Lock Gate Replacement System

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Presenters

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The Scope

Provide a suitable Lifting Device to Remove and Replace both Lower Pool Lock Gates. These Lock Gates shall be completely assembled for both removal and installation with the following dimensions:

- 85’ Tall
- 65’ Wide
- 7’ Thick
- 360 Tons / Each
Additional Scope Requirements

The successful solution will provide a way to handle complete installation of the Gates within 30 Days. (Extending work beyond the scheduled outage would have severe economic effects on the region).
Competitive Advantage

The ability to perform the work of replacing the gates “in the dry” would provide a higher degree of safety and allow the Corps of Engineers to perform functions that had not been done in decades.
The Solution

A portable, high capacity bridge crane that would span the Lock and replace the gates, and do so "in the dry."

Barnhart was awarded the Project with approximately 3 weeks to prepare.
ENGINEERING AND PLANNING

• Challenges
  – The Span
  – The Weight (360 Tons Each)
  – The Obstructions
    • The Operations Room and the Maintenance Room
    • The “Voids” in the Lock Wall surface for mechanical access
  – Tailing the Load
  – Securing the Gates for Dewatering
  – The Weather (Hurricane Ivan)
  – The Schedule (30 Days)
The Planning Phase

• Design and Fabrication (3 Weeks!)
• Two Important Load Tests
  – One in Memphis for Full Functionality
  – One in Alabama using the 330 Ton Crawler as the Test Load
• Component Load Out for Rapid Assembly
• Safety At Every Step
Project Execution

Removal and Replacement Procedure
Each leaf was removed by rotating it out of its “hinges”, lifting it between the 8’ Deep Trolley Girders, and lowering it onto a barge using the barge as the tailing device.
Installation and Dewatering

After the New Gates were removed from the delivery barge and temporarily installed, the Lock would be dewatered for final installation and inspection procedures.
INNOVATION AND INGENUITY

• Newly Designed Equipment
  – Trolley Gantry utilizing the BCR Containerized 500 Ton Hoist
  – BCR Gripper System w/ Wheel Mounted End Trucks

• Modification of Existing Equipment
  – 150’ Long, 8’ Deep Box Girders were developed using existing 60’ Long Girders. (60’, 90’, 120’, 150’ Lengths)
BCR 8’ DEEP, 150’ LONG BOX GIRDERs

LATERAL TORSIONAL BUCKLING
MLT TROLLEY W/ 500 TON HOIST
FINITE ELEMENT ANALYSIS
Minds Over Matter
BCR WHEELED GRIPPER SYSTEM
COMMERCIAL LIMITATIONS

This Project was a **Fixed, Lump Sum Proposal** with an agreement to accept **liquidated damages** for exceeding scheduled outage days.

Barnhart completed assembly, removal, replacement, dewatering procedure and permanent installation lifting within **15 days**.
SAFETY OVERVIEW

• No OSHA Recordables
• No First Aids (Includes Load Test, Load Out, Erection, and Execution)
• Daily Safety Meetings with Corps
• Pre-Lift Meetings with Job Assignments for the Crew
• 100% Remote Operations
• Met or exceeded Army Corps of Engineers Safety Manual Requirements
• Awarded Army Corps of Engineers Annual Safety Award
Barnhart’s Key to Fit Any Lock

Thank You
Presenters Contact Info

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