

## Microstructural Properties of the Interfacial Transition Zone and Strength Development of Concrete Incorporating Recycled Concrete Aggregate

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**Abstract :** This study investigates the potential of using crushed concrete as aggregates to produce green and sustainable concrete. Crushed concrete was sieved to powder fine recycled aggregate (PFRA) less than 80  $\mu\text{m}$  and coarse recycled aggregates (CRA). Physical, mechanical, and microstructural properties for PFRA and CRA were evaluated. The effect of the additional rates of PFRA and CRA on strength development of recycled aggregate concrete (RAC) was investigated. Additionally, the characteristics of interfacial transition zone (ITZ) between cement paste and recycled aggregate were also examined. Results show that concrete mixtures made with 100% of CRA and 40% PFRA exhibited similar performance to that of the control mixture prepared with 100% natural aggregate (NA) and 40% natural pozzolan (NP). Moreover, concrete mixture incorporating recycled aggregate exhibited a slightly higher later compressive strength than that of the concrete with NA. This was confirmed by the very dense microstructure for concrete mixture incorporating recycled concrete aggregates compared to that of conventional concrete mixture.

**Keywords :** compressive strength, recycled concrete aggregates, microstructure, interfacial transition zone, powder fine recycled aggregate

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