

DIMENSIONS'14

CASE STUDY

Topic

Colonies built 30-40 years ago near water bodies had poor foundations. As a result the water seeps into the foundations of the buildings. How can we stop this seepage now and safe guard against any failure, provided we do not demolish the structure?

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PROPOSED SOLUTIONS

The problem is quite serious and can't be ignored. In certain cases such as in case of large buildings this causes heavy settlements resulting into overall deformation of the structure. Apart from this after continuously soaking with water, concrete and bricks in the foundation, floors and walls damage over time and lose their strength. The possible symptoms of this problem are

1. Visible dampness on floor near wall or on wall near floor.
2. Trickle of water visible at a crack in the nearby wall to the foundation.

As stated in the case study the colonies were built 30-40 years ago near the water bodies and had poor foundation. As a result water from the nearby thus seeped into the foundations of the building and this allowed seepage of water. This extra water induces the seepage pressure acting on the foundations and the super structure and also reduces the bearing capacity of the soil beneath it.

As we can clearly see here the problem is related to water only. So, at first remaking floor or colouring walls will not help. So, to start solving the problem the first step is to know where the ground water table elevation is. This can be easily found out by:-

- a) Observing wells in nearby areas
- b) Observing ponds
- c) Making a hole in ground and finding water level in the plan (most accurate)

So the possible reasons to this problem arising from the presence of nearby water bodies are as follows.

1. Caused by high water table forcing water in poor foundation, wall and floor connection
2. Improper roof downspout discharge not draining away from house or improper slope or grading at house causing water to drain into foundation and basement wall
3. Cracks in concrete foundation

The solution to the problems are discussed below in detail. All the possible solutions revolve around reducing the water level or finding ways to reduce the effect on the super structure.

1. Installation of impermeable concrete walls along the periphery of the colony facing the water body. Length of the concrete wall in lateral (extent) and

vertical (depth) direction can be found out using Bligh's Creep Theory ensuring minimum allowable seepage of water to the foundation of the colony. High grade and non-porous concrete materials should be used for the construction of wall.

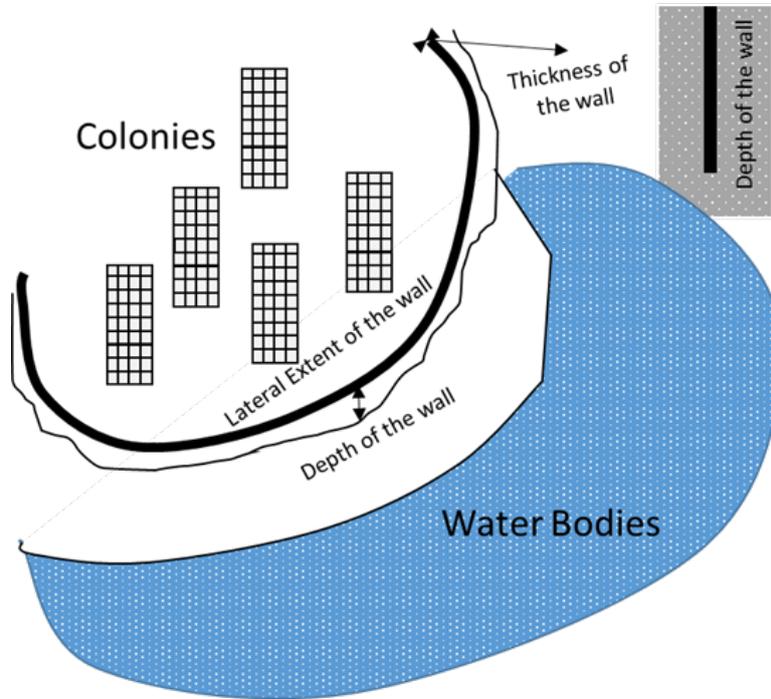


Figure 1 Proposed Impermeable Concrete Wall

2. Installation of drain tile system with a sump pump to discharge the water outside and away from the foundation of super structures. Drain tile system reduces the seepage of water by giving water an easier path for flowing. Drain tile system should be installed around the concrete walls in the periphery of colony and around every building to reduce seepage.

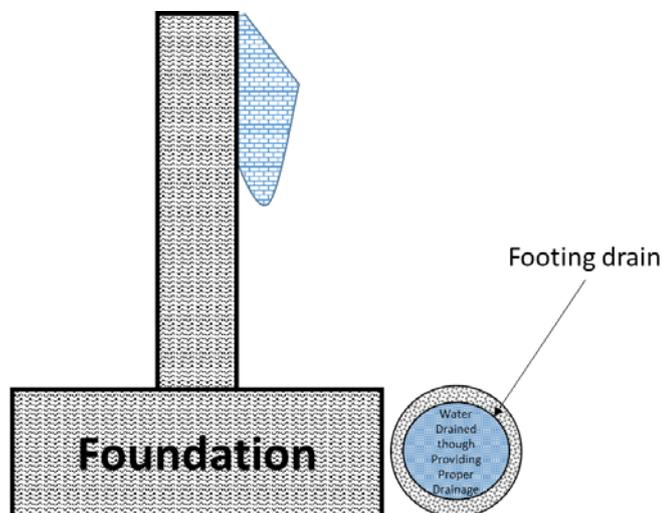


Figure 2 Water drained through providing sump drainage

3. Ground surrounding the foundation should be slope away from the house discouraging water to enter inside foundation walls. This will also take care of flooding during rain and thus reducing seepage. Make sure surrounding soil is pitched away from the house at a slope of at least 1/4 inch per foot so that water drains away from foundation.
4. All the drains and gutters need to be directed well away from foundation and need to be cleaned from time to time for avoiding accumulation.
5. Cracks in foundation and in joints between floors and walls need to be sealed up and if possible proper water proofing can be carried out to prevent the seepage of water.
6. Water table in the area can be brought down by creation of wells and bore wells and by extracting a large amount of water from them. The water extracted can be used for other purposes like domestic, irrigation, sanitation or for drinking.
7. To avoid surface runoff of water to stand in nearby areas by providing it other paths to deflect them as much as possible from buildings. The building should be constructed at higher elevation with sloppy drainage from the water bodies to prevent its seepage.
8. Trees should be at safe distances from buildings. Care should be taken so that roots of the tree shouldn't create cracks in foundation.

The solutions one to five are direct solutions to the stated problem and it must be performed immediately after the detection of proper symptoms. While the rest three practices should be adopted to reduce the effect of seepage further in the long run or should be ensured before construction to prevent this problem in future.