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APPENDICIES

SECTION 1.0 – INSPECTION SUMMARY

1.1 BRIDGE DESCRIPTION

Year Built	1922
Lanes on Bridge	2 vehicle lanes
Sidewalk(s)	None
No. of Spans	1
Bridge Posting Sign(s)	None
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	N/A
Bridge Railing Material	Reinforced concrete railing
Bridge Railing Height	2'-6"

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

- Job Number: N/A
- Structure Name: N/A
- Project Name: Waianae Road, Ewa Junction to Sta. 409+00, Concrete Slab Bridge Station 145+35
- Year Approved: 1922
- File Number: 4-10-1-36

Abutment 1 and Abutment 2 are at the south and north 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	All sides of the 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 in poor condition. Periodic bridge inspections are recommended to occur within 24-month intervals as specified in the National Bridge Inspection Standards (NBIS). 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, 0, 0, 0	0, 0, 0, 0
#58	Deck	4	4
#59	Superstructure	4	4
#60	Substructure	7	7
#61	Channel & Channel Protection	5	5
#62	Culvert	N	N
#67	Structural Evaluation	4	4
#71	Waterway Adequacy Comments: Observed conditions appear similar to the 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 not posted for reduced load carrying capacity. 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 September 13, 2019 by Nagamine Okawa Engineers Inc. The most recent load rating was performed on July 15, 2014 by Nagamine Okawa Engineers Inc. See the following load rating summary sheet.

CITY AND COUNTY OF HONOLULU
DEPARTMENT OF DESIGN AND CONSTRUCTION
CIVIL DESIGN AND ENGINEERING DIVISION

Existing Bridge Data — **Bridge Load Rating Summary**

Structure Number:	003902001100001	Last Load Rating Date:	1/21/2012
Bridge Name:	902-Farrington Hwy Bridge No. 3	Last Inspection Date:	2/6/2014
Bridge Number:	-	Inspected By:	Nagamine Okawa
District:	Ewa	Fracture Critical Member (Y/N):	N
Span Type:	RC-Slab Bridge	Item 58, Deck Rating:	5
Bridge Plans Available (Y/N):	Y	Item 59, Superstructure Rating:	5
Design Loading:	-	Item 60, Substructure Rating:	7
Past Inventory Rating (HL-93):	26.2	Bridge Load Posted (Y/N):	Y
Past Operating Rating (HL-93):	42.5	Posted Weight Limit:	-

Bridge Load Rating Summary

Dead Load Data

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

LRFR Evaluation Factors

Surface Roughness Rating:	2
Condition Factor:	0.90
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	0.63	Ext Strip	Flexure	33%	0.179 (M)
	HL-93 (OPR)	N/A	0.82	Ext Strip	Flexure	33%	0.179 (M)
Legal Load	Type 3	50.0	1.41	Ext Strip	Flexure	33%	0.179 (M)
	Type 3S2	72.0	1.55	Ext Strip	Flexure	33%	0.179 (M)
	Type 3-3	80.0	1.72	Ext Strip	Flexure	33%	0.179 (M)
	NRL	80.0	1.06	Ext Strip	Flexure	33%	0.179 (M)
	SU4	54.0	1.20	Ext Strip	Flexure	33%	0.179 (M)
	SU5	62.0	1.13	Ext Strip	Flexure	33%	0.179 (M)
	SU6	69.5	1.06	Ext Strip	Flexure	33%	0.179 (M)
	SU7	77.5	1.06	Ext Strip	Flexure	33%	0.179 (M)

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	N/A	-	-	-	-	-
Permit Load	N/A	-	-	-	-	-

Posting Analysis Summary

Governing Legal Load Rating Factor:	1.06
Governing Legal Load Model:	NRL,SU6,SU7
Posting Recommended (Y/N):	N
Recommended Posting Load:	-

Please check the following boxes that apply:

- [x] Bridge load rating is not governed by deck rating
- [x] Bridge load rating is not governed by substructure rating
- [x] 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

Quality Control/Quality Assurance

Load Rating Engineer

- Name:	Norman Nagamine
- License No.:	5479-S
- Signature:	Norman Nagamine
Load Rating Checked By:	Joshua Tyau
Quality Assurance By:	Karl Umemoto
Load Rating Date:	7/15/14

Remarks/Recommendations for Bridges without Plans

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 03, 2021

Bridge Number: 003902001100001 Bridge Name: FARRINGTON HWY BRIDGE # 3

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, 36C, 36D: See Appendix A
36B	Transitions	
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	572	sq.ft	440	0	132	0
1080	Delamination/Spall/Patched		60	sq.ft	0	0	60	0
1090	Exposed Rebar		72	sq.ft	0	0	72	0

Defect No. 1080:
- 3'x1' delamination (3SF CS3) on upstream face of slab adjacent to Abutment 1 (Photo 21)
- 14'x2' delamination (28SF CS3) on slab soffit along Abutment 1 starting from upstream end (Photo 22)
- 8'x2' delamination (16SF CS3) on slab soffit along Abutment 1, 5' from downstream end (Photo 23)
- 2'x2' delamination and spall with exposed rebar (4SF CS3) on downstream face of slab at Abutment 2 (Photo 24)
- 5'x1' delamination (5SF CS3) on slab soffit along Abutment 2, 12' from downstream end
- 4'x1' delamination (4SF CS3) on slab soffit along Abutment 2, 22' from downstream end

Defect No. 1090:
- 2'x2' spall with exposed rebar with 0.0123 sq. in section loss (4SF CS3) on slab soffit at downstream end of slab soffit adjacent to Abutment 1 (Photo 25)
- 12'x2' spall with exposed rebar with 0.0123 sq. in section loss (24SF CS3) on slab soffit along Abutment 1, 10' from downstream end (Photo 26)
- 10'x2' spall with exposed rebar with 0.0123 sq. in section loss (20SF CS3) on slab soffit along Abutment 2 starting from upstream end (Photo 27)
- 8'x3' spall with exposed rebar with 0.0123 sq. in section loss (24SF CS3) on slab soffit along Abutment 2 starting from downstream end (Photo 28)

215	Re Conc Abutment	1	72	ft	71	1	0	0
1130	Cracking (RC and Other)		1	ft	0	1	0	0

Defect No. 1130:
- Moderate width vertical crack (1FT CS2) on Abutment 2 (Photo 27)

331	Re Conc Bridge Railing	1	44	ft	9	21	14	0
1080	Delamination/Spall/Patched		27	ft	0	16	11	0
1090	Exposed Rebar		3	ft	0	0	3	0
1130	Cracking (RC and Other)		5	ft	0	5	0	0

Defect No. 1080:
- 3'x3'x4" spall with exposed rebar (3FT CS3) on exterior face of upstream railing, 2' from north end (Photo 10)
- 9"x1'-8"x2-1/2" spall (1FT CS3) on interior face of upstream railing, 2' from north end (concurrent with 3'x3'x4" spall noted above) (Photo 11)
- 5'-3"x1'-6"x3" spall with exposed rebar (6FT CS3) on exterior face of upstream railing, 10' from north end (Photo 12)
- 4'x1'-6"x2" spall with exposed rebar (4FT CS3) on exterior face of upstream railing, 2' from south end (Photo 13)
- Delamination (8FT CS2) on exterior face of upstream railing (Photo 14)
- Typical sound concrete patches (8FT CS2) on exterior face of downstream railing (Photo 15)

Defect No. 1090:
- 1'x1'-6"x2" and 1'x1'x2" spalls with exposed rebar with 0.31 sq. in section loss (2 FT CS3) on interior face of upstream railing, 10' and 12' from north end (concurrent with 5'-3"x1'-6"x3" spall noted above) (Photos 16 & 17)
- 1'x1'-6"x2" spall with exposed rebar with 0.31 sq. in section loss (1 FT CS3) on interior face of upstream railing, 14' from north end (Photo 18)

Defect No. 1130:
- Moderate width cracks (5FT CS2) on both bridge railings (Photo 19)

NBI ITEM CONDITION RATINGS			Describe defects noted during bridge inspection. Provide sketches, diagrams, and photographs where possible.
58	Deck	4	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	4	
60	Substructure	7	
61	Channel and Channel Protection	5	
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			1/1/01

OTHER FEATURES			REMARKS
Posted Status (NBI Item 41)	A - Open, no restriction		
Posted Weight Limit	(Posted limit (Tons) or 'N' if not applicable)	N	
Signing for Posting Legible/Visible? (Provide 2 pictures of signs. 1 on each end of bridge)	(Y or N)		
Riding Surface (Roughness) Rating	(3 - smooth, 2 - Avg, 1 - Poor)	3	

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 bridge railings to current acceptable standards (Est. Cost = $90,000)
- Repair guardrail and install transitions and guardrail end treatments to current acceptable standards (Off-Bridge Repair Item)
- Repair spalls/delaminations/exposed rebars on bridge railings (Est. Cost = $18,000)
- Repair spalls/delaminations/exposed rebars on slab soffit (Est. Cost = $105,600)

Other comments or observations.

Inspector: **Signature:** _____ **Phone:** 808-488-7579
Amar P Jaishi

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

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

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

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

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 # 3** Bridge No: **003902001100001** Inspection Date: 09/03/2021

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/PALEHUA STRM
Border Bridge Code	98:	Unknown (P)	County Code	3:	Oahu
Border Bridge Number	99:	NA	Location	9:	TMK=9-1-16
Mile Post	11:	NA	Latitude	16:	21° 21' 07"
Struc Num	8:	003902001100001	Longitude	17:	158° 03' 47"

INSPECTION

Inspection Date	90:	9/3/2021	Frequency	91:	24 months	Next Inspection:	9/3/2023
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:	4 Poor	Super	59:	4 Poor	Sub	60: 7 Good
Culvert	62:	N N/A (NBI)	Channel/Channel Protection	61:	5 Bank Prot Erode	SD/FO:	SD
						SUFF RATE:	22.8

LOAD RATING AND POSTING

Inventory Rating Method	65:	8 LRFR (HL93)	Operating Rating Method	63:	8 LRFR (HL93)
Inventory Rating	66:	0.63	Operating Rating	64:	0.82
Design Load	31:	4 M 18 (H 20)	Posting	70:	5 At/Above Legal Loads
Posting Status	41:	A - Open, no restriction			

GEOMETRIC DATA

Length Max Span	48:	20.01 ft	Structure Length	49:	21.98 ft
Width Curb to Curb	51:	23.95 ft	Curb/Sdwlk Width L	50A:	0.00 ft
Approach Roadway width (w/ shoulders)	32:	38.06 ft	Curb/Sidewalk Width R	50B:	0.00 ft
			Width Out to Out	52:	26.90 ft
Deck Area:		592.02 sq. ft	Median	33:	0 No median
Skew	34:	45.00°	Structure Flared	35:	0 No flare
Vertical Clearance	10:	99.99 ft	Horizontal Clearance	47:	23.95 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:	1922	ADT	29:	5,685
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:	1983

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:	0 Substandard	**Approach Rail Ends**	36D:	0 Substandard
Str Evaluation	67:	4 Minimum Tolerable	**Deck Geometry**	68:	2 Intolerable - Replace
Waterway Adequacy	71:	6 Equal Minimum	**Approach Alignment**	72:	8 Equal Desirable Crit
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:	$10,000	**Length of Improvement**	76:	42.7 ft
Total Cost	96:	$157,000	**Future ADT**	114:	7,106
Year of Cost Estimate	97:	2004	**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)			