

Review of the Most Common Repair Techniques for Reinforced Concrete Structures in Coastal Areas

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Abstract

Asset managers are faced with the challenge of maintaining concrete structures in coastal environment, within the financial constraints of maintenance budget allocations, such that they remain functionally and structurally safe for the remainder of their design lives. For these reasons concrete remediation is fast becoming an important component of asset management in coastal areas. This research describes remediation techniques and practice currently being employed by prominent public and private organisations responsible for maintaining concrete structures in the Illawarra region (New South Wales, Australia). These common remediation techniques range from conventional restoration, cathodic protection and structural strengthening. The research also considers the underlying factors used to evaluate the effectiveness of these techniques and practices. A model of good practice for concrete remediation in the Illawarra is developed from the literature and industry research undertaken. This model is developed for concrete suffering deterioration caused by the corrosion of steel reinforcement and is aimed to provide intelligent concrete remediation options based on sound principles and industry knowledge.

Key Words: Reinforced Concrete, Repair, Maintenance, Strengthening.

1 Introduction

The popularity of concrete as a construction material can be attributed to its versatility, low cost and durability. It is reasonable to expect concrete that is correctly specified, mixed, placed, and embedded reinforcement correctly positioned, will last indefinitely in non-aggressive environments, with minimal maintenance and repair. In reality, an ideal situation rarely exists and various entities such as environment and the inherent properties of concrete influence a structure's serviceability performance. The subsequent concrete deterioration occurs as a function of local exposure conditions, concrete properties and interaction of loadings and other physical mechanisms. Often the initial manifestation of concrete deterioration is cracking of the exposed surfaces, which may pose aesthetic problems; lead to an increased rate of deterioration; or present a hazard to public safety. Ultimately, deterioration may degenerate into a serious structural problem, which will have an effect on the safety, function and operation of the structure [1].

The aim of this paper is to address the various techniques available to asset managers and remedial engineers for the repair and protection of