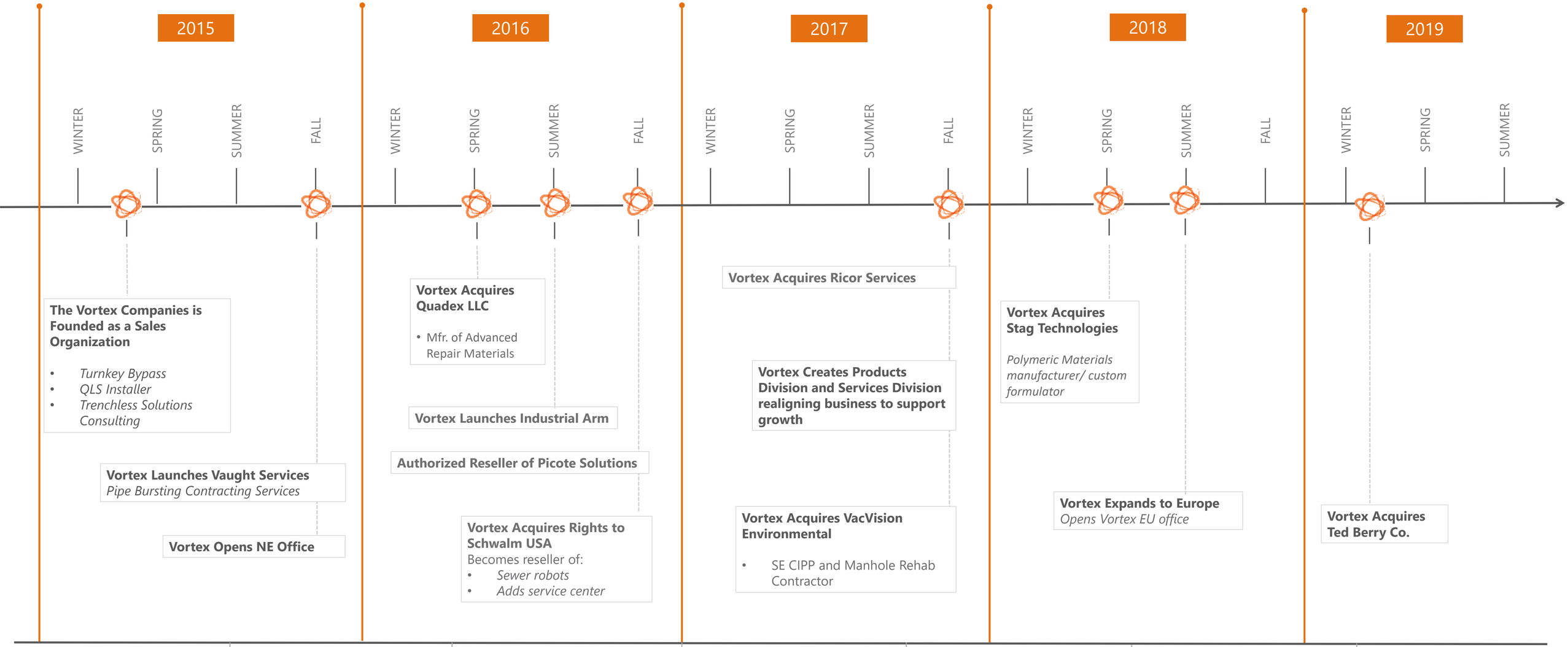

VORTEX
companies

ADVANCED TRENCHLESS REHABILITATION SERVICES FOR WATER, SEWER & INDUSTRIAL INFRASTRUCTURE

ADVANCED TRENCHLESS REHABILITATION SERVICES FOR WATER, SEWER & INDUSTRIAL MARKETS

PRESENTED BY: CONNOR COLLIER

THE VORTEX STORY



VORTEX services

QUADEX A VORTEX COMPANY

SCHWALM USA

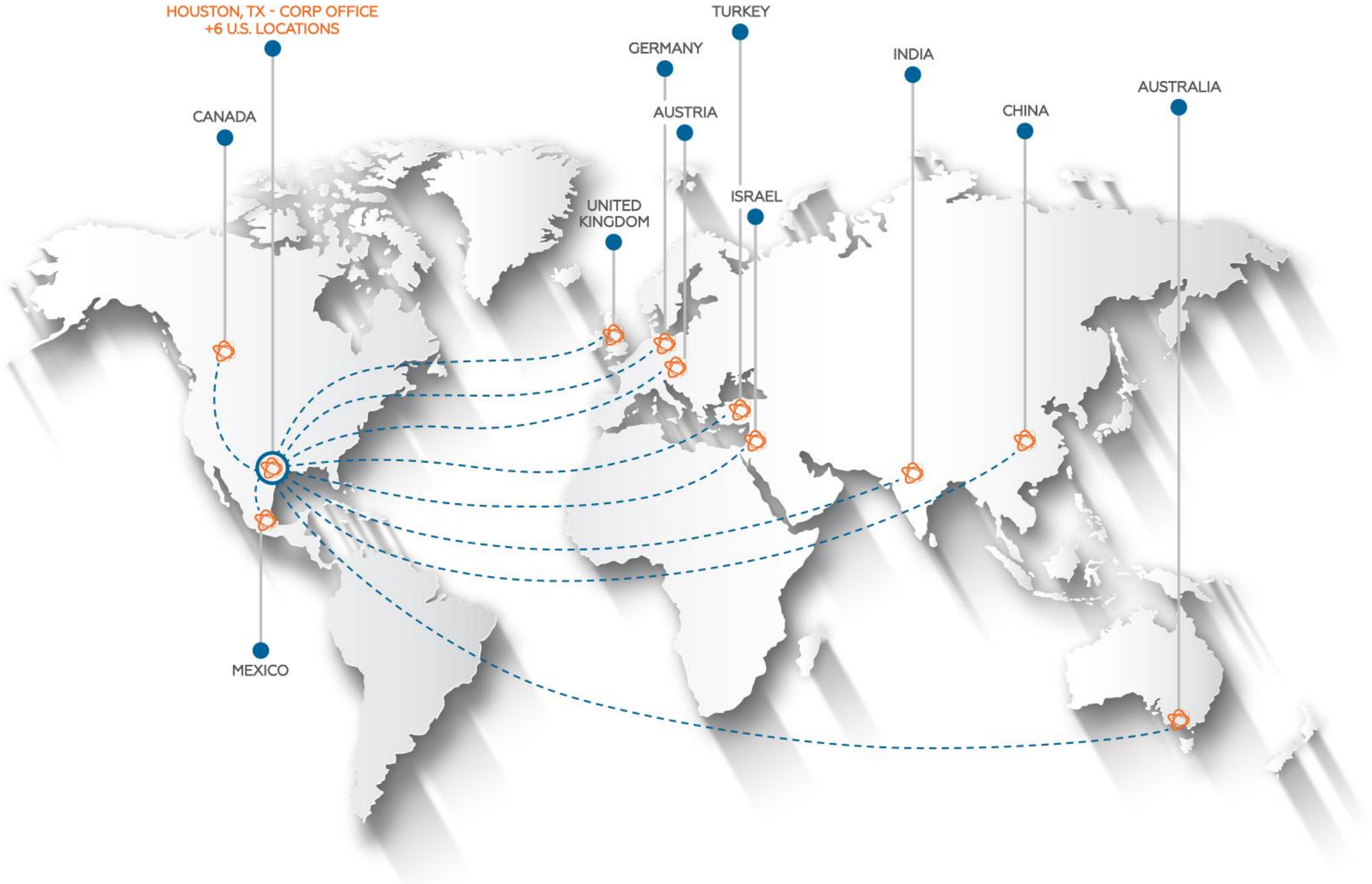
PICOTE LIFE FOR PIPES

RICOR services A VORTEX COMPANY

STAG technologies A VORTEX COMPANY

TED BERRY company, llc A VORTEX COMPANY

GLOBAL PRESENCE



VORTEX COMPANIES

OFFICE LOCATIONS

HOUSTON, TX
Corporate Office

ARVADA, CO
Ricor Services

GREENVILLE, SC
Vortex Products & Services

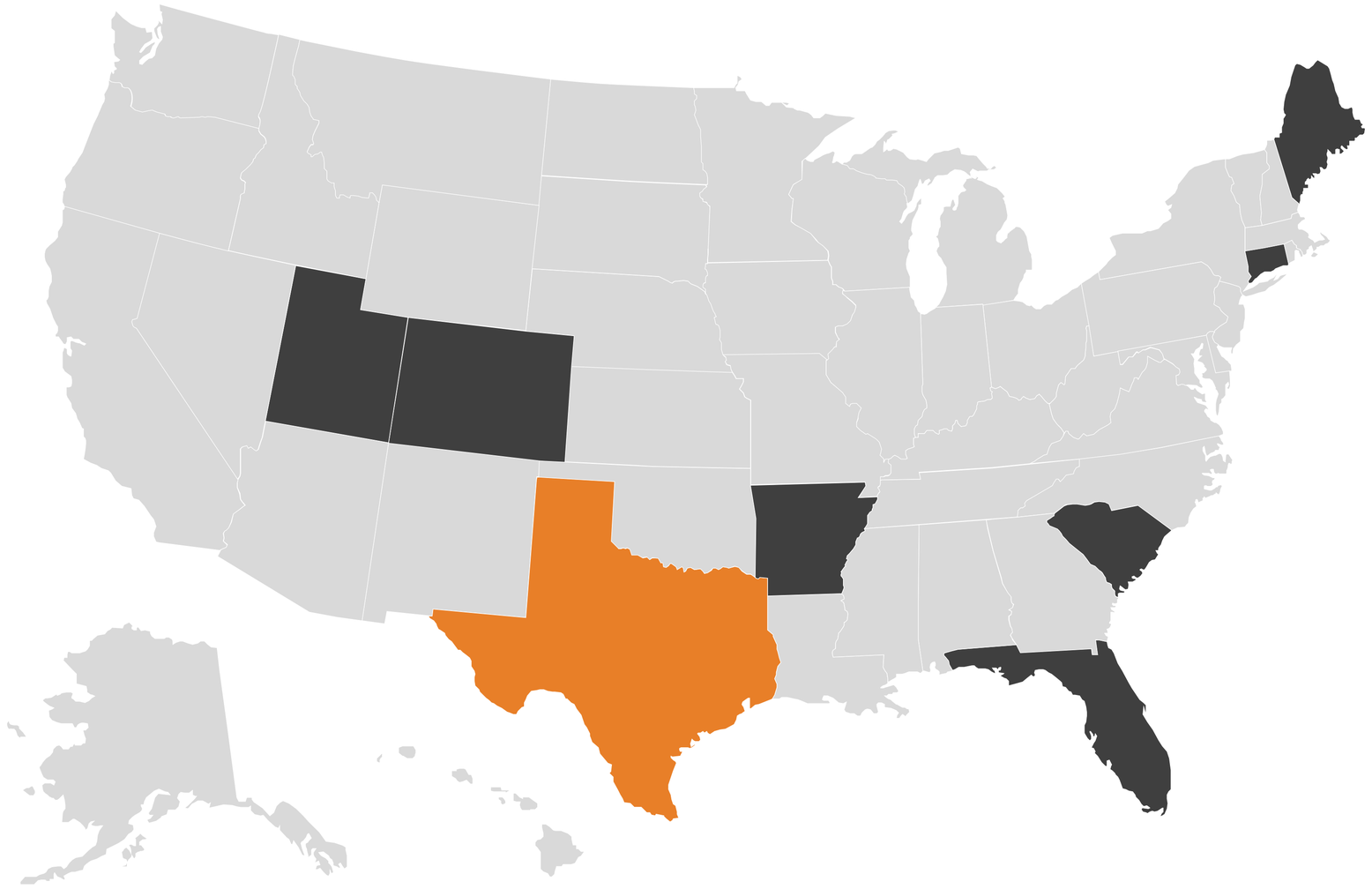
LITTLE ROCK, AR
Quadex LLC

LIVERMORE, ME
Ted Berry Company

PUTNAM, CT
Vortex Services

SANDY, UT
Stag Technologies

TAMPA, FL
Vortex Services



VORTEX COMPANIES

INFRASTRUCTURE IN CRISIS

INFRASTRUCTURE IN CRISIS

INFRASTRUCTURE REPORT CARD

UNITED STATES WASTEWATER INFRASTRUCTURE

GRADE MAKE-UP

- OPERATION & MAINTENANCE
- CONDITION
- RESILIENCE
- CAPACITY
- INNOVATION
- FUNDING
- PUBLIC SAFETY
- FUTURE NEED

D+

A	EXCEPTIONAL, FIT FOR FUTURE
B	GOOD, ADEQUATE FOR NOW
C	MEDIOCRE, REQUIRES ATTENTION
D	POOR, AT RISK
F	FAILING/ CRITICAL, UNFIT FOR PURPOSE

VORTEX companies

OVERALL ANNUAL CAPITAL GAIN FOR WATER INFRASTRUCTURE

(in billions)

YEAR	SPENDING	NEED	GAP
2010	36.4	91.2	54.8
2020	41.5	125.9	84.4
2040	51.7	195.4	143.7

Sources: Needs calculated from EPA (1997a, 1997b, 2001, 2003, 2005, 2008, 2009, 2010). Spending calculated from CBO (2010) and USCB (2011a, 2011b). Consumer price index adjustment from BLS (2011).

INFRASTRUCTURE IN CRISIS

LOCAL SPENDING

It is estimated **local governments** spend…

- $20 billion a year on capital sewer expenditures
- $30 billion annually on operation and maintenance

95% of spending on WATER INFRASTRUCTURE is made at the **local level**

Source: https://www.infrastructurereportcard.org/wp-content/uploads/2017/01/Wastewater-Final.pdf

VORTEX companies

INFRASTRUCTURE IN CRISIS

OPERATION & MAINTENANCE

Approximately half of total annual expenditures in the wastewater sector go to operation and maintenance (O&M) and this share will likely rise further against capital investments.

“maintenance costs are expected to escalate from $93 billion needed in 2016, to $108 billion in 2025, and $134 billion in 2040”

Sources: https://www.infrastructurereportcard.org/wp-content/uploads/2017/01/Wastewater-Final.pdf
https://www.infrastructurereportcard.org/wp-content/uploads/2016/10/ASCE-Failure-to-Act-2016-FINAL.pdf

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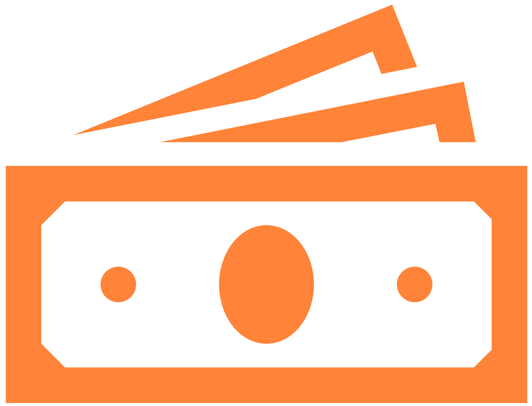
INFRASTRUCTURE IN CRISIS

WASTEWATER NEED



"The EPA estimates **$271 billion** is needed for wastewater infrastructure over the next 25 years."

Source: https://www.infrastructurereportcard.org/wp-content/uploads/2017/01/Wastewater-Final.pdf

ABOUT THE COMPANY

The Vortex Companies provide advanced trenchless products and services to help its customers cost-effectively renew water, sewer and industrial infrastructure.

Products

Multipurpose Cutters

Infrastructure Rehab Equipment

Coating & Lining Systems

Advanced Repair Materials

Polymeric Resins

Drain Cleaning Tools

Contract Manufacturing

Services

Engineering Design

Inspection and Cleaning

Pipe Bursting and Slip Lining

Manhole Rehabilitation

Pipe Lining and Coating

Turnkey Bypass

UV CIPP

VORTEX COMPANIES

COMMITMENT TO JOB SAFETY

BE ALERT. BE AWARE. BE SAFE.

OBJECTIVE: ACHIEVING ZERO ACCIDENTS

- Preventing accidents
- Mitigating occupational hazards
- Continuous training of personnel
- Provide proper Personal Protective Equipment (PPE)
- Social responsibility
- Established system for incident/accident investigation and corrective actions
- Understanding and complying with laws, rules and applicable regulations
- Environmental initiatives
- Creating a **Safety-First** Culture

PORTFOLIO OF SOLUTIONS

TURN-KEY CCTV/ CONTRACTING

SUPPORT

Inspection

Assessment

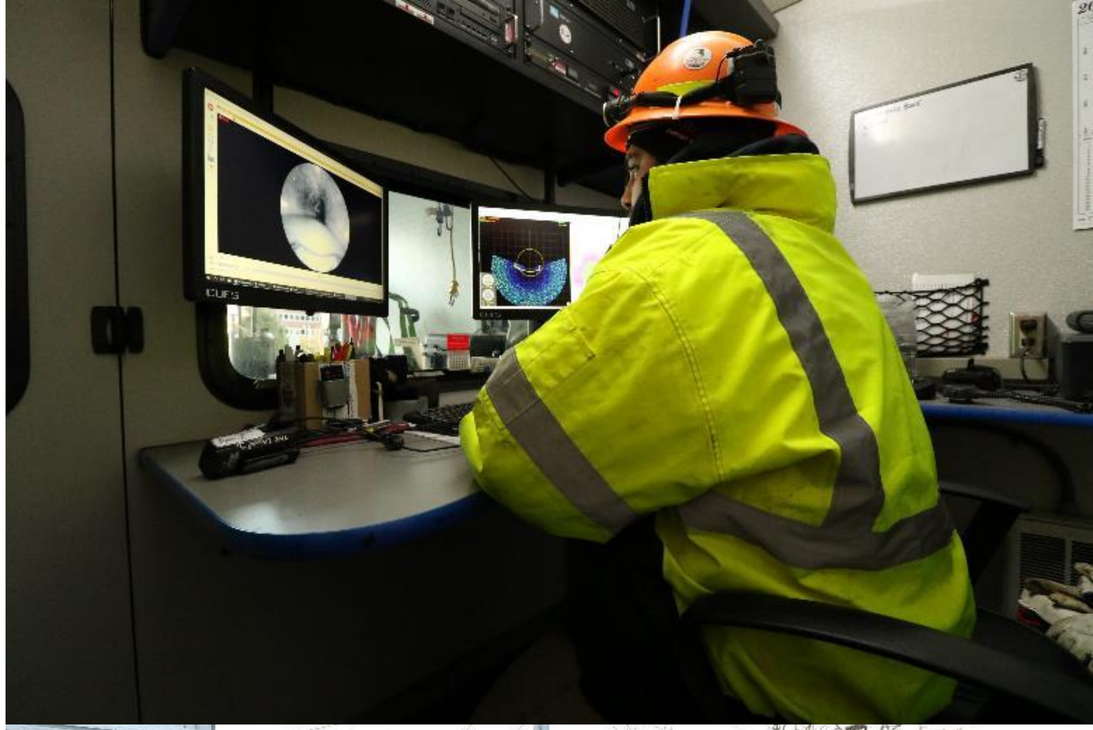
Pipe Cleaning

Chemical Grouting

MSI Inspection

Installation

Fleet Of CC/TV & CIPP Lining Equipment



PORTFOLIO OF SOLUTIONS

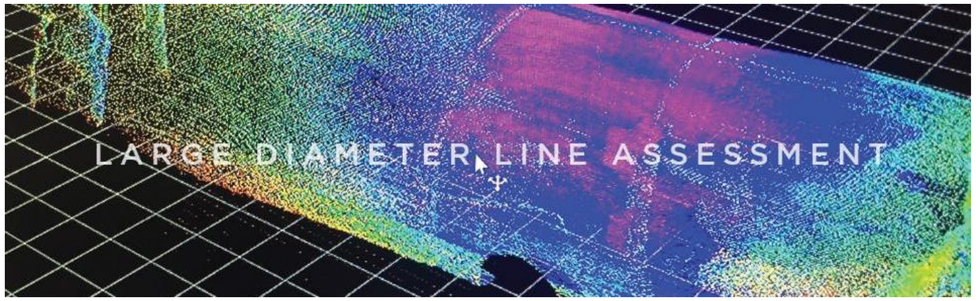
INSPECTION & CONDITION ASSESSMENT SERVICES

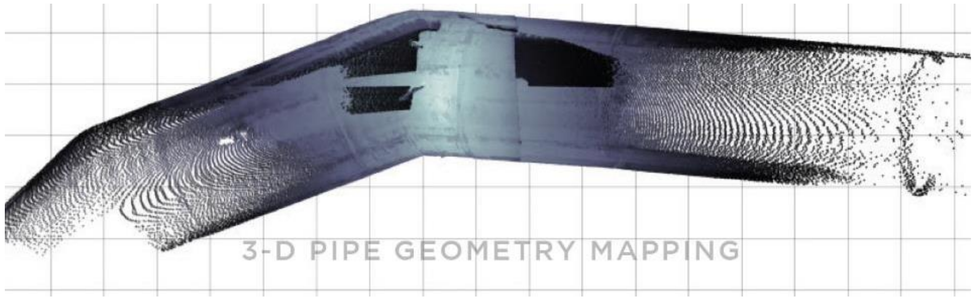
WHAT KIND OF SHAPE IS YOUR INFRASTRUCTURE IN?

Critical to addressing pipe defects before they get out of hand is to understand exactly what is going on inside your infrastructure. Let us help you assess the health of your pipe and manhole system.

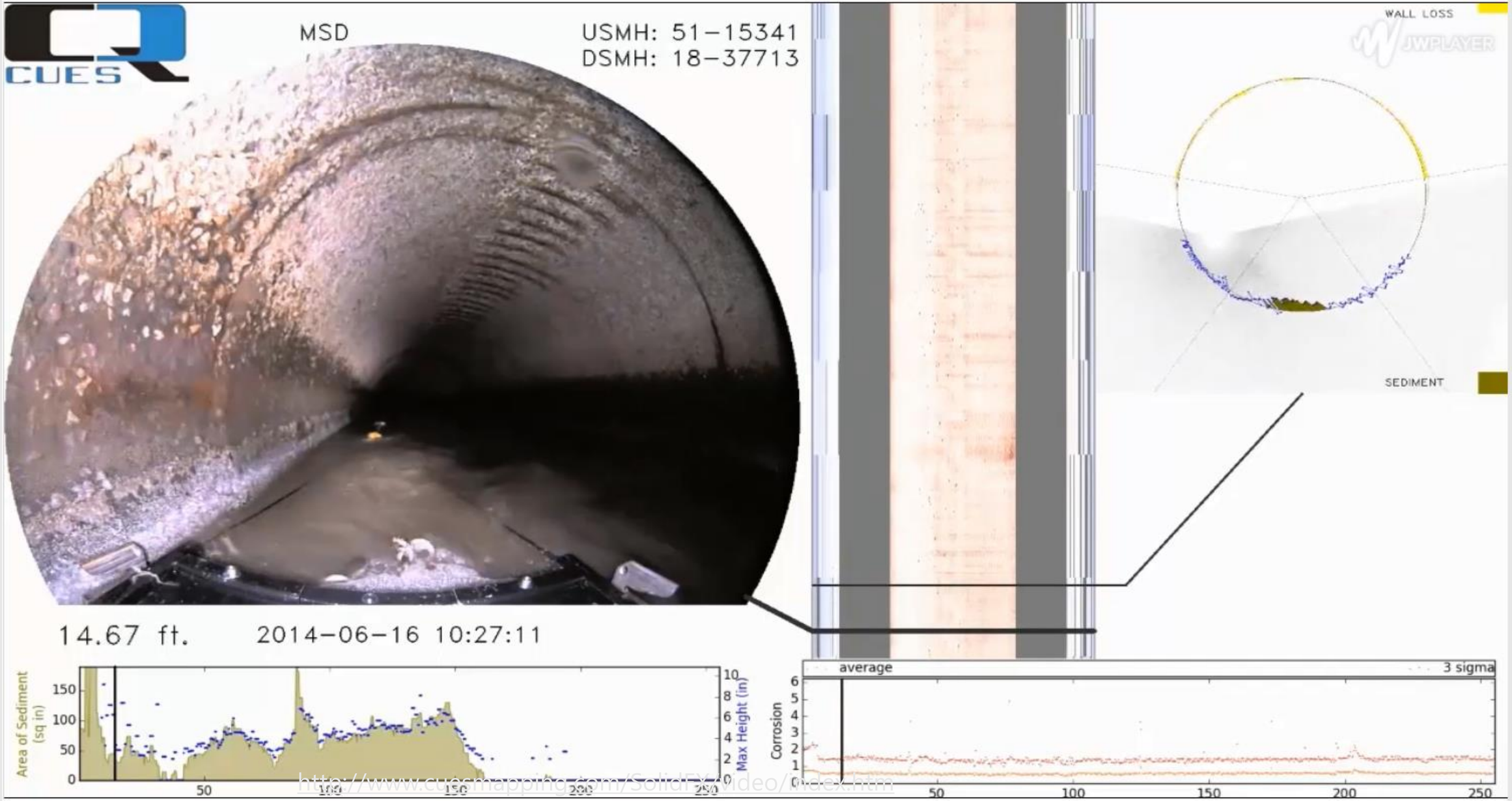
VORTEX SERVICES OFFERS:

- Standard Condition Assessment
- Multi-sensor Condition Assessment
- Manhole Assessment
  - Level 1 & Level 2
  - MACP & Non-MACP



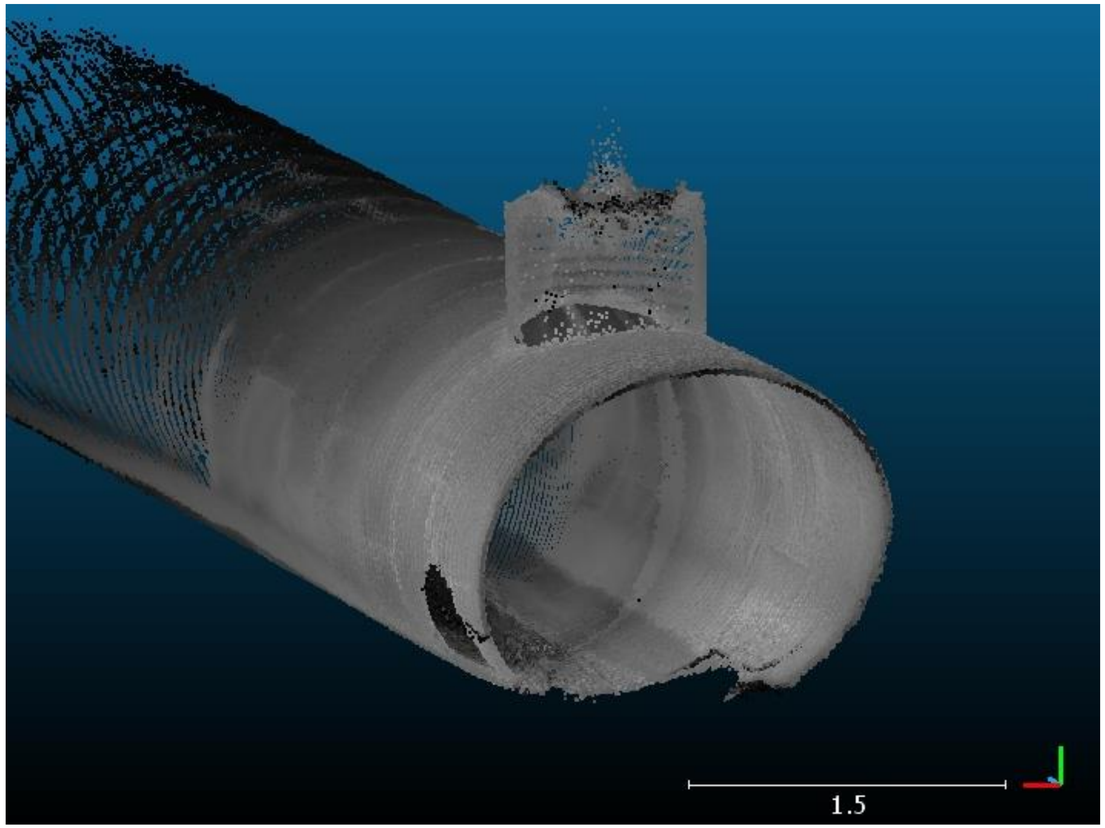


VORTEX companies


CUES
MSD
USMH: 51-15341
DSMH: 18-37713
WALL LOSS
JWPLAYER
SEDIMENT
14.67 ft.
2014-06-16 10:27:11
Area of Sediment (sq in)
Max Height (in)
average
3 sigma
Corrosion
http://www.cuesmapping.com/SolidFX/video/index.htm

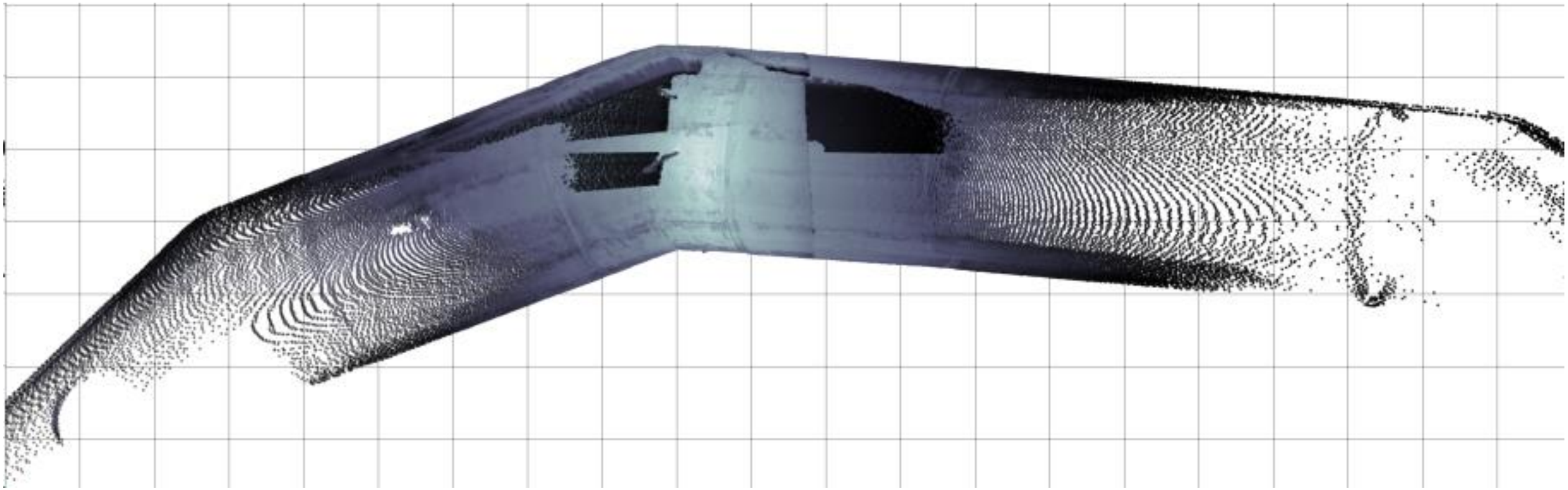
PORTFOLIO OF SOLUTIONS

3D LIDAR FROM POINT CLOUD



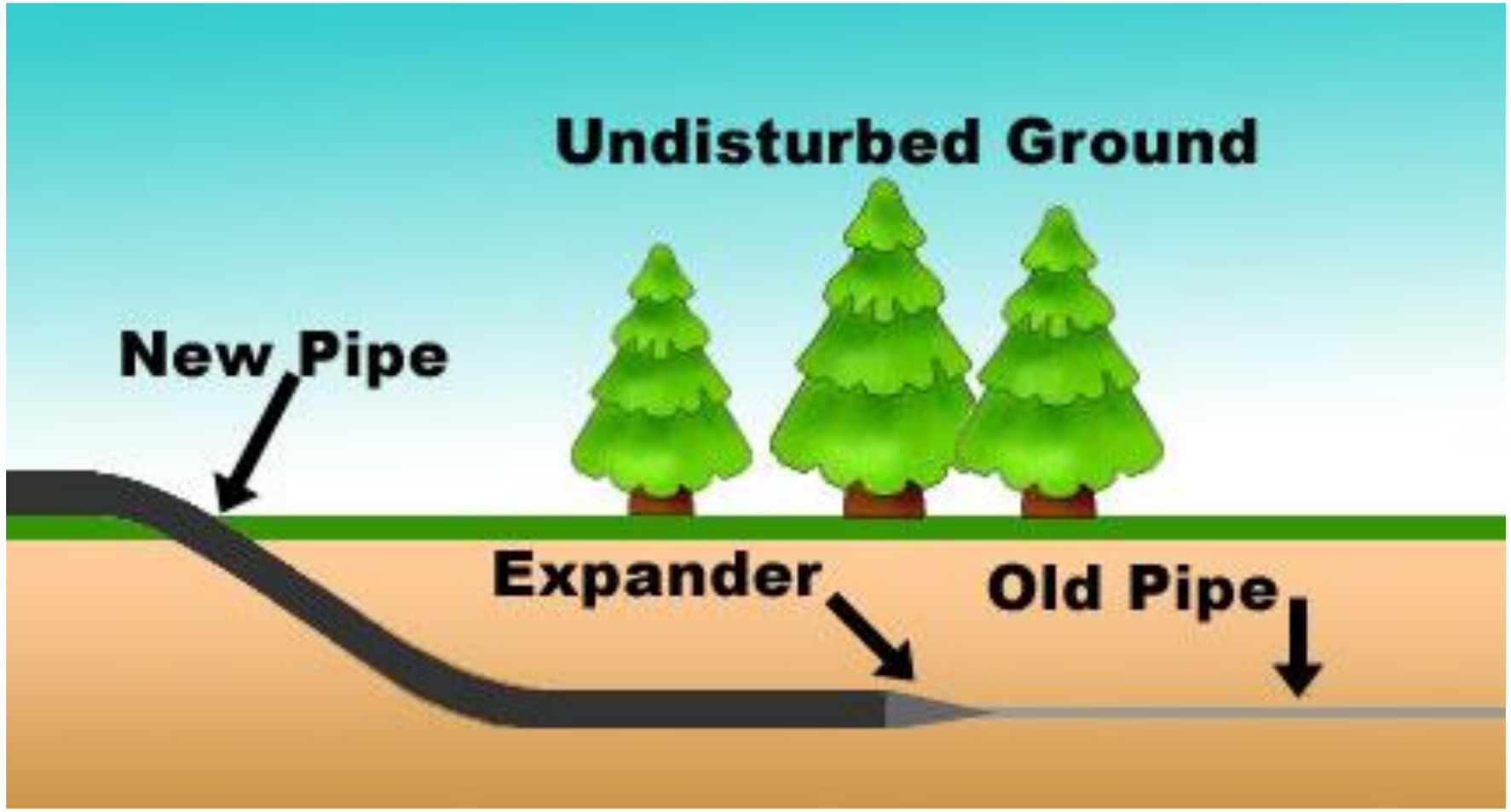
PORTFOLIO OF SOLUTIONS

MAPPING PIPE GEOMETRY IN 3D



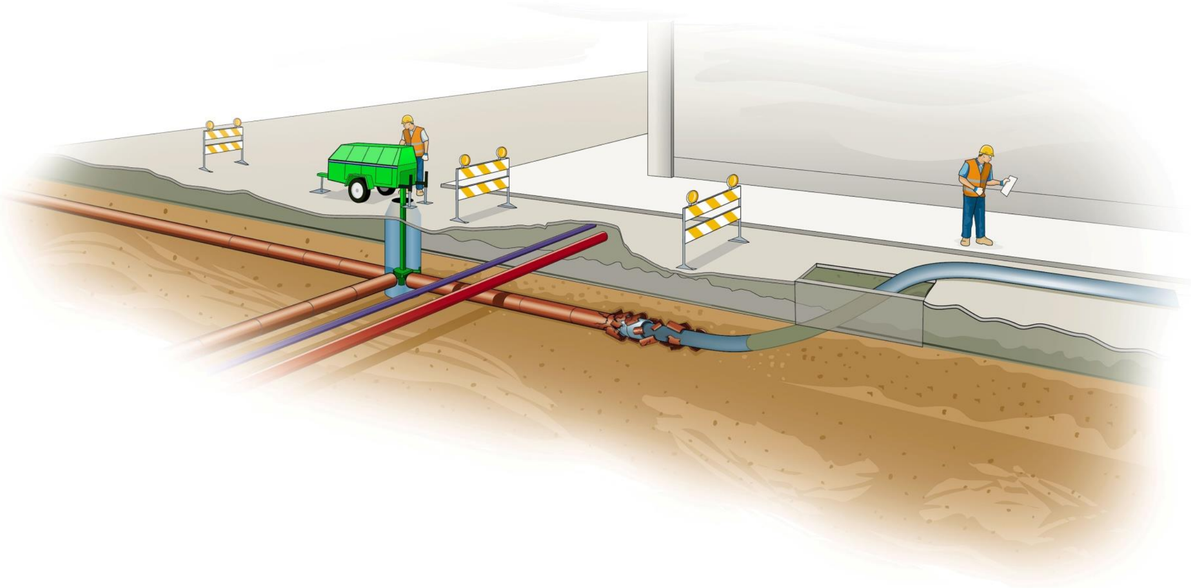
NO-DIG VS. TRENCHLESS

PIPE BURSTING



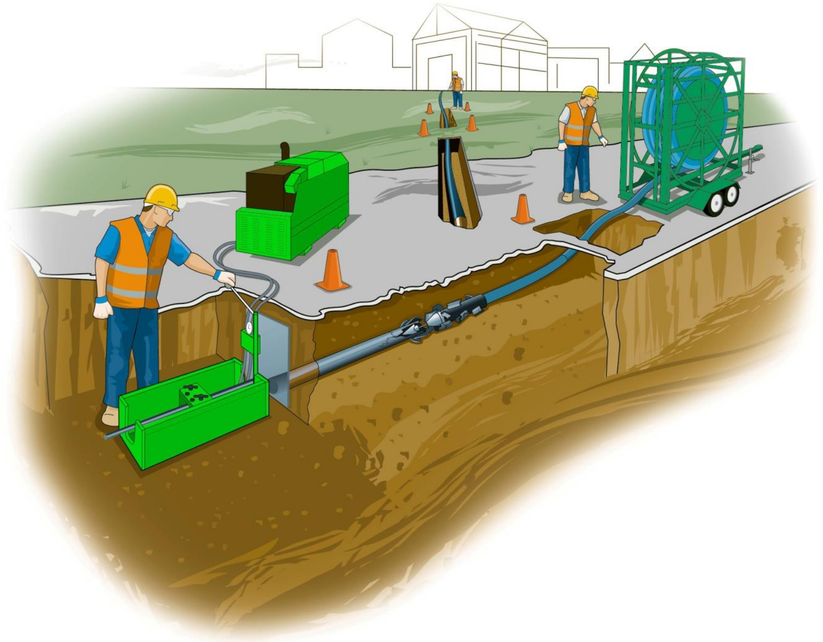
Pipe Bursting is a <u>replacement</u> technique NOT a rehabilitation technique.
Unlike rehabilitation methods a new factory manufactured pipe is installed.

PIPE BURSTING



Pneumatic

Is a method of replacing an existing pipe with a new pipe of the same or larger diameter by pulling a steel splitting head with pneumatic hammer through the pipeline with a hydraulic force required to fracture the pipe and tow the new pipe in place



Static

Is a method of replacing an existing pipe with a new pipe of the same or larger diameter by pulling a steel splitting head through the pipeline with a hydraulic force required to fracture the pipe and tow the new pipe in place

PIPE BURSTING

Pipe Receiving Pit

Pipe Insertion Pit

PORTFOLIO OF SOLUTIONS

SLIP LINING CASE STUDIES

CONTINUOUS (Can be HDPE or PVC)

Slip Lining 24″ CMP storm culvert with new 21″ HDPE pipe

SEGMENTAL (Various Materials Available)

Slip Lining 48″ brick combined sanitary sewer with new 42″ Hobas Pipe

NO – DIG SOLUTIONS

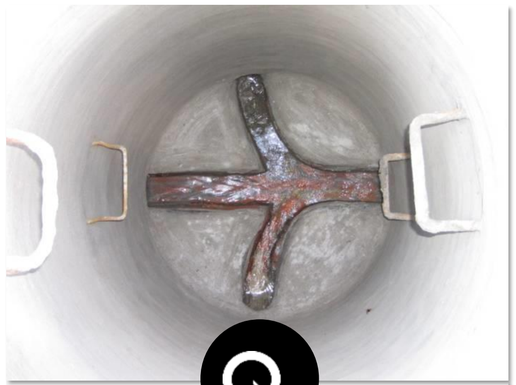
GEOPOLYMER PIPE LINING

PORTFOLIO OF SOULTIONS

REHABILITATION MATERIALS

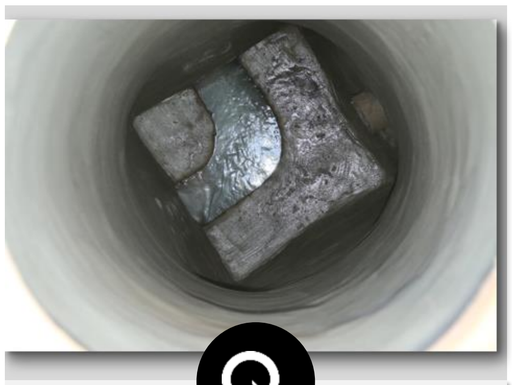
FROM STRUCTURAL SOLUTIONS, TO ANTI-CORROSION COATINGS, SEALANTS, GROUTS AND HIGHLY FLEXIBLE MATERIALS, QUADEX DELIVERS A FULL PORTFOLIO OF INFRASRUCTURE REPAIR MATERIALS

CONSTRUCTION MATERIALS



HYBRID CEMENTS

POLYMERIC MATERIALS



GeoKrete® GEOPOLYMER

QUADEX® LINING SYSTEMS

GEOPOLYMER PIPE LINING

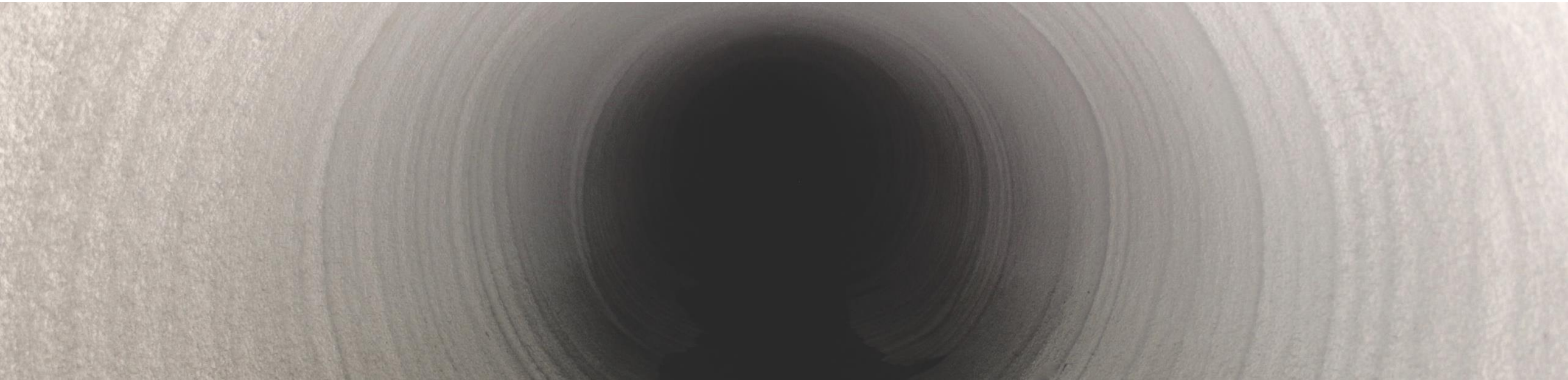
VORTEX companies

GEOPOLYMER PIPE RELINING

WHY GEOPOLYMER?

FULLY STRUCTURAL AND CORROSION RESISTANT REHABILITATION FOR LARGE DIAMETER STORM AND SEWER PIPE

- CAN BE APPLIED IN WIDE RANGE OF TEMPERATURES
- VERY LOW WATER CONTENT
- DOES NOT RESULT IN ANY REBOUND
- BONDS TENACIOUSLY TO HOST INFRASTRUCTURE
- EXCELLENT CORROSION PROTECTION
- MONOLITHIC LINER (NO COLD JOINTS OR CRACKING)
- 50+ YEAR DESIGN LIFE



GEOPOLYMER PIPE RELINING

APPLICATIONS

When Should Geopolymer Pipe Lining be Considered?

- 48” and greater
- Deep Pipe
- Pipes with Bends
- Non-Round Pipes
- CMP, Brick, Concrete, Stone
- Difficult Access

GEOPOLYMER PIPE RELINING

INSTALLATION PROCESS

FOR PROVEN STRUCTURAL RELINING

These steps must be taken to ensure proper application and long-term performance

1. Bypass/Flow Control
2. Pre-Clean
3. Patch & Plug
4. Application:
   - A. Spin Cast Geopolymer Pipe
   - B. Spray applied
   - C. Trowel applied

QUADEX® LINING SYSTEMS

GEOPOLYMER PIPE RELINING

SMALL FOOTPRINT

ONSITE MIXING

500+ LF FROM ONE ACCESS POINT

GEOPOLYMER PIPE LINING

BWSC WESTSIDE INTERCEPTOR

Mass General Hospital – Boston, MA

Dimensions: 54” x 36”, 1700 LF

Problems:

- Deteriorated and leaking brick sewer interceptor serving Massachusetts General Hospital and located in front of the ER entrance
- Three concrete beam “obstructions” inside sewer prevented entire sewer from being CIPP lined

Restoration Method:

Quadex® Lining Systems

- Spray applied 1.75” thickness
- Completed in 1 week
- Restored to 50+ year service life
- CIPP in rounded sections of interceptor

PROJECT CRITERIA

- Trenchless solution only option
- Minimal surface and street disruption
- Entrances/exits must remain open
- Environmentally safe method and materials
- Full structural restoration and corrosion protection
- Quick return to service

Suffering from mortar failure and infiltration.

Three concrete beam “obstructions” inside sewer prevented CIPP lining.

Located less than 30’ from hospital entrance.

Spray applied 1.75” thickness.

Completed in 1 week and restored to 50+ year service life.

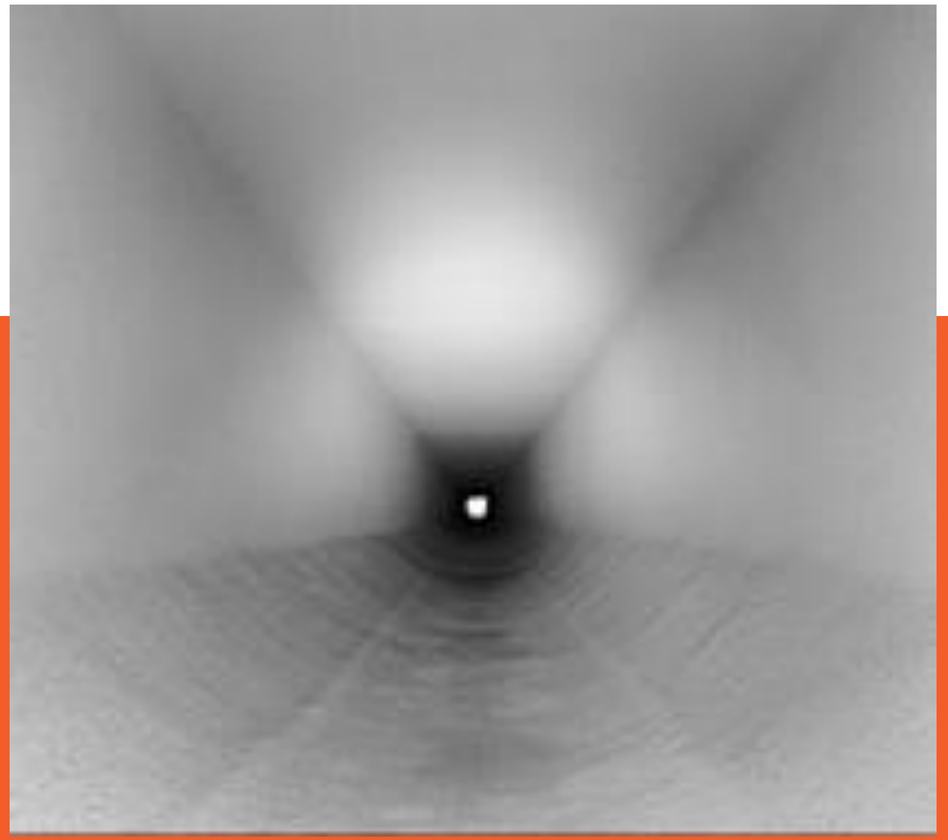
CCTV Camera inspection conducted at one year by owner.

GEOPOLYMER PIPE LINING

BRICK PIPE REHABILITATION

GEOPOLYMER PIPE LINING

RCP REHABILITATION



PORTFOLIO OF SOLUTIONS

REHABILITATION EQUIPMENT

Quadex™ sprayMASTER™

Manhole Rig

Quadex™ spinMASTER™

Manhole Application

Quadex™ sprayMASTER II™

Polymeric Coatings Rig

trekMASTER™

Off-road Manhole Rig

GEOPOLYMER LINING

MANHOLE REHABILITATION

Cheektowaga

Situation:

- City seeking a long-term manhole rehab solution
- Conducted pilot test to compare GeoKrete geopolymer to traditional, spray applied cementitious coating materials
- Each product lined 56 manholes

Restoration Method:

Three other products were tested against GeoKrete Geopolymer

All manholes were prepped, and linings applied per spec.

City inspected manholes several hours after initial application and then over period of several weeks.

PROJECT INFO

- Manhole lined with cementitious materials:
- Showed flaking after several hours
- Reveal cracks, some significant after a few weeks
- Manholes lined Quadex GeoKrete Geopolymer
- No Flaking after initial installation
- No cracking after a few weeks
- City chose GeoKrete for project

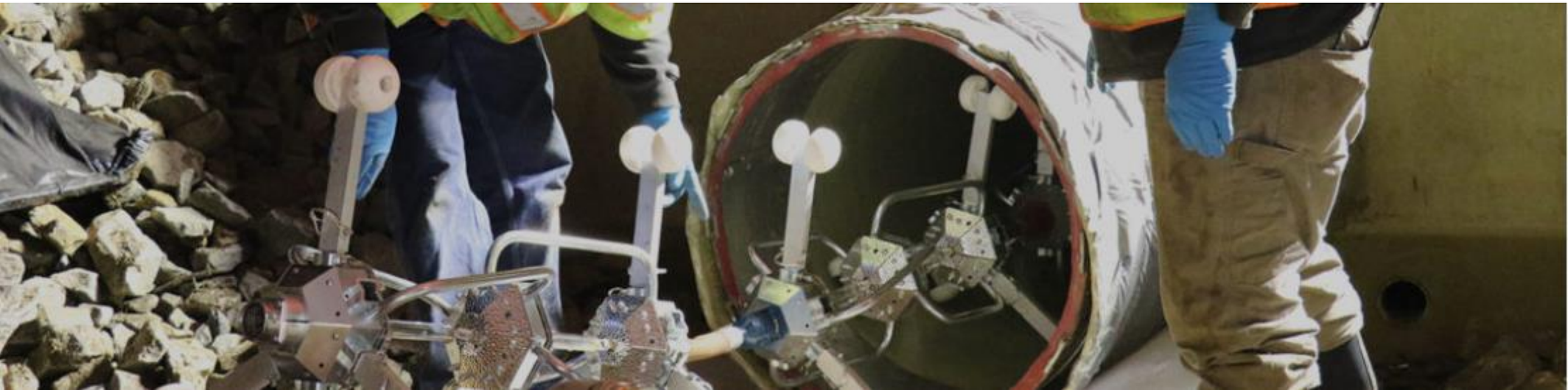
UV CIPP

VORTEX companies

PORTFOLIO OF SOLUTIONS

PROVEN UV CIPP SOLUTIONS

- DESIGN & INSTALL
- SEWER, STORM, PRESSURE
- UTILIZING UV CIPP



UV CIPP

UV CIPP is an advanced generation of cured in place pipe methodology and materials.

- Ultra-Violet Cure Process
- Exceptional QA/QC
- Small Construction Footprint
- Fully Structural Restoration
- Excellent corrosion protection
- 50+ Year Design Life
- Europe to North America

UV CIPP

When Should UV CIPP be considered?

- 6” – 60”
- Difficult Access
- CMP, RCP, Brick
- Environmental Sensitive Areas
- Outfalls
- I & I Issues, Root Intrusion
- Pipe Defects – Cracks, Fractures, Holes

PORTFOLIO OF SOLUTIONS

UV CIPP

PREP WORK

These steps must be taken to ensure proper application and long-term performance:

1. Bypass/Flow Control
2. Pre-Clean / CCTV Inspection
3. Slip-Sheet and Wench Cable

PORTFOLIO OF SOLUTIONS

UV CIPP

INSTALLATION PROCESS

These steps must be taken to ensure proper application and long-term performance:

Installation:

B. Liner Pulled into Place

C. Hydraulic Gasket, Packer for Inflation

PORTFOLIO OF SOLUTIONS

UV CIPP

INSTALLATION PROCESS

These steps must be taken to ensure proper application and long-term performance:

Installation:

D. Light Train Prep/Test

E. Liner Inspection

F: Light Train UV Cure

VORTEX companies

UV CIPP

FINAL PRODUCT

UV CIPP

Easily maneuverable equipment

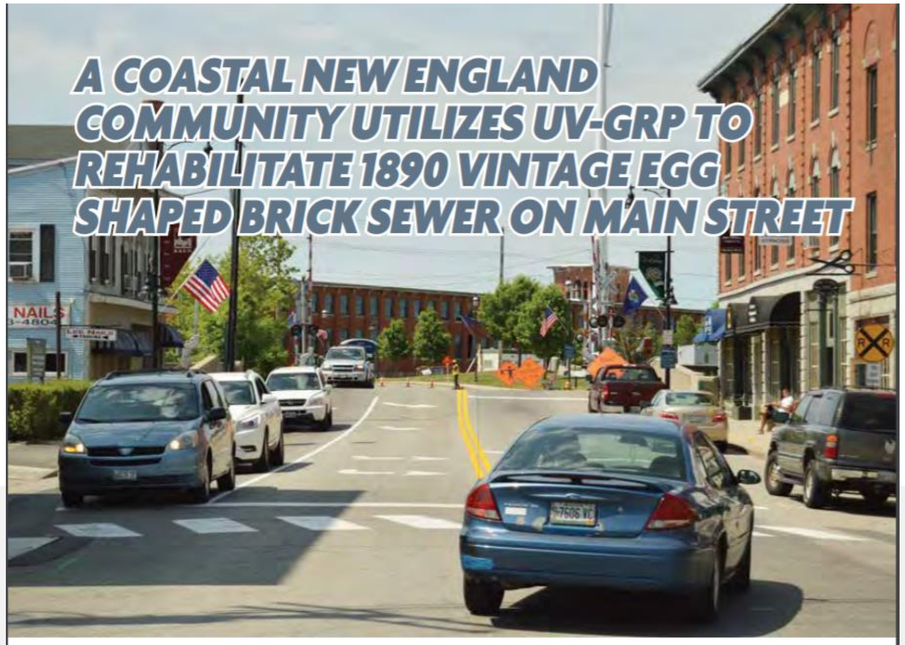
Equipment does not need to be right at manhole or over the pipe

Useful in hard to access areas and easements

No inversion tower needed at pipe or manhole

UV CIPP

CASE STUDY



A COASTAL NEW ENGLAND COMMUNITY UTILIZES UV-GRP TO REHABILITATE 1890 VINTAGE EGG SHAPED BRICK SEWER ON MAIN STREET

By: Peter Goodwin, Ted Berry Company

The City of Saco, Maine encompasses 53 square miles of prime real estate along Maine's Southern coastline and is located approximately 14 miles south of the City of Portland, Maine. Saco is a destination for residents and visitors alike due to its 2.5 miles of accessible coastline, and proximity to Portland, Maine, Portsmouth, New Hampshire, and Boston, Massachusetts along with major transportation links including the Maine Turnpike, US Route 1, and the Amtrak Downeaster rail station.

Saco has approximately 18,500 residents based on the 2010 US Census. Like many historic New England manufacturing communities, the initial sewer system was a combined sewer system conveying rainwater runoff, domestic wastewater, and industrial wastewater in the same pipe with direct discharges to the Saco River. In 1971, the City constructed its first wastewater treatment facility on Front Street along the Saco River to treat the combined sewage and upgraded it in 1988 to its current design capacity of 4.2 MGD. Since 1995, the City has been completing an aggressive sewer separation program to reduce the nine CSO discharges. The treatment facility is now known as the Saco Water Resource Recovery Facility (WRRF). The WRRF currently treats an average daily flow of approximately 2.5 MGD from 4,700 customer accounts. City staff have indicated that seasonal wet weather flows can increase to over 12 MGD at the facility.

Main Street in Saco is the backbone of a vibrant and bustling community stretching from the renovated Mills of Biddeford and Saco to the Town of Old Orchard Beach. In 1996, a large part of downtown Saco was nominated as a National Register Historic District, which acknowledges the rich architectural and social heritage that makes Main Street distinctive and important to the broader understanding of the history and culture of Maine. Historic buildings including Saco City Hall, constructed in 1855, line Main Street, which now includes local shops, businesses, and restaurants with high vehicular and pedestrian traffic. Saco is also a proud member of Main Street America Program with cultural activities occurring year round.

In the late 1800s with significant growth and industrial development, the City began constructing a combined sewer system with the trunk line consisting of a 39-inch egg shaped brick sewer below Main Street. In the late 1990s and

Each segment could be installed without bypass pumping if the work was done at night

determined that open cut construction was not an option for the sewer rehabilitation.

Based on previous success with trenchless technologies including pipe bursting and UV-GRP trenchless in the Bear Brook sewer-shed, the City decided to evaluate trenchless options as an alternative to open cut excavation. In addition to a CCTV inspection, a comprehensive field assessment determined that there were actually three different size egg-shaped segments along the Main Street length. It was also found that an emergency repair had been completed and a short section of 30-inch PVC pipe had been grouted into the line along 600 feet of manhole-to-manhole run. City staff recommended removal of this section and installation of a new manhole to allow for consistent installation of a UV-GRP liner from manhole to manhole.

The City prepared bid documents and publically bid the project in August 2017 using a UV-GRP specification. The Ted Berry Company, Inc. was the low bid at $ 297,500 with a second alternate bid for conventional thermal cure CIPP liner coming in slightly higher.

During the bidding process, Ted Berry Company Inc. developed a detailed installation plan to maximize installation efficiency and reduce impacts to daily life for the Main Street businesses and residents. Based on flow data, it was

A motorized conveyor load system was used for liner placement into the existing manholes

UV CIPP

CASE STUDY

The egg-shaped sewer UVGRP liner was installed in seven sections completed in under two weeks

TRENCHLESS SUMMARY

- Inspection / Condition Assessment – Proactive vs Reactive
- Technology Selection
  - Pipe Bursting
  - Slip-Lining
  - Geopolymer Pipe Lining
  - UV CIPP
  - Manhole Rehabilitation
- No Dig vs Trenchless

HOW CAN WE HELP?

VORTEX COMPANIES

LOCATION

521 Federal Road

Livermore, ME 04253

CONTACT US

CCOLLIER@VORTEXCOMPANIES.COM

(207) 897-3348 OR (713)750-9081

HOURS

MON-FRI 8:00 – 5:00

MORE INFO

WWW.VORTEXCOMPANIES.COM

WWW.SHOPTRENCHLESS.COM

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