

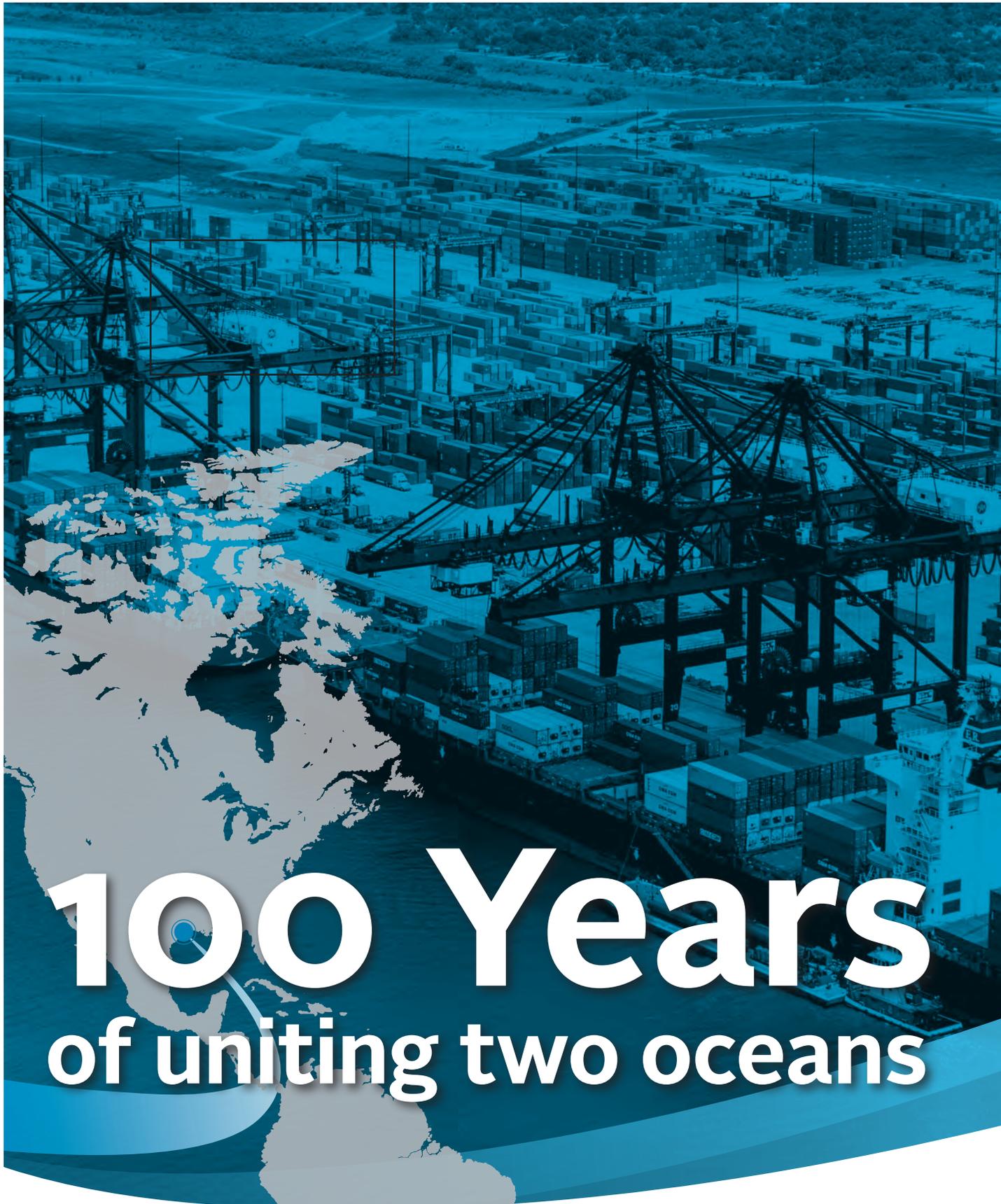


100 YEARS OF THE

# PANAMA CANAL

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CELEBRATING THE CENTENNIAL 1914-2014



# 100 Years of uniting two oceans

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Panama Canal Opens 1914



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111  
100 YEARS OF THE  
**PANAMA CANAL**  
CELEBRATING THE CENTENNIAL: 1914-2014





J. Bernard Machen  
President

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PO Box 113150  
Gainesville, FL 32611-3150  
(352) 392-1311  
Fax (352) 392-5275  
[www.ufl.edu](http://www.ufl.edu)

November 22, 2013

The University of Florida has over many decades preserved a wealth of significant historical research materials on Panama and the Panama Canal.

We are proud to make this material available to the public this year as part of the canal's centennial celebration.

"100 Years of the Panama Canal – Celebrating the Centennial: 1914-2014," set for August 15-17, will feature exhibits, events, lectures and more. The centerpiece of the event will be the exhibition of UF's unique historical materials related to Panama and the Panama Canal. These materials include new fossil discoveries along the canal by UF's Panama Canal Project at the Florida Museum of Natural History – and a 40-foot model of the canal on display in Smathers Library.

"100 Years of the Panama Canal – Celebrating the Centennial: 1914-2014" will also include a performance of the Symphony of the Americas Summerfest Chamber Orchestra at the Phillips Center; an exhibit of appliquéd textiles known as "molas" at the Harn Museum; and Panama Canal Zone Day at the Florida Museum of Natural History.

The event reflects the support of the Friends of the Panama Canal Museum Collection at UF, as well as grants and sponsorships obtained by the Libraries. The collaboration between the support organization and the university began with the transfer of museum items and has continued with an expansion of the coverage of Panama by the Latin American Collection at the Libraries.

Access to the many online resources offered through the Libraries' Panama and the Canal Collection – including photographs, newspapers, maps, oral histories and more – is already available at <http://ufdc.ufl.edu/pcm>. These resources illustrate the historic significance of the Canal and its impact on global trade and economy.

The Libraries have worked collaboratively with the Samuel Proctor Oral History Program in collecting and transcribing personal memories of the Canal Zone and the Center for Latin American Studies in encouraging speakers and discussions of business, history, science and the culture of Panama.

Thank you for keeping UF in mind as a destination and a resource as you celebrate the 100<sup>th</sup> anniversary of the Panama Canal in 2014. I hope to see you in August!

A handwritten signature in black ink, appearing to read 'J. Bernard Machen'.

J. Bernard Machen

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## The Panama Canal Museum Collection and its Friends

The 1977 Panama Canal Treaty between the United States and the Republic of Panama ended 76 years of U.S. jurisdiction in the Canal Zone and provided for a 20-year transition period during which the United States would continue to operate the Canal until its transfer to Panama on December 31, 1999.

Concerned that a significant piece of American history would fade from memory once the U.S. left Panama, a group of former residents of the Canal Zone joined together in 1998 to establish a Panama Canal Museum in Seminole, Florida. The museum's founders saw a need to document the significant achievements made by the U.S. in constructing, operating and defending the Canal during the 20th century and to preserve the history of a unique, culturally and socially cohesive community created by the presence of an American jurisdictional entity (the Canal Zone) within the borders of Panama.

The Canal community shared a strong common bond. From the original builders, who sacrificed and endured great hardships during its construction, to those who followed to operate, maintain and defend it, the Canal was a source of immense pride. In their view, it was their Canal – not the United States' and not Panama's – and they dedicated their combined efforts and their working lives to embrace it truly as their own. Employees at all levels and of varying nationalities manifested a fierce loyalty and devotion toward the Canal that went well beyond what one would find in any other business or governmental organization.

Additionally, the intermingling of American, Panamanian, West Indian and other nationalities in Panama and the Canal Zone, each with its own distinctive food, music and customs – and set in the natural beauty of Panama – created a blend of languages, art and social interaction rarely found in a country as small as Panama. The tapestry woven by the merging of these cultures and the commonality of purpose that focused on the Canal revealed a composite portrait of an energetic, vibrant and richly diverse lifestyle in which all who were fortunate enough to share in the experience were immersed.

Within that backdrop, the challenge for the museum was to strive to capture in objects, documents, photographs and other materials the leadership role of the United States in the Canal's construction, operation and defense, while preserving the essence of the distinctive lifestyle of Canal workers, residents of the Canal Zone and others who supported the Canal effort.

It is with considerable pride and satisfaction that we can say that the challenge was met, with results exceeding even our own greatest expectations. The collection reflects the special bond, the camaraderie, the friendships and interrelationships among all those who were part of the Panama Canal enterprise. American "Zonians," with their replicated slice of Americana in a country far from their homes; Panamanians, with their rich and diverse culture, food, art and music; West Indians, with their lyrical and colorful linguistic expressions and dialects; and the Spanish, French, Chinese,

Indian and many other nationalities who contributed to the Canal's success, are all represented in the museum's collection.

Over the years, as new objects were acquired, the scope of the growing collection gradually expanded beyond its original focus on the Panama Canal and the Canal Zone to include additional aspects of Panama's culture and history that had a significant and positive influence on the American presence in that country.

These acquisitions allowed the museum to create exhibits that highlighted not only the Canal's construction, operation and defense, but, also, the impact of the intermingling of cultures; the Spanish Conquistador era; the French Canal construction era; the U.S. construction of the Panama Railroad in 1855; molas from the indigenous Kuna Indians of Panama; other artwork from Panamanian and American artists; pre-Columbian pottery and artifacts; the flora and fauna of Panama; the contributions of the West Indians to the Canal's success; and many others.

In July 2012, the Panama Canal Museum pulled down the shades on its brief but impactful existence, and transferred its rich and varied collection to the University of Florida, where its maintenance, conservation and digitization is being overseen by a dedicated staff of museum and library science professionals. This collaborative undertaking between the museum and the university has served as a model for the nation, showing how a small museum can be integrated successfully within a much larger institution, thus preserving the collection and ensuring its continued public access by students, researchers, genealogists and others for generations to come.

Although the museum has now closed, many former supporters and stewards of its collection continue to collaborate with the University of Florida under the auspices of the Friends of the Panama Canal Museum Collection at the University of Florida. This group of dedicated volunteers continues to seek additional items for the collection and raises funds for its long-term support and preservation. Membership in the Friends of the PCM at UF is open to anyone who is interested in preserving the unique history of the United States in Panama. An application for membership form can be found at this link: <http://www.uflib.ufl.edu/giving/images/FriendsPCM.pdf>

This year we commemorate the 100th Anniversary of the opening of the Panama Canal in 1914. Planned for the Centennial celebration is a campus-wide exhibit at the University of Florida, where many of the objects, artifacts and other materials from the Panama Canal Museum Collection will be on display. We invite everyone to visit the University for a grand weekend celebration beginning on August 15, 2014. Details of Centennial activities can be found at the link shown here: [www.uflib.ufl.edu/giving/images/Panama-canal-celebration.pdf](http://www.uflib.ufl.edu/giving/images/Panama-canal-celebration.pdf)

We are grateful to the many thousands of individuals who have supported the museum over the years and we look forward to continuing this exceptional effort to preserve an important chapter in the annals of U.S. and Panama history.

**Joe Wood**

*President, Friends of the Panama Canal Museum Collection at the University of Florida*



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GRANDS PROJETS



October 3, 2013

Dr. Rachel A. Schipper, Chair  
Panama Canal Centennial  
University of Florida  
George A. Smathers Libraries  
535 Library West  
Gainesville, FL 32611-7000

Dear Dr. Schipper:

As Vice President at the Museum of Science & Industry (MOSI) in Tampa, Florida, I am writing to convey my sincere support for the Panama Canal project at the University of Florida. The comprehensive digitization process to preserve over 20,000 museum objects and items in the collection is truly impressive. The contribution from partners to the Panama and the Canal collection within the Digital Library of the Caribbean shares the amazing involvement of engineers and workers who had a part in the construction and expansion of the Panama Canal. In addition, the digitized lesson plans provide additional access to resources worldwide.

The Panama Canal history is so rich, and unfortunately, maybe only a few paragraphs are devoted in public school history books to the amazing science and engineering skills incorporated in its creation. As a science center devoted to science, technology, engineering, arts and design and mathematics (STEAM), it is now possible for museums to bring the Panama Canal STEAM into their public and school classes and summer science camps. The links to your digital collection (<http://ufdc.ufl.edu/pcm>) can be shared with the Association of Science and Technology Centers (ASTC) in order that science centers worldwide can know of this valuable resource for their staffs and members. We will also share it with the Florida Association of Museums (FAM).

Those who worked on the Panama and the Canal collection at the University of Florida George A. Smathers Libraries are to be commended. As you celebrate the 100<sup>th</sup> anniversary of the construction of the Canal through your exhibit, events, and lesson plans, please know that I enthusiastically endorse the Panama and the Canal collection as a much needed resource for our country.

You are to be commended on this contribution.

Sincerely,

A handwritten signature in black ink that reads "Judith Lombana".

Judith Lombana EdD  
Vice President



*MOSI (Museum of Science & Industry) is the proud winner of the 2009 National Medal for Museums by the Institute of Museum and Library Services, the nation's highest honor for museums.*



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October 03, 2013

University of Florida  
George A. Smathers Libraries  
535 Library West  
Gainesville, FL 32611-7000

Dear Dr. Schipper:

From September 8-11, 2013, my assistant Ibrahim Sánchez and myself had the pleasure of visiting the George A. Smathers Libraries, at the University of Florida in Gainesville. We helped the Libraries to identify exhibit-quality materials, and, in addition, we met with representatives of the Florida Museum of Natural History, the Harn Museum of Art, Marston Science Library, the Memory of the World Project, and the Latin American Collection.

We were very impressed with the installations, collections and the professionalism and devotion shown by the staff and members we met during our short visit. The collections of books, photographs, maps, museum materials and documents are unique and in a perfect state of conservation. The process of digitizing portions of the collection and making them available through the Digital Library of the Caribbean (<http://ufdc.ufl.edu/pcm>) will be most appreciated by historians, U. S. and Latin American researchers, and cultural personnel around the world.

We want to take this opportunity to congratulate the George A. Smathers Libraries for their fine work and for their extraordinary efforts to commemorate the forthcoming Centennial of the construction of the Panama Canal.

Sincerely,

**RAÚL CASTRO ZACHRISSON**  
Deputy Director  
National Institute of Culture  
Panama



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200

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September 26, 2013

Dr. Rachel A. Schipper, Chair  
Panama Canal Centennial  
University of Florida  
George A. Smathers Libraries  
535 Library West  
Gainesville, FL 32611-7000

Dear Dr. Schipper:

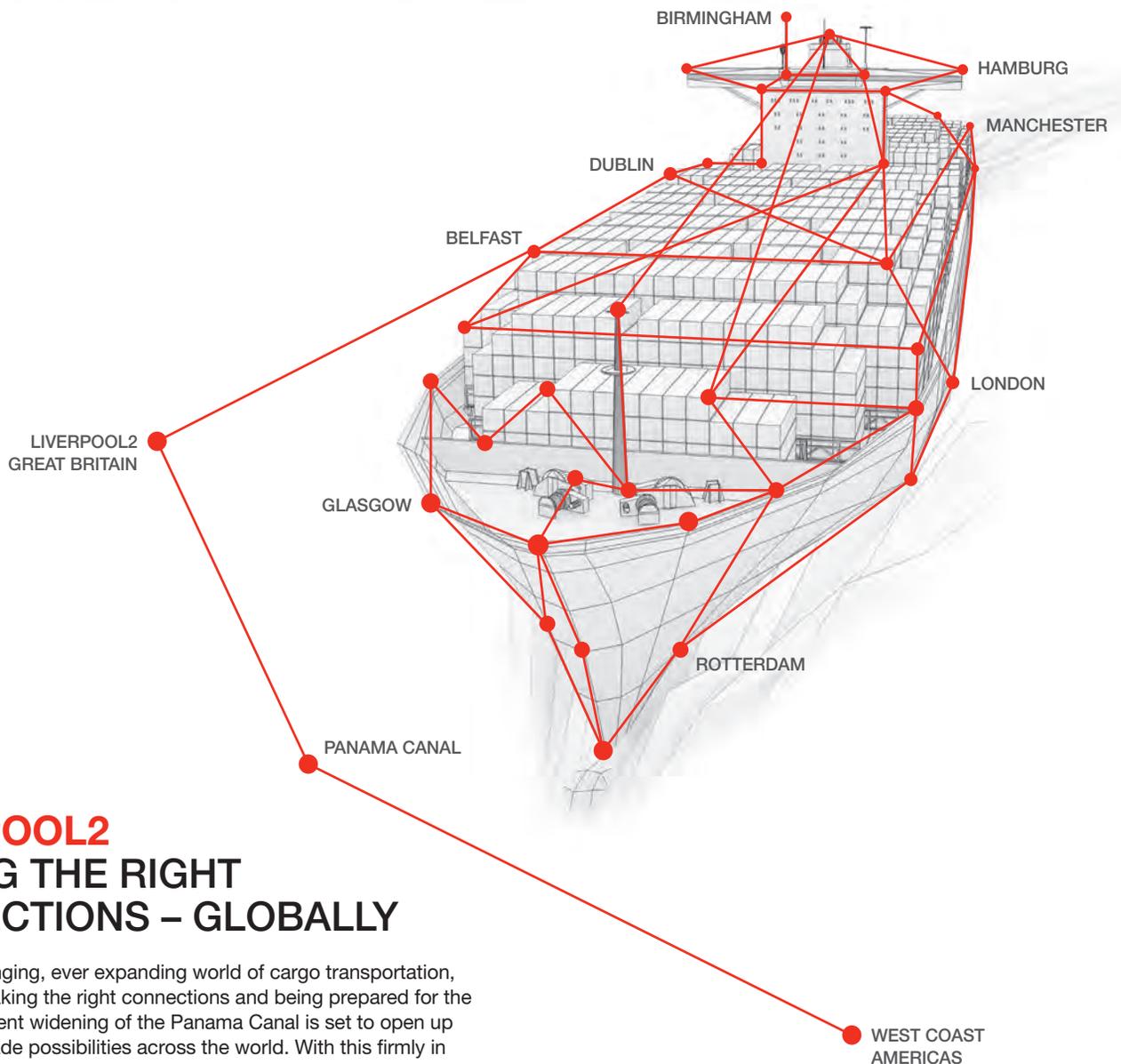
As President of the Society of Friends of the West Indian Museum of Panama (S.A.M.A.A.P.), it is with great enthusiasm that I write a letter of endorsement for the Panama Canal project at the University of Florida. Having recently visited the libraries in Gainesville, I was most impressed with the process of digitization of over 20,000 museum objects and items through the University of Florida Digital Collection (UFDC) <http://ufdc.ufl.edu/>. The Panama and the Canal collection <http://ufdc.ufl.edu/pcm>, within the Digital Library of the Caribbean (dLOC), includes information and research from over 35 partners. Researchers all over the globe can now understand the contributions of all workers who had a part in the original construction and the current expansion of the Canal. Historical information and current materials are all available from this fine resource.

We of S.A.M.A.A.P. <http://www.samaap.org/> hope to one day have the capacity to collect, digitize and offer access to all materials of interest to the Afro-Descendants who were so important to the construction of the Canal and the entire development of the country of Panama. One of the most important documents now available through the Panama and the Canal collection is a compendium of the letters written home from actual workers who offer primary testimonials. These letters are only available in a single physical volume from the West Indian Museum of Panama; it is a rare and extraordinary testimonial. Through the assistance of the National Library of Panama and the George A. Smathers Libraries, this volume can now be accessed online globally.

I fully endorse the Panama and the Canal collection that the University of Florida George A. Smathers Libraries have made available, and support the Libraries in their exhibits, events and celebration concerning the 100<sup>th</sup> anniversary of the construction of the Canal.

Sincerely,

Lic. Glenroy O. James-Grant, President  
S.A.M.A.A.P.



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# PANAMA CANAL FACTS

**\$40,000,000** > amount paid by United States to French for rights and property

- First ground broken by French: Jan. 1, 1880
- Active work started by the French: Jan. 20, 1882
- Excavation by French: 78,146,906 cubic yards
- Excavation by French useful to present Canal: 29,908,000 cubic yards
- French expenditure: \$260,000,000
- Deaths during French control: 20,000

**200**

number of carloads of dirt removed daily by railroad

## *S.S. Ancon*

name of first official ship to transit Canal

number of ships crossing daily > **40**

- Canal Zone acquired by U.S. from Panama by treaty: Feb. 23, 1904
- Amount paid by United States for Canal Zone: \$10,000,000
- Yearly rent paid by U.S. to Panama beginning in 1913: \$250,000
- Work begun by the United States: May 4, 1904
- First ship through the Canal: Sept. 26, 1913
- Date of official opening: Aug. 15, 1914

- Excavation by Americans: 232,353,000 cubic yards
- Weight of 1 cubic yard of concrete: 1.5 tons
- Estimated U.S. cost of Panama Canal: \$375,000,000
- Deaths during United States control: 5,609
- First Panama Railroad completed: 1855
- Length of Panama Railroad: 47.11 miles
- Cost to build Panama Railroad: \$8,984,922

total concrete for Canal  
**5,000,000** CUBIC YARDS

time to transit Canal: **8-10 HOURS**

amount of water filling each lock:

**52 million gallons**

tide on Pacific side: **20 feet**

- Canal Zone in square miles: 436
- Length of Canal from Atlantic to Pacific: 51 miles
- Width of the Canal Zone: 10 miles
- Number of ships crossing each year: 12,000-15,000
- Time of passage through locks: 3 hours
- Maximum bottom width of the channel: 1,000 feet
- Minimum bottom width of the channel at Culebra Cut: 300 feet
- Number of locks in pairs: 12
- Locks, usable length: 1,000 feet
- Locks, usable width: 164 feet
- Gatun Lake area: 164 square miles
- Gatun Lake normal elevation above Pacific sea level: 85 feet
- Gatun Lake depth: 85-87 feet
- Draft limit of vessels when Gatun Lake is at 85 feet: 40 feet
- Minimum depth of channels: 41+ feet

- Tide on Atlantic side: 2.5 feet
- Average rainfall on Atlantic side: 130 inches
- Average rainfall on Pacific side: 70 inches

# Opening up opportunities



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# Connected to our Canal

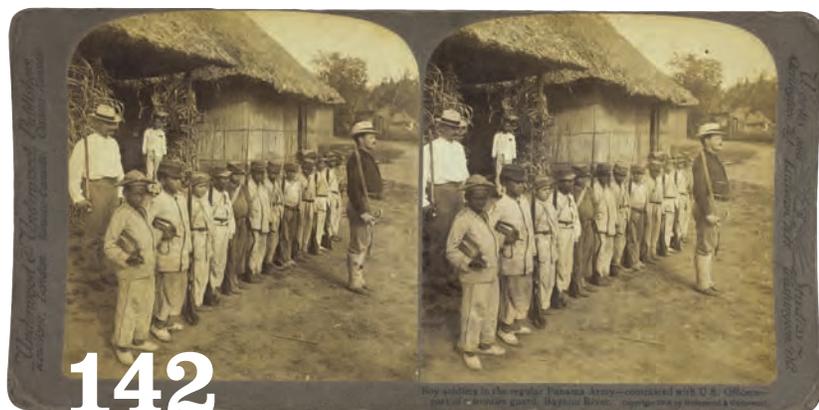


Panama Pacifico, the new city, shares the pride of the thousands of Panamanians who celebrate 100 years of service of the Panama Canal. The engineering marvel that connected the oceans, and strengthened the bonds of humanity around the globe.





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of Jamaica



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# Authors

**Patrice Brown** is a native Washingtonian with a bachelor's degree in history from Dunbarton College and a master's in american studies from George Washington University. She has worked as an archivist at the National Archives since 1977 and is currently a special assistant with the National Declassification Center at the National Archives. She also serves as the subject matter specialist in connection with Panama Canal Records in the holdings of the National Archives. Her article entitled "The Panama Canal: The African American Experience" appeared in the Summer 1997 issue of *Prologue*.

**James Brooks-Bruzzese** was born in Panama and received his doctorate in Opera Conducting and Musicology from Washington University in St. Louis. Maestro Brooks founded the Augusta Opera and the Florida Music Festival and Summerfest. His leadership of the Symphony of the Americas has enabled music of the highest quality to be brought to South Florida. In 2005, the Hispanic Heritage Foundation honored James Brooks-Bruzzese with the Hispanic Heritage Award for the Arts in recognition of his lifelong work as a world-renowned conductor and for his dedication to promoting classical music to youth as a global educator/performer.

**Edith Read Barkowitz Crouch** is an author, glass artist and teacher who spent her formative years in the Panama Canal Zone. Her undergraduate degree is in art education from Florida State University. Schiffer Publishing Ltd. will publish her book, *Architecture of the Panama Canal Zone: Civic and Residential Structures & Townsites* in 2014. Among her other books is *The Mola: Traditional Kuna Textile Art*, 2011.

**James Garber** is a historian in the U.S. Army Corps of Engineers. He is pursuing his doctorate in history at George Mason University in Fairfax, Va. His dissertation research focuses on how engineers understood, utilized, and altered environmental features in the Canal Zone to plan and build the Panama Canal.

**Rolando Garcia-Milian** is the basic biomedical sciences librarian at the University of Florida Health Science Center Library. After obtaining his B.S. in biology at the University of Havana, Cuba, he worked for seven years at the Center for Genetic Engineering and Biotechnology in Havana on projects related to the effect of cytokines on human papillomavirus-associated diseases. He has more than 14 publications to his credit and numerous presentations at national and regional conferences and meetings.

**Greg Hillebrenner** is a vice president with MWH Global, Inc., where he has worked for more than 37 years on large water resource projects. He is currently the design manager of the design joint venture for the Panama Canal Expansions' Third Set of Locks Project, which is led by MWH and includes Tetra Tech of the USA and Iv Groep of the Netherlands.

**Ernesto A. Holder** has worked in the communication field for more than 35 years and is a Panama Canal career employee of 28 years who has held various supervisory and managerial positions in this area. He currently serves as manager for communication and historic documentation for the Canal Expansion Program. He holds a management degree from NOVA Southeastern University and a graduate degree from Universidad Latina de Panama. He is a writer and researcher in communication, social change, and mass media. In addition, he is a 2004 Fulbright Scholar with research tenure at the University of Wisconsin-Milwaukee, Department of Communications.

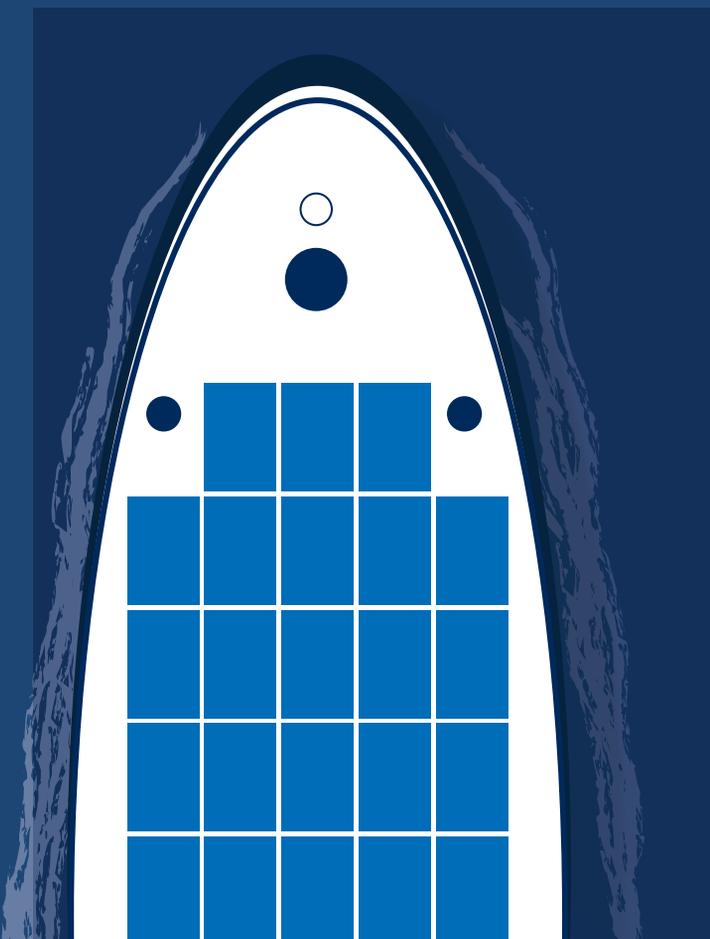
**Jan W.M. Kop** is project manager, The Panama Canal Expansion, Jan de Nul Group (JDN). Jan Kop received his Bachelor of Science in civil engineering (forestry, land & water management) at Hogeschool Larenstein, Velp, the Netherlands. He initially worked for a Dutch dredging contractor, and in 1989 went to work for the Belgian dredging contractor, Jan De Nul. Prestigious projects around the world include the new Chek Lap Kok Airport in Hong Kong, the Changi Airport in Singapore, the Palm construction in Dubai, and now the construction of the Third Set of Locks for the Panama Canal Expansion. Kop has encouraged, supported, and mentored many students throughout these and other projects.

**Renée LaBonte** is executive director of the Symphony of the Americas and has many years of experience as a concert pianist and symphony orchestra manager. She was the 2007 honoree of Florida Grand Opera's DIVA Impresario Award, recognized for her contributions to the Arts in Broward County. She has appeared with national symphonies in Bulgaria, Costa Rica, Greece, Mexico, Peru, Spain, Malaysia, Hungary, and others. She co-founded the Florida Music Festival and the South Florida Symphony, both acclaimed for their international concert tours, for which she has received recognition from the president and Congress of the U.S., Guatemala, and El Salvador. LaBonte has a teaching degree from St. Louis Institute of Music and has studied and taught with many distinguished faculties.

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## Authors continued

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**Karen Smits** recently obtained a doctoral degree in social sciences at Vrije Universiteit (VU) in Amsterdam, the Netherlands. Her book *Cross Culture Work: Practices of Collaboration in the Panama Canal Expansion Program* reveals how project participants deal with the cultural complexity in their everyday life. Based in Panama, she works as a researcher and consultant supporting organizational members in developing intercultural collaboration, organizational change and growth initiatives.

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**César A. Vásquez** is a historian at United States Southern Command through Macaulay Brown Inc. His area of expertise is U.S.-Peru relations. He has degrees in both History and political science and a Master of Arts degree in American history from Florida International University, where he is currently pursuing his Ph.D in history. He is a member of Phi Alpha Theta International History Honor Society and Golden Key International Academic Honor Society. Vásquez is an American of Peruvian birth and hails from Chorrillos, a small district of Lima Province.

**Richard Wainio** has in-depth knowledge about the maritime industry, international trade, and global transportation gained from more than 30 years of high-level public- and private-sector experience that includes work in many countries around the world. He worked 23 years in executive positions with the Panama Canal, where his responsibilities included strategic and treaty planning, economic research and marketing, and serving as the primary advisor to the Canal's binational board of directors. He subsequently held executive positions with Manzanillo International Terminal (Panama) and Eberhard Maritime Transport Company. Wainio also served as CEO of the ports of Tampa and Canaveral in Florida, and was executive director for the American Chamber of Commerce and Industry of Panama.

**Aaron R. Wood**, a postdoctoral associate at the Florida Museum of Natural History, studies the geology and paleontology of Panama as part of the National Science Foundation (NSF) funded Panama Canal Project (PCP). Since 2011, he has trained and led many cohorts of young scientists during fieldwork in Panama, exposing these students to the country's rich natural history.

**Alberto Alemán Zubieta**: From 1996 to 1999, Alberto Alemán Zubieta served as the administrator of the former Panama Canal Commission (PCC). In 1998, he was appointed administrator of the Panama Canal Authority (ACP), serving simultaneously as the PCC administrator. In 2005, he was re-elected as the CEO for the ACP for a second seven-year term. Under his leadership, the Canal expansion was envisioned and it continues to be a model of excellence in global maritime transportation. Alemán is the recipient of numerous international awards for his contributions. He is a graduate of the Texas A&M civil and industrial engineering schools.



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# Introduction

By Rachel Schipper

Fifteen years ago, a small dedicated group of people who had lived and worked in what was called the Panama Canal Zone banded together to preserve the history of the construction and culture of the unique area surrounding the Panama Canal. The community founded and formed the Panama Canal Museum (PCM) (<http://cms.uflib.ufl.edu/pcm/Home.aspx>) and began to welcome home to the United States a population of people whose families and roots were as mixed as the fertile soils of the tropics. The culture of the Zone was as diverse as its origins; the old maxims of “where worlds collide” and “the world united” identified a dichotomy of challenges for what would result in some referring to its Canal construction as “the 8th Wonder of the World.” In terms of world trade and the transport of product, as well as opportunities for biodiversity and the diversity of the cultures of people who have worked and improved the country, the Panama Canal has no equal.

When the museum founders began to look for a permanent home for their collection in 2009, the University of Florida (UF), with its top-rated Latin American (Library) Collection,

its well respected Center for Latin American Studies, and the impressive Samuel Proctor Oral History Program, was selected as the most appropriate location to steward the collection and its community. In 2013, the UF George A. Smathers Libraries was awarded the 4th largest Institute of Museum and Library Services (IMLS) National Leadership Grant to preserve and support the collection and foster community engagement in the 2014 Panama Canal Centennial Celebration (<http://blogs.uflib.ufl.edu/news/2012/10/10/libraries-receive-fourth-largest-national-leadership-award-for-library-and-museum-collaboration/>). The Friends of the PCM Collection at UF was formed, and the collection continues to grow today through the generosity of those who donate funds and related museum items ([http://www.uflib.ufl.edu/giving/giv\\_ops.html](http://www.uflib.ufl.edu/giving/giv_ops.html)).

With the promise of an expanded Canal to be completed soon after the Centennial Celebration, the Canal remains today an integral part of global trade, biodiversity, and culture of the region. Advocates from engineering, business, sciences, humanities, the arts, and technology have teamed together to



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The Panama Canal expansion will create a third set of locks that intends to double the capacity of the Canal by creating a new lane of traffic and allowing for larger ship transit.

uncover new aspects of ancient life while focused on the logistics of future cultural growth and economic development. The Florida Museum of Natural History (FLMNH) participates in the National Science Foundation (NSF) Panama Canal Project (PCP) Partnerships for International Research and Education (PIRE), and further information about the project can be found in several articles within this publication. Cultural aspects of Panama and its indigenous people are reflected in articles authored by Edith Crouch and Patrice Brown, and a focus on the music of its people, by Panamanian Maestro James Brooks-Bruzzese and Symphony of the Americas' Renee LaBonte, is included as well. The rich history of the Canal and the genius of its engineering are highlighted by James Garber of the U.S. Army Corps of Engineers, Panama Canal Authority documentarian Ernesto Holder, and by the man who is most responsible for the expansion concept, Alberto Alemán Zubieta, former CEO of the Panama Canal. Articles that look to the future of an expanded Canal are authored by Richard Wainio, former CEO of the Tampa Port Authority, and who served as the primary adviser to the Canal's binational board of directors; Vice President/Project Manager of MWH Global, Inc., Greg Hillebrenner, in charge of the joint

venture design for the Third Set of Locks; and Karen Smits, a recent Ph.D. who has researched modern collaboration within the cross-cultural work environment of the 2015 expansion.

The year of celebration at UF promises to be informative, educational, and illuminating. Starting with the Center for Latin American Studies Conference on Panama in March 2014, attracting international experts in business, engineering, and humanities, and continuing with a spectacular weekend of focus Aug. 15-17, 2014 at the Gainesville, Fla., campus, the Panama Canal Centennial Celebration will have something for everyone: more than 12 exhibitions, a 40-foot model of the Canal from the Netherlands' Nationaal Baggermuseum, the Symphony of the Americas Summerfest Chamber Orchestra, Panama Canal Zone Day at the Florida Museum of Natural History, and a presentation by Edith Crouch at the Harn Art Museum featuring a selection of *molás* (appliqué art) from the Kuna Indians of Panama.

The George A. Smathers Libraries and the Friends of the Panama Canal Museum Collection at the University of Florida welcome you to participate, enjoy, interact, and celebrate the 100th anniversary of the Panama Canal. ■



The Institute of Museum and Library Services is the primary source of federal support for the nation's 123,000 libraries and 17,500 museums. Through grant making, policy development, and research, IMLS helps communities and individuals thrive through broad public access to knowledge, cultural heritage, and lifelong learning.



# The Canal Zone

What was it? Where was it? Why was it?

By Richard D. Morgan

## Panama Canal Commission

The Canal Zone was a strip of land and water in the Republic of Panama that was almost 50 miles long, from the Caribbean on the north to the Pacific Ocean on the south, and ten miles wide except at the two terminal ends, where it narrowed to border the preexisting Panamanian cities of Colón and Panama City. This 500-square-mile area was established at the previous site of the French attempt to construct a sea level canal across the Isthmus of Panama in the 1880s. The Canal Zone was located at the midpoint of the country of Panama, which stretches between Costa Rica on the west and Colombia on the east.

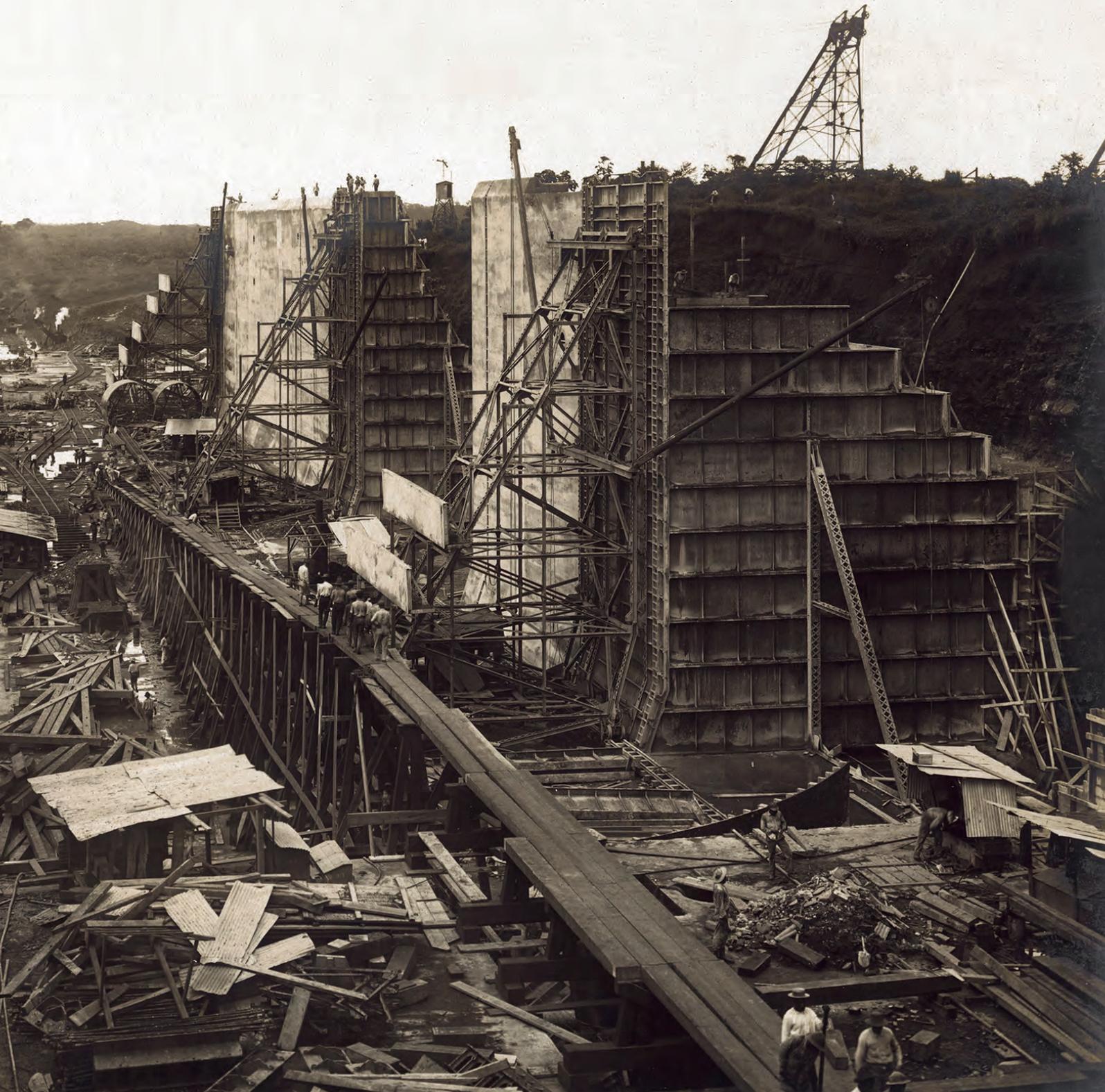
The Canal Zone was created by the Hay-Bunau-Varilla Treaty of 1903. That treaty empowered the United States to construct an interoceanic canal through a zone 10 miles wide in Panama. Article III of the treaty specified that Panama granted to the United States “all the rights, power and authority within this zone ... which the United States would possess and exercise if it were the sovereign of the territory ... to the entire exclusion of the exercise by the Republic of Panama of any such sovereign rights, power or authority.”<sup>1</sup> These rights were granted to the United States for a period of time specified to be “in perpetuity.”<sup>2</sup>

The Canal Zone existed from Nov. 18, 1903, through Sept. 30, 1979, a period of almost 76 years. The only physical boundaries between the Canal Zone and Panama were on maps and on survey markers. Except for security fences around United States military bases and some safety barriers along roadways and rail lines in a few civilian townsites at each end of the Panama Canal, there were no fences or physical barriers between the Canal Zone and Panama. Panama and Canal Zone residents were free to move across the territorial boundaries without impediment or restrictions of any kind.

The reason for establishing a Canal Zone in what previously had been a remote western province of Colombia was to give the United States a firm geographical and political base in which to construct and operate a canal in another country. In President


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Side wall construction, Gatun Middle Locks, looking north. Nov. 1, 1910.



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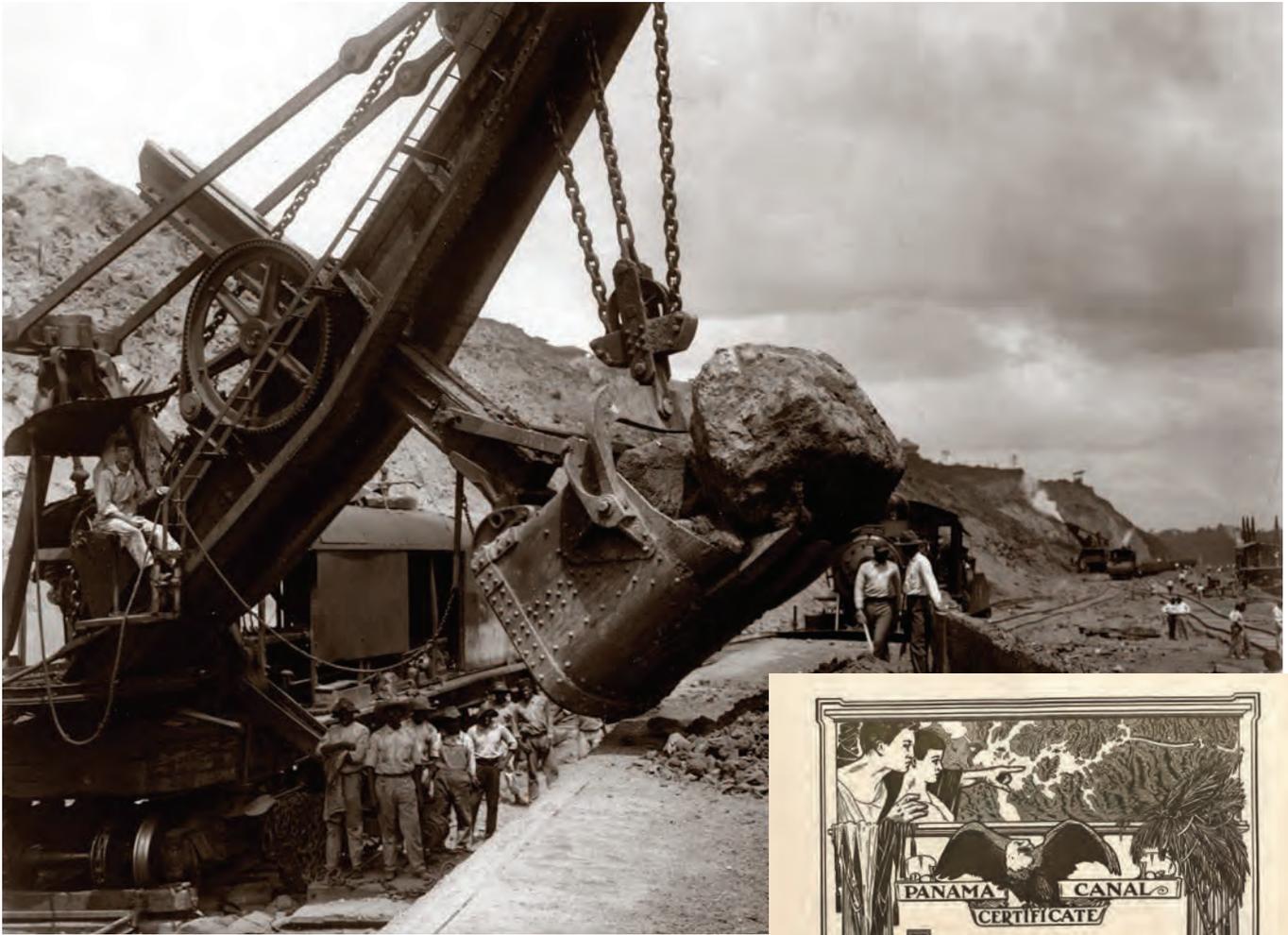


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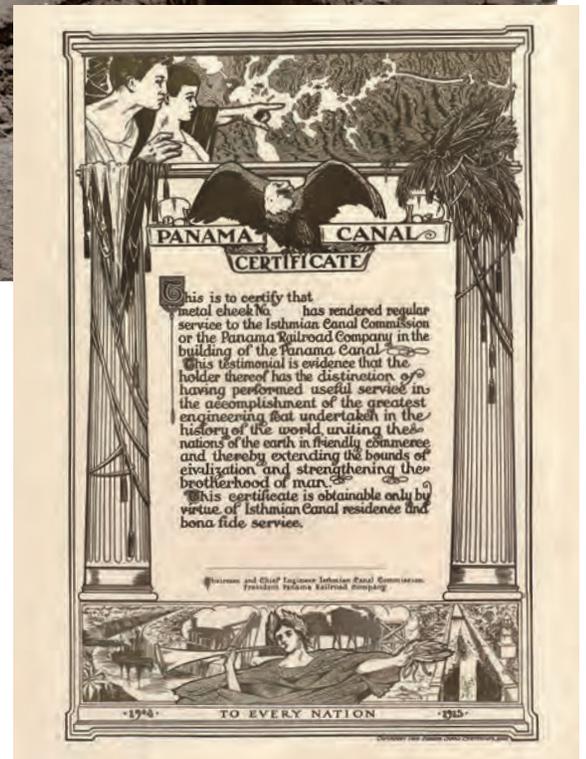




Theodore Roosevelt's words to his newly appointed Chief Engineer John F. Stevens in 1905, Panama was in "a devil of a mess."<sup>3</sup> Panama was, at the time, an undeveloped country teeming with poverty, disease, and death. Malaria, yellow fever, dengue, and dysentery were rampant, their causes as yet unknown. The areas of French canal construction were described as a "graveyard" of ruin and desolation, with "hundreds of tons of rusted and dilapidated machinery, the abandoned trains, the locomotives with trees sprouting out of their fireboxes ... and the 2,000 ruined houses empty except for the termites which were steadily eating them away."<sup>4</sup> The nation of Panama was newly independent because of the 1903 treaty, and had little or no infrastructure, public health or sanitation programs, organized government, or established system of law. The treaty created the Canal Zone as an area in which solely the United States would exercise jurisdiction and control while constructing and operating the Panama Canal.

The Canal Zone Government ran its own police, courts, legal codes, postal service, customs, licensing, draft boards, libraries, and fire departments. It operated hospitals and clinics, a model school system, and cemeteries. All were structured after

**ABOVE:** Steam shovel loading rock, Culebra Cut, March 1911.  
**RIGHT:** Certificate presented to construction-era employees of the Isthmian Canal Commission or the Panama Railroad Company, 1913.



communities in the United States, and made life in the Zone as much a mirror image of America as was possible.

A separate U.S. government agency, the Panama Canal Company, managed and provided employee housing, buildings and grounds maintenance, commissaries, restaurants, clubhouses, movie theaters, bowling alleys, gas stations, and other necessities of life in a typical American community. In the early 20th century few, if any, of these activities were available in the Republic of Panama, so the United States was



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**Administration Building, Balboa Heights. Rear view. May 1916.**

compelled to provide them in order to retain skilled workers. As remarkable as the construction of the Panama Canal was to become, it could not have been accomplished without the basic necessities afforded first in the Canal Zone.

At least three generations of American citizens were born in Canal Zone hospitals, raised in its housing, educated in its schools, were governed by its laws, attended its churches, and worked for its Government or the company, and many were buried in its cemeteries. The only restriction to which U.S. citizens and other employees were subject was that they could not retire in the Canal Zone. When retired from a career there or otherwise separated from their Government jobs, Zone residents had to move to the United States, Panama, or another country of their choice. This restriction applied to the substantial Zone population of West Indians as well as the U.S. citizens.

Between 1914 and 1979, the Canal Zone was the home of many thousands of U.S. citizens, Panamanians, West Indians, and citizens of other countries who worked and lived at the Panama Canal or at the U.S. military bases in the Zone. The town sites in which they lived constituted only a small portion of the 500-square-mile area, with the vast majority comprising undeveloped tropical rain forest, rivers, and lakes. Several U.S. Army, Navy, and Air Force bases also were established in the Zone, concentrated at the northern and southern ends of the Canal. The entire length of the Panama Canal, including three locks complexes and both terminal ends, was situated within the Canal Zone.

On Sept. 7, 1977, U.S. President Jimmy Carter and Panamanian military administrator Omar Torrijos Herrera, head of government of the Republic of Panama, signed two new Panama Canal treaties, terminating and superseding the 1903 treaty and “all other treaties,

conventions, agreements and exchanges of notes between the United States of America and the Republic of Panama which were in force prior to the entry into force of this Treaty.”<sup>5</sup> One of the new treaties, upon its implementation on Oct. 1, 1979, eliminated the Canal Zone and phased out the Canal Zone Government and many supporting Canal commercial activities.

On the evening of Sept. 30, 1979, the American flag was lowered at the Canal administration building for the last time, and at midnight the Canal Zone ceased to exist. One of the last “company towns” was gone forever. From that date until noon on Dec. 31, 1999, the newly created Panama Canal Commission continued to operate the canal as a U.S. government agency located in the Republic of Panama under a binational board of directors composed of five U.S. and four Panamanian citizens. The Canal was thereafter transferred to Panama.

U.S. military bases also continued to operate in Panama during this transition period, but were phased out of existence by the end of the 20th century. ■

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# Architecture of the Panama Canal Zone

By Edith Read Barkowitz Crouch

Early in May 1904, an American flag was raised over the old French Canal Company's headquarters building in Panama City to announce the completed transaction of the American purchase of the French Canal holdings and operations. The enormous task of completing the abandoned French Canal required a decade of unprecedented engineering innovation.

Temporary townsites were developed to house Canal employees during the construction decade. Architects, city planners, landscape designers, engineers, and builders planned and then created permanent townsites to house Canal employees and their families who remained to administrate and run the Canal operations. Buildings were designed by prominent American architects and were constructed to provide education, security, hospitality, health services, retail locations, and places of worship. Between 1910 and 1925, the Panama Railway Station, Administration Building (1914), schools at Ancon, Balboa, and Cristobal (1917), a YMCA and Ancon Hospital – later renamed Gorgas Hospital – (1915-1919), Balboa Union Church (1917-1925), and the landscaped El Prado mall area were constructed. The residential structures, from the earliest wooden “bird cage” cottages through the concrete mid-century patio homes reflect a broad spectrum of housing types and styles.

## Canal Construction Decade (1904 – 1914)

The governing body of the Canal Zone, the Isthmian Canal Commission (ICC), established an architectural office charged with the building operations connected with the work of the Canal, the construction and repair of highways, and the landscape design of grounds adjacent to buildings.

**Oblique view of the front of the Administration and Clinics Building, Gorgas Hospital, facing southwest. Culebra Road, Balboa Heights, former Panama Canal Zone, 1995. The building was built circa 1919.**



The American government had received more than 2,000 buildings from the French; although many were dilapidated, over half were rehabilitated for occupation and administration, including the French administration building and a building used as the American Legation – both in Panama City.

The townsites of Balboa and Ancon, close to Panama City on the Pacific side of the Canal, and Cristobal, on the Atlantic side, close to Colon, have different origins. During the latter part of the Canal construction, Balboa and Ancon were developed as a primary civic and administrative center for the Canal Zone. Colon was developed during the construction of the trans-isthmian railroad. Cristobal was developed during the Canal construction years.

Family quarters were constructed during the Canal construction decade to house workers and their families and military personnel in the towns of East La Boca, Ancon, Corozal, Pedro Miguel, Paraiso, Culebra, Cunette, Empire, Las Cascadas,



Gorgona, Tabernilla, Bas Obispo, San Pablo, Gatun, Colon, and Cristobal. “Silver Roll” or “Local Rate” employees lived in separate housing and townsite areas during and following the construction of the Canal, including Rainbow City, Red Tank, and Santa Cruz. Housing was in such demand during the Canal construction decade that tent cities and railroad box cars served as residences for some workers. Over the decades, some townsites were switched from “Gold” to “Silver” sites or vice versa, including La Boca and Paraiso; townsites were also changed from civilian to military bases.

Col. George Washington Goethals, the third and final chief engineer during the construction decade of the Panama Canal, worked with the American architect and designer Austin Willard Lord to develop a cohesive and progressive architectural plan.

**Colorized postcard taken from Tavernilla Street in Balboa. The scene is looking downhill toward the Balboa Clubhouse and El Prado area with the Administration Building in the distance. The tropical concrete-block, red-tiled-roof quarters were built in Balboa during the late Canal construction days, circa 1920.**

Lord designed the city layout for Balboa, the civic center of the Canal Zone. His plans and architecture embedded the precepts found in the Beaux-Arts style and the “City Beautiful” movement popularized at the 1893 World’s Columbian Exposition in Chicago and exemplified by the work of American architect and city planner Daniel H. Burnham. Lord also designed the Administration Building, the three locks’ control houses, the Balboa and Cristobal train stations, the Gatún hydroelectric plant, the El Prado residences, and other buildings.

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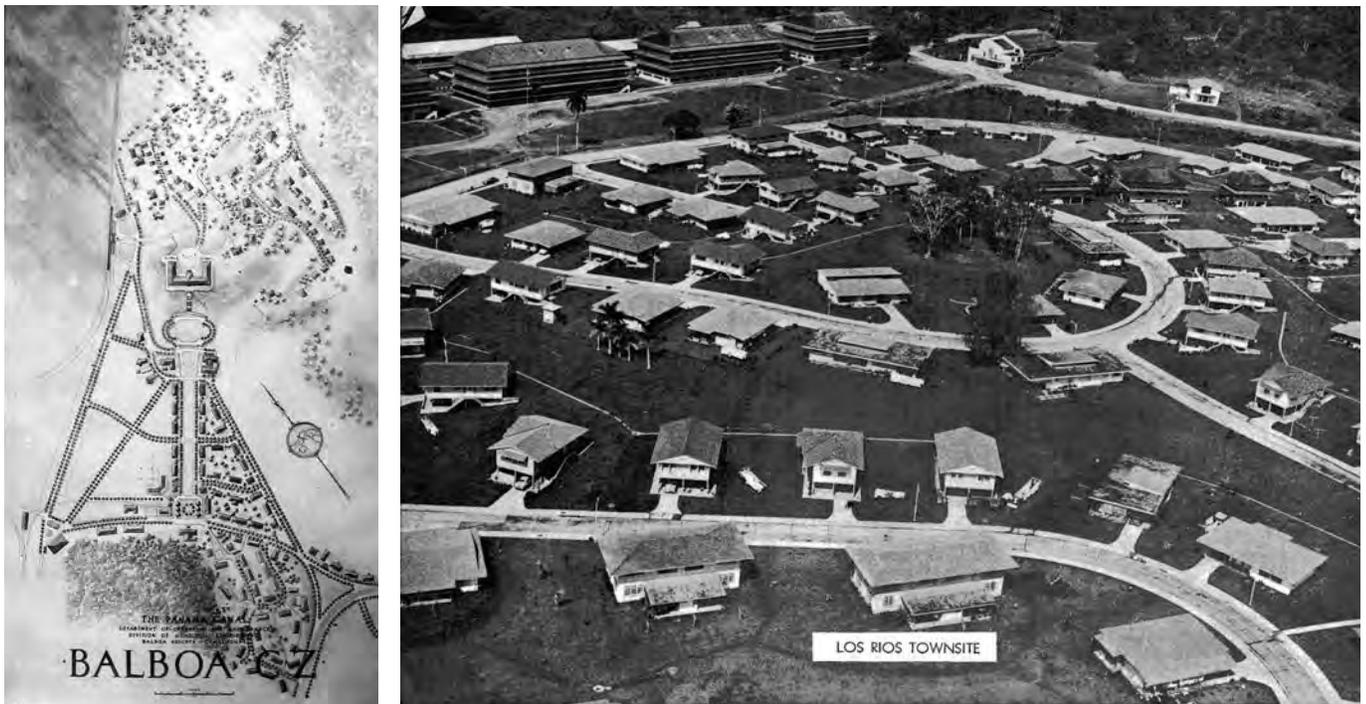
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**LEFT:** Balboa Townsite Rendering: The Panama Canal, Department of Operation and Maintenance Division of Municipal Engineering, Balboa Heights – Canal Zone, 1915. **RIGHT:** Aerial view of the Los Rios townsite with the Corozal Army Reservation buildings (upper left) along McKinley Avenue as well as Cameron Street, Dos Bocas Street (upper loop), and Boqueron Street (foreground) showing a number of housing types including on-the-ground concrete-block “breezeway” and elevated-on-stilts cottages, circa 1955.

The architecture of the Canal Zone was modern when constructed and conveyed global technological and social innovations of the time. The tropical climate inspired the use of covered walkways, shaded large windows, and pitched roofs in local architectural designs.

Typically, living quarters were raised off of the ground by wooden piers, interior and exterior walls of the buildings were of wood frame siding, and the roof was corrugated iron. Permanent residential barracks or family quarters included the following architectural elements: reinforced concrete exterior, clay tile roofs, copper-screened louvers, large copper-screened porches, and living quarters located on the second level, with maids quarters, laundry, and storage areas and garages (later) on the ground level. Due to the heavy rains that occurred in the region, intermediate roof projections, referred to locally as “media aguas,” kept water away from entryways and windows and blocked the harsh mid-day sun from interiors.

The construction of the Panama Canal created great interest globally, and a tide of tourists travelled to Panama, creating demand for hotel accommodations. Canal authorities developed railroad tours to the construction sites and housed some of the visitors at the Tivoli Hotel on the Pacific side, completed in time for President Theodore Roosevelt’s visit to the Canal Zone in 1906. Demand for a modern hotel facility in the vicinity of the Atlantic terminus of the Canal resulted in the construction of the Hotel Washington (1911-1913), designed by the prominent American architect Bertram Grosvenor Goodhue. The architecture of the Washington combined fine contemporary design

with tropical needs, and was built of concrete and concrete blocks in a modified Spanish Colonial Mission style.

### Post Canal Construction and War Years

The design elements and construction methods at the townsites and military installations of permanent buildings were typically excellent ICC architecture in the post Canal construction era. The solid, reinforced concrete walls also rendered the buildings rat proof – a Sanitation Department regulation requirement for the prevention of the spread of bubonic plague.

Sub-floors and interior partitions were also of concrete, with wood reserved for doors and window frames, media aguas, roof framing, and floors. Copper-screened windows and porches allowed for air circulation within the buildings, while at the same time keeping out mosquitoes, carriers of Yellow Fever and malaria.

The design for military barracks, family quarters, and headquarters buildings was made in accordance with the Quartermaster Corps, United States Army. A board of officers determined the types of quarters already formalized and approved by the ICC. Camp Elliott (Camp Gaillard) was one of the two original U.S. Marine installations established in the earliest days of Canal construction (1904) and located at the town of Bas Obispo, near the towns of Culebra and Empire on what is now the west bank of the Panama Canal; Camp Otis was the second of the two original U.S. Marine installations converted from the Canal construction community near Las Cascadas. When the earliest permanent buildings

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for military use (the Coast Artillery Corps) at Amador (Fort Grant) were built in 1915, the quarters were constructed from the same plans as the quarters on El Prado, Balboa. Quarry Heights was the nerve center for U.S. military forces in the Canal Zone, developed in 1915. Fort Clayton was the first infantry post constructed on the Pacific side (1919-1920), on the site of the construction era's Miraflores landfill, to protect Miraflores and Pedro Miguel Locks. Fort Davis (Camp Gatun) was constructed circa 1920 as an infantry post to protect the nearby Gatun Locks and other Atlantic side facilities of the Panama Canal. France Field was constructed in 1918-1920 on Manzanillo Bay near Forts Randolph and DeLesseps; it was the first air base in the Canal Zone.

A number of buildings from the towns of Empire and Culebra were disassembled piece by piece – each section carefully numbered – transported by railroad and truck to Quarry Heights, and re-erected at the military reservation. The chief engineer's house from Culebra was reassembled in Balboa Heights and became the governor's house.

Located on the western shore of Gatun Lake, Fort Gulick was built to accommodate an increasing number of troops in the Canal Zone leading up to World War II. Established as part of the 1928-1929 Canal defense augmentation program, Fort Kobbe was strategically located on the west bank of the Pacific entrance to the Canal. Albrook airfield, headquarter, and residential buildings were built in the 1930s.

An improved airstrip became a separate installation: Howard Air Force Base. Rodman Naval Station was the hub for all naval activities in Central and South America and supported Allied military ships transiting the Panama Canal; Camp Rousseau was constructed in the early 1940s as a Naval hospital adjacent to the Panama Canal between Rodman Naval Station and the townsite of Cocoli.

Diablo Heights was selected as the headquarters for the Special Engineering Division in 1939 to design another set of locks; subsequently office buildings, bachelor quarters, 12- and 10-family houses, and cottages were all built, with additional 12-family houses later added.

The Dredging Division moved from Paraiso to Gamboa in 1938, and the townsite was developed with “stilt” or elevated types of house construction.

### Mid-Century & Modern Years

After the war, a building program began in earnest to accommodate the increased demands for housing. New townsites were developed, including Cardenas, Margarita, Los Rios (1954), La Boca (rebuilt in 1959) and Coco Solo (previously a naval base). The Maintenance Division of the Canal organization was formed



**Marine Barracks, view of north and east sides, facing southwest, Panama Canal, Officers' Quarters, 800 feet west of Bruja Road, Balboa, Panama Canal Zone, circa 1995.**

from the Municipal and Building Division in 1952 and two large contracts were to be awarded by the Panama Canal Company

to private contractors. The program involved the construction of more than 5,000 family units and 1,500 bachelor units, at a cost for housing alone of more than \$8 million; new community facilities, such as schools, clubhouses, commissaries, and post offices were in addition to these costs.

New types of masonry patio and “breezeway” homes were designed and built during this period, updating the Canal Zone with a mid-century modern style. A leading U.S. architectural firm, Skidmore, Owings & Merrill (SOM), developed the design for the breezeway house. The masonry house plan provided for a separation of the living space from the bedrooms by a wide covered porch and was used for houses of two, three and four bedrooms.

The Panama Canal Company and U.S. military maintained the infrastructure of its townsites and bases with ongoing maintenance programs for quarters and public buildings, landscaping, utilities, and road repairs through the period. The United States had built and maintained the buildings from the beginning of the construction of the Canal in 1904.

### Conclusion

A new millennium dawned and the Canal Zone in its entirety reverted to Panama, including civic and residential buildings, townsites, military installations, and the Canal. Approximately 5,000 buildings with an estimated value of \$4 billion were involved. This physical legacy will remain as part of the United States' rich contribution to the cultural heritage of Panama. The preservation of many of these structures has significance as part of a shared cultural and architectural heritage. ■

# The Ladies, God Bless Them!

By Paul W. Morgan, Jr.

Before the Panama Canal was built, earlier achievements by the United States on the isthmus heralded future success. Americans had overseen the conquest of the isthmus by rail in the construction of the Panama Railroad in the mid-19th century. Americans had aided Panama in gaining its independence from Colombia in 1903, and by 1904, Americans were convinced of the efficacy of their engineering and poised to build a trans-isthmian canal.

An historical case can be made that without the presence of American women, the task may have taken much longer. The potential contribution of women to this effort was not apparent to Canal authorities at the beginning. Construction plans did not include wives accompanying U.S. workers to “the Big Ditch,” as neither the climate nor the work was deemed conducive to family life. Ironically, it would be the work itself, or the need for a stable workforce, that would eventually make the Isthmian Canal Commission (ICC) more receptive to, and even desirous of, the presence of women.

From the beginning of construction, conditions on the isthmus mitigated against continuity in the U.S. workforce. Even as late as 1911, the average length of stay on the isthmus for mechanics, for example, was only one year.<sup>1</sup> Climate, disease, and exhausting, repetitive work prompted many enthusiastic

Canal workers to return to the United States long before the task was accomplished. But as debilitating as the environment was, monotony, loneliness, and the perception of cultural deprivation were even more enervating. After work, there were relatively few avenues of amusement and recreation for workers housed along the construction line. To relieve boredom they turned to makeshift cantinas near the work sites and brothels in the nearby terminal cities of Panama. But such diversions often resulted in missed work and poor performance. Lack of familiar pursuits led U.S. workers to mourn the loss of the old rather than to seek the new culture.



**Postcard, woman looking over edge of lock chamber. Text on back reads: Gatun lock chamber-1911, Florence Neville. 3" x 5".**





What had brought many workers to the project – a patriotic fervor and the desire to make history while making expenses – soon succumbed to the fear that by going to Panama they were sacrificing all that was good and wholesome back home.

The ICC tried to resolve the dilemma by building YMCA “clubhouses,” with soda fountains, gymnasiums, and card and reading rooms. This solution illustrated the cooperation between government and citizenry advocated by progressives in the United States at the time. The government provided the funds for constructing the facilities, while stateside families supported the wholesome amusement and recreation provided for their loved ones in a foreign land. The remedy for homesickness and boredom was to bring “home” to the isthmus rather than to go home from the isthmus. To maintain a stable U.S. workforce, the Commission sought to make life on the isthmus more familiar and to cultivate a spirit of American moral order.

At the dawn of the 20th century, U.S. society considered moral order to be the natural interest of women, and communities looked to their female citizenry and the culture of domesticity to provide the moral elements of home. Nevertheless Gen. George W. Davis, the first governor of the Panama Canal Zone, 1904-1905, tried to dissuade workers from bringing their wives to the isthmus, even though ICC headquarters stateside advertised free quarters for both married and bachelor workers as an inducement

to work on the Canal.<sup>2</sup> Canal officials did not consider the environment on the isthmus to be fitting for American women. But the main reason officials

wanted to deter workers from bringing their wives was the lack of family housing. Quarters for male workers took priority in construction budgets, though housing for higher ICC officials in construction towns included space for their families. Even unmarried female employees, other than nurses, had to find their own accommodations in the Republic of Panama. Yet despite the lack of government sponsorship and housing, wives of U.S. workers kept coming to the isthmus and were forced to live in tents, railroad boxcars, dilapidated shacks, and deteriorating French quarters.

Eventually, Canal authorities felt compelled to approve and support the presence of women and families on the isthmus and to make family housing a priority. The growing presence of women was bringing a stabilizing atmosphere of home, the prerequisite for a steady and proficient workforce. The value in married workers having their families with them was pragmatic: contented married men stayed longer, lost less time at work, and were more reliable and effective on the job.

As more women arrived, they increasingly affected social life in the Canal Zone. Their presence altered the leisure and recreational world of men, as well as men’s public behavior.<sup>3</sup>

**The presence of women in the Canal Zone made for improvements to the quality of life there for men, women, and children.**



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Here is an early gathering of the Canal Zone Federation of Women's Clubs, held at Empire during the early construction days. In the foreground will be seen, Mrs. George W. Goethals, first president of the Federation; Mrs. Gaillard, Mrs. Rousseau, Mrs. L. C. Collins, Mrs. Sibert Lewis Baker, Miss J. Machlin Beatty, Mrs. Thomas E. Brown, Mrs. Coolidge and Mrs. Chester Harding.

From the book, *Twenty-Five Years of Club Work on the Isthmus of Panama 1907-1932*.

In preparing meals for special picnics and organizational days, they gave young, homesick American workers a taste of home, leading one worker to exclaim, "The ladies, God bless them! [Food] like mother used to make."<sup>4</sup>

Although, by 1906, wives of U.S. workers had the support of the authorities to come to Panama, they faced the same conditions that caused many workers to leave before the job was done. They too were plagued by disease and climate and felt deprived of the common items they were used to in the United States. Physical hardships often gave way to emotional hardships. In 1907, Secretary of War William Howard Taft, under whose department the Canal was being built, sent Gertrude Beeks, secretary of the Welfare Department in the National Civic Federation, to Panama to appraise the conditions affecting workers on the Canal and the Panama Railroad and to assess potential problems. As part of her appraisal, Beeks reported on the benefits of family life, which contributed to the Commission's decision to support a larger married workforce. But her report also revealed the growing discontent in the wives of workers.

Though Beeks discovered that wives were dissatisfied with inadequate housing and the lack of commissary items for women, adequate facilities and supplies alone could not bring satisfaction and contentment. Women's quality of life was stymied by boredom and emotional isolation. The arena of home was not sufficient to occupy their time. As William Haskins, a Canal employee pointed out, "Her husband was away all day at his work. When he came home in the evening he was tired out."<sup>5</sup> Workers' wives faced a monotonous existence in isolated towns

along the line of construction with little organized contact with other women. To Beeks, despondent wives could be as much of a drain on the progress of construction as contented wives could be a boon. Contented wives meant contented workers and, consequently, progress on the Canal. Women needed to be organized around satisfying, collective activities. Club work, in vogue in the United States, seemed to be the answer to enhancing both the lives of women and the Zone community as a whole.

Early individual efforts to establish such clubs in the construction towns of Gorgona and Culebra had met with some success, but Taft and Canal officials believed someone had to coordinate this organizing effort to ensure a lasting result. In an age where people appealed to experts, Beeks nominated Helen Varick Boswell, a member of the National Civic Federation's Welfare Department and the official organizer of Republican women in the United States. Accepting her nomination, ICC Chairman and Chief Engineer Col. George Goethals requested that Beeks send Boswell to the isthmus to organize women's clubs, with the ICC paying her salary and expenses.<sup>6</sup> Consequently, it would later be said that the Canal Zone women's clubs were thought to be the only women's clubs organized in any country by governmental authority.<sup>7</sup>

Soon after arriving in Panama and assessing the emotions of the wives of U.S. workers, Boswell stressed a collective and positive approach to the problem. Collective activity meant providing Zone women with cultural interests similar to those they had left behind in their stateside homes. The positive tone meant getting every club woman to pledge herself as "a committee of one" to

foster favorable, rather than adverse, impressions of the Zone and the Isthmus of Panama.<sup>8</sup> The formation of women's clubs in the Canal Zone would provide a forum for women to import and reproduce activities from the United States. By bringing women together around common, familiar cultural pursuits, the clubs would help alleviate the isolation and loneliness while creating the elements of "home" in the Zone.

At the outset, women's clubs were organized on the isthmus much as they were back home. Generally, the emphases in each club were related to the concerns of the town in which the club was located. Each club had four departments, and through them, women looked to influence domestic life on the isthmus. The home department taught ways to beautify and make home life more efficient and comfortable. The educational department motivated more women to learn and provided a vehicle for women to lobby for improved school facilities for their children. The arts were included in the literature and music department. Lastly, each club had a philanthropic department.<sup>9</sup>

In the United States, women's clubs had already shifted their campaigns to pressuring politicians for social and political reforms. But since Canal authorities, who were appointed and not locally elected, took care of the policies governing quality of life in the Zone, women could only make suggestions for improving life in the home and community. This was apparent in the report of the president of the General Federation of Women's Clubs, upon her return to the United States from her trip to the isthmus to integrate the Zone clubs into the greater federation. She stated that the aim of the Zone federation was to be "a help to the American homes on the isthmus."<sup>10</sup> Still, the more stable the workforce became and the more construction problems were solved, the more receptive Canal officials became to women's community recommendations, which, though restricted, were still effective.

As women's presence increased, they gradually improved the living conditions in the construction townsites. They hosted lectures on homemaking and home health care. They promoted high school education in the Zone and proposed school boards. But community improvement went beyond aiding women and children. Women influenced the choice of furnishings that the government placed in family quarters and prompted government commissaries to expand and diversify their inventories. They conducted beautification campaigns to make the external as well as the internal surroundings more like home. They called for stronger bridges and more police presence at crossings along construction work, and they campaigned for town libraries and churches to be built.

In addition to the women's clubs, women formed familiar cultural and church organizations. During his visit to the isthmus in 1909, (now President-elect) Taft addressed the newly formed Canal Zone Federation of Women's Clubs and congratulated the women "as citizens of the United States resident on the isthmus, upon the great progress which [was]

**Postcard of woman and boy setting table.**



being made in the canal."<sup>11</sup> Government agencies charged with the quality of life in the Zone were now listening to a more collective voice of women, as their efforts were increasingly being tied to the progress of construction.

After the Canal was completed, Goethals would summarize the value and benefit of the women who had come to join their men in the great engineering feat:

It is without a doubt true ... that the largest single factor in the contentment, and therefore in the permanency and efficiency, of these men was the policy of providing family quarters so that they might have their wives with them on the isthmus. ... In any body of men removed for a long period from the restraining and refining influence of women, there is inevitable deterioration.<sup>12</sup>

The women came, the men stayed – and the Canal was built. ■

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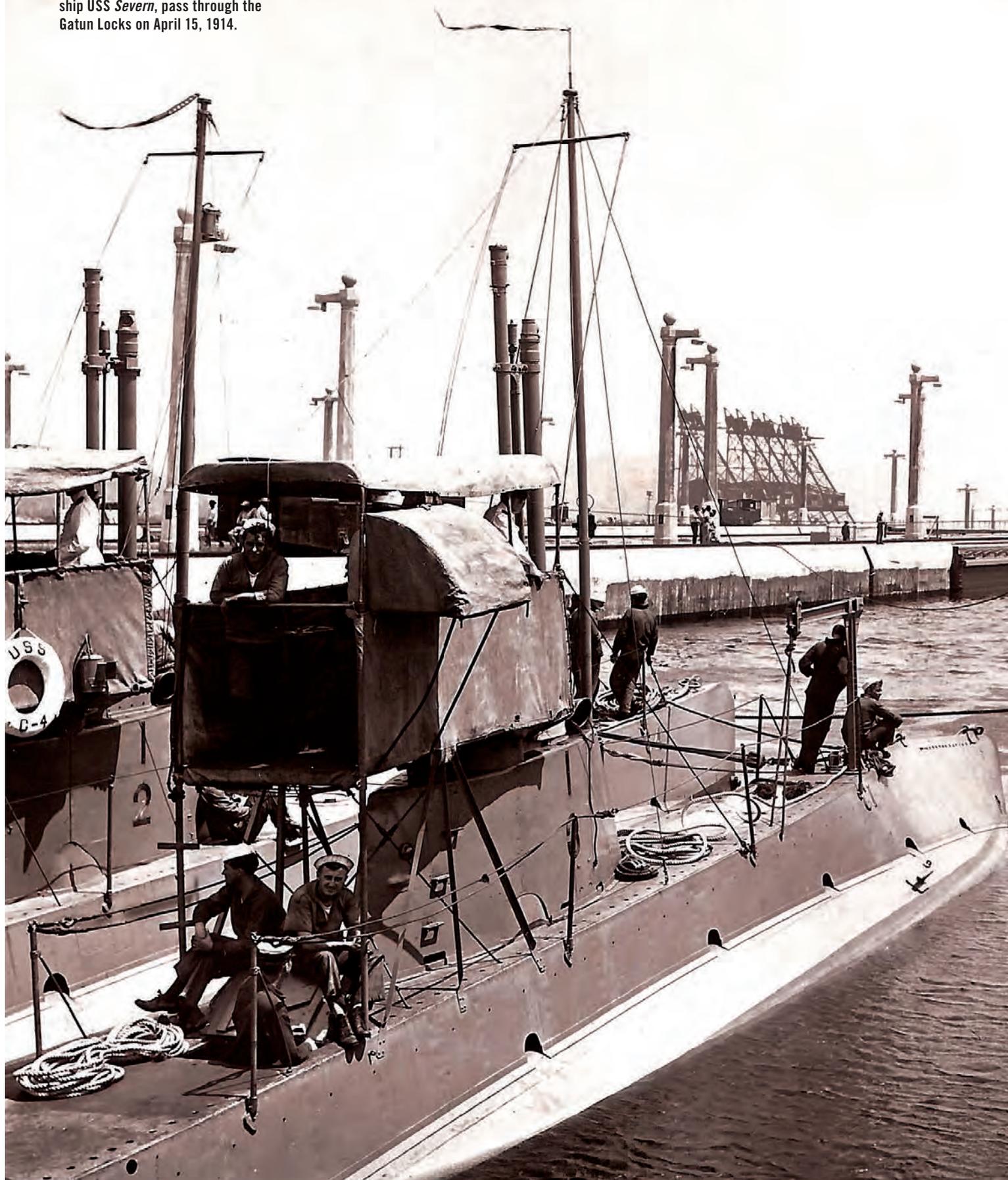
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U.S. C-class submarines, with tender ship *USS Severn*, pass through the Gatun Locks on April 15, 1914.



# Military Significance of the Panama Canal

By César A. Vásquez

In 1907, as the Panama Canal was being built, John F. Stephens, the chief engineer of the project, abruptly resigned for reasons that were never made clear. He had been at his position for about two years, and left President Theodore Roosevelt in a precarious situation. Roosevelt had to replace the person most responsible for the greatest engineering project ever attempted for a second time mid-stream. Finding an adequate replacement was no simple task; the intricacies of the project were such that the personnel attached to it were of the utmost concern. The project had been started on the ruins of the previous, failed French attempt, and the United States had invested much of its treasure and reputation in getting it accomplished where others had failed.

Despite all the preparation and planning that had preceded the project, however, the American efforts had run into many of the same problems as the previous French attempt had. To make matters worse, the scope of the project had steadily increased as the sheer tonnage of earth that needed to be moved was reestimated upward several times. The channel lock system had originally been intended to create a workable canal at a much more economical rate than the alternate option of a sea level canal.

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**U.S. military nurses in the Canal Zone, March 1942.**

In the end, however, the final mass of earth that was displaced ended up being almost equal to that of the proposed sea level canal design. The complications being encountered meant that personnel attached to the project had to be well versed in several different disciplines. The building of the Canal was not simply an engineering project, but also a major waterworks and building project, and ultimately a strategic and military one as well.

Roosevelt chose to fill the vacancy with Maj. Gen. George W. Goethals, an engineer with close to three decades of experience, and, most importantly, a member of the U.S. Army's Corps of Engineers. Roosevelt reasoned that placing a military officer in the position would ensure that the project would be headed by someone he could count on to stay on until ordered to do otherwise. This move made a lot of practical sense. The Corps of Engineers had for a long time been tasked with improving the

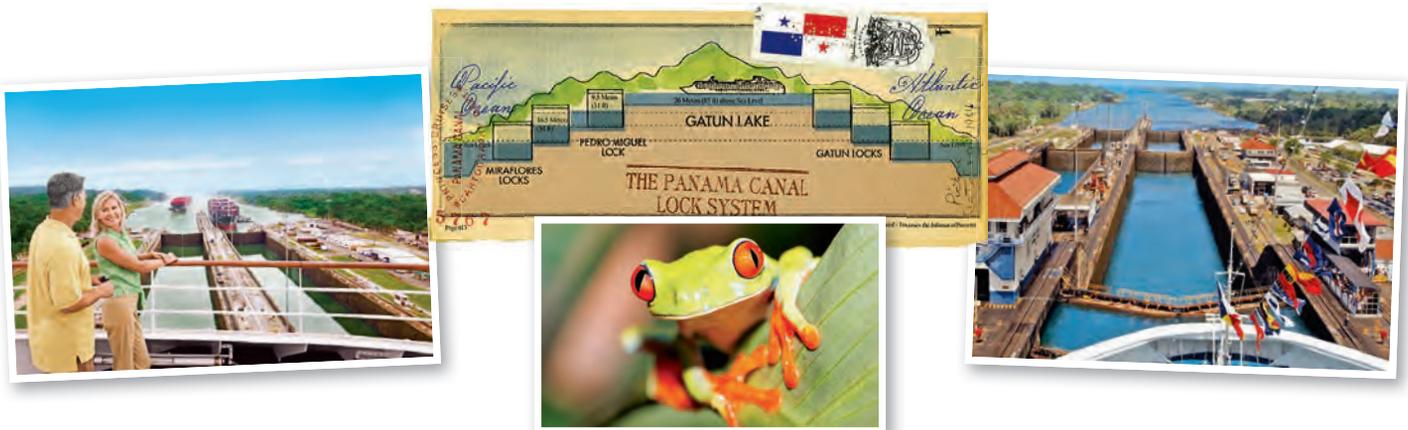
nation's waterways, meaning that they were intimately versed in the creation of locks, canals, levees, and dams. There was also the issue of security; Roosevelt had decided that the Canal would need to be protected by building a series of fortifications, a job that was ideal for the Corps.

Eventually, it would become a standing tradition that the governor of the Canal Zone should be a senior officer in the Army Corps of Engineers. Thus was cemented a long, storied, and often turbulent official relationship between the Panama Canal and the U.S. military. The military importance of the Panama Canal has evolved greatly over the decades of its existence, and although it would be unfair to categorize the Canal's importance in solely military terms, it cannot be denied that the military aspect was one of great concern from very early on.

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**The hospital ship USNS *Comfort* passes through the Panama Canal, July 1988.**

That the Army should be involved in the construction was perhaps not surprising. The Canal was a major investment for the United States, but more importantly, it came to be seen as a strategic asset that allowed the U.S. and its military to operate on two oceans simultaneously. Access through the Canal cuts out about 8,000 to 10,000 miles of navigation and cuts down on approximately 20 days of travel time. The Canal provided the U.S. Navy several operational advantages, such as rapid transit of fleets, flexibility in the application of force, and timely arrival of troops and equipment at the scene of an international crisis or conflict. More importantly, the establishment of the Canal Zone, which operated as a de facto second Panamanian state, allowed the United States to establish a lasting presence in the region from where it hoped to project its influence.

The 1903 treaty between the United States and Panama that established the Canal Zone had, in effect, allowed for the establishment of the first U.S. enclave in Central America, and provided for the establishment of the first permanent overseas American naval force. The existence of this major military presence in the area helped the United States become the dominant force in the Caribbean. The treaty also allowed the United States to build bases and fortifications necessary for the defense of the Canal, and left ample leeway to the U.S. to interpret what was meant by “necessary.” As a result, the number of U.S. bases clustered in the Canal Zone quickly grew, and became a

major factor in providing the United States with a strategic presence in the Americas. Strategically, the importance of the Canal may simply have been that it allowed the Navy the capability to rapidly deploy from one coast to the other in response to crises and significant events, but in real-world terms, this meant that any potential aggressor always had to take into consideration not only the United States’ existing forces, but also that they could be quickly and easily redeployed and reinforced should the need arise.

Aside from the actual military strength the Canal Zone bases created, the existence of these bases and control of the Canal allowed the United States to extend its military strength throughout the region in a manner disproportionate to the Canal’s actual military value. Additionally, there was always the threat that American control of the Canal could be used in an offensive manner via denied access to strategic rivals. The large amount of commerce that traveled daily through the Canal made it a strategic choke point that controlled a significant amount of world commerce. The very existence of a strong military presence in the Canal Zone served as a deterrent to foreign competitors and enemies far beyond the actual strategic value of the Canal itself.

Perhaps nothing illustrates the military importance of the Canal and Canal Zone as much as the establishment of a unified combatant command there during World War II. The Franklin D.

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**A U.S. commercial vessel moves through the Gatun Locks, February 1969.**

Roosevelt administration established the U.S. Caribbean Defense Command (CDC) in 1941, and it continued to exist until being reorganized in 1947. A prototype unified military organization designed to defend the Panama Canal and surrounding area, the command sought to organize and implement a regional defense program that included antisubmarine and counterespionage operations. The CDC also established military training missions in Latin America, distributed military equipment to regional partners through the Lend-Lease program, and opened U.S. service schools to Latin American soldiers, sailors, and aviators. At the height of World War II, U.S. military planners had assigned 135,000 uniformed personnel to duty stations in Latin America and the Caribbean, approximately half of which were under the direct control of the CDC. Although ultimately most see the Caribbean Defense Command as having failed to establish a unified command headquarters for the entire Caribbean, the great amount of effort that was expended in the attempt illustrates the perceived importance of the Canal and the Canal Zone.

In 1947, the wartime headquarters was transformed into the U.S. Caribbean Command (CARIBCOM). CARIBCOM had operational responsibility for an area that encompassed

Central America (less Mexico), South America, the Caribbean, and a portion of the Pacific. CARIBCOM's primary missions were security of U.S. forces in Panama and the Caribbean, defense of the Panama Canal, and protection of the maritime approaches to the Canal. CARIBCOM also assumed broad responsibilities for inter-American security cooperation in Central and South America. In 1960, after reductions in its mission and authority, the command changed its name to United States Southern Command to be more in line with its reduced geographic interests, namely Central and South America. Defense of the Panama Canal remained the command's No. 1 mission, but primary missions expanded to include contingency planning for Cold War activities and the administration of the U.S. foreign military assistance program in Central and South America. In May of 1975, the command was downgraded from a four-star to a three-star billet and retained with only defense of the Panama Canal and contingency planning for emergencies and disaster relief as its primary missions.

The start of Panama Canal Treaty Implementation (Oct. 1, 1979) and the rise of Manuel Noriega to power in Panama



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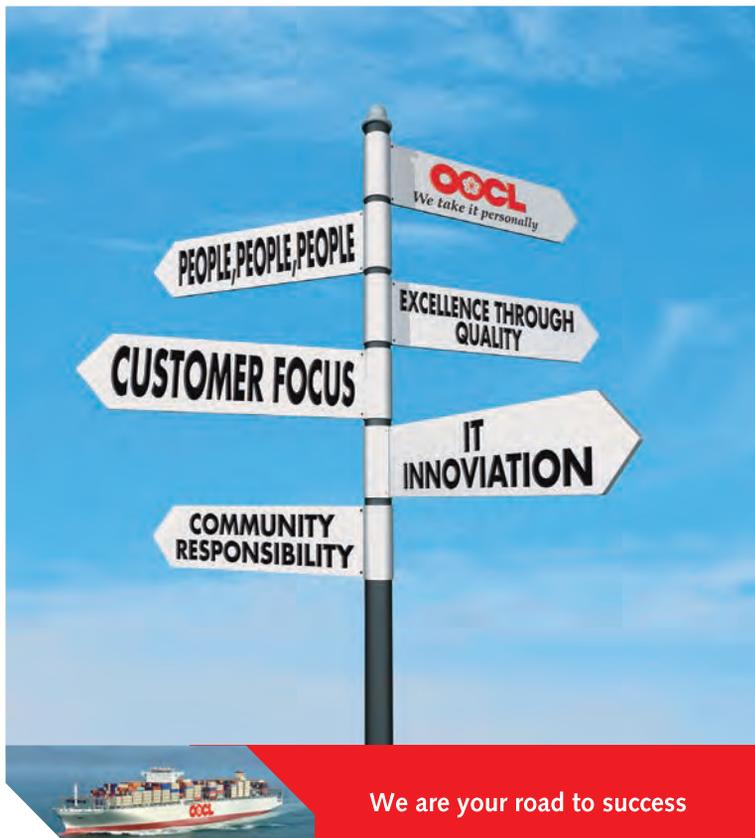
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(1981) along with other political events in the region such as the emergence of leftist insurgencies and the rise of drug cartels, greatly affected U.S. policy during the 1980s, causing the Ronald W. Reagan administration to revitalize the command and return it to a four-star billet, a status that it has retained even after moving out of the Canal Zone. Without a doubt, the existence of United States Southern Command and broad military partnerships in the Americas are a direct result of the existence of the Panama Canal.

World War II was in many ways a high water mark for the military significance of the Canal. Throughout the war years, more than 10,000 American military vessels passed through the Canal; thus it provided an ideal and economical way of meeting the transportation needs of a nation at war. Even by this point, however, the actual military importance of the Canal itself had already begun to diminish. By the end of the war, the Canal's locks were already too small to accommodate the largest U.S. capital ships. The railroads that cross Panama operated at less than full capacity throughout the war years, and, if necessary, could have met all the shipping and transportation needs of the U.S. military without ever reaching full capacity, albeit at a higher price. Despite this, the Canal continued to be a huge psychological deterrent to would-be aggressors, and the American military presence continued to be a source of projected power in the region. As late as 1942, U.S. Secretary of War Henry Stimson had described Panama as "the one spot external to our shores which nature has decreed to be the most vital to our national safety, not to mention our prosperity"; interestingly, he did not mention the Canal itself, though its existence was at the root of his assertion.

The end of World War II and the coming of the nuclear age fundamentally altered the importance of the Panama Canal, both militarily and from a security standpoint, and brought to light several problems related to the American control of the Canal Zone. The U.S. military had for a long time seen Panama as a completely separate entity from the Canal Zone, which was considered a strategic U.S. enclave and therefore an extension of the United States itself, akin to an embassy. Protecting the Canal, then, was not simply a matter of protecting vital interests, but also one of protecting American citizens and territory. The governor of the Canal Zone, though officially having no power within the Panamanian government, in effect held a great deal of influence over Panamanian politics. Any dispute between the Panamanians and the Canal Zone governance (which was under military command) carried with it the inherent threat of U.S. military intervention into the country itself. It is notable that for much of its history, authority over the Canal Zone rested solely with the Secretary of War, while the State Department was largely excluded from any real influence. As the postwar era progressed, this situation became increasingly burdensome and led to inevitable disputes.

By the terms of the 1903 treaty, Panamanians were allowed free entrance into the Canal Zone, but the Zone itself was under American jurisdiction and most of the permanent residents

of the Canal Zone were American citizens. Zone residents tended to enjoy a much higher per capita income than the average Panamanian, leading to increasing animosity with the Panamanian people. The treaty also gave the United States ample privileges over its use of the Canal Zone beyond the simple operation of the Canal, such as eminent domain rights over terminal cities it deemed "necessary and convenient" for the operation and security of the Canal. Panamanians had long argued that the military bases in the Canal Zone were being set up with the intention of securing U.S. interests in the region and not for the actual protection of the Canal as required by the treaty. Through a series of negotiations in 1936, a new treaty ended the eminent domain rights and streamlined the various military bases, but even this only had the effect of officially entrenching the U.S. military's presence and position in the Canal Zone.

It was world events that finally altered the situation. While the projection of U.S. power continued to be of the utmost importance, the U.S. emergence from World War II as one of two world superpowers diminished the importance of military control of the Canal. Furthermore, security for the Canal had to be reconsidered in light of the nuclear age, as it is inherently indefensible against the type of weapons that emerged after World War II. The very nature of the Canal, being stationary and depending on intricate mechanisms, makes it highly vulnerable to a nuclear attack. The vulnerability of the Canal forced the United States to think of its defense in more strategic terms than before, thus the 1977 Carter-Torrijos Treaty sought only to secure U.S. rights to guarantee neutrality of the Canal. Protection of the Canal is now seen as a collaborative effort with both the Panamanian government and regional partners. The removal of U.S. Southern Command from the Canal Zone has also greatly reduced the military importance of the region, as it's no longer the hub for U.S. military activity in Latin America.

The military importance of the Canal has now come full circle. Though remaining a strategic commodity, the increase of world shipping and the growth of the East have meant that it will continue to be a vital and convenient shipping lane, but it has also meant that there is almost universal strategic interest in keeping it open and running. The proposed third lock system that is currently under construction may increase the utility of the Canal in the transit of U.S. capital ships, but it will likely be used most frequently to accommodate the larger "New Panamax" sized commercial vessels. In the end, the Canal's utility may be its most important remaining strategic asset. ■

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Canal Zone Free Public School, Culebra, 1905.

# Public Schools in the Canal Zone

By Patrice Brown

The Panama Canal has long been recognized as a tremendous engineering feat, but less attention has been given to the equally tremendous human feat of carving out a living space that included housing, hospitals, towns, and schools that needed to be in place in order to allow Canal construction. The workforce, with their spouses and their children, arrived to the Canal Zone in Panama from many areas of the world, including the United States. The Panama they found had dense jungle, dangerous diseases, flooding, and few amenities for their families. Most workers expected decent living conditions to be provided. Canal officials knew that the workers' expectations had to be reasonably met if they hoped to retain them. Schools would be a factor in drawing workers with families – the type Canal officials thought would make the best employees. However, there were no viable public schools in the Zone. Canal officials realized there was an urgent need to provide schools as soon as possible, and took steps to establish them. A look at the establishment and development of public schools in the Canal Zone allows a look into a little discussed but nonetheless important aspect of Canal history.

In November 1903, the United States and Panama signed the Hay-Bunau-Varilla Treaty, which granted rights to the United States over a strip of land in order to build a canal across the middle of Panama roughly 10 miles wide and 50 miles long. This strip of land was known as the Canal Zone. Residents

of the Canal Zone would include the Canal workforce as well as the native population from the existing towns and villages now within its borders. On March 8, 1904, President Theodore Roosevelt appointed and organized the second Isthmian Canal Commission (ICC). The Commission was to supervise the construction of the Canal and to establish the government for the Canal Zone. The ICC created a Canal Zone Government that was headed by a governor with supporting offices and divisions. The Canal Zone Government, under the direction of the ICC, was responsible for providing the children of its Zone residents with schools. In 1904, the ICC authorized the establishment of a public school system. In June 1905, the Collector of Revenue's staff, a Zone Government department, took a census of school-aged Zone children. The census results showed that there were 1,936 children between the ages of 6 and 16. These children were located in 36 villages along the Panama Railroad line within an approximately mile-and-a-half radius from the railroad. The total number of children was further broken down into 976 males and 960 females; 1,045 were between the ages of 6 and 10; and 891 were between the ages of 11 and 16. It was further determined that 893 of the children could read and write while 935 could neither read nor write. The remainder of the children could read but not write.<sup>1</sup>

The Collector of Revenue staff wanted school buildings to have two to four rooms. One room would house primary

**Canal Zone School, Cristobal, December 1904.**





Free Public School, Paraiso, 1905.

grades (one to three) and the other room or rooms would house the intermediate grades (four to six). As the need arose, additional room/rooms would be added to cover the advanced grades (seven to eight). There were no students that initially required a high school education, so secondary schooling was postponed until there were enough students. In order to start schooling the children as soon as possible, Canal officials recommended the use of government-owned buildings for schools once necessary repairs or renovations were made. The school plan recommended the establishment of two schools in each municipality and that every village with at least 40 or 50 schoolchildren have a school. The school curriculum was to include reading, writing, arithmetic, physiology, and hygiene.<sup>2</sup> The children eligible to attend the public schools would include not only the children of Canal workers and the railroad employees that lived inside or outside the Zone, but also the rest of the residents of the Canal Zone. Also, children who lived outside the Canal Zone whose parents or guardians did not work for the Canal or its subsidiaries were

allowed to pay \$1 in gold a month and attend the schools as long as it did not cause overcrowding in the school facilities.<sup>3</sup>

Plans were slow to take shape. It was not until December 1905 that David C. O'Connor was appointed superintendent of schools and school organization began in earnest. Nevertheless, many difficulties were encountered that slowed the progress to obtain and to repair suitable school buildings. The schools were initially placed under the Collector of Revenue, but the ICC determined that the office could not move freely or swiftly enough to secure the needed buildings, supplies, and labor to make the necessary repairs. On May 1, 1906, the ICC placed the schools under the Bureau of Municipalities, a department within the Zone Government. The bureau had the authority to go directly to the municipalities where the schools would be located to obtain funds to rent the necessary buildings if the government did not own them. It was also authorized to repair or construct new buildings and to obtain the material and labor necessary to do the work.<sup>4</sup> On Jan. 2, 1906, the first U.S.-run public school in the Zone opened at Corozal.<sup>5</sup>



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Unfortunately, the school was closed on May 18, 1906, because only nine children were registered, and to keep the school open with such a low enrollment was not considered a good use of the government's revenue. The Bureau of Municipalities moved quickly to offset this early closure, and by the end of the month opened additional schools in La Boca (91 pupils), Cunette (52 pupils), and Bohio (89 pupils).<sup>6</sup> By the end of 1906, 33 schools were opened in 17 towns with 1,799 pupils enrolled and an average daily attendance of 1,157.<sup>7</sup>

In November 1906, the ICC created an independent Division of Schools within the Zone Government to carry out further school development. The division created the four-term school year: July 16-Sept. 26, Oct. 16-Dec. 21, Jan. 2-March 22, and April 8-June 30.<sup>8</sup> Later in 1907, the four-term school year was abolished in favor of a one-term school year that would operate from Oct. 1 to June 30.<sup>9</sup> School would be held five days a week for six hours per day. All necessary materials such as books, pencils, pens, and paper were furnished to all the pupils free of charge.

The Zone schoolchildren were from the United States, the West Indies, the French West Indies, Central America, Europe, Panama, and China. There were separate schools for white children and what were termed "colored" children. Colored was defined as anyone who was not white, which included "... Martinican, Jamaican, Chinese, native Indian, and mixed Spanish background."<sup>10</sup> The majority of white children came from the United States; the majority of colored children came from the West Indies. Most of the children spoke English and thus it was designated by school officials as the principal language used for instruction. In some cases where Spanish was the native tongue exclusively, teachers taught in both English and Spanish.<sup>11</sup>

In order to be hired as a teacher, an applicant had to have either four years of high school (or its equivalent), or two years of normal or college training.<sup>12</sup> School officials' policy was to hire teachers from the United States with normal school or college training and actual teaching experience for the white schools. The colored schools were assigned "the best of" the West Indian teachers.<sup>13</sup> Teachers were closely supervised and visited by high-level school administrators to assess their performance in the classroom.

From 1907 to 1909, Zone school subjects more closely resembled the subjects offered in U.S. schools. The subjects for primary grades through eighth grade now included arithmetic, calisthenics, drawing, English composition (oral and written), grammar, geography, history, music, physiology, reading, Spanish, spelling, and writing.<sup>14</sup> By 1911, there were high schools opened in the Zone with added subjects such as algebra, Latin, Spanish, literature, civics of the United States, rhetoric, and elementary geometry.<sup>15</sup> However, none of these high schools were for colored students, thus curtailing their education. At the end of 1912, the school census had changed dramatically to include three high schools (white) with 84 pupils, 12 grade schools (white) with 1,248 pupils,

and 15 colored schools with 1,325 pupils.<sup>16</sup> As time grew nearer to completing the Canal in 1914, the Zone school officials could say that they had established an efficient and workable school system that was educating 3,127 pupils in a total of 21 schools where only nine years earlier no school system had existed.

The school system was quickly organized, suitable buildings were either built or repaired, teachers were hired and trained, and curricula created. Children of Canal Zone employees received an education similar to the education available to students in the United States. Youths from the United States were able to continue their schooling and Panamanian or immigrant children who previously had little or no instruction were able to obtain an education. Canal officials met their objectives and were able to accomplish them while simultaneously managing the construction of the Panama Canal. ■

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# The Black Paradox on the Panama Canal

By Anthony McLean

Panama's good luck was built on bad luck: the failure of Ferdinand Marie, viscount de Lesseps' quest to repeat his success constructing the Suez Canal. The chaos that reigned in France as a result of the limited industrial capacity in Panama resulted in indictments and imprisonment; the only recourse for de Lesseps was to seek the help of his countryman Philippe-Jean Bunau-Varilla, the young and intelligent French engineer. The immense excavators and cranes already fallen into disuse would go without cost to Colombia by 1904. With the collaboration of Colombian friends, Bunau-Varilla sought the help of the only country with the potential intellectual and industrial capacity capable of finishing the Canal: the United States of America.

At the dawn of the 19th century, the United States had already explored immense regions of Central and South America with agricultural, industrial, and mining prospects. An exploratory

expedition had concluded that the two best options for a canal were either the narrow strip of land on the Isthmus of Panama or across Nicaragua. William Aspinwall, entrepreneur, philanthropist, and man of great vision, together with others, established the guideline when he built the railroad across the isthmus from the new city of Aspinwall on the Caribbean coast to the City of Panama on the Pacific. The challenge of a channel parallel to the railroad was the best option.

Bunau-Varilla convinced U.S. lawmakers to choose the Panama option rather than the Nicaragua route.

The international treaties with Colombia were an impediment when America signed the Hay-Herran Treaty with the Colombian state, essentially authorizing the purchase of the French assets and the control of the strip of Panama. The Colombian parliament rejected the treaty, opening the door for



PANAMA CANAL MUSEUM COLLECTION AT THE UNIVERSITY OF FLORIDA. UNIVERSITY OF FLORIDA DIGITAL COLLECTIONS. PHOTO DONATED BY VARNET T. CORNWELL.



**Panama Canal  
Commissary, with  
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a more vigorous approach that included Panama’s separation, something that had never occurred to the Colombians.

On Nov. 3, 1903, Manuel Amador Guerrero and others declared the Panama province free from the rule of Bogota. In Colon, the Colombian forces were ousted with the help of the U.S. Navy, and the Hay-Bunau-Varilla Treaty was signed. Canal construction started in 1904, giving the United States the opportunity to display to the world its great industrial and technological capacity, and the effective cooperation between countries of different backgrounds and cultures.

From the point of view of the United States, the triumph of that engineering feat in Panama was symbolized by the size of the locks and the inland waterway. Relatively unnoticed was the role of the labor force, the sweat and blood that flowed, and the many deaths due to the environment and the nature of the work.

Besides the magnitude of the construction, the responsibility for such a large workforce was colossal. Rather than using an exclusively American workforce, as many as 45,107 laborers were recruited from 20 nations of six different languages – most from the British colonies of the West Indies, followed by Spaniards – to work as unskilled laborers. The Panamanian population did not show much interest in the project.

Because the United States assisted in achieving Panama’s political autonomy, it inherited the task of developing and preparing Panama for the thousands of immigrants and visitors the Canal would bring. The United States took upon itself the task of cleaning up the country, especially the terminal cities of the Canal. It administered the Santo Tomas Hospital and also created the nursing school. Roads were built, streets paved, a sewer system installed, and drinking water reservoirs were established to serve Panama and Colon.

The U.S. government supported medical research efforts to battle a number of diseases, such as cholera, malaria, pneumonia, and yellow fever. Insecticide at that time was in a very primitive state. DDT, the first effective insect control, was introduced after World War II, as were antibiotics. The United States also proceeded to install a stable government of democratic principles with the development of a strong republic.

Meanwhile, the Isthmian Canal Commission came to the brink of failure due to managers’ lack of experience in dealing with workers from various cultures and with a variety of social habits and languages, in addition to the inclement jungle climate, sickness, and the unforeseen demise of many workers. The first directors rejected the use of black workers because they perceived them as lazy and indolent. Subsequently they were proven wrong, as black workers became the most essential workforce in the area.

Establishing recruiting centers for unskilled laborers in different countries was only possible after intense negotiations with each government. Many Caribbean islands were under the

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Common Laborers' Kitchen #2, Camp Bierd, Cristobal.

rule of Great Britain and they were all British subjects. Jamaica rejected recruitment offers, while Barbados, an island of 430 square kilometers and 195,000 inhabitants, ready to ease its overpopulation and unemployment, became the main supplier of manual labor with 20,000 workers. The fact that all non-Americans were hired as "unskilled" did not mean they were unskilled. Many were welders, plumbers, printers, builders, masons, animal caretakers, etc., but the lure of a job in Panama was an offer they could not refuse. By orders of the president of the United States, Americans were hired as specialized workers only<sup>1</sup> at such a rate that gold was the logical denomination for payment, while the workers hired from other countries – including Europe – at lower wages were paid in Panamanian silver coins, thus establishing the infamous gold roll and silver roll.<sup>2</sup>

Panama was offended, and issued Decree No. 11 of 1909 (Feb. 22), demanding management of the gold roll classification for

all Panamanian workers. The Canal administrators responded that workers of any nationality who accrued wages payable in gold coins would be classified as such.<sup>3</sup>

Because of the high humidity and continuous rain, the engineers determined that it would be healthier to disburse metal coins instead of paper currencies. More than 1,600 pounds of American gold coins and 24 tons of Panamanian silver coins were paid to the workers each month for seven years.

Feeding the workforce was also a challenge. The workers revolted over the food and demanded their traditional favorites, so the kitchens cooked different platters for different nationalities and mess halls were separate, which appeared to be a discriminatory act. By 1911, 200,000 meals were served monthly at 18 hotels for the American workers, along with 270,000 meals for the Europeans, while the West Indians, at 27 cents per ration, ate about 100,000 meals monthly.<sup>4</sup> The

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Spanish workers each consumed 1.5 pounds of bread per day, the black workers got 1 pound, and in the white hotels, consumption averaged two-thirds of a pound.<sup>5</sup>

The distorted worker-employer relationship, with separate dining facilities, perceived inferiority of the blacks, gold and silver rolls, lack of stability, and unequal salaries, provoked protests, work stoppages, and strikes. Many worked for a short time, then walked off the job. The Europeans, for the most part, had migrated to other countries, leaving vacancies to be filled by the West Indians, whose salaries, negotiated by their governments, were lower than all others but higher than in their own country; they stayed on to successfully complete the Canal. Wage classification for the silver employees was forcefully kept lower and periodically adjusted downward.<sup>6</sup>

Upon the completion of the Canal, the workforce suffered a logical decline. The largest working force ever reported was 44,733 on March 26, 1913, during the construction. By June 1915, it dropped to 26,807, and this number included the railroad and contractors.<sup>7</sup> Although many were retained for the operation and maintenance stage of the Canal, the low wages persisted, with very little room for improvement. The battle for wage improvement was almost endless, and the iconic strike in 1920 by Preston Stoute and Samuel Innis marked the end of the strikes in the area. That unsuccessful strike was supported by 80 percent of non-U.S. employees; many were removed from their jobs and driven from their homes, overwhelming the cities bordering the Canal. That dire situation fueled in 1925 the infamous Tenant Strike, forcing the intervention of U.S. military forces in Panama.

The West Indians did not relent. They created religious congregations, lodges, and charitable organizations to meet their needs for protection in their old age and illness as well as their economical, educational, and personal development. It is estimated that during the 1940s there were more than 400 lodges and mutual benefit societies, such as the Panama Canal West Indian Employees Association (PCWIEA), the Silver Employees Death Benefit Association, Barbadian Progressive Society, British Order of Ancient Free Gardeners, the Jamaican Society, Independent Order of the Good Samaritan and Daughters of Samaria, Ancient Mystic Order of Ethiopia, Inc., Sojourners Charitable Society, the Odd Fellows Lodges, Universal Negro Improvement Association of Marcus Garvey, the Salvation Army, and Father Divine.

The Panamanian government had not made life any easier for West Indians and their children born in Panama. From almost the beginning of the republic, laws and decrees were issued banning and restricting immigrants from countries whose original language was not Spanish.<sup>8</sup> The children born in Panama to West Indian parents were denied citizenship and their names altered. With the infamous 1941 Constitution, racism was deepened. Many black-only commercial activities were banned, confiscated, and then awarded to Panamanians. That constitution was subsequently abolished and the president deposed, but existing laws were still in effect and caused

havoc until 1956, when, at the insistence of the black community, a new constitution entirely abolished racism.

### Credit Unions

In 1948, due to the initiative of the workers, both West Indians and Panamanians established five credit unions (the first in the Republic of Panama): the Cristobal, Gamboa, Red Tank, Balboa, and Gatun. The republic had not legislated on the new cooperative movement, forcing the non-American credit unions to adhere to the jurisdiction of the Regional Office of the Bureau of Federal Credit Unions in Atlanta, Ga. The Americans had previously founded a credit union in the Canal area exclusively for the gold employees. After the Canal Treaty of 1977, that credit union ceased to exist. Today, only the Cristobal Credit Union has survived. Gamboa ended, Gatun and Red Tank merged into others, and the Balboa Credit Union was later changed to Ancon Credit Union, which crashed in 1990 as a result of severe mismanagement.

### Labor Trade Unions

From the start of the construction, the Americans organized various labor unions only for gold employees and opposed the creation of others. It was not until 1946 that non-Americans were able to establish a trade union – Local 713 – affiliated with the Committee for Industrial Organization (CIO). The Canal Zone Government revoked the union's license, however, because of leftist ties to those who had been expelled from the area. Many of the members lost their jobs, including Pascual Ampudia, Edward Gaskin, and Foster Bourne, who were leaders of the union. Gaskin, a teacher, organized a new labor group in 1950, and Local 900 of the American Federation of Labor (AFL) was born. The administration did not object, and they organized the Local 907 for non-American citizens of the military bases in the Canal Zone. The CIO was renamed the Congress for Industrial Organizations and merged with the AFL to form the Federation of Unions in the United States (AFL-CIO).

The establishment of Local 900 of the American Federation of State, County, and Municipal Employees (AFSCME)/AFL-CIO trade union for the non-American workforce was rewarding for the members, and had the partial backing of the Panamanian government. Almost immediately, noticeable changes were made. Racist and discriminatory gold roll and silver roll signs and separate toilet facilities and drinking fountains were removed. Inclusion in the federal retirement program was obtained and wages were incorporated into the U.S. salary structure, with health insurance, life insurance, and injury, dismemberment, and premature death clauses. Employment equity was achieved as proficiency was tested and grade classified using the federal system, with fairness to all employees of the Canal. The non-Americans, later known as “local rate,” were incorporated into the apprentice program



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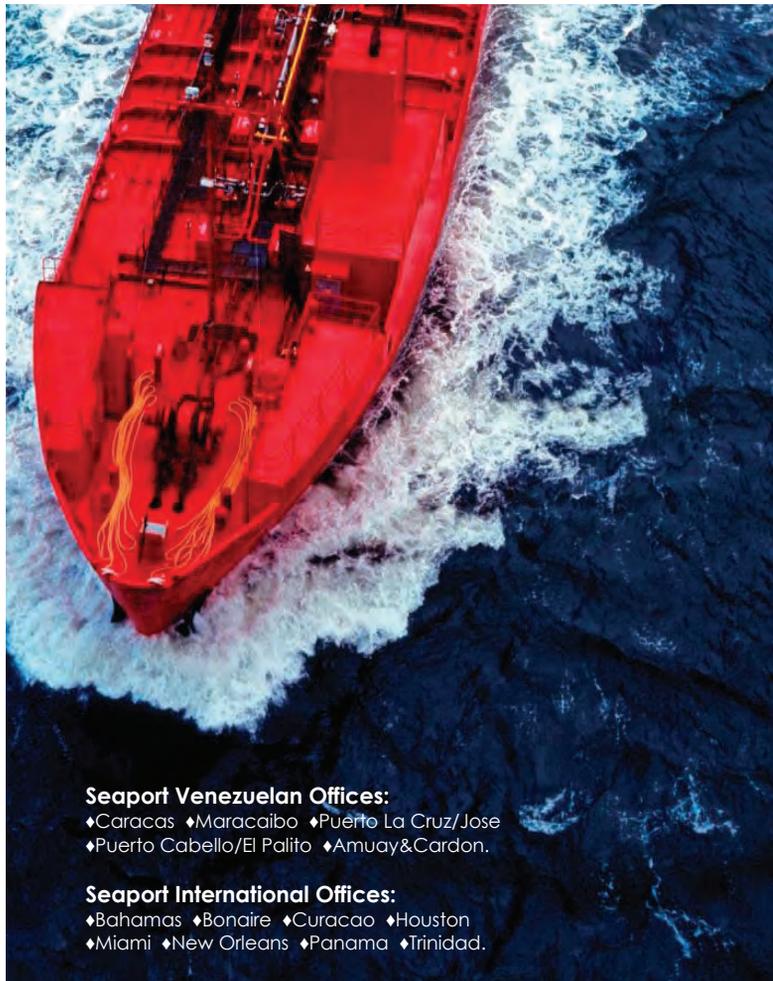


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to be trained as journeymen and specialized assistants, such as electrical and electronic technicians, boat builders, launch operators, firemen, police, and other specialized tradespeople needed for the operation and maintenance of the Canal.

### Living Conditions

In 1913, the Canal administration joined with the British embassy and Panama to offer a land development project to the displaced workers of the Canal Zone, establishing Rio Abajo and the West Indian colony on the Atlantic side. Eventually, the old wooden buildings were demolished and concrete duplexes were built in the local rate community. The Canal Zone administration financed a large housing project outside the Canal Zone for several hundred middle-income workers.

The settlement, Urbanizacion Villa Caceres, was developed in 1961, on the Pacific side and located along the Trans Isthmian Highway, about 5 miles from the Canal's main headquarters in Balboa. Many were critical of the economic benefits of the Canal to the United States, but one thing is certain: The United States had benefited Panama, not only economically, but in other ways. Panama did not provide a substantial workforce in building the Canal, but in the long run was the recipient of strong, capable people of many trades and professions from distant places around the world.

That vast influx of people from different countries brought new religions, food, art, sports, and music. The West Indians gave Latin America its first boxing champion, bantamweight Alfonso Teofilo "Panama" Brown. Panamanian Lloyd LaBeach provided Central America with its first Olympic medal holder in 1948, and Panama was also home to Central America's first

Major League Baseball player (Humberto Robinson) and one of the best Latin American baseball players of the 20th century, Rod Carew. In music, calypso was popular in both English and Spanish, as was reggae, as it was first sung in Spanish by the Panamanians. A medical first for Central America was also obtained with in vitro fertilization (IVF), first performed in Panama in 1990.

By 1911, there were more than 39 churches in Panama, including the Church of England, Seventh Day Adventist, Southern Baptist, Methodist, Christian Mission, and Salvation Army. The English-speaking churches started the process of change as the Panamanian-born children of the West Indians came of age and dropped English for Spanish. Many of the churches extended their missionary work into Panama's Spanish-speaking community and the indigenous regions.

In Panama City, on a corner in the Caledonia District, sits a wooden chapel now converted into a museum. Built in 1910 by Christian Mission Barbadians working on the Canal, it is an example of their profound faith and dedication, built after work hours. As the generation matured, the Panamanian offspring were not as engaged in the preservation of the chapel. It fell into disrepair but was restored and is now the Museo Afro Antillano de Panama (Afro-Antillean Museum of Panama). The museum is administered by the cultural institute of Panama, called INAC. Today, the museum is a government entity economically supported by the Society of Friends of the West Indian Museum of Panama (SAMAAP).

Little by little things changed in the Canal Zone. Working conditions improved and equality was obtained, but the strip of land dividing the isthmus was an open wound in the heart of Panama. Although late in arriving, change finally did occur in the Canal, but at the tragic expense of many years and people.

Now 100 years after the construction first began, it can be said that the hardships had not been in vain. Panama is slated to be the most economically stable country in Latin America, ethnically diverse, with a strong sports and cultural heritage. The Panamanian children of the black West Indian Canal builders have obtained a comfortable social standing, political stability, and pride in the contributions of their forefathers. SAMAAP, as the caretaker of the West Indian Museum, has pledged to keep the history of the black workers in the Canal alive. ■

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*A poem by Kwambino (Anthony McLean):*

## The West Indians of Panama

They did not cry did not wimp.  
Nor crawl nor limp  
They fought and struggled  
With determination and will  
Excel they did.

They came to Panama  
dug and died  
the Train rolled with pride.  
Came again, dug and dig  
On the long run made the ditch.

Others from distance yonder  
Overcome with heat and despair  
Sunk with the tide  
shy away and hide.

The Caribbean man a come  
English speaking  
Brawns pull to stretch  
Flowing sweat.

Sweat and Blood  
Tears and mud  
Muscles strain  
Pain and more pain.

Rain water, hot sun  
In a tandem hum  
Gyrate in playful mode  
Only to make a muddy hole  
Storm, fear and tears.

Little by little a shape  
Water, no escape  
Concrete, steel and wood  
A canal to enjoy stood.

Not a shrine  
Not a road,  
not a street  
not a toast

Green go home  
Chombo go-wue  
All else come  
Enjoy, stay, play.

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# The U.S. Army Corps of Engineers and the Construction of the Panama Canal

By James T. Garber

President Theodore Roosevelt's decision to put an Army Engineer in charge of Panama Canal construction in 1907 through its completion in 1914 is a well-known story. Yet, the Corps of Engineers supplied more than builders and managers: It represented one of the most influential groups responsible for America's presence in Panama. From the outset, Army Engineers counseled policy makers on major decisions, including the Canal's locations and construction plans. Later, their expertise in hydrology, construction management, and systems engineering made Army Engineers ideal candidates to carry out the construction plans they helped draft. Their unique engineering experience, prominent positions within the U.S. government, and propensity for efficient organization made Army Engineers some of the most important actors in realizing the American vision for an isthmian canal.

The United States first became interested in a canal during the Jefferson administration, as America drastically expanded westward. Army Engineers began conducting surveys in 1839, explored numerous Central American routes through the 1880s, and ultimately narrowed their choices to two locations – one in Panama and one in Nicaragua. Interest in a canal surged in March 1898, when it appeared the United States would soon be at war with Spain. Anxious to protect the East Coast from the

Spanish fleet in Cuba, the Navy ordered one of its newest battleships on the West Coast, the USS *Oregon*, to reinforce the North Atlantic Squadron. The *Oregon's* 15,000-mile, 66-day race around South America captivated the American public. Estimates that an isthmian canal would have saved the *Oregon* some 8,000 miles emphasized the need for an American-built canal.

Yet well before the outbreak of the Spanish-American War, French engineers had already begun a canal along the Panamanian route. In 1880, Count Ferdinand de Lesseps, the heralded builder of the Suez Canal, gained exclusive rights along the isthmus and attempted to replicate his success by digging a sea-level canal. After nine years, however, the project was bankrupt and had cost roughly 22,000 lives. A defeated de Lesseps returned to France as his investors sought to salvage some of their money by selling their holdings to the United States.



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Installing the upper lock gates at Pedro Miguel, March 28, 1912.





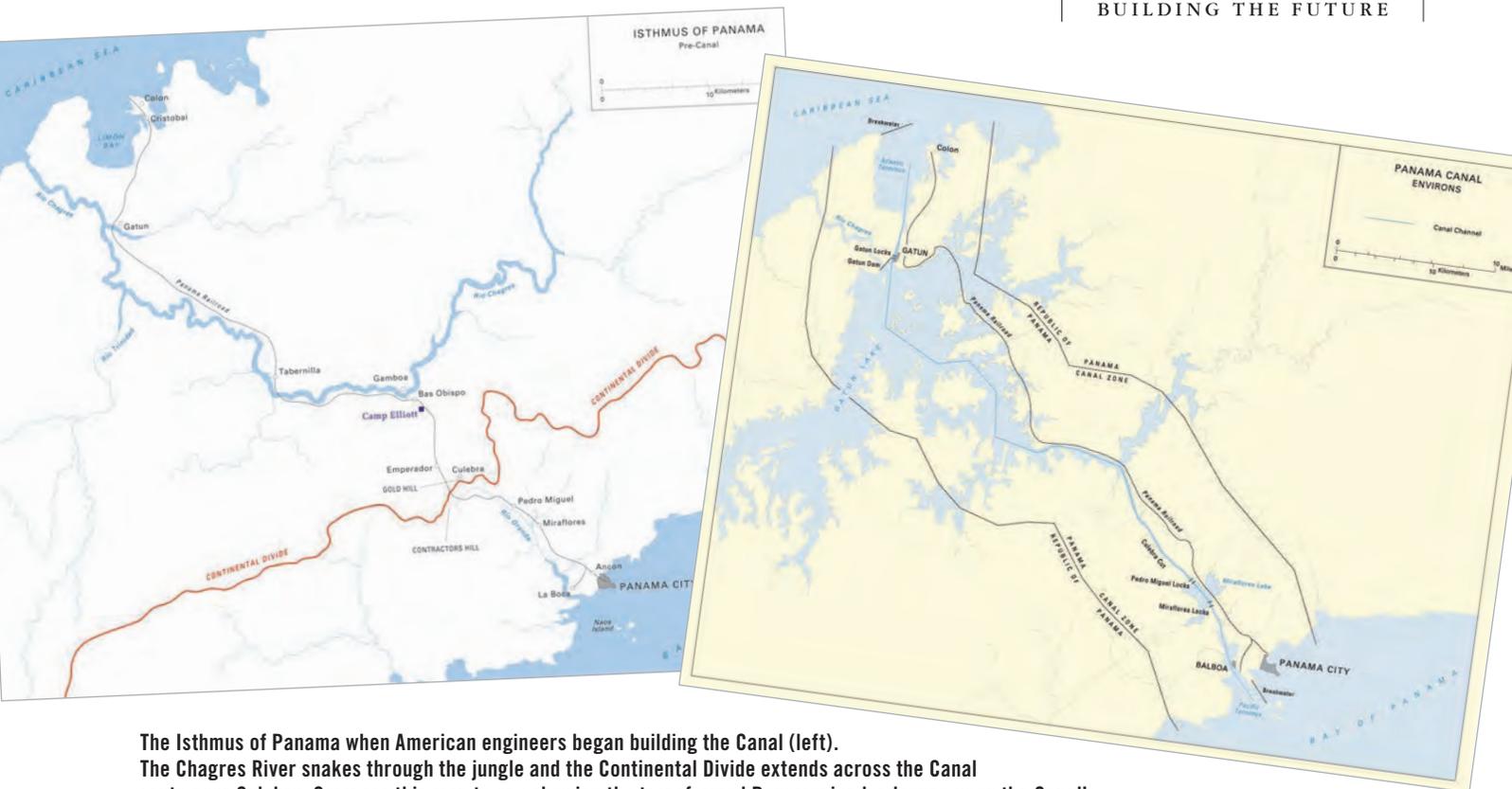
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**The Isthmus of Panama when American engineers began building the Canal (left). The Chagres River snakes through the jungle and the Continental Divide extends across the Canal route near Culebra. Compare this map to one showing the transformed Panamanian landscape upon the Canal's completion (right). Changes included the dammed Chagres River, which created Gatun Lake; the waterway through the Continental Divide; and the dredged passages from the coasts to the towns of Gatun and Miraflores.**

While the French were in Panama, the United States started planning a canal through Nicaragua. Now, with the French willing to sell their holdings, the United States faced some major decisions: Where would they build their canal and how would the location factor into the construction plan? One of the most influential figures in both decisions was an Army Engineer, Henry L. Abbot. Abbot was one of the Army's most prominent engineers and one of the world's leading experts in hydrology. He graduated second in the class of 1854 at West Point before spending his early career studying and surveying the Mississippi River and the mountain passes in the American West for railroad construction. It was there that Abbot gained strong respect for environmental forces – a respect that guided his engineering philosophy for the rest of his career. His topographical and hydrological expertise also made him uniquely qualified to consult on matters of canal construction.

Abbot fervently believed that the best possible canal route was the one through Panama and that a sea-level canal, as demonstrated by de Lesseps, was inferior to one built with locks. He defended his position and helped pen a lock canal plan alongside four Army and American civilian engineers while serving on the international Board of Consulting Engineers formed by Roosevelt to determine the best canal plan. Unfortunately, Abbot and his colleagues were squarely in the minority on both matters. Most politicians, engineers, journalists, and interested lay people favored a sea-level canal, and most preferred a route through Nicaragua because it was closer to the United States

than Panama. Fearing the American government would make the same mistake as its European counterpart, Abbot waged a campaign to convince Roosevelt, Congress, and the engineering community that a lock canal in Panama was the only feasible option. He did so based on the topographical and hydrological features that he believed outweighed any other considerations. Although most envisioned a sea-level canal as a placid strait joining the two oceans, Abbot knew its true form would be a hazardous, narrow, winding gauntlet with streams of all sizes pouring into it, surrounded by huge levees to keep raging rivers at bay. Moreover, drastic tidal fluctuations between two oceans would cause swift and unpredictable currents that would disrupt shipping. Instead, Abbot and his colleagues used the Soo Locks along the U.S.-Canadian border as an example of the benefits of a lock canal. Using their ample experience with dams and spillways throughout America's vast river network, they advocated for a system that would raise ships 85 feet above sea level into an enormous man-made lake impounded by dams on either end. By lifting ships into a lake, excavating down to sea level would be unnecessary, saving millions of dollars and years of work. Ultimately, the president and Congress agreed that a lock canal would be safer, more affordable, and faster to build than one at sea level. The United States then bought out the French interests in Panama for \$40 million in 1904.

To build the Canal, Roosevelt needed an efficient organization and experienced engineers. Rather than assign construction to an existing federal agency, in 1904 he created a new

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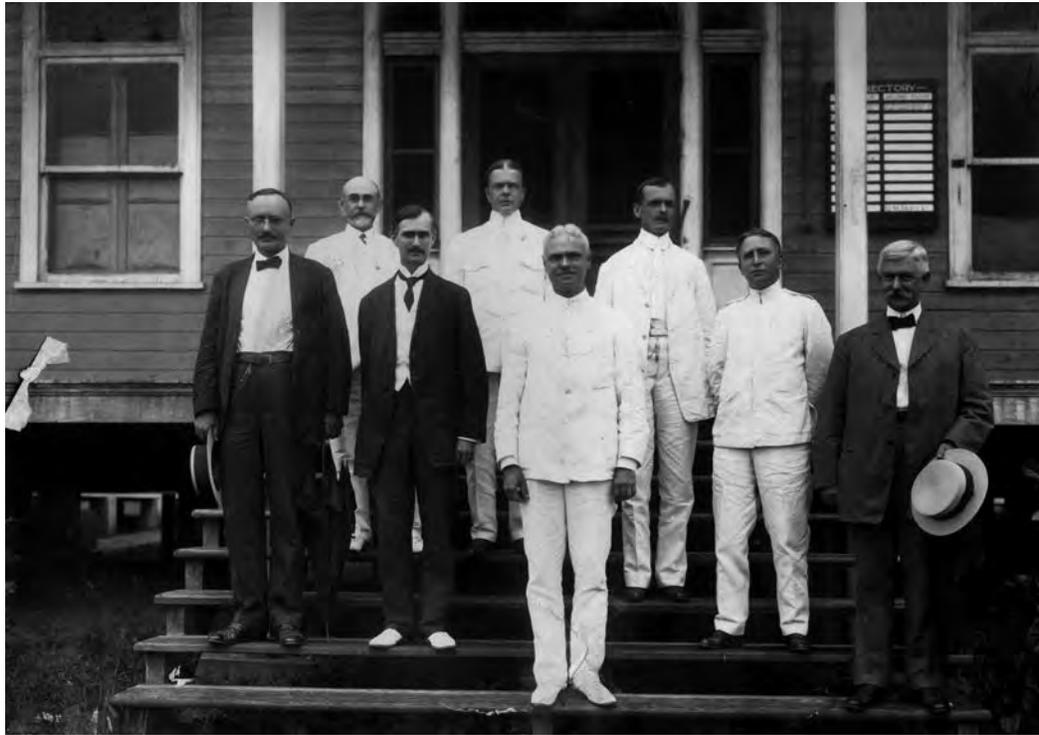
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Isthmian Canal Commission (ICC) to oversee the work. He chose railroad engineers to be the first two chief engineers for the ICC, partly because one of the earliest aspects of the project was building rail lines to and from the mountainous interior for efficient removal of spoil. However, both engineers resigned after only months on the job. Not surprisingly, Roosevelt then turned to engineers from the very agency that had convinced him and the rest of the federal government to choose the adopted plan. When appointing a new chief engineer, Roosevelt joked that he needed someone who could not resign, and an Army officer would have to stay on the job or face a court martial. Equally important, the Corps of Engineers offered unrivaled expertise in hydrology, lock and dam construction, and construction management. On March 4, 1907, Roosevelt appointed Col. George W. Goethals as chief engineer of the ICC. Goethals had graduated second in his West Point class of 1880, and in 1891 he took charge of completing the Muscle Shoals Canal in Alabama, where he built innovative locks with an unprecedented 26-foot lift. In 1903, he joined the Army's General Staff in Washington, D.C., and made strong impressions on Secretary of War William H. Taft, who first recommended Goethals for work in Panama.

The construction of the Canal was not a monolithic enterprise, but rather a multitude of interrelated projects all in close proximity to one another. The scale of some of those projects was unprecedented. In addition to undertaking a colossal excavation project, engineers were building the world's largest locks, earthen dam, and man-made lake, as well as hundreds of support facilities, all within a 50-mile swath of jungle. Goethals' role in Panama, therefore, was to be a manager rather than a structural engineer. The combined projects were too big for one man, so he relied on capable and trusted engineers he brought along with him from the Corps of Engineers, along with support from the U.S. Navy and Army Medical Corps. He reorganized the Canal construction effort into three geographic-based divisions. As heads of those divisions, he placed Army Engineer colleagues Lt. Col. David D. Gaillard (Central Division), Lt. Col. William L. Sibert (Atlantic Division), and Army civilian Sydney B. Williamson (Pacific Division), among whom he purposely created an atmosphere of friendly competition. Once in Panama, all took leave from the Corps of Engineers



**The Isthmian Canal Commission members from 1909 to 1914, including George Goethals, center; David Gaillard, upper right; William Sibert, far left; and William Gorgas, far right.**

and served on temporary duty with the ICC. For lock design, Goethals chose another Army Engineer colleague, Lt. Col. Harry Hodges. Hodges had worked with Goethals on the Muscle Shoals Canal and was familiar with a fairly new building material: concrete. Although concrete was then rarely used in structural engineering, Hodges chose to use 4.5 million cubic yards of mass concrete – huge blocks of unreinforced cement, sand, rock, and water – to build lock chambers that could withstand the enormous water pressure put upon them.

On the Atlantic side at Gatun, Hodges planned a three-step lock, the largest ever conceived, to raise and lower ships 85 feet between the sea and man-made Gatun Lake. On the Pacific side, two locks, one at Miraflores and one at Pedro Miguel, equaled the task. To build the locks, Sibert and Williamson first coordinated the transport of cement, rock, sand, and water from as far away as the United States. Then they devised innovative systems to mix and deliver via cableways and cranes roughly 120 tons of concrete to the lock sites every hour. Each completed lock chamber was 1,000 feet long, 110 feet wide, and up to 81 feet tall, requiring a total of 46 gates. Each gate leaf was made of steel frames covered in steel panels and measured 7 feet thick, 65 feet wide, and between 64 and 82 feet tall. Once built, the locks have remained in continual operation through a century of use.

After passing the locks, ships would transit 32 miles across the Panamanian interior via the 164-square-mile man-made lake – the largest in the world when completed. To create the lake, the engineers proposed damming the Chagres River near Gatun, where its valley narrowed to a 1.5-mile width. They designed the largest earthen dam ever conceived to impound the 183 million cubic feet of water necessary to fill the lake. To build the dam, train cars dumped rock removed from the

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**Wreathed in steam and smoke, two shovels prepare to meet at the bottom of the Gaillard Cut, May 20, 1913.**

Culebra Cut onto two parallel ridges across the 1.5-mile-long site and then dredges pumped impervious clay from the adjacent river bottom into the space between. Ultimately, the stone and earth dam was 2,100

feet wide at its base and 115 feet tall. It contained 22 million cubic yards of material and covered 288 acres. In the center of the dam, engineers built a concrete spillway that could discharge water if a major flood threatened the Canal. On the other side of the Culebra Cut, a much smaller dam terminated the lake at Pedro Miguel. The locks there lowered ships into a 1.5-mile-long man-made lake that led to the last set of locks at Miraflores. In total, all but 15 miles of the Panama Canal is traversed upon man-made lakes.

Raising and lowering ships into and out of lakes greatly reduced the amount of material that had to be excavated from the Canal. Traditional excavation occurred only in the lowlands along each coast and for 9 miles at the Continental Divide. Still, during construction, workers removed an estimated 182,537,766 cubic yards of material, mostly near the small village of Culebra, where hills 530 feet high stood along the Canal's path. To direct excavation there, Goethals relied on Gaillard, who orchestrated a carefully coordinated process, with up to 6,000 men working in the cut daily. Laborers attacked the hill-sides with drills, boring so many holes that, if lined up, they would have burrowed through the center of the Earth. Dynamite crews fired 600 coordinated explosions per day while 43 steam shovels, 3,700 flatbed railcars, and 140 locomotives moved the material out of the cut.

Despite Gaillard's incredibly efficient excavation process, no one could control or predict devastating landslides. Some slides sent mud and gravel down the slopes slowly, almost like glaciers, while others burst from the Canal walls, trapping men and equipment. The slides poured 40 million cubic yards of earth back into the Canal – almost one quarter of the excavation total. They bewildered Gaillard and drove him to what many thought was a nervous breakdown. In the summer of 1913, he began speaking incoherently and suffered memory loss. Doctors later discovered his ailments were caused by a brain tumor, from which he died on Dec. 5, 1913. In recognition of Gaillard's gallant efforts, President Woodrow Wilson renamed the Culebra Cut in his honor after the Canal opened.

Building the Canal was not the lone job of the Army Engineers in Panama. They were also responsible for providing housing, hospitals, administrative buildings, recreation facilities, electricity, and healthy drinking water. Creating a healthy work environment was one of the greatest challenges and successes of the American venture. Tropical diseases like malaria and yellow fever plagued the French effort and contributed heavily to its eventual failure. The Americans were determined to eliminate tropical diseases and gave that responsibility to Dr. William Gorgas of the Army Medical Corps. Gorgas believed in new medical theories that mosquitoes transmitted tropical illness. As chief sanitary officer and with full support of the ICC, Gorgas declared war on the insects. He required copper screening in most buildings, mandated hundreds of fumigations, banned open cisterns, built drainage ditches, and had oil sprayed on the surfaces of bogs and

**A view of the Balboa Heights offices and quarters from the steps of the Administration Building, July 4, 1919.**





Modern day view of the Parliament Buildings of Barbados and the Chamberlain Bridge in the Careenage - the embarkation point for thousands of Barbadians who made the journey to construct the Panama Canal (1904-1914)



# The Barbados - Panama Canal Connection

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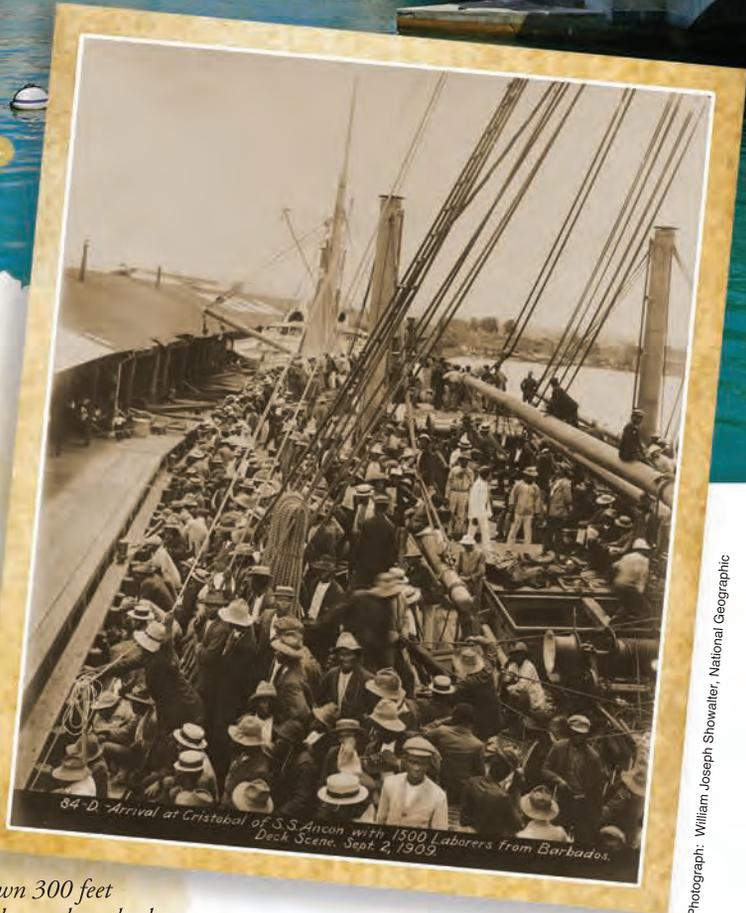
*It should be remembered that Barbadians constituted a valuable segment of the Panama Railroad Company's workforce in the 1850s, and a significant percentage of the total Panama Canal construction labour from 1882 onwards. Between 1904 and 1914, Isthmian Canal Commission (ICC) recruiting agents sent 19,900 Barbadians to work on the Panama Canal construction, while around 42,000 migrated to Panama independently.*

*Barbadian labourers were deployed to the most taxing segment of the canal construction project – the Culebra Cut, renamed Guillard Cut, arguably the most difficult excavation through the continental mountain divide of the Panama*

*highland. In 1905, Chief Engineer John Stevens observed that "at Culebra, we are facing a proposition greater than was ever undertaken in the history of the world".*

*The labourers and equipment had to bore down 300 feet through the rock, gravel, clay and earth along a corridor of nine miles. Some 5,893 Barbadians were reported to have perished in the Canal Zone from a combination of disease, explosions, landslides and machinery accidents.*

*On a visit to Barbados in 1913, President Roosevelt publicly thanked Barbadians for their help in the construction of the Panama Canal, emphasizing the service it would render to mankind.*



84-D. Arrival at Cristóbal of S.S. Ancon with 1500 Laborers from Barbados. Deck Scene, Sept. 2, 1909.

Photograph: William Joseph Showalter, National Geographic

Arrival at Cristóbal, Panama of S.S. Ancon with 1500 Laborers from Barbados. Deck Scene, Sept. 2, 1909.

*Barbadians proudly salute the engineering accomplishments of the Panama Canal, and the role our people played in its execution. We join with Panamanians and Americans in celebrating the tremendous contribution the Canal has made to the facilitation of shipping and international trade over the past 100 years.*



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swamps. Tropical disease rates plummeted under Gorgas's leadership and greatly increased the American chances of success in Panama.

The Canal builders also relied on hundreds of unheralded support facilities essential to the project's completion, including repair shops, port facilities, warehouses, office space, and a hydroelectric plant. The main administrative building at Ancon Hill had 67,000 square feet of office space, and stood above what had once been marshland. Engineers filled the marsh with spoil from the Culebra Cut and built upon it a post office, police and fire stations, a church, a commissary, social clubs, and even baseball and tennis facilities. By the time the Canal opened, the roughly 10,000 American workers lived in what resembled contemporary U.S. towns. As for foreign workers, thousands were already living in the Canal Zone when the United States commenced construction, having been recruited by the French from the West Indies, Colombia, and Cuba. In December 1906 there were 24,000 laborers, and by 1911 there were 45,000. Most of the new recruits were hired directly by the U.S. government in Barbados, but workers hailed from 97 nations. Early on, sanitation and housing conditions were poor; many laborers lived in dilapidated French structures or boxcars. In 1906, American engineers built or rehabilitated 2,500 structures, including homes, schools, shops, and hospitals. They also built sewer systems, paved roads, and dug wells, greatly improving the conditions for all. Work on all aspects of the Canal occurred every day except Sunday, when Goethals opened his office to any worker who wished to raise a grievance or express concern. His determination and fairness quickly earned the laborers' respect.

Today the Panama Canal is still seen as one of mankind's greatest engineering achievements. Success was based on thorough planning, innovative design, effective management, and a dedicated workforce representing much of the world. Before construction began, Army Engineers were instrumental in determining the canal route and the construction plan. Once work began, Roosevelt brought in Army Engineers to implement the plan and to reorganize and manage the construction effort. Abbot, Goethals, and their colleagues brought with them decades of experience on America's river and canal systems, as well as unrivaled expertise in hydrology and construction management from the Corps of Engineers. Once in Panama they used that expertise to integrate a multitude of individual projects, ranging from excavation to housing construction, so efficiently that they delivered a completed canal in only seven years. Finally, they ensured a healthy environment for the workers, who expressed unparalleled pride in having helped complete such a monumental engineering achievement, one that we are still celebrating after 100 years. ■

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# Evolution of a Global Passageway

By Richard Wainio

Panama is a small country, with an area about equal to that of South Carolina. Its population of 3.6 million and a gross domestic product (GDP) of less than \$40 billion are barely those of a large city. Panama's role in world affairs, however, has never been in proportion to its size. Since the arrival of Spanish conquistadors in Panama more than 500 years ago, the country's importance has always been shaped by its unique geographical position – a 35-mile-wide strip of land between the world's two largest oceans, connecting the North and South American continents.

Panama's importance as a transit point rose dramatically following the opening of the Panama Canal on Aug. 15, 1914. Today, 100 years later, that venerable waterway continues to serve a significant portion of global trade and influences world transportation developments and trade patterns. Use of the Canal has grown from 1,075 oceangoing commercial vessels aggregating 3.6 million net tons of shipping in 1915, to 12,862 transits and more than 333 million net tons of shipping in 2012. The pattern of this growth over the century since the Canal first opened has not been uniform. The Panama Canal is not a microcosm of world trade. It serves specific regions and countries. Trade through the Canal has ebbed and flowed over the last century in response to a myriad of global and regional political and economic events.

U.S. political and strategic interests initially overshadowed the economic and commercial value of the Panama Canal. The construction of the Canal coincided with America's changing foreign policy interests in both Latin America and the world after the Spanish-American War. The decision to build the Canal was predominantly driven by these geopolitical and strategic interests. In many respects, it could be said that the Canal was built for the military, by the military. Even the ultimate

dimensions of the lock chambers (110 feet by 1,050 feet) were determined by the size of battleships rather than what was on the drawing board for commercial vessels. The largest commercial vessels in the world at that time were the Olympic-class passenger ships (which included the *Titanic*) with beams of 92 feet. Trade was carried around the world predominantly in small general cargo vessels, the largest of which generally had beams of 50-60 feet and net tonnage less than 5,000 tons. Commercial vessel types and sizes, in fact, changed little from

Culebra Cut, looking south, Panama Canal, ca. 1910-1920.





the time the Canal opened through 1955. The average Panama Canal net tonnage of commercial vessels in 1915 was about 3,500 tons, increasing to 4,847 tons in 1930, and remaining virtually unchanged at 4,832 tons in 1955.

Nevertheless, long before the Canal was opened to trade, the potential importance of a passageway for ships in Panama to the United States for global trade purposes was recognized. Many articles and studies appearing before the Canal opened anticipated remarkable impacts on trade patterns and transportation

systems similar to what occurred after the Suez Canal opened in 1869. The period from 1870 up to the opening of the Panama Canal was a time of great transition and growth in global trade driven by the Industrial Revolution, economic development, and the spread of a system of macroeconomic regulation and methods of international payment. The period has been referred to as the first phase of globalization. Developments in transportation and communication, including the opening of the Suez Canal, the completion of the transcontinental railroad

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**The Lexington-class aircraft carrier USS *Saratoga* passes through Miraflores Locks in 1928.**

in the United States, steamships replacing sailing vessels, the invention of the telegraph and telephone, and new equipment to more efficiently handle cargo at ports and on ships, significantly lowered transportation costs and supported world trade expansion. Accordingly, expectations were high that the new Canal in Panama would further spur economic development and trade growth, particularly for the United States and countries on the west coast of South America. Experts predicted accurately that reduced sailing distances from the United States to and from Chile, Peru, and Ecuador through Panama, compared to the long journey around Cape Horn, would provide U.S. exporters new advantages over their European competitors who, at that time, dominated South American markets. Many also expected U.S. trade to shift increasingly into the Pacific basin, with Japan and China becoming major markets for U.S. products.

There was a special focus on the impact the opening of the Canal would have on U.S. railroads, which had enjoyed a near monopoly in the movement of U.S. transcontinental (intercoastal) trades for several decades. Indeed, the primary impact of the opening of the Panama Canal in the early years was to bring to an end the dominance of U.S. rail as the means to move goods across the United States. Prior to the opening of the Panama Canal, virtually all U.S. transcontinental cargo was moved by rail across the country or a combination of ship and rail from New York to New Orleans, and then by rail from New Orleans to California. The rail/ship system, called the Sunset-Gulf route, had been operated by Southern Pacific Railroad since 1885. The

start-up of this service essentially brought all alternative intercoastal ocean routes to an end. The alternatives up until then included the long ocean voyage around South America for some cargo and, for most, the route of choice was by ship to Panama, rail across the isthmus on the Panama Railroad, and then by ship to California.

By the time the Canal opened in 1914, virtually all U.S. transcontinental trade was being transported by rail either on the Sunset-Gulf route or on several other rail lines across the country. This changed abruptly after the opening of the Canal, as cargo quickly diverted to the lower-cost ocean route through Panama. Transcontinental rail was left handling primarily those cargoes where speed was of the essence. Just as the Sunset-Gulf service put the Panama Railroad out of business and sealed the fate of most ocean carriage around South America after 1885, the Panama Canal brought an end to the rail monopoly and the Sunset-Gulf service after 1914 for U.S. transcontinental trade.

Over the last century, many of the earlier predictions regarding the use of the Panama Canal have come true, but the immediate surge in commercial traffic expected following the opening of the Canal did not materialize. Ironically, on Aug. 3, 1914, the same day the first oceangoing ship (*SS Cristobal*) transited the Canal, war exploded across Europe. The official opening of the Panama Canal on Aug. 15, 1914, was buried in the back pages of the *New York Times* and the world's newspapers as the events in Europe took center-stage.



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**A Panamax-size Maersk Line container vessel squeezes through Pedro Miguel Locks, with new locks expansion work in the background.**

World War I and events that followed brought global trade growth to a trickle from 1914 through 1945, an unprecedented three-decade period in modern trade history. The Great Depression, protectionism and trade wars in the 1930s, and two world wars resulted in trade growth during the three decades falling to less than 1 percent annually on average. Use of the Panama Canal increased slowly for the first five years after its opening. In 1917, the first full year of uninterrupted operations, 1,803 vessels carrying 7.1 million tons of cargo passed through the Canal, and by 1922, transits had increased only to 2,736 and 10.9 million tons of cargo. Activity picked up considerably in the following few years, and by 1929, the peak year before the Great Depression, the number of vessel transits had increased to 6,413 and cargo stood at 30.6 million tons. But the 1929 peak was short-lived as trade through the Canal dropped by more than one-third from 1929-1933 and remained essentially stagnant through World War II. Not until 1950 would Canal activity return to pre-Great Depression levels.

Measured in purely commercial terms, the Canal's importance to global trade in the first half of the 20th century was very small. In fact, the Canal was little more than a regional passageway serving primarily U.S. intercoastal trade. More than one-third of Canal business (in terms of cargo tonnage) in 1929 was U.S. intercoastal trade, and most of the remainder was shipments between the United States and Europe or the west coast of South America. Cargo flows consisted primarily of California oil and lumber from the Pacific Northwest, nitrates from Chile, wheat from the U.S. West Coast, and iron and steel products from eastern U.S. steel mills. Trade through the Canal as late as the earlier 1950s was still primarily U.S. intercoastal movements, concentrated in the shipment of California crude oil to East Coast

and Gulf refineries and the movement of ores and metals from the west coast of South America to the United States. The Panama Canal was not yet living up to its potential as a truly global passageway.

Global trade and the role of the Panama Canal changed dramatically in the post-World War II period. The rebuilding and restructuring of the international community and the U.S.-led trade liberalization combined with tremendous technological advances in transportation to drive an explosion in global trade. In the second half of the 20th century, the volume of international trade rose from 5 percent of world GDP immediately after World War II to nearly 20 percent by the year 2000, and today accounts for more than half of the world's output. Most of that growth has occurred in Asia, first linked to the economic miracle in Japan in the 1950s, followed by the rise of the Asian Tigers (South Korea, Taiwan, and Hong Kong) and, in the last 15 years, a result of the massive expansion in the Chinese economy. Panama Canal trade patterns shifted rapidly as Asia increasingly became the focus of U.S. trade growth.

Then in April 1956, ocean shipping was forever changed when the first vessel sailed from Newark, N.J., to Houston, Texas, carrying 58 shipping containers. Although use of containers initially was slow to develop, the widespread adoption of containerized shipping after 1970 caused port and shipping costs to plummet and paved the way to globalization and massive increases in trade over the last several decades.

The small general cargo vessel that dominated the trade lanes prior to 1955 has virtually disappeared as container ships and a plethora of other specialized vessel types have come into operation. And the ships have become larger and

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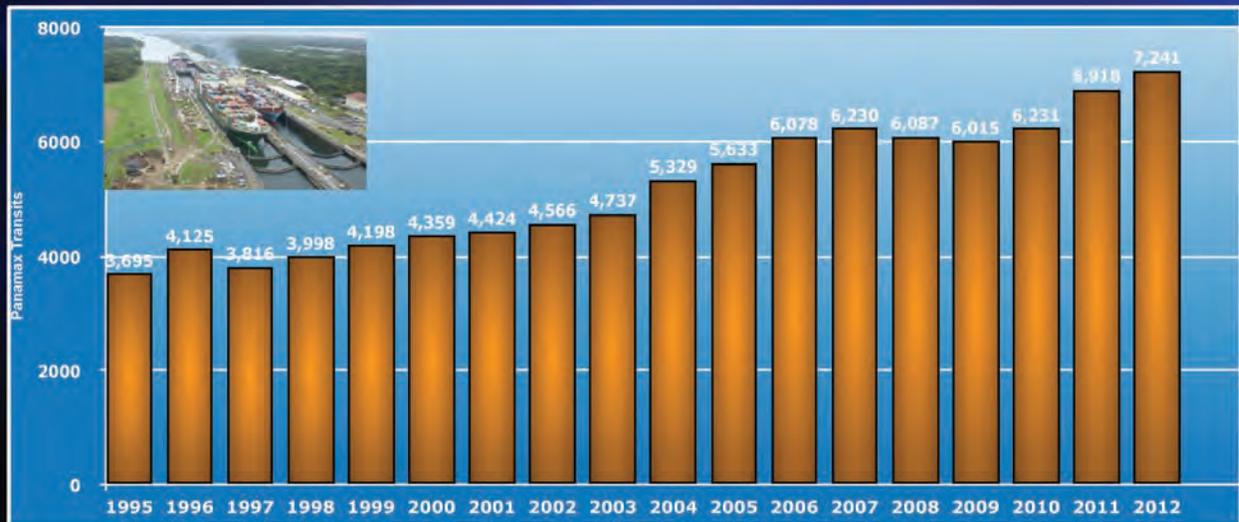


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larger with each round of new building. Cargo ships having beams in excess of 80 feet were a rarity before 1955 and, as late as 1965, less than 1 percent of transiting vessels had beams greater than 100 feet. Last year 9,838 vessels, more than 76 percent of all oceangoing transits, had beams above 80 feet, and 7,241 of these, more than 56 percent of all oceangoing Canal transits, were by vessels with beams exceeding 100 feet. Average ship size in Panama Canal net tons has risen more than fivefold since 1955 to 25,943 tons. In particular, each new generation of container ships has brought ever larger vessels. Since the first truly cellular vessel was launched in 1968, with a capacity of 1,530 containers (20-foot equivalent units or TEUs), today's Panamax container ships (the largest able to transit the Canal) have a capacity of nearly 5,000 containers, and Post-Panamax container ships (too large for the Canal) are being built with up to 18,000 container capacities.

Globalization and containerization have also changed the nature of cargo flows through the Canal both in terms of the trade routes and the composition of cargo served by the waterway. Unlike in the early years of its history, the Canal has evolved into a global passageway, handling ships and cargo from throughout much of the world. Cargo moving between the United States and Asia accounts for 39 percent of the total tonnage; 13 percent moves between the United States and west coast South America; 7 percent between Europe and South America; 6 percent is to and from the U.S. East Coast and Central America; and another 5 percent is intercoastal South America movements. U.S. intercoastal trade – which had been the dominant Canal trade route from 1914 through the mid-1950s – now accounts for less than 3 percent of all Canal

business. Canal trade, once predominantly bulk movements such as grains, crude oil and petroleum products, ores, metals, and coal, has shifted over the last several decades increasingly to manufactured goods in containers. In each of the last 10 years, containerized cargo has been the leading commodity by tonnage passing through the Canal, accounting for more than 20 percent of all cargo tonnage and 36 percent of all ship tonnage.

The sheer size of vessels and the volume of shipping transiting the Panama Canal has risen to levels far greater than any original planners would have envisioned. Prior to the opening of the Canal, the eminent professor Emory R. Johnson was hired to study the capacity of the waterway and to forecast future use. He estimated that by 1975 the full capacity of the Canal – 80,000,000 net tons annually – would be reached and a third lane of locks, which the original engineers had planned for, would be needed to meet future traffic demand. In that year, actual ship tonnage passing through the Canal topped 137,000,000 net tons and today stands in excess of 333,000,000 tons of shipping annually.

The ability of the Canal to continue providing reliable service to increasingly more and larger vessels for nearly 100 years is a tribute to the original design and to the many improvements that have been made to the waterway over the years. The Canal may look much like it did on opening day, but it is not the same. It is a more modern and efficient system with far greater capacity than anyone could have imagined, and improvements continue to be made. The ongoing Canal Expansion Project that will add a much larger third lane of locks, effectively doubling capacity and opening the Canal to vessels presently too large to transit, will ensure that the Panama Canal remains a successful global passageway for decades to come. ■

# The Panama Canal Transfer: A Success Story

Two countries coming together to do what needed to be done

By Alberto Alemán Zubieta

The handover of the Panama Canal from the United States to Panama was scheduled for Dec. 31, 1999. Three years earlier, as the Universal Congress of the Panama Canal celebrated the 20th anniversary of the 1977 signing of the Torrijos-Carter Treaties, both the United States and the European Union presented the results of two separate studies. Both studies stated, in unequivocal terms, that the Canal would reach its capacity between 2011 and 2012; in other words, it would soon become a bottleneck for maritime trade. Compounding that, influential voices in the global shipping industry publicly declared that Panama would “slaughter the goose that lays the golden eggs” when it received the Canal. There were evident apprehensions about a Third World country operating a First World asset. There were fears that the Canal’s prices would skyrocket, that its operative capacity would decline, and that its quality of service would essentially disappear. We were told “don’t rock the boat” after the Canal’s handover; to keep things running well.

The transfer of control of the Panama Canal was the culmination of an historic, decades-long transition. It is a success story of two countries coming together and doing what needed

to be done – the United States, the most powerful in the world, and Panama, an emerging democracy coming to grips with the challenges of its developing economy. The transfer was a complex negotiation process that was rife with political concerns and conflicting, oftentimes asymmetrical, national interests. The transition met the resistance of the doubtful and the apathy of those who were convinced that Panama would fail in managing one of the most important waterways of the world. History proved the skeptics wrong.

**Ceremony for the transfer of the Canal Zone to Panama at Miraflores Locks, 1997.**





The binational board of directors, under the guidance of then-Chairman of the Board Joe Reeder, stated a clear mission for the Panama Canal Commission in 1995: a seamless handover of the Canal to Panama on Dec. 31, 1999. With that as a focus, the U.S. government, including Congress, was very helpful in providing all the legal instruments that the Panama Canal Commission required to align with its mission. An example of that was illustrated in the creation of new Panama Canal acquisition regulations, moving away from the stricter federal

acquisition regulations, which aligned the Canal to the envisioned operational framework that Panama needed to be in place for an effective transfer. Another important measure was the establishment of a golden parachute program so that Panamanians could be placed in key management and operational positions in the Canal before the transfer date.

On the Panamanian side, the government elevated the question of the proper administration of the Canal to the highest possible level – a reformation of the National Constitution.

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Two different governments at polar opposites of the political spectrum had to approve the fundamental constitutional changes. The reformation was first proposed by the government of President Guillermo Endara and finally accepted by the government of President Ernesto Pérez Balladares. A clear message surfaced from the constitutional reformation: a critical affirmation that the Panama Canal rose above party politics.

A key element of the transfer process meant that a newly formed Panama Canal Authority (ACP) would take over the task of the U.S. government's Panama Canal Commission. Subsequently, Panama entered a very open, inclusive process to develop the ACP's Organic Law. Every segment of Panama's society was invited to participate. Thus, the Organic Law, approved unanimously by the legislative National Assembly, became an expression of what all sectors of Panamanian society considered to be necessary for operating the Canal under a new model. The new model had to make sense for Panama's particular socioeconomic needs and is based on the principles that the Canal must be run efficiently and profitably, not just to meet our country's developmental needs, but also for the benefit of the Canal's clients.

As the transfer date drew closer, it became clear that not mishandling the aftermath of the Canal's turnover – in and of itself a considerably complex undertaking – would be the least of our country's challenges. Simply maintaining the status quo would be insufficient; running the Canal in the same manner as the previous century was the surest path to irrelevance. Panama faced the tough choice of administrating a century-old and soon-to-be-outdated infrastructure of the Industrial Revolution, or embarking upon an unprecedented journey to modernize the Canal and adapt it to the demands of the new millennium.

When the last moment of the joint Panama-U.S. operations came around, at noon on Dec. 31, 1999, the mission was accomplished. The transition period was over. The handover appeared to be seamless, due to the extraordinary effort on both sides. Everything proceeded normally, in order, and as planned. Absolutely nothing changed in the efficiency of the Canal's operations.

However, the most difficult work was only just beginning for Panama. The operative transition seemed to be the easier task. Panama still had to deal with the present threat of receiving an asset that was surely on the way to obsolescence, as proven by a series of infrastructure analyses that evaluated the Canal's real value. As a result, Panama commissioned a team of ACP professionals with the task of solving the looming capacity issue. The task force was spearheaded by engineer Agustín Arias and examined every single project and program that had ever been considered to face the capacity issue, going all the way back to the opening of the Panama Canal in 1914. The task force's assignment was to define the programs and projects that needed to be executed in the short, mid, and long term in the waterway. This was the inception of what was later known as the Master Plan of the Panama Canal.

As modernization strategies were explored, it became increasingly important to encourage an understanding that the Panama Canal did not have a monopoly on the movement of goods; it needed to compete, aggressively, for its business. The container trade was a rapidly developing segment in the Canal. Its modernization also demanded considerable improvements in its reliability for the shipping industry, ensuring that ships could cross on time, predictably, and avoiding long queues or maintenance delays. The ACP started a modernization program aimed at revamping the Canal with the latest technology, such as hydraulic systems to operate the locks' gates and a cutting-edge traffic management system to better track and control the ships as they crossed the waterway.

These decisions started a new approach of dealing with clients, understanding their needs, adapting to the evolving market, and providing solutions that had a positive impact on the Canal's trade. It was a paradigm shift, the foundation of a new business model that aligned the Canal with Panama's vision of how it should be run. Taking the best elements of the inherited U.S. management system, the ACP improved upon its solid foundation by adding a corporate strategy to our operations.

The Panama Canal needed a cultural change, both internally and externally. Internally, Panama had to enact a drastic shift from the break-even, budget-driven management system that the U.S. administration required toward a resource management approach directed at making profits and maximizing operational efficiency. Externally, a new culture contemplated a customer-oriented approach in client relationships; they were used to paying only for the operational costs of the break-even model. Under the new model, the Canal charges for the value it provides to its clients, requiring an extensive dialogue with our stakeholders.

I believe that one of the critical elements in the success of the Canal's new model has been the capacity and courage of our workforce. They were willing to accept the required changes and they faced the challenge of adapting to a new culture, which was far from an easy task. A lot was at stake. New leaders at different levels started emerging from the workforce, facilitating a process that I believe is yet to conclude. A good company should have change as part of its DNA, both to reinforce its culture and to continually improve its processes.

At noon, on Dec. 31, 1999, Panama received much more than the infrastructure of the Canal. Panama received, for the first time in history, the full control of the geographic position of our country. I believe this is Panama's most important strategic asset. This concept is an essential part of the new mission for the Panama Canal – to maximize the geographic position of our country in a sustainable way.

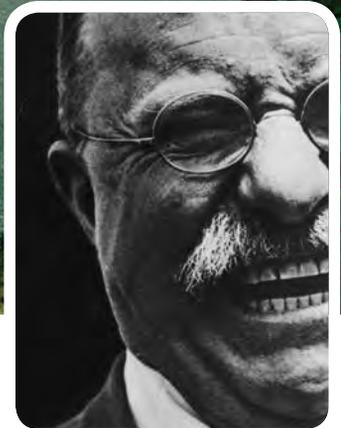
As the Master Plan was developed, the building of the Third Set of Locks was required, and monumental challenges were to be met to undertake a project of such magnitude. Among these challenges, Panama had to figure out the best way to maximize the use of water, safeguard the sustainability of the environment, train and prepare human resources, determine what type of contracts had to be in place, define all proper legal

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instruments, develop a thorough risk management strategy, and secure the financial capacity of the Canal. Early in 2007, once all Master Plan studies were concluded, including rigorous peer reviews to ascertain a sound expansion program, the people of Panama were ready to hear the idea.

Under the National Constitution, the expansion project for a third set of locks had to be approved by a national referendum. The benefits of the expansion project needed to be presented to every person in every city and every town across the country. The expansion project would not only change the shipping industry worldwide, it would also provide Panama with the necessary elements to become the most important trans-shipment and logistics hub of the Americas. Nonetheless, Panamanians wanted to know one thing first and foremost, a basic question that came up time and again: What's in it for us? That essential question was successfully answered. The referendum was approved by a large majority of Panama's citizens, with more than 70 percent voting in favor. It granted us the license to continue and execute the expansion project.

Less than a year after the referendum, on Dec. 3, 2007, the expansion of the Panama Canal began. Today, it is the largest and most important transportation project in the world. This project will change the movement of goods across the world by generating new economies of scale to the shipping industry. It has also demanded the building, or heavy revamping, of new port and logistics facilities, in order to prepare for the oncoming surge in maritime trade. The expansion project

is going to double the Panama Canal's capacity. Perhaps more importantly, the waterway's imposed restrictions to the shipping industry will be removed. That is why today, a large portion of the ships being built are Post-Panamax in dimension, in order to capture the value that the expanded Canal will deliver. Ports across the Eastern Seaboard and Gulf Coast of the United States, as well as in the Caribbean, are getting ready to accept these new and larger vessels. The shipping industry is poised for the newly expanded capacity of the Canal.

Today, the maritime industry is already taking advantage of what Panama offers, which is the world's only port with terminals in the two largest oceans – the distance between them is about 80 kilometers, or less than an hour's drive. This unique connectivity has made the Panamanian port system the most important and fastest growing trans-shipment port in the Americas, controlling more than 23 percent of all the container cranes in the region and moving more than 7 million twenty-foot equivalent units (TEUs) per year.

The magnitude of the impact that the expanded Canal will have on the shipping industry, and on Panama itself, is yet to be determined. I see a bright future and am confident of a most positive outcome. I am also certain that the Panama Canal will continue to be a success story, that it will continue to surprise, and that its leadership in the field of international maritime trade will be the cornerstone that will make Panama the most important transportation and logistic hub in the Americas. ■

# Documenting the Panama Canal Expansion Program

By Ernesto A. Holder

## Our Obligation to History: Then and Now

During the construction of the Panama Canal, a little over 100 years ago, at the beginning of the past century, Isthmian Canal Commission Engineer F.B. Maltby requested the following in a 1906 memorandum: “I would very much desire to have a series of photographs taken in Gatun, about once every month, to show construction progress. This task must be conducted regularly since I believe they will be of great value for the drafting of reports on progress of the works. Therefore, I request authorization to hire a photographer with whom, to my understanding, arrangements have already been made to work not more than two days a month.”<sup>1</sup> This note resulted in the hiring of photographer



Ernest “Red” Hallen, who served as the official photographer for the Canal Company from 1907 to 1937, the year when he retired.

The visual documentation conducted by Hallen and his team resulted in what we know today as “The Hallen Collection.” Its 23 albums include 2,233 black and white photographs from the Canal construction period, the first years of operation, and the waterway’s surrounding areas. The photographer’s complete work is made up of nearly 17,200 photographs in 8- by 10-inch glass plates and the originals are maintained by the United States National Archives and Records Administration (NARA). They constitute a valuable visual patrimony, not only from the Panama Canal construction period, but also from the establishment of the Canal Zone and its resulting segregation. It shows the initial stages of commercial activities and community settlements in the terminal cities of Panama and Colon and, above all, it grasps the essence of the beginnings of Panama as a republic.

**The USS *Missouri* (BB 11) in the Panama Canal, approaching the Chagres River railroad crossing, July 16, 1915. The USS *Ohio* (BB 12) and USS *Wisconsin* (BB 9) are in the background.**

The Canal Expansion Program through a third set of locks was approved in a national referendum in 2006, and this implied not only the beginning of the titanic works, but also of a historical documentation effort that had not been experienced in Panama for more than a century.





In recognition of the relevance of this moment, the Panama Canal Authority (ACP) put together a specialized team of professionals who were assigned the responsibility for effectively documenting the process of the Expansion Program in detail. The collection, classification, and preservation of documents, photographs, artifacts, and other products guaranteed the conservation of all work elements of historical value. The team will document in a logical perspective the progress, the stories, and the facts as they occur, as well as the threats, the challenges, the triumphs, and, above all, the hands and faces of those who are taking part in this new chapter of the nation's history.

The team has divided the task into three main areas: a.) the audiovisual documentation of the project (photo and video documentation); b.) the collection of objects and documents of potential historical value; and c.) an oral history program. All items that are compiled, either in physical or digital form, go through a classification and documentation process by

metadata and finally are stored in a secure location.

The ACP's audiovisual documentation specialists – photographers and videographers – have recorded, up until the end of 2013, close to 260,000 high-resolution images related to the daily works, and close to 280 hours of high-definition video. The documentation protocols determine that both the photographs and the videos are to be stored unaltered in anticipation of new and future technologies in order for these historical materials to be available and used in the future.

Another important component of the historical documentation of the Expansion Program is its oral history collection. Since the beginning of the execution of works, the team has conducted more than 260 hours of interviews that

**The Panama Canal expansion, Aug. 6, 2012. The expansion of the Panama Canal (Third Set of Locks Project) will double the capacity of the Canal by allowing more and larger ships to transit.**



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collect first-person accounts of Panamanian workers and international contractors involved in the project.

Research based on this collection of oral history has had an international reach. The ACP specialists have participated in the XVII International Oral History Association Conference, held in Argentina in 2012, and the V Latin American Oral History, held in El Salvador in 2013.

To complement this effort, there is a team of specialists dedicated to the collection, classification, and preservation of objects and documents with historical potential.

The work recorded about 2,100 documents and 1,000 three-dimensional objects that include the first blasting detonator that inaugurated the expansion in September 2007, a 2-ton, 3-meters-in-diameter wheel that belonged to the largest truck used during the construction works in Panama, and uniforms of farmworkers.

In the Canal expansion, where art and engineering have found common ground, the project is also being documented on canvas. Just as the original Canal construction had murals painted by William B. Van Ingen, the expansion is being reflected in the works of renowned painters such as Amalia Tapia, Jose Inocencio Duarte, Carlos Gonzalez Palomino, Roberto Vergara Del Cid, George Scribner, and Al Sprague.

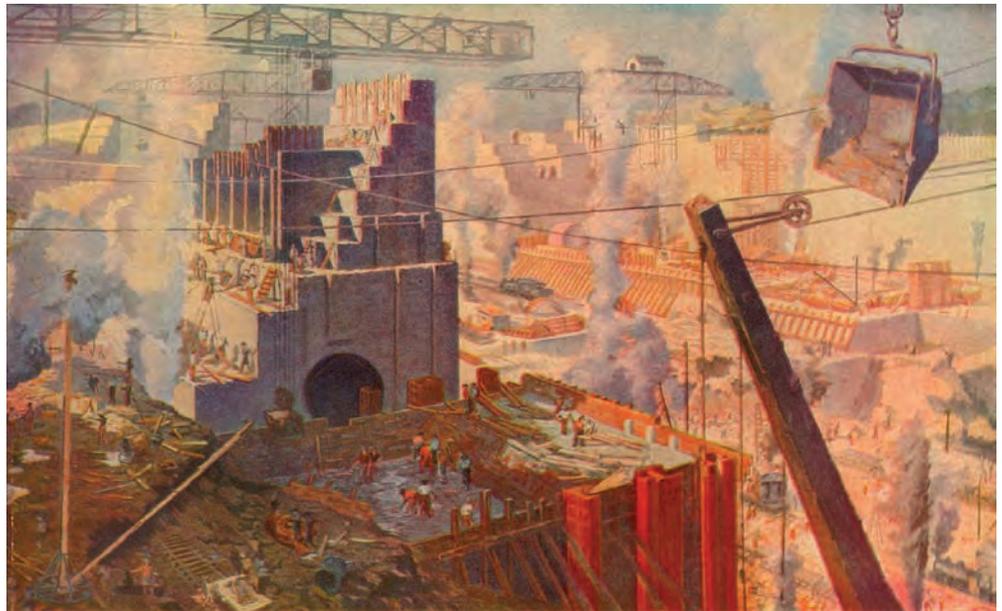
As of today, a total of 57 artworks by these six artists, in watercolor, oil, and acrylic, depict both the movement of heavy equipment and the human aspect of the work, represented by its workers.

### Expanding Our Commitment to History

We began the project in 2007 with three main objectives. The first was to manage the communication aspects of the project, the second was to document it, and our final responsibility was to ensure the long-term preservation of this phenomenal work by proposing and establishing a final repository for the preservation of all materials and making them available to the public.

The responsibility for doing so has been broadened by the ACP, and the initial steps have been made to improve the preservation process of all historical documents related to the Canal.

Under the leadership of ACP Administrator Jorge L. Quijano, this writer has been tasked with managing a multiyear international program that will first identify and, later, recuperate as



**Miraflores Locks in process of construction as depicted in this William B. Van Ingen painting.**

much Panama Canal historical material as possible, located in many other repositories around the world. This will complement those valuable historical files that are in our own Panama Canal archives as well as those that the Expansion Program is producing.

The recuperation of Panama Canal related historical materials comes from the need to responsibly preserve the historical memory of the Panama Canal, to centralize the efforts to preserve the elements related to the history of the Panama Canal and protect them for posterity.

We have identified documents in France, Colombia, Spain, and in various institutions in the United States. In May 2013, Quijano and this writer visited a number of locations in Paris, France, and had the opportunity to examine previously unknown and valuable documents and photographs related to the French era of the construction of the Panama Canal. These institutions included: the Bibliothèque Nationale de France (National Library of France), the Société de Géographie, and the National Archives of France. This visit was hosted primarily by the Association du Souvenir de Ferdinand de Lesseps et du Canal de Suez.

As this project progresses in the coming years, and with most of the historical elements under ACP protection, the Panama Canal strives to become, as Quijano said, “The center and keeper of its own history,” and we move in the direction of materializing our vision to become the primary global reference on the history of the Canal and the center for research, with all materials preserved and protected by modern and high-tech international standards. ■

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# Design of the Third Set of Locks for the Panama Canal Expansion Program

By Greg Hillebrenner

The Panama Canal Expansion represents one of the largest engineering feats undertaken in the last 100 years. This \$5.25 billion expansion will allow ships nearly three times larger than the current capacity to traverse through the Canal, saving nearly 8,000 miles on their journey. To accommodate these new ships, the expansion includes construction of a new Pacific approach channel, dredging of the existing channel and ocean entrances, and modifications to the Gatun Spillway, raising the lake level approximately 1.5 feet to provide additional water supply storage to support the signature \$3.4 billion component, the Third Set of Locks (TSL). These new locks are designed by a joint venture (JV) team led by MWH Global (U.S.) that includes TetraTech (U.S.) and Iv Groep (Netherlands), under contract to the international JV design-build contractor Grupo Unidos por el Canal (GUPC). The existing locks have performed admirably and beyond expectations for the past 100 years. To match this feat, the TSL is required by the Panama Canal Authority (ACP) to have a planned service life of 100 years included in the design and construction criteria for the project.

**New Pacific Locks  
lower chamber  
under construction,  
October 2013.**



Both the existing and new Atlantic and Pacific Locks move ships between the ocean and Gatun Lake and back to the ocean in three nearly equal steps at each end of the Canal, a total vertical distance of 85 feet. This is accomplished using the principles of gravity, without any pumping required, including for the water-saving basins (WSBs) used for the TSL. Routing of water between various chambers is controlled by a sequence of hydraulically operated valves for both the existing and new locks systems. It is here that the differences in design, technology, and construction methods begin to differ from the original design. Recognizing these differences



allows for a deeper understanding of the original feats that were accomplished and enables the team to plan for the next 100 years by building on this experience.

### The Visual Differences

While fundamentally the existing and new locks operate in the same way, there are significant differences, some that will be visible to the public and others that will be hidden once the new lock chambers are filled with water and put into operation. The changes that will be immediately noticeable

include: (1) the layout and increased size of the chambers for the TSL; (2) the addition of large WSBs; (3) the types of lock gates; and (4) the use of tugboats instead of locomotives (called "mules") to guide the ships.

#### 1. Layout and Size of Chambers

The most noticeable differences between the TSL and the existing locks are the single-lane layout for the TSL, as opposed to the existing dual, parallel lanes, and the increased size of the lock chambers. To accommodate the larger Post-Panamax vessels, the TSL lock chambers each are approximately 50

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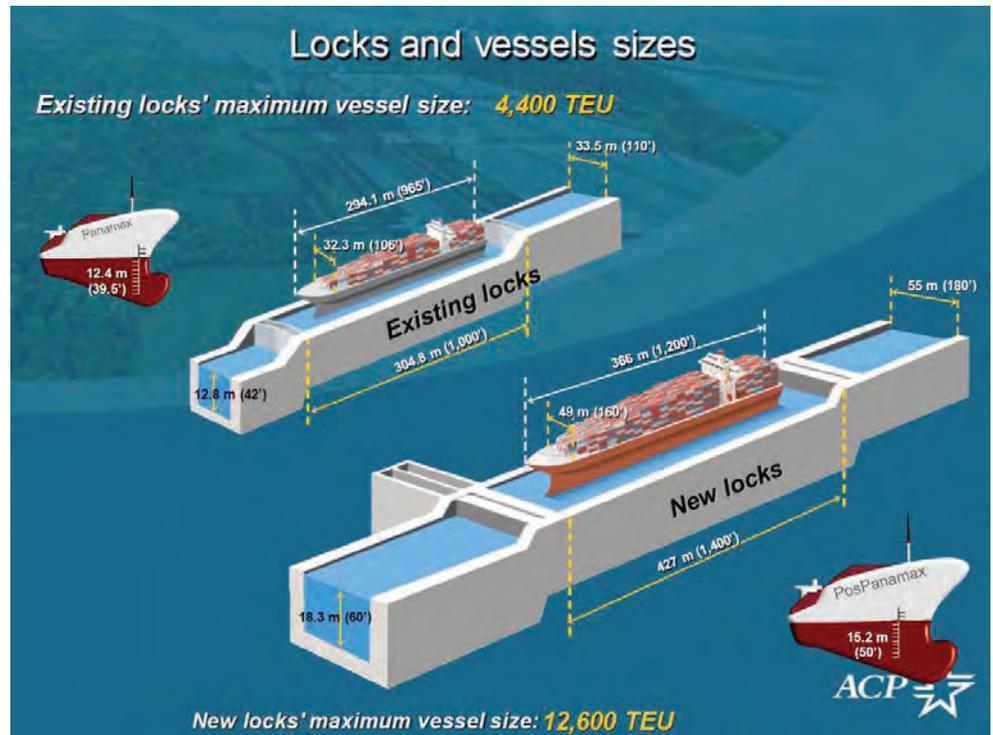
percent wider and longer than those for the existing locks.

The existing locks consist of two parallel sets of three chambers, each 110 feet wide by 1,000 feet long, whereas the TSL consists of a single set of three chambers, each 180 feet wide by 1,400 feet long. The heights of the chamber walls also are increased from the current 85 feet to 110 feet to accommodate the greater draft requirements for the larger ships. The concrete structures for the TSL extend over one mile, from the beginning of the inlet walls at Gatun Lake to the end of the outlet walls at the ocean.

To remain competitive in the shipping industry, the Panama Canal must be reliable and possess sufficient redundancy to be available for transits a large percentage of the time. The existing system accomplishes its redundancy by having the two parallel lanes that allow for maintenance to be performed on one set of chambers by taking it out of service while the other lane remains in use. The TSL consists of a single lane, which requires that it have built-in redundant features that allow minimal downtime for maintenance activities. To ensure nearly continuous availability for the larger Post-Panamax ships, the TSL has been designed with sufficient redundancies to achieve a required reliability factor of 99.6 percent (i.e., percent of time available for use). In addition to incorporating certain design features, this requires a detailed evaluation of all equipment's maintenance requirements and implementation of a robust, proactive maintenance schedule. One important redundant design feature implemented for the TSL is having two identical rolling gates located at each lock head. With the ability to retract each gate completely into a recess in the concrete structure and then install closure panels to allow dewatering of the recess, maintenance and repairs can be performed on each gate under dry conditions without interrupting use of the TSL.

## 2. Water Saving Basins

The waters of Gatun Lake, created by Gatun Dam and replenished by annual rainfall within the lake watershed, provide the sole water source for the operation of both the existing and new



**ABOVE:** Comparison of new and existing locks and vessel sizes. **RIGHT:** New Pacific Locks Complex with water saving basins overlaid onto photo of Existing Locks Complex, looking north.



locks systems. To avoid the need to construct an additional water source for their combined operation, WSBs have been incorporated into the TSL design. The WSBs provide a local storage reservoir for each lock chamber that covers an area of approximately 24 acres. This technology is currently being used in Europe on a much smaller scale.

These WSBs utilize wheel gate-type valves to control flow in both directions for filling and emptying the lock chambers, which allows for the reuse of nearly 60 percent of the water required for each lockage. This operational efficiency allows the



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TSL to use approximately 7 percent less water for a total lockage than the existing locks, even though the new chamber size is much larger. The net quantity of water used for a complete transit (i.e., both Atlantic and Pacific lockages) and discharged to the ocean is reduced to 48 million gallons for the TSL when the WSBs are used, as compared to 52 million gallons for the existing locks without WSBs.

### 3. Types of Lock Gates

Given the stringent 99.6 percent reliability requirements for the TSL, combined with a wider and deeper chamber and increased seismic and fatigue criteria, a decision was made by ACP to use rolling gates that ride on a bottom rail and are operated by a motorized drive mechanism using steel ropes. Each rolling gate can be opened or closed in four to five minutes. The existing locks contain two miter gate leaves at each location, weighing up to 700 tons each, that must either be removed by floating crane or have the lock chamber dewatered to perform major maintenance in place in the dry.

There is a total of eight new gates at each new Locks Complex, two at each of the four lock heads (for redundancy) that form the three lock chambers. These new massive steel gates average approximately 100 feet high by 192 feet long. Depending on their location and due to different loading conditions, the gates have a width of 26 to 33 feet and a weight of 3,300 to 4,400 tons. With the incorporation of flotation chambers within the gates and the effects of buoyancy, the operating weights of the mostly submerged gates are approximately 10 percent of their gross dead weight, or 330 to 440 tons.

The 16 new lock gates are being fabricated by Cimolai in Italy and shipped to Panama in groups of four aboard a ship especially designed to safely transport the large gates across the ocean to the new Atlantic Locks Complex in Panama. Eight of the gates will then be transported individually by barge through the existing locks and Canal to the Pacific site. Special motorized, hydraulically operated transporters are used to move the gates on and off the ship and barge and into position at the lock heads.

### 4. Tugboats Instead of Locomotives

For economic and practical reasons, the ACP made a significant decision not to continue the use of electric locomotives (or



**New lock rolling gates being unloaded from ship at Atlantic site, August 2013.**

mules) for guiding the ships through the lock chambers and instead have the tugboats that guide the vessels to the locks remain with the vessels in the chambers. The existing locomotives represent both a significant expenditure to purchase as well as the highest maintenance costs for the existing locks. The largest vessels that currently transit the existing locks require the assistance of eight locomotives, four at each end, during each lockage. Since the Post-Panamax ships are capable of carrying approximately three times the cargo as the Panamax ships, the increased number of locomotives needed to perform this task would not only be costly to purchase and maintain, but would also present significant logistics problems in coordinating their use. To assist the tugs, the Post-Panamax ships are required to be fitted with special bow thrusters, and the TSL chambers will also have continuous rubber fenders installed along their walls to protect the ships.

### The Hidden Differences

There are other differences between the existing and new locks that are hidden from the public view and will only be known to those closely associated with the design and construction of the new facilities. Several of these differences mentioned here include: (1) the filling and emptying systems; (2) the seismic design; (3) the concrete mix design requirements; and, (4) the impacts of previous excavations.

### 1. Filling and Emptying System

The new filling and emptying (F/E) system for the TSL can fill or empty each chamber in 17 minutes when using the WSB and 10 minutes without using the WSB. The existing lock chambers utilize a bottom filling concept consisting of 100 round openings in the floor of each chamber, connected by lateral conduits to a larger main supply conduit. The new lock chambers are filled with water through a total of 40 port openings (each 6.5 feet high and 6.5 feet wide) located along the base of the lock walls in each chamber. Water is facilitated to the ports through secondary culverts supplied with water from both conduits connected to the WSB (60 percent of total) and an interconnection to the main culvert connected to Gatun Lake (40 percent of total).

### 2. Seismic Criteria

Little was known about seismicity across the Isthmus of Panama during the design and construction of the existing Gatun, Pedro Miguel, and Miraflores Locks for the current Canal. Additional studies for the new TSL in 2004 determined that there existed a potentially significant seismic risk for the project and that stringent design criteria for seismicity should be included in the designs for the new Lock Complexes. While there are no active faults in the direct vicinity of the Atlantic site, the Pacific site required special design for four faults that crossed the project – three for Borinquen Dam, and one for the TSL Upper Chamber.

The increased seismic requirements for the design of the TSL (that did not exist for the existing locks) result in large lateral earthquake design forces that require the use of reinforced concrete instead of mass concrete for construction of the new lock structures. Due to different seismic risks determined for the Atlantic and Pacific, the new Pacific Locks Complex concrete structures require approximately 30 percent more reinforcement steel than the Atlantic Locks Complex. Total concrete reinforcement steel for the TSL project is almost 200,000 tons, as compared to the unreinforced mass concrete used for the existing locks.

### 3. Concrete Requirements

The TSL required the development of a reinforced concrete with a service life of 100 years that could withstand the variability of water salinity ranging from fresh water to high-salinity seawater and could protect the steel reinforcement from corrosion. These were not factors for the existing locks, which were constructed using mass concrete without reinforcement. Due to the variability of the water salinity in the lock chambers, ranging from freshwater at the upstream intake entrance in Gatun Lake to high-salinity seawater at the downstream discharge outlet at the ocean, sophisticated analyses were performed to develop multiple concrete mix designs and determine depths of concrete cover to prevent corrosion of the reinforcement.

It was determined during early studies that silica fume was needed in the concrete mixes for the highest salinity areas to

protect the reinforcement. To provide an economical design with reduced potential for cracking while also providing the required protection for reinforcement, a 2-foot-thick structural marine concrete utilizing silica fume and a higher cement content mix was used as a “skin” for the lock structures to encapsulate the reinforcement in areas exposed to contact with water and to surround an interior mass mix that contained a lower cement content to reduce heat generation. After the final mix designs were developed and tested, sophisticated thermal analyses were performed to determine required maximum placement temperatures needed to reduce the potential of cracking due to large temperature gradients and excessive drying shrinkage. Lower placement temperatures for the concrete were achieved by introducing ice water at the batch plant during the mixing process.

### 4. Impacts of Previous Excavations

Between 1939 and 1941, the United States began excavations for a new set of locks; however, with the onset of World War II, construction was put on hold and later abandoned after the war ended. These previous excavations at each site significantly affected the design and construction of the TSL, but in different ways. At the Atlantic site, the previous excavation benefited the project, as it was possible to align the TSL chambers within the existing excavation. This allowed the new chambers to be excavated by widening and deepening the previous excavation to accommodate the larger dimensions required for the TSL.

At the Pacific site, however, the opposite situation existed, and the previous excavation negatively affected the project expansion. Due to physical space limitations at the site, it was not possible to locate the chambers for the TSL within the existing excavation. Not only was it necessary to excavate completely new lock chambers, it was also required to remove the water and soft muck that had accumulated in the previous 100-foot-deep excavation and backfill it with rock and earthfill to allow construction of the new WSBs, operations buildings, and access roadways at the ground surface. Once the project is complete, however, the TSL Complexes at each site will appear nearly identical.

### Conclusion

The existing locks have withstood the test of time, performing beyond expectations during the past 100 years and setting the standard and expectations to be met or exceeded by the new TSL. As the tools available for analyses and design have become much more sophisticated since the original concept, so have the expectations and requirements for a service life of at least 100 years. This requirement, combined with the reliability factor of 99.6 percent, has pushed the design envelope to a new level such that the Panama Canal Expansion’s new TSL has set a new standard for future design of navigation locks throughout the world. ■

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# Everyday Challenges in the Third Set of Locks Project

By Jan Kop

Constructing a mega project can only be done when various parties combine knowledge, skills, financial resources, and experience. For the execution of the Third Set of Locks Project in the Panama Canal Expansion Program, four parties joined their resources and formed the consortium *Grupo Unidos por el Canal* (GUPC). The program reflects modernization of the Panama Canal that, by expanding the waterway with an extra set of locks, will give access to larger vessels. Furthermore, with this project the *Autoridad del Canal de Panamá* (Panama Canal Authority, or ACP) expects to achieve long-term sustainability and growth for the Canal's contributions to the society of Panama; to maintain the Canal's competitiveness and added value as a maritime route; to increase its ability to capture the growing tonnage demand with the appropriate service level; and to make the Panama Canal a more productive, safe, and efficient work environment.<sup>1</sup> In this article the project participants of the Third Set of Locks Project are outlined, insight is given into the challenges that GUPC faces, and the intercultural aspects encountered in the project organization are highlighted.

## The Third Set of Locks Project

A key and by far the largest component in the Expansion Program is the Third Set of Locks Project: the design and construction of the Atlantic and Pacific Locks. At a worth of \$3.2 billion, the locks project is the most costly contract in the history of the United States' involvement, totaling \$5.25 billion for this "civil engineering wonder." The objective of the locks project is to build larger lock chambers so that Post-Panamax vessels can transit, and environmental aspects and impacts have been taken into account by designing and constructing locks with water-saving basins that can re-use the water before recycling into the ocean. Each of the chambers of the new locks will measure 427 meters long and 55 meters wide. This will allow giant container cargo ships (the Post-Panamax ships), measuring 366 meters in length, 49 meters wide, and 16 meters for the draft-depth, to pass through the Panama Canal.

After an intense bid process, on July 8, 2009, the execution of the Third Set of Locks Project was awarded to the consortium GUPC. Formed by the companies Sacyr, Impregilo, Jan de Nul, and Cusa, GUPC is in charge of the design and construction





**Atlantic Locks, Colon.**  
Left, the existing locks;  
right, the new complex  
under construction.

of the new set of locks within the Panama Canal Expansion Program. Before describing the progress of the project, a brief insight into the four GUPC project partners is provided.

Commonly known as Sacyr, the Sacyr Vallehermoso Group is divided into various business groups: construction, real estate, property leasing, infrastructure concessions, and utilities services. Operating from its headquarters in Madrid, Spain, Sacyr is involved in numerous engineering works worldwide and located in more than 15 countries. The company is mostly known for its knowledge and experience in building highways and tunnels. Projects are located in Spain, Portugal, Ireland, Italy, Costa Rica, Panama, and Chile, among other countries. Within GUPC, Sacyr operates as the consortium leader.

The Italian company Impregilo, headquartered in Milan and listed on the Italian Stock Exchange, has made a name for itself as one of the principal leaders in worldwide construction, and throughout its history has built thousands of kilometers of communication infrastructure, roads, railroads, bridges, viaducts, tunnels, airports, hospitals, and some of the most

modern subways, as well as major hydroelectric plants and dams.

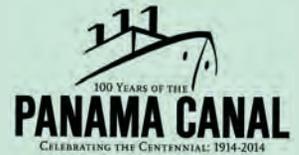
The family-owned Jan de Nul Group (JdN) ranks at the top of the international dredging industry. The company is the largest civil contractor in Belgium and is expanding its services in the offshore oil and gas industry, while its environmental division, Envisan, specializes in soil remediation and groundwater redevelopment. JdN is armed with an ultramodern fleet and has completed large-scale projects in various parts of the world, such as Chek Lap Kok airport in Hong Kong, Palm Jebel Ali in Dubai, and Changi Airport in Singapore. JdN also executed other projects for the ACP within the expansion program, such as the Pacific entrance dredging of the Pacific Access Channel for the Third Set of Locks Complex on the Pacific side and the widening and deepening of the Atlantic entrance and North Approach Channel to the Third Set of Locks.

Panama's leading construction company, Constructora Urbana S.A.<sup>2</sup>(CUSA), has been active in the construction of roads, houses, bridges, and infrastructure areas. Besides its participation in GUPC,



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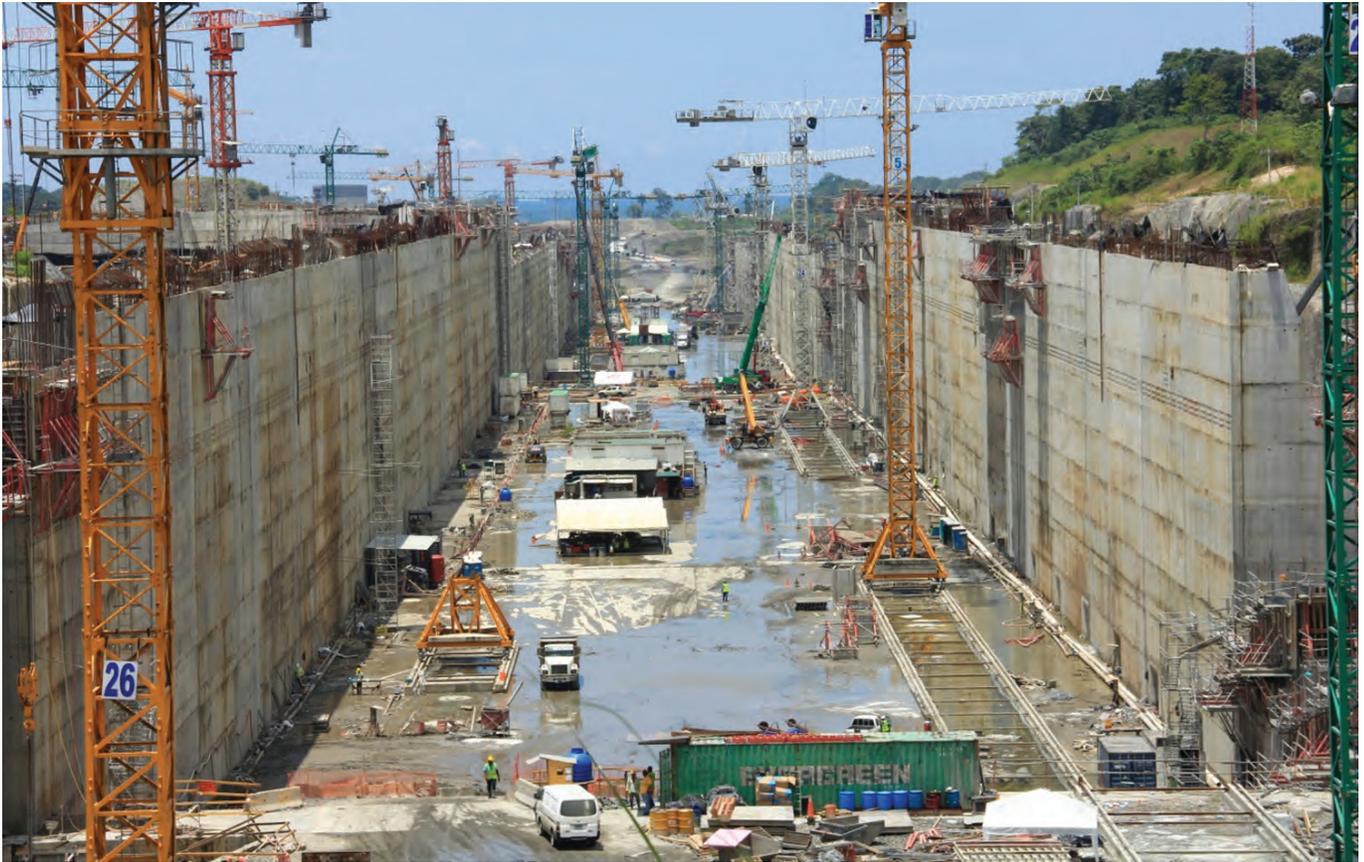


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**Atlantic lower lock chamber under construction.**

CUSA also has performed other projects in the Panama Canal Expansion Program, such as straightening the Gaillard Cut.

As of September 2009, GUPC initiated operations in Panama. Excavation work marked the start of the execution of the Third Set of Locks Project.

### Project Progress

The emphasis of the work has shifted from civil construction to electrical and mechanical installation. Hyundai Samho Heavy Industries, South Korea, has begun installation of the steel froes for 64 main valves in the culverts that will regulate the flow of the water-saving basins and lock chambers. GUPC has begun the construction of mechanical and electrical equipment buildings to be used for maintenance and access to the Canal. Work on the Borinquen dam will be completed in 2014, with GUPC's attention to detail. Cimolai (Italy) will have delivered the lock gates to Panama by 2014, and they are working to install the gates in their final position. Flooding of the locks is scheduled around the Centennial Celebration in August 2014, and the testing and completion will be around mid-2015.

### GUPC's Challenges

The scale of the project has been a challenge for GUPC. Blasting millions of cubic meters of rock and excavating a large amount of soil totaling 40 million cubic meters was a

considerable undertaking. The concrete works totaled 5 million cubic meters, constructing dams and backfill works involved another 40 million cubic meters, quarrying 20 million cubic meters to produce aggregates and sand for the concrete production. The electrical and mechanical works demand 16 gates in different weights, 152 valves, 76 Hydraulic Power Units, electrical installations, 60,000 square meters of buildings spread over 45 structures, 800 kilometers of electrical cables, 300 kilometers of fiber optic cables, and 25 kilometers of pipelines.

The technical design caused difficulties for project completion. The ACP requires 100 years of durability and high standards with regard to seismic resistance, while GUPC needs to deal with variable ground conditions. The soil at the Atlantic project site, called Gatun rock, is a soft, siltstone type of material that is relatively easy to excavate. The Panama tropical climate conditions have an idiosyncratic effect on this rock. At the Pacific project site, the soil consists of robust basalt rock, causing difficulties in excavation.

The climatic conditions in which the project is executed are another challenge for GUPC. In Panama it rains nine months a year. In the months of November and December 2010 and January 2011, about 1,700 millimeters of water fell to the ground. After heavy rainfall, the soil at the Atlantic project site turns into mud, blocking machinery and causing a congestion of the work in progress. At the Pacific project site rain causes fewer obstacles, because the soil remains

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solid under the pressure of heavy-duty trucks and excavators. Nevertheless, the downpours were a challenge to excavation, pouring concrete, and backfilling.

The project's tight schedule also provides a challenge. The green light came to commence work on Aug. 25, 2009; from that date onward, GUPC contractually received 1,883 days to complete the works. Due to a wide variety of complications, the original date of completion, set for October 2014, moved to April 2015 for the Atlantic Locks and June 2015 for the Pacific Locks.

In the midst of Panama's booming business, the project organization had to find 8,000 employees and train them to meet the project's high standards for health, safety, and quality. Negotiating with the local unions became quite an obstacle in the execution of the project. Working with the local employees under pressure of the time schedule and high standards for health, safety, and quality is an ongoing difficult task. Teaching employees the new standards and incorporating these principles into daily practices requires extra assistance, more control, and the perseverance of the quality department.

Of the four companies that came together to form a temporary project organization, each has brought along its idiosyncratic norms, values, and practices about how project execution should commence. Uniting project participants coming from different societies, affiliated with various organizations, and possessing a multiplicity of interests, creates a culturally complex work environment.<sup>3</sup> The next section, derived from Karen Smits' Ph.D. study on cross-cultural collaboration in the Third Set of Locks Project, will highlight the intercultural aspects encountered in this magnificent endeavor.

### Cultural Characteristics in the Third Set of Locks Project

On an everyday basis, the collaboration between Sacyr, Impregilo, JdN, and CUSA is colored by high pressure and simmering tensions. By using metaphors and labeling cultures, project participants translate their thoughts and experiences into more amendable forms of understanding. For example, the collaborative relationship between the project partners is often described as an "arranged marriage," reflecting the contractual agreement that binds them. Project participants also tend to speak in cultural labels, such as "these Spanish" and "those from Jan de Nul," distinguishing the stereotypes they know about either the nation or the specific organization. Furthermore, to give meaning to the project environment, project participants seek a clear organizational structure and mark spatial boundaries, talking about "the Atlantic versus the Pacific" project sites instead of the project as a whole. One might think such practices support the project participants in unraveling the cultural complexity of the project organization, but when Smits took a closer look, she realized that these practices reflect how a collaborative relationship is hindered. The outcomes of these practices led to differentiation, segregation, and fragmentation among the project participants, or, as Smits stated, the practices

created a "canal" between them. That is, the workers' strong focus on cultural differences and boundaries magnified the emotional distance between them. Hence, Smits described these practices as "diminishers" of collaboration.

Conversely, project participants showed interest in building collaborative relationships aiming at the progress of the Third Set of Locks Project, and, understanding the need to combine their knowledge, to interact about ideas, and to share skills, employees sought common ground for ways to bridge the cultural gaps. For example, their mutual passion for engineering tasks and shared goals resulted in the mantra "the work needs to be done," expressing a basic drive among project participants to finalize the project. Moreover, language barriers were reduced, established work attitudes and routine practices improved, and, in the flow of learning, new practices specifically related to GUPC evolved. Connected by their aim to enhance collaboration within the GUPC project organization, such practices guided project participants to integrate, intermingle, and engage with each other in their everyday work environment.<sup>3</sup> Therefore, Smits termed these practices as "amplifiers" of collaboration.

Both the diminishers and amplifiers of collaboration portray a picture of cross-cultural collaboration in the Third Set of Locks Project. They highlight that, although the situation in GUPC's project organization can be stressful and acrimonious at times, there exists an underlying need to work together. A feeling of togetherness strengthened the nature of a collaborative relationship among GUPC participants.

### Conclusion

Often, in project management, human issues receive less attention than topics focused on the financial, risk assessment or, decision-making procedures. An extensive form of collaboration is required to construct a mega project: governmental institutions, construction companies, consultancy firms, and other specialized agencies are obliged to join forces and combine their knowledge, skills, and assets to complete such a large endeavor. Within GUPC, people are recognized to be the most important asset in the execution of a project, and culture does require special attention in collaborative relationships. The unique insight received from the GUPC project organization offers great opportunities for better understanding of cross-cultural collaboration in mega projects. It creates awareness for the need to view the everyday work from a cultural perspective and underscores the claim that culture and collaboration need to be high on the project management agenda. ■

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# Summary of the Study: Cross Culture Work: Practices of Collaboration in the Panama Canal Expansion Program

By Karen Smits

Serving as milestones in mankind's development, national triumphs, and technical advances, mega projects are a ubiquitous part of our everyday life. However, the construction processes of these mega projects often fail to meet expectations as they suffer from cost overruns, delays, and deficit in terms of quality and user satisfaction.<sup>1</sup> This problematic performance has attracted academic attention to the management of infrastructure projects. While most studies concentrate on themes such as policymaking, contracting, expected outcomes, risks, and project performance, both academics and practitioners call for more insight into the "people" side of project management.<sup>2</sup>

Requiring a combination of skills, knowledge, and resources that are organizationally dispersed, the construction of a mega project can only be completed when various parties collaborate. Since each party carries its own idiosyncratic cultures, interpretations, and priorities, we can consider project organizations as complex social settings. Hence, in this culturally complex work environment, collaboration is considered key for successful project outcomes.<sup>3</sup>

The objective of this study was to illustrate the internal dynamics between participants in a project organization and how this affects collaboration in a mega project. The everyday organizational life in the Panama Canal Expansion Program provides insight into cultural complexity of collaboration and gives a better understanding of how project participants make sense of and deal with the cultural differences and similarities they encounter in

their work environment. In this study, I sought to understand how collaboration manifests itself in the daily practices of project participants in the Panama Canal Expansion Program.

The theoretical foundation for this research lies in the academic debates about project management and cross-cultural management. Within the field of project management, this study demonstrates the perspective that projects are unique organizational phenomena. Following this approach, researchers pay attention to the context, culture, and behavior within the project and recognize the need to explore how the relationships between individuals and collectivities are being developed, and how power relations affect the project actors. They claim that project management research should focus on the "actuality" in project organizations and should strive for the lived experiences of its participants.<sup>4</sup>

In the scientific discipline around cross-cultural management, this study connects with the perspective that recognizes organizations as a multiplicity of cultures. Culture is not perceived as equal to nation, but rather composed of explicit and tacit assumptions held by a group of people, guiding their perceptions, thoughts, feelings, and behaviors, that, through social interaction, are learned and passed on to new members of the group.<sup>5</sup> In project organizations, where different partners such as public administrators, construction companies, engineers, and subcontractors meet, collaboration is inevitable.

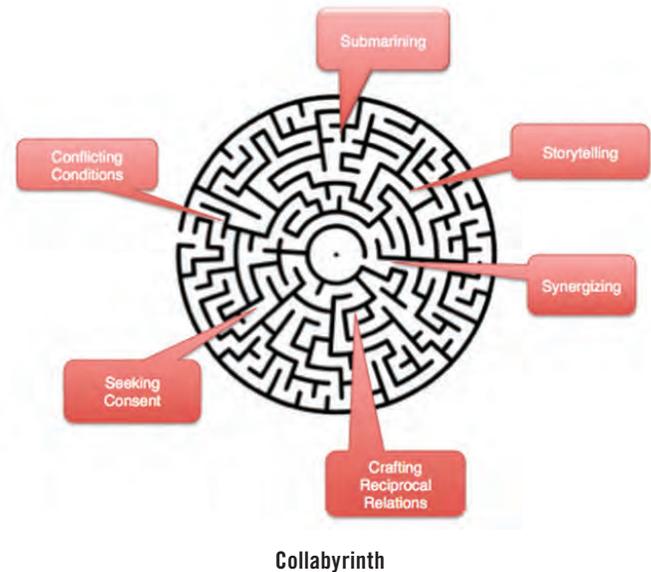
Hence, numerous cultural differences and similarities, as well as distinctive practices and interests for participation, appear

when firms and people come together to build a mega project. Concerned with everyday work activities and the action and interaction between people, I adopted the practice-based approach to study collaboration. Research of practices examines the internal dynamics in the organization and is interested in what people do, how they do it, and under what circumstances they perform their actions; it focuses on the micro-level interactions. During a year of ethnographic fieldwork, in which I was present at all levels of the project organization, I gathered the data for this study. With a practice lens, I discovered what was actually going on in the project organization, unraveled the practices of collaboration that emerged, and came to understand how project participants make sense of the diversity of cultures in their daily work environment.

In the collaborative relationship within the consortium Grupo Unidos por el Canal (GUPC), I detected practices that hindered the development of a collaborative relationship – diminishers of collaboration – and practices that were aimed at enhancing collaboration: amplifiers of collaboration. Chaperoning, a practice focused on guiding, teaching, and supervising novices in the world of project management, represents the collaboration between the Panama Canal Authority (ACP) and CH2M Hill. These practices of collaboration portray a picture of how project participants make sense of collaboration in their everyday work life. In the process of collaboration, actors translated, negotiated, and developed practices to find their way in the project organization. Although they first disagreed on the route and felt disorientated, actors soon concluded that working together was the way toward project completeness. I describe this journey toward developing a collaborative relationship as exploring a collabyrinth. This neology of “collaboration” and “labyrinth” reflects the complexity of collaboration.

In the collabyrinth, six key practices of collaboration can be distinguished. First are three manifest practices: (1) conflicting conditions; (2) seeking consent; and (3) crafting reciprocal relations. And second are three concealed practices: (1) submarining; (2) storytelling; and (3) synergizing. “Conflicting conditions” indicate the conflicts that obstructed collaboration in the project organization. “Seeking consent” refers to the notion that actors explored for shared understandings, mutual interests, and common features within the different organizational groups. The project participants’ willingness to collaborate is captured in “crafting reciprocal relations.” Used figuratively, “submarining” depicts the act of distancing oneself from the project partners and operating autonomously without taking other project participants into account. “Storytelling” portrays the stories and narratives that evolved in project organization to enhance a collaborative relationship. As project participants came to realize that collaboration is essential, they became more accepting of each other’s ideas, expectations, and practices, which are reflected in “synergizing.”

Placing these practices on the Collaboration Continuum represents how they affect the product of cross-cultural collaboration. On the continuum, the practices of collaboration are divided into three categories: (A) adverse practices, including all practices that hinder collaboration; (B) building practices, referring to actions



and activities that attempt to bring about collaboration; and (C) connecting practices, undertakings that enhance collaboration. The continuum proves that a practice-based approach in project management is helpful in understanding what is actually going on in a project organization, how actors make sense of cross-cultural collaboration, and in what context their practices are carried out. Finally, I portray five key recommendations for working in a cross-cultural project organization. Highlighting the importance of a cultural perspective in the management of projects, these recommendations stress the need for explicit attention to cross-cultural collaboration. After all, culture and collaboration should be high on the project management agenda. ■

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The book can be purchased from <http://crossculturework.com/>.

# Panama Canal Centennial Celebration Exhibitions at the University of Florida

By Lourdes Santamaría-Wheeler

To celebrate the centennial of the opening of the Panama Canal, the George A. Smathers Libraries at the University of Florida will present a series of exhibitions across campus illustrating the rich history of the Canal. The exhibitions will feature original, unique, and rare materials, including manuscripts, photographs, maps, artifacts, and books from the diverse collections at the University as well as items from various public and private collections.

Exhibition highlights will be permanently available online, allowing free worldwide access to the complete resources. All exhibitions are free and open to the public.



A mola from the Panama Canal Museum Collection.

## ***Patterns Past & Present: Ancient and Modern Arts of Panama***

**August 2014 – July 2015**

**Samuel P. Harn Museum of Art**

*Patterns Past & Present* will feature examples of Panamanian art from both ancient and modern times. The juxtaposition of ancient and modern art forms will illustrate various common visual themes, including imagery and design motifs. The exhibition will include examples of ceramics, stone, and metalwork from ancient peoples in the region (with works in Chiriquí, Conte, Veraguas, and Cocle styles), spanning the time period of 400 to 1000 CE. Also featured will be molas (applied textiles) and garments from the Kuna of San Blas Islands of Panama and Colombia from the 20th century. Early through late-20th century examples of molas will be on view, illustrating the development of the art, using factory-made cloth and sewing techniques as well as new imagery adopted from the United States and popular culture.

## ***From Microscopic to Massive: Worker Health Challenges in the Construction Era***

**August 2014 – December 2014**

**Health Science Center Library**

*From Microscopic to Massive* will focus on the role of disease and injury in Canal construction and how addressing these issues transformed the construction, creating a long-lasting infrastructure that gave Panama prominence in the annals of tropical medicine. Featuring artifacts, books, photographs, and

official government documents, the exhibition will demonstrate the power of medical discoveries, showing the connection between mosquito vectors and yellow fever and malaria. These medical advancements lowered tropical disease morbidity and mortality rates and made laboring in the region safer and more appealing. Yet despite efforts to minimize and treat diseases, significant morbidities and injuries from Canal work continued, with pronounced differences in experience due to race.

### **Voices from the Panama Canal**

**August 4, 2014 – October 24, 2014**

**Smathers Library Gallery**

The Panama Canal would not have been possible without the ingenuity, labor, and commitment of tens of thousands of people from all over the world who represented many heritages. However, for the workers and their families, life on the Canal – during construction and after – was affected by a variety of social dynamics, including labor movements, racism, segregation, and the emergence of women as a force in the economy. This exhibition seeks to recognize and honor the legacy of all the different people who constructed, worked, and lived in the area, celebrating the joy of their achievement and acknowledging the scale of their sacrifice.

### **Panama Canal Model**

**Smathers Library, Room 1A**

**October 2013 – December 2014**

This extraordinary model of the Panama Canal (12.5 meters long by 3 meters) was shipped from the Nationaal Baggermuseum (Dutch National Dredging Museum) and painstakingly reassembled in Smathers Library by Hans Wijn, former director of the museum, and library staff and volunteers. The model, which accurately represents water level differences between the oceans and Gatun Lake and includes the new Third Set of Locks, took Baggermuseum volunteer Dick Kamsteeg nearly two years to complete. Display cases in the room will feature complementary materials from the Smathers Libraries Special and Area Studies Collections.

### **Big Business: The Panama Canal Expansion**

**Gerson Hall Commemorative Gallery  
(Fischer School of Accounting)**

**July 24, 2014 – November 24, 2014**

This exhibition will focus on the global impacts of the Canal in commercial and economic terms: gross domestic product (GDP), shipping, trade flows, and related strategic outcomes. The international reach of the Canal will be told through photographs, books, and other original documents.

### **Building the Canal**

**Marston Science Library**

**August 2014 – December 2014**

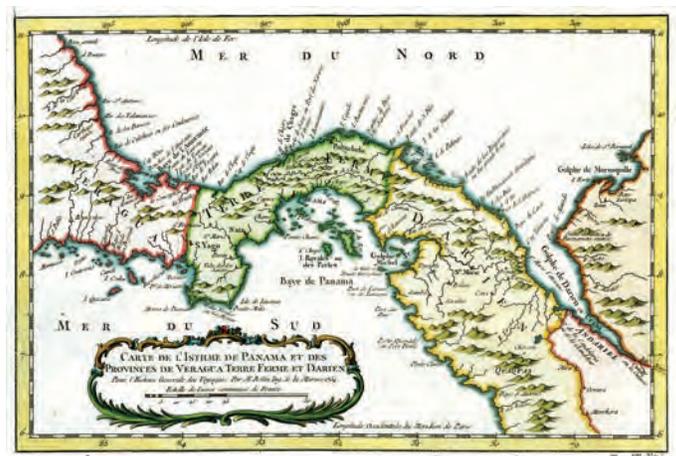
Focusing on the three distinct construction divisions of the Panama Canal – the Atlantic Division, which worked from Limon Bay to Gatun; the Central Division, which ran from Gatun to Pedro Miguel; and the Pacific Division, which worked from Pedro Miguel to the Panama Bay's deep waters – the exhibition will show the varying differences in topography/terrain and the construction developments utilized in the successful completion of the Canal. The importance of heavy construction equipment in completing this monumental undertaking will also be highlighted.

### **Revealing the Right Route: Cartographic Evidence of Early Canal Plans**

**Map and Imagery Collection**

**August 2014 – November 2014**

As early as 1513, man envisioned a canal crossing the Isthmus of Panama. The Spanish considered but declined the challenge in 1556. The French attempted and failed in 1889. In 1914, after 10 years of excavating, engineering, and constructing, the United States opened the Panama Canal for maritime transit. Featuring surveys and both antique and modern maps, *Revealing the Right Route* will demonstrate the possible and proposed routes for the Canal over the pre-construction period, development during the American Era, the Canal at the time of completion, and the current expansion.



**Carte de L'Isthme de Panama et des Provinces de Veragua  
Terre Ferme et Darien by Jacques Nicolas Bellin, 1754.**



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**Legal History of the Panama Canal**

**August 2014 – December 2014**

**Lawton Chiles Legal Information Center**

The history of the Panama Canal stretches back hundreds of years before the era of U.S. construction. It includes expeditions by Spanish explorers in the early 16th century, a struggle for control over trade routes in the New World, failed construction attempts, rebellion against colonial powers, and, perhaps most importantly, a significant legal record that tells a unique story of the 10-mile-wide strip of land that has been so instrumental to the economic and strategic movement of goods worldwide.

Featuring rare and unique government documents, the exhibition will present a legal narrative of the Canal Zone extending from the first attempts by European powers to create a canal on the Isthmus to the Torrijos-Carter Treaties of the 1970s that led to the transfer of Canal operations from the United States to the Republic of Panama. In addition, the exhibit will highlight issues related to sovereign control over the territory proposed for Canal construction, guarantees of unimpeded transit of ships of all nations through the Canal, the negotiation of numerous international agreements that made the Canal project possible, and the legal basis for activities such as the initial exploratory surveys commissioned by the Spanish and British crowns, support for the cessation of Panama from Colombia, and the transfer of the construction project from France to the United States.

**Panama: Tropical Ecosystem**

**August 2014 – May 2015**

**Florida Museum of Natural History**

Featuring artifacts, books, photographs, and animal and plant specimens, Panama: Tropical Ecosystem will present a visual survey of the natural and cultural landscape of Panama, with a special emphasis on items from the Canal Zone. Located in the hallway adjacent to the McGuire Center for Lepidoptera and Biodiversity.

**Bigger Better, Best: the Panama Canal through American Children's Literature**

**August 1, 2014 – October 10, 2014**

**Smathers Library, Special & Area Studies Reading Room**

In the 1900s, Panama was a diverse place buzzing with excitement and frustration, a fountain of possibility. During this time, the United States' construction efforts and operations exemplified American expansion and ingenuity. News of this endeavor was propagated and depicted in children's literature, giving us an insight into how the United States wanted this project



A group portrait in front of a building, part of the "Voices from the Panama Canal" exhibit.

perceived in the minds of its smallest citizens: as an adventure, a trail of progress, a set of locks that held the key to the future.

Featuring works of nonfiction, adventure stories, and picture books, the exhibition will explore representations of the Panama Canal, as depicted for children, from an American perspective. Highlights include books about Panamanian history by Sue Core Odom.



# Indigenous Arts of Panama

By Edith Read Barkowitz Crouch

Panama is home to several indigenous cultures with rich craft traditions in textiles, pottery, basketry and fiber weaving, beadwork, tooled leather, gold and metal smith work, stone, and woodcarving. Superb craftsmanship has been a hallmark of Central American arts dating back to the first century.

## Kuna (Guna, Cuna)

The Kuna people live in a region called the Comarca de Kuna Yala (Kuna Land.) The chain of more than 365 coral islands, known as the San Blas Archipelago, is located in the Caribbean or Atlantic Ocean off the eastern coast of Panama, south of the Panama Canal. Kuna Yala also includes a 140-mile landmass of rainforest and coastal mainland stretching to the border of Colombia to the south.

Kuna women make and wear molas – vibrantly colorful, multilayered, hand-appliquéd textile panels for blouses. Early mola designs were drawn from pre-Hispanic body painting and themes from basketry and pottery.

The intricately designed and sewn molas are attached to the front and back of women's blouses and reflect

the artistic expression and ethnic identity of the Kuna women artists. Beliefs, observations, cultural cosmology, sense of humor, and exposure to foreign elements are represented in the designs.

Molas are created in a technique referred to as appliqué or reverse appliqué and consist of two or more layers of cloth, hand sewn and cut to reveal the layers of colored cloth beneath.

Contemporary mola designs incorporate traditional and modern elements and may reflect abstract geometric designs, motifs from the natural world, themes related to politics, popular culture, and Kuna legends, and depict many details of their lives.

In addition to the creation of the mola blouses and textile art made by Kuna women, the Kuna men and women make, wear, and use other handmade artifacts in their daily lives, for ceremonial purposes, and to decorate their homes. Necklaces are made from beads, coins, and local materials, such as shells, bones, and seeds. Bead wraps are strung and worn on Kuna women's arms and legs. Kuna men and women carve wooden dolls painted and dressed in miniature molas; they also make painted decorative gourds and maracas. They carve elaborate wooden boats, tools, stools, arrows, toys, cooking tools, authority staffs (cane-like scepters used by Kuna dignitaries), and other functional implements and decorative items.

Spirit dolls (Nuchu) are carved by the Kuna and are used to assist in the healing of an ill Kuna, to ward off evil, and for protection. Once carved, the nuchu is taken to a Kuna medicine man, who fills it with a soul or spirit.

## Emberá and Wounaan

The Emberá and Wounaan live in the rainforest of Panama in the Darien region and share a river basin culture. They were previously known collectively as the Choco, having migrated from the region of the same name in Colombia in the late 1700s. The Comarca Emberá-Drua is a semi-autonomous territory for both groups in the Darien that is also home to the Darien National Park and Biosphere.

Tagua nut carvings are created by the Emberá and Wounaan and depict the animals of their rainforest. The tagua palm tree nut resembles ivory in color and texture. It has been used for buttons, dice, and chess pieces since Victorian times. The Emberá and Wounaan men also carve cocobolo and balsa wood into household utensils, depicting fanciful animal shapes and spirit sticks used by shamans in ceremonies.

The Wounaan and Emberá women create unique coiled baskets of extraordinary artistry using local plant fibers. Their basketry designs incorporate religious symbols, reflect their natural environment and cultural artifacts, and are also wrought in complex geometric motifs. The decorative coil baskets are fabricated from the fibers harvested from two varieties of locally grown palms: the chungu or "black palm" and the nahuala or "Panama hat" plant. Natural plant dyes from a variety of sources, including plant roots, leaves, bark, and others, are used as vibrant colorants.

Coiling of basketry involves stitching over a foundation and attaching rows of work together as the stitching progresses to form the basketry structure. The foundation forms the



**Opposite:** This mola is one of many from the Panama Canal Museum Collection at the University of Florida.

**Left:** Balsa wood figures, urkuwala are carved and decorated by the Kuna, c. 1970s – 2000s.

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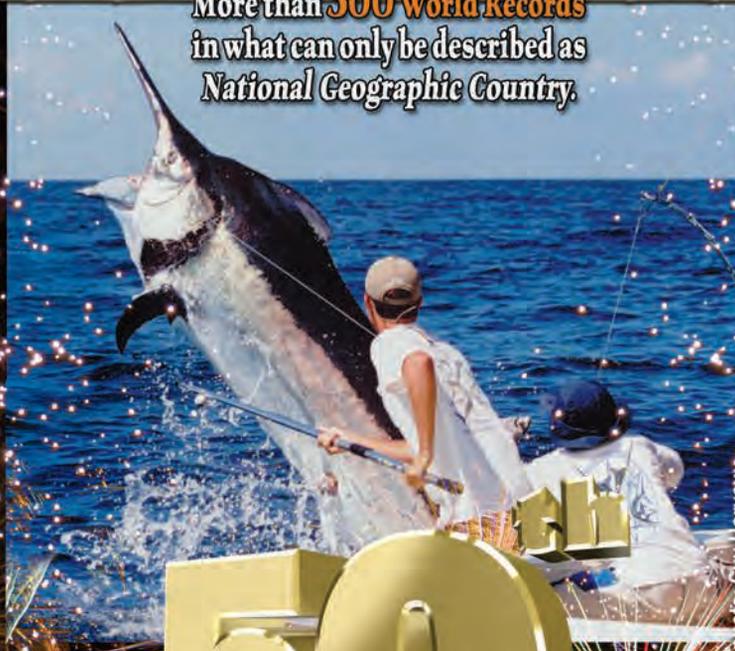


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**Clockwise from top left:** Tooled leather purse, 15" width x 13" height, with straps 23" height, Panama, c. 1970. • Glazed earthenware clay pottery vessels decorated in Pre-Columbian design motifs, incised, etched and buff slip glazed. Left to right are: pottery bowl, 3 1/2" height x 6" width, unmarked; pottery vase, 9 1/8" height x 6 1/2" width, marked "La Peña Ceramica Hecho a Mano Veraguas Panama"; pottery vase, 4" height x 4" width, marked "La Peña Ceramica Hecho a Mano Panama" c. 1980. • Chaquira hand-beaded necklace, 11" diameter, created by the Ngöbe-Buglé (Guaymí) people of western Panama, c. 1970. The elaborate necklace's geometric designs are created with glass beads using a vertical strung and cross-woven technique of beading.

base over which the stitching is done, and the stability of this element holds the shape of the work. Successive wraps over the foundation are made with the sewing material that fastens back into or around one or more of the foundations or catches into the stitches of the former row to hold the work together. The complex basket bottoms may include a signature design element that identifies the basket maker. The basket coils into a spiral and is formed into a symmetrical shape.

### Ngöbe-Buglé (Guaymí)

Chácara bags are elaborately patterned string bags woven by the largest group of Panama's indigenous peoples, the Ngöbe-Buglé or Guaymí of western Panama. The bags are woven from the fiber of the wild pineapple plant or agave plant and are used by the Guaymí for medicinal pouches, for carrying infants, or as a shoulder bag to carry goods purchased at markets or produce harvested from fields. The fiber is spun in an elaborate and physical manner by the women and is then woven in colorful patterns.

The Ngöbe use various leaves, fruits, roots, vines, and bark to produce an extensive palette of dye colors. The chácara is usually constructed without the use of a needle. The base of the chácara is formed of a series of connected figure eights and the body consists of row after row of connecting single loops.

Additional lengths of yarn are spliced on as the work progresses or whenever a change of color is desired. Two types of color patterns are commonly produced: the "sencilla" (simple) and the "pintada" (painted). Of the countless different designs, each has its special significance to the Ngöbe, suggesting particular animals, moods, fables, history, or local scenery.

Hand-beaded chaquira jewelry was created for and worn by the ancestors of the Ngöbe-Buglé (Guaymí), who were formidable fighters; the conquistadors rated them among the most skilled of all the warriors in the Western Hemisphere. The original chaquiras were fabricated with pebbles, pieces of bone, seeds, and seashells, and were colored with homemade dyes. Today's chaquiras are elaborate necklaces of geometric designs created with glass beads using vertical strung and cross-woven techniques of beading.

### Pre-Columbian Pottery and Bateas

A long history of pottery making is found in La Arena on the Azuero Peninsula in southwestern Panama. The clay utilitarian pottery was historically used for storing and cooling water, for cooking meals, and for serving food and drink.

The pottery produced today is similar in design and style, although the traditional earth-colored clays and glazes have been supplemented with a palette of colorful hues. Finely crafted



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dishes and decorative pieces are created with design elements and motifs reminiscent of the pre-Columbian pottery unearthed in the Coclé Province region.

The pre-Columbian clay pots and plates featured design motifs of native flora and fauna of Panama stylized into pictographs of extraordinary quality and beauty. In addition to the contemporary pottery featuring many of these designs, a Panamanian art form was created in the 1930s that featured these motifs painted onto wooden platters with an upturned edge. These bateas have been created in a variety of shapes and sizes and are beautiful and functional.

The bateas are carved from “cedro espino,” a type of locally grown mahogany. The wood is sanded smooth and a clay wash is applied to the surface. A free-hand sketch of the pre-Columbian highly stylized designs of insects, birds, crustaceans, other flora or fauna, and a scroll design motif is drawn on the platter surface in pencil. A protective coat of alcohol- and acid-resistant lacquer is applied to both sides of the platter.

### Huacas

The pre-Columbian Carib natives of Panama left no written accounts of their history, but their rich artisan traditions have been unearthed in archeological finds of jewelry, weapons, tools, and ornaments. Following floods in the 1920s, the Rio Grande de Coclé changed course, and in so doing exposed in the previous riverbed and adjacent pastures an archeological find to Panamanians living in the area. Archeologist Samuel K. Lothrop studied these finds and led other expeditions to unearth stone and gold ornaments, pottery, and human bone fragments, indicating that these were ancient grave sites.

Huacas refer to the golden artifacts removed from the graves of the Caribs. The skilled goldsmiths, using the plentiful and pure gold panned from Panamanian streambeds, crafted breast ornaments for warriors, gold beads for women, and charms and ornamental offerings to their gods. One small grave site yielded more than 2,000 objects, including pendants set with semiprecious stones, ornamental breast plates, necklaces of thousands of beads, heavily embossed gold disks, wrist and ankle cuffs, and earrings.

The technically and aesthetically masterful gold figures portrayed stylized human and animal forms, or a combination of the two. There are snakes with two legs, men with crocodile heads, figures with a human head and shoulders attached to the body of a snake with the protruding eyes of a crab, and the recurring image of the alligator and eagle, which is believed to have special religious significance.

These golden huaca designs have been replicated into contemporary ornamental pieces and jewelry, including earrings, pendants, pins, bracelets, and rings, using the “lost wax” casting technique. To create these reproductions, a wax model is made from an original piece and then is cast in gold.

In the lost wax process, threads of wax are added to the model for decorative details and then a cone of wax is affixed to the

model’s base that will serve as a funnel-shaped pouring channel for the molten metal. Then the model is covered with an outer shell made of a mixture of moist clay and crushed charcoal. When the outer shell is dried, the entire assembly is fired in a kiln to strengthen the mold and to burn out the wax, leaving a cavity of the same shape as the now “lost wax” model. When the metal solidifies, the mold is removed to expose the golden huaca.

### Other Contemporary Arts and Crafts of Panama

Exquisitely tooled leather has been fabricated into saddles, purses, chairs, and tables by artisans in the interior provinces of Panama. The tooled leather detailing may be found in the Spanish Revival style, an elaborate and eclectic style of craftsmanship.

Soapstone carvings of local flora and fauna have been a popular craft in the market of El Valle de Anton in the interior of Panama. Intricate birdcages of many sizes and designs (houses, churches, airplanes, pagodas, and more) are fashioned from a bamboo-like reed. The stem of the sugarcane plant and the hard center strip of coconut palm leaves are dried and the fibers are used to create the birdcage structures, also found in El Valle.

The arts of the pollera and montuno were born from the Spanish colonial historical era of Panama’s history. The pollera is the national costume of Panama and is a prized possession of many Panamanian women. The pollera de gala or all-white pollera was believed to be worn by Spanish colonial nursemaids, and the pollera montuna in calico was worn by female servants. Today’s formal pollera is sewn using fine white linen or voile fabric and is embellished with floral garlands and designs of native origin. It is embellished with cross-stitching and needlework referred to as “talco en sombra,” consisting of two pieces of fabric joined together in a designed motif. Handmade bobbin lace is used on the blouse and additional embroidery and lacework is used in the skirting of the costume.

Elaborate filigreed jewelry and combs in gold, encrusted with pearls, are made in Panama and worn with the pollera costume. Panamanian jewelers have used the gold and pearls (from the Pacific side Pearl Islands, Archipiélago de las Perlas) native to Panama to create beautiful and elaborate filigreed mosqueta jewelry.

The traditional men’s costume is much simpler and less intricate than the women’s pollera. The formal camisella style of the montuno attire consists of a white, slightly loose fitting long-sleeved cotton shirt with a slightly up-turned collar. This shirt is paired with navy or black knee-length trousers. The front and back of the shirt are embellished with either brightly colored embroidery or a row of fine tucks. Accessories include a shallow-brimmed straw hat and white lightweight shoes made of canvas and leather. Ironically, the hat known as the “Panama hat” is made in Ecuador from the plaited leaves of the native toquilla straw plant, although hats are woven in Panama and worn by the montuno. These costumes are still made in Panama and are worn for special occasions and performances of folkloric dances. ■

# Symphony of the Americas Summerfest 2014

By James Brooks-Bruzzese and Renée LaBonte

The inaugural and signature event of the Panama Canal Centennial Celebration in Gainesville, Fla., in August 2014 will be highlighted by the featured chamber orchestra in residence of Summerfest 2014, produced by the Symphony of the Americas, Broward County, Fla. The concert will feature Artistic Director Dr. James Brooks-Bruzzese, international symphony conductor and recipient of the 2005 Hispanic Heritage Foundation Kennedy Center Award to honor Hispanic leaders and role models. Brooks-Bruzzese is a talented professional who was also awarded the Critic's Choice Award, presented at the Villa Lobos Festival in Brazil in 2005, and the Hispanic Unity's International Amigos Award in 2009.

## Summerfest

Summerfest is a six-week cultural exchange, with Maestro Brooks-Bruzzese and selected musicians of the Symphony of the Americas joining an internationally renowned chamber orchestra, serving as a cultural bridge to audiences in Latin America and Europe. Summerfest outreach performances have taken place in every country of Central America, four countries of South America, and five islands of the Caribbean.

Together the musicians rehearse, perform, and conduct workshops and recording sessions in the chamber orchestra's home country in early summer. In July, the combined musical ensemble Summerfest performs throughout the United States and includes outdoor beach, education, and gala performances.

As an integral part of Summerfest, the ensemble then travels with the maestro to Panama for public and educational performances as well as master classes as part of United States and Florida outreach. Summerfest 2014 marks the 23rd anniversary of the festival, and the Mission Chamber Orchestra of Rome – Lorenzo Turchi-Floris, artistic director – will be in residence, along with Juan Castillo, Panamanian composer of a newly commissioned orchestral piece dedicated to the Panama Canal centennial. Its premiere will take place



James Brooks-Bruzzese

during Summerfest and will be a highlight of the Gainesville performance. Turchi-Floris will join the maestro and chamber orchestra members for a memorable concert in Gainesville on Friday, Aug. 15, 2014, at 7:30 p.m. at the University of Florida Phillips Center for the Performing Arts.

The Mission Chamber Orchestra is an established international ensemble that has been acclaimed throughout Europe. Its musicians are experienced professionals, graduates, and faculty members of noted European conservatories, devoted to presenting musical excellence and organizing performances of high humanitarian importance, and furthering the important goal of educational outreach. From Baroque to contemporary,



the orchestra offers innovative programs to provide its audience with a wide range of music. They perform often for the Vatican and worked on a project with Vatican City to present an important music festival in 2013.

Several signature pieces of Summerfest 2014 will be composed by Turchi-Flores.

### Symphony of the Americas

The Symphony of the Americas has been thrilling audiences since 1987 with world-class performances of masterworks of the classical repertoire. Under the maestro's leadership, the symphony is committed to serving South Florida's multicultural population.

The symphony has taken an inventive approach each season to combine classical music with other art forms and to engage and develop new audiences. International guest artists encompass ballet soloists, the classical Mexican mariachi, the pulses of tango, the mesmerizing acrobats of Cirque de la Symphonie, the drama and intensity of opera, toe-tapping Broadway, and the rhythms of Spanish zarzuela.

### The Artistic Director

Brooks-Bruzzese was born in Panama to a Colombian mother and a father who was a member of the U.S. armed forces. He received his doctorate in opera conducting and musicology from Washington University in St. Louis, Mo., and coached with the great Pablo Casals. Brooks-Bruzzese has performed his artistic mastery stirring audiences with orchestral performances at many of the most prestigious venues worldwide.

His studies were with eminent conductors Leonard Slatkin, director of the St. Louis Symphony and others, Ignace Strasfogel of New York's Metropolitan Opera, and Richard Karp of the Pittsburgh Opera. Their mentorship is clearly evident in the maestro's founding of the Augusta Opera, Florida Music Festival, and Summerfest.

As a Hispanic, the maestro has toured the former Soviet Union, conducted at the famed Vigado, Concertgebouw, and Teatro Colon theaters, and is the first Hispanic to bring music education programs from the United States to young children throughout Latin America.

The maestro has been recognized by heads of state and dignitaries all over the world; U.S. President Ronald Reagan praised

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***"The Bach was one of the most sublime moments of the evening ... it was so beautiful, so heavenly ... Brooks' baton was precise, brilliant and showed security ... which created magic and fantasy."***

***– Le Prensa Panama, República de Panamá***

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maestro as an "Ambassador to Latin America for his exceptional musical talents and diplomatic skills."

He has worked with international soloists including Yo-Yo Ma, Emanuel Ax, Roberta Peters, Joaquin Achucarro, Bella Davidovich, and Eugene Istomin, and has appeared with the national symphonies of Central America and the Caribbean, South America, Asia, and Africa.

### Pianist and Vice-President, Executive Director

Renée LaBonte is the symphony's pianist and vice-president, executive director. LaBonte is a 2007 honoree of Florida Grand Opera's DIVA Impresario Award for her contributions to the arts in Broward County. She has gained worldwide recognition for orchestral performances and recitals through Europe, Latin and South America, the Orient, and the United States. She has appeared with the national symphonies of Bulgaria, Costa Rica, Greece, Mexico, Peru, Spain, and Malaysia's Mozart Festival as well as with the internationally acclaimed Budapest Chamber Orchestra,

Cappella Istropolitana, the Czech Moravian Virtuosi Orchestra, and the Hungarian Virtuosi Chamber Orchestra in Budapest's famed Vigado Theater. She holds a teaching degree from the St. Louis Institute of Music and has studied at the Manhattanville College in New York. ■

Tickets for the opening Panama Canal Centennial Celebration with the Summerfest 2014 performance will be sponsored at the unbelievably low price of just \$15 each for orchestra seating and can be purchased through the Phillips Center at <http://performingarts.ufl.edu/tickets/> or by calling (352) 392-2787.

Tickets for a performance of this caliber will sell out quickly; reserve your tickets today!

# Discovering the Ancient Biodiversity of Tropical America:

## A Once-in-a-century Opportunity Along the Panama Canal

By Aaron Wood with Bruce MacFadden

### Introduction

If we could rewind time to 20 million years ago, the Isthmus of Panama, the land bridge joining the North and South American continents, was still being developed by geological activity. We would see Panama form the tip of a long peninsula, separated from South America by mere hundreds of kilometers of ocean. On land, life on the peninsula was superficially similar to the modern environments of Panama. Tropical forests and wetlands were teeming with a diversity of plants and animals, the majority of which, however, have their origins in the north, unlike the more even mixture of northern and southern species afforded by the land bridge today.

Twenty million years ago, species living in the ocean, including sharks, bony fish, marine mammals, mollusks, and a myriad of other marine invertebrates, were not separated into distinctive Pacific and Caribbean ecosystems as they are currently. These creatures could migrate with unimpeded currents within a homogenous tropical marine ecosystem that stretched along the coasts of the Central American peninsula and northern parts of South America.

The original construction and recent expansion of the Panama Canal has provided this rare window into Panama's ancient past. Natural exposures of rocks and their fossil content are extremely rare in the tropics. The warm and humid weather combined with the tropical forest's voracious appetite for new space and soils quickly erode and obscure rocks as soon as they are exposed, hiding the secrets of the geologic past.

Without the Panama Canal, our understanding of how the isthmus formed and its effects on both land and in the oceans would be greatly diminished. Documenting the ancient biological diversity of Panama, particularly the diversity of plants and animals that lived on land, would have been nearly impossible

without the fresh exposures of rock excavated along the Canal. The original excavation of the Panama Canal and current expansion 100 years later have truly provided once-in-a-century opportunities for scientific inquiry.

The Florida Museum of Natural History (FLMNH), along with its many U.S. and international partners, is taking advantage of the opportunities afforded by the expansion of the Canal, initiated by the Panama Canal Authority in 2007. A diverse team of scientists, educators, and students have been brought together to study the ancient biodiversity, climate and environments of the New World Tropics. Our work builds upon the intriguing discoveries of the Smithsonian Institution and the U.S. Geological Survey made during the past century in Panama. The University of Florida's Panama Canal Project (PCP), a project funded by the U.S. National Science Foundation's Partnerships in International Research and Education (PIRE) program, has made significant progress in reconstructing Panama's environments 20 million years ago and documenting new fossil plants and animals. This work has resulted in a tenfold increase in recorded biodiversity of extinct species in some cases.

Along the way, PCP PIRE participants conduct field work, research, and science education and outreach in international





settings, primarily in Panama, Colombia, and the United States. This international experience is highly important not only for improving each individual's bilingual abilities, but also for breaking down geographical and cultural barriers to performing international research and science, technology, engineering, and mathematics (STEM) education. The PCP PIRE provides some level of international experience to students and scientists across all age and career levels, from

**PCP PIRE students and interns conducting paleontological fieldwork along the Panama Canal. Clockwise starting from top left: Students from the United States and Panama work at a very fossil-rich quarry during the annual spring break field trip to the Panama Canal; PCP PIRE intern Erik Fredrickson carefully extracts a fossil rhinoceros shoulder bone near the new Pacific Locks; and PCP PIRE intern Sarah Widlansky prospects for fossils exposed on the surface while dredging of the Panama Canal occurs in the background.**

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*1985 Marine Engineering Graduate  
Texas A&M University at Galveston  
Executive Vice President  
Engineering and Program Management Department  
in charge of the Panama Canal Expansion Program*

## HISTORY IN THE MAKING. AGAIN.

As we celebrate the Centennial of the Panama Canal, it is only fitting that we salute the graduates of Texas A&M University at Galveston. For more than 50 years mariners from the institution's maritime academy have sailed ships through the canal. The university's marine scientists have researched the Canal Zone waters. Today, A&M Galveston's engineers are leading the construction for the historic Panama Canal Expansion – opening a new era of opportunity for world maritime commerce.



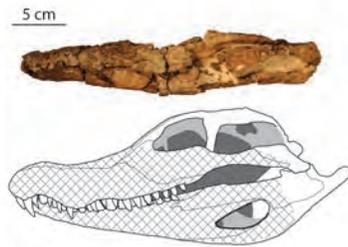
**GALVESTON CAMPUS**



A lower jaw fragment and teeth from the small fossil camel *Aguascalientia panamaensis*<sup>1</sup>. In comparison to the modern llama and dromedary camel, this 20-million-year-old camel from Panama was remarkably small, standing less than 3 feet high at the shoulder.



Petrified fruits from well-known families of tropical fruits: (left to right) the soursop family (Annonaceae), the mango family (Anacardiaceae), the passion fruit family (Passifloraceae), and the coco plum family (Chrysobalanaceae).



Artist reconstruction<sup>2</sup> and fossil skull of *Culebrasuchus mesoamericanus*, an extinct species of caiman<sup>3</sup>. The cross-hatched area on the sketched black caiman skull indicates the portions of the skull preserved in fossil specimen shown above. The evolutionary relationship between *Culebrasuchus mesoamericanus* and all other fossil and modern caimans indicates that caimans were able to disperse between North and South America before the geological development of the Isthmus of Panama.

### Representative fossil animals and plants from Panama.

kindergarten students to tenured professors, taking advantage of the opportunities offered by the Panama Canal.

### Ancient Biodiversity and Environments

The New World Tropics, the area of land and ocean between 23° north and 23° south latitudes, is a hotspot of biodiversity today. The number of species of mammals, birds, reptiles, amphibians, fish, insects, trees, herbaceous plants, and many other groups of plants and animals is greater in the tropics than at higher northern and southern latitudes. The fossil record, however, is ironically sparse in the New World Tropics due to the rare exposures of fossil-bearing rocks mentioned above. Consequently, it is not clear how this extraordinary biodiversity came to be or when it was established.

The fossil-bearing rocks of the Panama Canal Basin record a time millions of years before what is known as the Great American Biotic Interchange, or GABI, a series of events in which land vertebrates dispersed between North and South America. The GABI dispersals are intimately tied to the development of the Isthmus of Panama. A peak in the number of these dispersals began roughly 3-4 million years ago, indicating the isthmus formed a

complete land bridge at this time. The fossils from the Panama Canal, therefore, give us a perspective on ecosystems before the continents were connected and the oceans were divided.

Our knowledge of fossil mammals in Panama before the formation of the isthmus is quickly becoming clearer through the efforts of the PCP PIRE team. The number of species of fossil mammals has increased sevenfold since the first publications discussing this 20-million-year-old fossil fauna in the 1960s. Fossil horses, camels, musk deer, peccaries, rhinos, gopher-like rodents and flying squirrels have all been discovered in the fossiliferous rocks of the Panama Canal Basin, as have fossil canids (wolves, coyotes, and foxes) and procyonids (raccoons, coatis, and olingos). Other captivating fossil mammals from Panama, such as the hippo-like anthracothere, the large carnivorous amphicyonids or bear dogs, and the horned, deer-like protoceratids, do not have direct living descendants. Remarkably, all of these fossil mammals found in Panama have their evolutionary origins in the Northern Hemisphere.

Likewise, the record of terrestrial plants continues to grow as new evidence from fossil leaves, fruits, seeds, and pollen accumulates. This 20-million-year-old record includes many typical neotropical plants, including the cassava and soursop families,

1. Rincon, A.F., J.I. Bloch, C. Suarez, B.J. MacFadden, and C.A. Jaramillo. 2012. New Floridatragulines (Mammalia, Camelidae) from the Early Miocene Las Cascadas Formation, Panama. *Journal of Vertebrate Paleontology* 32: 456-475.  
 2. Reconstruction of *Culebrasuchus Mesoamericanus* by Danielle Byerley of the Florida Museum of Natural History.  
 3. Hastings, A.K., J.I. Bloch, C.A. Jaramillo, A.R. Rincon, and B.J. MacFadden. 2013. Systematics and Biogeography of Crocodylians from the Miocene of Panama. *Journal of Vertebrate Paleontology* 33: 239-263.

# KEEPING THE PANAMA CANAL MOVING FORWARD.

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which have their evolutionary origins in South America. Clearly, many terrestrial plants were able to disperse over the seaway well before mammals. Likewise, fossil boa constrictors and caimans in Panama provide evidence that reptiles dispersed between the continents prior to 20 million years ago, perhaps as long ago as the end of the "Age of Dinosaurs" (Cretaceous).

We are left with important questions concerning these intercontinental dispersals before the GABI. Are these simply chance events in which some organisms "won" the migratory sweepstakes? Or was there a filter that allowed some groups of organisms to make the crossing while restricting others to stay at home? Such a filter could be imposed by differences in the ancient environments and climates. On the other hand, the filter may be due to the physiological or ecological characteristics of the organisms themselves, giving some species a greater dispersal potential. The discoveries the PCP PIRE team is making along the Panama Canal will be key to answering these types of exciting questions.

### Training the Next Generation of Globally Engaged Scientists: Intellectual Capital for the 21st Century

In the eyes of the National Science Foundation (NSF), one of the basic components of the PIRE program is training of the next generation so that they can more effectively enter the global arena of science. In addition to senior investigators, the PCP PIRE therefore focuses on the professional development of undergraduate and graduate students and postdoctoral fellows. These members of the project team come from the United States, Panama, Colombia, and Peru, and are involved in research projects, mentoring, and international fieldwork along the Panama Canal. They are therefore contributing to advancing knowledge of the ancient biodiversity of Panama. These young professionals are disseminating their research through papers presented at scientific meetings and articles published in peer-reviewed professional journals.

At the moment, the excavations along the Panama Canal are ongoing and continue to provide opportunities to advance knowledge and discovery. In several years the sedimentary outcrops will be lost as the Panama excavations wind down. We have therefore maximized a "boots-on-the-ground" campaign via developing a PCP PIRE internship program. Interns are typically university students taking time off from their studies to gain international experience and spend three to four months in Panama. They live in a project house rented for the interns ("Casa de los estudiantes"), do fieldwork and research, participate in activities (e.g., seminars) at our partner, the Smithsonian Tropical Research Institute (STRI), and otherwise benefit from the immersion experience in Panama. Since January 2012, we have had 23 PCP PIRE interns working in Panama.

### Broader Impacts of the PCP PIRE

In addition to the fundamental research discoveries and training the next generation of scientists, the PCP PIRE has a third component that NSF calls "Broader Impacts," i.e., how

our project can be communicated for the benefit of society. Our broader impacts are varied, and include activities such as partnering with museums and universities and conducting STEM teacher professional development.

Panama is currently in the final phase of building a spectacular, world-class museum devoted to New World tropical biodiversity. Designed by the world-renowned architect Frank Geary, once it is opened in 2014, the BIOMuseo will be a signature iconic architectural element greeting visitors to Panama along the southern approach to the Panama Canal (Amador Causeway). The BIOMuseo will celebrate Panama's biodiversity past and present with state-of-the-art exhibits that will capture the imagination of the projected quarter-million visitors per year. The BIOMuseo does not maintain its own natural history collections. Therefore, as part of our outreach, the PCP PIRE has partnered with the BIOMuseo by developing replicas of fossils from our museum as well as collaborating in a temporary exhibit on our discoveries from the Canal that will be featured when the BIOMuseo opens. We also have been developing other partnerships with the Museo de Ciencias Naturales in downtown Panama City and the museum at UNACHI (Universidad Autónoma de Chiriquí) in David, Chiriquí.

As another part of our outreach, we have partnered with schools from the United States and Panama to involve STEM teachers in authentic international research experiences. During July 2012 and 2013, we led a group of six teachers (from California and Florida) to Panama for a two-week intensive learning experience about paleontology and ancient and modern biodiversity. The teachers interacted with our PCP PIRE interns and postdocs, attended lectures and seminars at STRI, did bird watching in the rainforest, took a trip across Lake Gatun to Barro Colorado Island – the STRI research station – and conducted fieldwork alongside paleontologists. When they returned to their classrooms after the trip, the teachers worked to incorporate what they learned in the field into their lesson plans. To think that we are able to not only affect teachers, but also indirectly the students that they teach, multiplies the impact and reach of the PCP PIRE educational and outreach activities.

### PCP PIRE Concluding Remarks

We are very fortunate to have the opportunity to develop such a comprehensive and far-reaching project like the PCP PIRE. Given the magnitude of the current excavations, it truly is a once-in-a-century opportunity to advance research, train the next generation of scientists, and conduct meaningful outreach that impacts and benefits numerous segments of society both in the United States and Panama. ■



For further information about the PCP PIRE, consult our website (<http://www.flmnh.ufl.edu/panama-pire/>) or sign up for our monthly e-newsletter (as described on the website).

Digging the Canal,  
mixed material.





# Health and Safety During Canal Construction

By Nancy Schaefer  
Nina Stoyan-Rosenzweig  
Rolando Garcia-Milian

Like many great construction feats, successful completion of the Panama Canal depended on evolving technologies and the ability to control the environment. For the Canal, this meant controlling infectious diseases and reducing death rates. With mortality estimated at 25,000 for the French and American eras combined, the 47-50-mile-long Panama Canal cost approximately 500 lives per mile. Although health was an initial barrier to completion, the resources brought to bear in solving disease issues helped to create a permanent focus on tropical health concerns in the Canal Zone.

Yellow fever and malaria hampered the French attempt and shaped the American effort. Although not the only diseases present, they were pervasive and caused significant suffering and loss of work. During the year starting December 1904, yellow fever hit the recently arrived American Canal employees so hard that construction work was partially suspended. More than 21,000 of the more than 26,000 employees working on the Canal were reported hospitalized for malaria at some time during the year 1906. As word of these illnesses spread, worker recruitment became increasingly difficult.

# U.S. Government Approves Louisiana International Gulf Transfer Terminal Regional Center

## Approval Clears Way to Create Nation's Largest Deep-water Containerized Cargo Transfer Terminal

Louisiana Sen. A.G. Crowe's vision of making America more competitive and capitalizing on the Gulf of Mexico's deep-water resources has taken a major step forward – the Louisiana International Gulf Transfer Terminal Regional Center (**LIGTT RC**) has received approval from the U.S. Citizenship and Immigration Services (CIS). This will allow development of the largest transshipment facility in the United States, known as the Louisiana International Gulf Transfer Terminal. The terminal is designed to improve trade and enhance America's competitiveness amid increased shipping demand. It will achieve this by opening up a new supply chain via the Mississippi River and its tributaries that reaches 32 states and Canada (over 14,500 miles of inland waterways), while generating jobs and reducing environmental concerns related to the transportation industry.

The terminal will be located just east of the mouth of the Mississippi River at Mile 0 off Louisiana's Gulf Coast. Because of its location in deep water (at a minimum of 70 feet), it will be able to accommodate the massive ships known as Post-Panamax vessels that are expected to begin transiting the expanded Panama Canal. It will also be able to handle even larger ships known as Super Post-Panamax vessels currently in operation. The terminal will employ a hub and spoke system for transporting goods to and from America's heartland, expanding America's shipping capacity by more than 2 million 20-foot equivalent units (TEUs) annually – with the goal of ultimately expanding capacity up to 3.5 million TEUs annually.

"This is a major infrastructure opportunity for this country. With this terminal in place, America will be ahead of the curve and able to keep pace with modern international trade, particularly as the Panama Canal undergoes its historic, first-ever expansion," said Adm. James Milton Loy, former deputy secretary of the U.S. Department of Homeland Security (DHS) and former commandant of the U.S. Coast Guard (CG). "The Gulf of Mexico provides an ideal location to maximize shipping routes through other ports and inland waterways that until now have been largely untapped."

Similar to the Louisiana Offshore Oil Port, which serves as port of call for massive crude oil tankers too big for U.S. inland ports to offload oil, the terminal will be a transfer point for container vessels arriving from Asia and other regions, as well as for U.S. exports headed to foreign destinations. In support of DHS's goal of ultimately screening 100 percent of all cargo entering the country, the terminal has set its own goal to have all arriving containers electronically screened by DHS. After screening, goods will be delivered to the Midwest and other ports in the Gulf and around the country via specially designed container-carrying vessels. These vessels, equipped with cranes, require just a 9-foot draft and travel upriver through the Mississippi and its tributaries.

A number of federal agencies have expressed interest in eventually having a presence at the facility, including the U.S. Department of Defense, the U.S. Department of Veterans Affairs, DHS, the U.S. Transportation Command, the U.S. Drug Enforcement Administration and the U.S. Department of Labor. Other interested stakeholders include the Army Corps of Engineers, CG, the U.S. Environmental Protection Agency, the U.S. Department of Transportation, the U.S. Department of Commerce and the U.S. Chamber of Commerce.

- Economically hard-hit areas in Louisiana and Mississippi stand to benefit from the development and operations of the terminal. In particular, the project has established a target goal of filling nearly 25 percent of its available positions with U.S. military veterans (and/or their spouses).

"This project is projected to create tens of thousands of new jobs and generate tens of billions in revenue for the next century throughout the interior of the United States, benefitting 32 states and Canada," said Crowe, head of the **LIGTT** Port Authority Commission (PAC), which is overseeing the project. "It will add a third major port of entry to America's heartland to complement the existing East and West Coast ports of entry."

According to the most conservative economic studies, the terminal will generate nearly 180,000 direct and indirect jobs within 32 states, of which 34,000 will be in Louisiana over a multi-year period. This also includes jobs created through a multiplier effect across a broad supply chain, as the terminal is expected to increase demand for U.S.-made concrete, steel and other construction materials.

- The terminal will increase America's shipping efficiency at a time when the expanded Panama Canal is expected to introduce larger ships, which will hold up to four times as many containers as current vessels. Ports that accept these massive ships require a minimum 50-foot draft to navigate and dock. The new terminal will not require expensive long-term labor-intensive dredging, which is common throughout the industry, because of its location in permanently deep water (70 feet minimum) and its ability to handle the new 18,000 container vessels. The terminal's flexible design and initial 500-acre site allow for expansion as needed.

**LIGTT's** central and strategic location in the Gulf of Mexico provides critical connections that will help vessels reach hundreds of inland waterway ports and destinations more efficiently and with less environmental impact from carbon emissions. Currently, America's inland waterways transport just 2 percent of the nation's containerized cargo. The U.S. Maritime Administration's goal is to reduce wear and tear on highways, as well as take some of the strain off rail systems by utilizing U.S. massive waterways.

"The need for smart solutions has never been greater as America's existing infrastructure is strained and cannot sustain the upcoming shipping volume growth," said John Vickerman, president of Vickerman & Associates, a port and intermodal planning and design firm. "This project represents a major milestone, positioning America to better capitalize on existing resources for transporting goods, while helping to reduce the impact on the environment."

The terminal will increase the reliability and efficiency of the shipping process by enabling some cargo to travel to inland areas by **LIGTT's** self-propelled specialized container-carrying vessels, moving along America's internal waterway systems. It will also reduce the need for ships to idle because they will not have to wait for a berth slot; the terminal will be a world-class green-built facility.

- This critical infrastructure project was envisioned by the **LIGTT (PAC)**, which was created following the passage of Louisiana State Senate Bill 780, Act 699 – introduced by Crowe and signed by Gov. Bobby Jindal in 2008. In a rare example of bipartisanship, the bill passed both the state's chambers unanimously, with no dissenters.

The recent CIS approval allows the **LIGTT RC** to operate as an EB-5 immigrant investor capital regional center. EB-5 projects provide foreign nationals with a method of obtaining permanent resident status in return for investing money in critical U.S. projects that create jobs.

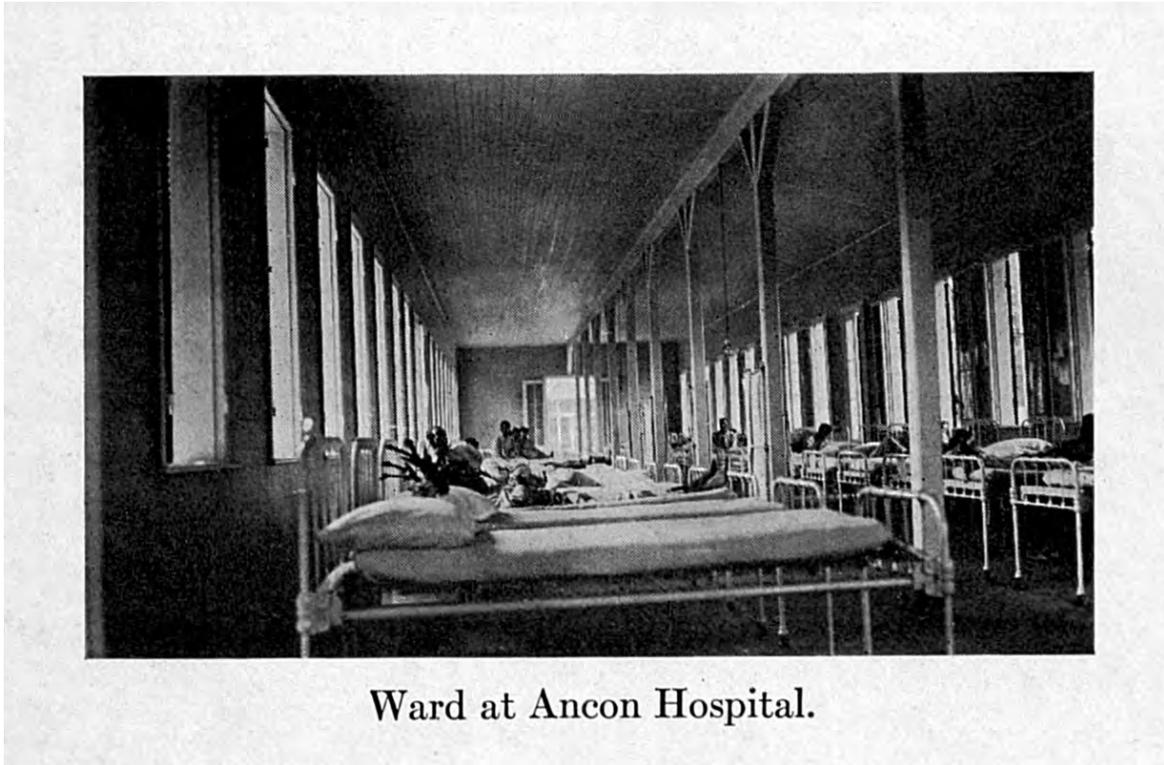
The **LIGTT PAC** will oversee the project, which is being managed by the **LIGTT RC** and developed by **LIGTT** Development Partners. PAC includes the Louisiana secretaries of the Department of Economic Development and the Department of Transportation and Development, and the chairmen of the House of Representatives and Senate Committees on Transportation, Highways & Public Works.

The project will be capitalized through the EB-5 immigrant investor capital program, along with other traditional forms of investment. The **LIGTT RC** will adhere to strict guidelines for reporting corporate governance and disclosure information to the government and investors, communicating through quarterly reports to stakeholders, regular media releases and live webinar briefings.

Preconstruction work on the terminal began in November 2013.

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Ward at Ancon Hospital.

An image from the book *Sanitation in Panama* by William Crawford Gorgas, 1854-1920, D. Appleton and Company, New York, London. 4 p.l., 297, 1 p. front., illus. (map) plates. 20 cm. 1915.

## Diseases

Climate, microbes, and humans combined perfectly for disease proliferation in the Panama Canal area. For three centuries before construction even began on the Canal, merchant ships brought malaria, yellow fever, cholera, and plague to the area, and its constant warm temperature, humidity, and lush vegetation provided ideal breeding conditions for disease-carrying mosquitoes and rats. Panamanians had developed some resistance to yellow fever, but not to malaria. Panamanian suspicion of French and American aims caused reluctance to work on the railroad and Canal projects, and war with Colombia (1899-1902) depleted Panama's labor force. Thus, both the French and the Americans resorted to the recruitment of large numbers of laborers from Africa, Asia, Europe, the United States and the Caribbean. These imported workers lacked immunity, making them excellent new hosts for disease-carrying insects.

**Malaria:** In 1880, Charles Alphonse Laveran discovered *Plasmodium*, the malarial parasite. Ronald Ross, a British officer in the Indian Medical Service, discovered the life cycle of the *Anopheles* mosquito, and how it transmitted that parasite, in 1897. A year later, Giovanni Battista Grassi and a team of Italian investigators conclusively proved human

transmission and demonstrated the complete life cycle of the parasite in humans.

**Yellow Fever:** Much of the search for yellow fever's cause took place independently of the malarial research. Yellow fever was generally believed to result from an environmental contagion, although the pattern of infection was inconsistent – one person could be struck down by the disease while another in a house next door would be unaffected. In 1881, Cuban Carlos Finlay, M.D., postulated a mosquito vector based on personal observation in his Havana practice. He identified the mosquito species responsible and proposed controlling the mosquito population as a means of controlling the disease, but was unable to prove his theory experimentally.

Only in 1900 were experiments designed to demonstrate unequivocally that mosquitoes spread yellow fever. Cuba had suffered from yellow fever outbreaks since 1649, when a third of Havana's population died from the disease. After suffering major casualties from disease during the Spanish-American War (1898) and the occupation of Cuba, the U.S. Army sent Walter Reed and the U.S. Army Yellow Fever Commission to the island to find the cause of yellow fever. The commission proved experimentally that the disease was transmitted by mosquitoes rather than by contact with infected individuals or soiled bedding or other materials. Among the volunteers willing

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to risk contracting the disease were Dr. Jesse Lazear and nurse-volunteer Clara Maass, who was infected a second time to test the theory that one contact with yellow fever led to immunity.

### Measures to Control Illness

Once the mosquito was identified, its habits were used to control disease transmission. Col. William Gorgas, chief sanitation officer in Havana, led efforts to prevent contact and eliminate mosquito breeding areas in Havana. The yellow fever-carrying *Aedes* (subgenus *Stegomyia*) mosquito tends to live close to humans and breed in man-made containers holding water during the dry season, so fumigating homes and eliminating standing water helped control the mosquito population in urban areas. Within a relatively short period of time, yellow fever was eradicated in Havana. When he heard about U.S. plans to build the Canal in Panama, Gorgas requested a transfer because he believed the methods for eliminating *Stegomyia* could translate to the rural areas of Panama. The malaria-carrying *Anopheles* mosquito's behavior patterns differ from those of *Stegomyia*, so his efforts would need to target both species.

Gorgas was appointed chief sanitation officer of the Canal in 1904 and began the effort to control the mosquitoes in the Canal Zone, which was acquired by the United States that same year. At first he encountered resistance to the idea that mosquitoes carried malaria and yellow fever – this fact was still considered a new and unproven theory by many – so it was not until 1905 that Gorgas gained support for his activities. To eliminate mostly night-biting mosquitoes from homes, his sanitation department encouraged architectural designs that maximized ventilation yet minimized unscreened entries; installed, inspected, and repaired window and door screens; and sealed cracks in buildings. Sanitation efforts targeted mosquito breeding grounds by draining swamps, digging and paving drainage ditches, removing open water containers, and covering ponds and other standing bodies of water with oil to suffocate the larvae. Larger bodies of water were covered with larvicide to kill the larvae. The sanitation department also improved the sewer system's partially exposed underground channels, paved roads, and implemented a system for collecting “night soil” (waste).

The construction effort itself brought on challenges. Excavation and the constant moving of heavy equipment left depressions that filled with rain, making more ideal breeding beds for mosquitoes. At one point, depositing silt in a small lake provided abundant nutrients to create a swarm of *Anopheles* (malarial) mosquitoes in an area that had previously hosted a relatively small population.

In addition to mosquito-borne diseases, typhoid, cholera, dysentery, pneumonia, bubonic plague, leprosy, and other infectious disease had to be addressed. Long hours of physically demanding work in rain – often standing in deep water – and overcrowded workers' barracks facilitated widespread

pneumonia, while lack of thiamine did the same for the far-less-pervasive beriberi.

All vessels transiting the Canal after it became functional in 1913 – even if both departure and destination ports were foreign – were subject to quarantine if a person or animal on board was sick with, carrying, or capable of conveying a quarantinable disease. This made the Canal a giant sieve to sift out disease that might otherwise pass through the world's highways, infecting other lands.

Health appropriations during the decade of construction – including sanitation, hospitals, medical attendance, and other activities – totaled \$20 million, but the results were spectacularly successful; after 1906 no more cases of yellow fever were reported, and cases of malaria, while never disappearing, also declined significantly.

### General Living and Working Conditions

Workers on the Canal also faced difficult living conditions. When available, 50-foot by 30-foot huts – built by the French 20 years previously and not all well-maintained since – housed 40 to 50 West Indians, sometimes more. Constant traffic and inevitable holes made screens ineffective mosquito barriers in these quarters, necessitating a daily visit from “mosquito killers” who would lure mosquitoes to their deaths into test tubes containing a drop of chloroform. Other workers in the early days lived in tents or even boxcars – both impossible to screen. Several West Indian workers spoke of having to boil water to make it potable. Mess halls for these laborers lacked chairs, tables, and appealing food. Thus, the housing and the food available to the unskilled laborers rendered them more vulnerable to disease and injury.

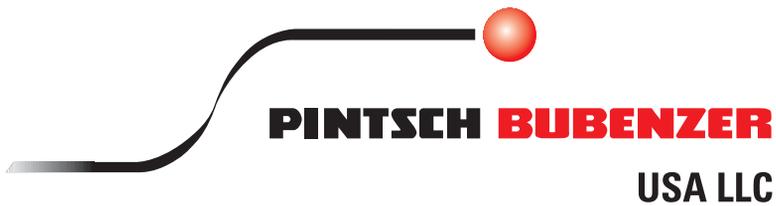
### Injuries

Especially during the building of the railroad in the French era, workers feared injuries even more than disease. During all of the French construction and most of the American Canal construction, few state and no national or international laws existed to compensate construction workers and their families for death or disability.

Injuries in the Canal Zone stemmed from both natural and man-made causes. Natural causes included deadly snake bites, wild animals, overexposure to sun and rain, and landslides. Coral snake venom attacked the nervous system, while the bite of the 10-foot mapana snake caused internal bleeding and degeneration of organs. One Panamanian worker wrote years later of entangling his feet with a 15-foot snake while running down a steep hill. Another laborer recounted sightings/encounters with “lions” and “tigers” (puma and jaguars), although only 38 cases of kicks, bites, riding, and other animal-related injuries were reported by employees late in construction (1908-1911) – none fatal and only 14 involving disability (maximum: 13 weeks).<sup>1,2</sup>

Minor landslides occurred prior to 1908, but then large-scale excavation disturbed root-holding vegetation and displaced

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soil-compacting rock. A Barbadian worker wrote of a March 1907 slide that carried away a few houses and a shop and of the largest slide (Oct. 22, 1913) in which “the toe of the slide advanced 75 feet in 40 minutes, carrying away all four of the construction tracts, ... immobilizing a 16-foot ... flatcar, two locomotives and two steam shovels.”<sup>3</sup> Annual reports reveal that “traumatism by landslide” accounted for 40 hospitalizations in 1912-13 and 15 admissions in 1914-15, with both years including a death in this category.<sup>4,5</sup>

Among the human and technological causes of injuries were suffocation by noxious gases, burial under equipment in quick-moving landslides, falling or being thrown from or run over by railroad cars, and falling from or being hit by objects falling from the scaffolding used in construction of the eight-story-high locks. Several West Indian laborers wrote of steam shovels tipping over, and one noted the lack of protection against cement dust. Welders and riveters worked without safety harnesses or became unhooked from other tethers with sudden movement. Objects or people occasionally fell on unstable parts of lower scaffolding, causing the entire structure to collapse. Trains running around the clock in multiple directions occasionally ran over people or hit them with swinging booms. In 1914 alone, 44 employees were killed in railroad accidents. Railway accidents were dangerous throughout the construction era, even in 1915 when they were exceeded only by pneumonia and accidental drowning among all causes of employee deaths.

Falling and being hit by falling objects also occurred as workers drilled dynamite charge holes into rock precipices. The dynamite of the time was so unstable that even its “sweat” could set off an explosion if it was not handled carefully. It occasionally malfunctioned or didn’t ignite on detonation but exploded later. At least once lightning is thought to have set off charges prematurely. In the worst single accident (Dec. 12, 1908, at Bas Obispo), premature explosion claimed 23 lives and injured 40 workers.

## Health Care

In the early days of the construction of the Canal, the sick and dying reported to work not only to get paid but also to be allowed to sleep in the camp at night. If sick or injured sufficiently to require hospitalization, a patient endured transportation by horse cart, train, or launch to a healthcare facility.

The Americans purchased two hospitals and a convalescent center from the French on May 4, 1904, although they were in poor condition due to neglect since the French departure in 1889. Care was segregated, with “colored” wards in hospitals usually located in the worst parts of these buildings and lacking isolation units, thereby increasing the risk of hospital-acquired infection. In April 1915, the U.S. Congress appropriated \$2 million for a new hospital, which became known as the best medical facility south of the Rio Grande with its 33 doctors and 81 trained nurses, but it was too late to help during the construction of the Canal.

During the American construction era, about 40 hospitals of five to 15 beds each – called rest camps – housed the sick until they could be moved to a district hospital (20 to 100 beds each).

Quinine was bought by the ton for Canal Zone dispensaries and hospitals. In 1908 each employee was advised to take three grains daily (there are 437.5 grains in an ounce). One laborer wrote “malaria fever have [sic] me so bad I had to drink plenty quine [sic] tonic tell [sic] I heard singing in my ears ... going to quits drinking quine [...] was getting me deaf.”<sup>6</sup> Quinine’s ototoxicity meant warning whistles weren’t always heard in time to get out of a train’s way.

Medical staff were mistrusted: “Some were so afraid of those doctors in those days they would hide away and try to use their own remedies and when caught up with, would be brutalized or sometimes carried to jail, since laborers were supposed to be on the job or in hospital.”<sup>7</sup> Some medical doctors had experience with tropical diseases prior to their arrival in Panama, but many were very recent graduates of medical colleges. Samuel Taylor Darling, the pathologist who performed most of the autopsies on malarial patients (about 4,000), published extensively on diseases, including a formula for a larvicide.

## Conclusion

Even after infectious disease had been controlled by new discoveries and technologies, the magnitude of the effort, the tropical climate, and the limitations of humans and technologies of the day challenged health in the Canal during the construction era. Disease and injury negatively affected recruitment and maintenance of the labor force throughout this period. ■

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# Educational Outreach: Panama and the Making of Modern Caribbean Literature

By Leah Rosenberg

I was delighted when I learned of the union between the Panama Canal Museum and the University of Florida (UF) Libraries. Librarians Paul Losch and Richard Phillips informed me of the agreement and tried to temper my enthusiasm. While they made clear that the museum held a large and unique collection of books, photographs, archival documents, and objects and that the collection constituted a terribly important addition to the libraries, they did not understand why I was excited by the acquisition. I am a professor of literature, not history, and of the English-speaking Caribbean, not the United States or Latin America.

I had to explain. I was smiling so broadly because I knew that even if they had been established to preserve the history of U.S. employees, the archives of the Panama Canal Museum would also contain invaluable sources to illuminate the experiences of the more than 100,000 West Indians who migrated to Panama to build the Canal or support the project. While it would be hard to deny the importance of the West Indians, who comprised the majority of laborers on the Canal, the question remained: What could these hard-working men (and women) have to do with literature? Certainly few of the West Indian laborers were poets or novelists. However, as fictional characters, they had a special significance in Caribbean literature. While standard histories of the construction of the Panama Canal have focused

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Boarding house proprietress & children. March 17, 1920.

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on the United States' extraordinary feats of engineering and on the Canal's economic and military significance, relatively little attention is paid to West Indian laborers. When historians and writers do include them, we are often shown either comic figures or men living and working under difficult and dangerous conditions, with little opportunity to improve their lot.

By contrast, as literary scholar Rhonda Frederick has documented, Caribbean music and literature have given a much more dashing role to the West Indians who worked on the Panama Canal. They tell of their dreams and frustrations, their pain and their power. The figure from Panama most prominent in Caribbean literature is the flashily dressed "Colón Man," who returns to his West Indian homeland often with an American twang on his tongue and enough money to build a home and start a business. This Colón Man has played a surprisingly important role in Caribbean literature from the early 1900s onward, in works as diverse as Eric Walrond's *Tropic Death* (1926), Claude McKay's *Banana Bottom* (1933), George Lamming's *In the Castle of My Skin* (1953), Maryse Condé's *The Tree of Life* (1992), and Olive Senior's "Window" (1995). However, Panama did not just supply Caribbean literature with interesting characters. The hard-earned savings of West Indian workers and the profits of West Indian firms that supplied provisions to Panama created the capital needed for the growth of the West Indian middle classes, their political consciousness, nationalism, and yes, too, the production of modern Caribbean literature. Thus even as West Indians transformed the Panama Canal, the Canal also transformed West Indian society and culture.

In other words, I was delighted to discover UF's acquisition of the Panama Canal Museum Collection because I knew the collection would shed significant light on the lives of real Colón men. This historical knowledge would, in turn, help us to interpret their portrayal in Caribbean literature by making visible the differences between what happened and the stories Caribbean authors wrote. I would use the historical sources in the Panama Canal Museum Collection to teach students how to use primary historical sources to illuminate the significance of literature.

However wide my smile was back in 2010, I never dreamt that a short three years later, I would be teaching a course on the literature and history of West Indians in Panama. Much less could I have imagined that the course would be collaboratively designed by faculty and librarians at the University of Florida, the University of Miami (UM), and Amherst College and that we would be teaching it, concurrently, at all three institutions.

### The History of Our Panama Canal Course

In June 2012, I was attending the Caribbean Studies Association annual conference in Guadeloupe, where I had the honor of meeting Rhonda Cobham-Sander, a scholar whose work I had admired for more than 20 years. We both presented papers on the importance of the archives to Caribbean literary studies in which we explained how access to literary and historical documents was significantly changing the field. Prior to the early

2000s, Caribbean literary studies focused almost exclusively on literature published after 1950, even though literature of the 1910s, 1920s, and 1930s, such as Herbert de Lisser's *Jane's Career* (1913) or C.L.R. James's *Minty Alley* (1936) had been the first literature to tell the stories of ordinary Caribbean people from a Caribbean perspective. In the 1980s, Cobham-Sander had eloquently written on the importance of this work, but the books and magazines she wrote about remained largely unavailable. One had to go to the national libraries of Jamaica or Trinidad, for instance, to read them. As a result, few scholars could study them and yet fewer teach them. As a result, the field of Caribbean literary studies did not significantly expand to include pre-1950s literature until the early 2000s, when a new generation of scholars (myself included) began to publish on this early literature and the literature began to be made available online. (A significant number of early novels were also reprinted.)

The Digital Library of the Caribbean (dLOC) has been the primary open-access database to collect early Caribbean literature. This is important to our story because one of the first early literary texts to be included in dLOC was de Lisser's *Susan Proudleigh* (1915), which is the first Caribbean novel about the construction of the Panama Canal. Its heroine is a spirited and young Jamaican woman who travels to Panama and marries a responsible but boring Jamaican engineer who drives a steam shovel in the Culebra Cut. He dies in a mudslide, leaves her all his money, and she returns to Jamaica as an independently wealthy widow accompanied by a much more exciting Jamaican engineer, whom she loves. When Cobham learned that *Susan Proudleigh* (and nearly all of de Lisser's other books) were available in dLOC and that many historical resources from the Panama Canal Museum would also be available, she said to me: "We must teach a course on this!" We invited one more scholar, Professor Donette Francis at UM, because her work focuses also on archival research and literature.

The course is a pilot course for inter-collegiate collaborative learning and instruction in digital humanities. The collaboration was a great benefit; we had three libraries, three IT experts, three budgets, and three creative minds. Our three classes share a website where students share their written work. Thanks to funding from UF's Latin American Studies Program, the UF Libraries, UM, and Amherst, we have been able to invite five speakers, whose lectures and Q&A sessions are streamed live to the three campuses. These speakers have included Glenroy James, president of the Society of Friends of the Afro-Antillean Museum of Panamá, as well as Professor Rhonda Frederick, author of the groundbreaking literary study of West Indian literature and the Panama Canal, entitled "*Colón Man a Come*": *Mythographies of Panamá Canal Migration*. Rhonda, Donette, and I planned the course via conference call over a period of 10 months at the end of which we had a two-day workshop, hosted by Laurie Taylor of UF Libraries with financial assistance from UM, to pull together the content and technology. Throughout the planning and teaching phases of the course, we have received invaluable assistance from the UF, Amherst, and UM libraries.



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- Marine Services - Jason Marchioni - [jlmarchioni@weeksmarine.com](mailto:jlmarchioni@weeksmarine.com)

The reason we, as scholars, felt it imperative to teach such a challenging course is that it is not enough to make materials available on the Internet. Libraries and scholars must supply the contextual, bibliographical, and interpretative information to explain the significance of the materials so that instructors and researchers can make use of them. Without information about the construction of the Canal or the West Indian women who lived in the Canal Zone, *Susan Proudleigh* is a comic romance set in Panama. However, once one learns a bit about the historical – Susan Proudleigh’s life as a housewife who is married to an engineer with spacious quarters in Culebra supplied by the Canal Commission – the novel takes on new meaning. Most West Indian women worked for a living. Few would have lived as the mistress (not the servant) in an elegant home provided by the Canal Commission. Even her husband’s death obscures the reality of the Culebra Cut, as only three men died in the accident in the novel when hundreds upon hundreds of men died there in reality. Historical context makes clear that Susan is an exception and that de Lisser’s portrayal of the West Indians in Panama omits much of the hardship.

Thus, having read historical studies of West Indians in the Panama Canal Zone, students were keenly aware that de Lisser had portrayed the lives of West Indians in Panama with rose-tinted glasses. But they were able to draw more nuanced conclusions because they had access to historical photographs of the Culebra Cut, to accounts written by West Indian men about their jobs on the Canal, and in oral histories, as well as memoirs of white women that describe the West Indian women who worked as domestics and laundresses, and to periodicals like the *Canal Record* and the *Star and Herald*. These accounts allowed students to place de Lisser within a spectrum of U.S. and West Indian accounts. They concluded that de Lisser omitted many of the harsh realities described by workers in the essays for the Isthmian Historical Society. However, by presenting Jamaicans who are hardworking engineers, de Lisser depicted West Indians as significantly more prominent to the building of the Canal, more modern and more privileged than did most U.S. accounts. Why would de Lisser focus on the exception, rather than the norm? Students suggested that de Lisser’s account stood midway between the first-person accounts by laborers and U.S. accounts of the Canal, because de Lisser himself occupied an intermediate position, between white U.S. authors and black West Indian workers. Moreover, by presenting Panama as a place where Jamaicans can make good (or die), the novel writes Panama into national history as a source of Jamaica’s own progress toward modernity.

### Course Description: Panama Silver, Asian Gold: Migration, Money, and Modern Caribbean Literature

The course focuses on two often overlooked labor migrations that profoundly affected the emergence of modern Caribbean literature: The emigration and return of the Afro-Caribbean workers who built the Panama Canal and the immigration of



*Susan Proudleigh* by Herbert G. de Lisser, the first Anglophone Caribbean novel about the construction of the Panama Canal.

indentured laborers from India and China into the West Indies. Both groups worked under difficult conditions for exploitative wages. However, both used their savings to bankroll their entry into the educated middle class, thereby fostering the conditions that produced the first generation of nationalist politicians, as well as the first generation of Caribbean writers to achieve international acclaim. Students read a broad array of Caribbean literature about West Indians in Panama and Asians in the Caribbean written between the early 1900s and the early 2000s, including works by V.S. Naipaul, Sam Selvon, Claude McKay, Edgar Mittelholzer, Ramabai Espinet, Maryse Condé, David Dabydeen, and Derek Walcott. In addition to reading historical studies and literary scholarship, students are learning how to use archival material related to these 19th- and 20th-century migrations, including photos, court cases, newspaper reports, popular songs, and first-person accounts of the migrants’ experiences, to enrich their understanding of Caribbean literature.

In the first half of the course, students do hands-on assignments to learn research methods for each type of archival



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## Conjet Hydrodemolition Technology helped keep Panama Canal tow track repairs on schedule

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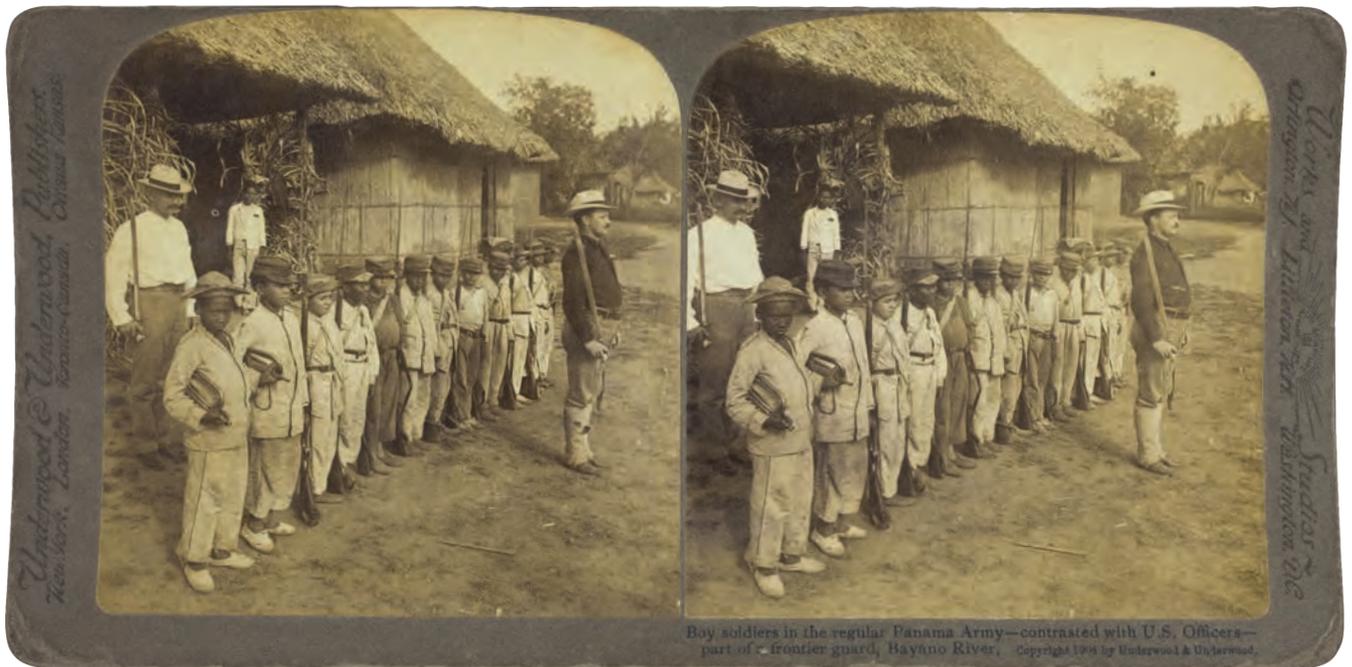


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**Stereograph showing boy soldiers in the regular Panama Army – contrasted with U.S. officers – part of a frontier guard, Bayano River. 1904.**

source, and in the second half of the course, students are introduced to the technology used in digital archiving (producing metadata, exhibit labels, finding guides) and digital humanities (e.g., Omeka, and time lines). Throughout, they are learning how to integrate primary historical research into literary analysis. They will contribute directly to the *Panama and the Canal* online collection and to dLOC by adding metadata to items in the collection, for which we currently have little data, and by producing finding guides and curated exhibits for materials in the collections. For example, one student is already in the early stages of designing an online exhibition for K-12 students that would use historical newspapers, photographs, and literature to produce a guide to the Canal Zone for prospective workers. This creative project would introduce students to the daily life of West Indians during the construction of the Canal by showing them what West Indians could expect in terms of weather, housing, work, medical care, and entertainment.

Many of the most important primary sources for the class are from the Panama Canal Museum collection and the Afro-Antillean Museum of Panamá. The Afro-Antillean Museum has contributed the entries for *Isthmian Historical Society competition for the best true stories of life and work on the Isthmus of Panama during the construction of the Panama Canal*, which contains the first-person narratives of men who worked on the Canal; it is one of the few sources of this material. Students have used it extensively to contrast the difficult experiences men describe with the relatively easy lives of the protagonists in *Susan Proudleigh*.

The Panama Canal Museum collection of stereographs and historical photographs is another invaluable resource for the

class. This stereograph collection offers rare images of West Indians in the Canal Zone. It contains views of black men at work on the Canal as well as relatively rare images of West Indian children; women as restaurant owners, servants, and laundresses; and West Indian prisoners, living quarters, and even black Panamanian child soldiers. The historical significance of these images will remain obscure without the historical identification and contextualization that students (and librarians) are providing. Involving students in research projects is a defining characteristic of university pedagogy, and it gives students a strong sense of purpose, in addition to preparing them for the job market by giving them new skills and accomplishments to list on their résumés.

### Conclusion

We hope that the course will become part of a broader initiative to make visible to other teachers and scholars new ways of incorporating archival material into research on Caribbean literature and culture. Since the Panama and Asian migrations are rarely privileged in stories Caribbean nationalists tell about the region, we want to use the course to intervene more broadly in the way Caribbean literary scholarship imagines the Caribbean cultural diaspora and interrogates the ways in which both traditional and colonial archival sources shape the stories we can tell about the Caribbean region. We hope our experiment will sow the seed for future collaborative courses involving students at institutions in the Caribbean, Panama, and beyond. We hope also that students will make meaningful contributions to the *Panama and the Canal* online collection. ■

# The Panama and the Canal Digital Collection and the Digital Library of the Caribbean

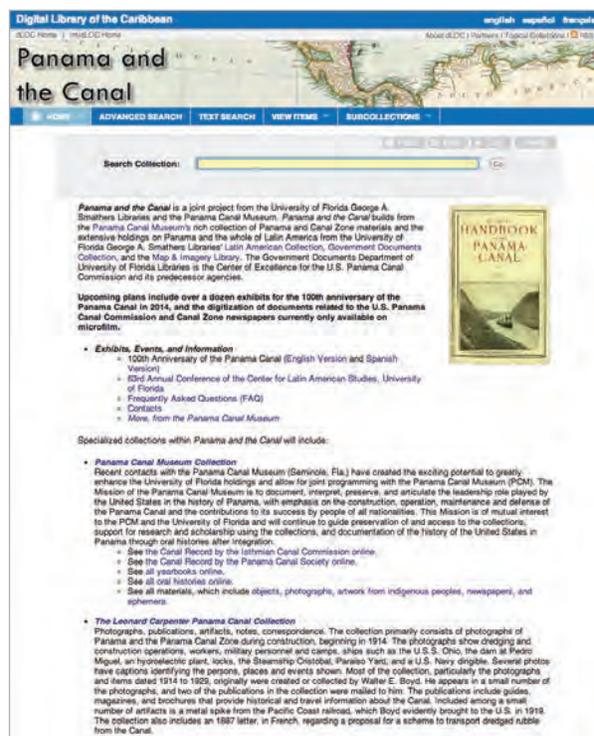
By Laurie N. Taylor

As explained on its homepage, the *Panama and the Canal* digital collection ([www.ufdc.ufl.edu/pcm](http://www.ufdc.ufl.edu/pcm)) is part of the joint project from the University of Florida (UF) George A. Smathers Libraries and the Panama Canal Museum. *Panama and the Canal* builds from the Panama Canal Museum's rich collection of Panama and Canal Zone materials and the extensive holdings on Panama and the whole of Latin America from the University of Florida George A. Smathers Libraries' Latin American Collection, Government Documents Department and the Map and Imagery Library. The Government Documents Department of University of Florida Libraries is the center of excellence for the U.S. Panama Canal Commission and its predecessor agencies.

The online collection has proven to be vastly successful, with interest and positive impact for researchers, students, and many others. Users from around the world have viewed the collection and its items 2,830,306 times. In addition to the collection materials, the history of collaboration and digital innovation within the George A. Smathers Libraries ensured the collection would be of tremendous use and benefit. Researchers have started creating new scholarly and teaching resources, leveraging and building upon the online collection materials.

## Smathers Libraries and Digital Library Innovation

The *Panama and the Canal* digital collection builds on the Smathers Libraries' long history of digitization for preservation, access, and innovation. The libraries began digitizing collection materials in the early 1990s for preservation. At that time, it was experimental and part of the research that supported the future success of digital libraries. For the first project, the Internet was not what it is today, and the libraries initially planned to distribute digitized materials by mailing



The home page of the *Panama and the Canal* digital collection website.

CD sets to people around the world. Fortunately, with the rapid Internet growth during the years for the first project, the libraries recognized the new opportunities provided by the Internet and began placing materials online. Even in this early and experimental first phase, rare and unique materials were digitized for worldwide free and open online access.



*Spillway* newspaper, 1v. : ill. ; 28-43 cm.,  
October 5, 1962, Balboa Heights CZ, Spanish.

The libraries' early digitization began with the Latin American Collection because of its prominence. The Latin American Collection also greatly needed preservation support to combat threats posed by the hot and humid tropical climate, acidic paper, hurricanes, and other environmental disasters. Prior to experimenting with digitization, the libraries had a long history of microfilming materials for preservation and access, shipping microfilm around the world. The early digitization efforts built on the technical and subject expertise that had been fostered and enriched through microfilming work.

The Latin American Collection is one of the largest and most respected collections in the world for Latin American and Caribbean materials. The collection has been central to the University of Florida throughout history, with major activities already under way by the 1930s.

In 1931, the university held the inaugural conference for the group that would become the Latin American Collection and the Center for Latin American Studies. During the conference, UF's Plaza of the Americas was dedicated at the closing ceremony, with 21 live oaks planted on the university quadrangle, one for each of the republics of the Americas of the time, and with Panama prominently represented.<sup>1</sup>

Over time, the libraries experimented with and eventually began microfilming materials from across Florida and the Caribbean for preservation. The many decades of microfilming for preservation and access supported the Smathers Libraries

in creating and sustaining the wealth of resources in the Latin American Collection.

In addition to technological work with microfilm and digitization, the libraries have continually supported and built community in collaboration with other libraries, universities, museums, and archives in Florida and the Caribbean. The Smathers Libraries collaborated and continue to collaborate with other institutions to share and ensure preservation of library materials.

### Digital Library of the Caribbean (dLOC)

In 2004, building from the history of strong and successful partnerships, the Smathers Libraries became one of the founding partners and the technical host partner for the Digital Library of the Caribbean (dLOC; [www.dloc.com](http://www.dloc.com)). dLOC is a cooperative digital library that houses resources from and about the Caribbean and circum-Caribbean. In the years since its founding, dLOC has grown to include 37 international partner institutions as well as many scholars, teachers, student researchers, and classes, with teachers and students who both use and contribute to dLOC. dLOC currently receives more than 1.5 million user views each month from users across the world.

dLOC partners facilitate access to digitized versions of Caribbean cultural, historical, and research materials currently held in archives, libraries, museums, and private collections. In addition to an abundant quantity of quality materials, dLOC also boasts a great variety of rare books, manuscripts, maps, newspapers, research publications, data sets, photographs, oral histories, official documents, ecological and economic data, histories, travel accounts, literature, poetry, musical expressions, artifacts, recordings of music and songs, and videos. dLOC partners also work to ensure these materials are intellectually accessible, collaborating with educators for primary, secondary, and university-level courses to promote Caribbean studies and new research initiatives.

Since 2010, free personal accounts called "myDLOC" have been made available. These accounts allow users to create bookshelves, save items to their bookshelves, and save searches. Over the past few years, UF has continued to expand the tools available in the myDLOC accounts.

dLOC's active, collaborative community contributes collection materials, just as they are doing for the *Panama and the Canal* digital collection. After the Smathers Libraries created the *Panama and the Canal* digital collection, many dLOC partners reviewed their holdings, selected Panama-related materials, digitized them, and contributed the materials to enrich the collection and support the University of Florida.

### Panama and the Canal Digital Collection

The *Panama and the Canal* digital collection provides free worldwide access for 267 titles that make up 4,652 items and a total of 152,602 pages. In June 2013, the collection saw more than 212,000 user views, for a total of more than 2.8 million user views



Panama Canal Related Stereographs holdings include "The Quaint Balcony-hung Avenue B of Panama."

since the collection began. Though usage cannot fully demonstrate the significance of the materials, such high usage is a clear indicator of interest and importance, and the contributions from dLOC partners further reinforce the importance of this collection.

As with all digital collections hosted by the Smathers Libraries, the main *Panama and the Canal* digital collection allows users to search and easily browse through all materials. Users can view all items in various ways, with standard images, zoomable images for close-up views of maps and other large or intricate items, page turner or flipbook views for books, thumbnail views to help users easily review full books and photo sets, and other views for specific item types to best support users in using the digital collection and all of the items.

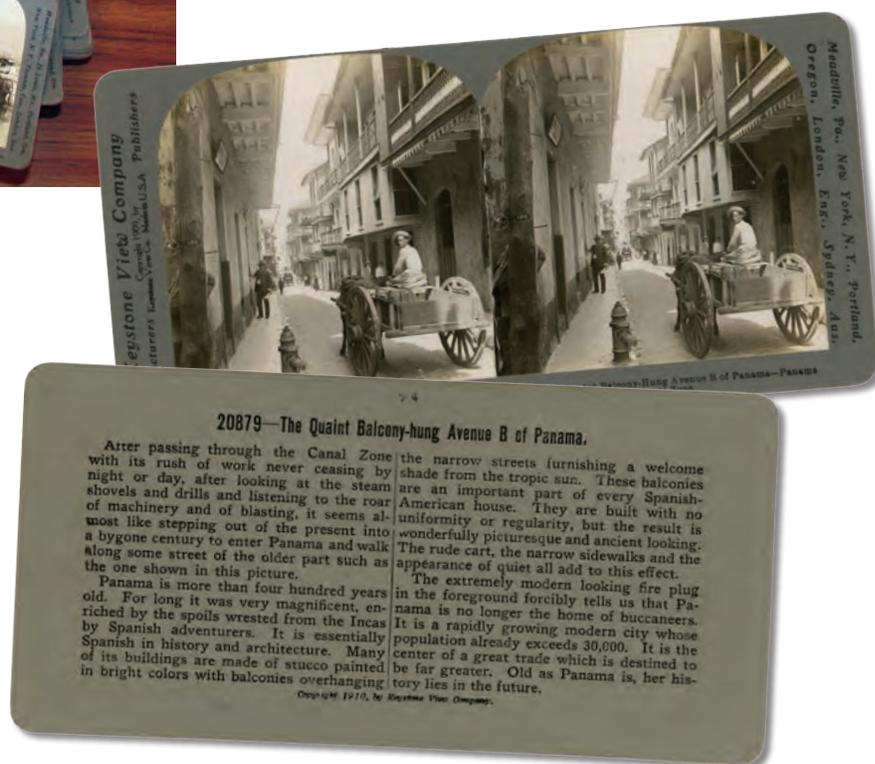
The *Panama and the Canal* digital collection includes materials from the Panama Canal Museum, with yearbooks, the *Canal Record* by the Panama Canal Society, the *Canal Record* by the Isthmian Canal Commission, oral histories, rare books, museum objects, artwork, historical photographs, and newspapers. The Panama Canal Museum materials are essential resources documenting the experiences of and the work done by U.S. citizens in the Canal Zone.

The *Panama and the Canal* digital collection also includes smaller collections linked on the homepage. Two of these smaller collections are the *Oral Histories of the Panama Canal* and the *Panama Canal Related Stereographs*. *Oral Histories of the Panama Canal* is

a joint project with the Smathers Libraries and the Panama Canal Museum in partnership with the Samuel Proctor Oral History Program and includes oral histories about Panama and the Canal.

*Panama Canal Related Stereographs* includes 200 stereographs of the Canal. Personnel from the Panama Canal Museum discovered these stereographs, which combine visually stunning images and explanatory text on the back. Researchers have expressed enthusiastic interest in using them in their teaching. Recognizing this opportunity, library staff designed a project that would create a digital collection of the stereographs by utilizing available experts and interested volunteers.

The syllabus is not visually interesting, but it lists the texts for the class and so is useful for selecting images: <http://dloc.com/AA00013935/00001>



#### 20879—The Quaint Balcony-hung Avenue B of Panama.

After passing through the Canal Zone with its rush of work never ceasing by night or day, after looking at the steam shovels and drills and listening to the roar of machinery and of blasting, it seems almost like stepping out of the present into a bygone century to enter Panama and walk along some street of the older part such as the one shown in this picture.

Panama is more than four hundred years old. For long it was very magnificent, enriched by the spoils wrested from the Incas by Spanish adventurers. It is essentially Spanish in history and architecture. Many of its buildings are made of stucco painted in bright colors with balconies overhanging the narrow streets furnishing a welcome shade from the tropic sun. These balconies are an important part of every Spanish-American house. They are built with no uniformity or regularity, but the result is wonderfully picturesque and ancient looking. The rude cart, the narrow sidewalks and the appearance of quiet all add to this effect.

The extremely modern looking fire plug in the foreground forcibly tells us that Panama is no longer the home of buccaners. It is a rapidly growing modern city whose population already exceeds 30,000. It is the center of a great trade which is destined to be far greater. Old as Panama is, her history lies in the future.

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### Digital Scholarship and Library Futures

With the Digital Library of the Caribbean (dLOC) and the *Panama and the Canal* digital collection, the Smathers Libraries continue as leaders in innovative work for preservation and access. With these and other collaborative projects, greater integration of the libraries with research and teaching needs on campus, and other ongoing changes to academic research libraries, the Smathers Libraries are leaders and innovators in collaborating to develop new resources, services, and ways of working. ■

1. <http://www.latam.ufl.edu/history>

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