CONSTRUCTION PLANNING FOR THE PLACING OF LARGE QUANTITIES OF CONCRETE

by

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ABSTRACT

This study is attempted to identify the problems and to explore the more advanced of technical know-how involved in the process of large concreting work. The operational sequence, placement methods and the factors which influence the progress of concreting work on various construction projects are analysed. The types of construction included in this study are dams, bridge, underground power-house and high-rise building.

Comparisons of the results has shown that the continuous placement method yield the better output in placing of large amounts of concrete, especially for massive reinforced concrete structures. However, this method is still not widely accepted in many construction projects. It is recommended that further study be conducted on the possibility of using this method specifically for dams, underground and under water structures as well as mass foundations.

Finally, a proposed planning model and some relevant check lists are given as to provide construction planning for the placing of large quantities of concrete more meaningful.

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I. INTRODUCTION

1.1 General

Concrete presents unusual and different problems to the constructor. Although there is no best, right or cheapest way to place and finish concrete, good advance planning can help in choosing the proper method before any crisis occurs.

In our fast developing construction industry, the casting of large monolithical concrete structures in one continuous placement i.e. foundation of high rise building, pile cap of bridges, dam, etc. is becoming increasingly common. Uneven settlement, construction joints waterstops, and many other inconveniences are minimized or eliminated.

Some previous research has been carried out to study the actual concreting practice, e.g. TUMWATTANA (1976), in three concrete building projects in Thailand, and ALIGAEN (1983) in many projects throughout Philippines, pertaining to measuring, mixing, transporting, placing, and curing concrete. The concreting procedures were observed to be in accordance with the recommended practice. Tumwattana found that in those projects observed in Thailand the concreting practice and the quality of concrete were quite in compliance to the recommended procedures and specification, while Aligaen discovered so many faults in concreting practices in Philippines causing poor concrete quality.

Both of the studies emphasized more on the statistical concepts of quality control to evaluate the concreting practices and the concrete produced in those projects, while the amount of concrete placed were relatively small.

In this study, the construction planning, methods and procedures on concreting practice in some selected projects in Thailand and Indonesia will be observed, with particular emphasis on the process of works on placing of large amounts of concrete continuously in one time. The study is to review and to compare the methods and techniques commonly used in both ASEAN countries in order to provide guidelines for planning the applicable construction methods and procedures on this particular work.

1.2 Statement of Problem

1.2.1 Continuous Casting

For large monolithic placement, concrete supply should be as high as possible. Therefore placement time should be minimized to reduce the temperature differential induced by difference in concrete age. Placing Concrete is a "process", or "a series of actions conducted to an end", rather than just an "operation". This study will involve the entire process of production of large quantity of concrete in order to seek for the solutions of maintain the continuity of the whole process. However considering the time and financial constraints, this study will not be able to explore each section in detail and depth.

1.2.2 Heat Generation and Control

Since the obvious problem of large amounts of concrete placed is the necessity of controlling its specific behaviour, i.e. heat generation, thermal stress and cracking, and volume change, the method of construction should be carefully considered. Modern concrete technology allows us to overcome the typical problems associated with mass concrete pours, but the construction planners are often confronted with the problem of choosing the appropriate technology amongst the number of alternatives. The nature of characteristics and requirements of each alternative are varied. This problem is compounded by the condition of site and location, the nature of economy in developing countries, labor surplus, unemployment, financial unstability, underutilized resources and many other things which characterize the economies of these Asean countries.

1.3 Objectives of the Study

(1) To review and interpret different construction practices on placing large amount of concrete in different types of projects in Thailand and Indonesia.

(2) To classify the problems involved in the sequence of the process and to explore the possibilities of developing the most appropriate method for placing large quantities of concrete, with the following objectives chosen for investigation :

- to reduce the cost,
- to reduce the time of construction, and
- to increase the quality of concrete produce

(3) To set up guidelines to be followed for planning the whole process of works, to perform the descriptive model of the placement operation according to the type of the project, and to evaluate the economic and the practical aspect of planning.

1.4 Scope of Study

Even though construction planning begins long before the contractor moves onto the construction site, it is beyond the scope of this study to cover all the data relating to the planning process from the design phase. The study will cover only the planning which is provided by the contractors prior and during the construction operation.

Some different types of the projects dealt with large amount of concrete placing in Thailand and Indonesia were selected as cases study, i.e:

1. IBM Office Building Construction Project in Bangkok
   (Part of foundation of the 20 storeys building, with approximately 300 m^3 of concrete being placed at one ,time)

2. Dao Khanong Cable Stayed Bridge Construction Project in Bangkok.
   (The pile caps supporting the pylon, with approximately 7,000 m^3 of concrete)

3. Asahan Hydroelectric Power in North Sumatera, Indonesia
   i 38,000 m^3 of concrete of Siguragura Gravity Dam
   ii 20,000 m^3 of concrete of Siguragura underground power-station
   iii 55,000 m^3 of concrete of Tangga Arch Dam

4. BNI 46 Office Building Project in Jakarta, Indonesia
   (12,400 m^3 of concrete of Raft Foundation of the 32 storeys concrete building).