

Subject : Maintenance and rehabilitation of structure

“Unit-1 Maintenance of Buildings ”



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Major Learning Outcomes : **(in Cognitive Domain)**

- Explain the requirement of Maintenance in building.
- Explain various types of maintenance in building.
- Assess the quality aspects of existing building.

Topics and Sub-topics :

- 1.1 Introduction :
 - Definitions, Objectives of Building maintenance,
 - Points to remember during the design and construction stages
- 1.2 Importance of maintenance
 - Necessity of maintenance
- 1.3 Types of maintenance
 - Daily, Weekly, Monthly, Annually
- 1.4 General Maintenance
 - Painting of Buildings - Home Electricity System

1.INTRODUCTION

- Building maintenance is work undertaken to keep, restore or improve every facility i.e. every part of a building, its services including Horticulture operations to a currently acceptable standard and to sustain the utility and value of the facility.
- Building maintenance is the combination of technical and administrative actions to ensure the items and elements of a building in an acceptable standard to perform its required function.
- Maintenance is preventive in nature. Activities include inspection and works necessary to fulfill the intended function or to sustain original standard of service.

The objective of maintenance are:

- (i) To prevent damages due to natural agencies
- (ii) To preserve premature capital outlay for replacement building and services to keep in good appearance and operating condition.
- (iii) To Repair of the defects occurred in the structure and strengthen them and restore it back to its original standards to extend the useful life of the buildings

- (vi) To improve the facilities depending upon the development that is taking place in the building engineering and To satisfy Lender / Insurer requirement
- (v) To provide a safe, secure and efficient working & living environment and to avoid deterioration of physical assets.
- (vi) To maximize the aesthetic and economic values of a building as well as increase the health and safety of the occupants

➤ Maintenance aims at effective and economic means of keeping the building and services fully utilizable. It involves numerous skills as influenced by occupancy and the performance level expected of a building.

• During the design and construction stages, the following become essential:-

- (i) Right choice of material.
- (ii) Suitable construction techniques.
- (iii) Adequate specifications for construction and installation work.
- (iv) Effective supervision throughout construction and rectification of defects prior to final certification.
- (v) Provision of adequate space for landscaping with proper design.

- The expected economic life of the building under normal occupancy and maintenance conditions is considered to be as below:
- (i) Monumental buildings 100 years.
- (ii) RCC Framed construction 75 years
- (iii) Load bearing construction 55 years.
- (iv) Semi permanent structures 30 years
- (v) Purely temporary structures 5 years

IMPORTANCE OF MAINTENANCE:

- **Is building maintenance important? why?**
- It was important that buildings continue to be properly maintained to ensure that they can function as efficiently and effectively as possible
- The deterioration of buildings due to the lack of maintenance could lead to future financial burdens, pose legal and other industrial relations issues and affect the delivery of services
- Identifying building problems and understanding of building materials and its mechanical and electrical systems are aspects of the process of preserving and conserving building quality and to ensure the efficiencies of the facilities

- Improves the life of structure
- Improved life period gives better return on investment
- Better appearance and aesthetically appealing
- Better serviceability of elements and components
- Leads to quicker detection of defects and hence remedial measures
- Prevents major deterioration and leading to collapse
- Ensures safety to occupants
- Ensures feeling of confidence on the user

- Maintenance is a continuous cycle involves every element of building science namely...

- Structural

- Electrical wiring

- Plumbing-water-supply-sanitation

- Finishes in floors and walls

- Roof, terrace

- Service platform/verandah

- Lifts

- Doors windows and other elements

- **CLASSIFICATION OF MAINTENANCE:**

- The Maintenance work is broadly classified as
 - a) Preventive Maintenance
 - b) Remedial Maintenance
 - c) Routine Maintenance
 - d) Special Maintenance

- a) Preventive Maintenance**

- The maintenance work done before the defects occurred or damage developed in the structure is called preventive maintenance.
- It includes thorough inspection, planning the programs of maintenance and executing the work
- It depends upon the specifications, condition and use of structure.

- Preventive maintenance comprises of activities which are essentially required to make the structure strong and sound and capable of resisting early decay or damage. Preventive maintenance of a structure means improving the quality of construction and makes it more durable and functional.

Preventive Action Prior To Commencement of Construction:

- Soil investigation, collection of information about climatic condition of the site including possible seismic danger and taking action by strengthening the structure accordingly against all probable future eventualities, fall under the preventive maintenance action.
- **Preventive Action during Construction:**
 - i. Selection of right material for construction and using those in proper way as per specification and according to I.S. Code.
 - ii. Improvement of workmanship by engaging trained workmen.
 - iii. Cement concrete is one of the main items which need the most preventive action to make it weather proof, sound and durable.

• **b) Remedial Maintenance**

- In spite of taking all possible preventive measures and providing routine maintenance, a structure may undergo decay and damage, which would require remedial measures.
- Remedial maintenance or repairs is removal of any decayed or damaged part of the structure or removal of any defect in the structure. Due to some reasons, the structure may show sign of damage or distress. Action for repairs or restoration work should be taken up without allowing increase of the possible defect causing further damage to the structure.
- i.e. Anti termite treatment after termite attack
- Repair for leakage from roof
- Repair of Plaster and replacement of floor tile
- Replacing old door and window frame

- It is the maintenance done after the defects or damage occurs in the structure. It involves the following basic steps.
 - Finding the deterioration
 - Determining the causes
 - Evaluating the strength of the existing structure
 - Evaluating the need of the structure
 - Selecting and implementing the repair procedure

c) Routine Maintenance

- It is the service maintenance attended to the structure periodically.
- The nature of work done and interval of time at which it is done depends upon specifications and materials of structure, purpose, intensity and condition of use.
- It includes white washing, parch repair to plaster, replacement of fittings and fixtures, binding of road surface.

- Routine maintenance of the structure is essential to keep it functional and protect it against early decay. A building is made of different parts in different locations and made of different materials. These are all susceptible to natural decay due to ageing.
- There are various items of work which fall under routine maintenance and are expected to be attended regularly for up-keeping of the building some of the items need be attended daily, some weekly, while some at regular interval.
- Routine maintenance includes-
cleaning, servicing, oiling, greasing, renewal of plastering, painting walls, painting woodworks, etc.

d) Special Maintenance

- It is the work done under special condition and requires sanction and performed to rectify heavy damage.
- It may be done for strengthening and updating of the structure to meet the new condition of usage or to increase its serviceability.
- It may include particular or complete renewal occurring at long interval, such as floors, roofs etc.

- **Types of Maintenance of Building:**

- To prevent wear or decay of a building i.e. painting of door and windows, steel work etc.
- Maintenance of buildings may be broadly classified in two categories:
 - i. Preventive maintenance, and
 - ii. Remedial maintenance/measure or repair.
- **Preventive maintenance** may be divided into four parts:
 - 1. Routine maintenance
 - 2. Periodical
 - 3. Pre-monsoon
 - 4. Post – monsoon

- Preventive maintenance comprises of activities which are essentially required to make the structure strong and sound and capable of resisting early decay or damage. Preventive maintenance of a structure means improving the quality of construction and makes it more durable and functional

1. Routine maintenance:

- Everyday maintenance

- Routine maintenance is post construction activity

Routine maintenance of the structure is essential to keep it functional and protect it against early decay.

A building is made of different parts in different locations and made of different materials. These are all susceptible to natural decay due to ageing. While designing, the life of the members is assumed with normal maintenance.

Routine maintenance includes cleaning, servicing, oiling, greasing, renewal of plastering, painting walls, painting woodworks, etc.

2. Periodical Maintenance:

-at some regular interval of time : washing of building, painting of wall, door, windows etc.

3. Pre monsoon maintenance:

-Before start of monsoon to prevent the building from rain

-Repair of plaster in outer wall, cleaning of sewer line , water proofing ,change of damage parts etc.

4. Post monsoon maintenance:

After monsoon – water proofing, filling of depression near compound wall

NECESSITY OF MAINTENANCE:

The causes which necessitate the maintenance effects the service and durability of the structure as follows:

- a) Atmospheric agencies
- b) Normal wear and tear
- c) Failure of structure

- **a) Atmospheric agencies**

- ✓ **Rain**

- ✓ **Physical**

- ✓ **Expansion and contraction**

- ✓ **Expansion of water**

- ✓ **Erosion Chemical**

- ✓ **Wind**

- ✓ **Temperature**

- **b) Normal Wear and tear**

During the use of structure it is subjected to abrasion and thereby it loses appearance and serviceability.

c) Failure of structure

Failure is defined as the behavior of structure not in agreement with expected condition of stability or lacking freedom from necessary repair or non-compliance with desired use of and occupancy of the completed structure. In field it may result in visual collapse of the structure or even suspension of the services e.g. the collapse of towers, sliding or overturning of dam, settlement of foundation, crushing of columns etc.

The causes of failure may be broadly grouped as:

- **Improper Design:**

Due to incorrect, insufficient data regarding use, loading and environmental conditions, selection of material and poor detailing.

- **Defective Construction:**

Poor materials, poor workmanship, lack of quality control and supervision.

- **Improper use of structure:**

Overloading, selecting the structure for the use for which they are not designed such as deteriorating environment due to impurities from industrial fuel burning, sea water minerals, chemicals, storage of chemicals etc.

- **Lack of maintenance:**

Lack of upkeep, proper protection, precaution and preservation, deteriorated the structure, which may result in the failure.

VARIOUS ASPECTS OF ROUTINE MAINTENANCE:

The following are the various routine maintenance aspects,

- a) Daily Routine Maintenance
- b) Weekly Routine Maintenance
- c) Monthly Routine Maintenance
- d) Yearly Routine Maintenance

a) Daily Routine Maintenance

- Basically an inspection oriented and may not contain action to be taken
- Help in identifying major changes, development of cracks, identifying new cracks etc
- Inspection of all essential items by visual observation
- Check on proper function of sewer, water lines, wash basins, sinks etc
- Check on drain pipes from roof during rainy season.
- Cleaning of the floors and walls, Water closets , Cleaning of the sanitary installations , Glass panes of doors and windows etc.

b) Weekly Routing Maintenance

- Flushing sewer line
- Leakage of water line
- The roof top should be cleaned
- Bathrooms and bathing places should be cleaned by flushing
- Oiling of the doors and windows' hinges
- ventilation installations
- Electrical accessories and electric pumps and motors installation
- Cleaning of the decorations inside and outside

c) Monthly Routing Maintenance

- Cleaning doors, windows' latches etc
- Checking septic tank/ sewer
- Observation for cracks in the elements
- Cleaning of overhead tanks
- Peeling of plaster, dampness, floor cracks

d) Yearly Routing Maintenance

- Attending to small repairs and white washing
- Painting of steel components exposed to weather

CLASSIFICATION OF REPAIR WORKS:

- The repair works are classified in under mentioned categories:
- Day to day repairs / service facilities
- Annual repairs
- Special repairs
- **1. Day to Day Repairs:**
- The purpose of this maintenance service is to ensure satisfactory continuous functioning of various services in the buildings.

- Day to day repairs include service repairs which arises from time to time in the services of the buildings such as in plumbing works, water supply, etc.
- Examples for such repairs are removing chokage of drainage pipes, manholes, restoration of water supply, replacement of blown fuses, repairs to faulty switches, watering of plants, lawn mowing, hedge cutting, sweeping of leaf falls etc.

- **2. Annual Repairs(Periodical repairs):**

- This maintenance service is carried out to maintain the aesthetics of buildings and services as well as to preserve their life, some works like white washing, distemping, painting, cleaning of lines and tanks, Patch repair, ele.wiring and switches etc. are carried out periodically. These works are planned on year to year basis.

- **3. Special Repairs:**

- Special repairs of building are undertaken to replace the existing parts of buildings and services which get deteriorated on ageing of buildings. It is necessary to prevent the structure & services from deterioration and restore it back to its original conditions to the extent possible.

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- As the building ages, there is deterioration to the various parts of the building and services. Major repairs and replacement of elements become inevitable. It becomes necessary to prevent the structure from deterioration and undue wear and tear as well as to restore it back to its original conditions to the extent possible.

- The following types of works in general are undertaken under special repairs:
- White Washing, Color washing, distempering etc., after completely scrapping the existing finish and preparing the surface afresh.
- Painting after removing the existing old paint from various members.
- Provision of water proofing treatment to the roof. All the existing treatments known are supposed to last satisfactorily only for a period of about ten years.

- Repairs of internal roads and pavements.
- Repairs / replacement of flooring, skirting, dado and plaster.
- Replacement of doors, window frames and shutters. Replacement of door and window fittings .
- Replacement of water supply and sanitary installation like water tanks, WC, cistern, Wash basins, kitchen sinks. pipes etc..

The special repairs to buildings shall be divided in following six groups:

- (i) Concrete work.
- (ii) Masonry works including plaster, flooring and brick work. -
- (iii) Woodwork.
- (iv) Steel work.
- (v) Sanitary and Water supply.
- (vi) Water proofing treatment.
- (vii) Electrical wiring and fittings

Thank you...