

Equotip hardness of adobes for the Arg-e-Bam restoration, the world heritage in Iran

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An Iranian heritage, Arg-e-Bam (29°N, 58°E, a.s.l. 1060 m), was hit by gigantic earthquake in December, 26th, 2005. The hypocenter is directly below Arg-e-Bam and its magnitude was 6.8. Bam city was severely damaged by this earthquake and more than 30,000 people were died. After the earthquake, the Arg-e-Bam was inscribed on the UNESCO world heritage list. The oldest part of the Arg-e-Bam was made in 500 B. C. Bam Citadel citizens lived until 1850 as they restored the structures occasionally, however, they suddenly abandoned it. The Arg-e-Bam is one of the largest adobe (mad brick) structures. Architectural differences caused by crossroads of Silk Road and Spice Road are observed in this ruin. We measured hardness values of adobes, baked bricks, Chines and mortars using Equotip tester. The values of adobes are around 300, whereas those of baked bricks are around 380. The values of old and new adobes are 200-250 and they do not have differences. The values of Chine are around 170 in inside and around 225 at the surface. The values of mud mortar were around 300. We measured the changes in Equotip values of adobes under manufacturing in progress. One day progressed adobes could not be measured the hardness. Two days progressed adobes shows the values of around 150. Within 7 days the values reach around 200-250 and stable. These results shows the newly progressing adobes are enough durable for the use of Arg-e- Bam restoration.