

Lecture 15

* Maintenance, Repair & Retrofitting of Building

1st two terminologies are relevant to each other

* Maintenance :-

Non-structural work undertaken in a building to ensure its good appearance and keep the building serviceable during its life time.

→ Non technical & Non structural

* Repair :-

It is a technical intervention to restore the pre-damaged state of a damaged building

→ technical & structural
means beam, columns

* Strengthening :-

It is a technical intervention to enhance the capacity of existing undamaged structure

→ technical intervention to enhance ~~restore~~ ^{undamaged} ~~structure~~

* Retrofitting :-

It is a technical intervention to enhance the capacity of existing damaged structure

- technical intervention to enhance the strength than pre-damaged state

Rehabilitation

It is a term ^{used} collectively for repair, strengthening & retrofitting.

Maintenance in Buildings

- White wash, colour wash, painting of walls, doors, windows, steel elements etc
- Replastering of damaged/deteriorated plaster
- Removal of efflorescence
- Maintenance of electrical & mechanical work
- Repair to damaged parts of floor
- Repolishing of floor
- Replacement of decayed timber and fittings
- Leakage control measures
- Removal of stains from floors
- Dampness control measures
- Easing of doors & windows
- Servicing of water supply & Sanitation system

- Replacing of glass panes.
- Replacement of damaged parts of the roofing, false ceiling etc.
- Maintenance of plinth Protection.
- Removal shrubs & wild plants grown on roof & walls.

TYPES OF MAINTENANCE

(1) ROUTINE MAINTENANCE:-

Activities repeated at predominated intervals. The activities may be repeated yearly in a particular season.

(2) Condition-based maintenance:-

The work initiated after condition assessment of a building.

(3) Preventive maintenance:-

This is intended to preserve the building by preventing failure & detecting developing faults.

(4) Opportunity maintenance:-

Work done as & when possible within the limits of operational demand.

(5) Day to day maintenance

It involves maintenance that has to be performed on daily basis.

Dr. W. S. Acharya Building 16

Shutdown maintenance

Thorough overhaul & maintenance after for which temporarily closing the facility is needed

Emergency maintenance

Necessitated by unforeseen (Great damage) caused by natural calamity like earthquakes, floods etc

Repair of building

Following are some ~~of~~ repair measures

- Repair of Foundations & or Foundation Soils
- Repair of cracks in masonry wall
- Repair of damages in concrete structural elements such as beams, columns, slab etc
- Repair of Support System of Floor & roof
- Rectification of leaking roof
- providing DPC in existing buildings
- Repairing expansion joints

- ① Draw the footing 8×8
- ② Reinforcement $\rightarrow$ U shaped bar $\rightarrow$
 below No of bar 12 & above number
 of bar 6.

③ Repair of Foundations & masonry

$\rightarrow$ The method of underpinning is
 commonly used for repair of
 foundations & foundation soils

$\rightarrow$ Underpinning by ~~pit~~ & pit method
 & pile method are the two methods

$\rightarrow$ For repair of foundation soil, Cement
 grouting is usually done.
 waterproof cement rendering is
 done in case of outside masonry
 wall to prevent it from dampness

$\rightarrow$ Before repair of cracks in masonry
 walls, the source of crack shall
 first be rectified.

Repair of Masonry - following are different

- (1) Grout Injection in cracks, which is
 a process of filling the crack
 void or honeycombed under pressure
 1 to 36
 36 to 100 bar

In concrete or masonry structural members

Application of fibro cement overlay, which is a binding material in dust form, consisting of compressed mixture of sand, cement & cellulose fibre

Concrete Stitching, which is a technique used at cracks to maintain aggregate interlock & provide added reinforcement to minimize ^{relative movement of} concrete slabs at the cracks.

Repair of concrete members

- Epoxy Injection
- Repair with rich mortar/micro concrete
- Replacement of concrete cover
- Concrete replacement

Strengthening & Retrofitting

Different strategies are adopted depending at the scenario

- Retrofitting by increasing the capacity of structure
- Retrofitting by decreasing seismic demand

Retrofitting Criteria

→ Type of the structure

- Cost of retrofitting
- Materials, technology & skill available
- Problem of occupying
- Historical importance of the structure.

Strengthening / retrofitting of masonry buildings

- Ferrocement overlay
- Shotcrete overlay
- Structural repair
- Application of fibre reinforced polymer
- Center core technique

Strengthening / retrofitting of RC buildings

- Concrete jacketing
- Application of fibre-reinforced plastic polymer (FRP), which is a composite material made of a polymer matrix reinforced with fibres.
- Application of steel strips, steel bands, steel haunches
- Use of additional elements such as shear walls, steel bracers etc
- Base isolation & use of dampers
- During earthquake most of load comes on beam-column joint

Steel tranch

