Project Sheet

Delta Marine Consultants
H.J. Nederhorststraat 1, 2801 SC Gouda, P.O. Box 268, 2800 AG Gouda, the Netherlands
T +31 (0)182 59 06 10, dmc@dmc.nl, www.dmc.nl
Delta Marine Consultants is a trade name of BAM Infraconsult bv

Production and Placement of Xblocs® for Gorgon

More than 40,000 Xblocs® form the protection of the causeway for the materials offloading facility (MOF) for the Gorgon LNG project, located at Barrow Island, just off the coast of Western Australia. The Xblocs® have been produced, stored and quarantined to meet the strict Australian quality requirements at the BAM Indonesia precast yard in the Port of Cigading, West Java. The Xblocs® were transported by barge to Barrow Island, where they were placed with land based equipment.

Main Client
KJVG (Kellog Joint Venture Gorgon)

Client
BAM International

Type of Contract
Design & Construct & Xbloc

Completion
March 2013

Location
Port of Cigading, Cilegon, Banten, West Java, Indonesia (production) and Gorgon, Western Australia (placement)

Consultancy Fees
Category 5 (see page 2)

Services
Review of the Design
Supervision of the Model Tests
Provision of the Xbloc® License
Preparation of Xbloc® Drawings
Control of Production of the units from the head offices and from site by means of 6 site visits
Control of Placement and Instruction from the head offices and from site by means of 9 site visits

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Xbloc® is a simple, robust and reliable single-layer armour unit. It was developed by DMC, BAM's marine engineering design consultant. Development started in 2001, with the intention of creating an innovative interlocking armour unit that would protect breakwaters and shores in extreme conditions and over long periods of time. Since 2004 the Xbloc® has been successfully applied on shore protections and breakwaters all over the world.

Numbers and Volume

A total of 40,073 Xblocs® and 26 antifers were produced and stored in BAM Indonesia's precast concrete yard on West Java, from where they were shipped to their final destination by client's barge. Sizes of the Xblocs® ranged from 1.5m³ (33,285 units) to 6.0m³ (6,762 units); the size of the antifers was 14.5m³. Over a period of approximately 17 months a total volume of 91,000m³ of concrete was poured in 86 moulds of 1.5m³ and 35 moulds of 6.0m³, with an average production of 330m³ per day.

Stringent Quality Requirements

All Xblocs® were produced to meet the strict Australian quality and quarantine requirements and specifically to meet the even more stringent quarantine requirements for Barrow Island, a Class 'A' Nature Reserve. They were successfully treated with biodegradable chemicals to prevent any alien flora and fauna to be imported into Australian waters during sea shipment.

Quality Control System

All Xblocs® are uniquely marked and a data-base quality control system tracks each block from concrete mixing to final shipment. For ease of identification all Xblocs® are colour coded to mark the completion and acceptance of the various quality control and quarantine phases.

BAM Indonesia's Precast Yard

The permanent precast yard on West Java caters for the production, storage and quarantining of precast concrete units, whether it be reinforced concrete units such as jetty elements or gravity blocks, or concrete armour units, including the Xbloc®. Precast concrete elements can be loaded from the nearby materials offloading facility. The permanent set-up of the yard garantees a quick response after order, which minimises delivery time for our clients.

Placement

After the production and quarantine in BAM Indonesia's precast concrete yard, the Xblocs® were shipped by barges to Barrow Island in Western Australia. The offloading of the Xblocs® was done with front loaders equipped with hydraulic clamps.

The aforementioned total number of Xblocs® were placed with land based equipment. The total length of the MOF was 2.5km and the design included a breakwater at the edge of the structure.

The placement of the units was executed by the Contractor Companies Thiess and Boskalis. Placement was executed by means of crawler cranes or excavators provided with rotational hydraulic clamps in order to facilitate the orientation, when placing the units.

Project Milestones

February 2010:	Start of Xbloc® mould fabrication
March 2010:	Start of Xbloc® production
October 2010:	First Load Out 800 Xblocs®
March 2011:	Start of placement
October 2011:	All Xbloc® units produced
July 2012:	Xbloc® breakwater completed
March 2013:	All Xblocs® placed

Project Details

Hs:	6.0 m
Water depth:	9.0 m at DWL
Length of MOF:	2.5 km
Size of Xblocs®:	1.5 and 6 m³
Number of units:	40,200

Consultancy Fees: 1: 50.000€ 2: 50 - 150.000€ 3: 150 - 300.000€ 4: 300 - 600.000€ 5: > 600.000€

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