

## Extending the Life of Historic Concrete Bridges



**Arne P. Johnson**

Principal

Wiss, Janney, Elstner Associates,  
Inc.

Northbrook, USA  
[ajohnson@wje.com](mailto:ajohnson@wje.com)

Structural engineer with 30 years' experience at WJE and expertise in evaluations, testing and repair, particularly for historic structures.



**Gary J. Klein**

Executive Vice President and  
Senior Principal

Wiss, Janney, Elstner Associates,  
Inc.

Northbrook, USA  
[gklein@wje.com](mailto:gklein@wje.com)

Structural engineer with 45 years' experience in collapse investigation, structural rehabilitation, and research on behavior of structural concrete.



**John S. Lawler**

Associate Principal

Wiss, Janney, Elstner Associates,  
Inc.

Northbrook, USA  
[jlawler@wje.com](mailto:jlawler@wje.com)

Materials engineer with 18 years' experience at WJE and expertise in materials evaluations, field and laboratory testing, and repair design.

**Contact:** [ajohnson@wje.com](mailto:ajohnson@wje.com)

### 1 Abstract

Open-spandrel, concrete arch bridges were a common bridge design in the United States during the early 1900s. Many of these bridges are now urban landmarks and listed historic structures that local jurisdictions wish to rehabilitate, including widening the deck to more safely accommodate pedestrians and bicyclists. However, decades of exposure in harsh climates have led to advanced deterioration and reduced load ratings for most extant examples. Further complicating rehabilitation, the height, and arch-reliant behavior of these bridges make construction access, staging, and maintenance of traffic difficult. Drawing upon the authors' experience with several bridges of this type, this paper discusses best practices and special considerations for investigating and rehabilitating historic concrete arch bridges to extend their life.

**Keywords:** Arch bridge; historic; concrete; freeze-thaw; cathodic protection.