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# NATIONAL CONSTRUCTION ESTIMATOR

Edited by Richard Pray  
72nd Edition



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# This Book Is an Encyclopedia of 2024 Building Costs

The **2024 National Construction Estimator** lists estimated construction costs to general contractors performing work with their own crews. Overhead and profit are not included.

## National Estimator Cloud

This manual is also available by subscription on the Web. *National Estimator Cloud* includes all ten of Craftsman's 2024 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.
- Supports progress invoices. *National Estimator Cloud* remembers what has been billed so far and what's yet to be billed.
- 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.

**This Manual Has Two Parts;** the Residential Construction Division begins on page 17. Use the figures in this division when estimating the cost of homes and apartments with a wood, steel or masonry frame. The Industrial and Commercial Division begins on page 308 and can be used to estimate costs for nearly all construction not covered by the Residential Division.

The Residential Construction Division is arranged in alphabetical order by construction trade and type of material. The Industrial and Commercial Division follows MasterFormat™ 2004. A complete index begins on page 640.

## Material Costs

**Material Costs** for each item are listed in the column headed "Material." These are neither retail nor wholesale prices. They are estimates of what most

contractors who buy in moderate volume will pay suppliers as of early-2024. Discounts may be available for purchases in larger volume.

Material costs can change rapidly. Material prices in *National Estimator Cloud* are revised as material prices change. See the inside the back cover of this manual for more on *National Estimator Cloud*.

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

**Add Sales Tax** when sales tax will be charged to the contractor buying the materials. *National Estimator Cloud* makes it easy to add sales tax to your estimates, bids and invoices.

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

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

## Labor Costs

**Labor Costs** for installing the material or doing the work described are listed in the column headed "Labor." The labor cost per unit is the labor cost per hour multiplied by the manhours per unit shown after the @ sign in the "Craft@Hours" column. Labor cost includes the basic wage, the employer's contribution to welfare, pension, vacation and apprentice funds and all tax and insurance charges based on wages. Hourly labor costs for the various crafts are listed on page 10 (for the Residential Division) and page 309 (for the Industrial and Commercial Division).

Hourly labor costs used in the Industrial and Commercial Division are higher than those used in the Residential Division, reflecting the fact that craftsmen on industrial and commercial jobs are often paid more than craftsmen on residential jobs.

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

**Payroll Taxes and Insurance** included in the labor cost are itemized in the sections beginning on pages 185 and 285.

**Manhours per Unit** and the Craft performing the work are listed in the "Craft@Hrs" column. Pages 7 through 9 explain the "Craft@Hrs" column. To find the units of work done per man in an 8-hour day, divide 8 by the manhours per unit. To find the units done by a crew in an 8-hour day, multiply the units per man per 8-hour day by the number of crew members.

**Manhours Include** all productive labor normally associated with installing the materials described. This will usually include tasks such as:

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

**Adjust the Labor Cost** to the job you are figuring when your actual hourly labor cost is known or can be estimated. The labor costs listed on pages 10 and 309 will apply within a few percent on many jobs. But labor costs may be much higher or much lower on the job you are estimating.

If the hourly wage rates listed on page 10 or page 309 are not accurate, divide your known or estimated cost per hour by the listed cost per hour. The result is your adjustment for any figure in the "Labor" column for that craft. See page 11 for more information on adjusting labor costs.

*National Estimator Cloud* makes it easy to compile estimates using your own labor rates.

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

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

- Add 10% to 15% when working temperatures are below 40 degrees or above 95 degrees.
- Add 15% to 25% for work on a ladder or a scaffold, in a crawl space, in a congested area or remote from the material storage point.
- Deduct 10% when the work is in a large open area with excellent access and good light.
- Add 1% for each 10 feet that materials must be lifted above ground level.
- Add 5% to 50% for tradesmen with below average skills. Deduct 5% to 25% for highly motivated, highly skilled tradesmen.
- Deduct 10% to 20% when an identical task is repeated many times for several days at the same site.
- Add 30% to 50% on small jobs where fitting and matching of materials is required, adjacent surfaces have to be protected and the job site is occupied during construction.
- Add 25% to 50% for work done following a major flood, fire, earthquake, hurricane or tornado while skilled tradesmen are not readily available. Material costs may also be higher after a major disaster.
- Add 10% to 35% for demanding specs, rigid inspections, unreliable suppliers, a difficult owner or an inexperienced architect.

*National Estimator Cloud* makes it easy to adjust estimates for unusual labor productivity.

**Use an Area Modification Factor** from pages 12 through 15 if your material, hourly labor or equipment costs are unknown and can't be estimated.

Here's how: Use the labor and material costs in this manual without modification. Then add or deduct the percentage shown on pages 12 through 15 to estimated costs to find your local estimated cost.

Area cost modifications in *National Estimator Cloud* will adjust all costs in this manual to any US zip or Canadian postal code you select.

## Equipment Costs

**Equipment Costs** for major equipment (such as cranes and tractors) are listed in the column headed "Equipment." Costs for small tools and expendable supplies (such as saws and tape) are usually considered overhead expense and do not appear in the Equipment cost column.

Equipment costs are based on rental rates listed in the section beginning on page 320 and assume that the equipment can be used productively for an entire 8-hour day. Add the cost of moving equipment on and off the site. Allow for unproductive time when equipment can't be used for the full rental period. For example, the equipment costs per unit of work completed will be higher when a tractor is used for 4 hours during a day and sits idle for the remaining 4 hours. Generally, an 8-hour day is the minimum rental period for most heavy equipment. Many sections describe the equipment being used, the cost per hour and a suggested minimum job charge.

## Subcontracted Work

**Subcontractors** do most of the work on construction projects. That's because specialty contractors can often get the work done at competitive cost, even after adding overhead and profit.

Many sections of this book cover work usually done by subcontractors. If you see the word "subcontract" in a section description, assume that costs are based on quotes by subcontractors and include typical subcontractor markup (about 30% on labor and 15% on material). Usually no material or labor costs will appear in these sections. The only costs shown will be in the "Total" column and will include all material, labor and equipment expense.

If you don't see the word "subcontract" in a section description, assume that costs are based on work done by a general contractor's crew. No markup is included in these costs. If the work is done by a subcontractor, the specialty contractor may be able to perform the work for the cost shown, even after adding overhead and profit.

## Markup

**The General Contractor's Markup** is not included in any costs in this book. On page 208 we suggest a 20% markup on the contract price for general contractors handling residential construction. Apply this markup or some figure you select to all costs, including both subcontract items and work done by your own crews.

To realize a gross profit of 20% on the contract price, you'll have to mark up costs by 25%. See page 208 for an example of how markup is calculated. Markup includes overhead and profit and may be the most difficult item to estimate.

*National Estimator Cloud* will add to the estimate any percentage you select for overhead, contingency and profit.

## Keep In Mind

**Labor and Material Costs Change.** Costs in this manual were compiled in the fall of 2023 and projected to early 2024 based on recent price trends. These projections will be accurate for some materials but inaccurate for others. No one can predict material price changes accurately. Costs in *National Estimator Cloud*

are revised as prices change and are likely to be different from the cost in this manual.

**How Accurate Are These Figures?** As accurate as possible considering that the estimators who compiled this manual don't know your subcontractors or material suppliers, haven't seen the plans or specifications, don't know what building code applies or where the job is, tried to project material costs several months into the future, and had no record of how much work your crews can handle.

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

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

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

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

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

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

For more on using *National Estimator Cloud*, go to: <https://craftsman-book.com/support/tutorials/>



**We'll Answer Your Questions** about any part of this book and explain how to apply these costs.

Free telephone assistance is available from 8 a.m. until 5 p.m. California time Monday through Friday except holidays. Phone 760-438-7828 x 2.

We don't accept collect calls and won't estimate the job for you. But if you need clarification on something in this manual, we can help.

# Abbreviations

<b>AASHO</b>	American Assn. of State Highway Officials	<b>FAA</b>	Federal Aviation Administration	<b>OC</b>	spacing from center to center
<b>ABS</b>	acrylonitrile butadiene styrene	<b>FICA</b>	Federal Insurance Contributions Act (Social Security, Medicare tax)	<b>OD</b>	outside diameter
<b>AC</b>	alternating current	<b>FOB</b>	freight on board	<b>OS &amp; Y</b>	outside screw & yoke
<b>AISC</b>	American Institute of Steel Construction Inc.	<b>FPM</b>	feet per minute	<b>oz</b>	ounce
<b>APP</b>	attactic polypropylene	<b>FRP</b>	fiberglass reinforced plastic	<b>perf</b>	perforated
<b>ASHRAE</b>	American Society of Heating, Refrigerating and Air Conditioning Engineers	<b>FS</b>	Federal Specification	<b>Pr</b>	pair
<b>ASME</b>	American Society of Mechanical Engineers	<b>ft-lbs</b>	foot pounds	<b>PSF</b>	pounds per square foot
<b>ASTM</b>	American Society for Testing Materials	<b>FUTA</b>	Federal Unemployment Compensation Act Tax	<b>PSI</b>	pounds per square inch
<b>AWPA</b>	American Wood Products Association	<b>Gal</b>	gallon	<b>PV</b>	photovoltaic
<b>AWWA</b>	American Water Works Association	<b>GFCI</b>	ground fault circuit interruptor	<b>PVC</b>	polyvinyl chloride
<b>Ba</b>	bay	<b>GPH</b>	gallon(s) per hour	<b>Qt</b>	quart
<b>Bdle</b>	bundle	<b>GPM</b>	gallon(s) per minute	<b>R</b>	thermal resistance
<b>BF</b>	board foot	<b>H</b>	height	<b>R/L</b>	random length(s)
<b>BHP</b>	boiler horsepower	<b>HP</b>	horsepower	<b>R/W/L</b>	random widths and lengths
<b>Btr</b>	better	<b>Hr(s)</b>	hour(s)	<b>RPM</b>	revolutions per minute
<b>Btu</b>	British thermal unit	<b>IMC</b>	intermediate metal conduit	<b>RSC</b>	rigid steel conduit
<b>B &amp; W</b>	black & white	<b>ID</b>	Inside diameter	<b>S1S2E</b>	surfaced 1 side, 2 edges
<b>C</b>	thermal conductance	<b>KD</b>	kiln dried or knocked down	<b>S2S</b>	surfaced 2 sides
<b>C</b>	one hundred	<b>KSI</b>	kips per square inch	<b>S4S</b>	surfaced 4 sides
<b>CF</b>	cubic foot	<b>KV</b>	kilovolt(s)	<b>Sa</b>	sack
<b>CFM</b>	cubic feet per minute	<b>KVA</b>	1,000 volt amps	<b>SBS</b>	styrene butyl styrene
<b>CLF</b>	100 linear feet	<b>kw</b>	kilowatt(s)	<b>SDR</b>	size to diameter ratio
<b>cm</b>	centimeter	<b>kwh</b>	kilowatt hour	<b>SF</b>	square foot
<b>CPE</b>	chlorinated polyethylene	<b>L</b>	length	<b>SFCA</b>	square feet of form in contact with concrete
<b>CPM</b>	cycles per minute	<b>Lb(s)</b>	pound(s)	<b>Sq</b>	100 square feet
<b>CPVC</b>	chlorinated polyvinyl chloride	<b>LF</b>	linear foot	<b>SSB</b>	single strength B quality glass
<b>CSPE</b>	chloro sulphinated polyethylene	<b>LP</b>	liquified propane	<b>STC</b>	sound transmission class
<b>CSF</b>	100 square feet	<b>LS</b>	lump sum	<b>Std</b>	standard
<b>CSY</b>	100 square yards	<b>M</b>	one thousand	<b>SY</b>	square yard
<b>CY</b>	cubic yard	<b>Mb</b>	million bytes (characters)	<b>T</b>	thick
<b>d</b>	penny	<b>MBF</b>	1,000 board feet	<b>T&amp;G</b>	tongue & groove edge
<b>D</b>	depth	<b>MBtu</b>	1,000 British thermal units	<b>TV</b>	television
<b>DC</b>	direct current	<b>MCM</b>	1,000 circular mils	<b>UBC</b>	Uniform Building Code
<b>dia</b>	diameter	<b>MDO</b>	medium density overlaid	<b>UL</b>	Underwriter's Laboratory
<b>DSB</b>	double strength B quality glass	<b>MH</b>	manhour	<b>USDA</b>	United States Dept. of Agriculture
<b>DWV</b>	drain, waste, vent piping	<b>Mi</b>	mile	<b>VLF</b>	vertical linear foot
<b>Ea</b>	each	<b>MLF</b>	1,000 linear feet	<b>W</b>	width
<b>EMT</b>	electric metallic tube	<b>MPH</b>	miles per hour	<b>Wk</b>	week
<b>EPDM</b>	ethylene propylene diene monomer	<b>mm</b>	millimeter(s)	<b>W/</b>	with
<b>equip.</b>	equipment	<b>Mo</b>	month	<b>x</b>	by or times
<b>exp.</b>	exposure	<b>MSF</b>	1,000 square feet		
<b>F</b>	Fahrenheit	<b>NEMA</b>	National Electrical Manufacturer's Association		
		<b>NFPA</b>	National Fire Protection Association		
		<b>No.</b>	number		
		<b>NRC</b>	noise reduction coefficient		

## Symbols

/	per
—	through or to
@	at
%	per 100 or percent
\$	U.S. dollars
'	feet
"	inches
#	pound or number

# Craft Codes, Hourly Costs and Crew Compositions

Both the Residential Division and Commercial and Industrial Division of this book include a column titled Craft@Hrs. Letters and numbers in this column show our estimates of:

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

For example, on page 51 you'll find estimates for installing BC plywood wall sheathing by the square foot. The Craft@Hrs column opposite ½" plywood wall sheathing shows:

B1@.016

That means we estimate the installation rate for crew B1 at .016 manhours per square foot. That's the same as 16 manhours per 1,000 square feet.

The table that follows defines each of the craft codes used in this book. Notice that crew B1 is composed of two craftsmen: one laborer and one carpenter.

To install 1,000 square feet of ½" BC wall sheathing at .016 manhours per square foot, that crew would need 16 manhours (one 8-hour day for a crew of two).

Notice also in the table below that the cost per manhour for crew B1 is listed as \$37.19. That's the average for a residential laborer (listed at \$33.31 per hour on page 10) and a residential carpenter (listed at \$41.06 per hour): \$33.31 plus \$41.06 is \$74.37. Divide by 2 to get \$37.185 (rounded up to \$37.19), the average cost per manhour for crew B1.

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

Costs in the Labor column in this book are the installation time (in manhours) multiplied by the cost per manhour. For example, on page 51 the labor cost listed for ½" BC wall sheathing is \$0.60 per square foot. That's the installation time (.016 manhours per square foot) multiplied by \$37.19, the average cost per manhour for crew B1.

## Residential Division

Craft Code	Cost Per Manhour	Crew Composition	Craft Code	Cost Per Manhour	Crew Composition
B1	\$37.19	1 laborer and 1 carpenter	BR	\$39.73	1 lather
B2	\$38.48	1 laborer, 2 carpenters	BS	\$36.83	1 marble setter
B3	\$35.89	2 laborers, 1 carpenter	CF	\$39.27	1 cement mason
B4	\$41.23	1 laborer 1 operating engineer 1 reinforcing iron worker	CT	\$39.06	1 mosaic & terrazzo worker
B5	\$40.80	1 laborer, 1 carpenter 1 cement mason 1 operating engineer 1 reinforcing iron worker	D1	\$40.51	1 drywall installer 1 drywall taper
B6	\$36.29	1 laborer, 1 cement mason	DI	\$40.29	1 drywall installer
B7	\$34.01	1 laborer, 1 truck driver	DT	\$40.72	1 drywall taper
B8	\$40.20	1 laborer 1 operating engineer	HC	\$32.41	1 plasterer helper
B9	\$36.45	1 bricklayer 1 bricklayer's helper	OE	\$47.09	1 operating engineer
BB	\$41.83	1 bricklayer	P1	\$40.66	1 laborer, 1 plumber
BC	\$41.06	1 carpenter	PM	\$48.00	1 plumber
BE	\$44.88	1 electrician	PP	\$37.73	1 painter, 1 laborer
BF	\$37.90	1 floor layer	PR	\$41.20	1 plasterer
BG	\$39.83	1 glazier	PT	\$42.15	1 painter
BH	\$31.07	1 bricklayer's helper	R1	\$39.45	1 roofer, 1 laborer
BL	\$33.31	1 laborer	RI	\$43.29	1 reinforcing iron worker
			RR	\$45.59	1 roofer
			SW	\$46.53	1 sheet metal worker
			T1	\$36.39	1 tile layer, 1 laborer
			TL	\$39.46	1 tile layer
			TR	\$34.70	1 truck driver

## Commercial and Industrial Division

Craft Code	Cost Per Manhour	Crew Composition	Craft Code	Cost Per Manhour	Crew Composition
P5	\$50.32	3 laborers 1 tractor operator 1 truck driver	S8	\$56.37	2 pile drivers, 2 laborers 1 truck driver 1 crane operator 1 tractor operator
P6	\$57.91	1 laborer, 1 plumber	S9	\$53.73	1 pile driver, 2 laborers 1 tractor operator 1 truck driver
P8	\$51.16	1 laborer, 1 cement mason	SM	\$67.17	1 sheet metal worker
P9	\$53.62	1 carpenter, 1 laborer 1 cement mason	SP	\$71.70	1 sprinkler fitter
PA	\$58.83	1 painter	SS	\$57.28	1 laborer
PD	\$62.62	1 pile driver	T2	\$58.67	2 tractor operators 3 laborers, 3 carpenters 3 iron workers (structural) 1 crane operator 1 truck driver
PF	\$69.05	1 pipefitter	T3	\$58.68	1 laborer 1 reinforcing iron worker
PH	\$50.12	1 plasterer's helper	T4	\$51.04	1 laborer, 1 mosaic worker
PL	\$70.24	1 plumber	T5	\$56.37	1 sheet metal worker 1 laborer
PS	\$60.60	1 plasterer	T6	\$59.97	2 sheet metal workers 1 laborer
R3	\$51.60	2 roofers, 1 laborer	TD	\$51.73	1 truck driver
RB	\$71.78	1 reinforcing iron worker	TO	\$63.14	1 tractor operator
RF	\$54.61	1 roofer	U1	\$56.13	1 plumber, 2 laborers 1 tractor operator
S1	\$54.36	1 laborer 1 tractor operator	U2	\$53.79	1 plumber, 2 laborers
S3	\$57.44	1 truck driver 1 tractor operator			
S4	\$45.57	3 laborers			
S5	\$48.99	5 laborers 1 crane operator 1 truck driver			
S6	\$51.43	2 laborers 1 tractor operator			
S7	\$54.36	3 laborers 3 tractor operators			



## Residential Division

	1	2	3	4	5	6
Craft	Base wage per hour	Taxable fringe benefits (@5.65% of base wage)	Insurance and employer taxes (%)	Insurance and employer taxes (\$)	Non-taxable fringe benefits (@4.99% of base wage)	Total hourly cost used in this book
Bricklayer	\$30.71	\$1.73	24.23%	\$7.86	\$1.53	\$41.83
Bricklayer's Helper	22.80	1.29	24.23	5.84	1.14	31.07
Building Laborer	23.25	1.31	30.91	7.59	1.16	33.31
Carpenter	28.89	1.63	29.81	9.10	1.44	41.06
Cement Mason	29.23	1.65	22.44	6.93	1.46	39.27
Drywall installer	29.95	1.69	22.62	7.16	1.49	40.27
Drywall Taper	30.27	1.71	22.62	7.23	1.51	40.72
Electrician	34.25	1.93	19.32	6.99	1.71	44.88
Floor Layer	28.09	1.59	22.98	6.82	1.40	37.90
Glazier	29.16	1.65	24.58	7.57	1.45	39.83
Lather	30.00	1.69	20.65	6.54	1.50	39.73
Marble Setter	27.79	1.57	20.72	6.08	1.39	36.83
Millwright	29.39	1.66	20.62	6.40	1.47	38.92
Mosaic & Terrazzo Worker	29.48	1.66	20.72	6.45	1.47	39.06
Operating Engineer	34.58	1.95	24.16	8.83	1.73	47.09
Painter	31.00	1.75	23.98	7.85	1.55	42.15
Plasterer	29.58	1.67	27.10	8.47	1.48	41.20
Plasterer Helper	23.28	1.31	27.10	6.66	1.16	32.41
Plumber	35.42	2.00	23.55	8.81	1.77	48.00
Reinforcing Ironworker	31.05	1.75	27.27	8.94	1.55	43.29
Roofer	29.61	1.67	41.01	12.83	1.48	45.59
Sheet Metal Worker	33.97	1.92	24.94	8.95	1.69	46.53
Sprinkler Fitter	34.81	1.97	24.19	8.90	1.74	47.42
Tile Layer	29.77	1.68	20.72	6.52	1.49	39.46
Truck Driver	25.29	1.43	25.16	6.72	1.26	34.70

### Hourly Labor Cost

The labor costs shown in Column 6 were used to compute the manhour costs for crews on page 7 and the figures in the "Labor" column of the Residential Division of this manual. Figures in the "Labor" column of the Industrial and Commercial Division of this book were computed using the hourly costs shown on page 309. All labor costs are in U.S. dollars per manhour.

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

**Column 1**, the base wage per hour, is the craftsman's hourly wage. These figures are representative of

what many contractors will be paying craftsmen working on residential construction in 2024.

**Column 2**, taxable fringe benefits, includes vacation pay, sick leave and other taxable benefits. These fringe benefits average 5.65% of the base wage for many construction contractors. This benefit is in addition to the base wage.

**Column 3**, insurance and employer taxes in percent, shows the insurance and tax rate for construction trades. The cost of insurance in this column includes workers' compensation and contractor's casualty and liability coverage. Insurance rates vary widely from state to state and depend on a contractor's loss experience. Typical rates are shown in the Insurance section

of this manual beginning on page 185. Taxes are itemized in the section on page 285. Note that taxes and insurance increase the hourly labor cost by 30 to 35% for most trades. There is no legal way to avoid these costs.

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

**Column 5**, non-taxable fringe benefits, includes employer paid non-taxable benefits such as medical coverage and tax-deferred pension and profit sharing plans. These fringe benefits average 4.96% of the base wage for many construction contractors. The employer pays no taxes or insurance on these benefits.

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

These hourly labor costs will apply within a few percent on many jobs. But wage rates may be much higher or lower in some areas. If the hourly costs shown in column 6 are not accurate for your work, develop modification factors that you can apply to the labor costs in this book. The following paragraphs explain the procedure.

## Adjusting Labor Costs

Here's how to customize the labor costs in this book if your wage rates are different from the wage rates shown on page 10 or 309.

Start with the taxable benefits you offer. Assume craftsmen on your payroll get one week of vacation each year and one week of sick leave each year. Convert these benefits into hours. Your computation might look like this:

$$\begin{array}{r} 40 \text{ vacation hours} \\ + 40 \text{ sick leave hours} \\ \hline 80 \text{ taxable leave hours} \end{array}$$

Then add the regular work hours for the year:

$$\begin{array}{r} 2,000 \text{ regular hours} \\ + 80 \text{ taxable benefit hours} \\ \hline 2,080 \text{ total hours} \end{array}$$

Multiply these hours by the base wage per hour. If you pay carpenters \$20.00 per hour, the calculation would be:

$$\begin{array}{r} 2,080 \text{ hours} \\ \times \$20.00 \text{ per hour} \\ \hline \$41,600 \text{ per year} \end{array}$$

Next, determine the tax and insurance rate for each trade. If you know the rates that apply to your jobs, use those rates. If not, use the rates in column 3 on page 10.

Continuing with our example, we'll use 29.81%, the rate for carpenters in column 3 on page 10. To increase the annual taxable wage by 29.81%, we'll multiply by 1.2981:

$$\begin{array}{r} \$41,600 \text{ per year} \\ \times 1.2981 \text{ tax \& insurance rate} \\ \hline \$54,001 \text{ annual cost} \end{array}$$

Then add the cost of non-taxable benefits. Suppose your company has no pension or profit sharing plan but does provide medical insurance for employees. Assume that the cost for your carpenter is \$343.67 per month or \$4,124 per year.

$$\begin{array}{r} \$4,124 \text{ medical plan} \\ + 54,001 \text{ annual cost} \\ \hline \$58,125 \text{ total annual cost} \end{array}$$

Divide this total annual cost by the actual hours worked in a year. This gives the contractor's total hourly labor cost including all benefits, taxes and insurance. Assume your carpenter will work 2,000 hours a year:

$$\frac{\$58,125}{2,000} = \$29.06 \text{ per hour}$$

Finally, find your modification factor for the labor costs in this book. Divide your total hourly labor cost by the total hourly labor cost shown on page 10. For the carpenter in our example, the figure in column 6 is \$41.06.

$$\frac{\$29.06}{\$41.06} = .708$$

Your modification factor is 70.8%. Multiply any building carpenter (Craft Code BC) labor costs in the Residential Division of this book by .708 to find your estimated cost. For example, on page 24 the labor cost for installing an 18" long towel bar is \$11.50 per each bar. If installed by your carpenter working at \$20.00 per hour, your estimated cost would be 70.8% of \$11.50 or \$8.14. The manhours would remain the same @.280, assuming normal productivity.

## If the Labor Rate Is Unknown

On some estimates you may not know what labor rates will apply. In that case, use both labor and material figures in this book without making any adjustment. When all labor, equipment and material costs have been compiled, add or deduct the percentage shown in the area modification table on pages 12 through 15.

Adjusting the labor costs in this book will make your estimates much more accurate.

# Area Modification Factors

Construction costs are higher in some areas than in other areas. Add or deduct the percentage shown on the following pages to adapt the costs in this book to your job site. Adjust your cost estimate up or down by the 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 alphabetically. 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. Figures for three-digit zips are the average of all five-digit zips in that area. Figures in the Total column are the weighted average of factors for Labor, Material and Equipment.

National Estimator Cloud will apply an area modification factor for any five-digit zip or Canadian postal code you select.

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, these area cost modifiers should improve the accuracy of your estimates.

Location	Zip	Mat.	Lab.	Equip.	Total Wtd. Avg.	Location	Zip	Mat.	Lab.	Equip.	Total Wtd. Avg.	Location	Zip	Mat.	Lab.	Equip.	Total Wtd. Avg.												
<b>Alabama Average</b>		-1	-4	0	-3%	Long Beach	907-908	3	20	1	11%	<b>District of Columbia Average</b>																	
Anniston	362	-3	-8	-1	-5%	Los Angeles	900-901	3	16	1	9%	Washington	200-205	2	21	1	11%												
Auburn	368	-1	-5	0	-3%	Marysville	959	1	4	0	2%	<b>Florida Average</b>		-1	-9	0	-4%	Altamonte Springs	327	-1	-4	0	-2%						
Bellamy	369	-2	0	-1	-1%	Modesto	953	1	1	0	1%	Bradenton	342	0	-10	0	-5%	Brooksville	346	0	-14	0	-6%						
Birmingham	350-352	-3	14	-1	5%	Mojave	935	0	13	0	6%	Daytona Beach	321	-2	-18	-1	-9%	Fort Lauderdale	333	3	2	1	3%						
Dothan	363	-1	-6	0	-3%	Novato	949	3	33	1	17%	Fort Myers	339	0	-14	0	-6%	Fort Pierce	349	-2	-17	-1	-9%						
Evergreen	364	-2	-11	-1	-6%	Oakland	945-947	3	38	1	19%	Gainesville	326	-1	-13	0	-7%	Jacksonville	322	-1	-1	0	-1%						
Gadsden	359	-4	-9	-1	-6%	Orange	928	3	25	1	13%	Lakeland	338	-3	-14	-1	-8%	Melbourne	329	-2	-10	-1	-6%						
Huntsville	358	1	5	0	3%	Oxnard	930	3	4	1	3%	Miami	330-332	2	-5	1	-1%	Naples	341	3	-9	1	-3%						
Jasper	355	-2	-17	-1	-9%	Pasadena	910-912	4	18	1	10%	Ocala	344	-3	-21	-1	-11%	Orlando	328	0	0	0	0%						
Mobile	365-366	-1	-5	0	-3%	Rancho Cordova	956-957	2	15	1	8%	Panama City	324	-2	-16	-1	-8%	Pensacola	325	-1	-12	0	-6%						
Montgomery	360-361	-1	3	0	1%	Redding	960	1	4	0	2%	Saint Augustine	320	-1	-5	0	-3%	Saint Cloud	347	-1	-2	0	-1%						
Scottsboro	357	0	-2	0	-1%	Richmond	948	2	41	1	20%	St Petersburg	337	0	-10	0	-5%	Tallahassee	323	0	-15	0	-7%						
Selma	367	-1	-9	0	-5%	Riverside	925	1	6	0	3%	Tampa	335-336	-1	2	0	0%	West Palm Beach	334	1	2	0	1%						
Sheffield	356	-1	1	0	0%	Sacramento	958	1	17	0	8%	<b>Georgia Average</b>		-1	1	0	0%	Albany	317	-2	-9	-1	-5%						
Tuscaloosa	354	0	-11	0	-5%	Salinas	939	3	4	1	3%	Athens	306	0	4	0	2%	Atlanta	303	3	43	1	21%						
<b>Alaska Average</b>		14	14	4	14%	San Bernardino	923-924	0	8	0	4%	Augusta	308-309	-2	0	-1	-1%	Buford	305	0	0	0	0%						
Anchorage	995	16	18	5	17%	San Diego	919-921	3	13	1	8%	Calhoun	307	-1	0	0	-1%	Columbus	318-319	-1	-6	0	-3%						
Fairbanks	997	16	25	5	20%	San Francisco	941	3	58	1	28%	Dublin/Fort Valley	310	-3	-14	-1	-8%	Dublin/Fort Valley	310	-3	-14	-1	-8%						
Juneau	998	18	7	6	13%	San Jose	950-951	3	53	1	26%	Hinesville	313	-2	10	-1	4%	Kings Bay	315	-2	-19	-1	-10%						
Ketchikan	999	3	12	1	7%	San Mateo	943-944	4	50	1	25%	Macon	312	-2	3	-1	0%	Marietta	300-302	1	13	0	7%						
King Salmon	996	16	10	5	13%	Santa Barbara	931	3	4	1	3%	Savannah	314	-1	-2	0	-1%	Statesboro	304	-2	8	-1	3%						
<b>Arizona Average</b>		1	-10	0	-4%	Santa Rosa	954	3	22	1	12%	Valdosta	316	-1	-10	0	-5%	<b>Hawaii Average</b>		17	18	6	17%						
Chambers	865	1	-38	0	-17%	Stockton	952	2	12	1	7%	Aliamanu	968	17	22	6	19%	Ewa	967	17	16	6	16%						
Douglas	855	0	-22	0	-10%	Sunnyvale	940	3	54	1	26%	Halawa Heights	967	17	16	6	16%	Hilo	967	17	16	6	16%						
Flagstaff	860	2	-20	1	-8%	Van Nuys	913-916	3	16	1	9%	Honolulu	968	17	22	6	19%	Kailua	968	17	22	6	19%						
Kingman	864	1	-8	0	-3%	Whittier	906	3	17	1	9%	Luualualei	967	17	16	6	16%	Luualualei	967	17	16	6	16%						
Mesa	852	1	10	0	5%	<b>Colorado Average</b>		2	1	1	1%	Milliani Town	967	17	16	6	16%	Milliani Town	967	17	16	6	16%						
Phoenix	850	1	10	0	5%	Aurora	800-801	3	17	1	9%	Pearl City	967	17	16	6	16%	Pearl City	967	17	16	6	16%						
Prescott	863	3	-13	1	-4%	Boulder	803-804	3	11	1	7%	Wahiawa	967	17	16	6	16%	Wahiawa	967	17	16	6	16%						
Show Low	859	2	-22	1	-9%	Colorado Springs	808-809	2	2	1	2%	Waianae	967	17	16	6	16%	Waianae	967	17	16	6	16%						
Tucson	856-857	0	-10	0	-5%	Denver	802	3	21	1	11%	Wailuku	967	17	16	6	16%	Wailuku	967	17	16	6	16%						
Yuma	853	0	9	0	4%	Durango	813	1	-14	0	-6%	<b>Delaware Average</b>		1	3	0	2%	Dover	199	1	-4	0	-1%						
<b>Arkansas Average</b>		-2	-13	0	-7%	Fort Morgan	807	2	-9	1	-3%	Newark	197	2	7	1	4%	Newark	197	2	7	1	4%						
Batesville	725	0	-17	0	-8%	Glenwood Springs	816	2	8	1	5%	Wilmington	198	0	5	0	2%	Wilmington	198	0	5	0	2%						
Camden	717	-4	-8	-1	-6%	Grand Junction	814-815	1	-10	0	-4%	<b>Connecticut Average</b>		1	16	0	8%	Bridgeport	066	0	20	0	9%	Bristol	060	1	23	0	11%
Fayetteville	727	0	-7	0	-3%	Greeley	806	3	8	1	5%	Fairfield	064	2	19	1	10%	Fairfield	064	2	19	1	10%						
Fort Smith	729	-1	-15	0	-7%	Longmont	805	3	4	1	3%	Hartford	061	0	21	0	10%	Hartford	061	0	21	0	10%						
Harrison	726	-1	-27	0	-13%	Pagosa Springs	811	0	-16	0	-7%	New Haven	065	1	13	0	7%	New Haven	065	1	13	0	7%						
Hope	718	-3	-19	-1	-10%	Pueblo	810	-1	-5	0	-3%	Norwich	063	0	6	0	3%	Norwich	063	0	6	0	3%						
Hot Springs	719	-2	-27	-1	-13%	Salida	812	2	-5	1	-1%	Stamford	068-069	4	27	1	15%	Stamford	068-069	4	27	1	15%						
Jonesboro	724	-1	-4	0	-2%	<b>Connecticut Average</b>		1	16	0	8%	Waterbury	067	1	13	0	7%	Waterbury	067	1	13	0	7%						
Little Rock	720-722	-1	-3	0	-2%	Bridgeport	066	0	20	0	9%	West Hartford	062	1	4	0	2%	West Hartford	062	1	4	0	2%						
Pine Bluff	716	-4	-19	-1	-11%	Bristol	060	1	23	0	11%	<b>Delaware Average</b>		1	3	0	2%	Dover	199	1	-4	0	-1%						
Russellville	728	0	-12	0	-6%	Fairfield	064	2	19	1	10%	Newark	197	2	7	1	4%	Newark	197	2	7	1	4%						
West Memphis	723	-3	3	-1	0%	Hartford	061	0	21	0	10%	Wilmington	198	0	5	0	2%	Wilmington	198	0	5	0	2%						
<b>California Average</b>		2	17	1	9%	New Haven	065	1	13	0	7%	<b>Delaware Average</b>		1	3	0	2%	Dover	199	1	-4	0	-1%						
Alhambra	917-918	3	18	1	10%	Norwich	063	0	6	0	3%	Newark	197	2	7	1	4%	Newark	197	2	7	1	4%						
Bakersfield	932-933	0	-1	0	0%	Stamford	068-069	4	27	1	15%	Wilmington	198	0	5	0	2%	Wilmington	198	0	5	0	2%						
El Centro	922	1	-2	0	0%	Waterbury	067	1	13	0	7%	<b>Delaware Average</b>		1	3	0	2%	Dover	199	1	-4	0	-1%						
Eureka	955	1	-3	0	-1%	West Hartford	062	1	4	0	2%	Dover	199	1	-4	0	-1%	Dover	199	1	-4	0	-1%						
Fresno	936-938	0	-1	0	0%	<b>Delaware Average</b>		1	3	0	2%	Newark	197	2	7	1	4%	Newark	197	2	7	1	4%						
Herlong	961	2	0	1	1%	<b>Delaware Average</b>		1	3	0	2%	Wilmington	198	0	5	0	2%	Wilmington	198	0	5	0	2%						
Inglewood	902-905	3	18	1	10%	<b>Delaware Average</b>		1	3	0	2%	<b>Delaware Average</b>		1	3	0	2%	Dover	199	1	-4	0	-1%						
Irvine	926-927	3	27	1	14%	<b>Delaware Average</b>		1	3	0	2%	Dover	199	1	-4	0	-1%	Dover	199	1	-4	0	-1%						
Lompoc	934	3	-1	1	1%	<b>Delaware Average</b>		1	3	0	2%	Newark	197	2	7	1	4%	Newark	197	2	7	1	4%						

# Area Modification Factors

Location	Zip	Mat.	Lab.	Equip.	Total Wtd. Avg.	Location	Zip	Mat.	Lab.	Equip.	Total Wtd. Avg.	Location	Zip	Mat.	Lab.	Equip.	Total Wtd. Avg.	
Columbia	384	-1	-12	0	-6%	Charlottesville	229	1	-5	0	-2%	Gillette	827	-1	-5	0	-3%	
Cookeville	385	0	-13	0	-6%	Chesapeake	233	-1	-1	0	-1%	Powell	824	0	-19	0	-9%	
Jackson	383	-1	17	0	7%	Culpeper	227	1	-12	0	-5%	Rawlins	823	0	-6	0	-3%	
Kingsport	376	0	-6	0	-3%	Farmville	239	-2	-16	-1	-8%	Riverton	825	-1	-15	0	-7%	
Knoxville	377-379	-1	6	0	2%	Fredericksburg	224-225	1	-10	0	-4%	Rock Springs	829-831	0	3	0	1%	
McKenzie	382	-1	-7	0	-4%	Galax	243	-2	-18	-1	-9%	Sheridan	828	1	-14	0	-6%	
Memphis	380-381	-1	16	0	7%	Harrisonburg	228	1	-14	0	-6%	Wheatland	822	0	-22	0	-10%	
Nashville	371-372	1	18	0	9%	Lynchburg	245	-2	-9	-1	-5%							
						Norfolk	235-237	0	3	0	1%							
<b>Texas Average</b>		<b>-2</b>	<b>0</b>	<b>-1</b>	<b>-1%</b>	Petersburg	238	-2	1	-1	-1%	<b>UNITED STATES TERRITORIES</b>						
Abilene	795-796	-4	-10	-1	-7%	Radford	241	-2	-14	-1	-8%	Guam	53	-21	-5	18%		
Amarillo	790-791	-2	-6	-1	-4%	Reston	201	3	18	1	10%	Puerto Rico	2	-47	-5	-21%		
Arlington	760	-1	16	0	7%	Richmond	232	-1	4	0	1%							
Austin	786-787	1	18	0	9%	Roanoke	240	-1	-6	0	-3%	<b>VIRGIN ISLANDS</b>						
Bay City	774	-1	22	0	10%	Staunton	244	0	-11	0	-5%	St. Croix	18	-15	-4	2%		
Beaumont	776-777	-3	12	-1	4%	Tazewell	246	-3	-22	-1	-12%	St. John	52	-15	-4	20%		
Brownwood	768	-3	-11	-1	-7%	Virginia Beach	234	0	-2	0	-1%	St. Thomas	23	-15	-4	5%		
Bryan	778	0	-4	0	-2%	Williamsburg	230-231	0	5	0	2%							
Childress	792	-3	-24	-1	-13%	Winchester	226	0	-15	0	-7%	<b>CANADIAN AREA MODIFIERS</b>						
Corpus Christi	783-784	-2	3	-1	0%	<b>Washington Average</b>	<b>1</b>	<b>-1</b>	<b>1</b>	<b>0%</b>	These figures assume an exchange rate of \$1.00 Canadian to \$0.76 U.S.							
Dallas	751-753	-1	19	0	8%	Clarkston	994	0	-3	0	-1%	<b>Alberta Average</b>	<b>26</b>	<b>-1</b>	<b>7</b>	<b>13%</b>		
Del Rio	788	-3	-22	-1	-12%	Everett	982	2	5	1	3%	Calgary	26	1	7	14%		
El Paso	798-799	-3	-18	-1	-10%	Olympia	985	2	-2	1	0%	Edmonton	25	2	7	14%		
Fort Worth	761-762	-1	16	-1	7%	Pasco	993	0	-1	0	0%	Fort McMurray	28	-7	7	12%		
Galveston	775	-3	18	-1	7%	Seattle	980-981	3	24	1	13%	<b>British Columbia Average</b>	<b>26</b>	<b>-15</b>	<b>7</b>	<b>7%</b>		
Giddings	789	0	-1	0	0%	Spokane	990-992	0	-6	0	-3%	Fraser Valley	26	-16	7	6%		
Greenville	754	-3	9	-1	3%	Tacoma	983-984	2	5	1	3%	Okanagan	27	-18	7	6%		
Houston	770-772	-1	19	0	8%	Vancouver	986	2	0	1	1%	Vancouver	26	-11	7	9%		
Huntsville	773	-2	13	-1	5%	Wenatchee	988	1	-13	0	-5%	<b>Manitoba Average</b>	<b>20</b>	<b>-22</b>	<b>5</b>	<b>0%</b>		
Longview	756	-2	-10	-1	-6%	Yakima	989	0	-15	0	-7%	North Manitoba	20	-22	5	0%		
Lubbock	793-794	-3	-10	-1	-6%	<b>West Virginia Average</b>	<b>-2</b>	<b>-15</b>	<b>-1</b>	<b>-8%</b>	Selkirk	20	-22	5	0%			
Lufkin	759	-3	-5	-1	-4%	Beckley	258-259	0	-18	0	-8%	South Manitoba	20	-22	5	0%		
McAllen	785	-3	-22	-1	-12%	Bluefield	247-248	-1	-24	0	-12%	Winnipeg	20	-22	5	0%		
Midland	797	-3	18	-1	7%	Charleston	250-253	1	4	0	2%	<b>New Brunswick</b>	<b>16</b>	<b>-47</b>	<b>3</b>	<b>-13%</b>		
Palestine	758	-2	-7	-1	-4%	Clarksburg	263-264	-3	-6	-1	-4%	Moncton	16	-47	3	-13%		
Plano	750	0	18	0	8%	Fairmont	266	0	-30	0	-14%	<b>Newfoundland/Labrador</b>	<b>19</b>	<b>-29</b>	<b>4</b>	<b>-3%</b>		
San Angelo	769	-3	-3	-1	-3%	Huntington	255-257	-1	-7	0	-4%	<b>Nova Scotia Average</b>	<b>17</b>	<b>-36</b>	<b>4</b>	<b>-8%</b>		
San Antonio	780-782	-2	2	-1	0%	Lewisburg	249	-2	-30	-1	-15%	Amherst	16	-36	3	-8%		
Texarkana	755	-3	-16	-1	-9%	Martinsburg	254	-1	-18	0	-9%	Nova Scotia	17	-35	4	-7%		
Tyler	757	-1	-13	0	-7%	Morgantown	265	-3	-11	-1	-7%	Sydney	17	-37	4	-8%		
Victoria	779	-3	-3	-1	-3%	New Martinsville	262	-2	-24	-1	-12%	<b>Ontario Average</b>	<b>22</b>	<b>-11</b>	<b>5</b>	<b>7%</b>		
Waco	765-767	-3	-4	-1	-3%	Parkersburg	261	-3	-11	-1	-7%	London	22	-10	5	7%		
Wichita Falls	763	-3	-8	-1	-5%	Romney	267	-4	-16	-1	-9%	Thunder Bay	24	-14	6	6%		
Woodson	764	-3	-4	-1	-3%	Sugar Grove	268	-3	-27	-1	-14%	Toronto	21	-9	5	7%		
						Wheeling	260	-3	5	-1	1%	<b>Quebec Average</b>	<b>19</b>	<b>-24</b>	<b>4</b>	<b>-1%</b>		
<b>Utah Average</b>		<b>1</b>	<b>-8</b>	<b>1</b>	<b>-3%</b>	<b>Wisconsin Average</b>	<b>-1</b>	<b>3</b>	<b>0</b>	<b>1%</b>	Montreal	19	-24	4	-1%			
Clearfield	840	2	0	1	1%	Amery	540	0	4	0	2%	Quebec City	19	-24	4	-1%		
Green River	845	1	-16	0	-7%	Beloit	535	0	7	0	3%	<b>Saskatchewan Average</b>	<b>23</b>	<b>-18</b>	<b>5</b>	<b>4%</b>		
Ogden	843-844	0	-14	0	-6%	Clam Lake	545	-1	-12	0	-6%	La Ronge	24	-21	6	3%		
Provo	846-847	-2	-15	1	-6%	Eau Claire	547	-1	-2	0	-1%	Prince Albert	22	-20	5	2%		
Salt Lake City	841	2	4	1	3%	Green Bay	541-543	0	7	0	3%	Saskatoon	22	-14	5	5%		
<b>Vermont Average</b>		<b>1</b>	<b>-10</b>	<b>0</b>	<b>-4%</b>	La Crosse	546	-2	-4	-1	-3%							
Albany	058	1	-14	0	-6%	Ladysmith	548	-2	11	-1	4%							
Battleboro	053	1	-12	0	-5%	Madison	537	2	11	1	6%							
Beecher Falls	059	1	-15	0	-6%	Milwaukee	530-534	0	12	0	6%							
Bennington	052	-1	-15	0	-7%	Oshkosh	549	-1	16	0	7%							
Burlington	054	3	3	1	3%	Portage	539	0	2	0	1%							
Montpelier	056	2	-9	1	-3%	Prairie du Chien	538	-2	-5	-1	-3%							
Rutland	057	-1	-15	0	-7%	Wausau	544	-1	-5	0	-3%							
Springfield	051	-1	-12	0	-6%	<b>Wyoming Average</b>	<b>0</b>	<b>-10</b>	<b>0</b>	<b>-5%</b>								
White River Junction	050	1	-1	0	0%	Casper	826	-2	-4	-1	-3%							
<b>Virginia Average</b>		<b>0</b>	<b>-5</b>	<b>0</b>	<b>-3%</b>	Cheyenne/Laramie	820	1	-10	0	-4%							
Abingdon	242	-2	-13	-1	-7%													
Alexandria	220-223	3	23	1	12%													

## Credits and Acknowledgments

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This book has over 30,000 cost estimates for 2024. To develop these estimates, the editors relied on information supplied by hundreds of construction cost authorities. We offer our sincere thanks to the contractors, engineers, design professionals, construction estimators, material suppliers and manufacturers who, in the spirit of cooperation, have assisted in the preparation of this Seventy-Second Edition of the National Construction Estimator. Many of the cost authorities who supplied information for this volume are listed below.

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Photos: iStock by Getty Images™

## Adhesives

**Adhesives** See also, Caulking, Flooring, Roofing and Tile in the Residential Division

**Panel adhesives** Better quality, gun applied in continuous bead to wood or metal framing or furring members, material only, add labor below. Per 100 SF of wall, floor, or ceiling including 6% waste.

	Unit	Bead diameter			
		1/8"	1/4"	3/8"	1/2"
<b>Subfloor adhesive, on floors</b>					
12" OC members	CSF	3.55	14.20	32.00	56.90
16" OC members	CSF	2.67	10.70	24.00	42.70
20" OC members	CSF	2.13	8.53	19.20	34.10
24" OC members	CSF	1.78	7.11	16.00	28.40
<b>Wall sheathing or shear panel adhesive, on walls</b>					
12" OC members	CSF	5.06	20.20	45.50	80.90
16" OC members	CSF	3.79	15.20	34.10	60.70
20" OC members	CSF	3.03	12.10	27.30	48.50
24" OC members	CSF	2.53	10.10	22.80	40.40
<b>Polystyrene or polyurethane foam panel adhesive, on walls</b>					
12" OC members	CSF	5.23	20.90	47.00	83.60
16" OC members	CSF	3.92	15.70	35.30	62.70
20" OC members	CSF	3.14	12.50	28.20	50.20
24" OC members	CSF	2.61	10.50	23.50	41.80
<b>Gypsum drywall adhesive</b>					
12" OC members	CSF	1.71	6.83	15.40	27.30
16" OC members	CSF	1.28	5.12	11.50	20.50
20" OC members	CSF	1.02	4.10	9.22	16.40
24" OC members	CSF	.85	3.42	7.69	13.70
<b>Hardboard or plastic panel adhesive, on walls</b>					
12" OC members	CSF	4.45	17.80	40.10	71.30
16" OC members	CSF	3.34	13.40	30.10	53.50
20" OC members	CSF	2.67	10.70	24.10	42.80
24" OC members	CSF	2.23	8.91	20.00	35.60
	<b>Craft@Hrs</b>	<b>Unit</b>	<b>Material</b>	<b>Labor</b>	<b>Total</b>
<b>Labor to apply adhesive to framing members, 1/8" to 1/2" bead diameter, no material included</b>					
<b>Floor or ceiling joists</b>					
12" OC members	BC@.075	CSF	—	3.08	3.08
16" OC members	BC@.056	CSF	—	2.30	2.30
20" OC members	BC@.052	CSF	—	2.14	2.14
24" OC members	BC@.042	CSF	—	1.72	1.72
<b>Interior and exterior wall members</b>					
12" OC members	BC@.100	CSF	—	4.11	4.11
16" OC members	BC@.090	CSF	—	3.70	3.70
20" OC members	BC@.084	CSF	—	3.45	3.45
24" OC members	BC@.068	CSF	—	2.79	2.79

**Special purpose adhesives**

Construction adhesive, for counters, cabinets, paneling, brick veneer, ceramic fixtures, shelving, sets in 10 minutes, 10.5 oz. cartridge	—	Ea	1.63	—	1.63
Epoxy-tie adhesive, bonds concrete, fills cracks to 3/4", seals doors and windows, anchor grouting, non-shrink, 22 oz. cartridge	—	Ea	37.10	—	37.10
Gypsum drywall adhesive, waterproof, bonds to wood, metal, masonry, concrete, 29 oz. cartridge	—	Ea	5.91	—	5.91

## Aggregate

	Craft@Hrs	Unit	Material	Labor	Total
Latex FRP adhesive, indoor, bonds wood, concrete, drywall, foamboard, trowel grade, gallon	—	Ea	24.30	—	24.30
Panel insulation adhesive, waterproof, for polyurethane & polystyrene panels, bonds to wood, metal, masonry, concrete, 4.5 lbs.	—	Ea	44.40	—	44.40
Marine adhesive/sealant, 10 oz.	—	Ea	29.80	—	29.80
Project adhesive, rubber-based, bonds plywood, hardboard fiberglass, drywall, foam board, shelving, ceramic fixtures, 10 minute work time, 10.5 oz. cartridge	—	Ea	5.07	—	5.07
		Unit	1 quart can	1 gallon can	
<b>General purpose adhesives</b>					
Acoustic tile adhesive, solvent base, waterproof, sound deadening type		Ea	—		16.30
Aliphatic resin woodworking glue		Ea	13.80		36.60
Carpet cement, outdoor		Ea	25.80		—
Professional carpenter's glue, multi-purpose		Ea	21.30		30.50
Contact cement, rubber based, waterproof, bonds veneers to plywood, particleboard, wallboard		Ea	19.30		47.30
Gel contact cement		Ea	19.70		—
Resilient flooring adhesive, latex base, adheres to concrete, plywood, felt, sheet flooring		Ea	11.70		22.20
Tile cement, solvent base, ceramic/stone, interior		Ea	11.10		34.80

	Craft@Hrs	Unit	Material	Labor	Total
<b>Aggregate</b> Typical prices, 5 mile haul, 24 ton minimum. See also Roofing, Built-up					
Crushed stone (1.4 tons per CY)					
3/8" stone	—	Ton	28.50	—	28.50
3/4" (Number 3)	—	Ton	26.20	—	26.20
1-1/2" (Number 2)	—	Ton	24.60	—	24.60
Crushed slag, typical prices where available					
3/4" slag	—	Ton	27.20	—	27.20
1-1/2"	—	Ton	27.80	—	27.80
Washed gravel (1.4 tons per CY)					
3/4" gravel	—	Ton	49.30	—	49.30
1-1/2"	—	Ton	53.20	—	53.20
Pea gravel, (1.4 tons per CY), typical prices where available					
3/8" or 1/2"	—	Ton	58.00	—	58.00
Sand, (1.35 tons per CY), typical prices where available					
Fill sand	—	Ton	33.40	—	33.40
Mason sand	—	Ton	44.30	—	44.30
Concrete sand	—	Ton	37.00	—	37.00
Add per ton less than 24 tons	—	Ton	9.79	—	9.79
Add for delivery over 5 miles, one way	—	Mile	12.20	—	12.20

**Appraisal Fees** Costs for determining the value of existing buildings, land, and equipment. Actual fee charged is based on the level of difficulty and the time spent on appraisal plus travel to location and cost of support services, if any. Costs include research and report by a professional state licensed appraiser. Client may request an appraisal on a "fee not to exceed" basis. Fees shown are averages and are not quoted as a percentage of value or contingent on value. The fee for cancelling an appraisal after the inspection is equal to the original appraisal fee.

## Appraisal and Arbitration Fees

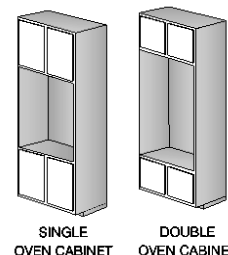
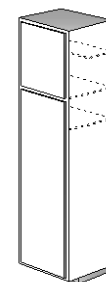
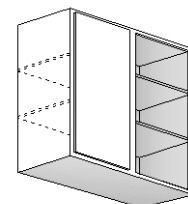
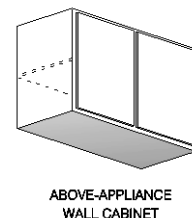
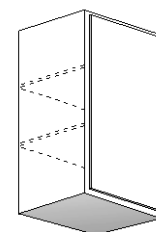
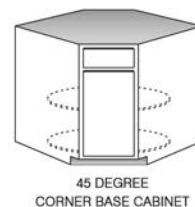
	Craft@Hrs	Unit	Material	Labor	Total
Single family residences, condominiums, planned unit developments (PUDs). Fees for complex, expensive (over \$1 million) or atypical properties or those that require higher licensure than a state license are usually negotiated. Based on square feet of gross living area (excluding the garage).					
To 2,500 square feet	—	LS	—	—	363.00
Over 2,500 SF to 3,500 SF	—	LS	—	—	411.00
Over 3,500 SF to 5,000 SF	—	LS	—	—	508.00
Over 5,000 SF	—	LS	—	—	750.00
Small residential income properties (duplex, triplex, quadriplex)					
2 to 4 units	—	LS	—	—	653.00
Apartment houses, commercial and industrial buildings					
To \$300,000 valuation	—	LS	—	—	3,150.00
Over \$300,000 to \$1,000,000 valuation	—	LS	—	—	4,110.00
Over \$1,000,000 to \$3,000,000 valuation	—	LS	—	—	4,600.00
Over \$3,000,000 to \$5,000,000 valuation	—	LS	—	—	5,810.00
Other services					
Additional photograph (each)	—	LS	—	—	26.60
Outlying area fee	—	LS	—	—	53.20
Satisfactory Completion (old Form 442 / new Form 1004d)	—	LS	—	—	145.00
Appraisal update, same comps (Form 1004d)	—	LS	—	—	290.00
Operating Income Statement (FNMA 216)	—	LS	—	—	77.40
SFR Rental Survey (FNMA 1007)	—	LS	—	—	77.40
Appraisal review (desk)	—	LS	—	—	169.00
Appraisal review (field)	—	LS	—	—	363.00
Drive-by appraisal (Form 2055) starting at	—	LS	—	—	266.00
Drive-by appraisal (Form 2070/2075)	—	LS	—	—	218.00
Machinery (Fee is based on total value of equipment appraised) Additional charges for travel and lodging may be required					
To \$30,000 valuation	—	LS	—	—	600.00
Over \$30,000 to \$100,000 valuation	—	LS	—	—	803.00
Over \$100,000 to \$500,000 valuation	—	LS	—	—	1,350.00
Over \$500,000 to \$1,000,000 valuation	—	LS	—	—	1,840.00
Over \$1,000,000 to \$5,000,000 valuation	—	LS	—	—	3,150.00
Court testimony (excluding preparation)	—	Day	—	—	1,450.00
Consulting fees billed at an hourly rate	—	Hour	—	—	184.00
Outside of office meetings or court appearance are billed including travel time and expenses round trip, minimum 4 hours.					

**Arbitration and Mediation Fees** These are administrative fees paid to the American Arbitration Association (AAA). Rules and fees are subject to change. The AAA's web site at [www.adr.org](http://www.adr.org) has current rules and fee information. Fees charged by Construction Dispute Resolution Services (<http://www.constructiondisputes-cdrs.com>) will usually be less. Arbitrators are chosen from the National Roster of Construction Arbitrators and are paid a fee by the parties. Legal representation, if desired (although not necessary), is at the expense of each party. These fees do not include rental of a hearing room. An initial filing fee is payable in full by a filing party when a claim, counterclaim or additional claim is filed. A case service fee is payable at the time the first hearing is scheduled. This fee will be refunded at the conclusion of the case if no hearings have occurred so long as the Association was notified of cancellation at least 24 hours before the first scheduled hearing. The minimum AAA filing fee for any case having three or more arbitrators is \$2,750 plus a \$1,000 case service fee.



## Cabinets, Kitchen

	Craft@Hrs	Unit	Material	Labor	Total
Corner sink front, 34-1/2" high 40" wide at walls	BC@2.63	Ea	257.00	108.00	365.00
Wall cabinets, adjustable shelves, 30" high, 12" deep					
9" wide, 1 door	BC@.461	Ea	162.00	18.90	180.90
12" wide or 15" wide, 1 door	BC@.461	Ea	177.00	18.90	195.90
18" wide, 1 door	BC@.638	Ea	209.00	26.20	235.20
21" wide, 1 door	BC@.638	Ea	215.00	26.20	241.20
24" wide, 1 door	BC@.766	Ea	231.00	31.50	262.50
27" wide, 2 doors	BC@.766	Ea	270.00	31.50	301.50
30" wide, 2 doors	BC@.911	Ea	270.00	37.40	307.40
33" wide, 2 doors	BC@.911	Ea	295.00	37.40	332.40
36" wide, 2 doors	BC@1.03	Ea	310.00	42.30	352.30
42" wide, 2 doors	BC@1.03	Ea	333.00	42.30	375.30
48" wide, 2 doors	BC@1.16	Ea	360.00	47.60	407.60
Above-appliance wall cabinets, 12" deep					
12" high, 30" wide, 2 doors	BC@.461	Ea	171.00	18.90	189.90
15" high, 30" wide, 2 doors	BC@.461	Ea	195.00	18.90	213.90
15" high, 33" wide, 2 doors	BC@.537	Ea	210.00	22.00	232.00
15" high, 36" wide, 2 doors	BC@.638	Ea	215.00	26.20	241.20
18" high, 18" wide, 2 doors	BC@.537	Ea	162.00	22.00	184.00
18" high, 30" wide, 2 doors	BC@.766	Ea	215.00	31.50	246.50
18" high, 36" wide, 2 doors	BC@.911	Ea	237.00	37.40	274.40
Corner wall cabinets, 30" high, 12" deep					
24" at each wall, fixed shelves	BC@1.03	Ea	295.00	42.30	337.30
24" at each wall, revolving shelves	BC@1.03	Ea	395.00	42.30	437.30
Blind corner wall cabinets, 30" high					
24" minimum, 1 door	BC@1.03	Ea	223.00	42.30	265.30
36" minimum, 1 door	BC@1.32	Ea	270.00	54.20	324.20
42" minimum, 2 doors	BC@1.20	Ea	340.00	49.30	389.30
Utility cabinets, 66" high, 12" deep, no shelves					
18" wide	BC@1.32	Ea	340.00	54.20	394.20
24" wide	BC@1.71	Ea	388.00	70.20	458.20
Utility cabinets, 66" high, 24" deep, add shelf cost below					
18" wide	BC@1.24	Ea	360.00	50.90	410.90
24" wide	BC@1.71	Ea	427.00	70.20	497.20
Add for utility cabinet revolving shelves, includes mounting hardware					
18" wide x 24" deep	BC@.360	Ea	309.00	14.80	323.80
24" wide x 24" deep	BC@.360	Ea	362.00	14.80	376.80
Add for utility cabinet plain shelves					
18" wide x 24" deep	BC@.541	Ea	104.00	22.20	126.20
24" wide x 24" deep	BC@.541	Ea	109.00	22.20	131.20
Oven cabinets, 66" high, 24" deep					
27" wide, single oven	BC@2.19	Ea	431.00	89.90	520.90
27" wide, double oven	BC@2.19	Ea	327.00	89.90	416.90



## Cabinets, Kitchen

	Craft@Hrs	Unit	Material	Labor	Total
Microwave cabinet, with trim, 21" high, 20" deep, 30" wide	BC@.986	Ea	259.00	40.50	299.50
Additional labor costs for cabinets					
Tall utility, pantry, or oven cabinets	BC@2.00	Ea	—	82.10	82.10
Tall wall cabinet to counter level	BC@1.50	Ea	—	61.60	61.60
Hood cabinet over a range with vent cutout	BC@1.50	Ea	—	61.60	61.60
3/4" raised end panels applied to cabinet ends	BC@.250	Ea	—	10.30	10.30
Refrigerator end panels, cut, fit, install	BC@.500	Ea	—	20.50	20.50
Cabinet end panels, most sizes, per panel					
Refrigerator end panels	BC@.557	Ea	—	22.90	22.90
Refrigerator end panels with return	BC@1.00	Ea	—	41.10	41.10
Applied decorative end panels	BC@.334	Ea	—	13.70	13.70
Mitered island end or back panels	BC@.667	Ea	—	27.40	27.40
Dishwasher return panels	BC@.667	Ea	—	27.40	27.40
Precut filler panels installed between cabinets, per panel					
Most base or wall fillers	BC@.200	Ea	—	8.21	8.21
Most base or wall fillers with overlays	BC@.400	Ea	—	16.40	16.40
Tall filler panels over 36"	BC@.268	Ea	—	11.00	11.00
Tall filler panels over 36" with overlays	BC@.535	Ea	—	22.00	22.00
Corner filler panels	BC@.224	Ea	—	9.20	9.20
Corner fillers panels with overlays	BC@.448	Ea	—	18.40	18.40
Angled corner filler panels	BC@.268	Ea	—	11.00	11.00
Angled corner filler panels with overlays	BC@.536	Ea	—	22.00	22.00
Moldings and trim for cabinet work					
Scribe molding, per 8' length	BC@.224	Ea	—	9.20	9.20
Scribe molding, per linear foot	BC@.028	LF	—	1.15	1.15
Crown molding, per 8' length, miter cut	BC@.448	Ea	—	18.40	18.40
Crown molding, per 8' length, butt joint	BC@.180	Ea	—	7.39	7.39
Crown plate and riser, per miter cut	BC@.180	Ea	—	7.39	7.39
Crown plate and riser, per straight cut	BC@.112	Ea	—	4.60	4.60
Applied molding, per miter cut	BC@.112	Ea	—	4.60	4.60
Applied molding, per straight cut	BC@.067	Ea	—	2.75	2.75
Light rail molding, per miter cut	BC@.224	Ea	—	9.20	9.20
Light rail molding, per straight cut	BC@.067	Ea	—	2.75	2.75
Furniture toe kick, per 8' length	BC@.334	Ea	—	13.70	13.70
Furniture toe kick, per linear foot	BC@.042	LF	—	1.72	1.72
Valance, straight, per 8' length	BC@.334	Ea	—	13.70	13.70
Valance, with side returns or cap, 8' length	BC@.667	Ea	—	27.40	27.40
Mantle or hood molding, length to 8'	BC@.800	Ea	—	32.80	32.80
Corbels, plain	BC@.224	Ea	—	9.20	9.20
Corbels, on uprights	BC@.334	Ea	—	13.70	13.70
Enkeboll molding, miter cut, 8' length	BC@.667	Ea	—	27.40	27.40
Enkeboll molding, straight cut, 8' length	BC@.180	Ea	—	7.39	7.39
Posts, to 8' length	BC@.500	Ea	—	20.50	20.50
Pilasters	BC@.334	Ea	—	13.70	13.70
Cabinet feet, per cabinet	BC@.334	Ea	—	13.70	13.70
Cabinet extras					
Scribing in wood tops	BC@.133	LF	—	5.46	5.46
Job built 2 x 4 support wall to 42" high	BC@.334	LF	—	13.70	13.70
Framing for range support or sink cutout	BC@.667	Ea	—	27.40	27.40

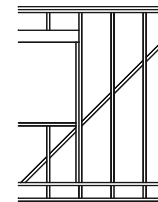
## Carpentry

**Craft@Hrs Unit Material Labor Total**

**Carpentry** See also carpentry items in other sections: Carpentry Steel Framing, Cabinets, Ceilings, Closet Door Systems, Countertops, Cupolas, Doors, Entrances, Flooring, Framing Connectors, Hardboard, Hardware, Lumber, Molding, Paneling, Shutters, Siding, Skylights, Soffits, Stairs, Thresholds, and Weatherstripping.

**Carpentry Rule of Thumb** Typical rough carpentry (framing) cost per square foot of floor in living area. These figures will apply on many residential jobs where joists, studs and rafters are 16" on center. Unconventional designs and complex framing plans will cost more. See detailed cost breakdowns in the next section.

Using framing lumber at	—	MBF	916.00	—	916.00
Using 1/2" OSB sheathing at	—	MSF	879.00	—	879.00
Using 7/16" OSB sheathing at	—	MSF	674.00	—	674.00
Using 5/8" OSB sheathing at	—	MSF	881.00	—	881.00
Using 1/2" RTD sheathing at	—	MSF	871.00	—	871.00
Using 5/8" RTD sheathing at	—	MSF	925.00	—	925.00
Single story, conventional foundation	B1@.237	SF	7.54	8.81	16.35
Single story, concrete slab foundation	B1@.180	SF	5.04	6.69	11.73
First of two floors, conventional foundation	B1@.203	SF	5.75	7.55	13.3
First of two floors, concrete slab foundation	B1@.146	SF	3.25	5.43	8.68
Second floor of a two-story residence	B1@.191	SF	6.05	7.10	13.15
Add for plywood sheathing	—	%	3.7	—	—



### Framing a single story residence, conventional crawl-space foundation

Sills, pier blocks, floor beams (145 BF per 1,000 SF)	B1@.018	SF	.13	.67	.80
Floor joists, doublers, blocking, bridging (1,480 BF per 1,000 SF)	B1@.028	SF	1.36	1.04	2.40
Subflooring, 5/8" OSB (1,150 SF per 1,000 SF)	B1@.011	SF	1.01	.41	1.42
Layout, studs, sole plates, top plates, header and end joists, backing, blocking, bracing and framing for openings (2,250 BF per 1,000 SF)	B1@.093	SF	2.06	3.46	5.52
Ceiling joists, header and end joists, backing, blocking and bracing (1,060 BF per 1,000 SF)	B1@.045	SF	.97	1.67	2.64
Rafters, braces, collar beams, ridge boards, 2" x 8" rafters 16" OC, (1,340 BF per 1000 SF)	B1@.032	SF	1.23	1.19	2.42
Roof sheathing, 7/16" OSB (1,150 SF per 1,000 SF)	B1@.010	SF	.78	.37	1.15
<b>Total framing, single story, conventional foundation</b>	<b>B1@.237</b>	<b>SF</b>	<b>7.54</b>	<b>8.81</b>	<b>16.35</b>
Add for plywood sheathing	—	%	3.7	—	—

### Framing a single story residence, concrete slab foundation

Layout, sole plates, anchors, studs, top plates, header and end joists, backing, blocking, bracing and framing for openings (2,250 BF per 1,000 SF)	B1@.093	SF	2.06	3.46	5.52
Ceiling joists, header and end joists, backing, blocking and bracing (1,060 BF per 1,000 SF)	B1@.045	SF	.97	1.67	2.64
Rafters, braces, collar beams, ridge boards, 2" x 8" rafters 16" OC, (1,340 BF per 1,000 SF)	B1@.032	SF	1.23	1.19	2.42
Roof sheathing, 7/16" OSB (1,150 SF per 1,000 SF)	B1@.010	SF	.78	.37	1.15
<b>Total framing, single story, concrete slab foundation</b>	<b>B1@.180</b>	<b>SF</b>	<b>5.04</b>	<b>6.69</b>	<b>11.73</b>
Add for plywood sheathing	—	%	4.5	—	—

## Carpentry, Assemblies

	Craft@Hrs	Unit	Material	Labor	Total
<b>Framing the first of two floors, conventional crawl-space foundation</b>					
Sills, pier blocks, floor beams (145 BF per 1,000 SF)	B1@.018	SF	.13	.67	.80
Floor joists, doublers, blocking, bridging (1,480 BF per 1,000 SF)	B1@.028	SF	1.36	1.04	2.40
Subflooring, 5/8" OSB (1,150 SF per 1,000 SF)	B1@.011	SF	1.01	.41	1.42
Layout, studs, sole plates, top plates, header and end joists, backing, blocking, bracing and framing for openings (2,250 BF per 1,000 SF)	B1@.093	SF	2.06	3.46	5.52
Rough stairway, 15 risers and landing (96 BF of dimension lumber and 128 SF of plywood per 1,000 SF)	B1@.008	SF	.22	.30	.52
Ceiling joists, header and end joists, backing, blocking and bracing (1,060 BF per 1,000 SF)	B1@.045	SF	.97	1.67	2.64
<b>Total framing, 1st of 2 floors, crawl-space foundation</b>	<b>B1@.203</b>	<b>SF</b>	<b>5.75</b>	<b>7.55</b>	<b>13.30</b>
Add for plywood sheathing	—	%	0.9	—	—
<b>Framing the first of two floors, concrete slab foundation</b>					
Layout, sole plates, anchors, studs, top plates, header and end joists, backing, blocking, bracing and framing for openings (2,250 BF per 1,000 SF)	B1@.093	SF	2.06	3.46	5.52
Rough stairway, 15 risers and landing (96 BF of dimension lumber and 128 SF of plywood per 1,000 SF)	B1@.008	SF	.22	.30	.52
Ceiling joists, header and end joists, backing, blocking and bracing (1,060 BF per 1,000 SF)	B1@.045	SF	.97	1.67	2.64
<b>Total framing, first of two floors, concrete foundation</b>	<b>B1@.146</b>	<b>SF</b>	<b>3.25</b>	<b>5.43</b>	<b>8.68</b>
<b>Framing the second story of a residence</b>					
Subflooring, 5/8" OSB (1,150 SF per 1,000 SF)	B1@.011	SF	1.01	.41	1.42
Layout, studs, sole plates, top plates, header and end joists, backing, blocking, bracing and framing for openings (2,250 BF per 1,000 SF)	B1@.093	SF	2.06	3.46	5.52
Ceiling joists, header and end joists, backing, blocking and bracing (1,060 BF per 1,000 SF)	B1@.045	SF	.97	1.67	2.64
Rafters, braces, collar beams, ridge boards, 2" x 8" rafters 16" OC (1,340 BF per 1,000 SF)	B1@.032	SF	1.23	1.19	2.42
Roof sheathing, 7/16" OSB (1,150 SF per 1,000 SF)	B1@.010	SF	.78	.37	1.15
<b>Total framing, second floor of a two-story residence</b>	<b>B1@.191</b>	<b>SF</b>	<b>6.05</b>	<b>7.10</b>	<b>13.15</b>
Add for plywood sheathing	—	%	4.6	—	—
<b>Floor Assemblies</b> Costs for wood framed floor joists with subflooring and R-19 insulation. These costs include the floor joists, subflooring as described, blocking, nails and 6-1/4" thick R-1.9 fiberglass insulation between the floor joists. Figures include box or band joists and typical double joists. No beams included. Planked subflooring is based on 1.24 BF per square foot of floor. Costs shown are per square foot of area covered and include normal waste. Deduct for openings over 25 SF.					
Using framing lumber at	—	MBF	916.00	—	916.00
Using 5/8" RTD plywood subfloor at	—	MSF	925.00	—	925.00
Using 3/4" RTD plywood subfloor at	—	MSF	1,050.00	—	1,050.00
Using 7/16" OSB subfloor at	—	MSF	674.00	—	674.00
Using 5/8" OSB subfloor at	—	MSF	881.00	—	881.00
Using 3/4" OSB T&G subfloor at	—	MSF	1,050.00	—	1,050.00

## Carpentry, Assemblies

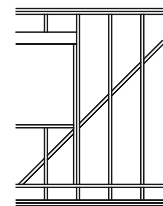
	Craft@Hrs	Unit	Material	Labor	Total
Floor joists 16" OC, R-19 insulation and OSB subflooring					
7/16" OSB subfloor					
2" x 6" joists	B1@.040	SF	3.09	1.49	4.58
2" x 8" joists	B1@.041	SF	3.33	1.52	4.85
2" x 10" joists	B1@.043	SF	3.92	1.60	5.52
2" x 12" joists	B1@.044	SF	5.08	1.64	6.72
Floor joists 16" OC, R-19 insulation and OSB subflooring					
5/8" OSB subfloor					
2" x 6" joists	B1@.040	SF	3.30	1.49	4.79
2" x 8" joists	B1@.041	SF	3.53	1.52	5.05
2" x 10" joists	B1@.043	SF	4.12	1.60	5.72
2" x 12" joists	B1@.044	SF	5.29	1.64	6.93
3/4" OSB subfloor					
2" x 6" joists	B1@.042	SF	3.46	1.56	5.02
2" x 8" joists	B1@.043	SF	3.70	1.60	5.30
2" x 10" joists	B1@.045	SF	4.29	1.67	5.96
2" x 12" joists	B1@.046	SF	5.45	1.71	7.16
Floor joists 16" OC, R-19 insulation and plywood subflooring					
5/8" plywood subfloor					
2" x 6" joists	B1@.040	SF	3.29	1.49	4.78
2" x 8" joists	B1@.041	SF	3.53	1.52	5.05
2" x 10" joists	B1@.043	SF	4.12	1.60	5.72
2" x 12" joists	B1@.044	SF	5.28	1.64	6.92
3/4" plywood subfloor					
2" x 6" joists	B1@.042	SF	3.46	1.56	5.02
2" x 8" joists	B1@.043	SF	3.70	1.60	5.30
2" x 10" joists	B1@.045	SF	4.29	1.67	5.96
2" x 12" joists	B1@.046	SF	5.45	1.71	7.16
For different type insulation					
Fiberglass batts					
10" thick R-30, add	—	SF	.44	—	.44
12" thick R-38, add	—	SF	.92	—	.92

**Wall Assemblies** Costs for wood framed stud walls with wall finish treatment on both sides. These costs include wall studs at 16" center to center, double top plates, single bottom plates, fire blocking, nails and wall finish treatment as described. No headers or posts included. All lumber is Std & Btr. 2" x 4" walls have 1.12 BF per SF of wall and 2" x 6" walls have 1.68 BF per SF of wall. Costs shown are per SF or LF of wall measured on one face and include normal waste.

Using 2 x 4 lumber at	—	MBF	874.00	—	874.00
Using 2 x 6 lumber at	—	MBF	906.00	—	906.00
Using 1/2" gypsum wallboard at	—	SF	.51	—	.51
Using 5/8" gypsum wallboard at	—	SF	.54	—	.54

### Interior wall assemblies

2" x 4" stud walls with 1/2" gypsum drywall both sides, ready for painting					
Cost per square foot of wall	B1@.064	SF	1.76	2.38	4.14
Cost per running foot, for 8' high walls	B1@.512	LF	14.10	19.00	33.10
2" x 4" stud walls with 1/2" gypsum drywall one side, ready for painting					
Cost per square foot of wall	B1@.046	SF	1.25	1.71	2.96
Cost per running foot, for 8' high walls	B1@.368	LF	9.98	13.70	23.68
2" x 4" stud walls with 5/8" gypsum fire rated drywall both sides, ready for painting					
Cost per square foot of wall	B1@.068	SF	1.81	2.53	4.34
Cost per running foot, for 8' high walls	B1@.544	LF	14.50	20.20	34.70



## Carpentry, Assemblies

	Craft@Hrs	Unit	Material	Labor	Total
2" x 4" stud walls with 5/8" gypsum fire rated drywall one side, ready for painting					
Cost per square foot of wall	B1@.048	SF	1.27	1.79	3.06
Cost per running foot, for 8' high walls	B1@.384	LF	10.20	14.30	24.50
2" x 6" stud walls with 1/2" gypsum drywall both sides, ready for painting					
Cost per square foot of wall	B1@.072	SF	2.19	2.68	4.87
Cost per running foot, for 8' high walls	B1@.576	LF	17.50	21.40	38.90
2" x 6" stud walls with 1/2" gypsum drywall one side, ready for painting					
Cost per square foot of wall	B1@.054	SF	1.68	2.01	3.69
Cost per running foot, for 8' high walls	B1@.432	LF	13.40	16.10	29.50
2" x 6" stud walls with 5/8" gypsum fire rated drywall both sides, ready for painting					
Cost per square foot of wall	B1@.076	SF	2.24	2.83	5.07
Cost per running foot, for 8' high walls	B1@.608	LF	17.90	22.60	40.50
2" x 6" stud walls with 5/8" gypsum fire rated drywall one side, ready for painting					
Cost per square foot of wall	B1@.056	SF	1.70	2.08	3.78
Cost per running foot, for 8' high walls	B1@.448	LF	13.60	16.70	30.30
<b>Exterior wall assemblies</b>					
2" x 4" stud walls with drywall interior, wood siding exterior, 1/2" gypsum drywall inside face ready for painting, over 3-1/2" R-13 insulation with 5/8" thick rough sawn T-1-11 exterior grade plywood siding on the outside face.					
Using 5/8" rough sawn T-1-11 siding at	—	MSF	1,420.00	—	1,420.00
Cost per square foot of wall	B1@.068	SF	3.13	2.53	5.66
Cost per running foot, for 8' high walls	B1@.544	LF	25.00	20.20	45.20
2" x 6" stud walls with drywall interior, wood siding exterior, same construction as above, except with 6-1/4" R-19 insulation					
Cost per square foot of wall	B1@.077	SF	4.14	2.86	7.00
Cost per running foot, for 8' high walls	B1@.616	LF	33.10	22.90	56.00
2" x 4" stud walls with drywall interior, 1/2" gypsum drywall on inside face ready for painting, over 3-1/2" R-11 insulation with 1" x 6" southern yellow pine drop siding, D grade, 1.19 BF per SF at 5-1/4" exposure on the outside face.					
Using D grade yellow pine drop siding at	—	MSF	3,810.00	—	3,810.00
Cost per square foot of wall	B1@.074	SF	5.52	2.75	8.27
Cost per running foot, for 8' high wall	B1@.592	LF	44.20	22.00	66.20
2" x 6" stud walls with drywall interior, 1" x 6" drop siding exterior, same construction as above, except with 6-1/4" R-19 insulation					
Cost per square foot of wall	B1@.083	SF	6.53	3.09	9.62
Cost per running foot, for 8' high wall	B1@.664	LF	52.30	24.70	77.00
2" x 4" stud walls with drywall interior, stucco exterior, 1/2" gypsum drywall on inside face ready for painting, over 3-1/2" R-11 insulation and a three-coat exterior plaster (stucco) finish with integral color on the outside face					
Cost per square foot of wall	B1@.050	SF	5.42	1.86	7.28
Cost per running foot, for 8' high wall	B1@.400	LF	43.30	14.90	58.20
2" x 6" stud walls with drywall interior, stucco exterior, same construction as above, except with 6-1/4" R-19 insulation					
Cost per square foot of wall	B1@.059	SF	6.43	2.19	8.62
Cost per running foot, for 8' high wall	B1@.472	LF	51.50	17.60	69.10
Add for different type gypsum board					
1/2" or 5/8" moisture resistant greenboard					
Cost per SF, greenboard per side, add	—	SF	.14	—	.14
1/2" or 5/8" moisture resistant greenboard					
Cost per running foot per side 8' high	—	LF	1.09	—	1.09
5/8" thick fire rated type X gypsum drywall					
Cost per SF, per side, add	—	SF	.12	—	.12
5/8" thick fire rated type X gypsum drywall					
Cost per running foot per side 8' high	—	LF	1.00	—	1.00

## Carpentry, Assemblies

Craft@Hrs Unit Material Labor Total

**Ceiling Assemblies** Costs for wood framed ceiling joists with ceiling finish and fiberglass insulation, based on performing the work at the construction site. These costs include the ceiling joists, ceiling finish as described, blocking, nails and 3-1/2" thick R-13 fiberglass insulation batts between the ceiling joists. Figures in parentheses indicate board feet per square foot of ceiling framing including end joists and typical header joists. No beams included. Ceiling joists and blocking are based on standard and better grade lumber. Costs shown are per square foot of area covered and include normal waste. Deduct for openings over 25 SF.

Ceiling joists with 5/8" regular gypsum drywall taped and sanded smooth finish, ready for paint					
Using 2" x 4" at	—	MBF	874.00	—	874.00
Using 2" x 6" at	—	MBF	906.00	—	906.00
Using 2" x 8" at	—	MBF	797.00	—	797.00
2" x 4" ceiling joists at 16" on center (.59 BF per SF), with insulation and 1/2" gypsum drywall	B1@.053	SF	1.80	1.97	3.77
2" x 6" ceiling joists at 16" on center (.88 BF per SF), with insulation and 1/2" gypsum drywall	B1@.055	SF	2.24	2.05	4.29
2" x 8" ceiling joists at 16" on center (1.17 BF per SF), with insulation and 1/2" gypsum drywall	B1@.057	SF	2.46	2.12	4.58
For spray applied plaster finish (sometimes called "popcorn" or "cottage cheese" texture)					
Add for ceiling texture	DT@.011	SF	.04	.45	.49
For different type gypsum drywall with taped and sanded smooth finish, ready for paint					
5/8" moisture resistant greenboard, add	—	SF	.10	—	.10
5/8" ultralight, add	—	SF	.01	—	.01
5/8" fire rated "C", add	—	SF	.04	—	.04
For different ceiling joist center to center dimensions					
2" x 4" ceiling joists					
12" on center, add	B1@.004	SF	.17	.15	.32
20" on center, deduct	—	SF	-.10	-.07	-.17
24" on center, deduct	—	SF	-.15	-.11	-.26
2" x 6" ceiling joists					
12" on center, add	B1@.006	SF	.24	.22	.46
20" on center, deduct	—	SF	-.14	-.07	-.21
24" on center, deduct	—	SF	-.23	-.11	-.34
2" x 8" ceiling joists					
12" on center, add	B1@.006	SF	.29	.22	.51
20" on center, deduct	—	SF	-.17	-.07	-.24
24" on center, deduct	—	SF	-.26	-.11	-.37
For different type insulation					
Fiberglass batts					
6-1/4" thick R-19, add	—	SF	.29	—	.29
10" thick R-30, add	—	SF	.73	—	.73
Blown-in fiberglass, subcontract					
8" thick R-19, add	—	SF	—	—	.55

**Roofing Assemblies** Costs for wood framed roof assemblies with roof finish material as shown based on performing the work at the construction site. Costs shown include all material and labor required above the top plate or ledger on the supporting walls. These costs assume the supporting wall structure is in-place and suitable for the assembly described.

## Carpentry, Assemblies

	Craft@Hrs	Unit	Material	Labor	Total
<b>Flat roof assembly</b> Based on using 2" x 12" joists Std & Btr grade at 16" on center including blocking, ripped strips and normal waste. The roof surface is built-up 3 ply asphalt consisting of 2 plies of 15 lb. felt hot mopped with a 90 lb. mineral-coated cap sheet.					
Using 2" x 12" joists at	—	MBF	1,110.00	—	1,110.00
Using 2" x 8" joists at	—	MBF	797.00	—	797.00
Using 1/2" RTD plywood at	—	MSF	871.00	—	871.00
Using 7/16" OSB at	—	MSF	674.00	—	674.00
Flat roof assembly as described above					
Framing, with plywood sheathing	B1@5.00	Sq	358.00	186.00	544.00
Framing, with OSB sheathing	B1@5.00	Sq	338.00	186.00	524.00
Built-up roofing, 3-ply and gravel	R1@2.15	Sq	141.00	84.80	225.80

**Conventionally framed roof assemblies** Based on straight gable type roof (no hips, valleys, or dormers) with 6" in 12" rise or less. Cost per 100 square feet of plan area under the roof, not actual roof surface area. Framing includes 2" x 8" common rafters Std & Btr grade at 24" on center. Cost includes blocking, ridge and normal bracing. Roof sheathing is either 7/16" OSB (oriented strand board) or 1/2" RTD plywood.

Conventionally framed roof assembly. Select roof finish from below

Framing, with plywood sheathing	B1@4.10	Sq	183.00	152.00	335.00
Framing, with OSB sheathing	B1@4.10	Sq	163.00	152.00	315.00
Add for built-up 3-ply finish roofing	R1@1.25	Sq	123.00	49.30	172.30
Add for composition shingle (Class C) roofing	R1@1.83	Sq	473.00	72.20	545.20
Add for asphalt shingle (Class A) roofing	R1@1.83	Sq	197.00	72.20	269.20
Framing, with no sheathing	B1@2.80	Sq	92.00	104.00	196.00
Add for 26 gauge steel roofing	R1@2.70	Sq	274.00	107.00	381.00
Add for gable studs					
2" x 4" spaced 16" OC (.54 BF per SF)	B1@.023	SF	.47	.86	1.33
Add for purlins (purling), Std & Btr, installed below roof rafters. Figures in parentheses indicate board feet per LF including 5% waste					
Using 2" x 8" joists at	—	MBF	797.00	—	797.00
2" x 8" (1.40 BF per LF)	B1@.023	LF	1.12	.86	1.98

**Piecework, Rough Carpentry** Rough carpentry on residential tracts is usually done by framing subcontractors who bid at piecework rates (such as per square foot of floor). The figures below list typical piecework rates for repetitive framing work and assume all materials are supplied to the framing subcontractor. No figures appear in the Craft@Hrs column because the work is done for a fixed price per square foot and the labor productivity can be expected to vary widely.

**Layout and plating** Piecework rates

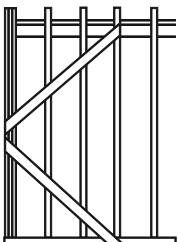
Lay out wall plates according to the plans (snap chalk lines for wall plates, mark location for studs, windows, doors and framing details), cut top and bottom plates and install bottom plates. Costs per square foot of floor (excluding garage).

Custom or more complex jobs	—	SF	—	.30	.30
Larger job, longer runs	—	SF	—	.20	.20

**Wall framing** Piecework rates

Measure, cut, fit, assemble, and tip up walls, including studs, plates, cripples, let-in braces, trimmers and blocking. Costs per square foot of floor.

Complex job, radius walls, rake walls	—	SF	—	.81	.81
Larger job, 8' high walls, fewer partitions	—	SF	—	.30	.30





## Carpentry, Piecework

Craft@Hrs    Unit    Material    Labor    Total

### Plumb and align framed walls Piecework rates

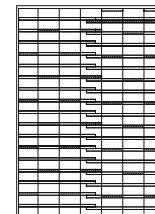
Force walls into alignment. Adjust walls to vertical and install temporary wood braces as needed. Bracing plates includes shooting powder driven fasteners through wall plates. Based on accuracy to 3/16". Includes re-checking plumb and alignment when framing is done. Costs per square foot of floor.

Small or complex job, brace walls and plates	—	SF	—	.26	.26
Larger job, fewer braces, walls only	—	SF	—	.15	.15
Sheathed walls, squared before lifting	—	SF	—	.09	.09

### Floor joists or ceiling joists Piecework rates

Lay out, cut and install floor or ceiling joists, including rim joists, doubled joists, straps, joist hangers, blocking at 8' OC and ceiling backing for drywall. Based on larger jobs with simple joist layouts set 16" OC and pre-cut blocking supplied by the general contractor. Add the cost of floor beams, if required. Costs per square foot of horizontal joist area. More complex jobs with shorter runs may cost 50% more.

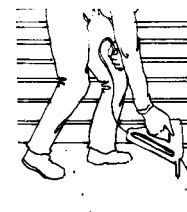
2" x 8" ceiling or floor joists	—	SF	—	.23	.23
2" x 10" ceiling or floor joists	—	SF	—	.26	.26
2" x 12" ceiling or floor joists	—	SF	—	.29	.29
2" x 14" ceiling or floor joists	—	SF	—	.33	.33
Add for 12" OC spacing	—	SF	—	.10	.10
Deduct for 20" OC spacing	—	SF	—	-.03	-.03
Deduct for 24" OC spacing	—	SF	—	-.07	-.07



### Floor sheathing Piecework rates

Lay out, cut, fit and install 5/8" or 3/4" tongue and groove plywood floor sheathing, including blocking as required. Based on nailing done with a pneumatic nailer and nails supplied by the general contractor. Costs per square foot of sheathing installed

Smaller, cut-up job	—	SF	—	.26	.26
Larger job, longer runs	—	SF	—	.20	.20
Add for 1-1/8" sheathing	—	SF	—	.09	.09



### Stair framing Piecework rates

Lay out, cut, fit and install straight, "U"- or "L"-shaped 30" to 36" wide stairs made from plywood and 2" x 12" stringers set 16" OC. These costs include blocking in the adjacent stud wall and a 1" skirt board. Costs per 7-1/2" riser. Framing more complex stairs may cost up to \$500 per flight.

Small job, short runs	—	Ea	—	19.10	19.10
Larger job, longer runs	—	Ea	—	14.40	14.40
Add per 3' x 3' landing, including supports	—	Ea	—	49.20	49.20
Add for larger landings, including supports	—	Ea	—	122.00	122.00

### Shear panels Piecework rates

Lay out, cut, fit and install structural 3/8" or 1/2" OSB or plywood wall panels. These figures assume shear studs were set correctly by others and that panel nails are driven at 4" OC with a pneumatic nailer. Not including hold-down straps, posts, shear blocking or extra studs. Costs per 4' x 9' panel installed.

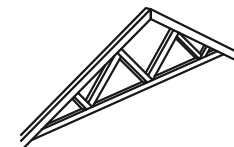
Small job, many openings, 2nd floor	—	Ea	—	13.20	13.20
Larger job, few openings, 1st floor	—	Ea	—	8.13	8.13

### Roof trusses Piecework rates

Setting and nailing engineered gable and hip roof trusses 24" OC on prepared wall plates. These figures assume that lifting equipment is provided by the general contractor and that the truss supplier provides a fill package, spreader blocks for each plate and the ridge and jack rafters (if required). Includes installation of ceiling backing where required and catwalks at the bottom chord. Costs per square foot of plan area under the truss.

Small job assumes multiple California fill between roof surfaces and understacking

Small job, rake fill above a partition wall	—	SF	—	.71	.71
Larger job, little or no fill or understacking	—	SF	—	.40	.40



As-built drawings.....	126	Auditorium		Barrier posts.....	452	rough-in.....	531
Ash		acoustic design fees.....	134	Barrier tapes.....	318	seat.....	25
drop.....	151	seating.....	474	Barrier, egress.....	487	walk-in.....	246
dumps.....	151	Auger holes		Bars		whirlpool tub.....	245
flooring.....	155	caissons.....	608	bath accessories.....	24	Battens, lumber.....	222
urns.....	473	post holes.....	617	masonry.....	346, 372	Batterboards.....	189
Ash wood flooring.....	155, 158	Augers		reinforcing steel.....	89, 346	Batts, insulation.....	181, 397
Ashtrey.....	473	rental.....	327	welding.....	348	Bay vent channel.....	292
Asphalt		toilet, rental.....	328	Base		Bay window.....	299
access road.....	610	Auto hoist.....	450	asphalt.....	243	roof cover.....	304
built-up roofing.....	256	Automatic gates.....	165	ceramic tile.....	290, 374, 428	Bead	
coatings.....	256	Awning		column.....	387	lath.....	426
cold milling.....	611	roll-up.....	21	course, paving.....	243	lath & plaster.....	188
curb.....	610	Awning windows		floor.....	154	molding.....	223, 226
dampproofing.....	397	aluminum.....	302	hardwood.....	222	Beadex.....	169
emulsion.....	381	vinyl-clad wood.....	300	marble.....	381	Beam clamps, piping.....	517
felt.....	27, 401	Awnings.....	21	MDF.....	226	Beams	
milling.....	611	canopy-type.....	472	post.....	162	applied.....	54
mix.....	82	commercial.....	471	resilient flooring.....	154	carpentry.....	390
paper.....	258	fabric.....	21	screed.....	188, 426	ceiling.....	45
parking lot.....	610	lean-to type.....	471	sheet, fiberglass.....	257, 258	clamps, conduit.....	554
paving.....	243, 609	motorized.....	471	slab.....	94	collar.....	48
paving, demolition.....	102			Base wages		concrete.....	339, 345
primer.....	466			industrial & commercial.....	309	formwork.....	339, 345
recycling.....	332			residential.....	10	grade.....	93
repair.....	611	<b>B</b>		Baseball backstops.....	618	laminated timbers.....	396
roll sheathing.....	27	Baby changing stations.....	447	Baseboard.....	55	log.....	193
roof coating.....	237	Backbar.....	457	bamboo.....	157	lumber.....	201
roofing.....	257	Backboard, plywood.....	460	MDF.....	226	LVL.....	396
sawing.....	371	Backer board		Baseboard heating		precast.....	359
sheathing.....	182	gypsum drywall.....	168	electric.....	536	ridge.....	193
slurry seal.....	611	tile.....	290	radiation.....	537	shoring.....	345
speed bumps.....	610	Backer rod.....	612	radiators.....	175	steel.....	383
tack coat.....	610	Backer strip, steel framing.....	70	Basement		steel collar.....	72
walks.....	615	Backfill		doors.....	23	Bearing capacity test.....	279
waterproofing.....	397	concrete excavation.....	339	stairs.....	281	Bearing ratio, soil testing.....	317
Asphalt cutters, rental.....	320	earthwork.....	136	storm window.....	304	Bed bumpers.....	444
Asphalt-fiberglass shingles.....	258	tilt-up.....	361	window.....	301	Bed molding.....	224, 226
Asphaltic concrete testing.....	315	trench.....	598, 619	Basic wage cost.....	3	Beds, concealed.....	25
Assemblies		Backflow		Basketweave fence.....	147	Beehive climber.....	467
brick wall.....	209, 373	preventers.....	522, 619, 627	Basswood blinds.....	296	Beehive grate.....	636
ceiling.....	36	valves.....	312	Bath accessories.....	445	Bell footings.....	609
floor.....	33	Backhoes		ceramic.....	288	Bell wire.....	105
floor slab.....	352	excavation.....	137, 599	ceramic tile.....	289	Bell wiring, electrical work.....	128
framing, door opening.....	43	rental.....	138, 322	compartments.....	442, 533	Bells	
framing, window openings.....	44, 67	trenching.....	597	enclosures.....	272	door.....	105
interior walls.....	34, 57	Backing		fans.....	142	fire alarm.....	591
plumbing.....	530, 532	carpentry.....	47	shower cabinets.....	533	Belt conveyors.....	491
ramps, landings,		clay tile.....	374	shower doors.....	271	Benches	
for handicapped.....	476	finish carpentry.....	51	vanities.....	290	athletic.....	466
roof.....	36	rods.....	411	Bath exhaust fan.....	139, 140	bus stop.....	479
roofing.....	37	steel framing.....	70	accessories.....	141	church.....	460
steel framing, door opening.....	66	Backsplashes.....	96	ceiling blower.....	139	locker room.....	474
steel framing, window opening.....	66	Backstops		Exhaust Air.....	140	park.....	474
wall.....	34, 57	basketball.....	464	Heat-A-Lamp.....	141	stadium.....	474
wall, brick.....	209, 373	Backstops, baseball.....	618	heater, ceiling.....	141	Benderboard.....	187
Astragal molding.....	108, 223, 413, 421	Balance beams.....	467	QuieTTest.....	140	Benefits, fringe.....	309
Astro dial time switch.....	564	Balancing valves.....	173, 539	switch.....	141	Bentonite	
Athletic		Ball cleaning sewer mains.....	630	timer switch.....	141	granules.....	355
benches.....	466	Ball valves.....	522	ValueTest.....	140	waterproofing.....	294
court, striping.....	467	Ballista range hood.....	254	vent kit.....	141	Bevel siding.....	199
court, surface prep.....	466	Balusters		with heater.....	141	Beveled glass doors.....	107
equipment.....	465	painting.....	240, 438	with heater, infrared.....	140	Beverage dispenser.....	458
equipment, swimming pools.....	475	stair.....	56	with light.....	140	Bicycle racks.....	475
field marker.....	218	Bamboo		Bath fixtures.....	531, 533	Bidets.....	247
fields.....	465	baseboard.....	157	Bathroom		Bi-fold doors.....	124, 125
gym equipment.....	464	flooring.....	157	accessories.....	23	hardware.....	125
ATM machine.....	453	stair nose.....	158	cabinets.....	290	mirrored.....	125
Attachments, crane, rental.....	322	threshold.....	158	fan wiring.....	128	Bike post bollard.....	475
Attic		Band molding.....	222	fans.....	139, 140, 141	Bin, trash.....	332
access doors.....	266	Band saws, rental.....	328	sinks.....	247, 533	Birch	
fans.....	128	Bank equipment.....	452	vanities.....	290	doors.....	115, 116
fans, belt drive.....	141	Bar		wallboard.....	168	paneling.....	242
gable vents.....	142	doors.....	118	Baths, steam.....	285	plywood.....	203
stairs, folding.....	284	sinks.....	247	Bathtubs.....	245, 531, 533	Bird screen.....	406
vents.....	291	Barbed wire fence.....	144	ADA compliant.....	246	Birdstop.....	262
Audio		Barracks, manufactured.....	480	caulk.....	78	Bitumen adhesive, modified.....	258
detectors.....	264	Barricade		doors.....	271	Bituminous	
sensors.....	589	highway.....	615	enameled cast iron.....	245	paving.....	243, 611
Audio-visual equipment,		lights.....	22	enameled steel.....	245	paving, removal.....	332
school.....	458	rental.....	22	fiberglass.....	245	roofing.....	256, 401
		roadway.....	22	recessed.....	245		
		temporary enclosures.....	331				

Black steel pipe.....	494	Bonds, insurance.....	185	Bricklayer, wage		Bus schedule, display panel....	480
Blanket insulation.....	183	Bookcases, painting.....	241	industrial & commercial.....	309	Bus stop	
Blasting		Boomlifts, rental.....	324	residential.....	10	enclosures.....	479
excavation.....	595	Boring		Bricklayer's helper, wage		shelters.....	479
sand.....	371	caissons.....	608	residential.....	10	Bushings	
water.....	239, 263, 333, 371, 437	soil testing.....	279	Bridge, pedestrian.....	487	ABS.....	516
Bleachers.....	464, 474	under walkways.....	619	Bridging		conduit.....	543
Blinds		Bottom plates, carpentry.....	37	carpentry.....	41	Business overhead.....	208
aluminum.....	296	Bottom track, steel framing.....	73	I-Joist.....	160	Butacite.....	482
cellular.....	297	Bow windows.....	304	joist.....	159, 390	Butt hinges.....	420
PVC.....	296	Box nails.....	227	steel floor joists.....	62	Button board.....	187
roll-up.....	296	Boxes		tension.....	159	Button switches.....	565
Venetian.....	296	electrical.....	561	Broan Manufacturing... 140, 141, 255		Buttweld joints, welding.....	389
vertical.....	296	junction.....	563	Broiler, food.....	455	Butyl roof coating.....	402
Block		outlet.....	128, 561	Bronze fabrications.....	388	Butyl roofing.....	401
adobe.....	216	pull.....	562	Broom finish, concrete.....	95, 356	BX cable.....	560
concrete.....	213, 378	switch.....	128	Brown coat plaster.....	244, 427	Bypass doors.....	123
core fill.....	213, 378	valve.....	619	Brush		accessories.....	124
demolition.....	335	Braces		chippers, rental.....	327	beveled mirror.....	123
detailed concrete.....	213, 378	tilt-up.....	363	cutters, rental.....	327	mirrored.....	123, 124
filler, acrylic.....	237	trench, rental.....	323	hogs, rental.....	327		
flooring.....	158	wall.....	164	removal.....	137, 594		
glass building.....	217	Bracing		Brush finish, concrete.....	95		
masonry.....	213, 378	bulkheads.....	605	Brush painting.....	436		
painting.....	240, 438	carpentry.....	44, 390	Bucket truck			
pier.....	39	steel framing.....	67	rental.....	324	Cabinets	
sawing.....	370	temporary.....	44, 67	clamshell, rental.....	322	bath.....	220, 290, 446
walls, concrete.....	213	trenches.....	605	Buckets, rental.....	321	classroom.....	473
Block filler, painting.....	438	trenches, rental.....	323	Buggies, rental.....	321	cleaning.....	83
Blocking		Brads, nails.....	229	Builder's adhesive.....	17	custom.....	472
carpentry.....	389	Braille signage.....	442	Builder's hardware.....	421	end panels.....	31
finish carpentry.....	51	elevator.....	479	rough carpentry.....	159	extinguisher.....	493
fireblocks.....	45	Branch circuits.....	573	Building		finish carpentry.....	473
sheathing.....	392	Brass		appraisal.....	18	fire hose.....	493
steel floor joists.....	62	fabrications.....	388	blocks, concrete filled.....	87	hardware.....	420, 472
Blockout forms		railing.....	386	board.....	293, 398	hospital.....	473
cast-in-place slabs.....	341	storm.....	114	columns.....	186	installation.....	55
tilt-up.....	361	Bread slicer.....	456	demolition.....	103, 334	kitchen.....	29
Blockouts, concrete.....	342	Breaker		hardware.....	421	labor cost.....	31
Blood storage refrigerators.....	469	bond.....	355	moving.....	338	laboratory.....	473
Blowers		circuit.....	128	paper.....	27, 28	lavatory.....	290
exhaust hood.....	455	form.....	355	permit fees.....	28	lighting fixtures.....	191, 221
fans.....	142	panels.....	571, 572	posts, steel.....	186	linen, shelving.....	270
fireplace.....	152	paving, rental.....	320	sewer.....	266	medicine.....	220, 290, 446
heating.....	535	vacuum.....	312, 618	stone, testing.....	316	metal.....	472
Blow-in insulation.....	183, 398	Breaking, demolition.....	104, 334	wiring.....	127	painting.....	241
Blue Board insulation.....	181	Brewer, coffee.....	458	Building laborer, wage		shelving.....	270
Bluegrass seeding.....	624	Brick		industrial & commercial.....	309	shop.....	472
Blueprinting.....	25	acid-proof.....	375	residential.....	10	shower.....	533
Board		artificial.....	243	Building layout.....	595	storage.....	473
insulation.....	181	chemical-resistant.....	375	Buildings		utility.....	30, 31
marker.....	440	cleaning.....	371	steel engineered.....	483	vanity.....	290
sheathing.....	50, 51	Colonial.....	209	temporary, rental.....	330	wardrobe.....	458, 472, 473
Boards		commercial.....	210	Built-in ovens.....	255	wood.....	473
forming.....	88	common.....	374	Built-up girders		Cable	
lumber.....	194, 196-198	cutting.....	370	carpentry.....	40	antenna.....	130
sheathing.....	62	demolition.....	100	steel.....	383	armored.....	560
treatment.....	206	face brick.....	374	steel framing.....	61	BX.....	560
Board-up		firebrick.....	212	Built-up roofing.....	256, 401	Cat 5.....	593
window.....	274	flooring.....	220	cement, Cold-App.....	258	Cat 5e.....	593
Bobcats, rental.....	323	jumbo.....	210	demolition.....	102	Cat 6.....	593
Boilermaker, wage.....	309	manhole.....	637	cement, Cold-App.....	258	coaxial.....	592
Boilers.....	578	masonry.....	209, 374	demolition.....	102	communication.....	591
expansion tank.....	173	mini.....	211	Bulb, light.....	192	computer network.....	593
foundations.....	366	mission.....	212	Bulkhead forms.....	340, 342	electrical.....	561
modules.....	578	modular.....	209, 210	Bulkheads, shoring.....	605	Ethernet.....	593
Bollards		mold flashing.....	268	Bulldozers		fiber optic.....	592
bicycle.....	475	molding.....	108, 222	excavation.....	137	flexible armored.....	560
cast iron.....	616	mortar.....	209	rental.....	138	ice melting.....	561
granite.....	616	Norman.....	209, 210	Bullet resistant glass.....	422	metal-clad.....	560
Bolt cutters, rental.....	328	Padre.....	210	Bulletin boards.....	441	network.....	130, 459, 460
Bolts		painting.....	240	Bullnose		phone.....	591
anchor.....	59	paving.....	215, 243, 382, 612	drywall.....	169	power.....	560
carriage.....	232	plate.....	382	paver.....	212	punch down.....	460
foundation.....	159	pointing.....	371	Bumper guards.....	444	RG Series.....	592
lag.....	232	sandblasting.....	263	Bumper threshold.....	285	RJ Series.....	592
machine.....	232	sawing.....	370	Bumpers		Romex.....	127, 542, 559
tilt-up.....	361	standard.....	209, 210	dock.....	365, 451	signal.....	592
Bond breaker.....	355	steps.....	382	highway.....	615	snow-melting.....	476, 561
tilt-up.....	363	testing.....	316	Bumps, speed.....	610, 617	tap.....	591
Bonding agents		vener.....	211	Bungalow fittings, ABS.....	514	testing, computer.....	594
adhesives.....	17, 18	walls.....	209, 373	Burlap soil stabilization.....	603	tray.....	557
flooring.....	154			Bus duct connection.....	571	twiaxial.....	593
roofing.....	256, 402					twisted pair.....	593

**C**

Cable Panel.....	130	vinyl-clad wood.....	300, 301	treatments.....	54	Charging station	
Cable testing.....	130, 460	Cases		Ceilings		electric vehicle.....	128
Cabs, elevator.....	133, 490	cabinets.....	29, 473	acoustical.....	429	check desks.....	452
Café doors.....	118	laboratory.....	473	drop.....	80	check valves.....	492, 519, 521
Caissons.....	608	painting.....	241	plywood.....	54	checkroom equipment.....	453
Calcimine removal.....	439	Cash box, service station.....	450	stained glass look.....	81	chemical fire protection.....	455
Calcium chloride.....	85, 350	Cash dispenser.....	453	suspended.....	79, 429	chemical-resistant brick.....	375
Calcium nitrate.....	623	Cashier booth, bulletproof.....	485	tin.....	82	Cherry	
California B.A.C.T.....	579	Casing		wood strip.....	54	paneling.....	242
California Code 2010.....	579, 581	aluminum siding.....	276	Cellar doors		parquet.....	158
California pavers.....	212	beads.....	188	steel.....	23	Chestnut flooring.....	155, 156
Cambria countertop.....	96	door.....	53, 108	Cellular blinds.....	297	Child protection seat.....	447
Campus network wiring.....	459	extruded polymer.....	226	Cellulose insulation.....	183	Chilled water pipe.....	494
Cane fiber joint.....	355	finish carpentry.....	52	Cement.....	82	Chimes, door.....	105
Canopy		hardwood.....	222	adhesive.....	17	wiring.....	128
commercial.....	471	MDF.....	226	cold process.....	258	Chimneys	
door.....	21	molding.....	223	coloring.....	85, 218, 356	anchors.....	151
door or window.....	21	nails.....	229	concrete.....	351	caps.....	291
food service hoods.....	455	window.....	54	cutting.....	370	firebrick.....	212
range hoods.....	253	Cast iron		duct, envelopes.....	541	fireplace.....	152
steel framing.....	387	column bases.....	387	lap roof.....	258	flashing.....	404
Canopy lights.....	587	fittings.....	626	painting.....	240	flues.....	152, 216, 374
Cant strips		flanged pipe.....	626	paring.....	382	masonry.....	220, 374
carpentry.....	50	ornamental iron.....	150	plaster.....	244	prefabricated.....	374
roofing.....	182, 403	pipe.....	626	roofing.....	256	Chippers	
Canvas tarpaulins.....	285	sections.....	387	testing.....	315	pneumatic, rental.....	320
Cap		valve box.....	627	tile.....	261	rental.....	327
conduit.....	544	valves, AWWA.....	627	white.....	82, 427, 433	Chisels, rental.....	320
door bottom.....	286	Cast-in-place, concrete.....	92	Cement and EPS forms.....	87	Chop saws, rental.....	328
sheet, roofing.....	257	Catch basins.....	635	Cement mason, wage		Church	
test.....	515	demolition.....	333	industrial & commercial.....	309	acoustical design fees.....	134
tile.....	374	entrance.....	474	residential.....	10	chairs.....	461
Capillary fill.....	339	gratings.....	387	Cementitious		equipment.....	460
Capital forms.....	343	Catwalks, carpentry.....	46	coating.....	369	glass.....	470
Caps		Caulk		decks.....	369	pews.....	461
ABS.....	516	acrylic latex.....	77	roofing system.....	403	Chutes	
black steel.....	494	fireproof.....	78	Central		demolition.....	337
copper.....	504	guns.....	79	air filter.....	176, 180	garbage.....	491
CPVC.....	507	sealants.....	77, 410	heating and cooling.....	174	linen.....	491
drain pipe.....	126	strip.....	79	Central vacuum systems.....	290	mail.....	447
flashing.....	403	Cautions lights.....	22	Ceramic tile.....	287, 427	trash.....	337
masonry.....	213, 216	Cautions tape.....	23	backer board.....	290	Cigarette disposal.....	473
molding.....	222	Cavity wall		demolition.....	101, 102, 336	Cinder rock.....	604
post.....	163	insulation.....	184	facing tile.....	374	Circline lighting.....	191
Cappuccino dispenser.....	458	reinforcing.....	372	fixtures.....	288	Circuit balancing	
Car charging station.....	128	C-clamps, pipe.....	517	installation.....	289	valves.....	173, 539
Carbon steel pipe.....	494	Cedar		mosaic.....	288	Circuit breakers	
Carborundum rub.....	95, 356	boards.....	79	vener.....	381	panels.....	575
Card reader		closet lining.....	79	Cesspools, septic tanks.....	265	wiring for.....	128
parking.....	450	fence.....	147, 148	CFL light bulb.....	192	Circuits	
security access.....	590	lumber.....	198	Chain hoists, rental.....	329	dryer.....	543
Carpenter, wage		paneling.....	242	Chain link fence.....	142, 617	exit light.....	542
industrial & commercial.....	309	plywood.....	203	demolition.....	333	light and power.....	542
residential.....	10	roofing.....	259	painting.....	437	motor.....	566
Carpentry		saunas.....	263	Chain railing.....	386	range.....	543
assemblies.....	37	shakes.....	259	Chain saws.....	139	receptacle.....	542
cabinets.....	29, 473	shingles.....	255	rental.....	328	switch.....	542
finish.....	51, 52, 421	siding.....	199	Chair rail.....	55, 223	under slab.....	542
furring.....	52	Cedarmill.....	274	MDF.....	226	Circular louver.....	292
industrial and commercial.....	389	Ceiling		Chairs		Circular windows.....	299
molding.....	226	access hatches.....	407	auditorium.....	474	City cost adjustments.....	12-15
piecework.....	37	adhesive.....	17	cathedral.....	461	Civil engineering fees.....	134
piecework rates.....	39, 74	assemblies, wood framed.....	36	reinforcing steel.....	90	Cladding, preformed.....	400
plates.....	390	beams.....	45	school.....	458	Clamps	
rough.....	46	beams, carpentry.....	390	Chalkboard.....	440	column forms.....	355
square foot costs.....	32	demolition.....	100	Chamfer		concrete, rental.....	322
wall sheathing.....	394	domes.....	79	corner forms.....	355	conduit.....	555
Carpet adhesive.....	18	fans.....	142	strip.....	355	ground rod.....	566
Carpet tile.....	434	fans, bath.....	139	Changes in costs.....	5	pipe.....	517, 518
Carpets		grid.....	429	Changing stations.....	447	PVC conduit.....	551
access flooring.....	433	joists.....	46, 68	Channel		riser.....	517
access flooring.....	434	joists, steel.....	68, 73	hanger.....	555	top beam.....	517
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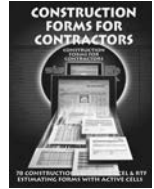
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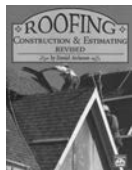
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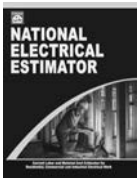
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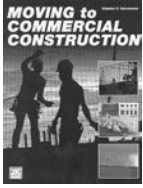
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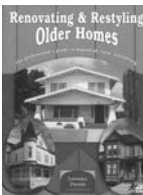
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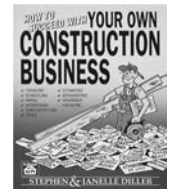
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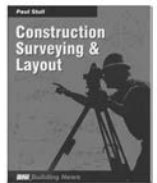
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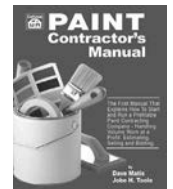
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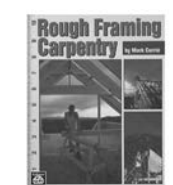
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