HOW TO BUILD A DECK - Book One

Introduction

Few home improvements can match a wood deck for usefulness, beauty and enhanced value to a home. For adults, decks offer outdoor living space for entertaining, sun bathing and dining. For children, they provide an excellent outdoor play area.

But the best news about a deck is that it is an ideal home improvement construction project for the average handyman or woman. Design is straightforward. No advanced carpentry skills or sophisticated tools are needed. If you can hammer a nail, saw on a straight line, and read a level, then building a deck should present no major problems.

What's more, the use of pressure-treated lumber helps assure that your project will be virtually maintenance-free and will provide enjoyment for decades to come. You won't even have to paint or stain the wood, unless you want to. Left unfinished, it weathers to a rustic gray. It is a good idea to seal the deck periodically to prevent the wood from checking, however.

There's enough information in this article to help you design and build an attractive wood deck.

Tools

Building a deck is easier and usually better done when proper tools are used. Certain property and construction conditions may necessitate special tools, but the following list will suffice for most deck projects:

- circular saw
- power drill
- tape measure
- hammer
- chalk line
- level
- combination square
- framing square
- hand saw

For safety,the following are recommended:

- gloves

- goggles
- dust mask

Preliminary Planning

The location and design of your deck should be influenced by several factors:

- *Anticipated use (private sunbathing, large parties, family relaxation, outdoor cooking)
- *Air currents (allow flow of gentle breezes, block out prevailing winds)
- *Existing structure (should be compatible)
- *Sunlight (desire sun or shade)
- *Privacy (screen certain areas, avoid street noise, landscaping)
- *View (emphasizes a good view, mask a poor one)
- *Safety (children or grandchildren, senior citizens)
- *Access to home (adjoin kitchen, living room or bedroom)
- *Terrain (elevated deck, ground level, split level)
- *Other personal needs and preferences

Decks originally gained popularity as a way of adding outdoor living space on hillside lots. However, many decks today are built on level ground where they offer firm, dry footing close to the home.

Decks can be built just inches high or elevated will above the ground. They may be freestanding or attached to the home or other building. They can even be built in a second-story above a garage, carport, or other roofed structure.

It's important; of course, to make certain the deck does not seal access to any utility or drainage lines. If you aren't sure of the location or depth of buried electric, telephone, gas, water or sewer lines, it's a good idea to ask your utilities.

Keep in mind how you intend to use your deck. Will it accommodate benches, lounge chairs, perhaps a table for outdoor dining? How many people will be using the deck at any given time? These are elements which must be considered in planning for proper size and design.

Once you have decided on the basic size, shape and location of your deck, check local building codes. You may find that there are restrictions as to height and size within your sub-division or community. A construction permit will probably be needed, but don't apply for one until you've finalized your planning.

Don't order any lumber or start work until you're sure that your plans meet local requirements. The information provided here should meet any local codes, but you will need to check to see if there are any particular requirements in your town.

Construction tips

Here are some additional suggestions that may help you in building your deck.

- Always nail a thinner member to a thicker member.
- Drive nails at a slight angle toward each other for greater holding power.
- When toenailing, stagger opposing nails so they pass each other.
- Nails and other hardware should be hot-dipped zinc-coated (galvanized) or equally well-protected material. Otherwise, weather may cause them to rust, leaving streaks on your deck.
- For maximum holding power, use ring- or spiral-shank nails. They can help reduce warping of lumber.
- To reduce splitting, when nailing close the the edge of a board, drill a pilot hole about three quarters the diameter of the nail. For dense or brittle wood, blunt the points by striking them carefully with a hammer. Blunt nails cut through; sharp ones pry apart.
- Place nails no close to the edge than about half the board thickness and no closer to the end than the thickness of the board. When nailing closer to the edge, pre-drill holes.
- Use 16d nails on nominal two-inch decking. Use two at each joint with 2 x 4's laid flat; use three for 2 x 6's laid flat.
- Mill ends may not be square. Resquare and trim the ends. Take this step into consideration when figuring lengths and finished deck size. IT is a good idea to leave all the deck boards slightly longer than the finished size and cut them all to the final dimension after they are all nailed down.
- With lag screws, use flat washer under head.
- Use washers under nut and head of machine bolts and just under nut of carriage bolts.
- Wear gloves to help avoid splinters.
- Tops of upright structurals and joist ends should be beveled to a 30 to 45 degree angle for drainage to minimize moisture (see fig. 18, page 11). While pressure-treated wood resists end rot, it remains subject to splitting, checking and chipping caused by moisture-induced swelling and subsequent shrinkage, therefore sealing the deck is a good idea to protect the surface.
- When staining wood, follow the manufacturers' instructions. Wood should be dry for best results.
- Remember, you are about to do finish work, not rough framing. The results will be visible for years to come. There is no substitute for good construction techniques and workmanship. (This is not intended to scare you, just remind you.)

DESIGN

Decks consist of six parts: footings, posts, beams, joists, decking and railing. In planning for these you have three basic considerations: function, structural stability, and appearance.

The aesthetics of your deck will probably be most noticeable in your choice of railing and decking, but the location of posts and beams can have a major effect on the appearance of a raised deck.

In almost every instance, your choice lies between several small pieces of lumber or comparatively fewer large ones. A railing, for example, may be held by 2 x 4 posts spaced every 16 inches or less, or it may have 4 x 4 posts capped by a 2 x 6 spaced as far apart as eight feet. (Note: a 2 x 4 isn't always 2" x 4". Actual size of finished dry lumber is typically 1/2 inch smaller than the nomimal size.

Your best guide at this stage is to look at various deck plans and inspect decks completed by friends and neighbors to help decide what you like best.

Choosing decking lumber presents similar alternatives. A popular choice is 2-inch thick lumber in widths of 4 or 6 inches. These can be alternated to make more interesting patterns. There is also 5/4 decking, which has rounded (bullnosed) edges to give the deck boards a more finished, softer look.

Develop your own design using the tables and information that follow. Clicking on the table reference will bring you to the table page. There will be an easy return link back to here on the table page. Take a look at the Tables 1 through 5. The figures given are for maximum spans using pressure-treated wood. Inferior grade wood will not safely span the distances in these tables. More on how to use the tables will follow below.

The design and construction information presented here is for normal usage. If special loading conditions are anticipated or unusual circumstances exist, consult a competent designer.

SUPPORTING A DECK

Elevated decks have generally been supported by 4x4 and 6x6 solid timber posts. Under a properly designed deck, these can provide very satisfactory support. Deck posts support the deck above, they are its foundation. The first consideration, then, should be the ability of a post to support the structure and the people on it.

ACCESSORIES AND CONNECTORS

Some of the special connectors and accessories that you should be familiar with are:

- Lag screws
- Expansion bolt (for bolting into the cement foundation, if necessary)
- Carriage bolt
- spiral nails
- ring shank nails
- joist hangers
- post fasteners (to fasten a wooden post to a cement footer)

Make sure all connectors, nails, screws, bolts and related hardware are hot-dipped zinc-coated or otherwise rustproof. Remember, pressurized wood will remain in

serviceable condition long after ordinary nails and connectors have been weakened by corrosion. Rust will also cause unsightly stains. The same conditions that cause untreated wood to rot also cause metal to rust.

USE THESE TABLES TO HELP PLAN YOUR DECK

Let's say that your deck will extend eight feet from the house and be 14 ft. long. If it is to be just above ground level, there's little need for a railing. However, higher decks call for a sturdy railing.

Table 1 shows the appropriate beam size. For example, the distance between the house and the beam is 8 ft. Using (2)2x12's as your beam members allows a span of 7 ft. between posts, a convenient figure for a deck 14 ft. long. A beam can be built up from two small pieces either nailed together or placed a few inches apart on either side of a post. Be sure you have a post under any joints in your beams.

To calculate the size post needed, multiply the beam spacing (eight ft.) by the post spacing (7 ft.). This gives you the load area-56 square feet. Table 2 shows that for a load area less than 72 sq. ft. and a post height under 6 ft, a 4 x 4 post is adequate.

Decking in this example will be a 2 x 6 boards, laid flat. Table 3 shows the safe spans for the decking.

Now refer to Table 4. As in our example, your joists must span the 8 ft. between the house and the outer beam. That can be achieved with 2 x 8 joists spaced 24 inches apart. To avoid any springiness in your deck, however, you should design with joists 16 inches apart.

If a railing is desired, refer to Table 5 to determine proper post sizes and spacing requirements. Be sure to check your local code here since the space between balusters is usually specified to be sure the small heads of children can not get stuck between them.

Estimating

After deciding the type, shape and size of deck you'll build, the next step is to estimate the materials you'll need. If you use a ready-made design, and the materials list is provided, this work is already done for you. But if you design your own deck, or use a variation from a standard plan, you'll have to estimate material requirements. In estimating, it's better to overestimate since you can always use any excess material in other projects, such as benches or planter boxes. There is nothing worse than running out of material and dashing off to the lumber yard before they close (hopefully) right in the middle of the project. (On the other hand, you may just looking for a break!)

First, draw a simple sketch of the deck; decking, rails, footings, posts and beams. Sketch the deck to scale, perhaps ¼" per foot. To save money, stick to standard lumber sizes and lengths to the fullest extent possible. For example, deck boards are usually stocked 2 x 4, 2,x 6, or 5/4 x 6 inch and 8, 10, 12,14 and 16 foot lengths. I usually keep a sale flier from the lumber yard handy to be sure I know what sizes of

lumber stock. For the decking, calculate using actual dimensions (5 ½ for a 6 in boards) and don't allow for spacing between boards. (More on that later, but I recommend little or no gap between the boards).

We present the second part of this article with step by step instructions in [How To Build A Deck Part 2](#).

Table 1 Minimum Beam Sizes

Length of Span ↓ ft	Spacing between posts (ft) 4	5	6	7	8	9	10
6	(2) 2x8s	(2) 2x8s	(2) 2x8s	(2) 2x10s	(2) 2x10s	(2) 2x10s	(2) 2x12s
7	(2) 2x10s	(2) 2x10s	(2) 2x10s	(2) 2x10s	(2) 2x10s	(2) 2x12s	(2) 2x12s
8	(2) 2x10s	(2) 2x10s	(2) 2x10s	(2) 2x12s	(2) 2x12s	(2) 2x12s	(3) 2x12s
9	(2) 2x10s	(2) 2x10s	(2) 2x12s	(2) 2x12s	(2) 2x12s	(3) 2x12s	*
10	(2) 2x10s	(2) 2x12s	(2) 2x12s	(3) 2x12s	(3) 2x12s	*	*
11	(2) 2x12s	(2) 2x12s	(3) 2x12s	(3) 2x12s	*	*	*
12	(2) 2x12s	(3) 2x12s	(3) 2x12s	(3) 2x12s	*	*	*

* Beams Larger than 2x12 recommended

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Table 2 Minimum Post sizes

Height post spacing (ft)	**Load Area (sq. ft)= beam spacing x 48**	**72**	**96**
up to 6	4x4	4x4	6x6
up to 8	6x6	6x6	6x6

Vertical loads figured as concentric along axis.
No Lateral loads considered

Table 3 Recommended Spans for spaced deck boards

Spans in Inches Laid Flat				**Laid on Edge**
5/4x4	5/4x6	2x4	2x6	2x4
16	16/24**	16	16/24**	48

**Although 24 inches is a safe span, undesirable deflection or springiness may occurr.

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Table 4 Maximum allowable

spans for deck joists		
Joist size (inches)	**Joist 16**	**spacing 24**
2x6	9'-9"	7'-11"
2x8	12'-10"	10'-6"
2x10	16'-5"	13'-4"

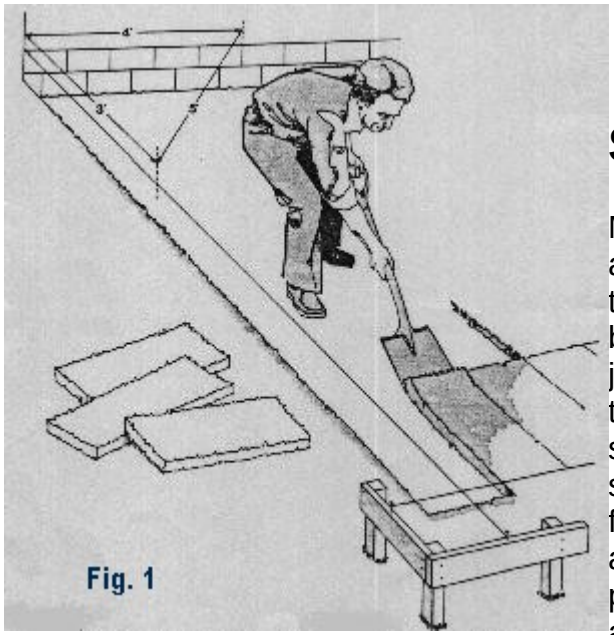
Table 5 Railings

Distance between posts	**Post size (inches)**	**Cap size (inches)**
2' to 3'	2x4	2x4
3' to 4'	2x4, 4x4	2x4, 2x6
4' to 6'	2x6, 4x4	2x6

Side rails can be nominal 1" or 2" lumber of varying widths

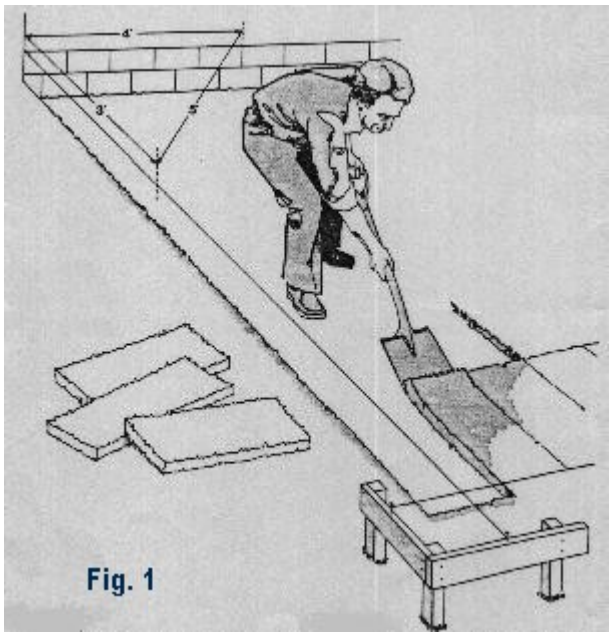
Tables are based on lumber with 1200 psi bearing stress rating and a live load of 40 psf.

STEP-BY STEP METHOD OF DECK CONSTRUCTION



Step 1

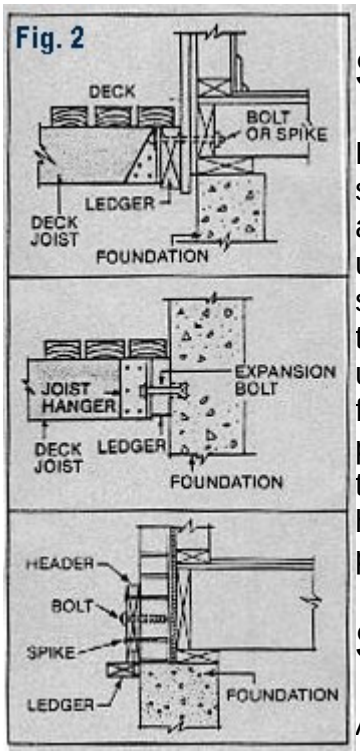
Mark off the deck area using string and "batterboards" making sure that it is square. Batterboards are boards hammered in to the ground just outside the corners of where the deck will be. See Fig 1. The string will help you visualize the size and appearance of the finished deck and will also serve as a guide for excavation and post placement. But trust me, it will always look smaller this way than when it is done.



SQUARING WITH STRING

1. Attach string to house and/or batterboards to make sure its level.
2. Use a felt tip marker to mark the string 3' from the corner in one direction and 4' from the corner in other direction.
3. When the diagonal connecting these 2 points is 5', you have a right triangle and the angle at the corner will be 90°.

Note: To obtain the 5' measurement, move the string attached to batter board to the left or right until correct.



Step 2

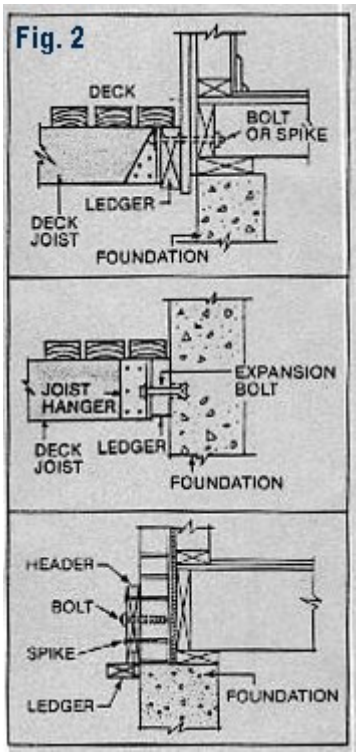
Prepare the site. With a spade or sod cutter, remove sod to a depth of 2 or 3 ". Uncover an area approximately 2 ft. larger than the planned deck. It's unlikely that grass would be able to grow in the shadow of your deck, so you might as well transfer the sod to a bare spot in your yard where it would be useful. To prevent weeds and unwanted vegetation from growing up through the deck, spread a sheet of polyethylene film over the area. You'll have to slit this to embed posts in the ground. After the posts have been installed, cover the sheet with gravel, pebbles or wood chips.

Step 3

A ledger/header board is the next step if you are attaching your deck to an existing structure.

The placement of the ledger/header determines the level of the deck floor, so be sure it is positioned at the correct height and is horizontal.

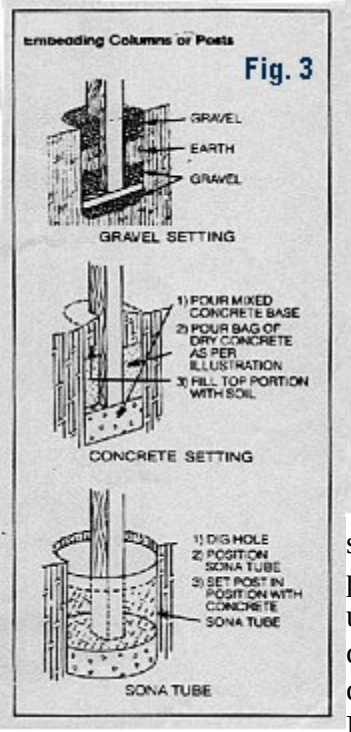
When fastening ledger/header boards to wood, the ledger should be held securely with bolts through the wall or lag screws. Use aluminum flashing to keep water from getting behind your ledger board. This should tuck up under your siding and bend down over the ledger, then down the face of the ledger board. Where aluminum or vinyl siding is in place, carefully cut siding away from house so that ledger/header board can be secured directly to the house. You may be able to use the bottom edge pieces of the siding above the deck to refinsh the lower edge, so save these if possible. See figure 2. I will assume the joists are hung from the ledger and not resting on it, but be sure you account for the height of your deck boards when figuring the placement of the ledger. (Typically just 1 ½ inches down from the final height of the deck.)

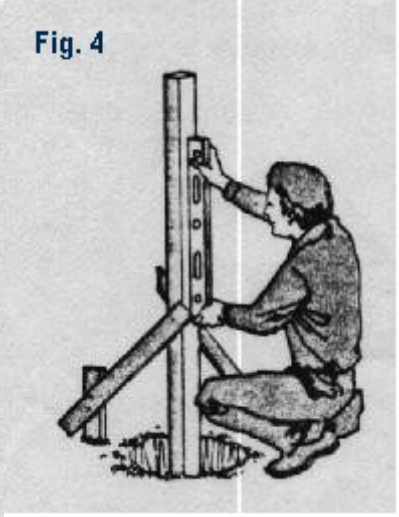


Step 4

Locate and dig holes for footings. In normal soil the holes should be a minimum of 24 to 36 inches deep, although the actual depth will depend on the height of the column and the depth of the frost line. Posts should go deeper than the frost line to avoid heaving during freeze and thaw cycles. Again, this is usually specified by code when the deck is attached to the house.

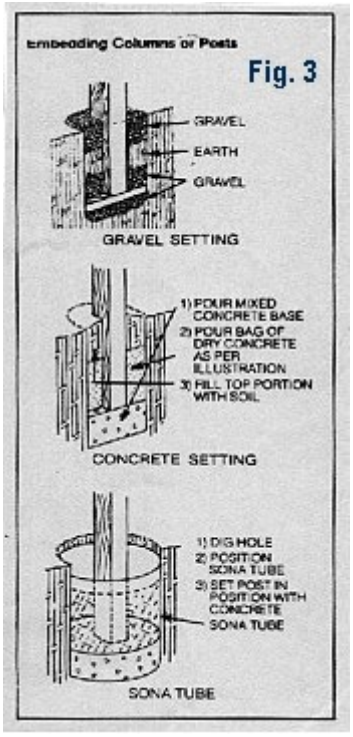
If you have many holes to dig and/or have difficult soil to dig in, you should rent a power posthole digger. These can be operated by one person, and certainly make the digging go MUCH faster. Typically to rent one will cost about $50 for a day.



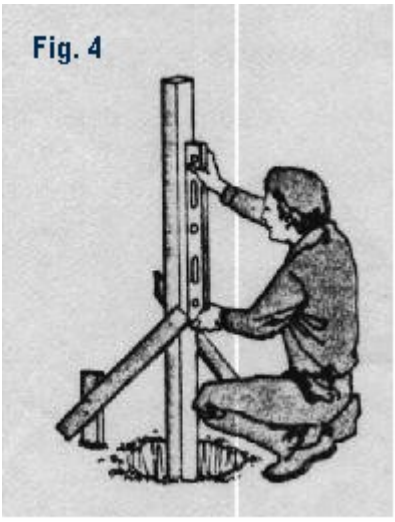


You can use pressure treated wood in the ground for your footings as follows. Fill the bottom of the hole with 6 inches of gravel and place a wood footer plate (2" x 6", or 2" x 8" cut off) on top of the gravel. Upright posts can then be positioned on this base (Fig. 3). Fill the posthole with alternating layers of 4 to 5 inched of gravel and earth. Tamp each layer until the hole is filled and post is plumb and solid. If concrete collars are used, taper the tops downward and away from the post for drainage. Posts can also be set in concrete. Or my preferred method, uses a concrete footing to just above the ground level. Fill the post hole completely with concretet and use a section of "sono tube" (a heavy cardboard tube, 8 inches in diameter) to finish off the hole at ground level. Make sure you have already purchased the hardware to attach the posts to the concrete so you can set the bolts in the concrete while it is wet.

For a complete article on preparing your footings see Post Holes (another article on this site).



When setting the posts directly in the holes, make sure they are plumb and in alignment with one another. Use a carpenter's level to check for vertical alignment (Fig. 4).



One advantage of using the concrete footings and the wood attached to them above ground, is the leveling and exact location can be set later, when the beams are positioned. It allows for some adjusting later (a little, but that is all you are usually looking for.)

Step 5

Secure beams to posts. Using a string and level, find the desired deck floor height on the posts. Or extend a long straight 2 by 4 from the ledger board to the posts and placing a level on the board, determine the post height. By subtracting the thickness of the joist (use the actual dimension not the nominal one), you will have determined the correct height for securing the top of the beam to the post. Carefully mark all 4 sides of the posts. Beams can rest on top of the post, or be fastened to the side. You may cut all posts except those serving as railing supports at this time. Fasten the beam to the post, keeping post and beam flush. Or set the beam atop the post nailing it down to the post.

Step 6

Attach joists. Joists are attached to the house with joist hangers and/or supported by a ledger board. Joists are placed on 16" or 24" centers, and attached to the beams and ribbon joist. Joists can be attached to the beams using joist hangers, or rest on the beam. If the joists are to extend over a beam, do not extend them more than 1/3 of their length.

Step 7

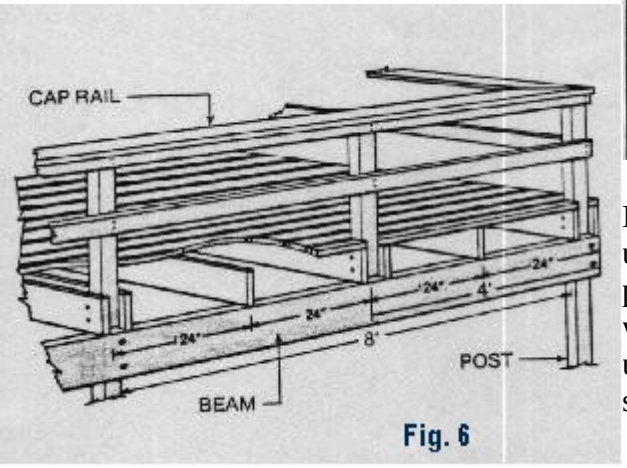
Install deck boards using hot-dipped zinc-coated 16-penny nails.

Seperate boards using a small finishing nail as a spacer or set boards right up against each other. If pressure treated wood came dry, a space would be necessary for some

expansion may take place when it gets wet. However, it typically is quite wet and will always shrink. I have found that when placed tight against each other they will shrink leaving an adequate gap. If you leave to large a gap while they are still wet, the gap may get quite large .

Your deck surface is an important part of your project, and the most visible. Make it simple with the boards set to end on the joists. If you could not get decking long enough to span your deck, stagger the butt end joints so they do not all end along the same joist.

You can trim your deck after nailing to assure a straight line (see Fig. 5). Do not allow an overhang exceeding 1 ½". For a more finished appearance, cut boards flush to the joist and add a fascia board.



If a board is slightly humped, install it with the bark side up when possible to minimize cupping. The weight of people and objects on the deck, and of the board itself, will tend to flatten it. A curved board can also be used; use a board to pry it to the desired position and nail securely.

Step 8

Install posts for railing. These can be a continuation of the posts which support the deck, or railing posts may be bolted to the outside joist or joist extensions.

Notice in Fig. 6 how the main posts continue up from the actual deck floor level and by doing so provide a good sturdy post. Intermittent posts or spacer posts can by used

between the main support posts. The top railing member can be easily nailed to the side of the main posts at desired height. Posts can then be cut off. Spacer post height can be determined and added for additional support and appearance. Railing cap of suitable size can now be added as well as additional rails. More railing ideas are illustrated below.

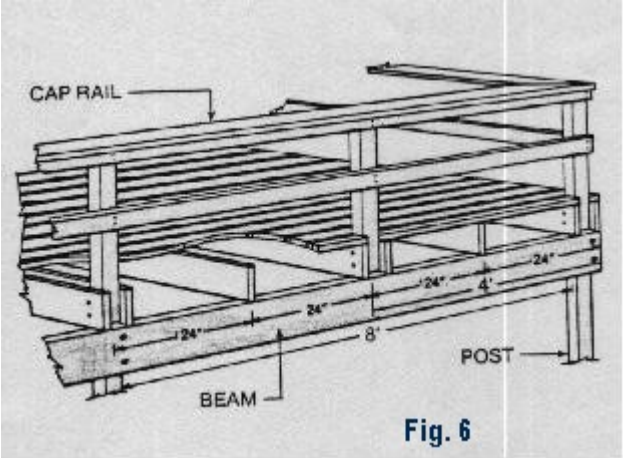
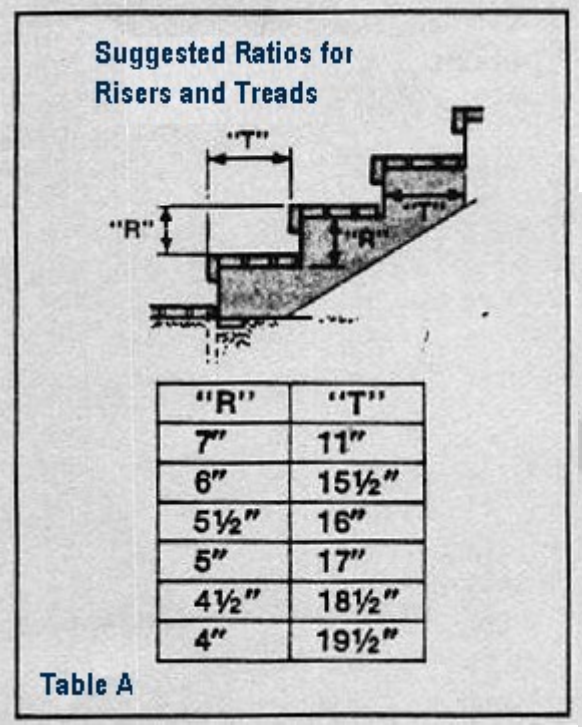
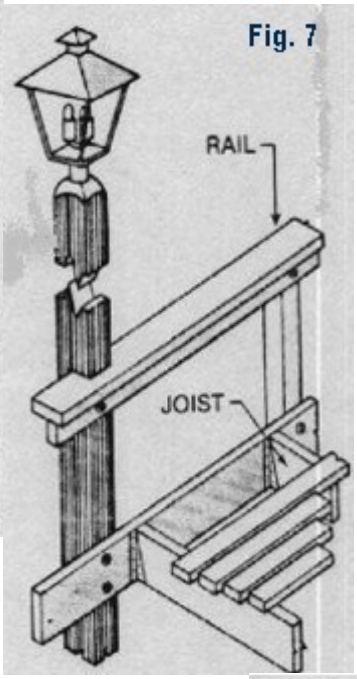


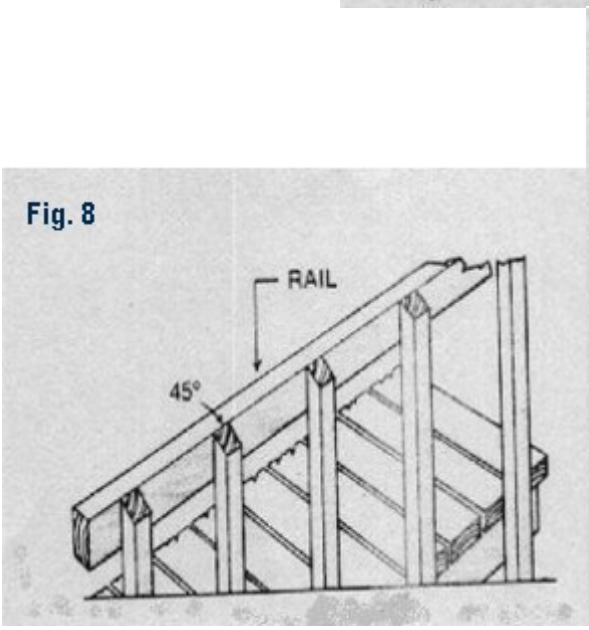
Fig. 6

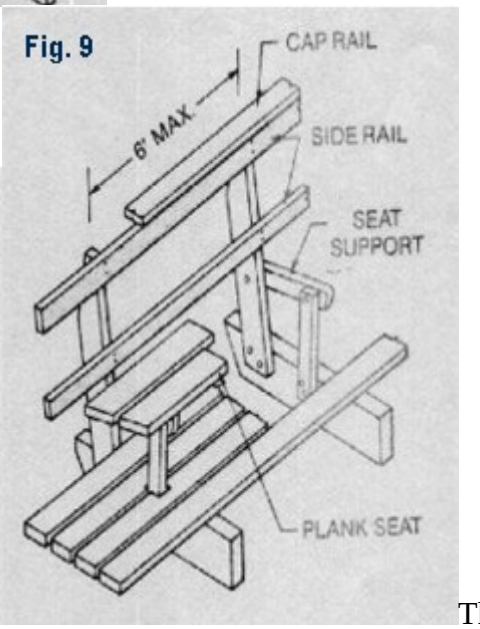


"R"	"T"
7"	11"
6"	15½"
5½"	16"
5"	17"
4½"	18½"
4"	19½"

Table A







The safety and beauty of your deck are enhanced by its railings. They can be plain or very elaborate, offering as much opportunity for individual preference as a fence.

Benches can be integrated into the railing on one or all sides. Bench seats should be at least 15" wide and 15" to 18" above the deck floor.

Privacy screens can enhance the beauty of your deck, as well as offering you privacy. They can also be used effectively under an elevated deck to create a storage facility or hide an unsightly hillside.

Step 9

Construct steps. Measure the vertical rise and decide upon the best riser size for each step. This will determine the number of steps needed. The adjecent table shows some

How To Build a Deck

Throughout the web site, you'll come across words that are bold and italicized. Since there is no separate glossary of definitions, these important points are explained right there in the surrounding text. Pictures of all of the hardware items can be found on other web sites. Two links are provided. You need to speak the lingo, and know what you're talking about, when you buy your materials.

TABLE OF CONTENTS

1. LOCATION, SHAPE and SIZE

Decks should be planned out to suit your needs both now and in the future. This may include a place to entertain, dine out or just chill out. It can also be a play area for children. The planning of your deck should take into account several things. These include: anticipated usage, how it will blend in with other existing structures, privacy, the view, safety and topography. Some other considerations may be: whether to allow gentle air currents or to block any prevailing winds, how much direct sunlight would you want or the kind and type of access to your home. How many people might be using your deck at any given time (anticipated usage)? What kinds and types of furniture will be used on the deck? How much of you and what's happening on your deck do you want your neighbors to see (privacy)? Is there something beautiful worth seeing from your deck (the view)? Then you wouldn't want any obstructions in your line of sight. If there's nothing of note, then plant Juniper trees so you may gaze upon the hypnotic swaying of one of Nature's little miracles, sorry got a little carried

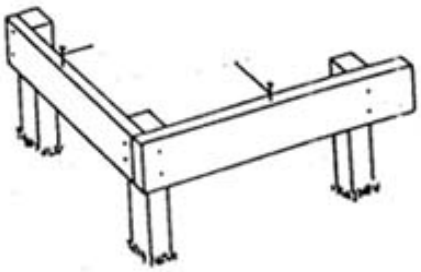
away there, but you get the idea. With children and the elderly, the kind and type of railing and stairs becomes more of a factor in planning (safety). How does your property slope in the area where you intend to build (topography)? Everything mentioned in this paragraph are elements to be considered in the size and design of your deck. Some of these elements are more important than others, but they all need to be considered. And by the way, a deck will give you a major return on your investment when reselling your house. Check with a realtor for the percentage of resale value of your investment.

Part of your planning must also take into account any underground wiring, gas lines, sewer, plumbing or septic tanks. Check with your local utilities office. Two aspects of the ground, itself, will affect how your deck is anchored in place as well as its shape and size. They are the grading of your lot and the composition of the soil. You need to grade the area under the deck so water drains away from the deck supports and house. Grade down to the bare soil then use black plastic to cover the area to prevent weed growth (see Section 2). Later on, when you're digging the post holes, just slit the plastic. If you're careful, you might be able to reuse the sod elsewhere on your property where it may be needed. There are many kinds and types of decorative gravel or stone one may use to secure the black polyurethane in place. Three to five degrees of grade will probably be sufficient on a normal lot. If the grading of your lot is extreme, then special construction techniques come into play. It may become necessary to build your deck on several levels. You may need to use longer support posts. You may also need the use of ***pilings*** (a column of concrete) above ground. These are the cases where the services of an architect, civil or structural engineer may be necessary. Try not to allow vegetation to grow on any of the deck's substructure. It speeds up the degradation of the wood. If the grading of your lot is such that water drains in towards your house from a hill, you need to build a swale at the base of the slope. A ***swale*** is a shallow gully that will vary in size but is about a foot or so deep and two to three feet wide. It should also have a raised bank opposite the hill and several inches above the general grading of the adjacent land. This will divert the water runoff from your hill away from your house and new deck. The composition of the soil is its makeup. Is it sandy, rocky or full of clay? This will be covered in greater detail in Section 3.

2. LAYOUT

It's always better to work from a drawing rather than out of your mind (just a figure of speech). In other words, draw out what you want in as much detail as possible. You need to include dimensions as well. Here's the thing, if the county where your deck is to be built requires a permit, and it probably will, then the code enforcement division of your local government may want any or all of the following drawings: ***foundation plans, floor plans, elevations*** and ***sections***. When you apply for your building permit, they will tell you when and how often to expect a building inspector. The permit is to make sure you do not lower the area property values. Your idea of beauty and grace may not necessarily coincide with the neighbors or neighborhood. The building inspector will make sure your deck is safe to use. The foundation plan is the kind, type and location of the holes that will eventually support the deck and anchor it in place. The floor plan is just a bird's eye view of your deck. An elevation is a drawing of the deck from ground level. This may or may not include several different perspectives. The first three types of drawings should all be drawn to the same ***scale*** (a unit of measurement used to reduce a large object down to something that will fit on drafting paper, usually 2'0" x 3'0"). 1/4" to equal 1'0" is the simplest and most common scale. You can buy a 12" architects rule at an arts and crafts store. The Sectionals should be a larger scaling so as to be easier to read. 1" or 1 1/2" to equal 1'0" should be sufficient. A sectional drawing is very specific. This may include a cut-away drawing from ground level of one or more interior aspects of your deck. It can also be a detailed drawing of a joint showing where and how boards are fastened together. This amount of detail probably won't be necessary but its worth mentioning because you will have to deal with it at some point in the construction phase. If an architect designs your deck, the fee for services may be in the 10% to 15% range of the total job cost. Materials for your deck may cost $10.00 to $20.00 per square foot for yellow pine treated wood versus other species of woods and non-woods. The other types of woods and non-woods will increase the cost of your deck. Treated southern yellow pine is the most common deck building material. The various kinds and types will be covered in Section 8. Beginning January 1st, the chromated copper arsenate (CCA) pressure treated wood is being replaced by an arsenic-free treated wood (ACQ which stands for Alkaline Copper Quat) for use in all residential applications. This will be covered in Section 9.

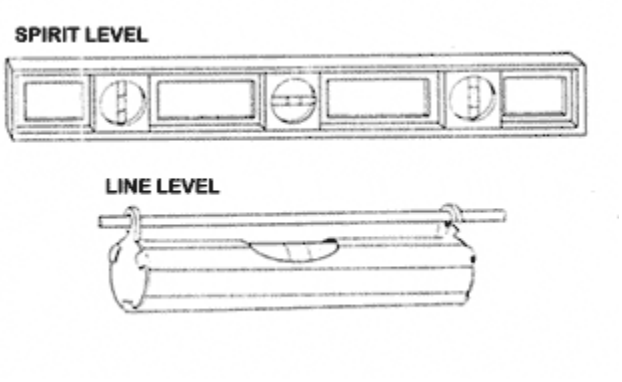
The first aspect of laying out the deck is determining its physical location. Use a can of spray paint on your grass to draw an outline of your deck. It doesn't need to be perfect. It's only meant to help to visualize your project. The area within the painted lines of your deck is what you will grade then cover with black plastic. Don't do any grading until you've marked where the deck posts are to be dug. Make sure it's a latex (water) based spray paint. It'll wash away with the first rain. Drive a stake into the ground close to your house and two feet to the outside of the proposed deck. The stakes should be at least 2"x2"x3'0" or 4'0". One third of the stake should be driven into the ground. The use of a ***two-pound mallet*** (very large hammer) is effective but not cumbersome. Drive three more stakes into the ground to form a triangle out away from the house at the far end of your deck. These set of stakes must be on the same side of your deck as the single stake up against the house. The three stakes need only be 18" to 24" apart (just eyeball it). The grouping should also be 2'0" outside the perimeter of the deck. This means both front and side. Nail a piece of 1x2 furring strip to the outside of the stakes creating an actual right angle. Using a 4'0" spirit level, make sure the cross braces ***(batterboards)*** are ***level*** (perfectly horizontal) and the stakes are ***plumb*** (perfectly vertical).



The Batterboards are the Horizontal Members

A fifth, temporary stake should be used to make sure this first side of your deck is perpendicular to your house. This last stake is placed in towards the center of the deck about six feet and also up against the house. Drive nails into the top of both stakes near the house. Tie a string between them and make sure it is taut and level.

A ***line level*** is a small gadget that is light enough to hang on the string. Measure 3’0” from the outside towards the inside then mark the string with a black magic marker. Drive a nail into the batterboard that is parallel to your house (not to deep; you may have to move this nail).



Tie a string from the first stake to the nail in the batterboard. Make sure this also is taut and level. Now measure from the corner away from the house 4’0” and mark the string as before. Here’s a trick for determining a perfect 90° angle. Tie off a third piece of string connecting both dots. Now measure that length of string. If it measures 5’0”, then your corner is correct. (see, geometry is important; a2 + b2 = c2; (3x3) + (4x4) = (5x5)) If it doesn’t, then move the nail along the batterboard until the string is 5’0”. Repeat this procedure for the opposite side of your deck. Lastly, you need to place nails on the remaining two batterboards that are parallel to each other and perpendicular to the house. It still works the same way. Measure off 3’0” in one direction from the corner and 4’0” in the other direction from the same corner. Connect the dots again and move the nail until its 5’0”. Now you have the four square corners of your deck. For the sake of simplicity and explanation, this particular deck will measure 10’0” x 20’0”.

3. HOLES and POSTS

Okay, now you need to figure out where to dig the holes to place the posts that will support your deck.

The string line you set up is 2’0” to the outside of the deck all around. Your string rectangle should measure 12’0” x 24’0”. The number of posts to be used in supporting your deck is directly affected by the size of your deck and/or

Grade		No. 1		No. 2		No. 3	
Size & Spacing (inches) \ Load psf		30	40	30	40	30	40
2x6	12	12-0	10-11	11-10	10-9	10-1	9-0
	16	10-11	9-11	10-9	9-9	8-9	7-10
	24	9-7	8-8	9-4	8-4	7-1	6-4
2x8	12	15-10	14-5	15-7	14-2	13-3	11-11
	16	14-5	13-1	14-2	12-10	11-6	10-3
	24	12-7	11-5	12-4	11-0	9-5	8-5
2x10	12	20-3	18-5	19-10	18-0	16-11	15-2
	16	18-5	16-9	18-0	16-5	14-8	13-1
	24	16-1	14-7	15-8	14-0	12-0	10-9
2x12	12	24-8	22-5	24-2	21-11	20-7	18-5
	16	22-5	20-4	21-11	19-11	17-10	16-0
	24	19-7	17-9	19-1	17-1	14-7	13-0

Span Rating Chart for Southern Yellow Pine

the complexity of your deck. This deck is simple. The ***joist*** (the parallel framing that supports the decking) selected, (2x10), will span the 10’0” distance without any intermediary support. Section 4 goes into more detail on supporting structures. There are no posts needed up against the house because of the ***ledger board*** (anchors one end of the joists) bolted to the house (section 4 also). A 2x10 cannot span 20’0” without an in-between support; therefore three posts will be necessary for this deck. The names and functions of all of these parts and pieces are explained in Section 4. One will be located near each corner away from the house and the third centered between the first two. This deck will have a 2’0” overhang (called a ***cantilever***). Measure away from the house 8’0” and drive a temporary stake along both sides of your deck. Run another string line between the two stakes. Measure in towards the center from your string line 2’6” from both ends and mark those points. Find the center point and put in another stake. Now you have the locations of all three posts.

Up until now, your level of exertion and effort has been minimal. Unless you are use to hard physical labor, you might want to pay attention to the little aches and pains you will feel building the rest of your deck. Stop when you feel a twinge somewhere. Don’t ignore it. It means you’ve strained or overexerted something and if you continue, it may lead to something more serious. Use your legs for lifting, not your back. Shoveling counts as lifting. Remember how you felt after shoveling snow last winter? Don’t struggle to lift something, get help. Barn raisings were a party, in a sense, just as much as they were work. Many people make heavy work easier and get the job done quicker. If you think you are sweating a lot, you’re probably right. Stop and rest before you succumb to a heat stroke. You should drink lots of water as you work (not Gatorade, etc). Take lots of short breaks. You may get muscle aches in muscles you forgot you had (or don’t realize you have). Be careful as you work through the pain so you don’t get hurt any worse. The muscle pain does go away after a couple of days. Your muscles adapt quickly to increased usage. Don’t continue to work if you’re tired or if it’s late in the day. 100% of your mind as well as your body needs to pay attention to the task at hand. If you lose your concentration, or if you’re trying to work in the dim light of dusk, you’re asking for an accident to happen.

The hole for the post should be twice the size of the post itself. If you are using 4x4’s, then the hole needs to be 8” in diameter. Don’t get fanatical trying to make it perfect. A 12” diameter hole is used for 6x6’s. This simple deck and the moderate usage of it needs only be supported by 4x4’s. Our deck has no basement access beneath it, so it

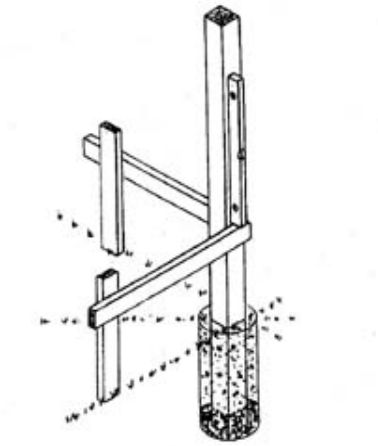
will only be 4’0” off the ground. This house has a crawlspace. The hardest way to dig out these three holes is with a shovel, because the sides of the holes should be relatively vertical. The next option is to use a ***post-hole digger***. It’s sort of like a 5’0” long salad tong and requires a lot of upper body strength. The fastest and easiest way to dig holes is with an auger drill. This is the same gadget the phone company uses to plant telephone poles. It can be rented and used by one person.

The next aspect is how deep to make these holes. Okay, the first consideration is the frost line in your area. In the dead of winter, if you have one, how far down does the earth freeze? In the Middle Atlantic States, this is 30”. The Building Code authority in your area can provide this information. At the very least, dig down 24”. Otherwise, dig down 6” below the frost line. This will prevent the heaving and settling of the earth which will have a profound impact on your deck eventually. It is prevented because the post is on solid ground not normally subject to the freezing and thawing environment (earthquakes are the exception). The “profound impact” mentioned may be the sound of your deck being literally ripped away from your house and maybe damaging the foundation as well. The next consideration is the consistency of the soil in your area (mentioned in Section 1).

Sandy or rocky soil is more porous and can hold more water. Soil full of clay tends to keep water at or near the surface. Rocky soil or clay earth tends to keep water at or near the surface. There are two ways to anchor your posts in place. They can be anchored to the top of your cement piling (also called a “footing”) or embedded in it. What it comes down to is a personal preference.

Dig the three holes and install the posts all at the same time. For the top mount, fill the hole with concrete a few inches above ground level (no more than six, unless there is an extreme slope involved). Use a ***sonotube*** (cardboard tube like the center of toilet paper but way, way bigger). By the way, that part that is above ground should be tapered down to the ground to allow water to runoff. While the concrete is still wet, jam an ***anchor bolt*** down into the center until about ¾” of threading is sticking out. An anchor bolt is 1/2” in diameter and sort of like the letter “J”. Use one that is 8” or 10” long. They are available in a wider range of lengths, but most of the time this size will be adequate. Make sure the threading is reasonably vertical. The three anchor bolts must be aligned in the center of the concrete. 4x4 ***post anchor bases*** will be attached to these bolts and the posts attached

to the bases. The concrete will dry in a couple of days depending on the weather but leave it alone for about a week (it will dry completely [called ***"cured"***] in about a month). You can slip off the sonotube after two or three days. You can practice your logrolling technique after the inside of the tube dries. You'll need two more temporary stakes and cross bracing attached to each post to keep them plumb until the rest of the substructure is installed. The two stakes and post will form a right angle. All three posts must be aligned. Stand at one end of your deck so you and the three posts are in a line. Look at the three posts before you. Looking from this perspective, you can easily tell if one or more posts are twisted even slightly. The top mount installation will allow you to adjust your post after the footing is cured. Embedding the posts requires a correction immediately.



How a post should be braced and supported until the concrete dries.

If you choose to embed the posts in the concrete, then dig down to the proper depth, fill the hole with 2" to 3" of ***pea gravel*** (stones 1/4" to 1/2" in diameter). Then set your post with the cross-bracing, and then pour in the concrete mix. Buy the 80# bag and add water (don't let anyone sell you the "special" concrete water). Mix a bag at a time in a 3'0"x4'0" plastic tray (to the consistency of toothpaste or a little thicker). Use a cement hoe to mix the concrete and water quickly. The difference between this hoe and your average variety of hoe is that this hoe has two holes in it. Once your three posts are set, leave them alone for a week. Don't touch them for the week. Testing to see if the concrete is hard will only create gaps between them and the surrounding concrete. This, in turn, allows water and bugs to get in and eventually destroy the wood. The three posts and the ledger board work together to support the entire structure. The ledger board is explained in the next section.

4. SUPPORTING STRUCTURE

This deck will be level with whatever door allows access to it (kitchen and/or living room). You will step out of your house onto the deck. The deck boards will butt into your house right below the threshold of the door. This is so rainwater or melting snow won't run into your house. Below the deck boards are the joists. At one end of the joists

and attached to your house is the ledger board while at the other end are the three supporting posts. The posts are located at each corner and center away from your house. The ledger board must run the full width of the deck. It doesn't matter if its one continuous board or two since it won't be seen.

The ledger board will be located at the same height as the joists. It will also be the same size as the joists. The deck boards are usually 1" or 1 1/2" thick. Depending on the span of the deck (from the house out), the joists may be 7 1/4", 9 1/4 " or 11 1/4". This example deck is 10'0" so a 2 x 10 joist is appropriate. Therefore the ledger board must also be a 2 x 10. A span-rating chart will determine which size joist to use and how far apart they must be placed. Any lumberyard should be able to provide you with a chart for the kind and type of material being used. If they can't provide this information, then go to a different lumber yard where the salespeople are more knowledgeable. You're spending a lot of money so make sure you have competent people helping you. This is critical information that you must know because different types of decking necessitate different joist spacing. Placing your joists 16" on center is correct for the pressure treated yellow pine used in this example. Please be aware that some types of plastic wood need joists 12" on center while Brazilian Ironwood (Ipe, pronounced "ee-pay") can have joists at 60" on center (yep, 5'0" apart). The span rating depends on the load rating above it. See Section 8.

Grade		No. 1		No. 2		No. 3	
Size & Spacing (inches) \ Load psf		30	40	30	40	30	40
2x6	12	12-0	10-11	11-10	10-9	10-1	9-0
	16	10-11	9-11	10-9	9-9	8-9	7-10
	24	9-7	8-8	9-4	8-4	7-1	6-4
2x8	12	15-10	14-5	15-7	14-2	13-3	11-11
	16	14-5	13-1	14-2	12-10	11-6	10-3
	24	12-7	11-5	12-4	11-0	9-5	8-5
2x10	12	20-3	18-5	19-10	18-0	16-11	15-2
	16	18-5	16-9	18-0	16-5	14-8	13-1
	24	16-1	14-7	15-8	14-0	12-0	10-9
2x12	12	24-8	22-5	24-2	21-11	20-7	18-5
	16	22-5	20-4	21-11	19-11	17-10	16-0
	24	19-7	17-9	19-1	17-1	14-7	13-0

Span Rating Chart for Southern Yellow Pine

All dimensional lumber has two sets of sizing values called nominal and actual. The nominal size is the name of the lumber. The actual size is what it really measures. Dimensional lumber includes boards (any width that actually measures 3/4" thick), stair treads and decking (measuring 1"), framing lumber (measuring 1 1/2") and timbers (measuring 2 1/2" or more in thickness). Don't be confused by the use of the word "decking" in the previous sentence. There is wood that may be used for the purpose of decking that measures 1" thick though this is not always the case. Any product used above the substructure, as surfacing material, is legitimately called decking. The most common width for decking is 6" (actually 5 1/2"). The nominal size, or name, of

each piece of lumber is as follows: boards are called 1x (spoken as "one by"), the decking is 5/4 x (spoken as "five quarter by – never call this one and a quarter or inch and a quarter), framing is 2x and timbers are called 3x or 4x or 6x, etc. When you buy lumber, remember we live in a three dimensional world. The lumber you will need has three dimensions to it. Specify lumber sizing by thickness first then width then length. Our joists, therefore, are 2x10x10's (nominally speaking). The first two numbers are always in inches while the last is always in feet. Remember that what you're buying is actually 1 1/2 x 9 1/4 x 10'0". By the way, lumber lengths may only be purchased by even numbers (8,10,12,14,16,18,20). An 8'0" length will be the shortest standard length available, while 20'0" is usually the longest. If you happen to need an odd length, buy the standard size and cut it to size yourself. The place where you bought it will probably charge you to cut it. The sizing chart shows you both the nominal size and the actual size. Years ago, these were one in the same but not now. Pressure treated southern yellow pine is probably the most widely used deck material. Check out Section 8 for other types of wood and non-wood materials.

NOMINAL AND ACTUAL SIZES OF SOFTWOOD LUMBER

Thicknesses			Face widths		
Actual (inches)			Actual (inches)		
*Nominal size**	*Minimum dry***	*Dressed green*	*Nominal size*	*Minimum dry***	*Dressed green*
1	3/4	25/32	2	1 1/2	1 9/16
1 1/4	1	1 1/32	3	2 1/2	2 9/16
1 1/2	1 1/4	1 9/32	4	3 1/2	3 9/16
2	1 1/2	1 9/16	5	4 1/2	4 5/8
2 1/2	2	2 1/16	6	5 1/2	5 5/8
3	2 1/2	2 9/16	7	1 1/2	1 5/8
3 1/2	3	3 1/16	8	7 1/4	7 1/2
4	3 1/2	3 9/16	9	8 1/4	8 1/2
			10	9 1/4	9 1/2
			11	10 1/4	10 1/2
			12	11 1/4	11 1/2

* Thickness sometimes is expressed as 4/4, 5/4, etc.
** Dry lumber has been seasoned to a moisture content of 19 percent or less.

The decking and railing is the most visible aspect of your deck. Choose the kind and type of material you want now. As mentioned before, the placement of the joists, beams and ledger board depend on this choice. The deck in this example is being made of treated yellow pine.

The joists on this deck will be 16" on center. There is still a decision to be made. Should the decking b3 5/4x6 or 2x6? Both can be used in this situation. There is also a choice to be made as to the grade of the lumber. Different species of wood have different grading rules. These rules govern the physical appearance of the wood. The higher the grade, the prettier it looks and the more expensive it becomes. Because of supply and demand and politics, you may find that pricing and availability vary radically. Again, competent sales help can explain all this stuff and even show you the difference. Your choice comes down to price and aesthetics. This deck will use the 2x6 because it's easier to type. All of the substructure will be a #2 grade of

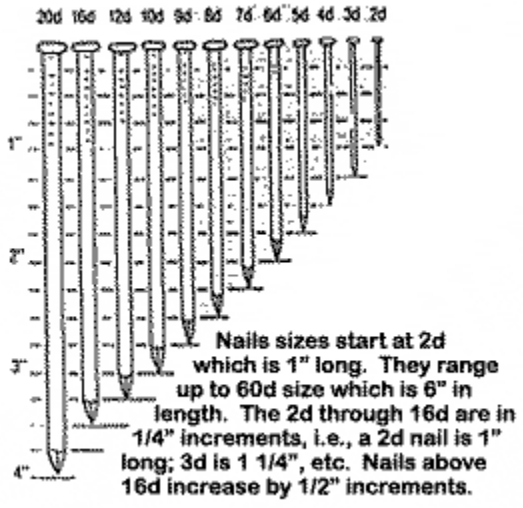
Yellow Pine. The decking and railing will be #1. It should be noted that the grading of woods has more to do with appearance than structural integrity. The first thing to do is attach the ledger board to your house. It should be mentioned that another alternative construction method is the freestanding deck that simply adjoins your house. This, of course, requires posts at both ends of the deck and no ledger board at all. In a high wind situation, where there is the potential of your deck being carried off by Mother Nature (she obviously likes your work), a freestanding deck won't rip out some of the foundation of your house. If your posts and ledger are properly anchored, then this shouldn't be a concern. The ledger board can be attached in two different ways. It can be anchored directly into the foundation wall or bolted completely through the wall of your house.

In the latter case, there is a rim joist inside your house which holds your floor joists in place. This rim joist is the interior version of your ledger board. So you're drilling through your wall and this rim joist every 2'0". Begin drilling approximately 1'0" from each end of where the ledger board will be located. Deckster recommends two holes vertically aligned about 6" apart. The holes must be 1" to 1 1/2" from the top and bottom edge of the board. This is to prevent splitting the wood. At a minimum, make a 3/8" diameter hole. A 1/2" hole is also acceptable. The length of these bolts must be determined on site. The wall of your house is constructed of many vertical members called studs which are usually located 16" apart. You do not want to drill through a stud. This is a structural part of your house and you don't want to damage it in any way. So how does one find a stud? (sorry ladies, the business of construction has many names and labels that may be construed as sexual in orientation) Studs are nailed to, and in between, two other pieces of wood called plates. A gadget called a ***studfinder*** will locate the metal hidden behind the wall (the nails used to fasten the studs to the bottom plates). Another type of metal hidden in the wall is used to hold the joists to the rim board and is called a ***joist hanger***. The joists and rim boards are located below the bottom plates. Mark the location of every metal "hit" on the wall at the height where the ledger will be located. One more word of warning has to do with plastic or metal utilities in your wall. You don't want to drill through your plumbing or air conditioning ducts either. Measure their location in relation to the finished floor, and then transfer this information to the outside. Now you have a picture of where not to drill.

If you're going to anchor the ledger right into the foundation wall, drill into the masonry (please don't pronounce this as "masonary", there's

no such word) joint between the cinder block or brick. There are several types of hardware that may be used to secure the ledger board. These are ***lag screws, wedge anchors,*** or ***sleeve anchors***. Lag screws work best with a ***lead shield***. Go to a hardware store, pick somebody else's brain and decide. One works just as well as another. Whichever you choose needs to be about 4" to 4 1/2" long. Don't forget that the ledger board is 1 1/2" thick.

Drill the upper hole (implies a lower hole) at each end of your ledger first a couple inches from each end as well as the top and bottom. Loosely hang the ledger and make sure its level. Now you can drill all the rest of the holes and secure it in place. You should only drill into the mortar joints between the brick or block. Keep in mind that you'll be nailing joist hangers every 16" onto this ledger. Now take some clear silicone caulk and a caulking gun and run a bead around the whole ledger board. This seam of caulk must be in contact with both your house and the wood to be effective. This will help prevent water and bugs from getting behind the board and damaging it. The first joists to be installed will be doubled up and rest on top of each post. The posts will start out 8'0" long. 3'0" will be buried in the ground and 4'0" above then cut to the proper height. Remember to subtract the depth of the joist. Embedding the post will use one that's 6'2 1/2". Using a post anchor base, the post need be only 3'2 1/2". If you buy one (1) 4x4x10, you can get all three of your posts from it. Make sure the joists are level and perpendicular to the ledger. You can use a ***carpenter's square*** for this. It's a small flat right-angled measuring device. You'll also use it for the stairs. All of the top and bottom edges of the joists, ledger and header must be flush. Nail the boards together alternating top then bottom and space the nails about 15" apart. You should also nail from both sides alternately. Blunt the point of the nails before you drive them into the wood. This can be done by rubbing the points across a file a few times. This allows them to cut through the wood fibers rather than splitting them apart. Use a 3" galvanized nail (a 10d nail). The "d" following the nail size is leftover from our European heritage. It was used as an abbreviation for "pennyweight". This referred to how many nails one could buy with the old English penny. The two boards are 1 1/2" thick each. Attach a double 2x10 joist

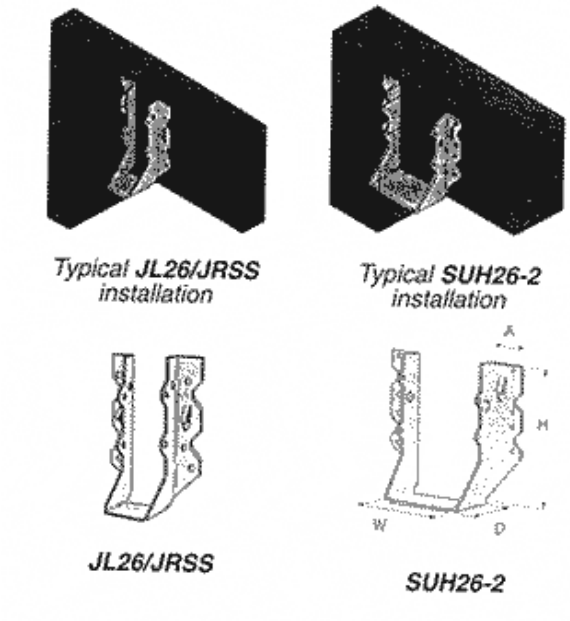


hanger to the ledger board. Use either Kant Sag® (www.uspconnectors.com/catalogs.htm) or Simpson® (www.strongtie.com) hardware (using the links provided, go to either of the sites to view pictures of the hardware mentioned). This double joist is 10'0" long so it will protrude past the post 2'0". The proper hardware to hold the joists to the post is a ***post cap***. All nails to be used in this project will be double hot-dipped galvanized. All nails used in conjunction with hardware will be 1 1/4" in length (3d). These three sets of joists add strength and support to your deck. The joists at each end will also be doubled. All the rest of your joists will be single boards and all must be parallel.

The next step is to attach the ***header*** board to the end of your double joists opposite the ledger board. This also is doubled for strength and support and to connect all the ends of the joist system. For this, use two 2x10x20's. You're going to install them one at a time. The first board must be cut to measure 19'6". The first Cardinal Rule of carpentry is to "measure twice and cut once". Don't be a "wood butcher". That is anybody that rushes through a job, makes mistakes and uses much more wood than necessary. After cutting, find the center point of the board and mark the top edge with a black crayon or chalk (called ***keel***). This mark needs to be centered between the double joists at the center post. Use six 10d nails per double joist. Think of the six-of-clubs playing card. Drive one nail through the header into the butt-end of the joist at each end. Make sure this header is level and that the top edge of the header is flush (even) with the tops of the joists. Remember to leave a 1" to 1 1/2" from both the top and bottom when you nail. Finish the rest of the nailing. Now you're going to nail a second 2x10x20 on top of the first header. This board should measure 19'9". Center this board as you did the first one and use the same nailing pattern except about an inch wider. Now finish the same type of nailing pattern you used for the three double joists.

Now you'll install the joists at both ends. The inner 2x10x10 needs to be cut to 9'10 1/2". Leave the outer 2x10x10 alone. There is a 1 1/2" difference here. You'll see why when you install this end joist. When you measure the offset from the first and second header, you'll notice a 1 1/2" difference at each end. This offset will neatly accept the double end joists. Make sure the distance from the double joist on the post to this double end joist is the same at both ends. Install a 2x10 ***double joist hanger*** on the ledger board so as to accept this double end joist. Just rest the end joist in the joist hanger while you're nailing the opposite end joist to the header. Use three 10d nails at the top,

middle and bottom. Nailing from the side of the deck, nail thru the end joist into the header. This means nailing about 3/4” from the end. This should create a neat herringbone corner. Now go back and nail the joist into the joist hanger at the ledger board. Lastly, from inside your deck, at the junction of the side and front, in both corners, nail an ***all-purpose framing anchor***. In this instance, use 10d nails. It may not have been mentioned earlier, but all of the framing hardware specified has holes predrilled in them. Nail through the holes provided. You need not nail through every single hole provided. Now you have five sets of double joists installed along with the double header tying all of them together.



The last thing to install is the remaining 12 single joists. There will be six single joists on either side of the center double joist. These will not be exactly 16” on center. Space them equal distance apart anyway. Nail up all of the remaining single 2x10 ***joist hangers***. Lay in all of your joists. Make sure everything is level, parallel and flush across the top. Nail the joists into their respective hangers. Take the rest of the day off. You’ve earned it. You’ve completed the hardest part of building a deck. Go have a drink of your favorite beverage and stare in amazement at your marvelous creation.

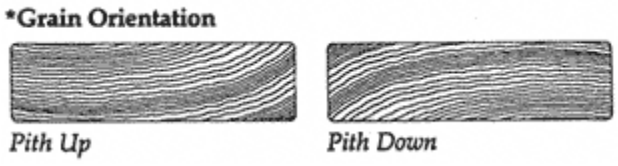
5. DECKING

You already know the deck boards will be located right below the threshold of the door accessing the deck. You already know that you’re using 2x6’s for the decking. And you already know you want a #1 grade lumber. Okay, the last piece of business is the orientation of the deck boards. How are they to be laid out? One way is at a 45° angle. (very beautiful but difficult due to all the angle cuts and also time consuming) This is your first deck and a simple one at that so you’ll continue that theme. The deck boards will be perpendicular to the joists. (90°) 2x6x20’s are available but expensive. The narrow width plus the long length makes them susceptible to twisting and

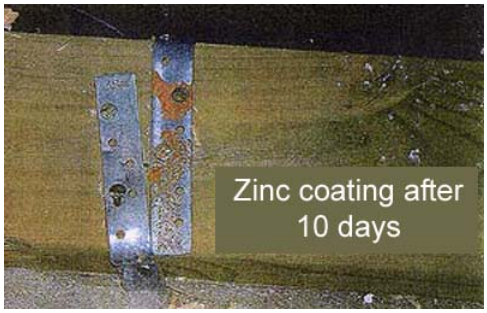
warping. Lumberyards tend to frown on customers that ***cherry-pick***. That means going through a whole stack of wood for a few pieces. If you do the grunt work of restacking the lumber neatly, maybe they will look the other way.

So how many boards will you need to cover your deck? Your deck is 10'0" deep which equals 120". If you divide by 6" (remember you're using a 2x6), then you will need to buy 20 boards, right? No, you will really need 22 boards. Its not a 6" board but rather 5 1/2". This is why "nominal" versus "actual" is so important.

How will you nail them to the deck? If you look at the butt end of the boards, you'll notice a semi-circular grain pattern. What you're looking at are the annual growth rings of the tree from which it came. The grain orientation of your deck boards should be nailed pith down. Another inherent problem with wood is called ***cupping***. This occurs across the width of a board and is more pronounced in wider boards. The sides rise up higher than the middle thus trapping water in the cup. In the winter, this turns to ice, which becomes potentially dangerous. Nailing the boards with the grain facing down won't prevent the cupping, but it will keep the ice at bay. The cupping will be minimized because of the constant traffic on the boards pressing down against the natural tendencies of the wood. The spacing between the deck boards should be the width of a nail. The reasoning is because wood is a living, breathing entity. It expands and contracts depending on the amount of moisture in the air. By the way, this is also true of the wooden floors inside your house. By allowing some gapping between boards, you are allowing the boards room to move. This also allows pooled water to drain through the deck to the ground below.



Begin nailing the decking at the ledger board and work out to the double header. Lay out all the boards first to see if there are any unforeseen problems. As each deck board crosses a joist, drive two 10d nails, about 3" apart, aligned with the joist. Remember not to nail within 1" of the edge of a board, to use double hot-dipped galvanized nails and drive the nails into the center of the joist below. Measure out from the house, at each end, every few boards to make sure the leading edges are an equal distance. Because CCA lumber can no longer be used for decks, different coatings on the hardware must also be used. The new arsenic-free alkali-based treated lumber is highly



corrosive and will eat through the standard galvanized nails. Any hardware that comes in contact with this new wood will also have a different type of coating. Stainless steel hardware is the best but also the most expensive. Ask your salesperson about it. There is also hardware available that will allow you to secure the deck boards to the joists without the nails being visible. This is just another option.

If you really want to run the decking at an angle (say 45°), then you can use any length board. Check again with your local lumberyard and find out which lengths are cheapest. Take the price per piece and divide it by the length. The reason why the length won't matter is because you will be cutting the boards at 45° where they cross over a joist in order for the end to rest on a joist. Around all four perimeter edges, the end of the decking must be flush with the outside edge of your deck. The deck boards ending on a joist must rest on only half (about 3/4"). The continuation of the deck board needs to use the other half of the same joist. Be careful about nailing the two deck-ends to the same joist. Angle the nails slightly towards the center of the joist from about 1" from the end edge of each joist.

If all of the decking is to be angled parallel, then buy boards 16'0" in length. Why? If you do the geometry arithmetic, then you would know that your boards, after you cut them, are slightly more than 14'0" long. Now you have a different measuring problem. Your 45° angle cuts, at each end, will be opposite to each other. Do you need to know the longer dimension of the two edges? No. The ends should be flush with the outside edge of the deck. And at the two opposite corners of your deck, the boards will get shorter and shorter. Lay out one single deck board at 45° to your double header. Stand at the front of your deck and hold this deck board in both hands. You will only deal with the right-hand edge of this board. At the opposite end from where you're standing along the right edge, align the corner of the board with the corner of the deck. Yes, a small part of this board is hanging over the edge of the end joist while nearly 2'0" is overhanging the double header. Drive one nail in each end to hold the board in place. Use the double end joist and the double header as a guide to mark the two angle cuts. Make these two cuts then finish nailing this board in place. Use two nails at each end and align the nails with the header and end joist. It probably should be mentioned that a circular saw would be the fastest and easiest method of neatly cutting

wood. Additionally, there are choices to be made pertaining to the type of saw blade used. Use a carbide-tipped blade rather than a standard blade because it will last longer. The more "teeth" on a blade, the smoother will be the cut. Don't be so quick to throw away a short piece of a cut board. Remember the corners need short pieces. It cannot be stressed too many times that you should take your time measuring a board before you cut it. It's neither stupid nor a waste of time to double-check a measurement.

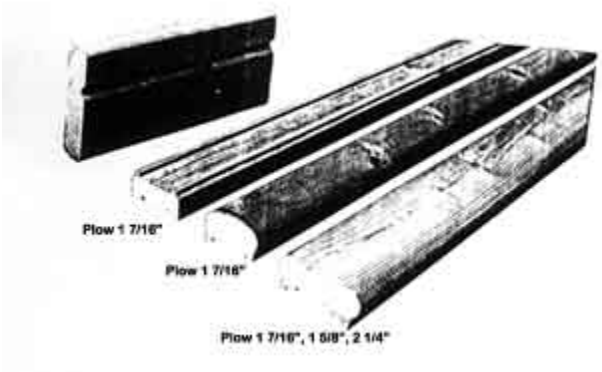
One you've installed this first deck board, it can be used as a guide for all the rest. Cut the one end that goes up against the house, and then nail the board in place. Let it overhang the header board. Install several boards, and then draw your cut line using the header below as a guide. Set the blade depth on the circular saw to 1 1/2" and go to it. Finish off the rest of your deck the same way. A file or a fine trim saw can clean up the sharp ends protruding.

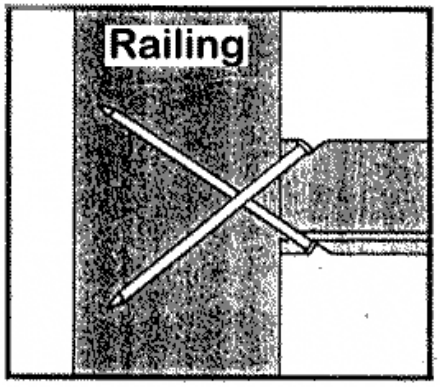
6. DECK RAILING

The rail system is important because it's the first thing your guests will see. It's got to be cool, hip, groovy, far out, spiffy, fly, the cat's meow, depending on your generation, pick an adjective. There are four basic component parts. They are the posts (aka newels), top rail (aka cap rail), bottom rail (aka shoe rail) and balusters (aka spindles). One method of installing posts is just to extend the deck support posts up above the deck. Check the code requirements in your area but the top rail is usually 36" to 42" above the deck at a minimum. Add this measurement to the length of the support post used and remember that lumber is sold in even number increments, then cut the post to the appropriate height. Another way is to do the posts as a separate piece of the deck. The sloped rail on the stairs is called a ***rake*** rail. Stair rail posts should be every 4'0" max, while the deck posts may be up to 8'0" apart. The spacing of the spindles should be too slim to slip through (good alliteration, huh?). They are measured from center to center not the gap between them. This measurement should be 4". This also applies to the spacing from the shoe rail to the deck. This spacing should be about 3" to 3 1/2".

Using the second method, start by identifying the location of each newel post. Make sure there is a newel at each corner of your deck and on either side of the stairs. At the bottom of each post, cut out a notch about 1/3 to 1/2 the thickness of the post and six to ten inches tall. This post will fit over the edge of the deck, then down the front

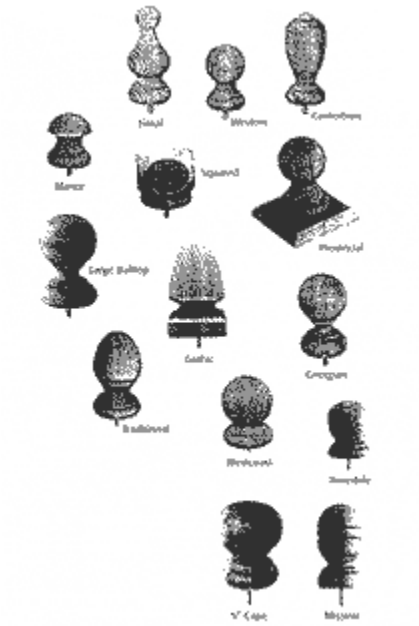
and sides. You can either nail it or bolt it to the header. First, figure out the thickness of all the wood, then use a nail 1/2” smaller or add 1” for the appropriate length of a bolt. Just make sure it is secure because people will be leaning against it. Your next choice will be whether to run the cap rail continuously over the posts or butt the railing into each post. You can readily buy pressure-treated railing parts and pieces. You can also make a railing by using a 2x4 on top of a 2x6. This is quick, easy and adequate. ***Miter*** (cutting lumber at a precise angle) the corners to a 45° angle and nail straight down into the top of each post. Beveled balusters can be bought at better lumberyards. They will be plain and smooth with slightly rounded edges (eased) and either 36” or 42” in length. Nail them to the outside edge of the 2x6 and the deck header. The deck posts are 8’0” on center. The rail sections you’ll be making must be smaller. The posts are 4x4’s (3 1/2 x 3 1/2). Therefore the distance between them is 8’0” minus 3 1/2”. Where does this 3 1/2 come from? It represents half a post from each end. (1 3/4 + 1 3/4). So the gap between posts, and each of your rail sections, is 7’ 8 1/2”. If you posts happen to be closer together, you still need to subtract the 3 1/2”. Cut your top and bottom rail (if you are using one) to size, connect the balusters, then toenail both ends of the top rail and do the same for the bottom rail. There are rail patterns where the balusters are nailed right to the deck or the header eliminating the shoe rail. Do whatever appeals to you.





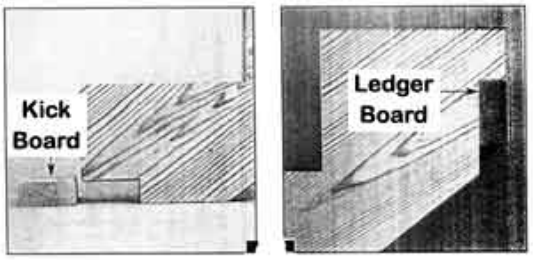
The readymade railing is nicer looking and is available in several styles. Go back to your local lumberyard and have them order it for you if that’s the direction you want to go. The prettier rail patterns are also more complicated to put together. Follow the included directions. All the parts and pieces are readymade to fit together saving you the aggravation. The readymade railing may have to be

assembled in sections, by you, and then nailed in place between the posts. Nail the spindles to the shoe rail first, then the cap rail. Remember the spindle spacing is measured center to center and not the gap between. You will only need one nail accurately driven into the center of the spindle at the bottom end. You'll see that both the top and bottom rails are grooved to accept the spindles and to keep them from twisting. If you don't want the nail visible from the top, then you must ***toenail*** them from underneath. Using two nails drive them at an angle through the baluster into the underside of the top rail. The nails will be on opposite sides of each spindle near the top. A 6d galvanized finish nail will probably be adequate. One last piece of business is to fill in the gaps between each baluster. This is optional. You may or may not find it to be ascetically pleasing. This involves cutting to length a small piece of wood specially made to fit in the groove in both the top and bottom rails. This wood is called a ***fillet***. Tack this in place with 1" brads and glue it using any wood glue. After each rail section is completed, toenail each end into the posts both top and bottom. Of course the railing must be level and to accomplish this task, precut two or three 4x4 blocks to the appropriate height, then rest each rail section on these blocks so you may nail the sections in place. The last thing to do is finish off each post with some type of top covering. There are many different kinds and types of post covers, both wood and metal. The cut end of any piece of wood is the most vulnerable to the elements and Nature (weather and bugs). If you have no plans for a stair, then this completes your task and adventure. Take a moment to gaze upon the wonder of nature and how you have affected a profound change upon her. To build a stair, one must continue to read.



7. STAIRS

You need to have a few specific dimensions at hand before building stairs. The first is the vertical height from the deck surface to the ground where the steps will be located. This is called the ***rise***. The second measurement, called the ***run***, is how far out your steps will extend horizontally. There will always be one LESS tread than rise. Generally, the sum of one rise and one tread should equal 17" or 18". The comfort level of you and your guests ascending and descending stairs is affected by the rise and run configuration. A higher rise and shorter run will cause the body to stand straighter and take shorter strides. A lower rise and longer run will cause the body to lean forward and take a longer stride. The third measurement is the width of the stairs. This is measured from the outside of one stringer to the outside of the other. If your stairs are for minimal access, then 36" wide is fine. With two people side-by-side, then maybe 4'0" would be better. Some other considerations might be: how many stairs will access your deck, where will they be located and their physical configuration in relation to the deck. This example deck is twenty feet wide. You could put a stair at each end or one very wide set of steps at the front. Stairs have three basic parts. What you step upon is the ***tread***. What you trip on or otherwise accidentally kick thus bruising your toe is called the ***riser***. The two sidepieces that hold it all together are called the ***carriage*** or stringer. Deck stairs usually don't have risers. They are built open (with the risers is a closed system). The wider your set of stairs, the more stringers need to be used. Consider using one every 18" to 22". Stairs 3'0" wide with light to moderate traffic need have only two stringers. You probably should have a concrete pad at the bottom of your stairs too. 4" thick by 2'0" deep is okay. The width should extend



RISE OF STEP (IN INCHES)

NUMBER OF STEPS	7	7⅛	7¼	7⅜	7½	7⅝	7¾	7⅞	8
1	14	14¼	14½	14¾	15	15¼	15½	15¾	16
2	21	21⅜	21¾	22⅛	22½	22⅞	23¼	23⅝	24
3	28	28½	29	29½	30	30½	31	31½	32
4	35	35⅝	36¼	36⅞	37½	38⅛	38¾	39⅜	40
5	42	42¾	43½	44¼	45	45¾	46½	47¼	48
6	49	49⅞	50¾	51⅝	52½	53⅜	54¼	55⅛	56
7	56	57	58	59	60	61	62	63	64
8	63	64⅛	65¼	66⅜	67½	68⅝	69¾	70⅞	72
9	70	71¼	72½	73¾	75	76¼	77½	78¾	80
10	77	78⅜	79¾	81⅛	82½	83⅞	85¼	86⅝	88
11	84	85½	87	88½	90	91½	93	94½	96

DISTANCE FROM GROUND TO TOP OF FLOORING

For Stairs - Find the approximate height of the deck first then you will know how many steps you will need and the height of the rise from one step to the next.

past the stairs, on both sides, by about 6”. Check your local building codes.

Taking the deck height and dividing it by the riser height tells you how many risers will be needed. The answer can be carried out to sixteenths of an inch. There will always be one less tread than riser. This deck is 4’0” high or 48”. If you use the maximum riser height of 8”, then you will have six risers at 8” and five treads. Using the minimum height of 7” will give you six risers that will actually be 6 7/8” high. This will probably be okay. As to the depth of the treads, you’re pretty much on your own. Try to keep them to more than 9”. If you lay 2 - 2x6’s next to each other, you get an 11” tread. Using 3 - 2x4’s will give you a tread that’s 10 1/2”. These two suggestions are the most common. They also allow you to use a 2x12 for the carriage. If you want to have deeper treads, then you’ll have to use alternative materials for the stringers.

Cutting carriages can be a challenge. You can buy precut carriages (saving you time but not money) or you can buy a ***framing square*** (a right-angled metal ruler) and a ***stair gauge*** (pair of small, brass screw clips used on metal rulers to mark a point). These tools will enable you to mark off your rise and run on a board and make your own stringers. Clip the gauge to the ruler marking the appropriate height of each rise and depth or each tread. Then align the gauge along the same edge of a 2x12 and trace the right angle to be eventually cut out. Stairs are always described from the bottom up. Laying out your carriage is done the same way. Repeat the tracing for each rise and tread of your stair. To determine the length of wood necessary for the carriage, add three to the number of risers in you stair. Remember boards are sold in even lengths. The top end of your stair carriage needs to be horizontal and parallel to all the treads you have marked. Cut the board completely through at this point. The bottom end needs to be vertical and parallel to all of the risers you have marked. Keeping in mind that the carriage represents the third side of your triangle and thus angled, it is necessary to cut the bottom so it lays flat on the concrete pad. The other two sides of the triangle are the height of the deck, the rise, and the horizontal measurement from the sum of all the treads. This cut is parallel to the tread and should also be cut completely through the board. You need to cut the top of the stringer so it lays flat against the header its being nailed into. This cut is parallel to the riser and it too is cut completely through the board. The use of a kick board and stair ledger board is optional although it will make your stairs sturdier. You may want to consider it if you expect heavy deck usage. Using a circular saw, cut along the

lines until the saw blade just touches the intersecting line. Cut inside the lines, on the part to be tossed out. Using a hand saw, grip it backwards and cut the remainder of the wood. This will be a little awkward but the result will be a clean corner at the intersection of the rise and tread.

There is a third alternative for stringers. You can buy stair ***cleats*** of metal that are screwed into the stringer and treads from the underside. You need not cut carriages at all. These heavy steel brackets allow the tread to rest upon them giving you a ***boxed*** set of stairs. With a boxed set of stairs, when you look at them from the side, all you see is the carriage. On a boxed set of stairs, all of your balusters will be the same length and cut the same way. On an open set of stairs, you will see the treads from the side. The balusters from your railing will be square-cut on the bottom, but different lengths. You will use at least two per tread per side. The height of the first should be about 36" while the second will be about 39". Of course, the height of your railing is also governed by building codes.

Assembly is pretty straightforward. Install the carriages first. Do the treads second and the railing is last. All of this instruction is based on the carriages being nailed directly to the front or side header of the deck. You may wish to build a small platform adjacent to the deck off of which the stairs are attached. This is most likely the scenario if your deck is higher off the ground and/or your stairs make a 90° turn. If you consider this platform to be just another deck, and build it much the same way, it's not so daunting a task. Your deck is merely a little more complicated. Now you really have completed your deck. Kick back, enjoy and congratulations.

8. TYPES of WOOD

Decks may be made from dozens of different kinds and types of woods and non-woods. Non-woods includes plastics, composites and combinations thereof. To be sure, there are pros and cons about virtually everything, including how to build a deck. Only a few will be discussed here. Please don't get wrapped up in the technical aspects. It's only provided to help you make an informed decision. The best decision-making tool is simply what makes the most sense. Then ask yourself what will give you the best bang for your buck? After you've answered these two questions, then look at the technical stuff.

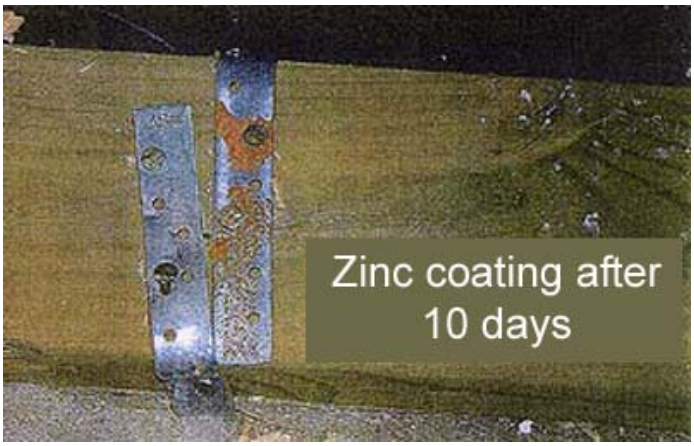
Deckster does not condone eco-terrorism or clear cutting. Eco-terrorism is the premeditated and sometimes violent guerilla tactics used to prevent the harvesting of timber. Clear cutting is an outdated method of harvesting still used occasionally where several acres of land are stripped bare and left open to the elements. Both the United States and Canada impose heavy fines and other penalties on lumber companies that ignore their responsibility of maintaining a home for forest-dwelling animals and don't reseed cut areas. Currently more trees are being planted than are being cut for use and export.

Let's get a few generalities out of the way first. Synthetic wood is not structurally stable. Do not use it in any structural capacity. You may use it for the decking only, and even then you need to compensate by adjusting the spacing of the supporting joists. You can check online for the manufacture's guidelines or your local lumberyard or the Building Codes office of your local government. Unfortunately, there is no independent body that can provide unbiased information on span ratings or structural analysis. The information provided is taken from product literature. Synthetic woods have not been around for very long. One inherent problem with synthetic woods is when a traffic pattern is worn into the textured surface, it can never be repaired. Unbiased analysis and comparisons are available with wood since it has been around a little longer (as in a few thousand years). Your substructure can be any hardwood; Southern Yellow Pine and Douglas Fir are the most common. All wood is categorized as being either "softwood" or "hardwood". What's the difference? The simplest answer is if the tree has needles, (called a conifer) it's a softwood. If a tree has leaves, (called a deciduous) it's a hardwood. Please keep in mind these are generalities. Besides needles and leaves, the difference has to do with structural integrity. Hardwoods have a tighter grain pattern, thus they can support greater weights and stresses. Softwoods are easier to cut and shape for decorative accents. The grading of woods is based on only one "face", not the entire piece. This is all about aesthetics.

Cypress is a softwood that usually is classified with hardwoods. Its natural oils make it highly resistant to moisture that can cause decay. The #2 and Better grading usually has a more rustic appearance due to its larger tight knots. The Select grade is clear and must be special ordered. No special fasteners or nails are necessary. The coloring can vary from light to reddish brown. It is considered superior as far as durability, cracking, weathering, resistant to decay, rot and mildew. It's also easy to work with. It is usually a pale yellow white.

Redwood is a softwood that is graded from the best, Clear All Heart, to the lowest, Construction Common. There are five different grades. No special fasteners or nails are required. Its natural oils make it highly resistant to bugs. Its coloration can vary from a light cherry to nearly as dark as mahogany. It's easy to work with, almost never warps and is relatively lightweight. Like Cedar, it holds stains and sealers quite well. It will weather to a grayish color quickly.

Treated lumber comes in several flavors. It always has a greenish tint. It is usually pressure-treated. It can be either Yellow Pine or Douglas Fir because these two species of wood accept the pressure treatment process the easiest. They are at the bottom end of the hardness scale. White Pine, by the way, is at the top end of the softwood scale. As mentioned earlier, this calendar year marks a transition from wood treated with arsenic to kill bugs to wood treated with another type of fungicide called Quat, which is arsenic-free. However, the old stuff, Chromated Copper Arsenate may still be used in non-residential applications. By the way, it has been in use since the 1940's. The EPA is not recommending that neither existing structures nor the surrounding soil be removed or replaced. C.C.A. may still be legally sold until supplies run out. In residential applications and using the new Alkaline Copper Quat treated lumber, different nails and fasteners must be used. The chemical makeup of this new combination is highly corrosive on metals. Remember to ask about the hardware coating when you buy ACQ lumber. The ACQ-treated lumber will fade to a brownish-gray in about five years. Do not burn or bury any treated wood. Don't grind it up for use as animal bedding. Don't use it around beehives where it may come in contact with the honey. Don't make a habit of inhaling the sawdust. Dimensional lumber has nine different grades ranging from Dense Select Structural to #2 Non-Dense.



Western Red Cedar is the most common of all the cedar woods. It has the same workability, weathering and stability characteristics as Redwood. Its grading goes from Clear Vertical Grain to Standard and Better. Its coloration is that of a rich, earthy red. Different Cedar

Associations grade their material differently thus there may be five or six different grades from top to bottom. It is a softwood that's easy to work with, is brittle, tends to split, almost never warps and is lightweight. It will scratch and dent very easily. It also burns very easily. Cedar affords a high degree of insulation in roofing and wall applications. Most cedar comes from Canada, which is currently at war with the USA over tariff restrictions concerning lumber imports. Canada supplies the USA with about 1/3 of all its lumber requirements. This website remains apolitical in this debate.

Ipe (pronounced ee-pay) has been used in the American construction industry about twenty years. It is an import from Brazil. It ranks near the top of the hardwood scale. It weighs 70 pounds per cubic foot. Yellow Pine is about 35 pcf while Redwood and Cedar are about 28 pcf. It is so dense, that mildew cannot grow on it. The roots can't penetrate the wood. It is a rich dark reddish-brown. Because of its density, all holes must be predrilled. Cutting must be done with a carbide-tipped saw blade. It is guaranteed, in writing, to last twenty years without replacement. Go to the website www.ocfp.com, click on tropical decking, then click on warranty. This can be printed and mailed after your Ipe deck is installed. The Atlantic City boardwalk is made out of this stuff. A 1x4 and a 1x6 can span at least 24". A 5/4 x 4 or 6" deck board can span 32" between supports. 2x4 and 2x6 boards can span 48" with a 100 pound ***live load*** upon it (100 psf). Since most building codes only require a load factor of 40 psf, the span ratings can be greater between supports. There are two "load" factors in construction. "Live" loads are portable while "dead" loads are permanent. The structure of your house is a dead load while the furniture in it is a live load. These are always figured in pounds per square foot. The fire rating of Ipe is A-1, the same as concrete. This material is less expensive than the synthetic woods but more than other real woods. There is very little shrinkage, twisting, warping or cupping. Avoid breathing the sawdust and as with all woods, thoroughly wash exposed areas of your skin when you quit for the day. Coat all of the cut ends with liquid wax sealer

Geodeck is made with recycled materials. It is available in Camel and Pewter colors. It is a hollow construction that does not require special tools or fasteners. It comes with a 20-year limited warranty. 3/8" spacing must be allowed for expansion and contraction. Use stainless steel fasteners only. Boards are available in 12'0", 16'0" and 20'0" lengths.

Profection has a reversible textured and wood-grained surface. It is made with high density polyethylene. It meets with the Americans with disabilities Act requirements. It is made with recycled wood and polymers. It is available in gray, cedar and redwood colors and has a 10-year warranty. Do not fasten within 1” of the edge of the boards. For use as stair treads, made sure the carriages are no more than 16” apart. Oil based paint may be applied after 90 days.

Trex was the first synthetic wood on the market. It is made of approximately 50% reclaimed hardwood sawdust and 50% recycled polyethylene plastic. It is the only non-wood listed with the three major U.S. building code agencies. It is available in four colors. There is a light and dark shade of gray as well as a light and dark brown. The boards are only available in 12’0”, 16’0” and 20’0” lengths.

TimberTech is available in both hollow and solid forms. The manufacturer claims the tongue and groove hollow plank can actually span 24’. It is available in 12’0”, 16’0” and 20’0”. The regular 5/4 and 2x6 planks can span 16” on center. They also offer a deck cover that installs directly over an existing deck. Included in their engineered deck system is a starter strip and end cap.

Crosstembers is a composite blend of hardwood and polypropylene which gives it greater strength. It contains no recycled polyethylene products. This product can span 24" between supports. Its available in five colors. It uses a concealed fastener system. It's covered by a 20 year limited warranty. It is available in 12', 16' and 20' lengths.

9. FACT or FICTION ABOUT C.C.A.

S P E C I A L R E P O R T By Anne W. West

The CCA Story

Fact vs. Fiction

Approved for Accuracy by the EPA, Washington, D.C.

Starting December 31, 2003, the Environmental Protection Agency (EPA) will no longer allow chromated copper arsenate (CCA) products to be used to treat wood intended for most residential settings. CCA-treated wood will remain available for industrial and marine applications (see sidebar). And, lumber dealers and retail outlets are free to sell existing inventory of CCA-treated wood after December 31, 2003, for residential use if appropriate end tags and consumer safety information sheets are provided with the product.

The change is the result of a voluntary withdrawal by the wood preservative manufacturers – Arch Wood Protection, Inc., Chemical Specialties, Inc., and Osmose, Inc. – who have agreed to transition to the manufacture of a new generation of wood preservatives for use in non-industrial treated wood products. Announced by EPA on February 12, 2002, the withdrawal is unfortunately fraught with misinformation and rumors about CCA, the new preservatives, and the future of treated wood.

Does this withdrawal mean treated wood will no longer be available? Does it mean deck and dock builders must learn to work with a new product? Does it mean consumers should replace decks, docks, and

other structures built with CCA-treated wood? The answer to these and many other questions about treated wood is a resounding, "No!"

Voluntary Withdrawal

For more than 70 years, CCA-treated wood has been used in a variety of residential structures including decks, docks, gazebos, fences, play structures, walkways, picnic tables, and patios. Although CCA contains arsenic, years of use and performance along with scientific studies has shown that CCA treated wood is effective, economical, and safe when used as recommended. However, since 2001, media attention and policy debate have drawn attention to new standards for arsenic in drinking water and to the rate at which arsenic leaches from CCA-treated products.

Arsenic is a chemical element that occurs naturally in rocks, soil, water, air, plants, and animals. In its natural environment, arsenic binds to other molecules and does not travel very far, although it can be released into the environment through natural occurrences such as volcanic eruptions, erosion of rocks, and forest fires, or through human actions such as mining. Arsenic is a known carcinogen at very low levels.

According to EPA, about 90 percent of industrial arsenic in the United States is used as wood preservative, and it is also used in paints, dyes, metals, and semiconductors. EPA has "not concluded that CCA-treated wood poses any unreasonable risk to the public or the environment," although the agency received over 8,000 pages of comments on CCA and is continuing their risk assessment of the product. In a move EPA called "responsible action," the wood preservative manufacturers voluntarily agreed to withdraw use of CCA for certain applications.

Many in the industry credit negative media coverage and scare tactics by environmentalists as the driving forces behind the withdrawal. "This was a voluntary label withdrawal, not a ban on using CCA, driven by the media attention," stressed Al Heberer, national marketing manager, Osmose, Inc., Griffin, Georgia. "When the American Institute of Architects (AIA) won't spec your product because of consumer concerns and perceptions and people are scared of your product, it becomes an image problem."

Experts say the transition to new lines of non-arsenic-based preservatives may be slower than anticipated and there will likely be a mass change-over to these new products after December 31, 2003. "I thought we would be about 65 percent converted to new products at this point, but we are still a CCA treating industry," said Dave Mason, director of treated markets, Southern Forest Products Association, Kenner, Louisiana, "but only about 15 percent of the industry has converted." Mason and others agree that the transition will be smooth and that wood treated with the new preservatives will be readily available after the first of the year. In fact, it is already available through some lumber yards.

New Generation Preservatives

The voluntary withdrawal of CCA has brought on a new breed of non-arsenic based preservatives that are used to treat wood. The withdrawal could mean a new interest in untreated wood such as cedar and redwood and non-wood materials such as plastics, metal, and composite materials. Although referred to as "next generation" or "new generation" preservatives, these products have

been in use for more than a decade, primarily throughout Europe and Asia. The two primary preservatives for exterior use are alkaline copper quaternary (ACQ) and copper azole (CBA). For interior applications, wood is treated with sodium borates (SBX). (see sidebar)

Arch Wood Protection, Inc., offers its patented preservative, a formulation of copper azole. Copper, derived from recycled sources, is the principal active ingredient, protecting against termites and fungal decay. Protection against copper-tolerant fungi is provided by an organic azole that is also used to protect many of the foods we eat such as fruit, peanuts, and wheat. This formulation makes the wood useless as a food source for termites and fungi, while maintaining an attractive, clean, and odorless end product. "In terms of effectiveness of product, we have 60 years of actual testing with CCA, and in accelerated testing side-by-side the new products are holding up as well as CCA," said Huck DeVenzio, manager marketing communication, Arch Treatment Technologies, Atlanta. "We have confidence to put the same lifetime warranty on the new product."

ACQ is the world's leading new generation preservative, available through Chemical Specialties, Inc., and Osmose. ACQ's main ingredient is 100 percent recycled copper, which is combined with a

natural base of alkaline and quaternary, (also known as quat), a fungicide. “Consumers will continue to see a very reliable and safe product in ACQ treated wood and it will perform to their expectations, just as CCA did,” added Dave Fowlie, vice president sales and business development, Chemical Specialties, Inc., Charlotte, North Carolina. “With ACQ, you get the same mold inhibitor that we used with CCA treated wood and the added benefit of an additional inhibitor in quat.”

“Both preservatives are excellent and have the same good features as CCA-treated wood, so customers won’t be able to tell them apart,” said Heberer. “Most likely you’ll go into a lumber yard and see products from several different treaters, just as we did with CCA-treated products.”

Other chemicals will be coming onto the market in the future, continuing to make treated wood a good alternative for building. “With any change there are bumps in the road,” said Connie Welch, branch chief, EPA, Washington. “The [chemical] alternatives have been available for quite some time and it is likely that new alternatives will become available in the near future.”

Rumors Abound

Industry experts agree that the biggest challenge with the CCA issue is the multitude of rumors and misinformation about the withdrawal and the future of pressure treated wood. Information is available from EPA and industry associations as well as the preservative manufacturers themselves (see sidebar). Some of the more common rumors include these items:

RUMOR: Pressure treated wood is going away.

FACT:

Treated wood, using the new generation, non-arsenic preservatives, is still available and safe. “It’s not going away,” emphasized Welch. “Treated wood is still a viable alternative for building.” In fact, CCA-treated wood will remain available for many marine and industrial applications (see sidebar). Even decks built with non-treated wood or non-wood products will continue to require treated wood for the understructure.

RUMOR: New generation treated wood will be cost prohibitive.

FACT:

Lumber prices fluctuate; making it difficult to predict future costs although experts expect a 15 to 30 percent price increase over traditional CCA treated wood. CCA preservatives were relatively inexpensive, while the components of the new generation preservatives are more expensive. "You have quite a capital investment on the part of the treaters as they retool their plants to use the new preservatives and those costs will find their way into the product, at least initially," Mason pointed out. Others add that as much as 80 percent of the price of the finished product is for the wood itself.

RUMOR: Deck and dock builders must learn to use a new product.

FACT:

Builders and consumers are not likely to notice any difference in wood treated with the new preservatives. In fact, the wood handles, looks, installs, weathers, and lasts much the same as CCA-treated wood. The industry has the same recommendations for handling and disposing of wood treated with the new preservatives as it had for CCA-treated wood.

RUMOR: Wood treated with non-arsenic preservatives doesn't last as long as CCA treated wood.

FACT:

In terms of effectiveness, the new products are holding up as well as CCA so the preservative manufacturers have confidence to put the lengthy warranties on the new products.

RUMOR: There is a fastener corrosion issue with the new preservatives.

FACT:

The preserved wood industry has always recommended using hot-dipped galvanized, stainless steel, or coated fasteners. The recommended fasteners are the same with the new preservatives. In fact, use of the prescribed fasteners is more important than ever because the new preservatives are slightly more corrosive than CCA treated wood, which is slightly more corrosive than untreated wood. Osmose even offers its own line of specially designed deck screws that come with a limited lifetime warranty.

Arch recommends hot-dipped galvanized fasteners and connectors meeting ASTM A153 and G185 respectively and 304 or 316 stainless steel for permanent wood foundations. Aluminum should not be used in direct contact with this treated wood because copper and aluminum can have a reaction and accelerate corrosion.

RUMOR: The new preservatives don't prohibit mold.

FACT:

"The preservative manufacturers are working with wood treaters to adjust their formulations to have the proper amount of mold inhibitor in the solution mix so that the products are comparable to CCA in terms of mold propensity," said Mason, adding that

the new preservatives seemed to attract a white, non-toxic mold that showed up very readily with the consumer and was unacceptable.

RUMOR: CCA is being removed because it is dangerous.

FACT:

The EPA has "not concluded that CCA-treated wood poses unreasonable risks to the public when used around or near their homes or from wood that remains available in stores." The Treated Wood Council points to an analysis by the Florida Department of Health that determined "a child would have to eat a spoonful of dirt, taken from right next to a CCA treated play set, every day, for 30 years, before there would be a potential health effect." Experts across the industry agree that many "scare tactics" have been employed to remove CCA from the marketplace, although the product has performed very well for years without any major incident or toxicity finding. In February 2003, the United States District Court, Southern District of Florida, denied class action status to a lawsuit challenging the safety of CCA-treated wood and its warnings. The Court stated that the establishment of a class is unwarranted given the relatively small number of claims related to CCA-treated wood: "For instance, even in spite of the seventy year history of treated wood's use in this country, there is no track record of cases in which plaintiffs were alleging property damage as a result of treated wood. And there is no indication that a sea of litigation over treated wood is imminent."

RUMOR: Consumers need to remove decks or other structures built with CCA treated wood.

FACT:

There is no need to remove existing structures or the soil surrounding those areas. However, consumers who are concerned can take extra precautions by applying a penetrating coating such as oil-based, semi-transparent stains on a regular basis. Consumers should keep in mind that some "film-forming" or non-penetrating stains are not recommended for outdoor surfaces. Simple precautions like covering wooden tables before eating, regular hand washing, not allowing food to touch treated wood and not burning treated wood in a residential setting can also be taken. The precautions outlined in the consumer safety information sheet should be followed when working with CCA-treated wood. "This is a culture change for the industry that allows the continuation of a very useful building product," said Welch. In fact, EPA credits the preservative manufacturers for coming forward in a voluntary way to undergo a conversion and retooling of their plants as quickly as possible, and giving new alternatives that provide consumers with greater choice for their building needs. EPA is currently reviewing the use of CCA-treated wood in light of the latest science and safety standards under the Agency's re-registration program. Throughout this transition process EPA continues to proceed with a risk assessment. Through this assessment process to date, EPA has received extensive recommendations from the Scientific Advisory Panel (SAP), a group of scientific experts, on the best approach to evaluating potential risks to children from exposure to decks and play-structures. Updates can be found at www.epa.gov.pesticides and other preservative industry web sites (see sidebar). Even with the ongoing research and evaluation, treated wood continues to be a popular building product and it will continue to be in heavy demand for use in outdoor residential settings. "Treated wood is a fantastic product, using a renewable resource that is fast growing and plentiful," DeVenzio added. "It takes low energy to produce, has good insulation value and the preservative is made mostly of recycled materials that prolong the life of the wood, which lessens demand on forest resources." "We are not dropping an unproven product on the American public. CCA was so good and so effective, it's a tough act to follow," said Heberer. "We think we do have a winner."

10. DECK ESTIMATING WORKSHEET

(all information is to include quantity and size)

L Ledger
_____

D Nuts, Bolts,
Washers_____

G Wedge/Sleeve
Anchors_____

R Lead Anchors &
Lags_____

F # of
Posts_____
O Sonotube_____

O Concrete_____

T Anchor
Bolts_____

I Post Anchor
Base_____

N Post
size_____

G Post to Beam
Hdwr_____

B Beams_____

M Nuts, Bolts,
Washers_____

J Joists_____

S Joist
Hangers (sgl)_____(dbl)_____

T Band
Board_____

D Decking_____

K

R Rail
Posts_____

A Nuts, Bolts,
Washers_____

I Top
Rail_____

L Bottom
Rail_____

I Spindles_____

N (when calculating railing – don't forget stair rails)

G

S Carriages_____

T Cleats_____

R Treads_____

M
Miscellaneous_____

I _____

S _____

C _____

H 10d Galv Com_____10d Galv Fin_____

D 16d Galv Com_____Joist Hanger Nails_____

W Multi-Purpose Anchors_____Gal Sealer_____

R Miscellaneous_____

recommended ratios of tread length and riser height. Multiply the number of steps by the tread length to find the overall run of the stairs.

Using 2 x 4 or 2 x 6 boards for treads will reduce cupping problems common with wider boards.

It is also possible to purchase precut steps at certain lumberyards. A call ahead might eliminate some of the more difficult angle cutting you need to do.

Good Luck!