

Wiroj Atipornwanich 2011: Development Length of Multiple Five-Strand
Tendons in Post-Tensioned Slabs. Master of Engineering (Civil Engineering),
Major Field: Civil Engineering, Department of Civil Engineering. Thesis
Advisor: Associate Professor Trakool Aramraks, Ph.D. 68 pages.

The objective of this thesis is to determine the bonded development length of multiple 5-strand tendons with surrounding concrete in post-tensioned slabs. The prestressing steel is 7-wire strand grade 270 K diameter 0.5 inch (12.7 mm). The bond between concrete and multiple strands are developed to produce the prestressing force replacing the anchorage force after the loss of anchorage. The relationship between bonded length and the concrete compressive strength is determined by test of 21 concrete blocks stressed by multiple 5-strand tendons with anchorage at both ends. The concrete compressive strengths of 240, 280, 320 and 380 ksc are casted in the blocks to cover strands, then the anchorage is cut and the bonded length is determined to develop sufficient tensile force instead of anchorage force.

The results show that the bond between the multiple strand tendons and covering concrete can be used to replace the anchorage stressing force. The bonded length of multiple strand tendons decreases when the concrete compressive strength increases. The transfer length from tests are close to the length by ACI equation at the compressive strength of 280 ksc and less than 10% for the other compressive strength. All recommended bonded development lengths from test are less than the computational length by codes because the long term effects are not considered in test. The bonded length of the multiple 5-strand tendons is longer than the multiple 3-strand tendons and should be conservative to be the representative for bonded length of all multiple strand tendons in practice.

Student's signature

Thesis Advisor's signature

____ / ____ / ____