

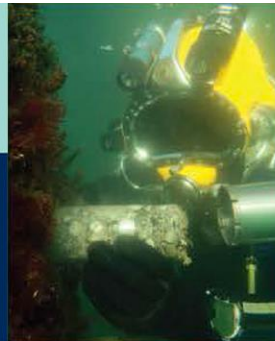
Facilities Engineering Seminar

San Diego, CA

October 20-22, 2015



ASCE Manuals
and Reports on
Engineering
Practice No. 130



Waterfront Facilities Inspection and Assessment

NEW ASCE WATERFRONT FACILITIES INSPECTION & ASSESSMENT MANUAL

Ron Heffron, P.E., D.PE

Waterfront
Inspection
Task Committee

Edited by
Ronald E. Heffron, P.E.



ASCE



Agenda

- Need and Purpose
- Scope
- The Team
- New Topics Introduced
- Cutting-Edge and Controversial Topics Introduced
- Content of the Guidelines
- What's Next?



Need and Purpose

- “Underwater Investigations Standard Practice Manual” (ASCE Manual 101)
 - 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
- Manual 101 remains valid for underwater inspection of non-waterfront structures

Need and Purpose

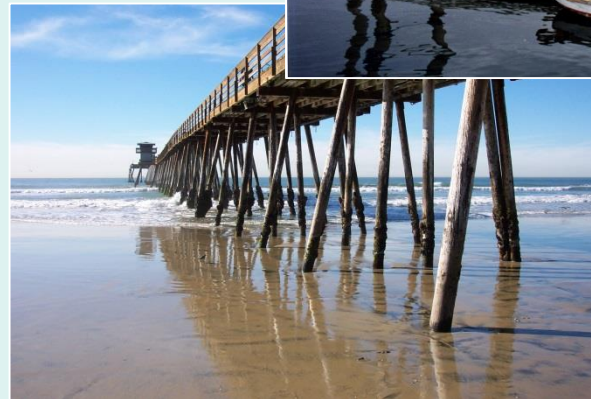
“Waterfront Facilities Inspection & Assessment Manual”

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



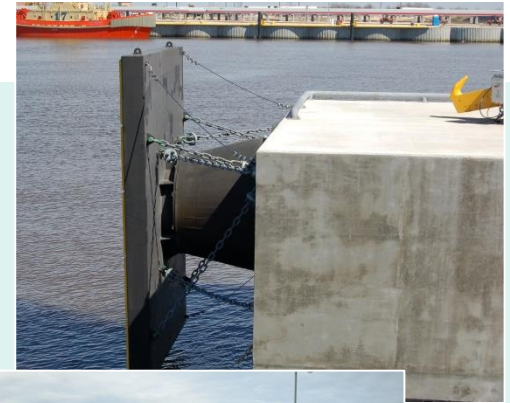
Scope

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



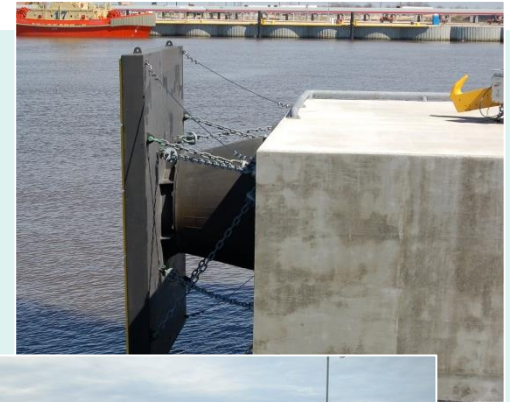
Scope

- 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 Owners and Engineers — by Owners and 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
- Bill Bruin
- Elizabeth Burkhart
- Andrew Cairns
- Sean Chapman
- Steve Curtis
- John Daley
- Frank Davidson
- 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, *APM Terminals*
- Richard Jenkins, *Port of Seattle*
- Angel Lim, *Port of Los Angeles*
- William Stahlman, *America's Central Port*
- Philip Vitale, *Naval Facilities Engineering Command*

The Team

Representing:

- Port Authorities
- U.S. Navy
- Academia
- Consulting Engineers



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



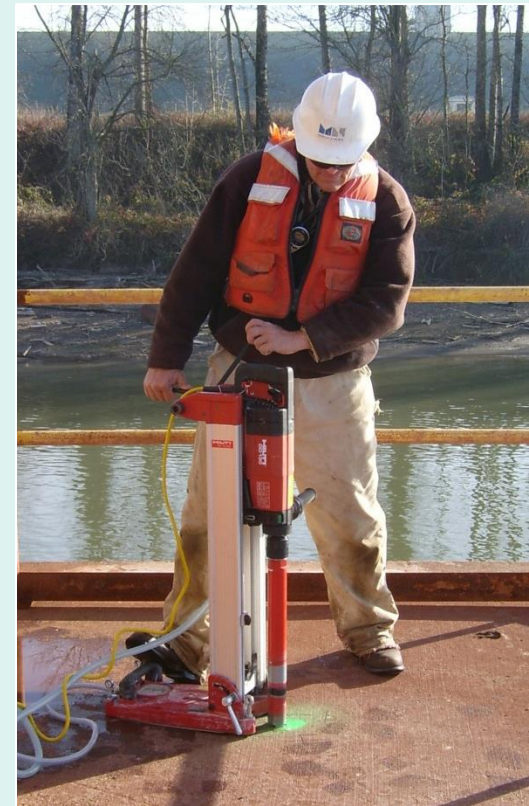
New Topics Introduced

- 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



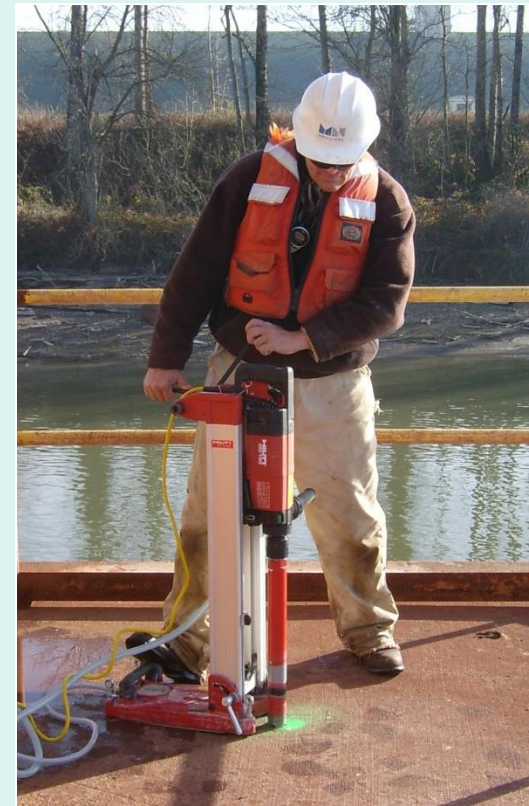
New Topics Introduced

- 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



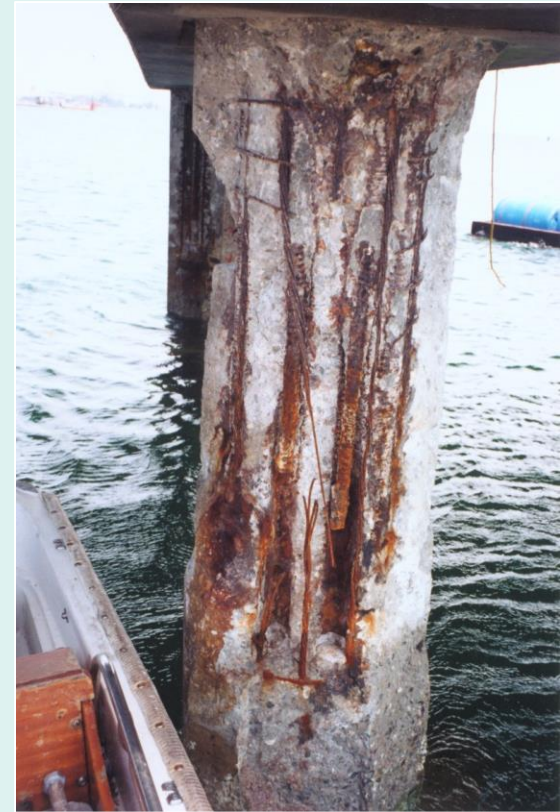
New Topics Introduced

- 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



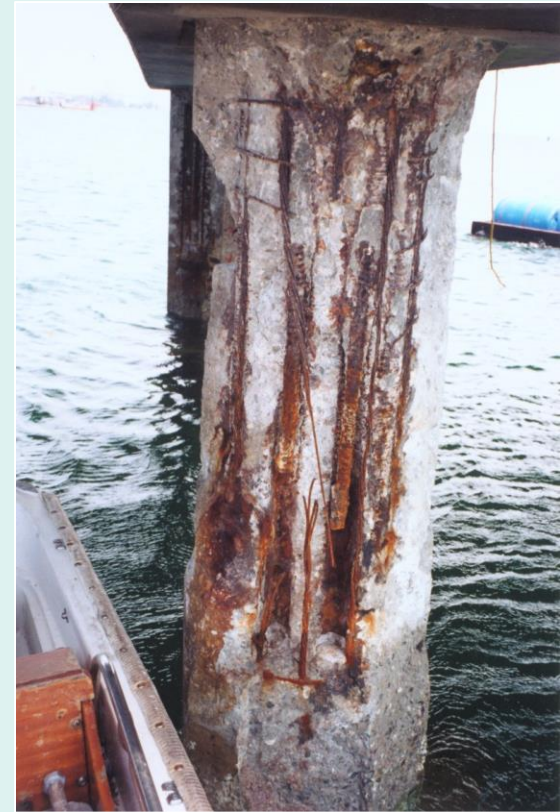
Cutting-edge and Controversial Topics Introduced

- 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



Cutting-edge and Controversial Topics Introduced

- 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

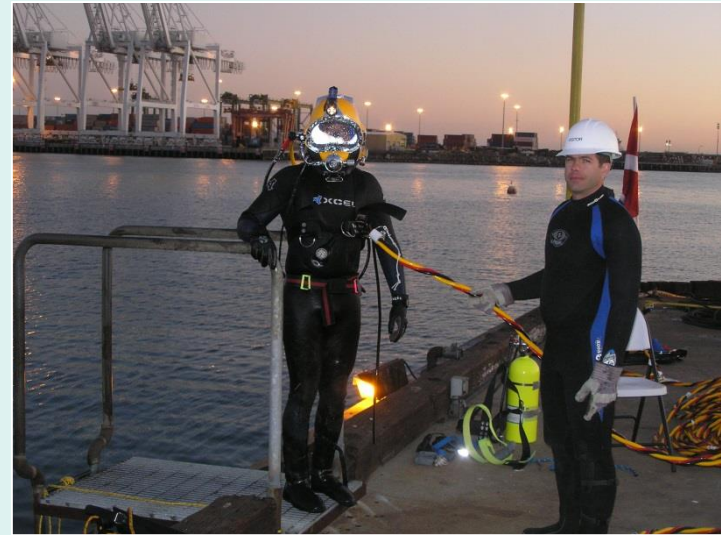
- Intent of Manual and target audience
- Importance of inspection over life cycle of asset
- Guidance on Owner responsibilities
- Terminology clarification
 - Preservation
 - Sustainment
 - Rehabilitation
 - Upgrade



Content of the Guidelines

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
- Standardized rating systems for both elements and overall systems
- Guidelines for follow-up actions



Content of the Guidelines

3. Scope of Inspection

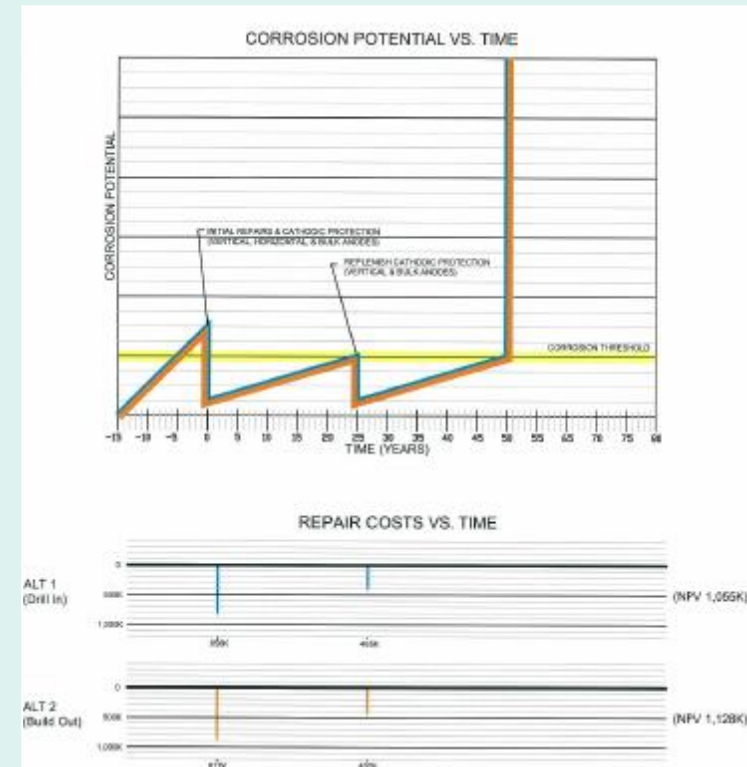
- Guidance on boundaries and limits
- Definitions of the three levels of inspection effort
- For each of the 8 inspection types:
 - Objectives
 - Methods of inspection and documentation
 - Guidance on evaluating, rating and recommending follow-up actions



Content of the Guidelines

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



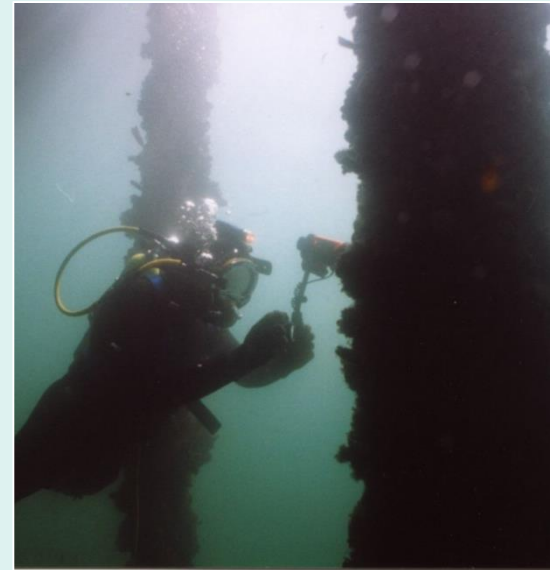
Content of the Guidelines

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



Content of the Guidelines - Appendices

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. Glossary

- Compendium of definitions for waterfront facilities and inspections of same

F. References

- Comprehensive list of references



What's Next?

Rehabilitation Manuals:

- Timber Waterfront Structures (nearing completion)
- Concrete Waterfront Structures
- Steel Waterfront Structures

What's Next?

Continuing Education:

- 4-Hour WFI Short Course at the PORTS '16 Conference
 - New Orleans, June 2016
 - Oriented towards Owners

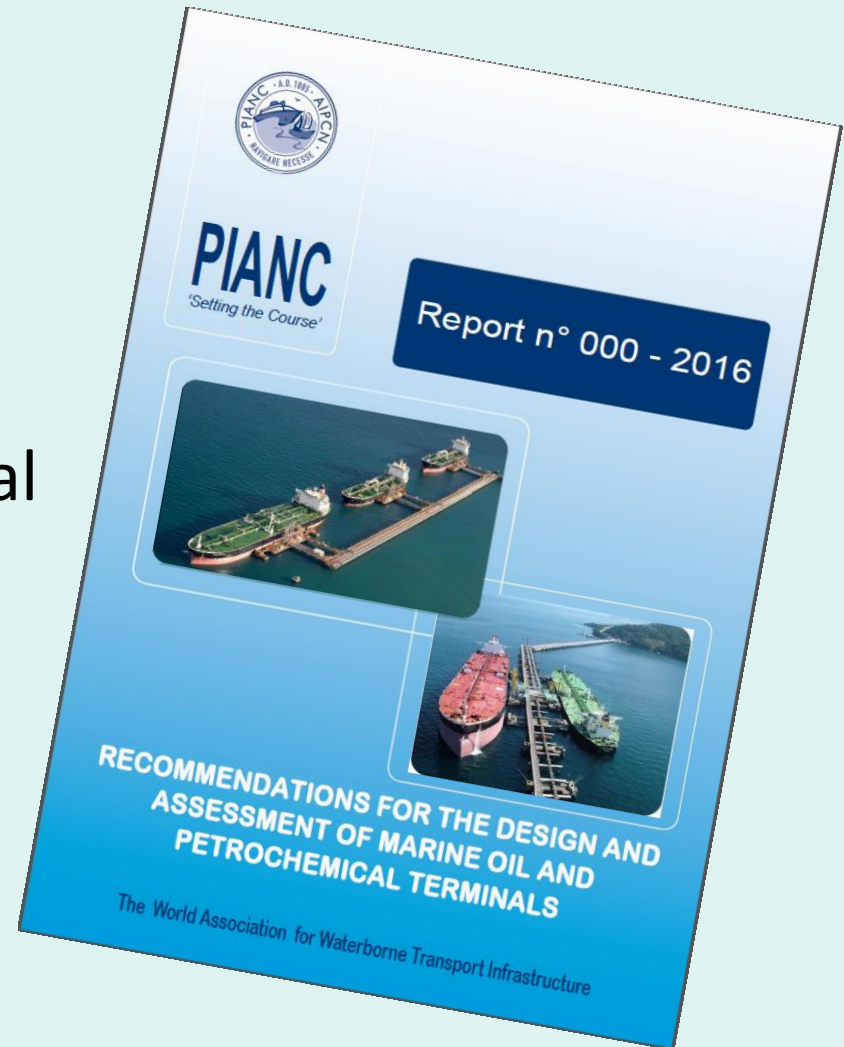


- Seminars and Webinars

Also of Interest...

New PIANC Document:

- Recommendations for the Design and Assessment of Marine Oil and Petrochemical Terminals
 - Fall 2016 Target Publication



NEW ASCE WATERFRONT FACILITIES INSPECTION & ASSESSMENT MANUAL



PLANNING

MUCH WORK REMAINS TO BE DONE BEFORE WE CAN ANNOUNCE
OUR TOTAL FAILURE TO MAKE ANY PROGRESS.

QUESTIONS?

Ron Heffron, PE, D.PE
rheffron@moffatnichol.com