



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

LOCK & DAM 11 (DUBUQUE, IOWA) MISSISSIPPI RIVER

General Contractors:

Lock: Warner Construction Company, Chicago Illinois
Dam: Maxon Construction Company, Inc., Dayton, Ohio

Construction: 1934-1937

Congressional Districts: IA-1; WI-3

DESCRIPTION

Lock and Dam 11 borders on the northern edge of Dubuque, Iowa, and is 583 miles above the confluence of the Mississippi and Ohio rivers. A complex of islands and sloughs extends three-quarters of the way across the river from the Wisconsin shore. The Upper Mississippi River Wildlife and Fish Refuge occupies the land adjacent to the Wisconsin shore, both upstream and downstream from the dam.

The movable dam has 13 submersible Tainter gates (20-feet high, 60-feet long) and three submersible roller gates (20-feet high, 100-feet long). The roller gates submerge eight feet. The dam system also includes a 3,540-foot long, curved, non-overflow, 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 603.0; approximately 19 feet above the tail waters below the dam at low water. The maximum lift is 11 feet with an average lift of 9.4 feet. It takes approximately 7 minutes to fill or empty the lock chamber. It takes 9 hours for water to travel from Lock and Dam 10, in Guttenberg, Iowa, to Lock and Dam 11.

HISTORY/SIGNIFICANCE

The lock opened in 1937. Dams 11 and 18 were designed concurrently, and were the first dams in the Rock Island District to employ submersible, elliptical Tainter gates. They were also the first dams in the District to use submersible roller gates.

Lock and Dam 11 was scheduled to be above Sprecht's Ferry, Iowa, but in 1933 was relocated to Dubuque. The acute unemployment in Dubuque led the government to begin construction on this complex before others of its class. During the peak of construction, the complex employed 901 people. The lock and dam elements of the complex were completed at a cost of \$7,430,000.

ANNUAL TONNAGE (10-YEAR HISTORICAL)

<u>Year</u>	<u>Tons</u>	<u>Year</u>	<u>Tons</u>
1998	20,333,245	2003	18,276,060
1999	22,504,873	2004	15,769,584
2000	20,756,882	2005	16,347,999
2001	17,340,441	2006	17,048,863
2002	20,966,149	2007	16,228,148

(MORE INFORMATION ON THE REVERSE SIDE)

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COMMODITY TONNAGE & LOCKAGES (2007)

Coal	4,038,819	<u>Subtotals:</u>	
Petroleum	485,621		
Chemicals	1,737,701	Grain	6,956,724
Crude Materials	1,765,103	Steel	157,721
Manufactured Goods	625,227		
Farm Products	7,544,198	<u>Lockages:</u>	
Manufactured Machinery	22,909		
Waste Material	1,000	Boats:	6,724
Unknown	7,570	Cuts:	4,221

CURRENT MAINTENANCE ISSUES – LOCK & DAM 11

Item (Critical Rank Order)

Repair or Replace Emergency Gates
L&D 11 Stage II Lock Rehabilitation - Major Rehabilitation
L&D 11 Stage II Lock Rehabilitation Operations & Maintenance Portion
L&D 11 Stage III Dam Rehabilitation - Major Rehabilitation
Systemic Miter Gate Replacement
Repair Roller End Shields & Seals
Central Control Station Flood Proofing
Systemic Tainter Valve Replacement
Dam Rehabilitation Evaluation Report
Replacing 70-Yr Old Lock Pontoon Barges (Work Flats)
Bridge Crane Repairs to Lattice Boom & Crane Undercarriage

TOTAL ESTIMATED COST: \$63,300,000

Breakdowns of mechanical and electrical equipment are becoming more frequent with resultant delays and loss of revenue to commercial waterway users. The electrical system presents safety concerns due to its age and insulation deterioration. The 70-year-old miter gates require extensive rehabilitation. If Lock 11 miter gates are damaged, the lock would be closed for an indefinite period until the gates are repaired or replaced. Potential unscheduled closures of 60 days have been estimated if the electrical or mechanical systems fail. Transportation impacts associated with a 60-day closure of Lock 11 would approach \$30.9 million. The improvement work is accomplished in three stages.

Stage I, Dam Scour Protection -- Involves placing additional scour protection upstream and downstream of the dam. This was completed in 2003.

Stage II, Lock -- Involves the rehabilitation of the navigation lock chamber and associated parts. Major work items include resurfacing the lock chamber, replacing the original lock machinery and electrical systems, bulkhead slots, repairing guidewall concrete, repairing Tainter valves, and bulkhead procurement. A lock closure took place the winter of 2005-2006 and the contractor completed the upper guidewall concrete repairs, installed bulkhead slots, and rehabilitated the filling and emptying system Tainter valves. Work will continue during a lock closure the winter of 2007-2008.

Stage III, Dam -- Involves the rehabilitation of the navigation dam. Major work includes the replacement of the electrical system, replacement of Tainter gate chains, repair of roller gate chains, and removal and replacement of deteriorated concrete on the dam piers. Insufficient funds to commence the Stage III design will likely delay a contract award to FY09, with construction completion in FY10.

Portions of the rehabilitation efforts are cost shared 50/50 with the Inland Waterways Trust Fund, which collects money from a barge fuel tax.

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7 March 2008



**US Army Corps
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Rock Island District

LOCK & DAM 12 (BELLEVUE, IOWA) MISSISSIPPI RIVER

General Contractors:

Lock: James Stewart Corporation, Chicago Illinois
Dam: Warner Construction Company, Chicago Illinois

Construction: 1934-1938

Congressional Districts: IA-1; IL-16

DESCRIPTION

Lock and Dam 12 is 556.7 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; a complex of islands and sloughs extends nearly three-quarters of the way across the river from the Illinois side. Bellevue State Park occupies the high ground on the Iowa side, while the urbanized area of Bellevue extends to the government-owned property on the flat land below the bluff. The Lost Mound Unit of Upper Mississippi River National Wildlife and Fish Refuge occupies the islands, slough, and small flat bottom areas on the Illinois side.

The movable dam consists of seven submersible Tainter gates (20-feet high and 64-feet long) and three submersible roller gates (20-feet high and 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.

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. It takes approximately 10 minutes to fill or empty the lock chamber. It takes 8 hours for water to travel from Lock and Dam 11, in Dubuque, Iowa, to Lock and Dam 12.

HISTORY/SIGNIFICANCE

The lock opened in 1938. During the peak of construction, a maximum of 1,217 men were employed at one time. The lock and dam elements of the complex were completed at a cost of \$5,581,000.

ANNUAL TONNAGE (10-YEAR HISTORICAL)

<u>Year</u>	<u>Tons</u>	<u>Year</u>	<u>Tons</u>
1998	21,596,296	2003	19,622,041
1999	24,426,919	2004	17,350,487
2000	22,280,448	2005	17,672,950
2001	19,098,873	2006	18,655,930
2002	23,031,159	2007	17,681,771

(MORE INFORMATION ON THE REVERSE SIDE)

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COMMODITY TONNAGE & LOCKAGES (2007)

Coal	3,996,770	<u>Subtotals:</u>	
Petroleum	401,956		
Chemicals	2,089,998	Grain	7,863,070
Crude Materials	1,980,406	Steel	176,400
Manufactured Goods	650,106		
Farm Products	8,531,987	<u>Lockages:</u>	
Manufactured Machinery	24,354		
Containers & Pallets	1,624	Boats:	4,679
Unknown	4,570	Cuts:	4,088

CURRENT MAINTENANCE ISSUES – LOCK & DAM 12

Item (Critical Rank Order)

Repair or Replace Emergency Gates
Systemic Bulkhead Slots
Systemic Miter Gate Replacement
Repair Spillway
Major Rehabilitation Stage III Dam Repairs
Repair Roller End Shields & Seals - Dam
Central Control Station Flood Proofing
Systemic - Crane Rail Adjustments - Dam
Systemic Tainter Valve Replacement
Dam Rehabilitation Evaluation Report
Replacing 70-year Old Lock Pontoon Barge (Work Flats)
Bridge Crane Repairs to Lattice Boom & Crane Undercarriage

TOTAL ESTIMATED COST: \$27,000,000

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.

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7 March 2008



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

LOCK & DAM 13 (FULTON, ILLINOIS) MISSISSIPPI RIVER

General Contractors:
Lock and Dam: McCarthy Improvement Company, Davenport, Iowa
Construction: 1935-1939
Congressional Districts: IA-1; IL-16

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 movable dam consists of 10 submersible Tainter gates, 20-feet high and 64-feet long; and 3 submersible roller gates, 20-feet high and 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.

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. It takes approximately 10 minutes to fill or empty the lock chamber. It takes 10 hours for water to travel from Lock and Dam 12, in Bellevue, Iowa, to Lock and Dam 13.

HISTORY/SIGNIFICANCE

The Lock opened in 1939. Locks and Dams 13, 14 and 17 were designed and built concurrently. The site for the lock was inaccessible from the nearest highway. As a result, the general contractor constructed a dike road to the site through the sloughs, islands, and marshy bottom lands of the Illinois shore. A ferry had to be operated during the construction of the dam and central control station. It was also necessary to divert Johnson Creek so that it entered the river downstream from the lock site. The lock and dam elements of the complex were completed at a cost of \$7,503,000.

ANNUAL TONNAGE (10-YEAR HISTORICAL)

<u>Year</u>	<u>Tons</u>	<u>Year</u>	<u>Tons</u>
1998	21,866,721	2003	19,990,636
1999	24,803,042	2004	17,729,645
2000	22,746,082	2005	18,028,251
2001	19,277,553	2006	19,078,754
2002	23,495,472	2007	18,030,735

(MORE INFORMATION ON THE REVERSE SIDE)

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COMMODITY TONNAGE & LOCKAGES (2007)

Coal	3,985,350	<u>Subtotals:</u>	
Petroleum	401,956		
Chemicals	2,096,384	Grain	8,204,136
Crude Materials	1,974,848	Steel	182,877
Manufactured Goods	655,366		
Farm Products	8,889,453	<u>Lockages:</u>	
Manufactured Machinery	24,254		
Containers & Pallets	1,624	Boats:	3,941
Unknown	1,500	Cuts:	3,903

CURRENT MAINTENANCE ISSUES – LOCK & DAM 13

Item (Critical Rank Order)

Repair or Replace Emergency Gates
Systemic Bulkhead Slots
Systemic Miter Gate Replacement
Repair Roller End Shields & Seals - Dam
Central Control Station Flood Proofing
Structural Repairs - Tainter and Roller Gates Exterior
Systemic - Crane Rail Adjustments - Dam
Systemic Tainter Valve Replacement
Lock Checkpost Replacement
Dam Rehabilitation Evaluation Report
Replacing 70-Year Old Lock Pontoon Barge (Work Flats)
Bridge Crane Repairs to Lattice Boom & Crane Undercarriage
Flood Damage - Repair/Raise Entrance Road
New Water Supply Well
Scour Repair at Dam and Riverwall
Systemic - Standby Generator and Compressor Enclosures
New Maintenance Building

TOTAL ESTIMATED COST: \$24,400,000

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.

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7 March 2008



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

LOCKS & DAM 14 (PLEASANT VALLEY, IOWA) MISSISSIPPI RIVER

General Contractors:

Lock and Dam: Central Engineering Company, Davenport, Iowa

Construction: 1935-1940

Congressional Districts: IA-1; IL-17

DESCRIPTION

Lock and Dam 14 is 4 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 movable dam has 13 non-submersible Tainter gates (20-feet high and 60-foot long) and four submersible roller gates (20-feet high and 100-foot long). The dam system also includes an earth and sand-filled dike.

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. It takes approximately 8 minutes to fill or empty the main lock. It takes 9 hours for water to travel from Lock and Dam 13, in Fulton, Iowa, to Lock and Dam 14.

HISTORY/SIGNIFICANCE

The lock opened in 1940. The Corps built the oldest elements of this complex between 1921 and 1924, during the six-foot channel project. As part of that channelization, the Corps built a longitudinal dam paralleling the Iowa shore from the head of the Rock Island Rapids at LeClaire, to the head of Smith's Island. The dam formed the riverward wall of the LeClaire Canal, by which vessels could bypass the rapids. The Iowa shore served as the canal's landwall. Most of the longitudinal dam was submerged when Dam 14 was built; however, a portion of the original canal near the dam is still used as a mooring and storage site. The lock and dam elements of the complex were completed at a cost of \$6,439,000.

ANNUAL TONNAGE (10-YEAR HISTORICAL)

<u>Year</u>	<u>Tons</u>	<u>Year</u>	<u>Tons</u>
1998	27,277,374	2003	24,224,248
1999	30,839,734	2004	20,626,075
2000	28,348,136	2005	20,819,999
2001	24,264,635	2006	21,934,232
2002	28,428,345	2007	20,675,817

(MORE INFORMATION ON THE REVERSE SIDE)

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COMMODITY TONNAGE & LOCKAGES (2007)

Coal	3,972,497	<u>Subtotals:</u>	
Petroleum	412,515		
Chemicals	2,560,897	Grain	9,279,079
Crude Materials	2,589,334	Steel	215,452
Manufactured Goods	697,442		
Farm Products	10,413,618	<u>Lockages:</u>	
Manufactured Machinery	21,294		
Waste Material	600	Boats:	3,304
Containers & Pallets	1,624	Cuts:	4,099
Unknown	5,996		

CURRENT MAINTENANCE ISSUES – LOCK & DAM 14

Item (Critical Rank Order)

Systemic Bulkhead Slots
 Systemic Miter Gate Replacement
 Repair Roller End Shields & Seals - Dam
 Structural Repairs - Tainter and Roller Gates Exterior
 Systemic - Crane Rail Adjustments - Dam
 Modify Downstream Approach
 Repair Miter Gate SPD Reducer
 Systemic Repair Auxiliary Lock Gates, Including New Bulkhead Slots
 Systemic Tainter Valve Replacement
 Dredge Main Lock Upstream Approach

Dam Rehabilitation Evaluation Report
 Painting Under Dam Service Bridge
 Replacing 70-Year Old Lock Pontoon Barge (Work Flats)
 Bridge Crane Repairs to Lattice Boom & Crane Undercarriage
 Repairs to Auxiliary Lock 14 - Machinery Bases
 Upper Bullnose Repair
 Auxiliary Lock Valves Rehabilitation
 Main Lock Chamber - Armoring
 Systemic - Standby Generator and Compressor Enclosures

TOTAL ESTIMATED COST: \$29,200,000

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.

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7 March 2008



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



LOCKS & DAM 15 (ROCK ISLAND, ILLINOIS) MISSISSIPPI RIVER

General Contractors:

Lock: Merritt-Chapman & Whitney Corporation, Duluth, Minnesota

Dam: D.A. Healy Company, Detroit, Michigan

Construction: 1931-1934

Congressional Districts: IA-1; IL-17

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 movable dam has 11 non-submersible roller gates (each 100-foot long). Nine of the gates have 19-foot, 4-inch diameters; two of the gates have 16-foot, 2-inch diameters.

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. It takes approximately 7 minutes to fill or empty the lock chambers. It takes 3 hours for water to travel from Lock and Dam 14, in Pleasant Valley, Iowa, to Lock and Dam 15.

HISTORY/SIGNIFICANCE

The lock complex opened in 1934. Locks and Dam 15 was the first 9-Foot Channel Project complex, and served as a prototype for the whole system. Still, Dam 15 is unusual among the Project as it is composed entirely of roller gates, employs only non-submersible roller gates, has roller gates of differing sizes, contains non-standard length roller gates, is not at a right angle to the river, includes no earthen embankment dike section, incorporates a power plant that generates electricity to operate its gates and valves, and uses an open-truss service bridge with a bulkhead-lifting crane on its lower chord. The complex is also unusual because the intermediate locks' wall encases a bridge swing span. The lock and dam elements of the complex were completed at a cost of \$2,524,700.

ANNUAL TONNAGE (10-YEAR HISTORICAL)

<u>Year</u>	<u>Tons</u>	<u>Year</u>	<u>Tons</u>
1998	27,440,301	2003	24,923,417
1999	31,209,760	2004	20,948,490
2000	28,753,278	2005	20,991,007
2001	24,707,186	2006	21,942,068
2002	28,829,063	2007	20,880,043

(MORE INFORMATION ON THE REVERSE SIDE)

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COMMODITY TONNAGE & LOCKAGES (2007)

Coal	3,952,506	<u>Subtotals:</u>	
Petroleum	415,604		
Chemicals	2,540,775	Grain	9,709,330
Crude Materials	2,309,798	Steel	213,775
Manufactured Goods	864,378		
Farm Products	10,772,518	<u>Lockages:</u>	
Manufactured Machinery	20,140		
Waste Material	1,200	Boats:	5,120
Containers & Pallets	1,624	Cuts:	4,873
Unknown	1,500		

CURRENT MAINTENANCE ISSUES – LOCKS & DAM 15

Item (Critical Rank Order)

Systemic Bulkhead Slots	Dam Rehabilitation Evaluation Report
Dam Gate Rehabilitation - Exterior	Rehabilitate Concrete on River Wall, Erosion Repairs to Lower Guidewall
Rehabilitation of Bulkhead Hoist	Bridge Crane Repairs to Lattice Boom & Crane Undercarriage
Systemic Miter Gate Replacement	Tainter Valve Limit Switch Replacement and Relocation
Repair Roller End Shields & Seals - Dam	Hydropower Turbine Rehabilitation
Systemic Structural Repairs Service Bridge Dam	Scour Repair
Replace/Rehabilitate Motors and Brakes for Roller Gates	Davenport Seawall Interior Inspection
Structural Repairs - Tainter and Roller Gates - Interior	Rehabilitate Boat Dock
Systemic Repair Auxiliary Lock Gates, Including New Bulkhead Slots	Construct Central Control Station /Visitor Center Addition
Systemic Tainter Valve Replacement	
Lock Checkpost Replacement	

TOTAL ESTIMATED COST: \$35,500,000

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.

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7 March 2008



**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	Boats:	3,366
Waste Material	1,800	Cuts:	4,384
Containers & Pallets	1,624		
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.

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7 March 2008



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LOCK & DAM 17 (NEW BOSTON, ILLINOIS) MISSISSIPPI RIVER

General Contractors:

Lock: Massman Construction Company and
Massman-Peterman Company, Kansas City, Missouri
Dam: Maxon Construction, Dayton, Ohio

Construction: 1935-1939

Congressional Districts: IA-2; IL-17

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 movable dam has eight submersible Tainter gates (20-feet high and 64-feet long) and three submersible roller gates (20-feet high and 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.

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 8 feet with an average lift of 4 feet. It takes approximately 7 minutes to fill or empty the lock chamber. It takes 6 hours for water to travel from Lock and Dam 16 in Muscatine, Iowa, to Lock and Dam 17.

HISTORY/SIGNIFICANCE

The lock opened in 1939. The site was inaccessible from the nearest highway. As a result, the contractors for the lock had to construct a 3.7-mile-long entrance road. The remoteness of the site caused other problems. Not enough workers could commute to the job site from their homes. As a result, the Massman Construction Company and the Massman-Peterman Company built a workers' camp near the lock and dam site. This camp consisted of eleven 16-man bunk houses and a large mess hall. During the peak of construction in July 1936, 626 men were employed on the project. The lock and dam elements of the complex were completed at a cost of \$4,164,000.

ANNUAL TONNAGE (10-YEAR HISTORICAL)

<u>Year</u>	<u>Tons</u>	<u>Year</u>	<u>Tons</u>
1998	30,015,252	2003	27,171,584
1999	34,170,210	2004	22,107,520
2000	31,375,823	2005	22,596,983
2001	27,451,332	2006	24,046,856
2002	31,631,819	2007	22,843,570

(MORE INFORMATION ON THE REVERSE SIDE)

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COMMODITY TONNAGE & LOCKAGES (2007)

Coal	4,929,824	<u>Subtotals:</u>	
Petroleum	371,780		
Chemicals	2,731,648	Grain	11,043,794
Crude Materials	1,756,936	Steel	276,642
Manufactured Goods	730,197		
Farm Products	12,276,775	<u>Lockages:</u>	
Manufactured Machinery	32,490		
Waste Material	1,800	Boats:	2,655
Containers & Pallets	1,624	Cuts:	3,906
Unknown	10,496		

CURRENT MAINTENANCE ISSUES – LOCK & DAM 17

Item (Critical Rank Order)

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

Systemic Tainter Valve Replacement
 Lock Rehabilitation Evaluation Report
 Riprap Repair
 Riverwall Concrete Horizontal Resurfacing
 Dam Rehabilitation Evaluation Report
 Bridge Crane Repairs to Lattice Boom & Crane
 Undercarriage
 Flood Damage-Repair Sidewalk Upper/Lower Guidewall
 Systemic - Standby Generator and Compressor Enclosures
 Resurface Entrance Road
 New Maintenance Building

TOTAL ESTIMATED COST: \$33,800,000

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.

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7 March 2008



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Rock Island District

LOCK & DAM 18 (GLADSTONE, ILLINOIS) MISSISSIPPI RIVER

General Contractors:

Lock: Maxon Construction Company, Dayton, Ohio

Dam: S.A. Healy Company, Chicago, Illinois

Construction: 1934-1937

Congressional Districts: IA-2; IL-17

DESCRIPTION

Lock and Dam 18 is 410.5 miles above the confluence of the Mississippi and Ohio rivers. The bottom lands on both shores are flat and punctuated by sloughs, marshes, and reefs. The river is dotted with low islands of various sizes. The Oquawka State Wildlife Refuge is adjacent to the lock and dam complex on the Illinois shore. The installation's esplanade interrupts a levee and functions as part of the Henderson River diversion that converted Turkey Island into an extension of the Illinois shore.

The dam is composed of 14 submersible Tainter gates (20-feet high and 60-feet long) and three submersible roller gates (20-feet high and 100-feet long). All gates submerge to a depth of eight feet. The dam also includes a submersible earth and sand-filled dike, a non-overflow earth and sand-filled dike, and two transition dikes.

Lock dimensions are 110-feet wide by 600-feet long with additional provisions for an auxiliary lock. Normal upper pool elevation is 528.0, about 13 feet above the dam tail waters at low water. Maximum lift is 9.8 feet with an average lift of 6.9 feet. It takes approximately 10 minutes to fill or empty the lock. It takes 8 hours for water to travel from Lock and Dam 17, in New Boston, Illinois, to Lock and Dam 18.

HISTORY/SIGNIFICANCE

The lock opened in 1937. Dams 11 and 18 were the first in the Rock Island District to employ submersible, elliptical Tainter gates. They were also the first two dams in the District to use submersible roller gates. This complex also involved the diversion of Henderson River so that it entered the Upper Mississippi immediately below the lock and dam. During the peak of construction in September 1934, the project employed 960 men as laborers and 74 men as supervisors. Average employment was 478 laborers and 44 supervisors.

The lock and dam elements of the complex were completed at a cost of \$4,122,400.

ANNUAL TONNAGE (10-YEAR HISTORICAL)

<u>Year</u>	<u>Tons</u>	<u>Year</u>	<u>Tons</u>
1998	31,228,140	2003	28,389,384
1999	35,707,505	2004	23,015,891
2000	32,864,097	2005	23,602,042
2001	28,570,073	2006	25,262,995
2002	32,948,597	2007	24,193,022

(MORE INFORMATION ON THE REVERSE SIDE)

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COMMODITY TONNAGE & LOCKAGES (2007)

Coal	4,934,026	<u>Subtotals:</u>	
Petroleum	371,780		
Chemicals	2,741,040	Grain	12,362,325
Crude Materials	1,760,615	Steel	276,642
Manufactured Goods	730,397		
Farm Products	13,622,074	<u>Lockages:</u>	
Manufactured Machinery	19,170		
Waste Material	1,800	Boats:	3,257
Containers & Pallets	1,624	Cuts:	4,401
Unknown	10,496		

CURRENT MAINTENANCE ISSUES – LOCK & DAM 18

Item (Critical Rank Order)

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

Miter Gate Machinery/Gearbox Repair
 Systemic Tainter Valve Replacement
 Lock Rehabilitation Evaluation Report
 Replacing 70-Year Old Lock Pontoon Barge (Work Flats)
 Bridge Crane Repairs to Lattice Boom & Crane Undercarriage
 Repair Henderson River Bridge
 Systemic - Standby Generator and Compressor Enclosures
 Resurface Entrance Road (1,200')
 New Maintenance Building

TOTAL ESTIMATED COST: \$51,750,000

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.

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7 March 2008



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LOCK & DAM 19 (KEOKUK, IOWA) MISSISSIPPI RIVER

General Contractors:

Stage I: McCarthy Improvement Company, Davenport, Iowa
 Stage II: Jones Construction Company, Charlotte, North Carolina
 Stage III: Oil Gear Company, Milwaukee, Wisconsin
 Stage IV: Evans Electrical Construction Company, Omaha, Nebraska
Construction: (1910-1914) 1952-1957
Congressional Districts: IA-2; IL-17

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. It takes approximately 10 minutes to fill; 9.25 minutes to empty the lock. It takes 12 hours for water to travel from Lock and Dam 18, in Gladstone, Illinois, to Lock and Dam 19.

HISTORY/SIGNIFICANCE

The lock opened in 1957. The lock and dam complex was not built as part of the original 9-foot navigation channel project. The Des Moines Canal Bullnose was built from 1867-1870 as part of the Corps' 4-foot channel project. The Keokuk and Hamilton Water Power Company built the dam, power plant, dry dock, and original lock from 1910-1914.

The Corps built the 1,200-foot lock, control houses, utility building, and esplanade in four stages: Stage I – Construction of lock lower approach (1952-1954); Stage II – Lock construction (1954-1956); Stage III – Manufacture and delivery of electrical control equipment and upstream gate operating equipment (1954); Stage IV – Installation of power, control, and lighting system (1956-1957).

During the peak of construction, 415 people were employed. Elements of the lock and dam were listed on the National Register of Historic Places in 1978. The complex was completed at a cost of \$37,909,000.

ANNUAL TONNAGE (10-YEAR HISTORICAL)

<u>Year</u>	<u>Tons</u>	<u>Year</u>	<u>Tons</u>
1998	31,076,726	2003	29,827,673
1999	35,803,139	2004	24,190,511
2000	34,097,581	2005	24,697,974
2001	30,128,512	2006	26,390,867
2002	34,914,721	2007	25,504,854

(MORE INFORMATION ON THE REVERSE SIDE)

COMMODITY TONNAGE & LOCKAGES (2007)

Coal	3,829,396	<u>Subtotals:</u>	
Petroleum	396,268		
Chemicals	2,923,029	Grain	14,388,333
Crude Materials	1,850,077	Steel	282,786
Manufactured Goods	734,948		
Farm Products	15,739,962	<u>Lockages:</u>	
Manufactured Machinery	17,040		
Waste Material	1,800	Boats:	3,054
Containers & Pallets	1,624	Cuts:	2,720
Unknown	10,710		

CURRENT MAINTENANCE ISSUES – LOCK & DAM 19

Item (Critical Rank Order)

Major Rehabilitation
Concrete Work - Major Maintenance
Major Rehabilitation – Operations & Maintenance Portion
Downstream Cell Replacement
Mooring Bits Rehabilitation
Ice Gate Study
Systemic Tainter Valve Replacement
Repair Lock Valve Intake Screens
Dewatering Guard Gate
Replacing 70-Year Old Lock Pontoon Barge (Work Flats)
Remove Rock to Modify Downstream Approach
Replace Roof and Brick Veneer on Lock Building
Rehabilitate Upper Control Buildings
Restore Old Lock and Drydock

TOTAL ESTIMATED COST: \$53,250,000

As the structures and equipment approach the end of their project lives, breakdowns and failure of mechanical and electrical equipment become more frequent and expensive, with resultant delays and loss of revenue to commercial waterway users. The rehabilitation involves the navigation lock chamber and associated parts. Major work items include resurfacing the lock chamber, rehabilitation of Tainter valves, replacing and refurbishing the lock machinery, miter gates and overall site electrical systems. The rehabilitation was started in Fiscal Year 2003 with a Congressional add of \$500,000. Funding for rehabilitation projects is normally provided through Construction General funds, and cost shared 50/50 with the Inland Waterways Trust Fund for the Major Rehabilitation portion of the work; and Operations & Maintenance funds used for the Major Maintenance portion of the work.

Stage I -- Upper gates repair is scheduled for completion in March 2008.

Stage II, Lock Rehabilitation and Miter Gate Replacement -- completed in 2006. After four months of operation, the lower land wall miter gate developed a grinding noise. In 2007, in-house crews repaired the gate. This emergency repair was not included in the Fiscal Year 2007 or 2008 budget, as a result it drew funds from Stage I.

Concrete resurfacing of the lock chamber is deferred (more than \$30 million) due to Operations & Maintenance funding levels that will not permit completion of all major maintenance elements.

Potential unscheduled closures of 90 days have been estimated and associated with failures of mechanical equipment. Transportation impacts associated with a 90-day closure of Lock 19, outside of the winter closure, would approach \$53 million. AmerenUE, a privately owned utility company, owns the adjacent navigation/hydroelectric dam.

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7 March 2008



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LOCK & DAM 20 (CANTON, MISSOURI) MISSISSIPPI RIVER

General Contractors:

Lock: Maxon Construction, Dayton, Ohio

Dam: S.A. Healy Company, Detroit, Michigan, and Davenport, Iowa

Construction: 1932-1935

Congressional Districts: MO-9; IL-17

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 movable dam has three non-submersible roller gates (20-feet high and 60-foot long), 34 non-submersible Tainter gates (20-feet high and 40-foot long), and six submersible Tainter gates (20-foot high and 40-foot long). The submersible Tainter gates submerge three feet.

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. It takes approximately 7 minutes to fill or empty the lock chamber. It takes 6 hours for water to travel from Lock and Dam 19, in Keokuk, Iowa, to Lock and Dam 20.

HISTORY/SIGNIFICANCE

The lock opened in 1935. Dam 20 was the first dam in the Rock Island District to include Tainter gates. The plans originally called for all of the Tainter gates to be operated by hoist cars traveling on the dam's service bridge. However, the District modified two Tainter gates so they were individually operated by line shafts and motors housed in installations above each gate. This operating machinery worked so well that all subsequent Tainter gates in the 9-foot channel project, regardless of which district they were in, used line shafts and motors. Lock and Dam 20 was the first complex in the District on the Mississippi River to undergo major rehabilitation. The lock and dam elements of the complex were completed at a cost of \$3,363,500.

ANNUAL TONNAGE (10-YEAR HISTORICAL)

<u>Year</u>	<u>Tons</u>	<u>Year</u>	<u>Tons</u>
1998	31,745,410	2003	30,811,633
1999	36,530,515	2004	25,228,357
2000	35,015,410	2005	25,564,051
2001	31,113,406	2006	27,584,821
2002	35,902,022	2007	26,423,478

(MORE INFORMATION ON THE REVERSE SIDE)

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COMMODITY TONNAGE & LOCKAGES (2007)

Coal	3,926,590	<u>Subtotals:</u>	
Petroleum	390,482		
Chemicals	2,928,533	Grain	15,096,740
Crude Materials	1,866,566	Steel	296,843
Manufactured Goods	739,733		
Farm Products	16,530,030	<u>Lockages:</u>	
Manufactured Machinery	27,410		
Waste Material	1,800	Boats:	3,168
Containers & Pallets	1,624	Cuts:	4,464
Unknown	10,710		

CURRENT MAINTENANCE ISSUES – LOCK & DAM 20

Item (Critical Rank Order)

Miter Gate Replacement
 Systemic Bulkhead Slots
 Lock Strut Arm Replacements and Traveling Kevel Rail
 Mule Replacements
 Systemic Miter Gate Replacement
 Raise Gate/Valve Machinery
 Systemic - Crane Rail Adjustments - Dam
 Structural Repairs - Tainter and Roller Gates - Interior
 Initiate Rehabilitation Evaluation Report for Ice/Debris
 Gate
 Systemic Structural Repairs Service Bridge Dam
 Systemic Structural Repairs - Tainter and Roller Gates
 - Exterior
 Miter Gate Machinery/Gearbox Repair
 Systemic Tainter Valve Replacement
 Lock Checkpost Replacement

Dam Rehabilitation Evaluation Report
 Repair Lock Ladder Recesses
 Repair Lock Armor Plates
 Replacing 70-Year-Old Lock Pontoon Barge (Work Flats)
 Lock Concrete Condition Survey and Repairs
 Repairs to Guide Cells and Erosion Repairs at Lower Ends
 Bridge Crane Repairs To Lattice Boom & Crane
 Undercarriage
 Repair Upstream Landwall Bullnose
 Replace Dam Decking
 Repair Downstream Dam Bullnose
 Control Station Repairs
 Rehabilitation of Lock Roadway
 Repair Canton Creek Bridge
 Systemic - Standby Generator and Compressor Enclosures

TOTAL ESTIMATED COST: \$40,900,000

The Water Resources Development Act of 2007 (WRDA 07) Title VIII authorized the dual-purpose navigation and ecosystem restoration plan for the Upper Mississippi River and Illinois Waterway. The new 1,200-foot lock, which will be located in the auxiliary lock chamber, will cost approximately \$221,000,000. The design and construction of the new lock is dependent upon annual appropriations.

The 9-foot Navigation Project was largely constructed in the 1930's and includes 37 Locks and 1,200 miles of waterway in Illinois, Iowa, Minnesota, Missouri, and Wisconsin. The system's 600-foot locks require tows to split and lock through in two operations. This requires uncoupling barges which triples lockage times and exposes deckhands to safety risks.

More than 580 manufacturing facilities, terminals, and docks ship and receive tonnage on the system. In 2005, more than 160 million tons of cargo worth roughly \$28.5 billion moved on the system. Annually, the project generates an estimated \$1 billion of transportation cost savings compared to 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 increase. Long-established programs for preventative maintenance have essentially given way to a fix-as-fail strategy, with repairs sometimes requiring weeks or months to complete. Depending on the lock malfunction, extended repairs can have major consequences for shippers, manufacturers, consumers, and commodities investors.

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7 March 2008



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LOCK & DAM 21 (QUINCY, ILLINOIS) MISSISSIPPI RIVER

General Contractors:

Lock: Joseph Meltzer, Inc., New York, New York

Dam: McCarthy Improvement Company, Davenport, Iowa

Construction: 1933-1939

Congressional Districts: MO-9; IL-17

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.

The movable dam has 10 submersible, elliptical Tainter gates (20-feet high and 64-feet long) and three submersible roller gates (20-feet high and 100-feet long). The dam system also includes two earth and sand-filled transitional dikes, and a submersible earth dike.

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. It takes approximately 7 minutes to fill or empty the lock chamber. It takes 5 hours for water to travel from Lock and Dam 20, in Canton, Missouri, to Lock and Dam 21.

HISTORY/SIGNIFICANCE

Because Lock and Dam 21 was located adjacent to Quincy, which had acute unemployment, the complex was built before some of the other, higher priority locks and dams. The lock, central control station, and esplanade were completed by August 1935. At that point, however, no money was available to begin the dam. As a result, representatives from Quincy vigorously, and successfully, lobbied for federal money to construct the dam as a work relief project. The dam was completed in 1939. The lock and dam elements of the complex were completed at a cost of \$4,155,000.

ANNUAL TONNAGE (10-YEAR HISTORICAL)

<u>Year</u>	<u>Tons</u>	<u>Year</u>	<u>Tons</u>
1998	33,312,353	2003	32,025,867
1999	37,863,139	2004	26,556,326
2000	36,449,116	2005	27,127,688
2001	32,874,457	2006	29,497,577
2002	37,208,243	2007	28,546,672

(MORE INFORMATION ON THE REVERSE SIDE)

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COMMODITY TONNAGE & LOCKAGES (2007)

Coal	3,974,706	<u>Subtotals:</u>	
Petroleum	469,682		
Chemicals	3,227,448	Grain	15,596,918
Crude Materials	2,034,027	Steel	316,968
Manufactured Goods	765,758		
Farm Products	18,043,347	<u>Lockages:</u>	
Manufactured Machinery	25,280		
Waste Material	1,800	Boats:	3,273
Containers & Pallets	1,624	Cuts:	4,670
Unknown	3,000		

CURRENT MAINTENANCE ISSUES – LOCK & DAM 21

Item (Critical Rank Order)

Systemic Miter Gate Replacement - Includes Miter Gate Rehabilitation Report	Miter Gate Machinery/Gearbox Repair
Systemic Bulkhead Slots	Systemic Tainter Valve Replacement
Dam Gate Rehabilitation – Exterior	Rehabilitation Evaluation Report
Lock Strut Arm Replacements & Traveling Kevel Rail Mule Replacements	Concrete & Armor Repairs
Repair Roller End Shields & Seals	Replacing 70-Year-Old Lock Pontoon Barges (Work Flats)
Structural Repairs - Roller & Tainter Gates – Interior	Bridge Crane Repairs to Lattice Boom & Crane Undercarriage
Systemic - Crane Rail Adjustments	Systemic - Standby Generator & Compressor Enclosures
Upper Approach Erosion Repairs	Pave Lower Turnaround & Ranger Station Entrance
Dam Piers Concrete Repairs	New Maintenance Building
Resurface Horizontal Concrete Intermediate Wall & Riverwall	

TOTAL ESTIMATED COST: \$35,700,000

The Water Resources Development Act of 2007 (WRDA 07) Title VIII authorized the dual-purpose navigation and ecosystem restoration plan for the Upper Mississippi River and Illinois Waterway. The new 1,200-foot lock, which will be located in the auxiliary lock chamber, will cost approximately \$322,000,000. The design and construction of the new lock is dependent upon annual appropriations.

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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7 March 2008



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



LOCK & DAM 22 (SAVERTON, MISSOURI) MISSISSIPPI RIVER

General Contractors:

Lock: Joseph Meltzer, Inc., New York, New York

Dam: Massman Construction Company, Kansas City, Missouri

Construction: 1934-1939

Congressional Districts: MO-9; IL-17

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 movable dam has nine non-submersible Tainter gates (25-feet high and 60-foot long), one submersible Tainter gate (25-feet high and 60-foot long), and three submersible roller gates (25-feet high and 100-foot long). Completing the dam system are two transition dikes 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 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. It takes approximately 7 minutes to fill or empty the lock chamber. It takes 7 hours for water to travel from Lock and Dam 21, in Quincy, Illinois, to Lock and Dam 22.

HISTORY/SIGNIFICANCE

The lock opened in 1939. It was on the submersible roller gates at Dam 22 that the Rock Island District introduced the Poiree dam trestles to mitigate scour problems. The trestles were subsequently used as a retrofit solution on other project dams. It was also on this dam's submersible roller gates that the St. Paul District Hydraulic Laboratory conducted tests that led to the design of stilling basins for roller gates. The Rock Island District incorporated an experimental design for a submersible roller gate with end shields and introduced a new type of non-submersible, truss-type Tainter gate in Dam 22. During the peak of construction, 959 people were employed on the installation. The lock and dam elements of the complex were completed at a cost of \$3,943,000.

ANNUAL TONNAGE (10-YEAR HISTORICAL)

<u>Year</u>	<u>Tons</u>	<u>Year</u>	<u>Tons</u>
1998	33,648,345	2003	32,229,405
1999	38,074,304	2004	26,755,587
2000	36,812,642	2005	27,371,325
2001	33,336,062	2006	29,789,804
2002	37,567,046	2007	28,908,447

(MORE INFORMATION ON THE REVERSE SIDE)

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COMMODITIES/TONS (2007)

Coal	4,003,358	<u>Subtotals:</u>	
Petroleum	471,182		
Chemicals	3,182,071	Grain	15,815,219
Crude Materials	2,026,562	Steel	325,238
Manufactured Goods	924,877		
Farm Products	18,256,378	<u>Lockages:</u>	
Manufactured Machinery	23,780		
Waste Material	1,800	Boats:	3,017
Containers & Pallets	1,624	Cuts:	4,613
Unknown	16,815		

CURRENT MAINTENANCE ISSUES – LOCK & DAM 22

Item (Critical Rank Order)

Systemic Bulkhead Slots	Repair Concrete and Protection Armor in Lock Chamber
Systemic Tainter Valve Replacement – Includes Rehabilitation Evaluation Report	Repair Upstream Riverwall Bullnose
Dam Gate Rehabilitation - Exterior	Dam Rehabilitation Evaluation Report
Repair Spillway	Replacing 70-Year-Old Lock Pontoon Barge (Work Flats)
Systemic Miter Gate Replacement	Repairs to Guide Cells and Erosion Repairs at Lower Ends
Repair Roller End Shields & Seals - Dam	Bridge Crane Repairs To Lattice Boom & Crane Undercarriage
Structural Repairs - Tainter and Roller Gates - Interior	Storage Yard Repairs
Systemic - Crane Rail Adjustments - Dam	Damage-Repair Lower Landwall Vertical Concrete
Resurface Horizontal Surfaces of Bridge Piers	Systemic - Standby Generator and Compressor Enclosures
Systemic Structural Repairs Service Bridge Dam	New Maintenance Building

TOTAL ESTIMATED COST: \$33,150,000

The Water Resources Development Act of 2007 (WRDA 07) Title VIII authorized the dual-purpose navigation and ecosystem restoration plan for the Upper Mississippi River and Illinois Waterway. The new 1,200-foot lock, which will be located in the auxiliary lock chamber, will cost approximately \$232,000,000. The design and construction of the new lock is dependent upon annual appropriations.

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