

The Greenhouse

The Herman Miller Greenhouse was completed in October 1995.

Located in West Michigan, this building is a combined manufacturing plant and office space of approximately 293,500 square feet for 400 people. This includes a two-shift warehouse and assembly area for 300 first shift, 53 second shift, and offices for 140 (12/04/02). The design incorporates many green building concepts.

Ecological Harmony

Architect Bill McDonough led the design team that developed the Greenhouse. Bill incorporates into his design approach biologist John Todd's idea that a building should be a "living machine" rather than a machine for living, using nature as the metaphor for a building that is alive and responsive to its inhabitants and changing climatic conditions. A "living machine" allows people to experience the cyclical changes of day to night and season to season, as well as variations of weather.

The Greenhouse was designed to take advantage of existing regional and site assets. It is placed to follow the curve of a natural ridge on the site's high point to allow water to drain naturally from the site. The landscape has been carefully sculpted into a series of layers and sedimentation basins that slope toward the Macatawa River at the front of the site. The layering and planting act as a cleansing system that slows and filters storm water runoff from the parking lots and the building through a series of six acres of constructed wetlands that flow into the river.

Native plantings cover the entire site, eliminating the need for fertilization, irrigation, herbicides, and lawn-mowing equipment. Wetland plants like cattails and bulrushes absorb more water than a traditional bluegrass lawn and help to break down petroleum and metal pollutants. Hedgerows of shrubbery and stands of ash and oak will buffer the site from wind and snow and attract the array of wildlife that normally inhabits Michigan woodlands, fields and wetlands. Trees planted in the parking areas will minimize the solar impact on pavement and vehicles.

The materials for this project were selected taking into consideration embodied energy, toxicity, off-gassing, finish and maintenance requirements, recyclability, adaptability, durability, and flexibility.

Reduction of Waste and Energy

This building was designed to optimize resources. Using a detailed review of available data to evaluate the use of energy, materials, and process and their adaptation to structures, we made design decisions that invested in the future by using assets wisely.

Herman Miller intends to be a "waste-free" company. Currently 85 percent of the company's by-products are reused in some productive way. The Greenhouse's design includes special areas for the collection and sorting of materials to be converted to energy, reused, recycled, or composted. During construction, unused materials from the building construction process were collected, sorted, and processed in the same way.

The building design conserves water through the runoff treatment methods described above and through special plumbing fixtures that minimize waste.

The Greenhouse's use of energy is optimized by its approach to daylighting. A sophisticated arrangement of operable windows, skylights, and clerestories allows the sun to penetrate the building from many angles, resulting in dramatic lighting energy savings, even though Michigan experiences around 30 percent direct solar exposure a year.

A variety of glass coverings have been used to insulate, diffuse, and filter the light as necessary. In some areas, electronic solar control devices, controlled by building occupants, provide shading as necessary.

High-efficiency artificial lights are controlled with electronic sensors that dim them when daylighting is sufficient. Motion sensors are installed in areas where continuous lighting is unnecessary. All lighting specifications comply with or exceed "Greenlights" guidelines and all operational equipment is designed to comply with or exceed "Energy Star" guidelines.

The offices are serviced by a central centrifugal chiller using a HFC 134a refrigerant. Direct digital controls dramatically reduce energy use. In-floor hot water heating along the perimeter of exterior office walls is used to provide a comfortable and energy-efficient environment in the winter.

The plant area has three large air rotation units to turn the air over every thirty minutes. Approximately 80,000 CFM of fresh air will be introduced into the plant after it is tempered (if necessary) and filtered.

Facing southwest, the Greenhouse is sited to maximize solar gain. Interior block walls strategically placed under south-facing glass provide passive solar heating for the building. Natural ventilation creates air currents through the space, using operable windows when the weather permits.

The building is located as a convenient buffer between a freeway and a residential development, giving workers the opportunity to walk or bike to work on a local system of trails. For those using motorized vehicles, efficiently designed parking lots and driveways minimize traffic on the site and separate cars and trucks.

Visual Harmony

When seen from afar, the building view is dominated by native trees, grasses, and wildflowers. Closer in, land shape and landscape lead toward the building. One moves into the site through a layered series of woods, hedgerows, and grass fields, and up past wetlands and lowlands to uplands. The landscape and building are linked physically, visually, and environmentally.

At the building, the relationship between inside and out is enhanced by the siting, which locates the Greenhouse solidly and appropriately in the landscape, and by carefully placed windows and vistas that display the natural setting from the interior.

Reforestation and landforms in horizontal layers at the perimeter of the site will provide shelter, buffer winter winds and wind-blown snow, and visually screen adjacent homes from car and truck lights and noise.

The curved form, receding layered elevations, and use of glass reduce the building's visible mass. Although the structure is large, its full length and height are not experienced when viewed from the road.

Innovative Achievement

Achieving an elegant balance among the multitude layers of requirement is the greatest innovation of this project. The long, narrow design uses the site efficiently while keeping its natural landscape features intact and developing a rich habitat for wildlife. It provides tremendous efficiency for “just in time” operational needs while remaining flexible for quick plant layout changes and future expansion. It encourages a sense of community for the Greenhouse occupants and at the same time is an asset to the adjoining neighborhood and community. It dramatically reduces waste output and energy use within the constraints of a very real budget and schedule.

Awards: ISO14000 Certification July, 2003

The first annual *Business Week/Architectural Record* "Good Design is Good Business" Award

The Michigan Audubon Society's Annual Corporate Award for Environmental Stewardship

The President of the United States Environmental and Conservation Challenge Award

2000 - The LEED Pioneer Award (Leadership in Energy and Environmental Design) from the United States

Green Building Council

1995 - International Development Research Council Distinguished Service Award for Environmental Planning

1995 – Renew America – Environmental Sustainability Award