After closing the lock gates, the control house operator opens the giant valves that control the flow of water from the lake into the chamber. Gauges in the control house show the position of the gates and the rising level of water in the lock.

Filling a lock to raise the ship takes about ten minutes. All of the water for lockages comes from the rain-fed lake and flows into and out of the locks by gravity, another example of how the Canal works in harmony with nature.

Once the level of water in the lower and upper chambers has equalized, the gates are opened and the ship moves into the next chamber, and the process is repeated. Each full transit uses about 52,000,000 gallons of lake water.

Right: Locking up a step. In each lock chamber the rise is about 27 feet and takes about ten minutes.
Annual rainfall on the Isthmus provides plenty of water for lockages, but has the disadvantage of being concentrated in the rainy season, the eight months between mid-April and mid-December.

In the early 1930's an additional lake—Madden Lake—was created to provide added water storage for dry season lockages as well as to minimize the threat of flash floods during the rainy season. Created by damming the upper Chagres River, it is fed by runoff from a vast tropical rain forest. Because of the vital role of water in Canal operations, and the direct interrelationship between the tropical forest and its rainfall, the Canal's reservoir management system has been kept continually modernized; and the Government of Panama has implemented conservation programs specifically designed to protect the Canal's watershed.
On the average, a ship spends less than 24 hours in waiting and transiting time, with actual transit time averaging 8 to 10 hours. The average toll paid is about $27,000. For an additional fee, a ship with a tight schedule can book a reservation in advance and be guaranteed transit for a specific day.

Canal tolls are based on the ship’s cargo-carrying capacity, measured in “Panama Canal net tons” equivalent to 100 cubic feet of cargo space. Passenger space is charged on a similar basis. The highest toll ever paid was near $107,000, by the Queen Elizabeth II. The smallest toll was 36 cents, paid in 1928 by an American who was permitted to swim the Canal. Other statistics appear on page 18.
On its transit toward the Atlantic, a northbound ship emerges from Gaillard Cut at Gamboa, where the Chagres river flows into the Canal.

For the 23 remaining miles of the ship's journey across Gatun Lake, the channel generally follows the original bed of the Chagres, winding its way between islands that once were Chagres valley hilltops.

An ongoing program to straighten curves and to lower hilltops for improved pilot visibility is aimed at permitting ships to maintain maximum speed across the lake.

When the ship reaches Gatun Locks at the far side of Gatun Lake, it is lowered to sea level in the Atlantic.

After leaving Gatun Locks, the ship travels out a seven-mile long approach channel to the Atlantic, thus completing its transit.
DID YOU KNOW

- That more than four and a half million cubic yards of concrete went into the construction of the Panama Canal's locks and dams?
- That if the material originally excavated to build the Canal were put on a train of flat cars, it would encircle the earth four times?
- That 101 steam shovels, 369 locomotives, 6,163 railroad cars, 9 track shifters, 26 earth spreaders, 20 dredges, 553 drills and 51 cranes, as well as numerous other equipment, were used in the building of the Canal?
- That steam shovel gangs competed to see which could excavate the most dirt each month?
- That in the record-breaking month of March 1912, 3,217 trains hauling 65,555 cars carried dirt out of Gaillard Cut?
- That Gatun Lake contains one and a half million million (1.5 trillion) gallons of water?
- That a ship traveling between New York and San Francisco saves 7,872 miles by using the Panama Canal instead of going around Cape Horn?
- That the lock gates are seven feet thick?
- That the Atlantic entrance to the Canal is 22 1/2 miles west of the Pacific entrance?
- That because of the reclining “S” shape of the Isthmus of Panama the sun rises from the Pacific and sets in the Atlantic?
- That the longest commercial vessels to transit on a regular basis are the Marchen Maersk and her sister ships, 964.9 feet long and 105.7 feet in beam?
- That the most transits started in a single day was 65, on February 29, 1968?
- That the fastest transit ever was made in June 1979 when the U.S. Navy hydrofoil Pegasus traveled from Miraflores through Gatun Locks in 2 hours and 41 minutes?
- That mean (average) sea level for the Atlantic and Pacific is virtually the same?
- But that because of the tidal variation at the Pacific entrance it can be up to 18 feet, a sea level canal would be faced with the problem of a current running northbound when the Pacific tide was high and a current running southbound when the tide was low?

SPECIAL INFORMATION

Additional information about the Panama Canal will be furnished upon request. Inquiries by mail should be addressed to the Panama Canal Commission, 2000 L Street NW, Suite 550, Washington, D.C. 20036-4996, or to the following offices in care of the Panama Canal Commission: APO Miami 34011-5000; by Telex 3034 PCCAMRM PG; FAX 507-52-2122; or by calling the following offices weekdays between 7:15 a.m. and 4:15 p.m., EST.

General Information
Director of Public Affairs
Office of Public Affairs
507-52-3165 (Panama)

Economic and Marketing Information
Chief, Economic Research and Marketing Development Div.
Office of Executive Planning
507-52-7961 (Panama)

Marine Operations
Marine Director
Marine Bureau
507-52-4500 (Panama)
Because the locks look much the same today as they did in 1914, it is easy to forget how much has changed in the 75 years since the Canal opened. In 1914, kitchens had ice boxes, not refrigerators, and ice was delivered in a mule-drawn wagon. But the world was already changing: World War I began in Europe the very same week the Canal opened, and was followed in time by World War II, Korea, and Viet Nam. Perhaps more significant than wars have been the social and technological changes: greater equality for women and minorities; a greater political voice for millions; the influence of the automobile, the airplane, radio, television, computers, and communications. Change on top of change, and on the Isthmus of Panama nowhere was it more evident than in the development of Panama City into a modern metropolis.
Opposite page: Panoramas of Panama City from Ancon Hill, 1908 and 1969.
Foldout: Panorama of Panama City today.
Above: The Panama Canal Administration Building, with a section of Panama City in the distance.
As the number of ships using the Canal grew, they were also increasing in size. After World War II, the evolution of specialized vessels and new methods of cargo handling, particularly the development of container ships, revolutionized the maritime industry.

As ships were changing, so too was the Canal. So much work has been done on the channel—including slide removal and the widening of the Cut from 300 to 500 feet—that more dirt has been removed than was excavated to build it. The Canal acquired faster and more powerful tugs and locomotives, installed bank lights in the Cut and stronger lights at the locks, and improved its operating and overhaul techniques.

Left: The Japanese general cargo ship Chicago Maru passes a curve widening project at La Pita, December 2, 1922.
Above: Biplanes aboard the “aeroplane” carrier USS Saratoga in Miraflores Locks, June 11, 1930.
Below: Considered a giant ship then, a 96-foot wide bulk carrier passes dredges widening the Cut from 300 to 500 feet, 1968.
Facing page: One of today’s giants, Century Hope 105.6 feet in beam, with 2.2 feet to spare on either side.
Today's biggest challenge is the growing number of very large ships transiting the Canal. In 1965, less than 1% of all oceangoing transits were over 100 feet in beam; today more than 24% are over 100 feet in beam. Often referred to as Panamax vessels, they are designed to the maximum size that can safely fit into the 110-foot wide locks. The advantage to the Canal is that these ships are wonderfully efficient users of the waterway.

Because of them, increasing amounts of cargo transit in fewer vessels. If the average vessel size had stayed the same as it was in 1965, it would have taken more than 30,000 ships to carry the tonnage that passed through the Canal last year in just over 12,000 transits.