Inland Marine Transportation Systems (IMTS) Capital Projects Business Model

Final Report

Revision 1

April 13, 2010

Prepared by:
IMTS Capital Investment Strategy Team

The views and recommendations contained within this report reflect those of the Inland Marine Transportation System Capital Investment Strategy Team and not necessarily those of the Inland Waterways Users Board, the U.S. Army Corps of Engineers, or the Administration.

Revision 1 includes minor formatting and grammatical changes, and acknowledges the Inland Waterways Users Board approval, adoption and subsequent forwarding of the report to the Assistant Secretary of the Army for Civil Works for consideration by the Administration

Contents

Contributors

This report was prepared at the request of the Inland Waterways Users Board and represents a collaborative effort between navigation industry representatives and U.S. Army Corps of Engineers inland navigation experts. The views, opinions, and findings contained in this report are those of the Inland Marine Transportation System Capital Investment Strategy Team (IMTS CIS Team, or Team). The report should not be construed as an official Agency position, policy, or decision, unless so designated by other official documentation.

On 13 April 2010, the Inland Waterways Users Board unanimously approved and adopted this report.and transmitted the report to the Assistant Secretary of the Army for Civil Works (ASA(CW)), requesting that the Administration adopt and implement those recommendations of the report within the purview of the Administration. The Board further transmitted the report to the Congress, recommending that Congress implement those recommendations requiring legislative action.

_____

Stephen Little
Chairman
Inland Waterways Users Board

_____

Jeanine Hoey
Program Manager
U.S. Army Corps of Engineers

The following are acknowledged for participating as team members or contributing by providing input, background or advice:

Timothy Black	U.S. Army Corps of Engineers
Eric Braun	U.S. Army Corps of Engineers
Rick Calhoun	Cargill Marine and Terminal, Inc.
Larry Daily	Alter Barge Line, Inc.
John Doyle	Jones Walker
Anthony Dunams	Booz Allen Hamilton

Michael Ensch	U.S. Army Corps of Engineers
James Fisher	U.S. Army Corps of Engineers
William W. Fuller	U.S. Army Corps of Engineers
Sandy Gore	U.S. Army Corps of Engineers
David Grier	U.S. Army Corps of Engineers
Jorge Gutierrez	U.S. Army Corps of Engineers
James Hannon	U.S. Army Corps of Engineers
William Harder	U.S. Army Corps of Engineers
Andy Harkness	U.S. Army Corps of Engineers
Michael Hennessey	Consol Energy
Stephen Hrabovsky	U.S. Army Corps of Engineers
Keith D. Hofseth	U.S. Army Corps of Engineers
John E. Hite	U.S. Army Corps of Engineers
Michael Jacobs	U.S. Army Corps of Engineers
Gerald Jenkins	Ursa Farmer Cooperative
Steve Jones	U.S. Army Corps of Engineers
Michael Kidby	U.S. Army Corps of Engineers
Jerry Knapper	Ingram Barge Company
Mark Knoy	AEP River Operations LLC
Gary Loew	U.S. Army Corps of Engineers
Cornel Martin	Waterways Council Inc.
Daniel Martin	Ingram Barge Company
Jeffrey McKee	U.S. Army Corps of Engineers
Deane Orr	Consol Energy
Michael Park	U.S. Army Corps of Engineers
Timothy Parker	Parker Towing
John Pigott	Tidewater Barge Lines
Mark Pointon	U.S. Army Corps of Engineers
Glenn Proffitt	U.S. Army Corps of Engineers
Michael Ryan	American Commercial Lines
Jose E. Sanchez	U.S. Army Corps of Engineers
Mary Anne Schmid	U.S. Army Corps of Engineers
Ty Thomas	Ian Inc.
Major General Bo Temple	U.S. Army Corps of Engineers
James Walker	U.S. Army Corps of Engineers
Wesley Walker	U.S. Army Corps of Engineers
Royce Wilken	American River Transportation Company
Matthew Woodruff	Kirby Corporation

Executive Summary – IMTS Capital Projects Business Model

The U.S. Army Corps of Engineers (Corps) has played a major role in the nation's marine transportation system and inland water management since the country's founding and, through its navigation mission, retains a pivotal role in managing inland waterways into the future. The Corps Navigation mission is to provide a safe, reliable, efficient, effective, and environmentally sustainable waterborne transportation system for the movement of commerce, national security needs, and recreation. In fulfilling the navigation mission, the current project delivery model, that was effective in the past, is no longer appropriate for successful inland waterways management. Fundamentally, local district and regional division efforts that previously focused on addressing regional needs and improving infrastructure problems neither provide optimal solutions for managing a nationwide portfolio of assets nor the investments needed to maintain those assets. As investigated in the *Inland Navigation Construction Selected Case Studies* report and specifically recognized by the Inland Marine Transportation System (IMTS) Capital Investment Strategy Team (IMTS CIS Team or the Team), in recent years there has been an undesirable trend of lock and dam construction projects exceeding, by unacceptable amounts, their originally authorized cost and schedule expectations.

After many years of a growing balance in the Inland Waterways Trust Fund (IWTF or Trust Fund), which funds half of navigation construction and major rehabilitation projects, the Trust Fund balance began to decline in fiscal year (FY) 2003 as the Administration and Congress dedicated increased amounts of Trust Fund resources to address modernization of the inland waterway system. This trend continued through FY 2009, resulting in a decline of the Trust Fund balance to the point that expenditures must be limited to the amount of annual fuel tax revenues collected for that particular year. The increased costs and constrained IWTF have resulted in a backlog of authorized projects that have not yet begun construction. This backlog, in turn, exacerbates the declining reliability of the IMTS.

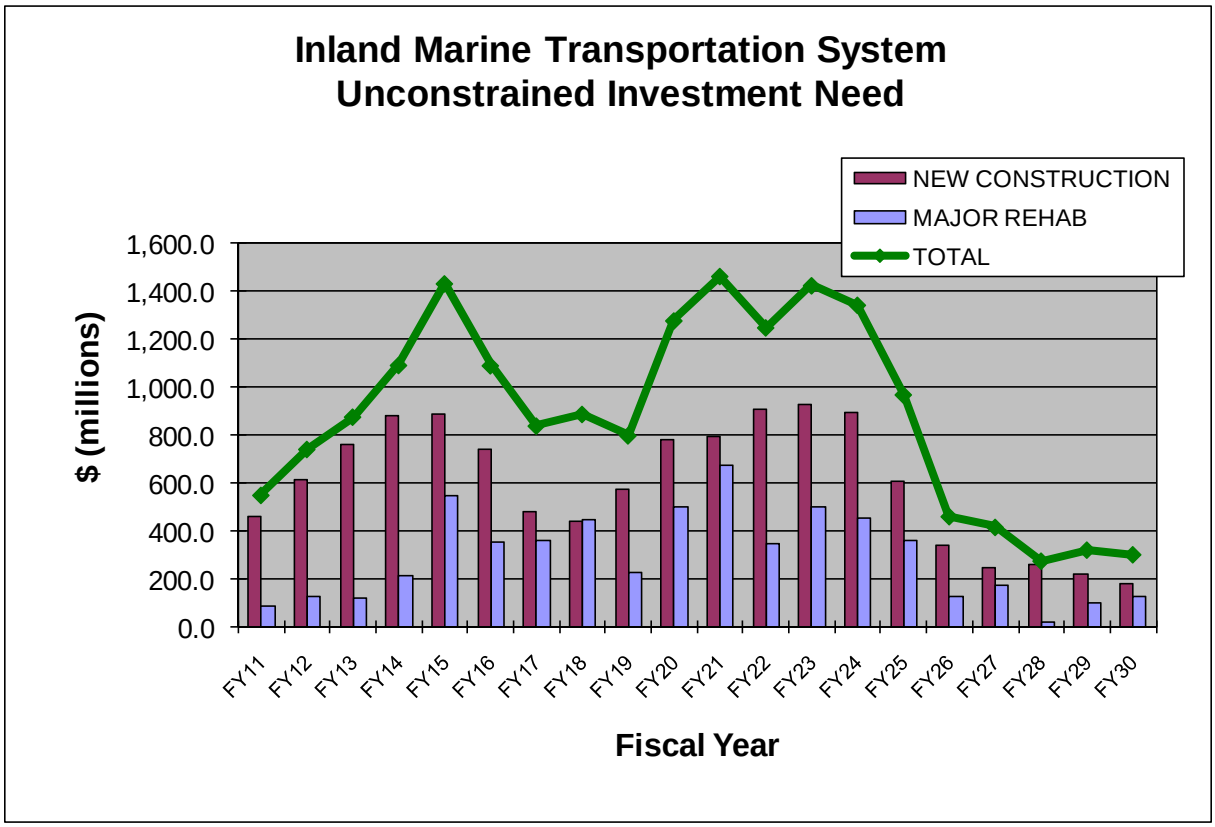
Given current average annual revenues of $85 million, the substantial backlog of authorized projects, and the declining reliability of the IMTS, the Corps is collaborating with the Inland Waterways Users Board (IWUB or the Board) to identify ways to improve the capital projects business model in tandem with developing an investment strategy designed to improve and ensure the long-term viability of the IMTS. The goals of the IMTS CIS Team are the following:

1. Identify ways to improve the project delivery system (i.e., more reliable cost estimates and construction schedules, better contracting practices, improved project management) to ensure that future system improvements can be completed on time and within budget.
2. Develop a list of long-term capital needs for the inland navigation system, including an objective methodology for prioritizing those needs.
3. Develop a capital investment strategy that balances reliability with affordability.
4. Develop and recommend a strategy to help ensure that funding requirements can be met with reasonable certainty and efficiency.

Unconstrained Project List

To aid the IMTS CIS Team in identifying future needs/demands on the IWTF and help in establishing a funding strategy, the Corps developed an "unconstrained" list of projects. Currently, the Corps has identified over 100 projects in the inland and intracoastal waterways system that require, or could conceivably require, capital investments in the next 20 years. For analytical purposes, this list was developed without regard to funds that would be available to perform the work. Each district identified new construction or major rehabilitation projects that were (1) under construction (Phase 1 projects) or (2) that were authorized but not yet under construction (Phase 2 projects). In addition, districts identified potential future projects over the 20-year time horizon, a few of which are already under study, assuming the availability of completely unconstrained funding (Phase 3 projects).

Over the 20-year period from fiscal year (FY) 2011 to FY 2030, the districts' unconstrained financial requirements to address the infrastructure needs of the IMTS is reflected in Figure ES-1 and totals nearly $18.0 billion, or an annual average of nearly $900 million. Of the $18.0 billion identified for expenditure, nearly $12.1 billion (67 percent) would be for new construction and $5.9 billion (33 percent) would address major rehabilitation projects.



Note: Fully funded estimates assume a 3 percent escalation of costs per year.

Figure ES-1. Unconstrained Investment Need of IMTS, FY 2011 to FY 2030

Prioritization Criteria and Prioritized List

Inland waterways system users, policy makers in the U.S. Congress and within the Administration, and others share a desire to better understand both the value of existing IMTS assets and the return on investments made to the system. Reflecting this desire, the IMTS CIS Team worked together to develop and apply logical metrics to help guide system modernization investments. After discussing numerous

approaches, the Team concluded that the most useful representation of system value and return on investment should include assessments on an asset-by-asset basis using the following:

1. The asset's current condition
2. The likelihood of diminished asset performance
3. The consequence of diminished performance in terms of repair costs, outages, and economic losses
4. How the proposed investment would improve performance or reduce the asset's likelihood of diminished performance
5. For new assets, whether the project could be expected to improve system performance.

The criteria the IMTS CIS Team selected for ranking projects fell into two broad categories: (1) structural and operational risk and reliability and (2) economic return. Structural and operational risk and reliability metrics were represented either by a Dam Safety Action Classification (DSAC) rating or a Condition Index (CI) rating.[1] Economic consequence metrics included Net Benefits, Benefit-Cost Ratio (BCR), and Remaining Benefit Remaining Cost Ratio (RBRCR) (for Phase 1 and Phase 2 projects only), and Economic Impact (for all projects, however this is the only category of economic criteria used for Phase 3 projects). The risk and reliability criteria were depicted as numeric grades of 1 through 5 for DSAC ratings (with 1 being the worst/failed condition), and as letter grades of A through F for CI ratings (with F being the worst/failed condition). Those risk and reliability criteria metrics were then converted to numeric scores, with a maximum weight of 40 for Phase 1 and Phase 2 projects or 60 for Phase 3 projects. The rationale for a higher weight for risk and reliability for Phase 3 projects was necessitated by the limited economic analyses data performed on Phase 3 projects and recognition that infrastructure in a failed or failing condition could require earlier attention. The economic criteria were depicted as dollars for net benefits, as ratios for BCRs and RBRCRs, and as numeric grades of 1 through 100 for economic impact. These metrics were normalized to the highest value observed for that metric in the project list, with a maximum weight of 60 or 40 depending on the project phase. Table ES-1 and Table ES-2 display the criteria used to prioritize the unconstrained project list.

Table ES-1. IMTS Investment Strategy Criteria Weighting

Criteria	Phases 1 and 2	Phase 3
Risk and Reliability	40	60
Condition Index for Locks (rated A through F)		
DSAC for Dams (rated 5 through 1)		
Economic Return	60	40
Net Benefits	15	
BCR	5	
RBRCR	25	
Economic Impact	15	40
Totals	100	100

[1] The team is assessing the relative importance of channels on a case-by-case basis. Metrics compatible with those used for locks and dams were not available at the time this report was prepared.

Table ES-2. IMTS Investment Strategy Condition Weights

Risk and Reliability DSAC | Condition Index Rating	Phase 1 and 2	Phase 3
1 | F	40	60
2 | D	25	45
3 | C	10	30
4 | B	5	10
5 | A	0	0

IMTS Capital Investment Program

The IMTS CIS Team evaluated what should be reasonably addressed and completed in the next 20 years to maintain a reliable IMTS. It became apparent from this examination that two separate program component levels were required to ensure that both new construction as well as major rehabilitation projects are being prioritized and funded effectively. It was recognized that worthwhile projects already under construction should be completed as efficiently as possible. The Team recommended that new construction projects should be allocated an annual funding level of about $320 million. Figure ES-2 shows the proposed timing associated with those new construction projects that are recommended in the plan.

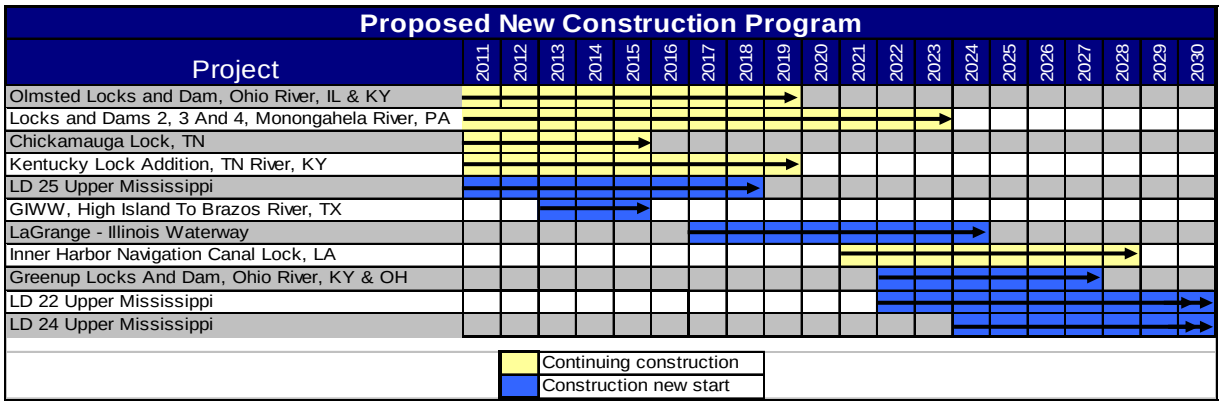
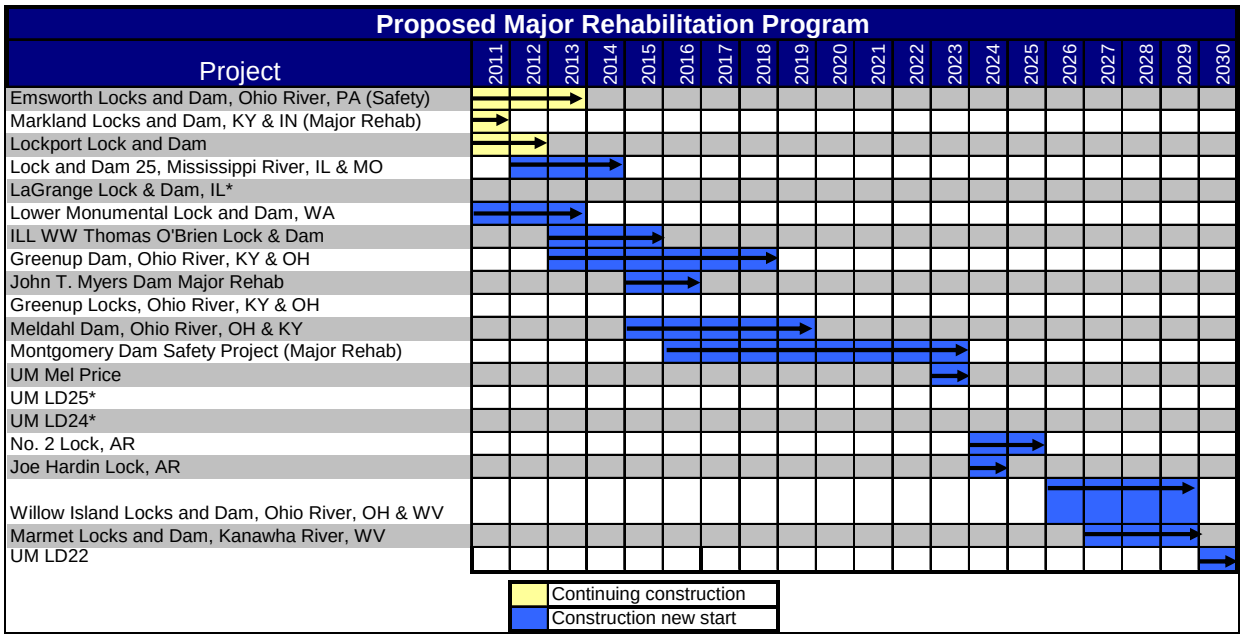


Figure ES-2. Proposed New Construction Projects Timeline

To ensure that existing infrastructure is being continually maintained and rehabilitated in a timely and appropriate manner, the IMTS CIS Team also looked at separately funding major rehabilitation projects. The Team recommends using the average amount spent on major rehabilitation projects in the last three years, which amounts to approximately $60 million per year. Figure ES-3 shows the proposed timing associated with major rehabilitation projects. Because there is a large bottleneck of new construction early in the capital investment strategy, the funding allocations between new construction and major rehabilitation would be skewed to new construction in the immediate near term. The target total for the 20-year capital investment strategy for new construction and major rehabilitation on average is $380 million per year.



* Note – Lagrange, Greenup, UM LD 25 and UMLD24 do not show scheduled rehabilitation projects due to new construction projects at these facilities. Their priority remains as a placeholder until the new construction work begins and criteria is re-evaluated for these projects.

Figure ES-3. Major Rehabilitation Projects Timeline

The proposed 20-year capital investment strategy generally addresses the highest priority new construction and major rehabilitation projects as determined by the criteria weighting and decision principles implemented. With a $380 million average annual investment level, this investment strategy addresses at least 27 of the candidate projects that have been identified by Corps districts and highlights how those projects would be prioritized based on the recommended investment level. Figure ES-4 compares cumulative project completions at the current investment level of about $170 million per year ($85 million from general appropriations and $85 million from the IWTF) with project completions at the recommended investment level of $380 million per year. The recommended investment plan addresses five DSAC 1 and three DSAC 2 dams, as well as one lock facility that was rated F and six that were rated D through the operational condition assessment process.

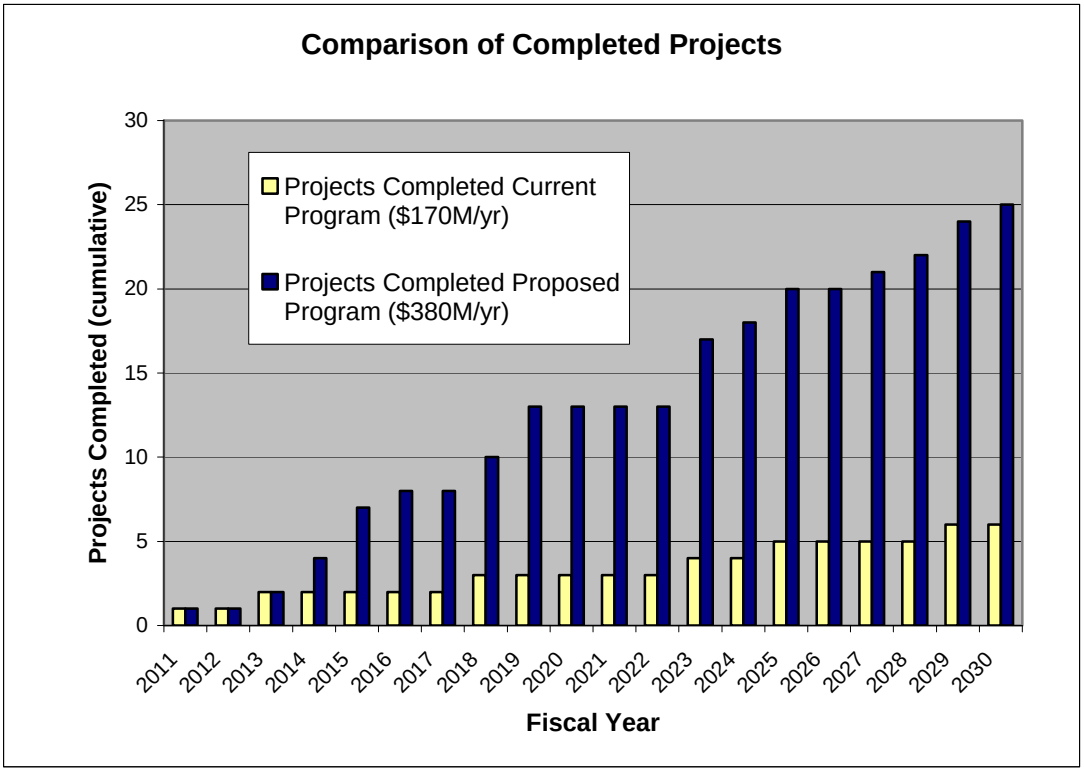


Figure ES-4. Comparison of Completed Projects

Funding Model

Cost-Share Recommendations

With the recommended $380 million annual funding-level program, IWTF revenues are proposed to be increased beyond what is anticipated under current law to address the needs of the IMTS. The IMTS CIS Team members understand the implications of an increase in revenues and have strived to develop cost-sharing recommendations that are fair and equitable.

The IMTS CIS Team reviewed and evaluated more than a dozen options for funding the IMTS capital investment program. These options included maintaining the current cost-sharing arrangement of 50 percent federal and 50 percent IWTF for all capital investments; varying that percentage; excluding some projects/features, such as dam or major rehabilitation projects; setting different thresholds for the cost-sharing of major rehabilitation projects; and capping the IWTF share for some projects with significant cost increases, such as Olmsted Locks and Dam and Lower Monongahela Locks & Dams 2, 3, and 4 (Lower Mon).

After a high-level review and evaluation of the options presented, the IMTS CIS Team recommends the following cost-sharing program:

- All *lock* construction projects should be cost-shared 50 percent from general appropriations and 50 percent from the IWTF and all major rehabilitation *lock* projects costing at least $100 million should be cost-shared at 50 percent from general appropriations and 50 percent from the IWTF.
- Construction and major rehabilitation *dam* projects and major rehabilitation *lock* projects below $100 million should be entirely funded from general appropriations.

- With the program recommendation of $380 million per year and the proposed program shown in Figure ES-2 and Figure ES-3, the average IWTF requirement over the next 20 years is $110 million per year, with the federal cost-sharing requirement averaging $270 million per year. In the future, these average amounts may vary depending on the mix of projects in the program.

Another feature the Team recommends is establishment of a project-by-project cost-sharing cap to protect industry from unreasonable cost escalation and project delays. The IMTS CIS Team recommends that the cap be set at the Feasibility or Rehabilitation Evaluation Report base cost using risk-based cost and schedule estimates. This risk-based cost estimate will include contingencies reflected in the relevant decision document and will be escalated to the new construction start date, plus whatever additional amount, if any, that both the Corps and the Board agree is appropriate. This cap places additional emphasis on the need to produce more reliable project cost estimates in the underlying decision document and to manage projects within the identified and agreed upon project budgets and schedules, protecting both the waterways industry and the general taxpayer from preventable project cost escalation and delay.

Revenue Recommendations

The IMTS CIS Team also reviewed alternative options for generating revenues for the IWTF. These options included the current revenue plan consisting of a waterways fuel tax, a user fee, bonding, and other revenue sources, such as state funding or other beneficiaries of the IMTS. The Team acknowledged that the current revenue-raising system is a workable, understood, acceptable, and auditable system for collecting the waterways industry's share of the IMTS capitalization costs and that the additional revenues required in the Teams' consensus recommendations should best be raised through an increase in the current fuel tax. The recommended program would require a 30–45 percent increase in the current fuel tax (a $0.06–$0.09 per gallon increase). The 30 percent increase is based on an assumption that, under current law, anticipated future revenues would equal the average $85 million annual amount generated over the past five years, while the 45 percent increase is based on FY 2009 actual revenues of $76 million.

Process Improvements

Given the challenges with the current project delivery model, as highlighted with a few recent projects, and the need to improve the process so that the IMTS remains viable for the foreseeable future, change is essential. In addition to insufficient funding identified in *The Inland Navigation Construction, Selected Case Studies Report,* other factors identified in the report also have contributed significantly to the cost increases and schedule delays affecting recent Corps capital projects. Because many of these issues could be controlled with an improved project delivery process, the IMTS CIS Team, in combination with its development of the capital investment strategy, examined the Corps' current project delivery process and developed a number of recommended process improvements. Together with the underlying premise that the necessary project funding will be provided in an efficient manner, the team believes that these improvements will achieve the goal of an improved capital projects business model. Some of these recommendations are already in the process of being implemented and just need to be measured and monitored. Other recommendations can immediately be put into practice, while still others will take additional study or authority to implement. The following recommendations have been organized into those three categories:

Already Implemented Process Improvement Recommendations

1. Encourage project management certification. A project management certification program was recently developed and implemented. Senior leaders within the Corps should emphasize the benefits of and encourage certification. The Corps should ensure that only certified project managers are assigned to critical IWTF projects.

2. Develop highly reliable risk-based cost estimates for IMTS projects meeting certain thresholds. Risk-based cost estimates are now required for all projects over $40M and meeting certain thresholds. Only a few of existing projects incorporate updated risk-based cost estimates. As a first step, the IMTS CIS Team will recommend a list of existing projects to be reevaluated using risk-based cost estimating techniques by the summer 2010 Board meeting. In the future, all IMTS projects being proposed for congressional authorization would have a risk-based cost estimate having at least an 80 percent confidence level performed prior to completion of the project's feasibility report.

3. Require independent external peer reviews for IMTS projects meeting certain criteria. Independent external peer reviews are a new requirement for large or controversial capital projects. The IMTS CIS Team will follow the new regulation, which was implemented in December 2009, for external peer reviews. No additional specific action is required at this time.

Immediately Implementable Process Improvement Recommendations

1. Appoint a Board representative to each IMTS project. The Board Chairman should assign a representative from the Board to each active project by the summer 2010 IWUB meeting. Those representatives will be forwarded to the project managers for inclusion as Project Delivery Team (PDT) members.

2. Provide project status communication to the Board. The following template, shown in Figure ES-5, should be used for briefing project status beginning at the summer 2010 Board meeting.

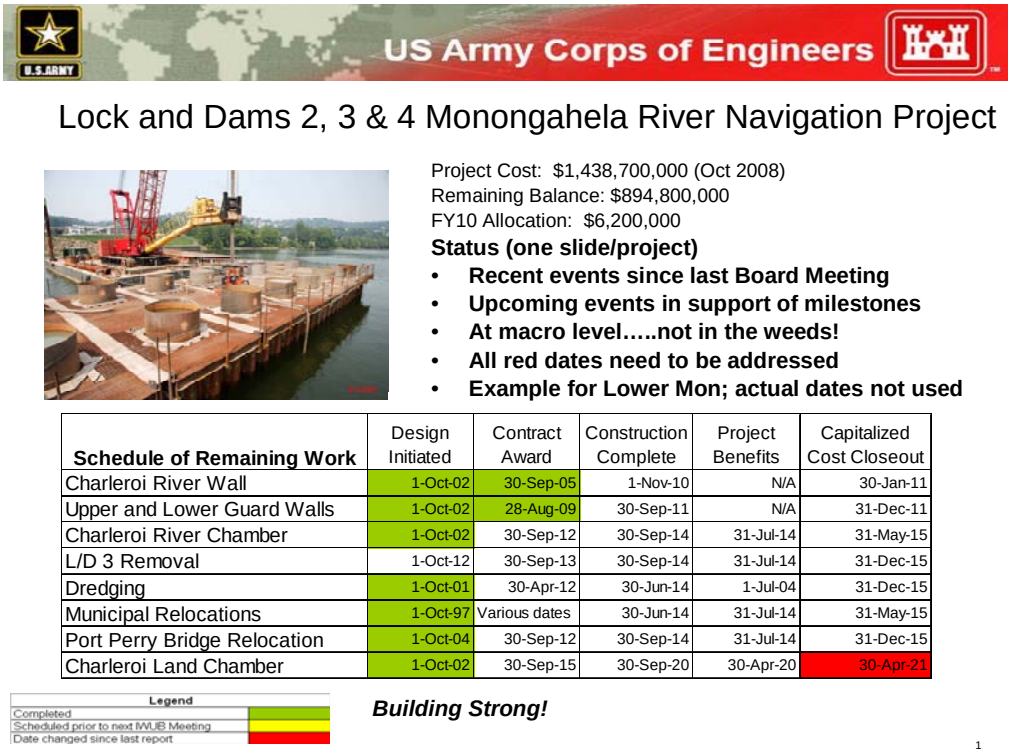


Figure ES-5. Proposed Project Status Briefing Template

3. Include the Board chairman and representative as signatories for all project management plans (PMPs). Project management plans for new projects should be developed during the planning

phase. Existing PMPs should be updated to include the Board representative and Chairman as signatories over the next year. All plans should be signed by the spring 2011 Board meeting.

4. Apply lessons learned to managing new projects. The Navigation Community of Practice (COP) should set up a system to capture lessons learned specifically for IMTS projects and ensure that they are reviewed prior to initiating new work.

5. Evaluate use of early contractor involvement as a contract vehicle for an IMTS project. The Corps should identify one or more pilot projects where early contractor involvement would improve the outcome.

6. Implement applicable principles from the Military Construction (MILCON) Model. Adopting several principles of the MILCON model would result in a culture change; these principles should be reinforced at all levels throughout the Corps Civil Works program hierarchy. Principles include that cost estimates cannot be exceeded, schedules must be met, and a multiyear funding stream must have a commitment from the U.S. Congress. Contracts should be structured with awardable options that can be eliminated if costs are exceeded, but still provide a functioning facility. Project managers and project staff members should follow guidance requiring that budgets and schedules be met and abandon the presumption that additional funding will always be available. The culture should reflect that the construction program cannot afford what would be "nice" for the projects, but can address only what is necessary.

7. Establish procedures for recommending new construction starts. Through the new IMTS capital projects business model, the Corps should establish the procedures for recommending new construction starts.

Process Improvement Recommendations Requiring Additional Study or Authority

1. Revisit use of the continuing contracts clause. Use of an appropriately structured continuing contracts clause or fully funding contracts often is essential to move forward with the larger civil works IMTS project being proposed. The Corps must work with the U.S. Congress to develop a continuing contracts clause that adequately protects the prerogatives of both the legislative and executive branches while not causing unnecessary project delay and cost escalation. One approach for consideration is to fully fund all contracts up to $50 million (current Corps regulations require all contracts $20 million or less to be fully funded), while allowing contracts greater than $50 million to have the option of using an agreed-upon continuing contracts clause.

2. Draft and ultimately obtain approval for a capital projects business model regulation. The process improvements and funding strategies recommended in this report should be incorporated into a regulation to direct future IMTS project prioritization and funding. A smaller subset of this Team should develop the regulation with a draft prepared by September 30, 2010.

3. Create Design/Review Center(s) of Expertise. Implementation of this recommendation would require organizational changes affecting a number of non-navigation-related considerations that would in turn have to be evaluated. This recommendation is offered to Corps senior leadership for study and evaluation.

4. Develop a portfolio of standardized designs. A team from Corps Engineering and Operations should be identified to consider a pilot project for design of a lock component that could be used throughout the IMTS. In addition, for new projects, it may be helpful to begin requiring a design concepts meeting that involves senior design and technical personnel who are not otherwise involved in the project to brainstorm ideas, solutions, and experiences on past projects.

Benefits

The capital investment strategy and process improvements described above are expected to result in measurable benefits to the IMTS. Cost growth that has become typical with IMTS projects will be reduced. Using the *Selected Case Study Report* as a basis, cost growth on IMTS projects under the in-place business model can be as high as 60 percent of the initial cost. Of that amount**,** about 30 percent is attributable to inefficient funding and 70 percent to other factors, such as differing site conditions or design changes. Another benefit to the capital investment strategy is avoiding additional benefits foregone on construction projects by completing current ongoing projects efficiently and on time. Additionally, it is important to monitor and measure project performance as the capital investment strategy is implemented to document the benefits of the program with this improved process. The Team estimates the benefits of the recommended program to be the following:

- The avoided cost growth due to inefficient funding over the 20-year capital investment program is conservatively estimated to be between $350 million and $1,180 million.
- Benefits foregone to date at only two of the larger construction projects, Olmsted and Lower Mon, are calculated to be $5.2 billion.
- With the 20-year capital investment program, more than $2.8 billion in additional benefits foregone would be avoided when looking only at the projects that are currently under construction and the schedule for completing these projects under the current program.

Future Improvements

The Team recognizes that as the process matures, changes will be needed to continue to provide the best program and a reliable IMTS. Additional studies and data are recommended to advance the current recommended process, including, but not limited to, the following:

- Developing criteria for channels that are comparable to those developed for lock and dam projects. These criteria would eliminate the need to evaluate channel projects to determine their priority without an established process for comparison.
- Changing the rating scale for the Relative Risk Marix Rankings for Operations and Maintenance budget work packages (currently ranked 25 to 1 and 5 to 1, with 25 and 5 beign the worse condition) to parallel the DSAC scale (1 through 5, with 1 beign the worse condition) for consistency.
- Identifying and quantifying other IMTS beneficiaries to develop a fuller understanding of the IMTS and its importance to the nation’s waterways.
- Developing and standardizing additional economic data for proposed projects to improve the information used to prioritize projects.
- Developing reliability data for all projects to use the full capability of the Impact Algorithm.
- Automating the prioritization process to more efficiently manage the program and enable analysis of different factors/constraints.

The inland waterways project delivery process has faced increased criticism over funding priorities, the timing of capital projects funding, escalating costs and construction schedules, and project delivery issues. The IMTS CIS Team’s review and analysis resulted in the recommended capital investment strategy and process improvements. While unlikely that any set of recommended improvements could completely eliminate cost increases and schedule delays, these recommended improvements—in combination with the development of the capital investment strategy and with the underlying premise that the funding will be provided in an efficient manner—will achieve the goal of an improved capital projects business model.

This report was prepared at the request of the Inland Waterways Users Board and represents a collaborative effort between industry representatives and U.S. Army Corps of Engineers inland navigation experts. The views, opinions, and findings contained in this report are those of the Inland Marine Transportation System Capital Investment Strategy Team and should not be construed as an official agency or board position, policy, or decision, unless so designated by other official documentation.

1. Background

As the world's leading maritime and trading nation, the United States relies on an efficient inland marine transportation system (IMTS) to maintain its role as a global power. The federal government's involvement in navigation projects dates to the early days of the United States, when rivers and coastal harbors were the primary paths of commerce and exploration in the new country. Federal interest in navigation stems from the Commerce Clause of the Constitution and subsequent Supreme Court decisions defining the federal government's authority to regulate commerce and navigation and to provide navigation improvements.

Today, navigable inland waterways provide the most cost-effective and energy efficient means for transporting commercial goods, particularly major bulk commodities, such as grain, coal, and petroleum products.[2] Inland navigation is a key element of state and local government economic development and job creation efforts and is essential to maintaining economic competitiveness and national security.

One of the principal responsibilities of the U.S. Army Corps of Engineers (USACE, or the Corps) is to provide safe, reliable, economically efficient, and environmentally sustainable movement of vessels, and it does so by constructing and maintaining navigation channels, harbors, locks and dams, and regulating water levels on these same inland waterways. The system of harbor channels and waterways developed and maintained by the Corps is an integral link in the nation's intermodal transportation system. Domestic waterborne commerce accounts for approximately one-seventh of the nation's volume of intercity cargo, by ton-miles.

Every day, the Corps operates, maintains, and manages more than $232 billion of the nation's water resources infrastructure assets. The Corps has played a major role in managing these resources for more than 200 years. Of the 25,000 miles of navigable waters throughout the United States, approximately 12,000 miles of inland and intracoastal waterways constitute the commercially active system maintained by the Corps and known as the IMTS. This network includes nearly 11,000 miles of the "fuel-taxed waterways system" (FTWS), as shown in Figure 1-1. The FTWS includes 207 lock chambers (at 171 sites) on 27 inland rivers and intracoastal waterways system segments.[3] Commercial waterways operators on the designated fuel-taxed waterways pay a fuel tax of $0.20 per gallon, which is deposited into the Inland Waterways Trust Fund (IWTF). This Trust Fund generally pays half the cost of new construction and major rehabilitation of the inland waterways infrastructure. The fuel-taxed waterways system carries over 546 million tons of freight per year.[4] Beyond enabling commercial transportation, the inland waterways system aids in flood control, enables a stable water supply for nearby communities and industries, provides hydroelectric power, offers recreation such as boating and fishing, provides regional economic development opportunities, and enhances national security capabilities.

[2] C. James Kruse, A. Protopapas, L. E. Olson, and D. H. Bierling, Texas Transportation Institute, *A Modal Comparison of Domestic Freight Transportation Effects on the General Public*, amended March 2009, pp. 1, 39.

[3] There are 14 other shallow draft lock chambers on tributaries of the FTWS that are not included in the FTWS, making a total of 221 lock chambers at 185 inland and intracoastal sites that the Corps operates or maintains.

[4] USACE Navigation Data Center, *The U.S. Waterway System – Transportation Facts*, December 2009.

Figure 1-1. The Fuel-Taxed Inland and Intracoastal Waterways System

While still the world's preeminent inland navigation system, the IMTS—and its reliability—is increasingly threatened by the passage of time and the need to invest in its improvement. The economic service life for navigation structures is typically 50 years and is usually extended through major rehabilitation to 75 years. Currently, 54 percent of the IMTS's structures are more than 50 years old and 36 percent are more than 70 years old. There are currently seven IMTS projects under construction, and some of these have had significant cost increases and schedule delays. Because of strong industry and congressional support during the past decade for improving the efficiency of construction, lowering the costs of construction, and achieving the completed projects' benefits as early as possible, the surplus in the IWTF has been spent down. Annual funding for system modernization is now limited to revenues as they are generated each year. This reality has contributed to increasing the backlog of needed improvements, both for new construction and major rehabilitation. For example, projects at 17 facilities have been authorized, but they have not yet received funding for construction.

The inland waterways project delivery process has faced increased criticism over funding priorities, the timing of capital projects funding, escalating costs and construction schedules, and project delivery issues. In an effort to determine how these factors contributed to project cost and schedule growth, the Corps completed a study in July 2008[5] to document project performance at three inland navigation projects and to identify lessons learned that would help shape and improve future navigation investment

[5] U.S. Army Corps of Engineers Great Lakes and Ohio River Division, *Inland Navigation Construction Selected Case Studies,* July 2008.

funding decisions. The three projects studied were Marmet Locks and Dam, Kanawha River; Locks and Dams 2, 3, and 4, Monongahela River (Lower Mon); and Olmsted Locks and Dam, Ohio River (Olmsted).

Olmsted Locks and Dam was authorized by the Water Resources Development Act of 1988 (WRDA 1988, Public Law 99-662) to replace the locks and wicket dams at Ohio River Locks and Dams 52 and 53 with a single lock and dam project. The latest estimated total cost for the project is $2.124 billion, an increase of $1.3 billion over the original estimate. In addition, the construction completion date has been delayed from 2005 to 2018, 13 years beyond the original estimate. The cost escalation in this project can be linked to factors such as design and scope changes, differing site conditions, and omissions, some of which were within the Corps' control, while others, such as some of the escalation (approximately 30 percent) has been attributed to inefficient funding. The Lower Mon project was found to have experienced similarly caused unacceptable cost escalation and schedule delay.[6]

It is apparent that the cost growth experienced at both Olmsted and Lower Mon, which are still under construction, has contributed significantly to the spend-down of the IWTF. Because the IWTF shares in the costs of construction and major rehabilitation of IMTS projects, it needs to remain viable to fulfill the navigation mission of providing a safe, reliable, efficient, effective and environmentally sustainable waterborne transportation system for the movement of commerce, national security needs, and recreation. These case studies have revealed significant inefficiencies and shown that the model for planning, funding, constructing, and maintaining these waterways is broken. Changes and improvements must be made in the way that inland waterways system modernization projects are conceived, funded, and delivered. The current IWTF revenues of approximately $85 million per year will not be able to support the ongoing needs of the IMTS. Both the IWTF revenue stream and cost-sharing model are also areas to addressed when making improvements.

This report examines the current project delivery process and funding model and provides recommendations for improvements in the capital projects business model.

1.1 Corps' Mission

The Corps serves the Armed Forces and the nation by providing vital engineering services and capabilities in support of national interests. Corps missions encompass five broad areas:

- Water resources
- Environment
- Infrastructure
- Homeland security
- War fighting.

Much of the Corps' infrastructure mission is related to its Water Resources mission. The Corps builds and maintains a variety of water resource-related infrastructure assets, including locks and dams, flood reduction structures and reservoirs, and hydroelectric facilities. Navigation, the Corps' earliest civil works mission, with its associated infrastructure is a subset of the Water Resources mission.

The IMTS system represents the most efficient mode of freight transportation. A recent study performed by the Texas Transportation Institute (TTI) and cosponsored by the U.S. Department of Transportation Maritime Administration (MARAD) concluded that a typical 15-barge tow can move 26,250 tons of cargo, which is equivalent to about 216 rail cars or 1,050 tractor-trailer trucks. If the cargo transported on the inland waterways each year had to be moved by highway, for example, TTI estimated that, it would take

[6] Ibid.

an additional 58 million truck trips each year on the nation's already congested roads. Whether the alternative transportation mode were by truck or rail, the TTI study makes clear that the associated increase in fuel consumption, air pollution, accidental deaths, and congestion from not being able to use the IMTS would be considerable.[7]

The ability to move more cargo per shipment thus makes barge transport fuel efficient and environmentally advantageous. On average, one gallon of fuel allows one ton of cargo to be shipped 155 miles by truck, 413 miles by rail, and 576 miles by barge. Because of barge transport efficiencies, carbon dioxide emissions from water transportation were 2.1 million metric tons less in 2005 than if rail transportation had been used and 14.4 million metric tons less than if trucks had been used.[8] The IMTS allows America to realize tremendous savings in fuel consumption, reduced air emissions from fuel combustion, reduced traffic congestion, fewer accidents on our rail lines and highways, and less noise and disruption in our cities and towns.

The IMTS directly serves 38 states throughout the nation. The shippers and consumers in these states depend on the inland waterways to move about 630 million tons of cargo valued at over $180 billion at an average savings of more than $14 per ton over an alternate overland mode. As a result, more than $9.2 billion in transportation cost savings are achieved each year, enhancing the nation's economy and jobs and significantly strengthening our country's international competitiveness.

Despite being the most efficient mode of transportation for many commodities, shippers sometimes elect other modes, for reasons including convenience or timeliness. A major concern of shippers is the reliability of the transportation method chosen. For the IMTS to remain viable and provide the associated benefits to the nation, both economically and environmentally, it must remain viable. However, significant cost increases within the navigation industry could result in a decline in commodities shipped, thus reducing the overall benefits to the nation.

1.2 Corps' Role in Navigation

The Corps has a proud history of over 200 years of service, improving and developing the nation's water resources. Over that time, changes in congressional and Administration priorities have expanded and refocused its mission.

The role of the Corps with respect to navigation is to provide safe, reliable, and efficient waterborne transportation systems (channels, harbors, and waterways) for movement of commerce, national security needs, and recreation. The Corps accomplishes this mission through a combination of capital improvements and the operation and maintenance of existing projects. Capital improvement activities include the planning, design, and construction of new navigation projects and the rehabilitation of existing projects. These activities are performed for shallow draft (equal to or less than 14 foot project depth) and deep draft (greater than 14 foot project depth) projects on both inland waterways and harbors, and coastal and lake ports, harbors, and channels. With the exception of projects implemented pursuant to a continuing authority, the U.S. Congress specifically authorizes harbor and waterways projects. Financial responsibility for project components is specified in the Water Resources Development Act of 1986 (WRDA 1986), as amended.

Local needs and impacts have always been important in Corps project planning and implementation, and a variety of requirements for nonfederal cost-sharing have existed for many years in relation to Corps

[7] C. James Kruse, A. Protopapas, L. E. Olson, and D. H. Bierling, Texas Transportation Institute, "A Modal Comparison of Domestic Freight Transportation Effects on the General Public", amended March 2009, Chapter 2.

[8] Ibid., pp. 42, 37.

projects. WRDA 1986 significantly increased the nonfederal role for all categories of Corps projects, including navigation projects.

1.3 Corps' Planning Process

The Corps planning process offers a structured approach to problem solving with a rational framework for sound decision making. The planning process is intended to provide sufficient information to determine whether a water resources project warrants federal investment in accordance with the *Principles and Guidelines for Water and Related Resources Implementation Studies* (P&G) prepared in 1983 (the P&G is currently under revision).

A six-step process is used for all planning studies conducted by the Corps. The process is also applicable to other types of studies and its wide use is encouraged. The six steps are (1) identifying problems and opportunities, (2) inventorying and forecasting conditions, (3) formulating alternative plans, (4) evaluating alternative plans, (5) comparing alternative plans, and (6) selecting a plan. Corps decision making is generally based on completing and documenting these steps. It is important to stress the iterative nature of this process.

A single alternative plan is selected for recommendation from among all of those that have been considered. The recommended plan must be shown to be preferable to taking no action (if no action is not recommended) or implementing any of the other alternatives considered during the planning process. The criteria for selecting the recommended plan differ, depending on the type of plan and whether project outputs are National Economic Development (NED), National Ecosystem Restoration, or a combination of both. For all project purposes except ecosystem restoration, the alternative plan that reasonably maximizes net economic benefits consistent with protecting the nation's environment, or the NED plan, is selected. For ecosystem restoration projects, a plan that reasonably maximizes ecosystem restoration benefits compared to costs, consistent with the federal objective, is selected. The selected plan must be shown to be cost-effective and justified to achieve the desired level of output.

For new projects, the Corps conducts a reconnaissance study to determine whether pursuing a project or a modification to a project is feasible. If so, the Corps then conducts a feasibility study to determine whether the project or project modification is in the federal interest. The feasibility study becomes the basis for congressional authorization. Once a project is authorized, additional engineering and design work is performed in the preconstruction, engineering and design (PED) phase leading to construction.

Prior to 1986, project planning studies were funded fully by the federal government. Cost-sharing requirements, to the extent that they existed for project implementation, were often met through in-kind contributions. WRDA 1986 stipulated for the first time that nonfederal sponsors must make actual cash contributions, and it required such contributions for most Corps studies as well as projects. While the WRDA 1986 authorized full federal funding (up to $100,000) for reconnaissance studies—to determine whether a project was needed and if there was an appropriate federal (Corps) role—for virtually all categories of Corps projects, it required that nonfederal sponsors fund 50 percent of the feasibility study—to identify and assess alternative proposals and recommend a preferred option. The exception is that feasibility studies for the 27 named fuel-taxed waterways are conducted at 100 percent federal cost. Nonfederal cost-sharing requirements were also established for implementation (construction) of each specific kind of project (for example, flood control, recreation, coastal harbors, etc.).

At the time the WRDA 1986 was passed, advocates of the statute's new cost-sharing provisions expected available federal funds to be spread among more projects and to be used more efficiently, based on the assumption that nonfederal sponsors would only be willing and able to support truly worthy projects or project features. WRDA 1986 requirement to have nonfederal funding for studies (except fuel-taxed waterways) and projects, and the corollary of having significant involvement by nonfederal project

sponsors, produced a new framework for federal/nonfederal partnerships. With WRDA 1986, the U.S. Congress created a project authorization process that called for the Corps to recognize that WRDA 1986's new cost-sharing requirements were intended to give increased weight to nonfederal sponsors' concerns and to increase the role of those sponsors and their congressional representatives in deciding the scope of studies and selecting project designs . Because of the unique trust fund mechanism chosen to fund inland waterways projects, WRDA 1986 established the IWUB to make recommendations to the Secretary on construction and rehabilitation priorities and on spending levels on the commercial navigational features and components of the inland waterways and inland harbors of the United States.

1.4 Inland Waterways Users Board

Section 302 of WRDA 1986 created the IWUB, which consists of 11 members appointed by the Secretary of the Army to provide a regionally balanced representation of the primary commercial users and shippers using the inland waterways system. In addition, representatives of the Secretaries of Army, Agriculture, Commerce, and Transportation currently serve as nonvoting official federal observers of the Board.

The Board is a federal advisory committee intended to give commercial users a strong independent voice in the investment decision making they are supporting with their cost-sharing tax payments. The principal responsibility of the Board is to annually recommend to the U.S. Congress, the Secretary of the Army, and the Corps the prioritization of new and replacement inland navigation construction and major rehabilitation projects. The Board typically meets three times a year. The Board has no staff of its own and receives staff support from Corps employees. The Corps Deputy Commanding General for Civil Works and Emergency Operations currently serves as the Board's Executive Director.

Since its creation, the Board has submitted 23 reports providing its recommendations on construction and rehabilitation priorities and spending levels on the commercial navigation features and components of the nation's inland waterways and inland harbors. Its most recent report was submitted in August 2009.

1.5 Inland Waterways Trust Fund

1.5.1 Legislative Background

The IWTF was authorized by two separate acts of the U.S. Congress. The original authorization was contained in the Inland Waterways Revenue Act of 1978 (Public Law 95-502, October 21, 1978, Sec. 1801 et seq; hereinafter, the "1978 Revenue Act"). Under the 1978 Revenue Act, the U.S. Congress created the IWTF within the U.S. Treasury for the purpose of "making construction and rehabilitation expenditures for navigation on the inland and coastal waterways of the United States as provided in appropriations acts." The U.S. Congress funded the IWTF with a "tax on fuel used in commercial transportation on inland waterways" and statutorily defined 26 specific segments of the inland and intracoastal waterways to be subject to the tax and to be eligible for construction and rehabilitation expenditures from the IWTF.

As indicated in Table 1-1, the inland fuel tax began October 1, 1980, at the rate of $0.04 per gallon and incrementally increased to $0.10 per gallon beginning October 1, 1985. The 1978 Revenue Act did not authorize any new program, project, or activity and further provided that no expenditures from the IWTF could be made "unless the law authorizing the expenditure for which the amount is appropriated explicitly provides that the appropriation is to be made out of the Trust Fund."

Table 1-1. Inland Waterways Fuel Use Tax Rates, 1980–Present

If fuel use occurs:	The tax per gallon is:
After September 30, 1980	$0.04
After September 30, 1981	$0.06
After September 30, 1983	$0.08
After September 30, 1985	$0.10
During 1990	$0.11
During 1991	$0.13
During 1992	$0.15
During 1993	$0.17
During 1994	$0.19
After 1994	$0.20

Because the inland waterways fuel tax began to be collected in October 1980, while neither the 1978 Revenue Act nor other legislation initially explicitly authorized expenditures to be made from the IWTF, the unspent balance in the IWTF began to grow, reaching $260.2 million by the time the U.S. Congress had completed and the President had signed the second law— WRDA 1986 in November 1986— authorizing the IWTF. No construction or rehabilitation projects on the inland waterways system received funding from the IWTF between the 1978 Revenue Act's passage and enactment of WRDA 1986.

WRDA 1986 in essence re-created the IWTF. While WRDA 1986 repealed the provisions of the 1978 Revenue Act that had originally established the IWTF (including the limitation that "no amount may be appropriated out of the Fund unless the law authorizing the expenditure…explicitly provides that the appropriation is to be made out of the Trust Fund") and that had addressed the availability of expenditures from the IWTF. WRDA 1986 also made clear that "the Inland Waterways Trust Fund established by (WRDA 1986) shall be treated for all purposes of law as a continuation of the Inland Waterways Trust Fund established by…the Inland Waterways Revenue Act of 1978." In this way, WRDA 1986 increased the inland waterways commercial fuel tax rates, as shown in Table 1-1, up to the current $0.20 per gallon tax, which started in January 1995 and continued thereafter. WRDA 1986 also added the Tennessee–Tombigbee Waterway to the list of fuel-taxed inland and intracoastal waterways and specifically authorized the construction of eight inland waterways system modernization projects. Inland and intracoastal waterways projects that were already authorized, but not completed, were allowed to proceed at 100 percent federal funding without drawing from the IWTF.

WRDA 1986 generally set fixed future project cost-sharing formulae for the various Corps project mission categories (e.g., coastal harbors, flood control, hydroelectric power, recreation, etc.). That approach was followed for inland waterways system operations and maintenance (O&M) projects in Section 102(b) of WRDA 1986, which continued the policy that had been in place for almost 200 years and provided that "the Federal share of the cost of operation and maintenance of any project for navigation on the inland waterways is 100 percent." However, for inland and intracoastal waterways "construction" projects, the U.S. Congress took a different approach. Instead of establishing a fixed cost-sharing formula applicable to all inland waterways construction projects, WRDA 1986 established fixed construction cost-sharing requirements only for the eight inland waterways modernization projects specifically authorized in WRDA 1986, providing for those specific projects that "one-half of (construction) costs shall be paid only from amounts appropriated from the Inland Waterways Trust Fund." The term "construction" was defined as including "planning, designing, engineering, surveying, the acquisition of all lands, easements, and rights-

of-way necessary for the project, including lands for disposal of dredged material, and relocations necessary for the project."

In every subsequent post-1986 water resources development act that authorized additional new construction projects on the inland waterways system, the U.S. Congress has followed the 50/50 cost-sharing precedent established in WRDA 1986 for those newly authorized inland and intracoastal waterways modernization projects, essentially following the 1978 Revenue Act's repealed provision statutorily requiring that approach.

The 27 waterways or waterways segments where the tax applies, as described in the two acts, have their limits defined by river-mile points in most cases (see Appendix A). Based on the high specificity of those descriptions, the intent of the U.S. Congress has been interpreted generally to mean that the fuel tax applies only on waterways mainstems. Unspecified tributaries and side channels are exempt, with one exception. Although both acts specify that expenditures from the IWTF are for the waterways described, WRDA 1986 specifically authorized use of the IWTF for a new Bonneville Lock below the downstream limit of fuel taxes on the Columbia River.

The provisions of the 1978 and 1986 acts are codified in the Internal Revenue Code of 1954 as follows: establishment of the Trust Fund in Section 9506 of Subchapter A, Chapter 98; and imposition of the Inland Waterways Fuel Tax in Section 4042 of Chapter 31. Procedures for operation of the IWTF are contained in Memoranda of Understanding (MOUs) between elements of the Treasury Department, and between the Treasury Department and the Corps.

1.5.2 Operation of the Inland Waterways Trust Fund

The IWTF is an invested fund. Fuel tax revenues are invested in interest-bearing obligations, and IWTF revenues are a combination of tax receipts and interest earnings. The Treasury Department is responsible for estimating and investing tax receipts and for the administration and accounting of the IWTF. The Corps is in turn responsible for determining the timing and amount of IWTF obligations and for the preparation of the annual budget submission to the Office of Management and Budget (OMB) and the U.S. Congress. The U.S. Congress appropriates funds from general appropriations and the IWTF and specifies which IWTF projects are to be funded from the IWTF in annual appropriations acts.

Fuel tax revenues are credited to the IWTF when tax liability is incurred and prior to the actual collection of taxes. The Treasury Department's Office of Tax Analysis (OTA) estimates the tax revenues to be collected by the Internal Revenue Service (IRS). Collections are quarterly in arrears, based on reports filed by commercial waterways fuel users. Funds are transferred to the Corps based on estimated amounts and subsequently adjusted to reflect actual net collections, including any interest and penalties. The Treasury Department provides a monthly income statement and a balance sheet for the IWTF, with interest on investment and accrued interest reported. IWTF amounts are used to fund construction contracts, in-house labor, and other authorized project costs. No amount may be transferred out of the IWTF unless the law authorizing the expenditure provides that the funds are to be paid from the IWTF. The MOU between the Corps and the Treasury Department requires a transfer request to detail the purpose of the expenditures and specifies a notification period to give the Treasury adequate time to liquidate sufficient investments.

1.5.3 Summary of Inland Waterways Trust Fund Revenues and Expenditures

The IWTF was physically established in February 1981, with the transfer of $10 million in estimated fuel tax revenues. By the time that the first expenditure from the IWTF occurred in January 1987, for projects authorized by WRDA 1986, the balance in the IWTF had grown to slightly more than $260 million.

IWTF statistics appear in several publications. The two basic sources for the numbers are the annual Budget of the United States, with amounts based on estimates, and Treasury Department reports, which reflect actual book entries. The Budget estimates and Treasury books are not always comparable because the Budget estimates are for cash available for obligation, whereas Treasury books include unexpended obligations. The balance of the IWTF at the end of FY 2009 was $57.7 million, according to the Treasury Department Inspector General's November 6, 2009, *Audit Report of the Bureau of the Public Debt Trust Fund Management Branch Schedules for Selected Trust Funds for Fiscal Year 2009*. Of that amount, $43.4 million had already been obligated for project work but had not yet been paid out, while only $14.3 million remained available to obligate for new project work. Table 1-2 shows a historical summary for the IWTF from the Treasury statements provided to the Corps and reported periodically to the Board.

Table 1-2. Inland Waterways Trust Fund Cash Flow, 1987–2009 through September 2009, in $Millions

Fiscal Year	Outlays	Tax Revenues	Interest Earnings	Year-End Balances*
1987	24.5	48.3	16.5	300.6
1988	62.1	48.1	24.3	310.8
1989	62.8	47.0	26.0	321.1
1990	117.3	62.8	26.2	292.8
1991	148.6	60.5	21.2	225.9
1992	122.7	69.9	13.7	186.7
1993	74.5	78.6	7.5	198.3
1994	75.7	88.4	9.3	220.2
1995	94.8	103.4	13.3	242.1
1996	85.5	108.4	15.6	280.6
1997	89.5	96.4	17.0	304.6
1998	76.9	91.1	18.3	337.1
1999	88.2	104.4	17.4	370.6
2000	102.4	99.6	20.0	387.8
2001	110.2	112.7	20.9	411.2
2002	106.2	95.3	12.4	412.6
2003	112.7	89.5	9.5	399.0
2004	114.7	90.8	6.9	382.0
2005	128.4	91.3	7.7	352.6
2006	175.1	80.8	9.4	267.7
2007	159.8	91.1	10.4	209.4
2008	171.0	87.6	4.8	130.8
2009	149.5	76.0	0.4	57.7**

*Year-End Balances include previously obligated (but unspent), as well as unobligated funds

**$43.4 million of this balance is already obligated, leaving only $14.3 million available for new obligations

The Treasury's monthly statements consolidate waterways fuel tax receipts and IWTF transactions. These monthly statements are the only publicly available source for consecutive monthly data. Annually, the Treasury Department's Quarterly Bulletin (usually March) shows detailed comparisons of the Treasury's Trust Fund amounts with OMB estimates for future years.

The publicly available budget shows estimates for the current and budget years, along with actual results for the preceding year. These estimates are revised annually. Budget amounts used by the Corps in the IWTF analyses are OMB-approved estimates for future years.

Figure 1-2 shows the outlays, revenues, and year-end balance of the IWTF since the initial Trust Fund expenditure in 1987. From 1989 through 1992, the balance in the Trust Fund diminished as project construction activity proceeded. Beginning in 1993 and continuing through 2002, the IWTF balance increased every year as revenues into the Trust Fund each year exceeded expenditures for the respective year. In FY 2003, after reaching a level of $412.6 million, the Trust Fund balance began to decline as the Administration and the U.S. Congress dedicated increased amounts of IWTF resources to inland waterways system modernization. This trend continued through FY 2009, with IWTF expenditures exceeding revenues each year between 2003 and 2009, resulting in declining IWTF balances in each of those years and a 2009 balance of $57.7 million, most of which previously had been obligated for project work underway but not yet completed. The Board strongly supported this FY 2003–2009 spend-down of the IWTF balance as a fulfillment of what it considered the mission of WRDA 1986, whereby fuel tax revenues would be spent to modernize the inland waterways system and would no longer be “banked” by the federal government for other uses.

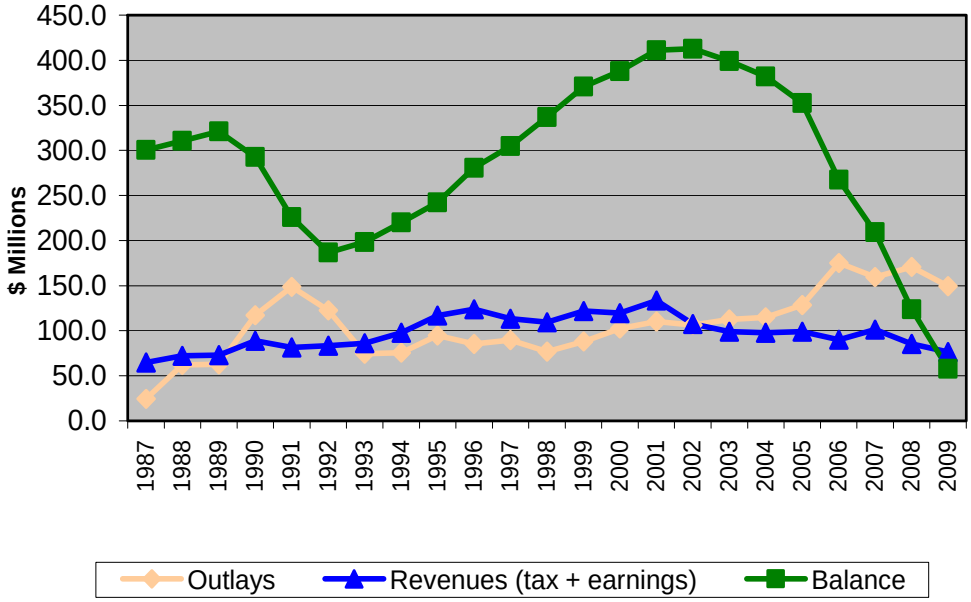


Figure 1-2. Inland Waterways Trust Fund Financial History

While the amount of fuel tax revenue changes from year to year based on a number of factors, average tax revenues into the IWTF over the past five years have been about $85 million per year, declining to only $76 million in the recession year of 2009. As a result, under current law and without further relief, with the IWTF balance almost drawn down, future annual IWTF expenditures will be limited to the amount of annual fuel tax revenues collected for that particular year. Without a change in revenues, cost-sharing policy, or both, some ongoing modernization projects as well as newly authorized projects will continue to be delayed.

The U.S. Congress provided limited relief in FY 2009. In an effort to minimize the effect of the constrained IWTF funds, the Consolidated Security, Disaster Assistance, and Continuing Appropriations Act, 2009, PL 110-329, and the Omnibus Appropriations Act, 2009, PL 111-8, temporarily exempted lock and dam major rehabilitation projects from being cost-shared with the IWTF, albeit with the expectation that the Trust Fund share would be reimbursed at a future date. The American Recovery and Reinvestment Act of

2009 (Recovery Act) (Public Law 111-5) provided additional relief, permanently exempting IWTF cost-sharing for inland waterways system construction and major rehabilitation work funded under the Recovery Act.

1.6 Completed Projects

Since the beginning of withdrawals from the IWTF following enactment of WRDA 1986, 22 IWTF cost-shared projects have been completed through FY 2009 (see Table 1-3). Two additional projects (Upper Miss 27 Rehab and Lockport) will finish in FY 2011 and 2012, respectively.

Table 1-3. Completed Projects Cost-Shared from the Inland Waterways Trust Fund (as of March 2010)

Project	Start Year	Completion Year[1]	Construction Duration (Years)	($ Million) IWTF Cost	($ Million) Total Cost
Bonneville New Chamber	1987	1994	8	170.6	341.0
Oliver Replacement L&D	1987	1991	5	60.0	123.3
Price Auxiliary 600' Chamber	1987	1993	7	106.3	212.6
RC Byrd New 1,200' and 600' chambers	1987	1993	7	191.7	383.5
Grays Landing Replacement Lock	1988	1993	5	89.0[4]	178.0[4]
Grays Landing Dam	1993	1995	2	[4]	[4]
Point Marion New Chamber	1989	1994	6	56.6	113.1
Winfield New Chamber	1989	1997	8	118.2	236.3
Illinois Waterway (4 Rehabs)	1993	1996	4	13.6	27.2
Upper Miss 13 Rehab	1993	1996	4	10.4	20.7
Upper Miss 15 Rehab	1993	1996	4	9.8	19.6
Brazos Locks Rehab	1994	1995	2	4.5	9.0
Sargent Beach Protective Barrier	1994	1999	6	26.4	52.8
Upper Miss 25 Rehab	1994	2000	7	13.0	25.9
Marmet New Chamber	1998	2009	10	202.9	405.8
Upper Miss 3 Rehab	1998	2009	10	3.7	71.2
London Rehab & Lock Extension	2000	2003	4	11.5	22.9
Upper Miss 12 Rehab	2000	2003	4	5.2	14.7
Upper Miss 11 Rehab	2002	2008	7	20.3	47.3
Upper Miss 19 Rehab	2003	2008	6	15.8	31.6
Upper Miss 27 Rehab	2007	2011	5	3.4	37.3
Upper Miss 14 Rehab	1996	2000	5	10.0	20.0
Upper Miss 24 Rehab	1996	N/A[2]	N/A	N/A	N/A
McAlpine 1,200' Auxiliary	1996	2009	14	212.9	429.3
Lockport Rehab	2006	2012[3]	7	0	136.8

1. Completion year is when facility was placed in service, not when the project was closed out administratively.
2. Cost and completion date pending results of ice vibration study and recommended repairs.
3. Balance to complete was fully funded with Recovery Act funds in FY 2009.
4. Grays Landing Costs include the Lock Replacement and Dam

1.7 Goals

In a memorandum to the heads of executive departments and agencies dated 21 January 2009, President Obama wrote, “Executive departments and agencies should offer Americans increased opportunities to participate in policy making and to provide their Government with the benefits of their

collective expertise and information." He also stated, "Government should be collaborative. Collaboration actively engages Americans in the work of their Government."[9] Given the current revenues being generated and depleted balance of the IWTF, the current backlog of authorized projects, and the declining reliability of the IMTS, the Corps is collaborating with the Board to identify ways to improve the capital projects business model in tandem with developing an investment strategy designed to improve and ensure the long-term viability of the IMTS. This working group is called the IMTS Capital Investment Strategy Team (IMTS CIS Team, or the Team).

The goals of this team are the following:

1. Identify ways to improve the project delivery system (i.e., more reliable estimates, better contracting practices, improved project management) to ensure that future system improvements can be completed on time and within budget.
2. Develop a list of long-term capital needs for the inland navigation system, including an objective methodology for prioritizing those needs.
3. Develop a capital investment program that balances reliability with affordability.
4. Develop and recommend a strategy to help ensure that those funding requirements can be met with reasonable certainty and efficiency.

1.8 Methodology

This report broadly examines the Corps' planning and budgeting activities, describes the project delivery process and recommended improvements discussed by the Corps and the Board; and discusses alternative approaches and criteria necessary for prioritizing and managing the existing portfolio of required inland marine projects. This report relied on the following range of data and methods.

Review of Studies and Reports

The Team reviewed reports issued by expert panels concerning the overall Corps' Civil Works construction projects, reports evaluating inland marine transportation improvements (e.g., *Improving the Inland Marine Transportation System*), and reports on problems of project planning and funding (e.g., *Inland Navigation Construction Efficiency Case Studies* and Corps project planning reports). These reports were informative and provided a wealth of information and analysis related to the Corps' planning processes and the context in which they are carried out, as well as a number of recommendations that coincide with those that this Team ultimately developed. The references list contains the studies, monographs, and reports reviewed.

Review of Federal and Corps-specific Policy Documents

The IMTS CIS Team considered federal and Corps policy documents on planning and budgeting. These documents included Civil Works strategic plans, regulations, Corps-issued engineering circulars and regulations, and the OMB's budget guidance. The IMTS CIS Team also reviewed budget and funding processes and documents, such as Corps budgets and project decision documents.

Interviews with Corps Personnel and Key Stakeholders

The IMTS CIS Team conducted informal interviews with Corps personnel, as well as inland waterways system representatives, including civilian and military managers, staff economists, members of the Institute for Water Resources, and key waterways commercial users.

[9] Memorandum, signed by President Obama, SUBJECT: Transparency and Open Government, 21 January 2009

Working Sessions with the IMTS CIS Team

Over the last 12 months, representatives of the Corps and the navigation industry engaged in numerous working sessions to discuss limitations of the current capital projects business model, recommend ways to improve the model, and suggest actions that could be taken to overcome obstacles to future progress.

1.9 Report Outline

This report is organized into the following chapters:

- **Chapter 1 – Background.** This chapter describes the Corps mission, development and implementation of the IWTF, and the creation and role of the Board. It provides a brief history of the legislative background leading to the trust fund, how the trust fund has operated, and a discussion on the revenue stream associated with the trust fund. It also describes the scope, goals, and methods of the study.
- **Chapter 2 –Capital Project Business Model – Prior and Current.** This chapter describes the Corps' past and current project delivery process. It begins with an overview of the modifications that have occurred to date with the capital projects business model. This chapter also addresses concerns with the Corps' past and current construction program.
- **Chapter 3 – Capital Project Business Model – Future.** This chapter describes the first step of the strategy, which is focused on improving the current project delivery process. It identifies potential improvements that are being evaluated for incorporation into the project delivery process, including, but not limited to, improving planning and risk mitigation communication, implementing risk-based cost and schedule estimates, standardizing designs, design/review centers, and using alternative contracting methodologies.
- **Chapter 4 – Twenty-Year Capital Investment Strategy.** This chapter describes the steps in developing the Twenty-Year Capital Investment Strategy, including developing an unconstrained project list defining the evaluation criteria used to prioritize projects for funding, and addressing the principles and defining elements associated with the prioritization process.
- **Chapter 5 – Cost-Sharing Model and Revenue Plan.** This chapter describes revenue options considered for funding the 20-year capital investment strategy and cost-sharing options that could be applied after the revenue level is determined.
- **Chapter 6 – Implementation Strategy.** This chapter describes how potential recommendations and future considerations should be implemented and how the investment strategy process should be managed.
- **Chapter 7 – Summary of Final Recommendations.** This chapter presents the Team's recommendations from this study.

2. Capital Project Business Model – Prior and Current

This chapter discusses the prior and current capital projects business models used to select, fund, and construct capital improvements to the inland waterways system. Understanding the current business model is crucial to formulating and substantiating the improvements needed for the future capital projects business model.

The Corps has played a major role in the nation's water management since the country's founding, and it is uniquely positioned to play a continuing pivotal role in managing inland waterways into the future. The project delivery model that has worked in the past is no longer appropriate for effective inland waterways management, as documented in the *Inland Navigation Construction Selected Case Studies* report completed in July 2008. Fundamentally, local district and regional division efforts focused on addressing regional needs and improving infrastructure problems do not yield the optimum systems investments unless coordinated IMTS investment planning is regularly practiced to account for the significant and numerous economic, energy, and environmental challenges the nation faces. As investigated in the *Inland Navigation Construction Selected Case Studies* report and specifically recognized by the IMTS CIS Team, in recent years there has been an undesirable trend of lock and dam construction projects significantly exceeding their originally authorized cost and original schedule. The Corps and the waterways industry recognize this trend and collaboratively have established the recommended process improvements discussed in Chapter 3.

Concerns with the current projects business model include (1) the size and scope of project cost overruns and (2) delays in project schedules. Some project completion delays result from federal budgeting and appropriations processes that provide funding in annual, and often insufficient, increments rather than under a more reliable, full upfront funding or multiyear funding structure that could provide certainty for more efficiently administered contracts and project construction. To provide a historical perspective, projects that were authorized by WRDA 86 were physically completed within an average of 6.3 years with an average increase of 32.5 percent above the authorized costs. Projects authorized since then and those being constructed under the current process are sometimes taking up to 20 years or more to complete and are costing more than double the authorized amount. An example of longer construction duration would be the McAlpine Locks and Dam project in Louisville, KY. The recently completed new 1,200' lock took 10 years to complete. A virtually identical lock chamber, located next to this new lock, took only three years to complete back in 1961. A seven-year difference in construction time reveals a large delta in developing accurate capital planning forecasts and points to potential project delivery issues.

The discussion below sets the foundation for understanding the planning and funding environment that existed (per the original and current capital projects business model) and the areas requiring improvement as inland marine planning continues into the future.

2.1 Capital Projects Business Model Characterization Prior to 2006

Prior to 2006, the IWTF developed a large surplus, peaking at over $400 million. Project construction began without consideration of subsequent year funding, other projects, and total system funding demands.

The evaluation process for lock replacements and major rehabilitations was on an individual project-by-project basis. If the economic analysis showed a favorable return on investment, the project went forward. Study funds were not highly constrained, and many projects were evaluated and authorized. These evaluations led to large numbers of projects proceeding to the PED phase, where funds were a little more constrained. Still, a large number of projects received PED funds. Upon completion of PED, the projects awaited construction funds. These funds were more constrained and resulted in projects being compared against one another, almost exclusively based on the benefit-to-cost ratio. Some projects advanced to construction through the Administration's "New Start" process, while others received congressional appropriations without being recommended as a new start by the Administration. There was not a clear process for evaluating or prioritizing the new starts nationally and matching them to anticipated future funding.

Program performance focused on obligations and expenditures of annual appropriations. Cost overruns were addressed by fiscal flexibilities such as reprogramming. The large balance in the IWTF diverted attention away from the concern for the 50/50 cost-sharing portion of any overruns. Reprogramming of funds from projects that could not obligate the funds in a given year to projects that could was a routine program management practice. These fiscal flexibilities contributed to a management belief that fiscal shortfalls would work themselves out.

The continuing contracts clause presented another fiscal flexibility: it allowed the Corps to award contracts without all of the funding being available at the time of award and to continue construction with limited funding under the expectation that additional funding would be appropriated in the future. These construction efforts could continue with the contractor essentially self-financing the work or receiving partial payments during continuing resolutions. The payments would then be resolved, and the funds earned were paid with interest once an appropriations act was passed.

Emphasis on initiating projects to get them in the pipeline led to spending down the IWTF surplus and simultaneously constructing more projects than could be efficiently funded. The Corps did not manage the program from the perspective of total out-year funding requirements for the work being initiated. In some cases on contracts with the continuing contracts clause, work proceeded on the contractor's efficient funding schedule, even if the annual appropriation was less. For example, if a construction project's annual appropriations amount did not meet what the contractor earned in a given fiscal year, the amount owed the contractor carried into the next year, plus interest. The amounts needed for "catching up" continuing contract work escalated to the point that the U.S. Congress considered that the Corps was directing construction program funding rather that requesting it.

During this same timeframe, the capital projects business model was narrowly focused on the Corps' execution of individual projects that were initiated on a first-come, first-serve basis. Projects were initiated in the planning process by local recognition of needed action for either rehabilitation due to deteriorated condition or new construction to improve capacity at that particular location in the IMTS. The benefits and impact to the overall system were not considered.

Projects that received authorizations and appropriations were implemented per congressional legislation; however, the funding commitment from the combined IWTF and general appropriations was constrained to remain within a notional construction program allocation, which apportioned available funding among the various Corps water resources mission areas. Annual, constrained funding for many projects did not provide for efficient construction.

> **The Result**
> An oversubscribed construction program afflicted by insufficient and inefficient funding delayed construction schedules, and significantly escalated construction costs.

To provide a measure of prioritization for projects throughout the IMTS, the Board annually prepared a report to the Assistant Secretary of the Army for Civil Works (ASA (CW)). This report categorically recommended which projects should be "Capstone Activities," "High Priority Projects," "Priority Studies and PED Projects," and "Complete Expeditiously." However, the missing, complementary business element for such a prioritization would have been cohesive fiscal management of the national network of systems (i.e., the IMTS), an element that would have comprehensively evaluated the potential investments versus the program allocation level. Although this report hinted at some of the process's shortcoming, several key aspects were missing that would have enabled the Board's recommendations to be effective:

1. The prioritization did not include a national IMTS assessment that considered and recommended which particular project should be "next."
2. The prioritization lacked an enabling funding commitment for the duration of the projects' construction periods; this funding commitment was, and continues to be, the most crucial systemic problem facing the entire construction program.
3. The prioritization process lacked transparent, traceable, performance metrics that underscored National Economic Development.

2.1.1 Corps Internal Pre-2006 Management General Approach

The following highly chronological general approach highlights the internal Corps practices to create and implement IMTS capital projects prior to 2006. Detailed practices and issues with this approach are discussed in the next section.

1. **Identify capital needs.** Districts and the navigation industry identified problems with the inland marine infrastructure.
2. **Evaluate recapitalization.** Studies were conducted primarily on a site-specific or subsystem basis to determine whether to repair, rehabilitate, or replace the deficient structure or to construct a new, often larger, asset.
3. **Review study report.** Each reconnaissance, feasibility, and rehabilitation report was reviewed for quality control by Division and Headquarters, with consideration given to the merits of the stand-alone project and not to the project's merits when compared to other improvement projects in the overall IMTS.
4. **Request authorization.** If warranted by the results of the study, the Corps requested authorization for construction (expansion or replacement) or rehabilitation projects.
5. **Request funds.** Funds were requested to execute projects with little emphasis for efficiently funding the entire portfolio of projects. At the same time, the President's Budget portfolio of construction

funding requests was constrained to a notional amount with the intent to keep many projects going simultaneously. The Administration also provided guidance on whether or not to include new starts in the President's Budget.

6. **Execute projects.** The execution of projects was narrowly focused on a single metric: 98 percent minimum expenditure of the annual appropriations.

2.1.2 Corps Internal Pre-2006 Capital Projects Practices and Issues

The following practices were common to the pre-2006 capital projects business model:

- **Continuing contracts.** The continuing contracts clause is used to enable awarding of very large civil works contracts with funding only available on an annual basis. There is a commitment built in that the contract will continue from year to year with annual appropriations. The original continuing contracts clause also allowed contractors to self-finance if they worked ahead of schedule. This provision effectively obligated the future year's yet-to-occur appropriation. The upside of operating in this manner is that the contractor continues uninterrupted and avoids high demobilization–mobilization costs; the project's progress is maintained. The downside, though, is that the contractor self-finances expenses, which increases the project cost since the contractor is entitled to interest on the work that he or she self-finances. Through this practice, appropriations were being directed rather than requested.
- **Maintenance versus capital rehabilitation.** Maintenance is funded 100 percent from the general appropriations O&M account, whereas new construction and major rehabilitations are cost-shared between the general appropriations construction account and the IWTF. Decision on maintenance versus rehabilitation of a project was partially based on whether the work would meet the funding threshold for rehabilitations (about $12 million in 2006). A clear guideline for maintenance and rehabilitation projects was lacking. Often a project or feature could be included in either category. Constrained O&M funds may have contributed to these ambiguous projects being deferred, which first led to an increased number of major rehabilitation projects and in turn led to increased demands on limited IWTF resources.
- **Reprogramming and paybacks.** Frequent reprogramming allowed for the movement of funds to maximize annual expenditure rates rather than to maximize overall project construction efficiency, with expectations that other funds would be reprogrammed to the donor project when required.
- **Expenditures as percent appropriation.** When the annual appropriations for projects occurred, the fiscal management emphasis was on maximum expenditure of funds by the fiscal year-end. Due to the nature of any major construction process, frequently reprogrammed funds between construction projects were necessary to satisfy individual contracts and to meet the 98 percent execution goal. The expenditure of at least 98 percent of the annually appropriated funds was the expressed target performance metric. Success was measured by meeting this 98 percent goal, not by metrics gauging construction schedule or cost efficiency.
- **Project funding focus.** Funding was determined on a project-by-project basis; there was not a programmatic or system-wide approach in place. Project-based funding was systemic throughout project initial inception, authorization, appropriation, and execution. Funding and sequencing were first-come, first-served and were not based on the analyzed risk and consequences of navigation lock component failure, unsuitable performance, system consequences, or the benefits to be gained.
- **New start emphasis.** The primary concern prior to 2006 was getting projects started, with less concern devoted to their future funding. The threshold milestone was believed, corporately, to be starting a new project construction in order to "get it into the queue," which it was assumed

presumably assured that the U.S. Congress would appropriate the needed follow-on funds to continue with the project and that the previously large balance in the IWTF would meet these needs. There was little or no consideration given to the IWTF balance or to the combined general appropriations and IWTF ability to fund the project efficiently. Project starts were determined by congressional appropriations, which may not have been based on the projects with the greatest overall benefits, overall system needs, or risk-reduction effectiveness.

- **Workforce driver.** One of the less evident, but real, drivers of the process was the intent to keep the districts' workforce engaged (e.g., planning, engineering, construction) to retain skills and workforce capability. This intent conflicted with the mission to apply capital investment decisions on projects that yielded the most return-on-investment in the federal interest regardless of where those improvements were physically located. Workload sharing between districts was not widely practiced, and the workforce focus was internal to each district. This practice led to workload imbalances and, in some cases, redundancies.
- **Cost estimating.** Cost estimates were prepared under the assumption that annual appropriations would consistently, without interruption, adequately fund ongoing construction. Some feasibility cost estimates had relatively large error margins. Cost contingencies assessments lacked rigor, and estimates were low partially due to contingency calculations. Too often, optimistic cost estimates and construction schedules were used to maximize benefit-to-cost ratios.
- **Scope definition.** Project scope definitions were created in the Feasibility phase of Planning, and often increased during the Engineering phase of the project. Scope "creep" drove costs higher.
- **Contract acquisition strategy.** Due to the lack of commitment for each annual appropriation to meet the projects' needs, the construction acquisition strategy was based primarily on the traditional design–bid–build approach, which relies heavily upon continuing contracts or multiple contracts awarded in separate years. Annual appropriations and allocations for multiyear projects often did not support an efficient schedule. The annualized piecemeal strategy forced construction inefficiencies, which further increased costs and schedules. Acquisition strategies had to change frequently when the annual appropriation was known.
- **Long-term capital plan.** Pre-2006 practices did not include a long-term vision for the system of inland and intracoastal waterways. The cohesion and benefits of a prudently established construction projects long-term portfolio did not exist. Interaction between the individual projects' budgetary constraints were not readily apparent to each project manager who was forced to contend with rigid process issues mixing with unpredictable annual appropriations.

For all of the above reasons, the past business model became ineffective with issues and deficiencies that needed to be addressed. It needed to be either improved or completely restructured to ensure that the IMTS remained viable far into the future.

2.2 Current Capital Projects Business Model

Improvements to the original business model were initiated in 2006. Since that time, there has been much discussion about other improvements needed in the business process to promote efficiency in the planning, funding, and completion of the Corps capital projects (to be discussed in Chapter 3). This section addresses the modifications that took place after 2006 to improve the process and outcomes associated with the capital projects business model.

2.2.1 Current Project Process Background

Passage of the FY 2006 Energy and Water Development Appropriations Act led to a major shift in the Corps' approach to project and fiscal management. The U.S. Congress directed changes to severely restrict the use of the continuing contracts clause, a practice that had been in place for over 50 years. It also moved to reduce the number of reprogramming actions by requiring congressional notification of such actions. Additionally, the U.S. Congress changed the program execution emphasis from percentages of funds obligated and expended to having the funds remain on the projects for which the funds were appropriated until they were expended.

Because of these legislative changes, the Corps had to reassess the way it pursued construction work. Its solution post-2006 was to break up single "turnkey" contracts into several construction packages that could be fully funded either from that year's appropriation or by pooling the funds of multiple fiscal years. In addition, the Corps processed modifications to remove the original continuing contracts clause from those contracts that had already been awarded.

The Corps also undertook a nationwide review of the construction projects underway to determine the optimum use of limited funds in the IWTF. Some projects were identified to complete work to a certain point and then suspend work until funds to complete them could be identified. Priority was placed on project completions and projects with high-risk safety concerns.

The U.S. Congress provided temporary relief from the IWTF shortfall in the 2009 appropriations act by providing a one-year exemption for lock and dam major rehabilitation projects having to be cost-shared with the IWTF with the understanding that the IWTF share would be paid at a later date. Additionally, the Recovery Act permanently exempted IMTS construction funds appropriated in the Recovery Act from having to be cost-shared from the IWTF.

Since 2006, all projects undergo both a District Quality Review[10] and an Agency Technical Review.[11] In addition, an Independent External Peer Review (IEPR) will be conducted in cases where there are public safety concerns, a high level of complexity, novel or precedent-setting approaches; where the project is controversial, has significant interagency interest, has a total project cost greater than $45 million, or has significant economic, environmental and social effects to the nation; or where requested by the governor of an affected state.[12]

This type of review is applied in cases that meet certain risk and magnitude criteria and warrant examination by a qualified team outside of the Corps. The purpose of the IEPR is to provide the Chief of Engineers with an independent assessment of the adequacy and acceptability of the economic, engineering, environmental methods, models, data, and analyses provided, as well as the range of alternatives and the adequacy of risk and uncertainty analyses.

Under the current capital projects business model, the Corps' inland waterways projects that have already started construction would require an estimated $3.8 billion to complete. At current IWTF revenues of about $75 to $85 million per year, plus the matching federal appropriations, these projects would not be completed until the 2035 to 2040 timeframe. The Corps also estimates that there is an additional $4.3 billion of work already authorized on other projects. In addition, there are many projects that could be required that have not yet been authorized or studied.

[10] A District Quality Review is a review of basic science and engineering work products focused on fulfilling the project quality requirements defined in the project management plan.
[11] An Agency Technical Review is a review to ensure the proper application of clearly established criteria, regulations, laws, codes, principles, and professional practices.
[12] Department of the Army, EC 1165-2-209, *Civil Works Review Policy*, Washington, D.C.: January 2010, pp. 9-10.

2.2.2 Current Capital Projects Business Model Improvements Implemented

The following improvements to the capital projects business model have already been recognized and implemented since 2006:

- **Capital process issues comparison: selected case studies.** Key to the implemented changes was the beginning of the capital projects business model examination. While some of the individual improvements (explained below) could be slowly implemented, a tool needed to trigger the larger formulation of improvements was missing. To create such a tool, the Board, along with 22 key leaders of the inland navigation industry, met with the ASA (CW) on June 12, 2007, to discuss the first step in implementing process improvements. The report, *Inland Navigation Construction Selected Case Studies,* was produced, resulting in the tool needed to begin to understand and strategically convey the IMTS capital projects business model issues in plain language.
- **System risk comparisons.** Projects are being evaluated based on system-wide benefits and their ability to minimize overall system risk. Operational Condition Assessments (OCAs) are being performed for all inland locks and dams in FY 2010 to assess the condition of Corps assets and determine the risk of failure on a consistent, nationwide basis.
- **Risk-based cost estimates.** In the past, cost estimates were based on assuming that the Corps would receive the maximum funding that it could efficiently spend each year. Risk-based analysis identifies and measures the cost and schedule impact of uncertainties on the estimated project cost. It can evaluate areas of high-cost uncertainty and the probability that the estimated project cost will or will not be exceeded. This analysis provides a more realistic cost estimate and construction schedule and is an additional tool to assist in the decision making associated with project planning and design. The Corps adopted a risk-based cost estimating approach in 2007[13] for projects estimated to cost more than $40 million and established the Cost Estimating Center of Expertise in Walla Walla, Washington.
- **Optimized versus constrained funding.** Projects prior to 2006 were typically constrained, regardless of the relative risk reduction or benefits that the projects afforded when complete. This practice changed to identify those projects that have the highest benefits and to fund those projects at an optimum or close to optimum level (i.e., funding for efficient construction). For example, Olmsted Locks and Dam had the highest benefits and was designated a National Priority Project. While this identification practice offered a partial solution, the available total construction funds could not satisfy the entire portfolio of active projects.
- **High-risk project budget prioritization.** Budgeting emphasis has been shifted away from notional constrained levels to optimal budgets for high-risk projects. For example, Emsworth Locks and Dams Major Rehabilitation received optimum budget requests and was put near the top of the annual priority list due to the dam instability factor.
- **Contract acquisition strategy.** The acquisition strategy has changed from large continuing contracts to multiple contracts, where feasible. This change includes the full funding of contracts less than established dollar thresholds (currently at $20 million). This change was not instigated from an intent to reduce the overall project cost or schedule; rather the change was made to preclude contractors, under a continuing contract, from unilaterally incurring government obligations. Whether this measure was an improvement for the navigation construction program is debatable.

[13] Memorandum, signed by General Riley, SUBJECT: Application of Cost Risk Analysis Methods to Develop Contingencies for Civil Works Total Project Costs, 3 July 2007.

- **Project Management Professional (PMP) certification.** Project managers in the Corps are now expected to complete the PMP training and obtain certification. Their training focuses on project cost and schedule control. While thus far only some Corps project managers have successfully satisfied this expectation, in the near future virtually all PMs will be expected to have met it.
- **External peer review.** Feasibility studies for projects where there are public safety concerns, a high level of complexity, novel or precedent-setting approaches; where the project is controversial, has significant interagency interest, has a total project cost greater than $45 million or has significant economic, environmental and social effects to the nation; or where requested by the governor of an affected state are required to undergo an independent review of the evaluation criteria and the project's overall merits and alignment with the Corps' mission.

Table 2-1 compares the Corps' pre- and post-2006 tools for inland navigation project delivery.

Table 2-1. Comparison of Project Delivery Tools Pre-2006 to Current

Tool	Pre-2006	Transition	Current Approach
Contract	Single "turn-key" contract	Established fully funded contract thresholds: $5 million, $10 million, and $20 million	Multiple contracts, each fully funded
Continuing contract clause	Universally used	Removed from existing contracts	Used by exception; requires ASA (CW) approval
Reprogramming	Used frequently	Reduced its usage	Rarely used
IWTF balance	Surplus	Declining balance, eventually limited the appropriation	Minimum balance; month-to-month cash flow
Study funds	Not heavily constrained	Constrained	Prioritized and scheduled

3. Capital Project Business Model – Future

Given the issues with the current business model described in Chapter 1 and the need to improve the process so that the IMTS remains reliable and resilient for the foreseeable future, change to the model is essential. The economic service life of locks and dams is 50 years, but currently 54 percent of the locks and dams in the IMTS are more than 50 years old and 36 percent are more than 70 years old. Without a comprehensive plan to ensure timely replacement and rehabilitation of deteriorating system components, unscheduled closures will become commonplace and a reliable system cannot be guaranteed to the waterways industry and the shippers who use it.

At the same time that system components are deteriorating, the MARAD is predicting a dramatic growth in domestic freight volume. Since other surface modes of transportation (rail and truck) face capacity constraints during normal economic circumstances, many see the inland waterways, which do not suffer systemic capacity constraints, as part of the solution to the nation's future freight transportation needs. Yet, increases in movement of the bulk commodities historically moved by water and new intermodal cargoes shifted to water from other modes could, without a sound program to maintain and, where appropriate, enhance our inland waterways infrastructure, lead to congestion within the waterways, higher risks for systems to be damaged, and expedited needs for repair. If more users come to rely on the waterways, especially for time-sensitive cargoes such as intermodal containers, maintaining system reliability becomes even more important. Without reliable waterways, not only will we lose the opportunity to take the strain off of other modes through increases in waterways transportation, we will risk shifting the vast quantities of cargo currently moved by water to truck and rail, further exacerbating congestion in these modes and increasing the costs of maintaining those systems.

Chapter 1 notes the issues with the past and current process, including (1) the size and scope of project cost overruns, (2) delays in project schedules, (3) a focus on individual projects rather than the system, and (4) an emphasis on project starts rather than project completions.

Replacing the existing prioritization methodology with a prioritized national project list will optimize system reliability by focusing investments where needed to reduce instances and durations of unscheduled closures. Achieving the benefits of the new methodology will require discipline at all stages of the process. Inserting a project or advancing a new construction start can adversely impact a great number of projects. The more efficient system-focused process will require a tremendous a commitment and a tremendous amount of compromise from all parties involved in the process.

The IMTS capital investment strategy also needs to be supported through an appropriate mechanism, one that ensures appropriation of the federal share of program costs and generates sufficient revenue from users to meet the cost-share requirements. This mechanism will likely require a 30 to 45 percent increase in the fuel tax paid by industry. The success of the IMTS capital investment strategy is dependent on this: providing 100 percent definition of project scope and realistic, achievable, risk-based,

80 percent confidence level[14] estimates of project costs and schedules through completion of the feasibility report. The Corps is also seeking out best practices for program and project management during planning, design, and construction to ensure efficient, cost-effective, and timely completion of funded work with minimal design and construction changes.

3.1 The Future Capital Project Business Model

The goals of an improved capital project business model include the following:

- A timely and efficient planning process guided by a sound IMTS investment plan.
- Facilities assessed for continued structural, operational, and economic viability.
- Priorities set to provide best overall return for the program .
- An investment plan supported through an appropriate funding mechanism.
- One hundred percent definition of project scope and targeted 80 percent or higher confidence level risk-based estimates of project costs and schedules through completion of the feasibility report.
- Improved program and project management to ensure efficient, cost-effective, and timely completion.
- Evaluation of actual benefits to confirm feasibility report predictions.
- Monitoring and measurement of program and project performance.
- An increased Board role throughout the process.

The future capital project business model, as shown in Figure 3-1, changes the status quo in two main areas. First, life-cycle asset management analysis will provide criteria for project prioritization, and second, the capital decision will use the prioritization to make decisions on where to best allocate constrained funding to provide for the best IMTS.

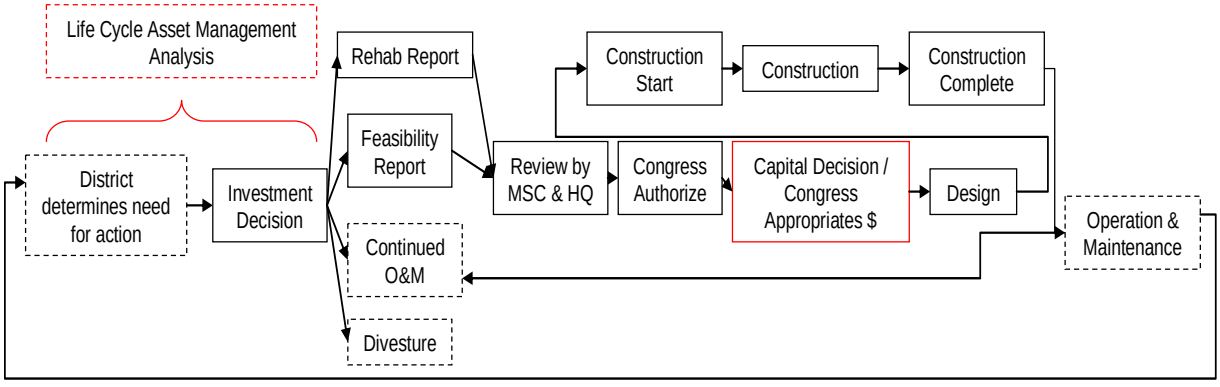


Figure 3-1. Future Capital Projects Business Model

Greater Incorporation of Life-Cycle Asset Management Principles

The Corps is the steward of the fourth largest asset portfolio, by value, of all federal agencies. The public expects the Corps to manage that portfolio in an accountable and responsible manner. The Corps will carry out this responsibility through asset management, a risk-informed decision-making process that assesses the life-cycle trade-offs of a portfolio of projects within a watershed system. Figure 3-2 illustrates several strategies that could be used to manage assets. Strategy “A” provides a new asset, performs minimal routine maintenance (RM) and periodic maintenance (PM), replaces the asset when it reaches a

[14] The 80 percent confidence level is consistent with level used by other federal agencies.

minimum acceptable standard, and results in the shortest asset lifespan. Strategy "B" involves some level of routine and periodic maintenance and results in a longer lifespan. Strategy "C" represents the ideal solution: it involves routine and periodic maintenance of the asset, major rehabilitation, and continued routine and periodic maintenance and results in the longest asset lifespan.

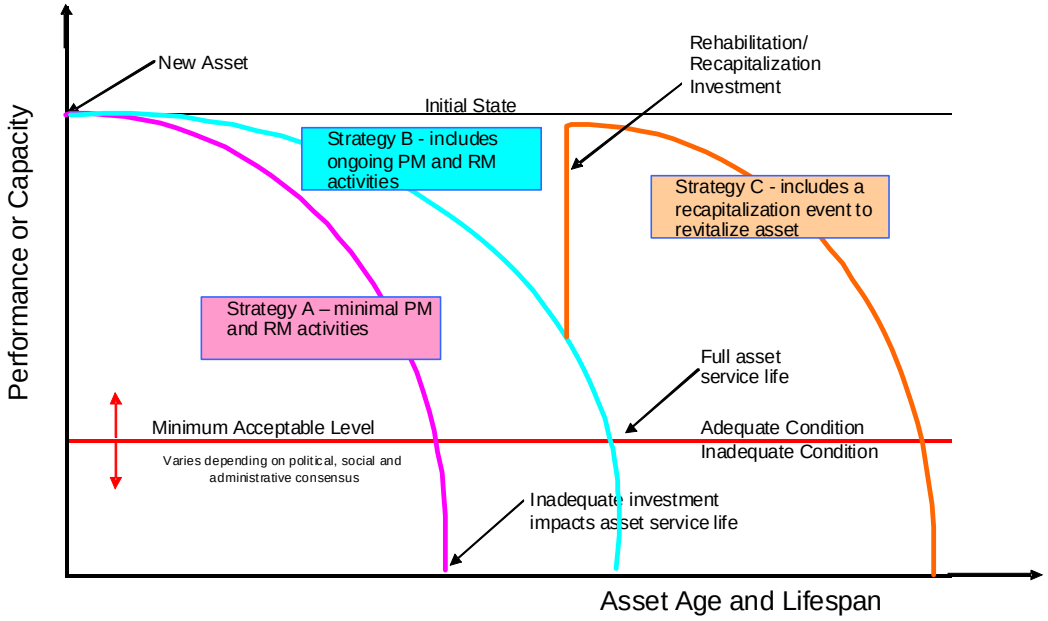


Figure 3-2. Asset Age and Lifespan

Within the Civil Works Program's overall watershed management philosophy, the Corps plans to expand its life-cycle management efforts at the tactical level to incorporate a holistic, integrated, and strategic approach that embraces a national IMTS perspective. This enhanced asset management outlook will enable risk-informed, life-cycle investment decisions that include an assessment of sustainment, restoration, and modernization projects, as well as portfolio trade-offs. In addition, asset management will be the unifying catalyst to ensure integration of the IMTS with other business lines, major programs, and initiatives to improve vertical as well as horizontal communication and collaboration. As a result of this multidimensional communication and collaboration, the Corps expects to leverage resources, eliminate duplication, understand economic and other consequential trade-offs, adapt to new and anticipated requirements, and benefit from synergy.

Ultimately, this broader asset management approach is intended to provide common practices for inventorying, assessing condition and risk, and categorizing IMTS assets and evaluating them in the context of their relationship to one another and to other assets in the watershed to help determine each asset's strengths, weaknesses, and value to the system's mission. It is designed to provide a strategy for O&M, capital investment, and disposition decision making at the strategic, tactical, and operational level. The strategy's objective is to balance benefits, consequences of failure, and risk against life-cycle costs. In the end, this formal asset management approach will help the Corps improve reliability, minimize risk, and meet projected infrastructure demands. It will also formalize business processes that standardize

best practices, promote accountability, and predict work requirements. These processes will support defensible budgets that account for requirements across the IMTS and at the watershed system level. The life-cycle asset management analysis is a key driver in the IMTS capital investment strategy.

Project Prioritization That Guides Capital Decisions

The future capital project business model will also include a long-term IMTS investment strategy that identifies and prioritizes capital investments to provide a safe, reliable, highly cost-effective, and environmentally sustainable IMTS. As the Corps transitions to the future business model, many of the issues and problems identified with the past and current models will be resolved through new tools, practices, or processes. These process improvements are discussed in the following paragraphs. The investment strategy is detailed in Chapter 4.

3.2 Project Delivery Process Improvements

In addition to insufficient funding identified in *The Inland Navigation Construction, Selected Case Studies* report, other factors have contributed to the cost increases and schedule delays affecting recent Corps capital projects. Because many of these issues could be controlled with an improved project delivery process, the IMTS CIS Team, as a component of its development of the capital investment strategy, examined the Corps' current project delivery process. While unlikely that any set of recommended improvements could completely eliminate cost increases and schedule delays in Corps capital projects, the following recommendations should minimize these occurrences in the future. If implemented, these recommendations have clear, potentially positive ramifications on the funding levels needed to complete future system improvements on time and within budget. These recommendations are linked with the phases of the capital projects life cycle and reflect various stages of implementation readiness.

3.2.1 Inland Marine Transportation System Program

At the program level, the IMTS CIS Team recommends development of an IMTS capital investment strategy. The planning process for the capital investments (i.e., construction, expansion, replacement, and rehabilitation work) under the Corps' purview should be timely and efficient—and guided by a sound IMTS investment plan. Prioritization of projects must occur based on providing the best overall return on available funds, which involves examining factors such as economic return, risk-based analysis of component failure or unsuitable performance, and the estimated cost and construction schedule. Program management must also push to ensure that individual projects are being constructed as efficiently as possible, while also providing for timely maintenance and rehabilitation of key infrastructure.

A bedrock principle underlying the CIS Team's recommendations is the need to adopt a more programmatic approach to systematically managing the entire inland waterways network. This approach envisions the network as a system composed of subsystems (i.e., river basins) that need to operate to ensure the most efficient movement of cargo possible. Chapters 4, 5, and 6, describe the details and recommendations associated with this more programmatic approach (the IMTS capital investment strategy).

Recommendation: The Corps should incorporate the process improvements and funding strategies recommended in this report into a regulation to direct future IMTS project prioritization and funding. A smaller subset of this team should develop the regulation with a draft prepared by September 30, 2010.

3.2.2 Project Life Cycle

After examining the project delivery process, the IMTS CIS Team identified several improvements to the process that span the life cycle of any capital project. They include developing a project management certification program, including a Board representative on the project's Project Delivery Team, and providing regular status communications to the Board.

3.2.2.1 Utilize the Project Manager Certification Program

Over the past several years, the Corps has made numerous organizational and process changes to improve the services and infrastructure it maintains for the nation and the Armed Forces. Among these changes was an update to the Corps' strategic vision and campaign plan (excerpt follows):

> *One team: relevant, ready, responsive and reliable, proudly serving the Armed Forces and the Nation now and in the future. A full-spectrum Engineer Force of high quality Civilians and Soldiers, working with our partners to deliver innovative and effective solutions to the Nation's engineering and environmental challenges. (Project Manager and Program Manager Career Development Plan)*

For this vision to become a reality, the Corps must invest in additional enabling capabilities. One of these capabilities is a world-class workforce. The Corps must identify, develop, maintain, and strengthen its competencies and leadership. And, as a very large organization that operates in diverse areas around the world, consistency in personnel competency is important.

The new Project Management Career Development Plan will help the Corps with these requirements. This plan provides a consistent structure for project and program manager training and development and establishes standards for internal certification at increasing levels of proficiency. The related Project and Program Manager Career Development Program (PPM-CDP) provides a framework for the training, education, and experience necessary to ensure the systematic and consistent development of project and program management career civilians within the Corps. The PPM-CDP establishes minimum standards for internal certification at various proficiency levels.

Recommendation: This program has recently been developed and its implementation has begun. Senior Leaders within the Corps should emphasize the benefits of and encourage certification. The Corps should ensure that only certified project managers be assigned to IWTF projects.

3.2.2.2 Include a Board Representative on Each Project Delivery Team

To foster a more collaborative relationship with, and to elicit input from, the inland waterways industry, a Board representative will be included on the Project Delivery Team and participate in project team meetings, offering industry perspective. The scope and level of involvement would be determined by the Board. This representative would be identified at the start of the project and would be able to provide support to the process that is already in place. The expectation is that, through this participation, the Board will be more informed and effective because its members will have greater involvement in the process.

Recommendation: The Board Chairman should assign a representative from the Board to each active project by the summer 2010 Board meeting. Those representatives should be forwarded to the project managers for inclusion as Project Delivery Team (PDT) members.

3.2.2.3 Provide Status Communication to the IWUB

As an advisory committee to the Corps, the IWUB advises the Corps on project selection and management objectives. However, the current project delivery process does not call for regular status communications between these two entities. Effective and transparent communication with the Board and the public—and within the Corps—about risk and reliability and other aspects of active projects would enable the Board to have more buy-in over the process and the decisions that are made. For this reason, in addition to a Board representative being involved in each project, each project will have a fact sheet included in the Board's notebook for the IWUB meeting and a project briefing slide to be discussed at each IWUB meeting by an assigned PDT member addressing projects with significant issues or projects requiring decisions by the Board.

Recommendation: The following template, shown in Figure 3-3, should be used for briefing project status beginning at the summer 2010 Board meeting.

US Army Corps of Engineers

Lock and Dams 2, 3 & 4 Monongahela River Navigation Project

Project Cost: $1,438,700,000 (Oct 2008)
Remaining Balance: $894,800,000
FY10 Allocation: $6,200,000

Status (one slide/project)

- **Recent events since last Board Meeting**
- **Upcoming events in support of milestones**
- **At macro level…..not in the weeds!**
- **All red dates need to be addressed**
- **Example for Lower Mon; actual dates not used**

Schedule of Remaining Work	Design Initiated	Contract Award	Construction Complete	Project Benefits	Capitalized Cost Closeout
Charleroi River Wall	1-Oct-02	30-Sep-05	1-Nov-10	N/A	30-Jan-11
Upper and Lower Guard Walls	1-Oct-02	28-Aug-09	30-Sep-11	N/A	31-Dec-11
Charleroi River Chamber	1-Oct-02	30-Sep-12	30-Sep-14	31-Jul-14	31-May-15
L/D 3 Removal	1-Oct-12	30-Sep-13	30-Sep-14	31-Jul-14	31-Dec-15
Dredging	1-Oct-01	30-Apr-12	30-Jun-14	1-Jul-04	31-Dec-15
Municipal Relocations	1-Oct-97	Various dates	30-Jun-14	31-Jul-14	31-May-15
Port Perry Bridge Relocation	1-Oct-04	30-Sep-12	30-Sep-14	31-Jul-14	31-Dec-15
Charleroi Land Chamber	1-Oct-02	30-Sep-15	30-Sep-20	30-Apr-20	30-Apr-21

Legend
Completed
Scheduled prior to next IWUB Meeting
Date changed since last report

Building Strong!

1

Figure 3-3. Sample Project Status Briefing Template

3.2.3 Planning Phase

The existing Corps process for evaluating and selecting projects needs to be implemented more effectively. Planning and design requirements, such as sufficient geotechnical explorations, must not overlook any potential flaws, but at the same time project evaluation must be completed within reasonable timeframes and must not unduly delay the required start of project construction. Improvements within the planning phase that will aid in effective implementation of the existing process include requiring the Board Chairman and a representative to be signatories for project management plans (PMPs), using improved highly reliable risk-based cost estimates and requiring independent external peer reviews for projects meeting certain standard criteria.

3.2.3.1 Include the Board Chairman and Representative as Signatories for All Project Management Plans

Currently, PMPs are developed for all Corps projects, must be signed by the PDT, and must be approved by the Corps' senior leaders. As a member of the PDT, the Board representative will participate in developing the plan and both the representative, as part of the PDT, and the Board Chairman, as part of senior leadership, will therefore sign the plan, agreeing to the project's scope, schedule, and budget. The PDT will then be committed to manage the project within that agreed upon scope, schedule, and budget defined in the plan, including contingencies. Once the project is included in the IMTS capital investment strategy as a new start, its budget, schedule, and IWTF cost-sharing strategy can be established based on the scope of the project.

Recommendation: Project management plans for new projects are developed during the planning phase. Existing PMPs should be updated to include the Board representative and Chairman as signatories over the next year. All plans should be signed by the spring 2011 Board meeting.

3.2.3.2 Use Highly Reliable Risk-based Cost Estimates for Projects Meeting Certain Thresholds

In response to the recent trend of significant project cost increases, the Corps realized that a change in business practice was needed. Beginning in 2007, formal analysis was required for all projects requiring authorization that were anticipated to cost $40 million or more in total project cost. This upfront formal analysis now includes risk-based cost and schedule estimates. The IMTS CIS Team established a minimum 80 percent confidence level as appropriate for IMTS capital projects. Several project cost estimates completed before 2007 have been reevaluated using risk-based analysis, including Olmsted, Lower Mon, and Emsworth. Accurate and reliable risk-based cost and schedule estimates are considered essential to the success of an IMTS capital investment strategy.

Recommendation: Risk-based cost and schedule estimates are now required for all projects requiring congressional authorization that exceed $40 million. Only a few existing projects currently have updated risk-based cost estimates. As a first step, the IMTS CIS Team should recommend a list of existing projects to be reevaluated using risk-based cost estimates by the summer 2010 Board meeting. In the future, all IMTS projects being proposed for congressional authorization should have a risk-based cost estimate performed prior to completion of the project's feasibility report.

3.2.3.3 Require Independent External Peer Reviews (IEPR) for Projects Meeting Certain Criteria

All capital projects now undergo both a District Quality Review (a review of basic science and engineering work products focused on fulfilling the project quality requirements defined in the PMP) and an Agency Technical Review (a review to ensure the proper application of clearly established criteria, regulations, laws, codes, principles, and professional practices). In addition, an IEPR may also be required for projects where there are public safety concerns, a high level of complexity, novel or precedent-setting approaches; where the project is controversial, has significant interagency interest, has a total project cost greater than $45 million or has significant economic, environmental and social effects to the nation; or where requested by the governor of an affected state. This type of review offers the most independent and most critical level of review. The purpose of the IEPR is to provide the Chief of Engineers with an independent assessment of the adequacy and acceptability of the economic, engineering, environmental methods, models, data, and analyses used, as well as the range of alternatives and the adequacy of risk and uncertainty analyses.

Recommendation: Independent External Peer Reviews are a new requirement for capital projects. The IMTS CIS Team should follow the existing regulation, ER 1165-2-209, Civil Works Review Policy, for external peer reviews. No additional specific action is required at this time.

3.2.4 Design Phase

Improvements proposed for the design phase include applying lessons learned from past projects, creating engineer design and/or review centers of expertise, developing a portfolio of standardized designs, using risk-based cost and schedule estimates, and evaluating the use of early contractor involvement.

3.2.4.1 Apply Lessons Learned to Managing New Projects

Lessons learned from previous projects must be identified and implemented when it comes to managing new projects more effectively. The Great Lakes and Ohio River Division (LRD) case studies for example, revealed that over 60 percent of recent claims and modifications were associated with differing site conditions and scope of work changes. These lessons learned should be incorporated into the design staff training the Corps conducts so that particular focus can be given to risk management mitigation with respect to site condition evaluation and controlling the scope of work changes. Flags should be raised when change orders are being suggested or evaluated, that in the aggregate are more than 5 percent of the original contract cost.

Recommendation: The Navigation Community of Practice (COP) should set up a system to capture lessons learned specifically for IMTS projects and ensure they are reviewed prior to initiating new work.

3.2.4.2 Create Design/Review Center(s) of Expertise

The Corps has 17 districts operating and maintaining IMTS assets. The CIS Team concluded that maintaining design capability for locks and dams at each district is not the most effective means for resolving design problems of the past and ensuring the most consistent and cost-effective designs for the future. This observation is especially true based on the CIS Team's strategy of sequencing projects and only undertaking as many projects at any one time as can be efficiently funded with the resources available. Implementing and improving the design/review center concept would ensure greater design consistency, be more economical, and allow for easier transfer of knowledge from past projects to current ones. Design/review centers will provide the technical knowledge for all lock and dam projects and will be augmented with local knowledge of site conditions and operations to ensure that lessons learned are addressed in the future. Different centers may be appropriate for high and low head locks.

Recommendation: Implementation of this recommendation is beyond the scope and capability of this Team. Implementation of this recommendation would require organizational changes affecting a number of non-navigation-related considerations that would have to be evaluated. Recommend the Corps senior leadership study and evaluate,creating Design/Review Center(s) for future implementation.

3.2.4.3 Develop a Portfolio of Standardized Designs

The Corps will develop, as much as is feasible, a portfolio of consistent designs that can be used at its navigation facilities (for example, filling valves). Consistent designs will minimize life-cycle costs. A design center would then ensure adherence to these template designs. This type of design tool in the Corps' tool

kit may provide greater consistency in design, construction, and operation, as well as interchangeability that could reduce the time and cost required for repairs.

Recommendation: A team from Corps Engineering and Operations should be identified to consider a pilot project for design of a lock component that could be used throughout the IMTS. In addition, for new projects, it may be helpful to begin requiring a design concepts meeting that involves senior design and technical personnel who are not otherwise involved in the project to brainstorm ideas, solutions, and experiences on past projects.

3.2.4.4 Evaluate Use of Early Contractor Involvement

While all acquisition methods should be evaluated before deciding the best method for accomplishing a project, early contractor involvement is a method that has not often been considered for IMTS projects and could provide great benefits. The Corps should explore early contractor involvement during the project's design phase to identify opportunities for time and cost savings and to minimize modifications and claims. This approach has benefitted other areas of the Corps' program by incorporating the expertise of those involved in actual construction.

Recommendation: The Corps should identify one or more pilot projects where early contractor involvement would benefit the effort.

3.2.5 Acquisition Phase

Potential improvements within the acquisition phase include adopting elements of the military construction (MILCON) model and establishing a continuing contracts clause for large IMTS projects.

3.2.5.1 Implement Applicable Principles from the Military Construction Model

Projects are expected to be completed on time, within budget, and to a determined level of quality and scope. One way to achieve that expectation with new construction projects is to more closely follow the MILCON model with out-year planning and a commitment for full, upfront funding and fixed project costs. Principles include that cost estimates cannot be exceeded, schedules must be met, and a multiyear funding stream must have commitment from the U.S. Congress. Adopting these principles of the MILCON model would result in a culture change; these principles should be accepted at all levels throughout the Corps Civil Works program hierarchy.

Recommendation: Contracts should be structured with awardable options that can be eliminated if costs are exceeded, but still provide a functioning facility. Project managers and the project staff members should follow guidance requiring that budgets and schedules must be met and abandon the presumption that additional funding will always be available. The culture should reflect that the construction program cannot afford what would be "nice" for the projects, but can afford only what is necessary.

3.2.5.2 Revisit Use of the Continuing Contracts Clause

Currently Energy and Water Development Appropriations Act language restricts the use of continuing contracts clauses in IWTF cost-shared contracts. However, to move forward on the larger civil works IMTS projects, an appropriately constructed continuing contracts clause is likely to be a necessary part of the solution.

Recommendation: Use of an appropriately structured continuing contracts clause or fully funding of contracts often is essential to move forward with the larger civil works IMTS projects being proposed. The Corps should work with the U.S. Congress to develop a continuing contracts clause that adequately protects the prerogatives of both the legislative and executive branches, while not causing unnecessary project delay and cost escalation. One approach that should be considered is to fully fund all contracts up to $50 million (contracts up to $20 million are currently required to be fully funded), while allowing contracts greater than that amount to have the option of using an agreed-upon continuing contracts clause.

3.2.6 Construction Phase

The Corps seeks to start new construction only when it is reasonably sure that funding can be provided to enable efficient construction and completion. The Corps and the Board, through the new IMTS capital projects business model, will recommend new construction starts only when the program can afford to effectively and efficiently fund the project.

Recommendation: Through the new IMTS capital projects business model, the Corps should establish the procedures for recommending new construction starts.

4. Twenty-Year Capital Investment Strategy

This chapter describes the steps in developing the Twenty-Year Capital Investment Strategy. The first step is developing an unconstrained project list that consists of all projects that are authorized for study or construction, those projects currently under construction, and those that are anticipated or being considered for future study and action. It assumes that projects are completed with optimized funding and schedules. Next, it defines the evaluation criteria used to prioritize projects for funding and describes a more comprehensible, transparent method of applying these criteria to budget decisions. The criteria focus on two groupings—condition metrics and economic metrics. Finally, the chapter addresses the principles and defining elements associated with the prioritization process and development of a 20-year investment strategy for the IMTS. This process is intended to be dynamic, reviewed and updated through the implementation process.

4.1 Unconstrained Capital Projects

To aid the IMTS CIS Team in identifying future needs/demands on the IWTF and help in establishing a funding strategy, the Corps developed an “unconstrained” projects list. Currently, the Corps has identified over 100 projects in the inland waterways system that require or could conceivably require major work in the next 20 years. The list was developed without regard to funds that would be available to perform the work. The following sections present the anticipated capital projects that the Corps survey has identified, including the projects currently underway, those projects authorized but not yet underway, and those projects that may be necessary to provide a reliable and effective IMTS. These projects are categorized below—by phase, by project type, and by division—to provide additional insight into the Corps’ capital projects portfolio (see Appendix B for project fact sheets describing these projects).

4.1.1 Project Identification Process

To address the full national realm of potential projects needed, each Corps district with inland waterways was surveyed concerning its respective portfolio of IMTS assets to determine what projects the district believed could be required in the next 20 years and the schedule associated with such projects. Each district identified projects that were underway, authorized but not underway, or at an advanced study stage for improvement or major rehabilitation. In addition, divisions canvassed districts to identify potential future generally unstudied projects over the 20-year time horizon. Most of the more than 100 projects identified were in this latter category. Clearly, data on project scope, cost, and timing are more detailed for those projects in the first group, while only broad estimates are available for projects in an early study stage or not yet under study.

4.1.2 Project Totals by Division

The Corps has 17 districts that operate and maintain IMTS assets. The Corps’ current capital projects are taking place within 15 of those districts across five divisions (see **Figure 4-1 Corps Divisions**):

- Great Lakes and Ohio River Division (LRD) – 45 projects
  - Huntington District (LRH)
  - Louisville District (LRL)
  - Nashville District (LRN)
  - Pittsburgh District (LRP)
- Mississippi Valley Division (MVD) – 48 projects
  - New Orleans District (MVN)
  - Rock Island District (MVR)
  - St. Louis District (MVS)
  - St. Paul District (MVP)
  - Vicksburg District (MVK)
- Northwestern Division (NWD) – 2 projects
  - Portland District (NWP)
  - Walla Walla District (NWW)
- South Atlantic Division (SAD) – 1 project
  - Jacksonville District (SAJ)*
  - Mobile District (SAM)
  - Wilmington District (SAW)*
- Southwestern Division (SWD) – 16 projects
  - Galveston District (SWG)
  - Little Rock District (SWL)
  - Tulsa District (SWT)

* Note – No current Capital Projects

Figure 4-1. Corps Divisions

4.1.3 List of Projects by Phase

The phase of the project indicates where the project is in the decision making and construction life cycle. The IMTS CIS Team has defined three phases for IMTS projects:

- **Phase 1** – Phase 1 projects are those projects that have already begun construction (see Table 4-1). There are currently seven projects in Phase 1—five new construction projects and two major rehabilitation projects (Emsworth Dam and Markland Locks).
- **Phase 2** – Phase 2 projects are those projects for which a feasibility study or a rehabilitation evaluation report (RER) has been completed and that are congressionally authorized or otherwise approved for construction but have not yet started construction (see Table 4-2). For new construction projects, the feasibility study is the basis for congressional authorization, while for major rehabilitation projects, the RER serves as the authorization document and must be approved by Corps Headquarters. There are projects at 17 sites, 7 of which were authorized as a single project under the Navigation and Ecosystem Sustainability Program (NESP) on the Upper Mississippi River and Illinois Waterway. Some of these projects could be ready to start as early as FY 2011.
- **Phase 3 –** Phase 3 projects are potential projects based on a district's knowledge of its operational requirements, facility condition and the unrealistic assumption that unconstrained funding will be available. Neither a feasibility study nor an RER has been completed for these projects (although a few studies have been started). For projects in this phase, the districts made assumptions on the scope of the projects resulting in cost estimates that are only rough order of magnitude (ROM) estimates. There are 86 projects in this phase (see Table 4-3).

Table 4-1. List of Corps Projects – Phase 1

Project	Waterway	Div/Dist	Project Type[1]		Current Cost Estimate[2] $(M)	Total Remaining Base Cost[3] $(M)
			D/L/C	MR/NC		
Chickamauga Lock Replacement	Tennessee River	LRD/LRN	L	NC	374.5	180.5
Kentucky Lock Addition	Tennessee River	LRD/LRN	L	NC	713.4	383.1
Locks & Dams 2, 3, & 4, – Monongahela	Monongahela River	LRD/LRP	L D	NC NC	1,022.0 416.3	764.9 129.9
Olmsted Dam	Ohio River	LRD/LRL	D	NC	2,044.0	835.5
Inner Harbor Navigation Canal Lock Replacement	Gulf Intracoastal Waterway	MVD/MVN	L	NC	1,034.0	892.6
Emsworth Dams Major Rehabilitation	Ohio River	LRD/LRP	D	MR	160.0	15.6
Markland Locks – Lock Major Rehabilitation	Ohio River	LRD/LRL	L	MR	35.8	5.4

1. Key for Project Type: D = Dam; L = Lock; C = Channel; MR = Major Rehabilitation; NC = New Construction
2. Cost estimates are current estimates not necessarily the most recent approved estimate.
3. Remaining cost is FY 2011 through project completion base cost (2008).

Table 4-2. List of Corps Projects – Phase 2

Project	Waterway	Div/Dist	Project Type[1]		Current Cost Estimate[2] $(M)	Total Remaining Base Cost[3] $(M)
			D/L/C	NC/MR		
Greenup Lock Extension	Ohio River	LRD/LRH	L	NC	242.2	242.2
John T. Myers Lock Extension	Ohio River	LRD/LRL	L	NC	315.1	315.1
NESP Upper Mississippi Lock 25	Mississippi River	MVD/MVT	L	NC	396.6	396.6
NESP Upper Mississippi Lock 22	Mississippi River	MVD/MVR	L	NC	304.5	304.5
NESP Upper Mississippi Lock 24	Mississippi River	MVD/MVR	L	NC	379.0	379.0
NESP Upper Mississippi Lock 21	Mississippi River	MVD/MVR	L	NC	394.5	394.5
NESP Upper Mississippi Lock 20	Mississippi River	MVD/MVR	L	NC	269.5	269.5
NESP LaGrange Lock	Illinois Waterway	MVD/MVR	L	NC	320.9	320.9
NESP Peoria Lock	Illinois Waterway	MVD/MVR	L	NC	322.1	322.1
Gulf Intracoastal Waterway, High Island to Brazos River	Gulf Intracoastal Waterway	SWD/SWG	C	NC	17.0	16.3
Gulf Intracoastal Waterway, Matagorda Bay	Gulf Intracoastal Waterway	SWD/SWG	C	NC	19.5	18.8
McClellan–Kerr Arkansas River Navigation System Channel Deepening	Arkansas River	SWD/SWL/ SWT	C	NC	185.4	184.4
Lower Monumental Lock Rehabilitation	Snake River	NWD/NWW	L	MR	14.0	14.0
Lock & Dam 25, Mississippi River – Dam Rehabilitation	Mississippi River	MVD/MVS	D	MR	40.0	27.0
Thomas J. O'Brien Lock Rehabilitation	Calumet River	MVD/MVR	L	MR	22.9	22.9
LaGrange Lock Rehabilitation	Illinois Waterway	MVD/MVR	L	MR	53.2	53.2
John T. Myers Dam Rehabilitation	Ohio River	LRD/LRL	D	MR	44.8	44.8

1. Key for Project Type: D = Dam; L = Lock; C = Channel; MR = Major Rehabilitation; NC = New Construction
2. Cost estimates are current estimates not necessarily the most recent approved estimate.
3. Remaining cost is FY 2011 through project completion base cost (2008).

Table 4-3. List of Corps Projects – Phase 3

Project	Waterway	Div/Dist	Project Type[1]		Current Cost Estimate[2] $(M)	Total Remaining Base Cost[3] $(M)
			D/L/C	NC/MR		
Meldahl Lock Extension	Ohio River	LRD/LRH	L	NC	220	220
Pickwick Lock Extension	Tennessee River	LRD/LRN	L	NC	210	210
Upper Ohio Navigation Improvements – Emsworth Lock Addition	Ohio River	LRD/LRP	L	NC	550	550
Upper Ohio Navigation Improvements – Montgomery Lock Addition	Ohio River	LRD/LRP	L	NC	500	500

Project	Waterway	Div/Dist	Project Type[1]		Current Cost Estimate[2] $(M)	Total Remaining Base Cost[3] $(M)
			D/L/C	NC/MR		
Upper Ohio Navigation Improvements – Dashields Lock Addition	Ohio River	LRD/LRP	L	NC	590	590
Watts Bar Lock Addition	Tennessee River	LRD/LRN	L	NC	310	310
Wilson Lock Replacement	Tennessee River	LRD/LRN	L	NC	610	610
Bayou Sorrel Lock Replacement	Gulf Intracoastal Waterway	MVD/MVN	L	NC	170	170
Calcasieu Lock Replacement	Gulf Intracoastal Waterway	MVD/MVN	L	NC	60	60
J. Bennett Johnston Waterway – Channel Deepening	Red River	MVD/MVK	C	NC	50	50
Gulf Intracoastal Waterway, Brazos River to Port O'Connor	Gulf Intracoastal Waterway	SWD/SWG	C	NC	20	20
Gulf Intracoastal Waterway, Port O'Connor to Corpus Christi Bay	Gulf Intracoastal Waterway	SWD/SWG	C	NC	20	20
Gulf Intracoastal Waterway Modification – Texas	Gulf Intracoastal Waterway	SWD/SWG	C	NC	150	150
Gulf Intracoastal Waterway, Sabine River to High Island	Gulf Intracoastal Waterway	SWD/SWG	C	NC	20	20
Gulf Intracoastal Waterway, High Island to Brazos River Realignment	Gulf Intracoastal Waterway	SWD/SWG	C	NC	20	20
Norrell Lock Extension	Arkansas River	SWD/SWL	L	NC	120	120
Arkansas River No. 2 Lock Extension	Arkansas River	SWD/SWL	L	NC	240	240
Joe Hardin Lock Extension	Arkansas River	SWD/SWL	L	NC	120	120
Col Charles D. Maynard Lock Extension	Arkansas River	SWD/SWL	L	NC	120	120
Emmett Sanders Lock Extension	Arkansas River	SWD/SWL	L	NC	120	120
Allegheny Locks 2 & 3 – Rehabilitation	Allegheny River	LRD/LRP	L	MR	40	40
Belleville Locks and Dam Rehabilitation	Ohio River	LRD/LRH	L D	MR MR	90 60	90 60
Braddock Locks Rehabilitation	Monongahela River	LRD/LRP	L	MR	110	110
Cannelton Lock and Dam Rehabilitation	Ohio River	LRD/LRL	L D	MR	30 10	30 10
Green River Locks 1 & 2 Rehabilitation	Green River	LRD/LRL	L	MR	140	140
Greenup Lock and Dam Rehabilitation	Ohio River	LRD/LRH	D L	MR	80 60	80 60
John T. Myers Main Lock Rehabilitation	Ohio River	LRD/LRL	L	MR	40	40
London Dam Rehabilitation	Kanawha River	LRD/LRH	D	MR	40	40
Marmet Dam Rehabilitation	Kanawha River	LRD/LRH	D	MR	30	30
Maxwell Locks Rehabilitation	Monongahela River	LRD/LRP	L	MR	80	80
McAlpine Dam Rehabilitation	Ohio River	LRD/LRL	D	MR	10	10

Project	Waterway	Div/Dist	Project Type[1]		Current Cost Estimate[2] $(M)	Total Remaining Base Cost[3] $(M)
			D/L/C	NC/MR		
Meldahl Lock and Dam Rehabilitation	Ohio River	LRD/LRH	L D	MR	80 60	80 60
Montgomery Dam Safety Rehabilitation	Ohio River	LRD/LRP	D	MR	190	190
Morgantown, Hildebrand, & Opekiska Lock Rehabilitation	Monongahela River	LRD/LRP	L	MR	120	120
New Cumberland Lock Rehabilitation	Ohio River	LRD/LRP	L	MR	200	200
Newburgh Lock and Dam Rehabilitation	Ohio River	LRD/LRL	D L	MR	10 30	10 30
Pike Island Lock Rehabilitation	Ohio River	LRD/LRP	L	MR	200	200
Racine Lock and Dam Rehabilitation	Ohio River	LRD/LRH	L D	MR	90 60	90 60
Smithland Dam Rehabilitation	Ohio River	LRD/LRL	D	MR	10	10
Willow Island Locks and Dam Rehabilitation	Ohio River	LRD/LRH	L D	MR	90 60	90 60
Winfield Lock Rehabilitation	Kanawha River	LRD/LRH	L	MR	40	40
Upper St. Anthony Falls Lock Rehabilitation	Mississippi River	MVD/MVP	L D	MR	50 20	50 20
Lower St. Anthony Falls Lock Rehabilitation	Mississippi River	MVD/MVP	L D	MR	30 20	30 20
Upper Mississippi Lock & Dam 1 Rehabilitation	Mississippi River	MVD/MVP	L D	MR	40 20	40 20
Upper Mississippi Lock & Dam 2 Rehabilitation	Mississippi River	MVD/MVP	L D	MR	40 20	40 20
Upper Mississippi Lock & Dam 3 Rehabilitation	Mississippi River	MVD/MVP	L D	MR	40 20	40 20
Upper Mississippi Lock & Dam 4 Rehabilitation	Mississippi River	MVD/MVP	L D	MR	40 20	40 20
Upper Mississippi Lock & Dam 5 Rehabilitation	Mississippi River	MVD/MVP	L D	MR	40 20	40 20
Upper Mississippi Lock & Dam 5a Rehabilitation	Mississippi River	MVD/MVP	L D	MR	40 20	40 20
Upper Mississippi Lock & Dam 6 Rehabilitation	Mississippi River	MVD/MVP	L D	MR	40 20	40 20
Upper Mississippi Lock & Dam 7 Rehabilitation	Mississippi River	MVD/MVP	L D	MR	40 20	40 20
Upper Mississippi Lock & Dam 8 Rehabilitation	Mississippi River	MVD/MVP	L D	MR	40 20	40 20
Upper Mississippi Lock & Dam 9 Rehabilitation	Mississippi River	MVD/MVP	L D	MR	40 20	40 20
Upper Mississippi Lock & Dam 10 Rehabilitation	Mississippi River	MVD/MVP	L D	MR	40 20	40 20
Upper Mississippi Lock & Dam 12 Rehabilitation	Mississippi River	MVD/MVR	L D	MR	40 20	40 20

Project	Waterway	Div/Dist	Project Type[1]		Current Cost Estimate[2] $(M)	Total Remaining Base Cost[3] $(M)
			D/L/C	NC/MR		
Upper Mississippi Lock & Dam 13 Rehabilitation	Mississippi River	MVD/MVR	L D	MR	40 20	40 20
Upper Mississippi Lock & Dam 14 Rehabilitation	Mississippi River	MVD/MVR	L D	MR	50 20	50 20
Upper Mississippi Lock & Dam 15 Rehabilitation	Mississippi River	MVD/MVR	L D	MR	50 20	50 20
Upper Mississippi Lock & Dam 16 Rehabilitation	Mississippi River	MVD/MVR	L D	MR	50 20	50 20
Upper Mississippi Lock & Dam 17 Rehabilitation	Mississippi River	MVD/MVR	L D	MR	50 20	50 20
Upper Mississippi Lock and Dam 18 Rehabilitation	Mississippi River	MVD/MVR	L D	MR	50 20	50 20
Upper Mississippi Lock & Dam 19 Rehabilitation	Mississippi River	MVD/MVR	L D	MR	50 20	50 20
Upper Mississippi Lock & Dam 20 Rehabilitation	Mississippi River	MVD/MVR	L D	MR	50 20	50 20
Upper Mississippi Lock & Dam 21 Rehabilitation	Mississippi River	MVD/MVR	L D	MR	50 20	50 20
Upper Mississippi Lock & Dam 22 Rehabilitation	Mississippi River	MVD/MVR	L D	MR	50 20	50 20
Upper Mississippi Lock & Dam 24 Rehabilitation	Mississippi River	MVD/MVS	L D	MR	50 20	50 20
Upper Mississippi Lock & Dam 25 Rehabilitation	Mississippi River	MVD/MVS	L D	MR	40 20	40 20
Upper Mississippi Melvin Price Locks & Dam Rehabilitation	Mississippi River	MVD/MVS	L D	MR	40 20	40 20
Starved Rock Lock & Dam Rehabilitation	Illinois Waterway	MVD/MVR	L D	MR	40 20	40 20
Dresden Island Lock & Dam Rehabilitation	Illinois Waterway	MVD/MVR	L D	MR	40 20	40 20
Brandon Road Locks & Dam Rehabilitation	Illinois Waterway	MVD/MVR	L D	MR	40 20	40 20
Marseilles Lock & Dam Rehabilitation	Illinois Waterway	MVD/MVR	L D	MR	40 20	40 20
Peoria Lock & Dam Rehabilitation	Illinois Waterway	MVD/MVR	L D	MR	50 20	50 20
John Day Lock Rehabilitation	Columbia River	NWD/MWP	L	MR	50	50
Holt Lock & Dam Lock Rehabilitation	Black Warrior River	SAD/SAM	L	MR	30	30
Colorado River Locks Rehabilitation	Gulf Intracoastal Waterway	SWD/SWG	L	MR	300	300

Project	Waterway	Div/Dist	Project Type[1]		Current Cost Estimate[2] $(M)	Total Remaining Base Cost[3] $(M)
			D/L/C	NC/MR		
Arkansas River No. 2 Lock Rehabilitation	Arkansas River	SWD/SWL	L	MR	20	20
Joe Hardin Dam Rehabilitaiton	Arkansas River	SWD/SWL	D	MR	10	10

1. Key for Project Type: D = Dam; L = Lock; C = Channel; MR = Major Rehabilitation; NC = New Construction
2. Cost estimates are current estimates not necessarily the most recent approved estimate
3. Remaining cost is FY 2011 through project completion base cost (2008)

4.1.4 List of Projects by Project Type

The Corps has also categorized its IMTS capital projects by project type: all IMTS capital projects pertain to navigation locks, dams, or channels (see Table 4-4). Locks and dams exist together at the same facility, but may be addressed separately in project planning depending on timing of the need, funds availability, and other factors. Channel projects usually involve deepening or alignment projects not adjacent to an existing lock or dam, although a small amount of dredging in the approach areas to a lock would be considered part of a lock project. Of the 101 planned projects, only nine of the projects pertain to channel improvements and 45 projects are or include a portion that pertains to dam improvements. Of the 207 locks on fuel-taxed waterways, potential project investment needs have been identified at 84 lock locations over the next 20 years.

Table 4-4. List of Projects by Project Type – Locks, Dams, and Channels

Project Name	Waterway	Div/Dist	Phase	Project Type[1]		Current Cost Estimate[2] $(M)	Total Remaining Base Cost[3] $(M)
				D/L/C	MR/NC		
Locks							
Chickamauga Lock Replacement	Tennessee River	LRD/LRN	1	L	NC	374.5	383.1
Kentucky Lock Addition	Tennessee River	LRD/LRN	1	L	NC	713.4	359.3
Locks & Dams 2, 3, & 4, Locks – Monongahela	Monongahela River	LRD/LRP	1	L	NC	1,022.0	764.9
Inner Harbor Navigation Canal Lock Replacement	Gulf Intracoastal Waterway	MVD/MVN	1	L	NC	1,034.0	892.6
Markland Locks – Lock Major Rehabilitation	Ohio River	LRD/LRL	1	L	MR	35.4	5.4
Greenup Lock Extension	Ohio River	LRD/LRH	2	L	NC	242.2	242.2
John T. Myers Lock Extension	Ohio River	LRD/LRL	2	L	NC	315.1	315.1
NESP Upper Mississippi Lock 25	Mississippi River	MVD/MVT	2	L	NC	396.6	396.6
NESP Upper Mississippi Lock 22	Mississippi River	MVD/MVR	2	L	NC	304.5	304.5
NESP Upper Mississippi Lock 24	Mississippi River	MVD/MVR	2	L	NC	379.0	379.0
NESP Upper Mississippi Lock 21	Mississippi River	MVD/MVR	2	L	NC	394.5	394.5

Project Name	Waterway	Div/Dist	Phase	Project Type[1]		Current Cost Estimate[2] $(M)	Total Remaining Base Cost[3] $(M)
				D/L/C	MR/NC		
NESP Upper Mississippi Lock 20	Mississippi River	MVD/MVR	2	L	NC	269.5	269.5
NESP LaGrange Lock	Illinois Waterway	MVD/MVR	2	L	NC	320.9	320.9
NESP Peoria Lock	Illinois Waterway	MVD/MVR	2	L	NC	322.2	322.2
Lower Monumental Lock Rehabilitation	Snake River	NWD/NWW	2	L	MR	14.0	14.0
Thomas J. O'Brien Lock Rehabilitation	Calumet River	MVD/MVR	2	L	MR	22.9	22.9
LaGrange Lock Rehabilitation	Illinois Waterway	MVD/MVR	2	L	MR	53.2	53.2
MeldahlLock Extension	Ohio River	LRD/LRH	3	L	NC	220	220
Pickwick Lock Extension	Tennessee River	LRD/LRN	3	L	NC	200	200
Upper Ohio Navigation Improvements – Emsworth Lock Addition	Ohio River	LRD/LRP	3	L	NC	550	550
Upper Ohio Navigation Improvements – Montgomery Lock Addition	Ohio River	LRD/LRP	3	L	NC	500	500
Upper Ohio Navigation Improvements – Dashields Lock Addition	Ohio River	LRD/LRP	3	L	NC	590	590
Watts Bar Lock Addition	Tennessee River	LRD/LRN	3	L	NC	300	300
Wilson Lock Replacement	Tennessee River	LRD/LRN	3	L	NC	610	610
Bayou Sorrel Lock Replacement	Gulf Intracoastal Waterway	MVD/MVN	3	L	NC	170	170
Calcasieu Lock Replacement	Gulf Intracoastal Waterway	MVD/MVN	3	L	NC	60	60
Norrell Lock Extension	Arkansas River	SWD/SWL	3	L	NC	120	120
Arkansas River No. 2 Lock Extension	Arkansas River	SWD/SWL	3	L	NC	240	240
Col Charles D. Maynard Lock Extension	Arkansas River	SWD/SWL	3	L	NC	120	120
Emmett Sanders Lock Extension	Arkansas River	SWD/SWL	3	L	NC	120	120
Joe Hardin Lock Extension	Arkansas River	SWD/SWL	3	L	NC	120	120
Allegheny Locks 2 & 3 Rehabilitation	Allegheny River	LRD/LRP	3	L	MR	40	40
Belleville Locks Rehabilitation	Ohio River	LRD/LRH	3	L	MR	90	90
Braddock Locks Rehabilitation	Monongahela River	LRD/LRP	3	L	MR	110	110
Cannelton Lock Rehabilitation	Ohio River	LRD/LRL	3	L	MR	30.	30
Green River Locks 1 & 2 Rehabilitation	Green River	LRD/LRL	3	L	MR	140	140
Greenup Locks Rehabilitation	Ohio River	LRD/LRH	3	L	MR	60	60
John T. Myers Lock Rehabilitation	Ohio River	LRD/LRL	3	L	MR	30	30

Project Name	Waterway	Div/Dist	Phase	Project Type[1]		Current Cost Estimate[2] $(M)	Total Remaining Base Cost[3] $(M)
				D/L/C	MR/NC		
Maxwell Locks Rehabilitation	Monongahela River	LRD/LRP	3	L	MR	80	80
Meldahl Locks Rehabilitation	Ohio River	LRD/LRH	3	L	MR	80	80
Morgantown, Hildebrand, & Opekiska Locks Rehabilitation	Monongahela River	LRD/LRP	3	L	MR	120	120
New Cumberland Lock Rehabilitation	Ohio River	LRD/LRP	3	L	MR	200	200
Newburgh Lock Rehabilitation	Ohio River	LRD/LRL	3	L	MR	30	30
Pike Island Lock Rehabilitation	Ohio River	LRD/LRP	3	L	MR	200	200
Racine Locks Rehabilitation	Ohio River	LRD/LRH	3	L	MR	90	90
Willow Island Locks Rehabilitation	Ohio River	LRD/LRH	3	L	MR	90	90
Upper St. Anthony Falls Lock Rehabilitation	Mississippi River	MVD/MVP	3	L	MR	50	50
Lower St. Anthony Falls Lock Rehabilitation	Mississippi River	MVD/MVP	3	L	MR	30	30
Upper Mississippi Lock 1 Rehabilitation	Mississippi River	MVD/MVP	3	L	MR	60	60
Upper Mississippi Lock 2 Rehabilitation	Mississippi River	MVD/MVP	3	L	MR	60	60
Upper Mississippi Lock 3 Rehabilitation	Mississippi River	MVD/MVP	3	L	MR	60	60
Upper Mississippi Lock 4 Rehabilitation	Mississippi River	MVD/MVP	3	L	MR	60	60
Upper Mississippi Lock 5 Rehabilitation	Mississippi River	MVD/MVP	3	L	MR	60	60
Upper Mississippi Lock 5a Rehabilitation	Mississippi River	MVD/MVP	3	L	MR	60	60
Upper Mississippi Lock 6 Rehabilitation	Mississippi River	MVD/MVP	3	L	MR	60	60
Upper Mississippi Lock 7 Rehabilitation	Mississippi River	MVD/MVP	3	L	MR	60	60
Upper Mississippi Lock 8 Rehabilitation	Mississippi River	MVD/MVP	3	L	MR	60	60
Upper Mississippi Lock 9 Rehabilitation	Mississippi River	MVD/MVP	3	L	MR	60	60
Upper Mississippi Lock 10 Rehabilitation	Mississippi River	MVD/MVP	3	L	MR	60	60
Upper Mississippi Lock 12 Rehabilitation	Mississippi River	MVD/MVR	3	L	MR	60	60
Upper Mississippi Lock 13 Rehabilitation	Mississippi River	MVD/MVR	3	L	MR	60	60
Upper Mississippi Lock 14 Rehabilitation	Mississippi River	MVD/MVR	3	L	MR	70	70

Project Name	Waterway	Div/Dist	Phase	Project Type[1]		Current Cost Estimate[2] $(M)	Total Remaining Base Cost[3] $(M)
				D/L/C	MR/NC		
Upper Mississippi Lock 15 Rehabilitation	Mississippi River	MVD/MVR	3	L	MR	70	70
Upper Mississippi Lock 16 Rehabilitation	Mississippi River	MVD/MVR	3	L	MR	70	70
Upper Mississippi Lock 17 Rehabilitation	Mississippi River	MVD/MVR	3	L	MR	70	70
Upper Mississippi Lock 18 Rehabilitation	Mississippi River	MVD/MVR	3	L	MR	50	50
Upper Mississippi Lock 19 Rehabilitation	Mississippi River	MVD/MVR	3	L	MR	70	70
Upper Mississippi Lock 20 Rehabilitation	Mississippi River	MVD/MVR	3	L	MR	70	70
Upper Mississippi Lock 21 Rehabilitation	Mississippi River	MVD/MVR	3	L	MR	70	70
Upper Mississippi Lock 22 Rehabilitation	Mississippi River	MVD/MVR	3	L	MR	70	70
Upper Mississippi Lock 24 Rehabilitation	Mississippi River	MVD/MVS	3	L	MR	70	70
Upper Mississippi Lock 25 Rehabilitation	Mississippi River	MVD/MVS	3	L	MR	70	70
Melvin Price Locks Rehabilitation	Mississippi River	MVD/MVS	3	L	MR	60	60
Starved Rock Lock Rehabilitation	Illinois Waterway	MVD/MVR	3	L	MR	60	60
Dresden Island Lock Rehabilitation	Illinois Waterway	MVD/MVR	3	L	MR	60	60
Brandon Road Locks Rehabilitation	Illinois Waterway	MVD/MVR	3	L	MR	60	60
Marseilles Lock Rehabilitation	Illinois Waterway	MVD/MVR	3	L	MR	60	60
Peoria Lock Rehabilitation	Illinois Waterway	MVD/MVR	3	L	MR	70	70
John Day Lock Rehabilitation	Columbia River	NWD/MWP	3	L	MR	50	50
Holt Lock Rehabilitation	Black Warrior River	SAD/SAM	3	L	MR	30	30
Colorado River Locks Rehabilitation	Gulf Intracoastal Waterway	SWD/SWG	3	L	MR	300	300
Arkansas River No. 2 Lock Rehabilitation	Arkansas River	SWD/SWL	3	L	MR	20	20
Dams							
Locks & Dams 2, 3, & 4, Dams – Monongahela	Monongahela River	LRD/LRP	1	D	NC	416.3	129.9
Olmsted Dam	Ohio River	LRD/LRL	1	D	NC	2,044.0	835.5
Emsworth Dams Major Rehabilitation	Ohio River	LRD/LRP	1	D	MR	163.8	19.3
Lock & Dam 25, Mississippi River – Dam Rehabilitation	Mississippi River	MVD/MVS	2	D	MR	40.0	27.0

Project Name	Waterway	Div/Dist	Phase	Project Type[1]		Current Cost Estimate[2] $(M)	Total Remaining Base Cost[3] $(M)
				D/L/C	MR/NC		
John T. Myers Dam Rehabilitation	Ohio River	LRD/LRL	2	D	MR	44.8	44.8
Joe Hardin Dam Rehabilitation	Arkansas River	SWD/SWL	3	D	MR	10	10
Belleville Dam Rehabilitation	Ohio River	LRD/LRH	3	D	MR	60	60
Cannelton Dam Rehabilitation	Ohio River	LRD/LRL	3	D	MR	10	10
Greenup Dam Rehabilitation	Ohio River	LRD/LRH	3	D	MR	80	80
London Dam Rehabilitation	Kanawha River	LRD/LRH	3	D	MR	40	40
Marmet Dam Rehabilitation	Kanawha River	LRD/LRH	3	D	MR	30	30
McAlpine Dam Rehabilitation	Ohio River	LRD/LRL	3	D	MR	10	10
Meldahl Dam Rehabilitation	Ohio River	LRD/LRH	3	D	MR	60	60
Montgomery Dam Safety Rehabilitation	Ohio River	LRD/LRP	3	D	MR	190	190
Newburgh Dam Rehabilitation	Ohio River	LRD/LRL	3	D	MR	10	10
Racine Dam Rehabilitation	Ohio River	LRD/LRH	3	D	MR	60	60
Smithland Dam Rehabilitation	Ohio River	LRD/LRL	3	D	MR	10	11.2
Willow Island Dam Rehabilitation	Ohio River	LRD/LRH	3	D	MR	60	60
Winfield Dam Rehabilitation	Kanawha River	LRD/LRH	3	D	MR	40	40
Upper St. Anthony Falls Lock Rehabilitation	Mississippi River	MVD/MVP	3	D	MR	20	20
Lower St. Anthony Falls Lock Rehabilitation	Mississippi River	MVD/MVP	3	D	MR	20	20
Upper Mississippi Dam 1 Rehabilitation	Mississippi River	MVD/MVP	3	D	MR	20	20
Upper Mississippi Dam 2 Rehabilitation	Mississippi River	MVD/MVP	3	D	MR	20	20
Upper Mississippi Dam 3 Rehabilitation	Mississippi River	MVD/MVP	3	D	MR	20	20
Upper Mississippi Dam 4 Rehabilitation	Mississippi River	MVD/MVP	3	D	MR	20	20
Upper Mississippi Dam 5 Rehabilitation	Mississippi River	MVD/MVP	3	D	MR	20	20
Upper Mississippi Dam 5a Rehabilitation	Mississippi River	MVD/MVP	3	D	MR	20	20
Upper Mississippi Dam 6 Rehabilitation	Mississippi River	MVD/MVP	3	D	MR	20	20
Upper Mississippi Dam 7 Rehabilitation	Mississippi River	MVD/MVP	3	D	MR	20	20
Upper Mississippi Dam 8 Rehabilitation	Mississippi River	MVD/MVP	3	D	MR	20	20
Upper Mississippi Dam 9 Rehabilitation	Mississippi River	MVD/MVP	3	D	MR	20	20

Project Name	Waterway	Div/Dist	Phase	Project Type[1]		Current Cost Estimate[2] $(M)	Total Remaining Base Cost[3] $(M)
				D/L/C	MR/NC		
Upper Mississippi Dam 10 Rehabilitation	Mississippi River	MVD/MVP	3	D	MR	20	20
Upper Mississippi Dam 12 Rehabilitation	Mississippi River	MVD/MVR	3	D	MR	20	20
Upper Mississippi Dam 13 Rehabilitation	Mississippi River	MVD/MVR	3	D	MR	20	20
Upper Mississippi Dam 14 Rehabilitation	Mississippi River	MVD/MVR	3	D	MR	20	20
Upper Mississippi Dam 15 Rehabilitation	Mississippi River	MVD/MVR	3	D	MR	20	20
Upper Mississippi Dam 16 Rehabilitation	Mississippi River	MVD/MVR	3	D	MR	20	20
Upper Mississippi Dam 17 Rehabilitation	Mississippi River	MVD/MVR	3	D	MR	20	20
Upper Mississippi Dam 18 Rehabilitation	Mississippi River	MVD/MVR	3	D	MR	20	20
Upper Mississippi Dam 18 Rehabilitation	Mississippi River	MVD/MVR	3	D	MR	20	20
Upper Mississippi Dam 19 Rehabilitation	Mississippi River	MVD/MVR	3	D	MR	20	20
Upper Mississippi Dam 20 Rehabilitation	Mississippi River	MVD/MVR	3	D	MR	20	20
Upper Mississippi Dam 21 Rehabilitation	Mississippi River	MVD/MVR	3	D	MR	20	20
Upper Mississippi Dam 22 Rehabilitation	Mississippi River	MVD/MVR	3	D	MR	20	20
Upper Mississippi Dam 24 Rehabilitation	Mississippi River	MVD/MVS	3	D	MR	20	20
Upper Mississippi Dam 25 Rehabilitation	Mississippi River	MVD/MVS	3	D	MR	20	20
Melvin Price Dam Rehabilitation	Mississippi River	MVD/MVS	3	D	MR	20	20
Starved Rock Dam Rehabilitation	Illinois Waterway	MVD/MVR	3	D	MR	20	20
Dresden Island Dam Rehabilitation	Illinois Waterway	MVD/MVR	3	D	MR	20	20
Brandon Road Dam Rehabilitation	Illinois Waterway	MVD/MVR	3	D	MR	20	20
Marseilles Dam Rehabilitation	Illinois Waterway	MVD/MVR	3	D	MR	20	20
Peoria Dam Rehabilitation	Illinois Waterway	MVD/MVR	3	D	MR	20	20
Channels							
Gulf Intracoastal Waterway, High Island to Brazos River	Gulf Intracoastal Waterway	SWD/SWG	2	C	NC	17.0	16.3
Gulf Intracoastal Waterway, Matagorda Bay	Gulf Intracoastal Waterway	SWD/SWG	2	C	NC	19.5	18.8

Project Name	Waterway	Div/Dist	Phase	Project Type[1]		Current Cost Estimate[2] $(M)	Total Remaining Base Cost[3] $(M)
				D/L/C	MR/NC		
McClellan–Kerr Arkansas River Navigation System Channel Deepening	Arkansas River	SWD/SWL/ SWT	2	C	NC	185.4	184.4
J. Bennett Johnston Waterway – Channel Deepening	Red River	MVD/MVK	3	C	NC	50	50
Gulf Intracoastal Waterway, Brazos River to Port O'Connor	Gulf Intracoastal Waterway	SWD/SWG	3	C	NC	15	15
Gulf Intracoastal Waterway, Port O'Connor to Corpus Christi Bay	Gulf Intracoastal Waterway	SWD/SWG	3	C	NC	20	20
Gulf Intracoastal Waterway Modification - Texas	Gulf Intracoastal Waterway	SWD/SWG	3	C	NC	150	150
Gulf Intracoastal Waterway, Sabine River to High Island	Gulf Intracoastal Waterway	SWD/SWG	3	C	NC	20	20
Gulf Intracoastal Waterway, High Island to Brazos River Realignment	Gulf Intracoastal Waterway	SWD/SWG	3	C	NC	20	20

1. Key for Project Type: D = Dam; L = Lock; C = Channel; MR = Major Rehabilitation; NC = New Construction
2. Cost estimates are current estimates not necessarily the most recent approved estimate
3. Remaining cost is FY 2011 through project completion base cost (2008)

These projects, either new construction or major rehabilitation, have particular ramifications on funding stream/source and in addressing how different project types should be planned for and funded. Thirty-seven of the identified projects are for adding new structures to the existing inland waterways asset portfolio, while the remaining two-thirds of the authorized and potential projects address major rehabilitations to existing facilities.

4.1.5 Unconstrained Capital Projects Investment Analysis

To fully understand the magnitude of the potential projects considered to be necessary for a reliable IMTS, an unconstrained capital projects investment analysis was conducted as an analytical starting point. This analysis identified the potential funding requirements and project timing expected by Corps districts as if funding availability were not an issue. Funding and scheduling requirements were determined by assuming unconstrained availability of funds whenever those funds were delivered to manage the capital needs of the FTWS—both for new construction and major rehabilitation projects. This unconstrained scenario would address the financial needs to meet the improvements necessary based on the current condition of assets (measured by Condition Index [CI] or Dam Safety Action Classification [DSAC]) and the normal useful design lives of locks, dams, and other inland waterways components. As a second step, because it was recognized that the underlying analytical assumption used to develop the unconstrained project list was not realistic for purposes of developing the recommended 20-year IMTS investment program, it was then necessary for the PDT to identify projects, project timing, and the level of investment desired to effectively complete Phases 1 and 2 and to address the additional work associated with Phase 3 projects for all Corps divisions in a reasonably achievable way.

Figure 4-2 shows the year-by-year expenditure level from FY 2011 to FY 2030 to construct or rehabilitate over 100 projects that were identified by the districts under the unconstrained funding assumption. These

projects were scheduled based on district-level inputs about when projects should be effectively constructed based on their condition, operation problems, past unscheduled closures, and anticipated traffic needs associated with inland waterways locks and dams. Over the 20-year period from FY 2011 to FY 2030, the unconstrained financial requirements to address the projects authorized or proposed amount to nearly $18.0 billion, or an annual average of nearly $900 million. Of the $18.0 billion planned for expenditure, $12.1 billion, 67 percent, is for new construction and $5.9 billion, 33 percent, addresses major rehabilitation projects. The 20-year time period addresses most of the authorized projects under the unconstrained funding scenario, but there are still 8 Phase 3 projects that would continue after FY 2029, as well as the wrap-up of one Phase 2 project, the Upper Mississippi and Illinois Waterway Locks (NESP) project.

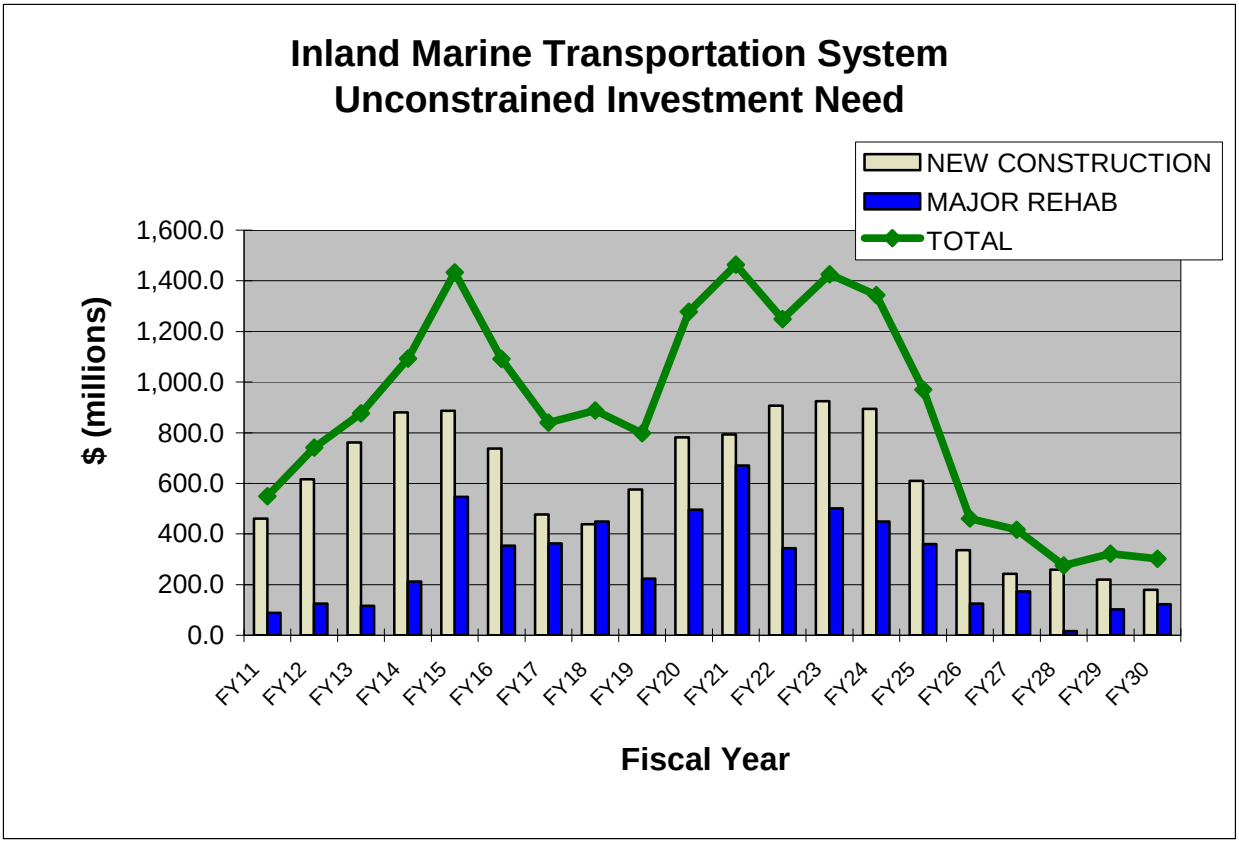


Figure 4-2. Unconstrained Investment Need of IMTS

There are also many years where expenditures on waterways locks and dams would exceed $1 billion per year under this scenario, such as FY 2014 through FY 2016 and FY 2020 through FY 2024. Most of the work in the former period is to address final construction components associated with the Olmsted and Lower Mon projects, while most of the projects in the latter period address improvements and new construction on the Upper Mississippi.

This analysis recognizes that funding at such high levels is not feasible under the current process and not realistic under any likely future funding scenarios. The Team also recognizes that this unconstrained list is an estimate of potential project scope, funding and schedules. The assumptions for these projects may change as these projects are developed. However, this analysis approximates an upper-level threshold of what would be required financially to provide a highly reliable IMTS. For this reason, the Team developed

criteria to prioritize IMTS projects and identify a realistic program level to continue to provide a reliable IMTS for the next 20 years.

4.2 Evaluation Criteria

Inland waterways system users, policy makers in the U.S. Congress and within the Administration, and others share a desire to better understand both the value of existing IMTS assets and the return on investments made in the system. Reflecting this desire, the IMTS CIS Team worked together to develop and apply logical metrics to help guide system modernization investment. After discussing numerous approaches, the IMTS CIS Team concluded that the most useful representation of system value and investment return should include assessment on an asset-by-asset basis using the following:

1. The asset's current condition.
2. The likelihood of diminished asset performance.
3. The consequence of diminished performance in terms of repair costs, outages, and economic losses.
4. How the proposed investment would alter the asset's likelihood of diminished performance.
5. For new assets, whether the new project could be expected to improve system performance.

The Corps manages a multitude of water resource assets in addition to the IMTS, all of which place demands on the Corps' budget. The challenge to adequately and reliably fund necessary improvements to the IMTS is daunting, especially given the analytical requirements associated with evaluating IMTS investment requirements. Those requirements involve three essential components: (1) forecasts of structural reliability for the major components of all locks, navigation dams, and channels; (2) estimates of economic consequences faced by shippers when waterways service is interrupted; and (3) integration of this information by a system-level economic model. While the *Ohio River Mainstem System Study* (ORMSS) (2003) attempted to address this challenge, it did so for just 19 mainstem Ohio River locks. The study's narrow population of assets limits its utility in making objective IMTS system-wide investment recommendations. The IMTS CIS Team recognized that analytical information comparable to the ORMSS did not exist for all of the locks and dams on other parts of the IMTS and that replicating this Ohio River framework nationally or developing another nationally applicable analytical framework would require extensive engineering and economic data and model development. Such an effort far exceeded the Team's available time to generate its recommendations. Although completion of a new comprehensive framework could not be achieved within the time and funding constraints, the Team continued to investigate the development and use of analytical metrics that were consistent, credible, and reproducible.

Given these constraints, the Team chose to use what it considered to be the best information currently available concerning project performance and economic risks for the three categories of projects. Doing so required the use of different information sources for different project categories. For example, because detailed benefit-cost analysis calculations were performed and were available for congressionally authorized projects, that information was used to examine those projects (categorized as Phase 1 and Phase 2 projects). Likewise, because very little or no detailed analysis had been developed for remaining IMTS projects (Phase 3 projects), benefit-cost analysis data was unavailable for those projects. Instead, an economic impact factor was developed and used for all lock and dam structures, and was the sole economic metric for all Phase 3 lock and dam projects.

Once the best-available sources of information had been identified for the types of projects being examined, varying factors, or criteria, were used to evaluate and prioritize capital investment projects

within a ranking system to help determine if and when a project under construction should be completed (Phase 1 projects), if and when a specific project should be approved for construction (Phase 2 projects), and whether a project should be approved for feasibility-level study (Phase 3 projects).

The criteria the IMTS CIS Team selected to rank projects fell into two broad categories: (1) structural and operational risk and reliability and (2) economics. Structural and operational risk and reliability metrics were represented either by a Dam Safety Action Classification (DSAC) rating or a Condition Index (CI). Economic consequence metrics were represented by Net Benefits, Benefit-Cost Ratio (BCR), Remaining Benefit Remaining Cost Ratio (RBRCR) (for Phase 1 and Phase 2 projects only), and Economic Impact (for all projects). The risk and reliability criteria were represented as numeric grades of 1 through 5 for DSAC ratings and as letter grades of A through F for Condition Index ratings. Those risk and reliability criteria metrics were then converted to numeric scores, with a maximum weight of 40 or 60 depending on the project phase. The economic criteria were represented as dollars for net benefits, as ratios for BCRs and RBRCRs, and as numeric grades of 1 through 100 for economic impact. These metrics were each converted to a relative percentage of the highest value observed for that metric at a project, with a maximum weight of 40 or 60 depending on the project phase.

This chapter more fully discusses the derivation of initial metric values, as well as the relative weighting of scores used to calculate final scores and rankings for the entire portfolio of projects being considered.

4.2.1 Risk and Reliability

Risk and Reliability (R&R) was viewed as a key noneconomic component for the prioritization of capital projects. These metrics were based on the Corps' evaluation of an asset's current performance and the ability of that asset to meet the mission requirements of a dam or lock. Calculation of R&R metrics requires site-by-site assessments of assets. These assessments involve specific evaluations that indicate if the facility, in its current condition, is adequate, if failure is imminent, or if it exists in an intermediate condition. Intermediate ratings indicate how critical it is for immediate action to take place. Two assessment methods were used to address R&R ratings: CI and DSAC. The former rating system was applied to locks and dams. The latter was applied primarily to dams, but is also applied to gates and walls if a failure would result in a loss of pool. Because channel projects did not have an R&R value, they were manually prioritized. [15]

In general, R&R ratings included a vital condition evaluation within the prioritization spectrum by identifying the overall condition and function of the inland marine asset. This rating provided a filter to highlight the most compromised assets if R&R were used as the only evaluation criteria. When combined with economic factors, the most distressed assets with the greatest financial benefit were identified as the projects at the high end of the prioritization list. R&R were rated differently depending on the evaluation stage of a project. Phase 1 and 2 projects were prioritized with R&R constituting 40 percent of the final decision, whereas Phase 3 projects were evaluated with R&R totaling 60 percent of the decision ranking. This higher weighting ensured that Phase 3 projects in a failing state were addressed as a matter of higher priority.

4.2.1.1 Condition Index

The CI employs a measurement used when evaluating locks within the inland waterways system. In 2009, the Corps established a consistent process for conducting OCAs at navigation locks. By the end of FY 2010, the Corps will have assessed all Corps' navigation locks using this approach. These OCAs will evaluate key components using information from periodic inspections, input from project staff, and a site

[15] The Team is assessing the relative importance of channels on a case-by-case basis. Metrics compatible with those used for locks and dams were not available at the time this report was prepared.

inspection to develop a CI for the project based on its probability of failure, i.e., its inability to serve its function and pass traffic. Once the field evaluation is completed, the lock is assessed a CI level based on the condition of the facility at the time of the assessment. A greater weight is given to the CI for Phase 3 projects to highlight those projects with the highest risk of failure and move them toward authorization. Figure 4-3 defines the facility condition for each level of the index. The use of a standard national process is intended to ensure that projects are compared using similar criteria.

Condition	Definitions
A – Adequate	Limited probability of failure
B – Probably Adequate	Low probability of failure
C – Probably Inadequate	Moderate probability of failure
D – Inadequate	High probability of failure
F – Failed	The feature has FAILED

Figure 4-3. Condition Index

The CI will also be used to identify and rank investments in assets with the greatest maintenance needs and that pose the highest risk to the navigation mission absent any action. Depending on the scope of the problems for a given asset, the CI can be used as a guide for prioritizing the maintenance of assets with the aim of preventing deterioration that would result in urgent, major, unplanned repairs;, it could also support the need for capital improvements.

Better prioritization of project investments is an important first step in making trade-offs between maintenance and construction priorities.

4.2.1.2 Dam Safety Action Classification

The DSAC reflects the safety rating of each dam or structure and the resultant and immediate actions required for remediation based on the safety rating level. The classifications are organized into five levels shown below—with Level 1 as the most compelling for action (the least safe structure) and Level 5 as the safest. DSAC assessments have been completed for all Corps' navigation dams. The classification may be reviewed whenever new information is available that might affect the rating, e.g., results from a risk assessment or study, event at the project, signs of distress, geotechnical investigation, instrumentation data, etc. The maximum interval between DSAC reviews will reflect new risk assessments that will be performed (or updated) every 10 years when the district performs a Periodic Assessment (periodic inspection with a risk assessment.) The IMTS CIS Team will include this classification, along with the OCAs, for prioritization of all navigation dams throughout the inland waterways system.

LEVEL 1 – Urgent and Compelling

- Level 1 classification is Urgent and Compelling (Unsafe) and indicates a requiring need for immediate action. A Level I dam is near critical failure or has an extremely high risk of failing.

LEVEL 2 – Urgent

- Level 2 classification is Urgent, indicating that the dam is unsafe or potentially unsafe. At this level, a potential failure is foreseen or is at a very high risk to fail soon.

LEVEL 3 – High Priority

- Level 3 classification is High Priority (conditionally unsafe). A dam rated at this level is significantly inadequate and has a moderate to high risk of failure.

LEVEL 4 – Priority

- Level 4 classification indicates a priority ranking that considers a dam to be marginally safe. A dam rated at this level is inadequate but with a low risk of failure.

LEVEL 5 – Normal

- The Level 5 classification is rated as normal and safe. A dam with this rating is adequately safe and residual risk is considered tolerable.

4.2.2 Economic Return

The IMTS CIS Team identified the Economic Return for projects based on four key metrics: Net Benefits, BCR, RBRCR, and Economic Impact. The first three metrics are all derived from the economic analysis contained in the last approved report—whether a feasibility study, a Limited Re-evaluation Report (LRR), a General Re-evaluation Report (GRR), an Economic Update, or a Major Rehabilitation Report. For projects under consideration at this time, such economic information is available only for projects in construction or authorized for construction, Phase 1 and Phase 2 projects. For planned projects in Phase 3, it was determined that Economic Impacts would be assessed by use of a prioritization algorithm. Each of the four metrics that constitute Economic Return is discussed below.

4.2.2.1 Net Benefits

Net benefits are NED benefits net of the cost of the investment plan. Project benefits are estimated relative to a base condition reflective of existing operations and conditions absent the proposed or planned capital investment. Benefits are typically transportation cost reductions (due to reduced delays, the ability to use a more efficient vessel fleet, or shifts from a more expensive overland mode to a now less expensive water route) and maintenance cost reductions (as a result of reduced operating costs or from the replacement of worn components that improve the reliability of the project). Reduced transportation delay costs merit special mention. This benefit category captures the benefit of expanded capacity that alleviates chronic waterways traffic congestion and the benefit of reducing unexpected outages associated with degradation of structural components. Similarly, the benefit category that captures reduced maintenance costs relative to a base condition recognizes that planned replacement of a component or multiple components can result in lower repair costs than replacing individual components as they fail.

A stream of benefits is forecast for each year of the project life. Calculation of annual benefits requires projections for project structural performance, operational performance, the cost of waterway and overland transportation, and demands for service. These projections enable estimates of degraded service (due to chronic traffic congestion, diminished reliability, or a combination of both) in the base condition and how and to what extent the proposed investment will provide benefits by improving performance. Annual benefit streams are discounted using current discount rates and the OMB's preferred 7 percent discount rate. The present value of this stream is then amortized over the 50-year life cycle to arrive at an average annual equivalent benefit.

Cost streams are treated similarly and expressed as average annual equivalent costs. Cost expenditures that occur prior to the online date (typically construction costs) are brought forward with the discount rate, while costs that occur after the project's online date are discounted back to the online date. By bringing construction costs forward, the project is in effect charged interest during construction (IDC). A longer construction period results in a more expensive project and a greater IDC amount.

Net benefits are the difference between average annual equivalent benefits that will be realized by the proposed/completed investment and the average annual equivalent cost of the proposed/completed investment. Net benefits are used to select among competing investment alternatives for a specific

project; the alternative with the greatest net benefits is referred to as the NED plan. Net benefits used at any given time are taken from the last approved report (decision document). Net benefits change only when a more current economic analysis is performed as part of an Economic Update, LRR, or GRR.

4.2.2.2 Benefit–Cost Ratio

The BCR presents the average annual equivalent benefits and costs discussed in Section 4.2.2.1 in ratio form. The BCR is used to compare the economic performance of an investment across projects. The BCR used at any given time is taken from the last approved report (decision document). The only time the BCR changes is when a more current economic analysis is performed as part of an Economic Update, LRR, or GRR.

The OMB and the U.S. Congress use BCRs to make judgments about the relative need for major capital improvement projects in other areas of the federal government, not just for Corps or other water resource projects. Typically, a project must have a BCR of at least 1.0 to be eligible for congressional authorization. Because prioritizing projects from highest to lowest BCR rank orders expected project investment results, a project with a higher BCR generally is favored over one with a lower BCR unless other noneconomic factors (for example, safety considerations) require a different result.

4.2.2.3 Remaining Benefit Remaining Cost Ratio

The RBRCR has played an important role in the budgeting of Corps construction projects in the past. The RBRCR is calculated for the first time during the project budget cycle update in the first year of construction. The ratio is then updated every year until construction is complete. Cost engineers provide a current estimate of actual costs for all remaining years the project is to be under construction. These remaining costs are deflated back to the price level used in the latest authorizing document. These remaining costs are then amortized to obtain an average annual equivalent remaining cost. The remaining benefits (typically these benefits are the same as benefits reported in the decision document because, in most cases, benefits from the investment are not realized until the project is placed in service), and remaining costs are then displayed as a ratio—the RBRCR. Like the BCR for projects being considered for authorization, the RBRCR informs the budget process by recognizing that prioritizing construction projects from highest to lowest RBRCR will maximize a multi-project investment program's net benefits within a given level of available funding.

4.2.2.4 Economic Impact

The Economic Impact metric is used in all phases. However, for planned, or Phase 3 projects, the IMTS CIS Team relied solely on Economic Impact metrics to account for Economic Return. Phase 3 projects have not undergone feasibility or major rehabilitation studies, so the more conventional benefit-cost information is not available. This section discusses the tools, methods, and data used to estimate Economic Impact.

Two candidate methods were explored to represent Economic Impact. The first relied on the Shipper Carrier Cost Model (SCC) in simulating estimates of main chamber closure cost impacts; the second relied on an impact algorithm (referred to as the Algorithm).[16] While the Algorithm was chosen for its ability to incorporate multiple metrics or representations of engineering risk and economic consequences, the SCC work generated important data for the entire inland waterways system, most notably the transportation rate savings required to run the Algorithm.

[16] The SCC Model and the results of its analysis are available in a draft report, *Inland Navigation Lock Projects, Estimation of Value and Main Chamber Closure Costs,* dated 23 March 2009. The Algorithm is documented in *Application of LRD Maintenance Standard Procedure to All Corps Navigation Locks and Dams* dated 22 July 2009.

Impact Algorithm. The Impact Algorithm relies on basic data originally built for the SCC Model. A set of 235 unique projects were assessed with the Algorithm. Projects as defined in this analysis were categorized as either (1) single lock or dam, (2) main chamber, or (3) dam. All single chamber facilities fell into the "lock or dam" project category, as it is assumed closure of either the lock or the dam at a single chamber site produces the same result. Dual chamber sites were handled as two separate projects because if the main chamber were closed, traffic could pass through the site, albeit at a potentially reduced rate, through the auxiliary chamber, but if the dam had failed, it is assumed that traffic would be halted through the site because adequate pool cannot be maintained. Auxiliary chamber closures are not considered because, in most cases, auxiliary chamber closures have minimal impact on traffic.

The Algorithm combines three factors related to navigation locks and dams: (1) risk of unscheduled lock chamber or dam failure, (2) potential severity of the failure, and (3) a measure to gauge the potential economic impact of the failure. A flowchart of the Algorithm logic is shown in Figure 4-4. It should be noted that although the Algorithm allows for consideration of risk of failure, that feature was not used in this analysis because the probabilities have not yet been developed. The IMTS CIS Team anticipates implementing this portion of the Algorithm sometime in the future as the IMTS capital projects business model matures and as time permits the development of data needed to support this feature.

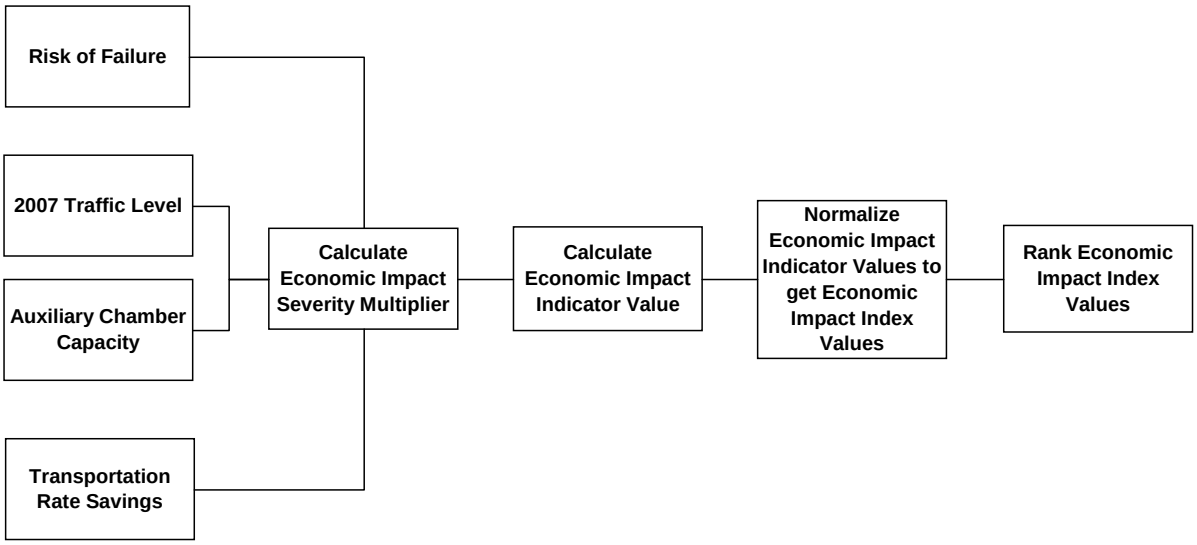


Figure 4-4. Algorithm Flowchart

The Algorithm proceeds through the following steps for each project (a main chamber lock project, a dam project at dual chamber sites, and a single lock or dam project at single chamber sites):

1. Calculate the ratio of traffic demand to auxiliary lock capacity (demand/capacity ratio) at each dual chamber site.

2. Select the appropriate Economic Impact severity multiplier (see Table 4-5) for each project. This multiplier is a factor that represents the increase in transit time given closure of the main chamber (for dual chamber locks) and/or magnitude of increased transportation cost necessitated by going to an overland mode (for single chamber facilities, dams, and main chamber closures, where traffic exceeds capacity of the auxiliary).

3. Multiply the Economic Impact severity multiplier and transportation rate savings for each site to obtain the Economic Impact indicator value.

4. Normalize the Economic Impact indicator value by representing each as a proportion of the maximum indicator value calculated for any project.

5. Rank each project by its normalized Economic Impact indicator value.

Table 4-5. Severity Multipliers Used in the Algorithm

Demand/Capacity Ratio (%)	Severity Multiplier
0	1.6
70	3.4
80	4.4
90	9.4
95	18.5
99	46.4
100	70.0
200	120.0
Single Chamber	140.0

Demand/capacity ratios from 0 percent to 100 percent applied to a main chamber project, while the single chamber/dam ratio applied to lock or dam (single chamber sites) projects and to dam projects.

4.2.2.5 Economic Impact Prioritization Principles

Sections 4.2.1 through 4.2.2.4 identify criteria and possible metrics for the Corps' use in budget development. The information these metrics provide is then used to prioritize projects by ranking them based on a weighted score derived from the criteria metrics. The ranking process considers different economic criteria, such as Net Benefits, BCR, RBRCR, and Economic Impact to determine Economic Return. Prioritization also considers reliability criteria, such as the CI and the DSAC rating. Economic Return and R&R together determine the initial prioritization of individual projects, with an understanding that additional feedback may also inform the prioritization process.

Various iterations occurred, with evaluations on what criteria should be used, how the criteria should be weighted, and whether projects under different phases should be evaluated differently. Before developing a final decision tool, each project was evaluated to make sure that the right data points were collected using a similar methodology and assumptions. Major principles of the prioritization process focused on having standardized metric development and criteria weights and different applications of those weights based on project phase.

Projects were prioritized by ranking their total scores in descending order. The evaluation criteria and condition weights shown in Table 4-6 and Table 4-7 were recommended by the IMTS CIS Team to establish ratings for the projects. Table 4-6 presents the culmination of analysis on how weights should be established and when applied. Key prioritization process principles include evaluating what criteria grouping should be more important and how that weighting changes for the phase of the project work.

As discussed earlier, the IMTS CIS Team noted that Phase 1 and 2 projects have been studied in more depth. The most critical factor in ordering the projects was the economics of individual projects; the RBRCR was the most critical economic criterion to efficiently complete those projects already under construction and to realize, at the earliest, the intended benefits. Phase 3 projects have not been studied enough to provide significant level of detail for a risk-based, accurate cost estimate or for reliable economic criteria, so condition or DSAC rating was deemed the more critical aspect and was weighted more heavily than economic criteria.

Table 4-6. IMTS Investment Strategy Criteria Weighting

Criteria	Phases 1 and 2	Phase 3
Risk and Reliability	40	60
Condition Index for Locks (rated A through F)		
DSAC for Dams (rated 5 through 1)		
Economic Return	60	40
Net Benefits	15	
BCR	5	
RBRCR	25	
Economic Impact	15	40
Totals	100	100

Table 4-7 shows the final weighting associated with the R&R parameters for each phase grouping. Condition F or D and DSAC 1 or 2 were given heavier weights than the other ratings. The IMTS CIS Team had concerns over the current condition of the IMTS assets and wanted to ensure that those assets in the worst condition were not overlooked solely due to a higher economic return of an asset that was in much better condition. Those facilities that are failing or near failing need to be addressed as soon as possible.

Table 4-7. IMTS Investment Strategy Condition Weights

DSAC | CI Rating	Phase 1 and 2	Phase 3
1 | F	40	60
2 | D	25	45
3 | C	10	30
4 | B	5	10
5 | A	0	0

Table 4-8 shows the 10 highest ranked projects and includes projects from both Phase 1 and 2. Olmsted Lock and Dam was by far the highest ranking project based on the CI rating (for Locks and Dams 52 and 53, which Olmsted will replace) and the economic rating, highest in all areas except Economic Impact. See Appendix D for a complete final ratings list.

Table 4-8. Total Ranking for the 10 Highest Ranked Projects

Project Name	Subproject Name	Criteria Total	Rank
Olmsted Locks and Dam	Olmsted L/D Construction	90.5	1
Monongahela Locks and Dams 2, 3, and 4	Lower Mon 2,3,4, Dam Features	69.5	2
Monongahela Locks and Dams 2, 3, and 4	Lower Mon 2,3,4, Lock Features	68.8	3
Greenup Lock, Ohio River	Greenup Lock Extension PED	59.0	4
Chickamauga Lock	Chickamauga Replacement Lock	40.2	5
Upper Mississippi & Illinois Waterway, L/D 25	1200' Lock Addition	26.9	6
Upper Mississippi & Illinois Waterway, L/D 22	1200' Lock Addition	26.5	7
Kentucky Lock Addition	Kentucky Lock Addition	26.3	8

Project Name	Subproject Name	Criteria Total	Rank
Inner Harbor Navigation Canal Lock	IHNC	23.9	9
Upper Mississippi & Illinois Waterway, Lagrange	1200' Lock Addition	23.2	10

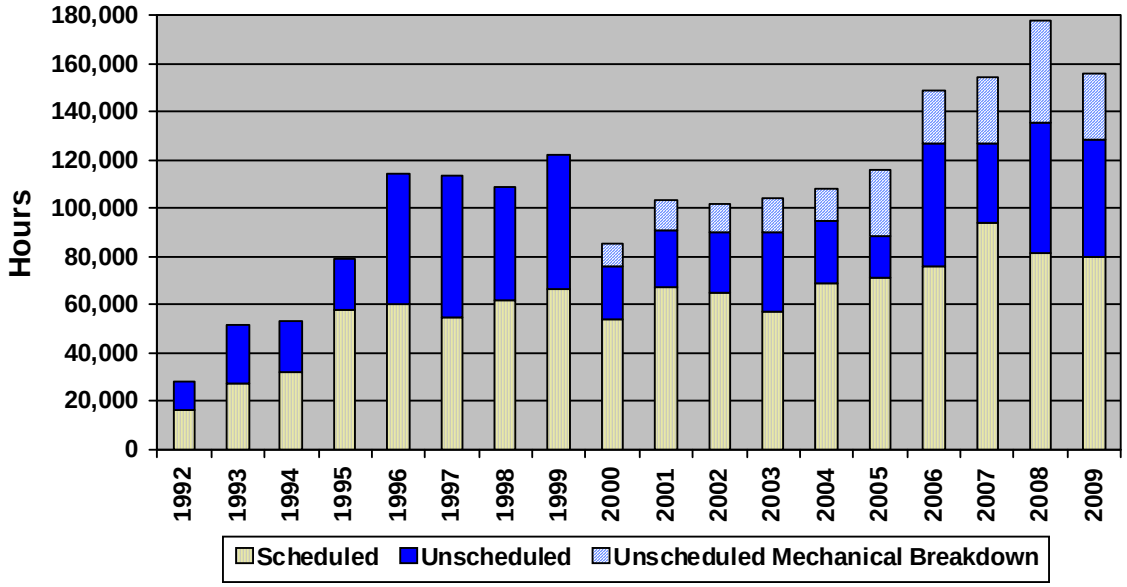
4.3 Twenty-Year Capital Investment Strategy

This 20-year capital investment strategy focuses on (1) effectively improving the hundreds of assets that constitute the inland waterways infrastructure via replacement and rehabilitation and (2) enhancing and improving the inland waterways to address critical, long-standing navigation needs. It begins with a capital needs assessment, which highlights the current gaps in the system and where ongoing investment in the IMTS network is essential to counter the unscheduled closures, longer travel times, and aging and inadequate waterways infrastructure.

The strategic enhancements included in this assessment, summarized on the following pages and in Appendix B, provide a view of future planned waterways investments. Over the next 20 years, these capital investments will provide a reliable IMTS and successful execution of the navigation mission. Although the Team is representing this strategy as a 20-year capital investment strategy, the process is dynamic, and the strategy will be evaluated**,** adjusted**,** and updated annually. Chapter 6 contains details of the implementation.

4.3.1 Improving System Efficiency

The ongoing Corps commitment to provide a reliable IMTS requires both (1) rehabilitation or replacement of the current facilities and (2) evaluation of potential system improvements. There is still room, however, for further improvement of system efficiency. Unscheduled maintenance problems, which are magnified when operating only a single chamber lock, can lead to closure, and insufficient O&M funds can result in navigation infrastructure becoming increasingly unreliable. Figure 4-5 depicts increasing delays due to scheduled and unscheduled closures, including mechanical breakdowns. Closures become more frequent as navigation assets age**,** support more gate operations on an annual basis**,** experience condition deterioration**,** and have O&M funding levels that do not provide for adequate maintenance of the facilities. In short, the IMTS is not operating at peak system efficiency and it cannot continue to operate as needed—and to sustain the goals of the navigation mission—under these conditions. Long-term capitalization, recapitalization, and rehabilitation are essential to ensure the long-term viability of the IMTS.



Note: Total unscheduled closures includes both unscheduled and unscheduled mechanical breakdowns

Figure 4-5. Waterways System Performance

4.3.2 Twenty-Year Capital Needs Assessment

Recognizing that continuous investment is essential to ensure the viability of the inland waterways system for current and future navigation usage, the Corps is rebuilding and improving the system as needed. As an analytical starting point and to establish the long-term planning context, the Corps prepared a 20-year capital needs assessment based on submissions from individual districts that articulates the long-term capital investments recommended if there were unlimited funds available to invest in the IMTS. These investments have two priorities: rebuilding aging infrastructure and improving the efficiency of travel. Recognizing that unlimited funding is not available and in all likelihood will never be available, the Team applied the criteria to the unconstrained needs (discussed in Section 4.1), and a priority list of projects was compiled.

4.3.2.1 Evaluating the Status Quo

The IMTS CIS Team evaluated the future program under the current funding level of approximately $170 million per year (federal appropriations and IWTF contribution). Figure 4-6 depicts one example of what the program could look like under current revenues. Projects currently under construction would not be completed until after FY 2038 and no new projects could be started. The status quo would eventually result in the end of the IMTS. The system cannot be maintained under the current funding level and would become increasingly unreliable at this level of investment.

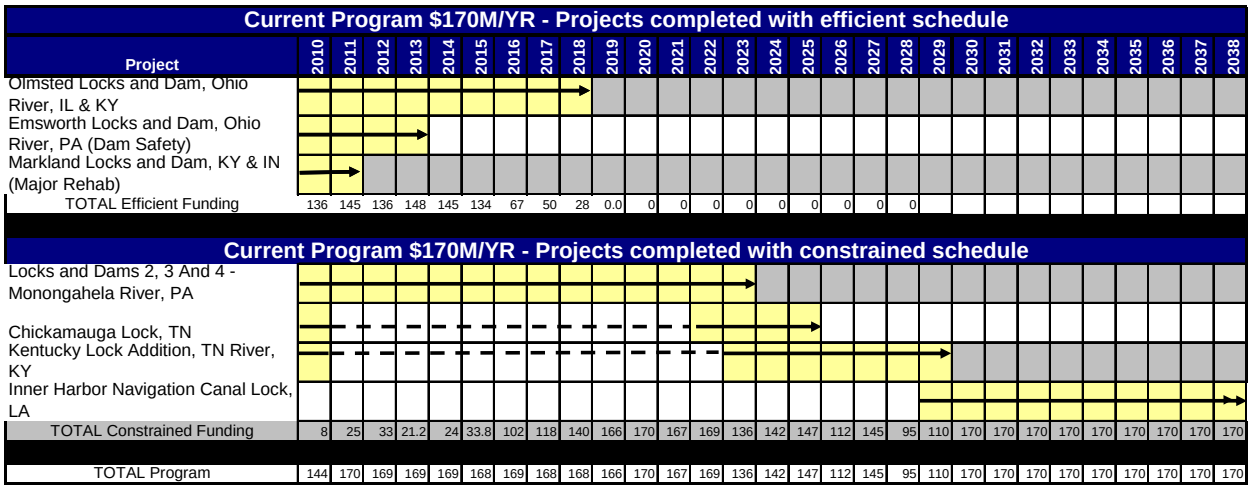


Figure 4-6. Future IMTS Program with Current Revenues of $170 Million per Year

4.3.2.2 Recommended 20-Year Capital Investment Strategy

The investments in the 20-year capital needs assessment reflect the requirement to restore waterways components within the inland waterways system to a state of good repair, to replace or improve assets that have reached the end of their useful lives, and to minimize the number of projects that already operate in a state of deferred maintenance. The capital needs assessment provides the information needed to plan for future investments, identify funding requirements, and optimize scheduled work so that the IMTS remains safe and reliable well into the future.

The IMTS CIS Team next looked at what ***should*** be completed in the next 20 years to maintain a reliable IMTS. It became apparent from this examination that two program levels were required to ensure that new construction, as well as major rehabilitation, projects would be prioritized and funded effectively. Regarding new construction, the Team agreed that, within the 20-year time horizon for new construction, projects must include substantial progress on the Upper Mississippi and Illinois Waterway System NESP projects. This scenario represents a potential funding level of about $320 million per year for new construction.

To ensure that existing infrastructure is being rehabilitated in a timely and appropriate manner, the IMTS CIS Team also looked at major rehabilitations. The Team recommends using the average amount spent on major rehabilitation projects in the last three years, which amounts to approximately $60 million per year. Because there is a large bottleneck of new construction early in the capital investment strategy, the funding allocations between new construction and major rehabilitation would be loosely adhered to in the short term. The target total for the 20-year capital investment strategy for new construction and major rehabilitation is an average of $380 million per year.

In developing the capital investment strategy, priority was first given to projects that had already begun construction—Phase 1 projects—and then to the remaining projects. Although each project was assigned a total score for prioritization, if within a reasonable range, i.e., 23.2 versus 23.9, they are considered essentially equal. The prioritization score was intended to provide a 90 percent to 95 percent solution with minor adjustments if other factors warrant. These factors could include legal or compliance requirements, scheduling considerations that could provide better design data, or project type such as channel projects since the criteria does not fairly prioritize these projects. In the case of the recommended program, two NESP projects were brought forward within the program as constructing these projects earlier would result in valuable lessons learned for the remaining projects.

With an infrastructure valued in the billions, this capital needs assessment represents an investment level between $7 billion and $8 billion over the next 20 years to address the desired repair and replacement needs of the system.[17] These investments to rebuild and modernize the system include almost 30 of the over 100 projects in this assessment and are considered necessary to ensure continued reliability of the IMTS over the long term.

Under the $320 million per year funding level option for new construction, the investment strategy can address current ongoing construction needs and includes new construction starts for several additional projects. When developed in tandem with the $60 million funding level for major rehabilitation projects, this new funding program will begin to significantly address the component renewal and reliability of existing infrastructure, as well as enable the necessary additions and expansions to improve the flow of commercial navigation through key waterways. Table 4-9 lists those projects included under the proposed funding level.

Table 4-9. The Recommended Program: Projects Included in the 20-Year Funding Horizon

Funding Option	Projects Included in the Funding Level
New Construction	Olmsted L/D Construction Lower Monongahela LD 2, 3, and 4 Chickamauga Lock Kentucky Lock Addition Upper Mississippi LD 25 GIWW High Island to Brazos River LaGrange ILL WW Inner Harbor Navigation Canal Lock Greenup Locks and Dam Upper Mississippi-LD 22 Upper Mississippi LD 24
Major Rehabilitation	Emsworth Locks and Dam OHR Markland Locks and Dam OHR Lockport Lock and Dam ILL WW Upper Mississippi LD 25 (Scour Repairs) Lower Monumental Lock and Dam ILL WW Thomas O'Brien Lock and Dam Greenup Dam John T. Myers Dam Meldahl Locks and Dam Montgomery Dam Safety Upper Mississippi-Mel Price No. 2 Lock Bank Slope Rehab R Willow Island Locks and Dam Marmet Locks and Dam Rehab Joe Hardin Lock Upper Mississippi LD 22

Table 4-10 highlights the construction schedule under unconstrained, current ($170 million) and recommended ($380 million) funding levels. As funding levels increase, projects can be implemented and, more importantly, completed earlier than they can at lower funding levels; this table also provides some indication of construction slippage based on funding levels. The timing, based on unconstrained

[17] An interesting aside, the New York City Metropolitan Transit Authority requires $130 billion over the same 20-year period (from the *20-Year Capital Needs Assessment, 2010–2029*).

funding, is shown with key projects having a start date in 2011. Project implementation at the current funding level of $170 million per year significantly delays some projects by 10 to 30 years. This delay indicates that funding at the status quo level will further exacerbate and compromise the inland waterways infrastructure by continuing to put off necessary new construction and much needed major rehabilitations of existing infrastructure.

Table 4-10. Illustrative Program-Level Comparison of Project Construction Schedules

Project	Unconstrained		Current at $170M		Recommended at $320M	
	Start FY	Finish FY	Start FY	Finish FY	Start FY	Finish FY
Olmsted	Ongoing	2018	Ongoing	2019	Ongoing	2019
Lower Mon	Ongoing	2021	Ongoing [1]	2023	Ongoing	2023
Chickamauga	Ongoing	2014	2023 [1]	2026	Ongoing	2015
Kentucky Lock	Ongoing	2016	2024[1]	2029	Ongoing	2019
Inner Harbor	2011	2018	2027	2039	2021	2028
Greenup Locks	2011	2016	2044	2049	2022	2027
Upper Mississippi LD 25	2011	2022	2037	2045	2011	2018
LaGrange	2011	2023	2045	2053	2017	2025
GIWW High Island to Brazos River	2013	2015	2043	2045	2013	2015

1. Ongoing projects would be interrupted or severely limited in funding at the $170 million funding levels and resumed in the fiscal years indicated

Recommendation: The IMTS CIS Team recommends a capital investment program funding level of $380 million per year with target levels of $320 million/year for new construction and $60 million/year for major rehabilitation. The new construction and major rehabilitation targets are not strict funding allocations and can be adjusted if in the best interest of the program.

4.3.3 Project Implementation Timeline for Recommended Program

The 20-year capital investment strategy addresses the highest priority new construction and major rehabilitation projects generally as determined by the criteria weighting and decision principles in Chapters 4.2. With a $380 million average annual investment level, this investment strategy addresses 26 of the 101 projects that have been identified by Corps districts and highlights how projects would be prioritized based on the recommended investment level. Figure 4-7 compares cumulative project completions at the current investment level with project completions at the recommended investment level. The recommended investment plan addresses five DSAC 1 and three DSAC 2 dams, as well as one lock facility that was rated F and six that were rated D through the operational condition assessments.

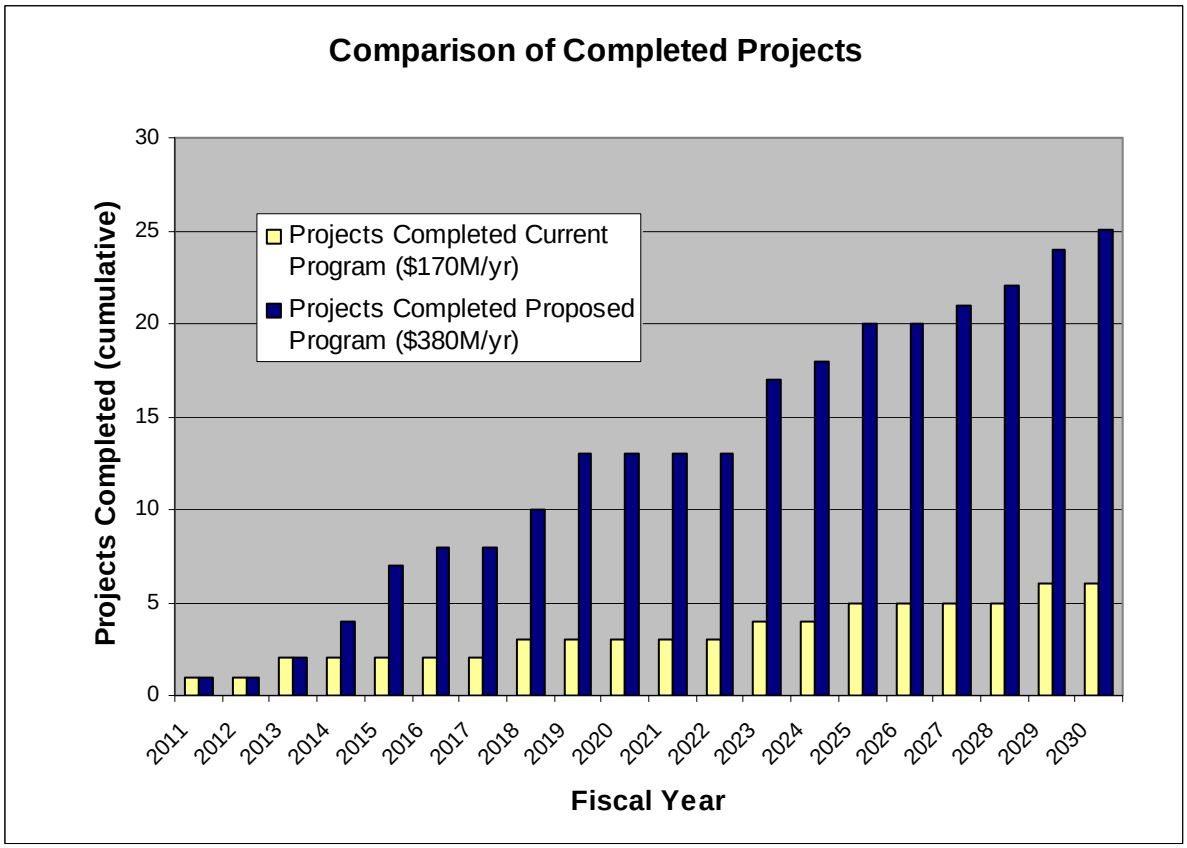


Figure 4-7. Comparison of Completed Projects at the Current Investment Level and the Recommended Investment Level

The Team believes that the recommended investment level should be adequate and should effectively help to address the sizable backlog of deferred inland waterways projects. This IMTS capital investment strategy will be reviewed annually and updates could result in adjustments to the investment level or priorities based on new information, current conditions, and potential risk.

Figure 4-8 shows the timing associated with new construction projects, which constitute approximately 87 percent of the planned expenditures over the next 20 years. Note that the last two projects shown, Upper Mississippi LD 22 and 24, continue past the end of the 20-year time horizon. Table 4-11 shows the funding profile for the proposed new construction program. Similar to Figure 4-8, Figure 4-9 shows the timing associated with major rehabilitation improvements. Table 4-12 shows the funding profile for the proposed major rehabilitation program. Upon enactment of implementation language and annually thereafter, the program will be updated with the most current information, reviewed, and adjusted to ensure that projects identified for construction or major rehabilitation can be completed efficiently. Chapter 6 details the implementation process for this program.

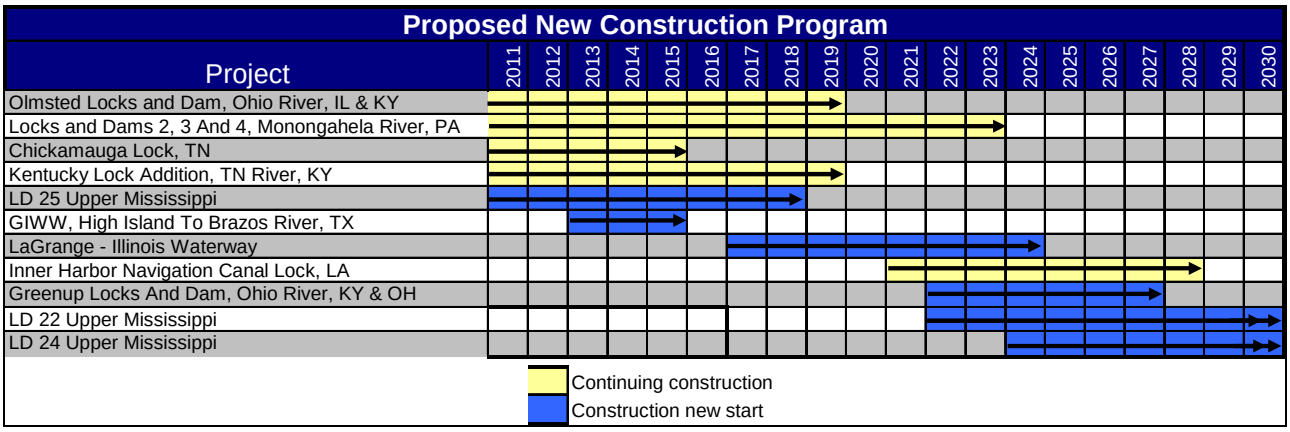


Figure 4-8. Proposed New Construction Projects Timeline, FY 2011 to FY 2030

Table 4-11. New Construction Project Funding Profile, FY 2011 to FY 2030

Division	District	Official Authorization Name (possible future)	Lock / Dam / Channel	Total Remaining Cost[1]	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
NEW CONSTRUCTION																								
LRD	LRL	OLMSTED LOCKS AND DAM, OHIO RIVER, IL & KY	D	1002.7	132.0	138.0	144.3	131.1	135.1	86.9	89.6	92.2	53.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LRD	LRP	LOCKS AND DAMS 2, 3 AND 4, LOCKS - MONONGAHELA RIVER, PA	L	904.1	80.0	103.0	83.3	27.2	56.3	52.2	29.9	79.9	101.3	106.5	93.9	69.2	21.4	0.0	0.0	0.0	0.0	0.0		
LRD	LRP	LOCKS AND DAMS 2, 3 AND 4, DAMS - MONONGAHELA RIVER, PA	D	172.5		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	117.4	22.2	17.0	15.8	0.0	0.0	0.0	0.0			
LRD	LRN	CHICKAMAUGA LOCK, TN	L	189.3	40.0	51.5	47.7	38.2	11.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LRD	LRN	KENTUCKY LOCK ADDITION, TN RIVER, KY	L	399.9	40.0	56.7	47.7	54.6	56.3	34.8	35.8	36.9	37.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MVD	MVS	LD 25 UPPER MISSISSIPPI	L	456.9	7.6	7.3	26.0	43.2	88.0	104.3	122.6	57.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SWD	SWG	GIWW, HIGH ISLAND TO BRAZOS RIVER, TX	C	18.7		0.0	2.1	10.9	5.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MVD	MVR	LAGRANGE - ILLINOIS WATERWAY	L	453.0	0.0	0.0	0.0	0.0	0.0	0.0	3.7	6.0	12.7	26.1	60.5	62.3	114.1	104.3	63.4	0.0	0.0	0.0	0.0	0.0
MVD	MVN	INNER HARBOR NAVIGATION CANAL LOCK, LA	L	1325.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	51.1	180.0	199.6	252.6	260.2	202.5	101.1	78.7	0.0	0.0
LRD	LRH	GREENUP LOCKS AND DAM, OHIO RIVER, KY & OH	L	369.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	27.0	21.1	42.8	75.0	122.6	81.0	0.0	0.0	0.0
MVD	MVR	LD 22 UPPER MISSISSIPPI	L	532.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.6	2.6	2.6	2.1	2.0	21.7	47.4	75.1	144.3
MVD	MVS	LD 24 UPPER MISSISSIPPI	L	650.2		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.7	15.4	18.7	35.3	65.3	161.7	163.1

1. Remaining cost is based on current cost estimate

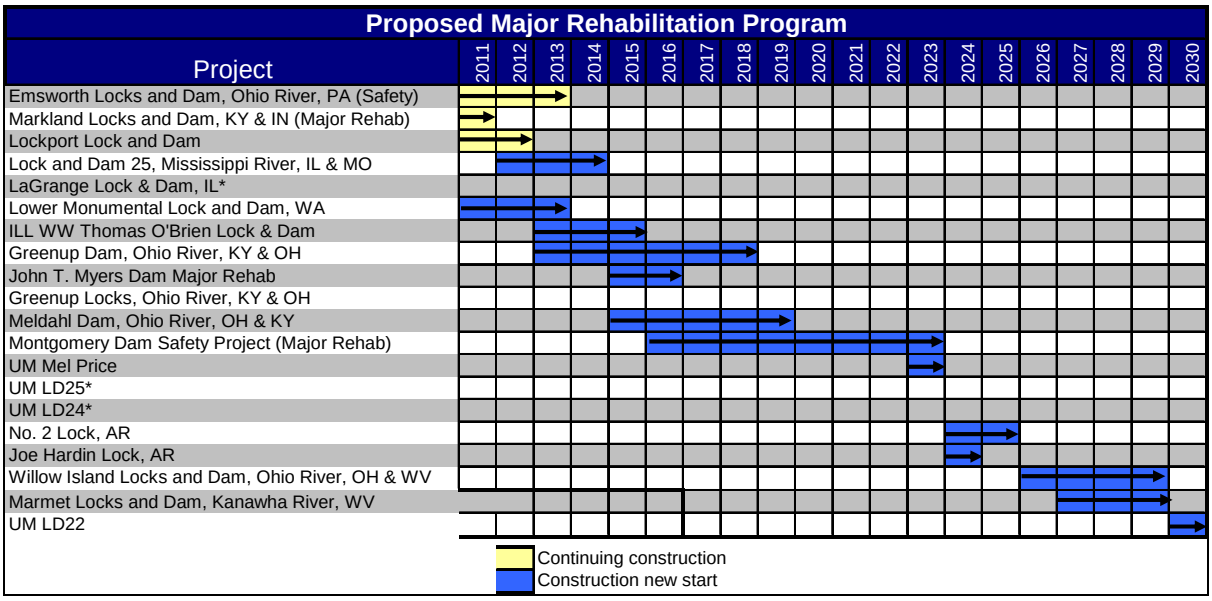


Figure 4-9. Proposed Major Rehabilitation Program Timeline, FY 2011 to FY 2030

* Note – Lagrange, Greenup, UM LD 25 and UMLD24 do not show scheduled rehabilitation projects due to new construction projects at these facilities. Their priority remains as a placeholder until the new construction work begins and criteria is re-evaluated for these projects.

Table 4-12. Major Rehabilitation Project Funding Profiles, FY 2011 to FY 2030

IMTS Proposed Program																								
Division	District	Official Authorization Name (possible future)	Lock / Dam / Channel	Total Remaining Cost[1]	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
MAJOR REHABILITATION[2]																								
LRD	LRP	EMSWORTH LOCKS AND DAM, OHIO RIVER, PA (Dam Safety)	D	19.8	10.3	4.6	3.2	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LRD	LRL	MARKLAND LOCKS AND DAM, KY & IN (MAJOR REHAB)	L	5.4	5.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MVD	MVS	LOCK AND DAM 25, MISSISSIPPI RIVER, IL & MO	D	28.9		5.2	10.6	13.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MVD	MVR	LAGRANGE LOCK & DAM, IL[6]	L	0.0																				
NWD	NWW	LOWER MONUMENTAL LOCK AND DAM, WA	L	28.7	3.1	9.7	15.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
MVD	MVR	ILL WW THOMAS O'BRIEN LOCK & DAM	L	25.1		0.0	5.3	10.9	8.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LRD	LRL	JOHN T. MYERS DAM MAJOR REHAB	D	51.7		0.0	0.0	0.0	6.8	45.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LRD	LRH	GREENUP LOCKS AND DAM, OHIO RIVER, KY & OH	D	93.6		0.0	3.2	3.3	3.4	17.4	41.8	24.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LRD	LRH	GREENUP LOCKS AND DAM, OHIO RIVER, KY & OH[3]	L	0.0																				
LRD	LRH	MELDAHL LOCKS AND DAM, OHIO RIVER, OH & KY	D	69.7		0.0	0.0	0.0	2.3	2.3	2.4	18.4	44.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LRD	LRP	MONTGOMERY DAM SAFETY PROJECT (MAJOR REHAB)	D	245.3	0.0	0.0	0.0	0.0	0.0	7.0	11.9	24.6	38.0	39.1	40.3	41.5	42.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MVD	MVS	UM Mel Price	L	85.5		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	85.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MVD	MVS	UM LD25[5]	L	0.0																				
MVD	MVS	UM LD24[4]	L	0.0																				
SWD	SWL	NO. 2 LOCK, AR	L	24.6		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.7	12.9	0.0	0.0	0.0	0.0	0.0
LRD	LRH	MARMET LOCKS AND DAM, KANAWHA RIVER, WV	D	49.5		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.8	24.8	11.9	0.0
SWD	SWL	JOE HARDIN LOCK, AR	D	14.7		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.7	0.0	0.0	0.0	0.0	0.0	0.0
LRD	LRH	WILLOW ISLAND LOCKS AND DAM, OHIO RIVER, OH & WV	D	109.3		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	3.2	3.3	1.7	0.0
MVD	MVR	UM LD22	L	119.2		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	119.2

1. Remaining cost is based on current cost estimate.

2. Major Rehabilitation projects in Phase 2 are based on an approved Rehabilitation Evaluation Report

3. Greenup Rehab delayed, Greenup lock extension included in New Construction Program. Placeholder for rehab project remains pending completion of lock extension

4. UM LD 24 Rehab delayed. New lock chamber included in New Construction Program. Placeholder for rehab project remains pending completion of new chamber

5. UM LD 25 Rehab delayed. New lock chamber included in New Construction Program. Placeholder for rehab project remains pending completion of new chamber

6. Lagrange Rehab delayed. New lock chamber included in New Construction Program. Placeholder for rehab project remains pending completion of new chamber

4.3.4 Capital Investment Strategy Benefits

Section 1.1 describes the Corps' mission and the benefits of the IMTS over other forms of transportation. In short, improvements to the capital investment program that reduce costs and improve reliability increase the value of the IMTS to the nation. The selected case study report highlighted issues with the current process and established goals for developing an improved process that would result in a much more cost-efficient program. The capital investment strategy and process improvements described throughout this report are expected to result in measurable ***benefits*** to the IMTS. For example, cost growth that has become typical of IMTS projects will be greatly reduced. Using the selected case study report as a basis, cost growth on IMTS projects with the current process can be expected to be between 18 percent and 60 percent. Of that amount**,** about 30 percent is attributable to inefficient funding and 70 percent to other factors, such as differing site conditions or design changes—the future process will minimize cost growth. Another benefit to the capital investment strategy is avoiding additional benefits foregone on construction projects by completing these projects efficiently. It is important to monitor and measure project performance as the capital investment strategy is implemented to document the benefits of the program with this improved process.

4.3.4.1 Inefficient Funding

This capital investment strategy is intended to ensure that once project construction begins, each project will be funded efficiently until it is complete. Therefore, the Team assumed that cost growth due to inefficient funding would be eliminated on projects that would not normally be fully funded. Those projects that would be fully funded were not included in estimating avoided cost growth due to inefficient funding. The Team assumed that eliminating the cost growth would apply to construction or major rehabilitation projects greater than $200 million. The avoided cost growth due to inefficient funding over the 20-year capital investment period is conservatively estimated to be between $350 million and $1,180 million.

4.3.4.2 Other Cost Growth Factors

It is not realistic to assume that all other cost growth factors, such as differing site conditions or design changes, could be eliminated, but with the process improvement recommendations in Chapter 3**,** the Team expects to reduce the cost growth due to other factors by 25 percent to 30 percent. Over the 20-year capital investment period**,** the avoided cost growth due to other factors is conservatively estimated to be between $230 million and $925 million.

4.3.4.3 Benefits Foregone

The benefits foregone are the benefits a project would have realized upon construction, but because of construction delays, they have not yet been realized. Benefits foregone to date at only two of the larger construction projects, Olmsted and Lower Mon, are calculated to be $5.2 billion. Had these projects been completed as scheduled**,** the nation would have realized these benefits. In an effort to quantify the reduction in the benefits foregone with the recommended 20-Year capital investment period, the Team looked only at the projects that are currently under construction and the schedule for completing these projects under the current program (see Figure 4-6) compared to the schedule for completing these projects under the recommended program (see Figure 4-8). With the 20-year capital investment strategy, the IMTS would avoid more than $2.8 billion in additional benefits foregone. This estimate should be viewed as a conservative minimum because the Team did not quantify the benefits that would be foregone with the other projects in the program.

5. Cost-Sharing Model and Revenue Plan

This chapter addresses various cost-sharing options and recommends a revenue plan to fund IMTS needs over the next 20 years, with the goal of ensuring that future high-priority system improvements will be completed on time and within budget. Ensuring achievement of the goal of an improved capital projects business model depends on adoption of the full package of IMTS CIS Team recommendations, including the project delivery process improvements discussed in Chapter 3 and, particularly, on adoption of the underlying premise that the funding will be provided in an efficient manner.

5.1 Considerations

A number of important considerations set the tone for the recommendations presented throughout this report. These considerations explain some of the logical constraints that dictated the recommended project selection, the rating methodology that was ultimately used in the analysis, and the cost-sharing and revenue components of the Team's proposed recommendations. These considerations encompass the following:

- The 50/50 cost-sharing precedent established in WRDA 1986 for inland navigation modernization projects worked best in the early years of the program, where available revenues roughly matched needed IMTS project investment requirements and where project construction cost estimates approximated the actual construction costs encountered. In later years, project investment needs overwhelmed available construction funds, construction costs skyrocketed, and project completion dates were significantly delayed.
- Wholesale revisions to WRDA 1986's entire inland navigation construction cost-sharing formulation was unlikely to be supported by either the Congress or the Administration, limiting the types of policy changes that reasonably could be considered by the IMTS CIS Team.
- For approximately 30 years, the fuel tax on commercial users of the fuel-taxed portion of the IMTS has operated in a well-understood, well-accepted, and administratively workable fashion for both industry and the federal government.
- In light of the fact that waterborne transportation is less costly, more energy-efficient, more environmentally friendly, and safer than alternative transportation modes, cost-sharing and revenue enhancement policy should reward and not discourage increased use of the inland waterways system to help relieve growing congestion problems on the nation's highways.
- The beneficiaries of the lock feature of inland waterways modernization projects cover a wide range of interests—from commercial and defense users in a narrow sense to regional and national economies in a broader sense. The beneficiaries of the dam feature of these projects encompass an even wider reach and also include those who benefit from hydropower, municipal water supply, recreation, industrial water supply, agricultural water supply, local economic development, environmental enhancement, and flood damage prevention attributable to the pools created by the project's dam feature.

- Compared to truck and rail, the inland waterways industry is relatively small, with significantly limited capacity to contribute additional revenues to the IWTF.
- Equity and fundamental fairness, as well as the need to prevent governmental inefficiency, require that commercial users of the IMTS be protected against being required to cost-share unreasonable project cost escalation and delay.
- The current weak state of the national economy, following the worst recession in almost seven decades, requires that the waterways industry's taxes not be raised until the economy has recovered sufficiently, which the IMTS CIS Team's proposal assumes will occur in FY 2012.
- Near-term completion of the ongoing expansion of the Panama Canal will increase the importance of assuring that our nation's inland waterways transportation system is fully able to handle the significant additional maritime commerce that the expansion is expected to bring.
- As the United States continues to compete in the international economic arena with China and other countries that currently are investing vast sums to improve their respective country's transportation infrastructure, it is even more urgent that our country make significant strides in modernizing the IMTS.

These and other policy considerations guided the development of the cost-sharing recommendations presented in this report and are noted here because they informed the analysis involved after the prioritization step.

5.2 Revenue Needs

With the recommended $380 million program annual funding level developed in Chapter 4, revenues will need to increase beyond what is anticipated under current law to address the requirements of the IMTS. The IMTS CIS Team members understand the implications of an increase in revenues and have strived to ensure that the Team's cost-sharing recommendations are fair for all involved.

5.3 Cost-Sharing Model

With the current precedent requiring 50 percent of funding to come from the General Treasury (federal) and the other 50 percent to come from the IWTF for construction of all congressionally designated navigation projects and major rehabilitation projects on fuel-taxed inland and intracoastal waterways, the $380 million annual program would require $190 million annually from each of the general fund and the IWTF. In turn, the increase in the fuel tax to support such a cost-sharing alternative would be $0.30 per gallon for a total fuel tax of $0.50 per gallon, an increase to a level that is 250 percent of the current level. The Team acknowledges that this increase is unrealistic and would be extremely detrimental in a number of respects, yet the entire IMTS is in jeopardy without this level of investment. The Team also recognized that many other non-navigation entities and interests benefit from the IMTS, and these beneficiaries should be taken into account in the new recommended cost-sharing model.

With this in mind, the IMTS CIS Team reviewed and evaluated more than a dozen options for funding the IMTS capital investment program. These options included maintaining the current cost-sharing arrangement of 50 percent federal and 50 percent IWTF for all capital investments; varying that percentage; excluding some projects/features, such as dam or major rehabilitation projects; setting different thresholds for the cost-sharing of major rehabilitation projects; and capping the IWTF share for some projects with significant cost increases, such as Olmsted and Lower Mon. Table 5-1 lists the options that were considered.

Table 5-1. Cost-Sharing Options Considered

Description
Baseline Option – 50% Federal and 50% IWTF
50/50 for New Construction, 100% Federal for Major Rehabilitation
50/50 for New Construction and Major Rehabilitation above $50M, 100% Federal for Major Rehabilitation below $50M
50/50 for Locks, 100% Federal for Dams
50/50 for New Construction, and 75/25 for Major Rehabilitation
60% Federal, 40% IWTF
65% Federal, 35% IWTF
75% Federal, 25% IWTF
50% Federal, 50% IWTF on all projects except Lower Mon and Olmsted
50% Federal, 50% IWTF for New Construction and Major Rehabilitation above $50M (Locks); 75% Federal, 25% IWTF for New Construction and Major Rehabilitation above $50M (Dams); 100% Federal for Major Rehabilitation below $50M
50% Federal, 50% IWTF for Lock New Construction and Major Rehabilitation above $100M; 100% Federal for Dams and Lock Major Rehabilitation below $100M (with cap on Lower Mon)
50% Federal, 50% IWTF for Lock New Construction and Major Rehabilitation above $50M; 100% Federal for Dams and Lock Major Rehabilitation below $50M
50% Federal, 50% IWTF for Locks; 75/25 for Dams
50% Federal, 50% IWTF for Locks; 75/25 for Dams; 100% Federal for remaining Lower Mon
50% Federal ,50% IWTF for Locks; 80/20 for Dams

The Team's recommendation that the dam feature of inland waterway system modernization projects should be excluded from cost-sharing with the IWTF stemmed from the recognition that such large and varied segments of the U.S. population benefit from the presence of the dams on the system that it is most appropriate for general revenues to fully fund dam construction and major rehabilitation costs. A partial list of the non-navigation beneficiaries of inland waterway system dams includes the following:

- **Municipal water supply.** Hundreds of cities and towns throughout the country draw their drinking water supplies from pools created by dams on the IMTS. On the Ohio River system alone, 63 federal locks and dams have pools with active water intakes.
- **Hydropower.** The Corps owns and operates 24 percent of U.S. hydropower capacity, a significant portion of which is generated at dams that are collocated at dams with locks for navigation.
- **Recreation.** The Corps is the nation's number one federal provider of outdoor recreation with 423 lakes and river projects, many of which depend on the pools created by IMTS dams throughout the country.
- **Industrial water supply.** Manufacturing facilities, including process water users and electric power generation plants, and the end-users of the products manufactured at those facilities reap enormous benefits from the facilities' ability to draw their needed water from pools created by IMTS dams.
- **National defense/security.** The IMTS plays a vital but often unrecognized role in the national defense of this country. Whether measured by historical criteria like the more than 1,000 submarine chasers and minelayers and destroyer escorts and landing ship tanks that were built on the Ohio River and its tributaries during World War II or by the system's current capacity to ship large quantities of raw materials and commodities necessary today to support vital defense

production capabilities, the security of every American is significantly enhanced because of the IMTS.

Some additional non-navigation categories that benefit from IMTS dams include flood damage prevention, agricultural water supply, environmental restoration, local and regional economic development, property value enhancement, and international competitiveness. Because the non-navigation beneficiaries of the dam feature of IMTS projects are so widespread and so significant, the Team concluded that a broad-based revenue source like general revenues should fully fund the system's improvement rather than having only the navigation industry and the IWTF share those costs.

As part of its challenge, the IMTS CIS Team also examined the issue of how best to address major rehabilitation projects in the new model. As discussed in Section 1.5, the U.S. Congress created the IWTF to share with industry the capitalization costs of the IMTS as opposed to the system's O&M costs, which the U.S. Congress consistently has kept separate and funded federally. Uncertainty about where to draw the line between rehabilitation-type costs, on the one hand, and routine O&M costs, on the other hand, contributed to delaying the initial expenditure from the IWTF for any rehabilitation project until 1993, six years later than the initial Trust Fund expenditures for the first new IWTF cost-shared construction project. Some of that uncertainty was eliminated by WRDA of 1992, which for the first time provided a statutory definition for rehabilitation of inland waterways projects. Additional concerns have remained, however, about whether the costs associated with O&M are inappropriately migrating into the "rehabilitation" category, thereby inappropriately drawing down the IWTF's resources.

To address and attempt to remedy this situation, the IMTS CIS Team has proposed to increase the IWTF cost-share threshold for major rehabilitation projects to $100 million in total project construction costs. The Team asserts that such an approach would result in a clearer "bright-line" test that will provide greater assurance that IWTF resources indeed are dedicated exclusively to IMTS capitalization improvements and not to routine O&M costs.

After review and evaluation of the options, the IMTS CIS Team recommends that all construction lock projects and all major rehabilitation lock projects costing at least $100 million be cost-shared at 50 percent federal, 50 percent IWTF. Construction and major rehabilitation dam projects and major rehabilitation lock projects below $100 million would be 100 percent federally funded. With the program recommendation of $380 million per year and the proposed program described in Chapter 4.3, the average IWTF requirement is $110 million per year and the federal requirement averages $270 million per year. Because the year-by-year funding required for this cost-sharing recommendation could vary depending on the type of projects in the program, the IMTS CIS Team needs to review and monitor the project-specific funding requirements, making project funding recommendation adjustments well ahead of any program needs. Figure 5-1 shows requirements and balances of the recommended capital investment program. Section 5.4 discusses further how the IWTF revenues would be collected.

Recommendation: The IMTS CIS Team recommends all new *lock* construction projects should be cost-shared 50 percent from general appropriations and 50 percent from the IWTF and all major rehabilitation *lock* projects costing at least $100 million should be cost-shared at 50 percent from general appropriations and 50 percent from the IWTF. The team also recommends new construction and major rehabilitation *dam* projects and major rehabilitation *lock* projects below $100 million should be entirely funded from general appropriations.

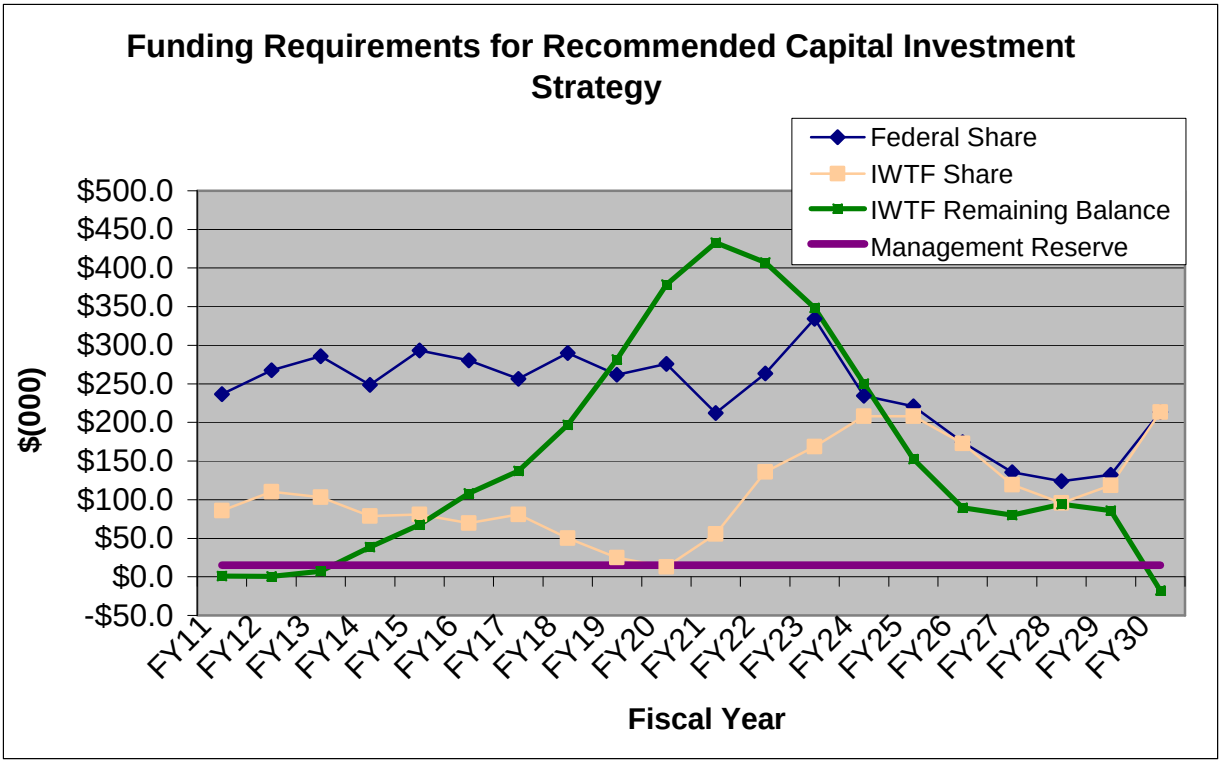


Figure 5-1. Funding Requirements for Recommeded Capital Investment Strategy

The Team did not fully prescribe the program in the later years of the 20-year period, knowing that conditions and changes are inevitable and to maintain some flexibility without major impacts to the projects identified. Although under the Team-recommended program, there is capacity in the later years to add additional projects, the balance in the IWTF also is decreasing in those years. With additional NESP projects coming online, as well as other projects likely to become priorities over time, the IWTF contribution could conceivably need an increase in the later years of the program. On the other hand, with completion of the Panama Canal expansion and continued growth in the world economy and improved project delivery performance, it also is possible that no additional out-year increase in the IWTF contribution would be required to accomplish the 20-year plan's proposed program. As the Team works with the new process, an additional requirement, if any, can be determined. Chapter 6 contains detailed implementation guidance for the program.

Another feature the Team recommends is establishment of a project-by-project cost-sharing cap to protect industry from unreasonable cost escalation and project delays. Some IMTS projects currently under construction have experienced extraordinary cost increases. An analysis of the cost increases for a few recent projects was detailed in the *Select Case Studies Report.* Some of the process improvements noted in Chapter 3 are recommended to reduce future significant cost increases. In addition to those improvements, statutory establishment of a cost-sharing cap is recommended that will put an upper limit on the cost-share requirement for the IWTF for any specific project. Cost increases above the cap threshold would be 100 percent federally funded unless the amount above the cap was specifically approved for cost-sharing by both the Corps and the Board. The IMTS CIS Team recommends that the cap be set at the Feasibility or RER base cost, including contingencies reflected in the relevant decision document, escalated to the new construction start date based on the IMTS capital investment program schedule. This cap places additional emphasis on the need to produce more reliable project cost

estimates in the underlying decision document and to manage projects within the identified and agreed upon cost estimates and schedules.

Recommendation: The IMTS CIS Team recommends a cost sharing cap be set at the feasibility or rehabilitation evaluation report base cost, including contingencies, escalated to the new construction start date based on the IMTS capital investment program schedule. Additional necessary costs would have to be approved by both the Corps and the Board

5.4 Revenue Sources

The IMTS CIS Team also reviewed other options for generating revenues for the IWTF. These options included the current revenue plan of the waterways fuel tax, a user fee, bonding, and other revenue sources, such as states or other beneficiaries of the IMTS. The Team weighed the comments and recommendations of its industry partners heavily in evaluating these options. The Waterways Council, Inc. (WCI) published a report[18] that documents conceptual concerns with user tax and fee options. While the current system is not perfect, the Team's industry partners acknowledged that it is a workable system for collecting the fuel tax and that the additional revenues required in the Teams' recommendations should just involve an increase in the fuel tax. The recommended program would require a 30 to 45 percent increase in the fuel tax (a $0.06–$0.09 per gallon increase). The 30 percent increase is based on an assumption that, under current law, anticipated future revenues would equal the average $85 million annual amount generated over the past five years, while the 45 percent increase is based on FY 2009 actual revenues of $76 million. As can be seen in Figure 5-1 and mentioned earlier, depending on decisions to be made in the future about different project funding priorities and other variables, an additional increase in the fuel tax could conceivably be needed in the later years of the recommended program.

Recommendation: The IMTS CIS Team recommends that the current revenue plan continue to be a waterways fuel tax initially adjusted to at least $0.26 per gallon to provide needed revenues for the IWTF.

Because the funding required for this cost-sharing recommendation could vary depending on the type of projects in the program, the IMTS CIS Team will need to review and monitor the revenue requirements and expenditures, making project-related funding adjustment recommendations well ahead of any out-year program needs. Chapter 6 details this implementation guidance for the program.

[18] Haulk, Jake, Waterways Council, Inc., *The Case Against Waterways User Taxes and Fees*, Arlington, VA: February 2008.

6. Implementation Strategy

The IMTS capital investment program must be annually reviewed and updated by a Corps/industry implementation team familiar with the program. The work performed by this IMTS CIS Team is not a one-time study, but will require that data, analysis, and decision-making remain current in order to arrive at the best program for providing a reliable IMTS throughout the entire 20-year period of the recommended plan and beyond. In addition, the Team anticipates that this process can and will be improved over time through development of additional data, experience with executing the program, and further process improvements.

While the capital investment strategy will be reviewed and updated each year as annual federal budgets are being developed and implemented, a more in-depth strategic-level review and refinement of the CIS should occur at least once every five years. Such a strategic-level review should examine the CIS and its underlying assumptions, measured against actual experience under the strategy and any significant changed circumstances that may have occurred, in much the same fashion that private sector entities and some federal agencies periodically review and update their respective strategic plans.

The authors of the recommended 20-year IMTS Capital investment program contained in this report envision that both the annual reviews and the strategic reviews would be carried out in the future in partnership with the Board and within the performance of its responsibilities, in much the same fashion that this report was developed.

6.1 IMTS Capital Investment Strategy Team

The development of the IMTS capital investment strategy is intended to be a dynamic process that should be updated annually. The IMTS CIS Team recommends that a Capital Investment Strategy Implementation Team (CISIT) be formed that considers, refines, and improves the capital investment strategy. The CISIT would have leadership at the Headquarters level (initially Headquarters, Civil Works, Operations Community of Practice, CECW-CO), where the data, spreadsheets and other information needed by the CISIT would be centrally located. The CISIT would also include at least one member from each IMTS Division; LRD, MVD, NWD, SAD, and SWD; members from the navigation industry as appointed by the Board; and appropriate representation from both the Corps Navigation Center of Expertise and the Corps Institute for Water Resources. Other advisors and subject matter experts would contribute as needed as the process is matured and improved.

6.2 Capital Projects Business Model

The program recommended in this report is based on the premise that the government will provide funds in an efficient manner. Inefficient funding will significantly impair the ability to implement this program. The following paragraphs present a schedule for implementation and continued improvement of the process. Program and project performance must continually be monitored and measured to ensure that the

benefits of the program are being realized or to identify instances where the program's results are falling short of expectations.

6.2.1 Implementation Calendar

Figure 6-1 represents the implementation calendar for the program, illustrating how four years of the program work at different stages during the year. One fiscal year is shown (2012) as an example, along with the status of the program in each of the four program years (2012–2015).

2015 Program

Three years prior to the program year in the July to September timeframe, the project list will be updated. Districts should review all projects on the list. Projects should be added or deleted as required. BCR/RBRCR and Net Benefit data should be included for projects that have completed studies. Projects should also be moved to their current phase, costs and schedules should be adjusted, and criteria and weights should be updated as required based on current knowledge and data.

2014 Program

- At the Fall IWUB meeting two years prior to the program year in the November to December timeframe, the updated project list will be presented to the Board.
- The prioritization criteria will be applied to the unconstrained current project list in the October to January timeframe two years prior to the program year.
- At the Winter/Spring IWUB meeting in the February to March 2010 timeframe, the current prioritized list will be presented to the Board, and project recommendations for new starts and new studies will be approved by the Board.
- New starts approved at the Winter/Spring IWUB meeting will be included in the Corps budget for the program year. Budget development for 2014 begins in April 2012.

2013 Program

- In the year prior to the program year and after release of the President's Budget in February, project agreements that define the scope, cost, and schedule for new start budgeted projects will be prepared.
- Agreements will be approved and signed at the Summer IWUB meeting in the July to August timeframe.

2012 Program

Projects will be executed in the program year that begins October 1 with status reports on all active projects at each Board meeting throughout the year.

Typical Cycle for Inland Marine Transportation System Capital Investment Program

Program Year	2012	2013	2014	2015

	2011 Oct	2011 Nov	2011 Dec	2012 Jan	2012 Feb	2012 Mar	2012 Apr	2012 May	2012 Jun	2012 Jul	2012 Aug	2012 Sep
2012 Program Year Activities		**Fall IWUB Meeting -** Project Status Briefings			**Winter/Spring IWUB Meeting -**Project Status Briefngs					**Summer IWUB Meeting -** Project Status Briefings		
	Execute Inland Marine Transportation System Capital Program for FY 2012											
2013 Program Year Activities		**Fall IWUB Meeting**			**Winter/Spring IWUB Meeting**					**Summer IWUB Meeting -** Approve and sign Project		
					President's Budget released							
						Prepare Project Management Plans that define scope, cost and schedule for budgeted projects						
2014 Program Year Activities		**Fall IWUB Meeting** - Present and approve current unconstrained project list			**Winter/Spring IWUB Meeting** - Present prioritized project list. Recommend new starts for construction and studies, recommend any divestitures, appoint IWUB representative for PDT.					**Summer IWUB Meeting**		
	Prioritize Projects						**Program Year Budget Development**					
2015 Program Year Activities										**Update Unconstrained Project List.** Add and delete projects as required. Include BCR and Net Benefits data for projects that have completed studies. Move projects to current phase, update project costs, update criteria and weights and update project schedules if changed.		

Figure 6-1. Implementation Calendar for the IMTS Capital Investment Program

6.2.2 Communications

The success of the capital investment program is dependent on key communications and cooperation among the Corps and the Board with support from the U.S. Congress. To facilitate the process, several meetings of the participants need to take place each year. These meetings will also aid in developing a common, consensus-based understanding of the IMTS needs and priorities.

Recommended meetings include the following:

- The CISIT Team Leader, IWUB Chairman, and others as needed would meet each March to discuss the Team's priorities for the upcoming budget year. The priorities would include recommended new studies and new start construction projects necessary to continue to provide a reliable IMTS. Program and project performance would also be discussed.
- In addition to working virtually throughout the year on the capital investment strategy, the CISIT Team would meet at least once per year to review the program and project performance, evaluate the sufficiency of the program investment level and IWTF revenues, and recommend process improvements.

6.3 Future Improvements

The Team recognizes that as the process matures, changes will likely be needed to continue to provide the best program and a reliable IMTS. Additional studies and data are recommended to advance the current recommended process, including, but not limited to, the following:

- Developing criteria for channels that are comparable to those developed for lock and dam projects. These criteria would eliminate the need to evaluate channel projects to determine their priority without an established process for comparison.
- Changing the rating scale for the Relative Risk Marix Rankings for Operations and Maintenance budget work packages (currently ranked 25 to 1 and 5 to 1, with 25 and 5 beign the worse condition) to parallel the DSAC scale (1 through 5, with 1 beign the worse condition) for consistency.
- Identifying and quantifying other IMTS beneficiaries to develop a fuller understanding of the IMTS and its great importance to the nation.
- Developing additional economic data for proposed projects to improve the information used to prioritize projects.
- Developing reliability data for all projects to use the full capability of the Impact Algorithm.
- Automating the prioritization process to more efficiently manage the program and enable analysis of different factors/constraints.

7. Summary of Final Recommendations

After an in-depth review of the current capital projects business model, the IMTS CIS Team developed recommendations that could improve the current process and a capital investment strategy that will ensure continued reliable navigation long into the future. These recommendations are summarized below for consideration, with the underlying premise that the funding will be provided in an efficient manner to achieve the goal of an improved capital projects business model. Some of the recommendations have been implemented and just need to be measured and monitored. Other recommendations can immediately be put into practice, while still others will take additional study or authority to implement. The following recommendations have been organized into those three categories:

Already Implemented Process Improvement Recommendations

1. Encourage project management certification. A project management certification program has already been developed and implementation has begun. Senior leaders within the Corps should emphasize the benefits of and encourage certification. The Corps should ensure that only certified project managers are assigned to IWTF projects.

2. Develop risk-based cost estimates for IMTS projects meeting certain thresholds. Risk-based cost estimates are now required for all projects requiring congressional authorization that exceed $40 million. Not all existing projects have developed updated risk-based cost estimates. The IMTS CIS Team should recommend a list of existing projects to be reevaluated using risk-based cost estimates by the summer 2010 Board meeting. In the future, all IMTS projects being proposed for congressional authorization would have a risk-based cost estimate performed prior to completion of the project's feasibility report.

3. Require independent external peer reviews for IMTS projects meeting the criteria of EC 1165-2-209, Civil Works Review Policy. Independent External Peer Reviews are a new requirement for capital projects. IEPR may be required for projects where there are public safety concerns, a high level of complexity, novel or precedent-setting approaches; where the project is controversial, has significant interagency interest, has a total project cost greater than $45 million or has significant economic, environmental and social effects to the nation; or where requested by the governor of an affected state. The IMTS CIS Team should follow the existing regulation for external peer reviews. No additional specific action is required at this time.

Immediately Implementable Process Improvement Recommendations

1. Appoint a Board representative to each IMTS project. The IWUB Chairman should assign a representative from the Board to each active project by the summer 2010 IWUB meeting. Those representatives will be forwarded to the project managers for inclusion as PDT members.

2. Provide project status communication to the IWUB. The following template, shown in Figure 7-1, should be used for briefing project status beginning at the summer 2010 Board meeting.

US Army Corps of Engineers

Lock and Dams 2, 3 & 4 Monongahela River Navigation Project

Project Cost: $1,438,700,000 (Oct 2008)
Remaining Balance: $894,800,000
FY10 Allocation: $6,200,000

Status (one slide/project)

- **Recent events since last Board Meeting**
- **Upcoming events in support of milestones**
- **At macro level…..not in the weeds!**
- **All red dates need to be addressed**
- **Example for Lower Mon; actual dates not used**

Schedule of Remaining Work	Design Initiated	Contract Award	Construction Complete	Project Benefits	Capitalized Cost Closeout
Charleroi River Wall	1-Oct-02	30-Sep-05	1-Nov-10	N/A	30-Jan-11
Upper and Lower Guard Walls	1-Oct-02	28-Aug-09	30-Sep-11	N/A	31-Dec-11
Charleroi River Chamber	1-Oct-02	30-Sep-12	30-Sep-14	31-Jul-14	31-May-15
L/D 3 Removal	1-Oct-12	30-Sep-13	30-Sep-14	31-Jul-14	31-Dec-15
Dredging	1-Oct-01	30-Apr-12	30-Jun-14	1-Jul-04	31-Dec-15
Municipal Relocations	1-Oct-97	Various dates	30-Jun-14	31-Jul-14	31-May-15
Port Perry Bridge Relocation	1-Oct-04	30-Sep-12	30-Sep-14	31-Jul-14	31-Dec-15
Charleroi Land Chamber	1-Oct-02	30-Sep-15	30-Sep-20	30-Apr-20	30-Apr-21

Legend
Completed
Scheduled prior to next IMUB Meeting
Date changed since last report

Building Strong!

1

Figure 7-1. Proposed Project Status Briefing Template

3. Include the Board chairman and representative as signatories for all project management plans. Project management plans for new projects should be developed during the planning phase. Existing PMPs should be updated to include the Board representative and Chairman as signatories over the next year. All plans should be signed by the spring 2011 Board meeting.

4. Apply lessons learned to managing new projects. The Navigation COP should set up a system to capture lessons learned specifically for IMTS projects and ensure that they are reviewed prior to initiating new work.

5. Evaluate use of early contractor involvement for an IMTS project. The Corps should identify a pilot project where early contractor involvement would benefit the effort.

6. Implement applicable principles from the Military Construction Model. Adopting several principles of the MILCON model would result in a culture change; these principles should be accepted at all levels throughout the Corps Civil Works program hierarchy. Principles include that cost estimates cannot be exceeded, schedules must be met, and a multiyear funding stream must have a commitment from the U.S. Congress. Contracts should be structured with awardable options that can be eliminated if costs are exceeded, but still provide a functioning facility. Project managers and the project staff members should follow guidance requiring that budgets and schedules must be met and abandon the presumption that additional funding will always be available. The culture should reflect that the construction program cannot afford what would be “nice” for the projects, but can afford only what is necessary.

7. Establish procedures for recommending new construction starts. Through the new IMTS capital projects business model, the Corps should establish the procedures for recommending new construction starts.

Process Improvement Recommendations Requiring Additional Study or Authority

1. Draft and ultimately obtain approval for a capital projects business model regulation. The process improvements and funding strategies recommended in this report should be incorporated into a regulation to direct future IMTS project prioritization and funding. A smaller subset of this Team should develop the regulation with a draft prepared by September 30, 2010.

2. Create Design/Review Center(s) of Expertise. Implementation would require organizational changes affecting a number of non-navigation-related considerations that would in turn have to be evaluated. This recommendation is offered to Corps senior leadership for study and evaluation.

3. Develop a portfolio of standardized designs. A team from Engineering and Operations should be identified to consider a pilot project for design of a lock component that could be used throughout the IMTS. In addition, for new projects, it may be helpful to begin requiring a design concepts meeting that involves senior design and technical personnel who are not otherwise involved in the project to brainstorm ideas, solutions, and experiences on past projects.

4. Revisit use of the continuing contracts clause. Use of an appropriately structured continuing contracts clause or fully funding contracts often is essential to move forward with the larger civil works IMTS projects being proposed. The Corps must work with the U.S. Congress to develop a continuing contracts clause that adequately protects the prerogatives of both the legislative and executive branches while not causing unnecessary project delay and cost escalation. One approach for consideration is to fully fund all contracts up to $50 million, while allowing contracts greater than $50 million to have the option of using an agreed-upon continuing contracts clause.

5. Capital Investment Program funding. The IMTS CIS Team recommends a Capital Investment Program funding level of $380 million per year with target levels of $320 million/year for new construction and $60 million/year for major rehabilitation. The new construction and major rehabilitation targets are not strict funding allocations and can be adjusted if in the best interest of the program.

6. Revise the cost-share. All new *lock* construction projects should be cost-shared 50 percent from general appropriations and 50 percent from the IWTF and all major rehabilitation *lock* projects costing at least $100 million should be cost-shared at 50 percent from general appropriations and 50 percent from the IWTF. New construction and major rehabilitation *dam* projects and major rehabilitation *lock* projects below $100 million should be entirely funded from general appropriations.

7. Set a cost-sharing cap. A cost-sharing cap should be set at the feasibility or rehabilitation evaluation report base cost, including contingencies, escalated to the new construction start date based on the IMTS capital investment program schedule. Additional necessary costs would have to be approved by both the Corps and the Board.

8. Increase the waterways fuel tax. Adjust the waterways fuel tax to at least $0.26 per gallon to fund current revenue plan. The IMTS CIS Team recommends that the current revenue plan continue to be a waterways fuel tax initially adjusted to at least $0.26 per gallon to provide needed revenues for the IWTF.

Acronyms List

ASA (CW)	Assistant Secretary of the Army (Civil Works)
BCR	Benefit–Cost Ratio
CECW-CO	Headquarters, Civil Works, Operations Community of Practice
CI	Condition Index
CIS	Capital Investment Strategy
CISIT	Capital Investment Strategy Implementation Team
COP	Community of Practice
DSAC	Dam Safety Action Classification
FTWS	Fuel-Taxed Waterways System
FY	Fiscal Year
GIWW	Gulf Intracoastal Waterway
GRR	General Re-evaluation Report
IDC	Interest During Construction
IEPR	Independent External Peer Review
IMTS	Inland Marine Transportation System
IRS	Internal Revenue Service
IWTF	Inland Waterways Trust Fund
IWUB	Inland Waterways Users Board
IWW	Illinois Waterway
L/D	Lock and Dam
LRD	Great Lakes and Ohio River Division
LRH	Huntington District
LRL	Louisville District
LRN	Nashville District
LRP	Pittsburgh District

LRR	Limited Re-evaluation Report
MARAD	Maritime Administration (U.S. Department of Transportation)
MILCON	Military Construction
MOU	Memorandum of Understanding
MVD	Mississippi Valley Division
MVK	Vicksburg District
MVN	New Orleans District
MVP	St. Paul District
MVR	Rock Island District
MVS	St. Louis District
NED	National Economic Development
NESP	Navigation and Ecosystem Sustainability Program
NWD	Northwestern Division
NWP	Portland District
NWW	Walla Walla District
O&M	Operations and Maintenance
OCA	Operational Condition Assessment
OMB	Office of Management and Budget
ORMSS	*Ohio River Mainstem System Study*
OTA	Office of Tax Analysis (U.S. Department of the Treasury)
P&G	*Principles and Guidelines for Water and Related Resources Implementation Studies*
PDT	Project Delivery Team
PED	Preconstruction, Engineering and Design
PMP	Project Management Plan
PMP	Project Management Professional
R&R	Risk and Reliability
RBRCR	Remaining Benefit Remaining Cost Ratio
RER	Rehabilitation Evaluation Report
ROM	Rough Order of Magnitude
SAD	South Atlantic Division
SAM	Mobile District

SCC	Shipper Carrier Cost Model
SWD	Southwestern Division
SWG	Galveston District
SWL	Little Rock District
SWT	Tulsa District
TTI	Texas Transportation Institute
UMR	Upper Mississippi River
USACE	United States Army Corps of Engineers
WCI	Waterways Council, Inc.
WRDA	Water Resources Development Act

References

Department of the Army. EC 1105-2-410. *Water Resources Policies and Authorities: Review of Decision Documents.* Washington, D.C.: August 2008.

Haulk, Jake. Waterways Council, Inc. *The Case Against Waterways User Taxes and Fees.* Arlington, VA: February 2008.

Inland Waterways Users Board. *Inland Waterways Users Board 23rd Annual Report to the Secretary of the Army and the United States Congress with Appendixes.* Washington, D.C.: August 2009.

Institute for Water Resources. *Application of LRD Maintenance Standard Procedure to All Corps Locks and Dams.* Draft. Alexandria, VA: June 2009.

Memorandum, signed by General Riley, SUBJECT: Application of Cost Risk Analysis Methods to Develop Contingencies for Civil Works Total Project Costs, 3 July 2007.

Memorandum, signed by President Obama, SUBJECT: Transparency and Open Government, 21 January 2009.

National Academy of Public Administration. *Prioritizing America's Water Resources Investments: Budget Reform for Civil Works Construction Projects at the U.S. Army Corps of Engineers.* Washington, D.C.: February 2007.

Kruse, C. James, A. Protopapas, L. E. Olson, and D. H. Bierling. Texas Transportation Institute. *A Modal Comparison of Domestic Freight Transportation Effects on the General Public.* Final Report. Amended March 2009.

U.S. Army Corps of Engineers. *Improving the Inland Marine Transportation System.* Executive Report. Washington, D.C.: September 2008.

U.S. Army Corps of Engineers. *Inland Marine Transportation System Investment Strategy Program Management Plan.* Washington, D.C.: January 2009.

U.S. Army Corps of Engineers. *Inland Navigation Lock Projects, Estimation of Value and Main Chamber Closure Costs.* Washington, D.C.: March 23, 2009.

U.S. Army Corps of Engineers. *The Capital Projects Business Model for Inland Marine Transportation Systems.* Working Draft. Washington, D.C.: February 12, 2009.

U.S. Army Corps of Engineers Great Lakes and Ohio River Division. *Inland Navigation Construction Selected Case Studies.* Cincinnati: July 17, 2008.

U.S. Army Corps of Engineers. Navigation Data Center. *The U.S. Waterway System – Transportation Facts*. Alexandria, VA: December 2009.

Appendix A: Inland and Intracoastal Fuel Taxed Waterways

SOURCES: Public Law 95-502, October 21, 1978.

Public Law 99-662, November 17, 1986.

1. Alabama-Coosa Rivers: From junction with the Tombigbee River at river mile (hereinafter referred to as RM) 0 to junction with Coosa River at RM 314.

2. Allegheny River: From confluence with the Monongahela River to form the Ohio River at RM 0 to the head of the existing project at East Brady, Pennsylvania, RM 72.

3. Apalachicola-Chattahoochee and Flint Rivers (ACF): Apalachicola River from mouth at Apalachicola Bay (intersection with the Gulf Intracoastal Waterway) RM 0 to junction with Chattahoochee and Flint Rivers at RM 107.8. Chattahoochee River from junction with Apalachicola and Flint Rivers at RM 0 to Columbus, Georgia at RM 155 and Flint River, from junction with Apalachicola and Chattahoochee Rivers at RM 0 to Bainbridge, Georgia, at RM 28.

4. Arkansas River (McClellan-Kerr Arkansas River Navigation System): From junction with Mississippi River at RM 0 to Port of Catoosa, Oklahoma, at RM 448.2.

5. Atchafalaya River: From RM 0 at its intersection with the Gulf Intracoastal Waterway at Morgan City, Louisiana, upstream to junction with Red River at RM 116.8.

6. Atlantic Intracoastal Waterway: Two inland waterway routes approximately paralleling the Atlantic coast between Norfolk, Virginia, and Miami, Florida, for 1,192 miles via both the Albermarle and Chesapeake Canal and Great Dismal Swamp Canal routes.

7. Black Warrior-Tombigbee-Mobile Rivers: Black Warrior River System from RM 2.9, Mobile River (at Chickasaw Creek) to confluence with Tombigbee River at RM 45. Tombigbee River (to Demopolis at RM 215.4) to port of Birmingham, RM's 374-411 and upstream to head of navigation on Mulberry Fork (RM 429.6), Locust Fork (RM 407.8), and Sipsey Fork (RM 430.4).

8. Columbia River (Columbia-Snake Rivers Inland Waterways): From the Dalles at RM 191.5 to Pasco, Washington (McNary Pool), at RM 330, Snake River from RM 0 at the mouth to RM 231.5 at Johnson Bar Landing, Idaho.

9. Cumberland River: Junction with Ohio River at RM 0 to head of navigation, upstream to Carthage, Tennessee, at RM 313.5.

10. Green and Barren Rivers: Green River from junction with the Ohio River at RM 0 to head of navigation at RM 149.1.

11. Gulf Intracoastal Waterway: From St. Mark's River, Florida, to Brownsville, Texas, 1,134.5 miles.

12. Illinois Waterway (Calumet-Sag Channel): From the junction of the Illinois River with the Mississippi River RM 0 to Chicago Harbor at Lake Michigan, approximately RM 350.
13. Kanawha River: From junction with Ohio River at RM 0 to RM 90.6 at Deepwater, West Virginia.
14. Kaskaskia River: From junction with Mississippi River at RM 0 to RM 36.2 at Fayetteville, Illinois.
15. Kentucky River: From junction with Ohio River at RM 0 to confluence of Middle and North Forks at RM 258.6.
16. Lower Mississippi River: From Baton Rouge, Louisiana, RM 233.9 to Cairo, Illinois, RM 953.8.
17. Upper Mississippi River: From Cairo, Illinois, RM 953.8 to Minneapolis, Minnesota, RM 1,811.4.
18. Missouri River: From junction with Mississippi River at RM 0 to Sioux City, Iowa, at RM 734.8.
19. Monongahela River: From junction with Allegheny River to form the Ohio River at RM 0 to junction of the Tygart and West Fork Rivers, Fairmont, West Virginia, at RM 128.7.
20. Ohio River: From junction with the Mississippi River at RM 0 to junction of the Allegheny and Monongahela Rivers at Pittsburgh, Pennsylvania, at RM 981.
21. Ouachita-Black Rivers: From the mouth of the Black River at its junction with the Red River at RM 0 to RM 351 at Camden, Arkansas.
22. Pearl River: From junction of West Pearl River with the Rigolets at RM 0 to Bogalusa, Louisiana, RM 58.
23. Red River: From RM 0 to the mouth of Cypress Bayou at RM 236.
24. Tennessee River: From junction with Ohio River at RM 0 to confluence with Holstein and French Rivers at RM 652.
25. White River: From RM 9.8 to RM 255 at Newport, Arkansas.
26. Willamette River: From RM 21 upstream of Portland, Oregon, to Harrisburg, Oregon, at RM 194.
27. Tennessee-Tombigbee Waterway: From its confluence with the Tennessee River to the Warrior River at Demopolis, Tennessee.

Appendix B: Project Fact Sheets

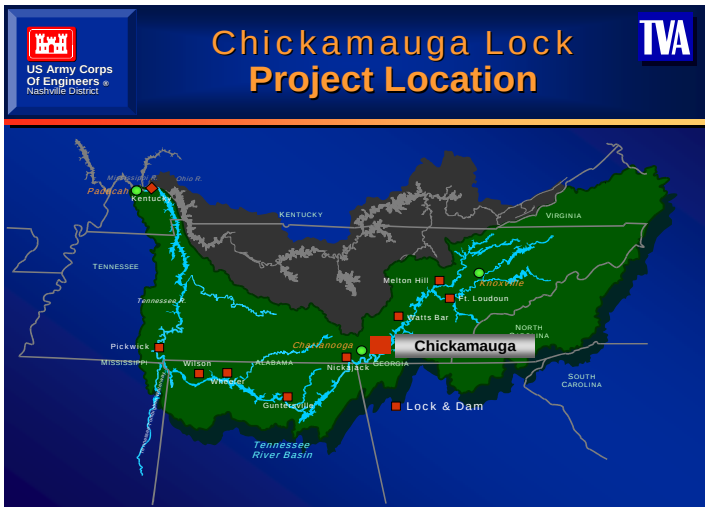
Phase 1
Projects Currently Under Construction

CHICKAMAUGA LOCK AND DAM	April 2010
Official Project Name: Chickamauga Lock, TN	**Sub Project:** Chickamauga Lock Replacement
Division/District: LRD/Nashville District	**Tributary/Waterway:** Tennessee River
Project Authorization: Energy & Water Dev. Act, 2003, Section 114 (PL 108-7)	
Project Status (under construction, authorized or planned): under construction	**Project Type (new construction or rehabilitation) and note if Lock, Dam or Channel:** New construction - lock

Project Description

The Chickamauga Lock and Dam project is located at Tennessee River Mile 471 in Chattanooga, Tennessee. The lock replacement project, which was authorized by the Energy and Water Development Act of 2003, consists of a new 110-foot by 600-foot lock to be located riverward of the existing 60-foot by 360-foot lock and immediately downstream of Chickamauga Dam. In addition, local roadways and utilities adjacent to the lock will be relocated to provide access to the site for construction.

Project Location Map:



Project Photo:

Current Cost Estimate (Constr & DDR, Oct 08):	$ 374,500,000
Current Remaining Costs FY11 to completion:	$ 180,520,000
Authorized Base Cost (Oct 01):	$ 267,167,000
Fully Funded Cost Estimate at Authorization (price level):	$ 319,188,000
Current Average Annual Net Benefits (2009, 7%): $68,001,000[1]	**Current Remaining Average Annual Net Benefits at 7% (2009):** $68,001,000[1]
Current Benefit Cost Ratio at 7%: 4.6[1]	**Current Remaining Benefit Remaining Cost Ratio at 7%:** 4.6[1]

Additional Remarks: The new lock is required because of structural deficiencies of the existing lock resulting from physical expansion of the concrete structure. This phenomenon of concrete growth was observed soon after initial construction and is caused by a reaction between the alkali in the cement and the rock aggregate. Even with costly aggressive maintenance procedures, this expansion threatens the structural integrity of the lock and limits its life. Engineering reliability studies indicate that the probability of an event with unacceptable, possibly even catastrophic results, increase significantly after 2010. At some point, the probability of such an event would cause TVA's Dam Safety Officer to permanently close the lock to protect the public downstream of the project and TVA's investment in other features of the project. Current and current remaining average annual net benefits and BCRs are the same due to a recent economic reevaluation. The original BCR for this project was 2.0 at 6 3/8%.

KENTUCKY LOCK AND DAM	April 2010
Official Project Name: Kentucky Lock Addition, TN River, KY	**Sub Project:** Kentucky Lock Addition
Division/District: LRD/Nashville District	**Tributary/Waterway:** Tennessee River
Project Authorization: WRDA 1996	
Project Status (under construction, authorized or planned): under construction	**Project Type (new construction or rehabilitation) and note if Lock, Dam or Channel:** new construction - lock

Project Description

The Kentucky Lock and Dam project is located at Tennessee River Mile 22.4 in western Kentucky. The project consists of a new 110-foot by 1200-foot lock to be located landward and adjacent to the existing 110-foot by 600-foot lock. In addition three major relocations are required to construct the lock: 1) the relocation of four large transmission towers; 2) construction of a new two lane highway bridge across the Tennessee River; and 3) construction of a new single track railroad bridge across the Tennessee River. The new lock is needed because of the existing lock's inability to meet current and future traffic demands without significant delays.

Project Location Map:	Project Photo:
	
Current Cost Estimate (Const & DDR, Oct 08):	$ 713,400,000
Current Remaining Costs FY11 to completion:	$ 383,100,000
Authorized Base Cost (Oct 94):	$ 393,200,000
Fully Funded Cost Estimate at Authorization (Oct 98):	$ 533,000,000
Current Average Annual Net Benefits (2009, 7%): $28,560,000	**Current Remaining Average Annual Net Benefits at 7% (2009):** $74,473,000
Current Benefit Cost Ratio at 7%: 2.5	**Current Remaining Benefit Remaining Cost Ratio at 7%:** 3.7

Additional Remarks: Over the last ten years average delays per tow have ranged from three to seven hours, and projected traffic increases will only aggravate these delays. The new lock will essentially eliminate the delays currently being experienced and significantly reduce those in the future.

MONONGAHELA LOCKS AND DAMS 2, 3 AND 4	April 2010
Official Project Name: Locks and Dams 2, 3 and 4 Monongahela River Navigation Project	**Sub Project:**
Division/District: LRD/Pittsburgh District	**Tributary/Waterway:** Monongahela River
Project Authorization:	Water Resource Development Act (WRDA) of 1992, Section 101 (P.L. 102-580)
Project Status (under construction, authorized or planned): under construction	**Project Type (new construction or rehabilitation) and note if Lock, Dam or Channel:** New Construction, Locks and Dam

Project Description

The three projects are located on the lower portion of the Monongahela River near the city of Pittsburgh, Pennsylvania and are located in Allegheny, Washington and Westmoreland Counties. Measured from the Point in Pittsburgh, Locks and Dam 2 is located at river mile 11.2, Locks and Dam 3 at river mile 23.8, and Locks and Dam 4 at river mile 41.5. At the Point in Pittsburgh, the Monongahela River joins with the Allegheny River to form the Ohio River.

Project Location Map:

Project Photo:

Current Cost Estimate (risk-based, Oct 2008 price level):	$1,438,700,000
Current Remaining Costs FY11 to completion:	$ 894,800,000
Authorized Base Cost (Oct 1991):	$ 556,400,000
Fully Funded Cost Estimate at Authorization :	$ 750,000,000
Current Average Annual Net Benefits (2009, 7%): $259,598,230	**Current Remaining Average Annual Net Benefits (2009, 7%)**: **$**345,878,170
Current Benefit Cost Ratio (7 3/4%): 1.8	**Current Remaining Benefit Remaining Cost Ratio at 7%:** 4.0

Additional Remarks: The authorized projects consist of a new gated dam and a rehabilitated auxiliary chamber floodway bulkhead structure at Locks and Dam 2; new twin 84 by 720 foot locks and below-dam scour protection of Locks and Dam 4; raising pool 2 by 5 feet and lowering pool 3 by 3.2 feet; removal of Locks and Dam 3; and associated channel dredging, relocations and bank stabilization.

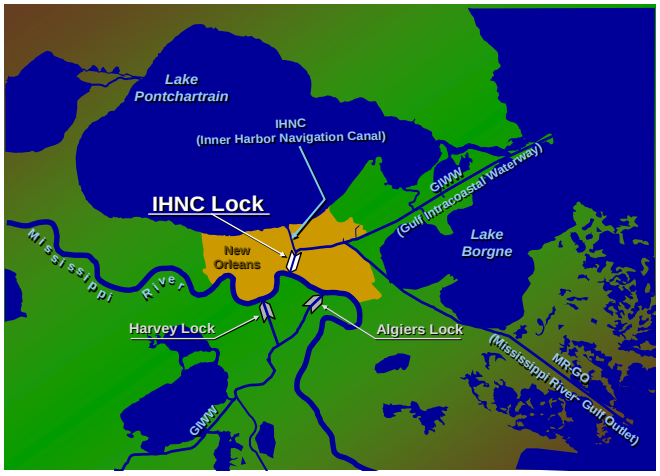
OLMSTED LOCKS AND DAM	April 2010
Official Project Name: Olmsted Locks and Dam, Ohio River, IL & KY	**Sub Project:** Olmsted L/D Construction
Division/District: LRD/Louisville District	**Tributary/Waterway:** Ohio River
Project Authorization:	Water Resources Development Act of 1988
Project Status (under construction, authorized or planned): under construction	**Project Type (new construction or rehabilitation) and note if Lock, Dam or Channel:** new construction – lock and dam

Project Description

The Olmsted Locks & Dam project, located downstream of Locks and Dam 53 on the Illinois/Kentucky border, was authorized by the Water Resources Development Act of 1988. The proposed replacement structure will eliminate Ohio River Locks & Dams 52 & 53. The project consists of two 110' X 1200' locks adjacent to the Illinois bank, and a dam comprised of five tainter gates, 1400' of boat-operated wickets and a fixed weir.

Project Location Map:	**Project Photo:**
	
Current Cost Estimate (risk-based, price level):	$2,044,000,000
Current Remaining Costs FY11 to completion:	$ 835,500,000
Authorized Base Cost (price level):	$ 775,000,000
Fully Funded Cost Estimate at Authorization (price level):	$1,389,000,000
Current Average Annual Net Benefits (2009, 7%): $409,998,000	**Current Remaining Average Annual Net Benefits at 7% (2009):** $410,736,000
Current Benefit Cost Ratio at 7%: 6.7	**Current Remaining Benefit Remaining Cost Ratio at 7%:** 7.4

Additional Remarks: Locks & Dams 52 & 53 were completed in 1929 and the temporary 1,200' long lock chambers were added in 1969 at Locks & Dam 52 and 1979 at Locks & Dam 53. The antiquated design and age of these structures make it impossible to meet current traffic demands without significant delays. The existing structures have deteriorated structurally and are overstressed during normal operating conditions. The temporary locks at Locks & Dam 52 & 53 have significantly passed their design life.

INNER HARBOR NAVIGATION CANAL LOCK	April 2010
Official Project Name: IHNC Lock Replacement	**Sub Project:** Construction of a pre-cast, floated-in, concrete lock
Division/District: MVD/MVN	**Tributary/Waterway:** Inner Harbor Navigation Canal/ Mississippi River
Project Authorization:	Act of 1956, Water Resources Development Acts of 1976, 1986 and 1996
Project Status Under Construction	**Project Type:** New Construction Lock
Project Description: The plan of improvement consists of construction of a pre-cast, floated-in, concrete lock; replacement of the St. Claude Avenue bridge with a new, low level double bascule bridge; construction of a temporary by-pass bridge at St. Claude Avenue; replacement of the center lift-span and raising of the towers on the Claiborne Avenue bridge; provisions for by-pass channels during construction; extension of the Mississippi River flood protection along the canal to the site of the new lock; and implementation of a community impact mitigation plan.	
Project Location Map:	**Project Photo:**
	
Current Cost Estimate (detailed, price level):	$1,034,000,000
Current Remaining Costs (FY11 to completion):	$ 892,643,200
Authorized Base Cost (price level):	$ 882,000,000
Fully Funded Cost Estimate at Authorization :	$ 714,000,000
Current Average Annual Net Benefits (price level, discount rate): $115,000,000	**Current Remaining Average Annual Net Benefits (price level, discount rate):** $115,000,000
Current Benefit Cost Ratio (7 1/8):	**Remaining Benefit Remaining Cost Ratio (7 1/8):** 0.9
Additional Remarks: Details about the cost share breakdown are available in Supplement 1 to the Evaluation Report, approved by ASA (CW) September 2000	

EMSWORTH, LOCKS AND DAMS	April 2010
Official Project Name: Emsworth Locks and Dams, Ohio River PA (Dam safety)	**Sub Project:** Emsworth Major Rehab
Division/District: LRD/Pittsburgh District	**Tributary/Waterway:** Ohio River
Project Authorization:	Rivers and Harbors Act, dated July 1918
Project Status (under construction, authorized or planned): under construction	**Project Type (new construction or rehabilitation) and note if Lock, Dam or Channel:** rehabilitation, Dam

Project Description

Emsworth Locks and Dams are located on the Ohio River immediately downstream of the City of Pittsburgh in Allegheny County, Pennsylvania. The project includes two dams, one on either side of an island (Neville). The main channel dam and locks are located at river mile 6.2 and the back channel dam is located at river mile 6.4. The project creates the navigation pool for the City of Pittsburgh. The pool includes the uppermost 6.2 miles of the Ohio River, the lower 11.2 miles of the Monongahela River, and the lower 6.7 miles of the Allegheny River.

Project Location Map:

Project Photo:

Current Cost Estimate (risk-based, price level):	$160,000,000
Current Remaining Costs FY11 to completion:	$ 15,600,000
Authorized Base Cost (Mar 01):	$ 66,400,000
Fully Funded Cost Estimate at Authorization (Mar 01):	$ 72,750,000
Current Average Annual Net Benefits (2009, 7%):	**Current Remaining Average Annual Net Benefits (2009, 7%): $**7,904,380
Current Benefit Cost Ratio (6 5/8%): 1.1	**Current Remaining Benefit Remaining Cost Ratio at 7%:** 1.9

Additional Remarks: The major rehabilitation project provides for new dam lift gates and dam gate operating machinery, permanent downstream scour protections, new emergency bulkheads for each dam, and rehabilitation of critical Service Bridge Components.

MARKLAND LOCKS AND DAM	April 2010
Official Project Name: Markland Locks and Dam, KY & IN (Major Rehab)	**Sub Project:** Markland Lock Major Rehab
Division/District: LRD/Louisville District	**Tributary/Waterway:** Ohio River
Project Authorization:	
Project Status (under construction, authorized or planned): under construction	**Project Type (new construction or rehabilitation) and note if Lock, Dam or Channel:** major rehabilitation - lock

Project Description

The Markland Locks and Dam are located at Ohio River Mile 531.5 and are 3.5 miles downstream of Warsaw, Kentucky. The navigation facility consists of two adjacent parallel locks located on the Kentucky bank. The main lock chamber has clear dimensions of 110' x 1200' and the auxiliary lock 110' x 600'.

Project Location Map:

Project Photo:

Current Cost Estimate (detailed , price level):	$ 35,800,000
Current Remaining Costs FY11 to completion:	$ 5,400,000
Authorized Base Cost (price level):	$ 17,600,000
Fully Funded Cost Estimate at Authorization (price level):	$ 17,600,000
Current Average Annual Net Benefits (2009, 7%): $3,186,000	**Current Remaining Average Annual Net Benefits at 7% ($2009):** $3,455,000
Current Benefit Cost Ratio at 7%: 2.4	**Current Remaining Benefit Remaining Cost Ratio at 7%:** 2.7

Additional Remarks: The risk is very high that a failure of the lock gates will occur, forcing traffic through the auxiliary lock for an extended period, causing huge delays and costs to the towing industry. The auxiliary lock miter gates are now showing signs of fatigue cracking also. Markland is now being dewatered annually instead of every five years, at additional cost to the government and industry, to inspect and repair the miter gates. The results of the risk-based engineering and economic analysis presented in the Markland Major Rehabilitation Report are that combined replacement of the main chamber lock miter gates and culvert valves in the year 2002 was the optimum strategy. Construction and installation of the miter gate assembly area and pier, new miter gates for main chamber, and new culvert valves for the main chamber. Construction will take approximately 4 years. A 60 day closure of the 1200' lock is required to install components and will be broken into two phases with about 30 days in-between.

Phase 2
Projects Currently Authorized

GREENUP LOCKS AND DAM	April 2010
Official Project Name: Greenup Locks and Dam, Ohio River, KY & OH	**Sub Project:** Greenup Lock Extension PED and Construction
Division/District: LRD/Huntington District	**Tributary/Waterway:** Ohio River
Project Authorization:	
Project Status (under construction, authorized or planned): authorized	**Project Type (new construction or rehabilitation) and note if Lock, Dam or Channel:** new construction - lock

Project Description

Greenup Locks and Dam is located at river mile 341.0 on the Ohio River. The existing structure was completed in 1962 and consists of two lock chambers: a 110 by 1200 feet "main" chamber and a 110 by 600 feet "auxiliary" chamber. Greenup Locks have a 30 feet lift provided by a non-navigable dam consisting of 9 tainter gates with a clear span of 100 feet between piers. The project has a 3 turbine hydropower plant on the Ohio bank with a capacity of 70,000 kilowatts.

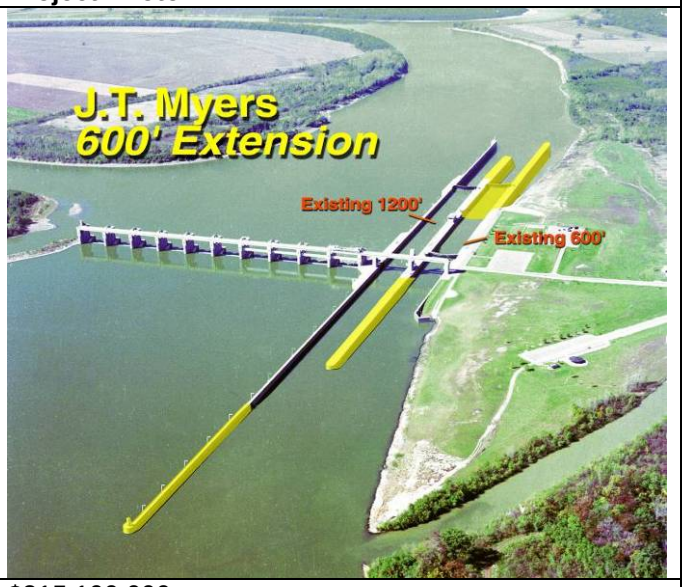
Project Location Map:	**Project Photo:**
	
Current Cost Estimate (detailed , price level):	$242,200,000
Current Remaining Costs FY11 to completion:	$242,200,000
Authorized Base Cost (price level):	$175,500,000
Fully Funded Cost Estimate at Authorization (price level):	$200,100,000
Current Average Annual Net Benefits (2009, 7%): $65,271,000	**Current Remaining Average Annual Net Benefits at 7% (2009):** $65,099,000
Current Benefit Cost Ratio at 7%: 4.8	**Current Remaining Benefit Remaining Cost Ratio at 7%:** 5.2

Additional Remarks: The Greenup plan of improvement includes a 600-foot extension of the existing 600-foot auxiliary lock to provide an overall length of 1200 feet, extension of the downstream guide wall, filling and emptying system improvements, installation of a miter gate quick changeout system (MGQCS) for faster repairs to the lock miter gates, and environmental mitigation measures.

JOHN T. MYERS LOCKS IMPROVEMENT	April 2010
Official Project Name: John T. Myers Locks Improvement, Ohio River	**Sub Project:** Auxiliary Lock Extension
Division/District: LRD/Louisville District	**Tributary/Waterway:** Ohio River
Project Authorization:	Water Resources Development Act (WRDA) 2000
Project Status (under construction, authorized or planned): authorized	**Project Type (new construction or rehabilitation) and note if Lock, Dam or Channel:** new construction - lock

Project Description

John T. Myers Locks and Dam is located at Ohio River Mile 846.0, approximately 3 miles downstream from Uniontown, Kentucky. The current navigation facility consists of two adjacent parallel lock chambers, a 110-foot by 1200-foot main lock and 110-foot by 600-foot auxiliary lock, and a gated dam with adjoining fixed weir section that is navigable when high water ceases locking operations. Authorized in the Water Resources Development Act (WRDA) 2000, the John T. Myers Locks Improvements Project will extend the existing 600-foot long auxiliary lock chamber to a 1,200-foot long lock chamber. This effort will give the navigation facility twin 1,200-foot locks for inland navigation tow traffic. This additional lock capacity will enable the facility, in operation since 1969, to manage tow traffic during planned and unscheduled main lock closures without significant delays to inland navigation.

Project Location Map:	**Project Photo:**
	

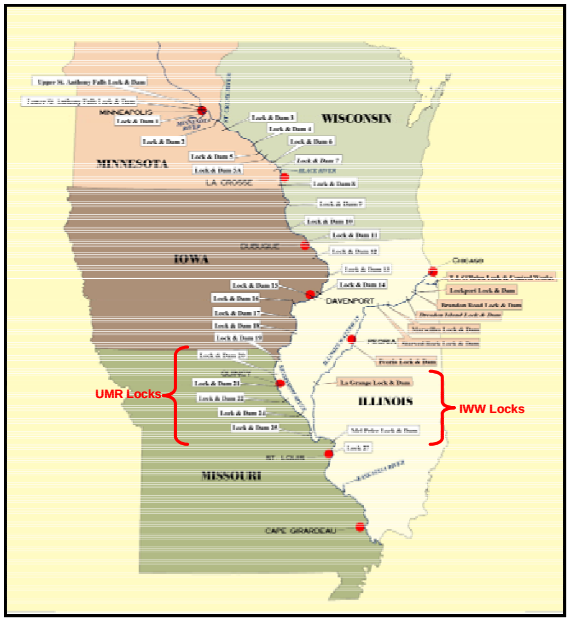
Current Cost Estimate (detailed , price level):	$315,100,000
Current Remaining Costs FY11 to completion:	$315,100,100
Authorized Base Cost (price level):	$182,000,000
Fully Funded Cost Estimate at Authorization (price level):	$225,000,000
Current Average Annual Net Benefits (2009, 7%): $3,312,000	**Current Remaining Average Annual Net Benefits at 7% (2009):** $5,165,000
Current Benefit Cost Ratio at 7%: 1.1	**Current Remaining Benefit Remaining Cost Ratio at 7%:** 1.2

Additional Remarks: Many contracts are required to design and construct the project. Preconstruction, Engineering and Design (PED) efforts since 2000 included hydraulic model studies and engineering analysis and foundation explorations towards preparation of project Plans and Specifications. Awarded in September 2004 the first site preparations construction contract for the Operations Support Facility was completed in Nov/December 2005. The next construction contracts to be awarded are the remaining site preparation work including the Resident Engineers office, the Upper Bank site preparation and Construction Access Road, and the Aquatic Mitigation to all be completed prior to initiation of the lock extension construction.

UPPER MISSISSIPPI RIVER- ILLINOIS WATERWAY SYSTEM	April 2010
Official Project Name: Upper Mississippi River – Illinois Waterway System Navigation and Ecosystem Sustainability Program (NESP)	**Sub Project:** Dual purpose authority providing for systemic Navigation Efficiency Improvements and Ecosystem Restoration
Division/District: Mississippi Valley Division – Rock Island, St Louis and St Paul Districts	**Tributary/Waterway:** Upper Mississippi River (UMR) and Illinois Waterway (IWW)
Project Authorization:	WRDA of 2007, Title VIII
Project Status: Authorized	**Project Type:** New Construction Locks

Project Description: The navigation improvement component consists of construction of seven new locks, construction of seven new mooring cells, implement switch boats at five sites, develop and test appointment scheduling system, and construct environmental mitigation. To date lock designs have focused primarily on LD 22 and LD 25 and to a lesser extent, LaGrange LD. Designs are currently at 25-30% level of completion for LD 22 and 25. Two mooring cell sites are fully designed and ready to go to construction. Contractual documents have been readied for Switch boat acquisition.

Project Location Map:



Project Photo:

Current Cost Estimate:	$2,387,070,000
Current Remaining Costs (FY11 to completion):	$2,387,070,000
Authorized Base Cost (Oct 2006 price level):	$2,206,000,000
Fully Funded Cost Estimate at Authorization :	$2,822,000,000
Current Average Annual Net Benefits (2006, 4.875%): $54,799,000	**Current Remaining Average Annual Net benefits (2006, 4 7/8%):** 54,799,000
Current Benefit Cost Ratio (5 3/8):1.29	**Remaining Benefit Remaining Cost Ratio at 7%:** 1.23

Additional Remarks: The UMR-IWW system has over half (19 of 36) of the most delayed lock sites in the country's system of inland waterways. Existing delays vary based on location in the system, but are generally greatest furthest downstream. These delays result from traffic backups due to congestion as well as closures for operation and maintenance. From 1990 to 2001, the estimated cumulative average delay per tow was 48.5 hours (more than two days) on the UMR and 10.6 hours on the IWW. In 2005, the UMR moved just over 109 million tons of commercial cargo. This tonnage was worth almost $19 billion. Of the almost 84.2 million tons leaving the river (tonnage shipped + tonnage through), two-thirds was destined for the Lower Mississippi River. Another 10 percent moved to the Ohio River and its tributaries. Comparatively, in 2005 the IWW moved 51.6 million tons of commercial cargo worth $9.5 billion.

GIWW, High Island to Brazos River, TX	April 2010
Official Project Name: GIWW, High Island to Brazos River, Texas	**Sub Project:**
Division/District: SWD/Galveston District	**Tributary/Waterway:** Gulf Intracoastal Waterway
Project Authorization:	Water Resources Development Act of 2007
Project Status (under construction, authorized or planned): Authorized	**Project Type (new construction or rehabilitation) and note if Lock, Dam or Channel:** New Construction, Channel

Project Description

This reach of the Gulf Intracoastal Waterway (GIWW) includes approximately 43 miles of channels in Galveston and Brazoria Counties, from Rollover Pass at GIWW Mile 330 to West Bay at Mile 373. The recommended project includes a sediment basin at Rollover Pass, widening the channel area by 75 feet for a length of 1400 feet at Sievers Cove, widening the channel at the Texas City Wye, setting back existing mooring facilities by 80 feet at Pelican Island, establishing a mooring basin at Greens Lake, and protecting existing open channels from wave action at the West Bay washout.

Project Location Map:

Project Photo:

Current Cost Estimate (ROM, Oct 2008 price level):	$17,000,000
Current Remaining Costs FY11 to completion:	$16,304,000
Authorized Base Cost (Oct 2005):	$13,893,000
Fully Funded Cost Estimate at Authorization :	$14,450,000
Current Average Annual Net Benefits (2009, 7%): $3,203,000	**Current Remaining Average Annual Net Benefits :** $3,272,000
Current Benefit Cost Ratio (7%): 2.17	**Current Remaining Benefit Remaining Cost Ratio at 7%:** 2.2

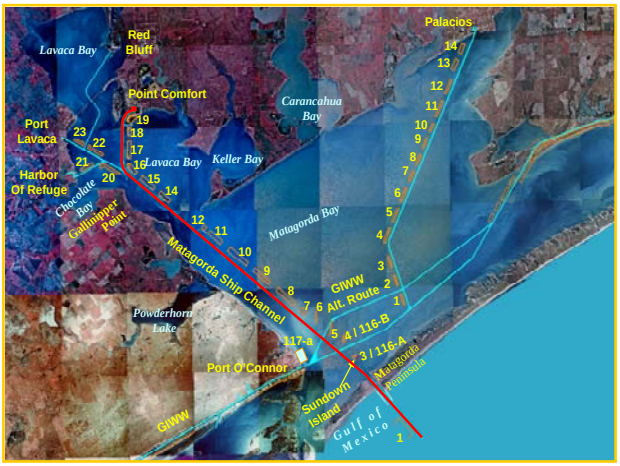
Additional Remarks: This project will allow for uninterrupted transportation of goods and services on the waterway while reducing the potential for spills and collisions. This section of the GIWW contains significant wetland & environmental sensitive areas which must be protected. Navigational difficulties are caused by frequent shoaling at Rollover Pass, and traffic congestion at Sievers Cove and Texas City Wye. This portion of the channel needs to be realigned and new mooring facilities established .The commerce transported along this section of the GIWW totaled nearly 56 million tons in 2008 with petrochemicals as the major commodity shipped. This project is authorized for construction in WRDA 2007, but is not currently funded. If funds are received in FY10, construction can begin in FY11.

GIWW, Brazos River to Port O'Connor, Matagorda Bay, TX (Reroute)	April 2010
Official Project Name: GIWW, Brazos River to Port O'Connor, Matagorda Bay, Texas (Reroute)	**Sub Project:**
Division/District: SWD/Galveston District	**Tributary/Waterway:** Gulf Intracoastal Waterway
Project Authorization:	Water Resources Development Act of 2007, Section 1001 (41)
Project Status (under construction, authorized or planned): Authorized	**Project Type (new construction or rehabilitation) and note if Lock, Dam or Channel:** New Construction, Channel

Project Description

The project is located on the Gulf coast in southeast Texas at approximately the midpoint between Corpus Christi and Galveston. The project provides for rerouting the Gulf Intracoastal Waterway in the vicinity of the Matagorda Ship Channel to avoid the strong currents and high shoaling occurring at the intersection. The selected channel alignment utilizes the existing GIWW route on the eastward end for approximately 3.9 miles before turning westward. The alignment is approximately 6,000 feet north of and parallel to the existing route. The total length of the alignment is 13 miles. Several ecosystem restoration features and beneficial use of dredged material features are included in the placement plan.

In order to expedite the identification of a viable solution to the safety issues at the Matagorda Bay Ship Channel crossing due to high shoaling rates and tidal currents, the Matagorda Bay reach was studied separately as an interim to the overall Brazos River to Port O'Connor Feasibility Study.

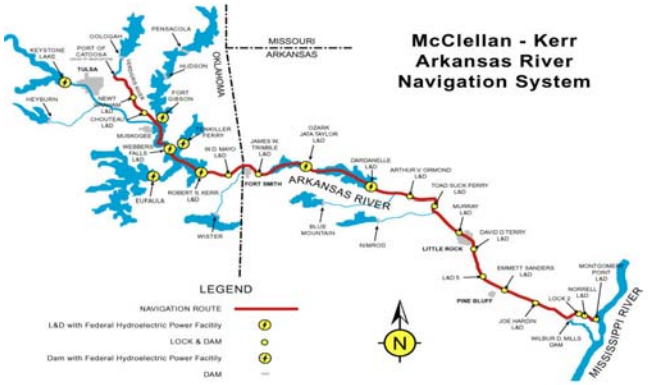
Project Location Map:	Project Photo:
	

Current Cost Estimate (ROM, Oct 2008 price level):	$19,540,000
Current Remaining Costs FY11 to completion:	$18,792,000
Authorized Base Cost (Oct 2005):	$16,240,000
Fully Funded Cost Estimate at Authorization :	$17,280,000
Current Average Annual Net Benefits (2009, 7%): $2,185,000	**Current Remaining Average Annual Net Benefits:** $2,185,000
Current Benefit Cost Ratio (7%): 1.3	**Current Remaining Benefit Remaining Cost Ratio at 7%:** 1.6

Additional Remarks: This project will allow for uninterrupted transportation of goods and services on the waterway while reducing the potential for spills and collisions. The realigned channel will be in an area of reduced currents, thus allowing for greater maneuverability of the barges, and results in reduced future maintenance dredging costs. Due to the various problems along this reach, the waterways industry has reported that numerous groundings have occurred and that vessels operate under reduced speeds. Reroute of the channel will reduce or eliminate the groundings and allow vessels to operate more safely and efficiently. Reroute of current channel will also reduce annual maintenance costs. The commerce transported along this section of the GIWW totaled nearly 18 million tons in 2008. This project is authorized for construction in WRDA 2007, but is not currently funded. If funds are received in FY10, construction can begin in FY11.

McClellan-Kerr Arkansas River Navigation System (MKARNS)	April 2010
Official Project Name: McClellan-Kerr Arkansas River Navigation System (MKARNS), AR & OK, 12-Footot Navigation Channel	**Sub Project:** This project would deepen the navigation channel to a minimum depth of 12 feet throughout the MKARNS.
Division/District: SWD/Little Rock & Tulsa Districts	**Tributary/Waterway:** Arkansas River
Project Authorization	Section 136, E&WDAA FY 2004 (PL108-137)
Project Status (under construction, authorized or planned): authorized	**Project Type (new construction or rehabilitation) and note if Lock, Dam or Channel:** new construction

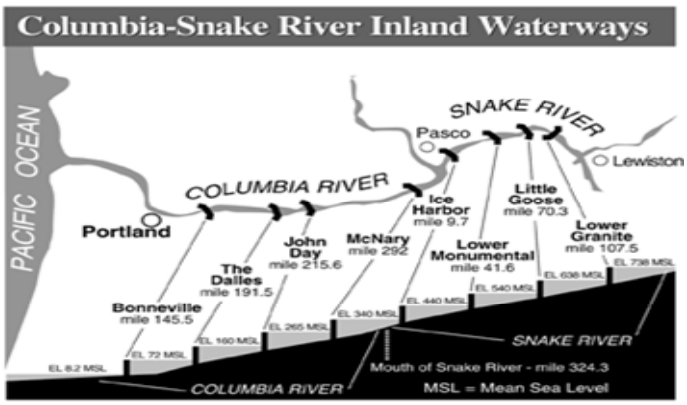
Project Description: The existing 445-mile long McClellan-Kerr Arkansas River Navigation System (MKARNS) consists of 18 locks and dams, providing 9-foot depth inland navigation from the Mississippi River to Catoosa, Oklahoma. This project would deepen the navigation channel to a minimum depth of 12 feet throughout the MKARNS.

Project Location Map:	Project Photo:
	 
Current Cost Estimate (detailed, Oct 2008 price level):	$185,435,000
Current Remaining Costs FY11 to completion:	$184,435,000
Authorized Base Cost (price level):	$149,900,000
Authorized Fully Funded Cost:	$156,600,000
Current Average Annual Net Benefits (price level, discount rate): $13,800,000	**Authorized Average Annual Net Benefits (price level, discount rate):** $13,700,000
Authorized Benefit Cost Ratio (discount rate): 1.1	**Current Remaining Benefit Remaining Cost Ratio at 7%:** 0.9

Additional Remarks: This project would include construction of new upland dredge disposal sites, new dikes, revetments, and dredging as well as concurrent environmental mitigation including the construction of Least Tern Islands, fish habit mitigation, and dike notching.

LOWER MONUMENTAL LOCK AND DAM	August 2009
Official Project Name: Lower Monumental Lock and Dam	**Sub Project:** N/A
Division/District: Northwestern Division/Walla Walla District	**Tributary/Waterway:** Snake River/Columbia-Snake River System
Project Authorization	Public Law (PL) 79-14 (79th Congress, 1st session, approved March 2, 1945) authorized construction of Lower Monumental Lock and Dam (Lower Monumental). Report approved 2006
Project Status (under construction, authorized or planned): authorized	**Project Type (new construction or rehabilitation) and note if Lock, Dam or Channel:** Lock Rehabilitation

Project Description: There are eight dams along the Columbia/Snake River waterway, each with its own single chamber lock providing an average lift of 100 feet. The Lower Monumental lock, located at Snake River mile 41.6 is the sixth most upstream lock on the Columbia/Snake River waterway. The Major Rehabilitation Project report recommends replacing the downstream lock gate and lift gate machinery, replacing lift gate machinery for the upstream lock gate, replacing electrical systems for the upstream and downstream gates, replacing the lock electrical power system, and upgrading all four tainter valves and their mechanical and electrical systems. The downstream lift gate is the main driver. The gate is over 80 feet tall and 85 feet wide and highly unreliable. Currently, over $0.5 million is being spent each year on repairs to keep the gate in service. Fatigue problems, cracking and fractures within the gate have more than doubled since 2005.

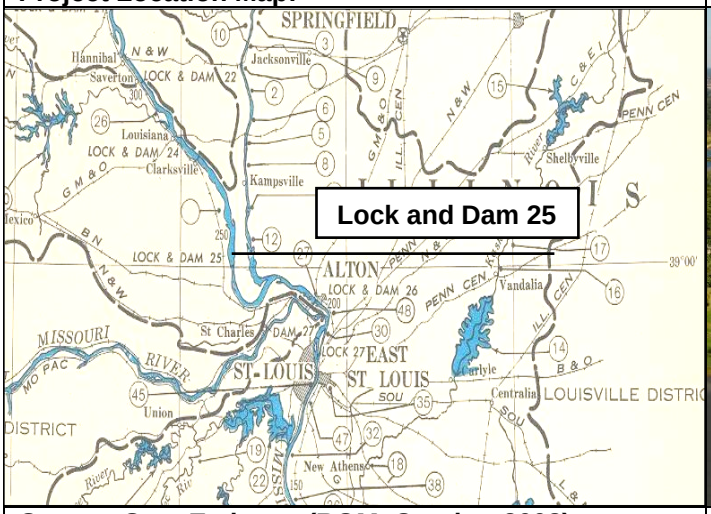
Project Location Map:	**Project Photo:**
	

Current Cost Estimate (detailed, 2006):	$14,000,000
Current Remaining Costs (FY11 to completion):	$14,000,000
Authorized Base Cost (2006):	$14,000,000
Fully Funded Cost Estimate at Authorization :	N/A
Current Average Annual Net Benefits (2004, 7%) $26,509,000	**Current Remaining Average Annual Net Benefits (2009, 7%):**
Current Benefit Cost Ratio (2004, 7%): 2.0	**Remaining Benefit Remaining Cost Ratio (current and include discount rate):** N/A

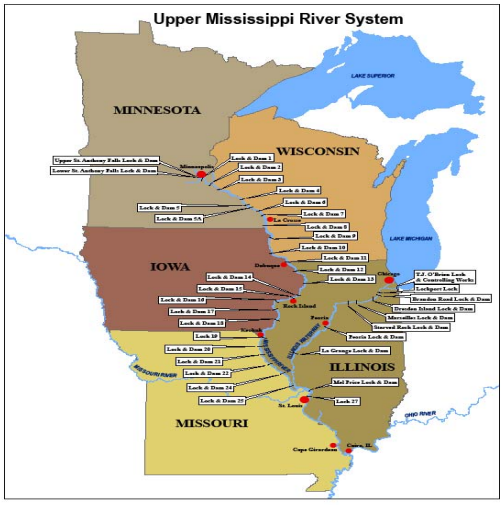
Additional Remarks:

LOCK AND DAM 25 MISSISSIPPI RIVER	August 2009
Official Project Name: Lock and Dam No. 25 Dam Safety Modification Report	**Sub Project:** Report Phase 1, Scour Repair, Report Phase 2, Overflow Dike Repairs, Sandy Slough Dike Repairs
Division/District: MVD/MVS	**Tributary/Waterway:** Upper Mississippi River
Project Authorization:	N/A
Project Status: Authorized (Phase 1 under construction)	**Project Type:** Major Rehabilitation – Dam

Project Description: The Lock and Dam 25 project is located in Calhoun County, Illinois, and Lincoln County, Missouri, at Winfield, Missouri, UMR mi 241.4 above the confluence of the Mississippi and Ohio rivers. The project has only a single lock chamber, with dimensions 110 feet wide by 600 feet long. Normal upper pool elevation is 449.0. The dam is 1,296 feet long with three submersible roller gates (near the center of the structure) and 14 submersible tainter gates. Phase 1 (report complete): scour upstream which is beginning to undercut the dam structure (repairs are under construction), and Phase 2: sand boils in the upstream levee (dike), sand boils downstream of the overflow portion of the dam, and a past history of voids under the dam.

Project Location Map:	**Project Photo:**
	
Current Cost Estimate (ROM, October 2008):	$40,000,000
Current Remaining Costs (FY11 to completion):	$27,000,000
Authorized Base Cost (price level):	$40,000,000
Fully Funded Cost Estimate at Authorization:	$40,000,000
Current Average Annual Net Benefits (price level, discount rate): $1,109,195	**Current Remaining Average Annual Net Benefits (price level, discount rate):** $1,109,195
Current Benefit Cost Ratio (discount rate): 2.06	**Current Remaining Benefit Remaining Cost Ratio at 7%:** 2.06

Additional Remarks:

THOMAS J. O'BRIEN LOCK AND CONTROLLING WORKS	April 2010
Official Project Name and Location: Thomas J. O'Brien Lock and Controlling Works	**Sub Project:** Lock and Controlling Works
Division/District: MVD/MVR	**Tributary/Waterway:** Illinois Waterway
Project Authorization: The O'Brien Rehabilitation Evaluation Report (dated March 2003, revised June 2003)	O&M (River and Harbor Act 1930), CG
Project Status: Authorized	**Project Type:** Lock & Controlling Works Rehabilitation
Project Description: The project is located at the entrance to Lake Michigan (River Mile 326.0), in Chicago, Illinois. O'Brien Lock is a low lift sector gate lock. It provides a maximum lift of 5.0 feet for traffic passing from Lake Michigan to the Little Calumet River. The lock chamber is 1,000 feet long by 110 feet wide. The adjacent dam is 257 feet long and comprised of two sections. The fixed section is 204 feet of steel sheet pile cellular construction. The controlling segment, a reinforced concrete structure with four slide gate sections, is 53 feet long. Items to be addressed include lock walls and guide walls, electrical system and operating machinery, lock gate and valve repairs, lock chamber bulkheads, and scour protection.	
Project Location Map:	**Project Photo:**
	
Current Cost Estimate (Detailed, Oct 2009):	$22,900,000
Current Remaining Costs (FY11 to completion):	$22,900,000
Authorized Base Cost (price level):	$22,900,000
Fully Funded Cost Estimate at Authorization :	$25,100,000
Current Average Annual Net Benefits (price level, discount rate) $1,393,800	**Current Remaining Average Annual Net Benefits (price level, discount rate):** $1,393,800
Current Benefit Cost Ratio (4 5/8): 1.7	**Current Remaining Benefit Remaining Cost Ratio (4 5/8):** 1.7
Additional Remarks:	

LAGRANGE LOCK AND DAM	April 2010
Official Project Name: LaGrange Lock and Dam	**Sub Project:** Lock
Division/District: MVD/MVR	**Tributary/Waterway:** Illinois Waterway
Project Authorization:	O&M (River and Harbor Act 1930), CG
Project Status Authorized	**Project Type:** Lock Rehabilitation

Project Description: LaGrange Lock & Dam located at river mile 80.2 was put into service in 1939. A major rehabilitation was completed in 1988, which included concrete repairs, repositioning lock machinery, and installing a traveling kevel. For 70 years, the lock has been exposed to multiple freeze/thaw cycles and flooding causing degradation of the lock components. In August of 2004, an expert elicitation workshop was held to determine the probability and consequences related to the operation of LaGrange Lock with deteriorated concrete. The panel concluded that the lock concrete was in need of rehabilitation at the earliest opportunity. Items to be addressed by the project include lock concrete, lock chamber bulkheads to allow dewatering, and the electrical and mechanical operating system.

Project Location Map:	**Project Photo:**
	

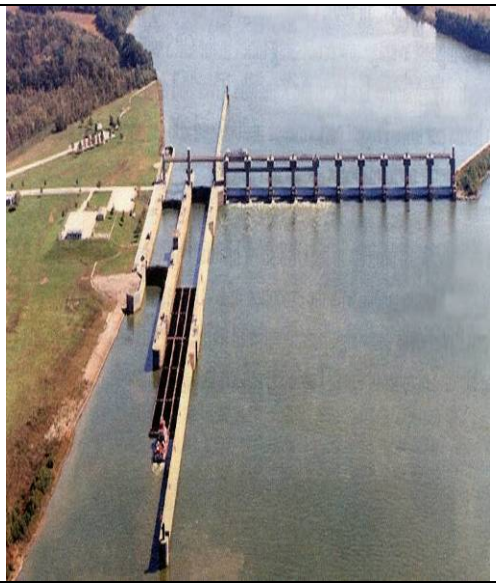
Current Cost Estimate (detailed, Oct 2009):	$53,200,000
Current Remaining Costs (FY11 to completion):	$53,200,000
Authorized Base Cost (Oct 2009):	$53,200,000
Fully Funded Cost Estimate at Authorization :	$61,300,000
Current Average Annual Net Benefits (Oct 2009, discount rate): $2,263,200	**Current Remaining Average Annual Net Benefits (Oct 2009, discount rate):** $2,263,200
Current Benefit Cost Ratio (4 5/8): 1.5	**Current Remaining Benefit Remaining Cost Ratio @ 7%:** N/A

Additional Remarks:

JOHN T. MYERS MAIN LOCK MAJOR REHABILITATION	April 2010
Official Project Name: John T. Myers Dam Major Rehabilitation	**Sub Project:** JT Myers Dam Major Rehab
Division/District: LRD/Louisville District	**Tributary/Waterway:** Ohio River
Project Authorization:	
Project Status (under construction, authorized or planned): authorized	**Project Type (new construction or rehabilitation) and note if Lock, Dam or Channel:** major rehabilitation - dam

Project Description

John T. Myers Locks and Dam is located at Ohio River Mile 846.0, about 3 miles below Uniontown, Kentucky. The navigation facility consists of a 1200-foot long main lock chamber, 600-foot auxiliary lock, highlift dam with 10 tainter gates, and a fixed weir section.

Project Location Map:	**Project Photo:**
	

Current Cost Estimate (detailed, price level):	$44,800,000
Current Remaining Costs FY11 to completion:	$44,800,000
Authorized Base Cost (price level):	$44,800,000
Fully Funded Cost Estimate at Authorization (price level):	$45,000,000
Current Average Annual Net Benefits (2009, 7%): $4,785,000	**Current Remaining Average Annual Net Benefits at 7% (2009):** $4,785,000
Current Benefit Cost Ratio at 7%: 2.4	**Current Remaining Benefit Remaining Cost Ratio at 7%:** 2.4

Additional Remarks: In recent years, the 33-year old gated-dam has sustained significant structural damage with repair costs easily exceeding the current inland waterways navigation major rehabilitation threshold. Hydrographic surveys, dive inspections and underwater sonic camera imaging revealed large holes in the reinforced concrete stilling basin, piers, and baffle blocks within several gate bays of the dam. Rock and other hard materials continually erode concrete surfaces in areas that presently cannot be dewatered for inspection and repairs. In addition to the stilling basin damage, the Evaluation Report identified other areas of concern including seizing of hinged-brackets that attach hoisting cables to the tainter gates, and major maintenance needs for operating machinery and associated electrical service and controls.

Phase 3
Planned Projects

MELDAHL LOCKS AND DAM	April 2010
Official Project Name: Meldahl Locks and Dam, Ohio River, OH & KY	**Sub Project:** Meldahl Lock Extension PED and Construction
Division/District: LRD/Huntington District	**Tributary/Waterway:** Ohio River
Project Authorization:	
Project Status (under construction, authorized or planned): planned	**Project Type (new construction or rehabilitation) and note if Lock, Dam or Channel:** new construction - lock

Project Description

Captain Anthony Meldahl Locks and Dam is located on the Ohio River at river mile 436.2, approximately 1.7 miles downstream of Chilo, Ohio. The project consists of a 1,756-foot long non-navigable, high lift gated dam and a main lock chamber 110-feet wide by 1,200-feet long with a parallel auxiliary lock chamber 110-feet wide by 600-feet long.

Project Location Map:	Project Photo:
	

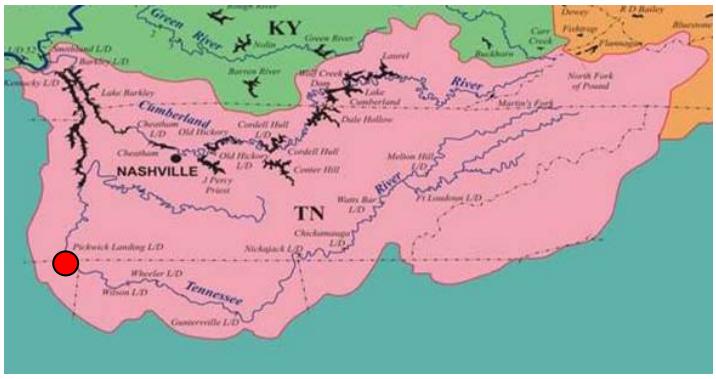
Current Cost Estimate (ROM, price level):	$220,000,000
Current Remaining Costs FY11 to completion:	$220,000,000
Authorized Base Cost (price level):	$N/A
Fully Funded Cost Estimate at Authorization (price level):	$N/A
Current Average Annual Net Benefits (2009, 7%): N/A	**Current Remaining Average Annual Net Benefits at 7% (2009):** N/A
Current Benefit Cost Ratio at 7%: N/A	**Current Remaining Benefit Remaining Cost Ratio at 7%:** N/A

Additional Remarks: Current and projected traffic levels can be accommodated with the current lock capacity; however, a combination of diminishing lock reliability and insufficient auxiliary lock capacity are in question. Proposed lock extension efforts will be specifically identified during the Feasibility and Preconstruction Engineering and Design (PED) phases. In order to accommodate traffic while the main lock is closed for repairs (major rehabilitation), a plan for the extension of the auxiliary lock chamber to 1200 feet is necessary.

PICKWICK LOCKS AND DAM	April 2010
Official Project Name: Pickwick Lock, TN, TN	**Sub Project:** Pickwick Lock Extension
Division/District: LRD/Nashville District	**Tributary/Waterway:** Tennessee River
Project Authorization:	
Project Status (under construction, authorized or planned): planned	**Project Type (new construction or rehabilitation) and note if Lock, Dam or Channel:** new construction - lock

Project Description

The Pickwick Locks and Dam project is located at Tennessee River Mile 206.7 near Counce, Tennessee. The project has a 110-foot by 1000-foot main chamber and a 110-foot by 600-foot auxiliary chamber.

Project Location Map:	**Project Photo:**
	

Current Cost Estimate (ROM, price level):	$210,000,000
Current Remaining Costs FY11 to completion:	$210,000,000
Authorized Base Cost (price level):	$N/A
Fully Funded Cost Estimate at Authorization (price level):	$ N/A
Current Average Annual Net Benefits (2009, 7%): N/A	**Current Remaining Average Annual Net Benefits at 7% ($2009):** N/A
Current Benefit Cost Ratio at 7%: N/A	**Current Remaining Benefit Remaining Cost Ratio at 7%:** N/A

Additional Remarks: The Pickwick Lock Extension Project provides for a 110-foot by 200-foot extension to be added to the existing 110-foot by 1000-foot main lock chamber resulting in a 110-foot by 1200-foot lock. The project when completed will have a 110-foot by 1,200-foot lock and the existing 110-foot by 600-foot auxiliary lock. An extension of the main lock chamber at Pickwick Lock to 1200 feet is needed to provide maximum efficiency with minimal wait times for traffic on the lower Tennessee River. With a 1200-foot lock at Pickwick and the completion of new 1200-foot locks at Kentucky and Wilson, the shipping industry will see facilitated movement of a standard 15-barge tow all the way from the Ohio River to the Decatur, Alabama port with a single lockage at each of these three Tennessee River locks.

UPPER OHIO NAVIGATION LOCKS AND DAMS	April 2010
Official Project Name and Location: Upper Ohio Navigation Locks and Dams Improvements	**Sub Project:** Emsworth, Dashields and Montgomery Locks and Dams
Division/District: LRD/Pittsburgh District	**Tributary/Waterway:** Ohio River
Project Authorization:	N/A
Project Status (under construction, authorized or planned): planned	**Project Type (new construction or rehabilitation) and note if Lock, Dam or Channel:** New Construction, Locks

Project Description

Emsworth, Dashields and Montgomery (EDM) Locks and Dams are the uppermost lock and dam structures on the Ohio River and are located at river miles 6.2, 13.3 and 31.7, respectively below the "Point" in Pittsburgh, PA. All three have dual lock chambers, 110'x600' and 56'x300', which are the smallest capacity chambers of the Ohio River navigation system. All three facilities are 70+ years of age and exhibit significant signs of structural and operational degradation.

Project Location Map:

Project Photo:

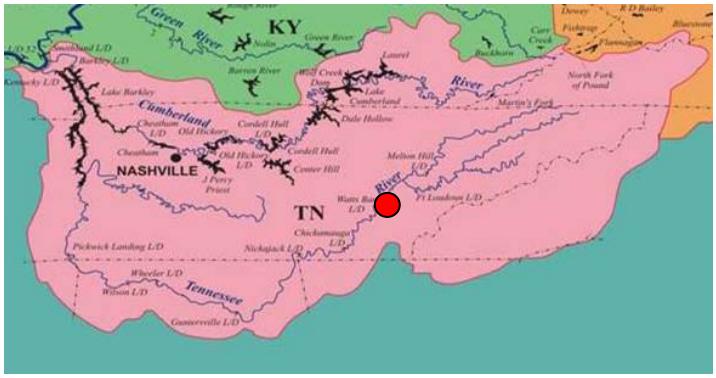
Current Cost Estimate ROM, Oct 2008 price level):	$1,640,000,000
Current Remaining Costs FY11 to completion:	$1,640,000,000
Authorized Base Cost:	$ N/A
Fully Funded Cost Estimate at Authorization :	$ N/A
Current Average Annual Net Benefits: $N/A	**Current Remaining Average Annual Net Benefits**: $N/A
Current Benefit Cost Ratio: N/A	**Current Remaining Benefit Remaining Cost Ratio at 7%:** N/A

Additional Remarks: The project is currently in the feasibility study stage. The project consists of new 110'X600' lock chambers at each facility and rehab of the existing main chamber at each facility. Cost is roughly $550M for Emsworth, $500M for Montgomery, and $590M for Dashields

WATTS BAR LOCK AND DAM	April 2010
Official Project Name: Watts Bar Lock, TN River, TN	**Sub Project:** Watts Bar Lock Addition
Division/District: LRD/Nashville District	**Tributary/Waterway:** Tennessee River
Project Authorization:	
Project Status (under construction, authorized or planned): planned	**Project Type (new construction or rehabilitation) and note if Lock, Dam or Channel:** new construction - lock

Project Description

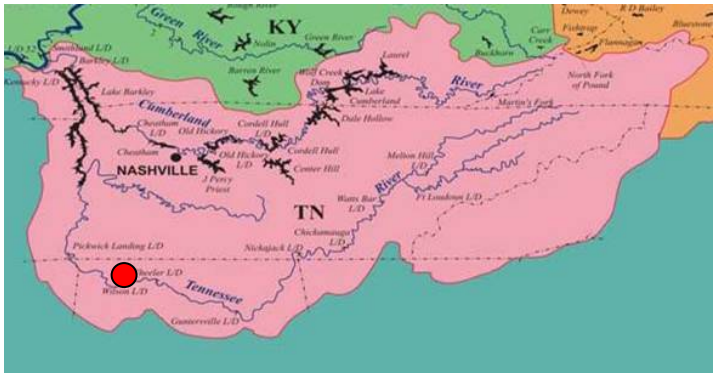
The Watts Bar Lock and Dam project is located at Tennessee River Mile 529.9 near Decatur, Tennessee. The project has a 60-foot by 600-foot single chamber.

Project Location Map:	**Project Photo:**
	
Current Cost Estimate (ROM, price level):	$310,000,000
Current Remaining Costs FY11 to completion:	$310,000,000
Authorized Base Cost (price level):	$ N/A
Fully Funded Cost Estimate at Authorization (price level):	$ N/A
Current Average Annual Net Benefits (2009, 7%): N/A	**Current Remaining Average Annual Net Benefits at 7% (2009):** N/A
Current Benefit Cost Ratio at 7%: N/A	**Current Remaining Benefit Remaining Cost Ratio at 7%:** N/A

Additional Remarks: The Watts Bar Lock Addition Project provides for a new 110-foot by 600-foot lock. The project when completed will have the new 110-foot by 600-foot lock and the existing 60-foot by 360-foot lock. The Watts Bar Lock and Dam processed an average of 1.4 million tons of commodities annually from 2000 to 2005.

WILSON LOCK REPLACEMENT	April 2010
Official Project Name: Wilson Lock, TN River, TN	**Sub Project:** Wilson Lock Replacement
Division/District: LRD/Nashville District	**Tributary/Waterway:** Tennessee River
Project Authorization:	
Project Status (under construction, authorized or planned): planned	**Project Type (new construction or rehabilitation) and note if Lock, Dam or Channel:** new construction - lock

Project Description
The Wilson Locks and Dam project is located at Tennessee River Mile 259.4 in Florence, Alabama.

Project Location Map:	**Project Photo:**
	
Current Cost Estimate (ROM, price level):	$610,000,000
Current Remaining Costs FY11 to completion:	$610,000,000
Authorized Base Cost (price level):	$ N/A
Fully Funded Cost Estimate at Authorization (price level):	$ N/A
Current Average Annual Net Benefits (2009, 7%): N/A	**Current Remaining Average Annual Net Benefits at 7% (2009):** N/A
Current Benefit Cost Ratio at 7%: N/A	**Current Remaining Benefit Remaining Cost Ratio at 7%:** N/A

Additional Remarks: The Wilson Locks Replacement Project provides for a new 110-foot by 1200-foot lock to replace the auxiliary lock which is a double lift structure comprised of two 60-foot by 300-foot chambers. The project when completed will have one 1200-foot lock and one 600-foot lock. The Wilson Locks and Dam processed 10.3 million tons of commodities in 2007.

BAYOU SORREL LOCK	April 2010
Official Project Name: Bayou Sorrel Lock Replacement	**Sub Project:** N/A
Division/District: MVD/New Orleans District	**Tributary/Waterway:** GIWW Alternate Route
Project Authorization:	WRDA 2007
Project Status Authorized, undergoing Post Authorization Change evaluation for exceeding 902 limit	**Project Type:** New construction to replace existing lock.

Project Description: This is a multipurpose project that includes navigation and flood risk reduction components. The lock is an integral part of the EABPL, a feature of the Atchafalaya Basin, Louisiana, project designed to pass the MR&T project design flood flow safely to the Gulf of Mexico, while reducing navigation delays on the GIWW, Morgan City - Port Allen Route.

Project Location Map:	**Project Photo:**
	
Current Cost Estimate (Detailed, 2006):	$170,000,000
Current Remaining Costs (FY11 to completion):	$170,000,000
Authorized Base Cost (price level):	$9,600,000
Fully Funded Cost Estimate at Authorization :	
Current Average Annual Net Benefits (price level, discount rate): $13,131,349	**Current Remaining Average Annual Net Benefits (price level, discount rate)**
Current Benefit Cost Ratio (current and authorized, include discount rate):2.7	**Current Remaining Benefit Cost Ratio @ 7%:** N/A

Additional Remarks: Significant change since authorization. Project is being reformulated

CALCASIEU LOCK AND DAM	April 2010
Official Project Name: Calcasieu Lock Replacement Study	**Sub Project:**
Division/District: MVD/MVN	**Tributary/Waterway:** Gulf Intracoastal Waterway
Project Authorization:	N/A
Project Status: Planned	**Project Type:** New Construction of replacement lock at Calcasieu

Project Description: Calcasieu Lock is a feature of the Gulf Intracoastal Waterway between Apalachee Bay, Florida, and the Mexican Border Project. The lock is located east of the Calcasieu River, approximately 10 miles south of Lake Charles, Louisiana, in Calcasieu Parish. The lock prevents saltwater intrusion from the Calcasieu River into the Mermentau River basin, a major rice producing area. Calcasieu Lock, completed in 1950, has dimensions of 13 by 75 by 1,206 feet and is structurally sound. The project study evaluates the efficacy of replacing the lock to alleviate traffic delays currently experienced at the lock.

Project Location Map:	**Project Photo:**
	
Current Cost Estimate (ROM, Oct 2008:	60,000,000
Current Remaining Costs (FY11 to completion):	60,000,000
Authorized Base Cost (price level):	N/A
Fully Funded Cost Estimate at Authorization :	N/A
Current Average Annual Net Benefits (price level, discount rate): N/A	**Authorized Average Annual Net Benefits (price level, discount rate):** N/A
Authorized Benefit Cost Ratio (discount rate): N/A	**Current Remaining Benefit Remaining Cost Ratio at 7%:** N/A

Additional Remarks:

J. BENNETT JOHNSTON WATERWAY	April 2010
Official Project Name: J. Bennett Johnston Waterway, Mississippi River to Shreveport, LA	**Sub Project:** N/A
Division/District: Mississippi Valley Division/Vicksburg	**Tributary/Waterway:** J. Bennett Johnston Waterway (Red River Navigation)
Project Authorization:	N/A
Project Status: Planned	**Project Type:** Channel

Project Description: The existing project is located in central and northwest Louisiana and provides for a 9- by 200-foot navigation channel extending about 236 miles from the Mississippi River through Old River and Red River to the vicinity of Shreveport, LA. Five locks and adjacent dams provide a lift of about 141 feet. Facilities to provide recreation and fish and wildlife development are also an integral part of the project.

Project Location Map:

Project Photo:

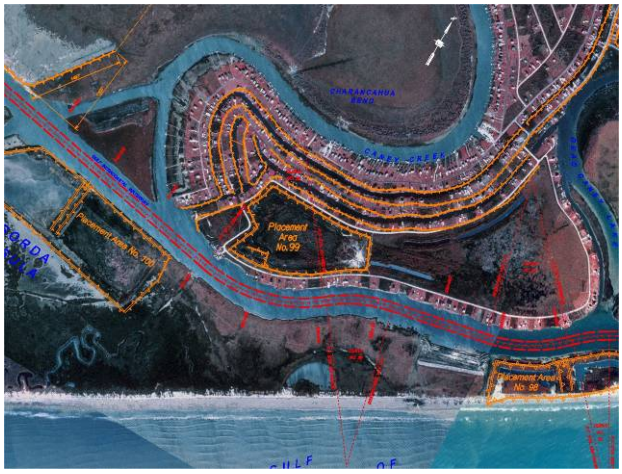
Current Cost Estimate (ROM):	$50,000,000
Current Remaining Costs (FY11 to completion):	$50,000,000
Authorized Base Cost (price level):	N/A
Fully Funded Cost Estimate at Authorization :	N/A
Current Average Annual Net Benefits (price level, discount rate): N/A	**Current Remaining Average Annual Net Benefits (price level, discount rate):** N/A
Current Benefit Cost Ratio (discount rate): N/A	**Current Remaining Benefit Remaining Cost Ratio at 7%:** N/A

Additional Remarks:
Funds in the amount of $100,000 could be used to conduct the reconnaissance study to determine the Federal interest in providing a 12-foot navigation channel.

GIWW, Brazos River to Port O' Conner, TX	April 2010
Official Project Name: GIWW, Brazos River to Port O' Conner, TX	**Sub Project:**
Division/District: SWD/Galveston District	**Tributary/Waterway:** Gulf Intracoastal Waterway
Project Authorization:	N/A
Project Status (under construction, authorized or planned): Planned	**Project Type (new construction or rehabilitation) and note if Lock, Dam or Channel:** New Construction, Channel

Project Description

The study area includes approximately 72 miles of the Gulf Intracoastal Waterway (GIWW) in Brazoria, Matagorda and Calhoun Counties, from the Brazos River near Freeport to Port O'Connor, Texas. This study will evaluate operational problems along this reach of the GIWW. Initial problems identified by users along this reach include difficulties navigating currents encountered as a result of river flows from the San Bernard; high shoaling at Jones Creek, bank erosion at miles 408-420 and 446-451, safety concerns and dangerous currents across Matagorda Bay (mile 454-473), and delays and one-way traffic at Caney Creek (mile 420).

Project Location Map:	Project Photo:
	
Current Cost Estimate (ROM, Oct 2008 price level):	$20,000,000
Current Remaining Costs FY11 to completion:	$20,000,000
Authorized Base Cost (price level):	N/A
Fully Funded Cost Estimate at Authorization :	N/A
Current Average Annual Net Benefits (price level, discount rate): N/A	**Current RemainingAverage Annual Net Benefits (price level, discount rate):** N/A
Current Benefit Cost Ratio (discount rate): N/A	**Current Remaining Benefit Remaining Cost Ratio at 7%:** N/A

Additional Remarks: Bend easing is required for the channel bends along Caney Creek (mile 420) to relieve one way traffic and resultant traffic delays to improve navigational safety and efficiencies. This project is not currently funded. Construction start date is unknown.

In order to expedite the identification of a viable solution to the safety issues at the Matagorda Bay Ship Channel crossing due to high shoaling rates and tidal currents, the Matagorda Bay reach was studied separately as an interim to the overall Brazos River to Port O'Connor Feasibility Study and is included in Phase 2, page 2-5.

GIWW, Port O'Connor to Corpus Christi Bay, TX	April 2010
Official Project Name: GIWW, Port O'Connor to Corpus Christi Bay, TX	**Sub Project:**
Division/District: SWD/Galveston District	**Tributary/Waterway:** Gulf Intracoastal Waterway
Project Authorization:	N/A
Project Status (under construction, authorized or planned): Planned	**Project Type (new construction or rehabilitation) and note if Lock, Dam or Channel:** New Construction, Channel

Project Description

The study area includes approximately 79 miles of the Texas section of the main channel of the Gulf Intracoastal Waterway (GIWW), extending from Port O'Connor to the Kennedy Causeway at Corpus Christi Bay. The purpose of this study is to evaluate operational problems and address environmental concerns along this reach of the waterway. Navigational difficulties caused by frequent shoaling at various locations within this reach, traffic congestion near Port O'Connor, and the lack of navigational aids and mooring facilities have been identified by users as areas of concern.

Project Location Map:	**Project Photo:**
	
Current Cost Estimate (ROM, Oct 2008 price level):	$20,000,000
Current Remaining Costs FY11 to completion:	$20,000,000
Authorized Base Cost (price level):	N/A
Fully Funded Cost Estimate at Authorization :	N/A
Current Average Annual Net Benefits (price level, discount rate): N/A	**Current Remaining Average Annual Net Benefits (price level, discount rate):** N/A
Current Benefit Cost Ratio (discount rate): N/A	**Current Remaining Benefit Remaining Cost Ratio at 7%:** N/A

Additional Remarks: Potential structural solutions may involve channel rerouting across Corpus Christi Bay, widening to relieve traffic congestion at Port O'Connor and Victoria Wye, stabilizing of banks in critical locations to relieve channel shoaling problems, and the relocation of mooring facilities for holding vessels during inclement conditions. All these solutions would provide safer, more efficient, less costly transportation along the waterway. This project is currently in Feasibility phase and is funded in FY 2009. Construction start date is unknown.

GIWW, Modifications, TX	April 2010
Official Project Name: GIWW, Modifications, TX	**Sub Project:**
Division/District: SWD/Galveston District	**Tributary/Waterway:** Gulf Intracoastal Waterway
Project Authorization:	N/A
Project Status (under construction, authorized or planned): Planned	**Project Type (new construction or rehabilitation) and note if Lock, Dam or Channel:** New Construction, Lock and Floodgate

Project Description

The study area encompasses two locations on the Gulf Intracoastal Waterway (GIWW) along the Texas coast. One, the Brazos River Floodgates, is located approximately 7 miles southwest of Freeport, Texas, at the intersection of the Brazos River and the GIWW in Brazoria County. The other, the Colorado River Locks, is located approximately 45 miles southwest of Freeport, Texas, at the intersection of the Colorado River and the GIWW in Matagorda County. Both projects improve navigational safety by controlling traffic flow and currents at these dangerous intersections. Both also serve to control sand and silt deposition at the intersection of the GIWW with the respective rivers. As sediment control structures, they reduce maintenance dredging costs by decreasing the trapping effects of the intersection. The Colorado River Locks have an additional purpose which is to raise the navigation traffic from the GIWW to the level of the river during flood stages for crossing the river and lowering the traffic to the level of the GIWW after crossing. This study will determine the need and advisability of modifying the configuration of the crossings at the Brazos River Floodgates and the Colorado River Locks on the GIWW to reduce traffic accidents and navigation delays.

Project Location Map:

Project Photo:

Current Cost Estimate (ROM, Oct 2008 price level):	$450,000,000 ($150M Brazos River Floodgates) ($300M Colorado River Locks)
Current Remaining Costs FY11 to completion:	$450,000,000
Authorized Base Cost (price level):	N/A
Authorized Fully Funded Cost:	N/A
Current Average Annual Net Benefits (price level, discount rate): N/A	**Current Remaining Average Annual Net Benefits (price level, discount rate):** N/A
Current Benefit Cost Ratio (discount rate): N/A	**Current Remaining Benefit Remaining Cost Ratio at 7%:** N/A

Additional Remarks: Potential solutions for minimizing navigation delays and safety concerns include realigning the approaches to the crossings or increasing the width of the gates. Current configuration and narrow gates at both facilities result in navigation difficulties, accidents, and traffic delays that exceed $1,000,000 annually. Currently, 17 to 25 million tons of commerce pass through these facilities each year. This project is not currently funded. Construction start date is unknown.

GIWW, Sabine River to High Island, TX	April 2010
Official Project Name: GIWW, Sabine River to High Island, TX	**Sub Project:**
Division/District: Galveston District	**Tributary/Waterway:** Gulf Intracoastal Waterway
Project Authorization:	N/A
Project Status (under construction, authorized or planned): Planned	**Project Type (new construction or rehabilitation) and note if Lock, Dam or Channel:** New Construction, Channel

Project Description

The study area extends from the Sabine River to High Island and consists of approximately 50 miles of the Texas section of the Gulf Intracoastal Waterway (GIWW) in Orange, Jefferson, Chambers, and Galveston Counties. Problems identified by users along this reach include bank erosion and shoaling near Pleasure Island and the McFaddin Marsh National Wildlife Refuge. Users have identified a number of hazardous bends and channel reaches that present safety problems.

Project Location Map:	Project Photo:
	

Current Cost Estimate (ROM, Oct 2008 price level):	$20,000,000
Current Remaining Costs FY11 to completion:	$20,000,000
Authorized Base Cost (price level):	N/A
Fully Funded Cost Estimate at Authorization :	N/A
Current Average Annual Net Benefits (price level, discount rate): N/A	**Current Remaining Average Annual Net Benefits (price level, discount rate):** N/A
Current Benefit Cost Ratio (discount rate): N/A	**Current Remaining Benefit Remaining Cost Ratio at 7%:** N/A

Additional Remarks: Potential solutions include restoration of areas previously impacted by project construction or subsequent maintenance activities, and restoration of wetland habitat lost as a result of project usage. Structural solutions may involve channel widening to relieve traffic congestion, stabilizing of banks in critical locations to relieve channel shoaling problems, and the coordination and sitting of mooring facilities for holding vessels during inclement conditions. Existing commerce through this reach of the GIWW is estimated to be 25,000,000 tons annually. This project is not currently funded. Construction start date is unknown.

GIWW, High Island to Brazos River Realignment, TX	April 2010
Official Project Name: GIWW, High Island to Brazos River Realignment, TX	**Sub Project:**
Division/District: SWD/Galveston District	**Tributary/Waterway:** Gulf Intracoastal Waterway
Project Authorization:	N/A
Project Status (under construction, authorized or planned): Planned	**Project Type (new construction or rehabilitation) and note if Lock, Dam or Channel:** New Construction, Channel

The study area includes approximately 85 miles of the Gulf Intracoastal Waterway (GIWW) in Galveston and Brazoria Counties, from High Island, Texas, to the Brazos River. This study will evaluate and recommend improvements to 3 primary areas within the reach, including evaluation of navigation improvements in negotiating two 90-degree bends near High Island; difficulties negotiating a double "S" curve near Freeport; difficulties negotiating the intersection within the Chocolate Bayou Channel; and developing long range disposal plans.

Project Location Map:

Project Photo:

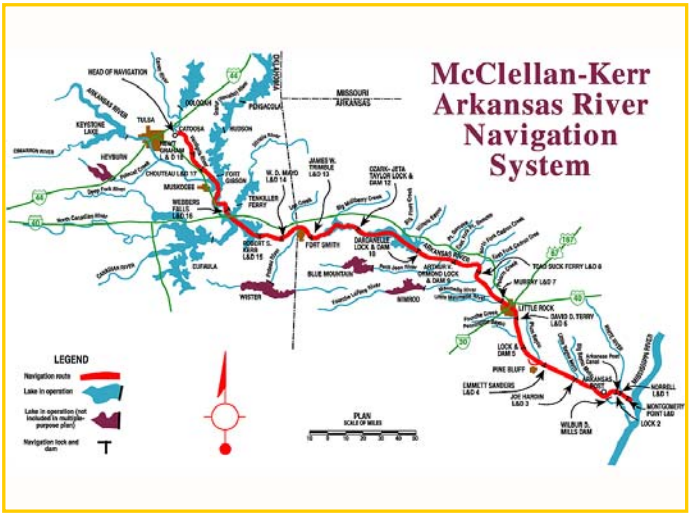
Current Cost Estimate (ROM, Oct 2008 price level):	$20,000,000
Current Remaining Costs FY11 to completion:	$20,000,000
Authorized Base Cost (price level):	N/A
Fully Funded Cost Estimate at Authorization :	N/A
Current Average Annual Net Benefits (price level, discount rate): N/A	**Current Remaining Average Annual Net Benefits (price level, discount rate):** N/A
Current Benefit Cost Ratio (discount rate): N/A	**Current Remaining Benefit Remaining Cost Ratio at 7%:** N/A

Additional Remarks: Tonnage transported along this section of the GIWW totaled nearly 74 million tons in 2006, with a commercial value of over 25 billion dollars. Petrochemicals are the major commodity shipped along this reach of the waterway. The Feasibility Study is currently funded and is in the President's FY10 budget. Construction start date is unknown.

Norrell Lock	April 2010
Official Project Name: Norrell Lock, AR	**Sub Project:**
Division/District: SWD/Little Rock	**Tributary/Waterway:** McClellan-Kerr Arkansas River Navigation System
Project Authorization:	N/A
Project Status (under construction, authorized or planned): Planned	**Project Type (new construction or rehabilitation) and note if Lock, Dam or Channel:** New Construction, Lock

Norrell Lock is located on the left descending bank of the White River Canal at NM 10.3. The project consists of a 110-foot wide by 600-foot long main chamber and an un-gated concrete weir that is navigable under certain high water conditions.

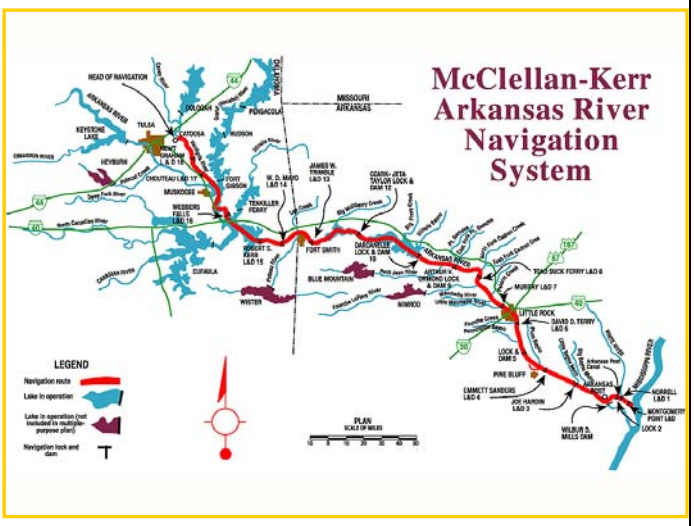
Project Location Map:



Project Photo:

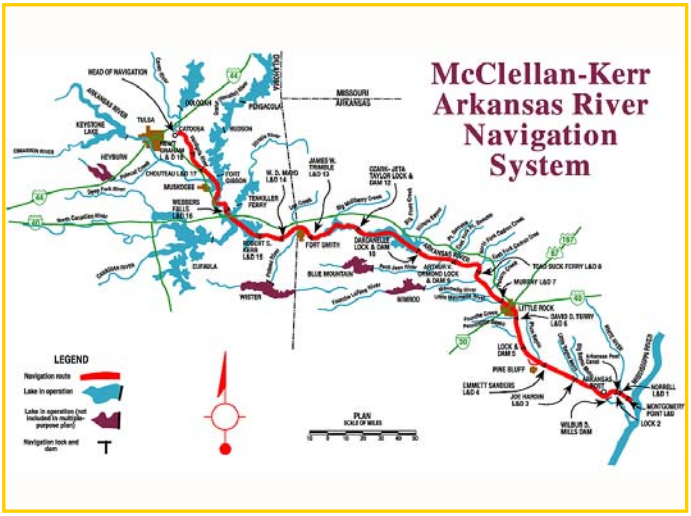
Current Cost Estimate (ROM, price level):	$120,000,000
Current Remaining Costs FY11 to completion:	$120,000,000
Authorized Base Cost (price level):	N/A
Fully Funded Cost Estimate at Authorization (price level):	N/A
Current Average Annual Net Benefits (price level, discount rate): N/A	**Current Remaining Average Annual Net Benefits (price level, discount rate):** N/A
Current Benefit Cost Ratio (discount rate): N/A	**Current Remaining Benefit Remaining Cost Ratio at 7%:** N/A

Additional Remarks: The lock is approaching the 40-year point of an anticipated 50-year design life. The new construction consist of a lock extension project that provides for a 110-foot by 600-foot extension to be added to the existing 110-foot by 600-foot main lock chamber, which will result in a new 110-foot by 1200-foot lock.

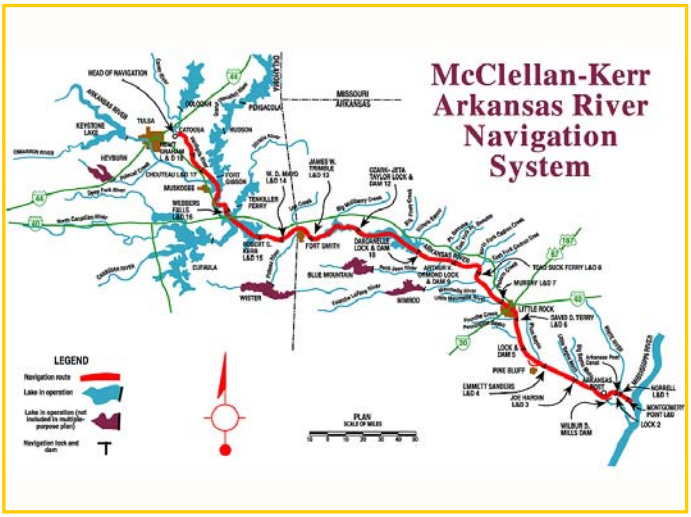
ARKANSAS RIVER NO. 2 LOCK	April 2010
Official Project Name: No. 2 Lock, AR	**Sub Project:**
Division/District: SWD/Little Rock	**Tributary/Waterway:** McClellan-Kerr Arkansas River Navigation System
Project Authorization:	N/A
Project Status (under construction, authorized or planned): Planned	**Project Type (new construction or rehabilitation) and note if Lock, Dam or Channel:** New Construction, Lock
No. 2 Lock is located on the left descending bank of the White River Canal at NM 13.3. The project consists of a 110-foot wide by 600-foot long main chamber.	
Project Location Map:	**Project Photo:**
	
Current Cost Estimate (ROM, price level):	$240,000,000
Current Remaining Costs FY11 to completion:	$240,0,000
Authorized Base Cost (price level):	N/A
Fully Funded Cost Estimate at Authorization (price level):	N/A
Current Average Annual Net Benefits (price level, discount rate): N/A	**Current Remaining Average Annual Net Benefits (price level, discount rate):** N/A
Current Benefit Cost Ratio (discount rate): N/A	**Current Remaining Benefit Remaining Cost Ratio at 7%:** N/A
Additional Remarks: The lock is approaching the 40-year point of an anticipated 50-year design life. The new construction consist of a lock extension project that provides for a 110-foot by 600-foot extension to be added to the existing 110-foot by 600-foot main lock chamber, which will result in a new 110-foot by 1200-foot lock.	

JOE HARDIN LOCK	April 2010
Official Project Name: Joe Hardin - Lock, AR	**Sub Project:**
Division/District: SWD/Little Rock	**Tributary/Waterway:** McClellan-Kerr Arkansas River Navigation System
Project Authorization:	N/A
Project Status (under construction, authorized or planned): Planned	**Project Type (new construction or rehabilitation) and note if Lock, Dam or Channel:** New Construction, Lock

Joe Hardin Lock is located on the right descending bank of the Arkansas River at NM 50.2. The project consists of a 1,260-foot long non-navigable dam with 18 tainter gates that are 60-foot by 30-foot and a 110-foot wide by 600-foot long main chamber.

Project Location Map:	**Project Photo:**
	
Current Cost Estimate (ROM, price level):	$120,000,000
Current Remaining Costs FY11 to completion:	$120,000,000
Authorized Base Cost (price level):	N/A
Fully Funded Cost Estimate at Authorization (price level):	N/A
Current Average Annual Net Benefits (price level, discount rate): N/A	**Current Remaining Average Annual Net Benefits (price level, discount rate):** N/A
Current Benefit Cost Ratio (discount rate): N/A	**Current Remaining Benefit Remaining Cost Ratio at 7%:** N/A

Additional Remarks: The lock is approaching the 40-year point of an anticipated 50-year design life. The new construction consist of a lock extension project that provides for a 110-foot by 600-foot extension to be added to the existing 110-foot by 600-foot main lock chamber, which will result in a new 110-foot by 1200-foot lock.

COL CHARLES D. MAYNARD LOCK	April 2010
Official Project Name: COL Charles D. Maynard Lock and Dam AR	**Sub Project:**
Division/District: SWD/Little Rock	**Tributary/Waterway:** McClellan-Kerr Arkansas River Navigation System
Project Authorization:	N/A
Project Status (under construction, authorized or planned): Planned	**Project Type (new construction or rehabilitation) and note if Lock, Dam or Channel:** New Construction, Lock
Col Charles D. Maynard Lock is located on the right descending bank of the Arkansas River at NM 86.3. The project consists of a 1,050-foot long non-navigable dam with 15 tainter gates that are 60-foot by 31-foot and a 110-foot wide by 600-foot long main chamber.	
Project Location Map:	**Project Photo:**
	
Current Cost Estimate (ROM, price level):	$120,000,000
Current Remaining Costs FY11 to completion:	$120,000,000
Authorized Base Cost (price level):	N/A
Fully Funded Cost Estimate at Authorization (price level):	N/A
Current Average Annual Net Benefits (price level, discount rate): N/A	**Current Remaining Average Annual Net Benefits (price level, discount rate):** N/A
Current Benefit Cost Ratio (discount rate): N/A	**Current Remaining Benefit Remaining Cost Ratio at 7%:** N/A
Additional Remarks: The lock is approaching the 40-year point of an anticipated 50-year design life. The new construction consist of a lock extension project that provides for a 110-foot by 600-foot extension to be added to the existing 110-foot by 600-foot main lock chamber, which will result in a new 110-foot by 1200-foot lock.	

EMMETT SANDERS LOCK	April 2010
Official Project Name: Emmett Sanders - Lock, AR	**Sub Project:**
Division/District: SWD/Little Rock	**Tributary/Waterway:** McClellan-Kerr Arkansas River Navigation System
Project Authorization:	N/A
Project Status (under construction, authorized or planned): Planned	**Project Type (new construction or rehabilitation) and note if Lock, Dam or Channel:** New Construction, Lock

Emmett Sanders Lock is located on the right descending bank of the Arkansas River at NM 66.6. The project consists of a 1,190-foot long non-navigable dam with 9 tainter gates that are 60-foot by 28-foot, 8 tainter gates that are 60-foot by 23-foot and a 110-foot wide by 600-foot long main chamber.

Project Location Map:

Project Photo:

Current Cost Estimate (ROM, price level):	$120,000,000
Current Remaining Costs FY11 to completion:	$120,000,000
Authorized Base Cost (price level):	N/A
Fully Funded Cost Estimate at Authorization (price level)::	N/A
Current Average Annual Net Benefits (price level, discount rate): N/A	**Current Remaining Average Annual Net Benefits (price level, discount rate):** N/A
Current Benefit Cost Ratio (discount rate): N/A	**Current Remaining Benefit Remaining Cost Ratio at 7%:** N/A

Additional Remarks: The lock is approaching the 40-year point of an anticipated 50-year design life. The new construction consist of a lock extension project that provides for a 110-foot by 600-foot extension to be added to the existing 110-foot by 600-foot main lock chamber, which will result in a new 110-foot by 1200-foot lock

ALLEGHENY LOCKS AND DAMS 2 AND 3	April 2010
Official Project Name: Allegheny River Locks and Dams 2 & 3 Major Rehabilitation Project	**Sub Project:** Locks Rehab Project
Division/District: LRD/Pittsburgh District	**Tributary/Waterway:** Allegheny River
Project Authorization	N/A
Project Status (under construction, authorized or planned): Planned	**Project Type (new construction or rehabilitation) and note if Lock, Dam or Channel:** Rehabilitation, Locks

Project Description: Lock and Dam 2 is located across from Sharpsburg, Aspinwall and Etna, downstream from the Highland Park Bridge and C.W.Bill Young Lock and Dam is located across from Acmetonia, PA, just above the Pennsylvania Turnpike Bridge. Construction began in 1932 and continued until 1935. Both facilities consist of a single lock chamber 56' wide by 360' long and a fixed crest dam.

Project Location Map:

Project Photo:

Current Cost Estimate (ROM, Oct 2008 price level):	$40,000,000
Current Remaining Costs FY11 to completion:	$40,000,000
Authorized Base Cost (price level):	N/A
Fully Funded Cost Estimate at Authorization :	N/A
Current Average Annual Net Benefits (price level, discount rate): N/A	**Current Remaining Average Annual Net Benefits (price level, discount rate):** N/A
Current Benefit Cost Ratio (discount rate): N/A	**Current Remaining Benefit Remaining Cost Ratio at 7%:** N/A

Additional Remarks: This project would include replacement of miter gates, gate operating equipment, replacement of filling and emptying valves and valve operating equipment, complete electrical system rehabilitation, tow haulage system replacement and removal and replacement of vertical and horizontal wall concrete surfaces.

BELLEVILLE LOCKS AND DAM	April 2010
Official Project Name: Belleville Locks and Dam, Ohio River, OH & WV	**Sub Project:** Belleville Lock and Dam Rehab PED and Construction
Division/District: LRD/Huntington District	**Tributary/Waterway:** Ohio River
Project Authorization:	
Project Status (under construction, authorized or planned): planned	**Project Type (new construction or rehabilitation) and note if Lock, Dam or Channel:** major rehabilitation - lock

Project Description

Belleville L/D is located on the Ohio River at river mile 203.9, approximately 0.5 miles downstream of Belleville, West Virginia. The project consists of a 1,206-foot long non-navigable, high lift gated dam and a main lock chamber 110-feet wide by 1,200-feet long with a parallel auxiliary lock chamber 110-feet wide by 600-feet long.

Project Location Map:	Project Photo:
	

Current Cost Estimate (ROM, price level):	$90,000,000
Current Remaining Costs FY11 to completion:	$90,000,000
Authorized Base Cost (price level):	$N/A
Fully Funded Cost Estimate at Authorization (price level):	$N/A
Current Average Annual Net Benefits (2009, 7%): N/A	**Current Remaining Average Annual Net Benefits at 7% (2009):** N/A
Current Benefit Cost Ratio at 7%: N/A	**Current Remaining Benefit Remaining Cost Ratio at 7%:** N/A

Additional Remarks: Rehabilitation of the main lock chamber will be accomplished following completion of the major rehabilitation report, which will identify the specific features of the lock chamber that require rehabilitation. Efforts could include, but not necessarily be limited to, addressing all mechanical and electrical deficiencies at the locks and taking action to replace, rehabilitate, or construct in order to bring the safety and efficiencies of the components to current standards. However, the specific items to be addressed will be verified and potentially revised based upon the condition of the structure at the time of the rehabilitation report.

BELLEVILLE LOCKS AND DAM	April 2010
Official Project Name: Belleville Locks and Dam, Ohio River, OH & WV	**Sub Project:** Belleville Dam Rehab PED and Construction
Division/District: LRD/Huntington District	**Tributary/Waterway:** Ohio River
Project Authorization:	
Project Status (under construction, authorized or planned): planned	**Project Type (new construction or rehabilitation) and note if Lock, Dam or Channel:** major rehabilitation - dam

Project Description

Belleville L/D is located on the Ohio River at river mile 203.9, approximately 0.5 miles downstream of Belleville, West Virginia. The project consists of a 1,206-foot long non-navigable, high lift gated dam and a main lock chamber 110-feet wide by 1,200-feet long with a parallel auxiliary lock chamber 110-feet wide by 600-feet long.

Project Location Map:	Project Photo:
	
Current Cost Estimate (ROM , price level):	$60,000,000
Current Remaining Costs FY11 to completion:	$60,000,000
Authorized Base Cost (price level):	$ N/A
Fully Funded Cost Estimate at Authorization (price level):	$ N/A
Current Average Annual Net Benefits (2009, 7%): N/A	**Current Remaining Average Annual Net Benefits at 7% (2009):** N/A
Current Benefit Cost Ratio at 7%: N/A	**Current Remaining Benefit Remaining Cost Ratio at 7%:** N/A

Additional Remarks: Rehabilitation of the navigation dam will be accomplished following completion of the major rehabilitation report, which will identify the specific features of the dam that require rehabilitation. Efforts could include, but not necessarily be limited to, addressing all mechanical and electrical deficiencies at the dam and taking action to replace, rehabilitate, or construct in order to bring the safety and efficiencies of the components to current standards. However, the specific items to be addressed will be verified and potentially revised based upon the condition of the structure at the time of the rehabilitation report.

BRADDOCK LOCKS AND DAM	April 2010
Official Project Name and Location: Braddock Locks Major Rehabilitation Project	**Sub Project:** Locks Rehab Project
Division/District: LRD/Pittsburgh District	**Tributary/Waterway:** Monongahela River
Project Authorization	N/A
Project Status (under construction, authorized or planned): Planned	**Project Type (new construction or rehabilitation) and note if Lock, Dam or Channel:** Rehabilitation, Locks

Project Description: Braddock Locks and Dam is located at river mile 11.2 at the city of Braddock, PA The lock chambers and operations buildings are situated along the right bank of the river adjacent to a major steel-making plant. The locks are located side by side on the right bank, with a110 feet by 720 feet main chamber and a 56 feet by 360 feet auxiliary chamber. The original fixed crest dam was replaced with a gated dam in 2004 under the Locks and Dams 2, 3 and 4 Monongahela River Navigation Project

Project Location Map:	**Project Photo:**
	
Current Cost Estimate (ROM, Oct 2008 price level):	$110,000,000
Current Remaining Costs FY11 to completion:	$110,000,000
Authorized Base Cost (price level):	N/A
Fully Funded Cost Estimate at Authorization :	N/A
Current Average Annual Net Benefits (price level, discount rate): N/A	**Current Remaining Average Annual Net Benefits (price level, discount rate):** N/A
Current Benefit Cost Ratio (discount rate): N/A	**Current Remaining Benefit Remaining Cost Ratio at 7%:** N/A

Additional Remarks: This project would include replacement of miter gates, gate operating equipment, replacement of filling and emptying valves and valve operating equipment, complete electrical system rehabilitation, and removal and replacement of vertical and horizontal wall concrete surfaces.

CANNLETON LOCKS AND DAM	April 2010
Official Project Name: Cannelton Dam Major Rehab	**Sub Project:** Cannelton Dam Major Rehab
Division/District: LRD/Louisville District	**Tributary/Waterway:** Ohio River
Project Authorization:	
Project Status (under construction, authorized or planned): planned	**Project Type (new construction or rehabilitation) and note if Lock, Dam or Channel:** major rehabilitation - dam

Project Description
Cannelton Locks and Dam is located at Ohio River Mile 720.8, three miles upstream from Cannelton, Indiana.

Project Location Map:	**Project Photo:**
	

Current Cost Estimate (ROM , price level):	$10,000,000
Current Remaining Costs FY11 to completion:	$10,000,000
Authorized Base Cost (price level):	$ N/A
Fully Funded Cost Estimate at Authorization (price level):	$ N/A
Current Average Annual Net Benefits (2009, 7%): N/A	**Current Remaining Average Annual Net Benefits at 7% (2009):** N/A
Current Benefit Cost Ratio at 7%: N/A	**Current Remaining Benefit Remaining Cost Ratio at 7%:** N/A

Additional Remarks:
The Navigation Dam Major Rehabilitation Project provides for major repairs to the dam from FY 2012 through FY 2014. The work will include repairs to stilling basins and baffle blocks, repairs to the skin sheets on the tainter gates, installation of new tainter gate side seals, welding of wire rope lay areas on all tainter gates, and refurbishing the bulkhead crane power feed and controls. These major rehabilitation activities will ensure safe and reliable operation of the dam at Cannelton. The estimated cost is $13 Million, which includes design and construction.

CANNLETON LOCKS AND DAM	April 2010
Official Project Name: Cannelton Lock Major Rehab	**Sub Project:** Cannelton Dam Major Rehab
Division/District: LRD/Louisville District	**Tributary/Waterway:** Ohio River
Project Authorization:	
Project Status (under construction, authorized or planned): planned	**Project Type (new construction or rehabilitation) and note if Lock, Dam or Channel:** major rehabilitation - lock

Project Description
Cannelton Locks and Dam is located at Ohio River Mile 720.8, three miles upstream from Cannelton, Indiana. The project consists of two adjacent parallel lock chambers, a 110-foot by 1200-foot main lock and 110-foot by 600-foot auxiliary lock, and a non-navigable gated dam.
.

Project Location Map:	Project Photo:
	
Current Cost Estimate (ROM , price level):	$30,000,000
Current Remaining Costs FY11 to completion:	$30,000,000
Authorized Base Cost (price level):	$ N/A
Fully Funded Cost Estimate at Authorization (price level):	$ N/A
Current Average Annual Net Benefits (2009, 7%): N/A	**Current Remaining Average Annual Net Benefits at 7% (2009):** N/A
Current Benefit Cost Ratio at 7%: N/A	**Current Remaining Benefit Remaining Cost Ratio at 7%:** N/A

Additional Remarks:
The Main Lock Major Rehabilitation Project provides for major repairs to the 1200-foot lock chamber from FY 2017 through FY 2019. The work will include replacement or major repairs to components of the miter gates, miter gate machinery, electrical and hydraulic systems, and culvert valves. These major rehabilitation activities will ensure safe and reliable operation of the main lock chamber at Cannelton Locks and Dam. The estimated cost is $35.3 Million, which includes design and construction.

GREEN RIVER LOCKS 1 & 2 MAJOR REHABILITATION	April 2010
Official Project Name: Green River Locks 1 & 2 (Major Rehabilitation)	**Sub Project:** Green River Locks 1 & 2 (Major Rehabilitation)
Division/District: LRD/Louisville District	**Tributary/Waterway:** Green River
Project Authorization:	
Project Status (under construction, authorized or planned): planned	**Project Type (new construction or rehabilitation) and note if Lock, Dam or Channel:** major rehabilitation - lock

Project Description
Green River Locks and Dams 1 & 2 are located at river mile 9.1 and 63 on the Green River.

Project Location Map:	**Project Photo:**
	
Current Cost Estimate (ROM , price level):	$140,000,000
Current Remaining Costs FY11 to completion:	$140,000,000
Authorized Base Cost (price level):	$ N/A
Fully Funded Cost Estimate at Authorization (price level):	$ N/A
Current Average Annual Net Benefits (2009, 7%): N/A	**Current Remaining Average Annual Net Benefits at 7% (2009):** N/A
Current Benefit Cost Ratio at 7%: N/A	**Current Remaining Benefit Remaining Cost Ratio at 7%:** N/A

Additional Remarks:
The Green River Locks Major Rehabilitation Project provides for major repairs to the locks in FY 2020 and FY 2021. The work will include purchasing and installing new miter gates, purchasing and installing new filling and emptying culvert valves, and refurbishing the culvert valve and miter gate operating machinery. These major rehabilitation activities will ensure reliable operation of Locks 1 & 2 on Green River. Estimated cost for the work is $13.7 Million, which includes design and construction.

GREENUP LOCKS AND DAM	April 2010
Official Project Name: Greenup Locks and Dam, Ohio River, KY & OH	**Sub Project:** Greenup Dam Rehab PED and Construction
Division/District: LRD/Huntington District	**Tributary/Waterway:** Ohio River
Project Authorization:	
Project Status (under construction, authorized or planned): planned	**Project Type (new construction or rehabilitation) and note if Lock, Dam or Channel:** rehabilitation - dam

Project Description

Greenup Locks and Dam is located at river mile 341.0 on the Ohio River. The existing structure was completed in 1962 and consists of two lock chambers: a 110 by 1200 feet "main" chamber and a 110 by 600 feet "auxiliary" chamber. Greenup Locks have a 30 feet lift provided by a non-navigable dam consisting of 9 tainter gates with a clear span of 100 feet between piers. The project has a 3 turbine hydropower plant on the Ohio bank with a capacity of 70,000 kilowatts.

Project Location Map:	**Project Photo:**
	
Current Cost Estimate (ROM , price level):	$80,000,000
Current Remaining Costs FY11 to completion:	$80,000,000
Authorized Base Cost (price level):	$ N/A
Fully Funded Cost Estimate at Authorization (price level):	$ N/A
Current Average Annual Net Benefits (2009, 7%): N/A	**Current Remaining Average Annual Net Benefits at 7% (2009):** N/A
Current Benefit Cost Ratio at 7%: N/A	**Current Remaining Benefit Remaining Cost Ratio at 7%:** N/A

Additional Remarks: Rehabilitation of the navigation dam will be accomplished following completion of the major rehabilitation report, which will identify the specific features of the dam that require rehabilitation. Efforts could include, but not necessarily be limited to, addressing all mechanical and electrical deficiencies at the dam and taking action to replace, rehabilitate, or construct in order to bring the safety and efficiencies of the components to current standards. However, the specific items to be addressed will be verified and potentially revised based upon the condition of the structure at the time of the rehabilitation report.

GREENUP LOCKS AND DAM	April 2010
Official Project Name: Greenup Locks and Dam, Ohio River, KY & OH	**Sub Project:** Greenup Lock Rehab PED and Construction
Division/District: LRD/Huntington District	**Tributary/Waterway:** Ohio River
Project Authorization:	
Project Status (under construction, authorized or planned): planned	**Project Type (new construction or rehabilitation) and note if Lock, Dam or Channel:** rehabilitation - lock

Project Description

Greenup Locks and Dam is located at river mile 341.0 on the Ohio River. The existing structure was completed in 1962 and consists of two lock chambers: a 110 by 1200 feet "main" chamber and a 110 by 600 feet "auxiliary" chamber. Greenup Locks have a 30 feet lift provided by a non-navigable dam consisting of 9 tainter gates with a clear span of 100 feet between piers. The project has a 3 turbine hydropower plant on the Ohio bank with a capacity of 70,000 kilowatts.

Project Location Map:	**Project Photo:**
	
Current Cost Estimate (ROM , price level):	$60,000,000
Current Remaining Costs FY11 to completion:	$60,000,000
Authorized Base Cost (price level):	$
Fully Funded Cost Estimate at Authorization (price level):	$
Current Average Annual Net Benefits (in 000s of $2009, 7%):	**Current Remaining Average Annual Net Benefits at 7% (PY2011 in 000s of $2009):**
Current Benefit Cost Ratio at 7%:	**Current Remaining Benefit Remaining Cost Ratio at 7% (PY2011):**

Additional Remarks: Following extension of the auxiliary lock chamber to 1200 feet, rehabilitation of the main lock chamber will be accomplished following completion of the major rehabilitation report, which will identify the specific features of the lock chamber that require rehabilitation. Efforts could include, but not necessarily be limited to, replacement of the miter gates. However, the specific items to be addressed will be verified and potentially revised based upon the condition of the structure at the time of the rehabilitation report.

JOHN T. MYERS MAIN LOCK MAJOR REHABILITATION	April 2010
Official Project Name: John T. Myers Locks Main Lock (Major Rehab)	**Sub Project:** John T. Myers Main Lock Major Rehab
Division/District: LRD/Louisville District	**Tributary/Waterway:** Ohio River
Project Authorization:	
Project Status (under construction, authorized or planned): planned	**Project Type (new construction or rehabilitation) and note if Lock, Dam or Channel:** rehabilitation - lock

Project Description

John T. Myers Locks and Dam is located at Ohio River Mile 846.0, approximately 3 miles downstream from Uniontown, Kentucky. The current navigation facility consists of two adjacent parallel lock chambers, a 110-foot by 1200-foot main lock and 110-foot by 600-foot auxiliary lock, and a gated dam with adjoining fixed weir section that is navigable when high water ceases locking operations.

Project Location Map:	**Project Photo:**
	
Current Cost Estimate (ROM , price level):	$40,000,00
Current Remaining Costs FY11 to completion:	$40,000,000
Authorized Base Cost (price level):	$
Fully Funded Cost Estimate at Authorization (price level):	$
Current Average Annual Net Benefits (2009, 7%):	**Current Remaining Average Annual Net Benefits at 7% (2009):**
Current Benefit Cost Ratio at 7%:	**Current Remaining Benefit Remaining Cost Ratio at 7%:**

Additional Remarks: The Main Lock Major Rehabilitation Project provides for major repairs to the 1200-foot lock chamber from FY 2018 through FY 2020. The work will include replacement or major repairs to components of the miter gates, miter gate machinery, electrical and hydraulic systems, and culvert valves. These major rehabilitation activities will ensure safe and reliable operation of the main lock chamber at John T. Myers Locks and Dam. The estimated cost is $37 Million, which includes design and construction.

LONDON LOCKS AND DAM	April 2010
Official Project Name: London Locks and Dam, Kanawha River, WV	**Sub Project:** London Dam Rehab PED and Construction
Division/District: LRD/Huntington District	**Tributary/Waterway:** Kanawha River
Project Authorization:	
Project Status (under construction, authorized or planned): planned	**Project Type (new construction or rehabilitation) and note if Lock, Dam or Channel:** major rehabilitation – dam

Project Description
London Locks and Dam is located at London, West Virginia approximately 2 miles downstream of Montgomery, West Virginia on the Kanawha River 82.8 miles above the mouth of the river. The project consists of a 557-foot long non-navigable, high lift gated dam and a main lock chamber of 56-feet wide by 400-feet long with a parallel auxiliary lock chamber 56-feet wide by 360-feet long.

Project Location Map:	**Project Photo:**
	
Current Cost Estimate (ROM , price level):	$40,000,000
Current Remaining Costs FY11 to completion:	$40,000,000
Authorized Base Cost (price level):	$
Fully Funded Cost Estimate at Authorization (price level):	$
Current Average Annual Net Benefits (7%):	**Current Remaining Average Annual Net Benefits at 7% (2009):**
Current Benefit Cost Ratio at 7%:	**Current Remaining Benefit Remaining Cost Ratio at 7%:**

Additional Remarks:
Rehabilitation of the navigation dam will be accomplished following completion of the major rehabilitation report, which will identify the specific features of the dam that require rehabilitation. Efforts could include, but not necessarily be limited to, addressing concrete deterioration in critical areas of the dam piers, rehabilitation and painting of critical members of the roller gates, replacement of seized roller gate lifting chains and upgrade of obsolete electrical and mechanical operating equipment. However, the specific items to be addressed will be verified and potentially revised based upon the condition of the structure at the time of the rehabilitation report.

MARMET LOCKS AND DAM	April 2010
Official Project Name: Marmet Locks and Dam, Kanawha River, WV	**Sub Project:** Marmet Dam Rehab PED and Construction
Division/District: LRD/Huntington District	**Tributary/Waterway:** Kanawha River
Project Authorization:	
Project Status (under construction, authorized or planned): planned	**Project Type (new construction or rehabilitation) and note if Lock, Dam or Channel:** major rehabilitation – dam

Project Description

The Marmet Locks and Dam project is located at Kanawha River Mile 67.7 near Belle, West Virginia. The Marmet Locks and Dam project provides for a new 110 by 800-foot lock, continued use of the existing twin 56 by 360-foot locks during maintenance closures of the new chamber, and rehabilitation of the navigation dam. The new lock became operational on January 22, 2008 and the lock construction contract is scheduled for completion in March 2009.

Project Location Map:

Project Photo:

Current Cost Estimate (ROM , price level):	$30,000,000
Current Remaining Costs FY11 to completion:	$30,000,000
Authorized Base Cost (price level):	$
Fully Funded Cost Estimate at Authorization (price level):	$
Current Average Annual Net Benefits (2009, 7%):	**Current Remaining Average Annual Net Benefits at 7% (2009):**
Current Benefit Cost Ratio at 7%:	**Current Remaining Benefit Remaining Cost Ratio at 7%:**

Additional Remarks:

Rehabilitation of the navigation dam will be accomplished following completion of the major rehabilitation report, which will identify the specific features of the dam that require rehabilitation. Efforts could include, but not necessarily be limited to, addressing concrete deterioration in critical areas of the dam piers, rehabilitation and painting of critical members of the roller gates, replacement of seized roller gate lifting chains and upgrade of obsolete electrical and mechanical operating equipment.

MAXWELL LOCKS AND DAM	April 2010
Official Project Name: Maxwell Locks Major Rehabilitation Project	**Sub Project:** Locks Rehab Project
Division/District: LRD/Pittsburgh District	**Tributary/Waterway:** Monongahela River
Project Authorization	N/A
Project Status (under construction, authorized or planned): Planned	**Project Type (new construction or rehabilitation) and note if Lock, Dam or Channel:** Rehabilitation, Locks

Project Description: Maxwell Locks and Dam is located at river mile 61.2 approximately 5 miles south of Brownsville, PA The lock chambers and operations buildings are situated along the right bank of the river. Construction of Maxwell Locks and Dam began in 1960 and was completed in 1965**.** Both lock chambers are 84 feet wide by 720 feet long.

Project Location Map:	**Project Photo:**
	

Current Cost Estimate (ROM, Oct 2008 price level):	$80,000,000
Current Remaining Costs FY11 to completion:	$80,000,000
Authorized Base Cost (price level):	N/A
Fully Funded Cost Estimate at Authorization :	N/A
Current Average Annual Net Benefits (price level, discount rate): N/A	**Current Remaining Average Annual Net Benefits (price level, discount rate):** N/A
Current Benefit Cost Ratio (discount rate): N/A	**Current Remaining Benefit Remaining Cost Ratio at 7%:** N/A

Additional Remarks: This project would include replacement of miter gates, gate operating equipment, replacement of filling and emptying valves and valve operating equipment, complete electrical system rehabilitation, and tow haulage system replacement.

MC ALPINE DAM MAJOR REHABILITATION	April 2010
Official Project Name: McAlpine Dam (Major Rehabilitation)	**Sub Project:** McAlpine Dam (Major Rehabilitation)
Division/District: LRD/Louisville District	**Tributary/Waterway:** Ohio River
Project Authorization:	
Project Status (under construction, authorized or planned): planned	**Project Type (new construction or rehabilitation) and note if Lock, Dam or Channel:** major rehabilitation - dam

Project Description
McAlpine Locks and Dam is located at Ohio River Mile 606.8 in downtown Louisville, Kentucky and near Jeffersonville, Indiana.

Project Location Map:	**Project Photo:**
	
Current Cost Estimate (ROM , price level):	$10,000,000
Current Remaining Costs FY11 to completion:	$10,000,000
Authorized Base Cost (price level):	$
Fully Funded Cost Estimate at Authorization (price level):	$
Current Average Annual Net Benefits (2009, 7%):	**Current Remaining Average Annual Net Benefits at 7% (2009):**
Current Benefit Cost Ratio at 7%:	**Current Remaining Benefit Remaining Cost Ratio at 7%:**

Additional Remarks:
The Navigation Dam Major Rehabilitation Project provides for major repairs to the upper and lower dam from FY 2018 through FY 2020. The work will include repairs to stilling basins and baffle blocks, replacement of the tainter gate hoist cables, overhaul of the bulkhead cranes, replacement of bulkhead crane lifting cables, upgrades to the dam electrical system, and replacement of the safety warning signs on the dam. These major rehabilitation activities will ensure safe and reliable operation of the dam at McAlpine. The estimated cost is $11.4 Million.

MELDAHL LOCKS AND DAM	April 2010
Official Project Name: Meldahl Locks and Dam, Ohio River, OH & KY	**Sub Project:** Meldahl Lock Rehab PED and Construction
Division/District: LRD/Huntington District	**Tributary/Waterway:** Ohio River
Project Authorization:	
Project Status (under construction, authorized or planned): planned	**Project Type (new construction or rehabilitation) and note if Lock, Dam or Channel:** major rehabilitation - lock

Project Description

Captain Anthony Meldahl Locks and Dam is located on the Ohio River at river mile 436.2, approximately 1.7 miles downstream of Chilo, Ohio. The project consists of a 1,756-foot long non-navigable, high lift gated dam and a main lock chamber 110-feet wide by 1,200-feet long with a parallel auxiliary lock chamber 110-feet wide by 600-feet long.

Project Location Map:	**Project Photo:**
	
Current Cost Estimate (ROM , price level):	$80,000,000
Current Remaining Costs FY11 to completion:	$80,000,000
Authorized Base Cost (price level):	$
Fully Funded Cost Estimate at Authorization (price level):	$
Current Average Annual Net Benefits (2009, 7%):	**Current Remaining Average Annual Net Benefits at 7% (2009):**
Current Benefit Cost Ratio at 7%:	**Current Remaining Benefit Remaining Cost Ratio at 7%:**

Additional Remarks: Following extension of the auxiliary lock chamber to 1200 feet, rehabilitation of the main lock chamber will be accomplished following completion of the major rehabilitation report, which will identify the specific features of the lock chamber that require rehabilitation. Efforts could include, but not necessarily be limited to, addressing all mechanical and electrical deficiencies at the locks and taking action to replace, rehabilitate, or construct in order to bring the safety and efficiencies of the components to current standards. However, the specific items to be addressed will be verified and potentially revised based upon the condition of the structure at the time of the rehabilitation report.

MELDAHL LOCKS AND DAM	April 2010
Official Project Name: Meldahl Locks and Dam, Ohio River, OH & KY	**Sub Project:** Meldahl Dam Rehab PED and Construction
Division/District: LRD/Huntington District	**Tributary/Waterway:** Ohio River
Project Authorization:	
Project Status (under construction, authorized or planned): planned	**Project Type (new construction or rehabilitation) and note if Lock, Dam or Channel:** major rehabilitation - dam

Project Description

Captain Anthony Meldahl Locks and Dam is located on the Ohio River at river mile 436.2, approximately 1.7 miles downstream of Chilo, Ohio. The project consists of a 1,756-foot long non-navigable, high lift gated dam and a main lock chamber 110-feet wide by 1,200-feet long with a parallel auxiliary lock chamber 110-feet wide by 600-feet long.

Project Location Map:	**Project Photo:**
	
Current Cost Estimate (ROM , price level):	$60,000,000
Current Remaining Costs FY11 to completion:	$60,000,000
Authorized Base Cost (price level):	$
Fully Funded Cost Estimate at Authorization (price level):	$
Current Average Annual Net Benefits (2009, 7%):	**Current Remaining Average Annual Net Benefits at 7% (2009):**
Current Benefit Cost Ratio at 7%:	**Current Remaining Benefit Remaining Cost Ratio at 7%:**

Additional Remarks: Rehabilitation of the navigation dam will be accomplished following completion of the major rehabilitation report, which will identify the specific features of the dam that require rehabilitation. Efforts could include, but not necessarily be limited to, addressing all mechanical and electrical deficiencies at the dam and taking action to replace, rehabilitate, or construct in order to bring the safety and efficiencies of the components to current standards. However, the specific items to be addressed will be verified and potentially revised based upon the condition of the structure at the time of the rehabilitation report.

MONTGOMERY DAM LOCKS AND DAM	August 2009
Official Project Name: Montgomery Dam Safety Project	**Sub Project:** Dam Rehab Project
Division/District: LRD/Pittsburgh District	**Tributary/Waterway:** Ohio River
Project Authorization	N/A
Project Status (under construction, authorized or planned): Planned	**Project Type (new construction or rehabilitation) and note if Lock, Dam or Channel:** Rehabilitation, Dam

Project Description: Montgomery Locks and Dam are located on the Ohio River at river mile 31.7 in Beaver County, 34 miles downstream of the Port of Pittsburgh. The locks and dam were originally constructed between 1932 and 1936. The dam is 1378.75 feet long with ten gated bays of 100 feet each. The Montgomery locks consist of a 110 feet wide by 600 feet long main chamber and 56 feet wide by 360 feet long auxiliary chamber.

Project Location Map:

Project Photo:

Current Cost Estimate (ROM, Oct 2008 price level):	$190,000,000
Current Remaining Costs FY11 to completion:	$190,000,000
Authorized Base Cost (price level):	N/A
Fully Funded Cost Estimate at Authorization :	N/A
Current Average Annual Net Benefits (price level, discount rate): N/A	**Current Remaining Average Annual Net Benefits (price level, discount rate):** N/A
Current Benefit Cost Ratio (discount rate): N/A	**Current Remaining Benefit Remaining Cost Ratio at 7%:** N/A

Additional Remarks: Montgomery Dam is one of the oldest gated structures on the Ohio River and currently shows significant signs of structural and operational degradation. Scour has eroded the downstream erosion protections and scour surveys indicate scour immediately downstream from the end sill as deep as 13 feet. In addition the dam gates are extremely corroded. The project would consist of replacing the dam gates and gate operating machinery and extending the downstream gate sill and scour protection.

MORGANTOWN, HILDEBRAND AND OPEKISKA LOCKS AND DAM	April 2010
Official Project Name: Morgantown, Hildebrand and Opekiska Locks Major Rehabilitation Project	**Sub Project:** Locks Rehab Project
Division/District: LRD/Pittsburgh District	**Tributary/Waterway:** Monongahela River
Project Authorization	N/A
Project Status (under construction, authorized or planned): Planned	**Project Type (new construction or rehabilitation) and note if Lock, Dam or Channel:** Rehabilitation, Locks
Project Description: Morgantown Lock and Dam is located at river mile 102.0 at the city of Morgantown, WV the lock chamber and operations building are situated along the left bank of the river. Hildebrand Lock and Dam is located at river mile 108.0, six miles southwest of the city of Morgantown, WV and near Hildebrand, WV and Round Bottom, WV the lock chamber and operations building are situated along the left bank of the river. Opekiska Lock and Dam is located at river mile 115.4, about 7 miles northeast of the city of Fairmont, WV the lock chamber and operations building are situated along the right bank of the river. All three facilities have a single lock chamber, 84 feet wide by 600 feet long.	
Project Location Map:	**Project Photo:**
	
Current Cost Estimate (ROM, Oct 2008 price level):	$120,000,000
Current Remaining Costs FY11 to completion:	$120,000,000
Authorized Base Cost (price level):	N/A
Fully Funded Cost Estimate at Authorization :	N/A
Current Average Annual Net Benefits (price level, discount rate): N/A	**Current Remaining Average Annual Net Benefits (price level, discount rate):** N/A
Current Benefit Cost Ratio (discount rate): N/A	**Current Remaining Benefit Remaining Cost Ratio at 7%:** N/A
Additional Remarks: This project would include replacement of miter gates, gate operating equipment, replacement of filling and emptying valves and valve operating equipment, complete electrical system rehabilitation, tow haulage system replacement and removal and replacement of deteriorated vertical and horizontal wall concrete surfaces.	

NEW CUMBERLAND LOCKS AND DAM	August 2009
Official Project Name: New Cumberland Major Rehab	**Sub Project:** Locks Rehab Project
Division/District: LRD/Pittsburgh District	**Tributary/Waterway:** Ohio River
Project Authorization	N/A
Project Status (under construction, authorized or planned): Planned	**Project Type (new construction or rehabilitation) and note if Lock, Dam or Channel:** Rehabilitation, Lock
Project Description: New Cumberland Locks and Dam is located on the right descending bank of the Ohio River just off Ohio State Route 7 in the small town of Stratton, Ohio. The locks and dam were originally constructed between 1955 and 1961. The New Cumberland locks consist of a 110 feet wide by 1200 feet long main chamber and 110 feet wide by 600 feet long auxiliary chamber.	
Project Location Map:	**Project Photo:**
	
Current Cost Estimate (ROM, Oct 2008 price level):	$200,000,000
Current Remaining Costs FY11 to completion:	$200,000,000
Authorized Base Cost (price level):	N/A
Fully Funded Cost Estimate at Authorization :	N/A
Current Average Annual Net Benefits (price level, discount rate): N/A	**Current Remaining Average Annual Net Benefits (price level, discount rate):** N/A
Current Benefit Cost Ratio (discount rate): N/A	**Current Remaining Benefit Remaining Cost Ratio at 7%:** N/A
Additional Remarks: The project would consist of replacing the miter gates, gate operating machinery, replacement of filling and emptying valves and valve operating equipment, complete electrical system rehabilitation, tow haulage system replacement and removal and replacement of deteriorated vertical and horizontal wall concrete surfaces.	

NEWBURG DAM MAJOR REHABILITATION	April 2010
Official Project Name: Newburg Dam (Major Rehabilitation)	**Sub Project:** Newburg Dam (Major Rehabilitation)
Division/District: LRD/Louisville District	**Tributary/Waterway:** Ohio River
Project Authorization:	
Project Status (under construction, authorized or planned): planned	**Project Type (new construction or rehabilitation) and note if Lock, Dam or Channel:** major rehabilitation - dam

Project Description

Newburgh Locks and Dam is located at Ohio River Mile 776.1, near Newburgh, Indiana. The present dam configuration has been in operation since September of 1971. The gated section of the dam is 1,140 feet long with 9 tainter gates. The fixed navigable weir is 1,300 feet long. The dam holds the pool between Newburgh and Cannelton Locks and Dam. Maintaining the proper upper pool provides the depth needed for a navigable channel between Newburgh and Cannelton.

Project Location Map:	**Project Photo:**
	
Current Cost Estimate (ROM , price level):	$10,000,000
Current Remaining Costs FY11 to completion:	$10,000,000
Authorized Base Cost (price level):	$
Fully Funded Cost Estimate at Authorization (price level):	$
Current Average Annual Net Benefits (2009, 7%):	**Current Remaining Average Annual Net Benefits at 7% (2009):**
Current Benefit Cost Ratio at 7%:	**Current Remaining Benefit Remaining Cost Ratio at 7%:**

Additional Remarks:

The Dam Major Rehabilitation Project provides for major repairs to the dam from FY 2023 through FY 2025. The work will include repairs to stilling basins and baffle blocks, replacement of tainter gate hoist cables and connections, overhaul of tainter gate operating machinery, refurbishing the bulkhead crane power feed and controls, and replacement of the bulkhead crane lifting cables. These major rehabilitation activities will ensure safe and reliable operation of the dam at Newburgh. The estimated cost for this work is $9.3 Million, which includes design and construction.

NEWBURG MAIN LOCK MAJOR REHABILITATION	April 2010
Official Project Name: Newburg Main Lock (Major Rehabilitation)	**Sub Project:** Newburg Main Lock (Major Rehabilitation)
Division/District: LRD/Louisville District	**Tributary/Waterway:** Ohio River
Project Authorization:	
Project Status (under construction, authorized or planned): planned	**Project Type (new construction or rehabilitation) and note if Lock, Dam or Channel:** major rehabilitation - lock

Project Description

Newburgh Locks and Dam is located at Ohio River Mile 776.1, near Newburgh, Indiana. The project consists of two adjacent parallel lock chambers, a 110-foot by 1200-foot main lock and 110-foot by 600-foot auxiliary lock, and a gated dam with adjoining fixed weir section that is navigable when high water ceases locking operations.

Project Location Map:	**Project Photo:**
	
Current Cost Estimate (ROM , price level):	$30,000,000
Current Remaining Costs FY11 to completion:	$30,000,000
Authorized Base Cost (price level):	$
Fully Funded Cost Estimate at Authorization (price level):	$
Current Average Annual Net Benefits (2009, 7%):	**Current Remaining Average Annual Net Benefits at 7% (2009):**
Current Benefit Cost Ratio at 7%:	**Current Remaining Benefit Remaining Cost Ratio at 7%:**

Additional Remarks:

The Main Lock Major Rehabilitation Project provides for major repairs to the 1200-foot lock chamber from FY 2016 through FY 2018. The work will include replacement or major repairs to components of the miter gates, miter gate machinery, electrical and hydraulic systems, and culvert valves. These major rehabilitation activities will ensure safe and reliable operation of the main lock chamber at Newburgh Locks and Dam. The estimated cost is $35.3 Million, which includes design and construction.

PIKE ISLAND LOCKS AND DAM	August 2009
Official Project Name: New Cumberland Major Rehab	**Sub Project:** Locks Rehab Project
Division/District: LRD/Pittsburgh District	**Tributary/Waterway:** Ohio River
Project Authorization	N/A
Project Status (under construction, authorized or planned): Planned	**Project Type (new construction or rehabilitation) and note if Lock, Dam or Channel:** Rehabilitation, Lock

Project Description: The lock chambers lie on the West Virginia side of the Ohio River along West Virginia Route 2, just north of the Warwood district of the city of Wheeling. The villages of Yorkville, site of a large steel plant, and Tiltonsville are across the river in Ohio. The Pike Island locks were constructed from 1959-63, and were opened in November 1963. The dam was constructed from 1962-65. The Pike Island project has two locks and a gated dam. The main lock chamber is 110 feet wide by 1200 feet long and the auxiliary chamber is 110 feet wide by 600 feet long.

Project Location Map:	**Project Photo:**
	

Current Cost Estimate (ROM, Oct 2008 price level):	$200,000,000
Current Remaining Costs FY11 to completion:	$200,000,000
Authorized Base Cost (price level):	N/A
Fully Funded Cost Estimate at Authorization :	N/A
Current Average Annual Net Benefits (price level, discount rate): N/A	**Current Remaining Average Annual Net Benefits (price level, discount rate):** N/A
Current Benefit Cost Ratio (discount rate): N/A	**Current Remaining Benefit Remaining Cost Ratio at 7%:** N/A

Additional Remarks: The project would consist of replacing the miter gates, gate operating machinery, replacement of filling and emptying valves and valve operating equipment, complete electrical system rehabilitation, tow haulage system replacement and removal and replacement of deteriorated vertical and horizontal wall concrete surfaces.

RACINE LOCKS AND DAM	April 2010
Official Project Name: Racine Locks and Dam, Ohio River, OH & KY	**Sub Project:** Racine Lock Rehab PED and Construction
Division/District: LRD/Huntington District	**Tributary/Waterway:** Ohio River
Project Authorization:	
Project Status (under construction, authorized or planned): planned	**Project Type (new construction or rehabilitation) and note if Lock, Dam or Channel:** major rehabilitation - lock

Project Description

Racine Locks and Dam is located on the Ohio River at river mile 237.5, approximately 1.5 miles downstream of Letart Falls, Ohio. The project consists of a 1,173-foot long non-navigable, high lift gated dam and a main lock chamber 110-feet wide by 1,200-feet long with a parallel auxiliary lock chamber 110-feet wide by 600-feet long.

Project Location Map:	Project Photo:
	
Current Cost Estimate (ROM , price level):	$90,000,000
Current Remaining Costs FY11 to completion:	$90,000,000
Authorized Base Cost (price level):	$
Fully Funded Cost Estimate at Authorization (price level):	$
Current Average Annual Net Benefits (2009, 7%):	**Current Remaining Average Annual Net Benefits at 7% (2009):**
Current Benefit Cost Ratio at 7%:	**Current Remaining Benefit Remaining Cost Ratio at 7%:**

Additional Remarks: Rehabilitation of the main lock chamber will be accomplished following completion of the major rehabilitation report, which will identify the specific features of the lock chamber that require rehabilitation. Efforts could include, but not necessarily be limited to, addressing all mechanical and electrical deficiencies at the locks and taking action to replace, rehabilitate, or construct in order to bring the safety and efficiencies of the components to current standards. However, the specific items to be addressed will be verified and potentially revised based upon the condition of the structure at the time of the rehabilitation report.

RACINE LOCKS AND DAM	April 2010
Official Project Name: Racine Locks and Dam, Ohio River, OH & KY	**Sub Project:** Racine Dam Rehab PED and Construction
Division/District: LRD/Huntington District	**Tributary/Waterway:** Ohio River
Project Authorization:	
Project Status (under construction, authorized or planned): planned	**Project Type (new construction or rehabilitation) and note if Lock, Dam or Channel:** major rehabilitation – dam

Project Description
Racine Locks and Dam is located on the Ohio River at river mile 237.5, approximately 1.5 miles downstream of Letart Falls, Ohio. The project consists of a 1,173-foot long non-navigable, high lift gated dam and a main lock chamber 110-feet wide by 1,200-feet long with a parallel auxiliary lock chamber 110-feet wide by 600-feet long.

Project Location Map:	**Project Photo:**
	
Current Cost Estimate (ROM , price level):	$60,000,000
Current Remaining Costs FY11 to completion:	$60,000,000
Authorized Base Cost (price level):	$
Fully Funded Cost Estimate at Authorization (price level):	$
Current Average Annual Net Benefits (2009, 7%):	**Current Remaining Average Annual Net Benefits at 7% (2009):**
Current Benefit Cost Ratio at 7%:	**Current Remaining Benefit Remaining Cost Ratio at 7%:**

Additional Remarks Rehabilitation of the navigation dam will be accomplished following completion of the major rehabilitation report, which will identify the specific features of the dam that require rehabilitation. Efforts could include, but not necessarily be limited to, addressing concrete deterioration in critical areas of the dam piers, rehabilitation and painting of critical members of the roller gates, replacement of seized roller gate lifting chains and upgrade of obsolete electrical and mechanical operating equipment. However, the specific items to be addressed will be verified and potentially revised based upon the condition of the structure at the time of the rehabilitation report.

SMITHLAND DAM MAJOR REHABILITATION	April 2010
Official Project Name: Smithland Dam (Major Rehabilitation)	**Sub Project:** Smithland Dam (Major Rehabilitation)
Division/District: LRD/Louisville District	**Tributary/Waterway:** Ohio River
Project Authorization:	
Project Status (under construction, authorized or planned): planned	**Project Type (new construction or rehabilitation) and note if Lock, Dam or Channel:** major rehabilitation - dam

Project Description

Smithland Locks and Dam is located at Ohio River Mile 918.5, near Smithland, Kentucky. The present dam configuration has been in operation since November of 1980. The gated section of the dam is 1,390 feet long with 11 tainter gates. The fixed navigable weir is 1,572 feet long. The dam holds the pool between Smithland and John T. Myers Locks and Dam. Maintaining the proper upper pool provides the depth needed for a navigable channel between Smithland and John T. Myers.

Project Location Map:	**Project Photo:**
	
Current Cost Estimate (ROM , price level):	$10,000,000
Current Remaining Costs FY11 to completion:	$10,000,000
Authorized Base Cost (price level):	$
Fully Funded Cost Estimate at Authorization (price level):	$
Current Average Annual Net Benefits (2009, 7%):	**Current Remaining Average Annual Net Benefits at 7% (2009):**
Current Benefit Cost Ratio at 7%:	**Current Remaining Benefit Remaining Cost Ratio at 7%:**

Additional Remarks:

The Dam Major Rehabilitation Project provides for major repairs to the dam from FY 2021 through FY 2023. The work will include repairs to stilling basins and baffle blocks, replacement of the tainter gate hoisting cables, and upgrades to the dam electrical equipment. These major rehabilitation activities will ensure safe and reliable operation of the dam at Smithland. The estimated cost for this work is $11.2 Million, which includes design and construction.

WILLOW ISLAND LOCKS AND DAM	April 2010
Official Project Name: Willow Island Locks and Dam, Ohio River, OH & KY	**Sub Project:** Willow Island Lock Rehab PED and Construction
Division/District: LRD/Huntington District	**Tributary/Waterway:** Ohio River
Project Authorization:	
Project Status (under construction, authorized or planned): planned	**Project Type (new construction or rehabilitation) and note if Lock, Dam or Channel:** major rehabilitation – lock

Project Description

Willow Island Locks and Dam are located on the Ohio River approximately 3.4 miles upstream from Waverly, West Virginia. The project consists of a 1,170-foot long non-navigable, high lift gated dam and a main lock chamber 110-feet wide by 1,200-feet long with a parallel auxiliary lock chamber 110-feet wide by 600-feet long.

Project Location Map:	Project Photo:
	

Current Cost Estimate (ROM , price level):	$90,000,000
Current Remaining Costs FY11 to completion:	$90,000,000
Authorized Base Cost (price level):	$
Fully Funded Cost Estimate at Authorization (price level):	$
Current Average Annual Net Benefits (2009, 7%):	**Current Remaining Average Annual Net Benefits at 7% (2009):**
Current Benefit Cost Ratio at 7%:	**Current Remaining Benefit Remaining Cost Ratio at 7%:**

Additional Remarks:

Rehabilitation of the main lock chamber will be accomplished following completion of the major rehabilitation report, which will identify the specific features of the lock chamber that require rehabilitation. Efforts could include, but not necessarily be limited to, addressing all mechanical and electrical deficiencies at the locks and taking action to replace, rehabilitate, or construct in order to bring the safety and efficiencies of the components to current standards. However, the specific items to be addressed will be verified and potentially revised based upon the condition of the structure at the time of the rehabilitation report.

WILLOW ISLAND LOCKS AND DAM	April 2010
Official Project Name: Willow Island Locks and Dam, Ohio River, OH & KY	**Sub Project:** Willow Island Dam Rehab PED and Construction
Division/District: LRD/Huntington District	**Tributary/Waterway:** Ohio River
Project Authorization:	
Project Status (under construction, authorized or planned): planned	**Project Type (new construction or rehabilitation) and note if Lock, Dam or Channel:** major rehabilitation – dam

Project Description

Willow Island Locks and Dam are located on the Ohio River approximately 3.4 miles upstream from Waverly, West Virginia. The project consists of a 1,170-foot long non-navigable, high lift gated dam and a main lock chamber 110-feet wide by 1,200-feet long with a parallel auxiliary lock chamber 110-feet wide by 600-feet long.

Project Location Map:	**Project Photo:**
	
Current Cost Estimate (ROM, price level):	$60,000,000
Current Remaining Costs FY11 to completion:	$60,000,000
Authorized Base Cost (price level):	$
Fully Funded Cost Estimate at Authorization (price level):	$
Current Average Annual Net Benefits (2009, 7%):	**Current Remaining Average Annual Net Benefits at 7% (2009):**
Current Benefit Cost Ratio at 7%:	**Current Remaining Benefit Remaining Cost Ratio at 7%:**

Additional Remarks:

Rehabilitation of the navigation dam will be accomplished following completion of the major rehabilitation report, which will identify the specific features of the dam that require rehabilitation. Efforts could include, but not necessarily be limited to, addressing concrete deterioration in critical areas of the dam piers, rehabilitation and painting of critical members of the roller gates, replacement of seized roller gate lifting chains and upgrade of obsolete electrical and mechanical operating equipment. However, the specific items to be addressed will be verified and potentially revised based upon the condition of the structure at the time of the rehabilitation report.

WINFIELD LOCKS AND DAM	April 2010
Official Project Name: Winfield Locks and Dam, Kanawha River, WV	**Sub Project:** Winfield Dam Rehab PED and Construction
Division/District: LRD/Huntington District	**Tributary/Waterway:** Kanawha River
Project Authorization:	
Project Status (under construction, authorized or planned): planned	**Project Type (new construction or rehabilitation) and note if Lock, Dam or Channel:** major rehabilitation – dam

Project Description
Winfield Lock and Dam is located at Winfield, West Virginia on the Kanawha River 67.7 miles above its confluence with the Ohio River. The project consists of a 557-foot long non-navigable, high lift gated dam and a new 800-feet long by 110-feet wide main chamber which became operational in 1997 and two parallel auxiliary locks each 360-feet long by 56-feet wide.

Project Location Map:	**Project Photo:**
	
Current Cost Estimate (risk-based, price level):	$40,000,000
Current Remaining Costs FY11 to completion:	$40,000,000
Authorized Base Cost (price level):	$
Fully Funded Cost Estimate at Authorization (price level):	$
Current Average Annual Net Benefits (2009, 7%):	**Current Remaining Average Annual Net Benefits at 7% (2009):**
Current Benefit Cost Ratio at 7%:	**Current Remaining Benefit Remaining Cost Ratio at 7%:**

Additional Remarks:
Rehabilitation of the navigation dam will be accomplished following completion of the major rehabilitation report, which will identify the specific features of the dam that require rehabilitation. Efforts could include, but not necessarily be limited to, addressing concrete deterioration in critical areas of the dam piers, rehabilitation and painting of critical members of the roller gates, replacement of seized roller gate lifting chains and upgrade of obsolete electrical and mechanical operating equipment. However, the specific items to be addressed will be verified and potentially revised based upon the condition of the structure at the time of the rehabilitation report.

UPPER ST. ANTHONY FALLS LOCK	April 2010
Official Project Name: Upper St Anthony Falls Lock	**Sub Project:**
Division/District: Mississippi Valley Division/ St Paul District	**Tributary/Waterway:** Mississippi River
Project Authorization:	
Project Status planned	**Project Type:** Rehab Lock, Dam

Project Description: Upper St. Anthony Falls (USAF) Lock and Dam is located at Mississippi River Mile 853.9, in Minneapolis, Minnesota, and is the northern most lock. USAF Lock consists of a single lock chamber 56 feet wide by 400 feet long. The upper pool elevation is 799.2, tailwater elevation is 750.1, and the vertical lift is 49.1 feet. In addition to four lock miter gates, there is an upstream lock Tainter gate for passing flow through the lock chamber during high water. There is no auxiliary lock or provisions for one. On the left descending bank there is a horseshoe dam with a chord dam downstream of the horseshoe and a concrete overflow spillway owned by Xcel Energy Center that ties into the Lock. On the right descending bank the Corps has a short non-overflow concrete dam between the Lock and the bank. Authorized In 1937, the lock was put into operation in September 1963.

Project Location Map:	**Project Photo:**
	
Current Cost Estimate (ROM):	$70,000,000
Current Remaining Costs FY11 to completion:	$70,000,000
Authorized Base Cost (price level):	$
Fully Funded Cost Estimate at Authorization (price level):	$
Current Average Annual Net Benefits (2009, 7%):	**Current Remaining Average Annual Net Benefits at 7% (2009):**
Current Benefit Cost Ratio at 7%:	**Current Remaining Benefit Remaining Cost Ratio at 7%:**

Additional Remarks: The lock and dam are nearly 50 years old. While some major maintenance and rehabilitation have been performed, additional rehabilitation will be required to ensure reliability over the next 30 years. Future rehabilitation potentially will include repair or replacement of miter gates, emergency gates, culvert valves, gate and culvert valve machinery, dam gates, electrical and mechanical components, concrete repair and resurfacing, and scour repairs. Lock rehab is estimated at $50M while the dam is estimated at $20M.

LOWER ST ANTHONY FALLS LOCK	April 2010
Official Project Name: Lower St Anthony Falls Lock	**Sub Project:**
Division/District: Mississippi Valley Division/ St Paul District	**Tributary/Waterway:** Mississippi River
Project Authorization:	
Project Status: planned	**Project Type:** Rehab Lock, Dam

Project Description: Lower St. Anthony Falls (LSAF) Lock and Dam is located at Mississippi River Mile 853.3, in Minneapolis, Minnesota. LSAF Lock is located along the right descending bank and consists of a single lock chamber 56 feet wide by 400 feet long with an upper pool elevation of 750.1, a tailwater elevation of 725.1, and a vertical lift of 25 feet. The lock uses miter gates on the downstream side and a lock Tainter gate on the upstream side for the purpose of passing flow through the lock chamber during high water. The movable dam has three Tainter gates (24 feet high by 56 feet long) and an auxiliary lock submersible Tainter gate (24 feet high by 56 feet long). the dam system is a concrete non-overflow wall owned by the Corps and a short, earth embankment owned by Xcel Energy. Authorized In 1937, the Lock was put into operation in September 1956.

Project Location Map:	**Project Photo:**
	
Current Cost Estimate:	$50,000,000
Current Remaining Costs FY11 to completion:	$50,000,000
Authorized Base Cost (price level):	$
Fully Funded Cost Estimate at Authorization (price level):	$
Current Average Annual Net Benefits (2009, 7%):	**Current Remaining Average Annual Net Benefits at 7% (2009):**
Current Benefit Cost Ratio at 7%:	**Current Remaining Benefit Remaining Cost Ratio at 7%:**

Additional Remarks: The lock and dam are over 50 years old. While some major maintenance and rehabilitation have been performed, additional rehabilitation will be required to ensure reliability over the next 30 years. Future rehabilitation potentially will include repair or replacement of miter gates, emergency gates, culvert valves, gate and culvert valve machinery, dam gates, electrical and mechanical components, concrete repair and resurfacing, and scour repairs. Lock rehab is estimated at $30M while the dam is estimated at $20M.

LOCK AND DAM 1 MISSISSIPPI RIVER	April 2010
Official Project Name: Lock and Dam 1 Mississippi River	**Sub Project:**
Division/District: Mississippi Valley Division/ St Paul District	**Tributary/Waterway:** Mississippi River
Project Authorization:	O&M (River and Harbor Act 1930), CG
Project Status: planned	**Project Type:** Rehabilitation Lock, Dam

Project Description: Lock and Dam 1 is located at Mississippi River Mile 847.9, in Minneapolis, Minnesota. The original Lock construction was completed in 1917, reconstructed in 1929 with the main lock completed in May 1932. It was the only twin lock in the district. The main lock is located along the right descending bank and consists of a lock chamber 56 feet wide by 400 feet long with an upper pool elevation of 725.1, a tailwater elevation of 687.2, and a maximum vertical lift of 37.9 feet. The
auxiliary lock is immediately adjacent to the main lock but has only 7.5-foot of clearance over the downstream sill, and has been abandoned. The dam consists of an Ambursen concrete overflow structure 574 feet long with a two-foot-high inflatable rubber dam along the top and a hydro power station located at the left descending bank abutment. The hydro power facility and rubber dam are both owned and operated by Brookfield Renewable Power.

Project Location Map:	**Project Photo:**
	
Current Cost Estimate:	$60,000,000
Current Remaining Costs FY11 to completion:	$60,000,000
Authorized Base Cost (price level):	$
Fully Funded Cost Estimate at Authorization (price level):	$
Current Average Annual Net Benefits (2009, 7%):	**Current Remaining Average Annual Net Benefits at 7% (2009):**
Current Benefit Cost Ratio at 7%:	**Current Remaining Benefit Remaining Cost Ratio at 7%:**

Additional Remarks: : The lock and dam are over 70 years old. While some major maintenance and rehabilitation have been performed, additional rehabilitation will be required to ensure reliability over the next 30 years. Future rehabilitation potentially will include repair or replacement of miter gates, emergency gates, culvert valves, gate and culvert valve machinery, electrical and mechanical components, concrete repair and resurfacing, and scour repairs. Lock rehab is estimated at $40M while the dam is estimated at $20M.

LOCK AND DAM 2 MISSISSIPPI RIVER	April 2010
Official Project Name: Lock and Dam 2 Mississippi River Project	**Sub Project:** Lock and Dam 2 Mississippi River
Division/District: Mississippi Valley Division/ St Paul District	**Tributary/Waterway:** Mississippi River
Project Authorization:	N/A
Project Status: Planned	**Project Type:** Rehab, Lock, Dam

Project Description: Lock and Dam 2 is upstream of Hastings, Minnesota, and is 815.2 miles above the confluence of the Mississippi and Ohio rivers. The original, riverward lock chamber was 110 feet by 500 feet and constructed from 1928-1930. Due to foundation conditions, some rotation of the original lock walls took place, which also affected the operation of the miter gates. Due to the foundation settlement problems, wall tilting and that the original lock chamber was of a non standard size, construction of a landward lock chamber commenced in 1941. The new lock chamber was not completed until 1948 due to the suspension of all civil construction during World War II. The lock is 110 feet wide by 600 feet long. The dam consists of a concrete structure 722 feet long with 19 Tainter gates, 30 feet long. The dam has 4.4 megawatt power plant owned and operated by the city of Hastings. The site includes 3,000 feet of earth embankment.

Project Location Map:	**Project Photo:**
	
Current Cost Estimate(ROM, Oct 2008) :	$60,000,000
Current Remaining Costs FY11 to completion:	$60,000,000
Authorized Base Cost (price level):	$
Fully Funded Cost Estimate at Authorization (price level):	$
Current Average Annual Net Benefits (2009, 7%):	**Current Remaining Average Annual Net Benefits at 7% (2009):**
Current Benefit Cost Ratio at 7%:	**Current Remaining Benefit Remaining Cost Ratio at 7%:**

Additional Remarks: The lock is 60 years old and the dam over 70 years old. While some major maintenance and rehabilitation have been performed, additional rehabilitation will be required to ensure reliability over the next 30 years. Future rehabilitation potentially will include repair or replacement of miter gates, emergency gates, culvert valves, gate and culvert valve machinery, dam gates, electrical and mechanical components, concrete repair and resurfacing, and scour repairs. Lock rehab is estimated at $40M while the dam is estimated at $20M.

LOCK AND DAM 3 MISSISSIPPI RIVER	April 2010
Official Project Name: Lock and Dam 3 Mississippi River Project	**Sub Project:** Lock and Dam 3 Mississippi River
Division/District: Mississippi Valley Division/ St Paul District	**Tributary/Waterway:** Mississippi River
Project Authorization:	N/A
Project Status: Planned	**Project Type:** Rehab Lock, Dam

Project Description:
Lock and Dam 3 is located at Mississippi River Mile 796.9 six miles upstream from Red Wing, Minnesota. The main lock is located along the right descending bank and consists of a single lock chamber 110 feet wide by 600 feet long with an upper pool elevation of 675.0, a tailwater elevation of 667.0, and a vertical lift of 8.0 feet. The movable dam is 365 feet long and consists of four submersible roller gates (20 feet high by 80 feet long). Completing the dam system is a series of spot dikes along the left descending bank (Wisconsin side) and an earthen embankment approximately 2,200 feet long, located between the main lock and high ground on the Minnesota side. The lock opened in July 1938.

Project Location Map:	**Project Photo:**
	
Current Cost Estimate(ROM, Oct 2008) :	$60,000,000
Current Remaining Costs FY11 to completion:	$60,000,000
Authorized Base Cost (price level):	$
Fully Funded Cost Estimate at Authorization (price level):	$
Current Average Annual Net Benefits (2009, 7%):	**Current Remaining Average Annual Net Benefits at 7% (2009):**
Current Benefit Cost Ratio at 7%:	**Current Remaining Benefit Remaining Cost Ratio at 7%:**

Additional Remarks: The lock and dam are over 70 years old. While some major maintenance and rehabilitation have been performed, including the ongoing embankment repairs and guidewall extension, additional rehabilitation will be required to ensure reliability over the next 30 years. Future rehabilitation potentially will include repair or replacement of miter gates, emergency gates, culvert valves, gate and culvert valve machinery, dam gates, electrical and mechanical components, concrete repair and resurfacing, and scour repairs. Lock rehab is estimated at $40M while the dam is estimated at $20M.

LOCK AND DAM 4 MISSISSIPPI RIVER	April 2010
Official Project Name: Lock and Dam 4 Mississippi River Project	**Sub Project:** Lock and Dam 4 Mississippi River
Division/District: Mississippi Valley Division/ St Paul District	**Tributary/Waterway:** Mississippi River
Project Authorization:	O&M (River and Harbor Act 1930), CG
Project Status: Planned	**Project Type:** Rehab, Lock, Dam

Project Description: Lock and Dam 4 is located at Mississippi River Mile 752.8 in Alma, Wisconsin, about 90 miles below Minneapolis. The main lock is located along the left descending bank and consists of a single lock chamber, 110 feet wide by 600 feet long with an upper pool elevation of 667.0, a tailwater elevation of 660.0, and a vertical lift of 7.0 feet. The dam consists of a concrete structure 1,357 feet long with six roller gates and 22 Tainter gates. The movable dam has six roller gates (20 feet high by 60 feet long), 18 non-submersible Tainter gates (15 feet high by 35 feet long), and four submersible Tainter gates (15 feet high by 35 feet long). Completing the dam system is an earthen embankment approximately 5,500 feet long, located between the movable dam and high ground on the Minnesota side of the river. The lock was put in operation in May 1935.

Project Location Map:	**Project Photo:**
	
Current Cost Estimate(ROM, Oct 2008) :	$60,000,000
Current Remaining Costs FY11 to completion:	$60,000,000
Authorized Base Cost (price level):	$
Fully Funded Cost Estimate at Authorization (price level):	$
Current Average Annual Net Benefits (2009, 7%):	**Current Remaining Average Annual Net Benefits at 7% (2009):**
Current Benefit Cost Ratio at 7%:	**Current Remaining Benefit Remaining Cost Ratio at 7%:**

Additional Remarks: The lock and dam are over 70 years old. While some major maintenance and rehabilitation have been performed, additional rehabilitation will be required to ensure reliability over the next 30 years. Future rehabilitation potentially will include repair or replacement of miter gates, emergency gates, culvert valves, gate and culvert valve machinery, dam gates, electrical and mechanical components, concrete repair and resurfacing, and scour repairs. Lock rehab is estimated at $40M while the dam is estimated at $20M.

LOCK AND DAM 5 MISSISSIPPI RIVER	April 2010
Official Project Name: Lock and Dam 5 Mississippi River Project	**Sub Project:** Lock and Dam 5 Mississippi River
Division/District: Mississippi Valley Division/ St Paul District	**Tributary/Waterway:** Mississippi River
Project Authorization:	N/A
Project Status: Planned	**Project Type:** Rehab, Lock, Dam

Project Description:
Lock and Dam 5 is located at Mississippi River Mile 738.1 in Minnesota City, Minnesota, 5.5 miles upstream of Fountain City, Wisconsin. The main lock is located along the right descending bank and consists of a single lock chamber 110 feet wide by 600 feet long with an upper pool elevation of 660.0, a tailwater elevation of 651.0, and a vertical lift of 9.0 feet. The movable dam has six roller gates (20 feet high by 60 feet long), 24 non-submersible Tainter gates (15 feet high by 35 feet long), and four submersible Tainter gates (15 feet high by 35 feet long). The dam consists of a concrete structure 1,619 feet long and an earthen embankment approximately 18,500 feet long, located between the movable dam and high ground on the Wisconsin side of the river. The lock was put into operation in May 1935.

Project Location Map:	Project Photo:
	

Current Cost Estimate (ROM, Oct 2008):	$60,000,000
Current Remaining Costs FY11 to completion:	$60,000,000
Authorized Base Cost (price level):	N/A
Fully Funded Cost Estimate at Authorization (price level):	$
Current Average Annual Net Benefits (2009, 7%):	**Current Remaining Average Annual Net Benefits at 7% (2009):**
Current Benefit Cost Ratio at 7%:	**Current Remaining Benefit Remaining Cost Ratio at 7%:**

Additional Remarks: The lock and dam are over 70 years old. While some major maintenance and rehabilitation have been performed, additional rehabilitation will be required to ensure reliability over the next 30 years. Future rehabilitation potentially will include repair or replacement of miter gates, emergency gates, culvert valves, gate and culvert valve machinery, dam gates, electrical and mechanical components, concrete repair and resurfacing, and scour repairs. Lock rehab is estimated at $40M while the dam is estimated at $20M.

LOCK AND DAM 5A MISSISSIPPI RIVER	April 2010
Official Project Name: Lock and Dam 5A Mississippi River	**Sub Project:** Lock and Dam 5A Mississippi River
Division/District: Mississippi Valley Division/ St Paul District	**Tributary/Waterway:** Mississippi River
Project Authorization:	N/A
Project Status: Planned	**Project Type:** Rehab, Lock, Dam

Project Description: Lock and Dam No. 5A is located at Mississippi River Mile 728.5 below Fountain City, Wisconsin, three miles above Winona, Minnesota. The original plan for the 9-foot channel system did not include this installation. However, due to pooling problems projected as a result of the construction of Lock and Dam No. 6 in conjunction with the City of Winona, this installation was designed and added to the system. The main lock is located along the right-descending bank and consists of a single lock chamber 110 feet wide by 600 feet long with an upper pool elevation of 651.0, a tailwater elevation of 645.5, and a vertical lift of 5.5 feet. The movable dam is a concrete structure 682 feet long with five roller gates (20 feet high by 80 feet long) and five non-submersible Tainter gates (15 feet high by 35 feet long), located between the main lock and the railroad line along the left descending bank. Completing the dam system is an earthen embankment approximately 22,000 feet long, between the main lock and high ground on the Minnesota side of the river, with a concrete overflow spillway 1,000 feet long. The lock was put in operation in 1936.

Project Location Map:

Project Photo:

Current Cost Estimate(ROM, Oct 2008) :	$60,000,000
Current Remaining Costs FY11 to completion:	$60,000,000
Authorized Base Cost (price level):	N/A
Fully Funded Cost Estimate at Authorization (price level):	$
Current Average Annual Net Benefits (2009, 7%):	**Current Remaining Average Annual Net Benefits at 7% (2009):**
Current Benefit Cost Ratio at 7%:	**Current Remaining Benefit Remaining Cost Ratio at 7%:**

Additional Remarks: The lock and dam are over 70 years old. While some major maintenance and rehabilitation have been performed, additional rehabilitation will be required to ensure reliability over the next 30 years. Future rehabilitation potentially will include repair or replacement of miter gates, emergency gates, culvert valves, gate and culvert valve machinery, dam gates, electrical and mechanical components, concrete repair and resurfacing, and scour repairs. Lock rehab is estimated at $40M while the dam is estimated at $20M.

LOCK AND DAM 6 MISSISSIPPI RIVER	April 2010
Official Project Name: Lock and Dam 6 Mississippi River	**Sub Project:** Lock and Dam 6 Mississippi River
Division/District: Mississippi Valley Division/ St Paul District	**Tributary/Waterway:** Mississippi River
Project Authorization:	N/A
Project Status: Planned	**Project Type:** Rehab, Lock, Dam

Project Description: Lock and Dam 6 is located at Mississippi River Mile 714.1 at Trempealeau, Wisconsin, 139 miles below Minneapolis. The main lock is located along the left descending bank and consists of a single lock chamber 110 feet wide by 600 feet long with an upper pool elevation of 645.5, a tailwater elevation of 639.0, and a vertical lift of 6.5 feet. There are miter gates at each end of the lock chamber. The movable dam consists of an 893-foot-long concrete structure with five roller gates (20 feet high by 80 feet long) and 10 non-submersible Tainter gates (15 feet high by 35 feet long). Completing the dam system is an earthen embankment approximately 1,600 feet long, located between the movable dam and high ground on the Minnesota side of the river, with a concrete overflow spillway 1,000 feet long. The lock was put in operation in June of 1936.

Project Location Map:	**Project Photo:**
	

Current Cost Estimate (ROM, Oct 2008):	$60,000,000
Current Remaining Costs FY11 to completion:	$60,000,000
Authorized Base Cost (price level):	N/A
Fully Funded Cost Estimate at Authorization (price level):	$
Current Average Annual Net Benefits (2009, 7%):	**Current Remaining Average Annual Net Benefits at 7% (2009):**
Current Benefit Cost Ratio at 7%:	**Current Remaining Benefit Remaining Cost Ratio at 7%:**

Additional Remarks: The lock and dam are over 70 years old. While some major maintenance and rehabilitation have been performed, additional rehabilitation will be required to ensure reliability over the next 30 years. Future rehabilitation potentially will include repair or replacement of miter gates, emergency gates, culvert valves, gate and culvert valve machinery, dam gates, electrical and mechanical components, concrete repair and resurfacing, and scour repairs. Lock rehab is estimated at $40M while the dam is estimated at $20M.

LOCK AND DAM 7 MISSISSIPPI RIVER	April 2010
Official Project Name: Lock and Dam 7 Mississippi River	**Sub Project:**
Division/District: Mississippi Valley Division/ St Paul District	**Tributary/Waterway:** Mississippi River
Project Authorization:	N/A
Project Status: Planned	**Project Type:** Rehab Lock, Dam

Project Description: Lock and Dam 7 is located at Mississippi River Mile 702.5 near La Crescent, Minnesota, 4.5 miles above LaCrosse, Wisconsin The main lock is located along the right descending bank and consists of a single lock chamber 110 feet wide by 600 feet long with an upper pool elevation of 639.0, a tailwater elevation of 631.0, and a vertical lift of 8.0 feet. The movable dam consists of a concrete structure 940 feet long with five roller gates (20 feet high by 80 feet long), nine non-submersible Tainter gates (15 feet high by 35 feet long), and two submersible Tainter gates (15 feet high by 35 feet long). Completing the dam system are two earthen embankment segments: the French Island embankment approximately 7,000 feet long, located between the movable dam and French Island, with a concrete overflow spillway 1,000 feet long; and the Onalaska embankment approximately 1,600 feet long, located between French Island and Onalaska, with a concrete overflow spillway 677 feet long. The Lock was put in operation in April 1937.

Project Location Map:	**Project Photo:**
	
Current Cost Estimate (ROM, Oct 2008):	$60,000,000
Current Remaining Costs FY11 to completion:	$60,000,000
Authorized Base Cost (price level):	N/A
Fully Funded Cost Estimate at Authorization (price level):	$
Current Average Annual Net Benefits (2009, 7%):	**Current Remaining Average Annual Net Benefits at 7% (2009):**
Current Benefit Cost Ratio at 7%:	**Current Remaining Benefit Remaining Cost Ratio at 7%:**

Additional Remarks: The lock and dam are over 70 years old. While some major maintenance and rehabilitation have been performed, additional rehabilitation will be required to ensure reliability over the next 30 years. Future rehabilitation potentially will include repair or replacement of miter gates, emergency gates, culvert valves, gate and culvert valve machinery, dam gates, electrical and mechanical components, concrete repair and resurfacing, and scour repairs. Lock rehab is estimated at $40M while the dam is estimated at $20M.

LOCK AND DAM 8 MISSISSIPPI RIVER	April 2010
Official Project Name: Lock and Dam 8 Mississippi River	**Sub Project:**
Division/District: Mississippi Valley Division/ St Paul District	**Tributary/Waterway:** Mississippi River
Project Authorization:	N/A
Project Status: Planned	**Project Type:** Rehab, Lock, Dam

Project Description: Lock and Dam 8 is located at Mississippi River Mile 679.2 near Genoa, Wisconsin, 173.4 miles below Minneapolis. The main lock is located along the left descending bank and consists of a single lock chamber 110 feet wide by 600 feet long with an upper pool elevation of 631.0, a tailwater elevation of 620.0, and a vertical lift of 11.0 feet. There are miter gates at each end of the lock chamber. The foundation material consists of piles in sand, gravel and broken clay. The movable dam consists of a concrete structure 934 feet long with five roller gates (20 feet high by 80 feet long), eight non-submersible Tainter gates (15 feet high by 35 feet long), and two submersible Tainter gates (15 feet high by 35 feet long). Completing the dam system is an earthen embankment approximately 15,000 feet long, located between the movable dam and high ground on the Minnesota side of the river, with two submersible sheetpile cell spillways, 938 and 1,338 feet long, respectively. The foundation consists of piles in sand and gravel. The Lock was put in operation in April 1937.

Project Location Map:	Project Photo:
	
Current Cost Estimate (ROM, Oct 2008):	$60,000,000
Current Remaining Costs FY11 to completion:	$60,000,000
Authorized Base Cost (price level):	N/A
Fully Funded Cost Estimate at Authorization (price level):	$
Current Average Annual Net Benefits (2009, 7%):	**Current Remaining Average Annual Net Benefits at 7% (2009):**
Current Benefit Cost Ratio at 7%:	**Current Remaining Benefit Remaining Cost Ratio at 7%:**

Additional Remarks: The lock and dam are over 70 years old. While some major maintenance and rehabilitation have been performed, additional rehabilitation will be required to ensure reliability over the next 30 years. Future rehabilitation potentially will include repair or replacement of miter gates, emergency gates, culvert valves, gate and culvert valve machinery, dam gates, electrical and mechanical components, concrete repair and resurfacing, and scour repairs. Lock rehab is estimated at $40M while the dam is estimated at $20M.

LOCK AND DAM MISSISSIPPI RIVER	April 2010
Official Project Name: Lock and Dam 9 Mississippi River	**Sub Project:**
Division/District: Mississippi Valley Division/ St Paul District	**Tributary/Waterway:** Mississippi River
Project Authorization:	N/A
Project Status: Planned	**Project Type:** Rehab, Lock, Dam

Project Description: Lock and Dam 9 is located at Mississippi River Mile 647.9 near Lynxville, Wisconsin, 205.1 miles below Minneapolis. The main lock is located along the left descending bank and consists of a single lock chamber 110 feet wide by 600 feet long with an upper pool elevation of 620.0, a tailwater elevation of 611.0, and a vertical lift of 9.0 feet. The movable dam consists of concrete structure 811 feet long with five roller gates (20-feet high by 80-feet long), six non-submersible Tainter gates (15 feet high by 35 feet long), and two submersible Tainter gates (15 feet high by 35 feet long). Completing the dam system is an earthen embankment approximately 7,200 feet long, located between the movable dam and high ground on the Iowa side of the river, with a submersible sheetpile cell spillway 1,350 feet long. The Lock was put in operation in July 1937.

Project Location Map:	**Project Photo:**
	
Current Cost Estimate(ROM, Oct 2008) :	$60,000,000
Current Remaining Costs FY11 to completion:	$60,000,000
Authorized Base Cost (price level):	N/A
Fully Funded Cost Estimate at Authorization (price level):	$
Current Average Annual Net Benefits (2009, 7%):	**Current Remaining Average Annual Net Benefits at 7% (2009):**
Current Benefit Cost Ratio at 7%:	**Current Remaining Benefit Remaining Cost Ratio at 7%:**

Additional Remarks: The lock and dam are over 70 years old. While some major maintenance and rehabilitation have been performed, additional rehabilitation will be required to ensure reliability over the next 30 years. Future rehabilitation potentially will include repair or replacement of miter gates, emergency gates, culvert valves, gate and culvert valve machinery, dam gates, electrical and mechanical components, concrete repair and resurfacing, and scour repairs. Lock rehab is estimated at $40M while the dam is estimated at $20M.

LOCK AND DAM 10 MISSISSIPPI RIVER	April 2010
Official Project Name: Lock and Dam 10 Mississippi River	**Sub Project:**
Division/District: Mississippi Valley Division/ St Paul District	**Tributary/Waterway:** Mississippi River
Project Authorization:	N/A
Project Status: Planned	**Project Type:** Rehab, Lock, Dam

Project Description: Lock and Dam 10 is located at Mississippi River Mile 615.0 in Guttenberg, Iowa. The main lock is located along the right descending bank and consists of a single lock chamber 110 feet wide by 600 feet long with an upper pool elevation of 611.0, a tailwater elevation of 603.0, and a vertical lift of 8.0 feet. There are miter gates at each end of the lock chamber. The movable dam consists of a concrete dam 763 feet long with four roller gates (20 feet high by 80 feet long), six non-submersible Tainter gates (20 feet high by 40 feet long), and two submersible Tainter gates (20 feet high by 40 feet long). Completing the dam system is an earthen embankment approximately 4,600 feet long, located between the movable dam and high ground on the Wisconsin side of the river, with a concrete overflow spillway 1,200 feet long. The Lock was put in operation in November 1937.

Project Location Map:	**Project Photo:**
	
Current Cost Estimate (ROM, Oct 2008):	$60,000,000
Current Remaining Costs FY11 to completion:	$60,000,000
Authorized Base Cost (price level):	N/A
Fully Funded Cost Estimate at Authorization (price level):	$
Current Average Annual Net Benefits (2009, 7%):	**Current Remaining Average Annual Net Benefits at 7% (2009):**
Current Benefit Cost Ratio at 7%:	**Current Remaining Benefit Remaining Cost Ratio at 7%:**

Additional Remarks: The lock and dam are over 70 years old. While some major maintenance and rehabilitation have been performed, additional rehabilitation will be required to ensure reliability over the next 30 years. Future rehabilitation potentially will include repair or replacement of miter gates, emergency gates, culvert valves, gate and culvert valve machinery, dam gates, electrical and mechanical components, concrete repair and resurfacing, and scour repairs. Lock rehab is estimated at $40M while the dam is estimated at $20M.

LOCK AND DAM 12 MISSISSIPPI RIVER	April 2010
Official Project Name: Lock and Dam 12 Mississippi River Project	**Sub Project:** Lock and Dam 12 Mississippi River
Division/District: Mississippi Valley Division/ Rock Island District	**Tributary/Waterway:** Mississippi River
Project Authorization:	N/A
Project Status: Planned	**Project Type:** Rehab Lock, Dam

Project Description: Lock and Dam 12 is 556.7 miles above the confluence of the Mississippi and Ohio rivers. The lock dimensions are 110 feet wide by 600 feet long with additional provisions for an auxiliary lock. The normal upper pool elevation is 592 feet, approximately 15 feet above the tail waters below the dam at low water. The maximum lift is 9 feet with an average lift of 6 feet. The movable dam consists of seven submersible Tainter gates (20 feet high by 64 feet long) and three submersible roller gates (20 feet high by 100 feet long). The dam system also includes two, non-overflow, earth and sand-filled dikes; two transitional dikes; and a concrete-covered, ogee spillway, submersible earth and sand-filled dike. The foundation is set in sand, gravel, and silt

Project Location Map:	**Project Photo:**
	
Current Cost Estimate(ROM, Oct 2008) :	$60,000,000
Current Remaining Costs (FY11 to completion):	$60,000,000
Authorized Base Cost (price level):	N/A
Fully Funded Cost Estimate at Authorization:	N/A
Current Average Annual Net Benefits (price level, discount rate): N/A	**Current Remaining Average Annual Net Benefits (price level, discount rate):** N/A
Current Benefit Cost Ratio (discount rate): N/A	**Current Remaining Benefit Remaining Cost Ratio at 7%:** N/A

Additional Remarks: The lock and dam are over 70 years old. While some major maintenance and rehabilitation have been performed, additional rehabilitation will be required to ensure reliability over the next 30 years. Future rehabilitation potentially will include repair or replacement of miter gates, emergency gates, culvert valves, gate and culvert valve machinery, dam gates, electrical and mechanical components, concrete repair and resurfacing, and scour repairs. Lock rehab is estimated at $40M while the dam is estimated at $20M.

LOCK AND DAM 13 MISSISSIPPI RIVER	April 2010
Official Project Name: Lock and Dam 13 Mississippi River Project	**Sub Project:** Lock and Dam No. 13 Mississippi River
Division/District: Mississippi Valley Division/ Rock Island District	**Tributary/Waterway:** Mississippi River
Project Authorization:	N/A
Project Status: Planned	**Project Type:** Lock, Dam Rehabilitation

Project Description: Lock and Dam 13 is 522.5 miles above the confluence of the Mississippi and Ohio rivers. The complex stretches across the river at a point where the bluffs on the Iowa side are very close to the river; islands and chutes dot the river beneath the bluffs. Eagle Point Nature Center occupies the high bluff immediately above the lock and dam. A dense group of sloughs and islands extend out from the Illinois shore. The lock dimensions are 110 by 600 feet with additional provisions for an auxiliary lock. Lock lift is 11 feet. Normal upper pool elevation is 583 feet, about 17 feet above the tail waters below the dam at low water. The maximum lift is 11 feet with an average lift of 8.6 feet. The movable dam consists of 10 submersible Tainter gates, 20-feet high by 64-feet long; and three submersible roller gates, 20-feet high by 100-feet long. The Tainter gates are elliptical. The dam system also includes three non-overflow earth and sand-filled dikes; two transitional dikes; and a submersible earth and sand-filled dike.

Project Location Map:

Project Photo:

Current Cost Estimate(ROM, Oct 2008) :	$60,000,000
Current Remaining Costs (FY11 to completion):	$60,000,000
Authorized Base Cost (price level):	N/A
Fully Funded Cost Estimate at Authorization:	N/A
Current Average Annual Net Benefits (price level, discount rate): N/A	**Current Remaining Average Annual Net Benefits (price level, discount rate):** N/A
Current Benefit Cost Ratio (discount rate): N/A	**Current Remaining Benefit Remaining Cost Ratio at 7%:** N/A

Additional Remarks: The lock and dam are over 70 years old. While some major maintenance and rehabilitation have been performed, additional rehabilitation will be required to ensure reliability over the next 30 years. Future rehabilitation potentially will include repair or replacement of miter gates, emergency gates, culvert valves, gate and culvert valve machinery, dam gates, electrical and mechanical components, concrete repair and resurfacing, and scour repairs. Lock rehab is estimated at $40M while the dam is estimated at $20M.

LOCK AND DAM 14 MISSISSIPPI RIVER	April 2010
Official Project Name: Lock and Dam 14 Mississippi River Project	**Sub Project:** Lock and Dam No. 14 Mississippi River
Division/District: Mississippi Valley Division/ Rock Island District	**Tributary/Waterway:** Mississippi River
Project Authorization:	N/A
Project Status Planned	**Project Type:** Lock, Dam Rehabilitation

Project Description: Lock and Dam 14 is four miles below LeClaire, Iowa, and 493.3 miles above the confluence of the Mississippi and Ohio rivers. The site is also 3.6 miles below the head of the notorious, rock-bedded, Rock Island Rapids. The LeClaire Lock and the remains of the LeClaire Lateral Canal, built in 1921-1924 to bypass this treacherous stretch of river, are located along the Iowa shore. The main lock's dimensions are 110 by 600 feet. Normal upper pool elevation is 572 feet, about 15 feet above the tail waters of the dam at low water. When both pools are at their normal elevation, the difference is reduced to 11 feet or less. The dimensions of the LeClaire Lock, which is used as an auxiliary lock, are 80 by 320 feet, with a low-water depth of eight feet at the upper sill and seven feet at the lower sill. The main lock's maximum lift is 11 feet with an average lift of 9.8 feet. The movable dam has 13 non-submersible Tainter gates (20 feet high by 60 feet long) and four submersible roller gates (20 feet high by 100 feet long). The dam system also includes an earth and sand-filled dike.

Project Location Map:	**Project Photo:**
	
Current Cost Estimate (ROM, Oct 2008):	$70.000.000
Current Remaining Costs (FY11 to completion):	$70,000,000
Authorized Base Cost (price level):	N/A
Fully Funded Cost Estimate at Authorization:	N/A
Current Average Annual Net Benefits (price level, discount rate): N/A	**Current Remaining Average Annual Net Benefits (price level, discount rate):** N/A
Current Benefit Cost Ratio (discount rate): N/A	**Current Remaining Benefit Remaining Cost Ratio at 7%:** N/A

Additional Remarks: The lock and dam are over 70 years old. While some major maintenance and rehabilitation have been performed, additional rehabilitation will be required to ensure reliability over the next 30 years. Future rehabilitation potentially will include repair or replacement of miter gates, emergency gates, culvert valves, gate and culvert valve machinery, dam gates, electrical and mechanical components, concrete repair and resurfacing, and scour repairs. Lock rehab is estimated at $50M while the dam is estimated at $20M.

LOCK AND DAM 15 MISSISSIPPI RIVER	August 2009
Official Project Name: Lock and Dam 15 Mississippi River Project	**Sub Project:** Lock and Dam No. 15 Mississippi River
Division/District: Mississippi Valley Division/ Rock Island District	**Tributary/Waterway:** Mississippi River
Project Authorization:	N/A
Project Status: Planned	**Project Type:** Lock, Dam Rehabilitation

Project Description: In the heart of the Quad Cities, Locks and Dam 15 is 483 miles above the confluence of the Mississippi and Ohio rivers. The complex stretches across the Upper Mississippi River at one of its narrowest points, a point which is also at the foot of the Rock Island Rapids. The complex extends from the northwest tip of the U.S. Army's Arsenal Island on the Illinois side, to a small area of flat-bottom land on the Iowa side. A highway and railroad bridge, joining Davenport and Rock Island, spans the site. The lock dimensions are 110 feet wide by 600 feet long; the auxiliary lock is 110 by 360 feet. Normal upper pool elevation is 561.0. Both lock's maximum lift is 16 feet with an average lift of 13 feet. The movable dam has 11 non-submersible roller gates (each 100 feet long). Nine of the gates have 19-foot, 4-inch diameters; two of the gates have 16-foot, 2-inch diameters.

Project Location Map:	**Project Photo:**
	

Current Cost Estimate(ROM, Oct 2008) :	$70,000,000
Current Remaining Costs (FY11 to completion):	$70,000,000
Authorized Base Cost (price level):	N/A
Fully Funded Cost Estimate at Authorization:	N/A
Current Average Annual Net Benefits (price level, discount rate): N/A	**Current Remaining Average Annual Net Benefits (price level, discount rate):** N/A
Current Benefit Cost Ratio (discount rate): N/A	**Current Remaining Benefit Remaining Cost Ratio at 7%:** N/A

Additional Remarks: The lock and dam are over 70 years old. While some major maintenance and rehabilitation have been performed, additional rehabilitation will be required to ensure reliability over the next 30 years. Future rehabilitation potentially will include repair or replacement of miter gates, emergency gates, culvert valves, gate and culvert valve machinery, dam gates, electrical and mechanical components, concrete repair and resurfacing, and scour repairs. Lock rehab is estimated at $50M while the dam is estimated at $20M.

LOCK AND DAM 16 MISSISSIPPI RIVER	April 2010
Official Project Name: Lock and Dam 16 Mississippi River Project	**Sub Project:** Lock and Dam No. 16 Mississippi River
Division/District: Mississippi Valley Division/ Rock Island District	**Tributary/Waterway:** Mississippi River
Project Authorization:	N/A
Project Status: Planned	**Project Type:** Lock, Dam Rehabilitation

Project Description: Lock and Dam 16 is about one mile upstream from Muscatine, Iowa, and 457.2 miles above the confluence of the Mississippi and Ohio rivers. The earthen embankment section of the dam straddles portions of Hog Island in the main channel. The lock dimensions are 110 feet wide by 600 feet long with additional provisions for an auxiliary lock. Normal upper pool elevation is 545.0, about 14 feet above the tail waters below the dam at low water. When both pools are at their normal elevation, the difference is reduced to nine feet or less. The maximum lift is nine feet with an average lift of 6.5 feet. The movable dam has 12 non-submersible Tainter gates (20 feet high and 40 feet long), three submersible Tainter gates of the same dimensions, and four non-submersible roller gates (20 feet high and 80 feet long). The dam system also includes a linear, concrete capped, ogee spillway; and a submersible earth and sand-filled dike.

Project Location Map:	**Project Photo:**
	

Current Cost Estimate (ROM, Oct 2008):	$70,000,000
Current Remaining Costs (FY11 to completion):	$70,000,000
Authorized Base Cost (price level):	N/A
Fully Funded Cost Estimate at Authorization:	N/A
Current Average Annual Net Benefits (price level, discount rate): N/A	**Current Remaining Average Annual Net Benefits (price level, discount rate):** N/A
Current Benefit Cost Ratio (discount rate): N/A	**Current Remaining Benefit Remaining Cost Ratio at 7%:** N/A

Additional Remarks: The lock and dam are over 70 years old. While some major maintenance and rehabilitation have been performed, additional rehabilitation will be required to ensure reliability over the next 30 years. Future rehabilitation potentially will include repair or replacement of miter gates, emergency gates, culvert valves, gate and culvert valve machinery, dam gates, electrical and mechanical components, concrete repair and resurfacing, and scour repairs. Lock rehab is estimated at $50M while the dam is estimated at $20M.

LOCK AND DAM 17 MISISSIPPI RIVER	August 2009
Official Project Name: Lock and Dam 17 Mississippi River Project	**Sub Project:** Lock and Dam No. 17 Mississippi River
Division/District: Mississippi Valley Division/ Rock Island District	**Tributary/Waterway:** Mississippi River
Project Authorization:	N/A
Project Status: Planned	**Project Type:** Lock, Dam Rehabilitation

Project Description: Lock and Dam 17 is 437.1 miles above the confluence of the Mississippi and Ohio rivers. The complex stretches across a wide portion of river where there are several marshy islands. The Port Louisa National Wildlife Refuge and Odessa State Wildlife Management Area occupy the islands, marshes, and sloughs on the Iowa shore both upstream and downstream from the dam. The lock dimensions are 110 feet wide by 600 feet long with additional provisions for an auxiliary lock. Normal upper pool elevation is 536.0, about 12 feet above the tail waters below the dam at low water. When both pools are at their normal elevation, the difference is reduced to eight feet or less. The maximum lift is eight feet with an average lift of four feet. The movable dam has eight submersible Tainter gates (20 feet high by 64 feet long) and three submersible roller gates (20 feet high by 100 feet long). The dam system also includes one non-overflow earth and sand-filled dike; two transitional dikes; and a submersible earth and sand-filled dike.

Project Location Map:	**Project Photo:**
	

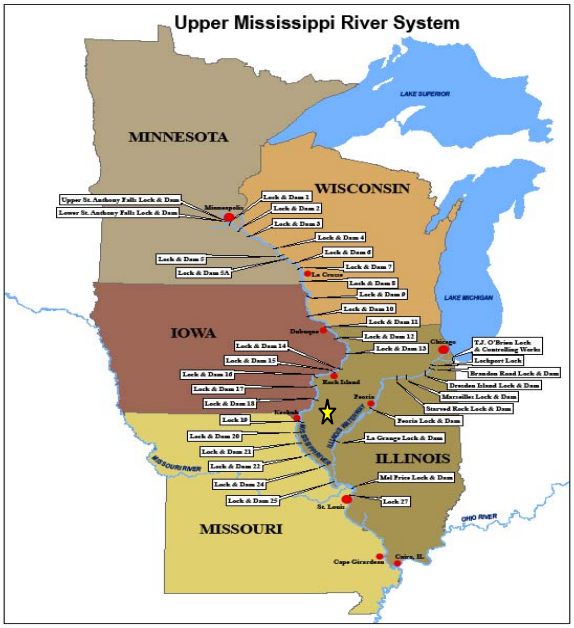
Current Cost Estimate:	$70,000,000
Current Remaining Costs (FY11 to completion):	$70,000,000
Authorized Base Cost (price level):	N/A
Fully Funded Cost Estimate at Authorization:	N/A
Current Average Annual Net Benefits (price level, discount rate): N/A	**Current Remaining Average Annual Net Benefits (price level, discount rate):** N/A
Current Benefit Cost Ratio (discount rate): N/A	**Current Remaining Benefit Remaining Cost Ratio at 7%:** N/A

Additional Information: The lock and dam are over 70 years old. While some major maintenance and rehabilitation have been performed, additional rehabilitation will be required to ensure reliability over the next 30 years. Future rehabilitation potentially will include repair or replacement of miter gates, emergency gates, culvert valves, gate and culvert valve machinery, dam gates, electrical and mechanical components, concrete repair and resurfacing, and scour repairs. Lock rehab is estimated at $50M while the dam is estimated at $20M.

LOCK AND DAM 18 MISSISSIPPI RIVER	April 2010
Official Project Name: Lock and Dam 18 Mississippi River	**Sub Project:** Lock and Dam
Division/District: MVD/MVR	**Tributary/Waterway:** Mississippi River
Project Authorization:	N/A
Project Status Planned	**Project Type:** Lock and Dam Rehabilitation

Project Description: Lock and Dam 18 is 410.5 miles above the confluence of the Mississippi and Ohio rivers. The lock dimensions are 110 feet wide by 600 feet long. The dam is composed of 14 submersible Tainter gates (20 feet high by 60 feet long) and three submersible roller gates (20 feet high by 100 feet long). All gates submerge to a depth of eight feet. The dam includes a submersible earth and sand-filled dike, a non-overflow earth and sand-filled dike, and two transition dikes.

Project Location Map:



Project Photo:

Current Cost Estimate (ROM, Oct 2008:	$70,000,000
Current Remaining Costs (FY11 to completion):	$70,000,000
Authorized Base Cost (price level):	N/A
Fully Funded Cost Estimate at Authorization:	N/A
Current Average Annual Net Benefits (price level, discount rate): N/A	**Current Remaining Average Annual Net Benefits (price level, discount rate):** N/A
Current Benefit Cost Ratio (discount rate): N/A	**Current Remaining Benefit Remaining Cost Ratio at 7%:** N/A

Additional Remarks: Recent Periodic Inspections have noted a significant increase in the rate of concrete deterioration of the dam structure. A concrete condition survey completed in 2005 confirmed that the dam concrete is deteriorating due to an expansive reaction and freeze-thaw cycling. Immediate concrete repairs are needed at an estimated cost of $18M. Additionally, the lock and dam are over 70 years old and additional rehabilitation will be required to ensure reliability over the next 30 years. Future rehabilitation potentially will include repair or replacement of miter gates, emergency gates, culvert valves, gate and culvert valve machinery, dam gates, electrical and mechanical components, additional concrete repair and resurfacing, and scour repairs. Lock rehab is estimated at $50M while the dam is estimated at $20M.

LOCK AND DAM 19 MISSISSIPPI RIVER	April 2010
Official Project Name: Lock and Dam 19 Mississippi River Project	**Sub Project:** Lock and Dam No. 19 Mississippi River
Division/District: Mississippi Valley Division/ Rock Island District	**Tributary/Waterway:** Mississippi River
Project Authorization:	N/A
Project Status: Planned	**Project Type:** Lock, Dam Rehabilitation

Project Description: Lock and Dam 19 is 364.2 miles above the confluence of the Mississippi and Ohio rivers. Privately built and owned, the dam was built in 1913 and includes 119 rectangular sliding gates. The lock was constructed from 1952-1957. The main lock is 110 by 1,200 feet, twice the size of the standard 9-foot navigation channel lock. Normal upper pool elevation is 518.2 feet, about 38.2 feet above the tail waters of the dam at low water. The Keokuk and Hamilton Water Power Company Lock (built between 1910 and 1914) is closed off by a permanent, steel pile, cell structure. Maximum lift is 38.2 feet with an average lift of 36.3 feet.

Project Location Map:

Project Photo:

Current Cost Estimate(ROM, Oct 2008) :	$70,000,000
Current Remaining Costs (FY11 to completion):	$70,000,000
Authorized Base Cost (price level):	N/A
Fully Funded Cost Estimate at Authorization:	N/A
Current Average Annual Net Benefits (price level, discount rate): N/A	**Current Remaining Average Annual Net Benefits (price level, discount rate):** N/A
Current Benefit Cost Ratio (discount rate): N/A	**Current Remaining Benefit Remaining Cost Ratio at 7%:** N/A

Additional Information: The dam is nearly 100 years old and the lock 50 years old. While some major maintenance and rehabilitation have been performed, additional rehabilitation will be required to ensure reliability over the next 30 years. Future rehabilitation potentially will include repair or replacement of miter gates, emergency gates, culvert valves, gate and culvert valve machinery, dam gates, electrical and mechanical components, concrete repair and resurfacing, and scour repairs. Lock rehab is estimated at $50M while the dam is estimated at $20M.

LOCK AND DAM 20 MISSISSIPPI RIVER	April 2010
Official Project Name: Lock and Dam 20 Mississippi River Project	**Sub Project:** Lock and Dam No. 20 Mississippi River
Division/District: Mississippi Valley Division/ Rock Island District	**Tributary/Waterway:** Mississippi River
Project Authorization:	N/A
Project Status: Planned	**Project Type:** Lock, Dam Rehabilitation

Project Description: Lock and Dam 20 is 343.2 miles above the confluence of the Mississippi and Ohio rivers. The complex stretches across the river at a point where the valley is quite wide, about five-miles wide at the level of the lock and dam. A levee and the Gregory Diversion Ditch separate the complex from the town of Canton. The lock dimensions are 110 feet wide by 600 feet long with additional provisions for an auxiliary lock. Normal upper pool elevation is 480.0; this is about 15 feet above the tail waters of the dam at low water. When both pools are at their normal depths, the difference is reduced to 10 feet or less. The maximum lift is 10.5 feet with an average lift of 5.3 feet. The movable dam has three non-submersible roller gates (20 feet high by 60 feet long), 34 non-submersible Tainter gates (20 feet high by 40 feet long), and six submersible Tainter gates (20 feet high by 40 feet long). The submersible Tainter gates submerge three feet.

Project Location Map:	**Project Photo:**
	

Current Cost Estimate (ROM, Oct 2008):	$70,000,000
Current Remaining Costs (FY11 to completion):	$70,000,000
Authorized Base Cost (price level):	N/A
Fully Funded Cost Estimate at Authorization:	N/A
Current Average Annual Net Benefits (price level, discount rate): N/A	**Current Remaining Average Annual Net Benefits (price level, discount rate):** N/A
Current Benefit Cost Ratio (discount rate): N/A	**Current Remaining Benefit Remaining Cost Ratio at 7%:** N/A

Additional Information: The lock and dam are over 70 years old. While some major maintenance and rehabilitation have been performed, additional rehabilitation will be required to ensure reliability over the next 30 years. Future rehabilitation potentially will include repair or replacement of miter gates, emergency gates, culvert valves, gate and culvert valve machinery, dam gates, electrical and mechanical components, concrete repair and resurfacing, and scour repairs. Lock rehab is estimated at $50M while the dam is estimated at $20M.

LOCK AND DAM 21 MISSISSIPPI RIVER	April 2010
Official Project Name: Lock and Dam 21 Mississippi River Project	**Sub Project:** Lock and Dam No. 21 Mississippi River
Division/District: Mississippi Valley Division/ Rock Island District	**Tributary/Waterway:** Mississippi River
Project Authorization:	N/A
Project Status: Planned	**Project Type:** Lock, Dam Rehabilitation

Project Description: Lock and Dam 21 is 324.9 miles above the confluence of the Mississippi and Ohio Rivers. The complex stretches across the river at a point where the valley is wide with flat bottom land on either side of the river. The city of Quincy, Illinois, lies on the low bluffs along the river just upstream from the complex. Lock dimensions are 110 feet wide by 600 feet long with additional provisions for an auxiliary lock. Normal upper pool elevation is 470.0, approximately 16 feet above the tail waters of the dam at low water. When both pools are at their normal depths, the difference in elevation is reduced to 11 feet or less. The maximum lift is 10.5 feet with an average lift of 6.55 feet. The movable dam has 10 submersible, elliptical Tainter gates (20 feet high by 64 feet long) and three submersible roller gates (20 feet high by 100 feet long). The dam system also includes two earth and sand-filled transitional dikes, and a submersible earth dike.

Project Location Map:

Project Photo:

Current Cost Estimate(ROM, Oct 2008) :	$70,000,000
Current Remaining Costs (FY11 to completion):	$70,000,000
Authorized Base Cost (price level):	N/A
Fully Funded Cost Estimate at Authorization:	N/A
Current Average Annual Net Benefits (price level, discount rate): N/A	**Current Remaining Average Annual Net Benefits (price level, discount rate):** N/A
Current Benefit Cost Ratio (discount rate): N/A	**Current Remaining Benefit Remaining Cost Ratio at 7%:** N/A

Additional Information: The lock and dam are over 70 years old. While some major maintenance and rehabilitation have been performed, additional rehabilitation will be required to ensure reliability over the next 30 years. Future rehabilitation potentially will include repair or replacement of miter gates, emergency gates, culvert valves, gate and culvert valve machinery, dam gates, electrical and mechanical components, concrete repair and resurfacing, and scour repairs. Lock rehab is estimated at $50M while the dam is estimated at $20M.

LOCK AND DAM 22 MISSISSIPPI RIVER	April 2010
Official Project Name: Lock and Dam 22 Mississippi River Project	**Sub Project:** Lock and Dam No. 22 Mississippi River
Division/District: Mississippi Valley Division/ Rock Island District	**Tributary/Waterway:** Mississippi River
Project Authorization:	N/A
Project Status: Planned	**Project Type:** Lock, Dam Rehabilitation

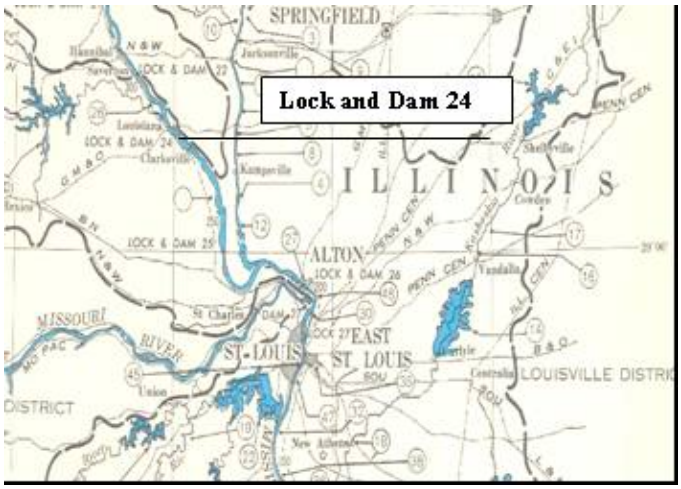
Project Description: Lock and Dam 22 is 301.2 miles above the confluence of the Mississippi and Ohio rivers. Bluffs rise more than 200 feet above the river west of the lock; the valley is quite wide east of the complex. The lock dimensions are 110 feet wide by 600 feet long with additional provisions for an auxiliary lock. Normal upper pool elevation is 459.5, about 16.5 feet above the tail waters of the dam at low water. When both pools are at their normal depths, the difference is reduced to 10.5 feet or less. The maximum lift is 10.5 feet with an average lift of 7.5 feet. The movable dam has nine non-submersible Tainter gates (25 feet high by 60 feet long), one submersible Tainter gate (25 feet high by 60 feet long), and three submersible roller gates (25 feet high by 100 feet long). Completing the dam system are two transition dikes and a submersible earth and sand-filled dike.

Project Location Map:	**Project Photo:**
	
Current Cost Estimate (ROM, Oct 2008):	$70,000,000
Current Remaining Costs (FY11 to completion):	$70,000,000
Authorized Base Cost (price level):	N/A
Fully Funded Cost Estimate at Authorization:	N/A
Current Average Annual Net Benefits (price level, discount rate): N/A	**Current Remaining Average Annual Net Benefits (price level, discount rate):** N/A
Current Benefit Cost Ratio (discount rate): N/A	**Current Remaining Benefit Remaining Cost Ratio at 7%:** N/A

Additional Information: The lock and dam are over 70 years old. While some major maintenance and rehabilitation have been performed, additional rehabilitation will be required to ensure reliability over the next 30 years. Future rehabilitation potentially will include repair or replacement of miter gates, emergency gates, culvert valves, gate and culvert valve machinery, dam gates, electrical and mechanical components, concrete repair and resurfacing, and scour repairs. Lock rehab is estimated at $50M while the dam is estimated at $20M.

LOCK AND DAM 24 MISSISSIPPI RIVER	August 2009
Official Project Name: Mississippi River Between Missouri River and Minneapolis, Mn. (MVS Portion)	**Sub Project:** Lock and Dam 24
Division/District: MVD/MVS	**Tributary/Waterway:** Upper Mississippi River
Project Authorization:	N/A
Project Status Planned	**Project Type:** Major Rehabilitation – Lock

Project Description: The Lock and Dam 24 project is located in Calhoun County, Illinois, and Pike County, Missouri, at Clarksville, Missouri, UMR mi 273.4 above the confluence of the Mississippi and Ohio rivers. The project has only a single lock chamber, with dimensions 110 feet wide by 600 feet long. Normal upper pool elevation is 449.0. The dam is 1,340 feet long and has 15 tainter gates, each 80-foot in width. Planned work includes rehabilitation of the lock miter gates, the auxiliary lock closure gates, the culvert valves, and the miter gate and culvert valve machinery. It includes replacement of the power distribution system, the lock motors and controllers, the control system, and the remaining original dam bridge columns. Also includes concrete repairs on the Illinois abutment, and the lock land wall, intermediate wall, and river wall.

Project Location Map:	Project Photo:
	

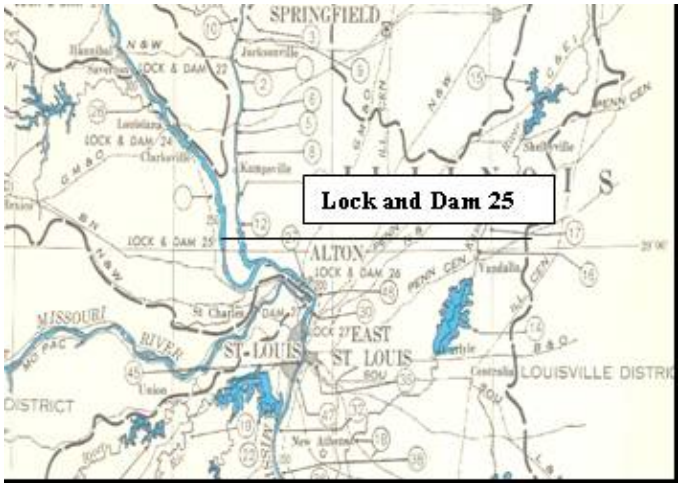
Current Cost Estimate (ROM, October 20080:	$70,000,000
Current Remaining Costs (FY11 to completion):	$70,000,000
Authorized Base Cost (price level):	N/A
Fully Funded Cost Estimate at Authorization:	N/A
Current Average Annual Net Benefits (price level, discount rate): N/A	**Current Remaining Average Annual Net Benefits (price level, discount rate):** N/A
Current Benefit Cost Ratio (discount rate): N/A	**Current Remaining Benefit Remaining Cost Ratio at 7%:** N/A

Additional Remarks:
Lock and Dam 24 was authorized for construction in The River and Harbor Act of 1935, and placed into operation in 1940. In 1992, Lock and Dam 24 was authorized, under the Water Resources Development Act, for cost-shared major rehabilitation of the line items in the approved report. The work included replacement of the lock miter gates, the auxiliary lock closure structure, the power distribution system, the lock motors and controllers, the control system, and the miter gate machinery; addition of debris openings in the dam guard wall and a portion of the bendway weirs; and rehabilitation of several dam bridge columns, the Illinois abutment, and the lock land wall, intermediate wall, and river wall, the addition of an upstream protection cell, bendway weirs, and the rehabilitation of the dam tainter gate anchorages (includes replacement of the downstream dam bulkheads and pickup beam). Major Rehabilitation restores reliability without increasing capacity. Lock rehab is estimated at $50M while the dam is estimated at $20M.

LOCK AND DAM 25 MISSISSIPPI RIVER	August 2009
Official Project Name: Mississippi River Between Missouri River and Minneapolis, Mn. (MVS Portion)	**Sub Project:** Lock and Dam 25
Division/District: MVD/MVS	**Tributary/Waterway:** Upper Mississippi River
Project Authorization:	N/A
Project Status: Planned	**Project Type:** Major Rehabilitation – Lock

Project Description: The Lock and Dam 25 project is located in Calhoun County, Illinois, and Lincoln County, Missouri, at Winfield, Missouri, UMR mi 241.4 above the confluence of the Mississippi and Ohio rivers. The project has only a single lock chamber, with dimensions 110 feet wide by 600 feet long. Normal upper pool elevation is 449.0. The dam is 1,296 feet long with three submersible roller gates (near the center of the structure) and 14 submersible tainter gates. Planned work includes rehabilitation of the lock miter gates, the auxiliary lock closure gates, the culvert valves, and the miter gate and culvert valve machinery. It includes replacement of the power distribution system, the lock motors and controllers, and the control system. Also includes replacement of concrete on the Illinois abutment, and the lock land wall, intermediate wall, and river wall.

Project Location Map:



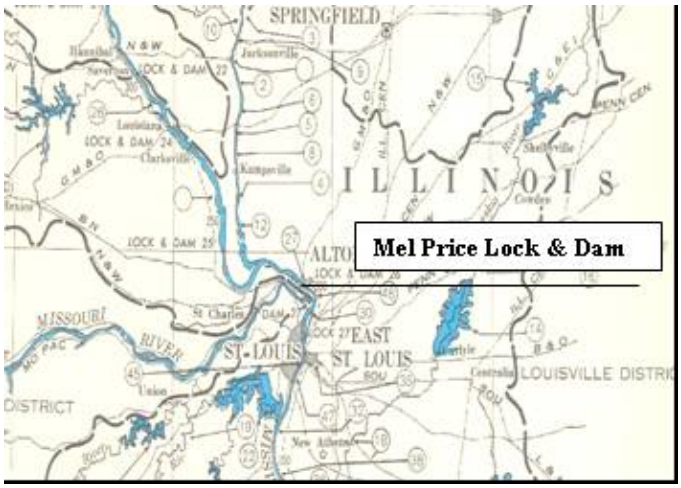
Project Photo:

Current Cost Estimate (ROM, October 2008):	$60,000,000
Current Remaining Costs (FY11 to completion):	$60,000,000
Authorized Base Cost (price level):	N/A
Fully Funded Cost Estimate at Authorization:	N/A
Current Average Annual Net Benefits (price level, discount rate): N/A	**Current Remaining Average Annual Net Benefits (price level, discount rate):** N/A
Current Benefit Cost Ratio (discount rate): N/A	**Current Remaining Benefit Remaining Cost Ratio at 7%:** N/A

Additional Remarks:
Lock and Dam 25 was authorized for construction in The River and Harbor Act of 1935, and placed into operation in 1939. In 1992, Lock and Dam 25 was authorized, under the Water Resources Development Act, for cost-shared major rehabilitation of the line items in the approved report. The work included replacement of the lock miter gates, the auxiliary lock closure structure, the power distribution system, the lock motors and controllers, the control system, and the miter gate machinery; installation of dewatering pump system and addition of debris openings in the dam guard wall. All work was completed in 1999. Major Rehabilitation restores reliability without increasing capacity. Lock rehab is estimated at $40M while the dam is estimated at $20M.

MELVIN PRICE LOCK AND DAM	August 2009
Official Project Name: Mississippi River Between Missouri River and Minneapolis, Mn. (MVS Portion)	**Sub Project:** Melvin Price Lock and Dam
Division/District: MVD/MVS	**Tributary/Waterway:** Upper Mississippi River
Project Authorization:	N/A
Project Status Planned	**Project Type:** Major Rehabilitation – Lock

Project Description: Mel Price Lock and Dam project is located in Madison County, Illinois, and St. Charles County, Missouri, at Alton, Illinois UMR mi 200.5 above the confluence of the Mississippi and Ohio rivers. The project has a 1200 foot main lock chamber and a 600 foot auxiliary lock chamber. Normal upper pool elevation is 419.0. The dam is 1,160 feet long with nine 110-feet wide tainter gates. Planned work includes rehabilitation of the lock miter gates, the auxiliary lock closure gates, the culvert valves, and the miter gate and culvert valve machinery. It includes replacement of the power distribution system, the lock motors and controllers, and the control system.

Project Location Map:	**Project Photo:**
	
Current Cost Estimate)(ROM, Oct 2008):	$60,000,000
Current Remaining Costs (FY11 to completion):	$60,000,000
Authorized Base Cost (price level):	N/A
Fully Funded Cost Estimate at Authorization :	N/A
Current Average Annual Net Benefits (price level, discount rate): N/A	**Current Remaining Average Annual Net Benefits (price level, discount rate):** N/A
Current Benefit Cost Ratio (discount rate): N/A	**Current Remaining Benefit Remaining Cost Ratio at 7%:** N/A

Additional Remarks: Mel Price Lock and Dam was authorized for construction by the Internal Revenue Code of 1954, Title I – Replacement of Locks and Dam 26; Water Resources Development Acts (WRDAs) of 1986 (Auxiliary Lock), 1990, 1992, and 1996 (visitor center); and the Consolidated Appropriations Act (CAA), 2001, PL 106-554. While the main lock was 100% federal, the auxiliary lock, authorized by WRDA 1996 was the first project cost shared with the Inland Waterway Trust Fund, also charted under WRDA 1986. The main lock was placed in service in 1989 and the auxiliary lock in 1995. The original (main lock) project authority remains open as approved punchlist items are completed. Current remaining costs total $1.49M. Lock rehab is estimated at $40M while the dam is estimated at $20M.

STARVED ROCK LOCK AND DAM	April 2010
Official Project Name: Starved Rock Lock and Dam	**Sub Project:** Lock and Dam
Division/District: MVD/MVR	**Tributary/Waterway:** Illinois Waterway
Project Authorization:	N/A
Project Status Planned	**Project Type:** Lock and Dam Rehabilitation

Project Description: Starved Rock Lock and Dam is 231.0 miles above the confluence of the Illinois River with the Mississippi river at Grafton, Illinois. The lock and dam is located about 1.5 miles southeast of Utica, Ill. The dam is a gated, concrete, gravity dam, 1,280 feet long. A 680-foot-long Tainter gate section contains 10 Tainter gates. The headgate section contains 30 headgates that were plugged with concrete in 1982. The 52-foot-long ice chute section of the dam includes a 52-foot-long inoperable Tainter gate. The lock is the standard 600 feet long by 110 feet wide.

Project Location Map:

Project Photo:

Current Cost Estimate (ROM, Oct 2008):	$60,000,000
Current Remaining Costs (FY11 to completion):	$60,000,000
Authorized Base Cost (price level):	N/A
Fully Funded Cost Estimate at Authorization :	N/A
Current Average Annual Net Benefits (price level, discount rate): N/A	**Current Remaining Average Annual Net Benefits (price level, discount rate):** N/A
Current Benefit Cost Ratio (discount rate): N/A	**Current Remaining Benefit Remaining Cost Ratio at 7%:** N/A

Additional Remarks: Preliminary work to support an RER is currently underway. Items likely to be evaluated include concrete repairs to the lock and dam, lock and dam operating machinery and control systems, and repair/replacement of gates (lock miter gates, lock valve gates, dam gates). Lock rehab is estimated at $40M while the dam is estimated at $20M.

DRESDEN LOCK AND DAM	April 2010
Official Project Name: Dresden Island Lock and Dam	**Sub Project:** Lock and Dam
Division/District: MVD/MVR	**Tributary/Waterway:** Illinois Waterway
Project Authorization:	N/A
Project Status: Planned	**Project Type:** Lock and Dam Rehabilitation

Project Description: Dresden Island Lock and Dam is 271.5 miles above the confluence of the Illinois River with the Mississippi river at Grafton, Illinois. The complex is 1-1/2 miles downstream from the mouth of the Kankakee River and about 15 miles southwest of Joliet, Illinois. The complex consists of a gated concrete gravity dam. The total length of the lock and dam between abutments is about 1,320 feet. Lock dimensions are 110 feet wide by 600 feet long with a maximum lift of 22 feet. The dam consists of an arch dam section, a fixed spillway section, nine Tainter gates (60 feet wide by 17 feet high), 18 plugged headgates, and a 500-foot-long earthfill section with steel sheet pile cut-off wall connecting the headgate section to the Illinois and Michigan Canal embankment.

Project Location Map:	**Project Photo:**
	

Current Cost Estimate:	$60,000,000
Current Remaining Costs (FY11 to completion):	$60,000,000
Authorized Base Cost (price level):	N/A
Fully Funded Cost Estimate at Authorization:	N/A
Current Average Annual Net Benefits (price level, discount rate): N/A	**Current Remaining Average Annual Net Benefits (price level, discount rate):** N/A
Current Benefit Cost Ratio (discount rate): N/A	**Current Remaining Benefit Remaining Cost Ratio at 7%:** N/A

Additional Remarks:
$60 Million merely a place holder. No RER performed. Lock rehab is estimated at $40M while the dam is estimated at $20M.

BRANDON ROAD LOCK AND DAM	April 2010
Official Project Name: Brandon Road Lock and Dam	**Sub Project:** Lock and Dam
Division/District: MVD/MVR	**Tributary/Waterway:** Illinois Waterway
Project Authorization:	N/A
Project Status Planned	**Project Type:** Lock and Dam Rehabilitation

Project Description: Brandon Road Lock and Dam is 286 miles above the confluence of the Illinois River with the Mississippi river at Grafton, Illinois. The complex is located 27 miles southwest of Chicago; 2 miles southwest of Joliet, Illinois, near Rockdale. The lock is 600 feet long, 110 feet wide. Nominal lift is 34 feet. The dam is 2,391 feet long. It contains 21 operational Tainter gates (50 feet wide by 2 feet, 3-1/2 inches high), six sluice gates (7 feet, 9 inches wide x 8 feet, five inches high), and 16 pairs of 16 feet high by 15 feet wide headgates. From the upper limits of the city of Joliet to Brandon Road Lock and Dam, the Illinois Waterway is contained between concrete gravity walls which are from 15 to 40-feet high. The walls extend approximately three miles upstream from the lock and dam.

Project Location Map:	**Project Photo:**
	
Current Cost Estimate:	$60,000,000
Current Remaining Costs (FY11 to completion):	$60,000,000
Authorized Base Cost (price level):	N/A
Fully Funded Cost Estimate at Authorization :	N/A
Current Average Annual Net Benefits (price level, discount rate): N/A	**Current Remaining Average Annual Net Benefits (price level, discount rate):** N/A
Current Benefit Cost Ratio (discount rate): N/A	**Current Remaining Benefit Remaining Cost Ratio at 7%:** N/A

Additional Remarks: Lock rehab is estimated at $40M while the dam is estimated at $20M.

MARSEILLES LOCK AND DAM	April 2010
Official Project Name: Marseilles Lock and Dam	**Sub Project:** Lock and Dam
Division/District: MVD/MVR	**Tributary/Waterway:** Illinois Waterway
Project Authorization:	N/A
Project Status: Planned	**Project Type:** Lock and Dam Rehabilitation

Project Description: Marseilles Lock is 244.6 miles above the confluence of the Illinois River with the Mississippi river at Grafton, Illinois, at the foot of Bells Island. Marseilles Dam is 2.5 miles upstream of the lock at the head of Bells Island. The lock and dam is located southwest of Marseilles, Ill., near Illini State Park. The Marseilles Canal, adjacent to the left bank of the Illinois, extends from the dam to the lock. There are hydroelectric generating facilities at the dam. The lock is 110 feet wide by 600 feet long. The maximum lift is 24.5 feet with an average lift lower than 24 feet. The dam is a fixed, gated-concrete, gravity dam. The main dam is 598.5-feet long with eight submersible Tainter gates (60-feet wide, 16-feet high, 25-foot radius) and Ogee spillway at Ice Chute. The gates are remotely controlled by the lockmaster at the lock. The South Channel Headrace dam is 111-feet long with one Tainter gate. The North Channel Headrace dam is 206-feet long with two Tainter gates.

Project Location Map:	**Project Photo:**
	

Current Cost Estimate (ROM, Oct 2008):	$60,000,000
Current Remaining Costs (FY11 to completion):	$60,000,000
Authorized Base Cost (price level):	N/A
Fully Funded Cost Estimate at Authorization:	N/A
Current Average Annual Net Benefits (price level, discount rate): N/A	**Current Remaining Average Annual Net Benefits (price level, discount rate):** N/A
Current Benefit Cost Ratio (discount rate): N/A	**Current Remaining Benefit Remaining Cost Ratio at 7%:** N/A

Additional Remarks: The lock and dam are over 70 years old. While some major maintenance and rehabilitation have been performed, additional rehabilitation will be required to ensure reliability over the next 30 years. Future rehabilitation potentially will include repair or replacement of miter gates, emergency gates, culvert valves, gate and culvert valve machinery, dam gates, electrical and mechanical components, concrete repair and resurfacing, and scour repairs. Lock rehab is estimated at $40M while the dam is estimated at $20M.

PEORIA LOCK AND DAM	April 2010
Official Project Name: Peoria Lock and Dam	**Sub Project:** Lock and Dam
Division/District: MVD/MVR	**Tributary/Waterway:** Illinois Waterway
Project Authorization:	N/A
Project Status: Planned	**Project Type:** Lock and Dam Rehabilitation

Project Description: Peoria Lock and Dam is 157.7 miles above the confluence of the Illinois River with the Mississippi river at Grafton, Illinois. The lock and dam is located four miles downstream of Peoria, Ill.
The lock is the standard 600-feet long by 110-feet wide. The maximum lift is 11 feet with an average lift of six feet. The dam is a Chanoine wicket dam, the navigable pass type. Overall length of the dam is 570 feet. The movable dam is 432-feet long containing 108 wickets (3.75-feet wide, 16.42-feet high, 0.25-foot gap between wickets). The dam includes a single 84-foot-long submersible Tainter gate. From 1987-1990, a major rehabilitation changed the physical components of the dam and operating procedures by replacing 26 of the original 134 wickets with a single 84-foot long submersible Tainter gate adjacent to the lock wall.

Project Location Map:

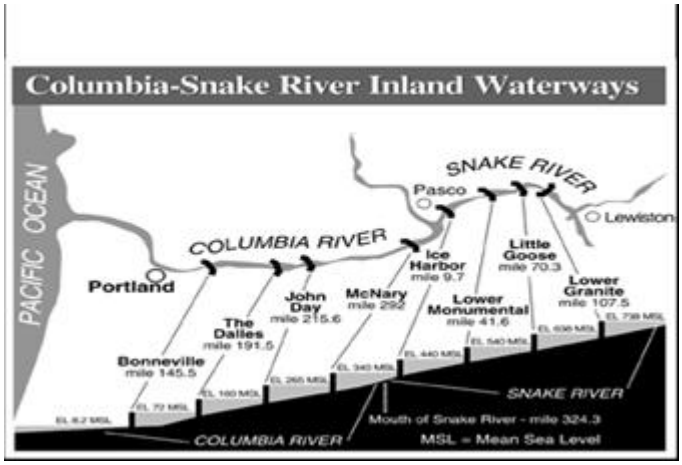
Project Photo:

Current Cost Estimate (ROM, Oct 2008):	$70,000,000
Current Remaining Costs (FY11 to completion):	$70,000,000
Authorized Base Cost (price level):	N/A
Fully Funded Cost Estimate at Authorization:	N/A
Current Average Annual Net Benefits (price level, discount rate): N/A	**Current Remaining Average Annual Net Benefits (price level, discount rate):** N/A
Current Benefit Cost Ratio (discount rate): N/A	**Current Remaining Benefit Remaining Cost Ratio at 7%:** N/A

Additional Remarks: The lock and dam are over 70 years old. While some major maintenance and rehabilitation have been performed, additional rehabilitation will be required to ensure reliability over the next 30 years. Future rehabilitation potentially will include repair or replacement of miter gates, emergency gates, culvert valves, gate and culvert valve machinery, dam gate, electrical and mechanical components, concrete repair and resurfacing, and scour repairs. Lock rehab is estimated at $50M while the dam is estimated at $20M.

JOHN DAY LOCK AND DAM	August 2009
Official Project Name: John Day Lock and Dam	**Sub Project:** N/A
Division/District: Northwestern Division/Portland District	**Tributary/Waterway:** Columbia River
Project Authorization	PL 81-516, Flood Control Act of 1950
Project Status (under construction, authorized or planned):	Preparing Major Rehab Study
Project Type (new construction or rehabilitation) and note if Lock, Dam or Channel:	Lock Rehabilitation

Project Description: John Day Lock & Dam is located at river mile 215.6 of the Columbia River in Oregon and Washington, approximately 112 miles east of Portland, Oregon. The dam is a concrete gravity and rock embankment dam that forms a pool approximately 105 feet above tail water. John Day has the highest single-lift lock in the United States. The project s experiencing problems with filling and emptying valves, monolith movement and cracking ad gate fatigue. Horizontal cracks have developed on the monoliths of the north and south lock walls. The suspected cause of the cracking is weak foundation rock, which allows the lock monoliths to move with each fill cycle of the lock. The Major Rehab study is evaluating alternatives to address all of these problems.

Project Location Map:	**Project Photo:**
	

Current Cost Estimate (ROM, 2009):	$50,000,000
Current Remaining Costs (FY11 to completion):	$50,000,000
Authorized Base Cost (price level):	N/A
Fully Funded Cost Estimate at Authorization :	N/A
Current Average Annual Net Benefits (price level, discount rate): N/A	**Current Remaining Average Annual Net Benefits (price level, discount rate):** N/A
Current Benefit Cost Ratio (discount rate): N/A	**Current Remaining Benefit Remaining Cost Ratio at 7%:** N/A

Additional Remarks: An updated cost estimate is scheduled to be completed in the fall of 2009. Some components are expected to be repaired/replaced using ARRA and FY 09 and 10 funding which will affect the final scope of the project. Other elements are still undetermined including foundation repairs and seismic upgrades.

HOLT LOCK AND DAM	April 2010
Official Project Name: Holt Lock & Dam – Cottondale , Alabama	**Sub Project:** Lower Miter Gate, Emptying & Filling Valves Replacement
Division/District: SAD / Mobile District	**Tributary/Waterway:** Black Warrior & Tombigbee Waterway
Project Authorization	N/A
Project Status (under construction, authorized or planned): Planned	**Project Type (new construction or rehabilitation) and note if Lock, Dam or Channel:** Lock Rehabilitation

Project Description:
Const. Date: 1962
River Mile: 347, Lift: 64'
Single Chamber Lock, 110' X 600'
Gated Spillway, 14 tainter gates
Hydro-Plant operated by Alabama Power Company on opposite bank

Project Location Map:

Project Photo:

Current Cost Estimate (ROM, Oct 2008):	$30,000,000
Current Remaining Costs (FY11 to completion):	$30,000,000
Authorized Base Cost (price level):	N/A
Fully Funded Cost Estimate at Authorization (price level):	N/A
Current Average Annual Net Benefits (price level, discount rate): N/A	**Current Remaining Average Annual Net Benefits (price level, discount rate):** N/A
Current Benefit Cost Ratio (discount rate): N/A	**Current Remaining Benefit Remaining Cost Ratio at 7%:** N/A

Additional Remarks: Rehab items:
(1) Replacement of the lock's lower miter gates. The existing gates are approx. 47 years old and past dewaterings have revealed numerous fatigue cracks and corrosion/deterioration. The cracks were repaired at previous lock closures but the cracking continues and it is believed that the gates are at a time for replacement to reduce continued maintenance costs and risk of gate failure.
(2) Replacement of emptying and filling valves including operational machinery and support structure. These valves have required two to three times more repairs as other valves on the project. Engineering inspections have revealed that the "light" design and 40 plus years of deterioration of the valves, operation machinery, and support structure indicate that replacement with an improved design is warranted. The replacement will reduce maintenance cost and reduce risk of possible failure of valve and components.

NO. 2, AR	October 2009
Official Project Name: No. 2 Lock, AR	**Sub Project:**
Division/District: SWD/Little Rock	**Tributary/Waterway:** McClellan-Kerr Arkansas River Navigation System
Project Authorization:	N/A
Project Status (under construction, authorized or planned): Planned	**Project Type (new construction or rehabilitation) and note if Lock, Dam or Channel:** Major Rehab, Lock

No. 2 Lock is located on the left descending bank of the White River Canal at NM 13.3. The project consists of a 110-foot wide by 600-foot long main chamber.

Project Location Map:

Project Photo:

Current Cost Estimate (ROM, price level):	$10,000,000
Current Remaining Costs FY11 to completion:	$10,000,000
Authorized Base Cost (price level):	N/A
Authorized Fully Funded Cost:	N/A
Current Average Annual Net Benefits (price level, discount rate): N/A	**Authorized Average Annual Net Benefits (price level, discount rate):** N/A
Authorized Benefit Cost Ratio (discount rate): N/A	**Current Remaining Benefit Remaining Cost Ratio at 7%:** N/A

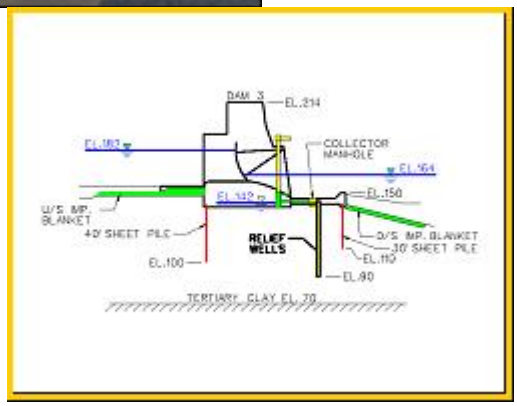
Additional Remarks: The lock is approaching the 40-year point of an anticipated 50-year design life. The major rehabilitation consists of a bank stabilizing project due to on-going downstream soil stability problems. The bank erosion is compromising the channel width/depth and contributes to surge problems within the channel. The concrete lock floor integrity could be compromised, if bank is not stabilized in near future.

JOE HARDIN LOCK AND DAM	April 2010
Official Project Name: Joe Hardin - Dam, AR	**Sub Project:**
Division/District: SWD/Little Rock	**Tributary/Waterway:** McClellan-Kerr Arkansas River Navigation System
Project Authorization:	N/A
Project Status (under construction, authorized or planned): Planned	**Project Type (new construction or rehabilitation) and note if Lock, Dam or Channel:** Major Rehabilitation, Dam

Joe Hardin Lock is located on the right descending bank of the Arkansas River at NM 50.2. The project consists of a 1,260-foot long non-navigable dam with 18 tainter gates that are 60-foot by 30-foot and a 110-foot wide by 600-foot long main chamber.

Project Location Map:

Project Photo:



Current Cost Estimate (ROM, price level):	$10,000,000
Current Remaining Costs FY11 to completion:	$10,000,000
Authorized Base Cost (price level):	N/A
Fully Funded Cost Estimate at Authorization (price level):	N/A
Current Average Annual Net Benefits (price level, discount rate): N/A	**Current Remaining Average Annual Net Benefits (price level, discount rate):** N/A
Current Benefit Cost Ratio (discount rate): N/A	**Current Remaining Benefit Remaining Cost Ratio at 7%:** N/A

Additional Remarks: Water-stop deterioration in concrete structure joints that has allowed under seepage to escape from beneath the dam and carry foundation sand thus forming a void. If not repaired, gradually developing excessive dam deflection down stream during low tailwater, leading to gate jamming and/or cracking in concrete and loss of full spillway discharge capability to a point of instability and possible collapse of structure and/or total gate collapse.

Appendix C: Dam Safety Action Classification Levels

LEVEL 1 – Urgent and Compelling

Level 1 classification is Urgent and Compelling (Unsafe) and indicates a requiring need for immediate action. A Level I dam is near critical failure or has an extremely high risk of failing. On inspection, a progression toward failure due to normal operations has been confirmed. At this level, the dam is almost certain to fail from normal operations immediately to within a few years if intervention does not occur. Also, a combination of negative life or economic consequences is extremely high. When a dam is classified at Level 1, the following actions are recommended:

- Take immediate action to avoid failure
- Validate classification through an external peer review
- Implement interim risk reduction measures, including operational restrictions and ensure that the dam's emergency action plan is current and has been functionally tested for the initiating event
- Conduct heightened monitoring and evaluation
- Expedite investigations to support justification for remediation using all resources and funding necessary
- Initiate intensive management and situation reports.

LEVEL 2 – Urgent

Level 2 classification is Urgent, indicating that the dam is unsafe or potentially unsafe. At this level, a potential failure is foreseen or is at a very high risk to fail soon. For the confirmed and unconfirmed dam safety issues, failure can begin during normal operations or can be caused by a natural event. The likelihood of a failure from one of these occurrences prior to remediation is too high to ensure public safety. Also, the very high risk factor can play into a scenario where a combination of life or economic consequences with probability of failure is very high. When a dam is classified at Level 2, several recommended actions take place:

- Implement interim risk reduction measures, including operational restrictions as justified, and ensure the dam's emergency action plan is current and has been functionally tested for the initiating event
- Conduct heightened monitoring and evaluation
- Expedite confirmation of classification
- Give very high priority for investigations to support justification for remediation.

LEVEL 3 – High Priority

Level 3 classification is High Priority (conditionally unsafe). A dam rated at this level is significantly inadequate and has a moderate to high risk of failure. For either confirmed or unconfirmed dam safety issues, the combination of life or economic consequences with the probability of failure is moderate to high. When a dam is classified at Level 3, several recommended actions take place:

- Implement interim risk reduction measures, including operational restrictions as justified, and ensure the emergency action plan is current and has been functionally tested for the initiating event
- Conduct heightened monitoring and evaluation
- Prioritize for investigations to support justification for remediation considering consequences and other factors.

LEVEL 4 – Priority

Level 4 classification indicates a priority ranking that considers a dam to be marginally safe. A dam rated at this level is inadequate but with a low risk of failure. For the confirmed or unconfirmed dam safety issues, a combination of life or economic consequences with probability of failure is low and may not meet all essential Corps guidelines. When a dam is classified at Level, several recommended actions take place:

- Conduct elevated monitoring and evaluation
- Give normal priority to investigations to validate classification, but no plan for risk reduction measures at the time of rating.

LEVEL 5 – Normal

The Level 5 classification is rated as normal and safe. A dam with this rating is adequately safe and residual risk is considered tolerable. Such dams shows all indications considering them safe while meeting all essential Corps guidelines and with no unconfirmed dam safety issues. When a dam is classified at Level 5, the following action takes place:

- Continue routine dam safety activities, normal operation and maintenance.

Appendix D: Current Project Prioritization List

Capital Investment New Construction Priority List

Phase 1 and 2 Projects					
Division	District	Official Authorization Name (possible future)	Sub-Project Name	Waterway	Total
LRD	LRL	OLMSTED LOCKS AND DAM, IL & KY	Olmsted L/D Construction	Ohio River	90.5
LRD	LRP	MONONGAHELA LOCKS AND DAMS 2, 3 AND 4, PA	Lower Mon 2,3,4, Dam Features	Monongahela River	69.5
LRD	LRP	MONONGAHELA LOCKS AND DAMS 2, 3 AND 4, PA	Lower Mon 2,3,4 Lock Features	Monongahela River	68.8
LRD	LRN	CHICKAMAUGA LOCK, TN	Chickamauga Replacement Lock	Tennessee River	40.2
LRD	LRN	KENTUCKY LOCK ADDITION, KY	Kentucky Lock Addition	Tennessee River	26.3
MVD	MVN	INNER HARBOR NAVIGATION CANAL LOCK, LA	IHNC	Gulf Intracoastal Waterway	23.9
LRD	LRH	GREENUP LOCK, OHIO RIVER, KY & OH	Greenup Lock Extension PED and Construction	Ohio River	59.0
MVD	MVR	UPPER MISSISSIPPI & ILLINOIS WATERWAY LOCKS, Lock and Dam 25	1,200' Lock Addition – includes small scale measures and mitigation	Mississippi River	26.9
MVD	MVR	UPPER MISSISSIPPI & ILLINOIS WATERWAY LOCKS, Lock and Dam 24	1,200' Lock Addition – includes small scale measures and mitigation	Mississippi River	26.9
MVD	MVR	UPPER MISSISSIPPI & ILLINOIS WATERWAY LOCKS, Lock and Dam 22	1,200' Lock Addition – includes small scale measures and mitigation	Mississippi River	26.5
MVD	MVR	UPPER MISSISSIPPI & ILLINOIS WATERWAY LOCKS, Lock and Dam 21	1,200' Lock Addition – includes small scale measures and mitigation	Mississippi River	26.4
MVD	MVR	UPPER MISSISSIPPI & ILLINOIS WATERWAY LOCKS, Lock and Dam 20	1,200' Lock Addition – includes small scale measures and mitigation	Mississippi River	25.8
LRD	LRL	JOHN T. MYERS LOCK AND DAM	Auxiliary Lock Extension	Ohio River	23.3
MVD	MVR	UPPER MISSISSIPPI & ILLINOIS WATERWAY LOCKS, Lagrange Lock and Dam	1200' Lock Addition - includes small scale measures and mitigation	Illinois Waterway	23.2

Phase 1 and 2 Projects					
Division	District	Official Authorization Name (possible future)	Sub-Project Name	Waterway	Total
SWD	SWG	GIWW, HIGH ISLAND TO BRAZOS RIVER, TX		Gulf Intracoastal Waterway	20.6
SWD	SWG	GIWW, MATAGORDA BAY, TX		Gulf Intracoastal Waterway	17.5
SWD	SWL & SWT	MCCLELLAN-KERR ARKANSAS RIVER NAVIGATION SYSTEM, AR	12' Channel	Arkansas River	14.9

Phase 3 Projects					
Division	District	Official Authorization Name (possible future)	Sub-Project Name	Waterway	Total
SWD	SWG	GIWW, BRAZOS RIVER TO PORT O'CONNOR, TX		Gulf Intracoastal Waterway	60.0
LRD	LRP	UPPER OHIO NAVIGATION LOCKS & DAMS IMPROVEMENTS, Emsworth PA	Emsworth Locks & Dams Improvements	Ohio River	50.9
MVD	MVN	BAYOU SORREL LOCK, LA	Replacement. Approved Estimate $102M ($9.6M Nav). Revised (unapproved) $262M ($170M).	Gulf Intracoastal Waterway	46.3
SWD	SWG	GIWW SABINE RIVER TO HIGH ISLAND, TX		Gulf Intracoastal Waterway	45.0
MVD	MVN	CALCASIEU LOCK, LA		Calcasieu River	38.7
LRD	LRP	UPPER OHIO NAVIGATION LOCKS & DAMS IMPROVEMENTS, Dashields PA	Dashields Locks & Dam Improvements	Ohio River	36.3
LRD	LRP	UPPER OHIO NAVIGATION LOCKS & DAMS IMPROVEMENTS, Montgomery PA	Montgomery Locks & Dam Improvements	Ohio River	36.1
LRD	LRH	MELDAHL LOCKS AND DAM, OHIO RIVER, OH & KY	Meldahl Lock Extension PED and Construction	Ohio River	34.7
SWD	SWG	GIWW, PORT O'CONNOR TO CORPUS CHRISTI BAY, TX		Gulf Intracoastal Waterway	30.0
SWD	SWG	GIWW, HIGH ISLAND TO BRAZOS RIVER, TX REALIGNMENT		Gulf Intracoastal Waterway	30.0
SWD	SWG	GIWW MODIFICATION, TX		Gulf Intracoastal Waterway	30.0
MVD	MVK	J. BENNETT JOHNSTON WATERWAY, MISSISSIPPI RIVER, LA	Channel deepening recon study to increase channel from 9' to 12 '	Mississippi River	30.0
SWD	SWL	NORRELL LOCK, AR	Norrell Lock Extension PED and Const	Arkansas River	16
SWD	SWL	NO. 2 LOCK, AR	No. 2 Lock Extension PED and Construction	Arkansas River	16

Phase 3 Projects					
Division	District	Official Authorization Name (possible future)	Sub-Project Name	Waterway	Total
SWD	SWL	EMMETT SANDERS LOCK, AR	Emmett Sanders Lock Extension PED and Const	Arkansas River	15.8
SWD	SWL	JOE HARDIN LOCK, AR	Joe Hardin Lock Extension PED and Const	Arkansas River	15.7
SWD	SWL	COL CHARLES D. MAYNARD LOCK, AR	Col Charles D. Maynard Lock Extension PED and Const	Arkansas River	15.4
LRD	LRN	WILSON LOCK, AL	Wilson Lock Replacement	Tennessee River	15.4
LRD	LRN	WATTS BAR LOCK, TN	Watts Bar Lock Addition	Tennessee River	10.4
LRD	LRN	PICKWICK LOCK, TN	Pickwick Lock Extension	Tennessee River	10.2

Capital Investment Major Rehab Priority List

Phase 1 and 2 Projects					
Division	District	Official Authorization Name (possible future)	Sub-Project Name	Waterway	Total
LRD	LRP	EMSWORTH LOCKS AND DAM, PA (Dam Safety)	Emsworth Major Rehab	Ohio River	53.3
LRD	LRL	MARKLAND LOCKS AND DAM, KY & IN (MAJOR REHAB)	Markland Lock Major Rehab	Ohio River	23.1
MVD	MVS	LOCK AND DAM 25, IL & MO	Rehab scour repairs	Mississippi River	58.8
MVD	MVR	LAGRANGE LOCK & DAM, IL		Illinois Waterway	37.3
NWD	NWW	LOWER MONUMENTAL LOCK AND DAM, WA		Snake River	36.2
MVD	MVR	ILL WW THOMAS O'BRIEN LOCK & DAM, IL		Calumet River	35.0

Phase 3 Projects					
Division	District	Official Authorization Name (possible future)	Sub-Project Name	Waterway	Total
LRD	LRH	GREENUP LOCKS AND DAM, OHIO RIVER, KY & OH	Greenup Dam Rehab PED and Const	Ohio River	91
LRD	LRH	GREENUP LOCKS AND DAM, OHIO RIVER, KY & OH	Greenup Lock Rehab PED and Const	Ohio River	62
LRD	LRH	MELDAHL LOCKS AND DAM, OHIO RIVER, OH & KY	Meldahl Dam Rehab Const	Ohio River	58
LRD	LRP	MONTGOMERY DAM SAFETY PROJECT (MAJOR REHAB)	Montgomery Major Rehab	Ohio River	54
MVD	MVS	UM MEL PRICE	Rehab	Mississippi River	54
MVD	MVS	UM LD25	Rehab	Mississippi River	51
MVD	MVS	UM LD24	Rehab	Mississippi River	51
SWD	SWL	NO. 2 LOCK, AR	No. 2 Lockwall/Bank Slop Rehab	Arkansas River	51
LRD	LRH	MARMET LOCKS AND DAM,	Marmet Dam Rehab	Kanawha River	51

Phase 3 Projects					
Division	District	Official Authorization Name (possible future)	Sub-Project Name	Waterway	Total
		KANAWHA RIVER, WV			
SWD	SWL	JOE HARDIN DAM AR	Joe Hardin Dam Void	Arkansas River	51
LRD	LRH	WILLOW ISLAND LOCKS AND DAM, OHIO RIVER, OH & WV	Willow Island Dam Rehab PED and Const	Ohio River	51
MVD	MVR	UM LD22	Rehab	Mississippi River	50
LRD	LRL	SMITHLAND DAM (MAJOR REHAB), KY	Smithland Dam Major Rehab	Ohio River	50
MVD	MVR	UM LD21	Rehab	Mississippi River	50
MVD	MVR	UM LD20	Rehab	Mississippi River	48
LRD	LRL	JOHN T. MYERS MAIN LOCK (MAJOR REHAB), KY	John T. Myers Main Lock Major Rehab	Ohio River	48
MVD	MVR	UM LD19	Rehab	Mississippi River	48
MVD	MVR	UM LD18	Rehab - Lock	Mississippi River	46
MVD	MVR	UM LD18	Rehab - Dam	Mississippi River	46
LRD	LRP	ALLEGHENY 2 & 3, PA (MAJOR REHAB)	Allegheny 2,3 Major Rehab	Allegheny River	46
MVD	MVR	UM LD17	Rehab	Mississippi River	45
LRD	LRP	NEW CUMBERLAND (MAJOR REHAB), PA	New Cumberland Major Rehab	Ohio River	45
LRD	LRL	NEWBURGH DAM (MAJOR REHAB), IN	Newburgh Dam Major Rehab	Ohio River	45
MVD	MVR	UM LD16	Rehab	Mississippi River	45
MVD	MVR	UM LD14	Rehab	Mississippi River	44
MVD	MVR	STARVED ROCK	Rehab	Illinois Waterway	43
MVD	MVR	UM LD13	Rehab	Mississippi River	42
MVD	MVR	MARSEILLES	Rehab	Illinois Waterway	42
MVD	MVR	UM LD12	Rehab	Mississippi River	42
MVD	MVR	DRESDEN	Rehab	Illinois Waterway	41
MVD	MVR	PEORIA	Rehab	Mississippi River	41
MVD	MVR	UM LD15	Rehab	Mississippi River	41
MVD	MVP	UM LD10	Rehab	Mississippi River	40
LRD	LRL	CANNELTON DAM, IN (MAJOR REHAB)	Cannelton Dam Major Rehab	Ohio River	39
MVD	MVP	UM LD9	Rehab	Mississippi River	39
MVD	MVR	BRANDON ROAD	Rehab	Illinois Waterway	39
LRD	LRL	MCALPINE DAM (MAJOR REHAB), KY	McAlpine Dam Major Rehab	Ohio River	38
LRD	LRH	WINFIELD LOCKS & DAM, KANAWHA RIVER, WV	Winfield Dam Rehab PED and Const	Kanawha River	38
MVD	MVP	UM LD8	Rehab	Mississippi River	38
MVD	MVP	UM LD6	Rehab	Mississippi River	38
MVD	MVP	UM LD7	Rehab	Mississippi River	38

Phase 3 Projects					
Division	District	Official Authorization Name (possible future)	Sub-Project Name	Waterway	Total
MVD	MVP	UM LD5	Rehab	Mississippi River	36
MVD	MVP	UM LD5A	Rehab	Mississippi River	36
MVD	MVP	UM LD4	Rehab	Mississippi River	36
MVD	MVP	UM LD2	Rehab	Mississippi River	35
MVD	MVP	UM LD3	Rehab	Mississippi River	35
LRD	LRH	MELDAHL LOCKS AND DAM, OHIO RIVER, OH & KY	Meldahl Lock & Dam Rehab PED and Const	Ohio River	35
NWD	NWP	JOHN DAY LOCK & DAM REHAB, OR		Columbia River	35
LRD	LRH	RACINE LOCKS & DAM, OHIO RIVER, OH & WV	Racine Dam Rehab PED and Const	Ohio River	33
LRD	LRL	GREEN RIVER LOCKS 1&2, KY (MAJOR REHAB)	Green River Locks 1 & 2 Major Rehab	Green River	33
LRD	LRH	BELLEVILLE LOCKS AND DAM, OHIO RIVER, OH & WV	Belleville Dam Rehab PED and Const	Ohio River	32
SAD	SAM	HOLT LOCK AND DAM, AL		Black Warrior River	32
LRD	LRH	RACINE LOCKS & DAM, OHIO RIVER, OH & WV	Racine Lock Rehab PED and Const	Ohio River	32
MVD	MVP	LOWER ST ANTHONY FALLS	Rehab	Mississippi River	31
MVD	MVP	UM LD1	Rehab	Mississippi River	31
MVD	MVP	UPPER ST ANTHONY FALLS	Rehab	Mississippi River	31
LRD	LRP	PIKE ISLAND, PA (MAJOR REHAB)	Pike Island Major Rehab	Ohio River	30
LRD	LRP	MORGANTOWN, HILDEBRAND, OPEKISKA (MAJOR REHAB)	Upper Mon MHO Major Rehab	Monongahela River	30
LRD	LRL	NEWBURGH MAIN LOCK (MAJOR REHAB), IN	Newburgh Main Lock Major Rehab	Ohio River	28
SWD	SWG	COLORADO RIVER LOCKS, TX		Gulf Intracoastal Waterway	26
LRD	LRP	BRADDOCK LOCKS, PA (MAJOR REHAB)	Braddock Locks Major Rehab	Monongahela River	16
LRD	LRL	CANNELTON LOCK, IN (MAJOR REHAB)	Cannelton Main Lock Major Rehab	Ohio River	12
LRD	LRH	BELLEVILLE LOCKS AND DAM, OHIO RIVER, OH & WV	Belleville Lock & Dam Rehab PED and Const	Ohio River	11
LRD	LRH	LONDON LOCKS & DAM, KANAWHA RIVER, WV	London Dam Rehab PED and Const	Kanawha River	11
LRD	LRH	WILLOW ISLAND LOCKS AND DAM, OHIO RIVER, OH & WV	Willow Island Lock Rehab PED and Const	Ohio River	11
LRD	LRP	MAXWELL (MAJOR REHAB), PA	Maxwell Major Rehab	Monongahela River	10