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RETROFITTING OF BUILDING

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A B S T R A C T

Considering the aging and deterioration of the infrastructure, the reinforcement of concrete buildings has gained importance. The problem is exacerbated by optimized design strategies. There are many scaling methods for model building and choosing the appropriate model/material is a challenge for the model designer. Reinforcement is the science and technology of improving existing structures or structures to improve their performance through new technologies, functions and materials. Reinforcing existing concrete includes repair, renovation or reinforcement requirements.

The term reinforcement is used if the structure is better than before with some additional resistance, then the term reinforcement will be representative. Today, many researchers have proposed many materials, methods and techniques for strengthening the reinforced concrete beam without bending. Studies have been done on flexible RC beams using traditional techniques such as stitching (joint construction). In addition, strengthening studies are needed to examine the effect of techniques on the bending capacity of beams with bending defects.

The restoration process is a broad term that can include a variety of treatments, including preservation, restoration, restoration, and reconstruction. Choosing the right treatment plan is a major challenge during retrofit and needs to be decided on a project-by-project basis. The protection and rehabilitation of buildings will have many different needs, depending on the purpose of the project, such as fire safety, geotechnical risks and repairs, air and water infiltration, model performance under earthquakes and wind loads.

Keywords: Retrofitting, Infrastructure, Strengthening, Seismic/Earthquake, FRP Wrapped, Weathering, Deterioration.

1. INTRODUCTION

1.1 General

Strengthening and improving the performance of poor quality materials or composite materials is called reinforcement. Home remodeling is not the same as repair or remodeling. Rehabilitation refers to the partial improvement of the strength of the buildings destroyed after the earthquake. In fact, this is just a cosmetic treatment. Renovation is an improvement work whose purpose is to restore the structure after the earthquake.
Retrofit refers to the improvement of buildings to meet needs after or before an earthquake. The target seismic performance of the reconstructed building is higher than the old building.

1.2 What is Retrofitting?

Retrofit is the process of adding something or functionality that wasn't included when the product was manufactured, or adding something that wasn't there when it was first made. It usually refers to the installation of a new building, such as heating systems, but can also be used for the structure of the building, such as the installation of double glazing or reinforcement insulation. The purpose of strengthening RCC elements is to restore the strength of weak concrete elements. It also helps prevent further damage to concrete products. Errors in design or construction can lead to insufficient strength of concrete elements.There are other explanations for the decline, such as the use of hazardous materials.

1.3 Importance and Need of Retrofitting:

At the same time, many of the important formal, public and private bodies became increasingly weak, and current reforms were presented undefined around the world. The buff may be the best option to protect vulnerable structures from threats or other forces. Retrofit is the process of adding new functionality to an old, legacy model extension. The buff reduces potential damage to existing structures in the event of a seismic event. It is a modification of the existing design to make it more resistant to seismic activity, ground motion, and soil damage caused by earthquakes or other disasters such as hurricanes, typhoons and hailstorms.

1.4 Advantages of Retrofitting:

All procedural problems have more than one solution, and the choice of solution depends on the economic evaluation of the alternatives. The contractor shall ensure that the assessment includes all costs incurred when the lowest price is given. The potential advantages of FRP composite panel are:

- Panel strength
- Panel weight
- Prestress capability
- Reduced mechanical fixation
- Energy trap durability
- fire remediation
- maintenance for remediation

2. LITERATURE REVIEW

2.1 General

2.2 Analysis of Research Reports:

Rafik Itani (2003) published an article on "Effects of reverse application of RC bridges". The Itani experiment found that the column steel cladding showed the best ability to increase the ductility of the bridge. In order to improve the longitudinal ductility of the bridge, it has been determined that the column with the short center line and effective height is more important. Amrita Ranganadhan, (2002) published an article on seismic retrofitting of existing structures.Research by Ranganadhan using software (Staad. Pro), analysis and design of existing models, design of Seismic Zone 2 and redesign of models according to revised guidelines for Zone 3 line revealed defective products that need to be recycled. . The most suitable reinforcement method is to use FRP wraps (for weak lines). Esfahan, (2001) presented a paper on "The Numerical Study of the Behavior of FRP-Reinforced RC Beam-Kumn Connections". He conducted experimental research on FRP-reinforced column-to-column joints.Concrete beam-column connections (weak and FRP reinforced) were chosen. Load models use step-by-step loading techniques to support cyclic loading. Hysteresis curves and models (non-linear) made in pre- and post-reinforcement studies show the strength of the joints and increase their capacity.

3. RESEARCH METHODOLOGY

3.1 General

Sample analysis was carried out in the G+2 building. According to the pattern analysis results, weak patterns that need to be corrected have been identified. A comparative study was conducted on the percent increase in strength using RCC pavement and FRP wrapping. Structural analysis is an important tool for understanding the soundness and condition of a building. The inspection should investigate and report hazardous areas, critical areas and determine if the building needs immediate attention.It also includes analysis of existing frameworks and identification of weak points for existing loads on the structure. For this reason, identification is important in order to detect the sound of the building. Therefore, the "Ranadevi Apartment" building was analyzed to create a structure below the existing features. Standard Health Report for "Belapur Ranadevi Apartments, Navi Mumbai" includes:

Fig. 3.1 Ranadevi Apartment

Table 3.1 Details of Structure

Name of project	**Structural Audit of Ranadevi Apartment.**
Location	**Ranadevi Apartment, Shimgya Gana Patil Road, Sector 20, Belapur Village, New Mumbai – 400614.**
Type of structure	**RCC Frame Structure (G+2)**
Year of construction	**1998**
Use of building	**Commercial Building**

3.5 Material use in Retrofitting

- Retrofit uses metal.
- Using steel profiles
- Using steel supports
- Reinforcement using composite materials

4. RESULT AND DISCUSSION

4.1 General

Non-Destructive Testing (NDT) is a test and inspection process used in industry to measure the difference between products or welding equipment and the uniformity of products, equipment, structure or process without damaging the original. NDT is also known as non-destructive testing (NDE), non-destructive testing (NDI), and non-destructive testing (NDE).

4.2 Objective

Gain knowledge and understanding of the types, benefits and applications of different NDT methods. You can choose the NDT method that best suits your part. The goal of non-destructive testing is to safely, reliably and efficiently inspect products without damaging equipment or stopping production. This contrasts with damage testing, where the product under test is damaged or destroyed during testing.

4.3 Introduction

It is often necessary to test concrete structures after the concrete has hardened to determine whether the structure is suitable for its designed use. Ideally such testing should be done without damaging the concrete. The tests available for testing concrete range from the completely non-destructive, where there is no damage to the concrete, through those where the concrete surface is slightly damaged, to partially destructive tests, such as core tests and pullout and pull off tests, where the surface has to be repaired after the test. The range of properties that can be assessed using non-destructive tests and partially destructive tests is quite large and includes such fundamental parameters as density, elastic modulus and strength as well as surface hardness and surface absorption, and reinforcement location, size and distance from the surface. In some cases it is also possible to check the quality of workmanship and structural integrity by the ability to detect voids, cracking and delamination.

4.4 Basic methods for NDT of concrete structures

The following methods and some applications are used for NDT of concrete: Visual inspection, a prerequisite for all non-destructive testing. A civil engineer or structural engineer can determine the probability of damage to a concrete structure and thus determine which of the various NDT methods available will be most effective for further investigation of the problem. Half-cell potentiometric method for determining the concentration in concrete. Schmidt / Hammer Test to evaluate the hardness of concrete. Carburization depth test to determine if moisture has reached the depth of the rebar and therefore corrosion.Ultrasonic pulse velocity test is used to measure the sound velocity of concrete to measure the compressive strength of concrete. The permeability test measures the flow of water through concrete. Penetration resistance or Windsor hardness probes measure the strength of rocks and surrounding layers. Gauge test to measure the distance of the rebar below the concrete surface and, if possible, also the diameter of the rebar. Radiographic inspection for the detection of voids in concrete and the location of reinforced concrete pipes. Impact echo testing to detect voids, delaminations and other anomalies in concrete.

4.4.1 Rebound Hammer Test:

Interpretation Of Result:

I. It depends on the method of laying, pressing and quenching the stone, as well as the materials and mixing ratios used to make the stone. For example, if the stone was not stepped on as accurately as possible, or if the stone is cracked, cracked, or turns out to be defective during installation, finding and mixing the same material slows down the impact.

II. The uniform quality of the stone, the presence of internal defects, cracks, chips, etc. performance indicators. It can be evaluated using expressions characteristically developed in the language. It is determined by the ultrasonic pulse frequency of the concrete in the sample. III. All elements are listed in the table. for measuring the quality of concrete after impact velocity may be of partial interest because the actual value of impact velocity depends on many parameters. However, quality ratings are useful and reliable when comparing multiple models produced simultaneously with similar materials, construction and service.

III. The evaluation of the compressive strength of concrete by the frequency of the ultrasonic pulse is insufficient due to the lack of evidence for the relationship between the ultrasonic impact speed and the compressive strength of concrete. This is because there are many factors that are not affected by differences in impact velocity and compressive strength of rocks. However, if the structure is a real concrete composite structure, the relationship between the compressive strength and the impact rate of the concrete sample mixed with this material can be established to evaluate the strength of the concrete, the environment. model state. Estimated capacity may differ by 20% from actual capacity. This ratio may not apply to other types of stones or stones of different materials.

4.4.2 Carbonation Depth Test:

Interpretation Of Result:

I. One of the advantages of the carbonization test is the speed at which results are obtained. There is no need to take a sample and send it to the lab. All tests are available on site. The release agent (phenolphthalein) is also environmentally friendly. Also, anyone can try it. However, test locations should be discussed and planned in advance.

II. Sample collection for this test requires withdrawal of the participant and test site. Therefore, it is not possible to take multiple samples from the same location to confirm the results.

III. This test determines whether the stone has an approximate pH above or below 10. Iron resistance above pH 12.5. So, if the pH is in the range of 10-12.5, the test will not show carburization, even though this level will make the steel bad.

IV. When phenolphthalein comes into contact with stones with a high pH (>10), the solution turns bright red. When a solution is exposed to a low pH.

4.4.3 Half-Cell Potentials Test:

Interpretation Of Result:

I. The corrosion rate is an important factor to consider when developing a strategy.

II. The semi-automatic test method is a method used to evaluate the performance of reinforced concrete and to help detect metal corrosion. A negative reading is generally considered an indication of high corrosion resistance

III. In the two enclosures (Sample Study 1 and Case Study 2), the half-cell potential value represents a 50% probability of corrosion. This may be due to insufficient rebar coverage or the roughness of the stone causing porosity in the cavity. In addition, there are many leak points that can lead to local corrosion points. Chloride can enter gemstone

IV. through its material or chloride-containing environment.In Case Study 3, the half-cell capacity represents a 10% corrosion potential. Corrosion is rare in the parlor models of the time. This can be attributed to the full return of success and hardness.

V. Many studies have shown that half of the hand can measure the effect of corrosion in only one place and time.The long-term test measures half of the required battery capacity.

VI. Corrosion rate, moisture content, oxygen availability, temperature, etc. The design of reinforced concrete structures is affected by many parameters. Therefore, for an accurate assessment, the corrosion rate should be measured by taking environmental factors into account.

VII. The risk of corrosion is assessed by obtaining the potential gradient, the higher the gradient, the higher the corrosion. The test results can be interpreted as follows.

Table 4.2 Relationship between the potential values and corrosion probability

Half – cell potential (mv) relative to Cu-Cu sulphate Ref. electrode	Probability of Corrosion
Less than – 200	90 % No Corrosion
Between – 200 to – 350	50 % (uncertain)
Above – 350	>90 % Possibility of Corrosion activity

5. CONCLUSION

1. We provide the complete process, steps, methods and use of modifications from different angles. Engineering, technology and years of experience combine to create transforming machines. Modernization is now a lucrative undertaking in both developed and developing countries. There are many ways to extend the life of a structure by healing structural damage and improving function and safety. Most of the changes are based on modern technology, the architects' special vision, and changes in local action.
2. This paper presents an experimental model designed to test the seismic reinforcement effect of reinforced concrete buildings using elastoplastic steel dampers. Experimental results show that using this method to retrofit existing buildings can increase durability and energy absorption. We present a method for estimating the strength of the modified model and confirm good agreement between calculations and results. Finally, examples of houses reconstructed using this method are shown. The reinforcement method has been proven to be effective in improving the seismic and seismic performance of low-frame buildings.
3. The fortification project provides an opportunity to preserve the historical and cultural values of the oldest cities while maintaining their importance and usefulness in the face of new challenges in the world. With the help of public services and laws that set environmental standards, improvement planning should play an important role in the construction process to meet expectations for years to come.
4. Retrofitting is one of the best ways to make existing fragile buildings more resistant to future earthquakes or other forms of environmental protection.
5. Empowerment is a way to improve standards. We saw two sixes. Process Type: Local Authorization and Global Authorization.
6. Overall, a comprehensive literature review was conducted with the specific aim of obtaining state-of-the-art knowledge on key issues critical to optimizing old and new products.
7. That is why it is important to use multiple risk strategies when choosing a recovery method and creating a project.

REFERENCES

1. Hoshi Kuma, J. & Unjoh. S (2017) “Seismic Retrofitting of existing reinforced concrete columns by steel jacketing”, Proceedings of the second Italy – Japan workshop on seismic design and retrofit of bridges, Italy, February 27-28, 1997, PP.413-428.
2. Abhishek Sharma1, Tara Sen, Joyanta Pal (2016) "Experimental Research on Flexural Characteristics of RC Beams Retrofitted Using FRP and Cement Matrix Composite", IOSR Journal of Mechanical and Civil Engineering (IOSR-JMCE) , e-ISSN: 2278-1684, p-ISSN: 2320–334X, January, pp.94-99.
3. Maheboob. M, Kashinath. R. (2015) "Composite Evolution of Different Retrofitting Techniques", International Journal of Engineering Research (IJER), ISSN:2321-7758, Volume .3, Issue 5, September, pp.145-151.
4. Pravin.B.Waghmare, (2011) published research article on “Materials and jacketing technique for retrofitting of structure”, pp 72-84
5. Lakshmanan D, (2006) seismic evaluation of retrofitting of building and Structures, ISET journal of earthquake technology, 43(1-2), pp 31-48.
6. Abhijit Mukherjee, Amit R. Kalyani, (2004) “Seismic retrofitting of reinforced concrete frames with fiber reinforced composites”, Workshop on Seismic evaluation and retrofitting of building, pp 74-82.
7. Rafik Itani, (2003) presented a paper on “Effects of retrofitting application on RC bridges”. Itani experimentally discovered that, Column steel jacketing presents the best capability to improve the bridge ductility.