# SUNLIGHT Heats Up Chicago

*The structure was designed as a heat storage mass. Photos courtesy of Howard Alan.*

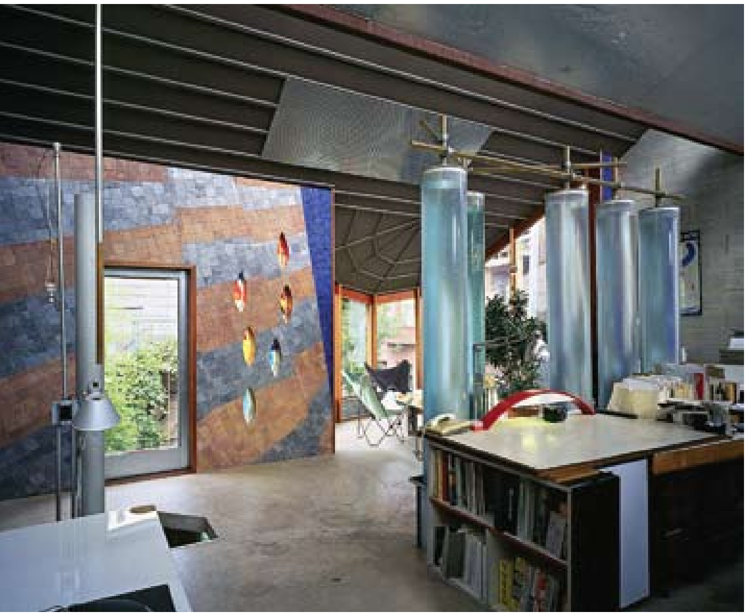
## Passive solar design makes your building work for you.

Tucked in the tiny Lincoln Park neighborhood of Chicago, there's a quiet revolution going on. There you'll find a slice of organic architecture and passive solar design rubbing elbows with million-dollar-manses.

But you wouldn't know it, save for the eclectic design that stands toe-to-toe with other unique and interesting architectures in this booming community of Gen Xers and recent college graduates.

That's where architect Howard Alan, principal of the design-build firm Howard Alan Architects, has his studio, in the back of a parcel which also houses his primary home. Located a mere mile and a half from Lake Michigan, he's been there for decades and has witnessed the metamorphosis of the area from working class Chicago to the heights of gentrification, but all along he's stayed steadfast with his mission to match a building and its construction to its surroundings — the definition of organic architecture — and that includes passive solar heating.

In fact, the Alan studio uses 50% less energy than a similar spatial volume at his other residence at the front of the same property, thanks to passive solar design.



*The building walls have an R-value of 31.7.*

"Passive solar design carries with it an act of redefining one's home living style," Alan says. "Adjusting to an open living environment makes harvesting light and heat directly from the sun more efficient, resulting in less stress on the mind and body. Active solar systems make no demand to renew or simplify one's living patterns. Rarely do the owners of active solar systems know how to read and/or adjust the controls of those systems and are forced to call in professionals. Of course they can learn to monitor and adjust their system if they have the time," he says.

An active solar system collects solar energy and converts it into energy our appliances can use to power themselves, while a passive solar system keeps solar energy intact in some sort of storage mass that allows the stored energy to radiate out when it's not being collected.

The entire second floor of the Alan studio is designed to capture the sun's heat and store it in the masonry walls, the concrete floor and in five fiberglass tubes of water that extend into the first floor. The heat stored in each of these components is passively radiated into living spaces when the sun goes down.

The exterior walls act exactly like a winter coat, keeping heat from radiating out to the colder outdoors. Clad in metal, the exterior walls are constructed of a roof-grade moisture barrier over structural insulated panels (SIPs) — which, coincidentally, were some of the first SIPs created in the country. These SIPs are a "sandwich" of exterior-grade plywood and drywall with polyurethane insulation between them, creating a very tight and well-insulated building.

*The walls are 6-inch-thick concrete masonry units insulated on the exterior with SIPs.*

*Five fiberglass tubes of water hold heat captured from sunlight.*

### Passive Solar Storage Components

The first component of the storage mass consists of walls of 6-inch-thick concrete masonry units (CMUs) filled with concrete and stacked against the SIPs almost all the way to the ceiling. The two sets of walls, SIPs and CMUs, add up to a very effective total wall R-value of 31.7. In case you haven't run into the term R-value yet, it is a measure of how well a material allows heat to pass through it. The larger the number, the better the material insulates.

The second component of storage mass is the fiberglass tubes, which each contain 18 cubic feet of water. They can radiate 62.4 BTUs of stored energy per cubic foot for every one-degree temperature increase gained during the day. In this way, all temperature increases are stored and released later for the comfort of the building's occupants.

The structure has three sets of daylighting clerestories on the south side of the building that allow sunlight in for storage in the walls and water tubes. The ceiling has an R-value of 46.8, making this building extremely energy efficient. This passive solar heating system provides 50% of the heat needed, and a natural gas-powered radiant heating system is embedded in the concrete floors for any necessary backup heat.

*By Deborah L. O'Mara*

## RESOURCES

Howard Alan Architects, **www.howardalanarchitects.com**

The American Solar Energy Society, **www.ases.org**

FindSolar.com, **www.findsolar.com**

The Interstate Renewable Energy Council, **www.irecusa.org**

Solar Electric Power Association, **www.solarelectricpower.org**

Solar Energy Industries Association, **www.seia.org**

Woodhenge, Adams Center, New York, **www.woodhenge.org**