Subcontractor Schedule Control Method

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Abstract: Trade coordination and claims documentation is a challenge on any project, particularly for specialty subcontractors. The writers introduce a schedule control method initiated by the subcontractor, which facilitates coordination and communication between a subcontractor and other project participants as well as documentation to the prime contractor. A case study illustrates the preparation of a trade-specific critical path method (CPM) schedule, which is updated on a regular basis. The writers also address the interrelationship between the CPM schedule, internal reporting, schedule of values, and labor tracking. It is difficult to ensure that all subcontractor-produced documentation is complementary, but it is well worth the effort when it comes to supporting a claim. Monthly schedule updates and narratives communicate the conflicts, issues, and schedule constraints the subcontractor experiences or anticipates on a project, thereby providing contractually required notice to the prime contractor during the project. This increases the likelihood of resolving issues during the project, while simultaneously protecting a subcontractor's position if change order requests are denied or if back charges are levied prompting a subcontractor to enforce its rights, execute a claim, or proceed to litigation.

DOI: 10.1061/(ASCE)0733-9364(2007)133:3(262)

CE Database subject headings: Subcontractors; Scheduling; Control methods; Documentation; Project management.

Introduction

The construction industry is facing a time when projects are becoming more complex and fast-paced (i.e., design/build, security concerns, smart technologies, integrated systems, etc.), while the shortage of talented design and project management professionals continues to deepen. The writers have noticed an increase in prime contractors and owners not fully understanding the scope of work and logical dependencies between subcontractor works that are critical to the success of such complex and fast-paced projects. Miscommunications and conflicts between prime contractors, subcontractors, and other project participants often result in costly litigation and dissatisfied customers. Furthermore, the writers note that prime contractors and construction management firms are taking a lesser role in coordination between trades, and instead specify coordination as a subcontractor requirement. Consequently, subcontractors must take a more proactive role in communicating their constraints and coordination issues to the other parties on a job site.

Based on the writers' recent experiences, this technical note discusses a schedule control method initiated by the subcontractor, which facilitates coordination and communication between subcontractors, prime contractors, construction managers, and owners. A capacity to communicate issues and concerns before and during construction progress opens the door to negotiating changes during the project, thereby avoiding claims and litigation after construction is completed, while simultaneously providing the documentation required to protect oneself if litigation becomes necessary. Subcontractors will increasingly seek out the sword and shield effect that the critical path method (CPM) scheduling process creates within a project management system.

Methodology

When faced with the challenge of coordination and communication, the writers suggest that subcontractors prepare a trade-specific CPM schedule, and update this schedule on a regular basis. The subcontractor schedule includes the subcontractor's scope of work as well as milestone activities representative of the prerequisite activities to be performed by others upon which the subcontractor's work progress relies. In conjunction with the submittal of the subcontractor schedule to the prime contractor and other project participants, the writers suggest a narrative be prepared that discusses issues and concerns that have affected, and more importantly, may affect the subcontractor's future scheduled work progress and scope of work.

The writers also recognize that project managers of specialty subcontractors are often faced with multiple external as well as internal reporting obligations. The schedule control method described herein can be used as a tool in meeting those obligations by supporting the development of the necessary reports and helping the project manager maintain accurate, up to date, and consistent records. The percent of work billed as complete must closely parallel the percent of work indicated complete by the CPM schedule.

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Note. Discussion open until August 1, 2007. Separate discussions must be submitted for individual papers. To extend the closing date by one month, a written request must be filed with the ASCE Managing Editor. The manuscript for this technical note was submitted for review and possible publication on June 21, 2005; approved on July 17, 2006. This technical note is part of the ***Journal of Construction Engineering and Management***, Vol. 133, No. 3, March 1, 2007. ©ASCE, ISSN 0733-9364/2007/3-262–265/$25.00.

It is very likely that three documents, the CPM schedule, the schedule of values (SOV), and the original estimate, will become key evidence in any dispute. Some negotiation may have to take place with the prime contractor to reach a baseline SOV agreeable to all parties, but as the writers have learned firsthand, consistency and accuracy in those three documents are important factors in supporting and ultimately winning a claim. Any inconsistencies in the subcontractor's documentation will be exploited by the opposition. The writers strongly recommend that the subcontractor's baseline CPM schedule and SOV align. Furthermore, these two schedules need be based upon the subcontractor's original estimate. This alignment, as well as the correlation between the percent of work billed as complete and the percent of work indicated complete by the CPM schedule, is invaluable to substantiating a claim.

Benefits

The schedule control method described in this technical note benefits the subcontractor throughout the project process. When established and used as a project management tool, a subcontractor's trade-specific schedule accomplishes the following:

1. Clarifies and communicates subcontractor's scope of work to the prime contractor and other project participants;
2. Clarifies and communicates the trade coordination constraints and activities by others, upon which the progress of a subcontractor's work depends;
3. Can be developed without electronic copy of prime contractor's schedule, in that it can be based on the hard copy, (which is typically the only version of a schedule given to a subcontractor by a prime, if any at all is provided);
4. Provides a snapshot in time of the overall project status based on knowledge provided to a subcontractor by the prime contractor, construction manager, owner's representative, or other subcontractors;
5. Statuses percent complete and provides documentation for billing purposes;
6. Provides a historical record of changed start or completion dates to prerequisite activities and constraints, as well as scope of work changes concurrent with project progress;
7. Documents subcontractor-specific impacts and issues concurrent with project progress;
8. Communicates the subcontractor-specific impact of project delays and changes and can be used to satisfy contractual notice requirements and facilitate subsequent negotiation of changes;
9. Provides documentation that can be quickly accessed and referenced, should a claim need to be developed;
10. May provide sufficient proof of damages to compel an upfront settlement of claim; and
11. Provides contemporaneous documentation to support the claim, if a claim proceeds to a litigious process.

The writers believe it is important to note that schedules published by others, such as prime contractors, construction management firms, owners, and other subcontractors, should be reviewed with a critical eye, because durations and sequences of work are sometimes inadvertently or covertly misleading to the benefit of the publisher. This schedule control method recommended by the writers will help mitigate these issues.

Drawbacks

Although the time and money saved over the course of a project outweighs the upfront investment in project management and benefits the subcontractor with trade-specific scheduling updates throughout the project, this schedule control method requires that the following commitments be made:

1. A subcontractor must make an up front planning effort of its entire scope of work;
2. A subcontractor must become proficient with the use of CPM scheduling software and modeling techniques; and
3. Project management must be allotted to update the CPM schedule and provide contemporaneous narratives of issues, changes, and delays.

Implementation

There are three phases in developing and updating a subcontractor's trade-specific schedule. First, a baseline or initial schedule is prepared. Second, this schedule is populated with information from the project's master schedule and feedback from other project participants. Third, the project progress is recorded in regular updates, which include changes and updates to the master schedule and the subcontractor's work scope status, as well as the status of prerequisite activities by others.

The writers illustrate this process using a case study example. The fictitious subcontractor, Fire Technology, Inc. ("FireTech") is contracted by the prime contractor to install fire safety systems in a four-story health care facility ("Health Center") with one basement level, a penthouse level, and a separate central plant building.

Phase 1—Schedule Production

The first step is to define activities that encompass the subcontractor's scope of work. For example, FireTech's responsibilities include the procurement, installation, and testing of a fire safety system for four patient room levels, one occupied basement level, a mechanical penthouse, and the central plant building. Other project responsibilities include application engineering, shop drawing submittals, as-built drawings, Health Center employee training, and close-out documentation. The anticipated completion dates for prerequisite activities can be obtained from the project master schedule. If prerequisite activities are not specified in the master schedule, or information is unclear, it is necessary for the subcontractor to meet with the prime contractor, other subcontractors, and perhaps the owner's representative to determine the anticipated completion dates.

This baseline schedule represents the subcontractor's anticipated progress, given the constraints of prerequisite activities as well as durations for subcontractor work. This provides the project participants a contextual work plan with which to discuss subcontractor specific project constraints, concerns, and issues before they arise in the field. This schedule also documents the subcontractor's initial understanding of the anticipated project progress and work plan based on the master schedule and other project constraints communicated by the prime contractor, construction manager, and other subcontractors.

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Phase 2—Coordination and Communication

Now that a subcontractor schedule exists, the subcontractor can compare the trade-specific work plan with the master schedule's start and finish dates, durations, and constraints. As a result of this review and analysis, conflicts and issues may become apparent and can be addressed before they affect costs and completion.

As a result of communication between project participants, the subcontractor schedule and possibly the master schedule should be refined and finalized. The finalized schedules provide a record of the prime contractor's, construction manager's, and subcontractor's planned and anticipated work plan. Upon publication, this CPM schedule becomes the subcontractor's baseline schedule and acts as a performance baseline to which all changes, delays, and accelerations are compared and measured.

As changes occur over the course of the project, the impact of these changes can be determined using the relationships defined in the schedule. For example, in their baseline schedule, FireTech identified the milestone "Elevator Operational" as a prerequisite for their pretesting; consequently, the schedule shows that if the elevator installation and startup is delayed, FireTech's testing is affected.

Phase 3—Schedule Update and Narrative

It is imperative to continue the process by updating the schedule at regular intervals, including recording receipt of any master schedule updates. The subcontractor now has a tool to evaluate the impact of the master schedule update to their scope and plan of work. Progress updates provide a contemporaneous record of changes, impacts, and progress over the life of the project. Updating the subcontractor schedule provides a project management tool that can be used to anticipate and mitigate conflicts, issues, and potential impacts to project progress as a result of changes on the job site. Furthermore, a contemporaneous record is powerful and useful in supporting claims, and if it becomes necessary, litigation at the conclusion of a project.

It is extremely beneficial to write and maintain a narrative that discusses the schedule update and any changes that affect, or may affect, the subcontractor's scheduled progress or work scope. The narrative should include explanations of changes to the subcontractor's schedule, including changes to activity status, activity durations, schedule logic, and any added or deleted activities or fragnets. Fragnets, also known as subnets, usually represent some form of subproject such as the addition of an operating room. The narrative might also address changes in the project master schedule that affect the anticipated work plan defined in the subcontractor schedule as well as any conflicts between the master schedule and subcontractor schedule resulting from changes during the update period. The update process may involve changes to prerequisite activities and logic, depending on project constraints. The subcontractor may wish to address billing forecasts and future manpower requirements in the context of the schedule and current project status. As part of the narrative, job photos of FireTech's completed works, incomplete prerequisite activities, or problem areas could be included. Current outstanding issues, which affect the subcontractor's progress and forecast, should be discussed. The narrative should include, but is not limited to the following:

1. Transmittal letter;
2. Work completed during the period;
3. Description of the current critical path;
4. Description of problem areas;
5. Current and anticipated delays
   - Cause of the delay;
   - Corrective action and schedule adjustments to correct the delay; and
   - Impact of the delay on other activities, milestones, and completion dates.
6. Changes in construction sequences;
7. Pending items and status thereof
   - Permits;
   - Change orders;
   - Time extensions; and
   - Noncompliance notices.
8. Contract completion date(s) status
   - Ahead of schedule and number of days; and
   - Behind schedule and number of days.
9. Include updated network diagram and reports; and
10. Photographs.

The baseline schedule defined in Phases 1 and 2 represents the subcontractor's work plan at the outset of a project. However, changes on the job may necessitate that the subcontractor implement workarounds in an effort to continue progress even though workaround progress is normally less productive than as-planned work. Workarounds and changes should be incorporated into the update indicating changes to the activities' scope, duration, or relationships with prerequisite activities.

Workarounds are worth presenting as change order requests (COR). Although a COR may not be approved, its submittal documents the subcontractor's request for additional time or money and, oddly enough, can create good will as it shows the subcontractor's willingness to make extra effort to help maintain the project's progress.

At times, new fragnets may be added or revised to illustrate the changed conditions on the project. For example, in discussions that FireTech had with the elevator subcontractor and the prime contractor, it became apparent that the elevators, which were originally scheduled for March 31 would not be operational until April 25 because of labor disputes at the manufacturing facility. FireTech acknowledged that even though on the baseline schedule the elevator is a prerequisite for FireTech testing activities, some of the FireTech pretesting could occur before the elevators were operational, and consequently, FireTech revised the schedule logic between the activity by others "Elevator Operational" and FireTech's activity "PreTest System" from the original relationship of "start to finish" to that of "finish to finish." This logic change shows that although FireTech's PreTest System activity can be started prior to the elevators being operational, it cannot be completed until the elevators are actually operational. The subcontractor's CPM schedule clearly shows the impact of the elevator delay on FireTech's baseline work plan, and communicates the mitigation efforts undertaken by FireTech.

Internal Reporting

It is the writers' experience that providing regular periodic reports to internal customers (in other words, the employer) is one of the most difficult, time consuming, and sometimes frustrating tasks a project manager must perform. With all the other demands placed on project managers, producing a weekly or even monthly internal report can feel overly burdensome. Most companies also require monthly financial reports that, at a minimum, consist of projections for revenue, manpower, and billing. Reports detailing

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amount billed to date, paid to date, and revenue to date may also be required. Internal status reports range from simple paragraphs conveying only major impacts, to those packed with superfluous detail. Unless established otherwise, the writers suggest producing weekly internal status reports and monthly internal financial reports concurrent with the external schedule update and narrative, and utilizing the scheduling and narrative process to streamline the preparation of both external and internal reports.

Schedule of Values

As discussed in the introduction, SOV billed amounts that do not align with CPM schedule work complete amounts are suspect, and thus detrimental to substantiating a claim. In most cases a subcontractor bills aggressively in order to collect more money early in the project. This action is ordinary, especially for small businesses, as cash flow is of utmost importance to a business. However, if the amount billed as reflected by the SOV is greater than the amount of work completed as indicated by the CPM schedule, suspicion is introduced because a subcontractor has no justification to bill for more than the actual amount of work completed to date. Overbilling is problematic in and of itself, but this misdeed can be compounded if the subcontractor inflates the amount of work complete as indicated by the CPM schedule in order to match the billed amount. The implications of overbilling, particularly on a troubled project, are far-reaching.

Labor Tracking System

The writers have found that an organization's payroll system and timesheets seldom provide the level of detail necessary to support a claim because the typical labor capture system is too rigid to provide adequate breakdowns to account for out-of-scope work. This leads to overbilling because labor and materials spent on out-of-scope work are not easily delineated from that spent on in-scope work. Subcontractors rationalize overbilling by saying that because they expended the labor they can bill for it. They fail to consider that the SOV represents base work, not out-of-scope work, and the billing amount should represent percent of work complete, not how much it cost them to perform the work. Labor and materials spent on out-of-scope work must be recorded, accounted for, and billed separately through a change order or claim.

The writers suggest that a subcontractor implement a labor tracking system that effectively delineates base contract work from that which the subcontractor considers out of scope. The system must provide the ability to account for out-of-scope work and other impacts on a daily basis. The delineation of how and where labor and material was used is imperative to support a recovery claim and to show the impacts of added scope.

Unfortunately, experience shows that it is difficult to get most employees to dutifully and accurately fill out daily labor reports, much less provide enough detail to support a claim. Based on the writers' experience of working with various major manufacturers and installers of controls and fire alarm systems, it appears that an organization's culture has the greatest effect on whether or not accurate reports are produced.

Accurate and timely documentation is the cornerstone to success in this litigious environment. The writers suggest that management take the steps necessary to ensure that employees accurately record how and where their labor was used, and provide relevant detail of the impacts that affected their work. Organizations may want to provide their employees with specific technical writing training and consider enticements such as gift certificates to local restaurants, etc., for continued compliance. A labor tracking system that records activities in a detailed, consistent manner is the best offense to support a recovery claim and the best defense to deflect back charges.

Conclusions

Subcontractor CPM schedules can be useful tools in sorting out the relationships between trades and communicating the requirements and prerequisites to a prime contractor and other project participants. In the FireTech example, the fire alarm subcontractor's work scope is toward the end of the job and is very much dependent upon other trades completing their work. Companies like FireTech often have a need to protect themselves from claims and back charges by showing that they are not the primary cause for project delays, but that their work depends upon another trade, whose delayed installation or faulty workmanship affects FireTech's own work. In the writers' experience, for subcontractors like FireTech, a trade-specific subcontractor schedule proves to be very useful in that it demonstrates to all parties the interdependency between the subcontractor's work and that of other trades. The subsequent updates and narratives provide a contemporaneous record of impacts and changes to the schedule and scope of work. The baseline schedule and updates prompt meetings and discussions regarding the prerequisite requirements for FireTech's commissioning work, and facilitate communication between project participants. The writers have used the schedule, updates, and narratives to support claims against a prime contractor, and the contemporaneous documentation provided a clear case for filing a claim and a strong defense against counter claims and back charges.

Through the writers' experience, a subcontractor CPM schedule streamlines coordination and communication between project managers of the various trades so that the trades have the materials, equipment, direction, and access to work efficiently and effectively. The schedule defines the interrelationship and dependency the subject trade has upon prerequisite work, and when changes occur on the project, the subcontractor's management can assess the impact and redirect the labor force to minimize the impact of the change.

It is difficult to ensure that all subcontractor-produced documentation is complementary, but it is well worth the effort when it comes to supporting a claim. Monthly schedule updates and narratives communicate the conflicts, issues, and schedule constraints the subcontractor experiences or anticipates on a project, thereby providing contractually required notice to the prime contractor during the project. This increases the likelihood of resolving issues during the project, while simultaneously protecting a subcontractor's position if change order requests are denied or if back charges are levied prompting a subcontractor to enforce its rights, execute a claim, or proceed to litigation.

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