A Trenchless Technology Prescription for Addressing Our Ailing Utility Infrastructure

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Urban Centers

• It took us 5,000 years to get to this point; however, it is expected that we will **double** our urban infrastructure in the next 35 years through construction. These new systems will last more than 50 years.

• Currently, **49%** of the world’s population (**81%** in the U.S.) live in urban areas.

• This figure is expected to increase to **75%** by the year **2050** as people look to urban centers for employment opportunities.
Present - Urban Population over 3 billion
2050 - Urban population over 6.5 billion
Space on the surface is becoming more narrow. Future lies in the underground.

- Limited space available to install utility services such as sewage lines, water pipeline, electric cables, gas pipelines, communication cables etc.
The world beneath our feet
America’s Grade: D+

- **Bridges**: 9.1% of bridges rated structurally deficient
- **Aviation**: U.S. Airports serve 2 million passengers daily
- **Dams**: 15,498 (17%) dams identified as high-hazard potential
- **Schools**: 53% of schools need improvements to reach “good” condition
- **Wastewater**: Demand on treatment plants will grow more than 23% by 2032
- **Energy**: 3,571 total power outages reported in one year
- **Inland Waterways**: 49% of vessels experience delays across the inland waterways system
- **Levees**: Over $1.3 trillion in property value behind levees
- **Ports**: 99% of America’s overseas trade passes through ports
- **Hazardous Waste**: 53% of Americans lives within 3 miles of a hazardous waste site

- **Drinking Water**: 6 billion gallons of treated water lost every day
- **Solid Waste**: 258 million tons of municipal solid waste generated in one year
- **Parks**: $11.9 billion in National Park Service deferred maintenance
- **Roads**: 6.9 billion hours delayed in traffic - 42 hours per driver
- **Transit**: $90 billion transit maintenance backlog
- **Rail**: $27 billion in improvements in one year by the freight railroads

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THE VALUE OF WATER
AMERICANS ON THE U.S. WATER CRISIS

Growing populations, rapid urbanization and chronic underinvestment are putting pressure on our nation's aging water infrastructure.

1.7 trillion gallons of water per year lost through broken and leaking pipes.

Cost of $2.6B a water main breaks in America every 2 minutes.

RECOGNITION OF THE WATER CRISIS

Americans recognize that our nation's water resources are increasingly at risk and are concerned about the state of our infrastructure system.

79% recognize demands on water resources are growing and water is becoming increasingly scarce.

86% say they have experienced the impact of water shortages and contamination.

77% are concerned about our nation's water infrastructure system.

88% believe our water infrastructure needs reform.

XYLEM
Let's Solve Water
Drinking Water
6 billion gallons of treated water lost every day
Wastewater Treatment Infrastructure in the U.S.

- 76% of Population Rely on 14,748 Treatment Plants
- $271 Billion Needed for Wastewater Infrastructure
- 8 Million Tons Sludge created annually by Treatment Works
- 1 Billion Gallons Water reclaimed everyday
- 4% Nation’s electricity usage to treat wastewater
- D+ ASCE 2017 Wastewater Infrastructure Rating

How big is this issue?
What is underground?
Sewer Lines

- Offset pipes
- Deterioration
- Root intrusion
- Crowned or cracked
- Leaking
- Capacity issues
- Rain infiltration/inflow
Water Lines

- Encrusted
- Corroded
- Leaking
- Capacity issues
"Your infrastructure needs work."
Open Heart Surgery

Open Cut Construction
Potential for dust pollution
Costs of Open Cut Pipe Replacement

- Pavement saw-cutting
- Excavation
- Trucking spoil and dump fees
- Backfill and transport
- Compaction
- Concrete or asphalt
- Traffic control
Why Trenchless?

- Minimal disruption of traffic
- Year round construction
- Improved safety
- Reduced landscape damage
- Minimal disturbance to local business
- Improved construction productivity
- Can access otherwise inaccessible areas
Many Arizona agencies are taking advantage of the benefits of trenchless technology
Horizontal Directional Drilling

- Lengths of up to 3.3 km
- Diameters of 50mm to 1650mm
- Applications:
  - utility conduits
  - pipelines
  - gravity sewers
  - force mains
  - horizontal remediation wells
  - geotechnical investigations
HDD Process
HDD Process
Speed Camera (Shea Blvd/124 St.)
1,600 Pennsylvania Avenue
Trenchless Pipe Replacement

- Lengths typically 100m to 200m
- Diameters up to 1050mm
- Applications:
  - replacement of force mains
  - replacement of gravity sewers
Pipe Replacement Process (Static)
Pipe Replacement Process (Static Cont.)
City of Phoenix Sanitary Sewer Replacement Program

- 35\textsuperscript{th} Avenue and Peoria Avenue
- Approximately 7,400 LF replacement
Existing water main under stalls
Completed in 3 hrs vs. 7 days
Microtunneling

- Lengths up to 600m
- Diameters up to 2.1m
- Applications
  - gravity sewer installations
Auger Boring

- Lengths of up to 150 m
- Diameters of 200mm to 1,500mm
- Applications:
  - relatively short crossings of pipes and conduits
Auger Boring in Glendale, AZ
Pipe Jacking

- Lengths of up to 300m
- Diameters up to 4.2m
- Applications:
  - large diameter gravity sewers and force mains
Lining of Pipe

- Lengths of up to 1,000 m
- Diameters of up to 1,500 mm
- Cost varies by method
- Applications:
  - relining of water, sewer, and natural gas lines
Before and After Rehabilitation
Lining of Pipe

Cured-In-Place

Fold and Form

Segmental Sliplining
Mobile CIPP System Heads to Arizona State Campus

By Michele Byar

Other maintenance issues were regularly addressed. In December 2006, ASU established an annual contract with $35,000 to perform CCTV inspection of more than 10,000 LF of sewer pipe and minor sewer repair maintenance. Despite these preventive measures, over the years, a growing structural problem of cracked and defective pipes significantly impacted flow and capacity.

Pro Pipe was tasked with cleaning and visual inspection of all sewer lines, and conducting pipe relining and point repairs where needed. Using RS Lining Systems' CityLiner technology, a mobile curative-in-place pipeline (CIPP) rehabilitation system, Pro Pipe overcame challenges such as extreme heat that exceeded 100°F while protecting the campus grounds. Lightly engineered to meet growing environmental challenges, CityLiner is a CIPP sewer repair technology designed specifically for repairing deteriorated municipal, residential and industrial pipelines, as well as storm drains, sewers, gas lines and ventilation ducts. Cary, N.C.-based RS Lining Systems is the exclusive distributor of CityLine in North South and Central America.

Inside Pro Pipe's specially designed truck was everything that was needed for a traditional CIPP rehabilitation project such as onboard holding tanks for resin and hardener, a mixing unit, and a stabilization mixer assembly.

“CityLiner truck is amazing,” says Pro Pipe regional manager Dean Monk. “Being able to perform all the steps for relining right here inside our truck gives us tremendous flexibility and superior logistical advantages.”

The self-contained CIPP inspection and installation unit on wheels enables jobs to be conducted in a timely manner and specific to the most stringent requirements.

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3,200 LF of 8” sewer and 10 MH’s
(completed in 90 days)
Conclusions

• Urbanization of metropolitan areas has resulted in a need for minimizing surface damage

• There is a need for repairing and expanding our utility infrastructure

• There are various prescriptions to address these needs

• Minimally-intrusive construction practices should be employed
HOW WOULD YOU PUT A UTILITY ACROSS?
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