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

  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

15 Engineers, 4 Academics, 3 Contractors, 1 Material supplier, 1 Owner, 1 Building code official
Questions – Discussion

Larry Kahn
Thank you

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