

## Project History and Description

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Prior to the advent of the railroads in the late 1800s and early 1900s, the Kentucky River was the main transportation route from eastern Kentucky to central Kentucky, the Ohio River, and the seaport of New Orleans. The timber harvests of the Kentucky River headwaters were gathered throughout the year; these harvests were held until spring rains could wash the loads of trees down the tributaries to the main stem of the Kentucky. There, the logs would be bundled into rafts and young men would “float” them down to the mills in Frankfort. Later flatboats would take the place of the makeshift rafts. After gathering much of Kentucky’s bounty of flour, meat products, hemp, soap, paper, powder, nails, tobacco, bourbon, and coal, the flatboats would make their way to the Ohio River, then down the Mississippi River to New Orleans. At the end of the trip, the goods sold and the boat scrapped for what the wood would bring, and the flatboat men would hike their way home to Kentucky (Grier 2001).

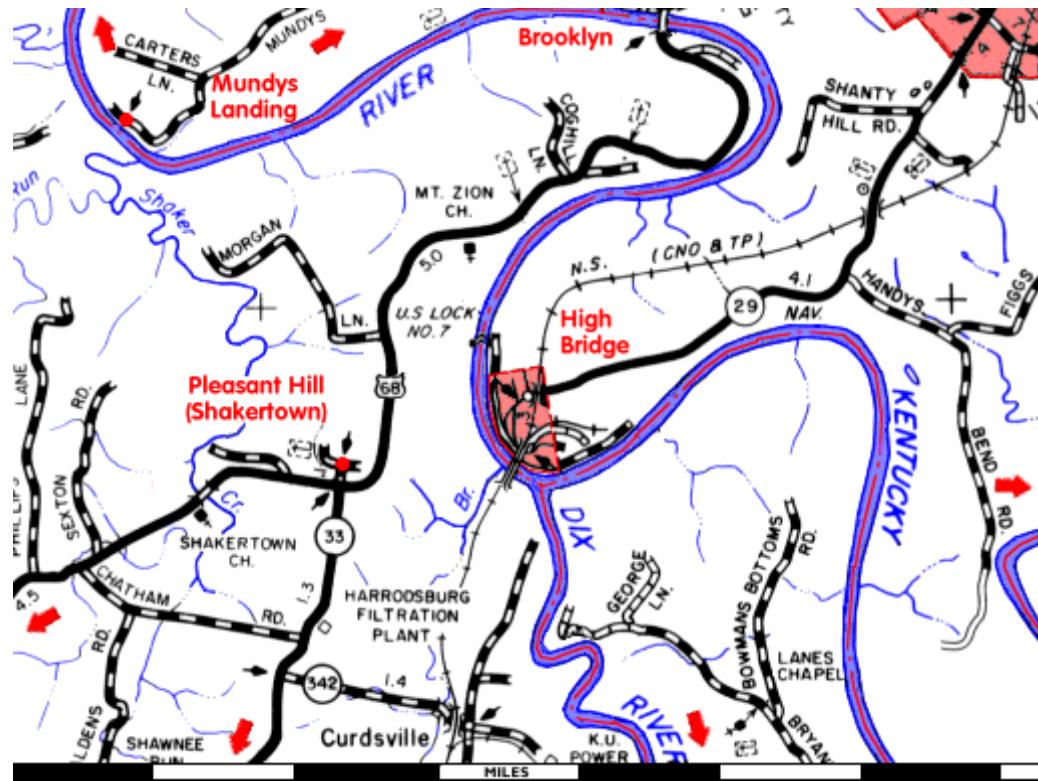
The shoals in the Kentucky River made travel dangerous and sometimes impossible during low flow. To facilitate the use of the river as a transportation corridor, various projects throughout the 1800s attempted to improve navigation on the river with limited success. In 1836, the Commonwealth of Kentucky constructed Locks 1 through 5; however, by 1884, Locks and Dams 1 through 5 were in complete disrepair and had to be rebuilt by the U.S. Army Corps of Engineers. By 1917, Locks 1 through 14 were in service to create year-round navigable pools from Beattyville to Carrollton. The locks provided passage for boats under most water conditions; however only small barges were able to navigate the relatively shallow, meandering river. By that time railroads had also been constructed throughout Kentucky and commercial transport was more economical by rail than by river.

During much of the 1900s, the Kentucky River provided commercial transport, mainly for the lower locks, with sporadic shipments of timber, coal, and minerals (such as fluorspar, calcite, barite, zinc, and lead) from the upper and lower pools. The last commercial use remaining on the river was by one company, operating in Frankfort, that shipped sand and gravel to Madison, Indiana on the Ohio River. As commercial activity on the river dwindled, the ACOE has worked to transfer ownership and maintenance to a state entity, the KRA. Transfer of ownership of Lock and Dam 7 from the ACOE to the KRA took place in March 2006.

Although the advent of the lock system up to Beattyville did not provide the anticipated economic stimulus, recreation was, and remains, popular on the river. The river provided entertainment before the days of television, with traveling minstrel shows, riverboat cruises, and river based resorts. One of these resorts, Estill Springs, was near Irvine and touted five separate waters for its guests’ health.

Flooding and water supply have always been important issues for the river. Various projects have been built in the Kentucky River watershed to control flooding, but none of these, save floodwalls, have been on the main stem of the Kentucky River.

The Kentucky River Navigation system, locks and dams, is one of the oldest still operating in the United States. Kentucky River Locks and dams 1 through 5 go back to 1836-1842 and were constructed by the Commonwealth under its Chief Engineer, Sylvester Welch. Lock and Dam No.7 was constructed in 1897 by the U.S. Army Corps of Engineers ("ACOE") and is located at river mile 117, near High Bridge at the end of Kentucky route 29.



In 1876 High Bridge was the location of the highest railway bridge in the world, and the first railroad cantilever bridge. Lock and Dam No. 7 is one half mile below the bridge, past a pair of stone portals. Lock and Dam 7 is a timber-crib dam with a stone lock chamber built in 1896-97 by the ACOE for barge navigation. At one end of the dam is the Mother Ann Lee Hydroelectric Station Hydroelectric Project (FERC Project No. 539).

While Lock and Dam 7 was originally built strictly for navigation, over time it took on the additional rolls of water supply and hydroelectric generation. In the last decade, Locks 5 through 14 were closed for navigation after there had been no commercial traffic for decades, and the cost of maintaining the locks could not be justified just for limited recreational traffic. Because of the deteriorating condition of the lock chambers, a concrete bulkhead has been added to strengthen the lock chambers at Lock and Dams 5 through 14, eliminating the possibility of navigational use of the dams. Today, the pool behind Dam 7 provides a water supply for residents of Mercer County, KY, which includes the city of Harrodsburg. In addition, Dam 7 allows for power generation at the Mother Ann Lee Hydroelectric Station.

This run-of-river project utilizes the Kentucky River Authority (KRA) owned Lock and Dam 7 to generate electricity. The plant was designed by L.F. Harza, and was built by the L.E. Myers Co. The Project was completed in 1928. A license for the Project was originally issued to the Kentucky Hydro Electric Company on August 19, 1926, and was transferred to Kentucky Utilities Co. (KU) effective December 31, 1928. The plant and Federal Energy Regulatory Commission (FERC) license were transferred to Lock 7 Hydro Partners, LLC on December 30, 2005. The plant was originally named the "Lock 7 Plant". Its name was changed to the Mother Ann Lee Hydroelectric Station when the FERC license was transferred to Lock 7 Hydro Partners, LLC.

The Mother Ann Lee Hydroelectric Station consists of:

- a concrete substructure, about 116 feet long, with a 36-foot-long solid concrete section and an 80-foot-long hollow dam/spillway, containing trash racks, six intake gates, three turbines, and discharge facilities;
- a 93-foot-long, 25-foot-wide and 6.5-foot-high superstructure/powerhouse located above the spillway, supported by hollow concrete piers, with three 680 kW generating units having a total installed capacity of 2,040 kW;
- a forebay about 120 feet long and 100 feet wide;
- a substation located on the west bank;
- a foot bridge, about 85 feet long, connecting the substation with the powerhouse;
- a trash boom about 170 feet long; a 34.5 kV, .4,540-foot-long transmission line, with a right-of-way ranging from 50 feet to 200 feet wide; and,
- appurtenant facilities.

The Mother Ann Lee Hydroelectric Station Powerhouse is unusual in that the Powerhouse with generators and electrical equipment is situated on piers. The Powerhouse is elevated well above the river (operating floor El 554 vs. El 514.6 for spillway crest). The Powerhouse was flooded in 1978 (maximum flood of record) leading to subsequent rewinding of the generators and replacement of the switchgear.

<b>Mother Ann Lee Hydroelectric Station Generator Data</b>	
Number of Units	3
Manufacturer	General Electric
Type of Units	Vertical
Rating KVA	850
KW Output @ 0.8 PF	680
Voltage	2300
Speed (rpm)	150

Each of the three turbines at the Mother Ann Lee hydroelectric project is open flume, fixed blade propeller type turbines with a long turbine shaft – more than 40 feet. Each turbine is controlled by a Woodward gate-shaft, electro-mechanical governor that actuates the operating ring on the turbine.

<b>Mother Ann Lee Hydroelectric Station Turbine Data</b>	
Number of Units	3
Type of Units	Vertical fixed blade
Manufacturer	Newport News Shipbuilding and Drydock
Design Head (ft)	15
Design Flow (cfs)	743
Max. Output (kW)	757
Max. Output (hp)	1000
Speed (rpm)	150
Runner Material	Cast Iron

In addition to the powerhouse superstructure, the Project's civil components include the hollow dam section containing the turbines and supporting the powerhouse piers as well as a short solid-concrete overflow section tying the powerhouse to the west bank.

The Project is not classified as high hazard and does not fall under the FERC Part 12 Independent Consultant process. No stability or project safety issues are known to exist and no such items appear in recent FERC operational inspection reports. An underwater inspection of the powerhouse foundation was conducted in December 2005, which found no problems.

The plant was operated from 1928 until the 1990's by Kentucky Utilities (KU), when problems with the generating units forced them out of service. KU last operated Unit 1 in 1992, Unit 2 in 1994, and Unit 3 in 1999. On April 1, 2004, KU filed an "Initial Consultation Document" stating its intent to decommission the Lock 7 Plant and surrender to FERC license for the project. The decommissioning proposal included a plan to spend \$3.4 million to tear the plant down. Upon this action, Soft Energy Associates (SEA) began discussion with KU on the purchase of the project with the intent

of renovating the plant. KU and SEA entered into an exclusive agreement that allowed for a due diligence evaluation of the site. SEA was encouraged by the comments that KU received from the public and environmental groups requesting that the plant be renovated by KU or sold to someone else that would save this clean renewable energy plant. In December 2004, KU and SEA signed a “Letter of Intent” to purchase the plant. SEA created a corporation, Shaker Landing Hydro Associates, Inc. (SLHA) specifically to renovate the plant. To strengthen its proposal to renovate the plant, SLHA formed a 50/50 partnership with Salt River Electric, a rural electric cooperative in Bardstown, KY. This partnership, named Lock 7 Hydro Partners, LLC, purchased the Lock 7 plant from KU in December 2005.

The plant is located on land once owned by the Shaker community at Pleasant Hill. Access to the plant by footpath (there is no road access) is over an easement granted by the restored Shaker community at Pleasant Hill. In recognition of this connection to the Shaker community, the Applicant approached the last active Shaker Community at Sabbath Day Lake, Maine, with the idea of renaming the Lock 7 plant after the spiritual leader of the Shakers, Mother Ann Lee. With the concurrence of the Sabbath Day Lake Shakers, the Applicant was granted by the FERC permission to rename the plant “The Mother Ann Lee Hydroelectric Station.”

By March 2006, the necessary paperwork was completed, insurance was in place, and the renovation of the Mother Ann Lee Hydroelectric Station began at the end of March.

**Information Sources** – Portions of this information is taken from Kentucky Utilities’ “Initial Consultation Document” prepared as part of its Application to Surrender FERC License 539. Sources of some of this information are from the web sites for the U.S. Army Corps of Engineers (“ACOE”) and Kentucky River Authority (“KRA”). Some excerpts have been taken from a recent environmental assessment sponsored by the Kentucky River Authority (“KRA”) and performed by Third Rock Consultants, LLC for the prime contractor Fuller, Mossbarger, Scott, and May Engineers, Inc. In addition, information on the project was taken from Kentucky Utilities’ (“KU”) original Federal Energy Regulatory Commission (“FERC”) license order, FERC’s environmental assessment for the project and the American Canal Guide for the Kentucky River Navigation.