

# **Clean living: Renovated Immaculate Heart of Mary motherhouse brims with Earth-friendly innovation**

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Three years ago the IHM sisters' motherhouse in Monroe was an elegant, vintage building and an enormous drain on Earth's resources. Fresh water use alone was a staggering 450 gallons an hour.

Today, after a 2 1/2-year renovation, the classic 1930s architecture encloses a new masterpiece of energy efficiency. And most of the eco-friendly techniques can be adapted by energy-conscious home owners, especially those building a new house.

On Wednesday, the 240 retired sisters who live there and 250 employees who work there will start moving back.

It's the end of the IHM sisters' long quest to create a sustainable or "green" building. To quote their literature, the sparing use of Earth's nonrenewable resources "is a spiritual and moral mandate for this 21st Century."

The renovation cost \$56 million because the nuns did not stint. They did not stress, as many remodelers do, how fast the money saved on energy would pay back money spent for quality construction.

Instead, this no-compromise project uses almost every step possible to "tread lightly on the Earth," in the nuns' words. They even built new wetlands out back that will recycle 40 percent of their wastewater.

This motherhouse is home base for the 600-member group, Sisters, Servants of the Immaculate Heart of Mary, known around southeast Michigan as social activists and superb teachers.

It's the building young women arrive at to train for life as an IHM sister and that retired nuns come home to. When built in 1932, with 18-inch walls of concrete and brick, it was deemed solid enough to last into the 23rd Century.

## **Gentle adhesives**

Now, as the building starts its new life, one of the first things a visitor may notice is that it does not smell new, despite thousands of gallons of new paint and more than 8 acres of new flooring.

"We've grown up to think that if it stinks like new, that's good," says Ronald Staley, vice president of the major contractor Christman. But the familiar smell of a new house or car is really just organic gasses that have to escape from glues and solvents.

Here, the sisters called for "low-VOC" or "no-VOC" building materials -- those low on or free of volatile organic compounds.

At 376,000 square feet, the IHM motherhouse is one of the country's largest such residential renovations. Planners and designers from around the country are coming to see it.

That suits the sisters' second goal. Besides treading lightly on the land themselves, they wanted a teaching facility that would show other groups how to do it.

They'd been researching sustainable building since 1994.

"The sisters have taught the contractors as well as the designers," says Lynn Rogien, project manager for Christman. "They know more about sustainable design, because they've been thinking sustainability all their lives."

Ron Donnell of electrical contractor Gem Industries says, "This is the first project our company has worked on where sustainability was the focus. We've done little pieces before, but it's never been the whole focus."

The constant question was the one at the heart of all sustainable building: Where did this come from, and where will it go?

In other words, did this product come from a nonrenewable source like oil or from a renewable one like plant material?

When this product is worn out, will it go to a landfill, or can it be recycled?

## **Project rundown**

The IHM motherhouse renovation is a huge undertaking. Here are highlights:

**GEOHERMAL HEATING AND COOLING:** Through last fall, the sprawling IHM campus in Monroe was covered with giraffe-like boring machines that drilled holes 450 feet deep -- 232 of them. It's one of the largest geothermal fields in the country.

Into these holes went 47 miles of water pipe, says plumbing contractor William Connors, who owns Monroe Heating & Plumbing. Pipes went down 450 feet, then back to the surface, then over to the next hole. The holes were backfilled with a clay-like compound that's a good conductor of heat.

Geothermal heat takes advantage of the constant underground temperature -- 55 degrees, no matter the weather above.

A mixture of water and antifreeze circulates inside this sealed system, drawing heat out of the ground in winter. In summer it pulls heat out of the building and sheds it into the ground.

The mechanism that handles this conversion is called a heat pump. If you were building a house, you might have a 2-ton heat pump. For this building, a special 450-ton version called a "chiller" was designed by William Devlin, an engineer at H.F. Lenz in Johnstown, Pa.

This chiller is unique, says Devlin. Usually, a large building would use multiple heat pumps. Instead, this pulls all maintenance work to one spot.

In a temperate climate, where the need for heating and cooling is about equal, a heat pump can handle both efficiently. In Michigan, though, the heat needs to be boosted, Devlin notes.

In your home, that boost would typically come from an electric heating unit. Although electric heat is more expensive than gas, geothermal heating usually is sold as part of an all-electric house. If you didn't want it that way, you'd need an expert to help you change the system to a different fuel.

The massive Monroe building uses gas-fired boilers for the extra boost. So much heat is needed for the cold climate and the large building, it makes sense to use the cheaper fuel.

The Monroe system also has:

- Heat-recovery devices at spots where air is exhausted from the building. These save heat from being blown outside and warm fresh air that comes in.
- A heating and cooling control in every room, rather than zoned temperature settings. Elderly residents can dial up for their own comfort without overheating the whole building. In addition, each resident can open their window if they want -- rare in a new or remodeled large building.
- A device that delivers fresh warmed or cooled air to each room from outside -- a new industry standard, says designer Devlin.

**ENLIGHTENED REWIRING:** Power was puny with the old-fashioned wiring, but the energy drain was great. Now the building has state-of-the-art electrical service, at a restrained cost.

Gem Industries rewired with ample electrical power, plus very high-quality voice, data and video systems. Donnell says these should be good for two generations of technical upgrades. That includes teleconferencing and a phone and high-speed computer wire to each room. Previously, all the residents on one hall shared one phone.

At the same time, Gem rewired the hundreds of existing light fixtures -- many quite handsome -- for fluorescent bulbs. All new fixtures use new-generation fluorescent bulbs. These can be as small as an incandescent bulb and less green-tinged than their predecessors.

The savings will be 30-40 percent of lighting costs, Donnell says, the biggest component of electrical use. What's more, the whole electrical system could be smaller because of the efficient design.

In your own house, these changes are very easy to make during new construction and only a little bit more difficult if you're rewiring.

**WATER RECYCLING AND REDUCTION:** Behind the motherhouse, earth-movers sculpted 3 acres of wetlands, now planted with spike rush, soft rush, soft-stem bulrush, coontail, waterweed, wild celery and marsh marigold.

These plants and bacteria, sunlight and wind will filter and cleanse about 7,200 gallons of "graywater" a day. That's water that drains from showers and sinks, as opposed to toilet sewage.

So the fresh city water delivered to sinks and showers is not sent to sewage treatment. It's filtered and cleaned in the wetland and brought back into the house to use for flushing. With 400 to 500 people in the motherhouse each day, that's a lot of water saved -- 40 percent of the previous volume. In addition, all toilets, showers and sinks are outfitted with low-flow plumbing. Together these systems will save about 55 percent of the fresh water used before -- 2.7 million gallons a year.

A wetlands system like this might be extreme in a single household, but it could be built for community use. Switching to low-flow faucets and toilets is fairly easy and cheap.

**PRESERVATION-REUSE:** The IHM motherhouse was constructed as a fine building in 1932, with cherry doors, cedar cabinets, marble bathroom stalls and handsome architectural details.

Christman, the major contractor, is a 100-year-old company that has specialized in historic preservation for the past 14 years. Previous projects include the State Capitol in Lansing and Henry Ford's Dearborn estate, Fair Lane.

Virtually all the better materials in the motherhouse were recycled and reused. The 800 wood windows were rebuilt. The 450 doors, plus the woodwork and parquet floors were refinished and reused. Old bathroom stalls were cut into hundreds of marble window sills. All period light fixtures were rewired.

Building materials that still had some life -- like sinks, toilets and ductwork -- were sent to the Ann Arbor Reuse Center.

Even refuse found a use. The plaster walls that were torn out to open up living spaces were crushed and laid down as temporary construction roads.

**EARTH-FRIENDLY INTERIOR:** Flooring materials are low on the totem pole in planning a sustainable building, says Bob Pollock of Continental Interiors. But they have a lot of impact. The majority of carpet and vinyl flooring is petroleum-based.

"The flooring industry is a lot like the auto industry," Pollock says. "We take material out of the earth, use it, then throw it away."

The IHM sisters worked with his company because it represents Interface Americas of Georgia, the rare flooring company that recycles what it sells.

The company guarantees that each carpet bought will contain recycled material. Then when the carpet wears out, the company will take it back and reuse it.

"The sisters flew down to Georgia to interview the CEO," Pollock says, "to verify that the corporate philosophy was one they wanted to do business with. They didn't just pick carpet samples."

Other Earth-friendly materials in the motherhouse include hall and stair floors made of cork. It's sliced from trees, which grow again, and it lasts for decades. For wet areas like kitchens, the sisters bypassed today's common vinyl floor for linoleum -- made of wood products bound with linseed oil.

This building used 25,000 square feet of cork, 50,000 square feet of linoleum and 500,000 square feet of carpet. All adhesives used to install floors were made of water-based low VOC compounds.

Rogien says the up-front cost of a green or sustainable building is about 7 percent higher than a conventional one. Costs here were higher though, because of special projects like the wetlands.

And at every step, says Ron Donnell, the sisters looked at life-cycle cost. "They were choosing for the long term, and for the people who would come after them."

That's the reverse of what's common in commercial projects, he says. "It's usually the initial cost that drives the project."

Rogien says the investment is worth it.

"If you look at this building versus a less costly building, over 20 to 25 years this building will last longer and perform better and do it at less cost."

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