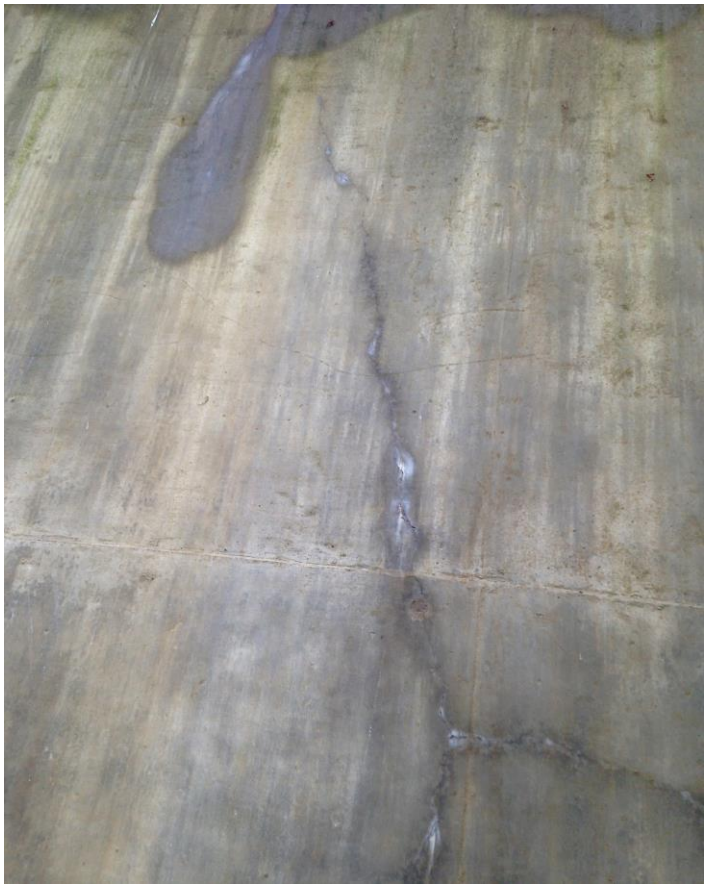
Pride Park Balancing Tank **April 2016**

Client:
Alpheus Environmental

The Problem:

Water egress through fractures

Restek were approached by Alpheus Environmental to look at a variety of fractures to a water treatment balancing tank located at Pride Park near Derby. Following our initial visit after heavy rainfall we made a second site inspection to take a detailed measure of the fractures which displayed signs of ingress. On this occasion the weather was cooler than during the previous visit and some of the egress had not evaporated, highlighting more areas of concern. Often these cracks are only hairline in width and are barely visible, however these can still extend through the entire thickness of the concrete. Unfortunately, these fractures were showing clear signs of water transport and as a result the reinforcement within the structure was showing signs of iron staining from the corrosion to the reinforcement in the concrete to the cracks on the external face of the tank. We also noted that there were leaks to the base of the tank along kicker joints as well as leaks to the pipe penetrations.



Combination of structural resins

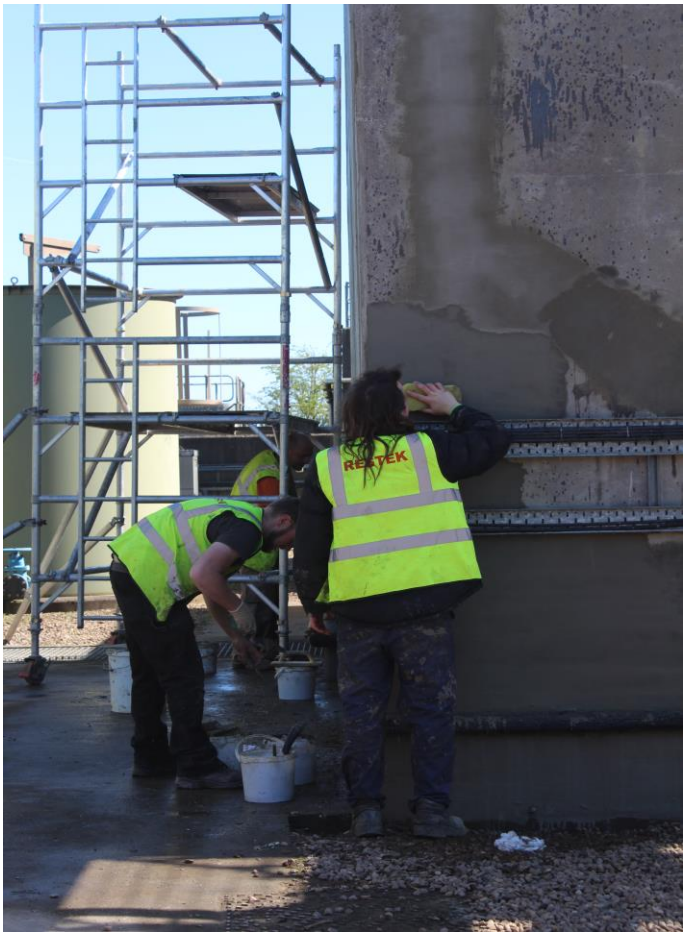
Although the water ingress appeared to be localised within a small area it was highly likely that once sealed, water would track along to an adjacent weak point. We therefore needed to seal the full length of the construction joints to ensure a water-tight seal and avoid any return visits which would require the tanks to be drained down once more.
In addition to leaking along the kicker joints, located to the base of the tank, there were a number of vertical joints that also required attention.
To combat these problems, we recommended the use of a combination of structural resins to bring the balancing tank back to its original design specification and prevent any further deterioration of the building components whilst forming a water tight seal that would allow for the slightest movements.

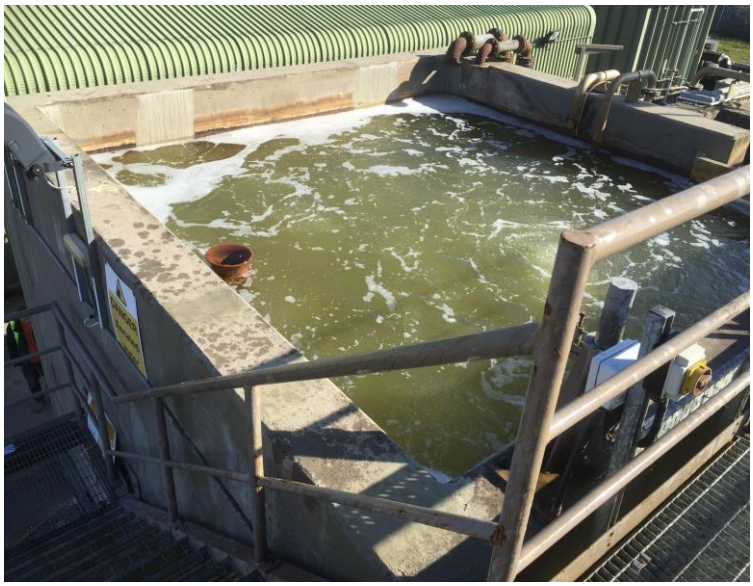
The Solution:

Due to the crack width characteristics, a full structural analysis was carried out prior to any injection.

The extent of the examination depended on the type of building structure, the type of cracks and their significance on the structure. The moisture content and the crack characteristics type, course, width modification determined, so that we could modify the resins to ensure optimum performance once injected.

Following the examination it was determined our pressure injection system with the use of *W157/150* was the best solution for fractures displaying water ingress. This method of repair with a PU is favoured by many of our clients for its ability to penetrate into the finest of hairline cracks during the injection process due to the resins low viscosity and its specially designed formula for sealing, bonding and stabilising building components where movement is to be expected.





Added benefits with this method of structural waterproofing

Via our pressure injection system, the resin will permeate into the finest of micro cracks and pores of the concrete, thus binding the building components together and renewing the structure back to its original design specification. There are added benefits with this method of structural waterproofing.

The resin has a controlled expansion of 15 times its volume compared to that of 40 times expansion with most polyurethane resins. Due to its controlled expansion, the resin will cure to form a tough flexible resin designed to maintain a good adhesive strength with the advantage of absorbing any movement without losing bond. Once the injection process had been undertaken the resin also provided a watertight seal to the concrete and prevented any further decay of the building components from water infiltration and frost due to the resins ability to displace any water within the structure during the injection process.

Where non-water baring fractures were encountered, we carried out our structural injections with an application of modified epoxy resins to suit the building components porosity such as *Webac 4170* via our specialist pressure injection systems for their ability to seal, bond and stabilise building components with a compressive strength of up to 65Nt and a greater than average tensile bond strength when tested to BS 3900 in both dry and wet conditions.

Materials:

WEBAC 150

A high-grade low viscosity PU injection resin was used to stem the flow of water ingress so that a secondary injection could be carried out with our structural waterproofing injection system.

WEBAC 157

Used to create a flexible seal at junctions were minor movements were to be expected.

WEBAC 4170

Structural resin with a controlled expansion that cures to form a total solid with a compressive strength of 65n/mm2 and a bending and tensile strength of 85n/mm2.