



2018 NATIONAL RENOVATION & INSURANCE REPAIR ESTIMATOR

edited by Jonathan Russell

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about this book

WHAT'S NEW IN 2018

New construction and remodeling markets are back on track and it's putting pressure on both labor and material costs. Throughout 2017, contractors were reporting delays receiving materials, especially framing lumber and OSB sheets, and many reported finding difficulty finding skilled labor. The surge in reconstruction activity in 2017 also pushed labor costs up in the specialized insurance repair market, and many employers are responding to that by reducing their share of the cost of health insurance or reducing or eliminating their contribution to a retirement program.

A TOOL

This book is a tool, and like all tools it can be misused. It is an excellent tool for the renovation and repair professional. It is not a substitute for experience, skill, and knowledge.

Prices in this book are based on research of actual jobs and successful estimates. They represent an average of the typical conditions. Estimators should compare the conditions described in this book with actual conditions on site and adjust the price accordingly.

UNIQUE TO RENOVATION AND REPAIR WORK

This book is compiled specifically for the unique problems and conditions found in renovation and repair work. It is not a new construction cost book.

Renovation and repair work involve completely different circumstances than those found in new construction.

For example, the renovation or repair professional must work around existing conditions including home contents, access problems, out-of-plumb or out-of-square buildings, outdated materials, existing conditions that violate current building codes.

New-construction professionals have the luxury of placing items in a logical order, but renovation, remodel, or repair professionals must deal with conditions as they find them.

This means that joists have to be replaced in an existing floor system, paint has to be applied in a room where stain-grade base and carpeting are already installed, structures may have to be braced, contents have to be moved or worked around and materials and installation techniques must be matched.

DETERMINING COSTS

All costs in this book are based on typical conditions and typical problems found when remodeling or repairing a structure.

This means a door takes 10 to 15 minutes longer to install than it would in the ideal circumstances found in new construction.

Stairs are more difficult to install around pre-existing walls, wall framing takes longer when walls are typically splicing into existing work, and so on.

Some prices in this book will very closely match prices used in new construction. Other prices will reflect the complex conditions found in renovation and repair and will be dramatically different.

For example, using this book's stair building prices to estimate stair work in a series of 150 tract homes will result in an estimate that is far too high.

THE ART OF ESTIMATING

Estimating is part art, part science. Estimators must consider many factors, including access, crew productivity, special techniques, special abilities, temperament of the owner, and how busy the company is.

A contractor who is desperate for work will estimate much lower than a contractor who is swamped with work.

All of these factors — and many other similar ones — cannot be included in this or any other price book. They are part of the art of estimating.

The science of estimating, which includes prices, typical techniques, and materials, is included in this book.

This book is designed to make the science of estimating easier, which allows you to spend much more time focusing on the art of estimating, where your skill is crucial to the success of your company.

GENERAL VS. SPECIFIC

It is important to note that the more specific the estimator is, the more accurate the final estimate will be.

For example, when an estimator calculates all electrical costs for a typical home using a square foot cost, it may not be as accurate as if the estimator priced each fixture, outlet, and appliance hook-up.

Since the square foot price is based on a typical installation, it will not be exact for a home that is atypical in any way — for example, one with special outdoor lighting or with an expensive crystal fixture in the entry.

The more specific the item, the more exact the prices. The more general an item, the more assumptions must be made.

To help ensure the accuracy of your estimates, we describe any assumptions made when determining general items.

For example, the Rough Carpentry chapter contains a square foot price for estimating 2" by 4" wall framing. To help you make sure that this price will work for you, we describe our assumptions: the stud centers, the number of openings, headers, corners, plates and so forth, that would typically be found in a wall.

rounding

This book rounds hourly wage rates and the material, labor, and equipment components of a unit price.

These prices are rounded to "three significant digits." This means that prices under three digits (including two to the right of the decimal) are not rounded. Prices four digits and larger are rounded to the third digit from the left.

For example:

.23 is not rounded
2.33 is not rounded
23.33 is rounded to 23.30
233.33 is rounded to 233.00
2,333.33 is rounded to 2,330.00
23,333.33 is rounded to 23,300.00

In most cases, the square foot price will apply, but you will always want to carefully consider items that are more general, and if needed, adjust them to fit the conditions.

In the case above, the estimator may want to use the square foot price for average fixtures, then add an allowance for the crystal fixture and the outdoor lighting.

TIME AND MATERIAL CHARTS

Almost all chapters include time and material charts at the end. These time and material charts are designed to show you the materials used, waste, labor rates, labor burden costs, and labor productivity.

When materials with a range of sizes appear, only the small and large size are usually listed.

When materials with a range of qualities appear, only the low and high prices are usually listed.

These charts are designed to give you accurate detail on the exact prices used. When prices change, this book does not become obsolete. Compare current prices with those used and factor accordingly.

MATERIAL COSTS

National average material costs are compiled from surveys of suppliers throughout the country.

Costs for some materials, such as clay tile, building stone and hardwood, will vary a great deal from region to region.

For example, clay tile plants are located near naturally occurring clay sources. Because clay tiles are heavy, the further the tiles have to be shipped, the more expensive the tiles will be. The user of this book must be aware of local price variations.

Materials commonly found in every city are priced based on local delivery. In most cases this will be delivery no greater than 20 miles away from a local source. However, many rural areas have lumber yards that will deliver to a wider area at no additional charge.

Materials that are not commonly available locally, like hand-carved moldings or historical wallpaper, include shipping costs anywhere in North America. Estimators in Hawaii, Alaska and remote areas of Canada should add for additional shipping costs when applicable.

Material waste is often indicated with the items, but it's always a good idea to check the time and material charts for the exact waste calculated for all the components of an item.

Waste indicates material that is discarded during installation. It does not include waste that occurs when materials are taken to storage and ruined, run over at the job site, spilled, improperly cut, or damaged due to mishandling.

These types of occurrences are kept to a minimum by every good contractor, but will still occur on any job site.

Another common waste issue in renovation and repair is when a contractor must buy a minimum quantity for a small repair. For example, to replace a six-inch section of base, it is necessary to buy a piece of base that is eight feet long or longer. In these cases, use the minimum price.

Material prices may not be listed with the time and material charts in some chapters. In these chapters, little new information would be provided by the materials chart so the space is saved for other information.

For example, a materials chart in the Appliance chapter will not provide an estimator with any new information.

The materials component of the unit price for an oven as listed in the main body of the chapter will tell the estimator how much the oven and connections cost.

Relisting these appliances in a materials chart wastes valuable space.

LABOR COSTS

Labor costs are national average rates that usually are consistent with union labor wages.

See the time and material charts for specific benefit costs and labor rates.

Crew labor rates are an average hourly rate for each member of the crew. For example, a masonry crew might consist of a mason, a mason's helper, and a hod carrier.

The hourly rate for this crew is the average cost of all three. In other words, the hourly rate is for 20 minutes work by the mason, 20 minutes work by the mason's helper, and 20 minutes work by the hod carrier.

Separation of labor in renovation and insurance repair work is much more difficult than is separation of labor on large commercial construction projects.

On a typical repair or renovation job a carpenter may participate in demolition, frame walls, set doors, set toilets, install electrical outlets and fixtures, and do a little painting.

In the jobs analyzed for this cost book, well over 40 percent of the demolition work was done by skilled workers. This is because demolition is often selective, requiring a skilled worker to ensure that additional damage does not occur.

Many renovation and repair companies are relatively small, so skilled workers participate in all phases of construction.

These realities are reflected in the labor costs used in this book. This means that a demolition laborer's hourly rate may seem higher than is normal for an unskilled worker.

The time and material charts show all items that are built into each labor rate.

Some contractors may not provide health insurance or retirement plans to some or all of their workers. Estimators can "back-out" these expenses from the labor costs.

It is critical that estimators examine the Workers' Compensation costs calculated in the wage rates. Some states have Workers' Compensation rates that are double, triple, or even quadruple the national average rates used in this book.

Workers' Compensation rates should be adjusted to match local conditions.

Labor productivity is based on observation of work performed in renovation and repair conditions.

These conditions differ from new construction in many ways, but a few of the most common are:

❶ difficulty matching existing work, ❷ access problems, ❸ materials that must be more carefully shaped and attached than is typical in new construction, ❹ out-of-plumb or out-of-square structures, ❺ reinforcing, ❻ more trips and effort are required to find materials, ❼ much more travel time is required because most jobs will have a relatively small amount of work in some trades, ❽ more vehicles are required by the renovation or repair contractor because many tradespeople are often traveling between jobs, compared to new construction where crews may spend weeks or months on one job, and because crews tend to be smaller and each crew may need a vehicle, ❾ more unexpected problems, ❿ more restrictions in established neighborhoods.

Labor productivity is based on a clean job site where tools are put away and secured at the end of each day.

Depending on the trade, 20 to 30 minutes per eight hours is allowed for clean-up and putting away tools. Normally, skilled workers spend half as much time cleaning up as do unskilled workers.

As is typical in new construction, labor includes unpacking materials, in some cases unloading materials from a truck on site, some travel to pick up minor materials (e.g. a forgotten tube of caulk, or a forgotten tool), typical breaks, lay-out, planning, discussion, coordination, mobilization (many companies meet at a central location each morning to receive instructions), recording hours (including specific information needed for job costing), occasional correction of mistakes in installation, and so forth.

Supervision is not included in these costs but should not generally be required. This is because each crew includes a skilled tradesperson who

normally would not require supervision beyond the normal dispatch and mobilization discussed previously.

EQUIPMENT COSTS

Equipment costs are included only when equipment will be used that is not typically a part of the tools used by the majority of renovation or repair contractors.

For example, each carpenter should have a worm-drive saw, miter box, compressor, nail guns, and so forth. These types of tools are not included in the equipment costs.

However, equipment like cranes, backhoes, concrete saws, and jack hammers are not assumed to be part of the equipment and tools owned by a typical renovation or repair contractor. When these are needed, equipment rates are included in the unit price.

Equipment costs include the typical cost to rent the equipment from a local equipment rental shop. When applicable, they also include fuel or blade costs.

Check each item to determine if it includes delivery to the job site or operator labor. Also be careful to note minimum costs for work where rented equipment is needed.

MARKUP

Prices in this book do not include markup. Insurance repair markup is almost always 20 percent: 10 percent for overhead and 10 percent for profit.

In renovation work on historical structures, markup may be as high as 30 percent, although markup over 20 percent may be "hidden" inside the unit cost. Typical remodeling work markup varies from 15 percent to 25 percent. The most common markup for all types of work is 20 percent.

THE COST LINES

The cost tables in each section of this manual consist of individual tasks or items followed by a description.

Beneath the description is a list of the items to be replaced or removed. For instance, under Appliances on page 17, you'll see Electric range, followed by a list of different ranges. Looking across, you'll see five columns of numbers and symbols. Let me explain how to read the numbers and symbols in those columns.

First let's look at the column headed Craft@Hrs. The Craft@Hrs column shows the recommended crew and manhours per unit for installation. For example, 2A in the Craft@Hrs column means that we recommend a crew of one appliance installer. The crew composition, with the cost per hour, is listed on page 12.

The manhours (following the @ symbol) is our estimate of the crew time required for installation (or demolition) of each unit. Manhours are listed in hundredths of an hour rather than minutes because it's easier to add, subtract, multiply and divide hundredths of a unit. For example, if the Craft@Hrs column shows 2A@.250, the Labor Cost column will show \$14.30. That's the labor cost per unit for a crew of one appliance installer at \$57.20 per hour multiplied by .250 manhours, rounded to the nearest penny. The unit is listed right after the Craft@Hrs, and may be the cost per square foot (sf), linear foot (lf), each (ea), or another unit of measurement.

The crew costs include the basic wage, taxable fringe benefits (vacation pay), Workers' Compensation insurance, liability insurance, taxes (state and federal unemployment, Social Security and Medicare), and typical nontaxable fringe benefits such as medical insurance and retirement. A breakdown of these expenses is included as a percentage in the footnote beneath the Labor table at the end of each section.

If your hourly crew cost is much lower or much higher, you can adjust your totals. For example, if your hourly labor cost is 25 percent less, reduce the labor figures in the cost tables by 25 percent to find your local cost.

The Material column shows your material cost for the item described under the heading.

The Total column is the sum of the Material and Labor cost columns.

CHARTS

Material charts show the material description, the material cost priced per typical unit purchased, the gross coverage, the typical waste, the net coverage after waste has been subtracted, and the resulting materials price including waste and often converted to a different unit of measure.

Equipment charts show the cost to rent equipment, the amount of work that can be done with the equipment per a period of time, and the resulting unit price.

Labor charts show the base wage, then add all additional costs that are based on wage. More information is always listed below this chart. It's important to note the "True" wage before adding labor related expenses. The true wage is the wage rate plus an allowance for vacation time. Since all the other costs must be paid even when an employee is on vacation, it is important that they become a component in the cost calculations when estimating work.

Labor productivity charts show the description of the work, the laborer or crew who will do the work, the average cost per man hour, the productivity and the resulting cost per unit.

REGIONAL DIFFERENCES

Construction techniques vary from region to region. Different cli-

mates and different local customs provide a variety of unique regional methods.

For example, in southern Florida it is common to build the first floor of a home from concrete block capped with a grade beam. This method won't be found in Colorado.

Similarly, coral stone walls won't be commonly found in Denver, although they are widely used in Miami.

Slate roofs are common on historical homes and newer custom homes in Philadelphia but are virtually nonexistent in Rapid City.

Homes in the south often include screened porches which aren't nearly so common in the west.

A Georgia home is much more likely to include a series of architecturally-correct columns with Corinthian capitals than is a home in Minnesota.

A Hawaii home may be built entirely from treated wood, when an Arizona home only uses treated lumber when it contacts dirt or concrete.

Many regional materials and techniques are priced in this book. Keep in mind that you should not use these prices if the item is not common to your area.

NATIONAL ESTIMATOR '18

The National Estimator program makes it easy to copy and paste these costs into an estimate, or bid, and then add whatever markup you select. Quarterly price updates on the Web are free and automatic all during 2018. You'll be

prompted when it's time to collect the next update. A connection to the Web is required.

To access the software download, follow the instructions printed on the certificate in the back of the book. The software will run on PCs using Windows XP, Vista, 7, 8, or 10 operating systems.

When you've installed the National Estimator program, click Help on the menu bar to see a list of topics that will get you up and running. Or, go online to www.craftsman-book.com, click on "Support," then "Tutorials" to view an interactive video for National Estimator.

If you have any problems using National Estimator, we'll be glad to help. Free telephone assistance is available from 8 a.m. until 5 p.m. Pacific time, Monday through Friday (except holidays). Call 760-438-7828.

WE WANT TO HEAR FROM YOU

If you have questions or concerns about this cost book, let us hear from you. Send letters to:

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abbreviations

ABSAcrylonitrile butadiene styrene	lflineal foot	SBSstyrene butyl styrene
acalternating current	lilineal inch	sfsquare foot
bfboard foot	mone thousand	shsheet
BtuBritish thermal units	mbf1,000 board feet	sisquare inch
CECCalifornia Earthquake Code	mBtu1,000 British thermal units	sq100 square feet
.....(also see page 56)	mhman hour	ststep
cfcubic foot	mimile	sysquare yard
cfmcubic foot per minute	mlf1,000 linear feet	t&gtongue-&-groove edge
cicubic inch	mmmillimeter(s)	TVtelevision
cycubic yard	momonth	UBCUniform Building Code
eaeach	mphmiles per hour	ULUnderwriters' Laboratory
FUTAFederal Unemployment	msf1,000 square feet	vlfvertical linear foot
.....Compensation Act tax	no.number	wkweek
galgallon	ocon center	w/with
GFCIground fault circuit interrupter	ozounce	xby or times
gphgallon(s) per hour	prpair	
gpmgallon(s) per minute	psipounds per square inch	SYMBOLS
hphorsepower	PVCpolyvinyl chloride	/ per
hr(s)hour(s)	qtquart	- through or to
IMCintermediate metal conduit	R/Lrandom length(s)	@ at
kdkiln dried	R/W/Lrandom widths and lengths	% percent
<b(kv)< b="">.....kilovolt(s)</b(kv)<>	RSCrigid steel conduit	\$ U.S. dollars
kva1,000 volt amps	S1S2Esurfaced 1 side, 2 edges	' feet
kwkilowatt(s)	S2Ssurfaced 2 sides	" inches
lb(s)pound(s)	S4Ssurfaced 4 sides	# pound or number

acknowledgements

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area modification factors

Construction costs are higher in some cities than in other cities. Use the factors on this and the following page to adapt the costs listed in this book to your job site. Increase or decrease your estimated total project cost by the percentage listed for the appropriate city in this table to find your estimated building cost.

These factors were compiled by comparing the actual construction cost of residential, institutional and commercial buildings in communities throughout the United States. Because these factors are based on completed project costs, they consider all construction cost variables, including labor, equipment and material cost, labor productivity, climate, job conditions and markup.

Use the factor for the nearest or most comparable city. If the city you need is not listed in the table, use the factor for the appropriate state. Note that these location factors 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 all estimated costs on a job, they should improve the accuracy of your estimates.

ALABAMA.....-4%	Pine Bluff.....-11%	Durango.....-1%	Pensacola.....-8%	ILLINOIS..... 4%
Aniston.....-8%	Russellville.....-4%	Fort Morgan.....-2%	Saint Augustine.....-2%	Arlington Heights.....14%
Auburn.....-4%	West Memphis.....-2%	Glenwood Springs.....4%	Saint Cloud.....-2%	Aurora.....14%
Bellamy.....5%		Grand Junction.....0%	St Petersburg.....-6%	Belleville.....0%
Birmingham.....2%	CALIFORNIA..... 7%	Greeley.....5%	Tallahassee.....-6%	Bloomington.....-1%
Dothan.....-6%	Alhambra.....8%	Longmont.....3%	Tampa.....-1%	Carbondale.....-4%
Evergreen.....-10%	Bakersfield.....2%	Pagosa Springs.....-4%	West Palm Beach.....-2%	Carol Stream.....14%
Gadsden.....-9%	El Centro.....0%	Pueblo.....0%		Centralia.....-3%
Huntsville.....-1%	Eureka.....-5%	Salida.....-6%	GEORGIA.....-4%	Champaign.....-2%
Jasper.....-8%	Fresno.....-2%		Albany.....-6%	Chicago.....15%
Mobile.....-2%	Herlong.....-3%	CONNECTICUT..... 8%	Athens.....-5%	Decatur.....-7%
Montgomery.....-2%	Inglewood.....9%	Bridgeport.....6%	Atlanta.....12%	Galesburg.....-4%
Scottsboro.....-4%	Irvine.....13%	Bristol.....12%	Augusta.....-2%	Granite City.....3%
Selma.....-5%	Lompoc.....3%	Fairfield.....9%	Buford.....-2%	Green River.....5%
Sheffield.....0%	Long Beach.....9%	Hartford.....11%	Calhoun.....-9%	Joliet.....13%
Tuscaloosa.....-4%	Los Angeles.....8%	New Haven.....7%	Columbus.....-3%	Kankakee.....-3%
	Marysville.....3%	Norwich.....3%	Dublin/Fort Valley.....-8%	Lawrenceville.....-6%
ALASKA..... 22%	Modesto.....1%	Stamford.....12%	Hinesville.....-6%	Oak Park.....18%
Anchorage.....27%	Mojave.....5%	Waterbury.....6%	Kings Bay.....-10%	Peoria.....6%
Fairbanks.....27%	Novato.....11%	West Hartford.....5%	Macon.....-4%	Peru.....2%
Juneau.....20%	Oakland.....17%		Marietta.....4%	Quincy.....16%
Ketchikan.....15%	Orange.....12%	DELAWARE..... 2%	Savannah.....-4%	Rockford.....3%
King Salmon.....23%	Oxnard.....2%	Dover.....-4%	Statesboro.....-11%	Springfield.....0%
	Pasadena.....9%	Newark.....6%	Valdosta.....-1%	Urbana.....-4%
	Rancho Cordova.....4%	Wilmington.....4%		
ARIZONA.....-4%	Redding.....-3%		HAWAII..... 20%	INDIANA.....-3%
Chambers.....-8%	Richmond.....17%	DISTRICT OF COLUMBIA	Aliamanu.....22%	Aurora.....-5%
Douglas.....-7%	Riverside.....4%	Washington.....12%	Ewa.....20%	Bloomington.....-2%
Flagstaff.....-7%	Sacramento.....3%		Halawa Heights.....20%	Columbus.....-4%
Kingman.....-5%	Salinas.....1%	FLORIDA.....-5%	Hilo.....20%	Elkhart.....-4%
Mesa.....3%	San Bernardino.....2%	Altamonte Springs.....-3%	Honolulu.....22%	Evansville.....4%
Phoenix.....3%	San Diego.....8%	Bradenton.....-6%	Kailua.....22%	Fort Wayne.....-1%
Prescott.....-6%	San Francisco.....27%	Brooksville.....-7%	Lualualei.....20%	Gary.....8%
Show Low.....-8%	San Jose.....17%	Daytona Beach.....-9%	Mililani Town.....20%	Indianapolis.....4%
Tucson.....-5%	San Mateo.....21%	Fort Lauderdale.....2%	Pearl City.....20%	Jasper.....-7%
Yuma.....2%	Santa Barbara.....7%	Fort Myers.....-6%	Wahiawa.....20%	Jeffersonville.....-6%
	Santa Rosa.....5%	Fort Pierce.....-10%	Waianae.....20%	Kokomo.....-8%
ARKANSAS.....-7%	Stockton.....4%	Gainesville.....-9%	Wailuku (Maui).....20%	Lafayette.....-5%
Batesville.....-9%	Sunnyvale.....20%	Jacksonville.....-2%		Muncie.....-8%
Camden.....-1%	Van Nuys.....8%	Lakeland.....-8%	IDAHO.....-9%	South Bend.....-2%
Fayetteville.....-4%	Whittier.....8%	Melbourne.....-8%	Boise.....-5%	Terre Haute.....-3%
Fort Smith.....-7%		Miami.....1%	Coeur d'Alene.....-10%	
Harrison.....-12%	COLORADO..... 1%	Naples.....-2%	Idaho Falls.....-9%	
Hope.....-8%	Aurora.....7%	Ocala.....-12%	Lewiston.....-11%	IOWA.....-3%
Hot Springs.....-13%	Boulder.....4%	Orlando.....1%	Meridian.....-9%	Burlington.....1%
Jonesboro.....-9%	Colorado Springs.....0%	Panama City.....-11%	Pocatello.....-10%	Carroll.....-11%
Little Rock.....-3%	Denver.....8%		Sun Valley.....-8%	Cedar Falls.....-4%

Cedar Rapids.....2%	MAINE.....-5%	Mankato.....-4%	North Platte.....-6%	Ithaca.....-5%
Cherokee.....1%	Auburn.....-4%	Minneapolis.....13%	Omaha.....0%	Jamaica.....14%
Council Bluffs.....-1%	Augusta.....-5%	Rochester.....-1%	Valentine.....-15%	Jamestown.....-7%
Creston.....1%	Bangor.....-6%	St Cloud.....2%	NEVADA.....1%	Kingston.....-4%
Davenport.....1%	Bath.....-6%	St Paul.....12%	Carson City.....-4%	Long Island.....30%
Decorah.....-8%	Brunswick.....-1%	Thief River Falls.....-2%	Elko.....9%	Montauk.....7%
Des Moines.....5%	Camden.....-10%	Willmar.....-6%	Ely.....-3%	New York (Manhattan)31%
Dubuque.....-4%	Cutler.....-7%	MISSISSIPPI.....-6%	Fallon.....0%	New York City.....31%
Fort Dodge.....-3%	Dexter.....-4%	Clarksdale.....-9%	Las Vegas.....3%	Newcomb.....0%
Mason City.....-3%	Northern Area.....-8%	Columbus.....0%	Reno.....-1%	Niagara Falls.....-6%
Ottumwa.....-6%	Portland.....2%	Greenville.....-14%	NEW HAMPSHIRE.....-1%	Plattsburgh.....-1%
Sheldon.....-7%	MARYLAND.....2%	Greenwood.....-10%	Charlestown.....-5%	Poughkeepsie.....1%
Shenandoah.....-14%	Annapolis.....8%	Gulfport.....-6%	Concord.....-3%	Queens.....17%
Sioux City.....5%	Baltimore.....7%	Jackson.....-3%	Dover.....1%	Rochester.....2%
Spencer.....-7%	Bethesda.....13%	Laurel.....-7%	Lebanon.....-3%	Rockaway.....10%
Waterloo.....-3%	Church Hill.....-4%	McComb.....-11%	Littleton.....-6%	Rome.....-4%
ANSAS.....-2%	Cumberland.....-8%	Meridian.....3%	Manchester.....2%	Staten Island.....8%
Colby.....-8%	Elkton.....-5%	Tupelo.....-7%	New Boston.....3%	Stewart.....-5%
Concordia.....-12%	Frederick.....7%	MISSOURI.....3%	NEW JERSEY.....9%	Syracuse.....2%
Dodge City.....-4%	Laurel.....8%	Cape Girardeau.....-5%	Atlantic City.....4%	Tonawanda.....-1%
Emporia.....8%	Salisbury.....-6%	Caruthersville.....-7%	Brick.....2%	Utica.....-6%
Fort Scott.....-6%	MASSACHUSETTS.....12%	Chillicothe.....-4%	Dover.....9%	Watertown.....-1%
Hays.....-13%	Ayer.....6%	Columbia.....-4%	Edison.....13%	West Point.....6%
Hutchinson.....-6%	Bedford.....15%	East Lynne.....4%	Hackensack.....10%	White Plains.....14%
Independence.....16%	Boston.....37%	Farmington.....8%	Monmouth.....12%	NORTH CAROLINA.....-4%
Kansas City.....5%	Brockton.....20%	Hannibal.....-2%	Newark.....11%	Asheville.....-7%
Liberal.....10%	Cape Cod.....4%	Independence.....5%	Passaic.....12%	Charlotte.....7%
Salina.....-7%	Chicopee.....7%	Jefferson City.....-5%	Paterson.....7%	Durham.....0%
Topeka.....-1%	Dedham.....8%	Joplin.....-6%	Princeton.....10%	Elizabeth City.....-8%
Wichita.....-4%	Fitchburg.....11%	Kansas City.....6%	Summit.....16%	Fayetteville.....-6%
KENTUCKY.....-4%	Hingham.....19%	Kirksville.....-15%	Trenton.....7%	Goldsboro.....0%
Ashland.....-4%	Lawrence.....14%	Knob Noster.....3%	NEW MEXICO.....-8%	Greensboro.....-3%
Bowling Green.....-5%	Nantucket.....9%	Lebanon.....-12%	Alamogordo.....-11%	Hickory.....-8%
Campton.....-11%	New Bedford.....6%	Poplar Bluff.....-10%	Albuquerque.....-3%	Kinston.....-9%
Covington.....2%	Northfield.....2%	Saint Charles.....1%	Clovis.....-11%	Raleigh.....3%
Elizabethtown.....-10%	Pittsfield.....1%	Saint Joseph.....-1%	Farmington.....-1%	Rocky Mount.....-6%
Frankfort.....7%	Springfield.....8%	Springfield.....-8%	Fort Sumner.....-2%	Wilmington.....-6%
Hazard.....-10%	MICHIGAN.....1%	St Louis.....8%	Gallup.....-7%	Winston-Salem.....-5%
Hopkinsville.....-5%	Battle Creek.....-1%	MONTANA.....-3%	Holman.....-10%	NORTH DAKOTA.....4%
Lexington.....1%	Detroit.....7%	Billings.....-2%	Las Cruces.....-8%	Bismarck.....3%
London.....-7%	Flint.....-4%	Butte.....-3%	Santa Fe.....-8%	Dickinson.....15%
Louisville.....2%	Grand Rapids.....1%	Fairview.....12%	Socorro.....-14%	Fargo.....0%
Owensboro.....-4%	Grayling.....-7%	Great Falls.....-6%	Truth or Consequences.....-8%	Grand Forks.....-1%
Paducah.....0%	Jackson.....-1%	Havre.....-9%	Tucumcari.....-8%	Jamestown.....-4%
Pikeville.....-8%	Lansing.....0%	Helena.....-2%	NEW YORK.....6%	Minot.....9%
Somerset.....-11%	Marquette.....3%	Kalispell.....-6%	Albany.....7%	Nekoma.....-10%
White Plains.....-4%	Pontiac.....12%	Miles City.....-7%	Amityville.....9%	Williston.....21%
LOUISIANA.....2%	Royal Oak.....7%	Missoula.....-6%	Batavia.....1%	OHIO.....-1%
Alexandria.....5%	Saginaw.....-5%	NEBRASKA.....-8%	Binghamton.....-2%	Akron.....1%
Baton Rouge.....10%	Traverse City.....-2%	Alliance.....-10%	Bronx.....10%	Canton.....-3%
Houma.....4%	MINNESOTA.....-1%	Columbus.....-7%	Brooklyn.....7%	Chillicothe.....-2%
Lafayette.....9%	Bemidji.....-6%	Grand Island.....-8%	Buffalo.....1%	Cincinnati.....3%
Lake Charles.....14%	Brainerd.....-3%	Hastings.....-9%	Elmira.....-3%	Cleveland.....3%
Mandeville.....-3%	Duluth.....2%	Lincoln.....-4%	Flushing.....15%	Columbus.....5%
Minden.....-5%	Fergus Falls.....-10%	McCook.....-9%	Garden City.....15%	Dayton.....1%
Monroe.....-8%	Magnolia.....-8%	Norfolk.....-10%	Hicksville.....14%	Lima.....-5%
New Orleans.....2%				Marietta.....-5%
Shreveport.....-4%				Marion.....-6%

Newark.....3%	Punxsutawney.....-3%	Austin.....13%	Lynchburg.....-9%	Powell.....-3%
Sandusky.....-3%	Reading.....2%	Bay City.....41%	Norfolk.....-2%	Rawlins.....8%
Steubenville.....1%	Scranton.....1%	Beaumont.....20%	Petersburg.....-3%	Riverton.....-6%
Toledo.....7%	Somerset.....-9%	Brownwood.....-8%	Radford.....-9%	Rock Springs.....1%
Warren.....-5%	Southeastern.....8%	Bryan.....10%	Reston.....7%	Sheridan.....-3%
Youngstown.....-3%	Uniontown.....-6%	Childress.....-14%	Richmond.....2%	Wheatland.....-3%
Zanesville.....-1%	Valley Forge.....11%	Corpus Christi.....19%	Roanoke.....-9%	
OKLAHOMA.....-5%	Warminster.....11%	Dallas.....6%	Staunton.....-7%	CANADIAN AREA MODIFIERS
Adams.....-10%	Warrendale.....5%	Del Rio.....0%	Tazewell.....-6%	These figures assume an
Ardmore.....-1%	Washington.....8%	El Paso.....1%	Virginia Beach.....-3%	exchange rate of \$1.00 Canadian
Clinton.....-3%	Wilkes Barre.....-1%	Fort Worth.....2%	Williamsburg.....-3%	to \$0.76 U.S.
Durant.....-11%	Williamsport.....-2%	Galveston.....25%	Winchester.....4%	
Enid.....-4%	York.....-1%	Giddings.....-1%		ALBERTA AVERAGE... 13%
Lawton.....-8%	RHODE ISLAND..... 5%	Greenville.....3%	WASHINGTON..... 0%	Calgary.....14%
McAlester.....-7%	Bristol.....5%	Houston.....28%	Clarkston.....-8%	Edmonton.....14%
Muskogee.....-8%	Coventry.....5%	Huntsville.....28%	Everett.....2%	Fort McMurray.....12%
Norman.....-4%	Cranston.....6%	Longview.....1%	Olympia.....-2%	
Oklahoma City.....-3%	Davisville.....5%	Lubbock.....-7%	Pasco.....1%	BRITISH COLUMBIA
Ponca City.....-1%	Narragansett.....5%	Lufkin.....9%	Seattle.....11%	AVERAGE..... 7%
Poteau.....-7%	Newport.....5%	McAllen.....-5%	Spokane.....-3%	Fraser Valley.....6%
Pryor.....-6%	Providence.....6%	Midland.....10%	Tacoma.....2%	Okanagan.....6%
Shawnee.....-8%	Warwick.....5%	Palestine.....2%	Vancouver.....3%	Vancouver.....9%
Tulsa.....0%		Plano.....7%	Wenatchee.....-6%	
Woodward.....5%	SOUTH CAROLINA..... -1%	San Angelo.....-6%	Yakima.....-5%	MANITOBA AVERAGE... 0%
OREGON.....-3%	Aiken.....4%	San Antonio.....9%		North Manitoba.....0%
Adrian.....-12%	Beaufort.....-2%	Texarkana.....-8%	WEST VIRGINIA.....-5%	Selkirk.....0%
Bend.....-5%	Charleston.....-1%	Tyler.....-7%	Beckley.....-5%	South Manitoba.....0%
Eugene.....-3%	Columbia.....-2%	Victoria.....14%	Bluefield.....0%	Winnipeg.....0%
Grants Pass.....-5%	Greenville.....8%	Waco.....-3%	Charleston.....4%	
Klamath Falls.....-8%	Myrtle Beach.....8%	Wichita Falls.....-9%	Clarksburg.....-7%	NEW BRUNSWICK
Pendleton.....-3%	Rock Hill.....-6%	Woodson.....-3%	Fairmont.....-11%	AVERAGE.....-13%
Portland.....10%	Spartanburg.....-3%	UTAH.....-3%	Huntington.....-4%	Moncton.....-13%
Salem.....-2%	SOUTH DAKOTA..... -6%	Clearfield.....0%	Lewisburg.....-14%	
PENNSYLVANIA.....-1%	Aberdeen.....-7%	Green River.....-3%	Martinsburg.....-5%	NEWFOUNDLAND/
Allentown.....3%	Mitchell.....-6%	Ogden.....-9%	Morgantown.....-4%	LABRADOR AVERAGE...-3%
Altoona.....-8%	Mobridge.....-9%	Provo.....-6%	New Martinsville.....-9%	
Beaver Springs.....-5%	Pierre.....-10%	Salt Lake City.....1%	Parkersburg.....1%	NOVA SCOTIA
Bethlehem.....4%	Rapid City.....-8%	VERMONT.....-5%	Romney.....-7%	AVERAGE.....-8%
Bradford.....-8%	Sioux Falls.....-1%	Albany.....-7%	Sugar Grove.....-8%	Amherst.....-8%
Butler.....-2%	Watertown.....-4%	Battleboro.....-4%	Wheeling.....5%	Nova Scotia.....-7%
Chambersburg.....-7%	TENNESSEE.....-2%	Beecher Falls.....-8%		Sydney.....-8%
Clearfield.....-3%	Chattanooga.....2%	Bennington.....-6%	WISCONSIN..... 0%	
DuBois.....-10%	Clarksville.....1%	Burlington.....3%	Amery.....-1%	ONTARIO AVERAGE.... 7%
East Stroudsburg.....-5%	Cleveland.....-1%	Montpelier.....-4%	Beloit.....5%	London.....7%
Erie.....-6%	Columbia.....-7%	Rutland.....-7%	Clam Lake.....-8%	Thunder Bay.....6%
Genesee.....-4%	Cookeville.....-8%	Springfield.....-6%	Eau Claire.....-2%	Toronto.....7%
Greensburg.....-4%	Jackson.....-2%	White River Junction.....-5%	Green Bay.....3%	
Harrisburg.....3%	Kingsport.....-5%	VIRGINIA.....-4%	La Crosse.....0%	QUEBEC AVERAGE.....-1%
Hazleton.....-3%	Knoxville.....-2%	Abingdon.....-9%	Ladysmith.....-2%	Montreal.....-1%
Johnstown.....-9%	McKenzie.....-8%	Alexandria.....10%	Madison.....8%	Quebec City.....-1%
Kittanning.....-6%	Memphis.....1%	Charlottesville.....-6%	Milwaukee.....6%	
Lancaster.....-1%	Nashville.....2%	Chesapeake.....-4%	Oshkosh.....4%	SASKATCHEWAN
Meadville.....-9%	TEXAS..... 5%	Culpeper.....-5%	Portage.....0%	AVERAGE..... 4%
Montrose.....-4%	Abilene.....-2%	Farmville.....-12%	Prairie du Chien.....-7%	La Ronge.....3%
New Castle.....-3%	Amarillo.....-2%	Fredericksburg.....-5%	Wausau.....-3%	Prince Albert.....2%
Philadelphia.....11%	Arlington.....1%	Galax.....-10%	WYOMING.....-1%	Saskatoon.....5%
Pittsburgh.....6%		Harrisonburg.....-6%	Casper.....1%	
Pottsville.....-8%			Cheyenne/Laramie.....-2%	
			Gillette.....3%	

crews

CRAFT CODE	AVG. COST /HR	CREW COMPOSITION	CRAFT CODE	AVG. COST /HR	CREW COMPOSITION
1A	\$49.50.....	acoustic ceiling installer	1I	\$45.20.....	insulation installer
2A	\$56.10.....	appliance installer	2I	\$52.30.....	cabinet installer
3A	\$67.00.....	appliance refinisher			laborer
4A	\$58.20.....	awning installer	3I	\$60.00.....	flooring installer
5A	\$44.00.....	awning installer's helper	4I	\$45.10.....	flooring installer's helper
6A	\$51.10.....	awning installer awning installer's helper	5I	\$52.60.....	flooring installer flooring installer's helper
1B	\$35.90.....	cleaning laborer	6I	\$62.50.....	paneling installer
2B	\$79.00.....	post & beam carpenter	7I	\$46.80.....	paneling installer's helper
3B	\$56.30.....	post & beam carpenter's helper	2L	\$41.80.....	cabinet installer's helper
4B	\$67.70.....	post & beam carpenter post & beam carpenter's helper	3L	\$38.60.....	masking & moving laborer
1C	\$62.70.....	carpenter	1M	\$64.80.....	mason
5C	\$46.80.....	carpenter's helper	2M	\$59.50.....	mason's helper
6C	\$54.80.....	carpenter carpenter's helper	3M	\$46.10.....	hod carrier
1D	\$42.70.....	demolition laborer	4M	\$56.80.....	mason mason's helper hod carrier / laborer
2D	\$49.50.....	drywall hanger drywall hanger's helper	5M	\$62.20.....	mason's helper
3D	\$56.30.....	drywall hanger	6M	\$105.00.....	stone carver
4D	\$42.60.....	drywall hanger's helper	7M	\$45.40.....	mobile home repair specialist
5D	\$56.80.....	drywall taper	10	\$81.70.....	equipment operator
6D	\$51.90.....	drywall hanger drywall hanger's helper drywall taper	20	\$58.40.....	concrete saw operator
5E	\$40.80.....	excavation laborer	4P	\$58.20.....	plasterer
6E	\$61.30.....	excavation laborer equipment operator	5P	\$52.50.....	plasterer's helper
7E	\$67.40.....	electrician	6P	\$55.40.....	plasterer plasterer's helper
8E	\$50.40.....	electrician's helper	7P	\$72.20.....	plumber
9E	\$58.90.....	electrician electrician's helper	8P	\$54.70.....	paneling installer paneling installer's helper
1F	\$59.20.....	concrete form installer	9P	\$55.30.....	plumber's helper
2F	\$43.30.....	concrete laborer	3R	\$61.40.....	retaining wall installer
3F	\$51.30.....	concrete form installer concrete laborer	4R	\$73.10.....	roofer
4F	\$54.80.....	carpenter (fence installer) carpenter's helper	5R	\$61.90.....	roofer's helper
5F	\$60.40.....	painter	6R	\$67.50.....	roofer roofer's helper
6F	\$59.10.....	concrete finisher	1S	\$50.30.....	susp. ceiling installer susp. ceiling installer's helper
7F	\$49.00.....	concrete finisher's helper	2S	\$57.40.....	susp. ceiling installer
8F	\$54.10.....	concrete finisher concrete finisher's helper	3S	\$43.20.....	susp. ceiling installer's helper
9F	\$52.70.....	concrete form installer concrete laborer concrete finisher concrete finisher's helper	4S	\$61.60.....	siding installer
1G	\$82.60.....	compaction grouting specialist	5S	\$46.20.....	siding installer's helper
2G	\$63.00.....	compaction grouting specialist concrete laborer	6S	\$53.90.....	siding installer siding installer's helper
1H	\$53.10.....	hazardous materials laborer	7S	\$55.40.....	security system installer
2H	\$66.40.....	HVAC installer	8S	\$70.20.....	swimming pool installer
3H	\$48.70.....	wallpaper hanger	9S	\$53.10.....	water extractor
			1T	\$58.00.....	tile layer
			7Z	\$42.60.....	mildew remediation specialist
			8Z	\$26.70.....	mildew remediation assistant
			9Z	\$34.70.....	mildew remediation specialist mildew remediation assistant

Craft@Hrs Unit Material Labor Total

Acoustic Ceilings

Minimum charge.

for acoustic ceiling tile work	1A@1.25	ea	23.10	61.90	85.00
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1/2" on strips. 12" x 12" tiles stapled in place. Includes 12" x 12" ceiling tiles, staples, and installation labor. Does not include furring strips. Includes 3% waste.

1/2" ceiling tiles on furring strips					
replace, smooth face	1A@.025	sf	1.41	1.24	2.65
replace, fissured face	1A@.025	sf	1.80	1.24	3.04
replace, textured face	1A@.025	sf	2.09	1.24	3.33
replace, patterned face	1A@.025	sf	2.20	1.24	3.44
remove only	1D@.012	sf	—	.51	.51

1/2" on flat ceiling. 12" x 12" tiles glued in place. Includes 12" x 12" ceiling tiles, glue, and installation labor. Includes 3% waste.

1/2" ceiling tiles on flat ceiling					
replace, smooth face	1A@.029	sf	1.41	1.44	2.85
replace, fissured face	1A@.029	sf	1.80	1.44	3.24
replace, textured face	1A@.029	sf	2.09	1.44	3.53
replace, patterned face	1A@.029	sf	2.20	1.44	3.64
remove only	1D@.016	sf	—	.68	.68

5/8" on strips. 12" x 12" tiles stapled in place. Includes 12" x 12" ceiling tiles, staples, and installation labor. Does not include furring strips. Includes 3% waste.

5/8" ceiling tiles on furring strips					
replace, smooth face	1A@.025	sf	1.80	1.24	3.04
replace, fissured face	1A@.025	sf	2.09	1.24	3.33
replace, textured face	1A@.025	sf	2.32	1.24	3.56
replace, patterned face	1A@.025	sf	2.47	1.24	3.71
remove only	1D@.012	sf	—	.51	.51

5/8" on flat ceiling. 12" x 12" tiles glued in place. Includes 12" x 12" ceiling tiles, glue, and installation labor. Includes 3% waste.

5/8" ceiling tiles on flat ceiling					
replace, smooth face	1A@.029	sf	1.80	1.44	3.24
replace, fissured face	1A@.029	sf	2.09	1.44	3.53
replace, textured face	1A@.029	sf	2.32	1.44	3.76
replace, patterned face	1A@.029	sf	2.47	1.44	3.91
remove only	1D@.016	sf	—	.68	.68

3/4" on strips. 12" x 12" tiles stapled in place. Includes 12" x 12" ceiling tiles, staples, and installation labor. Does not include furring strips. Includes 3% waste.

3/4" ceiling tiles on furring strips					
replace, smooth face	1A@.025	sf	2.09	1.24	3.33
replace, fissured face	1A@.025	sf	2.32	1.24	3.56
replace, textured face	1A@.025	sf	2.41	1.24	3.65
replace, patterned face	1A@.025	sf	2.68	1.24	3.92
remove	1D@.012	sf	—	.51	.51

Craft@Hrs Unit Material Labor Total

3/4" on flat ceiling. 12" x 12" tiles glued in place. Includes 12" x 12" ceiling tiles, glue, and installation labor. Includes 3% waste.

3/4" ceiling tiles on flat ceiling					
replace, smooth face	1A@.029	sf	2.09	1.44	3.53
replace, fissured face	1A@.029	sf	2.32	1.44	3.76
replace, textured face	1A@.029	sf	2.41	1.44	3.85
replace, patterned face	1A@.029	sf	2.68	1.44	4.12
remove	1D@.016	sf	—	.68	.68

Additional costs for acoustical ceiling tile.

add for 3/4" tiles with fire rating	—	sf	.39	—	.39
add for aluminum-coated tiles	—	sf	.58	—	.58

Furring strips. Includes 1" x 2" furring strips, nails, construction adhesive as needed, and installation labor. Furring strips placed as fireblocking is included. Includes 4% waste.

replace 1" x 2" furring strips 12" on center	1A@.007	sf	.34	.35	.69
remove	1D@.009	sf	—	.38	.38

Repair loose ceiling tile.

repair loose acoustic tile	1A@.253	ea	.16	12.50	12.66
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Angled install for ceiling tile.

- add 24% for diagonal install
- add 31% for chevron install
- add 40% for herringbone install

Time & Material Charts (selected items)

Acoustic Ceiling Materials

1/2" thick acoustic tile (per 12" x 12" tile)					
smooth face, (\$1.17 each, 1 sf, 3% waste)	—	sf	1.20	—	1.20
fissured face, (\$1.58 each, 1 sf, 3% waste)	—	sf	1.63	—	1.63
textured face, (\$1.82 each, 1 sf, 3% waste)	—	sf	1.87	—	1.87
patterned face, (\$1.95 each, 1 sf, 3% waste)	—	sf	2.02	—	2.02
5/8" thick acoustic tile (per 12" x 12" tile)					
smooth face, (\$1.58 each, 1 sf, 3% waste)	—	sf	1.63	—	1.63
fissured face, (\$1.82 each, 1 sf, 3% waste)	—	sf	1.87	—	1.87
textured face, (\$2.10 each, 1 sf, 3% waste)	—	sf	2.16	—	2.16
patterned face, (\$2.20 each, 1 sf, 3% waste)	—	sf	2.26	—	2.26
3/4" thick acoustic tile (per 12" x 12" tile)					
smooth face, (\$1.82 each, 1 sf, 3% waste)	—	sf	1.87	—	1.87
fissured face, (\$2.10 each, 1 sf, 3% waste)	—	sf	2.16	—	2.16
textured face, (\$2.17 each, 1 sf, 3% waste)	—	sf	2.23	—	2.23
patterned face, (\$2.38 each, 1 sf, 3% waste)	—	sf	2.45	—	2.45

Acoustic Ceiling Labor

	base wage	paid leave	true wage	taxes & ins.	total
Laborer					
Acoustic ceiling installer	\$27.30	2.13	\$29.43	20.07	\$49.50
Demolition laborer	\$22.70	1.77	\$24.47	18.23	\$42.70

Paid Leave is calculated based on two weeks paid vacation, one week sick leave, and seven paid holidays. Employer's matching portion of **FICA** is 7.65 percent. **FUTA** (Federal Unemployment) is .8 percent. **Worker's compensation** for the acoustic ceiling trade was calculated using a national average of 12.50 percent. **Unemployment insurance** was calculated using a national average of 8 percent. **Health insurance** was calculated based on a projected national average for 2018 of \$1,248 per employee (and family when applicable) per month. Employer pays 80 percent for a per month cost of \$998 per employee. **Retirement** is based on a 401(k) retirement program with employer matching of 50 percent. Employee contributions to the 401(k) plan are an average of 6 percent of the true wage. **Liability insurance** is based on a national average of 15.0 percent.

	Craft@Hrs	Unit	Material	Labor	Total
Acoustic Ceiling Labor Productivity					
Repair of ceiling tile					
repair loose tile	1A@.253	ea	—	12.50	12.50
Installation of ceiling tile					
tiles on furring strips	1A@.025	sf	—	1.24	1.24
tiles on flat ceiling	1A@.029	sf	—	1.44	1.44
furring strips	1A@.007	sf	—	.35	.35

Appliances

Minimum charge for appliances.

for appliance work	2A@1.05	ea	17.90	58.90	76.80
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Gas cook top.

replace, standard grade		7P@1.99	ea	652.00	144.00	796.00
replace, high grade		7P@1.99	ea	859.00	144.00	1,003.00
replace, with grill / griddle		7P@1.99	ea	1,150.00	144.00	1,294.00
remove		1D@.615	ea	—	26.30	26.30
remove for work, then reinstall		7P@2.20	ea	5.16	159.00	164.16

Gas range, free standing.

replace, economy grade		7P@2.05	ea	684.00	148.00	832.00
replace, standard grade		7P@2.05	ea	917.00	148.00	1,065.00
replace, high grade		7P@2.05	ea	1,250.00	148.00	1,398.00
replace, with grill / griddle		7P@2.10	ea	1,680.00	152.00	1,832.00
remove		1D@.618	ea	—	26.40	26.40
remove for work, then reinstall		7P@2.80	ea	5.48	202.00	207.48

Space-saver gas range, free-standing.

replace, standard grade		7P@1.99	ea	891.00	144.00	1,035.00
replace, high grade		7P@1.99	ea	1,150.00	144.00	1,294.00
remove		1D@.618	ea	—	26.40	26.40
remove for work, then reinstall		7P@2.80	ea	5.48	202.00	207.48

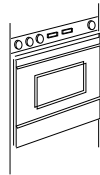
	Craft@Hrs	Unit	Material	Labor	Total
Gas range, free-standing with double oven.					
replace, standard grade	7P@2.05	ea	1,460.00	148.00	1,608.00
replace, high grade	7P@2.05	ea	1,730.00	148.00	1,878.00
replace, deluxe grade	7P@2.05	ea	2,060.00	148.00	2,208.00
remove	1D@.618	ea	—	26.40	26.40
remove for work, then reinstall	7P@2.80	ea	5.48	202.00	207.48

Restaurant-style gas range. Some common manufacturers are Viking, Thermador and Garland. Also, be aware of "mimicked" restaurant styles from prominent manufacturers of home kitchen ranges that sell from \$1,000 to \$2,500.

replace, standard grade	7P@2.88	ea	3,720.00	208.00	3,928.00
replace, high grade	7P@2.88	ea	8,150.00	208.00	8,358.00
replace, deluxe grade	7P@2.88	ea	12,900.00	208.00	13,108.00
remove	1D@1.58	ea	—	67.50	67.50
remove for work, then reinstall	7P@3.55	ea	7.76	256.00	263.76



Gas wall oven.					
replace, economy grade	7P@1.79	ea	670.00	129.00	799.00
replace, standard grade	7P@1.79	ea	874.00	129.00	1,003.00
replace, high grade	7P@1.79	ea	1,110.00	129.00	1,239.00
replace, deluxe grade	7P@1.79	ea	1,370.00	129.00	1,499.00
remove	1D@.630	ea	—	26.90	26.90
remove for work, then reinstall	7P@2.48	ea	6.47	179.00	185.47



Gas double wall oven.					
replace, economy grade	7P@2.22	ea	1,470.00	160.00	1,630.00
replace, standard grade	7P@2.22	ea	1,720.00	160.00	1,880.00
replace, high grade	7P@2.22	ea	2,170.00	160.00	2,330.00
replace, deluxe grade	7P@2.22	ea	2,690.00	160.00	2,850.00
remove	1D@.782	ea	—	33.40	33.40
remove for work, then reinstall	7P@2.70	ea	7.76	195.00	202.76

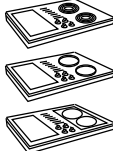
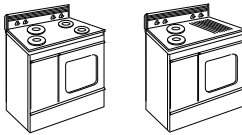
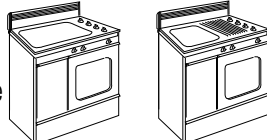


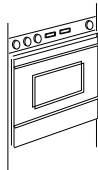
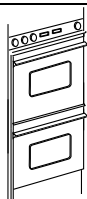
Electric cook top.					
replace, economy grade	7E@1.32	ea	352.00	89.00	441.00
replace, standard grade	7E@1.32	ea	516.00	89.00	605.00
replace, high grade	7E@1.32	ea	647.00	89.00	736.00
replace, cook top with grill / griddle	7E@1.32	ea	776.00	89.00	865.00
remove	1D@.612	ea	—	26.10	26.10
remove for work, then reinstall	7E@2.21	ea	2.57	149.00	151.57



Solid-disk electric cook top.					
replace, standard grade	7E@1.32	ea	813.00	89.00	902.00
replace, high grade	7E@1.32	ea	917.00	89.00	1,006.00
replace, with grill / griddle	7E@1.32	ea	993.00	89.00	1,082.00
remove	1D@.612	ea	—	26.10	26.10
remove for work, then reinstall	7E@2.21	ea	2.57	149.00	151.57



		Craft@Hrs	Unit	Material	Labor	Total
Flat-surface radiant electric cook top.						
replace, standard grade		7E@1.32	ea	981.00	89.00	1,070.00
replace, high grade		7E@1.32	ea	1,110.00	89.00	1,199.00
replace, cook top with grill / griddle		7E@1.32	ea	1,190.00	89.00	1,279.00
remove		1D@.612	ea	—	26.10	26.10
remove for work, then reinstall		7E@2.21	ea	2.57	149.00	151.57
Modular electric cook top.						
replace, two coil (Calrod) burners		7E@.287	ea	400.00	19.30	419.30
replace, two solid disk burners		7E@.287	ea	478.00	19.30	497.30
replace, two flat-surface radiant burners		7E@.287	ea	542.00	19.30	561.30
replace, griddle		7E@.287	ea	570.00	19.30	589.30
replace, grill		7E@.287	ea	607.00	19.30	626.30
replace, downdraft unit		7E@.287	ea	297.00	19.30	316.30
add for telescopic downdraft unit		—	ea	191.00	—	191.00
remove	1D@.215	ea	—	9.18	9.18	
Remove for work and reinstall.						
Modular cooking unit		7E@.344	ea	—	23.20	23.20
Modular downdraft unit		7E@.394	ea	2.62	26.60	29.22
Electric range, free-standing.						
replace, economy grade		2A@1.05	ea	492.00	58.90	550.90
replace, standard grade		2A@1.05	ea	707.00	58.90	765.90
replace, high grade		2A@1.05	ea	1,000.00	58.90	1,058.90
replace, deluxe grade		2A@1.05	ea	1,300.00	58.90	1,358.90
replace, cook top with grill / griddle		2A@1.05	ea	1,480.00	58.90	1,538.90
remove		1D@.505	ea	—	21.60	21.60
remove for work, then reinstall		2A@1.72	ea	5.16	96.50	101.66
Solid-disk electric range, free-standing.						
replace, standard grade		2A@1.05	ea	942.00	58.90	1,000.90
replace, high grade		2A@1.05	ea	1,050.00	58.90	1,108.90
replace, deluxe grade		2A@1.05	ea	1,240.00	58.90	1,298.90
replace, cook top with grill / griddle		2A@1.05	ea	1,540.00	58.90	1,598.90
remove		1D@.505	ea	—	21.60	21.60
remove for work, then reinstall		2A@1.72	ea	5.16	96.50	101.66
Flat-surface radiant electric range, free-standing.						
replace, standard grade		2A@1.05	ea	1,120.00	58.90	1,178.90
replace, high grade		2A@1.05	ea	1,240.00	58.90	1,298.90
replace, deluxe grade		2A@1.05	ea	1,540.00	58.90	1,598.90
replace, cook top with grill / griddle		2A@1.05	ea	2,330.00	58.90	2,388.90
remove		1D@.505	ea	—	21.60	21.60
remove for work, then reinstall		2A@1.72	ea	5.16	96.50	101.66

		Craft@Hrs	Unit	Material	Labor	Total
Drop-in or slide-in electric range.						
replace, standard grade		2A@1.05	ea	981.00	58.90	1,039.90
replace, high grade		2A@1.05	ea	1,300.00	58.90	1,358.90
replace, deluxe grade		2A@1.05	ea	1,510.00	58.90	1,568.90
replace, cook top with grill / griddle		2A@1.05	ea	1,880.00	58.90	1,938.90
remove		1D@.505	ea	—	21.60	21.60
remove for work, then reinstall		2A@1.72	ea	6.47	96.50	102.97
Space-saver electric range, free-standing.						
replace, standard grade		2A@.980	ea	1,310.00	55.00	1,365.00
replace, high grade		2A@.980	ea	1,370.00	55.00	1,425.00
remove		1D@.505	ea	—	21.60	21.60
remove for work, then reinstall		2A@1.72	ea	5.16	96.50	101.66
High-low electric range with microwave high.						
replace, standard grade		2A@1.90	ea	419.00	107.00	526.00
replace, high grade		2A@1.90	ea	561.00	107.00	668.00
replace, deluxe grade		2A@1.90	ea	868.00	107.00	975.00
remove		1D@.883	ea	—	37.70	37.70
remove for work, then reinstall		2A@2.11	ea	6.47	118.00	124.47
Electric range, free-standing with double oven.						
replace, standard grade		2A@.980	ea	1,230.00	55.00	1,285.00
replace, high grade		2A@.980	ea	1,510.00	55.00	1,565.00
replace, deluxe grade		2A@.980	ea	2,010.00	55.00	2,065.00
remove		1D@.505	ea	—	21.60	21.60
remove for work, then reinstall		2A@1.72	ea	2.57	96.50	99.07
Electric wall oven.						
replace, economy grade		7E@1.55	ea	723.00	104.00	827.00
replace, standard grade		7E@1.55	ea	836.00	104.00	940.00
replace, high grade		7E@1.55	ea	1,060.00	104.00	1,164.00
replace, deluxe grade		7E@1.55	ea	1,320.00	104.00	1,424.00
remove		1D@.652	ea	—	27.80	27.80
remove for work, then reinstall		7E@2.50	ea	2.57	169.00	171.57
Electric double wall oven.						
replace, economy grade		7E@2.72	ea	1,060.00	183.00	1,243.00
replace, standard grade		7E@2.72	ea	1,330.00	183.00	1,513.00
replace, high grade		7E@2.72	ea	1,910.00	183.00	2,093.00
replace, deluxe grade		7E@2.72	ea	2,550.00	183.00	2,733.00
remove		1D@.774	ea	—	33.00	33.00
remove for work, then reinstall		7E@2.78	ea	3.90	187.00	190.90

	Craft@Hrs	Unit	Material	Labor	Total
Warming drawer.					
replace, standard grade	7E@.977	ea	863.00	65.80	928.80
replace, high grade	7E@.977	ea	1,040.00	65.80	1,105.80
replace, deluxe grade	7E@.977	ea	1,470.00	65.80	1,535.80
remove	1D@.444	ea	—	19.00	19.00
remove for work, then reinstall	7E@1.66	ea	10.40	112.00	122.40

Range hood. Under-cabinet range hoods. Economy and standard grades may be non-vented. Stainless steel hoods usually range from high to custom grade. Designer hoods are usually deluxe or custom grade.

replace, economy grade	2A@1.33	ea	84.10	74.60	158.70
replace, standard grade	2A@1.33	ea	139.00	74.60	213.60
replace, high grade	2A@1.33	ea	171.00	74.60	245.60
replace, deluxe grade	2A@1.33	ea	207.00	74.60	281.60
replace, custom grade	2A@1.33	ea	272.00	74.60	346.60
remove	1D@.422	ea	—	18.00	18.00
remove for work, then reinstall	2A@1.58	ea	2.57	88.60	91.17



Range hood, oversized. Under-cabinet range hoods. Economy and standard grades may be non-vented. Stainless steel hoods usually range from high to custom grade. Designer hoods are usually deluxe or custom grade.

replace, standard grade	2A@1.46	ea	452.00	81.90	533.90
replace, high grade	2A@1.46	ea	543.00	81.90	624.90
replace, deluxe grade	2A@1.46	ea	664.00	81.90	745.90
replace, custom grade	2A@1.46	ea	873.00	81.90	954.90
remove	1D@.422	ea	—	18.00	18.00
remove for work, then reinstall	2A@2.04	ea	2.57	114.00	116.57



Range hood, slide-out. Under-cabinet slide-out range hoods.

replace, standard grade	2A@1.58	ea	614.00	88.60	702.60
replace, high grade	2A@1.58	ea	741.00	88.60	829.60
replace, deluxe grade	2A@1.58	ea	852.00	88.60	940.60
remove	1D@.492	ea	—	21.00	21.00
remove for work, then reinstall	2A@2.84	ea	2.57	159.00	161.57

Chimney range hood. Island-mount or wall-mount vented chimney hood. The most common finish (and the most popular) is stainless steel, but a wide range of finishes are available. Copper chimney hoods usually fall in the deluxe to custom deluxe grades.

replace, economy grade	2A@2.62	ea	1,080.00	147.00	1,227.00
replace, standard grade	2A@2.62	ea	1,470.00	147.00	1,617.00
replace, high grade	2A@2.62	ea	1,890.00	147.00	2,037.00
replace, deluxe grade	2A@2.88	ea	2,400.00	162.00	2,562.00
replace, custom grade	2A@2.88	ea	3,290.00	162.00	3,452.00
replace, custom deluxe grade	2A@3.04	ea	4,620.00	171.00	4,791.00
remove	1D@.787	ea	—	33.60	33.60
remove for work, then reinstall	2A@4.00	ea	2.57	224.00	226.57

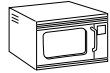
Downdraft ventilation system. Stand-alone downdraft ventilation systems used with cook tops and ranges. These units are often telescopic and retract when not in use. Do not use these prices for cook tops and ranges that have integrated downdraft systems.

replace, standard grade	2A@1.87	ea	638.00	105.00	743.00
replace, high grade	2A@1.87	ea	767.00	105.00	872.00
replace, deluxe grade	2A@1.87	ea	1,080.00	105.00	1,185.00
remove	1D@.576	ea	—	24.60	24.60
remove for work, then reinstall	2A@3.04	ea	2.57	171.00	173.57

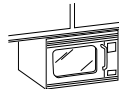
2 - Appliances

National Renovation &

	Craft@Hrs	Unit	Material	Labor	Total
Microwave oven. Countertop microwave.					
replace, economy grade	2A@.290	ea	128.00	16.30	144.30
replace, standard grade	2A@.290	ea	346.00	16.30	362.30
replace, high grade	2A@.290	ea	500.00	16.30	516.30
replace, deluxe grade	2A@.290	ea	711.00	16.30	727.30
replace, custom grade	2A@.290	ea	858.00	16.30	874.30
remove	1D@.182	ea	—	7.77	7.77
remove for work, then reinstall	2A@.345	ea	—	19.40	19.40



Microwave, under cabinet. Microwave oven mounted to wall and/or cabinets. Also called an "over-the-range" microwave.					
replace, standard grade	2A@.950	ea	462.00	53.30	515.30
replace, high grade	2A@.950	ea	716.00	53.30	769.30
replace, deluxe grade	2A@.950	ea	850.00	53.30	903.30
remove	1D@.346	ea	—	14.80	14.80
remove for work, then reinstall	2A@.677	ea	—	38.00	38.00



Dishwasher.					
replace, economy grade	2A@1.85	ea	290.00	104.00	394.00
replace, standard grade	2A@1.85	ea	444.00	104.00	548.00
replace, high grade	2A@1.85	ea	716.00	104.00	820.00
replace, deluxe grade	2A@1.85	ea	1,050.00	104.00	1,154.00
replace, custom deluxe grade	2A@1.85	ea	1,690.00	104.00	1,794.00
remove	1D@.649	ea	—	27.70	27.70
remove for work, then reinstall	2A@2.32	ea	—	130.00	130.00

Dishwasher, convertible (portable).					
replace, standard grade	2A@1.18	ea	522.00	66.20	588.20
replace, high grade	2A@1.18	ea	660.00	66.20	726.20
replace, deluxe grade	2A@1.18	ea	839.00	66.20	905.20
remove	1D@.388	ea	—	16.60	16.60
remove for work, then reinstall	2A@1.56	ea	—	87.50	87.50



Dishwasher, space-saver under-sink .					
replace, standard grade	2A@2.63	ea	772.00	148.00	920.00
replace, high grade	2A@2.63	ea	908.00	148.00	1,056.00
remove	1D@.732	ea	—	31.30	31.30
remove for work, then reinstall	2A@3.22	ea	6.47	181.00	187.47



Garbage disposal.					
replace, 1/3 hp	7P@1.51	ea	133.00	109.00	242.00
replace, 1/2 hp, standard grade	7P@1.51	ea	164.00	109.00	273.00
replace, 1/2 hp, high grade	7P@1.51	ea	256.00	109.00	365.00
replace, 3/4 hp, standard grade	7P@1.51	ea	261.00	109.00	370.00
replace, 3/4 hp, high grade	7P@1.51	ea	389.00	109.00	498.00
replace, 1 hp, standard grade	7P@1.51	ea	357.00	109.00	466.00
replace, 1 hp, high grade	7P@1.51	ea	393.00	109.00	502.00
remove	1D@.628	ea	—	26.80	26.80
remove for work, then reinstall	7P@2.51	ea	6.47	181.00	187.47



	Craft@Hrs	Unit	Material	Labor	Total
Surface-mounted one-tube fluorescent strip light.					
replace, 1'	9E@1.05	ea	29.70	61.80	91.50
replace, 1-1/2'	9E@1.05	ea	29.70	61.80	91.50
replace, 2'	9E@1.05	ea	37.30	61.80	99.10
replace, 4'	9E@1.05	ea	44.80	61.80	106.60
replace, 6'	9E@1.05	ea	67.30	61.80	129.10
replace, 8'	9E@1.05	ea	96.90	61.80	158.70
remove	1D@.500	ea	—	21.40	21.40
Surface-mounted one-tube fluorescent strip light with diffuser.					
replace, 2'	9E@1.05	ea	44.80	61.80	106.60
replace, 4'	9E@1.05	ea	52.20	61.80	114.00
replace, 6'	9E@1.05	ea	67.30	61.80	129.10
replace, 8'	9E@1.05	ea	104.00	61.80	165.80
remove	1D@.500	ea	—	21.40	21.40
2' two-tube surface-mounted fluorescent strip light.					
replace, exposed lights	9E@1.05	ea	52.20	61.80	114.00
replace, with diffuser	9E@1.05	ea	81.90	61.80	143.70
replace, with vinyl trim & diffuser	9E@1.05	ea	89.50	61.80	151.30
replace, with solid wood trim & diffuser	9E@1.05	ea	112.00	61.80	173.80
remove	1D@.500	ea	—	21.40	21.40
4' two-tube surface-mounted fluorescent strip light.					
replace, exposed lights	9E@1.05	ea	74.40	61.80	136.20
replace, with diffuser	9E@1.05	ea	96.90	61.80	158.70
replace, with vinyl trim & diffuser	9E@1.05	ea	104.00	61.80	165.80
replace, with solid wood trim & diffuser	9E@1.05	ea	140.00	61.80	201.80
remove	1D@.500	ea	—	21.40	21.40
6' two-tube surface-mounted fluorescent strip light.					
replace, exposed lights	9E@1.05	ea	81.90	61.80	143.70
replace, with diffuser	9E@1.05	ea	112.00	61.80	173.80
replace, with vinyl trim & diffuser	9E@1.05	ea	140.00	61.80	201.80
replace, with solid wood trim & diffuser	9E@1.05	ea	154.00	61.80	215.80
remove	1D@.500	ea	—	21.40	21.40
8' two-tube surface-mounted fluorescent strip light.					
replace, exposed lights	9E@1.05	ea	112.00	61.80	173.80
replace, with diffuser	9E@1.05	ea	135.00	61.80	196.80
replace, with vinyl trim & diffuser	9E@1.05	ea	174.00	61.80	235.80
replace, with solid wood trim & diffuser	9E@1.05	ea	201.00	61.80	262.80
remove	1D@.500	ea	—	21.40	21.40
4' four-tube surface-mounted fluorescent strip light.					
replace, exposed lights	9E@1.05	ea	119.00	61.80	180.80
replace, with diffuser	9E@1.05	ea	180.00	61.80	241.80
replace, with vinyl trim & diffuser	9E@1.05	ea	207.00	61.80	268.80
replace, with solid wood trim & diffuser	9E@1.05	ea	261.00	61.80	322.80
remove	1D@.500	ea	—	21.40	21.40

	Craft@Hrs	Unit	Material	Labor	Total
Fluorescent fixture for suspended ceiling. Add \$16 for boxed-in fixture for fire-rated ceiling.					
replace, 2' by 2' drop-in two-tube	9E@2.12	ea	119.00	125.00	244.00
replace, 2' by 4' drop-in two-tube	9E@2.12	ea	149.00	125.00	274.00
replace, 2' by 4' drop-in four-tube	9E@2.12	ea	187.00	125.00	312.00
remove	1D@.500	ea	—	21.40	21.40
Additional fluorescent fixture costs.					
remove fixture for work, then reinstall	9E@1.84	ea	—	108.00	108.00
remove and replace fluorescent fixture ballast	9E@1.41	ea	96.90	83.00	179.90
Fluorescent circline fixture.					
replace, economy grade	9E@.967	ea	52.20	57.00	109.20
replace, standard grade	9E@.967	ea	81.90	57.00	138.90
replace, high grade	9E@.967	ea	135.00	57.00	192.00
replace, deluxe grade	9E@.967	ea	261.00	57.00	318.00
remove circline fixture	1D@.371	ea	—	15.80	15.80
remove circline fixture for work, then reinstall	9E@1.67	ea	—	98.40	98.40
remove and replace circline fixture ballast	9E@1.41	ea	89.50	83.00	172.50
Ceiling fan. Fan only, no light.					
replace, economy grade	9E@2.45	ea	96.90	144.00	240.90
replace, standard grade	9E@2.45	ea	154.00	144.00	298.00
replace, high grade	9E@2.45	ea	254.00	144.00	398.00
replace, deluxe grade	9E@2.45	ea	397.00	144.00	541.00
remove	1D@.500	ea	—	21.40	21.40
remove fan for work, then reinstall	9E@2.74	ea	—	161.00	161.00
Ceiling fan with light.					
replace, economy grade	9E@3.68	ea	254.00	217.00	471.00
replace, standard grade	9E@3.68	ea	483.00	217.00	700.00
replace, high grade	9E@3.68	ea	425.00	217.00	642.00
replace, deluxe grade	9E@3.68	ea	609.00	217.00	826.00
replace, custom grade	9E@3.68	ea	731.00	217.00	948.00
remove	1D@.500	ea	—	21.40	21.40
remove fan with light for work, then reinstall	9E@2.82	ea	—	166.00	166.00
Light for ceiling fan.					
replace, economy grade	9E@.525	ea	52.20	30.90	83.10
replace, standard grade	9E@.525	ea	104.00	30.90	134.90
replace, high grade	9E@.525	ea	149.00	30.90	179.90
replace, deluxe grade	9E@.525	ea	254.00	30.90	284.90
replace, custom grade	9E@.525	ea	397.00	30.90	427.90
remove	1D@.300	ea	—	12.80	12.80
remove light from fan for work, then reinstall	9E@.919	ea	—	54.10	54.10
Hanging light fixture. Hanging light fixtures usually hang from ceiling hooks and plug into a switched outlet.					
replace, economy grade	9E@.305	ea	59.70	18.00	77.70
replace, standard grade	9E@.305	ea	74.40	18.00	92.40
replace, high grade	9E@.305	ea	89.50	18.00	107.50
replace, deluxe grade	9E@.305	ea	140.00	18.00	158.00
remove	1D@.100	ea	—	4.27	4.27

Craft@Hrs Unit Material Labor Total

Double hanging light fixture.

replace, economy grade	9E@.305	ea	89.50	18.00	107.50
replace, standard grade	9E@.305	ea	127.00	18.00	145.00
replace, high grade	9E@.305	ea	174.00	18.00	192.00
replace, deluxe grade	9E@.305	ea	233.00	18.00	251.00
remove	1D@.100	ea	—	4.27	4.27

Minimum charge.

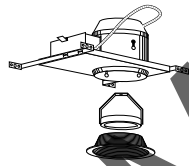
for light fixture work	9E@1.90	ea	29.70	112.00	141.70
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Porcelain light fixture.

replace, standard	9E@.230	ea	6.73	13.50	20.23
replace, with pull chain	9E@.230	ea	8.95	13.50	22.45
remove	1D@.100	ea	—	4.27	4.27
remove porcelain fixture for work, then reinstall	9E@.368	ea	—	21.70	21.70

Recessed spot light fixture.

replace, economy grade	9E@.835	ea	74.40	49.20	123.60
replace, standard grade	9E@.835	ea	104.00	49.20	153.20
replace, high grade	9E@.835	ea	135.00	49.20	184.20
replace, deluxe grade	9E@.835	ea	180.00	49.20	229.20
replace, custom grade	9E@.835	ea	239.00	49.20	288.20
remove	1D@.400	ea	—	17.10	17.10
remove spot fixture for work, then reinstall	9E@.766	ea	—	45.10	45.10
remove spot fixture & can for work, then reinstall	9E@1.41	ea	—	83.00	83.00



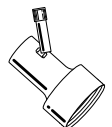
Electric strip for strip lighting. Surface-mounted electric strip channel. Does not include strip-mounted spot lights. 3 lf minimum.

replace, electric strip for strip lights	9E@.261	lf	16.50	15.40	31.90
remove	1D@.110	lf	—	4.70	4.70
remove electric strip for work, then reinstall	9E@.459	lf	—	27.00	27.00



Strip light. Spot light for surface mounted electric strip channel.

replace, economy grade	9E@.368	ea	37.30	21.70	59.00
replace, standard grade	9E@.368	ea	52.20	21.70	73.90
replace, high grade	9E@.368	ea	104.00	21.70	125.70
remove	1D@.150	ea	—	6.41	6.41
remove light for work, then reinstall	9E@.645	ea	—	38.00	38.00



strip spot light

Exterior single flood light fixture.

replace, standard grade	9E@.591	ea	67.30	34.80	102.10
replace, high grade	9E@.591	ea	89.50	34.80	124.30
remove	1D@.300	ea	—	12.80	12.80
remove fixture for work, then reinstall	9E@1.08	ea	—	63.60	63.60

Craft@Hrs Unit Material Labor Total

Exterior double flood light fixture.

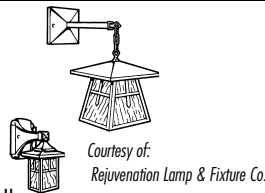
replace, standard grade	9E@.591	ea	81.90	34.80	116.70
replace, high grade	9E@.591	ea	112.00	34.80	146.80
remove	1D@.300	ea	—	12.80	12.80
remove fixture for work, then reinstall	9E@1.08	ea	—	63.60	63.60

Exterior triple flood light fixture.

replace, standard grade	9E@.591	ea	104.00	34.80	138.80
replace, high grade	9E@.591	ea	127.00	34.80	161.80
remove	1D@.300	ea	—	12.80	12.80
remove fixture for work, then reinstall	9E@1.08	ea	—	63.60	63.60

Exterior wall-mount light fixture.

replace, economy grade	9E@.574	ea	52.20	33.80	86.00
replace, standard grade	9E@.574	ea	81.90	33.80	115.70
replace, high grade	9E@.574	ea	207.00	33.80	240.80
replace, deluxe grade	9E@.574	ea	397.00	33.80	430.80
remove	1D@.250	ea	—	10.70	10.70
remove fixture for work, then reinstall	9E@1.08	ea	—	63.60	63.60



Exterior recessed light fixture.

replace, economy grade	9E@.835	ea	89.50	49.20	138.70
replace, standard grade	9E@.835	ea	127.00	49.20	176.20
replace, high grade	9E@.835	ea	226.00	49.20	275.20
replace, deluxe grade	9E@.835	ea	314.00	49.20	363.20
remove	1D@.500	ea	—	21.40	21.40
remove fixture for work, then reinstall	9E@1.67	ea	—	98.40	98.40

Exterior light fixture allowance. Contractor's allowance per light fixture in complete home.

replace, economy grade	9E@.591	ea	37.30	34.80	72.10
replace, standard grade	9E@.591	ea	74.40	34.80	109.20
replace, high grade	9E@.591	ea	140.00	34.80	174.80
replace, deluxe grade	9E@.591	ea	267.00	34.80	301.80
remove	1D@.315	ea	—	13.50	13.50
remove fixture for work, then reinstall	9E@1.08	ea	—	63.60	63.60

Exterior post with light fixture. Post up to 7 feet tall. Includes post hole, concrete base and hole backfill. Does not include wiring. Economy: Redwood post with beveled corners or light turnings, or straight metal post. Plastic or light metal fixture, usually one light with polystyrene lens. Standard: Turned redwood post. Black metal fixture, usually one light with polystyrene lens. High: Turned redwood post. Metal fixture, one to two lights, clear plastic or glass lens. Deluxe: Aluminum post with J bolts. Metal fixture, one to two lights, clear plastic or glass lens. Custom: Cast-iron post with J bolts. Cast-iron, brass, copper or pewter fixture, often simulated gas light with one to four lights, clear plastic or glass lens.

replace, economy grade	9E@5.41	ea	261.00	319.00	580.00
replace, standard grade	9E@5.41	ea	378.00	319.00	697.00
replace, high grade	9E@5.41	ea	483.00	319.00	802.00
replace, deluxe grade	9E@5.41	ea	708.00	319.00	1,027.00
replace, custom grade	9E@5.41	ea	1,260.00	319.00	1,579.00
remove	1D@1.20	ea	—	51.20	51.20
remove for work, then reinstall	9E@10.2	ea	—	601.00	601.00

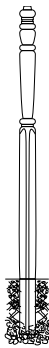
Craft@Hrs Unit Material Labor Total

Exterior post light fixture (no post). Economy: Plastic or light metal fixture, one interior light with polystyrene lens. Standard: Metal fixture, two interior lights with clear polystyrene lens. High: Metal fixture, two to four interior lights with clear polystyrene lens. Deluxe: Copper, pewter or antique finish, two to four interior lights with clear glass lens. Custom: Ornate copper, pewter, brass or antique finish, two to four interior lights with clear glass lens

replace, economy grade	9E@1.15	ea	84.70	67.70	152.40
replace, standard grade	9E@1.15	ea	140.00	67.70	207.70
replace, high grade	9E@1.15	ea	201.00	67.70	268.70
replace, deluxe grade	9E@1.15	ea	314.00	67.70	381.70
replace, custom grade	9E@1.15	ea	454.00	67.70	521.70
remove	1D@.500	ea	—	21.40	21.40
remove for work, then reinstall	9E@1.93	ea	—	114.00	114.00

Redwood post for exterior post light fixture. To 7' tall. Diameter to 4".

replace, standard grade, beveled edges or light turnings	9E@4.29	ea	373.00	253.00	626.00
replace, high grade, turned post	9E@4.29	ea	522.00	253.00	775.00
remove	1D@1.20	ea	—	51.20	51.20



Metal post for exterior post light fixture.

replace, standard grade	9E@4.09	ea	239.00	241.00	480.00
replace, high grade	9E@4.09	ea	373.00	241.00	614.00
replace, deluxe grade	9E@4.09	ea	522.00	241.00	763.00
replace, custom grade	9E@4.09	ea	661.00	241.00	902.00
replace, custom deluxe grade	9E@4.09	ea	1,030.00	241.00	1,271.00
remove	1D@1.20	ea	—	51.20	51.20

Additional exterior fixture costs.

add for exterior light motion sensor	—	ea	104.00	—	104.00
add for exterior light infrared detector	—	ea	104.00	—	104.00

Light fixture repair.

replace, light fixture socket and wiring	9E@.482	ea	9.69	28.40	38.09
replace, chandelier socket and wiring, per arm	9E@.510	ea	12.70	30.00	42.70

Bowl shade or globe for light fixture.

replace, economy grade	9E@.062	ea	18.00	3.65	21.65
replace, standard grade	9E@.062	ea	29.70	3.65	33.35
replace, high grade	9E@.062	ea	51.60	3.65	55.25
replace, deluxe grade	9E@.062	ea	74.40	3.65	78.05
replace, custom grade	9E@.062	ea	91.10	3.65	94.75

Time & Material Charts (selected items)

Electrical Materials

See Electrical material prices with the line items above.

Electrical Labor

Laborer	base wage	paid leave	true wage	taxes & ins.	total
Electrician	\$39.80	3.10	\$42.90	24.50	\$67.40
Electrician's helper	\$28.70	2.24	\$30.94	19.46	\$50.40
Demolition laborer	\$22.70	1.77	\$24.47	18.23	\$42.70

Paid leave is calculated based on two weeks paid vacation, one week sick leave, and seven paid holidays. Employer's matching portion of **FICA** is 7.65 percent. **FUTA** (Federal Unemployment) is .8 percent. **Worker's compensation** for the electrical trade was calculated using a national average of 8.08 percent. **Unemployment insurance** was calculated using a national average of 8 percent. **Health insurance** was calculated based on a projected national average for 2018 of \$1,248 per employee (and family when applicable) per month. Employer pays 80 percent for a per month cost of \$998 per employee. **Retirement** is based on a 401(k) retirement program with employer matching of 50 percent. Employee contributions to the 401(k) plan are an average of 6 percent of the true wage. **Liability insurance** is based on a national average of 15.0 percent.

	Craft@Hrs	Unit	Material	Labor	Total
Electrical Labor Productivity					
Demolition of electrical work					
remove 120 volt switch or outlet	1D@.150	ea	—	6.41	6.41
remove 240 volt switch or outlet	1D@.200	ea	—	8.54	8.54
remove bathroom fan	1D@.506	ea	—	21.60	21.60
remove bathroom fan / light with heater	1D@.726	ea	—	31.00	31.00
remove breaker panel	1D@6.09	ea	—	260.00	260.00
remove cable service drop	1D@10.5	ea	—	448.00	448.00
remove conduit service drop	1D@13.1	ea	—	559.00	559.00
remove rigid steel mast service drop	1D@15.4	ea	—	658.00	658.00
remove circuit breaker	1D@.200	ea	—	8.54	8.54
remove door bell or chime	1D@.100	ea	—	4.27	4.27
remove kitchen exhaust fan	1D@.539	ea	—	23.00	23.00
remove whole-house exhaust fan	1D@1.52	ea	—	64.90	64.90
remove intercom system master station	1D@.749	ea	—	32.00	32.00
remove intercom system remote station	1D@.300	ea	—	12.80	12.80
remove low-voltage outlet	1D@.150	ea	—	6.41	6.41
remove detector	1D@.200	ea	—	8.54	8.54
remove thermostat	1D@.200	ea	—	8.54	8.54
remove television antenna	1D@.835	ea	—	35.70	35.70
remove recessed electric space heater	1D@.506	ea	—	21.60	21.60
remove electric baseboard heater	1D@.165	lf	—	7.05	7.05
remove light fixture	1D@.300	ea	—	12.80	12.80
remove bathroom light bar	1D@.315	ea	—	13.50	13.50
remove chandelier	1D@.557	ea	—	23.80	23.80
remove florescent light fixture	1D@.500	ea	—	21.40	21.40
remove florescent circline light fixture	1D@.371	ea	—	15.80	15.80
remove ceiling fan	1D@.500	ea	—	21.40	21.40
remove hanging light fixture	1D@.100	ea	—	4.27	4.27

	Craft@Hrs	Unit	Material	Labor	Total
remove porcelain light fixture	1D@.100	ea	—	4.27	4.27
remove recessed spot light fixture	1D@.400	ea	—	17.10	17.10
remove electric strip for electric strip lights	1D@.110	lf	—	4.70	4.70
remove electric strip light	1D@.150	ea	—	6.41	6.41
remove exterior flood light	1D@.300	ea	—	12.80	12.80
remove exterior post with light fixture	1D@1.20	ea	—	51.20	51.20
remove exterior post light fixture	1D@.500	ea	—	21.40	21.40

Electrical crew

install wiring, boxes, and fixtures	electrician	\$67.40
install wiring, boxes, and fixtures	electrician's helper	\$50.40
install wiring, boxes, and fixtures	electrical crew	\$58.90

Install complete house electrical wiring, outlets, switches & light fixtures

economy grade	9E@.053	sf	—	3.12	3.12
deluxe grade	9E@.109	sf	—	6.42	6.42
low-voltage system	9E@.100	sf	—	5.89	5.89
add for wiring installation in conduit	9E@.055	sf	—	3.24	3.24

Install complete house rough electrical (no light fixtures)

standard	9E@.070	sf	—	4.12	4.12
in conduit	9E@.154	sf	—	9.07	9.07
low-voltage system	9E@.075	sf	—	4.42	4.42

Install complete house light fixtures

economy grade	9E@.015	sf	—	.88	.88
deluxe grade	9E@.017	sf	—	1.00	1.00
for low-voltage system	9E@.013	sf	—	.77	.77

240 volt system

install outlet or switch with wiring run & box	9E@1.34	ea	—	78.90	78.90
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120 volt system

install switch or outlet with wiring run & box	9E@.977	ea	—	57.50	57.50
install 3-way switch with wiring run & box	9E@1.95	ea	—	115.00	115.00

Electric wiring run

for typical 120 volt outlet or light	9E@.802	ea	—	47.20	47.20
for 120 volt appliance	9E@1.02	ea	—	60.10	60.10

Install conduit

electric metallic tubing (EMT), average installation	9E@.077	sf	—	4.54	4.54
flexible metal, average installation	9E@.041	sf	—	2.41	2.41
PVC, average installation	9E@.045	sf	—	2.65	2.65
intermediate (IMC), average installation	9E@.113	sf	—	6.66	6.66
rigid metal (RMC), average installation	9E@.067	sf	—	3.95	3.95

Install wiring

#10 2 wire with ground Romex	9E@.051	lf	—	3.00	3.00
#12 2 wire with ground Romex	9E@.047	lf	—	2.77	2.77
#14 2 wire with ground Romex	9E@.040	lf	—	2.36	2.36

Install breaker panel

100 amp ext. breaker panel (5 breakers)	7E@4.89	ea	—	330.00	330.00
100 amp int. breaker panel (5 breakers)	7E@4.30	ea	—	290.00	290.00
150 amp ext. breaker panel (10 breakers)	7E@7.68	ea	—	518.00	518.00
150 amp int. breaker panel (10 breakers)	7E@7.17	ea	—	483.00	483.00

	Craft@Hrs	Unit	Material	Labor	Total
200 amp ext. breaker panel (15 breakers)	7E@10.8	ea	—	728.00	728.00
200 amp int. breaker panel (15 breakers)	7E@9.77	ea	—	658.00	658.00
300 amp ext. breaker panel (30 breakers)	7E@14.3	ea	—	964.00	964.00
300 amp int. breaker panel (30 breakers)	7E@13.4	ea	—	903.00	903.00
40 amp int. breaker sub-panel (5 breakers)	7E@2.99	ea	—	202.00	202.00
50 amp int. breaker sub-panel	7E@3.16	ea	—	213.00	213.00
70 amp int. breaker sub-panel	7E@3.47	ea	—	234.00	234.00
Install electrical service					
100 amp cable service	7E@11.9	ea	—	802.00	802.00
150 amp cable service	7E@14.3	ea	—	964.00	964.00
150 amp conduit service	7E@15.4	ea	—	1,040.00	1,040.00
150 amp rigid steel mast service	7E@15.4	ea	—	1,040.00	1,040.00
200 amp cable service	7E@18.5	ea	—	1,250.00	1,250.00
200 amp conduit service	7E@19.9	ea	—	1,340.00	1,340.00
200 amp rigid steel mast service	7E@19.9	ea	—	1,340.00	1,340.00
Install breaker					
single-pole (120 volt) circuit breaker	7E@.636	ea	—	42.90	42.90
double-pole (240 volt) circuit breaker	7E@.649	ea	—	43.70	43.70
ground fault circuit interrupter breaker	7E@.689	ea	—	46.40	46.40
main disconnect circuit breaker	7E@3.47	ea	—	234.00	234.00
Install door bell or chime					
door bell or chime button	9E@.137	ea	—	8.07	8.07
door bell or chime	9E@1.24	ea	—	73.00	73.00
low-voltage wiring (per button)	9E@.563	ea	—	33.20	33.20
Install exhaust fan					
bathroom exhaust fan	9E@.685	ea	—	40.30	40.30
bathroom exhaust fan with heat lamp	9E@.883	ea	—	52.00	52.00
bathroom exhaust fan with heater	9E@.952	ea	—	56.10	56.10
kitchen exhaust fan	9E@1.12	ea	—	66.00	66.00
whole-house exhaust fan	9E@3.10	ea	—	183.00	183.00
Install intercom					
intercom system master station	9E@2.47	ea	—	145.00	145.00
intercom system remote station	9E@.685	ea	—	40.30	40.30
120 volt wiring for intercom master station	9E@.896	ea	—	52.80	52.80
intercom wiring (per station)	9E@.619	ea	—	36.50	36.50
Install low-voltage outlet					
install outlet	9E@.256	ea	—	15.10	15.10
wiring (per outlet)	9E@.358	ea	—	21.10	21.10
Install sound system					
speaker with grill	9E@.244	ea	—	14.40	14.40
Install detector					
battery operated	9E@.355	ea	—	20.90	20.90
direct-wired	9E@.398	ea	—	23.40	23.40
Check electrical circuits					
megameter test small home	7E@3.91	ea	—	264.00	264.00
megameter test average size home	7E@5.66	ea	—	381.00	381.00
megameter test large home	7E@7.79	ea	—	525.00	525.00
Install thermostat					
for electric resistance heating system	9E@.183	ea	—	10.80	10.80

	Craft@Hrs	Unit	Material	Labor	Total
electric heating system	9E@.326	ea	—	19.20	19.20
wiring (per thermostat)	9E@.538	ea	—	31.70	31.70
Install TV antenna					
television antenna	9E@1.24	ea	—	73.00	73.00
Install recessed electric space heater					
electric space heater recessed in wall	9E@2.47	ea	—	145.00	145.00
Install electric-resistance heating					
cable, ceiling installation	9E@.036	sf	—	2.12	2.12
cable, floor installation	9E@.060	sf	—	3.53	3.53
electric-resistance heating floor sensor	9E@.632	ea	—	37.20	37.20
Install electric baseboard heater					
electric baseboard heater	9E@.512	lf	—	30.20	30.20
remove for work, then reinstall	9E@.717	lf	—	42.20	42.20
Install underground wiring for exterior post light fixture					
up to 30 feet	9E@1.22	ea	—	71.90	71.90
up to 50 feet	9E@1.30	ea	—	76.60	76.60
Lighting					
Install interior light fixture					
interior incandescent light fixture	9E@.574	ea	—	33.80	33.80
Install bathroom bar light					
bathroom bar light	9E@.612	ea	—	36.00	36.00
Install chandelier					
chandelier	9E@1.67	ea	—	98.40	98.40
entrance chandelier	9E@3.35	ea	—	197.00	197.00
grand entrance chandelier	9E@4.59	ea	—	270.00	270.00
Install wall-mount fixture					
wall-mount light fixture	9E@.556	ea	—	32.70	32.70
Install fluorescent light fixture					
surface-mounted fluorescent light fixture	9E@1.05	ea	—	61.80	61.80
drop-in fluorescent fixture in suspended ceiling	9E@2.12	ea	—	125.00	125.00
fluorescent circline fixture	9E@.967	ea	—	57.00	57.00
Install ceiling fan					
assemble and install ceiling fan	9E@2.45	ea	—	144.00	144.00
remove ceiling fan for work, then reinstall	9E@2.74	ea	—	161.00	161.00
assemble and install ceiling fan with light	9E@3.68	ea	—	217.00	217.00
light for ceiling fan	9E@.525	ea	—	30.90	30.90
Install hanging light fixture					
hanging light fixture	9E@.305	ea	—	18.00	18.00
Install recessed spot fixture					
recessed spot light fixture	9E@.835	ea	—	49.20	49.20
Install exterior flood light					
exterior flood light fixture	9E@.591	ea	—	34.80	34.80
Install exterior post light fixture					
exterior post with light fixture	9E@5.41	ea	—	319.00	319.00
exterior post light fixture (no post)	9E@1.15	ea	—	67.70	67.70
wood post for exterior post light fixture	9E@4.29	ea	—	253.00	253.00
metal post for exterior post light fixture	9E@4.09	ea	—	241.00	241.00

Excavation

Mobilization charge.

Craft@Hrs	Unit	Material	Labor	Total
Delivery and take-home charge	6E@4.00	ea	—	245.00

Excavate for slab-on-grade structure, per sf of floor. Under-slab excavation up to 1-1/2' deep. Footing excavation up to 3' deep. Does not include mobilization.

Craft@Hrs	Unit	Material	Labor	Equip.	Total
Typical soil	6E@.002	sf	—	.12	.24
Medium rocky or clay soil	6E@.003	sf	—	.18	.31
Rocky or hardpan soil	6E@.004	sf	—	.25	.41
Backfill	6E@.002	sf	—	.12	.17

Excavate for structure with crawl space, per sf of floor. Crawl space excavation up to 3' deep. Footing excavation up to 4' deep. Does not include mobilization.

Typical soil	6E@.004	sf	—	.25	.21	.46
Medium rocky or clay soil	6E@.005	sf	—	.31	.25	.56
Rocky or hardpan soil	6E@.005	sf	—	.31	.29	.60
Backfill	6E@.002	sf	—	.12	.10	.22

Excavate for structure with basement, per sf of floor. Basement excavation up to 7' deep. Footing excavation up to 8' deep. Does not include mobilization.

Typical soil	6E@.011	sf	—	.67	.55	1.22
Medium rocky or clay soil	6E@.013	sf	—	.80	.67	1.47
Rocky or hardpan soil	6E@.015	sf	—	.92	.75	1.67
Backfill	6E@.006	sf	—	.37	.25	.62

Excavate footings. Excavation slopes to 3' width at bottom of footing trench. Does not include mobilization.

3' to 4' deep, typical soil	6E@.011	lf	—	.67	.54	1.21
3' to 4' deep, medium rocky or clay soil	6E@.013	lf	—	.80	.66	1.46
3' to 4' deep, rocky or hardpan soil	6E@.015	lf	—	.92	.74	1.66
5' to 6' deep, typical soil	6E@.013	lf	—	.80	.71	1.51
5' to 6' deep, medium rocky or clay soil	6E@.015	lf	—	.92	.80	1.72
5' to 6' deep, rocky or hardpan soil	6E@.019	lf	—	1.16	.94	2.10
7' to 8' deep, typical soil	6E@.016	lf	—	.98	.90	1.88
7' to 8' deep, medium rocky or clay soil	6E@.020	lf	—	1.23	1.02	2.25
7' to 8' deep, rocky or hardpan soil	6E@.023	lf	—	1.41	1.18	2.59
9' to 10' deep, typical soil	6E@.020	lf	—	1.23	1.04	2.27
9' to 10' deep, medium rocky or clay soil	6E@.024	lf	—	1.47	1.21	2.68
9' to 10' deep, rocky or hardpan soil	6E@.026	lf	—	1.59	1.40	2.99

Backfill against foundation wall. Typical backfill on flat lot or mild slope per sf of foundation wall. Does not include mobilization.

Per sf of wall	6E@.007	lf	—	.43	.32	.75
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Excavate utility trench, per lf of trench. Square trench, 2' wide. Does not include mobilization.

1' to 2' deep, sandy loam soil	6E@.004	lf	—	.25	.14	.39
1' to 2' deep, typical soil	6E@.004	lf	—	.25	.18	.43
1' to 2' deep, medium rocky or clay soil	6E@.004	lf	—	.25	.21	.46
1' to 2' deep, rocky or hardpan soil	6E@.005	lf	—	.31	.25	.56
1' to 2' deep, backfill	6E@.004	lf	—	.25	.13	.38

	Craft@Hrs	Unit	Material	Labor	Total
Antique style pillbox toilet. Round tank with beaded rim.					
replace	7P@2.23	ea	2,910.00	161.00	3,071.00
remove	1D@.429	ea	—	18.30	18.30
remove for work, then reinstall	7P@3.45	ea	—	249.00	249.00

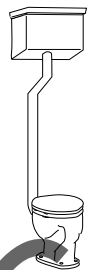
Antique style low-tank toilet. Identifiable by pipe (usually brass) running from tank to bowl.

Low-tank toilet					
replace, porcelain tank	7P@2.23	ea	1,550.00	161.00	1,711.00
replace, oak tank	7P@2.22	ea	1,310.00	160.00	1,470.00
remove	1D@.429	ea	—	18.30	18.30
remove for work, then reinstall	7P@3.45	ea	2.87	249.00	251.87



Antique style high-tank toilet. Tank mounted high on wall. Includes brass pipe and connectors, pull chain, hardwood toilet seat, brass tank support brackets. Wood tanks include plastic liner.

High-tank toilet					
replace, porcelain tank	7P@2.63	ea	1,920.00	190.00	2,110.00
replace, oak tank	7P@2.63	ea	1,670.00	190.00	1,860.00
remove	1D@.602	ea	—	25.70	25.70
remove for work, then reinstall	7P@3.70	ea	2.87	267.00	269.87

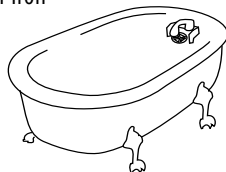


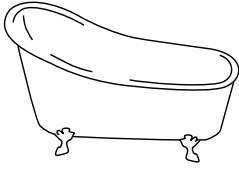
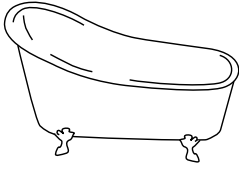
Antique bathtub. Does not include supply lines or faucet. Includes \$126 for crating and \$301 for shipping.

Antique claw-foot or ball-foot cast iron (as is condition)					
replace, 60"	7P@5.27	ea	1,120.00	380.00	1,500.00
replace, 66"	7P@5.57	ea	1,220.00	402.00	1,622.00

Refinished antique bathtub. Interior and lip refinished exterior surfaces painted. Does not include visible supply lines or faucet. Includes \$126 for crating and \$301 for shipping.

Antique claw-foot or ball-foot cast iron					
replace, 48"	7P@4.75	ea	3,360.00	343.00	3,703.00
replace, 52"	7P@5.01	ea	3,250.00	362.00	3,612.00
replace, 60"	7P@5.27	ea	2,910.00	380.00	3,290.00
replace, 66"	7P@5.57	ea	3,010.00	402.00	3,412.00



		Craft@Hrs	Unit	Material	Labor	Total
Reproduction antique bathtub. Claw foot or ball foot. New tubs built in the antique style. Does not include supply lines or faucet. Includes \$126 for crating and \$301 for shipping. (\$209 shipping for fiberglass tubs.)						
Cast-iron reproduction bathtub						
replace, 60"		7P@5.27	ea	2,350.00	380.00	2,730.00
replace, 66"		7P@5.57	ea	2,910.00	402.00	3,312.00
remove		1D@1.82	ea	—	77.70	77.70
Fiberglass reproduction bathtub						
replace, 60"		7P@3.13	ea	3,270.00	226.00	3,496.00
replace, 66"		7P@3.34	ea	4,410.00	241.00	4,651.00
remove		1D@1.45	ea	—	61.90	61.90
remove for work, then reinstall		7P@5.57	ea	—	402.00	402.00

Reproduction slipper bathtub. Claw foot or ball foot. Does not include supply lines or faucet. Includes \$165 for crating and \$301 for shipping. (\$209 shipping for fiberglass tubs.)

replace, 60" cast-iron		7P@5.27	ea	4,120.00	380.00	4,500.00
replace, 66" fiberglass		7P@5.57	ea	7,570.00	402.00	7,972.00
remove, cast-iron		1D@1.82	ea	—	77.70	77.70
remove, fiberglass		1D@1.45	ea	—	61.90	61.90

Additional antique bathtub costs.

add for solid brass legs	—	ea	132.00	—	132.00
add for brass-plated legs	—	ea	73.50	—	73.50
add for oak trim around lip of antique bathtub	—	ea	2,280.00	—	2,280.00

Time & Material Charts (selected items)

Plumbing Materials

Black steel pipe					
1/2" pipe	—	lf	1.80	—	1.80
3/4" pipe	—	lf	2.13	—	2.13
1" pipe	—	lf	3.01	—	3.01
2" pipe	—	lf	9.61	—	9.61
Brass pipe					
1/2" pipe	—	lf	6.15	—	6.15
3/4" pipe	—	lf	8.21	—	8.21
1" pipe	—	lf	13.40	—	13.40
2" pipe	—	lf	21.00	—	21.00
Type K copper pipe					
1/2" pipe	—	lf	3.50	—	3.50
3/4" pipe	—	lf	4.64	—	4.64
1" pipe	—	lf	6.04	—	6.04
2" pipe	—	lf	14.60	—	14.60
Type L copper pipe					
1/2" pipe	—	lf	2.04	—	2.04
3/4" pipe	—	lf	3.39	—	3.39
1" pipe	—	lf	4.64	—	4.64
2" pipe	—	lf	11.30	—	11.30

	Craft@Hrs	Unit	Material	Labor	Total
Type M copper pipe					
1/2" pipe	—	lf	1.58	—	1.58
3/4" pipe	—	lf	2.60	—	2.60
1" pipe	—	lf	3.53	—	3.53
Galvanized steel pipe					
1/2" pipe	—	lf	2.19	—	2.19
3/4" pipe	—	lf	2.59	—	2.59
1" pipe	—	lf	3.65	—	3.65
2" pipe	—	lf	11.70	—	11.70
CPVC pipe					
1/2" pipe	—	lf	1.26	—	1.26
3/4" pipe	—	lf	1.56	—	1.56
1" pipe	—	lf	1.87	—	1.87
PVC pipe					
1/2" pipe	—	lf	.78	—	.78
3/4" pipe	—	lf	.85	—	.85
1" pipe	—	lf	.93	—	.93
1-1/2" pipe	—	lf	1.26	—	1.26
2" pipe	—	lf	1.54	—	1.54
3" pipe	—	lf	2.21	—	2.21
4" pipe	—	lf	2.86	—	2.86
5" pipe	—	lf	4.16	—	4.16
6" pipe	—	lf	4.94	—	4.94
Cast-iron pipe					
2" pipe	—	lf	8.06	—	8.06
3" pipe	—	lf	11.20	—	11.20
4" pipe	—	lf	15.60	—	15.60
5" pipe	—	lf	44.70	—	44.70
6" pipe	—	lf	57.40	—	57.40
No-hub cast-iron pipe					
2" pipe	—	lf	11.20	—	11.20
3" pipe	—	lf	14.40	—	14.40
4" pipe	—	lf	18.60	—	18.60
5" pipe	—	lf	26.90	—	26.90

Plumbing Labor

	base wage	paid leave	true wage	taxes & ins.	total
Laborer					
Plumber	\$42.00	3.28	\$45.28	26.92	\$72.20
Plumber's helper	\$31.20	2.43	\$33.63	21.67	\$55.30
Demolition laborer	\$22.70	1.77	\$24.47	18.23	\$42.70

Paid leave is calculated based on two weeks paid vacation, one week sick leave, and seven paid holidays. Employer's matching portion of **FICA** is 7.65 percent. **FUTA** (Federal Unemployment) is .8 percent. **Worker's compensation** for the plumbing trade was calculated using a national average of 11.24 percent. **Unemployment insurance** was calculated using a national average of 8 percent. **Health insurance** was calculated based on a projected national average for 2018 of \$1,248 per employee (and family when applicable) per month. Employer pays 80 percent for a per month cost of \$998 per employee. **Retirement** is based on a 401(k) retirement program with employer matching of 50 percent. Employee contributions to the 401(k) plan are an average of 6 percent of the true wage. **Liability insurance** is based on a national average of 15.0 percent.

	Craft@Hrs	Unit	Material	Labor	Total
Plumbing Labor Productivity					
Demolition of plumbing					
remove faucet	1D@.356	ea	—	15.20	15.20
remove bathroom sink	1D@.367	ea	—	15.70	15.70
remove kitchen or laundry sink	1D@.370	ea	—	15.80	15.80
remove wet bar sink	1D@.356	ea	—	15.20	15.20
remove toilet	1D@.346	ea	—	14.80	14.80
remove fiberglass bathtub	1D@1.02	ea	—	43.60	43.60
remove cast-iron or steel bathtub	1D@1.61	ea	—	68.70	68.70
remove fiberglass bathtub with whirlpool jets	1D@1.45	ea	—	61.90	61.90
remove cast-iron or steel bathtub with whirlpool jets	1D@2.13	ea	—	91.00	91.00
remove bathtub and shower combination	1D@1.69	ea	—	72.20	72.20
remove shower stall	1D@1.22	ea	—	52.10	52.10
remove bathtub surround	1D@.893	ea	—	38.10	38.10
remove glass shower	1D@1.22	ea	—	52.10	52.10
remove sliding glass bathtub door	1D@.516	ea	—	22.00	22.00
remove shower door	1D@.484	ea	—	20.70	20.70
remove gas water heater	1D@1.11	ea	—	47.40	47.40
remove electric water heater	1D@1.06	ea	—	45.30	45.30
remove water softener	1D@.408	ea	—	17.40	17.40
remove submersible pump	1D@1.75	ea	—	74.70	74.70
remove sump pump	1D@.561	ea	—	24.00	24.00
remove antique style sink faucet	1D@.356	ea	—	15.20	15.20
remove antique style bathtub faucet	1D@.360	ea	—	15.40	15.40
remove claw-foot bathtub supply lines	1D@.429	ea	—	18.30	18.30
remove claw-foot bathtub drain	1D@.436	ea	—	18.60	18.60
remove free-standing water feeds	1D@.484	ea	—	20.70	20.70
remove pedestal sink	1D@.484	ea	—	20.70	20.70
remove antique style pillbox toilet	1D@.429	ea	—	18.30	18.30
remove antique style low-tank toilet	1D@.429	ea	—	18.30	18.30
remove antique style high-tank toilet	1D@.602	ea	—	25.70	25.70
remove cast-iron claw-foot bathtub	1D@1.82	ea	—	77.70	77.70
remove fiberglass claw-foot bathtub	1D@1.45	ea	—	61.90	61.90
Install field threaded pipe					
1/2"	7P@.127	lf	—	9.17	9.17
3/4"	7P@.136	lf	—	9.82	9.82
1"	7P@.158	lf	—	11.40	11.40
2"	7P@.231	lf	—	16.70	16.70
Install copper pipe					
1/2"	7P@.104	lf	—	7.51	7.51
3/4"	7P@.109	lf	—	7.87	7.87
1"	7P@.122	lf	—	8.81	8.81
2"	7P@.202	lf	—	14.60	14.60

	Craft@Hrs	Unit	Material	Labor	Total
Install plastic pipe					
1/2"	7P@.153	lf	—	11.00	11.00
3/4"	7P@.162	lf	—	11.70	11.70
1"	7P@.189	lf	—	13.60	13.60
2"	7P@.251	lf	—	18.10	18.10
3"	7P@.281	lf	—	20.30	20.30
4"	7P@.310	lf	—	22.40	22.40
5"	7P@.347	lf	—	25.10	25.10
6"	7P@.379	lf	—	27.40	27.40
Install cast-iron pipe					
2"	7P@.236	lf	—	17.00	17.00
3"	7P@.248	lf	—	17.90	17.90
4"	7P@.270	lf	—	19.50	19.50
5"	7P@.304	lf	—	21.90	21.90
6"	7P@.317	lf	—	22.90	22.90
Install no-hub cast-iron pipe					
2"	7P@.210	lf	—	15.20	15.20
3"	7P@.223	lf	—	16.10	16.10
4"	7P@.242	lf	—	17.50	17.50
6"	7P@.283	lf	—	20.40	20.40
Install faucet					
bathroom sink	7P@.557	ea	—	40.20	40.20
kitchen sink	7P@.561	ea	—	40.50	40.50
laundry sink	7P@.546	ea	—	39.40	39.40
shower	7P@.576	ea	—	41.60	41.60
tub	7P@.567	ea	—	40.90	40.90
tub with shower	7P@.606	ea	—	43.80	43.80
Install bathroom sink					
wall-hung	7P@.878	ea	—	63.40	63.40
self-rimming	7P@.910	ea	—	65.70	65.70
under-counter	7P@.953	ea	—	68.80	68.80
Install kitchen sink	7P@.925	ea	—	66.80	66.80
Install laundry sink					
in countertop	7P@.901	ea	—	65.10	65.10
on legs or frame	7P@.833	ea	—	60.10	60.10
Install wet bar sink					
self-rimming	7P@.910	ea	—	65.70	65.70
under-counter	7P@.953	ea	—	68.80	68.80
Install fixtures					
toilet	7P@1.33	ea	—	96.00	96.00
cast-iron or steel bathtub	7P@2.93	ea	—	212.00	212.00
fiberglass bathtub	7P@1.79	ea	—	129.00	129.00
cast-iron or steel bathtub with whirlpool jets	7P@4.00	ea	—	289.00	289.00
fiberglass bathtub with whirlpool jets	7P@3.45	ea	—	249.00	249.00
fiberglass bathtub & shower combination	7P@3.23	ea	—	233.00	233.00
shower stall	7P@2.70	ea	—	195.00	195.00

	Craft@Hrs	Unit	Material	Labor	Total
Install shower or bathtub door					
sliding bathtub door	7P@1.37	ea	—	98.90	98.90
shower door	7P@1.20	ea	—	86.60	86.60
Install water heater					
gas	7P@3.34	ea	—	241.00	241.00
electric	7P@3.13	ea	—	226.00	226.00
Install water softener	7P@3.34	ea	—	241.00	241.00
Install septic system					
with concrete tank					
1,000 gallon with 1,000 sf leach field	7P@77.7	ea	3,660.00	5,610.00	9,270.00
1,000 gallon with 2,000 sf leach field	7P@112	ea	5,260.00	8,090.00	13,350.00
with fiberglass tank					
1,000 gallon with 1,000 sf leach field	7P@77.5	ea	3,500.00	5,600.00	9,100.00
1,000 gallon with 2,000 sf leach field	7P@112	ea	5,140.00	8,090.00	13,230.00
with polyethylene tank					
1,000 gallon with 1,000 sf leach field	7P@77.5	ea	3,220.00	5,600.00	8,820.00
1,000 gallon with 2,000 sf leach field	7P@112	ea	4,840.00	8,090.00	12,930.00
Install water pump					
submersible	7P@5.52	ea	—	399.00	399.00
automatic sump	7P@1.39	ea	—	100.00	100.00
Install claw-foot bathtub faucet					
faucet	7P@.893	ea	—	64.50	64.50
faucet with shower conversion	7P@2.16	ea	—	156.00	156.00
Install pedestal sink	7P@1.22	ea	—	88.10	88.10
Install antique style toilet					
pillbox or low tank	7P@2.23	ea	—	161.00	161.00
high-tank	7P@2.63	ea	—	190.00	190.00
Install antique style bathtub					
52" cast-iron	7P@5.01	ea	—	362.00	362.00
60" cast-iron	7P@5.27	ea	—	380.00	380.00
66" cast-iron	7P@5.57	ea	—	402.00	402.00
60" reproduction fiberglass	7P@3.13	ea	—	226.00	226.00
66" reproduction fiberglass	7P@3.34	ea	—	241.00	241.00

Retaining Walls

Retaining walls. All walls include excavation and backfill. Measure the sf of surface area. Includes sand and/or gravel base and 2' to 3' of walls buried beneath exposed surface.

Minimum charge.

for retaining wall work	3R@3.50	ea	234.00	215.00	167.00	616.00
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Concrete retaining walls. See Masonry for brick veneer, wall caps and wall coping. Includes 4" perforated pipe drain line at inside base that is set in gravel.

replace, typical	3R@.227	sf	10.80	13.90	4.39	29.09
remove	1D@.345	sf	—	14.70	—	14.70

Pile retaining walls with wood lagging.

replace, wood	3R@.095	sf	8.36	5.83	2.58	16.77
replace, steel	3R@.104	sf	8.70	6.39	2.58	17.67
remove, wood	1D@.185	sf	—	7.90	—	7.90
remove, steel	1D@.204	sf	—	8.71	—	8.71

Anchored tieback, for all retaining wall types.

Add for anchored tiebacks						
replace	3R@2.44	ea	165.00	150.00	50.70	365.70
remove	1D@1.81	ea	—	77.30	—	77.30

Railroad tie retaining walls.

replace, with tie tiebacks	3R@.244	sf	8.54	15.00	2.48	26.02
replace, no tie tiebacks	3R@.167	sf	7.73	10.30	2.21	20.24
remove, with tie tiebacks	1D@.199	sf	—	8.50	—	8.50
remove, no tie tiebacks	1D@.188	sf	—	8.03	—	8.03

Cedar tie retaining walls.

replace, with tie tiebacks	3R@.251	sf	10.80	15.40	2.30	28.50
replace, no tie tiebacks	3R@.169	sf	10.40	10.40	2.14	22.94
remove, with tie tiebacks	1D@.188	sf	—	8.03	—	8.03
remove, no tie tiebacks	1D@.178	sf	—	7.60	—	7.60

Stone. Includes 4" perforated pipe drain line at inside base set in gravel.

Random stone retaining walls						
replace, dry set	1M@.385	sf	24.60	24.90	2.58	52.08
replace, mortar set	1M@.333	sf	25.60	21.60	2.58	49.78
Cut stone retaining wall						
replace, dry set	1M@.327	sf	30.90	21.20	2.58	54.68
replace, mortar set	1M@.323	sf	32.00	20.90	2.58	55.48
Remove stone retaining wall	1D@.384	sf	—	16.40	—	16.40

	Craft@Hrs	Unit	Material	Labor	Equip.	Total
Interlocking masonry block retaining walls. Knock-out cap is same as solid cap except 3" to 4" back the cap is cut out to about half its thickness to allow soil and vegetation to overlap the top of the wall.						
replace, typical	3R@.313	sf	14.80	19.20	2.58	36.58
remove	1D@.333	sf	—	14.20	—	14.20
add for solid cap, 4" x 16" x 10"	3R@.048	lf	7.32	2.95	—	10.27
add for knock-out cap, 4" x 16" x 10" per lf of wall	3R@.048	lf	8.44	2.95	—	11.39

Add for fabric reinforcement. One common brand name is called GeoGrid. Fabric ties retaining walls into hillside.

4-1/2' deep every 2' of wall height	3R@.007	sf	5.51	.43	—	5.94
4-1/2' deep every 3' of wall height	3R@.005	sf	3.66	.31	—	3.97
6' deep every 2' of wall height	3R@.007	sf	6.64	.43	—	7.07
6' deep every 3' of wall height	3R@.005	sf	4.43	.31	—	4.74

Shotcrete slope stabilization.

Slope stabilization with wire mesh (per inch deep)	3R@.104	sf	2.51	6.39	.40	9.30
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Time & Material Charts (selected items)

Retaining Walls Materials

See Retaining Walls material prices above.

Retaining Walls Labor

	base wage	paid leave	true wage	taxes & ins.	total
Laborer					
Retaining wall installer	\$33.20	2.59	\$35.79	25.61	\$61.40
Mason	\$35.30	2.75	\$38.05	26.75	\$64.80
Equipment operator	\$46.70	3.64	\$50.34	31.36	\$81.70
Demolition laborer	\$22.70	1.77	\$24.47	18.23	\$42.70

Paid leave is calculated based on two weeks paid vacation, one week sick leave, and seven paid holidays. Employer's matching portion of **FICA** is 7.65 percent. **FUTA** (Federal Unemployment) is .8 percent. **Worker's compensation** for the retaining walls trade was calculated using a national average of 19.41 percent for the retaining wall installer; 19.41 percent for the mason, and 15.32 percent for the equipment operator.

Unemployment insurance was calculated using a national average of 8 percent. **Health insurance** was calculated based on a projected national average for 2018 of \$1,248 per employee (and family when applicable) per month. Employer pays 80 percent for a per month cost of \$950 per employee. **Retirement** is based on a 401(k) retirement program with employer matching of 50 percent. Employee contributions to the 401(k) plan are an average of 6 percent of the true wage. **Liability insurance** is based on a national average of 15.0 percent.

	Craft@Hrs	Unit	Material	Labor	Total
Retaining Walls Labor Productivity					
Install retaining wall					
concrete	3R@.227	sf	—	13.90	13.90
railroad tie with tie tiebacks	3R@.244	sf	—	15.00	15.00
railroad tie, no tie tiebacks	3R@.167	sf	—	10.30	10.30
cedar tie with tie tiebacks	3R@.251	sf	—	15.40	15.40
cedar tie, no tie tiebacks	3R@.169	sf	—	10.40	10.40
interlocking masonry block	3R@.313	sf	—	19.20	19.20

Craft@Hrs Unit Material Labor Total

Roofing

Roofing. Costs are based on a typical 2,550 sf house with a 6 in 12 slope roof or less. Roof height is less than 16' so ropes and other safety equipment are not required. Includes costs for ridges and rakes. Typical roof has an intersecting or L-shaped roof and two dormers. Also includes boots and flashing.

Minimum charge.

for roofing work	6R@5.50	ea	118.00	371.00	489.00
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Add for steep and complex roofs. Cut-up roofs contain four to six intersecting roof lines. Very cut-up roofs contain seven or more.

add for steep roofs 6-12 to 8-12 slope (all roof types)	—	%	—	35.0	—
add for steep roofs greater than 8-12 slope (all roof types)	—	%	—	50.0	—
add for cut-up roof	—	%	—	30.0	—
add for very cut-up roof	—	%	—	50.0	—

Aluminum shingles. Includes natural finish aluminum shingles, pipe flashing, roofing felt, valley metal, drip edge, ridge cap, rust-resistant nails, and installation. Installation on roof 16' tall or less.

replace, .02" thick	6R@1.06	sq	401.00	71.60	472.60
replace, .03" thick	6R@1.06	sq	427.00	71.60	498.60
remove, all thicknesses	1D@1.04	sq	—	44.40	44.40
add for colored aluminum shingles (all colors)	—	%	20.0	—	—

Galvanized steel shingles. Includes galvanized steel shingles, pipe flashing, roofing felt, valley metal, drip edge, ridge cap, rust-resistant nails, and installation. Installation on roof 16' tall or less.

replace, 26 gauge	6R@1.11	sq	298.00	74.90	372.90
replace, 24 gauge	6R@1.11	sq	333.00	74.90	407.90
replace, 22 gauge	6R@1.11	sq	346.00	74.90	420.90
remove, all gauges	1D@1.04	sq	—	44.40	44.40
add for shingles with baked enamel factory finish	—	%	21.0	—	—
add for metal shingles with 1" polystyrene insulation	—	%	10.0	—	—

Minimum charge.

for metal shingle roof repair	6R@2.50	ea	74.80	169.00	243.80
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Asphalt shingles. Includes asphalt shingles, pipe flashing, roofing felt, valley metal, drip edge, ridge cap, rust-resistant nails, and installation. Installation on roof 16' tall or less. Prices are for standard three-tab shingles. (20-year shingles are not available in all areas.) Add **14%** for 4 to 6 tab. Add **16%** for thatch style edge. Add **15%** for shingles with cut-outs. Add **10%** for textured shingles.

replace, 20 year (210 to 230 lb)	6R@1.24	sq	125.00	83.70	208.70
replace, 25 year (220 to 240 lb)	6R@1.24	sq	157.00	83.70	240.70
replace, 30 year (240 to 260 lb)	6R@1.27	sq	183.00	85.70	268.70
replace, 40 year (260 to 300 lb)	6R@1.27	sq	213.00	85.70	298.70
remove	1D@1.02	sq	—	43.60	43.60

Craft@Hrs Unit Material Labor Total

Laminated asphalt shingles.

replace, standard grade (250 to 300 lb)	6R@2.06	sq	181.00	139.00	320.00
replace, standard grade (300 to 390 lb)	6R@2.06	sq	209.00	139.00	348.00
replace, high grade (260 to 300 lb)	6R@2.45	sq	257.00	165.00	422.00
replace, high grade (300 to 400 lb)	6R@2.45	sq	294.00	165.00	459.00
remove, all grades	1D@1.02	sq	—	43.60	43.60

T-lock, diamond and hexagonal asphalt shingles. (Not available in all areas.)

replace, T-lock (210 to 230 lb)	6R@1.27	sq	106.00	85.70	191.70
replace, diamond (210 to 230 lb)	6R@1.27	sq	106.00	85.70	191.70
replace, hexagonal (210 to 230 lb)	6R@1.27	sq	110.00	85.70	195.70
remove, all styles	1D@1.02	sq	—	43.60	43.60

Minimum charge.

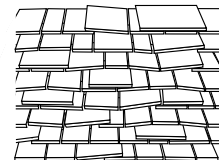
for asphalt shingle roof repair all types and grades	6R@2.50	ea	53.40	169.00	222.40
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Roll roofing. Includes roll roofing, galvanized roofing nails, seaming tar, and installation. Overlap according to manufacturer's specifications —usually a few inches. Installation on roof 16' tall or less. Add **82%** for double selvage lay.

replace, 90 lb	6R@.645	sq	94.80	43.50	138.30
replace, 110 lb	6R@.645	sq	113.00	43.50	156.50
replace, 140 lb	6R@.645	sq	132.00	43.50	175.50
remove, all weights	1D@.735	sq	—	31.40	31.40

Slate roofing. Includes roofing slates, galvanized nails, boots and flashing, roofing felt, valley metal, drip edge, ridge cap, and installation. Installation on roof 16' tall or less. Does not include furring strips.

replace, Vermont unfading green, clear	6R@4.00	sq	1,110.00	270.00	1,380.00
replace, Vermont unfading purple, clear	6R@4.00	sq	1,140.00	270.00	1,410.00
replace, Vermont unfading variegated purple, clear	6R@4.00	sq	1,280.00	270.00	1,550.00
replace, Vermont unfading dark gray or black, clear	6R@4.00	sq	1,170.00	270.00	1,440.00
replace, Vermont unfading red, clear	6R@4.00	sq	2,830.00	270.00	3,100.00
replace, Pennsylvania black weathering, clear	6R@4.00	sq	1,090.00	270.00	1,360.00
replace, Vermont weathering green, clear	6R@4.00	sq	1,050.00	270.00	1,320.00
remove, all types	1D@3.70	sq	—	158.00	158.00
deduct for slate with ribbons of foreign color	—	%	-15.0	—	—
minimum charge for slate roof repair	6R@4.00	ea	411.00	270.00	681.00
replace single slate	6R@.385	ea	29.80	26.00	55.80



Wood shingles. Includes wood shingles, boots, roofing felt, valley metal, drip edge, ridge cap, rust-resistant nails, and installation. Installation on roof 16' tall or less.

Blue label cedar shingles					
replace, 16" (Royals)	6R@2.86	sq	423.00	193.00	616.00
replace, 18" (Perfections)	6R@2.55	sq	449.00	172.00	621.00

QuickCalculators



QUICKCALCULATORS

Quantity	450-463
Bearing Wall (board feet)	450-451
Concrete Wall & Footing (cubic yards)	452-453
Gable Roof Rafters (board feet)	454-455

Gable Roof Trusses (lineal feet)	456-457
Gable Roofing (squares)	458-459
Joist System (board feet)	460-461
Non-bearing Wall (board feet)	462-463

Surface Area	464-469
Prismatic Room	464-465
Rectangular Room	466-467
Round Room	468-469

QuickCalculators are designed to help you quickly calculate quantities and the surface areas of some basic room shapes. Pages 450-463 contain QuickCalculators that are designed to calculate quantities, and pages 464-469 contain QuickCalculators that are designed to calculate the surface area of rooms.

Instruction for each QuickCalculator sheet are contained above the page.

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QuickCalculator mathematics

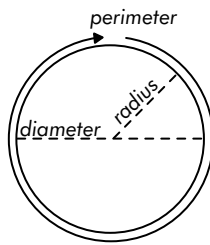
CIRCLE

Area

- ① = $\text{Pi} \times \text{radius}^2$
- ② = $.7854 \times \text{diameter}^2$
- ③ = $.0796 \times \text{perimeter}^2$

Perimeter

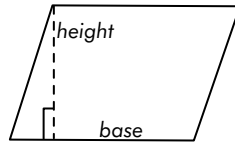
- ① = $\text{Pi} \times \text{diameter}$



PARALLELOGRAM

Area

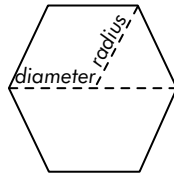
- ① = $\text{base} \times \text{height}$



PRISM

Area

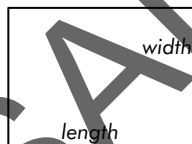
- ① = $\text{sum of sides} \div 2 \times \text{radius}$



RECTANGLE

Area

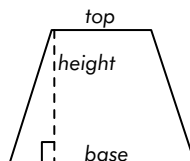
- ① = $\text{length} \times \text{width}$



TRAPEZOID

Area

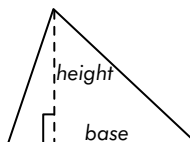
- ① = $\text{base} + \text{top} \div 2 \times \text{height}$



TRIANGLE

Area

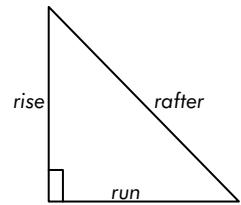
- ① = $\text{base} \times \text{height} \div 2$



PYTHAGOREAN THEOREM

Rafter length

- ① $\text{rafter length}^2 = \text{rise}^2 + \text{run}^2$



CONVERSION FACTORS

DIVIDE	BY	TO CONVERT TO
square inches	144	square feet
square inches	144	board feet
cubic inches	1,728	cubic feet
cubic inches	46,656	cubic yards
square feet	9	square yards
square feet	100	squares
cubic feet	27	cubic yards
feet	16.5	rods
rods	40	furlongs
feet	5,280	miles
meters	1,609	miles
yards	1,760	miles

MULTIPLY	BY	TO CONVERT TO
inches	2.54	centimeters
square inches	6.4516	square centimeters
square inches	.0069	square feet
square feet	9.29	square centimeters
square feet	.0929	square meters
square yards	.8361	square meters
square meters	1.1959	square yards
centimeters	.3937	inches
feet	.3048	meters
meters	3.281	feet
yards	91.44	centimeters
yards	.9144	meters
cubic feet	.0283	cubic meters
cubic meters	35.3145	cubic feet
cubic meters	1.3079	cubic yards
cubic yards	.7646	cubic meters
cubic inches	16.3872	cubic centimeters
cubic centimeters	.0610	cubic inches
cubic meters	1,000	cubic liters

USING THE BEARING WALL QUICKCALCULATOR

A Calculates the lineal feet of studs in a wall *before* adding for openings and corners. The length of the wall (Answer 1) is converted into inches by multiplying it by 12. The number of studs is calculated by dividing the wall length in inches by the stud centers (Answer 8), then adding 1 for the first stud. The calculation should now be rounded *up*, then multiplied by the wall height (Answer 4).

B Calculates the lineal feet of studs typically added for openings and corners. The number of openings (Answer 6) is multiplied by 2.4 (the *average* additional studs typically needed for an opening). The number of corners (Answer 7) is multiplied by 2.6 (the *average* additional studs typically needed at corners). The studs for openings and corners are added together, then should be rounded *up*. The total additional studs is then multiplied by the wall height (Answer 4).

C Calculates the total lineal feet of lumber in the wall. The length of the wall (Answer 1) is multiplied by the number of plates (Answer 3). The lineal feet of plates is added to the lineal feet of studs (Sum A) and additional studs (Sum B).

D Calculates the board feet in the headers. The lineal feet of headers (Answer 10) is multiplied by the header width (Answer 9), then multiplied by the wall thickness (Answer 5). This total is divided by 12 to convert to board feet.

E Calculates the total board feet in the wall. The lineal feet of board in the wall (Sum C) is multiplied by the wall width (Answer 5) then by the stud thickness (Answer 2). The total is divided by 12 to convert to board feet then added to the board feet in the headers (Sum D).

QUICK FACTS

See page 449 for more information about the geometric formulas used in this *QuickCalculator*. See page 357 for wall framing priced per board foot.

QUICK CALCULATOR
Bearing Wall

Use this sheet and a calculator to determine the board feet in a bearing wall. Calculate each line from left to right. Do math in parentheses first.

1 The wall(s) are 33.5 lineal feet long.

2 The studs are 2 inches thick.

3 There are 3 plates.

4 The wall(s) are 8 feet tall.

5 The studs are 6 inches wide.

6 There are 5 door and window openings.

7 There are 16 inches on center.

8 The studs are 17.5 lineal feet of header.

9 There are 4 corners.

10 The headers are 10 inches wide.

11 1/2 of studs (before openings) $\rightarrow \frac{33.5}{17.5} \times 12 + 1 = 216$ SUM A

12 1/2 of studs in openings $\rightarrow \frac{5}{2.4} \times 12 + 1 = 184$ SUM B

13 Lineal feet of board in wall $\rightarrow \frac{33.5}{17.5} \times 3 + \frac{4}{2.6} \times 12 = 501$ SUM C

14 Board feet in headers $\rightarrow \frac{17.5}{10} \times 6 \times 2 \div 12 = 88$ SUM D

15 Total board feet $\rightarrow \frac{501}{12} \times 2 + 88 = 589$ SUM E

*Round up answer to next whole number here before continuing with calculation.

Converting inches to decimal feet $1" = .083 \cdot 2" = .167 \cdot 3" = .25 \cdot 4" = .334 \cdot 5" = .417 \cdot 6" = .5 \cdot 7" = .584 \cdot 8" = .667 \cdot 9" = .75 \cdot 10" = .834 \cdot 11" = .917$

QUICK CALCULATOR

Bearing Wall

Use this sheet and a calculator to determine the board feet in a bearing wall.
Calculate each line from left to right. Do math in parentheses first.

1 The wall(s) are _____ lineal feet long.

2 The studs are _____ inches thick.

3 There are _____ plates.

4 The wall(s) are _____ feet tall.

5 The studs are _____ inches wide.

6 There are _____ door and window openings.

7 There are _____ corners.

8 The studs are _____ inches on center.

9 The headers are _____ inches wide.

10 There are _____ lineal feet of header.

A Lf of studs (before openings) $\rightarrow \left(\frac{\text{ANSWER 1}}{\text{ANSWER 8}} \times 12 \div \frac{\text{ANSWER 8}}{\text{ANSWER 4}} + 1 \right) \times \frac{\text{ANSWER 4}}{\text{ANSWER 4}} = \frac{\text{SUM A}}{\text{ANSWER 4}}$

B Lf of studs in openings $\rightarrow \left(\left(\frac{\text{ANSWER 6}}{\text{ANSWER 6}} \times 2.4 \right) + \left(\frac{\text{ANSWER 7}}{\text{ANSWER 7}} \times 2.6 \right) \right) \times \frac{\text{ANSWER 4}}{\text{ANSWER 4}} = \frac{\text{SUM B}}{\text{ANSWER 4}}$

C Lineal feet of board in wall $\rightarrow \frac{\text{ANSWER 1}}{\text{ANSWER 1}} \times \frac{\text{ANSWER 3}}{\text{ANSWER 3}} + \frac{\text{SUM A}}{\text{ANSWER 3}} + \frac{\text{SUM B}}{\text{ANSWER 3}} = \frac{\text{SUM C}}{\text{ANSWER 3}}$

D Board feet in headers $\rightarrow \frac{\text{ANSWER 10}}{\text{ANSWER 10}} \times \frac{\text{ANSWER 9}}{\text{ANSWER 9}} \times \frac{\text{ANSWER 5}}{\text{ANSWER 5}} \div 12 = \frac{\text{SUM D}}{\text{ANSWER 5}}$

E Total board feet $\rightarrow \frac{\text{SUM C}}{\text{ANSWER 5}} \times \frac{\text{ANSWER 5}}{\text{ANSWER 5}} \div 12 + \frac{\text{SUM D}}{\text{ANSWER 5}} = \frac{\text{SUM E}}{\text{ANSWER 5}}$

*Round up answer to next whole number here before continuing with calculation.

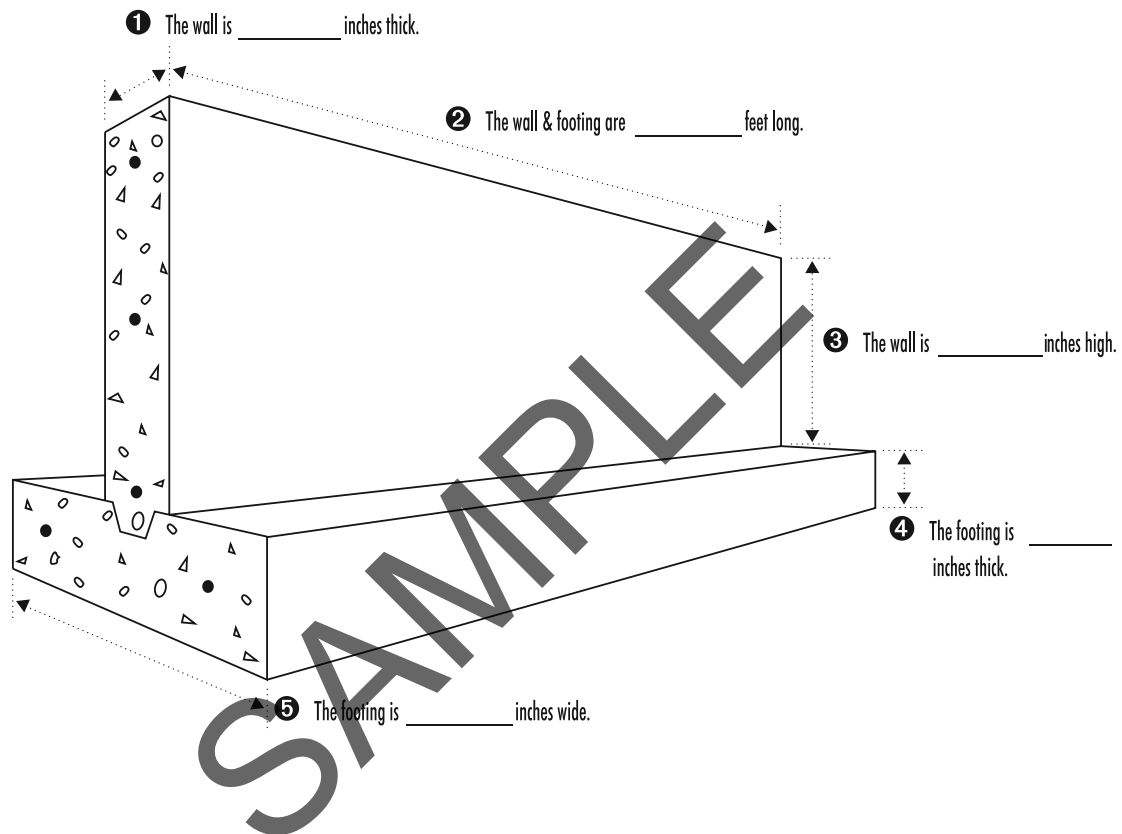
Converting Inches to Decimal Feet

1" = .084 • 2" = .167 • 3" = .25 • 4" = .334 • 5" = .417 • 6" = .5 • 7" = .584 • 8" = .667 • 9" = .75 • 10" = .834 • 11" = .917

QUICK CALCULATOR

Concrete Wall & Footing

Use this sheet and a calculator to determine the cubic yards of concrete in a foundation wall and footing.
Calculate each line from left to right.



A The cubic yards of footing → $\frac{\text{ANSWER 2}}{\text{ANSWER 2}} \times 12 \times \frac{\text{ANSWER 4}}{\text{ANSWER 4}} \times \frac{\text{ANSWER 5}}{\text{ANSWER 5}} \div 1,728 \div 27 = \frac{\text{SUM A}}{\text{SUM A}}$

B The cubic yards of wall → $\frac{\text{ANSWER 2}}{\text{ANSWER 2}} \times 12 \times \frac{\text{ANSWER 1}}{\text{ANSWER 1}} \times \frac{\text{ANSWER 3}}{\text{ANSWER 3}} \div 1,728 \div 27 = \frac{\text{SUM B}}{\text{SUM B}}$

C Total cubic yards of wall & footing → $\frac{\text{SUM A}}{\text{SUM A}} + \frac{\text{SUM B}}{\text{SUM B}} = \frac{\text{SUM C}}{\text{SUM C}}$

Converting Inches to Decimal Feet

1" = .084 • 2" = .167 • 3" = .25 • 4" = .334 • 5" = .417 • 6" = .5 • 7" = .584 • 8" = .667 • 9" = .75 • 10" = .834 • 11" = .917

USING GABLE ROOF RAFTERS

QUICKCALCULATOR

A Calculates the total number of rafters in the roof. The length of the roof (Answer 1) is converted into inches by multiplying it by 12. The number of rafters in the roof is calculated by taking the length in inches and dividing by the rafter centers (Answer 4) then adding 1 for the first rafter. Because you can never have a fraction of a rafter, the final answer should always be rounded *up* to the next *even* number. This calculates the total for one side of the roof only so the total is multiplied by 2.

B Calculates the lineal feet of rafters in the roof by multiplying the number of rafters (Sum A) by the rafter length (Answer 2).

C Calculates the board feet in the ridge and sub-fascia. The roof length (Answer 1) is multiplied by 3 (2 sub-fascia boards and 1 ridge) to get the total lineal feet of sub-fascia and ridge. This total is multiplied by the rafter thickness (Answer 5), then by the rafter width (Answer 3) plus 2" (e.g. a roof with 2" x 8" rafters will have 10" wide ridge and sub-fascia boards). This total is divided by 12 to get the total board feet in the ridge and sub-fascia boards.

D Calculates the total board feet in the roof system. The total lineal feet of rafters (Sum B) is *multiplied* by the rafter thickness (Answer 5) then by the rafter width (Answer 3). This total is *divided* by 12 to get the total board feet in the rafters. The total board feet of rafters is then added to the total board feet in the ridge and sub-fascia boards (Sum C) for the total board feet in the entire roof system.

QUICK CALCULATOR

Gable Roof Rafters

Use this sheet and a calculator to determine the board feet of rafters in a gable roof. Calculate each line from left to right. Do math in parentheses first.

1 The roof system is 31 feet long.

2 The rafters are 12.5 feet long.

3 The rafters are 8 inches wide.

4 The rafters are 24 inches on center.

5 The rafters are 2 inches thick.

6 The number of rafters: $\frac{31 \times 12}{24} + 1 = 16$ (Sum A)

7 Lineal feet of rafters: $16 \times 12.5 = 200$ (Sum B)

8 Bt in ridge & sub-fascia: $31 \times 3 \times 2 = 186$ (Sum C)

9 Total board feet in rafters: $\frac{200 \times 8 \times 2}{12} = 267$ (Sum D)

10 Total board feet in roof: $267 + 186 = 453$ (Sum E)

*The ridge and sub-fascia boards are calculated to be 2 inches wider than the rafters. **Does not include ceiling joists for the room below (as illustrated) or collar ties.

Converting inches to decimal feet: $1" = .084 \cdot 2' = .167 \cdot 3' = .25 \cdot 4' = .334 \cdot 5' = .417 \cdot 6' = .5 \cdot 7' = .584 \cdot 8' = .667 \cdot 9' = .75 \cdot 10' = .834 \cdot 11' = .917$

QUICK FACTS

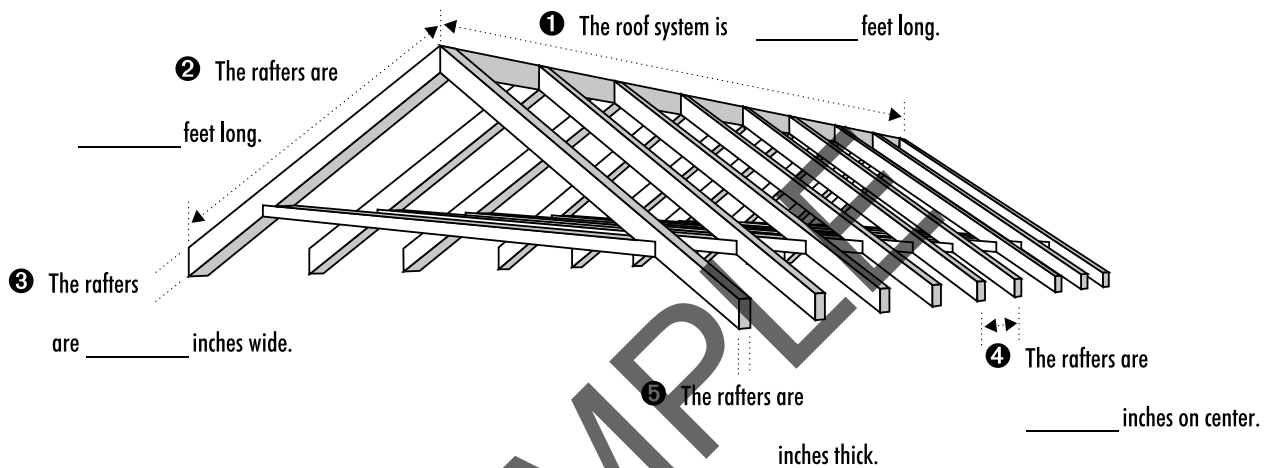
The sample *QuickCalculator* sheet shown above contains quantities that have been rounded. The total number of rafters should always be rounded up to the next even number. We also suggest rounding lineal feet and board feet to the nearest whole number.

See page 449 for more information about the geometric formulas used in this *QuickCalculator*. See page 372 for rafter systems priced per board foot.

QUICK CALCULATOR

Gable Roof Rafters

Use this sheet and a calculator to determine the board feet of rafters in a gable roof.
Calculate each line from left to right. Do math in parentheses first.



A The number of rafters $\rightarrow \left(\frac{\text{ANSWER 1}}{\text{ANSWER 4}} \times 12 \div \frac{\text{ANSWER 5}}{\text{ANSWER 4}} + 1 \right) \times 2 = \frac{\text{SUM A}}{\text{SUM A}}$ Round up to next even number

B Lineal feet of rafters $\rightarrow \frac{\text{SUM A}}{\text{SUM A}} \times \frac{\text{ANSWER 2}}{\text{ANSWER 2}} = \frac{\text{SUM B}}{\text{SUM B}}$

C Bf in ridge & sub-fascia* $\rightarrow \frac{\text{ANSWER 1}}{\text{ANSWER 1}} \times 3 \times \frac{\text{ANSWER 5}}{\text{ANSWER 5}} \times \left(\frac{\text{ANSWER 3}}{\text{ANSWER 3}} + 2 \right) \div 12 = \frac{\text{SUM C}}{\text{SUM C}}$

D Total board feet in roof** $\rightarrow \frac{\text{SUM B}}{\text{SUM B}} \times \frac{\text{ANSWER 5}}{\text{ANSWER 5}} \times \frac{\text{ANSWER 3}}{\text{ANSWER 3}} \div 12 + \frac{\text{SUM C}}{\text{SUM C}} = \frac{\text{SUM D}}{\text{SUM D}}$

*The ridge and sub-fascia boards are calculated to be 2 inches wider than the rafters. **Does not include ceiling joists for the room below (as illustrated) or collar ties.

Converting Inches to Decimal Feet

1" = .084 • 2" = .167 • 3" = .25 • 4" = .334 • 5" = .417 • 6" = .5 • 7" = .584 • 8" = .667 • 9" = .75 • 10" = .834 • 11" = .917

USING THE GABLE ROOF TRUSSES QUICKCALCULATOR

A Calculates the number of trusses in the roof by converting the length of the roof (Answer 1) into inches by multiplying it by 12. The number of trusses is then calculated by taking this length in inches, dividing it by the truss centers (Answer 3), then adding 1 for the first truss.

B Calculates the lineal feet of trusses by multiplying the number of trusses (Sum A) by the length of the truss bottom chord (Answer 2).

QUICK CALCULATOR

Gable Roof Trusses

Use this sheet and a calculator to determine the number and lineal feet of trusses in a gable roof.
Calculate each line from left to right.

1 The roof system is 32.5 feet long.

2 The truss bottom chord is 20 feet wide.

3 The trusses are 24 inches on center.

4 Number of trusses: $32.5 \times 12 \div 24 + 1 = 18$ (Sum A)

5 Lineal feet of trusses: $18 \times 20 = 360$ (Sum B)

Converting Inches to Decimal Feet: $1'' = .084 \cdot 2'' = .167 \cdot 3'' = .25 \cdot 4'' = .334 \cdot 5'' = .417 \cdot 6'' = .5 \cdot 7'' = .584 \cdot 8'' = .667 \cdot 9'' = .75 \cdot 10'' = .834 \cdot 11'' = .917$

QUICK FACTS

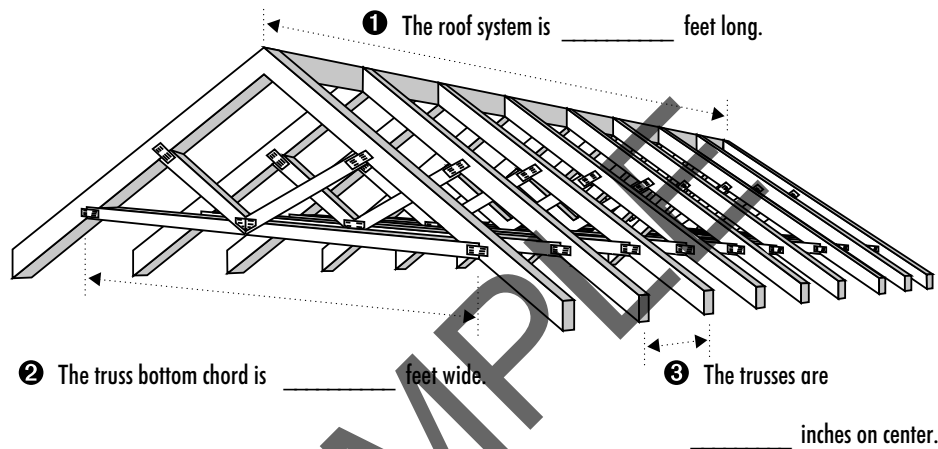
The sample *QuickCalculator* sheet shown above contains quantities that have been rounded. The total number of trusses should always be rounded up to the next whole number. We also suggest rounding lineal feet lineal feet to the nearest whole number.

See page 449 for more information about the geometric formulas used in this *QuickCalculator*. See page 374 for truss systems priced per lineal foot.

QUICK CALCULATOR

Gable Roof Trusses

Use this sheet and a calculator to determine the number and lineal feet of trusses in a gable roof.
Calculate each line from left to right.



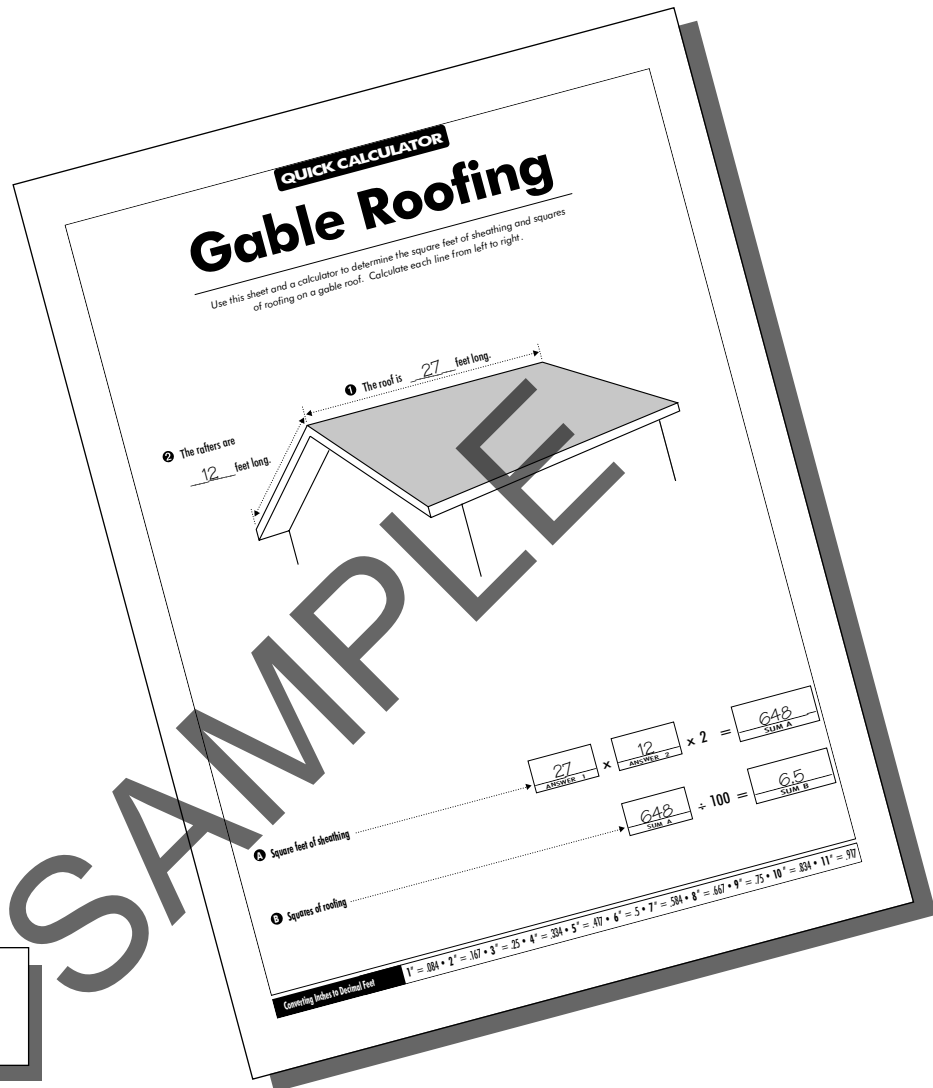
A Number of trusses _____ $\rightarrow$ $\frac{\text{ANSWER 1}}{\text{ANSWER 3}} \times 12 \div \text{ANSWER 3} + 1 = \text{SUM A}$ Round up to next whole number

B Lineal feet of trusses _____ $\rightarrow$ $\text{SUM A} \times \text{ANSWER 2} = \text{SUM B}$

Converting Inches to Decimal Feet

1" = .084 • 2" = .167 • 3" = .25 • 4" = .334 • 5" = .417 • 6" = .5 • 7" = .584 • 8" = .667 • 9" = .75 • 10" = .834 • 11" = .917

USING THE GABLE ROOFING QUICKCALCULATOR



A Calculates the square feet of sheathing on the roof by multiplying the roof length (Answer 1) by the rafter length (Answer 2), then multiplying this total by 2 to calculate both sides of the roof.

B Calculates the squares of roofing by dividing the square feet of roof (Sum A) by 100.

QUICK FACTS

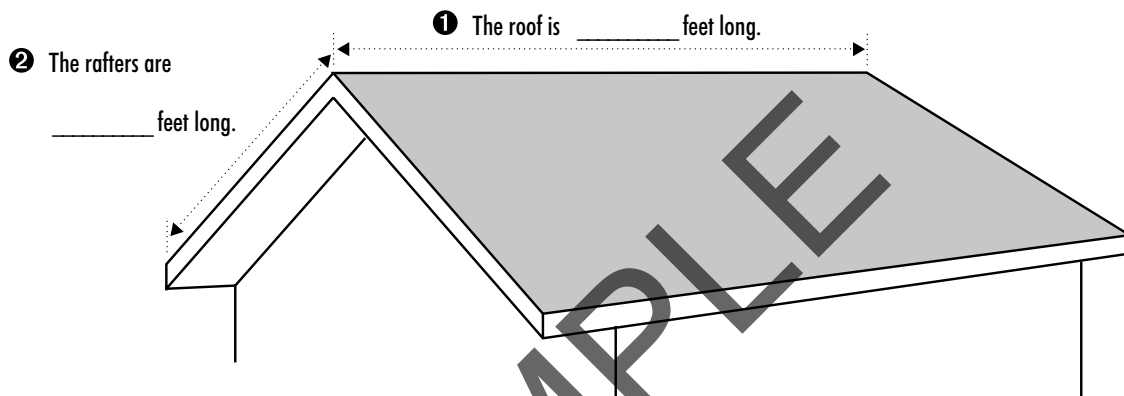
🔍 The sample *QuickCalculator* sheet shown above contains quantities that have been rounded. We suggest rounding sheathing to the nearest square foot and rounding squares *up* to the next 1/5 square for shakes, the next 1/4 square for wood shingles and clay tile, and the next 1/3 square for asphalt shingles.

🔍 See page 449 for more information about the geometric formulas used in this *QuickCalculator*. Also see Roofing beginning on page 339.

QUICK CALCULATOR

Gable Roofing

Use this sheet and a calculator to determine the square feet of sheathing and squares of roofing on a gable roof. Calculate each line from left to right.



A Square feet of sheathing

$$\boxed{\text{ANSWER 1}} \times \boxed{\text{ANSWER 2}} \times 2 = \boxed{\text{SUM A}}$$

B Squares of roofing

$$\boxed{\text{SUM A}} \div 100 = \boxed{\text{SUM B}}$$

Converting Inches to Decimal Feet

1" = .084 • 2" = .167 • 3" = .25 • 4" = .334 • 5" = .417 • 6" = .5 • 7" = .584 • 8" = .667 • 9" = .75 • 10" = .834 • 11" = .917

USING THE JOIST SYSTEM QUICKCALCULATOR

A Calculates the total number of joists. The length of the joist system (Answer 1) is converted into inches by multiplying it by 12. The number of joists is calculated by taking the joist system length in inches and dividing it by the joist centers (Answer 4) then adding 1 for the first joist.

B Calculates the lineal feet of joists by multiplying the number of joists (Sum A) by the joist length (Answer 2).

C Calculates the lineal feet in rim joists and in solid blocking. The length of the rim joist (Answer 1) is multiplied by 2 for rim joists on both sides of the joist system. The total lineal feet of rim joists are then added to the lineal feet of solid blocking (Answer 6).

D Calculates total lineal feet of lumber in the joist system by adding the lineal feet of joists (Sum B) to the lineal feet of rim joists and solid blocking (Sum C).

E Calculates the board feet in the joist system by multiplying the total lineal feet of joists (Sum D) by the joist thickness (Answer 5), then by the joist width (Answer 3). This total is then divided by 12.

QUICK FACTS

🔍 The sample *QuickCalculator* sheet shown above contains quantities that have been rounded. The total number of joists should always be rounded up to the next whole number. We also suggest rounding lineal feet and board feet to the nearest whole number.

🔍 page 449 for more information about the geometric formulas used in this *QuickCalculator*. See page 369 for joist systems priced per board foot.

Joist System QUICK CALCULATOR

Use this sheet and a calculator to determine the lineal feet and board feet in a joist system. Calculate each line from left to right.

1 The joist system is 25 feet long.

2 The joists are 15 feet long.

3 The joists are 10 inches wide.

4 The joists are 24 inches on center.

5 The joists are 2 inches thick.

6 There are 25 lineal feet of solid blocking in the joist system.

7 The number of joists: $\frac{25 \text{ ANSWER 1} \times 12}{24 \text{ ANSWER 4}} + 1 = 14 \text{ SUM A}$ (Round up to next whole number)

8 The lineal feet of joists: $15 \text{ ANSWER 2} \times 14 \text{ SUM A} = 210 \text{ SUM B}$

9 The lineal feet of rim joists and blocking: $25 \text{ ANSWER 1} \times 2 + 25 \text{ ANSWER 6} = 75 \text{ SUM C}$

10 The total lineal feet of all joists and blocking: $210 \text{ SUM B} + 75 \text{ SUM C} = 285 \text{ SUM D}$

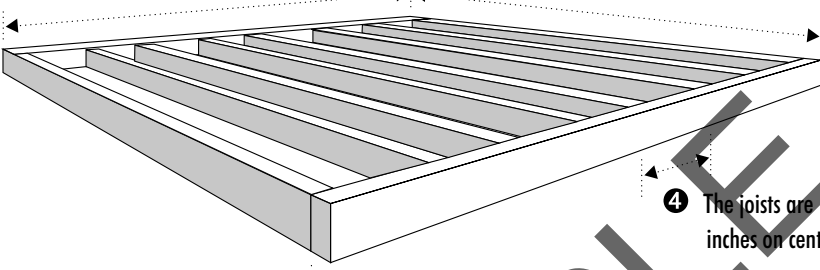
11 The total board feet in the joist system: $285 \text{ SUM D} \times 2 \text{ ANSWER 5} \times 10 \text{ ANSWER 3} \div 12 = 475 \text{ SUM E}$

Converting Inches to Decimal Feet: $1" = .083 \cdot 2" = .167 \cdot 3" = .25 \cdot 4" = .334 \cdot 5" = .417 \cdot 6" = .5 \cdot 7" = .584 \cdot 8" = .667 \cdot 9" = .75 \cdot 10" = .834 \cdot 11" = .917$

QUICK CALCULATOR

Joist System

Use this sheet and a calculator to determine the lineal feet and board feet in a joist system.
Calculate each line from left to right.



1 The joist system is _____ feet long.

2 The joists are _____ feet long.

3 The joists are _____ inches wide.

4 The joists are _____ inches on center.

5 The joists are _____ inches thick.

6 There are _____ lineal feet of solid blocking in the joist system.

A The number of joists $\frac{\text{ANSWER 1}}{\text{ANSWER 4}} \times 12 \div \frac{\text{ANSWER 4}}{\text{ANSWER 4}} + 1 = \frac{\text{SUM A}}{\text{SUM A}}$ Round up to next whole number

B The lineal feet of joists $\frac{\text{ANSWER 2}}{\text{ANSWER 2}} \times \frac{\text{SUM A}}{\text{SUM A}} = \frac{\text{SUM B}}{\text{SUM B}}$

C The lineal feet of rim joists and blocking $\frac{\text{ANSWER 1}}{\text{ANSWER 1}} \times 2 + \frac{\text{ANSWER 6}}{\text{ANSWER 6}} = \frac{\text{SUM C}}{\text{SUM C}}$

D The total lineal feet of all joists and blocking $\frac{\text{SUM B}}{\text{SUM B}} + \frac{\text{SUM C}}{\text{SUM C}} = \frac{\text{SUM D}}{\text{SUM D}}$

E The total board feet in the joist system $\frac{\text{SUM D}}{\text{SUM D}} \times \frac{\text{ANSWER 5}}{\text{ANSWER 5}} \times \frac{\text{ANSWER 3}}{\text{ANSWER 3}} \div 12 = \frac{\text{SUM E}}{\text{SUM E}}$

Converting Inches to Decimal Feet

1" = .084 • 2" = .167 • 3" = .25 • 4" = .334 • 5" = .417 • 6" = .5 • 7" = .584 • 8" = .667 • 9" = .75 • 10" = .834 • 11" = .917

USING THE NON-BEARING WALL

QUICKCALCULATOR

A Calculates the lineal feet of studs in a wall *before* adding for openings and corners. The length of the wall (Answer 1) is converted into inches by multiplying it by 12. The number of studs is calculated by dividing the wall length in inches by the stud centers (Answer 8), then adding 1 for the first stud. The calculation should now be rounded *up*, then multiplied by the wall height (Answer 4).

B Calculates the lineal feet of studs typically added for openings and corners. The number of openings (Answer 6) is multiplied by 2.4 (the *average* additional studs typically needed for an opening). The number of corners (Answer 7) is multiplied by 2.6 (the *average* additional studs typically needed at corners). The studs for openings and corners are added together, then should be rounded *up*. The total additional studs is then multiplied by the wall height (Answer 4).

C Calculates the total lineal feet of lumber in the wall. The length of the wall (Answer 1) is multiplied by the number of plates (Answer 3). The lineal feet of plates is added to the lineal feet of studs (Sum A) and additional studs (Sum B).

D Calculates the total board feet in the wall. The lineal feet of board in the wall (Sum C) is multiplied by the wall width (Answer 5) then by the stud thickness (Answer 2). The total is divided by 12 to convert to board feet.

QUICK CALCULATOR

Non-Bearing Wall

Use this sheet and a calculator to determine the board feet in an interior wall. Calculate each line from left to right. Do math in parentheses first.

1 The wall(s) are 33.5 lineal feet long

2 The studs are 2 inches thick.

3 There are 3 plates.

4 The wall(s) are 8 feet tall.

5 The studs are 6 inches wide.

6 There are 5 door and window openings.

7 There are 4 corners.

8 The studs are 16 inches on center.

9 If of studs (before opening) → $\frac{33.5}{\text{ANSWER 8}} \times 12 \div \frac{16}{\text{ANSWER 2}} + 1 \times \frac{8}{\text{ANSWER 4}} = \frac{216}{\text{SUM A}}$

10 If of studs in opening → $\left(\frac{5}{\text{ANSWER 6}} \times 2.4 \right) + \left(\frac{4}{\text{ANSWER 7}} \times 2.6 \right) \times \frac{8}{\text{ANSWER 4}} = \frac{184}{\text{SUM B}}$

11 Lineal feet of board in wall → $\frac{33.5}{\text{ANSWER 1}} \times \frac{3}{\text{ANSWER 3}} + \frac{216}{\text{SUM A}} + \frac{184}{\text{SUM B}} = \frac{501}{\text{SUM C}}$

12 Total board feet in wall → $\frac{501}{\text{SUM C}} \times \frac{6}{\text{ANSWER 5}} \times \frac{2}{\text{ANSWER 2}} \div 12 = \frac{501}{\text{SUM D}}$

*Round up answer to next whole number here before continuing with calculation.

Converting Inches to Decimal Feet $1" = .083 \cdot 2" = .167 \cdot 3" = .25 \cdot 4" = .334 \cdot 5" = .417 \cdot 6" = .5 \cdot 7" = .584 \cdot 8" = .667 \cdot 9" = .75 \cdot 10" = .834 \cdot 11" = .917$

QUICK FACTS

The sample *QuickCalculator* sheet shown above contains quantities that have been rounded. When calculating Sum A and Sum B we suggest rounding the calculation up to the next whole number at the asterisk. Board feet and lineal feet should be rounded.

See page 449 for more information about the geometric formulas used in this *QuickCalculator*. See page 357 for walls priced per board foot.

QUICK CALCULATOR

Non-Bearing Wall

Use this sheet and a calculator to determine the board feet in an interior wall.
Calculate each line from left to right. Do math in parentheses first.

1 The wall(s) are _____ lineal feet long

2 The studs are _____ inches thick.

3 There are _____ plates.

4 The wall(s) are _____ feet tall.

5 The studs are _____ inches wide.

6 There are _____ door and window openings.

7 There are _____ corners.

8 The studs are _____ inches on center.

A Lf of studs (before openings) $\rightarrow \left(\frac{\text{ANSWER 1}}{\text{ANSWER 8}} \times 12 \div \frac{\text{ANSWER 8}}{\text{ANSWER 4}} + 1 \right)^* \times \frac{\text{ANSWER 4}}{\text{ANSWER 4}} = \frac{\text{SUM A}}{\text{ANSWER 4}}$

B Lf of studs in openings $\rightarrow \left(\left(\frac{\text{ANSWER 6}}{\text{ANSWER 6}} \times 2.4 \right) + \left(\frac{\text{ANSWER 7}}{\text{ANSWER 7}} \times 2.6 \right) \right)^* \times \frac{\text{ANSWER 4}}{\text{ANSWER 4}} = \frac{\text{SUM B}}{\text{ANSWER 4}}$

C Lineal feet of board in wall $\rightarrow \frac{\text{ANSWER 1}}{\text{ANSWER 1}} \times \frac{\text{ANSWER 3}}{\text{ANSWER 3}} + \frac{\text{SUM A}}{\text{SUM A}} + \frac{\text{SUM B}}{\text{SUM B}} = \frac{\text{SUM C}}{\text{SUM C}}$

D Total board feet in wall $\rightarrow \frac{\text{SUM C}}{\text{SUM C}} \times \frac{\text{ANSWER 5}}{\text{ANSWER 5}} \times \frac{\text{ANSWER 2}}{\text{ANSWER 2}} \div 12 = \frac{\text{SUM D}}{\text{SUM D}}$

*Round up answer to next whole number here before continuing with calculation.

Converting Inches to Decimal Feet

1" = .084 • 2" = .167 • 3" = .25 • 4" = .334 • 5" = .417 • 6" = .5 • 7" = .584 • 8" = .667 • 9" = .75 • 10" = .834 • 11" = .917

USING THE PRISMATIC ROOM QuickCalculator

QUICK CALCULATOR

Prismatic Room

Use this sheet and a calculator to determine the area of a prismatic room where all walls are of equal length.
Use for pentagonal rooms, hexagonal rooms, octagonal rooms, and so forth.
Calculate each line from left to right.

1 The longest measurement between prism walls is 21.5 feet.

2 The room is 8 feet tall.

3 Each wall in the prism is 9.75 feet long.

4 The prism contains 8 sides of equal length.

5 Perimeter of room: $8 \times 9.75 = 78$ (SUM A)

6 Square feet of walls: $78 \times 8 = 624$ (SUM B)

7 Square feet of ceiling / floor: $22 \times 9.75 \div 2 \times 8 = 429$ (SUM C)

8 Square yards of floor: $429 \div 9 = 47.67$ (SUM D)

Converting Inches to Decimal Feet: $1" = .084 \cdot 2" = .167 \cdot 3" = .25 \cdot 4" = .334 \cdot 5" = .417 \cdot 6" = .5 \cdot 7" = .584 \cdot 8" = .667 \cdot 9" = .75 \cdot 10" = .834 \cdot 11" = .917$

A Calculates the perimeter of the prism by multiplying the number of prism walls (Answer 4) by the length of the prism walls (Answer 3).

B Calculates the square feet of walls by multiplying the perimeter of the room (Sum A) by the room height (Answer 2).

C Calculates the square feet of ceiling / floor by taking the longest dimension between walls (Answer 1) and dividing by 2 to determine the radius. The radius is multiplied by the length of each prism wall (Answer 3), divided by 2 and multiplied by the height of the walls (Answer 2).

D Calculates the square yards of flooring by dividing the square feet of floor (Sum C) by 9.

QUICK FACTS

The sample *QuickCalculator* sheet shown above contains quantities that have been rounded. We suggest rounding lineal feet to two decimal places then to the nearest inch when converting to inches. Square feet should probably be rounded to the nearest square foot and square yards should be rounded up to the nearest 1/3 or 1/4 yard.

See page 449 for more information about the geometric formulas used in this *QuickCalculator*.

QUICK CALCULATOR

Prismatic Room

Use this sheet and a calculator to determine the area of a prismatic room where all walls are of equal length.
Use for pentagonal rooms, heptagonal rooms, octagonal rooms, and so forth.
Calculate each line from left to right.

① The longest measurement between prism walls is _____ feet.

② The room is _____ feet tall.

③ Each wall in the prism is _____ feet long.

④ The prism contains _____ sides of equal length.

A Perimeter of room $\rightarrow$ $\frac{\text{ANSWER 4}}{\text{ANSWER 4}} \times \frac{\text{ANSWER 3}}{\text{ANSWER 3}} = \frac{\text{SUM A}}{\text{SUM A}}$

B Square feet of walls $\rightarrow$ $\frac{\text{SUM A}}{\text{SUM A}} \times \frac{\text{ANSWER 2}}{\text{ANSWER 2}} = \frac{\text{SUM B}}{\text{SUM B}}$

C Square feet of ceiling / floor $\rightarrow$ $\frac{\text{ANSWER 1}}{\text{ANSWER 1}} \div 2 \times \frac{\text{ANSWER 3}}{\text{ANSWER 3}} \div 2 \times \frac{\text{ANSWER 2}}{\text{ANSWER 2}} = \frac{\text{SUM C}}{\text{SUM C}}$

D Square yards of floor $\rightarrow$ $\frac{\text{SUM C}}{\text{SUM C}} \div 9 = \frac{\text{SUM D}}{\text{SUM D}}$

Converting Inches to Decimal Feet

1" = .084 • 2" = .167 • 3" = .25 • 4" = .334 • 5" = .417 • 6" = .5 • 7" = .584 • 8" = .667 • 9" = .75 • 10" = .834 • 11" = .917

USING THE RECTANGULAR ROOM QuickCalculator

QUICK CALCULATOR

Rectangular Room

Use this sheet and a calculator to determine the area of a rectangular room. Calculate each line from left to right. Do math in parentheses first.

1 The room is 14.75 feet long.

2 The room is 8 feet tall.

3 The room is 11.25 feet wide.

4 Perimeter of room: $14.75 + 11.25 \times 2 = 52$ (SUM A)

5 Square feet of walls: $52 \times 8 = 416$ (SUM B)

6 Square feet of ceiling / floor: $14.75 \times 11.25 = 166$ (SUM C)

7 Square yards of floor: $166 \div 9 = 18.5$ (SUM D)

Converting Inches to Decimal Feet: $1'' = .084 \cdot 2'' = .167 \cdot 3'' = .25 \cdot 4'' = .334 \cdot 5'' = .417 \cdot 6'' = .5 \cdot 7'' = .584 \cdot 8'' = .667 \cdot 9'' = .75 \cdot 10'' = .834 \cdot 11'' = .917$

A Calculates the perimeter of the room by adding the length (Answer 1) to the width (Answer 3) and multiplying by 2.

B Calculates the square feet of walls by multiplying the perimeter of the room (Sum A) by the room height (Answer 2).

C Calculates the square feet of ceiling / floor by multiplying the length of the room (Answer 1) by the width (Answer 3).

D Calculates the square yards of flooring by dividing the square feet of floor (Sum C) by 9.

QUICK FACTS

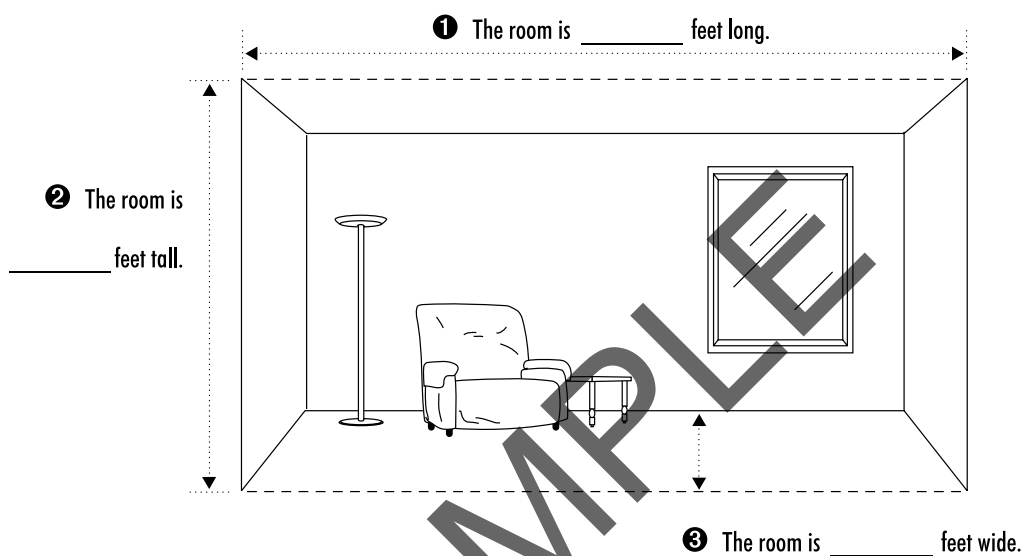
The sample *QuickCalculator* sheet shown above contains quantities that have been rounded. We suggest rounding lineal feet to two decimal places then to the nearest inch when converting to inches. Square feet should probably be rounded to the nearest square foot and square yards should be rounded to the nearest 1/3 or 1/4 yard.

See page 449 for more information about the geometric formulas used in this *QuickCalculator*.

QUICK CALCULATOR

Rectangular Room

Use this sheet and a calculator to determine the area of a rectangular room.
Calculate each line from left to right. Do math in parentheses first.



A Perimeter of room $\left(\frac{\text{ANSWER 1}}{\text{ANSWER 1}} + \frac{\text{ANSWER 3}}{\text{ANSWER 3}} \right) \times 2 = \frac{\text{SUM A}}{\text{SUM A}}$

B Square feet of walls $\frac{\text{SUM A}}{\text{SUM A}} \times \frac{\text{ANSWER 2}}{\text{ANSWER 2}} = \frac{\text{SUM B}}{\text{SUM B}}$

C Square feet of ceiling / floor $\frac{\text{ANSWER 1}}{\text{ANSWER 1}} \times \frac{\text{ANSWER 3}}{\text{ANSWER 3}} = \frac{\text{SUM C}}{\text{SUM C}}$

D Square yards of floor $\frac{\text{SUM C}}{\text{SUM C}} \div 9 = \frac{\text{SUM D}}{\text{SUM D}}$

Converting Inches to Decimal Feet

1" = .084 • 2" = .167 • 3" = .25 • 4" = .334 • 5" = .417 • 6" = .5 • 7" = .584 • 8" = .667 • 9" = .75 • 10" = .834 • 11" = .917

USING THE ROUND ROOM QUICKCALCULATOR

QUICK CALCULATOR
Round Room

Use this sheet and a calculator to determine the area of a round room.
Calculate each line from left to right.

1 The room is 12.5 feet in diameter.

2 The room is 8 feet tall.

3 Perimeter of room: $12.5 \times 3.1416 = 39.27$ (SUM A)

4 Square feet of walls: $39.27 \times 8 = 314$ (SUM B)

5 Square feet of ceiling / floor: $12.5 \times 12.5 \times .7854 = 123$ (SUM C)

6 Square yards of floor: $123 \div 9 = 13.67$ (SUM D)

Converting Inches to Decimal Feet: $1" = .083 \cdot 2" = .167 \cdot 3" = .25 \cdot 4" = .334 \cdot 5" = .417 \cdot 6" = .5 \cdot 7" = .584 \cdot 8" = .667 \cdot 9" = .75 \cdot 10" = .834 \cdot 11" = .917$

A Calculates the perimeter of the circle by multiplying the diameter (Answer 1) by Pi (3.1416).

B Calculates the square feet of walls by multiplying the perimeter of the room (Sum A) by the room height (Answer 2).

C Calculates the square feet of ceiling / floor by squaring the diameter (Answer 1 times Answer 1) and multiplying by .7854.

D Calculates the square yards of flooring by dividing the square feet of floor (Sum C) by 9.

QUICK FACTS

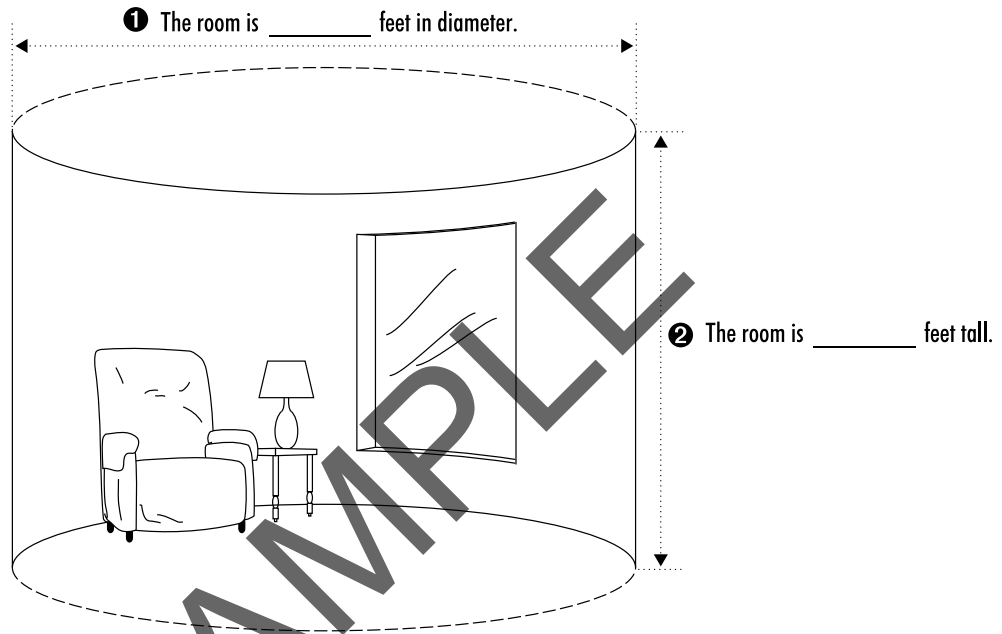
The sample *QuickCalculator* sheet shown above contains quantities that have been rounded. We suggest rounding lineal feet to two decimal places then to the nearest inch when converting to inches. Square feet should probably be rounded to the nearest square foot and square yards should be rounded to the nearest 1/3 or 1/4 yard.

See page 449 for more information about the geometric formulas used in this *QuickCalculator*.

QUICK CALCULATOR

Round Room

Use this sheet and a calculator to determine the area of a round room.
Calculate each line from left to right.



A Perimeter of room $\boxed{\text{ANSWER 1}} \times 3.1416 = \boxed{\text{SUM A}}$

B Square feet of walls $\boxed{\text{SUM A}} \times \boxed{\text{ANSWER 2}} = \boxed{\text{SUM B}}$

C Square feet of ceiling / floor $\boxed{\text{ANSWER 1}} \times \boxed{\text{ANSWER 1}} \times .7854 = \boxed{\text{SUM C}}$

D Square yards of floor $\boxed{\text{SUM C}} \div 9 = \boxed{\text{SUM D}}$

Converting Inches to Decimal Feet

1" = .084 • 2" = .167 • 3" = .25 • 4" = .334 • 5" = .417 • 6" = .5 • 7" = .584 • 8" = .667 • 9" = .75 • 10" = .834 • 11" = .917

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