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An Analysis of Construction Management Practices in Public Infrastructure Project

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Abstract

Maintenance management of structural assets has become a significant challenge for owners and facility managers in many countries with aging civil infrastructure. The scale of deterioration, combined with the high cost of repair or replacement, makes it impossible to restore every structure. Buildings exist to serve users over a defined lifespan, and the primary purpose of maintenance is to extend that lifespan by reducing deterioration, decay, and structural failures. Effective maintenance management involves planning, directing, regulating, and organizing resources to ensure the continuous functioning of a building.
This paper discusses essential elements of maintenance management systems, reviews prevalent practices in Chennai, and highlights advancements in structural rehabilitation. Through a detailed case study, the integration of structural condition monitoring into maintenance planning is shown to improve decision-making for owners facing resource constraints.

I. Introduction

Maintenance refers to activities carried out to keep civil engineering structures in functional condition so that they can continue to perform their intended purpose. Maintenance and management are closely related concepts. In addition to ensuring security and cleanliness, building management should incorporate the implementation of maintenance plans to promote a safe, healthy, and comfortable environment.

Inspection and surveillance can be combined strategically, allowing owners to assign the same personnel to perform both tasks efficiently. Structural defects, if undetected or neglected, may lead to severe or even fatal failures. Most defects exhibit early visible or measurable symptoms; addressing them promptly prevents escalation into major structural problems and reduces repair costs.

II. Objectives

The primary objectives of maintenance management in buildings include:

- Preventing damage caused by natural agencies and ensuring good appearance and working condition.
- Repairing defects that occur in structures and strengthening them when required.
- Extending the useful life of a building and avoiding premature replacement costs.
- Meeting lender/insurer requirements for safe, efficient, and secure living or working environments.
- Enhancing the aesthetic, functional, and economic value of buildings while safeguarding occupant health and safety.

III. Scope of the Study

- To study management techniques and repair methods used for the rehabilitation of concrete structures.
- To analyze defects present in an existing building.
- To understand modern repair materials and methods used for structural rehabilitation.
- To identify strategies to enhance structural durability and extend service life.

IV. Methodology

This project focuses primarily on **preventive maintenance**. The study was conducted on a canteen building located in an industrial facility at Tondiarpet, Chennai. The structure is a 30-year-old G+1 building exhibiting cracks and severe concrete spalling in several columns. Five critically damaged columns were selected for detailed investigation and repair to ensure the stability of the structure.

A. Detailed Investigation

1. **VisualExamination**

Experienced personnel conducted an overall site assessment to identify visible defects.

2. **ObservationandDocumentation**

The type, extent, and location of defects were recorded to guide the repair plan.

3. **Planning**

A complete schedule was developed for the sequence of repair activities.

4. **Execution**

The planned repair sequence was implemented to ensure timely completion without delays.

V. Testing and Condition Assessment

To determine the structural condition and plan the rehabilitation correctly, several tests were conducted:

- **UltrasonicPulseVelocityTest**

Assessed the quality and integrity of concrete in columns, beams, and slabs.

- **ReboundHammerTest**

Estimated surface hardness and relative compressive strength.

- **ProfoscopeRebarLocator**

Identified reinforcement layout and depth, providing real-time visualization for accuracy.

- **ChlorideandCarbonationTests**

Measured contamination and deterioration levels in cover concrete.

- **Half-CellPotentialSurvey**

Evaluated corrosion activity and severity in reinforcement.

- **CoreSamplingandCompressiveStrengthTest**

Determined in-situ concrete strength and material uniformity.

Based on the test results, an appropriate repair methodology was proposed and executed.

VI. Repair Methodology

A. Sequence of Activities

- Removal of brickwork surrounding the affected columns

- Removal of plaster and deteriorated cover concrete
- Cleaning corroded reinforcement
- Providing additional reinforcement where necessary
- Installing shear connectors
- Core cutting and surface preparation
- Application of bonding chemicals
- Concreting using micro-concrete
  - Epoxy jointing compound
  - Formwork/Shuttering
  - Placement of micro-concrete
  - De-shuttering
  - Curing
- Rebuilding brickwork
- Final plastering

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

B. Step-by-Step Rehabilitation Process

1. The damaged column was exposed by removing brickwork (Fig. 1).
2. Plaster and cover concrete were removed mechanically to reveal corroded reinforcement.
3. Reinforcement bars were cleaned using rust-removal agents.
4. Additional rebar and shear connectors were installed using specialized anchoring chemicals (Fig. 2).
5. The column surface was coated with an epoxy bonding agent (Fig. 3).
6. Micro-concrete (1:0.5 powder–aggregate ratio) was placed into the formwork to rebuild the section (Fig. 4).
7. After curing and de-shuttering (Fig. 5), brickwork and plaster were reinstated (Fig. 6).

VII. Use of Microsoft Project (MSP)

Microsoft Project (MSP) was utilized for scheduling repair activities. MSP enables:

- Effective planning and resource allocation
- Progress tracking
- Budget control
- Workload analysis
- Management of shared resource pools
- Calendar-based task scheduling

However, MSP assumes unlimited material availability, which may not align with practical site constraints.

For this project, MSP estimated a **56-day duration** to complete repairs for the five columns. MSP helped optimize scheduling, resource usage, and cost control.

VIII. Conclusion

Repair and rehabilitation of deteriorated concrete structures present significant challenges, particularly in India where large numbers of aging buildings require attention. Timely maintenance supported by advanced diagnostic techniques is essential for extending structural life and preventing costly failures.

Tests such as ultrasonic pulse velocity, rebound hammer, carbonation depth assessment, chloride analysis, and half-cell potential surveys provide accurate insights into existing conditions. Based on these assessments, appropriate rehabilitation strategies—supported by modern repair materials, polymers, admixtures, and protective coatings—can be implemented effectively.

As more structures built during the 1960s and earlier approach critical deterioration, structural audits and preventive maintenance must become mandatory. Regular visual inspections and systematic maintenance planning ensure long-term durability while reducing frequent repair expenditures.

Given the economic constraints in developing countries, rehabilitation is often more viable and environmentally sustainable than demolition and reconstruction. A well-designed maintenance management system will help preserve structural assets while ensuring safety and performance.

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References

[1] J. Bhattacharjee, “Repair and Rehabilitation of RCC for Sustainable Development with Case Studies,” *CiVEJ*, Vol. 3, No. 2, June 2016.
[2] R. Vijayalakshmi et al., “Case Study on the Repair and Rehabilitation of G+3 Residential Apartment…,” *Indian Journal of Science and Technology*, July 2017.
[3] Muhammad Imran Rafiq, “Structural Health Monitoring…,” 2nd International & 6th National Conference on Earthquake & Structures, 2015.
[4] Yuseni Ab Wahab & Abd Samad Hasan Basari, “Building Maintenance Management…,” *Middle-East Journal of Scientific Research*, 2013.
[5] Varinder K. Singh, “Structural Repair and Rehabilitation…,” *Procedia Engineering*, 2013.