



**US Army Corps
of Engineers**®
Rock Island District

LOCK & DAM 16 (MUSCATINE, IOWA) MISSISSIPPI RIVER

General Contractors:
Lock and Dam: Central Engineering Company, Davenport, Iowa
Construction: 1933-1937
Congressional Districts: IA-2; IL-17

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 complex stretches across the river at a point where the valley is wide. The earthen embankment section of the dam straddles portions of Hog Island in the main channel.

The movable dam has 12 non-submersible Tainter gates (20-feet high and 40-foot long), three submersible Tainter gates of the same dimensions, and four non-submersible roller gates (20-feet high and 80-foot long). The dam system also includes a linear, concrete capped, ogee spillway; and a submersible earth and sand-filled dike.

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 9 feet with an average lift of 6.5 feet. It takes approximately 7 minutes to fill or empty the lock chamber. It takes 8 hours for water to travel from Lock and Dam 15, in Davenport, Iowa, to Lock and Dam 16.

HISTORY/SIGNIFICANCE

The lock opened in 1937. Dam 16 was the last dam in the Rock Island District to employ non-submersible roller gates, as well as Tainter gates (submersible and non-submersible), which had steel sheeting on only one side. It was also the first dam in the District in which all the Tainter gates were operated by line shafts and motors housed in installations above each gate, rather than from locomotive hoist cars running on the dam's service bridge. The lock and dam elements of the complex were completed at a cost of \$3,682,000.

ANNUAL TONNAGE (10-YEAR HISTORICAL)

<u>Year</u>	<u>Tons</u>	<u>Year</u>	<u>Tons</u>
1998	28,872,800	2003	25,912,587
1999	33,139,184	2004	21,279,884
2000	30,583,395	2005	21,350,740
2001	26,451,754	2006	22,708,972
2002	30,323,912	2007	21,598,027

(MORE INFORMATION ON THE REVERSE SIDE)

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COMMODITY TONNAGE & LOCKAGES (2007)

Coal	4,326,203	<u>Subtotals:</u>	
Petroleum	366,980		
Chemicals	2,588,407	Grain	10,551,633
Crude Materials	1,842,087	Steel	271,942
Manufactured Goods	726,157		
Farm Products	11,701,363	<u>Lockages:</u>	
Manufactured Machinery	34,410		
Waste Material	1,800	Boats:	3,366
Containers & Pallets	1,624	Cuts:	4,384
Unknown	8,996		

CURRENT MAINTENANCE ISSUES – LOCK & DAM 16

Item (Critical Rank Order)

Systemic Bulkhead Slots
 Systemic Miter Gate Replacement
 Damage-Overflow Spillway Concrete
 Repair Roller End Shields & Seals - Dam
 Systemic Structural Repairs - Tainter and Roller Gates
 - Exterior
 Systemic - Crane Rail Adjustments - Dam
 Systemic Structural Repairs Service Bridge Dam
 Structural Repairs - Tainter and Roller Gates - Interior
 Systemic Repair Auxiliary Lock Gates, Including New
 Bulkhead Slots

Miter Gate Machinery/Gearbox Repair
 Systemic Tainter Valve Replacement
 Dam Rehabilitation Evaluation Report
 Replacing 70-Year Old Lock Pontoon Barge (Work Flats)
 Wave Damage and Upper End Approach Repair
 Bridge Crane Repairs to Lattice Boom & Crane
 Undercarriage
 Systemic - Standby Generator and Compressor Enclosures
 New Maintenance Building

TOTAL ESTIMATED COST: \$32,300,000

The existing 9-foot Channel Navigation Project was largely constructed in the 1930's and extends down the Upper Mississippi River from Minneapolis-St. Paul to its confluence with the Ohio River and up the Illinois Waterway to the Thomas J. O'Brien Lock in Chicago. It includes 37 Locks and approximately 1,200 miles of navigable waterway in Illinois, Iowa, Minnesota, Missouri, and Wisconsin. The system's 600-foot locks do not accommodate today's modern tows without splitting and passing through the lock in two operations. This procedure requires uncoupling barges at midpoint which triples lockage times and exposes deckhands to increased accident rates.

More than 580 manufacturing facilities, terminals, and docks ship and receive tonnage in the Upper Mississippi River basin. In 2005, the system moved more than 160 million tons of commercial cargo worth roughly \$28.5 billion. Grains (corn and soybeans) dominate traffic on the system. Other commodities, mainly cement and concrete products, comprise the second largest group. A modern 15-barge tow transports the equivalent of 870 large semi-trucks (22,500 cargo tons, 787,500 bushels, or 6,804,000 gallons). Annually, the project generates an estimated \$1 billion of transportation cost savings compared with the operation and maintenance costs of approximately \$115 million.

In constant dollar terms, operations and maintenance funding for the system has been largely flat or declining for decades, while maintenance needs of the aging infrastructure increase. This is adversely affecting reliability of the system. Long-established programs for preventative maintenance of major lock components have essentially given way to a fix-as-fail strategy, with repairs sometimes requiring weeks or months to complete. Depending on the nature of a lock malfunction, extended repairs can have major consequences for shippers, manufacturers, consumers, and commodities investors.

POINT OF CONTACT

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