LAPURAN PROJEK TAHUN AKHIR

KURSUS DIPLOMA LANJUTAN KEJURUTERAAN AWAM

KAJIAN KEJURUTERAAN , I.T.M. , SHAH ALAM

FLEXURAL STRENGTH BEHAVIOUR OF PRESTRESSED BEAM DIFFERENT INITIAL PRESTRESS FORCE

BY

ABDULLAH BIN SHAARI

MAHDZIR BIN MD ISA

NOVEMBER 1986

SYNOPSIS

This report is written based on a comparative study of the behaviour of flexural strength pretensioned and post-tensioned prestressed concrete beams subjected to variation in initial prestressing force.

The works are done through three stages namely preliminary work, actual test and analysis. Sand treatment, sieve analysis, design and test of trial mix and theoretical calculations are involved in preliminary work. The second stage involves making formwork, cutting and bending of reinforcements and tendons., casting, tensioning, curing, grouting and testing the prototype of the beams.

The observations are made based on the performance of three numbers of each post-tensioned and pretensioned concrete beams of same rectangular section. Size of the section is 150 mm x 300 mm. They are being designed as class 3 in accordance with CP110: Part 2: 1972. One beam is casted as a reinforced concrete beam which act as a control beam. All beams had four numbers of mild steel bars of same diameter with nominal links throughout the beams. Two numbers of prestressed wires of same

diameter are fixed in a parabolic profile for post-tensioned beams and straight profile for pretensioned beams with same midspan eccentricity. Each beam is subjected to different initial prestressing force ie. 80%, 70% and 60% respectively. Tensioning of prestressing wires are done before the pretensioned beams were casted and at 28 days after concreting the post-tensioned beams. Immediately after tensioning, grout was injected into the ducts of post-tensioned beams. All beams are tested at 38 days after concreting by using testing machine frame. Testing at 28 days cannot be done because fault of hydraulic jack. Concrete strength is assume not really affected for 10 days delay. Each beam is subjected to a point load at midspan.

The behaviour of the beam such as deflection, cracking width, cracking pattern, cracking length and strain are observed at various stages of loading until the beam fails. The ultimate load and the cracking load are noted down and compared to the theoeretical values for all prestressed beams.

Analysis and conclusions are done from plotting the graphs of load against deflection, crack width, crack length and strain. Hence, the relationship between the load and the resulting deformations for the entire range of load are known.

ACKNOWLEDGEMENT

The students would like to take this opportunity to express their sincere gratitude to their project advisor Puan Ir.Khafilah Bte Din for her continuous supervision, guidance and encouragement throughout the preparation of the project which resulted in successful completion of the project.

The students are also indebted to those who had willingly extend their helping hands to them either directly or indirectly especially to Encik Shamsudin and other laboratory technicians,all the staff of Civil Engineering Department and to all colleagues.Also not forgetting Cik Montironi who have secrified her free time in typing out this report.Without your generous help and support,the completion of this project will never been possible.

Special thanks to our parents,brothers and sisters for their encouragement throughout the years.

Our greatest and ultimate debt is due to ALLAH,the creator of the heavans and the earth.May He pardon and forgive our failings and weakness,strengthen and enliven our faith in Him. Amin.

TABLE OF CONTENTS