



PORTUGUES DAM



April 2008
Ponce, Puerto Rico

The Planned Portugues Dam



Images are artist rendering of planned Portugues Dam.

The Portugues Dam Flood Control Project



Artistic rendering of planned Portugues Dam.

We welcome you to be a part of history as the Portugues Dam becomes the first single-centered Roller Compacted Concrete thick arch dam constructed by the U.S. Army Corps of Engineers in the United States and the Caribbean. The Portugues Dam is final component of the entire Portugues and Bucana Flood Protection Project (P&B) in Ponce, Puerto Rico.

The US Army Corps of Engineers recently awarded a \$180 million contract to Dragados USA Inc. to build the Portugues Dam. Construction will start in April 2008 and should be completed in 5 years or by 2012. Upon completion Ponce residents will have much needed flood damage protection during the intense rainy season. The Portugues Dam overall cost is estimated at \$375 million.

When all work is complete, the overall total investment in the P&B project will have reached over \$715 million. The federal government contributes a significant share or 75% and the PR Government provides 25%. The local sponsor for this project is the PR Department of Natural and Environmental Resources (DNER).

The Challenge

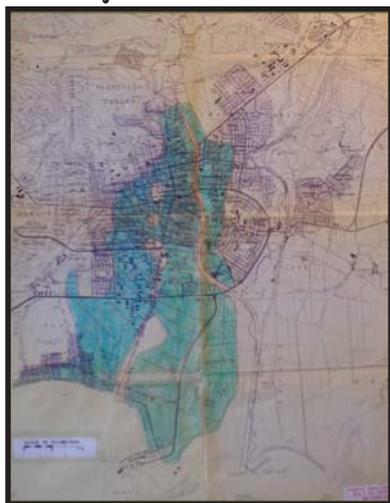
Puerto Rico's topography varies from steep mountain slopes that rise up 600 feet above the Portugues River with heavy growth of trees and brush, to the low plains of the southern coast. During the normal dry season, the river is shallow,

but can turn into a raging watershed during the rainy season. This is because the steep mountain slopes cause rainwater to quickly run into the river, rapidly overflowing its banks and flood surrounding areas. For decades, the people of Ponce have endured much human suffering and massive property damage. The Portugues Dam will put a stop to all of that.

Risk without Portugues Dam

- Channels & levees overtopped with flood > 25 yrs
- 40,000 people subject to 1.5-meter high velocity flooding
- 1,833 acres of urban areas impacted
 - 13,200 residential structures
 - City hospitals, schools, courts, police, fire departments.
 - 5 million square feet of commercial area
- Range of potential damages – \$200-\$500 million

Flood Projections without Dam



25 Year Flood



100 Year Flood

Project History

Since the 1970s, when technical experts from Jacksonville and South Atlantic Division began site investigation visits to find the best location for the dam, this unique project has brought the Corps and its partner, the Department of Natural



Corps geologists examine rock samples from borings to analyze the effectiveness of the drilling and grouting program.

and Environmental Resources of Puerto Rico, together as one team to meet its many design and geological challenges.

In the 1980s, technical experts decided the area's many unique challenges would call for the creation of the Corps' first three-centered double curvature thin arch dam. Final design and approval followed. During the excavation phase, many unique challenges were met. In the 1990s excavation, foundation test grouting and foundation curtain grouting took place with excavation for the left and right abutments, removing 350,000 cubic yards of material.

It was during the height of the testing program, which involved grout migration, mapping and extensive lab testing, a new grouting procedure called "duration grouting" was developed. This new procedure forms the basis for the foundation or grout curtain for the original design.

However, when the Portugues Thin Arch Dam was advertised for construction in September 2000, only one proposal was received, which was significantly above the government's cost estimate.

Project Revisited

To reduce costs, a five-year program was started. This program included investigation of alternative designs, field explorations, test programs, finalizing the designs and preparing contract plans and specifications. Along with technical experts from Jacksonville, other Corps district personnel from Portland and the Engineering Research and Center, and several A-E consulting firms participated in parts of the design and the technical review process. The Corps of Engineers Computer Aided Structural Engineering Task Group, composed of experts from the Corps and the Bureau of Reclamation, developed arch dam software tools and design criteria. Studies showed that by redesigning the structure from a double-curvature thin arch dam to a single-centered Roller Compacted



Corps experts make a site visit of the Portugues Dam area during the five-year technical review process.

Concrete (RCC) thick arch dam would significantly reduce construction costs while providing essential protection needed to prevent flooding. Incorporating RCC design also resulted in an overall design change of the left side of the dam. Now the left abutment will be rotated upstream to avoid the foundation resting on weathered rock. When the Portugues Dam is completed it will be the first thick arch RCC dam constructed by the Corps in the United States and the Caribbean.

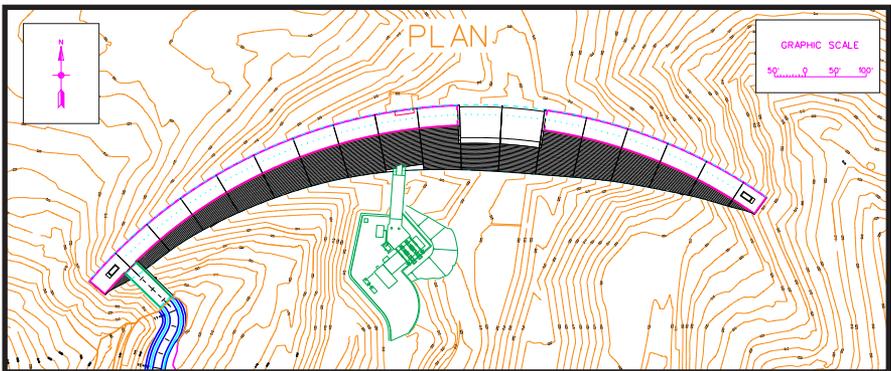
Project Location



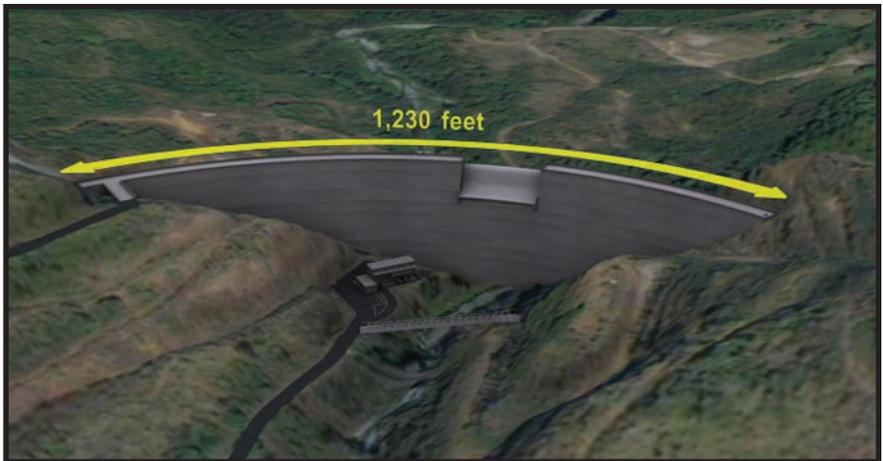
Project Description

The project is located approximately 3 miles northwest of the city of Ponce, Puerto Rico, on the Portugues River. The work will include construction of a 220-foot high Roller Compacted Concrete (RCC) single center thick arch dam with a crest length of 1,230 feet and an estimated 367,000 cubic yards of RCC. Appurtenant structures include integral spillway and intake structure. A valve house and control room for reservoir operation is located just downstream adjacent to the river.

Work will also include foundation excavation in rock, placing foundation concrete, foundation grouting, and development of an on-site quarry for concrete aggregate production. Construction time will depend upon funding and is currently estimated between 48 and 60 months.



Cross-section of work to be performed.



Artistic rendering of planned Portugues Dam.

Partners/Sponsors



U.S. Army Corps of Engineers

Jacksonville District

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www.saj.usace.army.mil



Department of Natural and Environmental Resources



Autonomous Municipality of Ponce
