



MARINE DRIVE – PORT ALICE MARINA BRIDGE

2024 BRIDGE INSPECTION

February 8, 2024

Prepared For:



Prepared By:



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1 BACKGROUND

On January 26, 2024, Brian Peeters, P.Eng of StoneCrown Engineering Ltd. (StoneCrown) completed a close proximity inspection of the Marine Drive Marina Bridge located in the town of Port Alice. The bridge has been termed “Marina Bridge” due to its proximity to the Marina. The inspection was completed visually.

The bridge is a two lane, single span simply supported 7.6m long pre-stressed concrete box girder bridge with an asphalt deck. The girders bear on treated timber caps with abutments consisting of cast-in-place inverted T-footings with riprap armouring at the base. An upstream pedestrian walkway is attached to the girder using galvanized steel members with a timber walking deck. Record drawings are not available to confirm girder dimensions, load capacity or construction date.

Structure spans a design channel which drains an uphill debris mitigation berm.

2 SUMMARY

The bridge overall is in fair condition. The asphalt deck is relatively uncracked, but the approaches have signs of settling with cracked and settled asphalt. The treated timber caps are in fair condition with minimal checking. The superstructure is in good condition with no signs of water egressing through the girder joints and efflorescence along the bottom side of the girders.

The abutments appear stable, but the riprap along both abutments is minimal with some riprap movement exposing the concrete footing. There is a moderate chance of scouring the footings and should continue to be monitored. The channel appears to have incised at the outlet with a riprap weir noticeable, scour of this riprap weir could undermine the downstream side of the footings destabilizing the bridge potentially requiring closure.

The abutments do not have wide enough return walls which has led to over steepened fill slopes adjacent to the abutment which has led to bank scour and could be a contributing factor to the approach settlement noted in the road surface.

The structure does not have Ministry of Transportation and Infrastructure (MOTI) current guard railing, delineators, and no approach barriers.

3 INSPECTION RESULTS

3.1 Approaches

The bridge approaches have signs of settling at both abutments due to what appears to be settling fill at the girder ends. Additional asphalt appears to have been added to reduce the

dip/impact. Both approaches are free of brush with the corners of the bridge visible, but no standard concrete approach barriers are present.

3.2 Deck

The concrete superstructure is overlaid with an asphalt deck, its unknown if a waterproof membrane was installed at time of the asphalt overlay. The current measured asphalt thickness was 150mm, this is typically more than MOTI standards. Additional asphalt should not be added without confirming with record drawings or load rating bridge for additional dead load.

The barrier consists of steel I-section posts bolted to exterior girder flanges are present at both sides of the bridge with additional poorly constructed butt welded I-sections raising the height of the post. Guard rail consists of flexible W-beam with timber posts at either end of the bridge. The guard rail is not connected to approach barriers.

The upstream guard posts are extended below the girder to allow a cantilevered steel I-section to support the timber plank pedestrian walkway. These guard posts will reduce the overall hydraulic clearance due to their height below the soffit of the girders.

The pedestrian walkway is supported by untreated D.Fir timber stringers and transverse plank decking. The timber stringers are in poor condition and the plank decking is in poor condition. Barrier height between road and pedestrian walkway is lower than MOTI specified.

3.3 Abutments

The cast-in-place concrete inverted T-footing abutments are in good condition with no indication of settlement or cracking. The treated 300mm x 300mm timber cap is in fair condition with minimal checking or rot at ends.

The connection of the girders to the abutments is not known. Typically, they would be doweled and grouted to the abutments with steel rods in knockouts in the girder ends. The bridge appears to not be seismically sufficient for lateral and transverse loads due to a lack of transverse shear keys or sufficient bearing length.

Minimal riprap is present along the bridge footings with the downstream end of both abutment footings exposed. The thickness of the abutment footing is unknown and is susceptible to scour and frost heave.

The abutments do not have wide enough return walls extending back into the banks, this has caused the fill slopes within this region to become over steepen and cause settlement and raveling of the banks.

Utility lines run longitudinally and transverse under the bridge, these lines are poorly supported and susceptible to tampering.

3.4 Girders

The girders are generally in good condition, there are no signs of cracking, joint seepage or efflorescence which can be an indicator of water seepage within cracks. Record drawings should be located to confirm load rating.

4 RECOMMENDATIONS

Table 1 – List of Maintenance / Repair Items

Item No.	Description	Priority
1	Install concrete approach barriers on all bridge approaches (upstream and downstream sides of bridge).	High
2	Stabilize raveling banks at corner of bridge through additional retaining walls.	Low
3	Replace pedestrian plank decking and stringers and handrails.	Moderate
4	Raise barrier rail height between pedestrian and vehicle to meet MOTI combination pedestrian/vehicle specifications.	High
5	Install MOTI specified delineators at all corners of the bridge.	High
6	Replace rotting timber posts supporting W-beam flex railing at ends of bridge within approach fill.	Low
7	Upgrade barrier system to meet current MOTI standards and integrate with approach barriers.	Moderate
8	Locate bridge record drawings	Low

Table 2 – List of Monitoring Items

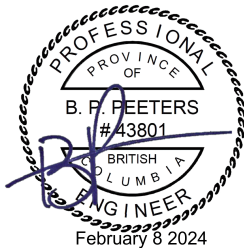
Item No.	Description	Priority
1	Scour at left and right bank abutments	Moderate
2	Scour at riprap weir downstream	Low
3	Approach settlement at girder ends	Low

5 CLOSURE

We trust you will find this information meets your requirements. If you have any questions or concerns, please feel free to contact Brian Peeters at brian@stonecroftengineering.ca or phone (778)-346-1818 at your convenience.

Sincerely,

StoneCroft Engineering Ltd.



Brian Peeters, P.Eng
Senior Bridge Engineer

Permit to Practice No. 1001856

APPENDIX A: 2024 INSPECTION FORM

Location: ° ' " N ° ' " W		LEVEL 1 INSPECTION - STEEL / CONCRETE BRIDGE		Clear Form
Road Name: Marine Drive	Structure #:	Fabricated by: Unknown	Fabricated Year: Unknown	
Station:	Bridge Name: Marina Bridge	Installed by: Unknown	Install Year: Unknown	
Conceptual Design: Unknown		Serial Number:		
Structural Design: Unknown				
Construction Assurance on File? <input type="checkbox"/>				

Creek Description:		Creek Name:	Approaches:	
Gradient:	Highwater Clearance: 2.7		Grades: Camp 0 %, Deck 0 %, Woods 0 %	
Upstream width: 3	Total Clearance: 3.4			Description:
Energy: Moderate			Alignment Horizontal:	Comment:
Debris Load: Low	Branches		Alignment Vertical:	
Sediment Load: Moderate	Gravel		Surface Runoff:	
Creek Channel: Relatively Stable	Debris Cone		Visibility:	
Substrate: Cobble / Gravel			Approach Fill:	Minor settlement cra
Stream Class: Unknown	Known <input type="checkbox"/> Assumed <input checked="" type="checkbox"/>		Approach Barriers:	None 0/4
Water User: N/A			Delineators:	Small 3/4
Abutments skew:	0 °		Bridge Ahead:	N/R
Creek Comments: Historic debris flows. Outlet perched on riprap with steep creek gradient change.			15cm asphalt overlay. No approach barriers.	

Deck:	Description	Condition	Girders:	
Road Width:	8.5		Structure Type:	Prestressed box girder
Running Width:	7x1.215 = 8.5m		Overall Length:	7.6 # of Spans: 1
Deck Type:	Asphalt		COB Span:	# of Girders: 7
Bullrail Type: W-Beam	Size	Fair	Total Girder Height (o/o):	Girder Spacing:
Risers: Steel	Per Side 4	Fair / Poor	Top Flange Width:	Top Flange Thickness:
Bolts Per Riser:	2	Fair	Web Height:	Web Thickness:
Ties (w x h): NA	@ Treated <input type="checkbox"/>		Bottom Flange Width:	Bottom Flange Thickness:
Sub Deck: NA	Treated <input type="checkbox"/>		Steel Coating:	
Running Deck: NA	Treated <input type="checkbox"/>		Bolted Splice Plate:	
Joints:	No visible.		Concrete Girder Depth: 50cm	Glulam Lamination Thickness:
Pots:			Concrete Girder Width: 1.215m	Glulam Lamination Width:
Shear Connectors:	Not visible			
Gravel Depth:				

Abutment: North	Description:	Condition:	Abutment: South	Description:	Condition:
Abutment Description:	CIP inverted T footing. Wall 47cm the, wing 25cm		Abutment Description:	CIP inverted T footing. Wall 47cm the, wing 25cm	
Girder-Abut. Connection:	None assumed		Girder-Abut. Connection:	None assumed	
Abutment Connection:	None assumed		Abutment Connection:	None assumed	
Cap:	Treated Timber, 12x12	Fair	Cap:	Treated Timber, 12x12	Fair
Ballast Wall:	None		Ballast Wall:	None	
Riprap:	Minimal	Poor	Riprap:	Minimal	Poor
Quality of Construction:		Poor	Quality of Construction:		Poor
Overall Condition:		Fair	Overall Condition:		Fair
Footing Founded On:	Coarse Granular	Fair	Footing Founded On:	Coarse Granular	Fair
Scour:	None, footing base exposed but not undermined		Scour:	None, footing base exposed but not undermined	
Indicators of Settlement:	None		Indicators of Settlement:	None	
Encroaching:	Yes		Encroaching:	Yes	

Summary of Comments

Structural:

Priority

Low

T footings appear stable, base of footings appear very close to channel grade, no signs of settlement.
Girders are in good condition with no signs of shear joint leaking.
Unknown girder section details, structural drawings not available.
Treated timber cap is not crushing, ends appear sound with minimal checking.
Connection of girder to abutment is unknown

Environmental:

Priority

Moderate

Riprap and embankment slopes very steep and inlet and outsides of bridge abutments.
A large gradient change “weir” is noticeable at outlet by natural channel agradation, this is causing near vertical banks downstream approx 5 to 20m downstream, banks should be pulled back to stabilize slopes and armoured with riprap.
Riprap and creek scour should be monitored as footings as susceptible to scour and settlement.

Maintenance:

Priority

High

15cm asphalt overlay is more than typical
Sidewalk in poor condition. 3x12" untreated fir decking. Timber 2-4x12" stringer in poor condition. Timber components should be replaced.
Moti approached approach barriers and physical connection to current outdated guard rail should be completed, high consequence downstream.
Additional asphalt overlays should not be added to bridge.

Safety:

Priority

High

Approach barriers and current bridge guard rail should be addressed as per maintenance section.

General Comments:

Approaches have settled relative to bridge which apparent by asphalt patches at both approaches. This is likely due to very steep embankment fills. Either side of wing wall returns.

Inspected by:

Brian Peeters

Inspection Date:

January 26, 2024 9:48 am

Current Load Rating:

Estimated Replacement Schedule:

Next Inspection:

2027

Design Load Rating:

Previous Load Rating:

Post Load Limit Sign:

Year

Reviewing Professional Engineer:

Seal



01 - Approach from North Facing South



02 - Approach from South Facing North



03 - Looking Upstream



04 - Looking Downstream



05 - Downstream Barrier



06 - Upstream Barriers



07 - Upstream Barrier Post, typ.



08 - Fill Settling Sound Abutment



09 - Fill Settling North Abutment



10 - Downstream Riprap Weir



11 - North Abutment



12 - South Abutment



12 - Typ. Timber Cap



13 - Typ. Girder Spofit



14 - Typ. Upstream Ballast Wall at Pedestrian Walkway



15 - Walkway Stringers



16 - Walkway Decking



17 - Upstream Profile Looking Downstream



18 - Downstream Profile Looking Upstream