PIANC Bulletin

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Permanent International Association of Navigation Congresses (PIANC)

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President's Message *by Major General Don T. Riley, President, PIANC USA, and Director of Civil Works, U.S. Army Corps of Engineers*

Dear Members,

The navigation community shares in important work in enhancing and sustaining the U.S. economy and aquatic environment. Almost 95 percent of all overseas trade (excluding Mexico and Canada) by volume presently moves by water. Tonnage at our harbors is forecast to double over the next 20 years. Much of our country's navigation infrastructure, however, is passing the 50-year design life, posing tremendous reliability challenges. The American Society of Civil Engineers gave the Nation's total infrastructure a "D" grade last year. Navigation infrastructure, in particular, received a "D-minus" when only 15 years ago it received a "B".

MG Riley

Now more than ever we need the kind of visionary leadership that brought the advances in U.S. transportation of the mid 20th Century. At that time, the USACE led innovations in policy, engineering approaches, and key technologies surrounding ports. Now is the time for new, innovative policy work.

The Corps has a major role in this arena, but it is a responsibility we share with the entire public, and especially the navigation community. Our strategy, therefore, is to:

INSIDE…

- Collaborate with the navigation community to understand its concerns and develop sustainable solutions,
- Develop thorough analyses of our navigation network to effectively inform policy makers, and
- Aggressively move to improve the most important components of our navigation network in a prioritized manner to meet anticipated future needs.

Our navigation network challenges include capacity, security, natural resources protection, and coordinated system oversight. In December, 2004, the President established the Cabinet-level Committee on the Marine Transportation System (CMTS) to address these challenges. This is the first ever committee of its kind at this level. It includes the heads of 11 Cabinet departments and two agencies, with the Secretary of Transportation as the Chair. The Assistant Secretary of the Army for Civil Works and PIANC USA Chairman, Mr. John Paul Woodley, represents the Department of Defense on this Committee.

The committee's charter is to improve cross-agency coordination and policies, promote environmentally sound integration of marine transportation with other modes, develop outcome-based goals and objectives for the MTS, and coordinate Federal annual budget requests for the MTS.

The CMTS created Integrated Action Teams (IAT) to address specific issues of their charge. The ***Disaster Response and Recovery IAT*** is developing a summary matrix situation report, which will give real time, critical information. With this tool, decision makers can conduct rapid response and recovery in disasters, avoiding critical loss in navigation system reliability.

The ***National Strategy IAT*** is outlining policies for the MTS based on risk and uncertainty. Using the National Strategy IAT's policies as a guide, the ***Assessment of MTS IAT*** is examining multiple objectives-based performance, such as positive/negative impacts to safety, reliability, economics, environment, and costs of the existing components of the system, as well as alternatives. This process will include stakeholder workshops to explain the current system status, demands, and objectives. Input would also include user and service provider surveys.

Our work in this area comes from lessons-learned and new, innovative approaches for risk- and uncertainty-based planning for restoration and improvement of the Hurricane Storm Damage Reduction System for Metropolitan New Orleans.

Meanwhile, we are examining innovative ways to improve the system, such as aids to navigation to identify natural channel thalwegs; Regional Sediment Management, improved use of navigation technologies such as automated data transfers, including current and wind velocities; river current monitoring to alert mariners of dangers to piloting; and improved economic modeling, providing a strong current understanding of the entire system's conditions and performance.

This latter measure will incorporate the benefits of science and engineering innovations. It will be: (a) consistently developed and applied across USACE, (b) transparent in how it operates, and (c) peer reviewed to ensure integrity. Collectively, these efforts are among Mr. Woodley's highest priorities.

To address this high priority, the Corps established the Navigation Economic Technologies (NETS) program to provide a standardized, defensible suite of performance-based tools for use in planning and decision making for our navigation system. The NETS Program has the following objectives:

- Expand the body of knowledge about objectives-based performance in navigation,

- Produce a toolbox of practical planning methods and models for a variety of situations to explore alternatives and their tradeoffs in decision making, and
- Support decision makers as the system is developed, recognizing that it will never be perfect.

These initiatives by the Federal Government represent a programmatic commitment, and provide for interaction with the navigation community to make wise choices for the benefit of our Nation's waterborne commerce. Regular meetings, such as the recently-held *PORTS 2007* and the *PIANC USA Annual Meeting*, provide strategic venues to advance these discussions. I appreciated the opportunity to engage in this dialogue with you all in San Diego at these events.

Sincerely,

Major General Don T. Riley
President, PIANC USA, and Director of Civil Works, U.S. Army Corps of Engineers

PIANC NEWS

Smart Rivers 2007: Technical Specialty Conference, Louisville, Kentucky, USA, September 16-19, 2007

Join PIANC USA in Louisville, Kentucky, September 16-19, 2007, for this 4-day technical specialty conference and technical tours. The 2007 conference will be the 3rd in a series of international joint conferences on synergies for an efficient waterway system in Europe and the U.S. Smart Rivers 21 is an international coalition intent on realizing "**S**trategic **M**aritime **A**sset **R**esearch and **T**ransformation (SMART) for 21st Century River Systems," which was started in 2004 by a cooperation agreement between U.S. and European partners. The first conference was held in 2005 in Pittsburgh, and the second was held in 2006 in Brussels. The 2007 conference is a continuation of this cooperation, and is expected to draw more than 200 port and waterway executives, policy, and technical professionals from the U.S., Europe and Latin America. The objective of the event is to share knowledge and experience, and to work for a better and more efficient integration of inland waterways (rivers and channels) into an integrated intermodal transport system. Questions? Contact PIANC USA staff at *kelly.j.barnes@usace.army.mil* or call 703-428-9090.

McAlpine Locks and Dam, Ohio River, Louisville, Kentucky.

Smart Rivers 2007 is organized by PIANC USA in conjunction with:

- American Association of Port Authorities (AAPA).
- Appalachian Regional Commission (ARC).
- Coasts, Oceans, Ports, and Rivers Institute (COPRI) of ASCE.
- European Federation of Inland Ports (EFIP).
- National Waterways Conference, Inc.
- Port of Pittsburgh Commission.
- Tennessee Valley Authority (TVA).
- TINA Vienna.
- Transportation Research Board (TRB) Marine Board.
- U.S. Army Corps of Engineers.

- via donau.
- Waterways Council, Inc.

Bayou Boeuf Lock, Louisiana.

Information on the previous Smart Rivers conferences can be found at:

- **Pittsburgh 2005:** Held in tandem with AAPA conference on Shallow Draft Ports: *http://www.port.pittsburgh.pa.us./home/index.asp?page=95*.
- **Brussels 2006:** *http://www.inlandports.be/public_smartriver.php*.

Sponsorship and exhibitor opportunities are available for Smart Rivers 2007. Please go to *www.pianc.us*, or contact PIANC USA staff at *kelly.j.barnes@usace.army.mil* or 703-428-9090 for more information.

Conference Agenda:

Sunday, September 16
12:30 p.m. – 7:00 p.m.:
Conference Registration
1:00 p.m. – 5:00 p.m.:
Technical Workshop(s) and Cultural Tour(s)
6:00 p.m. – 8:00 p.m.:
Icebreaker Reception and Official Start of Conference

Monday, September 17
8:00 a.m. – 9:00 a.m.:
Registration/Continental Breakfast
9:00 a.m. – 10:30 a.m.:
Opening Plenary Session
11:00 a.m. – 12:30 p.m.:
Technical Session: Country Experiences
12:30 p.m. – 2:00 p.m.:
Lunch Speaker
2:00 p.m. – 3:30 p.m.:
Technical Session: New Fuels/Engines
4:00 p.m. – 5:30 p.m.:
Technical Session: Changing Markets
7:00 p.m. – 9:00 p.m.:
Evening event

Tuesday, September 18
8:00 a.m. – 9:00 a.m.:
Registration/Continental Breakfast
9:00 a.m. – 10:30 a.m.:
Technical Session: New Electronic Operational Technologies/Strategies
11:00 a.m. – 12:30 p.m.:
Technical Session: Economic Development
12:30 p.m. – 2:00 p.m.:
Lunch Speaker
2:00 p.m. – 3:30 p.m.:
Technical Session: Policies
4:00 p.m. – 5:30 p.m.:
Roundtable Discussions: Future Strategies
7:00 p.m. – 9:00 p.m.:
Gala Reception at Kentucky Derby Museum and Churchill Downs

Wednesday, September 19
9:00 a.m. – 5:00 p.m.:
Technical Tour(s)
6:00 p.m. – 8:00 p.m.:
Evening event

Thursday, September 20
9:00 a.m. – 5:00 p.m.:
PIANC INCOM and other meetings

Friday, September 21
9:00 a.m. – 5:00 p.m.:
PIANC INCOM and other meetings

PIANC 2007 Annual Meeting Summary *by Kelly Barnes*

PIANC members gathered in sunny San Diego County, California, at La Costa Resort and Spa for PIANC USA's annual meeting March 27, 2007, held in conjunction with the Ports 2007 conference. PIANC USA Commissioners and members participated in a general membership meeting in the morning, and listened to technical presentations in the afternoon.

Major General Don T. Riley, PIANC USA President and Director of Civil Works for the U.S. Army Corps of Engineers (USACE), welcomed attendees and spoke about recent PIANC USA activities. He also recognized Charles Calhoun, one of the members of the U.S. Commission, whose term is ending this June. General Riley presented Mr. Calhoun with a PIANC medallion for having served as a Commissioner and Vice President of the Central Region since 1999.

Major General Don T. Riley, PIANC USA President, and Director of Civil Works for the U.S. Army Corps of Engineers.

Bruce Lambert, Secretary of PIANC USA, presented his annual report to PIANC USA. He discussed PIANC international and its upcoming work areas (Young Professionals, and ProCom as a new Promotion Commission). He emphasized that PIANC USA is working to become a more member-driven organization. To this end, the PIANC USA Commission and staff are gearing up for many new initiatives in the coming year. They are working on the strategic plan, and are setting priorities for membership development, outreach, young professionals, and more. For instance, upcoming events such as the Smart Rivers 2007 Conference will serve as a great opportunity for members to exchange technical information and network.

Mr. Lambert also discussed PIANC working groups as well as the upcoming elections to replace U.S. Commissioners. PIANC's work in Latin America was also on his agenda. For example, Mr. Lambert talked about PIANC USA's recent Memorandums of Understanding with organizations such as the Organization of American States-Inter-American Committee on Ports (OAS-CIP). Mr. Lambert's presentation is posted on the PIANC USA website at www.pianc.us.

Bruce Lambert, Secretary of PIANC USA.

After the Secretary's presentation, U.S. Representatives to the International Commissions gave their reports. Shiv Batra presented his report on InCom (Inland Navigation Commission), Dan Allen spoke about MarCom (Maritime Navigation Commission), and Jack Cox discussed RecCom (Recreational Navigation Commission). Dr. Robert Engler, Chairman of EnviCom (Environment Commission), presented that report, and Bruce Lambert spoke about CoCom (International Cooperation).

After the working group presentations, there was a general discussion regarding PIANC, where members of the audience had an opportunity to provide input on how they think PIANC USA can be improved. Several of the members who participated on working groups felt they were better connected to the ongoing work of PIANC International, rather than feeling more connected to their National Section. They felt that communications efforts should be improved to

better integrate the Commission heads with the U.S. Commissioners.

Several members also believed that PIANC USA is not aggressively marketing either the availability of working group slots, or the promotion of working group reports once it is finished. The group discussed ways to disseminate the technical information to a wider audience once the working group report has been completed. One idea is that the members of the working group can present the information as a workshop or an on-line seminar. This could be marketed not only to the U.S. membership, but also to a much larger audience. The discussion proved to be quite productive, with many good suggestions and a positive outcome for the staff and Commissioners to follow up with.

PIANC USA members at the 2007 Annual Meeting (left to right), Charles Calhoun (Commissioner and Vice President of the Central Region), Dan Allen (MarCom Representative), and Jack Cox (RecCom Representative).

The meeting attendees also had the opportunity to hear a presentation by the 2007 U.S. winner of De Paepe-Willems Award. Kenneth J. Connell, U.S. Army Engineer Research and Development Center (ERDC), Coastal and Hydraulics Laboratory, presented his winning paper, "Modeling Navigation Channel Infilling and Migration at Tidal Inlets: Sensitivity to Waves and Tidal Prism." Ken's insightful presentation can be downloaded at *www.pianc.us*.

Lunch was served in the Ports 2007 conference exhibit hall, giving attendees the chance to view the showcase of companies who provide goods and services to the ports and harbors industry.

PIANC Young Professional Members Ying Sze Yeo, Halcrow Consultants International, and Kenneth Connell, USACE ERDC Coastal and Hydraulics Laboratory (2007 U.S. Winner of the De Paepe-Willems Award).

The afternoon sessions consisted of two panel sessions on important topics related to Ports 2007 (Environment, and Port Security). Each session tackled a specific topic, with a moderator, key-note speaker, and a four-person panel of experts. Audience participation was encouraged, and it stimulated a lively dialogue.

Environment roundtable discussion

The first of two panel sessions addressed "Environmental Issues as They Are Developing in the European Union and Other Global Locales, and Their Influence in North America," with a focus on topics such as cold ironing, European Union water directives, ballast water, risk assessment, etc. The panel addressed a standing-room-only crowd, which later resulted in a very stimulating dialogue

amongst the participants. Dr. Robert Engler, Moffatt and Nichol, moderated the session, and Mr. Shiv Batra, U.S. Western Region Vice President and Representative to InCom, provided the opening key note comments.

Dr. Robert Engler, Moffatt and Nichol, Chairman of EnviCom (Environment Commission), moderated the Environment roundtable discussion.

Dr. Todd Bridges, Senior Scientist (Environmental Sciences), ERDC Environmental Laboratory, introduced "Risk-Informed Planning and Management for Ports." He discussed planning for an uncertain future, the role of uncertainty in planning and management process, and the application of risk analysis and decision analysis. Examples topics included assessment and planning for sea-level rise, storm protection, channel maintenance, dredged material disposal requirements, cleanup, and restoration of habitat.

Dr. Todd Bridges, USACE ERDC Environmental Laboratory Senior Scientist.

Ms. Stacey Jones, Vice President of Halcrow Consultants International, addressed shore-to-ship electrical supply issues, and how global entities are dealing with the prospect of shore power, the challenges they face, and how they are overcoming the constraints and implementation issues. The economics and sustainability of our shore-to-ship supply was also discussed, along with the response by U.S. Ports.

Dr. Geraldine Knatz, Executive Director of the Port of Los Angeles, discussed international issues from her participation in the international arena, and the trend toward "act locally" and "enforce globally!"

Dr. Geraldine Knatz, Executive Director of the Port of Los Angeles.

Port Security roundtable discussion

There is a lack of coordination between immediate operational plans developed to respond to port security threats, including emergency planning activities, and long-term navigation system strategic planning activities for freight (particularly container movements). The port security panel discussed how to incorporate security planning into long-term port and navigation planning. The panel joined with the audience to review case studies in which security requirements have been embedded in strategic planning of capital investments and in asset management programs. Dr. Thomas H. Wakeman, Port Authority of New York and New Jersey, moderated the session, and General Riley provided the opening key note comments.

Dr. Thomas Wakeman, Port Authority of New York and New Jersey, moderated the Port Security roundtable discussion.

George P. Cummings, Director of Homeland Security for the Port of Los Angeles (POLA), outlined the POLA Strategic Plan for Safety and Security for FY2007-2008. He described the initiatives that POLA will be undertaking to enhance their operations in the areas of public safety, homeland security, and emergency preparedness.

Robert S. Johansen, JWD Group (a division of DMJM Harris), is Manager of the JWD Planning Group, and Chairman of the American Society for Civil Engineers (ASCE) Ports and Harbors Security Subcommittee. He discussed some of the current physical impacts of security measures on maritime terminal design, as well as some of the shortfalls not being addressed.

Doug Sethness, M.ASCE and Vice-President of CH2M HILL's Port and Maritime Group, discussed the activities of the Critical Infrastructure Committee formed by the Board of Directors of ASCE to promote awareness in the professional community and the general public regarding sensible security and critical infrastructure resilience.

The audience for both sessions engaged the speakers with insightful questions which lead to rousing discussions of the topics. The presentations for all the speakers can be viewed on the PIANC website at www.pianc.us.

Kelly Barnes is an Intergovernmental Program Specialist at the U.S. Army Corps of Engineers, Institute for Water Resources. She provides program management and support to PIANC USA. Kelly is a member of the American Society of Association Executive.

Charles Calhoun Recognized at PIANC USA Annual Meeting

At the PIANC USA Annual meeting in northern San Diego county, California, in March 2007, Major General Don T. Riley recognized one of the members of the U.S. Commission whose term is ending in June 2007. General Riley presented Mr. Charles Calhoun a PIANC medallion for having served as a Commissioner, VP of the Central Region, since 1999. Mr. Calhoun completed a long and distinguished career at the U.S. Army Engineer Research and Development Center, Waterways Experiment Station, Vicksburg, Mississippi, when he retired in 1999 as the Deputy Director of the Coastal and Hydraulics Laboratory. He currently serves as a consultant and highly sought after speaker for seminars on leadership development. He has been an important part of the U.S. Commission for the last 8 years, and his presence will be missed. General Riley thanked him for his leadership and exceptional service to PIANC.

Major General Don T. Riley presented Mr. Charles Calhoun a PIANC medallion for his service on the U.S. Commission since 1999.

PIANC-IAPH Joint Working Group 1 (WG1) Update: Small Island Ports

Scope of work

The objectives of this joint Internation Co-operation Commission (CoCOM) PIANC-IAPH

(International Association of Ports and Harbors) working group are to:

- Make an inventory of the actual conditions of small island ports, amongst others, by sending a questionnaire to the relevant port authorities and by analyzing the responses. Such inventory will include all aspects of the ports; i.e., design, performance, operations, security, safety, and risk involvement.

- Identify the most critical issues in the operation of these ports, in the field of (shipping) economics, capacity of quays and storage areas, maintenance, environment, organization, etc.

- Develop a simple financial model to establish port tarrifs/cost revenue, and hence be able to determine the need for subsidies.

- Highlight the macro-economic benefits of the ports to improve the awareness for proper funding of the operation, maintenance, and repair of the facilities.

- Develop solutions for these issues, be they technical, logistic, or organizational in nature (for example, the development of low-cost maintenance techniques, adding other functions to make the port more viable, etc.). Some problems may be due to its inherent nature, and not be easy to solve. In such cases, recommendations shall be presented on the handling of such problems in the most appropriate way.

- Prepare a comprehensive report with recommendations for solutions.

Meeting location

Almost all of the working group communication has been by e-mail. Only two meetings have been held, both in Geneva, Switzerland, on February 3, 2006, and December 8, 2006.

Attendees at the February 3, 2006, meeting were Carlos Canamero (Chairman, Spain/Peru), Gary Crook (Canada), Chris Jones (Australia), and Bengt Bostrom (U.S.).

Attendees at the December 8, 2006, meeting were Carlos Canamero (Chairman, Spain/Peru), Gary Cook (Canada), and Bengt Bostrom (U.S.).

Status of the efforts

Most of year 2005 was spent on preparing, sending, and following up on the questionnaire in three different languages that was sent to 37 countries and territories selected for the survey. Despite several reminders, only seven replies were finally received by the end of 2005. Fortunately, there was a fairly even coverage of these replies, with three in the Pacific, two in the Indian Ocean, and two in the Caribbean. The questionnaire was prepared by Bengt Bostrom, Douglas Gaffney, Timothy Blankenship, and Thomas D. Smith, all from the U.S.

Year 2006 was devoted to analyzing the data, preparing the draft report, and to the extent possible filling in further information from other sources than the questionnaire. Bengt Bostrom (U.S.) developed the simple financial model, and worked on the economic impact of the ports.

The final report is very close to being completed, currently with about 23 pages of text and 7 tables. In this work, the four members who attended the February 3, meeting and Godfred Shuma (South Africa) have been contributing authors.

Tours

No tour was taken by this working group. Much of the analysis depended on direct knowledge by the core working group members of many of the ports.

PIANC Working Group 15 (WG15) Update: Emerging Materials in Marine Facility Construction

Recreation Commission (RecCom) WG15 "Emerging Materials in Marine Facility Construction" will be holding its next international group meeting July 2-4, 2007, in conjunction with the COPRI-ASCE Coastal Structures Conference in Italy.

The WG15 group report is presently being prepared. The primary materials in the report cover polymeric piles, thermoplastic lumber, and fiber-reinforced polymer products. The international working group will be soliciting input from other committees within PIANC since these materials are not confined to only recreational facility uses. In fact, these materials are currently found predominantly at commercial ports and navigable maritime waterways.

WG15 is also soliciting volunteers to join the U.S. Subcommittee of RecCom. WG15 has also coordinated with other organizations, including American Society for Testing and Materials (ASTM) D20.20 Committee on this topic.

Please contact Terry Browne, Collins Engineers, Inc., at (telephone: 414-349-2200), e-mail *tbrowne@collinsengr.com* for further information or contribution into this state-of-the art report.

PIANC Working Group 28 (WG28) Update: Developments in the Automation and Remote Control of Locks and Bridges

Scope of work

WG28 described and documented recent developments in lock automation, as well as the remote operation of locks and bridges. The main reason for remotely operating locks in Europe is reduced operation and maintenance cost because of reduced manpower requirements. Another advantage is that the programmable logic controllers (PLCs) that are used to control lock equipment can also be used for condition monitoring and asset management of lock control machinery. About 40 percent of mainly commercial locks (about 200 locks) in Europe are remotely operated at this time.

Meeting location

The most recent meeting of WG28 was held in Paris, France, on March 6-8, 2007. Representatives from the United States, England, France, Belgium, Germany, and The Netherlands were in attendance. The major activity at this meeting was the completion of the final report.

WG28 tour

Members of WG28 also visited Marquion Lock and control room, Canal du Nord, France, where one of two locks is remotely controlled.

WG28 Terms of Reference

The aim of WG28 is to organize an exchange of international experience and learning about (a) automation of river works (dams, locks, mobile bridges, etc.), and (b) remote control of these facilities. This exchange can be carried out from several points of view, including (a) quality of service for inland waterway transport, (b) safety and risk, and (c) limits to the operational fields.

Many countries have practices for different types of automation and remote control for river and canal operation, including (a) automation of groups of locks on less busy canals (this has been done in France on several waterways using differing techniques such as electronic control from the vessels, or simple mechanical control), (b) automation or remote control of dams on rivers, (c) remote control of locks on big and busy canals or rivers (several experiences are known, but generally the work-station is not far from the locks), and (d) automatic ship lock management that

involves using a procedure to define the position of the ships in the locks to maximize the number of ships in the chamber. There are now some automatic packages that can be used to regulate ships in locks (instead of the previous "first arrived – first in" technique). Such packages could use a River Information System (RIS) database for the ship sizes, estimated time of arrival, etc. …

WG28 members left side of table (left to right); John Dixon (England); Laurent Luchez (France), and Ashok Kumar (USA): right side of table (left to right); Gerritt Bruggink (The Netherlands), Seppo Kykkanen (Finland), Risto Lang (Finland), and Walif Scheineder (Germany).

The development of these practices is useful to improving the service given to the boats on rivers and canals, but they have limits. These practices often have positive influences on the quality of service given to the river transport companies, especially in terms of improved information that can be given to the boats, and on rapidity of through passage. Cost of the operational control staff is economical, and there is an increase of personal interest in the jobs. There is often a positive influence on the safety of the operation and of transport. There exists the possibility of standardization of equipment in automation of remote controls. Finally, with the advantage of better knowledge of traffic on the waterways, a means exists to achieve a more efficient organization of the staff.

WG28 members at Marquion Lock, Canal du Nord, France (left to right); Seppo Kykkanen (Finland), Risto Land (Finland), Laurent Luchez (France), Jean-Michel Pujadas (France), and Ashok Kumar (USA).

WG28 will also bring together experience in the matter from the different countries, synthesize them, and provide recommendations for future developments. Automatic management and remote control has already been the subject of two PIANC working groups (i.e., InCom Working Group 8: "Automatic Management of Canalized Waterways and Their Hydraulic Problems," and InCom Working Group 18: "Automation and Remote Control of Small Locks and Mobile Bridges"). WG28 will also include in their tasks the updating of those reports, taking into consideration the new opportunities offered by development of RIS systems and advanced automation.

PIANC Working Group 30 (WG30) Update: Inventory of Inspection and Repair Techniques of Navigation Structures (Steel, Concrete, Masonry, and Timber) both Underwater and In-the-Dry

Meeting location

The initial meeting of WG30 was held March 12-13, 2007, in Lyon, France.

Scope of work

This was the first full working meeting of WG30. Considerable time was spent making certain that all group members understood exactly how the scope of work would be defined. The group assembled a questionnaire that will be used to begin the inventory process.

WG30 attendees at the March 12-13, 2007, meeting in Lyon, France, left to right: (front row) Brahim Benaissa (France), Hans Joachim Uhlendorf (Germany), Andreas Husig (Germany), Hiroshi Yokota (Japan), Jukka Tapani Tuovinen (Finland), and Risto Lang (Finland): (back row) Astrid Laemont (Belgium), Eric Van Draege (Belgium), Peter Van Besien (Belgium), Bob Willis (USA), Chad Linna (USA), and Vladimir Holcik (Slovakia).

WG30 tour

The host for the WG30 meeting, Mr. Brahim Benaissa (France), provided an extremely informative cruise on the Rhone and Saone Rivers. The group was able to view the Lyon riverfront, beautiful bridges, and the historic city itself as seen from the rivers. The hospitablity and planning by the host allowed WG30 to quickly mature as a working group. Five attendees had previously participated in PIANC working groups (Brahim Benaissa, France; Hans Joachim Uhlendorf, Germany; Hiroshi Yokota, Japan; Risto Lang, Finland; and Eric Van Draeg, Belguim). Their experience allowed the group to organize efficiently and begin a strong group effort. The Young Professionals (Astrid Laemont, Belgium; and Chad Linna, USA) contributed significantly, and are a definite asset to WG30.

Next scheduled meeting

The next meeting of WG30 is scheduled for June 16-19, 2007, in Finland. That meeting will be hosted by the group Finnish members, Risto Lang and Jukka Tapani Tuovinen.

PIANC Working Group 49 (WG49) Update: Horizontal and Vertical Dimensions of Fairways

Meeting venue and attendance

PIANC Maritime Navigation Commission (MarCom) Working Group (WG) 49, "Horizontal and Vertical Dimensions of Fairways," held its fifth meeting at the Coastal and Hydraulics Laboratory (CHL), U.S. Army Engineer Research and Development Center, Vicksburg, Mississippi, on April 26-27, 2007. The main purpose of WG49 is to review, update, and expand design guidelines in the PIANC WG30 1997 report on design of deep draft navigation channel, "Approach Channels: A guide for Design." WG49 is considering recent developments in simulation and design tools, and sizes and handling characteristics of new generation vessels.

This meeting was scheduled for the week before the International Association of Ports and Harbors 2007 (IAPH 2007) and Offshore Technology Conference (OTC) conferences in Houston, Texas, for convenience of WG49 members attending those conferences. A total of nine members and three guests from eight countries participated in this meeting.

Agenda

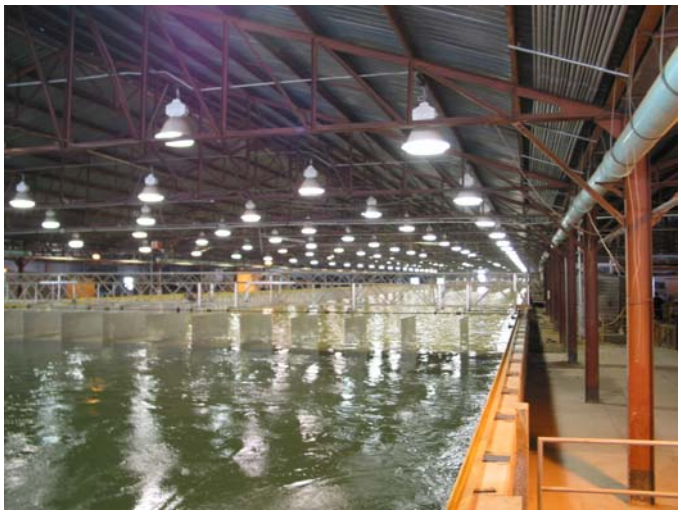
The agenda included discussions and presentations on: (a) coordination with International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA), (b) ship directory database being prepared by the U.S. Naval Academy, (c) fate of a proposed questionnaire to solicit input relative to approach channel design, and (d) review of objectives and documentation of progress to date. After some discussion on the questionnaire, it was decided that the effort would not justify the response, especially given the time limits of this working group.

WG49 attendees included, left to right (first row); Michael Briggs (member and host, U.S.), Kohei Ohtsu (member, Japan), Rink Groenveld (member, Netherlands), Takemasa Minemoto (guest, Japan), and Larry Cao (member, Canada); (second row); Masayoshi Hirano (guest, Japan), Pierre Debaillon (member, France), and Zeki Demirbilek (guest, U.S.); (third row); Hans Moes (member, South Africa), Terry O'Brien (member, Australia), Mark McBride (Chairman, UK), and Jos van Doorn (member, Netherlands).

WG49 attendees then split into two groups to discuss horizontal and vertical dimension chapters of the new report. Because of time constraints, the group was not able to discuss other chapters of the report.

Tour

On the second day, WG49 members and guests were given a tour of CHL simulation and physical modeling facilities. The first stop was CHL's Ship/Tow Simulator (STS). Mr. Dennis Webb discussed how the STS is used for channel design in the U.S. The next stop was a physical model of Hurricane Katrina damage to New Orleans. Mr. William Seabergh discussed how that model provided valuable insight into the collapse of the 17th Street Levee and subsequent flooding of New Orleans. Dr. Steven Hughes gave a demonstration of the ongoing calibration in the Estuarine Experiment (Estex) Basin that is being set up for a hydrodynamics study of Cook Inlet, Alaska. This basin is being considered for study of ship motions and squat of new super-containerships after the Alaska study. Finally, Dr. Ernest Smith described the Longshore Sediment Transport Facility.



Estex Basin at CHL, Vicksburg, Mississippi, undergoing calibration for use in the Cook Inlet, Alaska, hydrodynamic study for the Alaska District. Large tidal bore is seen moving up and down the basin. This basin may also be used in the future for ship motion and squat measurements of new super-containerships.

Next meeting

The next meeting of WG 49 is tentatively scheduled for the week of October 7 or 15, 2007

(probably October 11-12), at the Flanders Hydraulic Institute in Antwerp, Belgium. The meeting will be hosted by Professor Marc Vantorre.

Highlights from the Ports 2007 Conference, San Diego County, California, March 25-28, 2007

The Ports 2007 Conference, organized by the Coasts, Oceans, Ports, and Rivers Institute (COPRI) of the American Society of Civil Engineers and co-sponsored by PIANC USA, was a monumental success. Ports 2007 was held at La Costa Resort and Spa in the rolling hill country of northern San Diego County, under perfect weather conditions.

La Costa Resort and Spa, San Diego County, California, site of Ports 2007, and PIANC USA Annual Meeting.

The conference began on Sunday with three technical workshops, an ice-breaker reception in the exhibit hall, and the PIANC USA-COPRI sponsored Young Professionals Reception. The 3 days of technical sessions were the emphasis of the conference. With almost 800 attendees at the conference, many of the sessions were standing room only. The conference exhibit hall showcased 70 companies who provide goods and services to the ports and harbors industries.

The two technical tours on Wednesday visited the San Diego Bay (harbor excursion tour and working waterfront tour). There were plenty of opportunities for attendees to network at events such as the gala dinner held Tuesday evening on the USS Midway on San Diego Bay. The world-renowned conference facility and 400 acres of lush gardens at La Costa Resort provided a very pleasant backdrop to this successful and highly-regarded conference series.

PIANC USA President Major General Don T. Riley, Director of Civil Works, U.S. Army Corps of Engineers (USACE), delivered the keynote speech at Ports 2007. He expounded on the conference theme of "30 Years of Sharing," and spoke about the need for visionary leadership and innovative policy work. General Riley also discussed USACE's integrated action teams, innovative engineering approaches, navigation risk assessment, and innovative navigation.

COPRI Ports and Harbors Committee Chairman, Stan White (left), and Ports 2007 Chairman, Matthew Martinez (right), presented General Riley with a certificate of thanks for providing the keynote speech at the conference awards luncheon.

Conference attendees had the opportunity to network with other ports and harbors professionals at the Gala dinner on board the USS Midway.

USS Midway, San Diego Harbor, California.

The conference attendees who took the Working Waterfront technical tour got a first hand look at the waterfront businesses along San Diego Bay. They gained an awareness of the important role these businesses play in the region's economy, environment, and national security. They viewed major shipyards, Naval Station San Diego, boatyards, The National City Marine Terminal, and the Tenth Avenue Marine Terminal.

PIANC staff and Commissioners enjoying the reception on the USS Midway hanger deck (left to right), Kelly Barnes, Doris Bautch, Charles Calhoun, General Riley, and Shiv Batra.

The Working Waterfront Group is a coalition of water-dependent businesses along San Diego Bay, the San Diego Port Tenants Association, the Port of San Diego, and labor. Conference attendees on the Working Waterfront tour traveled by bus from National City northward along the Bay to the Tenth Avenue Marine Terminal, and along the Bay to Shelter Island's boatyards and the commercial fishing basin near the North Embarcadero.

Atop the flight deck of the USS Midway are (left to right), PIANC member Ron Coles, PIANC Treasurer Joe Mantey, and PIANC Secretary Bruce Lambert.

Example of water-dependent businesses along the Working Waterfront, Shelter Island's boatyards.

Robert Engler Honored at Ports 2007 Conference

Robert M. Engler, Ph.D., Senior Environmental Scientist and PIANC Member, was honored by ASCE at the Ports 2007 Conference where he was awarded the prestigious John G. Moffatt-Frank E.

Nichol Harbor and Coastal Engineering Award. Stephen A. Curtis, President of COPRI-ASCE, presented Dr. Engler with the certificate and plaque at the conference awards luncheon. The award was endowed by the firm of Moffatt and Nichol in 1977, and recognizes new ideas and concepts that can be efficiently implemented to expand the engineering or construction techniques available for harbor and coastal projects.

Dr. Engler has more than 35 years of work experience in water resource, environmental, and engineering-related research. He was a Research Scientist for 34 years at the U.S. Army Engineer Research and Development Center (ERDC) (Waterways Experiment Station), where he served as interagency liaison for the USACE on scientific and technical issues regarding dredged and fill material disposal testing and evaluative guidelines, criteria, and regulations. He served as a Technical Consultant to the USACE's Office, Chief of Engineers, on environmental regulatory criteria and guidelines, and has served as an expert witness in controversial environmental litigation and hearings. After his career with the USACE, Dr. Engler joined the firm of Moffatt and Nichol in 2006.

Dr. Engler received his Ph.D. in Geochemistry of Flooded Soils and Sediments. He has made notable contributions that have advanced the state-of-the-art in the geochemistry of dredged material, flooded soils, sediments, toxic substances, aquatic disposal, and domestic/international regulatory criteria.

Dr. Engler has been an active member of PIANC since the 70s. He championed the formation of the international Environmental Commission in the early 90s, and has served as the PIANC International Chairman of EnviCom since its approval in 1994.

The Moffatt and Nichol Award is presented annually to a member of ASCE who has made a definite contribution in the field of harbor and coastal engineering. Every third year, coinciding with the Ports Conference, preference will be given to a practitioner of the field of port or harbor engineering. The nominee's contribution to the field may have been made either in the form of written presentations or notable performance.

Stephen A. Curtis (right), President of COPRI-ASCE, presented Dr. Robert Engler (left) with the esteemed John G. Moffatt-Frank E. Nichol Harbor and Coastal Engineering Award on March 26, 2007, at Ports 2007.

Young Professionals Corner

by Jessica McIntyre and Shana Heisey

Second Young Professionals Commission meeting

The second meeting of the Young Professionals Commission (YPCOM) was held in Brussels, Belgium, on February 2, 2007. Thirteen national sections are now represented in YPCOM, with Portugal recently joining the group. There are approximately 40 Young Professionals currently involved in active working groups, three of which are from the USA National Section. The main focus of the meeting was to discuss national section activities and ways to increase participation by sharing successes from each. To celebrate the 125th Anniversary of PIANC, a book is being prepared by PIANC headquarters. Young Professionals participation in PIANC will be one of the topics in

the book stemming from the formation of the Young Professional Initiative in 2002.

Young Professionals at Ports 2007

PIANC Young Professionals (YP) had a great showing at Ports 2007 in San Diego, California, 25-28 March. The conference started with a YP welcome reception hosted by senior leadership of both PIANC USA, COPRI, and ASCE. The approximately 50 attendees used this informal social forum as a way to meet with other navigation professionals, both those new to the community and members with more experience. Through this event and the PIANC YP booth in the exhibit hall, PIANC staffers were able to start a mailing list of members interested in Young Professional activities.

Ken Connell, winner of the 2007 De Paepe-Willems Award, presented his paper titled "Modeling Navigation Channel Infilling and Migration at Tidal Inlets: Sensitivity to Waves and Tidal Prism" at the PIANC USA meeting on 27 March. Participants showed great interest in the topic, and engaged Mr. Connell in thought-provoking questions.

De Paepe-Willems paper award

The deadline for the 2008 De Paepe-Willems (DPW) paper award was extended to May 1, 2007; paper submissions are still due August 1, 2007. The DPW paper award is open to anyone under 35 years of age. The Winner of the PIANC USA paper competition will be entered in the international competition, and will receive a $1,000 U.S. savings bond, an expense paid trip to the 2008 PIANC USA annual meeting, and an individual membership in PIANC for 5 years. The international winner receives 5,000 euros, a trip to the PIANC 2008 Annual General Assembly, and a 5-year individual membership. Questions and submissions should be sent to Edmond Russo at *edmond.j.russo@erdc.usace.army.mil*.

Join the U.S. YP

Contact your U.S. YP representatives if you are interested in becoming more involved in the U.S. YP (PIANC USA Young Professional Group). Involvement may include a wide range of activities, from receiving information via email of upcoming events and opportunities for YPs, to participation in technical working groups, to assistance with the formation of the USYP. Regular emails are sent to interested U.S. YPs regarding upcoming activities for Young Professionals both on the national and international fronts. Please send your contact information and areas of interest to Jessica McIntyre at *jmcintyre@moffattnichol.com*. There is no additional fee to join the U.S. YP if you or your company is already a member of PIANC USA.

Young Professional members on PIANC Working Groups

In light of the importance of engaging Young Professionals in the organization, PIANC International allows two members from each national section to participate on all working groups if at least one of the representatives is a Young Professional. PIANC USA has many openings for Young Professional representatives on technical working groups. If you are interested in participating, please send us an email and we will provide a listing of openings. Are you a Young Professional and currently serving on a PIANC Working Group? Let us know so we can update our files!

We look forward to hearing from you!

PIANC Young Professionals Technical Event 2007, Venice, Italy

The PIANC Young Professionals (YP) Commission invites all interested Young Professionals to attend a technical visit to Venice, Italy, on July 5-6, 2007. Objective of such a YP technical event is to present top-class hydraulic projects to Young Professionals like the Experimental Electromechanical Module (MO.S.E) project in Venice. The YP technical event will comprise a technical visit to the Venice locks and a visit to the Voltabarosso laboratory. Both visits will be hosted by the Venice water authority.

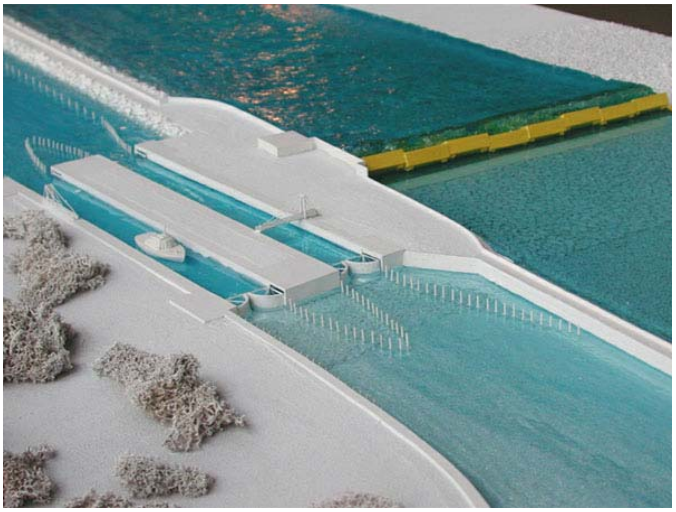
Aim of the MO.S.E. project is the defence of Venice against "high waters." The defence will be guaranteed by the installation of manoeuvrable barriers at the lagoon inlets - so called mouths (Lido, Malamocco, Chioggia) - together with other works such as the local defences (so-called insulae) works, coastline defence works, the reconstruction of existing breakwaters at the lagoon inlets, the construction or reconstruction of lagoon embankments, and waterfronts.

Aerial view of Malamocco mouth.

Hydraulic model tests of the MO.S.E project are performed at the Experimental Centre for Tests on Hydraulic Models at Voltabarozzo (Padova) which is a research institute of the Italian Ministry of Infrastructures, where fundamentally important tests on physical and mathematical models were performed in collaboration with the University of Padova.

In the laboratory, there is a complete model of the Venice lagoon, and some important experiments have been carried out during the last years, like operation and control performed on a full size gate (MO.S.E.) installed in a laboratory built specifically for this purpose.

The MO.S.E. works are totally financed by the Italian Ministry of Infrastructures - Venice Water Authority, that checks all the projects for the safeguarding of Venice and has the technical control of the works. The works are carried out by the Consorzio Venezia Nuova, a group of construction companies. The total cost of the works is 4.2 billion Euros. The works will end in 2012.



Hydraulic model in the Malamocco mouth from the laboratory of Voltabarozzo.

The number of participants for this very interesting technical visit is restricted to a maximum of 30. All participants must be Young Professionals and members of PIANC. The technical visit is free of charge. Travel and accommodation must be paid by the participants. If you are interested, please contact Eric Marcone (*marcone@infrastrutturetrieste.it*). A detailed program will be available on request.

Welcome New PIANC Members!

PIANC USA would like to introduce and welcome some of our newest members. They have now joined PIANC's world-wide network of professionals in the field of inland and maritime navigation and ports.

Alexis Blue, The RETEC Group

Alan Blume, U.S. Coast Guard

Stephen Dickenson, Oregon State University

Douglas Gaffney, Ocean & Coastal Consultants, Inc.

John Lyons, LLMC

Clovis Morrison, Morrison & Associates

Elba Rodriguez, Tetra Tech EC

Timothy Shelton, USACE, ERDC

Michael Tarpey, USACE, Rock Island District

Michael Winkler, USACE, ERDC

Majid Yavary, Moffatt & Nichol

Please continue to encourage your friends and colleagues to join PIANC USA so they can start to receive all the benefits that PIANC has to offer! Refer them to *www.pianc.us* for a membership application.

First Hemispheric Conference on Environmental Port Protection, Panama City, Panama, April 10-13, 2007

With almost 200 participants from over 20 countries, the First Hemispheric Conference on Environmental Port Protection was held in Panama City, Panama, April 10-13, 2007. The event, organized by the Panama Maritime Authority (PMA), with help from PIANC USA, discussed topics as diverse as basic engineering, oil spill response and recovery, and port development challenges. For many, the highlight of the meeting was the nighttime reception at the Mira Flores locks.

Containership passing through the Panama Canal.

The U.S. was well represented. Mr. Mario Cordero with the Port of Long Beach spoke on the "Clean Air Action Plan" undertaken by the Port of Long Beach, California. Mr. Stanley White, Chairman of the Coasts, Oceans, Ports, and Rivers Institute, Ports and Harbors Committee, discussed policies and management of port structures related to the environment. Other U.S. Speakers included Mr. Tom Kornegay, Houston Port Authority, Texas, speaking on Fundamental Principles of Port Development, and Ms. Janiece Gilbreath, U.S. Environmental Protection Agency (EPA), speaking on The EPA Cleaner Ports Initiative. Mr. Bernard Link, U.S. State Department, spoke on water development matters.

At the close of the meeting, the Panamanian delegation spoke on the need to protect the ocean and coastal zones of the continent, strengthen inter-American cooperation related to environmental port protection, support international conventions on environmental port protection, and promotion of the protection of the environment in port activities.

PIANC Annual General Assembly Meeting, Kochi, India, April 15-20, 2007

The Annual General Assembly 2007 (AGA 2007) was held in the City of Kochi, located in the State of Kerala in Southwest India. As always, the meeting affirmed the value of personal contacts with colleges, experts and friends, and the quality of the technical sessions. The U.S. Delegation consisted of Mr. John Paul Woodley, Jr., Assistant Secretary of the Army for Civil Works; Major General Don T. Riley, President of PIANC USA, and Director of Civil Works, U.S. Army Corps of Engineers; Mr. and Mrs. Bruce Lambert, (Mr. Lambert is Secretary of PIANC USA); Mr. and Mrs. Shiv Batra (Mr. Batra is a PIANC Commissioner); Drs. Tom and Rosemary Wakeman (Dr. Tom Wakeman is a PIANC Commissioner); Dr. Robert Engler (EnviCom Chairman); Mr. and Mrs. Thorndyke Saville; and Mr. and Mrs. Harry Cook.

During the meeting, both Mr. Eric Van den Eede as President, and Mr. Louis Van Schel, Secretary General, were reappointed to their third and final 4-year terms. Regarding PIANC Management Changes, Mr. Shiv Batra was appointed to the PIANC Executive Commission (ExCom) as Vice President, Western Hemisphere. Mr. Batra is replacing Dr. Tom Wakeman, who served admirably in his role on the ExCom. Mr. Ian White, England, was selected to replace Mrs. Sandra Knight as Chairman of InCom. Two people were recognized: Honorary Vice President Mr. Srikumar Ghosh, and Honoray Member Mr. Dik Trump.

The most important activity of the Meeting was the creation of a Promotion Commission (ProCom). ProCom was the brainchild of Tom Wakeman, who was responsible for creating a commission for promoting PIANC. Starting with their June 18, 2007 kick-off meeting, ProCom will focus on implementing the 2006-2010 Strategic Plan's goals and media outreach that will communicate the value of PIANC to all audiences, as well as examine ways to promote the findings of the working group reports to various technical journals. ProCom will also review the quality and distribution of the current materials, as well as examine lists of potential partners. The kick-off meeting for the new commission is June 18, 2007.

Members of the PIANC USA delegation (left to right); Mr. Shiv Batra (Commissioner), Dr. Robert Engler, (EnviCom Chairman), Dr. Rosemary Wakeman, Dr. Tom Wakeman (Commissioner), Major General Don T. Riley (President, PIANC USA), and Ms. Kamlesh Batra.

Container crane system, Port of Cochi, India.

The group also engaged in a harbor tour of the Port of Cochi. The waterways are fairly busy with port activity, a large naval base and ship repair yard,

and ongoing fishing activities. The cultural events include demonstrations of native dancing and martial arts, including a backwater tour on Wednesday night.

The technical sessions were very good, with presentations ranging from the plans of the Dubai Port World to local port projects in India. One presentation on the Sethusamudram Canal Project discussed the establishment of a deep draft navigation channel in the Strait between India and Sri Lanka. Other presentations focused on port development issues, and the relationship of tsunamis to port structures.

The next three Annual General Assembly meetings will be held in Beijing, China (2008), Finland (2009), and the AGA and Congress will be held in Liverpool, United Kingdom (2010).

INDUSTRY NEWS

Highlights from the Inland Waterways Conference, Cincinnati, Ohio, March 6-8, 2007

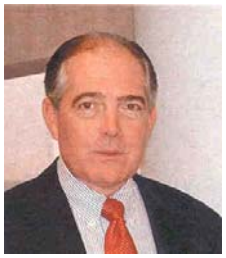
The Inland Waterways Conference, sponsored by the Navigation Industry, the U.S. Army Corps of Engineers, and the U.S. Coast Guard, was held March 6-8, 2007, in Cincinnati, Ohio. Welcoming remarks were presented by COL Raymond G. Midkiff, Commander and District Engineer, U.S. Army Engineer District, Louisville. The theme of the Conference was "Increased Safety, Security, and Efficiency through Better Technology." The theme was well appreciated, as over 225 attendees from around the nation listened intently as experts in all these critical areas described new technology, and discussed continuing innovative methodologies to upgrade and enhance inland waterway safety, security, and efficiency.

COL Raymond G. Midkiff, Commander and Director, U.S. Army Corps of Engineers District, Louisville, Kentucky

Following COL Midkiff's welcome, opening remarks were presented in turn for the U.S. Coast Guard (USCG) by Rear Admiral (RADM) Joel R. Whitehead, Commander, Eighth District, USCG; for the U.S. Army Corps of Engineers (USACE) by Mr. Michael F. Kidby, Senior Program Manager for Inland Waterways, Headquarters, USACE; for the Towing Industry by Mr. Steve Valerius, President, Kirby Inland Marine; and for the Passenger Vessel Association (PVA) by Mr. John Groundwater, Executive Director, PVA. Each presented the viewpoints of their own respective organizations pertaining to the conference theme as influenced by present day international issues.

RADM Joel R. Whitehead, Commander, Eighth District, U.S. Coast Guard.

Mr. Michael F. Kidby, Senior Program Manager for Inland Waterways, Headquarters, U.S. Army Corps of Engineers.



Mr. Steve Valerius, President, Kirby Inland Marine.

Mr. John Groundwater, Executive Director, Passenger Vessel Association.

CDR Jerry Torok, USCG, Sector Houston-Galveston, moderated a Case Studies seminar titled "Embracing Technology on Towboats—Madness, Folly, or Just Good Business." He was joined by Mr. Greg Menke; Seaman's Church; Mr. Shelby House, American Commercial Lines; Mr. Jerry Yacobellis, McGriff, Seibels, and Williams; Mr. Todd Powers, Schroeder, Mandrell, Barbiere, and Powers; and CDR P. J. Maguire; USCG, Sector Lower Mississippi River.

Following the Case Studies seminar, dinner was served on board the *Belle of Cincinnati* on the Ohio River with views of the Cincinnati skyline. Entertainment was provided by The Big Muddy String Band. An awards ceremony honoring several individuals for service to the waterway industry also took place.

The following day's technical program commenced with a presentation regarding inland waterway related studies being conducted by the U.S. Army Engineer Research and Development Center (ERDC), moderated by Mr. James Clausner, ERDC Associate Technical Director for Navigation. He was joined by ERDC research engineers who discussed results of several pertinent studies pertaining to the conference theme in particular and inland navigation in general.

Next, enhanced use of the global positioning system was discussed by Mr. Gregory Carter, American Commercial Lines. Then, Mr. Sean Connoughton, Administrator, U.S. Maritime Administration (MARAD) discussed present MARAD concerns in the area of inland navigation. He was followed by USACE and USCG presentations regarding the vessel automatic identification system (AIS) by Mr. Jorge Arroyo, USCG, Office of Navigation Systems; a real-time current velocity system by Mr. Michael Winkler, ERDC; and the Inland Rivers Vessel Movement Center by Mr. Burt Lahn, USCG, Office of Navigation Systems.

An interesting luncheon address was presented by Ms. Helen Brohl, Executive Director of the Executive Secretariat to the Committee on the Marine Transportation System (CMTS). The CMTS was established by the President's Ocean Action Plan to create a partnership of Federal agencies with responsibility for the Marine Transportation System (MTS) (waterways, ports, and their intermodal connections) to ensure the development and implementation of national MTS policies consistent with national needs and report to the President its views and recommendations for improving the MTS. The CMTS is chaired by the Secretary of the Department of Transportation, and is comprised of 14 cabinet level departments and several independent Federal agencies.

Ms. Helen Brohl, Executive Director of the Executive Secretariat to the Committee on the Marine Transportation System.

The Captains Panel was moderated by Mr. Michael W. Rushing, President, Rushing Marine Corporation. He was joined by very knowledgeable and experienced captains from the industry, including Captain Ben Ben Ainsworth,

Artco; Captain Daryl Capps, Ingram Barge Company; Captain Mike Coyle, Luhr Brothers, Inc.; Captain Shelby House, American Commercial Lines; Captain Randy Bowling, Crounse Corporation; Captain George Carpenter, B&H Towing, Captain Frank Ellis, Kirby Inland Marine; and Captain Mike Morris, AEP/Memco Barge Line. The Panel discussed a wide range of topics from electronic navigation chart enhancements to buoy placement and other safety issues, and on to security concerns such as the Transportation Worker Identification Credentials.

Ms. Lynn Muench, Senior Vice President for Regional Affairs, American Waterways Operators (AWO), presented the AWO report. AWO is the national trade association representing the owners and operators of tugboats, towboats, and barges serving the waterborne commerce of the U.S. Its mission is to promote the long term economic soundness of the industry, and to enhance the industry's ability to provide safe, efficient, and environmentally responsible transportation, through advocacy, public information, and the establishment of safety standards.

In concluding the 2007 Inland Waterways Conference, the Waterways Council, Inc. (WCI) report was presented by Mr. John Doyle, Vice President of Governmental Relations, WCI. WCI is a national public policy organization that focuses on educating policymakers, the news media, and the general public about the critical importance of our Nation's lock and dam infrastructure. WCI works to ensure optimal levels of Federal funding for the planning, construction, operation, and maintenance of port and inland waterways navigation improvements of national priority. WCI members are committed to the sustained success of that initiative, and to doing WCI's part for the economy of the U.S., and for global trade.

U.S. Army Corps of Engineers Perspective on Inland Navigation:

Opening Remarks to the 2007 Inland Waterways Conference *by Michael F. Kidby, Headquarters, U.S. Army Corps of Engineers*

I would like to thank COL Midkiff, Commander for our Louisville District, and RADM Whitehead, Commander of the Coast Guard's Eight District, for their welcoming and opening remarks! I would also like to add my welcome to theirs. I am looking forward to hearing opening remarks from Mr. Valerius, President of Kirby Inland Marine; and Mr. Groundwater, Executive Director of the Passenger Vessel Association, as well. It is a privilege and honor to be here. I want to extend a welcome to you on behalf of our Chief of Engineers, LTG Carl Strock; our Director of Civil Works, MG Don Riley; our Great Lakes and Ohio River Division (LRD) Commander, BG Berwick; and our Mississippi Valley Division (MVD) Commander, BG Crear. They, and our Senior Civilian Leaders, are attending House and Senate Hearings this week in support of many projects and programs that impact all of us here. Also occurring this week is a FEMA Senior Leaders Seminar, and a planning session for the smooth transition of our proposed but not yet confirmed new Chief of Engineers.

Although the timing and location of this important Conference was set nearly a year ago, I have seen at least four different Corps hearing schedules in the last month – making participation of our senior Corps leaders in this Conference a moving target and very difficult to accomplish this year. **We** do not set our Hearing Schedule with the Committees on Capitol Hill! I am sure that each and every one of our leaders would rather be here with us this week meeting new friends, renewing old acquaintances, and participating in our critical, timely, and especially valuable discussions.

Personally, I have been attending the Inland Waterway Conference (IWC) since 1988 when the Conference was held at the Drawbridge Inn in Fort Mitchell, Kentucky, right next to the Oldenberg Brewery. I've found these meetings to be very informative and useful for the USCG, Navigation Industry, and Corps of Engineers to share thoughts, ideas, and concerns, and to work toward mutually satisfactory solutions to important inland navigation issues. I am looking forward to our discussions over the next two days.

I would like to briefly talk about four items: (1) my new supervisor in Washington DC; (2) the 2007/2008 budget situation, (3) my concern for the reliability of the inland waterways as a critical transportation mode, and (4) how important this Conference is as we seek to improve the reliability and efficiency of our inland waterway system.

Item 1. My Boss: And the good news is, after our being without a Chief of Navigation and Operations Branch since Barry Holliday retired early in April 2006, Jim Walker, formerly from the Mobile District, is our new Navigation Business Line Manager and Chief of Navigation and Operations. He has experience with both coastal and inland waterways, both deep and shallow draft. He assumed those responsibilities on January 22, 2007. Larry Lang, Jim's supervisor, Deputy Chief of our Civil Works Operations and Regulatory Community of Practice, has assumed the duties and is Acting Chief of Operations and Regulatory following the retirement of Gerald Barnes in December 2006. The search for a new Chief of Operations is underway.

Item 2. The Budget: I wish I could tell you what the Corps FY07 budget is, but I can not. It is currently being discussed, manipulated, and coordinated among the Administration, Congress, and the Corps. The House and Senate have made their viewpoints known – to use the amounts of the FY06 appropriations at the program and account level with a minor adjustment of Construction General (CG) funds to General Expenses (GE) ($16M).

<u>GI, CG, and O&M Funding overview FY06 and FY08</u>

	FY06 Approp.	FY08 President's Budget
Total	$1.061 B	$1.383 B
Coastal	0.648 B (61%)	0 778 B (56%)
Inland	0.413 B (39%)	0.604 B (44%)

A significant portion of the increase is due to some CG work migrating to Operation and Maintenance (O&M), with Navigation being the primary recipient. It includes Major Rehabilitations, sand mitigation, and Columbia River and Missouri River Biological Opinions. The commensurate work came with the funds. We do not have the specific numbers yet, but there is good news here! The Navigation funding is increasing during these times of restricted and declining budgets.

In trying to cope with constrained budgets and still satisfy our navigation and other missions, our Divisions and Districts are doing things differently: regionalizing District elements throughout whole Divisions; closing system locks simultaneously to minimize impacts and increase efficiency; raising national awareness of our aging inland waterway infrastructure and the need for continued investment in our waterway systems, and holding successful maritime events to emphasize the navigation heritage and efficiency along our inland waterways (e.g., Tall Stacks Event last year in LRD).

Item 3. Reliability of the Inland Waterways: This year's theme is truly an appropriate one: Increased Safety, Security, and Efficiency through Better Technology. I am gravely concerned about the navigation accidents and incidents that have occurred since our last IWC in Memphis, Tennessee, in March 2006. Part of my job at Headquaraters, U.S. Army Corps of Engineers (HQUSACE) is to report navigation accidents or incidents that either resulted in a shut down or delay to navigation for more than 24 hours, or are of

significant media interest. Since March 2006, I have reported on 26 separate situations filing 103 reports (five allisions at locks, three groundings, five equipment problems, three sunken vessels, one power line snag and break, three pollution events, four shutdowns at locks for preventive maintenance, and two bridge allisions). Not all of these were on the Mississippi or Ohio Rivers and tributaries (including the Gulf Intracoastal Waterway (GIWW) and McClellan-Kerr Arkansas River system, but most were.

Navigation accidents above, at, and below our locks and dams, as well as accidents due to equipment failures, tend to force untimely river closures which are disastrous to the economy, the environment, and our stakeholders.

While I recognize coming up with innovative solutions to increase safety, security, and efficiency is a challenging endeavor for this group to tackle in just 2 very full days, I do believe this forum is a good place to start -- with the right people who understand the tough issues and opportunities facing our industry and agencies.

Item 4. Importance of this Conference: In closing, I turn your attention back to this year's meeting theme, "*Increased Safety, Security, and Efficiency through Better Technology."* Over the next 2 days you will receive many presentations on topics of concern, **and** you will also hear about some of the innovative technologies that can and will help us increase safety, security, and efficiency at our lock and dam projects and along our major waterways and their tributaries.

We will be hearing from relevant lunch and keynote speakers, and a panel discussion on casualty prevention. We also will hear about technology work ongoing at the Corps' Engineering Research and Development Center, and Institute for Water Resources. Work ongoing within the USCG will be discussed. There will be reports by the Maritime Administration, American Waterways Operators, Waterways Council, Inc., and the National Weather Service. And a Captains' Panel Discussion from the mariner's perspective (always enlightening and interesting) will be presented. I'm looking forward to the next 2 days. I hope you all will be able participate for the entire Conference. It will be a good one!

Thank you.

Michael F. Kidby is the Senior Program Manager for Inland Waterways at HQUSACE, in Washington, DC. His duties include oversight and support of the Civil Works Directorate's navigation mission, and require close coordination both within the Corps as well as with other Federal agencies and stakeholders throughout the navigation industry. Mr. Kidby holds a BS degree in Civil Engineering from Oregon State University, and has been in Operations Division of HQUSACE the last 19 years of his 32 years service with the Corps.

Towing Industry Perspective on Inland Navigation: Opening Remarks to the 2007 Inland Waterways Conference *by Steve Valerius, Kirby Inland Marine*

While I am certainly no expert at navigational technology, I clearly recognize the vast improvements that we have seen over the past 15 years in our industry's wheelhouse navigational tools. While some would say we have been slow to embrace some of the new technologies, those of us who have been in this business for decades recognize that we have certainly come a long way. The subject of this conference "Safety and Prevention through Technology" is certainly timely and important for our industry.

I do not think that it is in any way an understatement to say that the inland waterway marine transportation industry is under closer

scrutiny in regards to safety and environmental responsibility than at any time in our history. This is simply a fact created by the public's concern that translates into political and regulatory oversight. Frankly, the inland towing industry has created some of these concerns with very high profile accidents over the past several years--accidents that have resulted in tragic loss of life and significant publicity. These accidents, that some would say are statistical anomalies, stand in the backdrop of what many in the regulatory community continue to point at as an unacceptably high casualty rate in terms of collisions, allisions, and loss of our own crewmen predominately due to fall-overboard situations and vessel sinkings. Those issues have us squarely in the context of the pending U.S. Coast Guard regulatory process to implement the congressionally mandated Inland Towing Vessel Inspection requirements.

In today's world, "Safety" has taken on a new component in a post-9/11 environment, with "Security" being added as a national priority. Casualties now are viewed in the context of national security, and casualties that impact navigational and highway infrastructure take on a completely new significance by the regulatory authorities. Now, the Coast Guard and Corps of Engineers must view a casualty that might impact transportation infrastructure as a potential threat to national security even before we address the potential for terrorist acts.

The facts are that the inland marine transportation industry remains the safest mode of surface transportation of goods in the United States. We transport more tons and ton-miles safely, in regards to both environmental impact and personnel safety, than any other form of transportation. However, we are under tremendous pressure, just as are other forms of surface transportation, to improve our safety record.

We, as an industry, have responded with implementation of the American Waterways Operators Responsible Carrier Program that mandates a certifiable safety management system. This model will undoubtedly be a cornerstone of the new Inspected Towing Vessel Regulations that are expected to be published in a Notice of Proposed Rulemaking this fall. While it remains to be seen whether certain types of navigational hardware and software will be mandated, there certainly will be reference to addressing the need to utilize some of these new technologies.

The good news on the prevention front is that we have a host of new technologies that have and will continue to improve our mariner's ability to safely navigate the inland waters. There is no doubt that the technological improvements that we will be discussing at this conference will result in a safer waterway.

We will be discussing a variety of electronic technology, some new and some not so new but which has been dramatically enhanced. Certainly, many of us have been using electronic charting and GPS for many years, but we are now seeing a second and third generation of such technology with interconnectivity to our other navigational hardware that will greatly enhance our mariner's tool bag in the wheelhouse.

Automatic Identification System (AIS) is certainly not a new technology. However, the cost of the units was so high until Congress mandated the carriage requirement in certain strategic ports that there was considerable pushback from industry on the Coast Guard's proposed Vessel Traffic System (VTS) requirements that would have required them. The good news is that with a critical mass of demand for the units, along with new technology that made the units cheaper to produce, the prices came down. The Coast Guard is now poised to require carriage on virtually all towboats, and while there will certainly be those who protest the cost, few will argue that they are not an enhancement to navigational safety and efficiency. Few of us could have envisioned the benefit of being able to "see" the oncoming and overtaking vessels when they were around bends in the river or

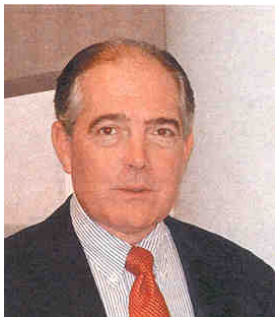
other obstructions blocked radar. Now they can be tracked by every vessel with an AIS unit. Obviously, the Coast Guard's mandate is predominately about security but the new AIS units, particularly when linked to other navigational hardware, have become a significant safety enhancement.

In the past couple of years we have seen new vendors with new technology, predominately adapted from airplane navigation systems, enter the marine electronic charting arena. The new Vector charts are a significant enhancement over the Raster charts contained in the first generation software. They incorporate NOAA and Corps digital charting that, although slow to complete, has dramatically improved accuracy with digitization and hugely enhanced updating ability.

New technology for the marine market such as "Smart Lock" will be discussed, and enhanced systems for "real time" current monitoring are innovations that could dramatically reduce allisions and collisions.

While all of these technological improvements cost money and some are still simply too expensive for smaller vessels and the smaller operators, I think it is important to look at the bigger picture and at the cost avoidance impact of these new navigational tools. In today's world, even minor collisions and allisions can result in very large costs and, certainly, the avoidance of any major casualty will more than pay for the capital outlay.

While no electronic or mechanical device can begin to supplant the knowledge, skill, and talent of our mariners, many of these new advances can provide them invaluable tools to enhance their ability to navigate the sometimes-treacherous Inland Waterways.



Steve Valerius is President of Kirby Inland Marine, L.P., a wholly-owned subsidiary of Kirby Corporation, Houston, Texas. Kirby is the largest tank barge company in the U.S., with over 900 barges and 250 boats. Steve is a CPA with an Accounting degree from the University of Texas, Austin, and a Juris Doctor degree from South Texas College of Law, Houston. Mr. Valerius was a member of the National Research Council's Committee on Maritime Advanced Information System that in 1999 published "Applying Advanced Information Systems to Ports and Waterways Management".

USACE Inland Navigation Research

by James E. Clausner, U.S. Army Engineer Research and Development Center

We appreciate the opportunity to present some of the important research studies being conducted by the U.S. Army Engineer Research and Development Center (ERDC) in the area of inland navigation to this 2007 Inland Waterways Conference.

To maintain the Nation's current economic position, the capacity of the inland portion of the Marine Transportation System (MTS) must be increased while providing safe, reliable, and environmentally sustainable channels. The U.S. Army Corps of Engineers (USACE) currently maintains 12,000 miles of shallow draft channels (14 ft and less), which are primarily riverine and intracoastal inland waterways.

Locks and dams are needed for navigation on many inland waterways. USACE owns and operates almost 200 commercial navigation locks with nearly 240 active lock chambers. In 2007, 50 percent of the lock chambers had exceeded their 50-year economic life. Several locks are less than the 1,200 ft length required to pass the longer tows

working on the Mississippi, Ohio, and Missouri Rivers. Currents and debris can slow lock transit times, and ice shortens the navigation season over 5,000 miles of the inland MTS and impacts 55 locks.

USACE inland navigation research is developing an integrated set of data, tools, and guidance to facilitate planning, design, construction, operation, monitoring, and maintenance of inland channels and structures. On-going studies will (a) improve predictions of vessel impacts on lock structures and hawser forces during lockages, (b) improve models for calculating vessel induced waves and currents, and subsequent bank erosion and sediment resuspension, and (c) improve discrete element modeling of ice and debris at locks.

Benefits from this research include (a) increased throughput to reduce shipping costs and vessel impacts to riverine ecosystems and stream banks, (b) reduced accidents and improved safety at locks and critical reaches due to better prediction of forces and vessel motions, (c) lower lock construction costs based on innovative material and construction alternatives, (d) improved approach and exit conditions and more efficient lock cycle times, (e) extended navigation season by innovative ice and debris design features, and (f) better scour inspection and prediction techniques below locks and dams. ERDC researchers will now discuss pertinent studies currently underway at various ERDC laboratories.

Detection of Scour below Navigation Dams

The objectives of this research are to (a) identify the most effective method(s) for determining the condition of existing scour protection and (b) develop a risk-based decision process to develop the type and timing of repair needed to ensure project performance. Scour has occurred upstream and downstream from essentially every navigation dam operated by USACE. The severity of the scour varies greatly from project to project. Periodic inspections have been used to assess the need for repair. Often these inspections do not provide enough information to adequately assess the extent of scour and the repair and/or requirements. Establishing a process to better identify the extent of scour and better assess repair requirements will provide a technique to conduct analyses to determine project performance, and allow program managers to decide the best investment for achieving system reliability.

Severe scour damage below a navigation dam.

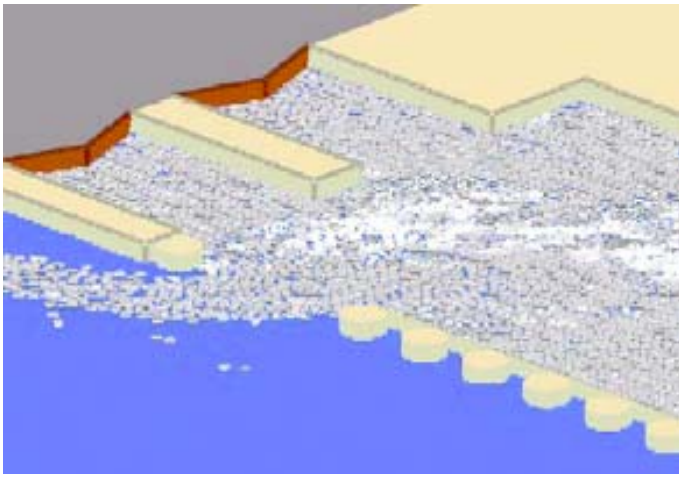
A risk-based decision process was incorporated into a computer program to aid project managers in developing the type and timing of repair or efforts. Establishing a process to better assess repair and rehabilitation requirements will provide project managers with valuable information for planning project needs and costs.

Additional information about these scour studies below navigation dams is available from John E. Hite, Jr., 601-634-2402, email: *John.E.Hite@erdc.usace.army.mil*.

Debris and River Ice Management

This research will enhance existing numerical computer simulation discrete element ice models by adding the capability to simulate ice and/or debris transport, treating the ice mass as an accumulation of discrete particles. The resulting model will be used to simulate the impact of ice and/or debris on riverine structures such as booms, weirs, and pile-

type ice control structures to estimate forces on the structures and the hydraulic influence of the ice and/or debris on the flow.



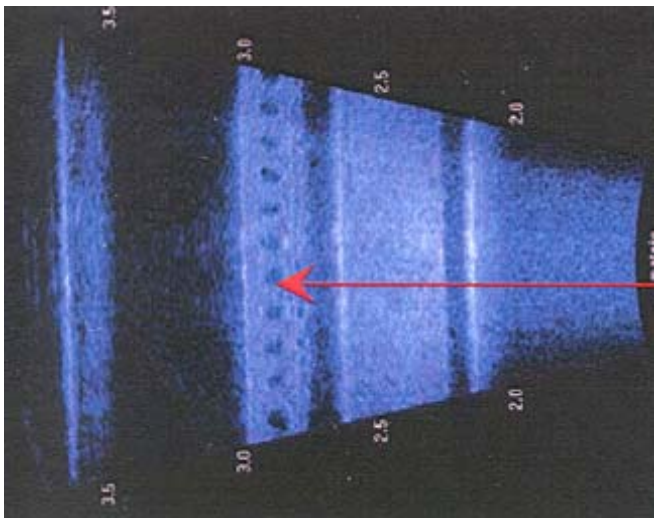
Numerical computer simulation model of ice flow passing through opening in lock guide wall.

A three-dimensional discrete element model of ice previously developed at CRREL was coupled to an appropriate two-dimensional unsteady flow model. The hydraulic effects of flow in and around ice control structures can then be modeled. The ability to model open water flow, flow under ice cover, and flow through a grounded ice jam, is included. The capability to simulate debris such as logs and trees to an existing coupled three-dimensional discrete element river ice model is being added.

Additional information regarding these ice and debris studies is available from Dr. Richard L. Stockstill, 601-634-4251, e-mail: *Richard.L.Stockstill@erdc.usace.army.mil*.

High-Resolution Acoustic Imaging

An acoustical imaging camera developed by the private sector is being integrated into deployable systems for ERDC engineers to assist with inspections of steel hydraulic structures in turbid water. Divers are frequently used in the inspection, maintenance, construction, and placement phases of underwater construction projects. However, in turbid water, the lack of visibility severely reduces their effectiveness and subjects them to potentially dangerous operational conditions. Additionally, a diver must wait until he returns to the surface before sketching what he saw or felt with his hands while underwater.



High-resolution underwater acoustic image of analogous sheet steel structure section.

The acoustic imaging system will be used to expedite construction, repair, and maintenance of underwater structures; provide safer conditions for employees engaged in environmental, wet construction, and structural inspection activities, and enable the user to immediately and permanently log underwater images from inspections.

Additional information regarding the high-resolution acoustic imaging system may be obtained from Richard W. Haskins, 601-634-2931, e-mail: *Richard.W.Haskins@erdc.usace.army.mil*.

Barge Impacts at Locks

Forces and locations of inland barge train impacts currently dictate Corps' design specifications for lock walls. This has resulted in a significant increase in the final construction costs of these walls. The Corps is developing an engineering procedure to perform cost-effective evaluations and/or designs of lock approach walls at navigation projects using realistic barge impact

forces. Corps' District engineers will use this new engineering methodology and software in the evaluation/design of a variety of stiff-to-flexible approach walls at Corp's navigation structures.

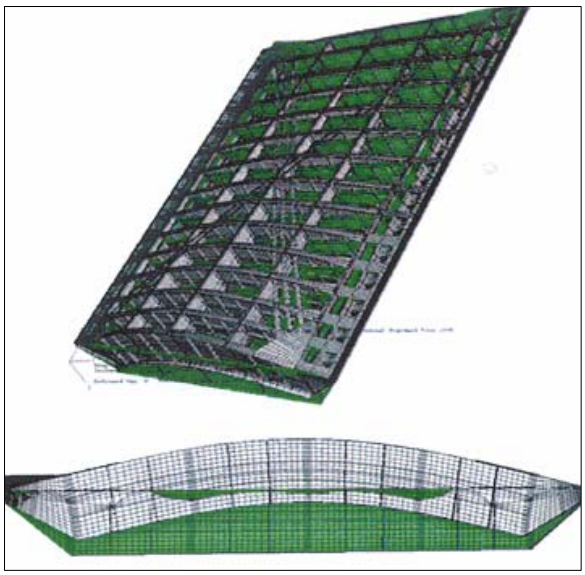
Failure of barge lashings can result in limiting impact force.

Limiting impact force results either from failure of the lashings that tie the barge train together or the buckling of hull plates and internal structure of the corner barge that impacts the approach wall. Benefits from this work unit will be cost savings by determining realistic values for impact loads which would permit the utilization of innovative lock wall structures that have the potential to be more cost effective.

Additional information pertaining to vessel/barge impact on lock features may be obtained from Bruce Barker, 601-634-2536, e-mail: *Bruce.C.Barker@erdc.usace.army.mil*.

Analysis of Cracks in Lock Gates

This research includes three focus areas related to the inspection and assessment of steel hydraulic structures. The first is to develop criteria for performing fitness-for-service assessments of fatigue cracking and weld defects in steel hydraulic structures. Analytical techniques for employing state-of-the-art capabilities for fracture mechanics analysis will also be developed. The second is the development of an acoustic instrument for testing tension in both exposed and buried post-tensioned steel members, as well as the degree of corrosion present on the member's buried surface. The third focus is the evaluation and implementation of an acoustic camera that can provide high-resolution images of underwater targets.



Numerical grid for assessing weld quality and potential fatigue cracking in steel hydraulic structures.

Avoidance of repairs and associated delays to navigation resulting in significant cost savings are a primary benefit. The acoustic instrument and test procedures will improve infrastructure reliability by requiring less testing time, and the resulting component evaluation will be more accurate and thorough compared to conventional methods. The acoustic camera will enhance underwater inspection capabilities with the potential for reducing the need to use divers or to dewater for inspection.

Additional information pertaining to inspection and condition assessment of steel hydraulic structures may be obtained from Guillermo Riveros, 601-634-4476, e-mail: *Guillermo.A.Riveros@erdc.usace.army.mil*.

Non-Destructive Testing of Tainter Gate Anchorages

The Corps of Engineers maintains many structures that contain embedded and external steel structural members that are under tension and subject to corrosion. Tainter gates and lock gate diagonal bracing are two examples. Tainter gates are restrained using trunnion bearings held in place by massive steel anchors embedded into the dam itself. Problems known to occur with anchors can lead to loss of anchor tension and consequent severe problems with gate operation. These problems are hidden and difficult to evaluate. The repeated opening or closing of lock gates can cause excessive tension on diagonal bracing.

Post-tensioned steel rods in navigation dams subject to deterioration require non-destructive testing to degree of corrosion.

A non-destructive testing method is needed to determine the tension and the degree of corrosion present. A method to continually monitor the tension while opening and closing the gates could prevent abrupt failures of the rods. This technology can be used to conduct quantitative measurements of tension and corrosion in steel tainter gate anchor rods and lock gate diagonal bracing. This research will create a method that directly interrogates the mechanical and material properties of the steel structural members, addresses the corrosion problem, takes little time and human resources to perform, and requires minimal access.

Additional information regarding non-destructive condition monitoring of post-tensioned steel members in navigation dams may be obtained from Michael McInerney, 213-373-6759, e-mail: *Michael.K.McInerney@erdc.usace.army.mil*.

Monitoring Concrete Navigation Structures

The objective of this research is to develop engineering procedures for monitoring and assessing the condition of concrete navigation structures. Specifically, the goal is to be able to detect deterioration, identify causes, assess serviceability levels, predict future performance, and effectively schedule maintenance and repair activities.

Deterioration of concrete navigation structure.

Maintenance of aging infrastructure is a challenge in the effort to keep inland navigation systems operable. The inability to accurately predict levels of deterioration and damage to structural concrete components hinders the efficient use of funds for preventive measures. Instead, resources are often allocated to fix problems after they have occurred and possibly imposed a negative effect on the navigation system. The ability to recognize potential maintenance issues, and to develop long-term plans for maintenance and repair will facilitate the effective use of available resources and help insure continued operation of the system.

Additional information regarding monitoring of concrete navigation structures may be obtained from Toy Poole, 601-634-3261, e-mail: *Toy.S.Poole@erdc.usace.army.mil*.

Condition Monitoring of Lock and Dam Infrastructure

This research addresses electrical, mechanical, and fatigue monitoring of lock and dam gates and associated machinery, as well as pumping station operating machinery. Data acquired from sensors will be used to monitor fatigue loads, correlate with machinery movements, and feed into a condition monitoring system to diagnose system malfunctions, optimize operational procedures, and assist in predictive maintenance.

Vibrating wire strain gage on a gate anchorage.

Lock and dam gates and pumping station machinery are subject to failure due to excessive loads and wear of components, resulting in excessive costs and downtime. Products from this research will include (a) guidelines for condition monitoring of structural components and operating machinery of locks, dams, and pumping stations, (b) vibrating wire strain gages for gate anchorage, and (c) guidelines for predictive maintenance. Conditioning monitoring and predictive maintenance provides real-time indication of overall electrical, mechanical, and structural condition, reduces the likelihood of failure or fracture of critical components, reduces maintenance cost and personnel requirements, and improves safety and reliability of lock gates, dam gates, and pumping station machinery.

More information pertaining to condition monitoring for predictive maintenance of lock and dam infrastructure may be obtained from Larry Stephenson, 213-373-6758, e-mail: *Larry.D.Stephenson@erdc.usace.army.mil*.

James E. Clausner is the Associate Technical Director for Navigation at the USACE ERDC Coastal and Hydraulics Laboratory in Vicksburg, Mississippi. He holds BS and MS degrees in Ocean Engineering from Florida Institute of Technology. Over the past 25 years, his research areas have included sand bypassing, innovative dredging equipment, capping of contaminated sediments, management of dredged material placement sites, and most recently managing the Navigation Systems Research Program for USACE. Mr. Clausner is a member of PIANC, WEDA, and ASCE, and is a registered professional engineer.

USCG Bridge Administration Program *by Nicholas E. Mpras, Headquaraters, Office of Bridge Administration, U.S. Coast Guard*

Security Concerns

The Bridge Administration Program (BAP) is an integral element of the U.S. Coast Guard's homeland security mission. Since September 11, 2001, the security needs of the nation's critical bridge infrastructure require the BAP to identify and develop, with bridge owners, security programs to protect these critical structures over the navigable waters of the United States. These bridges, vital to maintaining national economic stability, are tempting targets for terrorists looking to disrupt two important transportation systems (roads and waterways) simultaneously. Further, as navigation

and navigation safety are core Coast Guard missions, oversight of bridges over and across the navigable waters of the United States is the specific responsibility of the Coast Guard. The BAP function is a necessary component of the Coast Guard's ports, waterways, and coastal security mission—one that is statutorily categorized as a homeland security mission.

Bridges are attractive targets for terrorists to disrupt both highway and waterway commerce.

Bridges are potentially attractive terrorist targets given their status as highly recognizable U.S. landmarks, and their ability to handle high volumes of passenger and commercial traffic daily. A review of the FBI's Guardian Threat Tracking System for reports of suspected targeting of U.S. bridges over the 1-year period between September 1, 2005 and August 31, 2006 revealed over 380 threats and suspicious incidents.

Purpose of the BAP

The purpose of the BAP is to protect navigation and the environment, to balance intermodal transportation needs, and to promote intermodal mobility, safety, and security. Core program activities that preserve the reasonable needs of navigation include bridge permits, drawbridge operations, alteration of unreasonably obstructive bridges, bridge lighting and markings, compliance with National Environmental Policy Act and other environmental laws and regulations, and establishment of security measures at areas of national economic and mobility interests.

Federal law prohibits the construction of any bridge across the navigable waters of the United States unless first authorized by the Coast Guard. A bridge permit is the written approval of the location and plans of the bridge or causeway to be constructed or modified. Any individual, partnership, corporation, or local, state, or federal legislative body, agency, or authority planning to construct or modify a bridge or causeway across a navigable waterway of the United States must apply for a Coast Guard bridge permit. This includes all temporary bridges used for construction access or traffic detour.

Drawbridge delays are a significant problem along the inland waterway system. Civil penalties may be assessed against the operators of bridges to ensure that the operation and maintenance of bridges meets the reasonable needs of navigation. The Coast Guard and Maritime Transportation Act of 2004 (PL 108-293, Section 601) increased the civil penalties. Beginning with 2004, bridge operation violation penalties increased per occurrence per day from $1,100 to $20,000 in 2007. The maximum penalty amount allowed per violation per day will be $25,000 in 2008. Captains are encouraged to report all bridge problems and bridge damages. These increased civil penalty amounts are meaningless unless captains report the problems in a timely manner.

Bridge Program Mandate

All bridges are obstructions to navigation, but are tolerated so long as they provide for the reasonable needs of navigation and are used for land transportation. About 99 percent of obstructive bridges are located on the inland waterway system. Navigation's needs are paramount, but are not absolute. An intermodal balance between mobility, safety, and security is the objective. Conflicts can arise between navigation traffic versus clearances and drawbridge opening schedules, cost versus higher level bridges, and development versus the environment. The BAP works tirelessly to resolve such conflicts.

Conflicts can arise between navigation traffic and drawbridge opening schedules.

Bridge Allisions and the Truman-Hobbs Act

Bridge allisions (moving vessel striking a bridge) occur for several reasons, including: (a) navigation opening is too restrictive (old structure), (b) navigation channel is wider than the navigation span, (c) currents, bridge location, and inadequate markings, (d) operator error, and (e) vessel equipment failure. The Truman-Hobbs (T-H) Act is intended to protect navigation from unreasonably obstructive bridges. Publicly-owned and railroad-owned bridges can be funded for modifications. Privately-owned bridges are not funded. The BAP encourages the use of Army Corps of Engineers simulator facilities and the Seaman's Church Institute navigational simulator to select and verify bridge and pier locations and navigation clearances.

T-H funding is appropriated by Congress annually for specific bridge projects. Funds appropriated are far insufficient to cover all bridges under an Order to Alter at any one time. FY 1995 saw no funding for any bridge. Presently 13 bridges have received Orders to Alter from the Coast Guard Commandant. For FY 2007, Congress appropriated $16 million for T-H projects. As a federal agency, the Coast Guard cannot lobby for funds. However, the navigation industry can lobby for important projects. Present funding needs stand at approximately $500 million. There is a backlog list of 32 bridges awaiting preliminary investigation to determine funding eligibility under T-H.

Barge striking a bridge (allision).

Unused and Abandoned Bridges

The Coast Guard aggressively pursues removal of unused and abandoned bridges. It is Coast Guard policy that bridges no longer used for the convenience of land transportation are considered unreasonable obstructions to navigation and must be removed from the waterway by their owners. Failure to do so will result in civil penalties, and could result in involvement of the U.S. Attorney's office.

Conclusions

I cannot overemphasize the importance of clear and continuous communication between the industry, the Corps of Engineers, and the Coast Guard BAP. Such communication is essential in determining appropriate bridge clearances, identifying unreasonably obstructive bridges, enacting regulations that balance the needs of land and marine traffic, and ensuring our actions are compatible with Corps navigation projects. With continuing advances in communication technology, this is becoming more efficient and less time consuming.

As you know, the BAP has only 57 people nationwide to run the program. These few people manage the program, which has over 20,000 bridges under its jurisdiction, because of the strong support it receives from our uniformed personnel. With the districts, sectors, and stations in close proximity to the waterways and our customers, the relationship that exists between our field units and the marine community is definitely a force multiplier for the BAP.

The BAP facilitates safe and efficient intermodal transporation. A Coast Guard failure to keep waterways open would negatively affect U.S. commercial maritime traffic, naval emergency vessels, and Coast Guard vessel functions. In reality, the Coast Guard will continue to properly manage the nation's waterways, and conflicts will be resolved in a balanced manner.

Nicholas E. Mpras, Chief, Office of Bridge Administration, U.S. Coast Guard, has over 30 years experience in the Bridge Administration Program. As a result of his strong leadership, the complex and unique BAP is considered to be one of the Coast Guard's best managed nationwide programs. Mr. Mpras has received numerous and diverse recognitions for his consistent stellar government service to the public.

SmartLock: Instrumented Lock Navigation Aid for Inland Waterways

by Port of Pittsburgh Commission, Pennsylvania

At the Inland Waterways Conference, March 6-8, 2007, much discussion centered around SmartLock, a lock navigation aid similar to the system used by airline pilots to land aircraft. SmartLock is the Port of Pittsburgh Commission (PPC) and industry-tested initiative to reduce risk, increase reliability, introduce new technology, and improve navigation productivity on the inland waterways. This technology assists river pilots in their lock approach by presenting the pilot with essential, precise information in near-real time, including distances between the tow and the lock, and conditions at the lock such as dam opening and river and wind conditions. This information is overlaid on an electronic navigation chart (ENC).

The PPC has been working since 2003 with Concept2Solutions, a technology company located in Coraopolis, Pennsylvania, and graduate students from Carnegie Mellow University (CMU) of Pittsburgh as part of a Practicum Project, to develop SmartLock. The students were challenged to assume that there was a wireless connection at locks and dams along the Ohio River. The students were asked to answer questions such as what the SmartLock system would look like, and how it would change business for all stakeholders of the river system. The PPC, which owns the patent rights to SmartLock, has now licensed Jeppesen Marine, a subsidiary of Boeing, to commercialize the product to the towing companies. Cost per year for the towing companies to purchase these services has not been precisely determined at this time.

Functions and features

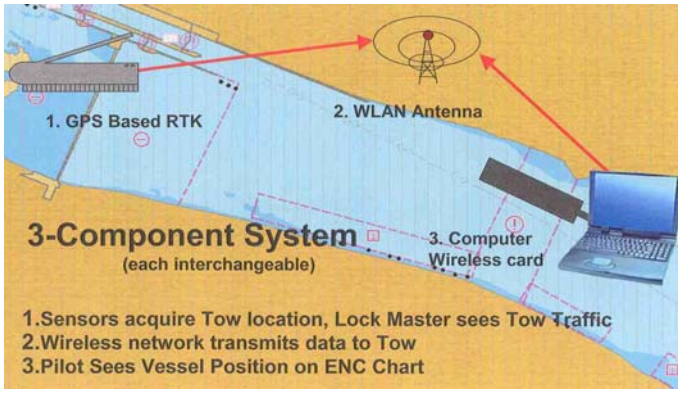
SmartLock will assist tow pilots in the lockage process in near-zero visibility. It will increase "situational awareness" with information regarding the tow in relation to the lock. SmartLock provides a platform for digital inland waterway navigation data and communication systems. SmartLock is easy to use, and presents information in an intuitive format that can be easily assimilated by the pilot. In addition to basic navigation aid features, SmartLock will be extended to provide data collection capabilities, training and guidance modules for pilots unfamiliar with a given lock, and allow pilots to review their most recent lockages.

Finally, using internet standard wireless technologies for transmission of river condition data will allow towboat operators internet access in the area of SmartLock. This may be used for

communication with the home office or simply to provide pilots with a link to land.

System requirements

SmartLock relies on only well-tested and well-understood technologies. High-precision Global Positioning System (GPS) is used for ascertaining the precise location of the tow via satellite. This is combined with survey points on the lock structure to calculate distances of interest to the pilot. The lock provides data about conditions such as dam openings, currents, and wind. The pilot receives the information via a Wireless LAN (IEEE 802.11), certified by the same encryption technology that is used to transmit credit card data over the internet. Finally, SmartLock information is overlaid on the ENC (IHO S-57) installed on standard personal computers, and displayed to the pilot.

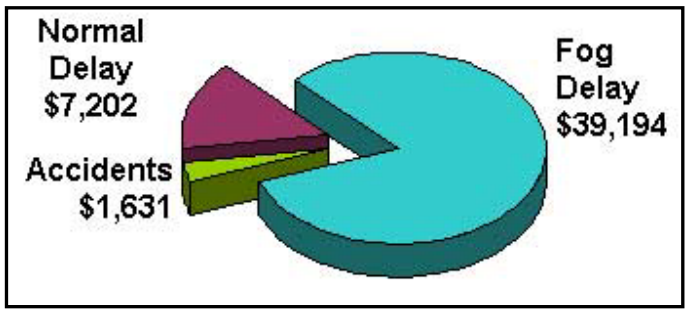


SmartLock architecture.

Benefit/Cost analyses

The benefits and costs associated with implementing SmartLock have been estimated by Carnegie Mellon University, **in calendar year 2004 dollars**. The SmartLock system improves reliability and predictability of inland waterway transportation by improving safety and efficiency at the lock. The largest sources of cost-savings facilitated by SmartLock are: (a) allowing locking in fog conditions, (b) speeding lockages, and (c) reducing accidents. Being able to continue to operate on only half the days currently lost to fog could save the towing industry and shippers an estimated $58 million annually. Reducing average lockage time by only 10 min per lockage could save the towing industry and shippers an estimated $10 million annually. Reducing the number of accidents at lock sites would save an estimated $1 million annually in unnecessary repair costs, and tens of millions more dollars presently lost due to related delays.

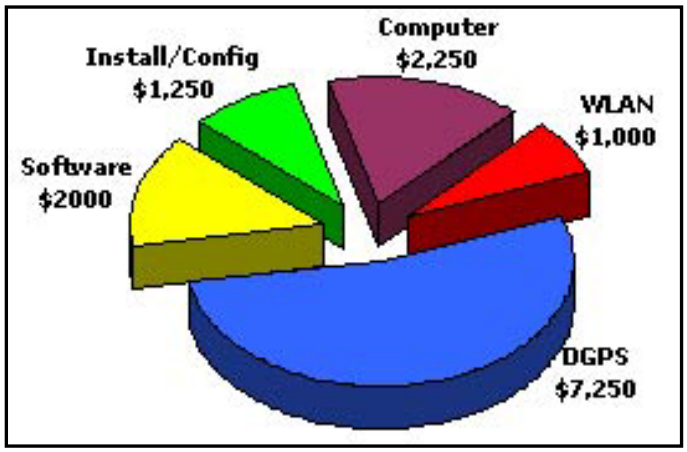
Use of near-commodity technologies, and the multi-use aspects of many system components, makes SmartLock surprisingly affordable. Each towboat can be outfitted with SmartLock for an estimated $14,000 (less than the cost of most radar systems). Sharing components such as personal computers or GPS with other applications reduces the effective cost even further.



Estimated SmartLock annual savings per boat, in calendar year 2004 dollars (estimate prepared by Carnegie Mellon University).

Availability

Initial feasibility studies and tests of a system prototype were carried out during the first half of 2003. These tests were conducted on towboats during the locking process, and included careful observation of pilots and their interaction with SmartLock. Pilots reported increased confidence in making the lock. A Request For Proposals resulted in the selection of Jeppesen Marine to develop the fully operational product for general use. Nationwide deployment of lock-based SmartLock infrastructure is envisioned.



Estimated SmartLock installation costs per boat, in calendar year 2004 dollars (estimate prepared by Carnegie Mellon University).

The Port of Pittsburgh Commission welcomes inquiries about SmartLock. For more information contact James R. McCarville, Executive Director of the Pittsburgh Port Commission at telephone 412-201-7335, or e-mail jim@port.Pittsburghh.pa.us.

Winkler and Marshall Awarded by River Industry Executive Task Force

During the Inland Waterways Conference, March 6-8, 2007, Cincinnati, Ohio, Messrs. Michael F. Winkler and Danny M. Marshall, U.S. Army Engineer Research and Development Center, Coastal and Hydraulics Laboratory (CHL), Vicksburg, Mississippi, each received awards from the River Industry Executive Task Forces (RIETF). The awards were presented by Mr. Scott Noble, Vice President of Ingram Barge Company, and Mr. Michael Monahan, Vice Chairman of American Commercial Lines. Mr. Noble and Mr. Monahan both serve as board members of RIETF. The awards acknowledged outstanding contributions Messrs. Winker and Marshall made in the development and successful demonstrations of the Real Time Current Velocity (RTCV) System. The RTCV uses an Acoustic Doppler Current Profiler (ADCP) as part of a system that provides real-time data on currents and wind to tow boats as they approach a lock. The RTCV has the potential for significant increases in safety and efficiency.

RTCV development was initiated following the Lock Currents workshop at CHL in March 2006, where the basic concept was presented to over 60 District, Division, ERDC, HQ, and Industry representatives. The concept was endorsed by the group, and a demonstration was requested by HQ and subsequently funded under the Navigation Systems Research Program. Michael Winkler led a team of ERDC and industry representatives to quickly develop the RTCV. Danny Marshall was the lead technician on the project. In mid-August 2006, thanks to considerable support from the Mobile District, a demonstration of the RTCV to 17 Corps, Industry, and Academia representatives was held at the Tom Beville Lock and Dam on the Tenn-Tom Waterway near Columbus, Mississippi.

Michael F. Winkler and Danny M. Marshall, ERDC, CHL, receive River Industry Executive Task Force award at Inland Waterways Conference. Left to right, Mr. Michael Monahan, American Commercial Lines; Messrs. Winkler and Marshall; and Mr. Scott Noble, Ingram Barge Company.

Within a few weeks of the Tom Beville demonstration, HQ requested a second demonstration of the RTCV for the Inland Waterway User Board (IWUB) Meeting on November 17, 2006, in Pittsburgh, PA. In response, Messrs. Winkler and Marshall quickly assembled a second RTCV, and deployed it at Emsworth Lock and Dam on the Ohio River. Here, the RTCV was demonstrated to over 70 attendees of the IWUB, including Major General Don T. Riley (Corps' Director of Civil Works) and Assistant Secretary of the Army for Civil Works, Mr. John P. Woodley, Jr.

Mr. Winkler is now leading a project development team that is creating a plan to deploy a number of RTCVs at select locks on the Inland River System. Additional information pertaining to the RTCV may be obtained from Michael F. Winkler, Engineer Research and Development Center, Coastal and Hydraulics Laboratory, 33909 Halls Ferry Road, Vicksburg, MS 39180-6199, 601-634-2652, e-mail *Michael.F.Winkler@erdc.usace.army.mil*.

Port Communicators to Convene June 13-15, in Cape Canaveral, Florida

AAPA Seminar to Focus on Effective Community and Public Relations to Support Port Development *by Aaron Ellis, American Association of Port Authorities*

As trade volumes and cruise passenger counts continue their meteoric rise, public port authorities struggle to keep congestion in check, often necessitating expansion and/or infrastructure development. In turn, affected communities may call for more say in how ports deal with cargo and passenger increases. To address these myriad challenges, the American Association of Port Authorities (AAPA) will hold its 2007 Public Relations Seminar in Cape Canaveral, Florida, June 13-15, 2007, focusing on effective community and public relations to support port development.

"Without question, seaports throughout the Western Hemisphere, as well as the transportation connections that serve seaports, are under increasing capacity pressures, both from growing freight and cruise passenger volumes, and from the communities affected by this growth," said Kurt Nagle, AAPA's president and CEO. "AAPA's Public Relations Seminar will help port public relations practitioners with a program that educates, excites, and engages them to enhance the way they interact with their communities. Only by bringing key stakeholders together can ports develop the partnerships and resources they need to tackle today's growing congestion problems."

AAPA's Public Relations Seminar will begin its first day with a strategic look ahead at the key issues important to ports, including the impacts of congestion and recommendations of what must be done to stave off traffic and economic gridlock due to growing passenger counts and freight volumes. After that will be a discussion on image branding, followed by a session to help port communicators better connect with audiences who are best reached through new and emerging technologies such as podcasts, vodcasts, blogs, and personal microsites.

For the first day's luncheon, a representative of the Panama Canal Authority will discuss how they ran a successful public referendum for the estimated $5.5 billion expansion of the Panama Canal. Later that day, seminar participants will be treated to a 3-hour interactive exercise that will ask them to play various character roles in a situation where a hypothetical port deals with the unanticipated consequences of trying to "fix" a congestion problem without first consulting the community it serves.

On the second day, seminar attendees will interact with a panel of reporters from across the media spectrum to find common ground for getting favorable coverage of their organizations, such as features on property and infrastructure development; and trade, travel, and environmental enhancement programs. Next will be a luncheon

program aboard a Disney cruise ship, followed by a companion session in the afternoon, presented by a panel of cruise line and cruise industry experts, on communications challenges in the cruise and travel industry.

Friday's sessions will include a workshop on community image and perception polling to learn how to query audiences about key port issues, followed by a session demonstrating how two major southern California ports combined resources and talents to develop a comprehensive program to reduce air emissions from port operations in and around Los Angeles' San Pedro Bay.

More information about AAPA's Public Relations Seminar is available at *www.aapa-ports.org* (click on the "Programs and Events" tab), or by calling AAPA's Ed O'Connell at 703-684-5700.

Aaron Ellis is Communications Director for the American Association of Port Authorities.

AAPA XVI Congress for Latin American Ports, Rosario, Santa Fe, Argentina *by Bruce Lambert, Secretary of PIANC USA*

On April 23- 27, 2007, the American Association of Port Authorities hosted its 16th Congress for Latin American Ports in Rosario. The meeting was held at the Fluvial Station alongside the Parana River, which provided a great opportunity to view deep-sea vessels passing by the windows!

The meeting focused largely on the development of a multi-modal transportation system in Latin America, recognizing that the nations in South America must depend upon further development of their inland navigation systems to enhance potential economic growth. The session topics ranged from discussions on why waterways and railroads were so underutilized in Latin America, to the importance of specific corridors for new economic development. Two speakers discussed development challenges in the Mercosur region, focusing not only on the infrastructural limitations, but also on some of the financial and institutional challenges in the region.

Several speakers from North America spoke on how multi-modal systems operate in the U.S. and Canada, as well as basic port operations. Some speakers echoed this same theme that institutions (national, state, or local) were willing to engage in these efforts, but were unsure as to how to proceed further. Many of the speakers recognized that the region must seek to develop trans-national transportation policies that foster a spirit of coordination, not competition, to develop inland navigation projects.

Most speakers discussed the need for reinvestment in infrastructure, from the construction of new locks and dams in Brazil, to canalizing waterways in the headwaters of the Amazon and Parana. A consensus emerged that supported the region rapidly moving towards a unified South American waterway network to sustain economic growth, but challenges (financial and institutional) would have to be overcome.

SUMMARY OF SELECTED PAPERS FROM PORTS 2007

The following nine articles are summaries of selected original papers presented at Ports 2007. Appreciation is extended to the American Society of Civil Engineers (ASCE) for permission to reproduce copyrighted material. The entire proceedings of Ports 2007 appear in "Ports 2007: 30 Years of Sharing Ideas; 1977-2007" edited by

Wade Watson, PE, may be obtained from ASCE at https://www.asce.org/bookstore/book.cfm?book=7183, and will be posted on line in ASCE's Research Library during summer 2007.

Plan for Deepening and Widening Miami Harbor Channels and Basins

by Bradd Schwichtenberg, U.S. Army Engineer District, Jacksonville

The Port of Miami ranks in the top 10 cargo container ports in the U.S. and is the largest container port in Florida. The Port has more than 40 shipping lines calling on over 132 countries and over 362 ports. The Port is also the largest multi-day cruise passenger homeport in the world. The total economic impact of Port operations on the nation is estimated at more than $12 billion per year. More than 90,000 jobs are directly or indirectly attributable to Port operations.

In 1997 the Port, working through Congress, requested that the Corps of Engineers study the feasibility of improving navigation in Miami Harbor. The study was initiated in 1999, and in 2004 the Corps completed the study that evaluated possible safety and efficiency improvements to the Miami Harbor channel system. The study recommended $181 million in improvements, including 8 ft of deepening from a project depth of 42 to 50 ft and significant widening of various channels, basins, and berthing areas.

Problem

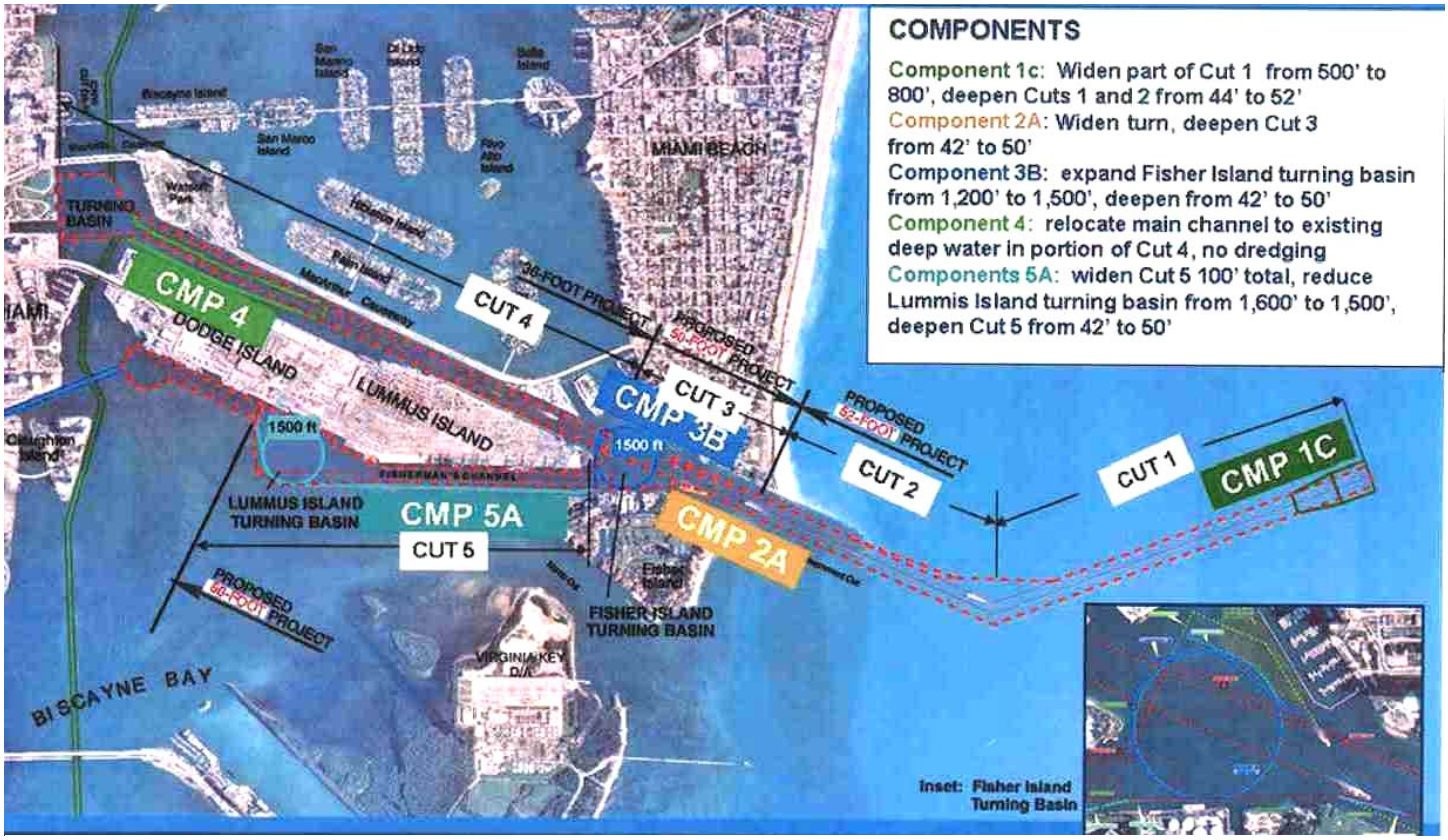
The Corps is responsible for the main navigation channels and basins located within Miami Harbor. The harbor entrance channel is 44-ft deep at mean lower low water from the ocean (Cut 1) to about the existing beach line (Cut 2) with a bottom width of 500 ft. A 42-ft inner harbor depth over a bottom width of 500 ft extends through Cut 3 and the Fisher Island Turning Basin that is located directly above Fisher Island. The 42-ft inner harbor depth continues west from the Fisher Island Turning Basin by the container terminals along Cut 5 (Lummus Island Cut or Fisherman's Channel) over a 400-ft bottom width to the west end of the Lummus Island or Middle Turning Basin. Continuing west from the Lummus Island turning basin a 34-ft-deep channel over a 400-ft bottom width extends 1,200 ft. The main channel (cruise ship channel or Cut 4) has a 36-ft depth over a 400-ft bottom width and extends from about the west end of the Fisher Island Turning Basin to the cruise ship turning basin.

The Port of Miami consists of two connected islands - Dodge Island and Lummus Island. A majority of the Port's landmass is devoted to cargo operations (mainly on Lummus Island), with the remainder support facilities and cruise operations (on Dodge Island). The Port has good rail connections, is less than one mile from major highways, and is close to the Miami International Airport (MIA). Anchorage for deep-draft cargo vessels lies north of the entrance channel to Miami Harbor.

The study examined the feasibility of deepening and widening the main navigation channels and basins. Currently some vessels using the harbor must light-load to enter or leave the harbor causing increased transportation costs. Difficult crosscurrents at the beginning of the entrance channel and the transition from Cut-3 to Lummus Island Cut have resulted in groundings. In addition, ships transiting the Lummus Island Cut pass extremely close to vessels docked at the gantry crane berths, which results in a surge effect on those ships at dock.

Plan Components

A broad range of components was developed that addressed the transportation inefficiencies and safety issues, including widening, deepening, and nonstructural components. Proposed channel deepening will provide a reduction or elimination of light-loading costs.



Recommended plan for improvements of channels and basins within Miami Harbor, Florida.

Proposed channel widening components at the beginning of the entrance channel, along the southern intersection of Cut-3 with Lummus Island Cut, and along the southern edge of Lummus Island Cut will improve navigation safety, and reduce tug assists. Components involving expansion of the Fisher Island Turning Basin will decrease transit times for ships due to a wider turning basin.

Six components were developed that included four widening measures, three turning basin modifications, one channel non-structural relocation, and one channel extension. The components related to the container terminal included deepening in 1-ft increments from an existing harbor project. Different versions of each component were considered. Alternative plans were then developed from different combinations of the component versions. One alternative maximized net benefits at a channel system depth of 49-51 ft. This system includes widening the channel and extending the Fisher Island Turning Basin. This combination plan has a benefit/cost ratio of 1.5 to 1, and is called the National Economic Development (NED) plan.

Recommended plan

The Port requested some deviations from the NED plan. This Locally Preferred Plan (LPP) can be recommended for Federal cost sharing if approved. The LPP was requested for a modified combination plan with a channel system depth of 50-52 ft. This LPP was requested because Post-Panamax container ships currently deployed in the Far East trade region have become more numerous. The Port anticipates that these Post-Panamax container ships will be deployed in the Atlantic trade region and will call at U.S. East Coast ports, including the Port of Miami.

The Assistant Secretary of the Army (Civil Works) in a November 29, 2004, letter granted an exception to the NED plan for the following reasons. The Port of Miami, Miami-Dade County Seaport Department, agreed to pay for the additional costs to deepen the additional foot of project depth beyond the NED plan. All other features of the NED plan and LPP plan are the same, including mitigation for unavoidable adverse environmental impacts. The LPP dos not require any additional annual operation, maintenance, repair, or rehabilitation costs. The LPP provides the same type of benefits as the NED plan. The LPP is the plan that was recommended to Congress (Recommended Plan) for authorization.

Environmental Mitigation

After all efforts to avoid and minimize environmental impacts had been completed, mitigation for remaining unavoidable environmental impacts was developed for the Recommended Plan. These mitigation measures include (a) restoration of a previously dredged borrow area within northern Biscayne Bay for seagrass impacts, and (b) creation of artificial reefs within permitted offshore artificial reef sites if available, or at two locations south of the entrance channel for unavoidable impacts to reef/hardgrounds associated with the expansion of the entrance channel. Mitigation for seagrass and hardbottom/reef impacts would be provided through restoration of seagrass beds and creation of artificial reefs.

Operation and Maintenance

Due to the lack of sediment bypassing under the existing conditions, and due to the negligible changes in tidal current velocities as determined by numerical modeling, no significant changes to the existing shoaling rates and patterns of deposition are expected due to construction of the proposed channel improvements at Miami Harbor. There is no additional future operation and maintenance anticipated as part of the proposed project.

Conclusions

Mr. John Paul Woodley, Jr., Assistant Secretary of the Army (Civil Works), provided a Record of Decision dated May 22, 2006, which found that the plan recommended by the Corps of Engineers, was technically feasible, in accordance with environmental statutes, and in the public interest. While the Record of Decision completes the National Environmental Policy Act process, the report awaits Congressional authorization and funding. The Senate approved, on a voice vote July 19, 2006, a Water Resources Development Act that authorizes $11.6 billion worth of projects. The Senate version of that bill contains the Miami Harbor report. The Senate bill now goes to a conference committee to be reconciled with a bill passed by the House of Representatives in July 2005.

Acknowledgement

I sincerely thank Richard Powell, Senior Planning Technical Leader, Terri Jordan, Biologist, and the entire study team of the U.S. Army Engineer District, Jacksonville, for their significant contributions to this study. I also thank Becky Hope, Environmental Manager, Port of Miami, Miami-Dade County Seaport Department, for her assistance in preparation of this article.

Bradd Schwichtenberg is Chief, Coastal Navigation Planning Section, U.S. Army Corps of Engineers, Jacksonville District. This Section is presently conducting some 50 on-going coastal, navigation, and ecosystem restoration studies throughout most of Florida, Puerto Rico, and the U.S. Virgin Islands. He holds a BS Degree in Civil Engineering, a MS Degree in Ocean Engineering, and is a licensed professional engineer in the state of California. Mr. Schwichtenberg is the membership committee chairman for ASCE Coastal, Ocean, Ports, and Rivers Institute.

Maritime Expansion at the Port of Oakland, California *by Michael Leue, Parsons*

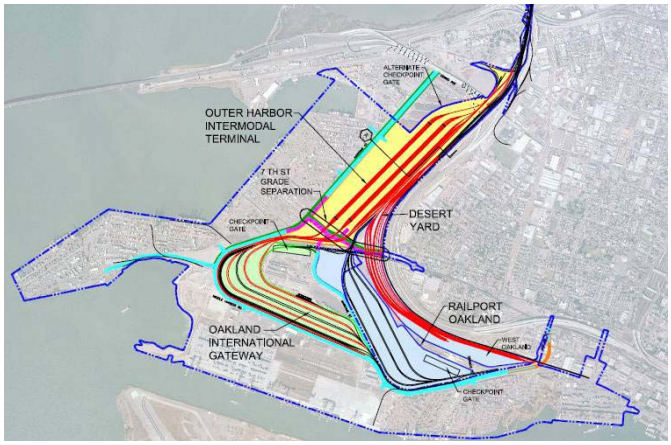
The Port of Oakland, California, oversees the Oakland seaport, Oakland International Airport, and 19 miles of waterfront. The Oakland seaport is the 4th busiest container port in the U.S., and moved a record 2.4 million 20-ft equivalent units (TEUs) in 2006 (an increase of approximately 5 percent over 2005). The Port provides a necessary service towards the region's and nation's goods movement requirements, and recognizes its responsibility to minimize impacts on surrounding communities.

Port of Oakland, California.

The Port is poised for significant additional growth in cargo volumes, as it prepares for the final stage of channel deepening to -50 ft mean lower low water (mllw), and development of the former Naval Supply Center and Oakland Army Base properties. The demand that is driving the cargo growth comes from several sources: (a) expanding urban areas reaching south toward Gilroy and east into the San Joaquin Valley; (b) development of inland transload warehouse centers; and (c) relative efficiency of intermodal service. The Vision 2000 Program included the recent completion of two new marine terminals, and the Oakland International Gateway (OIG) rail yard. The Port Maritime Development Alternatives Study considered utilization of decommissioned Oakland Army Base (OAB) property, and the Port is now working toward concept development and implementation.

OAB development alternative plans

The Port determined that a 180 acre portion of OAB located between the Union Pacific Railroad (UPRR) mainline and the Outer Harbor Terminals would be best utilized as a near-dock intermodal rail yard. The Port took a holistic approach to rail development planning, and evaluated marine terminal cargo growth and their gate operations, roadway system capacities and needed improvements, and port-wide intermodal operations, including potential expansion of existing and proposed rail terminals. The Port was keenly interested in two particular facility characteristics for proposed intermodal facilities: (a) incorporate automation, and (b) be environmentally green.



Port of Oakland boundaries, proposed rail facilities, and roadways.

The Port requested Parsons to develop an implementation plan for the Port's rail and roadway facilities to serve future intermodal plans. Some of the more interesting OAB development alternative plans included:

- **Rubber Tire Gantry (RTG)/Top-pick:** This industry standard system has a low capital cost and relatively low operating cost for volumes of 400,000 TEUs or less; however this mode requires significantly more land area than the other concepts. It is inherently less productive at higher volumes due to the loss of crane time while trains are moving. It has higher operating costs and is less green due to double-handling of containers by trucks and hostlers from buffer staging area to trackside, as well as low crane utilization.

- **Unit-train Length Facility:** This concept would use the RTG/Top-pick layout due to track spacing constraints imposed by Bay Area Rapid Transit columns. This layout would also have significant impacts to ongoing operations in the Railport facility. The ultimate capacity of this facility would come close to the preferred Rail Mounted Crane (RMC)/Nested Rail Mounted Gantry (RMG) concept (described below). The disadvantages of this concept include: (a) the facility would require combining Port property with private UPRR property, and would challenge UPRR's ability to provide proprietary service from their facility; (b) the concept does not enable automated operations; (c) "greening" the 45 ft RTGs by electrifying them would be expensive, and then have low crane utilization due to moving trains; and (d) train loading would need to be organized by full-train to realize the benefits of the unit-train length tracks.

- **Nested RMC/RMG:** This concept involves two sets of rail mounted cranes. The first crane set (RMC) would straddle multiple tracks and have two outboard cantilevers to serve truck lanes and a grounded container buffer stack. The second crane set (RMG) straddles the container stack, and has a cantilever which serves a lane of trucks. The first crane stretches above the second, so that each row and column of the grounded container stack can be reached by both cranes. The second crane manages the container stack so that train loading and unloading can be done by dedicated cranes as efficiently as possible 24 hours per day, independent of gate traffic to and from marine terminals. For capacity calculations, the dwell time of containers in the buffer stack is assumed to be 1 day, which is longer than the current average.

Preferred alternative plan

After dynamic simulation modeling, Parsons concluded the preferred alternative was the RMC/Nested RMG with live lift concept, based on the following:

- RMC utilization is very high due to the ability to perform lift operations on one track while a train is in motion on another. With smaller RTGs, the crane is unproductive while the train moves. The simulation did not assume that containers would be lifted over a moving train, but crane lock-out safety systems incorporated with the track protection system could make this feasible, which would further increase crane utilization.

- Operating costs are low since containers are taken directly from the gate to trackside. There is no double-handling from parking spaces or extra yard vehicles circulating in the yard.

- The trackside buffer stack allows the stacks to be managed in an automated "offline" mode that will optimize container placement for both train loading and truck delivery.

- Labor efficiency is maximized through automation and remote manual operations.

- Manual interfaces (discussed in Automation, below) can occur in a protected mode outside of on-going automated operations.

This preferred alternative has the Nested RMG and buffer stack on one side of the large RMC, and

the ability to directly interface with trucks on the other side. There was a concern that interrupting the large RMC to service trucks would introduce inefficiencies to the activity of loading trains, but the simulation showed that the live-lift operations fit well into the RMC assignments, and with three or more RMCs per six tracks did not increase unproductive gantry movements.

Conclusions

The demand for intermodal capacity on the West Coast is substantial, and the Port of Oakland is poised to contribute towards meeting that demand. Traditional railroad loading operations have remained substantially unchanged for a couple of decades. The in-depth investigations of this study led to selection of a highly-automated and densified rail yard concept that is substantially different from any other facility currently operating in North America.

Artist rendition of the OAB proposed development. The former OAB with Outer Harbor Intermodal Terminal are located in the center of the top half of the photo bounded by I880 to the right, Maritime Street to the left, Grand Avenue above, and 7th Street running horizontally through the center of the graphic below. Railport storage tracks are to the far right adjacent to I-880 (Railport working tracks are mostly off the graphic). OIG is partially shown at the bottom of the graphic.

The concept that is being considered involves tightly spaced sets of six tracks under a single RMC. Adjacent to the RMC is a buffer stack that is straddled by a smaller RMG. The RMC has a cantilever that allows it to access the buffer stack, while the RMG straddles the buffer stack. The RMG has a cantilever that unloads and delivers containers to trucks. On the side opposite the buffer stack, the RMC has a cantilever that allows it to unload and deliver containers to trucks directly from the railcars (live-lift). Both the RMCs and RMGs are rail mounted and electric powered.

Simulation modeling indicates the built-out facility can operate efficiently with three RMCs and five RMGs over each track set (two sets of six tracks with six RMCs and 10 RMGs total). Loading and storage tracks can accommodate approximately 4,000 ft of railcars each. This proposed concept shows substantial benefits when compared to traditional rail yard operations.

Acknowledgement

Parsons performed this study under the direction of Imee Osantowski and Mark Erickson, Port of Oakland, in collaboration with the Port of Oakland staff, and with contributions from subconsultant JWD.

Mike Leue has been Director of Port/Intermodal Development at Parsons since 2003. He has over 25 years experience in planning and design of transportation infrastructure. He has served as Project Manager for port development throughout the nation. Mr. Leue has a BS in Engineering from California State University, Long Beach, and is a Registered Professional Engineer in the state of California.

Impact of Large Container Ships on Port of Long Beach, California

by E. D. Allen, Moffatt and Nichol; and D. A. Thiesen, Port of Long Beach, California

Upgrading infrastructure in advance of the next generation of container ships requires advanced planning and assumptions. Since the Port of Long Beach, California, is strategically located to receive the largest Pacific Ocean vessels, an analysis of the impacts from the next generation of vessels on their infrastructure was conducted, which looked at the marine-side requirements for a 12,000+ TEU vessel, such as channel and berth dimensions plus wharf infrastructure. Landside infrastructure also was assessed for needed improvements including terminal size and equipment needs. The resulting recommendations laid out a schedule of additional studies, plus design and construction to pursue over the next 15 years.

Background

Recently, worldwide container crane orders have been for 22 containers wide and larger vessels as the shippers are moving into the next generation of vessels to handle anticipated increased volumes of containers. Ports around the country are struggling with the concept of costly dredging and upgrades to accommodate future ships. With this foresight in mind, an infrastructure evaluation for the Port of Long Beach was commissioned in 2004 to identify areas where the infrastructure will be stressed or inadequate when new larger container vessels come online.

This infrastructure evaluation required choosing a design vessel and the associated design criteria dealing with channel dimensions, wharf needs, and landside requirements. This study looked at these issues from the context of existing site conditions, analyzed the impacts to the infrastructure from the chosen design vessel, and developed conclusions on how the Port can prepare itself for these future vessels.

Basis of design

The design ship was labeled the "New Panamax" class, referring to a vessel that will become common in the future and especially if the Panama Canal is widened with the third locks project. The Canal's current capabilities are nearing the maximum. This enormous project, projected to be in place in 2014, is to accommodate the latest generations of container and other commercial vessels, and set a new Canal standard for ships.

The design vessel for the Canal is defined as 366 m (1,200 ft) length overall, 49 m (160 ft) beam, and a draft of 15 m (50 ft). It was reasonable to design the infrastructure at the Port to at least the vessel size for the Canal's new locks. It is appropriate to note however, this study's design vessel or a similar one may be built for Trans-Pacific use only, and not be dependent on the Panama Canal project. The vessel dimensions are similar to the future "Suez Max" class ship that could also trade on both Europe-Asia and Asia-North America routes. The criteria for comparing existing facilities against future needs was derived from the chosen design vessel which, after review of shipping and industry trends, and recent studies by the Mercator Transport Group, was determined to be a 10,000 12,000 TEU container ship with the following characteristics: (a) length overall 386 m (1,265 ft), (b) beam 54.9 m (180 ft), (c) draft 15.2 m (50 ft), and (d) air draft 61 m (200-ft).

Infrastructure criteria for the channel dimensions was determined based on a review of international and U.S. national standards, and was modified for local conditions by the Port commercial pilots, Jacobsen Pilot Service.

Infrastructure deficiencies

The anticipated infrastructure deficiencies were analyzed as to what proposed upgrades and modifications would be needed. This was done in two parts, with the marine-side consisting of navigation components including channel

alignment, width, depth, and turning basins; wharves including structure, equipment, appurtenances, and electrical; and ship motion downtime analysis and conclusions. The landside part provided analysis and conclusions for container throughput, throughput density, equipment choice, and equipment configurations including "ship-in-slip" opportunities.

The basic conclusions for the shipping channels and slips consist of a need to:

- Make channel alignment modifications.
- Widen the channel at various locations, including turning basins.
- Deepen the channel at various locations, including turning basins.

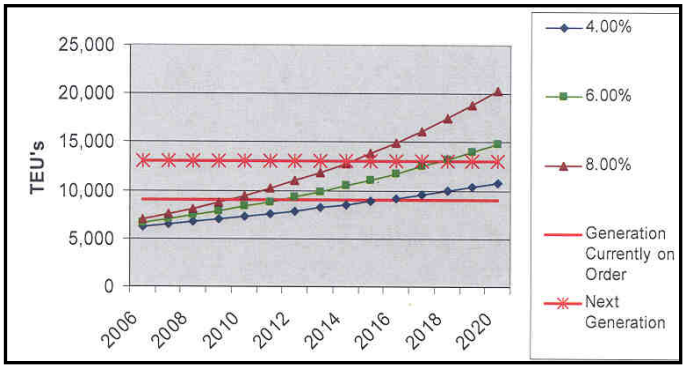
Wharf modification needs included toe walls at the pier head line for berth deepening on many wharves, plus strengthening the crane supporting structure. Some retrofit or upgrade of fenders will also be required. Ship-to-shore or cold ironing will require significant utility upgrades and service modifications.

Ship motion downtime analyses previously done were reviewed for the design vessel, and no significant changes between the "New Panamax" and previous Maersk S-Class ship studies were found. The results suggested the "New Panamax" vessel may have less ship motion at particular berths in the Port susceptible to long period motion, due to the shift of the ship's response period away from the long period wave energy peaks.

With respect to landside infrastructure requirements, the impacts from larger vessels are not necessarily linked to the vessel but the volume discharged. As volume increases, the vessel may increase to say 10,000 TEU, or the increases may be handled with two 5,000 TEU vessels. Land side impacts are more directly related to volume.

Marine side needs

The industry has recently expanded to 8,000 TEU ships and is now moving to the next generation of vessels with a capacity of over 10,000 TEUs. In 2006, the average Trans-Pacific direct service vessel was approximately 6,500 TEUs serving the Port of Long Beach. Assuming growth in the Trans-Pacific market of 4, 6, and 8 percent, the current generation of vessels that are becoming predominant will satisfy demand until 2010 to 2016. Growth in the southern California ports of Long Beach and Los Angeles averaged 8.5 percent per year compounded annual growth rate from 1997 to 2005. From 1987 to 1996, it was 6.3 percent.



Container vessel size demand, Port of Long Beach, California.

Assuming container traffic growth rates of between 4 and 8 percent, demand for 12,000+ TEU vessels will occur between the years 2014 and 2025. There are several 10,000 - 12,000 TEU class vessels on order for delivery in the 2008-09 time-frame, with Maersk delivering its E-class 11,000+ TEU vessels in 2006. Indications are even larger ships are on the order books but have not been disclosed.

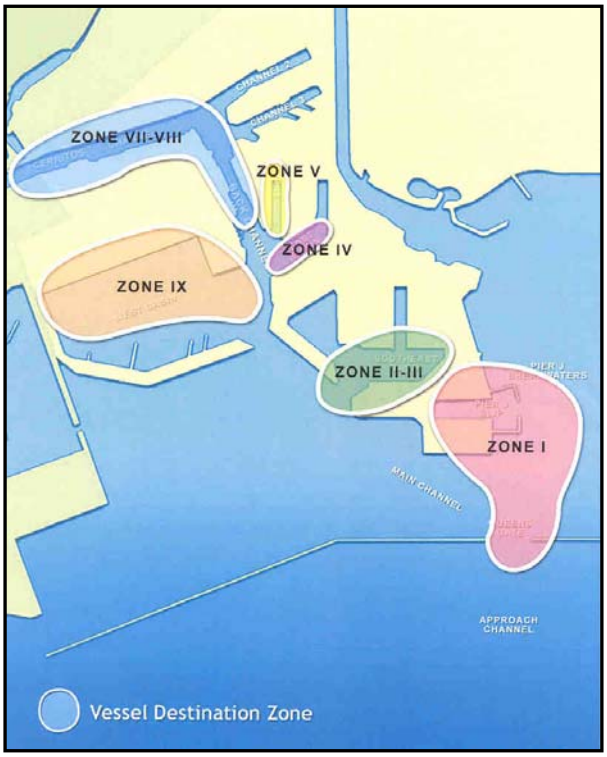
The Port was categorized into geographic zones for identifying infrastructure costs for the various container terminals in the port.

Anticipated cost estimates in **calendar year 2006** dollars for recommended modifications and upgrades for marine side needs (not already programmed) include: (a) Zone I, $11.0 million, (b) Zone II-III $2.0 million, (c) Zone IV, $2.6

million, (d) Zone V, $0, (e) Zone VII-VIII, $43.3 million, and (f) Zone IX, $10.8 million, for a total of approximately $70 million.

Land side needs

The land side infrastructure needs are driven by throughput density and not strictly by size of vessel. It is anticipated the current planning layouts and terminal infrastructure at the Port can support a throughput of around 10,000 TEU's per acre per year using conventional terminal operating equipment. Throughput above 10,000 TEU's per acre per year will most likely require new container stacking systems such as rail mounted cranes or bridge cranes. This conversion will trigger significant infrastructure modifications.



Vessel destination zones for identifying infrastructure costs, Port of Long Beach, California.

Since the current trend of developing modern terminals (121 hectares or 300 acres each) is continuing, the existing state of the infrastructure is constantly changing. It is not expected that any significant infrastructure changes will be necessary until the mid- to long-term time frame of 8-15 years. At that time, any serious electrical and terminal layout construction issues would be dealt with. A budget of future landside costs was not developed since it is very dependent on the type of stacking system each terminal evolves into. However, current plans to cold iron Port berths will accelerate implementation costs for electrical infrastructure.

Marine side forward plan

Following this infrastructure impact study for the Port, a Navigation Channel Master Plan was prepared to focus only on the water areas for dredging and filling. Those areas known to be candidate dredge disposal sites were identified based on the Port's Master Plan. Those areas and the Navigation Channel Master Plan would be used to strategically plan any dredging project, and match it to an appropriate disposal site consistent with the long range plans for the Port of Long Beach.

Dan Allen has more than 35 years experience, including research with the U.S. Army Corps of Engineers. From 1984-2000 he held senior engineering management positions at the Port of Long Beach, California, including Chief Harbor Engineer. Currently he is Director of Port Engineering with Moffatt & Nichol. Mr. Allen also is the U.S. representative to the PIANC Maritime Commission (MarCom).

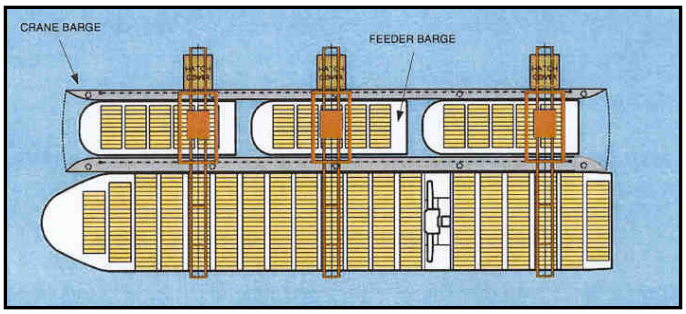
The Floaterm Concept and Waterside Cranes *by Michael Jordan, Liftech Consultants Inc.*

Container terminals are becoming increasingly more congested and expensive to operate. Highways and railways are already congested by

container traffic and this congestion will worsen. Pollution from port operations is also a rising concern. These factors create a growing need for new, more economical terminal operation methods. Floaterm is a concept that could help reduce pollution and congestion at ports and the arteries feeding them.

The Floaterm concept utilizes waterside container cranes on a barge to form, in effect, an offshore wharf. The container ship is moored to the crane barge or vice versa. Containers are transferred from the ship to the barge deck or to feeder barges.

The concept was originally developed by Liftech in 2000. Simultaneously, Dr. Asaf Ashar of Louisiana State University developed a parallel concept. Investigators at Delft University studied the Floaterm concept in 2005. Although the concept has not been implemented in the United States at this time, the costs of conventional waterfront terminal development and operations, combined with the associated congestion and pollution, will justify development and installation of the Floaterm concept in the not-too-distant future.



Plan view of Floaterm concept, midstream application.

The technical feasibility of two different applications of Floaterm concepts have been evaluated: (a) midstream, and (b) two-sided operations.

Midstream application

For the Floaterm midstream application, ships berth at the crane barge offshore, and cranes move containers between the ship and smaller feeder barges. The containers are not sorted as they are unloaded; they are simply transferred between the ship and the feeder barges. The containers would be sorted upstream at a remote terminal.

The midstream application saves berthing space and removes traffic from the wharf and from the yard off terminal to the hinterlands. Containers are transported to shore facilities by feeder barges that are much smaller than the ship. The feeder barges may travel to nearby shallow-draft terminals that provide minimal vessel clearance.

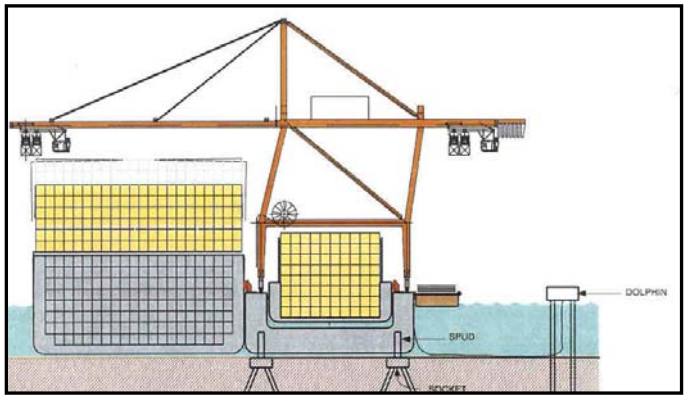
The midstream ship berthing process is similar to that at a marginal wharf. The ship berths alongside the barge and is held by Cavotec-style suction fenders.

Feeder barges are pushed or towed to a channel built into the crane barge. The feeder barges are moved along the channel by automated Cavotec-style fenders that grip the ship and maintain its position relative to the barge. These fenders "walk" the feeder barge within the channel to adjust relative longitudinal feeder barge-to-crane barge position. The "ship-to-shore" (STS) cranes and the crane barge are electrically powered by cables from a dolphin stationed near the stability spuds. The dolphin also provides sufficient power for cold-ironing, which further reduces pollution.

The crane barge is fixed in the midstream location by either retractable spuds or by a mooring system. Self-propulsion is not necessary on the crane barge, since it is not relocated often. Tugs move the crane barge on the rare occasion that it must be relocated.

The STS cranes operate over each ship hatch in the conventional way. A space between the bow and stern of adjacent barges allows for some adjustment so that one ship hatch can be unloaded without moving the adjacent barge. Occasionally, some of the cranes may need to wait while the first crane in line finishes loading its barge.

The barge is self-propelled by propeller pods located at the corners. A diesel engine on the barge is sufficient to power the pods and miscellaneous equipment. During vessel operations the barge engine is off and electrical power is transmitted by cable from shore. The cable may be disconnected when the barge is relocated.



Section view of Floaterm concept, midstream application.

Without stabilization spuds, the barge is very stable, listing less than one degree due to trolley loads, even during vessel operations. However, to further improve stability, retractable stability spuds extend from the barge and insert into foundation sockets. Jets on the bottom of the spuds clean the socket as the spud is inserted. This eliminates all list and trim but allows for vertical translation due to tidal variations. The spuds also hold the barge in position.

Feeder barges travel through a channel in the hull of the crane barge. Tugs maneuver the feeder barges into the hull channel. Once in the channel, automated fenders grip the feeder barges and move them along the channel. The feeder barge size and function are determined by the specific upstream conditions.

The largest feeder barge carries five rows of 10-wide by 8-high stacks of 40- to 45-ft containers. To avoid excessive labor costs, inter-box connectors are not used. Instead, full height cell guides restrain the stacks. The restraints are able to handle 20-, 40-, and 45-ft containers. The details of the restraint of 40- and 45-footers depend on the expected mix of lengths. Since the containers above the ship's main deck may be 45-footers and those below may be 40-footers, the cell guides are adjustable to suit both container sizes. Automatically adjustable fore and aft stops are provided.

The feeder barges are either towed or pushed upstream, depending on the specific conditions. Upstream, the feeder barges are unloaded/loaded at remote terminals, either by landside cranes or cranes mounted on the feeder barges. One landside crane arrangement allows the feeder barge to berth in a slip. Another landside crane arrangement allows the feeder barges to berth at a marginal wharf.

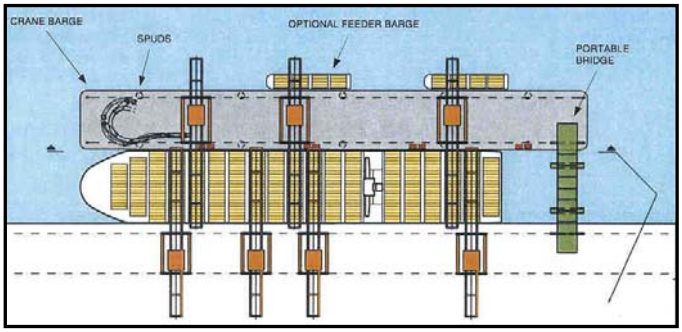
In Hawaii, Matson currently operates feeder barges with barge-mounted cranes. The Matson barges can load and unload at wharves without shore side cranes. There are two advantages to the barge mounted crane variation: (a) shore side cranes are not required, and (b) the containers on the feeder barges can be sorted for each destination. Feeder barges designed with cranes could load/unload both at the Floaterm and at the remote terminal. STS cranes on the crane barge could have clearance under the portal to clear the crane on the feeder barge. Although the portal ties would be very high, a practical structure could be designed.

Two-sided application

The two-sided application concept was originally applied at the Ceres Terminal in Amsterdam. A ship berths in a slip with cranes on

both sides. The terminal was completed in 2002, but has only recently begun operations.

The ship is berthed between a marginal wharf and a movable offshore crane barge. The ships may be berthed the normal way, since the barge can move out of the way under its own power. This arrangement also allows the option of feeder barge service at the crane backreach.

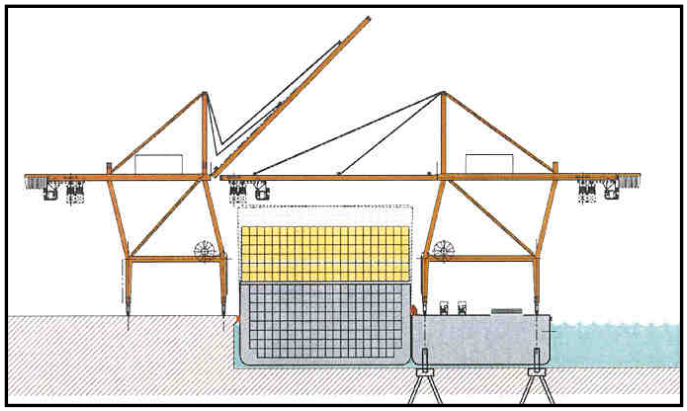


Plan view of Floaterm concept, two-sided application.

The primary advantage of the Floaterm offshore crane barge is the availability of more lanes underneath the cranes, which reduces congestion on the wharf. Congestion in the yard may increase. However, a suitable backlands operation combined with the additional lanes, allows production to nearly double. With dual hoist tandem-40 cranes on both the wharf and the barge, production would be expected to more than double that of a conventional terminal system. Based on reports from Asian ports, six cranes on one ship could produce over 300 moves per hour.

Conclusions

The Floaterm concept can alleviate increasing congestion and pollution at container terminals by expanding the wharf, either from the land to the water or to midstream. The midstream application reduces pollution and yard and urban traffic by using waterways instead of highways and railways. The two-sided application reduces under-crane traffic and increases productivity. With increased production, the ship spends less time at the port, and more berths are available.



Section view of Floaterm concept, two-sided application.

Waterside barge-mounted cranes are good options for overly-congested and polluted ports that need to expand but have limited land available. Although Floaterm has not been implemented in the United States at this time, the escalating costs of conventional operations, the off port traffic congestion, and the damage from pollution will soon compel Floaterm from conception to development stage.

Acknowledgement

I thank Catherine Morris, PE, and Anna Dix, PE, both of Liftech Consultants Inc. for assisting with this study.

Michael A. Jordan, founder of Liftech Consultants Inc., and of Jordan Woodman Dobson, has worked with container terminals since 1958. Mr. Jordan has provided consulting services on over 2,000 cranes, and numerous terminals.

Mooring Loads Caused by Passing Ships *by David Kriebel, U.S. Naval Academy*

It is well-known that if a moving ship passes close to a moored ship, hydrodynamic interactions

between the two vessels cause surge and sway forces, as well as yaw moments, on the moored vessel. If the passing vessel is moving at high speed, if the separation distance between the vessels is small, and/or if the vessels have minimal underkeel clearance, the mooring loads can be quite large.

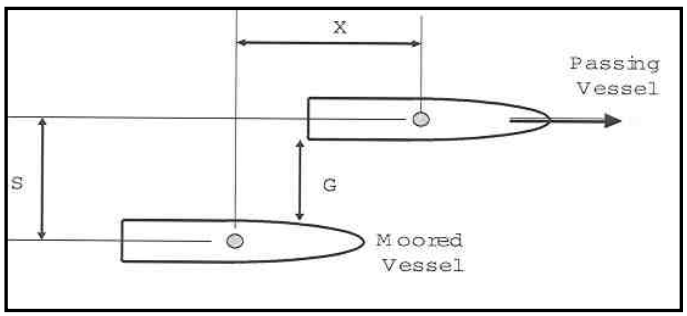
At present, there are few validated methods of predicting the hydrodynamic interaction and resulting loads on the moored vessel. Two simplified engineering methods (Flory method and Seelig PASS-MOOR method) have been evaluated that provide a direct estimate of mooring loads through simple equations and/or design graphs. Both simplified prediction methods use empirical results from the same limited laboratory tests conducted in the 1970s. Interestingly, both sets of data were obtained from the same laboratory facility and both used similar scaled models of large oil tankers. Given the limited number of tests performed, and the fact that both predictive methods have an empirical basis in the same data sets, it is not clear how well these methods apply outside of the range of conditions tested.

Experimental study

An experimental study was recently conducted at the U.S. Naval Academy to address these issues through scale model tests, through assessment of the existing predictive methods, and through development of new empirical equations to predict mooring loads. All tests conducted in this study use a parallel configuration where the passing ship moves parallel to, and in the same direction as, the moored ship.

These model tests were conducted in a shallow basin 40 ft long and 18 ft wide. The "passing ship" model was propelled by a cable-driven towing system, and was free to heave and pitch. The moored ship was attached to a fixed frame by means of light-weight carbon fiber rods, with one rod providing restraint in surge and two providing restraint in sway. Universal joints at the ends of each rod allowed the model to move in heave, pitch, and roll modes. Three load cells were then placed on the aluminum frame and were connected to the carbon fiber rods: one to measure surge force and two (fore and aft) to measure sway force and yaw moment. Measurements were also made of the passing ship speed and position as a function of time.

Two ship models were used. Both are part of the "Series 60" model series used widely in naval architecture laboratories world wide. These are generic hull forms, and are not scaled replicas of any particular full-scale ship. The two models have the same length (L = 5 ft), but have different beams, drafts, and block coefficients. All tests were performed with the same moored ship having a beam B = 8.9 in., draft D = 3.7 in., displacement Δ = 51.6 lbs, and block coefficient C_B = 0.75. All tests used the same passing ship with B = 9.2 in., but the draft was varied between a "deep draft" and a "shallow draft" condition. The deep draft condition used in most of the lab tests had D = 3.7 in., Δ = 59.0 lbs, and C_B = 0.8. The shallow draft condition then had D = 1.75 in. and Δ = 27.9 lbs. Three key dimensionless parameters were varied in the tests: (a) D/d (draft of moored ship relative to water depth); (b) S/L (centerline-to-centerline separation distance relative to moored ship length); and (c) Δ_R (displacement of the passing vessel relative to that of the moored vessel).



Model test configuration.

Water depths in the model tests were selected to produce a range of draft-to-depth ratios from about 0.24 to 0.9. The low end of the range was in relatively deep water with little bottom interaction,

while the upper range was intended to be more realistic for ships in dredged channels where the draft nearly equals the water depth.

Separation ratios ranged from 0.3 to 1.0. The low end of the range had ship models very close together with a gap between the outside of the hulls being about equal to the beam of the moored ship. The upper end of the range was effectively the largest separation possible in the coastal engineering basin.

Displacement ratios included just two values. When the passing vessel was in the "deep draft" configuration, the displacement was 1.14 times that of the moored vessel. The displacement was then 0.52 times that of the moored vessel when the passing ship was at "shallow draft."

Experimental test setup with moored ship (foreground) and passing ship (background).

Tests were conducted with four or five speeds for each depth, separation, and displacement condition. Speeds ranged from 0.8 to about 2.0 ft/sec, and corresponded to a range of 5.5 to 14 knots when scaled to prototype scale, based on scaling the 5 ft model to a 675 ft full scale ship.

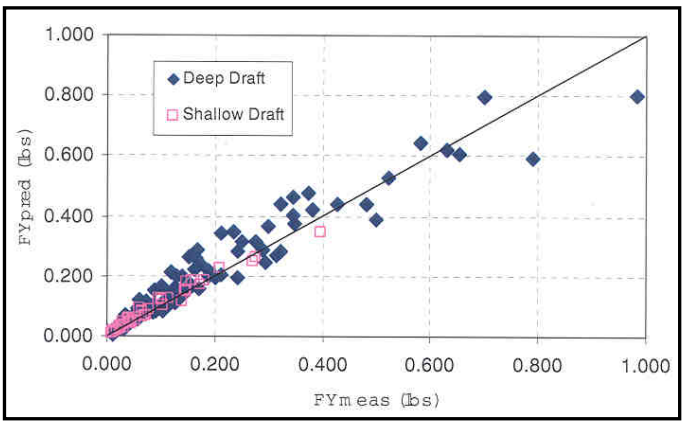
Results

Measured and predicted loads are compared to a line of perfect agreement and results show no bias in the predictions. Some scatter is apparent due to inherent variability in the experiments, and due to the simplified nature of the empirical model. Maximum error is on the order of ±25 percent.

Conclusions

This study has produced a new set of laboratory scale model data for the loads on a moored ship induced by a passing ship. A total of 144 tests were carried out covering a range of ship speeds, water depths, ship drafts or displacements, and separation distances. Results are for a Series 60 hull form, which is a generic form of commercial vessels that has been widely used in naval architecture laboratories. The degree to which results apply to other hull forms is unknown, and additional tests using other hull forms would be useful.

Measured values of peak mooring loads (surge force, sway force, and yaw moment) were first analyzed empirically. A new set of predictive equations was developed to permit simplified estimates of the mooring loads. These equations capture the observed variability in loads with ship separation distance, ship speed, and the draft-to-depth ratio. The simplified equations may be useful for simple hand calculations or for use in spreadsheet predictions.



Example data display: comparison of measured peak sway forces to sway forces predicted using empirical model (other load comparisons were also developed).

Measured values were also used to evaluate two methods of predicting mooring loads. The first method, a set of empirical equations (Flory method), was found to be the least reliable of the two methods. The formulation in that model for representing the differences in displacement of the passing and moored vessels, and for representing the effect of underkeel clearance, did not accurately reproduce observed variations in loads. The second method (Seelig PASS-MOOR method), a spreadsheet, was more consistent in its performance, but under-predicted measured surge and sway forces. Correction factors used in PASS-MOOR to represent the effects of vessel separation and draft-to-depth ratio were then re-derived using the new lab data.

Dr. David Kriebel is Professor of Ocean Engineering, and Director of the Ocean Engineering Program, at the U.S. Naval Academy, Annapolis, Maryland. He has been at the Academy since 1987, following receipt of the PhD from University of Florida. Dr. Kriebel teaches and conducts research in the areas of coastal engineering, ocean wave mechanics, marine soils mechanics and foundations, and ocean engineering capstone design.

Tandem-40 Dockside Container Cranes *by Derrick Lind, Liftech Consultants Inc.*

Conventional single-hoist container cranes have been in use since the mid-1960s. Many innovations have been developed to improve the productivity, including increases in trolley/hoist speeds, cranes with two trolleys, and elevating girder cranes. The latest development is a tandem-40 crane that can handle two 40-ft containers for each lift. They have been developed as both single-hoist tandem-40 (SHT40) and dual-hoist tandem-40 (DHT40) cranes. These cranes pick up two or more containers with a single trolley running on a conventional runway.

Tandem-40 crane technology has been used at several ports, including Algeciras, Spain; Antwerp, Belgium; Dubai, United Arab Emirates; Shanghai, China; Yantian, China; and Singapore. No U.S. terminal has ordered tandem lift cranes at this time, but some ports are actively considering such operations.

Productivity

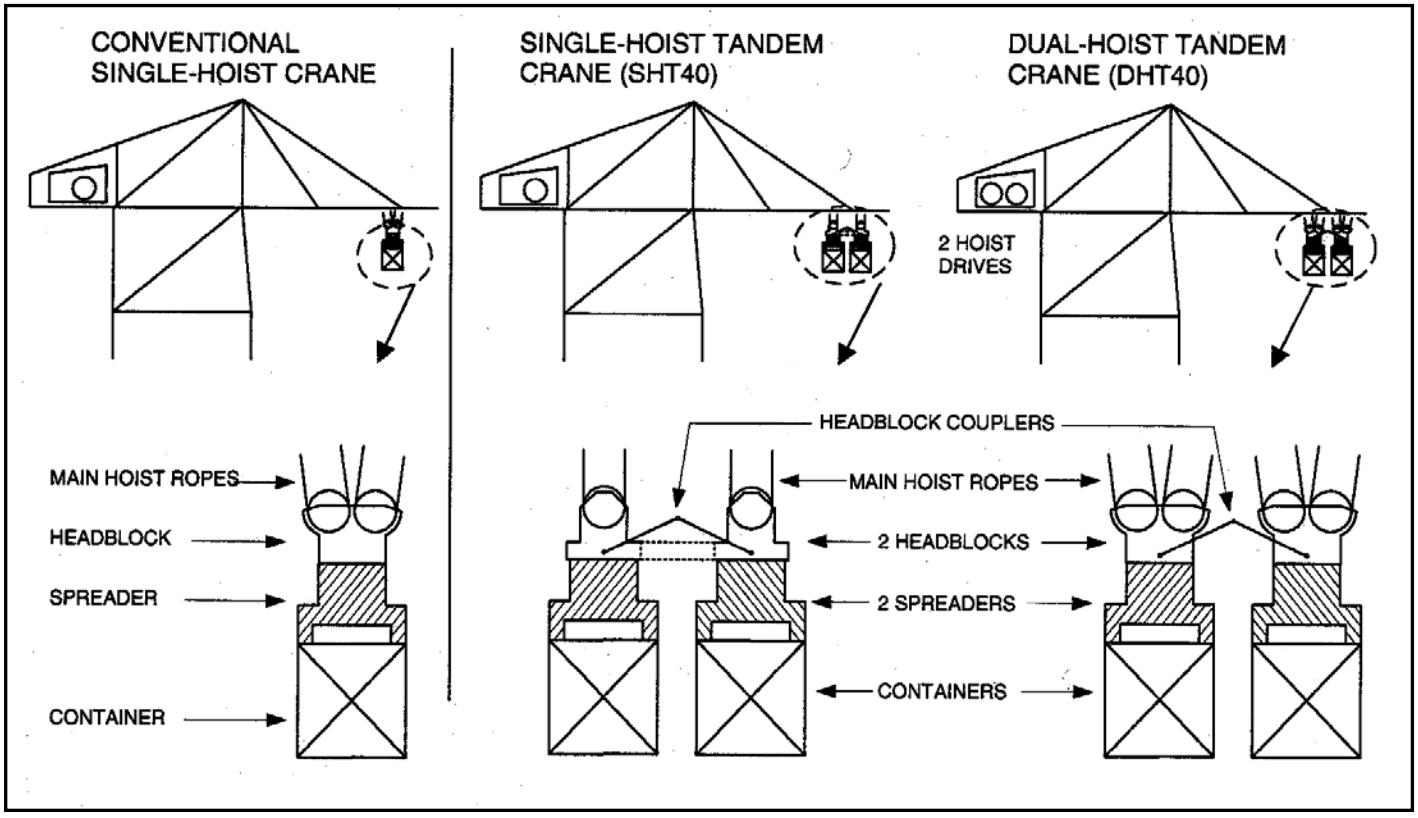
Tandem-40 crane productivity could double that of conventional single-hoist operations except for increases in non-crane delays. These delays reduce the productivity increase to about 50 percent, although this is still a significant improvement. Liftech's numerical simulation model (CraneSim) calculates productivity considering no delays. Although the production is overestimated, the relationships between various parameters are valid. Typically, the expected production including non-crane delays is about 65 percent of the simulation results.

Yard operation issues

To gain full advantage of the tandem-40 crane potential, yard operations must change. Automation will be necessary to achieve maximum efficiency.

Containers can be arranged in one of five patterns. Tandem operations exacerbate congestion, and require either two single chassis or one tandem chassis. Tandem chassis avoid added delays under the crane, but require major changes to the yard. Single chassis increase delays under the crane, but do not require significant yard changes.

For tandem operations, removal of inner box connectors (IBCs) is obstructed. One solution to this problem is to use open-corner bombcarts and remove IBCs in another location. The spreader/headblocks separate 1,600 mm to provide separation of chassis. On some cranes, an IBC removal work platform is added above the sill beam. This operation increases the crane cycle

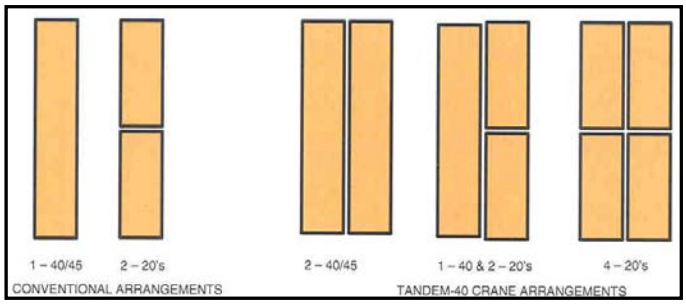


Crane configurations and commonly used terms, although terms may vary somewhat throughout the industry.

time, but removes workers from the wharf and reduces congestion on the wharf. If automated guided vehicles (AGVs) are used, the platform separates workers from the AGV traffic.

Tandem Crane Components

Structure: The heavier rated load obviously results in a heavier crane, but what may not be obvious is the increased fatigue damage caused by heavier tandem loads. This should be considered if existing cranes are to be converted to tandem cranes. Table 1 shows a comparison of conventional and tandem crane weights and wheel loads. Increasing the gage beyond the usual 30 m provides more space under the crane, improves stability, and reduces wheel loads. Several terminals are using gages of 35 m, and one is using 42 m.



Plan view of possible conventional and tandem-40 container arrangements.

Machinery house: The machinery house in an SHT40 crane is similar to a conventional house; however, the house for a DHT40 crane contains two complete hoist systems. The second hoist is simply a duplicate of the first hoist. To allow for future DHT operation, the machinery house on a new single-hoist crane can be designed to accept a second hoist later.

Table 1: Comparison of Typical Conventional and DHT40 Crane Loads

Item	Conventional Single-hoist Crane	DHT40 Crane
Wheel gage	30 m	30 m
Dead load + trolly	1,450 t + 27 t	1,850 t + 50 t
Rated load	61 t	80 t
Lifted system; including the headblock and spreader	60 to 85 t	100 to 140 t
Factored crane rail load when operating LS/WS	65/80 t/m (1.5 m whl. spacing)	90/110 t/m (1.5 m whl. spacing)
LS = landside WS = waterside 1 m = 3.28 ft 1 t = 1 tonne = 2.205 k		

Tandem chassis.


Headblock separation.


Inter-box connector removal.

Trolley: The STH40 trolley is similar to a conventional trolley. The DHT40 trolley is very different. DHT40 trolleys are longer to accommodate two sets of hoist sheaves. They also include a system to dock an unused headblock. For single-hoist operations, the unused headblock is locked into the trolley.

Headblocks and spreaders: Tandem-40 crane headblocks and spreaders can be single- or dual-hoist. A SHT40 spreader hangs from a single headblock. The sheaves are separated for stability. The hanging load is usually separated by ropes leading to a single-hoist drive. The spreaders can translate to accommodate unbalanced loads and single containers.

When the system is in the conventional single-hoist mode, the tandem spreader is replaced with a conventional spreader with the sheaves moved close together. This change takes less than 30 min.

Typically, the containers can be spread 1.2 to 1.6 m, and can accommodate 300 mm difference in container height.

A DHT40 crane uses two independent headblocks and spreaders which hang on 16 rope parts, eight for each hoist system. During tandem operations, the headblocks are connected by a headblock coupler. The coupler can adjust the relative positions of headblocks. The spacing can be increased to 1,600 mm, the height difference can be 500 mm, and the headblocks can be rotated about all axes. When the headblock coupler is released, each lift system can operate independently.

Conclusions

Dual-hoist tandem-40 cranes are one of the latest innovations to increase crane productivity. Tandem crane designs are maturing and efficiency is improving. However, yard design and operation of a tandem facility have not been optimized to handle the increased crane capacity. Tandem-40 container handling is the future of the container industry, but this system is still in development.

Acknowledgement

For their contributions to this study, thanks go to Larry Wright, of McKay International Engineers; and Jonathan Hsieh, Principal, and Michael Jordan, Chief Executive Officer, of Liftech Consultants Inc.

Derrick J. Lind is a structural engineer and associate with Liftech Consultants, Inc. Mr. Lind is experienced in designing and evaluating various structural systems for commercial, industrial, and transportation facilities, including buildings, marine structures, wharves, bridges, and container cranes. He has also performed fabrication and construction audits for several projects. Recently, Mr. Lind has managed three dual-hoist tandem container crane projects for clients in Hong Kong and Singapore.

Port of Gulfport, Mississippi, Rebirth after Katrina *by John Webb, Mississippi State Port Authority*

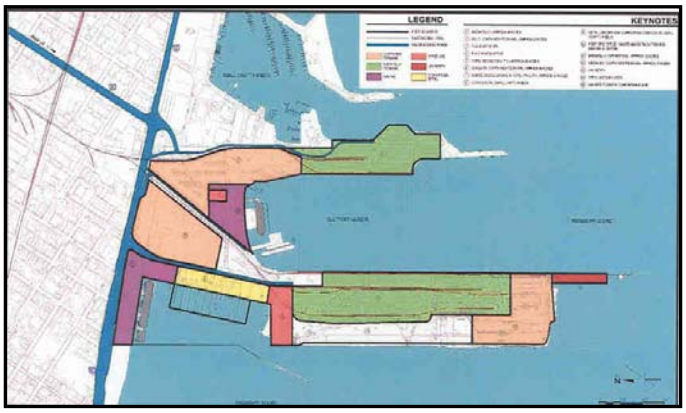
Following Hurricane Katrina, the Port of Gulfport, Mississippi, struggled to rebuild its port facilities and cargo base, while the surrounding local community and state government considered dramatic plans to reuse the Port and surrounding area for urban renewal of the waterfront. Local community interest and state renewal plans were developed to rebuild the Mississippi coastline that was devastated by Hurricane Katrina on August 29, 2005. The state renewal plan conflicted with the existing Port Master Plan and port access plans in ways that limited port operations. The Port balanced competing interests to arrive at a plan that allows its continued growth and success, and simultaneously provides a compromise for urban renewal of the Mississippi waterfront.

Pre-Katrina (August 29, 2005) existing condition

The Port at Gulfport is located approximately mid-point between Louisiana and Alabama, on the U.S. Gulf Coast. The man-made Port consists of two finger piers jutting south into the Mississippi Sound that form a protected inner harbor surrounded by the East and West Piers. Historically, the Port was developed to support economic growth of the State's lumber industry. Over time, the Port transitioned into handling bulk cargoes of lumber, steel, metal products, and powdered ores. Later, the Port also developed terminal facilities for handling containerized cargoes of bananas and other general cargo. In the 1980s and 1990s, U.S. regional frozen chicken exports to Russia and Asia were developed as further enhancements to the break bulk operations. Gulfport had become a thriving niche container and bulk port in the U.S. Gulf, competing with the cities of New Orleans to the west and Mobile to the east.

In 2003, the Port was in the process of transitioning from a multi-user bulk port to a mixed use port with break bulk, dry bulk, container cargo, and potential for cruise passengers. Opportunities became constrained by the Port layout, being

dispersed in random fashion between the two piers and its northern area. The terminal land areas were roughly split equally between container and bulk operations, with gaming occupying a smaller portion of land area. From a revenue perspective, the Port generated over 50 percent of its annual operating revenue from its portion of the gaming revenue. Most of the remaining operating revenue came from container operations. The Mississippi State Port Authority (MSPA) commissioned JWD Group to prepare a new master plan and market forecast in 2002 that was subsequently adopted in 2003.



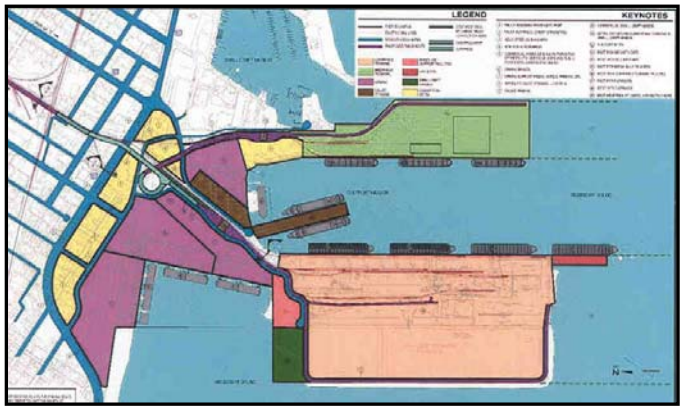
Port of Gulfport pre-Katrina existing condition.

2003 Master Plan (20-Year Vision Plan)

The goals of the 2003 Master Plan were to consolidate activities to maximize terminal efficiencies, minimize traffic conflicts/congestion, accommodate the future growth anticipated in the market forecast over the next 20-year planning horizon, and expand gaming activities without interfering with the Port's mission of handling maritime cargo.

The market study concluded that there was strong potential for cargo growth in addition to the developing cruise market in Gulfport. The Master Plan re-allocated land uses to improve access between the berths and terminal backland area. The study additionally addressed measures to separate the gaming/cruise passenger traffic patterns from the cargo traffic patterns through use of future grade separations and realignment of rail access corridors.

The 20-year Vision Plan expands the footprint of the Port through construction of approximately 60 acres of landfill on the West Pier and 24 acres on the East Pier. The Vision Plan consolidates the container terminal operations on the West Pier, bulk terminal operations on the East Pier, and combines gaming and cruise operations into the northern portion of the Port. A revitalized commercial entertainment area and gaming area is enhanced by relocating Highway 90 inland towards the downtown core to create opportunities to link the downtown core with the revitalized waterfront. The Plan also provides a relocated truck access corridor linking Interstate 10 with the Port by way of a grade separated access over Highway 90 and into the Port facility.



Port of Gulfport 2003 Master Plan (20-Year Vision Plan).

Katrina effects

All structures on the Port property were severely damaged or destroyed beyond repair, the floating casinos were lifted from their moorings and carried as far as north of Highway 90, and cargo was washed away or carried inland. The force of the wind and tidal surge destroyed all of the metal transit sheds and portions of the wharf structures and warehouse floors. Much of this damage was caused as groundwater rose with the tidal surge. At 28 ft of surge, the Port was completely submerged.

Overall, the Port lost roughly half of its warehouse capacity, approximately 430,000 sq ft, including chilled warehouse space and blast freezers used for frozen chicken and banana cargoes on the West Pier. These operations were identified for

closure or relocation in the 2003 Master Plan. The gaming industry lost all of the floating casino barges, and the two existing casino hotels were severely damaged during the storm.

Governor's Planning Charrette 2006

A group of prominent urban planners and architects were invited to the Mississippi coastline by the Governor soon after the hurricane to investigate the region and meet with local elected officials and residents. The objective of this Renewal Forum was to conduct a planning charrette in each of the communities impacted during the storm.

The charrette design team envisioned that the entire Mississippi coastline would be rebuilt to resemble parts of South Florida and Monte Carlo, with high-density Mediterranean-style developments clustered along the coast. The team identified other regions of the country that have been rebuilt to a much higher standard of living and density following major hurricanes. They reasoned that the damaged property provided potential for large-scale land developments. This was also supported by MSPA discussions with resort developers seeking development of high-end condominium housing along the coast.

The charrette team proposed plans that redesigned the East Pier and North Harbor portions of the Port's cargo terminals as high-density housing, hotels, aquariums, and other non-port uses. An elevated "viaduct" was also proposed on the western perimeter of the West Pier for truck and rail access. The charrette team suggested that all cargo be stored off-site immediately after discharge from the vessel. The plan provided for areas where portions of the North Harbor area could be investigated for gaming, waterfront commercial, and various other long-term lease real estate concepts, with the Port continuing to operate as a deepwater seaport.

2006 Gulfport Master Plan

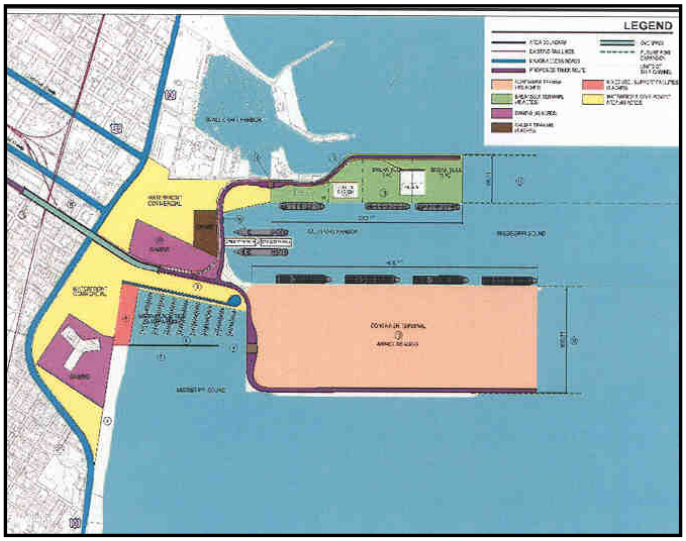
After the hurricane, MSPA asked JWD to re-evaluate the 2003 Master Plan to determine if the damage should change the plan's approach or strategy. With some minor exceptions related to investing in new blast freezer technology and potential relocation of the bulk handling facilities on the West Pier, the original Master Plan was found to be technically sound. The 2003 Master Plan is in the process of being updated to reflect the opportunities created by the storm.

Governor's Renewal Forum Charrette East Pier/North Harbor concept for Port of Gulfport.

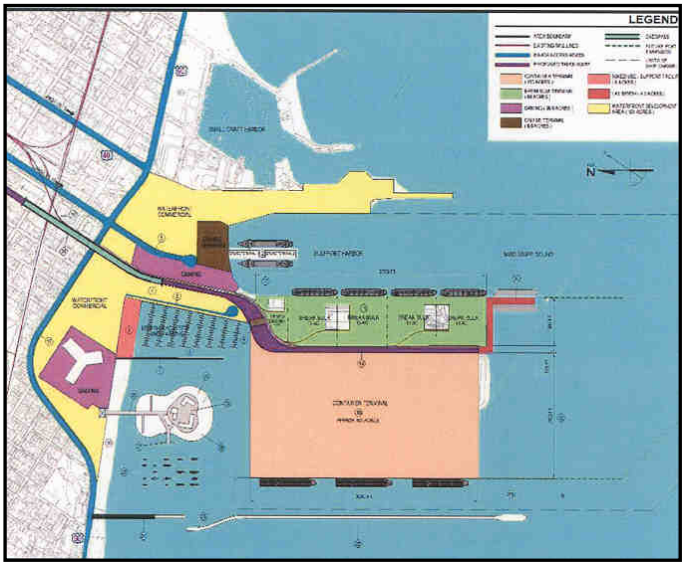
Various port layouts were studied to determine the best way to rebuild the Port to meet the future cargo needs identified by an updated market forecast and sound investment strategy. The updated Master Plan also addressed the compromise developed during the Governor's Charrette planning by considering options to use the North Harbor and possibly portions of the East Pier for commercial real estate and gaming operations.

Using cargo growth rates identified in the 2003 Master Plan, terminal capacity models were created for sizing each of the terminals for future operations. Pre-Katrina operating assumptions were used to calibrate the non-container operations and the container terminal operators had returned to pre-Katrina throughput levels, so the actual operating assumptions were used. This JWD refined two alternatives (Alternative 6, and Alternative 7) that met the Governor's and MSPA's goals to provide balanced terminal operations while expanding waterfront commercial development opportunities along the City's edge. The alternatives explored options of maintaining the East and West Piers for Port operations, and a second option that involved consolidating all of the Port's cargo related

activities onto an expanded West Pier configuration. Under both alternatives, the Port would entertain relinquishing cargo operations on the North Harbor area for commercial waterfront and gaming operation development. The final alternative is still under discussion and significant review. The shown alternatives are preliminary and only representative of the ongoing developmental concepts. Some version, or even combination of the two shown, will likely be approved by the Port Commission in mid-summer 2007.



Alternative 6, East and West Pier configurations.



Alternative 7, West Pier combined configuration.

The success of the rebuilding effort at the Port of Gulfport is rooted in the Board of Harbor Commissioners' and Port staff's commitment to the vision established in the 2003 Master Plan. Upon review, the original Port Master Plan still held merit due to the analysis and studies previously completed. After the hurricane, the logic behind critical decisions still holds true and the tenants at the Port see even better potential for growth.

Acknowledgement

I wish to thank Ronald Everett, JWD a Division of DMJM Harris, Inc., for assisting with this study.

Port of Everett, Washington, Oversized Pier Seismic Design

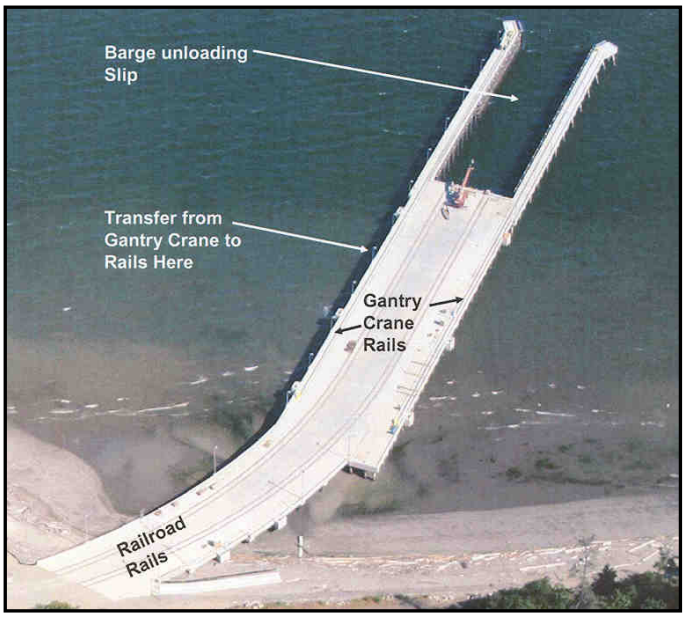
by Michael Wray, PE, SE, BERGER/ABAM Engineers, Inc.

A new pier was constructed for the Port of Everett, Washington, in 2005-2006 as part of a barge-to-rail transfer facility to handle oversized containers up to 35-ft wide, 35-ft tall, and 140-ft long in support of aircraft models 777 and 787 assembly at Boeing's Everett plant. The site, located in an ecologically sensitive area, was selected to minimize transit time from the barge to the plant. The 863-ft-long facility included two 266-ft-long finger piers to support a Rail Mounted Gantry crane (RMG) to lift the containers from barges.

BERGER\ABAM performed the seismic design of the pier. A 2-level, Marine Oil Terminal Engineering and Maintenance Standards (MOTEMS) displacement-based approach was used. Some of the key seismic design issues included discontinuities between the main pier and the finger piers, and a large eccentricity created by significant differences in pile lengths onshore to offshore. This was an interesting analysis, illustrating how the seismic design can be driven by operational requirements.

This site for the rail/barge transfer facility was selected due to its proximity to the plant and existing rail infrastructure. A fast-track schedule dictated that the permitting, design, and construction be accomplished in less than 3 years.

The facility needed to be operational at any time without tidal shutdowns, thus eliminating options, such as a roll-on/roll-off rail/barge berth. Property available to the Port that would meet all of the operational criteria also precluded the use of a marginal wharf, so a pier structure with fingers to accomplish barge unloading was selected.



Port of Everett, Washington, rail/barge transfer facility for very large containers.

Operational requirements

The purpose of the facility is to transfer containers between a barge berthed in the barge slip and rail cars standing on the straight pier. Briefly, the barge is guided into the slip, breasting against fender panels mounted on the fingers. The outboard end of the fingers is flared outward to facilitate berthing. Once the barge is secured in the slip, the rail-mounted gantry crane (RMG) operating on rails supported on the fingers picks up the container and travels to the straight pier where the container is transferred to waiting rail cars that then transport the container to the plant.

Structure design

The structure uses the Pacific Northwest method of pier construction, which consists of precast concrete haunched deck panels supported on cast-in-place concrete pile caps supported on prestressed concrete or pipe piles. Geotechnically, the upper loose layers of soil at the site were susceptible to liquefaction in an earthquake. It was determined the piles should be driven to refusal in the lower denser layer where they would develop sufficient capacity to resist the proposed gravity loads even after liquefaction of the upper layers.

The structure consists of three parts. Starting from land, the first section is a 210-ft-long curved approach trestle consisting of 10 bents spaced at 25 ft on the inside of the curve and 30 ft on the outside. The bents are supported on 18-in.-diam steel pipe piles spaced at approximately 10 ft on center.

Pacific Northwest method of pier construction.

The second section of the structure is the straight pier consisting of 16 bents spaced at 25 ft supported on solid prestressed concrete octagonal piles spaced between 7 and 12 ft on center.

The third section of the structure, required to support the gantry crane for barge unloading, is a pair of 12-ft-wide crane ways, called fingers, one along each outside edge of the main pier which, together, create the barge berth. Each of the fingers has 11 2-pile bents spaced at 25 ft.

Initial pier seismic analysis

Preliminary analyses determined the most economical structure system layout for gravity loads. Details included: (a) 12-in.-thick concrete slab acting compositely with 24-in. prestressed concrete deck panels, (b) cast-in-place concrete pile

bents spaced at 25 ft on center, (c) trestle and straight pier supported on 18-in. octagonal concrete plumb piles approximately 12 ft on center, (d) fingers supported on battered 18-in. octagonal concrete piles to resist wave and mooring loads, and to provide a laterally stiff structure for the RMG, and (e) no joints were provided in the structure.

The MOTEMS two-level displacement-based seismic analysis indicated the following issues with the initial layout.

- In the longitudinal direction, the structure was very stiff, resulting in a short period and placing it near the peak of the response spectra with a resulting Level 2 (10 percent chance of exceedence in 50 years; 475-year return period) acceleration of a 0.55 g which exceeded the capacity of the 18-in. concrete piles.
- In the transverse direction, a large eccentricity was created by variation in pile stiffness onshore to offshore, with the demand on the very stiff onshore piles greatly exceeding their capacity both in moment and shear.
- The stiff batter piles under the fingers were overwhelmed by the reaction forces imposed by the displacement demand of the large mass of the plumb-pile supported straight pier.

Final pier seismic design

The first two issues were solved as follows. The concrete piles under the trestle were changed to 18-in. pipe piles and pinned at the pile to cap connections. The key features of this connection are a spiral reinforced concrete core, and foam isolation on the outer edge and sides of the pile to facilitate the required rotation. Similar pinned connections were also used for the concrete piles under the landside end of the straight pier.

The pinned connections not only reduced the stiffness of the landside bents but also of the entire structure. This resulted in a structure with a longer period and reduced overall seismic demand. However, the reaction forces on piles under the fingers were still too much in the Level 2 earthquake, so another solution was required at the interface between the fingers and the main pier.

The conflicting requirements of service versus seismic loading presented an interesting challenge. After several iterations, a solution was developed to solve this problem of incompatible stiffness between the fingers and straight pier by incrementally increasing the stiffness of the batter piles moving offshore from the straight pier. The final pile layout that was adopted is described as:

- 2-pile bents with plumb piles were used to support the crane way (fingers) between Bents 27 and 31.
- 2-pile bents with one plumb pile and one pile battered at 2-H:12-V were used at Bents 32 and 33.
- 2-pile bents with one plumb pile and one pile battered at 3-H:12-V were used from Bents 34 to 3.

The work points of the piles would not intersect in the pile caps at Bents 32 to 37 because of geometric constraints. Therefore, the axial load in the piles, and the lateral capacity of the battered bents, would be limited by the moment capacity of the pile-to-cap connections. This apparent weakness was turned into an advantage by selecting piles and a connection that would be strong enough to provide batter action at service loads, yet have the capability to yield and act as more flexible moment frames under the Level 2 earthquake, if required.

Batter pile bents under construction showing incremental increase in batter moving offshore.

This innovative approach provided adequate lateral support for the crane ways under service loads, yet allowed the more flexible main pier to move during a seismic event without overloading the fingers. The relatively narrow (12-ft-wide) crane ways are, therefore, able to flex in the Level 2 earthquake sufficiently so as to not require a hinge or seismic joint at the intersections with the main pier. The resulting transverse displacements obtained from the multi-modal seismic spectral analysis indicated that all of the displacements were acceptable.

The need for a seismic joint at the interface between the fingers and the straight pier was eliminated by incrementally increasing the batter, and therefore, stiffness of the crane-way bents allowing the fingers to transition from the flexible plumb-pile supported straight pier to the stiffer battered bents, thereby maintaining the integrity of the structure and satisfying all operational requirements of the RMG.

Acknowledgement

I wish to thank Robert Harn and John Jacob, both of BERGER/ABAM for assisting with this work.

Mike Wray holds a bachelor's in civil engineering from California State Polytechnic University, and has over 21 years of experience in project management and structural engineering of waterfront structures. Mike, who is a registered structural engineer, is also a certified diver and member of the BERGER/ABAM underwater inspection team.

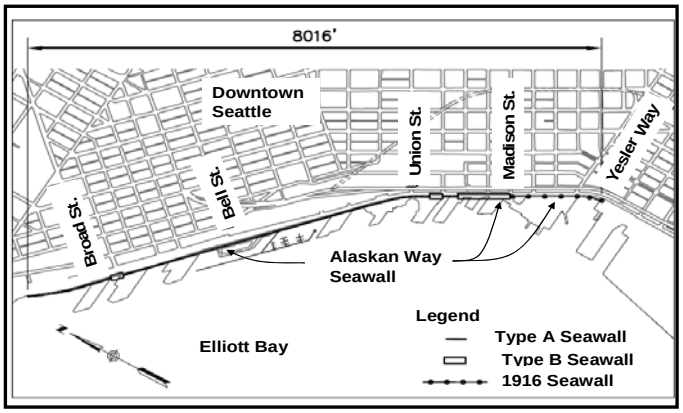
Replacement Concept for the Alaskan Way Seawall, Seattle, Washington

by Robert Harn, PE, SE, BERGER/ABAM Engineers, Inc.

The Alaskan Way Seawall is a unique structure located in Puget Sound, Washington. As the interface between the dense development of downtown Seattle and the marine waters of Elliott Bay, its purpose is to provide wave and erosion protection as well as to retain fill for upland developments, transportation, and utility corridors. While the seawall has served the city well over the past 70 years, its main structural support system, a timber relieving platform, has become vulnerable to marine borers. In addition, the design and location of the seawall make it vulnerable to liquefaction-induced failure in a strong earthquake. The loss of the seawall would threaten not only the transportation facilities, the waterfront street, and the Alaskan Way Viaduct (part of the National Highway System, and one of the two main north-south highway routes through Seattle), but also a regional utility corridor. Because of the importance of the structure and its vulnerabilities, many seawall replacement concepts were studied before arriving at the current concept that combines soil improvement with a new concrete face panel system.

Existing seawall

The City of Seattle designed and constructed the majority of the Alaskan Way Seawall with a relieving platform-based bulkhead system in 1934 that consists of two types of seawall. The Type A wall, which features a 40-ft-wide relieving platform and a buried sheet pile wall, makes up the greatest length of existing seawall and is primarily along the northern end of the waterfront. The Type B wall, which features a 60-ft-wide relieving platform and an exposed sheet pile wall, is located just below the central business district and supports the greatest depth of fill. This wall also provides lateral support to the adjacent Alaskan Way Viaduct foundations.

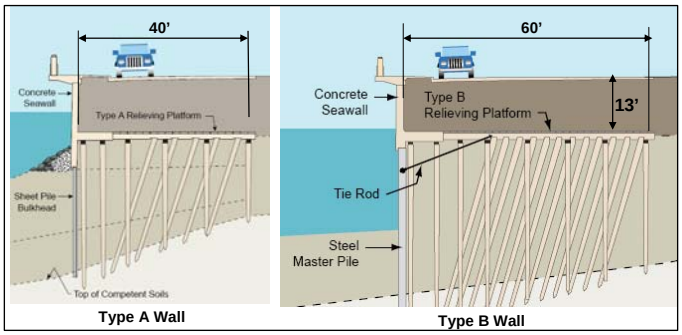


Plan view of Alaskan Way Seawall, Seattle, Washington.

Because of earthquake vulnerability and the fact that both the viaduct and seawall are reaching the end of their useful lives, the Washington State Department of Transportation, City of Seattle, and Federal Highway Administration are proposing to replace the Alaskan Way Viaduct and the seawall. The prime engineering consultant for the project is PB (formerly Parsons, Brinckerhoff, Quade, and Douglas). BERGER/ABAM Engineers, Inc. is the consultant for the seawall replacement, and Shannon & Wilson, Inc. is the geotechnical consultant.

Screening study

A screening study considered many seawall replacement concepts, taking into account not only the performance of the completed structure but also the impact of the construction of such a large project on the environment, adjacent transportation facilities (including Alaskan Way Viaduct, Port of Seattle, and Washington State Ferries), buried utilities, and other stakeholders (including tourism-dependant businesses and adjacent property owners).



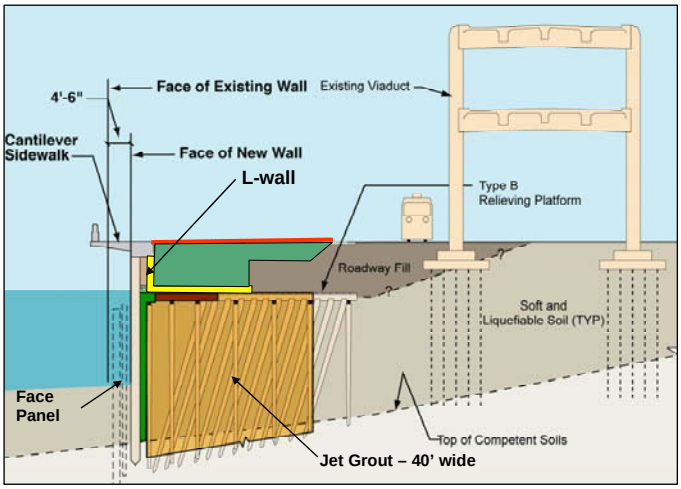
Seawall types.

The focus of the screening study was the Type B seawall because: (a) this wall is the highest and retains the deepest fill, which varies from 55 to 70 ft deep as opposed to 40 to 50 ft deep for the Type A wall; (b) this wall is the most difficult to replace because of the presence of tie rods and the high-exposed sheet pile bulkhead; (c) replacement of this wall appeared to have the greatest potential environmental impacts and the greatest impact on the Alaskan Way Viaduct; and (d) it was believed that any solution developed for the Type B wall could be readily adapted to the Type A wall. Of the concepts considered, two were selected to be carried forward in the project draft environmental impact statement phase: (a) the Frame Concept, and (b) the Soil Improvement Concept.

Type B wall concept development

The focus of the concept development to date has been on the Soil Improvement Concept, as the Frame Concept was initially estimated to be more expensive than the Soil Improvement Concept for the Type B wall. The goal of the Soil Improvement Concept is simple: to create a zone of nonliquefiable soils behind and supporting the seawall that acts as a gravity dam to lateral spreading of the soils farther inland. The challenge is how to achieve this goal as economically as

possible without compromising the stability of the existing seawall, with minimal impacts on the marine environment in a vital transportation and utility corridor that is also one of the main tourist attractions in one of the most beautiful cities in North America.



2004 concept, Type B wall.

Early in the development of the Soil Improvement Concept, it became apparent that the solution would be driven by a complex and often competing combination of structural, geotechnical, and environmental factors. A method had to be found to replace the face panels, replace the sheet pile wall, and stabilize the soil below the timber relieving platform through or around the mass of timber piles without compromising the stability of the wall. Another issue is the potential for the soil improvement medium (e.g., high pH Portland cement) to leak through the existing wall and into Puget Sound, causing environmental damage.

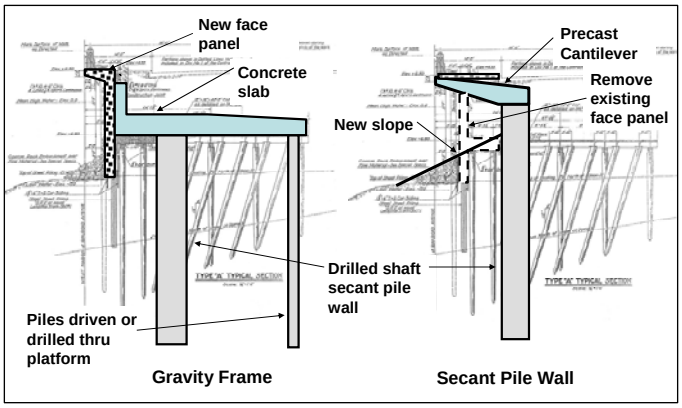
The first version of the soil improvement concept used a facing system consisting of drilled shafts with face panels, and a cantilever slab. Several methods of soil improvement were considered: stone columns, compaction grouting, deep soil mixing, and jet grouting. Jet grouting was selected as the best method to accomplish the improvements considering all the potential installation problems, such as random obstructions, buried utilities, and the potential for "shadowing" around the maze of timber piles.

A dynamic soil-structure interaction analysis was performed to evaluate the performance of varying widths, coverage, and quality of the jet grout. The jet grout zone appeared to be vulnerable to overturning and had a maximum displacement of 33 in. The moments in the drilled shafts were very high for all jet grout widths as the drilled shafts tended to rotate at the interface of the jet grout and the very dense glacial soils, producing large deflections at the top of the wall.

Because the drilled shafts appeared to offer no benefits commensurate with their cost, the concept was revised in 2004 and uses driven concrete face panels to support a cantilever slab. The back span of the cantilever slab is held down by a continuous L-shaped precast concrete element called the L-Wall, which has a sufficient length of horizontal leg to provide stability for resisting uplift loads due to loads on the cantilever slab. After removal of the existing face panels and sheet pile, the driven concrete face panels become the new face of the seawall. Analysis indicates this concept has a maximum vertical displacement of about 13 in. at the top of the wall in the 2,500-year earthquake for a 40-ft-wide jet grout zone. Cost estimates indicate the 2004 concept was approximately 12 percent less expensive than the initial concept. This concept was also applied to the Type A wall with similar improvements in performance and cost savings.

Type A wall concept development

A study is currently underway to further advance the seawall design focusing on the Type A wall. Preliminary findings indicate variations of the frame concept dropped from consideration for the Type B wall may be economically viable for the Type A wall due to the shallower depth of liquefiable soil. Two variations of the frame concept are currently being studied, the Gravity Frame and the Secant Pile Wall. The goal of the concept study is to select a preferred option for construction of a seawall test section in advance of full replacement project.



Proposed Type A concepts.

Acknowledgement

I wish to thank John Arnesen, Seattle Department of Transportation; Ralph Petereit, PB (formerly Parsons, Brinckerhoff, Quade, and Douglas); and Bill Perkins, Shannon and Wilson, Inc.; for their assistance in conducting these studies.

Robert Harn is a project manager with BERGER/ABAM Engineers, Inc. He is a graduate of Montana State University, and has 30 years of experience with a focus on marine structures. Mr. Harn can be contacted at bob.harn@abam.com.

Upcoming Related Conferences

2007

- ***18th World Dredging Congress (WODCON XVIII), Western Dredging Association Annual Meeting, and Texas A&M University 39th Annual Dredging Seminar.*** May 27 - June 3, 2007, Lake Buena Vista, Florida.
- ***World Canals Conference 2007.*** June 13-15, Liverpool, England.
- ***AAPA Public Relations Seminar.*** June 13-15, Cape Canaveral, Florida.
- ***National Waterways Foundation Meeting.*** June 18-19, Nashville, Tennessee.
- ***Coastal Structures 2007.*** July 2-4, Venice, Italy.
- ***Transportation Research Board Summer Conference.*** July 7-9, Chicago, Illinois.
- ***Coasts and Ports 2007.*** July 17-20, Melborne, Australia.
- ***Port Development and Coastal Environment (PDCE' 2000), Fourth International Conference.*** September 25-28, Varna, Bulgaria.
- ***Smart Rivers 2007.*** September 16-19, Louisville, Kentucky.
- ***AAPA Annual Convention.*** September 30 - October 4, 2007, Norfolk, Virginia.
- ***Waterways Council Annual Meeting and Symposium.*** October 1-3, Houston, Texas.
- ***National Waterways Conference Annual Meeting.*** November 7-9, Mobile, Alabama.

PIANC USA to Increase Dues

2007 Dues

As decided at the last Annual General Assembly in May 2006, PIANC International will raise membership dues in 2007. Since we have to pay our dues to PIANC International in Euros, the conversion from U.S. dollars adds an additional cost on top of the new rates for PIANC membership. As a result, the U.S. Commission voted to increase dues for PIANC USA members effective January 1, 2007. The new PIANC USA membership fees are as follows:

- Individual member: $120
- Student member: $40
- Small corporate member: $600
- Large corporate member: $1,150

Adjusting the PIANC USA dues enables us to continue to meet our international commitment as well as to expand and re-energize our current programs and fund new initiatives. At PIANC USA, we are dedicated to being good stewards of our resources and we stretch every penny to make sure that your investment in our organization is being put to the best use. We thank you for your

continued membership and support, and we look forward to working with you in 2007.

PIANC USA Member Benefits

As a reminder, your PIANC USA membership entitles you to receive many outstanding benefits. We hope you are taking advantage of all of the following:

- **Quarterly Technical Magazine,** *On Course,* with technical articles and news from the navigation community.
- **Technical Reports** in the field of inland maritime and recreational navigation, including environmental issues.
- Quarterly electronic **PIANC USA Newsletter**, *Bulletin*, with news and articles related to navigation and PIANC news in the United States.
- PIANC **International Electronic Newsletter,** *Sailing Ahead*, with international news updates for the navigation community.
- Complimentary or reduced registrations to **Conferences** such as the PIANC Annual General Assembly and World Congress, PIANC USA Annual Meeting, Ports Conference, SMART RIVERS, PIANC USA-COPEDEC Conference on Coastal and Port Engineering in countries in transition, etc.
- PIANC **Membership Directory**, an international network of like-minded professionals.
- Opportunity to develop "cutting edge" advancements in your profession by serving on **Technical International Working Groups**.
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About PIANC

What is PIANC? The International Navigation Association (PIANC) is a worldwide organization of individuals, corporations, and national governments. Founded in 1885 in Brussels, Belgium, it is concerned with maritime ports and inland waterways. The Association promotes contact and advances and disseminates information of a technical, economic, and environmental nature between people worldwide in order to efficiently manage, develop, sustain, and enhance inland, coastal and ocean waterways, ports and harbors, and their infrastructure, in a changing environment.

Where is PIANC? The international headquarters is located in Brussels, Belgium, at facilities provided by the Belgian Government. The headquarters of the United States Section is located in the Washington, DC area, within facilities provided by the U.S. Army Corps of Engineers.

International Interaction. The Annual General Assembly operates through a Council, which directs the working level permanent technical committees, international study commissions, and working groups.

Working Groups. Technical working groups are composed of participants from member countries who have interest in various subjects being studied. The groups gather, analyze, and consolidate state-of-the-art material from each country. The resulting reports are published and sent to each PIANC member. Working group reports and the International Bulletin are sent to each member from Brussels.

Every 4 years an International Congress, open to all members and other registrants, is held for the presentation and discussion of papers on subjects pertaining to waterways and maritime navigation.

PIANC also participates in technical activities with other organizations to study navigation problems and joins with them to present symposia on related subjects.

In the USA. The United States became a member of PIANC by Act of Congress in 1902. The Chairman of PIANC USA is the Assistant Secretary of the Army (Civil Works). The Director of Civil Works for the U.S. Army Corps of Engineers serves as President. A National Commission of 11 individuals, which represent both private industry and the Federal Government, manages PIANC USA. PIANC USA has two standing and four technical committees, which promote the flow of information between members and facilitate cooperation with other national organizations. The committees are Membership, Publications, Environment, Inland Navigation, Maritime Navigation, and Ports and Recreation Navigation.

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A publication of the Secretariat
PIANC USA
7701 Telegraph Road
Alexandria, VA 2315-3868

Bruce Lambert
Secretary
bruce.lambert@usace.army.mil

Edmond J. Russo, Jr., P.E.
Chairman, Publications Committee, and
Editor, PIANC USA Bulletin
edmond.j.russo@erdc.usace.army.mil