McAlpine
Locks and Dam
at the
Falls of the Ohio

McAlpine Locks and Dam Project History

The McAlpine project is located on the Ohio River 606 miles downstream from Pittsburgh, Pa. The navigation locks are located on the left descending bank of the river in the historic Portland neighborhood with access off 27th Street at Northwestern Parkway. The locks have the highest lift (37 feet) of any of the locks on the Ohio. The dam pools water 75 miles upriver to Markland Locks and Dam.

For over 200 years, the United States Army Corps of Engineers has been at work surveying, mapping, constructing, and operating navigation facilities to provide safe passage around the Falls of the Ohio.

The Louisville and Portland Canal and a three-lift lock system were completed in 1830. They provided the first improvements to navigation at the Falls, the most hazardous obstruction on the 981 mile-long river. This project was built by a stock company chartered by the Commonwealth of Kentucky, in which the Federal government became the major stockholder.

At the request of State government, Army engineers assisted with construction of larger locks and widening the Canal in the 1860s and 1870s.

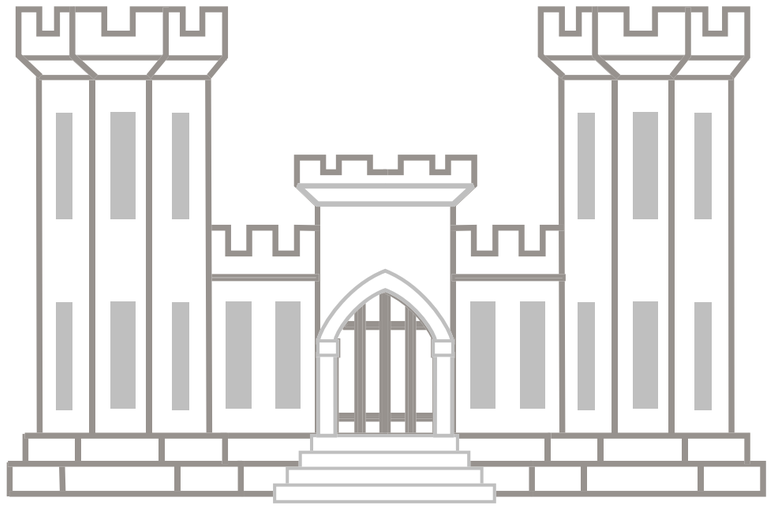
Following failure of the company to continue operation, the Federal government assumed jurisdiction at the Falls in 1874, and the U.S. congress assigned operation and maintenance duties to the Army Corps of Engineers. Since then the Corps has undertaken several projects to provide safe and dependable navigation at the Falls.

In the 1920s the Canal was widened again, and a lock 600 feet long by 110 feet wide was constructed as part of the “canalization” of the River, a massive project resulting in 51 locks and dams the length of the River. As part of this navigation system, the project at the Falls was named Lock and Dam No. 41, and consisted of the locks and a moveable wicket dam. The hydroelectric generating station was also built in this era to serve the Louisville Gas and Electric Company.

In the 1950s, the Corps began a navigation “modernization” program for the entire Ohio River to replace the old wicket dams and 600 foot locks. Construction of a lock chamber 110 feet wide and 1,200 feet long began in 1958 and was completed in 1961. Work on a new dam started in 1961 and was completed in 1964. The dam is a non-navigable structure, meaning all traffic must pass through the locks. The Canal was enlarged again in this era to 500 feet wide.

In 1960, the project name was changed to McAlpine Locks and Dam, in honor of William H. McAlpine, the only civilian to serve as District Engineer at Louisville, and who later held key positions in the office of the Chief of Engineers in Washington, D.C.

To meet future navigation needs at the Falls, a second 1,200 foot lock was completed in 2009. This will continue the Corps of Engineers’ heritage of providing a safe and efficient navigation infrastructure at the Falls well into the 21st century.



Compiled by Charles E. Parrish, District Historian
Layout by Jack B. Sweeney, Louisville District

For more information about McAlpine Locks and Dam, please contact the Louisville District Corps of Engineers

U.S. Army Corps of Engineers
Public Affairs Office
P.O. Box 59
Louisville, KY 40201-0059

THE FALLS OF THE OHIO
1784

The beautiful river Ohio, bounds Kentucke in its whole length, being a mile and sometimes less in breadth, and is sufficient to carry boats of great burthen. Its general course is south 60 degrees west; and in its course it receives numbers of large and small rivers, which pay tribute to its glory. The only disadvantage this fine river has, is a rapid, one mile and a half long, and one mile and a quarter broad, called the Falls of Ohio. In this place the river runs over a rocky bottom, and the descent is so gradual, that the fall does not probably in the whole exceed twenty feet. In some places we may observe it to fall a few feet. When the stream is low, empty boats only can pass and repass the rapid; their lading must be transported by land; but when high, boats of any burthen may pass. Excepting this place, there is not a finer river in the world for navigation of boats.

From "The Discovery, Settlement and Present State of Kentucke."
By John Filson. Published in 1784.

For additional information on the history of the Falls of the Ohio see "Triumph At the Falls: The Louisville and Portland Canal," by Leland R. Johnson and Charles E. Parrish, published by the Corps of Engineers in 2007 and "The Falls City Engineers: A History of the Louisville District," in 3 volumes – 1974, 1984, 2008; by Leland R. Johnson, published by the Corps of Engineers.

Additional sites of interest near the McAlpine Project:
Falls of the Ohio State Park, Clarksville, Ind.
Howard Steamboat Museum, Jeffersonville, Ind.
Portland Museum, Louisville, Ky.
Waterfront Park and RiverWalk, Louisville, Ky.

Chronology Of Navigation Improvements At The Falls Of The Ohio

1825 - 1830	Louisville and Portland Canal and three lift locks are built by a stock company chartered by the Commonwealth of Kentucky. Canal is 50 feet wide. Locks are 50 feet wide and 190 feet long.
1860	Canal is widened to 90 feet and two lift locks are partially completed. Work directed by Theodore Scowden.
1872	Work is completed by the Corps of Engineers. The locks are the largest in the world, 350 feet long and 80 feet wide.
1874	Army Corps of Engineers assumes jurisdiction at the Falls.
1881	First dam across the river is complete.
1910	Movable wicket dam is built to provide 9 feet navigation channel to Madison, Ind.
1921	600 feet long by 110 feet wide lock is completed and the canal is widened to 200 feet.
1925-1927	New movable dam and hydroelectric station are built. Project is designated Lock and Dam No. 41 as a component of the Ohio river navigation system consising of 51 locks and dams.
1958-1961	1,200 feet long by 110 feet wide lock constructed. Canal is widened to 500 feet. Surge basin is dredged. Lift bridge over the locks is constructed.
1960	Project is renamed McAlpine Locks and Dam, for William. H. McAlpine, Louisville District Engineer during WWI.
1961-1964	Moveable dam is replaced with the new dam consisting of two sections of Tainter gates and fixed weir.
1996-2009	600 foot lock and remains of the Scowden lock are removed. A second 1,200 foot lock is built. Bridges over the locks are removed and replaced with roadway span, the Portland-Shippingport Bridge. Heavy-lift crane *Henry M. Shreve* placed in service.

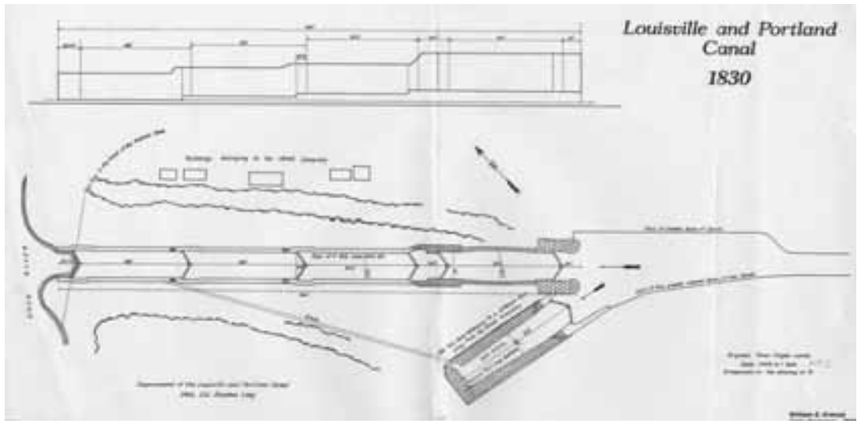
1825 -1830

In its natural condition, the “Falls of the Ohio” was *the* major obstruction to navigation on the entire Ohio River. Here, the river dropped 26 feet in a distance of just over two miles. Navigation was dangerous and seasona1. At high water stages, boats moved over the Falls through narrow channels between large rocks, sand bars, small islands, and other dangerous barriers. Many boats wrecked with loss of lives and cargo. During times of low water, boats could not navigate over this treacherous spot. When a boat was going downstream, cargo was unloaded above the Falls and put on wagons to take it around the Falls for loading on another boat to go on its way. For a small fee, a licensed Falls Pilot would come aboard and safely steer the boat over this hazard. Many studies and plans were considered to provide safe navigation around the Falls. There were even plans to build a canal on the Indiana side of the River.

Victor Collot’s 1796 map of the Falls of the Ohio.

The first canal and locks were built between 1825-1830, by the Louisville and Portland Canal Company, along with Federal support.

The Canal was 50 feet wide, and the three locks, each 190 feet long by 50 feet wide, were the largest in the world. The locks raised or lowered boats 26 feet to overcome the drop in elevation at the Falls. These locks served flatboat and steamboat commerce on the river until the 1870s.



Col. Stephen Long’s 1848 plan of the original locks and drydock.

Aerial View - Falls of the Ohio

1. 1,200 foot Lock - 1961 Chamber
2. 1,200 foot Lock - 2009 Chamber
3. Upper Gates McAlpine Dam
4. Fixed Weir McAlpine Dam
5. Lower Gates McAlpine Dam
6. Louisville Repair Station
7. Portland-Shippingport Bridge
8. Louisville and Portland Canal
9. Hydroelectric Station
10. Fossil Beds
11. Wave Rock Dike
12. Shippingport Island
13. Sand Island
14. Lewis and Clark Island
15. Vane Dike
16 . Louisville - Indiana Railroad Bridge
17. 18th Street Bridge Pier
18. Ky.-Ind. Railroad Bridge
19. Falls of the Ohio State Park Interpretive Center
20. New Albany, Ind. Levee
21. Clarksville, Ind. Levee
22. Portland Neighborhood
23. Portland Museum
24. Marine Hospital
25. Riverwalk
26. Lannan Park
27. Portland Wharf Park
28. Silver Creek
29. Mill Creek

Red line - Falls of the Ohio National Wildlife Conservation Area Boundary

Lewis and Clark at the Falls

In October 1803, Captain Meriwether Lewis met Captain William Clark at the Falls of the Ohio to begin the historic partnership we know as the Lewis and Clark Expedition.
The idea for this epic exploration of the Louisiana Territory originated with President Thomas Jefferson.

Here, the two captains recruited, trained, and equipped for the great journey, departing after signing up nearly one-third of the members of the Expedition from Kentucky, Indiana, and the surrounding area. The party included York, Clark's enslaved African-American.

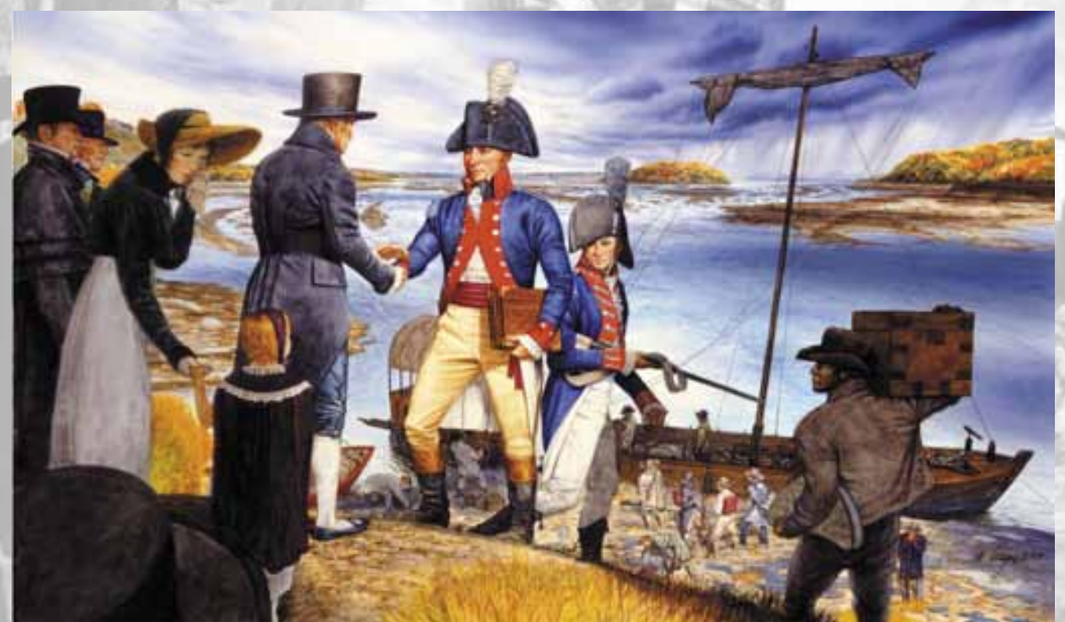
The Corps of Discovery went down the Ohio, up the Mississippi and Missouri Rivers, and eventually reached the Pacific Ocean, by way of the Columbia River and tributaries.

While experiencing great hardships and ever-present dangers, the Captains and the party made contact with many Native-American groups, and recorded many previously unknown plants and animals. Along the way they kept detailed journals of their discoveries.

The Captains returned to the Falls area in 1806, having traveled nearly 8,000 miles in their famous three year trek. Here, they shared with family and friends the tales and souvenirs of their great adventure.

The Lewis and Clark Expedition is considered the most well-known venture of discovery in American history.
This was a United States Army operation. Today, the Corps of Engineers is the major Army component along the Lewis and Clark Trail, managing over 90 percent of trail mileage.

The image here is from the painting, "On the Threshold of Discovery," by artist Michael Haynes, and depicts the departure of Lewis and Clark from the mouth of Mill Creek in October 1803.



Used with permission.

View of the lower end of the original locks, photo ca. 1900.

Guard gates at the head of the canal, photo ca. 1900.

View showing the three locks and bridge to Shippingport Island, photo ca. 1900.

1860s - 1870s

By the time of the Civil War, the original locks had deteriorated and become obsolete. Steamboats had become larger since 1830, and many could not move through the locks. During the 1860s, the canal was widened to 90 feet, and construction began on a double-lift lock system, again the largest in the world. Due to financial problems, the Canal Company asked for assistance from the Federal government, and at the direction of Congress, the Army Corps of Engineers completed these improvements in 1872. In 1874, Congress gave the Corps jurisdiction over navigation at the Falls which were the first locks operated by the Corps.

By 1881, the Corps had completed the first dam across the Ohio at this location. The U.S. Army Corps of Engineers has constructed and operated all navigation improvements at the Falls since 1874. The Corps preserved some of the stone used in the construction of the locks during the 1860s-70s, a marble dedication plaque from that era and other interesting navigation artifacts in the visitor area at McAlpine locks.

Canal construction, 1872.

Canal enlargement required manual labor.

Lower end of double-lift Scowden Locks nearing completion, 1872.

Falls of the Ohio
National Wildlife Conservation Area

In 1981, the U.S. Congress established the Falls of the Ohio National Wildlife Conservation Area, consisting of approximately 1,400 acres, roughly bounded by the Louisville & Indiana Railroad bridge, the K&I Railroad bridge and the waters between Indiana and Kentucky, including the islands, the fossil beds, the canal and the locks and dam.

The Falls area has been the focus of scientific and historical research for over 200 years. Paleontology, geology, ornithology, and river flora and fauna have been studied, as well as prehistoric peoples. This area has been witness to many events important to American history since the mid 1700s. The remains of the fossil beds exposed below the dam date to the Devonian Period, 390 million years ago. Scientists have identified nearly 600 species of fossils here, dominated by corals and other sea creatures.

The rapids and rocks make the Falls a natural stop-over for many migrating birds in the spring and fal1. Nearly 300 species have been observed here. The naturalist and artist, John James Audubon, studied and painted numerous birds at this spot. The area also provides excellent fishing opportunities at certain times of the year.

The Wildlife Conservation Area is administered by the U.S. Army Corps of Engineers, the states of Kentucky and Indiana, and the local governments. Their mission is to protect the area for the enhancement of fish and wildlife, and to provide opportunities for scientific research, environmental education, and outdoor recreation. The Falls of the Ohio State Park is located in Clarksville, Ind. There, at the Interpretive Center, you can see exhibits and participate in programs which tell the wonderful story of the Falls area.

Summer Camp on fossil beds at the Falls of the Ohio.
Fossilized Turbo Snails (pictuerd right).

Floods on the Ohio River

The Ohio River has flooded many times throughout history. In the visitor area at the McAlpine project there is a black stone obelisk with rings which indicate the water level reached in various years.

The Flood of 1937 is the greatest flood recorded in this portion of the Ohio Valley. In January and February of 1937, the Ohio at Louisville was on a 23 day rampage, cresting at 57 feet, 10 feet above the previous record level in 1884. More than 60 percent of the city was under water and more than 175,000 residents were evacuated. Flood waters extended south as far as Churchill Downs. The lobby of the Brown Hotel at 4th and Broadway had several feet of water.

Following this flood “of biblical proportions,” the Army Corps of Engineers began building a flood protection system consisting of many levees, flood walls and reservoirs throughout the Ohio Valley. The protection project for the Louisville area began in 1948 and was completed in 1988 consisting of 4.5 miles of concrete wall, 12.5 miles of earthen levee, 13 pumping stations and many street closures. Constructed by the Corps of Engineers, the system is now operated and maintained by the Metropolitan Sewer District.

A similar system of levees and floodwalls protects the communities across the Ohio River in Southern Indiana.

Ferry transported people and cars from Madison, Ind. to Milton, Ky., 1937.

Aerial photo of western Louisville and southern Indiana, 1937.

Pontoon Bridge used to evacuate flood victims, Louisville, Ky., 1937.

Corps of Engineers workboat McCracken assisting at Paducah, Ky., 1937.

1920s

In the 1920s, the Corps of Engineers again built major navigation improvements at the Falls. A lock, 600 feet long by 110 feet wide, was constructed along with a moveable wicket dam and a section of two beartrap gates at the lower end. The Canal was widened to 200 feet.

Between 1885 and 1929, the Corps built 51 locks and dams along the entire length of the Ohio. Each one had a wicket dam and a 600 feet by l10 feet lock. Each of the project locations were numbered. The facility here at the Falls was Lock and Dam #41. Also during the 1920s, the hydroelectric generating station was built by the Louisville Gas and Electric Company. A pivot bridge over the lock provided a roadway to Shippingport Island. The locks and dams on the Ohio served ably during World War II, providing safe movement of crucial petroleum products and military equipment.

View of Corn Island and L&P canal entrance, 1914 .

Widening of the canal to 200 feet.

The Corps towboat Cherokee made the first lockage on April 18, 1921, and the lock opened to commercial traffic on May 1.

Views of maneuver boat and workers placing a metal shutter in the Boule Dam, 1930.

1950s - 1960s

By the 1950s, the 600 foot locks had become too small to serve the growing barge traffic on the Ohio. Diesel-powered towboats were capable of pushing fifteen barges, which required a time-consuming and costly double-locking operation. Again, at the direction of the Congress, the Corps of Engineers began a program in the 1950s to replace the 600 foot locks and the wicket dams. At the Falls, the Corps built the new dam in its present form. The dam has 5 huge gates at the upper location and four gates at the lower location. The two sections of gates are connected by a concrete fixed-weir structure which joins the hydroelectric station. Construction of the dam was completed in 1964. The new lock, completed in 1961, doubled the capacity of the old 600 foot lock. It was built 1,200 feet long by 110 feet wide. The lock gates are 70 feet high by 60 feet wide, and each gate leaf weighs 300 tons. As part of this modernization project, the Canal was widened to 500 feet and a lift bridge was built over the 1,200 foot lock. In 1960, the project was renamed after William H. McAlpine who was a civilian that served as the Louisville District Engineer during WWI.

Widening of the canal from 200 feet to 500 feet.

Construction of 1,200 foot lock chamber with Kentucky and Indiana Railroad bridge in foreground.

The nearly completed 1,200 foot lock chamber, 1961.

View of concrete placement forming the Tainter gate piers, 1961.

Louisville Repair Station

The Louisville Repair Station (LRS) is the focal point of the Louisville District's personnel and fleet of boats whose mission is to perfom inspections and make major repairs to locks and dams and flood reduction structures throughout the district area and at other locations. The Station can also respond to emergencies on the waterways.

The Station staff consists of divers, skilled craftsmen, welders, mechanics, electricians, machinists, towboat pilots, engineers, and crane operators.

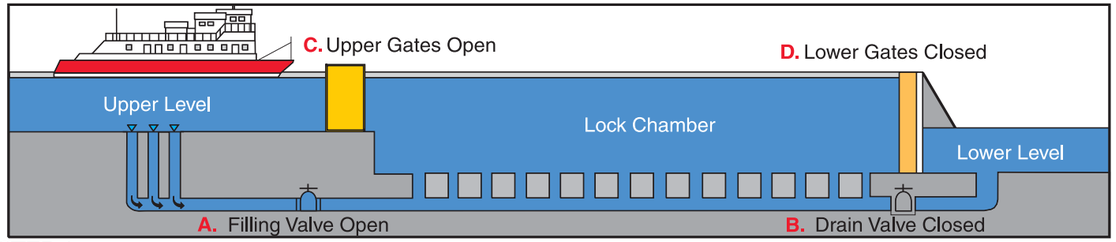
The fleet is made up of a towboat, workboats, floating cranes, machine shop and warehouse barges, along with an electrical power generation barge.

The largest floating crane on the western rivers, the *Henry M. Shreve*, is operated by Station personnel.

The restored workboat, *Whitewater*, was once part of the Repair Station fleet and is now on display in the visitor area at McAlpine.

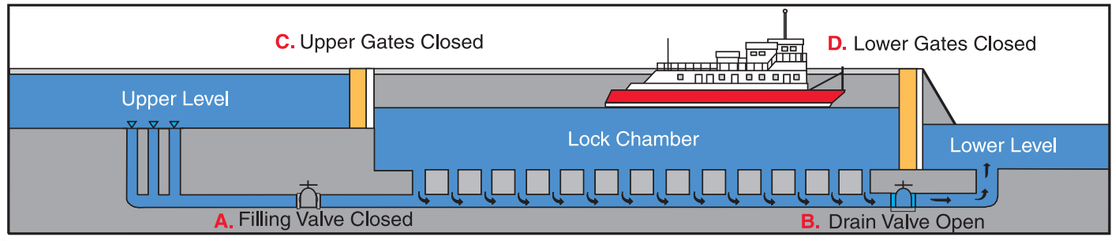
Locking Through : How Locks Operate

Locks provide a means for towboats, barges and pleasure craft to navigate past the dams moving either upstream or downstream. At McAlpine, the two locks are 1,200 feet long by 110 feet wide. The lock gates consists of two leaves, each 70 feet high by 60 feet wide and weighing 300 tons. The locks can hold a towboat and fifteen barges. The barges are arranged three wide and five long. Large steel cables tie the barges together and all are securely attached to the towboat. The boat pilot and lock operator are in communication by radio. The locks empty and fill by gravity. There is no pumping of water in the lock operation. Follow steps 1-3 to see how a boat moves through the lock downstream. When a boat locks upstream, this procedure is reversed.



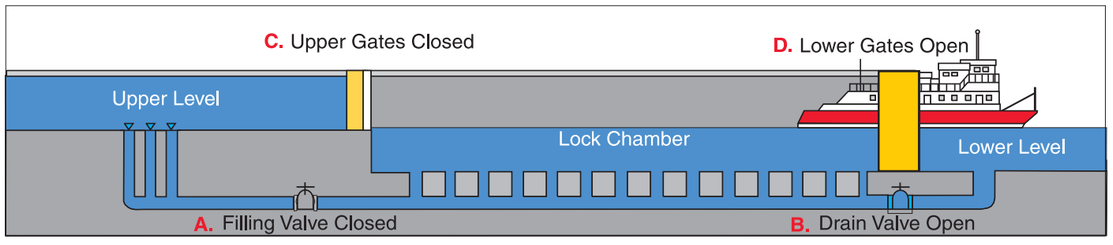
STEP 1

The Lower Gates (D) are closed. The Drain Valve (B) is closed. The Filling Valve (A) is open allowing the Lock Chamber to fill to the upper level. The Upper Gates are opened allowing the boat to enter the Lock Chamber.



STEP 2

Now the boat is in the Lock Chamber, the Upper Gates (C) are closed. The Filling Valve (A) is closed and the Drain Valve (B) is opened, allowing the water to drain out into the Lower Level. The boat is lowered as the water level lowers.



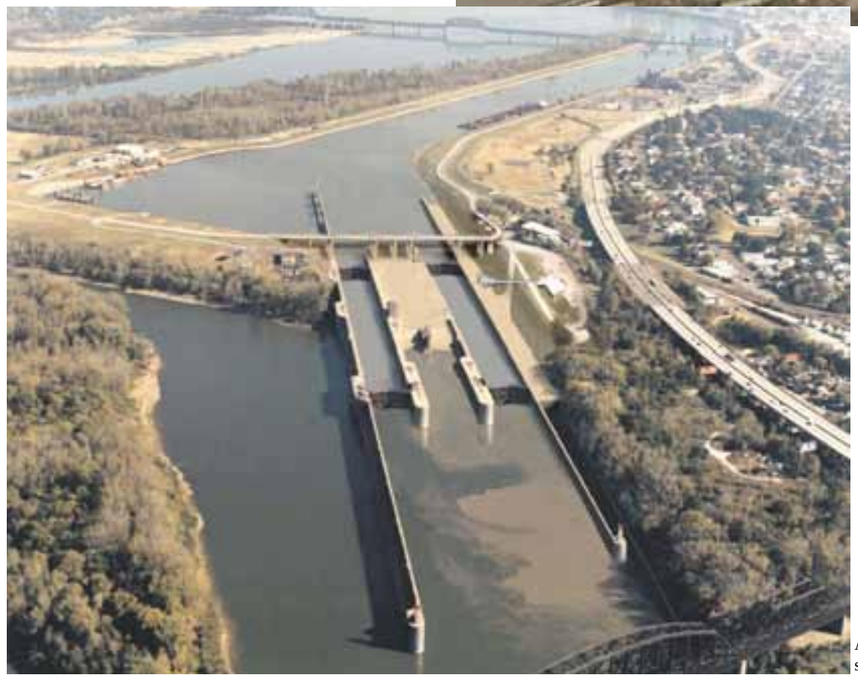
STEP 3

When the water level in the Lock Chamber reaches the Lower Level, the Lower Gates (D) are opened allowing the boat to leave the Lock Chamber and proceed down the river.

1990s - 2009

As barge traffic on the Ohio continued to grow, it was necessary to increase the lock capacity again. In 1996, construction began on a multi-phase project to improve the McAlpine facility. First, a new operations building and wharf area for stand-by gates were built. The 600 foot lock along with the remains of the lock built in the 1870s were removed and construction began on a second 1,200 foot lock. In addition, the old bridges were removed and a high roadway was built over the 2 locks resembling a suspension bridge. The bridge is named the Portland-Shippingport Bridge. Also during this period, the heavy-lift crane, *Henry M. Shreve*, was built. The *Shreve* is able to lift the huge lock gates during repair operations and is often docked at the Louisville Repair Station. All project features, including the visitor area and overlook, were completed in 2009. These improvements are designed to serve the navigation needs at the Falls of the Ohio for the next 50 years.

Construction of new 1,200 foot lock chamber. The Louisville Repair Station is in foreground with new wharf area completed.



Artist rendering of completed project showing both 1,200 foot locks.

Ohio River Mainstem Locks and Dams

The Monongahela and Allegheny Rivers join at Pittsburgh, Pa. to form the Ohio River. From there, the Ohio flows 981 miles to Cairo, Ill., where it empties into the Mississippi River. In its course, the Ohio River borders six states and seventy-two counties, dropping 450 feet in elevation.

Shown here are the locations of the locks and dams in the River, depicted by a “stairstep” arrangement to overcome the natural elevation of the river.

Several tributaries of the Ohio, the Kanawha, Big Sandy, Licking, Green, Cumberland and Tennessee rivers also carry commercial barge traffic.

The first navigation improvement project on the entire Ohio consisted of fifty-one locks and dams, built 1885-1929. These were movable wicket dams with locks 600 feet long by 110 feet wide. The wooden wickets were raised or lowered, depending on the flow of the River. When raised, the traffic moved through the locks, and when lowered, the boats moved over the wickets which lay on the river bottom.

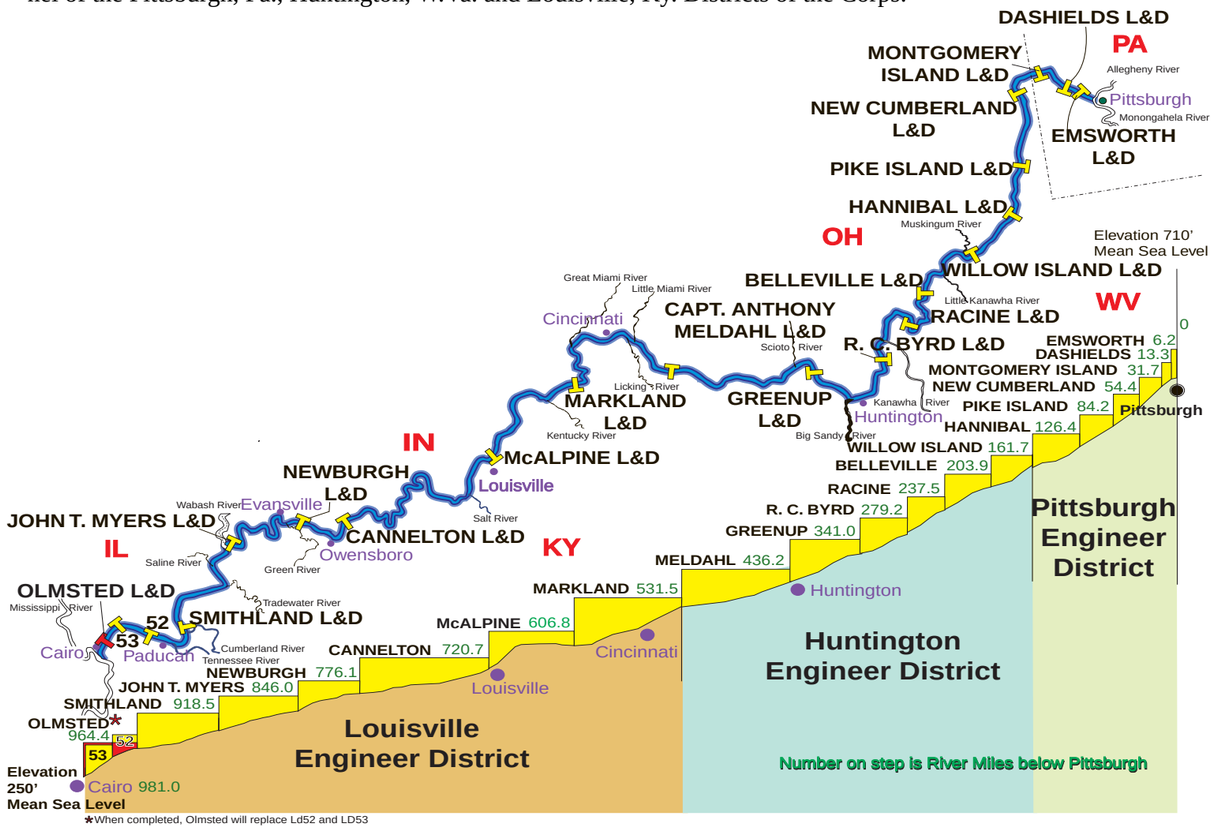
The “modernization” program began in the 1950s by the Corps of Engineers resulting in the 20 locks and dams shown here.

The Olmsted Locks and Dam project replaces the last of the wicket dams, number 52 and 53, near the Ohio’s confluence with the Mississippi River. This project is under construction with completion scheduled in 2018.

McAlpine, Smithland, and Olmsted are the only navigation projects on the Ohio with twin 1,200 foot locks.

The dams on the Ohio River do not provide a flood control measure. As flood stage approaches, the gates in the dams are opened for the water to flow downstream.

The locks and dam are operated by the Army Corps of Engineers, 24 hours a day, 365 days a year, by personnel of the Pittsburgh, Pa., Huntington, W.Va. and Louisville, Ky. Districts of the Corps.



*When completed, Olmsted will replace Ld52 and LD53

Transportation of Goods

The Ohio River and its navigable tributaries move approximately 280 million tons of cargo each year, and that’s more than what moves through the Panama Canal annually.

This system saves consumers millions of dollars each year by transporting commodities cheaper than by truck on crowded highways or by rail.

Coal makes up over half of all cargo moved in the system. Waterborne delivery of coal to electric generating stations is a primary reason electric rates in the Ohio River Basin are among the lowest in the nation.

Over 50 million tons of cargo move through McAlpine Locks each year.

Note the comparative cargo capacity of barges, trucks and trains. A wide variety of cargo is carried in the huge jumbo barges. Barges provide the most economical means of transporting large amounts of bulk goods over long distances.