

Forensic Investigation of Fire-affected Reinforced Concrete Buildings

Awoyera, P.O.¹, Akinwumi, I.I.², Ede, A.N.³, Olofinnade, M.O.⁴

^{1, 2, 3, 4}(Department of Civil Engineering, College of Science and Technology/ Covenant University, Nigeria)

Abstract: This study focused on forensic investigation of fire-affected reinforced concrete buildings. Post-fire investigation was conducted on structural elements in three selected fire-affected concrete buildings, in order to ascertain their in situ residual strengths and also to provide data for use in future assessment of fire-affected buildings. The selected sites for investigation include a five-storey building at Alagbaka and a bungalow at Adegbola in Akure, and a ten-storey building in Benin, Nigeria. Rebound hammer and ultrasonic pulse velocity are two non-destructive tests apparatus used for this investigation. Average values of pulse velocity were fitted into an established model in order to estimate the probable temperature, which the buildings were subjected to. Tests were conducted on beams, columns and slabs in both the affected and the unaffected parts of the buildings. From the results, visual examination of the fire-affected buildings revealed changes in the colour of the concrete, delamination of plaster of slab and exposure of reinforcement for severe cases at various locations on the concrete members. In addition, there was notable reduction in the in situ strengths of the fire-affected structural members when compared with the unaffected members. It was deduced that concrete members subjected to temperatures above 600°C lost about 70 % of its strength. **Keywords:** concrete, fire, nondestructive test, reinforcement, temperature