Adding a Fire Escape

BY ROB CORBO

When I review a set of plans that includes a type of construction we have never attempted before, my emotions run the gamut from the excitement of a new challenge to the anxiousness of an uncertain outcome. The latter feeling prevailed when I reviewed a three-story fire escape for a recent job in Hoboken, N.J. We had never erected a fire escape before, and increasing my anxiety was its location—it was to land on a concrete roof/patio above the homeowner's bedroom expansion. My concerns were eased by a couple of things: A professional engineer designed the fire-escape patio landing, and we had a structural-steel sub that could do the work.

The architectural plans reflected the homeowner's goal of expanding his daughter's bedroom at the garden level and expanding the two apartments above by squaring the back of the building, which stepped back from the first floor at each of the floors above; the project would add 8 feet to the second-floor apartment and 16 feet to the third-floor unit. When the architect presented the plan to the city, the building authority informed the architect and homeowner that to meet code, the upgrade required installing a fire escape to service the two apartments and provide roof access. While that added to the budget, the homeowner was willing to move forward.

Our construction plan was to build the garden-level bedroom expansion first and once finished, use the bedroom's roof/patio to erect scaffolding for construction of the upper levels. The footprint of the garden-level expansion measured 14 feet by 18 feet. It would be built where an existing patio and retaining walls had been constructed years before. The retaining walls were constructed with a future expansion in mind, but to make sure we could build off them, we dug three exploratory holes to check their existing footings. The architect joined us on site for the examination. She cleared the retaining walls for construction, and we started the block work. Once that was finished, things got interesting.

The engineer's structural plan for the roof, designed to support the future fire escape, called for two W12x26 I-beams running parallel across the addition block walls in a north to south direction, 4 1/2 feet apart, and 18 1/2 feet in length. In the southeastern quadrant of the addition, W8x18 I-beams were to be welded between the W12x26 I-beams, creating a 4-by-9-foot rectangle that reflected the fire-escape footprint. Equally spaced and welded across the top of the I-beam rectangle, six 18-inch-high HSS (hollow structural section) 4-by-4-by-5/16-inch steel tubes were placed to receive the fire escape posts.

There was one aspect of the structural plan I couldn't shake. A 20-foot W12x26 beam would be 12 inches high and weigh 26 pounds per foot, or 520 pounds per piece. In Hoboken, a community of mostly attached housing, there is no access to a backyard via a driveway or side yard. Therefore, we couldn't use any machines to carry the steel to the backyard or lift it to the top of the block wall; we'd have to carry every piece of steel by hand through the front window, through the house, and out the back door. To lighten the load, I asked the engineer if we might substitute two C-channels bolted together on site to create an acceptable I-beam. One C-channel would weigh less than the beam and would be less of a danger

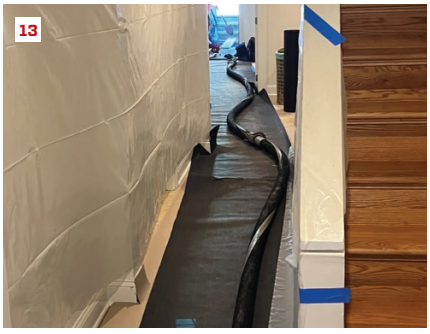
Before work began, the building stepped back on the second and third levels. Additions on the two levels will align with the brick wall of the main level **(1)**. With the back patio demolished, block work begins **(2)**, and an extension of the basement-level slab is prepped for the pour **(3)**.

Photos by Rob Corbo

With the basement-level block walls up, the crew receives the individual pieces of steel C-channel for the beams, threading them through a front window **(4)** and carrying them through the house **(5)**. The lengths of C-channel are placed atop the block walls to be fabricated into beams **(6)**.

To create the beams, the steel fabricator spot-welded and bolted the C-channel together **(7)**. Angle iron to support the corrugated steel decking was bolted to the C-channel, and the completed beams were painted with red oxide primer **(8, 9)**.

Blocks are fitted around the beam ends to form pockets **(10)**, and short, intersecting I-beams are added between the main beams **(11)**. These short beams will support the square tubing stub-outs that will connect to the fire escape. The deck, which will support the fire escape and serve as a patio, is ready to be poured **(12)**.



With no access to the backyard, the hose from the pumper truck has to run though the basement **(13)**. Yellow string lines guide the placement **(14, 15)** and finishing **(16)** of the slab, which slopes to a center drain. The new basement area was insulated **(17)** and finished while the second- and third-level additions were built out and the fire escape was erected **(18)**.

to the crew. I kept imagining a slip, a drop, and a crushed foot. The downside was twofold: We'd have to carry two C-channels for each beam, and we'd need to drill and bolt the channels together. The engineer agreed and specified C10x20 channels. These were lighter by 6 pounds per foot—120 pounds lighter per 20-foot length—so each piece would be 400 pounds instead of 520 pounds. I discussed the option with the sub doing the work, and he opted for the C-channels. He drilled, bolted, and spot-welded the channel for no extra charge.

Once the C10x20s and W8x18s were bolted and welded and all in place, we welded 4x4 angle iron to the beam webs. The angle iron was set to carry 20-gauge galvanized metal decking and metal mesh for the concrete pour to follow. The metal decking was spot-welded to the angle iron.

It's Hoboken, so for the pour, we had to orchestrate a pumper truck, a concrete truck, no parking at the site, and a police officer to open and close the street as required during the pour. The concrete truck had to back down a one-way street to align with the back end of the pumper. We ran the pumper hose through the garden-level hallway to the backyard, pouring 6 inches of concrete at the perimeter and pitching it to 4 1/2 inches at a center drain. I am happy to say the concrete flowed nicely throughout the pour. No hose clogs, no machinery breakdowns, no traffic accidents, no pedestrian injuries, and no blowouts. We let the slab cure for a few days and then set scaffolding up to build out the upper levels.

The mason constructed the upper-level additions with block, steel, and a brick veneer. Once the veneer was completed, Flores Welders, the iron guy, came by to take his measurements for the fire escape. During our meeting, the homeowner requested all platforms be curved on the outside and have a curved handrail to make the unit a bit more attractive. While the platform end frames and handrails were being bent, Flores' guys started extending the 4x4 square tubing stub-outs that were welded on the roof/patio steel infrastructure before the concrete pad was poured. The 4x4 extensions are done in sections: Extend the tubing 10 feet, install the first set of stairs, the first platform, and the next set of stairs; then, extend the tubing for the next level and continue up. The building extension took longer than I had hoped, which kept Flores off site.

As of this writing, the fire escape is taking longer than I had hoped, but everyone is busy juggling jobs trying to make everyone happy, while not making anyone happy. So it goes in construction. Until the fire escape is finished, the HVAC and roofer subs will not have roof access to finish their work. I tell myself, no worries, the last 40 years have passed in a heartbeat; another week or two for completion of the fire escape will be piece of cake.

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