No downtime for Soo Locks crews

Getting started
Within hours of the passage of the last boat on January 16, crews began removing the water from the Poe Lock. Maintenance projects filled the ten-week break in navigation to keep the 52-year-old lock operating efficiently and reliably.

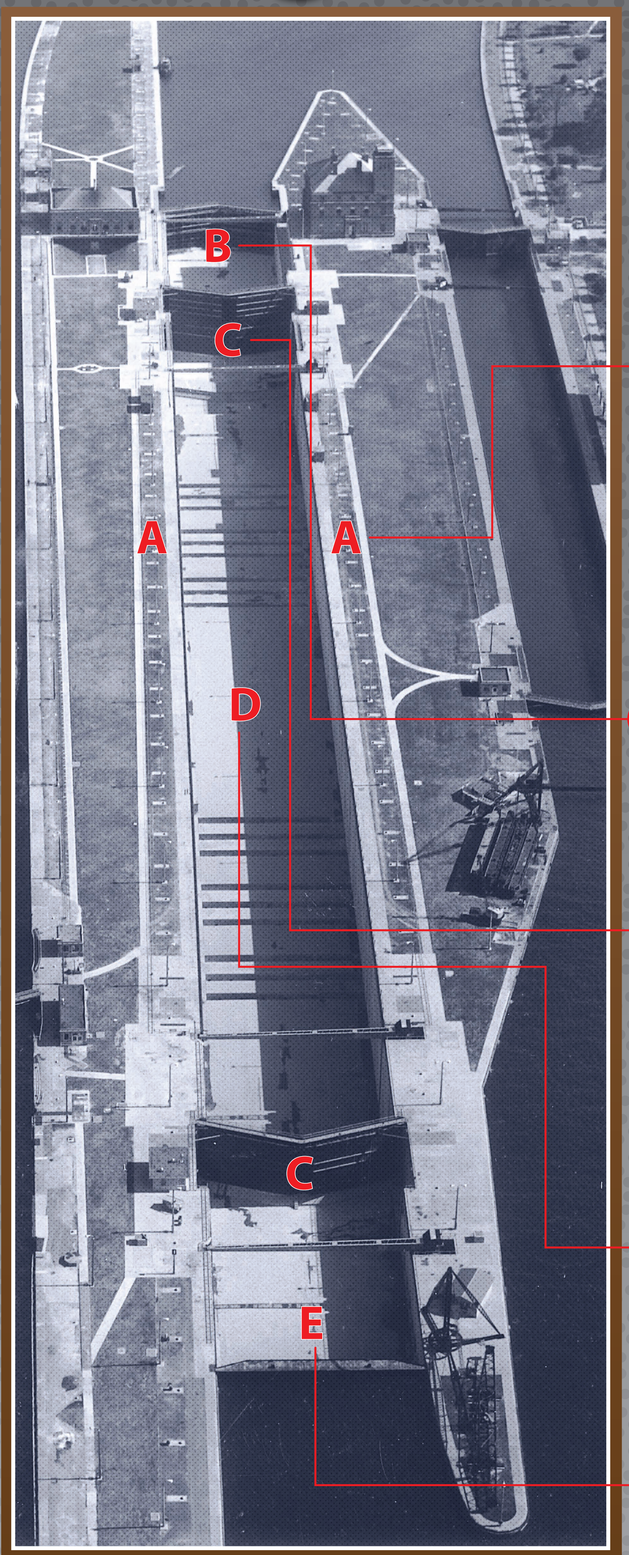
Replacing the sill
This year, crews replaced worn concrete on sill #2 at the lower end of the Poe Lock. The job took 42 cubic yards of concrete, weighing approximately 81 tons. It took four mixer trucks to deliver and a team of ten workers to move, place and finish it in a single day.

Refreshing the timber fenders
The Soo Locks facility in Sault Ste. Marie, Mich. has miles of piers. Fender timbers line the piers in areas where vessels land and approach the lock chambers. Maintaining these fenders is a year-round task, but each winter a dedicated crew of lock and dam operators spend the season replacing the worn timbers.

Deep cleaning the Poe Lock
Most winters, a crew of lock and dam operators spend the season clearing the drains of the Poe Lock. This often cold, wet and dirty work is critical to the maintenance and smooth operation of the lock during the navigation season.

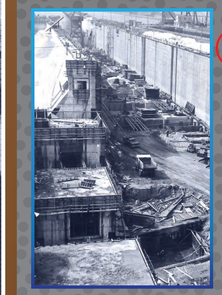
Mission accomplished
Careful planning and mild weather allowed crews to complete this year's maintenance tasks ahead of schedule. The Poe Lock was rewatered March 15, almost two weeks before the start of the 2021 Navigation Season.

Navigation Locks: More than meets the eye

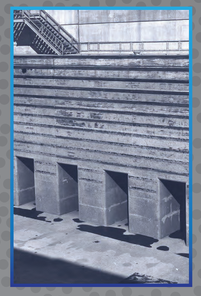


There is a lot to see at the Soo Locks when boats are locking through, but there's just as much going on below the waterline within the lock walls and below the lock floor.

Anatomy of a Lock

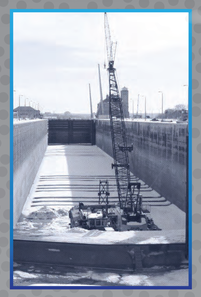


A. Monolith - The actual structure of the lock, sometimes referred to as "walls" is formed by individually poured concrete sections called monoliths built side by side. The monoliths for the Poe Lock are 12 feet wide at the top and up to 54 feet wide at its base.



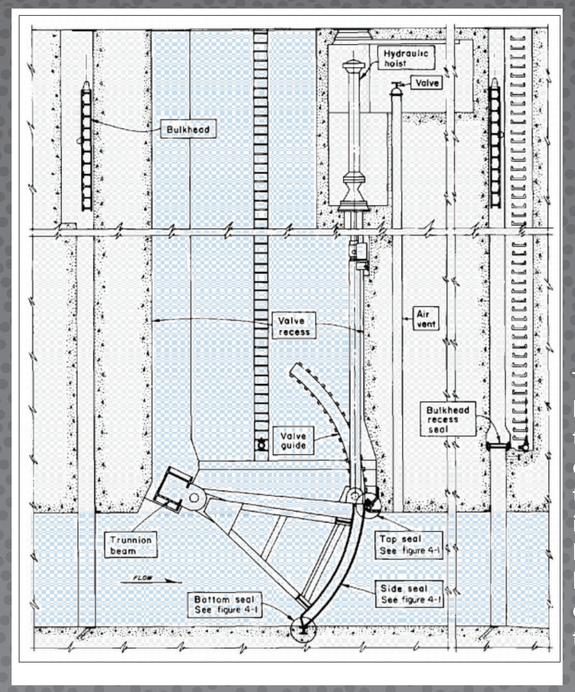
B. Fore bay and outlet ports - In the fore bay, at the lower end of the lock, a set of openings in the monolith allows water to flow out of the culverts and into the Lower St. Marys River.

C. Gates - Gates form the upper and lower ends of the lock holding back the water and opening and closing to allow boats to pass. The lower gates of the Poe Lock are 57 feet high and weigh 225 tons each.



D. Chamber and Ports - The area between the gates is the lock chamber where boats are raised and lowered. Water flows in and out of the chamber through openings in the lock floor that connect to the culverts in the walls. From ground level to the lock floor is 61 feet.

E. Fore bay and intake ports - In the fore bay at the upper end of the lock, a set of openings in the monolith allows water to flow from Lake Superior into the lock chamber.



Valves

To operate the locks water always flows from the upper, Lake Superior level to the lower Lake Huron level. Four reverse tainter valves control the flow of water in and out of the lock. To fill the lock, the operator closes the lower valves in the culverts, preventing water from leaving the chamber and the upper valves are opened allowing water to flow in. Because water seeks its own level, the water cannot rise any higher in the chamber than the Lake Superior level. To empty the lock, the operator closes the upper valves, stopping water from entering the culverts and opens the lower valves, allowing the water to flow out into the river.

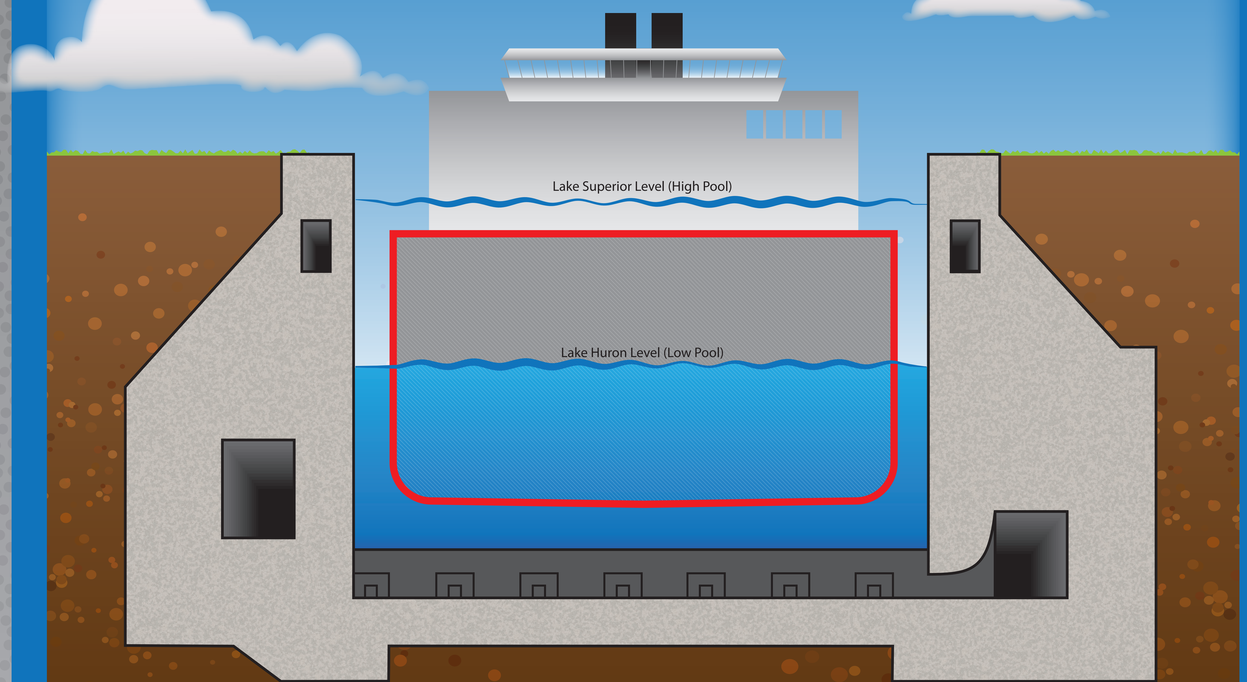
Look inside the monolith

Culverts

Gravity alone moves water in and out of the lock chamber through culverts built into the lock walls. On the Poe Lock these culverts on each side of the lock monolith measure 13 feet wide X 14 feet tall. Below the lock floors, smaller culverts connect the main culverts to opening in the lock floor called filling and emptying ports to carry water in and out of the chamber.

Galleries

Just below the water level, the lock walls have built in "galleries" or passageways along each side of the lock and connecting tunnels that run below the lock floor. These provide access to operating machinery at each end of the lock and carry electric, steam and hydraulic lines.



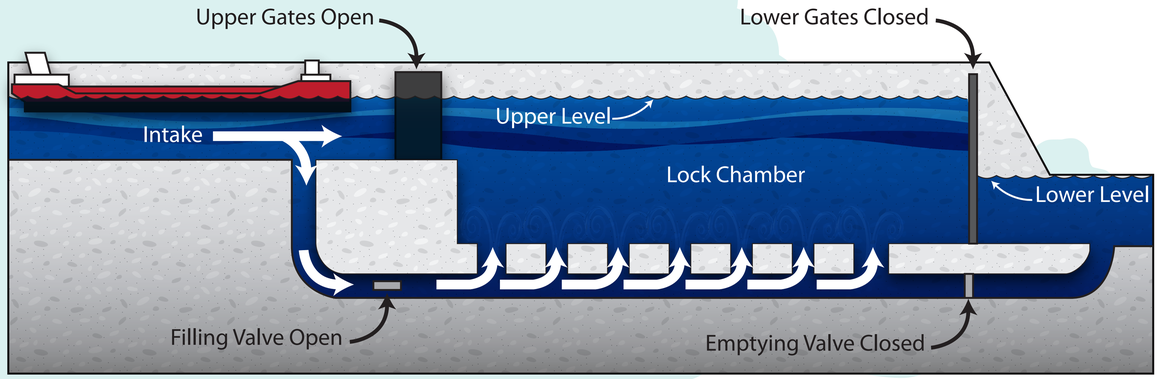
How do the locks work?

The approach

Vessels are in contact with the lockmaster throughout the river system and receive a lock assignment about 30 minutes before reaching the locks. Over the radio the lockmaster shares information about current water levels, other traffic in the river and provides instructions to the ship as it approaches.

Arriving at the pier, deckhands are lowered to the wall using a boson's chair. The deckhands carry the vessel's lines as it nears the lock and hand these over to the U.S. Army Corps of Engineers lock and dam operators when the vessel reaches the lock gates.

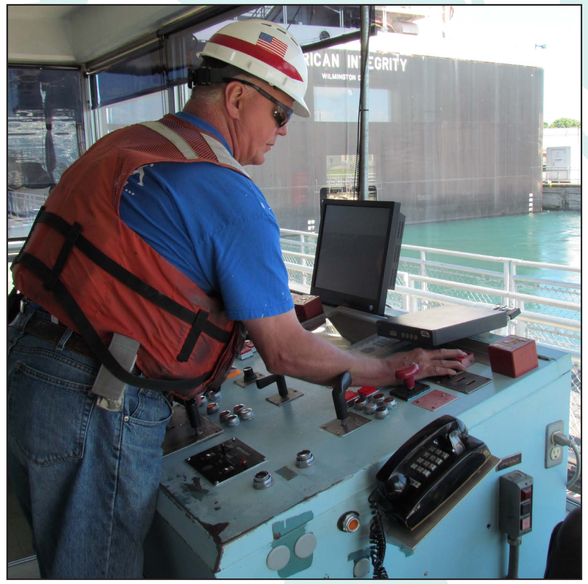
With the upper and lower gates and emptying valve closed, the open filling valve allows the lock chamber to fill to the upper level. The upper gates then open allowing the down-bound vessel to enter the chamber.



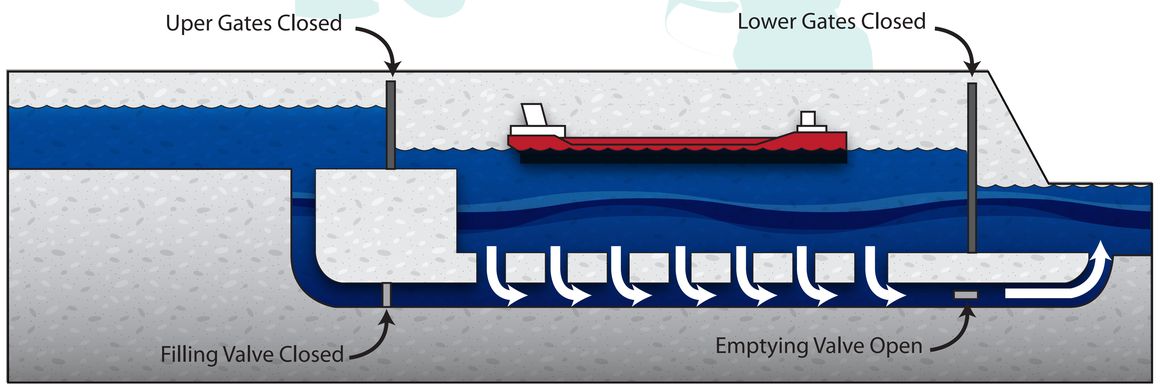
In the lock

When the vessel is in position in the lock the U.S. Army Corps of Engineers lock and dam operators, assisted by the ship's deckhands secure the mooring lines to the 'buttons' on the lock wall. A winch operator on the vessel makes constant adjustments to the lines as the ship is raised or lowered in the lock.

In the operating shelter a U.S. Army Corps of Engineers lock and dam operator works the controls to open and close the lock gates and to open and close the filling and emptying valves.



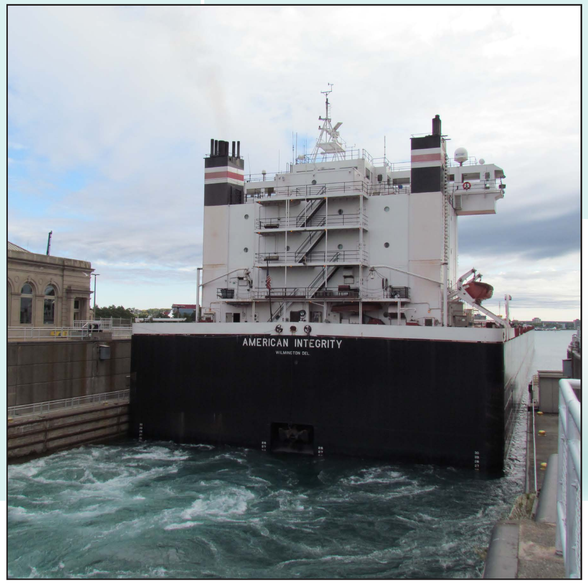
When the ship is in the lock chamber, the upper and lower gates and the filling valve are closed. The emptying valve opens to allow water to flow from the lock chamber to the lower level.



Heading out

Crewmembers get the vessel's mail from the marine post office on site, drop off dirty linens, and pick up their clean laundry while the ship is in the lock. Crew exchanges often take place while vessels are in the lock with security guards escorting arriving and departing crewmembers.

Once the vessel has been raised or lowered, the gates open and the safety boom is raised before the U.S. Army Corps of Engineers lock and dam operators release its lines. One blast of the ship's whistle signals that it is moving forward, and it quickly leaves the lock on its way to the next port.



With the water level in the lock chamber at the lower level, the lower gates open and the ship leaves the lock chamber. The lock is now ready for an up-bound vessel to enter and be lifted or it can be refilled to lower another down-bound vessel.