



Rail Safety

Oversight and Expertise



Rail Safety Bulletin

Bulletin 2013-001

Bridges and Culverts – Mitigating Risk During and After Severe Weather

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.

In 2013, several incidents occurred that did or had the potential to threaten safe railway operations, including the following:

1. **June – Southern Alberta:** Record levels of precipitation generated high flows throughout the region which resulted in a derailment on a five span, four-track railway bridge near Calgary. The incident was attributable to the scour of a pier footing.
2. **July – Greater Toronto area:** A record rainfall caused portions of track to be flooded or washed out. A double deck passenger train became stranded in floodwaters and required the evacuation of 1,400 passengers.
3. **September – Eastern Townships of Québec:** Rainfall washed out the track and embankment near a concrete arch culvert and caused the abutment of a 33 foot long railway bridge to settle excessively.
4. **September – north of Sault Ste Marie:** Rainfall resulted in the complete wash out of a 26 foot concrete arch railway bridge.



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Recommended Actions

Transport Canada is of the opinion that railway companies should consistently identify and mitigate the risks associated with operating over bridges and culverts during and after severe weather. In this regard, it is necessary for railway companies to reassess the implementation and effectiveness of their existing policies and procedures that pertain to such situations.

To ensure that safe railway operations are maintained during and after severe weather, it is recommended that railway companies:

1. conduct risk assessments for all bridges and culverts and develop mitigating measures to bring the risks associated with operating over them during and after severe weather to acceptable levels; and
2. develop and implement documented processes and procedures that pertain to safe operations over bridges and culverts during and after severe weather.

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

- a. Identification of bridges and culverts which are susceptible to scour or lateral stream migration;
- b. Identification of areas known to be subject to flooding or high flows;
- c. Identification of bridges and culverts that have experienced damage as a result of a previous event;
- d. Identification of critical bridges and culverts to determine whether, when, and where projected flooding or high flows might be consequential;
- e. Awareness of snow pack conditions and impact on spring runoff;
- f. Awareness of effects of ice flow dams and other debris accumulation on the substructure;
- g. Develop and implement acceptable methods of protecting bridges and culverts before, during, and after a flood or high flow event;
- h. Develop and implement monitoring technologies that could provide advance warning of pending failures due to the effects of an event;
- i. Use of sonar, sensors, and other smart technologies to monitor scour-critical bridges;
- j. Define qualification and training requirements for inspectors to monitor bridges and culverts during an event;
- k. Develop processes for monitoring the occurrence of severe weather events;
- l. Define frequency and scope of inspections to be performed during a flood or high flow event; and
- m. Determine acceptable methods of performing underwater inspection when divers cannot be used.



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For additional information feel free to communicate with one of Transport Canada's Rail Safety offices.

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