



TMC – Tinni Management Consulting

PAVEMENT INFORMATION NOTE

**Issue
No.
8**

Edited by Arvo Tinni. Email arvo@tinni.com.au

7 02 2008

NOTES ON BLEEDING

Bleeding is a form of segregation in which some of the water in the mix tends to raise to the surface. It results from the inability of the solid constituents to hold all the mixing water when they settle downwards during compaction, as well as due to the development of negative suction pressure in the air voids, as water is being absorbed during hydration of the cement.

Bleeding occurs when the bleeding rate is faster than the rate of evaporation of water from the surface of the concrete. In this situation it is unlikely that any plastic cracking will occur. The corollary is that if the evaporation rate is faster, then plastic cracking may occur.

Bleed water should never be remixed into the surface during finishing. This will create a weak, laitance like, layer on the surface, which will most likely peel off under traffic.

Bleeding is not necessarily harmful if it is left undisturbed and allowed to evaporate from the surface. The reduction of the mix water will reduce the w/c ratio and thus increase the strength of the concrete. (The amount may not be relevant, however).

The main causes for bleeding are the excess water content in the mix and the fineness of the cement used. The finer the cement, the lower the bleed.

Rich mixes are less prone to bleeding than lean ones. (Compare our subbase 5 MPa LMC with the 35 MPa base concrete behaviour).

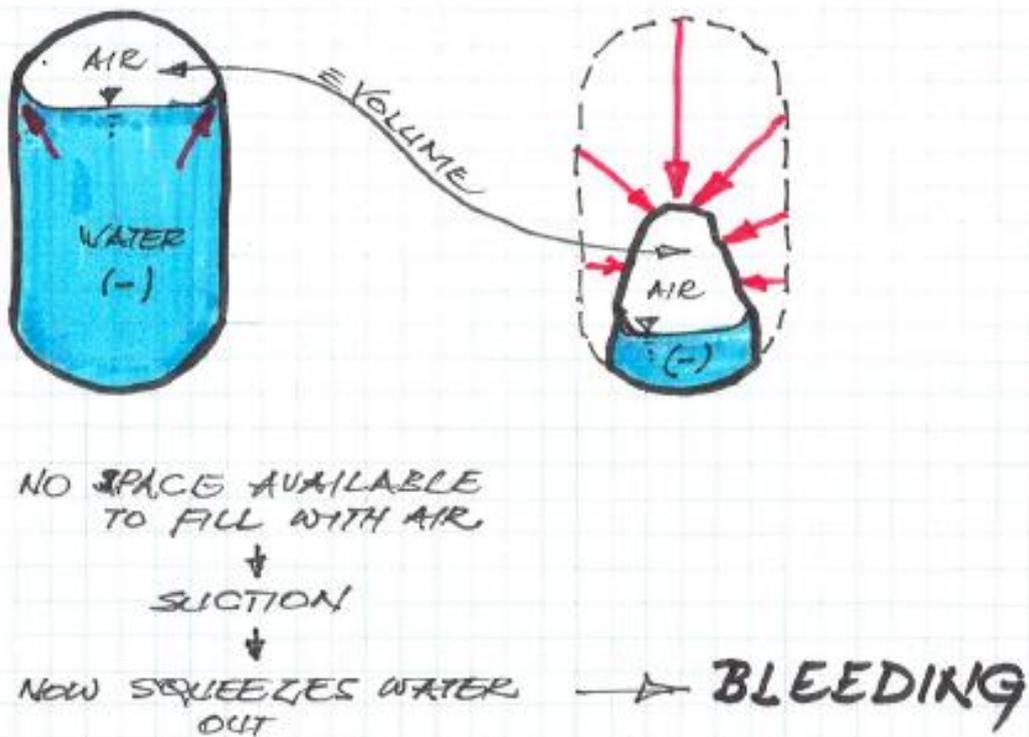
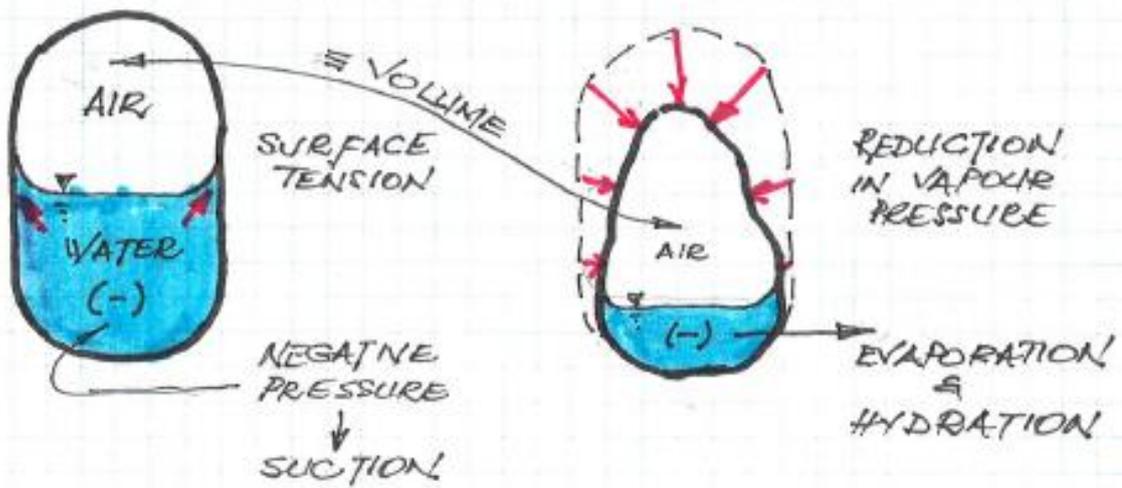
The amount of bleeding can be reduced by the addition of pozzolans, aluminium powder and ensuring that there is the correct amount of air entrainment in the mix. The latter is the most effective way of reducing bleeding.

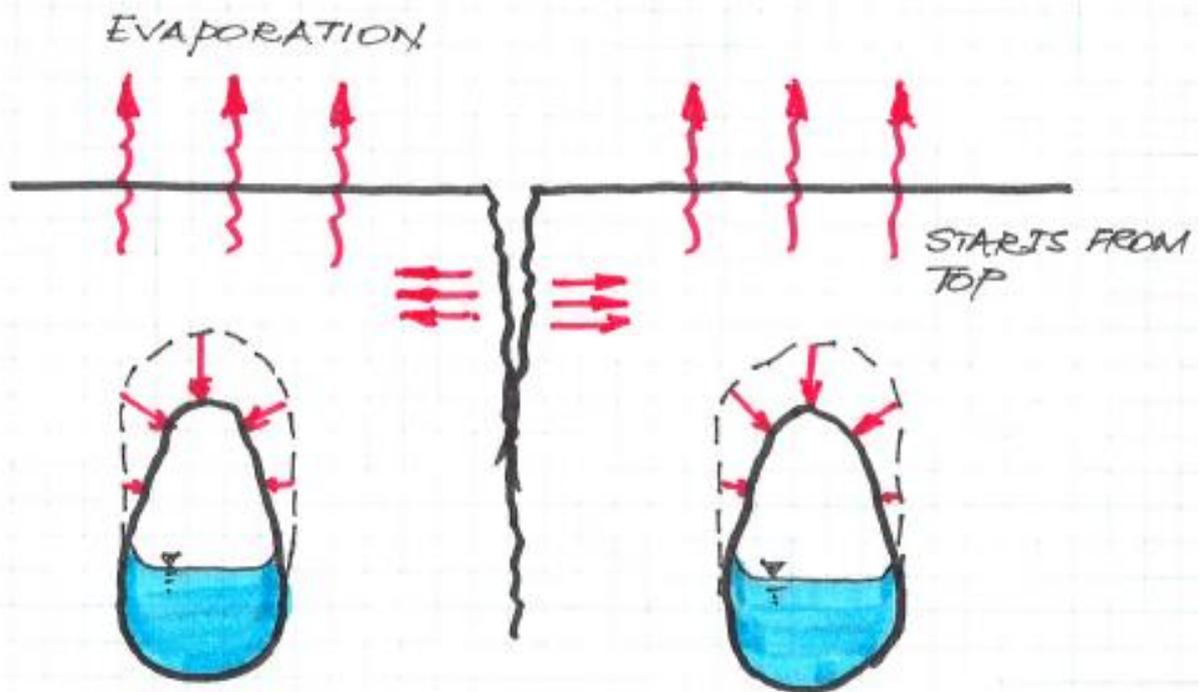
Curing compound should not be applied until bleeding has stopped, the free water evaporated and a low sheen appears on the surface of the concrete.

The RTA Specifications stipulate air entrainment as 5 +/- 2% in fresh concrete. What often happens is that during placement the paver vibrators will force a lot of this out and the end product could have a very low percentage of "air" left. It would be prudent to check the actual air content after placement of the concrete. This is probably best done at the end of a day's run, when the construction joint is squared off.

The attached sketches illustrate the mechanics of bleeding and formation of plastic cracking.

Arvo Tinni
21 May 2007





THE GREATEST SHRINKAGE
OCCURS ON FIRST DRYING OF
SURFACE