Craftsman

2027 NATIONAL REPAIR & REMODELING ESTIMATOR

50th Edition
Albert S. Paxton
Joshua K.J. Paxton

Labor and material costs for all repair and remodeling work



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2027 NATIONAL REPAIR & REMODELING ESTIMATOR

Albert S. Paxton & Joshua K.J. Paxton

50th Edition

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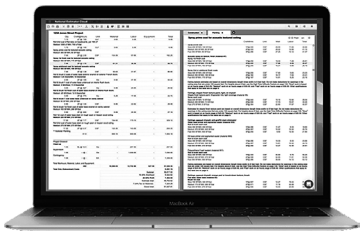

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Preface

The authors have corresponded with manufacturers and wholesalers of building material supplies and surveyed retail pricing services. From these sources, they have developed Average Material Unit Costs which should apply in most parts of the country.

Wherever possible, the authors have listed Average Labor Unit Costs which are derived from the Average Manhours per Unit, the Crew Size, and the Wage Rates used in this book. Please read How to Use This Book for a more in-depth explanation of the arithmetic.

If you prefer, you can develop your own local labor unit costs. You can do this by simply multiplying the Average Manhours per Unit by your local crew wage rates per hour. Using your actual local labor wage rates for the trades will make your estimate more accurate.

What is a realistic labor unit cost to one reader may well be low or high to another reader, because of variations in labor efficiency. The Average Manhours per Unit figures were developed by time studies at job sites around the country. To determine the daily production rate for the crew, divide the total crew manhours per day by the Average Manhours per Unit.

The subject topics in this book are arranged in alphabetical order, A to Z. To help you find specific construction items, there is a complete alphabetical index at the end of the book, and a main subject index at the beginning of the book.

This manual shows crew, manhours, material, labor and equipment cost estimates based on Large or Small Volume work, then a total cost and a total including overhead and profit. No single price fits all repair and remodeling jobs. Generally, work done on smaller jobs costs more per unit installed and work on larger jobs costs less. The estimates in this book reflect that simple fact. The two estimates you find for each work item show the authors' opinion of the likely range of costs for most contractors and for most jobs. So, which cost do you use, High Volume or Low Volume?

The only right price is the one that gets the job and earns a reasonable profit. Finding that price always requires estimating judgment. Use Small Volume cost estimates when some or most of the following conditions are likely:

- The crews won't work more than a few days on site.
- Better quality work is required.
- Productivity will probably be below average.
- Volume discounts on materials aren't available.
- Bidding is less competitive.
- Your overhead is higher than most contractors.

When few or none of those conditions apply, use Large Volume cost estimates.

About the Authors

Albert Paxton has been a California licensed General Contractor (B1-425946) and a Certified Professional Estimator with the *American Society of Professional Estimators*. He served as the National Project Director at *Unified Building Sciences, Inc. (UBS)* (www.UnifiedGroup.com) in Dallas, Texas, from 2012, to his UBS retirement in December 2022. Albert Paxton is active as an Insurance Policy Building Damage Appraiser and Umpire, and as an Arbitration Neutral.

Joshua Paxton serves as Senior Consultant at *Unified Building Sciences, Inc. (UBS)* (www.UnifiedGroup.com) since 2017 and is located in Los Angeles, California. In addition to Daily Claims involving commercial and industrial structures, Joshua Paxton's UBS assignments have included Catastrophe Claims related to fire, hurricane, flood, etc. Joshua Paxton is active as an Insurance Policy Building Damage Appraiser.

The *UBS* staff is comprised of estimators, engineers and project managers who are also building appraisers, expert witnesses and arbitrators in residential and commercial construction, both new and repair and remodeling work. *UBS* operates nationwide, with clients including property insurance carriers, financial institutions, self-insureds, and private individuals.

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How to Use This Book

1	2	3	4	5	6	7	8	9	10	11	12
Description	Oper	Unit	Vol	Crew Size	Man-hours per Unit	Crew Output per Day	Avg Mat'l Unit Cost	Avg Labor Unit Cost	Avg Equip Unit Cost	Avg Total Unit Cost	Avg Price Incl O&P

The descriptions and cost data in this book are arranged in a series of columns, which are described below. The cost data is divided into two categories: Costs Based On Large Volume and Costs Based On Small Volume. These two categories provide the estimator with a pricing range for each construction topic.

The Description column (1) contains the pertinent, specific information necessary to make the pricing information relevant and accurate.

The Operation column (2) contains a description of the construction repair or remodeling operation being performed. Generally the operations are Demolition, Install, and Reset.

The Unit column (3) contains the unit of measurement or quantity which applies to the item described.

The Volume column (4) breaks jobs into Large and Small categories. Based on the information given regarding volume (on page 2), select your job size.

The Crew Size column (5) contains a description of the trade that usually installs or labors on the specified item. It includes information on the labor trade that installs the material and the typical crew size. Letters and numbers are used in the abbreviations in the crew size column. Full descriptions of these abbreviations are in the Crew Compositions and Wage Rates table, beginning on page 15.

The Manhours per Unit column (6) is for the listed operation and listed crew.

The units per day in this book don't take into consideration unusually large or small quantities. But items such as travel, accessibility to work, experience of workers, and protection of undamaged property, which can favorably or adversely affect productivity, have been considered in developing Average Manhours per Unit. For further information about labor, see "Notes — Labor" in the Notes Section of some specific items.

Crew Output per Day (7) is based on how many units, on average, a crew can install or demo in one 8-hour day.

Crew Output per Day and Average Material Unit (8) Cost should assist the estimator in:

1. Checking prices quoted by others.

2. Developing local prices.

The Average Material Unit Cost column contains an average material cost for products (including, in many cases, the by-products used in installing the products) for both large and small volume. It doesn't include an allowance for sales tax, delivery charges, overhead and profit. Percentages for waste, shrinkage, or coverage have been taken into consideration unless indicated. For other information, see "Dimensions" or "Installation" in the Notes Section.

If the item described has many or very unusual by-products which are essential to determining the Average Material Unit Cost, the author has provided examples of material pricing. These examples are placed throughout the book in the Notes Section.

You should verify labor rates and material prices locally. Though the prices in this book are average material prices, prices vary from locality to locality. A local hourly wage rate should normally include taxes, benefits, and insurance. Some contractors may also include overhead and profit in the hourly rate.

The Average Labor Unit Cost column (9) contains an average labor cost based on the Average Manhours per Unit and the Crew Compositions and Wage Rates table. The average labor unit cost equals the Average Manhours per Unit multiplied by the Average Crew Rate per hour. The rates include fringe benefits, taxes, and insurance. Examples that show how to determine the average labor unit cost are provided in the Notes Section.

The Average Equipment Unit Cost column (10) contains an average equipment cost, based on both the average daily rental and the cost per day if owned and depreciated. The costs of daily maintenance and the operator are included.

The Average Total Unit Cost column (11) includes the sum of the Material, Equipment, and Labor Cost columns. It doesn't include an allowance for overhead and profit.

The Average (Total) Price Including Overhead and Profit column (12) results from adding an overhead and profit allowance to Total Cost. This allowance reflects the author's interpretation of average fixed and variable overhead expenses and the labor intensiveness of the operation vs. the costs of materials for the operation. This allowance factor varies throughout the book, depending on the operation. Each contractor interprets O&P differently. The range can be from 15 percent to 80 percent of the Average Total Unit Cost.

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Estimating Techniques

Estimating Repair/Remodeling Jobs: The unforeseen, unpredictable, or unexpected can ruin you.

Each year, the residential repair and remodeling industry grows. It's currently outpacing residential new construction due to increases in land costs, labor wage rates, interest rates, material costs, and economic uncertainty. When people can't afford a new home, they tend to remodel their old one. And there are always houses that need repair, from natural disasters or accidents like fire. The professional repair and remodeling contractor is moving to the forefront of the industry.

Repair and remodeling spawns three occupations: the contractor and his workers, the insurance company property claims adjuster, and the property damage appraiser. Each of these professionals shares common functions, including estimating the cost of the repair or remodeling work.

Estimating isn't an exact science. Yet the estimate determines the profit or loss for the contractor, the fairness of the claim payout by the adjuster, and the amount of grant or loan by the appraiser. Quality estimating must be uppermost in the mind of each of these professionals. And accurate estimates are possible only when you know exactly what materials are needed and the number of manhours required for demolition, removal, and installation. Remember, profits follow the professional. To be profitable you must control costs — and cost control is directly related to accurate, professional estimates.

There are four general types of estimates, each with a different purpose and a corresponding degree of accuracy:

- The guess method: "All bathrooms cost $5,000." or "It looks like an $8,000 job to me."
- The per measure method: (I like to call it the surprise package.) "Remodeling costs $60 per SF, the job is 500 SF, so the price is $30,000."

These two methods are the least accurate and accomplish little for the adjuster or the appraiser. The contractor might use the methods for qualifying customers (e.g., "I thought a bathroom would only cost $2,000."), but never as the basis for bidding or negotiating a price.

- The piece estimate or stick-by-stick method.
- The unit cost estimate method.

These two methods yield a detailed estimate itemizing all of the material quantities and costs, the labor manhours and wage rates, the subcontract costs, and the allowance for overhead and profit.

Though time-consuming, the detailed estimate is the most accurate and predictable. It's a very satisfactory tool for negotiating either the contract price or the adjustment of a building loss. The piece estimate and the unit cost estimate rely on historical data, such as manhours per specific job operation and recent material costs. The successful repair and remodeling contractor, or insurance/appraisal company, maintains records of previous jobs detailing allocation of crew manhours per day and materials expended.

While new estimators don't have historical data records, they can rely on reference books, magazines, and newsletters to estimate manhours and material costs. It is important to remember that **the reference must pertain to repair and remodeling**. This book is designed *specifically* to meet this requirement.

The reference material must specialize in repair and remodeling work because there's a large cost difference between new construction and repair and remodeling. Material and labor construction costs vary radically with the size of the job or project. Economies of scale come into play. The larger the quantity of materials, the better the purchase price should be. The larger the number of units to be installed, the greater the labor efficiency.

Repair and remodeling work, compared to new construction, is more expensive due to a normally smaller volume of work. Typical repair work involves only two or three rooms of a house, or one roof. In new construction, the job size may be three to five complete homes or an entire development. And there's another factor: a lot of repair and remodeling is done with the house occupied, forcing the crew to work around the normal, daily activities of the occupants. In new construction, the approach is systematic and logical — work proceeds from the ground up to the roof and to the inside of the structure.

Since the jobs are small, the repair and remodeling contractor doesn't employ trade specialists. Repairers employ the "jack-of-all-trades" who is less specialized and therefore less efficient. This isn't to say the repairer is less professional than the trade specialist. On the contrary, the repairer must know about many more facets of construction: not just framing, but painting, finish carpentry, roofing, and electrical as well. But because the repairer has to spread his expertise over a greater area, he will be less efficient than the specialist who repeats the same operation all day long.

Another factor reducing worker efficiency is poor access to the work area. With new construction, where building is an orderly "from the ground up" approach, workers have easy access to the work area for any given operation. The workers can spread out as much as needed, which facilitates efficiency and minimizes the manhours required to perform a given operation.

The opposite situation exists with repair and remodeling construction. Consider an example where the work area involves fire damage on the second floor. Materials either go up through the interior stairs or through a second

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story window. Neither is easy when the exterior and interior walls have a finished covering such as siding and drywall. That results in greater labor costs with repair and remodeling because it takes more manhours to perform many of the same tasks.

If, as a professional estimator, you want to start collecting historical data, the place to begin is with daily worker time sheets that detail:

1. total hours worked by each worker per day
2. what specific operations each worker performed that day
3. how many hours (to the nearest tenth) each worker used in each operation performed that day.

Second, you must catalog all material invoices daily, being sure that quantities and unit costs per item are clearly indicated.

Third, maintain a record of overhead expenses attributable to the particular project. Then, after a number of jobs, you'll be able to calculate an average percentage of the job's gross amount that's attributable to overhead. Many contractors add 45% for overhead and profit to their total direct costs (direct labor, direct material, and direct subcontract costs). But that figure may not be right for your jobs.

Finally, each week you should reconcile in a job summary file the actual costs versus the estimated costs, and determine why there is any difference. This information can't immediately help you on this job since the contract has been signed, but it will be invaluable to you on your next job.

Up to now I've been talking about general estimating theory. Now let's be more specific. On page 8 is a Building Repair Estimate form. Each line is keyed to an explanation. A filled-out copy of the form is also provided, and on page 10, a blank, full-size copy that you can reproduce for your own use.

You can adapt the Building Repair Estimate form, whether you're a contractor, adjuster, or appraiser. Use of the form will yield a detailed estimate that will identify:

- The room or area involved, including sizes, dimensions and measurements.
- The kind and quality of material to be used.
- The quantities of materials to be used and verification of their prices.
- The type of work to be performed (demolish, remove, install, remove and reset) by what type of crew.
- The crew manhours per job operation and verification of the hourly wage scale.
- All arithmetical calculations that can be verified.
- Areas of difference between your estimate and others.
- Areas that will be a basis for negotiation and discussion of details.

Each job estimate begins with a visual inspection of the work site. If it's a repair job, you've got to see the damage. Without a visual inspection, you can't select a method of repair and you can't properly evaluate the opinions of others regarding repair or replacement. With either repair or remodeling work, the visual inspection is essential to uncover the "hiders" — the unpredictable, unforeseen, and unexpected problems that can turn profit into loss, or simplicity into nightmare. You're looking for the many variables and unknowns that exist behind an exterior or interior wall covering.

Along with the Building Repair Estimate form, use this checklist to make sure you're not forgetting anything.

Checklist

- Site accessibility: Will you store materials and tools in the garage? Is it secure? You can save a half hour to an hour each day by storing tools in the garage. Will the landscaping prevent trucks from reaching the work site? Are wheelbarrows or concrete pumpers going to be required?
- Soil: What type and how much water content? Will the soil change your excavation estimate?
- Utility lines: What's under the soil and where? Should you schedule the utilities to stake their lines?
- Soundness of the structure: If you're going to remodel, repair or add on, how sound is that portion of the house that you're going to have to work around? Where are the load-bearing walls? Are you going to remove and reset any walls? Do the floor joists sag?
- Roof strength: Can the roof support the weight of another layer of shingles. (Is four layers of composition shingles already too much?)
- Electrical: Is another breaker box required for the additional load?

This checklist is by no means complete, but it is a start. Take pictures! A digital camera will quickly pay for itself. When you're back at the office, the picture helps reconstruct the scene. Before and after pictures are also a sales tool representing your professional expertise.

During the visual inspection always be asking yourself "what if" this or that happened. Be looking for potential problem areas that would be extremely labor intensive or expensive in material to repair or replace.

Also spend some time getting to know your clients and their attitudes. Most of repair and remodeling work occurs while the house is occupied. If the work will be messy, let the homeowners know in advance. Their satisfaction is your ultimate goal — and their satisfaction will provide you a pleasant working atmosphere. You're there to communicate with them. At the end of an estimate and visual inspection, the homeowner should have a clear idea of what you can or can't do, how it will be

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done, and approximately how long it will take. Don't discuss costs now! Save the estimating for your quiet office with a print-out calculator and your cost files or reference books.

What you create on your estimate form during a visual inspection is a set of rough notes and diagrams that make the estimate speak. To avoid duplications and omissions, estimate in a *systematic sequence of inspection*. There are two questions to consider. First, where do you start the estimate? Second, in what order will you list the damaged or replaced items? It's customary to start in the room having either the most damage or requiring the most extensive remodeling. The sequence of listing is important. Start with either the floor or the ceiling. When starting with the floor, you might list items in the following sequence: Joists, subfloor, finish floor, base — listing from bottom to top. When starting with the ceiling, you reverse, and list from top to bottom. The important thing is to be consistent as you go from room to room! It's a good idea to figure the roof and foundation separately, instead of by the room.

After completing your visual inspection, go back to your office to cost out the items. Talk to your material supply houses and get unit costs for the quantity involved. Consult your job files or reference books and assign crew manhours to the different job operations.

There's one more reason for creating detailed estimates. Besides an estimate, what else have your notes given you? A material take-off sheet, a lumber list, a plan and specification sheet — the basis for writing a job summary for comparing estimated costs and profit versus actual costs and profit — and a project schedule that minimizes down time.

Here's the last step: Enter an amount for overhead and profit. No matter how small or large your work volume is, be realistic — everyone has overhead and every business entity works to make a fair and reasonable profit. An office, even in your home, costs money to operate. If family members help out, pay them. Everyone's time is valuable!

If you expect there will be a supervising general contractor on the job, and the overhead and profit is computed as a percentage of the job, then overhead and profit dollars automatically adjust to the job size and the job complexity.

Don't forget to charge for performing your estimate. A professional expects to be paid. You'll render a better product if you know you're being paid for your time. If you want to soften the blow to the owner, say the first hour is free or that the cost of the estimate will be deducted from the job price if you get the job.

In conclusion, whether you're a contractor, adjuster, or appraiser, you're selling your personal service, your ideas, and your reputation. To be successful you must:

- Know yourself and your capabilities.
- Know what the job will require by ferreting out the "hiders."
- Know your products and your work crew.
- Know your productivity and be able to deliver in a reasonable manner and within a reasonable time frame.
- Know your client and make it clear that all change orders, no matter how large or small, will cost money.

National Estimator Cloud

This manual is also available by subscription on the Web. *National Estimator Cloud* includes all ten of Craftsman's 2027 construction cost estimating references. Each of these manuals has about 400 pages of current labor and material costs for construction – all neatly organized and indexed. Use these costs to build estimates and bids for nearly any type of project. Your work is kept secure on the Web. *National Estimator Cloud*:

- Prints estimates, bids and invoices as Word, Excel or PDF documents.
- Runs as a secure app on the Web so you can write estimates anywhere you have a Web connection.
- Exports invoices to *QuickBooks*, either desktop or the online.
- Bids and invoices can show as much or as little detail as you want.
- Material costs are updated regularly as prices change.
- Costs only a few dollars a month. Cancel any time you want.

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Building Repair Estimate

Date (33)

Insured (1)	Claim or Policy No. (2)		Page of (3)
Loss Address (4)	Home Ph.	Cause of Loss (5)	
City	Bus. Ph.	Other Ins. Y N (6)	
Bldg. R.C.V. (7) Bldg. A.C.V. (8)	Insurance Amount (9)		
Insurance Required R.C.V. ((10) %) A.C.V.((11))%	Unit Cost or Material Price Only (12)		Labor Price Only (16)

Description of Item	Unit	Unit Price	Total (Col. A)	Hours	Rate	Total Col. B)
(20)	(13)	(14)	(15)	(17)	(18)	(19)
THIS IS NOT AN ORDER TO REPAIR TOTALS			(21)			(22)

The undersigned agrees to complete and guarantee repairs at a total of $ (29)	Total Column A	
Repairer (30)	(23)	
Street (31)		(24)
City Phone	(25)	
By (32)		(26)
Adjuster (34) Date of A/P (35)	(27)	
Adj. License No. (If Any)	(28) Grand Total	
Service Office Name (36)		

Note: This form does not replace the need for field notes, sketches and measurements.

Building Repair Estimate

Date

Insured John Q. Smith	Claim or Policy No. DP 0029		Page 1 of 2
Loss Address 123 A. Main St.	Home Ph. 555-1241	Cause of Loss Fire	
City Anywhere, Anystate 00010	Bus. Ph. 555-1438	Other Ins. Y (N)	
Bldg. R.C.V. 100,000 Bldg. A.C.V. 80,000	Insurance Amount $100,000		
Insurance Required R.C.V. (80%) A.C.V.(80%)	Unit Cost or Material Price Only		Labor Price Only

Description of Item	Unit	Unit Price	Total (Col. A)	Hours	Rate	Total Col. B)
Install 1/2" sheetrock (standard,)						
on walls, including tape						
and finish 400 (page 146)	400	0.73	292.00	6.0	45.26	271.56
Paint walls, roller, smooth finish						
1 coat sealer 600 (page 304)	600	0.29	174.00	2.4	46.91	112.58
2 coats latex flat 600 (page 307)	600	0.35	210.00	4.8	46.91	225.17
THIS IS NOT AN ORDER TO REPAIR TOTALS			676.00			609.31

The undersigned agrees to complete and guarantee repairs at a total of $	Total Column A	676.00
Repairer ABC Construction		1285.31
Street 316 E. 2nd Street	6% Tax	77.12
City Anywhere Phone		1362.43
By Jack Williams	10% Overhead	136.24
Adjuster Stan Jones Date of A/P N/A	10% Profit	136.24
Adj. License No. (If Any) 561-84	Grand Total	1634.92
Service Office Name Phoenix		

Note: This form does not replace the need for field notes, sketches and measurements.

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Keyed Explanations of the Building Repair Estimate Form

1. Insert name of insured(s).
2. Insert claim number or, if claim number is not available, insert policy number or binder number.
3. Insert the page number and the total number of pages.
4. Insert street address, city and state where loss or damage occurred.
5. Insert type of loss (wind, hail, fire, water, etc.)
6. Check YES if there is other insurance, whether collectible or not. Check NO if there's only one insurer.
7. Insert the present replacement cost of the building. What would it cost to build the structure today?
8. Insert present actual cash value of the building.
9. Insert the amount of insurance applicable. If there is more than one insurer, insert the total amount of applicable insurance provided by all insurers.
10. If the amount of insurance required is based on replacement cost value, circle RCV and insert the percent required by the policy, if any.
11. If the amount of insurance required is based on actual cash value, circle ACV and insert the percent required by the policy, if any.

    Note: (regarding 10 and 11) if there is a non-concurrency, i.e., one insurer requires insurance to 90% of value while another requires insurance to 80% of value, make a note here. Comment on the non-concurrency in the settlement report.
12. The installed price and/or material price only, as expressed in columns 13 through 15, may include any of the following (expressed in units and unit prices):

    Material only (no labor)

    Material and labor to replace

    Material and labor to remove and replace

    Unit Cost is determined by dividing dollar cost by quantity. The term cost, as used in unit cost, is not intended to include any allowance, percentage or otherwise, for overhead or profit. Usually, overhead and profit are expressed as a percentage of cost. Cost must be determined first. Insert a line or dash in a space(s) in columns 13, 14, 15, 17, 18 or 19 if the space is not to be used.
13. The *units* column includes both the quantity and the unit of measure, i.e., 100 SF, 100 BF, 200 CF, 100 CY, 20 ea., etc.
14. The *unit price* may be expressed in dollars, cents or both. If the units column has 100 SF and if the unit price column has $.10, this would indicate the price to be 100 per SF.
15. The *total* column is merely the dollar product of the quantity (in column 13) times the price per unit measure (in column 14).
16. 16-19. These columns are normally used to express labor as follows: hours times rate per hour. However, it is possible to express labor as a unit price, i.e., 100 SF in column 13, a dash in column 17, $.05 in column 18 and $5.00 in column 19.
20. Under *description of item*, the following may be included:

    Description of item to be repaired or replaced (studs 2" x 4" 8'0" #2 Fir, Sheetrock 1/2", etc.)

    Quantities or dimensions (20 pcs., 8'0" x 14'0", etc.)

    Location within a room or area (north wall, ceiling, etc.)

    Method of correcting damage (paint - 1 coat; sand, fill and finish; R&R; remove only; replace; resize; etc.)

21-22. Dollar totals of columns A and B respectively.

23-27. Spaces provided for items not included in the body of the estimate (subtotals, overhead, profit, sales tax, etc.) Be sure to follow your state and local labor sales tax laws.

28. Total cost of repair.
29. Insert the agreed amount here. The agreement may be between the claim representative and the insured or between the claim rep and the repairer. If the agreed price is different from the grand total, the reason(s) for the difference should be itemized on the estimate sheet. If there is no room, attach an additional estimate sheet.
30. PRINT the name of the insured or the repairer so that it is legible.
31. PRINT the address of the insured or repairer legibly. Include phone number.
32. The insured or a representative of the repairer should sign here indicating agreement with the claim rep's estimate.
33. Insured or representative of the repairer should insert date here.
34. Claim rep should sign here.
35. Claim rep should insert date here.
36. Insert name of service office here.

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Building Repair Estimate

Date

Insured	Claim or Policy No.	Page of
Loss Address	Home Ph.	Cause of Loss
City	Bus. Ph.	Other Ins. Y N
Building. R.C.V. Bldg. A.C.V.	Insurance Amount	
Insurance Required R.C.V.(%) A.C.V.(%)	**Unit Cost or Material Price Only**	**Labor Price Only**

Description of Item	Unit	Unit Price	Total (Col. A)	Hours	Rate	Total Col. B)
THIS IS NOT AN ORDER TO REPAIR TOTALS						
The undersigned agrees to complete and guarantee repairs at a total of $					**Total Column A**	
Repairer						
Street						
City Phone						
By						
Adjuster Date of A/P						
Adj. License No. (If Any)					**Grand Total**	
Service Office Name						

Note: This form does not replace the need for field notes, sketches and measurements.

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Wage Rates Used in This Book

Wage rates listed here and used in this book were compiled in the fall of 2026 and projected to mid-2027. Wage rates are in dollars per hour.

"Base Wage Per Hour" (Col. 1) includes items such as vacation pay and sick leave which are normally taxed as wages. Nationally, these benefits average 6.57% of the Base Wage Per Hour. This amount is paid by the Employer in addition to the Base Wage Per Hour.

"Liability Insurance and Employer Taxes" (Cols. 3 & 4) include national averages for state unemployment insurance (4.00%), federal unemployment insurance (0.60%), Social Security and Medicare tax (7.65%), liability insurance (2.29%), and Workers' Compensation Insurance which varies by trade. This total percentage (Col. 3) is applied to the sum of Base Wage Per Hour and Taxable Fringe Benefits (Col. 1 + Col. 2) and is listed in Dollars (Col. 4). This amount is paid by the Employer in addition to the Base Wage Per Hour and the Taxable Fringe Benefits.

"Non-Taxable Fringe Benefits" (Col. 5) include employer-sponsored medical insurance and other benefits, which nationally average 5.80% of the Base Wage Per Hour.

"Total Hourly Cost Used In This Book" is the sum of Columns 1, 2, 4, & 5.

	1	2	3	4	5	6
Trade	Base Wage Per Hour	Taxable Fringe Benefits (6.57% of Base Wage)	Liability Insurance & Employer Taxes %	Liability Insurance & Employer Taxes $	Non-Taxable Fringe Benefits (5.80% of Base Wage)	Total Hourly Cost Used in This Book
Bricklayer or Stone Mason	$33.61	$2.21	23.64%	$8.47	$1.95	$46.24
Bricktender	$25.20	$1.65	23.64%	$6.35	$1.46	$34.66
Carpenter	$32.87	$2.16	28.85%	$10.11	$1.91	$47.05
Cement Mason	$32.57	$2.14	22.05%	$7.65	$1.89	$44.25
Drywall Installer	$32.91	$2.16	22.12%	$7.76	$1.91	$44.74
Drywall Taper	$34.05	$2.24	22.12%	$8.03	$1.98	$46.30
Electrician, Journeyman Wireman	$37.50	$2.46	19.05%	$7.61	$2.18	$49.75
Equipment Operator	$37.84	$2.49	23.79%	$9.59	$2.20	$52.12
Fence Erector	$33.94	$2.23	24.38%	$8.82	$1.97	$46.96
Floor Layer: Carpet, Linoleum, Soft Tile	$31.62	$2.08	22.53%	$7.59	$1.83	$43.12
Floor Layer: Hardwood	$33.20	$2.18	22.53%	$7.97	$1.93	$45.28
Glazier	$31.56	$2.07	23.94%	$8.05	$1.83	$43.51
Laborer, General Construction	$26.34	$1.73	29.95%	$8.41	$1.53	$38.01
Lather	$33.45	$2.20	20.32%	$7.24	$1.94	$44.83
Marble Setter	$28.91	$1.90	20.37%	$6.28	$1.68	$38.77
Millwright / Finish Carpenter	$33.45	$2.20	20.29%	$7.23	$1.94	$44.82
Mosaic & Terrazzo Setter	$40.58	$2.67	20.37%	$8.81	$2.35	$54.41
Mosaic & Terrazzo Setter Helper	$25.55	$1.68	20.37%	$5.55	$1.48	$34.26
Painter, Brush	$34.14	$2.24	23.50%	$8.55	$1.98	$46.91
Painter, Spray-Gun	$35.16	$2.31	23.50%	$8.81	$2.04	$48.32
Paperhanger	$35.85	$2.35	23.50%	$8.98	$2.08	$49.26
Plasterer	$32.98	$2.17	26.30%	$9.24	$1.91	$46.30
Plasterer Helper	$25.46	$1.67	26.30%	$7.14	$1.48	$35.75
Plumber	$38.84	$2.55	23.16%	$9.59	$2.25	$53.23
Pneumatic Tool Operator	$38.76	$2.55	24.60%	$10.16	$2.25	$53.72
Reinforcing Ironworker	$35.49	$2.33	26.56%	$10.04	$2.06	$49.92
Roofer, Foreman	$35.79	$2.35	39.36%	$15.01	$2.08	$55.23
Roofer, Journeyman	$32.54	$2.14	39.36%	$13.65	$1.89	$50.22
Roofer, Hot Mop Pitch	$33.52	$2.20	39.36%	$14.06	$1.94	$51.72
Roofer, Wood Shingles	$34.17	$2.24	39.36%	$14.33	$1.98	$52.72
Sheet Metal Worker	$36.89	$2.42	24.38%	$9.58	$2.14	$51.03
Tile Setter	$30.97	$2.03	20.37%	$6.72	$1.80	$41.52
Tile Setter's Helper	$25.55	$1.68	20.37%	$5.55	$1.48	$34.26
Truck Driver	$28.72	$1.89	24.79%	$7.59	$1.67	$39.87

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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 job site. 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 alphabetically 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 points in that state or province.

Alabama Average		**-3%**
Anniston	362	-4%
Auburn	368	-9%
Bellamy	369	2%
Birmingham	350-352	7%
Dothan	363	-7%
Evergreen	364	-11%
Gadsden	359	-7%
Huntsville	358	5%
Jasper	355	-8%
Mobile	365-366	-1%
Montgomery	360-361	-2%
Scottsboro	357	1%
Selma	367	-3%
Sheffield	356	-2%
Tuscaloosa	354	-3%
Alaska Average		**17%**
Anchorage	995	23%
Fairbanks	997	25%
Juneau	998	17%
Ketchikan	999	3%
King Salmon	996	19%
Arizona Average		**-5%**
Chambers	865	-15%
Douglas	855	-9%
Flagstaff	860	-9%
Kingman	864	-11%
Mesa	852	4%
Phoenix	850	4%
Prescott	863	-5%
Show Low	859	-10%
Tucson	856-857	-5%
Yuma	853	3%
Arkansas Average		**-9%**
Batesville	725	-13%
Camden	717	-6%
Fayetteville	727	-4%
Fort Smith	729	-8%
Harrison	726	-14%
Hope	718	-12%
Hot Springs	719	-13%
Jonesboro	724	-7%
Little Rock	720-722	-3%
Pine Bluff	716	-13%
Russellville	728	-6%
West Memphis	723	-8%
California Average		**8%**
Alhambra	917-918	8%
Bakersfield	932-933	-1%
El Centro	922	-1%
Eureka	955	1%
Fresno	936-938	0%
Herlong	961	4%
Inglewood	902-905	9%
Irvine	926-927	13%
Lompoc	934	3%
Long Beach	907-908	10%
Los Angeles	900-901	8%
Marysville	959	1%
Modesto	953	0%
Mojave	935	5%
Novato	949	11%
Oakland	945-947	17%
Orange	928	12%
Oxnard	930	2%
Pasadena	910-912	9%
Rancho Cordova	956-957	7%
Redding	960	1%
Richmond	948	18%
Riverside	925	3%
Sacramento	958	6%
Salinas	939	2%
San Bernardino	923-924	2%
San Diego	919-921	6%
San Francisco	941	28%
San Jose	950-951	25%
San Mateo	943-944	18%
Santa Barbara	931	2%
Santa Rosa	954	6%
Stockton	952	4%
Sunnyvale	940	24%
Van Nuys	913-916	8%
Whittier	906	8%
Colorado Average		**0%**
Aurora	800-801	8%
Boulder	803-804	5%
Colorado Springs	808-809	0%
Denver	802	9%
Durango	813	-7%
Fort Morgan	807	-2%
Glenwood Springs	816	4%
Grand Junction	814-815	-3%
Greeley	806	4%
Longmont	805	3%
Pagosa Springs	811	-9%
Pueblo	810	-4%
Salida	812	-4%
Connecticut Average		**3%**
Bridgeport	66	3%
Bristol	60	5%
Fairfield	64	5%
Hartford	61	3%

Figures for three-digit zips are the average of all five-digit zips in that area, and are the weighted average of factors for labor, material and equipment.

The *National Estimator Cloud* program at https://craftsman-book.com/national-estimator-cloud will apply an area modification factor for any five-digit zip you select. Click the Area Cost Modification icon on the program tool bar. Area modifications in *National Estimator Cloud* are updated regularly and may differ from figures on the following pages.

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

New Haven	65	2%
Norwich	63	-2%
Stamford	68-69	9%
Waterbury	67	2%
West Hartford	62	-2%
Delaware Average		**0%**
Dover	199	-5%
Newark	197	3%
Wilmington	198	2%
District of Columbia		
Washington	200-205	13%
Florida Average		**-4%**
Altamonte Springs	327	-2%
Bradenton	342	-6%
Brooksville	346	-7%
Daytona Beach	321	-9%
Fort Lauderdale	333	3%
Fort Myers	339	-6%
Fort Pierce	349	-9%
Gainesville	326	-7%
Jacksonville	322	1%
Lakeland	338	-8%
Melbourne	329	-6%
Miami	330-332	0%
Naples	341	-3%
Ocala	344	-11%
Orlando	328	0%
Panama City	324	-8%
Pensacola	325	-7%
Saint Augustine	320	-1%
Saint Cloud	347	-2%
St Petersburg	337	-5%
Tallahassee	323	-6%
Tampa	335-336	0%
W. Palm Beach	334	2%
Georgia Average		**-2%**
Albany	317	-6%
Athens	306	-3%
Atlanta	303	17%
Augusta	308-309	-5%
Buford	305	2%
Calhoun	307	-9%
Columbus	318-319	-12%
Dublin/ Fort Valley	310	-8%
Hinesville	313	1%
Kings Bay	315	-8%
Macon	312	-2%
Marietta	300-302	7%
Savannah	314	-1%
Statesboro	304	5%
Valdosta	316	-13%
Hawaii Average		**18%**
Aiamanu	968	20%
Ewa	967	17%
Halawa Heights	967	17%
Hilo	967	17%
Honolulu	968	20%
Kailua	968	20%
Lualualei	967	17%
Mililani Town	967	17%
Pearl City	967	17%
Wahiawa	967	17%
Waianae	967	17%
Wailuku (Maui)	967	17%
Idaho Average		**-5%**
Boise	837	3%
Coeur d'Alene	838	-4%
Idaho Falls	834	-8%
Lewiston	835	-7%
Meridian	836	-5%
Pocatello	832	-7%
Sun Valley	833	-6%
Illinois Average		**4%**
Arlington Heights	600	13%
Aurora	605	13%
Belleville	622	4%
Bloomington	617	3%
Carbondale	629	-8%
Carol Stream	601	13%
Centralia	628	-8%
Champaign	618	1%
Chicago	606-608	13%
Decatur	623	-3%
Galesburg	614	-2%
Granite City	620	4%
Green River	612	-1%
Joliet	604	12%
Kankakee	609	9%
Lawrenceville	624	-4%
Oak Park	603	15%
Peoria	615-616	3%
Peru	613	6%
Quincy	602	14%
Rockford	610-611	4%
Springfield	625-627	-2%
Urbana	619	-5%
Indiana Average		**-1%**
Aurora	470	5%
Bloomington	474	-3%
Columbus	472	-3%
Elkhart	465	-2%
Evansville	476-477	-2%

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Jamestown	584	-2%
Minot	587	2%
Nekoma	583	-10%
Williston	588	12%
Ohio Average		**1%**
Akron	442-443	2%
Canton	446-447	1%
Chillicothe	456	-4%
Cincinnati	450-452	5%
Cleveland	440-441	3%
Columbus	432	9%
Dayton	453-455	4%
Lima	458	-4%
Marietta	457	-5%
Marion	433	-2%
Newark	430-431	9%
Sandusky	448-449	0%
Steubenville	439	-4%
Toledo	434-436	3%
Warren	444	-3%
Youngstown	445	-1%
Zanesville	437-438	-2%
Oklahoma Average		**-8%**
Adams	739	-6%
Ardmore	734	-8%
Clinton	736	-10%
Durant	747	-7%
Enid	737	-11%
Lawton	735	-11%
McAlester	745	-10%
Muskogee	744	-8%
Norman	730	-8%
Oklahoma City	731	-8%
Ponca City	746	-8%
Poteau	749	-13%
Pryor	743	-3%
Shawnee	748	-9%
Tulsa	740-741	-2%
Woodward	738	-7%
Oregon Average		**-1%**
Adrian	979	-11%
Bend	977	1%
Eugene	974	-3%
Grants Pass	975	-4%
Klamath Falls	976	-8%
Pendleton	978	0%
Portland	970-972	14%
Salem	973	-1%
Pennsylvania Average		**-3%**
Allentown	181	1%
Altoona	166	-8%
Beaver Springs	178	-8%
Bethlehem	180	4%
Bradford	167	-9%
Butler	160	0%
Chambersburg	172	-5%
Clearfield	168	-2%
DuBois	158	-8%
East Stroudsburg	183	-9%
Erie	164-165	-8%
Genesee	169	-8%
Greensburg	156	-4%
Harrisburg	170-171	-1%
Hazleton	182	-4%
Johnstown	159	-9%
Kittanning	162	-9%
Lancaster	175-176	-2%
Meadville	163	-14%
Montrose	188	-5%
New Castle	161	-3%
Philadelphia	190-191	7%
Pittsburgh	152	2%
Pottsville	179	-5%
Punxsutawney	157	-11%
Reading	195-196	-1%
Scranton	184-185	-4%
Somerset	155	-8%
Southeastern	193	7%
Uniontown	154	-9%
Valley Forge	194	13%
Warminster	189	8%
Warrendale	150-151	2%
Washington	153	1%
Wilkes Barre	186-187	-3%
Williamsport	177	-8%
York	173-174	2%
Rhode Island Average		**3%**
Bristol	28	3%
Coventry	28	3%
Cranston	29	3%
Davisville	28	3%
Narragansett	28	3%
Newport	28	3%
Providence	29	3%
Warwick	28	3%
South Carolina Average		**-1%**
Aiken	298	2%
Beaufort	299	-1%
Charleston	294	3%
Columbia	290-292	-1%
Greenville	296	3%
Myrtle Beach	295	-5%
Rock Hill	297	-3%
Spartanburg	293	-3%
South Dakota Average		**-6%**
Aberdeen	574	-2%
Mitchell	573	-6%
Mobridge	576	-14%
Pierre	575	-9%
Rapid City	577	-4%
Sioux Falls	570-571	2%
Watertown	572	-6%
Tennessee Average		**2%**
Chattanooga	374	5%
Clarksville	370	7%
Cleveland	373	3%
Columbia	384	-6%
Cookeville	385	-7%
Jackson	383	4%
Kingsport	376	-1%
Knoxville	377-379	4%
McKenzie	382	-7%
Memphis	380-381	7%
Nashville	371-372	10%
Texas Average		**-1%**
Abilene	795-796	-3%
Amarillo	790-791	-4%
Arlington	760	5%
Austin	786-787	7%
Bay City	774	7%
Beaumont	776-777	4%
Brownwood	768	-6%
Bryan	778	-1%
Childress	792	-3%
Corpus Christi	783-784	2%
Dallas	751-753	8%
Del Rio	788	-10%
El Paso	798-799	-10%
Fort Worth	761-762	4%
Galveston	775	6%
Giddings	789	4%
Greenville	754	2%
Houston	770-772	8%
Huntsville	773	5%
Longview	756	-6%
Lubbock	793-794	-4%
Lufkin	759	-8%
McAllen	785	-13%
Midland	797	4%
Palestine	758	-5%
Plano	750	8%
San Angelo	769	-3%
San Antonio	780-782	-1%
Texarkana	755	-8%
Tyler	757	-7%
Victoria	779	-4%
Waco	765-767	-3%
Wichita Falls	763	-7%
Woodson	764	-2%
Utah Average		**-3%**
Clearfield	840	2%
Green River	845	-10%
Ogden	843-844	-6%
Provo	846-847	-6%
Salt Lake City	841	3%
Vermont Average		**-3%**
Albany	58	-3%
Battleboro	53	-4%
Beecher Falls	59	-3%
Bennington	52	-8%
Burlington	54	-4%
Montpelier	56	-2%
Rutland	57	-4%
Springfield	51	-4%
White River Junction	50	7%
Virginia Average		**-2%**
Abingdon	242	-7%
Alexandria	220-223	11%
Charlottesville	229	-2%
Chesapeake	233	-1%
Culpeper	227	-6%
Farmville	239	-8%
Fredericksburg	224-225	-6%
Galax	243	-9%
Harrisonburg	228	-5%
Lynchburg	245	-3%
Norfolk	235-237	3%
Petersburg	238	-1%
Radford	241	-8%
Reston	201	14%
Richmond	232	4%
Roanoke	240	-3%
Staunton	244	-6%
Tazewell	246	-12%
Virginia Beach	234	0%
Williamsburg	230-231	3%
Winchester	226	-6%
Washington Average		**1%**
Clarkston	994	1%
Everett	982	2%
Olympia	985	2%
Pasco	993	2%
Seattle	980-981	12%
Spokane	990-992	-2%
Tacoma	983-984	4%
Vancouver	986	1%
Wenatchee	988	-2%
Yakima	989	-6%
West Virginia Average		**-7%**
Beckley	258-259	-9%
Bluefield	247-248	-11%
Charleston	250-253	4%
Clarksburg	263-264	-3%
Fairmont	266	-10%
Huntington	255-257	-2%
Lewisburg	249	-17%
Martinsburg	254	-3%
Morgantown	265	-5%
New Martinsville	262	-13%
Parkersburg	261	-2%
Romney	267	-10%
Sugar Grove	268	-8%
Wheeling	260	-4%
Wisconsin Average		**0%**
Amery	540	-1%
Beloit	535	3%
Clam Lake	545	-6%
Eau Claire	547	-2%
Green Bay	541-543	0%
La Crosse	546	-3%
Ladysmith	548	-3%
Madison	537	6%
Milwaukee	530-534	7%
Oshkosh	549	7%
Portage	539	4%
Prairie du Chien	538	-3%
Wausau	544	-1%
Wyoming Average		**-3%**
Casper	826	-2%
Cheyenne/ Laramie	820	0%
Gillette	827	-9%
Powell	824	-9%
Rawlins	823	-3%
Riverton	825	-8%
Rock Springs	829-831	0%
Sheridan	828	1%
Wheatland	822	2%

CANADIAN AREA MODIFIERS

These figures assume an exchange rate of $1.00 Canadian to $0.76 U.S.

Alberta	**13%**
Calgary	14%
Edmonton	14%
Fort McMurray	12%
British Columbia	**7%**
Fraser Valley	6%
Okanagan	6%
Vancouver	9%
Manitoba	**0%**
North Manitoba	0%
South Manitoba	0%
Selkirk	0%
Winnipeg	0%
New Brunswick	**-13%**
Moncton	-13%
Nova Scotia	**-8%**
Amherst	-8%
Nova Scotia	-7%
Sydney	-8%
Newfoundland/ Labrador	**-3%**
Ontario	**7%**
London	7%
Thunder Bay	6%
Toronto	7%
Quebec	**-1%**
Montreal	-1%
Quebec City	-1%
Saskatchewan	**4%**
La Ronge	3%
Prince Albert	2%
Saskatoon	5%

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Crew Compositions & Wage Rates

Crew Code		Manhours per day	Total costs $/Hr.	$/Day	Average Crew Rate (ACR) per Hour	Average Crew Rate (ACROP) per Hour w/O&P
AB	1 Pneumatic tool operator	8.00	$53.72	$429.76		
	1 Laborer	8.00	$38.01	$304.08		
	TOTAL	**16.00**		**$733.84**	**$45.87**	**$68.80**
AD	2 Pneumatic tool operators	16.00	$53.72	$859.52		
	1 Laborer	8.00	$38.01	$304.08		
	TOTAL	**24.00**		**$1,163.60**	**$48.48**	**$72.73**
BD	3 Bricklayers	24.00	$46.24	$1,109.76		
	2 Bricktenders	16.00	$34.66	$554.56		
	TOTAL	**40.00**		**$1,664.32**	**$41.61**	**$62.41**
BK	1 Bricklayer	8.00	$46.24	$369.92		
	1 Bricktender	8.00	$34.66	$277.28		
	TOTAL	**16.00**		**$647.20**	**$40.45**	**$60.68**
BO	2 Bricklayers	16.00	$46.24	$739.84		
	2 Bricktenders	16.00	$34.66	$554.56		
	TOTAL	**32.00**		**$1,294.40**	**$40.45**	**$60.68**
2C	2 Carpenters	16.00	$47.05	$752.80	$47.05	$70.58
CA	1 Carpenter	8.00	$47.05	$376.40	$47.05	$70.58
CH	1 Carpenter	8.00	$47.05	$376.40		
	1/2 Laborer	4.00	$38.01	$152.04		
	TOTAL	**12.00**		**$528.44**	**$44.04**	**$66.06**
CJ	1 Carpenter	8.00	$47.05	$376.40		
	1 Laborer	8.00	$38.01	$304.08		
	TOTAL	**16.00**		**$680.48**	**$42.53**	**$63.80**
CN	2 Carpenters	16.00	$47.05	$752.80		
	1/2 Laborer	4.00	$38.01	$152.04		
	TOTAL	**20.00**		**$904.84**	**$45.24**	**$67.86**
CS	2 Carpenters	16.00	$47.05	$752.80		
	1 Laborer	8.00	$38.01	$304.08		
	TOTAL	**24.00**		**$1,056.88**	**$44.04**	**$66.06**
CT	1 Mosaic & terrazzo setter	8.00	$54.41	$435.28	$54.41	$81.62
CU	4 Carpenters	32.00	$47.05	$1,505.60		
	1 Laborer	8.00	$38.01	$304.08		
	TOTAL	**40.00**		**$1,809.68**	**$45.24**	**$67.86**
CW	2 Carpenters	16.00	$47.05	$752.80		
	2 Laborers	16.00	$38.01	$608.16		
	TOTAL	**32.00**		**$1,360.96**	**$42.53**	**$63.80**
CX	4 Carpenters	32.00	$47.05	$1,505.60	$47.05	$70.58

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Crew Code		Manhours per day	Total costs $/Hr.	$/Day	Average Crew Rate (ACR) per Hour	Average Crew Rate (ACROP) per Hour w/O&P
CY	3 Carpenters	24.00	$47.05	$1,129.20		
	2 Laborers	16.00	$38.01	$608.16		
	1 Equipment operator	8.00	$52.12	$416.96		
	1 Laborer	8.00	$38.01	$304.08		
	TOTAL	**56.00**		**$2,458.40**	**$43.90**	**$65.85**
CZ	4 Carpenters	32.00	$47.05	$1,505.60		
	3 Laborers	24.00	$38.01	$912.24		
	1 Equipment operator	8.00	$52.12	$416.96		
	1 Laborer	8.00	$38.01	$304.08		
	TOTAL	**72.00**		**$3,138.88**	**$43.60**	**$65.39**
DB	1 Cement mason	8.00	$44.25	$354.00		
	1 Laborer	8.00	$38.01	$304.08		
	TOTAL	**16.00**		**$658.08**	**$41.13**	**$61.70**
DD	2 Cement masons	16.00	$44.25	$708.00		
	1 Laborer	8.00	$38.01	$304.08		
	TOTAL	**24.00**		**$1,012.08**	**$42.17**	**$63.26**
DF	3 Cement masons	24.00	$44.25	$1,062.00		
	5 Laborers	40.00	$38.01	$1,520.40		
	TOTAL	**64.00**		**$2,582.40**	**$40.35**	**$60.53**
DI	1 Drywall installer	8.00	$44.74	$357.92	$44.74	$67.11
DJ	1 Drywall installer	8.00	$44.74	$357.92		
	1 Laborer	8.00	$38.01	$304.08		
	TOTAL	**16.00**		**$662.00**	**$41.38**	**$62.06**
DK	1 Drywall installer	8.00	$44.74	$357.92		
	1 Drywall taper	8.00	$46.30	$370.40		
	TOTAL	**16.00**		**$728.32**	**$45.52**	**$68.28**
DL	2 Drywall installers	16.00	$44.74	$715.84		
	1 Drywall taper	8.00	$46.30	$370.40		
	TOTAL	**24.00**		**$1,086.24**	**$45.26**	**$67.89**
DM	2 Drywall installers	16.00	$44.74	$715.84	$44.74	$67.11
DT	1 Drywall taper	8.00	$46.30	$370.40	$46.30	$69.45
DU	2 Drywall tapers	16.00	$46.30	$740.80	$46.30	$69.45
EA	1 Electrician	8.00	$49.75	$398.00	$49.75	$74.63
EB	2 Electricians	16.00	$49.75	$796.00	$49.75	$74.63
ED	1 Electrician	8.00	$49.75	$398.00		
	1 Carpenter	8.00	$47.05	$376.40		
	TOTAL	**16.00**		**$774.40**	**$48.40**	**$72.60**
FA	1 Floorlayer	8.00	$43.12	$344.96	$43.12	$64.68
FB	2 Floorlayers	16.00	$43.12	$689.92		
	1/4 Laborer	2.00	$38.01	$76.02		
	TOTAL	**18.00**		**$765.94**	**$42.55**	**$63.83**

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Crew Code		Manhours per day	Total costs $/Hr.	$/Day	Average Crew Rate (ACR) per Hour	Average Crew Rate (ACROP) per Hour w/O&P
FC	1 Floorlayer (hardwood)	8.00	$45.28	$362.25	$45.28	$67.92
FD	2 Floorlayers (hardwood)	16.00	$45.28	$724.50		
	1/4 Laborer	2.00	$38.01	$76.02		
	TOTAL	**18.00**		**$800.52**	**$44.47**	**$66.71**
GA	1 Glazier	8.00	$43.51	$348.08	$43.51	$65.27
GB	2 Glaziers	16.00	$43.51	$696.16	$43.51	$65.27
GC	3 Glaziers	24.00	$43.51	$1,044.24	$43.51	$65.27
HA	1 Fence erector	8.00	$46.96	$375.67	$46.96	$70.44
HB	1 Fence erector	8.00	$46.96	$375.67		
	1 Laborer	8.00	$38.01	$304.08		
	TOTAL	**16.00**		**$679.75**	**$42.48**	**$63.73**
HD	2 Fence erectors	16.00	$46.96	$751.34		
	1 Laborer	8.00	$38.01	$304.08		
	TOTAL	**24.00**		**$1,055.42**	**$43.98**	**$65.96**
1L	1 Laborer	8.00	$38.01	$304.08	$38.01	$57.02
LB	2 Laborers	16.00	$38.01	$608.16	$38.01	$57.02
LC	2 Laborers	16.00	$38.01	$608.16		
	1 Carpenter	8.00	$47.05	$376.40		
	TOTAL	**24.00**		**$984.56**	**$41.02**	**$61.54**
LD	2 Laborers	16.00	$38.01	$608.16		
	2 Carpenters	16.00	$47.05	$752.80		
	TOTAL	**32.00**		**$1,360.96**	**$42.53**	**$63.80**
LG	5 Laborers	40.00	$38.01	$1,520.40		
	1 Carpenter	8.00	$47.05	$376.40		
	TOTAL	**48.00**		**$1,896.80**	**$39.52**	**$59.28**
LH	3 Laborers	24.00	$38.01	$912.24	$38.01	$57.02
LJ	4 Laborers	32.00	$38.01	$1,216.32	$38.01	$57.02
LK	2 Laborers	16.00	$38.01	$608.16		
	2 Carpenters	16.00	$47.05	$752.80		
	1 Equipment operator	8.00	$52.12	$416.96		
	1 Laborer	8.00	$38.01	$304.08		
	TOTAL	**48.00**		**$2,082.00**	**$43.38**	**$65.06**
LL	3 Laborers	24.00	$38.01	$912.24		
	1 Carpenter	8.00	$47.05	$376.40		
	1 Equipment operator	8.00	$52.12	$416.96		
	1 Laborer	8.00	$38.01	$304.08		
	TOTAL	**48.00**		**$2,009.68**	**$41.87**	**$62.80**
LR	1 Lather	8.00	$44.83	$358.64	$44.83	$67.25

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Crew	Code		Manhours per day	Total costs $/Hr.	$/Day	Average Crew Rate (ACR) per Hour	Average Crew Rate (ACROP) per Hour w/O&P
MB		1 Millwright finish carpenter	8.00	$44.82	$358.56		
		1 Laborer	8.00	$38.01	$304.08		
		TOTAL	**16.00**		**$662.64**	**$41.42**	**$62.12**
ML		2 Bricklayers	16.00	$46.24	$739.84		
		1 Bricktender	8.00	$34.66	$277.28		
		TOTAL	**24.00**		**$1,017.12**	**$42.38**	**$63.57**
MM		1 Marble setter	8.00	$38.77	$310.16	$38.77	$58.16
MN		2 Marble setters	16.00	$38.77	$620.32	$38.77	$58.16
MR		1 Millwright finish carpenter	8.00	$44.82	$358.56	$44.82	$67.23
MU		2 Mosaic & terrazzo setters	16.00	$54.41	$870.56	$54.41	$81.62
NA		1 Painter (brush)	8.00	$46.91	$375.28	$46.91	$70.37
NC		1 Painter (spray)	8.00	$48.32	$386.59	$48.32	$72.49
PD		2 Plasterers	16.00	$46.30	$740.80		
		1 Plasterer helper	8.00	$35.75	$286.00		
		TOTAL	**24.00**		**$1,026.80**	**$42.78**	**$64.18**
PE		3 Plasterers	24.00	$46.30	$1,111.20		
		2 Plasterer helpers	16.00	$35.75	$572.00		
		TOTAL	**40.00**		**$1,683.20**	**$42.08**	**$63.12**
QA		1 Paperhanger	8.00	$49.26	$394.06	$49.26	$73.89
2R		2 Roofers (journeyman)	16.00	$50.22	$803.52	$50.22	$75.33
RG		2 Roofers (journeyman)	16.00	$50.22	$803.52		
		1 Laborer	8.00	$38.01	$304.08		
		TOTAL	**24.00**		**$1,107.60**	**$46.15**	**$69.23**
RJ		2 Roofers (wood shingles)	16.00	$52.72	$843.47	$52.72	$79.08
RL		2 Roofers (journeyman)	16.00	$50.22	$803.52		
		1/2 Laborer	4.00	$38.01	$152.04		
		TOTAL	**20.00**		**$955.56**	**$47.78**	**$71.67**
RM		2 Roofers (wood shingles)	16.00	$52.72	$843.47		
		1/2 Laborer	4.00	$38.01	$152.04		
		TOTAL	**20.00**		**$995.51**	**$49.78**	**$74.66**
RQ		2 Roofers (wood shingles)	16.00	$52.72	$843.47		
		7/8 Laborer	7.00	$38.01	$266.07		
		TOTAL	**23.00**		**$1,109.54**	**$48.24**	**$72.36**
RS		1 Roofer (foreman)	8.00	$55.23	$441.87		
		3 Roofers (pitch)	24.00	$51.72	$1,241.19		
		2 Laborers	16.00	$38.01	$608.16		
		TOTAL	**48.00**		**$2,291.22**	**$47.73**	**$71.60**
RT		2 Roofers (pitch)	16.00	$51.72	$827.46		
		1 Laborer	8.00	$38.01	$304.08		
		TOTAL	**24.00**		**$1,131.54**	**$47.15**	**$70.72**

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Crew Code		Manhours per day	Total costs $/Hr.	$/Day	Average Crew Rate (ACR) per Hour	Average Crew Rate (ACROP) per Hour w/O&P
SA	1 Plumber	8.00	$53.23	$425.84	$53.23	$79.85
SB	1 Plumber	8.00	$53.23	$425.84		
	1 Laborer	8.00	$38.01	$304.08		
	TOTAL	**16.00**		**$729.92**	**$45.62**	**$68.43**
SC	1 Plumber	8.00	$53.23	$425.84		
	1 Electrician	8.00	$49.75	$398.00		
	TOTAL	**16.00**		**$823.84**	**$51.49**	**$77.24**
SD	1 Plumber	8.00	$53.23	$425.84		
	1 Laborer	8.00	$38.01	$304.08		
	1 Electrician	8.00	$49.75	$398.00		
	TOTAL	**24.00**		**$1,127.92**	**$47.00**	**$70.50**
SE	2 Plumbers	16.00	$53.23	$851.68		
	1 Laborer	8.00	$38.01	$304.08		
	1 Electrician	8.00	$49.75	$398.00		
	TOTAL	**32.00**		**$1,553.76**	**$48.56**	**$72.83**
SF	2 Plumbers	16.00	$53.23	$851.68		
	1 Laborer	8.00	$38.01	$304.08		
	TOTAL	**24.00**		**$1,155.76**	**$48.16**	**$72.24**
SG	3 Plumbers	24.00	$53.23	$1,277.52		
	1 Laborer	8.00	$38.01	$304.08		
	TOTAL	**32.00**		**$1,581.60**	**$49.43**	**$74.14**
TA	1 Tile setter	8.00	$41.52	$332.16	$41.52	$62.28
TB	1 Tile setter (ceramic)	8.00	$41.52	$332.16		
	1 Tile setter helper (ceramic)	8.00	$34.26	$274.08		
	TOTAL	**16.00**		**$606.24**	**$37.89**	**$56.83**
UA	1 Sheet metal worker	8.00	$51.03	$408.24	$51.03	$76.55
UB	2 Sheet metal workers	16.00	$51.03	$816.48	$51.03	$76.55
UC	2 Sheet metal workers	16.00	$51.03	$816.48		
	2 Laborers	16.00	$38.01	$608.16		
	TOTAL	**32.00**		**$1,424.64**	**$44.52**	**$66.78**
UD	1 Sheet metal worker	8.00	$51.03	$408.24		
	1 Laborer	8.00	$38.01	$304.08		
	TOTAL	**16.00**		**$712.32**	**$44.52**	**$66.78**
UE	1 Sheet metal worker	8.00	$51.03	$408.24		
	1 Laborer	8.00	$38.01	$304.08		
	1/2 Electrician	4.00	$49.75	$199.00		
	TOTAL	**20.00**		**$911.32**	**$45.57**	**$68.35**
UF	2 Sheet metal workers	16.00	$51.03	$816.48		
	1 Laborer	8.00	$38.01	$304.08		
	TOTAL	**24.00**		**$1,120.56**	**$46.69**	**$70.04**
VB	1 Equipment operator	8.00	$52.12	$416.96		
	1 Laborer	8.00	$38.01	$304.08		
	TOTAL	**16.00**		**$721.04**	**$45.07**	**$67.60**

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Abbreviations Used in This Book

ABS	acrylonitrile butadiene styrene
ACR	average crew rate
AGA	American Gas Association
AMP	ampere
Approx.	approximately
ASME	American Society of Mechanical Engineers
auto.	automatic
Avg.	average
Bdle.	bundle
BTU	British thermal unit
BTUH	British thermal unit per hour
C	100
cc	center to center or cubic centimeter
CF	cubic foot
CFM	cubic foot per minute
CLF	100 linear feet
Const.	construction
Corr.	corrugated
CSF	100 square feet
CSY	100 square yards
Ctn	carton
CWT	100 pounds
CY	cubic yard
Cu.	cubic
d	penny
D	deep or depth
Demo	demolish
dia.	diameter
D.S.A.	double strength, A grade
D.S.B.	double strength, B grade
Ea	each
e.g.	for example
etc.	et cetera
exp.	exposure
FAS	First and Select grade
F.H.A.	Federal Housing Administration
fl. oz.	fluid ounce
flt	flight
ft.	foot
ga.	gauge
gal	gallon
galv.	galvanized
GFI	ground fault interrupter
GPH	gallons per hour
GPM	gallons per minute
H	height or high
HP, hp	horsepower
Hr.	hour
HVAC	heating, ventilating, air conditioning
i.d.	inside diameter
i.e.	that is
Inst	install
I.P.S.	iron pipe size
KD	knocked down
KW, kw	kilowatts
L	length or long
lb, lbs.	pound(s)
LF	linear feet
LS	lump sum
M	1000
Mat'l	material
Max.	maximum
MBF	1000 board feet
MBHP	1000 boiler horsepower
Mi	miles
Min.	minimum
MSF	1000 square feet
O.B.	opposed blade
oc	on center
o.d.	outside dimension
oz.	ounce
pcs.	pieces
pkg.	package
PSI	per square inch
PVC	polyvinyl chloride
Qt.	quart
R.E.	rounded edge
R/L	random length
RS	rapid start (lamps)
R/W/L	random width and length
S4S	surfaced-four-sides
SF	square foot
SL	slimline (lamps)
Sq.	1 square or 100 square feet
S.S.B.	single strength, B quality
std.	standard
SY	square yard
T	thick
T&G	tongue and groove
U	thermal conductivity
U.I.	united inches
UL	Underwriters Laboratories
U.S.G.	United States Gypsum
VLF	vertical linear feet
W	width or wide
yr.	year

Symbols

/	per
%	percent
"	inches
'	foot or feet
x	by
o	degree
#	number or pounds
$	dollar
+/-	plus or minus

For crew abbreviations, please see Crew Compositions & Wage Rates chart, pages 15 to 19.

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Acoustical and insulating tile

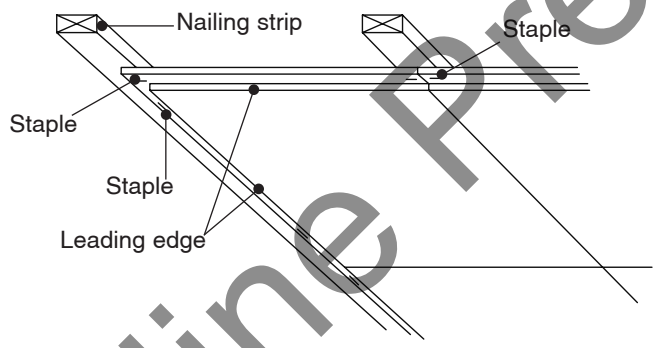
1. **Dimensions**
   a. Acoustical tile. 1/2" thick x 12" x 12", 24".
   b. Insulating tile, decorative. 1/2" thick x 12" x 12", 24"; 1/2" thick x 16" x 16", 32".

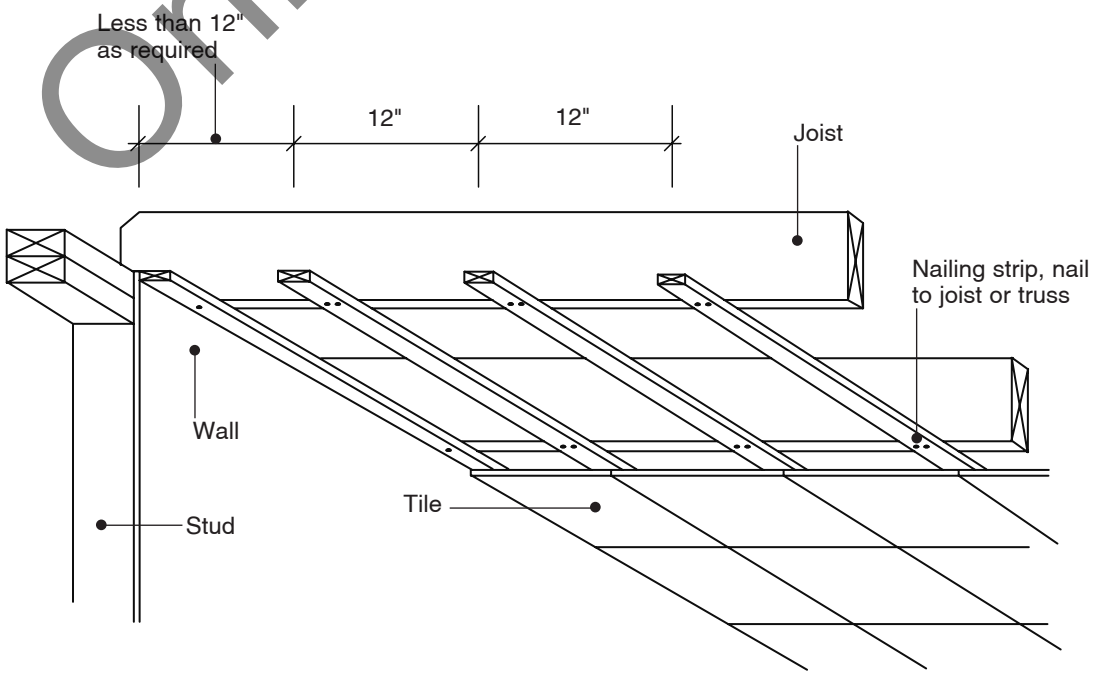
2. **Installation.** Tile may be applied to existing plaster (if joist spacing is suitable) or to wood furring strips. Tile may have a square edge or flange. Depending on the type and shape of the tile, you can use adhesive, staples, nails or clips to attach the tile.

3. **Estimating Technique.** Determine area and add 5 percent to 10 percent for waste.

4. **Notes on Material Pricing.** A material price of $25.40 a gallon for adhesive was used to compile the Average Material Cost/Unit on the following pages. Here are the coverage rates:

12" x 12"	1.25 Gal/CSF
12" x 24"	0.95 Gal/CSF
16" x 16"	0.75 Gal/CSF
16" x 32"	0.55 Gal/CSF





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Description	Oper	Unit	Vol	Crew Size	Man-hours per Unit	Crew Output per Day	Avg Mat'l Unit Cost	Avg Labor Unit Cost	Avg Equip Unit Cost	Avg Total Unit Cost	Avg Price Incl O&P
Acoustical treatment											
See also Suspended ceiling systems, page 406											
Ceiling and wall tile											
Adhesive set											
Tile only, no grid system; includes dumpster											
	Demo	SF	Lg	LB	.012	1300	---	.46	.09	.55	**.79**
	Demo	SF	Sm	LB	.018	910.0	---	.68	.10	.78	**1.15**
Tile on furring strips; includes dumpster											
	Demo	SF	Lg	LB	.009	1710	---	.34	.11	.45	**.65**
	Demo	SF	Sm	LB	.013	1197	---	.49	.12	.61	**.89**
Mineral fiber, vinyl coated, tile only											
Applied in square pattern by adhesive to solid backing; 5% tile waste											
1/2" thick, 12" x 12" or 12" x 24"											
Economy, mini perforated	Inst	SF	Lg	2C	.018	880.0	2.21	.85	---	3.06	**3.92**
	Inst	SF	Sm	2C	.026	616.0	2.43	1.22	---	3.65	**4.75**
Standard, random perforated	Inst	SF	Lg	2C	.018	880.0	3.05	.85	---	3.90	**4.93**
	Inst	SF	Sm	2C	.026	616.0	3.36	1.22	---	4.58	**5.87**
Designer, swirl perforation	Inst	SF	Lg	2C	.018	880.0	3.30	.85	---	4.15	**5.23**
	Inst	SF	Sm	2C	.026	616.0	3.64	1.22	---	4.86	**6.20**
Deluxe, sculptured face	Inst	SF	Lg	2C	.018	880.0	3.55	.85	---	4.40	**5.53**
	Inst	SF	Sm	2C	.026	616.0	3.91	1.22	---	5.13	**6.53**
5/8" thick, 12" x 12" or 12" x 24"											
Economy, mini perforated	Inst	SF	Lg	2C	.018	880.0	2.64	.85	---	3.49	**4.44**
	Inst	SF	Sm	2C	.026	616.0	2.91	1.22	---	4.13	**5.33**
Standard, random perforated	Inst	SF	Lg	2C	.018	880.0	3.68	.85	---	4.53	**5.69**
	Inst	SF	Sm	2C	.026	616.0	4.06	1.22	---	5.28	**6.71**
Designer, swirl perforation	Inst	SF	Lg	2C	.018	880.0	4.01	.85	---	4.86	**6.08**
	Inst	SF	Sm	2C	.026	616.0	4.42	1.22	---	5.64	**7.14**
Deluxe, sculptured face	Inst	SF	Lg	2C	.018	880.0	4.31	.85	---	5.16	**6.44**
	Inst	SF	Sm	2C	.026	616.0	4.75	1.22	---	5.97	**7.54**
3/4" thick, 12" x 12" or 12" x 24"											
Economy, mini perforated	Inst	SF	Lg	2C	.018	880.0	2.89	.85	---	3.74	**4.74**
	Inst	SF	Sm	2C	.026	616.0	3.19	1.22	---	4.41	**5.66**
Standard, random perforated	Inst	SF	Lg	2C	.018	880.0	4.07	.85	---	4.92	**6.15**
	Inst	SF	Sm	2C	.026	616.0	4.48	1.22	---	5.70	**7.21**
Designer, swirl perforation	Inst	SF	Lg	2C	.018	880.0	4.42	.85	---	5.27	**6.57**
	Inst	SF	Sm	2C	.026	616.0	4.87	1.22	---	6.09	**7.68**
Deluxe, sculptured face	Inst	SF	Lg	2C	.018	880.0	4.76	.85	---	5.61	**6.98**
	Inst	SF	Sm	2C	.026	616.0	5.25	1.22	---	6.47	**8.14**
Applied by adhesive to furring strips ADD											
	Inst	SF	Lg	2C	.002	---	---	.09	---	.09	**.14**
	Inst	SF	Sm	2C	.002	---	---	.09	---	.09	**.14**

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Description	Oper	Unit	Vol	Crew Size	Man-hours per Unit	Crew Output per Day	Avg Mat'l Unit Cost	Avg Labor Unit Cost	Avg Equip Unit Cost	Avg Total Unit Cost	Avg Price Incl O&P
Stapled											
Tile only, no grid system	Demo	SF	Lg	LB	.014	1170	---	.53	.10	.63	**.92**
	Demo	SF	Sm	LB	.020	819	---	.76	.11	.87	**1.27**
Tile on furring strips	Demo	SF	Lg	LB	.010	1540	---	.38	.13	.51	**.73**
	Demo	SF	Sm	LB	.015	1078	---	.57	.14	.71	**1.02**
Mineral fiber, vinyl coated, tile only											
Applied in square pattern by staples, nails, or clips to solid backing; 5% tile waste											
1/2" thick, 12" x 12" or 12" x 24"											
Economy, mini perforated	Inst	SF	Lg	2C	.017	960.0	1.74	.80	---	2.54	**3.29**
	Inst	SF	Sm	2C	.024	672.0	1.92	1.13	---	3.05	**4.00**
Standard, random perforated	Inst	SF	Lg	2C	.017	960.0	2.59	.80	---	3.39	**4.31**
	Inst	SF	Sm	2C	.024	672.0	2.85	1.13	---	3.98	**5.11**
Designer, swirl perforation	Inst	SF	Lg	2C	.017	960.0	2.84	.80	---	3.64	**4.61**
	Inst	SF	Sm	2C	.024	672.0	3.13	1.13	---	4.26	**5.45**
Deluxe, sculptured face	Inst	SF	Lg	2C	.017	960.0	3.09	.80	---	3.89	**4.91**
	Inst	SF	Sm	2C	.024	672.0	3.40	1.13	---	4.53	**5.77**
5/8" thick, 12" x 12" or 12" x 24"											
Economy, mini perforated	Inst	SF	Lg	2C	.017	960.0	2.18	.80	---	2.98	**3.82**
	Inst	SF	Sm	2C	.024	672.0	2.40	1.13	---	3.53	**4.57**
Standard, random perforated	Inst	SF	Lg	2C	.017	960.0	3.22	.80	---	4.02	**5.06**
	Inst	SF	Sm	2C	.024	672.0	3.55	1.13	---	4.68	**5.95**
Designer, swirl perforation	Inst	SF	Lg	2C	.017	960.0	3.55	.80	---	4.35	**5.46**
	Inst	SF	Sm	2C	.024	672.0	3.91	1.13	---	5.04	**6.39**
Deluxe, sculptured face	Inst	SF	Lg	2C	.017	960.0	3.85	.80	---	4.65	**5.82**
	Inst	SF	Sm	2C	.024	672.0	4.24	1.13	---	5.37	**6.78**
3/4" thick, 12" x 12" or 12" x 24"											
Economy, mini perforated	Inst	SF	Lg	2C	.017	960.0	2.43	.80	---	3.23	**4.12**
	Inst	SF	Sm	2C	.024	672.0	2.68	1.13	---	3.81	**4.91**
Standard, random perforated	Inst	SF	Lg	2C	.017	960.0	3.61	.80	---	4.41	**5.53**
	Inst	SF	Sm	2C	.024	672.0	3.97	1.13	---	5.10	**6.46**
Designer, swirl perforation	Inst	SF	Lg	2C	.017	960.0	3.96	.80	---	4.76	**5.95**
	Inst	SF	Sm	2C	.024	672.0	4.36	1.13	---	5.49	**6.93**
Deluxe, sculptured face	Inst	SF	Lg	2C	.017	960.0	4.30	.80	---	5.10	**6.36**
	Inst	SF	Sm	2C	.024	672.0	4.74	1.13	---	5.87	**7.38**
Applied by staples, nails or clips to furring strips ADD											
	Inst	SF	Lg	2C	.017	960.0	---	.80	---	.80	**1.20**
	Inst	SF	Sm	2C	.024	672.0	---	1.13	---	1.13	**1.69**
Tile patterns, effect on labor											
Herringbone, Increase manhours											
	Inst	%	Lg	2C	25.0	---	---	---	---	---	**---**
	Inst	%	Sm	2C	25.0	---	---	---	---	---	**---**
Diagonal, Increase manhours	Inst	%	Lg	2C	20.0	---	---	---	---	---	**---**
	Inst	%	Sm	2C	20.0	---	---	---	---	---	**---**
Ashlar, Increase manhours	Inst	%	Lg	2C	30.0	---	---	---	---	---	**---**
	Inst	%	Sm	2C	30.0	---	---	---	---	---	**---**

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Furring strips, 8% waste included											
Over wood											
1" x 3", 12" oc	Inst	SF	Lg	2C	.010	1600	.53	.47	---	1.00	**1.34**
	Inst	SF	Sm	2C	.014	1120	.58	.66	---	1.24	**1.68**
1" x 3", 16" oc	Inst	SF	Lg	2C	.008	1920	.41	.38	---	.79	**1.06**
	Inst	SF	Sm	2C	.012	1344	.45	.56	---	1.01	**1.39**
1" x 4", 12" oc	Inst	SF	Lg	2C	.010	1600	.61	.47	---	1.08	**1.44**
	Inst	SF	Sm	2C	.014	1120	.67	.66	---	1.33	**1.79**
1" x 4", 16" oc	Inst	SF	Lg	2C	.008	1920	.47	.38	---	.85	**1.13**
	Inst	SF	Sm	2C	.012	1344	.52	.56	---	1.08	**1.47**
Over plaster											
1" x 3", 12" oc	Inst	SF	Lg	2C	.013	1280	.53	.61	---	1.14	**1.55**
	Inst	SF	Sm	2C	.018	896	.58	.85	---	1.43	**1.97**
1" x 3", 16" oc	Inst	SF	Lg	2C	.010	1600	.41	.47	---	.88	**1.20**
	Inst	SF	Sm	2C	.014	1120	.45	.66	---	1.11	**1.53**
1" x 4", 12" oc	Inst	SF	Lg	2C	.013	1280	.61	.61	---	1.22	**1.65**
	Inst	SF	Sm	2C	.018	896	.67	.85	---	1.52	**2.07**
1" x 4", 16" oc	Inst	SF	Lg	2C	.010	1600	.47	.47	---	.94	**1.27**
	Inst	SF	Sm	2C	.014	1120	.52	.66	---	1.18	**1.61**

Adhesives

Better quality, gun-applied in continuous bead to wood or metal framing or furring members.
Per 100 SF of surface area including 6% waste.

Panel adhesives

Subfloor adhesives, on floors

12" oc members											
1/8" diameter (11 fl.oz./CSF)	Inst	CSF	Lg	CA	.075	106.0	3.80	3.53	---	7.33	**9.85**
	Inst	CSF	Sm	CA	.101	79.50	4.19	4.75	---	8.94	**12.20**
1/4" diameter (43 fl.oz./CSF)	Inst	CSF	Lg	CA	.075	106.0	15.20	3.53	---	18.73	**23.50**
	Inst	CSF	Sm	CA	.101	79.50	16.70	4.75	---	21.45	**27.20**
3/8" diameter (97 fl.oz./CSF)	Inst	CSF	Lg	CA	.075	106.0	34.20	3.53	---	37.73	**46.30**
	Inst	CSF	Sm	CA	.101	79.50	37.70	4.75	---	42.45	**52.30**
1/2" diameter (172 fl.oz./CSF)	Inst	CSF	Lg	CA	.075	106.0	60.50	3.53	---	64.03	**77.90**
	Inst	CSF	Sm	CA	.101	79.50	66.70	4.75	---	71.45	**87.10**
16" oc members											
1/8" diameter (9 fl.oz./CSF)	Inst	CSF	Lg	CA	.056	143.0	3.04	2.63	---	5.67	**7.60**
	Inst	CSF	Sm	CA	.075	107.3	3.35	3.53	---	6.88	**9.31**
1/4" diameter (34 fl.oz./CSF)	Inst	CSF	Lg	CA	.056	143.0	12.10	2.63	---	14.73	**18.50**
	Inst	CSF	Sm	CA	.075	107.3	13.40	3.53	---	16.93	**21.30**
3/8" diameter (78 fl.oz./CSF)	Inst	CSF	Lg	CA	.056	143.0	27.40	2.63	---	30.03	**36.80**
	Inst	CSF	Sm	CA	.075	107.3	30.10	3.53	---	33.63	**41.50**
1/2" diameter (137 fl.oz./CSF)	Inst	CSF	Lg	CA	.056	143.0	48.40	2.63	---	51.03	**62.00**
	Inst	CSF	Sm	CA	.075	107.3	53.30	3.53	---	56.83	**69.30**

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24" oc members											
1/8" diameter (7 fl.oz./CSF)	Inst	CSF	Lg	CA	.052	154.0	2.28	2.45	---	4.73	**6.41**
	Inst	CSF	Sm	CA	.069	115.5	2.52	3.25	---	5.77	**7.89**
1/4" diameter (26 fl.oz./CSF)	Inst	CSF	Lg	CA	.052	154.0	9.09	2.45	---	11.54	**14.60**
	Inst	CSF	Sm	CA	.069	115.5	10.00	3.25	---	13.25	**16.90**
3/8" diameter (58 fl.oz./CSF)	Inst	CSF	Lg	CA	.052	154.0	20.50	2.45	---	22.95	**28.30**
	Inst	CSF	Sm	CA	.069	115.5	22.60	3.25	---	25.85	**32.00**
1/2" diameter (103 fl.oz./CSF)	Inst	CSF	Lg	CA	.052	154.0	36.30	2.45	---	38.75	**47.20**
	Inst	CSF	Sm	CA	.069	115.5	40.00	3.25	---	43.25	**52.90**
Wall sheathing or shear panel wall adhesive on walls, floors or ceilings											
12" oc members											
1/8" diameter (11 fl.oz./CSF)	Inst	CSF	Lg	CA	.100	80.00	11.60	4.71	---	16.31	**21.00**
	Inst	CSF	Sm	CA	.133	60.00	12.80	6.26	---	19.06	**24.80**
1/4" diameter (43 fl.oz./CSF)	Inst	CSF	Lg	CA	.100	80.00	46.30	4.71	---	51.01	**62.60**
	Inst	CSF	Sm	CA	.133	60.00	51.00	6.26	---	57.26	**70.60**
3/8" diameter (97 fl.oz./CSF)	Inst	CSF	Lg	CA	.100	80.00	104.00	4.71	---	108.71	**132.00**
	Inst	CSF	Sm	CA	.133	60.00	115.00	6.26	---	121.26	**148.00**
1/2" diameter (172 fl.oz./CSF)	Inst	CSF	Lg	CA	.100	80.00	185.00	4.71	---	189.71	**229.00**
	Inst	CSF	Sm	CA	.133	60.00	204.00	6.26	---	210.26	**254.00**
16" oc members											
1/8" diameter (9 fl.oz./CSF)	Inst	CSF	Lg	CA	.091	88.00	9.29	4.28	---	13.57	**17.60**
	Inst	CSF	Sm	CA	.121	66.00	10.20	5.69	---	15.89	**20.80**
1/4" diameter (34 fl.oz./CSF)	Inst	CSF	Lg	CA	.091	88.00	37.00	4.28	---	41.28	**50.90**
	Inst	CSF	Sm	CA	.121	66.00	40.80	5.69	---	46.49	**57.50**
3/8" diameter (78 fl.oz./CSF)	Inst	CSF	Lg	CA	.091	88.00	83.60	4.28	---	87.88	**107.00**
	Inst	CSF	Sm	CA	.121	66.00	92.10	5.69	---	97.79	**119.00**
1/2" diameter (137 fl.oz./CSF)	Inst	CSF	Lg	CA	.091	88.00	148.00	4.28	---	152.28	**184.00**
	Inst	CSF	Sm	CA	.121	66.00	163.00	5.69	---	168.69	**204.00**
24" oc members											
1/8" diameter (7 fl.oz./CSF)	Inst	CSF	Lg	CA	.084	95.00	6.98	3.95	---	10.93	**14.30**
	Inst	CSF	Sm	CA	.112	71.25	7.69	5.27	---	12.96	**17.10**
1/4" diameter (26 fl.oz./CSF)	Inst	CSF	Lg	CA	.084	95.00	27.80	3.95	---	31.75	**39.30**
	Inst	CSF	Sm	CA	.112	71.25	30.60	5.27	---	35.87	**44.70**
3/8" diameter (58 fl.oz./CSF)	Inst	CSF	Lg	CA	.084	95.00	62.70	3.95	---	66.65	**81.10**
	Inst	CSF	Sm	CA	.112	71.25	69.10	5.27	---	74.37	**90.80**
1/2" diameter (103 fl.oz./CSF)	Inst	CSF	Lg	CA	.084	95.00	111.00	3.95	---	114.95	**139.00**
	Inst	CSF	Sm	CA	.112	71.25	122.00	5.27	---	127.27	**155.00**
Polystyrene or polyurethane foam panel adhesive, on walls											
12" oc members											
1/8" diameter (11 fl.oz./CSF)	Inst	CSF	Lg	CA	.100	80.00	5.92	4.71	---	10.63	**14.20**
	Inst	CSF	Sm	CA	.133	60.00	6.52	6.26	---	12.78	**17.20**
1/4" diameter (43 fl.oz./CSF)	Inst	CSF	Lg	CA	.100	80.00	23.60	4.71	---	28.31	**35.40**
	Inst	CSF	Sm	CA	.133	60.00	26.00	6.26	---	32.26	**40.60**
3/8" diameter (97 fl.oz./CSF)	Inst	CSF	Lg	CA	.100	80.00	53.20	4.71	---	57.91	**70.90**
	Inst	CSF	Sm	CA	.133	60.00	58.60	6.26	---	64.86	**79.70**
1/2" diameter (172 fl.oz./CSF)	Inst	CSF	Lg	CA	.100	80.00	94.10	4.71	---	98.81	**120.00**
	Inst	CSF	Sm	CA	.133	60.00	104.00	6.26	---	110.26	**134.00**

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16" oc members											
1/8" diameter (9 fl.oz./CSF)	Inst	CSF	Lg	CA	.091	88.00	4.73	4.28	---	9.01	**12.10**
	Inst	CSF	Sm	CA	.121	66.00	5.22	5.69	---	10.91	**14.80**
1/4" diameter (34 fl.oz./CSF)	Inst	CSF	Lg	CA	.091	88.00	18.90	4.28	---	23.18	**29.10**
	Inst	CSF	Sm	CA	.121	66.00	20.80	5.69	---	26.49	**33.50**
3/8" diameter (78 fl.oz./CSF)	Inst	CSF	Lg	CA	.091	88.00	42.50	4.28	---	46.78	**57.50**
	Inst	CSF	Sm	CA	.121	66.00	46.90	5.69	---	52.59	**64.80**
1/2" diameter (137 fl.oz./CSF)	Inst	CSF	Lg	CA	.091	88.00	75.30	4.28	---	79.58	**96.80**
	Inst	CSF	Sm	CA	.121	66.00	83.00	5.69	---	88.69	**108.00**
24" oc members											
1/8" diameter (7 fl.oz./CSF)	Inst	CSF	Lg	CA	.084	95.00	3.55	3.95	---	7.50	**10.20**
	Inst	CSF	Sm	CA	.129	62.00	3.91	6.07	---	9.98	**13.80**
1/4" diameter (26 fl.oz./CSF)	Inst	CSF	Lg	CA	.084	95.00	14.10	3.95	---	18.05	**22.90**
	Inst	CSF	Sm	CA	.129	62.00	15.60	6.07	---	21.67	**27.80**
3/8" diameter (58 fl.oz./CSF)	Inst	CSF	Lg	CA	.084	95.00	31.90	3.95	---	35.85	**44.20**
	Inst	CSF	Sm	CA	.129	62.00	35.20	6.07	---	41.27	**51.30**
1/2" diameter (103 fl.oz./CSF)	Inst	CSF	Lg	CA	.084	95.00	56.50	3.95	---	60.45	**73.70**
	Inst	CSF	Sm	CA	.129	62.00	62.20	6.07	---	68.27	**83.80**
Gypsum drywall adhesive, on ceilings											
12" oc members											
1/8" diameter (11 fl.oz./CSF)	Inst	CSF	Lg	CA	.100	80.00	2.12	4.71	---	6.83	**9.60**
	Inst	CSF	Sm	CA	.133	60.00	2.33	6.26	---	8.59	**12.20**
1/4" diameter (43 fl.oz./CSF)	Inst	CSF	Lg	CA	.100	80.00	8.42	4.71	---	13.13	**17.20**
	Inst	CSF	Sm	CA	.133	60.00	9.28	6.26	---	15.54	**20.50**
3/8" diameter (97 fl.oz./CSF)	Inst	CSF	Lg	CA	.100	80.00	19.00	4.71	---	23.71	**29.90**
	Inst	CSF	Sm	CA	.133	60.00	20.90	6.26	---	27.16	**34.50**
1/2" diameter (172 fl.oz./CSF)	Inst	CSF	Lg	CA	.100	80.00	33.60	4.71	---	38.31	**47.40**
	Inst	CSF	Sm	CA	.133	60.00	37.00	6.26	---	43.26	**53.80**
16" oc members											
1/8" diameter (9 fl.oz./CSF)	Inst	CSF	Lg	CA	.091	88.00	1.69	4.28	---	5.97	**8.45**
	Inst	CSF	Sm	CA	.121	66.00	1.86	5.69	---	7.55	**10.80**
1/4" diameter (34 fl.oz./CSF)	Inst	CSF	Lg	CA	.091	88.00	6.73	4.28	---	11.01	**14.50**
	Inst	CSF	Sm	CA	.121	66.00	7.42	5.69	---	13.11	**17.40**
3/8" diameter (78 fl.oz./CSF)	Inst	CSF	Lg	CA	.091	88.00	15.20	4.28	---	19.48	**24.70**
	Inst	CSF	Sm	CA	.121	66.00	16.70	5.69	---	22.39	**28.60**
1/2" diameter (137 fl.oz./CSF)	Inst	CSF	Lg	CA	.091	88.00	26.90	4.28	---	31.18	**38.70**
	Inst	CSF	Sm	CA	.121	66.00	29.60	5.69	---	35.29	**44.10**
24" oc members											
1/8" diameter (7 fl.oz./CSF)	Inst	CSF	Lg	CA	.084	95.00	1.26	3.95	---	5.21	**7.44**
	Inst	CSF	Sm	CA	.112	71.25	1.39	5.27	---	6.66	**9.57**
1/4" diameter (26 fl.oz./CSF)	Inst	CSF	Lg	CA	.084	95.00	5.05	3.95	---	9.00	**12.00**
	Inst	CSF	Sm	CA	.112	71.25	5.56	5.27	---	10.83	**14.60**
3/8" diameter (58 fl.oz./CSF)	Inst	CSF	Lg	CA	.084	95.00	11.40	3.95	---	15.35	**19.60**
	Inst	CSF	Sm	CA	.112	71.25	12.60	5.27	---	17.87	**23.00**
1/2" diameter (103 fl.oz./CSF)	Inst	CSF	Lg	CA	.084	95.00	20.20	3.95	---	24.15	**30.10**
	Inst	CSF	Sm	CA	.112	71.25	22.20	5.27	---	27.47	**34.60**

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Gypsum drywall adhesive, on walls											
12" oc members											
1/8" diameter (11 fl.oz./CSF)	Inst	CSF	Lg	CA	.100	80.00	2.12	4.71	---	6.83	**9.60**
	Inst	CSF	Sm	CA	.133	60.00	2.33	6.26	---	8.59	**12.20**
1/4" diameter (43 fl.oz./CSF)	Inst	CSF	Lg	CA	.100	80.00	8.42	4.71	---	13.13	**17.20**
	Inst	CSF	Sm	CA	.133	60.00	9.28	6.26	---	15.54	**20.50**
3/8" diameter (97 fl.oz./CSF)	Inst	CSF	Lg	CA	.100	80.00	19.00	4.71	---	23.71	**29.90**
	Inst	CSF	Sm	CA	.133	60.00	20.90	6.26	---	27.16	**34.50**
1/2" diameter (172 fl.oz./CSF)	Inst	CSF	Lg	CA	.100	80.00	33.60	4.71	---	38.31	**47.40**
	Inst	CSF	Sm	CA	.133	60.00	37.00	6.26	---	43.26	**53.80**
16" oc members											
1/8" diameter (9 fl.oz./CSF)	Inst	CSF	Lg	CA	.091	88.00	1.69	4.28	---	5.97	**8.45**
	Inst	CSF	Sm	CA	.121	66.00	1.86	5.69	---	7.55	**10.80**
1/4" diameter (34 fl.oz./CSF)	Inst	CSF	Lg	CA	.091	88.00	6.73	4.28	---	11.01	**14.50**
	Inst	CSF	Sm	CA	.121	66.00	7.42	5.69	---	13.11	**17.40**
3/8" diameter (78 fl.oz./CSF)	Inst	CSF	Lg	CA	.091	88.00	15.20	4.28	---	19.48	**24.70**
	Inst	CSF	Sm	CA	.121	66.00	16.70	5.69	---	22.39	**28.60**
1/2" diameter (137 fl.oz./CSF)	Inst	CSF	Lg	CA	.091	88.00	26.90	4.28	---	31.18	**38.70**
	Inst	CSF	Sm	CA	.121	66.00	29.60	5.69	---	35.29	**44.10**
24" oc members											
1/8" diameter (7 fl.oz./CSF)	Inst	CSF	Lg	CA	.084	95.00	1.26	3.95	---	5.21	**7.44**
	Inst	CSF	Sm	CA	.112	71.25	1.39	5.27	---	6.66	**9.57**
1/4" diameter (26 fl.oz./CSF)	Inst	CSF	Lg	CA	.084	95.00	5.05	3.95	---	9.00	**12.00**
	Inst	CSF	Sm	CA	.112	71.25	5.56	5.27	---	10.83	**14.60**
3/8" diameter (58 fl.oz./CSF)	Inst	CSF	Lg	CA	.084	95.00	11.40	3.95	---	15.35	**19.60**
	Inst	CSF	Sm	CA	.112	71.25	12.60	5.27	---	17.87	**23.00**
1/2" diameter (103 fl.oz./CSF)	Inst	CSF	Lg	CA	.084	95.00	20.20	3.95	---	24.15	**30.10**
	Inst	CSF	Sm	CA	.112	71.25	22.20	5.27	---	27.47	**34.60**
Hardboard or plastic panel adhesive, on walls											
12" oc members											
1/8" diameter (11 fl.oz./CSF)	Inst	CSF	Lg	CA	.100	80.00	5.28	4.71	---	9.99	**13.40**
	Inst	CSF	Sm	CA	.133	60.00	5.82	6.26	---	12.08	**16.40**
1/4" diameter (43 fl.oz./CSF)	Inst	CSF	Lg	CA	.100	80.00	21.10	4.71	---	25.81	**32.30**
	Inst	CSF	Sm	CA	.133	60.00	23.20	6.26	---	29.46	**37.20**
3/8" diameter (97 fl.oz./CSF)	Inst	CSF	Lg	CA	.100	80.00	47.50	4.71	---	52.21	**64.00**
	Inst	CSF	Sm	CA	.133	60.00	52.30	6.26	---	58.56	**72.20**
1/2" diameter (172 fl.oz./CSF)	Inst	CSF	Lg	CA	.100	80.00	84.00	4.71	---	88.71	**108.00**
	Inst	CSF	Sm	CA	.133	60.00	92.60	6.26	---	98.86	**121.00**
16" oc members											
1/8" diameter (9 fl.oz./CSF)	Inst	CSF	Lg	CA	.091	88.00	4.22	4.28	---	8.50	**11.50**
	Inst	CSF	Sm	CA	.121	66.00	4.65	5.69	---	10.34	**14.10**
1/4" diameter (34 fl.oz./CSF)	Inst	CSF	Lg	CA	.091	88.00	16.80	4.28	---	21.08	**26.60**
	Inst	CSF	Sm	CA	.121	66.00	18.60	5.69	---	24.29	**30.80**
3/8" diameter (78 fl.oz./CSF)	Inst	CSF	Lg	CA	.091	88.00	38.00	4.28	---	42.28	**52.00**
	Inst	CSF	Sm	CA	.121	66.00	41.90	5.69	---	47.59	**58.80**
1/2" diameter (137 fl.oz./CSF)	Inst	CSF	Lg	CA	.091	88.00	67.20	4.28	---	71.48	**87.10**
	Inst	CSF	Sm	CA	.121	66.00	74.10	5.69	---	79.79	**97.40**

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Description	Oper	Unit	Vol	Crew Size	Man-hours per Unit	Crew Output per Day	Avg Mat'l Unit Cost	Avg Labor Unit Cost	Avg Equip Unit Cost	Avg Total Unit Cost	Avg Price Incl O&P
24" oc members											
1/8" diameter (7 fl.oz./CSF)	Inst	CSF	Lg	CA	.084	95.00	3.18	3.95	---	7.13	**9.74**
	Inst	CSF	Sm	CA	.112	71.25	3.50	5.27	---	8.77	**12.10**
1/4" diameter (26 fl.oz./CSF)	Inst	CSF	Lg	CA	.084	95.00	12.60	3.95	---	16.55	**21.10**
	Inst	CSF	Sm	CA	.112	71.25	13.90	5.27	---	19.17	**24.60**
3/8" diameter (58 fl.oz./CSF)	Inst	CSF	Lg	CA	.084	95.00	28.50	3.95	---	32.45	**40.10**
	Inst	CSF	Sm	CA	.112	71.25	31.40	5.27	---	36.67	**45.60**
1/2" diameter (103 fl.oz./CSF)	Inst	CSF	Lg	CA	.084	95.00	50.40	3.95	---	54.35	**66.40**
	Inst	CSF	Sm	CA	.112	71.25	55.60	5.27	---	60.87	**74.60**

Air conditioning and ventilating systems

System components separate.

See page 35 for complete systems (exterior, roof, wall/window packages).

Air Handler units

Heat element only											
2 ton	Inst	Ea	Lg	SB	21.3	0.75	1030.00	947.00	---	1977.00	**2660.00**
	Inst	Ea	Sm	SB	26.7	0.60	1140.00	1190.00	---	2330.00	**3150.00**
3 ton	Inst	Ea	Lg	SB	22.9	0.70	1280.00	1020.00	---	2300.00	**3060.00**
	Inst	Ea	Sm	SB	28.6	0.56	1410.00	1270.00	---	2680.00	**3600.00**
4 ton	Inst	Ea	Lg	SB	24.6	0.65	1530.00	1090.00	---	2620.00	**3480.00**
	Inst	Ea	Sm	SB	30.8	0.52	1690.00	1370.00	---	3060.00	**4080.00**
5 ton	Inst	Ea	Lg	SB	26.7	0.60	1910.00	1190.00	---	3100.00	**4080.00**
	Inst	Ea	Sm	SB	33.3	0.48	2110.00	1480.00	---	3590.00	**4750.00**
A/C Coil only											
2 ton	Inst	Ea	Lg	SB	21.3	0.75	1100.00	947.00	---	2047.00	**2740.00**
	Inst	Ea	Sm	SB	26.7	0.60	1210.00	1190.00	---	2400.00	**3230.00**
3 ton	Inst	Ea	Lg	SB	22.9	0.70	1320.00	1020.00	---	2340.00	**3110.00**
	Inst	Ea	Sm	SB	28.6	0.56	1460.00	1270.00	---	2730.00	**3660.00**
4 ton	Inst	Ea	Lg	SB	24.6	0.65	1690.00	1090.00	---	2780.00	**3670.00**
	Inst	Ea	Sm	SB	30.8	0.52	1860.00	1370.00	---	3230.00	**4290.00**
5 ton	Inst	Ea	Lg	SB	26.7	0.60	1900.00	1190.00	---	3090.00	**4060.00**
	Inst	Ea	Sm	SB	33.3	0.48	2090.00	1480.00	---	3570.00	**4730.00**
Heat and A/C Coil											
2 ton	Inst	Ea	Lg	SB	21.3	0.75	1260.00	947.00	---	2207.00	**2930.00**
	Inst	Ea	Sm	SB	26.7	0.60	1390.00	1190.00	---	2580.00	**3440.00**
3 ton	Inst	Ea	Lg	SB	22.9	0.70	1480.00	1020.00	---	2500.00	**3310.00**
	Inst	Ea	Sm	SB	28.6	0.56	1640.00	1270.00	---	2910.00	**3870.00**
4 ton	Inst	Ea	Lg	SB	24.6	0.65	1850.00	1090.00	---	2940.00	**3860.00**
	Inst	Ea	Sm	SB	30.8	0.52	2040.00	1370.00	---	3410.00	**4500.00**
5 ton	Inst	Ea	Lg	SB	26.7	0.60	2060.00	1190.00	---	3250.00	**4250.00**
	Inst	Ea	Sm	SB	33.3	0.48	2270.00	1480.00	---	3750.00	**4940.00**

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Description	Oper	Unit	Vol	Crew Size	Man-hours per Unit	Crew Output per Day	Avg Mat'l Unit Cost	Avg Labor Unit Cost	Avg Equip Unit Cost	Avg Total Unit Cost	Avg Price Incl O&P
Condensing units											
Air cooled, compressor, standard controls											
1.0 ton	Inst	Ea	Lg	SB	8.00	2.00	1610.00	356.00	---	1966.00	**2470.00**
	Inst	Ea	Sm	SB	10.0	1.60	1780.00	445.00	---	2225.00	**2800.00**
1.5 ton	Inst	Ea	Lg	SB	9.14	1.75	1810.00	406.00	---	2216.00	**2790.00**
	Inst	Ea	Sm	SB	11.4	1.40	2000.00	507.00	---	2507.00	**3160.00**
2.0 ton	Inst	Ea	Lg	SB	10.7	1.50	2020.00	476.00	---	2496.00	**3130.00**
	Inst	Ea	Sm	SB	13.3	1.20	2220.00	591.00	---	2811.00	**3550.00**
2.5 ton	Inst	Ea	Lg	SB	12.8	1.25	2060.00	569.00	---	2629.00	**3320.00**
	Inst	Ea	Sm	SB	16.0	1.00	2270.00	711.00	---	2981.00	**3790.00**
3.0 ton	Inst	Ea	Lg	SB	16.0	1.00	2540.00	711.00	---	3251.00	**4120.00**
	Inst	Ea	Sm	SB	20.0	0.80	2800.00	889.00	---	3689.00	**4700.00**
4.0 ton	Inst	Ea	Lg	SB	21.3	0.75	2740.00	947.00	---	3687.00	**4700.00**
	Inst	Ea	Sm	SB	26.7	0.60	3020.00	1190.00	---	4210.00	**5400.00**
5.0 ton	Inst	Ea	Lg	SB	32.0	0.50	3120.00	1420.00	---	4540.00	**5880.00**
	Inst	Ea	Sm	SB	40.0	0.40	3440.00	1780.00	---	5220.00	**6800.00**
Condenser pad											
24" x 24"	Inst	Ea	Lg	SB	0.8	20.00	36.10	35.60	---	71.70	**96.70**
	Inst	Ea	Sm	SB	1.0	16.00	39.80	44.50	---	84.30	**114.00**
36" x 36"	Inst	Ea	Lg	SB	0.8	20.00	53.90	35.60	---	89.50	**118.00**
	Inst	Ea	Sm	SB	1.0	16.00	59.40	44.50	---	103.90	**138.00**
Minimum Job Charge											
	Inst	Job	Lg	SB	5.33	3.00	---	237.00	---	237.00	**355.00**
	Inst	Job	Sm	SB	6.67	2.40	---	296.00	---	296.00	**445.00**
Dampers, motorized											
Motorized, variable volume modulating											
8" diameter or less	Inst	Ea	Lg	UA	0.80	10.00	133.00	39.70	---	172.70	**219.00**
	Inst	Ea	Sm	UA	1.00	8.00	146.00	49.60	---	195.60	**250.00**
9" - 14" diameter	Inst	Ea	Lg	UA	1.33	6.00	184.00	66.00	---	250.00	**320.00**
	Inst	Ea	Sm	UA	1.67	4.80	203.00	82.90	---	285.90	**368.00**
15" - 18" diameter	Inst	Ea	Lg	UA	2.00	4.00	212.00	99.30	---	311.30	**404.00**
	Inst	Ea	Sm	UA	2.50	3.20	234.00	124.00	---	358.00	**467.00**
Thermostat, ADD	Inst	Ea	Lg	UA	1.33	6.00	50.40	66.00	---	116.40	**160.00**
	Inst	Ea	Sm	UA	1.67	4.80	55.60	82.90	---	138.50	**191.00**

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Diffusers / Grills											
Circular											
6" diameter	Inst	LF	Lg	UA	.267	30.00	16.00	13.30	---	29.30	**39.10**
	Inst	LF	Sm	UA	.333	24.00	17.60	16.50	---	34.10	**46.00**
8-10" diameter	Inst	LF	Lg	UA	.296	27.00	25.40	14.70	---	40.10	**52.50**
	Inst	LF	Sm	UA	.370	21.60	28.00	18.40	---	46.40	**61.10**
12-15" diameter	Inst	LF	Lg	UA	.333	24.00	42.40	16.50	---	58.90	**75.60**
	Inst	LF	Sm	UA	.417	19.20	46.70	20.70	---	67.40	**87.10**
18" diameter	Inst	LF	Lg	UA	.400	20.00	83.80	19.90	---	103.70	**130.00**
	Inst	LF	Sm	UA	.500	16.00	92.30	24.80	---	117.10	**148.00**
Perforated, 24" x 24" panel size											
6" x 6"	Inst	Ea	Lg	UA	.500	16.00	24.00	24.80	---	48.80	**66.00**
	Inst	Ea	Sm	UA	.625	12.80	26.40	31.00	---	57.40	**78.30**
8" x 8"	Inst	Ea	Lg	UA	.571	14.00	38.10	28.30	---	66.40	**88.20**
	Inst	Ea	Sm	UA	.714	11.20	42.00	35.40	---	77.40	**104.00**
10" x 10"	Inst	Ea	Lg	UA	.667	12.00	63.50	33.10	---	96.60	**126.00**
	Inst	Ea	Sm	UA	.833	9.60	70.00	41.40	---	111.40	**146.00**
12" x 12"	Inst	Ea	Lg	UA	.800	10.00	126.00	39.70	---	165.70	**210.00**
	Inst	Ea	Sm	UA	1.00	8.00	138.00	49.60	---	187.60	**241.00**
18" x 18"	Inst	Ea	Lg	UA	1.00	8.00	151.00	49.60	---	200.60	**255.00**
	Inst	Ea	Sm	UA	1.25	6.40	166.00	62.10	---	228.10	**292.00**
Rectangular, one- to four-way blow											
6" x 6"	Inst	Ea	Lg	UA	.500	16.00	20.00	24.80	---	44.80	**61.20**
	Inst	Ea	Sm	UA	.625	12.80	22.00	31.00	---	53.00	**73.00**
12" x 6"	Inst	Ea	Lg	UA	.571	14.00	31.80	28.30	---	60.10	**80.60**
	Inst	Ea	Sm	UA	.714	11.20	35.00	35.40	---	70.40	**95.20**
12" x 9"	Inst	Ea	Lg	UA	.667	12.00	53.00	33.10	---	86.10	**113.00**
	Inst	Ea	Sm	UA	.833	9.60	58.40	41.40	---	99.80	**132.00**
12" x 12"	Inst	Ea	Lg	UA	.800	10.00	105.00	39.70	---	144.70	**185.00**
	Inst	Ea	Sm	UA	1.00	8.00	115.00	49.60	---	164.60	**213.00**
24" x 12"	Inst	Ea	Lg	UA	1.00	8.00	117.00	49.60	---	166.60	**215.00**
	Inst	Ea	Sm	UA	1.25	6.40	129.00	62.10	---	191.10	**248.00**
T-bar mounting, 24" x 24" lay in frame											
6" x 6"	Inst	Ea	Lg	UA	.500	16.00	73.70	24.80	---	98.50	**126.00**
	Inst	Ea	Sm	UA	.625	12.80	81.20	31.00	---	112.20	**144.00**
9" x 9"	Inst	Ea	Lg	UA	.571	14.00	81.10	28.30	---	109.40	**140.00**
	Inst	Ea	Sm	UA	.714	11.20	89.30	35.40	---	124.70	**160.00**
12" x 12"	Inst	Ea	Lg	UA	.667	12.00	84.70	33.10	---	117.80	**151.00**
	Inst	Ea	Sm	UA	.833	9.60	93.40	41.40	---	134.80	**174.00**
15" x 15"	Inst	Ea	Lg	UA	.800	10.00	88.40	39.70	---	128.10	**166.00**
	Inst	Ea	Sm	UA	1.00	8.00	97.40	49.60	---	147.00	**191.00**
18" x 18"	Inst	Ea	Lg	UA	1.00	8.00	92.10	49.60	---	141.70	**185.00**
	Inst	Ea	Sm	UA	1.25	6.40	102.00	62.10	---	164.10	**215.00**
Minimum Job Charge											
	Inst	Job	Lg	UA	2.29	3.50	---	114.00	---	114.00	**171.00**
	Inst	Job	Sm	UA	2.86	2.80	---	142.00	---	142.00	**213.00**

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Registers, air supply											
One- or two-way deflection, adjustable curved face bars, enameled metal											
10" x 6"	Inst	Ea	Lg	UA	.333	24.00	13.00	16.50	---	29.50	**40.30**
	Inst	Ea	Sm	UA	.417	19.20	14.30	20.70	---	35.00	**48.20**
12" x 5"	Inst	Ea	Lg	UA	.364	22.00	14.20	18.10	---	32.30	**44.20**
	Inst	Ea	Sm	UA	.455	17.60	15.70	22.60	---	38.30	**52.70**
12" x 6"	Inst	Ea	Lg	UA	.364	22.00	13.60	18.10	---	31.70	**43.40**
	Inst	Ea	Sm	UA	.455	17.60	15.00	22.60	---	37.60	**51.90**
12" x 8"	Inst	Ea	Lg	UA	.400	20.00	16.20	19.90	---	36.10	**49.20**
	Inst	Ea	Sm	UA	.500	16.00	17.80	24.80	---	42.60	**58.60**
14" x 6"	Inst	Ea	Lg	UA	.444	18.00	14.90	22.00	---	36.90	**50.90**
	Inst	Ea	Sm	UA	.556	14.40	16.40	27.60	---	44.00	**61.10**
Minimum Job Charge											
	Inst	Job	Lg	UA	2.29	3.50	---	114.00	---	114.00	**171.00**
	Inst	Job	Sm	UA	2.86	2.80	---	142.00	---	142.00	**213.00**
Cold Air Return, enameled metal											
14" x 6"	Inst	Ea	Lg	UA	.400	20.00	13.20	19.90	---	33.10	**45.70**
	Inst	Ea	Sm	UA	.500	16.00	14.60	24.80	---	39.40	**54.70**
16" x 8"	Inst	Ea	Lg	UA	.444	18.00	17.20	22.00	---	39.20	**53.60**
	Inst	Ea	Sm	UA	.556	14.40	18.90	27.60	---	46.50	**64.10**
24" x 8"	Inst	Ea	Lg	UA	.444	18.00	22.40	22.00	---	44.40	**60.00**
	Inst	Ea	Sm	UA	.556	14.40	24.70	27.60	---	52.30	**71.10**
24" x 14"	Inst	Ea	Lg	UA	.500	16.00	32.20	24.80	---	57.00	**75.80**
	Inst	Ea	Sm	UA	.625	12.80	35.50	31.00	---	66.50	**89.10**
Ductwork											
Fabricated rectangular, includes fittings, joints, supports											
Aluminum alloy											
Under 100 lbs	Inst	Lb	Lg	UF	.343	70.00	3.19	15.60	---	18.79	**27.30**
	Inst	Lb	Sm	UF	.429	56.00	3.51	19.60	---	23.11	**33.50**
100 to 500 lbs	Inst	Lb	Lg	UF	.267	90.00	2.55	12.20	---	14.75	**21.30**
	Inst	Lb	Sm	UF	.333	72.00	2.81	15.20	---	18.01	**26.10**
500 to 1,000 lbs	Inst	Lb	Lg	UF	.218	110.0	1.91	9.93	---	11.84	**17.20**
	Inst	Lb	Sm	UF	.273	88.00	2.11	12.40	---	14.51	**21.20**
Over 1,000 lbs	Inst	Lb	Lg	UF	.185	130.0	1.27	8.43	---	9.70	**14.20**
	Inst	Lb	Sm	UF	.231	104.0	1.40	10.50	---	11.90	**17.50**
Galvanized steel											
Under 400 lbs	Inst	Lb	Lg	UF	.120	200.0	3.49	5.47	---	8.96	**12.40**
	Inst	Lb	Sm	UF	.150	160.0	3.84	6.83	---	10.67	**14.90**
400 to 1,000 lbs	Inst	Lb	Lg	UF	.112	215.0	2.79	5.10	---	7.89	**11.00**
	Inst	Lb	Sm	UF	.140	172.0	3.08	6.38	---	9.46	**13.30**
1,000 to 2,000 lbs	Inst	Lb	Lg	UF	.104	230.0	2.10	4.74	---	6.84	**9.63**
	Inst	Lb	Sm	UF	.130	184.0	2.31	5.92	---	8.23	**11.70**
2,000 to 5,000 lbs	Inst	Lb	Lg	UF	.100	240.0	1.39	4.56	---	5.95	**8.50**
	Inst	Lb	Sm	UF	.125	192.0	1.53	5.70	---	7.23	**10.40**
Over 10,000 lbs	Inst	Lb	Lg	UF	.096	250.0	.70	4.37	---	5.07	**7.40**
	Inst	Lb	Sm	UF	.120	200.0	.77	5.47	---	6.24	**9.12**

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Description	Oper	Unit	Vol	Crew Size	Man-hours per Unit	Crew Output per Day	Avg Mat'l Unit Cost	Avg Labor Unit Cost	Avg Equip Unit Cost	Avg Total Unit Cost	Avg Price Incl O&P
Flexible, coated fabric on spring steel, aluminum, or corrosion-resistant metal											
Non-insulated											
3" diameter	Inst	LF	Lg	UD	.058	275.0	1.26	2.52	---	3.78	**5.30**
	Inst	LF	Sm	UD	.073	220.0	1.39	3.18	---	4.57	**6.43**
4" diameter	Inst	LF	Lg	UD	.071	225.0	1.84	3.09	---	4.93	**6.84**
	Inst	LF	Sm	UD	.089	180.0	2.03	3.87	---	5.90	**8.25**
6" diameter	Inst	LF	Lg	UD	.080	200.0	2.50	3.48	---	5.98	**8.22**
	Inst	LF	Sm	UD	.100	160.0	2.75	4.35	---	7.10	**9.83**
7" diameter	Inst	LF	Lg	UD	.091	175.0	2.63	3.96	---	6.59	**9.10**
	Inst	LF	Sm	UD	.114	140.0	2.89	4.96	---	7.85	**10.90**
8" diameter	Inst	LF	Lg	UD	.107	150.0	2.75	4.66	---	7.41	**10.30**
	Inst	LF	Sm	UD	.133	120.0	3.03	5.79	---	8.82	**12.30**
10" diameter	Inst	LF	Lg	UD	.128	125.0	2.89	5.57	---	8.46	**11.80**
	Inst	LF	Sm	UD	.160	100.0	3.19	6.96	---	10.15	**14.30**
12" diameter	Inst	LF	Lg	UD	.160	100.0	3.04	6.96	---	10.00	**14.10**
	Inst	LF	Sm	UD	.200	80.0	3.35	8.70	---	12.05	**17.10**
Insulated											
3" diameter	Inst	LF	Lg	UD	.064	250.0	3.87	2.79	---	6.66	**8.82**
	Inst	LF	Sm	UD	.080	200.0	4.27	3.48	---	7.75	**10.40**
4" diameter	Inst	LF	Lg	UD	.071	225.0	4.08	3.09	---	7.17	**9.53**
	Inst	LF	Sm	UD	.089	180.0	4.49	3.87	---	8.36	**11.20**
5" diameter	Inst	LF	Lg	UD	.080	200.0	4.28	3.48	---	7.76	**10.40**
	Inst	LF	Sm	UD	.100	160.0	4.72	4.35	---	9.07	**12.20**
6" diameter	Inst	LF	Lg	UD	.091	175.0	4.37	3.96	---	8.33	**11.20**
	Inst	LF	Sm	UD	.114	140.0	4.82	4.96	---	9.78	**13.20**
7" diameter	Inst	LF	Lg	UD	.107	150.0	4.99	4.66	---	9.65	**13.00**
	Inst	LF	Sm	UD	.133	120.0	5.50	5.79	---	11.29	**15.30**
8" diameter	Inst	LF	Lg	UD	.128	125.0	5.48	5.57	---	11.05	**14.90**
	Inst	LF	Sm	UD	.160	100.0	6.04	6.96	---	13.00	**17.70**
10" diameter	Inst	LF	Lg	UD	.160	100.0	8.39	6.96	---	15.35	**20.50**
	Inst	LF	Sm	UD	.200	80.00	9.24	8.70	---	17.94	**24.10**
12" diameter	Inst	LF	Lg	UD	.213	75.00	9.25	9.27	---	18.52	**25.00**
	Inst	LF	Sm	UD	.267	60.00	10.20	11.60	---	21.80	**29.70**
14" diameter	Inst	LF	Lg	UD	.320	50.00	9.71	13.90	---	23.61	**32.50**
	Inst	LF	Sm	UD	.400	40.00	10.70	17.40	---	28.10	**39.00**

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Description	Oper	Unit	Vol	Crew Size	Man-hours per Unit	Crew Output per Day	Avg Mat'l Unit Cost	Avg Labor Unit Cost	Avg Equip Unit Cost	Avg Total Unit Cost	Avg Price Incl O&P
Fans and Ventilators											
Roof-type ventilators											
Aluminum, dome											
6" diameter, 300 CFM	Inst	Ea	Lg	EA	.667	12.00	158.00	32.30	---	190.30	**238.00**
	Inst	Ea	Sm	EA	.833	9.60	174.00	40.30	---	214.30	**269.00**
7" diameter, 450 CFM	Inst	Ea	Lg	EA	.727	11.00	166.00	35.20	---	201.20	**252.00**
	Inst	Ea	Sm	EA	.909	8.80	183.00	44.00	---	227.00	**286.00**
9" diameter, 900 CFM	Inst	Ea	Lg	EA	.800	10.00	175.00	38.70	---	213.70	**268.00**
	Inst	Ea	Sm	EA	1.00	8.00	193.00	48.40	---	241.40	**304.00**
12" diameter, 1,000 CFM	Inst	Ea	Lg	EA	1.00	8.00	184.00	48.40	---	232.40	**293.00**
	Inst	Ea	Sm	EA	1.25	6.40	203.00	60.40	---	263.40	**334.00**
16" diameter, 1,500 CFM	Inst	Ea	Lg	EA	1.14	7.00	233.00	55.10	---	288.10	**362.00**
	Inst	Ea	Sm	EA	1.43	5.60	256.00	69.10	---	325.10	**411.00**
20" diameter, 2,500 CFM	Inst	Ea	Lg	EA	1.33	6.00	279.00	64.30	---	343.30	**431.00**
	Inst	Ea	Sm	EA	1.67	4.80	308.00	80.70	---	388.70	**490.00**
26" diameter, 4,000 CFM	Inst	Ea	Lg	EA	1.60	5.00	335.00	77.40	---	412.40	**518.00**
	Inst	Ea	Sm	EA	2.00	4.00	369.00	96.70	---	465.70	**588.00**
32" diameter, 6,500 CFM	Inst	Ea	Lg	EA	2.00	4.00	402.00	96.70	---	498.70	**627.00**
	Inst	Ea	Sm	EA	2.50	3.20	443.00	121.00	---	564.00	**713.00**
38" diameter, 8,000 CFM	Inst	Ea	Lg	EA	2.67	3.00	482.00	129.00	---	611.00	**772.00**
	Inst	Ea	Sm	EA	3.33	2.40	532.00	161.00	---	693.00	**879.00**
50" diameter, 13,000 CFM	Inst	Ea	Lg	EA	4.00	2.00	579.00	193.00	---	772.00	**985.00**
	Inst	Ea	Sm	EA	5.00	1.60	638.00	242.00	---	880.00	**1130.00**
Plastic ABS dome											
900 CFM	Inst	Ea	Lg	EA	.667	12.00	122.00	32.30	---	154.30	**195.00**
	Inst	Ea	Sm	EA	.833	9.60	135.00	40.30	---	175.30	**222.00**
1,600 CFM	Inst	Ea	Lg	EA	.800	10.00	163.00	38.70	---	201.70	**253.00**
	Inst	Ea	Sm	EA	1.00	8.00	179.00	48.40	---	227.40	**288.00**
Wall-type ventilators, one speed, with shutter											
12" diameter, 1,000 CFM	Inst	Ea	Lg	EA	.667	12.00	184.00	32.30	---	216.30	**269.00**
	Inst	Ea	Sm	EA	.833	9.60	203.00	40.30	---	243.30	**304.00**
14" diameter, 1,500 CFM	Inst	Ea	Lg	EA	.800	10.00	233.00	38.70	---	271.70	**337.00**
	Inst	Ea	Sm	EA	1.00	8.00	256.00	48.40	---	304.40	**380.00**
16" diameter, 2,000 CFM	Inst	Ea	Lg	EA	1.00	8.00	279.00	48.40	---	327.40	**407.00**
	Inst	Ea	Sm	EA	1.25	6.40	308.00	60.40	---	368.40	**460.00**

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Description	Oper	Unit	Vol	Crew Size	Man-hours per Unit	Crew Output per Day	Avg Mat'l Unit Cost	Avg Labor Unit Cost	Avg Equip Unit Cost	Avg Total Unit Cost	Avg Price Incl O&P
Entire structure, exhaust, wall-type, one speed, with shutter											
30" diameter, 10,00 CFM	Inst	Ea	Lg	EA	1.60	5.00	742.00	77.40	---	819.40	**1010.00**
	Inst	Ea	Sm	EA	2.00	4.00	818.00	96.70	---	914.70	**1130.00**
36" diameter, 12,100 CFM	Inst	Ea	Lg	EA	2.00	4.00	781.00	96.70	---	877.70	**1080.00**
	Inst	Ea	Sm	EA	2.50	3.20	861.00	121.00	---	982.00	**1210.00**
42" diameter, 15,900 CFM	Inst	Ea	Lg	EA	2.67	3.00	804.00	129.00	---	933.00	**1160.00**
	Inst	Ea	Sm	EA	3.33	2.40	886.00	161.00	---	1047.00	**1300.00**
48" diameter, 21,100 CFM	Inst	Ea	Lg	EA	4.00	2.00	1330.00	193.00	---	1523.00	**1880.00**
	Inst	Ea	Sm	EA	5.00	1.60	1460.00	242.00	---	1702.00	**2120.00**
Two speeds, ADD	Inst	Ea	Lg	EA	---	---	49.00	---	---	49.00	**58.80**
	Inst	Ea	Sm	EA	---	---	54.00	---	---	54.00	**64.80**
12-hour timer, ADD	Inst	Ea	Lg	EA	.500	16.00	24.50	24.20	---	48.70	**65.70**
	Inst	Ea	Sm	EA	.625	12.80	27.00	30.20	---	57.20	**77.70**
Entire structure, lay-down type, one speed, with shutter											
30" diameter, 5,100 CFM	Inst	Ea	Lg	EA	1.33	6.00	370.00	64.30	---	434.30	**541.00**
	Inst	Ea	Sm	EA	1.67	4.80	408.00	80.70	---	488.70	**611.00**
36" diameter, 6,500 CFM	Inst	Ea	Lg	EA	1.60	5.00	715.00	77.40	---	792.40	**974.00**
	Inst	Ea	Sm	EA	2.00	4.00	788.00	96.70	---	884.70	**1090.00**
42" diameter, 9,000 CFM	Inst	Ea	Lg	EA	2.00	4.00	736.00	96.70	---	832.70	**1030.00**
	Inst	Ea	Sm	EA	2.50	3.20	812.00	121.00	---	933.00	**1160.00**
48" diameter, 12,000 CFM	Inst	Ea	Lg	EA	2.67	3.00	758.00	129.00	---	887.00	**1100.00**
	Inst	Ea	Sm	EA	3.33	2.40	835.00	161.00	---	996.00	**1240.00**
Two speeds, ADD	Inst	Ea	Lg	EA	---	---	49.00	---	---	49.00	**58.80**
	Inst	Ea	Sm	EA	---	---	54.00	---	---	54.00	**64.80**
12-hour timer, ADD	Inst	Ea	Lg	EA	.500	16.00	24.50	24.20	---	48.70	**65.70**
	Inst	Ea	Sm	EA	.625	12.80	27.00	30.20	---	57.20	**77.70**
Minimum Job Charge											
	Inst	Job	Lg	EA	2.29	3.50	---	111.00	---	111.00	**166.00**
	Inst	Job	Sm	EA	2.86	2.80	---	138.00	---	138.00	**207.00**

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Description	Oper	Unit	Vol	Crew Size	Man-hours per Unit	Crew Output per Day	Avg Mat'l Unit Cost	Avg Labor Unit Cost	Avg Equip Unit Cost	Avg Total Unit Cost	Avg Price Incl O&P
System units complete											
Fan coil air conditioning											
Residential / Light Commercial											
0.5 ton cooling	Inst	Ea	Lg	SB	4.00	4.00	2410.00	182.00	---	2592.00	**3170.00**
	Inst	Ea	Sm	SB	5.00	3.20	2660.00	228.00	---	2888.00	**3530.00**
1 ton cooling	Inst	Ea	Lg	SB	5.33	3.00	2680.00	243.00	---	2923.00	**3580.00**
	Inst	Ea	Sm	SB	6.67	2.40	2960.00	304.00	---	3264.00	**4000.00**
2.5 ton cooling	Inst	Ea	Lg	SB	8.00	2.00	2980.00	365.00	---	3345.00	**4120.00**
	Inst	Ea	Sm	SB	10.0	1.60	3280.00	456.00	---	3736.00	**4620.00**
3 ton cooling	Inst	Ea	Lg	SB	16.0	1.00	3570.00	730.00	---	4300.00	**5380.00**
	Inst	Ea	Sm	SB	20.0	0.80	3930.00	912.00	---	4842.00	**6090.00**
4 ton cooling	Inst	Ea	Lg	SF	12.0	2.00	3930.00	578.00	---	4508.00	**5580.00**
	Inst	Ea	Sm	SF	15.0	1.60	4330.00	722.00	---	5052.00	**6280.00**
5 ton cooling	Inst	Ea	Lg	SF	16.0	1.50	4400.00	771.00	---	5171.00	**6430.00**
	Inst	Ea	Sm	SF	20.0	1.20	4850.00	963.00	---	5813.00	**7260.00**
Commercial											
2 ton cooling	Inst	Ea	Lg	SB	12.80	1.25	2820.00	584.00	---	3404.00	**4310.00**
	Inst	Ea	Sm	SB	16.00	1.00	3110.00	730.00	---	3840.00	**4890.00**
5 ton cooling	Inst	Ea	Lg	SF	24.00	1.00	4160.00	1160.00	---	5320.00	**6730.00**
	Inst	Ea	Sm	SF	30.00	0.80	4590.00	1440.00	---	6030.00	**7670.00**
8 ton cooling	Inst	Ea	Lg	SF	32.00	0.75	5720.00	1540.00	---	7260.00	**9170.00**
	Inst	Ea	Sm	SF	40.0	0.60	6300.00	1930.00	---	8230.00	**10500.00**
10 ton cooling	Inst	Ea	Lg	SF	48.0	0.50	6180.00	2310.00	---	8490.00	**10900.00**
	Inst	Ea	Sm	SF	60.0	0.40	6810.00	2890.00	---	9700.00	**12500.00**
15 ton cooling	Inst	Ea	Lg	SF	72.7	0.33	12400.00	3500.00	---	15900.00	**20100.00**
	Inst	Ea	Sm	SF	92.3	0.26	13600.00	4450.00	---	18050.00	**23000.00**
Minimum Job Charge											
	Inst	Job	Lg	SB	5.33	3.00	---	243.00	---	243.00	**365.00**
	Inst	Job	Sm	SB	6.67	2.40	---	304.00	---	304.00	**456.00**

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Description	Oper	Unit	Vol	Crew Size	Man-hours per Unit	Crew Output per Day	Avg Mat'l Unit Cost	Avg Labor Unit Cost	Avg Equip Unit Cost	Avg Total Unit Cost	Avg Price Incl O&P
Heat Pump											
Exterior coil unit, not including curbs or pads											
2 ton cool	Inst	Ea	Lg	SB	16.0	1.00	2000.00	730.00	---	2730.00	**3500.00**
	Inst	Ea	Sm	SB	20.0	0.80	2210.00	912.00	---	3122.00	**4020.00**
3 ton cool	Inst	Ea	Lg	SB	32.0	0.50	2210.00	1460.00	---	3670.00	**4840.00**
	Inst	Ea	Sm	SB	40.0	0.40	2430.00	1820.00	---	4250.00	**5660.00**
4 ton cool	Inst	Ea	Lg	SF	72.7	0.33	2670.00	3500.00	---	6170.00	**8450.00**
	Inst	Ea	Sm	SF	92.3	0.26	2940.00	4450.00	---	7390.00	**10200.00**
5 ton cool	Inst	Ea	Lg	SF	96.0	0.25	2820.00	4620.00	---	7440.00	**10300.00**
	Inst	Ea	Sm	SF	120.0	0.20	3110.00	5780.00	---	8890.00	**12400.00**
Roof mounted with boom truck and operator, coil unit, not including curbs or pads											
8 ton cool	Inst	Ea	Lg	SF	48.0	0.50	6780.00	2310.00	416.00	9506.00	**12100.00**
	Inst	Ea	Sm	SF	60.0	0.40	7470.00	2890.00	458.00	10818.00	**13900.00**
10 ton cool	Inst	Ea	Lg	SF	72.7	0.33	8590.00	3500.00	416.00	12506.00	**16100.00**
	Inst	Ea	Sm	SF	92.3	0.26	9470.00	4450.00	458.00	14378.00	**18600.00**
15 ton cool	Inst	Ea	Lg	SF	96.0	0.25	12300.00	4620.00	416.00	17336.00	**22300.00**
	Inst	Ea	Sm	SF	120.0	0.20	13600.00	5780.00	458.00	19838.00	**25500.00**
20 ton cool	Inst	Ea	Lg	SF	120.0	0.20	16300.00	5780.00	416.00	22496.00	**28700.00**
	Inst	Ea	Sm	SF	150.0	0.16	17900.00	7220.00	458.00	25578.00	**32900.00**
Minimum Job Charge											
	Inst	Job	Lg	SB	8.00	2.00	---	365.00	---	365.00	**547.00**
	Inst	Job	Sm	SB	10.0	1.60	---	456.00	---	456.00	**684.00**
PTAC Wall / Window unit air conditioners.											
Semi-permanent installation, 3-speed fan, 125-volt GFI receptacle, energy-efficient models											
6,000 BTUH (0.5 ton cool)	Inst	Ea	Lg	EB	4.00	4.00	509.00	199.00	---	708.00	**909.00**
	Inst	Ea	Sm	EB	5.00	3.20	561.00	249.00	---	810.00	**1050.00**
9,000 BTUH (0.75 ton cool)	Inst	Ea	Lg	EB	4.00	4.00	674.00	199.00	---	873.00	**1110.00**
	Inst	Ea	Sm	EB	5.00	3.20	743.00	249.00	---	992.00	**1270.00**
12,000 BTUH (1.0 ton cool)	Inst	Ea	Lg	EB	4.00	4.00	792.00	199.00	---	991.00	**1250.00**
	Inst	Ea	Sm	EB	5.00	3.20	873.00	249.00	---	1122.00	**1420.00**
18,000 BTUH (1.5 ton cool)	Inst	Ea	Lg	EB	5.33	3.00	1090.00	265.00	---	1355.00	**1700.00**
	Inst	Ea	Sm	EB	6.67	2.40	1200.00	332.00	---	1532.00	**1940.00**
24,000 BTUH (2.0 ton cool)	Inst	Ea	Lg	EB	5.33	3.00	1580.00	265.00	---	1845.00	**2300.00**
	Inst	Ea	Sm	EB	6.67	2.40	1750.00	332.00	---	2082.00	**2590.00**
36,000 BTUH (3.0 ton cool)	Inst	Ea	Lg	EB	5.33	3.00	2180.00	265.00	---	2445.00	**3010.00**
	Inst	Ea	Sm	EB	6.67	2.40	2400.00	332.00	---	2732.00	**3380.00**
Minimum Job Charge											
	Inst	Job	Lg	EA	2.67	3.00	---	133.00	---	133.00	**199.00**
	Inst	Job	Sm	EA	3.33	2.40	---	166.00	---	166.00	**249.00**

Awnings. See Canopies, page 67

Backfill. See Excavation, page 155

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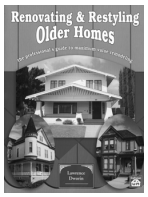
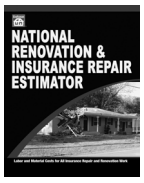
Renovating & Restyling Older Homes



Any builder can turn a run-down old house into a showcase of perfection — if the customer has unlimited funds to spend. Unfortunately, most cus-tomers are on a tight budget. They usually want more improvements than they can afford — and they expect you to deliver. This book shows how to add economical improvements that can increase the property value by two, five or even ten times the cost of the remodel. Sound impossible? Here you'll find the secrets of a builder who has been putting these techniques to work on Victorian and Craftsman-style houses for twenty years. You'll see what to repair, what to replace and what to leave, so you can remodel or restyle older homes for the least amount of money and the greatest increase in value.

416 pages, 8½ x 11, $33.50

National Renovation & Insurance Repair Estimator



Current prices in dollars and cents for hard-to-find items needed on most insurance, repair, remodeling, and renovation jobs. All price items include labor, material, and equipment breakouts, plus special charts that tell you exactly how these costs are calculated.

488 pages, 8½ x 11, $119.50. Revised annually

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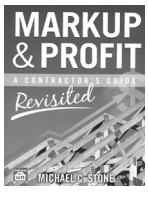
Markup & Profit: A Contractor's Guide, Revisited



In order to succeed in a construction business, you have to be able to price your jobs to cover all labor, material and overhead expenses, and make a decent profit. But calculating markup is only part of the picture. If you're going to beat the odds and stay in business – profitably, you also need to know how to write good contracts, manage your crews, work with subcontractors and collect on your work. This book covers the business basics of running a construction company, whether you're a general or specialty contractor working in remodeling, new construction or commercial work. The principles outlined here apply to all construction-related businesses. You'll find tried and tested formulas to guarantee profits, with step-by-step instructions and easy-to-follow examples to help you learn how to operate your business successfully. Includes a link to free downloads of blank forms and checklists used in this book.

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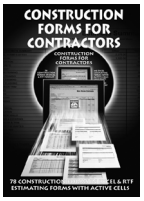

This practical guide contains 78 practical forms, letters and checklists, guaranteed to help you streamline your office, organize your jobsites, gather and organize records and documents, keep a handle on your subs, reduce estimating errors, administer change orders and lien issues, moni-tor crew productivity, track your equipment use, and more. Includes accounting forms, change order forms, forms for customers, estimating forms, field work forms, HR forms, lien forms, office forms, bids and proposals, subcontracts, and more. All are also on the CD-ROM included, in Excel spreadsheets, as formatted Rich Text that you can fill out on your computer, and as PDFs.

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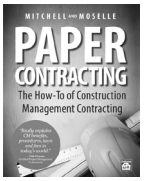

Risk, and the headaches that go with it, have always been a major part of any construction project — risk of loss, negative cash flow, construction claims, regulations, excessive changes, disputes, slow pay — sometimes you'll make money, and often you won't. But many contractors today are avoiding almost all of that risk by working under a construction management contract, where they are simply a paid consultant to the owner, running the job, but leaving him the risk. This manual is the how-to of construction management contracting. You'll learn how the process works, how to get started as a CM contractor, what the job entails, how to deal with the issues that come up, when to step back, and how to get the job completed on time and on budget. Includes a link to free downloads of CM contracts legal in each state.

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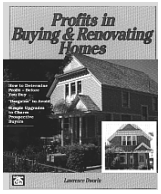

Step-by-step instructions for selecting, repairing, improving, and selling highly profitable "fixer-uppers." Shows which price ranges offer the highest profit-to-investment ratios, which neighborhoods offer the best return, practical directions for repairs, and tips on dealing with buyers, sellers, and real estate agents. Shows you how to determine your profit before you buy, what "bargains" to avoid, and how to make simple, profitable, inexpensive upgrades.

304 pages, 8½ x 11, $24.75

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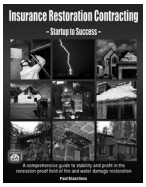

Insurance restoration — the repair of buildings damaged by water, fire, smoke, storms, vandalism and other disasters — is an exciting field of construction that provides lucrative work that's immune to economic downturns. And, with insurance companies funding the repairs, your payment is virtually guaranteed. But this type of work requires special knowledge and equipment, and that's what you'll learn about in this book. It covers fire repairs and smoke damage, water losses and specialized drying methods, mold remediation, content restoration, even damage to mobile and manufactured homes. You'll also find information on equipment needs, training classes, estimating books and software, and how restoration leads to lucrative remodeling jobs. It covers all you need to know to start and succeed as the restoration contractor that both homeowners and insurance companies call on first for the best jobs.

640 pages, 8½ x 11, $69.00

***eBook (PDF) also available;* $34.50 at** https://craftsman-book.com

Home Building Mistakes & Fixes



This is an encyclopedia of practical fixes for real-world home building and repair problems. There's never an end to "surprises" when you're in the business of building and fixing homes, yet there's little published on how to deal with construction that went wrong — where out-of-square or non-standard or jerry-rigged turns what should be a simple job into a nightmare. This manual describes jaw-dropping building mistakes that actually occurred, from disastrous misunderstandings over property lines, through basement floors leveled with an out-of-level instrument, to a house collapse when a siding crew removed the old siding. You'll learn the pitfalls the painless way, and real-world working solutions for the problems every contractor finds in a home building or repair jobsite. Includes dozens of those "surprises" and the author's step-by-step, clearly illustrated tips, tricks and workarounds for dealing with them.

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Every area you need to check in a home inspection – especially in older homes. Twenty complete inspection checklists: building site, foundation and basement, structural, bathrooms, chimneys and flues, ceilings, interior & exterior finishes, electrical, plumbing, HVAC, insects, vermin and decay, and more. Also includes information on starting and running your own home inspection business.

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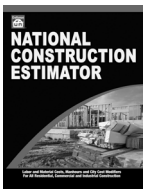
336 pages, 8½ x 11, $38.00

***eBook (PDF) also available;* $19.00 at** https://craftsman-book.com

National Construction Estimator

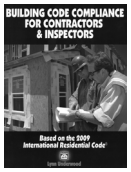


Current building costs for residential, commercial, and industrial construction. Estimated prices for every common building material. Provides manhours, recommended crew, and gives the labor cost for installation.

672 pages, 8½ x 11, $117.50. Revised annually

***Also available as an eBook (PDF),* $58.75 at** https://craftsman-book.com

Building Code Compliance for Contractors & Inspectors

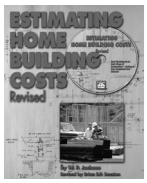


An answer book for both contractors and building inspectors, this manual explains what it takes to pass inspections under the 2009 *International Residential Code*. It includes a code checklist for every trade, covering some of the most common reasons why inspectors reject residential work – footings, foundations, slabs, framing, sheathing, plumbing, electrical, HVAC, energy conservation and final inspection. The requirement for each item on the checklist is explained, and the code section cited so you can look it up or show it to the inspector. Knowing in advance what the inspector wants to see gives you an (almost unfair) advantage. To pass inspection, do your own pre-inspection before the inspector arrives. If your work requires getting permits and passing inspections, put this manual to work on your next job. If you're considering a career in code enforcement, this can be your guidebook.

8½ x 11, 232 pages, $32.50

***eBook (PDF) also available;* $16.25 at** https://craftsman-book.com

Estimating Home Building Costs, Revised



Estimate every phase of residential construction from site costs to the profit margin you include in your bid. Shows how to keep track of manhours and make accurate labor cost estimates for site clearing and excavation, footings, foundations, framing and sheathing finishes, electrical, plumbing, and more. Provides and explains sample cost estimate worksheets with complete instructions for each job phase. This practical guide to estimating home construction costs has been updated with digital *Excel* estimating forms and worksheets that ensure accurate and complete estimates for your residential projects. Enter your project information on the worksheets and *Excel* automatically totals each material and labor cost from every stage of construction to a final cost estimate worksheet. Load the enclosed CD-ROM into your computer and create your own estimate as you follow along with the step-by-step techniques in this book.

336 pages, 8½ x 11, $38.00

***eBook (PDF) also available;* $19.00 at** https://craftsman-book.com

Drafting House Plans eBook

Here you'll find step-by-step instructions for drawing a complete set of house plans for a one-story house, an addition to an existing house, or a remodeling project. This book shows how to visualize spatial relationships, use architectural scales and symbols, sketch preliminary drawings, develop detailed floor plans and exterior elevations, and prepare a final plot plan. It even includes code-approved joist and rafter spans and how to make sure that drawings meet code requirements.

***Only available as an eBook (PDF),* $17.48 at** https://craftsman-book.com

Fences & Retaining Walls Revised

Everything you need to know to run a profitable business in fence and retaining wall contracting. Takes you through layout and design, construction techniques for wood, masonry, and chain link fences, gates and entries, including finishing and electrical details. How to build retaining and rock walls. How to get your business off to the right start, keep the books, and estimate accurately. The book even includes a chapter on contractor's math.

416 pages, 8½ x 11, $98.75

***eBook (PDF) also available* $49.38 at** https://craftsman-book.com

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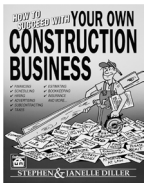
How to Succeed With Your Own Construction Business

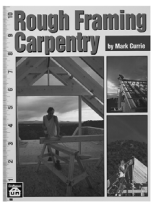


Everything you need to start your own construction business: setting up the paperwork, finding the jobs, advertising, using contracts, dealing with lenders, estimating, scheduling, finding and keeping good employees, keeping the books, and coping with success. If you're considering starting your own construction business, all the knowledge, tips, and blank forms you need are here.

336 pages, 8½ x 11, $28.50

***eBook (PDF) also available,* $14.25 at** https://craftsman-book.com

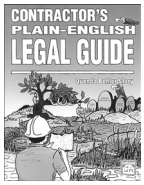
Rough Framing Carpentry



If you'd like to make good money working outdoors as a framer, this is the book for you. Here you'll find shortcuts to laying out studs; speed cutting blocks, trimmers and plates by eye; quickly building and blocking rake walls; installing ceiling backing, ceiling joists, and truss joists; cutting and assembling hip trusses and California fills; arches and drop ceilings — all with production line procedures that save you time and help you make more money. Over 100 on-the-job photos of how to do it right and what can go wrong.

304 pages, 8½ x 11, $26.50

Contractor's Plain-English Legal Guide



For today's contractors, legal problems are like snakes in the swamp – you might not see them, but you know they're there. This book tells you where the snakes are hiding and directs you to the safe path. With the directions in this easy-to-read handbook you're less likely to need a $250-an-hour lawyer. Includes simple directions for starting your business, writing contracts that cover just about any eventuality, collecting what's owed you, filing liens, protecting yourself from unethical subcontractors, and more. For about the price of 15 minutes in a lawyer's office, you'll have a guide that will make many of those visits unnecessary. Includes a CD-ROM with blank copies of all the forms and contracts in the book.

272 pages, 8½ x 11, $49.50

National Building Cost Manual



Square-foot costs for residential, commercial, industrial, military, schools, greenhouses, churches and farm buildings. Includes important variables that can make any building unique from a cost standpoint. Quickly work up a reliable budget estimate based on actual materials and design features, area, shape, wall height, number of floors, and support requirements.

280 pages, 8½ x 11, $98.00. Revised annually

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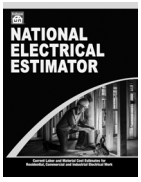
National Electrical Estimator



This year's prices for installation of all common electrical work: conduit, wire, boxes, fixtures, switches, outlets, loadcenters, panelboards, raceway, duct, signal systems, and more. Provides material costs, manhours per unit, and total installed cost. Explains what you should know to estimate each part of an electrical system.

552 pages, 8½ x 11, $117.75. Revised annually

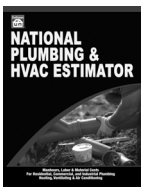
***eBook (PDF) also available,* $58.88 at** https://craftsman-book.com

National Painting Cost Estimator eBook

A complete guide to estimating painting costs for just about any type of residential, commercial, or industrial painting, whether by brush, spray, or roller. Shows typical costs and bid prices for fast, medium, and slow work, including material costs per gallon, square feet covered per gallon, square feet covered per manhour, labor, material, overhead, and taxes per 100 square feet, and how much to add for profit.

***Only available as an eBook (PDF),* $59.00 at** https://craftsman-book.com

National Plumbing & HVAC Estimator

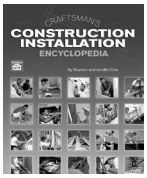


Manhours, labor and material costs for all common plumbing and HVAC work in residential, commercial, and industrial buildings. You can quickly work up a reliable estimate based on the pipe, fittings and equipment required. Every plumbing and HVAC estimator can use the cost estimates in this practical manual. Sample estimating and bidding forms and contracts also included. Explains how to handle change orders, letters of intent, and warranties. Describes the right way to process submittals, deal with suppliers and subcontract specialty work.

480 pages, 8½ x 11, $118.25. Revised annually

***eBook (PDF) also available*, $59.13 at** https://craftsman-book.com

Craftsman's Construction Installation Encyclopedia

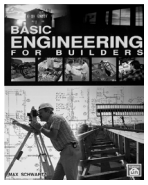


Step-by-step installation instructions for just about any residential construction, remodeling or repair task, arranged alphabetically, from Acoustic tile to Wood flooring. Includes hundreds of illustrations that show how to build, install, or remodel each part of the job, as well as manhour tables for each work item so you can estimate and bid with confidence. Also includes a CD-ROM with all the material in the book, handy look-up features, and the ability to capture and print out for your crew the instructions and diagrams for any job.

792 pages, 8½ x 11, $65.00

***Also available as an eBook (PDF),* $32.50 at** https://craftsman-book.com

Basic Engineering for Builders



This book is for you if you've ever been stumped by an engineering problem on the job, yet wanted to avoid the expense of hiring a qualified engineer. Here you'll find engineering principles explained in non-technical language and practical methods for applying them on the job. With the help of this book you'll be able to understand engineering functions in the plans and how to meet the requirements, how to get permits issued without the help of an engineer, and anticipate requirements for concrete, steel, wood and masonry. See why you sometimes have to hire an engineer and what you can undertake yourself: surveying, concrete, lumber loads and stresses, steel, masonry, plumbing, and HVAC systems. This book is designed to help you, the builder, save money by understanding engineering principles that you can incorporate into the jobs you bid.

400 pages, 8½ x 11, $39.50

***eBook (PDF) also available;* $19.75 at** https://craftsman-book.com

Paint Contractor's Manual

How to start and run a profitable paint contracting company: getting set up and organized to handle volume work, avoiding mistakes, getting maximum production from your crews and the most value from your advertising dollar. Shows how to estimate all prep and painting. Loaded with manhour estimates, sample forms, contracts, charts, tables and examples you can use.

224 pages, 8½ x 11, $46.50

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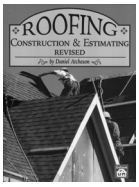
Roofing Construction & Estimating, Revised

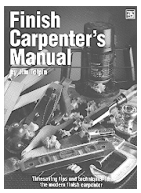


Detailed, step-by-step instructions, with photographs and diagrams, for installing, repairing and estimating nearly every type of roof covering available today for residential and commercial structures: asphalt shingles, roll roofing, wood shingles and shakes, clay tile, slate, metal, built-up, elastomeric, TPO and more. Provides guidance on sheathing, synthetic and felt underlayment, as well as tips and tricks from an experienced pro for dealing with those difficult points on a roof that are prone to leaks, such as valleys and roof penetrations. For each roofing type, instructions are provided for estimating material quantities and labor costs, with formulas, easy-to-follow examples and sample estimates for you to test your skill. Use these methods to create reliable estimates that will help insure a profit on every job you take.

448 pages, 8½ x 11, $72.50

***eBook (PDF) also available,* $36.25 at** https://craftsman-book.com

Finish Carpenter's Manual



Everything you need to know to be a finish carpenter: assessing a job before you begin, and tricks of the trade from a master finish carpenter. Easy-to-follow instructions for installing doors and windows, ceiling treatments (including fancy beams, corbels, cornices and moldings), wall treatments (including wainscoting and sheet paneling), and the finishing touches of chair, picture, and plate rails. Specialized interior work includes cabinetry and built-ins, stair finish work, and closets. Also covers exterior trims and porches. Includes manhour tables for finish work, and hundreds of illustrations and photos.

208 pages, 8½ x 11, $52.50

Plumber's Handbook Revised, 6th Edition

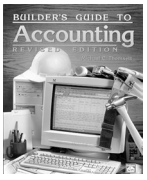


This new edition explains simply and clearly, in non-technical, everyday language, how to install all components of a plumbing system to comply not only with recent changes in the 2021 *International Plumbing Code* and the 2021 *Uniform Plumbing Code*, but with the requirements of the Americans with Disabilities Act. Originally written for working plumbers to assure safe, reliable, code-compliant plumbing installations that pass inspection the first time, Plumber's Handbook, because of its readability, accuracy and clear, simple diagrams, has become the textbook of choice for numerous schools preparing plumbing students for the plumber's exams. Now, with a set of questions for each chapter, full explanations for the answers, and with a 200-question sample exam in the back, this handbook is one of the best tools available for preparing for almost any plumbing journeyman, master or state-required plumbing contracting exam.

384 pages, 8½ x 11, $77.00

***eBook (PDF) also available;* $38.50 at** https://craftsman-book.com

Builder's Guide to Accounting Revised

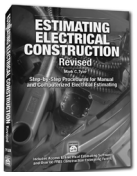


Step-by-step, easy-to-follow guidelines for setting up and maintaining records for your building business. This practical guide to all accounting methods shows how to meet state and federal accounting requirements, explains the new depreciation rules, and describes how the Tax Reform Act can affect the way you keep records. Full of charts, diagrams, simple directions and examples to help you keep track of where your money is going. Recommended reading for many state contractor's exams. Each chapter ends with a set of test questions, and a CD-ROM included FREE has all the questions in interactive self-test software. Use the Study Mode to make studying for the exam much easier, and Exam Mode to practice your skills.

60 pages, 8½ x 11, $71.50

***Also available as an eBook (PDF),* $35.75 at** https://craftsman-book.com

Estimating Electrical Construction Revised

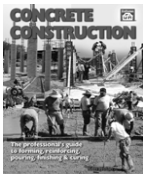


Estimating the cost of electrical work can be a very detailed and exacting discipline. It takes specialized skills and knowledge to create reliable estimates for electrical work. See how an expert estimates materials and labor for residential and commercial electrical construction. Learn how to use labor units, the plan take-off, and the bid summary to make an accurate estimate, how to deal with suppliers, use pricing sheets, and modify labor units. This book provides extensive labor unit tables and blank forms on a CD for estimating your next electrical job.

272 pages, 8½ x 11, $59.00

***Also available as an eBook (PDF),* $29.50 at** https://craftsman-book.com

Concrete Construction



Just when you think you know all there is about concrete, many new innovations create faster, more efficient ways to do the work. This comprehensive concrete manual has both the tried-and-tested methods and materials, and more recent innovations. It covers everything you need to know about concrete, along with Styrofoam forming systems, fiber reinforcing adjuncts, and some architectural innovations, like architectural foam elements, that can help you offer more in the jobs you bid on. Every chapter provides detailed, step-by-step instructions for each task, with hundreds of photographs and drawings that show exactly how the work is done. To keep your jobs organized, there are checklists for each stage of the concrete work, from planning, to finishing and protecting your pours. Whether you're doing residential or commercial work, this manual has the instructions, illustrations, charts, estimating data, rules of thumb and examples every contractor can apply on their concrete jobs.

288 pages, 8½ x 11, $28.75

***Also available as an eBook (PDF),* $14.38 at** https://craftsman-book.com

Commercial Metal Stud Framing



Master the transition from wood to metal stud framing with this comprehensive guide. Written by industry expert Ray Clark, this book offers step-by-step instructions, essential tools, and proven techniques to excel in commercial metal stud framing. Ideal for experienced wood framers, it includes hundreds of job site photos and valuable tips to help you work quickly, accurately, and safely on commercial projects.

208 pages, 8½ x 11, $65.50

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Painter's Handbook eBook

Loaded with "how-to" information you'll use every day to get professional results on any job: the best way to prepare a surface for painting or repainting; selecting and using the right materials and tools (including airless spray); tips for repainting kitchens, bathrooms, cabinets, eaves and porches; how to match and blend colors; why coatings fail and what to do about it. Lists 30 profitable specialties in the painting business.

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❍ 69.00 Insurance Restoration Contracting: Startup to Success
❍ 59.50 Markup & Profit: A Contractor's Guide, Revisited
❍ 98.00 National Building Cost Manual
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❍ 119.50 National Renovation & Ins. Repair Estimator
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❍ 46.50 Paint Contractor's Manual
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