EXAMINING THE STANDARD OF CARE FOR EVALUATION OF EXISTING STRUCTURES

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Presentation Overview

- Need for a standard of care
- Standard of care
- Challenges in evaluation of existing structures
- Thoughts on a standard of care for existing structures
Fundamental Questions

- How much evaluation is necessary?
  - Minimum number of locations / samples
  - Capture all representative elements
  - Allow rational decisions to be made

- How much evaluation is possible?
  - Access limitations
  - Cost and client limitations

- How to ensure Standard of Care is met
Standard of Care

- Defined as “degree of care that a reasonable person should exercise”
- “The quality of work expected of a Professional Engineer”
- Use of “generally accepted standards” and for engineer’s work product to be “safe”
Standards of Care

• Generally accepted standards
  • ASTM Guides
  • ACI / ASCE Guides
  • AASHTO Bridge Inspection Manual
  • ACI 562 – Code for Repair of Existing Concrete Structures
Evaluation of Existing Structures

- Existing Structures
- Can be non-redundant
Complications

• Is a perfect survey feasible
  • Extent of damage?
  • Number of samples?
  • Redundancy of structure
  • Cost of evaluation
  • Impact of a structural failure
Evaluation of Existing Structures

- Obvious conditions
- Hidden conditions
Evaluation of Existing Structures

- Hidden damage
Bridge Evaluation

• National Bridge Inspection Standards
  • Biennial inspections
  • Tactile inspection for fracture critical elements
    • Pins
    • Truss tension members
    • Pin / hanger assemblies
  • Typical – supplement with NDT
Building Facades

- ASTM E 2270
  - Qualified professional
  - General inspection
    - Visual survey
    - More than 6 feet away
  - Detailed inspection
    - Tactile
    - Build upon general insp.
Building Facades

- Local ordinances
- Regular intervals
- Exposed facades
- Report unsafe cond.
- Watertightness
- Maintenance requ.
ACI 562 – 6.2.1

- Performance based
- Evaluation required:
  - Evidence of distress, damage, etc.
  - Behavior inconsistent with design
  - Based upon preliminary evaluation
6.2.3 - Where repairs are required on an element in a structure, it shall be determined if similar elements throughout the structure also require evaluation.

- Repetitive elements
- Isolated repairs may not be acceptable
6.2.5 - If an analysis is required, the structural assessment shall document the requirements of 6.2.4 and (a) through (c).

(a) As-measured structural member section properties and dimensions.

(b) The presence and effect of any alterations to the structural system.

(c) Loads, occupancy, or usage different from the original design.
Standard of Care – Existing Structures

• Not clearly delineated
• Determined by licensed design professional
  • Project by project basis
  • Completeness over cost
• Evaluation considerations
  • Tactile and invasive surveys
  • Consider redundancy
  • Consider exposure conditions
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