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Recycling of Asphalt Pavements in New Bituminous Mixes

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ABSTRACT

The recycling of Recycled Asphalt Pavement (RAP) in the production of new bituminous mixtures is an interesting possibility at a time when waste minimization is to the fore. The economic cost of dumping RAP and other waste materials has increased which has led the drive by local authorities and contractors to investigate the recovery of RAP and other materials to reduce their spiraling waste disposal costs. The environmental effects of disposing RAP have posed questions to be asked about the pollution caused to the ground and streams by the leaking of leaches from RAP. The present investigation consisted of experimental and theoretical studies of using various % of RAP aggregate in three different mixtures. The aggregates used have been recycled from bituminous mixtures.

INTRODUCTION

Asphalt has been used as a construction material from the earliest days of civilization, but its early use was as a waterproofing material in shipbuilding and hydraulic components, its use in road building was more recent (Roberts, Mohammad and Wang 2002). The first roads were probably constructed over animal tracks and the only features on the route were markers to avoid marshes and other hospitable lands. The roads of the time tended to hold to high ground, such as on the Downs in the United Kingdom, to allow the traveller clear vision and, hence, safety. Bituminous mixtures used in roads nowadays were evolved from dry stone mixtures developed by two pioneers Telford and Macadam. These inventors introduced individually dry bound mixtures for pavements, which were subsequently sprayed with a sealing tar blend to bind the aggregates together and provide a medium with good water proofing properties. These composite mixtures relied on stone interlocking for their strength. However, the advent of motor vehicles highlighted the weaknesses in their performance.

REVIEW OF LITERATURE

Recycling of used asphalt and other waste mixtures as replacements for virgin aggregate is on the increase worldwide. The UK is ahead of Europe in terms of the amount of material recycled. The highways agency has already revised the specification for recycling of used asphalt into new base course mixtures from 30% to 50% (Asphalt Industry Alliance (AIA) 2001). The recycling of asphalt mixtures are marketed under a large number of names. This may be somewhat bewildering to professionals who are not familiar with asphalt recycling. All recycling processes fall into one of four possible categories as follows: hot recycling, cold recycling, in-situ recycling and in-plant recycling. It follows that both the in-situ and in-plant recycling processes can be either hot or cold (Sherwood 1995).

Advantages

(i) less user delay.
(ii)conservation of energy.

(iii) preservation of environment.
(iv) reduced cost of construction.
(v) conservation of aggregate and binder.
(vi) preservation of existing pavement
geometrics etc.

Disadvantages

(i) the major disadvantage of RAP is the inability to make significant changes to mix.
(ii) pavement that exhibit structural base failure, irregular patching.

CONCLUSIONS

From the work carried out in this thesis the following conclusions can be made:

" Specimens containing 30% RAP aggregate recorded the highest stiffness (ITSM) result for base course made with RAP aggregate from both Quarries No. I and No. 2. RAP aggregate between 30% and 50% can be added to base course, but caution needs to be exercised to ensure that the final product is compliant with the standard specification. " Specimens containing 15% RAP recorded the highest stiffness (ITSM), (ITST), fatigue (ITFT), tensile strength (ITT) and the lowest % wear results for road base. RAP aggregate between 15% and 30% can be added to road base and still have higher stiffness, fatigue and tensile strength values than 0% RAP.

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