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# Retrofitting of an existing RCC structure

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***Abstract :*** *The retrofitting of concrete structures has become increasingly important in view aging and more deterioration of infrastructure. The problem is more severe due to optimized technologies for construction. Many expansive methods are available for retrofit ting structures and choice of suitable method/material is a challenge to a structural engineer. Retrofitting is the Science and Technology of strengthening the existing structures or structural elements to enhance their performance with new technology, features and components. Retrofitting of an existing reinforced concrete structure includes either repair, rehabilitation (or) strengthening terms. The term retrofit is used if the damaged structure performance was satisfying than before with some additional resistance then the term retrofit will be representative. Now a day's many researchers have proposed many materials, methods and techniques for strengthening flexure deficient RC beams. The studies performed on the flexure retrofitted RC beams using traditional method like stitching (Hook Method) are studied. Further it is required to study the relative effect of these techniques on flexure carrying capacity of flexure deficient beams by retrofitting.*

***Keywords*** *– Flexure Deficient, Rehabilitation, Repair , Stitching (hook method), structural Engineering techniques*

## I. INTRODUCTION

Retrofitting in construction industry refers to strengthening of existing structure to make them sesmic resistant. Retrofitting is the method of modifying or repairing something after after it has been manufactured. Retrofitting work includes repairing the structure system of building after its construction. This works result in increase safety and durability of the structure.

Retrofitting of structure means making changes to an existing building to protect it from flooding or other hazards such as hing winds and earthquake.

Retrofitting techniques:- 1) Global
2) Local

## II. LITERATURE REVIEW

2.1 General:

A literature review is a crucial step for researchers to understand Retrofitting of an existing building and materials for treatment. It includes academic publications, books, articles, and relevant data. It's essential to understand the problem's status, practical solutions, and previous studies. Ineffective research may result from ignoring available online, book, and journal material.

2.2 Review of Journal Papers:

2.2.1 Rahul mimje [2019] "Strength of existing building using retrofitting techniques" i-manager journal of Modern Engineering Science and Managements.[3] Rahul mimje strength of existing building using retrofitting technique Now a days retrofitting becoming popular around the world as most of the important structure some other like old structure for the future earthquake and other environmental forces retrofitting is much better convinent retrofitting helps to enhance the strength resistivity and over are life span of the structure

2.2.2 Punit Kumar, Sudhanshu Jaiswal, Praveen Kumar Yadav [2020] "A Research Paper on Seismic Retrofitting of pure structure" i-manager Journal of structural Engineering.[2] Punit kumar seismic retrofitting method providing external strength to building under lateral loading we used Etabs 2015 computer for the analysis of structure there is a different load live load, dead load and seismic load in seismic analysis the parameter such as maximum displacement / maximum story drift overturning moment and story shear are calculated in the present technical paper.

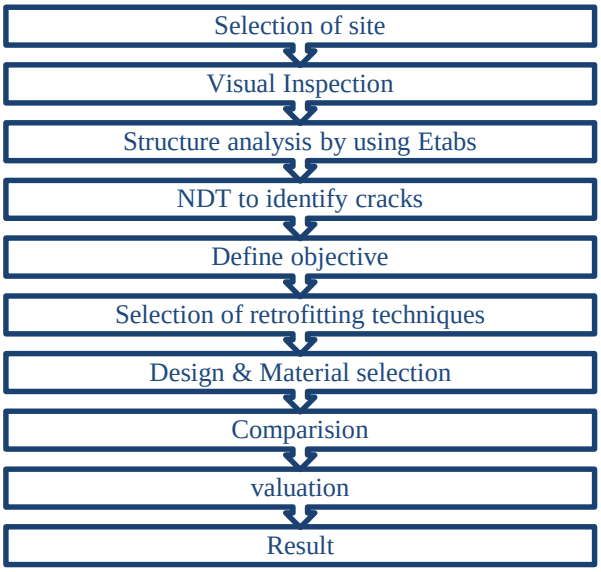
2.2.3 Anurag Mishra, Rajan Ashvari [2017] "Design and application of retrofitting technique in various structure www research" International journal of engineering research and Technology.[4] techniques in various structure paper is focused on

structure with lack the required strength as per the guideline of earthquake building code to sustain the seismic force the strength enhancement of structure is based on the concept of improving the flexibility stiffness, ductility, unity of the structure the method of retrofitting improving the seismic force sustaining capacity of various components of building without stress concentration at critical points.

2.2.4 Consuelo Beschi et al., "Beam-Column Joint Retrofitting with High Performance Fibre Reinforced Concrete Jacketing" (2011)[9] investigated on retrofitting of beam-column joints using high-performance fibre reinforced concrete jacketing. They started testing specimen on a column with cross section of 300×300 mm in the upper part and 400×400 mm in the lower part, and a beam cross section of 300×600 mm. The beam was 5 metres long and the column was 3.55 metres high. A R.C. corbel was put at the beam column joint to replicate the presence of the transverse beam in the real construction. A static load is applied on this beam-column joint, followed by cyclic loading. The column is wrapped in FRP sheets that have been bent at a 90 degree angle. They were eventually wrapped in the HPFRC. During the test, a horizontal load was applied with increasing amplitude cycles till failure. The use of HPFRC jacketing improves the bearing capacity of the column, as well as its ductility and overall performance of the beam column junction. The results of the suggested technique can be used to strengthen existing RC structures with low concrete strength and low reinforcement ratios.

## III. METHODOLOGY

3.1 Methodology:

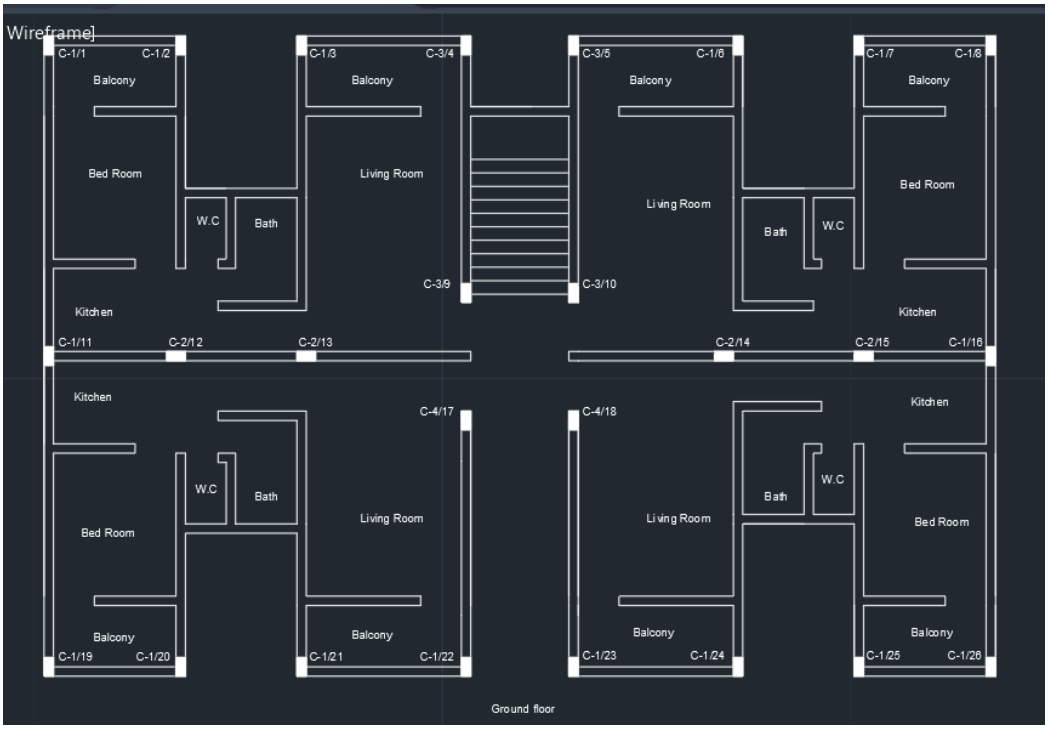


3.2 location & Site information:

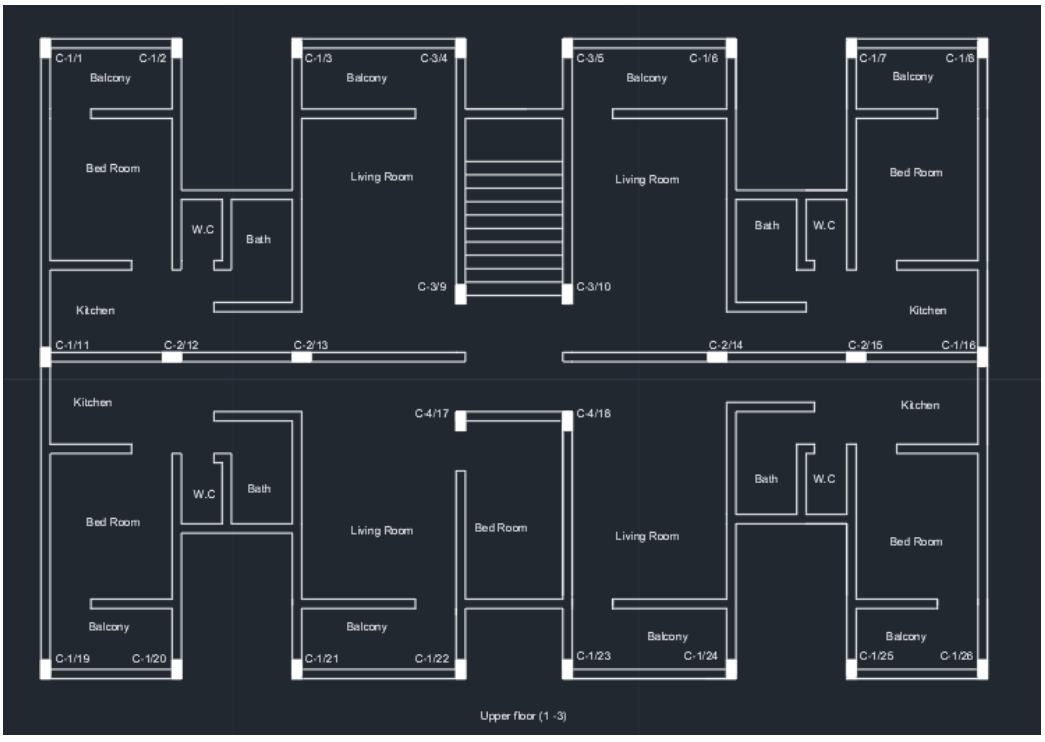
RIDDHI SIDDHI "SAI DARSHAN" CO. OP.
HOUSING SOCIETY LTD.
Gat No 212, Plot no 3-14 & 16-28, Riddhi Siddhi Park
Manor, Tal. & Dist Palghar .


## IV. FIGURES AND TABLES

4.1 Plans:




GROUND FLOOR PLAN




UPPER FLOOR PLAN

4.2 NDT Test Repots:

| Sr.No | ID mark of Member | Location | Avg. Rebound Index ( After Mean outliers) | Comp. Strength ($N/mm^2$ ) | Direction of Rebound | Surface condition |
|---|---|---|---|---|---|---|
| 1 | Ground Floor Column | C-1/21 | 24.2 | Below 10 | Horizontal | Dry |
| 2 | Ground Floor Column | C-1/23 | 26.6 | 10.4 | Horizontal | Dry |
| 3 | Ground Floor Column | C-4/17 | 22.2 | Below 10 | Horizontal | Dry |
| 4 | Ground Floor Column | C-2/12 | 19 | Below 10 | Horizontal | Dry |
| 5 | Ground Floor Column | C-1/19 | 17.6 | Below 10 | Horizontal | Dry |
| 6 | Ground Floor Column | C-1/11 | 15.6 | Below 10 | Horizontal | Dry |
| 7 | Ground Floor Column | C-1/1 | 23 | Below 10 | Horizontal | Dry |
| 8 | Ground Floor Column | C-1/2 | 20.2 | Below 10 | Horizontal | Dry |
| 9 | Ground Floor Column | C-1/3 | 25.2 | Below 10 | Horizontal | Dry |
| 10 | Ground Floor Column | C-3/4 | 16.6 | Below 10 | Horizontal | Dry |
| 11 | Ground Floor Column | C-1/6 | 27 | 10.9 | Horizontal | Dry |
| 12 | Ground Floor Column | C-1/7 | 25.4 | Below 10 | Horizontal | Dry |
| 13 | Ground Floor Column | C-1/8 | 28.8 | 13.1 | Horizontal | Dry |
| 14 | Ground Floor Column | C-1/16 | 24.6 | Below 10 | Horizontal | Dry |
| 15 | Ground Floor Column | C-2/26 | 32 | 16.9 | Horizontal | Dry |
| 16 | Ground Floor Column | C-2/14 | 25.4 | Below 10 | Horizontal | Dry |
| 17 | 1st Floor Column | C-2/15 | 24 | Below 10 | Horizontal | Dry |
| 18 | 1st Floor Column | C-2/12 | 26.6 | 10.4 | Horizontal | Dry |
| 19 | 3rd Floor Column | C-1/1 | 21.8 | Below 10 | Horizontal | Dry |
| 20 | Terrace Watertank column | C-3/5 | 26.8 | 10.7 | Horizontal | Dry |

Rebound Hammer Test

| Sr.No. | ID Mark Of Member | Location | Travel Path Length (mm) | Travel Time | Velocity (km/sec) | Probing Method | Suurface Condition |
|---|---|---|---|---|---|---|---|
| 1 | Ground Floor Column | C-1/21 | 400 | 185.9 | 2.15 | Surface Probing | Dry |
| 2 | Ground Floor Column | C-1/23 | 400 | 1760.3 | 2.27 | Cross Probing | Dry |
| 3 | Ground Floor Column | C-4/17 | 230 | 105.8 | 2.17 | Surface Probing | Dry |
| 4 | Ground Floor Column | C-2/12 | 400 | 268.1 | 1.49 | Surface Probing | Dry |
| 5 | Ground Floor Column | C-1/19 | 400 | 277.7 | 1.44 | Surface Probing | Dry |
| 6 | Ground Floor Column | C-1/11 | 400 | 252.8 | 1.58 | Cross Probing | Dry |
| 7 | Ground Floor Column | C-1/1 | 230 | 108.1 | 2.13 | Cross Probing | Dry |
| 8 | Ground Floor Column | C-1/2 | 230 | 120.4 | 1.91 | Cross Probing | Dry |
| 9 | Ground Floor Column | C-1/3 | 230 | 100.5 | 2.29 | Surface Probing | Dry |
| 10 | Ground Floor Column | C-3/4 | 400 | 274.6 | 1.46 | Cross Probing | Dry |
| 11 | Ground Floor Column | C-1/6 | 230 | 91.8 | 2.51 | Surface Probing | Dry |
| 12 | Ground Floor Column | C-1/7 | 400 | 180.2 | 2.22 | Surface Probing | Dry |
| 13 | Ground Floor Column | C-1/8 | 230 | 89.9 | 2.56 | Cross Probing | Dry |
| 14 | Ground Floor Column | C-1/16 | 400 | 181.8 | 2.2 | Surface Probing | Dry |
| 15 | Ground Floor Column | C-2/26 | 400 | 169.5 | 2.36 | Surface Probing | Dry |
| 16 | Ground Floor Column | C-2/14 | 400 | 186.6 | 2.14 | Surface Probing | Dry |
| 17 | 1st Floor Column | C-2/15 | 400 | 200.5 | 2 | Surface Probing | Dry |
| 18 | 1st Floor Column | C-2/12 | 400 | 190.4 | 2.1 | Surface Probing | Dry |
| 19 | 3rd Floor Column | C-1/1 | 400 | 194.2 | 2.06 | Surface Probing | Dry |
| 20 | Terrace Watertank column | C-3/5 | 400 | 188 | 2.13 | Surface Probing | Dry |

Ultrasonic pluse velocity test

## V. CONCLUSION

Retrofitting is the process of modifying an existing structure to improve its performance, typically to withstand seismic activity or other natural hazards. There are two main types of retrofitting: local and global. Local retrofitting focuses on strengthening individual members of a structure, while global retrofitting focuses on improving the overall stability of the structure. Retrofitting can be a more sustainable option than demolition and

rebuilding, as it reduces the consumption of resources and waste. While retrofitting can have upfront costs, it can often lead to long-term savings by reducing maintenance costs, improving energy efficiency, and increasing the structure's lifespan. fibre-reinforced polymers are being developed to enhance the durability and performance of retrofitted structures.

## Acknowledgements

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[1] Rahul mimje [2019] "Strength of existing building using retrofitting techniques" i-manager journal of Modern Engineering Science and Managements.

[2] Punit Kumar, Sudhanshu Jaiswal, Praveen Kumar Yadav [2020] "A Research Paper on Seismic Retrofitting of pure structure" i-manager Journal of structural Engineering.

[3] Anurag Mishra, Rajan Ashvari [2017] "Design and application of retrofitting technique in various structure www research" International journal of engineering research and Technology.

[4] Consuelo Beschi et al., "Beam-Column Joint Retrofitting with High Performance Fibre Reinforced Concrete Jacketing" (2011)

### Books:

[5] Earthquake resistant design of structures