Rijkswaterstaat
Ministry of Infrastructure and the Environment

Project Office for Coastal Protection strives for sustainability

Dike reinforcements in the Province of Zeeland, SW Netherlands

After the flood of 1953, the dikes in Zeeland were made higher and stronger. In the early nineties, however, it appeared that the stone revetments of many dikes no longer met the legal safety requirements. Although there was no immediate danger, it led to the establishment in 1997 of a partnership between Rijkswaterstaat and Scheldestromen Water Board – the Project Office for Coastal Protection, responsible for seven dike section projects per year. By 2015, the project office should have strengthened dikes totaling a distance of 325 kilometers. All dikes in Zeeland will then meet the current safety standards. In 2011 the project office decided – in the first instance as a pilot – to award tenders based on the the principle of the most economically advantageous tender (MEAT), which included sustainability as part of the quality criteria. It was decided that concrete products would be the initial focus – a logical choice, since the amount of concrete that is used in dike reinforcement is considerable and the production of concrete has a high impact on the environment.

DuboCalc: LCA software

The sustainability of a given design is calculated by bidders inputting proposed materials into DuboCalc, a software tool based on the life cycle analysis (LCA) of each material. DuboCalc calculates the total environmental impact of products from the initial phase of sourcing the raw materials right through to the demolition phase. This value is then expressed as a number, known as the Environmental Cost Indicator Value (ECI Value). The lower the ECI Value, the less environmental impact and the better the product scores in the MEAT assessment. In order to determine the lower limit of the ECI Value the project office executed a market scan that assessed current innovations in the market.

The transition to sustainability

The challenge for the market was: use less concrete or use concrete with a more sustainable composition. Haringman Concrete was one of the parties to respond to the challenge. This led to the development of the 'Hydro Block', a new concrete product that

Sustainability ambitions of Rijkswaterstaat

Rijkswaterstaat aims to improve the sustainability of infrastructure projects and aims to reduce energy consumption in 2020 by 20 percent compared to 2009. Rijkswaterstaat uses four instruments to achieve this goal: the 'Omgevingswijzer' ('Context Appraiser'); DuboCalc LCA software; the CO_2 performance ladder and a tendering procedure based on functional requirements and the 'most economically advantageous tender'. This is Rijkswaterstaat's contribution to the government policy focused on green growth. In addition, Rijkswaterstaat collaborates closely with all partners, customers and clients in the civil engineering sector to make the sector more sustainable in a partnership called the 'Green Deal Sustainable GWW'.

Project	Dike reinforcements Stavenissepolder, Sint Philipsland and Krabbendijke
Start of works and delivery	March - November 2012 (Stavenissepolder) March - November 2013 (Sint Philipsland and Krabbendijke)
Type of contract	Engineering & Construct (E&C)
Tendering instruments	DuboCalc and CO_2 performance ladder
Results	• Application of Hill Blocks in the Stavenissepolder project, innovative revetments using 30 percent less concrete • 50 percent improvement in ECI Values by use of Hydro Blocks and transport optimisation in the reinforcement of the revetments of the dikes at Sint Philipsland and Krabbendijke

distinguished itself through its innovative concrete composition. The company put the whole process, from extracting the raw materials to placing the blocks on the dike, under the microscope. They searched for an optimal location to manufacture the concrete taking into account the transportation of the blocks to the construction site at the dike. In 2013, Hydro Blocks were placed at the sites of St. Philipsland and Krabbendijke. This led a reduction in CO_2 emissions of approximately 50 percent. These savings are equivalent to 3,100 tons of CO_2, which equates to the annual emissions of about 360 households.

Hill blocks

The pilot project 'Stavenisse Polder' offered the opportunity to implement sustainable revetments. The contract was awarded to the bidder who was able to install the innovative concrete revetment product called 'Hill block', which had been developed by Hans Hill and Martens Concrete. Due to the special shape of the concrete block, 30 percent less concrete is needed. The result is a big step forward in terms of sustainability.

More information

Do you want to know more about Rijkswaterstaat? Go to www.rijkswaterstaat.nl/en.
For more information on the Green Deal Sustainable GWW: www.duurzaamgww.nl/?lang=en

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