TRANSFORMATIONS

Building a Better World

PANAMA PRIDE

Sunrise over Panama Canal.

For nearly 200 years, MWH has stood behind one key principle: to deliver the highest level of client service. This is especially true when you are the lead designer on the crown jewel of global engineering projects. One of the few man-made objects visible from space, the 100-year-old, 50-mile-long Panama Canal's multibillion-dollar makeover is eagerly awaited by the world's shipping titans. It will enable this essential waterway to handle what is expected to be a surge in shipping traffic. Once completed, it will provide efficient navigation, transform global trade and boost local economies for decades to come.

When new design technologies were needed to conserve water during transit of the more than 15,000 vessels expected to navigate the expanded Central American shortcut each year, officials turned to MWH. Leading a multinational team that included members from the U.S., Argentina, Netherlands, Italy, India and Panama, we have worked for over seven years across 13 time zones to exceed every goal, overcome every challenge and deliver the most sophisticated lock system and largest water saving basins in the world.

Nothing less than a unique solution would do for this engineering marvel that has seen more than a million ships pass between oceans since it opened a century ago. The Canal's new, larger lock system, operating together with the water saving basins, will allow reuse of 60 percent of the water for each lockage, or eight percent less water than needed for the existing smaller locks. This amounts to recycling 72 million gallons (272 million liters) of fresh water from Panama's Lake Gatun – the equivalent of 110 Olympic-size swimming pools – each time a ship transits the Canal.

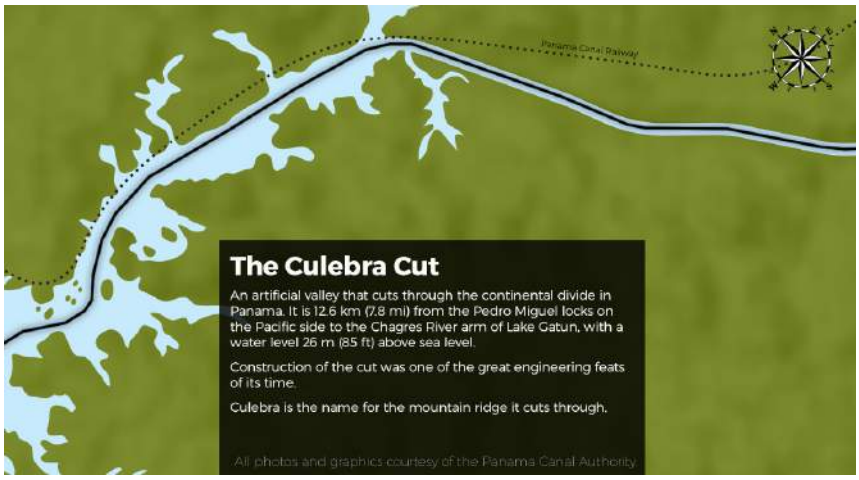
Major coastal cities along the Eastern seaboard have already begun increasing and upgrading their port infrastructures in preparation. Once the new Post-Panamax locks are operational, and the work of expanding the waterway is completed, Canal capacity will double. The world's ocean-going container ships—many nearly as wide as the new locks and carrying up to 13,000 TEUs* each—will be able to make safe passage. And though ship traffic is expected to increase significantly, the Post-Panamax ships navigating the locks will use less fuel, which will promote environmental protection, public health and sustainable development.

Ultimately, the metamorphosis of this iconic artery of global trade will enable Panama to better manage its valuable water resources, provide new growth and development opportunities for its 3.8 million citizens and transform the way countries trade with one another.

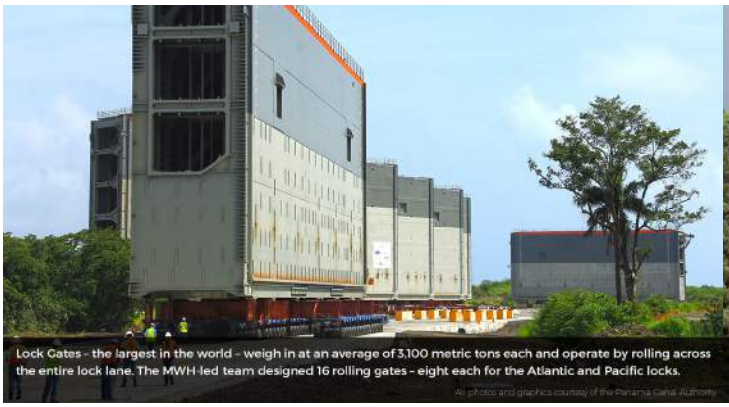
* Twenty-foot equivalent units (TEUs)


Atlantic Locks
Water saving basins – the largest in the world – are designed to reuse 60 percent of the fresh water consumed for lockages, with an optimized filling and emptying system that meets aggressive performance criteria for system efficiency and throughput.
All photos and graphics courtesy of the Panama Canal Authority.
Panama Canal Railway


Gatun Lake
A large man-made lake to the south of Colón, Panama. It forms a major part of the Panama Canal, carrying ships for 33 km (21 mi) of their transit across the Isthmus of Panama.
The lake was created between 1907 and 1913 by the building of the Gatun Dam across the Chagres River. At the time it was created, Gatun Lake was the largest man-made lake in the world. Gatun Dam was also the largest of its kind.
All photos and graphics courtesy of the Panama Canal Authority.
Panama Canal Railway


Panama Canal Railway
The Culebra Cut
An artificial valley that cuts through the continental divide in Panama. It is 12.6 km (7.8 mi) from the Pedro Miguel locks on the Pacific side to the Chagres River arm of Lake Gatun, with a water level 26 m (85 ft) above sea level.
Construction of the cut was one of the great engineering feats of its time.
Culebra is the name for the mountain ridge it cuts through.
All photos and graphics courtesy of the Panama Canal Authority


Panama Canal Railway
Pacific Locks
Through optimum design of operational features and control systems, lock operations will be seamless and efficient. Design of the lock operating gates for rapid opening and closing, coupled with an efficient filling and emptying system based on innovative hydraulic design, and state-of-practice control technologies, system safety, efficiency and throughput are maximized.
All photos and graphics courtesy of the Panama Canal Authority



Lock Gates - the largest in the world - weigh in at an average of 3,100 metric tons each and operate by rolling across the entire lock lane. The MWH-led team designed 16 rolling gates – eight each for the Atlantic and Pacific locks.

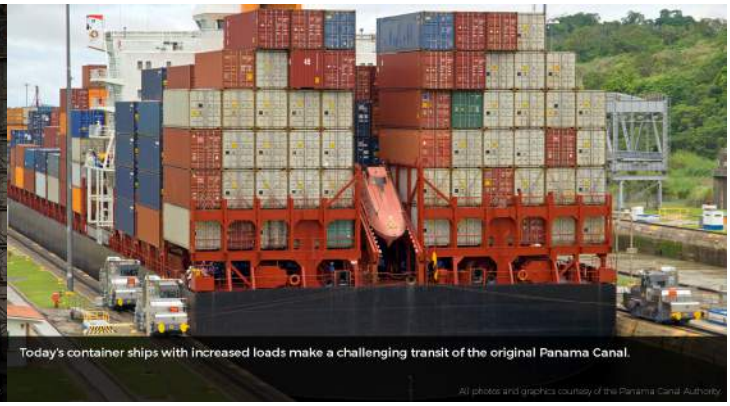
All photos and graphics courtesy of the Panama Canal Authority

Artist's rendering of Water Saving Basins - the largest in the world. They save and reuse 60 percent of the fresh water needed to operate the lock system. The operating capacity of three basins is 100 million gallons.

All photos and graphics courtesy of the Panama Canal Authority

Navigation Locks - each chamber is 426.72 m (1,400 ft) in length - nearly as long as the Empire State Building is tall. There are three lock chambers on the Atlantic side and three on the Pacific side.

All photos and graphics courtesy of the Panama Canal Authority

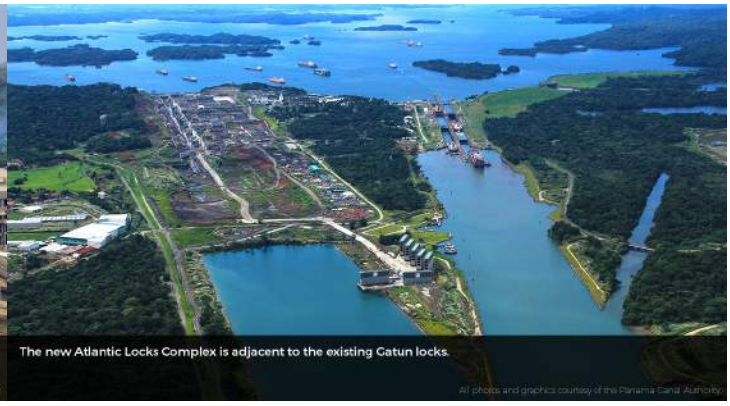


Today's container ships with increased loads make a challenging transit of the original Panama Canal.

All photos and graphics courtesy of the Panama Canal Authority

More than 15,000 vessels are expected to navigate the expanded Canal each year.

All photos and graphics courtesy of the Panama Canal Authority



The new Atlantic Locks Complex is adjacent to the existing Gatun locks.

All photos and graphics courtesy of the Panama Canal Authority

Panama rainforest toucan

All photos and graphics courtesy of the Panama Canal Authority

TRANSFORMATIONS

Building a Better World

KNOWING THE WORTH OF WATER

Scenic Austin, Texas – View from Lady Bird Lake

The City of Austin has had a long wait for more water. Since 1984, its citizens have anticipated construction of a new water treatment facility that would support its fast-growing population and carry it through the dry times that are so uncomfortably familiar to the central-Texas city. MWH helped to bring relief in the form of the Austin Water Treatment Plant completed in November 2014. Hired by the city to provide overall Construction Management-at-Risk (CMAR) services, MWH took on the Texas-sized challenge of coordinating the efforts of numerous subcontractors. Construction and regulatory considerations, daunting geological obstacles and even one celebrity salamander presented special challenges. In spite of these all, MWH delivered a quality project under budget. With its sophisticated technology and sustainable enhancements, the plant treats 50 million gallons of water per day, expandable to 300 million gallons per day. It will serve Austin's commercial and residential water needs well into the future.

When the City authorized the construction of a new $508 million water treatment plant in northwest Austin in 2009, expectations were high and so were the challenges. The site is located in an environmentally sensitive area with underground karst features that carry runoff to Austin's "crown jewel", Barton Springs. The project also included tunneling under the Balcones Canyonlands Preserve, home to threatened and endangered species of birds and salamanders. MWH Constructors personnel worked to balance these complex needs as they created the advanced, new treatment plant. Raw water comes from Lake Travis, nearly a mile away, and now has the capability to supply 35 percent of the city's water. It provides a reliable, continuous system and much needed backup service during periodic shutdowns and maintenance of the city's two older treatment plants. The facility's buildings are designed to achieve a Leadership in Energy and Environmental Design (LEED®) Silver rating.

Close collaboration with the local community and all contractors was a significant factor in the project's success. Designers aligned with the city's environmental plan to protect local habitats and to minimize any impacts to sensitive areas. The main finished water tunnel, which connects the plant to the existing water distribution system, was routed away from habitat areas; fragile geological formations were treated with care.

While reviewing the design documents, MWH Constructors personnel recognized some constructability challenges with the design of the intake structure on Lake Travis and the hard limestone formations. MWH worked with the design team to alter the design, thereby improving the construction efficiency and preventing potential problems. MWH also partnered successfully with local subcontractors and far exceeded the client's goals for inclusion of minority and women-owned businesses. Together, we awarded contracts to local businesses totaling over $63 million during the first three years of the project.

With more than three million hours invested, MWH created a design that was cost effective, while still delivering long-term value, environmental stewardship and innovative water treatment. Best of all, we ensured the delivery of safe, reliable drinking water to the citizens of Austin.

Austin is one of the fastest growing major cities nationwide, with more than 100 people a day arriving; its population is expected to increase by 500,000 people by 2040. CC Image courtesy of Bike Texas on Flickr.

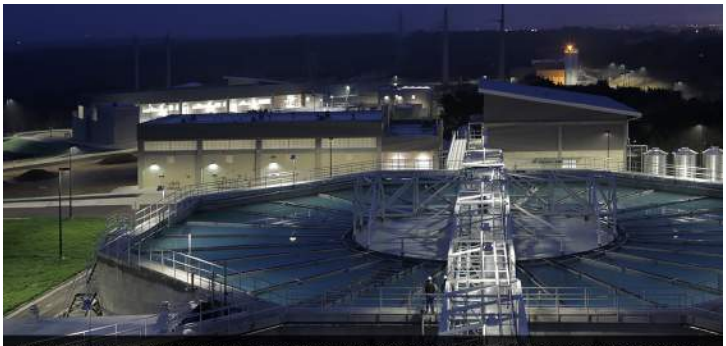
Careful monitoring of excavations protected the Jollyville Plateau Salamander, on the endangered species list since 2013.

The 2 mile (3.2 km) long, 9-foot (2.7 m) diameter raw water tunnel carries water from Lake Travis to the Austin WTP4 treatment plant, through the raw water pump station. An additional 6.5 miles (10.4 km) of finished water tunnel distributes water from the plant to the citizens of Northwest Austin and Travis County.

State of the art system controls, data acquisition (SCADA) and site security monitoring systems are centrally located in the LEED® Silver rated Administrative Building. Photo by Joel Grimes.

The raw water pump station houses five 375-foot (114 m) lifts, 12.5 MGD, 1,500 Hp vertical turbine pumps. Photo by Travis Bush.

Pipe gallery in the filter building where raw water is filtered as part of the treatment process to produce clean water for the City of Austin. Photo by Joel Grimes.



The Austin plant has the capacity to treat 50 million gallons of water per day to serve the growing population and to provide a reliable resource for clean drinking water to the citizens of Austin. Photo by Travis Bush.

TRANSFORMATIONS

Building a Better World

SUPER ALLIANCE MAINTAINS LONDON'S WATER SERVICES

View along the River Thames, London.

With its diverse range of people and cultures and more than 300 languages spoken, London is a challenging place to build anything. But as one of the major companies chosen for the largest and most varied asset management program in the U.K., MWH has brought smart thinking and factory construction methodologies to the city of 13 million inhabitants. We sent a dream team primed with an ambitious, customer-centric mindset and ready to grapple with the U.K.'s rigorous AMP6 water regulatory program. As part of a super alliance of industry-leading organizations, MWH will play a key role in the delivery of a $2 to $3 billion (£2-2.5 bn) capital investment program to upgrade Thames Water's aging infrastructure, a substantial undertaking that will run from 2015 to 2020, with the potential to continue to 2025. Taking on a dual role as both Program Manager and Design/Construction partner, we discovered doing two things at once has its upside, especially if it means helping a city create a world-class asset management program and shape its water and wastewater services for the future.

Knowing that a high level of collaboration was essential, we based our initial project management approach on a more structured and simple strategy. It favors co-operation over autonomy and employs standardized engineering practices as part of our transition from a project to a program mentality. The impact to date has been impressive and bodes well for the next phase of development.

Construction starts officially in 2015, and involves seven contract partners handling different aspects of the program. We created a solution that will treat water, manage wastewater, and ensure the long-term health of the River Thames. Our deliberate two-year planning cycle calls on our best innovative thinking in order to meet the country's shifting regulatory requirements – a challenge demanding foresight and flexibility. It also calls for a strategy to renew the vigor and value of existing assets versus building anew – an expectation that is driving change throughout our industry.

With the image of a resilient London water infrastructure clearly in our sights, we assembled the right team with the right talents and synchronized our intent to operate flawlessly from day one. High on collaboration and representing a diverse blend of specialty skills, the global team of management and project consultants, technical and innovation experts and increasingly important data analysts created a model for success that has inspired our alliance partners. At the same time, our readiness for the challenges ahead confirmed to our client that the industry-changing collaborative model they envisioned works. Partnering across time zones and accessing our global knowledge base, we have defined the project lifecycle and are primed to move into phase two design construction.

Our success in managing and delivering the Thames Water program hinges on continued collaborative and innovative, long-term thinking and decision making. What we achieve will impact the water services of one of the most vital cities in the world for generations to come.

Protecting the natural and historic environment of the River Thames is part of our plan for the future.

Used for recreation and as a wildlife haven. River Thames tributaries include rivers, brooks, canals and numerous underground streams that feed into the main river.

The Thames River basin contains at least 46 Special Protection Areas (SPA). The Shag Phalacrocorax Asitotelis (left) and Lapwing Vanellus are two of the U.K. bird species for which SPAs have been classified.

Thames Water headquarters in Reading. The company is the U.K.'s largest water and wastewater services utility.

Every day, Thames Water treats and supplies more than 6.2 million liters of water to 9 million customers throughout London.

TRANSFORMATIONS

Building a Better World

RECOVERY AND RECONNECTION

Years of flooding took a toll on communities such as Rockhampton.

Situated in the northeast corner of Australia, Queensland is known as the Sunshine State by its 4.7 million citizens. In the summers of 2010, 2011, 2012 and 2013, Queensland was hit by cyclones and significant flooding, with roads across most of the state receiving more damage than any other state asset. The Fitzroy Region, in Central Queensland, was one of the most heavily impacted regions in the state, with 1,000 kilometers (621 mi) of the 3,500-kilometer state-controlled road network requiring reconstruction. Following the 2010 floods, the Queensland Department of Transport and Main Roads (TMR) engaged MWH to work with it to reconnect the region, a role that was expanded after the 2011 and 2012 flood events. The program in Fitzroy for the 2010, 2011 and 2012 flood events was valued at $891 million (AUD) when completed in June 2014.

As one of the 12 regional program offices within the state-wide Transport Network Reconstruction Program (TNRP), the Fitzroy Region was one of the largest, covering an area approximately twice the size of Tasmania, Australia's island state. At the peak of construction, Fitzroy had more than 50 live work sites on major and secondary highways at one time.

The program was implemented in two phases. The first phase recovery work was focused on reconnecting communities isolated by flood damage, where deliveries of food and supplies to area stores and communities were impossible by road, and essential local industries like beef production were severely impacted. Once the roads were repaired enough to reconnect communities, work then focused on the reconstruction of the flood damaged roads.

Using a new and highly collaborative approach, MWH and TMR worked together to establish a two-stage design process, which provided contractors with early design plans for earthworks, drainage and pavements, essentially expediting the development phase so the region's transport network reconstruction could be implemented sooner.

Reconstruction of the damaged roads involved numerous contractors and suppliers. Despite the speed of reconstruction, the program achieved an impressive safety record with not a single lost time injury during the last 11 months of the reconstruction. Numerous safety and traffic strategies were implemented during the program in a constant effort to continue improving standards. The team gave priority to advising the general public and stakeholder groups on these strategies and on overall progress during reconstruction through a well-directed community outreach effort.

More than 300 environmental audits ensured the region's delicate natural environment, including cultural heritage areas, was protected. Through rigorous and ongoing internal and external evaluation, the collaborative approach between TMR and MWH demonstrated transparency and accountability for the government and the public. Ultimately, it provided value for the money contributed from state and federal funding.

The Fitzroy Region reconstruction program was successfully completed both in advance of the deadline, and under budget. It was recently recognized with a Highly Commended award in the collaboration category from Consult Australia.

Recovery efforts restored essential food deliveries to flood damaged areas.

Nearly 1,000 kilometers of roads in the Fitzroy Region required major reconstruction.

The cost of reconstruction in the Fitzroy Region was $891 million (AUD).

Restored roadways in the Fitzroy Region TNRP put critical local transport back in business; the project earned recognition from Consult Australia.