

Durability Design of the Concrete Caissons for the Artificial Peninsula of Monaco Territory

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Abstract

The construction of an artificial peninsula extending the Monaco territory is destined to create an urban area of 6 hectares. The project requires the prefabrication of 18 caissons which will constitute the maritime infrastructure of the extension at sea. Due to the construction process, the caissons' rafts and the walls will be exposed to chlorides at early ages: 5 days for rafts and 3 days for walls. A performance-based approach has been retained for all the concrete works of the maritime infrastructure. This approach implies to justify a 100-years lifetime. The paper will present the extensive natural and accelerated migration tests that have been performed to prove the appropriate durability of the concrete caissons, and the consequent provisions (concrete cover, protective coating) to prevent any loss of durability due to early age exposure.

Keywords: Marine concrete structures, durability, early exposure, chloride ingress, migration tests.

1 Introduction

Started in early 2000, the "Portier cove" project will add 6 hectares of valuable land to Monaco territory (Fig.1). This reclamation scheme will lead to the construction of an artificial peninsula, i.e. a neighbourhood primarily consisting of 60,000 m² of housing, public facilities, and an extension to the Grimaldi Forum, a seafront exhibition centre. A marina, a landscaped park and a promenade will enrich the project [1].

The preliminary works started end 2016 and the maritime infrastructure is scheduled to be completed by the end of 2020, the delivery of the first buildings being expected from 2022.

The construction technique to be used for the maritime infrastructure is a fill enclosed by a band of 18 trapezoid reinforced concrete caissons, 27 m tall and weighing 10,000 t each, equipped with absorption chambers (Fig.2). These precast units will help reduce breaches by strong swells and protect the exposed areas of the project [2].



Figure 1. View of the "Portier cove" new Monaco neighbourhood

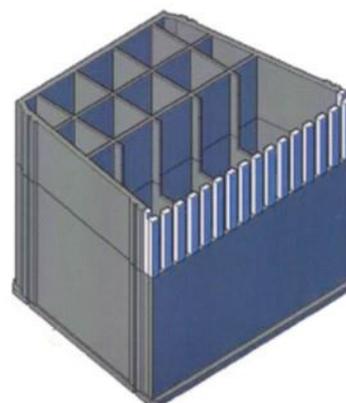


Figure 2. General view of the concrete caissons