

Review on Retrofitting

Pradeep Kumar Goyal¹, Rohit Soni², Ramesh Kumar Dhaka³

¹Department of Civil Engineering, Govt. Engineering College, Ajmer

²Bhagwant University, Ajmer

²Bhagwant University, Ajmer

Available online at: www.ijcseonline.org

Abstract: - Retrofitting is a technique to increase the strength of exist building including stiffness, ductility, stability. Retrofitting is one of the best options to make an existing inadequate building safe against future probable earthquake or other environment forces. Retrofitting is the process of addition of new features to older building, heritage structure, and bridge.

Retrofitting aims to strengthen a structure to satisfy the requirement of the current codes for seismic design. Retrofitting Re-strengthens of existing structure to make them more resistant to seismic action, motion of ground and failure of soil or liquefaction of soil, due to earthquake or other natural calamities such as cyclones, tornados and wind with high velocity caused by thunderstorm, hailstorm, snowfall etc. Structure loose their strength day by day so retrofitting increase their life or durability.

INTRODUCTION

Retrofitting is define as the technique in which different type of materials used to improve strength and durability of structure like building, bridge, chimneys, heritage structure to prevent from collapse or regaining the strength of structure. Mainly retrofitting is apart of repair and rehabilitation of structure. Retrofitting is a technique which makes building safe and habitable. Many of natural disaster like earthquake, cyclone, land sliding, liquefaction of soil due to loose bearing strength, heavy rainfall, tsunami are effected structure in very serious way which make structure in-habitable, by using retrofitting technique structure will regain strength and also extended its serviceability. It is used in mostly every component of building like beam, column, wall, foundation, pillars, roof.

METHODOLOGY

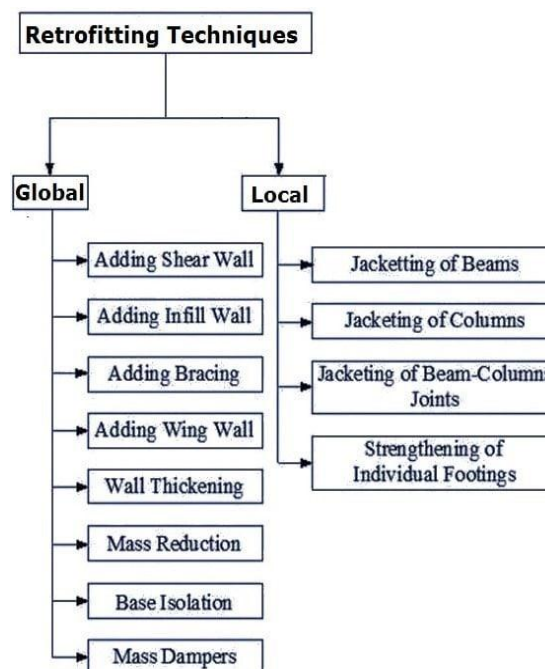
Retrofitting is treatment including preservation, rehabilitation, restoring, and reconstruction. A proper treatment and strategy of retrofitting will be increase all over strength and life duration of structure.

RETROFITTING TECHNIQUES

GLOBAL RETROFITTING:-This technique divided in two parts

(a) **CONVENTIONAL METHOD:-** It is used to increase resistance of structure due to seismic force on designing or construction level. In this method shear wall, infill wall, steel bracing technique are used.

Table1. TECHNIQUES OF RETROFITTING



(b) NON-CONVENTIONAL METHOD: - These technique is quite different from conventional technique. It is basically based on reduction of horizontally seismic force by using base isolation technique and supplemental damping devices.

LOCAL RETROFITTING:-

This techniques approach is to regain the strength of the member which are seismically deficient. In this technique additional members and materials like steel, concrete, reinforcement bars, FRP are used to improve the strength of building.

(A) JACKETING:- Jacketing is very common retrofitting technique for strengthening of building column, beam and footing. It is protect a structural member against deterioration, some common type of jacketing are RC jacketing, steel jacketing, FRP jacketing.

The main concept of jacketing is to increase the seismic capacity of the moment resisting framed structure.

Types of jacketing are described below

(a) JACKETING OF COLUMN:-

When a column is subjected to seismic activity and it is not sufficiently bearing the loads, column jacketing is used to improve the strength by adding concrete with longitudinal and transverse reinforcement around it. Jacketing improve its axial and shear strength, while the ductility of column remain same

(i) REINFORCEMENT CEMENT JACKETING: -

RC jacketing is applied to repair and strengthening the column

Two main purpose of jacketing of column

- (i) Increase in the shear capacity of column in order to accomplish a strong column-weak beam design
- (ii) To improve the column's flexural strength by longitudinal steel of the jacketing made continues through the slab system are anchored with the foundation

It is achieved by providing the new longitudinal reinforcement through holes drilled in the slab. The section will be designed in this way so that the flexural strength of column should be greater than that of the beam transverse reinforcement bars are provided above and below the joint in such way that two L-shapes ties that overlap diagonally in opposite corners.

FIG. 1 RC JACKETING

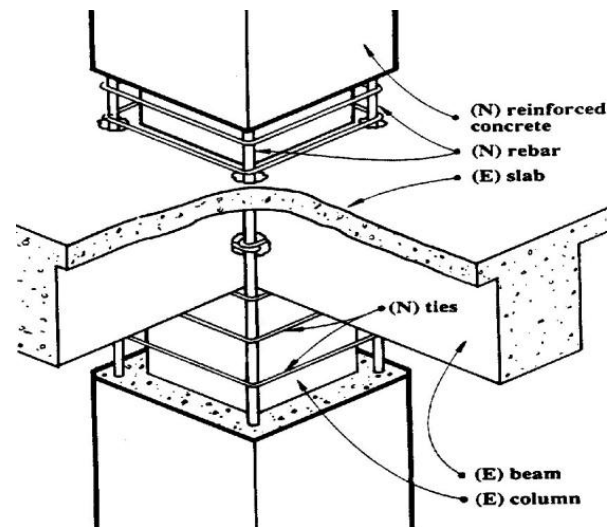
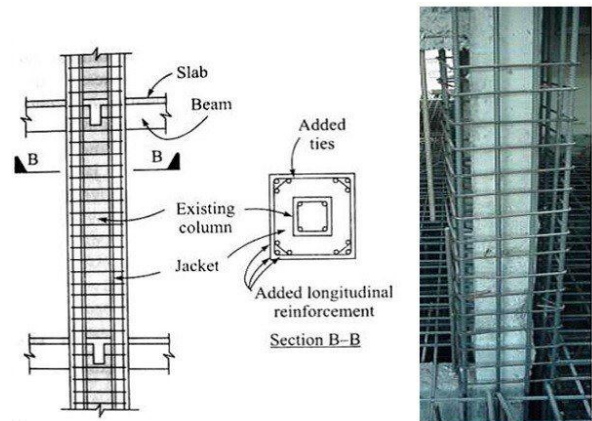


FIG.2 REINFORCEMENT AROUND COLUMN



- (ii) **STEEL JACKETING :-** In local retrofitting technique material like steel is also used to provide strengthening the building. Steel plates and steel caging are the common types of steel jacketing. In this method steel are provided around the column in two L-Shaped panels. It will be welded together.

FIG 3. CIRCULAR COLUMN WITH STEEL JACKETING

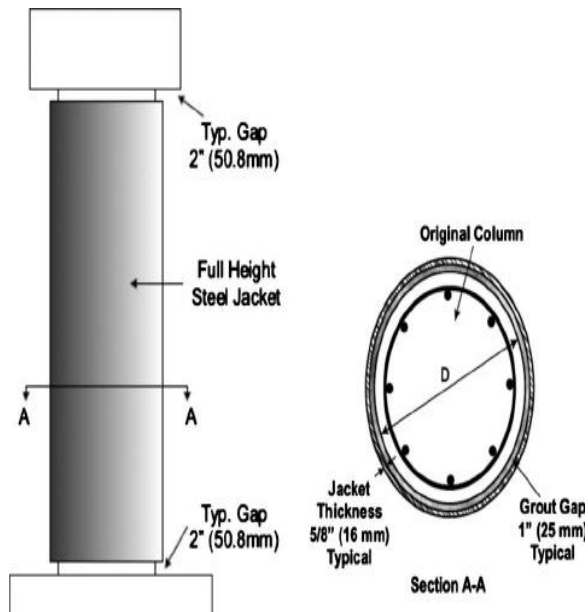


FIG.4 RECTANGULAR COLUMN WITH STEEL CAGING



(b)BEAM JACKETING :- Jacketing of beams is provided to increase the strength and stiffness of the structure. In this method strong beam-weak column system will be avoided. There is a possibility of change of mode of failure and redistribution of force as a jacketing of column, which causes hinging of beam. One sided,3-sided,4-sided jacketing is some common methods of beam jacketing. In this method top bars will be provided through out its whole length, It will be tied

up with U-shaped ties and bottom bar also ties with inverted U-shaped ties, closely spaced ties have been placed near the joints where beam hinging is expected.

FIG.5 DETAIL OF BEAM JACKETING

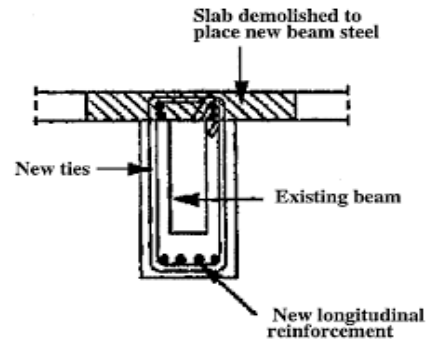
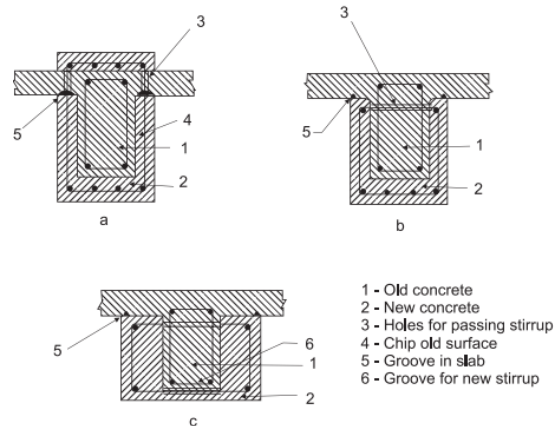


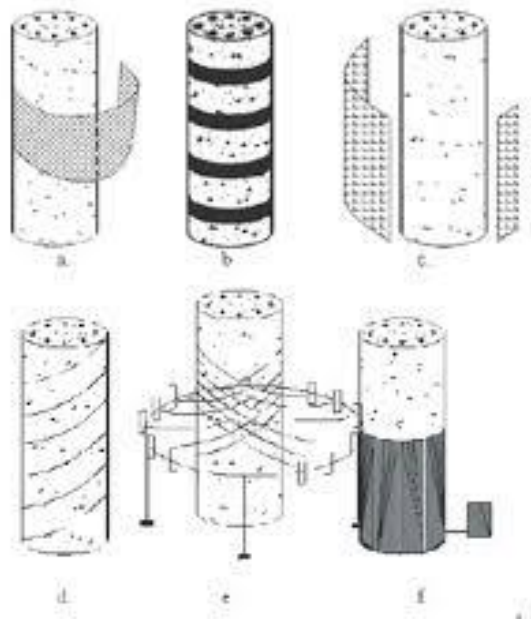
FIG.6 JACKETING OF BEAM



(c)FRP JACKETING: - It is modern technique of jacketing in which carbon fiber reinforced polymer is used to increase the serviceability of structure.

CFRP is flexible in nature, Its is also have high modulus of elasticity and light weight and rust proof. In this method CFRP increase the concrete confinement. It also increases the shear strength of column, CFRP warping all around the column.

FIG. 7 CFRP WRAPING ALL AROUND CIRCULAR COLUMN



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