

MODULE 9: MAINTENANCE OF ROADS AND WATERCOURSE CROSSINGS TIER REVIEW APPROACH

TIER 1 (5-day review)

- **Culvert maintenance**
- **Bridge maintenance**
- **Culvert or bridge removal (decommissioning)**
- **Vegetation clearing for watercourse crossing installation/replacement**
- **Beaver dam management and removal**

TIER 3 (requires a standard WAWA permit)

- Any alterations resulting in a permanent wetland impact greater than 100 sq. m
- Any alterations in and within 30 m of a provincially significant wetland (PSW)
- Any alterations within a designated [watershed](#) or [wellfield](#) used as a source for public water supply
- Any other activity not approved under Tier 1 or exceeding the guidelines

9.0 MAINTENANCE OF ROADS AND WATERCOURSE CROSSINGS

Maintenance is essential to the ongoing prevention of erosion and sedimentation associated with all aspects of a road system. The objective of maintenance is to ensure that all safety, structural, and environmental protection requirements are being met.

9.1 BASIC STANDARDS

Under the Watercourse Alteration Certification Program, the following standards apply to any maintenance related activities and must be adhered to.

- All instream work must be carried out in isolation of the stream flow. See Section 6.1 *Water Control Measures when Working in a Watercourse* for more details.
- During the repair or replacement of a watercourse crossing structure, preventative measures must be taken to prevent demolition debris, spoil, and excavated material generated by the project from entering a watercourse/wetland
- Culvert maintenance activities must be carried out between June 1st and September 30th of the same year, preferably during low water conditions
- Bridge maintenance requiring the dewatering of a section of the watercourse (i.e. replacement of abutments, etc.) must be carried out between June 1st and September 30th of the same year, preferably during low water conditions
- Excavated materials must be disposed of where they cannot be washed into a watercourse/wetland by floodwaters or surface runoff and any debris generated from the project must be entirely collected and disposed of outside a regulated area, in a manner acceptable to the Department of Environment and Local Government (DELG)

9.2 WATERCOURSE CROSSING STRUCTURES

Problems encountered when inspecting a watercourse crossing should be fixed immediately to prevent any further damage to the aquatic habitat and the fisheries resource. If a problem has been discovered outside of the June 1st to September 30th window, contact DELG for guidance on the next steps.

Maintenance of a watercourse crossing and surrounding areas may require one or more of the following modifications. These modifications are not limited to the circumstances listed below.

- Re-installation/re-construction
 - A structure may need to be re-installed if problems encountered cannot be fixed using other maintenance techniques or where problems continually recur
 - A structure may need to be re-constructed or replaced if it is inadequately sized to pass peak flows or obstructs fish passage

- Stabilization
 - A structure may require stabilization by adding rip-rap, re-vegetating, or implementing other stabilization techniques to stop scour and erosion
- Repair/replace
 - Repair or partial/complete replacement of the structural components of a watercourse crossing structure may be required if defects are encountered
- Removal
 - Obstructions preventing fish passage, threatening the stability, or reducing the discharge capacity of a watercourse crossing structure should be removed

9.2.1 Culvert Maintenance

Culverts should be inspected before and during the seasonal high flow period and following a significant rainfall event. Culverts that are causing ongoing problems should be inspected more frequently until the site is deemed stable and fully serviceable.

During a field inspection, common problem areas which may be encountered are:

- Scouring has occurred rendering the culvert impassable to fish
- Debris, ice, or beaver activity are blocking the inlet to the culvert
- Substrate is absent in the culvert
- Exposed erodible soil areas have not been stabilized around the crossing site or near the watercourse
- Areas around the crossing or near the watercourse are unstable
- The depth of water inside the culvert is insufficient to provide fish passage

Culvert maintenance is required to extend the life of the structure and to ensure that it functions as designed. Culvert maintenance includes the manual or mechanical removal of accumulated debris (*e.g.* logs, sediment, boulders, debris) that prevents the efficient passage of water and fish through the structure. Culvert maintenance may also include the reinforcement of eroding inlets and outlets.

Under the Watercourse Alteration Certification Program, channel cleaning may occur but must be limited to inside the culvert and the removal of foreign debris deposited between the control riffles. The channel width and depth must not be modified from its natural state, and the control riffles must not be manipulated in any way. All debris/fluvial material removed from the watercourse must be disposed of outside a regulated area, in a manner acceptable to DELG. Any culverts that are cleaned out require a WAWA permit.

Note: All maintenance activities to a culvert, including cleaning it out, require a watercourse and wetland alteration (WAWA) permit.

9.2.2 Bridge Maintenance

Bridges should be inspected frequently to evaluate serviceability and to identify any problems which may threaten the structural integrity of the bridge. Inspections should be carried out frequently, especially during and after peak flows.

Bridge maintenance includes the manual or mechanical removal of accumulated debris (e.g. logs, sediment, boulders, garbage) that prevents the efficient passage of water and fish underneath the structure. It may also include repairs/reinforcement work to an abutment, painting, welding, cement patching, etc.

During a field inspection, common problems which may be encountered include areas where:

- Backwater, flow constriction, and/or increased stream flow velocity is occurring as a result of an inadequately sized bridge
- Scour or erosion has occurred due to the overland runoff and/or improper alignment
- Debris or beaver activity is constricting the waterway opening
- There have been significant changes in the channel upstream or downstream of the structure
- Water is accumulating on the approaches and/or the deck of the bridge
- Components of the bridge are damaged or decayed

Note: Most maintenance activities to a bridge require a watercourse and wetland alteration (WAWA) permit.

9.3 ROAD MAINTENANCE

The purpose of road maintenance is to protect the roadway, maintain runoff control structures, prevent suspended sediment from reaching a watercourse/wetland, and meet road safety standards.

Roadways should be inspected during the seasonal high flow period and following each major rainfall event.

During a field inspection, common problems which may be encountered include areas where:

- The foreslope and backslope of the ditches have become unstable
- Erosion of the roadbed and/or foreslopes has occurred
- Materials such as loose rocks, pieces of wood, or other debris are littering the roadway, creating a hazard
- Erodible soil is exposed along the shoulders of the road

As soon as they are identified, any problems should be fixed to minimize the risk of degradation of the stream flow quality and any danger to road users.

Maintenance practices that include resurfacing and grading of roadways, when necessary, should be established.

9.3.1 Resurfacing the Roadway

Roadways may require resurfacing when there is an insufficient layer of surface material over the sub-base material to allow the roadway to be smooth graded.

The road type normally defines the type of material used in resurfacing. However, on gravel roads, pit run gravel, with sufficient fines, should be used.

Before resurfacing the road, ensure that:

- All drainage control structures are functioning properly
- Ditches are graded properly with no low points that may pond water

Crown and grade the finished road surface to a 3% grade to retain the desired shape of the road.

9.3.2 Grading the Road

Grading is used to reshape unpaved roads to remove ruts, potholes, washboard conditions, and to maintain or re-establish an appropriate crown.

Roads should be graded only when necessary rather than on a regular schedule and should maintain a crown of 3% to drain surface water into the ditch.

Evaluate the road surface to determine whether:

- The surface has washed out, or potholes have begun to form
- The road has become rutted and/or is trapping water

When grading, do not leave a berm or ridge along the edge of the road that prevents water from draining off the road.

Be careful grading near watercourses/wetlands to avoid side-casting material into these features.

Do not push road surface material onto the deck of a bridge.

9.3.3 Brush Maintenance within Right-of-Ways

Maintaining the right-of-way (including fore/back-slopes of roadside ditches) clear from vegetation is an important practice to allow a proper view of the road and any hazards that may be encountered by vehicle traffic. The following guidelines should be used when clearing vegetation within 30 metres (100 ft) of a watercourse/wetland. Provided these guidelines are followed, a WAWA permit is not required.

- Non-merchantable woody vegetation growing within 6 metres (20 ft) of a watercourse/wetland must not be cut or uprooted, unless it presents a significant safety hazard, is infested with insects, or is infected by disease.
- Clearing within 30 metres (100 ft) of a watercourse/wetland must be carried out using hand held equipment only, unless the ground is frozen solid, in which case, machinery may track into these areas (up to 6 metres (20 ft) from a watercourse/wetland).
- Soil disturbance, including grubbing, within 30 metres (100 ft) of a watercourse/wetland must not take place.
- No instream work must take place.
- All slash and woody debris generated during the clearing activity must be disposed of where it cannot be washed into a watercourse by floodwaters. It must either be removed from the floodplain or chipped on-site with the chips directed to areas away from a watercourse or the open water portion of a wetland.
- Vegetation removal/brush maintenance activities are limited to the area within the right-of-way.

Note: The exemption from obtaining a WAWA permit is limited to maintenance clearing along an existing right-of-way. Clearing for new roads and crossings, as well as clearing activities ahead of a crossing installation/replacement is not exempt and requires a WAWA permit. In most cases, these WAWA permits can be applied for under the Watercourse Alteration Certification Program.

9.4 MAINTENANCE OF DRAINAGE CONTROL STRUCTURES

The maintenance of drainage control structures is instrumental in the ongoing diversion of runoff away from watercourses/wetlands.

9.4.1 Roadside Ditches

Roadside ditches should be checked regularly; any obstructions which may impede runoff must be removed.

Re-stabilize areas prone to erosion with non-erodible material or vegetation wherever necessary to stabilize the site.

Pay attention to areas where water is ponding in the ditch. Adjust the ditch grade as required. It may also be necessary to and install additional cross-drainage culverts wherever site conditions permit.

9.4.2 Check Dams

Inspect check dams regularly and following each runoff event to ensure that sediment has not accumulated to a depth of more than half of the height of the check dam. Maintain the retention and discharge capacity of the check dam by removing the accumulated sediment when it reaches half the height of the structure.

Remove check dams when they are no longer needed, and once all erodible soil has become permanently stabilized with vegetation.

Before removing check dams, remove all accumulated sediment and dispose of it where it cannot enter a watercourse/wetland. This should be done whereby:

- Damage to the vegetation in the ditch is minimized
- Flow along the ditch is not interrupted

9.4.3 Hay/Straw Bales and Silt Fences

These types of silt barriers should be checked regularly and immediately following each runoff event and repaired/replaced as needed.

Sediment deposits must be removed when they reach half the height of the barrier.

Replace silt barriers when significant deterioration is evident or when they have reached their expected lifespan.

- Hay/straw bale barriers generally have a lifespan of approximately two months
- Silt fences generally have a lifespan of approximately six months

Any silt fences which has collapsed, torn, or is otherwise ineffective should be replaced within 24 hours of detection.

Remove silt barriers when permanent stabilization of the disturbed area has been accomplished. Smooth grade and stabilize the area where the barrier was located.

9.4.4 Settling Ponds (or Sediment Traps)

Inspect settling ponds regularly to ensure that the level of the sediment accumulated in the pond is 30 centimetres (12 in) below the lip of the outlet. When sediment has accumulated to this level, it must be removed from the pond and disposed of where it cannot be washed into a watercourse/wetland by floodwaters or surface runoff.

Remove any blockage at the outlet to ensure the discharge capacity is not compromised.

When the settling pond is no longer required, pump the detained water into a filter bag or into existing vegetation of sufficient expanse to ensure that there is no visible suspended sediment in the runoff returning to a watercourse/wetland. The pond or trap area should then be filled in and stabilized.

9.4.5 Off-Take Ditches

Inspect off-take ditches regularly to ensure runoff is flowing freely to a densely vegetated area.

Remove any debris from off-take ditches.

Areas where there are signs of channelized flow exiting the ditch other than into the intended densely vegetated area must be repaired and stabilized immediately.

9.4.6 Cross-Drainage Culverts

Inspect cross-drainage culverts regularly to ensure runoff is flowing freely through the culvert.

Remove any debris from the inlet, outlet, and/or inside the culvert, which may obstruct the flow.

Re-stabilize the inlet and outlet using rip-rap where necessary.

9.5 DECOMMISSIONING A ROAD

When decommissioning a road, adhere to the following guidelines.

- Construct water bars across the roadway to deflect and direct overland runoff into erosion-resistant areas. See Section 9.5.1 *Water Bars*.
- In follow-up inspections, repair areas where the runoff has overtopped the water bar. Also, remove any blockage in and at the outlet of the water bar.
- Ensure all drainage control structures are stable and functional.
- Stabilize all areas of exposed erodible soil.
- The approaches to a crossing that has been removed must be blocked off to discourage fording and destabilization of the bed and banks of the watercourse by all-terrain traffic.

9.5.1 Water Bars

Water bars are shallow ditches or channels constructed obliquely across a road surface to intercept runoff and deflect it towards the ditch instead of allowing it to flow further down the surface of the road. They are often associated with the closing or abandonment of a road.

Locate water bars a minimum of 30 metres (100 ft) from watercourses/wetlands.

<u>Slope of the Road (%)</u>	<u>Spacing</u>
< 5	38 m (125 ft)
5-10	30 m (100 ft)
10-20	23 m (75 ft)
20-35	15 m (50 ft)
> 35	7.6 m (25 ft)

Space water bars relative to the slope of the road, as indicated in Table 9-1.

When abandoning a road, construct water bars beginning at the far end of the road and work back towards its junction with an established/active road to prevent machinery from damaging them after they are constructed.

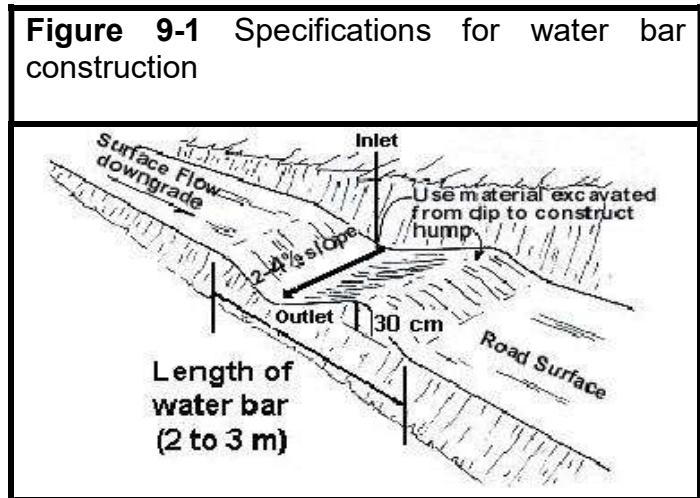
Install water bars at a 30° angle downslope from a line perpendicular to the centerline of the road.

The cross-sectional breadth of a water bar should be 2 to 3 metres (6 to 10 ft). See Figure 9-1.

Excavate a swale approximately 30 centimetres (12 in) deep across the width of the road.

Slope the bottom of the swale 2 to 4% from the inlet side to the outlet side. This allows runoff to readily flow across the road.

Use the material excavated to create the swale to form a 30 centimetres (12 in) high hump across the width of the road.



Extend the inlet end of the water bar swale to the invert of the roadside ditch to intercept all the runoff.

9.5.2 Removal of a Culvert

Removal of a culvert must be limited to the period between June 1st and September 30th.

Machinery used to fulfill the project must be located outside of the wetland and the wetted portion of the watercourse.

Fill must not be added and/or new structures must not be constructed to facilitate the project.

The removal of the culvert must be carried out during low stream flow/water level.

The culvert and any associated cover material must be removed, and the channel restored to the cross-section immediately upstream and downstream of the crossing, in isolation of the stream flow.

If you are unable to remove a crossing involving more than one culvert by pumping the stream flow around the worksite, the culverts must be removed per the following sequence:

- First, the culvert on the far side of the channel (the side opposite from where the machinery approaches the project) must be removed in isolation of the stream flow.
- The bank of the watercourse adjacent to this culvert must be restored to the cross-section immediately upstream and downstream of the crossing and permanently stabilized against erosion while all the flow is funnelled through the culvert closest to the other bank.
- As the project progresses toward the near bank, the reclaimed channel must be restored to the cross-section immediately upstream and downstream of the crossing.
- Finally, while the last culvert is being removed and the bank adjacent to it is being restored to the cross-section immediately upstream and downstream of the crossing and permanently stabilized against erosion, the work must be isolated from the stream flow with a cofferdam that constricts the flow to the other side of the watercourse.

The altered area must be restored to its natural grades and/or the channel restored to the cross-section immediately upstream and downstream of the altered area (*i.e.* a reference reach outside of the impacted zone).

The substrate in the new channel should be a mix consisting of rock that mimics what is present naturally in the watercourse or should use reclaimed stream bed material.

The new stream bed mix should have a wide range of particle sized and must include enough silts and fines (particles less than 2 mm in diameter) to fill interstitial spaces and create an impermeable surface. Fines should be washed into the stream bed with a

hose until the water runs clear. If subsurface flow is still evident then more fines and washing may be required.

Small particle sizes are of critical importance for stream bed mixes as a lack of these fines can cause water to flow below the surface of the new channel. It should never be assumed that sediment will be transported from upstream to plug the stream bed as this process could take years.

Woody vegetation removed/cut must be limited to those that are required to facilitate the removal of the culvert.

9.5.3 Removal of a Bridge

Abutments and erosion protection components that are stable, not constricting the stream flow, and composed of durable materials may be left in place. **Note:** Many previously constructed bridge approaches narrowed the watercourse opening through the flood plain and should be removed accordingly.

Completely remove the components of the structure spanning the watercourse. Remember to clean off the decking before the removal.

All work in the wetted portion of the watercourse must be carried out in isolation of the stream flow and must be limited to the time period between June 1st and September 30th.

Machinery used to fulfill the project must be located outside of the wetland and the wetted portion of the watercourse.

The removal of abutments and erosion protection components must be carried out during low stream flow/water level.

The removal of abutments and erosion protection components must be isolated from the stream flow, and any suspended sediment generated must be prevented from causing downstream sedimentation by installing a cofferdam or deploying a silt curtain around the work area that is weighted throughout the bottom (e.g. a chain threaded through it).

The cofferdam/silt curtain must not be removed until all suspended sediment has settled onto the bed of the watercourse.

The altered area must be restored to its natural grades and/or the channel restored to the cross-section immediately upstream and downstream of the altered area.

Woody vegetation removed/cut must be limited to those that are required to facilitate the removal of the structure.

9.6 BEAVER ACTIVITY

Beaver activity becomes increasingly more of a maintenance issue as the development of road systems increases.

Corrective action must only be taken when the impounded water is causing damage to or is an imminent threat of damage to property/infrastructure.

Property damage includes:

- The blockage of a watercourse crossing which results in the flooding and/or erosion of a roadway embankment or surface
- The flooding of properties that are negatively impacting landscaping, septic systems, wells, basements and the utilization of the private properties

When beaver activity is deemed responsible for causing any of the above problems, it must be dealt with in two steps:

- The removal/destruction of the beaver(s) from the impoundment
- The removal of the beaver dam

9.6.1 Removal of Beaver(s)

Beavers may only be removed from an impoundment by a:

- Certified/licensed nuisance wildlife control operator
- A licensed fur harvester

9.6.2 Removal of a Beaver Dam

Beaver dam removal may occur partially or completely depending on the reason for its removal. When fish passage is the issue, partial removal of the dam will often suffice. However, blockage resulting in property damage, flooding, or potential road washout may require the complete removal of the dam.

The removal must make allowance for the gradual release of water to minimize any scouring of the channel and the amount of sediment released downstream.

Under the Watercourse Alteration Certification Program, the following guidelines and general practices must be followed when removing a beaver dam.

In cases where guideline conditions cannot be met, individuals will be required to contact their local DELG office and apply for an emergency permit.

9.6.3 Guidelines

Beaver dams may only be removed/manipulated if the impounded water is causing damage to or is an imminent threat of damage to property/infrastructure. The lowering of the water level shall only be carried out until the risk to property/infrastructure has been minimized.

Non-mechanical (by hand) removal of beaver dams is the preferred method. This method minimizes disturbance to the bed/banks of the watercourse and should be the approach used wherever possible.

Under the Watercourse Alteration Certification Program, beaver dams may only be removed when the work takes place during the ice-free period (normally occurs between May and November). An application for a standard WAWA alteration permit must be made using the [online application program](#) on a site-specific basis to remove beaver dams if ice is present.

Note: A WAWA permit is required for each beaver dam removed or maintained.

9.6.4 General Practices

If machinery can reach the beaver dam from an existing roadway, its removal must be accomplished from the roadway with a hydraulically manipulated bucket or grapple. If machinery cannot reach the beaver dam from an existing roadway, it must not enter a wetland and/or be stationed below the shoulder of the banks of the watercourse to perform the removal; instead, the material must be winched, twitched, or pulled out of the natural channel.

At the first evidence of machinery causing ruts within 30 metres (100 ft) of a watercourse/wetland, the machinery must not advance any further, and the ruts must be immediately smooth graded and blanketed with mulch or slash.

No imported materials must be placed in or within 30 metres (100 ft) of a wetland or within the wetted perimeter of the impoundment to facilitate the removal of the beaver dam.

The removal of the beaver dam must be limited to the material used to build the structure such that the bank and substrate material of the natural channel is not removed/disturbed.

The impounded water must be released over an extended period to minimize silt flushed from the impounded area and reduce the amount of channel erosion downstream due to the increased discharge and flow velocity. Uncontrolled beaver dam removal could result in:

- A flush of sediment that can smother downstream habitats and incubating or emerging fish
- Flooding and erosion of downstream properties
- A rapid reduction in pond depth that can result in stranding and killing species of fish, amphibians, birds as well as aquatic and terrestrial plants
- Scouring and erosion of the downstream channel and banks
- Rapid changes to downstream water temperatures
- Potential contamination of downstream wells

The maximum allowable depth of water spilling over the structure at the drainage point should not exceed 10 centimetres (4 in). The width of the opening created must not exceed the cross-sectional area of the natural channel downstream of the dam. It is recommended that it take a minimum of one day per 0.5 hectare (1.2 acre) of ponded surface area to drain the impoundment.

During the release of the impounded water, the water level upstream and downstream shall be monitored to ensure that there is enough water to support fish and other aquatic habitat. If the water level drops below this threshold, the release of water shall cease immediately and may not commence again until the water level has risen.

The materials removed from the beaver dam must be disposed of where they cannot be washed into the watercourse or wetland by floodwaters.

9.6.5 Chronic Beaver Activity

At sites where beaver activity is continually blocking a closed-bottom culvert, consider replacing the structure with a bridge or open-bottom culvert to discourage this from happening.