

REPAIR AND STRENGTHENING

Major upgrade of Eastbourne Wastewater Treatment Works

A major £16 million upgrade of Eastbourne Wastewater Treatment Works is currently being carried out on behalf of Southern Water and part of the works has comprised the refurbishment of an underground reinforced concrete inlet chamber at the plant. Graham James and Chris Lloyd of AkzoNobel report.

Dating back to 1997, Eastbourne Wastewater Treatment Works is located on a prime site on the seafront at Langney Point in East Sussex. Serving a population of circa 140,000 across the Eastbourne area, the vast majority of the works are located underground, beneath a fortress-style building. Up to 74 million litres of wastewater is pumped into the works every day and treated almost entirely out of sight.

The concrete repair work was carried out by specialist asset maintenance contractor Concrete Repairs Limited (CRL) beneath ground level in confined spaces and extremely arduous conditions. The project involved the repair and refurbishment of the underground inlet channel that receives wastewater flows, as the concrete had deteriorated due to attack from hydrogen sulfide (H₂S) gas and sulfuric acid. The project was carried out on behalf of CMDP, a joint venture between Costain and MWH and one of Southern Water's three business partners delivering AMP6 improvements until 2020.

The original specification called for the use of a dry-spray repair mortar, a levelling skim coat and a final layer of a high-performance cementitious coating. However, in order to increase productivity and project efficiency, as well as shorten the programme time, it was decided to use a two-product system comprising Intercrete concrete repair materials to refurbish the underground inlet chamber. Intercrete is part of the International brand, expanded following AkzoNobel's acquisition of Flexcrete Technologies in July 2017, with Flexcrete products now known as Intercrete.

A system was specifically devised comprising a dry-spray application of Intercrete 4801 repair mortar followed by a final coat of 4840 cementitious coating. By using 4801 as a spray mortar, CRL was able to do away with the skim coat due to the quality finish on the 4840. This meant that the skimming stage was no longer required and there were no compatibility issues as the 4840 cementitious coating could be applied directly onto the rapid curing 4801.

In order to remove the defective concrete first, CRL used hydro-demolition methods before the dry-spray application of 4801. The application was then carried out at night when flows were lowest and, in total, almost 140 tonnes of 4801 were applied over a six-month period by CRL.

4801 is a high-strength, waterproof, shrinkage-compensated, class R4 cementitious repair mortar, which exhibits extremely low rebound when applied either by dry- or wet-spray techniques for the structural repair, rendering and profiling of

Eastbourne Wastewater Treatment Works is located on the seafront.

An area of Intercrete 4801 repair next to an area ready for the material to be sprayed back in.





Hydro-demolition to remove defective concrete and expose and prepare the steel reinforcement.

vertical, overhead and horizontal surfaces. The dry-spray application was particularly well suited for use at Eastbourne due to the low rebound/waste in the confined area, allowing easier site clean-up and a safer working environment.

Single component

Supplied as a single-component system only requiring the addition of clean water on-site, 4801 incorporates advanced cement chemistry, silica fume, fibre and styrene acrylic copolymer technology. CE marked in accordance with BS EN 1504 Part 3⁽¹⁾, it can be applied up to 80mm in a single layer and rapidly develops a high bond strength exceeding the tensile strength of concrete, thus ensuring monolithic performance of the repair. Developing a compressive strength of 33MPa within just 24 hours, one of the key advantages for this project was its rapid curing time, meaning it could be overcoated with 4840 within hours rather than days. It also has excellent sulfate resistance, remaining resistant to sulfates to class DS-5/5m of BRE Special Digest 1⁽²⁾.

Once the 4801 had fully cured, 4840 was applied. This is a two-component, water-based cementitious coating that benefits from modification with both a thermoplastic polymer as well as an epoxy resin to provide a hard-wearing surface with greatly enhanced chemical and abrasion resistance.

This combined 4801/4840 system was also specified for another Southern Water project carried out by CRL at Ford Wastewater Treatment Works in Arundel. For both

projects the combined 4801/4840 was chosen on the basis of its rapid curing properties, the omission of the skim coat due to the high-quality finish of the mortar and the short period between the application of the mortar and coating.

The finished system exhibits high chemical resistance in aggressive wastewater facilities, with no concerns about application in a damp environment and the ability to clean down works on a live waste site with storm flows. The system also minimises environmental impact due to the fact that both products are water-based, ultra-low odour and solvent-free, making them safe to apply in confined spaces and even while facilities are in operation.

The £16 million overhaul of Eastbourne Wastewater Treatment Works will bring many long-term benefits and ensure wastewater leaving the site is of the highest quality. As well as the concrete repair work, other upgrades include updating the biological filter, improving lighting, ventilation and odour controls and replacing pumps and other equipment. The refurbishment is due to be fully completed during early 2020. ■

References:

1. BRITISH STANDARDS INSTITUTION, BS EN 1504. *Products and systems for the protection and repair of concrete structures. Definitions, requirements, quality control and evaluation of conformity. Part 3 – Structural and non-structural repair.* BSI, London, 2005
2. BUILDING RESEARCH ESTABLISHMENT, Special Digest 1. *Concrete in aggressive ground.* BRE Construction Division, Watford, 2005.