Durable Structures through Planning for Preventive Maintenance

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***Abstract*- It is big challenge to engineers, scientist, and academicians to maintain the durability of structures as a today rapid industrlisation, population growth the most drastic demand of dwellings and moreover restricted available natural resources. This paper represents the practical cases of structural prevention to maintain the sustainability as a reconciliation of environmental, economics social aspects including health related and monetary/ financial aspects are integrated. This paper is focus on diagnosis and treatment of structures in distress.**

I. INTRODUCTION

It is the destiny of the of the man-made environment to vanish, but we short lived human being, look at our buildings so convinced that they will stand forever and when some may collapse, we are surprised and concerned The accidental death of a building is always due to the failure of its skeleton, the structure.

Expected life of structure is difficult to estimate as it depends upon several parameters including the maintenance of the structure. In addition deterioration, aging are ongoing natural phenomenon and its rate of erosion is gradual. Most of our present-day structures are estimated to have an average life span of about 50 years.

1.2 Preamble

The term structures reflect durability and permanency. It infuses a sense of security and stability. As a early malfunctioning of several new structures which is serious cause of concern, as safety is jeopardized and this explicitly long endured faith is shattering. These structures demand heavy ongoing maintenance and also repairs.

Both maintenance and repairs need infrastructure and resources. They are generally not adequate and seldom budgeted.

The retrospect is, therefore, necessary to decide what goes wrong in structure inputs which lead to early malfunctioning. Several inputs make the retrospect complex, as qualitative assessment of each one of them is difficult. Several materials and a variable labor skill result in poor workmanship.

2. CONSTRUCTION SET-UP AND OUTCOME

The present construction is with RC Framed structures. This is an improved option over earlier load bearing structures for moderate residential units. Generally, concrete quality of the work done in the mofussil/ rural areas is far from satisfactory. Also, certain areas structures do attract early corrosion due to poor cover, concrete quality, environmental effects and inbuilt construction lapses. It is common observation that most of the construction materials and their onsite utilization are not required quality, strength and workmanship. Basic awareness about good construction practices is lacking. This applies to everything i. e. concrete, brick, timber-joinery, plumbing and other services.

2.1 Enough R &D work is being done in the industry for structural designs and various building elements. The issue of quality of materials and workmanship are most important to achieve outcome commensurate with R&D refinements. The imbalance resulting from R&D efforts and actual provisions and their subsequent outcome is not fully realized. The outcome of these lacunae leads to structures with early functional problems. The tendency to permit, whatever is constructed in whatever manner, is derogatory to the industry. Generally, the observation of unsatisfactory service response from the structures is slow and gradually emerging phenomenon. Those who construct do not have follow-up rapport with their structures.

2.2 Even early separation lines between masonry and concrete frame work accepted as unavoidable. Routine cracks below windows are justified as shrinkage and thermal variations and declared as not of any significance. Leakage from plumbing joints is permitted almost helplessly as ugly scenario spread throughout the building. Rainwater seepage and leakages is continued due to inadequate basic provisions. Lack of access to the problem areas and appropriate solutions permits these observations to continue. Corrosion damage sets in short time and is continued with inaction. Floor settlements and structural masonry cracks are kept on observations for years, getting used to them in the process. Awareness for required sound foundation is lacking. These are the few of the common observations in present day constructions. Lack of initiative for monitoring and appropriate timely maintenance; create unsightly surface exposures in the structures.

3. PERFORMANCE OF STRUCTURES IN SERVICES LIFE AND RECOMMENDATIONS

3.1 Some of the common but important recommendations in planning provisions and corrective steps during supervision for preventive maintenance of the structures need be identified. The project is to be conceived with its entirety and not in piecemeal. This involves masterly co-ordination with skill of a craftsman. Entire plumbing layout is required to be predetermined and superimposed on plan finalization. This permits to avoid damage to the masonry and / or concrete later on. Also effectiveness of plumbing layout can be verified for corrective measured if required. At the latter stage, there is hardly any supervision on plumbers work. Several damages observation are common without such a preparation, as the defects cannot properly mended.

3.2 Superstructure drawings need to be updated, along with the progress of the work, to record the tolerances for out of plumb and centerline verifications including eccentricities etc. external areas must have safe and adequate access for inspection, more particularly for work execution. Unsafe bamboo scaffolds for tall structures or structures with more floor to floor heights do not permit work safety affecting concrete and plaster quality. No technical inspection or supervision is ever considered necessary for these exposed areas. The outcome is known in early deficient response, which invariably remains unattended.

3.3 Insist on providing hacking to column surfaces and beam bottoms which are in contact with masonry work. This would offer adequate bond between masonry and concrete surfaces. This would delay/ avoid, if properly executed and cured, separation cracks between columns and masonry works. Masonry portions below the beam bottoms need careful construction, particularly for top few layers below the beam soffit. Ensure proper mortar placement and compaction with hacked beam bottoms. This is never done but if done would avoid/ delay horizontal separation of masonry work and beam bottoms. This is important as several internal and external beams show these separation lines almost before occupation. The shrinkage in concrete block work is less compared to brick work. This suggests that controlled mortar joint thickness for masonry works. This most important aspect is completely overlooked. The concept of providing chicken-mesh covering beam and wall junction need to be discouraged. The air gap between brickwork and beam bottom would activate during routine shrinkage and thermal movements attracting the cracks to reoccur. Generally mortar between two vertical surfaces of bricks blocks when laid is insufficient, in fact in major portion, it is missing, and thereby proper bond is not developed. The solution is to provide the groove between column and brickwork for transfer of lateral wind force; but it is one of the most common and routine construction activities and is routinely neglected, later on causing major damage to the structure.

3.4 The common observation of separation of balcony parapet walls from the column/external wall surfaces could be avoided if proper bond is developed between parapet walls and these surfaces. This is to control on-going weather damage and inception of rain water. This can be prevented by roper bond between the two contacts surfaces is essential throughout. Enough reinforcement dowels, proper grooves and roughening are necessary. To avoid cold joints insist contractor for concrete pour sequences and schedule of resource management on

the day, including methodology of provisions of joints.

3.5 Provision of adequate cover blocks, chairs for reinforcement, binding wire tying particularly for slab bent up bars with beam anchor bars and many such permitted lapses need compliance without compromise. The correctly placed reinforcement would avoid balcony separation lines and also permit improved response of structure due to good cover concrete. So there is no incident like balcony failures. Open chowks, cutouts, ducts are another vulnerable areas. These areas permit water stagnation, attract humidity and filthy environment. Therefore growth of fungus, moss and dust accumulation, rodent and termite nuisance in such areas and inadequate rain water disposal from these areas is common .Sanitary/Plumbing connection in these areas and ground level drainage disposal is ineffective. Such areas can be improved in their performance if covered with roof to permit light and ventilation, but no direct rain water pour.

4. CONCLUSION

In above mentioned I have given the observation from multistoried structure of metropolitan city like Mumbai where have dense concrete jungle of dwellings structures deteriorate with the passage of time and need attention to improve present as also future uses. To attend these structure so we can avoid the rehabilitation by using technique not merely the durability and service life are enhanced but even capacity to bear heavier loads increase and *environmental decay* gets reduced.

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