Indigenous earth building construction technology in Ota, Nigeria

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This paper documents the earth construction techniques used in Ota in order to preserve the earth construction heritage of the Ota people while checking the suitability of the earth materials used, using soil classification tests. Interviews of earth constructors in six villages in Ota were conducted to determine their material selection criteria, material processing and construction techniques. Colour and texture of soil samples were determined and in-situ tests such as biscuit, cigar, hand-wash and adhesion tests were performed on soil samples used for earth building construction at three of the villages. Natural moisture content, sieve and hydrometer analyses, and Atterberg limits test were performed in the laboratory, on soil samples taken from these three locations. It was revealed from the interview sessions that cob construction technique is widely used and that earth building construction is becoming less-appealing to the youths in these locations. The soil samples at the three locations were classified as clayey sand and were ascertained to be suitable for earth building construction. Earth constructors in Ota perceive that earth buildings are more economical and energy-conserving. Earth buildings are a potential solution to the global housing crisis experienced, especially in developing countries.

Keywords: Earth building, Eco-efficient construction, Low-income housing, Mud, Sustainable housing

Despite cement being an essential material used for today’s infrastructural developments, there is increasing awareness to consider alternative construction materials and techniques that are more environment-friendly, affordable; and that will cut-down on our energy consumption\(^1\)-\(^4\). Most of the research works on construction materials focused on their mechanical properties with little or no consideration of their environmental impact\(^5\).

It is estimated that about one-third of the world’s population and about half of the people living in developing countries live in earth buildings\(^6\)-\(^7\). The most commonly used traditional building materials in the world are, undoubtedly, earth-based. This is because they are cheap\(^8\), locally-available, environment-friendly\(^8\) and are of low-embodied energy\(^8\)-\(^10\). They are traditionally used in various forms, depending on the processing techniques adopted or the materials combined with the earth for construction. Cob, earth or adobe bricks, rammed earth and wattle and daub are some examples of these forms. However, the traditional use of earth materials is not receiving the required attention it deserves despite global concerns about sustainable development issues in today’s building industry and the current worldwide housing crisis. There is still poor understanding of the selection and use of these materials, especially among scientists, architects and engineers\(^11\) but we can learn from the past.

Akinwumi\(^12\) investigated the earth building construction materials and techniques used by earth builders in three villages in the ancient Benin City of Nigeria. He investigated the earth material selection and construction techniques used by the Benin people and classified the soil samples used using standard soil classification schemes. He found out that the interplay between the tradition of the Benin people and their earth construction procedures is unique and represents their cultural building heritage.

The objectives of this study are to identify the earth-building construction materials, their selection criteria, their processing and the construction techniques used in the ancient town of Ota; to identify the challenges encountered by those living in earth-buildings that favour the increasing demand by many people for cement-based materials for