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# Twin waterproofing system ensures dry basement for Goldsmiths

**A twin waterproofing system was specified in the construction of the basement at the new DMC Building at Goldsmiths, University of London. The basement is 4.5m deep and extends to the complete 1800m<sup>2</sup> footprint of the new, two-storey building above.**

KEVIN DODDS, TRITON CHEMICALS

The twin approach was proposed by contractor, City Basements (Toureen Mangan), and system supplier, Triton Chemicals, and accepted by the architect, Stride Treglown of Bristol, and main contractor, Willmott Dixon Construction. A Triton watertight concrete system – the primary method of waterproofing – was backed up by a Platon cavity drained membrane system, also supplied by Triton and installed after completion of the watertight concrete construction. This combined system met the requirement for a ‘Grade 4’ environment for this very high-specification basement, which was to house lecture theatres as well as TV and photographic studios fitted out with highly moisture-sensitive equipment.

**Figure 1: Basement construction in progress at Goldsmiths, UCL.**



(Photos: Triton Chemicals.)

Triton’s TT Super Admix was used to produce a total of 900m<sup>3</sup> of watertight concrete. The TT Super admix was added at rate of 4.1kg/m<sup>3</sup> (1.17% by weight of cement) to a concrete mix design of 350kg/m<sup>3</sup> cement with a water/cement ratio of 0.45. The cement was a blend of 20% fly ash and Portland cement. The concrete was supplied by Hanson and was batched at its nearby plant to be used in the construction of the concrete capping beam to the top of the piles, the reinforced concrete liner walls (150–200mm) and the reinforced concrete floor slab (300mm). The floor slab was poured in four stages. All construction joints to the capping beam, wall capping beam, wall–floor and floor–floor joints were waterproofed with TT Swellmastic and TT Waterstop forming a completely watertight concrete system (see Figure 4).

TT Super Admix reacts with the free lime element of the concrete, locking it into the substrate and reducing the associated risk of potential blockages to any drainage detail that may be incorporated within the structure. It also helps the concrete withstand high hydrostatic pressures and reduces shrinkage cracking in the concrete. However, where this does occur, the in-depth crystallisation process of the admixture will enable these shrinkage cracks to self-heal over a period of time, minimising the need for repairs to non-structural cracks in the concrete. It also protects the steelwork/reinforcement within the structure against harsh/aggressive ground chemicals and enhances the workability of the concrete.

## Correct application checked

Triton’s technical team oversaw and inspected the concrete pours at each critical stage to ensure the correct application of the system, and which enabled each pour to be attributed to an admixture batch number, which corresponded to grid references on the detailed drawings.

TT Vapour Membrane, a liquid rubber membrane, was also applied to the external surfaces as a primary external waterproofer and Platon Double Drain, a tough geo-membrane, was applied as a drainage/protection layer to BS 8102<sup>(1)</sup>.

Phase II of the waterproofing project involved the installation of a Platon cavity drained membrane system. Although TT Super Admix had been incorporated into the concrete as described above, plus TT SwellMastic and TT Waterstop to the construction joints, when this type of admixture system is used alone, it can still be compromised by shrinkage, thermal cracking and poor joint detailing, leading to leaks that need to be repaired. These leaks will only become apparent when water comes to bear on the structure.

Platon cavity drained membranes were therefore specified as the second element to provide the extra security of a twin waterproofing system.

In total, 800m<sup>2</sup> of Platon Multi (5mm-high studded membrane) was applied to the walls and 1800m<sup>2</sup> of heavy-duty Platon P20 (20mm-high studded membrane) to the floors. Application of the 20mm membrane to floors (wherever headroom allows) is normally recommended so that a greater capacity of water may pass beneath it to reach the drainage sumps and to reduce the blocking effects of any free lime that can leach from fresh concrete.

On this particular project there was nearly 4m head-



Figures 2-3: Installation of a watertight concrete system to walls and floor, including Platon P20 (Figure 2).

*“An additional benefit of sourcing all materials for both waterproofing systems from one supplier negated any split responsibility issues.”*

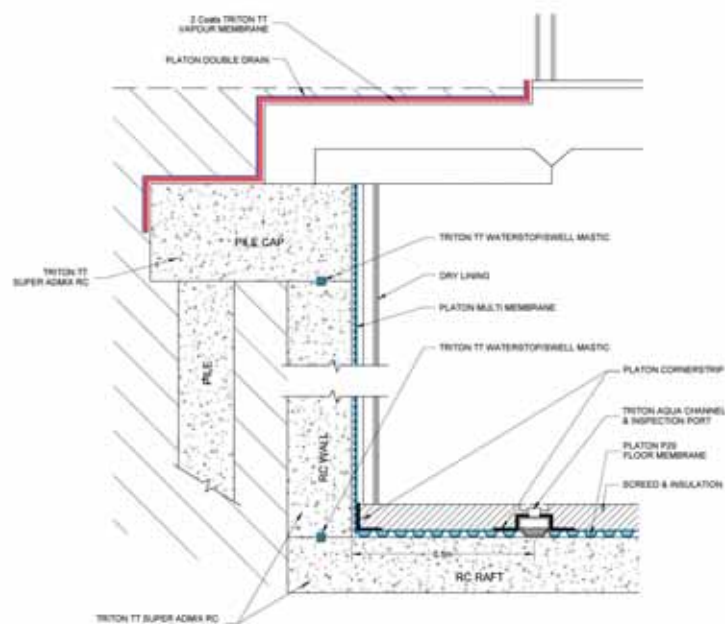


Figure 4 below: Goldsmiths, UCL – typical wall section detail.

room, so the height of the P20 membrane posed no problem and the contractor was able to apply a 150mm reinforced screed. A screed depth of 75mm above the P20 membrane is normally recommended. When Platon Multi is applied to floors, there is a minimum requirement of 50mm screed depth.

To complete the Platon cavity drained membrane system, 300 linear metres of Aquachannel (drainage conduit) were laid around the basement perimeter to direct any water to the sumps. Pre-formed inspection ports were installed at approximately every 12m of conduit to meet the requirement for a sustainable drainage system.

An additional benefit of sourcing all materials for both waterproofing systems from one supplier negated any split responsibility issues. ■



**Reference:**

1. BRITISH STANDARDS INSTITUTION, BS 8102. *Code of practice for protection of below ground structures against water from the ground.* BSI, 2009.