ALL DECKED OUT

A practical guide to stylish and durable decks

by Scott Grove

A deck extends the interior living space to the outdoors. It acts as a functional and aesthetic transition between the interior and exterior environments, so it should not e considered a separate structure from the house. But before we discuss building decks, let's look at some general design considerations.

Space Planning

Traffic flow is an important design issue. It's also the number one way to waste space. Many designs allot too much area for a pathway or locate a pathway where it isolates a portion of a deck and renders it useless. One good approach is to offset the doorway to one side, leaving more room for functional areas (see Figure 1, next page). In high traffic paths, allow room for at least two people to pass by.

Plan ahead for eating and lounge areas. If the clients will use the deck for entertaining, imagine how many people might occupy the deck all at one time. Also, they might want a plan that allows for future expansion.

When you lay out your design, arrange items that will be on the finished deck within a spray-painted outline of the deck. You and your client will be able to visualize the size and functional areas. Don't play it tight. It is better to build larger than smaller.

When you consider the site in relation to the house, most decks just about design themselves. By following the house and landscape's layout, you can align the edges and planes of the deck with those of the house. This way the deck will harmonize with the house design. We always try to build the deck to wrap around a standing tree or reflect an interesting shape in the landscape. Plan for any future landscaping, like bushes, trees, or plantings.

Consider any existing view from the house, and don't let the deck detract from it. You can help control views by adding blinds or trellis work that directs one's interest. Or you can use these elements to create an intimate eating area, and still leave an open space with a scenic view (see Figure 2). The deck materials and design can be integrated with the landscape and garden. Work with a landscaper and plan for this in your original design.

The 2x6 riser returns give the appearance of terraced stairs. Also, note how the angled railing posts and bench supports are extended downward as a design element.

Figure 1. *Offsetting the doorway to one side keeps traffic flow out of functional areas. Also, note how the decking patterns define different areas.*

Figure 2. *Blinds or trellis work can help direct one's interest or create an intimate eating area, and there can still be open space with a scenic view.*

Remember, the selling point of a deck is that you are custom designing it to suit your client's specific needs.

Lumber

Use pressure-treated lumber for decks. There are three types: Pressure-treated lumber marked LP-2 is for exterior use (it has .25 pounds of CCA per cubic foot of wood); LP-22 for ground contact (at .40 pounds), and FDN for wood foundations (at .60 pounds). The preservative level effects the longevity—and price. The industry claims it lasts at least 40 years. The Southern Forest Products Association (SFPA), however, recommends that "care should be taken to minimize drilling or cutting treated lumber, since this could permit decay organisms to get past the chemical barrier and start deterioration from within." (I'd love to see what kinds of decks they build.)

During processing, the lumber is dimensionally sawn and kiln-dried to about 15-percent moisture content. Then it is put into a tank and treated. The preservative doesn't always completely saturate the board, but only creates a protective barrier around the board. Two-by lumber is usually fully saturated, but on larger dimension boards there is only about 1-inch penetration on the face and 12-inch penetration on the end grain. The end grain, therefore, is vulnerable on a sawn board. It acts like a straw and sucks up water. This can bring on decay.

Two-by lumber is usually fully saturated with preservative. But larger dimension boards have only about 1-inch penetration on the face and 12-inches on the end grain, which sucks up water like a straw.

On larger dimension pressure-treated lumber, there is also a good chance heartwood still exists in the board. During processing, only sapwood receives the preservative; the heartwood remains untouched. Though the heartwood has some natural preservatives, water can get to the heartwood through the end grain and drilled holes, making it vulnerable to decay. Whenever the end grain is exposed, coat it with preservative. Use something that lets the wood breathe, like Cuprinol Green. (A spray bottle is a quick and convenient way to apply it.)

Warping is a big problem with pressure-treated lumber. After the wood is initially treated, it is removed with a moisture content of about 75 percent. (The wood will stabilize around 19 percent in the New England area.) You buy it wet. As it slowly air dries and hits about 30 percent, it starts to shrink, mainly across the grain. Checks, warping, and twisting are inevitable. If it is not stacked, bound, and stored properly the wood will just go crazy and become impossible to work with. Make sure your clients understand that the wood will expand and shrink when affected by moisture.

Pressure-treated wood can be purchased "kiln dried after treatment," stamped KDAT (dried to 19 percent). This is usually a special order at a very special price, but it will eliminate the majority of shrinkage. In any case, after six months, when the wood has had a chance to season, apply a weather-resistant finish to the entire deck. We use Olympic or Cuprinol deck stain. This will help prevent surface mold. (I remember when pressure-treated wood was sold with a "maintenance free" sales pitch. Things do change with time.)

Quality and selection are critical and more important than price. Pressure-treated lumber generally comes in two grades: standard and premium. For the decking surfaces, railings, and benches, strictly use premium grade. Quality varies widely within these grades, so check out different suppliers for the best quality. Also, ask about delivery, pick-up service, and restocking charges at each supplier.

When placing the order, add plenty of extra material. Inevitably there will be bad boards that should not be used in the critical areas. Poor quality lumber can ruin any chance of showing off good design and craftsmanship.

Site

Before giving the "go ahead" to dump the lumber, know where the septic tank is. Don't let the truck back over it; avoid damp soil and spinning wheels. It doesn't go over well starting a job with a turned up lawn. Deliver the lumber as

Pressure-Treated Wood and Safety

CCA pressure-treated wood is the product of choice for building decks. Most CCA pressure-treated wood is Southern yellow pine, because it is readily available and treats well. "CCA" stands for chromated copper arsenate, a preservative, which is impregnated in the wood with water. The CCA solution is toxic to humans and has been linked to cancer. Fortunately, the pressure-treating process bonds the chemical in the wood, making it relatively safe to handle and use.

Here is how the pressure-treating process works. The lumber is dimensionally sawn and kiln-dried to about a 15-percent moisture level. Then it is put into a tank where a vacuum is created. A 2-percent solution of preservative and water is pressurized into the wood at 150 psi. What is not absorbed by the wood is drawn off and measured to calculate how much was retained.

The preservative does not always completely saturate each board, and sometimes it only creates a barrier around the outside. Most 2x lumber gets thoroughly treated, but on larger dimension boards there is only about 1-inch penetration on the faces, and 12-inch penetration from the end grain. Consequently, whenever you cut or drill CCA-treated wood, treat the cut end or hole with a wood preservative (such as Cuprinol).

Once inside the wood, the CCA chemically joins with wood sugars to form insoluble "precipitates." These precipitates are highly resistant to leaching. They are non-volatile, and they will not vaporize or evaporate. Most tests show the precipitates can't be carried off by contact with water or moisture.

The Environmental Protection Agency (EPA), The American Wood Preservers Institute (AWPI), and The National Coalition Against the Misuse of Pesticides (NCAMP), have compiled or commissioned research on CCA-treated wood to gauge its safety.

The AWPI, which represents wood treaters and chemical manufacturers, cites many studies that demonstrate CCA's safety. One study claims that animals fed the sawdust of pressure-treated wood showed no adverse effects. Another points out that the arsenate in CCA-treated wood is much safer than the unstable and highly toxic arsenic poison we are familiar with.

Other organizations, including The National Coalition Against the Misuse of Pesticides (NCAMP), a membership-supported public-interest group, differ with industry-sponsored research on CCA. NCAMP says CCA-treated wood "poses an unnecessary health hazard." They cite cases where workers were poisoned by CCA dust or ash and won court settlements from manufacturers.

The cautious approach: *The EPA recommends wearing a mask when sawing pressure-treated wood, and washing your hands before eating or smoking.*

The EPA concluded in 1985, after an eight-year study, that "CCA-treated wood does not pose an unreasonable risk." However it makes the following recommendations: wear gloves when handling CCA-treated wood; if you are around wood dust, wear a mask. You should wash your hands before using tobacco products and before eating. The EPA requires that suppliers distribute public warnings on the potential dangers of CCA-treated products. The EPA further recommends that CCA-treated wood should not come in contact with food products, and therefore it should not be used for cutting boards or countertops.

—John Wagner

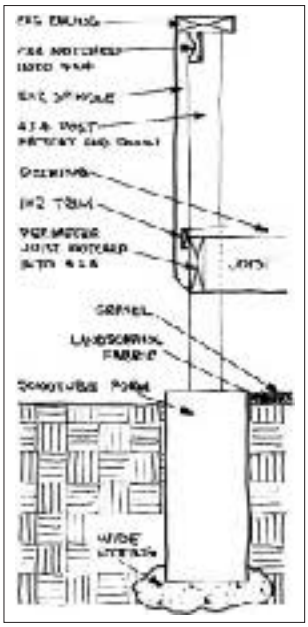

Figure 3. *Piers can be formed with Sonotubes; bring the piers up a couple of inches off the ground to help shed water. Make the pier wider at the base.*

close to the actual site as possible, but don't put it in your own way. Put plywood and 2x4s under the pile. Plan on restacking it every three days, so as not to kill the grass.

It's much easier to cut the boards right off the stack. This keeps the scraps in one place, too. Keep an eye out for bad boards for future return. Also, cull out any real nice ones for railing and bench tops. Do not burn any scraps—the ash is toxic.

Piers

Locate the piers exactly, or they will only cause problems later on. We lay out the site with standard mason's string and batter-board system. Check local codes for footing depth and diameter requirements.

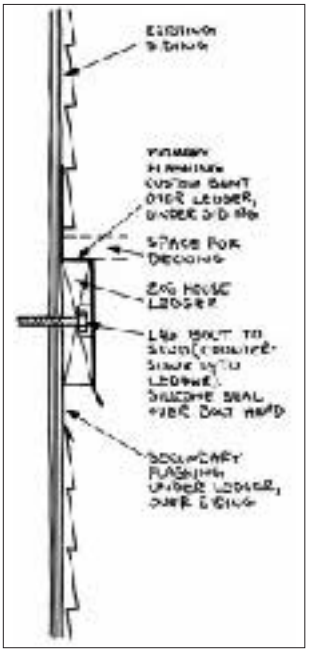

Figure 4. *Protect the ledger and any raw wood beneath it by sliding custom-fit flashing up under the siding. Attach another layer of flashing underneath so it sheds water away from the house.*

If there are more than six piers, it is worth renting a power auger. We prefer the one-man machine with the flex shaft and torque bar. The two-man machine is a real monster to handle. In any case, the auger seems to have a mind of its own, and the holes will have to be plumbed up and fudged over. Around new homes where there might be new backfill, be sure to hit solid ground. Even with a power auger, there is shoveling to do, because it's a good idea to widen the bottom of the hole for a good footing base.

We like to form each pier with sono tubes, though often we'll pour right into the hole. The footings' tops can be formed with 2x4s, but watch out because winter frost heaves can grab on the rough sides and lift. Bring each pier up a couple of inches off the ground to help shed water (see Figure 3).

In some cases, there might be an area where a change may occur during construction, so don't dig the footings there. Frame the perimeter with temporary supports until it's just right. Then locate the footings exactly, dig, and pour.

Concrete

Check with a few concrete trucking companies for delivery and unloading prices, and consider the time you'll save getting the footings poured. (That is, think of the lower back pain you'll avoid by not doing the mixing yourself.) For jobs with more than ten footings to pour, we order the truck. Some companies send trucks that mix as they pour, thus you only pay for what you use. This eliminates overestimating or, worse, not having enough.

On small jobs we figure two 100-pound bags of sand mix per footing. If the deck is close to the ground, lay down landscaping fabric and a few inches of gravel after the pour. This helps keep weeds from growing later.

House Ledger Joist

Properly attaching the ledger to the house is very critical. The ledger can easily trap moisture, and this can bring deterioration to the house. Protect any raw wood that might be exposed to water.

If we are attaching above the house's perimeter joist, we remove a slot of siding from the house and mark off the studs. We slide our flashing 3 inches up under the siding. This flashing is custom bent to fit out and over the top of the ledger once it is attached. (Most local roofing suppliers have brakes for customers to use free of charge.) We also add a second layer of flashing under the bottom of the ledger. This second piece should overlap the siding below

Figure 5. *When setting posts, put the factory end down. Cut any exposed post tops at an angle to shed water, and always seal your cuts with a preservative.*

Figure 6. *Decking boards can be left long and trimmed all at once. Here decking will change directions, with a trim piece marking the joint.*

so it sheds water away from the house.

The house ledger is bolted in place. We bolt 16 inches, on-center with 3 1/2-inch-long, 3/8-inch lag bolts. Squirt a little silicon over the lags bolts for extra sealing (see Figure 4).

When attaching directly to a foundation, use specialty concrete fasteners and eliminate the flashing.

Keep the surface of the deck a few inches below the interior floor level to prevent water from seeping under doorways. If the decking surface is at the same height as the interior floor, get a good seal under any exterior door thresholds. (Some high-end doors provide a 1/8-inch slot to slide in the flashing.)

When determining the deck height, keep all step rises equal distances and make up any adjustments at the first step from the ground or at the step into the house.

Posts and Beams

When setting the posts, put the factory end down. Remember, end grain is the most vulnerable part of a board. Also, cut any exposed post tops at an angle to shed water, and always seal your cuts with a preservative (see Figure 5).

Beams are fairly straightforward. As with joists, face the crown side up. We prefer to notch our beams into the post for extra strength. We bolt the beams to the post. Galvanized lag and carriage bolts won't rust or stain the wood, but they are hard to find. Check your Yellow Pages for industrial suppliers.

We avoid nailing two beam members face to face; we will add a 1/2-inch spacer. This prevents moisture from being trapped. For a clean look at the end of a double beam, miter in an end cap to hide the end grain.

Joists

To eliminate problems with varying joist widths, nail joist hangers to the joist before nailing to the house ledger. This way you can line the joist tops up flush with the ledger. Add a dab of silicon to the nail holes when nailing to the house ledger—this really gives a watertight seal.

Be sure to double check all perimeter members for squareness before filling in with the other joists. Check the house for squareness, straightness, and level siding. Don't be surprised if it's out somewhere. Assume nothing. After all the framing is done, clean out any scraps that may have fallen under the deck. Cleanliness definitely reflects on the client's impression of how nice of a job you are doing.

During the stage of the framing process take a step back and look over the job to see if everything appears

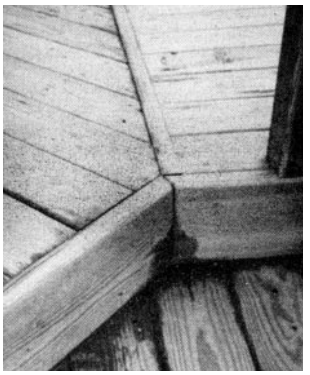

Figure 7. *A perimeter-rim joist covers deckboard end grain and cleans up the look of the deck. Note the dividing board on the seam in the deck.*

plumb, level, and straight. Changes are much easier to make before the decking goes on.

Decking

With any decking, it is important to control cupping. The industry recommends nailing the decking boards bark-side up to anticipate cupping. The wood may cup one direction or the other, however, depending on whether the wood is swelling or shrinking. Downward warping is preferred, because you won't get a pool of water. To ensure that the boards will cup downward, we score the bottom of each board in thirds with a cut 3/8-inch deep for 5/4 decking, and 1/2-inch for 1 1/2-inch decking.

Angling the decking direction and creating a pattern can add visual interest, and flowing patterns can define functional areas. In any event, start laying the decking with an ice, straight piece. Avoid cutting both ends for an exact fit. Start on a section where one side of the board is cut to fit and the other end is left long and overhangs an edge. Once that section of deck is completed, snap a line for the finished edge and cut all the ends at once (see Figure 6).

A common and fatal mistake is butting two decking boards end-to-end on a single joist. The first problem is that you'll nail the board 3/4 inch from its end. This may split the board. Second, there will be twice as many nails in a single joist. This may split the joist open and create a void for water to enter.

For internal seams, instead of using a single joist to pick up decking joints, add an extra joist. To clean the seam up and make it a design element, we add a dividing board on the seam (see Figure 7).

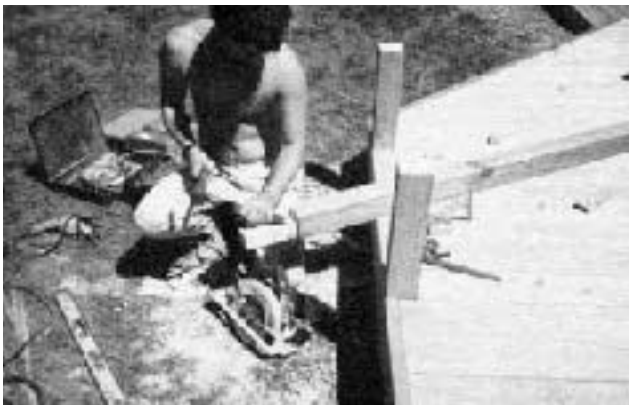

Figure 8. *Attach a post by notching it through the decking and bolt it to the joist from the inside. The post can be flush with the outside perimeter joist.*

Figure 9. *Different railing styles can define and separate functional areas on the deck. For sturdiness, screw rather than nail the railings. This also prevents splitting.*

Spacing

Some builders lay the decking boards right next to one another and let the shrinkage create the space between them, but this leaves no room for adjustment when you're laying down the decking. We use a 16-penny finish nail to gauge spacing. This allows you to fudge the boards and pick up an inch or two over 8 or 10 feet. When you are about halfway done with laying down the decking, check the area of decking to be installed. Count the existing boards you've put down, and measure how much they take p. Use their number and distance to calculate where you will end up. In any event, you don't want to end up with a 2-inch-wide end board.

Nails

For joist construction, we exclusively use pneumatic nailers loaded with double-galvanized 16-penny nails. To be competitive, this is the only way to go. These guns can nail two boards together in midair with little recoil.

But these guns can mar the lumber and countersink the nail, and that doesn't look so hot. Also, these guns are dangerous, and you could end up nailing your foot to the deck. We like to hand nail all the decking. Ten-penny hot-dipped-galvanized screw nails—two per joist, angled slightly inward—work well. Always predrill when nailing within 3 inches of the end of a board. Otherwise, the board will split, maybe not right when you nail it, but sometime in the future. Screwing the entire decking down is a great idea but a real pain in the rump since predrilling is a must.

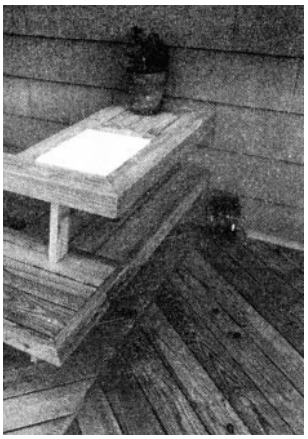

Figure 10. *An inlaid section of Corian acts as a food counter and keeps food from contact with pressure-treated lumber.*

Figure 11. *Notched 2x8s provide support for both bench seats and backs.*

Railings

Railings give the most personality to any deck, and they come in all shapes and sizes. Contemporary or colonial, they define and add visual interest to the perimeter. Even on low decks that don't need railings, they add a secure feeling, and define functional areas. Also planters, benches, or bushes can act as alternatives to railings and add a visual barrier that won't impede the view.

Typically, you add railing posts by bolting them to the outside perimeter joist. Or, notch the post through the decking and bolt to the joist from the inside (Figure 8). This way the post can be flush with the outside perimeter joist for a cleaner look.

If at all possible, use the supporting deck posts as railing posts by continuing them up through the decking. Then cut in additional posts where necessary. Of course, if the deck is built with cantilevering joists over a beam, running the supporting posts through will not be possible.

For spindles, 2x2 boards are common; they are available precut with beveled ends. For sturdiness, install them with predrilled screws (this also prevents splitting). They can be overlapped and attached to the perimeter rim joist or installed with a bottom rail. Two-by-fours or alternating 1x2s and 1x4s are also good for railing spindles (see Figure 9).

A standard railing height is 30 inches; decks more than 8 feet off the ground should have am ore comforting 36-inch-high railing. The top rail is usually a 2x6 with a 2x4 skirt. Top rails shouldn't span more than 4 feet. For a more traditional look (and pricey), premilled rails and spindles are available.

Benches

Don't plan on built-in seating for permanent eating seats, they are not as comfortable as regular chairs. Built-in cabinets or counters are a good idea, though pressure-treated wood shouldn't come in contact with food (see Figure 10).

The supporting members for benches need to be extra strong. For benches with backs, run 2x8s vertically, and rip them down to 2x4 where you want the bench back support to begin (see Figure 11). Backless benches can be supported with 4x4s or 2x6s. Bolt horizontal cross members to the structural member.

The bench back can either be made of stacked boards similar to the decking, or just a single rail (perhaps matching the railing). Angle the entire bench back five degrees, for comfort. All-weather cushions can be put in with Velcro straps for seasonal removal.

Stairs

Steps, particularly longer, wider runs, can give an elegant look. Add a landing or wider bottom step to dramatize the flowing effect. Make step a minimum of 4 feet wide, so two people can comfortably pass by. Use at least three stringers for wide stairways, and use a riser board to enclose the open-riser void. With stairs of only a couple risers, build each step as a single box, then just stack them on top of each other.

All Decked Out

The purpose of a deck is to be functional and also to harmonize with the house and its surroundings. A good design is only as good as the construction. With good design considerations and proper construction techniques, a deck can last a lifetime. ■

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