Reinforcing a Foundation With Structural Strapping

BY JAKE LEWANDOWSKI

Our company specializes in structural restorations, and we are regularly called on to repair basement walls. I have covered a number of techniques we employ for this in past articles; here, I cover the use of structural strapping to reinforce the interior of a basement wall that has bowed inward.

Structural strapping is made from several different materials. The type we're using on the job shown in this article is a woven grid of carbon fiber and Kevlar, which is bonded to the foundation wall with a two-part epoxy.

Foundations fail for many different reasons; typically, the walls are underengineered. Often, the walls lack enough rebar or were otherwise not built as stoutly as originally designed.

The repair for these walls was designed by the client's engineer.

Toby Bonilla of Great Lakes Builders smooths out the two-part epoxy used to reinforce a block foundation wall.

Photos by Jake Lewandowski

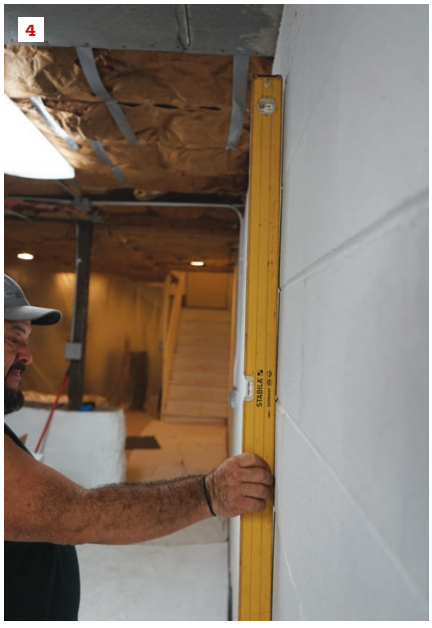
We did not use the full line of reinforcing products available from the manufacturer of the reinforcing straps. (On this job, we used a reinforcing system from Fortress Stabilization Systems; fortressstabilization.com.) Typically, the full product line includes a rim-joist strap connection, commonly called a "neck tie." Additionally, there is a bottom anchor that makes the connection from the bottom of the strap to the existing footing. In this case, the engineer did not employ the manufacturer's additional components, but the effect of his design is similar.

With this project, we were asked to first verify the floor slab thickness in several locations and notify the engineer of our findings. He determined that the slab was thick enough to restrain the bottom of the foundation wall. We also pulled the insulation out of the joist cavities to verify that the sill plate was anchored to the foundation wall, checking for anchor diameter and spacing. We relayed these details to the engineer to verify the sill-to-foundation connection, which he determined was acceptable. However, in some areas, he did ask us to add angle brackets to reinforce the floor-joist-to-sill-plate connection.

After setting up the site with temporary lighting, painter's plastic, an air scrubber, and drop cloths, we laid out the project. On this specific job, the engineer specified strapping "not to exceed 4' 0" on center." We laid out the strap locations on the wall and began to prep the wall by removing the paint with a grinder so we had a clean surface. (If there's no paint present, we usually still go over the strap locations with a surface grinder to ensure a good epoxy bond.) We also pointed the mortar joints and any horizontal cracks so we had a flat surface at each strap location.

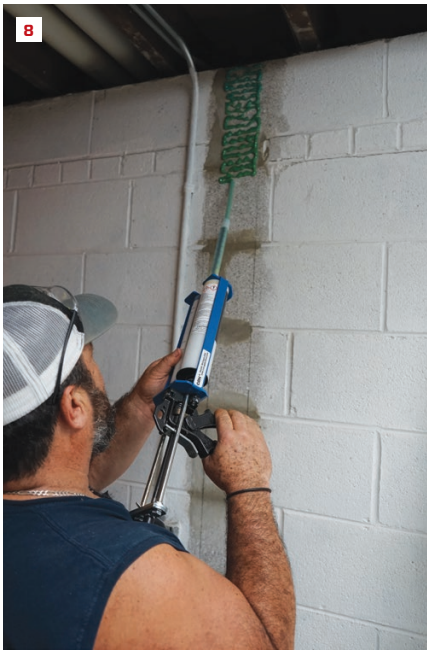
With the wall fully prepped, we were ready to lay down a bed of epoxy, spreading it out to ensure complete coverage. We then applied the strapping, pressing it firmly into the epoxy. The goal is to have the strapping fully saturated and encased within the epoxy. To achieve this, we needed to add epoxy to the outer face of the strap and smooth it out with a plastic applicator. The manufacturer of the reinforcing strap used here requires covering it with a thin sheet of plastic and pressing out any air bubbles that are trapped within the assembly. The thin sheet of plastic must stay on until the epoxy fully cures. We left it on, but it can be removed after the epoxy cures if you wish to paint over the repair.

JLC *contributing editor Jake Lewandowski is a construction manager with his family's business, Great Lakes Builders (greatlakesbuildersinc.com), which specializes in structural repairs in Greater Chicago. Follow him on Instagram: @jakemlewandowski.*

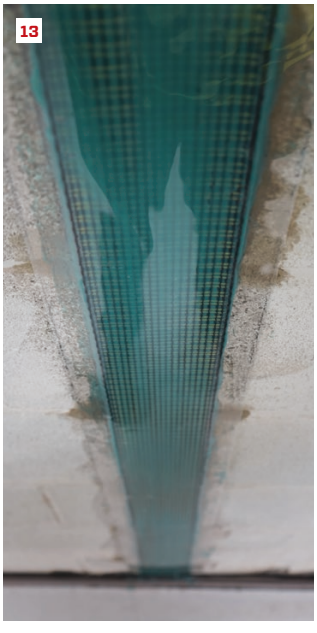


Structural strapping, which is very strong in tension, is typically specified to reinforce foundation walls that bow inward. Photos **(2)** and **(3)** above show some of the tell-tale cracks in a CMU wall in this condition. You can see clearly at the top of the level that Toby is holding how the wall bulges to the inside **(4)**.

Toby draws layout lines for placing the straps every 4 feet on-center **(5)**. Afterward, a helper grinds these areas free of paint **(6)**. Toby then adds grout to the mortar joints to create a flat bonding surface **(7)**.



Toby applies epoxy to the wall in a close pattern **(8)**. A helper spreads the epoxy out **(9)** before Toby applies the structural strap, pressing it firmly into the bed of epoxy **(10)**.



The goal is to have the strapping fully saturated and encased within the epoxy. To accomplish this, Toby adds more epoxy **(11)** and smooths it out **(12)**. With this particular reinforcing strap, a thin sheet of plastic is applied on top of the epoxy **(13)**, which completes the project **(14)**.