

Hydrotechnical Considerations



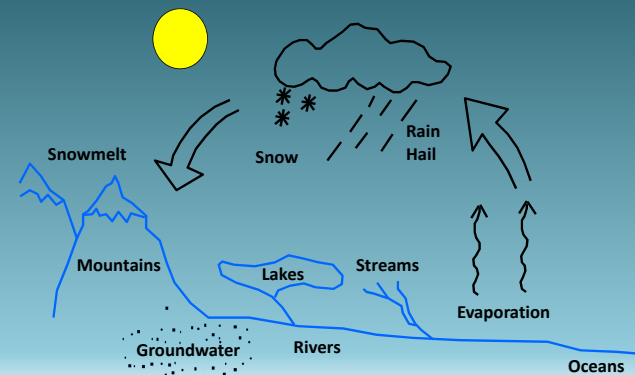
Overview

- Hydrotechnical Design
- River Issues
 - Lateral Stability
 - Vertical Stability
 - Blockage - ice, drift
- River Protection Works

Hydrotechnical Design

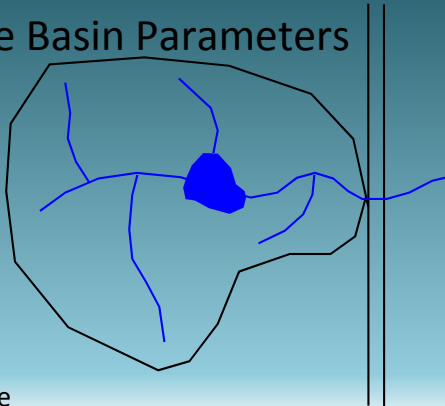


The Hydrologic Cycle

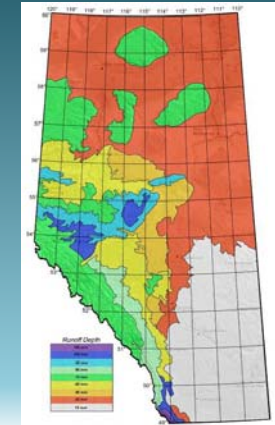


Drainage Basin Parameters

- Area
- Shape
- Slope
- Storage
- Density
- Vegetation
- Soil Type
- Initial Moisture



Runoff Response Variation Across Alberta



Hydrotechnical Design Guidelines

Channel Capacity

- channel size result of long-term runoff
- channel size affects routing of runoff
- typical channel
- activate overbank storage

Historic Highwater Data

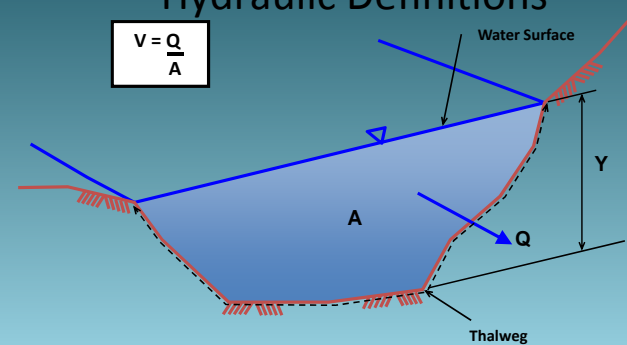
- HWM – AT, AE, WSC, site, airphoto, news
- Location, description

Runoff Potential

- Limit on supply of runoff
- Unit discharge

Hydraulic Definitions

$$V = \frac{Q}{A}$$



Hydrotechnical Considerations

Flow Constriction - Stream Crossing

Bridge

Culvert

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Flowlines - Before Constriction

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Flowlines - After Constriction

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Flow Profile - After Constriction

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File 00278 - Battle River



File 00278 - Battle River



File 00278 - Battle River



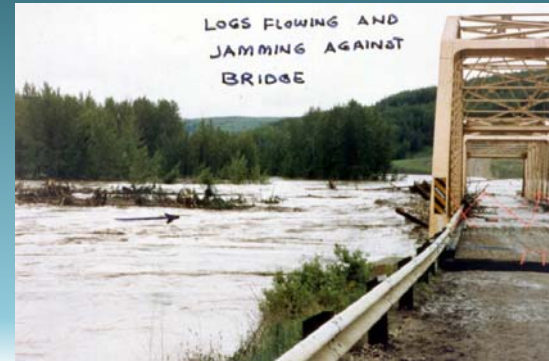
File 75194 - Simonette River



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File 07107 - Iron Creek



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BF76474 – Smoky River at Grande Cache



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File 80827 - Nelson Creek



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File 80827 - Nelson Creek



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File 79475 - Bald Mountain Creek



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File 79475 - Bald Mountain Creek



File 79475 - Bald Mountain Creek



File 79475 - Bald Mountain Creek



File 01324 - Pigeon Creek



File 01324 - Pigeon Creek



File 78230 - Brewster Creek



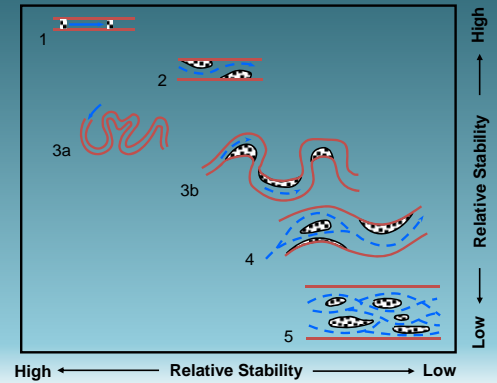
File 81653 - Watercourse



River Issues

Lateral Stream Stability

Stability of Stream Types



BF9259 – Freeman River



BF8036 – Redwillow River



BF13078 – Little Red Deer River



File 81113 - Marten Creek



File 75904 - Island Creek



File 75904 - Island Creek



File 75904 - Island Creek



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File 73204 - Whitehorse Creek



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Blockage - Drift, ice ...



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File 78889 - Whitecourt Creek



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File 71979 - Heart River



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File 72964 – Howard Ck



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Drift accumulation
can increase
velocities around
piers



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BF 6754 Bow River at Cluny



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Ice scarring on trees



Ice impact damage and abrasion on piers

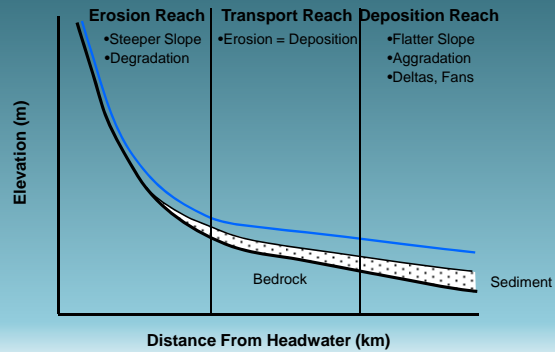


Other debris?



Vertical Stream Stability

Typical Stream Profile



File 76995 - Malcolm Creek

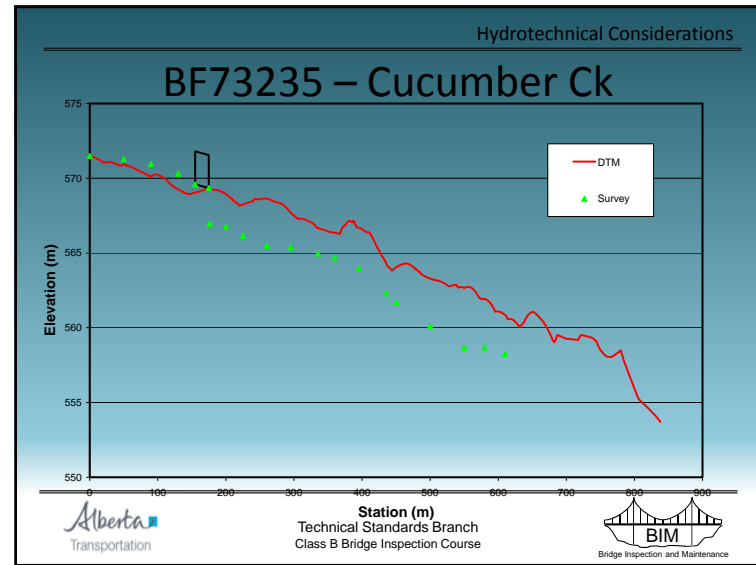
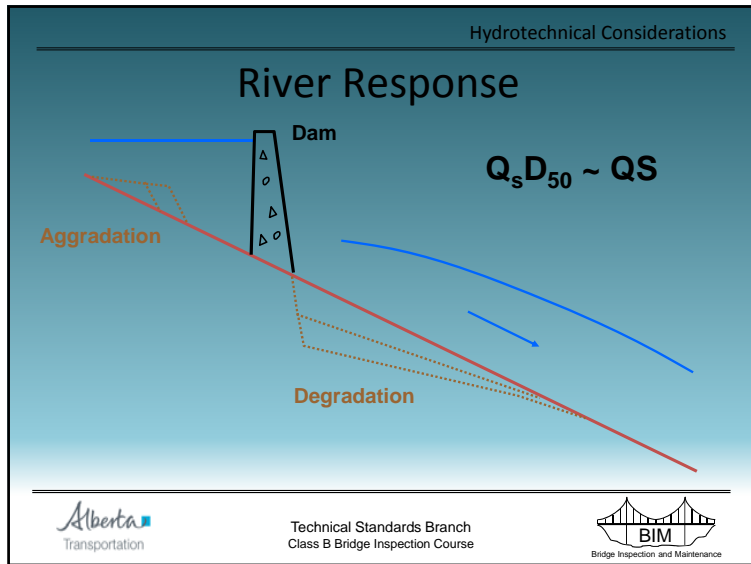


File 76617 - Cougar Creek



File 76617 - Cougar Creek





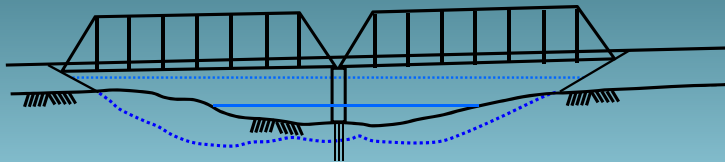
BF73235 – Cucumber Ck



BF73235 – Cucumber Ck

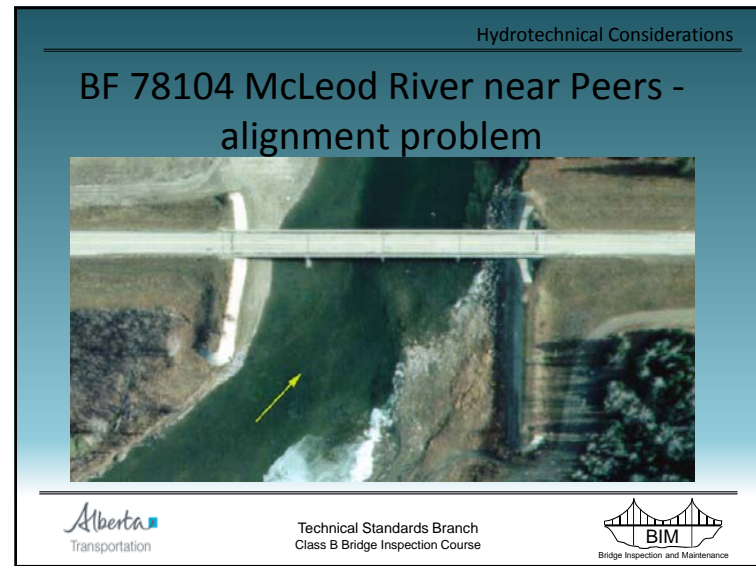
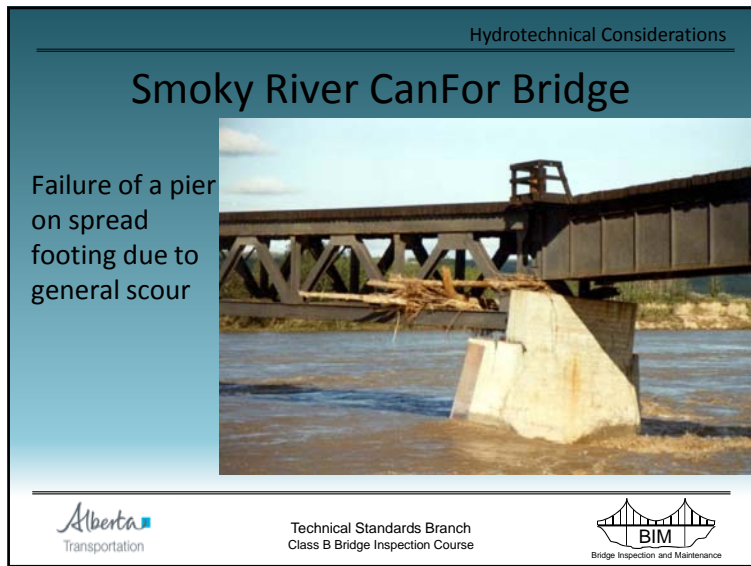
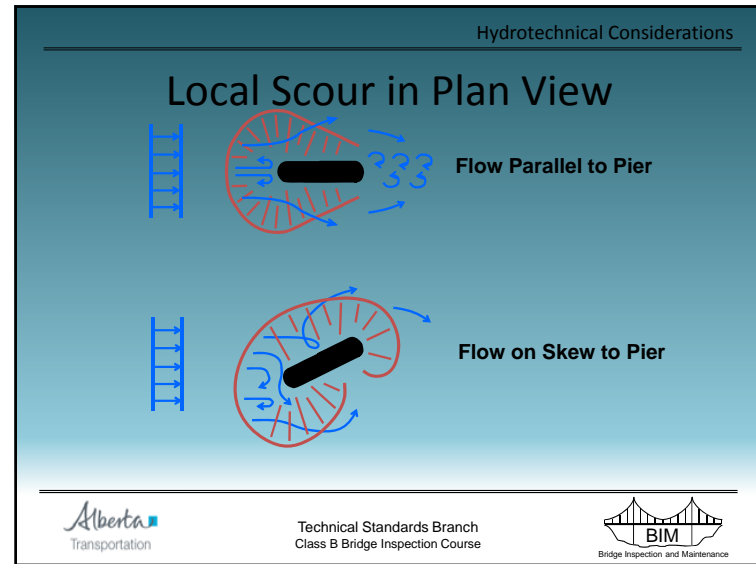
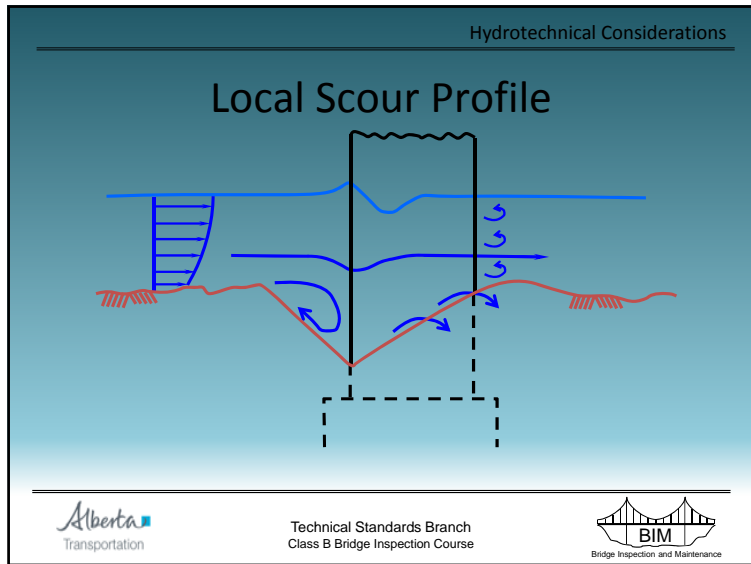


General Scour



BF74710 – Berland River

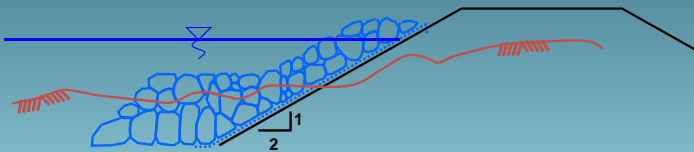




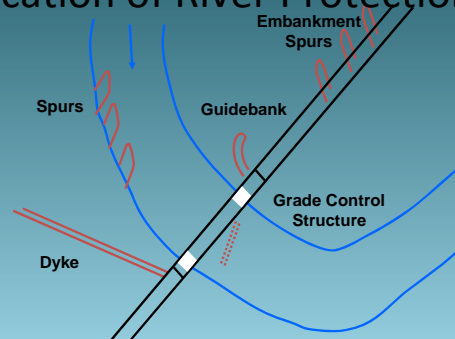


River Protection Works

Typical Rock Riprap Section



Location of River Protection Works





Hydrotechnical Considerations

File 81795B - Red Deer River (1992)

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File 81795B - Red Deer River

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File 81795B - Red Deer River



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File 81795B - Red Deer River



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File 81795B - Red Deer River (1999)



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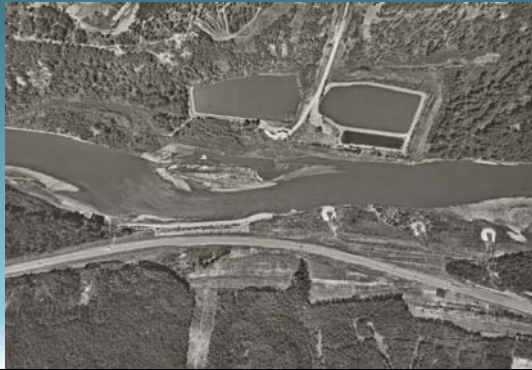
File 81778B - Wapiti River



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File 81778B - Wapiti River



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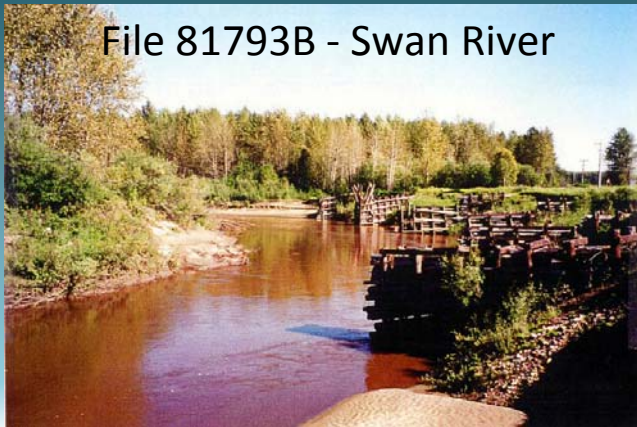
File 81793B - Swan River



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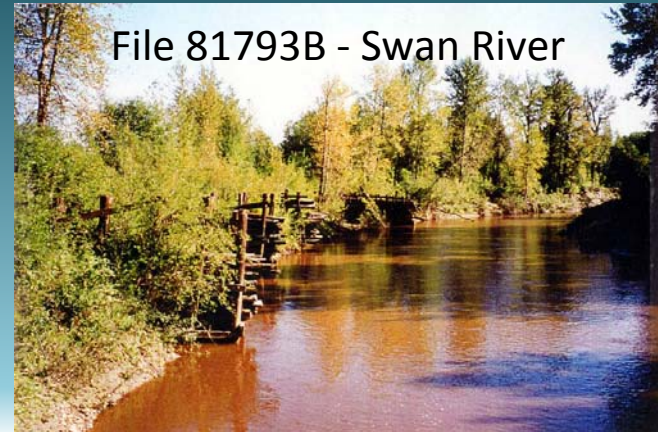
File 81793B - Swan River



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File 81793B - Swan River



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...Questions?



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