

October 20, 2007

MEMORANDUM FOR RECORD

SUBJECT: Regional Navigation Design Team (RNDT) Meeting in Louisville, Kentucky, September 17-19, 2007

The Regional Navigation Design Team met September 17-19 in conjunction with the Smart Rivers Conference. The conference, organized by PIANC USA, allowed us a unique opportunity to meet with the high level Corps personnel, the navigation industry and international colleagues. The SMART RIVERS 2007 general information link is: http://www.pianc.iwr.usace.army.mil/smart_rivers2007.htm. We basically had our own separate meeting but joined the Smart Rivers Conference for several activities including the keynote address of the conference by MG Don T. Riley. The RNDT was formed in 1994 by the Great Lakes and Ohio River Division but has since expanded to include several districts and divisions. The group was formed to incorporate innovative design and construction technologies into navigation structures.



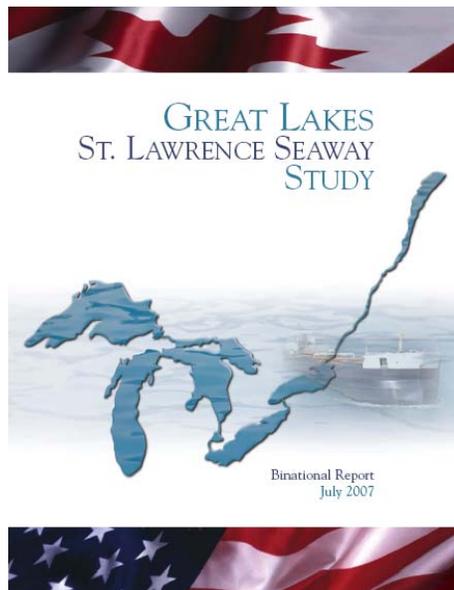
MG Don T. Riley addressing the RNDT



McAlpine Lock



Falkirk Wheel



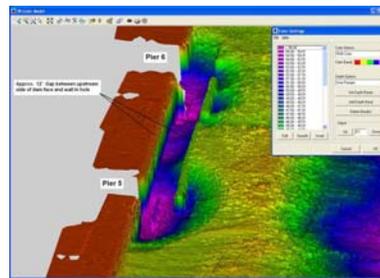
Binational Report
July 2007

The following personnel attended (* partial attendance):

Shiv Batra	PIANC (INCA Associates)
Mark Carr*	AEP River Operations
Anjana Chudgar	CECW-EW
Bill Chapman*	CELRD-PDS-O
Ron Coles*	Hanson Professional Services
John Clarkson	CELRH-EC-DS
James Clausner*	CEERD-HVT
Mark Cornish*	CEMVR-PM-A
David Dale*	CELRD-RB
Larry Dalton	CELRL
Dave Gordon	CESPK-CO-RV
John Hite	CEERDC-HN-NL
Mark Hammond*	CELRH-NC
Kent Hokens	CEMVP-EC-D
Fred Joers	CEMVR-EC-DS
Chad Linna	CELRD-PDS-O
Larry Lang*	CECW-LRD
Kevin Logan	CELRP-BR-P
Dan Mecklenborg_*	Ingram Barge
Coy Miller*	CELRH-PM
Capt Nordai *	CECW-ZA
Josh Nickel*	CELRL-ED-D-S
Allen Perry	CEMVD-RB-T
Angela Premo*	CESAD-PDS
Tom Quigley	CEMVS-EC-D
Lyn Richardson	CELRD-RBT
MG Don T. Riley*	HQ USACE
Rick Schipp	CELRL-CD-O
Harry Simpson	CELRD-RBT
Kenn Shoemaker*	CEMVR-OD
Jeffrey Stamper	CEMVS-EC-DA
Stephen Stoltz	CELRP-TS-DS
Anne Sudar*	CEIWR-GW
Tom Sully	CEMVP-PM-B
Michael Tarpey	CEMVR-EC-DM
Mike Thompson	CEMVS-OD-N
Matt Thurman	CEMVS-OD-NP
James Walker*	CECW-CO HQ USACE
Wesley Walker*	CELRH-NC
David Weekly*	CELRH-NC
Ian White *	British Waterways, PIANC
Michael White*	CELRD-PD
Robert Willis	CELRD-OR
Dave Wright	CELRE-PM

1. [New Challenges for RNDT](#) - *John Clarkson* welcomed everyone and discussed the new challenges for RNDT. He identified several challenges such as aging infrastructure, Asset Management, dwindling Trust Fund, stretched-out funding with multiply contracts, external Peer Review and trend of containers on the Inland System.
2. [Headquarters Update/Guidance Program](#) - *Anjana Chudgar* gave an overview of HQ Activities for Engineering. She discussed the USACE Actions for Change (Comprehensive Systems Approach, Risk Informed Decision Making, and Professional and Technical Expertise). She went over the FY07 GUMP Program. The average age of guidance publications has been increasing but goal is update guidance more often in support of the USACE Actions for Change. She encouraged the use of TEN (Technical Excellence Network) at <https://ten.usace.army.mil> as a tool for our CoP.

3. [ERDC Update](#) – *Dr. John Hite* summarized R&D efforts in the Navigation Systems Research Program (Nav Sys) focusing on the Inland Navigation aspects. The focus areas for Inland Navigation are Hydrodynamics and Infrastructure. Some of the Research efforts being conducted are: Vessel/Barge Impact, Deformable Wall Systems, Scour Detection using Multi Beam Sonar, Real Time Current Velocity System, Nondestructive Condition Monitoring for Tensioned Steel Members, Condition Assessment and Monitoring of Concrete Structures, and Robotic Inspection of Corps Structures. He also talked about Navigation Accidents as a results of out-draft conditions and other navigation safety initiatives. *Jeff Stamper* and *John Clarkson* are on NRAG (Navigation Research Area Review Group) team to help prioritize R&D efforts.



4. [NESP – Fish Passage](#) – *Mark Cornish* presented aspects of “Planning and Design of a Fish-way on the Upper Mississippi River.” Two projects are being planned for Melvin Price Locks and Dam and at Lock and Dam 22. The goals for project is to increase the opportunity for fish passage through the dam, thereby increasing access to upstream habitats which should result in an increase in the size and distribution of native migratory fish populations. The team will monitor, evaluate, learn, and adapt future fish passage projects using lessons learned from these initial projects. The existing opportunity for fish passage now is only during open river conditions. The team needs to come up with design parameters for desirable head differential, velocity, depth, flow, location, operational and maintenance impacts, flood impact and costs for the fish passage. Non-Structural alternatives include: increase open river conditions and assisted fish lockage. Structural alternatives include: rock ramps, nature like by pass channel on Illinois side, technical fish-ways,



modified gate bay, and notches through overflow spillway with and without rock ramp and dam removal. Mark Cornish has put together a proposal to form a working group that has been tentatively accepted by PIANC to document state-of-the-art fish passage guidelines.

5. [Miter Gate Acquisition and Bull Nose Teams](#) - *Robert Willis* went over the Miter Gate Acquisition Team which will have the authority to review and include as appropriate/applicable plans for all miter gate acquisitions in LRD to insure all the previous improvements to gates have been included in the solicitation. He is also forming a bull nose team as part of the DCW's initiative on Navigation Safety, which will study past accidents and come up with possible solutions. This team will work in conjunction with R&D efforts at WES for innovative solutions. So far the team includes *Larry Dalton, Robert Patev, John Clarkson* and perhaps someone from MVD.
6. [British Waterways - Falkirk Wheel](#) – *Ian White*, formerly of the British Waterways, who is now the InCom Chair for PIANC gave a very interesting presentation on the Falkirk Wheel, which is a major component of the Millennium Link. The Wheel connects the Forth and Clyde Canal with the Union Canal. He gave a brief history of the canals. Ian then presented the evolution of the Falkirk Wheel, including some of the first sketches. Some of the challenges of the project were dealing with the World Heritage Site of the Antonine's Wall and a high speed commuters' rail line. He showed some of the details of the Wheel's construction. The project has been an outstanding success for the region.



7. [Olmstead In-the-Wet Construction](#) - *Rick Schipp* gave an update on the In-the-Wet construction progress for this challenging project. The project is a cost reimbursable contract. The Government works with the contractor as a partner and has to approve all purchases. The original scope had the Government only to provide conceptual design on means and methods. The contract gave the Contractor considerable latitude to propose changes. The Government if requested would provide the design engineer to finish conceptual designs (means and methods) or redesign features of work if contractor had a better idea. Rick showed some of the specialized construction equipment needed including: a marine skidway to move the concrete shells from the casting area to the river, super gantry crane, catamaran barge, excavator barge, and heavy lift ringer crane barge. They used DredgePack software for river excavation to aid in the accurate under water placement. He also presented a paper on “Contractor Risk Assessment and Consideration during Bidding”, enclosed.

8. [Overview of Great Lakes St. Lawrence Seaway Study](#) - *David Wright* is the co-lead with *Marc Fortin* of Transport Canada preparing a bi-national report on the infrastructure needs of the Great Lakes St. Lawrence Seaway system. The study will assess the economic, environmental and engineering implications of those needs as they pertain to commercial navigation. The traffic forecast is for slow but steady growth through 2050. The study will also do a Criticality Assessment of the lock system corridors for key components using reliability analysis method. The Final Study Report is due in the fall of 2007. This consolidated report will include recommendations and an agenda for policy and development.

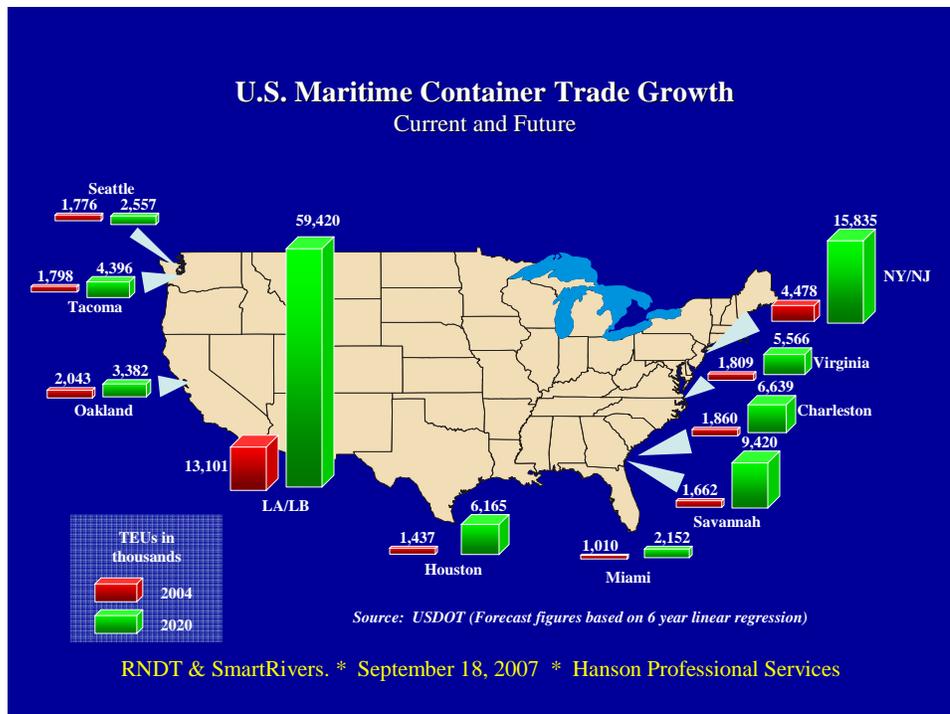
9. [Lockport Pool Approach Dike](#) - *Michael Tarpey* presented the history of seepage and remediation issues for the Lockport Pool of the Chicago Sanitary and Ship Canal (CSSC) on the Illinois Waterway (A Landmark Civil Engineering Project when built). The project has a “Perched” pool



that is some 40’ above the surrounding area. The problems date from the poor construction methods of 1905 and an early pool raise that placed canal levels above the top of the core wall of the dike. The approach dike is ~4,300 feet on the right-descending bank and has chronic seepage occurring with sink holes. The proposed solution is to use Hydromill cutter head to install a cutoff wall. The project also has nearly 400 monoliths of canal wall that has structural stability concerns due to its age, construction materials and techniques, and barge impacts, etc. The current acquisition plan is to use base contract with 4 options. It was suggested to pursue a Continuing Funds clause which has been approved on a case by case basis.

10. [Emerging Opportunities for Our Inland Waterways](#) – *Ron Coles* discussed Inland Waterway Opportunities with a Global Perspective. Projections show that international trade to double, container traffic to triple and the Latin American trade through Gulf of Mexico could more than triple by 2020. The proposed Panama Canal Expansion will improve shipping opportunities between Far East and the Gulf. The ports of Mobile and New Orleans are rapidly expanding container capabilities. The trend is to change in what moves by inland river barge from heavy, bulky and oversized cargo to higher value goods. The Alabama Freight Mobility Study (AFMS) discusses action plan for integrating the inland waterways into freight transportation network. To obtain a copy of the AFMS Phase 1 Report go to www.hanson-inc.com and click on “project reports”.





Slide-7 Emerging Opportunities of Our Inland Waterways, Container Trade Growth Current and Future.

11. Industries Perspective on Navigation Issues – Messrs. *Dan Mecklenborg* from Ingram Barge Company and *Mark Carr* from MEMCO Barge of AEP presented a brief summary of industry concerns on the Inland Waterways. These concerns are:

Dan Mecklenborg – Ingram Barge

- Guidewalls need to be longer on some projects to help with 1st cut during locking operations.
- Consider provisions to help flush ice and debris from upper lock approaches for some Corps projects (*Scott Noble* from Ingram has some insight in this area).
- Need to replace missing pins at some projects (Kentucky Lock was identified as one).
- The Real Time Current Velocity System is preferred at more projects.
- The laser distance measurement system on the end of the lock approach walls should be investigated further to determine its potential.
- Collaboration with the Nature Conservancy should be done to learn more about how environmental benefits can be included in project improvements.

Mark Carr – MEMCO

- Also expressed concern about missing pins and condition of project stop logs.
- Concerned that 3 ft. accuracy with the laser distance measurement system may not be good enough, need accuracy as small as inches.
- Transmission of electronic data is good idea and should help with operational problems and faster reporting (Both Ingram and MEMCO will have AIS capabilities).
- Would like to have 1,200 ft chambers at Emsworth, Dashiields, and Montgomery.
- Would like advance notice of next RNDT meeting so industry can participate.

12. [Emergency Gate Removal](#) – *Joshua Nickel* presented the collective efforts of LRH and LRL to design a division wide procedure for removing the emergency gates for maintenance. Since the emergency gates are normally submerged, rehabilitation work on these gates in place would require shutting down of the lock chamber. An inventory of the various gates sizes presented a challenge to design a conventional lifting beam to work on all LRD emergency gates. After a cost comparison the team came up a lifting beam that had the center of gravity below the lift. To overcome concerns of instability the team came up with beams and rigging to create a cradle for



the gate. Once built, the next challenge was how to test a lifting beam designed to lift a total load of 600,000 pounds with a safety factor of 1.25. With some modifications to the pier houses to allow for the gates to be removed the lift was ready to begin. Using the heavy crane barge, the M/V Shreve raised the lifting beam into place. The lift was successfully and the gate was set on the esplanade for inspection and repair.

13. [Updates on NESP](#) – *Jeff Stamper* gave a refresher on NESP, which is a navigation and ecosystem program seeking programmatic authority for dual-purpose operation and use of the Upper Mississippi River and Illinois Waterway System. Authorization language is contained in the current WRDA bill. Funding for PED-type activities has been approved by the congress in 2005-2007 and is anticipated in 2008. The Program is over \$3.6B for all projects. Navigation Projects leading the way are Locks 22 and 25. They could use significant funding to advance their in-the-wet construction techniques. Also competing for funds are moorings, switch-boats, traffic management concepts, LaGrange Lock, Systemic Environmental Mitigation, and continuing economic studies not to mention and entire Ecosystem Restoration component.

14. [Updates on EDM](#) – *Kevin Logan* from Pittsburgh District briefed us that age and deteriorating conditions of the Emsworth, Dashields, and Montgomery projects are driving the studies for improvement. With an age of 71 to 85 years, the condition of the concrete and stability are concerns in meeting the mission of keeping the river open. Delays are common with small chamber sizes of: auxiliary – 56x360, main -110x600. An improvement for EDM was the top priority coming out of the Ohio River Main Stem Study (ORMSS). The “2 for 3” plan is out of the study with the current plan is for major improvements at all 3 projects.



15. Inland Waterways for the 21st Century; Developing a Common Vision for Uncommon Success – *Major General Riley*, Director of Civil Works, US Army Corps of Engineers briefed the Smart Rivers Conference. He noted the passing of Worth Hager and paid tribute to her accomplishments. He said projections are for the navigation industry to double or increase by a third over the next 20 years. He said the Corps has 842 bridges and noted importance of inspection/maintenance after the I-35 bridge accident in St. Paul. He is working to get more O&M money due to the aging infrastructure needs. He discussed the USACE Actions for Change as the lessons learned from Katrina and how they will shape the Corps. He said the Corps needs to get more involved with PIANC, especially the working groups, where much good work is accomplished. One working group being considered will focus on repair to aging infrastructure. This is a critical area for future of the Inland Marine Transportation System in the US. He also said the UK is hosting the 125th anniversary of PIANC in the year 2010.



16. Role of PIANC in the Corps - *Major General Riley*, Director of Civil Works, US Army Corps of Engineers briefed the RNDT on current Corps issues, risk informed decision making, external reviews, actions for change, funding for guidance updates,



MG Don T. Riley addressing the RNDT

work driven by budget and economy, need to set national standards, Corps work for others (DOE, DOT, VA and DHS), and need to have right people in right positions. There is a lot of work coming your way. He also said the RNDT should become involved with PIANC, important to get engaged nationally and internationally. Need to figure out how to support the Working Groups.

17. USACE Approach to Information Technology – *Jim Walker* discussed the many initiatives supporting Inland Navigation that include collaborative efforts of multiple federal agencies: CRIS (Coastal River and Inland Services), Inland Electronic Navigation Charts (IENC), Automatic Identification System (AIS) which is real time



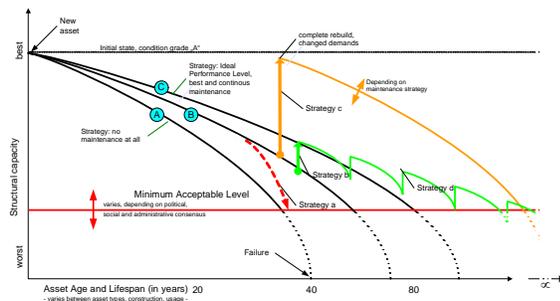
operational data to the vessel, and Asset Management. He also stressed General Riley's Navigation Safety Initiatives to reduce the frequency and damage of barge accidents. Other safety initiatives are Real Time Current Velocity System, Lock Distance Measurement System, and energy absorbing systems at the navigation lock approach. He is working with OMB on performance measures. Reliability is

more important than ever. He also discussed how we fit in to the CMTS (Committee on the Marine Transportation System). He also stressed we need to improve interchangeability of lock components.

18. Navigation Update – *David Dale*, the Regional Business Director from LRD spoke to the group concerning “work load to work force projections” that Corps leaders are formulating. What does the “lay of the land” look like in 5 years? He is involved in several Corps committees and stressed the need to keep the Corps leadership informed on issues and needs. One task for Corps leaders is to determine if the Corps is losing technical competency or just losing personnel. We are losing what we have. Are we losing what we need? He is also on a National Management Board with other SES (Senior Executive Service) members and we need to get engaged with them as they make far reaching decisions. There is also a Navigation HPO (High Performing Organization) scope of work, look at it and share your thoughts. The HPO will decide how you buy engineering services.

19. Capturing Lessons Learned - Innovative Design and Construction for Navigation Projects – *Lyn Richardson* showed the importance of Capturing Lessons Learned to assist in future innovative design. He wants to make sure we document Lesson Learned and “Best Practices” for design and construction of Braddock, Olmsted, McAlpine, Marmet and Kentucky. The approach is to document Lessons Learned (LL) via a contract to interview District Staff involved in these projects. *Andy Harkness* of the Pittsburgh District has the lead on this effort. The RNDT members will review and provide input to the LLs for documentation. Then key LLs will be incorporated into future EMs, ECs, ETL, TEN or other technical documentation as appropriate. The current plan is to update EM 1110-2-2611, Engineering for Prefab Construction of Navigation Projects and EM 1110-2-2106, Design of Precast and Prestressed Concrete for Hydraulic Structures. This process was well received by the RNDT and plans to focus the next meeting on this topic.

20. Asset Management – *Bill Chapman* from LRD provided valuable asset management information to the group. His presentation showed how asset management needs to work and talked about tools and processes that will be used in the future. They have completed the Navigation Dam Assessments in LRD and are working with automated condition reporting and automated assessment processes and risk categories. The Decision Process for Prioritization is to sort by greatest need, sort by greatest risk, then prioritize by Economic Impact (\$) and temper with other priorities. This process review will allow for sound system reliability and investment decisions.



21. McAlpine Update – *Larry Dalton* presented a slide show in preparation for the Technical Tour of McAlpine Locks, Jeffboat Shipyard and the Falls of the Ohio with Smart Rivers on Wednesday, 19 September. He showed an update and some of the project features, including Roller Compacted Concrete (RCC) lock walls. He also showed the scheduled completion dates for the McAlpine Lock Replacement Project.



22. Open Discussion, Wrap up and Future Meetings – Discussed the possibility of holding another workshop at ERDC Vicksburg, MS similar to the “Current Trends in the Engineering Design and Evaluation of Navigation Locks” held in 2001. The purpose would be to have more people involved and have time to conduct detailed discussions on pertinent topics.

There was a lot interest in pursuing the Lessons Learned from previous innovation projects as presented by *Lyn Richardson*. *Kevin Logan* was particularly interested as Emsworth, Dashields, and Montgomery projects are at a stage where they would significantly benefit from this discussion. It was suggested to make LL the focus of the next meeting. Other suggestions were to invite someone from the construction industry to the next RNDT to discuss their perspective. Also *Dan Mcklenbourg* and *Marc Carr* would like to send their senior pilots to the next RNDT meeting to share their experience. It was agreed to have the next meeting offsite, not in conjunction with any other conferences, but to concentrate on a technical “Hands On” Lessons Learned meeting in the spring. Rock Island has offered to host the next meeting if there is interest from RNDT members in visiting the Upper Mississippi River to see ongoing lock rehabilitation. The Lock 11 rehabilitation panel installation will start on 21 Jan and end on 9 Feb. Other suggestions for a spring meeting: the Soo, Pittsburgh, or St. Louis. Please let the chairman know your recommendation for a meeting or any other suggestions for the group.

John Clarkson
Chairman, RNDT

Enclosures

1. Agenda
2. RNDT Mission Statement
3. Contractor Risk Assessment and Consideration during Bidding
4. Mailing List

RNDT Agenda DRAFT Louisville, Kentucky

(Items in Bold in conjunction with the Smart Rivers)

Monday, September 17, 2007

1:00 pm	Convene in Walnut Room	
1:00 am to 1:15 am	Opening Remarks	TBD
1:15 am to 1:30 pm	New Challenges for the RNDT	All
1:30 pm to 2:00 pm	Headquarters Update/Guidance Program	Anjana Chudgar
2:00 pm to 2:20 pm	ERDC Update	John Hite
2:20 pm to 2:50 pm	NESP – Fish Passage	Mark Cornish
2:50 pm to 3:15 pm	Coffee Break	
4:15 pm to 4:40 pm	Miter Gate Acquisition & Bull Nose Teams	Robert Willis
4:40 pm to 5:00 pm	British Waterways - Falkirk Wheel	Ian White
5:00 pm to 5:30 pm	Olmstead In-the-Wet Construction	Richard Schipp
6:00 pm to 8:00 pm	RNDT Dinner at TBD (Dutch)	All

Tuesday, September 18, 2007

8:00 am to 9:00 am	Continental Breakfast – Networking with Smart Rivers	
9:00	Convene in Walnut Room, to continue RNDT	
9:00 am to 9:20 am	Overview of Great Lakes St. Lawrence Seaway Study	David Wright
9:20 am to 9:45 am	Lock Port	Michael Tarpey
9:45 am to 10:00 am	Navigation Trends	Ron Coles
10:00 am to 10:15 am	Flexible Approach Walls	TBD
10:15 am to 10:45 am	Coffee Break	
10:45 am to 11:15 am	Industries Perspective on Navigation Issues	TBD
11:15 am to 11:45 am	Emergency Gate Removal	Joshua Nickel
11:45 am to 12:00 pm	Update on NESP	Jeff Stamper
12:00 pm to 12:15 pm	Update on EDM	Kevin Logan
12:30 pm to 2:00 pm	Luncheon: Inland Waterways for the 21st Century: Developing A Common Vision for Uncommon Success	

	Major General Riley, Director of Civil Works, US Army Corps of Engineers	
2:00 pm to 2:10 pm	Reconvene in Walnut Room	
2:10 pm to 2:40 pm	<i>Role of PIANC in The Corps, Major General Riley, Director of Civil Works, US Army Corps of Engineers</i>	
2:40 pm to 3:00 pm	Coffee Break	
3:00 pm to 3:20 pm	Navigation Update	David Dale
3:20 pm to 4:00 pm	Capturing Lessons Learned	Lyn Richardson
4:00 pm to 4:20 pm	Asset Management	Bill Chapman
4:20 pm to 4:45 pm	Open Discussion	All
4:45 pm to 5:10 pm	McAlpine Update	Larry Dalton
5:10 pm to 5:30 pm	Open Discussion, Wrap up and Future Meetings	John Clarkson
6:00 pm	Dinner with Smart Rivers	
6:30 pm to 10:30 pm	Churchill Downs Gala Reception (additional fee)	All
Wednesday, September 19, 2007		
9:00 am to 5:00 am	Technical Tour of McAlpine Locks, Jeffboat Shipyard and the Falls of the Ohio with Smart Rivers (additional fee) Meet in hotel lobby at 8:30 am	All

REGIONAL NAVIGATION DESIGN TEAM

REVISED 09/06/06

The Regional Navigation Design Team (RNDT) was formed in January 1994 by the Ohio River Regional Office (formerly the Ohio River Division) of the Great Lakes and Ohio River Division (CELRD) in order to reinvent our design process, move away from our traditional design, and incorporate innovations into our navigation structures. The Team's purpose is to assure that innovative design and construction technologies, applicable to the modernization of the nation's navigation system, are adequately and efficiently evaluated in the interest of achieving modernization at the lowest practical cost. The team has expanded throughout history to address pressing navigation problems facing industry as a whole and has taken on a strategic role for the Navigation Business Line (Navigation COP).

Current Navigation Design Team Members (Must have attended at least one prior meeting)

- Andy Harkness Pittsburgh District
- Anjana Chudgar HQ USACE
- Bob Willis Great Lake and Ohio River Division
- Dave Weekly Navigation Center - Huntington District
- Dave Wright Detroit District
- Gordon McClellan Nashville District
- Harry Simpson Great Lakes and Ohio River Division
- Jeff Stamper St. Louis District
- John Clarkson Huntington District
- Larry Dalton Louisville District
- Marsha Mose St. Paul District
- Rick Schipp Louisville District
- Roger Less Rock Island District
- John Hite ERDC
- Shiv Batra PIANC
- Vacant Panama Canal Commission

The team was formed to take advantage of combined experience, lessons learned, and knowledge in the navigation area spanning across technical functional areas and Districts. They were given the latitude and challenges to seek better methods and not "just do it the way it was done before." Team members are empowered to speak for their respective organizations and set direction for innovative designs.

The RNDT has reinvented the design of navigation structures. The Team has examined the features of traditional navigation lock and dam design to determine if these highly important, but costly structures could be constructed faster, better, and at less cost. This process is carried out utilizing four objectives:

- a.) Challenging design criteria and providing support to engineers in promoting good design ideas and criteria changes and exemptions through the Corps design stovepipes.
- b.) Sharing information on innovative design experiences.
- c.) Maintaining continuous and effective communication with the Navigation industry.
- d.) Evaluating existing quality assurance/quality control (QA/QC) design procedures to assure product quality.

Contractor's Risk Assessment and Strategy **During Bid Preparation**

A Lot Has Happened in Recent Years:

- Jobs getting more complicated
- Durations are becoming longer
- Job schedule are more linear
- Funding uncertainties have impacted schedule
- World situation uncertainties

All these affect the RISK

Rick Elements:

- Labor (a few years ago this was the only real risk contractor worried about)
- Skilled labor forces are much better trained in metropolitan areas. Rural areas the skill level is much lower resulting in 75% efficiency on production.
- Materials (particularly steel and copper)
- Fuels
- Equipments shortages
- More sole source equipment is being specified
- World wide demand (Suppliers no longer need or want Government work)
- Environmental Factors (River, Weather, Others)
- Funding
- Less folks working (going into) in construction
- Less experienced technical folks (very competitive, will pay more)
- Bonding
- With innovation and more responsibility put on contractors to design means and methods, they are struggling with design responsibility/liability issues. They do not carry design insurance. They are afraid to come up with new ideas or better ideas for fear of being held accountable for them.

What Can We Do:

- Consider all this in the acquisition strategy
- Do pre-bid market surveys
- Hold pre-bid meetings to discuss risk and potential solutions w/Contractors
- Design projects with funding levels in mind (FY stopping points)
- Government take more risk (revise clauses)
- Take funding into account in construction method decisions
- Require insurances to cover certain risk, be very clear about it

- Reduce bonding requirements (100% to 50%)
- Provide escalation clauses
- Site funding stream in contract and include what will happen when Government fails to meet it.
- Specify more off the shelf items
- Corps can take more responsibility of means and methods in event they do not work.

How Contractor's Handle Risk:

- Two central questions (to bid or not and how to be competitive)
- Ghost Rating
- 10% Rule (Declare a mistake)
- Joint Venture because of size or risk
- Joint Venture to eliminate competition
- Senior estimators adds risk and probability factor to each bid item. This is then prorated back to the bid item or maintained in a separate account for PM to use as contingency.
 - Profit. Corporate Guidelines establish a minimum rate of return. They maintain data bases of actual returns for various type jobs and use that along with anticipated no. of bidders and who they are to determine final factor.
 - Contingencies, Contingencies, Contingencies. If Labor is where the risk are they apply it to that (highest I heard was 40%) if whole job is at risk a factor is applied to all cost.

Name	District/Company	Street	City	State	Zip	Phone	Email
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