

Crack Mitigation of Super-Long Concrete Structure

Abstract—Due to larger dimensions of Super-long concrete structures, shrinkage and temperature effects are more pronounced and common than in typical conventional RC structures. These shrinkage and temperature effects tends to induce secondary tensile stresses which may lead to frequent cracking and excessive deflection resulting with huge losses in durability and serviceability thereby seriously affecting the safety and functionality of building structures. Nowadays, this has been the major issue that many engineers and designers are more likely to be concerned with. To date, there are many design codes and recommendations available for RC and prestressed concrete structures. However, no such codes and practices are available for the analysis, design and construction of Super-long concrete structures thus making engineers, designers and contractors completely relying on the engineering judgement based on the prior experience in similar and related projects. Hence, it requires proper clear understanding and accurate estimation of shrinkage, creep and temperature effects. This paper considers the provision of pour strip and application of prestressing (post tensioning) method as the effective means of crack mitigation in Super-long concrete structures, which is found to be both reliable and convenient according to the quantitative FEM analysis realized in ANSYS software. Furthermore, other supplementary measures in addition to prestressing is recommended to save construction costs although its effectiveness strictly depends on the actual construction site conditions.

Keywords—*super-long concrete structure, temperature, shrinkage, creep, prestressing, cracks*