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# The Roles of Selected Material Zone and Lean Mix Concrete Subgrade in Concrete Pavement Design

Presentation by Arvo Tinni of Abigroup to the ASCP Forum on 31 March 2008

## ABSTRACT

The paper draws attention to the major differences in design methodology of flexible and rigid pavement designs. For concrete pavements, the design is based on the **Equivalent Strength** (CBR) of 1000 mm of subgrade. This includes the Selected Material Zone (SMZ) and is calculated using the widely accepted Japanese Public Works formula for equivalency.

The role of the SMZ is to provide a stable support platform of uniform bearing capacity. Its quality is specified to reduce the susceptibility of erosion. As a further insurance, the top 150 mm is lime modified if the material has a CBR <30%.

The Austroads Pavement Design Guide allows the subbase to be either cement stabilised crushed rock, dense graded asphalt or lean mix concrete. In NSW only 5 MPa concrete is used. It is emphasised that the subbase is not a structural layer in concrete pavement design. Its role is to provide a working platform of uniform support for the pavement (base) and has to be finished to accurate levels to ensure uniform thickness of the base. Its other attributes are to reduce the deflections at the joints in the base (by load transfer), resist erosion in the subbase and limit pumping at the joints and slab edges. Not being a structural layer, the low concrete strength is specified to reduce the amount of shrinkage and hence cracking. The LMC behaviour is more important to PC Pavements than to CRC Pavements.

The base design is based on the **Effective Strength** of the subgrade which is made up of the Equivalent Strength + the effect of the LMC "capping" layer. The concrete subbase has a significant contribution to the load distribution to the Equivalent Strength and subsequently to the natural subgrade strength ( $E_c = 10,000$  MPa vs  $E_{SMZ} = 150$  MPa).

The paper also demonstrates that when using 300 mm of CBR 15% SMZ with the top 150 mm lime stabilised and 150 mm of 5 MPa LMC, the base thickness is constant once the insitu subgrade strength of CBR 3% is reached. It is also shown that for insitu subgrades of CBR 5% or better, the provision of a SMZ has no significance in structural design.

The question is posed as to how much geotechnical information is really needed for rigid pavement designs?