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Study of New Technique Used in a Heritage Structure

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Abstract: *Heritage buildings and designs contribute to the richness of a country's history and culture, with "heritage" referring to archaic structures and artifacts associated with historic, cultural, and architectural designs. These structures and monuments serve as powerful reminders of the region's past while also compromising the regional culture's foundation. India has a long and illustrious history, as evidenced by diverse structures, forts, temples, landscapes, and ancient artifacts. Many of them were built during the Golden Age of Indian Civilization, many hundred years ago. India is characterized as a place with a great legacy, rich in traditional practices, culture, and historical landmarks, all of which have been blended to make a "unified nation." To preserve this cultural property restoration of heritage structure is necessary. New innovations, upgraded systems, improved technologies, advances in the construction industry are constantly evolving. It is very important that new techniques should match with heritage structure. In this study, some special techniques are used for restoration of heritage buildings are discussed.*

Keywords: Heritage buildings, Historical Monumental Structures, Restoration.

I. INTRODUCTION

Major heritages like as Qutub Minar, Red Fort complex, Humayun Tomb, and others may be found in northern states such as Delhi. TAJ MAHAL of Agra, FATEHPUR SIKRI, IMAMBARA RUMI GATE, and other heritage monuments in Uttar Pradesh are more popular than those in Rajasthan and Bihar. Every year, it attracts a large number of tourists to the country, which helps to boost the economy. From generation to generation, they mirror the majesty of history. These structures have survived hundreds of years, whereas most modern structures require maintenance after only a few years of use.

Historic structures are national symbols with cultural and historical significance, it is important to protect/ restore them. A study of the structure should be carried out prior to the restoration being carried out. The material and techniques to be used should be compatible with the original. It is essential to bring a systematic approach to deteriorating structures.

II. NEED OF THE RESEARCH

Most historical cities feature monuments that reflect former religious, military, political, or economic forces. The state of such structures is largely determined by their current purpose and use. Structures that are no longer in use degrade quickly, but structures that are currently in use have a greater chance of being preserved. The extent of maintenance varies from structure to structure, resulting in structural degradation. Restoration improves the structure's overall expected life by strengthening it to sustain all imposed stresses. If the structure is not restored promptly, its structure may deteriorate to the point that restoration becomes extremely difficult. It is required to adhere to a specific methodology, the key steps of which are survey, diagnosis, and safety evaluation, selection of criteria, appropriate materials, intervention techniques, and ultimately controls.

III. LITERATURE REVIEW

Bahira A. Abdul-Rahman (2006) Author concluded that FRP is an excellent choice for strengthening masonry historical structures, providing them with extra strength and ductility to withstand static and dynamic forces that are frequently the cause of historic building damage and collapse. Previous research revealed that FRP is a structural material that may be employed in a variety of novel ways to reinforce historic structures. This might be accomplished by manufacturing very strong structural parts with small dimensions and low weight. To enhance the binding between FRP and masonry, FRP

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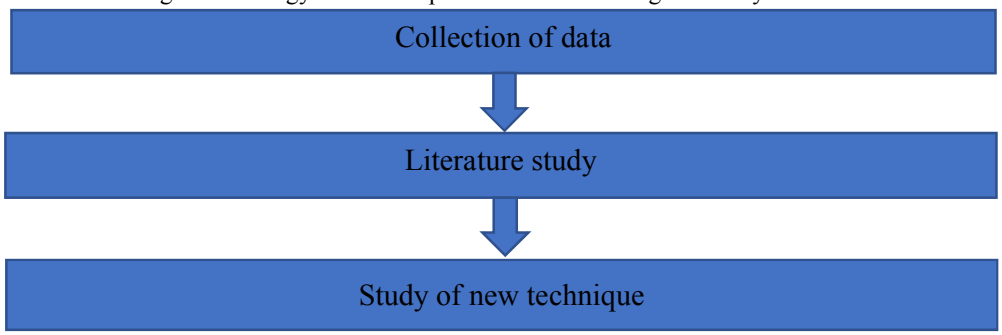
anchors might be made and placed on the body of the bricks. For ancient masonry walls and domes, FRP bonded or unbounded sheets and FRP tendons provided a suitable, reversible, and non-invasive reinforcement option.

S.Saileysh Sivarajaa (2013) in their assessment of 'Preservation of Historical Monumental Structures Using Fibre Reinforced Polymer,' stated that FRP had significant benefits over traditional materials for strengthening and retrofitting. Because of its thinness, its application does not add weight to existing buildings. It contributes to the preservation of monumental monuments' cultural heritage. It does not corrode

Yasser Korany (2011), gave his review on 'Effective Techniques for Restoration of Heritage Masonry' and states that the selected technique must be consistent with aesthetics, function, and the requirements of strength, ductility, and stiffness and provides an overview of the traditional and recent techniques proven to be effective in restoring heritage masonry structures

IV. RESEARCH METHODOLOGY

For achieving the Research objective there is a need for a detailed plan that keeps the researcher on track and for the effective completion of work. The research methodology allows understanding of different approaches and methods used to conclude. The following methodology will be adopted for data collecting and analysis



V. STUDY OF NEW TECHNIQUE

5.1 Repointing with Nano lime

Repointing is the best method for removing the jointing fault. In a historic construction, repointing is described as injecting material between stone connections and filling the cavity. Nano lime, Polyurethane Injection, and Epoxy Injection are acceptable materials for basalt stone and lime mortar joints. Nano lime is a suspension of Nano-sized calcium hydroxide particles in alcohol, such as ethanol. Polyurethane is a resin polymer, and the polyurethane injection process employs a polyurethane resin, isocyanate, and polyol combination. Epoxy resin suspended in an alcoholic solution is used in the epoxy injection. Because of its compatibility with lime mortar, the Nano line is regarded as the best of the three. Nano lime is made up of nano-sized calcium hydroxide particles that become highly activated in the presence of alcohol, making it suited for use with ancient lime mortar, as well as a nanosized particle with deep penetration properties.

5.2 Poulticing Technique

The use of a poultice is often the most effective way to remove graffiti and stains that have penetrated masonry. A poultice is a paste that can be applied to a stain. It is composed of an absorbent material or clay powder (such as kaolin or fullerís earth, or even shredded paper or paper towels), mixed with a liquid (a solvent or other remover). The moist poultice should remain on the stain as long as is it takes to dry and draw the stain out of the masonry surface. The masonry must be thoroughly rinsed once the stain has been removed.

If the cleaning approach does not remove stains, a poultice might be applied. A poultice extends the dwell period of the cleaning solution, which might be water, detergents, solvents, or other chemicals. A poultice is composed of inert substance, such as diatomaceous earth, blended with the gentlest cleanser, water. Once properly mixed in a clean plastic container, it is spread to the stone in an even coat with a plastic spatula or scraper and then covered with plastic. The cleaner is pulled into the pores where the stain resides when the substrate absorbs moisture. When the plastic is removed, the poultice dries, draining moisture back out of the pores and carrying the soiling with it. The poultice absorbs the

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chemicals and holds the dirt in place. When the poultice is completely dried, remove the crust with a plastic scraper and sweep it away, leaving a clean surface once washed.

5.3 Use of Composite Materials

For the most part, two strategies are used to reinforce masonry structures. - Single layers of composites and FRP wrap: In this approach, separate matrix and fiber are employed, and the composite is formed following wet Lay-up at the application location. It is sometimes referred to as the wet Layup system. - Carbon Composite Laminates: This process employs pre-cured carbon fiber laminates/plates that are adhesively connected to the structural members.

5.4 Center Coring

The center coring technique is used to improve the in-plane and out-of-plane flexural capacity of heritage masonry constructions' unreinforced walls. Drilling down through the wall height creates vertical reinforcing pathways. Reinforcing bars are installed, and the cores are filled with either a polyester resin-and-sand combination or a cementitious grout. This approach is also utilized to create horizontal shear reinforcement.

VI. CONCLUSION

Deterioration of the heritage structures took place due to various reasons such as aging of components of the structure, natural disasters like earthquakes and floods, etc. depending upon the original materials used for construction, new techniques and materials are used for the strengthening of this structure.

As a result, it is possible to conclude that the historic structures are cultural icons. The existing fabric must be restored; the new one must be compatible and similar to the old one with little interference. Heritage has traditionally drawn visitors both nationally and internationally, bolstering the local and national economies. Regular maintenance of these structures is required to enhance the structure's durability.

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