

Rock Aggregate Size Influence on Physical Degradation of Laminate Sedimentary Rocks in Flexible Pavement

H. Laldintluanga^{1*}, Rebecca Ramhmachhuani¹ and Zosangliana Ralte²

¹ Mizoram University, Department of Civil Engineering, Aizawl-796004(MZ), India

² Pachhunga University College, Department of Geophysics, Aizawl-796001(MZ), India

(*Corresponding Author, Email: laldin99@gmail.com)ORCID: 0000-0002-6180-9757

Abstract

Rock aggregates are the most fundamental material of highways, railroads, and other construction activities. Degradation of aggregate is the disintegration of aggregate due to the wheel load and moisture saturation causing loss of support in unbound granular layer and reduction of drainage in pavement materials. Sedimentary rocks from different quarries were evaluated to determine the influence of aggregate size on the degradation of materials. This study is to find out the effect of size on physical parameters of aggregate used in flexible and rigid pavement. The performance of river rock and crushed rock physical properties has been tested and compared. In order to determine the effect of aggregate size on their degradation properties, different sieve ranges were selected. The sieve sizes are graded into four categories according to Indian Standard sieve: R1 (20 mm-16 mm), R2 (16 mm-12.5 mm), R3 (12.5 mm-10 mm), and R4 (10 mm-4.75 mm) for degradation test such as, aggregate impact value (AIV), aggregate crushing value (ACV), water absorption (WA) and weathering test such as soundness and slake durability. It is observed that the larger size of aggregate has given better resistance against impact load, abrasion, weathering action and water absorption compare to smaller size over the same volume of rock. The rate at which aggregate degradation occurs is influenced by size. Along with the wheel load, environmental factors including moisture and temperature changes are the primary causes of the early degradation of aggregate. The river rock has a better resistance against degradation and weathering action as it has lesser lamination (a small scale sequence of fine rock layer). Adoption of larger size aggregate in the pavement base course is suggested to withstand the effect of environmental action and wheel load, especially on the friable and quickly disintegrated rock. Arating value, rating index and regression equation have been developed for aggregate degradation.

Keywords: Particle Size, Properties of Rock, Weathering, Slake Durability, Degradation Index

(Received : 18 October 2022 ; Revised Form Accepted : 28 April 2023)

<https://doi.org/10.56153/g19088-022-0122-28>