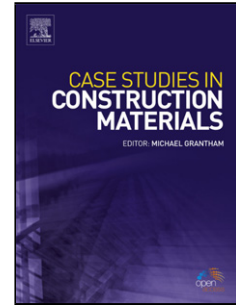


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Authors: Bilal S. Hamad, Ali H. Dawi, Anas Daou, Ghassan R. Chehab



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STUDIES OF THE EFFECT OF RECYCLED AGGREGATES ON FLEXURAL, SHEAR, AND BOND SPLITTING BEAM STRUCTURAL BEHAVIOR

Bilal S. Hamad¹, Ali H. Dawi², Anas Daou³, and Ghassan R. Chehab⁴

¹(Corresponding Author) Professor of Civil Engineering, Department of Civil and Environmental Engineering, American University of Beirut (AUB).

Mailing Address: P.O. Box: 11-0236, Riad El-Solh, 1107 2020, Beirut, Lebanon, Tel: 961-3-350000/3460; Email: bhamad@aub.edu.lb, bhamad@code-lb.com

²Structural Engineer, CODE Consultants & Designers sarl, Beirut, Lebanon; Email: adawi@code-lb.com

³Graduate Student, Department of Civil and Environmental Engineering, American University of Beirut; Email: ayd05@mail.aub.edu

⁴Associate Professor, Department of Civil and Environmental Engineering, American University of Beirut; Email: gc06@aub.edu.lb

Highlights

- 18 normal strength concrete beam specimens, prepared by replacing different 8 percentages of the natural coarse aggregates (NCA) with recycled coarse aggregates 9 (RCA), were tested.
- Three modes of failure were checked in the program: flexure, shear, and bond 11 splitting of the concrete cover in the splice region.
- The study investigates the actual bond splitting behavior of bars spliced in RCA 13 structural beams rather than the pullout strength of bars anchored in RCA specimens 14 or bond strength of reinforcement in beam-end RCA specimens.
- The results indicate that replacing different percentages of NCA with RCA sourced 16 from tested concrete cylinders did not have a significant impact on the mode of failure 17 or ultimate strength or load-deflection behavior of all tested beams.
- Nonlinear finite element models were built using the ADINA to validate the 19 experimental test results. The experimental and numerical results were comparable.

Abstract: This paper reports on a research program designed to investigate the structural behavior of reinforced concrete beams prepared by replacing different percentages of natural coarse aggregates (NCA) with recycled coarse aggregates (RCA), sourced from tested concrete cylinders in Ready/Mix plants. One objective was to recycle and reuse the crushed concrete cylinders in the construction industry and mitigate its negative environmental impact. The variables were the percentage replacement of NCA with RCA [0(control), 40, or 100%] and the mode of failure of the tested beams (flexure, shear, or bond splitting of the

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