REVIEW ON THE MAINTENANCE OF THE BUILT FORMS FROM THE SEEPAGE OF WATER

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Abstract: ThePart of Study aims to discuss on the water seepage into the built formshaving various kinds of roof coverings particularly from the terrace areas, with a view of identifying the cause, ways to arrest the problem and to come out with solutions availing the existing technology.
Infrastructural Development is taking its place rapidly both at urban areas as well as in rural areas depending on its scale. Due to ageing and improper maintenance of the built forms, the rainwater seepage into the floors/ slabs is becoming very common now a day. The Built forms have to be maintained properly and regularly, by availing the technology with in the reach.

Keywords: Seepage,Water, Maintenance, Built forms, methods of Waterproofing, Water proofing materials.

Introduction: The Water/ Rainwater seepage is a continuous issue in case of all the built forms, having different kinds of roofing materials which are effected by the weather. The 'Roof' of a built form by its shape and material will be very much inert to the climatic conditions. In general the rainwater management network at a built form includes filters, gutters, rain water pipes, traps, clamps and other accessories. When among these, some of the parts and/ or accessories are clogged with foreignmaterials, the rain water is going
to be stagnated at terrace which makes the water to flow inother possible ways by gravity, which causes the seepage of water into the slab incase of flat slab.
The seepage of water in some cases will damage the structure due to corrosion of the steel when the steel reinforcement come's into contact with the water/ moisture. This activityparticularly in some cases like coastal areas may cause serious damage to the structure if not attended in time and treated properly. The issue of seepage of water may differ from case to case and accordingly the solution has to be extracted by vigorous examination.In the process of preserving the built form, which has been effected either due to ageing or due to improper maintenance, utmost care should be given to the surrounding structures and the other nearby parts of the built form. This phenomenon is very common if the problem is not attended both at urban, suburban or rural areas.

Need of Study: Both in the urban as well as the rural areas,lots of built forms, which are affected by improper maintenance, arresting the rainwater seepage into the walls and slabs of the builtform. The study of such built forms will give the more data about the issue of handling the problem and solutions, further the study maylead to conclusionswith the solutions which can be opted at different stages of repair work.
The reasons for the water seepage has to be realized and issue has to be attended. Majority of the cases will arise because of the rain. The climatic conditions, which include more rainfall such as tropical climatic conditions, will face such issues.Rainwater clogging or the overflow water clogging from the overhead tank at the terrace due to the presence of foreign materials on terrace also adds up to the problem.
The poor finishing/ workmanship or damage occurred due to the ageing at terrace flooring also may cause the water stagnation on terrace, this may happen due to non maintenance of the slope towards the rain water drain outlets or un even plastering of the terrace flooring for the flow of water by gravity.
Case study: This part of study deals about the built from being utilized for residential cum commercial purpose, located at the town Chirala, prakasam district, Andhra Pradesh state, India.
The geographical datarelated to case study area is as mentioned in the table.

Geographical Information	
Latitude	15.8167
Longitude	80.3500
Altitude (feet)	13
Lat (DMS)	15° 49' 0N
Long (DMS)	80° 20' 60E
Altitude (meters)	3
Time zone (east)	UTC+5:30
Approximate population for 7 km radius	87618

Source: www.chirala.org, 21 Feb 2014

The prevailing climatic conditions falls under the zone of tropical climate. The averageannual rainfall is1028mm.

Description about the built form: The selected Built form/ structurefor the casestudy was constructed in three stages, is of 13m height having four floors admeasuring 4.27m x 17.07m, facing major roads on both east and west sides. The upper floors can be accessed with a straight flight staircase landing on to east side at ground floor and is of load bearing structure with 0.36m thick long walls and short walls.The age of the ground floor is around sixty years constructed in brick masonry with lime mortar with iron girders and wooden rafters in the slab. The slab thickness is 250mm thick.The slabs of upper two floorswere casted with reinforced cement concrete around forty-five years ago.

The fourth floor is partly built admeasuring 4.27m x 4maround ten years back with galvanized iron sheet as the roofing material. The entire built form was constructed with burnt mud bricks, which are present through out the height of the building. The exterior and interior surfaces and terrace floor finish of the upper two floors were done with cement mortar.

Presently the entire ground floor of the built form is being utilized for the commercial purpose and the upper floors are under residential utilization.

Seepage of water:

The Intrusion of water i.e. from either rainwater or the overflow water from the overhead tank situated at third floor is taking place due to the improper maintenance of the premises.

Water has been stagnating on the terrace for days together due to the presence of foreign organic materials, which are obstructing the flow of water into the rain water drainpipes.

Observations:

- The structure is built in stages with time, though basically the load bearing structure but falls under the composite masonry category as the upper two floors were casted in reinforced cement concrete having beams and slab.
- The construction is having around 40 to 60 years without any offsets, and the adjoiningbuildingson either side are also with joint walls on share basis resembling the row housing concept
- There is no direct seepage of water into the slab.
- As the built forms were constructed long ago resembling the row-housing concept with common wall, the slabs casted in adjacent built forms will certainly having the joints.
- Water is entering from the joints of slab with the wall and through the walls into the lower floors.
- The drain outlets at terrace were provided with the filters made of cast iron, which are been clogged with the solid waste like dry leafs, sand, paper etc.
- The stagnation of the water at the terrace has damaged the upper surface of the slab due to which the absence of easy flow of water towards the drainpipe.
- As the terrace floor finish is done with cement mortar, due to the presence of the water for longer period the cement mortar i.e. upper surface got damaged.
- The stagnation of water is helping the moisture to enter into the loadbearing walls and slabs through the joints.
- Due to the stagnation of the water and as the surface is exposed to sun;algae is growing to the extent of presence of moisture both on the surface of the slab and the walls.
- The seepage of the water has damaged the long wall on south side, to an extent of around 3m x 6m in measurement. In this entire area, the surface paint also got damaged at first and second floors.
- At lower floor, there is no result on interior wall painting though the oil-based primer was applied prior to the application of emulsion paint on the wall.
- The presence of moisture has damaged the woodwork for cupboards at second floor level.

- The location of the overhead water storage tank at third floor level was at a corner of long wall and a short wall.
- The overhead water storage tank was constructed with Ferro cement, circular in shape and of 750litre capacity at a height of 30cms from the terrace floor.

Recommendations:

- The Joint location of wall and roof at terrace floor level may be plastered with a round turn, which will almost nullify the seepage of water into the walls with a rich mortar mixed with water proofing material, will avoid the direct contact of water to the joint of non homogeneous materials.
- An Extra layer of smooth finished surface plastering for the walls exposed to climatic conditions on both the sides to be done with rich cement mortar along with water proofing materials, will arrest the rain water being absorbed directly into the wall.
- The External wall putty may be applied on the top surface and both the surfaces of the wall which will arrest or repel the water falling on to the wall, with which the rain water runoff from the surface of the walls.
- The gutter network should be properly connected to the rain water pipe network, which will eradicate the flow of rainwater on to the surface of terrace.
- The surface of the terrace floor area has to be plastered with rich cement mortar mixed with water proofing materials with proper curing.
- The Surface of the terrace area has to be cleaned at regular intervals such that no organic/ inorganic foreign materials stagnates and obstructs the flow of water into the drains.
- The rainwater collected from the surface area of the terrace has to be diverted towards the drain/ mouth of rain water pipe effectively.
- The overflow pipe of the overhead water tank should be directly connected to the rainwater pipe network such that the water doesn't flow on the terrace.
- The arresting of water from the overflow pipe of the overhead tank on to the terrace will not only solve the problem but enhances indirectly the life of the built form.
- The structures with composite masonry with certain age, various policies may be brought forward in maintenance of the building.
- The awareness among the public has to be created about the maintenance of the built forms under various age group and various utilizations.

References:

1. Building department, 2005, Guidelines on prevention of waterseepage in buildings, Hongkong.
2. Center for Science and Environment – Making water everybody's business, New Delhi, 2001.
3. Chitale M.A., A blue revolution, Bhavans Book University, Pune 2000.
4. ASTM. 2000. Standard E 1105-00: Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference. ASTM International, West Conshohocken, PA.
5. ASTM. 2006. Standard E 514 – 06: Standard Test Method for Water Penetration and Leakage through Masonry. ASTM International, West Conshohocken, PA.
6. ASTM. 2001. Standard E 2128 – 01a: Standard Guide for Evaluating Water Leakage of Building Walls. ASTM International, West Conshohocken, PA.
7. www.Chirala.org

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