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Original Paper

Structural and Physical Characteristics of the Adobe Bricks Used at the World Heritage Site of Arg-e Bam

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Abstract

Earthquake in 26th of December 2003 devastated the city of Bam and its magnificent Arg [citadel] and turned it to ruins. The Arg was surviving for centuries in this location. Some time it was more inhabited and once abandoned. During the past decades the Arg gradually becomes well known and it finds a general popularity over the past decade since the Iranian society recognizes it thanks to the efforts of the erudite scholars. This comprehensive recognition especially in the field of the materials is more important for the interventions since it supports any correct and successful conservation measure. Eventually, the structure of the Arg has been composed of several architectural layers constructed over each other. A considerable share of these structures includes repairs and infill constructions created upon the base of archaeological layers over the centuries. However, the recent researches discovered several structural weaknesses in most of the adobes used in Arg-e Bam. Nevertheless, the huge adobes which have been used in the surrounding wall, some parts of the governors sector, and a few significant buildings in the public sector, have a considerable quality and more attention has been paid in their production. Occasionally, weak architectural composition has intensified the structural weakness of the adobes. Accordingly, usage of the same adobe composition with the similar technique in restoration will follow an understandable concern and it sounds a critical measure. Neglecting this important element will direct the Arg in to the similar harsh experience of the past. According to the experiences concerning the structural behavior of the materials used in the Bam citadel, it is certain that any restoration and conservation measure by the same material would not result in any success. If no improvement is conducted on the weaknesses of such a fragile material, then the restoration exercises will encounter major challenges. Having referred to the results of the researches performed of the historical adobes of the Bam citadel, the importance and necessity of such improvement will become more apparent. Arg-e Bam has been frequently invaded the armies and tribes during its long life and the inhabitants had a very limited time for fixing the damaged parts. Consequently, adequate attention has not been paid on the quality of some of the adobes. This research with a functional approach is looking for recognition of the structural properties of the adobes used in the site as well as their strengths and weaknesses. In the frame of inductive reasoning (looking from detail to the whole), based on the experimental system with a compound method (library, laboratory, site investigations), this research tries to respond to the main question that is quiddity of the factors affecting the structure and the material behavior under the tensions as well as improvement and resolving the known weaknesses. Thus, the results of the researches concerning the structural characters of the adobes of the Bam citadel will help us in achieving the materials without or at least with minimum weaknesses comparing to the prior adobes in order to be used for the more

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reliable restorations. One may even think about production of the new adobes with boosted mechanical behavior. According to our knowledge about the condition of the earthen materials of the Bam citadel, it is possible to improve the characteristics of the new adobes and earthen mortars for the restoration measures by innovations in the production process. This is actually the hypothesis of the research.

Keywords: Archaeometry, Arg-e Bam, Earthen Architecture, Typology, Characterization.