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APPENDICIES

SECTION 1.0 – INSPECTION SUMMARY

1.1 BRIDGE DESCRIPTION

Year Built	1940
Lanes on Bridge	2 vehicle lanes
Sidewalk(s)	None
No. of Spans	1
Bridge Posting Sign(s)	Posting on Signs: - Weight Limit: 18 tons - EV Weight Limits: 16 tons (single axle), 20 tons (tandem), 28 tons (gross) Sign Locations: - East approach on Farrington Highway - West approach on Farrington Highway
Approach Slab Material and Location	N/A
Deck Wearing Surface	Asphalt Wearing Surface
Culvert Material and Type	N/A
Deck Material and Type	Reinforced concrete slab
Superstructure Material and Type	Reinforced concrete slab
Substructure Material and Type	Reinforced concrete abutments
Bearing Type	Roofing paper above Abutment 1
Bridge Railing Material	Reinforced concrete railing
Bridge Railing Height	1’-6” upstream concrete railing 2’-2” downstream concrete railing

Record drawings on file at the City and County of Honolulu, Department of Design and Construction, Civil Division, include the following:

- Job Number: F.A.P. 4-D(1)
- Structure Name: Farrington Highway Bridge No. 1
- Project Name: Bridge No. 1: Sta. 92+14.78 to 92+41.22, Waianae Road
- Year Approved: 1940
- File Number: 4468.9A, 4468.10A, 4468.11A, 4468.12, and 4468.13

Abutment 1 and Abutment 2 are at the east and west ends of the bridge, respectively.

1.2 PARKING, BRIDGE ACCESS, AND SAFETY HAZARDS

Parking to Perform Bridge Inspection	On shoulder along Farrington Highway
Access to Underside of Bridge	Upstream west side of bridge
Equipment Used to Access Underside of Bridge	None
Traffic Control	N/A
Water Depth at Time of Inspection	0”

1.3 OVERALL CONDITION

The bridge structure is generally in satisfactory condition. Periodic bridge inspections are recommended to not exceed 24-month intervals as specified in the National Bridge Inspection Standards. National Bridge Inspection (NBI) Ratings for the previous inspection and the current inspection are as follows:

NBI ITEM		NBI RATINGS	
		PREVIOUS INSPECTION	CURRENT INSPECTION
#36	Traffic Safety Features (Bridge Railings, Transitions, Approach Guardrail, Approach Guardrail Ends) (Per BrM Database)	0, N, 0, 0	0, N, 0, 0
#58	Deck	6	6
#59	Superstructure	6	6
#60	Substructure	6	6
#61	Channel & Channel Protection	6	6
#62	Culvert	N	N
#67	Structural Evaluation	3	3
#71	Waterway Adequacy Comments: Observed conditions appear similar to previous inspection. No analysis was performed to evaluate flood/overtopping risk.	6	6
#113	Scour Comments: No scour observed.	8	8

SECTION 2.0 – LOAD RATING SUMMARY

The bridge is currently posted for reduced load carrying capacity. Load posting signs were observed at bridge approaches. Based on visual observations at the time of this inspection, there appears to be no immediate signs of overstress or increased distress for the bridge that would affect rating calculations since the last inspection report dated October 18, 2019 by Nagamine Okawa Engineers, Inc. The most recent load rating was performed on June 8, 2020 by Nagamine Okawa Engineers, Inc. See the following load rating summary sheets.

CITY AND COUNTY OF HONOLULU
DEPARTMENT OF DESIGN AND CONSTRUCTION
CIVIL DESIGN AND ENGINEERING DIVISION
Bridge Load Rating Summary

Existing Bridge Data

Structure Number:	003923001100001	Last Load Rating Date:	2/27/2015
Bridge Name:	Farr Hwy Bridge No.1	Last Inspection Date:	10/18/2019
Bridge Number:	923	Inspected By:	Nagamine Okawa
District:	Waianae	Fracture Critical Member (Y/N):	N
Span Type:	RC Slab	Item 58, Deck Rating:	6
Bridge Plans Available (Y/N):	Y	Item 59, Superstructure Rating:	6
Design Loading:	-	Item 60, Substructure Rating:	6
Past Inventory Rating (HL93):	0.44	Bridge Load Posted (Y/N):	N
Past Operating Rating (HL93):	0.57	Posted Weight Limit:	-

Bridge Load Rating Summary

Dead Load Data

Overlay Type:	AC
Overlay Depth (IN):	2
Was Overlay Depth Measured (Y/N):	Y
Weight of Utilities:	n/a
Weight of other Non-Structural Attachments:	n/a

LRFR Evaluation Factors

Surface Roughness Rating:	3
Condition Factor:	1.00
System Factor:	1.00
ADTT (one way):	Unknown

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	0.46	Int Strip	Flexure	33%	0.091
	HL-93 (OPR)	N/A	0.60	Int Strip	Flexure	33%	0.091
Legal Load	Type 3	50.0	0.94	Int Strip	Flexure	33%	0.091
	Type 3S2	72.0	0.98	Int Strip	Flexure	33%	0.091
	Type 3-3	80.0	1.14	Int Strip	Flexure	33%	0.091
	NRL	80.0	0.66	Int Strip	Flexure	33%	0.091
	SU4	54.0	0.79	Int Strip	Flexure	33%	0.091
	SU5	62.0	0.73	Int Strip	Flexure	33%	0.091
	SU6	69.5	0.67	Int Strip	Flexure	33%	0.091
	SU7	77.5	0.66	Int Strip	Flexure	33%	0.091
	EV2	57.5	1.09	Ext Strip	Flexure	33%	0.600
	EV3	86.0	0.69	Ext Strip	Flexure	33%	0.600
Permit Load	HP1	120.0	0.84	Ext Strip	Flexure	33%	0.600
	HP2	157.1	0.63	Ext Strip	Flexure	33%	0.600
	HP3	209.9	1.03	Ext Strip	Flexure	33%	0.600

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

Legal Load	Governing Legal Load Rating Factor:	0.66
	Governing Legal Load Model:	SU6
	Posting Recommended (Y/N):	Y
	Recommended Posting Load:	18 Tons
EV	EV2 Rating Factor	1.09
	EV3 Rating Factor	0.69
	Recommended Single Axle Posting	16 Tons
	Recommended Tandem Posting	21 Tons
	Recommended GVW Posting	29 Tons

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
- ☐ Connections do not control the bridge load rating
- ☐ Exterior girder controls the bridge load rating
- ☐ Bridge plans do not exist - Rating based on judgement and current loading

Remarks/Recommendations for Bridges without Plans

Quality Control/Quality Assurance

Load Rating Engineer
- Name: Norman Nagamine
- License No.: 5479-S
- Signature: Norman Nagamine

Load Rating Checked By: Colin Kodama
Quality Assurance By: Karl Umemoto
Load Rating Date: 6/8/2020

CITY AND COUNTY OF HONOLULU
DEPARTMENT OF DESIGN AND CONSTRUCTION
CIVIL DESIGN AND ENGINEERING DIVISION
Bridge Load Rating Summary

Existing Bridge Data

Structure Number:	003923001100001	Last Load Rating Date:	2/27/2015
Bridge Name:	Farr Hwy Bridge No.1	Last Inspection Date:	10/18/2019
Bridge Number:	923	Inspected By:	Nagamine Okawa
District:	Waianae	Fracture Critical Member (Y/N):	N
Span Type:	RC Slab	Item 58, Deck Rating:	6
Bridge Plans Available (Y/N):	Y	Item 59, Superstructure Rating:	6
Design Loading:	-	Item 60, Substructure Rating:	6
Past Inventory Rating (HL-93):	0.44	Bridge Load Posted (Y/N):	N
Past Operating Rating (HL-93):	0.57	Posted Weight Limit:	-

Bridge Load Rating Summary

Dead Load Data

Overlay Type:	AC
Overlay Depth (IN):	2
Was Overlay Depth Measured (Y/N):	Y
Weight of Utilities:	n/a
Weight of other Non-Structural Attachments:	n/a

LRFR Evaluation Factors

Surface Roughness Rating:	3
Condition Factor:	1.00
System Factor:	1.00
ADTT (one way):	Unknown
ADT:	-

Superstructure/Deck Rating Summary

	Vehicle Type	Vehicle GVW (Kips)	Rating Factor	Travel	Controlling Member	Controlling Load Effect	IM	Live Load Distribution Factor
Refuse Vehicles	REF1	51.00	1.01	Yes	Interior Strip	Flexure	33%	0.091
	REF2	57.18	0.81	No	Interior Strip	Flexure	33%	0.091
	REF3	45.94	0.91	No	Interior Strip	Flexure	33%	0.091
	REF4	57.50	0.89	No	Interior Strip	Flexure	33%	0.091
Buses	BUS1	30.99	1.34	Yes	Interior Strip	Flexure	33%	0.091
	BUS2	39.60	1.08	Yes	Interior Strip	Flexure	33%	0.091
	BUS3	39.60	1.08	Yes	Interior Strip	Flexure	33%	0.091
	BUS4	64.38	1.07	Yes	Interior Strip	Flexure	33%	0.091
	BUS5	67.24	0.94	No	Interior Strip	Flexure	33%	0.091
	BUS6	67.78	0.98	No	Interior Strip	Flexure	33%	0.091
	BUS7	66.79	0.98	No	Interior Strip	Flexure	33%	0.091
	BUS8	39.90	1.00	Yes	Interior Strip	Flexure	33%	0.091
	BUS9	39.60	1.08	Yes	Interior Strip	Flexure	33%	0.091
	BUS10	39.60	1.08	Yes	Interior Strip	Flexure	33%	0.091
	BUS11	42.54	0.98	No	Interior Strip	Flexure	33%	0.091
Honolulu Fire Department Trucks	HFD1	38.40	1.36	Yes	Interior Strip	Flexure	33%	0.091
	HFD2	42.74	1.36	Yes	Interior Strip	Flexure	33%	0.091
	HFD3	43.50	1.36	Yes	Interior Strip	Flexure	33%	0.091
	HFD4	49.80	1.21	Yes	Interior Strip	Flexure	33%	0.091
	HFD5	49.80	1.21	Yes	Interior Strip	Flexure	33%	0.091
	HFD6	49.80	1.21	Yes	Interior Strip	Flexure	33%	0.091
	HFD7	52.20	1.04	Yes	Interior Strip	Flexure	33%	0.091
	HFD8	62.74	0.89	No	Interior Strip	Flexure	33%	0.091
	HFD9	73.50	0.75	No	Interior Strip	Flexure	33%	0.091
	HFD10	59.24	1.31	Yes	Interior Strip	Flexure	33%	0.091
	HFD11	60.00	0.98	No	Interior Strip	Flexure	33%	0.091
	HFD12	51.18	1.03	Yes	Interior Strip	Flexure	33%	0.091
	HFD13	58.00	0.91	No	Interior Strip	Flexure	33%	0.091
	HFD14	44.00	1.09	Yes	Interior Strip	Flexure	33%	0.091
	HFD15	44.00	1.09	Yes	Interior Strip	Flexure	33%	0.091
	HFD16	44.00	1.36	Yes	Interior Strip	Flexure	33%	0.091
	HFD17	42.74	1.36	Yes	Interior Strip	Flexure	33%	0.091
	HFD18	76.60	1.00	Yes	Interior Strip	Flexure	33%	0.091
	HFD19A	77.56	0.96	No	Interior Strip	Flexure	33%	0.091
	HFD19B	77.56	0.76	No	Interior Strip	Flexure	33%	0.091
	HFD20A	87.56	0.96	No	Interior Strip	Flexure	33%	0.091
	HFD20B	87.56	0.76	No	Interior Strip	Flexure	33%	0.091
	HFD21	42.00	1.36	Yes	Interior Strip	Flexure	33%	0.091
	HFD22	37.00	1.42	Yes	Interior Strip	Flexure	33%	0.091

Substructure Rating Summary

Substructure Rated (Y/N): N

Recommended Refuse Vehicle

Recommended Refuse LR Factor:	1.01
Recommended Refuse Load Model:	REF1
Recommended Max Payload:	FULL

*Payload is the Allowable Vehicle Load Carrying Capacity

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
- ☐ Connections do not control the bridge load rating
- ☐ Exterior strip controls the bridge load rating
- ☐ Bridge plans do not exist - Rating based on judgement and current loading

Quality Control/Quality Assurance

Load Rating Engineer
- Name: Norman Nagamine
- License No.: 5479-S
- Signature: Norman Nagamine

Load Rating Checked By: Colin Kodama
Quality Assurance By: Karl Umemoto
Load Rating Date: 6/8/20

Remarks/Recommendations for Bridges without Plans

*Refuse (REF) vehicles may travel over the bridge at the reduced allowable payload indicated.

SECTION 3.0 – BrM ELEMENT AND SI&A REPORTS

BrM Element and SI&A Reports for this inspection cycle are provided on the following pages.

STATE OF HAWAII
CITY & COUNTY OF HONOLULU
BRIDGE INSPECTION REPORT

Inspection Date: September 01, 2021

Bridge Number: 003923001100001 Bridge Name: FARRINGTON HWY BRIDGE # 1

County Oahu Route No: 09107 Milepost: 0 Facility: FARR HWY

NBI ITEM 36 - TRAFFIC SAFETY FEATURES		List any maintenance work required: (ie: defects, missing bolts, collision damage, etc.)
36A	Bridge Railings	36A: See Element Defects below.
36B	Transitions	36C, 36D: See Appendix A.
36C	Approach Guardrail	
36D	Approach Guardrail Ends	

ELEMENT INSPECTION

ELEM NO. / DEFECT	ELEMENT / DEFECT DESCRIPTION	ENV.	TOTAL QUANTITY	UNIT	CS 1 (Good)	CS 2 (Fair)	CS 3 (Poor)	CS 4 (Severe)
38	Re Concrete Slab	1	1,126	sq.ft	1,108	18	0	0
1080	Delamination/Spall/Patched		8	sq.ft	0	8	0	0
1120	Efflorescence/Rust Staining		10	sq.ft	0	10	0	0
510	Wearing Surfaces		623	sq.ft	623	0	0	0
Defect No. 1080: - 8'x1' delamination (8SF CS2) at upstream edge of slab soffit, adjacent to Abutment 2 (Photo 17) Defect No. 1120: - Longitudinal crack with surface white efflorescence (10SF CS2) on slab soffit (Photo 18)								
215	Re Conc Abutment	1	138	ft	131	7	0	0
1080	Delamination/Spall/Patched		3	ft	0	3	0	0
1130	Cracking (RC and Other)		4	ft	0	4	0	0
Defect No. 1080: - 3'x2' delamination (3FT CS2) on Abutment 1 (Photo 22) Defect No. 1130: - Moderate width cracks (4FT CS2) on both abutments (Photo 23)								
313	Fixed Bearing	1	1	each	1	0	0	0
316	Other Bearing	1	1	each	1	0	0	0
331	Re Conc Bridge Railing	1	57	ft	55	2	0	0
1080	Delamination/Spall/Patched		2	ft	0	2	0	0
7000	Damage		2	ft	0	2	0	0
Defect No. 1080/7000: - 1'-6"x6" spall (2FT CS2) on downstream railing at east end of bridge (Photo 15)								

NBI ITEM CONDITION RATINGS			Describe defects noted during bridge inspection. Provide sketches, diagrams, and photographs where possible.
58	Deck	6	See bridge element/defect notes and descriptions listed for defects noted during inspection. See also report, photographs and figures for defects noted during inspection.
59	Superstructure	6	
60	Substructure	6	
61	Channel and Channel Protection	6	
62	Culvert	N	
71	Waterway Adequacy	6	

NBI ITEM 93 - CRITICAL FEATURE INSPECTION		REQUIRED	FREQUENCY	CURRENT	NEXT
93A	Fracture Critical Details	N			1/1/01
93B	Underwater Inspection	N		6/23/11	1/1/01

OTHER FEATURES			REMARKS
Posted Status (NBI Item 41)	P - Posted for load		EV Posted Weight Limits: Single Axle = 16 tons, Tandem = 20 tons, Gross = 28 tons
Posted Weight Limit	(Posted limit (Tons) or 'N' if not applicable)	18	
Signing for Posting Legible/Visible? (Provide 2 pictures of signs. 1 on each end of bridge)	(Y or N)	Y	
Riding Surface (Roughness) Rating	(3 - smooth, 2 - Avg, 1 - Poor)	2	

REPAIRS, IMPROVEMENTS AND RECOMMENDATIONS

List all work done to this bridge since last inspection (ie: structural repair work, cleaning, maintenance work, etc.)

List proposed and/or recommended work for this bridge including estimated cost (ie: structural repair work, cleaning, maintenance, etc.)

- Upgrade approach guardrails and guardrail end treatments to current acceptable standards (Off-Bridge Repair Item)
- Upgrade bridge railings to current acceptable standards (Est. Cost = $120,000)
- Remove vegetation in channel at upstream and downstream sides of bridge (Est. Cost = $50,000)

Other comments or observations.

Inspector: Noe Lum **Signature:** _____ **Phone:** 808-488-7579

Team Leader: **Signature:** _____ **Phone:** 808-488-7579

Glenn Miyasato

Office: MKE Associates LLC **Certification Date:** 06/15/2017

BIP Leader: **Signature:** _____ **QC Date:** _____

Office: C&C Honolulu

Attachments:

Structural Inventory & Appraisal (SI&A) Sheet

Photos

State of Hawaii
Department of Transportation
Structure Inventory and Appraisal Sheet (English Units)

Name: **FARRINGTON HWY BRIDGE # 1** Bridge No: **003923001100001** Inspection Date: 09/01/2021

IDENTIFICATION

Rte.(On/Under)	**5A:**	Route On Structure	**State**	**1:**	15 Hawaii
Rte. Signing Prefix	**5B:**	5 City Street	**Facility Carried**	**7:**	FARR HWY
Level of Service	**5C:**	0 None of the below	**Place Code**	**4:**	
Route Number	**5D:**	09107	**SHD District**	**2:**	25 Oahu
Directional Suffix	**5E:**	0 N/A (NBI)	**Feature Intersected**	**6:**	FARR HWY/KALOI GULCH
Border Bridge Code	**98:**	Unknown (P)	**County Code**	**3:**	Oahu
Border Bridge Number	**99:**	NA	**Location**	**9:**	TMK=8-1-17
Mile Post	**11:**	NA	**Latitude**	**16:**	21° 21' 49"
Struc Num	**8:**	003923001100001	**Longitude**	**17:**	158° 03' 15"

INSPECTION

Inspection Date	**90:**	9/1/2021	**Frequency**	**91:**	24 months	**Next Inspection:**	9/1/2023
FC Inspection Date	**93A:**	NA	**FC Frequency**	**92A:**		**Next FC Inspection:**	NA
UW Inspection Date	**93B:**	NA	**UW Frequency**	**92B:**		**Next UW Inspection:**	NA

CONDITION

Deck	**58:**	6 Satisfactory	**Super**	**59:**	6 Satisfactory	**Sub**	**60:** 6 Satisfactory
Culvert	**62:**	N N/A (NBI)	**Channel/Channel Protection**	**61:**	6 Bank Slumping		

SD/FO: ND
SUFF RATE: 63.5

LOAD RATING AND POSTING

Inventory Rating Method	**65:**	8 LRFR (HL93)	**Operating Rating Method**	**63:**	8 LRFR (HL93)
Inventory Rating	**66:**	0.46	**Operating Rating**	**64:**	0.60
Design Load	**31:**	2 M 13.5 (H 15)	**Posting**	**70:**	1 30.0-39.9%below
Posting Status	**41:**	P - Posted for load			

GEOMETRIC DATA

Length Max Span	**48:**	23.95 ft	**Structure Length**	**49:**	25.92 ft
Width Curb to Curb	**51:**	40.03 ft	**Curb/Sdwlk Width L**	**50A:**	8.86 ft
Approach Roadway width (w/ shoulders)	**32:**	37.07 ft	**Curb/Sidewalk Width R**	**50B:**	8.86 ft
			Width Out to Out	**52:**	42.65 ft
Deck Area:		1,108.68 sq. ft	**Median**	**33:**	0 No median
Skew	**34:**	10.00°	**Structure Flared**	**35:**	0 No flare
Vertical Clearance	**10:**	99.99 ft	**Horizontal Clearance**	**47:**	21.98 ft
Min. Vert. Cl. Over Bridge	**53:**	99.99 ft	**Min. Lat. Undercl. Ref. R**	**55A:**	N Feature not hwy or RR
Min. Vert. Undercl. Ref.	**54A:**	N Feature not hwy	**Min. Lat. Undercl. R**	**55:**	0.00 ft
Min. Vert. Undercl.	**54B:**	0.00 ft	**Min. Lat. Undercl. L**	**56:**	0.00 ft

AGE AND SERVICE

Year Built	**27:**	1941	**ADT**	**29:**	5,213
Type of Service on	**42A:**	1 Highway	**Year Reconstructed**	**106:**	-1
Type of Service under	**42B:**	5 Waterway	**Detour Length**	**19:**	9.9 mi
Lanes on	**28A:**	2	**Truck ADT**	**109:**	0%
Lanes under	**28B:**	0	**Year of ADT**	**30:**	1980

STRUCTURE TYPE AND MATERIALS

Deck Type	**107:**	1 Concrete-Cast-in-Place	**Number of Spans Main Unit**	**45:**	1
Wearing Surface	**108A:**	6 Bituminous	**Main Span Material Design**	**43A:**	1 Concrete
Membrane	**108B:**	0 None	**Main Span Material Design**	**43B:**	01 Slab
Deck protection	**108C:**	None	**Number of Approach Spans**	**46:**	0

State of Hawaii

Department of Transportation

Structure Inventory and Appraisal Sheet (English Units)

APPRAISAL					
Bridge Rail	36A:	0 Substandard	**Approach Rail**	36C:	0 Substandard
Transition	36B:	N N/A or not required	**Approach Rail Ends**	36D:	0 Substandard
Str Evaluation	67:	3 Intolerable - Correct	**Deck Geometry**	68:	5 Above Tolerable
Waterway Adequacy	71:	6 Equal Minimum	**Approach Alignment**	72:	7 Above Min Criteria
Scour Critical	113:	8 Stable Above Footing	**Vert. & Horiz. Undercl.**	69:	N Not applicable (NBI)
CLASSIFICATION					
Defense Highway	100:	0 Not a STRAHNET hwy	**Parallel Structure**	101:	No || bridge exists
Direction of Traffic	102:	2 2-way traffic	**Temporary Structure**	103:	Unknown (NBI)
Highway System	104:	3 On free road	**NBIS Length**	112:	Long Enough
Defense Hwy	110:	0 Not on NHS	**Functional Class**	26:	02 Rural Other Princ
Toll Facility	20:	0 Not a STRAHNET hwy	**Historical Significance**	37:	5 Not eligible for NRHP
Owner	22:	County Hwy Agency	**Custodian**	21:	County Hwy Agency
PROPOSED IMPROVEMENTS					
Bridge Cost	94:	$0	**Type of Work**	75:	38 Other Structural
Roadway Cost	95:	$15,000	**Length of Improvement**	76:	0.0 ft
Total Cost	96:	$231,000	**Future ADT**	114:	6,516
Year of Cost Estimate	97:	2000	**Year of Future ADT**	115:	2025
NAVIGATION DATA					
Navigation Control	38:	Permit Not Required	**Horizontal Clearance**	40:	0.0 ft
Vertical Clearance	39:	0.0 ft	**Lift Bridge Vert. Cl.**	116:	
Pier Protection	111:	Unknown (NBI)			