PANAMA CANAL
EXPANSION PROGRAM
SEPTEMBER 2013
Post-Panamax Locks

Construction of the new locks complexes on the Pacific and Atlantic sides. Each one of the locks complexes will feature three chambers with three water-saving basins per chamber, a lateral filling and emptying system and rolling gates.

Pacific Access Channel

Excavation of the new access channel north of the new Pacific locks. The project entails the excavation of some 50 million cubic meters of material along a 6.1-kilometer span. It is executed in four phases (PACs 1-4).

Improvements to navigation channels

Dredging of both Canal entrances, on the Atlantic and Pacific oceans, as well as the existing navigation channels in Culebra Cut and Gatun Lake.

Improvements to water supply

Rising Gatun Lake’s maximum operating level by 45 centimeters to improve the Canal’s water supply and draft dependability.
Work to expand the Panama Canal officially began in September 2007 with dry-excavation work for the creation of the Pacific Access Channel that will link the Third Set of Locks on the Pacific side to Culebra Cut. The work calls for the excavation of some 50 million cubic meters of material. The first three dry-excavation phases have already been completed.

Consortium ICA-FCC-MECO is in charge of the fourth phase of the new 6.1 kilometer-long channel. To date, the required depth to enable navigation by vessels with deeper draft has already been achieved.

A 2.3 kilometer-long dam needed to separate the waters of Miraflores Lake from those of the new Pacific Access channel is being built under this project.

Work on the Pacific Access Channel has also required the clearing of more than 400 hectares contaminated with unexploded ammunition (UXO) left behind by the US military during its deployment in Panama Canal areas.
Atlantic entrance

This contract was awarded to Jan de Nul n.v. on September 25, 2009. The work, completed in April of this year, included dredging and dry excavation of nearly 17.9 million cubic meters of material.

Dredging of the 13.8-kilometer area included widening of the existing Atlantic entrance navigation channel from 198 meters to a minimum of 225 meters as well as the north access channel to the new Atlantic locks to a minimum of 218 meters.

An option for additional dredging up to 16.1 meters was executed, which represented an extra 2.3 million cubic meters of material.

The contractor deployed several dredges simultaneously along the area, including hopper dredge Fillipo Bruneleschi and cutter-suction dredges Hondius and Marco Polo.

Pacific entrance

This contract was awarded to Belgian company Dredging International on April 1, 2008. The work consisted of widening the navigation channel on the Pacific entrance to a minimum of 225 meters and deepening to 15.5 meters below mean low water springs and partial construction of the south access to the Pacific locks.

A total of 8.7 million cubic meters of underwater material were dredged under this component of the Expansion Program using world-renown high-tech, powerful equipment like dredges D’Artagnan, Vlaanderen XIX and Lange Wapper.

The work was completed during the last quarter of 2012.
This project consists of the removal of some 30 million cubic meters of material to deepen and widen the navigational channels in Gatun Lake and to deepen the navigation channel in Culebra Cut. Work in the Cut was completed at the end of 2012.

Most of the dredging work in Gatun Lake is being conducted by personnel and equipment of the Canal Dredging Division, with the support of the dredge Cornelius, rented to Boskalis. The remainder of the work was awarded to contractors Jan De Nul n.v., which dredged the north entrance to the new Pacific Access Channel (completed in November 2012) and Dredging International S.A., was responsible for dredging the reaches along the north end of the Gatun Lake navigation channel (completed in March 2012.)

Work under the latter project included the recovery of archaeological findings from the waters of Gatun Lake, which spans 422 kilometers and is vital to Canal operations.

The new Panama Canal-owned dredge “Alberto Aleman Zubieta” works at a section of the existing channel.

This project consists of rising the maximum operating level of Gatun Lake from 26.7 to 27.1 meters, to improve the Canal’s water supply. The project will enable additional water storage capacity for Gatun Lake by nearly 200 million cubic meters, which will allow for approximately 1,100 additional transits every year.

The project calls for the modification of specific structures in Gatun and Pedro Miguel locks. All 14 Gatun spillway gates were also extended and two additional gates were built at the Canal industrial dry dock. To ease the maintenance of the taller spillway gates, two new caissons or floating gates were also acquired.
It is the largest and most comprehensive project under the Expansion Program. At a cost of $3.2 billion, the design-build contract was awarded on July 15, 2009 to Grupo Unidos por el Canal, a consortium formed by companies Sacyr Vallehermoso, S.A. of Spain; Impregilo SpA of Italy; Jan de Nul n.v. of Belgium; and Constructora Urbana, S.A. of Panama. The contractor formally commenced the work on August 25 of the same year.

The project entails the construction of two similar sets of locks — one on the Pacific and the other on the Atlantic side — each with a total of nine water-saving basins and a redundant system of eight rolling gates per lock.

The designs for the Third Set of Locks, as well as the fabrication of its different components, are being done in different parts of the world. For instance, the 16 gates are being fabricated by Cimolai S.p.A. in Italy, with the first four, which will be installed in the middle chamber on the Atlantic side, already in Panama. Fabrication of the valves was awarded to South Korean mogul Hyundai Samho Heavy Industries, and the first four shipments with 114 valves, out of a total of 158, arrived in Panama between December 2012 and August 2013.

To build the new locks, the contractor installed its own industrial parks to produce aggregates and prepare concrete mixes. The rock extracted from excavation areas in the Pacific site, known as basalt, is crushed and used as aggregate and sand for concrete mixes in both sites.

A total of 3.4 million cubic meters of concrete from an approximate total required volume of 4.3 million cubic meters were poured by August at both the Pacific and Atlantic sites.
While the filling and emptying system at the existing Canal locks has a series of ports on the chamber floor, the Third Set of Locks will operate with a lateral system with ports located on the chamber walls. The system will allow filling each lock chamber in 10 minutes whenever water-saving basins are not in use and in 17 minutes when they are part of the operation.

**GENERAL INFORMATION ON THE NEW LOCKS**

The new rolling gates are easier to service.

The new locks will have 16 rolling gates operating from concrete recesses located perpendicular to the lock chambers. Such gate configuration turns each recess into a sort of dry dock which will allow servicing the gates on site without the need to remove them and therefore interrupt lock operations.

This design increases the capacity and flexibility of lockage operations, and allows for shorter maintenance times at a lower cost.
Following a nearly one month-long journey, the first four rolling gates for the Third Set of Locks arrived at the entrance to the Third Set of Locks on the Atlantic side on August 20 of this year. Built for the two middle chamber lock heads in the Atlantic site, the giant gates are 57.60 meters long by 10 meters wide by 30.19 meters high and weigh an average 3,100 tons.

Gate shipping operations began in early July at the shops of Cimolai S.p.A., the contractor responsible for their fabrication, in San Giorgio di Nogaro. There, one by one were loaded onto barges for their transportation to the Port of Trieste, in the Province of Pordenone, from which they departed at the end of July to begin their journey aboard heavy lift semi-submersible vessel SUN RISE.

At a cost of $547.7 million, including fabrication, transportation and installation, the gate system is one of the main elements of the locks design and construction. Each one is made up of the gate itself, the track system and the electromechanical elements required for its operation. The rolling gates will be installed in concrete recesses built at one side of the chamber and will roll on track to the opposite side. Each gate will open and close within five minutes. They will move perpendicular to the central axis of the lock, as opposed to the exiting locks miter gates, which are made up of two leafs, each hoisted at one side of the lock wall, and turn on an axis to open and close.

Rolling gates were selected after numerous studies of the types of gates used in Post-Panamax locks around the world. Among the features analyzed for their selection were their dimensions and the ease of their maintenance, which can be conducted on site inside the recess, thus, reducing potential interruptions to vessel transits. Rolling gates are used in Post-Panamax locks in Europe, including Berendrecht and Zandvliet, in Antwerp, Belgium. A total of six different gate types will be fabricated, with different characteristics according to their final location. For instance, the tallest and sturdiest gates will be installed at the Pacific entrance to the Canal to make up for the significant tidal variation. Although the heaviest gates will weigh nearly 3,700 tons, their design includes buoyancy chambers that will enable them to move on the track at a mere 15 percent of their real weight.

The unloading and future installation of the gates is conducted using specialized self-propelled modular transporters. The gates will be installed in the dry and will be tested once the locks complexes are flooded. This construction system will take the installation of these mechanical elements out of the critical path of the construction.
Activities under the Panama Canal Expansion Program abide by strict environmental standards. Along with its contractors for each of the components and in coordination with Panama’s National Environmental Authority (ANAM) and the Aquatic Resources Authority (ARAP), the Canal conducts wildlife rescue and relocation activities as work progresses. Mammals, reptiles and birds have been rescued and relocated to safe areas.

Reforestation projects with native species are also carried out as ecological compensation for expansion work. The reforestation is conducted in protected areas within city limits like Camino de Cruces National Park and Panama City’s east side in the Tapagra Hydro-Protection Zone in Chepo, as well as in the Chiriqui province and in selected areas in the Cocle and Herrera provinces. Two other projects are also being executed in the Chiriqui province, including the ANAM Forest Research Center (100 hectares) and mangrove areas in Chiriqui Viejo (50 hectares.)

As of July 2013, the ACP had paid ANAM and ARAP a total of $3,732,765.50 as ecological compensation.

PALEONTOLOGICAL AND ARCHAEOLOGICAL RESEARCH

As part of the efforts to preserve the cultural patrimony, highly-valuable archaeological items, such as a 16th-Century Spanish dagger, pre-Colombian arrowheads and bottles dating from last century have been recovered from excavation sites, restored and preserved.

A contract for paleontological research signed by the Panama Canal Authority with the Smithsonian Tropical Research Institute (STRI) concluded at the end of 2012. As a result of the work conducted by STRI, 8,862 items were collected and catalogued, of which 5,377 are made up of rock and sediments, and 3,485 are fossils.

Event conducted for the closing of the paleontological research contract with STRI.
To fulfill its responsibility of informing the public about the Expansion Program, and in compliance with Law 28 of July 17, 2006, the Canal publishes quarterly reports on the progress achieved in the contracts under the Expansion Program for the Executive Branch, the National Assembly, the Office of the Controller General, and the Ad-hoc Committee (formed by members of civil society). The contents of these reports are available for public consultation in the Canal Internet page at www.pancanal.com.

The Expansion Program has also established a hotline (800-0714) and an e-mail address (ampliacion@pancanal.com) to provide general information on the program as well as to respond to queries, complaints and suggestions related to the execution of the work.
To procure the required financing of $2.3 billion to complete the expansion of the waterway, the Panama Canal Authority signed contracts with a group of bilateral and multilateral credit institutions. A total of $1,350 million have been disbursed to date.

The Panama Canal Expansion Program has become a significant source of job opportunities and training for professionals in different fields. More than 30,000 jobs have been created in five years of execution. Technology, modernization and human resources are just some of the aspects boosted by the Canal expansion, in which the talents of thousands of men and women have been put to work, with the motivation of seeing this mega-project through to completion for the benefit of the nation and world shipping.

**LABOR**

**FINANCING**

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<th>FINANCING INSTITUTIONS</th>
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<td>Japan Bank for International Cooperation (JBIC)</td>
<td>$800 million</td>
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<td>Total $2.3 billion</td>
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