



# PIPELINES 2017



Planning  
and Design



Selected Papers  
from the Proceedings  
of Pipelines 2017

**ASCE**

**EDITED BY**

Anna Pridmore, Ph.D., P.E.

Jim Geisbush, P.E.



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# PIPELINES 2017

## *Planning and Design*

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PROCEEDINGS OF SESSIONS OF THE PIPELINES 2017  
CONFERENCE

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August 6–9, 2017  
Phoenix, Arizona

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# Preface

It is an exciting time to be in the pipeline industry. The importance of pipeline infrastructure is becoming more recognized as a major issue in sustaining and maintain our infrastructure. These pipelines provide a vital role in our everyday life from supplying drinking water to collecting wastewater, conveyance of petroleum products and other fluids; we depend greatly on pipelines in every aspect of our lives, every day.

This year the theme *Reliability and Resiliency through Sustainable Design and Construction* focused on the growing need to properly design, operate and maintain our infrastructure that is more resilient and sustainable in the life cycle of our infrastructure.

In coordination with the American Society of Civil Engineers, the technical program and this publication was planned and implemented by the Technical Program Committee (TPC), which was led by the Technical Co-Chairs. This is the second year we included the surveying and GIS systems in the conference and welcome their added experience to pipelines. We received a high number of abstracts for both papers and posters. Nevertheless, a selection process based on a scoring system, followed by the TPC discussion on the abstracts with a critical score, resulted in a high quality technical program with eight program tracks, and for the first time in several years a dedicated poster session with over 25 posters.

With the growing emphasis on managing pipeline assets and utility infrastructure more effectively, multiple tracks for Planning and Design, Condition Assessment and Rehabilitation were selected. Additionally, tracks on Surveying/Geomatics & Utility Risk Management were selected based on the number of quality abstracts provided. These eight tracks include 72 sessions of technical paper presentations with 175 individual presentations, including special panel discussions on Direct Pipes; Claims Reduction; Geospatial Technology; Arizona Pipelines Owners; new Surveying Engineering Manual; and a session on engineering ethics by ASCE. For publication purposes, technical papers from the eight presentation tracks were consolidated into the following three subjects: 1- *Pipelines 2017: Planning & Design*, 2- *Pipelines 2017: Condition Assessment/Surveying & Geomatics*, and 3- *Pipelines 2017: Construction & Rehabilitation*.

The overall program was further enhanced by six technical pre-conference workshops covering: AWWA Manual M11 – Steel Pipe, A Guide for Design and Installation; Large Diameter Pipelines Forum; Pilot Tube and Other Guided Boring Methods of Manual Practice; Putting “Grid” at “Ground”: Optimized Design of Low Distortion Projections; Steel Water Tanks; and Sustainable Design of Pipelines.

Our intent was to prepare a balanced technical program with today’s trends and best practices in the pipelines and surveying industry. We are also delighted to receive papers and posters from all over the globe, thereby, making this year, another premiere international conference on pipelines. On behalf of the Technical Program Committee, we are pleased to offer you the Proceedings of ASCE Pipelines 2017 “*Reliability and Resiliency through Sustainable Design and Construction*”.

We hope that you will find this year’s papers educational and worthwhile.

Yours truly,

Anna Pridmore, Ph.D., P.E., M.ASCE and Jim Geisbush, P.E., PMP, M.ASCE  
Technical Co-Chairs

# Acknowledgments

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### Technical Program Co-Chairs

Jim Geisbush, PE, PMP      Central Arizona Project  
Anna Pridmore, PhD, PE      Structural Technologies

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Britt Klein, Tucson Water

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Andy Dettmer, PhD, PE	Pure Technologies	Planning & Design Track
Mark Mihm, PE	HDR	Planning & Design Track
Michael Dennis, RLS, PE	Geodetic Analysis	Survey/Geomatics & Utility Risk Management
Dan Buonadonna, PE	CH2M	Extra Track

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Nathan Faber, PE - Large Diameter Pipeline Forum  
Jeff Boschert, PE - Pilot Tube and Other Guided Boring Methods of Manual Practice  
Michael Dennis, RLS, PE - Putting “Grid” at “Ground”: Optimized Design of Low Distortion Projections  
Wayne Geyer - Steel Water Tanks  
Walt Schwarz, PE - The Sustainable Design of Pipelines

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Frank Kim	

The Technical Program Co-Chairs and the Steering Committee would like to thank the over 80 individuals which participated as part of the 2017 Technical Committee. Everyone worked as a team to review abstracts, papers, and posters, and continued to collaborate throughout the construction of this

year's technical program. Most of the below technical committee members also served as moderators for the conference.

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The Technical Program Co-Chairs also thank the authors and exhibitors for their dedication to the industry in presenting at this conference. Without your contributions, the conference would not be possible.

And lastly, the Technical Program Co-Chairs express special thanks to Sam Ariaratnam and Britt Klein, Conference Co-Chairs, and the Steering Committee for their efforts and leadership during the planning and execution of Pipelines 2017 Conference.

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