Lock & Dam 4

(Alma, Minnesota)
Minnesota River

U.S. ARMY CORPS OF ENGINEERS **BUILDING STRONG®**

Construction: 1931-1938
General Contractors:
Lock: Ouillmette Construction & Engineering Co., Chicago, Ill.
Dam: United Construction Co., Winona, Minn.

Congressional District: MN-1; WI-3

Description

Lock and Dam 4 is located at Mississippi River Mile 752.8 in Alma, Wisconsin, about 90 miles below Minneapolis.

The main lock is located along the left descending bank and consists of a single lock chamber, 110 feet wide by 600 feet long with an upper pool elevation of 667.0 feet, a tailwater elevation of 660.0 feet, and a vertical lift of 7.0 feet. There are miter gates at each end of the lock chamber. There is a partial auxiliary lock consisting of an upstream set of miter gates and short concrete riverwall section. The foundation is piles in sand and gravel.

The dam consists of a concrete structure 1,357 feet long with six roller gates and 22 Tainter gates. The movable dam has six roller gates (20 feet high by 60 feet long), 18 non-submersible Tainter gates (15 feet high by 35 feet long), and four submersible Tainter gates (15 feet high by 35 feet long). Completing the dam system is an earthen embankment approximately 5,500 feet long, located between the movable dam and high ground on the Minnesota side of the river. The dam foundation consists of piles in sand and gravel.

The site has a public observation platform open from dawn to dusk from April to November.

History/Significance

The lock was put in operation in May 1935. At the time it was built, the dam's combination of roller and Tainter gates was believed to have been the first of its type to be constructed. Cold weather created several problems during construction of the complex. Approximately 120 timber pilings split and had to be pulled and replaced; engineers speculated that sap freezing in the green pilings may have caused the splitting. Ten major injuries, 296 minor injuries, and three deaths were reported during the construction of the dam.

The pool created by Lock and Dam 4 is the longest in river miles (44.1 miles) with the largest water area of all the Mississippi River pools in the St. Paul District. It encompasses Lake Pepin, which was formed in geologic time by sediment deposited in the Mississippi River at the mouth of Wisconsin's Chippewa River. The lake is 22 miles long and up to 2.5 miles wide. It is the only natural lake in the Mississippi River's main channel.

Annual Tonnage (20-Year Historical)

Year	Tons	Year	Tons	Year	Tons	Year	Tons
1992	9,638,080	1997	10,594,942	2002	11,536,928	2007	7,842,780
1993	8,107,590	1998	11,352,000	2003	9,897,604	2008	5,314,060
1994	10,199,820	1999	12,350,700	2004	8,575,017	2009	7,760,740
1995	10,522,568	2000	11,798,328	2005	8,054,094	2010	7,937,466
1996	11,399,178	2001	9,355,461	2006	8,238,928	2011	7,480,662

Commodity Tonnage & Lockages (2011)

Coal	284,886
Petroleum	290,307
Chemicals	1,299,790
Crude Materials	1,601,125
Manufactured Goods	711,177
Farm Products	3,258,570
Manufactured Machinery	19,607
Waste Material	0
Unknown	15,200

Subtotals:	Grain	3,025,628
	Steel	30,150
Lockages:	Commercial Boats:	714
	Recreation Boats:	6,558
	Light Boats:	49
	Other Boats:	54
	Total Boats:	7,375
	Total Cuts:	3,687

The 9-Foot Channel Project

Lock and Dam 4 is one of 29 locks and dams on the Upper Mississippi River that provide a water stairway of travel for commercial and recreational traffic from Minneapolis to the Gulf of Mexico.

The existing 9-foot Channel Navigation Project was largely constructed in the 1930s 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 maintenance needs of the aging infrastructure are increasing at a rate much greater than the operations and maintenance funding provided for the system which adversely affects reliability of the system. Long-established programs for preventive 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 malfunction, extended repairs can have major consequences for shippers, manufacturers, consumers, and commodities investors.

Additionally, 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.

There are more than 580 manufacturing facilities, terminals, grain elevators, and docks that ship and receive tonnage in the Upper Mississippi River basin. 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 1,050 large semi-trucks (26,250 cargo tons, 875,000 bushels, or 17,325,000 gallons). Annually, the 9-foot project generates an estimated $1 billion of transportation cost savings compared with the operation and maintenance costs of approximately $115 million.