Burying Deck Support Posts Below Grade

by Glenn Mathewson

Though some deck builders take issue with the practice, decks have been—and will continue to be—built with support posts sunk into the ground. I typically see buried support posts primarily on grade-level decks, mainly for cost savings but also because this approach speeds installation since you don't have to wait for a footing to cure and then install a post base. The main argument against burying wood posts is that they won't last as long as they would bearing on concrete piers that extend above grade, but the longest possible life isn't the primary goal for everyone. Another argument against buried posts is that they are difficult to replace, but if you've ever worked on cars, you know that's not a good argument either.

Regardless of your preferred method, burying deck posts in the ground is a code issue, and when we're talking about code, we aren't talking about "good design," which is a matter of opinion. With code, we need to decide on an opinion for everyone, so we decide the minimum opinion. So, sink your posts, but there are some new rules that you have to follow in order to meet code.

Use the right wood. The first rule is mandatory but not new: The posts must be decay resistant and suitable for ground contact. While naturally durable woods such as redwood and cedar meet the definition for decay resistance in Chapter 2 of the IRC, natural decay resistance is not suitable for below-grade use as deck posts. Section R317.1.2 in the 2021 IRC requires preservative-treated lumber rated for ground contact to be used when posts are in contact with the ground or embedded in concrete in contact with the ground. These treatments must meet the AWPA (American Wood Protection Association) U1 standard.

Even if you're using the right material, you still have to prove to your building department that the structural design of your deck supports is adequate. Rather than have engineering done, a costly expense, you can use the prescriptive design methods the IRC provides in Figure R507.3, up to the limits. Of the six methods illustrated for the post-to-footing interface, four feature sunken posts. What all six have in common is the bearing area. The IRC provides only one method for sizing the area at the bottom of the hole, so these methods are mostly about different post connections and how those connections will distribute the load at the bottom of the post into the bearing area of the footing (see IRC Figure R507.3, below).

Excavation depth. Per the IRC, the minimum depth of a footing is 12 inches below undisturbed soil. This is only for lateral stability, as regions with frost will require greater depths. So, for example, in the most basic option shown in Figure R507.3, a footing can be poured at the base of an excavation that is deep enough to meet local requirements, provided

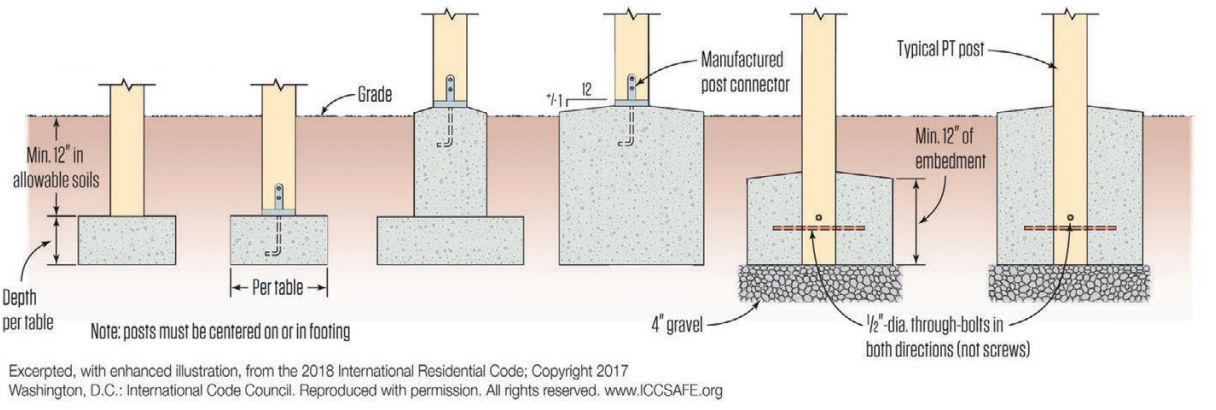

Figure R507.3 in the 2018 and 2021 IRC allows for several different footing options including burying the pressure-treated post, an approach that provides lateral restraint and reduces the amount of concrete needed for the footing.

the footing size and thickness meet the requirements found in IRC design table R507.3.1. Note that, depending on the load-bearing capacity of the soil, live or ground snow loads, and tributary area supported by the footing, the footing thickness may be as little as 6 inches. On top of the cured footing, still below grade, the post can then be directly placed and approximately centered.

Lateral restraint. Section R507.4.1 requires lateral restraint at the post-to-footing connection. Theoretically, lateral restraint could be provided by a manufactured post base, though I am not aware of any that are designed for below-grade use. Regardless, the IRC presents this as an option in the second detail shown in Figure R507.3. Your other option is to excavate the footing to a depth sufficient to sink the post into at least 12 inches of soil above the top of the poured footing, as shown in the first detail. This is sufficient depth for lateral restraint of a footing, so it is also considered to be sufficient for a post. The backfill soil around the post should be tamped in place and compacted after the post is placed.

Drainage. Neither of the methods described above is like the familiar practice of sinking a post in a concrete-filled hole, but this next method (as shown in Figure R507.3's fifth detail) is close. The concern with sinking a post into a bowl of concrete is the lack of drainage where water seeps around the post. For this method, the IRC requires a 4-inch bed of gravel to be placed in the bottom of the hole. The post is placed directly on the gravel, without concrete below. Concrete is then poured to its minimum thickness around the post and on the remaining exposed gravel. To transfer the gravity loads from the post to the wider concrete footing, two ½-inch-diameter galvanized bolts must be placed through the post at right angles to each other and extended into the wet concrete. Specifics for bolt length or exact location are not provided, so good judgment should be used. The bolts need to be completely encased in the concrete.

Alternatively, the final method shown in Figure R507.3 extends concrete to the surface. In areas of deep frost, that is a lot of concrete, in which case it probably makes sense to use either the third or fourth detail and keep the posts above grade. All the methods shown in R507.3 should satisfy your building inspector, but if you do choose to sink your posts, you just can't do it the way you probably have in the past. ❖

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