



Seabees around the World

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Abstract

This paper reviews 35 years of usage of Seabees in both public and industrial applications in various countries since the system was first presented at Melbourne ACCOE in 1977. It includes a review of the theoretical arguments that show close similarities to the Hudson equation and explain the boundary conditions that allow the concept and usage of Tapered Surcharge, to optimize the usage of material.

Practical experience includes methods of manufacture and placement and the use of variable geometry both for mass optimization and deliberate roughness for the management of reflection, runup and overtopping.

Introduction

Rubble mound breakwater design is subject to continuing development and analysis. 35 years ago, only a few single layer systems were in use – Tribars, Svee Blocks and Cobs. Like rock and other two-layer units, Tetrapods, Dolosse etc., these were all unique shapes and thus subject to the cubic law constraints of design rules which held that unit mass was proportional to slope, density and the cube of the wave height. This meant that there is a unique mass for each condition for each shape, and no ability to optioneer the result except by varying the slope or density.

The Seabee was first conceived in Sydney, Australia in August 1974 as a variable geometry unit, whereby unit height and porosity are independent of unit area, and the whole unit is in the form of a right hollow hexagonal prism with or without lateral porosity. Following gestation of the concept, including a thorough literature review, laboratory tests were undertaken in 1977 and the first prototype was constructed in 1978. Concurrently a linear theory was developed from first principles which produced equations of stability for both sliding and uplift failure for both discrete and coherent systems, and have found use as design equations for both discrete armour units, such as the Seabee, and coherent systems such as marine mattresses.

Since that early beginning, Seabees in sizes between 5kg and 4000kg have been made and used in all continents except Africa, and units of up to 40 tonnes have been designed and proposed. Only in a few cases has the inherent adaptability of the system been fully utilised by the designers and used in conjunction with the constructors to realize a fully optimised solution.

This paper seeks to remind clients, designers and constructors of the potential of the system to deliver economical solutions to a variety of problems.