Design and Installation of Embedded Culverts

Kamloops
March 12, 2002

Pilot 2
Fish Stream Crossing Guidebook Training

Comprises 3 Modules

• Fish Stream Crossing Guidebook Overview
• Fish Habitat Assessment
• Design and Construction of Embedded Culverts
Design and Construction of Embedded Culverts

This training module is comprised of the following parts:

• Part 1 - Introduction
• Part 2 - Design
• Part 3 - Installation
• Part 4 - Inspection and Maintenance
Part 1: Introduction

4 Main Topics

1. Background
2. Fish Stream Crossing Guidebook
3. Why Use Embedded Culverts?
4. Review Process and Approvals
1. Background

- Embedded culverts are the only type of closed bottom structure (CBS) permitted within fish streams

Why?
Non-embedded culverts have a poor historical record in providing fish passage due to:

High velocities
Perched culverts
Background

and

Loss of streambed

**Improvement is required if we are to continue using culverts in fish streams**

Design and Installation of Embedded Culverts

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2. Fish Stream Crossing Guidebook

Guidebook comprised of following sections:

- Review process
- Design and installation
  - open and closed bottom structures
  - other structures (i.e. ice bridges, snowfills)
- Fish stream protection measures
- Maintenance
- Deactivation
The Objectives of the Fish Stream Crossing Guidebook are:

1. The protection of fish and fish habitat and safe passage of fish when locating, designing, installing maintaining and deactivating stream crossings

2. An efficient submission and review process for proponents that addresses both federal and provincial authorities involved in the construction, maintenance and deactivation of stream crossing structures

3. Options that recognize the value and sensitivity of fish and fish habitat in balance with other environmental, social, resource and economic values
How do Embedded Culverts fit into FSCGB?

- One type of crossing option discussed in GB
- The only CBS available for fish streams
3. Why Use Embedded Culverts?

- Cost
- Alignment issues
- Durability
- Oregon experience
4. Review Process and Approvals

Review process potentially involves two level:

• Federal review
• Provincial review
Important concepts

- **Stream channel width**
  - Similar to Fish Stream Guidebook
- Timing windows
- Fish habitat evaluation
  - Classed as critical, important or marginal
Stream Channel Width

Definite change in vegetation and sediment texture

Edges of rooted vegetation

stream channel width
Stream Channel Width

- Edges of rooted vegetation
- Definite change in vegetation and sediment texture
Important concepts

- Stream channel width
  - Similar to Fish Stream Guidebook
- **Timing windows**
- Fish habitat evaluation
  - Classed as critical, important or marginal
Local fishery agency should be contacted for current information

Timing windows

- Periods of time when instream work can be conducted with reduced risk to fish and fish habitat

Review Process and Approvals
Important concepts

• Stream channel width
  – Similar to Fish Stream Guidebook

• Timing windows

• Fish habitat evaluation
  – Classed as critical, important or marginal
### Habitat at the Crossing Site

<table>
<thead>
<tr>
<th></th>
<th>Critical</th>
<th>Important</th>
<th>Marginal</th>
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<tbody>
<tr>
<td><strong>Definition</strong></td>
<td>Habitat that is critical in sustaining a subsistence, commercial, recreational fishery or species at risk (red and blue listed and cosewic list) – because of its relative rareness, productivity and sensitivity.</td>
<td>Habitat utilized by fish for feeding, growth and migration and utilization by fish is not deemed to be critical. This category of habitat usually contains a large amount of similar habitat that is readily available to the stock.</td>
<td>Low productive capacity that contributes marginally to fish production.</td>
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Type of review, and authorization required, depends on:

- Stream gradient
- Stream channel width
- Fish habitat at the crossing site (critical, important or marginal)
• Review process is based on the red light, yellow light, green light concept
<table>
<thead>
<tr>
<th>Habitat at crossing site</th>
<th>critical</th>
<th>important</th>
<th>marginal</th>
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<tbody>
<tr>
<td>6 % Stream gradient</td>
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<td>3 %</td>
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Installation of CBS can proceed without site specific fishery agency approval provided:

- Fish habitat is classified as “marginal”
- Stream gradient is 6% or less
- Stream channel width is 2.5m or less
- Timing windows are complied with
Embedded culverts are subject to a “Fisheries Act” Sec. 35 (2) authorization where:

- Fish habitat is classified as “important”, and
- Stream gradient is 6% or less
Embedded culverts are generally unacceptable where:

- Fish habitat is classified as “critical”
- Stream gradient is greater than 6%
### Review Process and Approvals

#### Habitat at crossing site

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- Critical: Habitat at crossing site is critical.
- Important: Habitat at crossing site is important.
- Marginal: Habitat at crossing site is marginal.
Introduction

Summary

1. Embedded culverts are one type of crossing structure in the FSCGB and the only type of CBS allowed in fish streams.
2. We have to improve our track record if we are to continue to use metal culverts in fish streams.
3. Embedded culverts can be installed in fish streams where stream gradient is 6% or less, stream channel width is 2.5m or less and sufficient excavatable fill is present for embedment, provided they are installed as per the Fish Stream Crossing Guidebook.