Conservation and Repair of Historic Concrete

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Historic Concrete

- Architectural detail
- Formboard finish
- Exposed aggregate
- Eroded paste surface
- Paste/aggregate color
- Different mixes
- Placement techniques
- Inconsistent appearance
Technical Considerations

- **Type of structure**
  - Small statue
  - Building
  - Bridge

- **Scope of work**
  - Stabilization
  - Minimal intervention
  - Repair
  - Remove and replace
Goals:

- Historic features shall be repaired rather than replaced.
- If replacement of a distinctive feature is necessary, the new feature shall match the old in design, color, texture, and other visual qualities and, where possible, materials.
- Replacement of missing features shall be sustained by documentary, physical, or pictorial evidence.
Preservation of Historic Concrete

Preservation Brief 15
Provides an overview of the history of concrete and its popularization in the United States, surveys the principal causes and modes of concrete deterioration, and outlines approaches to repair and protection that are appropriate to historic concrete.
Selecting a Preservation Treatment

- Relative importance in history
- Physical condition
- Proposed use
- Code requirements
Industrial Experimental Station, 1927
Pohnpei, Micronesia
Hydrastone (1921) Halifax, Nova Scotia
Special Considerations with Historic/Architectural Concrete

- Emphasis on investigation, laboratory analysis, samples, mock-ups and trial repairs
- Original design may need to be improved
- Development of repair strategy and goals
- Options may be more limited
- Tasks are similar to work with other concrete
- Rules of good concrete repair practice apply
- Higher level of craftsmanship
- Irreversible repairs
Technical Considerations

- Characteristics of concrete
- Cleaning
- Placement technique
- Finish, texture, and color
- Protection system
Mock-ups

- Cleaning
- Coating removal
- Color (mix design)
- Profile (formwork)
- Finish and texture
- Surface preparation
- Design mixes
Mock-ups
Color mock-ups take time for curing
Soldier Field, 1926
Chicago, Illinois
Mock-ups
63rd Street Beach House

- Built 1919
- Designed by South Park Commission Architects
- Jackson Park, Chicago, IL
Open air locker rooms for men and women
Architectural Concrete Mix

- Laboratory analysis to identify components
- Original specifications
  - 2 parts portland cement
  - 3 parts sand
  - 9 parts broken stone
- 1:1.5:4.5 mix (normal concrete 1:2:3)
Samples and Mockups

- Cleaning samples
- Color samples (mix design)
- Finish samples (formwork)
- Texture samples (aggregate exposure)
- Surface preparation
Cleaning Samples

- Cleaning original concrete
- Determine extent and degree of cleaning
- Match repair to clean original concrete
- Repair concrete will change color with age
Blending Repairs

- Cleaning
- Lift lines
- Variability in appearance
- Inconsistency of repairs
- Extent of repair
Mix Development
Conclusions

- Historic and architectural repair is more challenging
- Experience of project team is key
- Samples and mock-ups are critical
- Define expectations
- Review and approval process is important