

A Furniture-Grade Deck

Hidden fasteners and integral lighting streamline a contemporary, Craftsman-style deck

by Scott Fleming

Hungry deer prowl the sunburned hills of Danville, California. When spring rolls around and flower beds full of tendersprouts make their annual push, the deer practically paw the ground in anticipation. But not at Steve and Celeste Butterfield's house.

On their steep hillside, the Butterfields had grown weary of feeding the deer a steady diet of pedigreed plants with Latin names. The only shrubs that the deer wouldn't eat were the ones they couldn't reach—like the ones in pots out on the decaying deck. Deer don't like stairs, or wooden floors for that matter.

Landscaping seemed like a losing proposition, so Steve and Celeste decided to put their outdoor-improvement money into replacing the old deck. They hired me to lavish attention on the new deck as though it were a piece of furniture (photo facing page) and to make it last by avoiding the mistakes made in their original deck.

Why decks go bad—The Butterfields' original deck didn't have much of a chance at longevity. Its deck boards were too close together, and the oak leaves that collected in the narrow crevices between the boards held moisture and promoted rot. The deck's ledger was nailed directly to the plywood siding, and the lack of an airspace caused rot both in ledger and in plywood. At the butt joints between the deck boards, nails too close to the board ends caused splits and potentially dangerous splinters that angled upward toward oncoming feet.

At our earliest design sessions, we nailed down the important details to be included in the new deck. It would be made of the best-quality redwood that we could find, and it would be detailed to shed water and to promote ventilation. All exposed edges would be rounded to make them soft to the eye and to the touch, and all decking fasteners would be hidden from view. The railing would be unobtrusive and include a discreet lighting system. Finally, a pair of stairways to the hillside below would make for easy access to the area under the deck. With these marching orders, I set out to design and build the ultimate deck.

Following the lay of the land—As the defunct deck was being torn down and hauled off, Bary Pfaff and I began the layout for the new one. The old deck was 10 ft. wide, and we all agreed that a wider deck would be a more useful deck. We settled on 12 ft., which leaves enough room to have a table and chairs on the deck with circulation space to the sides.

As shown in the drawing, the deck wraps around two sides of the house, with a couple of triangular bays that are 20 in. below the main deck (drawing right). The bays serve several

functions. First, their triangular shapes are inherently strong, adding diagonal bracing to the horizontal plane of the deck. Second, we didn't want to cut any of the limbs of the splendid oaks that ring the house. By lowering the bays, we could project the deck into the treetops without pruning any limbs, which gives the bays a cozy, tree-house feeling. Finally, the bay on the east side of the house is also the landing for the two stairways that lead to grade. By code, the stairs can't have more than 18 risers in a single run. By lowering the landing, we could take the stairs down to grade in straight runs.

Don't forget the space under the deck—

Two conditions made it tough to get around under the original deck. A forest of posts and diagonal braces made an obstacle course out of the hillside next to the house. And the clay soil turned to grease during the rainy season. Steve and Celeste wanted an easy-to-use path under the deck. So before we got into carpentry, we did our time as concrete workers.

First we poured stepped concrete grade beams that roughly follow the perimeter of the deck.

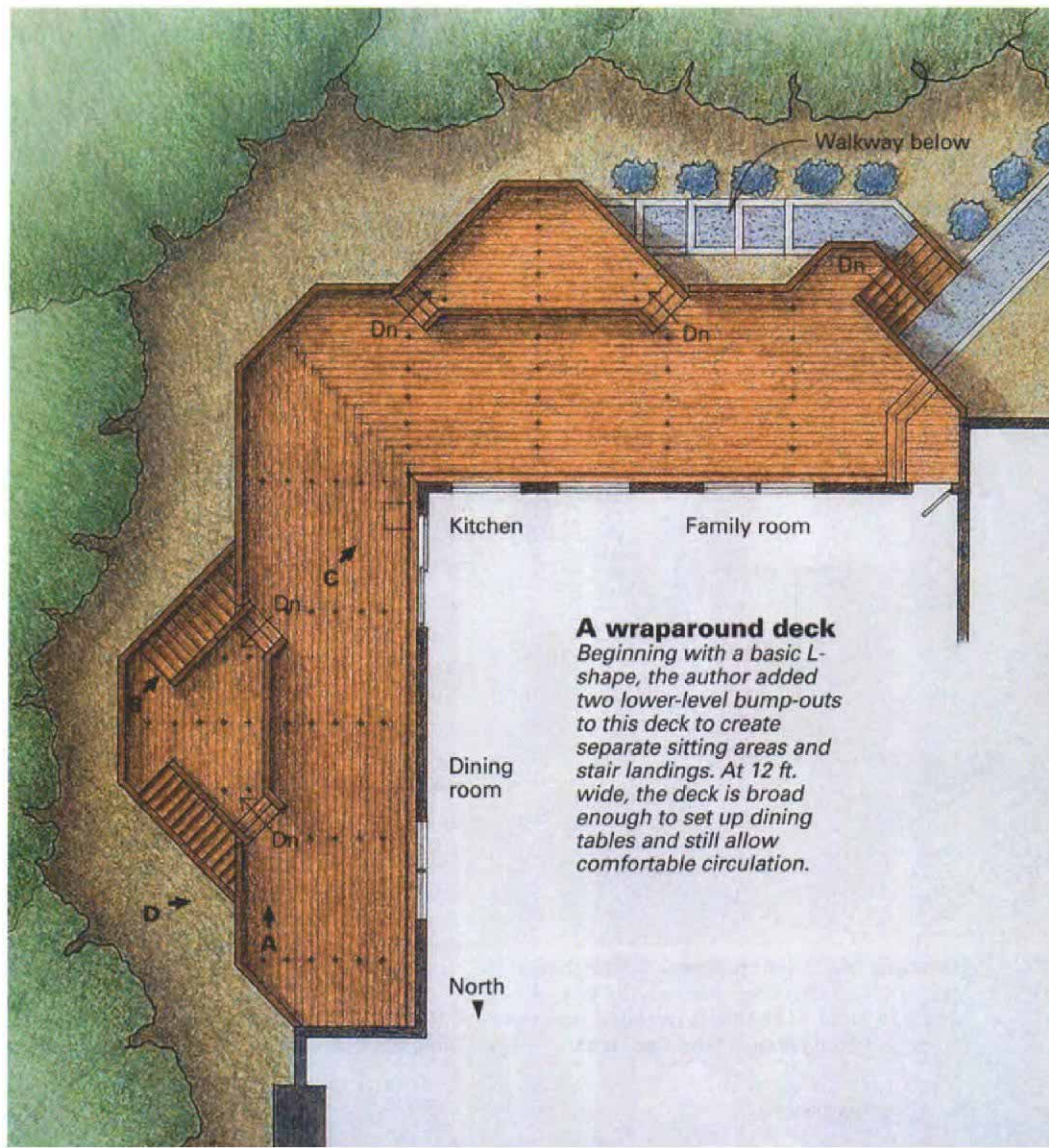
The grade beams are 4 ft. apart, and in several places they are affixed to the deck piers by tie beams. In combination with pressure-treated 2x12s, these tie beams double as risers for a path that steps down the hill in 4-ft. sq. increments (photo top left, p. 92).

The walkway connects the three stair landings and the door to the utility room below the deck. We filled the path's 4-ft. sq. cells with smooth, 2-in. blue pebbles and spread a layer of gravel on the soil underneath the deck.

Pressure-treated lumber gets special treatment—

We used the old concrete piers wherever possible to support the new deck. By using some 6x12s and several custom-made 3/8-in. steel brackets, we were able to pick up almost all of the loads from the new, expanded deck. Only four additional piers were required, mostly where the new deck had multiple levels.

All the new posts, beams and joists are Douglas fir and have been treated with ACZA preservative. I guess the companies that apply the preservative to this lumber search out the lowest grades of structural material, reasoning that it



A wraparound deck
Beginning with a basic L-shape, the author added two lower-level bump-outs to this deck to create separate sitting areas and stair landings. At 12 ft. wide, the deck is broad enough to set up dining tables and still allow comfortable circulation.



Pathway as retaining wall. Stepped concrete grade beams under the deck create a terrace of steps that help to stabilize the hillside. Photo taken at 6 on floor plan.



Hidden fasteners attach deck boards. Galvanized-steel angles affixed to the joists provide a flange for screws driven from below.



Housing the garden hose. A wire basket topped with a trap door conceals the hose. Behind it, a band of ebonized redwood borders the deck. Photo taken at C on floor plan.

will all end up out of sight someplace. Not here. We combed through the piles of treated lumber, searching with little success for straight sticks with no twist. To fix the pieces we ended up using, we had to break some new ground, prep-wise. We ran pressure-treated posts and joists over a jointer. This unlikely scenario was especially important for the deck joists, which all had wicked crowns. On a job such as this, with fastidious clients who wanted straight, true lines of deck boards, there really wasn't any other way to go. We had to change knives six times before we were through jointing the stuff.

We chamfered all visible edges of the posts and recoated all the pressure-treated material with a copper-based wood preservative to even out the color. This color turned out to match the trunks of the indigenous live oak and tan oak quite nicely, so the substructure of the deck virtually disappears.

Hidden fasteners anchor the decking—Back at the shop, we prepared the 6-in. wide deck boards for installation. They are mostly 20-footers, which started out at a true, rough-sawn 2-in. thickness. We surfaced them down to 1¾ in. thick and radiused their top edges with a ⅜-in. roundover bit. On site, the indefatigable Lalo Arjona cut the deck boards to length, radiused their ends and then coated them, top and bottom, with Penofin (Performance Coatings Inc., P. O. Box 1569, Ukiah, Calif. 95482; 707462-3023). This preservative is specially formulated for redwood. It has some reddish pigment in it, but not enough to impart the chalky, orange color that some stains leave on redwood.

We spaced the deck boards a generous ¼ in. apart. Large gaps make it easier to keep the deck clean but can trap spike heels. (Of course, a redwood deck is not the place to wear high heels, as Steve and Celeste would be quick to point out.)

The decking is affixed to the joists from below by way of 22-in. Deckmaster deck clips (P. O. Box 2044, Sebastopol, Calif. 95473; 800-869-1375). These sheet-metal clips are T-shaped in section. The top of the T is attached to the top of its joist, where it also serves as a flange for screwing the deck boards from below (photo center left) with 1½-in. galvanized deck screws. The flanges also elevate the deck boards slightly above the joists, promoting air circulation.

The deck wraps around the corner of the house in a series of herringbone steps (photo bottom left). At this strategic corner, equidistant to both ends of the deck, we placed a basket covered by a trap door to house a length of garden hose.

One deck board out from the house, a band of ebonized redwood borders the edge of the deck. The strong line established by the ebonized strip



Fabricating posts. With the post fixed at the correct angle, mortises for the 1-in. copper pipe rails were bored with a 1½-in. Forstner bit.

draws your attention away from the tapered deck board next to it, made necessary by the out-of-square corner of the house. Incidentally, ebonized wood has simply been coated with black stain.

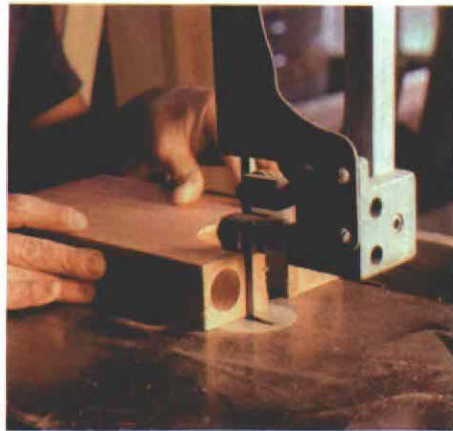
Ebonized redwood diamonds add another decorative touch to the deck. They are ¾ in. thick, and they are held in place by a single plugged screw. The diamonds occur over joists, between deck boards to ensure good drainage. After the deck boards had been installed, we cut the recesses for the diamonds with a bearing-guided router following a pattern clamped to the deck.

Low-voltage wiring is concealed in the railings—There are 108 posts in the railing of this deck, and each one has a minimum of six holes drilled in it for bolts and for the 1-in. copper pipes that serve as railings. To ensure accuracy and to speed things up as much as possible, all the holes were bored in the shop using a drill press fitted with a fixture to hold the posts in the right place (photo above right).

The railing design includes a horizontal 2x6 that's halfway between the 3x6 railing cap and the deck. The 2x6 has round or oval cutouts flanking a diamond-shaped recess in the middle. Semicircular cutouts at each end create the prongs that connect to the posts (top photos, facing page). Above and below the 2x6s, a pair of 1-in. copper pipes on 4½-in. centers complete the railing.

The post-to-post distances were kept under 48 in. to minimize deflection. We cut the copper to length with a zero-hook blade on a chop-saw. Short sections of the pipe worked fine as dowels to join 2x6 railing sections with the posts.

At less than 4 ft., 1-in. copper pipe is plenty sturdy to be a railing on a deck. It is also light, durable, splinter-free and easy to install. And al-



Railing sections include circular cutouts. The circular cutouts on the wooden railing sections begin on the drill press with a $2\frac{1}{2}$ in. hole bored with a Forstner bit (photo left). The $1\frac{1}{2}$ in. holes in the end grain

were bored with a horizontal milling machine. Next, a bandsaw removes the waste from the rail ends (photo center). Short sections of copper pipe act as dowels to connect the rails with their posts (photo right).

though gaudy in its initial brightness, the copper rails slowly oxidize to a soft reddish brown that is compatible with redwood. The copper rails barely affect the view on this deck, and they are maintenance-free.

The copper pipe also serves as a conduit for a 12v lighting system. A 700w transformer in the utility room powers 40 lamps, 30 of which illuminate the deck and stairs. The remaining ten are on the walkway below. We pulled the wires for the lighting as we assembled the railing section by section, drilling out the posts in the appropriate spots for the lamps.

The railings end at curvy posts—On your basic California deck, a 2x6 cap rail covers 4x4 posts. Cap sections abut atop the posts, where they are nailed into the end grain of the posts. After a couple of seasons in the sun and rain, the cap rails split around the nails. It's ugly.

On the Butterfields' deck, the cap-rail sections meet in midair between posts that are 4 in. apart. They are held together by dovetailed splines made of Honduras mahogany that have been soaked in Penofin until they were slippery enough to drive into their dovetailed slots. The rails end at the stairs, where built-up posts of 4x4s flair out, Deco style, to catch the ends of the cap rails (photo right).

By the way, a deck like this needs regular maintenance. The Butterfields give it an annual coat of Penofin for protection from the sun and rain. When we started, Penofin still contained VOC solvents, which have now been outlawed by California's air-quality laws. The new formulation, according to Steve and Celeste, seems to work just as well as the old one. □

Builder/designer Scott Fleming lives in Honolulu, Hawaii, and owns Sansea Design/Consulting. Photos by Charles Miller, except where noted.

Curved posts meet straight stairs. Held together by dovetailed splines, curvy posts made of three sections of 4x4 anchor the balustrade at stair landings. The posts nest in shallow mortises in the underside of the cap rail. Photo taken at D on floor plan.

