

# Five critical steps to build the best construction project schedule

Best practices boost schedule accuracy and optimize resources

**For construction project delivery teams, the critical path schedule is both the map and the compass. It sets out the myriad of complex relationships that intertwine timelines, activities, and resources. It establishes the path to deliver the project on time and within budget.**

On a major construction project, the schedule can include numerous activities for just a couple of weeks' work. Each has many underlying tasks, varying dependencies, and a different level of importance. And as schedule complexity increases, the likelihood of errors, omissions, or disconnects rises, limiting the visibility that is needed to manage activities and resources optimally.

True visibility comes from an understanding—by all relevant project participants—of how those parts fit together, the time and resource they require, any external factors which might affect the project, and how construction is likely to play out. That is no easy feat, and no matter how well put together a schedule is, there are several common process or organizational weaknesses that can result in costly deviations and delays. This paper examines five key areas where construction project delivery teams can improve scheduling practices to drive overall better project outcomes.

# #1

## Base new work durations on quantities and historical data from within the same market and region.

### How are you currently predicting activity durations for a new construction project?

For many firms, these estimates are still just educated guesses. Why's that? There are no systems or processes in place to capture historic project data for comparison.

While the world's largest construction firms may have the resources to conduct sophisticated historic cost and schedule analysis, that kind of important investigation traditionally has been unachievable for many companies. While such firms might be able to analyze cost overruns, it's extremely difficult to diagnose where the issues arose with your schedule.

## Regional variation

This challenge is compounded by differences between projects in varied sectors and regions. For example, building a power plant in India will likely be entirely different from building one in the US, due to resource availability, construction methods, and nuances of local laws. Similarly, a high-rise project in California might have noticeably different durations than an identical one in Seattle, due to weather variations. Even building a hospital may take much longer than a similar medical office building a few blocks away, due to different oversight jurisdictions.

As such, understanding these variations and how they impact schedules is critical. The key is capturing the right data across portfolios and conducting the right analysis in building the schedule. With the right data, systems, and processes, you don't have to be an ENR [Top 25 Builder](#) to do that.

## #2

# Ensure logical relationships are valid throughout the entire schedule.

Logical relationships between activities in the schedule are fundamental to the efficiency of a project. In simple terms, if two activities can be timed to overlap with one another and run in parallel rather than in series, then the total duration of the two activities is reduced. This is simple enough to visualize with a handful of activities—but it becomes increasingly difficult the more tasks there are to coordinate. With a complex, multi-year construction project, it's easy to accidentally omit dependencies.

Schedule managers can spend many hours cross-checking a project plan hundreds of pages long. It's tedious work, but today much of it can be automated. And failing to perform this work can have serious consequences.

## Get aligned

Say you're building a high rise, where the external glasswork can't be started until the structure has been built to a height of eight stories. If your glazing schedule isn't logically aligned to your building schedule, you could end up in one of two scenarios. You could slow down the project because the glazing is scheduled at a lag much greater than eight stories. Or you could have the frustrating and costly situation where your glazing crew arrives but are unable to begin their work. If you have to alter your logic to deal with this in the middle of the project, you could completely change your critical path and put yourself in recovery mode to get back on track.

All your contractors have based their productivity on the original schedule, so that single omission has a significant ripple effect. For the success of a project, it is essential to get buy-in and commitment for the whole team at the beginning and across each stage—where everyone knows what to expect of each other every week, and the whole project has a high degree of predictability. It's also critical to recognize and adjust to variations—and communicate changes—as quickly as possible.

## #3

# Verify that staffing levels are adequate and balanced (no peaks and valleys).

**In a traditional cost- or resource-loaded schedule, tasks are assigned with budgets and the required labor. At a summary level, that's a fairly effective way to run things. But this approach starts to break down as you get more granular with the detail.**

Returning to the high-rise glazing example: In your summary schedule, you might have glazing as a single task for the entire building, with labor and cost allocated at the summary level.

Yet in the day-to-day schedule, that task is broken down into each individual floor, where there may be other relevant factors that drive variations, such as a team's ability to work faster at the end of the process than the beginning.

In addition, in a resource-loaded schedule, you may end up with significant peaks and valleys in staffing levels, because several similar tasks have been scheduled at the same time. That can result in hiring many specific trades for a short period, whereas if your schedule enables spreading those tasks out, you could hire fewer carpenters and keep them on for longer. Again, having easy visibility into such relationships is the key to smoothing out resource needs.



## #4

# Perform weekly schedule updates and make notes on why things aren't getting done with each update.

The importance of this practice can't be overstated. In many construction projects, the standard contract between owner and contractor involves monthly updates on progress against the schedule. But monthly updates are worryingly infrequent; you need timely information on progress to make informed decisions

when anything diverges from plan. If there's an unplanned delay in the first week after a monthly update, it will take you far too long to spot and correct the issue. Given the vast number of things that can go wrong in construction, you need weekly updates at a minimum.

## Weekly updates

Different project types require different reporting cycles. Construction projects typically measure durations to the nearest day, whereas shut-down projects measure durations in minutes. These differing levels of control should define the schedule update frequency.

When the average construction project has a duration of 24-28 months, the best practice is to have weekly—rather than monthly—schedule updates. In the case of the high-rise glazing example mentioned above, it might take a week to glaze one floor of the building. A divergence from the schedule on week one might be straightforward to adjust to, but on a monthly schedule update the issues would be multiplied by four. That has a big impact on the other activities and contractors with logical ties to the glazing. A weekly schedule update allows you to follow a 'Plan, Do, Check, Act' approach—and where that hasn't been possible in the past, it's now achievable with modern scheduling tools.



## #5

# Understand the scope of work and contractual terms, and make sure the schedule addresses them.

**It may sound obvious, but you can only predict the scope and nature of the work if you know exactly what's expected before you begin.**

This is critical to understanding what to account for as you build your schedule and the scope of work. In far too many cases, project teams fail to do this, either because they are too time-constrained, or they base their assumptions on the drawings alone.

## Measure twice

For example, perhaps a scheduler sees a tile system in the plans and it looks on paper like one that's been used before, so they account for that in the schedule. Schedulers want to get started quickly and are confident of how to do it based on past experience. Yet when the actual tile installation happens, they realize there are stipulations in the contract (which wasn't reviewed) that are needed—for example, an inch of grout to level the floor before the tile goes on. That's been missed in the initial planning, and now there's a need to insert the omitted work into the schedule, which could affect the critical path.



# Tying it all together.

**Given the number of variables, the baseline CPM schedule will not precisely reflect the work that is ultimately done; there will always be flux. The key is building the best possible schedule (using the best data) and then properly managing the schedule throughout the project to minimize flux—and, more to the point, its impact.**

Fortunately, modern technology allows us to get increasing levels of predictability and responsiveness across every part of a construction schedule. Critical elements here include:

- Visibility into current progress, schedule and project execution data across stakeholders (single source of truth, accessible to all who need it)
- Workflows to update schedules based on worksite developments
- The ability to visualize and analyze progress performance against plan
- Change control and impact clarity

Many leading construction businesses are using technology to deliver more value with fewer resources—the Lean methodology. With the rise of Lean in construction, we've also seen many in the industry adopt an either/or approach to construction management methodologies—aligning with either the CPM or the Lean Construction approach. Both have strong and proven merits. Limiting adoption to one or the other, however, inherently means that organizations are leaving important opportunities for improving performance on the table.

Cloud technology now allows for the digitization of Lean processes and a unified platform that integrates Lean and CPM methodologies. Firms that can successfully harness the power of both approaches stand to gain a significant competitive and operational advantage.

An increasing number of firms are also leveraging schedule technology as part of an effort to enable earned-value management (EVM). Earned value, a critical dimension of the execution of large and complex projects, provides an integrated view of progress that encompasses cost, scope, and schedule, enabling deeper project analysis and more intelligent decision making. The EVM methodology entails comparing the amount of what was planned to be completed against what work has actually been completed, and how much that work has cost. Such a comparison enables greater precision in forecasting the final cost of the project and whether it will be completed on, behind, or ahead of schedule.



# The cutting edge.

**One major leap already taking place is the integration of models and other project visualizations in a true Common Data Environment to improve data management across the project lifecycle—from design to handover of the digital twin. With schedule and cost data associated to models and visualization tools, organizations are able to perform 4D (model + schedule) and 5D (model + schedule + cost) approaches to drive ever deeper levels of progress analysis.**

Machine learning/artificial intelligence is another area where we're already seeing an impact on scheduling. For example, when it comes to analyzing historical data, we can use AI to quickly normalize all the data, sort it, and suggest recommended durations for a new project.

Such developments in construction project delivery technology, taken together with the prevalence of sophisticated mobile tools in the field, mean that construction firms increasingly have access to more valuable data, in a more useful and usable format, at the right times for the right people. Having all this data in one place also opens the door for effective use of predictive analytics using historical data, the existing schedule, and all other aggregated data from the development. This can become an engine for improving outcomes today and driving continuous improvements into the future.

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