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Low-cost housing : Common mistakes in construction

Unmesh C. Desai

Civil engineering has made a vast progress with the development of new materials and sophisticated techniques of construction. Quality control, time saving and reliability have become the motto of civil engineering. But, the construction of low-cost residential buildings in India is dominated by the use of labour-intensive technique of construction. There is not much improvement in the quality of construction due to the following reasons:

- old traditional techniques of construction are on-going as they are cheaper and facilitate the contractors
- cheap labour attracts the local contractors as advanced machines are costly
- old techniques of construction involve more labour than machines
- about 50 percent of contractors have not undergone civil engineering education

The following construction mistakes are observed and overlooked during the construction phase of residential buildings.

- The cement-sand mix in the mortar

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and brick masonry is made quite early, prior to its use and in larger quantities than required

- The construction materials like sand, bricks, aggregates, etc, are not washed and are full of deleterious material and dust
- Compaction of bottom strata in foundation work is not carried out
- During concreting of footings, the concrete is poured at a height greater than 1 m. Generally, trapezoidal footings are resorted to, where concrete is never vibrated
- Reinforced concrete (RC) columns, being an important part of the structure, are neither mechanically vibrated nor machine mixed. They are cast in short lifts with increased number of joints
- Cover to reinforcement in columns, beams and slabs is insufficient
- Misalignment of columns at foundation level and rectification at higher level, leading to eccentric loading
- RC coping at plinth level being an important barrier to dampness is never densely cast

- The plinth filling is never carried out in layers nor compacted
- at the joints of RC and brick masonry, either the RC surface is not roughened or filling of mortar at the joint is not evident
- The joints of brick masonry at larger heights are improperly racked
- Mixing ratio in plaster and brick masonry is not maintained
- In the cases where beams are cast prior to slab:
 - (i) in large slabs, the concrete in beams starts setting before casting of RC slab
 - (ii) the concrete spilled on the sides of beams while casting is never removed which gets set subsequently
- Reinforcement of RC columns is kept exposed above RC slabs
- Hacking to concrete surface is poorly done prior to plastering
- Bearing to lintel on both ends is not sufficient
- In load-bearing structures, secondary beams are resting directly on the walls giving point loading

- Corner reinforcement is not provided in two-way slabs leading to upliftment of corners
- Proper care for uplift pressure in black cotton soil is not taken in:
 - (a) ground beam
 - (b) combined footing.

These construction mistakes can be easily taken care of during the construction phase. If neglected, these may result in:

- cracks in concrete
- improper bonding between concrete and brick masonry
- spillage of plaster
- dampness in walls
- leakages in slabs
- cracks in brick masonry
- settlement of foundations and walls.

Failure prompts enquiry, whose purpose is to establish cause. When failure proves to be unusual or not well understood by the industry, it promotes

research, which eventually feeds back into standards and codes so that future design is better informed. It is not the function of the codes to explain or improve unacceptable performance in existing buildings. Hence, the need for investigators and repairers to have a sound knowledge of defects and material behaviour and an appreciation that, knowledge is always incomplete.

The following preventive/remedial measures are suggested for improvement in the quality of construction for low cost residential buildings.

- The total civil work is executed mainly by labourers, masons and carpenters. A workshop or training schedules shall be arranged for training them. The training will also improve their approach towards quality work.
- Civil contractors who have undergone civil engineering education shall be preferred.
- Time and cost factor also affects the quality of construction. In such

cases, co-ordination between the architect, structural engineer and client plays a vital role in finalising an appropriate design without sacrificing functionality.

- Prior testing of construction materials like sand, yellow earth, bricks, aggregate, cement and reinforcement steel also helps to improve the quality of construction.
- Overall, a good supervision by the civil contractor is essential during the execution of construction.

Experience is an expensive teacher, therefore, every attempt must be made to strengthen the technical skills of construction professionals. The need to diagnose the cause of damage accurately, by considering all options before specifying a remedy cannot be emphasised enough. Savings made by preventive maintenance include not only the money that would have been spent on repair contracts but indirect costs such as loss of business and inconvenience to owners and users, which only goes to endorse the view that, always prevention is better than cure.

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