

Keeping Track

By Steve Revay



Thank you for voicing your encouragement in our new publishing venture. We have received a number of phone calls and many letters telling us to carry on - and so we are. For this second issue we have selected a single topic to explore in some depth, and which I hope is of general interest.

The theme is "Planning and Scheduling", with overviews by a lawyer, Peter Blaikie, and a construction practitioner, Mark Doyle.

Planning, as Mark points out, is one of the most important functions of management. In fact, the prerequisite of a good manager is the ability to plan, communicate efficiently and motivate effectively.

No wonder so much material has been published about planning - an almost endless stream of "better and more sophisticated" solutions to the needs of the construction industry.

However, Mark takes a different tack. He brings planning and scheduling back to earth by examining the basics of this important management function.

Planning, in my view, is finding answers to the WHAT, HOW and WHEN questions. Scheduling, on the other hand, responds to the WHO and HOW LONG questions.

Perhaps by accepting this definition, one might be less reluctant to accept Mark's comments about CPM.

I am frequently asked, both while testifying and otherwise, whether I subscribe to the theory that a Job without a network type of schedule (CPM, PERT or PRECEDENT DIAGRAM) is necessarily a mismanaged job - and I invariably answer with a definite "NO". Network is only a format which, unquestionably, makes planning easier, but never replaces the skill and experience of a good manager.

Unfortunately, network type of scheduling has been placed on a pedestal where format outweighs substance. Thus the quantum of delay damage is often determined by the apparent sophistication of the presented schedule without analyzing whether the suggested critical path is necessarily unique or could be moved at the manager's whim to any one of a dozen different chains of activities and, more importantly, without evaluating what impact resource utilization may have on the schedule.

LEGAL ASPECTS OF SCHEDULING

By P. M. Blaikie of Heenan, Blaikie, Jolin, Potvin, Trepanier and Cobbett, Montreal

The scheduling of construction projects can give rise to an enormous range of legal problems. This article will focus on a particular type of problem frequently encountered in practice, namely, the owner's obligation to provide drawings and information or to supply equipment to the contractor. To illustrate the situation, reference is made to the Saskatchewan Court of Appeal decision in Fischbach and Moore Ltd. v. Noranda Mines Limited (1978) 84 D.L.R. (3d) 465.

The Court of Appeal had to resolve two principal issues. First, the nature and extent of the owner's obligations with respect to drawings and equipment. Second, the type of remedy available to the contractor.

The contract in question related to the installation of mechanical and electrical equipment at a potash mine in Saskatchewan. It was held that the obligation of Fischbach and Moore was to complete the work on or before March 15, 1969. The contract documents referred to a General Construction Schedule; however, no such schedule was ever prepared. In addition, there were no references to the owner's obligations with respect to drawings and equipment.

a) As regards drawings, the expressions used were to the effect that the owner, acting directly or through the Engineer, would issue "additional instructions and detailed drawings ... as work progresses"

and from time to time as the work progresses".

b) The language relating to the supply of equipment was even more general. Apart from a statement to the effect that the owner would "supply all items of process equipment and materials to be incorporated into the permanent works", the only relevant provision was in the following terms.

"Scheduling:

The installation shall generally be scheduled to suit the Owner's Delivery Schedule and the General Construction Schedule. Adjustment shall be made as work progresses to accommodate unforeseen delays

in supply of equipment and rescheduling of delivery. Final scheduling and order of work shall be confirmed with and in accordance with the directions of the Engineer's Field Construction Superintendent."

The Court of Appeal found, as a fact, that the owner failed to deliver to Fischbach and Moore certain drawings and equipment in time to enable it to meet the completion date of March 15, 1969". The central issue for decision was whether this failure constituted a breach of contract by the owner. It should be pointed out that, in the contract, there was a specific exclusion of any implied obligations on behalf of the owner. Accordingly, for Fischbach and Moore to succeed, it was necessary for the Court of Appeal to find that the owner had breached a specific contractual provision.

In more precise terms, the issue required the Court of Appeal to examine the expressions "as work progresses" and from time to time as the work progresses! The judges decided that, in the context, these expressions imposed an obligation to deliver drawings and equipment "as and when it was appropriate to do so as work progressed". In order to assess what was "appropriate", in the absence of a binding construction schedule, one member of the Court suggested the following, nonexclusive list of relevant factors.

- a) The order in which the work was to be carried out.
- b) The state of readiness of the contractor's work for the relevant drawings and equipment.
- c) Whether the drawings and equipment related to the original work or to subsequent changes.
- d) Whether the contractor had made a request for particular drawings and equipment, thereby putting the owner on notice.
- e) Whether the owner could demonstrate that its failure to provide the drawings and equipment was the result of factors beyond its control.
- f) Viewed objectively, whether the contractor actually needed the

drawings and equipment at a time prior to their being received.

In this particular case, it was found, based on the facts, that a study of the foregoing factors led to a result favourable to Fischbach and Moore. Obviously, in a case where either the contract documents or a construction schedule provides for delivery of drawings and/or equipment at specified times, certain elements of the proof required are more easily established. Nevertheless, most of the factors suggested as being relevant would continue to apply.

As to the first question, the Saskatchewan Court of Appeal found that the owner had not delivered drawings and equipment at the "appropriate" time and, as a result, had prevented the contractor from completing its work on or before March 15, 1969. It was also decided that this constituted a breach of the express terms of the contract between the parties.

In accordance with normal practice, the contract provided "that the time of completion shall be extended for such reasonable time as the Engineer may decide" in the event of a delay in completion of the work resulting from "any act or neglect of the Owner or Engineer or of any employee of either". It must be stressed that the contract documents did not provide, as is frequently the case, that the contractor's remedy would be limited to an extension of time. In fact, no extension of time was requested or granted.

The Court of Appeal refused to accept the owner's argument to the effect that the contractor, having failed to request an extension of time, was denied the right to damages. It is clear, from the decision, that the result would have been the same even if there had been an extension of the time for completion. In this regard, the Court cites the English decision in Re Trollope & Sons and Coils & Sons Ltd. and Singe (1913) 1 Hudson's B.C. 849 as follows.

"If the delay affects the contractor not merely in the time he has to take in order to complete the whole work, but also affects him peculiarly in the way of damages, why, because the time has been extended, the employer should not pay the damages I cannot see. It is a simple

case, that by reason of the delays of giving the orders to go on with the work in some particular, this part of the work was idle, or the clerk of the works or somebody on the spot, whom the contractor has to pay, was idle. The extension of his time will prevent the contractor from having any difficulty about time, it will prevent his being liable for not doing the work by the contract date, and give him time to do it, but it will not put back into his pocket the damages which he has sustained by reason of having the men there idle and paying them. It seems to me that he has the right to have those damages, and therefore I must decide against that contention of the employer."

In the event, substantial damages were awarded in favour of Fischbach and Moore.

Viewed from the contractor's perspective, a number of significant features flow from this decision.

- a) Every attempt should be made to resist the inclusion, in the contractual provisions dealing with delays, of any language whereby the contractor accepts an extension of time as full compensation for delays. Such renunciations will be given their full effect; however, in their absence, the granting of an extension of time will apparently not be treated by the courts as full compensation.
- b) owners will be held responsible for their failure to provide, inter alia, drawings, instructions and equipment where they are contractually bound to do so, either at specific times or "when it was appropriate to do so as work progressed".
- c) In assessing the evidence, the courts will look at a number of factors. In order to make satisfactory evidence, contractors will have to ensure that their records are accurate and detailed. Relevant evidence would include the state of the work at different points of time, the need for particular drawings or items of equipment on specific dates, requests to the owner establishing the need for such drawings and equipment, and other similar matters.

Where the contract does not effectively bar a claim and where, on the facts, the contractor can prove damages, it is now clear that the courts will maintain claims

based on the owner's failure to provide drawings, instructions and equipment as and when required.

Note: Mr. Blaikie was a Discussion Leader in six RAL Seminars on The Causes and Settlement of Construction Contract Disputes, 1977-1981.



Mark Doyle

RAL Toronto Branch Manager Mark Doyle, who opened the office in 1977, is marking his 28th year in construction. During his varied career he has been involved as a surveyor, construction superintendent, project manager, planner, scheduler, lecturer, author and consultant.

Mark's responsibilities with RAL have

engaged him in a wide range of assignments in Canada and abroad concerning claims, planning and scheduling, productivity and construction course preparation.

Mark's earlier days took him to the Arctic with the Foundation Company to work on DEW Line sites. He was also a surveyor and crew chief with the Ontario Ministries of Natural Resources and Transportation and Communications. Before joining RAL, he was with E.G.M. Cape & Co. Ltd. for 22 years, for half that time as Chief of the firm's Planning Department. His last Cape assignment was as Project Manager.

Mark's practical experience - a reflection of his previous mobile lifestyle during construction of major civil, industrial and engineering works - has been passed on for the past seven years in teaching the "Management for Construction Superintendents" course at Seneca and Humber community colleges. He is author of the course "Management for

Construction Superintendents" and co-author of the course "Techniques of Planning and Scheduling". These courses were prepared for the Ontario General Contractors Association and the Ontario Ministry of Colleges and Universities and are part of the OGCA's Superintendents' Accreditation Program.

Active in industry association work, Mark is past chairman of the Canadian Construction Association's Business and Contractors Relations Committee and founding chairman of its Construction Safety Committee. He is author of a CCA report on "The Flow of Funds in the Construction industry" and was involved in developing the guides for alternate forms of contract. He is also a past member of the OGCA's Education and Training Committee, contributing to its Construction Superintendents' Accreditation Program.

Direct involvement of all team members is the key to success...

CONSTRUCTION PROJECT PLANNING AND SCHEDLING - THE MANAGEMENT VIEW

"The Best Laid Schemes o'Mice and Men Gang Aft A-gley". Robbie Burns said it all. Why is it that carefully prepared plans for the execution of construction projects are ignored or fail to achieve their goals? Why are simple bar charts and/or the day-to-day non-written plans more appropriate in some cases than network diagrams - and vice versa? Why is it important to distinguish between Detailed and Directional planning?

These issues and the importance of involving the on-site project management team in the development of a project plan and schedule are dealt with in this article on the Management Aspects of successful planning and scheduling. It was written by RAL Toronto Branch Manager Mark Doyle, whose many years of experience in the construction industry are outlined in the RAL Profile preceding this report.

It has often been stated by all schools of management research that one of the most important functions of management is that of planning. The process begins with the setting of objectives and continues with the detailing of all steps necessary to reach certain goals. Planning covers, among other vital items, the most effective use of men, materials, equipment and

money.

But what puzzles many managers is why - as so often happens - elaborate and carefully formulated plans seem to fall apart in actual practice. It often seems that a project proceeds according to internal preference with or without carefully detailed scheduling.

So, let's see if we can fit the planning pieces together in a more effective pattern.

Planning is the determination of a course of action to achieve the desired results the manager of the task wishes to achieve.

Put another way, the manager should not be asking the question: "What do I think will happen in the future?" Rather, he should decide: "What do I want to accomplish given the circumstances under which I am likely to operate?"

Finding that answer involves thinking through the general form and detail of the work so that it can be accomplished with the greatest certainty of success. There must be a careful consideration of all aspects of every construction task before an extensive planning exercise pays off.

Basically the questions centre around three considerations which are:

- The nature of the task.
- The structure of the organization which will accomplish the task.
- The style of leadership which is appropriate to both of these.

For the purpose of considering these questions it is necessary to divide the planning process into two separate approaches:

- Detail planning which is goal-oriented.
- Directional planning.

Detailed planning or planning with goals is a rational, analytical approach which assumes goals can be stated and accepts a narrowing of focus in order to use resources efficiently. This approach is suited to a stable environment and mechanistic organizations. Similarly, the same approach is viable for authoritarian, boss-centred leadership styles. By its nature, this goal-directed planning places limits on the flexibility of the organization since subordinates must take the goal as given and spend less time exploring alternative courses of action.

Directional planning is more appropriate for unstable environments and organic organizations. Here the planners identify a broad domain or area in which the organization will work and a general direction in which the job will move. This type of planning is more flexible. The emphasis shifts from carefully formulating what goal is to be accomplished to the general area or direction the work should take, and

Detailed and Directional Planning on a construction project are not mutually exclusive.

leaves all the details up to the foreman in charge. Accordingly, the leadership style changes to democratic style and the subordinate is given an area of freedom he cannot enjoy in the more goal-oriented plan.

As in most tasks, on a construction project, these two types of planning, and the related scheduling function, are not mutually exclusive. Instead they form a continuum from greater to lesser definition. For example, planning with goals is quite appropriate for work carried out by the contractor's own forces, such as forming, reinforcing and pouring the structure. For subtrade work, such as the electrical specialty contractors on complicated parts of the work, the planning effort would swing more toward the directional planning side of the scale. Here, the detailed goal setting would be up to the foreman in charge of the work. He would be responsible for determining steps of action, setting priorities, and developing a method for evaluating his results, were this to suit his particular management style.

Furthermore, in the forming, reinforcing and pouring phase the work environment is relatively stable, the tasks quantifiable and the goals specific and measurable. Also, by history and tradition the leadership style is more authoritarian and boss-centred with a direct chain of command.

In the case of the subcontractor's work, in particular that of the mechanical and electrical specialty contractors, much of their work has to do with unpredictable, non-routine tasks where creativity and entrepreneurial activities are emphasized. To encourage such activities these organizations tend to be "open" and "organic". They don't encourage employees to "play it by the rules" or stick closely to the formal chain of command. If the construction manager sets a very goal-oriented plan for this part of the work it's not likely that it will be followed. He should establish the general direction that this part of the work is to take and then encourage the

specially contractor's organization to do the detailed planning required. This detailed planning will, of course, need to fit or mesh with his overall master plan and it needs to give the manager some form of control over the work of the sub-trades.

There is a need to fit the planning and its related scheduling function to the situation where mechanistic conditions prevail. Plans are detailed and stress how the specific goals are to be met. For organic conditions only main points are covered and there is a stress on end results.

A variety of planning and scheduling approaches have been developed in recent years - such as the Critical Path Method (CPM) and Program Evaluation Review Techniques (PERT) - to aid the planning effort for construction projects. However, in many cases the use of these tools has not improved the success of the project. That is, if one defines success as completing the project within the original time estimate and/or within the original budget. Part of the reason for this failure has been that CPM and other sophisticated network techniques tend to be very goal-oriented and accept a narrow perception of the task.

Detailed Network Schedules set very definite objectives and they then detail the steps required to achieve these objectives. Similarly, they assume all tasks are quantifiable and that all organizations can be changed from organic to mechanistic to follow a rigid chain of command. Although organizations can be changed, they will not necessarily change to conform to the

In many cases, CPM and PERT have not improved the success of the project.

demands of a rigid plan and schedule. A detailed critical path is a very goal-oriented plan and schedule. It sets very definite objectives and then it details the steps required to achieve these objectives. This assumes the manager can clearly identify what specific goals he wants to achieve and he sets detailed plans for accomplishing these goals.

It also assumes that the structure of the site organization is mechanistic and will respond to the formal chain of command and will accept a high degree of imposed control by the site manager.

We can readily see that some sub-trades will accept these conditions and others will not, partly by nature of the task. Also, the design professions involved in the project may not be willing to respond to the formal chain of command and yet some of the steps detailed on the CPM schedule will require them to do exactly that.

Secondly, an approach often used to develop the detailed construction plan and schedule is to have an expert or top level executive analyze the problem and available information and arrive at answers through intuition. Although this approach is widely used, it has built-in dangers. For example, personal values are more important determinants in the choice of logic for the plan as well as duration for the activities. Similarly, occupational position influences the way in which a person defines the problem. Accordingly, the official plan for the job often does not have the confidence or support of the managers at various levels on the project.

Perhaps the simplest alternative to the emphasis on the intuition and experience approach provided by one or two persons is to expose the proposed plan and schedule to the active criticism of the project management team. Let this group seek to attack and demolish the proposed plan and schedule. If it holds up well under this attack, it is worth accepting. This method has the advantage of revealing underlying assumptions and implications more completely than the strictly individual approach. Also, this plan has the confidence of the managers because they have a chance to question the draft, to propose changes and to take part in the selection of the final plan and accompanying schedule.

In short, formal detailed planning where there is a separate planning and acting phase, is contingent upon a mechanistic organization staffed with people who function best when they are given well-defined tasks. If the planning and acting phases are separated, then it also means that the work environment must remain relatively stable and the manager must be able to identify and quantify

exactly what it is he wishes to accomplish. Both he and the subordinate must understand what the goals are and be able to identify steps to accomplish them.

It also assumes that there is in place relatively sophisticated management expertise and that the leadership yields a high degree of authority over the work group and makes most decisions unilaterally.

It is not surprising, then, that when companies adopt the formal detailed planning approach without considering the organization into which it is to be introduced, they run into failures and disappointments.

On the other hand, directional planning and scheduling systems, such as are provided by the more traditional bar chart method or the day-to-day non-written plan, are more flexible. Moreover, planning and acting are not separate phases. The manager has a broad perception of the task but control is very much in the hands of the subordinates.

Whichever approach is used, the measure of success of a project plan and schedule is determined by whether or not it communicates easily to the job-site organization. This communication yardstick of success applies equally to both the first tier of job management and also to the sub-tiers. In order to accomplish this, two or more levels of schedules may be appropriate. For example, to communicate to the craft foreman level would require much more specific instructions than that needed for the project manager or superintendent. Rather than try and accomplish this with one document or schedule, it may be more suitable to prepare individual short cycle schedules for each craft and an overall directional plan for top levels of job management. These short cycle schedules or work instruction sheets would, by necessity, conform to the master or directional plan.

The second measure of success of a project planning effort is whether or not it provides the manager with the degree of control over the work that he requires. If control is defined as "measuring performance against plans", and if the manager wishes to measure this frequently, then he will require a detailed plan and schedule which show very

specific work items. Accordingly, this suggests that the control function is related to the nature of the task, the organization and the leadership style, which, of course, it is.

If on the other hand, infrequent checks are all that are required and control is exercised autonomously through the self control of the person or sub-trade doing the job, a more directional plan would be appropriate.

The directional plan would give little more than the start and completion dates for a large block of work, such as erect the structural steel framework". The manager would know when the work started and when it was finished. However, he wouldn't know until the work was nearly finished if he was on target or not - and, if not, he might not have enough time left to take corrective actions.

He puts his faith in the subcontractor and hopes he will perform according to plan. This may be all that is required in some circumstances. This is a decision the manager will have to make.

The answer, then, as to which approach the Construction Manager should take to the planning function depends on these factors:

1. The nature of the task.
2. The amount of information available on the task.
3. How clearly the work can be defined.
4. The structure of the organization which will carry out the work.
5. The degree of reliance placed on the schedule as a means of communication.
6. The degree of control the manager wishes to exercise over the process.
7. The skills, motivation and competence of the manager and his subordinates.

To establish a formal project plan which does not take all of these factors into consideration is simply a waste of time.

If we say that one of the prime functions of a manager is that of "Planning", you

would then assume that those managers who do not engage in formal planning would be poor performers. However, this is not always the case. We all know, for example, of project superintendents who never pay any attention to the plan and schedule and yet appear to be successful. Such a manager may just be lucky or his level of performance may be acceptable to the specific situation. In a more demanding situation he may not be effective at all.

How useful formal planning and scheduling are for a construction project depends on many things. These include all of the foregoing as well as the

appropriateness of the approach for the situation, the motivation of employees to implement the plan and the general willingness to conform to its demands. All of these will affect the planning, scheduling and performance relationship.

There is one final consideration remaining for all managers involved in the running of construction projects. It is the nagging question: is it the managers who plan, or the planners who manage who make the difference? Studies have analyzed the relationship between managers who are planners and a number of effectiveness criteria,

including the rating of the manager by superiors and measures of work output. The findings indicate that planners were high performers. In addition, planners tended to score higher on a test of general reasoning ability and were more fluent.

This raises the point of whether organizations which plan their projects are more successful because of the competence of their managers, or their planning, or both. Often the secret for success is related to the manager's ability to recognize quickly the level of planning that is appropriate for the specific project.

ROM wasn't built in a day - but

CONSTRUCTION ON SCHEDULE

The Royal Ontario Museum (ROM) in Toronto is undergoing a major renovation program, with the reopening scheduled for July 1982.

RAL has played a significant role in this restoration project since the mid 1970's, acting as project planning and scheduling consultants, with involvement in all stages from concept to completion.

The project is a multimillion-dollar venture. It consists of four individual phases of work, and on completion, will form the resumption of operations of Canada's largest public museum and related major research institution The four phases: Site services; Curatorial centre; Terrace galleries; Renovations.

Apart from phase 1, the planning and scheduling of each phase took place prior to the start of construction. For

phases 2 and 3, detailed CPM Networks were prepared and computerized which then formed a complete program of operations. Updating and revising the networks took place when required. To perform this work also meant closing the existing museum down to the public for a set period of time. All the key milestone dates related to these moves were established and tied down from RAL's scheduling efforts.

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