Rails to Trails
Routine Condition Bridge Inspection Form

Crossing	Structure #	Site #	Length	UTM Zone and E	UTM N
OTTER CREEK	KV-060	KV-060	103	10 662211	5491037
Trail Name	**Km**		**Deck Type**	**Girder Type**	**Abutment Type**
KVRT	139.3		TIMB	TIMBER	TIMBER
Inspection Co. Name	**Inspector's Name /Signature**		Inspection Date:	3-Oct-12	
SNT Engineering Ltd.	J Cox, E Miller		Next Inspection:	1-Jul-13	

GENERAL INFORMATION:

LEFT/RIGHT APPROACHES (as seen facing downstream)

E = excellent; G = good; F = fair; P = poor; N/A = not appl.

Item	Present Condition (circle or fill-in)					Comments (a comment is mandatory if condition "Poor" is selected)
Alignment	E	G	F	P		
Bridge Ahead Signs Missing	0		1		2	
Brushing Required	Yes			No		
Delineator Missing Left	0		1		2	
Delineator Missing Right	0		1		2	
Approach Handrail/Guardrail	E	G	F	P	N/A	
Posted Load Rating (tonnes)					N/A	
Road Surface	E	G	F	P		
LEFT/RIGHT ABUTMENTS (as seen facing downstream)						
Log/Timber Cribs	E	G	F	P	N/A	
Tie-backs	E	G	F	P	N/A	
Bin Wall	E	G	F	P	N/A	
Concrete	E	G	F	P	N/A	
Stone Blocks	E	G	F	P	N/A	
Caps or sills	E	G	F	P	N/A	HEAVY DECAY
Piles or Posts	E	G	F	P	N/A	
Ballast Wall	E	G	F	P	N/A	HEAVY DECAY
Wing Wall	E	G	F	P	N/A	
Fill	E	G	F	P	N/A	
Bearings	E	G	F	P	N/A	
Riprap	E	G	F	P	N/A	
DECK						
Running Planks	E	G	F	P	N/A	
Sub-deck	E	G	F	P	N/A	SPLIT PLANKS/ WEATHERED
Ties	E	G	F	P	N/A	SPLIT PLANKS/ WEATHERED
Nails	E	G	F	P	N/A	NAIL HEADS PULLING
Deck to Girder Bolts	E	G	F	P	N/A	
Hardware	E	G	F	P	N/A	
Curb Rail/Blocks/Posts	E	G	F	P	N/A	
Handrail/Walkouts	E	G	F	P	N/A	
Overall Deck Condition	E	G	F	P		HEAVY QUAD USE

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OTTER CREEK	KV-060	KV-060	103	10 662211	5491037
Trail Name	**Km**		**Deck Type**	**Girder Type**	**Abutment Type**
KVRT	139.3		TIMB	TIMBER	TIMBER

PIERS (numbered from left bank)	Pier # 1 of 21				Comments	TYP
Caps or sills	G	F	P	N/A		
Material	G	F	P	N/A	CAP BEAMS CHECKING	
Bearings	G	F	P	N/A		
	Pier # 2 of					
Caps or sills	G	F	P	N/A		
Material	G	F	P	N/A		
Bearings	G	F	P	N/A		

SUPERSTRUCTURE						
Steel	E	G	F	P	N/A	
Bracing	E	G	F	P	N/A	
Bearing	E	G	F	P		
Hardware	E	G	F	P		
Overall Superstructure Condition	E	G	F	P		MATERIAL WEATHERED AND SOME ROTTING

CHANNEL

Est. Present Water Level Depth (m)	Est. Present Water Level Width (m)	Est. High Water Level Clearance (m)
0.8	70	2.5

HAZARDS (indicate Y or N)

High Water?	Scour?	Ice?	Debris?	Aggradation?
N	N	N	N	N

Hazard Comments

REPAIRS (H = High, M= Medium, L = Low)

#	Priority	Description	Estimate ($)
1	M	REPLACE MISSING HANDRAIL AT RIGHT SIDE	
2			
3			

ITEMS TO MONITOR

#	Description
1	RECOMMEND CLOSE PROXIMITY INSPECTION OF PIERS AND ABUTMENTS
2	
3	

General Comments HEAVY QUAD USE, LOCAL RESIDENT HAS RE-NAILED RUNNING SURFACE

P.Eng inspection required? Y N **Estimated date of replacement:** 2020

PROFESSIONAL ENGINEER (PEng) CERTIFICATION

Current Load Rating GVW (tonnes):	5	New Load Rating GVW (tonnes)		Replacement Date 2020	
Reviewed by - P.Eng.	Les Thiessen		Date:	January 17, 2013	

Bridge Inspection Photos

Structure # :	KV-060
Name of Crossing:	OTTER CREEK
Name of Trail:	KVRT
km:	139.3
Inspection Date:	10/3/2012

(Left and Right as seen facing downstream)

LEFT APPROACH

RIGHT APPROACH

RIGHT ABUTMENT

LEFT ABUTMENT

TYPICAL PILE & BEAM

TYPICAL CAP BEAM

VIEW FROM UPSTREAM

VIEW FROM DOWNSTREAM

Rails to Trails

Routine Condition Bridge Inspection Form

Crossing	Structure #	Site #	Km	UTM Zone	UTM E	UTM N	Width (m)	Length (m)
Otter Lake	KV-060	KV-060	139.3	11 N	228253	5495442	2.1	105.2
Trail Name		Super-Structure		Timber				
Kettle Valley		Sub-Structure		Timber				
Inspection Co. Name	Inspector's Signature				Inspection Date		Next Inspection	
Brook Robazza					June 27, 2019			

GENERAL INFORMATION:

LEFT/RIGHT APPROACHES (as seen facing downstream)

Item	Present Condition	Comments
Alignment	Good	Gentle curve on camp approach.
Bridge Ahead Signs Missing	2	
Brushing Required	No	No significant vegetation growth impacting approaches.
Delineator Missing Left	2	
Delineator Missing Right	2	
Approach Handrail/Guardrail	Poor	None present at woods approach. End section of hand rails removed at the woods-downstream approach.
Posted Load Rating (tonnes)	0	No sign.
Road Surface	Fair	Some pot holes and rutting.
LEFT/RIGHT ABUTMENTS (as seen facing downstream)		
Log/Timber Cribs	NA	None present.
Tie-backs	NA	None present.
Bin Wall	NA	
Caps or sills	Poor	Abutment caps starting to fail.
Piles or Posts		
Ballast Wall	Poor	Either failed or never present.
Wing Wall		
Fill	Poor	No fill retention.
Bearings	Poor	Completely filled with soil.
Riprap		

Rails to Trails

Routine Condition Bridge Inspection Form

Crossing	Structure #	Site #	Km	UTM Zone	UTM E	UTM N	Width (m)	Length (m)
Otter Lake	KV-060	KV-060	139.3	11 N	228253	5495442	2.1	105.2

Trail Name	Super-Structure	Timber
Kettle Valley	Sub-Structure	Timber

DECK	Condition	Comments
Running Planks	Good	Some ATV wear and some slightly loose boards.
Sub-deck	NA	Only 3 lengths of subdeck only above stringers.
Ties	Poor	Some moss growth and signs of rot on most ties and top surfaces are in generally very poor condition due to rot.
Nails	Fair	Small nails of which many are beginning to protrude.
Deck to Girder Bolts	Good	Bolts in good condition but ties are rotten, limiting the effectiveness of the connection.
Hardware	Good	Mostly timber “hardware” in good condition.
Curb Rail/Blocks/Posts	Poor	No curb rail present.
Handrail/Walkouts	Fair	Some sections of railing damaged or removed.
Overall Deck Condition	Fair	Overall good condition except for railing and ties.
PIERS	Condition	Comments
Caps or Sills	Fair	Signs of rot and deterioration on most caps.
Bearings	Good	Timber bearing pads in overall good condition.
PILES	Condition	Comments
Caps or Sills	Fair	Some piles show large cracks and deterioration.
Bearings	Good	Timber bearing in overall good condition.
SUPERSTRUCTURE	Condition	Comments
Steel	Good	Exterior stringers show some weather damage but overall good.
Bracing	Fair	Some cross bracing on piers are damaged or have become loose.
Bearings		
Hardware	Fair	Some signs of moderate corrosion.
Overall Superstructure Condition	Fair	Overall good condition except for railing and ties.
CHANNEL		

Est. Present Water Level Depth (m)	Est. Present Water Level Width (m)	Est. High Water Level Clearance (m)
0	0	0

Rails to Trails
Routine Condition Bridge Inspection Form

Crossing	Structure #	Site #	Km	UTM Zone	UTM E	UTM N	Width (m)	Length (m)
Otter Lake	KV-060	KV-060	139.3	11 N	228253	5495442	2.1	105.2

Trail Name	Super-Structure	Timber
Kettle Valley	Sub-Structure	Timber

HAZARDS

High Water?	Scour?	Ice?	Debris?	Aggradation?
No	No	No	No	No

	Hazard Comments	Just off Otter Lake. Low risk of major hydrological damage.

REPAIRS

#	Priority	Description	Estimate ($)
1	High	Replace all removed or damaged railing. Tighten all posts	
2			
3			

ITEMS TO MONITOR

#	Description
1	Conditions of ties, caps, and piles.
2	
3	

General Comments	

P. Eng inspection required?	Yes	Estimated date of replacement:	0

PROFESSIONAL ENGINEER (P.Eng)		Reviewed By:	Daniel Estey
Current Load Rating GVW (tonnes): 5	New Load Rating GVW (tonnes): 5	Reviewed by:	
Replacement Date:	0	2019/10/30	

Location


0 25 50 100 150 200 Meters
N
Otter Lake
Otter Lake
Eighth St
Otter Lake Provincial Park
6th St
Coalmont Rd
Lockyer St
5th St
Otter Ave
Strathcona Ave
Truro St
Nicola Ave
4th St
Dover St
3rd St
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community, Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Piers

	Cap or Sills	Bearings
Condition	Fair	Good
Comment	Signs of rot and deterioration on most caps.	Timber bearing pads in overall good condition.

Piers

	Cap or Sills	Bearings
Condition	Fair	Good
Comment	Signs of rot and deterioration on most caps.	Timber bearing pads in overall good condition.

Piles

	Cap or Sills	Bearings
Condition	Fair	Good
Comment	Some piles show large cracks and deterioration.	Timber bearing in overall good condition.

Piles

	Cap or Sills	Bearings
Condition	Fair	Good
Comment	Some piles show large cracks and deterioration.	Timber bearing in overall good condition.

Item to Monitor

Conditions of ties, caps, and piles.

None

Repair

Priority	Description	Estimate
High	Replace all removed or damaged railing. Tighten all posts	

None

Additional Photos

Additional Photos

Additional Photos

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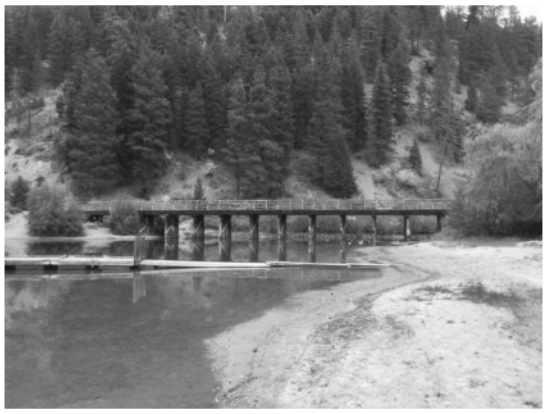
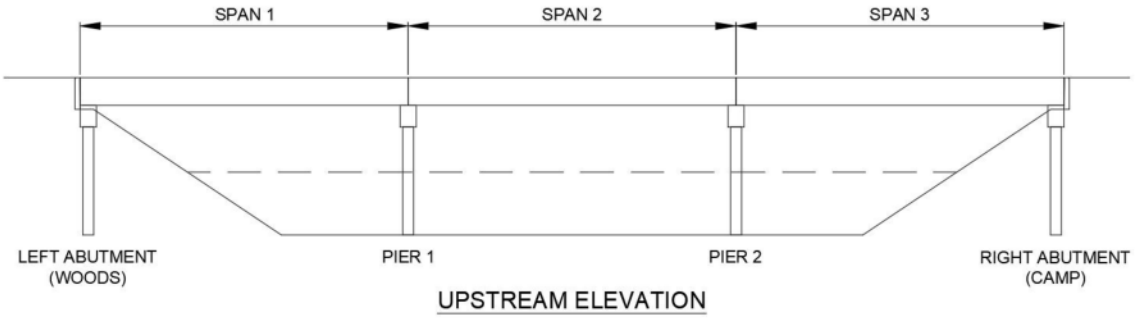
BRIDGE INFORMATION:



Bridge No./Name	KV-060: Kettle Valley Railway
Inspection Date	October 9, 2020
Inspected By	Mike Hanson, P.Eng. Josh Stadnyk, EIT.
Temperature (°C)	15
Access Method	Ground level assessment
Year Built	Unknown
Camp/Town	River Right
Number of Spans	23 **Span Lengths (m)** 4.3 to 4.8 m
Superstructure	Six creosote treated sawn stringers, spaced 150 mm in pairs and 650 mm clear distance between pairs. Stringers are 245 x 500 mm and generally continuous over two spans, aside from the stringers in the first and last spans, which are simply supported.
Deck	Untreated ties, 185 x 185 mm spaced at 300 mm c/c. Longitudinal nailing plank across ties supporting deck planks; all planks 140 x 35 mm. Running surface width 1.83 m, total deck width 3.58 m.
Curb	Untreated timber handrails.
Substructure	Creosote treated timber piles, cap beams and ballast walls. Piles are typically 300 mm diameter, cap beams are 400 mm deep x 300 mm wide timbers.

STANDARD NAMING CONVENTION:



UPSTREAM ELEVATION

NOTE:
- ABUTMENTS, SPANS, AND PIERS NUMBERED FROM LEFT TO RIGHT WHEN LOOKING DOWNSTREAM
- PILES AND GIRDERS NUMBERED UPSTREAM TO DOWNSTREAM

GENERAL BRIDGE CONDITION:

Bridge Element	Previous	Current
Superstructure	--	Poor
Substructure	--	Poor
Deck	--	Poor
Load Posting	--	--
Date for Next Close Proximity Inspection	--	2021

BRIDGE INSPECTION SUMMARY:

The bridge is generally in poor condition with severe widespread decay in the piles and deck ties. Severe decay was also noted in the exterior stringers where accessible from ground level which suggests numerous other stringers where not accessible are also in poor condition.

At least 75% of the deck ties are in poor condition with extensive decay in the upper half of the ties. The deck planks are generally in fair condition and help to distribute the load evenly across the decaying ties. Given the extent and severity of decay throughout the bridge, it is likely that a full bridge replacement is the most cost effective solution, rather than undertaking extensive repairs. Furthermore, much of the decay in the piles were noted at or near ground and present water level, which suggests that posting the piles, may not be feasible.

We recommend the bridge be restricted to pedestrians and recreational off road vehicles (UTV, ATV and dirt bikes/e-bikes) only, with a maximum speed of 5 km/hr over the bridge, until significant repairs or a full replacement is completed. Equestrian use should be prohibited as the thin (38 mm) deck planks and decayed ties are not likely to provide adequate capacity for the concentrated point loads of a horse hoof. If the bridge is to remain open under these restrictions, we recommend the bridge be monitored

on a monthly basis for signs of distress or failure. We also recommend a detailed inspection of the upper section of piles, caps and stringers be completed using a boat and/or ladder to determine the extent of decay and confirm if the load restrictions are suitable. Please note that a full closure may be required based on the results of this inspections.

The age of the structure is not known, however based on the existing condition the structure has certainly exceeded its useful life.

INSPECTION NOTES:

Approaches:

- The approaches are generally in fair condition.
- Minor pothole/loss of fill at the ends of the bridge deck.
- Vegetation overgrown at the right approach, reducing visibility.
- No bridge ahead signs.
- No approach barriers or guard rails.
- Large boulders in center of pathway to restrict larger vehicle access.
- No visible ballast walls, which is causing fill to spill around ends of the stringers.

Deck:

- The deck is generally in poor condition.
- The ties have widespread decay with at least 75 mm of severe decay noted on the top face of most of the ties. At least 75% of ties are in poor condition.
- The nailing planks and deck planks are in fair condition with minor decay in isolated areas.
- Limited access to inspect deck from under bridge.
- The handrails are generally in fair condition with several isolated sections with damaged handrail posts and planks.
- The handrails at both ends of the bridge are damaged and appear to have either been purposely removed or damaged for additional vehicle clearance.

Substructure:

Abutments:

- Both abutments are buried in fill with no access for inspecting the caps/ sills and piles.

Piers:

- The piers are typically in fair to poor condition.
- There are a number of heavily decayed piles with at most 50 mm shell remaining, as noted in the table below.
- All piles were inspected from ground level and at the present water level.
- Access to the cap beams were limited to piers 1, 2, and 22 where the caps are reachable from ground level.
- Pier 2 cap cored below stringer 6, 25 mm shell remaining in the upper 150 mm of the cap. Sounding indicates decay is present throughout the cap.
- The cross bracing has widespread decay, as noted in the table below.

Substructure Decay:

The table below provides a summary of the condition noted. All piles and bracing was hammer sounded, and selective coring was completed where deemed necessary to confirm the extent of decay. Photos of each pier are provided in the photo log, with coring locations denoted in pink. Piles and bracing with severe decay are considered poor condition and are denoted with a red shaded cell in the table below. Grey cells indicate where components are not applicable to that pier, and "P" indicates where the pile has been posted.

Pier	Pile									Bracing		Comments
	1	2	3	4	5	6	7	8	9	Left	Right	
1												Pile 4 cored, sound
2												
3												Pile 3 sound at ground level
4					P							Pile 1 cored, soft but no rot
5												
6												Pile 8 cored, sound
7												Pile 7 rot at 1.0m above PWL
8												
9	P											Pile 7 cored, sound
10	P											
11	P											Pile 6 cored, sound
12	P											
13	P					P						
14												Pile 3 cored, sound
15												
16						P						

Pier	Pile									Bracing		Comments
	1	2	3	4	5	6	7	8	9	Left	Right	
17								P				
18												
19						P						Pile 3 cored, sound
20												Pair of piles at 7, right is rotten
21	P		P									Pile 6 has wide split, no rot
22				P								Rot in pile 4 is in the sill/ blocking, no crushing noted

Stringers:

- Limited access from ground level to inspect stringers.
- Stringer 6 on spans 1 and 2 cored, 25 mm shell remaining on upper 150 mm of both stringers.
- Interior stringers at spans 1 and 2 sounded, no rot noted.
- Ends of stringers at spans 1 and 23 are buried; end of span 23 stringers are heavily decayed.
- Based on visual observations all of the exterior stringers appear to be in similar condition and therefore are likely to all have high levels of decay.

Channel:

- Limited flow during the inspection.
- Bridge is located at the head of the channel at Otter Lake.
- 0.7 m estimated present water level depth
- 56.0 m estimated present water level width
- 2.0 m estimated high water level clearance

LIST OF MAINTENANCE/ REPAIR ITEMS:

Item No.	Description	Priority
1	Replace broken handrails	High
2	Install additional vehicle barriers	High
3	Plan for full bridge replacement	High

LIST OF MONITORING ITEMS:

1. Monitor bridge components for signs of failure, particularly the deck ties.

Prepared by:

Mike Hanson, P.Eng.
Lead Bridge Inspector

Reviewed by:

Michael Foster, P.Eng.
Supervising Engineer

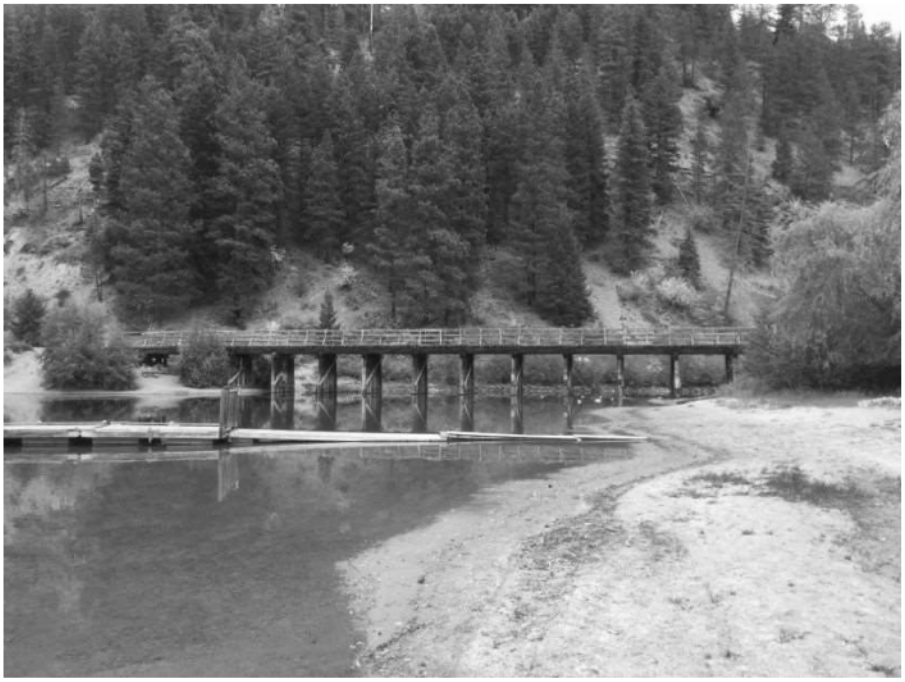


Photo 1
Bridge elevation from upstream (Lake)

Photo 2
Looking downstream

Photo 3
Left approach, looking away from bridge

Photo 4
Right approach, looking towards bridge

Photo 5
Right approach, looking away from bridge

Photo 6
Railing at left abutment

Photo 7
Railing at left abutment

Photo 8
Railing near middle of bridge

Photo 9
Railing at right abutment

Photo 10
General deck condition

Photo 11
Typical deck tie condition

Photo 12
Typical deck tie condition

Photo 13
Typical deck tie condition

Photo 14
Span 2 stringer 6 condition

Photo 15
Span 2 stringer 1 condition

Photo 16
Span 23 stringer 1 condition

Photo 17
Left abutment

Photo 18
Pier 1

Photo 19
Pier 2

Photo 20
Pier 3

Photo 21
Pier 4

Photo 22
Pier 4 blocking

Photo 23
Pier 5

Photo 24
Pier 6

Photo 25
Pier 7

Photo 26
Pier 8

Photo 27
Pier 9

Photo 28
Pier 9, Pile 1

Photo 29
Pier 10

Photo 30
Pier 11

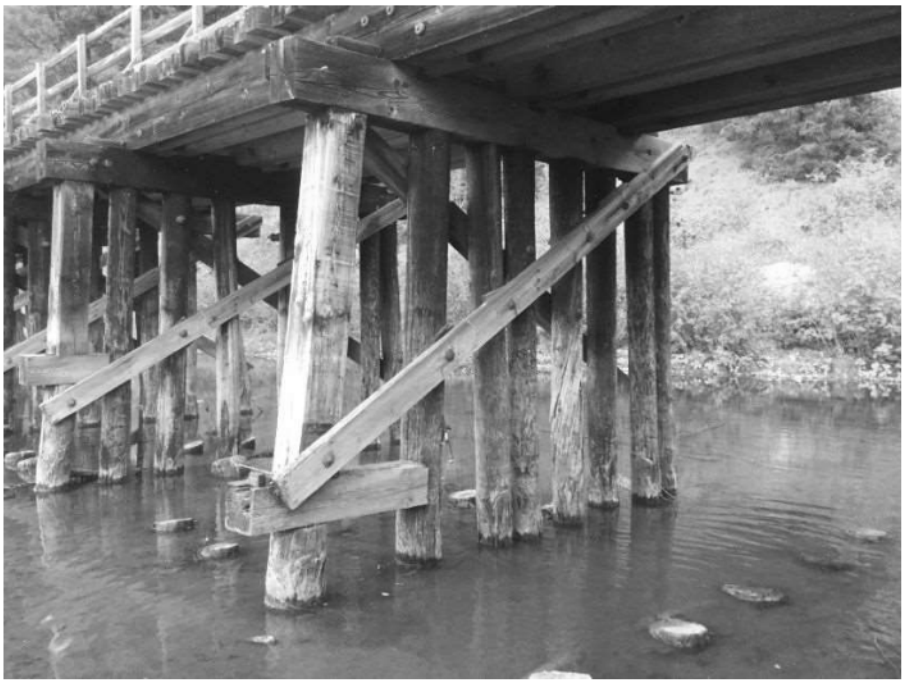


Photo 31
Pier 12

Photo 32
Pier 13

Photo 33
Pier 14

Photo 34
Pier 15

Photo 35
Pier 16

Photo 36
Pier 17

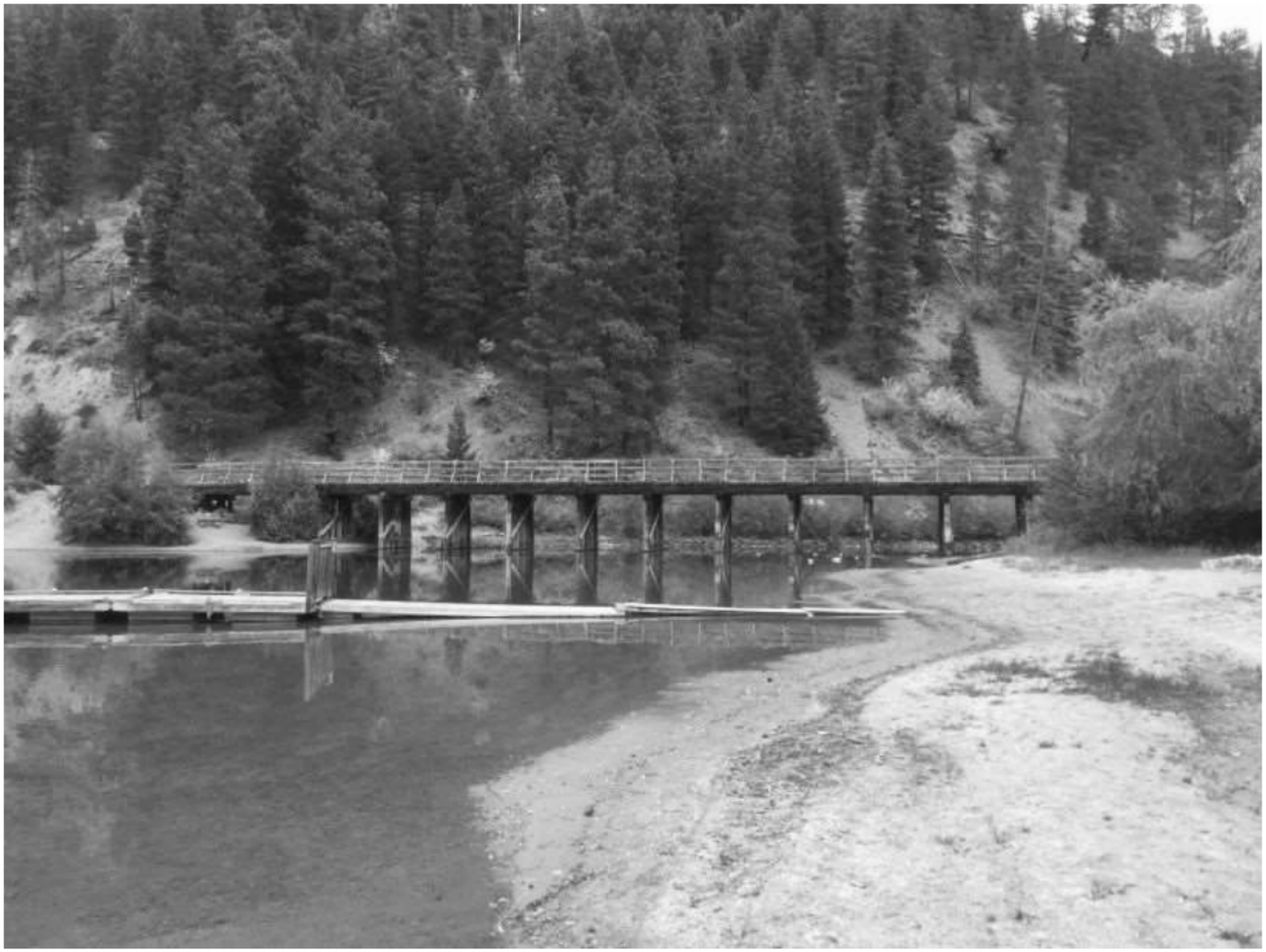
Photo 37
Pier 18

Photo 38
Pier 19

Photo 39
Pier 20

Photo 40
Pier 21

Photo 41
Pier 22



Structure	Span (m)	Total Replacement Cost
KV-060	103	$2,575,000.00
KV-062	8.9	$133,500.00
KV-063	31.46	$786,500.00
KV-064	8.8	$132,000.00
KV-066	25.9	$388,500.00
KV-067	27	$405,000.00
KV-068	45	$675,000.00
KV-069	30	$750,000.00
KV-071	26.2	$393,000.00
KV-072	33	$825,000.00
KV-074	7.4	$111,000.00
construction premium*	15%	$1,076,175.00
TOTAL		**$8,250,675.00**
General replacement cost per meter provided by Drew Alway. Bridges less than 30 = replacement cost of $15K/M, bridges 30m or over = replacement cost of $25K/M		
* costs for new bridges increased due to increased labour and materials costs and due to the fact that new bridges are often longer than original to accomdate stream values		