



# 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.

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**U.S. ARMY CORPS OF ENGINEERS – ST. PAUL DISTRICT**

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## Annual Tonnage (20-Year Historical)

<u>Year</u>	<u>Tons</u>	<u>Year</u>	<u>Tons</u>	<u>Year</u>	<u>Tons</u>	<u>Year</u>	<u>Tons</u>
2015	8,056,761	2010	7,919,466	2005	8,054,094	2000	11,798,328
2014	7,356,865	2009	7,760,740	2004	8,575,017	1999	12,340,409
2013	6,779,341	2008	5,314,060	2003	9,797,604	1998	11,639,859
2012	7,720,632	2007	7,842,780	2002	11,534,928	1997	10,692,193
2011	7,480,662	2006	8,238,928	2001	9,355,461	1996	11,609,190

## Commodity Tonnage (2015)

All Units (Ferried Autos, Passengers, Railway Cars)	-
Coal, Lignite, and Coal Coke	42,400
Petroleum and Petroleum Products	242,671
Chemicals and Related Products	1,808,350
Crude Materials, Inedible, Except Fuels	1,533,353
Primary Manufactured Goods	825,720
Food and Farm Products	3,588,498
Manufactured Equipment & Machinery	7,919
Waste Material	4,700
Unknown or Not Elsewhere Classified	3,150

## Vessel & Lockage Data (2015)

Average Delay - Tows (Hours)	0.56	Non-Commercial Vessels	98
Average Processing Time (Hours)	0.27	Non-Commercial Flotillas	97
Barges Empty	1,359	Non-Commercial Lockages/Cuts	97
Barges Loaded	5,515	Percent Vessels Delayed (%)	8
Commercial Vessels	962	Recreational Vessels	5,021
Commercial Flotillas	955	Recreational Lockages	2,311
Commercial Lockages/Cuts	1,287	Total Vessels	6,081
Non-Vessel Lockages	4	Total Lockages/Cuts	3,699

## The 9-foot Channel Navigation Project

The 9-foot Channel Navigation Project includes 37 lock and dam sites (42 locks) on 1,200 river miles in Illinois, Iowa, Minnesota, Missouri and Wisconsin. Constructed largely in the 1930s, it extends from Minneapolis-St. Paul on the Upper Mississippi River to its confluence with the Ohio River and up the Illinois Waterway to the T.J. O'Brien Lock in Chicago.

The maintenance needs of this aging infrastructure have surpassed annual operations and maintenance funding. This limited funding has adversely affected reliability of the system and has primarily resulted in a fix-as-fail strategy, with repairs sometimes requiring days, weeks or months. Depending on the nature of a failure and extent of repairs, shippers, manufacturers, consumers and commodity investors can experience major financial consequences. Additionally, today's 1,200'-long tows must split and lock through in two operations within the Project's 600' chambers. This procedure doubles and triples lockage times, increases costs and wear to lock machinery, and exposes deckhands to higher accident rates.

More than 580 facilities ship and receive commodities within the Project. Grains (corn and soybeans) dominate traffic; cement and concrete products are the second largest group. A modern 15-barge tow transports the equivalent of 1,050 semi-trucks (26,250 tons, 937,387 bushels of corn, or 240 rail cars). Annually, the 9-foot project generates an estimated \$1 billion of transportation cost savings compared to its approximately \$115 million operation and maintenance cost.

UPDATE: May 2016