American Concrete Institute

Always advancing

Conservation of Historic Concrete

ACI Fall 2013 Convention
October 20 - 24, Phoenix, AZ

ACI
WEB SESSIONS

David Whitmore is President of Vector Corrosion Technologies, a company which specializes in the restoration and corrosion protection of reinforced concrete structures. Dave is a registered Professional Engineer, a NACE Cathodic Protection Specialist and he serves on a number of corrosion and repair committees of ACI, ICRI and NACE. He is a fellow of the American Concrete Institute and the Canadian Society of Civil Engineers.

ACI
WEB SESSIONS

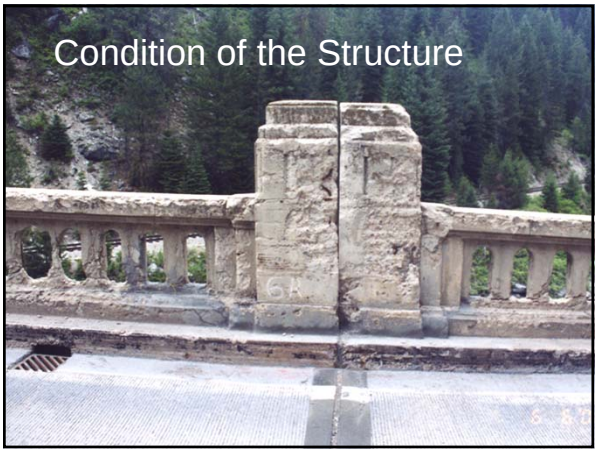
Rehabilitation of the Rainbow Bridge

David Whitmore, P.Eng., FACI, FCSCE
Vector Corrosion Technologies

VECTOR CORROSION TECHNOLOGIES

Historical Significance

- Bridge Built in 1933
- National Register of Historical Places
- Statewide Landmark
- Project Objectives
  - Safety
  - Historical Restoration



Rail Replacement

- Matched geometry of rail
- Matched color
- Precast sections
- Limited by maintenance of traffic
- Start cutting at noon on Monday
- Replaced rail section ready to take a hit by noon on Friday

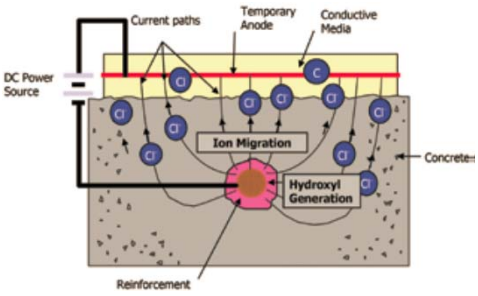
Localized Concrete Repairs

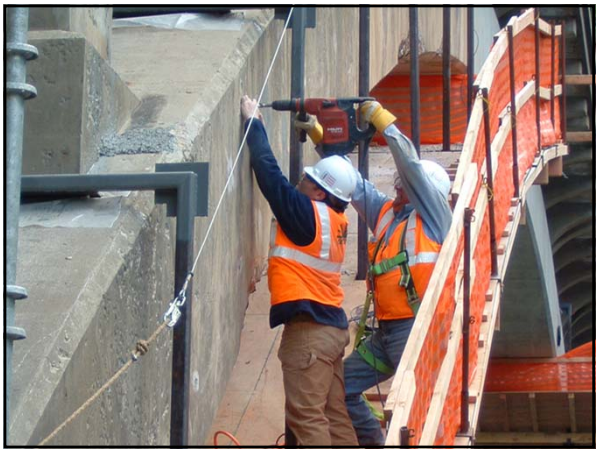
- Repairs completed in accordance with ICRI guidelines
- Repairs included galvanic anodes to mitigate on-going corrosion

Electrochemical Chloride Extraction (ECE)

- Concrete arch was chloride contaminated
- Concrete damage limited
- Localized repairs completed where required
- ECE performed on arch in accordance with NACE standard
- System removed after ECE completed

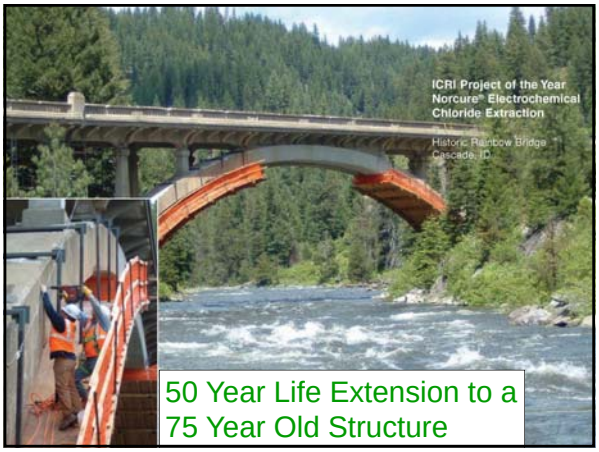
Electrochemical Chloride Extraction Schematic





Sustainability

- Environmental Impact and Sustainability
  - We can quantify environmental impact of various repair and replacement options
  - This information can be used to help to make sustainable choices



50 Year Life Extension to a 75 Year Old Structure

Concrete in Society

- Concrete is the most widely used man-made product in the world
- 6 Billion tons per year (~4 Billion m^3)
- CO_2 produced: ~ 1.5 Billion tons / yr
- Thermal pollution from concrete production is ~ 8 Billion GJ / yr.
- Despite the environmental impact, concrete is durable and has the ability to last for years.

Rainbow Bridge Rehabilitation

- 50 year service life extension.
- 1,809 yd^3 of concrete were maintained in service.
- Reduced CO_2 emissions by ~ 450 tons.
- Prevented the release of 4,800 GJ of heat. (enough heat to boil 3 Olympic Pools)
- Reduction of CO_2 emissions equivalent to annual emissions of 90 people

Questions

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VECTOR CORROSION TECHNOLOGIES