

As a result of complexity of stresses at the anchorage zone of post-tensioned concrete structures caused by tensile and compressive stresses in several directions, it is quite essential to control the tensile stresses in the zone. This is to prevent cracks which may lead to corrosion damages from moisture and salts penetration. This research dealt with stress control by means of hoop reinforcement as a major variable and longitudinal reinforcement as a secondary variable. Six specimens of 35x35 cm. cross-section with 70 cm length as per British Standard (BS-4447 : 1973) were tested to failure. The hoop reinforcement varied from 0 - 5.75% while the longitudinal reinforcement varied from 0 - 0.55% . Interaction behavior among concrete, anchorage and reinforcement was monitored under external loading.

Test results prior to cracking of the specimens showed a linear relationship between stresses and strains in each direction of the anchorage zone. These test results agree closely with those obtained from 3-D linear elastic finite element analyses. Hoop action became effective as micro cracks originated and the effectiveness is magnified as cracks appeared on the concrete surfaces. Hoop reinforcement increased the cracking strength, ductility and ultimate strength of the specimens. The most appropriate percentage of hoop reinforcement was found to be 4% by volume of the anchorage zone, providing excellent overall performance in strength , ductility, and safety index. The longitudinal reinforcement partly helped the hoop action and offered effective transfer of prestressing from the anchorage zone to the structural member.

This research also presents a simplified method for structural design of anchorage zones to conform with the behavior observed in the tests.