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## **Mechanical performance of nonindustrial building materials manufactured with clay as a natural binder.**

Adobe is one of the oldest handmade materials, but in present situation, their performances have to be measured. Previous studies examined either artificially-prepared soil sample that contained sand mixed with pure clay or natural soil. These studies have shown that it was necessary to use industrial binders as stabilizers to increase durability and mechanic performance. However, on one hand, these studies used the testing process obtained on fired clay bricks and concrete which are stiffer materials. On the other hand, a lot of old constructions with adobe blocks without stabilizers are still used. Clay being a natural binder which mechanical performances have been examined. Therefore, the aim of this investigation is to determine in optimum condition, the compressive strength and the stiffness of abode blocks make with natural soil. For that, both traditional adobe and Pressed Adobe Block (PAB) have been made at different water content with a natural soil. Then their dry density, compressive strength and elastic modulus were determined. The compression tests were realized on samples which have aspect ratio equal to 2 and three cycles were performed between 20 % and 50 % of compressive strength. Strain-stress curves indicate that adobe and BAP have an elasto-plastic behavior due to clay. Furthermore, binder effects of clay enabled compressive strength and reload modulus higher to 2.5 MPa and 500 MPa respectively. However, an increase of compressive strength is not accompanied by an increase of modulus. A hypothesis at the microscopic level has been proposed to explain this phenomenon.

Keywords: adobe, nonindustrial building material, clay, binder, compressive strength, elastic modulus.