

Improving water resistance of asphalt concrete in Saudi Arabia

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Abstract

This study was carried out to find the most effective and economical treatment for water resistance of asphalt concrete and the effects of different anti-stripping agents in reducing the loss of stability.

The research conducted included Marshall tests and standard stripping tests on mixes with different treatments. Other tests included penetration, softening point and ductility. Aggregates from four different sources and having different mineralogical and physical characteristics were studied. Fillers from three different sources were studied. The six types of treatments used for the study were amine, sodium dichromate, hydrated lime, cement, sulphur, and acid wash.

It was found that modification in the standard stripping test by enlarging the photographs of stripped off specimens is effective in determining the extent of stripping. Reasonably water resistant mixes could be developed if care is taken in the proper selection of fine aggregates and filler. Hydrated lime was found to be most effective in improving the water resistance of asphalt concrete. The optimum percentages of lime were 2.5% for Abuhardriyah and 5% for Hofuf aggregate.

Lime appears to have been better matched to Hofuf aggregate than to Abuhadriyah aggregate. However, lilamin was matched to Abuhadriyah aggregate.

The effect of the combination of different treatments was also studied which gave promising results. Stability determination after prolonged immersion was found to be an important factor to be considered in design criteria. It is anticipated that the findings of this research will enhance good asphalt mix procedures in the local asphalt concrete industry.