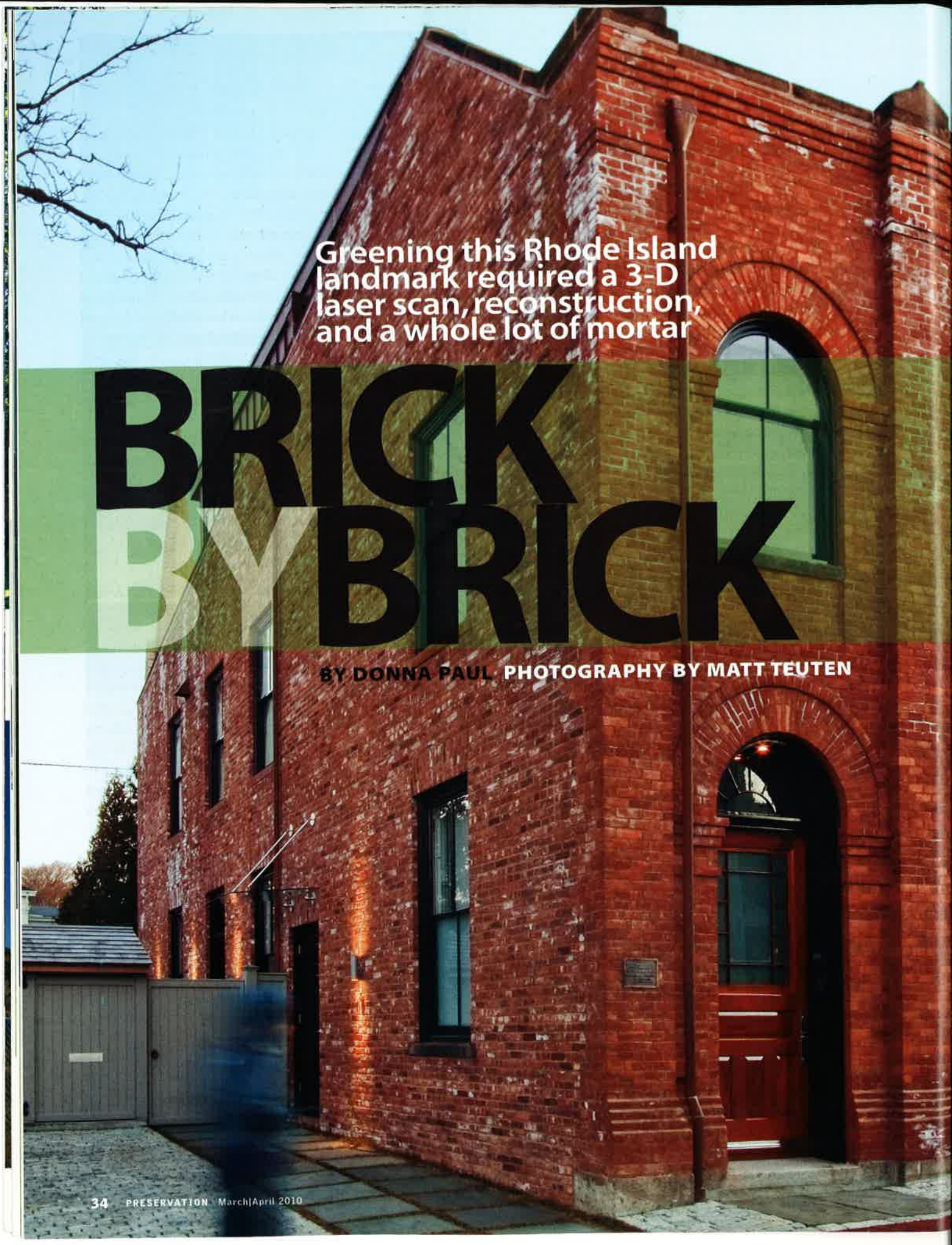

Greening this Rhode Island landmark required a 3-D laser scan, reconstruction, and a whole lot of mortar

BRICK BY BRICK

BY DONNA PAUL. PHOTOGRAPHY BY MATT TEUTEN

Redwood Hose Station 8 looks virtually unchanged from the way it appeared in 1887, when a photographer snapped a hose carriage outside.

ABOVE: COURTESY CLEMENS FAMILY

In the heart of Historic Hill, on one of the narrowest streets in Newport, R.I., stands a magnificent brick fire station with a stone marker engraved "1887." Redwood Hose Station 8 has seen more than its share of emergencies, tragedies, and close calls in the past century. In fact, its very existence is the result of a heroic rescue—a bold act of preservation that consumed nearly three years and involved a determined team of building professionals, all of them inspired by owners Kelly and Clint Clemens.

Four years ago Clint (a noted photographer) and Kelly (an artist) learned that Hose 8 had come up for sale. "At the time it contained three apartments," he remembers, "but two were vacant and only the one on the first floor was occupied." After exploring the historic 53-by-25-foot structure, Clint and Kelly agreed that it had enormous potential.

"We were looking for an unusual space where we could create an open floor plan," he says. "Few structures fit this criterion, but the firehouse did." Kelly also noted that the station had high ceilings, tall windows, and abundant natural light. And most important, "This building offered us the chance to learn more about living green," she says.

Clint, Kelly, and their younger son, Tripp, on the stairs to the third floor. "Our older son, Sam, and his wife and daughter are also frequent visitors," Clint says.

In 2006, Clint and Kelly purchased the 3,700-square-foot building, hiring Hacin + Associates, a Boston-based architectural firm known for clean, modern designs, to help bring it back to life. The new owners and their architect, David Hacin, expected a straightforward, top-to-bottom renovation that would last no more than 18 months.

Hacin knew that to make Hose 8 workable for his clients, he'd need to build additional space in the form of a third floor and new back deck. "And being familiar with historic preservation in Boston and in Providence, I thought this might be possible, but I knew we needed to be strategic and very careful as to how we modified the landmarked building," he remembers.

So Hacin approached Shantia Anderheggen, then the preservation planner for the city of Newport. (She is now the easement administrator at the National Trust for Historic Preservation.) With her help, the Clemens received approval from the Historic District Commission for what Hacin describes as "a very low profile revision that maintained the dominant lines of the original structure."

But as crews from E.S.H.I. Construction got to work, they became concerned and then alarmed about the condition of Hose 8. Portions of existing walls appeared to be in bad shape. So did many of the windows, and most of the sills. There was even an underground stream running through the basement, which would obviously prevent Clint from using that space as an archive for his work.

To make matters worse, construction crews removing the original roof uncovered the most alarming news of all. Peering down into the brick walls, which stood three rows thick, they noticed loose bricks—so loose they could be removed by hand. "That was a shocking realization," says Hacin. "The building was being held up by gravity, not mortar."

A mason traced the problem to the original mortar used during construction in the 19th century. Mortar is normally composed of water, lime or cement, and clean sand from quarries, but the mortar used at Hose 8 contained beach sand. "Not the first time I heard of this problem in historic buildings in Newport," notes Shantia Anderheggen.

Deeply concerned about the state of the building and the effects on the neighborhood should it be lost entirely, Anderheggen went to the city's Building Official, William Hanley, to explain the scope of the problem. He agreed that the building might indeed collapse—at any time. Together with the Historic District Commission, he granted Clint and Kelly permission to take the unstable fire station apart.

Anderheggen knew that the Clemens had already come to terms with dismantling their new property. What floored her was their declaration that they intended to reconstruct the exte-

MICHAEL EUDENBACH

rior of Hose 8—with only minor modifications. "Never in my career have I heard of that happening, and I bet I never will again," Anderheggen says. "By putting up a new, reconstructed building to identically match the predecessor, they preserved the streetscape, which is really unusual."

What had started as a simple restoration had become an elaborate engineering project—a struggle to dismantle and preserve the historic fabric of the 1887 building so that it could be restored to its rightful place on the Newport skyline. "We committed to rebuilding it exactly as it was," Clint says. For the time being, Kelly remembers, "Going backward was the only way forward."

David Hacin began work on a new set of drawings for the reconstruction. "My primary concern from a preservation point of view was that reconstructions always look too perfect," he remembers. Typically when buildings are taken down and rebuilt, their original character and patina are simply lost. How could they avoid that pitfall on Historic Hill?

Clint came up with the solution: He would use his photographic expertise to document the original building, guaranteeing a restored residence with all the quirks and charms of the original.

First he shot high-resolution images of every aspect of the building. Then, with a precisely calibrated instrument often used for 3-D measurements, he laser-scanned the building, essentially creating an MRI of the historic structure.

"In scanning the entire building," he explains, "every detail was captured"—42 million measurement points to be exact. His data would provide the literal map for reconstructing the fire station in exquisite detail.

With the mapping complete, contractor Dwayne J. Paiva and his crews began dismantling load-bearing walls with tremendous care. Seeing the bricks removed bucket-by-bucket "was tough," recalls Kelly Clemens. "After the house came down, I remember standing in front, trying to rally some faith." David Hacin remembers experiencing the same concern, especially the day he drove to the site and saw little more than a stack of bricks. "How are we going to do this?" he thought.

But optimism and persistence won out. The bricks were cleaned, sorted, and stacked—27,000 of them. So were the brick lintels, windowsills, parapet stones, and capstones, which were all numbered. The few bricks that had been irreversibly damaged were replicated.

Masons cleaned and sorted thousands of bricks before reconstruction of the exterior walls. "The design intent was to respect the original building," Jeremy Robertson says. Thus, true double-hung windows in the firehouse all have classic weight-and-chain mechanisms.

It's difficult to restore the nuanced look of any historic facade, the subtle imperfections that imbue a building with a sense of timelessness. But that was the goal here. "We weren't after crisp brickwork," says Jeremy Robertson, who served as project manager for the effort. "We wanted to get the Old World, handcrafted feel."

Clint Clemens' photo documentation facilitated that process, allowing masons to reconstruct the walls precisely as they once stood. (When a preliminary attempt at laying courses of bricks did not achieve the correct effect, the masons pulled down their work and started again.) With the shell of the

LEFT: COURTESY CLEMENS FAMILY

building stabilized and Hacin's light-filled interior beginning to take shape, Clint and Kelly concentrated on establishing the green credentials of their home.

This building was already a poster project for recycling by virtue of integrating every original brick and every salvageable stone. Nothing could be greener: No energy had been consumed to fire a kiln and produce new bricks. Zero energy had been wasted transporting old bricks to the dump or trucking new bricks to the job site.

To build on that green foundation, Clint and Kelly began searching for state-of-the-art mechanical systems that met exceedingly high efficiency standards. For heating and cooling, they decided to install a geothermal system, and drilled a well 850 feet deep. Both heating and cooling use water drawn up from the earth, extracting its relative warmth in winter and transferring heat back in summer, with the near-constant temperature of the water making heat exchange highly efficient.

The Clemens also chose a single-panel solar system (approved by the Historic District Commission) and placed it on the roof, out of sight of passersby. Four solar "tubes" running through the panel use the sun's energy to warm domestic hot water and supplement the geothermal system.

Left: A skylight illuminates the large kitchen on the second floor. Above: The vintage firepole descends to the first floor, landing in a billiard room that once accomodated horse-drawn fire pumps.

Thanks to these and other choices, the house uses no compressors and virtually no fossil fuels except for propane for the kitchen stove. And the geothermal radiant heat is so efficient, the couple often has no idea about the temperature outside.

Even the limited electrical power they purchase is distinctly green: Hose 8 is powered by energy from People's Power & Light (a local nonprofit consumers' alliance). And LED nightlights and dimmer switches permit low lighting levels and lower electrical loads.

The building is also super-insulated. The Clemens specified cellulose insulation composed of recycled newspapers with an added mold and fire retardant. By blowing the insulation into new wall and ceiling cavities, they created a dense thermal and acoustic barrier. Today the fire station is virtually soundproof, Clint Clemens says. "I have to really listen to hear the church bells right behind us."

Jeremy Robertson notes that even paints here were chosen with conservation in mind. Some purists might take issue with the oil-based paint used for the exterior, he says, but it is extremely durable paint and will last for many years. Robertson defends the decision, explaining, "durable materials are very green. Lifecycle costs need to be included in the green equation. This paint will probably last three to four times as long as a similar 'green' paint."

And that perfectly dry basement for Clint's photo archive? Foundation crews created one by pouring a new concrete slab with an additive called Xypex, which self-seals hairline cracks and remains impervious to water.

Now that the complicated years of saving Hose 8 are behind them, the Clemens take pride in the fact that all the choices they made at the station are practical and enduring: "It's like we are the custodians of a painting," Clint Clemens says. "It's up to us to take care of it. We'll be long gone and this building will still be here. Something happened to it on our watch, so we had to fix it."

Donna Paul writes about design, architecture, and lifestyle from her 1928 home in Sag Harbor, N.Y.