Green Projects Entry

The Renovation of the Motherhouse (o)

Section 1 - Project Overview Information Part 1

Project name:	The Renovation of the Motherhouse (o)
Project owner:	Sisters, Servants of the Immaculate Heart of Mary
Project address:	610 Elm Street Monroe, MI 48162

Section 2 - Project Overview Information Part 2

Project completion date:	1/2003 *(m/y) format*
Project Site:	Previously Developed
Project type:	Special needs housing
Project site context/setting:	Urban
Other Building description:	New
Lot size:	280.00 acres
Building gross floor area:	380000 ft2
BOMA floor area method used?:	no
Number of permanent occupants:	440
Number of visitors:	300
Occupants (hours/week/occupant):	80
Visitors (hours/week/visitor):	2
Total project cost:	$55,000,000

Section 3 - Project Overview General Description

General description: When the Sisters, Servants of the Immaculate Heart of Mary (SSIHM) recognized that their order was diminishing, they asked the Design Team to embark on a collaborative, long-range planning process to determine the best way to achieve an ecologically sustainable 21st century community on their 280-acre site in southern Michigan, because they believe that sustainability is the moral mandate for the 21st Century. Many of the structures on their property were built in the 1930's and are historically significant, so any proposed rehabilitation required review by the State Historic Preservation Office. Although a majority of the Sisters could live independently, many required some assistance, and those needs were not being met in the current facility that was originally designed for dormitory style living for young women, not for frail elderly. The Design Team met the complex programmatic challenge by designing 380,000 square feet of construction that utilized the existing structures to best meet the owner's very specific housing, long term care and spiritual needs, while achieving sustainable and preservation goals. The Team also succeeded in making this austere former convent into a warm and friendly home, with a strong focus on Nature and the surrounding site.

Section 4 - Top Ten Measures

Top Ten Measure 1: Sustainable Design Intent & Innovation

Key environmental aspects:	The Sisters wanted to leave a legacy to future generations with this project. One of the missions of their order is to respect the Earth and promote eco-justice, so the hope was to create a community that would exemplify these ideals. Since the SSIHM congregation is known for its teaching excellence, the Sisters saw this project as an opportunity to teach the public about important environmental issues. Throughout the design process, issues that the Design Team was studying with the Sisters were presented to neighbors so they could learn about how to live with more respect for the environment. Even if suggested strategies had a very long payback (longer than many of them would live), the Sisters still chose to incorporate them to be able to teach about them – the ground coupled HVAC system and the gray water system are examples. The constructed project dramatically showcases many of the sustainable strategies, through exhibits and signage prepared by the Sisters. In addition, the once enclosed and dark buildings were renovated by the Design Team to focus both visitors and residents, even those too infirm to go outdoors, on the beautiful site and the amazing things that SSIHM did with it.

Top Ten Measure 2: Regional/Community Design & Connectivity

Regional/Community Design:	Even before the renovation, the IHM Campus was an important part of the local community because, through the Sisters' generosity, it had long been used by neighbors as parkland. The rolling lawns and pathways were enjoyed by all - many neighbors take short cuts through the campus. IHM has always been happy to coexist with the community in this way. When the landscape architect recommended that the Sisters restore the indigenous oak savannah landscape that had been infiltrated with invasives by removing some trees (!) and return the lawns to meadow to eliminate wasteful watering and mowing, the Sisters were concerned that community park users would be upset. In response, they made special presentations to help neighbors understand why these changes to "their park" were the right thing to do. The project also provided less parking than required by code. By changing the Campus's zoning to a Planned Unit Development and showing that carpooling and van use strategies reduced the need for on-site parking, the Design Team eliminated over 300 parking spaces. The Sisters were also successful in getting the municipal bus line to make a stop at the Motherhouse!

Use other transport options:	25%
Parking spaces per person:	0.66

Top Ten Measure 3: Land Use & Site Ecology

Site ecology:	The most critical decisions the Sisters made in conceptualizing how best to use their property were: to stay on the site, to renovate their buildings and, most importantly, to resist offers from hungry developers to “McMansionize” their 280 acres. Preservation of the open space, with the possibility of developing a small sustainable eco-village in the future, is part of the IHM mission and holds with the congregation’s desire to remain Monroe’s unofficial city park. The Sisters also respected the historical value of their buildings, strongly believing that preservation of historically significant structures was also in keeping with their Mission. Although this phase of the project involved the renovation of the Motherhouse and Dining Building, future plans include reuse of St. Mary Center, an adjacent structure, as a Center of Sustainability. When the congregation learned that their site compromised some of the last remnants of native oak savannah habitat, they encouraged the landscape architect’s plans to protect it and develop a maintenance policy for removing invasives. In addition, the water and energy consuming lawns were roto-tilled, not sprayed with herbicide, to prepare for native meadow plantings which required no watering, mowing and encouraged wildlife species to make the Campus their home.

Top Ten Measure 4: Bioclimatic Design

Bioclimatic design: As a renovation project without new construction, orientation and siting were a given; however, certain strategies in the renovation and site design contributed substantially to making the campus a more environmentally sensitive residential community. The existing buildings are oriented primarily on an East/West access, meaning that a majority of the living spaces are oriented to the North or to the South. Since window openings are quite large, it was important for those window units facing south to be restored to reduce direct UV and heat gain. Although many residents felt that having direct sunlight was the most desirable option, the Design Team created more view opportunities to please the residents facing north. These north-facing rooms have another perk – direct access to a veranda that allows residents to spend summer months outdoors protected from direct sunlight by the roof overhang. Another aspect of the design which makes the most of the site is the geothermal design. Geotechnical studies indicated that the subsurface conditions were particularly suitable for this type of installation, and, although initial costs were high, the Sisters endorsed implementation because they wanted to make the community aware of this heating/cooling option.

Top Ten Measure 5: Light & Air

Light & Air: Daylight, views and natural ventilation are extremely important to the Sisters, many of whom are not able to go outside due to poor health. Connections to the outdoors are a key component to the renovation design. All of the Sisters rooms have multiple windows, all operable. Since the Motherhouse is organized around creating small communities of 10 – 12 Sisters, sharing a living room, kitchen and laundry, the Design Team opened the shared spaces to the corridors, allowing circulation spaces to be lit by daylight as well. On lower levels, the cloistered walkways, which had been turned into storage rooms and programmed space, were reincorporated as walkways. With the arched opening extending to the walkway floor, Sisters feel like they are outdoors, especially since many can be opened to let in breezes in warm months. The "Community Room" situated below the chapel - the heart of the congregation - spans between two newly created landscaped courtyards. Here, Sisters can all assemble, either informally or for special programs, and enjoy views of the gardens and fresh air flowing from one courtyard, through the community room, to the other, without even going outside.

Percent of building area that is daylit:	93%
Percent of building that can be ventilated or cooled with operable windows :	88%

Top Ten Measure 6: Water Cycle

Water Cycle: The Sisters were concerned that by meeting programmatic needs for future users who would require a private bathroom and tripling the number of fixtures, they would consume substantially more water. To keep this from occurring, the Design Team specified only low-flow plumbing fixtures. This strategy alone was insufficient to reduce water consumption to below pre-renovation amounts. The gray water system that was implemented routes all of the shower and lavatory water to a constructed wetlands, where it is purified and used for flushing toilets. Even though there are three times the fixtures, IHM uses only half of the potable water it used prior to the renovation. The wetlands also serve

another purpose. They, along with vegetated swales in the parking areas, collect storm water run-off, with the result that the new design keeps all storm water on site. This is especially important in Monroe where the city storm water system was already overtaxed. The design convinced a doubting City government and local civil engineer of the merits of a gray water system with a constructed wetlands. The wetland area has become a site amenity that attracts many bird and butterfly species.

Precipitation managed on site:	100%
Total water used indoors:	1830000 gal/yr
Total water used outdoors:	0 gal/yr
Percent of total water from reclaimed sources:	0%
Percent wastewater reused on-site:	31%
Calculated annual potable water use:	4.82 gal/sf/yr

Top Ten Measure 7: Energy Flows & Energy Future

Energy description:

Residential rooms were laid out to provide each occupant with sufficient natural light to illuminate living spaces during daylight hours. This has a great impact on energy consumption in the building because most of the Sisters retire shortly after dinner and rise at daybreak, so artificial illumination is limited to a few hours a day. All lamps in the Sisters' rooms were custom designed to utilize only energy efficient lamps. The cloistered walkways have daylight sensors and group spaces, such as conference rooms and program areas, have occupancy sensors. All of the windows in occupied spaces are operable, and French doors in circulation areas and larger spaces provide natural ventilation and beautiful views throughout.

Even though the payback on the ground-coupled geothermal system that was implemented was many years in the future, the driving force behind its selection was the elimination of the need for fossil fuels as mandated by the Sisters. A challenge to making the system as energy efficient as possible was the high indoor winter design temperature and the requirements to preserve the historic structure. Michigan is very cold in the winter and the elderly occupants like the ambient temperature higher than most. In order to preserve the exterior brick, we could not insulate the walls without causing permanent harm to them. Double glazing the windows helps, but the fact that they are operable makes for greater infiltration. The project saves nearly 20% of the energy that would've been used had all of the energy efficiency measures - such as direct injection outside air distribution, use of a chiller in geothermal mode and dessicant heat recovery - not been employed. Trane TRACE 700 V.4.1 was used for the energy simulation. Future projects include a solar powered carport which would recharge hybrid cars parked below.

Performance Rating

EPA	54
HERS	0
Percent total energy savings	18

	Base Case	Design Case
Total energy (Btu/sf/yr)	208401	170725
Electricity (Btu/sf/yr)	143220	93185
Natural gas (Btu/sf/yr)	69629	81130
Other: (Btu/sf/yr)		
Heating (Btu/sf/yr)	65650	77950
Cooling (Btu/sf/yr)	116150	66120
Cooling capacity (sf/ton)	835	835
Lighting load connected (W/sf)	0.75	0.75

Lighting load after controls (W/sf)		0.75
Plug load (W/sf)		0.5
Peak electricity demand (W/sf)	5.7	2.5
Percent on-site renewable energy (%)		
Percent grid-supplied renewable energy (%)		

Supplemental Narrative

Please see Energy Data Attachment above.

Top Ten Measure 8: Materials & Construction

Materials description: Early in the design process the Design Team and the Sisters concluded that the existing interior layout would not meet the current and future residents' needs – the corridors did not meet code, the group bathrooms were inappropriate for the elderly, and many of the habitable rooms were dark. In order to justify the 90% demolition of interior partitions, this project became an exemplary model of reuse and recycling. As a first step, the firebrick interior partitions were ground up on site and used as the subbase for the parking areas. Existing carpeting, which accounted for a substantial amount of the flooring, was recycled as was ceiling tile. All of the interior doors were refinished and reused, and hardware sets and door frames recycled. Most of the built-ins and casework were salvaged and relocated in the new design. Marble toilet stall partitions were made into countertops. All construction workers attended an orientation program, detailing the importance of demolition and construction recycling. It is amazing that a project of this size used so little new construction material. When new materials were specified, the Design Team was successful in incorporating local materials 70% of the time, many of them with recycled content.

Top Ten Measure 9: Long Life, Loose Fit

Long life, loose fit: An important goal of this project was to design a facility that would suit the Sisters' needs, while also looking to the needs of future users. A market analysis confirmed that the elderly population of Southeast Michigan would be interested in living in a facility such as the Motherhouse, after the retired Sisters stopped being the primary population. To suit the Sisters' and the future occupants' needs, the following facilities were included in the design: efficiency residences with private bath, both assisted living and skilled care facilities with health care and dining, future possibility of dining within the residential areas, various laundry options, with an ambiance that is dignified in an historically significant structure. All of the materials were selected for their durability as well as sustainability. Materials were also chosen to be compatible with the original design of the buildings, which are an important part of the architectural heritage of the area. As the Sisters hoped from the beginning of the project, the building and the site are their legacies to the community and the environment which has played an important role in each of their lives.

Top Ten Measure 10: Collective Wisdom & Feedback Loops

Collective Wisdom & Feedback Loops: The design process for this project was an amazing experience. Although this is private property and the Sisters were not obligated to present what they were planning to the community, they embraced community education right from the start. If there were issues that were sensitive to the community, such as the creation of the constructed wetlands (There was a rumor that it would be a

mosquito breeding "cesspool!"), the Sisters went the distance to assure neighbors that their fears were groundless. Some design choices were more difficult than others. When a difficult choice had to be made with complex variables, the Design Team prepared evaluation matrices for discussion and decision by the Project Team, including the Consultants, Client and End Users. Now that the project is complete, the Sisters are still intent on spreading the word. They have created displays throughout to instruct visitors about the sustainable features of their project. A large salon on the main floor of the Motherhouse has been given over to the display of the design and construction of the project. Since the renovated Motherhouse opened in 2003, thousands of visitors have toured the building and learned what this congregation has accomplished.

Section 5 - Project Economics

Finance:

The Motherhouse Renovation was funded entirely by the Sisters themselves for a number of reasons. Although one of the goals of the project was to design every aspect of the project in conformance with Michigan SHPO, a rehabilitation tax credit could not be considered because IHM, as a religious institution, was not a taxpayer. To reorganize the congregation and project to create a taxable entity was cumbersome. The Design Team also learned, while trying to secure foundation grants and special subsidy programs, that virtually all organizations approached would not consider funding groups with religious affiliations. With this knowledge – that the expense for the construction would fall to them - the Sisters still refused to sacrifice long lasting solutions for short term savings. The building that was being renovated was in amazingly good condition after 70 years of use, and they were committed to building something that would last as long. To that end all components of this project were evaluated by the entire Project Team, including the Sisters, for sustainability, historic appropriateness and value. However, several manufacturers, such as Interface Carpet, were willing to offer IHM price breaks because they believed in what the Sisters were doing.

Cost and payback analysis:

Since the average age of the residents of the Motherhouse was eighty at the time of the project completion, payback was less of an issue than it might have been for another client. The Sisters were willing to look ahead to the payback for the next Owner in twenty-five years. They could justify, therefore, a payback on the geothermal system of twenty years and on the gray water system of thirty years. Those two systems were implemented not to save money in the short term, but save money, fossil fuel, and water in the long run. Teaching a reluctant community about ways to protect the environment was the goal. The paybacks on many of the other systems in the building were not quantified, because the Sisters did not need justification to utilize them. Cork flooring was installed in many of the public corridors because it is easy on the feet, a rapidly renewable material, AND the cork flooring in their existing building had lasted 70 years. Even though the cost of refinishing interior wood doors was comparable to purchasing new doors, everyone was convinced that they would not last as long, and feel as much "like home."

Section 6 - Process and Results

PreDesign:

The first step was a collaborative master planning process during which a team consisting of planners, geriatric planners, organic farmers, architects, landscape architects, lighting designers, energy experts, economic advisors and MEP engineers met with IHM to determine the best and most sustainable use of the 280-acre site. Input from all of these entities, even in the early planning stages, set the groundwork for this project. Conceptual space planning, which followed the master planning phase, also involved the consultant and client team, so that decisions made early on supported the project mission.

Design:	Due to the Planning Team's rapport with the Owner and knowledge of project issues, IHM hired it to design Phase One. In schematic design, the construction management firm, with a strong background in historic preservation and a willingness to learn about sustainable design, joined the Project Team. This was especially important because the Architect got local pricing information as well as constructability and supply insights right from the start. All design decisions were made collaboratively, with the Sisters' input as well. A local civil engineer was also hired to help the Team wade through City concerns about reduced parking and constructed wetlands.
Construction Process:	Since the CM, who was also the project builder, was involved with the project from Schematic Design, construction was organized to be sensitive to the environmental concerns of the Sisters. Demolition and construction recycling initiatives were championed by the CM, who also instructed ALL of the subcontractors, prior to commencement of work, of the Client's environmental goals. In the end, some of the most dubious of the sub-contractors were won over to the Sisters' way of building.
Operations/maintenance:	Requirements for O&M training and commissioning were included in the specifications for the project, as per USGBC LEED 2.1, so the CM designated a fulltime person to oversee the assembly of O&M documents, conduct training and oversee the commissioning of the building. All of the Design Team professionals assisted in the definition of these requirements.
Commissioning:	Please see above: Operations/maintenance.
Measurement & verification/ post-occupancy evaluation:	

Rating System Name:
Version:
Rating Date:
Score or rating level:
Credits:

Sections 7: Visuals

Exhibit A

CourtyardBeforeAfter.jpg

Image has been scaled down. Click it to view actual size...

Description: Courtyard Before and After

Exhibit B

MainLobby.jpg

Image has been scaled down. Click it to view actual size...

Description: Main Lobby Before and After

Exhibit C

CloisterBeforeandAfter.jpg

Image has been scaled down. Click it to view actual size...

Description: Cloister Before and After

Exhibit D

ConstructedWetlandsBeforeandAfter.jpg

Image has been scaled down. Click it to view actual size...

Description: Constructed Wetlands; Landscape Before and After: Converted Lawn to Native Meadows

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Exhibit E

MechanicalRoomBeforeandAfter.jpg

Image has been scaled down. Click it to view actual size...

Description: Mechanical Room Before and After

Exhibit F

AerialContextPlan.jpg

Image has been scaled down. Click it to view actual size...

Description: Aerial View of Campus; Context Plan

Exhibit G

IHMLabeledSitePlan.jpg

Image has been scaled down. Click it to view actual size...

Description: Site Plan; Context Plan

Exhibit H

GroundFloorWithLandscapeandScale.jpg 

Image has been scaled down. Click it to view actual size...

Description: Ground Floor Plan

Exhibit I

CloisterSection.jpg 

Image has been scaled down. Click it to view actual size...

Description: Cloister Section

Exhibit J

SouthMainElevation.jpg 

Image has been scaled down. Click it to view actual size...

Description: Main Elevation (South)