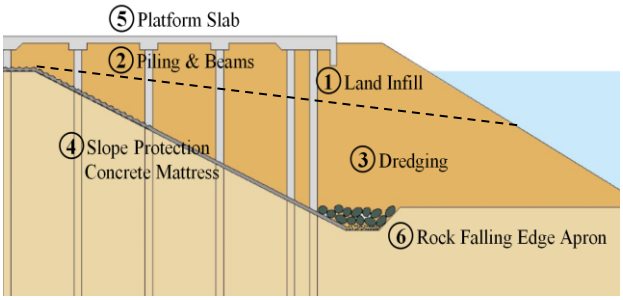
Engineer: Technical, Italy **Mattress Engineering**: Proserve **Contractor**: GLF, USA

Concrete Mattress Installation

'Land Infill' Method

The piles, vibrocompaction and reinforced concrete beams were constructed from land using the 'land infill' method.

The strata was sand with some gravels and occasional silty/clay layers. The strata was compacted by the vibrocompaction and was very stable working at underwater slopes of 1:2.



Slope Preparation

Slopes where excavated by long reach excavators working between beams with crane mounted water jetting controlled by Diver used to remove material under beams and around piles.

The slope and toe trench are prepared to agreed tolerances. At Port-au-Prince slope tolerance was +0.3 m & –0.45 m. Toe trench excavation and bed preparation were the slowest operation and controlled the rate of progress.

Installation

Panels of mattress fabric are premade for the width and length of bays between piles. Mattress bundles are floated out, fixed around piles and zipped to neighbouring panels. This typically takes some 2-3 hours.

19,600 m² of concrete mattress has been installed at Port-au-Prince by one dive team in 8 months. Excavation and slope preparation controlled progress. Most diver time was spent on bed preparation which took longer than mattress laying and filling. Establishing the nature of the strata and selecting appropriate plant is shown to be most important.

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Slope Protection Under Piled Quays

Micro Concrete

A sand:cement micro concrete is supplied by ready mix wagons and discharged into a suitable pump. At Haiti, a worm pump was used with a 50 mm Ø grout hose. A highly fluid mix of 2:1 sand:cement was developed using local sands and cement with appropriate quality control.

Filling

Mattress pump filling with micro concrete starts from the bottom of the slope and progresses upwards. Divers fix the pump hose end into mattress filler sleeves and fill in tremie-filling fashion. The highly fluid mix readily fills the mattress under the beams and round the piles to produce a reliable layer of insitu concrete protection with 'ball & socket' shear joints at zip connections between piles. Mattress filling typically takes 6-8 hours.

Pile Seals

Purpose engineered pile seals are used to reliably seal around piles. Additional mattress fabric (+5% at Port-au-Prince) is allowed to cater for pile position tolerances and slope preparation tolerance.

Rock Edge

Rock edge details are installed to the concrete mattress apron to act as falling edge aprons to manage the risk of underscour. The rock is simply lowered into place around the perimeter of the piled platform.