Building Construction Technology II

(Waterproofing in Buildings)

Department of Architectural Engineering/2nd stage

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What is waterproofing?

Waterproofing in building construction is the process of making a structure water-resistant or impervious to the ingress of water.

Waterproofing is essential as it prevents water from penetrating buildings and helps to keep the interior areas dry. It helps in reducing the humidity inside the building, minimizing the damage done to furniture and alike.

In areas that experience high annual rainfall and occasional flooding events, water proofing is a must. It is important for basement and foundations to be waterproof especially in areas where the ground water table is high. In the case of high water table, water in the soil is likely to exert hydrostatic pressure on the basement floor and walls. This can force the water through the cracks, which can result in structural damages along with moisture-related problems such as mold, mildew and decay.

Advantages of Waterproofing

- Safeguards the structural integrity of the building
- Prevents decay
- Prevents metals from rusting and wooden furniture from decay
- Prevents seepages from the ceiling and walls
- Prevents dampness inside the building
- Property value increases

Waterproofing Methods & Techniques

Waterstop plays an important role in waterproofing a concrete structure, especially joints, the weakest part which is liable to leakage of water or chemical liquids. So **waterstops** are designed as a fluid-tight diaphragm embedded in or running along the joints to solve these problems. Manufactured from various materials in a range of shapes and sizes.

Waterstops are perfect for various types of applications as shown below:

- Water and sewage disposal projects.
- Liquid containments.
- Dams, channels, tunnels and tanks.
- Box culverts and locks.
- Primary and secondary containments structures.
- Bridges and decks abutments.
- Wall and slabs.
- Basements and foundations

PVC is used to waterproof construction joints by embedding it in both sides of the joint to create a physical barrier. A variety of widths, thicknesses, and sizes are available to suit almost any construction joint. The advantage of PVC waterstops is that they can be installed in virtually any conditions, including rainy and wet conditions.

Water-proofing Membranes

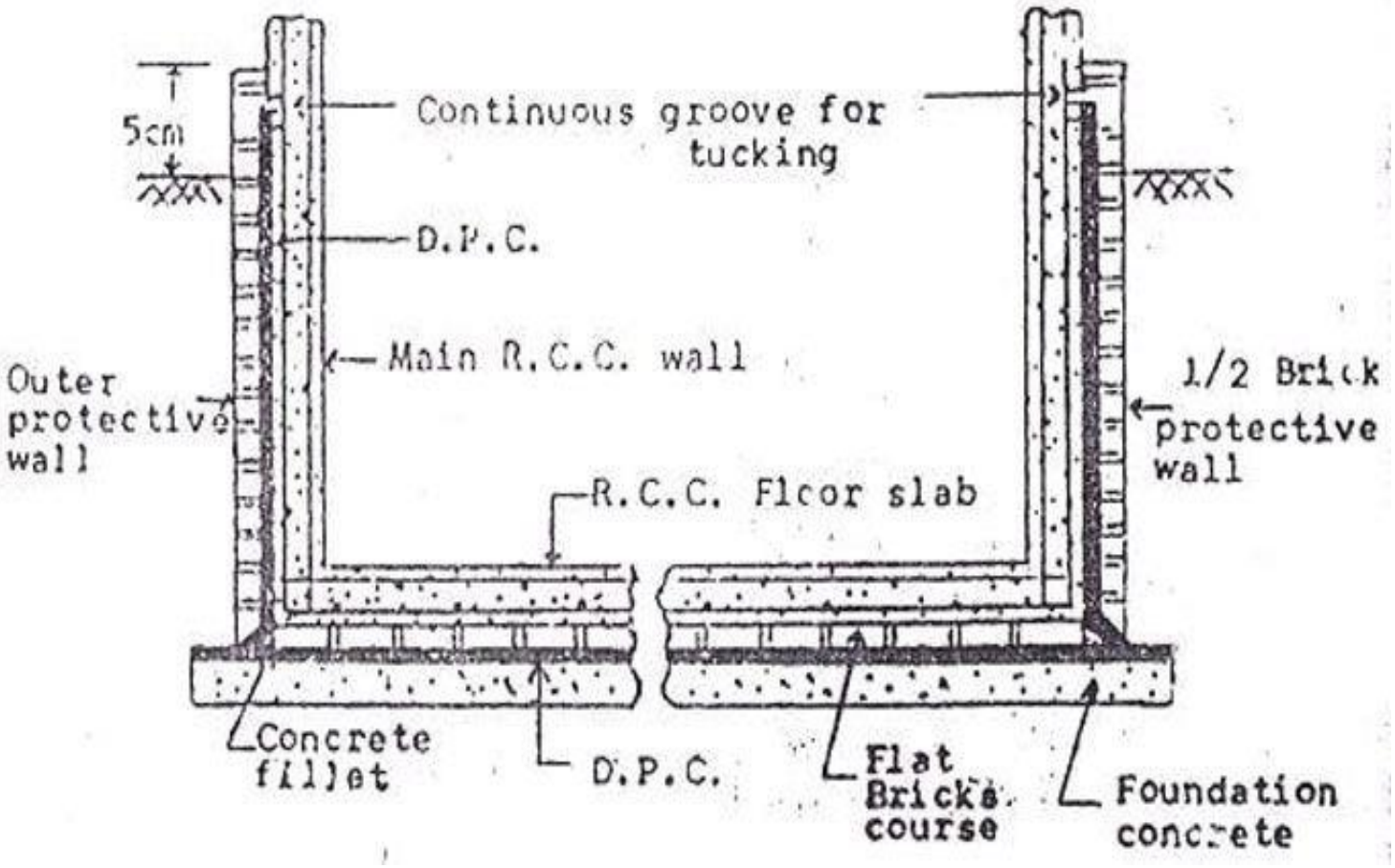
water-proof membrane is a thin layer of water tight material that is laid over the surface. Stagnated water is likely to seep into the structural slab overtime. In flat roofed terrace, the membrane is laid over a filler material that is sloped to ensure that water is drained away by drainage pipes.

Damp Proof Course (DPC)

DPC is a horizontal barrier on wall structure and its purpose is to stop moisture to rise from the foundation into the structure. This layer is put between layers of walls and is to be applied in both **partition wall** and the load bearing **wall**.

An effective damp proofing material should have the following properties:

- It should be impervious.
- It should be strong and durable, and should be capable of withstanding both dead as well as live loads without damage.
- It should be dimensionally stable.
- It should be free from deliquescent salts like sulphates, chlorides and nitrates.

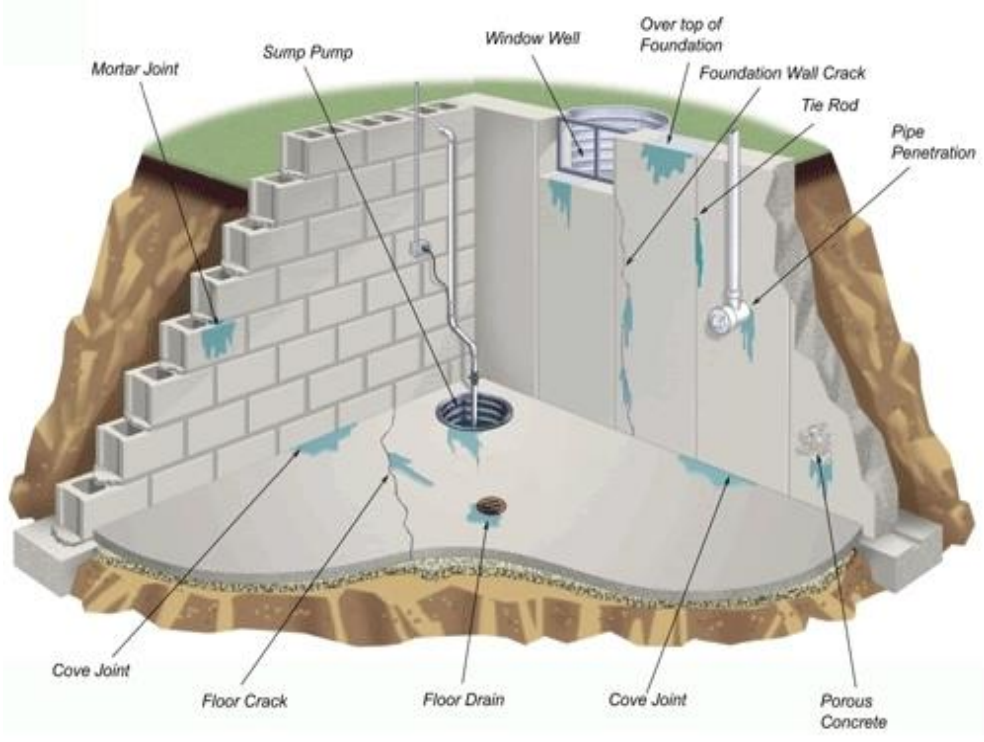

5cm
Continuous groove for tucking
D.P.C.
Main R.C.C. wall
Outer protective wall
1/2 Brick protective wall
R.C.C. Floor slab
Concrete fillet
D.P.C.
Flat Bricks course
Foundation concrete

The materials commonly used to check dampness can be divided into the following three categories:

- Flexible Materials: Materials like bitumen felts (which may be hessian based or fiber/glass fiber based), plastic sheeting (polythene sheets) etc.
- Semi-rigid Materials: Materials like mastic, asphalt, or combination of materials or layers.
- Rigid Materials: Materials like first class bricks, stones, slate, cement concrete etc

Basement Waterproofing

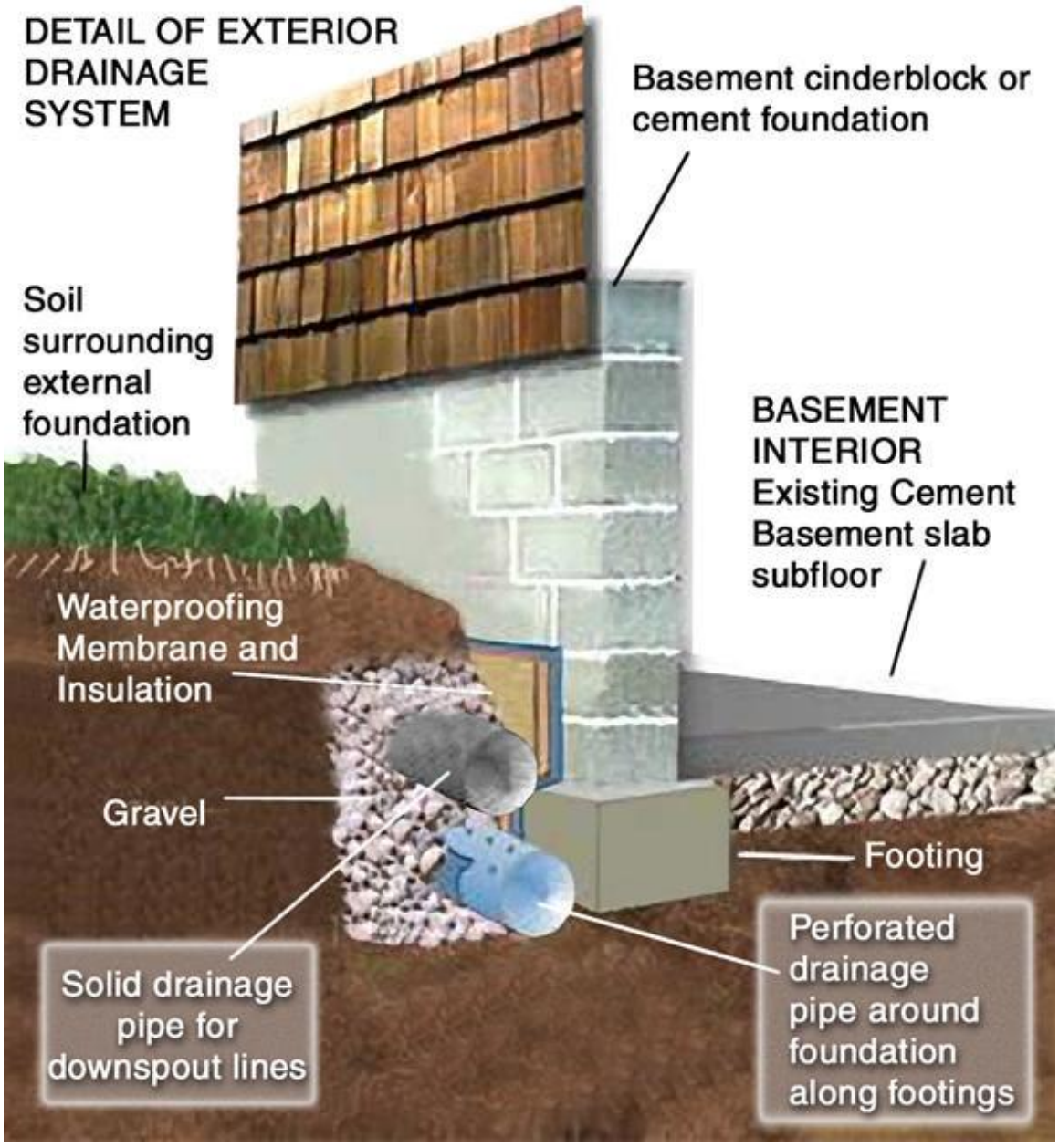
Basements are typically the area of a structure most at risk for water damage because they are located below grade and surrounded by soil. Soil releases water it has absorbed during rain or when snow melts, and the water can end up in the basement through leaks or cracks.



Water can find its way into a basement in many different ways. As this diagram shows, it is possible for water to come through foundation walls, basement wall cracks, and even up from under the basement floor.

Preventing water from entering the basement by ensuring it is diverted away from the foundation is of primary concern. Poor roof drainage and surface runoff due to gutter defects and improper site grading may be the most common causes of wet basements. Addressing these issues will go a long way toward ensuring that water does not penetrate the basement.

During rains the water table surrounding the buildings rises. It can actually be higher than the floor of basement. In an inadequately waterproofed basement the water can find its way in through a variety of areas. The water can show up by leaking through cracks in the floor or walls.


DETAIL OF EXTERIOR DRAINAGE SYSTEM
Basement cinderblock or cement foundation
Soil surrounding external foundation
BASEMENT INTERIOR
Existing Cement Basement slab subfloor
Waterproofing Membrane and Insulation
Gravel
Footing
Solid drainage pipe for downspout lines
Perforated drainage pipe around foundation along footings

Repair leak damage

- Once the leak has been resolved and deterioration arrested, water damage to walls, fixtures, and finishes may be required. In concrete structures where water infiltration has led to reinforcement corrosion, steel should be repaired and sealed, followed by application of a compatible concrete patching mortar. Migrating corrosion-inhibitors, either integrated into the patching compound or applied as a surface sealer, can provide additional protection to the structure.
- For outdoor areas, including plazas, sidewalks, and landscaping, some rehabilitation may be necessary following waterproofing remediation. If repair work involved excavation, or if leaks have damaged fixtures or dislodged pavers, then outdoor finishes and plantings may need to be reconstructed. Portions of the façade may also require rehabilitation.

- Where leaks migrate into occupied space or originate at an indoor area, water-damaged drywall, trim, paint, ceiling tiles, flooring, and fixtures may need to be replaced once the new waterproofing system is installed. Moisture also can lead to mold growth—
  a health hazard that may require professional removal and cleaning.
- The longer a leak is allowed to progress unchecked, the more extensive the underlying deterioration can become. Stopping a minor leak is far easier than rehabilitating the damage resulting from a major one.