



An Anti-corrosion Method for Concrete Slab with Cathodic Protection

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Abstract

Ohnaruto Bridge is a suspension bridge with a total length of 1,629m and has served for 38 years since opening in 1985. In 2001, flaking prevention work and surface coatings as salt damage countermeasures were carried out. Also, cross-sectional restorations were applied to deteriorated sections of the concrete slab. However, after 10 years of the repair work, in 2011, same deteriorations were observed again. Field investigations revealed that the main cause of the deterioration was macro-cell corrosion at the boundary between the repaired and unrepaired sections of the cross-sectional restoration. Impressed current cathodic protection method was adopted as a result of the verification to avoid the re-degradation and to save life cycle cost. This paper reports field investigations of the cause of the re-degradation, a study on cathodic protection, installation work of the adopted protection method, and its maintenance.

Keywords: Reinforced concrete, Macro-cell corrosion, Salt damage countermeasure, Cathodic protection, Life cycle cost, Impressed current system

1 Introduction

Ohnaruto Bridge (Figure 1) is a suspension bridge with a total length of 1,629m and served for 38 years since opening in 1985. The bridge is crossing Naruto strait where corrosion environment is harsh. In 1996, deteriorations due to the chloride attack such as spalling and corrosion were observed at the concrete slab on the 1A anchorage of Ohnaruto Bridge (Figure 2 (a), Figure 3). In 2001, cross-sectional restoration, surface coatings and spalling prevention were applied to the deck [1]. As the cross-sectional restoration, after chipping off the deteriorated concrete and removing the rust from reinforcing bars, anti-corrosion treatment and

primer were applied to reinforcing bars, and refilled with polymer-modified mortar. However, same deteriorations were observed again about 10 years after the repair work (Figure 2 (b,c)).