Schedule Management for Project Managers

Scheduling the work, and working the schedule

BY DOUG HORGAN

Keeping projects on schedule is one of the core responsibilities of a project manager, or "project lead," in a building and remodeling company. At the company where I work, we have 15 to 20 jobs running at any given time, each with its own project manager tasked with arranging the work. Knowing how to create and work a schedule is an essential skill for those individuals.

Finishing a job on time is one of our core promises to our clients. If we fail, they have a right to be mad. But when the schedule slips, it's not just about feelings: The company loses money. The way we build our project budgets is based on how long we think it's going to take to complete a project. Losing a day here and a day there because of schedule slippage can add up. If you add seven days of lost time to a 65-day schedule, for example, you've gone 10% over budget on supervisor and site labor.

We try to prevent all that by skillfully managing the schedule. In this story, I'll look at some of the scheduling tools we use to create and visualize the job schedule. I'll discuss some of the factors that can interfere with the schedule and hinder the timely accomplishment of projects. And I'll look at some of the practices we've instituted to help overcome those obstacles and complete our jobs in a timely fashion, as promised.

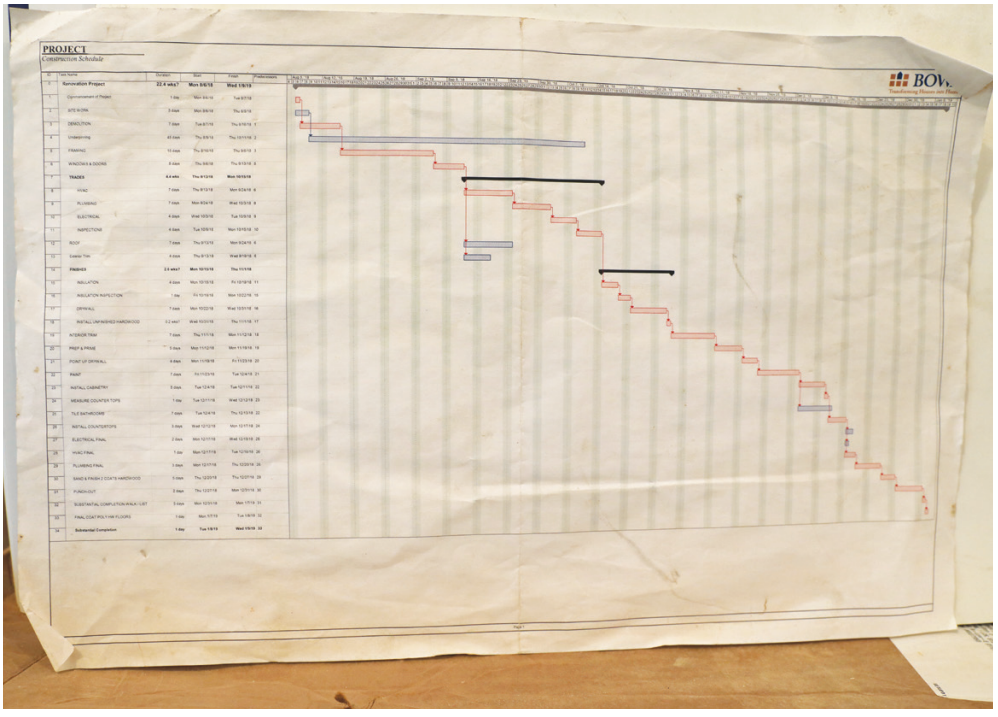
In our company, our project managers work with "production managers" who manage a team of PMs, carpenters, and laborers. Production managers also help with the design and budgeting process.

It's the production manager's role to create a master schedule for each job. We use Gantt charts, which we usually create using Microsoft Project (though for simpler projects, other methods are fine).

GANTT CHARTS AND THE CRITICAL PATH

Gantt charts show the phases of a project as they progress through time, and they illustrate which ones need to finish before another

Photos by Doug Horgan and Clayton DeKorne



This Gantt chart from a long-running gut-rehab and structural remodel shows the wear and tear of daily use on the job. Down the left-hand column are listed job phases and tasks. In the field to the right are bars indicating the time each step will require. Start and stop times for job steps are staggered to indicate the order in which tasks have to be performed.

starts, so they make a great visual guide to the whole project. For typical construction projects, calendar days are set out left to right. Construction activities are written in order down the left edge. The days we plan to do each activity are shown as a line or block on the calendar days, so a long activity will have a long bar, and a short one a smaller bar. When one activity has to finish before the other starts, they don't overlap, so the "Foundation" bar ends before the "Framing" bar starts. The result is a set of lines generally running from top left (first activities at the beginning of the project) to the bottom right (punch-out at the end).

Normally, our activities are defined by the work that a crew or trade will do at one point, such as "plumbing rough-in," "tile kitchen floor," "main roof shingles," and so on. The plumbers will be on a schedule more than once: "Ground works" is its own line because it happens separately from rough-in and final trim, which each get their own lines as well.

The "critical path" is the chain of all the activities that have to finish before each other to get the whole project done, and these tasks are the ones that need the most attention as we work the project. Of course, everything needs to be done by the end, but there are often a few activities that can happen in a wide window of time, because other tasks don't depend on them; these are not on the critical path for the project.

We use Microsoft Project for our Gantt charts, but it's overpowered for what we do with it. We sometimes use hand-drawn paper versions or use X'd out cells in a spreadsheet to make a simpler version, which is perfectly adequate for many jobs.

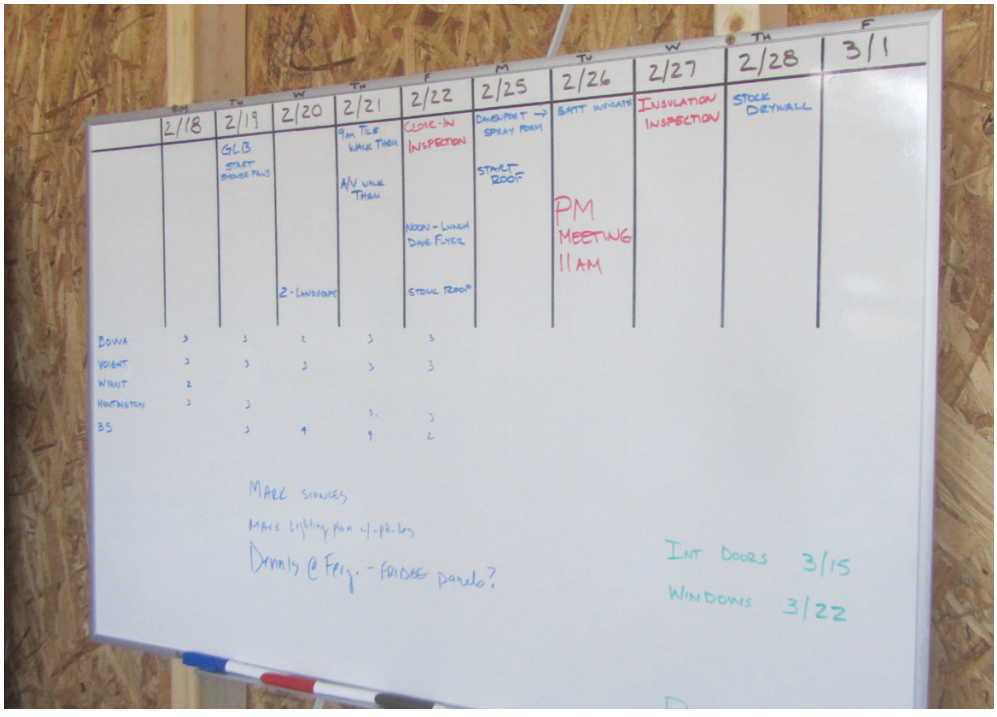
CREATING THE SCHEDULE

Many remodeling jobs are basically similar, and most custom home projects have a lot in common too. So when we are partway through designing a project and creating a budget for it, the production manager will pull out a similar project, take the Gantt chart from that project, and tweak it here and there to make it line up with what they expect will happen on this one.

It's the project manager's job to implement the schedule and make the promises into reality. Ideally, when the schedule's being created, the PM also has a chance to chime in about whether it's practical. They may say, "The waterproofing sub and the electrical heavy up can't overlap here," or "This isn't enough time for the framer." This doesn't always work out, because we can't always identify the lead for each project far enough ahead of time. In the end, we hope to have at least three people looking at the schedule, even if a different manager ends up running the job.

We also consult with the key subcontractors to make sure that they can accomplish their phases of the work in the time that we're allotting. On smaller jobs, this is less significant; we don't need a long conversation to know how long it takes a plumber to rough in a 6x10 bathroom, or a drywaller to hang and tape two rooms. But we've had custom house foundations that took eight weeks to build. We sub out a lot of our carpentry too, and some of our larger jobs are 10,000- or 20,000-square-foot houses. On projects like that, it's essential to have a detailed discussion with the sub who is going to be taking up a huge block of your schedule.

Staffing can also be a factor. For example, if you know that it's



This "look-ahead" chart is updated weekly by the project lead as a short-term planning and execution road map. The project manager and the production manager will meet routinely to update this chart and discuss the appropriate phone calls, materials ordering, or other steps needed to enable work to proceed as planned.

unusual for a plumbing sub to bring two crews to the site, but you plan on having them run floor heat at the same time they rough in the domestic water, you should clarify that in advance. In those cases, we may even include an understanding about staffing levels in the subcontract for that phase of the job.

As we build the schedule, we seek clarity about what the experts call "dependencies." I think of a dependency as something that can't start until something else is completed. We can't fabricate countertops until cabinets are installed, shower glass can't be measured until the tile is complete, and so on. We can't schedule these out of order; we need to identify those constraints and stretch the schedule according to the dependencies.

But this brings up the concept of "float"—which, in practice, is when people say that the work will take longer than they actually think it will, because they don't want to make promises they can't keep. If the plumber thinks it's a two-and-a-half-day job, they might say it will take three or four days to be on the safe side. Well, if you're checking in with all the trades and they all take that same approach, you could add a dozen or more days of float over the course of the project.

A conversation that you can have with people ahead of time is, "OK, I understand that you won't promise to be done before three days, but how long do you really think it's likely to take? How about if I pencil in the next trade for when you think you'll really be done, and if you need more time I can push them back half a day?"

On some of the bigger jobs, you can build in an explicit promise to everyone that you've included a few days of slack time in the total job—but you're not going to give everyone a few extra days each. We'll all do the best we can, and then at the key milestones of the job, we'll have a couple of days to make up for any of us having issues.

The key milestones where we find we really do need to allow these extra days include foundations—because those are built in the mud, and if it rains, you can't do them. And then the other places we always build in a little slack are at close-in inspection (when the mechanicals have to be completely roughed in before they're inspected and the drywall crew covers everything up) and, of course, at the end of the job.

SCHEDULE TOOLS

The Gantt chart lets everybody look at the whole sweep of the job from beginning to end. But it's not the only tool needed to make that schedule a reality and not just a wish.

At least once a week, the production manager visits each job and meets with the project manager for an update. To prepare for this meeting, the project manager creates a look-ahead schedule each week for the next two weeks. This two-week daily schedule organizes the conversation between the project manager and the production manager. Taking a half hour to write all that stuff out and see what is going on in the next couple of weeks prompts us to communicate: It reminds us that we need to be calling all our subcontractors two weeks before we want them, to remind them that this is when we need them. This practice also helps remind us about materials that need to be ordered or selections that aren't complete.

In fact, a lot of us, including myself, have found that two weeks is

Here's a view of another "look-ahead" calendar. Project managers may use a variety of methods to construct their forward-looking calendars, sometimes looking ahead as far as six weeks to stay on top of time-sensitive job requirements.

not far enough out in advance for a look-ahead schedule. For example, some material orders require a much longer lead time than two weeks. I like to look ahead at least three weeks, and the PM on a complicated project may build a look-ahead that is as long as six weeks forward.

There are many ways to do that; I've made a look-ahead calendar out of a piece of plywood and used sticky notes to fill it out, so that I can move the stickies around as time passes. Some of our PMs use a whiteboard and erase each week as it goes by, wrapping back around to the top when they run out of space at the bottom. Large desk-blotter calendars are popular, too, because each day has plenty of room to write in. Some use computer calendars as well.

WHAT COULD GO WRONG?

In my general reading about construction scheduling, I've run into some formal studies of the topic. One study surveyed commercial mechanical contractors to ask about the causes of schedule delays. The list they came up with rings true to me:

- Other subs behind schedule
- Out-of-sequence work
- Interference with other subs
- Drawings unclear or incorrect
- Work changes

A similar survey highlighted these factors as top causes of delay:

- Materials not available
- Prerequisite work not done
- Change in priorities
- Not enough labor
- Work underestimated

These studies weren't from residential remodeling jobs, but my gut tells me that these top factors are common sources of delay in residential work too.

STAYING ON TRACK

The point of focusing on these common factors that interfere with the schedule is this: The master schedule created at the beginning of a job is not a set of rails that you can just set the job on and expect it will roll on, right down to the end. The job schedule is little more than a wish, and it's a wish that will come true only if you take the steps to make it come true.

The way we make the schedule a reality is by following a set of routine practices. First, we schedule standing weekly meetings with the client, the production manager, the project lead, and any other key players needed (designer, key trades, and the like). This is our way of ensuring that the client is fully involved and reasonably available. In high-end residential remodeling, not getting timely information from the client might be our most frequent cause of delay, so we have found these weekly client meetings to be very helpful in keeping the lines of communication open.

Then there are the meetings with trade contractors as needed to keep the work moving. We start with a kickoff meeting at the beginning of each phase of work. If it's a relatively small job, that may not amount to much, though we always want to be sure the crew has the latest set of plans and is familiar with our trade standards. If there's something new or unusual or a chance of significant problems, that meeting could involve many people—maybe the architect or designer and maybe the owner of the trade contracting

Frequent ad-hoc meetings between project managers, production managers, and trade contractors to iron out critical details help to keep jobs moving and on schedule. Here, metal roof details are being discussed with the roofing contractor.

company as well as the trade crew. Nothing slows a job down more than redoing work that was done wrong! On a recent project, for example, we called a meeting with the roofing contractor, the roofing crew leader, the architect, and our PM to review all the metal roof details, because the contractor was ordering the roofing material pre-bent from the manufacturer, and we wanted to make sure all the terminations and intersections were properly addressed (see photo, above).

Then we meet again with the trades whenever there are decisions to be made about the work, or something to coordinate. For example, architects don't always draw a specific detail for locations where two different materials are going to butt together or connect, so we'll often meet with the sub to discuss options before we start asking the owners or the designer what they would prefer. Scheduling frequent onsite meetings helps us to figure out these tricky details.

Simply calling the trades a few times before they're scheduled to work is actually a key practice. Calling two to three weeks out (or more on a large project), then a week, and again a couple of days ahead keeps our project top of mind for the trade's scheduler.

It's also important to keep things moving ahead of each trade's work. After calling two or three times to say you'll be ready for them on Wednesday morning, it's important that the subs who are ahead of them are done on Tuesday afternoon. Most of the trades understand the importance of promised dates, and they'll work to keep on track. A fallback is to complete at least some of the space (like the whole first floor) so the next trade can get started while the tardy team finishes up. In fact, on larger jobs, we often work floor-by-floor so crews can overlap. We don't need to have a 15,000-square-foot house empty except for one crew when we can schedule each level separately. The painters can be priming the basement when the drywall finishers are working the main level and the hangers are on the attic level.

All these practices help us "make ready" the work, a term I learned from the Lean Construction movement. People can't get their job done unless the antecedent work is complete and they have correct plans and selections ready, all the materials on hand, room to work, and so on. Our role as managers is to get all these things ready so the crews can actually accomplish their work.

Making it easy for trades to do a good job is the best way to approach a project. Help a crew at the start of a job, and odds are they'll return the favor later on (the opposite happens too). I learned this lesson while working as a project manager, when I saw on the plans that a large supply duct needed to fit in an I-joist floor system. We decided to precut the holes in the I-joists to make room for the duct to be slid in from one end, and the grateful HVAC crew did little extras for us throughout the rest of the job because we had saved them so many hours at the beginning. Since that project, I've done what I could to help everyone be productive from the start, including steering people away from quality issues we are going to be watching for—rework is a schedule and morale killer, and we aim to prevent it up front.

Using all these practices, the picture on the Gantt chart can be made to happen, budgeted costs kept under control, and most importantly, the promise to the clients fulfilled.

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