

Special lecture delivered by Dr. P. R. Swarup, Director General, Counstruction Industry Development Council (CIDC), New Delhi on “Repair & Maintenance needs of the concrete structures in India”

As is the case globally, a significant percentage of India's civil structures have eroded with age, neglect, misuse, weather factors, rebar corrosion, extraneous loading and natural disasters adding to basic design deficiencies in many cases. Particularly given our tropical monsoon location, water permeation, and seepage have highlighted the crying need for renewal engineering and water proofing to be more specific. Neglecting the need to put down proper repair and maintenance systems results in loss and erosion of capital value, wastage of precious resources and lends for a poor quality of life. With multiple historic monuments and heritage buildings dotting our landscape, the need to address this damage is only more accentuated.

In a country with one of the fastest growing economies in the world, the increasing concentration of middle class populations and with the majority of our people unable to even manage two square meals a day, infrastructure and housing are key focus areas for the Indian Government. While there are major investments being pumped in to construct new structures, the spiraling costs of building these structures make them practically unaffordable to all but a very marginal few. We have 1.4 million concrete structures - residential, commercial industrial and others that are over forty years old. While one sees many of these still standing strong and looking like they can go on for another four decades and more, there are several relatively newer structures that are in bad shape. A key factor influencing the health and long-life of concrete structures is the implementation of timely and effective repair and maintenance procedures.

A major factor influencing the service life of concrete structures is the nature of exposure conditions. Generally Reinforced concrete apartment buildings in India lasts only for 30 to 50 years compared to the expectation of 70 to 80 years. The short life span is an economic burden for not only owners and residents but to the nation as a whole. A recent Japanese report urged housing industry in that country to adopt, as a goal, an average life span of 200 years. This will enable reducing the wastes during demolition, energy conservation, and harmony with environment, resistance to disasters like earthquakes and cyclones and achieving good

behaviour by regular and easy maintenance. The major factor influencing long-term service life of concrete structures is the nature of exposure conditions and environment to which concrete is subjected to especially soon after casting and subsequent early ages. It is to be noted that while the manufacture of concrete is under the control of the engineer environment during early age is a factor beyond human control and not accounted for either during construction or during design. Adverse conditions such as ground contamination, high temperature, humidity, fluctuating temperature and relative humidity can cause damage and reduce the life span of the structure.

While reinforcing steel is protected by design by ensuring adequate cover, there are several electrical, plumbing and other steel items which are embedded in the cover region of concrete as inserts not knowing the damage they can cause for long-term serviceability. It is indeed, the interaction between concrete, steel insert and environment that dictate the material performance and hence the life of the structure itself. The exposure conditions in the coastal areas and especially on the east coast where Chennai is located are recognised as some of the most aggressive climatic conditions which pose severe challenges to the design and construction engineer.

Total assets created in the country including industrial and commercial projects and public properties are estimated at Rs 3, 50,000 crore, which is equal to 20% of the income generated every year. It is estimated by the council that Rs 32, 000 crore is required to rebuild India's damaged concrete structures. Housing sector alone has assets worth more than Rs 50,000 crore and will require more than Rs 17,000 crore for repair and maintenance every year.

Instead of the house owners selling their assets after 12 years and invest in a new property, he said instead they should be wise enough to spend on regular maintenance. They can make use of the durable materials like blended cement and steel bars besides modern construction designs now available.

CIDC (Counstruction Industry Development Council) has recommended to the Central Government that an asset management agency be formed as a regulatory body as part of the urban renewal mission to make it mandatory for house owners for ensure proper maintenance of their buildings failing, which they have to pay higher property tax and loose subsidies.

(Lecture was delivered at Sheraton Park Hotel & Towers, Chennai on 4th December, 2009 as part of Healthy Construction Lecture Series organized by Dr. Fixit Institute of Structural Protection & Rehabilitation.)