What About Utility Distribution Systems?

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What Are Utility Distribution Systems?

• Move energy or water from power plants to buildings for consumption
  – Steam
  – Electricity
  – Chilled Water
  – Water
  – Storm and Sanitary Sewer
• At UI these are all buried underground
Steam System
Chilled Water System
Sanitary Sewer System
How Are Underground Utilities Constructed?

• Electric: buried in duct banks and vaults
• Steam: in tunnels or direct-bury with vaults
• Chilled Water: direct-buryed
• Water: direct-buryed
• Sewer: direct-buryed
 FINISHED GRADE  

760mm (30') MINIMUM  
25MPa CONCRETE  

DUCTBANK MARKING TAPE 
TYPICAL  

EQUAL  

FBR PVC  
(TYPICAL)  

#4 REBAR (TYPICAL)  
457mm (18') ON CENTER  

BASE AND INTERMEDIATE 
SPACERS 1,219mm (48') ON CENTER  

75mm (3') MINIMUM 
SEPARATION (TYPICAL)  

75mm (3') MINIMUM 
(TYPICAL)  

75mm (3') MINIMUM 
SEPARATION (TYPICAL)  

38mm (1-1/2') MINIMUM 
SEPARATION (TYPICAL)  

MASONRY LEVELING BLOCKS 
AT BASE SPACERS AS NEEDED  

75mm (3') MINIMUM 
SEPARATION (TYP.)  

10-WAY DUCTBANK DETAIL  
NO SCALE  

NOTES:  
1. GEOTECH TEST, IN ACCORD WITH ASTM D698, THE BOTTOM OF EXCAVATION TO ACHIEVE 85% TO 95% OF MAXIMUM DRY DENSITY, PRIOR TO CONCRETE PLACEMENT.
Steam Tunnels
Steam Safety

Typical Steam System

Condensate  Steam  Vapor

100 psig  337.9°F

50.3 psig  297.97°F

PRV

Trap

Trap

Trap

Trap

Vent

Facilities Management
THE UNIVERSITY OF IOWA
Steam Safety

https://www.youtube.com/watch?v=7MxsKkAnLC0
Watch to 1:30, language

Steam pipe explosion buckles street in downtown Baltimore

Three Injured in Steam Explosion at Ford Casting Plant

msnbc News | June 21, 2017
Deadly steam explosion in NYC
July 17: A deadly steam explosion rips a Manhattan street near NBC's Ron Allen reports.
Why Do We Need to Take Steam Outages?

• What happens to steel pipe and cement when you keep it in a hot, moist environment, and then add salt?

CORROSION!
Why Do We Need to Take Steam Outages?

- Materials corrode and create leaks
- Cement fails so structures become unsound
- Parts of our system are nearing 100 years old
- Valves, steam traps and other components wear out and fail
- Service is endangered and safety a concern
Other Components Need Repair Too

- Ventilation fans to keep spaces inhabitable for workers
- Sump pumps to move water out of the tunnels and vaults (to slow corrosion)
- Lighting needs frequent replacement in this environment
- Electric outlets need to be maintained
Sink Holes and Surcharging

- Best way to find that there is a break in a sewer line
- Storms surcharge when undersized or partially plugged
More Assertive Scheduling of Outages

- Difficulty obtaining outages in the past led to some leaks being tolerated
- As our system ages, leaks and failures will become more frequent
- Bottom line is that we have to have outages in order to maintain the safe operation of the system
- Might have outages covering larger segments of campus, but more repairs will be completed over the area, rather than multiple little shutdowns
  - Duration will still be minimized, advance notice given
Distribution Projects

• Arts Campus tunnel repairs this coming spring
  – Structural, water infiltration, ventilation challenges

• Grand Avenue Phase 2

• Currier Tunnel – north end complete!

• Old Capitol Tunnel replacement– Burlington to Washington heading to design
Arts Campus
Tunnel Repairs

Starts next spring -
Most work below ground
within the tunnels.
Grand Avenue Phase 2
Currier Tunnel

Construction ended late summer!
Old Capitol Tunnel

Construction 2019 at the earliest
Distribution Challenges

- Provide safe, reliable service with aging infrastructure
- Crowded space on campus makes work more difficult – often inconvenient locations
- Limited resources; focus on most efficient delivery of service
- If you notice steam rising out of a manhole, a sink hole, or surcharging storm sewer – let us know