

# ESTIMATING HOME BUILDING COSTS

Revised

By W.P. Jackson; revised by Brian E.P. Beeston



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*To Katherine,  
whose patience and support made this rewrite possible.  
With thanks and with love, Brian*

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## Chapter 1

# The Building Site

ONE OF THE BIGGEST investments most people make is in a home. Ask any person on the street, and they'll tell you — in detail — what their dream home would be. Most contractors try to put a little dream in every home they build. Some people dream of a huge country kitchen. Others visualize a cozy bedroom fireplace. What their dreams have in common is that the whole package has to be there. Not just the perfect kitchen or fireplace but, maybe the most important thing of all, the ideal setting. Even if our dreams take us to the Bahamas or Hawaii, what most of us seek is — location, location, location. So that's what we'll focus on first in this book: selecting the right site at the right price.

Site selection costs are included in this book for speculative (spec) builders: those who buy land and build houses to sell for profit, rather than those under contract to build for someone else. The cost of the building site isn't a construction cost unless you buy it and build a house for subsequent sale. In that case, the site cost is factored in. This chapter will serve as a guide to evaluating site costs, which include the purchase price of the site, recording and legal fees, engineering fees for the survey, interest, taxes, liability insurance and other expenses incurred before the house and lot are sold.

All too often, a spec builder is content to build a house without giving thought to possible disadvantages of the site. A wise builder knows what conditions add value to the finished home, and avoids any site that could reduce his profit.

When the house is finished and the property is appraised, the appraiser will look for:

1. Growth/decline of the local housing market
2. Where the property fits in the growth/decline pattern
3. The appearance and desirability of the street or area

4. Demographic and economic indicators for the area, such as population, employment opportunities, rate of growth or decline of the population and the reason why
5. Accessibility to good schools, churches, shopping centers, recreation areas and public transportation
6. Terrain
7. Adequacy of water supply
8. Adequacy of sewage disposal
9. Mandatory preservation of trees on the site (trees can add as much as 25 percent to the appraised land value, in many locations)

## The Move Back to the City

The move to the suburbs slowed a bit in the early 2000s, when fuel prices skyrocketed. Urban renewal has provided desirable neighborhoods, shopping variety, nearby medical facilities, and a full range of cultural opportunities. Urban construction generally has the advantage of immediate sewer and water connections, with streets, walks and utilities already in place.

However, there may not be many large building sites available in the city. If you intend to build more than one structure, you may only find lots that are scattered, rather than adjoining. You could have a tough time finding *any* prime sites, and may be forced to reconsider a site you once passed up. You may have to take a second look in older sections of town, as well as any vacant lot that has become a catch-all for neighborhood debris. Take another look at hillside sites that you once passed over. With adequate preparation, they could be the most profitable locations.

Never pay an inflated price for property based on a rumor that new industry is coming into the area. Check first to find out if the rumor is true. Your best resource for this information is the city planning department.

Check sales of comparable lots in the area. Go to the county recorder's office to find the most recent records of sale. Taxes paid on the transfer can help you determine a fair market price. Take along the legal description of the land in question. If the legal description and the name of the owner of the land aren't available at the county recorder's office, inquire at the local tax department. It also helps to have the names and addresses of surrounding property owners. The agency responsible for property taxes has the name and address of the owner of the property on file. For a nominal fee, anyone can check these records.

The selling price of nearby sites doesn't always tell you how much you should pay for a lot. That information just helps you get a ballpark figure. A building site with the lowest price may turn out to be the most expensive to build on, in the long run. But there are also

times when lots, reclaimed after on-site demolition, can be bought and developed into building sites for less than the surrounding lots. Estimate your costs to develop the property, as opposed to building on more expensive sites. The expensive sites may end up being more economical in the long run.

When looking for suitable lots in or near the city, keep in mind:

- Ideally, a single-family house shouldn't take up more than 40 percent of the lot. Lot size should be adequate for the planned house, and shaped so that the structure can be situated without violating local building codes.
- There should be easy access to (and circulation around) the building. When it's completed, can the house be maintained without trespassing on adjoining property?
- If required, there should be sufficient room for safe and sanitary installation of an individual water supply and sewage disposal system.

Zoning ordinances vary from community to community, but they're all intended to protect the health and safety — as well as the investments — of residents. Zoning rules once fit on one piece of paper, with room to spare. Not any more. Zoning ordinances are multisection, multipage legal documents that include every conceivable exception and special requirement. Fortunately, they're also readily available. Most cities and counties have planning departments or websites to help you find zoning ordinances.

## Check the Site Before Buying

Your goal is to build and sell a spec house quickly, when (or even before) it's completed. It's critical that you know as much as possible about the site before you buy.

Determine beforehand the type of house you want to build and the target price range. If your house is substantially more (or less) expensive than the average house in the neighborhood, you could have a problem selling it. That narrows the prospective market, so you'll wait longer for a buyer. A good rule of thumb: price your house within 15 to 25 percent of the average price in the neighborhood.

A good neighborhood is always a plus at selling time. Buy in growing areas. Proximity to schools, shopping centers, public transportation, hospitals and recreation areas are desirable to homebuyers. Vacant houses in the area may be signaling a declining market. You may find lower land prices near the proposed site of an airport or a future highway, but keep in mind that selling any house built there could be difficult, and will usually be at a lower profit margin.

Always check with the local planning commission for zoning regulations. Zoning regulations and deed restrictions may be the reason properties are sitting vacant, so know the area inside and out before purchasing a site. Don't count on breaking the rules and getting away with it.

City staff — and your neighbors — take zoning laws very seriously. Ask about future plans for the area that could affect your decision to buy in that jurisdiction. A building moratorium may be in place, or planned. If that's the case, don't buy the land until you get confirmation that the moratorium will be lifted by a specified date. Take an option on the land if necessary. Taxes, interest, and insurance are your financial responsibility the minute that property becomes yours. Finally, buying in a no-growth area can mean financial suicide: idle land is 100 percent liability.

If you're buying land as an investment, answer the following questions before buying:

1. Can you afford the monthly payments, taxes, and other assessments on the land until a house is built and the property is sold?
2. Is the area expected to continue growing? Is that growth expected in the residential, industrial, or commercial sector?
3. Are any highways planned through this area?
4. What are the future plans for zoning in the area?

There are rarely opportunities to both select the lot(s) you want and orient the house(s) on-site for maximum energy efficiency and livability. Some of the following types of property you initially rejected may be worth a second look:

- Wooded areas are expensive to develop, but with careful planning, can become beautiful building sites. They'll have a much higher resale value, if properly designed.
- Bare land, or land with few trees is cheaper to develop and build on, but landscaping it can be expensive.
- Hillside lots can have views that take your breath away. They can be developed into beautiful sites, but expect to have more than your breath taken away. Building to code here can be twice as expensive as construction on a flat lot. Not surprisingly, some of the most exclusive houses built today are on hillside lots.

## Purchase Price of Site

You've found the land you want to purchase. What steps do you take to buy it?

1. Hire a reputable attorney who specializes in land-use law.

2. Verify that a clear title to the property exists.
3. Check present and future zoning regulations for the area.
4. Do your research. Is a highway, shopping mall, or industrial park intended for nearby property in the foreseeable future? Is the site under the flight path of a present or future airport?
5. Is the site on or near a landfill or toxic dump site? Is there evidence the land could be chemically contaminated? If there's a chance of toxic contamination, thoroughly investigate the property.
6. Know the present and projected tax rate.
7. If there aren't already service lines to the property, contact the utility companies about installing them.
8. Research building codes, deed restrictions, easement rights, and any other building requirements for the land.

\*You can find Blank Cost Estimate Worksheets on the CD inside the back cover of this book. Make entries only in the underlined cells.

There's a cost estimate worksheet for the building site at the end of this chapter. When completed, it can show you what the total cost of the building site will be when you sell the improved property. Any additional costs of the land, along with the purchase price, are included in your building site cost. These costs are explained in the following sections. If you build under contract for a landowner (who's paying these additional costs), don't make entries in cost lines 1.1 through 1.7 on the *Cost Estimate Worksheet*.

Enter the ***purchase price of the land*** on Line 1.1 of your *Cost Estimate Worksheet*. \*We'll use a figure of \$60,000 in our Example *Cost Estimate Worksheet*.



## Recording and Legal Fees

In many states, a lawyer must complete any real estate transaction and prepare and record the deed. The seller (*grantor*) normally pays for preparing the deed, but the buyer (*grantee*) pays to transfer the property, including the deed of trust (if there is one), the recording fee, his share of the transfer tax, and the title check (to confirm a clear title).

The title should be free of any mortgages, mechanics liens, easements, or encumbrances that could influence your decision to buy the land.

If the building site is on a private road, determine the assessments for maintenance, snow removal, and utility lines. These fees add to the cost of the land. If the site is on a private street, make sure there's a permanent easement to the property.

Enter the ***recording and legal fees*** on Line 1.2 of your *Cost Estimate Worksheet*. We'll use a figure of \$2,000 in our Example *Cost Estimate Worksheet*.



## Engineering Fees

If you're unsure of property lines, a registered land surveyor can determine them for you. When the corners have been identified, the surveyor uses permanent markers (rather than wooden stakes) to indicate their locations. These markers may cost more, but they'll save you from having to resurvey if the wooden stakes are removed or broken off. Make sure the lot described in the deed is indeed the lot you intend to buy. People have built on the wrong lot. It's not as hard to make that mistake as you might think. Don't let it happen to you.

An engineer can give you a heads up on conditions that could affect construction costs. For instance, the property's topography can affect excavation costs, driveway grade, walks and drainage. Plans for outdoor living areas may need revising if the topography isn't user-friendly.

The building site should be free of hazards that could affect the structural soundness of the building, or the health and safety of the occupants. These include subsidence (excessive settling caused by unstable soil or high groundwater), flooding, and erosion. Underground springs produce hydrostatic pressure that can cause leakage in basement walls and floors. High groundwater means an additional expense to waterproof the basement, involving drain pipes, sump pumps, and waterproofing the foundation walls. Springs and high groundwater could necessitate raising the elevation of the finished floor.

Run-off can damage surrounding property. Many jurisdictions prohibit building any structure unless there's an approved erosion and sedimentation plan in place. In fact, it could be unlawful to clear, grade, or otherwise change the contour of land without these plans. You may also be required to get approval before you remove or destroy trees, shrubs, or other plant life. The city engineer can give advice for your specific situation.

Here's a little trick that could help in your situation. If you want to save money on storm sewers, use the smallest-diameter pipe permissible. A decrease in the size of the storm pipe decreases site development costs. When an on-site sewage system is required, the property must meet local sanitation requirements. Leave the job of designing the system to your engineer.

Enter the **engineering fees** on Line 1.3 of your Cost Estimate Worksheet.  
We'll use \$2,000 in our Example Cost Estimate Worksheet.



## Interest

Many contractors borrow money from a bank or lending institution to purchase land. That means interest payments from the time of purchase to the time the completed property is ultimately sold. If you borrow money

to buy your site, you could pay interest for over a year. And with the present cost of building land, interest payments can be substantial. You need to decide if buying and improving a property is going to work for you and your financial situation.

Guesstimate how long you'll need the loan, based on your building schedule. Also consider how long it'll take to sell the finished building. In a good market, you may be able to pre-sell the property. In a slow market, the property could be on the market for months after completion. To maximize your investment, you need answers to all the "what-ifs."

Enter the estimated time of the loan (months) and the **interest rate** on Line 1.4 of your Cost Estimate Worksheet. We'll use 12 months and 7 percent in our Example Cost Estimate Worksheet.



## Taxes

Contact the tax assessor to determine if you'll have to pay property tax on your building site before and during construction. Taxes are typically assessed on real property: land, improvements to land, structures, and certain equipment affixed to those structures. Property is generally appraised at 100 percent of its fair market value, according to the highest and best use of the property. Fair market value is the price a buyer is willing to pay a willing seller. Don't assume that because there's no completed structure on the site, you don't owe any taxes. The amount of property tax you'll have to pay depends on the length of time between land purchase and eventual property sale. Again, you'll have to estimate this time period. Obviously, the more time it takes, the more taxes you'll pay.

Enter the estimated property **taxes** (if any) on Line 1.5 of your Cost Estimate Worksheet. We'll use 12 months and \$100 a month in our Example Cost Estimate Worksheet.



## Maintenance

If you can't start building immediately after purchasing the property, you'll be responsible for maintenance of the site in the interim. You can't just let the vegetation grow unchecked. In many areas, underbrush poses a fire hazard, particularly in dry, desert climate areas. This was brought home during the California wildfires. Maintenance costs generally depend on the length of time between the purchase of the land and when you start construction. You'll need to estimate that time and, again, the longer the time, the more you'll pay.

Enter the **maintenance** costs on Line 1.6 of your Cost Estimate Worksheet. We'll use 3 months and \$100 a month in our Example Cost Estimate Worksheet.



We won't include site clearance and preparation costs yet — they'll be addressed in Chapter 3, when we discuss site cleaning, excavation and fill.

### Other Costs

You may need to include other costs, such as liability insurance. As the landowner, you could be held liable for any accidents that happen on the property. If your site is on a hillside, heavy rainfall could cause a landslide, damaging property at the bottom of the slope. Or runoff from a rainfall could cause flooding of other properties. Be sure that you have sufficient liability insurance — it's worth its cost for the peace of mind it gives. This is especially true if you aren't on site often, and don't catch accidents waiting to happen. The total cost depends on how much time passes between the land purchase and property sale. Estimate how long you expect construction to take, and remember, the longer the time, the more cost you'll incur.

Enter any **other costs** on Line 1.7 of your Cost Estimate Worksheet. We'll use 12 months and \$100 a month in our Example Cost Estimate Worksheet. 

<b>COST ESTIMATE WORKSHEET FOR BUILDING SITES</b>				
#	Item	Time	Rate	Subtotal
1.1	Purchase price of site			\$60,000.00
1.2	Recording and legal fees			\$2,000.00
1.3	Engineering fees			\$2,000.00
1.4	Interest	12 Months	@ 7 % annual interest rate	\$4,200.00
1.5	Taxes	12 Months	× \$100.00 per month	\$1,200.00
1.6	Maintenance <i>(Clearing underbrush, etc. while lot is idle)</i>	3 Months	× \$100.00 per month	\$300.00
1.7	Other costs <i>(Liability insurance, assessments, etc.)</i>	12 Months	× \$100.00 per month	\$1,200.00
<b>Total cost of site (entered on line 1 of Form 100)*</b>				<b>\$70,900.00</b>

\* Form 100 is the Cost Estimate Form used to compute the total cost of the house and building site — it is shown in Chapter 18 of this book. If the cost of the building site is not to be included in the estimate, enter zero for the total cost of site. This will then be transferred to line 1 of Form 100.

## Chapter 2

# Preliminary Costs

**I**F YOU HIRE AN architect to draw up blueprints for a project, his fee may or may not be included in your construction costs. You may opt to purchase stock plans, in which case they'd be part of your costs. If you're building spec houses, the cost of the plans is always included. But if you're bidding on a contract or working on a cost-plus basis, the blueprints will be provided by the owner, and shouldn't be included in your cost estimate.

### Architect's Fee

Even the smallest structure would be difficult to build without drawings to help illustrate the building instructions. These drawings are known as *blueprints*, named after the way they were originally made. Before the 1940s, blueprinting was the only way to copy drawings. The drawing was traced in India ink onto paper or cloth. When exposed to sunlight, a blue image of that illustration appeared through the tracing material. The material was then taken indoors, washed, and dried. A clear copy of the drawing appeared as white lines on a dark blue background; hence "blueprint."

The process has gone through a series of improvements since the 1940s. But even though plans today are processed on flatbed printers linked to computers, the term *blueprint* is still used.

### Stock Plans

An architect isn't usually hired to draw plans for residential construction unless large tracts or custom homes are being built. Small scale builders can buy standard plans quite reasonably from companies that specialize in home building-plan services. Many of these companies have Internet sites, such as [www.allplans.com](http://www.allplans.com). There are companies offering complete blueprints for houses of virtually any size and design. Many people who've decided

to build a house find a plan that, with a few minor changes, is compatible with their needs and taste. If the house is factory-built (modular), the manufacturer will furnish all necessary blueprints as part of the package price.

However, few standard plans are so complete that absolutely no changes are needed. Unless you're an expert in drawing house plans, I recommend hiring a professional to do it. Amateurs often think that by drawing their own plans, they'll save money. Big mistake. One error in the blueprints could be costly enough to halt construction.

You generally need a copy of the blueprints to show when you apply for financing, and later when you request building permits. Architectural and engineering exhibits are commonly submitted when applying for a construction loan or mortgage. These exhibits describe in detail the size and location of the house, and the types of the materials to be used. An appraisal (based on your exhibits) is made of the proposed structure before the loan can be finalized. If you have complete plans and are using quality material, the proposed structure should appraise at full value.

Enter the **architect's fee** or the **cost of stock plans** on Line 2.1 of your Cost Estimate Worksheet. We'll use \$5,000 in our Example Cost Estimate Worksheet.



## Plot Plans

A plot plan is an essential part of the working drawings for house construction. It's needed to help you accurately estimate construction costs. Plot plans are usually prepared by the builder or an engineer. If you hire an engineer, his fee is included in the engineering costs of the building site, as explained in Chapter 1. Plot plans can also be paid for by the property owner. If the job is open to bid, this fee isn't part of the builder's costs, and would be billed and paid separately.

The plot plan, as seen in Figure 2-1, must have the following minimum information:

- Compass direction indicating north
- Metes and bounds (see Glossary) of the property lines and their distances
- Lot corners
- Description of the lot and section number
- Elevations of each floor level
- Location and dimensions of easements
- Situation of the house on the lot
- Grade elevations
- Location and dimensions of water and sewer lines
- Location of electric, gas, telephone, and TV cable service

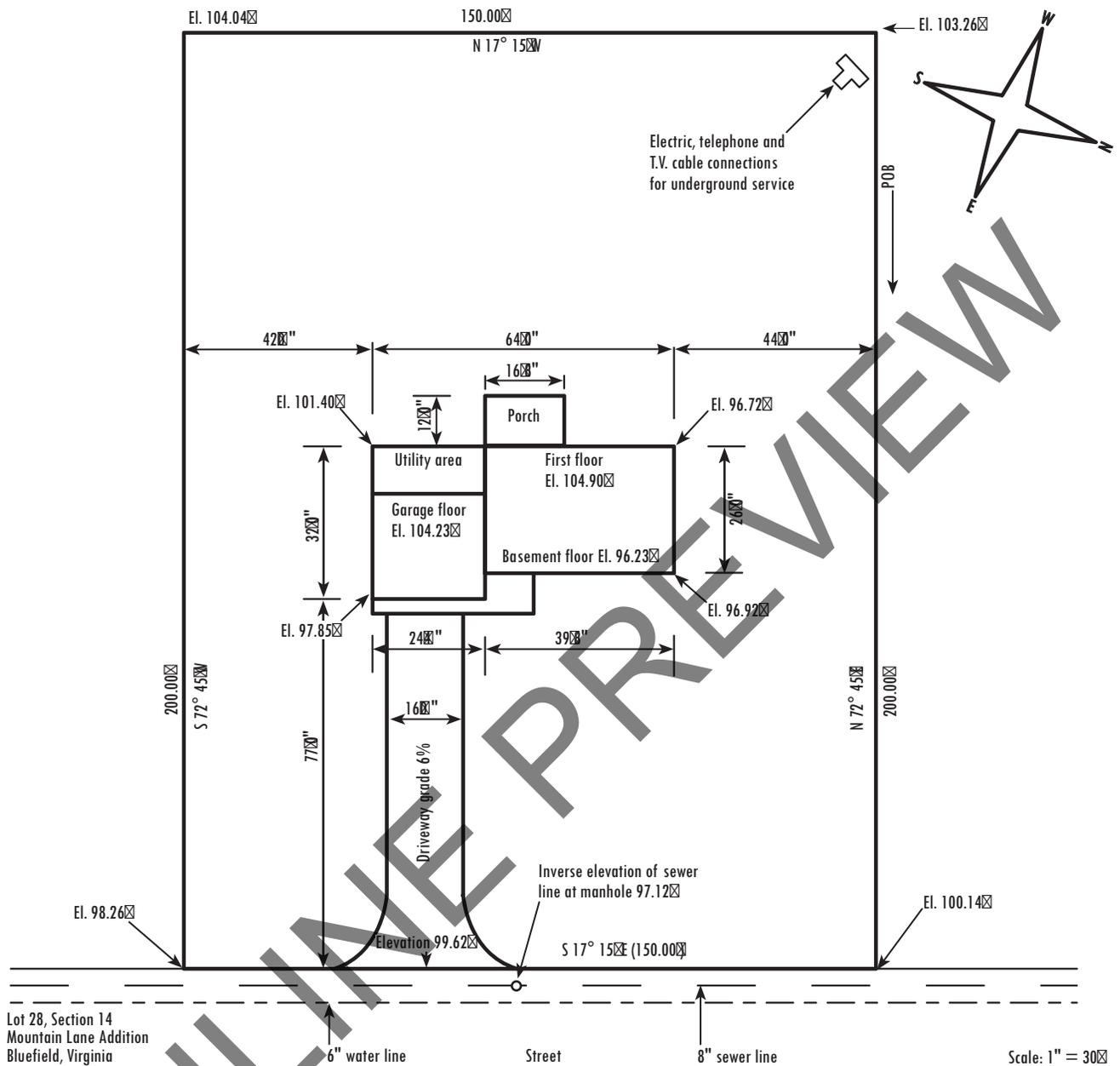


Figure 2-1  
Plot plan

- Finished elevations showing driveway to street connection
- Finished elevations at each corner of the dwelling
- Dimensions of the house, garage, carport, and other buildings
- Location and dimensions of walks and driveways
- Location of steps, terraces, and porches
- Scale of the drawing
- Location of existing trees (necessary in some jurisdictions)

The elevations can be given in relation to sea level (if known), or above or below a *bench mark* (BM), an arbitrary elevation based on a fixed point. The bench mark is normally assigned an elevation of 100 feet. All other elevations on the plot plan refer to this point. A bench mark may or may not be shown on the plot plan.

*Estimating Home Building Costs* contains sample estimates for a 2,238-square-foot two-story house, with a basement, a porch, and a two-car garage. All references, unless specifically noted, refer to this house, beginning with the plot plan in Figure 2-1. From the information given, you can make the following construction cost calculations:

1. Using the metes and bounds of the lot, you can calculate the interior angles of the lot corners. A book entitled *Building Layout*, available from Craftsman Book Company, shows how to convert these bearings into interior angles. This information is extremely important for the builder to know, because lot corners tend to get lost. Or there could be obstructions (such as trees or rocks) that prevent sighting with a transit from one lot corner to another. Corner angles aren't always 90 degrees, so don't miscalculate the property line. That could prove very costly.
2. Finished grade and floor elevations indicate how much excavation or fill dirt will be required. In our plot plan, the elevations shown require an estimated 1,540 cubic yards of compacted fill dirt to be imported to the jobsite. The basement floor elevation (96.23 feet) is lower than the elevation of the sewer line at the manhole (97.12 feet) where the sewer connection will be made. So, even though no bathroom or laundry is planned in the basement, a sump pump is required to remove any water that could seep in.
3. Location of the building and the dimensions of the driveway and walks determine their cost.
4. Location of the utility connections show how far the service lines must be run.
5. Easements shown on the plot plan may alter the plans for a particular area, such as the location of an accessory building or patio.

Enter your cost of **plot plans** on Line 2.2 of your Cost Estimate Worksheet.  
We'll use \$750 in our Example Cost Estimate Worksheet.



## Building Permits

A building permit regulates the location, size and type of structure that can be built on a particular plot. A plans examiner uses the blueprints and plot plan you supply to make sure that you won't be violating any zoning ordinances. If, after checking the blueprints and plot plan, the examiner is

satisfied that the building is in compliance with code, a building permit will be issued. If a minor violation is found, the plans examiner could present the permit application to the Planning Commission to be approved or disapproved.

In addition to the building permit, plumbing and electrical permits must be obtained. Because the plumbing and electrical work is usually done by subcontractors, the responsibility and expense of obtaining these permits is theirs. The costs will be included in the total construction bid, under their respective headings.

The cost of permits varies, depending on the area of the country. One way cost can be determined is based on the anticipated value of the structure. There's a set fee (for the first determined valuation), with increments for each additional thousand dollars. For example, assuming our house's estimated value is \$300,000, the building permit might be \$500.00 for the first \$100,000 of valuation, and \$2.50 for each additional \$1,000. Our permit would cost \$1,000 [ $\$500 + (200 \times \$2.50) = \$1,000$ ].

The value of any property can be debated. Disputes over the building's worth frequently arise between the property owner and the department issuing the permit. Consequently, many jurisdictions have developed a simpler process for establishing property value. An example is shown below.

Habitable space	\$100 per square foot
Garage	\$50 per square foot
Unfinished basement/storage	\$40 per square foot
Deck/patio/porch	\$25 per square foot
Carport	\$25 per square foot
Fence	\$10 per linear foot

Using these costs per square foot, the permitted value of the property for the permit in Figure 2-2 is:

Habitable space			
First floor	1,198 square feet @	\$100 per square foot	\$119,800
Second floor	1,040 square feet @	\$100 per square foot	104,000
Garage	610 square feet @	\$50 per square foot	30,500
Basement	1,031 square feet @	\$40 per square foot	41,240
Porch	200 square feet @	\$25 per square foot	<u>5,000</u>
Total value:			\$300,540

The jurisdiction where our sample house is located uses a sliding scale of permit costs for property valuation or for remodeling work, shown here:

\$1 to \$500	\$30	
\$501 to \$2,000	\$30 for 1 <sup>st</sup> \$500	\$1.50 each additional \$100
\$2,001 to \$25,000	\$50 for 1 <sup>st</sup> \$2,000	\$6.50 each additional \$1,000
\$25,001 to \$100,000	\$200 for 1 <sup>st</sup> \$25,000	\$4.00 each additional \$1,000
\$100,000 and up	\$500 for 1 <sup>st</sup> \$100,000	\$2.50 each additional \$1,000

**BUILDING PERMIT**  
ALL SPACES MUST BE COMPLETED

Date \_\_\_\_\_

A BUILDING PERMIT MUST BE ISSUED BEFORE CONSTRUCTION IS STARTED.

Application for a Building Permit must be made to the Building Officials.  
Application is hereby made for a Building Permit in accordance with the description and for the purpose hereinafter set forth. This application is made subject to all local and State laws and ordinances and which are hereby agreed to by the undersigned and which shall be deemed a condition entering into the exercise of this permit.

Name of Owner W. P. Jackson Address 109 Fincastle Lane

Name of Contractor/Builder Same Address Same

Certified State Contractor's No. 15474 Zone Classification\* R-1

If for Alteration or Repairs, state in detail None

\* Zone classification must be specified.

Street Name Mountain Lane Lot No. 28 Section of Mt. View Subdivision

Size of Lot 150' x 200' If purchased within the past two years from N/A

Date \_\_\_\_\_ I hereby certify that on January 1 the land described above is listed in the name of W. P. Jackson.

NOTE: Permit for septic tank and approval of location and of well must be obtained from the County Health Department after the lot has been cleared and building has been staked out, but before construction has been started.

Plot Plan \_\_\_\_\_ Construction Plans \_\_\_\_\_

Estimated Date of Completion \_\_\_\_\_

I hereby certify that I have the authority to make the foregoing application, that the information given is correct and that the construction will conform with the regulations in the Building Code, Zoning Ordinances and private building restrictions, if any, which may be imposed upon the above property by deed. I also agree to be responsible for any and all damage to any and all property, public or private, caused by above construction/repair.

Signature of Owner or Authorized Agent \_\_\_\_\_

Telephone \_\_\_\_\_ Email Address \_\_\_\_\_

**Figure 2-2**  
Typical building permit

I, the undersigned, hereby make application for a permit to erect a Two-story  
 building to be used for Residence on my property at 219 Mountain Lane  
 Commercial/Residence

Lot No. 28 Section No. 14 of Subdivision Mt. View

The general shape of the lot and the location of the proposed improvements are accurately set forth in the plot plan.

Front yard available 77'0" ft Type of heating Electric  
 Side yards available 42'0" and 44'0" ft No. of flues None  
 Rear yard available 91'0" ft Size of flues N/A  
 Note: All flues must be lined.

Type of roof Asphalt shingles Ceiling joists and rafters on 16-inch centers  
 Expected amount of total electrical load 200 amps

Type of floors Wall-to-wall carpet over subfloor and floor underlayment Joists on 16-inch centers  
 No. of rooms Seven Type of construction Drywall and panel  
 Number of baths Three Type of construction Drywall  
Concrete block with  
 Basement size 39'8" x 26'0" Type of construction concrete basement floor

Garage/carport 24'4" x 22'0" + 7'6" x 10'0" Square feet 610  
 First floor square feet 1,198 Second floor square feet 1,040

NOTE: Soil bearing test for other than one-family dwelling shall be required. Soil test report N/A

I, the undersigned, do affirm that all of the foregoing figures and statements are true, full and correct to the best of my knowledge and belief, and all sanitary, safety and building ordinances of the Town of Bluefield, Virginia will be complied with in said construction. I tender with this application the sum of \$ \_\_\_\_\_ covering permit, with \$ \_\_\_\_\_ covering sewer tap and \$ \_\_\_\_\_ covering water tap.

A TOTAL AMOUNT OF: \$ \_\_\_\_\_

Building Permit Approved \_\_\_\_\_ Applicant \_\_\_\_\_  
 Disapproved \_\_\_\_\_ Code reference \_\_\_\_\_

By: \_\_\_\_\_ Building Inspector \_\_\_\_\_  
 Engineer \_\_\_\_\_ Manager \_\_\_\_\_

Figure 2-2  
 Typical building permit (continued)

Our permit, based on a property value of \$300,540, would fall into the \$100,000 and up category for a permit based on valuation. The permit cost would be:

The 1 <sup>st</sup> \$100,000	\$500.00
\$200,540 @ \$2.50 for each \$1,000	<u>\$501.35</u>
[(200,540/1000) x \$2.50 = 501.35]	
<b>Permit cost:</b>	<b>\$1,001.35</b>

There may also be a state surcharge fee (ours adds 7 percent), and a plan check fee, which is around 65 percent of the permit amount. This levies additional costs of:

Permit	\$1,001.35
Surcharge fee (7 percent of \$1001.35)	\$70.09
Plan check fee (65 percent of \$1001.35)	<u>\$650.88</u>
<b>Total Fees:</b>	<b>\$1,722.32 (rounded to \$1,720)</b>

Complete line 2.3 of your Cost Estimate Worksheet to obtain the total **permit** fee. We'll enter these figures on our Example Cost Estimate Worksheet. 

Figure 2-2 is a typical building permit application for a two-story house. This application would also include the plot plan from Figure 2-1. It's a good idea to keep a duplicate copy of the blueprints, in case the copy submitted with the permit request isn't returned.

## Water Connection

To complete your estimate, you must also figure the cost of getting water to the building site. A fee is charged for connecting to the water supply if it's supplied by a public utility. If the service line isn't brought to the building site, a line must be run from the main source to the site. Before you submit an estimate, find out if this applies to your site.

If there's no public water supply, you'll have options for alternative water sources. One choice could be to dig a well; another is to have water piped from nearby springs (which may serve more than one family). If the water supply is privately owned, be sure you know who's responsible for maintaining it. Finally, ask the local Health Department to check the water for purity. It's hard to sell a house that doesn't have water you can drink.

Enter the **water connection** fee or cost on Line 2.4 of your Cost Estimate Worksheet. We'll enter \$500 on our Example Cost Estimate Worksheet. 

## Sewer Connection

As with the water supply, sewage disposal may be a public system. In that case, you'll be charged for the sewer tap. A private sewage disposal system generally consists of a septic tank or a privately-owned sewage disposal system that serves more than one family. When you apply for a permit to install a septic tank, an agent from the Health Department will come to the site and design a sewage disposal system for you.

Some of the factors used to determine the size of the tank include results from percolation tests, the size and shape of the building site, the size of the house, and whether or not a garbage disposal will be installed. It may come as a surprise that the material a garbage disposal adds to the septic tank can overtax its capabilities. In fact, in some jurisdictions, they aren't allowed at all.

After the system is designed, the Health Department will issue a permit to build it. An inspector will check the tank's installation for code compliance before final approval is given to bury the system.

Sewer system expenses are part of construction costs, to be included in your cost estimate.

Enter the **sewer connection** fee on Line 2.5 of your Cost Estimate Worksheet. We'll enter \$500 on our Example Cost Estimate Worksheet.



## Temporary Water Service

If water is supplied by a public utility, determine the cost of the water you anticipate using during construction, and add it to the cost estimate. In most cases, there's a minimum charge per month for the water. Except for brief periods, like when brick masons or drywall subcontractors are working, the minimum monthly charge will generally cover the cost of the water used. The minimum monthly water charge multiplied by the estimated number of months to complete the house gives a ballpark cost for temporary water service. The cost estimate worksheet at the end of this chapter can help you figure this cost.

Complete Line 2.6 of your Cost Estimate Worksheet for the **temporary water service**. We'll use \$50 a month for 9 months in our Example Cost Estimate Worksheet.



## Temporary Electric Service

Because permanent electric service can't be connected until the house is completed, you'll need a temporary meter for service during construction. Utility companies charge for installing these meters, and bill monthly for the electricity used. As with temporary water service, the monthly charge for electricity multiplied by the estimated number of months to complete the house gives a reliable estimate for anticipated electricity cost. If you'll be working in cold weather, be sure to include an allowance for the electricity needed to run heating units. Again, the cost estimate worksheet at the end of this chapter shows how to calculate the total cost of electric service.

*Complete Line 2.7 of your Cost Estimate Worksheet for the **temporary electric service**. We'll use a \$500 installation fee plus \$100 per month for 9 months in our Example Cost Estimate Worksheet.*



ONLINE PREVIEW

<b>COST ESTIMATE WORKSHEET FOR PRELIMINARY COSTS</b>			
#	Amount	Cost	Subtotal
2.1	<b>Architect's fee or cost of plans</b>		<u>\$5,000.00</u>
2.2	<b>Plot plans</b>		<u>\$750.00</u>
2.3	<b>Building permit</b>		
	<b>First floor</b>	1,198 sf @ \$100.00 per sf = \$119,800	
	<b>Second floor</b>	1,040 sf @ \$100.00 per sf = \$104,000	
	<b>Garage</b>	610 sf @ \$50.00 per sf = \$30,500	
	<b>Basement</b>	1,031 sf @ \$40.00 per sf = \$41,240	
	<b>Porch</b>	200 sf @ \$25.00 per sf = \$5,000	
		<b>Total valuation</b>	<u>\$300,540</u>
	<i>If the cost of the permit is based on valuation</i>		
	<u>\$100,000</u>	@ \$500.00 per	<u>\$100,000 = \$500.00</u>
	<u>\$200,540</u>	@ \$2.50 per	<u>\$1,000 = \$501.35</u>
		@ _____ per	<u>_____ = _____</u>
			<u>\$1,001.35</u>
	State Surcharge Fee	7 % of \$1,001.35 =	\$70.09
	Plan Check Fee	65 % of \$1,001.35 =	\$650.88
		<b>Total permit fee</b>	<u>\$1,722.32</u> \$1,720.00
2.4	<b>Water connection</b>		<u>\$500.00</u>
2.5	<b>Sewer connection</b>		<u>\$500.00</u>
2.6	<b>Temporary water service</b>		
	(a) Minimum cost per month	<u>\$50.00</u>	
	(b) Estimated months to complete	<u>9</u>	
	(a) \$50.00 × (b)	9 =	\$450.00    \$450.00
2.7	<b>Temporary electric service</b>		
	(a) Charge for temporary meter	<u>\$500.00</u>	
	(b) Minimum cost per month	<u>\$100.00</u>	
	(c) Estimated months to complete	<u>9</u>	
	(a)	=	\$500.00
	(b) \$100.00 × (c)	9 =	\$900.00
		<b>Total</b>	<u>\$1,400.00</u> \$1,400.00
<b>Total preliminary costs (entered on line 2 of Form 100)</b>			<b><u>\$10,320.00</u></b>

## Chapter 14

# Concrete Floors, Walkways and Terraces

**C**EMENT IS AS VERSATILE as it is durable. Cementitious materials were first put to use around 5600 BC. Aqueducts and other cement-bonded structures built by the Romans in the 8th century BC are still in good condition. The earth itself produced the first natural cement 12 million years ago, but little was known about the chemistry of cement until the mid-eighteenth century. Portland cement was introduced in 1824, when a patent was taken out for its manufacture. This material hardened into a yellowish-gray mass resembling the stone found in various quarries on the Isle of Portland, England, hence its name.

## Concrete

Concrete is a mixture of fine and coarse aggregates surrounded and held together by hardened portland cement paste. These materials are inorganic, so concrete is resistant to decay, fire, termites, and rodents.

There's a direct link between the strength of concrete and the proportion of water used in the mix. Too much water and the paste will become thin and be weak and porous when it hardens. Cement made with the correct amount of water has strong binding qualities that hold the particles of aggregate firmly together, making a strong, dense concrete. Six gallons of water per sack of cement is the recommended proportion.

Concrete's compression strength is measured in pounds per square inch (psi). A six-bag mix (six bags of cement per cubic yard) is rated at 3,000 psi. A five-bag mix has the compression strength of around 2,500 psi. Any concrete exposed to traffic and weather needs to withstand pressure of at least 3,000 psi.

## Estimating Concrete Quantities

Concrete pours in residential construction need to be coordinated with the carpentry work. For example, the basement floor must be poured before the basement stairs are built. Concrete is usually ordered by the cubic yard and delivered to the jobsite in a ready-mix truck. A cubic yard of concrete weighs approximately 4,000 pounds, or 2 tons.

To determine the cubic yards of concrete you need, calculate the cubic area of the pour (length  $\times$  width  $\times$  depth), and divide by 27 for cubic yards. For example, let's estimate the concrete you need for a garage floor that measures 24- by 26- feet and will have a 4½-inch concrete slab base. Multiply the garage length by the width and the desired depth of concrete to get the volume in cubic feet. Then divide by 27 to determine cubic yards.

$$24 \times 26 \times 0.375 (4\frac{1}{2}'' ) = 234 \text{ cf}$$

$$\frac{234 \text{ cf}}{27} = 8.67 \text{ cy}$$

To be precise when estimating concrete quantities, use estimating tables. However, for a quick, reliable estimate (but not as precise), you can use the table in Figure 14-1. Multiply the length by the width for the area to be filled. Find the next highest number in the left hand column of the table, and follow that row to the right until it intersects the column for concrete thickness you need.

The garage area in our example is 624 square feet (24  $\times$  26). Using the table in Figure 14-1, the next highest number in the left column is 650 (outlined). It intersects the 4½ inch or 0,375 foot column (shaded) at 9.03 cubic yards (outlined). This is reasonably close to the 8.67 cubic yards we calculated initially.

You can also use the concrete factors found in Figure 14-2 to determine concrete quantities. Using the appropriate concrete factor for 4½ inches from Figure 14-2, we can determine how many cubic yards of concrete we should estimate for the same garage area. Multiply the square footage by 0.01389 (4½ inch concrete factor):

$$624 \text{ sf} \times 0.01389 = 8.67 \text{ cy}$$

## Concrete Accessories

There's more to concrete work than meets the eye. Environmental factors can make it necessary to use additional materials, reinforcing, or supplemental treatments in order to ensure maximum concrete strength.

### Crushed Stone

When concrete is poured in areas prone to dampness (like floors, basements, or garages), you should place 4 inches of stone under the slab

Area Square Feet	Thickness in Inches and Decimal Equivalents of a Foot				
	3" 0.250'	3½" 0.292'	4" 0.333'	4½" 0.375'	5" 0.417'
5	0.05	0.05	0.06	0.07	0.08
10	0.09	0.11	0.12	0.14	0.15
20	0.19	0.22	0.25	0.28	0.31
30	0.28	0.32	0.37	0.42	0.46
40	0.37	0.43	0.49	0.56	0.62
50	0.46	0.54	0.62	0.69	0.77
60	0.56	0.65	0.74	0.83	0.93
70	0.65	0.76	0.86	0.97	1.08
80	0.74	0.87	0.99	1.11	1.24
90	0.83	0.97	1.11	1.25	1.39
100	0.93	1.08	1.23	1.39	1.54
150	1.39	1.62	1.85	2.08	2.32
200	1.85	2.16	2.47	2.78	3.09
250	2.31	2.70	3.08	3.47	3.86
300	2.78	3.24	3.70	4.17	4.63
350	3.24	3.79	4.32	4.86	5.41
400	3.70	4.33	4.93	5.56	6.18
450	4.17	4.87	5.55	6.25	6.95
500	4.63	5.41	6.17	6.94	7.72
550	5.09	5.95	6.78	7.64	8.49
600	5.56	6.49	7.40	8.33	9.27
650	6.02	7.03	8.02	9.03	10.04
700	6.48	7.57	8.63	9.72	10.81
750	6.94	8.11	9.25	10.42	11.58
800	7.41	8.65	9.87	11.11	12.36
850	7.87	9.19	10.48	11.81	13.13
900	8.33	9.73	11.10	12.50	13.90
950	8.80	10.27	11.72	13.19	14.67
1000	9.26	10.81	12.33	13.89	15.44

Figure 14-1  
Cubic yard content

(shown in Figure 14-3) to minimize the hydrostatic pressure. Crushed stone is sold by both the cubic yard and the ton. To estimate crushed stone, calculate the cubic yards required (length × width × depth in feet, then divide by 27). Convert to pounds by multiplying the cubic yards by 2,700 pounds and dividing by 2,000 to get tons (2,000 pounds per ton). Figure 14-2 provides some shortcut factors you can use for calculating crushed stone quantities. Let's look at an example.

A basement floor (42- × 28-feet) needs 4 inches of crushed stone under the slab. How many cubic yards of material should we estimate? Calculate the area in square feet, and multiply by the factor for 4 inches (0.01235) from Figure 14-2:

$$42 \times 28 = 1,176 \text{ sf}$$

$$1,176 \text{ sf} \times 0.01235 = 14.52 \text{ cy}$$

Once you know the cubic yards, multiply the cubic yards by the factor found in the bottom section of Figure 14-2 (1.35) to convert cubic yards of crushed stone to tons:

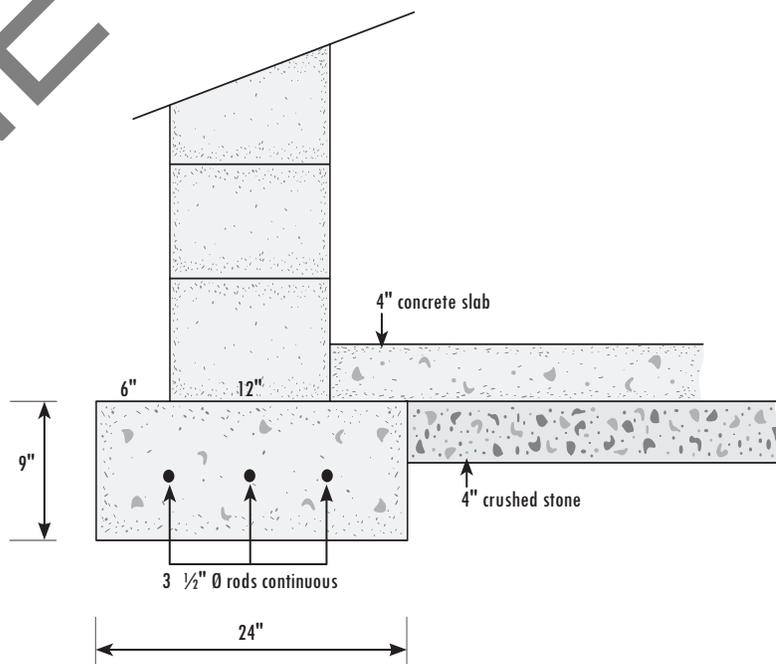
$$14.52 \text{ cy} \times 1.35 = 19.60 \text{ tons}$$

### Vapor Retarder

Polyethylene film (4 or 6 mil) acts as a vapor retarder under concrete. It comes in various widths up to 40 feet, in rolls usually 50 feet long. Place it on the ground or stone immediately under the concrete slab. Calculate the area to be covered, and divide by the width of the roll to determine the length you need. Allow 10 percent for overlapping, and round up to the next whole number of rolls.

Thickness in Inches						
3"	3½"	4"	4½"	5"	5½"	6"
0.00926	0.01080	0.01235	0.01389	0.01543	0.01698	0.01852
<b>Concrete</b>						
Area in Square Feet × Factor for Thickness = Cubic Yards						
<i>Example</i>	695 sf @ 4" thickness 695 sf × 0.01235 factor = 8.58 cy					
<i>Example</i>	1,065 sf @ 4½" thickness 1,065 sf × 0.01389 factor = 14.79 cy					
<b>Crushed Stone</b>						
Cubic Yards × 1.35 = Tons of Crushed Stone						
<i>Example</i>	8.58 cy × 1.35 = 11.58 tons of crushed stone					
<i>Example</i>	14.79 cy × 1.35 = 19.97 tons of crushed stone					

**Figure 14-2**  
Multiplying factors for cubic yards



**Figure 14-3**  
Crushed stone under concrete slab

Reinforcing Rods		
Rod Size		Weight
Diameter in Inches	Rod Number	Pounds per Foot
1/4	2	0.17
3/8	3	0.38
1/2	4	0.67
5/8	5	1.04
3/4	6	1.50
7/8	7	2.04
1	8	2.67

Note: If the reinforcing rods are sold by weight, compute the total weight and cost as follows:

1. Multiply the total number of linear feet by the weight per foot

*Example:* The weight of 940 linear feet of 1/2" diameter rod is 629.80 lbs (940 x 0.67 = 629.80 lbs)

2. Total weight (rounded up) multiplied by the rate = cost

**Figure 14-4**  
Reinforcing rods

## Expansion Joints

We know that concrete shrinks as it cures, but the materials used in the production of concrete can affect its shrinkage in one way or another, too. The water content is by far the most important factor contributing to the strength or weakness of concrete. Restricted movement can cause cracking. If the concrete can move as it shrinks, cracking is less likely to occur. But if there's no room to move at the edges of a slab, you'll get a crack. Concrete will also crack when stress exceeds the tensile strength of the slab.

Cracking can be controlled by careful placement of *expansion joints*, areas where the concrete is free to expand and contract. The most common materials for expansion joints are asphalt, fiber, and asphalt-impregnated fiber. Various thicknesses (1/4, 3/8, 1/2, 3/4 and 1 inch) and widths (from 2 to 8 inches) of expansion joint material are available. They're estimated by the linear foot. Allow 1 manhour per 100 linear feet for installation.

## Concrete Reinforcement

Welded wire fabric or reinforcing rods are used in slabs on grade to control cracking, but not to prevent it. If a reinforced slab cracks, the steel holds the cracks together so that loads can be transferred across the crack via the interlocked aggregate of the concrete.

**Welded Wire Fabric** Estimate welded wire fabric and wire mesh used for concrete reinforcement by the square foot. These materials are sold in rolls, typically 5 feet wide by 150 feet long (750 square feet), and are sized by the spacing and gauge of the wire.

Wire mesh labeled  $6 \times 6 : \#10 \times \#10$  or  $6 \times 6 : 10/10$  means both the lengthwise and crosswise wires are spaced 6 inches on center, and both wires are 10 gauge. The mesh can be square or rectangular ( $4 \times 8 : 8/12$ , etc). The  $4 \times 8$  means the lengthwise spacing is 4 inches and crosswise spacing is 8 inches. The  $8/12$  means the gauge of the long wire is #8, with #12 gauge used for the cross wire.

**Reinforcing Rods** Reinforcing rods are designated by the number of eighths ( $1/8$ ) in the rod diameter. Figure 14-4 shows rod sizes and weights. Reinforcing rods are used where heavy loading on the slab is expected, like

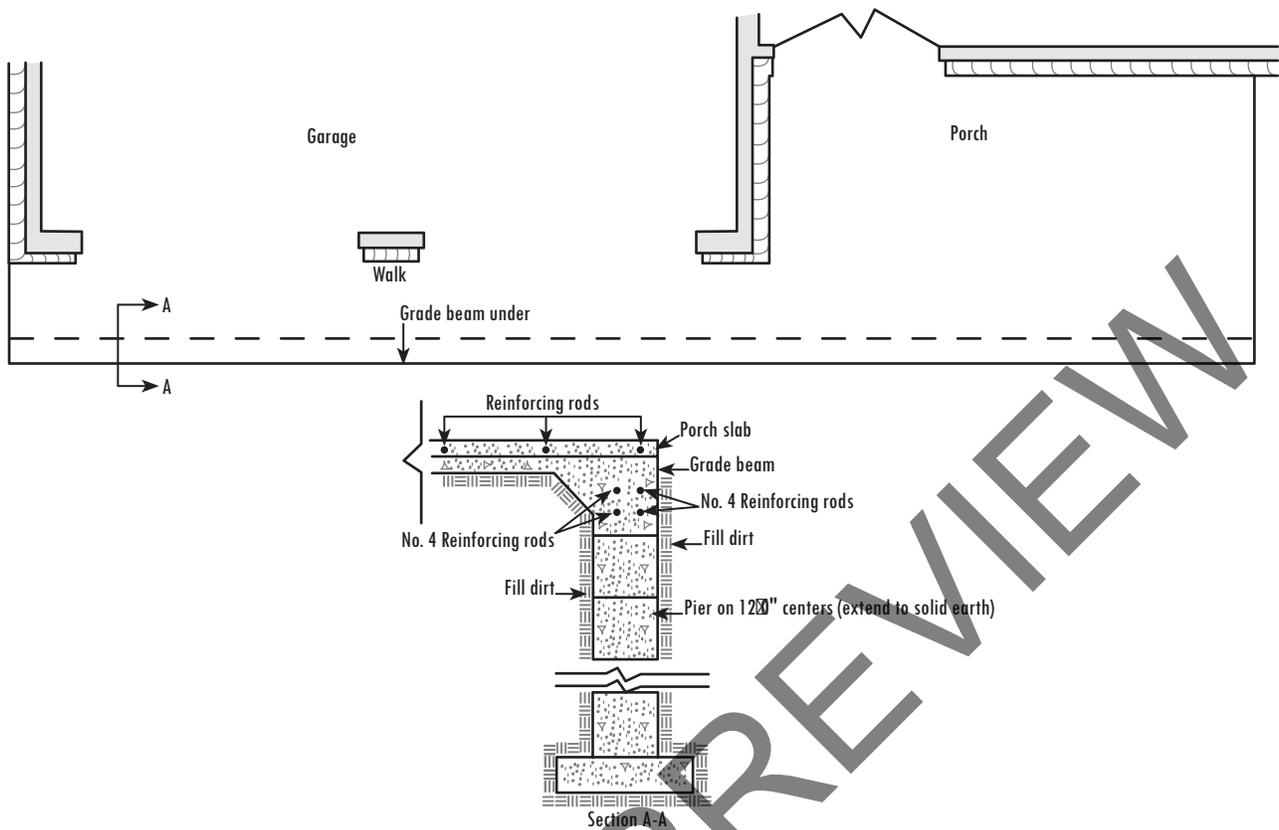


Figure 14-5  
Grade beam

in a garage. Rods are also recommended when pouring over dirt fill because they're stronger than wire mesh, and they can be supported by masonry walls. In some instances, you may be required to install a grade beam extending down to solid earth to support the reinforcing rods, as shown in Figure 14-5. In this case, a walkway poured over fill that's adjacent to the structure needs reinforcing. Blueprints don't always show these grade beams, but don't forget to include them in your estimate.

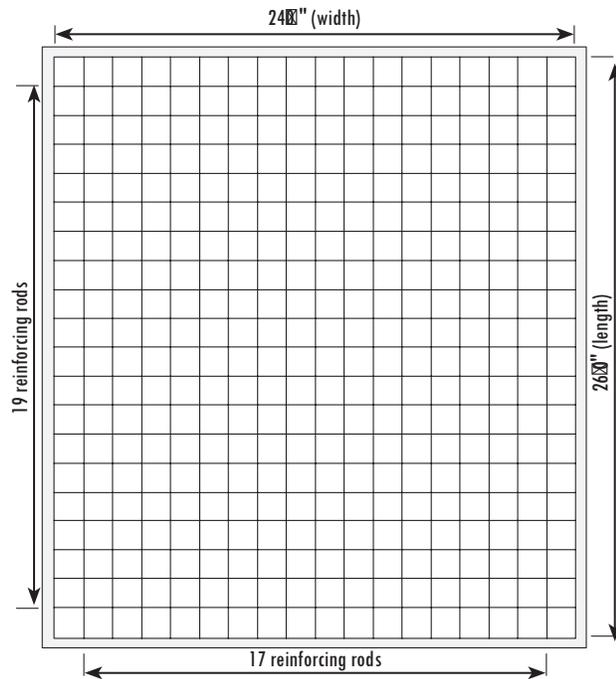
A worksheet for estimating reinforcing rods for various slab dimensions is shown in Figure 14-6. A duplicate of this worksheet is included on the CD-ROM at the back of the book. There are calculations provided for reinforcing rods at both 16- × 16-inch and 12- × 12-inch on-center spacing. Calculate the reinforcing rods for your structure based on the dimensions noted on the blueprints.

<b>Horizontal Rods and Traverse Rods @ 16" × 16"</b>			
Width _____	× 0.75 less 1 =	0.00 × length 0.00 =	0.00 lf
Length _____	× 0.75 less 1 =	0.00 × width 0.00 =	0.00 lf
			0.00 lf
Allow ____% for overlapping			0.00
Total			0.00 lf

<b>Horizontal Rods and Traverse Rods @ 12" × 12"</b>			
Width _____	less 1	= 0.00 × length 0.00 =	0.00 lf
Length _____	less 1	= 0.00 × width 0.00 =	0.00 lf
			0.00 lf
Allow ____% for overlapping			0.00
Total			0.00 lf

Figure 14-6  
Estimating reinforcing rod for slabs



**Figure 14-7**  
Reinforcing rods (16" × 16")

Use Figure 7-29 in Chapter 7 to convert inches and fractions to decimals of a foot. Enter the width and length of the slab, and the percentage of overlap specified for the reinforcing rods, which is typically 10 percent.

Figure 14-7 shows the number of reinforcing rods required for a 24- × 26-foot slab, with the rods at 16- × 16-inch on center spacing.

Tie wire for reinforcing rods is usually included in the cost of the rods. If not, allow 1 pound per 400 linear feet of rod.

### Forms and Screeds

Forms protect and support concrete against hydrostatic pressure until it's sufficiently cured. Forms are used for porches, garages, walkways, terraces, and patio slabs. They should be braced with 2- × 2- × 18-inch stakes to prevent displacement, be rigid enough to support the concrete, and be tight enough to prevent concrete leakage. When curves are required, use plywood or hardboard that will bend to the proper radius and brace them as well.

Screeds, made of 1- × 3-inch material, act as thickness and leveling guides. Set them in place using a transit or level, and secure them with stakes. Allow 2 manhours per 100 square feet to build and remove forms and screeds.

### Concrete Additives

You may need to include some of the following additives in your concrete estimate:

- Calcium chloride to accelerate the setting of concrete
- Air-entraining agents to improve the workability and durability of concrete, and increase its resistance to damage caused by frost
- Coloring agents

### Cold Weather Pours

Pouring concrete during the winter in areas subject to freezing presents special problems. Concrete that freezes soon after placement gains very

little strength and some permanent damage is done. This damage won't always be visible immediately. Surface scaling is easy to spot, but scaling an inch or more deep can take time to work its way to the surface. Frost action can also cause cracking, crumbling, or powdering.

Before pouring concrete, frozen ground must be thawed. There are various methods you can use, from propane heaters to electric blankets to circulating hot liquid through pipes. A 2 percent calcium chloride additive in conjunction with air-entrainment additives in the concrete also provides cold weather protection. After pouring, cover the concrete with straw or Styrofoam to keep the new surface from freezing. You can also use temporary heaters along with polyethylene film to protect the concrete. Make sure there's adequate ventilation when using temporary fuel-burning heaters. These heaters produce carbon dioxide which, if allowed to mix with the calcium hydroxide present in fresh concrete, forms a thin, poorly-bonded layer of lime (calcium carbonate) on the surface that will "dust" under traffic.

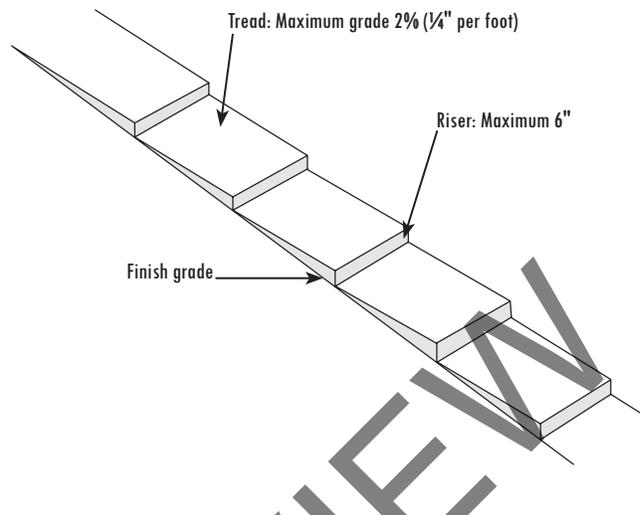
Concrete will become stiff and difficult to finish if the ambient temperature is below 30 degrees Fahrenheit. If possible, delay exterior work such as sidewalks, driveways, patios and garage floors until the weather warms. In areas subject to freezing, walkways on a grade exceeding 5 percent ( $\frac{5}{8}$  inch per foot) should be built with treads and risers (Figure 14-8). Ice on a sloping walk is an accident waiting to happen. You can expect concrete labor costs to increase about 5 to 15 percent during cold weather.

## Finishing Concrete

Pouring and finishing concrete is precision work. Those who specialize in pouring concrete are faster and usually more economical to hire than workmen who only do it occasionally. Take that into consideration when you plan your pour. Also remember that weather and other conditions can delay a ready-mix concrete truck from unloading in the allotted time. Then, no matter how efficient your concrete crew is, you'll face a penalty charge.

## The Material Estimate

Let's do a concrete materials estimate for our sample house. We'll figure each of the materials needed for our concrete pour separately by area: the basement, garage and utility area, front porch and walkway, and the terrace.



**Figure 14-8**  
Stepped ramp with single risers

## Estimating Concrete

We'll need to figure the square footage for each of the pour areas to determine how much concrete to estimate. Each area will require a 4-inch-thick concrete pour.

### Basement

Our basement floor slab will cover 928.08 square feet, and be 4 inches thick. To determine how many cubic yard of concrete we should estimate for the basement, multiply 928.08 square feet by the thickness factor for 4 inches, from Figure 14-2.

$$928.08 \text{ sf} \times 0.01235 \text{ factor} = 11.46 \text{ cy}$$

### Garage and Utility Area

The combined area of the garage and utility area is 669.90 square feet. The 4-inch concrete slab for this area will be poured over fill. To calculate the cubic yards of concrete, multiply 669.90 square feet by the thickness factor for 4 inches (0.01235) found in Figure 14-2.

$$669.90 \text{ sf} \times 0.01235 \text{ factor} = 8.27 \text{ cy}$$

### Front Porch and Walkway

The front porch and walkway total 217.32 square feet (the porch is 12 feet  $\times$  10 feet and the walkway is 24.33 feet  $\times$  4 feet). The concrete for these areas will also be 4 inches thick, poured over fill. A grade beam (shown in Figure 14-5) is required for the walkway, which increases the quantity of concrete we'll need.

At 4 inches thick (using the 4-inch factor from Figure 14-2), we'll need to estimate the following amount of concrete for the 217.32-square-foot front porch and walkway area:

$$217.32 \text{ sf} \times 0.01235 = 2.68 \text{ cy}$$

The walkway grade beam will be 8 inches (0.67 feet)  $\times$  12 inches (1 foot) and run the length of the walkway and porch (24.33 feet + 12 feet). Calculate the area as follows, dividing by 27 to find the cubic yards:

$$\frac{0.67' \times 1.00' \times 36.33'}{27} = 0.90 \text{ cy}$$

We'll need 2.68 cubic yards of concrete for the front porch and walkway and an additional 0.90 cubic yards for the grade beam, giving us a combined total of 3.58 cubic yards of concrete.

### Terrace

The dimensions of the proposed back terrace are 12 feet  $\times$  16.67 feet, which equal 200.04 square feet. The terrace will also be poured 4 inches thick.

Using the factor for 4 inches (0.01235) from Figure 14-2, we'll need the following amount of concrete:

$$200.04 \text{ sf} \times 0.01235 \text{ factor} = 2.47 \text{ cy}$$

### Total Cubic Yards of Concrete

We'll need the following amount of concrete (at 3,000 psi) for the basement, garage and utility area, front porch and walk, and terrace:

Basement	11.46
Garage and utility area	8.27
Front porch and walk	3.58
Terrace	<u>2.47</u>
<b>Total:</b>	25.78 (rounded to 26) cubic yards

Enter your estimate for **concrete** on line 14.1 of your Cost Estimate Worksheet. We'll use 26 cubic yards of concrete in our Example Cost Estimate Worksheet.



### Crushed Stone

The crushed stone for the basement was estimated back in Chapter 4. It was placed after the footings were poured and before the foundation walls were started. The front porch, walkway, and terrace will be poured over fill, and no crushed stone will be needed there.

The 4-inch slab in the garage and utility area will be poured over fill. No crushed stone is required for that area, either, so no more crushed stone will be estimated here.

Enter your estimate for **crushed stone** on line 14.2 of your Cost Estimate Worksheet. We'll use 0 (zero) crushed stone in our Example Cost Estimate Worksheet.



### Wire Mesh

Wire mesh reinforcement usually comes in 750-square-foot rolls, and is estimated in whole rolls. We'll be using wire mesh for the basement and terrace. First we'll calculate how many rolls we need, then convert back to square feet by multiplying by the square feet per roll.

#### Basement

Our basement area is 928.08 square feet. We'll use 6 × 6 : 10/10 wire mesh for the concrete reinforcement. To find how many rolls of wire mesh we need, divide 928.08 square feet by the area of a roll of wire mesh (750 square feet).

$$\frac{928.08 \text{ sf}}{750 \text{ sf per roll}} = 1.24 \text{ rolls}$$

We'll need 1.24 rolls of 6 × 6 : 10/10 wire mesh for the basement.

### Terrace

The terrace of our house is estimated at 200.04 square feet. How many 750-square-foot rolls of 6 × 6 : 10/10 wire mesh should we estimate for this area? Divide 200.04 square feet by the area of a roll of wire mesh (750 square feet):

$$\frac{200.04 \text{ sf}}{750 \text{ sf per roll}} = 0.27 \text{ roll}$$

We'll need 0.27 rolls of 6 × 6 : 10/10 wire mesh for the terrace.

### Total Square Feet of Wire Mesh

Total the rolls for each area and add 15 percent for waste. Then multiply the number of rolls by 750 to find the total square feet of wire mesh we'll need.

Basement	1.24 rolls
Terrace	<u>0.27</u> roll
Subtotal:	1.51 rolls
15 percent	<u>0.23</u> roll
<b>Total:</b>	1.74 (rounded to 2) rolls

The total amount of 6 × 6 : 10/10 wire mesh that we need for the basement floor and terrace is two 750-square-foot rolls or 1,500 square feet.

Enter your estimate for **wire mesh** on line 14.3 of your Cost Estimate Worksheet. We'll use 1,500 square feet (2 rolls) of 6 × 6 : 10/10 wire mesh in our Example Cost Estimate Worksheet.



### Reinforcing Rod

We'll need #4 reinforcing rods for the garage and utility area, and the front porch and walkway, including the grade beam.

### Garage and Utility Area

The combined garage and utility areas have been estimated at 669.90 square feet. We'll use #4 rods at 16 inches by 16 inches on center. They'll be supported by the foundation walls. We need to calculate how many linear feet we should estimate.

Using the top half of the worksheet in Figure 14-6, we can calculate the amount of rod required. Enter the width (22.33 feet) and the length (30.00

Horizontal Rods and Traverse Rods @ 16" × 16"	
Width <u>22.33</u> × 0.75 less 1 = 15.75 × length 30.00 =	472.50 lf
Length <u>30.00</u> × 0.75 less 1 = 21.50 × width 22.33 =	<u>480.10 lf</u>
	952.60 lf
Allow <u>10</u> % for overlapping	<u>95.26</u>
Total	1,047.86 lf

**Figure 14-9**  
Estimating reinforcing rod for the garage/utility area

Horizontal Rods and Traverse Rods @ 16" × 16"	
Width <u>12.00</u> × 0.75 less 1 = 8.00 × length 10.00 =	80.00 lf
Length <u>10.00</u> × 0.75 less 1 = 6.50 × width 12.00 =	<u>78.00 lf</u>
	158.00 lf
Allow <u>10</u> % for overlapping	<u>15.80</u>
Total	173.80 lf

**Figure 14-10**  
Estimating reinforcing rod for the front porch

feet) in decimal feet in the two underlined boxes, then do the calculations. The spreadsheet is also available on the accompanying CD-ROM. The correct result is shown in Figure 14-9.

We'll estimate 1,047.86 linear feet of reinforcing rod for the garage and utility area.

### Front Porch and Walkway

We previously estimated the area of the front porch (12 feet × 10 feet) and walkway (24.33 feet × 4 feet) at 217.32 square feet. How many linear feet of #4 reinforcing rod, at 16- × 16-inches on center (supported by the foundation wall and grade beam), should we estimate?

Again, use the worksheet in the top half of Figure 14-6 to calculate the linear feet of reinforcing rod required for each separate area. Using two separate spreadsheets, enter the widths (12.00 feet and 24.33 feet) and the lengths (10.00 feet and 4.00 feet) in decimals in the two underlined boxes, then Excel will do the math. The correct results are shown in Figures 14-10 and 14-11.

We'll estimate 303.23 (173.80 + 129.43) linear feet of reinforcing rod for the porch and walkway.

Now we need to figure how many linear feet of #4 reinforcing rod are required for the grade beam. Multiply the length of the grade beam by 4, which is the number of reinforcing rods needed (shown in Figure 14-5).

Grade beam length:

$$24.33' + 12.00' = 36.33'$$

Multiply length by 4:

$$36.33' \times 4 = 145.32 \text{ lf of reinforcing rod}$$

Horizontal Rods and Traverse Rods @ 16" × 16"	
Width <u>24.33</u> × 0.75 less 1 = 17.25 × length 4.00 =	69.00 lf
Length <u>4.00</u> × 0.75 less 1 = 2.00 × width 24.33 =	<u>48.66 lf</u>
	117.66 lf
Allow <u>10</u> % for overlapping	<u>11.77</u>
Total	129.43 lf

**Figure 14-11**  
Estimating reinforcing rod for the walkway

## Total Reinforcing Rod

The total linear feet of reinforcing rod we need is:

Garage and utility area	1,047.86
Front porch and walk	303.23
Grade beam	<u>145.32</u>
<b>Total:</b>	1,496.41 linear feet

Reinforcing bar comes in 20-foot lengths. Divide the total linear feet by 20 and round up to the next whole number to find how many bars you'll need. Then multiply that number of bars by 20 to find the linear feet to order.

$$\frac{1,496.41 \text{ lf}}{20 \text{ lf}} = 74.82 \text{ (rounded to 75) bars}$$

$$75 \times 20 \text{ lf} = 1,500.00 \text{ lf of reinforcing rod}$$

Enter your estimate for **reinforcing rods** on line 14.4 of your Cost Estimate Worksheet. We'll use 1,500.00 linear feet of #4 reinforcing rod in our Example Cost Estimate Worksheet.



## Expansion Joints

We need expansion joints in the concrete in the basement, garage and utility area, front porch, walkway, and terrace. The maximum spacing between these joints should be triple (in feet) the thickness of the concrete (in inches). For instance, a 4-inch slab needs an expansion joint at least every 12 feet.

We'll be using ½" × 4-inch expansion joint material for all of our expansion joints.

### Basement

Our basement slab is 38.67 feet long and 24 feet wide. We'll need three expansion joints across the width, and one down the length. Calculate the linear feet of joint material as follows:

$$(24.00 \times 3) + 38.67 = 110.67 \text{ lf of expansion joint material}$$

### Garage and Utility Area

The slab for the garage and utility area is 30 feet long and 22.33 feet wide. We'll need two expansion joints across the width, and one down the length. Calculate the linear feet of joint material for these areas as follows:

$$(2 \times 22.33) + 30.00 = 74.66 \text{ lf of expansion joint material}$$

## Front Porch and Walkway

We won't need any expansion joints for the front porch because its dimensions (12 feet  $\times$  10 feet) are within the maximum requirements for a 4-inch-thick slab, which is one expansion joint every 12 feet.

The walkway, however, will need expansion joints at two points along its 24.33-foot length. The walkway is 4 feet wide, so we'll figure the joint material as follows:

$$2 \times 4.00' = 8 \text{ lf of expansion joint material}$$

## Terrace

The back terrace is 12.00 feet  $\times$  16.67 feet. We'll need one expansion joint, requiring 12 linear feet of expansion joint material.

## Total Expansion Joint Material

The total expansion joint material needed for the basement, garage and utility area, front porch and walkway, and the terrace is:

Basement	110.67
Garage and utility area	74.66
Porch and walkway	8.00
Terrace	<u>12.00</u>
<b>Total:</b>	205.33 (rounded to 206) linear feet

Enter your estimate for the linear feet of **expansion joint** material on line 14.5 of your Cost Estimate Worksheet. We'll use 206 linear feet of expansion joint material in our Example Cost Estimate Worksheet.



## Vapor Retarder

We'll use 4 mil polyethylene film as a vapor retarder under the concrete. We've already calculated these areas, so all we need to do is total our square feet.

Basement (38.67' $\times$ 24.00')	928.08
Garage and utility area (22.33' $\times$ 30.00')	669.90
Front porch (12.00' $\times$ 10.00')	120.00
Walkway (24.33' $\times$ 4.00')	97.32
Terrace (12.00' $\times$ 16.67')	<u>200.04</u>
Subtotal:	2,015.34
Add 15 percent for waste and overlaps	<u>302.30</u>
<b>Total:</b>	2,317.64 square feet

We'll use 14-foot-wide film in 50-foot rolls. That's 700 square feet per roll. Why not use 12-foot-wide rolls, since many of the widths we'll

be covering are divisible by 12? Because that wouldn't allow for the overlap we need to keep moisture from leaking through the vapor retarder. For good coverage, it's better to go with the next width up — the 14-foot film.

Now, divide our 2,317.64 square feet by 700 square feet (the number of square feet in each roll), to find the number of rolls we need.

$$\frac{2,317.64 \text{ sf}}{700 \text{ sf per roll}} = 3.31 \text{ (rounded to 4) rolls}$$

We'll be ordering by the square foot, so we need to find how many square feet are in the 4 rolls:

$$4 \times 700 \text{ sf} = 2,800 \text{ sf of 4 mil polyethylene film}$$

Enter your estimate for the square footage of **vapor retarder** on line 14.6 of your Cost Estimate Worksheet. We'll use 2,800 square feet of 4 mil polyethylene film in our Example Cost Estimate Worksheet.



## Forms and Screeds

All material for the forms and screeds, including stakes and nails, will come from surplus supplies, so no extra material needs to be estimated here. However, we'll still need to enter the cost of the labor required in the Labor Estimate section.

## Optional Items

- Additives for concrete — none required
- Winter protection — none required

## Labor Estimate for the Concrete

Concrete is typically delivered to the site by ready-mix truck, and placed directly into the forms by chute. Labor is based on the total cubic yards of concrete to be placed. This total was calculated for line 14.1 of the Cost Estimate Worksheet, and automatically transferred to line 14.11.1. You can use the labor rate from your records, or use the current *National Construction Estimator* rate.

Enter your **labor rate** per cubic yard for pumping concrete on line 14.11.1 of your Cost Estimate Worksheet. We'll use the rate from the *National Construction Estimator* in our Example Cost Estimate Worksheet.



## Concrete Finishing

The surface must be finished after the concrete is poured. Labor is based on the square footage of concrete to be finished. Since the concrete is uniformly 4 inches thick, we can divide the cubic yards by 0.33 feet (4 inches) and multiply by 27 to get the square footage of concrete to be finished. The number of cubic feet is automatically calculated on line 14.11.2 of the Cost Estimate Worksheet. Enter the slab thickness in feet (0.33 feet, in this case), along with your labor rate.

Enter your **slab thickness** and **labor rate** per square foot for **finishing concrete** on line 14.11.2 of your Cost Estimate Worksheet. We'll use 0.33' (4") and the National Construction Estimator rate in our Example Cost Estimate Worksheet.



## Wire Mesh

The labor for laying the wire mesh is based on the square feet of mesh to be laid. The total square footage was calculated for line 14.3 of the Cost Estimate Worksheet, and automatically transferred to line 14.11.3.

Enter your **labor rate** per square foot for laying **wire mesh** on line 14.11.3 of your Cost Estimate Worksheet. We'll use the National Construction Estimator rate in our Example Cost Estimate Worksheet.



## Reinforcing Rods and Tie Wire

The labor for laying and tying reinforcing rod is based on the linear feet of rod laid. That was calculated for line 14.4 of the Cost Estimate Worksheet and automatically transferred to line 14.11.4.

Enter your **labor rate** per linear foot for laying and tying **reinforcing rod** on line 14.11.4 of your Cost Estimate Worksheet. We'll use the National Construction Estimator rate in our Example Cost Estimate Worksheet.



## Expansion Joints

Labor for laying expansion joints is based on the quantity of material to be laid. This total was calculated for line 14.5 of the Cost Estimate Worksheet and automatically transferred to line 14.11.5.

Enter your **labor rate** per linear foot for laying **expansion joints** on line 14.11.5 of your Cost Estimate Worksheet. We'll use the National Construction Estimator rate in our Example Cost Estimate Worksheet.



## Vapor Retarder

Labor for laying vapor retarder film is based on the amount of polyethylene film material to be laid. This was calculated for line 14.6 of the Cost Estimate Worksheet and automatically transferred to line 14.11.6.

Enter your **labor rate** per square foot for laying vapor **retarder** on line 14.11.6 of your Cost Estimate Worksheet. We'll use the National Construction Estimator rate in our Example Cost Estimate Worksheet.



## Forms and Screeds

Labor to build and remove the forms and screeds is estimated at 4 manhours per 250 square feet of concrete slab. We have calculated the following square feet:

Basement (38.67' × 24.00')	928.08
Garage and utility area (22.33' × 30.00')	669.90
Front porch (12.00' × 10.00')	120.00
Walkway (24.33' × 4.00')	97.32
Terrace (12.00' × 16.67')	<u>200.04</u>
<b>Total:</b>	2,015.34 square feet

Our total area is 2,015.34 square feet. At 4 manhours per 250 square feet, it will take the following manhours to build and remove forms and screeds:

$$\frac{2,015.34 \text{ sf}}{250 \text{ sf}} \times 4 \text{ hrs} = 32.25 \text{ (rounded to 33) manhours}$$

One carpenter and one laborer will do this work. The manhours per workman will be:

$$\frac{33 \text{ manhours}}{2 \text{ workmen}} = 16.50 \text{ manhours each}$$

Enter your estimate of the **manhours** for **forms and screeds** on line 14.11.7 of your Cost Estimate Worksheet. We'll use 16.50 manhours for each of the two workmen in our Example Cost Estimate Worksheet.



### COST ESTIMATE WORKSHEET FOR CONCRETE FLOORS, FRONT PORCH, WALKWAYS AND TERRACES

#	Qty	Size	Cost Per	Subtotal
14.1	<b>Concrete</b> 26.00 cy	test 3,000 psi	@ \$105.00 cy	= \$2,730.00
14.2	<b>Crushed stone</b> 0.00 cy		@ \$0.00 cy	= \$0.00
14.3	<b>Wire mesh</b> 1,500.00 sf	6 × 6 : 10/10	@ \$0.17 sf	= \$255.00
14.4	<b>Reinforcing rods</b> 1,500.00 lf	# 4	@ \$0.40 lf	= \$600.00
14.5	<b>Expansion joints</b> 206.00 lf	½" × 4"	@ \$0.69 lf	= \$142.14
14.6	<b>Vapor retarder</b> 2,800.00 sf	4 mil	@ \$0.08 sf	= \$224.00
14.7	<b>Additives for concrete</b> (List on separate sheet and enter cost here)			
14.8	<b>Forms and screeds</b> (List on separate sheet and enter cost here)			
14.9	<b>Winter protection</b> (List any materials needed or cost of temporary heat to protect the concrete from freezing, and enter total cost here)			
14.10	<b>Other material</b> (List on separate sheet and enter cost here)			
		<b>Subtotal</b>		\$3,951.14
		Sales tax	@ 7.75 %	\$306.21
		<b>Cost of material</b>		<b>\$4,257.35</b>
14.11	<b>Labor:</b>			
14.11.1	<b>Concrete - pumping</b> 26.00 cy		\$15.59 cy	= \$405.34
14.11.2	<b>Concrete - finishing</b> 702.00 cf	0.33 ft thick	2,127.27 sf @ \$0.43 sf	= \$914.73
14.11.3	<b>Wire mesh</b> 1,500.00 sf		@ \$0.15 sf	= \$225.00
14.11.4	<b>Reinforcing rods</b> 1,500.00 lf		@ \$0.46 lf	= \$690.00
14.11.5	<b>Expansion joints</b> 206.00 lf		@ \$0.88 lf	= \$181.28
14.11.6	<b>Vapor retarder</b> 2,800.00 sf		@ \$0.05 sf	= \$140.00
14.11.7	<b>Forms and screeds</b> 16.50 manhours - carpenter, BC		@ \$32.09 hour	= \$529.49
	16.50 manhours - laborer, BL		@ \$26.64 hour	= \$439.56
		<b>Total cost of labor</b>		\$3,525.40
		<b>Cost of concrete (entered on line 14 of Form 100)</b>		<b>\$7,782.75</b>

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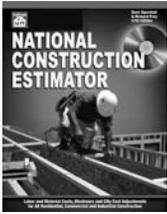
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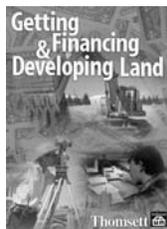
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## CD Estimator

If your computer has *Windows*™ and a CD-ROM drive, CD Estimator puts at your fingertips over 150,000 construction costs for new construction, remodeling, renovation & insurance repair, home improvement, framing & finish carpentry, electrical, concrete & masonry, painting, earthwork and heavy equipment, and plumbing & HVAC. Monthly cost updates are available at no charge on the Internet. You'll also have the *National Estimator* program — a stand-alone estimating program for *Windows*™ that *Remodeling* magazine called a "computer wiz," and *Job Cost Wizard*, a program that lets you export your estimates to QuickBooks Pro for actual job costing. A 60-minute interactive video teaches you how to use this CD-ROM to estimate construction costs. And to top it off, to help you create professional-looking estimates, the disk includes over 40 construction estimating and bidding forms in a format that's perfect for nearly any *Windows*™ word processing or spreadsheet program. **CD Estimator is \$98.50**

## National Home Improvement Estimator

Current labor and material prices for home improvement projects. Provides manhours for each job, recommended crew size, and the labor cost for removal and installation work. Material prices are current, with location adjustment factors and free monthly updates on the Web. Gives step-by-step instructions for the work, with helpful diagrams, and home improvement shortcuts and tips from experts. Includes a CD-ROM with an electronic version of the book, and *National Estimator*, a stand-alone *Windows*™ estimating program, plus an interactive multimedia tutorial that shows how to use the disk to compile home improvement cost estimates. **520 pages, 8½ x 11, \$63.75. Revised annually**



## Drafting House Plans



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

joist and rafter spans and how to make sure that drawings meet code requirements. **192 pages, 8½ x 11, \$34.95**

## Contractor's Guide to Change Orders

This book gives you the ammunition you need to keep contract disputes from robbing you of your profit. You'll learn how to identify trouble spots in your contract, plans, specifications and site; negotiate and resolve change order disputes, and collect facts for evidence to support your claims. You'll also find detailed checklists to organize your procedures, field-tested sample forms and worksheets ready for duplication, and various professional letters for almost any situation. **382 pages, 8½ x 11, \$79.00**



### Stained Concrete Interior Floors



Turn concrete slabs into works of art. This book shows you concrete design options, how to estimate costs, and even how to sell your services and write contracts for floor staining. Large color photos show how to correct problem floors, test your stain before beginning, apply dyes, grouts and sealers, and maintain stained concrete floors. In addition, you'll find information on specialty techniques and the tools you'll need for the job. Includes resources and websites for tools, supplies, equipment and training to help you become a concrete floor staining "pro." Full of charts, helpful hints and step-by-step instructions that should help you make extra income as a concrete floor staining expert. **100 pages, 8½ x 11, \$35.00**

### DeWalt Construction Estimating Complete Handbook

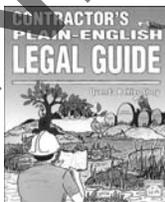
This new edition is loaded with tips, checklists, worksheets, data tables, and tutorials that will provide you tools to effectively navigate through every step of the estimating process. Focus is on the construction estimating "how-to" essentials, with on-the-spot answers backed up with graphic examples. With a thorough understanding of the important profit-making factors within construction, its comprehensive coverage includes marketing, bid planning, scope review, quantity take-off for all trades and divisions, cost analysis, value engineering, *Excel* spreadsheet estimating, and more. Includes on-line tutorials. **256 pages, 8 x 10, \$24.95**

### Craftsman's Construction Installation Encyclopedia

Step-by-step installation instructions for just about any residential construction, remodeling or repair task, arranged alphabetically, from *Acoustic tile* to *Wood flooring*. Includes hundreds of illustrations that show how to build, install, or remodel each part of the job, as well as manhour tables for each work item so you can estimate and bid with confidence. Also includes a CD-ROM with all the material in the book, handy look-up features, and the ability to capture and print out for your crew the instructions and diagrams for any job. **792 pages, 8½ x 11, \$65.00**

### Contractor's Plain-English Legal Guide

For today's contractors, legal problems are like snakes in the swamp — you might not see them, but you know they're there. This book tells you where the snakes are hiding and directs you to the safe path. With the directions in this easy-to-read handbook you're less likely to need a \$200-an-hour lawyer. Includes simple directions for starting your business, writing contracts that cover just about any eventuality, collecting what's owed you, filing liens, protecting yourself from unethical subcontractors, and more. For about the price of 15 minutes in a lawyer's office, you'll have a guide that will make many of those visits unnecessary. Includes a CD-ROM with blank copies of all the forms and contracts in the book. **272 pages, 8½ x 11, \$49.50**



### Construction Estimating

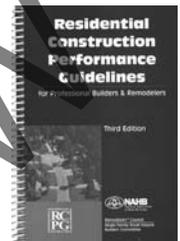
This unusually well-organized book shows the best and easiest way to estimate materials for room additions or residential structures. It gives estimating tables and procedures needed to make a fast, accurate, and complete material list of the structural members found in wood- and steel-framed buildings. This book is divided into 72 units, each of them covering a separate element in the estimating procedure. Covers estimating foundations, floor framing, wall framing, ceiling framing, roof framing, roofing materials, exterior and interior finish materials, hardware, steel joist floor framing, steel stud framing, and steel ceiling joist and rafter framing. **496 pages, 8½ x 11, \$49.50**

### Scale MasterPro XE w/PC Cable

If you're looking for a simple scaler for linear, area, and volume takeoffs with a PC interface, the Scale MasterPro XE offers a value-priced way to transfer measurements from plans, blueprints, and maps of any scale, into your computer for estimating with your *National Estimator* program. The PC interface is fully compatible with *Windows XP* or higher. Transfer any rolled values directly into *Excel* spreadsheets or the *National Estimator*. Includes Scale MasterPro XE, and connectors — no software needed. **\$149.95**

### Residential Construction Performance Guidelines

Created and reviewed by more than 300 builders and remodelers, this guide gives cut-and-dried construction standards that apply to new construction and remodeling. It defines corrective action necessary to bring all construction up to standards. Standards are listed for sitework, foundations, interior concrete slabs, basement and crawl spaces for block walls and poured walls, wood-floor framing, beams, columns and posts, plywood and joists, walls, wall insulation, windows, doors, exterior finishes and trim, roofs, roof sheathing, roof installation and leaks, plumbing, sanitary and sewer systems, electrical, interior climate control, HVAC systems, cabinets and countertops, floor finishes and more. **120 pages, 6½ x 8½, \$39.95**



### Construction Contract Writer



Relying on a "one-size-fits-all" boilerplate construction contract to fit your jobs can be dangerous — almost as dangerous as a handshake agreement. *Construction Contract Writer* lets you draft a contract in minutes that precisely fits your needs and

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### Construction Estimating Reference Data

Provides the 300 most useful manhour tables for practically every item of construction. Labor requirements are listed for sitework, concrete work, masonry, steel, carpentry, thermal and moisture protection, doors and windows, finishes, mechanical and electrical. Each section details the work being estimated and gives appropriate crew size and equipment needed. Includes a CD-ROM with an electronic version of the book with *National Estimator*, a stand-alone *Windows™* estimating program, plus an interactive multimedia video that shows how to use the disk to compile construction cost estimates. **432 pages, 11 x 8½, \$39.50**



### Home Builders' Jobsite Codes

A spiral-bound, quick reference to the 2009 *International Residential Code* that's filled with easy-to-read and understand code requirements for every aspect of residential construction. This user-friendly guide through the morass of the code is packed with illustrations, tables, and figures, to illuminate your path to inspection and approval. **281 pages, 5½ x 8½, \$28.95**

### National Repair & Remodeling Estimator

The complete pricing guide for dwelling reconstruction costs. Reliable, specific data you can apply on every repair and remodeling job. Up-to-date material costs and labor figures based on thousands of jobs across the country. Provides recommended crew sizes; average production rates; exact material, equipment, and labor costs; a total unit cost and a total price including overhead and profit. Separate listings for high- and low-volume builders, so prices shown are specific for any size business. Estimating tips specific to repair and remodeling work to make your bids complete, realistic, and profitable. Includes a CD-ROM with an electronic version of the book with *National Estimator*, a stand-alone *Windows*™ estimating program, plus an interactive multimedia video that shows how to use the disk to compile construction cost estimates. **496 pages, 8½ x 11, \$63.50. Revised annually**

### Estimating With Microsoft Excel

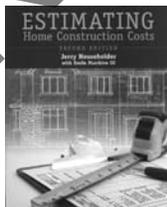
Most builders estimate with *Excel* because it's easy to learn, quick to use, and can be customized to your style of estimating. Here you'll find step-by-step instructions on how to create your own customized automated spreadsheet estimating program for use with *Excel*. You'll learn how to use the magic of *Excel* to create detail sheets, cost breakdown summaries, and links. You'll put this all to use in estimating concrete, rebar, permit fees, and roofing. You can even create your own macros. Includes a CD-ROM that illustrates examples in the book and provides you with templates you can use to set up your own estimating system. **148 pages, 7 x 9, \$39.95**

### Estimating & Bidding for Builders & Remodelers

This 5th edition has all the information you need for estimating and bidding new construction and home improvement projects. It shows how to select jobs that will be profitable, do a labor and materials take-off from the plans, calculate overhead and figure your markup, and schedule the work. Includes a CD with an easy-to-use construction estimating program and a data-base of 50,000 current labor and material cost estimates for new construction and home improvement work, with area modifiers for every zip code. Price updates on the Web are free and automatic. **272 pages, 8½ x 11, \$89.50**

### Estimating Home Construction Costs 2nd edition

This book walks you step-by-step through the process of estimating costs for new home construction. It discusses the different types of estimates and when to use each, how to integrate estimating into other functions, and describes the benefits of computer estimating. Includes forms, checklists and conversion tables to help your estimating go more easily and be more accurate. **116 pages, 8½ x 11, \$29.95**

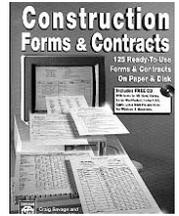


### Residential Wiring to the 2008 NEC

This completely revised manual explains in simple terms how to install rough and finish wiring in new construction, alterations, and additions. It takes you from basic electrical theory to current wiring methods that comply with the 2008 *National Electrical Code*. You'll find complete instructions on troubleshooting and repairs of existing wiring, and how to extend service into additions and remodels. Hundreds of drawings and photos show you the tools and gauges you need, and how to plan and install the wiring. Includes demand factors, circuit loads, the formulas you need, and over 20 pages of the most-needed 2008 *NEC* tables to help your wiring pass inspection the first time. Includes a CD-ROM with an Interactive Study Center that helps you retain what you've learned, and study for the electrician's exam. Also on the CD is the entire book in PDF format, with easy search features so you can quickly find answers to your residential wiring questions. **304 pages, 8½ x 11, \$42.00**

### Construction Forms & Contracts

125 forms you can copy and use — or load into your computer (from the FREE disk enclosed). Then you can customize the forms to fit your company, fill them out, and print. Loads into *Word for Windows*, *Lotus 1-2-3*, *WordPerfect*, *Works*, or *Excel* programs. You'll find forms covering accounting, estimating, fieldwork, contracts, and general office. Each form comes with complete instructions on when to use it and how to fill it out. These forms were designed, tested and used by contractors, and will help keep your business organized, profitable and out of legal, accounting and collection troubles. Includes a CD-ROM for *Windows*™ and *Mac*™. **432 pages, 8½ x 11, \$41.75**



### Standard Estimating Practice

Estimating isn't always an easy job. Sometimes snap decisions can produce negative long-term effects. This book was designed by the American Society of Professional Estimators as a set of standards to guide professional estimators. It's intended to help every estimator develop estimates that are uniform and verifiable. Every step that should be included in the estimate is listed, as well as aspects in the plans to consider when you're estimating a job, and what you should look for that may not be included. The result should help you produce more consistently accurate estimates. **506 pages, 8½ x 11, \$89.00**

### Defensive Estimating

More than a few residential builders and remodelers have walked away from closings with less profit than they deserve. You may get the job, but find out later you needed to make a lot more money on it. Performed correctly, estimating is a small builder's or remodeler's key to profit. Here you'll find how to estimate based on fiscal goals while protecting your company's bottom line. This unique approach to estimating gives readers user-friendly tips and methods for improving the process and providing hundreds of ideas and simple suggestions. Explains how to defend each line of an estimate so that your system of planned profit is consistent and bankable. **142 pages, 8½ x 11, \$29.95**

### 2008 National Electrical Code

This new electrical code incorporates sweeping improvements to make the code more functional and user-friendly. Here you'll find the essential foundation for electrical code requirements for the 21st century. With hundreds of significant and widespread changes, this 2008 *NEC* contains all the latest electrical technologies, recently-developed techniques, and enhanced safety standards for electrical work. This is the standard all electricians are required to know, even if it hasn't yet been adopted by their local or state jurisdictions. **784 pages, 8½ x 11, \$75.00**



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Replacing the *CABO One- and Two-Family Dwelling Code*, this book has the latest technological advances in building design and construction. Among the changes are provisions for steel framing and energy savings. Also contains mechanical, fuel gas and plumbing provisions that coordinate with the *International Mechanical Code* and *International Plumbing Code*. **868 pages, 8½ x 11, \$88.00**

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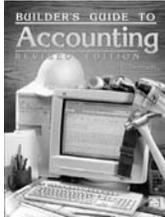
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Step-by-step, easy-to-follow guidelines for setting up and maintaining records for your building business. This practical guide to all accounting methods shows how to meet state and federal accounting requirements, explains the new depreciation rules,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



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### Basic Engineering for Builders

This book is for you if you've ever been stumped by an engineering problem on the job, yet wanted to avoid the expense of hiring a qualified engineer. Here you'll find engineering principles explained in non-technical language and practical methods for applying them on the job. With the help of this book you'll be able to understand engineering functions in the plans and how to meet the requirements, how to get permits issued without the help of an engineer, and anticipate requirements for concrete, steel, wood and masonry. See why you sometimes have to hire an engineer and what you can undertake yourself: surveying, concrete, lumber loads and stresses, steel, masonry, plumbing, and HVAC systems. This book is designed to help you, the builder, save money by understanding engineering principles that you can incorporate into the jobs you bid. **400 pages, 8½ x 11, \$39.50**

### Basic Lumber Engineering for Builders

Beam and lumber requirements for many jobs aren't always clear, especially with changing building codes and lumber products. Most of the time you rely on your own "rules of thumb" when figuring spans or lumber engineering. This book can help you fill the gap between what you can find in the building code span tables and what you need to pay a certified engineer to do. With its large, clear illustrations and examples, this book shows you how to figure stresses for pre-engineered wood or wood structural members, how to calculate loads, and how to design your own girders, joists and beams. Included FREE with the book — an easy-to-use limited version of NorthBridge Software's *Wood Beam Sizing* program.

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How to design plumbing systems in residential, commercial, and industrial buildings. Covers designing systems that meet code requirements for homes, commercial buildings, private sewage disposal systems, and even mobile home parks. Includes relevant code sections and many illustrations to guide you through what the code requires in designing drainage, waste, and vent systems.

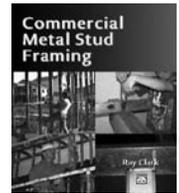
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Framing commercial jobs can be more lucrative than residential work. But most commercial jobs require some form of metal stud framing. This book teaches step-by-step, with hundreds of job site photos, high-speed metal stud framing that works in both residential and commercial construction. It describes the special tools you'll need, how to use them effectively, and the material and equipment you'll be working with. You'll find the shortcuts, tips and tricks-of-the-trade that take most steel framers years on the job to discover. Shows how to set up a crew to maintain a rhythm that will speed progress faster than any wood framing job. If you've framed with wood, this book will teach you how to be one of the few top-notch metal stud framers in both commercial and residential construction.



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### Concrete Manual

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### A Roof Cutter's Secrets to Custom Homes

A master framer spills his secrets to framing irregular roofs, jobsite solutions for rake walls, and curved and two-story walls. You'll also find step-by-step techniques for cutting bay roofs, gambrels, and shed, gable, and eyebrow dormers. You'll even find instructions on custom work like coffered ceilings, arches and barrel vaults, even round towers, hexagons, and other polygons. Includes instructions for figuring most of the equations in this book with the keypad of the Construction Master Pro calculator.

**342 pages, 8½ x 5½, \$32.50**

### National Concrete & Masonry Estimator

Since you don't get every concrete or masonry job you bid, why generate a detailed list of materials for each one? The data in this book will allow you to get a quick and accurate bid, and allow you to do a detailed material takeoff, only for the jobs on which you're the successful bidder. Includes assembly prices for bricks, and labor and material prices for brick bonds, brick specialties, concrete blocks, CMU, concrete footings and foundations, concrete on grade, concrete specialties, concrete beams and columns, beams for elevated slabs, elevated slab costs, and more. Includes a CD-ROM with an electronic version of the book with *National Estimator*, a stand-alone *Windows*™ estimating program, plus an interactive multimedia video that shows how to use the disk to compile construction cost estimates.

**608 pages, 8½ x 11, \$64.00. Revised annually**

### Business Letters for the Construction Industry

Here you'll find over 100 professionally-written model letters for virtually every situation. Put your business in the best possible light with a well-written letter — especially when you can use that letter to improve a bad situation. Use these letters over and over again to resolve disputes, win new clients, clarify proposals, coordinate with architects, subcontractors, owners, and insurers, schedule meetings and inspections, and to respond to complaints or difficult situations. Included are letters responding to threats of legal action, of commendation to workers, of job performance, apology for defective or delayed work; letters for justification of change orders and price increases; letters explaining your insurance liability, drug testing, injury at work, overtime, equipment use, and more. Practically every letter you'll have to write is in this book, already written, and available on *MS-Word* on the CD-ROM enclosed. Just load the letter you need, change a few phrases, print out and send, or e-mail, and you're free to spend your time on more productive endeavors.

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How to calculate the amount of dirt you'll have to move and the cost of owning and operating the machines you'll do it with. Detailed, step-by-step instructions on how to assign bid prices to each part of the job, including labor and equipment costs. Also, the best ways to set up an organized and logical estimating system, take off from contour maps, estimate quantities in irregular areas, and figure your overhead. **448 pages, 8½ x 11, \$39.50**

### Contractor's Guide to QuickBooks Pro 2010

This user-friendly manual walks you through *QuickBooks Pro's* detailed setup procedure and explains step-by-step how to create a first-rate accounting system. You'll learn in days, rather than weeks, how to use *QuickBooks Pro* to get your contracting business organized, with simple, fast accounting procedures. On the CD included with the book you'll find a *QuickBooks Pro* file for a construction company. Open it, enter your own company's data, and add info on your suppliers and subs. You also get a complete estimating program, including a database, and a job costing program that lets you export your estimates to *QuickBooks Pro*. It even includes many useful construction forms to use in your business.

**344 pages, 8½ x 11, \$57.00**

**See checklist for other available editions.**

### Architects, Contractors, Engineers, Guide to Construction Costs

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In commercial work, a single job can keep you and your crews busy for a year or more. The profit percentages are higher, but so is the risk involved. This book takes you step-by-step through the process of setting up a successful commercial business: finding work, estimating and bidding, value engineering, getting through the submittal and shop drawing process, keeping a stable work force, controlling costs, and promoting your business. Explains the design/build and partnering business concepts and their advantage over the competitive bid process. Includes sample letters, contracts, checklists and forms that you can use in your business, plus a CD-ROM with blank copies in several word-processing formats for both Mac™ and PC computers.

**256 pages, 8½ x 11, \$42.00**

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Square-foot costs for residential, commercial, industrial, military, schools, greenhouses, churches and farm buildings. Includes important variables that can make any building unique from a cost standpoint. Quickly work up a reliable budget estimate based on actual materials and design features, area, shape, wall height, number of floors, and support requirements. Now includes easy-to-use software that calculates total in-place cost estimates. Use the regional cost adjustment factors provided to tailor the estimate to any jobsite in the U.S. Then view, print, email or save the detailed PDF report as needed.

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### Markup & Profit: A Contractor's Guide

In order to succeed in a construction business, you have to be able to price your jobs to cover all labor, material and overhead expenses, and make a decent profit. The problem is knowing what markup to use. You don't want to lose jobs because you charged too much, and you don't want to work for free because you charged too little. If you know how to calculate markup, you can apply it to your job costs to find the right sales price for your work. This book gives you tried and tested formulas, with step-by-step instructions and easy-to-follow examples, so you can easily figure the markup that's right for your business. Includes a CD-ROM with forms and checklists for your use. **320 pages, 8½ x 11, \$32.50**

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A practical guide to simplified construction surveying. How to divide land, use a transit and tape to find a known point, draw an accurate survey map from your field notes, use topographic surveys, and the right way to level and set grade. You'll learn how to make a survey for any residential or commercial lot, driveway, road, or bridge — including how to figure cuts and fills and calculate excavation quantities. Use this guide to make your own surveys, or just read and verify the accuracy of surveys made by others. **256 pages, 8½ x 11, \$51.95**

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Current prices in dollars and cents for hard-to-find items needed on most insurance, repair, remodeling, and renovation jobs. All price items include labor, material, and equipment breakouts, plus special charts that tell you exactly how these costs are calculated. Includes a CD-ROM with an electronic version of the book with *National Estimator*, a stand-alone *Windows™* estimating program, plus an interactive multimedia video that shows how to use the disk to compile construction cost estimates. **488 pages, 8½ x 11, \$64.50. Revised annually**

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Stop "eating" the costs of bad designs, hidden conditions, and job surprises. Set ground rules that assign those costs to the rightful party ahead of time. And it's all in plain English, not "legalese." For less than the cost of an hour with a lawyer, you'll learn the exclusions to put in your agreements, why your insurance company may pay for your legal defense, and how to avoid liability for injuries to your sub and his employees. It also includes a FREE CD-ROM with contracts and forms you can customize for your own use. **352 pages, 8½ x 11, \$69.95**

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An accurate concrete estimate of quantities is crucial — order too much and you can't return it. Order too little and you pay through the nose for the extra you need, and risk the job setting into a cold joint while you wait. This unique calculator helps you correctly figure your concrete quantity by working in yards, or feet-inch fractions. Calculate area, volume, and weight per volume: square-ups and drops, and rebar solutions for total linear feet and weight per size of rebar. **\$69.95**



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