



**US Army Corps
of Engineers®**

Detroit District



Soo Locks Visitors Center

Sault Sainte Marie, Michigan



A selection of panels from the permanent exhibit at the Soo Locks Visitors Center.



The Soo Locks Visitors Center in Sault Sainte Marie, Michigan is a designated “Class A” facility owned and operated by the U.S. Army Corps of Engineers, Detroit District (the Corps.) Hosting approximately 400,000 visitors a year, these exhibits help the public better understand the operations of the Soo Locks and the importance of shipping on the Lakes. Exhibits also show unique aspects of the Great Lakes and the mission of the Corps, nationally, regionally and locally.

You can learn more about the Soo Locks and the entire Detroit District at www.lre.usace.army.mil and connect with us on Facebook at <https://www.facebook.com/Detroit-District-US-Army-Corps-of-Engineers>.

22 million

gallons of water to lift a boat

Despite changes in machinery and power sources, today's locks work much as they did 200 years ago. By opening and closing valves water moves in and out of the lock chamber using only gravity. Over 22 million gallons of water move through the Poe Lock every time a boat is raised or lowered.

1798 first lock on the St. Marys

The first lock at the Soo carried freight canoes around the rapids on the Canadian side of the river. American forces destroyed it during the War of 1812. For the next 40+ years, cargo had to be carried around the rapids. Since the opening of the State Lock on the U.S. side in 1855 there have been locks in continuous operation here.

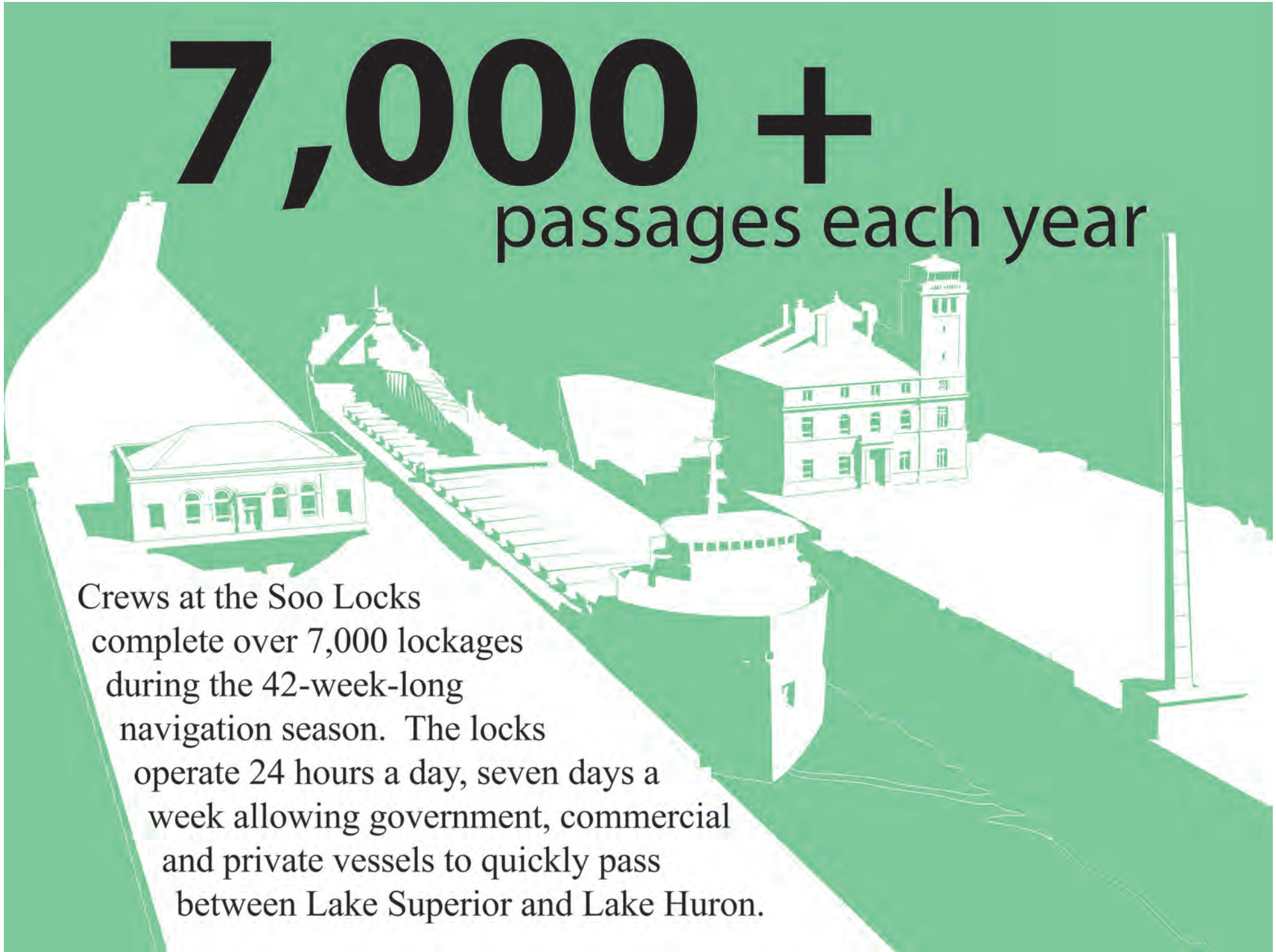


21-foot-drop

An aerial photograph of Lake Superior and the Soo Locks area in Sault Sainte Marie, Michigan. The image is overlaid with a semi-transparent green rectangle. The large number '21' is positioned on the left side of the green rectangle, and the text '-foot-drop' is to its right. A text box on the right side of the green rectangle contains a paragraph of text. The background shows the lake, a bridge, and some industrial buildings.

A thick layer of bedrock holds back the waters of Lake Superior where it joins the St. Marys River. At this spot it creates a 21-foot-drop that prevents boats from passing through. This reddish sandstone lines most of Lake Superior's southern shore and is about 1,000 feet-thick in the Soo area.

7,000 + passages each year

An aerial photograph of the Soo Locks. A large cargo ship is in the process of passing through the locks. The ship is white with a dark hull and has a prominent superstructure. The locks are a long, narrow channel with concrete walls. On the left side, there is a large, light-colored building with a flat roof and several windows. On the right side, there is a taller, more complex building with a clock tower and a spiral staircase. The water is a deep blue, and the surrounding land is green with some trees and buildings.

Crews at the Soo Locks complete over 7,000 lockages during the 42-week-long navigation season. The locks operate 24 hours a day, seven days a week allowing government, commercial and private vessels to quickly pass between Lake Superior and Lake Huron.

THE LOCKS

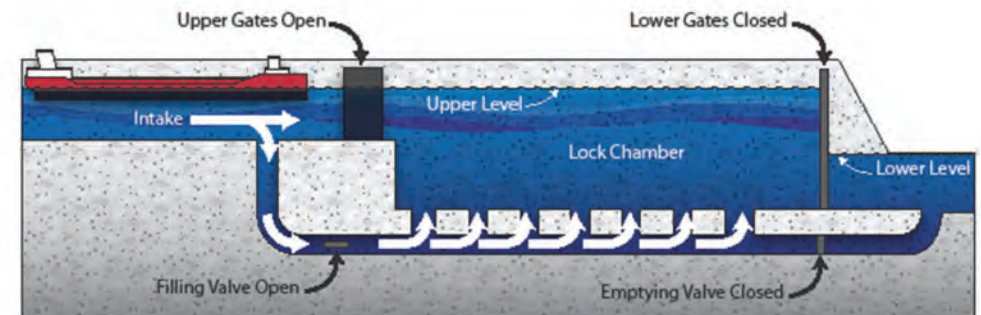
How do the locks work?



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 boat as it approaches.

Arriving at the pier, deckhands are lowered to the wall using a boson's chair. The deckhands carry the boat's lines as it nears the lock and hand these over to the U.S. Army Corps of Engineers line handlers 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 boat to enter the chamber.

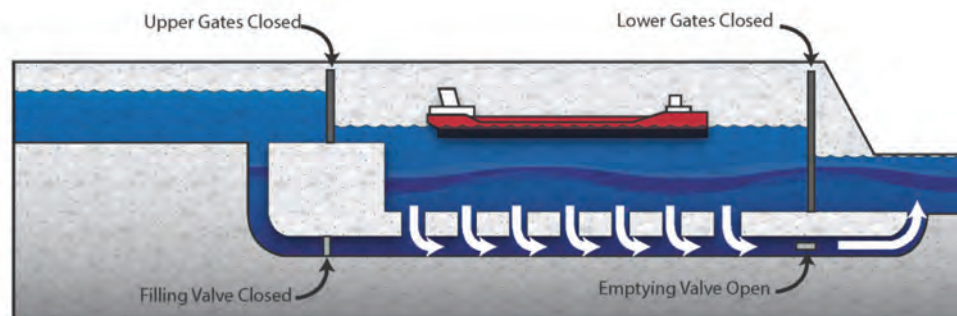


In the Lock



When the vessel is in position in the lock the U.S. Army Corps of Engineers line handlers, assisted by the boat'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 boat 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 boat 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.

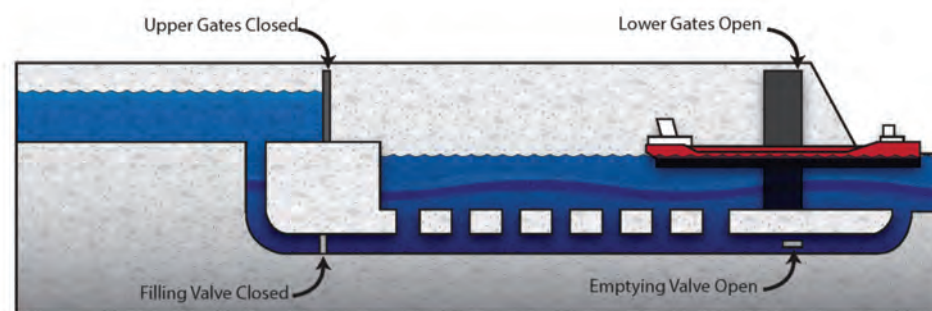


Heading Out



While the boat is in the lock, crewmembers get the boat's mail from the marine post office on site, drop off dirty linens, pick up their clean laundry and re-board the vessel.

When the boat has been raised or lowered, its lines are released, the safety boom is raised and the gates open. 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 boat leaves the lock chamber. The lock is now ready for an up-bound boat to enter and be lifted or it can be refilled to lower another down-bound boat.



US Army Corps
of Engineers.

A Quick History of the Soo Locks

1798

First Lock on St. Marys River

To support the growing fur trade, the Northwest Fur Company built a canoe lock on the north shore of the river. This lock was approximately 40 feet-long and 9 feet-wide.



1855

"State Lock" opens

Built in only two years this tandem lock used two chambers each measuring 350'X 70' and each with a lift of 10 feet to bypass the rapids.

This lock was operated and maintained by the State of Michigan.



1896

Poe Lock opens

Built on the site of the former State Lock, the Poe lock was 800 feet long and 100 feet wide.



1919

Sabin Lock opens

An exact twin of the Davis Lock, it was begun even before the Davis was finished. It is also the only lock on the site named for a civilian, Louis Sabin, the only civilian to ever serve as the Detroit District Engineer.



1968

Second Poe Lock opens

As the design for a new lock neared completion it became clear that an even larger lock would be needed as boats measuring 1,000 feet-long were being planned. Originally set to be 1,000 feet-long and 100 feet-wide it was redesigned to its current size of 1,200 feet-long and 110 feet-wide.



2009

Preparatory work for new lock completed

Funds were provided to build coffer dams at each end of the Sabin Lock and to dredge the approach channels to 28.5 feet.



1750

1800

1850

1900

1950

2000

2050

1814

Lock Destroyed

During the War of 1812 American forces destroyed the British lock. Goods had to be unloaded and stored in warehouses at either end of the falls and transported on a railway running down Portage Avenue.



1883

Wietzel Lock opens

This lock was the first one to fill and empty the chamber through openings in the floor, reducing turbulence in the lock.

During its construction in 1881 the entire facility was transferred from the state to the U.S. Army Corps of Engineers.



1914

Davis Lock opens

At 1,350 feet-long the Davis lock held the honor of being the longest lock in the world when it opened.



1943

MacArthur Lock opens

Opening of a new, deeper lock became a matter of national security during World War II and the MacArthur Lock was built in 15 months. During the war thousands of soldiers were stationed at the Soo to protect the locks and the flow of iron ore.



1986

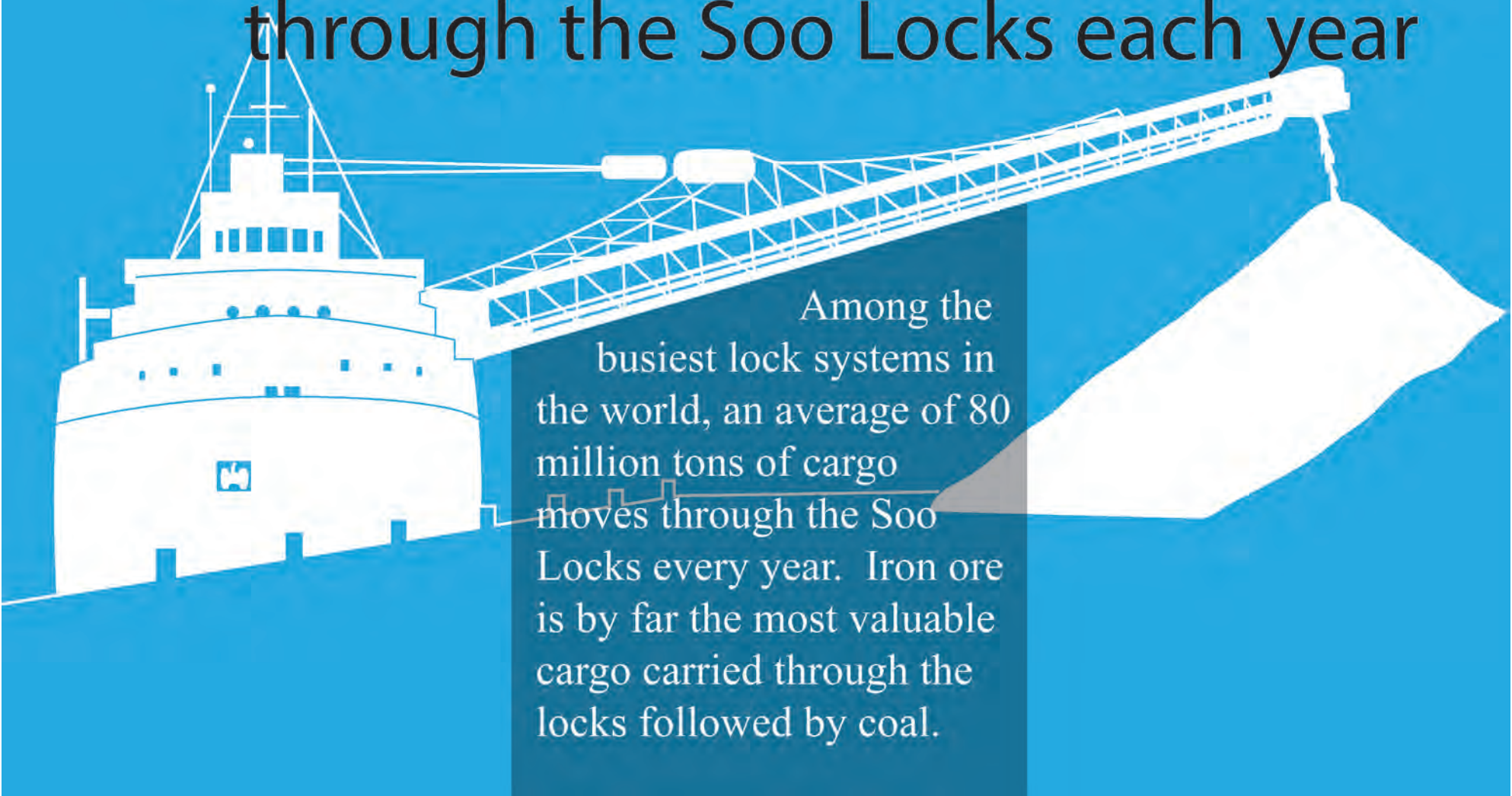
New Lock Authorized

As part of the Water Resources Development Act, Congress authorized the construction of a new lock to be built on the site of the Sabin and Davis Locks. This new lock will be the same size as the Poe Lock.



\$500.4 billion

value attributed to iron ore shipped
through the Soo Locks each year



Among the busiest lock systems in the world, an average of 80 million tons of cargo moves through the Soo Locks every year. Iron ore is by far the most valuable cargo carried through the locks followed by coal.

1,000-foot-long boats

Montreal Canoe
Length of Vessel:
approximately 35 feet
Years: 1700 - 1800s
Cargo Capacity:
up to 4 tons



Early Schooner
Length of Vessel:
between 100 and 200 feet
(depicted at 200 feet)
Years: 1800 - 1900s
Cargo Capacity:
approximately 300 tons



Late Schooner
Length of Vessel: up to 500 feet
(depicted at 300 feet)
Years: 1890s - 1920s
Cargo Capacity:
approximately 2,500 tons



Early Freighter
Length of Vessel: 530 feet
Years: 1900s
Cargo Capacity: approximately 8,000 tons



Classic Freighter
Length of Vessel: 730 feet
Years: 1958
Cargo Capacity: approximately 15,000 tons



1,000 Footer
Length of Vessel: 1,000 feet
Years: 1972
Cargo Capacity: up to 80,000 tons

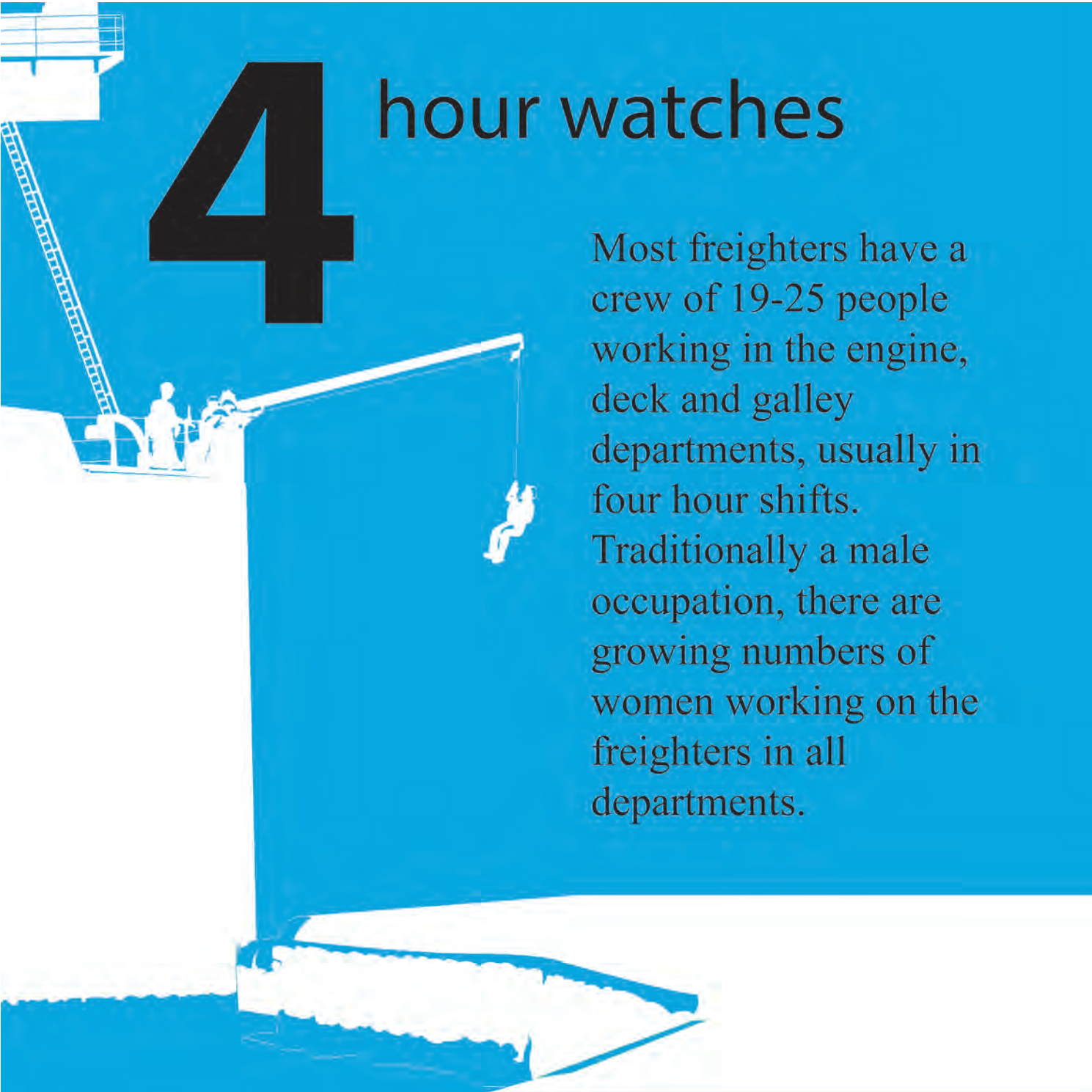
The first commercial freight vessels on the Great Lakes were 40 foot-long canoes. Over time vessel sizes increased as larger locks allowed fewer boats to carry more cargo in fewer trips. The largest boats are now just over 1,000 feet-long and 105 feet-wide.

10

month season

The shipping season has gradually been extended since the 19th Century due to ice breakers and improvements in technology. A few boats operate year round, but most go to 'lay-up' for routine maintenance in ports around the Great Lakes while the locks are closed from mid-January through late March.



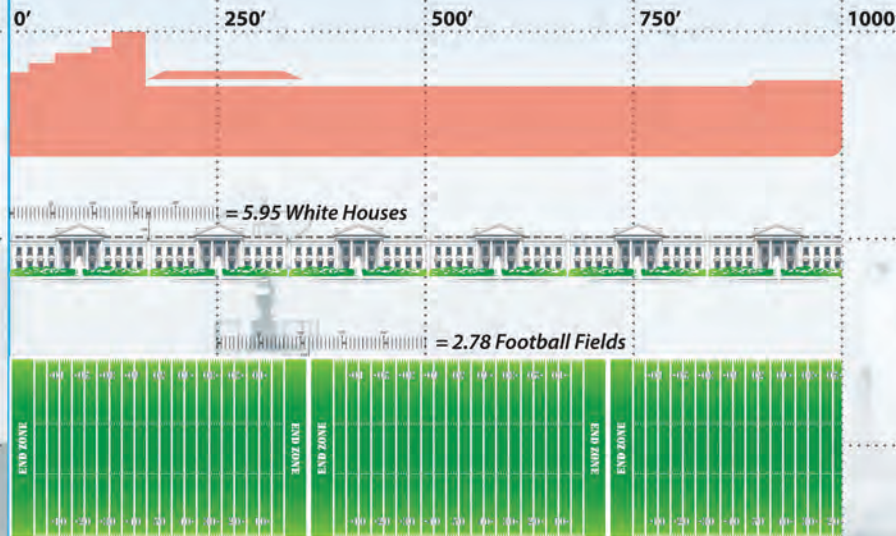
A photograph of a large concrete lock structure, likely the Soo Locks. A yellow crane is visible on the left side of the structure. A person is hanging from a cable, possibly a worker or a tourist. The background is a clear blue sky.

4 hour watches

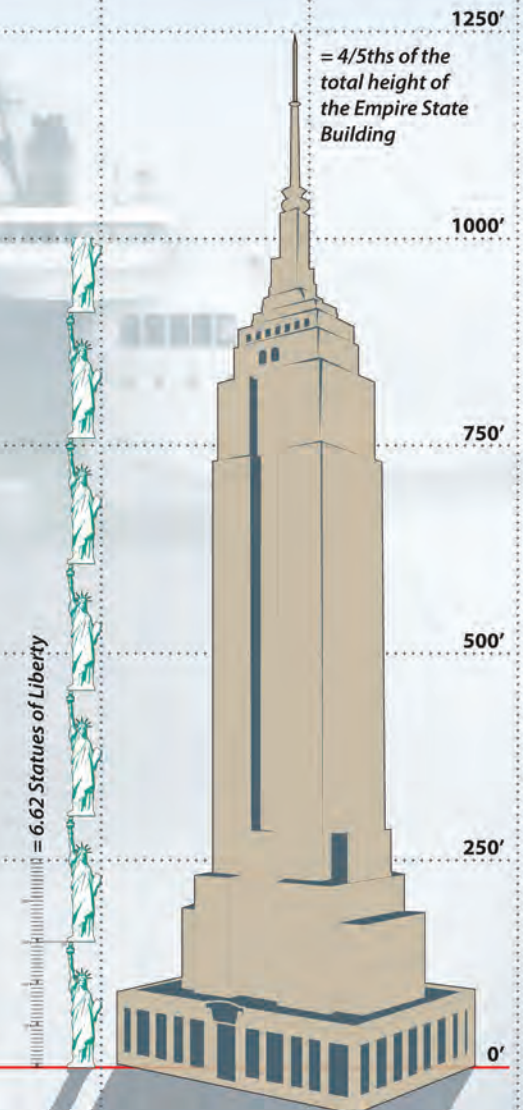
Most freighters have a crew of 19-25 people working in the engine, deck and galley departments, usually in four hour shifts.

Traditionally a male occupation, there are growing numbers of women working on the freighters in all departments.

Just how big is a 1,000-foot-long boat?



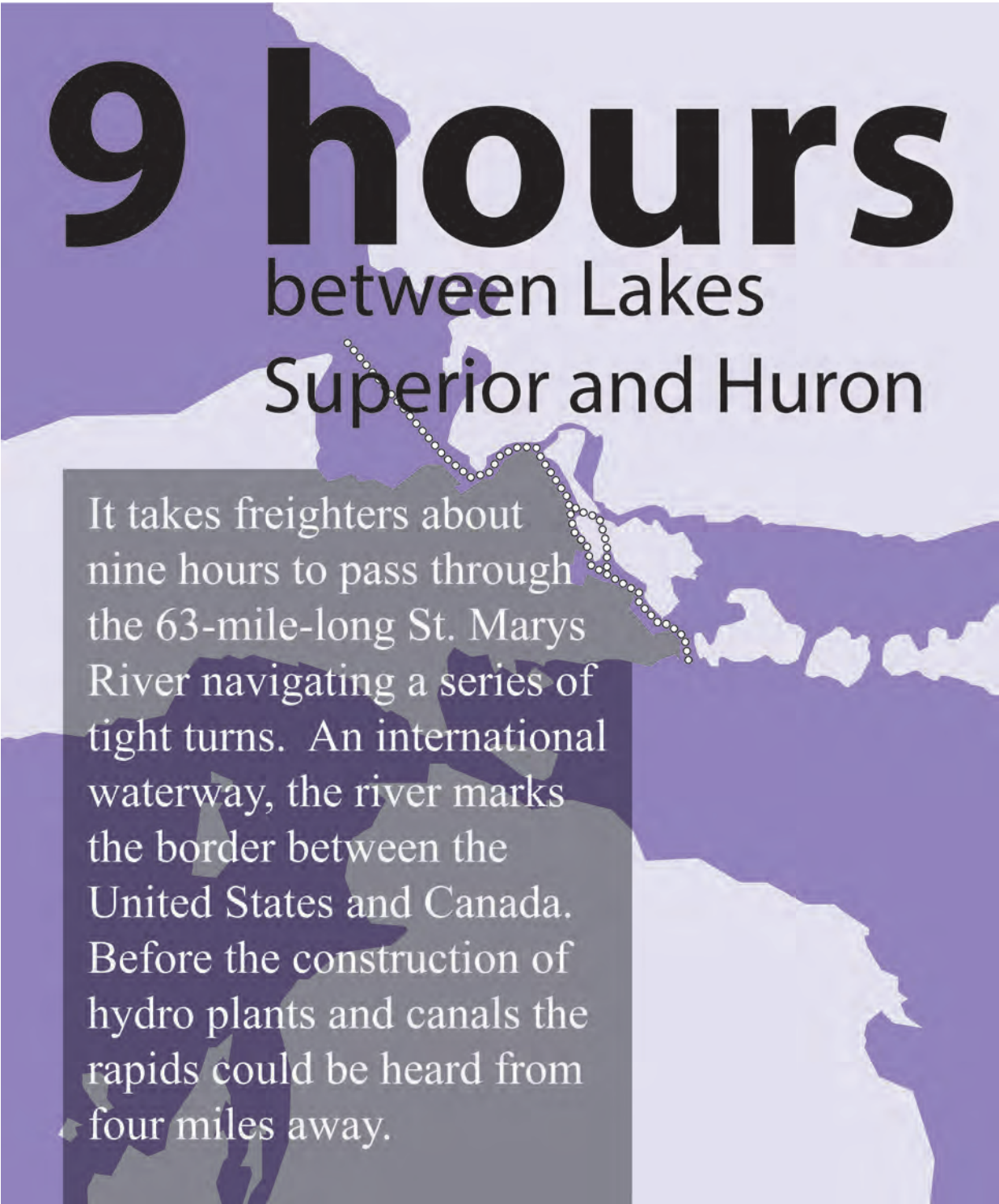
In a single trip, a 1,000-foot-long boat can carry the equivalent of 3,000 - 25 ton trucks or 700 train cars.



2,342 miles to the sea



Deep in the Upper Midwest, Duluth, Minnesota, is the western most Atlantic seaport. Ships from all over the world visit this port, reaching it through four of the five Great Lakes and a series of rivers and locks.

A stylized map of the St. Marys River region, showing the river's path from Lake Superior to Lake Huron. The river is highlighted with a dotted line, and the surrounding land is in shades of purple and blue. The title '9 hours between Lakes Superior and Huron' is prominently displayed at the top.

9 hours

between Lakes
Superior and Huron

It takes freighters about nine hours to pass through the 63-mile-long St. Marys River navigating a series of tight turns. An international waterway, the river marks the border between the United States and Canada. Before the construction of hydro plants and canals the rapids could be heard from four miles away.



Great Lakes Facts

- Four of the Great Lakes are in both the United States and Canada (Lake Superior, Lake Huron, Lake Erie and Lake Ontario). Only Lake Michigan is entirely within the United States.
- The Great Lakes contain one fifth of the world's fresh surface water – that is about six quadrillion gallons of water!
- The Great Lakes contain 250 species of fish.
- The Great Lakes basin is home to 25 million people in the United States and 8.5 million in Canada.
- The connected waterways of the Great Lakes are America's largest inland water transportation unit. They enable shipping to reach the Atlantic Ocean via their outlet, the St. Lawrence River, and to reach the Gulf of Mexico via the Illinois Waterway, from Lake Michigan to the Mississippi River.
- If all the water contained in the Great Lakes was spread evenly across the United States, the entire country would be covered in over 9.5 feet of water.

Stats from <http://www.epa.gov/gliipo/factsheet.html>
<http://www.great-lakes.net/lakes/ref/lakefact.html>

Lake Superior



Average depth: 483 feet
 Deepest point: 1,332 feet
 Miles of shoreline: 2,726
 Surface Area: 31,700 square miles

- Lake Superior is the largest of the Great Lakes and ranks as the largest lake by surface area in the world. (*Lake Baikal in Russia is the largest in volume*).
- Lake Superior contains 10 percent of the earth's fresh water.
- Waves in Lake Superior have been known to reach more than 30 feet in height.
- Lake Superior does not move by tides, but by weather. A combination of winds and high air pressure produces a tidal-like rise and fall called a seiche (saysh).
- The surface area of Lake Superior is roughly the size of South Carolina.
- More than 200 rivers empty into Lake Superior but it has only one outlet through the St. Marys River.

Lake Michigan



Average depth: 279 feet
 Deepest Point 925 feet
 Miles of Shoreline: 1,638
 Surface Area: 22,300 square miles

- Lake Michigan is the third largest of the Great Lakes and ranks as the fifth largest lake in the world.
- The world's largest freshwater dunes are on Lake Michigan's shoreline.
- During World War II submarines were built and had their sea trials on Lake Michigan.
- Lake Michigan's finger-like shape impacts water flow. Water entering the lake circulates slowly and on average remains there for 99 years before leaving through the Straits of Mackinac.
- Lake Michigan is the only Great Lake that is entirely in the United States.

Lake Huron



Average depth: 195 feet
 Deepest point: 750 feet
 Miles of shoreline 3827 (includes islands)
 Surface Area: 23,000 square miles

- Lake Huron is the second largest of the Great Lakes and ranks as the fourth largest lake in the world.
- There are more than 30,000 islands in Lake Huron, including the world's largest freshwater island, Manitoulin Island.
- Including island shorelines, Lake Huron has the longest shoreline at 3,827 miles of any of the Great Lakes.
- More than 1,000 shipwrecks have been recorded on Lake Huron.
- Lake Huron was the first Great Lake to be discovered by European explorers who initially called it La Mer Douce, or sweet water sea.

Lake Erie



Average depth: 62 feet
 Deepest Point 210 feet
 Miles of Shoreline: 871
 Surface Area: 9,910 square miles

- Lake Erie is the fourth largest of the Great Lakes and ranks as the 13th largest lake in the world.
- Lake Erie is the shallowest and warmest of the Great Lakes.
- Lake Erie is the most densely populated of the five great lakes basins
- Winds have been known to produce large, short-term differences between water levels at the eastern and western ends of Lake Erie. The record differential is known to be more than 16 feet.
- Lake Erie's walleye fishery is considered one of the best in the world.
- The water in Lake Erie is replaced every 2.6 years.

Lake Ontario



Average depth: 283 feet
 Deepest point: 802 feet
 712 miles of shoreline
 Surface Area: 7,340 square miles

- Lake Ontario is the smallest of the Great Lakes and ranks as the 17th largest lake in the world.
- Despite its smaller surface size, Lake Ontario holds almost four times as much water as Lake Erie.
- The oldest lighthouse on the U.S. side of the Great Lakes is along Lake Ontario's shore at Fort Niagara. It was completed in 1818.
- The first steam powered vessels on the Great Lakes were launched on Lake Ontario in 1816.
- Lake Ontario had several names in the course of its exploration, including Lac de St. Louis, Lacus Ontario, and Lac Frontenac. Its current name, Ontario, is what the Iroquois called it, meaning "beautiful great lake."

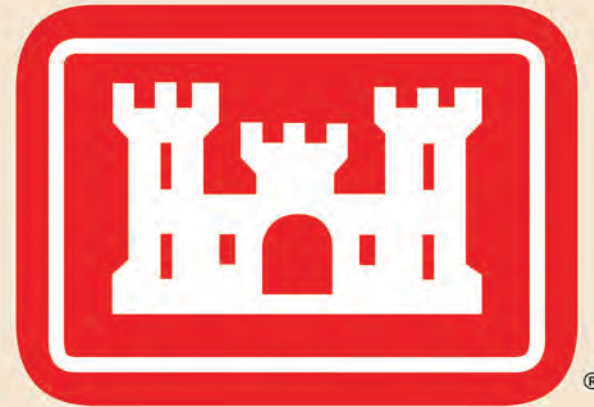


**For Great Lakes Water Levels
 and more information visit:**
<http://www.lre.usace.army.mil/>



Serving the nation since **1775**

The U.S. Army Corps of Engineers is a branch of the U.S. Army specializing in civil works projects like locks, dams, military construction and environmental restoration. Its specific missions are to strengthen the nation's security, energize the economy and reduce risks from disasters.



THE U.S. ARMY CORPS OF ENGINEERS

82,000

square miles

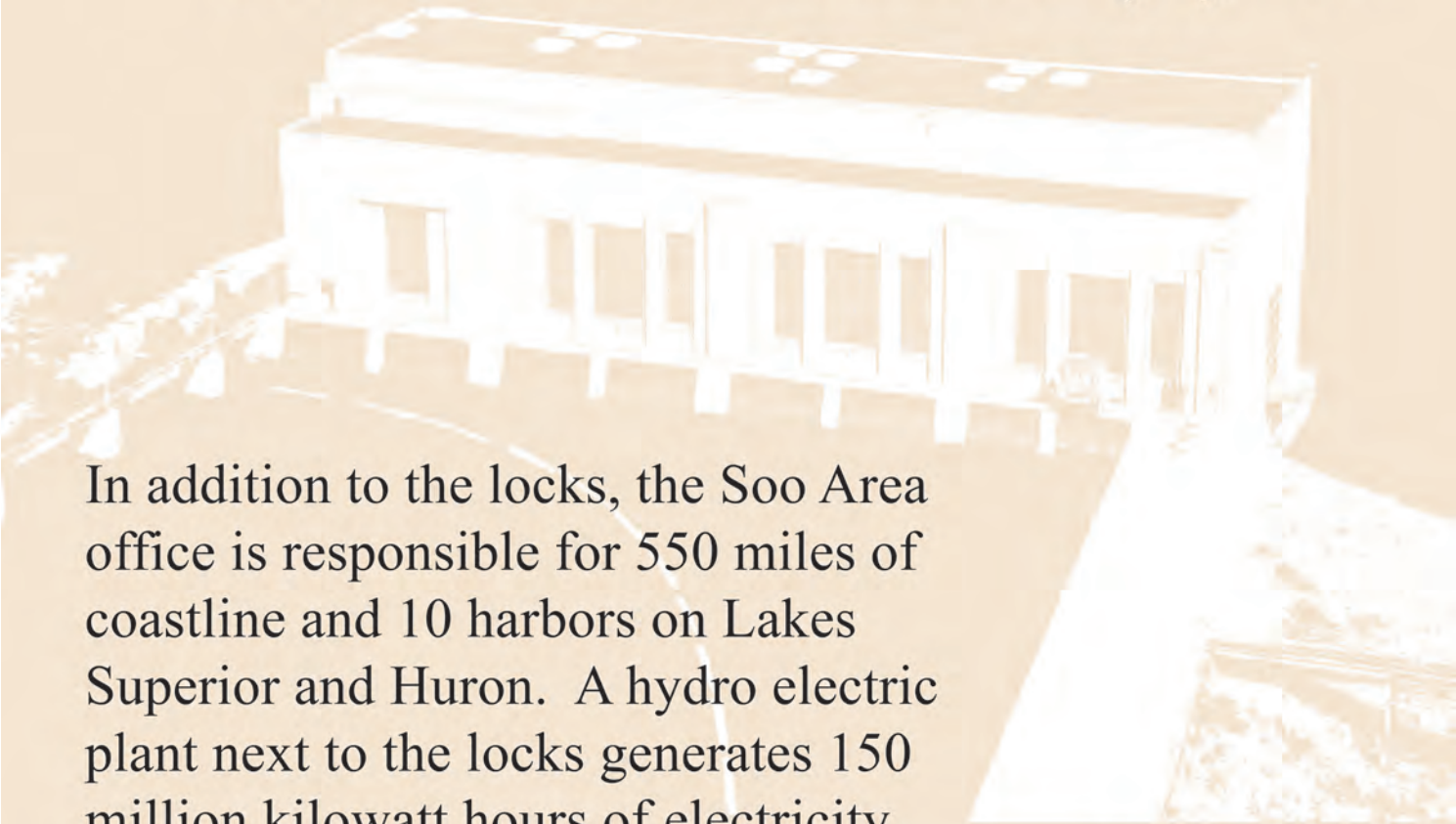


Detroit District Area of Responsibility

The area covered by the Detroit District includes 82,000 square miles of land in four states and 4,000 miles of coastline on Lakes Superior, Huron, Michigan and Erie. In addition to operating the Soo Locks, field offices across the district oversee harbor maintenance, break wall construction, military construction and wetlands protection.

150 million

kilowatt hours every year



In addition to the locks, the Soo Area office is responsible for 550 miles of coastline and 10 harbors on Lakes Superior and Huron. A hydro electric plant next to the locks generates 150 million kilowatt hours of electricity which powers the facility and provides baseline power for the Eastern Upper Peninsula.



U.S. ARMY
CORPS OF ENGINEERS

30

30

