

DE-MYSTIFYING MAINTENANCE

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INTRODUCTION

We are all inclined to think that the buildings in which we live and work are permanent, so much so that we tend to take very little notice of them from one day to the next. This is strange considering how we look after ourselves and maintain our bodies and those of our families. Then why do we not care for our buildings in the same manner?

This document is really about awareness, we need to become aware of our buildings that protect us from the elements and provide protected environments, in which we can live and work. However, in performing their sheltering function our buildings suffer from the very elements from which they protect us and in turn if we want our buildings to continue to serve us we must protect them by maintaining them.

To do this we need to cultivate an attitude towards our buildings, an attitude of caring. As we use the buildings we can 'keep an eye on it' then 'as we look at it' closely we will see how it suffers in performing its functions. Materials like, brick, stone, timber, concrete and steel are affected by heat, damp, moisture, movement, loading, impact, rain, wind etc. Temperature changes can cause cracks in walls, ceilings and floors. Once cracked water can enter and get underneath plaster, which may fall off the wall or lift off the floor. Damp causes timber to rot, which allows fixing screws and nails to come out causing shutters and doors to fall off and roofs to collapse. Moisture variations in the air can cause timber to swell, warp and crack.

If we can notice these things as they begin to happen we can take remedial measures and arrest progressive damage, this is known as MAINTENANCE. This document has been prepared to help the programme planners understand the basic subject as well as the occupier/user, community and engineers to understand their buildings and consequently to maintain them so that they will serve us long and well and also play their role in the development of the community.

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BUILDING MAINTENANCE

Building construction involves sizeable investment, deployment of human resources in terms of conception, design, construction and utilisation of vast amounts of scarce materials such as cement, steel and timber and the like. It therefore becomes necessary to have a system by which the properties so created are adequately cared for during their lifetime.

Maintenance has been defined as **'Work done to keep or restore a building so that it continues to perform properly and retains its appearance and value.'**

Therefore building maintenance is work undertaken to keep and restore every facility i.e. every part of the building and its surrounds to a currently acceptable standard and to sustain the utility and value of the facility but this activity will exclude improvements or extensions.

All buildings require regular maintenance and attention that caters to the changing needs of the building and its users, to keep it efficient and habitable.

Good maintenance leads to the following advantages:

- Increased life of the building
- Efficient use of the building
- Safety and security
- Reduced long-term capital expenditure
- Increased value of the building

The primary aim of maintenance is to;

- Preserve the building in good operating condition and service.

TYPES OF MAINTENANCE

In the upkeep of existing buildings, maintenance may be either **PLANNED** or **UNPLANNED**. Which basically means;

Preventive Maintenance - carried out to a predetermined plan to reduce the probability of failure. Usually just a case of good housekeeping and cleaning.

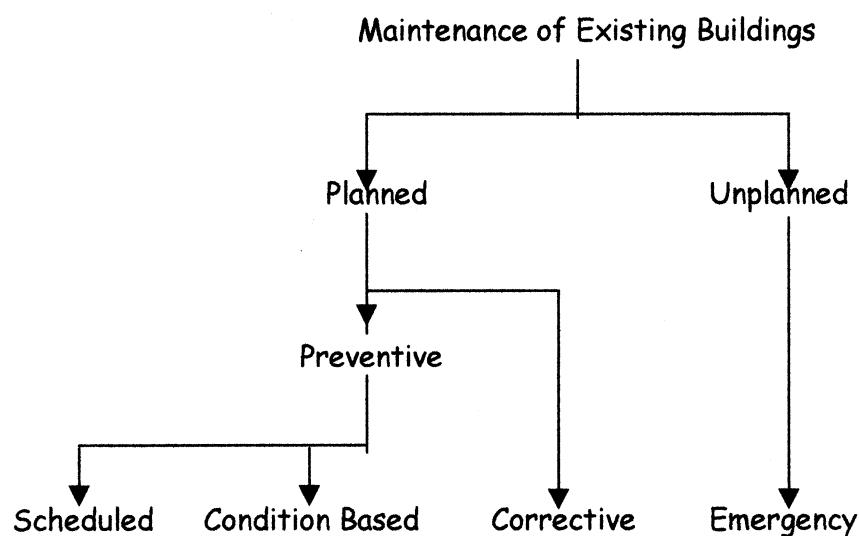
Scheduled Maintenance - preventive maintenance done at regular intervals. Often within the capacity of the user/occupier.

Condition Based Maintenance - preventive maintenance done when deemed necessary through regular inspection of the building. May require some technical expertise.

Corrective Maintenance - carried out after failure has occurred to restore an item so that it can perform it's required function. Requires technical expertise.

Emergency Maintenance - necessary immediately to avoid serious consequences. Requires technical expertise.

The relationship between these maintenance types is shown below;



Planned Preventive Maintenance is worthwhile if it;

- Is cost-effective
- Reduces the incidence of costly corrective and emergency maintenance

Unplanned Maintenance is reactive rather than proactive. It may be a deliberate policy recognising that maintenance comprises three main activities:

Servicing ----- Rectification ----- Replacement

Such a policy is dependent upon inspection rather than planning and being proactive has two inherent defects;

- If the inspection is not regular and carefully carried out defects may be missed and damage may accumulate i.e. loss of concrete cover, failure of reinforcement due to corrosion eventually leading to collapse.
- It is difficult to justify budget provision and this often results in under provision and the maintenance is regulated by the financial provision rather than need.

Efficient maintenance management comprises of formulating a maintenance strategy, which in turn will permit the development of a maintenance policy for each individual building.

The necessary budget may then be estimated and related to the total budget.

Value for money is essential whatever the financial provision for maintenance and management function relates to economic procurement, quality assurance through effective specification and supervision and the careful scrutiny of all accounts.



THE USER AND MAINTENANCE

The first aspect of maintenance is cleanliness, the interior and exterior of the building should be cleaned on a regular basis and this responsibility must rest with the user/occupier of the building.

The user/occupier is in the best position to notice problems arising with the building; prompt positive action by this person will save the building falling into a state of disrepair and eventually becoming unusable.

Basic preventive maintenance does not require vast technical knowledge, in most cases it is common sense.

If the building develops serious faults the user/occupier will be obliged to seek professional engineering assistance to correct or halt the problem, however with minor defects he/she can affect the repair/correction themselves.



APPROACH TO MAINTENANCE

Maintenance operations encompass a major portion of the useful life of any building. Due to present mind-sets and attitudes the job of maintenance can be more difficult than new construction to organise and carry out. However, this does not have to be so, it basically only requires all concerned people to act in a responsible manner.

Buildings, no matter how well constructed or what materials are used require maintenance; this is an economic and technological fact.

Deterioration of a building may result from a wide variety of natural causes in addition to every day wear and tear by the users. These forces combine to weaken the structure, make it perform less effectively and spoil its appearance.

Various components of a building like brickwork, flooring electrical and water supply installations have different economic lives and various environmental factors contribute to their gradual degradation.

It is therefore necessary to have a system by which the building along with its facilities is inspected and adequately cared for during its useful life.



INSPECTION

Basic to a maintenance programme is an inspection programme. Inspection implies that we know what we are looking for, so we need to be able to recognise the signs, which tell of distress or possible future trouble.

Inspections are essential features of any planned maintenance system and are undertaken for the following reasons:

- Preparing a schedule of items to be maintained and their present condition.
- Detecting deviation from pre-determined standards and the early development of faults, which may result in such deviation occurring before the next inspection.
- Ascertaining the causes of such deviations, the extent of remedial work necessary to restore the required standard, how to prevent a re-occurrence of the defect and the relative urgency of the work.
- Checking the previous work done was in accordance with instructions and that the work specified was adequate.

The advantages of these planned inspections are;

- An up to date appreciation of the overall condition of the building and a corresponding improvement in the records.
- More accurate prediction of maintenance requirements and therefore better budgetary control.
- The carrying out of timely repairs will extend the life of the buildings and reduce the risk of damage to adjoining parts of the building.

SOME BASIC CAUSES OF DETERIORATION

There is a need to understand the most common natural causes of building deterioration. The following list is by no means exhaustive and it is only produced to give the average user/occupier of the structure some idea of what happens to the building in their charge every hour of every day of every month of every year;

Water

Water is frequently a basic factor in causing decay.

- Changes in ground water moisture beneath foundations from seasonal wetting and drying may cause cracking (particularly if tree roots are near) especially in soils with high clay content such as 'black-cotton soils'.

- Rising damp from the ground damages decoration.
- Movement of soluble salts occurs in some porous materials resulting in efflorescence and 'spalling' of surfaces.
- Floods erode the footings of buildings and the resulting dampness encourages the onset of other problems.
- Corrosion of metals takes place where water is present - salt in seawater and spray is aggressive, particularly to ferrous metals.
- Wood boring insects are more active in damp than in dry timber.
- Organic materials such as wood may rot in damp conditions, if the moisture content is more than 20% fungal attack is possible.
- Faults in parapets and roofing can provide access to water; spoiling internal decorations and fostering rot and mould growth.

Sun

The heat from the sun may;

- Cause disruptive movements between materials with different expansion coefficients.
- Cause more rapid drying of exposed timber surfaces than in the body of the material, so producing 'cupping' and or splitting.
- Increase creep or rate of flow of some materials such as those with a bitumen base.
- The ultra violet component of the sun's radiation breaks down organic materials;
- Paints and varnishes 'chalk', crack and flake off.
- Bitumen based materials can quickly be degraded, becoming brittle and may crack.

Wind

Wind can be a damaging influence;

- It causes rain to fall at an angle and may drive the rain into places originally thought to be protected, causing water penetration of structures.
- Strong winds and cyclones will exert high loads on buildings, which if not properly built using suitable construction methods maybe so badly damaged that immediate maintenance is needed.

Carbon Dioxide

Carbon Dioxide in the air can permeate into reinforced concrete lessening the alkalinity of the cement. This may allow corrosion of the reinforcement, especially in moist conditions.

Plants and Animals

Surface growths of algae and lichen make buildings look dirty but are not necessarily harmful in themselves. However, over a period of time acidic conditions may develop from their metabolic processes, causing damage to the building.

Plants growing on roofs, window overhangs, from cracks in the plaster and drains will cause water to enter the building. Roots in porous materials or in joints between bricks will be disruptive.

Termite nests beneath the footings can cause the building to collapse. If termites gain access into the buildings they can be particularly damaging by weakening or destroying timber components.

Domestic animals, rodents and birds may nibble at softer substances such as plant-based materials and insulation on electrical cables.

Earthquakes

Some areas of India experience earthquakes causing extensive damage to buildings. The buildings that are not completely destroyed will require moderate to extensive remedial works.

Proximity of Different Materials

Problems may arise from having certain materials near each other;

- Copper will speed up corrosion of aluminium, galvanised iron and steel through electrolytic action.
- Bricks with high soluble sulphate content (magnesium or sodium sulphate) may under very moist conditions; cause softening of mortars made from Ordinary Portland Cement. This sometimes leads to disruptive expansion of brickwork and the adhesion of OPC renderings may be lost.

Daily Usage

The daily usage of a building by its user/occupants imposes loads that cause the structure and it's services to deteriorate. Foot traffic, opening and closing doors, windows and shutters, misuse of plumbing, knocking on walls etc contribute continually to building deterioration, cleaning processes often include rubbing, scrubbing and use of abrasive substances all of which wear surfaces away.

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