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# Getting Started With Hot Tubs

## Careful design is the key to this popular and profitable upgrade

by Kim Katwijk and Jason Russell

Adding a hot tub to a deck project requires creativity and close attention to structural details. Even when clients already have a specific tub in mind, they usually have only a vague idea of where it should go and how it should be integrated with the rest of the deck. And most haven't thought at all about the special framing needed or the impact that it can have on a deck's design. This is where we—the deck designers and builders—come in.

### Structural Support

Hot tubs must be placed on a flat, level surface, such as a concrete slab or a deck, without any shims. Beyond that, many structural and design decisions depend on the particular hot tub chosen, so clients need to select their tub early in the process.

Only when you know the tub's dimensions, dry weight, water capacity, and suggested occupancy can you figure out how much weight the slab or framing will need to support.

For a ground-level tub, we generally pour a 3½-inch concrete slab, but large tubs may require a thicker one (**Figure 1**). If a hot tub is going to be elevated, the framing will have to support it. Because the loads from the tub, the water, and the occupants can exceed 100 pounds per square foot—and most decks are designed to support combined live and dead loads of only 50 pounds per square foot—additional structural support is usually needed (**Figure 2**).

*Calculating loads.* A typical 7½-foot by 7½-foot hot tub, for example, with a dry weight of 855 pounds can hold 420 gallons of water and six to seven people. That much water weighs about 3,500 pounds (1 gallon weighs around 8.3 pounds, depending on its temperature), while seven people with an average weight of 185 pounds have a combined weight of 1,295 pounds. The 56-square-foot tub filled with water and people would therefore have a total weight of 5,655 pounds, so the framing must be able to support a design load of at least 101 pounds per square foot (5,655 ÷ 56 = 100.98).

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**Figure 1. Ground-level hot tubs are typically supported by a concrete slab, which should be formed and poured at the same time as the deck footings.**

If you're installing a used hot tub, look inside the pump compartment for the specs. Otherwise, you can estimate its volume (in cubic feet) by multiplying the tub's length by its width and depth. Then, multiply the volume by 62 pounds per cubic foot to find the weight of the water that the tub can hold.

*Engineering.* Prescriptive beam and joist sizing tables for 100-psf loads can't be found in the IRC or in DCA6, so I refer to a custom Excel spreadsheet designed by my engineer. Tables and calculators for different loads and wood species are also available from a number of sources, including the American Wood Council's online span calculator (awc.org), but these are more conservative than an

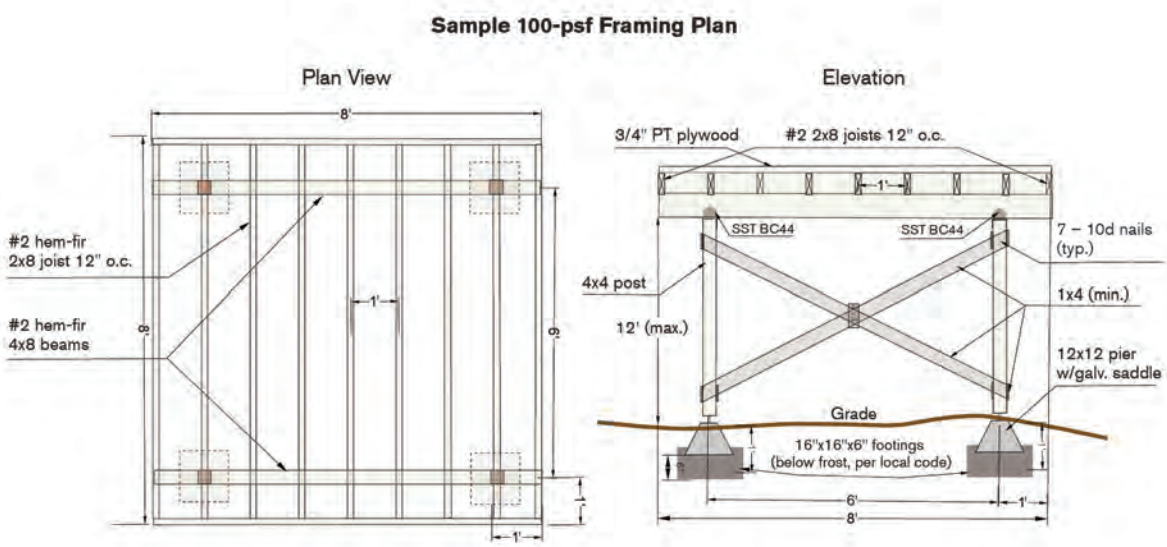


**Figure 2. On the West Coast, this is a common framing plan to support a 7x7 tub with a potential 100-psf live load. The footings and piers are reinforced and connected to each other with #4 rebar, and the 4x4 posts are reinforced as shown with diagonal bracing. Note the 12-inch on-center joist spacing, and ¾-inch PT plywood decking for the tub.**

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**Figure 3. Suppliers are usually responsible for delivering and placing the hot tub, but it's up to the deck builder to make sure the supporting structure is sized correctly and that necessary utilities are in place prior to delivery (top). It sometimes takes a little extra time and ingenuity to deliver a large hot tub to its final destination. When hiring a crane, be sure the hot tub doesn't exceed weight limitations, and that the crane has adequate reach (above).**

engineered design and typically result in an overbuilt structure. A better option for sizing joists and beams for heavy loads is StruCalc Lite (strucalc.com), a relatively inexpensive beam-design software package that is particularly well-suited for deck builders.

Most municipalities we work in require an engineered design for an elevated deck—a good idea even if it isn't required. Nonengineered decks tend to be overdesigned and overbuilt, and even then, have problems with safety. Hire a good engineer; you will have to pay his fee, but you'll probably spend less on materials and experience less anxiety.

*Delivery.* Hot-tub deliveries are usually handled by the manufacturer's crew (**Figure 3**). Most companies want at least one responsible party (usually the homeowner) to be present so they don't need to come back to explain start-up procedures, controls, and the like.

When access is tight, it may be necessary to rent a crane to lift the hot tub into place. Boom-crane rental and setup can be costly, so carefully evaluate access to the backyard when estimating installation costs.

## Locating the Tub

Even when the owners have an idea of where they want the tub to be located, we always review this decision carefully with them. On smaller decks, we've placed tubs as close as 12 inches from a house wall, which allows for the cover lift to function and provides air circulation. On a larger deck, locating a tub 17 inches from a wall leaves room for a table made up of three $5\frac{1}{2}$-inch-wide deck boards. If traffic needs to circulate between the tub and the wall, we place the tub at least 4 feet from the wall.

*Access.* The climate in the Pacific Northwest is relatively mild, so locating the tub close to an exterior door isn't as important as it might be in a colder climate; however, the closer a spa is to a door into the house and a dressing area, the

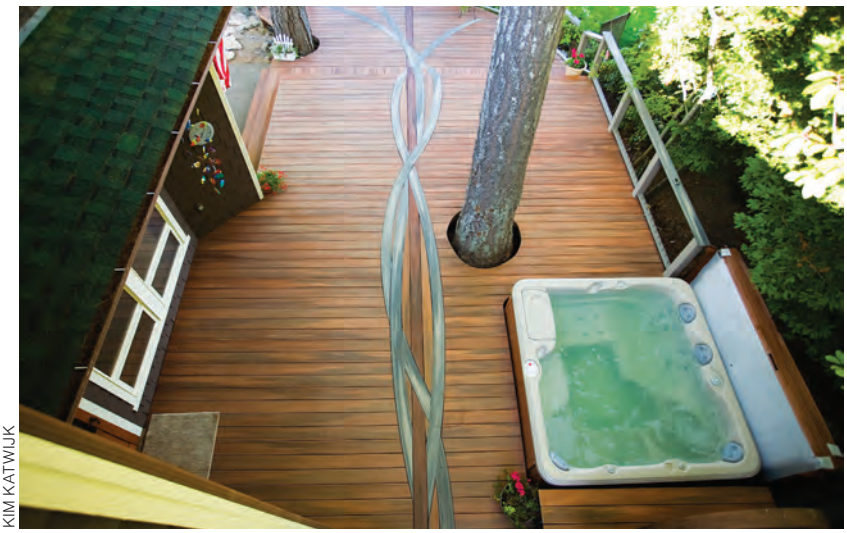

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**Figure 4. When locating the hot tub, consider the climate, the way the clients will use the tub, and access to the rest of the deck. To see more hot tubs, go to *Day's End* on page 48.**

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**Figure 5. A flush-mounted hot tub (above) can present safety issues. When the edge of the tub is at seat level, access is safer and easier (left).**

more likely it will be used. If the master bedroom is located on the second floor, an upper-level deck with stairs might solve the problem of a client having to walk through the home dripping wet. If the spa is some distance away from the house, discreet lighting along the pathway between the two will offer nighttime safety and set the mood.

Your clients will need to think about how they will be accessing the tub, and whether the tub will impede the flow of traffic when it's not being used. Ask them why they want a spa. Will it be used primarily to entertain family friends, or for family fun with the kids? Or will it be used for unwinding and meditating? Whatever the answer is, the location and design should reflect it (**Figure 4**).

*Privacy.* As we develop the design, we survey the views into and out of the yard. It may be necessary to include privacy screens, enclosures, porticoes, covers, or pergolas to block prying eyes. Sometimes a design needs to be tweaked to take advantage of attractive landscaping or views of mountains or a lake, but make sure that the tub doesn't block those views from inside the house.

*Weather.* Placing a hot tub close to a corner of a house tends to accentuate wind. Always consider prevailing winds, orientation of the sun, and shade, so that your clients will be able to use their spa comfortably throughout the year.

*Height.* A hot tub can be installed on top of a deck, flush with a deck's surface, or somewhere in between (**Figure 5**). We don't recommend dropping the tub so that it's flush with the deck, though a couple of clients have opted for this. Because stepping down into a slippery spa is unstable at best, a handrail should be installed. Having the edge 2 feet or more above the deck is safer, as small children

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**Figure 6. Tubs that are mounted on the surface of the deck should have a set of steps, which should be removable to provide access to the tub's pump and controls.**

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**Figure 7. A spa table is a handy hot-tub option that can provide a place to sit and dangle feet in the water, or to set a drink. The table should be designed so that it doesn't block access to the spa's plumbing.**

(or unobservant adults) will have a harder time accidentally falling in (for more on security barriers for hot tubs and spas, see *Question & Answer,* Jan/Feb 2008 and Nov 2012, deckmagazine.com).

Depending on the tub's brand, the first accessible area inside is about 13 inches down from the top, typically a step formed by the compartment containing the pump, heater, and controls. If the deck is also about 13 inches below the top of the tub, a person climbing in or out won't be changing elevation, making it easier to balance. And since that also puts the height of the tub close to the average height of a bench, a person could also sit on the edge and swing around into the water safely.

If the tub is installed on top of a deck, a step is usually required (**Figure 6**). When framing the step, we make it removable to provide access to the pump motor.

We also protect the framing and fasteners around the perimeter of hot tubs from the corrosive effects of the chlorine or bromine used to sanitize the water in them. This includes using stainless steel hardware and fasteners, and protecting the tops of the joists with Henry 900 flashing and construction sealant (henry.com), a great multi-purpose caulk that's readily available in the roofing section of most big-box home-improvement centers. The worst corrosion seems to occur within 2 feet of the tub, so that's where we use the sealant.

## Electrical

Some hot tubs can be plugged into a GFCI-protected 110v/20-amp outlet, but most require a 220v/50-amp electrical connection to heat the water and run the jets simultaneously. On our projects, the client is usually responsible for hiring a licensed electrical contractor to obtain the electrical permit, tie into the existing power, run the wiring in conduit, provide the emergency quick-disconnection box, and do the hook-up to the power panel inside the tub's control box.

By code, the emergency shut-off switch needs to be in sight of and between 5 and 15 feet from the tub. If the tub will be supported by a concrete slab, the wiring will need to be run in conduit, which should be placed before pouring the concrete. Also keep in mind that hot tubs can't be placed directly under or within 12 feet of overhead power or telephone cables.


PHOTOS BY CLEMENS JELLEMA

**Figure 8. This deck was designed to have a removable section, since much of the hot tub would be below deck level (A). Most of the framing and finishing was completed before the tub was delivered (B). The delivery crew was then responsible for safely setting up the hot tub (C). Most hot tubs are equipped with a cover that has an articulating arm to lift it; make sure to allow for enough room for the cover to fold up and out of the way (D).**

## Maintenance

Good-quality hot tubs have a life expectancy of 15 years. To make it easier to repair leaks and other problems, manufacturers usually specify a minimum amount of access to the tub's pumps, plumbing, and other accessories. When the tub is installed on top of the deck, it's usually not difficult to design hinged or removable access panels for all four sides. For a partially recessed tub, we try to leave at least one side of the spa open for easy removal. One way to do this is with a spa table that's the same height as the spa (**Figure 7, page 26**).

When the hot tub is recessed into the deck, we frame to accommodate an access hatch the size of the spa access panel—typically 4 feet by 3 feet—that leads to the electrical hookup, pump, and controls (**Figure 8**). This usually provides enough space to perform required maintenance.

Another option for access is to leave enough room around the hot tub so that it can be "coffin lifted" out of the deck for repairs and maintenance. Installing a 2½-inch-wide removable trim ring around the tub with a 1-inch gap between the tub and the trim ring leaves room for a pair of straps to be run under the tub, allowing four people to raise the tub out of the recess and onto the deck for extreme service calls. ❖

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