A research project was conducted using lowcost materials such as fly ash, bottom ash, etc. for production of masonry blocks for lowcost housing construction. The research was conducted into two phases. The first phase work was designed to identify mixture proportions, which would yield masonry blocks of sufficient strength to withstand handling, transfer, and long-term exposure. The second phase work was directed towards evaluating the response of fly ash block mixtures to continued soaking in fresh water. The blocks were tested for compressive strength, pulse velocity, density, and surface hardness over a two-year period. Based on the results obtained, it was concluded that: (1) fly ash blocks can be produced to meet lowcost housing material specifications; (2) all five fly ash block mixtures exhibited 100% increase in compressive strength; (3) three of the five block mixtures were unacceptable as they exhibited surface softening; and, (4) the pulse velocity can be used to monitor block strength and surface stability.