TMC – Tinni Management Consulting

PAVEMENT INFORMATION NOTE

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ASCP FORUM ON

INDUSTRIAL PAVEMENTS

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This was an afternoon Forum arranged by ASCP. Six papers were presented on design and construction of reinforced, steel fibre reinforced and post tensioned pavements. The following are snippets of info that are also of interest to us:

1 Their design bible is the CCAA T48 doc + Brit TR34.
2 Their designs include calculations for the actual load transfer across the joints. Sometimes this can govern the thickness of the pavement. (We do not do that).
3 The US ACI Manual of Concrete Practice actually shows the shrinkage stress calculations within slabs and also how to determine the need for dowels.
4 For floors the acceptable crack width is 0.5 mm (cf RTA 0.3 mm).
5 A number of speakers made that point that it can never be guaranteed that any floor is going to be completely crack free.
6 Square and flat dowels are preferred as round ones (as ours) do not cater for lateral shrinkage.
7 Keyed joints are not suitable for pavements or efficient load transfer.
8 Fibres are for holding cracks together rather than for load transfer,
9 In concrete pavements the load distribution from the edge of the wheel is 35º. (This is useful for our design also).
10 Laser screeds are now replacing the bridge type screeds (as commonly used by us).
11 The usual concrete is 40 MPa with 5.5 MPa flex strength.
12 The allowable shrinkage is 600 – 700 μm in 6 days (compared to RTA 450 μm in 21 days).
13 No fly ash is used in the mixes as they want early strength.
14 The predominant failure modes are:
   - Joint spalling;
   - Spider web (crocodile) cracking due to excess mortar;
   - Corer failures due to "curling", which generally is the slab thickness problem;

   Note that they do not distinguish between "warping", which is drying related and "curling" which is temperature related.
15 Normally they do not adjust pours/mixes to suit changes in weather conditions;
16 20 mm aggregate is maximum for pumping, but will use 40 mm where possible – less cement, mortar, shrinkage and cheaper. (Geoff Ayton's comment was that 40 mm is not practical for roadworks as this would require a new testing "kit"!!).

17 AS 3600 allows maximum shrinkage of 1000 μm, and was put into the spec only to eliminate certain undesirable aggregates. It does not represent any "unplanned" cracking potential in the field.
18 Cracking generally occurs a lot earlier than normally predicted;
19 The AS 1012 method of testing shrinkage has inherent variations. At best the answers could be, say, 500 ± 100 μm;
20 University tests on 400 identical mix samples for a nominal 500 μm mix had a SD of 65μm;
21 Research has shown that laboratory results do not represent what will actually occur in the field;
22 All early age movements (shrinkage and expansion) that occur in <7 days are 2 – 3 times that of the design model;
23 There is no model available that would reflect what will actually happen in the field;
24 A mix with nominal shrinkage of 600 μm or 800 μm will probably give identical performance in the field;
25 Planned cracking means induced cracks only. All other are unplanned;
26 Both steel fibre or conventional reinforcement only start to work after the concrete has cracked;
27 It was claimed that synthetic fibre has a yield strength of 620 MPa (compared to conventional reo having 500 MPa)