

Retaining Structure Management

5.14 Retaining Structure Management

Retaining structure management includes the regular cleaning, maintenance, repair and replacement of highway retaining structures to ensure their continued safe and stable condition.



Highway Maintenance Specification Sections

6-660 Retaining Structure Maintenance

Available at:

http://www.th.gov.bc.ca/BCHighways/contracts/maintenance/Schedule_21_Maintenance_Specifications.pdf



Environmental Issues

Primary environmental issues relating to routine retaining 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.

| Work Activity | Potential Environmental Impacts | Performance Standards and Legal Requirements |
|-----------------------------|---|---|
| Cleaning and Debris Removal | May introduce deleterious substances to nearby watercourses as a result of cleaning and debris removal activities | 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, and sediment. |
| | May damage roadside riparian vegetation or other significant habitats through the side casting of debris | No harmful alteration, disruption or destruction of fish habitat without authorization (<i>Fisheries Act</i> , Section 35(1)). 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). |
| | May damage habitat through the improper location of disposal sites in ditches, wetlands, or other significant habitat areas | No harmful alteration, disruption or destruction of fish habitat without authorization (<i>Fisheries Act</i> , Section 35(1)). 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). No dispersal of noxious weeds or their seeds (<i>Weed Control Act</i> , Weed Control Regulation). |

| Work Activity | Potential Environmental Impacts | Performance Standards and Legal Requirements |
|---------------|--|---|
| Repair Works | May release deleterious substances (sediment, cement-based products, treated wood, wood preservatives, epoxies, mineral oils, sealants) to nearby watercourses | 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, sealants, concrete leachate, and sediment. |
| | May disturb instream and riparian habitat adjacent to retaining structures if repair works involve changing the channel structure, banks, substrate, or vegetation | No harmful alteration, disruption or destruction of fish habitat without authorization (<i>Fisheries Act</i> , Section 35(1)). 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). No dispersal of noxious weeds or their seeds (<i>Weed Control Act</i> , Weed Control Regulation). |
| | May contaminate surface waters, groundwater, and soils through improper storage or disposal of materials | Reporting of any polluting substance spills (<i>Environmental Management Act</i> , Section 79(5)) and disposal of all waste materials in accordance with the <i>Act</i> (<i>Environmental Management Act</i> , Waste Disposal Regulation). |



Environmental Best Practices

The following BPs are provided as guidelines to help you ensure your routine 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 debris removal behind a retaining structure or larger-scale repairs to address stability concerns? What types of materials will you be using? 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.

Retaining Structure Management

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.

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. Some suggested options include the temporary placement of silt fencing between disturbed areas of slopes and watercourses or drainage areas and the seeding of exposed soils.

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 away from any watercourse.
- 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. 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 containment structures regularly to ensure they are functioning. Repair as required.
- 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.

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 raw material or wash water generated from the repaired area is prevented from entering all watercourses.



Key Information Sources

The documents and websites listed below are recommended resources for retaining 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).

Retaining Structure Management

MoT Technical Circulars:

There are no relevant Technical Circulars authored to-date for this activity.

All Technical Circulars are available at:

http://www.th.gov.bc.ca/Publications/Circulars/Current_technical.asp

Locally Developed BPs

(Provide any locally-developed BPs):

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Other Resources:

Standards and Best Practices for Instream Works. March 2004. Lower Mainland Region, MoE.

<http://www.env.gov.bc.ca/wld/documents/bmp/iswstdsbpsmarch2004.pdf>

General Best Management Practices to Protect Water Quality website. June 2004. Environmental Protection Division, Ministry of Environment.

http://www.env.gov.bc.ca/wat/wq/nps/BMP_Compendium/nps_bmp.htm

Catalogue of Stormwater Best Management Practices. September 2005.

Idaho Department of Environmental Quality.

http://www.deq.state.id.us/water/data_reports/storm_water/catalog/index.cfm



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:
 - _____
 - _____
 - _____
 - _____

Highway Maintenance
Specification Sections

6-680 Multiplate
Structure
Maintenance

Available at:

http://www.th.gov.bc.ca/BCHighways/contracts/maintenance/Schedule_21_Maintenance_Specifications.pdf

5.14 Multiplate Structure Maintenance

Multiplate structures, including culverts and arches, require routine maintenance to ensure they allow unimpeded flow. Multiplate structure management activities include the replacement or repair of multiplate components such as bolts, plates, aprons, and headwalls, and the placement or repair of scour and erosion protection structures.



Environmental Issues

Primary environmental issues relating to routine multiplate 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.

| Work Activity | Potential Environmental Impacts | Performance Standards and Legal Requirements |
|---------------|--|---|
| Repair Works | May release deleterious substances (sediment, cement-based products, epoxies, 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, sealants, concrete leachate, and sediment. |
| | May disturb instream and riparian habitat by changing the channel structure, banks, substrate, or vegetation | No harmful alteration, disruption or destruction of fish habitat without authorization (<i>Fisheries Act</i> , Section 35(1)). 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). |
| | May contaminate surface waters, groundwater, and soils through improper storage or disposal of materials | Reporting of any polluting substance spills (<i>Environmental Management Act</i> , Section 79(5)) and disposal of all waste materials in accordance with the <i>Act</i> (<i>Environmental Management Act</i> , Waste Disposal Regulation). |

Multiplate Structure Maintenance

| Work Activity | Potential Environmental Impacts | Performance Standards and Legal Requirements |
|---------------------|---|---|
| Placement of Riprap | May harmfully alter channel structures through the placement of riprap materials | No harmful alteration, disruption or destruction of fish habitat without authorization (<i>Fisheries Act</i> , Section 35(1)). 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). |
| | May introduce sediment or other deleterious substances to a watercourse through site preparation for riprap placement or the placement of silt-laden riprap materials | 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, concrete leachate and sediment. |



Environmental Best Practices

The following BPs are provided as guidelines to help you ensure your routine 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 activities like bolt replacement outside a wetted channel or large-scale concrete repairs to the bed of the multiplate structure? What types of materials will you be using? 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

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.

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.

Worksite Isolation

- Isolate your work area from any flowing water that may be present. Ensure any flows are temporarily diverted (using a pump, flume or other diversion) around the portion of the watercourse where you are working.
- Contain any sediment-laden water generated during your works in your isolated work cell. Use a pump to draw sediment-laden water out of the work cell and discharge it to a level vegetated area where sediment can settle as the water infiltrates the ground.

Waste and Materials Containment

- Store hazardous materials in accordance with applicable regulations and ensure that deleterious substances are handled with care.
- Have a spill response plan in place and spill kits on site.
- Ensure all equipment used on site is well maintained and free of fluid leaks.
- Clean tools and equipment off-site to prevent the release of wash water that may contain deleterious substances.
- Mix concrete compounds, sealants and paints away from any watercourse.
- 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. 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.

DFO Operational Statements:

- Culvert 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 are OSs for Culvert Maintenance which you can access at: (http://www-heb.pac.dfo-mpo.gc.ca/decisionsupport/os/operational_statements_e.htm)

Multiplate Structure Maintenance

- Inspect containment structures regularly to ensure they are functioning. Repair as required.
- 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.

Repairs Using Cement-based Products:

- If cement-based products are used for repairs of structures in or near water (i.e., headwall structures, bed liners, scour protection) 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 to contain leachate and raw materials for the duration of the product curing period (a minimum of 72 hrs).

Erosion and sediment control

- Use temporary covers to keep erodible construction materials dry if they are stored on site near watercourses.
- Install appropriate erosion and sediment control devices (e.g., silt fence installed below disturbed slopes, rock check dams and temporary silt dikes in low velocity, low volume ditches) to prevent the transportation of sediment to downstream watercourses. Ensure that any structures installed are maintained and monitored until they are no longer needed (i.e., vegetative cover on seeded areas is adequate to control erosion).
- Use clean materials, free of fine soils that may contribute sediment to the watercourse, when installing riprap or other scour protection measures.



Key Information Sources

The documents and websites listed below are recommended resources for multiplate structure maintenance. 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:

There are no relevant Technical Circulars authored to-date for this activity.

All Technical Circulars are available at:

http://www.th.gov.bc.ca/Publications/Circulars/Current_technical.asp

Locally Developed BPs

(Fill in with 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

Other Resources:

Standards and Best Practices for Instream Works. March 2004. Lower Mainland Region, MoE.

<http://www.env.gov.bc.ca/wld/documents/bmp/iswstdsbpsmarch2004.pdf>

Culverts and Fish Passage Fact Sheet. Oct. 2000. Environmental Management Section, Engineering Branch. Ministry of Transportation.

http://www.th.gov.bc.ca/publications/eng_publications/environment/references/Culverts_and_Fish_Passage.pdf

Culvert Maintenance – Pacific Region Operational Statement. 2008.

Fisheries and Oceans Canada (DFO). http://www-heb.pac.dfo-mpo.gc.ca/decisionsupport/os/os-culvert_maint_e.htm

Fish Stream Crossing Guidebook. 2002. Forest Practices Branch, BC Ministry of Forests.

<http://www.for.gov.bc.ca/tasb/legsregs/fpc/FPCGUIDE/FishStreamCrossing/FSCGdBk.pdf>

General Best Management Practices to Protect Water Quality website. June 2004. Environmental Protection Division, BC Ministry of Environment.

http://www.env.gov.bc.ca/wat/wq/nps/BMP_Compodium/nps_bmp.htm

Manual of Control of Erosion and Shallow Slope Movement. August 1997. BC Ministry of Transportation.

http://www.th.gov.bc.ca/Publications/eng_publications/environment/references/Man_Control_Erosion.pdf

Catalogue of Stormwater Best Management Practices. September 2005.

Idaho Department of Environmental Quality.

http://www.deq.state.id.us/water/data_reports/storm_water/catalog/index.cfm

Multiplate Structure Maintenance



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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