# Investigating the best methods for structural stabilization procedures for Historical earthen building conservation in Saudi Arabia: a technology–led construction analysis.

Doctoral thesis

**ABSTRACT**

Author: Ahmed Aidarous H Alaidarous

Directors

Dr. Fernando Vegas López-Manzanares.
Dra. Camilla Mileto

Instituto de Restaurcion del Patrimonio
Escuela Técnica Superior de Arquitectura. Universidad Politécnica de Valencia.
Doctorado de Arquitectura, Edificación, Urbanismo y Paisaje.

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## ABSTRACT

Over time, the construction potentialities and traditional architecture of Saudi Arabia have declined substantially. The modern generation in Saudi Arabia has neglected the traditional structural and architectural designs for building towns, cities and homes. The materials used in the construction of traditional structures has been replaced by more westernized building materials such as concrete, cement and glass. Westernized methods of design and architecture often fail to last long due to the climatic and topographical conditions of the country, such as extreme heat and fast sand-blowing winds. Reviving traditional architectural and structural building married with westernized building technologies will yield strong structures that are capable of withstanding the harsh conditions of the country. This research seeks to identify the most applicable methods of structural procedures that can be used in historical earthen buildings in Saudi Arabia for conservation purposes. This dissertation addresses the important structural and architectural perspectives of traditional Saudi Arabian buildings. It also examines the perspectives of the Saudi population that affect the selection of building materials and architectural styles that are widely used. An examination of the old techniques employed in traditional Saudi Arabian buildings, how they can help in the formulation of a new approach for contemporary architecture and how this can be implemented in Saudi Arabia are also discussed in this dissertation.

In the preparation of this dissertation, conforming processes were performed in order to fulfil the set objectives of the study. The first step was configured to examine different earthen architectural structures in Saudi Arabia. This stage involved travelling to different locations, observing the structures and also conducting interviews with older contractors. To collect more information on the topic, visits to Yemen and South Morocco were made, as these are two countries that have already married earthen architecture with modern architecture. The traditional architecture of Morocco and Yemen is similar to that of Saudi Arabia, but it has taken longer for these countries to shift to modern architecture. A laboratory examination was carried out to examine the relationship between the soil composition, stability, and strength of the structures that are built. Empirical studies were also conducted to examine the compactness, solidity, dimensional steadiness and permeability of the materials used in the constructions. These factors influence the choice of building materials for the conservation of traditional architecture and to solve the current need for cheap housing in the urban fabric.

The results of this study indicate that the Adobe and Cob traditional architectural styles are two of the leading architectural styles in Saudi Arabia, with each style symbolizing the perspective of the people living in a particular locality. This dissertation also found that different architectural patterns were influenced by functionality, convenience, efficiency and availability of the construction materials needed. This explains the reason for different structural and architectural patterns in different parts of Saudi Arabia.

This study concludes that mixing traditional architectural methods with modern technologies would serve to construct stronger and longer-lasting houses in Saudi Arabia. The new houses would not only serve to conserve the magnificent architecture of the country but would also help in building cheap houses, hence solving the rising demand for housing in urban areas. This study will add to the literature available on architectures in Saudi Arabia, specifically informing on how a mixture of early architecture can be reinforced with modern technology to help solve the conservation of Saudi historical earthen architecture and the housing challenge