

# Things to consider underground

Having been involved with basements for many years now, **Paul Green of Delta Membranes** takes a look at repair of perhaps the most critical scenario as an example, ie, a concrete structure below ground level.

**B**efore selecting the most appropriate methods and systems for repairing concrete that is leaking water, one of the most important factors will always be to ascertain whether they are static or moving cracks that one needs to remedy. Only then can one really begin to explore the best methods, products or combinations to use. There are several to choose from and although the following list may not be exhaustive, they are perhaps the most common types to consider.

- resin injection
- injection hosing
- hydrophobic (pore blocking for below-ground levels)
- mortar/cementitious-based
- polymer-modified
- crystalline
- crack stitching
- dormant pore blockers
- elastomeric
- hydrophilic (reactive/often used in more structural 'bird's mouth' type repairs).

One also needs to consider the heights of water tables (albeit these can be seasonal and fluctuate) and whether they may contain sea water, or have other contaminants, such as hydrocarbons, sulfates, nitrates, as well as various potential ground gasses too. The type of soil and ground conditions need to also be assessed as well, ie, is it free draining, sandy gravelly or heavily clayed ground (which can bring perched water tables in to play), or even a combination of the former? All of these characteristics can naturally increase associated risks.

It is also prudent to ascertain the thickness and depth of the concrete before embarking on a repair and, for example, a bird's-mouth-type repair using hydrophilic strips will require a certain amount of concrete cover, according to type and brand, as the strips need restraining due to their dynamic and expansive natures

Or if selecting injection systems, then it is widely recognised that this may well simply push the water to the next less-than-perfectly compacted/vibrated/honeycombed section

of concrete. So one can sometimes need to make many revisits before all are quelled and when dealing with honeycombed concrete on the surface, it also possible that this defect is mirrored to the reverse too, so may require a more structural approach.

If the cracks are non-static, then in addition one needs to explore the breaking and elongation point capacities of proposed elastomeric coatings.

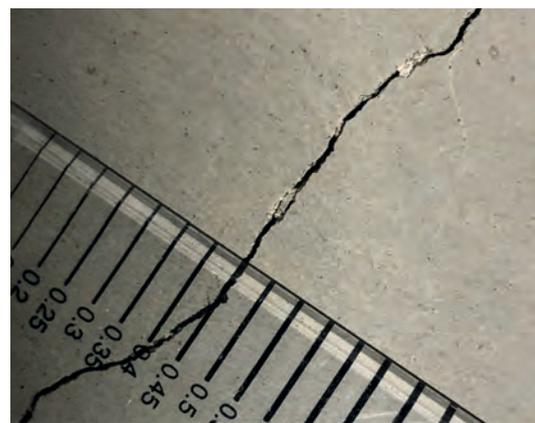
If suggesting crystalline/active products, then some ingredients within those repair products may be heavily reliant on free lime being present, so as to create chemical reactions to promote crystalline growth characteristics and capabilities too. If the leak has been heavy and prolonged, there may not be still be enough free lime present locally for these types to be efficient.

## High-risk

If a repair is to below-ground level or high-risk concrete – for example deep road or railway tunnels, which have construction joints or interfaces with injection hosing backup systems installed – then one needs to ensure that the injector spaces were sited within the manufacturer's recommended spacing centres before topping them up. If they are in fact too far apart, even the newly injected product may not be so effective.

Only subsequent to the above points being ascertained can one logically begin an appropriate selective product and methodology process. Whichever is decided on, further best advice is always to approach the respective manufacturers or suppliers at the outset to ensure that they are confident that their products are up to the challenge and that they are indeed suitable for the task ahead and all mixing ratios.

For cold liquid or cementitious systems, application thicknesses – as well as the correct methods of mixing – need to be observed for them to work to their optimum too. Some products require whisk-type, paddle or drum-type mixers and both surface and ambient temperatures need to be in accordance to a manufacturer's guidelines when applying the relative products too. ■



(Photo: The Concrete Society, Good Concrete Guide No.10.)