

## Bridge Structure Management

### 5.13 Bridge Structure Management

Bridge structure management activities include the cleaning and painting of bridge structures as well as the repair, rehabilitation, and replacement of bridge elements including decks, railings, abutments, and bearings. Works may include concrete works, and timber truss and piling maintenance. These activities help to ensure bridge structures remain structurally sound and safe for public use.



#### Environmental Issues

Primary environmental issues relating to routine bridge structure management activities are summarized in the following table. It should be noted that site-specific conditions might present additional issues you will need to address in planning and undertaking your works.

#### Highway Maintenance Specification Sections

- 6-500 Bridge Deck Maintenance**
- 6-510 Bridge and Structure Cleaning**
- 6-520 Bridge Drain and Flume Maintenance**
- 6-530 Bridge Joint Maintenance**
- 6-540 Bridge Bearing Maintenance**
- 6-560 Bailey and Acrow Bridge Maintenance**
- 6-570 Minor Painting of Bridge Structure**
- 6-600 Concrete Structure Maintenance**
- 6-605 Steel and Aluminum Structure Maintenance**
- 6-620 Timber Truss Bridge Maintenance**
- 6-640 Bridge Piling Maintenance**
- 6-650 Timber and Log Structure Maintenance**
- 6-690 Bridge Railing Maintenance**

#### Available at:

[http://www.th.gov.bc.ca/BCHighways/contracts/maintenance/Schedule\\_21\\_Maintenance\\_Specifications.pdf](http://www.th.gov.bc.ca/BCHighways/contracts/maintenance/Schedule_21_Maintenance_Specifications.pdf)

Work Activity	Potential Environmental Impacts	Performance Standards and Legal Requirements
Cleaning	May introduce accumulated deleterious substances (sediment, oils, de-icing chemicals, paint chips, treated wood debris) to a watercourse	No release of any substance that could be deleterious (toxic) to fish or fish habitat ( <i>Fisheries Act</i> , Sections 34(1) and 36(3)). Deleterious substances include, but are not limited to, gasoline, oils, paint, concrete leachate, sediment, and chlorinated water.
	May disrupt flow, damage habitat and kill fish through the extraction of water for cleaning	<p>No harmful alteration, disruption or destruction of fish habitat without authorization (<i>Fisheries Act</i>, Section 35(1)).</p> <p>No destruction of fish by any means other than fishing, except as authorized by the <i>Act</i> or the regulations (<i>Fisheries Act</i>, Section 32).</p> <p>No diversion or use of water without a formal approval (through a temporary water use permit or license) under the <i>Act</i> (<i>Water Act</i>).</p>
Repair Works	May cause erosion of watercourse banks and generation of sediment if bridge abutments are not protected from draining wash water	<p>No alteration of a stream unless authorized by an approval, licence, or order (<i>Water Act</i>, Section 9), or through a Notification (<i>Water Act</i> Regulation, Part 7).</p> <p>No harmful alteration, disruption or destruction of fish habitat without authorization (<i>Fisheries Act</i>, Section 35(1)).</p>
	May disturb birds and their nests on bridge structures	<p>No injury, molestation or destruction of a bird, its egg, and occupied nest, or the nest (occupied or otherwise) of an eagle, Peregrine Falcon, Gyrfalcon, Osprey, or heron, unless the species is listed under Schedule C as exempt from this protection (<i>Wildlife Act</i>, Section 34).</p> <p>No killing, capturing, injuring, taking or disturbing migratory birds or damaging, destroying, removing or disturbing their nests, unless permitted under the <i>Act</i> (<i>Migratory Birds Convention Act</i>).</p>
	May release deleterious substances (sediment, cement-based products, wood preservatives, epoxies, mineral oils, sealants) to a watercourse	No release of any substance that could be deleterious (toxic) to fish or fish habitat ( <i>Fisheries Act</i> , Sections 34(1) and 36(3)). Deleterious substances include, but are not limited to, gasoline, oils, paint, concrete leachate, sediment, and chlorinated water.
	May disturb instream and riparian habitat by changing the channel structure, banks, substrate, or vegetation	<p>No harmful alteration, disruption or destruction of fish habitat without authorization (<i>Fisheries Act</i>, Section 35(1)).</p> <p>No alteration of a stream unless authorized by a <i>Water Act</i> approval, licence, or order (<i>Water Act</i>, Section 9), or through a Notification (<i>Water Act</i> Regulation, Part 7).</p>

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Work Activity	Potential Environmental Impacts	Performance Standards and Legal Requirements
Repair Works	May disturb wildlife species (e.g., birds, beavers)	<p>No injury, molestation or destruction of a bird, its egg, and occupied nest, or the nest of an eagle, Peregrine Falcon, Gyrfalcon, Osprey, heron, or Burrowing Owl, unless the species is listed under Schedule C as except from this protection (<i>Wildlife Act</i>, Section 34).</p> <p>No killing, capturing, injuring, taking or disturbing migratory birds or damaging, destroying, removing or disturbing their nests, unless permitted under the <i>Act (Migratory Birds Convention Act)</i>.</p> <p>No disturbance, molestation or destruction of a beaver house or den, unless undertaken to provide irrigation or drainage under lawful authority for the protection of property, or if the action is authorized by regulation (<i>Wildlife Act</i>, Section 9).</p>
Painting	May contaminate surface waters, groundwater, and soils through improper storage or disposal of materials	Disposal of all waste materials in accordance with the <i>Act</i> and reporting of any hazardous materials spills ( <i>Waste Management Act</i> , Special Wastes Regulation).
	May release deleterious substances such as sediment, paints, sealants, or other chemicals to a watercourse	No release of any substance that could be deleterious (toxic) to fish or fish habitat. Deleterious substances include, but are not limited to, gasoline, oils, paint, concrete leachate, sediment, and chlorinated water ( <i>Fisheries Act</i> , Sections 34(1) and 36(3)).
	May contaminate surface waters, groundwater, and soils through improper storage and disposal of materials	Disposal of all waste materials in accordance with the <i>Act</i> and reporting of any hazardous materials spills ( <i>Waste Management Act</i> , Special Wastes Regulation)



### Environmental Best Practices

The following BPs are provided as guidelines to help you ensure your works are completed in compliance with the performance standards and environmental legislation. Please note that the general BPs provided apply for most work activities within this category; if BPs specific to the activity are available they are also noted below.

### Regulatory Agency Contact

- Prior to beginning your bridge management activities, identify any sensitive habitat areas including watercourses—streams, lakes and marine foreshores—found within your work area.
- Determine how much impact your required works will have on the identified areas. Are you undertaking small-scale routine bridge deck patching or large-scale repairs to bridge abutments? What types of materials will you be using? If you are planning to clean a bridge structure, where will you obtain any water used for rinsing the structure?

### Why Clean Bridges in the Rain?

Sediment is considered a deleterious substance when it has a negative impact on a receiving watercourse. At freshet or during periods of high flow a large watercourse will often have its highest background levels of sediment. At this time, the introduction of a small amount of sediment to a watercourse (from bridge cleaning) will have a lower risk of potential impact when considered against those high natural background levels.

### DFO Operational Statement – Bridge Maintenance

DFO has developed a series of “Operational Statements” (OS) to streamline the regulatory review of low risk activities completed in and around water. Each OS outlines measures and conditions that must be implemented to be compliant with Subsection 35(1) of the *Fisheries Act* (i.e., no harmful alteration, disruption and destruction (HADD) of fish habitat).

There is an OS for Bridge Maintenance which you can access at: ([http://www-heb.pac.dfo-mpo.gc.ca/decisionsupport/os/operational\\_statements\\_e.htm](http://www-heb.pac.dfo-mpo.gc.ca/decisionsupport/os/operational_statements_e.htm))

By asking these questions, you should be able to identify any planned works that may be of concern to regulatory agencies.

- Meet with the appropriate regulatory agency contact, as listed in Section 8, to discuss site-specific environmental protection measures. Refer to Section 7 for information on the Memorandum of Understanding with MoE and the recommended protocol for maintaining regular communications with regulatory agencies.

### Timing of Works

For most work activities within this category, the following general BPs apply:

- Works are preferably undertaken during periods of dry weather (e.g., summer) as this allows easier control of sediment. Typically this is also a less sensitive period for fish and wildlife than other seasons. If the work schedule requires working in the rain, the area of work must be isolated and appropriate sediment controls must be installed to prevent the release of sediment-laden water or any other deleterious substances.
- If your maintenance activities require work instream, you must schedule them to coincide with your region’s instream work window. Contact your local MoE and DFO offices for further information on timing windows in your District.

### Bridge Cleaning:

- Schedule bridge-cleaning activities to coincide with the watercourse’s spring freshet when possible.
- If works are planned outside the freshet or if your region does not experience a freshet, discuss your protocol and the timing of these works with your local DFO and MoE Habitat Officers

### Site Management

- When preparing your worksite and undertaking your maintenance works, minimize vegetation-clearing activities.
- When your works involve the disturbance of soils or the use of erodible materials (e.g., sands, topsoil), prevent the transport of sediment through the installation of appropriate erosion and sediment control BPs and devices.

### Materials Storage

- Use temporary covers to keep erodible construction materials dry if they are stored on site near watercourses.
- Store hazardous materials in accordance with applicable regulations and ensure that deleterious substances are handled with care.
- Mix concrete compounds, sealants and paints off the bridge and away from any watercourse.

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- Clean tools and equipment off-site to prevent the release of wash water that may contain deleterious substances.
- Ensure all equipment used on site is well maintained and free of fluid leaks.

### Waste and Materials Containment

- Have a spill response plan in place and spill kits on site.
- If potentially deleterious materials (e.g., cement-based products) are used for repair works, ensure raw material and wash water will not be released to any watercourse.
- Where possible, sweep up loose material or debris. Any material thought to pose a risk of contamination to soils, surface water or groundwater should be disposed of appropriately off-site. Any clean material should be removed to an area where it will not enter any watercourse, ditch, or channel.
- For larger works or sites with greater sensitivity, suggested techniques to help prevent wash water and construction and maintenance debris entering the watercourse include: building forms around the work area, hanging tarps to trap loose material, and (for inert substances and debris) using booms on surface waters below work areas to trap and remove any floating substances that may escape the primary containment system.
- Inspect tarps, drain blocks, and wash water runoff areas regularly to ensure they are functioning. Repair as required.

### Bridge Cleaning:

- Dry sweep and collect loose material off bridge surfaces before washing the bridge.
- Use water alone. If your cleaning activities require degreasers or any other chemical, approval for use must be obtained from DFO and MoE staff.
- If superstructure cleaning is undertaken above or on the bridge deck level, prevent potentially harmful materials from entering into road drains. Block deck drains with suitable barriers (e.g., polyethylene or drain blocks) to prevent direct discharge to a watercourse.
- Contain any wash water or runoff to the bridge deck. Direct wash water towards the bridge approaches and away from the watercourse, then to a vegetated area or contained settling area (e.g., dry ditch channel unconnected to a watercourse) where it can infiltrate.
- If dry sweeping is not feasible for the surface to be cleaned, discussion with local regulatory agencies will be required should the work plan calls for a flushing of materials off the bridge and directly into the watercourse.

### Bridge and Birds...

Some bridges may provide nesting habitat for birds. Most active bird nests, eggs and young are protected under Section 34 of the *Wildlife Act* and cannot be harmed. Raptor nests (including those of eagles, Peregrine Falcons, Gyrfalcons, Osprey, herons or Burrowing Owls) are protected at all times of year.

Several species of common birds (crows, Black-billed Magpies, European Starlings, House Sparrows, Rock Doves, and Black-headed Cowbirds) are listed in Schedule C of the *Wildlife Act* as exempt from the protection of the *Act*. You may remove such birds, their nests or young as part of your works.

If your bridge maintenance works require the removal of a nest of a species other than those listed in Schedule C, you will need to obtain a *Wildlife Act* exemption permit from the MoE.

Contact the Permits and Authorizations Service Bureau (<http://www.env.gov.bc.ca/pasb/applications.html>) or your local Conservation Officer for more information.

### Water Extraction

The DFO document, Freshwater Intake End-of-Pipe Fish Screen Guidelines, is available at <http://www.dfo-mpo.gc.ca/Library/223669.pdf>

### Treated Wood Product Information

The DFO document, Guidelines to protect fish and fish habitat from treated wood used in aquatic environments in the Pacific Region, is available at <http://www.wwpinstitute.org/pdffiles/treatedwoodguidelines.pdf>

### Impacts of Cement-based Products

One litre of concrete washwater or leachate in 1000L of water will kill fish. Cement-based products including grouts and concrete are lethal to fish and many other aquatic organisms. Raw product or leachate entering a watercourse will alter water chemistry, making it more basic or alkaline.

- If water for cleaning is extracted from a watercourse, a short-term water use approval must be obtained from the BC Ministry of Environment ([http://www.env.gov.bc.ca/wsd/water\\_rights/licence\\_application/section8/index.html](http://www.env.gov.bc.ca/wsd/water_rights/licence_application/section8/index.html)). On fish-bearing watercourses, the pump intake must be screened to specifications outlined in DFO's fish screening directive (<http://www.dfo-mpo.gc.ca/Library/223669.pdf>).

### Repairs Using Treated Wood Products:

- If treated wood is to be used, ensure it has been treated with a wood preservative appropriate for the project. Certain wood treatments (e.g., creosote) must not be used in or near freshwater.
- If treated timber must be cut to size, ensure cutting takes place away from the bridge and watercourse. Treated sawdust is harmful to aquatic organisms and must be prevented from entering any watercourse.
- Wood preservatives should not be applied over water

### Repairs Using Cement-based Products:

- If cement-based products are used for repairs of structures in or near water (i.e., bridge abutments) strict protocols must be followed to prevent the introduction of raw product or wash water to a watercourse. The concrete works should be isolated from water with a waterproof barrier (e.g., polyethylene sheets and wood forms or sealed sandbag coffer dams) to prevent leachate generation and contain leachate and raw materials for the duration of the product curing period (a minimum of 72 hrs).
- If your repair works are small and in areas away from the wetted portion of the watercourse, isolation of the site is as simple as ensuring that any wash water generated from the repaired area is prevented from entering bridge drains and watercourses.

### Bridge and Structure Painting:

- Lead-based paints and the abrasives used to remove them may be considered hazardous wastes. Lead paint removal requires special equipment and procedures for the containment, storage, transportation and treatment of lead-based paint waste. If your works will involve the removal of lead-based paint, please consult the Worker's Compensation Board and the Ministry of Environment Water Quality Best Management Practices Compendium Website ([http://www.env.gov.bc.ca/wat/wq/nps/BMP\\_Compndium/nps\\_bmp.htm](http://www.env.gov.bc.ca/wat/wq/nps/BMP_Compndium/nps_bmp.htm)).

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### Key Information Sources

The documents and websites listed below are recommended resources for bridge structure management. They can provide examples of existing protocols and management strategies, as well as additional information on specific operational BPs (e.g., erosion and sediment control techniques).

#### MoT Technical Circulars:

**Crack Sealing Asphalt Pavements** – MoT Technical Circular T-1/99

**Bridge Drainage and Treatment Environmental, Design and Operational Issues** – MoT Technical Circular T-10/08

These and all other MoT Technical Circulars are available at:

[http://www.th.gov.bc.ca/publications/Circulars/technical\\_circulars.asp](http://www.th.gov.bc.ca/publications/Circulars/technical_circulars.asp)

#### Locally Developed BPs

##### (Provide any locally-developed BPs):

- Omineca Region Bridge Washing Guidelines. MoT. 2003.
- Skeena BMPs for Road Maintenance. MoT. 2003.  
[http://www.th.gov.bc.ca/publications/eng\\_publications/best\\_practices/bp.pdf](http://www.th.gov.bc.ca/publications/eng_publications/best_practices/bp.pdf)
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#### Other Resources:

**Roadway and Bridge Maintenance Water Quality BPs.** Environmental Protection Division, Ministry of Environment.  
[http://www.env.gov.bc.ca/wat/wq/nps/BMP\\_Compndium/nps\\_bmp.htm](http://www.env.gov.bc.ca/wat/wq/nps/BMP_Compndium/nps_bmp.htm)

**Bridge Maintenance – DFO Pacific Region Operational Statement.** 2008. Fisheries and Oceans Canada (DFO). [http://www-heb.pac.dfo-mpo.gc.ca/decisionsupport/os/os-bridge\\_e.htm](http://www-heb.pac.dfo-mpo.gc.ca/decisionsupport/os/os-bridge_e.htm)

**Clear-Span Bridges – DFO Pacific Region Operational Statement.** 2008. Fisheries and Oceans Canada (DFO). [http://www-heb.pac.dfo-mpo.gc.ca/decisionsupport/os/os-clear\\_span\\_e.htm](http://www-heb.pac.dfo-mpo.gc.ca/decisionsupport/os/os-clear_span_e.htm)

**Guidelines for the protection of fish and fish habitat during bridge maintenance operations in British Columbia.** Samis, S.C., M.D. Nassichuk and B.J. Reid. 1991.  
[http://www.bieapfrem.org/toolbox/pdfs/guidelines\\_for\\_protection\\_of\\_fish\\_and\\_fish\\_habitat\\_during\\_bridge\\_maintenance\\_operations\\_in\\_bc.pdf](http://www.bieapfrem.org/toolbox/pdfs/guidelines_for_protection_of_fish_and_fish_habitat_during_bridge_maintenance_operations_in_bc.pdf)

**Standards and Best Practices for Instream Works.** March 2004. Lower Mainland Region, MoE.  
<http://www.env.gov.bc.ca/wld/documents/bmp/iswstdsbpsmarch2004.pdf>



### Checklist for Environmental Protection Requirements

- Is your proposed work considered a “routine” maintenance activity? If not, approvals or permits may be required. Contact your local municipal, provincial, or federal regulatory agency staff.
- Has this project been discussed with local environmental regulatory staff? In addition to the BP information presented, other site-specific conditions may apply.
- Have site-specific environmental protection requirements been identified? List below:
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