

## PROJECT CONTROLS NEWSLETTER SCHEDULING BEST PRACTICES SERIES

The sixth article in the Scheduling Best Practices series is “Multiple Calendars – Blessing or a Curse.” Our colleagues, Jodi Staub, Senior Consultant in Warner’s Scheduling Group and, contributing editor, Larry Conley, in Warner’s Disputes Resolution Group, are both recognized experts in scheduling and scheduling best practices. Jodi Staub has over 15 years of experience in the construction industry, including estimating, bidding, purchasing, scheduling, inspections and field supervision. Her construction experience has focused on schedule preparation, management and analysis. *Mark Anderson*

### **Multiple Calendars – Blessing or a Curse**

*By Jodi Staub, Senior Consultant in Warner Scheduling Group and, contributing editor, Larry Conley in Warner’s Disputes Resolution Group.*

Continuing our series of articles on scheduling, Warner examines the pros and cons of using multiple calendars in a single project schedule. Through this article and the series of Best Practices articles we will pass along observations and highlight the best practices for schedulers and project managers alike. Multiple calendars, as those who have had experience with them should know, can be both a blessing and a curse depending upon their use. This article will illustrate ways that multiple calendars can be used as an effective tool as well as point out why they may be an ineffective and even deceptive instrument.

This article is divided into two sections; first looking at the positive aspects of using multiple calendars, and secondly describing their ineffective use or abuse. First, we should describe the rationale behind the use of multiple calendars. A work week is typically described as a five-day week. What we often call a calendar week is a seven-day scheduling calendar, that is; all seven days are counted. The distinction is reflected in a statement such as, “This activity is going to take eight work-days or ten calendar-days.”

For the purpose of this article we define maintaining different calendars as the placement of activities (or resources) on specific calendars that reflect only the days on which a particular activity can be performed. Using different calendars, schedulers can identify what days are available for work to be completed.

Multiple calendars may also be used with particular trades as well, thus putting resources on different calendars. One such example occurs when some trades are available for shift work, extending their hours or days available for work in a given week, whereas other trades may not be similarly available. It would be burdensome to calculate an update without multiple calendars in this situation. Thus, when the days available for work vary for different activities or for different resources, the use of multiple calendars in scheduling software becomes a valuable tool.

### **Benefits of Multiple Calendar Use**

There are many positive reasons to use multiple calendars in the appropriate scheduling scenario. Without them, the schedule may become an inaccurate reflection of how and when work is able to be performed. This section discusses positive uses and gives examples of the appropriate use of multiple calendars.

Multiple calendars should be used to more accurately represent how activities are planned. For example, trying to schedule a two work-day activity that can only be performed on Saturdays and Sundays using a five day calendar would be inaccurate. The scheduler could schedule the activity in this example as a two day activity (constrained to Friday and Monday) in order to cover the weekend when the work is actually being performed. An example of this type of situation would be if there is a power shut-down or plumbing tie-in to be performed for an existing business that cannot afford to close during the week. The problem is, when this activity is delayed by even one day it cannot be moved to Monday and Tuesday, it has to jump to the next Friday. Thus, the scheduler would have to keep two sets of books in order to be able to convert the non-standard calendar activities when updating the schedule. This double accounting of durations would lead to inaccurate reporting, and the schedule logic itself would not be recorded accurately. Without the use of multiple calendars there are constant adjustments that would be needed to the schedule for activities which have different available work days or time periods.

Examples of situations, similar to the above, where multiple calendars can be used effectively, and should be used to incorporate accurate schedule logic are as follows:

- Concrete curing activities which can be performed on a seven-day calendar as opposed to just a five day calendar. After all, concrete cures whether you're on the jobsite or not.

- Work performed where an allowance for extreme weather conditions is needed. Some areas may not be accessible after winter snows begin, while other areas may require a reduced work schedule during periods of extreme heat.
- Winter weather shut-downs for landscaping, paving, or grading activities in areas where frozen ground prohibits such work.
- Work required to be performed during non-peak or non-business hours. This example is often found on State or Federal highway projects. Seasonal bridge or roadway closures may also affect the schedule in a way that requires an adjusted calendar.
- Mandatory weather days per State regulations (also found in roadway building).
- Other weekend or off-peak time work as mentioned above and in commuter rail construction.

Multiple calendars are also effectively used when milestone activities are on a different calendar than the work-day calendar. For instance, if contract duration is expressed in calendar days (7 days per week) and the work-day calendar is a typical five-day week, an alternate calendar for completion milestones should be used. This is important if there is an adjustment to the completion date; if it is delayed or advanced for any reason. The calendar-day to work-day adjustment does not have to be hand calculated with the dreaded, and not precise,  $5/7$  conversion each time an impact is encountered. Instead, an accurate representation may be made demonstrating how much gain or loss the schedule is experiencing.

As mentioned above, resources may also be put on alternate calendars. This may become especially important if the project requires acceleration. If certain trades are able to staff the project with two shifts, while others can work ten-hour days, and still others only eight-hour days, the scheduling of a recovery effort can become very burdensome. However, if multiple calendars are used, the scheduler can quickly, easily, and accurately determine the effect of extending work hours. This can be a vital tool when determining accurate time extensions. It also gives the scheduler a greater flexibility in scheduling the work.

## **Disadvantages of Multiple Calendar Use**

There are disadvantages and dangers in the use of multiple calendars of which a scheduler should be well aware. These disadvantages and dangers should also be known by both the owner and contractor alike.

A major disadvantage stems from how the use of multiple calendars complicates schedule evaluation. The complications encountered are due to several factors including; calculating float, finding the critical path, and inaccurate use of multiple calendars.

Total float on a given activity is calculated based on its calendar, thus the use of multiple calendars can make the evaluation of float more difficult. The reason for this is illustrated when two activities of the same duration are on different calendars, for example one on a seven-day calendar and the other on a five-day calendar. The activity on the seven-day calendar may show more float than the activity on the five-day calendar, even though they both must be completed on the same fixed calendar date (for example June 1<sup>st</sup>). Thus both activities would have the same late-finish date, yet show different total float. This can become confusing if the multiple calendar use is not made patent on schedule reports. Thus, looking at activities with the lowest total float may not give an accurate picture of what is on the critical path. In order to overcome this problem, calculating the longest path (through the use of filters) must be done in order to determine the true critical path; that is the path with the most work-days.

It is easy to see how the use of multiple calendars can be abused by schedulers. By adjusting the calendars, float may be altered and the critical path hidden if printed in a report that does not demonstrate the longest path or indicate the use of multiple calendars. This is made worse when intermediate milestones are to be met. However, using an intelligent activity identification system, combined with the longest path filter, a more accurate picture may be presented. An intelligent activity identification system will group activities within a particular interim completion date (milestone). Activities can then be filtered according to completion date (milestone) in order to find the longest path leading to that particular intermediate milestone.

## **Conclusion**

The use of multiple calendars can be both a blessing and a curse. They are a blessing to schedulers in the respect that they can accurately show when activities may be completed. However, they can easily become a curse if not managed properly through intelligent activity identification systems and the use of the longest path filters. Schedulers should be encouraged to use multiple calendars when appropriate because of the improved accuracy of the schedule logic but must be wary of their use and properly manage their implementation.