

SUSTAINABILITY OF HERITAGE STRUCTURES ; CONSERVATION ISSUES & CHALLENGES

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Abstract

Conservation of heritage structures for their sustainability requires an interdisciplinary approach. The challenges in understanding the structural behaviour and the ability to make correct decisions for structural intervention become complex and tedious due to non availability of exact documents and drawings, data regarding actual use of materials and methodologies, constructional techniques, processes of decay and damage, present safety level & possible risk of consequential distress. Present article briefly explains some of these challenges in conservation of heritage structures while emphasizing their sustainability aspects. Two case study examples are presented describing the historical, structural and architectural investigations, condition assessment, safety evaluation and structural intervention to highlight these issues.

Keywords: Heritage Structures, constructional techniques, condition assessment, safety evaluation, structural intervention, structural risk, challenges.

1 Introduction

Heritage Structures by their very nature and history (material and assembly) present a number of challenges in conservation, diagnosis, analysis, monitoring and strengthening. Knowledge of the history of architecture, material characteristics, instruments and techniques for investigations, diagnosis and restoration are all vital aspects for correct understanding of structural behaviour and the ability to make correct decisions for repair and strengthening / retrofitting. The conservation challenges and possible risk for structural intervention as investigated in case of two historically important heritage structures located in the state of Odisha, India are briefly presented in this article.

2 Case Study

Lord Jagannath Temple located at Puri and Sun Temple located at Konark constructed during 12th Century are two majestic heritage structures of Bharat (India) declared as National Protected Monument with conservation and maintenance responsibility under Archaeological Survey of India (ASI). Sun Temple at Konark is also UNESCO listed heritage structure. A cluster of various

geometrically shaped stone masonry structures are found in the premises of both the above two temple complex. The case study pertains to the structural conservation challenges of the pyramidal shaped stone masonry structures inside the temple complex, popularly known as “Jagamohana or Mukhasala (i.e the Prayer Hall) as per the local Kalinga style of temple Architecture (Shilpa Sastra).

2.1 Jagamohana (Mukhasala) of Lord Jagannath Temple at Puri, Odisha

JAGAMOHANA Structure (Mukhasala), refereed as the “Prayer Hall” of the Puri JAGANNATH temple complex, is an integral part of this 900 year old historical monument of Odisha. It is a living temple with complex rituals through out the year with restriction on time of work. Similarly, ritualistic restrictions prohibit on use of certain modern materials and machineries for any investigation / diagnosis / construction / conservation purpose, which is another major challenge. The original construction was made in ashlar stone dry masonry with blocks of Khandolite (a local sand stone) laid in courses. For the construction, no mortar has been used. Instead the stones have been jointed with help of wrought iron U-shaped clamps or dowels and have been supported one over another