EMERGENCY SEWER FORCE MAIN REHABILITATION IN VALLEY FORGE NATIONAL HISTORIC PARK

Presented by:
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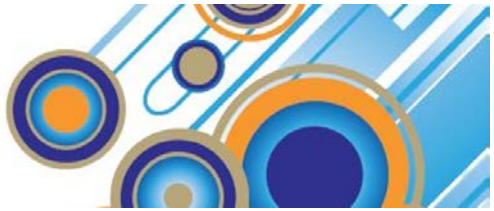
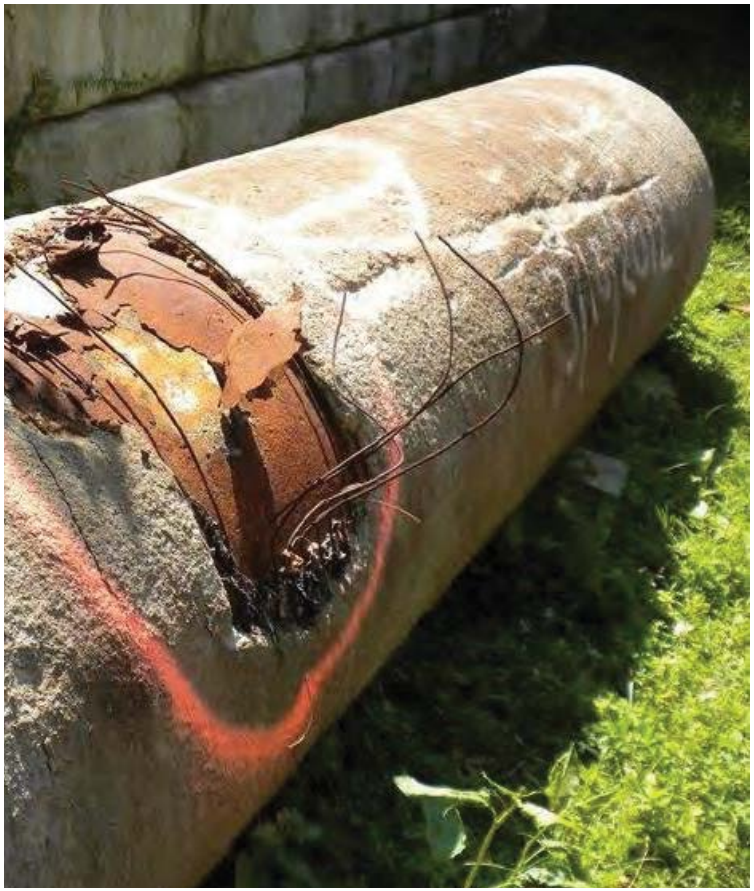


OVERVIEW

- Treddyfrin Township experienced three failures in a PCCP force main from 2012 to 2014, resulting in wastewater spills.
- Force main details:
  - 30-inch PCCP force main
  - 18,000 feet in length



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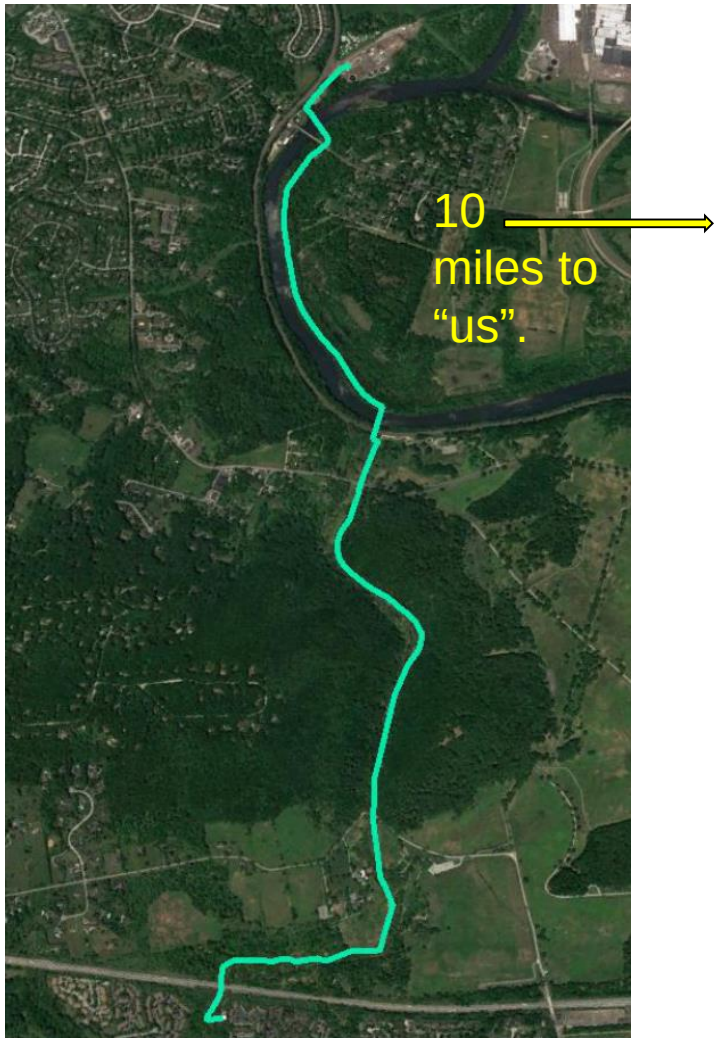
PIPE LOCATION

- Part of the Valley Creek Trunk Sewer (VCTS) owned by the Tredyffrin Township Municipal Authority (TTMA), a group of five municipalities that discharge into the VCTS system
- Located within Valley Forge National Park
- Includes multiple crossings of both Valley Creek and the Schuylkill River
  - "Exceptional Value" stream

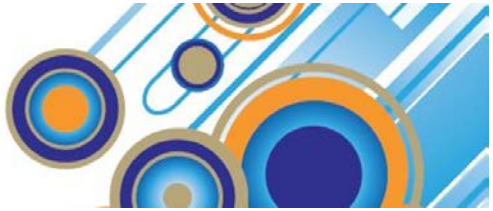


REHAB & REPLACEMENT ALTERNATIVES

Alternative No. and Name	Advantages	Disadvantages	Cost
• 1 - Parallel alignment	• FM in service • Conventional open cut	• Easement from VFNHP • Disturbance • Close Rt. 252	• $14,500,000
• 2 - Alternate alignment out of VFNHP	• FM in service	• Local topo • Two new PS or drilling	• $23,100,000
• 3 - Cured-in-place pipe lining	• Trenchless	• Access ports every 500 LF • FM OOS	• $15,100,000
• 4 - Slip-lining	• Trenchless	• Reduction in capacity • FM OOS	• $12,200,000
• 5- Open cut in existing alignment	• Conventional	• Disturbance • Close Rt. 252 • FM OOS	• **Not viable alternative**

ANALYSIS OF TRENCHLESS ALTERNATIVES

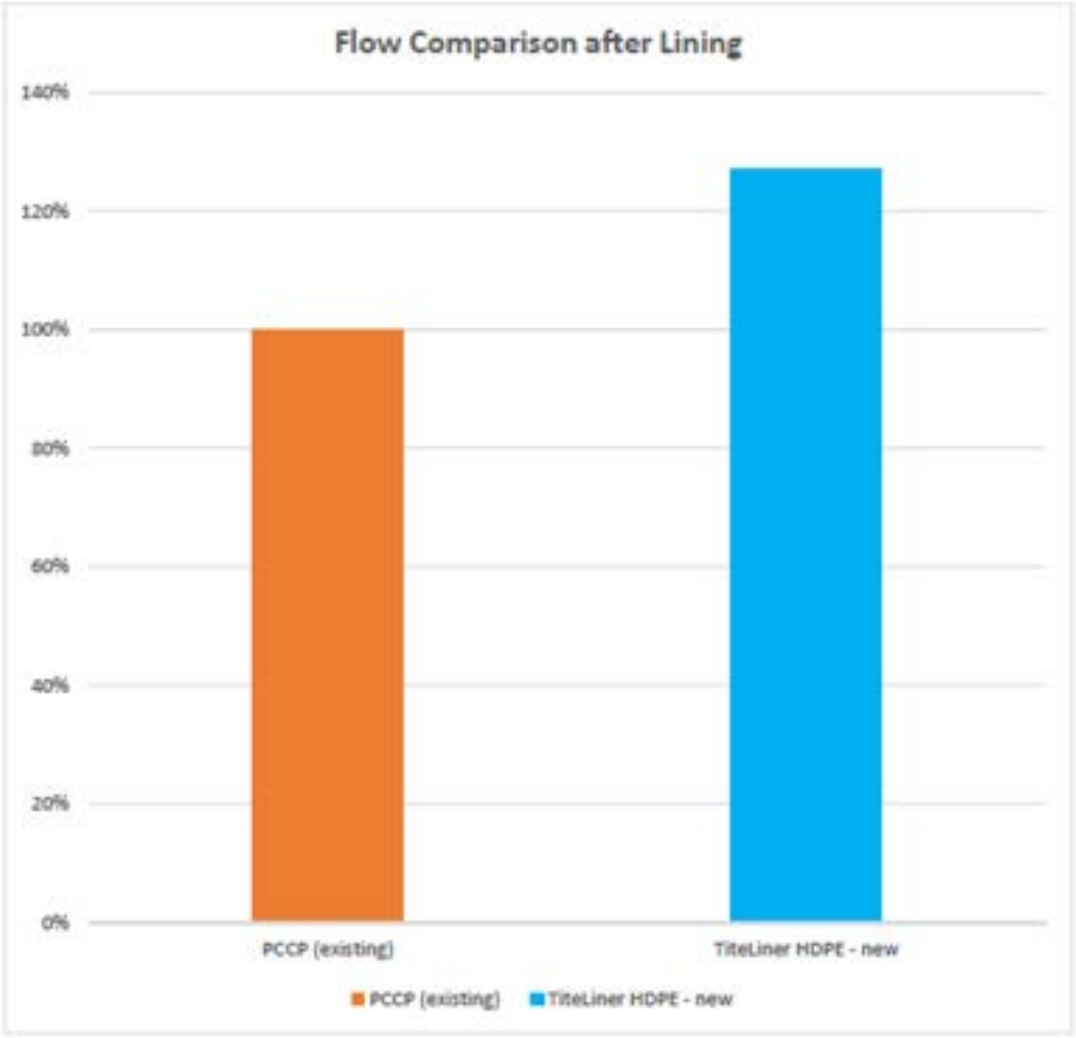
Trenchless Method	Advantages	Disadvantages	Cost Range, 2014
Cured-in-Place Lining	• Increases hydraulic capacity of existing FM • Maximizes cross sectional area of existing FM	• Access ports every 1,000 LF • FM OOS • Not tried and true for low pressure force main applications	$11 – 24 million
Slip Lining	• Access pits every 1,000 LF due to grouting	• Reduction in capacity of pipe due to 24% reduction in pipe diameter to slip new pipe into host pipe • FM OOS	$9 – 19 million
Compressed Fit Lining	• Access pits 3,000 LF maximum • Increases hydraulic capacity of existing FM • Maximizes cross sectional area of existing FM • Predictable field quality	• FM OOS	$12 - $19 million



FLOW COMPARISON

Modeling showed that the TiteLiner® system would increase flow capacity of the line due to its very low surface roughness.

Hazen William's "C" Factor=150



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PROJECT COORDINATION

- Highly sensitive project setting
- Valley Forge NHP
  - National Park Service Land
  - Disturbance will be an issue
  - Existing easement is contentious
  - Park events/schedule
- Stakeholders
  - Treddyffrin & TTMA
  - PACT ONE
  - Pennsylvania DEP
  - Sunbelt Rentals
  - Engineer
  - Park staff
  - State & local politicians
- Permitting

INSTALLATION

Pipe being pulled and compressed through roller box

OVERVIEW

- Project originally designed with ductile iron bends at pipe access pits that would be concrete encased
- United developed a mobile fusing machine that was lowered into the excavations to fuse the closure pieces
- Result was restrained joints with no need for concrete encasement or DI bends

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LINING

- Lining portion was completed over three months with zero incidents or wetlands impact
- 31 separate installations
- Expanded system from 20 MGD to 28 MGD

CONCLUSION

- Increased capacity of the main for another 25 years
- Largest compressed-fit HDPE force main rehabilitation project in history
- *Trenchless Technology* Honorable Mention Project

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Thank you!

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