

# **Guideline for Bridge Safety Management**

## **October 2018**

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## **Foreword**

The objective of this Guideline is to provide railway companies with a guide for the development of their Bridge Safety Management Program (BSMP) and to promote industry best practices with regards to bridge management.

This Guideline is not intended to replace existing procedures or practices in use by railway companies. It is not expected that every recommendation outlined in this Guideline be contained within a single document, or that information be duplicated if it is available through other railway programs or systems. However, the location of applicable information should be incorporated into the BSMP by reference.

### **Part A – General**

#### **0.1 - Definitions**

For the purposes of this Guideline, the terms and definitions given in the *Railway Safety Act* apply in addition to those given below:

**“bridge”** means a **“railway bridge”** or an **“overhead bridge”** that the railway company is responsible for with respect to inspection, evaluation, repairs, and the posting of load limits. This excludes **“third party overhead bridges”**.

**“Bridge Safety Management Program (BSMP)”** means a program that facilitates the management of all safety risks associated with bridges. This includes the key positions in the railway corporate structure, planning activities, responsibilities, practices, procedures, processes, standards, drawings, and personnel required for developing, implementing, achieving, reviewing and maintaining the program.

**“overhead bridge”** means any structure carrying pedestrian, highway, or railway traffic that spans over all or a portion of the railway right of way.

**“railway bridge”** means any structure with a deck, regardless of length, which supports one or more railway tracks, or any other under grade structure with an individual span length of 10 feet or more located at such a depth that it is affected by live loads.

**“third party overhead bridge”** means an **“overhead bridge”** that the railway company is not responsible for with respect to inspection, evaluation, repairs, and the posting of load limits.

#### *Section Analysis 0.1 – Definitions*

A “railway bridge” is any structure that spans an opening under the track except for a small culvert, pipe, or other such structure where that structure is located so far below the track that it only carries dead load from soil pressure and is not subjected to measurable bending, tension, or compression stresses from passing trains. Unloading pits, car dumpers, track scales, turntables, transfer tables, and waterfront structures such as piers and wharves that fall within the definition of a railway bridge are considered railway bridges for purposes of this Guideline.

Culverts with a span of 10 feet or more located at such a depth that they are affected by live loads are considered bridges and should be included in the railway company’s inventory as such. The determination of whether such a structure is affected by live loads is the responsibility of the Railway Bridge Engineer, through the use of appropriate engineering methods and judgment.

A railway bridge deck includes open decks, ballasted decks, and solid decks. Essentially, a railway bridge deck is the component of the bridge on which the track is supported, and which is subject to bending stresses from trains moving over it.

## **0.2 - Scope**

This Guideline has been developed to assist a railway company in formulating a BSMP that will follow the objectives of the *Railway Safety Act (RSA)*.

It is applicable to the railway company for it to:

- a. Implement and maintain a BSMP that identifies and mitigates, to the extent possible, hazards to users and other parties, who may be exposed to risks associated with bridges and related activities;
- b. Ensure the ongoing effectiveness of the BSMP in maintaining safe railway operations with respect to bridges; and
- c. Determine and assure compliance with all legal requirements, internal practices, procedures and instructions relating to safe railway operations as it applies to bridges.

## **0.3 - Application**

This Guideline is intended for railway companies to whom the *Railway Safety Act* applies.

## **0.4 - Responsibility**

A railway company is responsible for ensuring that inspections and maintenance are performed on railway bridges on a line where railway companies operate trains over the railway bridges. This overall responsibility may not be assigned to a road authority regardless of any agreements between the railway company and the road authority. The responsible railway company may be the track owner or another railway e.g. designated through a lease or other agreement as long as the track owner knows who is responsible and the responsibilities are clearly defined between the relevant railway companies.

For overhead bridges where the railway company is responsible for the inspection, evaluation, repairs, and verifications of load limits it shall<sup>1</sup> ensure that the structure is adequate for its posted load limit and that safe railway operations are being maintained.

For third party overhead bridges, the railway company is expected to carry out inspections as per the Rules Respecting Track Safety to ensure that safe railway operations are maintained.

## **Part B – Qualifications and Designation of Responsible Persons**

### **1.1 - Scope**

The railway company BSMP should describe the qualification, training or experience of persons who perform functions related to the integrity and safety of bridges.

### **1.2 – Bridge Safety Management Responsibility**

The railway company BSMP should identify responsibilities and accountabilities of positions involved in the management of bridge safety. To demonstrate this, an organizational chart illustrating the chain of responsibility may be used.

### **1.3 – Railway Bridge Engineer**

A Railway Bridge Engineer designated by the railway company is a Professional Engineer who is responsible for and has the related experience in the following functions:

- a. Determining the forces and stresses in bridges and their components;

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<sup>1</sup> Section 11 of the Railway Safety Act

- b. Prescribing safe loading conditions for bridges;
- c. Prescribing inspection, maintenance, repair and modification procedures for bridges;
- d. Designing repairs and modifications to bridges; and
- e. Deciding the extent to which Professional Engineers and others shall<sup>2</sup> be directly involved in the engineering work.

A Railway Bridge Engineer should be authorized to restrict the operation of traffic over a bridge according to its immediate condition or state of repair.

#### *Section Analysis 1.3 - Railway Bridge Engineer*

*Railway Bridge Engineering is based on the same principles of engineering as all other structural engineering work, but the application of many of those principles is unique to this particular field. The live loads carried on railway bridges are generally much higher than the loads on highway bridges or other transportation structures. The configuration and details of construction differ from other classes of structures, to the extent that dealing with these features requires some experience with them as well as an understanding of the fundamentals of engineering.*

*It is understood that not all Railway Bridge Engineers will be faced with all aspects of railway bridge engineering. For example, an engineer engaged in prescribing safe loads for short steel spans and timber trestles on a particular railway might never have to perform a detailed analysis of a large truss bridge. The basic premise is that the Railway Bridge Engineer is competent to perform the functions that are encompassed by that individual's employment or engagement.*

### **1.4 – Railway Bridge Inspector**

A Railway Bridge Inspector is a person who is designated by a railway company, and deemed to be technically competent and has the related experience to view, measure, report, and record the condition of a bridge and its individual components, under the direction of a designated Railway Bridge Engineer.

A Railway Bridge Inspector should be authorized to restrict the operation of traffic over a bridge according to its immediate condition or state of repair.

#### *Section Analysis 1.4 - Railway Bridge Inspector*

*Railway Bridge Inspectors should be able to understand and carry out the inspection procedure, including accessing inspection points on a bridge, measuring components, as required and recording any changes, clearly describing conditions found, and detecting the development of conditions that are critical to the safety of the bridge.*

*A Railway Bridge Inspector who detects a potential hazard to safe railway operations should be authorized to place appropriate restrictions on the operation of traffic and communicate with the Railway Bridge Engineer for further instructions.*

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<sup>2</sup> Section 11 of the Railway Safety Act

## **1.5 - Designation of Individuals**

The railway company should designate individuals qualified as Railway Bridge Engineers and Railway Bridge Inspectors. The records should include the basis for the designation (qualifications and related experience) in effect. The railway company should record designations of individuals doing work on their behalf, regardless of whether the work is conducted by railway employees or independent contractors e.g. consultants or contractors.

### *Section Analysis 1.5 - Designation of Individuals*

*If an independent contractor has several individuals performing the described functions under a contract or other engagement, then one or more individuals should be designated as being responsible for the work performed under that engagement.*

*In the case of independent contractor engaged by the railway company to provide engineering services, and act as the Railway Bridge Engineer, the railway company can specify in its BSMP that the record of designation is the signature and seal of the responsible Professional Engineer affixed to the documents, and the basis for the designation is licensure as a Professional Engineer.*

## **Part C – Capacity of Bridges**

### **2.1 - Scope**

The railway company BSMP should prevent the operation of railway equipment that could damage a bridge by exceeding safe stress levels in its components or by extending beyond the horizontal and vertical clearance limits of the bridge.

### **2.2 - Determination of Bridge Load Capacities**

- a. The railway company should determine the load capacity of each of its bridges.
- b. The load capacity of each bridge should be documented. The railway company BSMP should outline the method(s) by which the capacity is determined.
- c. The load capacity shall<sup>3</sup> be determined by a Railway Bridge Engineer using engineering methods and standards applicable to the particular class, configuration, and type of bridge being evaluated.
- d. Bridge load capacity may be determined from existing design and modification records of a bridge, provided that the bridge substantially conforms to its recorded configuration. Otherwise, the load capacity of a bridge should be determined by measurement and calculation of the properties of its individual components, or other methods as determined by a Railway Bridge Engineer.

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<sup>3</sup> Section 11 of the Railway Safety Act



- e. Where a bridge inspection reveals that the condition of a bridge or any of its components might adversely affect the load capacity of the bridge to carry the traffic operated, a Railway Bridge Engineer should determine a new capacity.
- f. Railway bridge load capacity may be expressed in terms of numerical values related to a standard system of railway bridge loads, but should in any case be stated in terms of weight and length of individual or combined cars and locomotives, for the use of transportation personnel.
- g. Bridge load capacity may be expressed in terms of both normal and maximum load conditions. Operation of equipment that produces forces greater than the normal capacity should be subject to any restriction or conditions that may be prescribed by a Railway Bridge Engineer.

#### *Section Analysis 2.2 - Determination of Bridge Load Capacities*

##### *Item c.*

*The current standards for railway bridge design and analysis are found in the "Manual for Railway Engineering" of the American Railway Engineering and Maintenance of Way Association (AREMA), and the chapters in this Manual dealing with Timber, Concrete and Steel structures, and Seismic Design, are under continuous review by committees consisting of leading engineers in the railway bridge profession.*

*However, it is recognized that alternative methods and standards exist and are employed by some railway companies to determine load capacity.*

##### *Item d.*

*A rigorous, exact method of rating is not practicable with some types of bridges. The Railway Bridge Engineer will necessarily use judgment in determining the loads that should be permitted to operate over these bridges, and ensure that adequate inspections are performed so that any developing deterioration or signs of overload are detected before they progress to become a safety problem.*

### **2.3 - Protection of Railway Bridges from Over-weight and Dimensional Loads**

The railway company should have, and ensure the implementation of documented procedures for the operation of equipment exceeding the usual weight or dimension restriction on a bridge. Equipment exceeding the usual weight or dimension restriction should only be operated under conditions determined by a Railway Bridge Engineer.

The railway company is expected to advise other railway companies operating over a railway bridge of the usual loads permitted over it. Railway companies should develop, maintain, and enforce written procedures to restrict a load that exceeds those limits, unless specific authority has been granted and in accordance with restrictions placed by the railway company.

Each company should issue instructions to the personnel responsible for the configuration and operation of trains over railway bridges to prevent the operation of cars, locomotives and other equipment that could exceed the capacity or dimensions of railway bridges.

A Railway Bridge Engineer should be informed of any substantial change in train operation or traffic patterns, which may affect railway bridge safety.

#### *Section Analysis 2.3 - Protection of Bridges from Over-Weight and Dimension Loads*

*Bridges can be seriously damaged by the operation of loads that exceed their capacity. Movement of equipment that exceeds the clear space on a bridge is an obvious safety hazard. This section proposes that the railway company should issue instructions to personnel who are responsible for the consist and operation of trains over railway bridges to prevent the operation of cars, locomotives and other equipment that would exceed the capacity or dimensions of bridges. Transportation personnel of a company are ultimately responsible for the movement of trains, cars and locomotives. It is essential that they should know and follow any restrictions that are placed on those movements.*

*The instructions regarding weight should be expressed in terms of maximum equipment weights, and either minimum equipment lengths or axle spacing. Transportation personnel have information on the weights and configuration of cars and locomotives, and they must be able to relate that information to any restrictions placed on the movement of that equipment.*

*The instructions regarding dimensions should be expressed in terms of feet and inches of cross section and equipment length, in conformance with common railway industry practice for reporting dimensions of exceptional equipment in interchange in which height above top-of-rail is shown for each cross-section measurement, followed by the width of the car or the shipment at that height. In the industry, a standard format exists for the exchange of information on dimensions of railway equipment. Use of the industry practice is necessary to avoid error and confusion.*

*The movement instructions may apply to individual structures or to a defined line segment or groups of line segments where the published capacities and dimensions are within the limits of all structures on the subject line segments. Railway companies commonly issue instructions related to equipment weights and dimensions to be effective on line segments of various lengths. It is not necessary that transportation personnel be advised of the capacity of every bridge as long as the railway bridge in the line segment has the capacity to safely carry the loads permitted on that line.*

*When there is a change proposed in train operation or traffic patterns, which may affect railway bridge safety, the transportation department should have a procedure in place for ensuring that the designated Railway Bridge Engineer is advised of the change so that the safety of the railway bridges can be verified.*

## **2.4 - Protection of Safe Railway Operations during Repairs or Modifications**

The railway company BSMP should specify procedures for any repair or modification that materially modifies the capacity of a bridge or the stresses in any primary load-carrying component of a bridge. At a minimum, the procedures for repairs or modifications shall<sup>4</sup> be performed under the direction of a Railway Bridge Engineer and should specify the manner in which traffic or other live loads may be permitted on the bridge while it is being modified or repaired.

Designs and procedures for repair or modification of bridges of a common configuration, such as timber trestles, or instructions for in-kind replacement of bridge components, may be issued as a common standard. Where the common standard addresses procedures and methods that could materially modify the capacity of a bridge or the stresses in any primary load-carrying component of a bridge, the standard shall<sup>5</sup> be designed under the direction of a Railway Bridge Engineer.

Bridge repair(s) or modification(s) should be performed under the direction of a Railway Bridge Engineer to ensure that the repair(s) or modification(s) are completed in conformity with the design.

### *Section Analysis 2.4 - Protection of Safe Railway Operations during Repairs or Modifications*

*For the purposes of Section 2.4, a “primary load-carrying component” is a bridge component, the failure of which would immediately compromise the structural integrity of the bridge, “bridge modification” means a change to the configuration of a bridge that affects the load capacity of the bridge, and “bridge repair” means remediation of damage or deterioration which may have affected the structural integrity of a bridge.*

*Transport Canada does not intend that minor repairs that do not affect the capacity of the bridge must be designed by a Railway Bridge Engineer, but the supervision of that work should be performed by a person who is competent to assure that the work does not inadvertently compromise the integrity of the bridge.*

*Railway companies have typically issued standard instructions for the performance of common maintenance repairs, such as replacement or upgrading of components of timber trestles.*

## **Part D – Bridge Inspection**

### **3.1 - Scope**

The railway company BSMP should provide for an effective bridge inspection program. The railway company should clearly define and document the different

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<sup>4</sup> Section 11 of the *Railway Safety Act*

<sup>5</sup> Section 11 of the *Railway Safety Act*

types of inspections to be undertaken for their bridges, including the frequencies of these inspections in their BSMP.

#### *Section Analysis 3.1 – Scope*

*A bridge with undetected or unreported damage or deterioration can present a serious hazard to the safe railway operations. Bridge inspection and evaluation is a multi-tiered process, unlike many other types of inspection on a railway. The evaluation of a bridge requires the application of engineering principles by a professional engineer or a competent person under the direction of a professional engineer, who is usually not present during the inspection. It is therefore necessary that an inspection report should show any conditions on the bridge that might lead to a reduction in capacity, initiation of repair work, or a more detailed inspection to further characterize the condition.*

### **3.2 – Inventory**

The railway company is expected to maintain an inventory of all bridges on its right of way, and should have a list of all third-party overhead bridges on its right of way.

#### *Section Analysis 3.2 – Inventory*

*The inventory may be included as an appendix to the BSMP or referenced as a separate, stand-alone document.*

#### **3.2.1 - Bridges**

At a minimum, the bridge inventory should include the following information:

- a. Location (e.g. subdivision and mileage),
- b. Geo-referenced coordinates (e.g. longitude, latitude),
- c. Obstacle being crossed (e.g. water body, roadway etc.),
- d. Maximum height,
- e. Total length,
- f. Bridge rating, which may be expressed in terms of the individual bridge capacity or line capacity based on the governing bridge rating on the line segment,
- g. Date of bridge rating completed,
- h. The entity, if other than the railway company, responsible for the inspection and maintenance of the bridge,
- i. Each bridge span should have the following information:

1. Superstructure type,
  2. Substructure type,
  3. Span length,
  4. Year built, and
  5. Deck type.
- j. Identify bridge sub-structures that are vulnerable to scour, erosion or lateral stream migration.

Items (f) and (g), if not part of the railway company's bridge inventory, should be referenced in its BSMP as to where it can be found.

### **3.2.2 – Third Party Overhead Bridges**

At a minimum the list of third-party overhead bridges should include the location and the entity responsible for inspection and maintenance.

## **3.3 - Types of Inspections**

### **3.3.1 - Visual Inspection**

A visual inspection is a documented inspection made by a Railway Bridge Engineer or a Railway Bridge Inspector under the direction of a Railway Bridge Engineer.

### **3.3.2 - Special Inspections**

The railway company BSMP should include an appropriate procedure for the protection of traffic after an accident or during and after a significant natural event that may have affected the structural integrity of the bridge, and for the subsequent inspection of any bridge that might have been affected.

A significant natural event may include but not limited to flood, fire, ice flows, debris flows, sub-grade instability, rock instability, the effect of beaver dam failure, and earthquake.

### **3.3.3 - Underwater Inspections**

The railway company should have in place an underwater inspection program to identify which bridges to inspect, the items to inspect, and the frequency of underwater inspections to provide reasonable assurance of the foundation's integrity.

The railway company BSMP should include provisions for routine underwater inspections for the detection of scour or deterioration of bridge components that are submerged and where the foundation cannot be inspected due to the depth of water or poor visibility.

The railway company should be knowledgeable of the risks posed by scour, erosion and stream stability hazards, including those associated with spread footings.

#### *Section Analysis 3.3.3 - Underwater Inspections*

*The condition of bridge components located underwater is usually not evident from above. Means to determine their condition might be as simple as using measuring rods from the surface, or might call for periodic or special diving inspections. Advanced technology might also provide devices that can be used to determine underwater conditions.*

*It is recognized that not all bridges require an underwater inspection, nor will every part of a bridge over water require an underwater inspection. The intent in this section is that if a bridge is deemed by a Railway Bridge Engineer to be susceptible to conditions that will require underwater inspections, provisions and procedures should be put in place.*

### **3.3.4 - Vegetation and Drainage Channel Inspection**

The railway company BSMP should incorporate inspection practices to monitor vegetation and drainage conditions to ensure conditions are compliant with the Rules Respecting Track Safety, do not negatively affect bridge safety or safe railway operations and enable a thorough bridge inspection to be carried out.

### **3.4 - Scheduling of Bridge Inspections**

The BSMP should include:

- a. A visual inspection for each bridge in service at least once each calendar year, with not more than 540 days between any successive inspections.
- b. An inspection for each third party overhead bridge as per the Rules Respecting Track Safety.

- c. A provision for inspecting bridges more frequently when a Railway Bridge Engineer determines that such inspection frequency is necessary considering the conditions noted on prior inspections, the type and configuration of the bridge, and the weight and frequency of traffic carried on the bridge.
- d. A defined requirement for the special inspection of a bridge, as per Section 3.3.2 of this Guideline.
- e. A requirement that any bridge that has not been in service and has not been inspected in accordance with this section should be inspected and the report of said inspection reviewed by a Railway Bridge Engineer before the resumption of service.

### **3.5 – Bridge Inspection Procedures**

- a. The BSMP should specify or reference the procedures to be used for inspection of bridges or classes and types of bridges.
- b. The bridge inspection procedures shall<sup>6</sup> be as specified by a Railway Bridge Engineer.
- c. The bridge inspection procedures should be designed to detect, report, and protect deteriorations and deficiencies before they present a hazard to safe railway operations.

### **3.6 – Bridge Inspection Records**

- a. The railway company should keep a record of each inspection.
- b. Each inspection record should be prepared from notes taken during the inspection, supplemented with sketches and photographs as needed.
- c. Each inspection record should specify, as a minimum, the following information:
  - Precise identification of the bridge inspected, ( e.g., geo-referenced coordinates);
  - The date on which the inspection was completed;
  - The identification and written or electronic signature of the inspector;
  - The type of inspection performed, in conformance with the definitions of the inspection types in the railway company BSMP;
  - An indication on the report as to whether any item noted thereon requires expedited or critical review by a Railway Bridge Engineer, and any restrictions placed at the time of the inspection; and

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<sup>6</sup> Section 11 of the Railway Safety Act

- The condition of components inspected, which may be in a condition reporting format prescribed in the railway company BSMP, together with any narrative description necessary for the correct interpretation of the report.
- d. The railway company should specify the location where inspection records are kept.
- e. The retention period for inspection records should be no less than five years following the completion of the inspection, or until the completion of the next two inspections of the same type, whichever is greater.

#### *Section Analysis 3.6 – Bridge Inspection Records*

##### *Item d.*

*There are several good reasons for retaining bridge inspection reports over the period of several years or inspection cycles. First, a comparison of successive reports can reveal any accelerating rates of deterioration or degradation of bridge components. Second, an audit or review of the effectiveness of a bridge inspection program requires comparison of previous inspection reports with the actual condition of a bridge included in the audit. It provides valuable information for determining the effectiveness of the BSMP.*

### **3.7 - Review of Bridge Inspection Reports**

The railway company BSMP should specify the process by which bridge inspection reports are reviewed by a Railway Bridge Engineer.

The purpose of this review is to:

- a. Ensure that inspections have been performed in accordance with the relevant frequency and specified procedures;
- b. Evaluate whether any items on the report represent a present or potential hazard to safety;
- c. Require any modifications to the inspection procedures for that particular bridge;
- d. Schedule any repairs or modifications to the bridge that are required to maintain its structural integrity; and
- e. Determine the need for a Higher Level Review.

#### *3.7 - Review of Bridge Inspection Reports*

*The timeline between the inspection and review should not be longer than 365 days. The review should be recorded and identify at a minimum the bridge reviewed, the date of the review, the responsible Railway Bridge Engineer, and the conclusions and recommendations resulting from the review.*



*However, a Railway Bridge Engineer shall<sup>7</sup> review potentially imminent failure conditions identified during bridge inspections before the next train movement.*

### **3.8 - Higher Level Review**

A higher level review is conducted by a Railway Bridge Engineer to ensure that a bridge is safe for its intended use. The review may include an assessment of all existing bridge inspections, evaluations, reports, information and circumstances relating to a bridge. Additional inspections or evaluations may be required to complete the higher level review.

Records of a higher level review should identify, at a minimum, the bridge evaluated, the date of the evaluation, the responsible Railway Bridge Engineer, and the conclusions and recommendations resulting from the higher level review.

### **3.9 –Bridge Hazard Identification**

- a. The railway company should develop, implement and maintain processes for the identification of safety issues and concerns, to evaluate and classify risks, and implement necessary control strategies.
- b. The railway company should be aware of the risks posed by scour, erosion and lateral stream migration. The railway company should implement measures to ensure safe railway operations over the bridges during and after severe weather.
- c. The railway company should be aware of the risks posed by load and distortion induced fatigue on steel bridges. It should maintain documentation of bridges where fatigue cracking has been observed. Where necessary the railway company should implement mitigating measures to minimize the probability of failure as a result of fatigue crack growth.

#### *Section Analysis 3.9 - Bridge Hazard Identification*

##### *Item b.*

*Severe weather events that result in flooding or high flows frequently damage or wash out railway bridges and culverts, which can threaten safe railway operations when the risks are not recognized or adequately mitigated.*

*Items that should be considered include, but are not limited to, the following:*

- *Identification of bridges which are susceptible to scour or lateral stream migration;*
- *Identification of areas known to be subject to flooding or high flows;*
- *Identification of bridges that have experienced damage as a result of a previous event;*

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<sup>7</sup> Section 11 of the *Railway Safety Act*

- Identification of critical bridges to determine whether, when, and where projected flooding or high flows might be consequential;
- Awareness of snowpack conditions and impact on spring runoff;
- Awareness of the effects of ice flow dams and other debris accumulation on the substructure;
- Develop and implement acceptable methods of protecting bridges before, during, and after a flood or high flow event;
- Develop and implement monitoring technologies that could provide advance warning of pending failures due to the effects of an event;
- Use of sonar, sensors, and other smart technologies to monitor scour-critical bridges;
- Define qualification and training requirements for inspectors to monitor bridges during an event;
- Develop processes for monitoring the occurrence of severe weather events;
- Define the frequency and scope of inspections to be performed during a flood or high flow event; and
- Determine acceptable methods of performing an underwater inspection when divers cannot be used.

*Item c.*

*Information regarding fatigue in railway bridges is available in the AREMA Manual for Railway Engineering, Volume 2. It is recognized that alternative methods and standards exist and are employed by some railway companies.*

## **Part E - Design, Construction, and Maintenance of Bridges**

### **4.1 – Scope**

The railway company BSMP should outline procedures for the design, construction, and maintenance of bridges.

### **4.2 – Responsibility**

The railway company is responsible for, among other things, the design, construction, and maintenance of its bridges.

### **4.3 - Procedures for Design, Construction, and Maintenance of Bridges**

The railway company should have documented:

- Standards or drawings for the design, construction, and maintenance of bridges;
- Procedures to ensure design, construction, and maintenance work is completed and carried out in accordance with standards and procedures;
- Procedures to ensure maintenance activities that affect load carrying capacity of a bridge are not deferred without first being assessed, recorded and approved by a Railway Bridge Engineer; and

- Procedures to ensure on-site construction changes are recorded reviewed, and approved by a Railway Bridge Engineer.

## **Part F – Documentation, Records and Evaluation of the BSMP**

### **5.1 - Scope**

The railway company BSMP should provide for the verification of the effectiveness of the program and the accuracy of the resulting information, including the validity of bridge inspection reports and bridge inventory data, and the correct application of movement restrictions to railway equipment of exceptional weight or configuration.

### **5.2 – Monitoring and Evaluation of the BSMP**

The railway company should implement and maintain procedures for periodic internal monitoring and evaluations of its BSMP to determine whether it:

- a. Meets the intent of this Guideline,
- b. Has been properly implemented and maintained, and
- c. Is effective in continually managing bridge safety.

### **5.3 - Verification of Bridge Inspections**

The railway company BSMP should incorporate provisions for on-site evaluation of a representative sampling of bridges to determine whether the inspection reports accurately describe the condition of the bridges.

#### *Section Analysis 5.3 - Verification of Bridge Inspections*

*One of the most important indicators of the effectiveness of the BSMP is a comparison of recent bridge inspection reports against actual conditions found at the subject bridges. It is recommended that the Railway Bridge Engineer carries out inspection verification on a yearly basis.*

### **5.4 - Documents and Records**

The BSMP documents and records shall<sup>8</sup> be made available to Transport Canada's Rail Safety Inspector, in Canada, upon request in the course of an inspection, as soon as reasonably practicable.

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<sup>8</sup> Section 28 of the *Railway Safety Act*

The railway company should retain, where possible, pertinent drawings for as long as they own the bridge and inspection records as per Section 3.6 of this Guideline.

When the railway company assigns maintenance responsibilities for track and bridges to another railway company, it should be given access to pertinent bridge documents and drawings.

## **Part G – Requirements of Section 11 – *Railway Safety Act***

### **6.1 - Scope**

Under section 11 of the *Railway Safety Act* “(1) All work relating to railway works — including, but not limited to, design, construction, evaluation, maintenance and alteration — must be done in accordance with sound engineering principles.”

“(2) All engineering work relating to railway works must be approved by a professional engineer.”

### **6.2 - Engineering work related to Bridges**

It is Transport Canada’s interpretation that engineering work related to bridges includes but is not limited to:

- Preparing bridge design and specifications;
- Determining bridge load capacities;
- Developing construction, repair and modification procedures;
- Developing inspection and evaluation procedures;
- Reviewing bridge inspection reports<sup>9</sup> and conducting the higher level review<sup>10</sup>;
- Evaluating proposed maintenance deferrals; and
- Verifying that construction, repair, and modification work is completed in accordance with design and specifications.

First Issued: February, 2011

Revision 1: February, 2012

Revision 2: October, 2018

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<sup>9</sup> See Section 3.7 of this Guideline

<sup>10</sup> See Section 3.8 of this Guideline