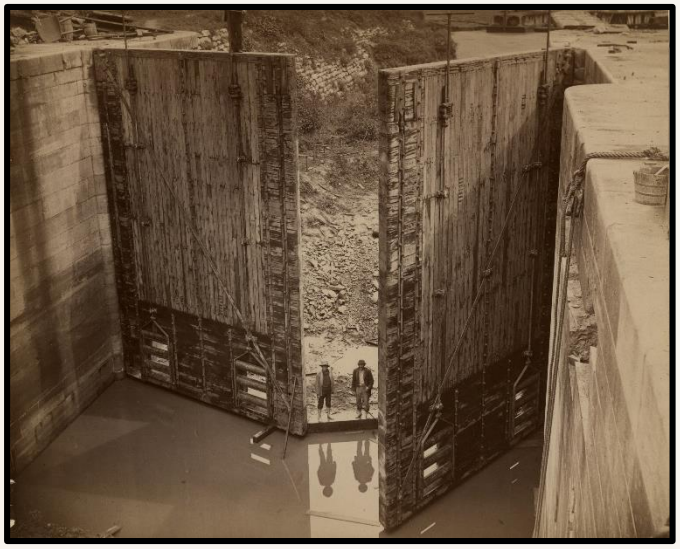
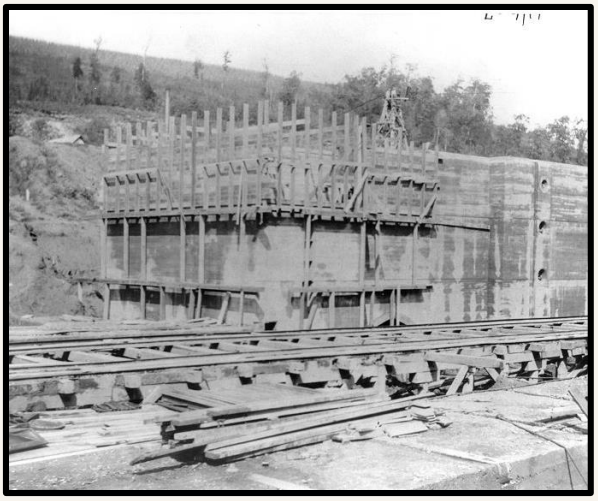
The Construction of the Lock and Dam System on the Kentucky River

Repairs to timbercrib dam at Lock No. 3 circa 1901. Courtesy of the National Archives.

The earliest locks and dams on the Kentucky River featured a stone lock and timbercrib dam. First, a cofferdam was built around the site, and the water was pumped out to reveal the foundation rock. The dams were constructed by framing pens that resembled log cabins and setting them side by side before filling them with stone. Once filled, wood planks known as "sheetpiles" were driven into the riverbed to prevent water from flowing under the dam. The completed timbercrib dam was topped with planks, giving it a stepped appearance. The locks were constructed of mortared, cut stone blocks, and they featured wood gates. The gates were opened and closed using a capstan along the top of the lock. Cast-iron paddle gates in each lock gate would open and close to empty and fill the lock chamber.



Construction work at Lock No. 5 showing the wooden lock gates circa 1885. Courtesy of the National Archives.

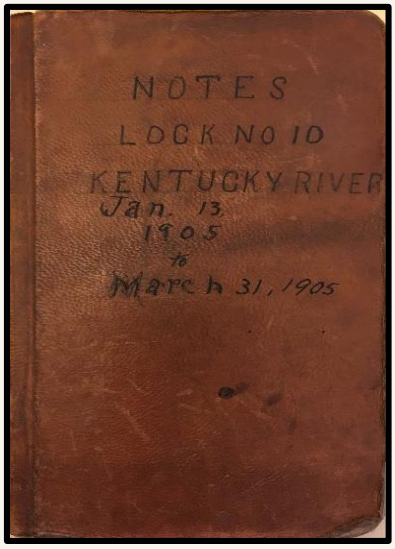


Lock No. 9 under construction circa 1901. Courtesy of Stantec. Each component of the lock and dam consisted of multiple layers of poured concrete.

Unlike Locks No. 1–8, which featured timbercrib dams and stone locks, Locks No. 9–14 were constructed of poured concrete. This transition cut construction time in half and significantly reduced maintenance costs. Contracted through the Mason and Hoge Company of Frankfort, work began on Lock No. 10 in 1902. The lock and dam were cast in place by pouring concrete into wooden forms. Once the layers of concrete were cured, the form was removed and the process was repeated until the component of the lock or dam was complete. The lock gates were made from steel and functioned similarly to a set of double doors. The gates met at an angle, forming a secure seal and reducing leaks. The lock chamber was filled and emptied by steel valves on the bottom of the chamber and was controlled by levers on top of the lock. Lock No. 10 was placed into service in January 1905.

In February 1905, the upper portion of the Kentucky River channel froze. Suspended in the ice were 300,000 logs waiting to be floated to sawmills downriver. In March, the weather warmed, the ice melted, and the river rose enough to break the log jam, releasing a torrent of water and logs that crashed into Locks No. 9 and 10, overflowing the existing structures. At Lock No. 10, a new channel formed west of the lock, isolating the lock in the middle of the river. The upper lockhouse and lock office were swept away in the flood. When the waters receded, an auxiliary dam was constructed across the new channel. The dam featured a timbercrib base and a poured concrete top. The new dam was built 6 feet higher than the original dam to keep the water from flowing around the extension.

Log jam at Ford, Kentucky, 1906. Courtesy of the Kentucky River Museum Collections.



1905 Lock No. 10 logbook from the Kentucky Historical Society Collections.

Once the was placed into service, the lockmaster was responsible for the daily operation and maintenance of the lock and dam. He oversaw repairs, supervised employees, regulated river traffic, and maintained the grounds, buildings, and machinery. The lockmaster kept a daily log detailing the weather conditions, the river levels, and the number, type, and cargo of the boats passing through the lock. The position of the lockman, who assisted with the locking process, helped maintain the machinery and the grounds, and oversaw operations while the lockmaster was away, was introduced in the 1880s. The lockmaster and lockman would alternate shifts to ensure that a boat could pass through the lock at any time of the day or night. A boat would signal by blowing the ship's horn or by ringing a bell positioned along the river. Depending on the condition of the river and the size of the boat, the locking process could take anywhere from 15 minutes to several hours. Typically, the lockmaster and lockman were both required to manually operate the lock's gates and valves.

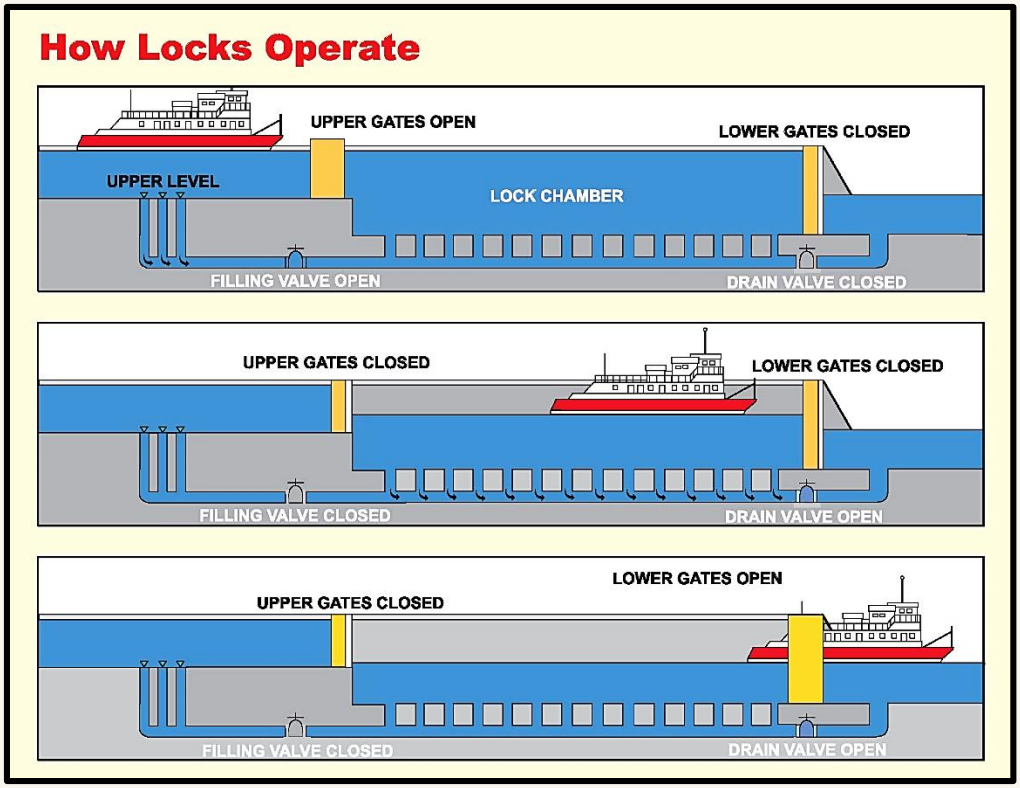


Diagram of lock operation. Courtesy of the United States Army Corps of Engineers, Louisville District.

Like a set of stairs, the Kentucky River locks allowed boats to move from one water level to another. Once a vessel entered the lock, the lockmaster closed the upper or lower gate, and the water level in the lock chamber was raised or lowered through a series of valves. When traveling downriver, the locking process consists of three main stages. First, with the lower gate closed, the lock chamber is filled to match the water level of the upper river using the filling valves located at the bottom of the chamber. The valves are operated by levers along the top of the lock. Gravity pulls the water through the valves and into the chamber. The filling valves are closed once the appropriate water level is reached.

Second, the boat enters the lock chamber through the upper gates and the upper gates are closed using the capstans located along the top of the lock. At this stage, the drain valves are opened to empty the water from the lock chamber in order to lower the boat.

Finally, boat exits through the lower gates once the water level inside the chamber matches the depth of the lower river. This process is reversed when a boat is traveling upriver.

Photograph of a boat "locking through" Lock No. 2 circa 1951. Courtesy of the National Archives.

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