SUSTAINABLE AGGREGATES SOUTH AUSTRALIA

Investigation of popping in thin asphalt surfaces

Environmental Fact Sheet No. 4

Introduction

There is an increasing use of recycled materials in road construction. The use of recycled crushed concrete as an aggregate on lightly loaded pavements is a common application adopted on a variety of projects such as car parks, sporting facilities, bikeways, school yards etc.; however, there are some perceived contamination problems.

Small defects in the surface of asphalt pavements were discovered in several locations, through examination and testing it was determined that the cause of the defects was the use of a material which included material susceptible to react and swell under the surface.

This also provided the impetus for the creation of a risk management strategy to manage these issues, should they arise in the future.

Problem

When an asphalt pavement started to have small areas where the surface was being pushed up, like the surface was "popping" (refer Figures 1 and 2), an investigation into the cause of the problem was undertaken.

Initially the spots where the deformities were occurring were examined, and a pocket of mottled white and grey material, with black specks, was discovered (Refer to Figure 3).

This looked like something had reacted chemically to create the various different materials, and subsequently an independent consultant was engaged to further investigate the cause of the "popping".

Diagnosis

It was determined that the "popping" was indeed caused by a chemical reaction, in this case it was the reaction of Pyrite and Dolomite to form a material called Epsomite. The Pyrite first reacts with water and oxygen to create an acid, which then in turn reacts with the Dolomite to form the Epsomite. These chemical reactions take up a greater space than the original material and, hence, push the pavement surface up, creating the popped appearance. This material is also ideal for the growth of mushrooms, which were also discovered in some locations.

Risk Management Strategy

Due to the large amounts of recycled concrete used, compared to the small amount of material containing dolomite, it is not possible to have a routine detection strategy.

It is, however, recommended that a risk management strategy is undertaken, where regular testing of recycled crushed concrete is done; especially where there is a suspicion that dolomite may be present. This is in attempt to catch the issue before the product is delivered.

As this occurrence was the first of its type associated with recycled crushed concrete, continued monitoring of product is recommended.

Figure 1 – popping in path surface

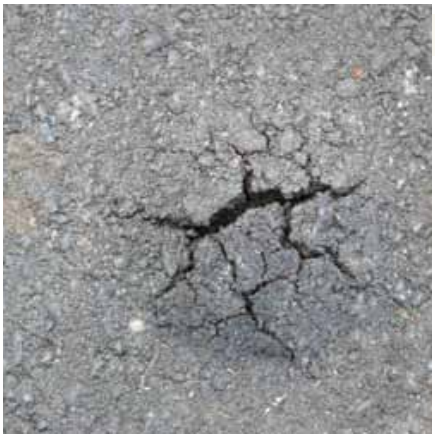

Figure 2 – close up of popping

Figure 3 – mottled material

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