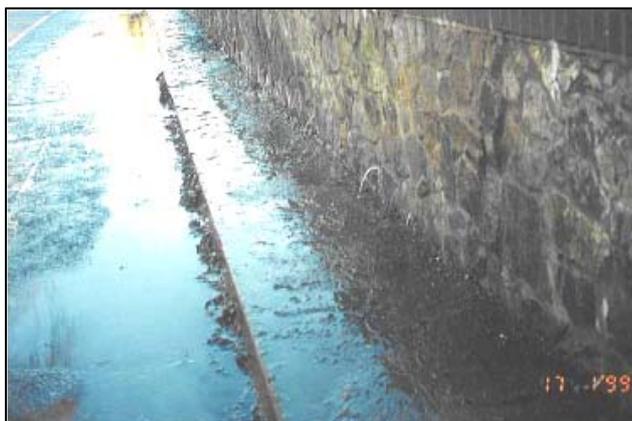


Innovation Case Study 8 – Using Resin Injection to repair an existing floodwall.

The Problem

Quorn flood wall in Leicestershire, provides a 1 in 100 year standard of protection to around 45 properties, against flooding from the River Soar. The wall runs for approximately 150m and was constructed as part of the Soar Valley Improvement Scheme.



Picture 1: Leakage during flooding of 1999.

The construction of the flood wall was called into question following flooding in 1998 and 1999, which resulted in large amounts of water percolating through the wall and ponding on the dry side of the defence.

Investigations revealed very poor quality concrete in the core of the wall and in areas surrounding the facing stones. This appeared to be mainly due to poor compaction and poor grading of the aggregates during construction. The seal between the piles and pile cap was also found to be unsatisfactory since the piles hadn't been burnt level allowing the pile cap to sit level on the top. This created voids between the baffle plates & piles. These faults combined to cause numerous, large direct pathways from the wet to the dry side of the wall.

The Solution

Initially the only feasible solution was thought to be demolition and reconstruction at an anticipated cost of £350k. Analysis showed that the wall was structurally sound and demolition seemed a waste of money and resources, so alternative methods of blocking the pathways were sought.

Oxford Hydrotechnics Ltd were brought in to repair the flood wall by intersecting flowpaths through the wall using polyurethane resin injection methods. The resin is injected as a low viscosity liquid that ensures initial penetration into flowpaths. Upon contact with water it reacts to produce an expanding cellular foam with consequential increase in volume from the initial liquid resin. The expansion process increases penetration of the resin into fissures within the structure where it cures to form a chemically inert conglomerate.



Picture 2: Drilling to intercept flowpaths.

The cured closed cell foam is hydrophobic and harmless to the environment. It resists chemical and biological attack. An accelerator agent is added to the base resin to vary the speed of reaction for the application in hand.

The work package also included sealing the interface between the floodwall foundation and the piles, sealing expansion joints and all other works deemed necessary to stop water seepage/ingress through the floodwall and any other temporary works.

Two levels of injection ports were drilled to intersect the central concrete core and the interface between the wall and the mass concrete footing. Injection packers fitted with non-return valves were set in place along the wall's length.



Picture 3: Resin emerging through the flood wall.

Dye testing followed to ensure potential flowpaths were intersected before resin was injected to seal the compromised areas of the wall.

Works to seal the interface between the floodwall foundation and the piles were carried out from a working barge using waterproof natural cement mortar. The final finishing works consisted of saw cutting new expansion joints and re-pointing sections of poor mortar joints. The re-pointed sections were then colour washed to match the existing wall colouration.

The Results

The work was completed in 4 weeks, 10 days under programme. This method saved over £250k compared to the costs of demolition and rebuilding and was much quicker and involved less disruption to the local community.



Picture 4: Finishing work included re-cutting expansion joints and re-pointed stonework.

Where can I go for more information?

The project was managed for Midlands East Area by Tichaona Madzimbamuto who can be reached on 01159828327 or 722 2727.

Alternatively contact the specialist contractor, Oxford Hydrotechnics, using the details below.



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