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## Frank Lloyd Wright House: Relocated and Reacquainted with Radiant

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# FRANK LLOYD WRIGHT HOUSE: RELOCATED AND REACQUAINTED WITH RADIANT

## Special to Radiant Living

**F**rank Lloyd Wright is unquestionably one of the greatest architects of all time, uniquely endowed with an unmatched imagination and vision. Wright is known for his organic, architectural flair and avant-garde designs that use aesthetic elements, complete with cantilevered floors that defy gravity. Among his most famous designs are Falling Water, the Dwight D. Martin House and the Price Tower.

Wright's Bachman Wilson House was originally built in 1954 along the Millstone River in the National Historic District of the Borough of Millstone, New Jersey. It was one of his "Usonian" style homes

— a distinctly "American" style house that was available and affordable to all, yet with an open floor plan, integrated with nature.

Wright designed Usonian homes to be built with only four different tradesmen: a plumber, an electrician, a mason and a carpenter. He brought the Bachman Wilson House to life with only cement block, concrete, glass and mahogany.

An architect/designer team, Lawrence and Sharon Tarantino, purchased the house in 1988. They restored it meticulously. The Hillsborough Township, New Jersey-based Tarantino Architect has led the restoration of numerous other Frank Lloyd Wright houses.



Before its big move, Wright's Bachman Wilson House was originally built in 1954 in the Borough of Millstone, New Jersey.

In August of 2011, Hurricane Irene hit the Northeast like a runaway freight train. The Millstone River flooded the Tarantino property, sending six feet of river water through the building, resulting in extensive damage to the home. In order for the Bachman Wilson House to live on as a historic monument, it had to be moved.

The Tarantinos decided that selling the house to an institution willing and able to relocate it was the best option for its preservation. Following several years of research for a potential buyer, they sold the home, (complete with all furnishings and interior fixtures) to Crystal Bridges Museum in 2013, who would turn it into a year-round, historical exhibit.

In April of 2014, Wright's masterpiece was carefully disassembled, board-by-board. Each section was laboriously inventoried, labeled and wrapped for transit. J.B. Hunt Transport Inc. charitably donated its services, transporting the house to Arkansas at no cost to Crystal Bridges.

Two giant shipping containers were carefully loaded with the dismantled house. One container made the entire 1,235-mile trek via tractor-trailer (taking over 24 hours), while the other was an intermodal transit, using both rail and road.

The construction team that the museum put together is now in the midst of piecing the house back together on site at Crystal Bridges' 120-acre property in the Northwestern corner of Arkansas.

Director of Operations Scott Eccleston estimated that it would take a year to fully reassemble and finish the house.

The home's front façade, with concrete block and mahogany trim, has a nearly fortress-like appearance that ensured privacy from the street in its original suburban location. Inside, 14-foot-tall, floor-to-ceiling plate glass windows tower over the open floor plan with red concrete floors, imprinted to show the grid work pattern that Frank Lloyd Wright used to design his homes — another architectural facet Wright loved to incorporate.

Even though Wright designed the home in 1954, it was wildly futuristic at the time. Aside from modern aesthetic characteristics, the Bachman Wilson House is equipped with green building components, such as passive solar through abundant use of natural light, and hydronic radiant floor heat.

### An exacting rebuild

The museum team is using the same methods Frank Lloyd Wright used in the original design for the reconstruction process, even down to using the same nail and screw holes.

The only exception was not an alteration — it was an addition. A basement was added to the new design so that a mechanical room could be installed out-of-sight for museumgoers. Metal decking fastened to steel joists was chosen to support the concrete floor.

Wright was one of the very first architects to use hydronic radiant heat as a key to clean, uncluttered design, chiefly because it eliminated visible heating elements such



**Wright had built the house on a grid system, which crews had to duplicate for the concrete pour.**

as ducts and a variety of terminal units. And while the original hydronic system used copper piping, the museum knowingly avoided that because of the frailty of copper when embedded in concrete. PEX tubing was chosen to transport heated fluids in the floors.

Using a grid system to build the Bachman Wilson House, Wright cast the grid lines right into the concrete, creating blocks that measure four-foot by four-foot. The grid lines (lettered horizontally and numbered vertically), show where all the homes' major elements align, so that when it was built (and now being rebuilt) workers knew, for example, that the fireplace would start exactly on grid D13 and end on E13.

"Every element in the home is on the grid or half-grid," explained Bill Faber, president of Bentonville, Arkansas-based Bill Faber Construction, the general contractor. "Reconstructing a house that's been built and disassembled once before is like a jigsaw puzzle. We're using the original boards and material to rebuild it, so everything has to piece together perfectly — including the new concrete floors — down to less than a sixteenth of an inch."

So that workers could make exact grooves to match the original grid work in the concrete without having to reach too far with the groove-making tool — potentially causing mistakes or damage — the concrete had to be poured in alternating eight-foot wide by 20-foot long strips.

Workers first installed Watts RadiantPEX+ tubing in alternating sections, with terminations in the basement below, leaving other sections untouched so that they could work in the areas without causing damage.

"Another tricky piece to the puzzle was the patio in front, and to the side of the Bachman Wilson House,"





**Workers first installed Watts RadiantPEX+ tubing in alternating sections, with terminations in the basement below.**

said Faber. “Because of year-round visitors from the museum, Crystal Bridges needed to ensure a safe and dry environment in the occasion of snow.”

### **Snowmelt, too**

“The patio was heated with radiant snowmelt,” said Cary Pestel, owner of Tulsa, Oklahoma-based Boone & Boone Sales, the manufacturers’ representative firm for the job. “Wright designed the home so that the entire structure — patio and all — would have one big concrete slab foundation.”

To accommodate those plans, the 1,400-sq.ft. patio was included in the sections to be poured. The interior sections of radiant are served by ½-inch Watts RadiantPEX+ that will have a steady 126°F flow of water going through it. The patio is warmed with 5/8-inch RadiantPEX+ with a 50% glycol/water mix running at a constant 136°F.

“The sectioned radiant installation and concrete pour also ensured that if there was ever damage to one section of the floor throughout the whole

rebuilding process, only *that* section would need to be repaired, instead of having to jackhammer the whole thing and start over again,” explained Pestel.

### **Ripley’s Believe it or Not Home Decor**

The Bachman Wilson House was designed with a second story, which is rare for a Wright home. Adding to the oddity are the home’s original, built-in mahogany beds, which appear to grow out of the mahogany flooring. Conventional forced air heating and cooling is delivered to the two bedrooms and a bathroom on the second level. The air moves through hidden vents, some visible only by close inspection under abandoned, but still standing radiators (vestiges of the original heating system), or tucked within the bedframes.

A basement mechanical room is now the main area of operations for all things mechanical and hydronic. A modulating 104,000-285,000 Btuh Viessmann Vitodens boiler will provide for all radiant heating and snowmelt.

To conserve space and save on-site mechanical fabrication time, Pestel specified the installation of three Watts Radiant Hydronex panels. The preassembled, pre-engineered hydronic control panels include a PM-4-PO primary panel, a DD-2-2 direct panel for distribution to the snow-melted surfaces, and a D-Mix, DM-2-2 for the inside floors.

“We’ll use the tekmar 664 snow-melt control with their outdoor slab sensor to control the snow-melt,” said Pestel. “Also, we’ll use the Tek519 thermostats for the inside zones. These will be mounted in the basement so they won’t be seen on the walls upstairs. They weren’t available in Frank Lloyd Wright’s times, so we are hiding them.

“Additionally, we’ll use in-slab sensors for the concrete floors, with wiring that’s run into sleeves that were installed under the slab prior to pouring the floors,” he said.

### **Humidity challenges**

Arkansas summers can reach highs in excess of 100°F, with sweltering humidity. Winter temperatures can dip into the negatives, all while holding that same humidity level. To reduce the possibility of sweating, thin vents in the concrete floor below the authentic single-pane glass walls and



**The entire structure, including the snow-melted patio outside, is radiantly heated.**

windows will constantly bathe the windows in dry air.

“Because this area is so humid, we also installed a whole-house dehumidifier system in the basement,” said Jeff Handley, owner of Seligman, Missouri-based Handley Heating. “An open plenum return pulls air from several different locations in the house to the basement, where it is dehumidified before being introduced back into the HVAC system.”

### Masterpiece restored

“For everyone involved in the process of rebuilding the Bachman Wilson House, it was a job unlike any before it. Disassembly, relocation and reconstruction of a historical masterpiece — saving it from what otherwise would have been its certain demise — was an amazing feat,” said Eccleston.

Beginning in the summer of 2015,

the Bachman Wilson House will be open to Frank Lloyd Wright devotees and museumgoers. Crystal Bridges Museum draws more than 500,000 visitors a year. People from all over

the country are already scheduling trips to Bentonville just to see the house.

Somewhere, up above, the master architect is smiling.

## Wright's WOW Factor

Frank Lloyd Wright loved dramatics. When people saw his finished products for the first time, awe and amazement were the emotions he hoped for. By design, his structures were more than mere architecture; they were designed and built to be an extraordinary, sensual experience.

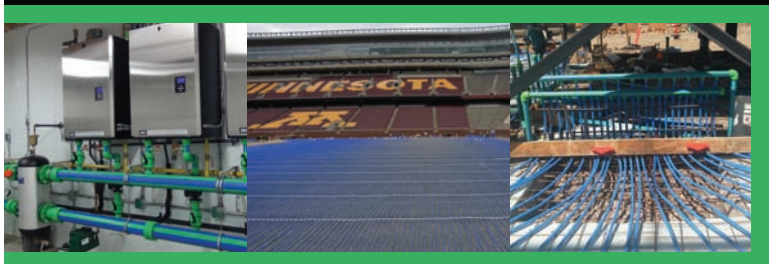
The Bachman Wilson House was designed to be entered by the front door, where visitors were immediately enveloped by 6-ft. 8-inch ceilings and narrow hallways lined by horizontal mahogany boards. They continued that way until entering the main living area when, suddenly, viewers experienced 15-foot-high ceilings, giant windows and even several all-glass corners. The horizontal mahogany quickly transitioned into long, vertical boards, making the ceiling seem that much higher.

Wright was a master of design who also mastered the wow factor.

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