Recommendations for

IMPROVING THE DELIVERY OF INLAND WATERWAY CAPITAL PROJECTS

WATERWAYS COUNCIL, INC.

The nation's inland waterways, which are vitally important for commerce, face challenges related to aging infrastructure.

The lock and dam network that allows commercial barges to carry cargo down the nation's major rivers and waterways is reaching the end of its useful life, with nearly 80 percent of the facilities over 50 years old and an overall average age of 70 years. In recent years, the U.S. Army Corps of Engineers (USACE) has faced challenges delivering projects to replace the locks and dams—with projects often experiencing substantial cost increases and schedule delays.

This study, commissioned by the Waterways Council, Inc. (WCI), involved interviews with stakeholders at USACE and other agencies to gather input on how to improve the delivery of lock and dam projects. Background research was also completed, including previous studies specifically related to inland waterway projects and more generally to the challenges of delivering large infrastructure projects on time and within budget.

Importance of the Inland Waterway System

The nation's inland waterway system consists of an estimated 25,000 miles of navigable waterways, including both coastal and inland waterways. These waterways are a part of the country's Marine Transportation System, a complex network of coastal and inland waterways, ports, intermodal connections, and their commercial, military, and recreational vessels and users. The inland waterway system is recognized as a key component in the National Strategy for the Marine Transportation System (U.S. Committee on the Marine Transportation System 2023).

The inland waterway system discussed in this report consists of commercially navigable waterways subject to fuel taxes, accounting for approximately 11,000 miles of waterways. Another 1,000 miles of waterways are not part of the taxable system and have few lock and dam structures (U.S. Government Accountability Office 2019).

What Is the Waterways Council, Inc.?

WCI was founded in 2003 and advocates for maintaining our nation's competitiveness and economic growth by supporting the inland waterways network.

Members represent shipping and related companies that rely on "marine highways" to transport valuable and essential cargo to U.S. and international markets.

Nation's navigable waterway system...

25,000 total miles

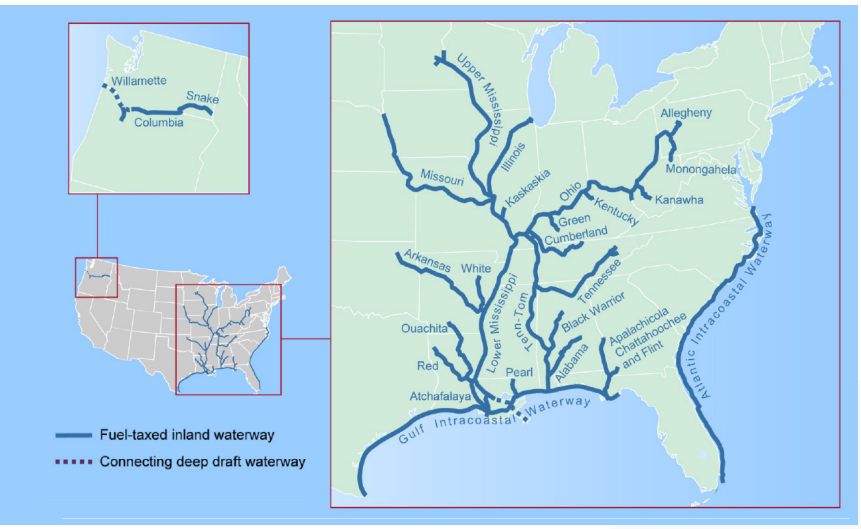
USACE operates and maintains...

12,000 miles → **90%** are taxable

218 lock chambers

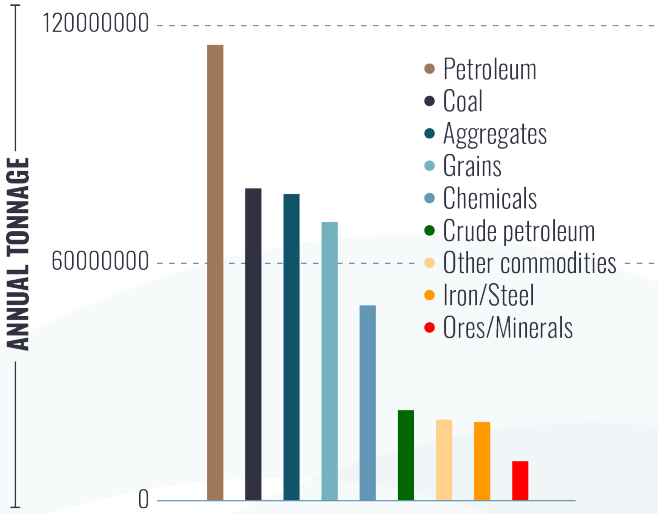
176 sites

INLAND WATERWAYS SUBJECT TO FUEL TAX



Source: From U.S. Government Accountability Office (2019)

WHAT GETS SHIPPED ALONG INLAND WATERWAYS?



Source: USACE (2023)

Aging Infrastructure

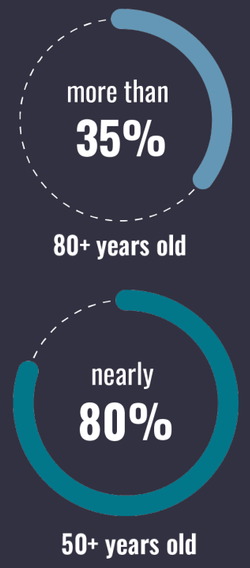
The 11,000 miles of fuel-taxed navigable waterways are a crucial component of our nation's agriculture, energy, and manufacturing supply chains. However, the network of lock and dam infrastructure was constructed in the early twentieth century and has far exceeded its original 50-year design life.

Of the 218 lock chambers in USACE's inland portfolio, 80+ (more than 35 percent) are over 80 years old and 170+ (nearly 80 percent) are over 50 years old. Infrastructure deterioration has made these facilities more susceptible to failures—resulting in unscheduled closures or stoppages. These delays increase congestion and the cost of transporting commodities, compounding the recent effects of inflation on consumers.

The inland waterway construction program that modernizes this aging infrastructure differs from others in USACE's Civil Works mission in several ways. Most Civil Works projects are cost-shared with a non-federal sponsor, such as a local or state government entity, but modernization and rehabilitation of infrastructure on the inland waterways is cost-shared with the Inland Waterways Trust Fund (IWTF).

The IWTF is funded through a 29 cent-per-gallon fuel tax imposed on commercial users of the system (barge operators). The statutorily required cost share of 25 percent is appropriated—along with matching general treasury funds—in the annual Energy and Water Development Appropriations bill. In fiscal year 2024, the IWTF collected $123 million in revenues, making nearly $500 million available for future appropriations when matched with general treasury funds.

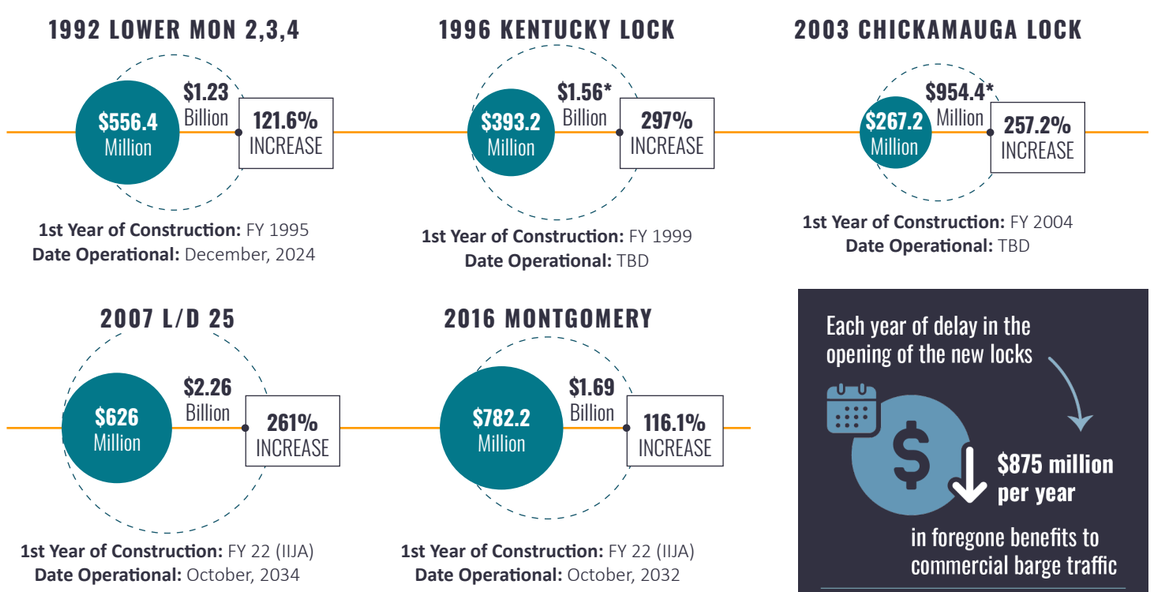
AGING LOCK CHAMBERS



Challenges Encountered During Recent Projects

Since 1987, 10 projects to modernize or expand locks on the inland waterway system have been completed. Seven of those projects began construction between 1987 and 1989 and were constructed in 8 years or less, with cost overruns averaging 33 percent. But over the last 28 years, only three projects have been completed. The most recently completed modernization project in 2018, Olmsted Locks and Dam, took 26 years to complete and increased in cost by 275 percent from its original estimate.

COST OVERRUNS AND SCHEDULE SLIPPAGES ● **Authorized Cost** ◌ **Current Estimated Cost** *****Current cost, expected to increase*



Source: *WCI*

Each year of delay in the opening of the new locks

$875 million per year

in foregone benefits to commercial barge traffic

(U.S. Gov. Accountability Office 2017)

Recommendations

Based on the stakeholder interviews, literature review, and other research, the following recommendations are presented for consideration.

RECOMMENDATIONS FOR CONGRESS

GOAL: Treat inland navigation waterways as a system and provide programmatic funding.

ACTION: Congress recognizes the inland navigation waterways as a system and funds them on a programmatic basis, providing annual amounts to key accounts.

GOAL: Require continuing contracts and/or incremental funding.

ACTION: Congress mandates (will or must) that continuing contracts and/or incremental funding clauses be used for the inland navigation waterways system.

GOAL: Direct use of alternative contract delivery approaches.

ACTION: Congress directs and provides funding to USACE to pursue pilot projects for the inland navigation waterways system using alternative contract delivery methods.

GOAL: Support USACE priority projects.

ACTION: Congress commits to supporting USACE priorities, as expressed in the CIS. Congressional members will not request specific projects outside of the prioritized list.

RECOMMENDATIONS FOR ADMINISTRATION OUTSIDE USACE

GOAL: Rescind or modify EO 12322.

ACTION: The Administration rescinds or modifies EO 12322 to address OMB's role in withholding critical information related to water resources projects needed by Congress for appropriation decision-making.

GOAL: Allow use of continuing contracts clause.

ACTION: OMB allows USACE to use continuing contracts clause once again, on the condition that USACE establishes detailed guidance providing accountability through criteria related to project size, duration, and funding.

RECOMMENDATIONS FOR USACE HEADQUARTERS

GOAL: Create an inland navigation waterways system program office.

ACTION: USACE HQ will create a separate Program Management Office (PMO) for inland navigation waterways system projects potentially separate from the current Navigation Branch to ensure implementation of the CIS occurs as intended.

GOAL: Follow the Capital Investment Strategy (CIS).

ACTION: As an annual update to the outyear funding baseline scenario of CIS, the USACE PMO for inland navigation waterways creates and implements an Inland Navigation Investment Plan to prioritize and schedule feasibility reports and major rehabilitation reports based on prior year funding received and actual project execution.

GOAL: Centralize competencies and deepen knowledge base.

ACTION: USACE ensures project management continuity and technical capabilities/expertise exist as related to the design and construction of the inland navigation waterways system through a hybrid (in-person and virtual) approach.

GOAL: Improve cost estimates.

ACTION: USACE follows BOR's process for improving project cost estimates, using value planning, design, cost estimating, and construction (DEC), and value engineering throughout the project lifecycle. USACE also facilitates the use of reference class forecasting (RCF) by establishing a central database and providing access to cost data for completed projects.

GOAL: Use standard designs.

ACTION: USACE uses standard designs for locks and dams to the extent possible and creates a standard set of drawing details, models, and specifications for proven components that require little or no site adaptation.

GOAL: Encourage the use of ECI/IDaC and design-build.

ACTION: USACE identifies pilot projects that may benefit from the ECI and IDaC approaches, allowing the contractor to collaborate with the designer during the design phase, resulting in better outcomes related to cost, schedule, and quality.

GOAL: Collaborate with industry and outside agencies.

ACTION: USACE enhances best practice identification and adoption by outside designers, agencies, contractors, and foreign countries with inland waterway project expertise.

GOAL: Create contracting plans.

ACTION: Regardless of project delivery method, USACE develops a contracting plan specific to each project, identifying separate project elements and the optimal delivery mechanism for each project element.

GOAL: Use 3D modeling and design and conduct constructability reviews.

ACTION: USACE designs every lock from the start in 3D CAD and fully designs each lock as a system, as opposed to designing in pieces.

GOAL: Expand site investigation efforts.

ACTION: USACE performs more rigorous site investigations as part of 35% design (or a comparable stage of alternative contract delivery) to better identify critical information. USACE identifies any land acquisition and other NEPA requirements and risks early and conducts community outreach and cultural and environmental investigations.

GOAL: Improve cost estimating and value engineering.

ACTION: USACE engages independent cost estimators and/or conducts IEPR of cost and schedule estimates at each stage of design. Update cost databases quarterly rather than just indexing.

Current Funding and Economic Framework

A recurring upkeep challenge for the inland navigation system is uncertainty around annual funding appropriation timing. Since 2010, USACE has operated under 54 Continuing Resolutions. Most of uncertainty relates to when funds will become available, rather than if funds will be received at all. Uncertainty has complicated USACE efforts to plan ahead.

Another economic challenge is the budgetary criterion for a favorable benefit-cost ratio (BCR). Inland navigation projects have traditionally not competed well under this framework because the narrow definition of benefits is limited primarily to transportation cost savings. However, the inland navigation system actually yields broader benefits to economic development, energy and sustainability, and safety/security/resilience. USACE now requires a comprehensive social, environmental, and economic benefit-cost analysis (BCA) be completed. WCI is interested in developing new models that consider widespread lock and dam project benefits to help achieve a favorable BCR.

Current Administrative Framework

Other administrative hurdles lengthen execution time for critical projects and increase the costs—ultimately placing a large burden on the taxpayer. Two primary administrative challenges for the inland waterways program stem from Executive Order (EO) 12322. This 1980s mandate requires any federal or federally assisted water and related land resources project proposal must be submitted to the Office of Management and Budget (OMB) for review before receiving Congressional approval. This has created a bottleneck for basic, fact-based data and information.

Additionally, no mechanism currently exists for USACE to recommend the use of continuing contracts for large scale civil works projects. Billion-plus dollar projects cannot be constructed in a single year. A recommendation for a huge project to be fully funded is not in the best interest of the taxpayer. The amount that should be funded is what could be executed in any given year, freeing up funding for other projects and maximizing use of appropriated dollars.

Considering the challenges—EO 12322 could be adjusted or eliminated by the current Administration, or Congress could legislatively address the issues.

Project Selection and Delivery

Seventeen USACE Districts currently take the lead in selecting and delivering inland waterway projects. Districts provide input and the CIS recommends prioritization based on condition. However, CIS recommendations are not always consistently followed as projects are authorized and appropriated.

USACE has worked to improve inland navigation project delivery by establishing the Inland Navigation Design Center (INDC) Mandatory Center of Expertise to handle engineering, design, analysis, and review for the construction, rehabilitation, maintenance, and operation of lock and dam projects.

While this has fostered technical competency, it requests District staffing resources for individual project work and requests INDC responses to individual Districts' project priorities because no programmatic structure exists to systematically prioritize needs.

Further Discussion

SYSTEM APPROACH AND PROGRAMMATIC FUNDING

The top recommendation is to view the inland navigation waterways as a system, versus a series of individual projects. With a system approach, the inland waterways can be administered as a program, with funding centrally managed. This could also be effective in the change management arena.

CONTINUING CONTRACTS

Continuing contracts make a difference in terms of better quality and better cost and schedule risk management with fewer contractors. The recommendation to reimplement the continuing contracts clause would help with predictability and cost control.

ALTERNATIVE CONTRACT DELIVERY

The recommendation regarding alternative contract delivery approaches is based on examples of federal agencies successfully using innovative acquisition strategies such as ECI, IDAC, and other contracting approaches that mitigate cost and schedule risks.

INVESTMENT PLAN

Annual updates to the CIS' outyear baseline scenario would provide a vehicle for scheduling construction modernization projects based on prior year funding received and actual execution. The update should continue to follow CIS recommendations.

IMPROVED COST ESTIMATES

USACE should pursue a systematic review and analysis of processes, systems, equipment, facilities, services, and supplies that achieve essential functions at the lowest life cycle cost—while meeting performance, reliability, quality, and safety requirements. A multidisciplinary team may perform this value analysis/engineering process in a workshop environment.

DESIGN MATURITY

As an alternative to immediately requesting construction funding after feasibility completion, consider deferring the request until appropriate design maturity has been reached—typically 35% to 40% (or a comparable state of alternative contract delivery). Or, after the project has been authorized by Congress, request PED funds only for purposes of progressing the design to achieve a greater cost confidence level before requesting construction funding. This would align project execution with funding timelines for efficient scheduling.

STANDARD DESIGN

Similar to the practice of standardization used in military programs, leverage the use of the INDC as a standardization center for the inland waterway system. This is meant to achieve savings and benefits in the programming, design, construction, and operation and maintenance of infrastructure.

OTHER ISSUES

Interviews and background research revealed other issues that may contribute to USACE's inland navigation waterways project performance, including the duration, geography, and scarcity of lock and dam infrastructure replacement projects; across-the-board increases in construction costs experienced by many industries; the challenges related to governmental requirements that do not apply to private-sector projects; lack of schedule and cost incentives; inadequate initial cost estimates; and project team experience.

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