

Premature wear on WA roads caused by wet base coat

March 24 2015, by Cristy Burne



HCTCRB, which was first developed to increase the strength of crushed rock bases and overcome the shrinkage problem associated with ordinary CTB, offers higher strength, improved flexibility and lower moisture sensitivity, making it especially useful for heavily trafficked roads. Credit: Petar

The lifespan of some West Australian roads has been reduced thanks to the moisture susceptibility of a road construction material, research suggests.

In recent years, many WA [roads](#) have been constructed using a layer of WA-developed material called hydrated cement-treated crushed rock base (HCTCRB), which is laid under asphalt in place of ordinary crushed rock to improve a road's durability, however, some HCTCRB roads aren't performing as expected.

Curtin University Department of Civil Engineering senior lecturer Dr Peerapong Jitsangiam says some roads have shown premature damage.

Dr Jitsangiam's team set out to determine what caused the damage, testing HCTCRB samples under a range of conditions to conclude that the addition of water to HCTCRB during road compaction was to blame.

"If the [HCTCRB] material is too dry after manufacturing, in a practical way, additional water is added to help compact the material," he says.

"This causes a problem."

Adding water to HCTCRB during construction helps with compaction and densification, but Dr Jitsangiam's team found it also reduces elasticity.

"Adding water's going to adversely affect the performance of the material," he says.

One way past the problem is to allow compacted HCTCRB to partially dry before laying asphalt, a process called dry-back.

"When we let the surface dry a bit more, the compacted material performs much better," Dr Jitsangiam says.

Hydration period unimportant

HCTCRB differs from traditional cement-treated bases (CTB) in that it cannot be laid immediately after mixing, but is instead stored for a period of days, allowing a hydration reaction to take place between the cement and water.

"This process is unique to HCTCRB," Dr Jitsangiam says.

As part of their research, Dr Jitsangiam's team tested four different hydration periods under three levels of water addition and three degrees of dry-back, discovering the length of hydration period does not significantly affect HCTCRB's properties.

"Based on our research, we couldn't find a trend...there was not much difference in terms of performance," he says.

HCTCRB, which was first developed to increase the strength of crushed rock bases and overcome the shrinkage problem associated with ordinary CTB, offers higher strength, improved flexibility and lower moisture sensitivity, making it especially useful for heavily trafficked roads.

"Some road designers may have lost confidence [in HCTCRB], but I still believe this material is a brilliant idea," Dr Jitsangiam says.

"We've found this material is fundamentally good, if we can standardise its use."

More information: "Performances of hydrated cement treated crushed rock base for Western Australian roads," *Journal of Traffic and Transportation Engineering* (English Edition), Volume 1, Issue 6, December 2014, Pages 432-438, ISSN 2095-7564, [dx.doi.org/10.1016/S2095-7564\(15\)30293-2](https://doi.org/10.1016/S2095-7564(15)30293-2)

Provided by Science Network WA

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