

Hydrotechnical Considerations



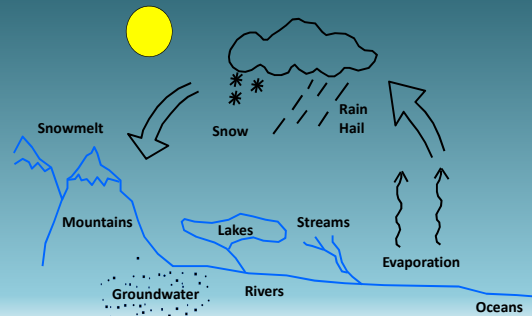
Overview

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

Hydrotechnical Design

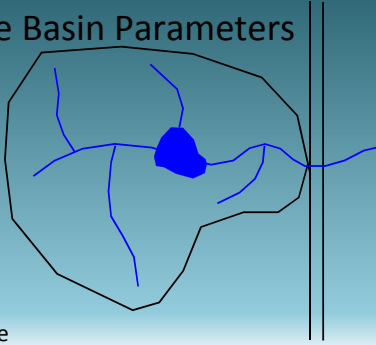


The Hydrologic Cycle



Drainage Basin Parameters

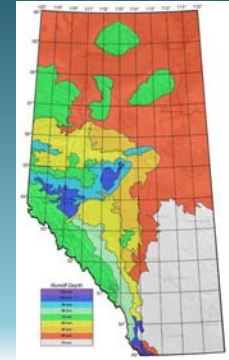
- Area
- Shape
- Slope
- Storage
- Density
- Vegetation
- Soil Type
- Initial Moisture



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Runoff Response Variation Across Alberta



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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 – AIT, AENV, WSC, site, airphoto, news
 - Location, description
- Runoff Potential**
- Limit on supply of runoff
 - Unit discharge

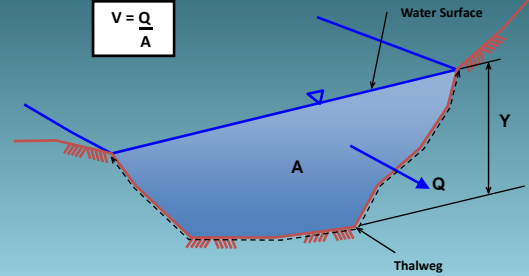


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Hydraulic Definitions

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



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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



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File 00278 - Battle River



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File 00278 - Battle River



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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



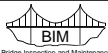
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File 80827 - Nelson Creek



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File 79475 - Bald Mountain Creek



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File 79475 - Bald Mountain Creek



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File 79475 - Bald Mountain Creek



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File 01324 - Pigeon Creek



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File 01324 - Pigeon Creek



File 78230 - Brewster Creek




File 81653 - Watercourse




River Issues

Hydrotechnical Considerations

Lateral Stream Stability

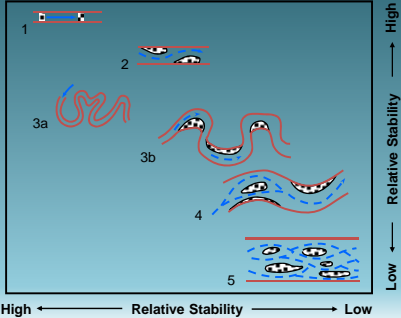



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Stability of Stream Types



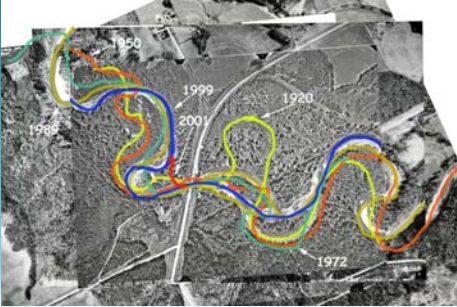



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Hydrotechnical Considerations

BF9259 – Freeman River





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Hydrotechnical Considerations

BF8036 – Redwillow River





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BF13078 – Little Red Deer River



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File 81113 - Marten Creek



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File 75904 - Island Creek



File 75904 - Island Creek



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File 75904 - Island Creek



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File 73204 - Whitehorse Creek



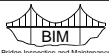
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File 73204 - Whitehorse Creek



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File 73204 - Whitehorse Creek



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File 73204 - Whitehorse Creek



File 73204 - Whitehorse Creek



Blockage - Drift, ice ...

File 78889 - Whitecourt Creek



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



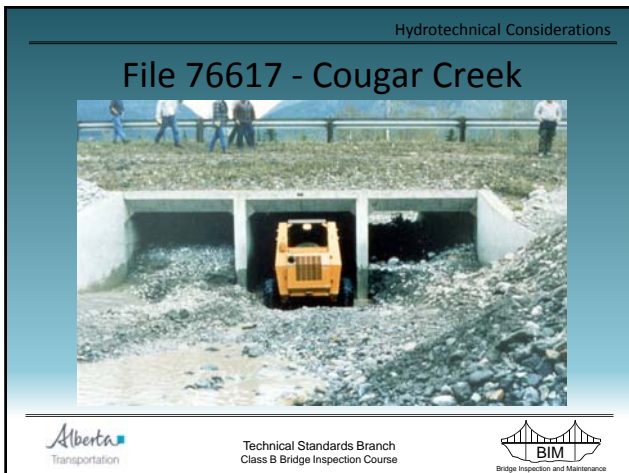
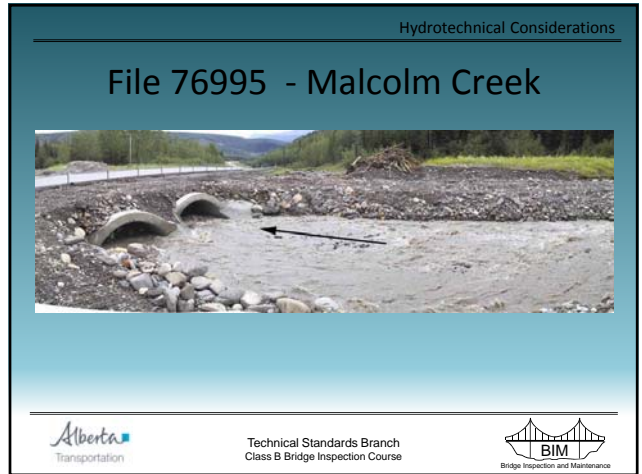
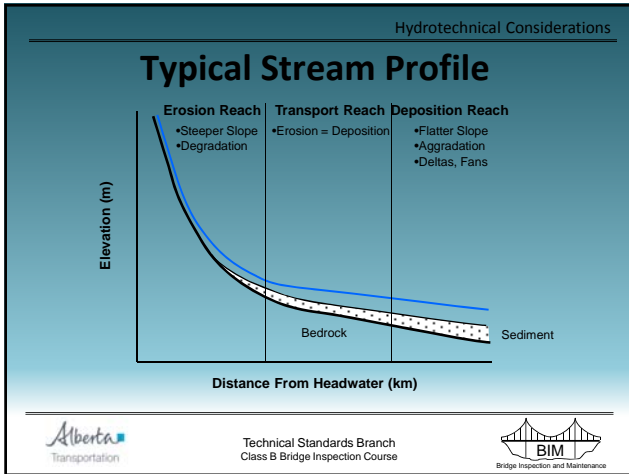
Ice impact damage and abrasion on piers

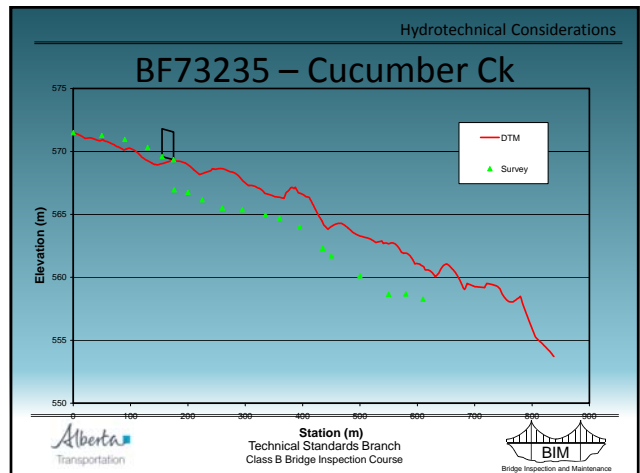
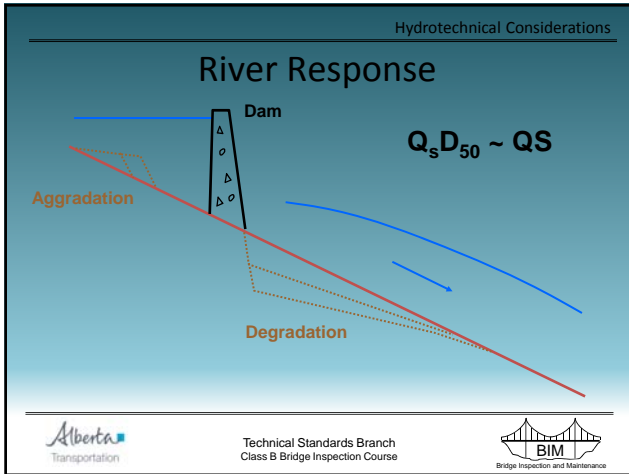


Other debris?



Vertical Stream Stability





BF73235 – Cucumber Ck



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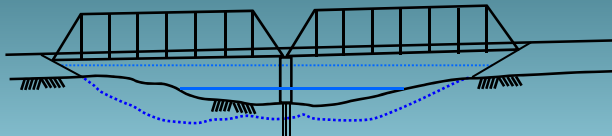
BF73235 – Cucumber Ck



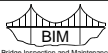
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General Scour



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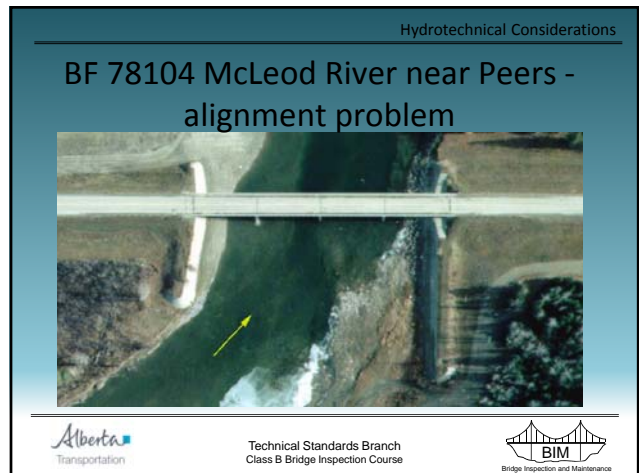
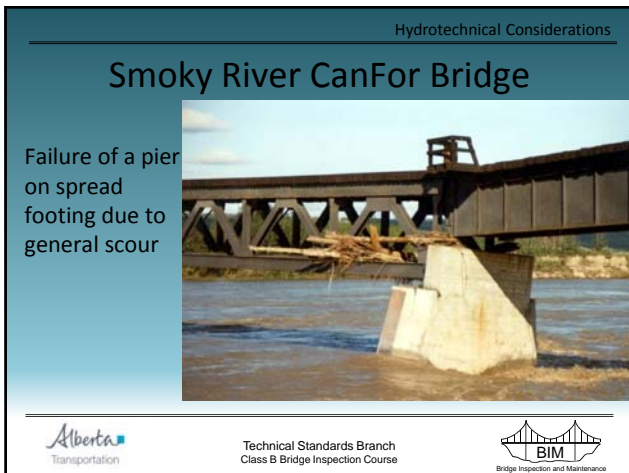
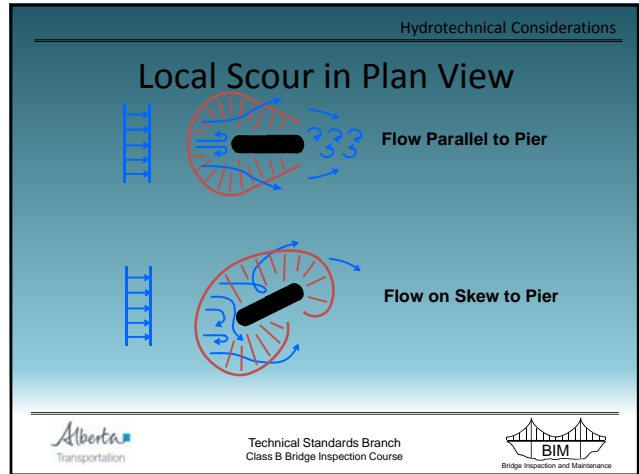
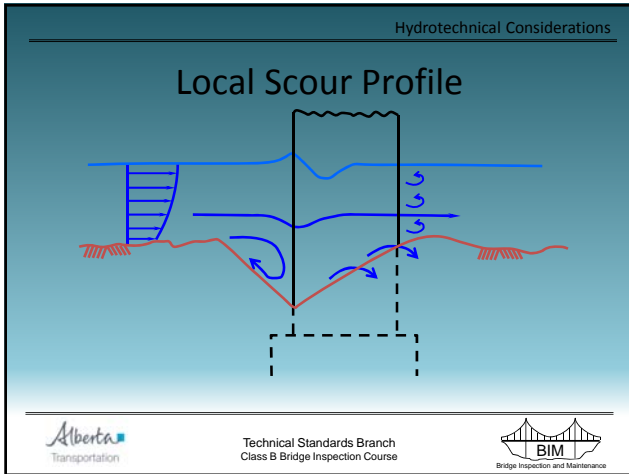


BF74710 – Berland River



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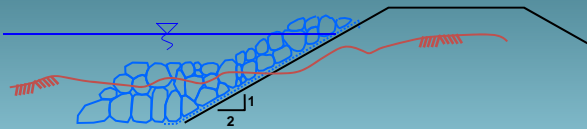




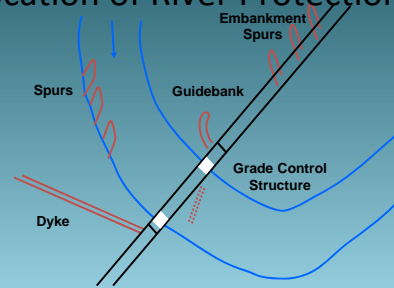


River Protection Works

Typical Rock Riprap Section




Location of River Protection Works






Hydrotechnical Considerations

File 81795B - Red Deer River (1992)



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Hydrotechnical Considerations

File 81795B - Red Deer River



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Hydrotechnical Considerations

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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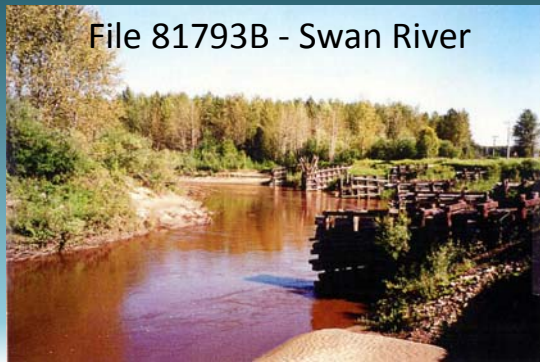
File 81793B - Swan River



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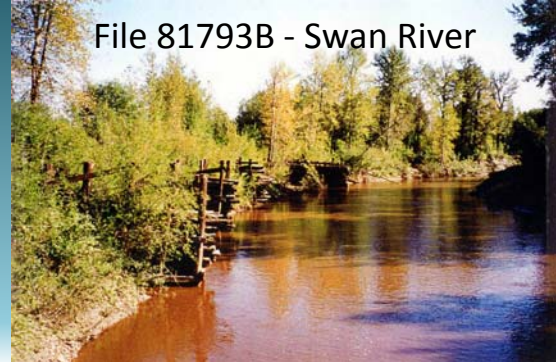
File 81793B - Swan River



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File 81793B - Swan River



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...Questions?



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