

## CHALLENGES IN MAINTENANCE, REPAIR & UPGRADATION OF OLD BUILDINGS

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### INTRODUCTION

Although buildings are designed for a prolonged service life, various components and utilities require upgradation and replacement within the service life. Moreover, the aspect of major upgradation required to extend the service life is rarely considered. Many buildings constructed during the early urbanization wave of 1980s have advanced in their service life. During early urbanization, concrete and construction technology were also not as advanced. Hence, it becomes crucial for us to assess the management aspects of old buildings not only to identify concerns but also to propose measures that can facilitate repair and upgradation of aging buildings.

As any building proceeds through its service life, the normal wear and tear results in two types of deterioration: cosmetic and structural. Most building committees and management bodies tend to focus on the cosmetic aspects from time-to-time; however, the aspect of gradual structural wear such as fatigue and deterioration of structural integrity, owing to various factors, are often ignored or not attended. These factors often include failure to timely address minor problems such as water dampness and leaks that can lead to drastic deterioration on prolonged exposure as well as the impact of haphazard retrofitting without considering structural guidelines or limitations. The former highlights the importance of a formal building management organization, while the latter underlines the requirement of organized approach to upgradation of buildings. Hence, proactive building management is indispensable not only to avoid any reduction of service life but also to ensure structural integrity and adequate serviceability of the building premise during the service life.

### THE NEED

Today, the participation of private sector developers in speculative development has opened the option of

redevelopment for many private buildings. However, the financial feasibility concerns pertaining to redevelopment projects often hinders such initiatives. Hence, for many aging complexes that look up to redevelopment as a measure to mitigate the risks originating from age, the odds are not always in favor. Real estate developers rely on the salable area that depends on utilization of permissible FSI (Floor Space Index, or FAR – Floor Area Ratio) obtained from urban authority or through transferable development rights. However, such transferable rights may not always be available at reasonable rates while the site layout can constrain realization of entire permissible FSI. For instance, a plot located within 200 M of transit corridor has a permissible FSI of 4.0 – however, if the adjacent road width is less than 18 M or if the plot size is less than 1500 SQ M, it limits the permissible height, reducing FSI utilization (Urban Development and Urban Housing Department, 2017). Moreover, successful redevelopment relies on many variables including financial feasibility for developer, consensus amongst stakeholders, speed of bureaucratic machinery and more. Thus, even with stakeholder consensus, redevelopment may not be an achievable option.

While for building premises that are under the hold of government agencies such as housing boards or corporate entities with long term leases, the option for redevelopment may not be available for the occupants. For instance, the affordable housing units provided by the government agencies are under the ownership of government not only limiting the ability of the occupants to act but also creating a psychological barrier to act for the greater good. Moreover, such old complexes are prone to depreciated structural integrity, owing to the poor quality of contractor workmanship during the previous decades with lax regulations.

The 2001 earthquake in Gujarat unearthed the extreme consequences of poor designs and workmanship.

Although the lessons learned were implemented in new construction, the old surviving structures are still at risk, thus necessitating the need for major repairs along with continual maintenance. And today's critical needs should not be postponed in anticipation for realization of future potential.

## CONTRIBUTING FACTORS

### Additions

Although retrofitting may be undesirable from architectural and aesthetics point of view, it is necessary to address design insufficiencies and to accommodate evolving needs of occupants. Moreover, buildings are retrofitted several times to accommodate various technological advances including the transition from window to split air conditioning, the replacement of telephone lines with optic fiber cables or addition of fire-fighting systems. In this process, certain elements of the building are utilized beyond their designed function as well as load carrying capacity. In absence of technical expertise and formal approach, the integrity impact is left to be addressed by the design safety factor.

Moreover, the absence of centralized approach or intervention further alleviates the problem. For

instance, the lack of provision for placement of outdoor units of air conditioners forces individual occupants to resort to makeshift arrangements that not only spoil the aesthetics but may also affect the structural integrity of the building. Considering the addition of air conditioning, absence of drainage provision for condensate water leads to improper placement of drainage pipes causing excessive damping or water accumulation. If such phenomenon persists for prolonged periods, it may result in seepage that can accelerate the corrosion of re-enforcement, affecting structural integrity.

While in case of major additions that require structural alterations, absence of technical expertise and organized approach can have far greater implications. It is the usual practice to hire a contractor and opt for a turnkey solution. However, the absence of technical know-how and domain knowledge can lead to ineffective solutions while still affecting the structural integrity. For instance, when the code mandated external staircase for fire evacuation, older complexes added hard to use spiral staircases of bare minimum dimensions. Similarly, addition, modification or extension of building utilities such as overhead water tanks or electrical supply require technical expertise to address safety concerns along with assurance to retain integrity of the building.

### Maintenance

Owing to the long service life of buildings, which is at least five decades, people tend to undermine the importance of maintenance. Moreover, the service tenure of the various individual components and utilities of the building are much shorter, requiring upkeep and replacement well within the service tenure of the building. Lack of maintenance can not only make the occupant experience unpleasant but also affect structural integrity, if left unaddressed for prolonged time. For instance, inability to repair or remedy small yet persistent plumbing leaks can cause dampening and seepage that affect the overall structural integrity. Moreover, maintenance is necessary at common level of building premises as well as at individual level of building occupant, thus allocating certain responsibilities to individual occupants. For instance, absence of policy enforcement to repair



of individual plumbing and floor seepage can have similar consequences.

Along with provision of maintenance manuals, the building design should be optimized to avoid maintenance needs beyond the means of occupants. For instance, certain public housing projects are five floors or higher, thus requiring passenger lifts; however, the financial constraints of the occupants can constrain the ability to maintain lifts, while replacement may be a far-fetched concern. Apart from passenger lifts, many utility components such as borewell, pumps, electrical panels, cables and switches, and water storage tanks



require maintenance or replacements. Since much of the maintenance is failure triggered maintenance, resulting in undesired service interruptions, the sudden urgency leads to improvised and haphazard resolutions.

Hence, maintenance at building premises as well as occupant level is a critical factor. During the design phase, maintenance should be taken into consideration to ensure that maintenance needs do not over burden the occupants. While during the occupancy phase, the individual as well as the committee should be aware of their maintenance responsibilities and oblige through appropriate actions.

### **Governance**

Governance through policies or presence of governing body, usually the resident's welfare association or building management committee, to manage the additions as well as routine maintenance of the building premises plays a critical role in maintaining the serviceability of the built space. Although based on the type of building premises the governing body

may have limited resources, the presence of governing body generates political capital to reach stakeholder consensus over matters concerning greater good. For instance, in leased or allocated units, a governing body can influence or compel the landlord or owner to undertake necessary remedial actions, while the absence of governing body leaves it to the prerogative or priority of the concerned stakeholder.

Absence of policies that limit the ability of occupants to make alterations or compel them to comply with certain standards further alleviates the problems caused by additions and retrofitting. For instance,

absence of policies pertaining to modification of individual units or enforcement of standardized approach towards addition of utilities such as water heaters, gas lines, telecom cables, air conditioning units can affect the building. In addition to preparing relevant policies, a governing body also ensures their effective implementation to avoid any undesired outcomes.

Moreover, the absence of governing body or centralized management committee leads to issues regarding common utilities and building services as there is no single party responsible for the upkeep while action through cumulative consensus and initiative of occupant

stakeholders is often difficult. With aging building complexes such issues become more rampant and critical, while the absence of governance lets the issues persist, making it unpleasant for occupants and affecting the integrity of the built premises. A governing body can avoid such issues through proper policy and enforcement mechanisms that are well within their powers. Hence, governance is a key factor to ensure proper modifications and maintenance as well as generate political capital to take initiatives pertaining to greater good for the occupant stakeholders of the building.

Stakeholder consensus plays a vital role in effective governance. If all decisions or actions require stakeholder consensus while minimal power is vested in the governing body, it may lead to frequent hindrances, rendering the governing body ineffective. Moreover, for matters that require stakeholder consensus, the participating stakeholders should be identified and the consensus criteria, whether majority percentage or unanimity, should be practical and appropriate to the



nature of decision. Thus, proper distribution of power and delineation of decision-making authority between the stakeholders and governing body are critical factors for successful governance.

## CHALLENGES

### Awareness and Basic Industry Knowledge

Another major concern is the lack of technical understanding and awareness regarding the problems of built environment. Although the building committees' resort to service providers from the industry such as engineers and contractors, they are often cavalier with the selection. Moreover, lack of proper knowledge curtails their ability to identify root cause as well as the severity of the problems and take appropriate remedial actions. For instance, after the 2001 earthquake most buildings repaired plasters through construction contractors; the committees did not understand the cosmetic nature of plaster while the contractors lacking the competence for critical structural repairs readily obliged without analyzing the core problem. Such negligence could have been avoided by approaching a structural consultant or engineer

who is qualified to diagnose the problem and suggest appropriate remedy. Hence, basic understanding of the roles and competence of solution providers in construction industry can enable building committees to select appropriate agencies or consultants.

### Absence Historical Records and Drawings

Since the past two decades, as-built-drawings have become a client requisite for all consultants and architect. However, for older buildings such details are either unavailable or inaccurate. In addition to the details of building, one also requires the details of utility connections including water, electricity, sewer and storm water drains. Although the building committee can hire a consultant to identify and document such details, the initiative is often ignored as the committee members are unaware about the importance of details. Such details are necessary not only for major alterations but also for repair and upkeep. For instance, while laying concrete roads in an old society, parts over underground utility can be paved with removable paver blocks to keep the concrete road intact during the numerous maintenances and replacement instances of utilities

throughout the service life. Whereas the lack of such consideration will disturb the concrete road for utility maintenance, affecting road quality and reducing service life. However, this kind of measure requires the utility layout of the premises.

### Construction Defects

Although the builder or contractor is liable during the defect liability period, during the normal course of service life the defects arising out of their negligence may not become apparent. But once such defects become apparent, given the critical nature of such defects, it gets very challenging for the committee or the occupants to repair on their own. For instance, in the 2001 Gujarat earthquake certain allocated quarters, which were load bearing structures, were damaged beyond repair; the damage was a result of extremely poor quality of brick mortar that surfaced due to failure of plaster, causing the walls to buckle. The defect could have been contractor negligence which surfaced well beyond the defect liability period. In above case, the cost of restoration was higher than the construction cost of new unit thus compelling the owner to abandon damaged units and construct new. Although the contractor may be sued for negligence,



the owners and occupants bear the immediate ramifications including safety risks, disruption to lives, and direct costs. Given the unprecedented and extreme nature of resulting challenges, planning any contingency may not be realistic.

### Financial Planning and Resources

Finance is the most critical resource required for execution and realization of any maintenance, repair or upgradation. However, it is not only the mere availability of finance but also the ability to authorize financial resources. Building committees raise periodic (quarterly or annual) maintenance fees to finance the routine operational expenses such as security, waste disposal, water and electricity. While they also seek one time maintenance deposits from owners, which are usually set aside and invested in long term deposits, to finance major repairs or upgrades during the service life.

For repairs that can be financed with available funds, committee should have the authority to mobilize finances. Owing to the fundraising issues, committee managers have the tendency to ration funds and raise fresh funds to mobilize initiatives. However, committee managers should not get too indulged with rationing funds and mobilize funds in accordance with the urgency of repairs. But in case of a major repair or upgrade initiative, as the costs are significantly higher, additional contribution from building owners may be necessary. Such additional contribution is difficult to raise owing to consensus issues and in absence of any statutory guidelines, or written obligation that compel stakeholders, the fate of the initiative rests on the priority of stakeholders. This is especially true for building

premises with too many stakeholders or complicated hierarchy of stakeholders such as allocated housing or long-term lease. Although the delays are usually inconsequential, for a building approaching the end of service life the consequences can be extreme. Hence, it is of paramount importance to plan financial resources, define authority of decision makers and highlight financial responsibility of stakeholders.

### Author's Information



**Dr. Devanshu Pandit** is a professor; construction, engineering & infrastructure consultant; trainer, and humourist all in one. Over 30 years of his professional career he worked as an academician teaching construction and management at CEPT University; Founding Director of Facile Maven Private Limited; and currently having his own firm Steadfast Adroit where he is undertaking infrastructure planning, design and project management related assignments.



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