Chapter

2

Modification and Strengthening of a Characteristic Reinforced Concrete Building in Patras, Greece

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Abstract
The design and application of strengthening measures aiming to effectively counter possible weaknesses related to the extensive architectural modification of a characteristic reinforced concrete building is discussed in this chapter. Several balconies were removed as part of the architectural interventions. Externally bonded reinforcement consisting of steel and fibre reinforced polymer laminates was applied as an "answer" to possible changes in flexural stress of selected structural elements in the immediate area of the demolitions. A unique anchorage system was also designed and applied as an answer to the loss of development length of the main reinforcement bars of selected beams due to the removal of their cantilever parts.

Keywords: flexural strengthening; externally bonded reinforcement, laminates, rebar anchor plates

2.1 Introduction

The continuous advancement in structural engineering practice, namely structural analysis, design and construction procedures, as well as the improved understanding and representation of the effects of earthquakes on structural elements has undeniably led to the increased safety of modern buildings compared with those designed and built decades ago. However, the latter represent the bulk of the built environment in major urban areas. The questionable seismic performance of such buildings is usually the main reason for assessing and, if necessary, strengthening them to comply with the performance objectives set out in modern codes for seismic assessment and retrofit of structures.

In most cases, the design and application of a complete system that will effectively upgrade the performance of an existing structure is a challenging process. It requires knowledge of the respective code framework, complex numerical modelling and analysis procedures, and, most importantly, deep understanding of the available structural intervention techniques and their effects on structural elements. The latter is of major importance when designing and applying a structural retrofit system as a "counterbalance" to specific weaknesses, which may occur as a result of local