

## Design of Sustainable Concrete Pavement by Incorporating RAP Aggregates

**Authors :** Selvam M., Vadthya Poornachandar, Surender Singh

**Abstract :** These Reclaimed Asphalt Pavement (RAP) aggregates are generally dumped in the open area after the demolition of Asphalt Pavements. The utilization of RAP aggregates in cement concrete pavements may provide several socio-economic-environmental benefits and could embrace the circular economy. The cross recycling of RAP aggregates in the concrete pavement could reduce the consumption of virgin aggregates and saves the fertile land. However, the structural, as well as functional properties of RAP-concrete could be significantly lower than the conventional Pavement Quality Control (PQC) pavements. This warrants judicious selection of RAP fraction (coarse and fine aggregates) along with the accurate proportion of the same for PQC highways. Also, the selection of the RAP fraction and its proportion shall not be solely based on the mechanical properties of RAP-concrete specimens but also governed by the structural and functional behavior of the pavement system. In this study, an effort has been made to predict the optimum RAP fraction and its corresponding proportion for cement concrete pavements by considering the low-volume and high-volume roads. Initially, the effect of inclusions of RAP on the fresh and mechanical properties of concrete pavement mixes is mapped through an extensive literature survey. Almost all the studies available to date are considered for this study. Generally, Indian Roads Congress (IRC) methods are the most widely used design method in India for the analysis of concrete pavements, and the same has been considered for this study. Subsequently, fatigue damage analysis is performed to evaluate the required safe thickness of pavement slab for different fractions of RAP (coarse RAP). Consequently, the performance of RAP-concrete is predicted by employing the AASHTO-1993 model for the following distresses conditions: faulting, cracking, and smoothness. The performance prediction and total cost analysis of RAP aggregates depict that the optimum proportions of coarse RAP aggregates in the PQC mix are 35% and 50% for high volume and low volume roads, respectively.

**Keywords :** concrete pavement, RAP aggregate, performance prediction, pavement design

**Conference Title :** ICDRCP 2022 : International Conference on Development and Research in Concrete Pavement

**Conference Location :** Rome, Italy

**Conference Dates :** October 13-14, 2022