

Subcontractor Scheduling

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by Ron Winter, PSP

Abstract

Scheduling for Subcontractors is very different from the type of scheduling done for Owners or General Contractors. The very nature of the schedules and the tools and measurements used to create, monitor, and evaluate a CPM schedule is in many ways different for a Subcontractor's schedule than when performing the same process for a Owner or a General Contractor. This paper will explore and explain the ramifications of those differences in a construction environment.

Introduction

Scheduling for Subcontractors is very different from the type of scheduling done for Owners or General Contractors. The very nature of the schedules and the tools and measurements used to create, monitor, and evaluate a CPM schedule is in many ways different for a Subcontractor's schedule than when performing the same process for a Owner or a General Contractor. This paper will explore and explain the ramifications of those differences in a construction environment.

Scheduling for the Project Owner (Owner) versus a General Contractor (GC) is remarkably similar. I assumed that scheduling for Subcontractors would be much the same as for scheduling for Owners and GCs. Further research has convinced that convinced me that the two are very different. [1]

On larger construction jobs, the Subcontractor is just as involved with scheduling as the GC is and in fact, the Subcontractor's CPM schedule is often incorporated into the GC's master schedule. This subcontractor schedule is really only a portion of a bigger schedule that encompasses all of the different jobs the Subcontractor may be working on.

A Subcontractor's responsibility entails scheduling jobs, maintaining and training a solid workforce, keeping employees busy, moving on and off of jobsites, avoiding interference from the GC and other Subcontractors, as well as satisfying the requirements of the GC and the project itself. While the GC typically is only scheduling for the one job, Subcontractors need to schedule and integrate the schedules of multiple jobs. They also need to be able to re-schedule these jobs for optimum deployment whenever any particular job is advanced or delayed.

This paper will look at the peculiarities and best practices of scheduling for a Subcontractor over four different time frames; before signing the contract, building your schedule, monitoring construction, and resolving any claims.

Before Signing the Contract

Subcontractors on large projects are increasingly being asked to pre-qualify. In addition to finances, they may also be asked to list their professional expertise in areas such as scheduling. In these cases, already owning the proper scheduling software and having a trained scheduling specialist may make or break the pre-qualification. For documentation purposes, formal schedule training by an outside firm may trump self-taught scheduling skills. A professional scheduling certification like the PSP or PMI-SP would even count for more.

Subcontractors don't always get to see the complete set of plans, specifications, addendas, general conditions, proposed contract format and complete contract documents when asked to submit their bids. Before signing a contract, it is extremely important review all plans and project documents, including architectural, structural, civil, plumbing, mechanical and electrical plans; soils reports; addendum's; finish schedules and the city conditions of approval.

It is foolish to sign a contract without reviewing the complete set of plans and specifications unless your bid contains a reasonable contingency for unknowns causing for underbids. Various portions of the Specifications that a Scheduler should read include,

- Time is of the Essence - This clause means that you will be held accountable to meeting your scheduling obligations without leeway.
- Acceleration Clauses - You may be forced to accelerate you work should your portion of the project be delayed, even if it is not your fault.
- Termination Clauses – How secure is your contract and what conditions will allow for involuntary termination?

Your rights and responsibilities may be further defined in,

- Time of Commencement and Completion – Confirm that this meets your requirements.
- Rate of Progress – If rates are specified, make sure that your planned crewing levels will meet this requirement.
- Schedule of Work – Confirm that this agrees with your work plan. Don't expect certain work to be complete if your work is listed before it.
- Coordination of Trades – Who is responsible for making sure that you have clear space to work and proper access and storage area? It is a Red Flag if the contract says that you are responsible for your own coordination.
- Delay Responsibilities – What part of the contractual delay responsibilities of the GC to the Owner can be transferred to you? Look for delay and damage clauses contained within the contract. Verify how you can remedy situations where you are being delayed by the Project Owner or a GC not performing as well as expected.

The following are also important entitlement clauses,

- No-Damages-for-Delay - Are you going to be compensated for extra costs incurred when requirements change or you are forced to change your original workplan?
- Concealed Conditions – What is the difference between what you should have been expected to include in your bid and what you reasonably could not have anticipated?
- Contract Changes – How far can the Owner go in changing the nature of your work without renegotiating your contract? You don't want to be stuck fixing the plumber's work if you install air handlers.
- Force Majeure – What constitutes a weather day and who will pay for your overhead during this time? You may not want to be 'excused' from not working if it means that you will be footing the bill for such delays.

Manage your risk by understanding your contractual entitlements. Those that grant entitlement for a broad range of causes for cost increases pose the least amount of risk. Those that grant no entitlement pose the greatest risk. The risk to the Subcontractor increases when the contract restricts the costs that are recoverable. The risk to the Subcontractor is greatest when the contract excludes the recovery of all monetary damages caused by all schedule disruptions. [2]

Don't think that because you haven't signed anything, that you are not legally obligated to the GC. Subcontractors can be forced to meet even an informal verbal bid if the GC relied on this information to determine their bid. The exception to this is when the GC later imposes strict scheduling requirements afterward that were not mentioned at the time that a bid was requested. [3]

Building Your Schedule

Subcontractor's schedules need to reflect their responsibilities to the project they are working on while maintaining their company-wide schedules. It is critical that Subcontractors have detailed schedule expectations so that they can coordinate 'project' scheduling with their company-wide schedule. If this information is not effectively delivered to Subcontractors, their individual schedules will control their activities and they may result in unresponsiveness to the project and increased expenses.[4]

Subcontractors should create and share their schedule for work with the GC. Be sure to coordinate your schedule structure with the GC before building the schedule. If both the master schedule and the subcontractor schedule are structured and formatted similarly, you will have created the most effective method for communicating and maintaining schedules. This will allow the GC and Subcontractor to share and integrate their schedules without additional input.

Lost profits generally can be attributed to improper scheduling of crews, poor supervision and lack of field coordination. A schedule that's too optimistic will result in a crunch at the end of the project, which costs everyone money. Also be careful to verify that your major suppliers can meet the schedule.

With the cost and ease of CPM computer programs, all projects should at least initially be scheduled using a CPM schedule and that schedule should be submitted to the GC. You should also make sure that your short interval schedule is coordinated with your CPM schedule to facilitate later claims, should they arise.

The key to proper scheduling for Subcontractors is to consider the resources involved. Subcontractor work is typically crew-oriented. The more crews that you have, generally the faster you can complete the work. A realistic resource plan will save you money and inefficient work later. Since many of the scheduling issues of Subcontractors involve the balancing of personnel, all subcontractor schedules should be resource-loaded at least as to the number of crews involved in each task.

Subcontractors are especially sensitive to intermittent delay and the schedule should be developed in a manner sufficient to be able to display the effects of delay while an activity is active. This means that logically relating various activities using Start-to-start relationships is discouraged.

Most scheduling software do not monitor the progress of predecessor activities in relation to successor activities once begun. After a set amount of time, the Start-to-start relationship automatically allows for the successor to begin and then assumes that the predecessor will continue to completion. Delays to the predecessor once begun will not show any affects to the successor activities in this configuration. Subcontractors should logically relate their pieces of work with Finish-to-start relationships (even with a negative lag if necessary to show the proper logic.) This will allow the Subcontractor to demonstrate the delay of successor activities to a wider degree.

Typical scheduling requirements demand that you break down the work into activities of 20-days or less. Because of this, a single job is often broken down into sections of identical work, only in different locations. The Subcontractor can work at any location, meaning that the work could be scheduled in parallel.

Due to the crew limitation issue, "soft logic" is added to the schedule to schedule each location to follow another. This order may be chosen at random and is always subject to later modification. On the field, the Subcontractor may choose a different order of work, looking as if they were working, "out of sequence." Even if they were working "in sequence," as soon as a problem occurs (conflict,

RFI, etc.) the Subcontractor will often maintain momentum by switching over to another section, again looking like it is working out-of-sequence.

If you do not use soft logic to sequence your repetitive work, then you are potentially signaling that you can efficiently add as many crews as necessary to perform this work at the same time. You are also hindering any chance you may have to press a delay claim. On the other hand, due to the fluid nature of the work, the existing logic frequently needs to be modified to reflect the actual work. This constant changing of the typical work plan may require significant amount of scheduling involvement.[5] Some contracts even forbid the changing of schedule logic without prior approval (although this is somewhat nullified by also demanding the you status the schedule to reflect your actual work.)

Subcontractors are subject to multiple mobilizations. Mobilization is often very expensive for a specialty Subcontractor. In addition to installing their own trailer, they must provide a secure storage for their tools and raw materials. Things such as electric wire can be very expensive while HVAC ductwork can be fragile. Subcontractors do not like multiple mobilizations while it is often in the GCs interest for subcontractors to mobilize many times.

Subcontractors typically rough-in and then wait for the other Subcontractors to perform other work, install their material, and then let the painters come in, and then install covers or finish fixtures or test, and finally punchlist. Each of these phases can require a complete or partial mobilization. It is extremely important that the Subcontractor be aware of the number of planned mobilizations and that this is documented in the schedule.

Scheduling During Work

The definition of “criticality” changes when you transition from the GC to the Subcontractor. Subcontractors have their own critical path that is sometimes different from that of GC.

Owners & GC worry about Total Float while Subcontractors really only consider Free Float. Many GCs do not even share what the project total float is for the Subcontractor. Subcontractors should look at their last activities in each chain of work, note the Free Float value, and then disperse that float throughout the chain of work.

Total Float indicates the amount of ‘free time’ that the activity has in relationship to the project. Free Float indicates the amount of ‘free time’ that the activity has in relation to the following activity. If a Subcontractor uses up Total Float when they do not have any Free Float, then they will be reducing the Total Float for everyone who logically follows them, not just themselves. This is why GCs do not typically show Subconsultants the Total Float.

GCs want the Subconsultant to finish when they said they would (on the early dates.) GCs do not want their Subconsultants to pull their workers off of their project to go work on some other project where the Subconsultant is being pressured by a different GC to accelerate.

Resource-constraints are extremely important for Subcontractors, while this is a much less practical issue for GCs in their controlling of the entire project. Subcontractors also suffer primarily from productivity losses due to interaction with other Subcontractors (stacking of trades, restricted access, congested access, and consequential delay due to other trade delays.)

GCs typically accelerate Subcontractors when they are behind instead of accelerating themselves. This is because 1) specialty trades tend to work at the end of the contract (when acceleration is the least available but most used) and 2) Subcontractors tend to 'eat' the acceleration costs, giving the GC 'free' acceleration.

The 'easiest' way for a GC to accelerate a Subcontractor is to work them overtime. This is also the least efficient and prolonged overtime quickly causes a loss in overall productivity and quality.

The next option for acceleration is to add additional crews. Done early, this is a viable option for long-term acceleration. Keep in mind that the first crew is likely to be the "A Team" with the most experience and productivity. Later crews will suffer from start-up learning curve issues as well as having less experience and lower productivity.

The 'best' option for acceleration is to simply make the existing crews more productive. This can be done by having the GC assist the Subcontractor in non-productive work in very special instances where the Subcontractor is controlling the project's completion.

Subcontractors waste a lot of time clearing the work site, carrying in materials, and cleaning-up afterwards. To make them more productive, designate priority laydown areas for selected, 'critical' Subconsultants. Clear hallways when critical Subcontractors are bringing-in their materials. Advance permanent power installation so that the critical Subcontractors can use it.

Even if the Owner has to pay the GC to perform this work for the Subconsultant, this is often a good idea as the specialty crew will be able to spend more time performing the work, increasing productivity. The Subcontractor is happy because they get the work done quicker and at less cost, the GC makes a small profit on the general laborers assisting the Subcontractor, and the Owner pays a minor premium without losing productivity and quality.

Subcontractors often are required to coordinate their work around other Subconsultant's work even though they do not have a contract between the two. Sometimes Subcontractor contracts require the subconsultant to coordinate their work and accommodate other Subconsultants, legally leaving the GC out of the responsibility for this typical contractual requirement. This sort of contractual requirement should raise a 'Red Flag' to the subconsultant that extra risk is being assumed.

Coordination means more than the different Subcontractors not bumping into each other (time coordination.) When spaces are tight, such as in the overhead run down a corridor, the plumbing, HVAC, electrical, specialty signaling and fire control all have to use the same space (spatial coordination.) Plumbing needs "swing room" to twist pipes into fittings whereas HVAC has a big, fragile, continuous metal box that cannot move around obstructions but creates a very large obstruction itself. Painting is intolerant of almost any other work being performed at the same time.

It is most efficient to have HVAC go first provided there is enough room left over for plumbing. If not, then plumbing must go first and you must be prepared to bring plumbing back (re-mobilize) to correct obstruction problems later. Electrical cannot be situated next to signaling. Fire control/security needs to go almost everywhere.

Subcontractors should note the status their schedules daily, if not by the hour. This is to facilitate optimum coordination, cost control, material control, as well as to support the types of claims that Subcontractors have (micro productivity issues as opposed to macro delays.) They also need to write down the verbal directions given to them by the GC and Owner in order to prove that their loss of productivity was not just 'means and methods.'

The CPM schedule should be periodically updated at least weekly for status to eventually produce an As-Built schedule. The further back you need to remember in order to update your status, the less accurate and believable your status figures will become. You should submit this statused schedule to the GC when done to protect your rights.[6]

Dispute Resolution

Planning your resource usage is a valuable procedure. After that, most of your work can be scheduled using a barchart. So why should you care if your CPM schedule accurately reflects your actual work?

Many construction claims involve a Subcontractor suing the GC to recover for additional costs due to changes in the work outside of the conditions listed in their contract. These claims depend on the same schedule analysis techniques

used in claims between Owners and GCs. Therefore, you must be able to accurately show the planned work and the effects of a delay on that work. This is where a properly built schedule with accurate status and documentation of the unplanned changes becomes necessary.

Default determination may invalidate a Subcontractor's claim. Many contracts forbid a delay claim from a Subcontractor to the GC ("No damage for delay.") This is a standard clause in the AGC form contracts. Even if this clause is in effect, most GCs will still allow 'pass-through claims' against the Owner. In this situation, the Subcontractor must be careful in their daily log to not 'vent' their frustration with the GC's Foreman when it turns out that the Owner was actually responsible for the delay. The log entries might be used to determine that it was the GC's fault and thus, deny any future claim on this issue.

The Subcontractor typically indirectly recovers damages caused by the Owner only to the extent that the Contractor recovers those damages from the Owner. When this is insufficient, often times the subcontractor will issue a "pass-through claim" to the Owner via the GC.

A "pass-through" claim may be defined as a claim by a party who has suffered damages (in this case, a Subcontractor) against a responsible party with whom he has no contract (such as the Owner), and which are presented through an intervening party who has a contractual relationship with both (namely, a GC).
[7]

In theory, the subcontractor only has a contract with the GC, not the Owner or other subcontractors. In reality, the GC will "pass through" any claims against them, as this is easier to do. If the Owner is willing to entertain the subcontractor's claim (through the GC,) then the problem will 'pay for itself.'

A pass-through claim may not be allowed by contract. According to the *Severin* decision, where a contractor, by reason of a release clause in the subcontract, has no liability to his Subcontractor for the Owner's breach of the general contract, the contractor may not successfully pass through the Subcontractor's damages claim to the Owner. Even when not allowed, I have seen such claims reasonably considered by the Owner when the Owner was a public entity.

The Owner is frequently at a disadvantage in a pass-through claim. This is because the Owner has no contractual access to review the records of the subcontractor making the claim. Often times, the Owner is required to try to verify claimed costs and impacts by independent means.

The analysis of the apportionment of liability is always complex and imprecise. Often times, Subcontractors tend to include all of their cost overruns in their claim without necessarily taking into account the causation issue. Similarly, in submitting both their own claims and the pass-through claims of their

Subcontractors, GCs often do not necessarily undertake a fair (or any) analysis of fault.

The Owner is not in a particularly advantageous position to evaluate those claims, without being permitted the opportunity to review a multitude of back-up documents and to understand the premises underlying the claims. A well-documented Time Impact Analysis using an approved CPM schedule will vastly improve the acceptability of a claim, and the likelihood of success.

Conclusion

Scheduling for a Subcontractor has all of the standard scheduling requirements and many new issues not ordinarily dealt with by Project Owners and General Contractors. Profit margins depend upon good schedule planning. Execution requires daily Scheduler involvement. In addition, the Subcontractor must be prepared to present an accurate and technically acceptable delay analysis every bit as rigorous as the General Contractor's if they wish to recover delay damages.

About the Author

Ron Winter, PSP is an independent CPM Scheduler and Owner of Ron Winter Consulting LLC, the makers of Schedule Analyzer Software. He can be reached via the web at Ron@RonWinterConsulting.com

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