

Frankipile Ghana on track with Ada coastal protection works

IN ITS BIGGEST PROJECT in Ghana to date, Frankipile Ghana, a division of Esorfranki Geotechnical, is on schedule for the June 2013 completion of the design and implementation of temporary works required for the construction of the offshore rock groynes for the Ada Coastal Protection Works. The temporary works for the entire project will involve approximately 2.5 linear km of jetties and 1.5 linear km of sheet piles.

The Ada Coastal Protection Works was implemented by Ghana's Ministry of Water Resources, Works and Housing as an urgent measure to reduce coastal erosion along the coastline of Ada Foah, approximately 100 km east of the capital, Accra. Ada is situated near the Volta River estuary and is bordered in the east by the Volta River and in the south by the Atlantic Ocean. The work involves the construction of seven rock groynes, with lengths ranging from 100 to 200 m, perpendicular to the shoreline over a distance of approximately 4.7 km west from the Volta river mouth.

The project was initiated to counteract the loss of property and the high inundation risks posed by the erosion of the beach. Changes in the ecological system, as a direct result of the coastal erosion, have also impacted the effectiveness of fishing, and tourist and other economic enterprises. Before the construction of the Akosombo Dam in 1963, the Volta River transported one million cubic metres of sediment per year to the coast, resulting in a dynamic river delta. After the dam had been constructed, however, the coastline eroded for more than 150 metres and the river mouth tended to close. The project, therefore, aims to provide this coastal area with appropriate protection, and to stop or slow down the closure of the river mouth.

The design and supervision of the project is being undertaken by International Marine & Dredging Consultants (IMDC), with Dredging



Installation of tube piles on support jetty for the construction of offshore rock groynes at Ada Foah in Ghana

International (DI) acting as the main contractor for the execution of the works.

In its role as specialist sub-contractor, Frankipile Ghana began the temporary works in June 2012. For the construction

of each groyne, the Frankipile team built one main jetty for the placement of the rock material – ranging in mass from 300 kg to 10 000 kg – for the full length of the groyne. A sheet pile cofferdam was

also required for the controlled placement of material near and on shore, and this has been accomplished by utilising two support jetties.

DESIGN

The temporary structure was designed for annual wave conditions with seabed levels shallower than -1.5 mLAT for the cofferdams and support jetties, and -4.5 mLAT for the main jetties. The ground profile below sea level is typical of marine or estuarine deposition, with sands generally inter-bedded with layers of silts and clays of varying thickness and consistency.

“The jetties were designed to accommodate vertical and lateral forces from the 100 tonne CAT C385 excavator used by DI for placement of armour rocks up to four tonnes, as well as dynamic forces from breaking waves,” says Dr Nicol Chang, senior design engineer at Esorfranki’s

ISO 9001 accredited in-house design department. “In addition, combined wave and excavator loading was used to establish safe operational conditions for the cranes and excavators on the jetties. Owing to the rapidly changing conditions of the seabed, standard solutions were established and implemented for the conditions that were actually being encountered at the time of the construction of the temporary works for each groyne.”

“Our final design, developed in conjunction with main contractor DI, also makes allowance for scour around the sheet pile cofferdam, as well as the tube piles. In this regard, actual scour conditions are monitored on a daily basis. Consideration is also given to the corrosion of the tube piles, which is critical to their bending resistance. Corrosion rates are also monitored after each use of the tube piles.”

WORKS

All the equipment needed to execute this project was sourced from Esorfranki Geotechnical’s extensive in-house plant base.

The main and support jetties are supported on steel tube piles vibrated into the seabed with a hydraulic vibratory hammer hanging from NCK C75 or Liebherr HS845 cranes. Sheet piles for the cofferdam are installed in a similar manner, with the cranes working off the two support jetties. Two purpose-built 40 tonne bogies are used to supply materials along the jetties.

The proposed 12-month works programme commenced during the season of the highest waves, which frequently generated splashes reaching heights of 20 metres. This made working conditions extremely difficult, particularly since the impact of these wave splashes often damaged the wooden decks between the main beams of the jetties, causing delays during the construction of jetties at the first groynes.

Frankipile works director, Garry Boyd, says that during construction the sequence of work was revised to allow the team to work on two groynes simultaneously, with the materials on the returning groyne used on the advancing groyne. This significantly reduced equipment standing time while material placement was taking place on the returning groyne.

FULL GEOTECHNICAL SOLUTIONS

“The success of a project of this magnitude and complexity requires constant adaptation to the ever-changing conditions,” comments Boyd. “With more than 66 years of experience in geotechnical and marine work, complemented by in-house design capabilities, Esorfranki Geotechnical is well equipped to provide full geotechnical solutions in sub-Saharan Africa and the Indian Ocean Islands.”

Frankipile Ghana was awarded its first contract in Ghana in 2011, effectively advancing Esorfranki’s corporate strategy of pursuing sound and sustainable growth opportunities across the African continent, with particular focus on mineral resources and marine infrastructure.



Removal of sheet piles from the support jetty



Completed rock groyne

► INFO

Esmarie Scheepers
Esorfranki Limited
+27 11 822 3906
esmarie.scheepers@esorfranki.co.za
www.esorfranki.co.za

Source:

http://www.saice.org.za/downloads/monthly_publications/2013/2013-Civil-Engineering-April/#/0