

# A Study on Construction Management with Focus on Public Construction and Maintenance Management

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**Abstract**— Maintenance management of structures is a big try for the owners and managers in many countries with aging civil infrastructure. It is not easy to change or perhaps heal, all structures because of the really extensive escalate and disposal of such infrastructure, and its associated costs. A building exists to serve the user's time obligation. The special intention of maintenance is, to overemphasize the mean life of a building, by delaying deterioration, decay and failure. Building maintenance management is a complex process that involves planning, directing, governing and organizing resources for the livelihood of the building's functional opera. This paper outlines the most important looks of maintenance management systems, reflect on the most competitive practices in Chennai and highlight the state of the art in this area. It is seen through case studies integrating structural strength monitoring in the maintenance management systems is promising in rationalizing decisions that are needful for the benefit owners embarrassed by the scarce resources.

**Keywords**— Maintenance management, Associated costs, Structural strength.

## I. INTRODUCTION

Maintenance is defined as a work done to keep the civil engineering structure in a working condition, to enable them to carry out the functions for which they are constructed. Maintenance and Management are two closely related issues. Building management, apart from covering the basic security and cleanliness aspects of buildings, should also coordinate or even include implementation of maintenance plans to ensure a safe and pleasant living environment. surveillance can be strategically combined with inspection for maintenance. It would be beneficial to owners in engaging the same personnel in carrying out both duties. Defects create hazards leading to serious or fatal injuries. Most defects can, at their early stages, be discovered through visible or detectable symptoms. If not promptly rectified, minor defects can develop into serious ones, causing failure or sudden collapse, endangering lives and becoming more costly to rectify.

## II. OBJECTIVES

- Prevention of damages due to natural agencies and keep them in good appearance and working condition
- To repair the defects occurred in the structures and strengthen them if necessary

- To extent the useful life of the building and prevent premature capital outlay of replacement.
- To satisfy lender/insurer requirement to provide a safe secure and efficient working and living environment and to avoid deterioration of physical assets.
- To maximize the aesthetic and economic values of the building as well as increase the health and safety of the occupants.

## III. SCOPE

- To study the management techniques and repair methods used in rehabilitation of concrete structures.
- To analyze the defects in the existing building.
- To understand the latest repair methods and materials used for repair and rehabilitation of the structures.
- To find out the ways to repair and increase the durability if the building.

## IV. METHODOLOGY

### A. General

This project mainly focus on preventive maintenance. The experimental study was distinctly divided into a definite sequences of the work for a factory at Tondiarpet, Chennai the canteen building situated inside the company was taken for repair and maintenance work. It is a G+1 building of 30 years old. The building had cracks and spalling of concrete in columns. Five of the columns which were badly damaged were observed, repair and rehabilitation work is processed to stabilize the building.

### B. Detailed Investigation

- Visual Examination - Experienced personal carrying detailed over view of the site.
- Observations - To ascertain the defects and miniature detailing of the building
- Planning - Making the schedule for the entire sequence of the work to be carried out for the project
- Execution - Implementing the schedule that is prepared to complete the work at the exact time without any delay.

### C. Tests carried out in the preliminary stage

- Ultrasonic pulse velocity and rebound hammer test were done to assess the condition of concrete in the column, beam and slab in different areas. Profoscope is a fully integrated rebar locator with data storage used to increase the efficiency on the construction site it offers real time visualization of rebar's, and automatic data Test for chloride and carbonation has been carried out for checking the existing condition of the cover concrete. Half cell potential survey was carried out to find out the extent and severity of corrosion activity. Out to recognizing the degree and seriousness for corrosion activity. The extraction of core sampling and testing for compressive strength was carried out to assess the homogeneity and actual insitu strength of concrete. following which a repair methodology was suggested and the work was executed.

**D. Repair Methodology**

Sequence of work carried out for the Repair and rehabilitations of the building

- Removal of brick work
- Removing Plastering and cover concrete
- Cleaning of bars
- Additional Reinforcement
- Shear connections
- Core cutting
- Application of chemicals
- Concreting
  - a) Epoxy Jointing compound
  - b) Form work or Shuttering
  - c) Concreting
  - d) De-shuttering
  - e) Curing
- Redoing of Brick work
- Plastering

**E. Sequence of Repair and Rehabilitation Methodology**

The column to be worked upon was isolated by removing the brick work around the column (Fig 1). After the removal of brick work the plastering of the column was removed by mechanical means. After exposing the core concrete with the corrode rebar's, the rebar's were thoroughly cleaned using rust remover agents. Additional rebar's were anchored in the columns to increase their durability by means of placing shear connectors using specialized chemical (Fig 2).After placing of additional reinforcements, the column was made ready for concrete with an epoxy bonding agent (Fig 3). Concreting was proceeded with a repair based material, micro concrete with powder aggregate ratio 1:0.5 (Fig 4) and applying AR compound after deshuttering (Fig 5) finished with redoing of brick work and plastering (Fig 6).



Fig. 1. Removing brick work



Fig. 2. Additional Reinforcement



Fig. 3. Epoxy bonding agent



Fig. 4. Concreting with micro concrete



Fig 5 Applying AR compound



Fig 6 Redoing of brick work and plastering

**V. PROJECT SCHEDULE**

The project schedule as stated by the site was worked on Microsoft project. The detailed schedule for one column is as stated below

ID	Task Mode	Task Name	Duration	Start	Finish
0		<b>(G+1) BUILDING REPAIR AND REHABILITATION</b>	<b>56 days</b>	<b>01 February 2018</b>	<b>07 April 2018</b>
1		<b>1 COLUMN NO.1</b>	<b>14 days</b>	<b>01 February 2018</b>	<b>16 February 2018</b>
2		<b>1.1 REMOVAL OF BRICK WORK</b>	<b>3 days</b>	<b>01 February 2018</b>	<b>03 February 2018</b>
3		1.1.1 BREAKING	1.5 days	01 February 2018	02 February 2018
4		1.1.2 REMOVING OF WASTE / BROKEN BRICKS	1.5 days	02 February 2018	03 February 2018
5		<b>1.2 REMOVAL OF PLASTERING AND COVER CONCRETE</b>	<b>2 days</b>	<b>01 February 2018</b>	<b>03 February 2018</b>
6		1.2.1 CLEANING OF BARS	1 day	03 February 2018	04 February 2018
7		1.2.2 ADDITIONAL REINFORCEMENT	2 days	03 February 2018	05 February 2018
8		<b>1.5 SHEAR CONNECTIONS</b>	<b>1 day</b>	<b>06 February 2018</b>	<b>06 February 2018</b>
9		1.5.1 DRILLING	0.5 days	06 February 2018	06 February 2018
10		1.5.2 CONNECTIONS	0.5 days	06 February 2018	06 February 2018
11		1.6 CORE CUTTING	2 days	07 February 2018	09 February 2018
12		<b>1.7 APPLICATIONS OF CHEMICALS</b>	<b>5 days</b>	<b>09 February 2018</b>	<b>14 February 2018</b>
13		1.7.1 STEEL RODS	1 day	09 February 2018	10 February 2018
14		1.7.1.1 ZINC COATING	1 day	09 February 2018	10 February 2018
15		<b>1.7.2 CONCRETING FOR FOOTING GROUND FLOOR, 1ST FLOOR AND TERRACE</b>	<b>14 days</b>	<b>10 February 2018</b>	<b>24 February 2018</b>
16		1.7.2.1 EPOXY JOINTING COMPOUND	1 day	10 February 2018	11 February 2018
17		1.7.2.2 FORMWORK OR SHUTTERING	2 days	10 February 2018	12 February 2018
18		1.7.2.3 CONCRETING	2 days	10 February 2018	12 February 2018
19		1.7.2.4 DESHUTTERING	1 day	10 February 2018	11 February 2018
20		1.7.2.5 CURING AIR COMPOUND	1 day	10 February 2018	11 February 2018
21		1.7.2.6 REDDOING OF BRICK WORK	4 days	10 February 2018	14 February 2018

ID	Task Mode	Task Name	Duration	Start	Finish
22		1.8 PLASTERING	2 days	15 February 2018	16 February 2018

Fig. 7. Project scheduling using Microsoft Project for one column

**A. Microsoft project**

In this project the scheduling is been done using MSP. Microsoft Project (MSP) is a project management software program. It is designed to assist project managers in developing plans, assigning resources to tasks, tracking progress, managing budgets, analyzing workloads. Project creates budgets based on assignment work and resource rates, Resources – people, equipment and materials, Resources can be shared between projects using a shared resource pool Each resource can have its own calendar. Limitation of MS Project presumes additional physical raw materials are always available without limit. MSP powerful management tools with the right blend of Usability, Power, Flexibility. Through this we can manage projects more efficiently and effectively. MSP enables to stay informed and control Project work, Schedules, Finances and to keep project teams aligned. The estimated time taken for the completion of the project is 56 days for five columns at an expensive cost.

**VI. CONCLUSIONS**

The repair and rehabilitation of Concrete structures are very challenging, now a day's Repair/Rehabilitation of concrete structure is comparatively a new subject in India. It is a real challenging task to carry out the repair/rehabilitation work, when structure has already undergone major structural damages/deterioration. As such, there is a requirement of periodical/timely assessment and maintenance with latest

available techniques and materials as described in this paper. This will go a long way to arrest deterioration and extend the lease of life to the structure. As the time passes, many more concrete structures will come up for major rehabilitation. Time has come to have a structural auditing of all the old concrete buildings/structures, which were constructed during sixties and earlier. Depending on the severity of the environmental effect, the restorative measures can be selected. In a country like India, we cannot afford to spend money on replacing the building, which is against implementation of green building concept also. As such selection & evaluation of right repair material and protective coatings will save enormous money & time by reducing the frequent repair costs of already repaired concrete buildings/structures. To modify/improve the properties of concrete or mortar, a large number of polymers/admixtures have been tried and extensively used in other countries..Further, the repair/rehabilitation works should be undertaken only after ascertaining properly the cause of deterioration. It is imperative that the Engineer understands the reasons which led to damage and or deterioration prior to developing a repair programme Proper maintenance by means of frequent visual inspections can help us improve a lot.

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