Concrete - slab edge dampness

Common building materials such as brick, concrete blocks, concrete and mortar are all permeable to some extent or other. Any permeable building material, if placed in contact with water, will draw water up by capillary action.

When capillary action occurs in permeable building material that is exposed to the air, the moisture is lost from the exposed parts through evaporation.

Building materials can also transfer moisture by vapour transport. Instead of flowing as a liquid, the water is carried as a vapour in the air in the material pores – a much slower process.

Slab edge dampness refers to the persistent dampness of the exposed surface at the edge of a slab-on-ground or raft slab.

Salt attack

While water can carry dissolved salts, water vapour cannot. Consequently, when capillary water evaporates, the salt is left behind either on the surface or in the pores of the material near to the surface.

Salt attack refers to the fretting and disintegration caused by the build-up of salt in the building material. Salt, particularly sulphate, can also chemically attack mortar, concrete and other cement based materials.

The severity of the effect varies with the type of salt. Sulphate salts are the most aggressive common salt.

**Salt and soil types**

The salt may originate in the building material itself; however, because there is only a finite amount in the material, salt from that source is usually not a problem except cosmetically such as in efflorescence deposits.

The most common source of the salt in significant cases of salt attack is from the soil in contact with the building material. Generally speaking, damp and salt attack problems are more likely to occur or more severe on clay-type soil sites rather than free draining sand sites.

**Identifying sites posing risk**

Ordinary site investigations for residential footing design purposes do not test the salt content of the soils; however, tests to determine the content of various salt types can be carried out. The local authority will hold a register of acid sulphate areas.

Salty sites can occur in coastal areas and canal estates but also in inland areas where soil salinity is a problem due to rising water tables caused by land clearing and agricultural practices.

Building practices

The first line of defence against slab edge dampness and salt attack problems is to adopt proper building practices. These practices would overcome most of the problems, or at least reduce them significantly.

**Masonry**

Some important masonry requirements that are often overlooked include:

* [AS 3700–2011 *Masonry structures*](http://infostore.saiglobal.com/store/Details.aspx?ProductID=1492286) requires that masonry below damp proof course (DPC) or in contact with aggressive soils must be laid using exposure grade masonry units and an M4 class of mortar (i.e. 1 : 0.5 : 4.5 cement : lime : sand or equal).
* Masonry in severe marine environments (i.e. up to 100m from a non-surf coast and up to 1km from a surf coast) must be laid with exposure grade masonry units and an M4 class mortar.
* Masonry above DPC level subject to non-saline wetting and drying must be laid with a Class M3 or better (i.e. 1 : 1 : 6 Portland cement : lime : sand or equivalent). Refer to AS 3700 for full details.
* Lime is an important component in mortar mixes. It significantly improves durability as well as facilitating autogenous healing of fine cracks.
* Ironed joints improve durability over raked joints due to the compaction of the mortar and the better shedding of water.

**Additional considerations**

* The underslab membrane should totally envelope the slab and edge beams unless the site is known to present a low hazard of dampness or salt attack problems.
* On sites of known hazard from dampness or aggressive salt conditions, consideration should be given to using higher grades of concrete to obtain better durability and less permeable concrete. Alternatively, a higher grade of concrete could be used in the exposed parts of the slab such as the garage door threshold.
* Ensure that there is no opportunity for ponding of water on buried surfaces associated with the slab edge such as the surface of the footing beam and the surface of the building platform before placement of top soil etc. Correcting the unsatisfactory surface falls by placing permeable fill may only make the problem worse.
* Set the slab at an appropriate height to allow proper surface falls away from the building. This is particularly critical on low-lying level sites where there is very little that can be done to correct the situation if the slab is set too low.
* Do not degrade the concrete by adding water to the mix on site.
* Compact the concrete in the footing beams and in the slab by using vibrators.
* Cure the slab.
* Prevent the possibility of water accumulating in the subwall cavity by filling the cavity with sound mortar or concrete.