

Microstructures and Chemical Compositions of Quarry Dust As Alternative Building Material in Malaysia

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Abstract : Quarry dust is a quarry end product from rock crushing processes, which is a concentrated material used as an alternative to fine aggregates for concreting purposes. In quarrying activities, the rocks are crushed into aggregates of varying sizes, from 75mm until less than 4.5 mm, the size of which is categorized as quarry dust. The quarry dust is usually considered as waste and not utilized as a recycled aggregate product. The dumping of the quarry dust at the quarry plant poses the risk of environmental pollution and health hazard. Therefore, the research is an attempt to identify the potential of quarry dust as an alternative building material that would reduce the materials and construction costs, as well as contribute effort in mitigating depletion of natural resources. The objectives are to conduct material characterization and evaluate the properties of fresh and hardened engineering brick with quarry dust mix proportion. The microstructures of quarry dust and the bricks were investigated using scanning electron microscopy (SEM), and the results suggest that the shape and surface texture of quarry dust is a combination of hard and angular formation. The chemical composition of the quarry dust was also evaluated using X-ray fluorescence (XRF) and compared against sand and concrete. The quarry dust was found to have a higher presence of alumina (Al_2O_3), indicating the possibility of an early strength effect for brick. They are utilizing quarry dust waste as replacement material has the potential of conserving non-renewable resources as well as providing a viable alternative to disposal of current quarry waste.

Keywords : building materials, cement replacement, quarry microstructure, quarry product, sustainable materials

Conference Title : ICGBT 2022 : International Conference on Green Building Technologies

Conference Location : Tokyo, Japan

Conference Dates : August 16-17, 2022