
 <p>The cornerstone of confidence™</p>		December 2004
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<p>SEMINARS PinnacleOne Institute</p> <hr/> <p>SERVICES Program & Project Management</p> <p>Dispute Avoidance & Resolution</p> <hr/> <p>PinnacleOne is a national construction consulting firm that provides sound advice, strategic solutions and peace of mind to its clients. Its diverse, highly trained professionals guide its clients through every step of the design, construction and contract closeout process to help them achieve their goals, and at the same time, avoid and manage risk. PinnacleOne's unimpeachable objectivity, along with a proven approach to planning and attention to detail, has earned the company a reputation as one of</p>	<div style="border: 1px solid black; padding: 10px; text-align: center;"> <h3>Construction Scheduling 101</h3> </div> <p>Construction scheduling has come a long way in the last 25 years. Unfortunately, despite the widespread use of computerized scheduling on construction projects today, there still exists a large disparity in the level of understanding in the proper use of this powerful tool. Some even say there is a crisis in the construction industry because they believe scheduling software is being misused to assert delay claims and there is, in their view, a predominance of poor quality schedules. Whether this is true or not, everyone involved in design or construction - owner, architect, engineer, contractor, subcontractor, or attorney - could use a refresher course "Construction Scheduling 101."</p> <p style="text-align: center;">Characteristics of a Good Construction Schedule</p> <p style="text-align: center;"><i>"You may delay, but time will not."</i></p> <p style="text-align: center;"><i>- Benjamin Franklin</i></p> <p>This statement could not be more true than for construction scheduling - time will march on, even if your job and schedule do not. Some project participants care more about their schedules than others. Some contractors prepare schedules only because it is a contract requirement. On far too many projects a schedule is created at the beginning of the project and never reviewed or revised until a problem develops. The best approach is for all project participants to join in the scheduling process and develop a meaningful schedule, and then use it throughout the duration of the project. This is most likely to happen when the schedule is realistic, useable, and understood by all of the project participants.</p>	
		 <p>Jennifer Frank, P.E.</p> <p>Jennifer Frank is a Scheduling and Construction Claims Analyst in PinnacleOne's Middletown, CT office. She has over 25 years experience in construction management working on a wide variety of projects including offices, schools, hospitals, prisons, pharmaceutical and water treatment plants. As a scheduler for a large construction management firm, Ms. Frank had primary responsibility for the development, updating, and analysis of CPM schedules for the design and construction phases of building projects throughout the Northeast United States with construction values up to \$80 million. In this</p>

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What are characteristics of a good schedule? Here are a few:

The Plan

All good schedules start with a well thought out planned work sequence. The plan should consider factors that could impact the timing of the work such as site access, access to work areas, long lead time equipment and materials, labor availability, and which areas of the work will take the longest. Once this plan has been established, it should be clearly communicated to all project participants. It is important to make sure that those not working on site, such as the engineer reviewing shop drawings or material fabricators, understand the priorities and planned work sequence.

Subcontractor Input

Generally, construction managers and general contractors are capable of putting together a schedule without subcontractor input. However, it is the subcontractors who are in the best position to know their durations and plan their work sequences. For this reason, I have found that a detailed schedule planning meeting with the major or early subcontractors is one of the best ways to ensure the schedule has appropriate work activity durations and sequencing.

Subcontractor input will also confirm durations for shop drawing submittals and material deliveries. How long will shop drawings take? What time has the manufacturer indicated for fabrication of materials? The initial schedule will include these activities, but the subcontractor can help "tune up" the schedule with more accurate information. Subcontractors can also assist in the schedule updating process, since they are closest to the actual work. Often they can suggest "work-arounds" or alternate sequences to mitigate delays or other field problems.

Schedule Card Trick

One method for coordinating the schedule input of large groups of contractors is a meeting called the "Schedule Card Trick." The contractors prepare their activities and durations in advance of the meeting on different colored 3 x 5

capacity, she led teams of contractors, owners, and designers in the interactive development of schedules using the "card trick" process.

Since joining PinnacleOne, Ms. Frank applies this experience and her skills in CPM scheduling to analyze delay claims and she is an instructor of the PinnacleOne Institute where she conducts seminars on CPM scheduling-related topics. Ms. Frank is a registered professional engineer in Connecticut and New York.

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cards. Several large calendar sheets with weekly time increments are also prepared before the meeting. During the "card trick" meeting, you "build the building," starting with the earliest work areas. The activities for each work area are sequenced and arranged by placing the cards on the calendar sheets and connecting related activities.

In this way, the construction schedule is created in front of the subcontractors. This is a great opportunity to hash out key sequencing and planning issues. For example, which subcontractor goes first inside the building, ductwork, or masonry? Will the finishes go from the bottom floor up or the top floor down? The "Schedule Card Trick" gives all the subcontractors a chance to see the big picture, as well as where and when their work fits in the schedule. There is also the added benefit of "buy in" of the schedule by the subcontractors because they helped put it together.

Explicit Activity Names

Work activities in the schedule should have names that are clear and specific. Explicit work activity names make it easy to understand what is included (and not included) in the work activity and when they start and finish. In order to properly track work progress, the schedule needs separate activities for each trade contractor even if the activities are scheduled to occur at the same time. "MEP rough-in" is a good example. The plan may be for them to start and finish together, but you will never be able to identify the contractor responsible for delaying the activity if they are combined in a single activity in the schedule. Similarly, it is good practice to separate activities that a certain trade contractor may do in different time periods or with different crews, such as "framing walls" and "drywall and tape."

The Right Level of Detail

When construction is just getting started on a project, it is not unusual to find the project team focused on the earlier parts of the work. As a result, they may not want to take the time to develop a detailed schedule for work that is a year or more in the future. On many projects, a detailed schedule will be developed for the site work, structure and enclosure, and a single long duration activity will be

allocated for "interior finish work." This will work, as long as enough time is allocated in the schedule for the later work and a future schedule details this work.

A schedule may not be used if it is cluttered with too much detail. Generally, activity durations should range between one and four weeks. How much to "break down" individual work activities also depends on how large the work areas are and if a set of activities will always be done in sequence. It may be all right to combine "form/reinforce/place footing - east side" if the duration is one or two weeks. One day activities or milestones signifying the completing of key project activities (i.e. permanent power available, roof tight, completion of a work stage) are also useful.

Even a large, detailed schedule may not provide all the specific activities needed in the field or may be too cumbersome to use on a daily basis. For these reasons, field staff often develop short-term, hand drawn schedules to coordinate day to day activities among subcontractors. This is an acceptable practice if the durations and sequencing in these short-term schedules are consistent with the "official" project schedule. Significant differences between the two schedules are indications that there may be a problem with the overall schedule because it is not accurately reflecting the work being performed in the field.

Well Organized Activity Groupings

The typical construction schedule on a large project will include hundreds or even thousands of activities. To make the schedule useable, it should be structured so these activities can be sorted and grouped, making it easy to find desired schedule information. Generally, activities can be separated by phases, such as bid/award, shop drawing/fabrication, new construction and renovation. It is helpful if the activities can be sorted by bid package or specification section within these categories.

It works best if the groupings of activities correspond to the planned work areas and sequences (i.e. how you are planning to "build the project"). For example, if the interior work on the floor of a building will be completed all at once or in two halves, or by specific functional areas (Administration Area, Classrooms,

Library, etc.), it is important to create schedule activities for each work area.

Breaking work into smaller pieces in the schedule also allows better tracking (for starts and finishes) and better logic (the following activity will probably start sooner). Areas on bridge and road projects are often sub-divided by survey stations or work phases.

Proper Consideration of Weather

Once a detailed schedule has been developed and the expected start date for the work is known, the project team should review the activities in relation to the time of year in which they are scheduled. In cold weather climates, activities which fall in the winter months may need to be shifted, or it may be necessary to plan for temporary enclosure and heating. Similarly, the schedule may need to allow more time for certain activities or show them being done on a limited basis because of weather considerations. Similar issues may arise in extremely warm areas or areas which have a rainy season.

If a revised project start date or other delays shift the work by several months, the schedule should be updated and the activities that have shifted into bad or difficult weather periods should be looked at closely and adjusted as needed to reflect the effect of weather. This is one of the most often ignored aspects of preparing and updating project schedules; when not considered and planned for, seasonal effects can significantly impact the project cost and schedule.

Finally, use the schedule. Hang a large plot on the wall at the jobsite. Write on it, noting actual starts and finishes, and make notes about changes and new issues. Put the new updates on top of older versions (which are very likely to be referred to by those who are really watching the schedule). Refer to it daily with the subcontractors. Formally review current activities at all regular subcontractor meetings.

Awareness of the schedule and delays will allow for better planning and a smoother job. Throughout the project, be "schedule conscious." The schedule itself may experience delays, but time will move on. Ben Franklin may not have been a construction scheduler, but he certainly understood its importance.

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