World Environmental and Water Resources Congress 2019

EWRI History and Heritage Symposium

Selected Papers from the
Proceedings of the
World Environmental and
Water Resources Congress 2019

Pittsburgh, Pennsylvania
May 19–23, 2019

ASCE

Edited by

Gregory F. Scott, P.E.

1999-2019
ENVIRONMENTAL & WATER RESOURCES INSTITUTE

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SPONSORED BY
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Preface

We are excited to offer the proceedings of the 2019 World Environmental and Water Resources Congress. The proceedings include published papers from an engaging and challenging array of technical sessions, posters, and workshops at the Environmental and Water Resources Institute's (EWRI) 19th Annual Congress, held in Pittsburgh, Pennsylvania, May 19-23, 2019. This conference is a leading venue for professional interaction among engineers and scientists, covering disciplines related to water and environmental resources and infrastructure.

America's infrastructure is in urgent need of attention. The 2017 American Society of Civil Engineers' Report Card for America's Infrastructure estimates that an investment of over $4.5 trillion is needed to return the nation's infrastructure to a state of good repair. Of critical importance to the public's health and safety are the needs of water focused infrastructure. The Environmental Protection Agency (EPA) estimates that wastewater and stormwater collection and treatment needs are $271 billion as of January 2012 and drinking water utilities needs are $472.6 billion as of March 2018. While significant, the needs are not limited to the United States alone. According to the World Health Organization (WHO), contaminated drinking water is estimated to cause 502,000 diarrheal deaths each year, and by 2025, half of the world's population will be living in water-stressed areas. Compounding the state of water infrastructure are on-going changes to the climate. Scientific evidence unequivocally indicates these changes are accelerating. While debate remains as to the causes and how best to slow, stop and/or reverse these changes, it falls to professionals in the water fields to address the challenges to rebuilding the world's water infrastructure to be more resilient and reducing direct impacts such as flooding and indirect impacts such as disruption of critical economical services.

The 2019 EWRI Congress covers a wide range of topics that attempt to provide innovative and sustainable solutions to ensure that our water and environmental infrastructure and resources will be improved and built to secure and protect them for the future. We proudly host the Congress under the auspices of the American Society of Civil Engineers (ASCE).

Within the six (6) volumes of the proceedings, more than 150 written scientific and technical papers from nearly 800 oral and poster presentations focusing on the subject areas of various EWRI Councils are included. A list of subject area tracks is included in the acknowledgements below. We hope these proceedings serve to enhance your knowledge and encourage you to follow up with more detailed publications by the same authors, and related papers, typically found in ASCE technical journals.

This collection contains papers organized by the History & Heritage Committee. Papers included in this special volume were presented at the EWRI History & Heritage Symposium.

EWRI History & Heritage Symposium sessions included:

- Formation and History of the Environmental and Water Resources Institute (EWRI: 1999-2019: Twenty Years of Accomplishments)
- AAWRE History as an EWRI Accomplishment and Selected Photos of AAWRE Annual Diplomates
- National Pennsylvania Historical Landmarks and Outstanding Pennsylvania Engineers and Water Engineers
- Pennsylvania ASCE History and Selected CE Education History in Pittsburgh
- Canals Historical Landmarks and Johnstown 1889 Flood
- International Water & Environmental History

Acknowledgments

Preparation and planning for this Congress strongly depends on the dedication of those individuals who plan session topics, solicit abstracts and papers, oversee reviews of all submissions. We are deeply grateful to all who have provided this considerable effort, especially the track chairs listed below:

17th Groundwater Symposium	Paul Mathisen & Amy Chan-Hilton
Emerging & Innovative Technologies	Barak Fishbain
Environmental	Wendy Cohen & Lisa Hayes
History & Heritage	Larry Magura & Jerry Rogers
Hydraulics & Waterways	Fabian Bombardelli
Hydro-climate/Climate Change Symposium	Levent Kavvas
International Issues	Erfan Goharian & Ali Mirchi
Irrigation & Drainage	Stuart Styles
Planning and Management	Mashor Housh & Debora Piemnonti
Standards	Dr. Kathlie S. Jeng-Bulloch
Stormwater Symposium	Bill Hunt & Sarah Waickowski
Student Competition	Wes Lauer
Sustainability	Joshua Peschel
Watershed	Levent Kavvas & Don Frevert
WDSA	Terra Haxton
New Professionals	Erfaneh Sharifi
Desalination Symposium	Luzma Nava
Water, Wastewater and Stormwater	Bridget Wadzuk & Arnie Strasser
Professional Practice	Kristin White
Education	Angelica Huerta

We also acknowledge the members of the Congress Organizing Committee, without whose time and efforts the event would not be possible.

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Finally, we acknowledge and thank EWRI staff who, in the end, makes this conference a reality.

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The Historic Augusta Canal and Industrial District: ASCE National Historic Civil Engineering Landmark

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ABSTRACT

The Augusta Canal launched an innovative economic development that created the first multi-user, multi-purpose, industrial district in the agrarian south. It was the first canal in the United States built for the multiple purposes of water power, water supply, and transportation, and is the only existing canal continuously operated for all of its original uses. The Augusta Canal is a civil engineering masterpiece of sustainability which provides a consistent source of renewable energy along with its recreational, educational, and economic development opportunities. On May 4th, 2018, the Augusta Canal and Industrial District was designated as an American Society of Civil Engineers (ASCE) national historic civil engineering landmark.

INTRODUCTION

The Central Savannah River Valley (CSRV) Branch of ASCE (including Augusta and parts of both Georgia and South Carolina) hosted a combined GA/SC conference in 2014 which included a boat tour on, and lectures about the Augusta Canal. Having experienced it first hand, participants remarked that the canal should be recognized for its remarkable and historic Civil Engineering. Energized by this experience, the CSRV decided to renew a previous effort to have the Canal System recognized as an ASCE National Historic Civil Engineering Landmark.

In light of a previous 2001 rejection, the CSRV expanded the effort to include associated canal-related industries and focus on the national significance of the entire Augusta Canal System. After a four-year effort filled with multiple advances and setbacks, the Augusta Canal and Industrial District became one of only two landmarks in Georgia to be so recognized for its historic Civil Engineering.

This paper focuses on those aspects of the Augusta Canal System's engineering and history which demonstrated to the ASCE History and Heritage Committee its merit to be recognized as a National Historic Civil Engineering Landmark.

THE AUGUSTA CANAL AND INDUSTRIAL DISTRICT, AN ASCE NATIONAL HISTORIC CIVIL ENGINEERING LANDMARK

The purpose of the ASCE Landmark program is to increase public appreciation of civil engineering contributions to society, provide civil engineers with an awareness of their own profession and encourage the preservation of significant historic civil engineering works.

In order to be considered as a historic engineering landmark, an engineering achievement must be of national historic civil engineering significance, represent a significant facet of civil engineering history and have some uniqueness, contributing to the development of the nation or at least a very large region.

It was the last requirement that seemed to have been problematic during the initial 2001

application. In a response letter the History and Heritage Committee noted "…[Although] the Augusta Canal is an impressive achievement, the committee did not feel as though the project exemplified the rigorous standards applied to national landmarks. Specifically, the project does not meet the criteria regarding uniqueness or originality in its design." "…[the committee] does encourage you to consider designation … as a South Carolina Civil Engineering Landmark. Such a designation would enable you to recognize [its] important role… in the history and development of your state."

Figure 1: Dedication Ceremony at Augusta Canal, Honorable Hardy Davis, Mayor, City of Augusta, Dayton Sherrouse, Director Augusta Canal Authority. Photo by Mark W. Lorah, P.E.

In the renewed 2014 effort, the CSRV addressed the initial concerns by

- Focusing on Canal District as a system
- Emphasizing nearly 180 years of continuous contribution
- Outlining three major contributions and use today
- Noting existing designations: National Heritage Area and National Historic Landmark
- Listing over 30 historic and current Canal Civil Engineers
- Comparing and Contrasting to other similar projects
- Emphasizing contribution to Civil Engineering Profession
- Emphasizing its contribution to the nation "or large region"

Throughout this four-year effort, there were varying (and even reversed) opinions regarding these points, including those among our own researchers and proponents.

In the eventual approach the CSRV specifically addressed the following application judging criteria with specific emphasis on points 3 and 6:

1. Date of Construction (and other significant dates)
2. Names of key civil engineer and other professionals associated with project.