Estimating by the Book

by Carl Hagstrom

Estimating Tables for Home Building by Paul I. Thomas (Craftsman Book Company, 1990; 800/829-8123). Softcover, 8 1/2x11, 334 pages. $21.50.

Estimating whole house construction often requires builders to choose between the lesser of two evils. Do you spend an inordinate amount of time considering every item in the house, knowing that you may lose the bid? Or do you shoot from the hip and toss out a price, knowing that you may lose your shirt?

In *Estimating Tables for Home Building*, author Paul Thomas has come up with a system that combines the best of both approaches. According to Thomas, if you know the square footage and the perimeter of a building, you can use the tables in his book to work up a quick — and accurate — estimate.

Thomas bases his method on the length-to-width ratio of a building. Since the length of the "average" home is twice the width, the tables in the book are based on a 2:1 ratio. When the ratio differs, Thomas provides adjustment factors (if the ratio is 3:1, for example, add 9% to the table quantities).

The book includes separate tables for each major building element, from foundation walls to drywall, insulation, and siding. Each table is accompanied by step-by-step instructions on how to use it, illustrative examples, and an explanation of any adjustments or additional calculations that need to be made.

Since Thomas's theory of length-to-width ratios was completely new to me, I decided to test it. I used the tables to figure the quantity of roof shingles for a 2,000-sq. ft. ranch house with a 5:12 pitch and a 3:1 length-to-width ratio. I looked up 2,000 sq. ft. in the table, added the recommended 5% for each foot of overhang, and multiplied the whole thing by .09 (the adjustment factor for a 3:1 ratio). I came up with 23 squares of shingles using the tables, and 23 1/2 squares doing the calculations by hand. Pretty slick. My test building didn't have any dormers or hips, which have to be added in separately. But for buildings with a lot of offsets and bump-outs, Thomas provides a separate table.

Most of the tables in this book apply to materials, but Thomas includes a smaller set of labor tables that show the number of man-hours required for various activities. As with the material tables, no prices are attached: You need to multiply the labor table quantities by your hourly labor rate.

Thomas also includes several early chapters that give more general information on estimating. One chapter, "Shortcut Estimating Mathematics," deals with fractions, calculating the area of irregular shapes (such as trapezoids and triangles), the properties of circles, and volume measurements. Another chapter examines the pros and cons of several common estimating methods, including examples of unit-price estimating. This is followed by a chapter on typical estimating errors. I was especially struck by the inclusion of "too much detail" as an estimating error. But after working through the examples, I agreed that Thomas has a point: If an estimator includes too much detail, his price will be high because of overlap and the accumulation of excess quantities. Still, I figure that excesses in one place in my estimates make up for items I accidentally leave out somewhere else.

After my successful sample calculation, I was intrigued, but it still seemed too good to be true. So I pulled out a set of plans for a simple 2,200-sq. ft. ranch house I built last year. The invoices I dug out showed the actual amount of material used for six categories: footers, foundation block, exterior wall studs, interior partition studs, siding, and shingles. Using the appropriate tables in Thomas's book, I compared his figures with mine. Everything was within 3%, with the exception of the exterior and interior studs. My plans and invoices showed more interior partition studs than the tables called for. When I compared two more sets of plans against the tables, my actual stud count was still high by 15% to 20% compared with Thomas's tables.

Am I a believer in Thomas's method? Not yet. I think there is still a problem with the interior partition figures because I was off by the same percentage on three separate test estimates. And the tables are designed only for new construction. Before I trust my pocketbook to Thomas's system, I plan to use his book for preliminary costs, and as a double check for completed estimates. If there aren't too many soft spots, I'll convert and start using it on a regular basis.

Reading an estimating manual, like doing an estimate, isn't the most exciting way to spend your time. But reading *Estimating Tables for Home Building* could make doing estimates a little easier.

Math to Build On by Johnny and Margaret Hamilton (Construction Trades Press, 1993; 910/592-1310). Softcover, 8 1/2x11, 228 pages. $22.95.

Builders tend to have one thing in common: a working knowledge of math. Most job-site math problems can be solved with simple arithmetic — addition, subtraction, multiplication, and division. But if you've ever tried to find a math book to help see you through more complex problems, you've probably ended up with some-

thing that reads like an IRS instruction booklet.

Take heart. There's a new book in town called *Math to Build On*. Authors Johnny and Margaret Hamilton have done a respectable job of making an inherently dull subject tolerable.

The book is logically organized, starting out with fractions and decimals before moving on to geometry and trigonometry. All the examples are based on situations that could easily be encountered on the job site, and scattered throughout the book are tricks and reminders to help you avoid tedious calculations. For instance, have you ever had to read a surveyor's rod that was graduated in tenths of a foot? The Hamiltons explain that each tenth of a foot is roughly equal to 1 1/4 inches. While you probably could have figured this out yourself, you probably just cursed the equipment and never took the trouble to do the math.

Another simple tip that can really help you in the field has to do with a 30:60 triangle: The short leg is always half the length of the hypotenuse. This is a handy piece of information if you're faced with a series of conduit offsets. Similarly, the Hamiltons explain that to find the length of the hypotenuse on a 45-degree triangle, multiply the length of the short leg by $\sqrt{2}$ (1.4142).

The section on trig is clearly written and shows builders how to solve angle problems in the field. Situations that require trig are not a daily occurrence for me, so when they do occur, I usually find myself doing a lot of head scratching. A working knowledge of trig could really save some time. The terminology is intimidating, however — tangent, cotangent, secant, cosine, and sine are just a few — and I can never remember which side gets divided into which. The Hamiltons come to the rescue again with a mnemonic device: *Oscar Has A Heap Of Apples* (Opposite over Hypotenuse = Sine; Adjacent over Hypotenuse = Cosine; Opposite over Adjacent = Tangent).

With trig tables or a scientific calculator, you can find the angles in a right triangle using the dimensions of two sides. For example, let's say you need to put a 1-inch back cut on a piece of 2x. To find the angle you should set the blade at, divide the long leg of the right triangle by the short leg: 1.5 ÷ 1 = 1.5. Then find the tangent of the answer: tangent 1.5 = 33.5 degrees. Next time I need to figure an angle in the field, my coworkers will be slack-jawed by the ease and speed with which I perform the calculations.

The book also has a lot to say about miters, although the discussion is geared more toward making offsets in pipe and conduit than mitering trim. Still, a carpenter could make good use of these sections, especially when it comes to angles other than 45 degrees.

If you own a scientific calculator, you will also be happy to learn that the book explains what all the buttons are for. There are 14 pages of clear text that describe, step-by-step, which button to push, and when.

If you're an electrician or plumber, you'll appreciate author Johnny Hamilton's background as a pipe fitter. Offsets in pipe work occur every time you go around an object, and there are tradespeople I know who still haven't figured out a system for dealing with them. Electricians like to work with 30-degree offsets (wire pulls easier), and the book explains that multiplying the offset distance — how far the obstruction sticks out — by 2 gives you the rough length of the pipe you'll need.

If all of this higher mathematics is putting you to sleep, don't give up on this book yet. It could serve as an excellent tutorial for an employee who is having trouble with numbers (for example, converting decimals to fractions). And every carpenter could benefit from a refresher course in geometry and trig. I'd bet if this book were on your shelf, it would be the first one you'd grab when you were having number troubles. ■

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