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U. N. Sinha

Central Building Research Institute, Roorkee, India

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FAILURE OF BUILDINGS ON MOUND - A CASE STUDY

U.N. Sinha
Geotechnical Engineering Division
Central Building Research Institute
Roorkee - 247 667 (U.P.) India

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ABSTRACT

The century old buildings situated on mound at Jais town, Rae Bareli (Uttar Pradesh), India, failed after heavy rainfall. The paper presents the convincing evidence of the failure of buildings through photographs. The prime cause of failures and suggestions are also reported.

KEYWORDS

Mound (Teela), century old, heavy rainfall, failure, Lakheri Bricks, geotechnical investigation, differential settlement, monitor, progressive tilt.

INTRODUCTION

Jais town the birth place of famous poet Malik Mohamud Jaisi is situated on century old manmade mound in the district of Rae Bareli (Uttar Pradesh), India. The buildings constructed over it, were also reported to be more than 80 to 100 years old.

Due to heavy rainfall in the month of September 1986 the area was inundated with flood and not found approachable without boat. Major distress developed after the rain stopped and the flood water started receding. It was apprehended that there might be any seismic activity in the area, but having the problem in the localised area on the mound, the failure of buildings due to seismic activity was ruled out.

Having the problem of societal nature, the district authority entrusted it to Central Building Research Institute, Roorkee (India) for undertaking the study on failure of buildings on age old mound. The author undertook the programme as a case study of special nature.

TYPE OF CONSTRUCTION AND EXTENT OF DISTRESS

A large number of residential buildings were supported on

mound (Teela) and reported to be about 80-100 years old. On inspection, the major failure in buildings were found in a localised area (Fig. 1) showing mostly in north-south direction. The construction of buildings on mound

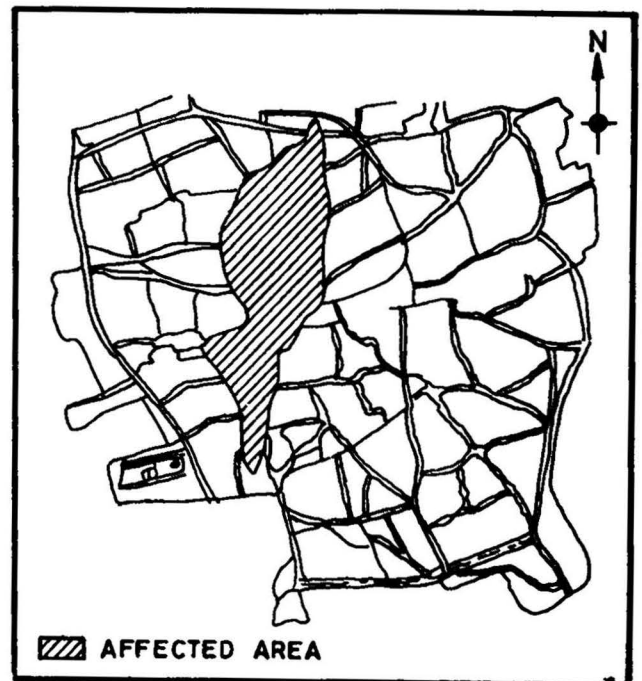


Fig. 1 Map of Jais Town

having rick walls with small size bricks of size 17 cm x 10 cm x 4 cm thickness approximately found laid in mud mortar. The bricks were locally known as **Lakheri Bricks**. The thickness of walls varied from 45 cm to 75 cm showing most often without proper bonds. The foundation of buildings was of shallow type without getting any proper detail except wider base of mostly spread type. This type of buildings showed higher degree of failure than the newly constructed buildings having properly bonded brick wall in mud mortar cement-sand plaster on walls and RCC or RBC roofings. As reported, the spread type shallow foundation was provided of burnt clay brick work laid in cement-sand mortar upto plinth level. Thereafter, the superstructure was laid in mud mortar of 23 cm thick brick work. The town was covered by a network of footpath made of flat brick soling with drains on both sides following natural contour of the mound.



Fig. 2 Collapsing Wall



Fig. 3 Separation of Walls at Corner



Fig. 4 Severe Cracking near Lintel

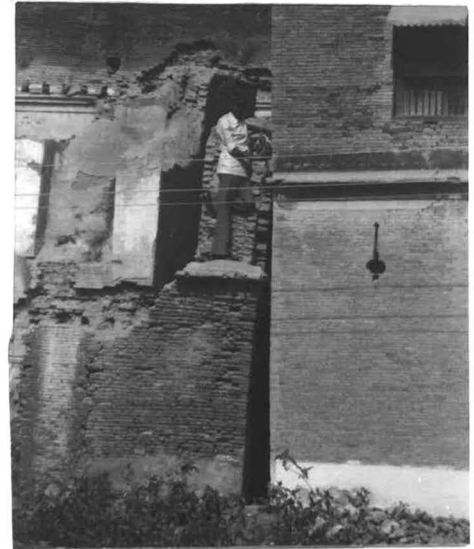


Fig. 5 Tilt in building due to settlement and tilt measurement

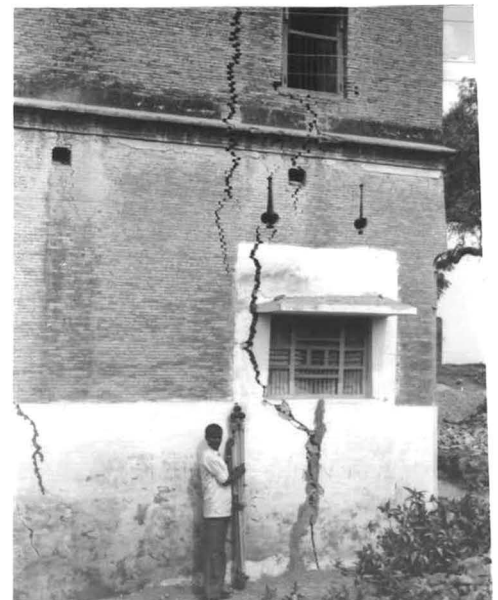


Fig. 6 Cracking in Wall and tilt measurement

The extent of distress in buildings were of interesting nature and it was decided to take large number of photographs to examine the failure pattern for convincing the district authority. Few are shown in Figs. 2 through 10 providing fair idea of failure in buildings. The EDM (Electronic Distance Meter) was used to assess tilt in buildings due to differential settlement.

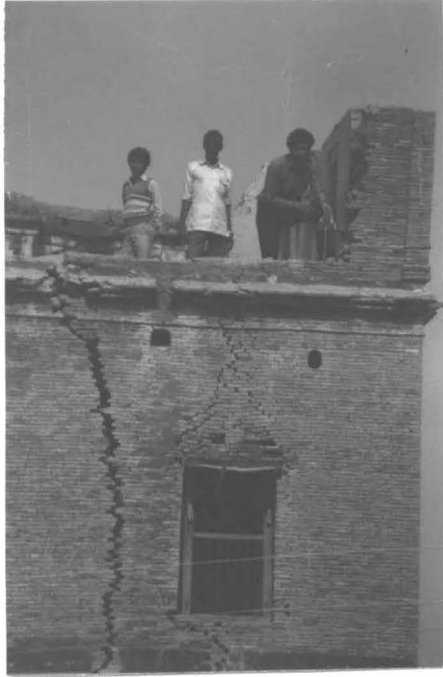


Fig. 7 Wide Crack in wall and tilt measurement



Fig. 8 Cracks in newly constructed building showing seepage in wall

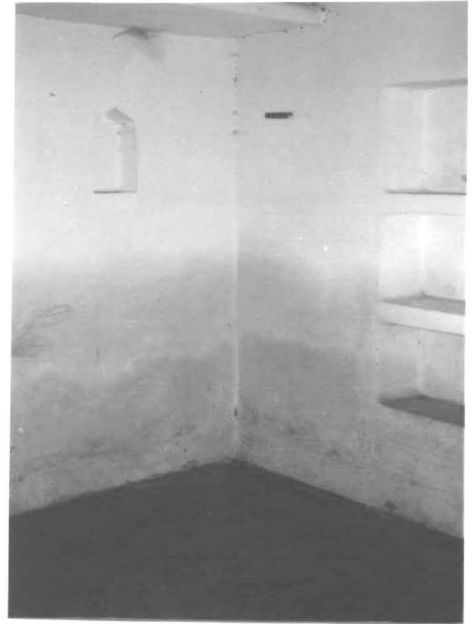


Fig. 9 Capillary rise and dampness in walls

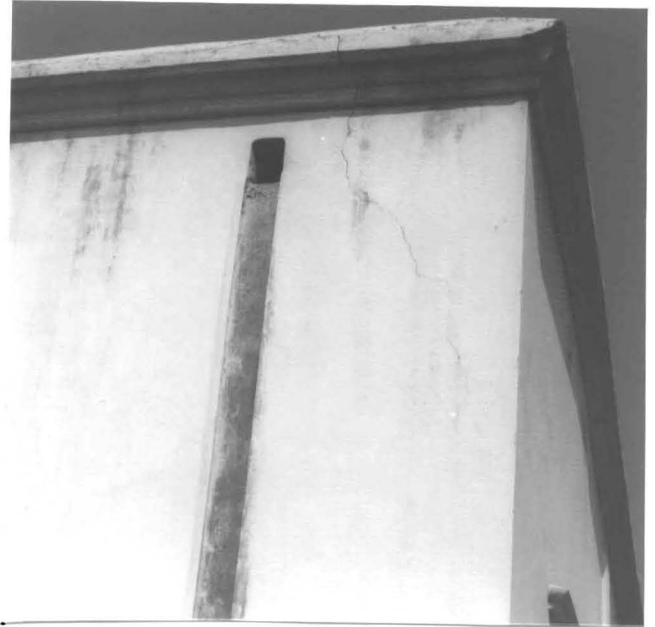


Fig. 10 Repaired cracks in building

GEOTECHNICAL INFORMATION

Due to urgent requirement of report on distressed buildings, the geotechnical investigation carried out for the proposed overhead water tank on the same mound (Teela) in the month of January 1986 was collected from the district authority to study the subsoil condition. The bore log of two locations are shown in Fig.s11(a-b). No fresh geotechnical investigation was carried out after getting geotechnical information from their record.

