The Panama Canal – An Engineering Wonder

By
Priyanka Ann Saini, Sea News
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The Panama Canal is a modern day engineering wonder. It is approximately 80 kilometers long between the Atlantic and Pacific Oceans. However, geographically, the Pacific and Atlantic oceans are not in the same level – the Pacific Ocean is a little higher than the Atlantic, thereby compelling ships to get up over the terrain of Panama, which is higher in the middle of the country. The canal is crucial to both merchant ships and passenger liners and the Panama Water Lock System is considered to be one of the greatest engineering services undertaken, purporting to the needs of the ships to save transit-time compared to the eight thousand mile journey around South America.

Image Courtesy: Canal De Panama

History

The dream of digging a water passage across the Isthmus of Panama uniting the Atlantic and Pacific oceans dates to the early 16th century, and can be traced to the 1513 Isthmian crossing of Vasco Nuñez de Balboa. He discovered that only a narrow strip of land separated the two oceans. Holy Roman Emperor Charles V, who was also Charles I of Spain, initiated a movement to build a passage across the Isthmus. By decree issued in 1534, Charles ordered the Panama regional governor to survey a route to the Pacific following the Chagres River. This was the first survey for a proposed ship canal through Panama, and it more or less followed the course of the current Panama Canal. At the time the survey was completed, it was the governor's opinion that it would be impossible for anyone to accomplish such a feat.

United States interest in a canal to join the Atlantic and Pacific oceans across the Central American Isthmus, not necessarily at Panama, awakened relatively late. The discovery of gold in California in 1848 created a tremendous volume of

transisthmian business, mostly overland using the Panama Railroad as it was completed and came into use, and interest in a canal was heightened.

Inauguration in 1869 of Ulysses S. Grant as the 18th U.S. president brought new impetus to U.S. canal policy. Grant's personal interest went back to July 1852, when, as an Army captain, he led the American Fourth Infantry across the Isthmus of Panama en route to garrison duty in California. The military detachment of several hundred men, together with their dependents, became victims of a raging cholera epidemic in Panama that claimed the lives of 150 men, women and children. Grant later wrote of the tragic incident, "The horrors of the road in the rainy season are beyond description."

In 1869, President Grant ordered survey expeditions to Central America. The expeditions were organised by Navigation Bureau Chief Commodore Daniel Ammen and were under the command of the Secretary of the Navy. Surveys were conducted in Tehuantepec, Mexico, by Captain Robert W. Shufeldt; in the Darien by Commander Thomas Oliver Selfridge; in Nicaragua by Commander Chester Hatfield, Commander Edward P. Lull and Chief Civil Engineer Aniceto G. Menocal; and in Panama along the railroad line by Lull and Menocal. The fine quality of these surveys is still recognised today. Interestingly, the route of the current Panama Canal is nearly identical to that proposed by this Panama survey.

An Interoceanic Canal Commission was appointed by President Grant to evaluate the findings resulting from these Navy expeditions that took place between 1870 and 1875. A report was prepared by the Commission and, following due consideration, the Commission, in 1876, came out in favour of the Nicaragua route.

The U.S. Isthmian Canal Commission of 1899-1901, usually referred to as the second Walker Commission, after its president, Rear-Admiral John G. Walker, was, following failure of the French canal effort, ordered to again study all routes feasible to constructing a water route between the Atlantic and Pacific oceans. The study was ordered by U.S. President William McKinley, who succeeded Grant in office. This time, the Panama and Nicaragua routes were to receive special consideration. The Nicaragua route again came out as the favoured choice, but not for long.

The first complete Panama Canal passage by a self-propelled, oceangoing vessel took place on January 7, 1914. The Alexandre La Valley, an old French crane boat that had previously been brought from the Atlantic side now came through the Pacific locks.

The Panama Canal cost Americans around USD 375,000,000, including the USD 10,000,000 paid to Panama and the USD 40,000,000 paid to the French company. It was the single most expensive construction project in United States history to that time. Fortifications cost extra, about USD 12,000,000.

How it works – The Panama Canal

This waterway was cut through one of narrowest saddles of the isthmus that joins North and South America.

The Canal uses a system of locks – compartments with entrance and exit gates. The locks function as water lifts: they raise ships from sea level (the Pacific or the Atlantic) to the level of Gatun Lake (26 meters above sea level); ships then sail the channel through the Continental Divide.

Each set of locks bears the name of the townsite where it was built: Gatun (on the Atlantic side), and Pedro Miguel and Miraflores (on the Pacific side).

The lock chambers – steps — are 33.53 meters wide by 304.8 meters long. The maximum dimensions of ships that can transit the Canal are: 32.3 meters in beam; draft -their depth reach- 12 meters in Tropical Fresh Water; and 294.1 meters long (depending on the type of ship).

The water used to raise and lower vessels in each set of locks comes from Gatun Lake by gravity; it comes into the locks through a system of main culverts that extend under the lock chambers from the sidewalls and the center wall.

The narrowest portion of the Canal is Culebra Cut, which extends from the north end of Pedro Miguel Locks to the south edge of Gatun Lake at Gamboa. This segment, approximately 13.7 kilometers long, is carved through the rock and shale of the Continental Divide.

Ships from all parts of the world transit daily through the Panama Canal. Some 13 to 14 thousand vessels use the Canal every year. The Panama Canal serves more than 144 maritime routes connecting 160 countries and reaching some 1,700 ports in the world.

The Canal has a work force of approximately 10 thousand employees and operates 24 hours a day, 365 days a year, providing transit service to vessels of all nations without discrimination.

https://www.youtube.com/watch?v=hoQ7RHyG-EA

The Expanded Panama Canal

The Panama Canal Expansion was the largest infrastructure project since the Canal's opening in 1914. Considered and analysed for a decade with more than 100 studies, the Expanded Canal provides the world's shippers, retailers, manufacturers and consumers with greater shipping options, better maritime service, enhanced logistics and supply-chain reliability.

Since its inauguration on June 26, 2016, the Expanded Canal increases the waterway's capacity to meet the growing demand of maritime trade using larger vessels, which means that the Panama route provides important economies of scale.

The Expansion included the construction of a new set of locks on the Atlantic and Pacific sides of the waterway, creating a third lane of traffic and doubling the cargo capacity of the waterway. It also included the creation of the Pacific Access Channel, improvement to the navigational channels, and improvements to the water supply.

While the expanded locks are 70 feet wider and 18 feet deeper than those in the original Canal, they use less water due to water-savings basins that recycle 60 percent of the water used per transit. In line with its commitment to customer service, the Panama Canal will continue to provide the world with value for another century and beyond.

https://www.youtube.com/watch?v=DrQrKAku3e0
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