BRIDGE INSPECTION

BRIDGE NO./NAME	**SI - 5635: Kennedy River Bridge on Sproat Lake FSR (0.50 KM)**
Inspection Date:	November 1st 2012
Inspected By:	D. Chen, D. Harrison
Year Built:	Unknown
Number of Spans:	2

Span Lengths:	Span 1: Approximately 26,650 mm c/c (field measurement) Span 2: Approximately 26,650 mm c/c (field measurement)
Superstructure Type:	Four glulam slab girders - 320 mm x 2120 mm; girder spaced at 440 mm c/c (pairs), 2300 mm clear distance between groups.
Deck:	1 layer of untreated timber deck planks, 100 mm thick. Deck width 4260 mm.
Deck Structural:	Untreated transverse timber ties 200 mm x 250 mm @ 400 mm c/c.
Curb:	Untreated timber curbs and risers.
Substructure:	Abutments: Cast-in-place concrete abutment with creosote treated timber sill. Pier: Steel pipe piles with concrete cap and creosote treated timber sill.

BRIDGE INSPECTION

GENERAL BRIDGE CONDITION:

Superstructure Condition:	Fair – Poor
Substructure Condition:	Good
Deck Condition:	Fair
Load Posting:	GVW = 64 Tonnes (Signs located at both approaches)
Date for the Next Close Proximity Inspection:	2015
Projected Replacement Date:	2017

BRIDGE INSPECTION SUMMARY/ RECOMMENDATIONS:

The bridge substructure and timber deck are in good to fair condition. The timber deck has recently been replaced; however, the wearing planks are not adequately spiked (< 50% of the required amount of nails were installed).

The glulam girders are in fair to poor condition. We found several large checks in Span 2, Girder 3 upstream face that were not previously identified. Based on our observations, we do not anticipate further reduction of the current bridge load rating due to the newly identified checks. However, the large checks in Span 2, Girder 3 upstream face are unusual due to their locations as we normally would not expect such significant checking on the interior face of an interior girder (which is partially protected from weathering). We recommend the Ministry monitor these checks for propagation. Should these checks show signs of propagation in the future inspections, we recommend the Ministry complete a load rating of Span 2 to verify whether the girder has sufficient capacity to support the current 64 tonne posted load limit.

We also understand that the Ministry has received reports from bridge users regarding noticeable vibration of the superstructure. We were unable to observe the vibration during our inspection; however, experience suggests that the vibration could be a result of:

- No plan bracing to stiffen the glulam girders; the girders rely on the timber deck to transfer transverse loads.
- The timber deck is not adequately spiked and hence may have insufficient stiffening effect.
- The vehicles crossing the bridge matched the predominant vertical frequency of the bridge.
- The combination of the horizontal and vertical vibration due to frequency matching.

We recommend the Ministry to seek further input from the users regarding the vibrations; if they persist, the Ministry should consider perform targeted inspection on the superstructure while the bridge is under load to determine the cause of the vibration.

BRIDGE INSPECTION

INSPECTION NOTES:

Approaches:

- Approach road surface is lower than deck surface; potholes were noted at both approaches.
- Road is rutted at wheel tracks.
- G.V.W. 64 tonnes load posting sign are located at both approaches.
- No guide logs at woods end approach; camp end guide logs are rotten, downstream guide log does not appear effective.
- A gate is located at the camp end approach.

Deck:

- Bridge deck has one layer of deck planks and the planks are not well spiked.
- Wearing planks, ties, and curbs have recently been replaced.
- Wearing planks are not properly spiked; < 50% of the required amount of nails were installed and many are not driven home.

Abutments:

- Generally in good condition.
- Moss growth noted on concrete abutments and wing walls.

Pier:

- Generally in good condition.
- Edge piles act as dolphin piles; steel plate sheathing noted.
- Moss growth on concrete cap.
- Significant amount of wood debris has accumulated at upstream end of pier and in between pier piles.

Girders:

Typical Condition:

Spans 1 & 2 - Girder 1 upstream face:

- Creosote leaching; girder face 100% covered by creosote.
- Numerous isolated checks at the deck tie clip and diaphragm bolt locations near the top of the girder; average 2000 mm long, 10 mm wide, and 140 mm deep in places. The checks were not tagged since they do not affect the capacity of the girder.
- A significant check was identified, extended from tag AE70 (camp end) to tag AE2323; eventually links to tag AE71.

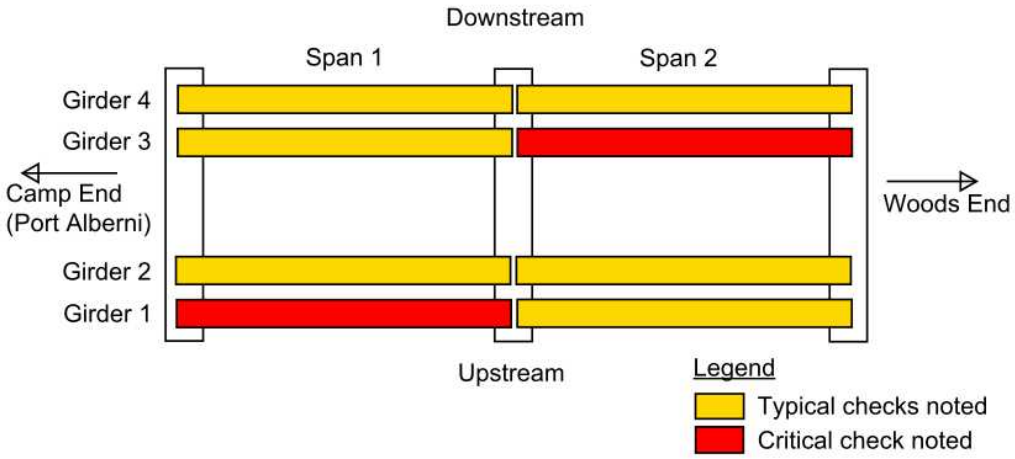
Spans 1 & 2 - Girder 2 downstream face & Girder 3 upstream face:

- Creosote leaching; visible creosote on > 75 % of the girder face.
- Numerous checks were observed along the girder length, average 25 mm deep.
- A number of significant checks were identified on the Span 2 Girder 3 upstream face near the pier (Checks tagged AE2329, AE2341, and AE2328). All significant checks are located on the lower 1/3 of the girder depth.

Spans 1 & 2 - Girder 4 downstream face:

- Creosote leaching; visible creosote on > 75 % of the girder face.
- Numerous isolated checks at the deck tie clip locations near the top of the girder; average 1500 mm long, 10 mm wide, and 140 mm deep in places. The checks were not tagged since they do not affect the capacity of the girder.

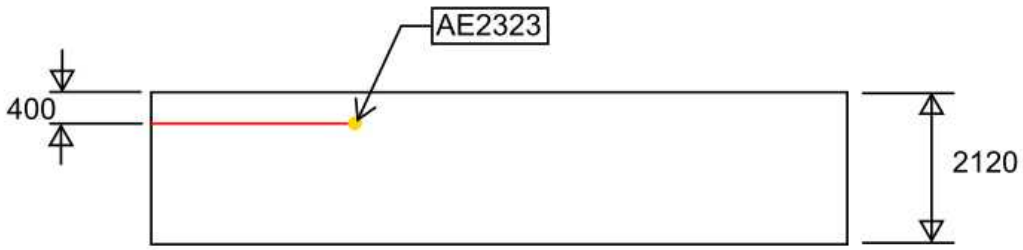
Checks on Girders:



Key Plan for Girders with Critical Check

Span 1 – Girder 1 upstream face:

Tag Type	Check Start	Check End	Length (mm)	Max. Depth (mm)	Max. Width (mm)	Location (mm)	Condition
Existing	AE70	AE71	7200	170	5	400 from top	Extends from AE70 to new tag AE2323; eventually links to AE71. Drilled 2 locations, no rot
New	AE2324	AE2305	4400	150		320 from top	
New	AE2306	Pier	1800	90		710 from top	
New	AE2346	AE2307	5200	165		630 from top	AE2307 is approx. 1600 mm from pier



Span 1 – Critical Check on Girder 1 Upstream Face

Span 1 – Girder 2 downstream face:

Tag Type	Check Start	Check End	Length (mm)	Max. Depth (mm)	Max. Width (mm)	Location (mm)	Condition
New	Marked by paint	Marked by paint	4000	85		1330 from top	
Existing	AE76	AE75				Between Diaphragms 1 & 2	Between 2 laminates; not propagated

Span 1 – Girder 4 downstream face:

Tag Type	Check Start	Check End	Length (mm)	Max. Depth (mm)	Max. Width (mm)	Location (mm)	Condition
New	AE2322	Camp end	5000	70		1450 from top	Mostly covered by creosote

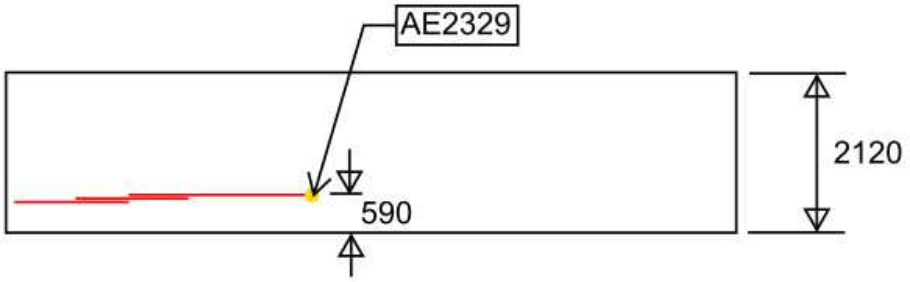
Span 2 – Girder 1 upstream face:

Tag Type	Check Start	Check End	Length (mm)	Max. Depth (mm)	Max. Width (mm)	Location (mm)	Condition
New	Woods end	AE2330	900	70		500 from top	
New	AE2350	AE2321	3600	120		465 from top	

Span 2 – Girder 3 upstream face:

Tag Type	Check Start	Check End	Length (mm)	Max. Depth (mm)	Max. Width (mm)	Location (mm)	Condition
Existing	AE2310	AE1733	5600	120		1400 from top	AE1735 retagged to AE2310

New	AE2345	AE2348	3600	50		280 from bott.	Drilled, no rot
New	AE2349	AE2347	4800	100		520 from bott.	Drilled, no rot
New	AE2301	AE2302	4000	95		480 from bott.	
New	AE2329	Pier	11300	140		520-590 from bott.	Check terminates approx. 50-100 mm before girder end. Drilled 2 locations, no rot, water accumulation noted
New	AE2341	Pier	9700	130		300 from bott.	Check terminates approx. 50-100 mm before girder end
New	AE2328	Pier	5500	105		720 from bott.	Check terminates approx. 50-100 mm before girder end



Span 2 – Critical Check on Girder 3 Upstream Face

Span 2 – Girder 3 downstream face:

Tag Type	Check Start	Check End	Length (mm)	Max. Depth (mm)	Max. Width (mm)	Location (mm)	Condition
New	No access	Pier		75		420 from bott.	Series of checks located approx. 2500 mm from Pier; no access

Span 2 – Girder 4 downstream face:

Tag Type	Check Start	Check End	Length (mm)	Max. Depth (mm)	Max. Width (mm)	Location (mm)	Condition
New	Woods end	AE2340	550	80		450 from top	

New	Not tagged	Pier	4200	140	10		Drilled 2 locations, no rot, moisture noted

- During the inspection, we utilized the resistograph to drill the Span 2 Girder 3 at the mid-span and at approximately 3 m from the pier. We drilled upward (vertically) from the bottom of the girder; the result at both locations does not show any signs of rot.

LIST OF MAINTENANCE ITEMS TO BE COMPLETED:

Items	Description	Priority
1.	Install additional nails on deck planks as required.	Medium
2.	Replace camp end guide logs.	Low
3.	Regrade approach roadway.	Low
4.	Remove debris accumulation at pier.	Low

MONITOR DURING FUTURE INSPECTIONS:

1. Monitor checks on the glulam girders.

Prepared by:

David Chen, P.Eng.
Project Manager
March 19, 2013

Reviewed by:

Dale Harrison, P.Eng.
Senior Reviewer
MAR 20/2013

Attached:

1. CBR Report
2. Annotated Photo Sheets
3. Condition Inspection and Load Rating of the Kennedy River Bridge prepared by AE

BRIDGE INSPECTION

NOTES:

Directional & Numbering Conventions Used:
Girders and piles are numbered from upstream to downstream. Left end or right end is determined facing downstream (except for delineators). Spans and piers are numbered from the left end when facing downstream.

Projected Replacement Date:
The projected date for the bridge replacement is based on the remaining service life of the bridge. We estimate the remaining service life as the greater of:

For Glulam Girder Bridges:
1. Original design life, typically 50 years.
2. If a bridge is nearing the end of its estimated service life but is still in fair condition, we recommend that the Ministry assume a remaining service life of five years.

For Steel and Concrete Bridges:
1. Original design life, typically 60 years.
2. If a bridge is nearing the end of its estimated service life but is still in fair condition, we recommend that the Ministry assume a remaining service life of ten years.

Condition Ratings:

Excellent:	New or almost new condition and properly installed
Good:	Structurally sound, in good repair with minimal wear
Fair:	Structurally functional, shows moderate wear or preliminary indications of deterioration
Poor:	Structurally unsound, items typically in need of repair or replacement

Maintenance Priority (Typical Usage):

High:	Critical items that need to be addressed to protect safety of users (curbs, structural decks, delineators, major structural repairs, etc.); schedule work immediately.
Medium:	Items that maintain the service life of the bridge (wearing planks, deck joints, etc.)
Low:	Items that will extend the service life of the structure or general maintenance.

Cost Estimate:
The cost estimate for individual maintenance items, shown in the CBR report, reflects the cost of materials and labour for completing a task; it does not include any costs associated with mobilization, demobilization, engineering or contract administration.

Date Printed: 2013/03/15
User Id: BCEID\WRILEY1
Database: PROD
Report Id: CBR001B

BC Ministry of Forests and Range

Log Stringer Bridge Inspection Report

Structure #:	SI-5635	**Site #:**	SI-5635	**Road Name:**	Sproat Lake	**Inspection Date:**	2012/11/01
KM:	0.50	**User km:**	0.50	**Crossing Name:**	Kennedy River	**Next Inspection Date:**	2014/11/01
Project File ID #:	7954	**Br.**	37	**Forest District:**	South Island Forest District		

Deck Type:	Timber - Untreated		**Running Surface:**	Timber Planks	
Superstructure	Glulam Girder		**Abutments (Left/Right):**	Other	
Total Length *(metres)*:	54.9	**# Spans:**	2	**Span Length(s)** *(metres)*:	26.8, 26.8
UTM Zone:	10	**UTM Easting:**	327750	**UTM Northing:**	5460567
Inspector Name:	D. Chen, D. Harrison	**Year Built:**			
Access:	Old S-269				

ABUTMENTS

Bearings	Not Applicable	
Bracing	Not Applicable	
Ballast Wall	Good	Concrete.
Corrosion Protection	Not Applicable	
Caps or Sills	Good	Creosote treated timber sill on concrete abutment. Moss growth noted on concrete abutments.
Fill	Good	
General Abutment Condition	Good	
Hardware	Not Applicable	
Piles or Posts	Not Applicable	
Riprap	Not Applicable	
Wing Wall	Good	Concrete, moss growth noted.

APPROACHES

Alignment	Good	
Bridge Ahead Signs Missing	0	
Brushing Required	No	
Delineator Missing Left	0	
Delineator Missing Right	0	
Fender Condition	Poor	No guide logs at woods end approach. Camp end guide logs are rotten, downstream guide log does not appear effective.
Posted Load Rating	64	Load posting sign are located at both approaches.
Road Surface	Fair	Approach road surface is lower than deck surface; potholes were noted at both approaches. Road is rutted at wheel tracks. A gate is located at the camp end approach.

DECK

BC Ministry of Forests and Range

Log Stringer Bridge Inspection Report

Structure #:	SI-5635	Site #:	SI-5635	Road Name:	Sproat Lake	Inspection Date:	2012/11/01

Span 1

Curb Rail/Blocks/Posts	Good	Curbs are recently replaced.
Deck to Girder Bolts	Good	
Hardware	Not Applicable	
Hand Rails/Walkouts	Not Applicable	
Nails	Poor	Wearing planks are not properly spiked, < 50% of the required amount of nails were installed.
Overall Deck Condition	Fair	Bridge deck only has one layer of deck planks and the planks are not well spiked.
Running Planks	Good	Wearing planks are recently replaced.
Sub Deck	Unrated	Not Applicable.
Ties	Good	Ties are recently replaced.

Span 2

Curb Rail/Blocks/Posts	Good	Curbs are recently replaced.
Deck to Girder Bolts	Good	
Hardware	Not Applicable	
Hand Rails/Walkouts	Not Applicable	
Nails	Poor	Wearing planks are not well spiked, < 50% of the required amount of nails were installed.
Overall Deck Condition	Fair	Bridge deck only has one layer of deck planks and the planks are not well spiked.
Running Planks	Good	Wearing planks are recently replaced.
Sub Deck	Unrated	Not Applicable.
Ties	Good	Ties are recently replaced.

PIERS

Pier 1

Bearings	Not Applicable	
Bracing or Sheathing	Good	Steel plate sheathing.
Caps	Good	Concrete cap with creosote treated timber sill. Moss growth on cap noted.
Cribs	Not Applicable	
Dolphins	Good	Edge piles act as dolphins piles.
Hardware	Not Applicable	
Overall	Good	Significant amount of wood debris are accumulating at upstream end of pier and in between pier piles.
Piles or Posts	Good	Steel piles.
Riprap	Not Applicable	
Wall	Not Applicable	

SUPERSTRUCTURE

Span 1

Date Printed: 2013/03/15
User Id: BCEID\WRILEY1
Database: PROD
Report Id: CBR001B

BC Ministry of Forests and Range

Log Stringer Bridge Inspection Report

Structure #:	SI-5635	Site #:	SI-5635	Road Name:	Sproat Lake	Inspection Date:	2012/11/01

Bracing	Not Applicable	
Diaphrams	Good	
Girders	Fair	See additional note for more details.
Hardware	Not Applicable	
Under Trussing	Not Applicable	

Span 2

Bracing	Not Applicable	
Diaphrams	Good	
Girders	Fair	See additional note for more details.
Hardware	Not Applicable	
Under Trussing	Not Applicable	

CHANNEL

Estimated Present Water Level Depth:		**Estimated Present Water Level Width:**	
Estimated High Water Level Clearance:	4.2		

HAZARDS

High Water:	No	**Scour:**	No	**Ice:**	No	**Debris:**	Yes	**Aggradation:**	No

Comment: Significant amount of wood debris are accumulating at pier.

REPAIRS

#	Status	Priority	Estimate	Description
1	Recommended	Medium	$3,500.00	Install additional nails on deck planks as required.
2	Recommended	Low	$2,000.00	Replace camp end guide logs.
3	Recommended	Low	$0.00	Regrade approach roadway. (Road maintenance)
4	Recommended	Low	$1,500.00	Remove debris accumulation at pier.
5	Recommended	Low	$0.00	.

MONITORS

#	Description
1	Monitor checks on the glulam girders.

GENERAL

Professional Inspection Required?	No	**Regional Review Date:**		**P. Eng Reviewer Name:**	
Replacement Date for full log haul traffic *(year)*:	2017	**Replacement Date for light vehicle traffic** *(year)*:	2017		
Current Load Rating GVW *(tonnes)*:	64	**Design Load GVW** *(tonnes)*:	64	**Design Vehicle Config.:**	BCL625
Inspector's Estimated Full Log Haul Replacement *(year)*:	2017				

BC Ministry of Forests and Range

Log Stringer Bridge Inspection Report

Structure #:	SI-5635	Site #:	SI-5635	Road Name:	Sproat Lake	Inspection Date:	2012/11/01

Inspector's Comment:	The bridge substructure and timber deck are in good to fair condition. The timber deck has recently been replaced; however, the wearing planks are not adequately spiked (< 50% of the required amount of nails were installed). The glulam girders are in fair to poor condition. We found several large checks in Span 2, Girder 3 upstream face that were not previously identified. Based on our observations, we do not anticipate further reduction of the current bridge load rating due to the newly identified checks. However, the large checks in Span 2, Girder 3 upstream face are unusual due to their locations as we normally would not expect such significant checking on the interior face of an interior girder (which is partially protected from weathering). We recommend the Ministry to monitor these checks for propagation. Should these checks show signs of propagation in the future inspections, we recommend the Ministry to complete a load rating of Span 2 to verify whether the girder has sufficient capacity to support the current 64 tonne posted load limit. We also understand that the Ministry has received reports from bridge users regarding noticeable vibration of the superstructure. We were unable to observe the vibration during our inspection; however, experience suggests that the vibration could be a result of: " No plan bracing to stiffen the glulam girders; the girders rely on the timber deck to transfer transverse loads. " The timber deck is not adequately spiked and hence may have insufficient stiffening effect. " The vehicles crossing the bridge matched the predominant vertical frequency of the bridge. " The combination of the horizontal and vertical vibration due to frequency matching. We recommend the Ministry to seek further input from the users regarding the vibrations; if they persist, the Ministry should consider perform targeted inspection on the superstructure while the bridge is under load to determine the cause of the vibration.
PEng Reviewer's Comment:	
District Staff Comment:	