

ABRIDGMENT

Katarynczuk, W., Shen, K. Y., and Goodwin, A. E. "Multi-Project Scheduling by Critical Path," presented at the 45th Annual Meeting of the Highway Research Board, Washington, D. C., January 7-11, 1966. Manuscript copy contains 30 pp. of text, bar charts and tables.

In 1963, the Department of Highways, Ontario undertook its largest highway reconstruction project, the widening of the Toronto Bypass. This project consists of 24 main contracts (work projects), and includes 20 major interchanges. The whole job was to be completed within nine years, and 60% of the work was scheduled for completion within the first five years. The Critical Path Technique was used during the design and budgeting period and is again extensively being used in the construction phase. Part A of this paper describes the experience gained during the application of the Critical Path technique to this multi-project scheduling problem. As a result of this application management has attained a firm control over the awarding of individual work projects. The technique has also been well received by the contractors.

Part B of this paper deals with a proposed computer oriented scheduling system, applying the Critical Path technique to pre-contract engineering. In this area of pre-contract engineering activities a well defined scheduling system to cope with the Department's present demands is lacking. The scheduling task is complex in nature due to the very large number of work projects involved, and the manpower restrictions imposed on each Section of the Department. The proposed system will provide the following major benefits:

1. System flexibility, which includes future growth facilities, updating of internal system parameters, production of scheduling reports, etc.
2. Speed of reappraisal
3. Manpower and equipment allocation
4. Inducement of pre-planning and co-ordination among Department's personnel.

The backbone of the system is the standardization of all projects by grouping them into work types, such as grading, paving, etc. For each work type, a template is to be created by a sub-committee of engineers representing various sections involved in pre-contract engineering work. This template will consist of all activities arranged in the sequence of actual performance which pertain to a particular group. The durations for each of the activities will be assigned on a unit basis system. A Critical Path

The opinions and conclusions expressed in this publication are those of the authors and not necessarily those of the Highway Research Board.

can thus be generated for any project by using the associated template, selected by the computer. The computer will calculate the total pre-contract engineering time for each project based on the unit duration time of all associated activities, which in turn are computed as a function of the project's size parameter. This function has a built-in "self-educating" feature, i.e., it can be modified by actual experience and thus assumes more practical significance. The Critical Path Schedule also provides control dates for each Section involved, such as design, soils reports, property acquisition, etc., thus providing an over-all pre-contract engineering schedule.

It is intended that the computer will determine the sufficiency of manpower and other resources, take into account any restrictions such as seasonal construction, and detect overloading or underloading in various areas. This information will enable management to make appropriate adjustments in the schedule. Re-scheduling can then take place on a continuing basis until a satisfactory over-all schedule is obtained.