

Pipelines 2021

Design

Proceedings of Sessions of the Pipelines 2021 Conference

Online

3 – 6 August 2021

Editors:

Duane Strayer

C. Douglas Jenkins

ISBN: 978-1-7138-3492-2

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© (2021) by American Society of Civil Engineers
All rights reserved.

Printed with permission by Curran Associates, Inc. (2021)

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

Contents

Alternative Delivery

Alternative Delivery for Emergency Multiple Installation-Method Replacement of 30/36-in. Dual Steel Force Mains with FRP1
 Gilbert Trejo, Jason Bowen, Michael Ancell, Doug Jenkins, Danny Maine, and Nancy Nuttbrock

Environmental Impact Assessment of Trenchless Cured-in-Place Pipe Renewal Method for Sanitary Sewer Applications10
 Vinayak Kaushal, Mohammad Najafi, Ramtin Serajiantehrani, and Mohammadreza Malek Mohammadi

Together We Are Better: How Using CMAR Project Delivery for a Multijurisdictional Transmission Pipeline Benefits the Owner and the Community21
 Jon Wicke, Michael D. Gossett, Steve Pool, and Keith Lemaster

Utility Coordination in Alternative Delivery Methods for Transportation Projects: Utility Responsibility Matrix and Design Development—Lessons Learned from Detailed Design Process and Construction31
 Juan Camilo Barrera and Tomasz (Tom) Bodera

Design Process

Critique of CANDE/AASHTO Soil Groups39
 Amster Howard and Mark Gemperline

An Enhanced Linear Project Resource Utilization Based on Line of Balance Technique49
 Eid Alagha, Abdulrahman Bin Mahmoud, and Ayman Altuwaim

Case Study—50% Labor Reduction, 30% Time Savings, and No Damages, No Delays, No Change Orders—No Kidding! Application of 3D Subsurface Utility Engineering per ASCE 38 Standard for Puget Sound Energy’s SR-510 Gas Pipeline Project58
 Philip J. Meis, Donald W. Haines, and Shawnté Anderson

Comparison of ASCE’s Unified Approach and Current Practice for Thrust Restraint Design of Continuous Pipelines—Welded Steel Pipe Example68
 Stephen Shumaker and Sri Rajah

Comparison of ASCE’s Unified Approach and Current Practice for Thrust Restraint Design of Segmented Pipelines Using Ductile Iron Pipe as Example	79
Sri Rajah and Steve Shumaker	
Forensic Study of a 96-in. PCCP Failure in Houston	89
Benjamin C. McCray, Singarpal S. Sekhon, James Wilson, and Gregory J. Henry	
Infrastructure Damage Prevention Approaches in the United States	102
Ahmed Jalil Al-Bayati	
Quality Management on Pipeline Projects—Observations from an Owner	109
Gary B. Savanyu	
The Review Phases of a Pipeline Design Project—Suggestions for the Reviewer and the Reviewee	118
Roger Beieler and James Chae	
<i>Seismic Considerations</i>	
Design of a Large Diameter Water Line at Active Fault Crossing	127
Meng Liu, Rafael Ortega, and Showri Nandagiri	
Evaluating Welded and Mechanical Pipe Joint Strength for Seismic Design—Part 2: Testing Set-Up	139
Chris C. Sundberg and Terri A. Tovey	
Seismic Ground Displacement and Pipeline Design Evaluation—A Case Study	149
Todd H. LaVielle, Geoffery Bee, Farid Sariosseiri, Yuxin Lang, and Mark D. Havekost	
Safeguarding the Integrity of Large-Diameter Steel Pipelines Subjected to Differential Ground Settlements	160
Dimitris Fappas, Gregory C. Sarvanis, Spyros A. Karamanos, Brent D. Keil, Richard D. Mielke, and Robert J. Card	
Seismic Vulnerability Assessment of Water Pipe Networks under Network Uncertainties	171
Abhijit Roy, Binaya Pudasaini, and Mohsen Shahandashti	
Strain-Based Design of a Large-Diameter Steel Water Pipeline Crossing Ground Settlement Areas	180
Gregory C. Sarvanis, Spyros A. Karamanos, Brent D. Keil, and Richard D. Mielke	

Sewermain Design

Experimental Study of a Noncircular Corrugated Steel Culvert at Different Shallow Cover Depths188
 Oliver Kearns, Ian D. Moore, and Neil A. Hoult

Finite Element Investigation of Corrugated Steel Pipe with Extreme Corrosion under Shallow Cover199
 Husam H. Hussein, Shad M. Sargand, Issam Khoury, and Fouad T. Al Rikabi

Investigation of Dynamic Impact Factor of Metal Multipipe Culvert under Shallow Cover.....210
 Issam Khoury, Husam H. Hussein, Shad M. Sargand, and Fouad T. Al Rikabi

It’s All True—Solid, Liquid, and Gas Don’t Mix in Inverted Siphons!221
 Matt Tooley and Roger Beielser

Local SSO Requires Regional Solutions231
 Gregory Henry, Joel Wilson, and Hemilkumar Patel

New Alignment Diverts Near Capacity Treatment Plant to Better Serve Fastest Growing South Carolina County.....241
 Ashley Yeh, Geoffrey Burdick, Johnathan Smith, and Mark Waters

New Bonnybrook Wastewater Treatment Plant Treated Effluent Outfall—Design, Contracting, and Construction Overview.....247
 Juan Morales and Darren Finney

Shallow Creek Crossing—Wye Bother? Split It!.....255
 Chris Bogert, Jared Barber, Elizabeth Byrd, and Kendall Ryan

Watermain Design

To SURGE or Not to SURGE, That Is the Question: Is Hydraulic SURGE Analysis Needed?264
 Jesse Ellis and Tom Hill

A Discussion on Pressure Standards and Its Effect on Water Distribution System Design and Operation.....274
 Vali Ghorbanian

Challenges with Maintaining Potable Water Quality—Designing Large Diameter Water Mains for Demands of Today and Tomorrow282
 Brandon Gorr, Cian McDermott, and Joseph Ng

Changing Regulations and New Developments along a Pipeline Alignment over an Extended Design Timeframe.....289
David Warner, Alan Moon, Paul Vining, and Showri Nandagiri

Designing Concrete Pressure Pipe to Resist Corrosion.....297
Richard I. Mueller and Yan Lan

Discharged Large Diameter Pipeline for Coal Fired Generation Plant by PE-sGF in Japan306
T. Mitsuaki, W. Yoshitaka, S. Yuichi, and K. Toshinori

Evaluating Intake Pipeline Hydraulics to Optimize Contra Costa Water District’s Rock Slough Intake316
Rachel Philipson, Stan Ali, Lloyd Slezak, and Dusan Stanisic

Refocusing Design for Water Line Replacement on a Pier Supporting Important Maritime Activities.....326
Charles Herckis

Fort Laramie Tunnel No. 2 Collapse and Repair—Lessons Learned.....336
Numan R. Mizyed and Wylie C. Duke

Getting across a Mile-Long Floodplain: Design and Maintenance Considerations344
Jonathan Shirk, Elizabeth R. Blackwelder, Courtney Jalbert, and Jason Gehrig

Increasing Redundancy to Prevent Water Service Disruption in Houston.....354
Benjamin C. McCray, Mackrena L. Ramos, Panduranga Kuruva, and Anh Hunter

Let’s Take a Second Look: HDPE Piping for Large Diameter Applications.....361
David Landing and Marcel P. Dulay

Making Connections to Concrete Pressure Pipe.....371
Andrew E. Romer and Richard I. Mueller

Northeast Transmission Line 108” × 84” Interconnect—Innovative Design Strategies to Overcome Space Constraints.....379
Christine H. Kirby, Eric I. Hernandez, J. Warren Green, Bob Card, Kevin Tran, and Ram Chakradhar

The Implementation, Outcome, and Lessons Learned of “Design Considerations for Dual 96-in. Water Transmission Pipeline Pig Retrieval Station and Flow Distribution Basin”388
Joshua Tebbe and Dorian French

Pipeline Triple-Double—Designing for Three Pipe Materials with Two Diameter Alternates395
 Hunter Hanson

San Patricio Water Transmission Pipeline—Multiple Pipe Solutions.....401
 Jeffrey LeBlanc, James Schwarz, and Luke Fontenot

Scour Power—An In-Depth Risk Analysis for Large Pipeline Creek Crossings.....409
 Hunter Hanson

Swamp Pipeline—Design and Construction of a 66-in. Pipeline in Awful Ground Conditions.....416
 Eric Engelskirchen, Travis Williams, Chad Sharbono, and Amanda Stubblefield

The Challenge of Air Valve Selection in Pumping Systems425
 Leila Ramezani and Jean-Luc Daviau

The Story behind Alberta’s Longest Regional Water System437
 Stephan Weninger

Updated and Advanced—3rd Edition of AWWA’s Manual 23 Provides Consensus Guidance for Designing and Installing PVC Pipe.....446
 Bob Walker

Welcome Neighbors! Upgrading an Existing Regional Water System to Extend the Service Footprint457
 Breagh Peel, Stephan Weninger, and Johnny Ke