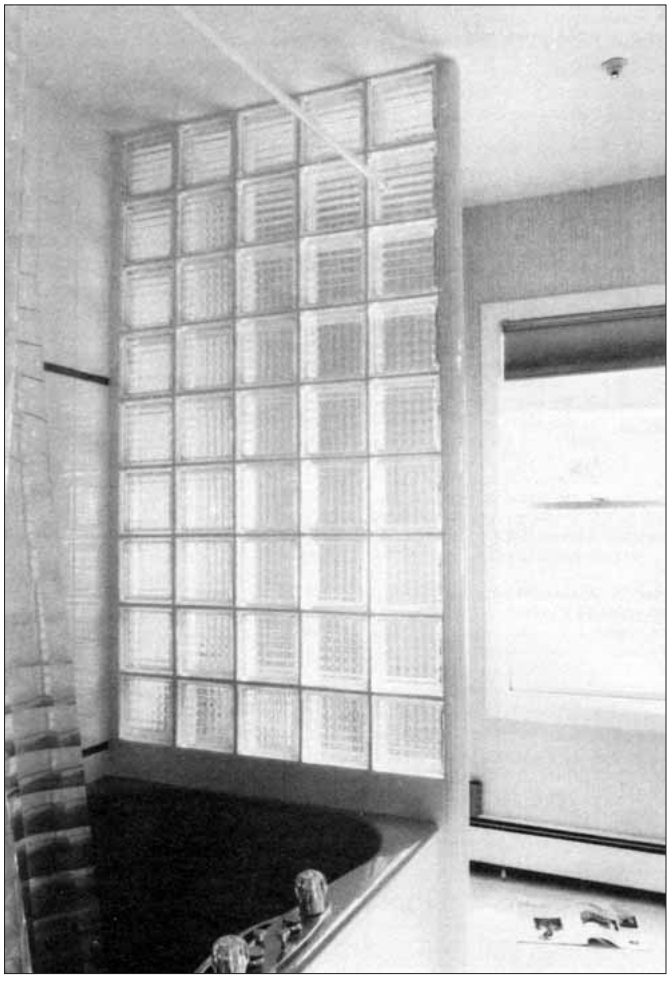
Glass Block in the Bathroom

by Michael Byrne



Use the right mortar and waterproof details for a durable installation

As a tilesetter, I have been working with glass blocks for years. I started out with simple "enclosed" panels (small areas of glass block surrounded by framing) and then, through experimentation, moved on to more open and freestanding designs. Thanks to special additives that greatly increase the mortar's strength, dramatic uses of glass block not possible ten years ago are becoming commonplace, especially in commercial buildings.

At present, there is not an industrywide standard for either large commercial work or residential applications. However, Pittsburgh Corning Corporation, the only manufacturer of glass block in the U.S., has conducted extensive research and provides good technical literature (see "Glass Block Sources and Materials"). They can also provide technical advice by telephone to help you with difficult or unusual situations.

In this article, I'll illustrate some techniques I've developed for situations that go beyond the simple enclosed panel, using a bathtub partition as an example (see photo at left). The material presented here is not meant to be considered a "standard." Rather, these are techniques that have served me well and assure me of a strong, durable installation.

Panel Design

On this job, the glass block panel at the end of the tub isolates the toilet area while allowing light from the window to flood the room. Rather than dim the available daylight with framing at the exposed edge of the glass block panel, which is right in front of the window, I chose to reinforce the panel with a rebar "spine" at this edge. This "spine" consists of two pieces of 1/2-inch rebar surrounded by mortar and disguised behind a thin wrapping of tile.

Getting started. The first step on a job like this is to float the wall in back of the tub and the sill on which the blocks will sit, and cover them with tile. I include a CPE (chlorinated polyethylene) membrane to protect the framing beneath the wall and divert water back into the tub (see Figure 1).

Rebar "spine." Next, I reinforce the blocks at the exposed edge. I begin by placing two lengths of 1/2-inch rebar from floor to ceiling, 1 inch apart and 1 inch out from the finish edge of the blocks. At the ceiling, I guide the rebar ends into holes bored into the framing, then drop the lower ends into holes bored into the floor framing. The rebars give me a place to anchor reinforcing wire at that edge.

Wiring the Grid

To secure the blocks and strengthen the panel, I wire a double grid of 9-gauge galvanized form wire for each block (see Figure 2, next page). The horizontal wires run from the wall framing, where they are anchored with metal clips and screws, to the rebar. The vertical wires run from the framing at the back of the tub to the ceiling, but are not attached at either end. Where a vertical wire crosses a horizontal wire, I secure it with a snug twist of galvanized tie wire. I then connect the two grids with horizontal strips of galvanized lath 1 1/2 inches wide.

At the rebar, I bend each horizontal wire into a 1 1/4-inch radius, trim it to length, and secure it to the neighboring rebar. I then cover the radius ends with bent sections of galvanized mesh, which I wire into place. I'll later fill this radiused end of the block panel with mortar, both to tie the edge reinforcing together and to make a base for the ceramic tile cap.

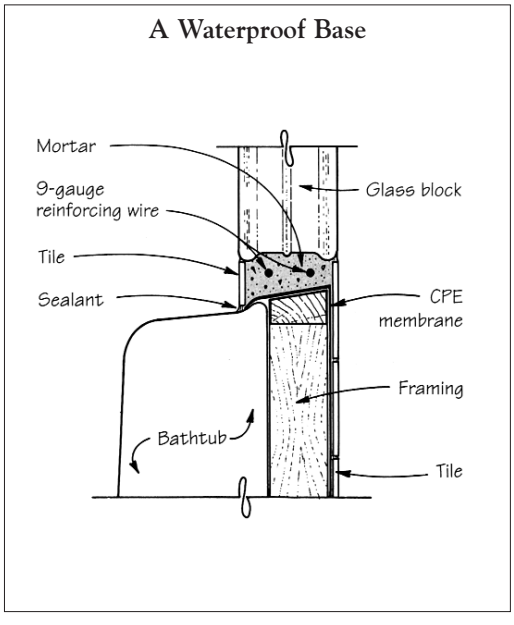


Figure 1. *A CPE membrane embedded in the mortar at the base of the glass block partition protects the framing below by diverting water into the tub.*

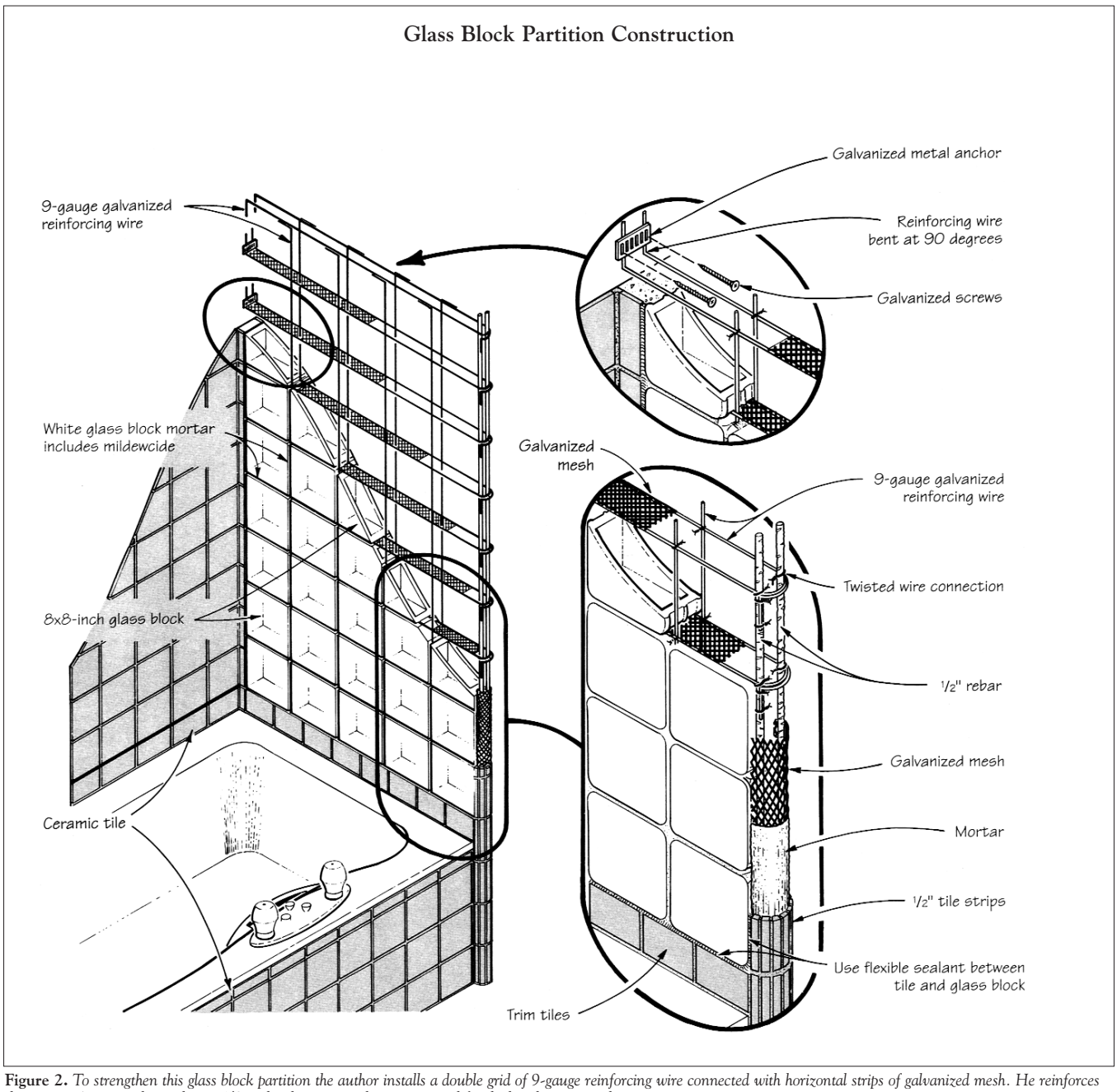


Figure 2. *To strengthen this glass block partition the author installs a double grid of 9-gauge reinforcing wire connected with horizontal strips of galvanized mesh. He reinforces the partition's outer edge with two 1/2-inch rebars encased in mortar and finished with ceramic tile strips.*

Laying the Glass Blocks

Stacking porous, square-edged masonry units, such as bricks or concrete blocks, is relatively easy compared to laying up impervious, round-edged glass blocks. For short runs and small panel areas, I feel confident enough to lay glass blocks one at a time using bricklaying techniques, but as the panel size grows, I use other methods to ensure that each block will run true.

Aligning the blocks. Because the edge on this wall must be dead plumb to match the tiles trimming it off, all the blocks must be in perfect alignment. To achieve this, I temporarily clamp the blocks to a wooden frame, pump mortar into the accessible joints, allow the mortar to set, remove the clamps, and pump mortar into the remaining joints. Here is how I do it:

First, I stack a row of blocks vertically, slipping each one into the reinforcing grid. When the entire row is stacked, I center a 1 1/2x2 1/2-inch length of straight-grained fir, as long as the stack is high, against the face of the blocks. I pass a U-shaped wire over the fir, through a block joint, and out the other side. Holding the wire ends with vise grips, I take up the slack and give the wire a couple of twists. I then slip a 16-penny finishing nail behind the twist so that it straddles two blocks. A few more twists with the grips tightens the blocks against the fir (see Figure 3).

Next, I run a row of blocks horizontally, just as above, only this

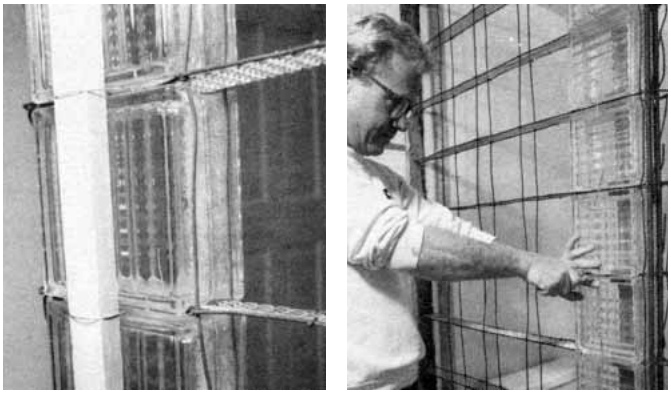


Figure 3. *The author uses straight lengths of fir to keep the blocks in alignment as the mortar sets. He passes a U-shaped wire around the wood straightedge and through the joint (left). From the other side, he clamps the straightedge tight against the blocks by twisting the wire around a 16-penny nail (right). Horizontal straight edges support the opposite side.*

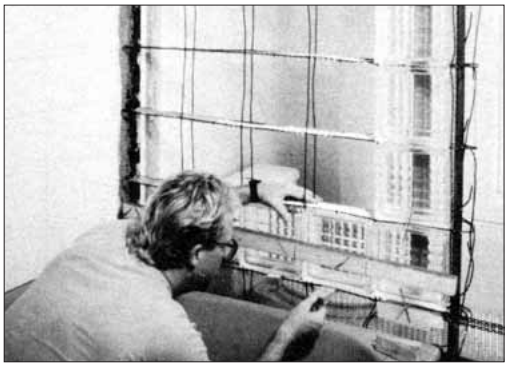


Figure 4. *The author places wooden shims to align the courses of blocks as he assembles the wall. He removes the shims after the first application of mortar has set up.*

Figure 5. *After clamping up a block panel with wooden straightedges — vertical on one side, horizontal on the other — the author uses a a heavy-duty pastry bag to squeeze mortar into the joints.*

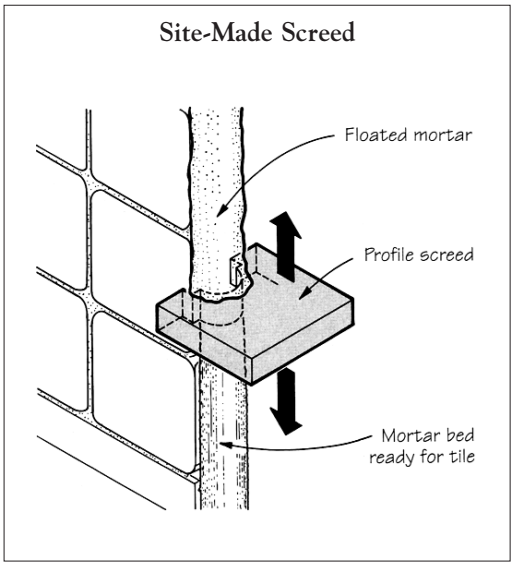


Figure 6. *The author uses a site-made screed to shape the mortar for the radius end of the partition. The screed rides on the edges of the glass block.*

time, the fir straightedges are placed on the opposite side and run horizontally. Beneath this bottom run of block, I use wooden shims or wedges to start off level (see Figure 4). On subsequent courses, I use short wooden shims to keep the blocks spaced right. Each twisted wire exerts a lot of force, and with all the courses attached, the fir straightedges hold the two faces of the panel in alignment. A quick check with the level, a few adjustments here and there, and the panel is ready for mortar.

Preparing the Mortar

I pump the mortar into the block joints using a heavy-duty pastry bag with a metal tip slightly smaller than the height of the joint (see Figure 5). For this to work, the mortar must be able to flow through the tip, and that means absolutely zero lumps. To do this, I power up the same mixing paddle I use for mixing grout and thinset adhesive.

At this stage in the job, speed is just as important as the consistency of the mortar. For most cement-based mortars, the "life" of the mortar follows these stages:

- ***Initial mixing:*** combining wet and dry ingredients
- ***Slaking period:*** the rest stop when all the dry ingredients become wet
- ***Remixing:*** to break down and homogenize any remaining clumps
- ***Plastic state:*** the only time a mortar should be worked
- ***Initial set:*** when the mortar should be protected from movement
- ***Hardening off:*** when the mortar is hard and appears to have lost all its moisture
- ***Curing:*** the period until the mortar is past the 28-day mark for maximum compressive strength

The best way to ensure that the mortar will do what it is intended to do is to carefully read and follow the instructions on the bucket or bag. Also, have all the materials (block, mortar, liquid additives) and the job site at room temperature. Mortar setup will be delayed if temperatures are in the 60s, and indefinitely postponed in the 50s.

Wetter than usual mix. To get the glass block mortar through the pastry bag tip, it must be mixed slightly wetter than normal. I begin by following the recommended wet-to-dry ratio provided by the manufacturer, mix up a batch, and see if it will go through the tip. I then add only enough extra liquid to make the mix flow. With a power mixer, I could prepare the total amount needed, but I generally mix only enough to fill the bag three or four times. After the initial mixing, I let the mortar rest for about ten minutes to slake, remix with the paddle, and start filling the bag.

Placing the Mortar

To shoot the mortar, I fill the bag half full and begin twisting the open end with one hand, controlling the tip and squeezing the bag with the other. Because of the configuration of the fir straightedges, I can pump mortar into all the intersecting joints on both sides of the panel. Once this mortar has set, I remove the straightedges and wire, then pump in the remaining mortar.

Patience. After all the joint intersections have been filled, I clean the bag and tip, strike the joints with a 1/4-inch or 3/8-inch margin trowel , and go on to other work while the mortar begins to set.

If this wall were much higher than 6 feet, I would have to wait overnight before the straightedges could be safely removed. But the combination of relatively low height, warm weather, and the fact that the initial pumping took place early in the day means that the fir can be stripped after about six hours, and the remaining mortar pumped in.

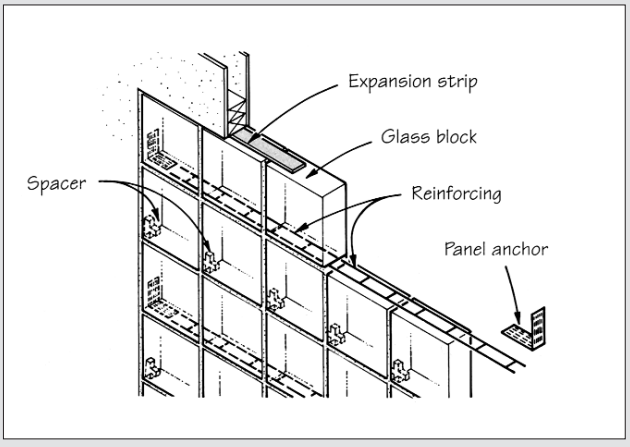
Removing Temporary Supports

First, I cut all the clamping wires, pull them gently through the blocks, and remove the fir strips. Then I cut away any misplaced mortar, gently clean the faces of the blocks with a damp sponge, mix fresh mortar, and fill the remaining joints. It is important to shoot the mortar in with enough force to fill

Simple Glass Block Panels

Interior glass block panels 25 square feet or less and surrounded by framing on four sides are the simplest to install. Using traditional mortaring techniques, you can lay up glass blocks in brick fashion. Because of the small size of the individual glass blocks, the effects of expansion and contraction are minimal. Use panel anchors where the block panel meets the framing, and embed panel reinforcing in the mortar joint every 24 inches for standard glass blocks (see illustration). Mortar the blocks in tight at side jambs, but at headers always use a fiberglass expansion strip to protect the panel from movement from above. Because of their light weight, these panels require only commonsense framing and high-quality framing materials to produce good results.

For basic information on glass block installation, contact Pittsburgh Corning. Always use informed, skilled installers. And when there is any doubt about a project, consult the architect or a structural engineer. — *M. B.*



Installation of small, enclosed glass block panels is straightforward using standard accessories.

Glass Block Sources and Materials

The recent surge of interest in glass blocks is probably due to one thing: They let light in. With this increased interest has come new block styles — blocks with various surface textures and patterns, corner blocks, bulletproof blocks, blocks that reduce solar heat gain, and blocks that admit more or less light, depending upon job requirements. And with new kinds of glass block has come the development of new materials that speed and improve installation.

Specialty Mortars

Most mortars, even plain, old hardware store readymix, will hold a glass block wall together, but to minimize potential problems, it's best to use mixes specially tailored to glass block installation. You can mix your own, but I don't advise it.

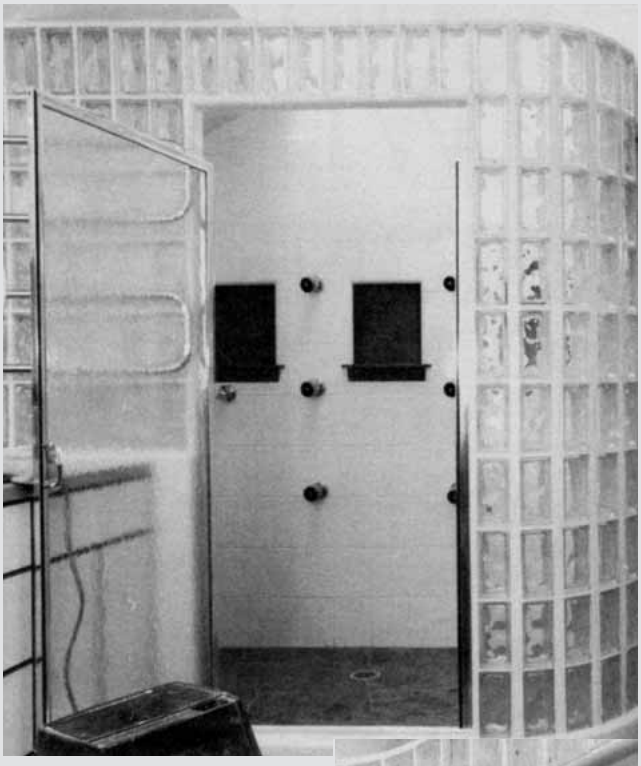
Mortars formulated with water-activated dry polymers or latex or acrylic additives have considerably increased the strength of glass block panels, making preassembly of panels possible. With this method, common in commercial work, panels are assembled in jigs off site, allowed to cure, and then brought to the site and installed with the help of a crane.

In my own work, fortified mortars allow me to create strong glass block headers trimmed only with tile, like the one above the shower door in the photo at right.

Mortars for wet locations. The ideal mortar for glass blocks in wet applications contains both a polymer and a mildewcide. The polymer reduces the absorption rate of the mortar, decreasing the amount of penetration and protecting the reinforcing from rust, which can discolor the joint. The mildewcide helps when the almost inevitable breach occurs and water penetrates the mortar joint.

It is important to use clean water for mixing mortar and to keep the glass blocks packaged until they are set. Any contamination could be a food source for mildew. Once an installation is in use, advise your clients to clean it on a regular basis. Cleaning is made easier with a hand-held shower. With a rinse after each use, some routine scrubbing, and adequate ventilation, mildew should not be a problem.

White mortar. Just as important as the mortar's ingredients are aesthetic considerations. Many clients want glass block panels with white mortar joints. Unlike gray mortar joints, white joints increase the reflected light coming through a panel. Colored mortars are also available.



Special fortified mortars have pushed the limits of what is possible with glass blocks. The header above the shower door is supported only by reinforced mortar and trimmed with tile (inset).

Installation Accessories

Accessories are available from a number of sources. For straight runs of glass block, Pittsburgh Corning is a source for reinforcing, anchors, and expansion strips, which are used at jambs and headers to accommodate movement in the framing. For curved or angled glass block panels, 9-gauge galvanized form wire can be purchased in 100-pound rolls from masonry supply yards.

There are a number of spacers to choose from. Some are crosses of plastic that ride over the raised seam formed when the two halves of a glass block are heat-welded together to form one block. While effective vertically and horizontally, spacers do allow some misalignment of faces. This problem can be addressed by installing another spacer that has a molded stop to keep the faces of the blocks in an even plane.

While there is no question that spacers can save time and energy, I am just not comfortable with the break each spacer creates within the mortar joint. Also, spacers limit you to a 1/4-inch joint. I prefer to use removable wooden shims instead. — *M. B.*

Sources of Supply

Conproco
P.O. Box 16477
Hooksett, NH 03106
800/258-3500
(maker of glass block mortar with dry polymer and fungicide)

Mayer Equity Inc.
P.O. Box 876
Plandome, NY 11030
516/333-0101
(maker of Accu-Speed Connectors)

Pittsburgh Corning Corp.
800 Presque Isle Dr.
Pittsburgh, PA 15239
800/992-5769
(maker of glass blocks and supplier of reinforcing, anchors, expansion strips, and spacers)

Tec Inc.
315 South Hicks Rd.
Palatine, IL 60067
800/323-7407
(maker of white glass block mortar with dry polymer)

all the cavities. Remember that for the mortar to achieve its maximum strength, the reinforcing matrix must be completely filled, with no voids.

To finish, strike all joints, remove excess mortar from the faces of the block, clean up with a damp sponge, and remove any cement haze with a soft cloth. The panel should be protected from bumps, shock (thermal or mechanical), and vibrations until it has hardened off — about 48 hours.

Finishing the End Cap

With the mortar hard and the panel rigid, it's time to cap the "spine" with tile. I begin by troweling mortar (the same used to set the blocks, only not as wet) through the diamond lath until the cage is filled. Then I build up a layer of mortar to form the setting bed.

Screeding to shape. When the mortar has begun to firm up, I use a curved screed, made with a saber saw from 2x stock, to cut away the excess mortar (see Figure 6, facing page). The screed is shaped so it rides off the edges of the glass blocks, ensuring that the mortar bed will be consistent from top to bottom. After forming the edge with the screed, I make any alterations with the tip of a margin trowel and check for flatness with a straightedge.

Tile strips. When the mortar has hardened off, I cover the semicircular edge with 1/2-inch-wide tile strips cut from a 6-inch tile using a wet saw. I round the cut edge slightly with a tile rubbing stone and then stick each strip to the curved bed with thinset mortar. After this dries, I grout the tile. You could also finish this type of radiused edge with quarter-round trim tile, but I like the dramatic and tailored look the thin tile segments give.

Block-to-tile joints. Mating glass blocks to tile need not be difficult. Whether the glass blocks are inset behind trim tiles or butted against a tile face, the joint between them should be filled with a resilient sealant, such as Color Caulk (1696 W. Mill St., Colton, CA 92324; 714/888-6225), instead of being packed with grout. There will be slight movement between the two materials, and the resilient sealant will provide a watertight hinge.

With the rebar locked into the upper and lower framing and encased in mortar, and the 9-gauge grid extending through the blocks, this panel will have no trouble holding up to normal use. ■

Michael Byrne is a master tilesetter and a contributing editor to The Journal of Light Construction.