Creation of Centre of Excellence on Conservation of Indian Heritage Structures at CSIR-CBRI Roorkee. (GAP 311)

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Abstract

The proposed project aims at development of a State of the Art Center of Excellence on Conservation of Indian Heritage Structures. The Aim is to address several issues of ancient structures of national importance. The seismic vulnerability assessment has been performed for important structure. The site-specific response spectra have been developed for the sites. The technologies / techniques have been under development for evaluation structural defects in heritage structures using combination of different non-invasive techniques. Cost effective digital recreation is also another objective of the study to preserve these structures for future. Methodology of creating 3-D model using drone has been developed. The physical twin of the structural components has been developed and being tested under different probable loading conditions. The set-ups regarding this are developed at CSIR-CBRI. The performance of the structure during the loading is being assessed using advanced monitoring techniques. Digital twin of Kedarnath model has been developed. Fire and smoke are often problem for crowded monuments. The smoke and fire management strategy has been developed for the selected heritage sites. FDS based solver has been used for the fire and smoke propagation in temple structure. The degraded heritage structures need to be repaired with compatible materials. Therefore, the one of the objectives is to develop compatible sustainable heritage material development. To accomplish this activity degradation mechanism, of stones have been studied and development of stone specific solution is under progress. Trees growth in the heritage structure is a serious problem. In this regards an eco-friendly solution have been developed. Nano titania coating is under development to protect the structures from environmental decay. The state-of-the-art facilities related to testing of structural components is under development. New building has been renovated / at CSIR-CBRI named a center of excellence on Indian Heritage Structures. As a part of capacity building, we will also conduct training program named “BHAGVAN – A SEARCH-II” for students, architects, field engineers and conservators.

Objectives

Creation of **Center of Excellence on Conservation of Indian heritage structures** at CSIR-CBRI.

I) Assessment of seismic vulnerability of important structures. a) Assessment of geotechnical vulnerability. b) Assessment of structural vulnerability.

II) Integrated non-destructive evaluation technique for heritage structure.

III) Cost effective digital recreation of heritage structural geometry& HBIM.

IV) Development of physical twin of heritage structural for monitoring and performance evaluation

V) Fire and smoke management inside Temples, and other crowded monuments. a) Fire management. b) Smoke management.

VI) Development of compatible and sustainable repair materials. a) Nano-lime based/lime based sustainable repair materials. b) Use of hydroxyapatite for conservation of stone masonry. c) Gypsum-based repair materials for heritage structures. d) Studies for fungal deterioration on mortar and stone surfaces.

VII) Effects of underground excavation and exploration of subsurface features.

VIII) State-of –the-art facility and creation of centre of excellence for conservation of Heritage structures in India.

IX) Training program on Bhagavan-A search II.