 1:7¼ 9/16

1½ 3 3 3 3 3 EXIST Rs 3 6 3 6 3 6 1½ 2-Rd

10 6 2 3 3/8 1'6 (TYR)

REVAMP-2-70E (45:2) MAKES-2-DB68E

BILL OF MATERIAL — NANUE BRIDGE

No.	Description	Length Ft.	Length Ins.	Mark	REMARKS
NOTE: REVAMP THE MATERIAL LISTED BELOW AS SHOWN ON THE DETAILS					
4	BRACES			4E	
2				15E	
2				17E	
2				70E	
NEW MATL. IS LISTED BELOW					
4	R 8 x 4	1	1½	a	TENR
4	8C 13.75#	2	6	b	Do
8	R 15 x 3/8	1	3	c	PLAIN
8	R 18½ x 3/8	1	6	d	Do
4	R 8 x 3/16	1	3	e	TENR
64	¾" RIVETS				

Rivets: ⅞"ø
Holes: 15/16"ø
Paint: (SEE SPECS.)

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

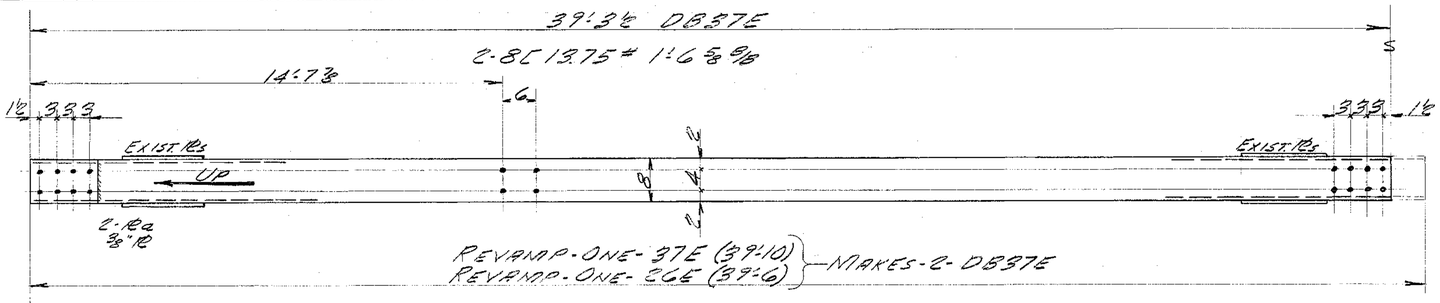
MADE BY	DD	10-9-50	ORDER NO.	3807
CHECKED BY			SHEET NO.	D57E

5468.137

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAWAII (2)	1950	138	337	

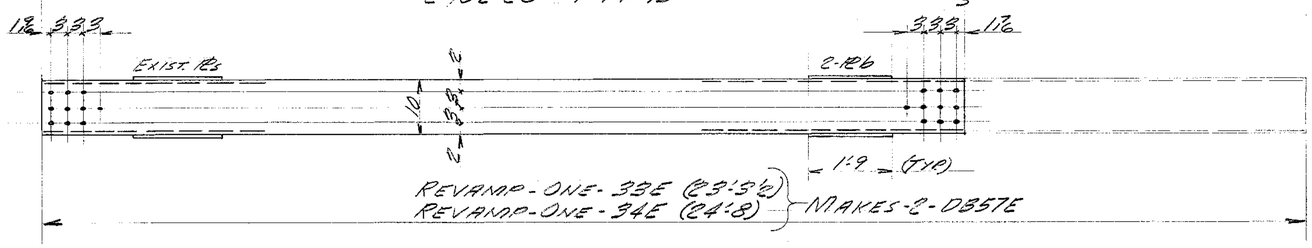
Order No. 3807 Sheet No. 0585

39:3½ DB37E
2-8C13.75# 1:6 5/8 G



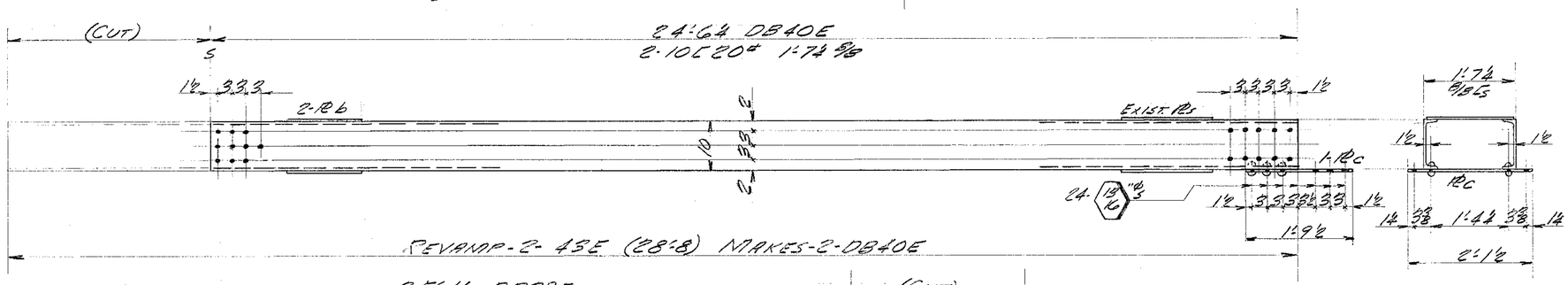
REVAMP-ONE-37E (39:10)
REVAMP-ONE-2C6E (39:6) } MAKES-2-DB37E

17:11 DB37E
2-10C20# 1:7¼ G



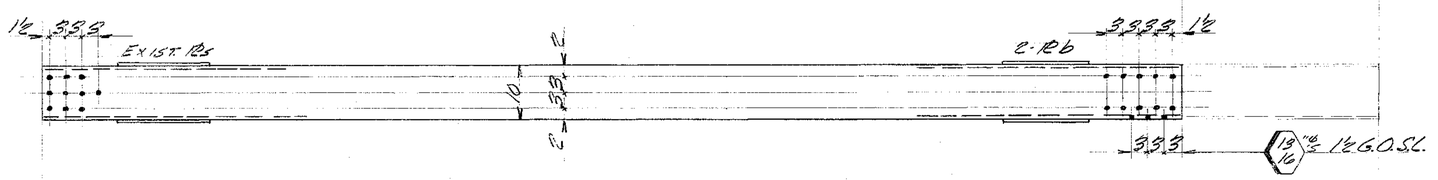
REVAMP-ONE-33E (23:3½)
REVAMP-ONE-34E (24:8) } MAKES-2-DB37E

24:6¼ DB40E
2-10C20# 1:7¼ G



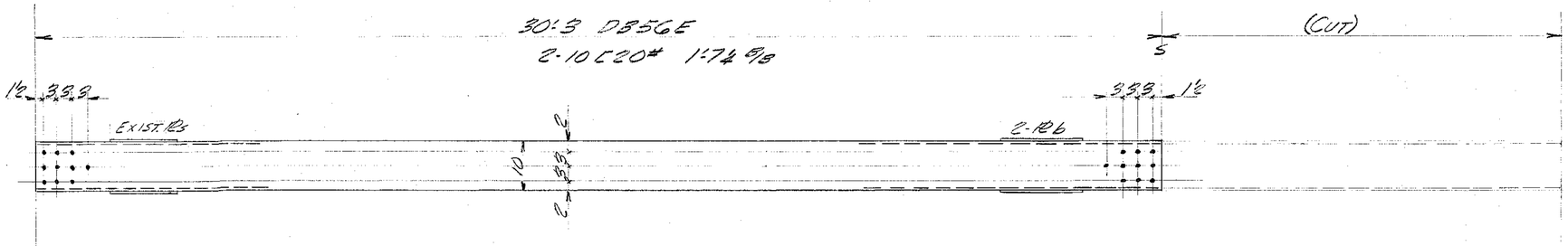
REVAMP-2-43E (28:8) MAKES-2-DB40E

25:1¼ DB39E
2-10C20# 1:7¼ G



REVAMP-2-42E (37:10) MAKES-2-DB39E

30:5 DB56E
2-10C20# 1:7¼ G



REVAMP-ONE-1E (37:10)
REVAMP-ONE-71E (49:0) } MAKES-2-DB56E

BILL OF MATERIAL NANUE BRIDGE

No.	Description	Length Ft.	Length Ins.	Mark	REMARKS
NOTE: THE MATERIAL LISTED BELOW IS TO BE REVAMPED AS ON THE DETAILS					
1	BRACE			37E	
1				2C6E	
1				33E	
1				34E	
2				43E	
2				42E	
1				1E	
1				71E	
NEW MATL IS LISTED BELOW					
4	R 8 x 3/8	1	0	a	TENAR
16	R 18½ x 3/8	1	9	b	PLAIN
2	R 21½ x 3/8	2	1½	c	TENAR
18	3/4" RIVETS				

Rivets: 3/4" FOR 13/16" HLS.
Holes: 13/16" U.N.
Paint: (SEE SPECS.)

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

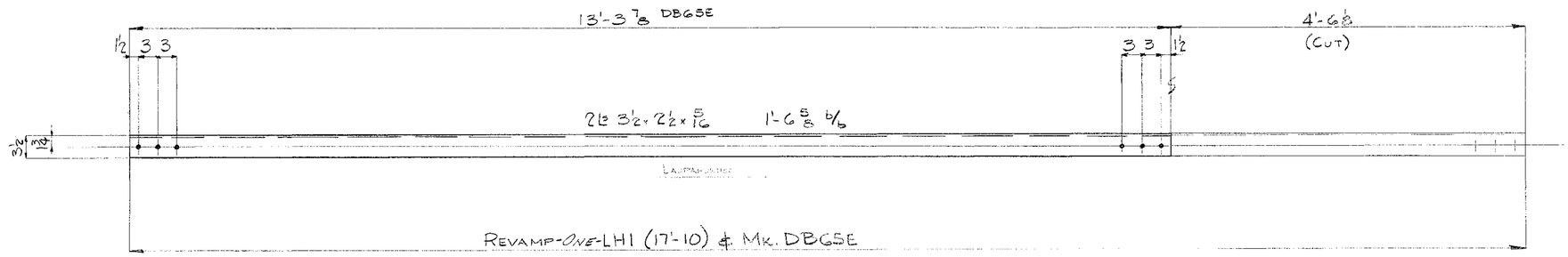
INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

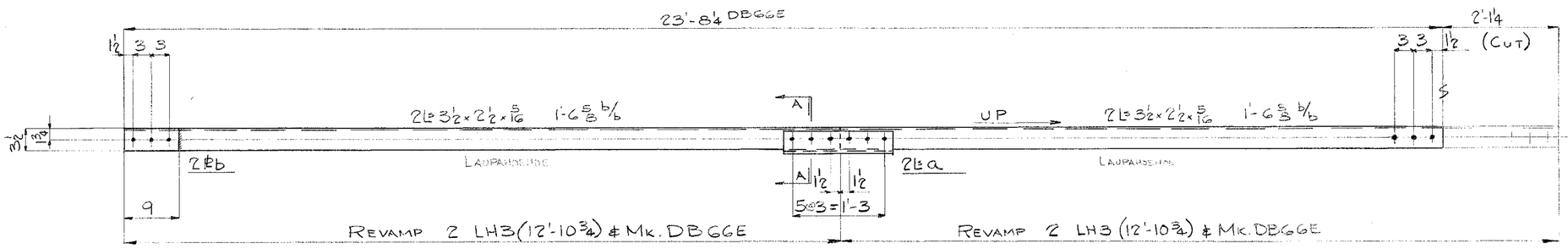
MADE BY	DW	10-9-50	ORDER NO.	3807
CHECKED BY			SHEET NO.	0585

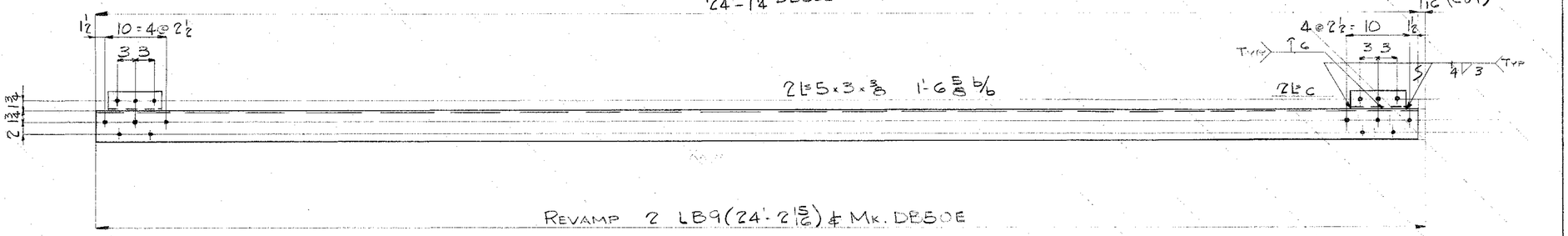
5468.138

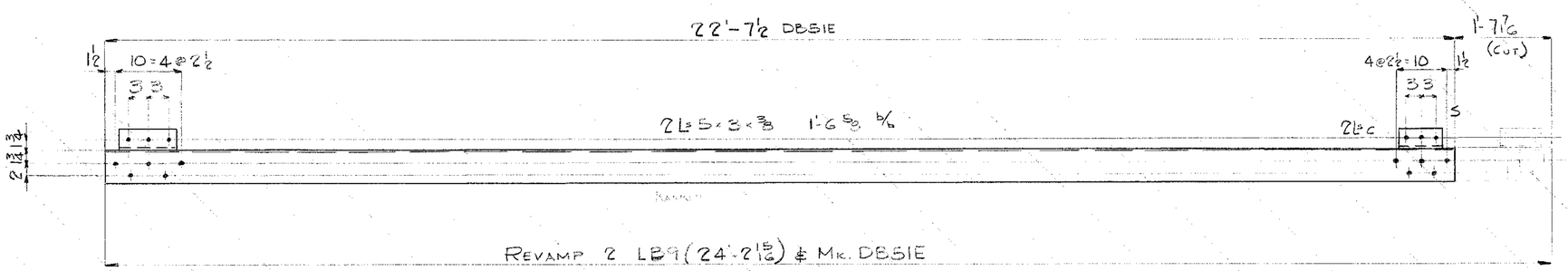
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAWAII	ODR 718	1950	139	304

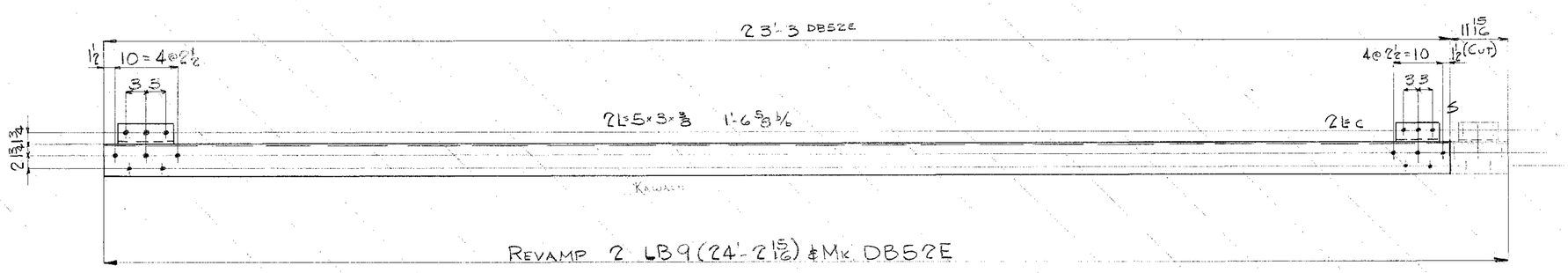
Order No. 3807 Sheet No. D59E









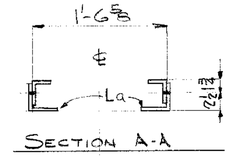


BILL OF MATERIAL

INDUSTRIAL DEVELOPMENT CO.

No.	Description	Length Ft.	Length Ins.	Mark	REMARKS
NOTE: BRACES LISTED BELOW ARE TO BE REVAMPED AS SHOWN ON DETAILS.					
					SALV. FROM
1	BRACES	17	10	LH1	LAUPAHOEHOE
4	DO	12	10¾	LH3	DO.
4	L 4 x 4 x ⅜	1	6	a	TEMP-NEW
4	PL 3½ x ¼	0	9	b	DO. DO.

NOTE:
EXISTING PL & L WHICH INTERFERE MAY BE REMOVED.



Rivets: ⅞ ϕ
Holes: 15/16 ϕ
Paint:

INDUSTRIAL DEVELOPMENT COMPANY

ADDITION TO THE NANUE BRIDGE
HAWAII

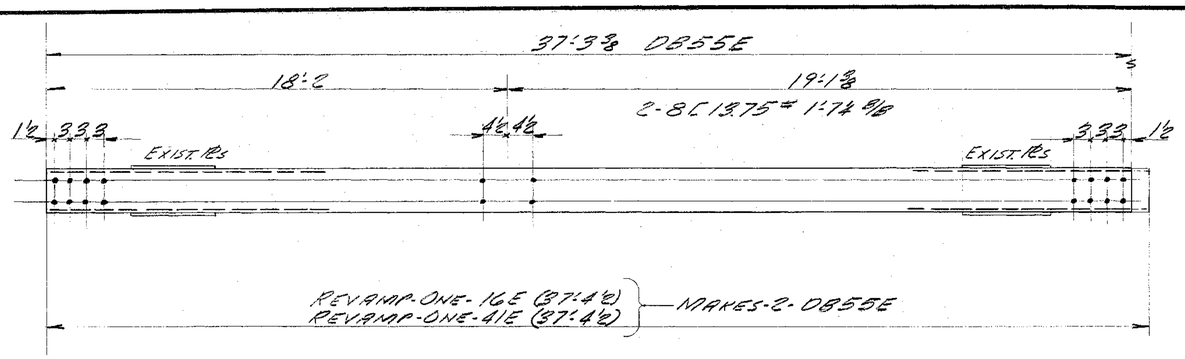
INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

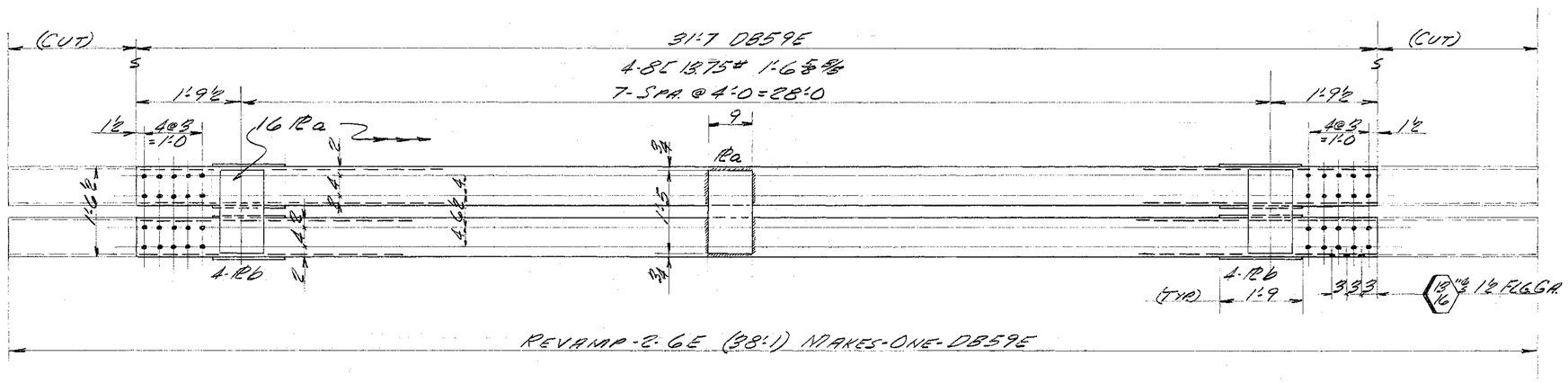
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CHECKED BY	RJ	2-17-50	SHEET NO.	D59E

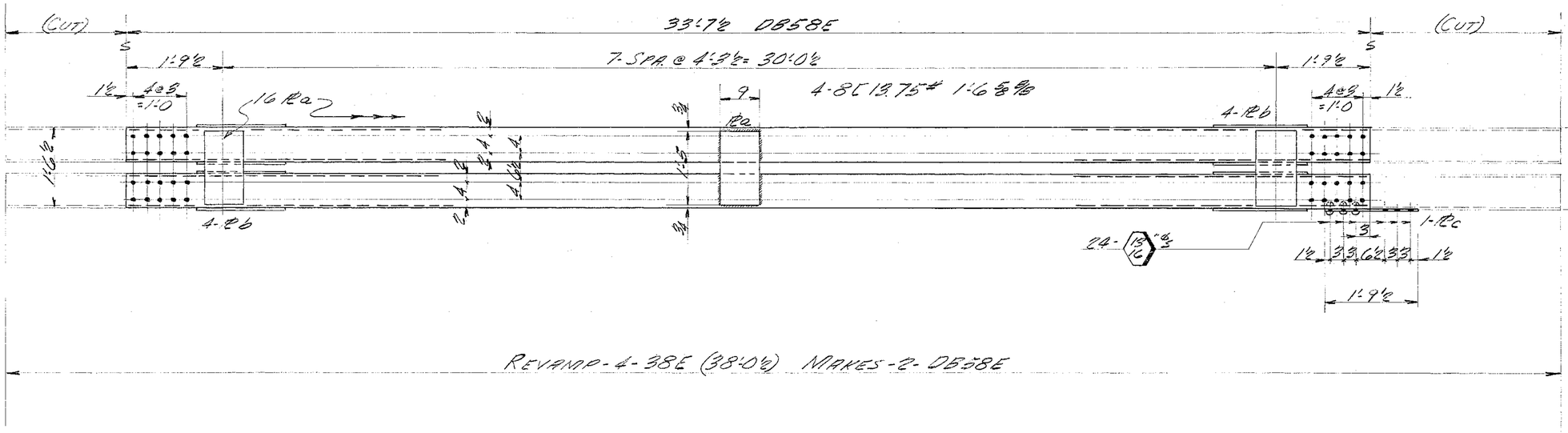
54GS.139

Order No. 3807 Sheet No. D60E

FBW311 HBW3DR3(13)1950 140 301







BILL OF MATERIAL — NANUE BRIDGE

No.	Description	Length Ft.	Length In.	Mark	REMARKS
NOTE: THE MATERIAL LISTED BELOW IS TO BE REVAMPED AS ON THE DETAILS					
1	BRACE			16E	
1				41E	
2				6E	
4				38E	
NEW MATL IS LISTED BELOW					
48	PL 9 x ½	1	5	a	PLAIN
24	PL 18 x ⅜	1	9	b	Do.
2	PL 21½ x ⅜	2	4⅜	c	TEMP
12	¾" ⌀ RIVETS				

Rivets: ¾" ⌀ FOR 13/16" ⌀ HGS.
Holes: 15/16" ⌀ U.N.
Paint: (SEE SPECS)

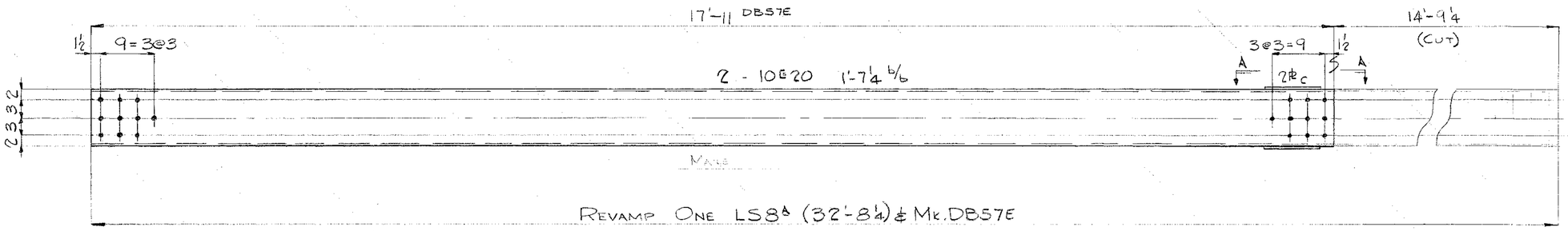
INDUSTRIAL DEV. CO.
ADDITION TO THE
NANUE BRIDGE
-HAWAII-
INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY	DR	10-10-50	ORDER NO.	3807
CHECKED BY			SHEET NO.	D60E

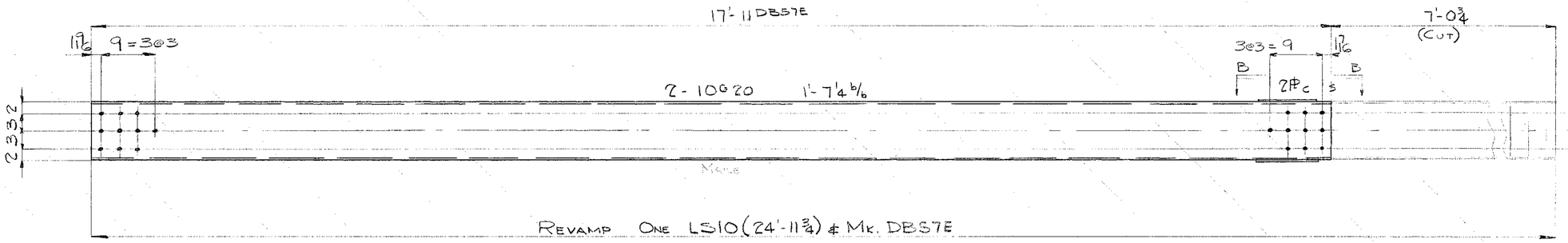
5468.140

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HBWBIII	HAWAII	BDR 3(10)	1950	141	304

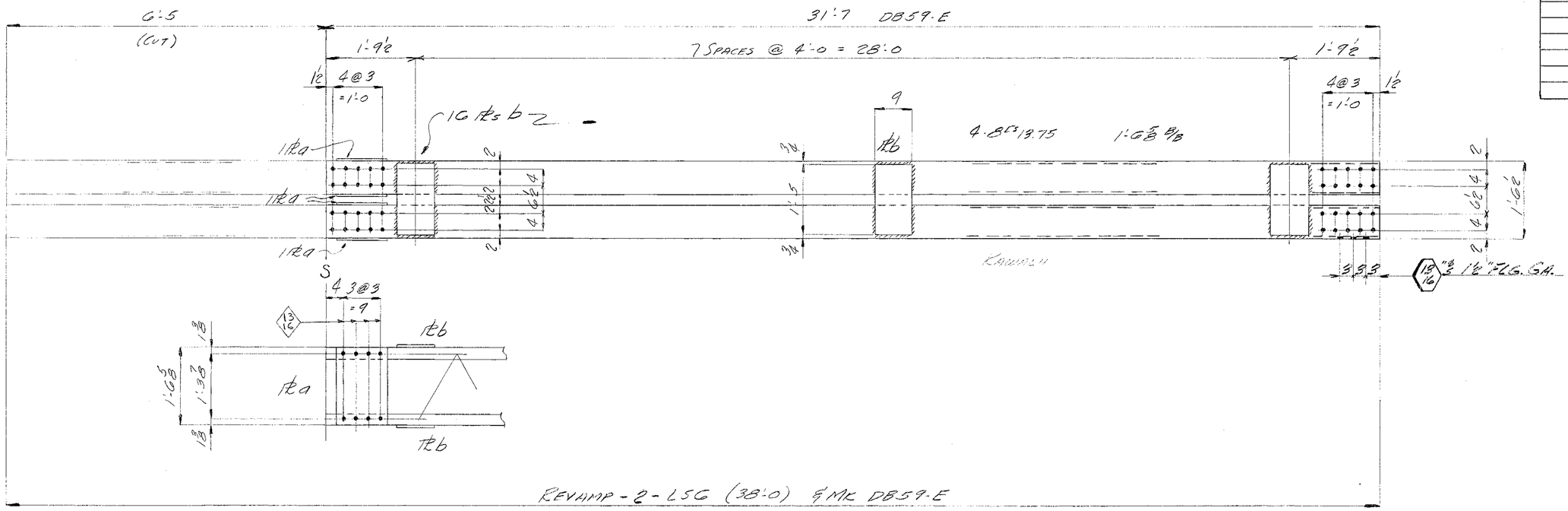
Order No. 3807 Sheet No. D61E



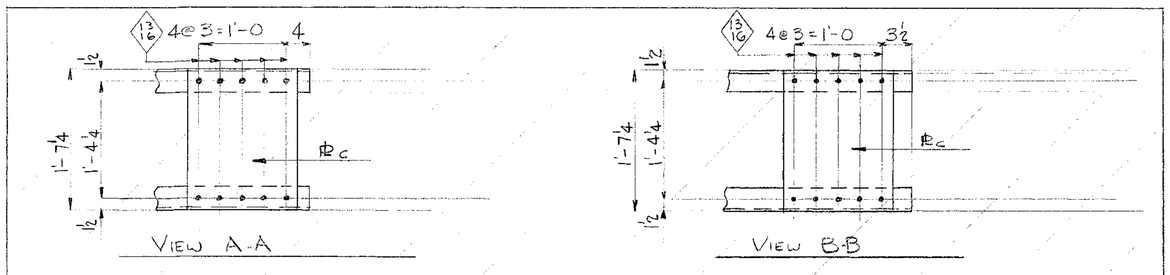
REVAMP ONE LS8A (32'-8¼) & Mk. DB57E



REVAMP ONE LS10 (24'-11¾) & Mk. DB57E



REVAMP - 2 - LSG (38'-0) & Mk DB59-E



BILL OF MATERIAL — INDUSTRIAL DEVELOPMENT CO.

No.	Description	Length Ft.	Length Ins.	Mark	REMARKS
NOTE: BRACES LISTED BELOW ARE TO BE REVAMPED AS SHOWN ON DETAILS.					
2	BRACES	38	0	LSG	KAUAI II
4	R 11½ x ⅜	1	6⅜	a	TEMP. NEW
16	R 9 x ½	1	5	b	MAIN - NEW

Rivets: ¾ ϕ FOR 13/16 ϕ HOLES
Holes: 15/16 ϕ
Paint:

INDUSTRIAL DEVELOPMENT COMPANY

ADDITION TO THE NANUE BRIDGE
HAWAII

INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

MADE BY	DAL SEE	12-3-50	ORDER NO.	3807
CHECKED BY	RA	2-17-50	SHEET NO.	D61E

5468.141

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HSW911	HAW	BDR-3(13)	1950	142	307

Nov. 1, 1950

Order No. 3807 Sheet No. 062E

BILL OF MATERIAL — Industrial Development Co.

No.	Description	Length Ft.	Length Ins.	Mark	REMARKS
NOTE: BRACES LISTED BELOW ARE TO BE REVAMPED AS SHOWN ON DETAILS					
					SALV FROM
2	BRACES	22	7⅞	TB4	KAULA
5		13	8⅝	TB5	Do
3		38	2⅛	TB7	Do
2		23	5½	TB30	Do
6	L 5×3×½	2	0	a	Temp. New

— FINAL DRAWING —

33'-8⅛ DBISE

2'-8⅛ (CUT)

2 L 4×3×5/16 11¾ b/b

2 L 4×3×5/16 11¾ b/b

2 L a

7@3=1'-9

REVAMP -2- TB4 (22'-7⅞) & MK. DBISE

REVAMP 2 TB5 (13'-8⅝) & MK. DBISE

33'-8⅛ DBISE

4'-6 7/16 (CUT)

2 L 4×3×5/16 11¾ b/b

REVAMP -3- TB7 (38'-2⅛) & MK DBISE

33'-8⅛ DBISE

13'-2⅞ (CUT)

2 L 4×3×5/16 11¾ b/b

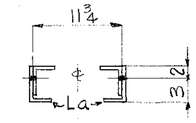
2 L 4×3×5/16 11¾ b/b

2 L a

7@3=1'-9

REVAMP ONE TB30 (23'-5½) & MK DBISE

REVAMP ONE TB30 (23'-5½) & MK. DBISE



SECTION A-A

Rivets:
Holes: 15/16 & UN.
Paint:

INDUSTRIAL DEVELOPMENT COMPANY

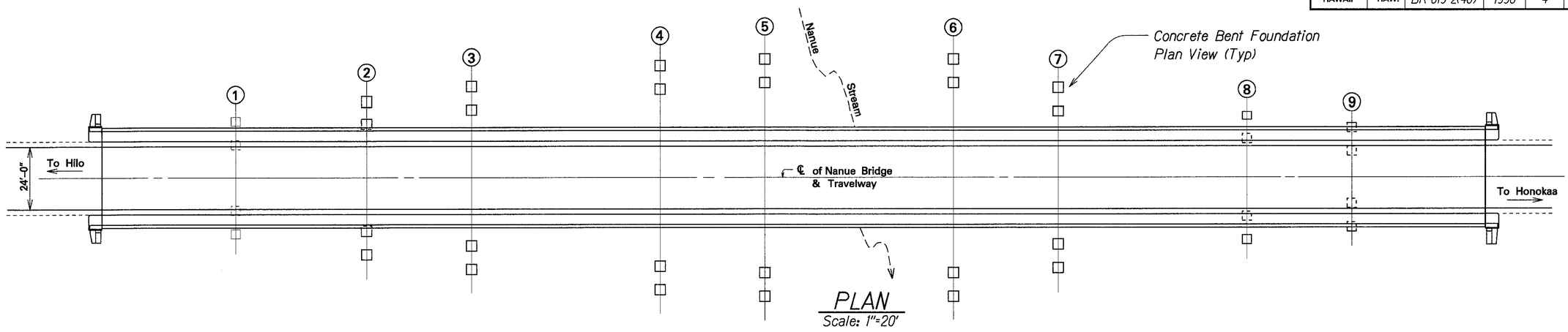
ADDITION TO THE NANUE BRIDGE
HAWAII

INDEPENDENT IRON WORKS, INC.
OAKLAND, CALIF.

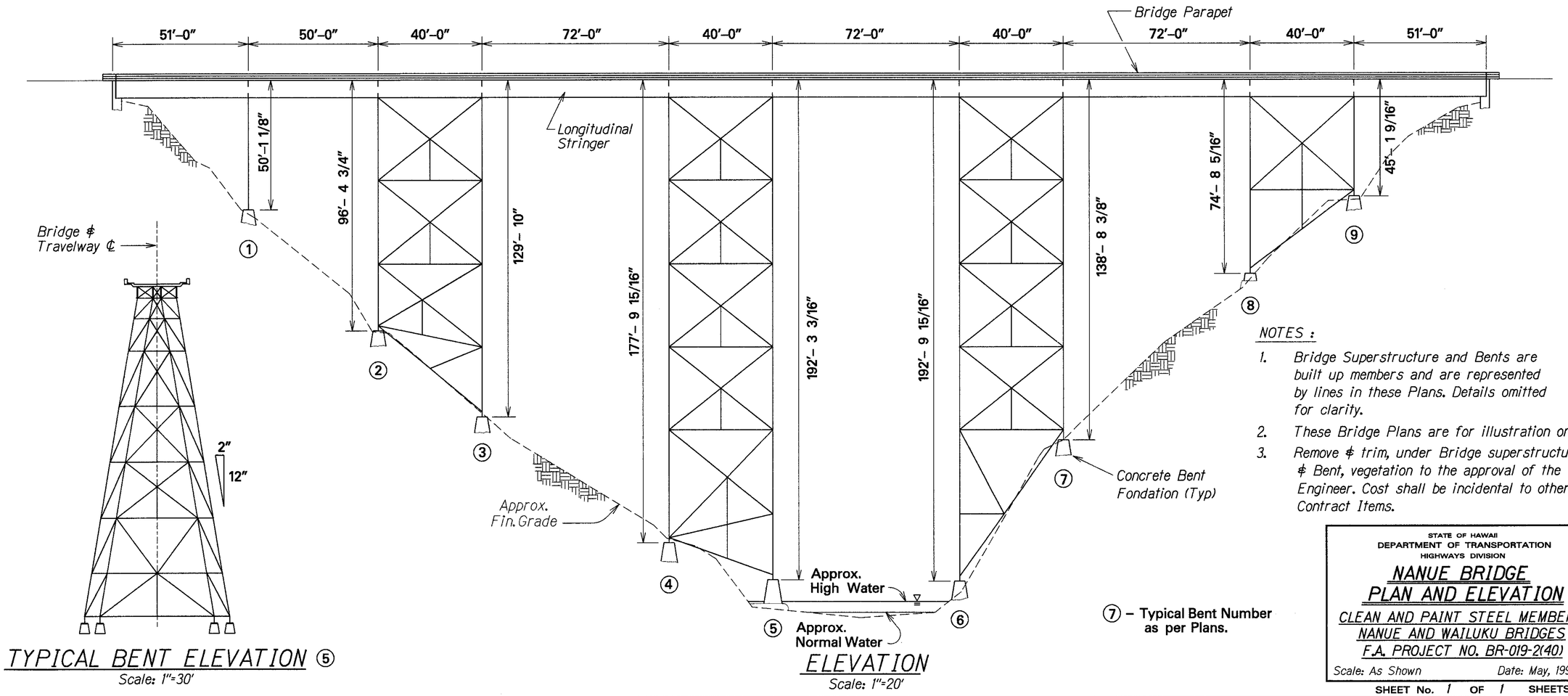
MADE BY	DAL	2-15-50	ORDER NO.	3807
CHECKED BY	RA	2-17-50	SHEET NO.	062E

5468.142

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(40)	1996	4	6



PLAN
Scale: 1"=20'



TYPICAL BENT ELEVATION ⑤
Scale: 1"=30'

ELEVATION
Scale: 1"=20'

⑦ – Typical Bent Number as per Plans.

NOTES :

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

ORIGINAL PLAN	SURVEY PLOTTED BY	DATE 5/12/96
	DRAWN BY X	
	TRACED BY X	
NOTE BOOK	DESIGNED BY X	
Library	QUANTITIES BY	
No. Hwy	CHECKED BY	

ddl/mh

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

NANUE BRIDGE
PLAN AND ELEVATION

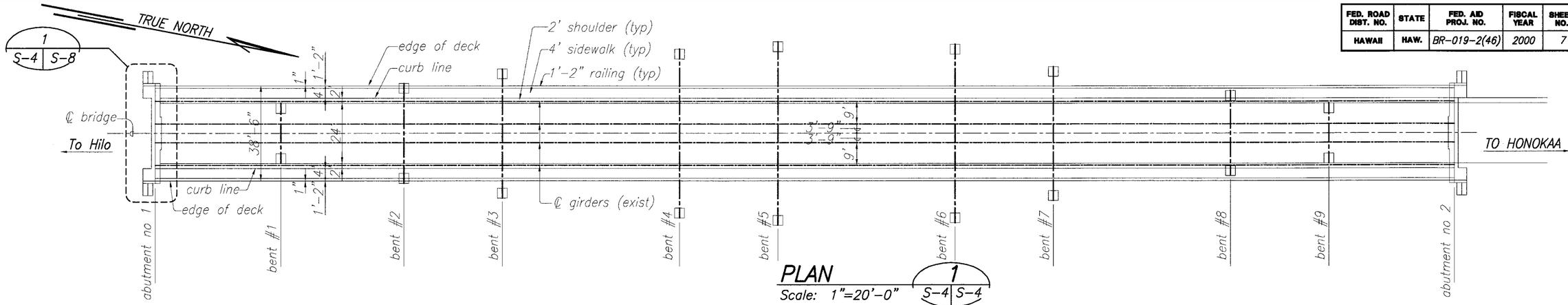
CLEAN AND PAINT STEEL MEMBERS
NANUE AND WAILUKU BRIDGES
F.A. PROJECT NO. BR-019-2(40)

Scale: As Shown Date: May, 1996

SHEET No. 1 OF 1 SHEETS

4

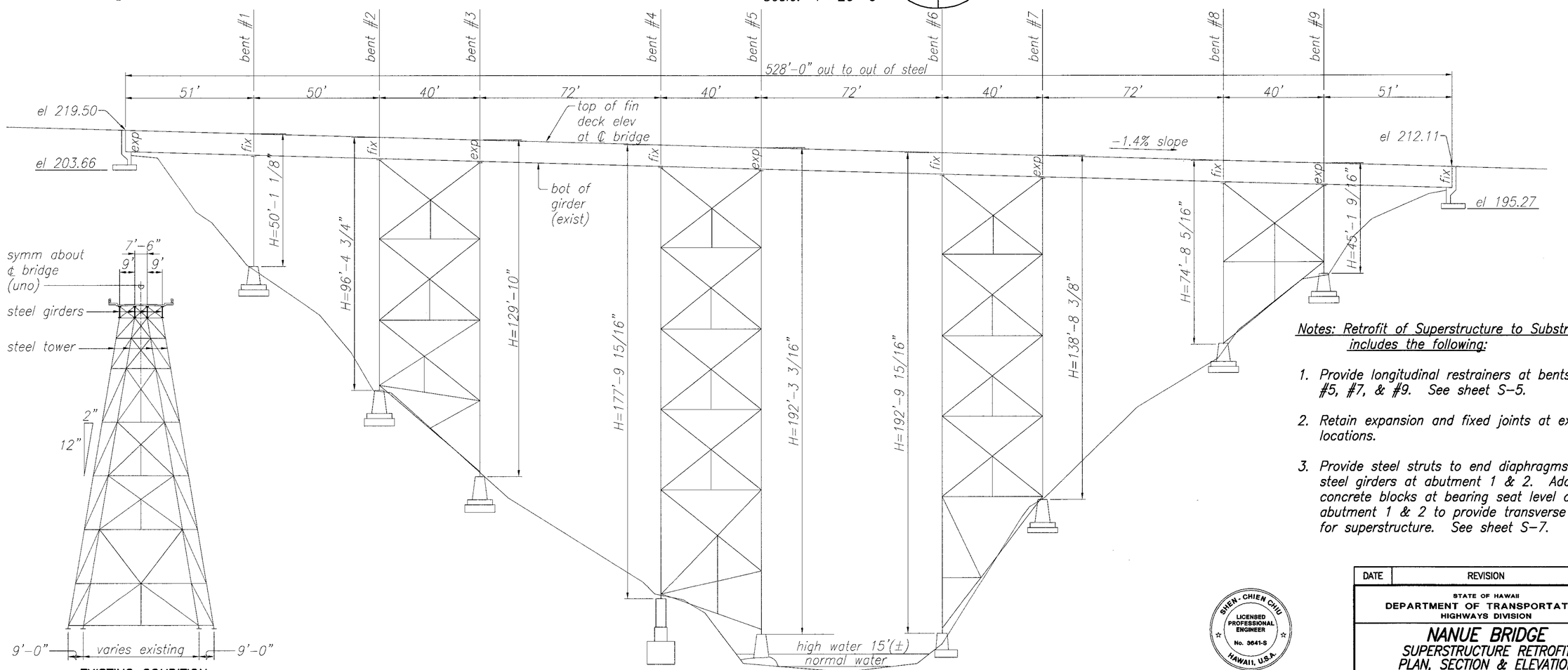
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(46)	2000	7	26



PLAN

Scale: 1"=20'-0"

1 | S-4 | S-4



EXISTING CONDITION

SECTION A

Scale: 1"=20'-0" | S-4 | S-4

Note: Section Taken at ℄ of Bridge

EXISTING CONDITION

TYPICAL BENT ELEVATION B

Scale: 1"=30'-0" | S-4 | S-4

Note: Existing Condition Shown

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.*

SHEN-CHIEN CHIU
LICENSED PROFESSIONAL ENGINEER
No. 3641-S
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THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

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)

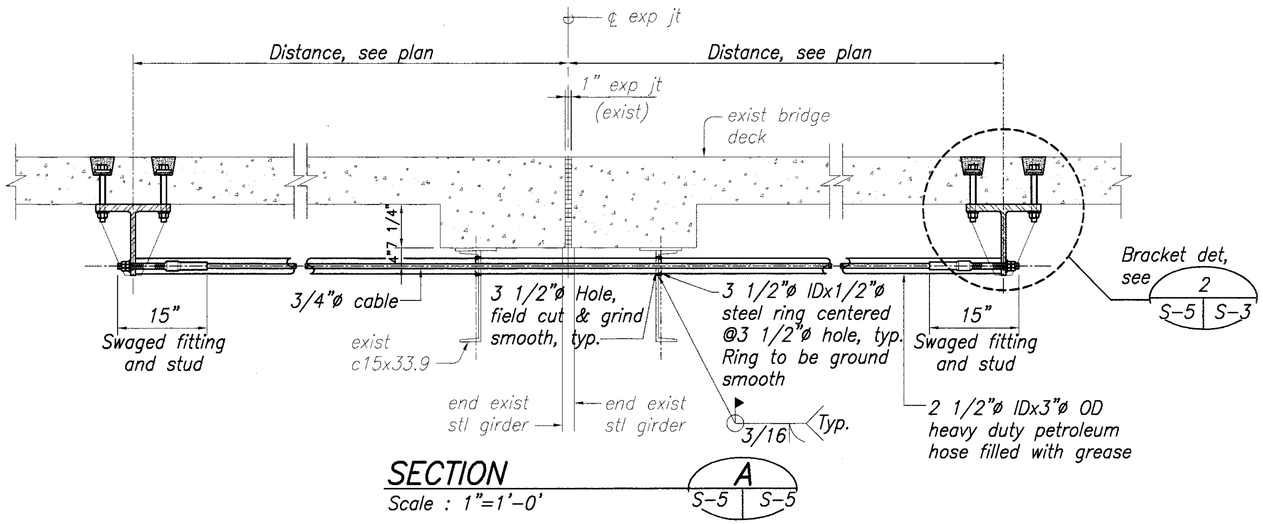
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SHEET No. S-4 OF 23 SHEETS

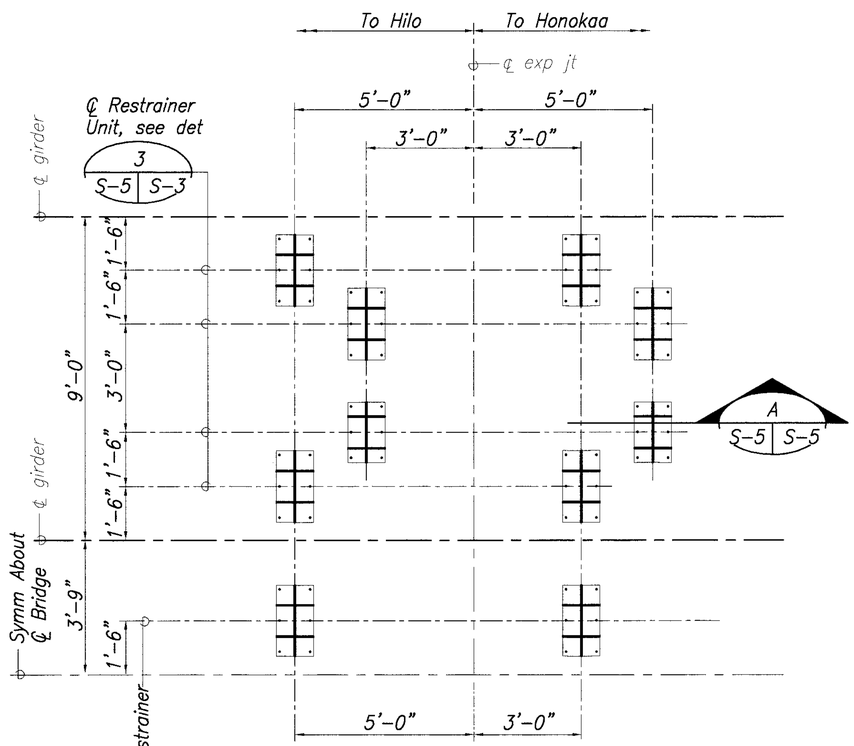
ORIGINAL PLAN
SURVEY PLOTTED BY
DRAWN BY
TRACED BY
DESIGNED BY
QUANTITIES BY
CHECKED BY
DATE
NOTEBOOK No.

NS1-1.DWG 08/04/99 15:51 FINAL L:\DWG\6041-01\NEWSTRUCT\NANUE

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

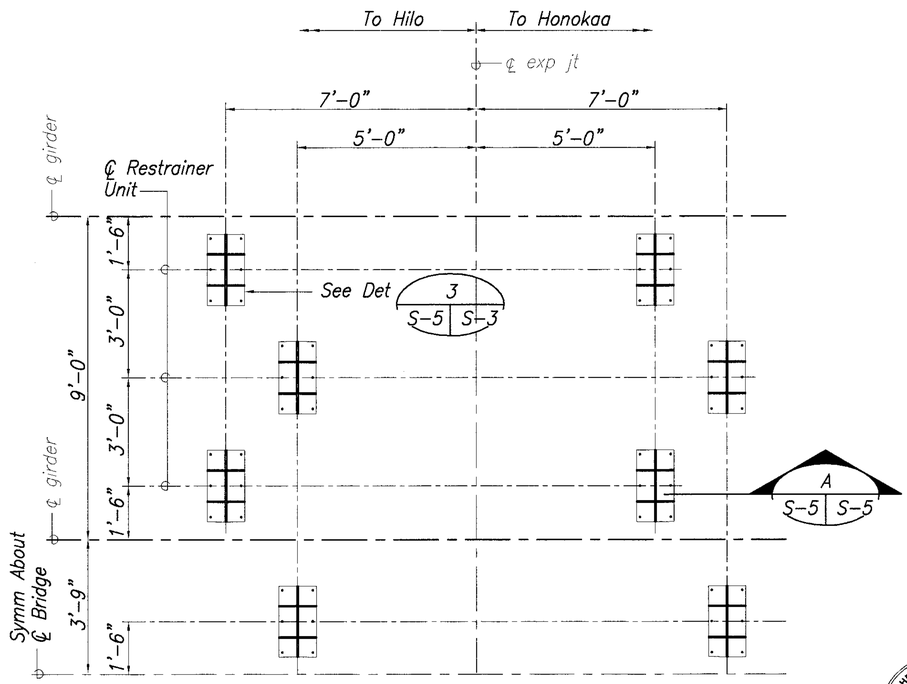


SECTION A
Scale : 1"=1'-0'



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

REFLECTED DECK PLAN AT BENTS 3 & 5 — 1 S-5 S-5
Scale: 1/2"=1'-0"



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

REFLECTED DECK PLAN AT BENTS 7 & 9 — 2 S-5 S-5
Scale: 1/2"=1'-0"

SHEN-CHIEN CHIU
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No. 3641-S
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

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

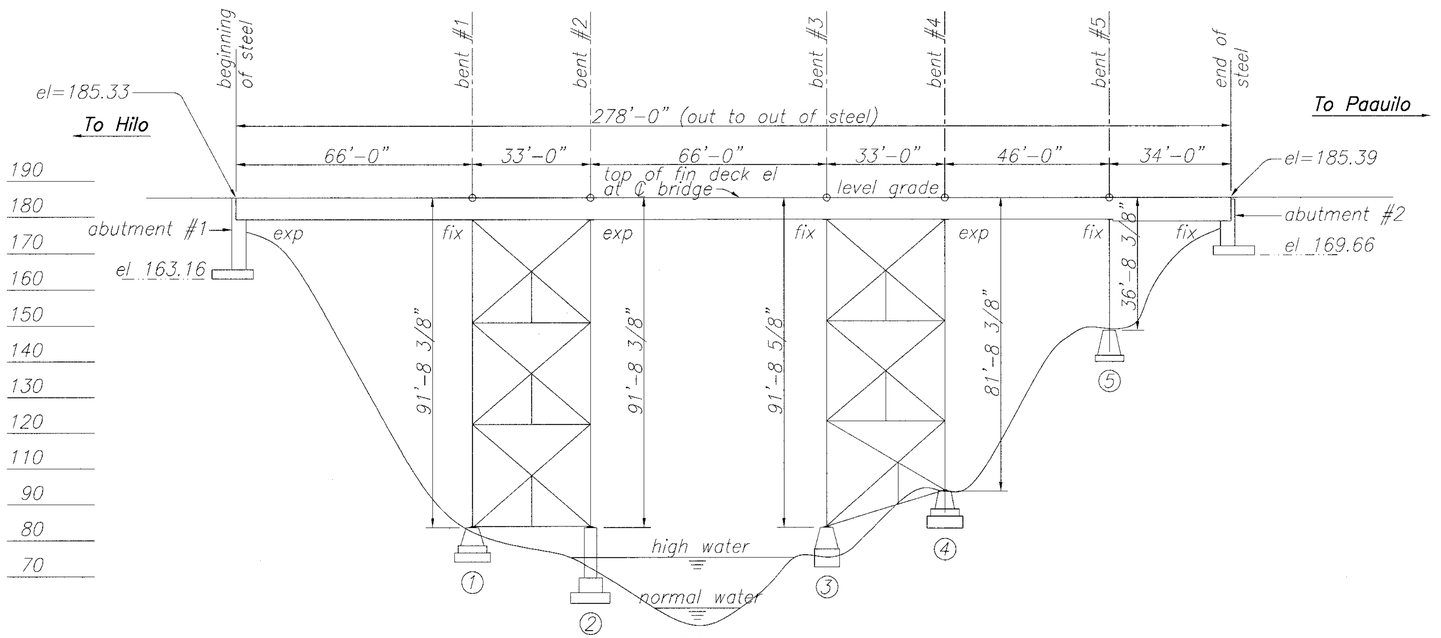
SHEET No. S-5 OF 23 SHEETS

ORIGINAL PLAN
NOTEBOOK
No. ____
SURVEY PLOTTED BY ____ DATE
DRAWN BY ____ - -
TRACED BY ____ - -
DESIGNED BY ____ - -
QUANTITIES BY ____ - -
CHECKED BY ____ - -

NS1-2.DWG 08/04/99 15:08 FINAL L:\DWG\6041-01\NEWSTRUCT\NANUE

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

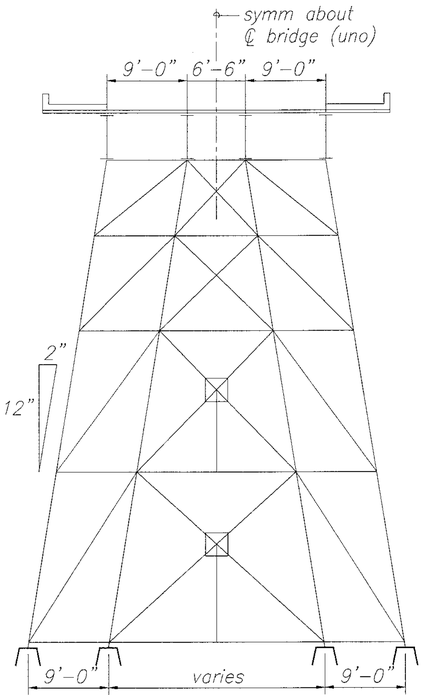
TRUE NORTH



EXISTING CONDITION

PROFILE — A — S-6 | S-6

Scale: 1"=20'



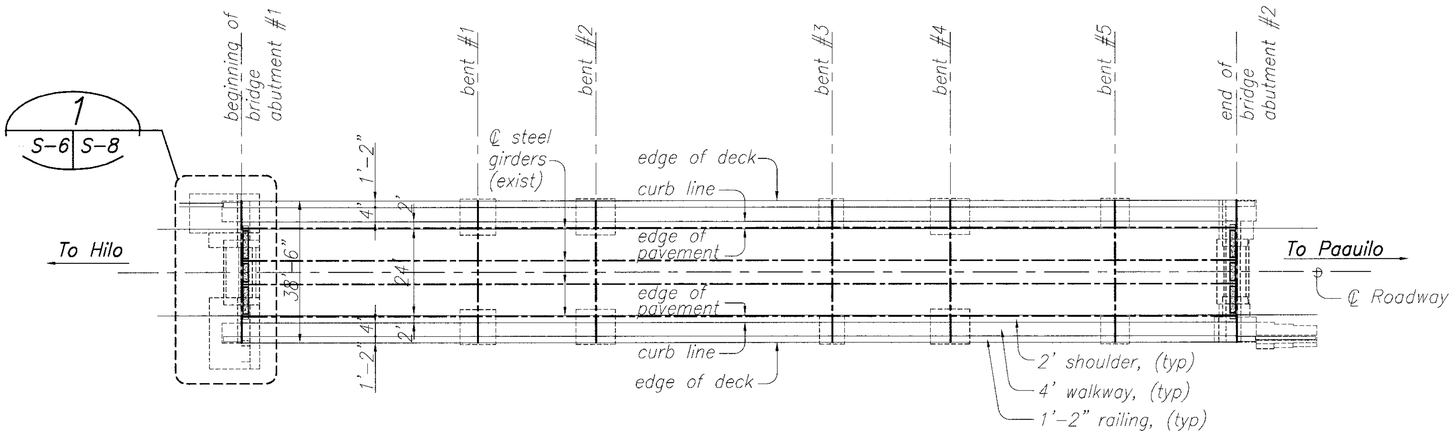
EXISTING CONDITION

TYPICAL BENT ELEVATION — B — S-6 | S-6

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

Note: Existing Condition Shown.

TRUE NORTH



PLAN — 1 — S-6 | S-6

Scale: 1"=20'

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.*

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Shen-Chien Chiu

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)

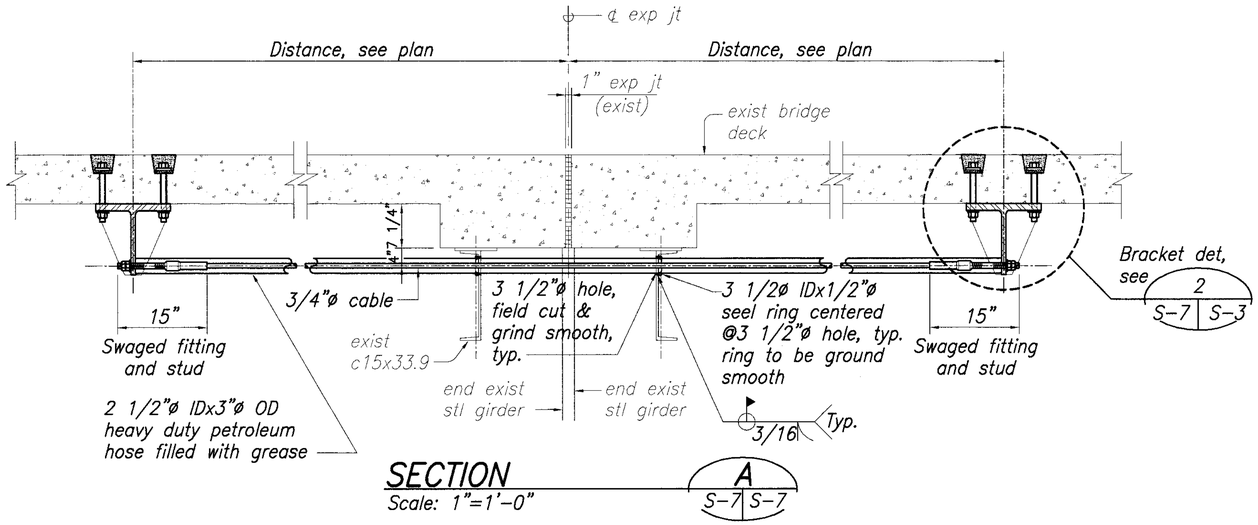
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SHEET No. S-6 OF 23 SHEETS

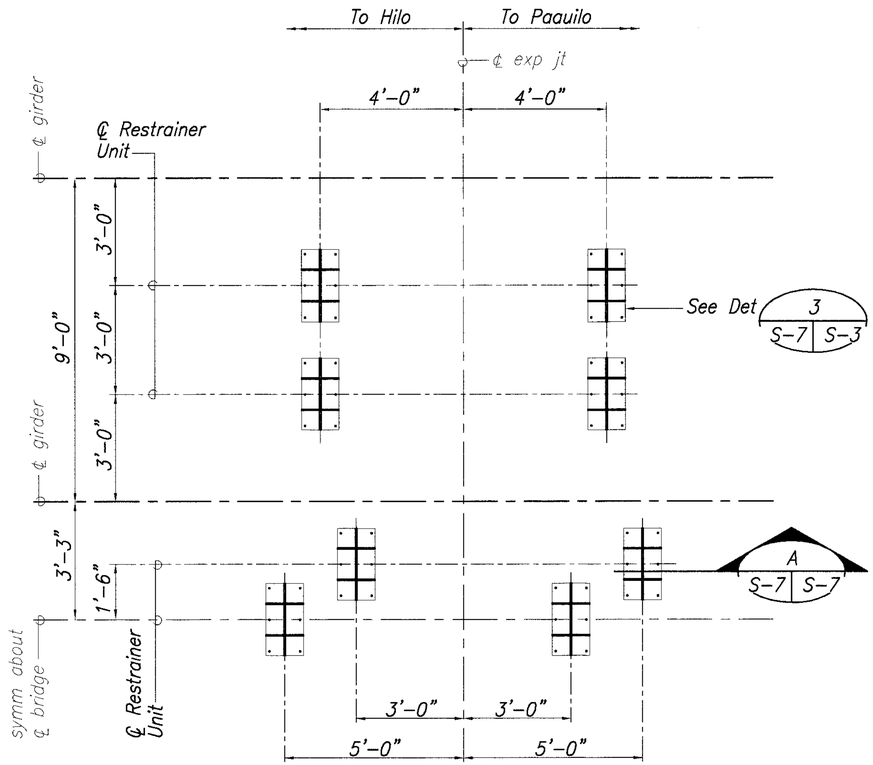
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FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(46)	2000	10	26



SECTION A
Scale: 1"=1'-0"
S-7 | S-7



Note:
1. Cable Restrainers not shown.

REFLECTED DECK PLAN AT BENTS 2 & 4
Scale: 1/2'=1'-0"
1 S-7 | S-7

SURVEY PLOTTED BY ____ DATE
DRAWN BY ____
TRACED BY ____
DESIGNED BY ____
QUANTITIES BY ____
CHECKED BY ____
ORIGINAL PLAN
NOTEBOOK No. ____

US1-2.DWG 08/04/99 15:13 FINAL L:\DWG\6041-01\NEWSTRUCT\UMA

SHEN-CHIEN CHIU
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No. 3641-S
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

DATE	REVISION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

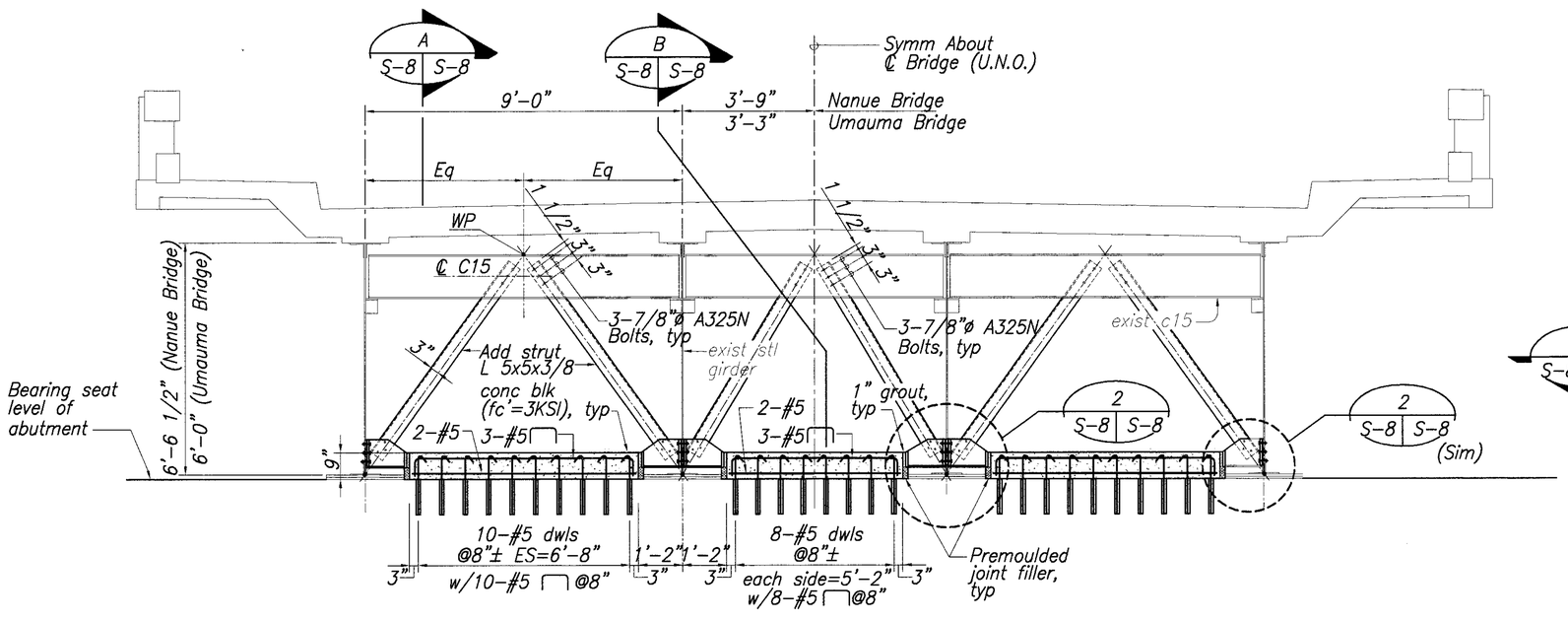
UMAUMA BRIDGE
SUPERSTRUCTURE RETROFIT
PLAN OF LONGITUDINAL RESTRAINERS

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-7 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	11	26

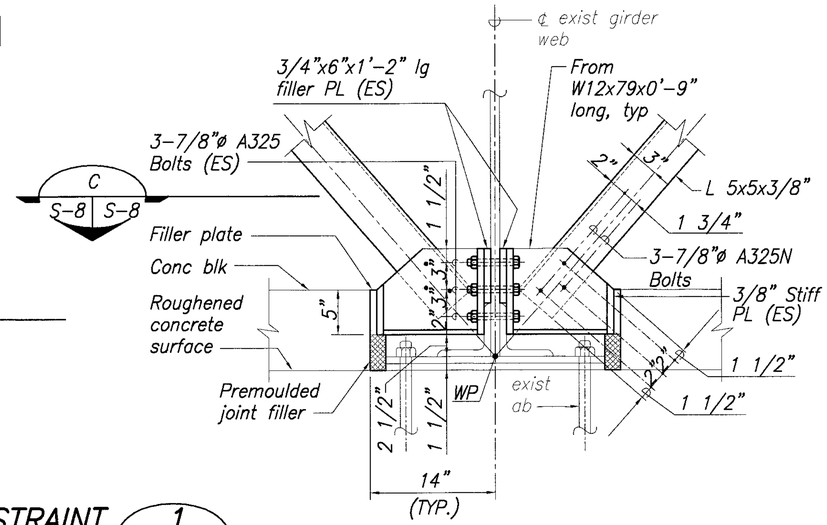


ELEVATION

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

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

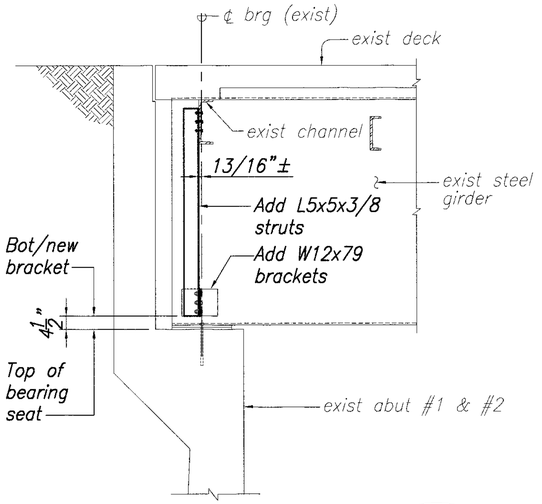
1 S-8 S-8 — S-6



CONNECTION DETAIL

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

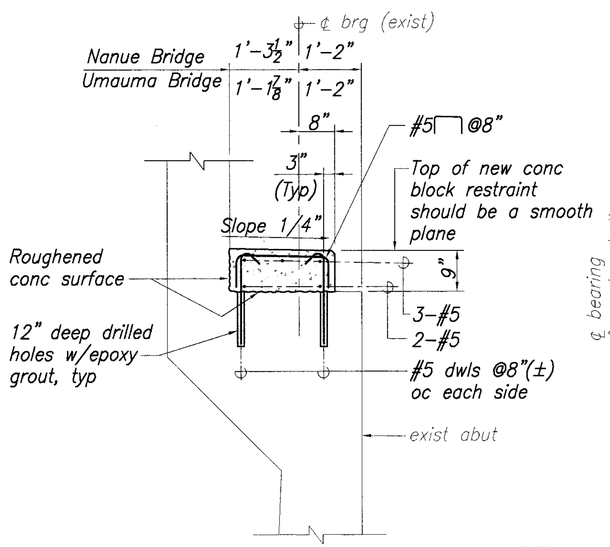
2 S-8 S-8



SECTION AT ABUTMENT

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

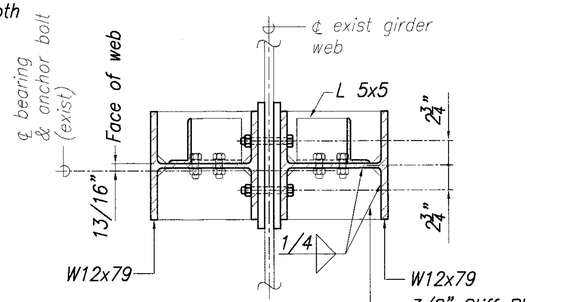
A S-8 S-8



SECTION AT ABUTMENT

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

B S-8 S-8



PLAN – SECTION

SECTION

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

C S-8 S-8

SHEN-CHIEN CHIU LICENSED PROFESSIONAL ENGINEER No. 3641-S HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

Shen-Chien 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

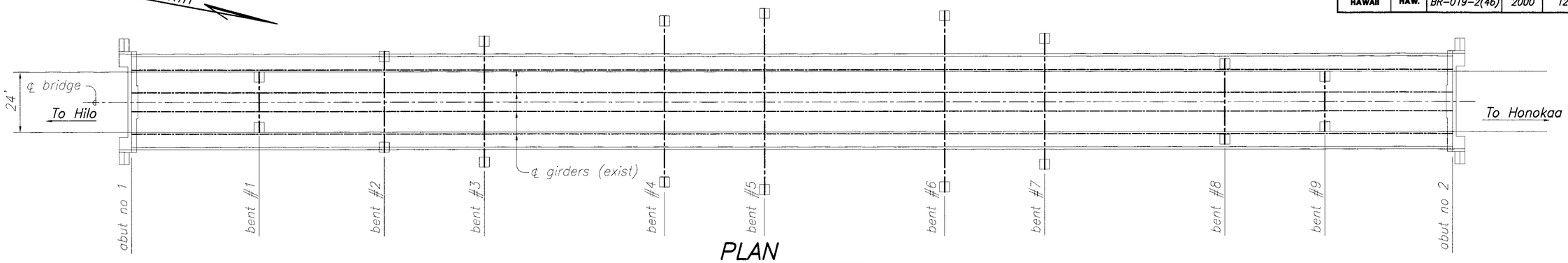
SHEET NO. S-8 OF 23 SHEETS

11

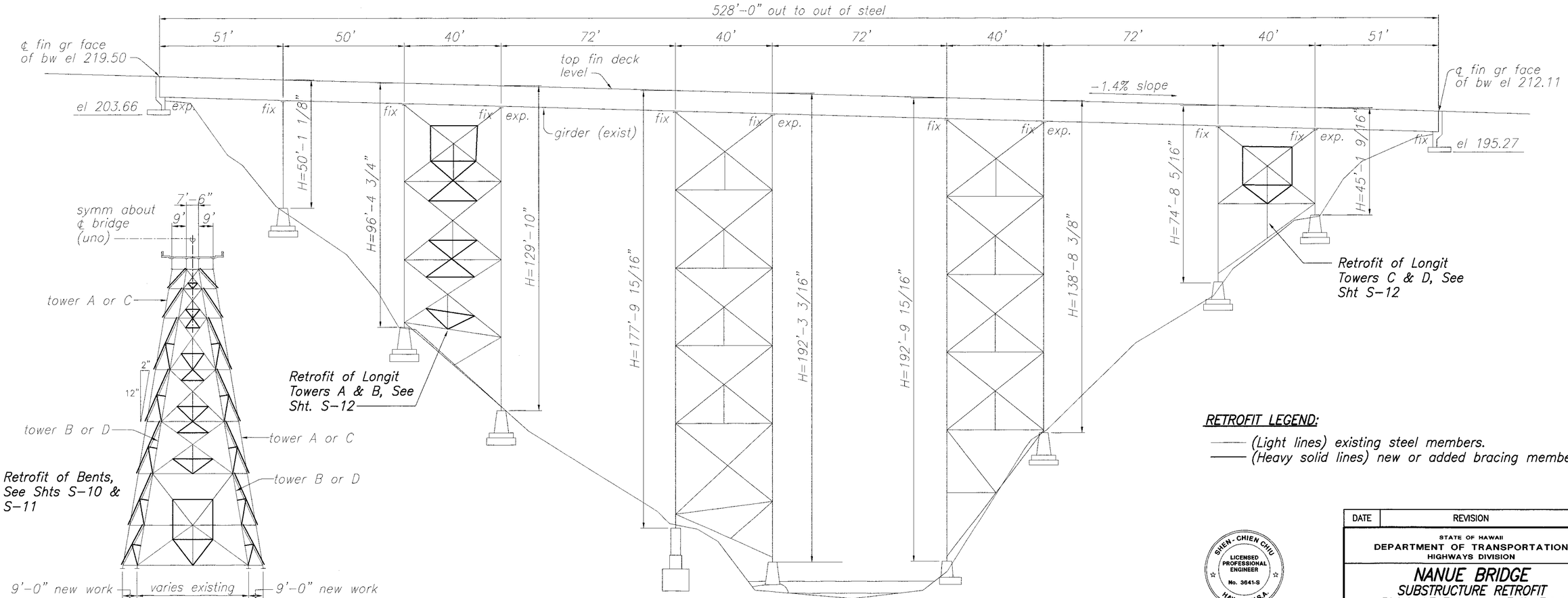
ORIGINAL PLAN
SURVEY PLOTTED BY
DRAWN BY
TRACED BY
DESIGNED BY
QUANTITIES BY
CHECKED BY
DATE
NOTEBOOK
No.

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



PLAN
Scale: 1"=20'-0"



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

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

RETROFIT LEGEND:

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

SHEN-CHIEN CHIU
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THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

DATE	REVISION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

NANUE 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

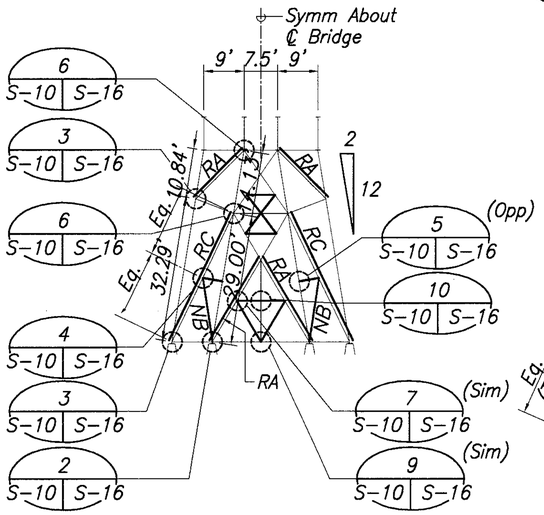
SHEET No. S-9 OF 23 SHEETS

12

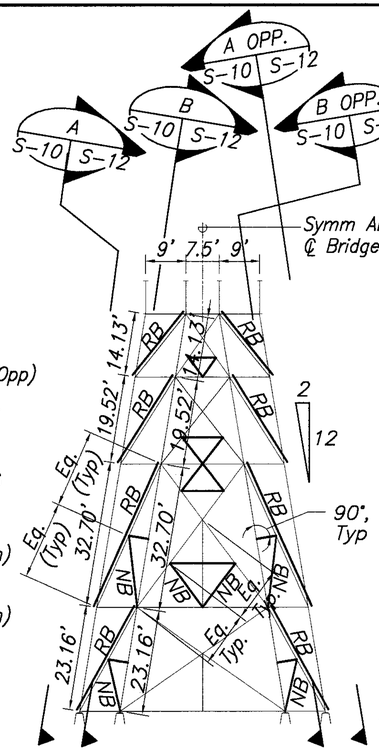
ORIGINAL PLAN
NOTEBOOK No. ___
SURVEY PLOTTED BY ___ DATE ___
DRAWN BY " "
TRACED BY " "
DESIGNED BY " "
QUANTITIES BY " "
CHECKED BY " "

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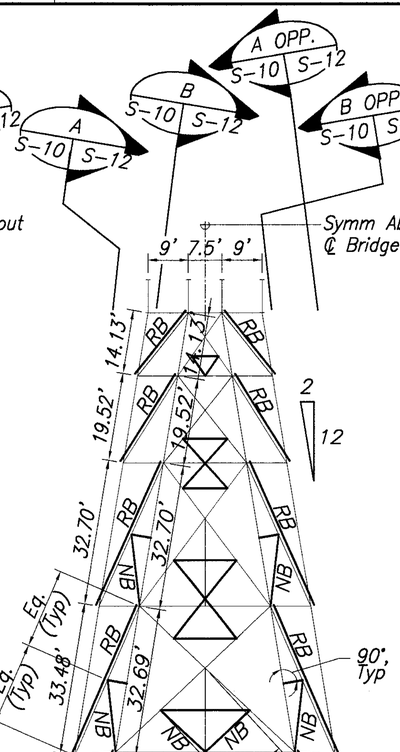
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(46)	2000	13	26



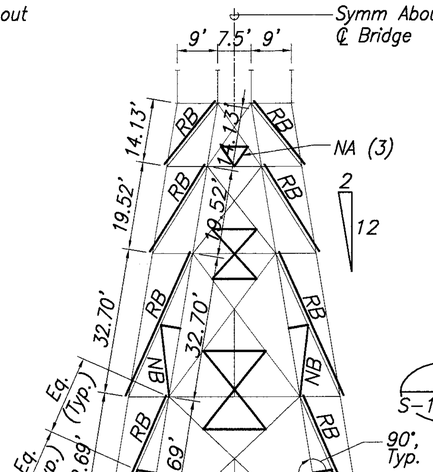
BENT #1
Scale: 1/16" = 1'-0"



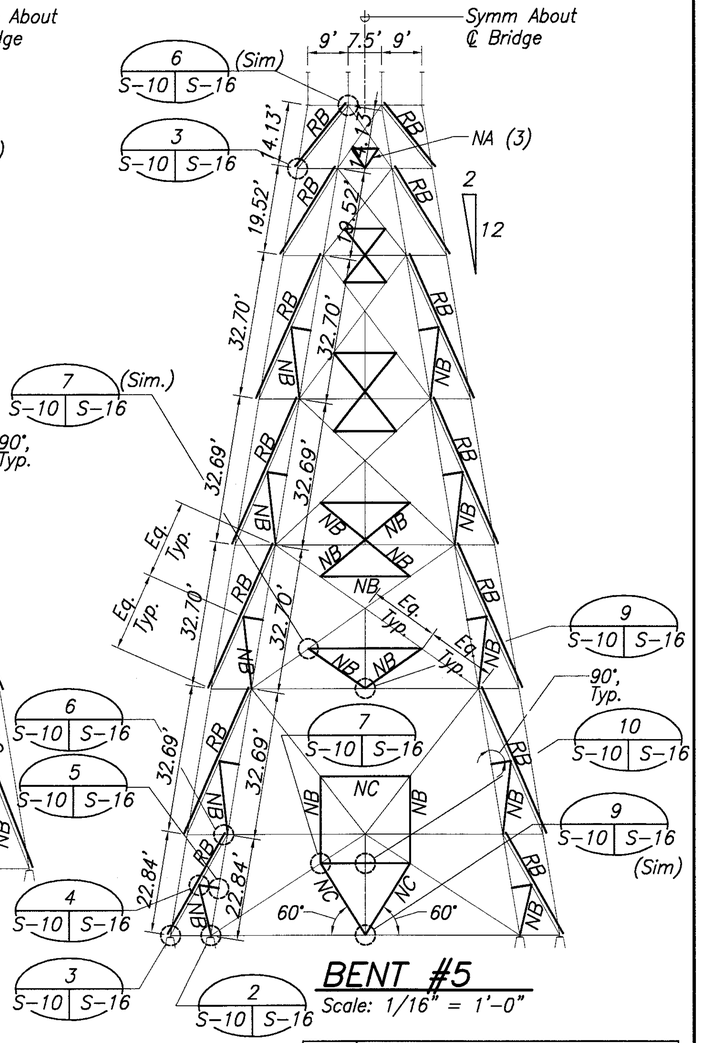
BENT #2
Scale: 1/16" = 1'-0"



BENT #3
Scale: 1/16" = 1'-0"



BENT #4
Scale: 1/16" = 1'-0"



BENT #5
Scale: 1/16" = 1'-0"

NOTES:

1. All new add 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. 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.

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 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.

ORIGINAL PLAN
NOTEBOOK No. ____
SURVEY PLOTTED BY ____ DATE
DRAWN BY " "
TRACED BY " "
DESIGNED BY " "
QUANTITIES BY " "
CHECKED BY " "

NS2-2.DWG 08/04/99 14:42 FINAL L:\DWG\6041-01\NEWSTRUCT\NANUE

SHEN-CHIEN CHIU
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No. 3641-S
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

DATE	REVISION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

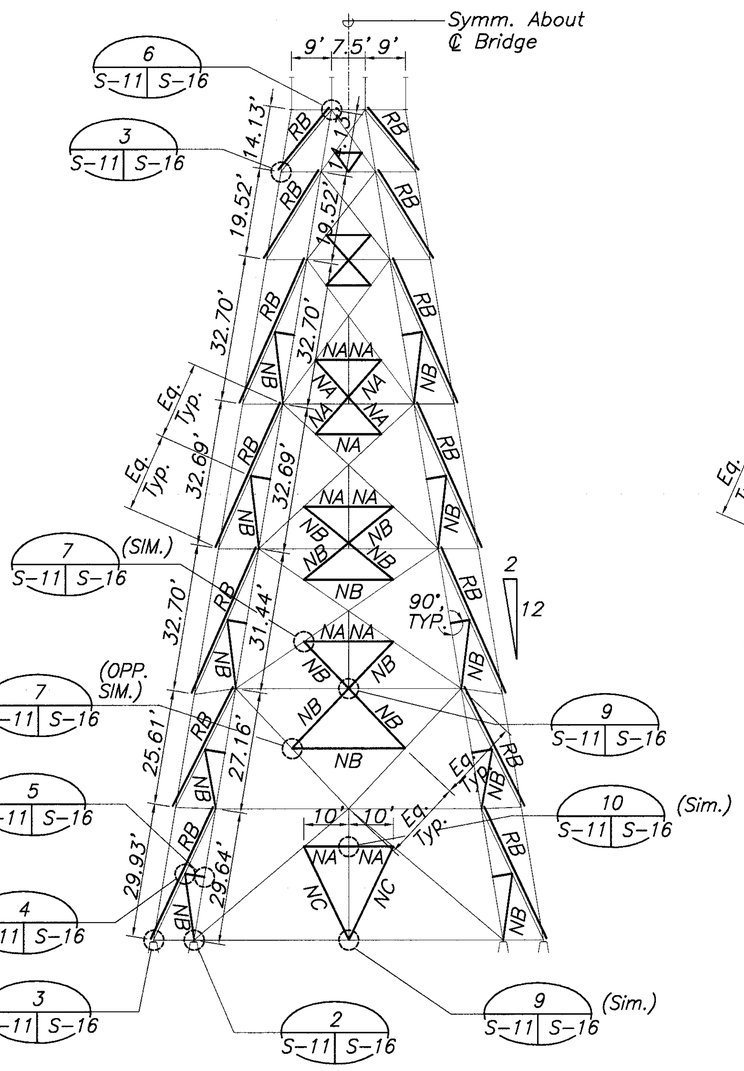
NANUE BRIDGE
SUBSTRUCTURE RETROFIT
TRANSV. BENTS #1,#2,#3,#4&#5

SEISMIC RETROFIT OF VARIOUS BRIDGES
EAST OF NINOLE, HAWAII
F.A. PROJECT NO. BR-019-2(46)

Scale: As Noted Date: AUG. 17, 1999

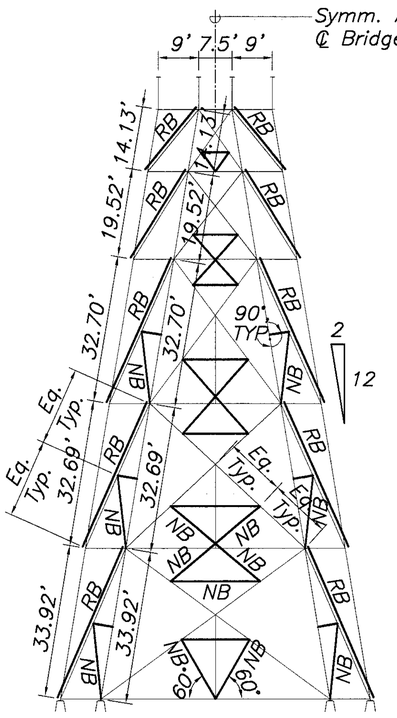
SHEET No. S-10 OF 23 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(46)	2000	14	26



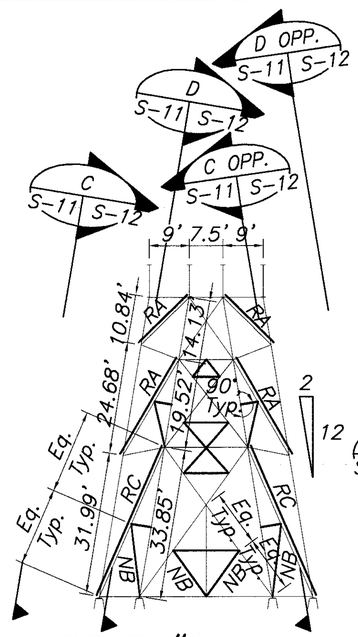
BENT #6

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



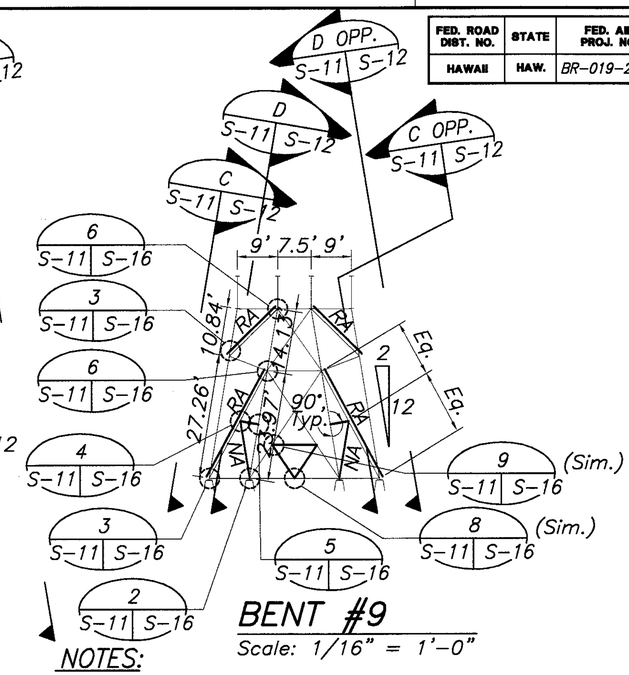
BENT #7

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



BENT #8

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



BENT #9

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

NOTES:

1. All new add 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 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.

SHEN - CHIEN CHIU
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No. 3641-S
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

Shen-chien Chiu

DATE	REVISION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

NANUE BRIDGE
SUBSTRUCTURE RETROFIT
TRANSV. BENTS #6,#7,#8 & #9

SEISMIC RETROFIT OF VARIOUS BRIDGES
EAST OF NINOLE, HAWAII
F.A. PROJECT NO. BR-019-2(46)

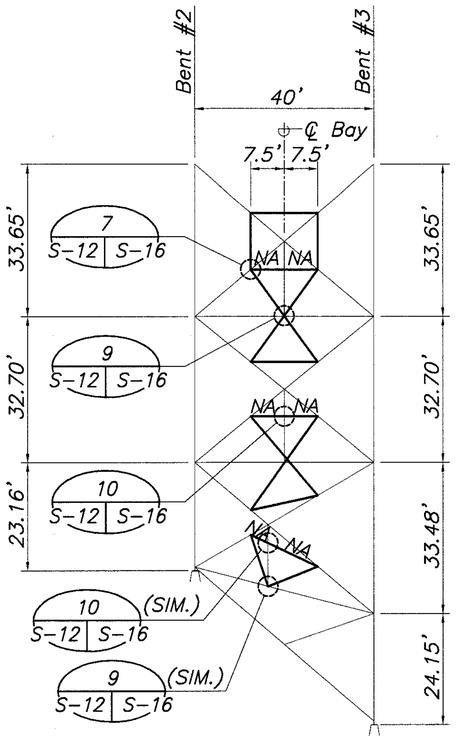
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SHEET No. S-11 OF 23 SHEETS

ORIGINAL PLAN | SURVEY PLOTTED BY ____ DATE | DRAWN BY " " | TRACED BY " " | DESIGNED BY " " | QUANTITIES BY " " | CHECKED BY " " | No. ____ | NOTEBOOK

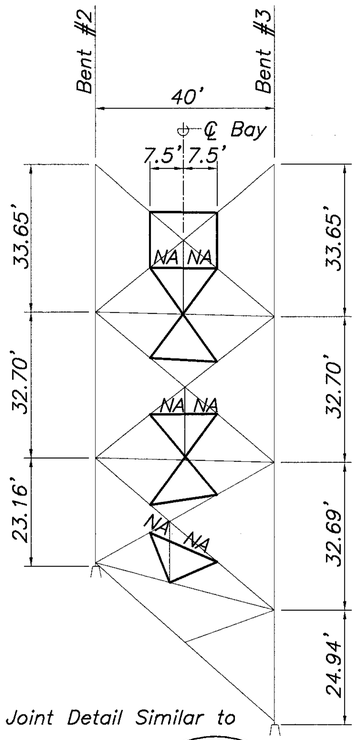
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FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(46)	2000	15	26

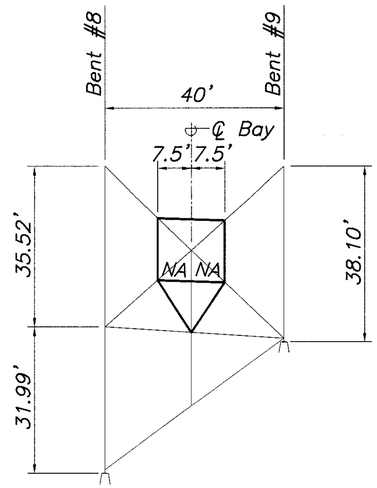


Note: Joint Detail Similar to A S-12 S-12

ELE.-TOWER A A S-12 S-12
Scale: 1/16"=1'-0"
S-10

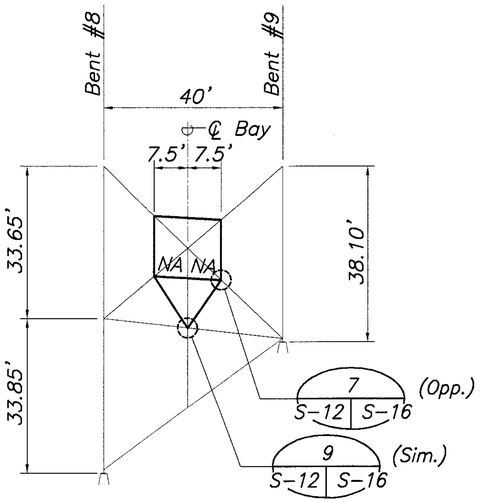


ELE.-TOWER B B S-12 S-12
Scale: 1/16"=1'-0"
S-10



Note: Joint Detail Similar to D S-12 S-12

ELE.-TOWER C C S-12 S-12
Scale: 1/16"=1'-0"
S-11



ELE.-TOWER D D S-12 S-12
Scale: 1/16"=1'-0"
S-11

NOTES:

1. See Retrofit Legends on Sheet S-9
2. All new members are "NB", unless otherwise indicated.
3. See Note 3 on Sheet S-10 for size of 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 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.

ORIGINAL PLAN | SURVEY PLOTTED BY | DRAWN BY | NOTEBOOK | DESIGNED BY | QUANTITIES BY | CHECKED BY | DATE

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SHEN-CHIEN CHIU LICENSED PROFESSIONAL ENGINEER No. 3641-S HAWAII, U.S.A.

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Shen-Chien Chiu

DATE	REVISION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

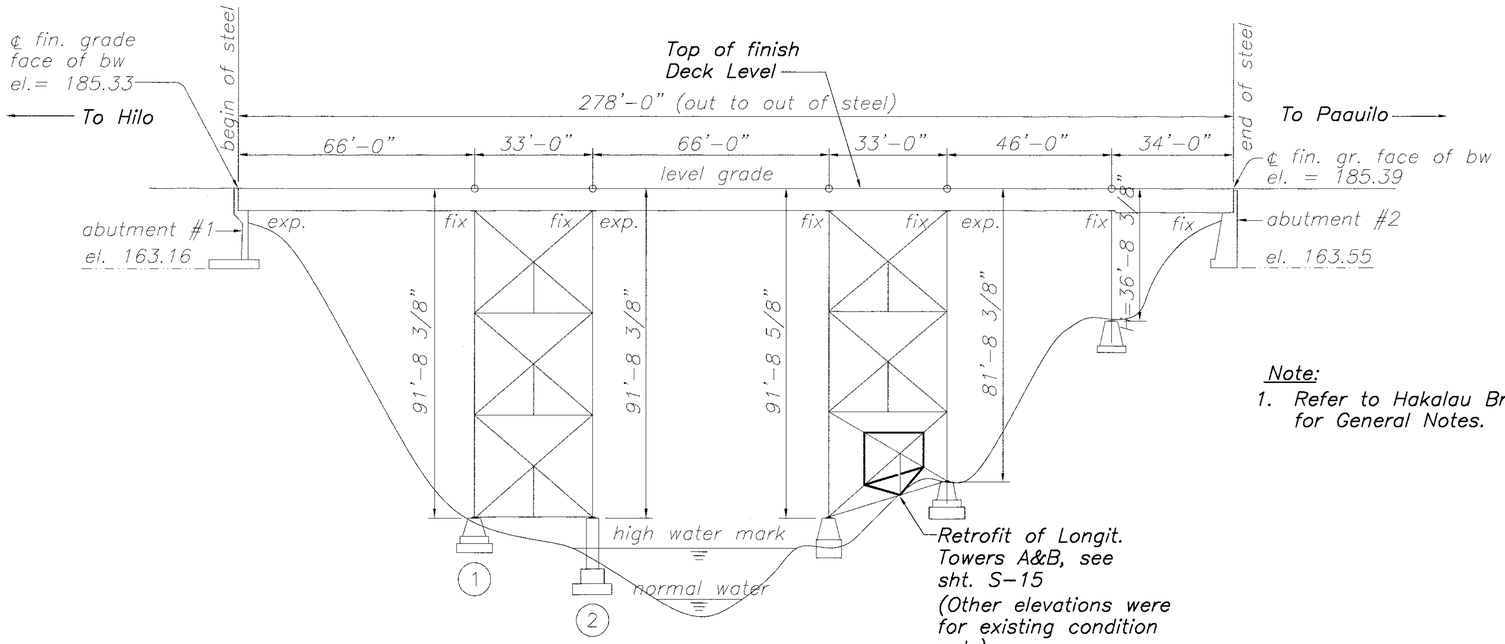
NANUE BRIDGE
SUBSTRUCTURE RETROFIT TRANSVERSE TOWERS A-D

SEISMIC RETROFIT OF VARIOUS BRIDGES
EAST OF NINOLE, HAWAII
F.A. PROJECT NO. BR-019-2(46)

Scale: As Noted Date: AUG. 17, 1999

SHEET NO. S-12 OF 23 SHEETS

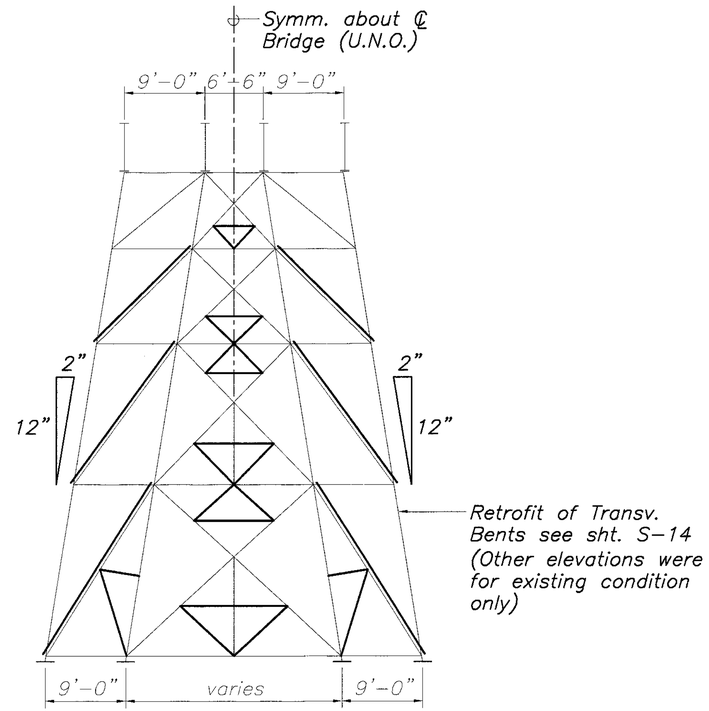
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(46)	2000	16	26



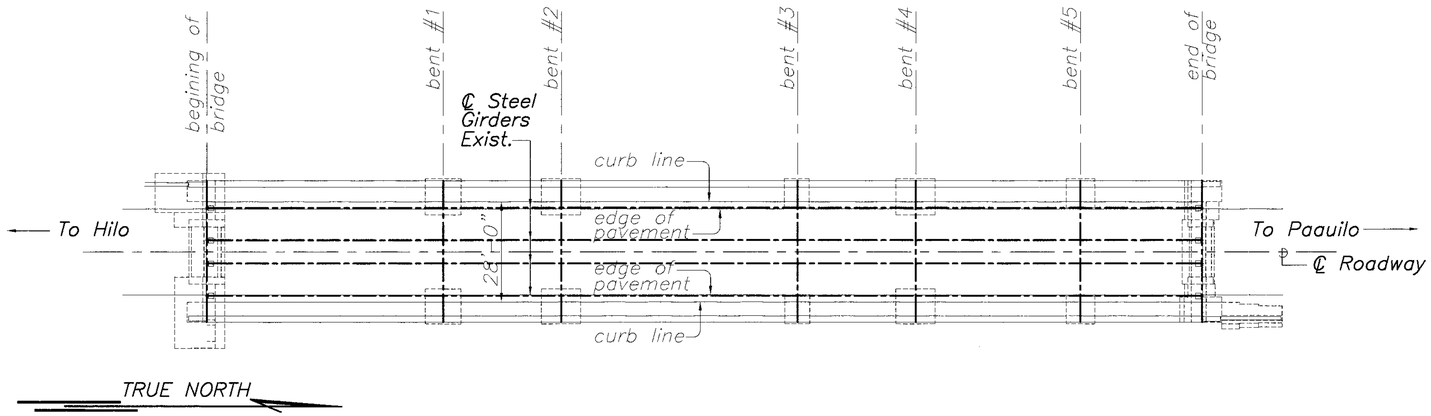
PROFILE B
Scale: 1"=20' S-13 | S-13

Note:

1. Refer to Hakalau Bridge for General Notes.



TYPICAL BENT ELEVATION C
Scale: 1/8"=1'-0" S-13 | S-13



DETAIL A
Scale: 1"=20' S-13 | S-13

RETROFIT LEGEND:

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

SHEN-CHIEN CHIU
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No. 3641-S
HAWAII, U.S.A.

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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

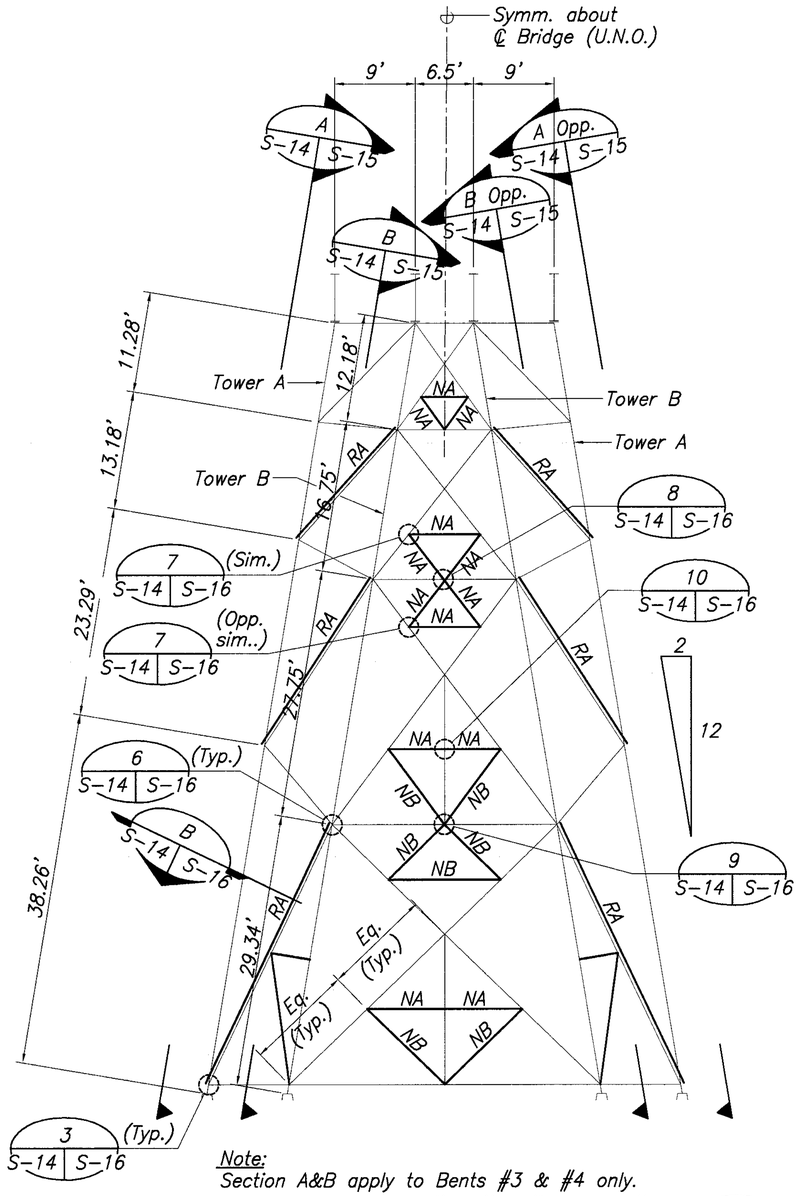
SHEET No. S-13 OF 23 SHEETS

16

ORIGINAL PLAN
NOTEBOOK No. ___
SURVEY PLOTTED BY ___ DATE
DRAWN BY " "
TRACED BY " "
DESIGNED BY " "
QUANTITIES BY " "
CHECKED BY " "

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FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(46)	2000	17	26

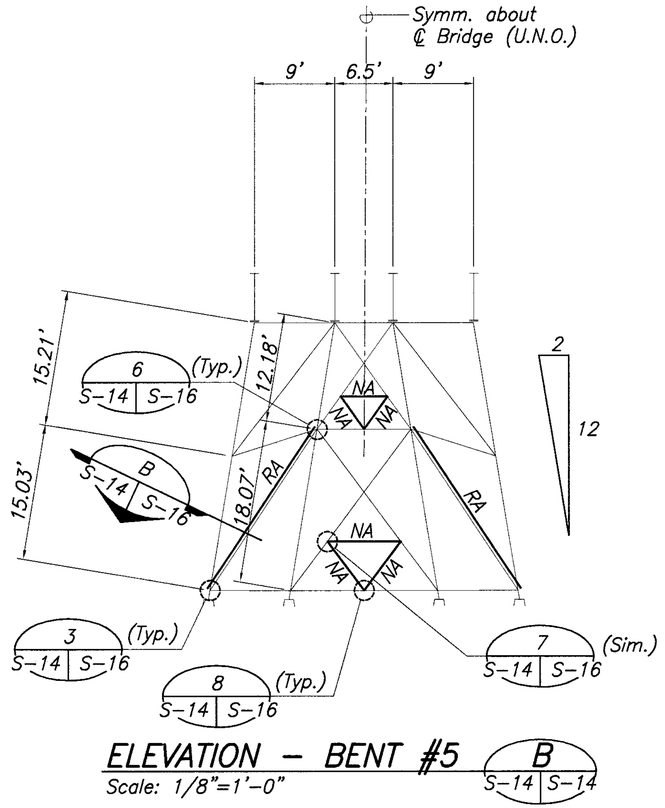


Note:
Section A&B apply to Bents #3 & #4 only.

ELEVATION – BENTS #1,#2,#3 & #4

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

A
S-14 S-14



ELEVATION – BENT #5

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

B
S-14 S-14

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.

ORIGINAL PLAN
SURVEY PLOTTED BY ____ DATE
DRAWN BY " "
TRACED BY " "
DESIGNED BY " "
NOTEBOOK No. ____ QUANTITIES BY " "
CHECKED BY " "

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HAWAII, U.S.A.

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DATE	REVISION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

UMAUMA BRIDGE
SUBSTRUCTURE RETROFIT
RETROFIT OF BENTS #1,#2,#3 & #4

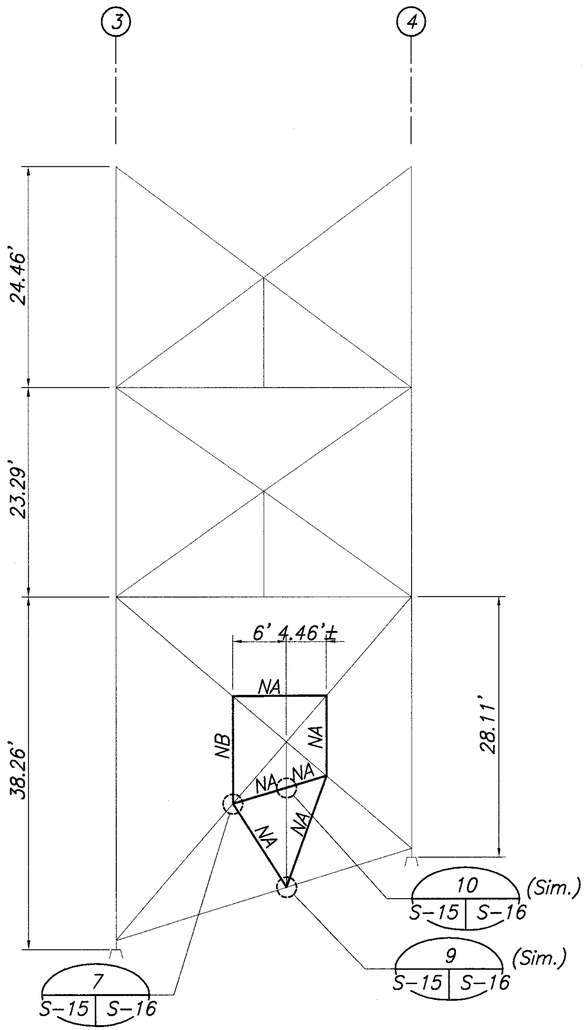
SEISMIC RETROFIT OF VARIOUS BRIDGES
EAST OF NINOLE, HAWAII
F.A. PROJECT NO. BR-019-2(46)

Scale: As Noted Date: AUG. 17, 1999

SHEET No. S-14 OF 23 SHEETS

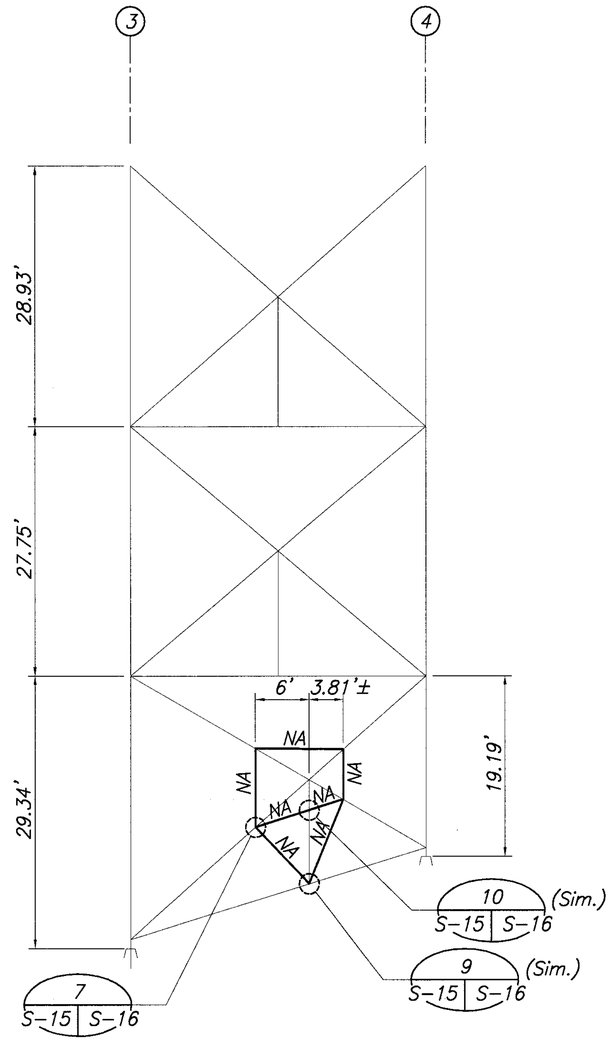
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FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(46)	2000	18	26



ELEVATION – TOWER A (A, S-14 | S-15)

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



ELEVATION – TOWER B (B, S-14 | S-15)

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.
NA Add 2-L 3x2 1/2x5/16 (w/lacing) new members.
NB Add 2-L 4x3x5/16 (w/lacing) new members.

ORIGINAL PLAN | NOTEBOOK No. | SURVEY PLOTTED BY | DRAWN BY | TRACED BY | DESIGNED BY | QUANTITIES BY | CHECKED BY | DATE

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SHEN-CHIEN CHIU LICENSED PROFESSIONAL ENGINEER No. 3641-S HAWAII, U.S.A.

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Shen-Chien Chiu

DATE	REVISION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

UMAUMA BRIDGE
SUBSTRUCTURE RETROFIT
RETROFIT OF TOWERS A,B,C & D

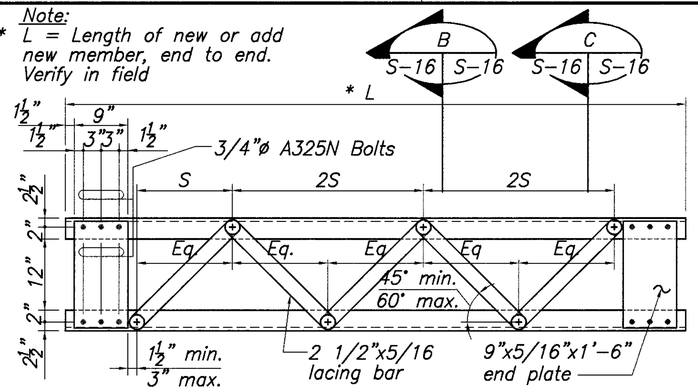
SEISMIC RETROFIT OF VARIOUS BRIDGES
EAST OF NINOLE, HAWAII
F.A. PROJECT NO. BR-019-2(46)

Scale: As Noted Date: AUG. 17, 1999

SHEET No. S-15 OF 23 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(46)	2000	19	26

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

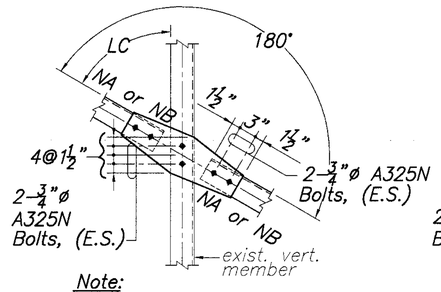


BOTTOM PLAN (Looking up)

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

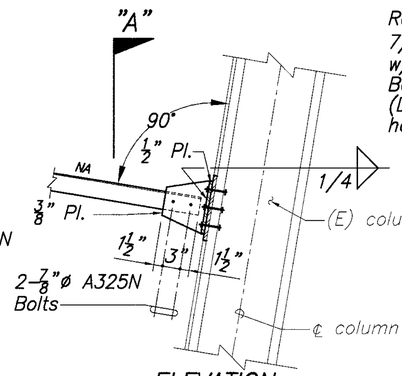
Scale: None

A S-16 | S-16

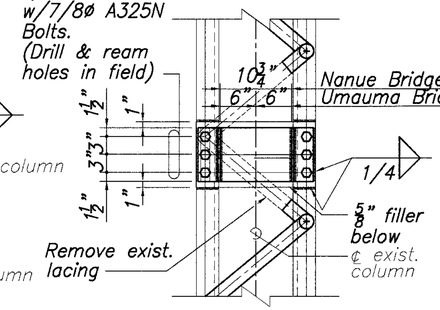


Note:
1. Determine angle "LC" from plans.
2. NA or NB, see plan.

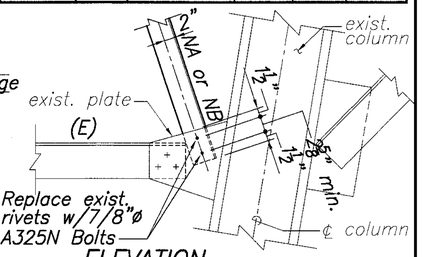
DETAIL 10
Scale: 1"=1'-0" S-16 | S-16
S-10, S-11, S-12
S-14, S-15



ELEVATION



SECTION "A"



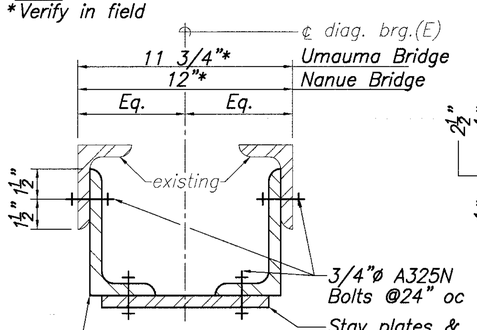
ELEVATION

DETAIL 5
Scale: 1"=1'-0" S-16 | S-16
S-10, S-11

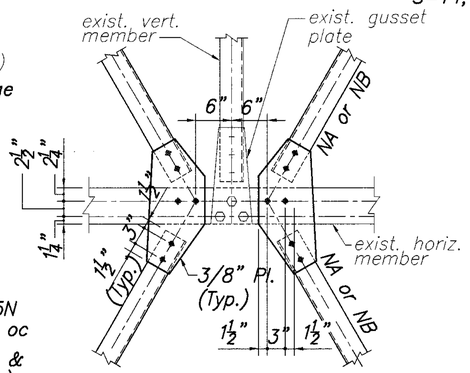
Note:
*See General Structural Note, #10 on sheet S-1 for information to determine the W.P.

DETAIL 2
Scale: 1"=1'-0" S-15 | S-15
S-9, S-10, S-11

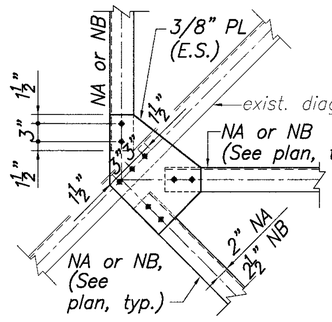
Note:
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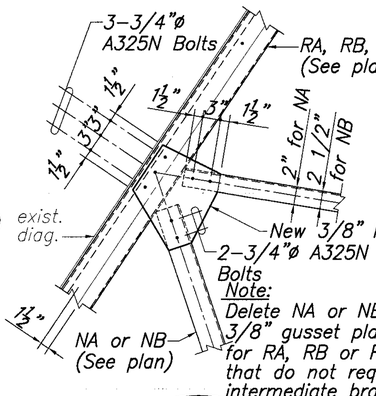
SECTION B
Scale: None S-16 | S-16
S-14



DETAIL 9
Scale: 1"=1'-0" S-16 | S-16
S-10, S-11, S-12
S-14, S-15

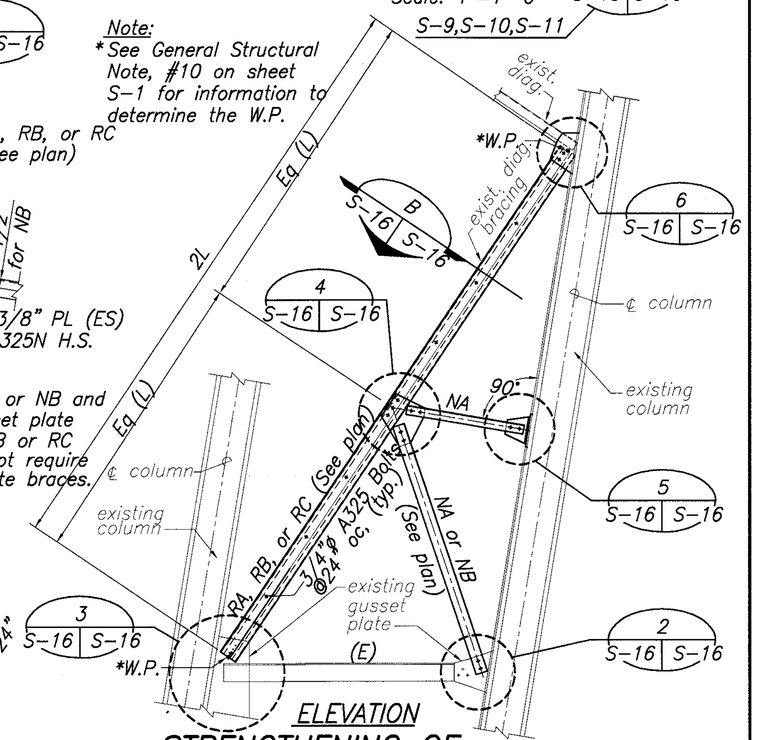


DETAIL 7
Scale: 1"=1'-0" S-16 | S-16
S-10, S-11, S-12
S-14, S-15



Note:
Delete NA or NB and 3/8" gusset plate for RA, RB or RC that do not require intermediate braces.

DETAIL 4
Scale: 1"=1'-0' S-16 | S-16
S-10, S-11



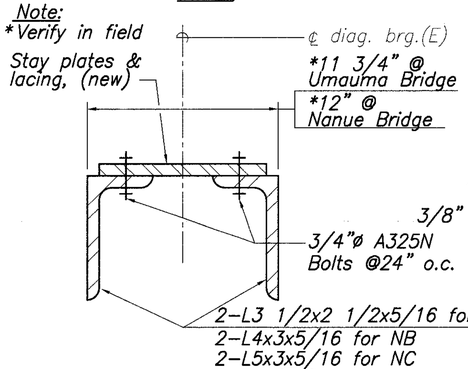
ELEVATION

STRENGTHENING OF EXIST. DIAG. BRACING

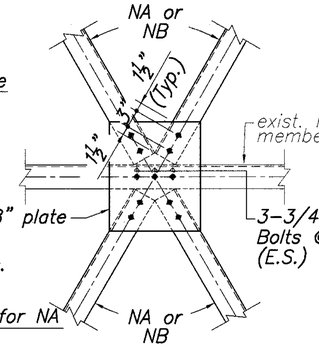
Scale: 1/2"=1'-0"

1 S-16 | S-16

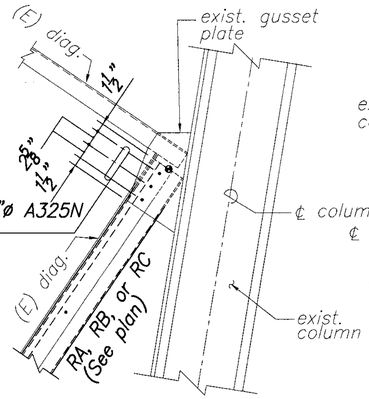
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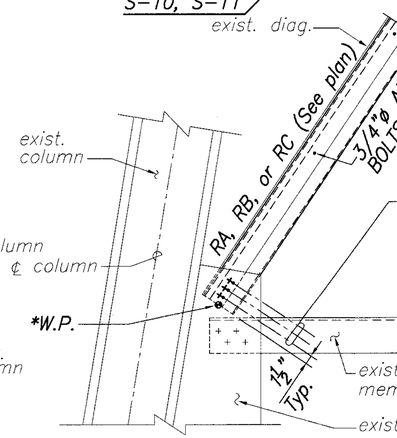
SECTION C
Scale: None S-16 | S-16



DETAIL 8
Scale: 1"=1'-0" S-16 | S-16
S-11, S-14



DETAIL 6
Scale: 1"=1'-0" S-16 | S-16
S-10. S-11, S-14



DETAIL 3
Scale: 1"=1'-0" S-16 | S-16
S-10, S-11, S-14

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 NINOLE, HAWAII
F.A. PROJECT NO. BR-019-2(46)

Scale: As Noted Date: AUG. 17, 1999

SHEET No. S-16 OF 23 SHEETS

SHEN-CHIEN CHIU
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No. 3641-S
HAWAII, U.S.A.

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NOTEBOOK | No.

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