

3D Structural Analysis and Suggesting Design Modifications of Proposed Shri Ram Mandir, Ayodhya. (SSP 421)

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Abstract

Temple Architect of Shri Ram Mandir at Ayodhya, M/s. C.B. Sompura approached CSIR-CBRI for the 3-D structural analysis of the Shri Ram Mandir at Ayodhya. Based on the information obtained from various inputs (geometrical characteristics, available material specifications, and construction details), the analysis aims to simulate as accurately as possible the structural behaviour with regard to the gravity and lateral loadings.

Around 50 computer models were analysed with Nine models were finalized for the appropriate structural model. Among these, the best-performed and architecturally suitable model considering the Nagara style of architecture intact has been considered for construction. The proposed modifications have enhanced the architecture, ensuring the structural safety for the Maximum Considered Earthquake i.e. for 2500 years return period without changing the architecture of the originally proposed structure drastically.

The structure designed for 1000 years lifespan is a dry jointed structure consists of only interlocked stone with no steel reinforcement. The 161 ft high structure with 3 floors of 20ft has five mandaps: Garbh Grah, Gudh Mandapa, Ranga Mandapa, Prathana Mandapa, and Nritya Mandapa with double domes. Pillars/columns are constructed of 7 stone pieces interlocked pieces with corbels present at different levels to support the beams and arches.

Objectives

Following is the main scope of the work for the project.

1. Study of Architectural drawings supplied by the Temple Architect.
2. Creation of finite element workable model.
3. 3D Finite Element Analysis (FEA) of complete structure using Macro Modelling.
4. Analysis of the structure at the global and local level through FEM.
5. Assessment of adequateness of the geometric properties of the sections.
6. Suggestion on structural modification required to enhance the global seismic stability.
7. Attending discussions with the stake holders (Temple Trust, Temple Architect, L&T and TCE).
8. Propose structural modification options based on structural Analysis.
9. Evaluation of mechanical properties of materials.
10. Submission of report.