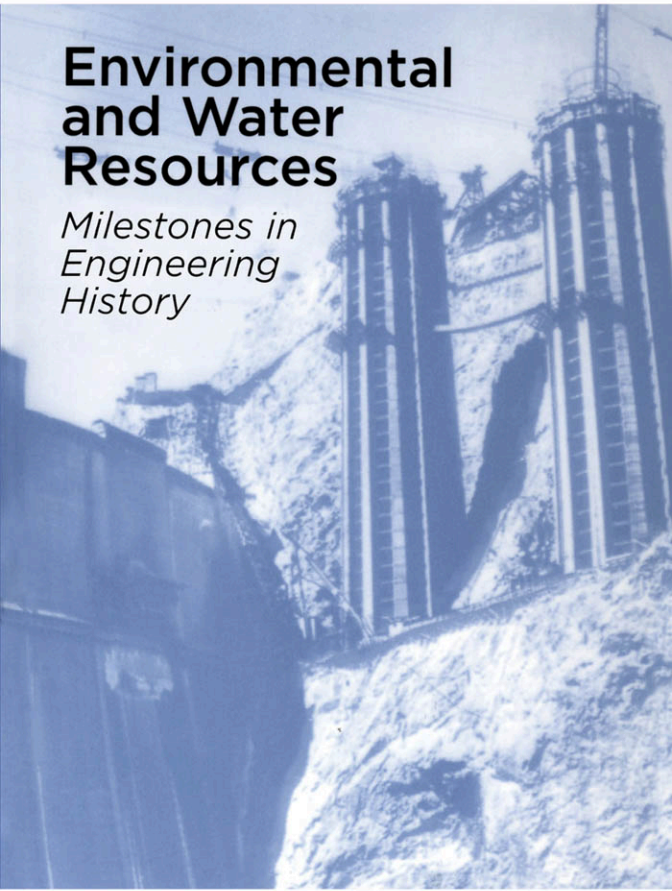
# Environmental and Water Resources

## *Milestones in Engineering History*



ASCE

Edited by **Jerry R. Rogers**

EWRI

# ENVIRONMENTAL AND WATER RESOURCES

## *MILESTONES IN ENGINEERING HISTORY*

May 15–19, 2007
Tampa, Florida

SPONSORED BY
EWRI National History & Heritage Committee

Environmental and Water Resources Institute (EWRI)
of the American Society of Civil Engineers

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Jerry R. Rogers

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Cover Photo: Nevada intake towers as seen from the upstream cofferdam. Photo courtesy of the Bureau of Reclamation.


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# Foreword

This is the fourth in a series of History and Heritage publications produced by the Environmental and Water Resources Institute (EWRI) of the American Society of Civil Engineers (ASCE). The preceding volumes were *Environmental and Water Resources History, ASCE 150th Anniversary* (2002) edited by Augustine J. Fredrich and Jerry R. Rogers, *Henry P.G. Darcy and Other Pioneers in Hydraulics* (2003) edited by Glenn O. Brown, Jurgen D. Garbrecht and Willi H. Hager, *Water Resources and Environmental History* (2004) edited by Jerry R. Rogers, Glenn O. Brown and Jurgen D. Garbrecht. These publications were sponsored by the EWRI History and Heritage Committee to provide historical engineering papers for libraries, classrooms, historians, professional societies, government agencies, firms and individuals. We encourage continued documentation of the history and heritage of the water resources and environmental professions.

*Environmental and Water Resources: Milestones in Engineering History* (2007) contains invited and submitted papers on a wide range of topics, many of which will be presented at the EWRI annual congress to be held in Tampa, Florida May 15-19, 2007. Unique to this volume are papers on James P. Kirkwood: environmental and civil engineer and ASCE Leader on the 200th Anniversary of his birth (1807-2007) and filtration of public water supplies in the United States. Following the past publication of histories of several university hydraulic laboratories, histories of environmental education/research are summarized at the University of Florida and the University of Texas at Austin. History and impacts of levees along the lower Rio Grande are documented. Historical small-scale water projects include those of the Mayan Indians, *acequias* of San Antonio, and the Versailles water supply at Marly. The Florida water management history project is followed by six papers on the history of experimental watershed research in the United States. As the 75th anniversary of the completion of Hoover Dam (1935-2010) approaches, a photo essay contains photos from Ansel Adams from the National Archives and Records Administration, College Park, Maryland and the Bureau of Reclamation. Two invited papers are on the hurricane of 1900 and the Galveston seawall and grade raising and recreating the July 1938 flood for computer model calibration.

The editor thanks the ASCE staff including Donna Dickert, Charlotte McNaughton, and Sheana Singletary, the EWRI staff, Tampa EWRI Congress Chairs: Paul Bizier and Karen Kabbes, reviewer and moderators: Augustine J. Fredrich, Jeffrey Bradley, William Cox, Brit Storey, and Richard Wiltshire of the Bureau of Reclamation, and Jurgen D. Garbrect for suggesting names of USDA Agricultural Research Service centers.

Jerry R. Rogers

# Acknowledgments

Other contributors to this publication include the University of Houston Department of Civil and Environmental Engineering, Donna Rogers for her computer assistance which was invaluable, and Glenn O. Brown for suggesting the 2007 anniversaries which were covered in part in this publication. Not only will the 200th anniversary of the birth of James Pugh Kirkwood (born in Edinburgh- 1807) (and the second ASCE National President following fellow Scotsman James Laurie- first ASCE National President) will be celebrated in May 2007 by EWRI/ASCE, but the 250th Anniversary of the birth of Thomas Telford will be celebrated in Scotland and the U.K. Professor Roland Paxton of Heriot- Watt University- Edinburgh has coordinated the following historical events with the Institution of Civil Engineers: July 1 (Glencorse Dam Tour with Scottish Water), July 2- Telford Symposium sponsored by the Royal Society of Edinburgh and others, July 3-6 Telford Projects Tour (with Sandra Purves, including the Telford International Historic Civil Engineering Landmarks for the Caledonian Canal and Craigellachie Bridge). Civil engineers/historians of ASCE, the Canadian Society for Civil Engineering (CSCE), and the Institution of Civil Engineers will participate in the Telford250 activities. The Institution of Civil Engineers (ICE) and their Panel for Historic Civil Engineering Works have been special hosts for ASCE and CSCE civil engineers in recent years: 2003 Robert Stephenson Symposium/Projects Tour (North Wales to Chester to Newcastle to Edinburgh to the Falkirk Millennium Wheel, 2006- I.K. Brunel Symposium/Projects Tour in London/Bristol with the Newcomen Society, and 2007 Thomas Telford Symposium/Projects Tour. The Scotland civil engineers and ICE and the Panel for Historic Engineering Works seem to inform, educate, socialize with and entertain visiting civil engineers in a remarkable style. Special contributions have been by Inverness Scotsman/Canadian civil engineer Alistair MacKenzie to ASCE, ICE, and the 2005 International History Symposium in Toronto by CSCE.

As the ASCE Body of Knowledge Committee compiles its 2007 report, a Civil Engineering History and Heritage component is recommended as part of the future education of civil engineers. Special leadership was observed from Richard O. Anderson, Jeffrey Russell, water resources engineer Stuart Walesh, Melanie Lawrence, Decker Hains, Henry Petroski, hydraulic engineer Rob Ettema, and many other visionaries. The documentation, discussions, preparation, and implementation of the civil engineering Body of Knowledge may be the biggest future contribution to environmental and water resources history! Perhaps grandchildren Jackson Appel, Scott Rogers, Will Rogers and/or Jamison Appel will become engineering students of engineering history.

# Contents

# Photo Essay of Hoover Dam/Construction As the 75th Anniversary in 2010 Approaches

Brit Storey, Ph.D.,[1] and Jerry R. Rogers, Ph.D., P.E., D.WRE[2]

Hoover Dam is one of the icons in civil and water resources engineering history and visited by very large numbers of people each year. The following Hoover Dam photographs were taken in the 1940s by Ansel Adams, a famous western photographer, and provided from the Bureau of Reclamation from photographs held in the WPA (Work Projects Administration) collections of the Still Pictures Branch, Archives II, National Archives and Records Administration, College Park, Maryland. Other archived Hoover Dam photos were provided by the Bureau of Reclamation.

Hoover Dam was completed in 1935 and was the tallest concrete curved-gravity (arched-gravity) dam in the world for about 30 years. Engineers came from all over the world to visit Hoover Dam and monitor the instrumentation data as the lake behind the dam was filled above the normal level to test the stresses on the concrete arch dam. In 2010, the Bureau of Reclamation will celebrate the 75th Anniversary of the completion of Hoover Dam (1935-2010). In 2002, the Bureau of Reclamation had its 100th Anniversary Celebration (1902-2002) at Hoover Dam and the University of Nevada- Las Vegas hosted a Reclamation History Symposium.

Ansel Adams was born in San Francisco in 1902, the year the U.S. Bureau of Reclamation was founded through the Reclamation Act of 1902. As a teenager, Adams visited the Pacific Exposition in San Francisco celebrating the engineering completion of the Panama Canal. For almost six decades, Ansel Adams photographed the American landscape and was recognized with awards/medals from Presidents Johnson, Carter, and Reagan. Several of his photographs of Hoover Dam are included in this photo essay along with those furnished by the Bureau of Reclamation History

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Archives. In 2006, the Bellagio Gallery of Fine Art covered the career of Ansel Adams though his photographs and memorabilia in an exhibit: "ANSEL ADAMS: AMERICA."

**The following four Hoover Dam photographs (Figures 1-4) were taken by Ansel Adams in 1942.**

Photos were provided through the Bureau of Reclamation from the WPA (Work Projects Administration) collections of the Still Pictures Branch, Archives II, National Archives and Records Administration, College Park, Maryland.

**Figure 1.** Downstream View of Hoover Dam with Water Flowing out the Right Outlet

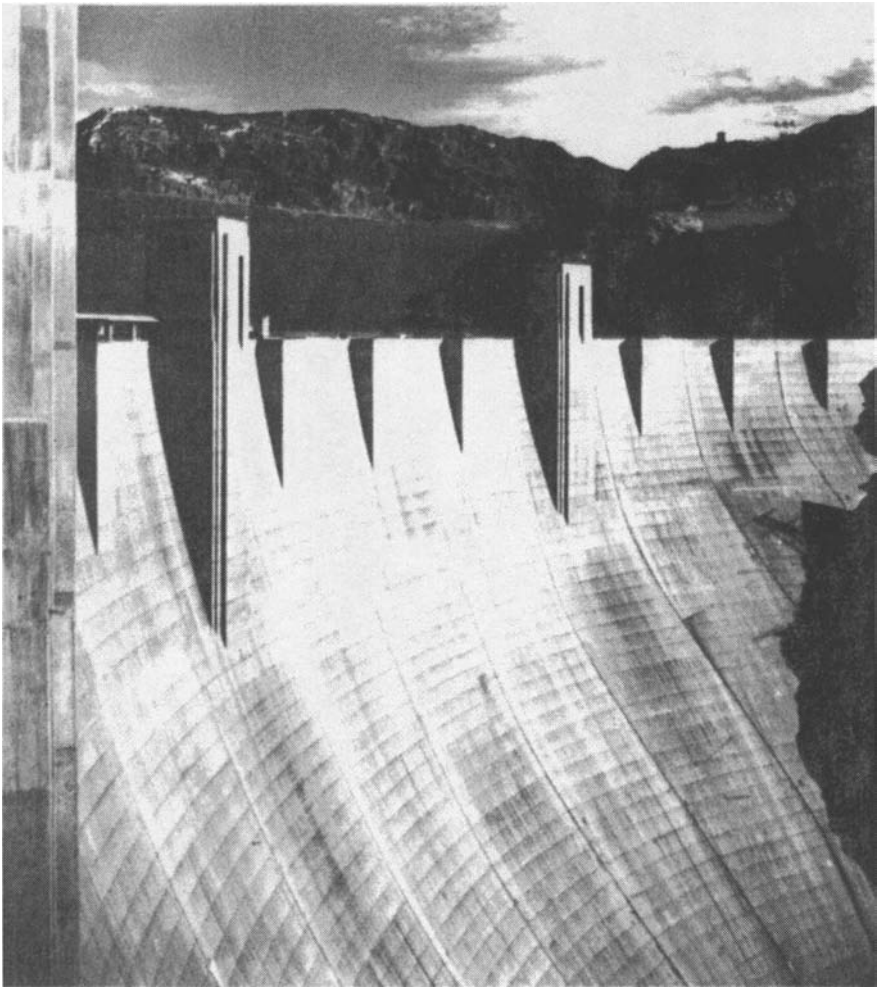

**Figure 2.** Side View of Concrete in Hoover Dam on the Downstream Face