



GUIDE

TO THE *CODE OF PRACTICE FOR*

WATERCOURSE CROSSINGS,

INCLUDING GUIDELINES FOR COMPLYING

WITH THE

CODE OF PRACTICE

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GUIDE TO THE CODE OF PRACTICE FOR WATERCOURSE CROSSINGS

INTRODUCTION

Under the *Water Act* (the Act), a code of practice sets out the regulatory mechanism to govern a certain activity or diversion of water included in the overall regulatory scope of the Act. The *Code of Practice for Watercourse Crossings* (the Code of Practice) is incorporated in the *Water (Ministerial) Regulation* under the authority of the Act and became effective on May 1, 2000 and was amended on April 1, 2001.

The potential harmful effects of watercourse crossings activity within a water body can be eliminated or minimized by identifying the objectives that are to be met when such an activity is undertaken. Objectives set out in the Code of Practice are based on the principles of sustainable water management. These principles are:

- Water must be managed sustainably.
- Water is a vital component of the environment.
- Water plays an essential role in a prosperous economy and balanced economic development.
- Water must be managed using an integrated approach with other natural resources.
- Water must be managed in consultation with the public.
- Water must be managed and conserved in a fair and efficient manner.

The Code of Practice establishes the objectives, standards and conditions to be met when undertaking the activity of constructing or removing watercourse crossing. Alberta Environment, as the government department responsible for the administration of the Act, establishes the environmental objectives, standards and conditions, monitors and audits for compliance, and enforces the Code of Practice requirements. An owner/proponent of a watercourse crossing is responsible for meeting all requirements set out in the Code of Practice, and bears responsibility for obtaining appropriate information and advice from appropriate professionals to meet the objectives, standards and conditions of the Code of Practice.

Persons responsible for the placement, construction, installation, maintenance, replacement or removal of a watercourse crossing must ensure their activities are now in compliance with the requirements of the Code of Practice. Operating under and following the requirements set out in the Code of Practice allows an owner/proponent to proceed with watercourse crossing without the requirement to obtain an approval under the Act (as was the previous requirement).

This Guide is intended to assist those responsible for watercourse crossing in meeting their obligations and the requirements of the Code of Practice.

TOPICS IN THE CODE OF PRACTICE

CODE OF PRACTICE	WHAT IT MEANS
<p>What activities does this Code of Practice apply to?</p>	<p>This Code of Practice applies to "any works". This includes placing, constructing, installing, maintaining, replacing or removing a watercourse crossing.</p> <p>A "watercourse crossing" is defined in section 1(2)(cc), and generally means an access over or through a water body involving the use of structures such as a culverts or bridges. This Code of Practice applies to overhead pipeline or telecommunication line bridge crossings. The Code <u>does not</u> apply to those watercourse crossings identified as being exempt from requiring an approval under Schedules 1 and 2 of the <i>Water (Ministerial) Regulation</i>. Table 1 outlines the watercourse crossings that this Code of Practice does not apply to.</p> <p>Any measures or physical structures <u>outside the</u> watercourse crossing right-of-way that maybe required for habitat compensation to meet clause (a) of Part 1, Schedule 2 of the Code of Practice, will require approval under the <i>Water Act</i>. Causeways and watercourse crossings in these causeways, geo-technical investigations in water bodies also require an approval under <i>Water Act</i>. A fen or a muskeg that does not have a defined bed and bank is not considered a water body for the purposes of this Code of Practice. As a result, the Code of Practice does not apply to crossings of a fen or muskeg.</p> <p>Compliance with the Code of Practice does not relieve a person of their obligations and responsibilities under other legislation. Regulatory approvals may be required under provincial legislation such as the <i>Public Lands Act</i>, <i>Environmental Protection and Enhancement Act</i> or under federal legislation such as the <i>Fisheries Act</i> and the <i>Navigable Waters Protection Act</i>.</p>
<p>Definitions [s.1]</p>	<p>If a term is used in either the <i>Water Act</i> or the <i>Water (Ministerial) Regulation</i> and is not defined in this Code of Practice, those terms will be used as defined in the <i>Water Act</i> or the <i>Water (Ministerial) Regulation</i>.</p> <p>If a term is used in either the <i>Water Act</i> or the <i>Water (Ministerial) Regulation</i> <u>and</u> is defined in this Code of Practice, the term will be used as defined in this Code of Practice.</p>
<p>Definition this "Code of Practice" [s. 2(b)]</p>	<p>An owner and person carrying out a works must comply with the most recent version of the <i>Code of Practice for Watercourse Crossings</i>. To secure a copy of the most recent Code of Practice, contact the appropriate Director, as specified in Schedule 5 of this Code of Practice or the Queen's Printer.</p> <p>There are also 17 Management Area maps that are part of this Code and these maps are also available at Queen's Printer . The maps are also accessible through the department's website [http://www.gov.ab.ca/env/water/legislation/index.html].</p>
<p>Definition of "active channel" [s 2(a)]</p>	<p>For purposes of this Code of Practice, "active channel" refers to those parts of the water body bed and banks that are frequently flooded so that terrestrial vegetation is not established.</p>
<p>Definition of "maintenance" [s. 2 (j)]</p>	<p>Where the maintenance of a watercourse crossing involves activities which do not disturb or alter the bed and banks of a water body, the Code of Practice <u>does not apply</u>. Examples of such activities include replacing the deck on a bridge or replacing a guard rail. The Code of Practice <u>does not apply</u> to activities such as removing debris from a culvert or a bridge pier. Works such as repairing an eroded road grade or repairing other parts of the watercourse crossing which results in the disturbance or alteration of the water body are, however, subject to the Code of Practice.</p>

CODE OF PRACTICE	WHAT IT MEANS
<p>Definition, “productive capacity” [s. 2 (o)]</p>	<p>The term “productive capacity” is used in this Code of Practice in the context of fish habitats that comprise the aquatic environment. Under this Code of Practice, fish and fish habitat are the primary indicators of the “productive capacity” of the aquatic environment that should be considered in meeting clause (a) of Part 1 of Schedule 2. Measures to meet clause (a) of Part 1 of Schedule 2 may include, but are not limited to, fish habitat mitigation and compensation measures that would help to achieve the objective of “no net loss” of productive fish habitat as described in “A Fish Conservation Strategy for Alberta, 2000 – 2005”. Any measures or physical structures <u>outside the</u> watercourse crossing right-of-way that may be required for fish habitat compensation to meet clause (a) of Part 1, Schedule 2 of the Code of Practice, will require approval under the <i>Water Act</i></p> <p>Available information on fish or fish presence in a water body may be obtained from Alberta Environment. Please contact the department through the Directors listed in Schedule 5 of the Code of Practice. Where information does not exist regarding the presence or absence of fish in a water body, field assessments conducted by a qualified aquatic environment specialist may be required to make this determination.</p>
<p>Definition, “fish” [s. 2(i)]</p>	<p>For the purposes of this Code of Practice, the definition of fish encompasses the definition of fish under the federal <i>Fisheries Act</i>. In addition to fish used for sustenance, recreational or commercial purposes, fish species of special concern, including rare, endangered, threatened or vulnerable species, are included in the definition. . Information on species of special concern and fish conservation objectives may be obtained from Alberta Environment. Information on fish species of special concern can also be found on the following web site: http://www.gov.ab.ca/env/fw/fishing/index.html.</p>
<p>Definition, "Director" [s. 2 (f)]</p>	<p>Schedule 5 of this Code of Practice sets out which Director should be notified. Addresses, faxes and telephone numbers are also listed.</p> <p>The term "Director" as used in this Code of Practice may not be the same as an administrative "Director" within Alberta Environment.</p>
<p>Definition, “water body” [s. 2 (v)]</p>	<p>The term “water body” is defined in this Code of Practice to mean a water body with defined bed and banks whether or not water is continuously present but does not include fish bearing lakes.</p> <p>Under these definitions, a fen or a muskeg that does not have a defined bed and bank is not considered a water body for the purposes of this Code of Practice. As a result, the Code of Practice does not apply to crossings of a fen or muskeg of this nature.</p>

CODE OF PRACTICE	WHAT IT MEANS
<p>What is a “qualified aquatic environment specialist?” [s. 2 (q)]</p>	<p>A qualified aquatic environment specialist may include a private individual, consultant or employee of a company. The specifications and recommendations prepared by the qualified aquatic environment specialist under the Code of Practice include, but are not limited to, mitigation and compensation measures related to achieving the “no net loss” objective and the determination of fish passage requirements that must be considered in the design and construction of watercourse crossings.</p> <p>A qualified aquatic environment specialist would generally be employed when a crossing results in a disruption or alteration of the bed or banks of a fish bearing water body and/or when fish passage requirements must be incorporated into the water course crossing design. The qualified aquatic environment specialist determines what information and assessments are needed to meet the requirement of the Code of Practice.</p> <p>In the event of enforcement actions resulting from contravention of the Code of Practice, a qualified aquatic environment specialist should be able to defend and rationalize any specifications and recommendations prepared on behalf of the owner. The Director may also request information regarding the experience and qualification of a qualified aquatic environment specialist.</p>
<p>Terminology: "Isolation"</p>	<p>The Code of Practice specifies where “isolation” methods must be used in carrying out a works in Class A, B and C water bodies (i.e., fish bearing water bodies). Isolation methods are not required for works carried out in Class D water bodies. The intent is to isolate any construction site in the water body from any flowing water to minimize erosion and sedimentation resulting from the disturbance associated with the works. The intent of isolation is generally to create a “dry” construction site through the use of coffer dams or other similar structures, however silt barriers or fences may be appropriate for use in certain situations.</p>
<p>Terminology: "Engineering Technical Specialist"</p>	<p>An Engineering Technical Specialist may include a private individual, consultant or employee of a company. The individual can have an educational background in areas such as forestry, engineering, water sciences or other similar fields and have knowledge and experience in designing watercourse crossings. A forest practitioner, engineering technologist, or engineering technician could qualify as an Engineering Technical Specialist provided he or she has the relevant experience and knowledge.</p>
<p>Terminology: "UTM"</p>	<p>The Code of Practice specifies that UTM coordinates for the location of the watercourse crossing should be provided as part of the notice and included in any plans prepared. Where provided, UTM coordinates must specify projection and datum.</p>
<p>Terminology: “Dry” and “Frozen”</p> <p>"Sufficient ice cover"</p>	<p>The Code of Practice allows for the construction and installation of a watercourse crossing under certain construction conditions when a water body is “dry” or “frozen”. In these circumstances, a water body can be considered “dry” when there is no free standing water covering the bed of the water body at the crossing site or if there is insufficient water in quantity or depth to support fish.</p> <p>“Frozen” means frozen to the bed of the water body or frozen with no water between the ice and the bed of the water body.</p> <p>The Code of practice allows for the installation of Type 5 crossings (log fill) as temporary crossings in some classes of water bodies where the water body is ice covered and the ice is of sufficient thickness to support the crossing. Type 5 crossings may be installed where water may be present under the ice however the crossing should be constructed in a manner so that the crossing does not sag to the bottom of the water body thereby blocking flows and creating over ice flooding</p>

CODE OF PRACTICE	WHAT IT MEANS
<p>What is the difference between the Code of Practice and the Guidelines contained in the Guide to the Code of Practice?</p>	<p>The Code of Practice consists of section 1, Definitions, to section 17, Code of Practice Amendment, inclusive, and Schedules 1 to 6, inclusive. The legal obligations of an owner and a person carrying out a works for a watercourse crossing that crosses a water body are set out in this Code of Practice.</p> <p>The Guidelines contained within the Guide to the Code of Practice include best management practices for carrying out the legal obligations set out in the Code of Practice, and are provided only to assist users. The Guidelines are not intended to apply to all situations and if there is another way of meeting obligations under the Code of Practice, the Guidelines do not have to be followed.</p>
<p>Notice to the Director [s. 3 and 4]</p>	<p>The owner of the proposed watercourse crossing is required to provide notice to the appropriate Director (as listed in Schedule 5). Notice must be in writing and given 14 days before starting work. While notice may be given up to one year in advance the plan(s) for the crossing must be prepared at least 14 days prior to commencing the works.</p> <p>Any changes to these notice requirements such as reducing the 14 day prior notice requirement must be secured from the Director (as listed in Schedule 5) in writing. The notice must contain the information listed in Schedule 1. An example of a notice form is available on the Alberta Environment website.</p> <p>If the works are not completed within the time specified in the notice, the notice expires and a new notice must be provided. This new notice must contain:</p> <ul style="list-style-type: none"> - the new start date, - the time period when there will be activity in the water body, - any changes in information from the first notice, - the new expected completion date.
<p>Notice in Emergencies [s.5, clauses (a), (b) , (c) of Schedule 1]</p>	<p>In some cases, where there is an emergency, it may not be feasible to provide the Director notice before starting work. In these emergency situations, an owner must notify the Director (as outlined in Schedule 5) within 24 hours of becoming aware of the emergency.</p> <p>Notice about an emergency must contain the following information:</p> <ul style="list-style-type: none"> - name, address and phone number of an owner of the watercourse crossing, - name and phone number of the contact person, - the diameter of the culverts, number and length and width of spans of a bridge to be (or that was) constructed, - a map, diagram or air photo, as described in clause (c) of Schedule 1, - any other information on the emergency that is available. <p>Within 30 days of completing works to address an emergency, additional information as specified in section 5 (3) of the Code of Practice is required including an indication whether the works incorporated the specifications and recommendations of a qualified aquatic environment specialist. The Code of Practice does not require the owner to obtain the specifications and recommendations of a qualified aquatic environment specialist. However, if circumstances allow for it, the specifications and recommendations of a qualified aquatic environment specialist are desirable when completing works to address an emergency occur in a fish bearing water body.</p>

CODE OF PRACTICE	WHAT IT MEANS
Plans [s.6 and Schedule 2]	<p>The owner of a watercourse crossing that will cross a water body is required to prepare a plan for the proposed work. In selecting a crossing site and in preparing a plan to comply with this Code of Practice, it is also necessary to meet other resource and land management requirements (i.e. <i>Public Lands Act</i>). This plan is to be prepared 14 days before commencing the works.</p> <p>A plan for a crossing will consist of:</p> <ul style="list-style-type: none"> - an indication as to the Type of Crossing and conditions to be used, determined in accordance with section 8 , section 9, and Schedule3, including the specifications and recommendations of a qualified aquatic environment specialist where required, - where required the specifications of a professional engineer or engineering technical specialist that are prepared in accordance with Parts 1 and 2 of Schedule 2. <u>Section 6(2)</u> states when a professional engineer or engineering technical specialist must be used in preparing the plan and when an owner can prepare a plan on his own <u>without using a professional engineer or engineering technical specialist.</u> - contingency measures to deal with potential problems, and - monitoring plans. <p>These plans will be prepared to:</p> <ul style="list-style-type: none"> - meet the design and construction standards outlined in Part 1 of Schedule 2, and - meet the requirements for the Class of water body in which the works will take place.
Removal of a Watercourse Crossing	<p>This Code of Practice applies to the removal of a watercourse crossing. Where a watercourse is to be <u>removed</u>, the following must be done:</p> <ul style="list-style-type: none"> - prepare a plan containing the information contained in section 6, - provide notice to the Director under section 3, and - meet the requirements as set out in the Code of Practice.
Certification or Confirmation of Plans for a Watercourse Crossings	<p>Where the plans have been prepared by a professional engineer it must contain the <u>stamp, certification and signature</u> of the professional engineer and where the plans have been prepared by an engineering technical specialist it must contain the <u>certification and signature</u> of the by engineering technical specialist.</p> <p>Where plans have been prepared by the owner without an engineering technical specialist or professional engineer the plans need to have the <u>signature of an owner confirming</u> the plans meet the standards of the code.</p>

CODE OF PRACTICE	WHAT IT MEANS
Maps and class of water bodies [s.7]	<p>A map that is listed in Schedule 6 will indicate the class of a mapped water body. The Code of Practice applies to both mapped and unmapped water bodies. Due to the large scale of the maps, there are many water bodies that are not shown on the maps. The Code of Practice outlines how the class of an unmapped water body is determined. Some maps were amended effective April 1, 2001.</p> <p>Determination of the class of a water body also determines the preferred Type of watercourse crossing, timing and conditions under which the watercourse crossing is constructed, replaced or removed.</p> <p>The class of a water body is based on the “sensitivity” of fish habitats and their known distribution. The sensitivity for the class of water body is as follows:</p> <p>Class A – highest sensitivity; habitat areas are sensitive enough to be damaged by any type of activity within the water body; known habitats in water body critical to the continued viability of a population of fish species in the area.</p> <p>Class B – high sensitivity; habitat areas are sensitive enough to be potentially damaged by any type of activity within the water body; habitat areas important to continued viability of a population of fish species in the area.</p> <p>Class C – moderate sensitivity; habitat areas are sensitive enough to be potentially damaged by unconfined or unrestricted activities within a water body; broadly distributed habitats supporting local fish species populations.</p> <p>Class D - low sensitivity; fish species as defined under this Code of Practice not present.</p> <p>The Code of Practice refers to a “distance of 2 km upstream of the mouth” in determining the class of the water body. The 2 km distance refers to a length of the water body.</p>
Types of Watercourse Crossings, except Temporary crossings [s. 8]	<p>The Code of Practice lists the “Types” of watercourse crossings that may be constructed or installed in the various classes of water body that may be encountered. The Types of watercourse crossings are identified as being:</p> <p>Type 1 – single span bridge or similar structure that does not result in a disturbance or alteration to the active channel of the water body</p> <p>Type 2 – multi-span bridge, open bottom culvert or similar structure that does not significantly narrow the width of the active channel and that maintains the natural bed of the waterbody</p> <p>Type 3 – culvert, pipe, box or similar structure that covers or replaces the natural bed or the water body</p> <p>Type 4 – ford, low-level crossing or similar structure that covers or alters the natural bed of the water body and is located below the surface of the water body</p> <p>Depending on the class of water body, the Code of Practice sets out the restrictions as to which watercourse crossing Types may be constructed and installed. In the classes of water body, a preference order for the various crossing Types are also set out.</p> <p>Tables 2 – 6 of this Guide outlines the use of the types of watercourse crossings in the various classes of water bodies.</p>

CODE OF PRACTICE	WHAT IT MEANS
Types of Temporary Watercourse Crossings, [s.9]	<p>The Code of Practice lists the “Types” of Temporary watercourse crossings that may be constructed or installed in the various classes of water body that may be encountered. Depending on the class of water body, the Code of Practice sets out where and when temporary crossings may be constructed and installed.</p> <p>The temporary crossings are to be removed within 6 months unless a request is made to the Director to extend the 6 month duration. The types of temporary watercourse crossings include a Type 1, Type 2, Type 3 and Type 4 crossing as listed above and a Type 5 crossing (log fill).</p> <p>A Type 5 crossing (log fill) is allowed in winter season when the water body is frozen to the bottom or has sufficient ice cover to support a crossing this type of crossing. A Type 5 crossing <u>can also be used</u> in situations where the water body is dry in the late summer and fall. All Type 5 crossings must be removed prior to spring break up or 6 months after being constructed which ever occurs first.</p> <p>Restricted activity periods may need to be considered and the specifications of a qualified aquatic environment specialist may be required in certain situations as specified in the Code of Practice. Table 7 of this Guide outlines the requirements of the Code of Practice as they relate to temporary watercourse crossings.</p> <p>Sections 6, 8, 10(1), 10(2), 10(3), 10(4), 10(5), 10(6), 10(7), 11, 13, and 14 do not apply to Temporary Crossings.</p>
Restricted Activity Period [s. 10]	<p>Restricted activity periods are times when works that disrupt the bed or banks of a water body must be avoided to prevent disturbing fish or fish eggs during sensitive periods of their reproductive life cycle (i.e., spawning, egg incubation, fry emergence).</p> <p>Maps under this Code of Practice identify restricted activity periods for mapped Class B and Class C water bodies. A qualified aquatic environment specialist determines the restricted activity period for a Class A water body. Restricted activity periods do not exist for Class D water bodies. The Code of Practice sets out how restricted activity periods for unmapped water bodies may be determined.</p> <p>If the construction of the watercourse crossing is to be carried out within a restricted activity period, the recommendations and instructions of a qualified aquatic environment specialist area required unless otherwise specified under the Code of Practice.</p>
Confirmation of Completion of Works [s. 11]	<p>Upon completion of the watercourse crossing, the owner of the crossing must confirm the crossing was completed according to the plans prepared for the crossing. The owner retains this confirmation in their records.</p>
Reporting [s. 12]	<p>If there is contravention of the Code of Practice, except for contravention under sections 11, 13, and 14, the owner of the watercourse crossing must report details of the contravention and the possible environmental impacts within 24 hours of the contravention. A follow up written report is required within 7 days of the report of the contravention.</p>
Record Keeping [s. 13]	<p>The owner responsible for a works must retain records, including plans, photographs and certifications, for a period of one year following the abandonment or removal of watercourse crossing. Note this requirement does not apply to temporary watercourse crossings</p>

CODE OF PRACTICE	WHAT IT MEANS
Monitoring of Works [s. 14]	The Code of Practice specifies that the works must be monitored over the period of time that they remain in place. The monitoring should be designed to determine whether the crossing continues to meet the Code of Practice standards over its life span. There is also a requirement to take a photographs or video recordings of the crossing site before construction commences and to conduct other monitoring that is identified in a plan prepared under section 6.
Date this Code of Practice Coming into Force [s. 16]	The Code of Practice came into force on May 1, 2000 and was amended on April 1, 2001.
Enforcement of this Code of Practice	Monitoring for compliance with the Code of Practice on intended crossings will be done by Alberta Environment.

Table 1

**CODE OF PRACTICE FOR WATERCOURSE CROSSINGS
APPLICABILITY OF THE CODE OF THE PRACTICE**

“Green Area”

Situation	Exemption in <i>Water Act</i>	Code of Practice Applies	Other Requirements
Culvert crossing where culvert size is less than 1.5 metres in diameter and does not alter water body characteristics below the 1 in 25 year flood event	Yes (Exemption applies)	N/A (Code does not apply)	Annual Operating Plan approval or other approval under the <i>Public Lands Act</i> . <i>Federal Fisheries Act</i> authorization may also be required
Single-span bridge crossing where bridge does not alter water body characteristics below the 1 in 25 year flood event	Yes (Exemption applies)	N/A (Code does not apply)	Annual Operating Plan approval or other approval under the <i>Public Lands Act</i> . <i>Federal Fisheries Act</i> authorization may also be required
Culvert crossings where the culvert size is greater than 1.5m in diameter.	N/A (No exemption provided for)	Yes (Code requirements apply)	Annual Operating Plan approval or other approval under the <i>Public Lands Act</i> . <i>Federal Fisheries Act</i> authorization may also be required
Ice Bridges	Yes (Exemption applies except for in areas listed in Schedule 2 of the Regulations)	N/A (Code does not apply)	Approval under <i>Water Act</i> required for ice bridges located in Areas listed in Schedule 2 and approval under <i>Public Lands Act</i> required for all ice bridges.
Log Fills	Yes (Exemption applies)	N/A (Code does not apply)	Annual Operating Plan approval or other approval under the <i>Public Lands Act</i> .
Bridge crossings greater than one span	N/A (No exemption provided for)	Yes (Code requirements apply)	Annual Operating Plan approval or other approval under the <i>Public Lands Act</i> . <i>Federal Fisheries Act</i> authorization may also be required
Causeway crossing through a lake or slough	N/A (No exemption provided for)	N/A (Code does not apply)	Approval under <i>Water Act</i> and <i>Public Lands Act</i> required. <i>Federal Fisheries Act</i> authorization may also be required

Table 1 (cont.)...

“White Area” (All other areas in the Province)

<u>Situation</u>	Exemption in <i>Water Act</i>	Code of Practice Applies	Other Requirements
Culvert crossings in a non-fish bearing stream, where culvert size is less than 1.5 m diameter, and does not alter water body characteristics below the 1 in 25 year flood event.	Yes (Exemption applies)	N/A (Code does not apply)	Approval under the <i>Public Lands Act</i> may be required.
Single-span bridges in a non-fish bearing stream, where the bridge crossing does not alter water body characteristics below the 1 in 25 year flood event.	Yes (Exemption applies)	N/A (Code does not apply)	Approval under the <i>Public Lands Act</i> may be required.
Culvert crossings (any size diameter), and bridge crossings greater than one span in a fish bearing stream.	N/A (No exemption provided for)	Yes (Code requirements apply)	Approval under <i>Public Lands Act</i> may be required. Federal <i>Fisheries Act</i> authorization may also be required.
Causeway crossing through a lake or slough.	N/A (No exemption provided for)	N/A (Code does not apply)	Approvals under <i>Water Act</i> and <i>Public Lands Act</i> required. Federal <i>Fisheries Act</i> authorization may also be required.

Table 2

**CLASS A WATER BODY
CODE OF PRACTICE REQUIREMENTS**

Class A Water Bodies – Mapped and Unmapped water bodies

	Code of Practice Specifications	Required Actions Under the Code of Practice	Alternatives under the Code of Practice
New Crossing	New crossings not allowed except pedestrian or equestrian crossings (similar to a Type 1 crossing).	Installation of pedestrian or equestrian crossing done at any time without the requirement of a qualified aquatic environment specialist.	None – only pedestrian or equestrian crossings allowed.
Replacement of Existing	Type 1 crossing preferred.	If the replacement crossing involves the disturbance or alteration to bed or banks of the water body: (i) isolation of the site required; and (i) the recommendations of a qualified aquatic environment specialist required.	If a Type 2 Crossing is to be installed, the site must be isolated and the recommendations of a qualified aquatic environment specialist needed. Isolation of the site not required if the water body is dry or frozen to the bottom at the time of work.
Maintenance of existing crossing	Maintenance allowed	If the maintenance of the crossing involves the disturbance or alteration to bed or banks of the water body: (i) isolation of the site required; and (ii) the recommendations of a qualified aquatic environment specialist required.	Isolation of the site not required if the water body is dry or frozen to the bottom at the time of work.

Table 3

**CLASS B WATER BODY (MAPPED)
CODE OF PRACTICE REQUIREMENTS**

Class B Water Bodies – Mapped Class B Water Bodies Only

	Code of Practice Specifications	Required Actions under the Code of Practice	Alternatives under the Code of Practice
New Crossing	Type 1 crossing preferred.	Installation of Type 1 crossing done at any time without the requirement of a qualified aquatic environment specialist.	<p>If a Type 2 Crossing is to be installed, the site must be isolated and the recommendations of a qualified aquatic environment specialist needed.</p> <p>If the works for a Type 2 crossing are to occur within the Restricted Activity Period, the recommendations of a qualified aquatic environment specialist needed.</p> <p>Isolation of the site not required if the water body is dry or frozen to the bottom at the time of work.</p>
Replacement of existing	Type 1 crossing preferred	<p>If the replacement crossing involves the disturbance or alteration to bed or banks of the water body:</p> <ul style="list-style-type: none"> (i) isolation of the site required; (ii) the recommendations of a qualified aquatic environment specialist required; and (iii) works to occur outside the Restricted Activity Period. 	<p>If a Type 2 Crossing is to be installed, the site must be isolated and the recommendations of a qualified aquatic environment specialist needed.</p> <p>If the works for a Type 2 crossing are to occur within the Restricted Activity Period, the recommendations of a qualified aquatic environment specialist needed.</p> <p>Isolation of the site not required if the water body is dry or frozen to the bottom at the time of work.</p>
Maintenance of existing crossing	Maintenance allowed	<p>If the maintenance of the crossing involves the disturbance or alteration to bed or banks of the water body:</p> <ul style="list-style-type: none"> (i) isolation of the site required; (ii) the recommendations of a qualified aquatic environment specialist required; and (iii) works to occur outside the Restricted Activity Period. 	<p>Isolation of the site not required if the water body is dry or frozen to the bottom at the time of work.</p> <p>If the maintenance requires works that involve the disturbance or alteration to bed or banks of the water body, and the works are to occur within the Restricted Activity Period, the recommendations of a qualified aquatic environment specialist needed.</p>

Table 4

**CLASS B WATER BODY (UNMAPPED)
CODE OF PRACTICE REQUIREMENTS**

Class B Water Bodies – Unmapped Class B Water Bodies Only

	Code of Practice Specifications	Required Actions under the Code of Practice	Alternatives under the Code of Practice
New Crossings	Type 1 crossing preferred.	Installation of Type 1 crossing done at any time without the requirement of a qualified aquatic environment specialist.	<p>If a Type 2 or Type 3 Crossing is to be installed, the site must be isolated and the recommendations of a qualified aquatic environment specialist needed.</p> <p>If the works for a Type 2, Type 3 or Type 4 crossing are to occur within the Restricted Activity Period, the recommendations of a qualified aquatic environment specialist needed.</p> <p>Isolation of the site not required if the water body is dry or frozen to the bottom at the time of work.</p>
Replacement of existing	Type 1 crossing preferred	<p>If the replacement crossing involves the disturbance or alteration to the bed or banks of the water body:</p> <ul style="list-style-type: none"> (i) isolation of the site required; (ii) the recommendations of a qualified aquatic environment specialist required; and (iii) works to occur outside the Restricted Activity Period. 	<p>If a Type 2 or Type 3 Crossing is to be installed, the site must be isolated and the recommendations of a qualified aquatic environment specialist needed.</p> <p>If the works for a Type 2, Type 3 or Type 4 crossing are to occur within the Restricted Activity Period, the recommendations of a qualified aquatic environment specialist needed.</p> <p>Isolation of the site not required if the water body is dry or frozen to the bottom at the time of work.</p>
Maintenance of existing crossing	Maintenance allowed	<p>If the maintenance of the crossing involves the disturbance or alteration to the bed or banks of the water body:</p> <ul style="list-style-type: none"> (i) isolation of the site required; (ii) the recommendations of a qualified aquatic environment specialist required; and (iii) works to occur outside the Restricted Activity Period. 	<p>Isolation of the site not required if the water body is dry or frozen to the bottom at the time of work.</p> <p>If the works involved in the maintenance of a Type 2, Type 3 or Type 4 crossing are to occur within the Restricted Activity Period, the recommendations of a qualified aquatic environment specialist needed.</p>

Table 5

**CLASS C WATER BODY
CODE OF PRACTICE REQUIREMENTS**

Class C Water Bodies – Mapped and Unmapped Water Bodies

	Code of Practice Specifications	Required Actions under the Code of Practice	Alternatives under the Code of Practice
New Crossings	Type 1, Type 2, Type 3, and Type 4 crossings allowed, in that order of preference.	<p>For a Type 1 crossing – installation done at any time without the recommendations of a qualified aquatic environment specialist.</p> <p>For a Type 2, and Type 3 crossing – the site must be isolated, the works to occur outside the Restricted Activity Period and the recommendations of a qualified aquatic environment specialist needed. Installation of a Type 4 crossing requires the recommendations of a qualified aquatic environment specialist.</p>	<p>Isolation of the site not required for Type 2 and Type 3 crossings if the water body is dry or frozen to the bottom at the time of work.</p> <p>If the works for a Type 2, Type 3 or Type 4 crossing are to occur within the Restricted Activity Period, the recommendations of a qualified aquatic environment specialist needed.</p>
Replacement of existing	Type 1, Type 2, Type 3, and Type 4 crossings allowed, in that order of preference.	<p>If the replacement crossing involves the disturbance or alteration to bed and banks of the water body:</p> <ul style="list-style-type: none"> (i) isolation of the site required; (ii) the recommendations of a qualified aquatic environment specialist required; and (iii) works to occur outside the Restricted Activity Period. <p>For a Type 2, and Type 3 crossing – the site must be isolated and the recommendations of a qualified aquatic environment specialist needed. Installation of a Type 4 crossing requires the recommendations of a qualified aquatic environment specialist.</p>	<p>An existing Type 3 crossing can be replaced with Type 1 or Type 2 crossing.</p> <p>Isolation of the site not required for Type 2 and Type 3 crossings if the water body is dry or frozen to the bottom at the time of work.</p> <p>If the works for a Type 2, Type 3 or Type 4 crossing are to occur within the Restricted Activity Period, the recommendations of a qualified aquatic environment specialist needed.</p>
Maintenance of existing crossing	Maintenance allowed	<p>If the maintenance of the crossing involves the disturbance or alteration to the bed or banks of the water body:</p> <ul style="list-style-type: none"> (i) isolation of the site required; (ii) the recommendations of a qualified aquatic environment specialist required; and (iii) works to occur outside the Restricted Activity Period. 	<p>Isolation of the site not required if the water body is dry or frozen to the bottom at the time of work where the maintenance involves the disturbance or alteration to bed or banks of the water body.</p> <p>Where the maintenance involves the disturbance or alteration to bed or banks of the water body and the works will occur within the Restricted Activity Period, the recommendations of a qualified aquatic environment specialist needed.</p>

Table 6

**CLASS D WATER BODY
CODE OF PRACTICE REQUIREMENTS**

Class D Water Bodies – Mapped and Unmapped Water Bodies

	Code of Practice Specifications	Required Actions under the Code of Practice	Alternatives under the Code of Practice
New Crossing	All crossing types may be installed.	Installation of any crossing type may be done at any time without isolation of the site or the recommendations of a qualified aquatic environment specialist.	
Replacement of existing	All crossing types may be installed.	Installation of any crossing type may be done at any time without isolation of the site or the recommendations of a qualified aquatic environment specialist.	
Maintenance of existing crossing	Maintenance allowed	Maintenance of any crossing type may be done at any time without isolation of the site or the recommendations of a qualified aquatic environment specialist.	

Table 7

**TEMPORARY WATERCOURSE CROSSING
CODE OF PRACTICE REQUIREMENTS**

Temporary Watercourse Crossings

Class of Water Body	Code of Practice Specifications	Required Actions under the Code of Practice
Class A	Type 1 and Type 2 crossings are allowed only if the crossing is needed to repair or maintain an existing watercourse crossing or structure.	<p>For Type 1 crossings, the recommendations of a qualified aquatic environment specialist are not required.</p> <p>For Type 2 crossings, the site must be isolated and the recommendations of a qualified aquatic environment specialist needed.</p> <p>Isolation of the site not required if the water body is dry or frozen to the bottom at the time of work.</p>
Class B	All crossing types, except for a Type 3 crossing, may be used subject to the required actions under the Code of Practice.	<p>Type 1 crossing may be used at any time.</p> <p>Type 2 crossing may be used at any time, and requires the recommendations of a qualified aquatic environment specialist.</p> <p>Type 4 crossings may be used if the water body is dry. The recommendations of a qualified aquatic environment specialist required where the water body contains water and is not covered by ice.</p> <p>Type 5 crossings may be used if water body is dry or frozen to the bottom at the time of work or if there is sufficient ice cover to support the crossing. The crossing must be removed prior to spring break up or within 6 months of installation, whichever is the earlier occurrence.</p>
Class C	All crossing types may be used subject to the required actions under the Code of Practice.	<p>Type 1 crossing may be used at any time.</p> <p>Type 2 crossing may be used at any time and requires the recommendations of a qualified aquatic environment specialist.</p> <p>Type 3 crossing may be used at any time when the water body is dry without the recommendations of a qualified aquatic environment specialist. If the water body has flowing water and is not covered by ice, isolation of the site and the recommendations of a qualified aquatic environment specialist are required.</p> <p>Type 4 crossing may be used if the water body is dry without the recommendations of a qualified aquatic environment specialist. The recommendations of a qualified aquatic environment specialist required where the water body contains water and is not covered by ice.</p> <p>Type 5 crossing may be installed if the water body is dry or frozen to the bottom at the time of work or if there is sufficient ice cover to support the crossing. The crossing must be removed before spring break up or within 6 months of installation, whichever is the earlier occurrence.</p>
Class D	All crossing types may be used subject to the required actions under the Code of Practice.	<p>All crossing types may be used at any time.</p> <p>Type 5 crossing may be installed if water body is dry or frozen to the bottom at the time of work or if there is sufficient ice cover to support the crossing. The crossing must be removed before spring break up or within 6 months of installation, whichever is the earlier occurrence.</p>

GUIDELINES FOR COMPLYING WITH THE CODE OF PRACTICE FOR WATERCOURSE CROSSINGS (the “Code of Practice”)

NOTE: **These Guidelines identify measures and best management practices to assist the user in meeting the objectives and conditions of the Code of Practice and do not form part of the Code of Practice**

A. Route Planning and Watercourse Crossing Site Selection

Guidelines, measures and best management practices for route planning and watercourse crossing site selection include, but are not limited to:

1. Existing crossings should be used wherever possible.
2. Route planning should be done in a manner that:
 - (a) minimizes the number of watercourse crossings,
 - (b) minimizes impacts on critical riparian and upland wildlife habitats, and sensitive and rare plant and animal species, including species at risk.
3. Temporary and permanent trails and roads should approach the watercourse crossing as nearly perpendicular to the water body channel as possible to minimize bank disturbance and reduce the crossing length.
4. Disruption of groundwater flow caused by trail or road construction should be avoided.
5. Trails, roads and watercourse crossings should be sited to conform closely to the natural topography in order to avoid extensive cut or fill sections and reduce the potential for erosion.
6. Crossing sites should be located:
 - (a) where gentle grades exist for proper drainage,
 - (b) where the depth of the water body is relatively shallow,
 - (c) at a minimum of 500 metres upstream of known fish spawning areas,
 - (d) at a minimum of 500 metres upstream of a river mouth or downstream of a lake outlet as these are preferred fish habitats,
 - (e) where the water body channel is straight, unobstructed and well defined to provide a direct entrance and exit for water flow through the crossing.

B. Aquatic and Biological Site Assessments

Aquatic and Biological Assessments

Guidelines, measures and best management practices for aquatic and biological assessments carried out by a qualified aquatic environment specialist as required by this Code of Practice include, but are not limited to:

1. The following features should be noted when preparing any summaries of physical and biological data pertaining to the water body and considered where necessary in the development of specifications and recommendations as required by this Code of Practice:
 - (a) areas of streambed groundwater upwelling and streambank seepage,
 - (b) barriers to fish movement,
 - (c) identification of other physical activities or natural disturbances which may have impacted the crossing site,
 - (d) surrounding land use activities and description of surrounding terrain,
 - (e) other environmental features or values that might be adversely affected by the works.
2. In describing the anticipated effects of the works on the water body the following should be considered by the qualified aquatic environment specialist:
 - (a) the anticipated effects resulting from disturbance of the streambed, streambanks and riparian area at and adjacent to the water body,
 - (b) the anticipated extent (zone of impact) of downstream sediment transport and sedimentation resulting from the works,
 - (c) the anticipated effects of sediment transport and sedimentation on aquatic biota and fish habitat,
 - (d) the requirements for fish passage through the watercourse crossing.

3. Fish passage requirements should be based on:
 - (a) fish species known or thought to be present at or migrating through the crossing site at any time of year,
 - (b) the timing of spawning or other migrations,
 - (c) the swimming capability of the smallest size of mature fish that would migrate through the crossing site.

 4. Specifications and recommendations developed by the qualified aquatic environment specialist for measures required to meet the requirements of this Code of Practice include, but are not limited to, descriptions of sediment control measures and fish habitat mitigation and compensation measures.

 5. Where existing fish and fish habitat data and information are deemed by the qualified aquatic environment specialist to be insufficient to complete an assessment of the potential effects of the works on the aquatic environment, the following methods should be followed where possible in designing and conducting field assessments at the crossing site:
 - (a) **Study sections** – Establish a minimum of two study sections for the purpose of conducting physical and biological assessments as follows:
 - (i) one, a minimum length of 100 metres, *immediately upstream* of the proposed crossing site,
 - (ii) one, a minimum length of 300 metres, or *encompassing the entire zone of impact* (whichever is greater), consisting of the crossing site and the area downstream of the crossing site,
 - (iii) establish additional study sections either upstream or downstream of the zone of impact as needed to determine the presence of fish species that could be potentially affected by the works.

 - (b) **Physical Assessment** - This assessment should be done to determine water body conditions and characterize fish habitat in the study sections immediately upstream of the crossing site and encompassing the zone of impact.
 - (i) **Determining the zone of impact** - For the purpose of this assessment, the zone of impact is defined as the area of bed and banks of the water body that will be altered or disrupted as a result of the works and where 90% of the sediment discharged as a result of the works will be deposited. Substrate sampling may be needed to determine the zone of impact associated with sediment deposition.
 - (ii) **Physical assessment methods and parameters** - One assessment of the upstream study section and the zone of impact study section should be conducted prior to the works. All data should be date referenced. The types and location of fish habitat in both study sections should be mapped as part of the physical assessment using an accepted habitat classification system. Generally habitat mapping should identify and document habitat types and cover composition including:
 - cover provided by surface turbulence
 - aquatic vegetation
 - instream cover
 - terrestrial canopy
 - rock/boulder substrates
 - under-cuts
 - turbidity
 - cover provided by depth
 - pool/riffle/run ratio

To complement habitat mapping, establish a minimum of five cross section transects across the two study sections (two transects upstream of the crossing site, one at the crossing site, and a minimum of two in the zone of impact) and record the following:
- (i) **At the crossing site**
 - water velocity and discharge
 - four photos at the proposed right-of-way transect; one of each bank taken from the opposite bank, one looking upstream of the crossing site, and one looking downstream of the crossing site
 - water quality parameters
 - water temperature and time of day reading taken
 - pH, conductivity, DO, turbidity

 - (ii) **At each transect within each study section**
 - bank full width and wetted width
 - water depths at 0.25, 0.5, and 0.75 of the wetted width
 - water velocity
 - bottom types
 - % fines, gravel, cobble and boulder
 - description of both banks of the water body, including height, slope and stability
-
- (c) **Biological Assessment** - This assessment should be done to determine the current presence/absence of fish in the water body at each study section. To account for seasonal variation, the biological assessment should ideally be conducted once in the spring, and again once in the fall, and should be conducted during that time period during which anticipated impacts of the works on fish species life stages, such as spawning and egg incubation, are best documented.

Where a biological assessment is conducted, following information should be obtained and recorded:

- (i) the actual length of the study section,
 - (ii) the type of equipment used, and the electrofishing effort made (seconds) and catch per unit effort (other active and passive fish capture methods may be used to augment electrofishing where required),
 - (iii) all fish species captured, the number of each species and the location or habitat types where fish were captured,
 - (iv) the fork length and weight of all sportfish species captured
 - (v) the gender and maturity of sportfish species if externally determinable,
 - (vi) the spawning potential,
 - (vii) during restricted activity periods, any evidence of spawning activity (redds, fish on redds, etc.), and determine where possible the presence of fish and fry at the crossing site.
6. A qualified aquatic environment specialist must obtain a Fish Research Licence from the appropriate area office of the Fisheries and Wildlife Management Division, Alberta Environment, prior to collecting fish data that may be needed in conducting field assessments. As part of the Fish Research Licence, the specialist is required to provide a copy of field data and reports to the Fisheries and Wildlife Management Division in a format specified in the licence. Field data and reports provided to the Fisheries and Wildlife Management Division will be available to the public upon request.
 7. Further information on fish and fish habitat assessments for watercourse crossings is provided in *Fish Habitat Manual: Guidelines & Procedures for Watercourse Crossings in Alberta* (Alberta Infrastructure, 1999).

C. Watercourse Crossing Design and Construction

I. Sediment and Erosion Control

Guidelines, measures and best management practices for erosion and sediment control include, but are not limited to:

1. The width of the right-of-way required for the approach road construction at the crossing site should be minimized, with due regard to safety and construction constraints.
2. Clearing or damage to vegetation outside of the watercourse crossing right-of-way should be avoided where possible. Equipment operators should not disturb or destroy vegetation or streambanks outside this area.
3. At crossing sites situated on highly erodible soils, site preparation should take place when the ground is frozen, whenever possible.
4. Clearing of vegetation on unstable or erodible banks should be done by hand wherever possible.
5. Maintain original groundcover vegetation by not blading, grubbing, or rooting on the banks of the water body and adjacent to the crossing site, except where required for the crossing construction.
6. Salvage as many trees and shrubs as possible for transplant after the crossing site construction is completed.
7. The flow of surface and subsurface water in and around the crossing site during the installation or removal of the watercourse crossing should be managed in a manner that minimizes erosion and sedimentation of the water body.
8. Stabilize all disturbed areas, including bridge and culvert headslopes, by:
 - (a) immediately installing temporary erosion control measures, at the crossing site and the developed road allowance sloping to the water body, that remain in place until vegetation or other long-term erosion control methods are fully established and functioning, and
 - (b) installing and placing long term erosion control measures at the crossing site and the developed road allowance sloping to the water body,including, but not limited to, slope stabilization, revegetation, soil coverings, rip rap and armouring, silt fences, check dams, sediment traps, brush barriers, and vegetation filters.
9. Place any excavated material in a location where erosion into the water body will be minimized.
10. Runoff or water from a work site or area disturbed by the crossing construction that contains sediment, should be diverted to a settling pond, sediment trap or through a vegetated area to minimize the addition of sediment to the water body.
11. When possible, and in consideration of restricted activity periods, works within the water body should be scheduled for the driest time of the year to minimize erosion.
12. Construction should be halted when adverse construction conditions caused by heavy rains or other weather exist.
13. Boulders should not be removed from the water body for use as rip rap.
14. Further information on sediment and erosion control measures is provided in *Fish Habitat Manual: Guidelines & Procedures for Watercourse Crossings in Alberta* (Alberta Infrastructure, 1999).

II. Control of Deleterious Substances and Transfer of Biota

Guidelines, measures and best management practices for preventing deleterious materials or materials toxic to aquatic organisms from being deposited in the water body and to prevent the transfer of biota include, but are not limited to:

1. Utilize untreated wood for construction in water where possible. Wood preservatives containing chemicals such as creosote, chlorophenols and zinc or copper naphthanate are very toxic to aquatic organisms. Chromated copper arsenate (CCA) treatment is a preferred wood preservative treatment although it has a shorter life expectancy than creosote or pentachlorophenol treated wood. Where long life spans or piling are required, steel should be considered as an alternative to creosote or pentachlorophenol treated wood.
2. Prevent any paints used in the construction, replacement, repair or maintenance of a watercourse crossing from entering a water body.
3. Use pre-cast concrete as part of the construction of the watercourse crossing where possible and ensure any cast-in-place concrete is totally isolated from the water body for a minimum of 48 hours to allow the pH to reach neutral levels.
4. Inspect equipment and, as necessary, repair equipment to prevent leaks of oil and other fluids (non-toxic hydraulic fluids such as vegetable-based fluids are recommended) into the water body.
5. Clean and free equipment of external grease, oil and other fluids prior to the equipment entering the water body.
6. Clean and free equipment of all mud and dirt prior to the equipment entering the water body or the area adjacent to the water body, and before the equipment exits areas adjacent to the water body upon completion of instream works, to prevent the transfer of biota not indigenous to the crossing site. Biota of concern include, but are not limited to, plants identified under the *Weed Control Act*, and diseases or alien organisms such as Whirling Disease. It is not necessary to clean equipment after completion of instream works if the equipment is being moved to another instream site on the same water body or a tributary of the same water body.
7. Wash equipment, if needed, in a manner that ensures the wash water does not enter a water body.
8. Store fuel and servicing and refuelling equipment in a manner that prevents fuel and equipment fluids from entering the water body.
9. Construction equipment should be kept within the designated construction site.
10. Operators involved in the water body crossing construction should be trained and equipped to contain spills or leakage from equipment.
11. Further information on measures control deleterious substances is provided in *Fish Habitat Manual: Guidelines & Procedures for Watercourse Crossings in Alberta* (Alberta Infrastructure, 1999).

III. Use of Explosives

When using explosives in or near a fish bearing water body during the construction, repair or maintenance of a watercourse crossing, the *Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters* (Department of Fisheries and Oceans, 1998) should be followed. Where explosives must be used in the construction of a watercourse crossing, the owner may require an authorization from the federal Minister of Fisheries and Oceans.

IV. Channel Realignment

Minor channel realignment which involves less than 20 metres of water body channel upstream or downstream of the watercourse crossing are considered to be part of the watercourse crossing under this Code of Practice. Any channel realignments or diversions, which extend beyond 20 metres upstream or downstream of the watercourse crossing require an authorization under the *Water Act*.

Where channel realignment is part of a watercourse crossing, as defined in this Code of Practice, guidelines, measures and best management practices for channel realignment or diversions include, but are not limited to:

1. If feasible, excavate channel realignments under dry conditions with the inlet and outlet of the diversion closed.
2. Minimize siltation by opening the channel realignment at the downstream end first.
3. Protect unstable sharp bends in the channel realignment against erosion.
4. Channel section and gradient of permanent channel realignments should approximate those of the existing water body.
5. The channel realignment should be designed to facilitate fish passage at low flows.
6. Abandoned temporary channel realignments should be plugged or stabilized where there is potential for erosion.
7. Consider the proximity to identified fish spawning, nursery and overwintering habitats, when locating channel realignments and determining aquatic (fish) habitat compensation requirements. Channel realignment should be avoided in areas of sensitive fish habitat.
8. Any water that must be pumped from a channel realignment during its construction should be treated in the same manner as water pumped from any isolated construction site.
9. Further information on channel realignment and natural channel design is provided in *Fish Habitat Manual: Guidelines & Procedures for Watercourse Crossings in Alberta* (Alberta Infrastructure, 1999).

V. Crossing Specific Guidelines

The following guidelines, measures and best management practices apply to specific types of watercourse crossings in addition to those described in other sections of these Guidelines:

1. Type 1 Crossings

Types 1 watercourse crossings for the purpose of this Code of Practice are considered to be clear span or similar structures that do not alter or disturb the bed or banks of the water body. In constructing a new Type 1 crossing it may be necessary to move heavy equipment through the water body to construct or place the crossing structure. Where this occurs, it should be done in a manner that minimizes the amount and duration of physical disruption of the bed and banks of the water body, and sediment and erosion control measures should be implemented where appropriate. Wherever possible, use existing crossings to move vehicles and equipment across the water body during construction.

2. Type 2 Crossings

When constructing, installing, maintaining or replacing a Type 2 watercourse crossing, it should be done in a manner so that the natural bed of the water body remains intact to the largest extent possible. Guidelines, measures and best management practices for constructing, installing, maintaining or replacing a Type 2 watercourse crossing include, but are not limited to:

- (a) Wherever possible, build piers and footings outside of the active channel of the water body and above the high water line, thereby minimizing the number of piers and footings in the water body. Piers and footings built in the active channel should be constructed parallel to the stream flow so as not to direct water into the banks.
- (b) Where an open bottom culvert is used as a Type 2 crossing, it should be of sufficient width to ensure that water body flows are not constricted during normal flow conditions (i.e., open bottom culvert width should be equal to or greater than the normal channel width).
- (c) Ensure that the natural water body hydraulic regimes are maintained to the greatest extent possible.

3. Type 3 Crossings

Guidelines, measures and best management practices for constructing, installing, maintaining or replacing a Type 3 watercourse crossing include, but are not limited to:

- (a) Culvert crossings should be designed and constructed to approximate the stream gradient if possible.
- (b) Culverts should be sized and placed to prevent upstream ponding from occurring.
- (c) Culverts should be sized so that the water body is not severely constricted relative to the natural channel.
- (d) Design and install the culvert crossing to avoid sudden drops or discontinuities in water surface profile at culvert ends.
- (e) Align the culvert crossing perpendicular to the direction of flow to minimize culvert length.
- (f) Avoid using frozen backfill and compact backfill in a manner to prevent settling, hydrostatic uplifting or side movements of the culvert that may lead to blockage of fish passage or washouts.
- (g) A single culvert is preferred over two or more smaller culverts.
- (h) Avoid using culverts where both the gradient of the water body exceeds 3.5 percent and fish passage is required.
- (i) Consider culvert geometry that will approximate existing stream hydraulics and provide fish passage for the weakest swimming fish species likely to use the culvert.
- (j) To facilitate fish passage through a crossing where a round culvert is used, the crossing should be sited and designed as follows:
 - (i) Minimize culvert length to aid in fish passage.
 - (ii) A continuous band of water of sufficient depth to submerge the largest fish passing through the culvert should exist throughout the entire length of the culvert during fish migration.
 - (iii) Install the culvert on a site where the gradient of the water body is 0.5 percent or less. In these situations, embed the culvert at least 10 percent of diameter below the water body bed elevation if normal water depths are less than 50 centimetres, or place the culvert at the water body bed elevation if normal water depth is greater than 50 centimetres.
 - (iv) Where the gradient of the water body at the crossing is between 0.5 and 3.5 percent, the culvert diameter should be at least 1.25 times the natural channel width and the downstream invert should be embedded at least 20 percent below the elevation of the water body bed. In these situations, natural substrate should be placed in the culvert where possible. A suggested upper limit for the application of this guideline is where the product of channel slope and culvert length exceeds 20 percent of the culvert diameter.
 - (v) To reduce flow velocity in culverts, baffles or large boulders may be used in longer and/or higher gradient culverts.
 - (vi) Water velocity in the culvert may be reduced and water depths within the culvert increased by using tailwater control devices. These devices can be incorporated with the outlet basin design.
- (k) To prevent erosion downstream of the culvert outlet (particularly where the slope of the water body bed exceeds 2 percent), a rip rap apron should be placed up to six culvert diameters beyond the end of the pipe and should have a “V” shaped cross-section to allow for fish passage at low water levels.

4. Type 4 Crossings

Guidelines, measures and best management practices for constructing, installing, maintaining or replacing a Type 4 watercourse crossing include, but are not limited to:

- (a) Fords should be restricted to users requiring a low frequency of use.

- (b) Forging sites should be selected at locations with firm streambeds to minimize siltation from traffic.
- (c) Avoid accessing fords on the outside of sharp bends unless the banks are stable.
- (d) Fords should be constructed and used during the driest times of the year however restricted activity periods should be avoided where possible.
- (e) Minimize the amount of vegetation removed adjacent to the crossing site.
- (f) Stabilize the approaches by using non-erodible material up the bank on both sides of the ford.
- (g) Vehicles using the ford should be free of contaminants and mechanical leaks.
- (h) Fords should be restricted to streams with banks not greater than 2 metres in height at the point of access.
- (i) Fords and low level crossings that are made of concrete or other similar material should be constructed with a “V” shaped cross section or rounded notch, at least five centimetres deep and 30 centimetres wide, located near the middle of the crossing to facilitate fish passage at low flows.

5. Temporary Crossings

Guidelines, measures and best management practices for temporary crossings include, but are not limited to:

- (a) Existing crossings should be used where possible to reduce the number to temporary crossings.
 - (b) Temporary crossings should be sized to accommodate flows expected during the period of use and to provide for fish passage where required.
 - (c) The width of the right-of-way and vegetation clearing required for the approach trail or road construction at the crossing site should be minimized.
 - (d) Approach grading should be avoided where possible.
 - (e) Temporary crossings should be located on straight reaches of the water body and should avoid areas of active bank erosion.
 - (f) Where log fills are used as temporary crossing, logs should have cables laid under them to allow for easy removal or should be removed by other means that do not disturb the bed or banks of the water body.
6. Further information on design and construction of crossing type, including the design for fish passage, is provided in *Fish Habitat Manual: Guidelines & Procedures for Watercourse Crossings in Alberta* (Alberta Infrastructure, 1999).

VI. Isolation Methods

Guidelines, measures and best management practices for isolation methods include, but are not limited to:

1. Water from the isolated construction site should be pumped to settling ponds or to upland vegetation filters in a manner that does not adversely affect the land.
2. The intake of any bypass pump line should be installed in a manner where it will not disturb sediments in the water body.
3. Prevent erosion of the area at and surrounding the outlet of a bypass pump, dewatering pump or flume by dissipating the energy of the released water using devices that include, but are not limited to tarps, flip buckets, plates, and appropriately sized granular materials.
4. All pumps used for bypass pumping should have capacity that exceeds expected flows, and backup pumps and generators shall be on site and operational if required.

VII. Aquatic (Fish) Habitat Mitigation and Compensation

This Code of Practice defines **standards** that are intended to meet the objective of “no-net-loss” of productive fish habitat as described in “A Fish Conservation Strategy for Alberta, 2000 – 2005” (Alberta Environment). The *Guidelines for Complying With the Code of Practice for Watercourse Crossings* describe measures, that if implemented, would help achieve the “no-net-loss” objective. However, these measures alone may not be sufficient to meet the “no-net-loss” objective where a permanent alteration or loss of aquatic (fish) habitat occurs as a result of watercourse crossing construction. The qualified aquatic environment specialist should determine the habitat alteration, or loss, that will result from the crossing construction to use as a basis for determining appropriate compensation measures required to meet the Alberta “no-net-loss” objective. In addition, the requirements of the *Fisheries Act (Canada)* must be met and an authorization under that Act may be required for the harmful alteration, disruption or destruction of fish habitat (HADD) associated with any watercourse crossing construction. It is recommended that the owner and/or the qualified aquatic environment specialist consult with the department to confirm aquatic, fisheries and fish conservation management objectives for the area when determining and designing aquatic (fish) habitat compensation measures.

Any compensation measures or structures placed outside of the watercourse crossing right-of-way requires that an approval under the *Water Act* be obtained.

1. Generally the following types of projects carried out in fish bearing waters would require habitat compensation measures:
 - watercourse diversion, channelization or realignment

- dredging or infilling of the watercourse
- new culvert installations
- new bridge installations involving the placement of piers or abutments in the active channel of the water body
- replacement of bridges with culverts

The following types of projects carried out in fish bearing waters may also require habitat compensation measures in certain situations:

- shore and bank protection works
 - culvert replacements or extensions
 - bridge pier replacement
2. Before commencing construction, construction staff and the contractor should be advised of all of the mitigation and compensation measures noted in the contract, on the construction drawings, or in the owner's plan for the works.
 3. Further information on fish habitat mitigation and compensation measures is provided in *Fish Habitat Manual: Guidelines & Procedures for Watercourse Crossings in Alberta* (Alberta Infrastructure, 1999).

D. Post-Construction Clean-up and Reclamation

Guidelines, measures and best management practices for post-construction clean-up and reclamation include, but are not limited to:

1. Begin reclamation and clean-up as soon as possible. Slopes leading directly into a water body should be given the highest priority for revegetation and erosion control. Vegetation should be established within one growing season of the completion of construction.
2. Remove any temporary facilities, equipment and waste construction materials from the construction site and reclaim any affected sites upon completion of construction.
3. Remove any abandoned culverts and bridge substructures not required for erosion and sediment control.
4. Recontour, stabilize, and revegetate areas disturbed by the crossing construction.
5. Close vehicular access to abandoned crossings.

E. Contingency Measures

Contingency measures prepared under this Code of Practice should identify steps, procedures and back-up measures to be taken by the owner in the event of:

1. emergency situations (i.e., equipment failures, adverse weather, flooding, spills, etc.), and
2. other occurrences or circumstances that require the owner to deviate from the proposed plan or schedule for completion of the works.

F. Watercourse Crossing Site Monitoring

Monitoring under the Code of Practice includes, but is not limited to:

- (a) monitoring during construction to assess immediate effects of the works on the aquatic environment,
- (b) post-construction monitoring to assess the condition of the crossing structure and site and effectiveness of mitigation and habitat compensation measures and other measures carried out in association with crossing construction.

Monitoring during the works to measure immediate construction effects on the aquatic environment should be undertaken when:

- (a) it is not possible to isolate the crossing construction site and the works are located in a sensitive site or if the works are carried out during a restricted activity period. The intent of this monitoring should be to quantify the effects of the works for the purpose of identifying appropriate habitat compensation measures that would be required in order for the works to achieve the "no-net-loss" objective.
- (b) the works use isolation methods that may potentially affect the migration of fish during the time the works are carried out. This is of greater concern when the works must be carried out during a restricted activity period.

The monitoring above should be designed and conducted by a qualified aquatic environment specialist.

Guidelines, measures and best management practices for post-construction monitoring include, but are not limited to:

1. The crossing site should be inspected annually, at a minimum, during the snow free season. Site inspections should be conducted more frequently (especially after high flow events) until establishment of permanent erosion control measures. Inspections should also be conducted more frequently on culvert crossings located in areas of high beaver activity.
2. Post-construction monitoring should assess or check for:
 - (a) the physical condition of the crossing, including scour at and around bridge piers and abutments and culvert inlets and outlets, culvert damage and sagging,
 - (b) slope/bank stability at and adjacent to the crossing, including vegetation on road approach and fill slopes,
 - (c) erosion control measures, including the proper functioning of cross drains, ditch blocks and diversion berms,
 - (d) physical integrity of any measures undertaken to meet the requirements of clause (a) in Part 1 of Schedule 2 of the Code of Practice (“no net loss” objective),
 - (e) debris accumulation in or around the crossing structure, and
 - (f) development of potential barriers to fish passage at the crossing site.
3. Post-construction monitoring required under this Code of Practice is not intended to replace watercourse crossing monitoring required under other statutes and regulations and can be conducted in conjunction with other monitoring programs where appropriate.

Useful References

The following references provide additional information on various technical methods and best management practices associated with the planning, construction and maintenance of watercourse crossings. These publications may be obtained directly from the relevant government agency (or their publications web sites), the Alberta Environment Library or Alberta Environment Information Centres.

Please note: Documents listed below may include references to regulatory processes, information requirements and department contacts, etc. that may no longer be applicable with the coming into effect of this *Code of Practice for Watercourse Crossings*.

Reference List:

Alberta Environment. 1998. A fish conservation strategy for Alberta: 2000 – 2005. Alberta Environment; Natural Resources Service; Fish and Wildlife Management Division. Publ. No.: I/698. ISBN 0-7785-0148-5. 17 pp.

Alberta Infrastructure. 1999. Fish habitat manual: guidelines and procedures for watercourse crossings in Alberta. 11-4 pp. + app.

Alberta Transportation and Utilities; and Forestry and Wildlife. 1992. Fish habitat protection guidelines for stream crossings. Alberta Forestry, Lands and Wildlife Publication No. T/263, 41 pp.

Canadian Department of Fisheries and Ocean and Manitoba Natural Resources. 1996. Manitoba stream crossing guidelines for the protection of fish and fish habitat. 48 pp. + app.

Canadian Pipeline Water Crossing Committee (CPWCC). 1999. Watercourse crossings – 2nd Edition. Prepared for the Canadian Pipeline Water Crossings Committee by Tera Environmental Consultants Ltd. And Salmo Consulting Inc. 9-9 pp.+ app.

Fisher, G.L. 1989. Resource road planning guidelines for the green area of Alberta. Alberta Forestry, Lands and Wildlife; Forest Service; Forest Land Use Branch. Tech. Rep. No.: T/25. Edmonton, Alberta. 36 pp.

Fisher, G.L., A.G.H. Locke, and B.C. Northey. 1989. Stream crossing guidelines operational guidelines for industry. Alberta Forestry, Lands and Wildlife; Forest Service. Tech. Rep. No.: T/80. Edmonton, Alberta. 52 pp.

Goodchild, Gareth A. and Serge Metikosh. Fisheries-related information requirements for pipeline water crossings. Can. Manusc. Rep. Fish. Aquat. Sci. 2235: 17 pp.

Ontario Government. 1995. Environmental guidelines for access roads and water crossings. 75 pp. + app. Ontario Ministry of Natural Resources. 64 pp. + app. ISBN 0-7729-3471-1

Ontario Ministry of Natural Resources. 1992. Sediment control plans: reducing sediment concerns at water crossings. Northwestern Ont. For. Tech. Dev. Unit. Technical Notes: TN-20. 7 pp.

Sentar Consultants Ltd. 1995. Fish habitat protection guidelines – road construction and stream crossings. Prepared for the Canadian Department of Fisheries and Oceans, Fisheries and Habitat Management and Saskatchewan Environment and Resource Management, Fisheries Branch. 25 pp + app.

Stoneman, C.L., C.B. Portt, and S. Metikosh. 1997. Road maintenance activities and fisheries act: a guidance document to avoiding conflicts. Can. Manu. Rep. Fish. Aquat. Sci 2404. 19 pp. + app.

Trow Consulting Engineers Ltd. 1996. Instream sediment control techniques field implementation manual. Ont. Min. Nat. Res., Northeast Sci. and Tech. FG-007. 109 pp.

V.A. Poulin, V.A. Poulin and Associates Ltd. and H.W. Argent. 1997. British Columbia Forest Practices Code: stream crossing guidebook for fish streams: a working draft for 1997/1998. Prepared for the BC Ministry of Forests; BC Ministry of Employment and Investment; BC Ministry of Environment, Lands and Parks; and Department of Fisheries and Oceans.

Wright, D.G. and G.E. Hopky. 1998. Guidelines for the use of explosives in or near Canadian fisheries waters. Department of Fisheries and Oceans. Can. Tech. Rep. Fish. Aquat. Sci. 2107: 14 pp. + app.