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Construction Scheduling: The Key to Timely Completion



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Delays to construction projects affect many parties with a vested interest in their timely completion: the developer that carries an interest-bearing construction loan and has commitments to prospective occupants, the contractors trying to complete the work on time and move on to the next project, architects, engineers and other professionals that are expending resources reviewing shop drawings and visiting the site, and the prospective users anticipating occupancy. However, despite the vast interests in timely completion, construction projects often do not achieve timely completion. In the best of circumstances, a delayed project results only in verbal accusations of responsibility for the delay. In others, the delayed project strains the parties' relationships and can result in a multitude of complex claims for damages and costly litigation.

Preparing a Project Schedule

The most prudent approach for avoiding delay of a construction project is to prepare a comprehensive and project-appropriate schedule and to maintain that schedule throughout the duration of the project. Unfortunately, developers and contractors often neglect the thorough and structured planning process that complex projects demand. At the early stages of a construction project, the parties are understandably consumed with obtaining financing, buying out trades, obtaining permits, procuring materials, and designing the project, and as a result, the important task of preparing the project schedule may be minimized. However, this is ill-advised



because the act of developing the project schedule is not just a means to an end, but is an end in itself.

Preparation of the project schedule requires the developer and contractor to anticipate the tasks required to complete the project, consider the interrelationships of the various tasks, identify the factors that can cause delay and temper unrealistic expectations as to the progress of the project. The very act of preparing the contract schedule is a major component in project delay avoidance.

Ultimately, the contractor should be responsible for preparing the project schedule, though not without active participation by the developer, the architect, the owner's representative, and with complex projects, a scheduling expert. In the early stages, the schedule should include details and important milestones for the major

activities and their approximate time frames. As the project moves along and major equipment and subcontractor procurement is well underway, the level of information in the construction schedule should be expanded to the point where it becomes a detailed plan for a successful project that can be used as a tool to assure compliance with the overall project schedule milestones.

There are various types of schedules, and each carries its own advantages and disadvantages. As a result, the type of schedule used for a particular project is an important consideration and should be discussed by the developer and the contractor.

At the most basic level is a form of schedule known as the bar chart. Bar charts can be described as graphical depictions of when activities are planned to occur. The activities are represented by rectangular bars whose length is accurately depicted on a calendar to indicate its

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duration. Bar charts are valuable in aggregating the necessary resources such as manpower and material needs but are only appropriate for less complex projects.

The most widely used form of scheduling is referred to as the critical path method (CPM). The CPM calculates the minimum completion time for a project by representing the sequence of activities that will take the longest time to complete. The length of the critical path then becomes the sum of the interrelated activity durations along the path. Preparation of the schedule requires that all of the necessary activities be identified, work days be established and assigned to the activities and the activities be logically connected in the sequence they need to be performed.

Once the CPM is completed, it will indicate the first and last date that an activity can commence, and the first and last date that an activity can be completed. This provides the scheduler with the knowledge of, and a graphic representation of, when the last day an activity can be completed without affecting the start of the next interrelated one. If a critical path activity is delayed, the completion forecast of the project will be delayed. The CPM schedule is a more involved form of scheduling and may not be appropriate for less complex projects.

Although there are other forms of scheduling and variations of those mentioned above, the bar chart method and CPM are the most common. Nevertheless, the type of schedule that is ultimately used must be appropriate for the project. For instance, a simple bar chart for a complex development project will be inadequate for coordinating the various trades and maintaining the progress of the work. Similarly, the preparation of a CPM schedule for a narrow scope of work requiring only a single trade contractor would be an unnecessary and inefficient use of resources. It is therefore advisable that the developer and the contractor work cooperatively to determine the best form of schedule and to explicitly identify the use of such form in the governing construction contract. For instance, the contract can include a provision similar to the following:

Contractor shall prepare and submit to owner for approval a project schedule utilizing a critical path method Gantt chart that: (i) shows all major elements with respect to the work; (ii) breaks down each element or phase by trade; (iii) clearly identifies critical path activities; (iv) discloses relationships in number of days and types of linkage between all linked activities; (v) identifies, coordinates and integrates design and construction schedules; and (vi) otherwise is in a form satisfactory to owner.

Effective project scheduling, however, does not end here.

Maintaining the Schedule

The preparation of a project schedule would be a futile exercise if the schedule is not maintained or is thereafter disregarded. It often happens that the developer and contractor fail to properly relate the progress of the work to the project schedule until delays become apparent. This not only does a great disservice to the resources that were expended during preparation of the schedule, but also diminishes the likelihood that corrective action will effectively get the project back on schedule.

The contractor is primarily responsible for keeping the project on schedule, which requires the proper and timely performance of the work and maintenance of the project schedule. On more complex jobs, the contractor should be required to update the schedule on a regular basis. The requirement should be included in the construction contract:

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Contractor shall update the project schedule monthly and as required by change order, incorporating the activities of subcontractors for the work, including activity sequences and durations, allocation of labor and materials, processing of shop drawings, product data and samples, and delivery of products requiring long lead time procurement. Contractor shall update and reissue the project schedule on a monthly basis to show current conditions and revisions required by actual experience. Contractor will provide owner with and utilize two (2)-week look-ahead schedules with the subcontractors for planning and coordination. Owner reserves the right to approve and make modifications to the project schedule.

However, it is not enough to merely delegate this responsibility to the contractor; it is equally important that the contractor keep the developer informed of the progress of the work. For proper planning and coordination, the contractor should provide the developer with look-ahead schedules along with the periodic schedule updates.

Of course, the developer also plays an important role in maintenance of the schedule. A staff of the most diligent of contractors is not enough to keep a complicated project on schedule without an active role by the developer in managing and responding to the schedule. The developer should be attentive to the updated schedules in order to respond to project delays effectively

with corrective measures. If both parties use the schedule as a tool, they should be in a position to determine what needs to be done to bring a delayed project back in line. This may require making modifications to the schedule to incorporate a recovery plan or invoking a contractual right to accelerate the work by ordering the contractor to work overtime hours or increase the manpower levels. A provision should be included in every contract for construction permitting the developer to accelerate progress of the work:

Contractor shall work reasonable overtime to achieve the milestone and completion dates set forth in the project schedule or as reasonably directed by owner as owner shall have the right to expedite specific items of the work, even out of sequence. If, however, contractor or its subcontractors are behind in the work, or are delaying the progress of the work necessary to complete the project in accordance with the project schedule, then, if directed by owner, contractor shall work overtime hours or days with additional personnel as may be necessary to keep abreast with the general progress of the work consistent with the project schedule and the cost incurred on account of the overtime shall be borne entirely by contractor and the appropriate subcontractors without additional cost to owner.

Utilizing such a clause will allow the developer and contractor to address any delays and develop a recovery plan during the course of the project, not at the end, when completion (and the possible imposition of delay damages) becomes critical to all parties.

Conclusion

When a schedule is prepared thoughtfully and monitored appropriately throughout the project, delays can be identified early and potential claims and their associated damages can be avoided or minimized. However, when the schedule is either poorly prepared or improperly updated, the completion projection is often inaccurate. This can provide a false sense of security and may result in masking the fact that the project is seriously behind schedule until it is too late to recover. An appropriate form of project schedule and its diligent maintenance are the best methods for ensuring that the project is completed on time.