Ground Rules for Grade-Level Decks

by Mike Guertin

A low deck can be a cost-effective alternative to hardscaping, especially when the framing for a shade structure can be factored into the design.

I love building grade-level decks. They are faster to frame than elevated decks and usually don't require guardrails. And when they're freestanding, there are no ledger or lateral-load connections to deal with and no requirements for frost-depth footings. As a result, a grade-level deck is generally more cost-effective than hardscaping, at least in my northern climate. Even in areas where this isn't the case, grade-level decks may be worth a slight premium, since they can be used to add visual interest and differentiate outdoor living spaces in ways that hardscaped surfaces can't.

There is no standard height for a "grade-level" deck—the maximum measurement from grade to the deck surface could be 6 inches, 12 inches, 24 inches, or more. But generally speaking, I apply the term to decks that are up to 30 inches above grade, since guardrails are required for any decks that are higher than that. And while generally built like an elevated deck, a grade-level deck has some differences and specific issues that should be addressed when you're designing and installing it, to avoid problems and make the most of its advantages. Of course, one downside to building a grade-level deck is that I'm bent over all day.

No Permit Needed

A huge bonus of building a freestanding grade-level deck is that a building permit isn't required as long as the deck's area is 200 square feet or less (see 2015 IRC, R105.2, Work exempt from permit, #10: *Decks not exceeding 200 square feet in area, that are not more than 30 inches above grade at any point, are not attached to a dwelling, do not serve the exit door required by Section R311.4*). So, provided your code jurisdiction has not amended out this code section, you save time and cost by not having to apply for a permit or wait for inspections. You can build decks sized 10 feet by 20 feet, 12 feet by 16 feet, or 14 feet square without a permit, and—theoretically—if you need a larger deck, you could build adjacent deck frames that each are 200 square feet or less and don't lap continuous decking over them, without a permit.

Shallow Footings Save Digging

While freestanding decks of any size can be built without footings that extend to the frost depth (R403.1.4.1 Frost Protection, Exception #3), grade-level decks are prime candidates for taking advantage of this code provision. Where you may think twice about building an elevated deck with shallow footings, the safety risk from the frost-heaving that shallow footings may experience on a grade-level deck is very low.

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Guardrails aren't required but may be a good idea on decks less than 30 inches above the ground. Stairs with four or more risers require at least one handrail.

The main code provision for footings that applies to freestanding decks (R403.1.4) calls for a minimum footing depth of 12 inches below undisturbed ground surface. When building a deck on a home with a full basement or crawlspace foundation, assume that there was an area of overdig when the foundation was built and that the earth up to 5 feet (or maybe more) around the house was excavated and backfilled (thus disturbed). So the prescriptive solution is to dig footing holes in the overdig area that reach to the level of the bottom of the house foundation.

To avoid digging deep footings, I dig footing holes about 18 inches deep, use a penetrometer to determine the bearing capacity of the soil, and size my footings based on the penetrometer reading. Sure, the soil bearing capacity in an overdig area may be only 1,000 psf (compared with 2,500 psf at 10 feet away from the house), but it's still a whole lot easier to dig a large-diameter shallow footing hole than a narrow-diameter deep footing hole.

Frame Design

Ground-hugging decks—those less than a foot off the ground—probably aren't going to use cantilever beams to support the joists; rim beams and in-floor beams make more sense. If you aren't mounting a deck ledger, then you can orient the beams either parallel or perpendicular to the house. I tend to orient the beams perpendicular to the house so the joists run parallel. The decking can then run perpendicular to the house, where the dimension is usually less than a full deck plank length, eliminating butt joints.

Lumber and Hardware

Because joists and beams will be close to—or in contact with—the ground, pressure-treated lumber used to frame grade-level decks needs to have an AWPA UC4A tag, which means that it is rated for ground contact. Leaves and other debris that collect under decks reduce lumber's drying potential, so there's greater risk of decay in grade-level deck framing than on an elevated deck.

It's only been in the last year that my local lumberyards and big-box stores began stocking ground-contact treated dimensional lumber; before that, I had to special-order ground-contact treated 2-by joist and beam lumber at a premium price. But in 2016, the American Wood Protection Association (AWPA) changed its standard to recommend ground-contact treated lumber instead of above-ground treated lumber in a number of circumstances, several of which apply to grade-level decks: when there is low air circulation; when the deck is less than 6 inches above grade; when leaf litter, soil, or other debris may build up under the deck; or when the framing is difficult to maintain, repair, or replace and is critical to performance and safety [see *Editor's Letter*, "Under Pressure," March/April 2016].

If you're building a grade-level deck that is a foot or more off the ground, then above-ground treated lumber is probably fine. But as the deck gets closer to the ground, the risk of decay rises.

There's also a hardware consideration. When framing rim beams and in-floor beams so a deck can hug the ground, you're going to use a lot more joist hangers and other metal hardware than when cantilevering joists over beams. Since those hangers are going to be close to the ground, there is potentially a greater risk of corrosion. One option may be to use stainless steel hardware, but keep in mind that hardware manufacturers don't recommend installing their hardware below grade.

Under-Deck Prep

Since moisture is a main issue for grade-level deck framing and metal-hardware durability, it makes sense to address what you can before you cover an area. Begin by sloping the earth away from the building and out from under the deck, to create positive drainage. If possible, consider digging the earth beneath the deck frame deeper than the surrounding area, then backfilling with crushed stone. Any water will flow through the stones, without being wicked up close to the deck framing.

Air circulation requirements to promote drying and cooling vary among decking manufacturers. Some decking brands have specific clearance requirements beneath decking or beneath the bottom of joists, others have performance guidelines calling for "adequate ventilation" without prescriptive clearances, and some don't mention any required measures for ventilation or clearances. If the decking is close to the ground, be sure to follow the manufacturers' guidelines, to prevent performance problems.

Fascia boards on ground-hugging decks

PHOTO: MATT BREYER

often are in direct contact with the soil. Many manufacturers don't permit their products to be installed below grade, but despite this restriction, I have installed several brands of decking fascia in contact with the ground—knowing that the manufacturers won't warranty the application—and haven't noticed any problems with deterioration or discoloration (yet). That said, there are some decking, fascia, and exterior trim products that are rated for ground contact.

Handrails and Guardrails

Guardrails are not required on decks when the grade is 30 inches or less below the deck surface. Handrails, however, may be required alongside a stair. The IRC doesn't mention a specific height above which handrails are required, but it does call for handrails on one side of stairways with four or more risers (2015 IRC, R311.7.8). That means that on a deck that's 23 inches above grade, a stair with four $5\frac{3}{4}$-inch risers requires a handrail. Reconfiguring the stair with three $7\frac{11}{16}$-inch risers eliminates the handrail requirement.

What if you frame a grade-hugging deck out of 2x6s and the client wants railing around the perimeter as a design element? Even when not required by code, a railing may have to comply with the guard sections of the building code if you install one anyway. My reading of 2015 IRC Section R312 is that a railing on a grade-level deck does not have to comply with the height or infill requirements of guards, and since the railing is not a guard, it probably doesn't have to comply with the Minimum Uniformly Distributed Live Load Table R301.05.

If the grade slopes under the footprint of the deck, however, resulting in one edge that is greater than 30 inches above grade, then that edge of the deck *would* require a code-compliant guard. Most of the guard-post attachment methods (using metal connectors, or blocking and structural screws) that meet structural muster are designed with a minimum joist size of 2x8. Consequently, if you are framing the grade-level deck out of 2x6s to hug the ground at one end, you may have to change the joist size to 2x8s or larger as the grade permits in order to mount structural guardrail posts.

This is a topic that is subject to interpretation, so it's a good idea to check with your local code-enforcement department regarding how it addresses railings on decks that are below the 30-inch height limit. It may have a different read on the code than I present here. ❖

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