

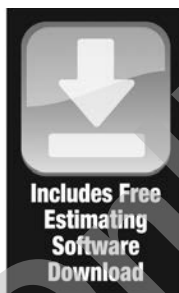
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2016 NATIONAL HOME IMPROVEMENT ESTIMATOR

Edited by Ray F. Hicks

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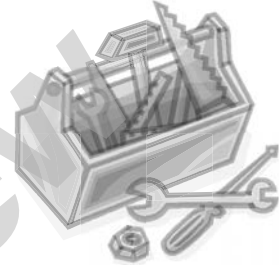
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Pricing Home Improvement Jobs

1



Estimating home improvement costs requires specialized skills. You can't price home improvement work the same way you'd price new construction. The proportion of labor expense is greater. There's far more risk because there are far more variables and unknowns. An example will make this clear.

Hanging doors in new construction is a 1-2-3 affair. You know ahead of time exactly what's required. You built the wall, installed the frame and know each door will fit right the first time. There won't be any surprises. An experienced estimator can forecast the cost of hanging a door in a new home with a high degree of certainty.

Now let's look at the same task on a home improvement project. First, remember that you may be hanging only one door. There's no chance to improve the production rate on second or later doors. Installing this door is probably different from the last door you installed on a similar project and will be different from your next door installation.

Work starts with removing the old door. That's probably not too hard — once you break through six coats of accumulated paint on the hinges. Let's assume you work carefully and don't damage the casing or trim. The next step is to install a blind Dutchman where the original hinges were attached. If the frame's badly chewed up from years of neglect and abuse, you'll have to remove and replace the entire frame. Don't forget that the building has settled over the years. The frame has probably twisted out of plumb. More time will be needed to shim and level the frame.

Finally the door is installed and swings smoothly. But the job still isn't finished. You have to paint the door to match and will certainly have to haul away the old door and the debris.

Every home improvement cost estimate comes with dozens of chances to make an expensive mistake. Surprises are inevitable and nearly all surprises will add to the cost, not reduce the cost. Estimating new construction is a snap by comparison.

All home improvement has similar problems:

- ❖ No chance for economies of scale (mass production),
- ❖ Difficulty in removing just enough of the old,
- ❖ Work doesn't follow the normal (from the ground, up) sequence of construction,
- ❖ Difficulty adding new materials to deteriorated or nonstandard existing materials,
- ❖ The need to match designs, colors and textures,
- ❖ Covering up for another contractor's mistakes,
- ❖ Struggling to get access to the place where the work is to be done,
- ❖ Protecting adjacent surfaces and pathway to the work area,
- ❖ Initial uncertainty about how much work is needed.

If you're an experienced home improvement contractor, you understand this already. Whether experienced or not, you know full well that accurate pricing is crucial to survival in the home improvement business. Unfortunately, most home improvement specialists have far less experience in pricing their work than in getting the work done. No wonder so many home improvement companies sink into obscurity.

But it doesn't have to be that way.

The chapters that follow explain how to price each type of home improvement work. Emphasis will be on avoiding risk — pricing pitfalls that can turn any home improvement contract into a financial nightmare.

No Price Fits All Jobs

There's no single way to arrive at the correct price for home improvement work. Neither is there a single correct price for most home improvement projects. But there are both good and bad ways to estimate prices and there are good and bad prices for any proposed job. Your task as a home improvement estimator is to produce consistently good estimates on most jobs. If you're already doing that, congratulations. You don't need this book. Return it where you bought it and get a refund. But if you're not, information in the following chapters will make or save you many times what you paid for the book.

It's accepted wisdom among home improvement specialists that salespeople need authority to quote prices when closing a sale. When trying to wrap up a deal, there's no substitute for having current cost information at your fingertips. That's especially true on larger jobs where you've prepared detailed plans and a written estimate. The owner will have questions and suggestions that change the job specs. If you want to close the sale then and there, you'd better know how much to add or subtract for each change the owner wants.

Most home improvement companies authorize salespeople to quote prices from an approved list in a price book. That simplifies the salesperson's job, eliminates most major errors, and saves the owner of the company from approving every item in every estimate. In our opinion, quoting from a price book is the only way to build sales volume in the home improvement business. That means every home improvement contractor needs a good price book.

Of course, the best price book for your company would be based on your actual cost experience — work done by your crews on your jobs with materials from your dealers and installed by your subcontractors. Since every contractor uses different crews, subcontractors and suppliers, every price book should be different. And, of course, prices in the company price book should be revised regularly to reflect current labor and material costs.

Having admitted that there's no substitute for developing your own price book, we'll suggest that you not bother. Most home improvement contractors don't have the time or patience to maintain current installed prices for thousands of repair and

remodeling items. Even if you did, spending hundreds of hours a year keeping a price book current would be a waste of time. Prices for home improvement work are usually negotiated on site. There's little value in keeping a book of exact costs if you have to cut a special deal to close each sale.

Instead, we suggest that you let this manual serve as your company price book. Using the prices in this book (and included software download) will eliminate most of the common estimating mistakes. If your labor costs are higher or if your crews aren't as skilled as most tradesmen, you may have to increase the selling prices listed here to make a reasonable profit. And, of course, sometimes you're going to have a job with costs that exceed what any reasonable estimate could have predicted. This manual isn't a substitute for the exercise of good judgment. That's always your job.

Cost Plus Markup Equals Selling Price

The figures in this manual show both costs to the contractor and a recommended selling price. The difference between your cost and your selling price is your markup. Markup varies widely, far more than either material cost or labor cost. You're the final authority on markup. You decide what markup fits best — based on market conditions, your client, and the profit you feel is reasonable. Once you decide on the "right" markup, it's easy to plug that percentage into the bid, assuming you use National Estimator.

Every construction contractor needs to distinguish between "markup" and "profit." Markup is what you add to estimated labor and material costs (usually called "hard costs") to find the selling price. Profit is what you have left when all bills have been paid. The two are very different. Profit is just the frosting on the cake.

Markup is also different from "margin." Figure 1-1 shows percentages of markup for various levels of hard costs. For example, if your markup on a \$20,000 job is 50 percent, the selling price will be \$30,000. The margin on that job is 33 percent, \$10,000 divided by the selling price of \$30,000. (Note the bottom row in Figure 1-1.) Margin is what's left after hard costs are recovered, and includes profit.

Markup vs. Margin				
Hard Cost	Price at 50% Markup	Price at 70% Markup	Price at 100% Markup	Price at 150% Markup
\$50	\$75	\$85	\$100	\$125
\$100	\$150	\$170	\$200	\$250
\$200	\$300	\$340	\$400	\$500
\$300	\$450	\$510	\$600	\$750
\$400	\$600	\$680	\$800	\$1,000
\$500	\$750	\$850	\$1,000	\$1,250
\$1,000	\$1,500	\$1,700	\$2,000	\$2,500
\$2,000	\$3,000	\$3,400	\$4,000	\$5,000
\$3,000	\$4,500	\$5,100	\$6,000	\$7,500
\$4,000	\$6,000	\$6,800	\$8,000	\$10,000
\$5,000	\$7,500	\$8,500	\$10,000	\$12,500
\$6,000	\$9,000	\$10,200	\$12,000	\$15,000
\$7,000	\$10,500	\$11,900	\$14,000	\$17,500
\$8,000	\$12,000	\$13,600	\$16,000	\$20,000
\$9,000	\$13,500	\$15,300	\$18,000	\$22,500
\$10,000	\$15,000	\$17,000	\$20,000	\$25,000
\$11,000	\$16,500	\$18,700	\$22,000	\$27,500
\$12,000	\$18,000	\$20,600	\$24,000	\$30,000
\$13,000	\$19,500	\$22,100	\$26,000	\$32,500
\$14,000	\$21,000	\$23,800	\$28,000	\$35,000
\$15,000	\$22,500	\$25,500	\$30,000	\$37,500
\$16,000	\$24,000	\$27,200	\$32,000	\$40,000
\$17,000	\$25,500	\$28,900	\$34,000	\$42,500
\$18,000	\$27,000	\$30,600	\$36,000	\$45,000
\$19,000	\$28,500	\$32,300	\$38,000	\$47,500
\$20,000	\$30,000	\$34,000	\$40,000	\$50,000
\$30,000	\$45,000	\$51,000	\$60,000	\$75,000
\$40,000	\$60,000	\$68,000	\$80,000	\$100,000
\$50,000	\$75,000	\$85,000	\$100,000	\$125,000
Hard Cost	33% Margin	41% Margin	50% Margin	60% Margin

Figure 1-1

Markup (based on cost) vs. Margin (based on selling price)

Many successful home improvement contractors find they can stay in business if hard costs are 59 percent of selling price. Hard costs include material expense, subcontract costs and labor (including taxes and insurance). The other 41 percent of selling price (“margin”) compensates the sales staff, covers overhead, supervision and contingency, and should yield a modest profit. From Figure 1-1, you can see that markup on hard costs has to be 70 percent to yield a margin of 41 percent.

To put this formula to work in your home improvement company, add 70 percent to your hard costs to find the selling price. Of course, some jobs need more markup and others can get by on less. A smaller job with more risk done for a demanding client may require greater markup. A larger job done mostly by subcontractors can usually carry a smaller markup.

Home improvement contractors have all the overhead of any business: office rent, telephone, owner’s salary, office salaries, legal and accounting expense, insurance, auto and truck expense, and more. But unlike other contractors, home improvement specialists routinely deal with high risk from both the unknown and the unknowable — at least until work actually begins. Since most of what you didn’t or couldn’t anticipate will inflate your costs, you’re assuming significant risk. That’s why markups for home improvement work have to be higher than for new construction.

Naturally, competition dictates markup. If you’re not getting enough work at 70 percent markup, maybe 70 percent is too much for your area. But remember that you shouldn’t have to bid remodeling work on a level playing field. New construction usually goes to the lowest responsible bidder. A creative salesman who follows the recommendations in this book has an advantage over lowball bidders who rely on price alone to sell their services.

If you have trouble using *National Estimator*, we’ll be glad to help, and we don’t charge you for it.

Free telephone assistance is available from 8 a.m. until 5 p.m. Pacific time Monday through Friday (except holidays). Call 760-438-7828, Ext. 2.

This Book Works Two Ways

Inside the back cover of this book you’ll find a software download certificate. To access the download, follow the instructions printed there. The download includes the *National Estimator*, an easy-to-use estimating program with all the cost estimates in this book.

The software will run on PCs using Windows XP, Vista, 7, 8, or 10 operating systems.



When the *National Estimator* program has been installed, click Help on the menu bar to see a list of topics that will get you up and running. Or, go online to www.costbook.com and click the ShowMe tutorial link to view an interactive tutorial for *National Estimator*.

Estimates That Work Two Ways

This manual is designed for use by both the owner of a home improvement business and by company sales staff. Prices shown in this manual include both hard costs (labor and material) and a recommended selling price (usually based on 70 percent markup). Sales staff will use the selling price.

Figure 1-2 shows the last page of an estimate for the Stillwel room addition, including 70 percent markup. The company estimator created this estimate from a job survey prepared by a sales representative. Figure 1-2 is for company use and was created in the National Estimator program.

Qty	Craft@Hours	Unit	Material	Labor	Equipment	Total
Roll & brush 1 coat of water base undercoat on interior flush doors						
Medium .3 MH/Door, 11.5 Doors/Gal						
3.00	2P@.9000	Ea	5.07	21.36	0.00	26.43
Roll & brush 1st finish coat of water base enamel on interior flush doors						
Medium .25 MH/Door, 12.5 Doors/Gal						
3.00	2P@.7500	Ea	5.39	17.80	0.00	23.18
Roll & brush 1 coat water base undercoat on vanity cabinet						
Medium 93 SF/MH, 250 SF/Gal						
0.90	2P@.9720	CSF	6.99	23.06	0.00	30.05
Roll & brush 1st finish coat of water base enamel on vanity cabinet						
Medium 103 SF/MH, 288 SF/Gal						
0.90	2P@.8740	CSF	7.02	20.70	0.00	27.72
Roll 1st coat of water base stain on rough sawn or resawn wood siding						
Medium 225 SF/MH, 213 SF/Gal						
17.00	2P@7.548	CSF	157.08	178.50	0.00	335.58
Roll 2nd coat of water base stain on rough sawn or resawn wood siding						
Medium 275 SF/MH, 273 SF/Gal						
17.00	2P@6.188	CSF	122.63	146.73	0.00	269.36
**Subtotal: Painting						
	40.7		1,014.54	973.46	0.00	1,988.00
Total Manhours, Material, Labor, and Equipment:						
	456.0		18,641.82	11,675.42	540.29	30,857.53
Total Only (Subcontract) Costs:						
						4,028.33
Subtotal:						34,885.85
70.00% Markup:						24,420.10
Estimate Total:						59,305.95

Figure 1-2

Estimate with a 70 percent markup shown

Figure 1-3 shows the last page of a proposal for the same job. This is what the customer sees. It was created by the Job Cost Wizard program. Both National Estimator and Job Cost Wizard are included in the free download that comes with this book. Notice that the total is nearly the same in both documents, \$59,305.95. Figure 1-2, the estimate, shows 70 percent markup on hard costs. Figure 1-3, the proposal, doesn't show the markup at all. Instead, markup has been distributed proportionately throughout each cost item in the job. Job Cost Wizard does this distribution at the click of a button.

Craftsman Construction		Proposal	
6058 Corte del Cedro Box 6500 Fairfield, GA 30456 856-3806		Date	Estimate #
		8/3/15	494
		Customer	Job
		Bill Stillwel	Room Addition
Description	Qty	Rate	Amount
Roll & brush 1st finish coat of water base enamel on vanity cabinet. Medium 103 SF/MH, 288 SF/Gal			
Material, per CSF	0.90	13.26	11.94
Labor, per CSF	0.90	39.09	35.18
Roll 1st coat of water base stain on rough sawn or resawn wood siding. Medium 225 SF/MH, 213 SF/Gal			
Material, per CSF	17	15.71	267.04
Labor, per CSF	17	17.85	303.45
Roll 2nd coat of water base stain on rough sawn or resawn wood siding. Medium 275 SF/MH, 273 SF/Gal			
Material, per CSF	17	12.26	208.47
Labor, per CSF	17	14.67	249.44
*Painting subtotal			3,379.60
*Project Subtotal			59,305.96
*Project Total			59,305.96

Figure 1-3

Proposal for the same job not showing the markup

Once an estimate is finished in the National Estimator program and saved to computer disk, press **Ctrl** on your keyboard and tap the letter **J** to convert the estimate into a proposal in Job Cost Wizard. You can't make changes in the Job Cost Wizard screen. But it's easy to toggle back to National Estimator program (press **Alt** and tap the **Tab** key), make a change, and then press **Ctrl-J** once again.

Job Cost Wizard offers dozens of choices on what you show and don't show in written proposals. Your bids can be long (full description for everything in the estimate) or short (only a summary of each category). You can show or hide labor and material cost detail. You can show or hide markup and profit.

Once work begins, you'll want to monitor job expenses to be sure actual costs remain consistent with estimated costs. If you use QuickBooks to pay bills and figure payroll, let QuickBooks do the comparisons for you. Job Cost Wizard exports the proposal to QuickBooks, where you can prepare progress invoices and track expenses against estimates.

The National Estimator program lets you change anything in the costbook or even add your own estimated costs. Make the *National Home Improvement Estimator* your collection point for all estimating and pricing information. Anything you add to the costbook shows up in red and can be migrated to later editions of this manual when available. The *National Home Improvement Estimator* starts out as your most useful estimating reference. What you add to the costbook will make it even more valuable.

Job Survey (Scope of Work)

Of course, neither a good price book nor a computer estimating program will solve all of your estimating problems. Computers seldom make mistakes in addition or multiplication. But nothing prevents you from making expensive estimating mistakes on your own. By far the most common estimating mistake will be omitting something essential to the job.

Get in the habit of completing an exhaustive job survey before beginning any estimate for home improvement work. Some of your estimates on a job may be too high. Other estimates on a job may be too low. With any luck, your over-estimates will roughly balance with your under-estimates, leaving the job total about where it should be. But the estimated price for anything omitted from a job survey is always zero. That's a 100 percent miss. It's hard to balance a complete miss with anything. A few of those can create a financial disaster.

Material Costs in This Book

Material costs for each item are listed in the column headed Material. These are neither retail nor wholesale prices. They are estimates of what most contractors who buy in moderate volume will pay suppliers as of mid-2016. Discounts may be available for purchases in larger volumes.

Add Delivery Expense to the material cost for other than local delivery of reasonably large quantities. Cost of delivery varies with the distance from source of supply, method of transportation, and quantity to be delivered. But most material dealers absorb the delivery cost on local delivery (5 to 15 miles) of larger quantities to good customers. Add the expense of job site delivery when it's a significant part of the material cost.

Add Sales Tax when sales tax will be charged to the contractor buying the materials. In some states, contractors have to collect sales tax based on the contract price. No matter what your state (or county) requires, National Estimator can handle the task. Click **Edit** on the National Estimator menu bar. Then click **Sales Tax**.

Waste and Coverage Loss is included in the installed material cost. The cost of many materials per unit after installation is greater than the purchase price for the same unit because of waste, shrinkage or coverage loss during installation. For example, about 120 square feet of nominal 1" x 4" square edge boards will be needed to cover 100 square feet of floor or wall. There's no coverage loss with plywood sheathing, but waste due to cutting and fitting will average about 6 percent.

Costs in the Material column of this book assume normal waste and coverage loss. Small and irregular jobs may require a greater waste allowance. Materials priced without installation (with no labor cost) don't include an allowance for waste and coverage except as noted.

Labor Costs for installing the material or doing the work described are listed in the column headed Labor. The labor cost per unit is the labor cost per hour multiplied by the manhours per unit shown after the @ sign in the Craft@Hrs column. Labor cost includes the basic wage, the employer's contribution to welfare, pension, vacation and apprentice funds, and all tax and insurance charges based on wages.

Supervision Expense to the general contractor isn't included in the labor cost. The cost of supervision and non-productive labor varies widely from job to job. Calculate the cost of supervision and non-productive labor and add this to the estimate.

Payroll Taxes and Insurance are included in the labor cost. See the following section for more on the "contractor's burden."

Manhours per Unit and the Craft performing the work are listed in the Craft@Hrs column. To find the units of work done per worker in an 8-hour day, divide 8 by the manhours per unit. To find the units done by a crew in an 8-hour day, multiply the units per worker per 8-hour day by the number of crew members.

Manhours include all productive labor normally associated with installing the materials described.

This will usually include tasks such as:

- ❖ Unloading and storing construction materials, tools and equipment on site.
- ❖ Moving tools and equipment from a storage area or truck on site at the beginning of the day.
- ❖ Returning tools and equipment to a storage area or truck on site at the end of the day.
- ❖ Normal time lost for work breaks.
- ❖ Planning and discussing the work to be performed.
- ❖ Normal handling, measuring, cutting and fitting.
- ❖ Keeping a record of the time spent and work done.
- ❖ Regular cleanup of construction debris.
- ❖ Infrequent correction or repairs required because of faulty installation.

Adjust the Labor Cost to the job you're figuring when your actual hourly labor cost is known or can be estimated. The labor costs listed in Figure 1-5 will apply within a few percent on many jobs. But labor costs may be much higher or much lower on the job you're estimating.

If the hourly wage rates listed in Figure 1-5 aren't accurate, divide your known or estimated cost per hour by the listed cost per hour. The result is your adjustment for any figure in the Labor column for that craft.

Adjust for Unusual Labor Productivity. Costs in the Labor column are for normal conditions: experienced craftsmen working on reasonably well-planned and managed home improvement projects with fair to good productivity. Labor estimates assume that materials are standard grade, appropriate tools are on hand, work done by other crafts is adequate, layout and installation are relatively uncomplicated, and working conditions don't slow progress.

Working conditions at the jobsite have a major effect on labor cost. Estimating experience and careful analysis can help you predict the effect of most changes in working conditions. Obviously, no single adjustment will apply on all jobs. But the adjustments that follow should help you produce more accurate labor estimates. More than one condition may apply on a job.

Jobsite conditions affect labor costs

- ❖ Add 10% to 15% when working temperatures are below 40 degrees or above 95 degrees.
- ❖ Add 30% to 35% when temperatures are below 20 degrees. Materials and tools are hard to handle. Bulky clothing restricts freedom of movement.
- ❖ Add 15% to 25% for work on a ladder or a scaffold, in a 36" crawl space, in a congested area, or remote from the material storage point.
- ❖ Add 50% for work in an 18" to 36" crawl space. Allow extra time for cleaning out the area before work begins.
- ❖ Add 200% if portions of the crawl space are less than 18". Allow extra time for passing tools and materials. Few contractors bid on work like this.
- ❖ Deduct 10% when the work is in an open area with excellent access and good light.
- ❖ Add 1% for each 10 feet that materials must be lifted above ground level.
- ❖ Add 5% to 50% for tradesmen with below-average skills. Deduct 5% to 25% for highly-motivated, highly-skilled tradesmen.
- ❖ Deduct 10% to 20% when an identical task is repeated many times for several days at the same site.
- ❖ Add 20% to 50% on small jobs where fitting and matching of materials is required, adjacent surfaces have to be protected and the job site is occupied during construction.
- ❖ Add 25% to 50% for work done following a major flood, fire, earthquake, hurricane or tornado while skilled tradesmen are not readily available. Material costs may also be higher after a major disaster.
- ❖ Add 10% to 35% for demanding specs, rigid inspections, unreliable suppliers, a difficult owner or an inexperienced architect.

Use an Area Modification Factor from pages 18 through 26 if your material, hourly labor or equipment costs are unknown and can't be estimated. Here's how: Use the labor and material costs in this manual without modification. Then add or deduct the percentages shown for labor, material and equipment.

Equipment Costs for small tools and expendable supplies (such as saws and tape) are usually considered overhead expense and are covered by your markup. Equipment costs for larger equipment (such as a compressor or backhoe) should be

based on the rental rate for the period needed. Equipment rental costs are included in sections where heavy equipment may be needed.

Labor and Material Costs Change. These costs were compiled in the fall of 2015 and projected to mid-2016 by adding a small percentage. This projection will be accurate for some materials and inaccurate for others. No one can predict material price changes accurately.

How Accurate Are These Figures? They're as accurate as possible considering that the estimators who wrote this book don't know your subcontractors or material suppliers, haven't seen the plans or specifications, don't know what building code applies or where the job is, had to project material costs at least six months into the future, and had no record of how much work the crew that will be assigned to the job can handle.

You wouldn't bid a job under those conditions. And we don't claim that all construction is done at these prices.

Estimating Is an Art, not a science. On many jobs the range between high and low bid will be 20 percent or more. There's room for legitimate disagreement on what the correct costs are, even when complete plans and specifications are available, the date and site are established, and labor and material costs are identical for all bidders.

No cost fits all jobs. Good estimates are custom-made for a particular project and a single contractor through judgment, analysis and experience.

This book isn't a substitute for judgment, analysis and sound estimating practice. It's an *aid* in developing an *informed opinion* of cost. If you're using this book as your sole cost authority for contract bids, you're reading more into these pages than the editors intend.

Use These Figures to compile preliminary estimates, when a "snap" bid is needed to close the deal, and when no actual costs are available. This book will reduce the chance of error or omission on bid estimates, speed "ball park" estimates, and be a good guide when there's no time to get a quote.

Where Do We Get These Figures? From the same sources all professional estimators use: material suppliers, material price services, analysis of plans, specifications, estimates and completed project costs, and both published and unpublished cost studies compiled by both private and government agencies. In addition, we conduct nationwide mail and phone surveys and have the use of several major national estimating databases.

We'll Answer Your Questions about any part of this book and explain how to apply these costs. Free telephone assistance is available from 8 a.m. until 5 p.m. Pacific time Monday through Friday except holidays. Phone 760-438-7828, Ext. 2. We don't accept collect calls and can't estimate the job for you. But if you need clarification on something in this manual, we can help.

Labor Costs and Crews

Throughout this manual you'll see a column headed *Craft@Hrs.* Letters and numbers in this column show our estimates of:

- ❖ Who will do the work (the craft code)
- ❖ An @ symbol which means at
- ❖ How long the work will take (manhours).

For example, in Chapter 4, page 70, you'll find estimates for installing BC plywood wall sheathing by the square foot. The Craft@Hrs column opposite 1/2" plywood wall sheathing shows:

B1@.016

That means we estimate the installation rate for crew B1 at 0.016 manhours per square foot. That's the same as 16 manhours per 1,000 square feet.

Figure 1-4 is a table that defines each of the craft codes used in this book. Notice that crew B1 is composed of two craftsmen: one laborer and one carpenter. To install 1,000 square feet of 1/2" BC wall sheathing at 0.016 manhours per square foot, that crew would need 16 manhours (one 8-hour day for a crew of two).

Notice also in the table that the cost per manhour for crew B1 is listed as \$33.11. That's the average for a laborer (listed at \$29.65 per hour) and a carpenter (listed at \$36.57 per hour): \$29.65 plus \$36.57 is \$66.22. Divide by 2 to get \$33.11, the average cost per manhour for crew B1.

In the table, the cost per manhour is the sum of hourly costs of all crew members divided by the number of crew members. That's the average cost per manhour.

Costs in the Labor column in this book are the product of the installation time (in manhours) multiplied by the cost per manhour. For example, in Chapter 4, the labor cost listed for 1/2" BC wall sheathing is \$0.53 per square foot. That's the installation time (0.016 manhours per square foot) multiplied by \$33.11, the average cost per manhour for crew B1.

Figure 1-5 shows hourly labor costs components — base wage, typical fringe benefits, payroll taxes, insurance and the total hourly cost.

The labor costs shown in Column 6 were used to compute the manhour costs for crews and the figures in the Labor column.

Craft Codes		
Craft Code	Cost Per Manhour	Crew Composition
B1	\$33.11	1 laborer, 1 carpenter
B2	\$34.26	1 laborer, 2 carpenters
B3	\$31.96	2 laborers, 1 carpenter
B4	\$36.58	1 laborer, 1 operating engineer, 1 reinforcing iron worker
B5	\$36.20	1 laborer, 1 carpenter, 1 cement mason, 1 operating engineer, 1 reinforcing iron worker
B6	\$32.17	1 laborer, 1 cement mason
B7	\$30.02	1 laborer, 1 truck driver
B8	\$35.68	1 laborer, 1 operating engineer
B9	\$32.28	1 bricklayer, 1 bricklayer's helper
BB	\$37.07	1 bricklayer
BC	\$36.57	1 carpenter
BE	\$39.63	1 electrician
BF	\$33.43	1 floor layer
BG	\$35.30	1 glazier
BH	\$27.49	1 bricklayer's helper
BL	\$29.65	1 laborer
BR	\$35.07	1 lather
BS	\$32.44	1 marblesetter
CF	\$34.68	1 cement mason
CT	\$34.48	1 mosaic & terrazzo worker
D1	\$35.57	1 drywall installer, 1 drywall taper
DI	\$35.59	1 drywall installer
DT	\$35.54	1 drywall taper
HC	\$28.71	1 plasterer helper
OE	\$41.68	1 operating engineer
P1	\$36.03	1 laborer, 1 plumber
PM	\$42.40	1 plumber
PP	\$33.48	1 painter, 1 laborer
PR	\$36.61	1 plasterer
PT	\$37.30	1 painter
R1	\$35.26	1 roofer, 1 laborer
RI	\$38.42	1 reinforcing iron worker
RR	\$40.87	1 roofer
SW	\$41.16	1 sheet metal worker
T1	\$32.22	1 tile layer, 1 laborer
TL	\$34.79	1 tile layer
TR	\$30.39	1 truck driver

Figure 1-4

Craft codes used in this manual

Hourly Labor Cost						
	1	2	3	4	5	6
Craft	Base wage per hour	Taxable fringe benefits (5.46% of base wage)	Insurance and employer taxes (%)	Insurance and employer taxes (\$)	Non-Taxable fringe benefits (4.82% of base wage)	Total hourly cost used in this book
Bricklayer	\$29.06	\$1.48	25.34%	\$7.23	\$1.30	\$37.07
Bricklayer's Helper	20.06	1.10	25.34	5.36	0.97	27.49
Building Laborer	20.47	1.12	32.73	7.07	0.99	29.65
Carpenter	25.46	1.39	31.63	8.49	1.23	36.57
Cement Mason	25.74	1.41	23.15	6.29	1.24	34.68
Drywall Installer	26.33	1.44	23.57	6.55	1.27	35.59
Drywall Taper	26.29	1.44	23.57	6.54	1.27	35.57
Electrician	30.20	1.65	19.84	6.32	1.46	39.63
Floor Layer	24.69	1.35	23.82	6.20	1.19	33.43
Glazier	25.69	1.40	25.78	6.98	1.24	35.31
Lather	26.43	1.44	21.28	5.93	1.27	35.07
Marble Setter	24.43	1.33	21.36	5.50	1.18	32.44
Millwright	25.90	1.41	21.24	5.80	1.25	34.36
Mosaic & Terrazzo Worker	25.96	1.42	21.36	5.85	1.25	34.48
Operating Engineer	30.45	1.66	25.22	8.10	1.47	41.68
Painter	27.32	1.49	24.88	7.17	1.32	37.30
Plasterer	26.07	1.42	28.58	7.86	1.26	36.61
Plasterer Helper	20.44	1.12	28.58	6.16	0.99	28.71
Plumber	31.21	1.70	24.27	7.99	1.50	42.40
Reinforcing Ironworker	27.36	1.49	28.61	8.25	1.32	38.42
Roofer	26.06	1.42	44.14	12.13	1.26	40.87
Sheet Metal Worker	29.89	1.63	26.01	8.20	1.44	41.16
Sprinkler Fitter	30.66	1.67	25.08	8.11	1.48	41.92
Tile Layer	26.20	1.43	21.36	5.90	1.26	34.79
Truck Driver	22.04	1.20	26.22	6.09	1.06	30.39

Figure 1-5*Components of hourly labor costs*

It's important that you understand what's included in the figures in each of the six columns in the table. Here's an explanation:

Column 1, the base wage per hour, is the craftsman's hourly wage. These figures are representative of what many contractors will be paying craftsmen working on home improvement jobs in 2016.

Column 2, taxable fringe benefits, includes vacation pay, sick leave and other taxable benefits. These fringe benefits average 5.46 percent of the base wage for many construction contractors. This benefit is in addition to the base wage.

Column 3, insurance and employer taxes in percent, shows the insurance and tax rate for construction trades. The cost of insurance in this column includes workers' compensation and contractor's casualty and liability coverage. Insurance rates vary

widely from state to state and depend on a contractor's loss experience. Note that taxes and insurance increase the hourly labor cost by 30 to 35 percent for most trades. There is no legal way to avoid these costs.

Column 4, insurance and employer taxes in dollars, shows the hourly cost of taxes and insurance for each construction trade. Insurance and taxes are paid on the costs in both columns 1 and 2.

Column 5, non-taxable fringe benefits, includes employer paid non-taxable benefits such as medical coverage and tax-deferred pension and profit sharing plans. These fringe benefits average 4.55 percent of the base wage for many construction contractors. The employer pays no taxes or insurance on these benefits.

Column 6, the total hourly cost in dollars, is the sum of columns 1, 2, 4 and 5.

These hourly labor costs will apply within a few percent on many jobs. But wage rates may be much higher or lower in the area where you do business. We recommend using your actual labor cost rather than national averages. That's easy with the National Estimator program. When copying and pasting any cost to your estimate, adjust the assumed hourly labor cost to your actual cost. You need do this only once for each trade. And you can make this adjustment at any time. Any change you make is applied to that trade throughout the estimate.

Abbreviations			
4WD	four-wheel drive	EPA	Environmental Protection Agency
ABS	acrylonitrile butadiene styrene	F	Fahrenheit
AC	alternating current	GFCI	ground fault circuit interrupter
ACQ	Alkaline Copper Quat	GRS	galvanized rigid steel
ADA	Americans with Disabilities Act	H	height
ANSI	American Nat. Standards Institute	HOM	higher order mode
APP	atactic polypropylene	HP	horsepower
ASTM	Amer. Society for Testing Materials	HVAC	heating, ventilating & air cond.
AWG	American Wire Gauge	ID	inside diameter
BF	board foot	IMC	intermediate metal conduit
Btr	better	KD	kiln dried
Btu(s)	British thermal unit(s)	KO	knockout
C	Celsius/Centigrade	kW	kilowatt(s)
CF	cubic foot	L	length
CFM	cubic feet per minute	Lb(s)	pound(s)
CLF	100 linear feet	LF	linear foot
CPM	cycles per minute	LS	lump sum
CSF	100 square feet	MBF	1,000 board feet
CY	cubic yard	MDF	medium density fiberboard
d	penny	mm	millimeter(s)
D	depth	Mo	month
DWV	drain, waste & vent	MPH	miles per hour
Ea	each	MSF	1,000 square feet
EMT	electric metallic tube	NEC	National Electrical Code
		NEMA	National Electrical Manufacturer's Assoc.
		OC	spacing from center to center
		OD	outside diameter
		OSB	oriented strand board
		OSHA	Occupational Safety & Health Admin.
		oz.	ounce(s)
		PSI	pounds per square inch
		PVC	polyvinyl chloride
		R	thermal resistance
		S4S	surfaced 4 sides
		SBS	styrene butadiene styrene
		SF	square foot
		SFCA	(per) square foot of contact area
		Sq	100 square feet
		Std	standard
		SY	square yard
		T	thick
		T&G	tongue & groove edge
		UL	Underwriter's Laboratory
		USDA	United States Dept. of Agriculture
		UV	ultraviolet
		W	width
		X	by or times

Figure 1-6

Abbreviations used in this manual

Area Modification Factors

Construction costs are higher in some areas than in other areas. Add or deduct the percentages shown on the following pages to adapt the costs in this book to your jobsite. Adjust your cost estimate by the appropriate percentages in this table to find the estimated cost for the site selected. Where 0% is shown, it means no modification is required.

Modification factors are listed by state and province. Areas within each state are listed by the first three digits of the postal zip code. For convenience, one representative city is identified in each three-digit zip or range of zips. Percentages are based on the average of all data points in the table. Factors listed for each state and province are the average of all data in that state or province. Figures for the zips are the average of all information in that area. And figures in the Total column are the weighted average of factors for Labor, Material and Equipment.

The National Estimator program will apply an area modification factor for any five-digit zip you select. Click Utilities. Click Options. Then select the Area Modification Factors tab.

These percentages are composites of many costs and will not necessarily be accurate when estimating the cost of any particular part of a building. But when used to modify costs for an entire structure, they should improve the accuracy of your estimates.

Area Modification Factors

Location	Zip	Mat.	Lab.	Equip.	Total Wtd. Avg.
Alabama Average		-1	-8	0	-4%
Anniston	362	-3	-13	-1	-8%
Auburn	368	0	-10	0	-5%
Bellamy	369	-2	4	-1	1%
Birmingham	350-352	-3	8	-1	2%
Dothan	363	0	-13	0	-6%
Evergreen	364	-1	-22	0	-11%
Gadsden	359	-4	-19	-1	-11%
Huntsville	358	1	-4	0	-1%
Jasper	355	-1	-18	0	-9%
Mobile	365-366	-1	-3	0	-2%
Montgomery	360-361	0	-3	0	-1%
Scottsboro	357	0	-9	0	-4%
Selma	367	-1	-10	0	-5%
Sheffield	356	-1	1	0	0%
Tuscaloosa	354	1	-9	0	-4%
Alaska Average		14	32	5	22%
Anchorage	995	17	38	6	27%
Fairbanks	997	16	40	5	27%
Juneau	998	18	22	6	20%
Ketchikan	999	3	29	1	15%
King Salmon	996	16	32	5	23%

Location	Zip	Mat.	Lab.	Equip.	Total Wtd. Avg.
Arizona Average		1	-9	0	-4%
Chambers	865	1	-18	0	-8%
Douglas	855	0	-15	0	-7%
Flagstaff	860	2	-18	1	-7%
Kingman	864	1	-11	0	-5%
Mesa	852	1	5	0	3%
Phoenix	850	1	6	0	3%
Prescott	863	3	-16	1	-6%
Show Low	859	1	-18	0	-8%
Tucson	856-857	0	-10	0	-5%
Yuma	853	0	5	0	2%
Arkansas Average		-2	-12	0	-6%
Batesville	725	0	-20	0	-9%
Camden	717	-3	-1	-1	-2%
Fayetteville	727	0	-8	0	-4%
Fort Smith	729	-1	-14	0	-7%
Harrison	726	-1	-25	0	-12%
Hope	718	-3	-6	-1	-4%
Hot Springs	719	-2	-25	-1	-13%
Jonesboro	724	-1	-18	0	-9%
Little Rock	720-722	-1	-6	0	-3%
Pine Bluff	716	-4	-8	-1	-6%

Area Modification Factors

Location	Zip	Mat.	Lab.	Equip.	Total Wtd. Avg.
Russellville	728	0	-9	0	-4%
West Memphis	723	-3	-4	-1	-3%

California Average 2 12 1 7%

Alhambra	917-918	3	15	1	8%
Bakersfield	932-933	0	4	0	2%
El Centro	922	1	-1	0	0%
Eureka	955	1	-12	0	-5%
Fresno	936-938	0	-5	0	-2%
Herlong	961	2	-8	1	-3%
Inglewood	902-905	3	16	1	9%
Irvine	926-927	3	24	1	13%
Lompoc	934	3	4	1	3%
Long Beach	907-908	3	17	1	9%
Los Angeles	900-901	3	13	1	8%
Marysville	959	1	-7	0	-3%
Modesto	953	1	0	0	1%
Mojave	935	0	11	0	5%
Novato	949	3	21	1	11%
Oakland	945-947	3	34	1	17%
Orange	928	3	21	1	11%
Oxnard	930	3	1	1	2%
Pasadena	910-912	4	16	1	9%
Rancho Cordova	956-957	2	6	1	4%
Redding	960	1	-8	0	-3%
Richmond	948	2	35	1	17%
Riverside	925	1	7	0	4%
Sacramento	958	1	6	0	3%
Salinas	939	3	-1	1	1%
San Bernardino	923-924	0	4	0	2%
San Diego	919-921	3	13	1	8%
San Francisco	941	3	55	1	27%
San Jose	950-951	3	33	1	17%
San Mateo	943-944	4	40	1	21%
Santa Barbara	931	3	11	1	7%
Santa Rosa	954	3	7	1	5%
Stockton	952	1	7	0	4%
Sunnyvale	940	3	39	1	20%
Van Nuys	913-916	3	14	1	8%
Whittier	906	3	14	1	8%

Colorado Average 2 1 1 1%

Aurora	800-801	3	11	1	7%
Boulder	803-804	3	5	1	4%
Colorado Springs	808-809	2	-3	1	0%
Denver	802	2	12	1	7%
Durango	813	1	-3	0	-1%
Fort Morgan	807	1	-6	0	-2%
Glenwood Springs	816	2	6	1	4%
Grand Junction	814-815	1	-1	0	0%
Greeley	806	3	8	1	5%
Longmont	805	3	2	1	3%
Pagosa Springs	811	0	-9	0	-4%
Pueblo	810	-1	2	0	0%
Salida	812	2	-15	1	-6%

Location	Zip	Mat.	Lab.	Equip.	Total Wtd. Avg.
Connecticut Average		1	20	0	10%
Bridgeport	066	1	20	0	10%
Bristol	060	1	24	0	12%
Fairfield	064	2	24	1	12%
Hartford	061	0	25	0	12%
New Haven	065	1	22	0	11%
Norwich	063	0	10	0	5%
Stamford	068-069	4	27	1	15%
Waterbury	067	1	20	0	10%
West Hartford	062	1	11	0	6%

Delaware Average 1 3 0 2%

Dover	199	1	-9	0	-4%
Newark	197	2	10	1	6%
Wilmington	198	0	9	0	4%

District of Columbia

Washington	200-205	3	23	1	12%
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Florida Average 0 -11 0 -6%

Altamonte Springs	327	-1	-7	0	-4%
Bradenton	342	0	-13	0	-6%
Brooksville	346	-1	-16	0	-8%
Daytona Beach	321	-2	-19	-1	-10%
Fort Lauderdale	333	3	1	1	2%
Fort Myers	339	0	-15	0	-7%
Fort Pierce	349	-2	-21	-1	-11%
Gainesville	326	-1	-18	0	-9%
Jacksonville	322	-1	-4	0	-2%
Lakeland	338	-3	-13	-1	-8%
Melbourne	329	-2	-16	-1	-8%
Miami	330-332	2	-2	1	0%
Naples	341	3	-10	1	-3%
Ocala	344	-2	-23	-1	-12%
Orlando	328	0	1	0	0%
Panama City	324	-2	-21	-1	-11%
Pensacola	325	0	-17	0	-8%
Saint Augustine	320	-1	-9	0	-5%
Saint Cloud	347	0	-7	0	-3%
St Petersburg	337	-1	-12	0	-6%
Tallahassee	323	0	-15	0	-7%
Tampa	335-336	-1	-2	0	-1%
West Palm Beach	334	1	-5	0	-2%

Georgia Average -1 -7 0 -4%

Albany	317	-2	-12	-1	-7%
Athens	306	0	-11	0	-5%
Atlanta	303	3	23	1	12%
Augusta	308-309	-2	-2	-1	-2%
Buford	305	0	-5	0	-2%
Calhoun	307	-1	-19	0	-9%
Columbus	318-319	-1	-8	0	-4%
Dublin/Fort Valley	310	-3	-13	-1	-8%
Hinesville	313	-2	-11	-1	-6%
Kings Bay	315	-2	-15	-1	-8%

Area Modification Factors

Location	Zip	Mat.	Lab.	Equip.	Total Wtd. Avg.
Macon	312	-2	-7	-1	-4%
Marietta	300-302	1	8	0	4%
Savannah	314	-1	-7	0	-4%
Statesboro	304	-2	-21	-1	-11%
Valdosta	316	-1	-1	0	-1%

Hawaii Average		17	28	6	22%
Aliamanu	968	17	30	6	23%
Ewa	967	17	27	6	21%
Halawa Heights	967	17	27	6	21%
Hilo	967	17	27	6	21%
Honolulu	968	17	30	6	23%
Kailua	968	17	30	6	23%
Lualualei	967	17	27	6	21%
Millilani Town	967	17	27	6	21%
Pearl City	967	17	27	6	21%
Wahiawa	967	17	27	6	21%
Waianae	967	17	27	6	21%
Wailuku (Maui)	967	17	27	6	21%

Idaho Average		0	-19	0	-9%
Boise	837	1	-12	0	-5%
Coeur d'Alene	838	0	-21	0	-10%
Idaho Falls	834	-1	-19	0	-9%
Lewiston	835	0	-24	0	-11%
Meridian	836	0	-19	0	-9%
Pocatello	832	-1	-20	0	-10%
Sun Valley	833	0	-18	0	-8%

Illinois Average		-1	9	0	4%
Arlington Heights	600	2	29	1	14%
Aurora	605	2	29	1	14%
Belleville	622	-2	2	-1	0%
Bloomington	617	1	-4	0	-1%
Carbondale	629	-3	-6	-1	-4%
Carol Stream	601	2	28	1	14%
Centralia	628	-3	-3	-1	-3%
Champaign	618	-1	-3	0	-2%
Chicago	606-608	2	31	1	15%
Decatur	623	-2	-13	-1	-7%
Galesburg	614	-2	-6	-1	-4%
Granite City	620	-3	11	-1	3%
Green River	612	-2	12	-1	4%
Joliet	604	0	31	0	14%
Kankakee	609	-2	0	-1	-1%
Lawrenceville	624	-4	-9	-1	-6%
Oak Park	603	3	35	1	18%
Peoria	615-616	-1	15	0	6%
Peru	613	0	4	0	2%
Quincy	602	3	31	1	16%
Rockford	610-611	-2	8	-1	3%
Springfield	625-627	-2	2	-1	0%
Urbana	619	-3	-6	-1	-4%

Location	Zip	Mat.	Lab.	Equip.	Total Wtd. Avg.
Indiana Average		-2	-2	-1	-2%
Aurora	470	-1	-9	0	-5%
Bloomington	474	1	-6	0	-2%
Columbus	472	0	-9	0	-4%
Elkhart	465	-2	-7	-1	-4%
Evansville	476-477	-2	12	-1	4%
Fort Wayne	467-468	-3	0	-1	-2%
Gary	463-464	-4	39	-1	16%
Indianapolis	460-462	-1	10	0	4%
Jasper	475	-1	-14	0	-7%
Jeffersonville	471	-1	-11	0	-6%
Kokomo	469	-2	-15	-1	-8%
Lafayette	479	-1	-9	0	-5%
Muncie	473	-4	-13	-1	-8%
South Bend	466	-4	0	-1	-2%
Terre Haute	478	-4	-2	-1	-3%

Iowa Average		-2	-5	-1	-3%
Burlington	526	0	1	0	0%
Carroll	514	-3	-20	-1	-11%
Cedar Falls	506	-1	-7	0	-4%
Cedar Rapids	522-524	0	5	0	2%
Cherokee	510	-3	4	-1	0%
Council Bluffs	515	-2	1	-1	-1%
Creston	508	-3	-10	-1	-6%
Davenport	527-528	-1	3	0	1%
Decorah	521	-2	-14	-1	-8%
Des Moines	500-503	-2	13	-1	5%
Dubuque	520	-2	-7	-1	-4%
Fort Dodge	505	-2	-5	-1	-3%
Mason City	504	0	-6	0	-3%
Ottumwa	525	0	-13	0	-6%
Sheldon	512	0	-15	0	-7%
Shenandoah	516	-3	-26	-1	-14%
Sioux City	511	-2	14	-1	5%
Spencer	513	-1	-14	0	-7%
Waterloo	507	-4	-1	-1	-3%

Kansas Average		-2	-7	-1	-4%
Colby	677	-1	-17	0	-8%
Concordia	669	-1	-25	0	-12%
Dodge City	678	-2	-7	-1	-4%
Emporia	668	-3	0	-1	-2%
Fort Scott	667	-2	-11	-1	-6%
Hays	676	-2	-26	-1	-13%
Hutchinson	675	-3	-9	-1	-6%
Independence	673	-3	11	-1	3%
Kansas City	660-662	0	10	0	5%
Liberal	679	-2	-4	-1	-3%
Salina	674	-3	-11	-1	-7%
Topeka	664-666	-3	2	-1	-1%
Wichita	670-672	-2	-6	-1	-4%

Area Modification Factors

Location	Zip	Mat.	Lab.	Equip.	Total Wtd. Avg.
Kentucky Average		-1	-8	0	-4%
Ashland	411-412	-3	-5	-1	-4%
Bowling Green	421	0	-11	0	-5%
Campton	413-414	-1	-23	0	-11%
Covington	410	0	5	0	2%
Elizabethtown	427	-1	-20	0	-10%
Frankfort	406	1	5	0	3%
Hazard	417-418	-1	-19	0	-9%
Hopkinsville	422	-2	-9	-1	-5%
Lexington	403-405	1	1	0	1%
London	407-409	-1	-13	0	-7%
Louisville	400-402	-1	5	0	2%
Owensboro	423	-2	-6	-1	-4%
Paducah	420	-2	2	-1	0%
Pikeville	415-416	-3	-14	-1	-8%
Somerset	425-426	0	-23	0	-11%
White Plains	424	-3	-6	-1	-4%

Louisiana Average		-1	2	-1	0%
Alexandria	713-714	-3	-2	-1	-3%
Baton Rouge	707-708	0	21	0	10%
Houma	703	-2	12	-1	4%
Lafayette	705	0	3	0	1%
Lake Charles	706	-2	11	-1	4%
Mandeville	704	0	-5	0	-2%
Minden	710	-2	-8	-1	-5%
Monroe	712	-2	-14	-1	-8%
New Orleans	700-701	0	5	0	2%
Shreveport	711	-2	-6	-1	-4%

Maine Average		0	-11	0	-5%
Auburn	042	-1	-7	0	-4%
Augusta	043	-1	-13	0	-7%
Bangor	044	-1	-11	0	-6%
Bath	045	1	-15	0	-6%
Brunswick	039-040	1	-3	0	-1%
Camden	048	-1	-21	0	-10%
Cutler	046	-1	-16	0	-8%
Dexter	049	-1	-12	0	-6%
Northern Area	047	-2	-16	-1	-8%
Portland	041	2	2	1	2%

Maryland Average		1	3	0	2%
Annapolis	214	3	13	1	8%
Baltimore	210-212	-1	16	0	7%
Bethesda	208-209	3	24	1	13%
Church Hill	216	2	-10	1	-4%
Cumberland	215	-4	-12	-1	-8%
Elkton	219	2	-14	1	-5%
Frederick	217	1	13	0	7%
Laurel	206-207	2	15	1	8%
Salisbury	218	1	-14	0	-6%

Location	Zip	Mat.	Lab.	Equip.	Total Wtd. Avg.
Massachusetts Average		2	24	1	12%
Ayer	015-016	1	12	0	6%
Bedford	017	3	31	1	16%
Boston	021-022	3	77	1	37%
Brockton	023-024	3	41	1	20%
Cape Cod	026	2	6	1	4%
Chicopee	010	1	14	0	7%
Dedham	019	3	36	1	18%
Fitchburg	014	2	22	1	11%
Hingham	020	3	37	1	19%
Lawrence	018	2	28	1	14%
Nantucket	025	3	16	1	9%
New Bedford	027	2	15	1	8%
Northfield	013	2	3	1	2%
Pittsfield	012	1	0	0	1%
Springfield	011	-1	18	0	8%

Michigan Average		-2	4	-1	1%
Battle Creek	490-491	-3	1	-1	-1%
Detroit	481-482	0	15	0	7%
Flint	484-485	-3	-5	-1	-4%
Grand Rapids	493-495	-2	4	-1	1%
Grayling	497	1	-17	0	-7%
Jackson	492	-3	1	-1	-1%
Lansing	488-489	0	1	0	0%
Marquette	498-499	-1	7	0	3%
Pontiac	483	-3	30	-1	12%
Royal Oak	480	-2	18	-1	7%
Saginaw	486-487	-2	-9	-1	-5%
Traverse City	496	-1	-4	0	-2%

Minnesota Average		0	-1	0	-1%
Bemidji	566	-1	-11	0	-6%
Brainerd	564	0	-6	0	-3%
Duluth	556-558	-2	7	-1	2%
Fergus Falls	565	-1	-20	0	-10%
Magnolia	561	0	-18	0	-8%
Mankato	560	0	-8	0	-4%
Minneapolis	553-555	1	28	0	13%
Rochester	559	0	-3	0	-1%
St Cloud	563	-1	6	0	2%
St Paul	550-551	1	26	0	12%
Thief River Falls	567	0	-5	0	-2%
Willmar	562	-1	-9	0	-5%

Mississippi Average		-2	-12	-1	-7%
Clarksdale	386	-3	-16	-1	-9%
Columbus	397	-1	1	0	0%
Greenville	387	-4	-26	-1	-14%
Greenwood	389	-3	-18	-1	-10%
Gulfport	395	-2	-7	-1	-4%
Jackson	390-392	-3	-4	-1	-3%
Laurel	394	-3	-11	-1	-7%

22 National Home Improvement Estimator**Area Modification Factors**

Location	Zip	Mat.	Lab.	Equip.	Total Wtd. Avg.
McComb	396	-2	-22	-1	-11%
Meridian	393	-2	-3	-1	-2%
Tupelo	388	-1	-15	0	-7%
Missouri Average		-1	-7	-1	-4%
Cape Girardeau	637	-2	-8	-1	-5%
Caruthersville	638	-1	-15	0	-7%
Chillicothe	646	-2	-9	-1	-5%
Columbia	652	1	-9	0	-4%
East Lynne	647	-1	-3	0	-2%
Farmington	636	-3	-15	-1	-8%
Hannibal	634	0	-4	0	-2%
Independence	640	-2	13	-1	5%
Jefferson City	650-651	1	-11	0	-5%
Joplin	648	-2	-10	-1	-6%
Kansas City	641	-2	15	-1	6%
Kirksville	635	0	-33	0	-15%
Knob Noster	653	0	-7	0	-3%
Lebanon	654-655	-2	-23	-1	-12%
Poplar Bluff	639	-1	-21	0	-10%
Saint Charles	633	1	2	0	1%
Saint Joseph	644-645	-3	2	-1	-1%
Springfield	656-658	-2	-15	-1	-8%
St Louis	630-631	-2	20	-1	8%
Montana Average		0	-8	0	-4%
Billings	590-591	0	-4	0	-2%
Butte	597	1	-7	0	-3%
Fairview	592	-1	15	0	6%
Great Falls	594	-1	-11	0	-6%
Havre	595	-1	-19	0	-9%
Helena	596	0	-4	0	-2%
Kalispell	599	1	-15	0	-6%
Miles City	593	-1	-15	0	-7%
Missoula	598	1	-14	0	-6%
Nebraska Average		-1	-17	0	-8%
Alliance	693	-1	-21	0	-10%
Columbus	686	0	-15	0	-7%
Grand Island	688	0	-18	0	-8%
Hastings	689	0	-20	0	-9%
Lincoln	683-685	0	-9	0	-4%
McCook	690	0	-21	0	-10%
Norfolk	687	-3	-19	-1	-10%
North Platte	691	0	-18	0	-8%
Omaha	680-681	-1	1	0	0%
Valentine	692	-2	-31	-1	-15%
Nevada Average		2	3	1	2%
Carson City	897	2	-12	1	-4%
Elko	898	1	37	0	18%
Ely	893	2	-8	1	-3%
Fallon	894	2	-2	1	0%
Las Vegas	889-891	2	5	1	3%
Reno	895	2	-4	1	-1%

Location	Zip	Mat.	Lab.	Equip.	Total Wtd. Avg.
New Hampshire Average		1	-4	0	-1%
Charlestown	036	1	-11	0	-5%
Concord	034	1	-7	0	-3%
Dover	038	0	2	0	1%
Lebanon	037	2	-8	1	-3%
Littleton	035	-1	-12	0	-6%
Manchester	032-033	0	4	0	2%
New Boston	030-031	2	5	1	3%
New Jersey Average		1	26	0	12%
Atlantic City	080-084	-2	20	-1	8%
Brick	087	2	4	1	3%
Dover	078	1	27	0	13%
Edison	088-089	1	32	0	15%
Hackensack	076	3	25	1	13%
Monmouth	077	3	28	1	14%
Newark	071-073	1	29	0	14%
Passaic	070	2	29	1	14%
Paterson	074-075	2	23	1	12%
Princeton	085	-2	31	-1	13%
Summit	079	3	38	1	19%
Trenton	086	-3	27	-1	11%
New Mexico Average		0	-18	0	-8%
Alamogordo	883	-1	-24	0	-12%
Albuquerque	870-871	2	-8	1	-3%
Clovis	881	-2	-22	-1	-11%
Farmington	874	2	-4	1	-1%
Fort Sumner	882	-3	0	-1	-2%
Gallup	873	1	-17	0	-7%
Holman	877	2	-24	1	-10%
Las Cruces	880	-1	-21	0	-10%
Santa Fe	875	3	-20	1	-8%
Socorro	878	1	-35	0	-16%
Truth or Consequences	879	-2	-23	-1	-12%
Tucumcari	884	-1	-19	0	-9%
New York Average		0	18	0	8%
Albany	120-123	0	16	0	7%
Amityville	117	2	26	1	13%
Batavia	140	-3	5	-1	1%
Binghamton	137-139	-3	0	-1	-2%
Bronx	104	2	28	1	14%
Brooklyn	112	3	22	1	12%
Buffalo	142	-3	7	-1	2%
Elmira	149	-4	-1	-1	-3%
Flushing	113	3	43	1	21%
Garden City	115	3	39	1	20%
Hicksville	118	3	35	1	18%
Ithaca	148	-4	-6	-1	-5%
Jamaica	114	3	41	1	20%
Jamestown	147	-4	-11	-1	-7%
Kingston	124	0	-8	0	-4%
Long Island	111	3	71	1	34%

Area Modification Factors

Location	Zip	Mat.	Lab.	Equip.	Total Wtd. Avg.
Montauk	119	1	23	0	11%
New York (Manhattan)	100-102	3	73	1	35%
New York City	100-102	3	73	1	35%
Newcomb	128	-1	2	0	0%
Niagara Falls	143	-4	-8	-1	-6%
Plattsburgh	129	1	-3	0	-1%
Poughkeepsie	125-126	1	2	0	1%
Queens	110	4	46	1	23%
Rochester	144-146	-3	8	-1	2%
Rockaway	116	3	31	1	16%
Rome	133-134	-3	-6	-1	-4%
Staten Island	103	3	25	1	13%
Stewart	127	-1	-9	0	-5%
Syracuse	130-132	-3	7	-1	2%
Tonawanda	141	-3	2	-1	-1%
Utica	135	-4	-8	-1	-6%
Watertown	136	-2	0	-1	-1%
West Point	109	1	15	0	7%
White Plains	105-108	3	33	1	17%
North Carolina Average		1	-9	0	-4%
Asheville	287-289	1	-16	0	-7%
Charlotte	280-282	1	15	0	7%
Durham	277	2	-3	1	0%
Elizabeth City	279	1	-18	0	-8%
Fayetteville	283	-1	-12	0	-6%
Goldsboro	275	1	-2	0	0%
Greensboro	274	1	-7	0	-3%
Hickory	286	-1	-17	0	-8%
Kinston	285	-1	-19	0	-9%
Raleigh	276	3	2	1	3%
Rocky Mount	278	0	-14	0	-6%
Wilmington	284	1	-14	0	-6%
Winston-Salem	270-273	0	-10	0	-5%
North Dakota Average		-1	10	0	4%
Bismarck	585	0	6	0	3%
Dickinson	586	-1	30	0	13%
Fargo	580-581	0	3	0	1%
Grand Forks	582	0	-2	0	-1%
Jamestown	584	-1	-7	0	-4%
Minot	587	-1	21	0	9%
Nekoma	583	-1	-20	0	-10%
Williston	588	-1	47	0	21%
Ohio Average		-2	2	-1	0%
Akron	442-443	-2	4	-1	1%
Canton	446-447	-3	-2	-1	-3%
Chillicothe	456	-2	-3	-1	-2%
Cincinnati	450-452	-1	7	0	3%
Cleveland	440-441	-3	11	-1	3%
Columbus	432	0	11	0	5%
Dayton	453-455	-3	6	-1	1%
Oklahoma Average		-3	-8	-1	-5%
Adams	739	-2	-20	-1	-10%
Ardmore	734	-3	-1	-1	-2%
Clinton	736	-3	-2	-1	-3%
Durant	747	-4	-20	-1	-11%
Enid	737	-4	-4	-1	-4%
Lawton	735	-3	-18	-1	-10%
McAlester	745	-4	-11	-1	-7%
Muskogee	744	-2	-16	-1	-8%
Norman	730	-2	-6	-1	-4%
Oklahoma City	731	-2	-4	-1	-3%
Ponca City	746	-3	1	-1	-1%
Poteau	749	-2	-14	-1	-8%
Pryor	743	-2	-11	-1	-6%
Shawnee	748	-4	-14	-1	-9%
Tulsa	740-741	-1	1	0	0%
Woodward	738	-4	15	-1	5%
Oregon Average		1	-9	1	-4%
Adrian	979	-1	-25	0	-12%
Bend	977	1	-14	0	-6%
Eugene	974	2	-9	1	-3%
Grants Pass	975	2	-13	1	-5%
Klamath Falls	976	2	-19	1	-8%
Pendleton	978	0	-7	0	-3%
Portland	970-972	2	19	1	10%
Salem	973	2	-7	1	-2%
Pennsylvania Average		-3	0	-1	-1%
Allentown	181	-2	8	-1	3%
Altoona	166	-3	-14	-1	-8%
Beaver Springs	178	-3	-8	-1	-5%
Bethlehem	180	-1	10	0	4%
Bradford	167	-4	-13	-1	-8%
Butler	160	-4	1	-1	-2%
Chambersburg	172	-1	-13	0	-7%
Clearfield	168	2	-8	1	-3%
DuBois	158	-2	-19	-1	-10%
East Stroudsburg	183	0	-11	0	-5%
Erie	164-165	-3	-10	-1	-6%
Genesee	169	-4	-5	-1	-4%
Greensburg	156	-4	-5	-1	-4%
Harrisburg	170-171	-2	8	-1	3%

24 National Home Improvement Estimator**Area Modification Factors**

Location	Zip	Mat.	Lab.	Equip.	Total Wtd. Avg.
Hazleton	182	-3	-3	-1	-3%
Johnstown	159	-4	-16	-1	-9%
Kittanning	162	-4	-9	-1	-6%
Lancaster	175-176	-2	1	-1	-1%
Meadville	163	-4	-16	-1	-9%
Montrose	188	-3	3	-1	0%
New Castle	161	-4	-1	-1	-3%
Philadelphia	190-191	-3	28	-1	11%
Pittsburgh	152	-4	17	-1	6%
Pottsville	179	-4	-12	-1	-8%
Punxsutawney	157	-4	-1	-1	-3%
Reading	195-196	-4	9	-1	2%
Scranton	184-185	-2	4	-1	1%
Somerset	155	-4	-16	-1	-9%
Southeastern	193	0	19	0	9%
Uniontown	154	-4	-9	-1	-6%
Valley Forge	194	-3	28	-1	11%
Warminster	189	-1	24	0	11%
Warrendale	150-151	-4	16	-1	5%
Washington	153	-3	23	-1	9%
Wilkes Barre	186-187	-3	2	-1	-1%
Williamsport	177	-3	-1	-1	-2%
York	173-174	-3	2	-1	-1%

Rhode Island Average

		1	10	0	5%
Bristol	028	1	9	0	5%
Coventry	028	1	9	0	5%
Cranston	029	1	12	0	6%
Davisville	028	1	9	0	5%
Narragansett	028	1	9	0	5%
Newport	028	1	9	0	5%
Providence	029	1	12	0	6%
Warwick	028	1	9	0	5%

South Carolina Average

		-1	-5	0	-3%
Aiken	298	0	9	0	4%
Beaufort	299	-1	-8	0	-4%
Charleston	294	-1	0	0	-1%
Columbia	290-292	0	-6	0	-3%
Greenville	296	0	-3	0	-1%
Myrtle Beach	295	0	-17	0	-8%
Rock Hill	297	-1	-12	0	-6%
Spartanburg	293	-1	-6	0	-3%

South Dakota Average

		-1	-13	0	-7%
Aberdeen	574	-1	-15	0	-7%
Mitchell	573	-1	-12	0	-6%
Mobridge	576	-2	-18	-1	-9%
Pierre	575	-2	-21	-1	-11%
Rapid City	577	-2	-14	-1	-8%

Location	Zip	Mat.	Lab.	Equip.	Total Wtd. Avg.
Sioux Falls	570-571	0	-2	0	-1%
Watertown	572	-1	-11	0	-6%
Tennessee Average		0	-5	0	-2%
Chattanooga	374	-1	5	0	2%
Clarksville	370	1	2	0	1%
Cleveland	373	-1	-1	0	-1%
Columbia	384	-1	-14	0	-7%
Cookeville	385	0	-18	0	-8%
Jackson	383	-1	-3	0	-2%
Kingsport	376	0	-11	0	-5%
Knoxville	377-379	-1	-3	0	-2%
McKenzie	382	-1	-16	0	-8%
Memphis	380-381	-1	3	0	1%
Nashville	371-372	1	5	0	3%

Texas Average

		-2	3	-1	0%
Abilene	795-796	-4	0	-1	-2%
Amarillo	790-791	-2	-2	-1	-2%
Arlington	760	-1	4	0	1%
Austin	786-787	1	9	0	5%
Bay City	774	-1	59	0	27%
Beaumont	776-777	-3	18	-1	7%
Brownwood	768	-3	-14	-1	-8%
Bryan	778	0	-7	0	-3%
Childress	792	-3	-28	-1	-14%
Corpus Christi	783-784	-2	16	-1	6%
Dallas	751-753	-1	15	0	6%
Del Rio	788	-3	-9	-1	-6%
El Paso	798-799	-3	-18	-1	-10%
Fort Worth	761-762	-2	5	-1	1%
Galveston	775	-3	30	-1	12%
Giddings	789	0	-2	0	-1%
Greenville	754	-3	9	-1	3%
Houston	770-772	-1	33	0	15%
Huntsville	773	-2	34	-1	15%
Longview	756	-2	4	-1	1%
Lubbock	793-794	-3	-11	-1	-7%
Lufkin	759	-3	-6	-1	-4%
McAllen	785	-3	-24	-1	-13%
Midland	797	-3	25	-1	10%
Palestine	758	-2	-7	-1	-4%
Plano	750	-1	15	0	6%
San Angelo	769	-3	-10	-1	-6%
San Antonio	780-782	-2	4	-1	1%
Texarkana	755	-3	-15	-1	-8%
Tyler	757	-1	-15	0	-7%
Victoria	779	-3	4	-1	0%
Waco	765-767	-3	-3	-1	-3%
Wichita Falls	763	-3	-16	-1	-9%
Woodson	764	-3	-5	-1	-4%

Area Modification Factors

Location	Zip	Mat.	Lab.	Equip.	Total Wtd. Avg.
Utah Average		1	-9	1	-4%
Clearfield	840	2	-3	1	0%
Green River	845	1	-7	0	-3%
Ogden	843-844	0	-19	0	-9%
Provo	846-847	2	-17	1	-7%
Salt Lake City	841	2	-1	1	1%
Vermont Average		1	-11	0	-5%
Albany	058	1	-16	0	-7%
Battleboro	053	1	-9	0	-4%
Beecher Falls	059	1	-19	0	-8%
Bennington	052	-1	-13	0	-7%
Burlington	054	2	5	1	3%
Montpelier	056	2	-10	1	-4%
Rutland	057	-1	-13	0	-7%
Springfield	051	-1	-11	0	-6%
White River Junction	050	1	-12	0	-5%
Virginia Average		0	-9	0	-4%
Abingdon	242	-2	-18	-1	-9%
Alexandria	220-223	3	18	1	10%
Charlottesville	229	1	-15	0	-6%
Chesapeake	233	0	-8	0	-4%
Culpeper	227	2	-12	1	-4%
Farmville	239	-2	-24	-1	-12%
Fredericksburg	224-225	1	-11	0	-5%
Galax	243	-2	-20	-1	-10%
Harrisonburg	228	1	-14	0	-6%
Lynchburg	245	-1	-17	0	-8%
Norfolk	235-237	0	-4	0	-2%
Petersburg	238	-2	-5	-1	-3%
Radford	241	-1	-18	0	-9%
Reston	201	3	12	1	7%
Richmond	232	-1	5	0	2%
Roanoke	240	-1	-18	0	-9%
Staunton	244	0	-16	0	-7%
Tazewell	246	-3	-10	-1	-6%
Virginia Beach	234	1	-6	0	-2%
Williamsburg	230-231	0	-6	0	-3%
Winchester	226	0	-6	0	-3%
Washington Average		1	-2	1	0%
Clarkston	994	0	-18	0	-8%
Everett	982	2	2	1	2%
Olympia	985	2	-6	1	-2%
Pasco	993	0	2	0	1%
Seattle	980-981	3	21	1	11%
Spokane	990-992	0	-7	0	-3%
Tacoma	983-984	2	3	1	2%
Vancouver	986	2	4	1	3%
Location	Zip	Mat.	Lab.	Equip.	Total Wtd. Avg.
Wenatchee	988	1	-14	0	-6%
Yakima	989	0	-10	0	-5%
West Virginia Average		-2	-8	-1	-5%
Beckley	258-259	1	-11	0	-5%
Bluefield	247-248	-1	2	0	0%
Charleston	250-253	1	8	0	4%
Clarksburg	263-264	-3	-9	-1	-6%
Fairmont	266	0	-24	0	-11%
Huntington	255-257	-1	-7	0	-4%
Lewisburg	249	-2	-29	-1	-14%
Martinsburg	254	-1	-10	0	-5%
Morgantown	265	-3	-6	-1	-4%
New Martinsville	262	-2	-18	-1	-9%
Parkersburg	261	-3	5	-1	1%
Romney	267	-4	-10	-1	-7%
Sugar Grove	268	-3	-14	-1	-8%
Wheeling	260	-3	10	-1	3%
Wisconsin Average		-1	1	0	0%
Amery	540	0	-3	0	-1%
Beloit	535	0	10	0	5%
Clam Lake	545	-1	-17	0	-8%
Eau Claire	547	-1	-4	0	-2%
Green Bay	541-543	0	6	0	3%
La Crosse	546	-2	3	-1	0%
Ladysmith	548	-2	0	-1	-1%
Madison	537	2	14	1	8%
Milwaukee	530-534	0	12	0	6%
Oshkosh	549	-1	9	0	4%
Portage	539	0	5	0	2%
Prairie du Chien	538	-2	-12	-1	-7%
Wausau	544	-1	-6	0	-3%
Wyoming Average		0	-3	0	-1%
Casper	826	-2	4	-1	1%
Cheyenne/Laramie	820	1	-6	0	-2%
Gillette	827	-1	7	0	3%
Powell	824	0	-13	0	-6%
Rawlins	823	0	13	0	6%
Riverton	825	-1	-12	0	-6%
Rock Springs	829-831	0	2	0	1%
Sheridan	828	1	-8	0	-3%
Wheatland	822	0	-11	0	-5%
UNITED STATES TERRITORIES					
Guam		53	-21	-5	18%
Puerto Rico		2	-47	-5	-21%
VIRGIN ISLANDS (U.S.)					
St. Croix		18	-15	-4	2%
St. John		52	-15	-4	20%
St. Thomas		23	-15	-4	5%

Canadian Area Modification Factors

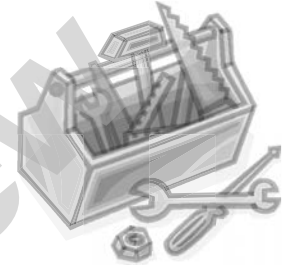
To find the cost in Canada in Canadian dollars, increase the costs in this book by the appropriate percentage listed below. These figures convert costs to Canadian dollars based on \$1.00 Canadian to \$0.76 U.S.

Location	Mat.	Lab.	Equip.	Total Wtd. Avg.
Alberta Average	26	-1	7	13%
Calgary	26	1	7	14%
Edmonton	25	2	7	14%
Fort McMurray	28	-7	7	12%
British Columbia Average	26	-15	7	7%
Fraser Valley	26	-16	7	6%
Okanagan	27	-18	7	6%
Vancouver	26	-11	7	9%
Manitoba Average	20	-22	5	0%
North Manitoba	20	-22	5	0%
Selkirk	20	-22	5	0%
South Manitoba	20	-22	5	0%
Winnipeg	20	-22	5	0%
New Brunswick	16	-47	3	-13%
Moncton	16	-47	3	-13%

Location	Mat.	Lab.	Equip.	Total Wtd. Avg.
Newfoundland/Labrador	19	-29	4	-3%
Nova Scotia Average	17	-36	4	-8%
Amherst	16	-36	3	-8%
Nova Scotia	17	-35	4	-7%
Sydney	17	-37	4	-8%
Ontario Average	22	-11	5	7%
London	22	-10	5	7%
Thunder Bay	24	-14	6	6%
Toronto	21	-9	5	7%
Quebec Average	19	-24	4	-1%
Montreal	19	-24	4	-1%
Quebec City	19	-24	4	-1%
Saskatchewan Average	23	-18	5	4%
La Ronge	24	-21	6	3%
Prince Albert	22	-20	5	2%
Saskatoon	22	-14	5	5%

Demolition

2



Nearly all home improvement projects require some breaking out and removing of existing materials and disposal of debris. Most will require protection of adjacent surfaces, taking safety precautions (such as setting up barricades), closing off doorways or windows, and normal cleanup. The demolition figures in this chapter include these tasks and will apply on most home improvement jobs that don't involve unusual conditions or complications. Costs will be higher when access to the work is limited, when your crew doesn't have complete control of the construction site, or when debris must be moved longer distances or around obstacles. All figures assume that debris is piled on site or in a bin. Add the cost of hauling to the nearest disposal site and tippage charges, if required. No salvage value is assumed except as noted.

Many of the following chapters include estimated costs to remove the old and replace with new materials of a similar description. For example, you'll find costs for removing shingles and replacing shingles in the roofing chapter. That's appropriate because they're part of the same task and usually performed by the same contractor. The estimates in this chapter are for demolition only and don't consider the cost of replacing what has been removed.

Of all construction tasks, demolition is probably the most difficult to estimate with any certainty. You're never sure what's in a wall to be demolished until the job begins. That's why it's best to exclude from your demolition bid what isn't in your estimate. Use the checklist to the right to help identify potential problems before they develop.

Demolition Checklist

- ☐ Can you anticipate any problem getting a demolition permit for this job?
- ☐ Is there a noise ordinance which will limit hours of operation or selection of equipment?
- ☐ Can the debris box be located close to the work?
- ☐ Can a trencher get to the job site?
- ☐ Is the site accessible to wheeled equipment?
- ☐ Will the debris have to be hand-carried to the roll-off box or gondola?
- ☐ Is there a direct route from the demolition site to the debris box?
- ☐ Will you need to re-route any plumbing, electrical, phone or gas lines?
- ☐ Will you need to remove and replace lawn sprinklers?
- ☐ Will you need to cut back or remove any bushes or trees?
- ☐ Will you have to remove and re-install a fence or gate?
- ☐ Does a septic tank or drain field extend into the site of construction?
- ☐ Can (must) materials generated from your project be recycled or salvaged?

	Day	Week	Month
Equipment Rental for Demolition.			
Air compressors, wheel-mounted			
16 CFM, shop type, electric	67.50	162.00	486.00
30 CFM, shop type, electric	74.30	223.00	670.00
80 CFM, shop type, electric	87.00	264.00	791.00
100 CFM, gasoline unit	108.00	324.00	913.00
125 CFM, gasoline unit	135.00	405.00	1,220.00
Paving breakers (no bits included) hand-held, pneumatic			
To 40 lb	25.00	75.00	210.00
41 - 55 lb	25.00	80.00	215.00
56 - 70 lb	31.00	95.00	260.00
71 - 90 lb	34.00	100.00	265.00
Paving breakers jackhammer bits			
Moil points, 15" to 18"	6.00	14.00	30.00
Chisels, 3"	7.00	17.00	44.00
Clay spades, 5-1/2"	10.00	23.00	62.00
Asphalt cutters, 5"	8.00	24.00	51.00
Pneumatic chippers, medium weight, 10 lb	30.00	90.00	250.00
Air hose rental, 50 LF section			
5/8" air hose	6.00	15.00	40.00
3/4" air hose	7.00	20.00	45.00
1" air hose	10.00	25.00	60.00
1-1/2" air hose	18.00	58.00	149.00
Dump truck rental rate plus mileage			
3 CY	310.00	649.00	1,730.00
5 CY	365.00	1,020.00	2,720.00
Hammer rental			
Electric brute breaker	61.00	250.00	750.00
Gas breaker	80.00	320.00	925.00
Demolition hammer, electric	55.00	216.00	635.00
Roto hammer, 7/8", electric	57.00	230.00	657.00
Roto hammer, 1-1/2", electric	60.00	206.00	589.00
Stump grinder, 9 HP	113.00	450.00	1,310.00
Brush chipper, trailer-mounted 40 HP	222.00	866.00	1,940.00
Chain saw, 18", gasoline	62.00	248.00	715.00
Chop saw, 14", electric	37.00	150.00	440.00
Backhoe/loader, wheel-mounted, diesel or gasoline			
1/2 CY bucket capacity, 55 HP	200.00	610.00	1,750.00
1 CY bucket capacity, 65 HP	215.00	680.00	2,100.00
1-1/4 CY bucket capacity, 75 HP	220.00	640.00	1,790.00
1-1/2 CY bucket capacity, 100 HP	270.00	800.00	2,230.00
Wheel loader, front-end load and dump, diesel			
3/4 CY bucket, 4WD, articulated	220.00	670.00	2,000.00
1 CY bucket, 4WD, articulated	270.00	800.00	2,300.00
2 CY bucket, 4WD, articulated	325.00	1,010.00	3,000.00

	Craft@Hrs	Unit	Material	Labor	Total	Sell
Sitework Demolition						
Debris disposal and removal. Tipping charges for solid waste disposal at the dump vary from \$30 to \$120 per ton. For planning purposes, estimate waste disposal at \$75 per ton, plus the hauling cost. Call the dump or trash disposal company for actual charges. Typical costs are shown below.						
Dumpster, 3 CY trash bin, emptied weekly	—	Mo	—	—	330.00	—
Dumpster, 40 CY solid waste bin (lumber, drywall, roofing)						
Hauling cost, per load	—	Ea	—	—	230.00	—
Add to per load charge, per ton	—	Ton	—	—	55.00	—
Low-boy, 14 CY solid waste container (asphalt, dirt, masonry, concrete)						
Hauling cost, per load (7 CY maximum load)	—	Ea	—	—	230.00	—
Add to per load charge, per ton	—	Ton	—	—	55.00	—
Recycler fees. Recycling construction waste materials can substantially reduce disposal costs. Recycling charges vary from \$95 to \$120 per load, depending on the type of material and the size of the load. Add the cost of hauling to a recycling facility.						
Greenwaste	—	Ton	—	—	30.00	—
Asphalt, per load (7 CY)	—	Ea	—	—	100.00	—
Concrete, masonry or rock, per load (7 CY)	—	Ea	—	—	100.00	—
Dirt, per load (7 CY)	—	Ea	—	—	100.00	—
Mixed loads, per load (7 CY)	—	Ea	—	—	100.00	—
Bush and tree removal. Includes cutting into manageable pieces with power hand tools and dumping debris in a trash bin on site. Add the cost of power equipment rental, if needed.						
Shrubs and bushes, including stump removal.						
4' high, per each	BL@.750	Ea	—	22.20	22.20	37.70
Tree removal. Costs will vary widely depending on the condition, size, location and accessibility of the tree. Includes cutting into manageable pieces with power hand tools and dumping debris in a trash bin or chipper on site. Does not include stump removal or grinding. Add the cost of power equipment rental, bucket truck, and other specialized equipment if needed. Large shade tree removal may require a crew of 5 or more. Use \$2,000 as a minimum job charge for trees with a 36" diameter trunk and larger.						
8" to 12" diameter trunk	B8@2.50	Ea	—	89.20	89.20	152.00
13" to 18" diameter trunk	B8@3.50	Ea	—	125.00	125.00	213.00
19" to 24" diameter trunk	B8@5.50	Ea	—	196.00	196.00	333.00
25" to 36" diameter trunk	B8@7.00	Ea	—	250.00	250.00	425.00
Stump grinding, using a 9 HP wheel-mounted stump grinder						
6" to 10" diameter stump	B8@.800	Ea	—	28.50	28.50	48.50
11" to 14" diameter stump	B8@1.04	Ea	—	37.10	37.10	63.10
15" to 18" diameter stump	B8@1.30	Ea	—	46.40	46.40	78.90
19" to 24" diameter stump	B8@1.50	Ea	—	53.50	53.50	91.00
Fencing demolition. Remove chain link fence and cemented posts for disposal. These figures assume fencing is removed by cutting ties at posts and rails and rolling the fabric. These rolls can be heavy. A larger crew will be needed on larger jobs.						
To 6' high	BL@.100	LF	—	2.97	2.97	5.05
Remove chain link fence and cemented posts for salvage,						
To 6' high	BL@.120	LF	—	3.56	3.56	6.05
Remove board fence and cemented posts for disposal,						
To 6' high	BL@.100	LF	—	2.97	2.97	5.05

	Craft@Hrs	Unit	Material	Labor	Total	Sell
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Building Demolition

Single-story room demolition. Includes breaking out a concrete or masonry foundation using pneumatic tools, breaking materials into manageable pieces with hand tools and handling debris to a trash bin on site. Includes the cost of erecting a temporary vapor barrier to seal the wall opening in the existing structure. Add the cost of wall patching on the remaining structure. Add the cost of equipment rental.

Demolish a wood-frame addition built on a concrete slab, including grade beams. Use these figures to estimate the cost of demolishing an attached garage.

Per square foot of floor area demolished	BL@.100	SF	—	2.97	2.97	5.05
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Demolish a wood-frame addition built on a conventional foundation, including wood deck, stairs to grade, and the concrete or concrete block foundation.

Per square foot of floor area demolished	BL@.120	SF	—	3.56	3.56	6.05
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Detached garage demolition. Includes breaking materials into manageable pieces with hand tools and handling debris to a trash bin on site. No slab or foundation demolition included. No salvage of materials assumed.

Frame garage with wood or aluminum siding

One-car garage, to 10' wide by 22' deep	BL@16.5	Ea	—	489.00	489.00	831.00
Two-car garage, to 20' wide by 28' deep	BL@23.0	Ea	—	682.00	682.00	1,160.00

Frame garage with stucco siding

One-car garage to 12' wide by 22' deep	BL@23.5	Ea	—	697.00	697.00	1,180.00
One-car to 16' wide by 22' deep	BL@28.5	Ea	—	845.00	845.00	1,440.00
Two-car garage to 22' wide by 28' deep	BL@42.5	Ea	—	1,260.00	1,260.00	2,140.00

Brick or block garage

One-car garage to 12' wide by 22' deep	BL@23.0	Ea	—	682.00	682.00	1,160.00
One-car garage to 16' wide by 22' deep	BL@28.0	Ea	—	830.00	830.00	1,410.00
Two-car garage to 20' wide by 22' deep	BL@33.0	Ea	—	978.00	978.00	1,660.00

Gutting a building. Interior finish stripped back to the structural walls. Building structure to remain. No allowance for salvage value. These costs include loading and hauling up to 6 miles but no dump fees. Costs are per square foot of floor area based on 8' ceiling height. Add the cost of equipment rental. Figures in parentheses show the approximate "loose" volume of materials after demolition.

Residential building (125 SF per CY)	BL@.100	SF	—	2.97	2.97	5.05
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Building Component Demolition. Itemized costs for demolition of building components when building is being remodeled, repaired or rehabilitated and not completely demolished. Costs include protecting adjacent areas and normal clean-up. Costs are to break out the items listed and pile debris on site or in a bin.

Brick wall demolition. Cost per square foot removed measured on one face. Removed using a pneumatic breaker. Add the cost of equipment rental. Figures in parentheses show the volume before and after demolition and weight of the materials after demolition.

4" thick walls (60 SF per CY and 36 lbs. per SF)	BL@.061	SF	—	1.81	1.81	3.08
8" thick walls (30 SF per CY and 72 lbs. per SF)	BL@.110	SF	—	3.26	3.26	5.54

Brick sidewalk demolition. Cost per square foot removed. Add the cost of Bobcat rental. Larger jobs will require a crew of 2 or more. Figures in parentheses show the volume before and after demolition and weight of materials after demolition.

2-1/2" thick brick on sand base, no mortar bed, removed using hand tools (100 SF per CY and 28 lbs. per SF)	BL@.010	SF	—	.30	.30	.51
Brick pavers up to 4-1/2" thick with mortar bed, removed using a pneumatic breaker (55 SF per CY and 50 lbs. per SF)	BL@.050	SF	—	1.48	1.48	2.52

Concrete masonry wall demolition. Cost per square foot of wall removed measured on one side. Removed using a pneumatic breaker. Add the cost of equipment rental. Figures in parentheses show the volume before and after demolition and weight of materials after demolition.

4" thick walls (60 SF per CY and 19 lbs. per SF)	BL@.066	SF	—	1.96	1.96	3.33
6" thick walls (40 SF per CY and 28 lbs. per SF)	BL@.075	SF	—	2.22	2.22	3.77
8" thick walls (30 SF per CY and 34 lbs. per SF)	BL@.098	SF	—	2.91	2.91	4.95
12" thick walls (20 SF per CY and 46 lbs. per SF)	BL@.140	SF	—	4.15	4.15	7.06
Reinforced or grouted walls add	—	%	—	—	50.0	—

Concrete foundation demolition (footings). Steel reinforced, removed using a pneumatic breaker. Add the cost of equipment rental. Figures in parentheses show the volume before and after demolition.

Cost per CY (.75 CY per CY)	BL@3.96	CY	—	117.00	117.00	199.00
Cost per LF with width and depth as shown						
6" W x 12" D (35 LF per CY)	BL@.075	LF	—	2.22	2.22	3.77
8" W x 12" D (30 LF per CY)	BL@.098	LF	—	2.91	2.91	4.95
8" W x 16" D (20 LF per CY)	BL@.133	LF	—	3.94	3.94	6.70
8" W x 18" D (18 LF per CY)	BL@.147	LF	—	4.36	4.36	7.41
10" W x 12" D (21 LF per CY)	BL@.121	LF	—	3.59	3.59	6.10
10" W x 16" D (16 LF per CY)	BL@.165	LF	—	4.89	4.89	8.31
10" W x 18" D (14 LF per CY)	BL@.185	LF	—	5.49	5.49	9.33
12" W x 12" D (20 LF per CY)	BL@.147	LF	—	4.36	4.36	7.41
12" W x 16" D (13 LF per CY)	BL@.196	LF	—	5.81	5.81	9.88
12" W x 20" D (11 LF per CY)	BL@.245	LF	—	7.26	7.26	12.30
12" W x 24" D (9 LF per CY)	BL@.294	LF	—	8.72	8.72	14.80

Concrete sidewalk demolition. To 4" thick, cost per SF removed. Figures in parentheses show the volume before and after demolition.

Non-reinforced, removed by hand with sledge (60 SF per CY)	BL@.050	SF	—	1.48	1.48	2.52
Reinforced with wire mesh. Mesh cut into manageable pieces, then removed using pneumatic breaker. Add the cost of equipment rental. (55 SF per CY)	BL@.060	SF	—	1.78	1.78	3.03

	Craft@Hrs	Unit	Material	Labor	Total	Sell
Porch and deck demolition. Includes breaking materials into manageable pieces with hand tools and handling debris to a trash bin on site.						
Demolish an enclosed wood-frame porch. Includes breaking out the concrete or masonry pier foundation. Per square foot of floor.						
One story	BL@.250	SF	—	7.41	7.41	12.60
Two story	BL@.225	SF	—	6.67	6.67	11.30
Three story	BL@.196	SF	—	5.81	5.81	9.88
Demolish a screened porch built on a concrete slab. Includes demolition of one concrete or wood frame step to grade. Per square foot of floor area.						
Porch and one step (no slab demolition)	BL@.100	SF	—	2.97	2.97	5.05
Demolish a wood deck with railing or kneewall. Includes demolition of the wood deck and up to 7 steps to grade.						
Deck to 150 SF	BL@18.5	Ea	—	549.00	549.00	933.00
Add per SF for deck over 150 SF	BL@.100	SF	—	2.97	2.97	5.05
Concrete slab demolition. Break up and remove concrete slab using a compressor and pneumatic hammer. Includes loosening concrete with a pick and handling debris to a trash bin on site. Costs for demolition of reinforced concrete slab include burning off rebars with an acetylene torch. Add the rental cost of a compressor, pneumatic hammer and a torch, as required. Figures in parentheses show the volume before and after demolition.						
4" non-reinforced concrete (60 SF per CY)	BL@.057	SF	—	1.69	1.69	2.87
4" reinforced concrete (60 SF per CY)	BL@.071	SF	—	2.11	2.11	3.59
6" non-reinforced concrete (45 SF per CY)	BL@.083	SF	—	2.46	2.46	4.18
6" reinforced concrete (45 SF per CY)	BL@.103	SF	—	3.05	3.05	5.19
8" non-reinforced concrete (30 SF per CY)	BL@.109	SF	—	3.23	3.23	5.49
8" reinforced concrete (30 SF per CY)	BL@.122	SF	—	3.62	3.62	6.15
Asphalt pavement demolition. Asphaltic concrete (bituminous) 3" thick, removed using a pneumatic spade. Add the cost of equipment rental and dump fees. Figures in parentheses show the volume before and after demolition and weight of debris.						
Break up and shovel on to a truck (4 SY per CY and 660 lbs. per SY)	BL@.140	SY	—	4.15	4.15	7.06
Concrete wall demolition. Steel reinforced, removed using a compressor and pneumatic breaker. Add the cost of equipment rental. Figures in parentheses show the volume before and after demolition.						
Cost per CY (1.33 CY per CY)	BL@4.76	CY	—	141.00	141.00	240.00
Cost per SF with thickness as shown						
3" wall thickness (80 SF per CY)	BL@.045	SF	—	1.33	1.33	2.26
4" wall thickness (55 SF per CY)	BL@.058	SF	—	1.72	1.72	2.92
5" wall thickness (45 SF per CY)	BL@.075	SF	—	2.22	2.22	3.77
6" wall thickness (40 SF per CY)	BL@.090	SF	—	2.67	2.67	4.54
8" wall thickness (30 SF per CY)	BL@.120	SF	—	3.56	3.56	6.05
10" wall thickness (25 SF per CY)	BL@.147	SF	—	4.36	4.36	7.41
12" wall thickness (20 SF per CY)	BL@.176	SF	—	5.22	5.22	8.87

Wood Framing Demolition. Typical costs for demolition of wood frame structural components using hand tools. Normal center-to-center spacing (12" thru 24" OC) is assumed. Includes breaking materials into manageable pieces with hand tools and handling debris to a trash bin on site. Costs include removal of Romex cable as necessary, protecting adjacent areas, and normal clean-up. Costs do not include temporary shoring to support structural elements above or adjacent to the work area. (Add for demolition of flooring, roofing, sheathing, etc.) Figures in parentheses give the approximate "loose" volume and weight of the materials after being demolished.

Ceiling joist demolition. Per in-place SF of ceiling area removed.

2" x 4" (720 SF per CY and 1.18 lbs. per SF)	BL@.009	SF	—	.27	.27	.46
2" x 6" (410 SF per CY and 1.76 lbs. per SF)	BL@.013	SF	—	.39	.39	.66
2" x 8" (290 SF per CY and 2.34 lbs. per SF)	BL@.018	SF	—	.53	.53	.90
2" x 10" (220 SF per CY and 2.94 lbs. per SF)	BL@.023	SF	—	.68	.68	1.16
2" x 12" (190 SF per CY and 3.52 lbs. per SF)	BL@.027	SF	—	.80	.80	1.36

Floor joist demolition. Per in-place SF of floor area removed.

2" x 6" (290 SF per CY and 2.04 lbs. per SF)	BL@.016	SF	—	.47	.47	.80
2" x 8" (190 SF per CY and 2.72 lbs. per SF)	BL@.021	SF	—	.62	.62	1.05
2" x 10" (160 SF per CY and 3.42 lbs. per SF)	BL@.026	SF	—	.77	.77	1.31
2" x 12" (120 SF per CY and 4.10 lbs. per SF)	BL@.031	SF	—	.92	.92	1.56

Rafter demolition. Per in-place SF of actual roof area removed.

2" x 4" (610 SF per CY and 1.42 lbs. per SF)	BL@.011	SF	—	.33	.33	.56
2" x 6" (360 SF per CY and 2.04 lbs. per SF)	BL@.016	SF	—	.47	.47	.80
2" x 8" (270 SF per CY and 2.68 lbs. per SF)	BL@.020	SF	—	.59	.59	1.00
2" x 10" (210 SF per CY and 3.36 lbs. per SF)	BL@.026	SF	—	.77	.77	1.31
2" x 12" (180 SF per CY and 3.94 lbs. per SF)	BL@.030	SF	—	.89	.89	1.51

Stud wall demolition. Interior or exterior, includes allowance for plates and blocking, per in-place SF of wall area removed, measured on one face.

2" x 3" (430 SF per CY and 1.92 lbs. per SF)	BL@.013	SF	—	.39	.39	.66
2" x 4" (310 SF per CY and 2.58 lbs. per SF)	BL@.017	SF	—	.50	.50	.85
2" x 6" (190 SF per CY and 3.74 lbs. per SF)	BL@.025	SF	—	.74	.74	1.26

Stud wall demolition, salvage condition. Remove wall cover (nailed hardboard or fiberboard) from partition wall and salvage the stud framing. Per linear foot of stud wall.

2" x 4" x 8', 16" on center	BL@.156	LF	—	4.63	4.63	7.87
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Roof cover demolition. Includes breaking materials into manageable pieces with hand tools and handling debris to a trash bin on site. Cost per Sq or "square". (1 square = 100 square feet.) Figures in parentheses show the approximate "loose" volume and weight of materials after being demolished.

Built-up, 5 ply (2.5 Sq per CY and 250 lbs per Sq)	BL@1.50	Sq	—	44.50	44.50	75.70
Shingles, asphalt, single layer (2.5 Sq per CY and 240 lbs per Sq)	BL@1.33	Sq	—	39.40	39.40	67.00
Shingles, asphalt, double layer (1.2 Sq per CY and 480 lbs per Sq)	BL@2.00	Sq	—	59.30	59.30	101.00
Shingles, slate. Weight ranges from 600 lbs. to 1,200 lbs. per Sq (1 Sq per CY and 900 lbs per Sq)	BL@1.79	Sq	—	53.10	53.10	90.30

	Craft@Hrs	Unit	Material	Labor	Total	Sell
Shingles, wood (1.7 Sq per CY and 400 lbs per Sq)	BL@2.02	Sq	—	59.90	59.90	102.00
Clay or concrete tile (.70 Sq per CY)	BL@1.65	Sq	—	48.90	48.90	83.10
Remove gravel stop or flashing	BL@.070	LF	—	2.08	2.08	3.54

Interior and exterior finish demolition. Includes breaking materials into manageable pieces with hand tools and handling debris to a trash bin on site. Figures in parentheses show the approximate "loose" volume and weight of the materials after being demolished. Demolition for disposal. No salvage of materials included.

Plywood sheathing, up to 1" thick, cost per in-place SF

(200 SF per CY and 2 lbs. per SF)	BL@.017	SF	—	.50	.50	.85
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Wood board sheathing

(250 SF per CY and 2 lbs. per SF)	BL@.030	SF	—	.89	.89	1.51
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Metal siding, using hand tools

(200 SF per CY and 2 lbs. per SF)	BL@.027	SF	—	.80	.80	1.36
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Stucco on walls or soffits, cost per in-place SF, removed using hand tools

(150 SF per CY and 8 lbs. per SF)	BL@.036	SF	—	1.07	1.07	1.82
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Wallboard 1/2" thick, cost per in-place SF, removed using hand tools. Add 50% to labor costs for 1" wallboard.

Gypsum, walls or ceilings

(250 SF per CY and 2.3 lbs. per SF)	BL@.010	SF	—	.30	.30	.51
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Including strip furring	BL@.015	SF	—	.44	.44	.75
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Plywood or insulation board

(200 SF per CY and 2 lbs. per SF)	BL@.018	SF	—	.53	.53	.90
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Insulation, fiberglass batts or rolls, cost per square foot removed

(500 SF per CY and .3 lb per SF)	BL@.003	SF	—	.09	.09	.15
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Plaster on walls, cost per square foot removed by hand

(150 SF per CY and 8 lbs. per SF)	BL@.015	SF	—	.44	.44	.75
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Remove baseboard molding

Single member base, no salvage	BL@.022	LF	—	.65	.65	1.11
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Base and base shoe, no salvage	BL@.038	LF	—	1.13	1.13	1.92
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Remove and salvage single member base	BL@.025	LF	—	.74	.74	1.26
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Remove and salvage base and base shoe	BL@.044	LF	—	1.30	1.30	2.21
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Ceiling demolition. Knock down with hand tools at heights to 9' and handle debris to a trash bin on site. Building structure to remain. No allowance for salvage value. Costs shown are per square foot of ceiling. Figures in parentheses show the approximate "loose" volume after demolition.

Plaster ceiling (typically 175 to 200 SF per CY)

Including lath and furring	BL@.025	SF	—	.74	.74	1.26
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Including suspended grid	BL@.020	SF	—	.59	.59	1.00
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Acoustic tile ceiling (typically 200 to 250 SF per CY)

Including suspended grid	BL@.010	SF	—	.30	.30	.51
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Including grid in salvage condition	BL@.019	SF	—	.56	.56	.95
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Tile glued or stapled to ceiling	BL@.015	SF	—	.44	.44	.75
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Tile on strip furring, including furring	BL@.025	SF	—	.74	.74	1.26
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Drywall ceiling (typically 250 to 300 SF per CY)

Nailed or attached with screws to joists	BL@.010	SF	—	.30	.30	.51
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	Craft@Hrs	Unit	Material	Labor	Total	Sell
Floor cover demolition. Includes breaking materials into manageable pieces with hand tools and handling debris to a trash bin on site. Cost per square yard of floor removed. (1 square yard = 9 square feet.) Figures in parentheses show the approximate "loose" volume and weight of the materials after demolition.						
Ceramic tile (25 SY per CY and 34 lbs. per SY)	BL@.263	SY	—	7.80	7.80	13.30
Hardwood, nailed (25 SY per CY and 18 lbs. per SY)	BL@.290	SY	—	8.60	8.60	14.60
Hardwood, glued (25 SY per CY and 18 lbs. per SY)	BL@.503	SY	—	14.90	14.90	25.30
Linoleum, sheet (30 SY per CY and 3 lbs. per SY)	BL@.056	SY	—	1.66	1.66	2.82
Resilient tile (30 SY per CY and 3 lbs. per SY)	BL@.300	SY	—	8.90	8.90	15.10
Terrazzo (25 SY per CY and 34 lbs. per SY)	BL@.286	SY	—	8.48	8.48	14.40
Carpet on tack strip (40 SY per CY and 5 lbs. per SY)	BL@.028	SY	—	.83	.83	1.41
Glue-down carpet with rubber backing (35 SY per CY and 1.7 lbs. per SY)	BL@.160	SY	—	4.74	4.74	8.06
Add for each LF of room perimeter	BL@.008	LF	—	.24	.24	.41
Carpet pad (35 SY per CY and 1.7 lbs. per SY)	BL@.014	SY	—	.42	.42	.71
Removal of interior items. Includes breaking materials into manageable pieces with hand tools and handling debris to a trash bin on site. Items removed in salvageable condition do not include an allowance for salvage value. Figures in parentheses give the approximate "loose" volume of the materials after demolition. Removed in non-salvageable condition (demolished) except as noted.						
Windows, typical cost to remove window, frame and hardware, cost per SF of window						
Metal (36 SF per CY)	BL@.058	SF	—	1.72	1.72	2.92
Wood (36 SF per CY)	BL@.063	SF	—	1.87	1.87	3.18
Wood stairs, cost per in-place SF or LF						
Risers (25 SF per CY)	BL@.116	SF	—	3.44	3.44	5.85
Landings (50 SF per CY)	BL@.021	SF	—	.62	.62	1.05
Handrails (100 LF per CY)	BL@.044	LF	—	1.30	1.30	2.21
Posts (200 LF per CY)	BL@.075	LF	—	2.22	2.22	3.77
Hollow metal door and frame in a masonry wall. (2 doors per CY)						
Single door to 4' x 7'	BL@1.00	Ea	—	29.70	29.70	50.50
Two doors, per opening to 8' x 7'	BL@1.50	Ea	—	44.50	44.50	75.70
Wood door and frame in a wood frame wall (2 doors per CY)						
Single door to 4' x 7'	BL@.500	Ea	—	14.80	14.80	25.20
Two doors, per opening to 8' x 7'	BL@.750	Ea	—	22.20	22.20	37.70
Metal door and frame in masonry wall, salvage condition						
Hollow metal door to 4' x 7'	BL@2.00	Ea	—	59.30	59.30	101.00
Wood door to 4' x 7'	BL@1.00	Ea	—	29.70	29.70	50.50

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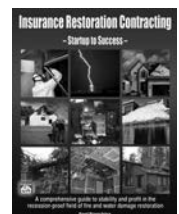
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