

A decorative graphic consisting of several concentric, overlapping bands of color. The bands transition from light blue on the left to a light green on the right, with a white space in the center. The bands have a soft, blurred appearance, giving a sense of depth and movement.

# Best Practices for HVAC Systems in Cold Climates

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# Resiliency

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- The ability for a commercial building to withstand an interruption in the function of the heating system
  - Rate of temperature degradation with time
  - High/Low resiliency based on building construction and system design

# Alaska, 1989

- 2 week sustained cold snap
- -65F temperatures
- Building maintenance measures
- Monitoring cost
- Building damage



# Heating Plants

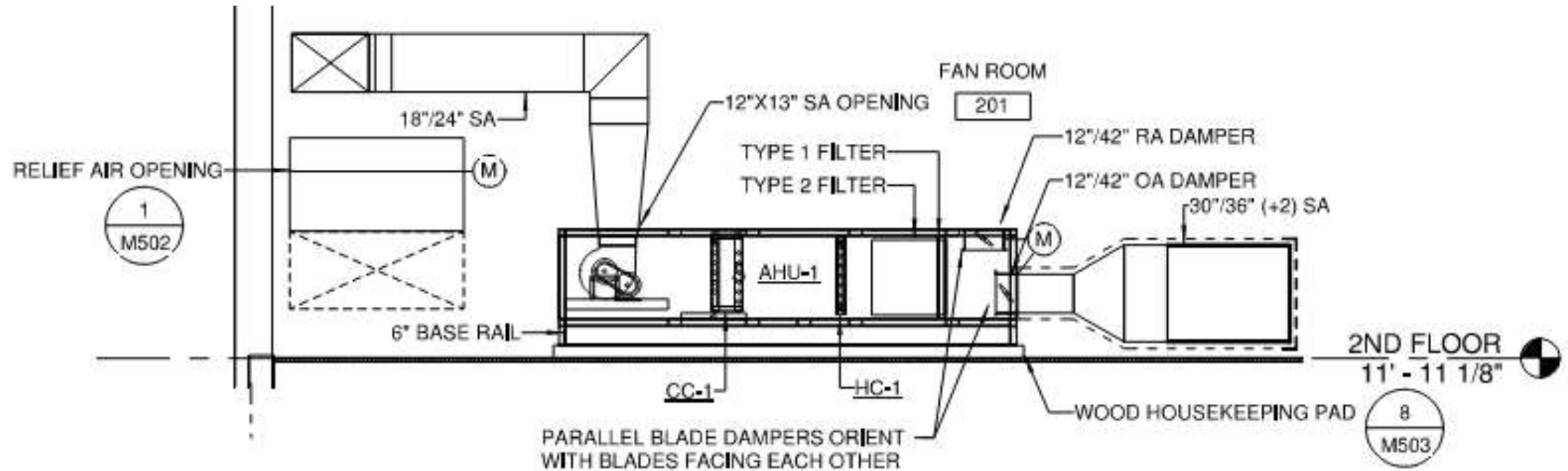
- Hydronic heating
  - Improved comfort
  - Better heat transfer medium compared to air
- Fuel Oil Cast Iron Sectional Boilers
- Natural Gas Condensing Boilers
- District Steam
  - Steam to glycol shell and tube heat exchanger



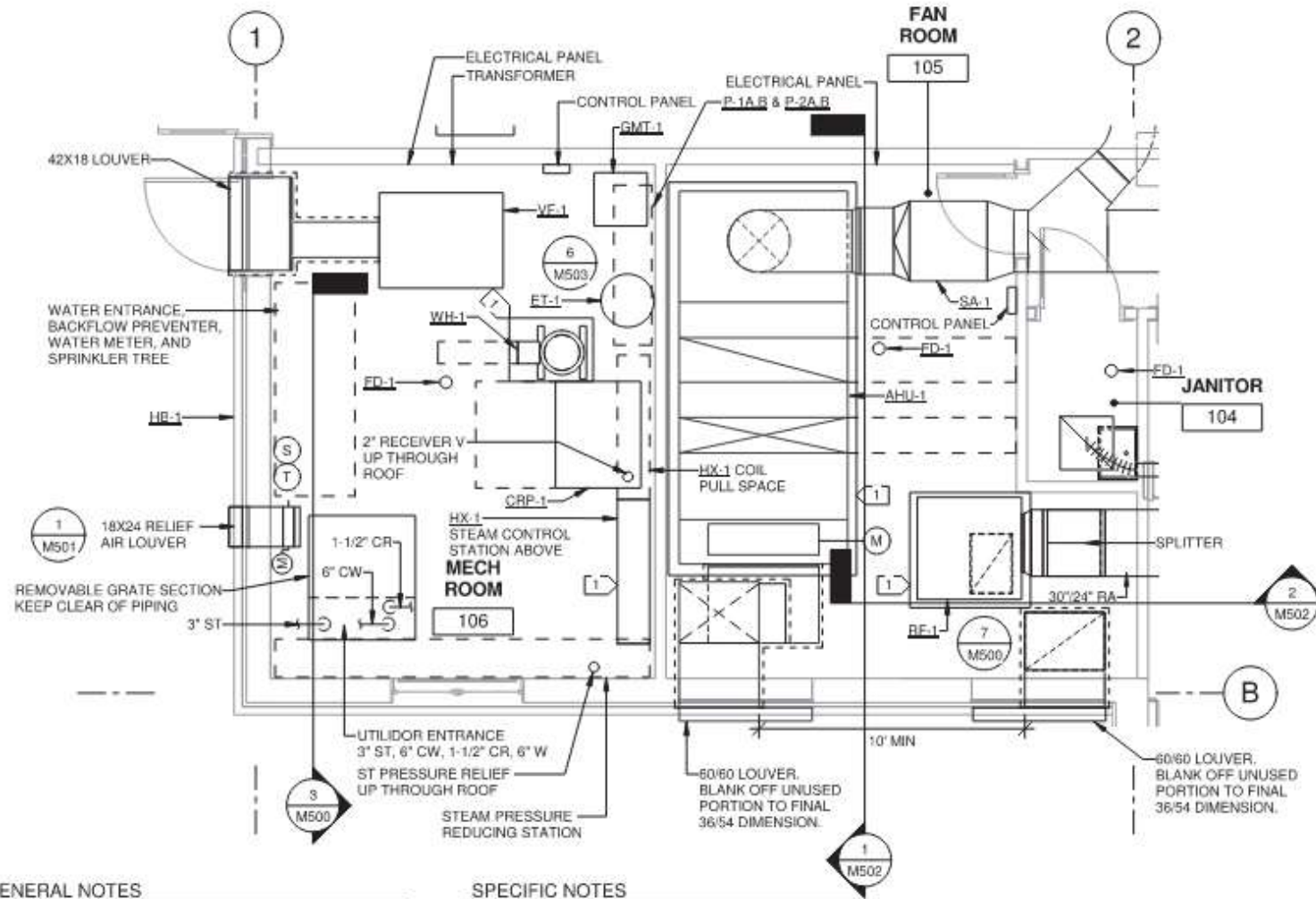


# Mechanical Space in the Building Footprint

- Consider the location of AHU
  - Fan room
  - Rooftop with heated vestibule



# Mechanical Spaces



## GENERAL NOTES

1. SUPPORT 6" PIPING, PRV PIPING & CONVERTER VALVE PIPING FROM FLOOR. USE SLIDE PLATES AT FLOOR CONNECTION FOR HOT PIPING.

## SPECIFIC NOTES

- 1 HOUSEKEEPING PAD, SEE 5/S400.



# Heating Systems

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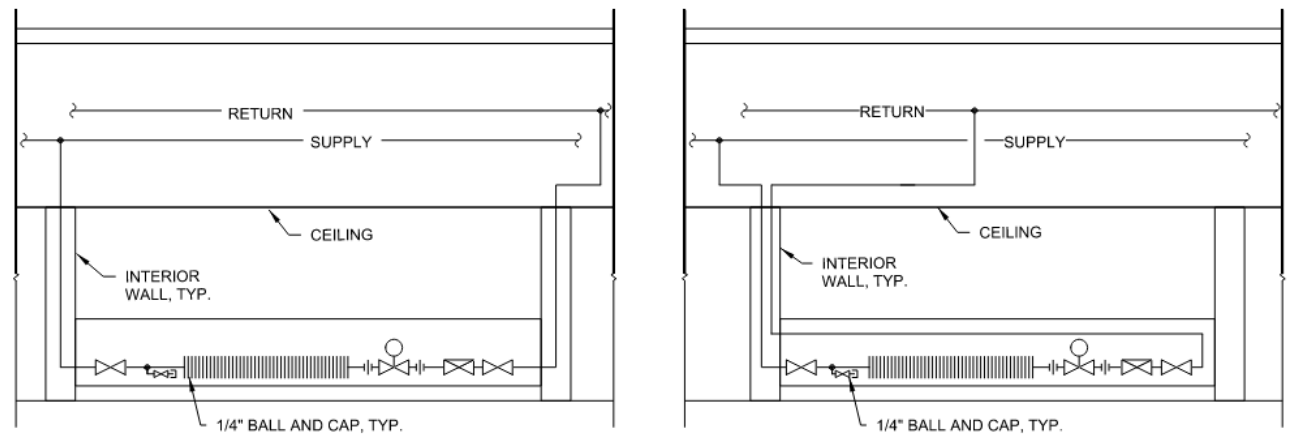
- Glycol – performance de-rate and wetted surfaces must be rated for use with % glycol
- Partially or fully redundant equipment
- Multiple heat sources
- Critical infrastructure: N+1 levels of redundancy at all levels of the building systems
- Coordinate building envelope and heat load





# Finned Tube Radiators

- Most economical first cost
- Flexible for future remodels
- High output with 180F heating system fluid
- Piping is accessible
- Concern with furniture placement
- Aesthetic concerns
- Lower resiliency compared to radiant slab



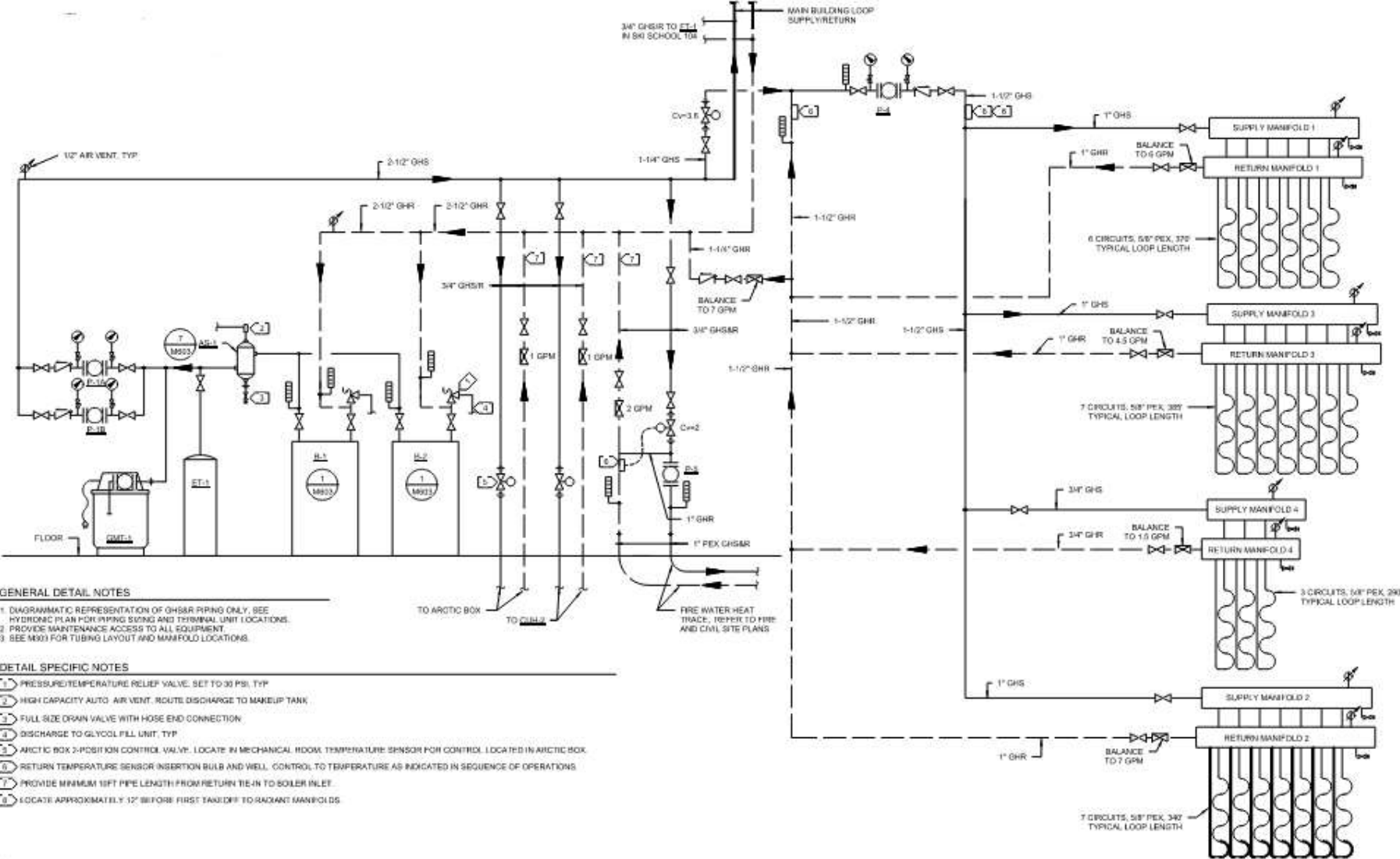


# Radiant Slab

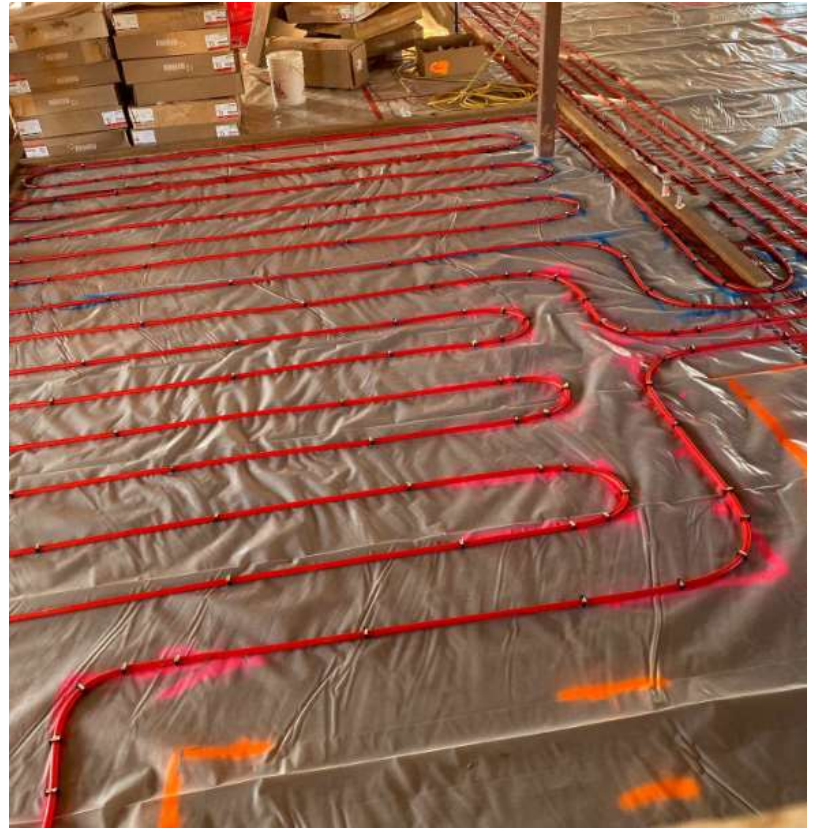
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- Performs well on thermal degradation tests
- Comfortable heat for occupants
- Flexibility limited
- Careful considering for manifold locations
- Return water temperature
- Slower response time
- May need backup heat source for pickup load

# Radiant System







# Radiant Tubing Installation

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# Humidification System Design

## ELECTRODE CANISTER



[www.condairgroup.com/know-how/electrode-steam-humidifier](http://www.condairgroup.com/know-how/electrode-steam-humidifier)

## STEAM TO STEAM



[www.armstronginternational.com/sites/default/files/resources/documents/steamtosteam.pdf](http://www.armstronginternational.com/sites/default/files/resources/documents/steamtosteam.pdf)

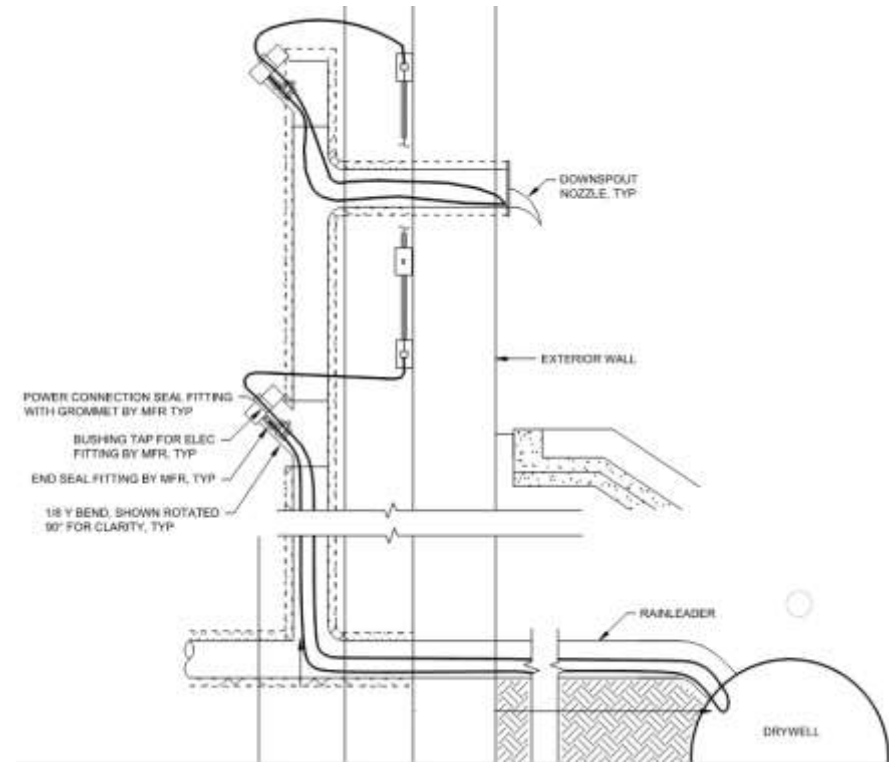
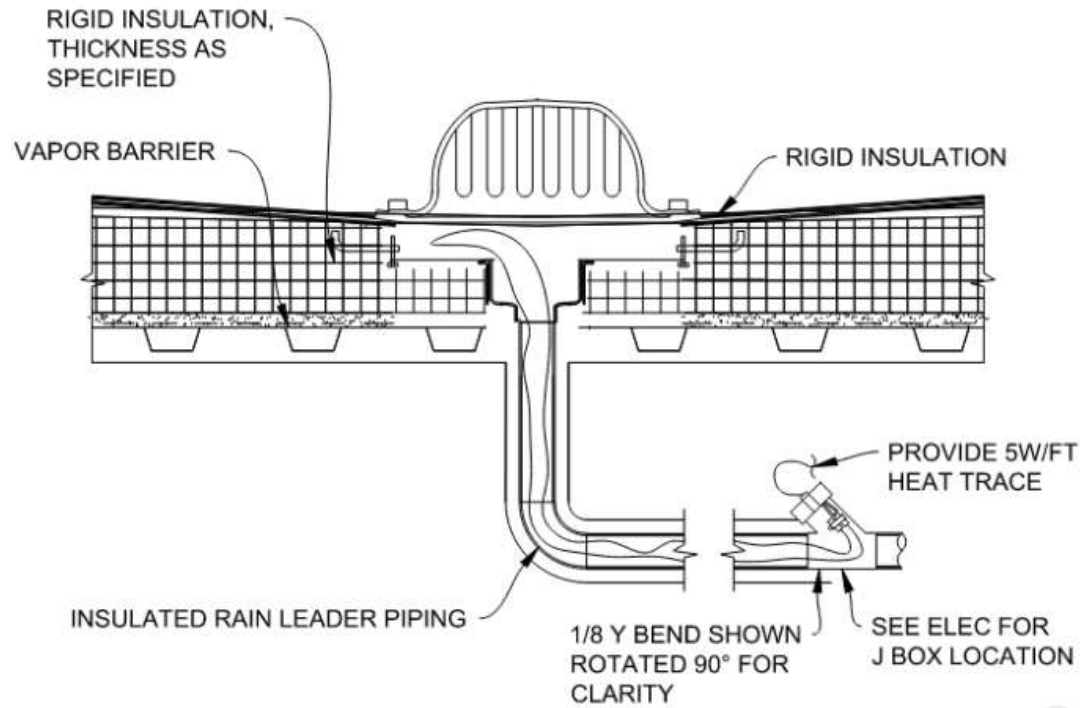


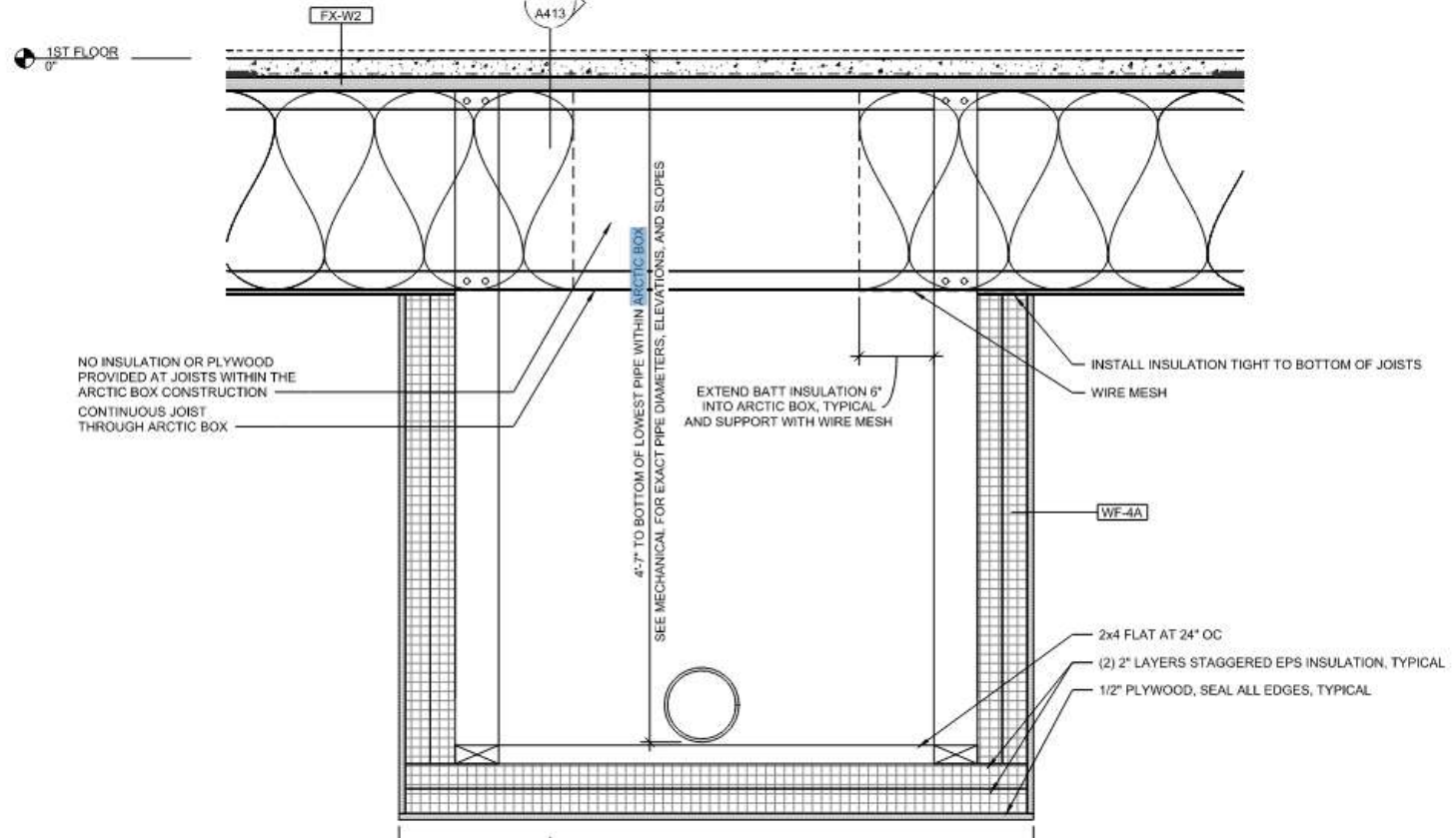
# Plumbing Systems

- Route through interior walls or fur out exterior walls
- VTR sizing
- Freeze risks in Mechanical Rooms
- Roof drain and overflow heat trace
- Shoulder season issues



# Heat Trace





# Piping Solutions

# Glacier Formations







# Glaciers

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# Remote Sites

- Preventative Maintenance Programs
- Maintenance guide on site and updated regularly
- Improved documentation
- Redundancy
- Stock spare parts
- Robust building envelope



# The *Right* Approach

Consider the building function

Anticipated maintenance capabilities

Future of the building

Cost constraints

THANK YOU

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