

# ALBERNI-CLAYOQUOT REGIONAL DISTRICT Parks Linear Asset Assessment & Mapping Log Train Trail



July 29, 2025

Prepared for:

Alberni-Clayoquot Regional District  
3008 Fifth Avenue  
Port Alberni, BC  
V9Y 2E3

Prepared by:

Herold Engineering Limited  
Unit 7, 1920 Lyche Road  
Ucluelet, BC  
V0R 3A0

Attention: Amy Mayo, Asset Management &  
Grants Coordinator



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# PARKS LINEAR ASSET ASSESSMENT & MAPPING

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Submittal Date: July 29, 2025

Herold Project No.: 6516-001

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PERMIT TO PRACTICE: 1000201

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## EXECUTIVE SUMMARY

The scope of the assignment includes an assessment of eleven bridge structures along the Log Train Trail. The report includes detailed descriptions of the bridge construction, assessment findings, recommended repairs, risk analysis and associated Class D cost estimates. The assessment was conducted on March 12 and June 3, 2025. The purpose of the assessment was to document the overall physical condition of the bridges via visual and tactile on-site assessment.

The majority of the structures appear to be re-purposed logging bridges, while other structures are prefabricated and/or locally constructed by trail users. These types of structures typically do not conform to code-based specifications. They are generally maintained by trail users and/or municipalities without professional oversight. Efforts have been made by stakeholders to limit the impact of the structures on the natural environment.

Municipalities generally manage risks associated with this type of infrastructure by providing a trail rating system which informs users of the level of difficult/accessibility of the trail and associated bridges. Additionally, risk can be mitigated with "use at your own risk" signage and consistent maintenance/assessment and replacement efforts.

It is understood that the Log Train Trail is used by hikers, bikers, equestrians, and recreational all-terrain vehicles. Loads imparted onto these structures may be significant and based on some of the bridge condition and construction, risk mitigation may be challenging. Professional oversight, in the form of a structural engineer registered to practice in British Columbia, is recommended for all repair/replacement work.

Two of the bridges have sustained significant structural failure of main load carrying elements. These bridges require immediate repair and are recommended to be closed to traffic until such time as repairs can be implemented.

There are two structures which use repurposed car frames as main load carrying elements in the structural system. Their structural capacity and adequacy for the application are unknown. These bridges are recommended to be retrofitted with appropriate structural elements with oversight by a structural engineer registered to practice in British Columbia.

The remaining bridges are generally in serviceable condition. Some minor remedial work is recommended immediately as follows:

- § Seven bridges require cleaning of bridge surfaces,
- § Three bridges require new vehicle guarding to be installed,
- § Two bridges require new decking within 1-3 years,
- § Two stringers require immediate replacement,
- § One bridge requires a load rating,
- § One bridge requires a new abutment.

It is to be noted that our recommendations are in line with efforts to minimally impact the environment. This philosophy is in line with stakeholder priorities; however, it can be accompanied by an elevated risk to users, and therefore municipalities.

The repairs noted in this report are to Class D standard, in 2025 Canadian dollars. For the immediate repairs, the estimated total cost for all eleven bridges, rounded to the nearest thousand dollars, is \$200,000.00. Replacement of the bridges in kind is estimated as \$739,000.00. Refer to Section 14 for detailed cost estimates.

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## 1.0 INTRODUCTION

Location: Log Train Trail, Port Alberni, BC

Assessment by: Shannon Summersides, P. Eng. (Herold Engineering Ltd.)  
Blair Forsyth (Herold Engineering Ltd.)

Date: March 12 and June 3, 2025

### 1.1 Purpose of Assignment

The assessment was conducted to identify members either requiring repairs or showing signs of deterioration. The assessment results, detailed in the following report, will provide information regarding maintenance, repair, replacement and health and safety on a ten-year forecasted period, allowing for a prioritized repair and maintenance program to be implemented. Other items noticed during the assessment will be reported only in terms of general overall condition.

All repair/replacement recommendations are accompanied by a Class D cost estimate, as well as a Class D level estimate of costs associated with complete replacement. These estimates are intended to inform maintenance and upgrade budgeting for the ACRD.

Where applicable, recommendations will be made for additional structural assessment in the form of seismic review and/or structural load rating. These recommendations are intended to inform budgeting strategies for future work as required.

### 1.2 Scope of Work

Herold Engineering Limited (Herold Engineering) travelled to the Log Train Trail for two separate site visits. Herold Engineering personnel travelled the extent of the trail and located eleven bridge structures.

The structures were assessed from ground level and the structure deck. The assessment is limited to visual and tactile assessment of the accessible components.

Herold Engineering generated and populated a structural checklist for each bridge which includes:

- General dimensions (length and width),
- Structural component sizes and lengths,
- Assessment of the existing condition of the elements based on an owner approved rating scale.

Herold Engineering generated the following report which includes the following:

- Remediation recommendations,
- Risk analysis,
- Residual life estimates,
- Class D cost estimate of the repair recommendations,
- Class D cost estimate for full replacement of the structure,
- General comments on suitability for seismic loads/analysis and load rating.

### 1.3 Reference Material

- Procedures for Inspection and Assessment of Fixed Timber Docks – 1994 September – 4th Edition by R.G. Sexsmith Ltd.
- Canadian Highway Bridge Design Code CAN/CSA S6-19.
- ACRD Risk Management Policy
- ACRD Risk Framework Matrix

### 1.4 Methodology

The bridges were reviewed by Herold Engineering from ground, as well as from the deck of the structures. Although these assessments can verify much of the visible and tactile damage, they are somewhat limited in assessing the severity and extent of internal damage, especially damage due to decay and/or borer insect damage in timber elements.

The assessment included detailed visual and tactile assessment of eleven bridges located along the Log Train Trail. The bridges vary in their material type and arrangement. Refer to Sections 2-12 for detailed descriptions of structures.

The condition assessment and residual life estimates were based on previous experience, as well as the reference material noted in Section 1.3. Our recommendations are in line with the philosophy of stakeholders, which is to limit the impact of the structure(s) on the natural environment. This approach does come with elevated risk to users, and potentially to municipalities tasked with management of these areas.

The structures are mainly re-purposed logging bridges of various types of construction. This differs significantly from other trails maintained by the ACRD. The bridges generally conform to code-based specifications, with some design changes reflecting their function as logging bridges. Ongoing maintenance and repairs are being collaboratively undertaken by the ACRD and local trail users. Municipalities generally manage risks inherent to this type of infrastructure by providing a trail rating system which informs users of the level of difficult/accessibility of the trail and associated bridges. Additionally, risk can be mitigated with “use at your own risk” signage and consistent maintenance, assessment, and replacement efforts.

All recommendations related to health and safety are provided based upon our experience with structures similar in form and function.

Comments on seismic aspects of the structure are in general terms only. Should Herold Engineering locate structure(s) with higher seismic risk a detailed desktop analysis of the structure seismic response will be recommended.

Load rating analysis is considered outside the scope of the assessments; however, structures considered light duty for the intended use will be recommended for future load rating desktop study.

Class D cost estimates are based on current industry construction rates for mobilization, demobilization, and material costs for supply and install, as well as historical data from similar projects. Estimates are high level and considered appropriate for budget projections only. Construction costs can be challenging to estimate in the current economic climate, and it is to be noted that prices may change often and can differ significantly based on many fluctuating variables (material costs, mobilization costs, etc). Should the ACRD postpone work

for more than six months, it is recommended an updated estimate be generated to reflect current construction costs.

A risk analysis was conducted for the infrastructure, using a modified version of the Alberni-Clayoquot Regional District (ACRD) risk framework (provided to Herold Engineering). The risk framework has been generated to evaluate level of risk of noted deterioration/damage allowing for prioritization of future repairs and their implications on structure use and life safety. All documents were provided by The ACRD and are referenced in Section 1.3 above.

The following appendices can be found at the end of this report:

- APPENDIX A - Site Photographs
- APPENDIX B - Damage Table
- APPENDIX C - Condition Assessment Checklists
- APPENDIX D - Aerial Map

### 1.5 Reference System

The Log Train Trail system can be accessed from two trailhead locations:

1. Woolsey Road trailhead located in Beaver Creek, Port Alberni, BC (north end)
2. Horne Lake Road trailhead located in Cherry Creek, Port Alberni, BC (south end)
3. Desmond Road trailhead located in Cherry Creek, Port Alberni, BC (south end)

There is a total of eleven bridges located along the trail length. The structures are logging bridges which are no longer in service. They are maintained by the ACRD and local trail users.

Refer to the following trail map identifying Bridges 1-11.

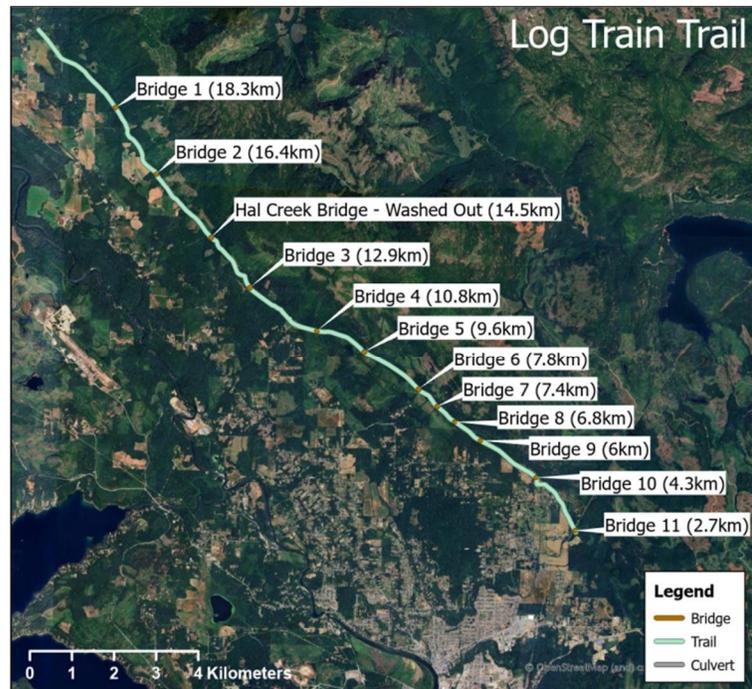


Figure 1: Log Train Trail Map

## 1.6 Rating Scale and Risk Rating

The following is an explanation of the assessment rating scale used in Sections 2 through 12 as it relates to the estimated time before the next required repair to a specific item.

Very Good (VG)	-	Element is in serviceable condition with no notable deterioration. No repairs are required.
Good (G)	-	Element has minor amounts of superficial deterioration with no noted overstressing or structural damage.
Fair (F)	-	Element has moderate amounts of damage which may increase rates of deterioration long term. No noted overstressing is observed. Repairs to prolong service life may be applicable.
Poor (P)	-	Element has significant amounts of damage or deterioration. No overstressing is observed. The element is nearing the end of its service life.
Very Poor (VP)	-	Element is no longer in serviceable condition with significant damage or loss of structural capacity. Immediate repair or replacement is likely required.

For timber elements exposed to moisture the assessment rating scale corresponds to an estimated remaining service life as follows:

Very Good (VG)	-	10 years
Good (G)	-	6 to 10 years
Fair (F)	-	3 to 6 years.
Poor (P)	-	1 to 3 years
Very Poor (VP)	-	0 years

The assessment rating scale then correlates to the risk rating based on the associated consequences associated with element deterioration and/or failure. The consequence rating scale is as follows:

Negligible (N)	-	Element failure has no effect on structural capacity, nor usage/performance (e.g.: coating failures)
Minor (M)	-	Element failure results in no effect on structural capacity and has a minor effect on usage/performance (e.g.: damage to guarding, signage etc.)
Moderate (Mod)	-	Element failure leads to local failure only. This can impact usage (e.g.: settlement of abutments, listing of the structure, loose decking)
Significant (S)	-	Element failure probably does not lead to total collapse due to continuity and/or multiple load paths. Other main structural members in the system may become overloaded due to the failure. This includes main load carrying members (e.g.: girder in a multi-girder system)
Collapse (C)	-	Element failure leads to total collapse of the structure. This includes failure of main members with no benefit from continuity or multiple-load paths (e.g.: simply supported girder in a two-girder system)

The assessment and consequence rating scales are combined to create a risk rating matrix as follows:

		Assessment Rating				
		VG	G	F	P	VP
Consequence Rating	N	1	2	3	4	5
	M	2	4	6	8	10
	Mod	3	6	9	12	15
	S	4	8	12	16	20
	C	5	10	15	20	25

Refer to Appendix B for damage table and associated risk rating.

## 2.0 BRIDGE 1

### 2.1 Description and Geometry

Bridge 1 is a mix of timber and reinforced concrete construction with dimensions as follows:

- Length: 8.0 meters
- Width: 4.93 meters
- Stream Clearance: 2.3 meters

The bridge is guarded by a low-profile vehicle guard (curb) and the deck is a shear connected reinforced concrete plank style supported on a concrete block abutment.

Refer to Appendix A for a view of the general arrangement.

The component sizes are as follows:

Guard	-	249mm x 249mm timber
Risers	-	249mm x 249mm x 610mm long
Decking	-	(4)-1.22m wide precast concrete planks
Abutment	-	(2) lifts of 762mm x 762mm x 1524mm concrete blocks

### 2.2 Assessment Results

The bridge is in overall fair condition. The bridge guarding is in poor condition with areas of moisture accumulation and biological damage. The plank deck is in good condition with no noted deterioration or overstressing to the planks. The abutment is in good condition.

The following items were noted on-site:

- Guard sections are decayed and soft when probed,
- Joint filler has dislodged from between two of the concrete planks,
- Superstructure has significant debris accumulated.

Refer to Appendix A for photographs of the observations noted above.

### 2.3 Recommendations

The bridge is in overall serviceable condition. Minor remedial recommendations are as follows:

- Replace vehicle guard in kind,
- Re-instate joint filler between planks,
- Clean bridge surfaces of vegetation,

Refer to Appendix B for detailed locations, observations and repair recommendations. Refer to Section 14 for cost estimates for repair and replacement of the bridge structure.

### 3.0 BRIDGE 2

#### 3.1 Description and Geometry

Bridge 2 is a mix of sawn timber and coated steel construction with dimensions as follows:

- Length: 6.83 meters
- Width: 4.45 meters
- Stream Clearance: 1.83 meters

The bridge is guarded by a low-profile vehicle guard (curb). The deck boards and cross beams are treated dimensional timber. The superstructure is supported by re-purposed coated steel I-girders. There is steel angle bracing between the girders. The girders are supported on abutments which were not accessible at the time of the assessment.

Refer to Appendix A for a view of the general arrangement.

The component sizes are as follows:

Vehicle Guard	-	267mm x 267mm
Decking	-	102mm x 305mm
Cross Beams	-	250mm x 250mm
Steel Girder	-	813mm deep x 394mm wide

#### 3.2 Assessment Results

The bridge is in fair condition. The superstructure has visible biological growth and moisture accumulation. The timber deck boards are soft at the cut ends. The girders appear to be re-purposed and are oversized for the application. The abutments were not visible at the time of the assessment, but treated timber wing walls were visible and appear to be in good condition.

The following items were noted on-site:

- Superstructure has significant biological growth and debris accumulation,
- Vehicle guard is decayed and showing signs of deterioration,
- Deck boards are worn and weathered with cracks and abrasion,
- Minor, localized coating failures on steel elements (bracing and girders),
- Abutments have vegetative overgrowth on the elements.

Refer to Appendix A for photographs of the observations noted above.

#### 3.3 Recommendations

Based on the overall condition the bridge is in serviceable condition.

Recommended repairs to be completed immediately are as follows:

- Clean surfaces of vegetation,
- Replace vehicle guard within the next three years,
- Replace deck boards within the next one to three years,
- Monitor coating deterioration and re-instate as part of a larger upgrade.

Refer to Appendix B for detailed locations, observations and repair recommendations. Refer to Section 14 for cost estimates for repair and replacement of the bridge structure.

## 4.0 BRIDGE 3

### 4.1 Description and Geometry

Bridge 3 is a mix of natural timber log and sawn timber construction. The bridge has the following dimensions:

- Length: 7.37 meters
- Width: 3.18 meters
- Stream Clearance: < 1.0 meters

The bridge is guarded by low profile vehicle guard comprised of natural log sections supported on bridge stringers below. The deck is a gravel overlay, retained by roofing material, and supported by treated timber stringers. The stringers are supported by reinforced concrete abutments at either side.

Refer to Appendix A for a view of the general arrangement.

The component sizes are as follows:

Vehicle Guard	-	305mm diameter natural log
Deck	-	150mm (±) thick gravel overlay
Stringers	-	254mm x 254mm treated timber

### 4.2 Assessment Results

The bridge is in very poor condition with primary structural members requiring replacement. One of the timber stringers has failed in shear and the deck (overlay) has failed in this location. The remaining bridge elements are soft when probed with evidence of moisture ingress and biological damage (decay).

The following items were noted on-site:

- Load rating signage is present (5-ton load limit specified),
- Vehicle guard is heavily decayed,
- Overlay roofing material is not cut to the bridge width and extends past the edges of the bridge. It is accumulating moisture and biological growth and allowing moisture to access the substructure,
- One stringer has failed due to internal decay,
- The remaining stringers have signs of internal decay and are accumulating moisture,
- Abutments have vegetative growth and are soft when probed.

Refer to Appendix A for photographs of the observations noted above.

### 4.3 Recommendations

Based on the overall condition of the elements, the bridge is at the end of its service life and requires replacement.

Recommended repairs to be completed immediately are as follows:

- Remove load limit signage that is not applicable given the overall bridge condition,
- Clean superstructure and substructure,
- Replace both vehicle guards,
- Remove overlay and replace stringers and roofing material,
- Ensure new roofing material is cut to the bridge footprint.

Refer to Appendix B for detailed locations, observations and repair recommendations. Refer to Section 14 for cost estimates for repair and replacement of the bridge structure.

## 5.0 BRIDGE 4

### 5.1 Description and Geometry

Bridge 4 is timber construction and appears to have been built where a previous structure existed. There are exterior stringers which appear to remain from the previous structure, as well as other stringers which appear to be new. The abutment also appears to have been present prior to this structure being erected. The bridge has the following dimensions:

- Length: 6.35 meters
- Width: 2.82 meters
- Stream Clearance: 2.4 meters

The bridge is comprised of cedar decking and vehicle guards supported by treated timber exterior stringers and cedar stringers of differing sizes. The stringers are supported on a reinforced concrete abutment which is armoured by angular rock.

Refer to Appendix A for a view of the general arrangement.

The component sizes are as follows:

Vehicle Guard	-	102mm x 152mm (cedar)
Deck Boards	-	102mm x 160mm (cedar)
Exterior Stringers	-	305mm x 305mm (treated)
Interior Stringers	-	152mm x 305mm (cedar)

### 5.2 Assessment Results

The bridge is in overall fair condition. The following items were noted on-site:

- Vehicle guard is cracking at hardware locations,
- Exterior stringers have visible mechanical damage penetrating the treatment layer,
- Accumulation of sediment and moisture at abutment. Exterior stringers are resting in the debris and are deteriorating.

Refer to Appendix A for photographs of the reported damage/ deterioration.

### 5.3 Recommendations

Based on the overall condition the bridge is in overall fair condition.

Recommended repairs to be completed immediately are as follows:

- Clean superstructure and abutment of debris,
- Install spacer or equivalent under exterior stringers at abutment to limit debris.

Refer to Appendix B for detailed locations, observations and repair recommendations. Refer to Section 14 for cost estimates for repair and replacement of the bridge structure.

## 6.0 BRIDGE 5

### 6.1 Description and Geometry

Bridge 5 is a mix of sawn timber and natural timber construction. The deck is supported by cross beams and natural log stringers. The stringers are supported at both ends by a concrete abutment. The vehicle guard is a natural log section on either side of the structure. The bridge has the following dimensions:

- Length: 7.62 meters
- Width: 4.47 meters
- Stream Clearance: 1.35 meters

Refer to Appendix A, for a view of the general arrangement.

The component sizes are as follows:

Vehicle Guard	-	406mm diameter natural log
Decking	-	64mm x 337mm
Cross Beams	-	146mm x 210mm @ 610mm o/c
Log Stringers	-	(2) - 406mm diameter natural unpeeled log

### 6.2 Assessment Results

The bridge is in overall fair condition. Timber elements are generally weathered with minimal biological damage/decay. The following items were noted on-site:

- The vehicle guard is decayed at the cut ends,
- The decking is weathered and checking at the approaches,
- The bridge stringers are unpeeled log sections. There are holes in the bark exceeding 25mm. It is unknown if this damage extends into the log section.
- The log stringers are not graded, and their structural capacity is unknown.

Refer to Appendix A for photographs of the reported damage.

### 6.3 Recommendations

The bridge is in overall serviceable condition. Recommended repairs are as follows:

- Replace vehicle guards,
- Consider replacing decking within 1 to 3 years,
- Consider load rating the bridge structure to confirm the capacity of the stringer sections.

Refer to Appendix B for detailed locations, observations and repair recommendations. Refer to Section 14 for cost estimates for repair and replacement of the bridge structure.

## 7.0 [BRIDGE 6](#)

### 7.1 Description and Geometry

Bridge 6 is a mix of sawn timber, natural timber and miscellaneous steel construction. The timber decking is supported by a steel car frame which spans between concrete block abutments. The vehicle guard is a natural round log section mounted on either side of the structure. The bridge has the following dimensions:

- Length: 6.10 meters
- Width: 3.38 meters
- Stream Clearance: 1.83 meters

Refer to Appendix A, for a view of the general arrangement.

The component sizes are as follows:

Vehicle Guard	-	305mm diameter natural log
Decking	-	115mm x 305mm
Stringers	-	repurposed car frame
Abutment	-	(2) lifts 635mm x 635mm x 1524mm concrete block

### 7.2 Assessment Results

The bridge is in overall very poor condition due to the structural uncertainty of the arrangement. The car frame substructure is unconventional and has unknown structural capacity. The following items were noted on-site:

- Vehicle guard is unsupported along the length. It will not perform well if impacted,
- Car frame being used as structural support with no redundancy or known capacity.

Refer to Appendix A for photographs of the reported damage.

### 7.3 Recommendations

Based on the overall construction, the bridge is recommended to be retrofitted with conventional substructure elements (stringers) to replace the existing car frame. Stringers are to be designed and specified by a structural engineer registered to practice in British Columbia. The following minor repairs are also recommended:

- Install intermediate support for guarding system,

Refer to Appendix B for detailed locations, observations and repair recommendations. Refer to Section 14 for cost estimates for repair and replacement of the bridge structure.

## 8.0 [BRIDGE 7](#)

### 8.1 Description and Geometry

Bridge 7 is a mixed construction of timber, concrete, and steel elements. It is comprised of

timber vehicle guard and decking supported on steel stringers. The stringers are supported on built-up natural log abutments. The bridge has the following dimensions:

- Length: 3.66 meters
- Width: 3.05 meters
- Stream Clearance: 950 millimeters

Refer to Appendix A for a view of the general arrangement.

The component sizes are as follows:

Vehicle Guard	-	52mm x 76mm
Deck Boards	-	89mm x 216mm
Steel Stringers	-	114mm deep x 102mm wide (bottom flange) 305mm o/c

## 8.2 Assessment Results

The structure is in overall very poor condition and requires immediate repairs. The current condition is considered a life safety issue.

The following items were noted on-site:

- Superstructure has significant debris accumulating on it,
- A vehicle guard is buried by debris on one side of bridge,
- Deck boards above the failed stringer have separated and there are voids in the deck,
- Stringers have significant surface corrosion,
- Abutments are deteriorating due to moisture and decay,
- Stringers are visible above grade along approach.

Refer to Appendix A for photographs of the reported damage.

## 8.3 Recommendations

Based on the overall condition and construction, the bridge is recommended to be closed to the public until such time as repairs can be made.

The following items are also recommended:

- Clean superstructure,
- Re-instate decking in original position,
- Replace failed stringer,
- Replace abutments.

Refer to Appendix B for detailed locations, observations and repair recommendations. Refer to Section 14 for cost estimates for repair and replacement of the bridge structure.

## 9.0 BRIDGE 8

### 9.1 Description and Geometry

Bridge 8 is a mix of sawn timber, concrete, and miscellaneous steel construction. The timber decking and vehicle guard are supported by a steel car frame which spans between concrete block abutments. The bridge has the following dimensions:

- Length: 2.74 meters
- Width: 2.92 meters
- Stream Clearance: 2.49 meters

Refer to Appendix A, for a view of the general arrangement.

The component sizes are as follows:

Vehicle Guard	-	203mm x 203mm timber
Decking	-	52mm x 305mm timber
Cross Beams	-	197mm x 216mm timber
Stringers	-	repurposed car frame
Abutment	-	(2) lifts 635mm x 635mm x 1524mm concrete block

## 9.2 Assessment Results

The bridge is in overall very poor condition due to the structural uncertainty of the arrangement. The car frame substructure is unconventional and has unknown structural capacity. The following items were noted on-site:

- Superstructure is covered in debris and sediment,
- Bridge stringers are made of a repurposed car frame. This is not structurally quantifiable.
- New abutments are retaining old abutment timbers which are decaying/settling.

Refer to Appendix A for photographs of the reported damage.

## 9.3 Recommendations

Based on the overall construction, the bridge is recommended to be retrofitted with conventional substructure elements (stringers) to replace the existing car frame. Stringers are to be designed and specified by a structural engineer registered to practice in British Columbia. The following minor repairs are also recommended:

- Clean superstructure,
- Remove old abutment elements and provide appropriate fill behind abutment.

Refer to Appendix B for detailed locations, observations and repair recommendations. Refer to Section 14 for cost estimates for repair and replacement of the bridge structure.

## 10.0 BRIDGE 9

### 10.1 Description and Geometry

Bridge 9 is a mix of sawn timber, steel, and concrete construction. The timber deck and vehicle guard are both supported by steel stringers resting on concrete block foundations. The bridge has the following dimensions:

- Length: 4.2 meters
- Width: 2.97 meters
- Stream Clearance: 712 millimeters

The component sizes are as follows:

Vehicle Guard	-	152mm x 152mm timber
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Decking	-	152mm x 152mm timber
Steel Stringers	-	115mm deep x 102mm wide I-beam

## 10.2 Assessment Results

The bridge is in overall fair condition. The following items were noted on-site:

- Superstructure is covered in sediment and debris,
- Decking is moderately weathered,
- Steel stringers have moderate surface corrosion, no visible evidence of delamination or flaking of the steel .

Refer to Appendix A for photographs of the reported damage.

## 10.3 Recommendations

Recommended repairs to be completed immediately are as follows:

- Clean superstructure,
- Ongoing monitoring of decking and stringer condition,

Refer to Appendix B for detailed locations, observations and repair recommendations. Refer to Section 14 for cost estimates for repair and replacement of the bridge structure.

## 11.0 BRIDGE 10

### 11.1 Description and Geometry

Bridge 10 is a mix of timber and concrete construction. The bridge appears to have been over decked and there are two layers of decking present. The decking is supported by treated timber stringers which span between concrete block abutments. The bridge has the following dimensions:

- Length: 3.89 meters
- Width: 2.74 meters
- Stream Clearance: 1.52 meters

The component sizes are as follows:

Decking	-	102mm x 305mm timber (top and bottom)
Stringers	-	(3) – 305mm x 305mm timber
Abutment	-	(1) lift 635mm x 635mm x1524mm concrete block

### 11.2 Assessment Results

The bridge is in overall very poor condition. The following items were noted on-site:

- The lower layer of (older) decking is decayed and beginning to fail in localized areas,
- There is no guarding on this structure

Refer to Appendix A for photographs of the reported damage.

### 11.3 Recommendations

Recommended repairs to be completed immediately are as follows:

- Remove the lower deck and re-instate upper deck boards,

- Install appropriate vehicle guard on bridge.

Refer to Appendix B for detailed locations, observations and repair recommendations. Refer to Section 14 for cost estimates for repair and replacement of the bridge structure.

## 12.0 [BRIDGE 11](#)

### 12.1 Description and Geometry

Bridge 11 is an aluminum truss bridge spanning between two concrete abutments. There is timber decking and rails on the structure.

The bridge has the following dimensions:

- Length: 15.34 meters
- Width: 1.55 meters
- Stream Clearance: 4.06 meters

Refer to Appendix A for a view of the general arrangement.

The component sizes are as follows:

Top Chord	-	HSS102x102
Bottom Chord	-	HSS 102x102
End Verticals	-	HSS102x102
Diagonals	-	HSS76x51
Top Rail	-	38mm x 140mm timber
Mid Rail	-	38mm x 140mm timber
Bottom Rail	-	38mm x 140mm timber
Decking	-	38mm x 140mm timber
Cross Beams	-	HSS102x102
Plan Bracing	-	HSS51x51

### 12.2 Assessment Results

The bridge is in overall good condition. The following items were noted on-site:

- The handrails are climbable and have gaps exceeding 102mm, which do not conform to code requirements.
- Plan bracing is installed.

Refer to Appendix A for photographs of the reported damage.

### 12.3 Recommendations

Recommended repairs to be completed immediately are as follows:

- Consider installing pickets to reduce spacing and prevent climbing on handrails.

Refer to Appendix B for detailed locations, observations and repair recommendations. Refer to Section 14 for cost estimates for repair and replacement of the bridge structure.

## 13.0 [RESIDUAL LIFE ESTIMATES](#)

The residual life estimates are based on the rating scale defined in Section 1.6 above. These

estimates represent the worst-case members inspected in any member group. For this reason, the overall condition of the member group is not necessarily reflected by the following residual life estimates.

See Appendix B to determine which members the residual life estimate applies to.

### 13.1 Bridge 1

Vehicle Guard	0-1 years (based on overall condition of the elements)
Deck Boards	1-3 years (based on the overall condition of the elements)

### 13.2 Bridge 2

Vehicle Guard	0-3 years (based on overall condition of the elements)
Deck Boards	0-3 years (based on overall condition of the elements)
Abutments	3-6 years (based on the overall condition of the elements)

### 13.3 Bridge 3

Vehicle Guard	0 years (based on the overall condition of the elements)
Stringers	0 years (based on one failed stringer, 1-3 years otherwise)

### 13.4 Bridge 4

Vehicle Guard	3-6 years (based on the overall condition of the elements)
Deck Boards	1-3 years (based on the overall condition of the elements)
Exterior Stringers	3-6 years (based on the overall condition of the elements)
Interior Stringers	6-10 years (based on the overall condition of the elements)

### 13.5 Bridge 5

Vehicle Guard	0 years (based on condition of one guard, 1-3 otherwise)
Deck Boards	1-3 years (based on the overall condition of the elements)
Cross Beams	3-6 years (based on the overall condition of the elements)
Stringers	0 years (based on the unknown structural capacity)

### 13.6 Bridge 6

Vehicle Guard	0 years (based on improperly supported span)
Deck Boards	1-3 years (based on the overall condition of the elements)

### 13.7 Bridge 7

Vehicle Guard	0 years (based on one buried guard, 1-3 otherwise)
Deck Boards	1-3 years (based on the overall condition of the elements)

### 13.8 Bridge 8

Vehicle Guard	1-3 years (based on the overall condition of the elements)
Deck Boards	1-3 years (based on the overall condition of the elements)

13.9 Bridge 9

Vehicle Guard	3-6 years (based on the overall condition of the elements)
Deck Boards	3-6 years (based on the overall condition of the elements)

13.10 Bridge 10

Upper Deck Boards	0 years (based on one failed element, 3-6 years otherwise)
Lower Deck Boards	0 years (based on the overall condition of the elements)
Stringers	3-6 years (based on the overall condition of the elements)

13.11 Bridge 11

Deck Boards	3-6 years (based on the overall condition of the elements)
Handrails	3-6 years (based on the overall condition of the elements)

14.0 COST ESTIMATES

The repairs noted in this report are estimated to Class D standard, in 2025 Canadian dollars. They are based on historical data, current industry rates, as well as our experience with projects of this nature.

The following cost estimate assumes that a construction crew has mobilized one time to repair/replace all four bridges. It is to be noted that construction costs fluctuate significantly in the current economic climate. It is recommended that if repairs are delayed more than six months, a revised estimate be generated. Additionally, should detailed design of replacement structures occur, costing should be redone to ensure accuracy for budgeting and maintenance projections.

Costing associated with full replacement includes removal and appropriate disposal of existing bridge structures.

Table 14.1 Cost Estimate for Recommended Repairs

ITEM	LOCATION	RECOMMENDATION	COST (\$)
Mobilization/Demobilization			\$80,000
Bridge 1			
General	General	Clean superstructure.	\$500
Vehicle Guard	General	Replace all vehicle guarding in kind.	\$5,600
Concrete Deck Planks	West plank	Re-instate joint filler in kind or install equivalent material.	\$300
Bridge 2			
General	General	Clean superstructure.	\$500
Deck Boards	General	Replace the deck boards within 1-3 years.	\$20,000
Vehicle Guard	General	Ongoing monitoring. Replace vehicle guard within the next 3-5 years.	\$5,500
Abutments	General	Clear abutments of biological growth	\$500
Bridge 3			
<b>BRIDGE 3 HAS FAILED AND REQUIRES IMMEDIATE REPAIRS</b>			

ITEM	LOCATION	RECOMMENDATION	COST (\$)
Load Rating	General	Based on the overall condition of the structure, this load rating is not accurate. Remove signage.	\$100
Vehicle Guards	General	Replace vehicle guards.	\$3,700
Roofing Material	Below gravel overlay	Replace roofing material and ensure edges are cut to fit the bridge width.	\$750
Stringers	General	Remove overlay to assess stringer condition. Replace as required.	\$750
Abutments	General	Clear abutments of biological growth. Consider replacing abutments within the next one to three years	\$500
<b>Bridge 4</b>			
General	General	Clean superstructure.	\$500
Abutments	General	Clear abutment of debris and install a spacer block to prevent accumulation of debris.	\$750
<b>Bridge 5</b>			
Vehicle Guard	General	Replace vehicle guard.	\$3,500
Decking	General	Ongoing monitoring. Consider for replacement within 1-3 years.	\$20,000
Log Stringers	General	Load rating is recommended to confirm use of recreational vehicles. This would include grading of the existing stringers.	\$5,000
<b>Bridge 6</b>			
Vehicle Guard	Risers	Install intermediate risers to limit the spans to 1.22m	\$200
Substructure	General	Replace frames with elements specified by a structural engineer certified to practice in British Columbia. It is recommended this includes load rating of the structure.	\$1,500
<b>Bridge 7</b>			
<b><u>BRIDGE 7 HAS FAILED AND REQUIRES IMMEDIATE REPAIRS</u></b>			
Superstructure	General	Clean superstructure	\$500
Deck Board	Northeast edge	Replace the stringer below and re-instate decking.	\$250
Vehicle Guard	West edge	Expose guard and replace as required.	\$1,000
Steel Stringer	East edge	<u>LIFE SAFETY ISSUE</u> . Close structure and replace stringer in kind.	\$1,500
Abutment	General	Replace abutment.	\$5,000
<b>Bridge 8</b>			
Superstructure	General	Clean superstructure.	\$500
Stringers	General	Replace car frame with appropriately sized bridge stringers (timber, concrete or steel) specified by an engineer qualified to practice in British Columbia.	\$5,000
<b>Bridge 9</b>			
Superstructure	General	Clean superstructure.	\$500
<b>Bridge 10</b>			
Deck Board	General	Remove old decking and re-deck structure.	\$900

ITEM	LOCATION	RECOMMENDATION	COST (\$)
Deck Board	Northeast corner	Replace affected deck board.	\$250
Bridge 11			
Handrails	General	Consider installing pickets to limit opening sizes and climb-ability.	\$1,000

Subtotal (\$) \$166,550.00  
 Contingency (20%) \$33,310.00  
 TOTAL (\$) \$199,860.00

*Table 14.2 Cost Estimate for Full Replacement*  
 (NOTE: l.s. = lump sum, l.m. = lineal meter, m<sup>2</sup> = square meter)

ITEM	SIZE	UNITS	QUANTITY	UNIT RATE	COST (\$)
Mobilization/Demobilization					\$200,000
Bridge 1					
Deck Boards	1.22m wide concrete planks	each	4	\$5,000	\$20,000
Vehicle Guard	249mm x 249mm timber	lineal meter	16	\$350	\$5,600
Abutment	635mm x 635mm x 1524mm concrete block	each	10	\$400	\$4,000
Mudsill	unknown dimensions	lump sum	1	\$2,000	\$2,000
Bridge 2					
Deck Boards	102mm x 305mm timber	lineal meter	97.9	\$200	\$19,580
Vehicle Guard	267mm x 267mm timber	lineal meter	13.7	\$350	\$4,795
Cross Beams	250mm x 250mm timber	lineal meter	102	\$275	\$28,050
Steel Girders	813mm deep x 394mm wide	lineal meter	13.7	\$1,157	\$15,847
Abutment	unknown dimensions	lump sum	1	\$4,000	\$4,000
Bridge 3					
Deck Boards	150mm thick gravel overlay with roofing material below	lump sum	1	\$2,500	\$2,500
Vehicle Guard	305mm diameter natural log	lineal meter	14.75	\$250	\$3,688
Stringers	(10)-254mm x 254mm timber	lineal meter	75	\$275	\$20,625
Abutment	unknown dimensions	lump sum	1	\$4,000	\$4,000
Bridge 4					
Deck Boards	102mm x 160mm timber	lineal meter	113	\$250	\$28,250
Vehicle Guard	102mm x 152mm timber	lineal meter	12.7	\$250	\$3,175
Exterior Stringers	305mm x 305mm timber	lineal meter	12.7	\$350	\$4,445
Interior Stringers	152mm x 305mm timber	lineal meter	19.05	\$250	\$4,763
Abutment	unknown dimensions	lump sum	1	\$4,000	\$4,000

ITEM	SIZE	UNITS	QUANTITY	UNIT RATE	COST (\$)
<b>Bridge 5</b>					
Deck Boards	64mm x 337mm timber	lineal meter	102	\$200	\$20,400
Vehicle Guard	406mm diameter natural log	lineal meter	15.24	\$250	\$3,810
Cross Beams	146mm x 210mm timber	lineal meter	58.2	\$250	\$14,550
Log Stringers	406mm diameter natural unpeeled log	lineal meter	15.24	\$250	\$3,810
Abutment	unknown dimensions	lump sum	1	\$4,000	\$4,000
<b>Bridge 6</b>					
Deck Boards	115mm x 305mm timber	lineal meter	68	\$200	\$13,600
Vehicle Guard	305mm diameter natural log	lineal meter	12.2	\$250	\$3,050
Stringers	Engineering design and install	lump sum	1	\$5,000	\$5,000
Abutment	635mm x 635mm x 1524mm concrete block	each	10	\$400	\$4,000
Mudsill	unknown dimensions	lump sum	1	\$2,000	\$2,000
<b>Bridge 7</b>					
Deck Boards	89mm x 216mm timber	lineal meter	55	\$200	\$11,000
Vehicle Guard	52mm x 76mm timber	lineal meter	7.32	\$250	\$1,830
Steel Stringers	114mm deep x 102mm wide I-beam	each	10	\$220	\$2,196
Abutment	unknown dimensions	lump sum	1	\$4,000	\$4,000
<b>Bridge 8</b>					
Deck Boards	52mm x 305mm timber	lineal meter	27	\$200	\$5,400
Vehicle Guard	203mm x 203mm timber	lineal meter	5.5	\$275	\$1,513
Stringers	Engineering design and install	lump sum	1	\$5,000	\$5,000
Abutment	635mm x 635mm x 1524mm concrete block	each	10	\$400	\$4,000
<b>Bridge 9</b>					
Deck Boards	152mm x 152mm timber	lineal meter	80.2	\$250	\$20,050
Vehicle Guard	152mm x 152mm timber	lineal meter	8.4	\$250	\$2,100
Steel Stringers	114mm deep x 102mm wide I-beam	each	14	\$220	\$3,080
Abutment	unknown dimensions	lump sum	1	\$4,000	\$4,000
<b>Bridge 10</b>					
Deck Boards	102mm x 305mm timber	lineal meter	36	\$250	\$9,000
Stringers	305mm x 305mm timber	each	11.67	\$350	\$4,085
Abutment	635mm x 635mm x 1524mm concrete block	each	4	\$400	\$1,600
Mudsill	unknown dimensions	lump sum	1	\$2,000	\$2,000

ITEM	SIZE	UNITS	QUANTITY	UNIT RATE	COST (\$)
Bridge 11					
Deck Boards	38mm x 140mm timber	lineal meter	107.38	\$150	\$16,107
Aluminum Truss Span	50-foot span	lineal meter	15.34	\$4,000	\$61,360
Abutment	unknown dimensions	lump sum	1	\$4,000	\$4,000

Subtotal (\$) \$615,857.48  
Contingency (20%) \$123,171.50  
TOTAL (\$) \$739,028.97

# Appendix A

## Site Photographs



Photograph 1: Bridge 1, note: general arrangement



Photograph 2: Bridge 1, note: damaged vehicle guard



Photograph 3: Bridge 1, note: vehicle guard checked and decayed at connection



Photograph 4: Bridge 1, note: decayed vehicle guard riser



Photograph 5: Bridge 1 Vehicle Guard and Deck Panels, note: vegetative growth and moisture



Photograph 6: Bridge 1, note: abutment and deck panel undersides, note: general arrangement



Photograph 7: Bridge 1, note: failed joint filler



Photograph 8: Bridge 2, note: structural arrangement



Photograph 9: Bridge 2, note: vehicle guard decay and accumulation of debris on structure



Photograph 10: Bridge 2, debris and biological growth on bridge abutment wing wall



Photograph 11: Bridge 2, note: biological growth on cross beams



Photograph 12: Bridge 2, note: substructure plan bracing and girders, note: minor coating failures



Photograph 13: Bridge 3, note: general arrangement looking south



Photograph 14: Bridge 3, note: load rating signage



Photograph 15: Bridge 3 vehicle guard, note: biological growth and moisture



Photograph 16: Bridge 3 vehicle guard, note: decayed cross section



Photograph 17: Bridge 3, note: failed stringer and overlay



Photograph 18: Bridge 3, note: failed stringer at support (abutment)



Photograph 19: Bridge 3, note: failed stringer with decay to the cross section.



Photograph 20: Bridge 3, note: roofing material extending past supports. Significant moisture present



Photograph 21: Bridge 3, note: remaining stringers visible decay



Photograph 22: Bridge 3, note: decayed vehicle guard and excess moisture



Photograph 23: Bridge 4, note: general arrangement looking north



Photograph 24: Bridge 4 vehicle guard, note: cracks through connections



Photograph 25: Bridge 4, note: decking and vehicle guard



Photograph 26: Bridge 4 exterior stringer, note: checking along length



Photograph 27: Bridge 4 interior stringers, note: general arrangement



Photograph 28: Bridge 4 abutment, note: moisture at exterior stringer with visible decay to bearing points



Photograph 29: Bridge 5, note: general arrangement



Photograph 30: Bridge 5 substructure, note: general arrangement



Photograph 31: Bridge 5 vehicle guard, note: decayed section



Photograph 32: Bridge 5 deck boards, note: decayed and checked ends at approach



Photograph 33: Bridge 5 stringer, note: penetrations in bark



Photograph 34: Bridge 6, note: general arrangement



Photograph 35: Bridge 6 vehicle guard, note: insufficient number of risers



Photograph 36: Bridge 6 substructure, note: vehicle frame being used as stringers



Photograph 37: Bridge 7, note: debris accumulation, guard is completely buried



Photograph 38: Bridge 7, note: movement in decking with >25mm voids



Photograph 39: Bridge 7, note: failed steel stringer



Photograph 40: Bridge 7, note: remaining stringers with visible corrosion and movement



Photograph 41: Bridge 7 abutment, note: decayed sections



Photograph 42: Bridge 7 approach, note: stringer ends exposed



Photograph 43: Bridge 8, note: general arrangement



Photograph 44: Bridge 8, note: debris accumulation



Photograph 45: Bridge 8 abutment and stringers, note: car frame used as bridge stringers



Photograph 46: Bridge 8 abutment, note: old abutment in place and decaying



Photograph 47: Bridge 8, note: old abutment elements



Photograph 48: Bridge 9 superstructure, note: general arrangement



Photograph 49: Bridge 9 stringer, note: surface corrosion



Photograph 50: Bridge 9 abutment, note: general arrangement



Photograph 51: Bridge 10, note: general arrangement



Photograph 52: Bridge 10 deck board, note: failed



Photograph 53: Bridge 10 deck board cut ends, note: decayed and failed



Photograph 54: Bridge 10 abutment, note: general arrangement



Photograph 55: Bridge 11, note: general arrangement



Photograph 56: Bridge 11 handrails, note: climbable



Photograph 57: Bridge 11 plan bracing



Photograph 58: Bridge 11 abutment connections

# Appendix B Damage Table

**Table B1 Damage Table**

*\*Note: all locations measured from zero datum at entry to the bridge*

ITEM	LOCATION	DAMAGE	CONDITION	COMMENTS	RECOMMENDATION	RISK	REMEDIAL YEAR
<b>Bridge 1</b>							
General	General	Biological	Fair	Superstructure elements have significant biological growth and accumulation of debris.	Clean superstructure.	3	2025/2026
Vehicle Guard	General	Mechanical/ Biological	Poor	Guard is decayed and has areas of checking and impact damage. Risers are decaying.	Replace all vehicle guarding in kind.	8	2028/2029
Concrete Deck Planks	West plank	Mechanical	Very Poor	Expansion joint filler has dislodged.	Re-instate joint filler in kind or install equivalent material.	5	2025/2026
<b>Bridge 2</b>							
General	General	Biological	Fair	Superstructure elements have significant biological growth and accumulation of debris.	Clean superstructure.	3	2025/2026
Deck Boards	General	Mechanical/ Biological	Poor	Deck boards are weathered and splitting longitudinally. Deck is covered in debris.	Replace the deck boards within 1-3 years.	12	2025/2026
Vehicle Guard	General	Mechanical/ Biological	Fair to Poor	Vehicle guards are showing signs of decay. Visible vegetative growth extends through the section.	Ongoing monitoring. Replace vehicle guard within the next 3-5 years.	8	2028/2029
Steel Girders	General	Corrosive	Fair to Good	Local coating failures with surface corrosion.	Ongoing monitoring.	12	-
Lateral Bracing	General	-	-	Bridge has a lateral resistance system of unknown capacity.	-	-	-
Lateral Bracing	General	Corrosive	Fair to Good	Local coating failures with surface corrosion.	Ongoing monitoring.	12	-
Abutments	General	Biological	Fair to Good	Significant biological accumulation around abutments	Clear abutments of biological growth	9	2025/2026
<b>Bridge 3</b>							
<b>BRIDGE 3 HAS FAILED AND REQUIRES IMMEDIATE REPAIRS</b>							
Load Rating	General	-	Very Poor	Bridge has load rating signage authorizing a 5-ton load limit.	Based on the overall condition of the structure, this load rating is not accurate. Remove signage.	<u>FAILED</u>	2025/2026

ITEM	LOCATION	DAMAGE	CONDITION	COMMENTS	RECOMMENDATION	RISK	REMEDIAL YEAR
Vehicle Guards	General	Biological	Very Poor	Guards are significantly decayed with excess of moisture.	Replace vehicle guards.	10	2025/2026
Roofing Material	Below gravel overlay	Biological	Very Poor	Roofing material extends past the edges of the bridge and has absorbed a significant amount of moisture. This moisture has penetrated the substructure and is affecting performance.	Replace roofing material and ensure edges are cut to fit the bridge width.	5	2025/2026
Stringers	General	Biological	Poor	Stringers are very moist with visible biological growth, which may indicate cross sectional decay.	Remove overlay to assess stringer condition. Replace as required.	16	2025/2026
Stringers	East Edge Stringer	Mechanical/ Biological	Very Poor	Stringer has failed at the abutment. The cross section is decayed.	<u>LIFE SAFETY ISSUE.</u> Prevent use of the structure and immediately replace stringer in kind.	<u>FAILED</u>	2025/2026
Abutments	General	Biological	Fair to Good	Significant biological accumulation around abutments	Clear abutments of biological growth. Consider replacing abutments within the next one to three years	9	2028/2029
<b>Bridge 4</b>							
General	General	-	Fair	Superstructure has moderate accumulation of debris.	Clean superstructure.	3	2025/2026
Vehicle Guard	General	Mechanical	Fair to Good	Guard is cracking at connections.	Ongoing monitoring.	6	-
Edge Stringers	General	Mechanical/ Biological	Fair to Good	Stringers have checking and mechanical damage.	Ongoing monitoring.	12	2025/2026
Abutments	General	Biological	Fair to Poor	Stringers bear on abutment with sediment and moisture accumulation. Stringers are deteriorating.	Clear abutment of debris and install a spacer block to prevent accumulation of debris.	9	2025/2026
<b>Bridge 5</b>							
Vehicle Guard	General	Biological	Poor	Guard is decayed with visible loss of cross section at the cut ends.	Replace vehicle guard.	8	2025/2026
Decking	General	Mechanical	Fair	Ends of decking at approach are weathered and cracking due to mechanical damage.	Ongoing monitoring. Consider for replacement within 1-3 years.	12	225/2026

ITEM	LOCATION	DAMAGE	CONDITION	COMMENTS	RECOMMENDATION	RISK	REMEDIAL YEAR
Log Stringers	General	-	-	Stringers are natural logs with bark still on the elements. They were likely cut down near the structure and installed.	Load rating is recommended to confirm use of recreational vehicles. This would include grading of the existing stringers.	25	-
<b>Bridge 6</b>							
Deck Boards	General	Mechanical/ Biological	Fair	Decking is moderately weathered and abraded.	Ongoing monitoring.	9	-
Vehicle Guard	Risers	-	Very Poor	Vehicle guard risers span too great a distance and would likely fail if they sustained an impact midspan.	Install intermediate risers to limit the spans to 1.22m	10	2025/2026
Substructure	General	-	Very Poor	The substructure is comprised of an old car frame. Structural capacity is unknown.	Replace frames with elements specified by a structural engineer certified to practice in British Columbia. It is recommended this includes load rating of the structure.	25	2028/2029
<b>Bridge 7</b>							
<b>BRIDGE 7 HAS FAILED AND REQUIRES IMMEDIATE REPAIRS</b>							
General	General	-	Very Poor	The bridge has a failed structural element (stringer)	Close structure to the public until such time as repairs can be made.	<u>FAILED</u>	2025/2026
Superstructure	General	Biological	Very Poor	Significant debris accumulation on the superstructure. Guard is buried.	Clean superstructure	3	2025/2026
Deck Boards	General	Biological	Fair to Poor	Decking is deteriorating due to biological growth and moisture. One section has failed.	Clean superstructure.	3	2025/2026
Deck Board	Northeast edge	Mechanical/ Biological	Very Poor	Decking is spreading at the failed stringer. There are visible voids in the deck.	Replace the stringer below and re-instate decking.	15	2025/2026
Vehicle Guard	West edge	Biological	Very Poor	Guard is buried in wet soil and appears to be deteriorating.	Expose guard and replace as required.	10	2025/2026
Steel Stringers	General	Corrosive	Poor	Stringers are moderately corroded with visible delamination of steel elements.	Ongoing monitoring. Consider removing decking and further investigating the condition. Otherwise, consider for replacement within three years.	16	2028/2029

ITEM	LOCATION	DAMAGE	CONDITION	COMMENTS	RECOMMENDATION	RISK	REMEDIAL YEAR
Steel Stringer	East edge	Corrosive/ Mechanical	Very Poor	Stringer has failed in shear at the abutment.	<u>LIFE SAFETY ISSUE.</u> Close structure and replace stringer in kind.	<u>FAILED</u>	2025/2026
Abutment	General	Biological	Poor	Log cribbing is decayed and beginning to settle.	Replace abutment.	12	2025/2026
Approach	General	Mechanical	Poor	Approach gravel has eroded, and the ends of the steel stringers are exposed.	Ongoing monitoring.	16	-
Bridge 8							
Superstructure	General	Biological	Very Poor	Accumulation on the superstructure of debris and vegetative growth.	Clean superstructure.	3	2025/2026
Stringers	General	-	Very Poor	A car frame is installed in lieu of bridge stringers. Capacity is unknown.	Replace car frame with appropriately sized bridge stringers (timber, concrete or steel) specified by an engineer qualified to practice in British Columbia.	25	2025/2026
Abutment	General	-	-	Abutments have been replaced. Decommissioned abutment is still in place, and forms part of the existing structure. The new structure is currently retaining the older elements, which are deteriorating.	Ongoing monitoring. The approaches will begin to erode when the timber abutment decays.	-	-
Bridge 9							
Superstructure	General	Biological	Very Poor	Accumulation of debris and vegetative growth on the superstructure.	Clean superstructure.	3	2025/2026
Deck Boards	General	Mechanical	Fair	Decking is moderately weathered.	Ongoing monitoring.	9	-
Steel Stringers	General	Corrosive	Fair	Stringers have moderate surface corrosion. No noted delamination of the elements.	Ongoing monitoring.	12	2025/2026
Bridge 10							
Deck Board	General	-	-	The bridge appears to have been re-decked with the old decking in place. Older elements are deteriorating and decayed.	Remove old decking and re-deck structure.	15	2025/2026

ITEM	LOCATION	DAMAGE	CONDITION	COMMENTS	RECOMMENDATION	RISK	REMEDIAL YEAR
Deck Board	Northeast corner	Mechanical/ Biological	Very Poor	Deck board has failed. There is a void in the deck.	Replace affected deck board.	15	2025/2026
Bridge 11							
Handrails	General	-	-	Handrails are climbable and have large openings which do not conform to code requirements.	Consider installing pickets to limit opening sizes and climb-ability.	-	2025/2026
Plan Bracing	General	-	Very Good	Plan bracing is in place. Bridge has a dedicated lateral system.	-	4	-

# Appendix C

## Bridge Checklist







# HEROLD ENGINEERING

## BRIDGE ASSESSMENT REPORT

**BRIDGE NAME** BRIDGE 4 **LOCATION** LOG TRAIN TRAIL

**LENGTH** 6.35m **ROADWAY WIDTH** 2.82m **CLEARANCE** 2.4m  
**No. SPANS** 1 **SPAN TYPE** SIMPLY SUPPORTED **MAX. SPAN** N/A  
**POSTED LOAD** N/A **YEAR BUILT** N/A **UTILITIES** N/A

ITEM	CONSTRUCTION	25							
<b>DECK</b>	102mm x 160mm UNTREATED CEDAR	G							
<b>GUARDING</b>	102mm x 152mm UNTREATED CEDAR	F-G							
<b>EXT. STRINGERS</b>	305mm X 305mm TREATED TIMBER	F-G							
<b>INT. STRINGERS</b>	152mm x 305mm UNTREATED CEDAR	G							
<b>ABUTMENT</b>	CONCRETE	G							
<b>STREAM CHANN.</b>	CLEAR	G							

**RATING SCALE**

- VERY GOOD (VG) - ELEMENT IS IN SERVICEABLE CONDITION WITH NO NOTABLE DETERIORATION. NO REPAIRS ARE REQUIRED.
- GOOD (G) - ELEMENT HAS MINOR AMOUNTS OF SUPERFICIAL DETERIORATION WITH NO NOTED OVERSTRESSING OR STRUCTURAL DAMAGE.
- FAIR (F) - ELEMENT HAS MODERATE AMOUNTS OF DAMAGE WHICH MAY INCREASE RATES OF DETERIORATION LONG TERM. NO NOTED OVERSTRESSING IS OBSERVED. REPAIRS TO PROLONG SERVICE LIFE MAY BE APPLICABLE.
- POOR (P) - ELEMENT HAS SIGNIFICANT AMOUNTS OF DAMAGE OR DETERIORATION. HOWEVER NO OVERSTRESSING IS OBSERVED. THE ELEMENT IS NEARING THE END OF SERVICE LIFE.
- VERY POOR (VP) - ELEMENT IS NO LONGER IN SERVICEABLE CONDITION WITH SIGNIFICANT DAMAGE OR LOSS OF STRUCTURAL CAPACITY. IMMEDIATE REPAIR OR REPLACEMENT IS LIKELY.

**REMARKS**

2025 - GUARD IS CRACKING AT CONNECTIONS  
 EXTERIOR STRINGERS HAVE CHECKING AND MODERATE MECHANICAL DAMAGE  
 ABUTMENTS HAVE LOTS OF DEBRIS AND MOISTURE. DAMAGE IS HAPPENING TO THE STRINGERS.



# HEROLD ENGINEERING

## BRIDGE ASSESSMENT REPORT

**BRIDGE NAME** BRIDGE 5 **LOCATION** LOG TRAIN TRAIL

**LENGTH** 7.62m **ROADWAY WIDTH** 4.47m **CLEARANCE** 1.35m  
**No. SPANS** 1 **SPAN TYPE** SIMPLY SUPPORTED **MAX. SPAN** N/A  
**POSTED LOAD** N/A **YEAR BUILT** N/A **UTILITIES** N/A

ITEM	CONSTRUCTION	25													
<b>DECK</b>	64mm x 337mm TIMBER	F													
<b>GUARDING</b>	406mm DIAMETER NATURAL LOG	P													
<b>CROSS BEAMS</b>	146mm x 210mm TIMBER @ 610mm o/c	F													
<b>STRINGERS</b>	(2)- 406mm DIAMETER NATURAL LOG	G													
<b>STREAM CHANN.</b>	CLEAR	G													

**RATING SCALE**

- VERY GOOD (VG) - ELEMENT IS IN SERVICEABLE CONDITION WITH NO NOTABLE DETERIORATION. NO REPAIRS ARE REQUIRED.
- GOOD (G) - ELEMENT HAS MINOR AMOUNTS OF SUPERFICIAL DETERIORATION WITH NO NOTED OVERSTRESSING OR STRUCTURAL DAMAGE.
- FAIR (F) - ELEMENT HAS MODERATE AMOUNTS OF DAMAGE WHICH MAY INCREASE RATES OF DETERIORATION LONG TERM. NO NOTED OVERSTRESSING IS OBSERVED. REPAIRS TO PROLONG SERVICE LIFE MAY BE APPLICABLE.
- POOR (P) - ELEMENT HAS SIGNIFICANT AMOUNTS OF DAMAGE OR DETERIORATION. HOWEVER NO OVERSTRESSING IS OBSERVED. THE ELEMENT IS NEARING THE END OF SERVICE LIFE.
- VERY POOR (VP) - ELEMENT IS NO LONGER IN SERVICEABLE CONDITION WITH SIGNIFICANT DAMAGE OR LOSS OF STRUCTURAL CAPACITY. IMMEDIATE REPAIR OR REPLACEMENT IS LIKELY.

**REMARKS**

2024 - GUARD IS DECAYED WITH VISIBLE LOSS OF CROSS SECTION AT THE CUT ENDS  
 DECK BOARDS ARE WEATHERED AND CRACKED AT THE APPROACH  
 LOG STRINGERS ARE UNPEELED AND LIKELY CUT DOWN NEARBY - STRUCTURAL CAPACITY UNKNOWN



# HEROLD ENGINEERING

## BRIDGE ASSESSMENT REPORT

**BRIDGE NAME** BRIDGE 6 **LOCATION** LOG TRAIN TRAIL

**LENGTH** 6.10m **ROADWAY WIDTH** 3.38m **CLEARANCE** 1.83m  
**No. SPANS** 1 **SPAN TYPE** SIMPLY SUPPORTED **MAX. SPAN** N/A  
**POSTED LOAD** N/A **YEAR BUILT** 1995 **UTILITIES** N/A

ITEM	CONSTRUCTION	25								
DECK	115mm x 305mm TIMBER	F								
GUARDING	305mm DIAMETER NATURAL LOG	VP								
STRINGERS	RE-PURPOSED CAR FRAME	VP								
ABUTMENT	(2) LIFTS OF 762mm x 762mm x 1524mm CONCRETE	G								
STREAM CHANN.	CLEAR	G								

**RATING SCALE**

- VERY GOOD (VG) – ELEMENT IS IN SERVICEABLE CONDITION WITH NO NOTABLE DETERIORATION. NO REPAIRS ARE REQUIRED.
- GOOD (G) – ELEMENT HAS MINOR AMOUNTS OF SUPERFICIAL DETERIORATION WITH NO NOTED OVERSTRESSING OR STRUCTURAL DAMAGE.
- FAIR (F) – ELEMENT HAS MODERATE AMOUNTS OF DAMAGE WHICH MAY INCREASE RATES OF DETERIORATION LONG TERM. NO NOTED OVERSTRESSING IS OBSERVED. REPAIRS TO PROLONG SERVICE LIFE MAY BE APPLICABLE.
- POOR (P) – ELEMENT HAS SIGNIFICANT AMOUNTS OF DAMAGE OR DETERIORATION. HOWEVER NO OVERSTRESSING IS OBSERVED. THE ELEMENT IS NEARING THE END OF SERVICE LIFE.
- VERY POOR (VP) – ELEMENT IS NO LONGER IN SERVICEABLE CONDITION WITH SIGNIFICANT DAMAGE OR LOSS OF STRUCTURAL CAPACITY. IMMEDIATE REPAIR OR REPLACEMENT IS LIKELY.

**REMARKS**

2025 – DECKING IS MODERATELY WEATHERED AND ABRADED  
 VEHICLE GUARD SPAN IS TOO LONG. RISER SPACING IS TOO FAR APART  
 SUBSTRUCTURE IS AN OLD CAR FRAME – STRUCTURAL CAPACITY UNKNOWN



# HEROLD ENGINEERING BRIDGE ASSESSMENT REPORT

**BRIDGE NAME** BRIDGE 7 **LOCATION** LOG TRAIN TRAIL

**LENGTH** 3.66m **ROADWAY WIDTH** 3.05m **CLEARANCE** 950mm  
**No. SPANS** 1 **SPAN TYPE** SIMPLY SUPPORTED **MAX. SPAN** N/A  
**POSTED LOAD** N/A **YEAR BUILT** 1995 **UTILITIES** N/A

ITEM	CONSTRUCTION	25							
<b>DECK</b>	89mm x 216mm TIMBER	F-P							
<b>GUARDING</b>	52mm x 76mm TIMBER	VP							
<b>STRINGERS</b>	114mm DEEP x 102mm WIDE STEEL I-BEAM @ 305mm o/c	VP							
<b>ABUTMENT</b>	NATURAL LOG	P							
<b>STREAM CHANN.</b>	CLEAR	G							

**RATING SCALE**

- VERY GOOD (VG) - ELEMENT IS IN SERVICEABLE CONDITION WITH NO NOTABLE DETERIORATION. NO REPAIRS ARE REQUIRED.
- GOOD (G) - ELEMENT HAS MINOR AMOUNTS OF SUPERFICIAL DETERIORATION WITH NO NOTED OVERSTRESSING OR STRUCTURAL DAMAGE.
- FAIR (F) - ELEMENT HAS MODERATE AMOUNTS OF DAMAGE WHICH MAY INCREASE RATES OF DETERIORATION LONG TERM. NO NOTED OVERSTRESSING IS OBSERVED. REPAIRS TO PROLONG SERVICE LIFE MAY BE APPLICABLE.
- POOR (P) - ELEMENT HAS SIGNIFICANT AMOUNTS OF DAMAGE OR DETERIORATION. HOWEVER NO OVERSTRESSING IS OBSERVED. THE ELEMENT IS NEARING THE END OF SERVICE LIFE.
- VERY POOR (VP) - ELEMENT IS NO LONGER IN SERVICEABLE CONDITION WITH SIGNIFICANT DAMAGE OR LOSS OF STRUCTURAL CAPACITY. IMMEDIATE REPAIR OR REPLACEMENT IS LIKELY.

**REMARKS**

2025 - DECKING IS DETERIORATED DUE TO BIOLOGICAL GROWTH AND MOISTURE  
 VEHICLE GUARD IS BURIED IN DEBRIS  
 STEEL STRINGER HAS FAILED - LIFE SAFETY ISSUE  
 STEEL STRINGERS ARE MODERATELY CORRODED  
 ABUTMENT IS DECAYED AND BEGINNING TO SETTLE  
 APPROACH GRAVEL HAS ERODED AND STEEL STRINGERS ARE VISIBLE





# HEROLD ENGINEERING BRIDGE ASSESSMENT REPORT

**BRIDGE NAME** BRIDGE 9 **LOCATION** LOG TRAIN TRAIL

**LENGTH** 4.2m **ROADWAY WIDTH** 2.97m **CLEARANCE** 712mm  
**No. SPANS** 1 **SPAN TYPE** SIMPLY SUPPORTED **MAX. SPAN** N/A  
**POSTED LOAD** N/A **YEAR BUILT** 1995 **UTILITIES** N/A

ITEM	CONSTRUCTION	25					
<b>DECK</b>	152mm x 152mm TIMBER	F					
<b>GUARDING</b>	152mm x 152mm TIMBER	G					
<b>STRINGER</b>	115mm DEEP x 102mm WIDE STEEL I-BEAM	F					
<b>ABUTMENT</b>	(2) LIFTS 762mm x 762mm X 1524mm CONCRETE BLOCK	G					
<b>STREAM CHANN.</b>	CLEAR	G					
		G					

**RATING SCALE**

- VERY GOOD (VG) – ELEMENT IS IN SERVICEABLE CONDITION WITH NO NOTABLE DETERIORATION. NO REPAIRS ARE REQUIRED.
- GOOD (G) – ELEMENT HAS MINOR AMOUNTS OF SUPERFICIAL DETERIORATION WITH NO NOTED OVERSTRESSING OR STRUCTURAL DAMAGE.
- FAIR (F) – ELEMENT HAS MODERATE AMOUNTS OF DAMAGE WHICH MAY INCREASE RATES OF DETERIORATION LONG TERM. NO NOTED OVERSTRESSING IS OBSERVED. REPAIRS TO PROLONG SERVICE LIFE MAY BE APPLICABLE.
- POOR (P) – ELEMENT HAS SIGNIFICANT AMOUNTS OF DAMAGE OR DETERIORATION. HOWEVER NO OVERSTRESSING IS OBSERVED. THE ELEMENT IS NEARING THE END OF SERVICE LIFE.
- VERY POOR (VP) – ELEMENT IS NO LONGER IN SERVICEABLE CONDITION WITH SIGNIFICANT DAMAGE OR LOSS OF STRUCTURAL CAPACITY. IMMEDIATE REPAIR OR REPLACEMENT IS LIKELY.

**REMARKS**

2025 – ACCUMULATION OF DEBRIS AND GROWTH ON STRUCTURE  
 DECKING IS MODERATELY WEATHERED  
 STEEL STRINGERS HAVE MODERATE SURFACE CORROSION – NO DELAMINATIONS NOTED





# HEROLD ENGINEERING

## BRIDGE ASSESSMENT REPORT

**BRIDGE NAME** BRIDGE 11 **LOCATION** LOG TRAIN TRAIL

**LENGTH** 15.34m **ROADWAY WIDTH** 1.55m **CLEARANCE** 4.06m

**No. SPANS** 1 **SPAN TYPE** SIMPLY SUPPORTED **MAX. SPAN** N/A

**POSTED LOAD** N/A **YEAR BUILT** 2021 **UTILITIES** N/A

ITEM	CONSTRUCTION	25						
<b>DECK</b>	38mm x 140mm TIMBER	G						
<b>TOP CHORD</b>	HSS102x102 ALUMINUM	G						
<b>BOTTOM CHORD</b>	HSS102x102 ALUMINUM	G						
<b>VERTICALS</b>	HSS102x102 ALUMINUM	G						
<b>DIAGONALS</b>	HSS51x76 ALUMINUM	G						
<b>CROSS BEAMS</b>	HSS102x102 ALUMINUM	G						
<b>PLAN BRACING</b>	HSS51x51 ALUMINUM	G						
<b>TOP RAIL</b>	38mm X 140mm TIMBER	G						
<b>MID RAIL</b>	38mm X 140mm TIMBER	G						
<b>BOTTOM RAIL</b>	38mm X 140mm TIMBER	G						
<b>STREAM CHANN.</b>	CLEAR	G						

**RATING SCALE**

- VERY GOOD (VG) - ELEMENT IS IN SERVICEABLE CONDITION WITH NO NOTABLE DETERIORATION. NO REPAIRS ARE REQUIRED.
- GOOD (G) - ELEMENT HAS MINOR AMOUNTS OF SUPERFICIAL DETERIORATION WITH NO NOTED OVERSTRESSING OR STRUCTURAL DAMAGE.
- FAIR (F) - ELEMENT HAS MODERATE AMOUNTS OF DAMAGE WHICH MAY INCREASE RATES OF DETERIORATION LONG TERM. NO NOTED OVERSTRESSING IS OBSERVED. REPAIRS TO PROLONG SERVICE LIFE MAY BE APPLICABLE.
- POOR (P) - ELEMENT HAS SIGNIFICANT AMOUNTS OF DAMAGE OR DETERIORATION. HOWEVER NO OVERSTRESSING IS OBSERVED. THE ELEMENT IS NEARING THE END OF SERVICE LIFE.
- VERY POOR (VP) - ELEMENT IS NO LONGER IN SERVICEABLE CONDITION WITH SIGNIFICANT DAMAGE OR LOSS OF STRUCTURAL CAPACITY. IMMEDIATE REPAIR OR REPLACEMENT IS LIKELY.

**REMARKS**

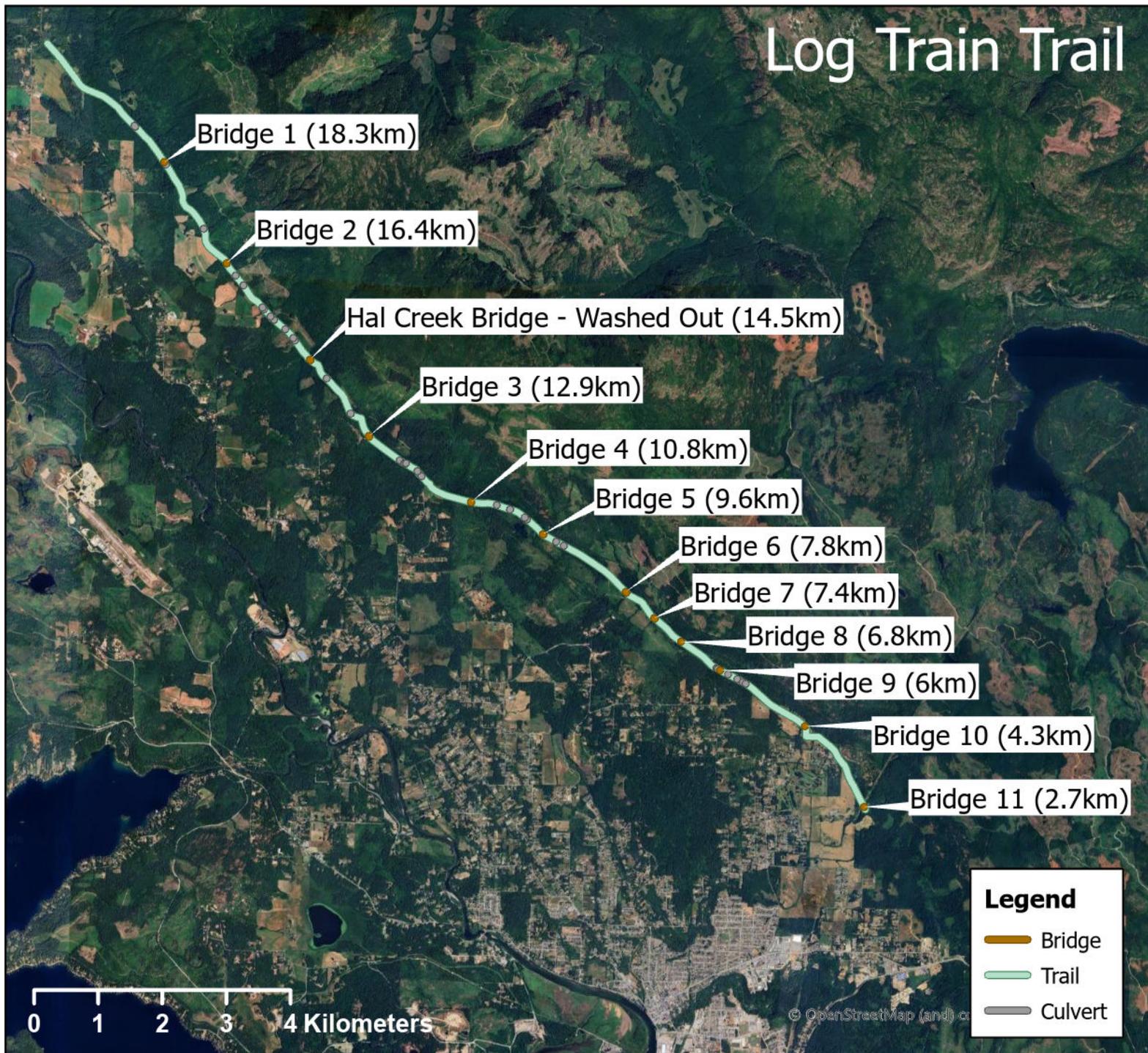
2025 - HANDRAILS ARE CLIMBABLE AND HAVE OPENINGS EXCEEDING THE MAXIMUMS OF THE BRITISH COLUMBIA BUILDING CODE  
 PLAN BRACING IS IN PLACE



# Appendix D

## Aerial Map

# Log Train Trail



## LIST OF OF BRIDGES WITHIN THE LOG TRAIN CORRIDOR

'Condition' & 'Risk' columns evaluate all of the bridge components and displays the worst condition value and highest risk value.

UniqueID	Name	Surface	Description	Length (m)	Width (m)	Condition	Risk
08740016	Bridge 1 (18.3km)	Concrete	Guarded by low-profile curb	8	4.93	Fair	8
08740017	Bridge 2 (16.4km)	Timber	Guarded by low-profile curb	6.83	4.45	Fair	12
08740018	Bridge 3 (12.9km)	Gravel	Requiring Replacement	7.37	3.18	VeryPoor	FAILED
08740019	Bridge 4 (10.8km)	Timber	Built where a previous structure existed	6.35	2.82	Fair	12
08740020	Bridge 5 (9.6km)	Timber	Supported by cross beam and log stringers	7.62	4.47	Poor	25
08740021	Bridge 6 (7.8km)	Timber	Timber decking is supported by a steel car frame	6.1	3.38	VeryPoor	25
08740022	Bridge 7 (7.4km)	Timber	Mixed construction of timber, concrete, and steel	3.66	3.05	VeryPoor	FAILED
08740023	Bridge 8 (6.8km)	Timber	Mix of sawn timber, concrete, and steel	2.74	2.92	VeryPoor	25
08740024	Bridge 9 (6km)	Timber	Mix of sawn timber, steel, and concrete	4.2	2.97	Fair	12
08740025	Bridge 10 (4.5km)	Timber	Two layers of timber decking present	3.89	2.74	VeryPoor	15
08740026	Bridge 11 (2.7km)	Timber	Aluminum truss, between concrete abutments	15.34	1.55	Good	4
08740027	Hal Creek Bridge (14.5km)	Native Soils	Washed out				