

## 4.1 Mandatory Procedures & Best Practices

Table 4-1 Design & Construction of Bridges, Major Culverts & Retaining Structures

Results to be achieved:

- bridges, major culverts and retaining structures safe for industrial user (FPPR s. 72)
- meet or exceed bridge design standards (FPPR s. 73)
- bridges and culverts designed to pass peak flow (FPPR s. 74)
- culvert materials standards (FPPR s. 76)
- retaining as-built information (FPPR s. 77)
- standards for FSR bridges built by licensees [FPPR s. 79(8)]

**Note:** All references to bridges, major culverts and retaining structures includes those bridges, major culverts and retaining structures built under Road Permit (BCTS) and designated in that permit to be an FS bridge to be used for harvesting after completion of the Timber Sale License. Insert the appropriate clauses in the Road Permit to achieve the results described herein.

M1	A professional engineer registered with the Association of Professional Engineers and Geoscientists of British Columbia (APEGBC) <b>must</b> prepare designs and take responsibility for retaining structures (associated with the road prism) that are greater than 1.5m high. [see <u>Structure Design Responsibility</u> ]
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M1a	A professional engineer must prepare a geotechnical report for retaining structures associated with the road, and that it evaluates and addresses possible (1) foundation and construction difficulties, (2) effects on existing adjacent structures or slope stability, and (3) methods of overcoming any identified difficulties during the construction stage, or other requirements. [see <u>Geotechnical Report</u> ]
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M2	
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	A ministry engineer <b>must</b> review all detailed designs of retaining structures for conformance with ministry standards and other site specific requirements, and accept the designs prior to the construction phase on FSRs. [see <u>Ministry Review of Externally Prepared Designs</u> ]
M2a	Where a POR will be involved in a structure project, the POR <b>must</b> carry out field reviews and, where responsible for the construction of the structure, <b>must</b> prepare the POR Construction Assurance Statement.
M3	The CRP <b>must</b> coordinate and ensure materials fabrication and construction field reviews are carried out during the construction of a crossing or a retaining structure on an FSR, and <b>must</b> gather all relevant information and prepare record drawings and sign, seal and date a Road Project Assurance Statement (see Schedule 8.1) for submission to the ministry. For retaining structures greater than 1.5m high, the CRP <b>must</b> be a professional engineer. [see <u>Construction Documentation</u> ]
M4	Bridge and major culvert construction drawings for any FS bridge project <b>must</b> be signed and sealed by a qualified professional, to clearly identify the Coordinating Registered Professional and/or Professional of Record [see <u>Design Responsibility</u> ]
M5	Where portable bridge superstructures or other structural components are used for any FS bridge project, the components <b>must</b> have been designed or structurally analyzed by a professional engineer, to demonstrate adequacy for the intended use. [see <u>Portable Bridge Superstructures</u> ]
M6	Bridge components assembled or manufactured off the construction site (such as treated timber, steel girders, and precast concrete footings, girders, footings or deck panels) <b>must</b> be inspected during fabrication to provide quality assurance that all materials and procedures meet the materials specifications as well as the applicable codes and standards. [see <u>In-Plant Inspection</u> ]
M7	As-built drawings of bridges and major culverts <b>must</b> be signed and sealed by the Coordinating Registered Professional or Professional of Record as appropriate, in addition to providing a statement of conformance for the design and construction of the

	bridge. [see <a href="#">Construction Documentation</a> ]
B1	During the conceptual design phase and well in advance of any detailed design work or procurement of materials, ensure that a ministry engineer is given an opportunity to review and comment on the suitability of a retaining structure proposed for construction on an FSR by the ministry. [see <a href="#">Concept Review Phase</a> ]
B2	In consultation with the Ministry Engineer, determine the design parameters for a bridge, major culvert or retaining structure [see <a href="#">Design Implementation</a> ]
B3	Where the maintainer of an industrial use FSR will replace a bridge, major culvert or retaining structure on that road under a Road Use Permit, ensure that the conditions for that crossing structure: <ul style="list-style-type: none"> <li>• provide mandatory site specific design and construction requirements to the maintainer; and</li> <li>• direct the maintainer to submit the completed construction drawings for review and approval prior to commencing construction. [see <a href="#">Design Implementation</a> and <a href="#">FS 1229 DM REQUIREMENTS – BUILDING OF FSR BRIDGES BY A ROAD USE PERMIT HOLDER (DOCX)</a>]</li> </ul>
B4	Ensure that practitioners in bridge, major culvert and retaining structure design for FSRs have established skill sets. Refer to the <a href="#">Engineering Equipment and Services (EES) Directory</a> . [see <a href="#">Design Implementation</a> ]
B5	Ensure that a detailed site survey is carried out for bridge, major culvert and retaining structure projects. [see <a href="#">Site Data</a> ]
B6	Ensure that general arrangement drawings clearly depict the proposed components and configuration of the bridge or major culvert in relation to the forest road, stream, and streambanks. [see <a href="#">General Bridge Arrangement</a> ]
B7	

	Ensure that the construction drawings clearly show all construction details and provide for installation in general conformance with the design intent. [see <u>Construction Drawings</u> ]
B8	Ensure that for log superstructures on log cribs, the drawings address layout of the structure and its elements, required component sizing, and connection details. [see <u>Log Bridge</u> ]
B9	Ensure that final bridge drawings are signed off by the Ministry Engineer as acceptable. [see <u>Construction Drawings</u> ]
B10	Obtain and keep on file all relevant material documentation, such as mill test certificates, in-plant test results, field test results, and all reports or comments made by field or in-plant inspectors. [see <u>In-Plant Inspection</u> ]
B11	Ensure that all structural field welding and field grouting is carried out in accordance with the <u>Forest Service Bridge Design and Construction Manual</u> . [see <u>Field Welding and Field Grouting</u> ]
B12	Retain an environmental monitor when specified by the environmental agencies on a site specific project basis. [see <u>Environmental Monitors</u> ]
B13	Ensure that after construction of a bridge or major culvert, the Coordinating Registered Professional signs and seals the <u>Structure Assurance Statement (PDF)</u> indicating that the entire structure is in general conformance with the design drawings and specifications. [see <u>General Conformance</u> ]
B14	Where a structure project on an FSR will be constructed by a timber sale licensee, ensure that the timber sale licensee provides copies of the pertinent assurance statements completed and signed off by the CRP/POR (as appropriate);

B15	Ensure that a BCTS/District engineering technician inspects the completed bridge for acceptability/assurance of the structure; and a Ministry Engineer reviews the as-built information and field inspection note. [see see <u>General Conformance</u> ]
B16	Ensure that the necessary steps in the bridge and major culvert design and construction processes were undertaken and issues addressed [see <u>Project Tracking Checklist</u> ]

In the above table of chronological events:

- **M** = Mandatory procedures
- **B** = Best practices