ELITH RESEARCH ACTIVITIES, 2013-16

APPENDIX 1 TO CAMBRIDGE ELITH QUARTERLY REPORT 2016

Full documentation not received

Krupa Dodia project on "Low Income Tropical Housing: In the context of Mumbai's Slums"

Technical Abstract

Research demonstrated the lack of adequate housing for the low-income group in Mumbai, forcing many people earning a steady, sufficient income to reside in rented accommodation in slums, characterised by overcrowding, humid and unhygienic conditions. It was found that many of those people belonging to the higher end of the lower income bracket aspire to own their houses, which are built to their specific needs, however with material costs accounting for 70% of total construction costs, the severity of the climatic conditions and the constraints imposed in slums, housing design and construction becomes increasingly difficult. It was thus decided to investigate a range of different wall building technologies, in terms of their cost, suitability to self-construction, applicability in slums and suitability to the climatic conditions within Mumbai and deduce the implications of the findings on slum dwellers.

Sections of brick walls, interlocking compressed earth blocks (CEBs) and Rapid Panels (expanded polystyrene steel mesh panel) were built using materials that were as close as possible to those found in Mumbai. Earth from Cambridge was used for the CEB walls, due to feasibility issues in importing soil from Mumbai. Properties most relevant to the climate and slum issues were identified as: compressive strength, water absorption, thermal resistance and fire resistance and were used as parameters to test the sections against.

The compression tested involved subjecting wall sections to vertical loading, and noting the failure modes for each case, in order to deduce the effects of construction quality on performance and the suitability of the sections to a two-storey house. Water absorption tests were conducted by replicating heavy rain on the wall surfaces by soaking sections face flat in 25mm of water and replicating flooding by standing the wall in 90mm of water. The amount of water absorbed in 24 hours was measured by mass, and the drying period for each section was noted. Thermal resistance was measured through conducting heat tests. Smaller wall samples were wrapped in insulation and placed on top of a power controlled heat plate. The temperature difference between the exterior and interior faces were measured after 3 hours and used to calculate the thermal resistance. Due to the experimental limitations, standard fire tests couldn't be conducted, thus elevated temperature tests at 330°C was conducted for purely the Rapid Panels, which were predicted to be more prone to damage at these temperatures.