

# **Gholamreza Fathifazl**

Thesis

Structural Performance of Steel Reinforced Recycled Concrete Members

Abstract

Concrete constitutes a large portion of the construction and demolition waste produced by the construction industry. Up until very recently, no regulations existed concerning the production and disposal of this waste. In the last couple of decades, however, there has emerged greater emphasis on sustainability and so-called green practices, and consequently recycled concrete aggregates (RCA) has been considered as an alternative construction material to conventional natural aggregates. Due to the many previously reported short and long term inferiorities of concrete made with RCA, compared to conventional concrete, the construction industry has been reluctant to use it, especially in structural applications. To overcome this problem, the results of a comprehensive study are presented in this thesis investigating the structural performance of steel reinforced recycled aggregate concrete (RAC) members. The research program was planned to fill the identified gaps in the existing literature on the subject and to provide data which could help remove the fundamental barriers to the use of RAC as structural-grade concrete in the construction industry. The current study focuses on the short- and long-term behaviour of RAC as a new material and on the flexural and shear behaviour of reinforced RAC beams. It is demonstrated theoretically and verified experimentally that RAC is not inherently inferior, but its reported inferiority emanates from using improper concrete mix proportioning methods. Therefore, a new concrete mix proportioning method is developed and verified experimentally. It is also demonstrated that methods of structural design developed for conventional concrete could be used to design RAC structures, provided the mechanical properties of RAC are duly accounted for.

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Completion

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Supervisor

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