

Legacy Homes

Team Case Report

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Building a house is like putting a three-dimensional puzzle together. Having all the materials and the labor to do it at the right time is essential and can make or break the process. Legacy Homes promises 90 day completion.. However, we know that we can have a house built in less than 90 days.

Design a Process Flow

This is our critical path. It starts with the concrete footer for 0.25 days. It is not the most cost efficient way, but we tried to cut the process down as much as we could. If we had more time on it, it would have been more cost efficient. Later, it leads in the foundation that lasts for 1 day. Then into grading for 0.25 days, then framing for 1.3 days. We cut the framing time in half as so many other things was dependent on it. It then leads into roofing, furnace and cuts, and insulation. After the insulation, the Dry Wall is set up and then painted. Heating trim and tiling are then done simultaneously before carpentering and cleanup. Taking the time bonus into consideration, we tried to make the process as fast as possible not looking at potential cost savings in keeping the process at some length.

Minimum Time with Present Data

Using Microsoft Project to manipulate the given data, we calculated the minimum time requirement to build a house to be 16 days. We arrived at this number by taking advantage of extra workers through subcontractors. First, in the concrete footer stage we hired 5 workers instead of two allowing us to complete the project 75% faster than before. We did not change the amount of workers on the foundation. Second, for concrete we hired 4 workers instead of 2 to cut the time from half a day to a quarter of the day. Third, for framing we hired 10 workers instead of 5 to cut the time until activity completion by 1.3 days. We did not change the amount of workers for roofing, leaving the activity at its normal duration of 1 day. For concrete, we hired 6 instead of 6 instead of 3 to cut .75 days out of our projected project time. Approaching wiring, furnace and ducts, plumbing, insulation, drywall and siding. was different. Although we could get these processes done more quickly, we had to pay respect to preceding activities, therefore leading us to cut time but still having to wait for preceding activities. For these activities, we hired 5 extra workers. In the concluding parts of construction we were not as aggressive in hiring extra workers as we were in earlier stages. For sewer, electrical trim, and heating trim we did not exercise hiring extra workers. Yet, in finish carpentry, tile, finish plumbing, and cleanup we hired 7 extra workers to speed up the time until completion to 13 days. In conclusion, the main variable that allowed us to speed up the time of completion was the ability to hire on extra workers, allowing us to take advantage of the financial incentives for completing ahead of schedule.

Shortened Time Requirement

To shorten the time requirement to complete the house, we had to spend some of our cash reserve to hire additional subcontractors. We also had to max out our labor. We used as many workers as we could on a given task to complete it as soon as possible, and then be able to move on to the next task in the project. We were able to do this without overextending our crew, and without tasks conflicts, as in our original analysis.

One of our analysis showed that a house could be built in less than 16 days, around 12 to be exact. The problem, however, is that a time frame shorter than 16 days can create task conflicts, and a higher expense on labor. Additionally, our

concern for quality prompted us to stay at a comfortable 16 day completion time because we felt the supervisor could have adequate visual control of the project at this speed.

Economic Justification

On average, we give ourselves 90 days to build a house. However, with the \$1000 incentive for shortening the building days gives us motivation to reduce the amount of building days. We have reduced our amount of building days from 90 to 16. This means we made \$74,000 in early delivery incentives. Our costs to reduce the amount of days is \$35,350 - leaving us \$20,650 left over from the \$56,000 reserve to reduce the amount of days. Although our costs are a lot higher than the original costs (\$19,100), we are still in the budget of the \$5,000,000 given to build the house. Shortening the days reduces the amount of *muda* produced. *Muda* is produced when the set of actions extends over a set amount of days, most of which creates or has no value. There are two types of muda; type one *muda* is waste that is unavoidable and type two *muda* is waste that can be taken care of and rid of right away. By shortening the building time to 16 days, the time to get rid of type two muda is shorter – thus more time in getting the job done at a more efficient time. In addition, reducing the amount of days to build the house gives us a more efficient way to get our resources more quickly, and thus build at a more timely and swifter rate. There won't be too much waiting delays.

Raw Materials

Using our new shortened schedule of 16 days and the job's preceding operations a sequence for raw material supplies can be scheduled, six separate times, for delivery on site throughout the shortened schedule. Due to the shortened time schedule several jobs are grouped together without conflict. The delivery of raw material supplies are grouped as well, and are to be delivered one day before particular jobs or tasks are to start. It just so happens that the first four raw material deliveries are set to be delivered every three days, while delivery five is set to be delivered five days after the fourth delivery, and delivery six is set for the very next day. First delivery is before the job even starts. Raw materials for concrete footer, grading, and enough materials for foundation, framing and roofing for two preceding operations are to be delivered on site. Second delivery is on day three that consists of raw materials for wiring, furnace and ducts, drywall, enough raw materials for preceding operation jobs for plumbing, and insulation are to be delivered for the work to begin on day four. Third deliver is on day six. Enough raw materials for four preceding operation jobs for painting, and finish carpentry are to be delivered for the jobs to start on day seven. Fourth delivery consists of raw materials for concrete, siding, sewer line, tile, electrical trim, finish plumbing, and heating trim are to be delivered on day nine, so the work can start on day ten. Raw materials for carpeting is the fifth delivery to be scheduled on day fourteen. The sixth delivery is for materials that are used for clean up on day sixteen.

Conclusion

We were able to, in theory, complete the house within 16 days, thus earning a substantial bonus for early delivery. We did this by taking advantage of the cash reserve and hiring more subcontractors. We also shifted our labor resources around to have our workers, as many as possible, to collaborate on the task at hand to complete them sooner and be able to move on to the next. The end result is a quality home, built to specifications, earlier than expected, creating value for the consumer.