

Why facility owners should use CPM and resource loading as tools in the contracting process

By Ted Ritter

The *Critical Path Method* (CPM) of planning construction has been around for over fifty years, and is generally accepted as an effective technique for planning a construction project. Developed by DuPont in 1957, the method has three components. The CPM:

1. Shows which items in the construction contract are “critical” to the project schedule
2. Presents the information in graphic form, usually an expanded flow chart
3. Establishes a time-line for the project, with milestones and completion dates built in

Resource Loading is a technique for plugging time, material, and workforce needs into the schedule to see what is needed where, when, and for how long. For instance, in a construction project, we may estimate that 100,000 square feet of drywall need to be installed in a two-week period. We determine how many men it will take to do the installation, how many sheets of drywall are needed, and add them to the schedule mix.

However, CPM and resource loading are complex, sophisticated techniques. They take time and cost money. Wickwire and Groff, for instance, in discussing specifications for scheduling, note “...specifications may range from one paragraph to five to ten pages. The short specifications are dangerous, and the long ones expensive.” (1)

In addition, CPM and resource loading require significant input and cooperation from subcontractors. Finally, there is usually resistance to overcome from contractors and subs, who tend to view such activities askance when they first encounter them.

In other words, CPM and resource loading are complex enough and expensive enough that an entity contemplating a construction project might be somewhat taken aback by the magnitude of the task, and wonder if the end result will be worth it.

There are at least five reasons why CPM/resource loading is worth doing:

1. **A successful project outcome is much more likely.** This is not just a hopeful assessment. Andrew Griffith, after examining the data from a number of projects, concluded: “Projects that have schedules based on the critical path method (CPM) at the time of authorization have less cost growth, less schedule slip, and better absolute cost performance.”(27) Later in his analysis, he adds, “Projects with



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resource-loaded project schedules at the time of authorization typically had better absolute cost performance and less schedule slip.” (28)

The higher the investment in CPM/resource loading, the greater the likelihood of a successful project. That means fewer delays, fewer claims, less litigation, smoother sailing. The highest level of development is a detailed schedule with cost and labor loading. Thus, if you want a successful project, this is the way to get it. As Griffeth puts it, projects with CPM/resource loading showed “a significant improvement in outcome performance to justify the additional investment,” including “9 percent lower cost and 13 percent faster schedules.”(29)

2. ***There is less likelihood of subcontractor claims.*** Having a unit of measurement such as dollars or worker/days provided by the subcontractor and input into the CPM schedule provides the owner with an important analytical tool. The owner can analyze subcontractor’s progress and pre-empt claims by showing the subcontractor how it is losing long before the subcontractor will have learned it through internal analysis. When the owner beats the subcontractor to the punch in profit and loss analysis, it goes a long way to reducing subcontractor claims.
3. ***Subcontractors are more likely to perform well.*** Cost loading requires that the owner and subcontractor have to be on the same page from day one of their connection. The subcontractor is aware from the beginning of its scope of work, its work plan, the schedule, and how it plans to be paid.

In addition, CPM/resource loading provides an effective tool for assessing subcontractor effort on an almost daily basis, so problems can be solved before they become insurmountable. The owner has up-to-the moment data in order to compare work planned with work actually in place. So, if a contractor is not meeting schedules, for instance, the owner has a concrete, specific, and comprehensive picture of exactly when and where the work schedule is breaking down.

4. ***All parties to the contract are on common ground.*** The schedule is the point where planning, progress, and payment meet. Because the subcontractor is paid according to work completed according to the schedule, it is in the sub’s best interest to keep the owner informed on just what is happening.

When all parties are using the CPM/resource loading method, the entire process becomes more effective. If a superintendent questions an item on the schedule, the question gets resolved and the schedule becomes more efficient. Items that might evolve into contract disputes or litigation later are taken care of as they occur.



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5. **Cost flow becomes transparent.** As progress input comes in from each subcontractor on a monthly basis, the data forms a comprehensive history of the project. In addition, the cost loading of a schedule generates accurate cash flow predictions, allowing the owner to keep closer track of the money and to generate an easily updated cash-flow analysis.

Mobilization and stored materials are a reality of all pay requests. These items tend to get lost, or can even be hidden in contracts where there is less detail in the scheduling. CPM/resource loading allows a review of the costs across all of a subcontractor's work, so front loading and distorted cost assignments can be minimized. It also allows the subcontractor to cost load submittals, fabrication, and delivery, allowing it to get paid when the payable work occurs.

Griffeth reports, "Projects on which the core project team conducted a formal review of the project schedule demonstrated less cost growth than projects that did not conduct a formal schedule." (28)

Notes to the article

Griffeth, Andrew F., Dr., PE. "Scheduling Practices and Project Success." *Cost Engineering*, 48:9 (24-30), September 2006.

Wickwire, J.M., Esq. and M. J. Groff, Esq. "Drafting Scheduling Specifications, Part I." *Construction Management Association of America White Paper*:
<http://cmaanet.org/drafting-scheduling>



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