

The Essential Guide to Structural Waterproofing

Syntegra Consulting took part on the 28th of November at a webinar organised by [Building](#) and [RIW](#) on “The essential guide to structural waterproofing”. The webinar explored the BS8102 specification and design principles for a successful waterproofing strategy, looked at different system choices and their application with case studies including Berkeley Home’s Royal Arsenal Riverside development. The webinar brought together a panel of expert speakers to debate these issues as Mark Anstee, Technical Adviser at RIW Ltd, Bob Treadwell, Technical Director at Waterman Transport & Development Ltd and Nick Simms, Project Manager at Byrne Brothers.

A successful waterproofing strategy is essential in today's fast-track construction environment. Deep basements, complex foundations, different substrate materials and changes in levels can test the continuity of the waterproofing strategy. Guidance and design principles are available from Building Regulations, Waterproofing specialists or the code of practice BS8102 which states “the protection of structures against water from the ground”. Waterproofing systems and waterproofing specialists should be involved at an early stage of a development within the design team to provide the best option. Structural, weatherproofing and waterproofing design should be considered all together as they interact and a line of communication should be established and maintain between all designers, waterproofing specialists and contractors. This is a result as modifications on the design of the development decided by others could impact on the waterproofing strategy.

To develop a robust design to protect the structure from the water, the design team and client must agree on the intended use of structure and the acceptable level of water tightness. The design team should decide on the form and design of the structure and undertake a risk assessment on the external environmental conditions. There are four design principles to take into consideration as the basement usage site information, form of structure and waterproofing. The first criterion is particularly important as it sets the performance level of the basement depending of the usage as shown on the table below.

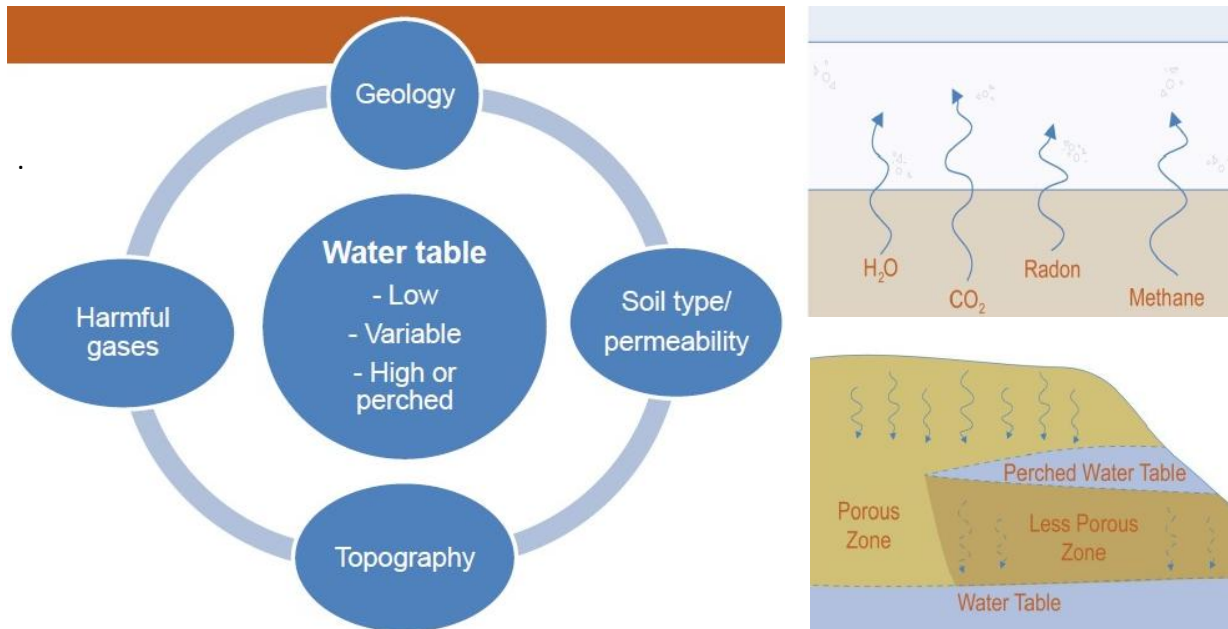
Grade	Basement Usage	Performance Level
1	Car parking Plant rooms (excluding electrical equipment) Workshops	Some seepage and damp patches tolerable
2	Workshops and plant rooms requiring drier environment Retail storage areas	No water penetration but moisture vapour tolerable
3	Ventilated residential and working areas (including offices) Restaurants Leisure centres	Dry environment

Remember:

- What are the client's expectations?
- What is the intended use for the structure?
- If existing: are current waterproofing levels acceptable for intended use?
- If new: will the intended use change in the future?

NB: Based on Table 2: BS8102:2009
Grade 4 as referred to in previous version of BS8102 no longer applies

The second principle is to gather site information (BS5930) about the geology, topography of the site, soil type, pollution (gases) and the water table which is divided in three categories, low, variable and high.



Assessing the water table:

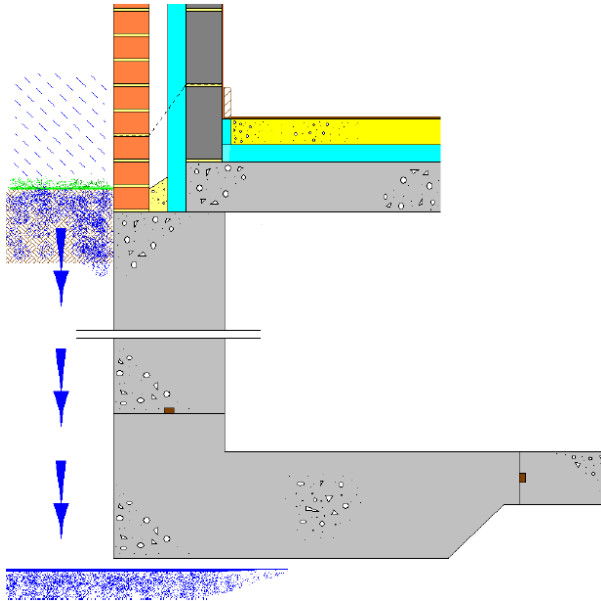
Syntegra Consulting Ltd, 2 The Braccans Business Centre, The Braccans, London Road, Bracknell, RG12 2XH
T: 01344988127 E: mail@syntegra-epc.co.uk

Registered Company No. 06408056

VAT Registration No. 980016044



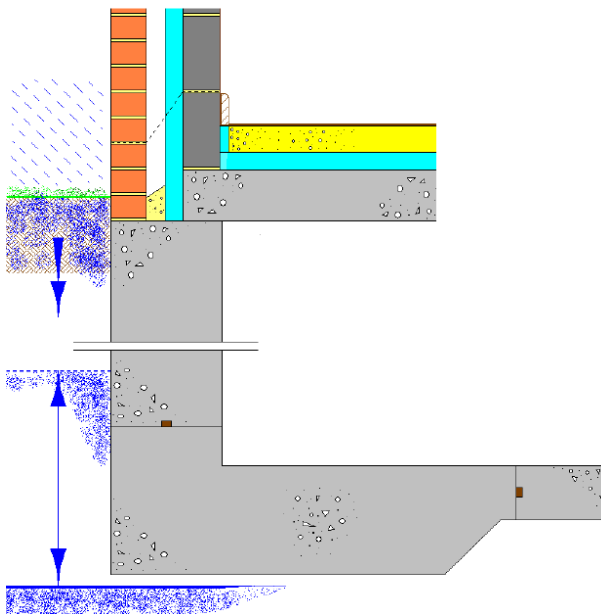
- permanently low



- Permeable soils
- Low risk of percolating build-up
- No hydrostatic head of water
- Permanently below the underside of the slab

Consequence: free hand in choice of waterproofing solution

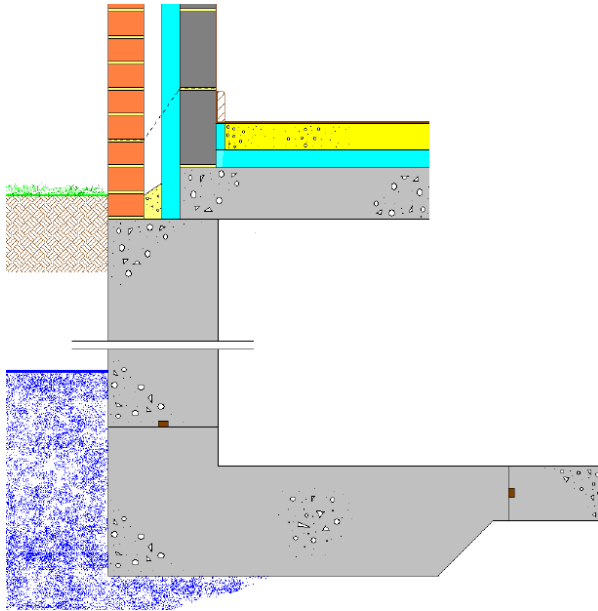
- variable



- Low permeability soils
- Risk of temporary exposure to a hydrostatic head of water
- Water table fluctuates between high and low

Consequence: drainage may reduce the risk considerably

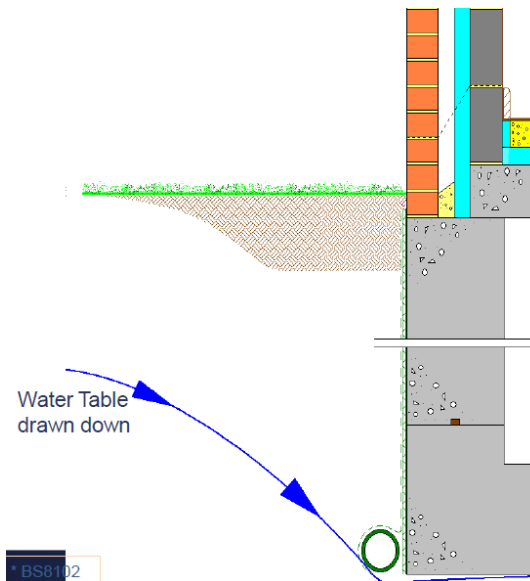
- permanently high



- Impermeable soil types
- Structure exposed to permanent hydrostatic water pressure
- Highest risk
- Permanently above the underside of the base slab

Consequence: maximum attention needed to waterproofing solution

Drainage system may be also used to lower the water table:

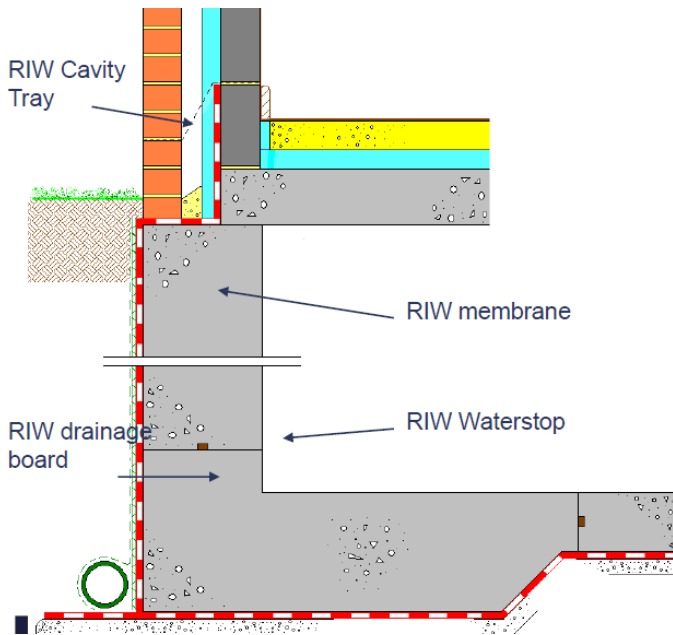


“During the life of the structure, some degree of groundwater pressure is likely to build up against the waterproofing system”*

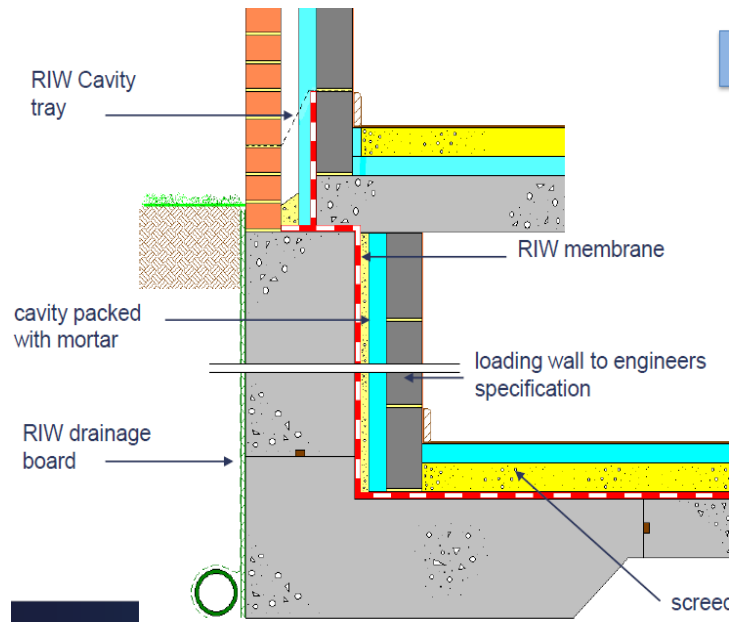
- Effective drainage reduces severity of risk
- Draws water table down so a high/variable can become permanently low
- Geo-composite drainage board
- Pumping may be necessary on high risk sites

The third and final principles are based on the form of the structure and the waterproofing (A, B and C).

Type A – No Internal Protection: External Tanking



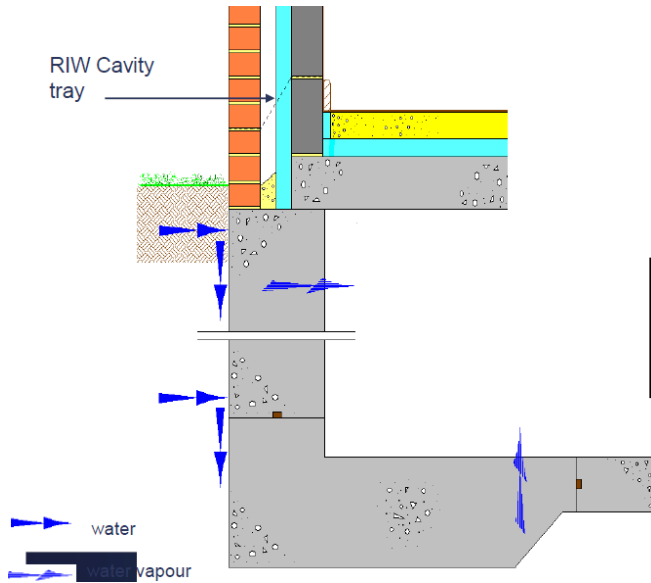
Type A – No Internal Protection: Internal Tanking



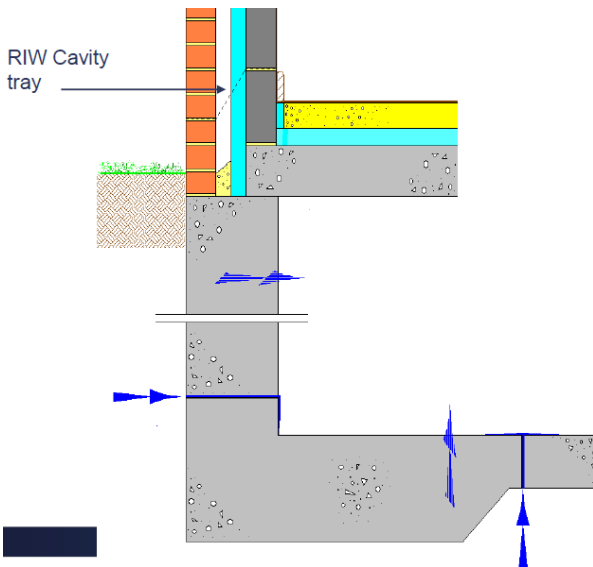
External tanking: The membrane is supported on the wall and the structure remains dry. It also protects the structure from harmful chemicals/gases, however, this system requires land drainage and it is difficult to inspect due to the membrane located on the external wall basement. The type A external tanking can be use for basement grades 1, 2 and 3.

Internal tanking: With this system external excavation is not required as the waterproofing system is located inside the basement and controlled environment apply to membrane. However, it requires an internal loading skin, usually screed, which also reduces the internal space. Land drainage is needed and can be use for basement grades 1, 2 and 3.

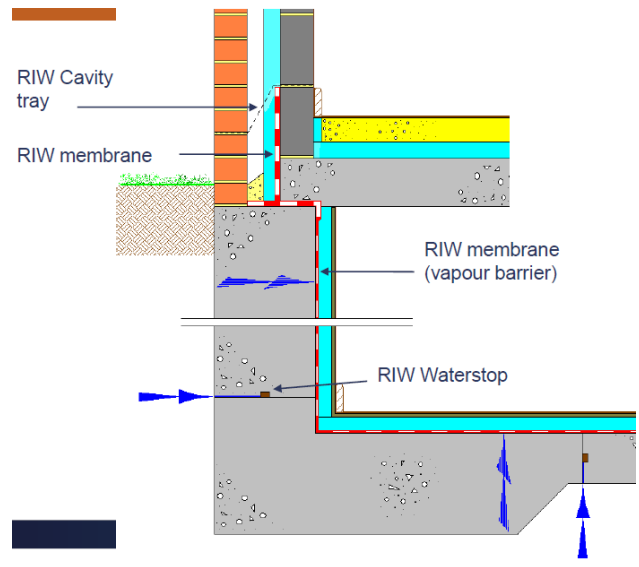
Type B – Internal Protection



The all structure is waterproof (water-resistant shell) but it is not an effective barrier to water vapour through joists and vertical wall.



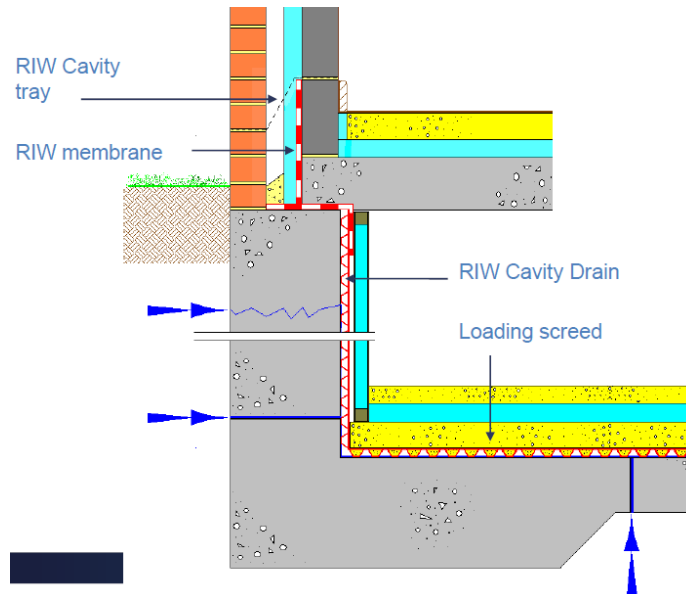
Grade 1 only and some water seepage acceptable



Grade 2 and 3 and water ingress is not acceptable. More reinforcement is needed; waterstops in construction joints and it requires a vapor barrier

The type B has some limitations and to avoid cracking, poorly compacted and honeycombed concrete it requires a quality workmanship, a correct concrete placement, thorough joint preparation, curing.

Type C – Drained Protection



It is suitable for grades 2 and 3 with a high water table and requires a cavity drain with pump to collect and remove the water in order to minimise water ingress.

To provide a good waterproofing system it might be considered to combine forms of construction in order to get the best results.

[Syntegra Consulting Ltd](http://www.syntegra-epc.co.uk) is a leading international Building services design & Energy Consultancy, we can suggest solutions and products which are efficient, practical and cost effective. Our Energy consultants are experienced with specialist areas of expertise.