

American Society of Civil Engineers

11th PORTS Triannual International Conference

PORTS 2007

“30 Years of Sharing Ideas ... 1977-2007”

March 25 – 28, 2007
San Diego, California, USA

Volume 1 of 2

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571
www.proceedings.com

ISBN: 978-1-60423-004-8

Some format issues inherent in the e-media version may also appear in this print version.

American Society of Civil Engineers
11th PORTS Triannual International Conference
2007

TABLE OF CONTENTS

Volume 1

PORT PLANNING

Master Planning of New Ports

Planning the Prince Rupert Container Terminal	1
<i>H. Westerman and L. Nye</i>	

Port of Kamsar Expansion: Development of a Greenfield Bulk Terminal in Guinea, West Africa.....	11
<i>William Lee Allen, Glenn Gaydar, and John Bardi</i>	

Master Planning for a New Seaport in Doha, Qatar	19
<i>S. Butler and J. Denton-Brown</i>	

Master Planning for Port Expansion 1

Overview of the Comprehensive Miami Harbor Study	30
<i>Bradd Schwichtenberg, Richard B. Powell, Jr., and Terri L. Jordan</i>	

Master Planning and Implementation of Phase IV Expansion: Manzanillo International Terminal - Panama, S.A., Colón, Republic of Panama.....	40
<i>Chris Cornell, Ricardo Cheng, and Viswanath Kumar</i>	

Master Plan for Expansion of Jebel Ali Port.....	50
<i>Dennis Padron, Javier Itriago, and Adnan Al Abbar</i>	

Re-setting the Productivity Bar: Conceptual Planning of Jebel Ali New Container Terminal, Dubai	60
<i>Dan Johnson</i>	

Master Planning for Port Expansion 2

U.S. Ports' Market Share Analysis	68
<i>Doug Rubin and Eleanor Hadland</i>	

South Gate Complex Planning and Design - Port of Palm Beach, Riviera Beach, Florida.....	78
<i>J. Casey Long, Thomas J. Lundeen, and David W. Mock</i>	

Port of Oakland Maritime Expansion	88
<i>Michael Leue, Imee Osantowski, and Mark Erickson</i>	

INCREASING PORT CAPACITY WITH LIMITED PHYSICAL GROWTH

Densification is the Only Solution to Increase the Port Capacity in US.....	98
<i>Milan B. Lazic</i>	

Planning for Major Improvements on an Operating Terminal During a Period of Unprecedented Growth.....	110
<i>Nathan Watson and Ticson Mach</i>	

Determining Surge Capacity and Maximizing Throughput by Integrating Landside Seaport Operations with Rail and Roadway	120
<i>J. Michael Walters and Jenish J. Joseph</i>	

Terminal Planning & Vessel/Equipment Trends

The Impact of Technology on Terminal Design	130
<i>Robert S. Johansen</i>	
Tandem-40 Dockside Container Cranes and Their Impact on Terminals.....	140
<i>Derrick Lind, Jonathan K. Hsieh, and Michael A. Jordan</i>	
The Floaterm Concept: Reducing Terminal Congestion with Waterside Cranes.....	149
<i>Michael Jordan, Catherine Morris, and Anna Dix</i>	

Working Waterfront in the Urban Environment

Eureka Fisherman's Terminal	159
<i>Brent Siemer, Robert Richardson, Clinton Scott Branlund, James Brennan, and Marty Lay</i>	
Balancing the Needs of the Working Waterfront with Commercial Development at Terminal 91, Port of Seattle	167
<i>Mark Griffin, Michael McLaughlin, Don Oates, and Nathan Watson</i>	
Thea Foss Waterway: Transition through Remediation Projects	177
<i>Bill Conley, Susan Bialous, Mary Henley, and John OTMLoughlin</i>	
Master Planning the Port of Gulfport, Mississippi - Rebirth after Katrina	187
<i>J. Webb and R. Everett</i>	

ENVIRONMENTAL ISSUES & MITIGATION

Dredging 1

A Potential Alternative to Berth Maintenance Dredging	199
<i>Joe T. Bryant and Marianne D. Moseley</i>	
The Cost of Environmental Protection In Construction Dredging	209
<i>T. T. Leeser</i>	
Cox Creek Dredged Material Containment Facility Design and Construction.....	219
<i>Peter W. Kotulak and John R. Headland</i>	
Cost-Effective Sediment Remediation at Port of Richmond on San Francisco Bay.....	229
<i>Scott A. Bourne and Norman Chan</i>	

Dredging 2

Innovative Construction Contracting for Todd Pacific Shipyards Sediment Superfund Cleanup	239
<i>Stephen Reimers, Kate Snider, Tom Coultas, and Allen Rainsberger</i>	
Sediment Movement and Dredging in Newark Bay, NJ.....	249
<i>Thomas H. Wakeman, Alan F. Blumberg, Dov B. Kruger, and Anne M. Fullerton</i>	
Collaborative Strategy for Dredging and Environmental Restoration Projects: Annapolis, Maryland	261
<i>Robert D. Agee, Christopher L. Overcash, and Thomas G. Sprehe</i>	
Minimizing Harbor Siltation (MHS)	271
<i>John R. Headland, Robert Kirby, Han Winterwerp, Horst Nasner, Jacob Vested, Marc Sas, Koen Lamers, Yasuyuki Nakagawa, Javier Enriquez, Franz Westermeier, and Jaques Paul</i>	

Environmental Issues 1

Rainfall Simulation to Evaluate Pollutant Build-Up and Wash-Off from Selected Land Uses Within a Port Environment.....	281
<i>B. Kitchen and A. Goonetilleke</i>	
Copper Loading Assessment from In-Water Hull Cleaning following Natural Fouling, Shelter Island Yacht Basin, San Diego Bay, San Diego, California	292
<i>Rolf Schottle and Paul Brown</i>	
Integrating Air Emission Management into Port Planning, Engineering and Construction	302
<i>J. G. McNally, R. M. Rhoads, J. A. Fink, and T. Fidell</i>	
Portwide Storm Water Pollution Prevention and Dust Control Program	312
<i>Emily Ueda, Douglas Thiessen, Denise Yaffe, and Travis Taylor</i>	

Environmental Issues 2

Supporting a Vision: Redeveloping the Port of Bellingham Waterfront.....	325
<i>Mark Larsen, Jack Cox, and Jim Darling</i>	
Rapidly Revising an Approved Sediment Remedial Action Plan: A Brownfield Redevelopment Success Story.....	335
<i>William Elmer and Clifford J. Whitmus</i>	
Ships and Shorebirds: A Case Study on the Development of a Constructed Roosting Site at the Port of Brisbane	345
<i>B. P. Kitchen and W. Young</i>	
Port of Everett Rail/Barge Transfer Facility: Permitting in Tribal Treaty Right Areas, Lessons Learned.....	356
<i>John Mohr, William Stelle, and Michael Wray</i>	

WATERWAYS AND CHANNELS

Widening & Deepening Projects

Impact of Large Container Ships on Port Infrastructure.....	366
<i>E. D. Allen and D. A. Thiessen</i>	
Adding Capacity to a Leading Waterway.....	376
<i>Rodolfo R. Sabonge and Valentine Lynch</i>	
Blair Waterway Widening, Port of Tacoma, Tacoma, Washington.....	386
<i>Scott Bickel, Sally Fisher, Tom Kress, and Elmer Ozolin</i>	
Port of Oakland Inner Harbor Turning Basin.....	396
<i>B. A. Porter, L. Cardoza, and D. V. Doak</i>	

Navigation Improvement Projects

Reconciling Conflicting Utility Location Data: A Case Study of Submarine Gas Lines in the Providence River	406
<i>John A. DeRugieris and Susan E. Nilson</i>	
Manipulating Harbor Geometries to Defeat Long Wave Agitation Problems	416
<i>Jack C. Cox and Mauricio Wesson</i>	

Port Canaveral Navigation Improvements: Section 203 WRDA 1986 Engineering Investigations	426
<i>Gary D. Ledford, Jeannie Adame, Sandra D. Rice, Donald L. Kingery, and Mohamad Al-Hawaree</i>	
In-Situ Capping of Contaminated Sediments with Reactive Materials	436
<i>J. T. Olsta</i>	

Modeling & Simulation 1

Enhancement of a Tidal Model for the Loxahatchee River Estuary (Southeastern Florida)	445
<i>Peter Bacopoulos and Scott C. Hagen</i>	
Mooring Loads Due to Parallel Passing Ships.....	455
<i>David Kriebel</i>	
Ferry Wake Wash Analysis in San Francisco Bay.....	465
<i>S. Anil Kumar, Justus Heimann, Bruce L. Hutchison, and Scott W. Fenical</i>	
Coupled Field Measurements and Numerical Modeling of Harbour Resonance at Marina di Carrara.....	475
<i>G. Cuomo, L. Franco, and I. Melito</i>	

Modeling & Simulation 2

Reverse Engineering Harbor Geometries to Achieve Water Basin Agitation Goals.....	485
<i>Jack C. Cox and Murat Utku</i>	
Propwash Model Development, Verification, and Port Applications	495
<i>M. Tirindelli and S. Fenical</i>	
Sediment and Shoaling Processes: Bolivar Ferry Terminal, Galveston, Texas	505
<i>R. D. Kite II, B. L. Edge, and W. D. Mears</i>	
Navigation at the Amazon River Mouth: Sand Bank Migration and Depth Surveying	515
<i>Rodrigo D. Fernandes, Susana B. Vinzon, and Felipe A. M. de Oliveira</i>	

Modeling & Simulation 3

Vessel Hydrodynamics and Berthed Vessel Loading Model Verification with Field Data and Laboratory Data.....	525
<i>S. Fenical</i>	
Vessel Hydrodynamics Analysis for Impacts of Port Expansion in Corpus Christi Ship Channel	535
<i>J. D. Carter, M. D. Campbell, S. W. Fenical, and D. L. Krams</i>	
Water Quality Modeling System for Charleston Harbor, South Carolina	545
<i>Hugo N. Rodriguez and Jamie Miller</i>	

LANDSIDE TRANSPORTATION

Roads and Railroads

Port of Los Angeles Port-wide Transportation Master Plan	556
<i>Sue Lai, Dina Aryan-Zahlan, and Michael Leue</i>	
Georgia Ports Authority Intermodal Planning.....	566
<i>Jonathan E. Thomas, Larry W. Nye, and H. Wilson Tillotson</i>	

San Pedro Bay Ports Rail Enhancement Program	576
<i>Michael Leue, Carlo Luzzi, and David Walsh</i>	
Planning Rail Service Connections	586
<i>Terry Wilcox, Thomas Ellert, Michael Holmquist, and Christopher A. Lawrence</i>	

TERMINALS & SPECIFIC FACILITIES

Container Terminals

Sustainable and Green Ports: Application of Sustainability Principles to Port Development and Operation	595
<i>Karim A. Abood</i>	
The Port of Houston Authority Delivers the Bayport Terminal Complex	605
<i>E. Tyson Thomas, Stephen A. Gilbreath, Sarah Kresta, and Mark E. Vincent</i>	
Sustainable Building Design: The "Greening" of Container Terminals	615
<i>Bruce R. Farrell and Emil Zordilla</i>	
Reconstruction of Maher Terminals, Elizabeth, New Jersey	625
<i>Christopher A. Lawrence, David J. Nisula, Christopher A. Dorang, Crystal Pecora, Leroy Luft, and Don Olesky</i>	

Petroleum & LNG Terminals

Marine Aspects of a Baja California LNG Terminal Development.....	635
<i>C. D. Fassardi and G. D. Baxter</i>	
Recent Oil and Gas Port Projects in Northern British Columbia	645
<i>R. Byres and V. Szabo</i>	

Volume 2

Design of First California Marine Oil Terminal in 25 Years Rises to the Challenge: "What Does it Take to Build a MOT in Today's Environment?"	655
<i>Ron Heffron and Nestor Taura</i>	
Idiosyncrasies of LNG Marine Terminals.....	665
<i>Dominic D. Legoe and John A. Imrie</i>	

Cruise Passenger Terminals

Strategic Implementation of Cruise Facility Improvements in Ketchikan, Alaska	675
<i>Robert Riley, Susan Bialous, and Harvey Hansen</i>	
New York City Cruise Terminal Developments	685
<i>Robert W. Beasley</i>	
Bayport Cruise Terminal Complex Master Plan, Port of Houston Authority, Houston, Texas.....	695
<i>J. Casey Long, Mark Vincent, and David W. Mock</i>	
Cozumel's International Cruise Terminal: Hurricane Wilma Recovery and Reconstruction	705
<i>John C. Bardi, Bruce I. Ostbo, S. Fenical, and M. Tirindelli</i>	

Passenger Ferry Terminals

Anacortes Tie-Up Slip Relocation, Washington State Ferries, Anacortes, Washington	715
<i>Frank Yang, Scott Branlund, and Hien Trinh</i>	
South Mitkof Island Ferry Terminal: New Routes for Southeast Alaska	725
<i>Douglas R. Playter and Bern Savikko</i>	
Delivering a New High-Speed Inter-Island Ferry Service for Hawaii.....	735
<i>David O. Torseth, Marshall Ando, and Theodore W. Bell</i>	
Navigable Approaches to New San Francisco Bay Area Ferry Terminals	745
<i>M. Culnane, S. Fenical, and V. Shepsis</i>	

Military Facilities

U. S. Navy Double Deck Piers	755
<i>Frank Cole and Anthony Farmer</i>	
Mobile Crane Load Assessment of Berth 8, Fleet Activities Yokosuka, Japan.....	763
<i>C. M. Inaba</i>	
Open-Ocean Roll-on/Roll-off Cargo Pier on San Nicolas Island	771
<i>R. F. Zueck and T. A. Blount</i>	
The DeLong Pier Repair Project: The Unique Challenges of Designing Repairs to a 1950 Vintage Marine Structure in the Arctic.....	781
<i>Noah J. Elwood and John W. Gaythwaite</i>	

SPECIFIC TECHNICAL TOPICS

Waterfront Structures & Cold Ironing

The First Permitted Cold Ironing Project at the Port of Long Beach, Pier G Phase 2 Wharf	790
<i>Luke Mahier, Nicholas C. Kozma, and P. "Ben" Chavdarian</i>	
Design of Sustainable Marine Concrete Structures : A Case Study.....	800
<i>Markus Wernli and Preston S. Springston</i>	
Upgrade of Berth 15 for Gantry Cranes, Panama Ports Company, Balboa, Republic of Panama	810
<i>Chris Cornell, William Bohlen, Viswanath Kumar, and Alex Reyes</i>	
Design and Development of Bid Documents for Cold Ironing of Oil Tanker Vessels at Berth T121 at the Port of Long Beach	820
<i>S. Nagel, J. Khouri, and R. Mast</i>	

Fender Systems

Floating Rubber Fenders for All-Tide Moorage of Vessels.....	828
<i>Kirk D. Miller</i>	
Flexible Steel Dolphins, System-Wide Performance Study	838
<i>Louis A. Klusmeyer, Robert E. Richardson, and Nicole McIntosh</i>	
Fender System Evaluation and Upgrade at Waterfront Street Terminal	848
<i>Jeffrey Schechtman, Brian Cresenzi, and John Fucci</i>	
Analysis of Historic Wind Data for Use in Vessel Mooring Analyses.....	858
<i>Joseph F. Marrone</i>	

Bulkheads & Seawalls

Development of Replacement Concepts for the Alaskan Way Seawall, Seattle, Washington	867
<i>Robert Harn, John Arnesen, Ralph Petereit, and Bill Perkins</i>	
Design and Construction of Bulkheads Using Synthetic Sheeting	877
<i>Siamac Vaghar and Francis Fung</i>	
Bulkhead Design Using Recycled Materials as Backfill	887
<i>Dennis G. Grubb, Wanxing, Liu, Allen W. Cadden, and Dana N. Humphrey</i>	
New York City Harbor - Remediation of Seawalls on the Historic Liberty and Ellis Islands	898
<i>Helen D. Robinson, Jesús E. Gómez, Carlos M. Englert, and Allen W. Cadden</i>	

Waterfront Structures

Design of a Floating Breakwater for the Port of Bremerton	909
<i>Robert F. Henry, Woosuk Ahn, C.J. Garrison, and Vladimir Shepsis</i>	
Recent Experience in Analysis and Design of Perforated Vertical Breakwaters	919
<i>V. Shepsis, J. D. Carter, S. Fenical, and M. Tirindelli</i>	
Design and Construction of the Energy Berthing Dock and Access Pier at the Esso Bahamas Clifton Terminal Facility	929
<i>Patrick R. Graney and Arturo Hernandez</i>	
Seismic Design of the Unloading Platform and North Trestle at the Port of Los Angeles Pier 400 Crude Oil Marine Terminal	941
<i>Angel Lim, John Posadas, and Omar A. Jaradat</i>	

Wharf Upgrades

Increasing Hurricane Winds? Dockside Crane Retrofit Recommendations	950
<i>Patrick McCarthy, Michael Jordan, Kenton Lee, and Stu Werner</i>	
Port of Oakland Wharf and Embankment Strengthening Program Phase 3 Final Design and Construction of Wharf Modifications for Deepening of Berths 23-26 & 30	960
<i>Jeff Aldrich, Rajendram Arulnathan, David Hebert, Ken Jung, Tom LaBasco, and Said Salah-Mars</i>	
Wharf Deepening Enabled by Modern Analysis Techniques	970
<i>B. P. Erickson, C. G. Bader, J. L. Carlson, W. Haynes, D. W. Mageau, and W. L. Schroeder</i>	
Spruce Mill Dock Replacement, Demolition, Design, and Construction	980
<i>Kamyar Nikzad, Anne Fabrello-Streufert, and Joseph May</i>	

Seismic Analysis & Design 1

Seismic Engineering Program at the Port of Los Angeles	990
<i>Peter Yin, Nigel Priestley, Geoffrey Martin, Max Weismair, Omar A. Jaradat, and (Arul) K. Arulmoli</i>	
Ports of Los Angeles and Long Beach Port-Wide Ground Motion Study	1000
<i>Arul K. Arulmoli, Ignatius Po Lam, Bruce A. Schell, Norman A. Abrahamson, Jim Santa Ana, and Peter Yin</i>	
Tsunami Propagation into the Ports of Los Angeles and Long Beach	1010
<i>David Dykstra</i>	

Probabilistic Tsunami Hazard Analysis for Ports and Harbors	1019
<i>Hong Kie Thio, Paul Somerville, Jascha Polet, and Gene Ichinose</i>	
 Seismic Analysis & Design 2	
Performance of New Pile-Deck Connections under Earthquakes	1029
<i>J. I. Restrepo, P. Yin, O. A. Jaradat, and M. Weismair</i>	
Seismic Response of Jumbo Container Cranes and Design Recommendations to Limit Damage and Prevent Collapse	1039
<i>Erik Soderberg and Michael Jordan</i>	
Evaluating the Seismic Capacity of a Newly Designed Wharf at the Port of Oakland	1049
<i>Shah Vahdani, John Egan, Robert Pyke, Chih-Cheng Chin, Tom Griswold, and Tom LaBasco</i>	
 Geotechnical Analysis & Design 1	
Geotechnical Considerations for National City Marine Terminal Development	1058
<i>Leo D. Handfelt and Jennifer L. Nevius</i>	
Compaction Grouting of Loose Soil Beneath the West Coast's Largest Dry Dock	1068
<i>M. A. Nykamp, S. R. Boyle, M. M. Bonus, and J. B. Spady</i>	
Development of a Landfill in Difficult Site Conditions at the Port of Los Angeles	1078
<i>(Raj) S. Varatharaj, Arul K. Arulmoli, Eric Brown, Richard Mast, and John Foxworthy</i>	
Full-Scale Testing of Piles in Wharf-Foundation-Dike System	1088
<i>Teerawut Juirnarongrit, Yohsuke Kawamata, Carlos A. Blandon, Scott A. Ashford, Jose I. Restrepo, Peter Yin, Omar A. Jaradat, Max Weismair, and Carlo G. Lai</i>	
 Geotechnical Analysis & Design 2	
Prediction and Impacts of Pile Driving on Port Terminal Facilities	1098
<i>D. D. Lindquist, G. E. Horvitz, and S. Asavareungchai</i>	
Large Diameter Steel Pipe Piles Running under Self Weight in Soft Clay: Predicted vs. Observed Behavior - Richmond San-Rafael Bridge Seismic Retrofit	1107
<i>A. R. Dover and J. Davidson</i>	
Port of Everett Rail/Barge Transfer Facility Seismic Design, Everett, Washington	1117
<i>Michael Wray, Robert Harn, and John Jacob</i>	
 Geotechnical Analysis & Design 3	
Stone Columns for Underwater Wall Stability, U.S. Coast Guard, Seattle, Washington	1127
<i>Pete Carroll, David Phelps, Rich Davis, and Scott Branlund</i>	
Stabilization of Dredge Spoil Basin and Filled Marsh for Container Terminal Development at the Former Charleston Naval Base	1137
<i>A. D. Goldberg, G. J. Canivan, and D. N. Smith</i>	
Finite Element Modeling of New Marine Terminal at the Port of Tacoma	1147
<i>D. W. Mageau and K. H. Chin</i>	
Unconservative Outcomes from Conservative Soil Properties Used in Waterfront Applications	1157
<i>N. J. McCullough, S. E. Dickenson, and J.J. Esterhuizen</i>	

SECURITY

Security Systems & Strategies

Spending Federal Security Funds Wisely	1165
<i>John McIntyre and David P. Cruz</i>	

Exciting Opportunities for Change in Container Terminal Gates	1172
<i>Dan Johnson and Steve Kingsley</i>	

LIFE-CYCLE MANAGEMENT

Facilities Management Systems 1

Engineered Management System for Waterfront Facilities	1182
<i>Thomas E. Spencer</i>	

Instrumentation and Monitoring of Port Facilities: Planning, Funding, Field Applications, and Long-Term Benefits	1193
<i>Stephen E. Dickenson</i>	

Instrumentation of Waterfront Structures for Monitoring During Extreme Events and Life-Cycle Management	1203
<i>Stephen E. Dickenson, Martin L. Eskijian, and Thomas LaBasco</i>	

Facilities Management Systems 2

Pile Condition Index Development	1213
<i>Kurt A. Keifer, Mohamed Y. Shahin, and David E. Pendleton</i>	

Terminal 5 Asset Management Plan	1223
<i>Michael McLaughlin and Don Oates</i>	

Effective Expert Reports for Marine Structure Investigations	1233
<i>Joseph F. Marrone, Stanley M. White, and David R. Hornig</i>	

Piling Maintenance & Repair

Accelerated Freshwater Corrosion Study in the Duluth-Superior Harbor	1243
<i>Gene Clark, Dave Bowman, Jim Sharrow, Chad Scott, and Jeff Gunderson</i>	

Update: The PANYNJ Experience with Protecting Marine Timber Piles	1253
<i>Daniel Webber</i>	

Innovative Techniques for Extending the Service Life of Deteriorating Concrete Piers and Wharves	1260
<i>Ron Heffron</i>	

NON-TRADITIONAL PROJECTS

Project Delivery Methods

Modern Delivery of Construction Management Services with Emphasis on Environmental Risk Management for Projects in Marine and Tidal Areas	1270
<i>Andrea Rosenthal and Samuel Scozzari</i>	

Marine Construction Cost Estimating - Thinking like a Contractor	1280
<i>Scott R. Anastasio and Stephen A. Famularo</i>	

Sustainable Precast-Concrete-Block Structural System	1290
<i>Reece F. Shaw</i>	

West Central Africa's Transshipment Terminal: São Tomé e Príncipe 1300
Marcel D. Veilleux, Eric McClellan, and Scott B. Jazynka

Author Index