

## Multi-Index Performance Investigation of Rubberized Reclaimed Asphalt Mixture

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**Abstract :** Asphalt pavement with recycled and sustainable materials has become the most commonly adopted strategy for road construction, including reclaimed asphalt pavement (RAP) and crumb rubber (CR) from waste tires. However, the adhesion and cohesion characteristics of rubberized reclaimed asphalt pavement were still ambiguous, resulting in deteriorated adhesion behavior and life performance. This research investigated the effect of bonding characteristics on rutting resistance and moisture susceptibility of rubberized reclaimed asphalt pavement in terms of two RAP sources with different oxidation levels and two tire rubber with different particle sizes. Firstly, the binder bond strength (BBS) test and bonding failure distinguishment were conducted to analyze the surface behaviors of binder-aggregate interaction. Then, the compatibility and penetration grade of rubberized RAP binder were evaluated by rotational viscosity test and penetration test, respectively. Hamburg wheel track (HWT) test with high-temperature viscoelastic deformation analysis was adopted, which illustrated the rutting resistance. Additionally, a water boiling test was employed to evaluate the moisture susceptibility of the mixture and the texture features were characterized with the statistical parameters of image colors. Finally, the colloid structure model of rubberized RAP binder with surface interaction was proposed, and statistical analysis was established to release the correlation among various indexes. This study concluded that the gel-phase colloid structure and molecular diffusion of the free light fraction would affect the surface interpretation with aggregate, determining the bonding characteristic of rubberized RAP asphalt.

**Keywords :** bonding characteristics, reclaimed asphalt pavement, rubberized asphalt, sustainable material

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