Alaska Department of Transportation & Public Facilities and Fish

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Keep Alaska Moving through service and infrastructure
Water and Roads

• Do not MIX!!!!!!

• Design, Construction, and Maintenance
NEPA

- Purpose and need
- Alternatives
  - Avoidance, Minimize, and Mitigate impacts
- Considerations
- Coordination w/ Agencies
Environmental Permits

• Permits (pertaining to water)
  ▪ ADF&G
  ▪ COE
  ▪ Flood Hazard
  ▪ ADEC - APDES Construction General Permit & 401 Cert
  ▪ Essential Fish Habitat Permit (part of NEPA, not permit)
Other Criteria

- DOT&PF Criteria
- FHWA Criteria
- Bioengineering cannot be sole means to protect critical infrastructure
Water and Roads

• Different water challenges
  ▪ Surface – Rain and Snow
  ▪ Subsurface
  ▪ Waterbody crossing/paralleling
Surface Runoff on the Road

- Road General Features
  - Road cross-slope
  - Foreslopes
  - Ditches
Surface Runoff on the Road

• Special Considerations - Bridges
  ▪ Scuppers
Surface Runoff on the Road

- Special Considerations - Maintenance
  - Plowing
  - Sand
  - MS4
Subsurface

- Groundwater
- Storm Drain systems
  - Oil Grit Separators
  - LID
  - Sumps
Waterbody Crossings
Tier 1 Fish Passage Design

Tier 1 (Stream Simulation)

- Slope < 0.5%: culvert span > 0.75*OHW
- 0.5% ≤ Slope < 6%: culvert span > 0.9*OHW
- Round: invert burial ≥ 40% of diameter
- Pipe arch: invert burial ≥ 20% of rise.
- Culvert slope ± 1% of natural stream slope.
- Add Substrate in culvert to simulate streambed and be stable during larger discharges
- Provide baffles to help retain sediment.
Coal Creek at K Beach Road
18’ diameter buried 7.2’, After
Tier 2 Fish Passage Criteria

- Requires FishXing software created by USFS
  - Fish sustained and burst swimming vs. water velocity
  - Add resting areas as needed
  - Compares water depth to minimum depth for fish
Tier 2 fish passage with baffles
Alyeska Highway, Girdwood
Tier 3 Fish Passage Criteria

• Use hydraulic calculations to ensure successful fish passage
• Both ADF&G and DOT&PF agree
Other information

• Collaborate with ADF&G to provide the best culvert designs that meet the criteria and constraints of both agencies

• Erosion protection, as needed
Wasilla Creek at Bogard, 17’-0” x 6’-9”
Coal Creek at K Beach Road
2008, 10’ Diameter, Before, Outlet
Coal Creek at K Beach Road, 2010, looking upstream
Coal Creek at K Beach Road
2015, Tailwater looking downstream
Coal Creek at K Beach Road
2015 looking upstream
Fish Creek at Knik Goose Bay Road
Before, 2 – 12’ diameter
Fish Creek at Knik Goose Bay Road
After, 32’ x 12’
Wasilla Creek at Palmer-Fishhook
17′-2″x11′-4″, buried 2.3′, 2016, Outlet
Wasilla Creek at Palmer-Fishhook
2016 looking upstream
Fish Culverts in the design phase

- North Fork Anchor River at Nikolaevsk Road
- Crooked Creek at Sterling Highway
- Two Moose Creek at Sterling Highway
- Leader Creek near Naknek
- Others on smaller streams
Parallel Flow, Road Overtopping

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Parallel Flow, Embankment Stabilization
Parallel Flow, Embankment Stabilization