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## **Enhancing the Sustainability of Sand Concrete by Recycling Quarry Waste**

Oday Jaradat, Nael Salman

Dar Al-Kalima University, Bethlehem, Palestine

### **Abstract**

This study investigates the reuse of quarry waste—specifically crushed limestone sand in the production of eco-friendly sand concrete. Five mix designs with varying limestone sand ratios were evaluated for their physical and mechanical performance, including compressive strength, flexural strength, and microstructural characteristics. The incorporation of crushed limestone sand significantly enhanced sand concrete properties. The mix containing 60% limestone sand demonstrated the best overall performance, achieving a balanced improvement in strength, density, dynamic elastic modulus, and workability. These findings highlight the viability of using quarry waste as a partial sand replacement in concrete. This approach contributes to sustainability by reducing environmental burdens related to waste disposal and raw material consumption, while promoting circular economy practices in the construction sector.

In conclusion, crushed limestone sand offers a dual advantage: enhanced material performance and environmental benefits, positioning it as a promising alternative for sustainable construction.