Forest Practices Board

SPECIAL INVESTIGATION OF BRIDGE PLANNING, DESIGN AND CONSTRUCTION

Follow-up to a 2014 Special Investigation

Purpose of the Report

- Our second special investigation of bridge planning, design and construction. The first was published in 2014.
- Focused on safety, protection of the environment, planning, and professional practice.
- Purpose was to assess if practices have improved since the 2014 report.

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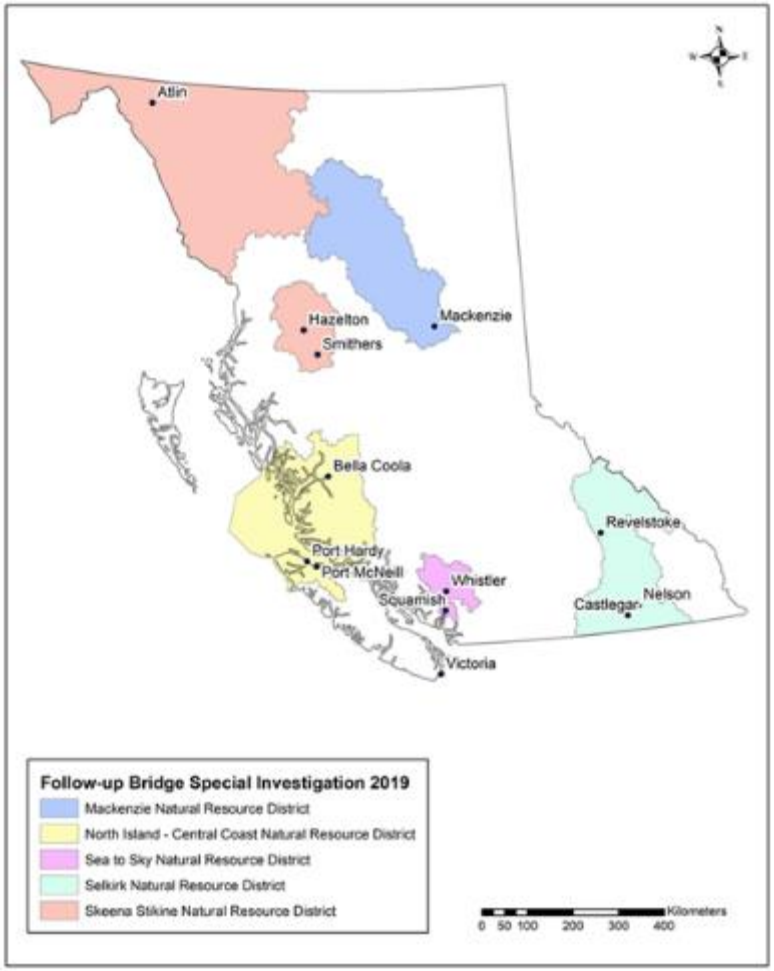
What did we look at?

- 5 randomly selected natural resource districts
- 269 forestry bridges and 59 wood box culverts on Crown land – industry, BCTS and MFLNRO built
- Assessed for:
  - Compliance with the *Forest Planning and Practices Regulation* (FPPR)
  - Conformance with version 2 of the *Guidelines for Professional Services in the Forest Sector - Crossings* (the crossing guidelines)



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Highlights – 2020 vs. 2014

- Safety of crossings and protection of the environment has improved!
- Planning and professional assurance is about the same
- Planning and practices for wood box culverts are appropriate

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Findings

Improvement in all areas, notably:

- Safety
  - In 2014, 15% of the bridges assessed had safety concerns
  - In 2020, 5% of the bridges assessed had safety concerns
- Environment
  - In 2020, bridges are being designed with better consideration of peak flows
  - In 2020, maintenance of natural surface drainage patterns is better

	% COMPLIANCE	
	2020	2014
Planning		
Complete plans (s. 73, 77 FPPR)	74	60
Adequate plans (question was not posed in 2014)	95	n/a
Record drawing prepared (s. 77 FPPR)	76	72
Accurate record drawing (s. 77 FPPR)	85	84
Peak flow (s. 74 FPPR)	92	64
Environment		
Natural surface drainage maintained (s. 39 FPPR)	99	89
Protected banks and channel (s. 55 FPPR)	95	89
Fish and fish habitat protected (s. 57 FPPR)	98	96
Fish passage maintained (s. 56 FPPR)	100	99
Safety		
No abutment erosion (s. 72 FPPR)	96	89
Safe approaches and alignment (s. 72 FPPR)	99	93
Adequate clearance (s. 72 FPPR)	98	94
Safe and sound (s. 72, 73 FPPR)	95	85
Professional Assurance		
Crossing Assurance – CRP	55	n/a
Crossing Assurance – POR	87	66

Two issues of concern

1. Incorrectly declaring a crossing as ‘simple’ when it is ‘complex’

Section 4 of the *Crossing Guidelines* defines a ‘simple’ crossing

- Anything that does not meet the criteria in Section 4 is ‘complex’
- ‘Complex’ crossings require specialized expertise for their design

Section 6.2 of the Crossing Guidelines lists the additional skills required to design a ‘complex’ crossing

2. Forest professionals taking over as professional of record from a P.Eng.

- When a P.Eng designs a crossing but a forest professional signs and seals the record drawing, the forest professional becomes the professional of record, with the associated accountability.

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There is opportunity for improvement…

Safety

- If structures are reused, they need to be inspected and certified as safe by a qualified registered professional (QRP)
- QRP sign-off required before industrial use

Environment

- Sediment control is crucial - especially in areas with highly erodible soils - to minimize impacts to water quality and fish habitat

Professional Documentation

- Bridge plans need to be complete and certified by appropriately Qualified Registered Professionals (QRPs), as described in section 6 of the *Crossing Guidelines*
  - This includes fabrication drawings of bridge components and the general arrangement of the crossing and its approaches

More opportunity for improvement…

Professional Documentation (continued)

- Record drawings (as-built) need to be accurate, signed, sealed and dated by the “Professional of Record” (POR)

Professional Assurance

- Coordinating Registered Professional (CRP) and Professional of Record (POR) each need to sign a Construction Assurance Statement
- Professionals must recognize when a crossing is ‘complex’ and ensure the POR has the required expertise
- POR must be involved when a crossing is constructed in a manner that is not consistent with the general arrangement drawing (i.e. the pre-construction design)

Recommendations

The goal is to ensure that bridges are safe for industrial use and the environment is being protected

Joint Practices Board (ABCFP and EGBC)

Improve clarity of the *Crossing Guidelines* to help practitioners understand their responsibilities for bridge planning and design.

Association of BC Forest Professionals

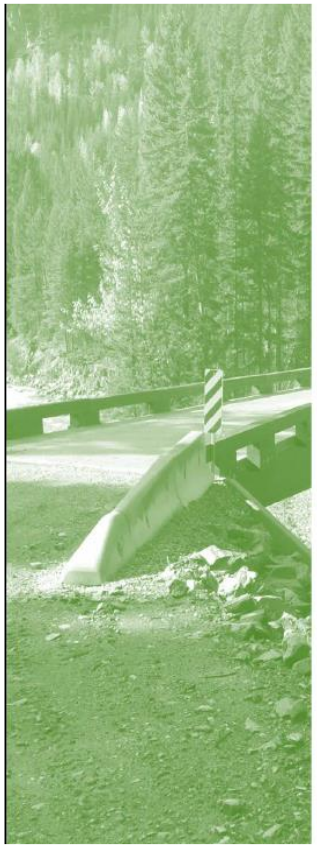
Review its guidance for forest professionals to ensure clarity and consistency with the *Crossing Guidelines.*

Ministry of Forests, Lands, Natural Resource Operations and Rural Development

Confirm how it intends to undertake ongoing compliance monitoring and enforcement of bridge planning, design and construction.

To find out more…

- Read the full report
- Review the 2014 report
- Subscribe to receive future reports via email
- Look at other things we are working on
- Learn more about the Forest Practices Board



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Follow-up Investigation of Bridge Planning, Design and Construction

SPECIAL INVESTIGATION

APRIL 2020

FPB/SIR/51

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More Information

- The following slides provide examples of what is considered good and poor practices, organized by requirements of the *Forest Planning and Practices Regulation* (FPPR)

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FPPR s.39 – natural surface drainage patterns

This is an example of a good result

This is an example of a poor result

	% COMPLIANCE	
	2020	2014
Natural surface drainage maintained (s. 39 FPPR)	99	89

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FPPR s.55 – stream channel and banks

This is an example of a good result

	% COMPLIANCE	
	2020	2014
Protected banks and channel (s. 55 FPPR)	95	89

This is an example of a poor result

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FPPR s.56 – maintain fish passage

This is an example of a good result

	% COMPLIANCE	
	2020	2014
Fish passage maintained (s. 56 FPPR)	100	99

This is an example of a poor result from 2014

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FPPR s.57 – protect fish and fish habitat

This is an example of a good result

	% COMPLIANCE	
	2020	2014
Fish and fish habitat protected (s. 57 FPPR)	98	96

This is an example of a poor result

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FPPR s.72 – sound & safe for industrial use

This is an example of an unsafe crossing

Comments	Overall	UNSAFE

Camp-end downstream approach is failing. Tension cracks. Upstream side of bridge running surface has holes, though not due to broken superstructure. Fill washed through stringer gap, held by geotextile.

2 rotten outside stringers. Several stringers have longitudinal cracks. Tie back logs not spaced evenly. Lashing loose.

Bridge not built as designed. 2 sills, not 3; alignment not skewed.

Insufficient gravel on deck. 5 cm.
No guide logs.

	% COMPLIANCE	
	2020	2014
Safe and sound (s. 72, 73 FPPR)	95	85

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FPPR s.72 – sound & safe for industrial use

These are examples of crossings with major concerns regarding safety and soundness

This is a bearing plate. It needs to be fully supported and bolted to a sill timber.

	% COMPLIANCE	
	2020	2014
Safe and sound (s. 72, 73 FPPR)	95	85

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FPPR s.74 – designed to pass peak flows

This is an example of a good result

	% COMPLIANCE	
	2020	2014
Peak flow (s. 74 FPPR)	92	64

This is an example of a poor result

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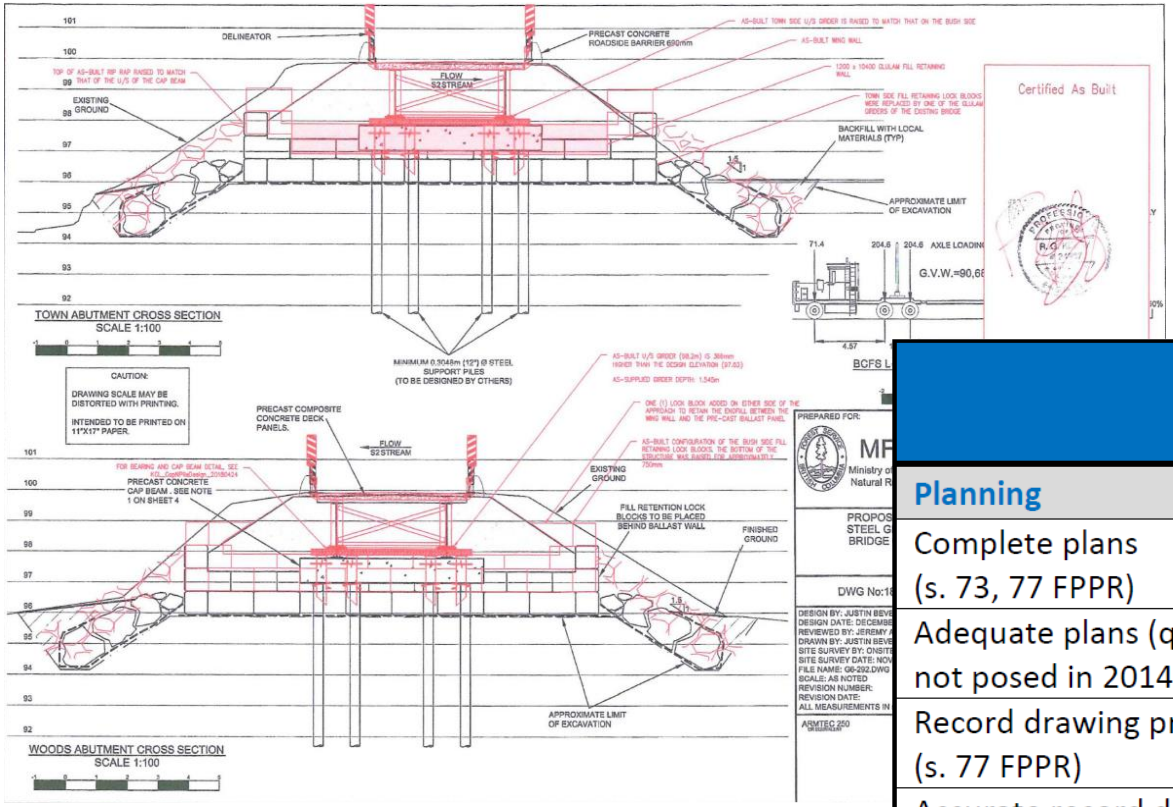
FPPR s.73 & 77 – design and documentation

FPPR s.73: bridge must be designed to meet or exceed applicable standards

FPPR s.77: certain records, including the as-built / record drawing must be retained



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