

# Adding Under

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With nowhere to go but down, this basement addition carves out extra living space from within the home's existing footprint

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by Danny Feig-Sandoval

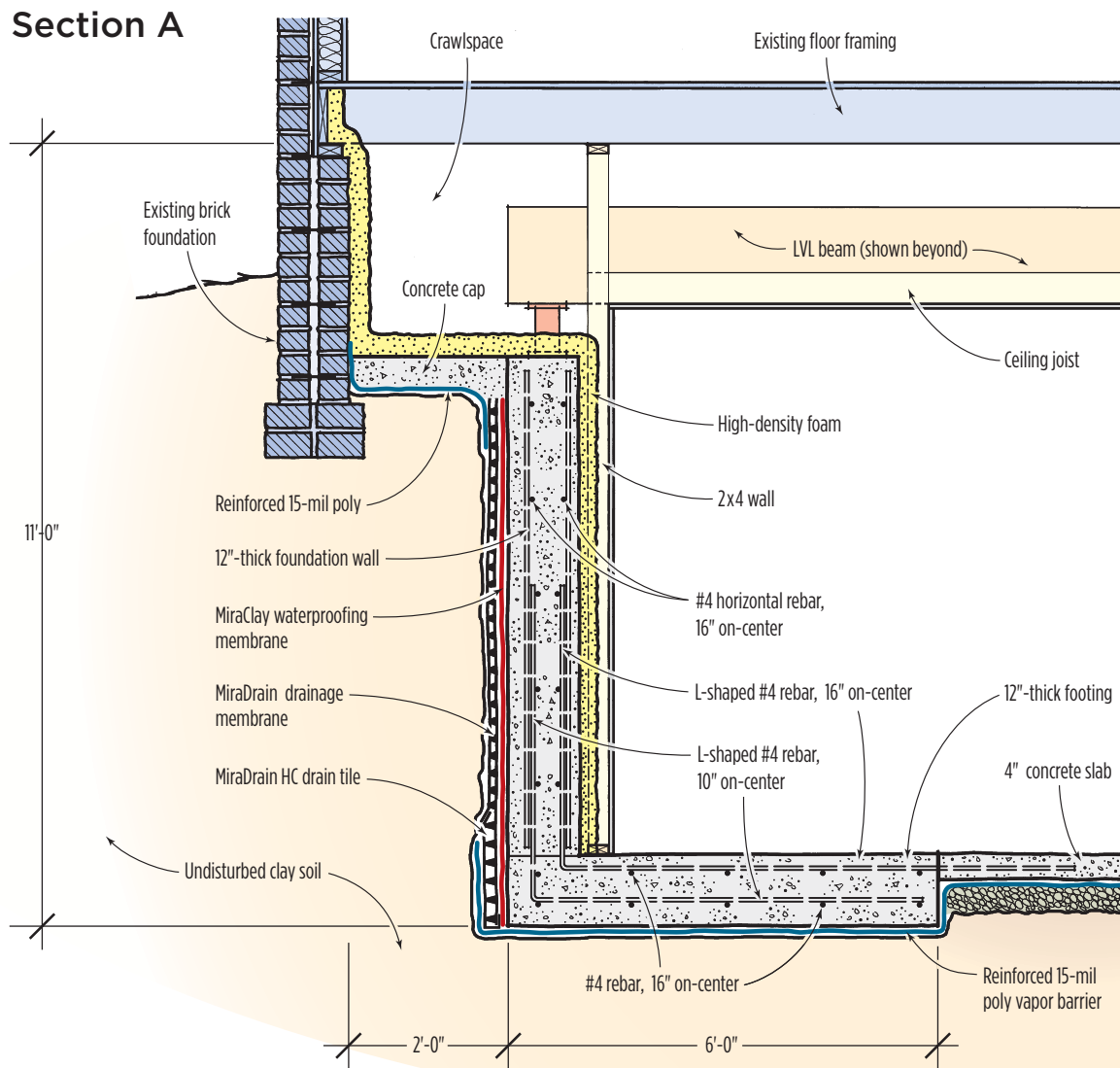
To accommodate their two growing kids, our clients wanted to add a media room and another bedroom and bath. But because their house is on a tight Atlanta lot with no room for an addition — and we'd already expanded upward with a previous master-suite addition — they faced a simple choice: Find another house or finish the basement. They didn't want

to move, so going down into the crawl-space appeared to be the only option for creating the additional 1,000 square feet of living area.

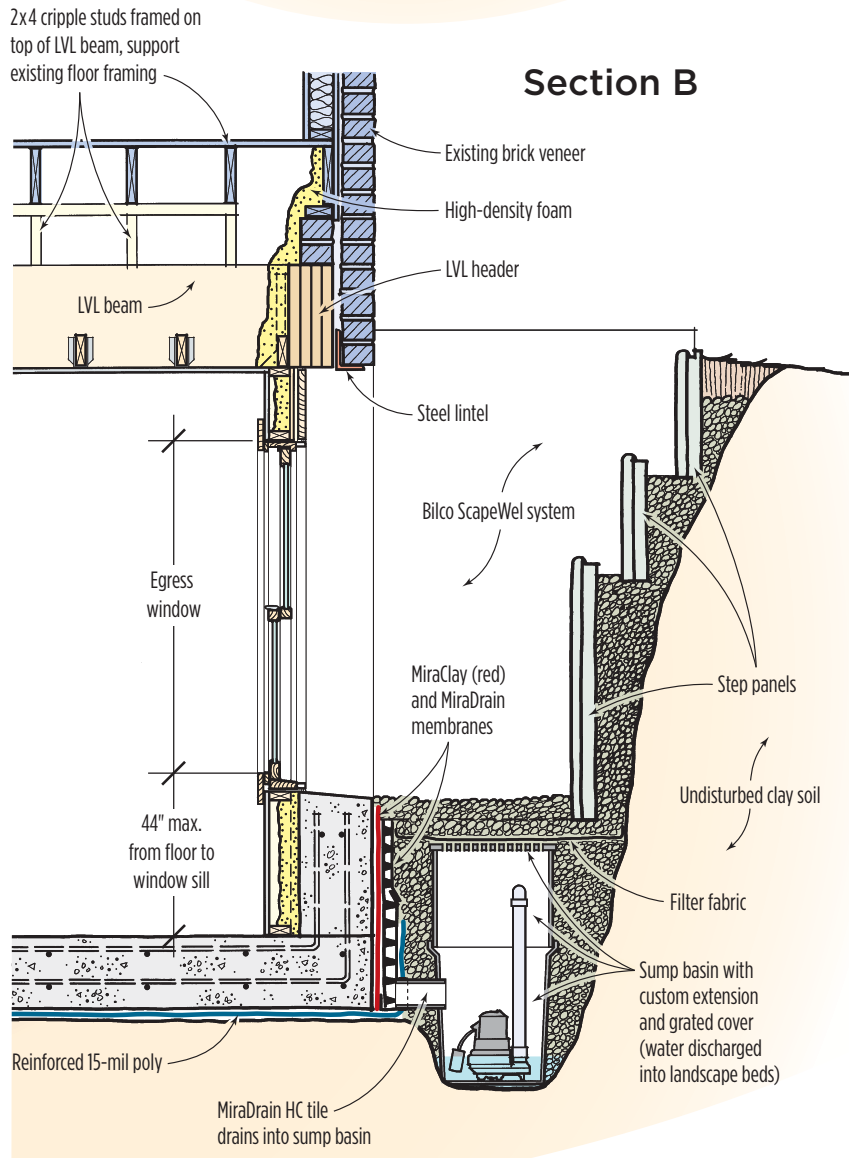
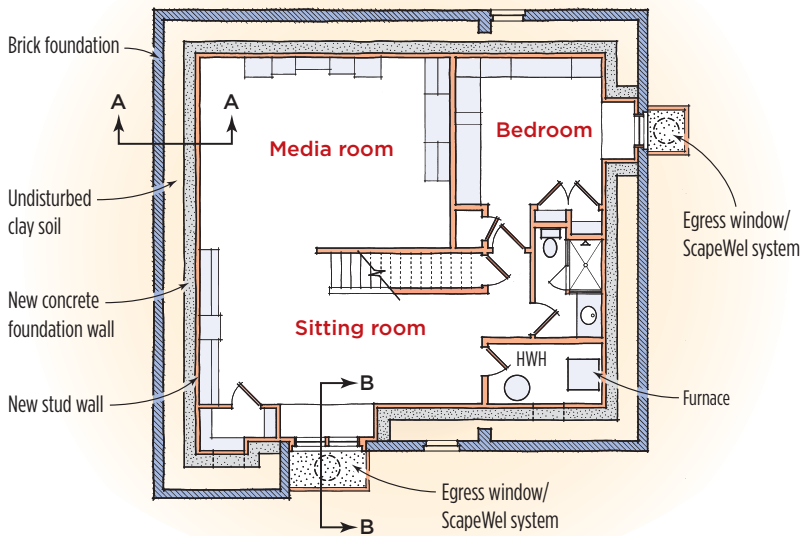
We've taken on some interesting projects in our 29 years in business, but this was the first time we ever had to remove 300 cubic yards of dirt from underneath an existing house — by hand. If the lot

had been larger, we might have used the conventional approach — cribbing the house, removing the existing foundation, mechanically excavating the basement, then pouring a new foundation. There were two problems with that approach: First, the tight lot lines would have made it difficult to maneuver heavy equipment; and second, removing the existing

**Full-height concrete retaining walls** formed within the perimeter of the existing crawlspace stabilize the original brick foundation and help support the floor framing. A bentonite waterproofing membrane, installed before the retaining wall was poured, keeps ground moisture out of the concrete. Drainage is provided by a composite dimpled membrane that channels water into a perimeter drain connected to sump pits in the new egress window wells. See next page for Section B



## After



foundation would have required that we temporarily support the home's brick veneer. So instead, we decided to leave the existing foundation walls intact and pour a new full-height foundation within the perimeter (see illustration, left). This would also make it possible for our clients to stay in their house during the project.

## Excavation

The house was built in the 1930s. Its brick foundation was supported by a double-brick footing set on the clay substrate about a foot below grade (see Figure 1, page 4). Only a 10-foot-by-12-foot portion of the crawlspace had ever been dug out, to a depth of around 8 feet. The plan was to dig down 11 feet below the bottom of the floor joists to provide plenty of room overhead for upgraded mechanicals. Since excavating the space by machine wasn't feasible, we would dig by hand.

For access, we created an opening in the front foundation wall, where the plans called for an egress window and window well. The opening was close to the street, making it a convenient place to back up a dump truck for dirt removal.

To ensure that we didn't undermine the house, our structural engineer, Tom Skywark, advised us to stop the digging 2 feet from the foundation and to approach the excavation and new concrete work in 4-foot-long sections. It turned out, however, that the soil — a clay-shale mix — was much firmer than predicted; in fact, we had to use jackhammers to loosen it. As we chipped away, we had a hunch we could excavate larger sections at a time. A soils engineer confirmed this and gave us the go-ahead to dig out the entire space. Amazingly, we were able to dig vertical walls down to the planned depth without disturbing the soil beneath the footings at all.



## Adding Under



**Figure 1.** Because the home's tight lot lines limited access (top), all the excavation for the basement addition was done by hand, with dirt removed by wheelbarrow through a small opening in the foundation (above). The clay-shale soil was firm enough to allow for nearly vertical dirt walls within 2 feet of the existing brick footing (right).



### Shoring

The floor framing was supported by at least a dozen posts, several brick piers, and an old fireplace foundation (we had already removed the actual chimney during the attic renovation 15 years earlier). Rather than using a lot of cribbing, we replaced each support as we went. We worked in stages, excavating a couple of feet down around the support, setting a pair of temporary 6x6 posts on blocks on both sides, then removing the support. Next we'd dig down another couple of feet, set another blocked 6x6 post in the new hole, and remove the flanking posts so we could keep going down. We repeated this process until we reached the final depth — 11 feet below the floor framing — and moved on to the next support.

As we swapped posts, we also reinforced the floor framing according to the new framing plan. The original plans called for steel beams, but we chose to use built-up LVL beams instead because the individual members are lighter and easier to maneuver in a cramped space.

### Concrete Work

We planned to place the concrete in four steps: first, the 6-foot-wide perimeter footing, followed by the 8-foot-high perimeter

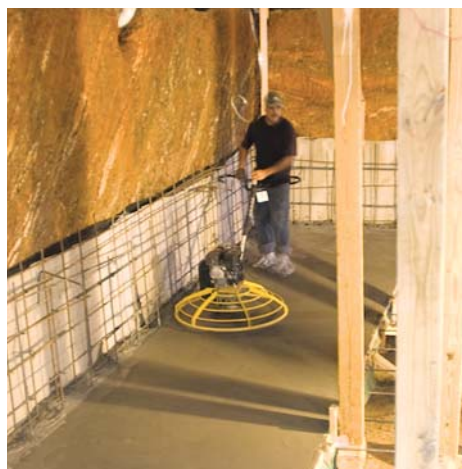




walls; then the massive footings for the center support posts; and finally, after installing rough plumbing for the bathroom, the basement slab. But before we could pour any concrete, we had waterproofing and rebar to install.

**Steel reinforcement.** The massive footing works in conjunction with the new foundation walls to create a retaining wall that resists overturning and lateral soil pressure (**Figure 2**). The finish slab locks the footing in place and prevents sliding. The rebar schedule called for a double L-shaped cage made from #4 rebar, with rods extending horizontally from the footing to tie into the slab.

**Waterproofing.** Although the 80-year-old house had no perimeter footing drain, the basement had stayed dry; as we removed soil, we found no evidence of moisture. Still, we wanted to make absolutely sure that any dampness in the soil couldn't come in contact with the new concrete foundation walls or the bottom of the slab. Since the sides of the excavation would serve as the outside form for the foundation walls, we lined the dirt with MiraDrain 6200 (Carlisle Coatings & Waterproofing, 888/229-0199, [www.carlisle-ccw.com](http://www.carlisle-ccw.com)), a dimpled drainage membrane



**Figure 2.** Shown here (top) is the first of two layers of rebar designed to tie the 6-foot-wide footing to the new concrete walls, creating an 8-foot retaining wall inside the basement. The concrete was pumped in (above), then power-troweled for a smooth finish (left).



## Adding Under



**Figure 3.** Before the walls could be poured, the waterproofing subcontractor installed MiraDrain and MiraClay membranes all the way to the top of the excavation (top left), then covered the exposed dirt at the top with a poly vapor barrier (top right). He also spread poly over the dirt floor in preparation for placing the slab (above).

that allows water to move freely through it. At the base of the excavation, we installed MiraDrain HC, a 1-inch-thick by 6-inch-high perimeter drain that collects any water at the base of the foundation wall and directs it to sump baskets located in the egress window wells, where it's pumped out to grade.

On top of this drainage layer we installed Carlisle's MiraClay, a waterproofing membrane made with a layer of bentonite clay sandwiched between layers of woven and nonwoven polypropylene fabric (Figure 3). When exposed to water, the clay expands and creates a self-sealing waterproofing barrier for the concrete walls.

Both MiraClay and MiraDrain come in 4-foot-wide rolls, so we needed two courses to extend up the full height of the walls. We pinned the membranes to the



## Adding Under

dirt walls with nails driven through washers, and capped the walls with 15-mil reinforced poly. We also spread poly on the ground underneath the new footing, cutting in around the temporary shoring posts as necessary.

### Placing the Concrete

With the rebar placed, we pumped the concrete for the footings, using a standard 3,000-psi mix. Because the top of the footing would be part of the finished floor, we also screeded it and gave it a smooth trowel finish.

**Foundation walls.** The following day we stripped the footings and set the forms for the 1-foot-thick by 8-foot-high walls (**Figure 4**). Besides restraining the soil under the existing foundation, these walls support the new LVL beams used to carry the floor loads above.

We couldn't use snap ties with a one-sided form, so we needed rugged bracing. Since we would eventually be framing interior stud walls inside the new concrete



**Figure 4.** Pressure-treated 2x4s shot into the footing restrained the bottom of the one-sided wall forms (left); diagonal braces secured to temporary posts and the floor framing above held the top and middle (right).

wall, we went ahead and shot down permanent PT bottom plates, which we used to brace the bottom of the forms. We also set 6x6 posts against the footing every couple of feet and used these posts and the floor framing above as nailers for diagonal bracing.

Again, we pumped in the concrete, bringing it up enough to cap the soil next to the existing brick foundation.

**Beam footings.** Next we formed and poured three grade-beam footings for the load-bearing basement walls (**Figure 5**), bringing their top elevation 2 inches



**Figure 5.** The new bathroom required a sewage ejector pump (left), which is located in the middle of one of the footings designed for the basement's bearing walls (above).



## Adding Under



**Figure 6.** LVL beams now support the first floor, with room above for mechanicals (left). New stud walls around the perimeter were insulated with high-density polyurethane sprayed directly against the new concrete and existing brick (below left). The new space includes two egress windows (below right) and a large exercise and media room (bottom).

below the finish slab. We also poured the egress window wells at this time. The window wells each have their own sump basket and pump to redirect water to nearby landscaping beds, and were eventually finished with Bilco ScapeWels (203/934-6363, [www.bilco.com](http://www.bilco.com)).

**Finished slab.** Before pouring the slab, we framed the load-bearing stud walls and finished installing the LVL beams and posts to support the existing floor system. When all the temporary supports were out of the way, we brought in the concrete pumper once again. We took extra care in floating and troweling the slab because it's also the finished floor. Sealed with a couple of coats of polyurethane, it would be covered with rugs in each of the three main basement living areas.

### Insulation and Drywall

Once the perimeter 2x4 wall framing was installed and rough-ins completed, we had our insulation sub spray a couple of inches of high-density foam into the cavities (**Figure 6**). The low-permeance foam completely covers the concrete, laps over the top cap, and extends up the brick foundation wall to the band joist. This effectively seals the narrow space between the old and new foundations.

The small crawlspace at the top of the wall is accessible through the mechanical room;



some of the home's ductwork was rerouted through this conditioned space. The plan had been to provide an uninterrupted flat ceiling, but when the homeowners saw all the overhead space we'd allowed for mechanicals, they requested a number of coffers, soffits, and vaulted spaces to help break up the ceiling plane.

### Cost

The cost for finishing basements ranges widely, but this one was unlike any other we've ever done. The excavation, the new foundation — including the slab and waterproofing — and the structural work overhead to support the floor framing took about four months to complete, and added around \$120,000 to the overall cost of the project.



**Danny Feig-Sandoval** owns *Small Carpenters at Large*, a design-build remodeling firm in Atlanta.

### JLCEXTRA

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