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RETROFITTING ANALYSIS AND PREDICTION ON RESIDENTIAL BUILDING WITH NDT AND ETABS

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Abstract: **Civil engineering structures can be damaged due various reasons which include earthquakes, cyclones, blasting, etc. This kind of loading collapses the shape upfront or reasons vast harm to them. When the damage is minor, it is possible to retrofit the structure. A evaluation of the to be had literature has disclosed that umpteen numbers of retrofitting methodologies are available. The study is carried out for the behaviour of G+2 storied R.C frame buildings. Floor height provided as 3 m. And also, properties are defined for the frame structure. Models are created in ETABS software. Various types of load are considered. For static behaviour dead load of the building is considered as per IS 875 Part 1 and live load is considered as per IS 875 Part III, lateral load confirming IS 1893(part 1)2016.**

Keywords: *Retrofitting, Nano Concrete, Glass Fiber Reinforced Polymer*

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I INTRODUCTION

Retrofitting is making changes to an current constructing to defend it from flooding or other dangers such as excessive winds and earthquakes. You have already visible an instance of these modifications, and you'll study more within the following chapters. But you may be thinking at this factor why retrofitting is vital. Why aren't houses and different buildings constructed in such a manner that they won't want these adjustments? One purpose is that construction technology, which includes both strategies and materials, keeps to improve, as does our know-how of dangers and their outcomes on homes. Many homes existing nowadays were built when little changed into known about where and how regularly floods and different hazardous activities would occur or how homes ought to be protected, and houses being built today may advantage from improvements based on what we study in the future. As a result, retrofitting has turned out to be an important and critical device in risk mitigation.

Jacketing of columns is composed of introduced concrete with longitudinal and transverse reinforcement around the present columns. This type of strengthening improves the axial and shear electricity of columns while the flexural power of column and electricity of the beam-column joints continue to be the same. It is also discovered that the jacketing of columns is not successful for enhancing the ductility. A foremost advantage of column jacketing is that it improves the lateral load ability of the constructing in a fairly uniform and distributed way and as a result averting the attention of stiffness as inside the case of shear walls. This is how essential strengthening of foundations may be avoided. In addition the authentic function of the building may be maintained, as there are not any main changes within the unique geometry of the building with this technique.

Objective

- To study various retrofitting technique of RCC building.
- To analyse G+2 building for seismic load by Using ETABS and find beam column failure for seismic load
- Comparative Analysis of retrofitting for GFRP and Nano-cement to the beam column connection in ANSYS.

II. STATE OF DEVELOPMENT

This article summarizes previous studies on the reasons that contribute to the usage or avoidance of Retrofitting.

Arif, M., Akhtar, S et. al. It has been mounted in the studies pronounced that the retrofitting has achieved well under almost all the loading situations, whether it is tension, compression, flexure, shear, torsion, fatigue, effect or the dynamic loading. A large quantity of experimental and analytical research coping with retrofitting structural elements, having various shapes and sizes, subjected to exceptional loading conditions are suggested in literature. These researches have installed the fabric worthiness to be used in diversified applications and prove it to be a sturdy alternative to traditional construction material.

D. G. Gaidhankar et. al 2017 Retrofitting is a twine mesh reinforcement impregnated with mortar to produce elements of small thickness, high sturdiness and resilience and, when properly shaped, high strength and rigidity. To skip these troubles and directly determine the reaction of retrofitting in unconventional applications, numerical simulations exploiting the Finite Element Method (FEM) have yielded crucial outcomes in current years.

Dharanidharan et. al. 2016 In order to keep efficient serviceability, older structures should be repaired or strengthened in order that they meet the equal necessities demanded of the structures built today and in future. These ends in the improvement of Ferro cement systems. Ferro cement is a kind of thin-wall reinforcement concrete commonly constructed of hydraulic cement mortar, reinforced with carefully spaced layers of continuous and relatively small diameter mesh.

Hamid Eskandari et. al 2015 for experimental research to offer the basis for layout equations continues however via making use of the FEM, can reduce the time and fee of otherwise costly experimental tests, and may higher simulate the loading and support situations of the actual structure. So to this give up the FEM is utilized by Nassif and Najm to investigate the conduct of retrofitting composite beams beneath a two-point loading system.

III. PROBLEM STATEMENT

In this research, a G+2 storey structure of a building located in Punavale, Pune with 3 m floor to floor height has been analysed seismic Analysis of R.C.C Buildings using ETABS software in zones III. The plan selected is square in shape. It is not the plan of any existing or proposed building but is an architectural plan. The structure has been analysed for earthquake forces. Hard soil condition has been selected for the structure.

Table 1 Parameters to be consider for ETABS model Analysis

Sr. No.	Parameter	Values
1.	Number of storey	G+2
2.	Base to plinth	1.5m
3.	Floor height	3 m
5.	Materials	Concrete M 25 and Reinforcement Fe 500
6.	Frame size	-
7.	Grid spacing	-
8.	Size of column	230 mm x 450 mm
9.	Size of beam	230 mm x 450 mm
10.	Depth of slab	150 mm

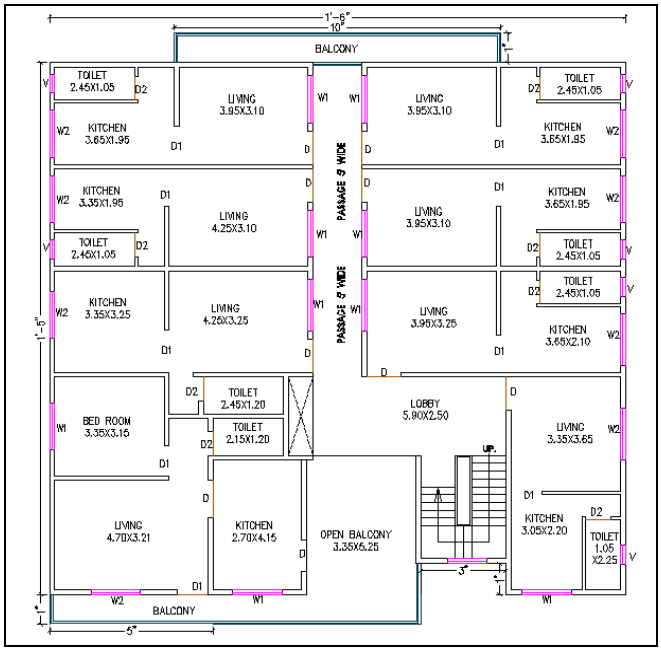

Fig 1 Floor Plan of Punavale Project

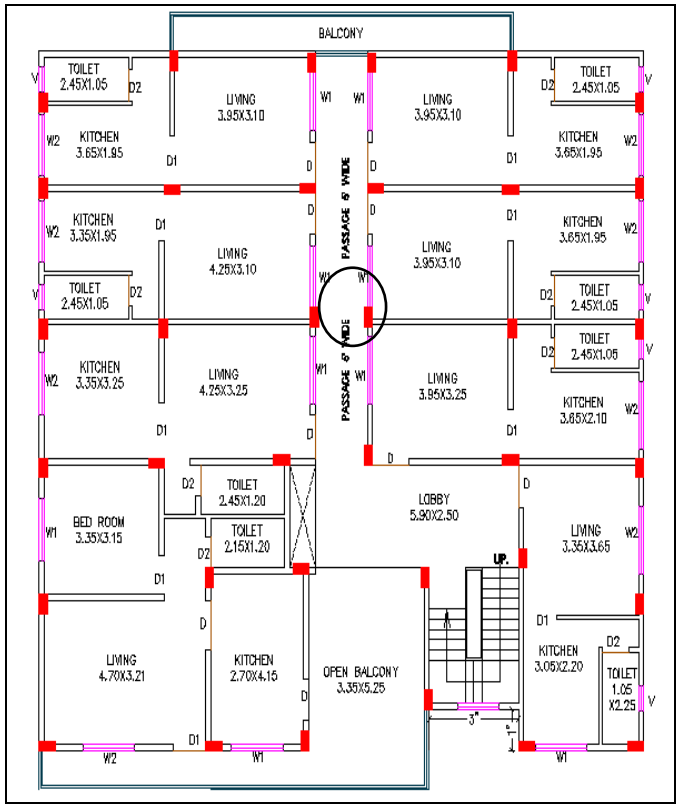

Fig 2 on site Column Positions and failure column

In above diagram highlighted column are breakdown on site we are going to develop modeling of structure in ETABS as per provided column locations and load and find out total load on that failure column, then evaluate this column in ansys for the same or rising load by using different retrofitting methods.

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IV. RESULT AND DISCUSSION

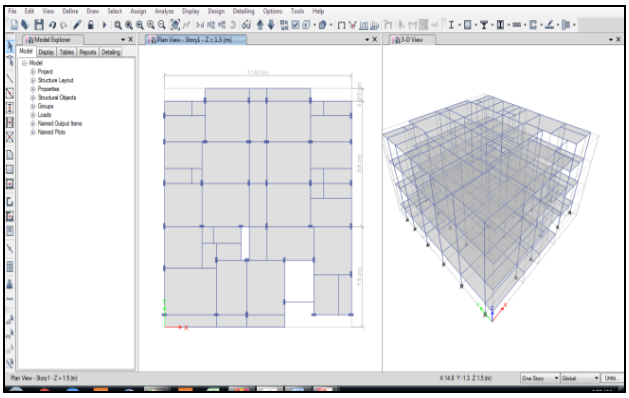


Fig 3 Model in ETABS

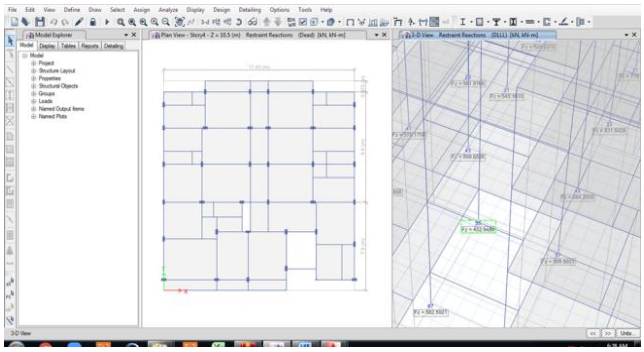


Fig 4 Total Load on Failure Column

In the above figure, the failed column, which has a total load of 452 KN, has broken. Next, we will focus on retrofitting the column with a load of 500 KN.

A. Prepare Modeling In ANSYS

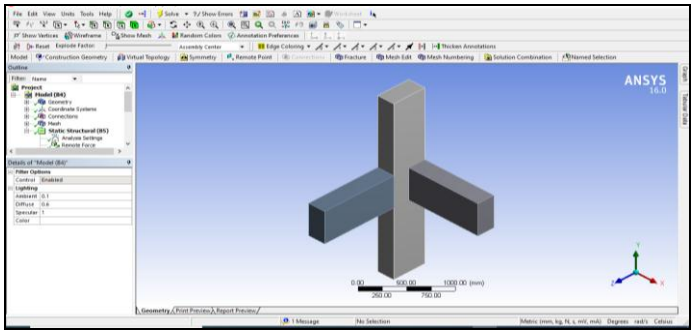


Fig 5 RCC Beam Column

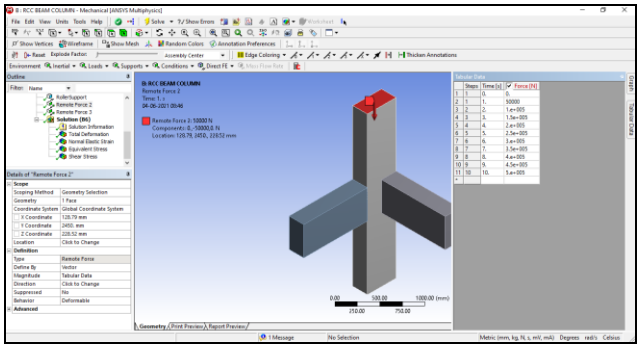


Fig 6 500KN load on column

B. Results for Deflection

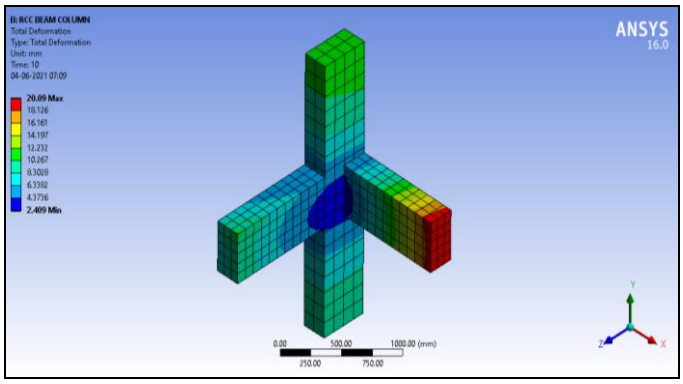


Fig 7 Deformation of RCC

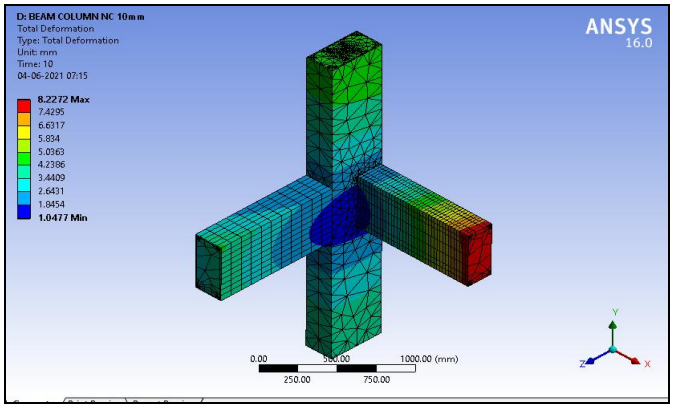


Fig 8 Deformation of NC10

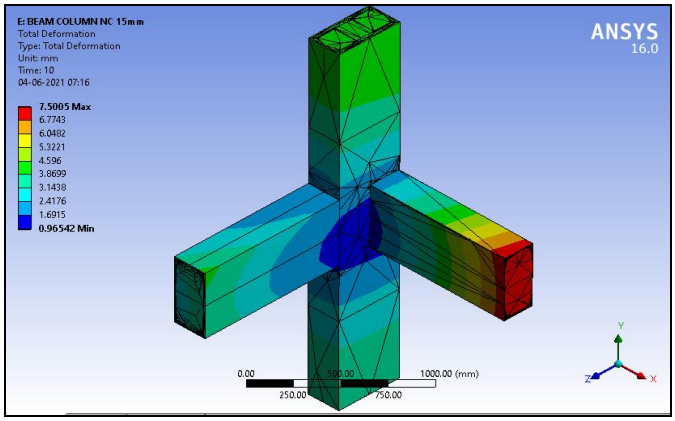


Fig 9 Deformation of NC15

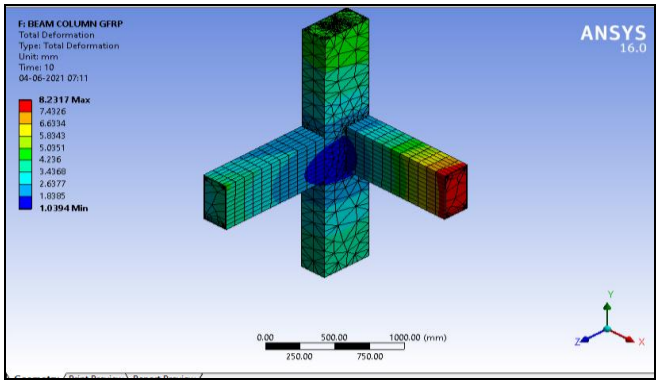
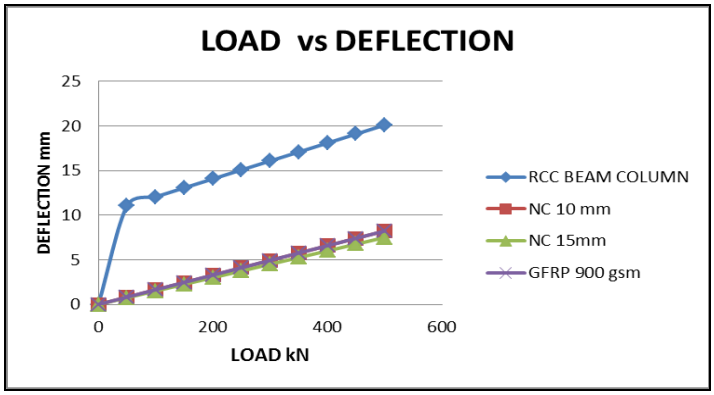


Fig 10 Deformation of GFRP

Table 1 Deflection

LOAD kN vs DEFLECTION				
LOAD kN	**RCC**	**NC 10 mm**	**NC 15mm**	**GFRP 900 gsm**
0	0.00	0.00	0.00	0.00
50	11.05	0.82	0.75	0.82
100	12.05	1.65	1.50	1.65
150	13.06	2.47	2.25	2.47
200	14.06	3.29	3.00	3.29
250	15.07	4.11	3.75	4.12
300	16.07	4.94	4.50	4.94
350	17.08	5.76	5.25	5.76
400	18.08	6.58	6.00	6.59
450	19.09	7.40	6.75	7.41
500	20.09	8.23	7.50	8.23



Above graph shows the results for load vs deflection the results for retrofitting technique NC 15 & NC 10 are more less than RCC by 30-40%.

IV. CONCLUSION

Strengthening techniques can be adopted as a feasible solution for enhancing the compression capacity of concrete member. Confinement of concrete was achieved by jacketing the specimen with concrete. The compressive behavior of the specimens was enhanced due to the confinement pressure exerted by the strengthening material. From study it is understood that By using retrofitting technique we achieve maximum strength at low cost of Nano cement, And GFRP jacketed RCC column under concentric load in ANSYS and the following concluding remarks could be made that NC jacketing technique could be used effectively, if proper jacketing scheme is introduced for the RCC Column, Deflection also got decreased as the thickness of jacketing increased. RC retrofitting technique is significant improvements in equivalent strength capacity, shear strength capacity in Beam and Axial load carrying capacity in column.

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