Construction of basements has become more and more common, especially in densely populated areas such as London

Covering all bases

Chris Lloyd, Director of Flexcrete Technologies, discusses the most effective and cost-efficient waterproofing for basements.

When it comes to basement construction and the specification of waterproofing materials for basements, specifiers need to consider BS 8102:2009, the Code of Practice for Protection of Structures Against Water from the Ground. It outlines best practice when planning a basement waterproofing scheme, providing guidance on methods of dealing with and preventing the entry of water from the surrounding ground into a structure below ground level, covering areas such as the use of waterproofing materials and structurally integral watertight construction.

Construction of basements has become more and more common, especially in densely populated areas such as London where land costs are high. BS 8102 was updated in 2009 from a previous version written in 1990, to reflect the increase in deep urban constructions and residential basement conversions.

Spinningfields' site following Monolevel RM

BS 8102:2009 defines four grades of basement, namely:

1. Basic utility (e.g. car parks and plant rooms excluding electrical equipment)
2. Better utility (e.g. plant rooms and workshops requiring drier environments than Grade 1)
3. Habitable (ventilated residential and commercial areas)
4. Special (archive storage)

The Code of Practice also outlines three types of water-resistant construction and waterproofing methods:

- **Type A -** Barrier protection
- **Type B -** Structurally integral protection
- **Type C -** Drained protection

Threats to the effectiveness of a basement waterproofing system include poor workmanship and defects caused by materials that are inadequate for the job. There are structural waterproofing products on the market that are classed as Type A systems and are designed to provide a completely dry internal environment, defined as Grade 3 within BS 8102. This optimum grade is for ventilated residential and commercial areas where no water penetration is acceptable.

Equally, these structural waterproofing products can be used as part of a combined waterproofing system, for example in conjunction with a Type C internal cavity drain system. BS 8102:2009 suggests that consideration should be given to the use of dual systems in areas of high-risk where the likelihood of leakage is high.

The National House Building Council (NHBC) has produced a guide to basements and waterproofing which states that 'basements should be constructed to ensure they are structurally robust, durable, able to resist water ingress and appropriate for their intended use.' NHBC requires basements which are to be used for habitable accommodation to be constructed to Grade 3. The publication states that whilst the number of claims relating to basement failures is relatively small, the organisation has had experiences of individual claims costing up to £500k.

Products available for creating a Grade 3 environment include Monolevel RM, a pre-bagged cementitious render for structural waterproofing. It can be used as a complete one-coat render system for basement waterproofing, offering significant benefits over alternative products which require the application of multiple coats. As the contractor simply needs to mix Monolevel RM with water onsite and only needs to apply a single coat, there is no need to go to site several times and it can prove far more cost-effective for the end client. It can be applied in thicknesses ranging from 5-50mm, even on a vertical face, and is resistant to 7 bar positive and negative hydrostatic water pressure at just 10mm applied thickness. The NHBC's advice is to only use waterproofing systems that have independent certification and Monolevel RM is CE Marked to EN 998-1 as a one-coat render (OC).

A useful publication to refer to is 'Basements: Waterproofing – General Guidance to BS 8102:2009' produced by The Basement Information Centre. It classifies the range of structural waterproofing products available into seven different categories, of which Monolevel RM falls into Category 7: Proprietary cementitious multi-coat renders, toppings and coatings. The design considerations detailed include the ability to be applied internally with no loading coat requirement, effectiveness against severe groundwater infiltration and easy application to difficult substrate profiles.

There are several examples of Monolevel RM being used in practice. One example is a commercial office building under construction in Manchester's busy Spinningfields district. The secant pile construction in the basement required a waterproofing system that was capable of resisting negative water pressure, even at critical points with upstands, floors and capping beams. Due to the large surface area, Monolevel RM was applied by wet spray techniques. As the product is fibre reinforced, it provides excellent tensile and impact strength, whilst preventing cracking. Its high bond strength exceeds the tensile strength of concrete and the physical properties of the cured material are similar to base concrete.

Another example is a refurbishment project at a major theatre in London's West End. The streets around the theatre are washed every night, which had subsequently caused major water ingress problems in the basement. A quick turnaround was essential, as the theatre was soon opening for a major new show. Monolevel RM was amongst a series of products chosen because of their speed of installation and reliability in ensuring a durable solution was achieved. Monolevel RM was applied to the complete surface of the walls in the stalls, bar and corridor areas to provide effective waterproofing. A major advantage to the waterproofing contractor was the ability to apply the Monolevel RM in a single coat with no need for primers, significantly reducing the project time over traditional waterproofing render systems. ■

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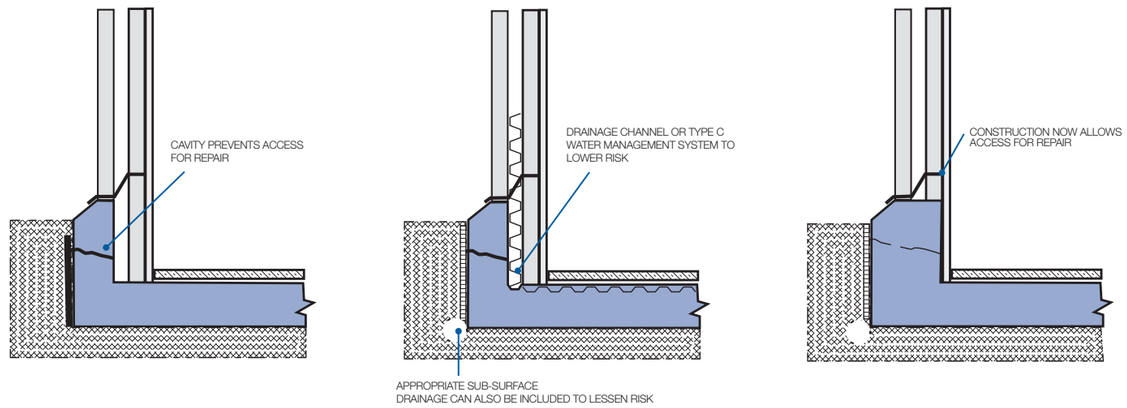
CONSIDERATION OF NEED FOR REPAIR LEADING TO AN ALTERNATIVE DESIGN
DIAGRAM COURTESY OF THE BASEMENT INFORMATION CENTRE



(A) STRUCTURE DESIGNED FOR WATER RESISTANCE (TYPE B)

(B) REDESIGNING WITH CAVITY DRAINAGE SYSTEM LESSENS RISK

(C) REDESIGNING WITH THICKER WALL ENHANCES RESISTANCE AND ENABLES ACCESS FOR REPAIR