

Study on mechanical properties of very low-strength concrete from an existing building

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Abstract

The properties of old concrete are directly related to the seismic performance of the existing reinforced concrete (RC) buildings and are important factors in seismic evaluations of these buildings. However, the strength and elasticity modulus of concrete in existing buildings are affected by deterioration over long periods, uncertainty in the construction and several other important factors. Therefore, accumulating data and knowledges on the properties of old concrete and checking the validity of the equations used in the seismic evaluation is essential. For this study, 41 concrete cylinders were obtained from an RC building constructed in 1969. In this paper, we mainly discuss the mechanical properties of concrete. The compressive tests, tensile splitting tests, componential analysis of concrete and carbonation tests were performed. Additionally, the observed values were compared with the present standard and various estimation equations.

Keywords: mechanical properties of concrete; existing building; compressive strength; modulus of elasticity; splitting tensile strength; mix properties.

1 Introduction

Seismic evaluations of existing reinforced concrete (RC) buildings have been extensively conducted in Japan since the Kobe Earthquake in 1995. Such evaluations have discovered that many RC buildings were not constructed according to their

structural draft. The current standard for seismic evaluation [1] requires, subjecting three concrete cylinders from each storey of the building to compressive tests instead of non-destructive tests. Very low-strength concrete with less than half of the specified concrete strength was found in many RC buildings. The mechanical properties of



(a) City hall



(b) Girders



(c) Columns

Figure 1 Target building and core borings