TMC – Tinni Management Consulting

PAVEMENT INFORMATION NOTE

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What is new with Asphalt Pavements?

The following information is summarised from the Report on the AAPA Study Tour to US in August 2010.

1 "Perpetual Pavement" Concept

This is a marketing term from the US and in reality means "long life flexible pavement". It is based on, what is claimed to be now evident, that the asphalt Fatigue Endurance Limit (FEL) is now an accepted concept. Hence, if the design ensures that if the asphalt pavement structure is sufficiently thick and hence the FEL is not exceeded, then the pavement structure has an indeterminate fatigue life. The principle is the same as for composite pavements which are designed so that failure mechanism starts from the top. This would mean that, in NSW at least, the Design Life of a Deep Lift Asphalt pavement would then become the same as for rigid pavements, ie 40 years

The FEL research now is focused on quantifying the limit rather than establishing its existence.

2 Thickness Design

The direction of thickness design methods is away from the WMAPT (Weighted Mean Annual Pavement Temperature) and towards the dynamic modulus at a selected number of temperature conditions that represent the seasonal range. Determination of asphalt dynamic modulus using cyclic compression loading is favoured by research institutions, but has not been accepted by Road Authorities.

3 Construction Standards

In various trials it has been demonstrated that the effect of layer thickness and the mix grading for asphalt compaction has resulted in recommendations to increase the layer thickness relative to the nominal mix size – typically to a minimum of 3 times the maximum aggregate size for fine graded mixes and 4 times for coarse graded mixes.

Full scale trials have also demonstrated the importance of interface bonding. There have been some dramatic failures due to debonding of the asphalt layer interfaces. Similar failures have occurred where a geotextile membrane had been placed at the interface of a "mill and fill" rehabilitation treatment. As a general conclusion, excellent bonding between asphalt layers within a thick asphalt pavement structure is now regarded as essential. Poor bonding between the layers of several test sections has resulted in significantly reduced pavement life.

4 Tackless Tack Coats

The importance of good bond between layers has lead to the investigation of the effectiveness of the existing method of providing tack coats and the realisation of its inadequacy for bonding. Thicker applications however will roll up under

vehicle tyres and hence do not provide the solution. Research is now underway to develop a "tackless tack coat" that can have a thicker application rate and will not pick up under construction traffic

5 Warm Mix Asphalt

Warm mix ac is made at a lower temperature than normal hot mix. The different manufacturing process for WMA causes a temporary reduction in the viscosity of the bitumen which apparently allows for better coating of the aggregate and easier compaction. Either certain additives are added to the ac mix to lower the viscosity of the binder or the bitumen is foamed through direct injection of water. The mixing temperature can be reduced 17 - 39ºC depending on the additive. This methodology is getting quite popular in the US.

6 Grading of Bitumen

Most States have now moved away from the traditional penetration or pen/vis specification and adopted the **Performance Grade (PG)** binder specification system. This classification indicates the temperature range over which a binder will exhibit satisfactory rheological behaviour. For example, a bitumen with a classification of PG64 -22 will be considered suitable for use as an asphalt binder in locations where the average 7 day maximum pavement temperature at a pavement depth of 20 mm is 64ºC and the average minimum 7 day surface temperature is -22ºC. Hence, the PG system is theoretically based on performance characteristics rather than the traditional empirical nexus relating physical properties with observed performance.

7 Snippets

- Virginia DoT have found that geofabric is not successful in reducing reflective cracking;
- Texture depth is no longer measured as an independent measure for skid resistance assessment;
- Quotes:

  "Before we save the planet, let's make sure the treatments meet our specifications!"

  "Don't mess with old men. They did not get old by being stupid!"