

# RIDING THE GIANT WAVE

An aerial photograph of a large-scale dam and lock project. The image shows a long concrete dam structure with a lock in the center. A large ship is docked in the lock. The surrounding area includes several white buildings with blue roofs, parking lots, and construction equipment. The background features a wide river and forested hills under a clear sky.



Aerial view showing the new Panama Canal expansion at the Gatun Locks in Colon, Panama.

## LARGE POST-PANAMAX CARGO SHIPS ALONG WITH LARGER LOCKS ON THE PANAMA CANAL ARE PROMPTING U.S. PORTS TO UNDERGO MODERNIZATION PROJECTS

BY SAMUEL GREENGARD

**W**hen engineering and construction crews completed the massive Panama Canal modernization project in June 2016, it was a defining moment in global commerce.

The \$5.25 billion upgrade, which allowed new and significantly larger ships to pass through the series of new locks, represented nothing less than a sea change for shippers and ports worldwide.

“There’s a recognition that ports must support larger ships and improved economies of scale,” says Jeff Schechtman, vice president at WSP | Parsons Brinckerhoff, which specializes in port modernization. “It’s something that impacts the entire port industry.”

RODRIGO ARANGUA/GETTY IMAGES

## Panama Canal Facts and Figures At a Glance

**Groundbreaking:** Jan. 1, 1880

**Canal Opened:** Aug. 15, 1914

**Cost:** \$350 million

**Length:** 51 miles

**Original Width of Canal:** 110 feet

**Original Length of Locks:** 1,050 feet

**Original Depth of Locks:** 39.5 feet

**Miles Saved:** 7,872 through the Drake Passage or Strait of Magellan at the tip of South America

**First Year Traffic:** 1,000 ships

**Annual Traffic:** Between 12,000 and 15,000 vessels (about 40 ships per day)

**Passage Time Through the Canal:** 8 to 10 hours

**Passage Time for Locks:** 3 hours

**Highest Toll:** \$330,000 (Disney cruise ship in 2008)

**Highest Elevation:** 85 feet

**Cost of Modernization:** \$5.25 billion

**Width of Post-Panamax Canal:** 160 feet

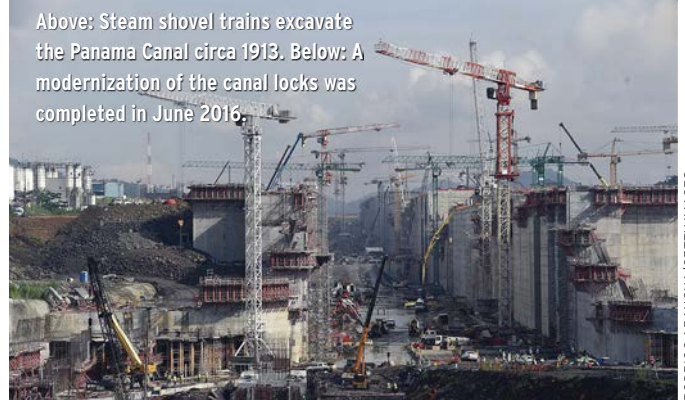
**Length of New Locks:** 1,200 feet

**Depth of Post-Panamax Locks:** 50 feet

Source: Panama Canal Museum



Above: Steam shovel trains excavate the Panama Canal circa 1913. Below: A modernization of the canal locks was completed in June 2016.



As shippers switch to larger vessels—including so-called post-Panamax ships—there's a need for deeper and wider berths, larger cranes, upgraded port infrastructure and changes to railways and highways that connect to the ports. These projects, which involve everything from dredging channels and building new container yards to installing new cranes and computer software, typically run into the billions of dollars and require precise coordination among numerous companies and agencies, including the Army Corps of Engineers, state and local officials, and private companies.

"There's been an infrastructure investment race taking place, particularly on the Eastern Seaboard of the United States, to meet the demands of larger vessels," says Patrick King, global director, Ports & Maritime at CH2M, the program manager for the Panama Canal project. Not surprisingly, the scale of this type of work is enormous—sometimes spanning a decade—and involves a great deal of engineering and construction acumen, not only to modernize the port but also to keep it operating while improvements are taking place.



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According to the American Association of Port Authorities (AAPA), ports and their partners are investing \$155 billion over the next five years in infrastructure improvements. Yet, at the same time, it found that one in three U.S. ports requires at least \$100 million in intermodal upgrades to handle projected 2025 cargo and freight volumes. All of this creates new challenges and opportunities for A/E/C firms.

"These projects change ports and the surrounding areas in significant ways," says Jamie Gwaltney, vice president at Moffatt & Nichol, which has handled economic forecasting, planning, engineering and construction management for the Georgia Ports Authority (GPA) and other ports and terminal operators.

### MAKING WAVES

It's no secret that business and commerce have become increasingly global. AAPA notes that about \$6 billion worth of goods—automobiles, appliances, electronics, furniture, petroleum and myriad other products—move to and from overseas markets

The cost of shipping goods to the U.S. East Coast, and some key inland cities, from Asia through the Panama Canal could lower by **25 percent** or more

**524 million tonnage** is estimated to flow through the Panama Canal in 2020

every day. The overall impact of U.S. seaports on the domestic economy is more than \$4.6 trillion, which has resulted in larger cargo and tanker ships.

“The shipping industry has had to continually reboot and adjust its business model to accommodate larger ships,” says John Young, director of freight and surface transportation policy at AAPA. In 1956, a typical vessel carried about 500 containers. Even a decade ago, a typical vessel carried about 5,000 20-foot equivalent units (TEU). Today, the largest ships accommodate up to 20,000 TEUs in 20- to 40-foot containers, Young says.

The ships aren’t going to get smaller. By the end of 2017, about 60 percent of the world’s container ship capacity will be on vessels larger than those that the old Panama Canal could accommodate, says Jim Newsome, president and CEO of the South Carolina Ports

Authority. The new Panamax ships are sometimes as long as 1,200 feet and require a channel depth of about 50 feet.

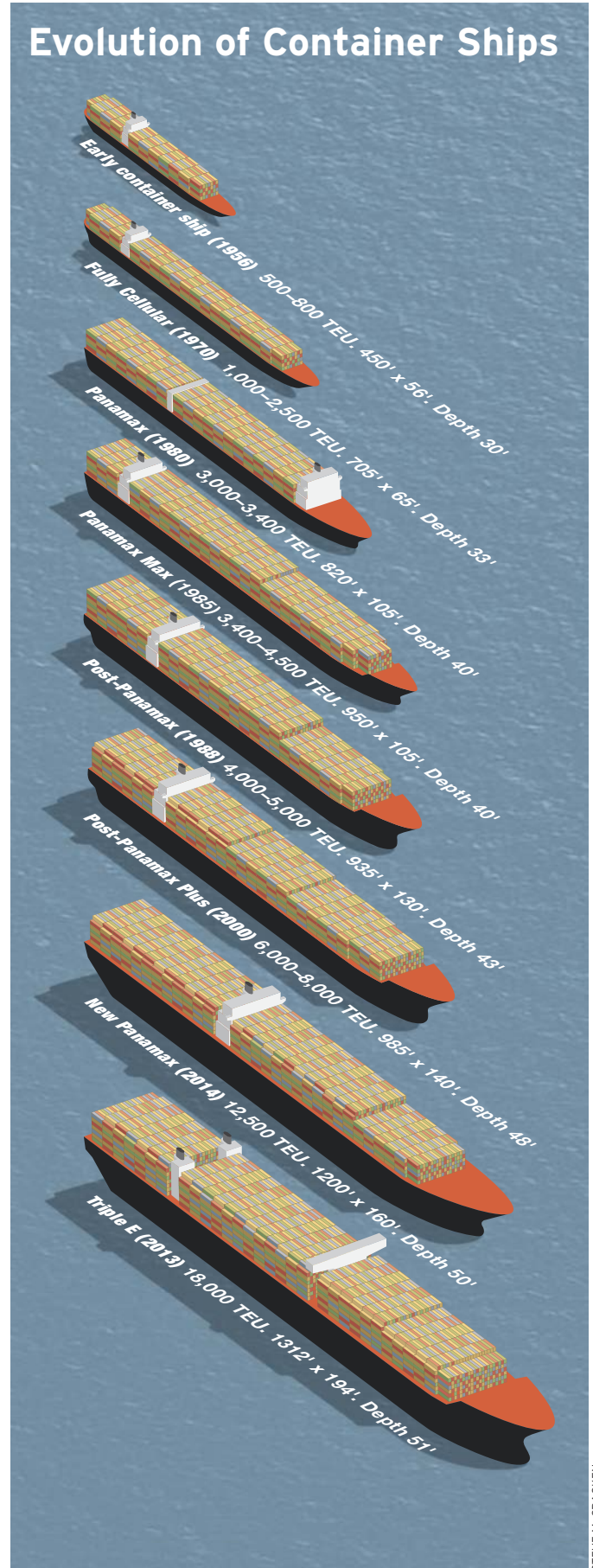
That means the ports have to keep up. The shipping industry isn’t waiting for major ports to expand before building and deploying larger ships designed to lower costs and increase efficiency.

In 2006, the Panama Canal Authority estimated 37 percent of the world’s container ships would be too large to pass through the locks by 2011. This meant that many vessels would instead embark on a longer trip through the Suez Canal and sail around the Cape of Good Hope in Africa or Cape Horn in South America. The subsequent expansion of the Panama Canal, which took place from 2007 to 2016, added two new flights of locks adjacent to two existing sets of locks (there are now three parallel sets of locks at the canal). The new locks are 1,400 feet long, 180 feet wide and 60 feet deep. The improvements will allow the Panama Canal to increase the tonnage flowing through it from a record 340.8 million tons in 2015 to an estimated 524 million tons in 2020.

Now several U.S. ports—including Baltimore, Miami, New York/New Jersey, Los Angeles, Seattle, Oakland (California), Houston, Norfolk (Virginia), Charleston (South Carolina), Savannah (Georgia) and Philadelphia—are following suit and modernizing facilities so that they can handle the larger ships. But it’s no small task.

For example, The Port Authority of New York & New Jersey is in the final stages of a multiyear project to accommodate post-Panamax cargo vessels. It is dredging the harbor to a 50-foot depth, raising the Bayonne Bridge to allow ships to pass, and

## Evolution of Container Ships



STEVE McCracken