

Petrographic and geotechnical characteristics of carbonate aggregates from Darwaza limestone and its suitability for the construction of road surface structures

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This research work involves a detailed physico-mechanical investigations of Darwaza Formation and correlations with international standards to find out its suitability as a construction material. Among the physico-mechanical parameters of studied samples, compressive strength values ranged from 11-33 MPa, water absorption ranged from 0.2 to 1%, porosity ranged from 0.13 to 0.55, specific gravity ≥ 2.5 i.e., 2.5 to 3.0. Similarly, Loss Angeles abrasion value was obtained as 27.2 which is within the standard range. The shape index of the studied aggregate samples was 5.8% (Flakiness Index) and 5.6% (Elongation Index) where the specified upper limit is 15%. Using sodium sulfate for determining the soundness test the total weight loss in 5 cycles was 2.9, which is well within the specified range. Petrographic studies suggested these rocks are classified as micritic limestone or mudstone. Only a few dolomitic romes were observed that shows dolomitization at the very initial stages and neglects the alkali carbonate reaction, making them feasible for use as concrete aggregate. The absence of quartz minerals also suggests absence of alkali silica reaction, suggesting its suitability for asphalt aggregate. Although the fractures, joints and weak zones are noticed in the studied thin sections, nevertheless, the geotechnical parameters support it as suitable and feasible for the construction of road surface structures. Based on the detailed study of rock material and aggregates, it is inferred that the asphalt-concrete mixtures will be of good quality. This in turn assures the production of a durable road surface with an optimal thickness, which would be resistant to environmental factors. Such approach among producers of aggregates, asphalt, concrete and road surfaces should assure a sustainable development and satisfaction of road users.

Keywords: Aggregates; Darwaza Limestone