Channel Changer

The Panama Canal expansion project has required consolidated control and a phased approach.

BY NOVID PARSI

Expansion of the canal in Panama

Container ships enter a lock on the Panama Canal in 2012. The expansion will allow larger ships to pass through the canal.

PHOTO BY THOMAS KOEHLER/PHOTOTHEK VIA GETTY IMAGES

Global trade volumes have expanded exponentially over the last century. And to accommodate that growth, shipping freighters have expanded in kind. Today's container ships have more than five times the capacity of their early predecessors—and require a significantly wider berth.

For the Panama Canal, this was bad for business. Opened in 1914, the canal handles 5 percent of the world's shipping traffic and 70 percent of all cargo to and from the United States. But over the years, this valuable shortcut became desperately outdated. The Panama Canal Authority knew it was time for an upgrade and launched an expansion megaproject in 2007.

"We weren't capturing all the business we could. We were losing business," says Jorge de la Guardia, executive manager, locks project management division, Panama Canal Authority, Panama City, Panama.

The organization charges shippers based on the capacity of their vessels—and the organization was starting to see its most valuable customers head in another direction. In 2013, 16 percent of the world's container fleet was post-Panamax, meaning they were too large to fit through the Panama Canal. However, these ships carried 45 percent of the world's cargo—and are expected to represent 62 percent of total container ship capacity by 2030. To keep up with the evolving needs of its customer base, the 50-mile (80-kilometer) waterway needed a complete overhaul.

For the first major renovation since the canal was built, the Panama Canal Authority divided a US$5.6 billion, eight-year canal expansion program into four major project areas and established a project management office (PMO) to oversee them.

"This program was so big and it had to move fast. Decisions had to be made quickly for efficiency and cost-effectiveness, to finish within the targeted time frame," says Ilya Marotta, executive vice president, Panama Canal Authority, Panama City, Panama. "So we created a project manage-

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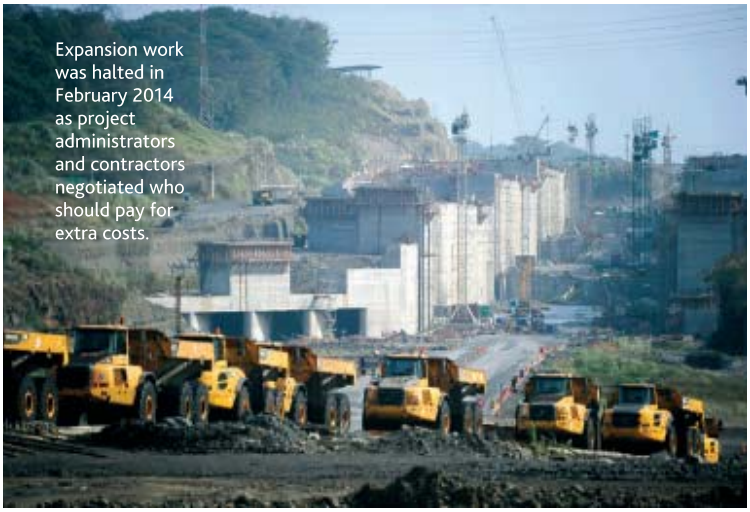
—Ilya Marotta, Panama Canal Authority, Panama City, Panama

New Panama Canal locks under construction in Cocoli, near Panama City, in August 2014



Expansion work was halted in February 2014 as project administrators and contractors negotiated who should pay for extra costs.

PHOTOS BY RODRIGO ARANGUA/AFP/GETTY IMAGES

Shipshape

1997: Studies begin for a program to expand the Panama Canal.

2002: The Panama Canal Authority starts to draft the program proposal.

2006: Voters approve expansion proposal via a national referendum.

2007: Program construction begins.

2009: The project to construct the third set of locks begins.

2011: The locks' contractor faces a six-month construction delay on concrete placement startup.

2013: Work completed on wider Atlantic and Pacific entrances to accommodate larger ships.

June 2015: Atlantic and Pacific locks are filled and gate-testing begins.

June 2016: Scheduled completion for expansion program

ment office within the Panama Canal Authority for fast reaction."

CONTROL ROOM

With a staff of 350, the PMO helped the organization consolidate its talent and resources—and ensured that the expansion program was the organization's highest priority. Consolidating talent led to faster decisions, which accelerated project execution, while other organization staff could focus on making daily canal operations run smoothly during construction, Ms. Marotta says.

The PMO also was tasked with controlling the massive program's cost and scope. "One of megaprojects' largest risks is scope creep," Ms. Marotta says. The PMO mitigated that risk by implementing a program management information system and creating a manual detailing its project management processes. This helped the organization implement stringent change management practices, including a rigorous change-order procedure for any request that could affect the budget or schedule.

A project manager had to submit a change order if a requested change affected any part of the project, such as cost or timeline. A matrix with thresholds was established within the program management plan—the maximum scheduling and budget changes that project leaders at different levels could approve. For instance, Ms. Marotta was authorized to approve a change of up to US$5 million, but higher amounts required authorization from the administrator. And change requests higher than 5 percent of the project budget had to be green-lighted by the Panama Canal Authority board.

"If there was something worth changing, then it would be approved, but it had to be very needed," Ms. Marotta says.

LOCKED IN

At US$3.2 billion, the new locks were the most expensive project in the expansion program. It

"It may take more time for the contractor to get things done properly. But we can live with a delay. We cannot live with a bad project."

—Jorge de la Guardia, Panama Canal Authority, Panama City, Panama

The team made some advance payments or paid some claims in as few as 15 days rather than the contractual obligation of 56 days—all to keep the project moving.

Four of the 16 new gates installed for the project are transported through port of Colon, Panama in June 2014.

PHOTO BY ED GRIMALDO/AFP/GETTY IMAGES

Talent Spotlight

Itzel Ulloa, PMP, project control manager, third set of locks project

Organization: Panama Canal Authority

Location: Panama City, Panama

Experience: 30 years

Other notable projects:

1. Fortuna Hydroelectric Project, a US$532 million, 300-megawatt reservoir-based hydroelectric facility completed in 1994. Ms. Ulloa served as quality control engineer for concrete mix design and installation for parts of the project.

2. Gaillard Cut Widening Project, a US$166 million expansion of the narrowest navigation channel in the Panama Canal that was completed in 2001. Ms. Ulloa oversaw contracts for excavation work.

Career lessons learned: "Being involved in the preparation of the owner's project cost estimate and the selection of the contractor has been extremely valuable. It gave me the experience, knowledge and skills required for such a huge undertaking."

expanded the existing locks by 16 meters (52 feet)—to allow post-Panamax ships to pass through the canal—while reducing water usage by 7 percent.

These improvements involved more than 10,000 activities and relied on a baseline document to track the timeline, budget and payment schedule for each activity. "It's the document that we used for seven years to review the payment and progress of the project," says Itzel Ulloa, PMP, project control manager, Panama Canal Authority, Panama City, Panama.

The project control team met each week to review completed and outstanding tasks, then met with the representative for the consortium of international contractors each month to discuss any issues and how the contractor would address them. To stay on top of the budget, the organization required a contract that settled all payment disputes with contractors through an adjudication board. The team made some advance payments or paid some claims in as few as 15 days rather than the contractual obligation of 56 days—all to keep the project moving.

"From a project management perspective, our team's success really depended on helping the contractors continue the project by being creative from a financial point of view," Ms. Ulloa says.

SCHEDULED PROGRAMMING

Delays were a constant threat on this long-term project. For instance, a lock leak in 2015 caused a weeks-long delay while the team worked to find a solution. When a video of the leak went viral and riled the public, the team knew it needed to mitigate the damage—and fast. The contractor quickly identified and remedied the problem—a lack of reinforcement in a lock joint.

The Panama Canal Authority held weekly meetings with the contractor and brought in third-party experts to ensure repairs were completed effectively. Once the problem was solved, the organization reached out to media to explain how future risks were mitigated.

"This project has 4 million owners," Mr. de la Guardia says, referring to Panama's population. "This is a very emotional topic in this country. It wasn't an unsolvable problem, but it was a very visual one."

Although the entire expansion program was

Construction of the new Gatun Locks next to the Atlantic Ocean in June 2015

scheduled to finish 18 months behind schedule, taking shortcuts to reduce delays would have impacted the quality of work, Mr. de la Guardia says. Relaxing specifications on, for instance, concrete work, might have accelerated the project but would have increased the risk of noncompliance, he says. "It may take more time for the contractor to get things done properly. But we can live with a bad project."

MADE IN PANAMA

When work is completed, shipping traffic capacity will double. New locks on the Atlantic and Pacific sides of the canal already allow vessels more than twice the previous size to pass through; a new 6.3-kilometer (3.9-mile) access channel links the new Pacific locks to the canal; the original channels are wider and deeper; and the entire canal system has increased water supply. This success has been a point of national pride for Panama, Ms. Marotta says.

"The canal's original construction [in 1914] was built mainly by foreigners under the U.S. Corps of Engineers," Ms. Marotta says. "This time it's different: 90 percent of the workforce is Panamanian."

As a result, the project management and engineering expertise gained during the expansion will remain in Panama, while the canal's expansion will have a global reach, she says.

"It's a project that will touch the world." **PM**

Route Revisions

Other canal projects in progress or on the horizon:

1 NICARAGUA CANAL

Location: Southern Nicaragua

Description: The 278-kilometer (173-mile) channel to connect the Atlantic and Pacific oceans would be among the world's largest.

Budget: US$50 billion

Status: Start of construction delayed until late 2016 because of environmental concerns and China-based sponsor Hong Kong Nicaragua Canal Development Group's financial woes.

2 SUEZ CANAL EXPANSION

Location: Egypt

Description: A 72-kilometer (45-mile) stretch in the middle of the canal was widened and deepened to increase traffic and revenue.

Budget: US$8 billion

Status: The one-year project was completed in August.

3 DUBAI WATER CANAL

Location: Dubai, United Arab Emirates

Description: A 3-kilometer (1.9-mile) canal that connects Business Bay Canal with the Arabian Gulf

Budget: US$545 million

Status: Scheduled to be completed by end of 2016