

BRIDGE INSPECTION, INVENTORY AND APPRAISAL III, FY 2016

**FARRINGTON HIGHWAY BOX CULVERT 1 OVER DITCH
BRIDGE NO. 935**



Prepared for:

**CITY AND COUNTY OF HONOLULU
DEPARTMENT OF DESIGN AND CONSTRUCTION
CONTRACT NO. SC-DDC-1600113**



50 S. Beretania Street, #C-119C
Honolulu, HI 96813

NOVEMBER 2016

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A handwritten signature in black ink that reads "Michael P. Hunnemann".

This work has been prepared by me or under my supervision.



50 S. Beretania Street, #C-119C
Honolulu, HI 96813

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SECTION 1.0 - BRIDGE DESCRIPTION

1.1 LOCATION

The culvert is located on Farrington Highway in Kapolei on the island of Oahu.

1.2 DESCRIPTION

The existing structure is a reinforced concrete box culvert.

- Year Built:** 1922
- Tax Map Key (TMK):** 9-1-17
- Spans:** 1
- No. of Traffic Lanes:** 2
- Bridge Rails:** W-beam guardrail
- Sidewalks:** None
- Wearing Surface:** A.C. wearing surface
- Culvert:** Reinforced Concrete
- Channel:** Natural
- Utilities:** None
- Skew:** 0°
- Clear Span of Bridge:** 6'
- Roadway Width Curb to Curb:** 22'
- Total Bridge Width Out to Out:** 27'
- Global Positioning System (GPS):**

	DATUM (NAD83)
Latitude (N)	021° 21' 18"
Longitude (W)	158° 03' 43"

SECTION 2.0 - PREVIOUS INSPECTIONS

2.1 INSPECTION HISTORY

Previous Bridge Inspection Reports and Bridge Appraisal Sheets on file with the City and County of Honolulu are dated: 8/3/1972, 8/4/1975, 7/10/1980, 6/20/1984, 8/8/1988, 4/16/1990, 5/2/1996, 3/2/2004, 11/19/2013.

2.2 LIST OF PREVIOUS SIGNIFICANT OBSERVATIONS

- Upstream guardrail failed
- Heavy vegetation in channels
- 6"-12" of freeboard height at each culvert end

SECTION 3.0 - OBSERVATIONS

3.1 TRAFFIC FEATURES

- Culvert railings do not appear to be crash tested
- The upstream guardrail is in a failed state and has been since before the 1996 inspection of the culvert (see Photo 9)

3.2 DECK

- A.C. wearing surface is in satisfactory condition

3.3 SUPERSTRUCTURE

N/A

3.4 SUBSTRUCTURE

N/A

3.5 CULVERT

- Corroded upstream guardrail posts embeddings in upstream headwall (see Photo 14)
- Spall measuring 8" high x 16" wide x 1" deep occurring at the top East corner of the upstream headwall (see Photo 15)
- 12" long x 72" wide area of delamination occurring in culvert soffit at inlet (see Photo 17)
- Spall measuring 10' long x 30" wide x 2" deep with 8 exposed reinforcing bars occurring in culvert soffit near outlet above the East culvert wall (see Photo 18)
- Spall measuring 10' long x 24" wide x 2" deep with 8 exposed reinforcing bars occurring in culvert soffit near outlet above the West culvert wall (see Photo 19)
- Scaling occurring along the top 12" of the culvert walls (see Photo 22)
- Scattered spalls occurring throughout downstream headwall (see Photo 25)

3.6 STREAM OVERVIEW

- Concrete block built at outlet leaves only the top 16" of the culvert for water to flow through (see Photo 26)

3.7 COMPARISON WITH PREVIOUS INSPECTION

The culvert appears to have been recently cleaned so inspection inside the culvert was possible. Extensive spalling was discovered during this inspection in the culvert soffit with many exposed reinforcing bars,

SECTION 4.0 - LOAD RATINGS

4.1 LOAD RATINGS

This structure is not posted for reduced load carrying capacity. The visual inspection of the structure found no evidence of overload or over stress. Load rating calculations were completed for this structure. The load rating summary can be found on the next page. The calculations are located in Appendix E.

**City and County of Honolulu
Bridge Load Rating Summary**

Existing Bridge Data

Bridge Number:	935	Last Load Rating Date:	11/23/2016
Bridge Name:	Farrington Hwy Box Culv No. 1	Last Inspection Date:	10/6/2016
Structure Number:		Inspected By:	KAI Hawaii
District:		Fracture Critical Members (Y/N):	N
Span Type:	Reinforced Concrete Box Culvert	Item 58, Deck Rating:	N
Bridge Plans Available (Y/N):	Y	Item 59, Superstructure Rating:	N
Design Loading:		Item 60, Substructure Rating:	N
Past Inventory Rating:		Bridge Load Posted (Y/N):	N
Past Operating Rating:		Posted Weight Limit:	N/A

Bridge Load Rating Summary

Dead Load Data		LRFR Evaluation Factors:	
Overlay Type:	Asphalt	Surface Roughness Rating:	2
Overlay Depth (IN):	3	Condition Factor:	1.00
Was Overlay Depth Measured (Y/N):	N	System Factor:	1.00
Weight of Utilities:	N/A	ADTT (one way):	Unknown
Weight of other Non-Structural Attachments:	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	Middle of top slab, inside face	Flexure	33.0%	0.138
	HL-93 (OPR)	N/A	Middle of top slab, inside face	Flexure	33.0%	0.138
Legal Load	Type 3	50.0	Middle of top slab, inside face	Flexure	33.0%	0.138
	Type 3S2	72.0	Middle of top slab, inside face	Flexure	33.0%	0.138
	Type 3-3	80.0	Middle of top slab, inside face	Flexure	33.0%	0.138
	NRL	80.0	Middle of top slab, inside face	Flexure	33.0%	0.138
	SU4	54.0	Middle of top slab, inside face	Flexure	33.0%	0.138
	SU5	62.0	Middle of top slab, inside face	Flexure	33.0%	0.138
	SU6	69.5	Middle of top slab, inside face	Flexure	33.0%	0.138
Permit Load	SU7	77.5	Middle of top slab, inside face	Flexure	33.0%	0.138
	HP1	120.0	Middle of top slab, inside face	Flexure	33.0%	0.138
	HP2	157.0	Middle of top slab, inside face	Flexure	33.0%	0.138
	HP3	209.9	Middle of top slab, inside face	Flexure	33.0%	0.138

Substructure Rating Summary

Substructure Rated (Y/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/R	-	-	-	-	-
Permit Load	N/R	-	-	-	-	-

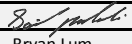
Posting Analysis Summary

Governing Rating Factor:	1.42
Governing Load Model:	Type 3
Posting Recommended (Y/N):	N
Recommended Posting Load:	-

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 - Rated based on judgement and current loading

Quality Control/Quality Assurance

Load Rating Engineer Name:	Saeid Pourjalali
Load Rating Engineer License No.:	11475
Load Rating Engineer Signature:	
Load Ratings Checked By:	Bryan Lum
Quality Assurance By:	Mike Hunnemann
Load Rating Date:	11/23/2016

Remarks/Recommendations for Bridges without Plans

**City and County of Honolulu
Bridge Load Rating Summary**

Existing Bridge Data

Bridge Number:	935	Last Load Rating Date:	11/23/2016
Bridge Name:	Farrington Hwy Box Culv No. 1	Last Inspection Date:	10/6/2016
Structure Number:		Inspected By:	KAI Hawaii
District:		Fracture Critical Members (Y/N):	N
Span Type:	Reinforced Concrete Box Culvert	Item 58, Deck Rating:	N
Bridge Plans Available (Y/N):	Y	Item 59, Superstructure Rating:	N
Design Loading:		Item 60, Substructure Rating:	N
Past Inventory Rating:		Bridge Load Posted (Y/N):	N
Past Operating Rating:		Posted Weight Limit:	N/A

Bridge Load Rating Summary

Dead Load Data		LRFR Evaluation Factors:	
Overlay Type:	Asphalt	Surface Roughness Rating:	2
Overlay Depth (IN):	3	Condition Factor:	1.00
Was Overlay Depth Measured (Y/N):	N	System Factor:	1.00
Weight of Utilities:	N/A	ADTT (one way):	Unknown
Weight of other Non-Structural Attachments:	N/A		

Superstructure/Deck Rating Summary

Vehicle Type	Vehicle GVW (Kips)	Rating Factor	Controlling Member	Controlling Load Effect	IM	Live Load Distribution Factor	
Refuse Vehicles	REF1	51.00	1.29	Middle Of Top Slab, Inside face	Flexure	33.0%	0.138
	REF2	57.18	1.21	Middle Of Top Slab, Inside face	Flexure	33.0%	0.138
	REF3	45.94	1.42	Middle Of Top Slab, Inside face	Flexure	33.0%	0.138
	REF4	57.50	1.23	Middle Of Top Slab, Inside face	Flexure	33.0%	0.138
Buses	BUS1	30.99	1.18	Middle Of Top Slab, Inside face	Flexure	33.0%	0.138
	BUS2	39.60	0.96	Middle Of Top Slab, Inside face	Flexure	33.0%	0.138
	BUS3	39.60	0.96	Middle Of Top Slab, Inside face	Flexure	33.0%	0.138
	BUS4	64.38	0.95	Middle Of Top Slab, Inside face	Flexure	33.0%	0.138
	BUS5	67.24	0.84	Middle Of Top Slab, Inside face	Flexure	33.0%	0.138
	BUS6	67.78	0.87	Middle Of Top Slab, Inside face	Flexure	33.0%	0.138
	BUS7	66.79	0.86	Middle Of Top Slab, Inside face	Flexure	33.0%	0.138
	BUS8	39.90	0.89	Middle Of Top Slab, Inside face	Flexure	33.0%	0.138
	BUS9	39.60	0.96	Middle Of Top Slab, Inside face	Flexure	33.0%	0.138
	BUS10	39.60	0.96	Middle Of Top Slab, Inside face	Flexure	33.0%	0.138
	BUS11	42.54	0.86	Middle Of Top Slab, Inside face	Flexure	33.0%	0.138
Honolulu Fire Department Trucks	HFD1	38.40	1.00	Middle Of Top Slab, Inside face	Flexure	33.0%	0.138
	HFD2	42.74	1.00	Middle Of Top Slab, Inside face	Flexure	33.0%	0.138
	HFD3	43.50	1.00	Middle Of Top Slab, Inside face	Flexure	33.0%	0.138
	HFD4	49.80	0.89	Middle Of Top Slab, Inside face	Flexure	33.0%	0.138
	HFD5	49.80	0.89	Middle Of Top Slab, Inside face	Flexure	33.0%	0.138
	HFD6	49.80	0.89	Middle Of Top Slab, Inside face	Flexure	33.0%	0.138
	HFD7	52.20	0.76	Middle Of Top Slab, Inside face	Flexure	33.0%	0.138
	HFD8	62.74	1.09	Middle Of Top Slab, Inside face	Flexure	33.0%	0.138
	HFD9	73.50	0.92	Middle Of Top Slab, Inside face	Flexure	33.0%	0.138
	HFD10	59.24	1.00	Middle Of Top Slab, Inside face	Flexure	33.0%	0.138
	HFD11	60.00	1.20	Middle Of Top Slab, Inside face	Flexure	33.0%	0.138
	HFD12	51.18	1.27	Middle Of Top Slab, Inside face	Flexure	33.0%	0.138
	HFD13	58.00	1.20	Middle Of Top Slab, Inside face	Flexure	33.0%	0.138
	HFD14	44.00	0.79	Middle Of Top Slab, Inside face	Flexure	33.0%	0.138
	HFD15	44.00	0.80	Middle Of Top Slab, Inside face	Flexure	33.0%	0.138
	HFD16	44.00	0.99	Middle Of Top Slab, Inside face	Flexure	33.0%	0.138
	HFD17	42.74	1.00	Middle Of Top Slab, Inside face	Flexure	33.0%	0.138
	HFD18	76.60	0.77	Middle Of Top Slab, Inside face	Flexure	33.0%	0.138
	HFD19A	77.56	0.90	Middle Of Top Slab, Inside face	Flexure	33.0%	0.138
	HFD19B	77.56	0.92	Middle Of Top Slab, Inside face	Flexure	33.0%	0.138
	HFD20A	87.56	0.90	Middle Of Top Slab, Inside face	Flexure	33.0%	0.138
	HFD20B	87.56	0.92	Middle Of Top Slab, Inside face	Flexure	33.0%	0.138
HFD21	42.00	1.00	Middle Of Top Slab, Inside face	Flexure	33.0%	0.138	
HFD22	37.00	1.05	Middle Of Top Slab, Inside face	Flexure	33.0%	0.138	

Substructure Rating Summary

Substructure Rated (Y/N):	-
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Recommended Refuse Vehicle

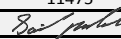
Recommended Refuse LR Factor:	1.21
Recommended Refuse Load Model:	ALL
Recommended Max Payload:	FULL

*Payload is 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 girder controls the bridge load rating
- Bridge plans do not exist - Rated based on judgement and current loading

Quality Control/Quality Assurance

Load Rating Engineer Name:	Saeid Pourjalali
Load Rating Engineer License No.:	11475
Load Rating Engineer Signature:	
Load Ratings Checked By:	Bryan Lum
Quality Assurance By:	Mike Hunnemann
Load Rating Date:	2/28/2017

Remarks/Recommendations for Bridges without Plans

SECTION 5.0 - GENERAL CONDITION ASSESSMENT

5.1 CONDITION ASSESSMENT

In general, the culvert is in poor condition.

5.2 MAINTENANCE RECOMMENDATIONS

MAINTENANCE RECOMMENDATIONS
No maintenance recommendations at this time.

5.3 REPAIR RECOMMENDATIONS

In consideration of the limited resources available for bridge rehabilitation, the City should prioritize the remediation of the deficiencies as it deems to be appropriate.

REPAIR RECOMMENDATIONS	ESTIMATED COST
Upgrade bridge railings	\$10000.00
Repair spalls in culvert headwalls and soffit	\$30000.00

APPENDIX A

Location and Vicinity Maps

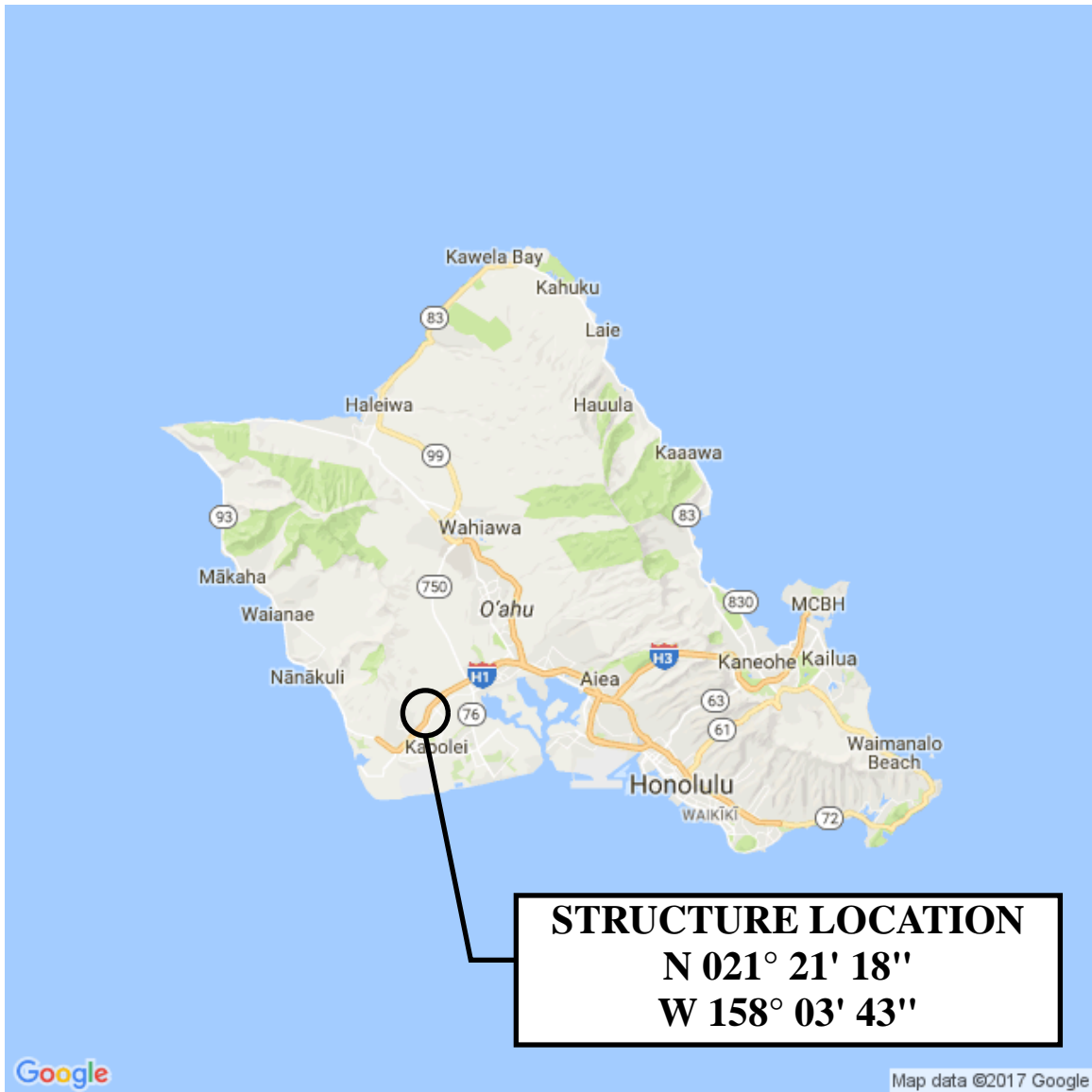


**FARRINGTON HIGHWAY BOX CULVERT
1 OVER DITCH**

BRIDGE NO. 935

LOCATION MAP

City and County of
Honolulu
Department of
Design and
Construction





**FARRINGTON HIGHWAY BOX CULVERT
1 OVER DITCH**

BRIDGE NO. 935

VICINITY MAP

City and County of
Honolulu
Department of
Design and
Construction



APPENDIX B

Photographs



Photo 1: East approach



Photo 2: Upstream east approach guardrail end



Photo 3: Downstream east approach guardrail end



Photo 4: Structure as seen from east approach



Photo 5: West approach



Photo 6: Upstream west approach guardrail end



Photo 7: Downstream west approach guardrail end



Photo 8: Structure as seen from west approach



Photo 9: Upstream guardrail/railing



Photo 10: Downstream guardrail/railing



Photo 11: Roadway



Photo 12: Upstream channel



Photo 13: Upstream elevation



Photo 14: Corroded upstream guardrail posts embedments in upstream headwall



Photo 15: Spall measuring 8" high x 16" wide x 1" deep occurring at the top east corner of the upstream headwall



Photo 16: View of culvert soffit



Photo 17: 12" long x 72" wide area of delamination occurring in culvert soffit at inlet



Photo 18: Spall measuring 10' long x 30" wide x 2" deep with 8 exposed reinforcing bars occurring in culvert soffit near outlet above the east culvert wall



Photo 19: Spall measuring 10' long x 24" wide x 2" deep with 8 exposed reinforcing bars occurring in culvert soffit near outlet above the west culvert wall



Photo 20: View of east culvert wall



Photo 21: View of west culvert wall



Photo 22: Scaling occurring along the top 12" of the culvert walls, typical



Photo 23: View of culvert invert



Photo 24: Downstream elevation



Photo 25: Scattered spalls occurring throughout downstream headwall



Photo 26: Concrete block built at outlet leaves only the top 16" of the culvert for water to flow through



Photo 27: Downstream channel

APPENDIX C

NBI Bridge Inspection Report,
Pontis Bridge Inspection Report,
and Bridge Appraisal Sheet

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

NBI BRIDGE INSPECTION REPORT

Date of Inspection: <u>11-09-2016</u>	Bridge Number: <u>935</u>	
Structure Number: <u>N/A</u>	Bridge Name: <u>FARRINGTON HIGHWAY BOX CULVERT 1</u>	
Location : Island: <u>Oahu</u>	Number of Spans: <u>1</u>	
Route No.: <u>N/A</u>	Highway: <u>N/A</u>	
Feature Crossed: <u>Ditch</u>	Milepost: <u>N/A</u>	
Bridge Material: <u>Superstructure: N/A</u>	Substructure: <u>N/A</u>	
Bridge Coordinates: Latitude (N) <u>021° 21' 18"</u>		
Longitude (W) <u>158° 03' 43"</u>		

REMARKS

PHOTOS

36 TRAFFIC SAFETY FEATURES

Indicate if feature meets currently acceptable standards.
0 - No 1 - Yes N - Not applicable

- | | | |
|----------------------------|--------------------------------|--|
| 1. Railings | <input type="text" value="0"/> | The W-beam guardrails do not meet minimum height requirements for acceptable railings. There is heavy damage along the upstream railing. |
| 2. Transitions | <input type="text" value="0"/> | |
| 3. Approach Guardrail | <input type="text" value="0"/> | The W-beam guardrails in the approaches do not meet minimum height requirements for acceptable railings. |
| 4. Approach Guardrail Ends | <input type="text" value="0"/> | |

REMARKS

PHOTOS

58 DECK

- | | | |
|--------------------------------------|--------------------------------|---|
| 1. Wearing Surface | <input type="text" value="7"/> | Asphalt wearing surface is in satisfactory condition. |
| 2. Decks - Structural Condition | <input type="text" value="N"/> | |
| 3. Curbs | <input type="text" value="N"/> | |
| 4. Median | <input type="text" value="N"/> | |
| 5. Sidewalks | <input type="text" value="N"/> | |
| 6. Parapet | <input type="text" value="N"/> | |
| 7. Railing | <input type="text" value="0"/> | W-beam guardrail along both sides of road. Upstream guardrail is in a FAILED state. All posts are bent and each panel is damaged. The guardrail will likely not retain a stray vehicle. It appears that the guardrail has been in this state since before the inspection on 5/2/96. |
| 8. Paint | <input type="text" value="N"/> | |
| 9. Drains | <input type="text" value="N"/> | |
| 10. Lighting Stand | <input type="text" value="N"/> | |
| 11. Utilities | <input type="text" value="N"/> | |
| 12. Joint Leakage | <input type="text" value="N"/> | |
| 13. Expansion Joint or Devices | <input type="text" value="N"/> | |
| INSPECTOR'S CONDITION RATING: | <input type="text" value="N"/> | Based on item 2 only. |

Date of Inspection: 11-09-2016
Structure Number: N/A

Bridge Number: 935
Bridge Name: FARRINGTON HIGHWAY BOX CULVERT 1

REMARKS

PHOTOS

59 SUPERSTRUCTURE

- 1. Bearing Devices N
- 2. Stringers N
- 3. Girders, Beams, or Arches N
- 4. Floor Beams and Diaphragms N
- 5. Trusses
 - General N
 - Portals N
 - Bracing N
- 6. Paint N
- 7. Machinery (Moveable Spans) N
- 8. Rivets and/or Bolts N
- 9. Welds - Cracks N
- 10. Rust N
- 11. Timber Decay N
- 12. Concrete Cracking and/or Spalling N
- 13. Collision Damage N
- 14. Deflection Under Load N
- 15. Alignment of Members N
- 16. Vibrations Under Load N
- 17. Flat Slab / Soffit N
- INSPECTOR'S CONDITION RATING: N

REMARKS

PHOTOS

60 SUBSTRUCTURE

- 1. Abutment
 - Wings N
 - Backwall/Breastwall N
 - Footing N
 - Piles N
 - Erosion N
 - Settlement N
- 2. Piers or Bents
 - Caps N
 - Column/Wall N
 - Footing N
 - Piles N
 - Scour N
 - Settlement N
- 3. Pile Bents N
- 4. Concrete Cracking and/or Spalling N
- 5. Steel Corrosion N
- 6. Timber Decay, etc. N
- 7. Debris on Seats N

Date of Inspection: 11-09-2016
 Structure Number: N/A

Bridge Number: 935
 Bridge Name: FARRINGTON HIGHWAY BOX CULVERT 1

- 8. Paint
- 9. Collision Damage
- INSPECTOR'S CONDITION RATING:

		REMARKS	PHOTOS
61 CHANNEL and CHANNEL			
1. Channel Scour	<input type="text" value="7"/>	Vegetation growth in channels. No scour observed.	
2. Embankment Erosion	<input type="text" value="6"/>	Culvert has been cleaned since the previous inspection	
3. Drift	<input type="text" value="6"/>	Culvert has been cleaned since the previous inspection	
4. Vegetation	<input type="text" value="5"/>	The heavy vegetation growth in the upstream and downstream channel has been trimmed since the previous inspection	
5. Channel Change	<input type="text" value="6"/>		
6. Fender System	<input type="text" value="N"/>		
7. Spur Dikes and Jetties	<input type="text" value="N"/>		
8. Rip Rap	<input type="text" value="N"/>		
9. Adequacy of Opening	<input type="text" value="4"/>	Culvert has been cleaned since the previous inspection, however, there is a concrete block built at the outlet leaving only 16" of freeboard height for water to flow through	
INSPECTOR'S CONDITION RATING:	<input type="text" value="4"/>	Based on all items.	

		REMARKS	PHOTOS
62 CULVERT and RETAINING WALLS			
1. Barrel	<input type="text" value="4"/>		
- Concrete		Extensive spalling was found in the culvert soffit (see Photos)	
- Steel			
- Timber			
2. Headwall	<input type="text" value="5"/>	Spalls in headwalls	
3. Cutoff Wall	<input type="text" value="N"/>		
4. Wing Walls	<input type="text" value="N"/>		
5. Settlement of Roadway	<input type="text" value="7"/>		
6. Scour / Undermining	<input type="text" value="7"/>	No scour or undermining observed.	
7. Adequacy	<input type="text" value="4"/>	There is a concrete block built at the outlet leaving only 16" of freeboard height for water to flow through	
8. Debris	<input type="text" value="6"/>	Culvert has been cleaned since the previous inspection	
INSPECTOR'S CONDITION RATING:	<input type="text" value="4"/>		

Date of Inspection: 11-09-2016
Structure Number: N/A

Bridge Number: 935
Bridge Name: FARRINGTON HIGHWAY BOX CULVERT 1

REMARKS

PHOTOS

93 CRITICAL FEATURE INSPECTION DATE


Provide date if applicable
If not applicable, indicate with N

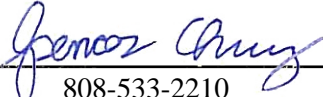
- 1. Fracture Critical Details N
- 2. Underwater Inspection N
[If applicable, submit Underwater Inspection Report]
- 3. Other Special Inspection N

OTHER FEATURES

Y - Yes N - No

- 1. Bridge Posted? **N**
Posted Limit = N/A
- 2. Signage for Posting Legible/Visible? **N**
- 3. Riding Surface (Roughness) Rating **3**
[3 - Smooth, 2 - Average, 1 - Poor]

Inspected by: Name (printed): Brian Lott Title: Inspector
NHI Certified?: No
Signature: 
Phone Number: 808-533-2210

Supervised by: Name (printed): Spencer Chung Title: Team Leader
NHI Certified?: Yes
Signature: 
Phone Number: 808-533-2210


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

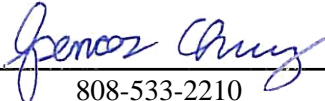
PONTIS BRIDGE INSPECTION REPORT

Date of Inspection: <u>11-09-2016</u>	Bridge Number: <u>935</u>
Structure Number: <u>N/A</u>	Bridge Name: <u>FARRINGTON HIGHWAY BOX CULVERT 1</u>
Number of Spans: <u>1</u>	Route Number: <u>N/A</u>
Location : Island: <u>Oahu</u>	Highway: <u>N/A</u>
Feature Crossed: <u>Ditch</u>	
Superstructure: <u>N/A</u>	Substructure: <u>N/A</u>

ELEM NO	ENV	ELEMENT DESCRIPTION	TOTAL QUANT.	UNIT	ST1	ST2	ST3	ST4	ST5
241	2	Culvert: Reinforced Concrete	27	FEET		17	10		
330	3	Metal Bridge Railing	12	FEET		6		6	
359	2	Soffit Smart Flag	1	EACH	1				

COMMENTS:

Inspected by: Name (printed): Brian Lott Title: Inspector
 NHI Certified?: No
 Signature: 
 Phone Number: 808-533-2210

Supervised by: Name (printed): Spencer Chung Title: Team Leader
 NHI Certified?: Yes
 Signature: 
 Phone Number: 808-533-2210

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

BRIDGE APPRAISAL SHEET

Date of Inspection: 11-09-2016 **Bridge Number:** 935
Structure Number: N/A **Bridge Name:** FARRINGTON HIGHWAY BOX
Tax Map Key: 9-1-17 CULVERT 1
District: 9

CONDITION:	MATERIAL	CONDITION ANALYSIS	RATING (0-9)
58. Deck	<u>N/A</u>	<u>Not Applicable</u>	<u>N</u>
59. Superstructure	<u>N/A</u>	<u>Not Applicable</u>	<u>N</u>
60. Substructure	<u>N/A</u>	<u>Not Applicable</u>	<u>N</u>
61. Channel and Channel Protection	<u>Natural</u>	<u>Poor Condition</u>	<u>4</u>
62. Culvert and Retaining Walls	<u>Concrete</u>	<u>Poor Condition</u>	<u>4</u>
63. Method Used to Determine Operating Rating	<u>N/A</u>		
64. Operating Rating	<u>1.11</u>		
65. Method Used to Determine Inventory Rating	<u>N/A</u>		
66. Inventory Rating	<u>0.86</u>		

APPRAISAL:	DEFICIENCIES	RATING (0-9)
67. Structural Condition	<u>No ADT available. Estimated ADT is 401-1000 based on site review.</u>	<u>6</u>
68. Deck Geometry	<u>Curb to curb width = 22' (6.705600000000004 m)</u>	<u>4</u>
69. Under Clearance - Vert. and Lat.	<u></u>	<u>N</u>
70. Bridge Posting	<u></u>	<u>5</u>
71. Waterway Adequacy	<u></u>	<u>7</u>
72. Approach Roadway Management	<u></u>	<u>6</u>

PROPOSED IMPROVEMENTS:

75. Type of Work: N/A

76. Length of Structure Improvement: N/A

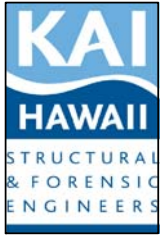
90. Inspection Date: Month: 11 Year: 2016

REMARKS:

In general, the culvert is in poor condition.

APPENDIX D

Figures



Farrington Hwy Box Culvert No. 1 over Ditch

City and County of Honolulu
Department of Design and
Construction

Bridge No. 935

Date: 11/30/16

PLAN VIEW

Scale: 1"=20'

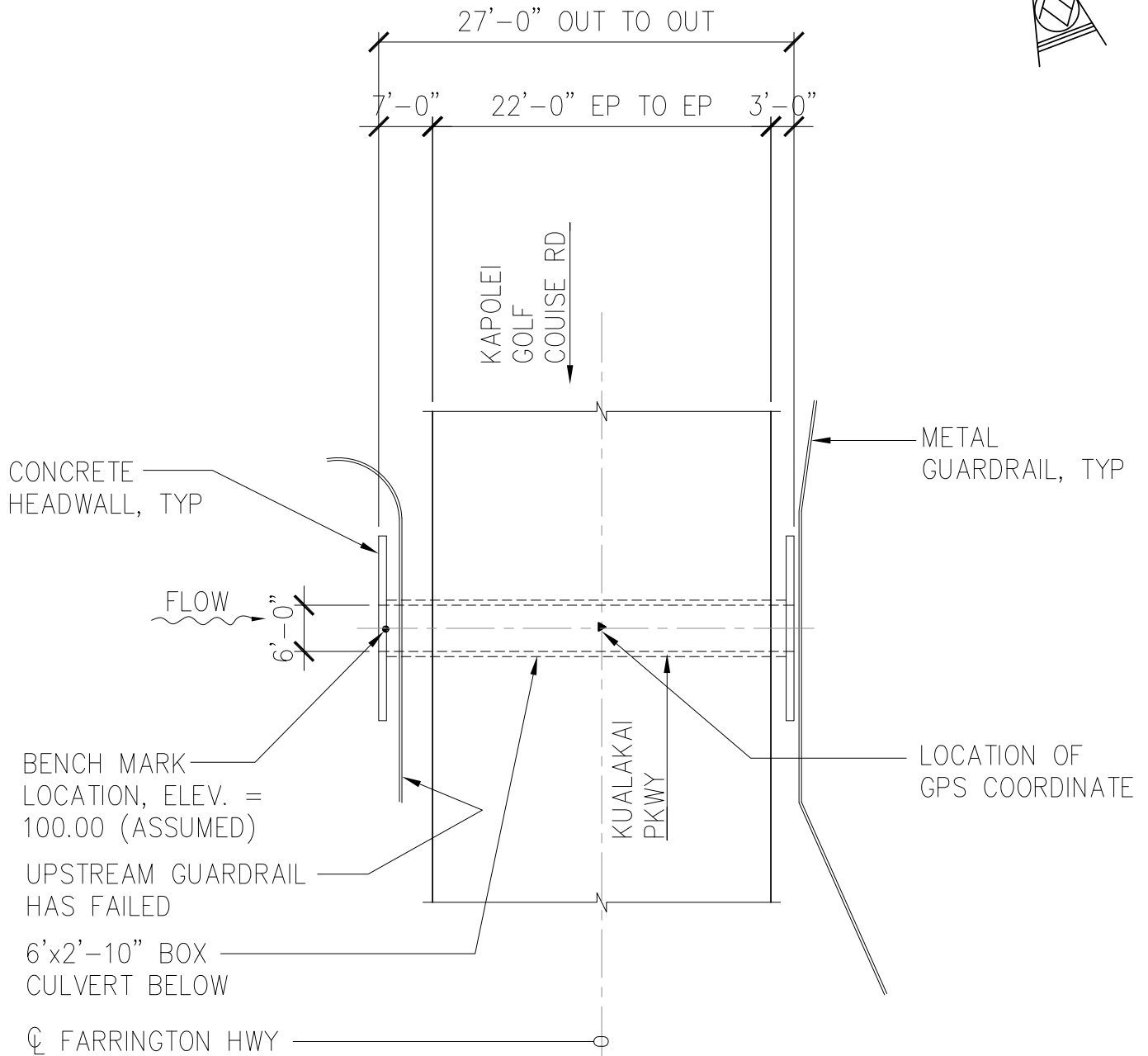
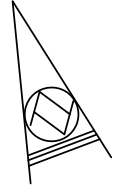


FIGURE 1 of 3



Farrington Hwy Box Culvert No. 1
over Ditch

City and County of Honolulu
Department of Design and
Construction

Bridge No. 935

Date: 11/30/16

TRANSVERSE SECTION

Scale: 3/32"=1'-0"

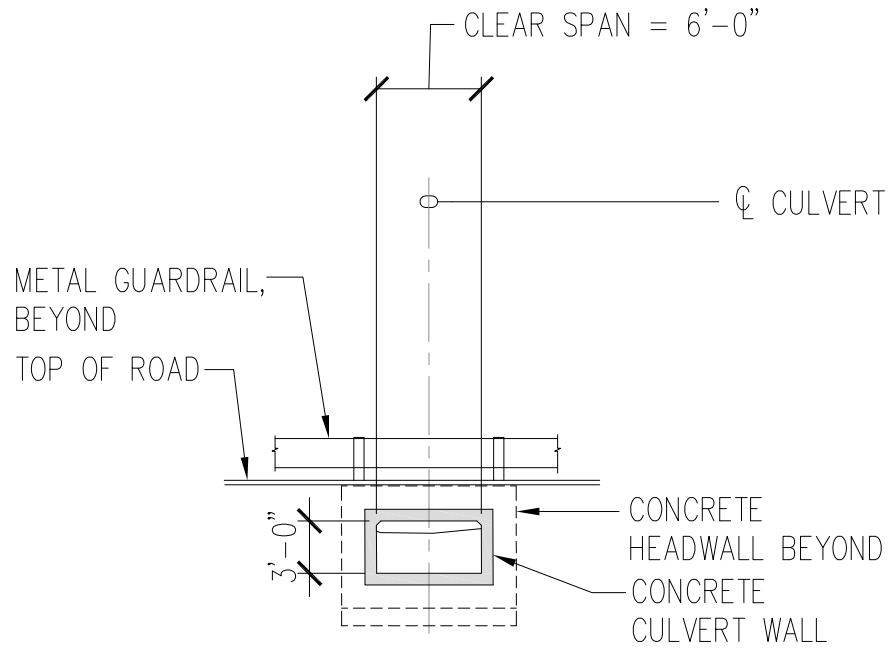


FIGURE 2 of 3



Farrington Hwy Box Culvert No. 1
over Ditch

City and County of Honolulu
Department of Design and
Construction

Bridge No. 935

Date: 11/30/16

LONGITUDINAL SECTION

Scale: 3/32"=1'-0"

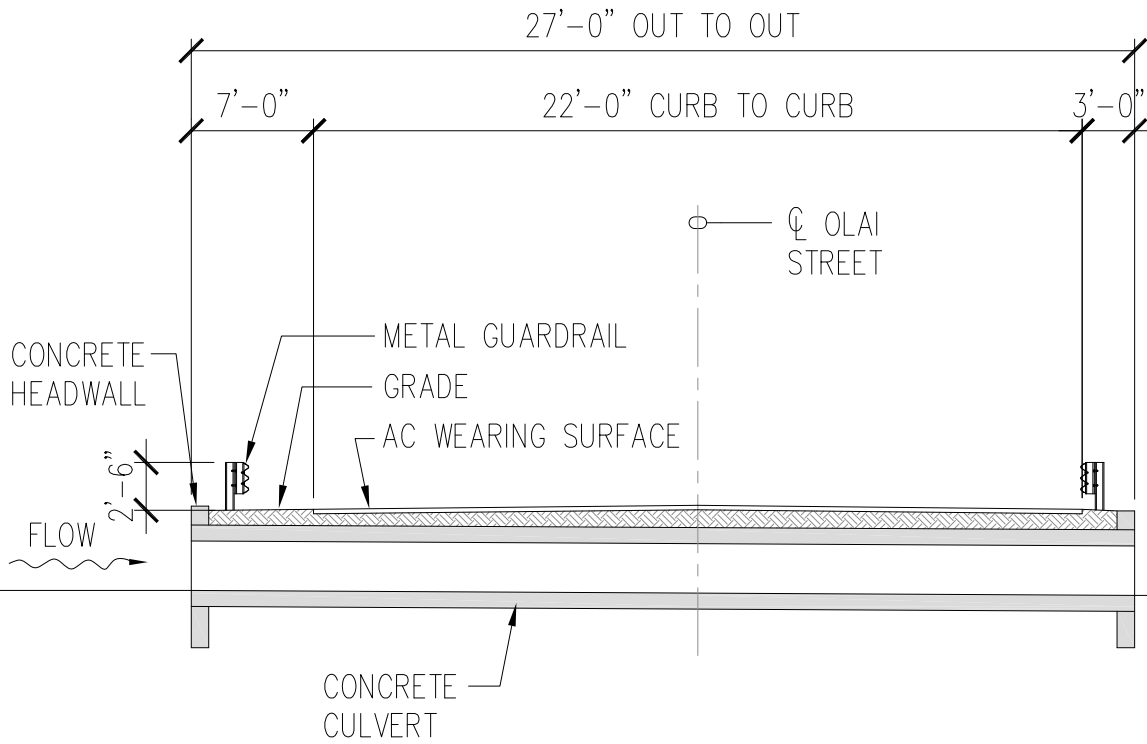
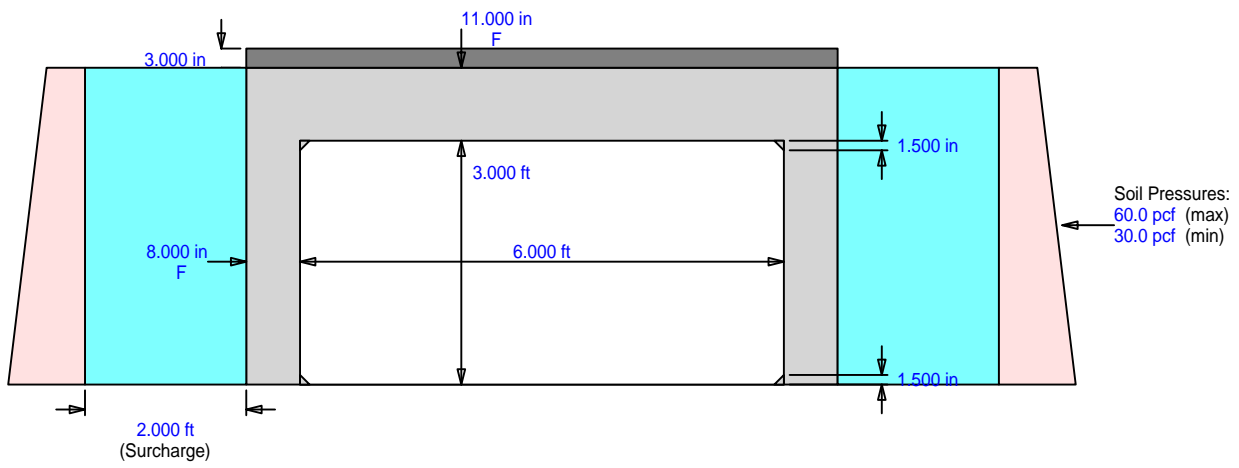


FIGURE 3 of 3

APPENDIX E

Load Rating Calculations



AASHTO LRFD HL-93 Design Truck (US) / No Lane (due to fill depth)

Controlling Rating Factor	
Action Type	Flexure
Location	Middle of top slab, inside face
Rating Type	Inventory
Rating Factor	0.86
Controlling Rating Factor	
Action Type	Flexure
Location	Middle of top slab, inside face
Rating Type	Operating
Rating Factor	1.11

AASHTO LRFD HL-93 Design Tandem (US) / No Lane (due to fill depth)

Controlling Rating Factor	
Action Type	Flexure
Location	Middle of top slab, inside face
Rating Type	Inventory
Rating Factor	1.10
Controlling Rating Factor	
Action Type	Flexure
Location	Middle of top slab, inside face
Rating Type	Operating
Rating Factor	1.42

AASHTO Type 3 Rating Truck (US)/ No Lane Specified

Controlling Rating Factor	
Action Type	Flexure
Location	Middle of top slab, inside face
Rating Type	Legal
Rating Factor	1.42

AASHTO Type 3S2 Rating Truck (US)/ No Lane Specified

Controlling Rating Factor	
Action Type	Flexure
Location	Middle of top slab, inside face
Rating Type	Legal
Rating Factor	1.56

AASHTO Type 3-3 Rating Truck (US)/ No Lane Specified

Controlling Rating Factor	
Action Type	Flexure
Location	Middle of top slab, inside face
Rating Type	Legal
Rating Factor	1.51

AASHTO Notional Rating Load (NRL-MIN)/ No Lane Specified	
Controlling Rating Factor	
Action Type	Flexure
Location	Middle of top slab, inside face
Rating Type	Legal
Rating Factor	1.42

AASHTO Notional Rating Load (NRL-MAX)/ No Lane Specified	
Controlling Rating Factor	
Action Type	Flexure
Location	Middle of top slab, inside face
Rating Type	Legal
Rating Factor	1.42

AASHTO Spec. Hauling Veh. (SU4 Truck)/ No Lane Specified	
Controlling Rating Factor	
Action Type	Flexure
Location	Middle of top slab, inside face
Rating Type	Legal
Rating Factor	1.42

AASHTO Spec. Hauling Veh. (SU5 Truck)/ No Lane Specified	
Controlling Rating Factor	
Action Type	Flexure
Location	Middle of top slab, inside face
Rating Type	Legal
Rating Factor	1.42

AASHTO Spec. Hauling Veh. (SU6 Truck)/ No Lane Specified	
Controlling Rating Factor	
Action Type	Flexure
Location	Middle of top slab, inside face
Rating Type	Legal
Rating Factor	1.42

AASHTO Spec. Hauling Veh. (SU7 Truck)/ No Lane Specified	
Controlling Rating Factor	
Action Type	Flexure
Location	Middle of top slab, inside face
Rating Type	Legal
Rating Factor	1.42

HI Std. Single Trip Permit Trucks (HP1)/ No Lane Specified	
Controlling Rating Factor	
Action Type	Flexure
Location	Middle of top slab, inside face
Rating Type	Legal
Rating Factor	1.00

HI Std. Single Trip Permit Trucks (HP2)/ No Lane Specified	
Controlling Rating Factor	
Action Type	Flexure
Location	Middle of top slab, inside face
Rating Type	Legal
Rating Factor	0.60

HI Std. Single Trip Permit Trucks (HP3)/ No Lane Specified	
Controlling Rating Factor	
Action Type	Flexure
Location	Middle of top slab, inside face
Rating Type	Legal
Rating Factor	1.19

EXTWALL (Inside)	B1	60	4	STR	3- 6	140
LONGITUD.(1)	C1	20	4	STR	29- 9	398
LONGITUD.(1)	C100	9	4	STR	29- 9	179
	F1	7	4	STR	8- 7	0

Total weight black bars	1793
Total weight all bars	1793

The minimum temperature and shrinkage steel for the:

Top slab(s) = 0.4400 in2
Bottom slab(s) = 0.0000 in2
Exterior wall(s) = 0.3200 in2

Splice Lengths Chart

Mark	Size	Splice (Ft-In)	Length (m)
B1	4	1- 9	0.533
C1	4	1- 9	0.533
C100	4	1- 9	0.533

PAGE151
DATE 03/01/2017
BRASS-CULVERT(LRFD) Version 2.3.0
FARRINGTON HWY BOX CULV NO. 1

Factored Actions for Load and Resistance Factor Design at Tenth Points (per unit design width)

M-Pt	+Moment (Kft)	-Moment (Kft)	+A.F. (Kips)	-A.F. (Kips)	+Shear (Kips)	-Shear (Kips)
EXTERIOR WALL BOTTOM						
1- 0	0.000	0.000	-0.510	-11.549	0.643	-1.076
1- 1	0.191	-0.384	-0.331	-11.550	0.465	-1.146
1- 2	0.323	-0.792	-0.331	-11.550	0.297	-1.209
1- 3	0.398	-1.220	-0.331	-11.550	0.139	-1.266
1- 4	0.420	-1.667	-0.331	-11.550	-0.007	-1.319
1- 5	0.393	-2.130	-0.331	-11.550	-0.083	-1.426
1- 6	0.319	-2.607	-0.331	-11.550	-0.121	-1.555
1- 7	0.203	-3.097	-0.331	-11.550	-0.152	-1.674
1- 8	0.046	-3.595	-0.331	-11.550	-0.177	-1.784
1- 9	-0.133	-4.123	-0.332	-11.548	-0.195	-1.884
1-10	-0.232	-4.791	-0.332	-11.548	-0.207	-1.974
EXTERIOR WALL TOP						
TOP SLAB LEFT SIDE						
2- 0	-0.232	-4.791	-0.293	-1.883	11.550	0.331
2- 1	3.211	-1.243	-0.323	-1.853	9.101	-0.434
2- 2	6.427	-0.153	-0.323	-1.853	7.417	-1.275
2- 3	8.864	-0.022	-0.323	-1.853	5.739	-2.196
2- 4	10.152	0.000	-0.323	-1.853	4.717	-3.127
2- 5	10.629	0.000	-0.323	-1.853	3.686	-4.134
2- 6	10.121	0.000	-0.323	-1.853	2.686	-5.166
2- 7	8.878	-0.026	-0.323	-1.853	1.742	-6.492
2- 8	6.385	-0.166	-0.323	-1.853	0.864	-8.174
2- 9	3.144	-1.283	-0.323	-1.853	0.078	-9.860
2-10	-0.231	-4.839	-0.293	-1.883	-0.335	-11.520
TOP SLAB RIGHT SIDE						

Output complete for a HFD9 / No Lane vehicle

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BRASS-CULVERT(LRFD) Version 2.3.0
FARRINGTON HWY BOX CULV NO. 1

1991-1993 SEAGRAVE (HFD1)/ No Lane Specified	
Controlling Rating Factor	
Action Type	Flexure
Location	Middle of top slab, inside face
Rating Type	Legal
Rating Factor	1.00

1992-2002 PIERCE (HFD2)/ No Lane Specified	
Controlling Rating Factor	
Action Type	Flexure
Location	Middle of top slab, inside face
Rating Type	Legal
Rating Factor	1.00

2006 PIERCE (HFD3)/ No Lane Specified	
Controlling Rating Factor	
Action Type	Flexure
Location	Middle of top slab, inside face
Rating Type	Legal
Rating Factor	1.00

2008 PIERCE (HFD4)/ No Lane Specified	
Controlling Rating Factor	
Action Type	Flexure
Location	Middle of top slab, inside face
Rating Type	Legal
Rating Factor	0.89

2009 PIERCE (HFD5)/ No Lane Specified	
Controlling Rating Factor	
Action Type	Flexure
Location	Middle of top slab, inside face
Rating Type	Legal
Rating Factor	0.89

2010 PIERCE (HFD6)/ No Lane Specified	
Controlling Rating Factor	
Action Type	Flexure
Location	Middle of top slab, inside face
Rating Type	Legal
Rating Factor	0.89

QUINT 85' SINGLE AXLE (HFD7)/ No Lane Specified	
Controlling Rating Factor	
Action Type	Flexure
Location	Middle of top slab, inside face
Rating Type	Legal
Rating Factor	0.76

QUINT 100' TANDEM AXEL (HFD8)/ No Lane Specified	
Controlling Rating Factor	
Action Type	Flexure
Location	Middle of top slab, inside face
Rating Type	Legal
Rating Factor	1.09

TOWER APPARATUS (HFD9)/ No Lane Specified	
Controlling Rating Factor	
Action Type	Flexure
Location	Middle of top slab, inside face
Rating Type	Legal
Rating Factor	0.92

Reinforcing Steel Bar Schedule

Location	Mark	Qty	Size	Type	Length (Ft-In)	Wgt (Lbs)	H Leg (Ft-In)	V Leg (Ft-In)
TOP SLAB (Inside)	A100	52	5	STR	7- 0	380		
CORNER (Top)	A1	90	5	L-BAR	6- 9	634	3- 8	3- 1
EXTWALL (Inside)	B1	60	4	STR	3- 6	140		
LONGITUD.(1)	C1	20	4	STR	29- 9	398		
LONGITUD.(1)	C100	9	4	STR	29- 9	179		
	F1	7	4	STR	8- 7	0		
Total weight black bars						1731		
Total weight all bars						1731		

The minimum temperature and shrinkage steel for the:

Top slab(s) = 0.4400 in²
 Bottom slab(s) = 0.0000 in²
 Exterior wall(s) = 0.3200 in²

Splice Lengths Chart

Mark	Size	Splice (Ft-In)	Length (m)
B1	4	1- 9	0.533
C1	4	1- 9	0.533
C100	4	1- 9	0.533

PAGE151
 DATE 03/01/2017
 BRASS-CULVERT (LRFD) Version 2.3.0
 FARRINGTON HWY BOX CULV NO. 1

Factored Actions for Load and Resistance Factor Design at Tenth Points (per unit design width)

M-Pt	+Moment (Kft)	-Moment (Kft)	+A.F. (Kips)	-A.F. (Kips)	+Shear (Kips)	-Shear (Kips)
EXTERIOR WALL BOTTOM						
1- 0	0.000	0.000	-0.510	-10.346	0.655	-1.164
1- 1	0.196	-0.415	-0.331	-10.346	0.477	-1.234
1- 2	0.331	-0.852	-0.331	-10.346	0.310	-1.297
1- 3	0.411	-1.311	-0.331	-10.346	0.151	-1.354
1- 4	0.437	-1.788	-0.331	-10.346	0.005	-1.407
1- 5	0.414	-2.282	-0.331	-10.346	-0.071	-1.513
1- 6	0.344	-2.790	-0.331	-10.346	-0.109	-1.642
1- 7	0.232	-3.309	-0.331	-10.346	-0.140	-1.762
1- 8	0.080	-3.838	-0.331	-10.346	-0.164	-1.872
1- 9	-0.095	-4.397	-0.332	-10.345	-0.183	-1.972
1-10	-0.190	-5.094	-0.332	-10.345	-0.194	-2.062
EXTERIOR WALL TOP						
TOP SLAB LEFT SIDE						
2- 0	-0.190	-5.094	-0.281	-1.970	10.347	0.331
2- 1	3.706	-1.432	-0.311	-1.940	8.984	-0.568
2- 2	7.310	-0.164	-0.311	-1.940	7.905	-1.516
2- 3	10.097	0.000	-0.311	-1.940	6.736	-2.592
2- 4	11.854	0.000	-0.311	-1.940	5.533	-3.735
2- 5	12.498	0.000	-0.311	-1.940	4.319	-4.923
2- 6	11.893	0.000	-0.311	-1.940	3.147	-6.133
2- 7	10.131	-0.040	-0.311	-1.940	2.036	-7.315
2- 8	7.359	-0.178	-0.311	-1.940	1.009	-8.446
2- 9	3.728	-1.478	-0.311	-1.940	0.146	-9.469
2-10	-0.316	-5.156	-0.281	-1.970	-0.335	-10.369
TOP SLAB RIGHT SIDE						

Output complete for a HFD18 / No Lane vehicle

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 BRASS-CULVERT (LRFD) Version 2.3.0
 FARRINGTON HWY BOX CULV NO. 1

1992-1993 SEAGRAVE LADDER (HFD10)/ No Lane Specified	
Controlling Rating Factor	
Action Type	Flexure
Location	Middle of top slab, inside face
Rating Type	Legal
Rating Factor	1.00

TANKER 2500 GAL (HFD11)/ No Lane Specified	
Controlling Rating Factor	
Action Type	Flexure
Location	Middle of top slab, inside face
Rating Type	Legal
Rating Factor	1.20

(1500 GAL) RET T-412, 339 (HFD12)/ No Lane Specified	
Controlling Rating Factor	
Action Type	Flexure
Location	Middle of top slab, inside face
Rating Type	Legal
Rating Factor	1.27

TANKER 26 (HFD13)/ No Lane Specified	
Controlling Rating Factor	
Action Type	Flexure
Location	Middle of top slab, inside face
Rating Type	Legal
Rating Factor	1.20

TANKER 12-28 (HFD14)/ No Lane Specified	
Controlling Rating Factor	
Action Type	Flexure
Location	Middle of top slab, inside face
Rating Type	Legal
Rating Factor	0.79

2010 TANKER (2000 GAL) (HFD15)/ No Lane Specified	
Controlling Rating Factor	
Action Type	Flexure
Location	Middle of top slab, inside face
Rating Type	Legal
Rating Factor	0.80

SPARTAN RESUE APPARATUS (HFD16)/ No Lane Specified	
Controlling Rating Factor	
Action Type	Flexure
Location	Middle of top slab, inside face
Rating Type	Legal
Rating Factor	0.99

SVI HAZMAT APPARATUS (HFD17)/ No Lane Specified	
Controlling Rating Factor	
Action Type	Flexure
Location	Middle of top slab, inside face
Rating Type	Legal
Rating Factor	1.00

2010 PIERCE 100' (HFD18)/ No Lane Specified	
Controlling Rating Factor	
Action Type	Flexure
Location	Middle of top slab, inside face
Rating Type	Legal
Rating Factor	0.77

USAR TRAILER (HFD19A)/ No Lane Specified

Controlling Rating Factor	
Action Type	Flexure
Location	Middle of top slab, inside face
Rating Type	Legal
Rating Factor	0.90

USAR TRAILER (HFD19B)/ No Lane Specified

Controlling Rating Factor	
Action Type	Flexure
Location	Middle of top slab, inside face
Rating Type	Legal
Rating Factor	0.92

MASS DECON TRAILER (HFD20A)/ No Lane Specified

Controlling Rating Factor	
Action Type	Flexure
Location	Middle of top slab, inside face
Rating Type	Legal
Rating Factor	0.90

MASS DECON TRAILER (HFD20B)/ No Lane Specified

Controlling Rating Factor	
Action Type	Flexure
Location	Middle of top slab, inside face
Rating Type	Legal
Rating Factor	0.92

MOBILE COMMAND CENTER (HFD21)/ No Lane Specified

Controlling Rating Factor	
Action Type	Flexure
Location	Middle of top slab, inside face
Rating Type	Legal
Rating Factor	1.00

COMMUNICATION VEHICLE (HFD22)/ No Lane Specified

Controlling Rating Factor	
Action Type	Flexure
Location	Middle of top slab, inside face
Rating Type	Legal
Rating Factor	1.05

Output complete for a BUS4 / No Lane vehicle

PAGE137
DATE 03/01/2017
BRASS-CULVERT (LRFD) Version 2.3.0
FARRINGTON HWY BOX CULV NO. 1

27 YARD TAPERED AUTOREACH (REF1)/ No Lane Specified	
Controlling Rating Factor	
Action Type	Flexure
Location	Middle of top slab, inside face
Rating Type	Legal
Rating Factor	1.29

25 YARD DURAPACK FORMULA 5000 (REF2)/ No Lane Specified	
Controlling Rating Factor	
Action Type	Flexure
Location	Middle of top slab, inside face
Rating Type	Legal
Rating Factor	1.21

20 YARD HEAVY DUTY RL (REF3)/ No Lane Specified	
Controlling Rating Factor	
Action Type	Flexure
Location	Middle of top slab, inside face
Rating Type	Legal
Rating Factor	1.42

43 YARD PACIFIC 85 (REF4)/ No Lane Specified	
Controlling Rating Factor	
Action Type	Flexure
Location	Middle of top slab, inside face
Rating Type	Legal
Rating Factor	1.23

OPUS 25-29 (BUS1)/ No Lane Specified	
Controlling Rating Factor	
Action Type	Flexure
Location	Middle of top slab, inside face
Rating Type	Legal
Rating Factor	1.18

GILLIG 40-49 (BUS2)/ No Lane Specified	
Controlling Rating Factor	
Action Type	Flexure
Location	Middle of top slab, inside face
Rating Type	Legal
Rating Factor	0.96

GILLIG 50-59 (BUS3)/ No Lane Specified	
Controlling Rating Factor	
Action Type	Flexure
Location	Middle of top slab, inside face
Rating Type	Legal
Rating Factor	0.96

NEW FLYER 110-115 (BUS4)/ No Lane Specified	
Controlling Rating Factor	
Action Type	Flexure
Location	Middle of top slab, inside face
Rating Type	Legal
Rating Factor	0.95

M-Pt	+Moment (Kft)	-Moment (Kft)	+A.F. (Kips)	-A.F. (Kips)	+Shear (Kips)	-Shear (Kips)
EXTERIOR WALL BOTTOM						
1- 0	0.000	0.000	-0.510	-9.147	0.637	-1.026
1- 1	0.189	-0.367	-0.331	-9.147	0.460	-1.096
1- 2	0.319	-0.757	-0.331	-9.147	0.292	-1.160
1- 3	0.392	-1.169	-0.331	-9.147	0.134	-1.217
1- 4	0.413	-1.598	-0.331	-9.147	-0.013	-1.269
1- 5	0.383	-2.044	-0.331	-9.147	-0.089	-1.376
1- 6	0.307	-2.505	-0.331	-9.147	-0.126	-1.505
1- 7	0.189	-2.977	-0.331	-9.147	-0.158	-1.625
1- 8	0.030	-3.458	-0.331	-9.147	-0.182	-1.734
1- 9	-0.151	-3.969	-0.332	-9.146	-0.201	-1.834
1-10	-0.251	-4.619	-0.332	-9.146	-0.212	-1.925
EXTERIOR WALL TOP						
TOP SLAB LEFT SIDE						
2- 0	-0.251	-4.619	-0.314	-1.834	9.320	0.331
2- 1	3.311	-1.308	-0.344	-1.804	8.089	-0.481
2- 2	6.563	-0.157	-0.344	-1.804	7.112	-1.337
2- 3	9.077	0.000	-0.344	-1.804	6.055	-2.308
2- 4	10.657	0.000	-0.344	-1.804	4.967	-3.338
2- 5	11.238	0.000	-0.344	-1.804	3.869	-4.409
2- 6	10.692	0.000	-0.344	-1.804	2.812	-5.503
2- 7	9.104	-0.022	-0.344	-1.804	1.810	-6.572
2- 8	6.604	-0.171	-0.344	-1.804	0.884	-7.596
2- 9	3.327	-1.351	-0.344	-1.804	0.102	-8.523
2-10	-0.316	-4.677	-0.314	-1.834	-0.335	-9.339
TOP SLAB RIGHT SIDE						

Output complete for a BUS11 / No Lane vehicle

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DATE 03/01/2017
BRASS-CULVERT(LRFD) Version 2.3.0
FARRINGTON HWY BOX CULV NO. 1

NEW FLYER 132-141 (BUS5)/ No Lane Specified
--

Controlling Rating Factor	
Action Type	Flexure
Location	Middle of top slab, inside face
Rating Type	Legal
Rating Factor	0.84

NEW FLYER 151-160 (BUS6)/ No Lane Specified
--

Controlling Rating Factor	
Action Type	Flexure
Location	Middle of top slab, inside face
Rating Type	Legal
Rating Factor	0.87

NEW FLYER 161-181 (BUS7)/ No Lane Specified
--

Controlling Rating Factor	
Action Type	Flexure
Location	Middle of top slab, inside face
Rating Type	Legal
Rating Factor	0.86

NOVA 201-224 (BUS8)/ No Lane Specified

Controlling Rating Factor	
Action Type	Flexure
Location	Middle of top slab, inside face
Rating Type	Legal
Rating Factor	0.89

GILLIG 501-555 (BUS9)/ No Lane Specified

Controlling Rating Factor	
Action Type	Flexure
Location	Middle of top slab, inside face
Rating Type	Legal
Rating Factor	0.96

GILLIG 854-868 (BUS10)/ No Lane Specified
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Controlling Rating Factor	
Action Type	Flexure
Location	Middle of top slab, inside face
Rating Type	Legal
Rating Factor	0.96

NEW FLYER 901-940 (BUS11)/ No Lane Specified	
Controlling Rating Factor	
Action Type	Flexure
Location	Middle of top slab, inside face
Rating Type	Legal
Rating Factor	0.86