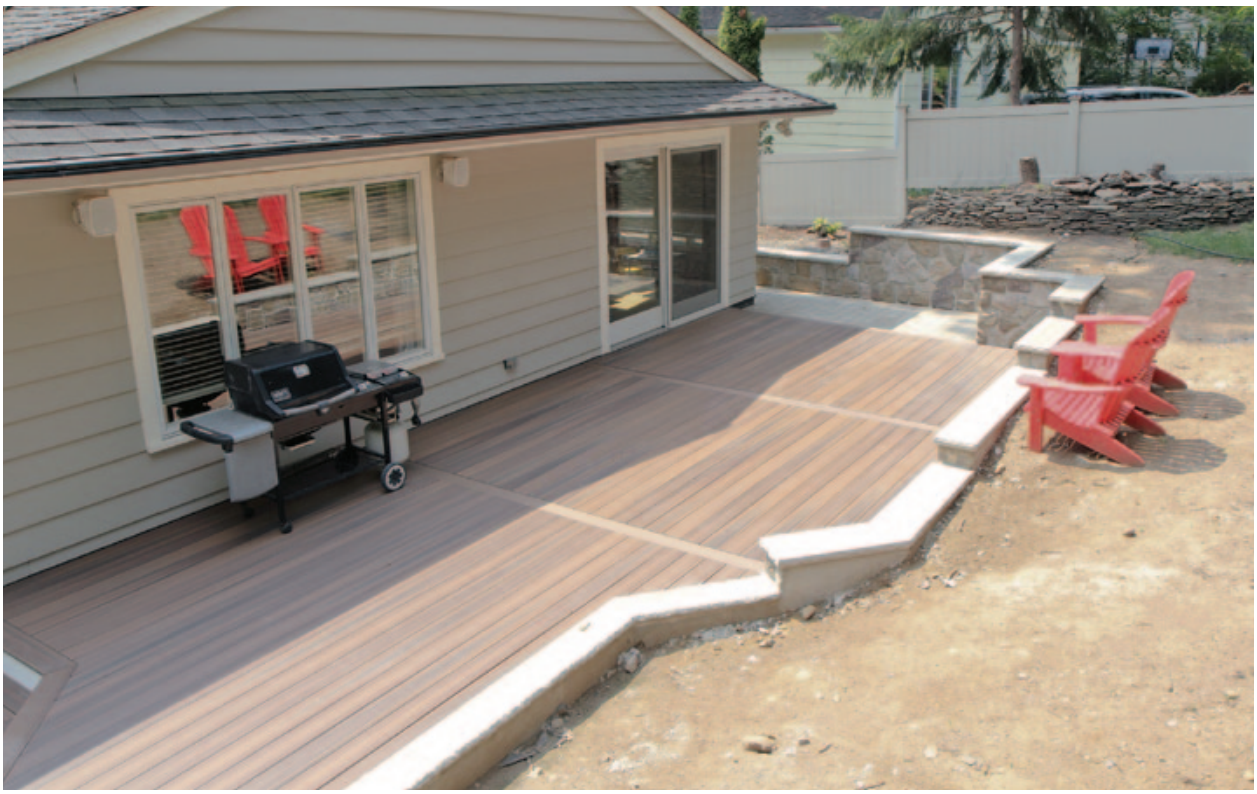
Supporting a Deck With a Retaining Wall

A stone-faced concrete-block wall joins a new deck to the backyard

As I do a lot of unusual deck projects, I wasn't surprised to get the call for the one pictured here. The challenge was that the rear door of the house was 3 to 4 feet below the small backyard. Previous owners had terraced the yard with an old-fashioned 6x6 railroad-tie retaining wall, but it was poorly drained and was showing signs of age (**Figure 1**). It's likely that it was installed at the same time as an existing 30-year-old wood deck, which the owners wanted to replace with a larger one that would provide more entertainment space and a route to the rest of the backyard.

Complex Designs Call for a Solid Contract

Because of the extensive design work required, the clients and I entered into a design agreement in which I charged a fixed fee to create a plan and specifications for the project. I use agreements like this for 80 percent of my jobs — and I require them for atypical projects like this one so I don't risk giving away too much of my time. The right kind of clientele (the kind you want to work for) will gladly pay a design fee, because they value your time and the services you provide. Once the clients approve the design, I provide them with an exact cost for their project.



by Greg DiBernardo

The design we implemented here was similar to the existing layout, but I was able to enlarge the area a considerable amount, add some much-needed drainage, and create a more durable and better-looking retaining wall.

The heart of this project is the stone-faced concrete-block retaining wall. It serves a dual purpose: It creates a sloped terrace and it supports the outer edge of the deck in lieu of traditional footings. While we could have installed a retaining wall made of interlocking modular block and supported the deck on separate footings, that wasn't the aesthetic the clients wanted — in fact, they absolutely rejected the idea. Because the retaining wall was to be such a visible part of the project, they wanted it to have the look of natural stone.

I ended up designing the retaining wall much like the basement of a house, with a poured concrete footing and a stacked block wall. The blocks would then be covered by a cultured stone veneer. My engineer agreed that this approach would not only work, but work exceptionally well.

Figure 1. Problems with this job included a sunken backyard, poor drainage, and an old retaining wall that had to go.

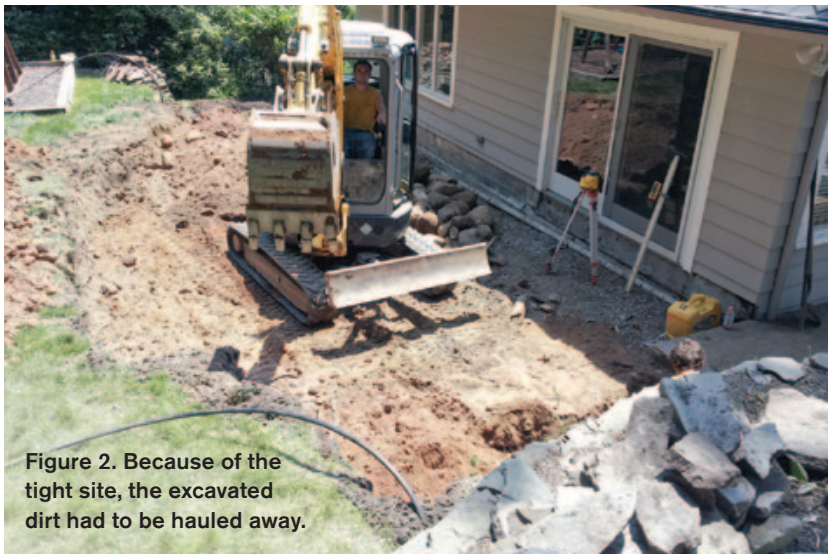


Figure 2. Because of the tight site, the excavated dirt had to be hauled away.

Get the Dirt Work Right

My crew tore out the old deck, then an excavation contractor dug out the area (**Figure 2**). This was no simple task because the small lot had limited access for moving machinery and dirt in and out. Since there was so little room to work and we'd be replacing a fair amount of

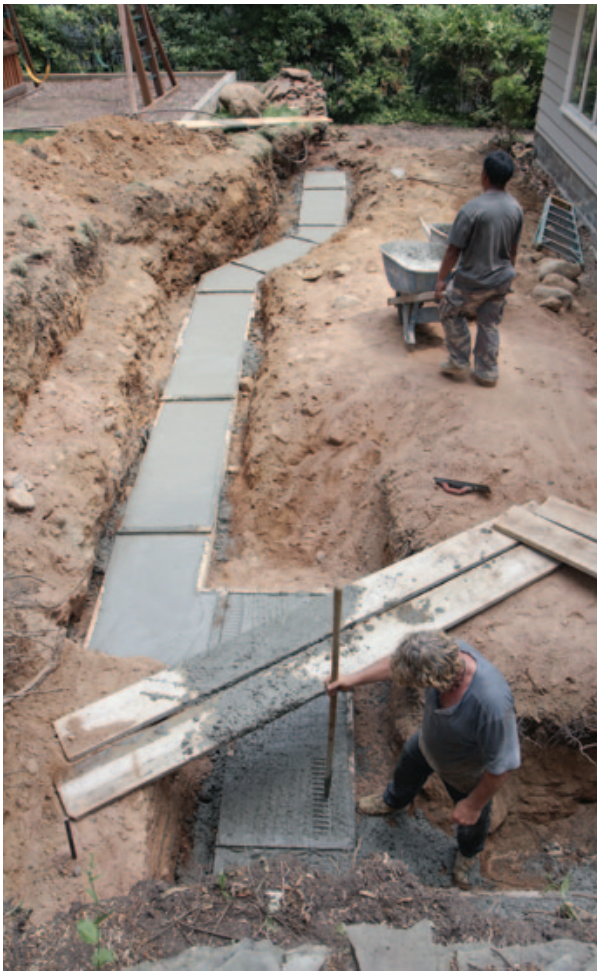


Figure 3. A concrete footing — like what you'd use for a basement wall — was poured to support the new retaining wall.

Figure 4. A mason fills the rebar-containing cells in the concrete-block retaining wall with grout.

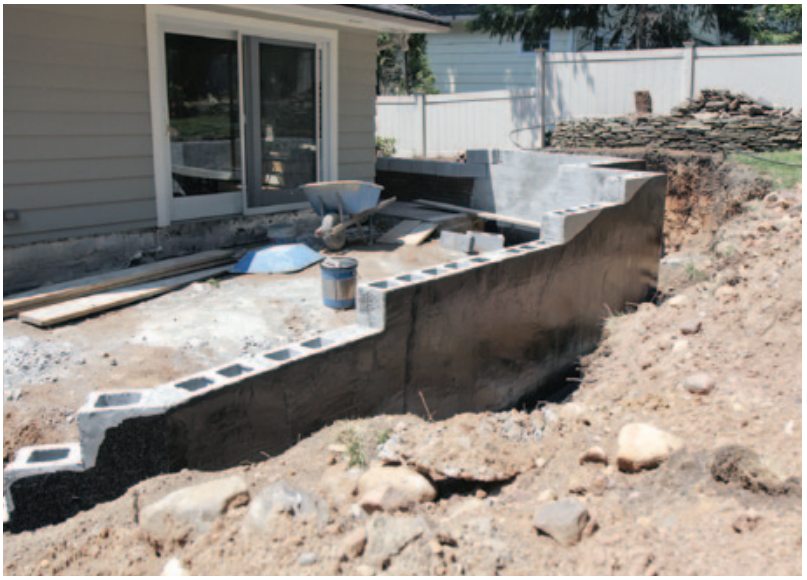


Figure 5. Portland-cement plaster and a coat of tar makes the wall water-resistant and prepares it for stone veneer.

the excavated dirt with gravel for drainage, we trucked out the majority of the dirt during the initial excavation.

My mason contractor formed and poured a 12-inch-by-24-inch footing along the length of the wall (**Figure 3**). Ten-inch hollow concrete block was then set on the footing. Rebar was pinned into the footing every few feet and the block cavities containing the rebar were grouted full, per the engineer's instructions (**Figure 4**). The next day, the mason plastered and subsequently tarred both sides of the retaining wall prior to backfill (**Figure 5**). To provide the excavator access to get his machinery back up the grade to complete the backfill process, a section of the wall was only partially blocked up.

Before backfilling, the excavator installed 4-inch perforated drain pipe on both sides of the wall at the footing (**Figure 6, page 36**). Landscape cloth and ¾-inch clean gravel were installed above it to facilitate drainage. A third drain pipe was placed near an existing dry-laid stone wall where a box drain received surface water running down the lawn.

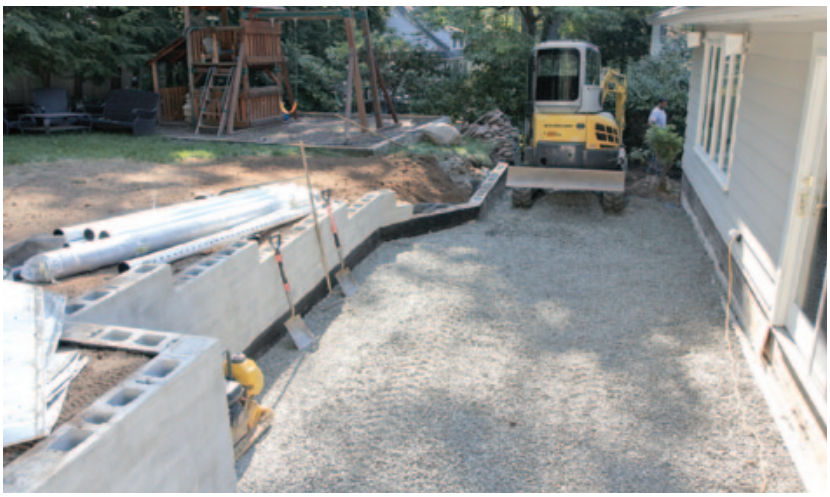


Figure 6. PVC pipe and crushed stone drain the wall. The ground below the deck was graded toward the wall, and then covered with crushed stone.

Figure 7. Epoxy anchors and bolts secure the ledger to the retaining wall.

All three drain pipes were tied together with solid pipe and run downhill toward the front of the property where we were able to deal with runoff more effectively than on the steep slope of the backyard.

Beneath the area where the deck was to be built, the excavator graded the existing soil away from the house foundation and toward the retaining wall where the perforated pipe was installed. We installed landscape fabric and enough ¾-inch clean crushed stone over the graded soil to give it the appearance of being flat and to give the pressure-treated deck frame as much room as possible to breathe and dry out.

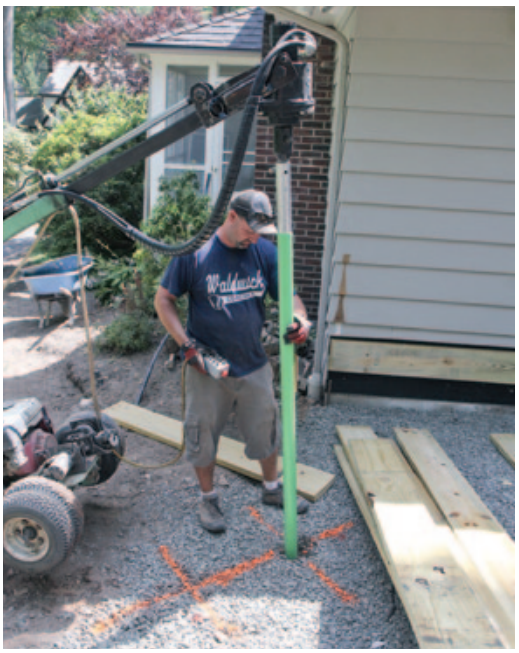


Figure 8. Galvanized steel helical-pile footings were driven to support a drop beam at the stairs.

The Deck Build Was the Easy Part

Before my crew could install the new deck framing, they had to deal with rotted sheathing, which we found on the house upon removing the old deck. Considering that the deck hadn't been flashed properly, we were lucky the rot was mostly limited to the sheathing; there was only superficial rot on the wall plates and it didn't warrant remediation. We cut out the old CDX sheathing and replaced it with pressure-treated plywood just to be safe. We covered that with adhesive roofing underlayment, which we slid up behind the existing building paper.

We attached the deck ledger to the existing rim joist using LedgerLok screws (FastenMaster; 800/518-3569, fastenmaster.com). The ledger at the retaining wall (**Figure 7**) was fastened with ½-inch galvanized threaded rod and HY-20 two-part epoxy and screens (Hilti Corp.; 800/879-8000, us.hilti.com). This was familiar technology for us — my company frequently attaches deck ledgers to hollow concrete-block house foundations using these chemically anchored threaded rods, with my engineer's approval.

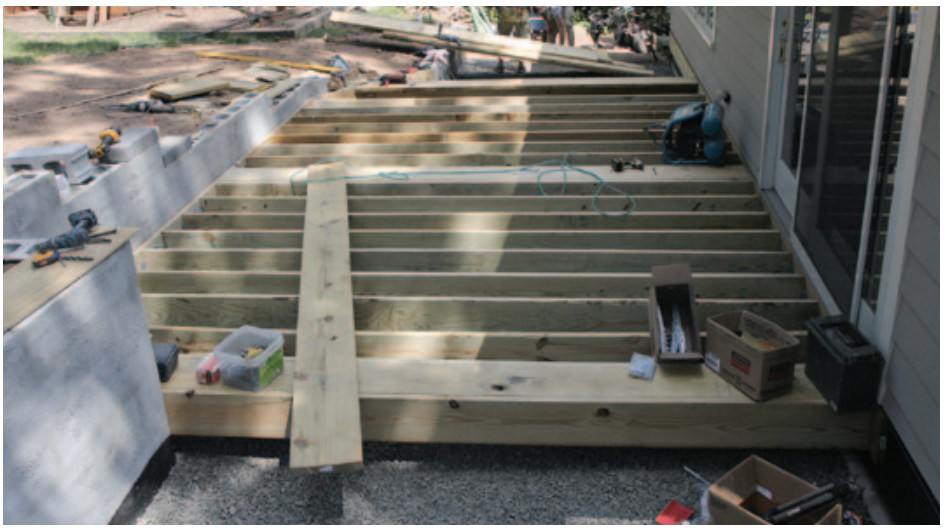


Figure 9. With the ledgers installed, framing was typical. The blocking will support seam boards in the decking.

Although the deck is primarily supported by the house and the retaining wall, the design required that a drop girder be installed on one side, near the staircase (**Figure 8, page 36**). To support this beam, we installed two helical piles during the framing phase (see "Helical Pile Deck Foundations," May/June 2012).

The deck was otherwise typical — 2x10 southern-pine joists 12 inches on-center were attached with joist hangers to both ledgers (**Figure 9**). I added blocking to support two seam-board details that eliminated the need for staggered butt joints in the decking. We installed the decking — Fiberon Horizons Tudor Brown (800/573-8841, fiberondecking.com) — with Tiger Claw TC-G hidden fasteners (FastenMaster; 800/518-3569, deckfastener.com).

After the decking was installed, the mason returned to install the cultured stone veneer on the retaining wall and on an existing brick wall that ran along the side of the house (**Figure 10**). A 2-inch-thick natural bluestone cap finished off the top of the wall. Concrete pavers serve as a stair landing on one side of the deck and as an entrance on the other (**Figure 11**). ❖

Greg DiBernardo owns Bergen Decks in Waldwick, N.J.

Figure 10. After the decking was complete, cultured stone was applied to the retaining wall.

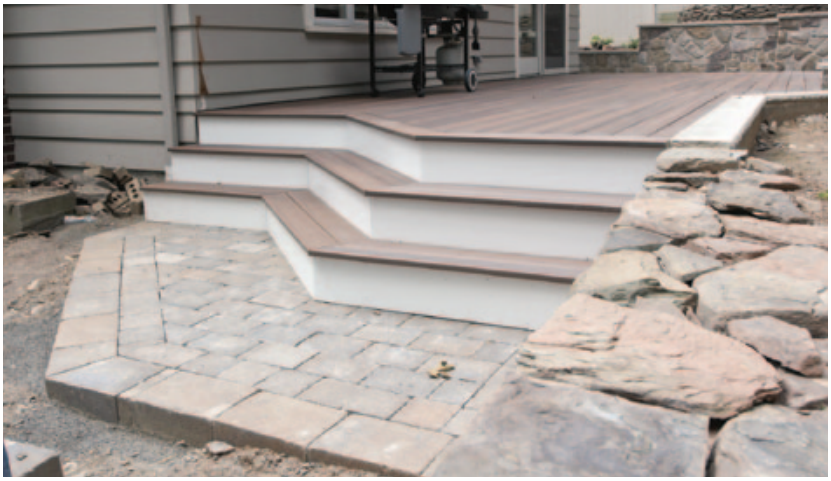


Figure 11. Concrete pavers provide a stair landing and a path to the deck.