TECHNICAL GUIDANCE NOTE

NEWTON SYSTEM 500

Internal V External Waterproofing

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We are often asked to help in the design of an external waterproofing system, and although we supply various external waterproofing systems, we find that on most occasions we recommend internal waterproofing as being the best option. This leaflet has been produced to clarify our reasons for John Newton specifying internal systems rather than external waterproofing systems.

External waterproofing is only really an option in new build construction, and even then, a complete system to both the walls and floor should be used. In many cases the floor slab/raft has already been constructed, making it impossible to install a continuous membrane around the outside of the whole structure.

If external waterproofing is being considered, the removal of ground water by the use of a perforated land drain should be incorporated into the design of the external waterproofing. Removal of water from the structure ensures that the primary waterproof barrier is not in constant contact with ground water and complies with the guidance within BS8102 that asks that the designer should assume that less than adequate workmanship will been employed during the installation of the waterproofing. Within the landmark case, Outwing V Thomas Weatherald it was decided that it is not possible to achieve 100% defect free workmanship with external membranes and that removal of the water should be considered as part of the waterproofing design.

Removal of water to prevent a build up of water against structure means that the structure and its waterproofing will not be tested. However, the life-span of the water removal system is finite and can be problematic and asks too many unanswered questions:

How much water is to be removed?

It is not possible to ascertain exactly how much water will need to be removed to prevent a build up of water pressure to the structure. In many cases watercourses are arriving at the structure from many miles around and it is possible to be in a scenario where you are trying to remove unlimited sources of water. This can create an enormous strain on the system, especially where pumps are used to remove the water. As well as being extremely costly, the life expectancy of the pumps is dramatically reduced. If the designer is asked as to how much water he expects to have to remove, the honest answer is that it is not possible to accurately determine the volume. Therefore, what size pumps do you need?

Gravity or pumped removal of the ground water?

Gravity drainage is not totally safe unless it is impossible for the drainage to back up and prevent the land drain from discharging. Unless the drainage or soak-away are below the level of the basement floor, pumps will be required. If natural drainage down hill of the property is available, the question still has to be asked as to how much water is to be removed by the system, and the same vague answers will result. Without knowing how much water is to be removed, it is difficult to determine the capacity of the drainage system that will be required.

Consequence of large scale removal of ground water?

The potentially large volumes of water being removed by the system can remove relatively large amounts of fines from the ground. External drainage systems utilise geotextile membranes as a filter to prevent the fines blocking the perforated pipe. However, like all filters they can eventually block and once the geotextile is completely blocked it may no longer remove water from around the structure and prevent ground water bearing against the structure. It is not possible to determine how long this process could take, but evidence of complete blockage on external drainage systems within months has been documented.

As well as having the potential to block the drainage system, the removal of fines can undermine surrounding structures. It is vitally important that a geological engineer assesses the design of an external system to determine that neighbouring structures will not be undermined by the system.

It is difficult for any designer to guarantee that the external drainage system will remain in working operation for the whole of the life expectancy of the building, and it is in our opinion not a viable option for these reasons.

Internal advantages

Internal waterproofing of new build structures is in our opinion a much safer option, and it is possible to design the system that will outlive the life expectancy of structure, without having the problems that are associated with external drainage systems:

It is likely that the new structure will be built to BS8110, or possibly to BS8007. These structures are very strong and will only leak at joints within the construction. Measures to prevent leakage at the construction joints should be taken using hydrophobic or hydrophilic water stops, leaving a structure that should not leak. However, we should assume that the structure would leak if subjected to a head of water pressure because of the possibility of less than adequate workmanship at the construction joints.

Wherever the weakest point of the structure lies, the amount of water entering a well built structure should be minimal, and significantly less than the amount of water removed by the external waterproofing system. The internal waterproofing system is only dealing with relatively small amounts of water, and so the system can work well within its designed performance.

Water entering a strong structure is virtually crystal clear, as the structure filters out the fines. Because the movement of water through the structure is much smaller than the amount of water potentially being moved by an external system, the volume of fines being removed from the ground is also much less.

Internal drainage systems will require pumps to remove any water that may enter the structure but the size of pumps is much easier to determine and these will be dramatically smaller and more efficient because of the smaller volume of water they will be expected to remove. The pumps will be operating much less than in an external waterproofing system and so power consumption and pump replacement will be significantly less with an internal waterproofing system.

Form and feasibility of repair

BS8102 also states that the designer should consider the form and feasibility of remedial words in the event of failure of the waterproofing system. Repair of an external system is in many cases just not possible, and where it is possible to excavate to show the system, identification of the problem and repair is almost impossible.

Repair of an internal cavity drainage system is much less of a problem, as in the main, the problem will be with the drainage system. Inspection ports make the identification and cleaning of the system quick and easy.

We believe the arguments for using an internal drainage system as opposed to an external waterproofing system are conclusive. If you require assistance in designing an internal cavity drainage waterproofing system please contact our technical department on 020 7100 3576 and we will be happy to assist you in the design of your waterproofing system.