# **Pipelines 2017**

## Condition Assessment, Surveying, and Geomatics

Proceedings of Sessions of the Pipelines 2017 Conference

Phoenix, Arizona, USA 6 – 9 August 2017

**Editors:** 

Anna Pridmore Jim Geisbush

ISBN: 978-1-5108-4733-0

#### Printed from e-media with permission by:

Curran Associates, Inc. 57 Morehouse Lane Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2017) by American Society of Civil Engineers All rights reserved.

Printed by Curran Associates, Inc. (2017)

For permission requests, please contact American Society of Civil Engineers at the address below.

American Society of Civil Engineers 1801 Alexander Bell Drive Reston, VA 20191 USA

Phone: (800) 548-2723 Fax: (703) 295-6333

www.asce.org

#### Additional copies of this publication are available from:

Curran Associates, Inc. 57 Morehouse Lane Red Hook, NY 12571 USA

Phone: 845-758-0400 Fax: 845-758-2633

Email: curran@proceedings.com Web: www.proceedings.com Pipelines 2017 vi

## **Contents**

### **Bedding**

Sinkhole Locating and Corrosion Quantification with Pipe Penetrating Radar1
Csaba Ékes
Case Studies
Costs and Benefits for Pipeline Acoustic Fiber Optic Monitoring12 Nathan D. Faber
New Developments in Multi-Sensor Condition Assessment Using LiDAR, Sonar, and CCTV23 Csaba Ékes
Technology for Assessing the Condition of Your Pipelines: Two Decades in the Making
Condition Assessment
Overcoming the Challenges of Pipeline Conflicts on a Major Interstate P3
Sewer Superhighway: Fast Track for Large Diameter Consent Decree Pipeline48
Jeff Farnsworth and David Bennett
Water Research Foundation Project #4618: Status and Application of Cathodic Protection in the Water Utility Industry
Construction
Energy Savings in Water and Wastewater Transmission Systems through the Use of Air Valves

Pipelines 2017 vii

Lessons Learned Mapping Critical Pressure Pipelines: City of Ottawa
Case Studies
Practical Applications of Validation and Verification Protocols for Infrastructure Asset Management Models and Tools
Buried Pipeline Utility Relocation for Light Rail Transit in Phoenix What Is the Best Project Delivery Method?101 Tricia Cook
Construction and Rehabilitation Poster
An Assessment of UAS-Based Photogrammetry for Civil Integrated  Management (CIM) Modeling of Pipes
Collection and Compilation of Water Pipeline Field Performance Data124 Sunil Sinha and Lee Sears
Integrated Analysis of Aerial and Terrestrial Imagery Data for Efficient and Effective Water Loss Mapping of a Canal System
Optimizing Utility Investigations on Large Design-Build Projects148 James H. Anspach and Robert E. Ramsey
Contingency Planning and Design
A Drive to Confidence—Managing the Reliability of San Diego County Water Authority's Large Diameter Pipelines160 Martin R. Coghill
Drinking Water Distribution Systems Asset Management: Statistical  Modelling of Pipe Breaks
Increasing Sustainability in Small Utilities through GIS and Asset  Management

Pipelines 2017 viii

### Design

Just When You Thought You Had Seen It All—The Value of High Frequency Pressure Data199
Kevin Fisher, Shonnie Cline, and Cliff Jones
A Marriage of Robotics and Remote Field Technology to Inspect Un-Piggable Pipeline Sections
River Rejuvenation along Heritage Site: Drainage and Sewerage Infrastructure Condition Assessment, Planning, Design, and Upgradation213 Raman Kumar, Deepika, and Foster McMasters
Next Generation Laser Profiling226
Tammy Cleys, Daniel Buonadonna, Sam Cancilla, and Justin Starr
San Francisco Public Utilities Commission Hetch Hetchy Water and Power Kirkwood Penstock Short Term Risk Reduction Measures
Precision Tracking of Pressure Events: "What's Going on in My Transmission Pipeline Loop?"
Design-Build Alternative Delivery
Bringing Risk Out into the Miami Dade Sunshine—5,300 Miles of Pipeline, Which Mile Is First?
Finding Effeciency in Modern Force Mains
Real-Time Defect Detection in Sewer Closed Circuit Television Inspection Videos
Saeed Moradi and Tarek Zayed
So Now What? Tough Decisions When Monitoring a PCCP Transmission  Main
Damion Lampley, Jorge Rodriguez, and Mike Jacobson
Sustainable Leakage Monitoring Systems for Water Distribution  Pipeline Networks

Pipelines 2017 ix

The Case for Indefinite Life Facilities in Water and Wastewater	221
Conveyance	.331
Using a Phased Approach to Plan for Condition Assessment of a Lime Slurry Force Main Using In-Line Inspection Technology	337
Watermain Asset Management Ben Pressman, Sandra Rolfe-Dickinson, Bethany McDonald, and Graham Bell	348
Distribution Transmission	
Development of a Quality Assurance Process for Sewer Pipeline Assessment and Certification Program (PACP) Inspection Data Hossein Khaleghian, Yongwei Shan, and Phil Lewis	360
Managing Your Infrastructure's Mid-Life Crisis: Strategic Pipeline Renewal for Distribution Mains Susan Donnally and Paul DiMarco	370
Using Advanced Computational Modeling to Select the Appropriate Level of Structural Rehabilitation for Ductile Iron Pressure Pipes John C. Matthews, Ali Alavinasab, and Masood Hajali	381
Wichita Rapid Assessment and Repair of Critical 66-Inch Pipeline	389
Emergent Technologies	
Extending the Service Life of a Brick and Cast-in-Place Concrete Sewer Bryon Livingston and Andy Clements	399
Large Diameter Sewer Assessment: When to Take It to the Next Level? V. Firat Sever, Jeremy Cawley, Zachary Neukam, John Schroeder, and Marc Lehmann	.405
Siphon 1 Failure Analysis	.419
GIS and Alternative Project Delivery	
Condition Assessment of 30-Inch Steel Force Mains	<b>430</b> d

Development of Guidelines for Managing Stormwater Pipe Assets—Utility Perspective Case Study Approach442
Vivek Prasad Velayutham Kandasamy and Sunil K. Sinha
High Pressure
Financial Optimization of Condition Assessment Spending for Pipeline Replacement Programs454
Kevin Laven, Fionn Boyle, Roel Diemel, Muhammad Tak, Asif Noor, and Paul Murray
<b>Seymour-Capilano Filtration Project: Transient Analysis Field Testing463</b> Michael Georgalas
Inspection
City of Phoenix Water Services Water and Sewer Assessment and Rehabilitation Program: Yesterday and Today
Developing and Implementing a PCCP Condition Assessment Program486 Gen Nielsen, Amanda Shane, Peter D. Nardini, and Rasko Ojdrovic
Theoretical and Experimental Basis of AWWA Standard C305 on CFRP Renewal of PCCP
Transmission Main Assessment in the City of Phoenix: Where Have We Been and Where Are We Going?
Large Diameter
An Optimal Preventive Maintenance Model for Natural Gas  Transmission Pipelines
Sharareh Kermanshachi, Mustafa M. Cobanoglu, and Ivan Damnjanovic  Analysis and Verification of PCCP Stiffness Testing Using Non-Invasive
Acoustics
Criticality Ranking and Condition Assessment of PCCP539 Peter D. Nardini, Rasko Ojdrovic, and Paul Pasko

Pipelines 2017 xi

Indian Bend Wash Side Inlet Pipe Assessment Using the NASSCO Pipe Certification Assessment Guidelines
Michael D. Heaton, Frank Brown, and Gregg Kent
Lessons Learned from Large-Diameter Pipe Failure Case Studies561 Jayantha Kodikara, Suranji Rathnayaka, Jian Zhang, Craig Crawly, David Zhang, and Frank Blaha
Olmsted Power Plant Penstock Condition Assessment and Replacement572 Adam Murdock, K. C. Shaw, Tim Petty, and Mitchell Dabling
Simultaneous Cable-Less Video Inspection of Pipelines with Integrated
Leak Detection
Use of Downhole Instrumentation to Reduce Risk of Inadvertent Return ("Frac-Out")596
N. H. Strater, D. Crumpton, J. Seibert, G. Thomas, J. Bardwell, Ralph Young, Colby Jesset, and Brian C. Dorwart
Using Risk Models and Automated Defect Characterization Algorithms to Convert PACP Data into Capital Upgrading Programs for ALCOSAN605 Chris Macey and Brad Croft
Utility Engineering Operation and Maintenance
Identifying Corrosion Zones in Coastal Regions for Metal Pipes—A GIS Approach
banjay rewarrand raneis manning