Developing Unit-Cost Assemblies for Estimating

by Bob Kovacs

Someone posted a question on *JLC's* estimating forum recently about using standard assemblies to reduce the amount of time it takes to estimate. He wanted to know how to develop the assemblies and how detailed they ought to be. It's not the first time I've heard this question and it struck me that many contractors would benefit from knowing how to create and use assembly pricing.

Assemblies estimating is exactly what it sounds like: preparing an estimate using unit prices for entire assemblies of work, rather than by counting each stick and brick. This method is often used for budget estimates or when plans aren't fully defined, because it allows you to do quick estimates for a job you don't yet "have." If you get the job, you can go back later and do the sticks-and-bricks takeoff that is required to generate your materials lists. Some of the higher-powered estimating software such as Timberline and Master Builder can be set up to automatically generate the materials list during the assemblies estimating process.

Number of Assemblies

For the purposes of this article, I'll assume you're estimating by hand (shame on you) or by using a spread-

Bare Wall Framing – 2x4-8', 16" o.c. (based on 100 LF of wall)

Item	Quantity	U/M	Unit Cost	Labor	Material	Sub	Total
2x4-8' Precut Stud - Assume 1 per LF	100	EA	$3.25		$325.00		$325.00
2x4-16' Plates - Sgl. Bottom, Dbl. Top	19	EA	$6.70		$127.30		$127.30
16d Commons	4	LB	$0.65		$2.60		$2.60
						Assembly Total:	**$454.90**
						Unit Cost:	**$4.55/LF**

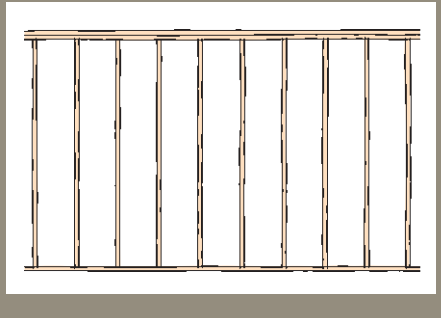

Figure 1. In this example, the assembly includes the most basic materials in the wall. Carpentry labor is not included because the contractor does not have detailed job costing from similar projects. He knows how long it takes to frame an entire building, but not how long it takes to frame this particular type of wall. It's assumed he will carry a lump sum for the framing labor.

Wall Framing w/Headers – 2x4-8', 16" o.c. (based on 100 LF of wall)

Item	Quantity	U/M	Unit Cost	Labor	Material	Sub	Total
2x4-8' Precut Stud - Assume 1 per LF	100	EA	$3.25		$325.00		$325.00
2x4-16' Plates - Sgl. Bottom, Dbl. Top	19	EA	$6.70		$127.30		$127.30
2x12-16' - Dbl. Headers - Assume 15 LF	2	EA	$20.25		$40.50		$40.50
16d Commons	4	LB	$0.65		$2.60		$2.60
						Assembly Total:	**$495.40**
						Unit Cost:	**$4.95/LF**

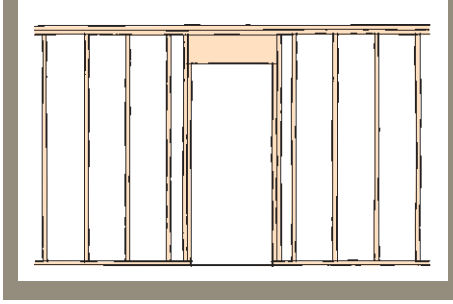

Figure 2. This assembly is the same as the first one except that it contains headers. There aren't any subs and it's assumed that carpentry labor will be carried as a lump sum for all the framing assemblies in the job. For example, there might also be assemblies for the roof, floor, and interior walls.

sheet. The first thing you have to decide is what assemblies you need and how detailed you want them to be. If you need to estimate framing, you'll want assemblies for items such as walls, floors, and roof systems. If you're a finish carpenter, you may need assemblies only for complex built-up trim, or maybe for a door assembly, which might include the door, jamb, casings, and hardware.

Amount of Detail

The next thing to consider is the level of detail. For example, say you have a 2x4 wall that's 8 feet high. You could start with an assembly that consists only of top and bottom plates, studs, and nails (see Figure 1). As you can see, this basic assembly includes only three items. You could add other elements: Figure 2 shows the assembly with a line item for headers. The quantity is based on the assumption that for every 100 linear feet of wall there will be 15 linear feet of 2x12 header.

It's up to you to decide what the quantity will be, based on the kind of jobs you do. If your projects always have a ton of doors and windows, you could include more feet of header. The quantities in all your assemblies will be based on the way you build.

You could expand the assembly to include exterior sheathing, insulation, and drywall (Figure 3). You could even include the siding. The advantage of doing that is you only have to perform a single calculation to determine the cost of the entire wall from inside to outside face.

The disadvantage of using this level of detail is that you will need different assemblies for every combination of sheathing, insulation, drywall thickness, and siding type. As you can imagine, this could result in a huge number of possible combinations and an unmanageable number of assemblies.

I use a wall assembly that's similar to Figure 3, because 95 percent of the walls I estimate are 2x4 at 16 inches on-center, with 1/2-inch plywood sheathing, R-13 batt insulation, and 1/2-inch drywall. If I estimated more 2x6 walls, I would create a separate assembly for them. The siding choices vary quite a bit, so I always estimate siding as a separate item.

Labor. You'll notice that the first two assemblies I've shown do not have line items for labor, while the third assembly does. The decision to include labor in each assembly or as a total "project framing labor cost" depends on whether you have labor cost data for specific

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Wall Assembly – 2x4-8' - w/1/2" CDX, Ins., DW (based on 100 LF of wall)

Item	Quantity	Units	Unit Cost-Material	Material	Unit Cost-Labor	Labor	Unit Cost-Sub	Sub	Total
2x4-8' Precut Stud - Assume 1 per LF	100	EA	$3.25	$325.00	$4.00	$400.00			$725.00
2x4-16' Plates - Sgl. Bottom, Dbl. Top	19	EA	$6.70	$127.30	$0.75	$14.25			$141.55
2x12-16' - Dbl. Headers - Assume 15 LF	2	EA	$20.25	$40.50	$9.00	$18.00			$58.50
1/2" CDX Sheathing - incl. 5% waste	27	SHT	$19.00	$513.00	$10.00	$270.00			$783.00
R-13 Fiberglass Batt Insulation - Subbed	800	SF				$0.00	$0.55	$440.00	$440.00
1/2" Drywall - Taped and Finished - Subbed	800	SF				$0.00	$1.20	$960.00	$960.00
16d Commons	4	LB	$0.65	$2.60		$0.00			$2.60
8d Vinyl Coated Sinkers	5	LB	$0.90	$4.50		$0.00			$4.50
								Assembly Total:	**$3,115.15**
								Unit Cost:	**$31.15/LF**

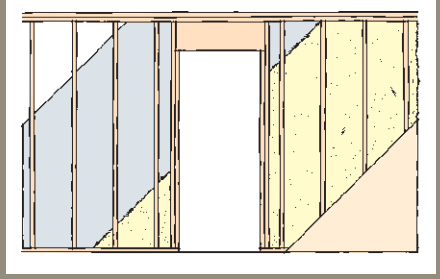

Figure 3. This assembly includes every part of the wall except windows, siding, and paint. It also includes carpentry labor and the subs' cost to install insulation and drywall. In this case, it's assumed that the contractor has enough job-costing data to attach unit labor costs to each item in the takeoff.

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items of work. The assemblies I use include a line for labor, and you may want to consider doing this if you have historical data for how many hours it takes your crew to frame a particular type of item.

If you don't have such information, you will need to carry a separate line item for labor. This is often the case with small additions and remodels, or on framing projects where the overall amount of labor is tracked but not broken down by task.

Adjustments

Once the assemblies are created and priced, you need to come up with some adjustment factors to use when there is something different about the job.

For example, the wall assembly shown in Figure 1 shows a unit cost of $4.55 per linear foot of wall, and is based on the "typical" 100 linear feet used to construct the assembly in the spreadsheet. If the actual project you're estimating includes only 20 feet of wall, or if it includes 100 feet with an extremely high number of corners, you may find that you'll need more studs than the assembly would allow for. In this case, you could adjust the cost for the wall assembly, either by a percentage or by an amount per foot, based on the actual conditions.

Productivity. The unit cost for material does not vary that much for different-size jobs. But the unit cost for labor can vary significantly, so it's important to include an adjustment factor related to labor productivity. For instance, the amount of labor it takes to frame a linear foot of wall will be higher if the wall is short or if the work is really cut up.

By the same token, the unit labor cost will be lower if the job is much bigger than the jobs you based your assembly pricing on. The crew can get into a "rhythm" and there may be economies of scale.

While I can't tell you precisely how much to adjust the unit costs for a particular project, I can say that I've seen them swing as much as 50 percent up or down based on actual project conditions. If you consistently do the same type of work (say, framing additions in the 200-square-foot to 400-square-foot range), and you devise your assemblies based on the quantity of an item that you typically see on your jobs, the variations are unlikely to be that great.

If, however, you perform a wide range of projects, from 100-square-foot additions to 8,000-square-foot custom homes, there will be big differences in the unit costs for wall framing at the two ends of your range. In those cases, you may want to consider setting up multiple assemblies. You could call one "2x4-8' Wall Framing — Small Quantity" and another "2x4-8' Wall Framing — New Home." You could then use the assembly that best matches the job you're estimating at the time.

Assemblies estimating can save a lot of time, once the assemblies are set up and correct. The pricing within the assemblies must be updated regularly to ensure that they are based on current material prices, labor rates, and sub rates. It takes some work to do this, but it's still much faster than doing a sticks-and-bricks estimate for every project. The time you save can then be put to better use — such as fishing.

Bob Kovacs *has more than 15 years of experience managing and estimating residential and commercial construction projects. He moderates the estimating forum at jlconline.com.*