Waterfront Facilities Inspection and Assessment

NEW ASCE WATERFRONT FACILITIES INSPECTION & ASSESSMENT MANUAL

HEATH POPE, P.E.
Agenda

• Need and Purpose
• Scope
• The Team
• New Topics Introduced
• Cutting-edge and Controversial Topics Introduced
• Content of the Guidelines
Need and Purpose

  – Published in 2001
  – Written by engineers, for engineers
  – Provides guidance on many structure types, from piers & wharves to bridges, dams and tunnels

• The Need for a Waterfront Facilities focused manual became evident
  – Inclusive of the entire structure and fixed appurtenances
  – New concepts and technical approaches needed
Need and Purpose

“Waterfront Facilities Inspection & Assessment Manual”

• Covers inspection of the entire asset
• Provides guidance to Owners, as well as “executing” engineers
Scope

- Comprehensive treatment of waterfront facilities:
  - Piers/jetties
  - Wharves/quays
  - Bulkheads/quaywalls
  - Wave screens
  - Marinas
  - Boat ramps
  - Floating structures
  - Buoys
  - Slope protection
Scope

• Guidance provided for:
  – Structural components
    • Above water and underwater
  – Fixed utilities
  – Equipment
  – Mooring hardware
  – Topside paving and drainage
  – Safety features
  – Appurtenances
  – Excluded: container cranes; material offloading/conveyance equipment
Scope

• Written for Engineers — by Engineers
  – Working knowledge of waterfront structures is assumed
  – Focuses on “what, when, why, and where”
  – Detailed “how to” guidance NOT provided
The Team

• Members:
  – Ron Heffron, Chairman
  – Noah Elwood, Secretary
  – Terry Browne
  – Andrew Cairns
  – Sean Chapman
  – Steve Curtis
  – John Daley
  – Frank Davidson
  – Bill Bruin
  – Elizabeth Burkhart
  – Anna Dix
  – Joshua Johnson
  – Bryan Jones
  – Ikaika Kincaid
  – Shawn Lindmark
  – Matthew Martinez
  – Todd Mitchell
  – Bruce Ostbo
  – Ralph Petereit
  – Heath Pope
  – Kirk Riden
  – Charlie Roberts
  – Paul Roberts
  – Craig Sams
  – Alberto Sanchez
  – Shelley Sommerfeld
  – Tom Spencer
  – Warren Stewart
  – Erling Vegsund

• Blue Ribbon Panel Reviewers:
  – Lee Barco
  – Richard Jenkins
  – Angel Lim
  – William Stahlman
  – Philip Vitale
The Team

Representing:

• Port Authorities
• U.S. Navy
• Consulting Engineers
• Academia
New Topics Introduced

• Seven Inspection Types Remain from Manual 101:
  – Routine Inspection
  – Structural Repair or Upgrade Inspection
  – New Construction Inspection
  – Baseline Inspection
  – Special Inspection
  – Repair Construction Inspection
  – Post-Event Inspection

• Eighth Inspection Type Introduced:
  – Due Diligence Inspection
New Topics Introduced

• Service Life Modeling
• Definition of element-level ratings, with sketches
• Mooring and berthing system condition inspections and rating scheme
• Addition of utility system condition inspections and rating scheme
• Addition of coating system defect definitions
• Addition of load isolators and bearing defect definitions
• Addition of a comprehensive appendix on specialized inspection techniques
New Topics Introduced

- Extensive coverage of “Special Considerations” for specific structure and system types
  - Pile-supported waterfront structures
  - Relieving platforms
  - Bulkheads and retaining walls
  - Seawalls and revetments
  - Gravity block walls
  - Paving in immediate vicinity of structure
  - Caisson, cofferdams and cellular structures
  - Floating structures
  - Mooring hardware and fender systems
  - Mooring buoy systems
New Topics Introduced

- Extensive coverage of “Special Considerations” for specific structure and system types
  - Wave screens and attenuators
  - Waterfront security barriers
  - Cathodic protection systems
  - Marinas and small craft harbor components
  - Gangways
  - Boat ramps
  - Marine railways
  - Bullrails, ladders and safety features
  - Crane rails, trenching and cables
  - Waterfront utility systems
Cutting-edge and Controversial Topics Introduced

• Guidance provided on “Significant Changes and Owner Responsibilities”
  – Significant changes include:
    • Reduction in design capacity due to damage or deterioration
    • Increased loads
      – Larger vessels
      – Increased sail or current area
      – Increased live loads
    • Upgrades that modify load paths
  – No “significant” deterioration or damage
    • Repair/rehabilitation may proceed normally
• Guidance provided on “Significant Changes and Owner Responsibilities”
  – “Significant” deterioration or damage requires structural evaluation prior to repair or rehabilitation
    • Reduction in design capacity of primary members of 20% or more is considered potentially significant
    • Structures that are rated “Poor” or below are considered to exhibit potentially significant damage
    • Method of structural evaluation should be determined by a registered professional engineer
  – For upgrade projects where loads are “significantly” increased, performance of system should be ensured
    • “Significant” is when demand-capacity ratio is 10% or greater than without increased loads
Content of the Guidelines

1. Introduction

- Intent of Manual and target audience
- Importance of inspection over life cycle of asset
- Guidance on Owner responsibilities
- Terminology clarification
  - Preservation
  - Sustainment
  - Rehabilitation
  - Upgrade
2. Standards of Practice

- Introduction of the 8 inspection types
- Guidance on choosing the right inspection type based on project needs
- Guidance on inspection frequency
- Introduction to Service Life Modeling
- Minimum qualifications of inspection personnel
- Rating systems for both elements and overall systems
- Guidelines for follow-up actions
3. Scope of Inspection

• Guidance on boundaries and limits
• Definitions of the three levels of inspection effort
• For each of the 8 inspection types:
  – Objectives
  – Methods of inspection and documentation
  – Guidance on evaluating, rating and recommending follow-up actions
4. Service Life Modeling

- Guidance on when and how to conduct SLM as part of inspection & rehabilitation strategy for a project
- Guidance on field sampling and testing
- Guidance on laboratory testing & analysis
- Key modeling considerations
- How to find optimum solution for extending life of existing asset
Content of the Guidelines

5. Documentation and Reporting

- Guidance on appropriate level of documentation and reporting
- Guidance on tailoring report content to project and client requirements

6. Administrative Considerations

- Guidance on contractual agreements
- Guidance on insurance considerations
  - Longshoreman’s and Harbor Worker’s Insurance
  - Jones Act Maritime Insurance
  - Professional Liability Insurance
  - Railroad Protective Insurance
A. Special Considerations for Specific Structure Types and Systems

- Very Comprehensive!
- Detailed guidance for virtually every type of waterfront structure
- “What” to look for, not “how” to inspect
- Detailed guidance on inspection of utility systems
- Guidance on appurtenant systems and features
Content of the Guidelines - Appendices

B. Types and Causes of Defects/Deterioration

• Extensive guidance on defining defect types
• Insights on determining root cause of defects
• Materials and systems covered:
  – Concrete
  – Steel
  – Timber
  – Masonry
  – Composite materials
  – Coating systems
  – Load isolators and bearings
  – Undermining/scour
Content of the Guidelines - Appendices

C. Specialized Inspection Techniques

- Infrared thermography
- Ground penetrating radar
- Acoustic emission
- R-Meter testing
- Schmidt Hammer
- Impact echo testing
- Windsor Probe
- Half-cell corrosion testing
- Chloride ion testing

- Material sampling
- Ultrasonic testing
- Liquid dye penetrant
- Magnetic particle
- Structure monitoring systems
- Unknown foundation investigations
- Underwater acoustic imaging and channel bottom soundings
- Bacteria testing
Content of the Guidelines - Appendices

D. Inspection Nomenclature
- Guidance on standardized nomenclature for both components and defect types
- Guidance on numbering schemes
- Guidance on reporting schemes

E. Bibliography
- Comprehensive list of references

F. Glossary
- Compendium of definitions for waterfront facilities and inspections of same
What’s Next?

REHABILITATION MANUALS:

• Timber Waterfront Structures (Started 2004!)
• Concrete Waterfront Structures
• Steel Waterfront Structures
QUESTIONS?

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