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Experimental Assessment of Polypropylene Plastic Aggregates(PPA) for Pavement Construction: Their Mechanical Properties via Marshall Test

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Abstract : This research paper presents the results of using plastic aggregate in flexible pavement. Plastic aggregates have been prepared with polypropylene (PP) recycled products and have been tested with Marshall apparatus. Grade 60/70 bitumen has been chosen for this research with a total content of 2.5 %, 3 % and 3.5 %. Plastic aggregates are mixed with natural aggregates with different proportions and it ranges from 10 % to 100 % with an increment of 10 %. Therefore, a total of 10 Marshall cakes were prepared with plastic aggregates in addition to a standard pavement sample. In total 33 samples have been tested for Marshall stability, flow and voids in mineral aggregates. The results show an increase in the value when it changes from 2.5 % bitumen to 3 % and after then it goes again toward declination. Thus, 3 % bitumen content has been found as the most optimum value for flexible pavements. Among all the samples, 20 % PP aggregates sample has been found satisfactory with respect to all the standards provided by ASTM. Therefore, it is suggested to use 20 plastic aggregates in flexible pavement construction. A comparison of bearing capacity and skid resistance is also observed.

Keywords : marshall test, polypropylene plastic, plastic aggregates, flexible pavement alternative, recycling of plastic waste
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