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Advanced Building Repair Techniques

[1]Sushant Shelke, [2]Gaurav Bhise, [3]Prof. Swapnil Sharma

[1]Student M.Tech Construction Management MITCOM, MIT ADT University, Pune, India shelkesushant2016@gmail.com
[2]M.Tech Construction Management MITCOM,MIT ADT University,Pune, India gauravbhise@gmail.com
[3]M.Tech Construction Management MITCOM, MIT ADT University, Pune, India swapnilsharma@mituniversity.edu.in

ABSTRACT:-

As Structure gets older the wear and tear actions acting on it due to weather conditions or faulty construction, overloading of structure the damages can affect the livelihood of the people living in it. To restore the aesthetics or increase the life of building some advanced techniques are used. It is seen that there are buildings which are more than 100 years and also the new construction works may also make the opportunity for building repair business. There are different methods available, but some common and economical methods are discussed in this paper. Advanced building repair techniques often involve innovative approaches and technologies designed to efficiently address structural issues, extend the lifespan of buildings, and minimize disruption to occupants.

Keywords— Repair – Rehabilitation – Restoration – maintenance

Objective of Study:

- To understand the Repair Methods
- To study the different repair Procedures

Introduction

In an era defined by rapid urbanization and aging infrastructure, the need for innovative approaches to building repair and maintenance has never been more pressing. Traditional methods, while effective, often come with limitations in terms of efficiency, durability, and environmental impact. Enter advanced building repair techniques, a realm where cutting-edge technologies and novel methodologies converge to address structural issues with unprecedented precision and efficacy.

These advanced techniques represent a paradigm shift in the way we approach building repair, offering solutions that not only mitigate existing damage but also fortify structures against future challenges. From harnessing the power of nanotechnology to deploying autonomous robots in the field, the arsenal of tools available to engineers and architects has expanded dramatically in recent years.

In this exploration, we delve into the forefront of building repair innovation, uncovering the most promising advancements poised to shape the future of construction and infrastructure maintenance. From Structural Health Monitoring (SHM) systems that vigilantly watch over the integrity of buildings to self-healing concrete that repairs itself at the molecular level, the possibilities are as vast as they are transformative.

Need for repairs

In every corner of the globe, buildings stand as testaments to human ingenuity, housing our communities, workplaces, and cherished institutions. Yet, behind the facade of architectural splendor lies an inevitable truth: time, wear, and environmental factors conspire to degrade even the sturdiest of structures. The need for building repairs is not merely a matter of upkeep; it's an imperative woven into the fabric of urban life. As buildings age, they become susceptible to a myriad of ailments cracks form in concrete facades, steel beams succumb to corrosion, and foundations settle unevenly, threatening structural integrity. Left unchecked, these issues can escalate, compromising safety, functionality, and the very essence of the spaces we inhabit. Moreover, the specter of natural disasters looms large, unleashing forces that can wreak havoc on even the most meticulously constructed edifices. From seismic tremors to raging infernos, the destructive power of nature underscores the importance of robust building repair strategies capable of withstanding the unpredictable onslaught of the elements.

Repair Methodology

Jacketing of existing column:

1. Temporary shoring of existing RC columns and adjoining beams.
2. Removal of deteriorated concrete by hand chipping, jack hammering or any other method, micro cracking of concrete of existing Column. (care should be taken not to disturb the core structure)
3. Making the surface of existing Column rough sand blasting.
4. Removing 25 mm concrete behind steel bars for damaged portion by way of hammer and chisel and removal of all loose concrete to be removed.
5. Reinforcement to be exposed till the concrete is found well bounded by the steel or point till the corrosion has not affected the steel members.
6. Cleaning Of rust or corrosion using wire brush or sand paper till only hard stable rust remains.
7. Apply rust remover chemicals to the exposed steel, apply anti corrosive coating to the steel bars.
8. Replacing the steel bars which have cross sectional reduced to less that 70% of original diameter by way of cutting of old bars and replacing new bars of same size either by wielding or by lapping the bars.
9. Apply protective primer (Zinc, neat resin or suitable coating),
10. Apply Bonding agent coat (slurry)/ epoxy resin to the concrete.
11. Steel connectors L shaped shear keys to be installed by drilling holes and injecting epoxy bonding paste in the drilled holes, and additional longitudinal and transverse reinforcement with steel connectors to be installed. (as per detail dwgs provided)
12. Form Work to the new Column section should be placed in place and rich concrete of minimum M30 grade to be used for filling of the column section so prepared.
13. Joints of the form work should be sealed to prevent any leakages.
14. The concrete should be properly compacted.
15. Curing to be done for these newly casted columns.
16. Finishing of the repaired surface and additional jacketing area as per requirements to be completed.

Polymer Modified Mortar Treatment:

Basically to be carried out to columns, beams & slabs exhibiting cracks, fissures in the concrete cover/plaster.
Material Suggestion :

a. Sunanda Polyalk EP
b. Ultratech Cement
c. Quartz Sand

1. **SURFACE PREPRATION**: The surface of all such cracks, fissures shall be dismantled to a minimum 75mm beyond the crack limit. Undue force shall not be applied to remove the cover, in case crack exists in the concrete cover the cover shall be removed and the steel exposed shall be pretreated. If any reinforcement is missing then the same shall be replaced as per the consultant suggestions. All unevenness removed or smoothed using cement mortar 1: 5 adding polymer at the rate of 15% by weight of cement.

2. **TREATMENT**. Polymer Concrete Mortar shall be prepared using cement and quartz sand in the ratio of 1: 3 with Polymer being added in the ratio of 10 kg. for every 50 kgs. Of cement. Polymer Modified mortar to be used in ratio as 1:1 (Polymer) : 5 (Cement) : 15 (Quartz Sand (50% Fine & 50% Coarse)).
   While preparing PCM water should be controlled as per manufacturers' specification. PCM prepared should be used within 30 minutes in case of non-use all such material should be duly disposed off. The area prepared is pretreatment is sprayed with polymer /cement slurry as bonding coat and polymer mortar is to be applied in 12 mm thick polymer cement plank till the damaged area is restored to original shape and configuration. The treated areas will be brought to a nearest measurable shape & size.

Future Scope

As buildings age, they become susceptible to a myriad of ailments cracks form in concrete facades, steel beams succumb to corrosion, and foundations settle unevenly, threatening structural integrity. Left unchecked, these issues can escalate, compromising safety, functionality, and the very essence of the spaces we inhabit. Moreover, the specter of natural disasters looms large, unleashing forces that can wreak havoc on even the most meticulously constructed edifices. From seismic tremors to raging infernos, the destructive power of nature underscores the importance of robust building repair strategies capable of withstanding the unpredictable onslaught of the elements. But the need for repairs extends beyond mere preservation; it speaks to our collective responsibility to safeguard the built environment for generations to come. As stewards of

architectural heritage, we are tasked with the ongoing maintenance and restoration of structures that serve as repositories of history, culture, and identity.

Conclusion

If the structure is properly constructed under strict quality control & good work membership, construction material specification complying IS standard, the stages will be further prolonged. Any negligence in the structure can have an excellence service life As mentioned earlier, the behavior of the concrete structure in dry climate and in humid climate is different. In humid climate, due to air & water entrainment reinforcement steel rusts and forms scales around its periphery. As the volume of scaling increases it tries to disintegrate the concrete part. If we allow the process doesn't stop, the structure becomes more and more weak. It is advisable to have a "Structural Audit" After every five years to observe &to control the longterm damage, which are making the structure weak. Nothing (including human being) is long lasting. But every attempt should be made to utilize &enjoy the benefits for maximum possible period.

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