

Create a Dry Space Under Your Deck

Four different approaches for different needs

BY ASA CHRISTIANA

For regions of the country with multiple-story homes or hilly terrain, the dead zone under a tall deck can add valuable living space at far less cost than a traditional addition. The trick to transforming that dark, wet space into an area that's dry and useful is a deck drainage system.

"Think about real-estate value," says Pete Ciaraldi, who remodels exteriors in Salem, N.H. "You're adding another room. It could be an outdoor patio with a fire pit or a finished formal room that's completely closed in, with an outdoor kitchen on the deck above."

Deck drainage can do more than just shield the space below it from the elements; some systems also make it easy to add lights, speakers, heaters, and fans to the ceiling under a deck, adding comfort and value to the space they protect.

While drainage systems are most often added to decks 7 ft. or more above grade, Ciaraldi has added them to decks as low as 5 ft. high, creating valuable outdoor storage space—letting a client drive a lawn tractor underneath, for example.

For these reasons and more, deck drainage systems are increasingly popular, driving an expanding—and confusing—marketplace. Systems vary widely, as do the conditions they contend with.

Protecting today's vulnerable deck framing

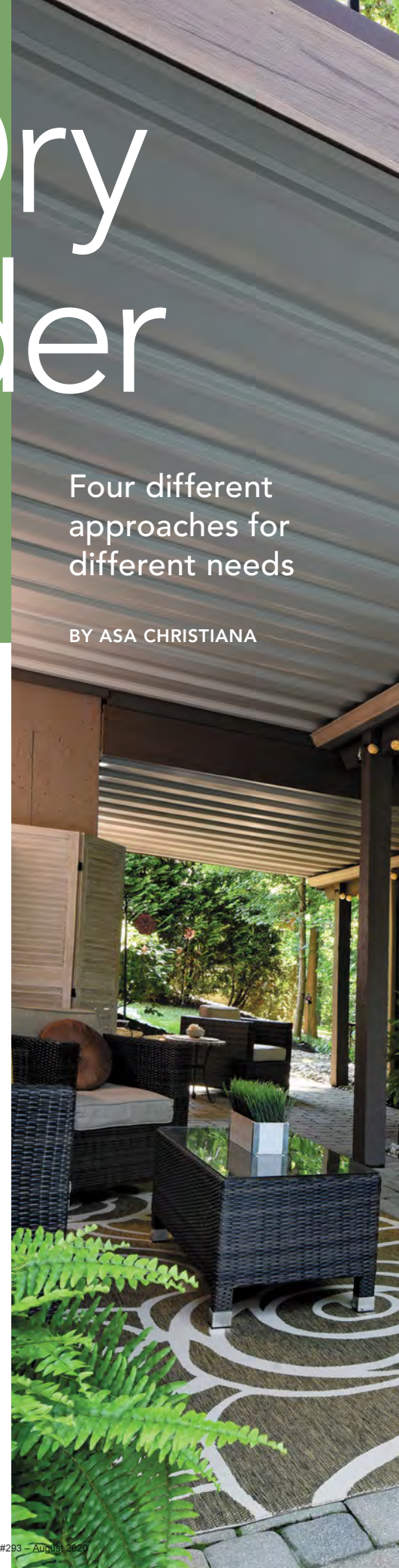
The stakes are high for making a wise choice. Trapped water and debris can cause damaging leaks that are hard to track down and cause the deck framing to rot and fail.

"We've taken failing systems down and found hundreds of pounds of soggy, smelly crud," Ciaraldi says. "Think about what gets caught in a 5-in.-wide gutter. This is like having a big gutter in each bay [between the joists]."

A well-chosen drainage system, on the other hand, installed correctly, will be reliable and easy to maintain, keeping the framing healthy and the space below it dry and comfortable for decades to come.

Contractors across the country agree that pressure-treated deck-framing lumber isn't what it once was, thanks to faster-growing forests, lower grading standards, and less effective preservatives. At the same time, today's decking is more durable than ever, lasting decades with minimal maintenance.

"It's like putting a filet mignon on a paper plate," says Leslie Adkins, VP of marketing for Trex. Experienced contractors agree. This reality makes standing water and rotting leaf mold





even more threatening to deck framing, and therefore more important to avoid in the drainage system you choose.

Two main approaches to deck drainage

With one outlying exception, there are two main groupings of deck drainage systems: those installed above the framing and those that attach below it. The undermount type is usually an array of ceiling panels, which act as the drain system and create a ceiling finish at the same time. The big advantages of this type of system is its overall cost and its ability to be added to any type of deck, be it new construction or retrofit.

Systems that install above the framing break down into two categories: waterproof decking that stops water at the surface, and membrane material that's draped over the joists, creating sloped troughs that direct water outward.

Both types of products protect the framing from moisture, and allow any type of ceiling finish to be installed below, with dry, open space for wiring, junction boxes, and electrical fixtures like lights, fans, and speakers. But there are critical differences between the two.

Choose an over-the-joist membrane system if possible

I spoke with high-end deck builders across the United States, each with decades of experience, and all agreed that the best approach to deck drainage is some sort of membrane installed over the joists. Their big advantage is the amount of slope that can be created in each trough—up to $\frac{3}{4}$ in. per ft., depending on the depth of the joists and span of the deck. The drain slope is created by pulling the material nearly flat at one end—typically the ledger board—and draping it almost to the bottom of the framing at the other—usually at the rim joist.

Slope is critical for clearing debris, which is why Ciaraldi and others trust these systems enough to install them over fully finished indoor rooms created below.

On the negative side, over-the-joist systems are generally pricier overall. There's the cost of the system, and then the additional cost of installing some sort of ceiling finish below them. That's why a number of high-end deck builders prefer to create their own over-the-framing membrane systems on-site, using common building materials, which lets them offer a state-of-the-art system for less (see "Site-built systems," p. 65).

Also, these systems are seldom added to existing decks, since that requires removing the decking and either replacing it with new material or numbering each board, flashing the posts and other penetrations, and reattaching the deck boards in their original order.

Of the three manufactured draped-membrane systems, Trex RainEscape was the runaway favorite of the deck builders I spoke with. The other two similar systems are Dek Drain Topside and Goberco.

The RainEscape system includes plastic trough material, downspout gutters that collect water and debris at the end of each trough (directing it into a standard gutter installed below), and adhesive butyl tape that seals the overlapping

THE FAVORED APPROACH

OVER-THE-JOIST MEMBRANES

PROS

- Pitch up to $\frac{3}{4}$ in. per ft. while maintaining a level deck
- Any finish can be used below
- Large slope reduces clogging
- Protects framing from rot

CONS

- Expensive
- Difficult to retrofit to existing decks



Business up top. Trex RainEscape consists of a series of overlapping membrane troughs that feed into plastic downspouts, and includes various proprietary flashing and sealing materials. The system is a favorite among deck builders, who like the slick-surfaced membrane's ability to shed debris without clogging.



Party underneath. Ceilings under membrane systems that provide waterproofing from above can allow just about any ceiling finish and amenity to be added underneath. Here, Trex RainEscape provides waterproofing and drainage above a cozy enclosed porch.

seam over each joist and also seals around screw penetrations when decking is installed.

The slick plastic trough material is one advantage of the system; contractors believe that it clears debris better than a rubber membrane. Another plus is the cutlines on the trough material, premarked for various joist spans and spacing.

While contractors like Ciaraldi and others extol the self-purging abilities of RainEscape and site-built systems like it, all recommend that installers build in a way to clear debris from the draped troughs, which are trapped beneath the decking and above the finished ceiling.

The easiest approach is to face-screw a few rows of deck boards—one set near the house and another above the gutters, and maybe one at the midpoint too—for inserting a garden hose and clearing debris at least once a year. Others build access hatches into the ceiling at the end of each joist bay, allowing the homeowner to clear debris by pushing up on the underside of the flexible troughs and reaching into the gutter boxes.

Brendan Casey, who's built decks for four decades in western Maryland, has another tip. To eliminate what he considers to be a weak link in the system—the flashing and caulking around railing posts that penetrate the decking—he uses only surface-mounted posts that he bolts down on top of the RainEscape tape and trough material, placing an extra layer of adhesive butyl rubber below, with everything compressed and sealed by the post flange.

Trex RainEscape has an excellent set of instructions and instructional videos, and the product's North American sales director, Dave Kile, highly recommends that installers read and watch them, as the system has been refined over the years and each step is critical. One important step, Kile says, is to unroll the long strips and fold them down the middle to keep them straight and make them easier to handle. This lets them finish shrinking or expanding as they acclimate to the environment, especially in hot sun.

Kile also recommends Trex's free design services. "Send us your plans and we'll do a materials estimate and send you diagrams," he says. "For example, we'll show you how to frame around a railing so it works better with our system."

Waterproof decking is another over-joist option

Waterproof decking can also stop water and debris before it gets to the framing, and create a dry space below. Unlike draped membranes, waterproof deck boards create a finished look on their lower side, albeit at the tops of the joist bays.

Two downsides are slope, which is only as steep as the pitch of the deck framing, and the potential to trap water and debris in channels that can't be accessed. Both factors make it important to sweep debris off the deck regularly.

While some contractors aren't sold quite yet on waterproof decking, Jason Russell (aka Dr. Decks), a longtime

deck builder in Tacoma, Wash., uses three of these products regularly with good results.

His first choice is Dexerdry, a rubber flange installed between deck boards, filling the slots intended for hidden fasteners. This requires that the decking be face-screwed instead (Russell uses Cortex screws with grain- and color-matched plugs). To seal around screw penetrations, he tops each joist with G-Tape, a popular adhesive flashing that tears by hand. Russell uses Dexerdry flanges with Azek PVC decking, but they make versions for other popular deck boards too.

For other decking materials and looks, Russell chooses interlocking deck boards with integrated drainage channels. When composite decking is called for, his choice is DuxxBak, which offers a range of wood looks in a durable material that includes no wood flour. And when clients want aluminum decking, he goes with LockDry, made by Nexan Building Products.

Systems that install from below

Whether you are building a deck from scratch or waterproofing an existing deck, you can save money and time with a system that installs below the joists. These two-in-one ceiling systems provide a drainage system and a finished look at the same time.

Their main downside is drainage slope, which is limited by the nature of a ceiling-panel system. While that slope can be increased by adding nailers or tapered 2x4s to the bottom of the joists, it will never be as much as a draped membrane can produce, and the increased angle will show up in the finished ceiling. Worse, the low slope angle renders these systems less capable than draped membrane when it comes to clearing debris, potentially trapping wet muck against wood framing for years at a time.

Therefore, contractors should think twice about installing these systems in areas with heavy rains and overhanging trees. If one of these systems is the right option, for cost or other reasons, installers must make it clear to clients that clogs will need to be cleared, and explain the dangers of not doing so.

Another reality of under-joist systems is how they need to stop and restart around support beams, with a gutter on each side.

When it comes to favorites, Ciaraldi and Russell both go with TimberTech's DrySpace drainage system for existing decks or customers unwilling to pay extra for an over-the-framing system. It includes rails that cap the bottom of the joists and serve as mounting points for the shallow troughs that collect and drain water, channeling it away from the house and completing a finished ceiling.

Instead of the caulk that some systems use to seal the joints between their brackets and the wood joists, DrySpace uses a self-adhesive butyl rubber flashing tape.

Because of the design of the cap rails and how they attach, the system can only be sloped 1¾ in. from end to end, but experienced contractors like *FHB* editorial advi-

CAPABLE, BUT INCOMPLETE

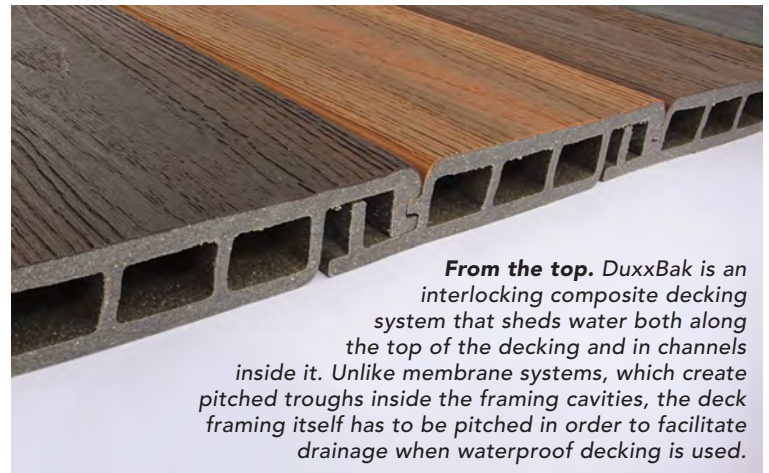
WATERPROOF DECKING

PROS

- Protects framing from rot
- Can cost far less than other systems
- Somewhat finished look below

CONS

- Framing must be pitched to shed water
- May have to reorient framing to properly direct water away from structure
- Additional products required to waterproof wall transitions



From the top. DuxxBak is an interlocking composite decking system that sheds water both along the top of the decking and in channels inside it. Unlike membrane systems, which create pitched troughs inside the framing cavities, the deck framing itself has to be pitched in order to facilitate drainage when waterproof decking is used.



Watertight flange. Dexerdry produces waterproofing thermoplastic flanges to fit into the hidden fastener slots of various manufacturers' deck boards. More of an accessory than a system, Dexerdry also relies on a properly pitched deck for drainage.

sor Mike Guertin recommend attaching wedge-shaped 2x4s to the bottom of each joist, adding 3½ in. to the slope and helping the system clear debris.

Casey uses Zip-Up Underdeck for his waterproofing retrofits. It's an under-joist system that creates a smooth, finished ceiling at the same time. As with all of the best ceiling-panel systems, the individual panels pop out easily for maintenance. To create additional drain slope (beyond the pitch of the deck itself), Zip-Up provides plastic "pitch rails." Casey points out that these rails drop the end of the system below the bottom of the rim joists, requiring a wider fascia board to hide them.

While Zip-Up does not provide or recommend wiring or lighting systems for the wet environment atop the ceiling panels, Casey's electrician surface-mounts lights and

TWO-IN-ONE SYSTEMS

CEILING-MOUNTED

PROS

- Easiest to retrofit to existing decks
- Less expensive than membrane systems
- Provides ceiling finish and drainage
- Some easy to remove for cleaning debris

CONS

- Slope can be limited, so greater chance of clogs
- Increasing slope is evident in finished ceiling
- Doesn't protect framing



Dry below. Installing a deck drainage system can protect what's below from the weather and create additional outdoor spaces that stay dry when the deck itself is battered by rain. Here, TimberTech's DrySpace provides both drainage and a finished ceiling.



Easy access and customizable. Haven Underdeck comes in dozens of colors in flat or beadboard finishes, and has numerous add-on features, including LED lights, speakers, ceiling fans, and swing hooks. The all-aluminum panels are easily removed to clean out debris.

junction boxes on the dry side, and shields wiring in the wet space above with small putty dams.

When John Lea, of Decksouth in Marietta, Ga., can't mount his own DIY membrane system above the framing, he installs Haven Underdeck below. It's an all-aluminum system with removable panels that create a smooth ceiling.

Lea cites Haven's accessory lighting and electrical systems as pluses, as well as the hockey-puck-type vents available upon request. "If you're going to encapsulate a deck frame, you need to add ventilation and be able to remove a panel to inspect the system, without taking down the whole thing," he says.

DryJoistEZ is in its own category

One option that doesn't fit into either of the two broad categories described above is DryJoistEZ from Wahoo Decks. This is a unique hybrid, with its own set of strengths and weaknesses. What you get are a series of structural, interlocking aluminum joists with integral drainage channels. These replace standard deck joists and handle spans up to 8 ft., greatly simplifying the wood framing below—the panels sit right on the deck beams. They also protect that framing from moisture and rot, and create a finished beadboard look above the deck beams. Better yet, you can attach any type of decking to the aluminum joists, using face screws or hidden fasteners.

The big downside is slope, which is limited to the pitch of the overall deck. To create the drainage angle other systems can produce, you'll need a more noticeably pitched deck. That said, the drainage channels in DryJoistEZ are very deep, and should easily be able to handle considerable obstructions without leaking.

After a few years, however, once leaf mold and other debris piles up, you'll need a way to push it through the system, so installers should definitely face-screw a few areas of the decking for the occasional clearout.

Bottom line

Choosing a deck drainage system—or choosing not to add one—depends on a number of factors. The first main one is where you live. Ciaraldi's New England locale, for example, serves up a perfect storm of challenges, including heavy rainfall and overhanging trees that dump piles of dead leaves and pine needles onto the deck.

Because of that, he sticks with drainage systems that install over the joists, isolating the wood framing from water, leaves, asphalt-shingle granules, food grease, and everything else that drops between deck boards. For regions with lighter rain or fewer trees, however, a broader array of products are workable.

Roof load—the amount of the roof that drains onto a deck—is another variable, potentially doubling or tripling the amount of water and debris that ends up in the system. That's because heavy rain tends to bypass

gutter guards, while gutters without them tend to clog and overflow.

If the deck is new construction, any deck drainage system on the market will work. If the system is a retrofit, however, an under-joist system is usually the best option. That said, in a tough drainage environment, it might be worth the extra time and labor to install an over-joist membrane system on an existing deck, as Ciaraldi sometimes does.

Another key factor is the desired look of the ceiling below the deck, and what you want to have in it. Most of the systems that install under the joists are finished ceiling panels, saving money on additional finish work but making it more difficult to add wiring and fixtures. Over-the-joist systems sit high up in the bays, letting you add whatever ceiling finish and electrical systems you want, knowing they will stay dry.

Closely related to the ceiling is the purpose of the space below. If it's an outdoor living space, a leaky ceiling panel might be OK once in a while, since most systems allow individual panels to be taken down to clear debris and blockages. To create a finished, indoor room, however, best practices must be followed. □

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A CATEGORY OF ITS OWN

STRUCTURAL DRAINAGE

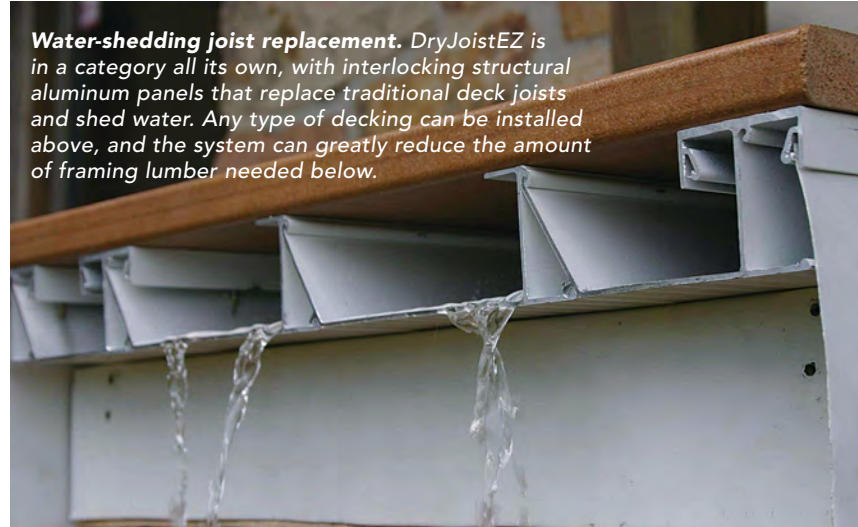
PROS

- Eliminates a large amount of traditional framing
- Protects the limited framing below
- Provides ceiling finish and drainage
- Works with any decking material

CONS

- Relies on framing for slope
- Difficult to retrofit

Water-shedding joist replacement. DryJoistEZ is in a category all its own, with interlocking structural aluminum panels that replace traditional deck joists and shed water. Any type of decking can be installed above, and the system can greatly reduce the amount of framing lumber needed below.



BEST PRACTICES FOR LESS Site-built systems

The raw materials for an over-the-framing deck drainage system are widely available, at a fraction of the cost of the commercial products, which is why a number of skilled deck builders prefer a DIY approach.

Fine Homebuilding editorial advisor Mike Guertin outlined his site-built system in *FHB* #220, and it's included in a video at FineHomebuilding.com/magazine. Guertin and others base their systems on EPDM rubber, a roofing material used on flat and low-slope roofs and also as pond liner. It's available from roofing-supply

houses in 0.45-in. and 0.60-in. thicknesses, in 10-ft.- or 20-ft.-wide rolls 50 ft. to 100 ft. long. Guertin used the thicker material at first, but uses 0.45-in. EPDM now, which is easier to handle but just as durable in this context, he believes.

For curvy decks with irregular framing and decking, deck builder Jason Russell creates a site-built system much like Guertin's, with EPDM cut in long, fan-shaped strips that are draped between joists to create sloped troughs, which lead in turn to a standard rain gutter installed near the rim joist. To seal the

overlaps on top of each joist, Russell applies self-adhesive G-Tape flashing, warning that it's important to use a product that seals around screws and is compatible with EPDM.

Builder John Lea uses two types of site-built systems: the draped approach when rainfall and debris will be severe, and a flat system when it won't. The flat system is created by attaching a layer of plywood to the framing, followed by a wide, unbroken sheet of EPDM, and then sleepers that the deck boards are screwed to.

While RainEscape rep Dave Kile acknowledges that his product is more costly than the basic materials for a site-built approach, he points to RainEscape's 20-year warranty and ease of installation. "A two-person crew with no experience can install 70 sq. ft. per hour, and get twice as fast over time," he says. —A.C.

Go it alone. Skilled builders can save a lot of money installing a site-built membrane. This approach can also be easily tailored for unique or unusual situations.

