

PROJECT SHEET

PUNTA PACIFICA ISLANDS
CREATION OF THE FIRST ARTIFICIAL REAL-ESTATE ISLAND
IN THE AMERICAS

INTRODUCTION

The shoreline of Panama has increasingly become densely populated and, as the economy has boomed over the past 10 years, there is strong demand for high-end products. The real-estate market has taken a revolutionary step with the completion of the the first artificial real-estate island in the Americas. The Santa Maria island is named after one of the vessels used by Christopher Columbus on his first transatlantic voyage in 1492. The island is connected to the shore by a bridge.

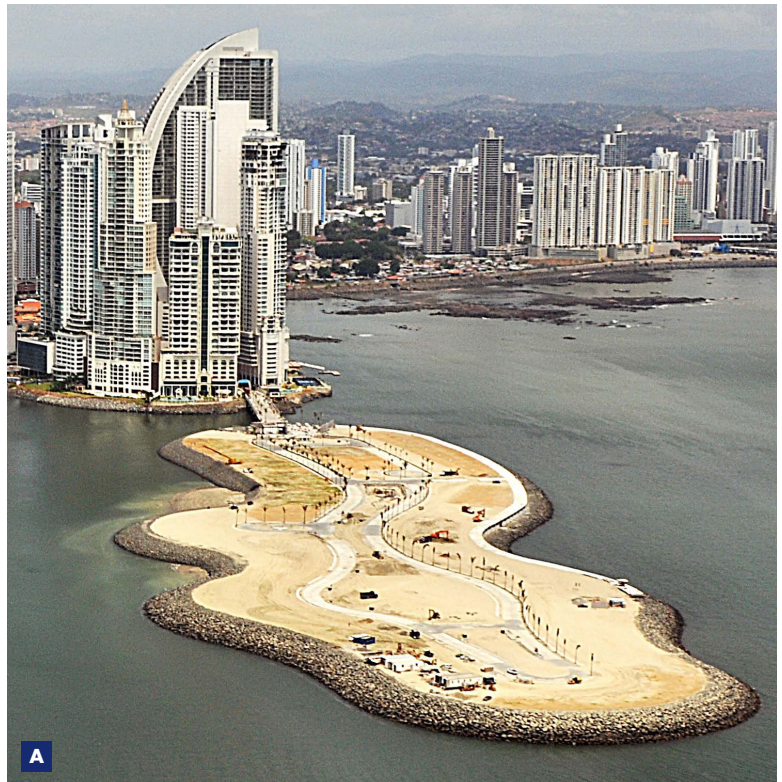
The project was initiated by the Ocean Reef Island Inc., and Boskalis Panama S.A. was awarded the Design and Construct contract at the end of a tender procedure. The decisive factors included not only the price but also, and more importantly, the reliability of the contractor in terms of quality, the involvement of local management, the proposed construction method, equipment resources, and in-house engineering capability and capacity. After completing two pre-contracts (the construction of a promotional island and the partial removal of soft sediments), the main contract was finally signed on 7 January 2011.

THE CONSTRUCTION OF THE ISLAND

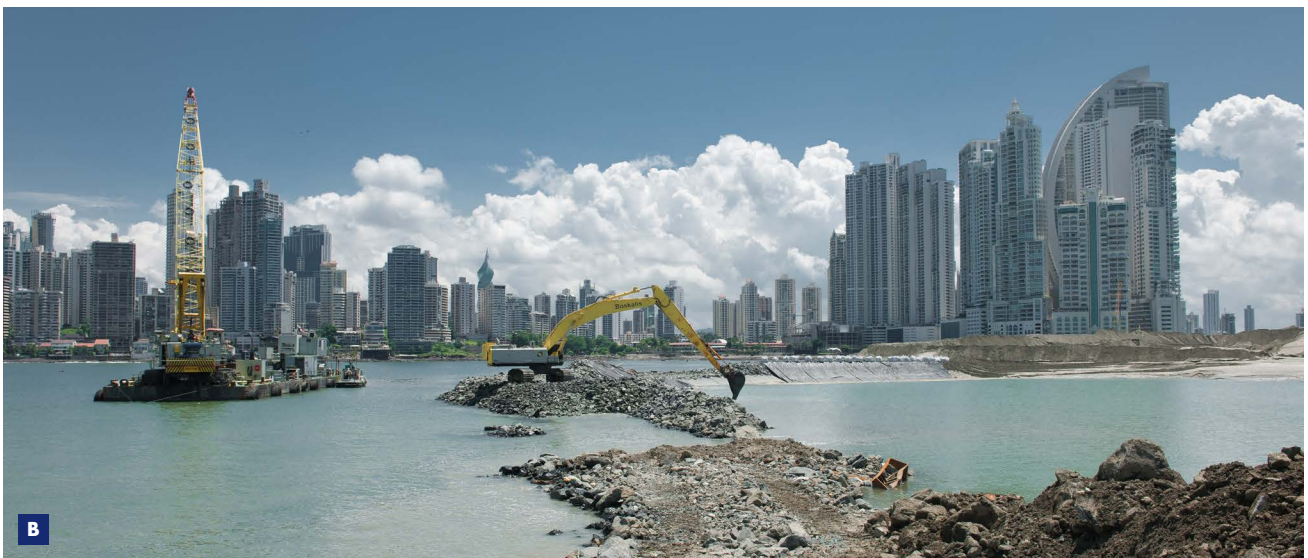
The first step in the project was the dredging and disposal of the soft sediments overlaying the weathered rock layer with the clamshell Alex and TSHD Flevo. Work then started on the construction of the rock dike. The rock was produced by the Client in the area of Vacamonte and then taken by truck to the Boskalis loading facility alongside the port of Vacamonte.

FEATURES

Client	Ocean Reef Islands Inc.
Location	Punta Pacifica, Panama City, Panama
Period	July 2011 - March 2013
Contractor	Boskalis Panama SA



A Aerial view of the completed island
B Construction of the rock dyke



B

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Prior to the start of the contract the Client and Boskalis undertook a detailed soil investigation in the (rock)quarry area in order to establish the presence of the various required gradings. Also during the quarry activities Boskalis supported the Client in order to achieve an optimal quarry performance. The loading facility is in a location that is not sheltered against the long pacific swells. Adopting a flexible loading structure reduced downtime and Boskalis was able to match rock production output without difficulty. A total of five different types of rock grading were used to work as cost-effectively as possible while maintaining the stability of the island given the long and strong swells. The inside of the rock dike was covered with a geotextile to prevent the loss of sand through the dike back into the ocean. By April 2012, the island was ready for filling with sand.

A critical factor in the sand supply operations was the combination of the extremely shallow and flat shore of the Panama Bay with the high tides (5-6 meters) and the long sailing distance to the borrow area (58 nautical miles). As a result, the discharge location selected for the TSHD Gateway was 3,000 meters away from the construction area. At this distance it was possible to deliver a full load of sand every high tide, and to use a submerged pipeline to connect the discharge location and the island.

Finally, vibro compaction was used to densify the sand in order to prevent liquefaction of the sand body resulting from earthquakes.



C Discharge location of TSHD Gateway
D Deliverance of sand to the island

A TOP-QUALITY PRODUCT

Some of the high-quality standard features of the island are:

- Highest elevation of all near-shore reclamations in Panama at +9.40 m MLWS;
- High-density rock was selected in order to withstand forces from wind and waves with a return period of 100 years;
- The complete sand body has been compacted to enhance density and provide resistance against earthquakes with maximum ground accelerations of 0.15 g. The densification of sand is only possible when the level of fines in the sand is less than 10%. Therefore an extensive soil investigation program in the borrow area has been executed in order to identify areas where minimum levels fines could be expected.

By removing all soft sediments down to the hard, weathered, rock layer, we were able to reduce the long-term residual settlement to less than 30 mm.



D



E

E Aerial view June 2012

PROJECT FINANCE

To make the project happen, Boskalis Finance teamed up with a consortium of banks to provide the construction loans for the island. The involvement of Boskalis in both the construction and the financing was a critical factor in the decision of the bank consortium to provide the loans.

WORKING IN A DENSELY-POPULATED AREA

Working close to a densely-populated area involved some additional challenges. The access road to the island passes through one of the most congested areas of Panama city, and the client did not allow road transport through that area. All the material (rock / sand / pipelines / equipment) was therefore delivered from the sea using barges, pontoons and other floating equipment. During the execution of the project and in consultation with the representatives of the local community and the client, Boskalis developed mitigating measures to minimize noise nuisance at night. Rock placement at night proved to be the trigger for the local community. A different rock placement schedule was implemented, allowing the project to continue 24/7 and reducing the noise levels to a level that was found acceptable.

PROJECT COMPLETION

In February 2013, the final quality control tests were conducted successfully and the island was handed over to the client on time, within budget and in accordance with the design specifications.

NUMBERS

- 950,000 m³ of soft sediments removed by Clamshell Alex and TSHD Flevo.
- 700,000 m³ of rock loaded, transported and installed with a rock loading installation, flat top and split-hopper barges with several tugboats, positioning pontoons, Clamshell Alex, a Cat 345 and a Cat 385 HD-LR.
- 32,000 m² of geotextile installed.
- 1,450,000 m³ of sand delivered with TSHD Gateway.
- 12,000 vibro compaction points, each 15 meters long.

KEY DATES

- July 2010 – December 2010: Advance dredging works (removal of soft sediments)
- 7 January 2011: Main contract signed
- March 2011 – March 2013: Rock transport and installation works installed
- April 2012 – July 2012: Sand delivery
- June 2012 – March 2013: Vibro compaction
- 15 March 2013: Project completion

Royal Boskalis Westminster N.V.
PO Box 43
3350 AA Papendrecht
The Netherlands

T +31 78 69 69 000
F +31 78 69 69 555

royal@boskalis.com
www.boskalis.com