Repair prevention—now that's a novel idea!

Much of the hundreds of millions of dollars a year spent in Australia on concrete repair could be prevented if construction were done with a little more thought and care.

Low reo cover, for example, is a constant problem, one that could readily be avoided with little more design and construction effort.

But even if cover problems arise during construction, it isn't too late to take steps (eg, the use of membranes and protective treatments such as silanes or corrosion inhibitors) to lower the risk of premature deterioration.

Likewise, if curing is poorly done, the cover concrete can be of a very low quality, and potentially corrosive chloride ions or carbonation, etc, can invade the concrete.

Many causes

The long list of factors that can cause deterioration includes poor compaction, addition of water to concrete (boosting porosity and drying shrinkage), failure to protect concrete from rapid drying, inappropriate finishing, etc.

This raises two interesting points.

Monitor a must

Firstly, monitoring of construction can detect such problems. Routine supervision and testing (eg, covermeter, measuring surface absorption, ultrasound, crack width monitoring) can check that design objectives will be met.

Secondly, it is possible to overcome poor construction techniques during or soon after construction using specialist treatments that do not need to last the expected life of the concrete.

If, for example, a concrete element has insufficient cover, it is possible, at the time of construction, to apply a coating to prevent the movement of both carbon dioxide and moisture (containing chloride ions) into the concrete. But such a treatment may only be completely effective for 15 years, nothing like the 50 years that typically building designers would demand. However, the benefits of this type of protective treatment will last well beyond the life of the treatment itself.

SKILLED TESTERS DETECT WORK-IN-PROGRESS DEFICIENCIES

Concrete gets stronger with time. With this strength gain comes an increase in durability. If a suitable protective treatment is used to fix the cover problem, the concrete will still be in a pristine state by the time the treatment fails in 15 years and will have matured significantly.

As an example, the rate of chloride ion diffusion in 15 year old concrete is less than one tenth of what it was new.

On this basis, the application of a suitable protective treatment that lasts only 10–15 years has the potential to increase the design life of the concrete by 40–50 years.

Not only can one address poor construction techniques in this way, but also the cost of such treatments is far less than repairing future damage.

Skills needed

One can't generalise on the most suitable treatment and each case needs to be considered on its merits. However, the use of technologies most often use in repair can be highly beneficial to new concrete structures.

Members of ACRA have the skills to analyse new concrete structures and make recommendations on the benefits of various protective coatings and/or treatments. ■