

# Water Ponding Causes Problems On Concrete Patios And Balconies

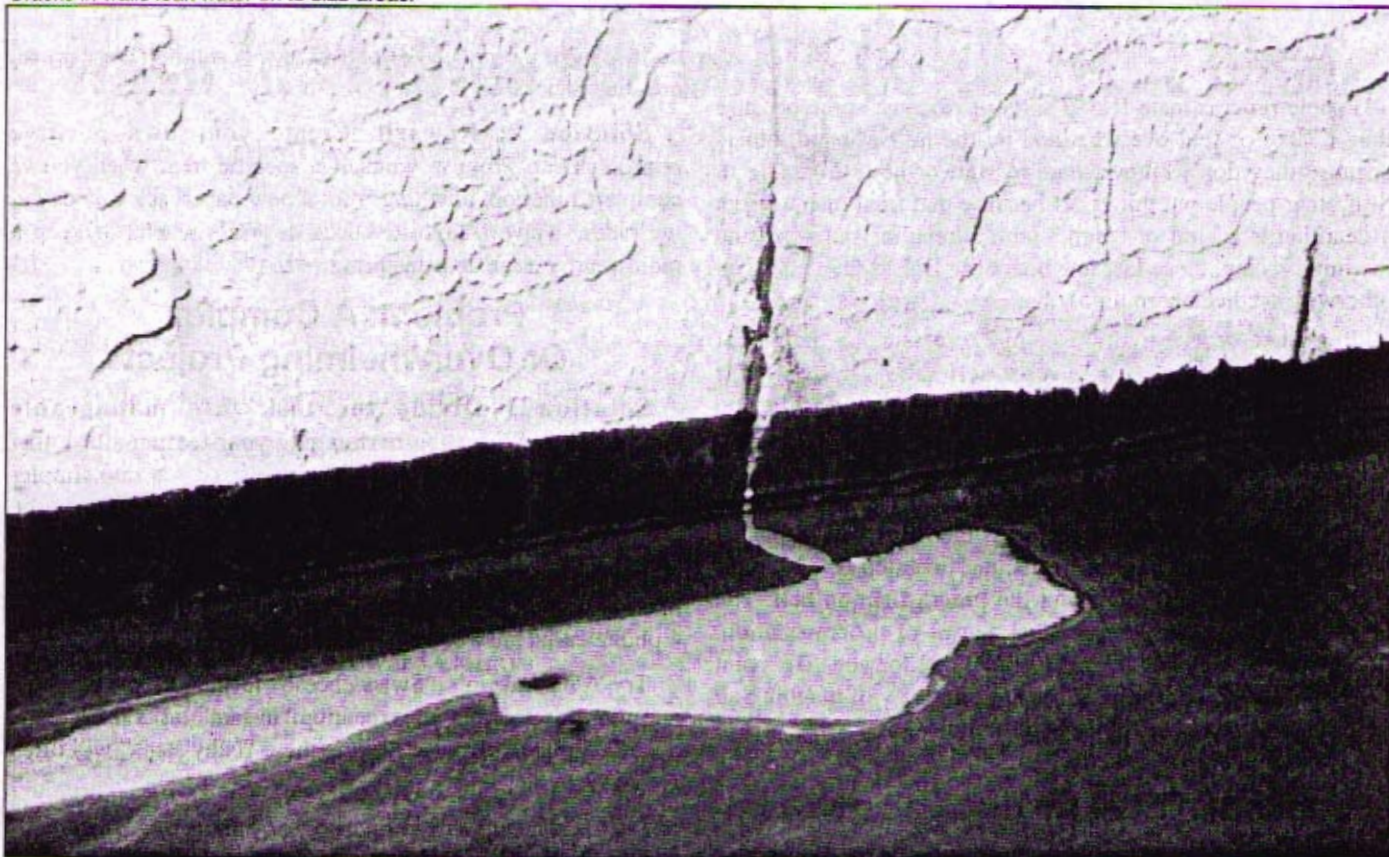
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Water ponding is a common problem occurring in many condominiums on balcony areas and large flat decks such as elevated recreation and garage decks. Simply defined, water ponding is areas of water that accumulate after rain storms. Exterior concrete floors frequently have inadequate drainage that causes small areas of water ponding. Water ponding is caused by lack of water runoff towards drains or slab edges. Water ponding is especially bad in front of an entrance doorway or sliding glass door where residents are forced to step in the puddle.

Water ponding is also a problem in a garage areas where people walk to and from automobiles. On stairways and landings, ponding is caused by reverse slopes that hold water. On stairways this is a safety problem. Water ponding is almost always associated with algae that grows in water causing slime, that can cause slips and falls. Even if the slime dries, it will become slippery with just a little water present on the bottom of shoes. Safety hazards create unnecessary liabilities. There have been many slip and fall lawsuits because of water ponding.

Cracks in walls leak water on to slab areas.



## Terminology

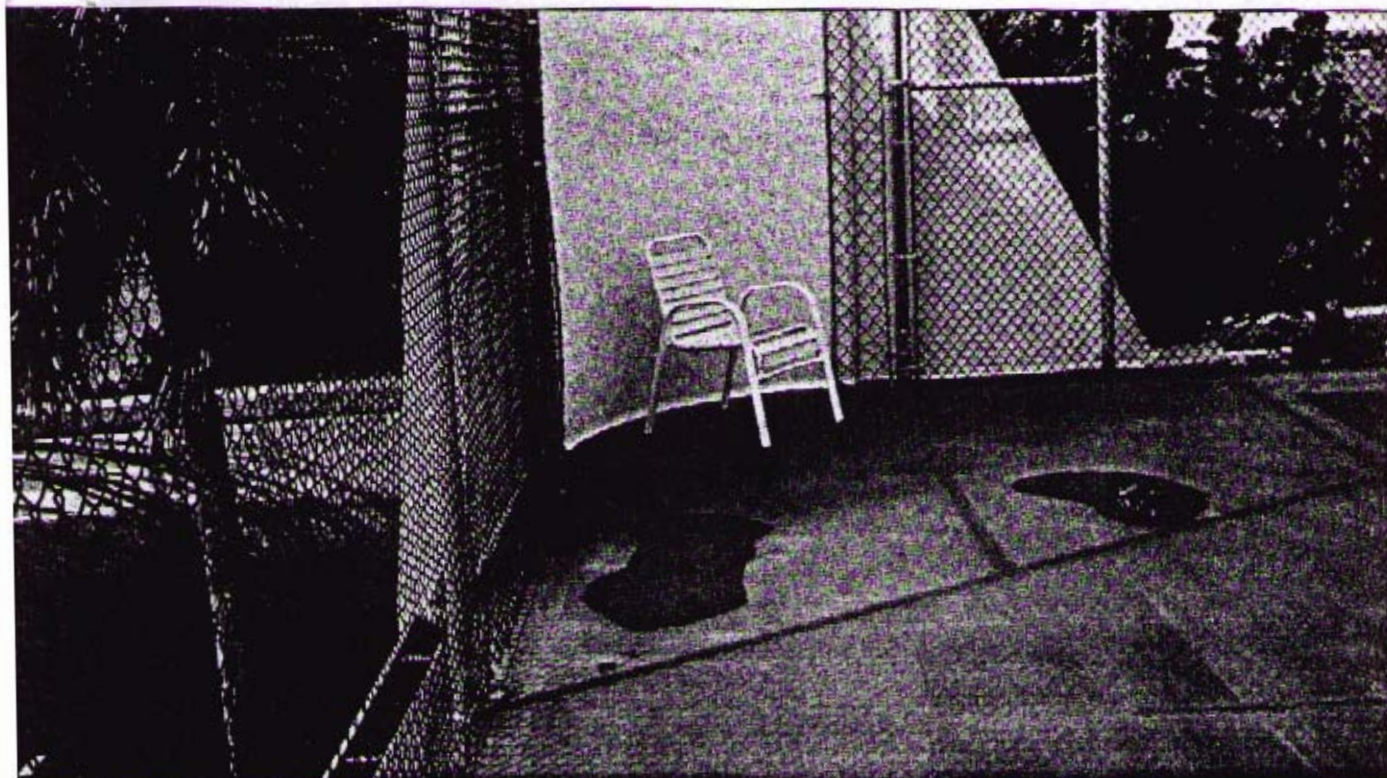
"Flatness" of surfaces is determined by the amount of waviness. High spots and low spots cause variations in flatness. There is realistically no true flat surface. Concrete surface finishes are never perfectly flat. "Slope" of surfaces is determined by the amount of tilt from the true horizontal. Slope causes runoff of water in the direction of lower elevation.

Concrete surface finishes are never perfectly flat or horizontal. Interior concrete floors are designed to be flat with no slope. Exterior walkways and balcony floors are designed to be flat and sloped away from walls and doorways. Most balconies are intended to be sloped approximately 1 inch down at the outer edge over an 8 foot width. Waviness or lack of flatness causes small areas of slope increase or decrease that appear as uphill or downhill areas. It is normal to have variations in flat concrete surfaces. The waviness of a concrete surface might be plus or minus 1/4 of an inch. The intent of slope is to override minor variations in flatness and ensure positive water runoff at all times and in all areas.

## The Causes Of Water Ponding

Perfectly flat surfaces with minimal slope in one direction will drain. A surface with high or low areas will drain well if there is adequate slope around the high areas. When there is a





Ponding water deteriorates waterproof coatings and can cause slip hazards.

Combination of waviness and slope, the benefit of the slope is to reduce the effect of the waviness. Even with excess waviness with adequate slope, there will be runoff. The effect of slope is additive to the effect of waviness. Water ponding is caused by local areas of excess waviness or inadequate slope. With minimal slope and excess waviness, the high spots can cause a restriction or water runoff. The low areas are ponding areas that hold water. The goal is a combination of visually flat surfaces, and adequate sloping such that there will always be adequate run off from all areas. All water that hits balcony surfaces should have a positive path for run off. Water ponding with plenty of sun and wind exposure will eventually dry out because of absorption into the slab or evaporation. Shaded and hidden areas will take much longer to dry out. Areas covered by tile or pavers hide water ponding areas and almost never dry out.

Large elevated roof slabs and slabs over garages have drains to facilitate drainage. The concrete surface is designed to have varying slopes towards drains. Drains are typically placed in areas mid span between column supports so that the natural slope due to deflections would always be additive to the original design slope. These areas are where we would expect to natural "creep" or sag occurring. The design slope and creep work in harmony to ensure drainage.

Water ponding problems can also occur simply due to age. Over time, all concrete structures sag a little bit. Concrete "creep," small deflections is a relaxation that occurs due to load.

Sometimes, with older balconies supported on the outer edges by columns or beams, there will be a "sag" in the center that causes new water ponding areas.

Another source for ponding areas is a bit of a surprise. New concrete placed during repair work often has increased thickness

or excess waviness in it. Waviness of the repaired area can be more than the original waviness. This is primarily because repairs are done on smaller areas than the original construction was. The original construction was finished with larger tools than the tools that are used in restoration work. Often the contractors would rather place concrete and grind down high spots after removal of forms. Also, during repair work, concrete surfaces are finished to visual appearance only. Sometimes edges of the forms may not have been checked to make sure that there is adequate slope built in to provide for drainage. The combination of flatness with slope can be overlooked during restoration work.

After this new concrete is placed, it looks fine until a rain storm comes and that's when a ponding area is discovered where there wasn't one before. Testing for water ponding is normally done following concrete repairs. If there are any new ponding areas, the responsibility falls with the contractor to correct those areas. Owners have the right of finished repairs to be free of any ponding areas.

## Test For Water Ponding

Water ponding may only be noticed after rains storms, but the true extent of water ponding can only be determined by simple testing. A garden hose is used to flood exterior areas with water. The area being tested is wetted and flooded all over with a continuous water supply until water is observed running off or into drains. This occurs when each gallon of additional water results in a gallon of additional runoff water. The water is then turned off and the run off is observed at the edge or drains until all drainage stops (except for minor dripping). This usually takes about 10 minutes.

All areas where water did not run off from are from are the ponding areas. The perimeter of each ponding area

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