History & Background of ACI 562-13

Code Requirements for Evaluation, Repair and Rehabilitation of Concrete Buildings

Larry Kahn, former chair Committee 562

ACI 562 – Key Points

- Developed to provide consistent, minimum level of life safety and performance of repaired buildings
- Performance-based code
- Help design professionals and building officials by providing a uniform standard for design and execution of evaluation, design and execution
- Continuing development and improvement

  Committee interested in feedback and contribution from other ACI committees

Why a Repair Code?

- Vision 2020 – ACI Strategic Development

  Create a repair/rehabilitation code to:

- Establish evaluation, design, materials and construction practices
- Raise level of repair/protection performance
- Establish clear responsibilities
- Provide Building Officials with means to issue permits

Why a repair code?

- Large segment of construction industry

  20 Billion dollars

  8 Billion dollars in corrosion dam

- Repair performance

  COE - 50% of repairs are not performing satisfactorily

  After 10 years – 30% of repairs are satisfactory

Why a repair code?

- ACI 318 Survey
  - One-half use for repair of existing structures
  - Use for non-building structures
- Conclusions from ACI 318 Survey
  - ACI 318 functioning beyond its intent
  - Code guidance for repairs is needed
- Variations in practice

Why not a repair code?

- Rigorous process – few ACI standards

  Took 7 years to develop
- Consensus ?
- Establish minimum practice requirements

  Who decides minimum requirements?
- Concern about limiting creative solutions
- ACI TAC – bottom up vs. Strategic

Repair in ACI

- ACI 318 – Chapter 20, since 1971
- ACI 546 Repair, since 1969
- ACI 364 Rehabilitation, since 1981
- ACI 437 Evaluation, since 1958
- ACI 369 Seismic Rehabilitation, since 1991

  Input into ASCE 31 and 41
- Over 23 committees identified by TRRC with evaluation, repair and rehabilitation

Code Development Process

- Developed by consensus process (ANSI approved)
- ACI TAC – standards procedures
- Written for design professionals
- Adopted in law – General Building Code – IBC and IEBC

Changes in IBC and IEBC

- 2012 Cycle (2015 IBC Code)

  ICC Board approves deletion of Chapter 34 of the IBC in favor of reference to the IEBC

- 2015 IBC

  Will no longer include Chapter 34 entitled Existing Structures

- 2015 IEBC

  Adopted for use in most states and jurisdictions

Creating the repair code – a philosophy

- Emphasize performance based rather than prescriptive requirements
- Encourage creativity and flexibility
- Promote innovation and new materials
- Establish responsibilities
- Enhance life safety
- Extend service life
- Provide sustainable and economic alternatives
- Use ACI standards and other documents

Key steps in rehabilitation and continued use

- Determine applicable standards and general requirements
- Preliminary evaluation
  Substantial structural damage
- Evaluation
- Repair & rehabilitation design
- Considerations for durability & maintenance
- Construction & Quality assurance
  Guide through specifications

What the code is and what it does – Gene Stevens

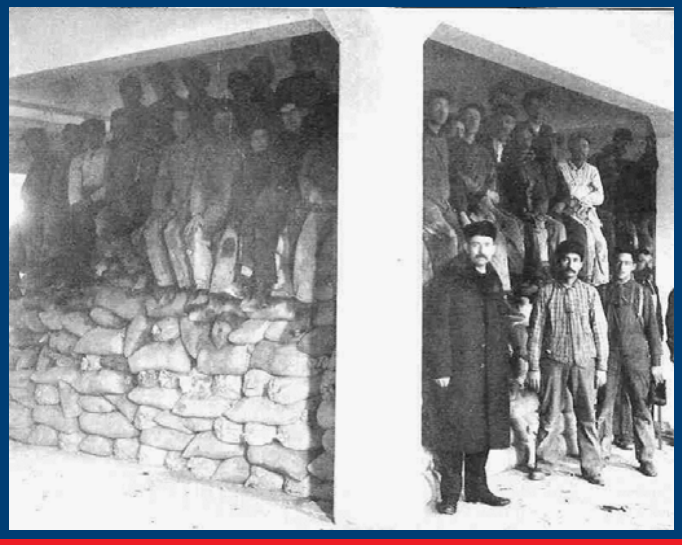
- Standard which requires safety and serviceability of repaired concrete buildings
- Superstructure, foundations (slabs), and elements part of structural load path
- Structural vs. nonstructural – “Unsafe”
- Establishes the “design basis code”
- Sets evaluation, repair design and durability requirements

Evaluation – Chuck Larosche

- Extent of damage, in-place conditions
- Substantial structural damage
- Structural assessment / analysis / load test (ACI 437)

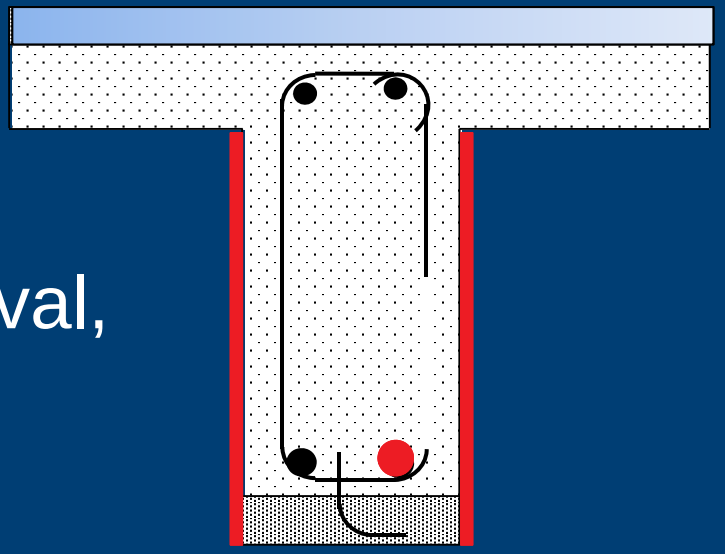
  As-measured dimensions

  As-measured or historic properties



Repair Design – Rick Edelson

- FRP and steel reinforcement
- Repair materials
- Composite behavior
- External Reinforcement
- Fire , elevated temperatures
- Define repair sequence: removal, placement, stressing



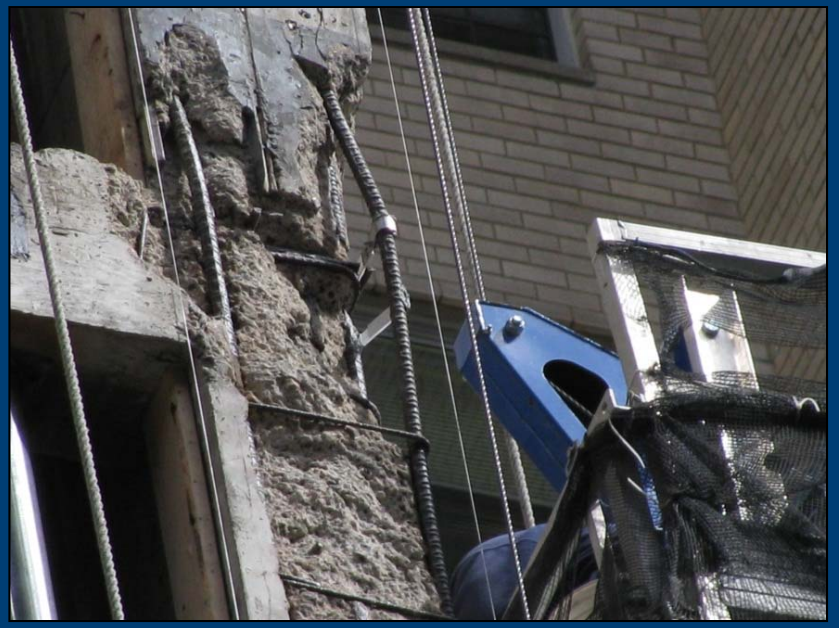
Durability – Fred Goodwin

- Service life and maintenance
- Compatible materials

  Interaction with existing structure in environment
- Corrosion protection & cover
- Corrosion & deterioration reinforcement
- Cracks

Construction & Specifications – Jay Paul and Tracy Marcotte

- Stability and shoring – sequence and conditions
- Loads, ASCE/SEI 37
- Instructions to contractor
  - Report uncovered conditions
  - Control debris
  - ACI 563 – Specifications
- Quality Assurance



Future directions

- Continuous improvement
  performance measurements & service life
- Adoption of the code by IEBC
- Adoption of the code by design practice
- Education – ACI and ICRI
- Focus on sustainability =
  Rehabilitation and use of existing structures

Acknowledgements

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Questions – Discussion

Larry Kahn

Thank you

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