Conservation of Historic Concrete

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Rehabilitation of the Rainbow Bridge

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Historical Significance

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

Condition of the Structure
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

Concrete in Society

• Concrete is the most widely used man-made product in the world
• 6 Billion tons per year (~4 Billion m³)
• CO₂ 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 yd³ of concrete were maintained in service.
• Reduced CO₂ emissions by ~ 450 tons.
• Prevented the release of 4,800 GJ of heat. (enough heat to boil 3 Olympic Pools)
• Reduction of CO₂ emissions equivalent to annual emissions of 90 people
Questions

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