

# Cold Region Considerations in Water Distribution and Collection

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# Water Treatment Facilities in Alaska

## Total Facilities = 222



Served Population *Community Systems	Groundwater under the influence	Ground- water	Surface Water
Large (> 10,000)	0	3	4
Small (3,300 - 10,000)	0	3	5
Very small (500 – 3,300)	3	36	24
Very very small (< 500)	10	76	58



77% of Alaska's population is served by a large systems



97% of the systems in the state are small (< 10,000 ppl)

# Living in Remote Alaska (Kipnuk, AK)



[https://c2.staticflickr.com/6/5499/11642151726\\_a78b22b7b2\\_b.jpg](https://c2.staticflickr.com/6/5499/11642151726_a78b22b7b2_b.jpg)

Photos by Liz Hodges-Snyder for Alaska Water  
Sewer Challenge



# Putting Remote into Context (typical): Transportation



Propeller Air Cargo / Transport –  
Gravel Runway:  
Possibility for C130  
Cargo Place (last resort)



Seasonal Barge Service



Boat/Snowmachine/4wheeler  
along River/Trail:  
many communities  
do not have large vehicles



# Putting Remote into Context (typical): Power



Community Grid Power – Diesel Fuel



Home Heating –  
Diesel Fuel or Wood (where available)



Vehicles - Gasoline

# Frozen Ground, Permafrost & Subsurface Ice



# The Cold Region + Limited Access + Frozen Ground =

An all around challenge to live a modern life



# Observed Water Use in the AK



Self Haul: 1-5 gpcpd



Watering Point: 5 gpcpd



Washateria: 10-20 gpcpd



Trucked Haul: 5-30 gpcpd



Piped Arctic: 40-60 gpcpd  
*Minimal seasonal variation  
unless used for freeze  
household protection*



US National : 100 – 150 gpcpd



# Self Haul



Washeteria/Watering Point



Ice



Rain



# Small Vehicle Haul



# Large Vehicle Haul

## Rural Alaska

# Big need for water truck drivers shows itself in Bethel -- when water runs out

Lisa Demer | January 22, 2016

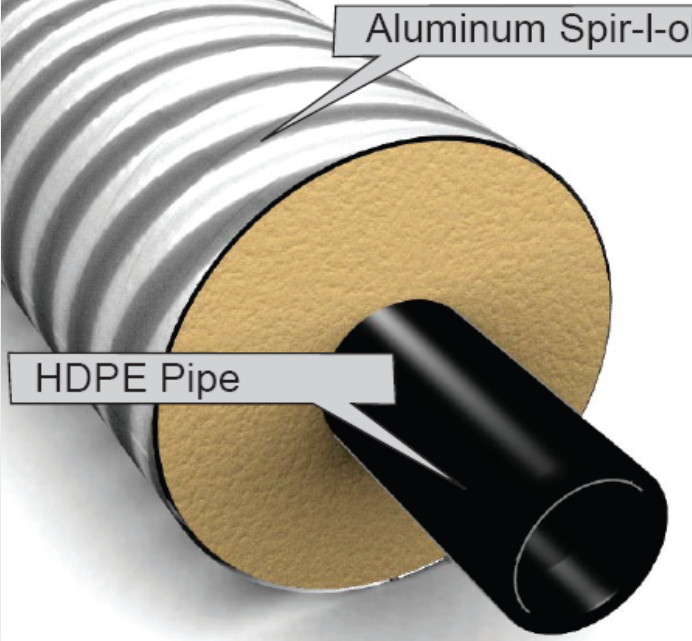
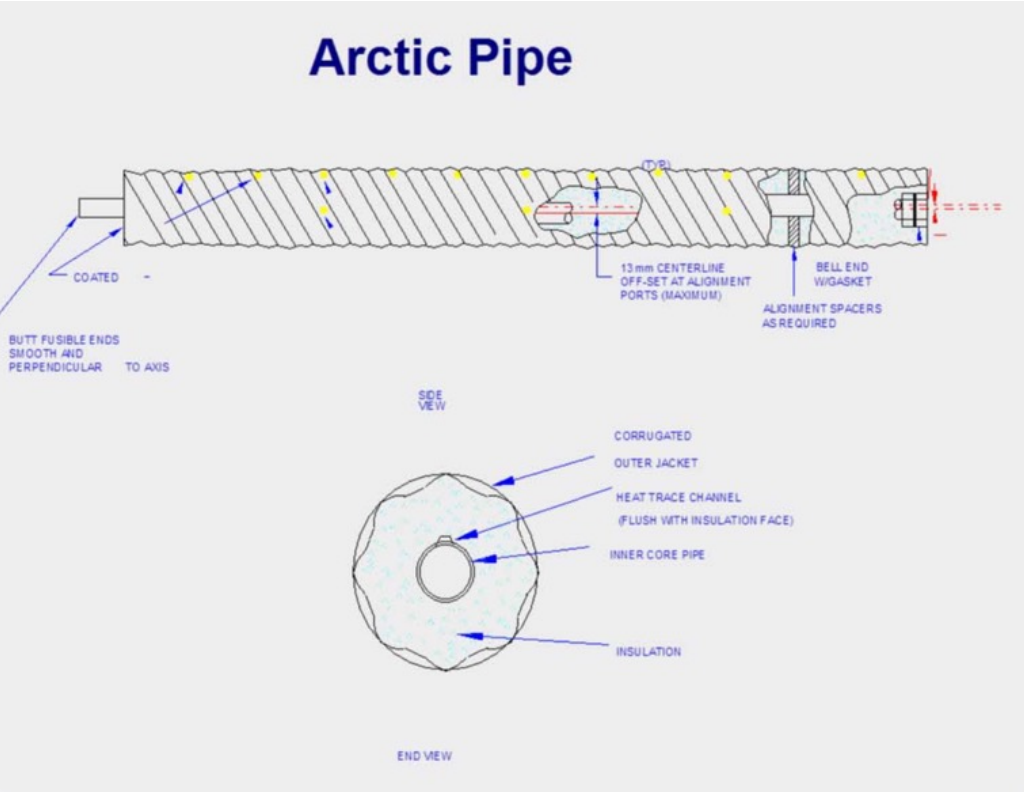
PLAY

### Photos: Bethel's water delivery trucks keep the town



Bethel water trucker driver Lisa Paul, 30, works to deliver water to homes and businesses in Bethel, Alaska, on Thursday, Jan. 21, 2016. She displays a Spiderman mask on her truck as a nod to her 8-year-

# Arctic Pipe



# Above Ground



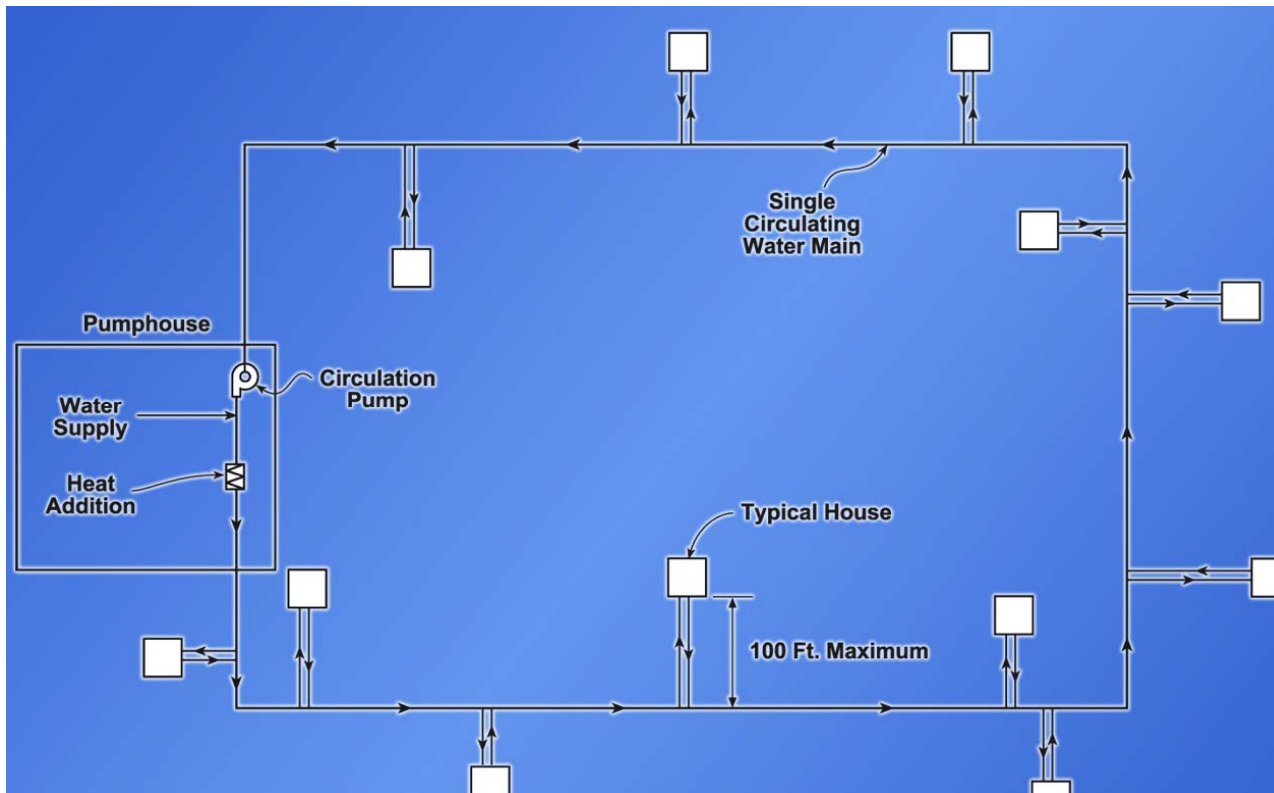
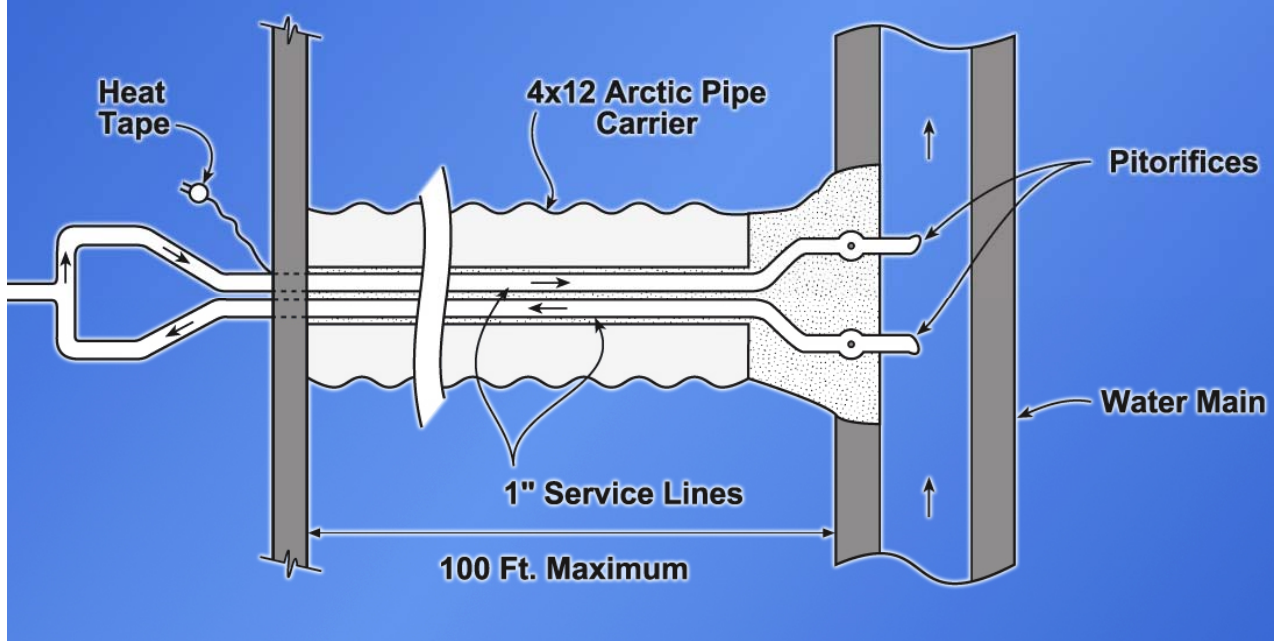
# Below Ground



# Deep Bury

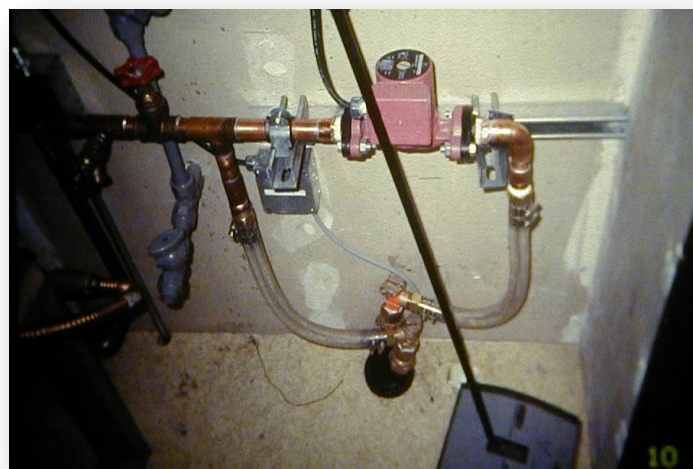
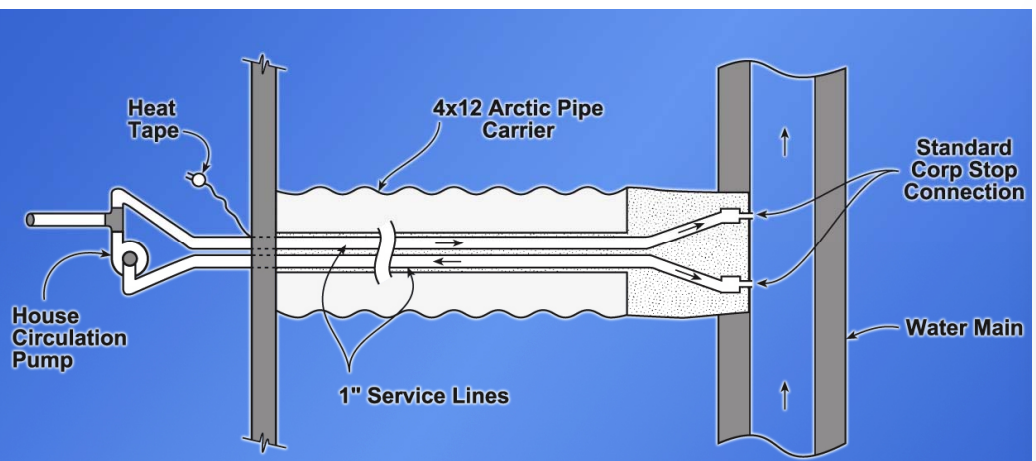
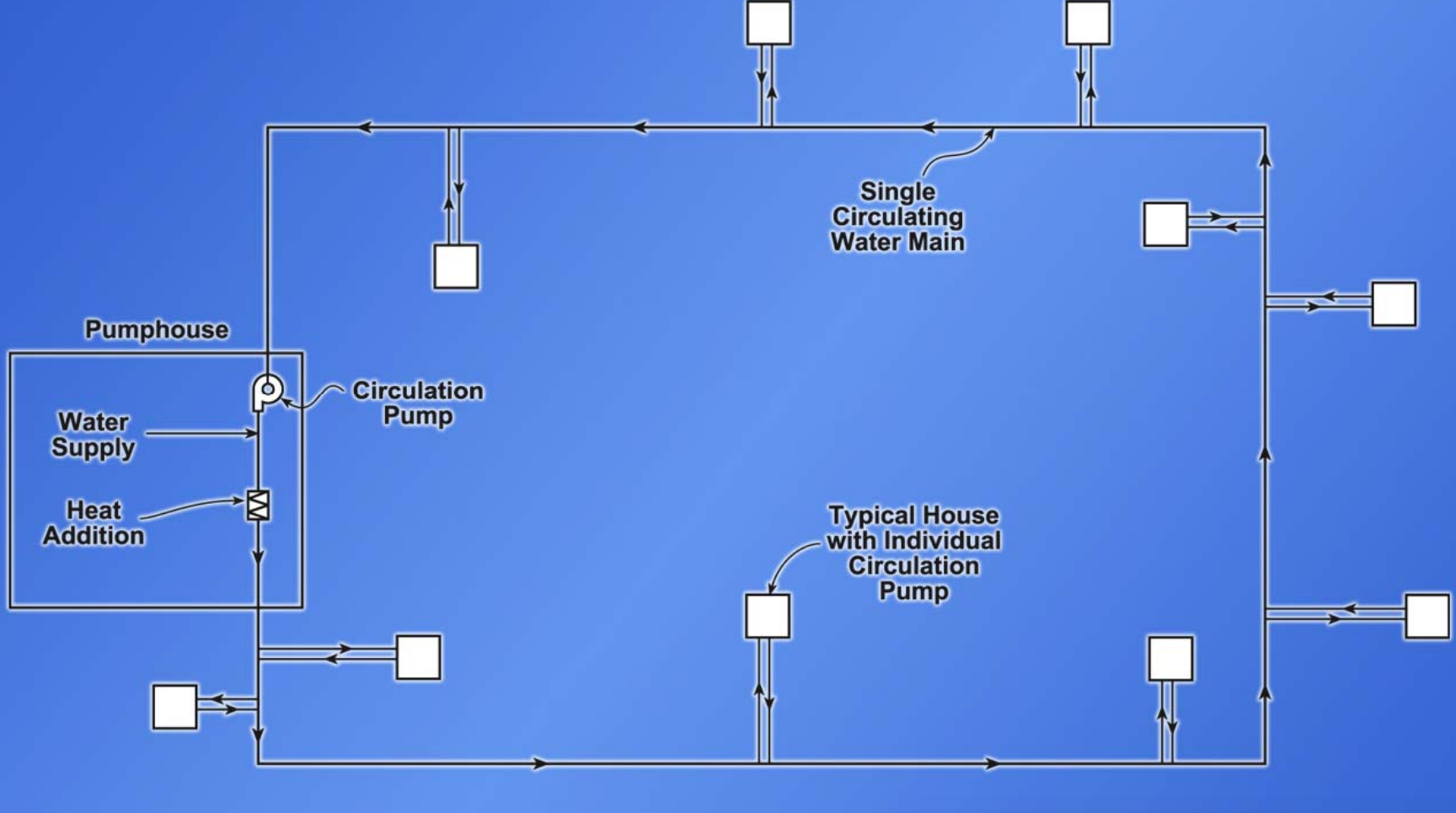


# Fast Main

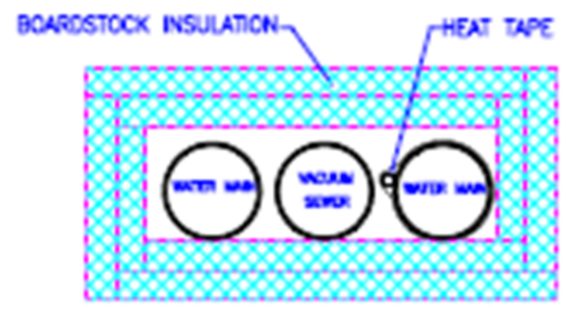
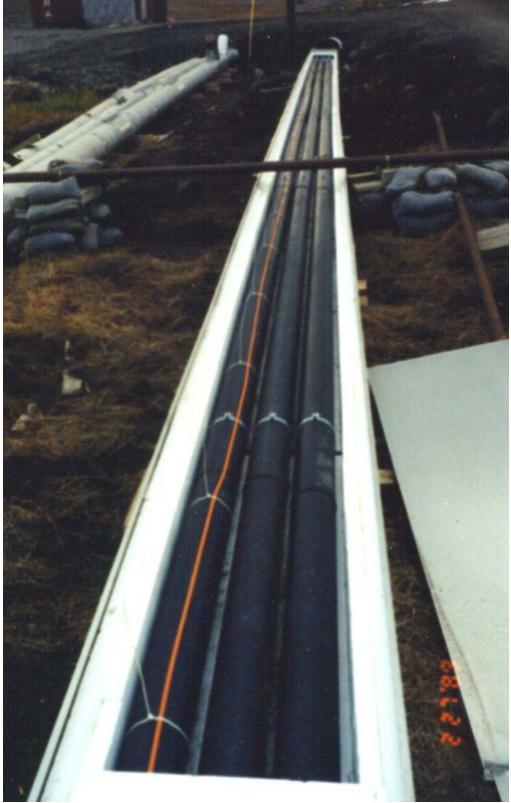




# Slow Main



# Utilidors

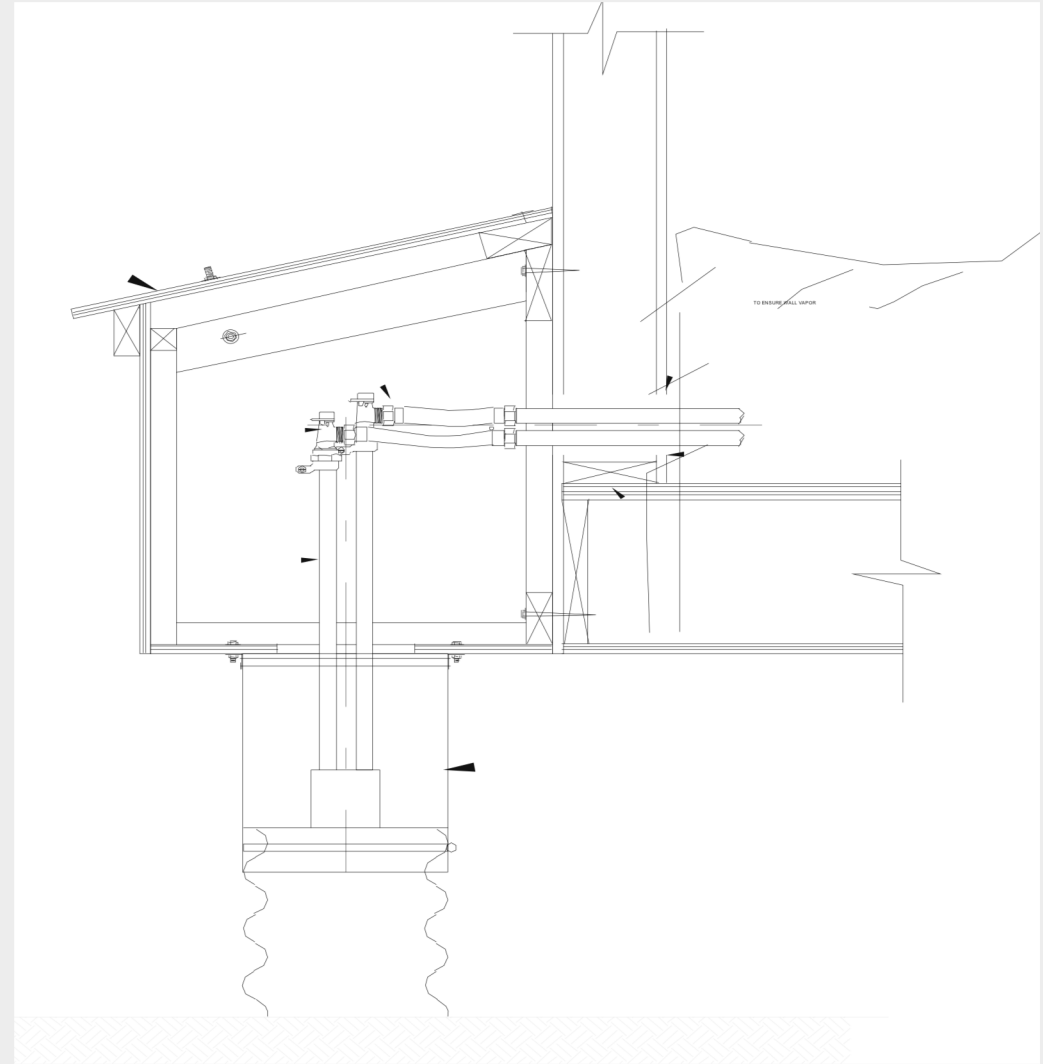




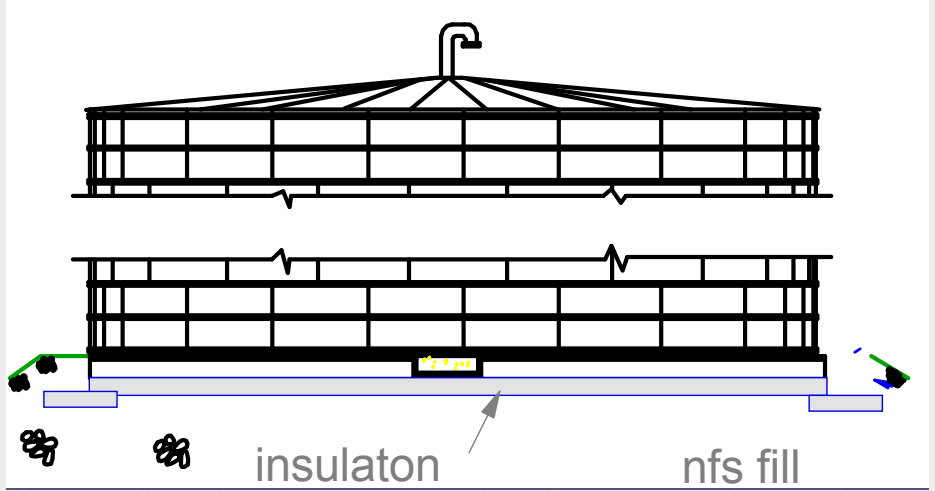
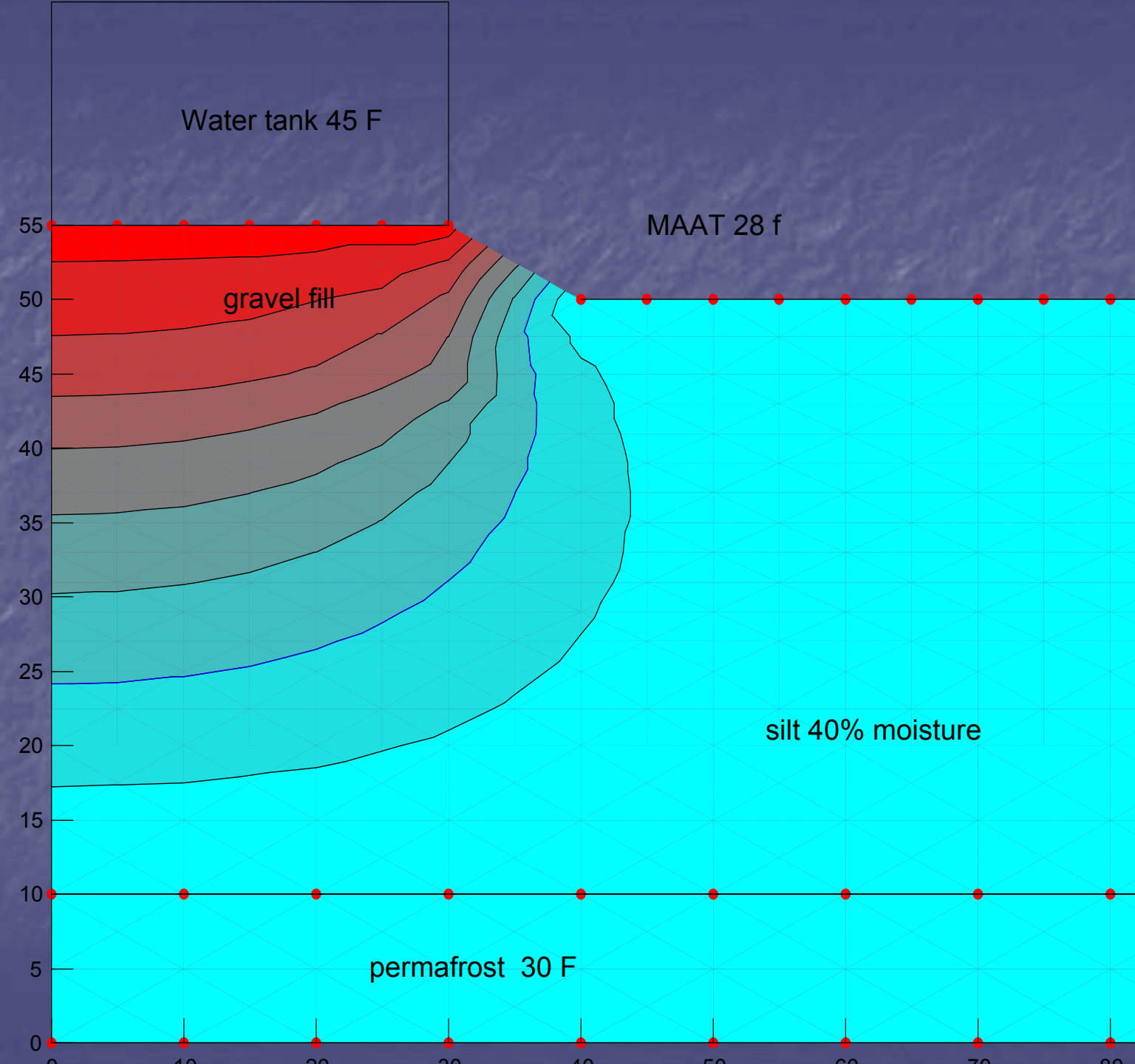
# Freeze Protection versus Wasted Energy



# System only as good as the connection



# Considering Reservoirs



# Ice Features? Managing Winter Failures



# Thank you for the opportunity to share!





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