

Eliminating Vaults from Direct Bury Distribution Systems

IDEA Campus Conference – Distribution Workshop

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Overview

- Replacing vaults with pre-insulated direct bury pipe and valves
- Reconstruction of underground vaults
- Evolution of valves in a distribution network

District Energy St. Paul Strategically Replaces Underground Vaults with Pre-Insulated Direct Bury Pipe and Valves.

- Eliminates the high cost of underground concrete structure repairs.
- Reduce annual maintenance cost of vault electrical systems, sump pumps, freeze protection and dehumidifiers.
- Removes the risk of exposure to confined space of an underground vault.
- Concrete underground structures are susceptible to the effects of road salt and ground water.

Expansion Vault Removal Project



Expansion Vault Removal Project



Expansion Chamber Removal Project



Expansion Chamber Removal Project



Expansion Vault Removal Project

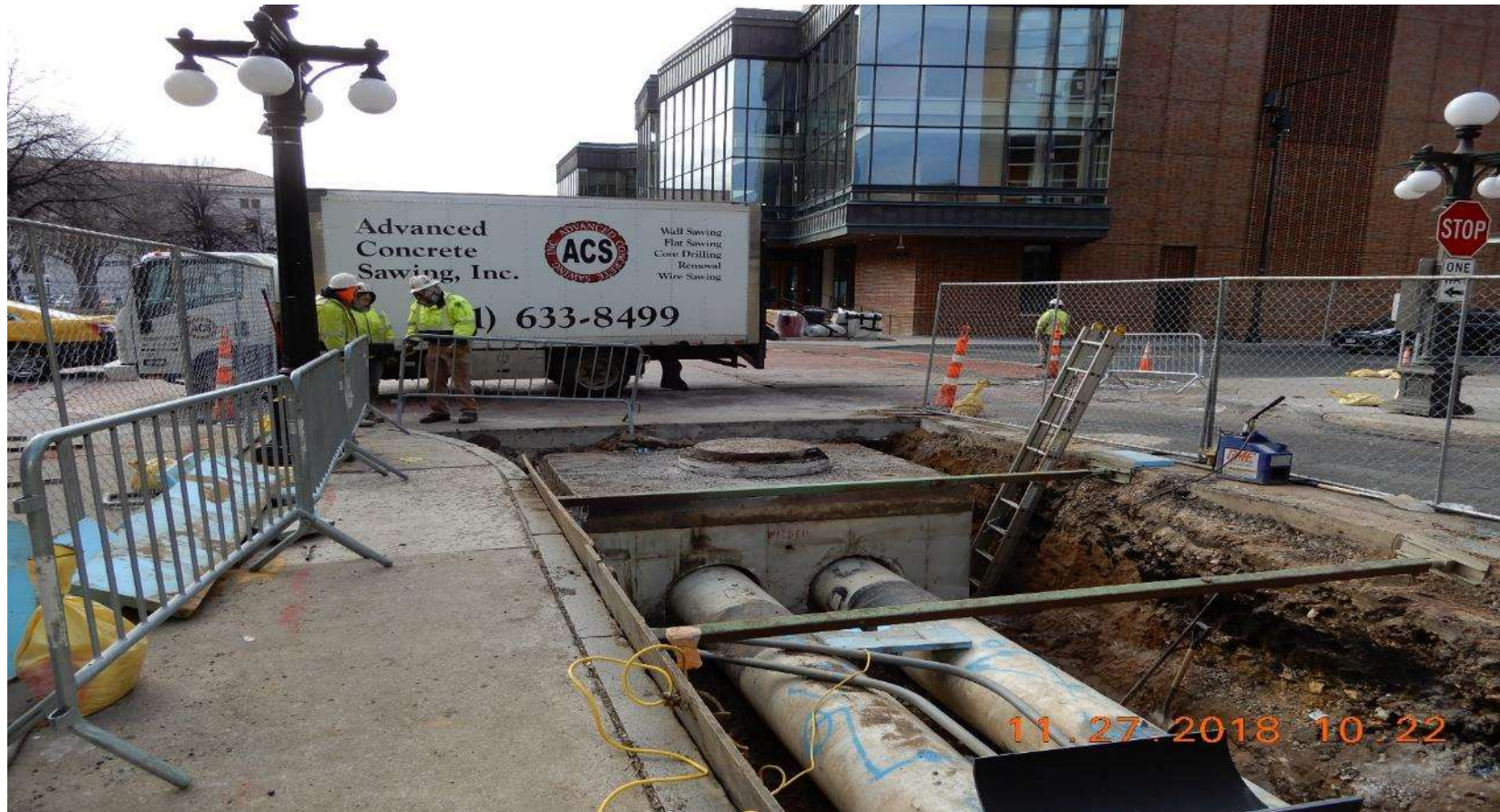


Expansion Vault Removal Project

Ready for insulation



Air Vent Vault Removal



Air Vent Vault Removal



Air Vent Vault Removal



Air Vent Vault Removal



Air Vent Vault Removal



Air Vent Vault Removal

Air Release



Air Vent Vault Removal



Air Vent Vault Removal



Benefits of Pre-Insulated Direct Bury Pipe and Valves

- Significant advancement in field joint kits – shrinkable sleeve. Resistant to ground water intrusion.
- Polyurethane foam insulation reduces heat loss, improves system efficiency.
- Impact resistant polyethylene outer pipe jacket.
- Pre-insulated pipe is watertight, resistant to road salt and other chemicals found in soil.

Mainline Vault Reconstruction

- Mainline vaults are major intersecting pipeline arteries in the distribution network.
- Mainline vaults allow for multiple configurations of the distribution network.
- These vaults contain large diameter piping, isolation valves, air vents, drains, bypass piping, communication networks, connections to leak detection systems.
- Reconstruction projects are budgeted annually.
- Not suitable for direct bury applications.

Mainline Vault Reconstruction

Not suitable for direct bury applications



Vault Reconstruction Project

Lid Removals



Vault Reconstruction Project



Vault Reconstruction Project

Insulation removed. Wall repairs in progress. Plug and butterfly valves



Vault Reconstruction Project

Concrete forms for wall repairs.



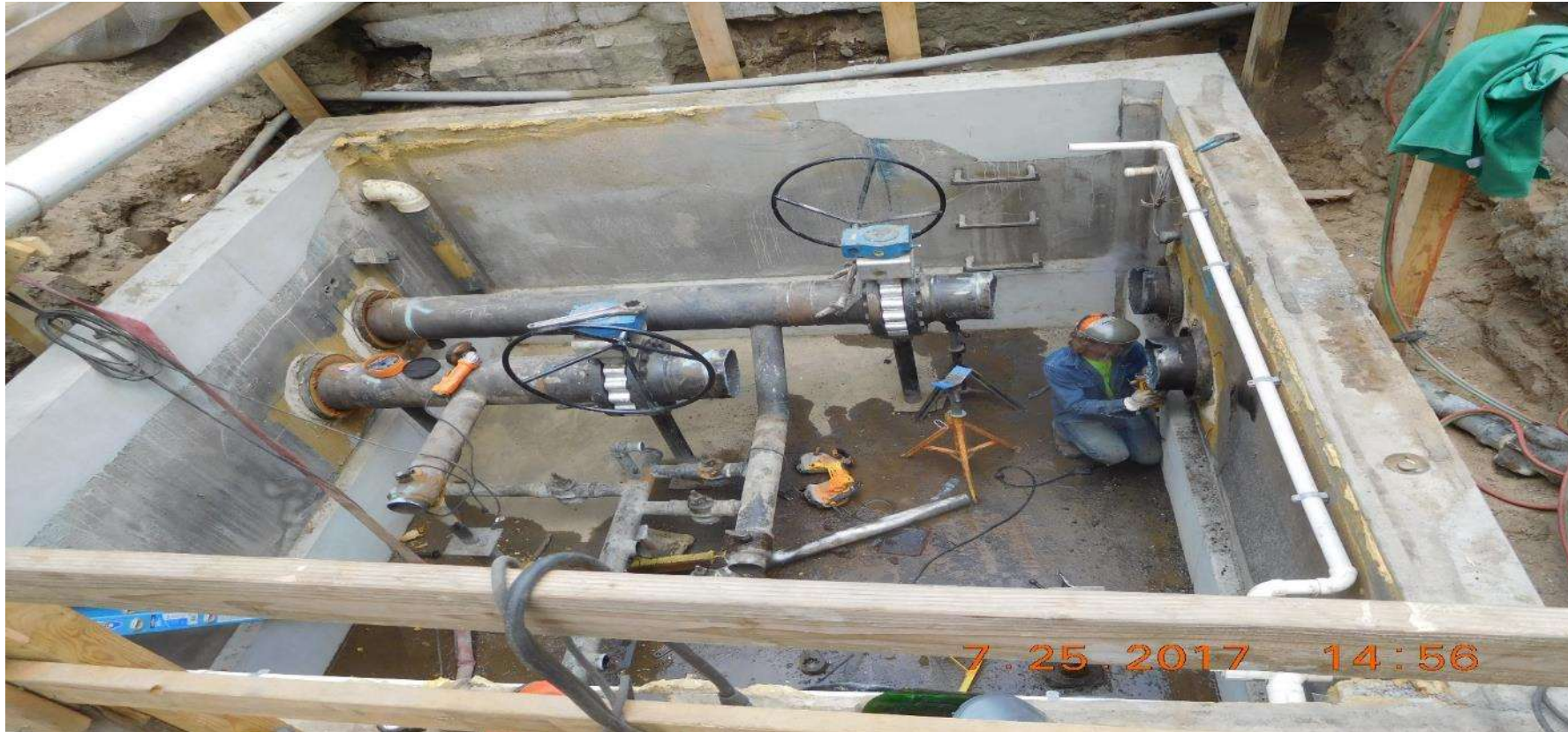
Vault Reconstruction Project

Wall repairs complete.



Vault Reconstruction Project

Phase 1. Pipe and valve replacement.



Vault Reconstruction Project

Phase 2. Pipe and valve replacement.



Vault Reconstruction Project

More pipe and valve replacement

Vault Reconstruction Project



Vault Reconstruction Project

Insulation in progress. Closed cell high performance insulation (polyisocyanurate)



Vault Reconstruction Project

Final insulation.



Vault Reconstruction Project

Cover installation.



Vault Reconstruction Project

Cover installation.



Vault Reconstruction Project

Waterproofing and manhole covers. Street restoration. Project complete.



Valves for Distribution Mainline Vaults



Types of Valves in the Distribution Network 1983 - 2019

Lubricated Plug Valve



Butterfly Valve



Ball Valve



Lubricated Plug Valves

- Installed in the distribution network in the 1980's
- Gear operator replacement parts no longer available.
- Grease port failures caused operational issues.
- Valves became difficult to operate.
- Valve replacement projects began in 2005.



Butterfly Valves

- Installed in the distribution network in the 1990's.
- Low maintenance and excellent operational performance.
- Lower up front cost compared to ball valves.
- Disc in the center of the valve creates higher pressure drop.
- Valve leak by issues due to disc and/or seat wear.



Ball Valves

- Quality constructed ball valves.
- Superior operational performance.
- Lower pressure drop.
- 40+ year service life.
- Higher upfront cost.
- Ball valves are 20% of the overall project costs.



Questions?

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