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Stream Crossings for Cattle

Many farms and ranches have watercourses crossing their properties, making accessibility between the parcels of land difficult. Livestock often require access to land on both sides of a stream, making crossing of the watercourse necessary.

When livestock have direct access to streams and ditches, bacteria and nutrient levels in the water may increase and bank erosion can take place. As a result, water quality for downstream users may be degraded, herd health jeopardized and livestock productivity reduced. Livestock trampling the stream banks may increase the sediment load entering the watercourse which can smother out aquatic habitat.

To address these issues, and to contribute to improved livestock health and comfort, man-made stream crossings are constructed. However, improperly-constructed stream crossings can also have detrimental impacts on fish and fish habitat by impeding fish migration.

Unimproved Stream Crossing for Cattle

Enhanced Stream Crossing

Are there any laws or government regulations that may have bearing on stream crossings for cattle?

Any activity that can be judged to be potentially harmful to water quality or fish and fish habitat may be viewed as contraventions or violations of both provincial and federal legislation[1]. Allowing cattle to access surface water bodies without incorporating some sort of restrictions or mitigation might be viewed as violations of these laws. Improper construction of man-made cattle crossing facilities might also constitute an infraction under some legislation. Before conducting any alterations or construction works in or adjacent to a watercourse, check with authorities to obtain any necessary approvals.

Compliance with existing laws should not be viewed as the only motivation for creating properly-constructed cattle crossings; such facilities can also contribute to improved livestock health by preventing death by drowning, reducing stress and exertion by creating conditions that enhance comfort and convenience for the animal, and by reducing the chances of developing foot-rot and other diseases.

[1] Applicable provincial legislation will vary by province and the major federal legislation affecting cattle crossings is the *Fisheries Act*.

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Is it necessary to get professional assistance in planning and implementing a cattle crossing facility?

It may helpful to seek professional assistance for designing and constructing a cattle crossing to ensure the design is in compliance with regulations in your region and that it is designed for cattle comfort and longevity. In some cases, professional assistance may be required by provincial and federal approval requirements in your region. Potential sources of advice include professional engineers, engineering technologists, and aquatic environment specialists.

This fact sheet provides general guidance for the development of crossings on smaller waterways.

What should be considered in planning a stream crossing for cattle?

General

Livestock look for two basic things when crossing a stream; they prefer to be able to see the bottom, and they prefer a surface that offers firm footing, without being excessively uneven. They will usually avoid soft muddy areas, or surfaces that consist of large rocks. If the streambed is composed of gravel, and the water depth is typically less than about 0.6 m, there may be no need for any physical improvements or alterations, other than fencing to restrict crossings to as few locations as possible. Low-level or ford-type crossings should not be considered in areas where the height of the banks exceeds about 1.5 m. For these “large” streams, culvert crossings or bridges should be employed.

Similarly, where water depths typically exceed about 0.6 m, it may be necessary to construct a raised-bed crossing. In such situations, culverts should be employed to ensure that the ford does not create an obstruction at low flows. As an alternative to culverts, a raised-bed ford could have a notch or ditch excavated through it to ensure that low flows are not obstructed.

At crossings where trees and shrubs provide shade, the vegetation should be trimmed and pruned to minimize shade and thereby discourage cattle from loitering in the area.

Location

Any existing crossing sites that seem to be preferred by cattle should be used wherever possible, and the number of crossings should be kept to a minimum. Stream crossings should be sited in locations where the streambed is stable, and where practical, should be located just upstream of natural barriers such as rock shelves or large boulders. Sites where the channel grade or alignment changes abruptly, where overfalls exist, where large tributaries enter the stream, or where signs of instability are obvious should be avoided.

Width

The width (in the stream flow direction) at the top surface of the crossing (not including side slopes to the base of watercourse) can be about 2 m for cattle-only crossings, between 3 m and 5 m for multi-use crossings, or wider if required eg. equipment crossing.

Side Slopes

Cuts and fills made in constructing cattle crossings should be stable for the soil or material involved. Typically, cut and fill slopes should be in the order of 2 horizontal (H) to 1 vertical (V).

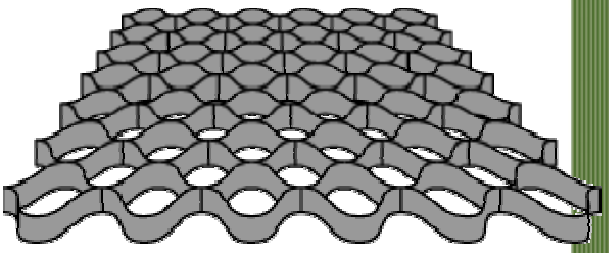
Entrance and Exit to the Crossing

The entrance and exit ramps to and from the stream should blend in with the existing site, if possible, but should be no steeper than 5 (H) to 1 (V). Surface runoff from the surrounding landscape should be directed away from the approaches to the crossing to ensure that erosion of the completed crossing does not occur.

Surface Stabilization

The entrance and exit ramps should be covered with a layer of gravel or stone about 200 mm thick. For crossings on soft, muddy foundations, it may be necessary to underlay the gravel with a layer of geotextile filter fabric to prevent the gravel from being trampled into the substrate. The geotextile fabric should be a non-woven, needle-punched material with a minimum tensile strength of about 500 N (120 lb.)

In addition to geotextile fabric, a cellular-confinement system (geocell) may be used to hold gravel in place. Geocells are an inter-woven series of plastic strips that, when expanded, create a series of vertical tubes that can filled with gravel. The geocell should be installed over geotextile fabric, and the gravel fill should completely cover the geocell by at least 50 mm.

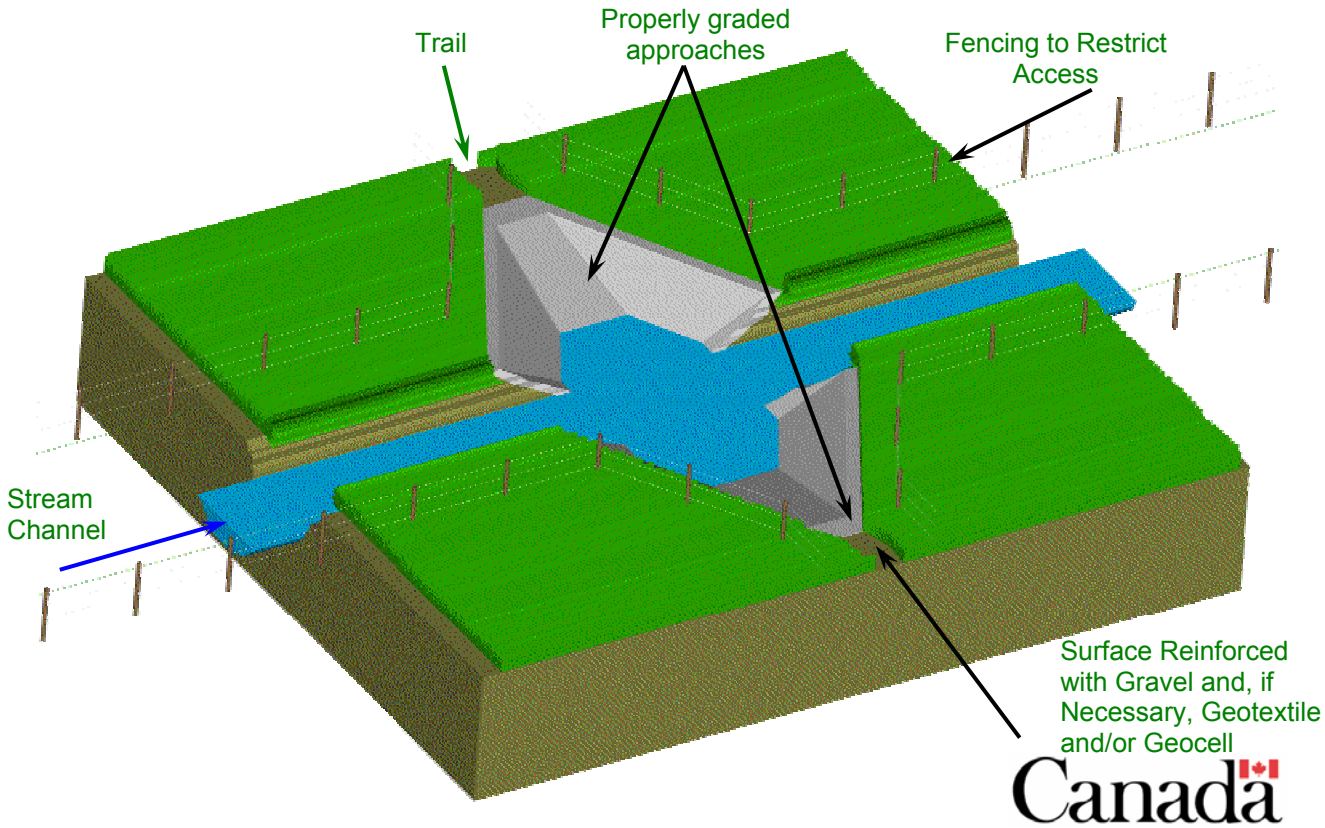


Cellular Confinement System (Geocell)

To prevent problems that might result from scour or overfall, and to ensure that the crossing does not create an obstruction, the final surface of the stone in the bottom of the streambed should be the same elevation as the bottom of the original watercourse.

Gravel used to stabilize stream crossing surfaces should be clean, well graded material with a median diameter of about 50 mm. Gravels composed of particles of this size are fairly resistant to erosion by flowing water, and the particles are large enough to be slightly uncomfortable for livestock, thereby discouraging loitering.

The following sketch illustrates a cattle crossing constructed according to the preceding guidelines:



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The Bigger Picture

Proper construction and maintenance of stream crossings for cattle can contribute to improved livestock health, as well as protecting water quality and fish habitat in the stream. For additional information on developing stream crossings for cattle, contact your local AAFC-PFRA office.

Sources of information for this fact sheet included: Stone Stream Crossing, Alabama Sheet Guide No. 728, http://efotg.nrcs.usda.gov/references/public/AL/al578StoneStreamCrossing.pdf; B.C Ministry of Transportation Fact Sheet – Culverts and Fish Passage, http://www.th.gov.bc.ca/publications/eng_publications/environment/references/Culverts_and_Fish_Passage.pdf; University of Wisconsin Extension publication "To Safeguard Livestock and Waterways, http://clean-water.uwex.edu/pubs/pdf/farm.cattlewater.pdf; USDA-NRCS Conservation Practice Standard – Stream Crossing (Code 578), ftp://ftp-fc.sc.egov.usda.gov/NHQ/practice-standards/standards/578.pdf; Ontario Ministry of Agriculture and Food Factsheet – Low Flow Mid-Level Stream and Ditch Crossing With Culverts; Agdex #751, http://www.omafra.gov.on.ca/english/engineer/facts/92-143.htm; Alberta Environment Guide to the Code of Practice for Watercourse Crossings, Including Guidelines for Complying With the Code of Practice; http://www3.gov.ab.ca/env/water/Legislation/CoP/WatercourseGuide.pdf.

UNIT ABBREVIATIONS

psi - pounds per square inch	kPa - kilopascal	gpm - gallons per minute
mm - millimetre	m - metre	ft - feet
in - inches	km - kilometre	L/s - litres per second
N – Newtons (unit of force)		

UNIT CONVERSIONS

1 US gallon = 3.785 litres	1 cubic metre (m^3) = 1,000 litres	1 metre (m) = 3.28 feet
1 Imperial Gallon = 4.546 litres	1 kilometre = 1,000 m = 0.62 miles	1 psi = 6.985 kPa
1 inch = 25.4 mm		

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