Photo: Ted Lacey Photography.

Service Life Design for 100 Years?

Dr. Henry G. Russell, *Managing Technical Editor*

This past summer, I had the opportunity to follow portions of Route 66 through Illinois. Back in 1926, Route 66 (known as the "Mother Road") was the primary cross-country highway from Chicago, Ill., to Santa Monica, Calif. Although the route has been replaced by a modern interstate, portions of the old highway still exist.

Along this route, I encountered two concrete bridges: a reinforced concrete beam bridge built in 1921 and still carrying restricted traffic and a concrete arch bridge built in 1915. The concrete on both bridges is in remarkably good condition considering their ages.

This issue of *ASPIRE*™ includes articles about replacing or restoring three old bridges: the Downer Place Bridges from 1909, Jack's Run Bridge from 1924, and Stillwater Viaduct from 1932. The last issue of *ASPIRE* featured the replacement of the West 7th Street Bridge in Fort Worth, Tex., originally built in 1913—100 years ago.

Did the designers and builders of these original bridges consider a service life?—I doubt it because they had this wonderful new material called concrete that would last forever!

Fast forward 100 years and we have a lot more options that can be used to produce durable and long-lasting concrete bridges. Are we smart enough to use current concrete technology to replicate what our predecessors accomplished without it?

The Strategic Highway Research Program 2 has been investigating service life beyond 100 years and their reports are being published. We should be able to design concrete bridges for at least a 100-year service life. In many aspects, we can learn from the durability studies performed for major bridge crossings in Europe and Asia. Here, service-life design is approached in the same way as structural design. There are loads (environmental conditions) and there are resistances (freezing and thawing resistance, etc.). In the United States, we generally use a deemed-to-safety approach with a prescriptive specification.

According to the National Cooperative Highway Research Program Synthesis 441, state specifications for concrete to be used in bridges remain largely prescriptive. All state specifications now permit the use of one or more supplemental cementitious materials (SCMs) in concrete. The use of SCMs contributes to reducing chloride penetration to the reinforcement and is a step in the right direction. In addition, we can add corrosion inhibitors to raise the threshold level before reinforcement corrosion begins.

We also have alternative corrosion-resistant reinforcement that can be used including epoxy-coated reinforcement, metal-clad reinforcement, low-carbon chromium steel, stainless steel, and fiber-reinforced polymers.

AASHTO now has a standard practice, PP65-11, that provides a prescriptive approach and a performance approach for dealing with reactivity of concrete aggregates. This again is a step in the right direction.

Modern concrete technology provides us with many approaches to use as illustrated by the above examples. Our challenge is to select the appropriate ones to use for a given bridge in a particular location for the desired service life. Please let us know how you are approaching durability and extending service life on your projects.

Editor-in-Chief
William Nickas • wnickas@pci.org

Managing Technical Editor
Dr. Henry G. Russell

Program Manager
Nancy Turner • nturner@pci.org

Associate Editors
Emily B. Lorenz
Craig A. Shutt

Art Director
Paul Grigonis

Layout Design
Tressa A. Park
Tom Scully

Editorial Advisory Board
William Nickas, *Precast/Prestressed Concrete Institute*
William R. Cox, *American Segmental Bridge Institute*
Dr. David McDonald, *Epoxy Interest Group*
Dr. Henry G. Russell, *Henry G. Russell Inc.*

Cover
Morning mist and sunlight captures the distinct architectural features of the Jeremiah Morrow Bridge, including curved deck overhangs, parabolic bottom soffit, and pier twin wall capitals. Photo: Ohio Department of Transportation

Ad Sales
Jim Oestmann
Phone: (847) 838-0500 • Cell: (847) 924-5497
Fax: (847) 838-0555 • joestmann@arlpub.com

Reprints
Paul Grigonis • pgrigonis@pci.org

Publisher
Precast/Prestressed Concrete Institute
James G. Toscas, President

Postmaster: Send address changes to *ASPIRE*, 200 W. Adams St., Suite 2100, Chicago, IL 60606. Standard postage paid at Chicago, IL, and additional mailing offices.

ASPIRE (Vol. 8, No. 1), ISSN 1935-2093 is published quarterly by the Precast/Prestressed Concrete Institute.

If you have a project to be considered for *ASPIRE*, send information to *ASPIRE*
200 W. Adams St., Suite 2100 • Chicago, IL 60606
phone: (312) 786-0300 • www.aspirebridge.org • e-mail: info@aspirebridge.org