

# Kresge Foundation

*Troy, Michigan*



*Case Study*

## KRESGE FOUNDATION PROMOTES THE WELL-BEING OF MANKIND BY SUPPORTING SUSTAINABLE INNOVATION

The Kresge Foundation, an independent, private foundation, was created in 1924 by Sebastian S. Kresge to “support organizations whose object is to promote the well-being of mankind.” It is one of the largest foundations in the United States with assets over \$3 billion. The Foundation intends to support green planning and significant innovation in sustainable design and defines an environmentally sustainable building as “a building, which in its design, construction, and operation, makes a minimal draw on non-renewable resources and gives high priority to respecting the physical environment.” In 2004, the Kresge Foundation renovated its headquarters and created a sustainable office space. The facility consists of 19<sup>th</sup> century buildings and a 19,500 square-foot structure located on a three-acre site. This site exemplifies sustainability because it incorporates historical site preservation, green design, and modern technology.

### Materials Selection

The new office space incorporates 27% recycled materials. The use of renewable and/or recycled materials is important because it creates less landfill waste. Sixty seven percent of all materials used came from within 500 miles, thus reducing expense and energy used for transportation of the materials to the construction site. Large portions of the office building are embedded into the earth; therefore the site relies on many retaining walls for structure. These walls were formed with gabions as an alternative to traditional concrete.

The gabions are baskets of recycled concrete finished with crushed granite. The retaining walls contain more recycled concrete than was created by the demolition of the former Kresge office building, sparing it from the landfill. Advantages of the gabion walls are lower initial cost, use of demolition waste and the attractive appearance.



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Wood flooring and desks are made from rapidly-renewable wheat board, finished with a veneer of FSC-certified wood. Important features of the certified wood are very small cost premium and assurance that the wood is from sustainably managed forests. The Forest Stewardship Council (FSC) is a nonprofit organization that sets standards for forestry practices that are environmentally responsible, socially beneficial, and economically viable.

Walls are painted with milk paint, made from milk protein, herbs and minerals and contain no volatile organic compounds (VOCs), which are linked to short- and long-term health risks.

Window shades are made of recycled plastic fabric. The window shades increased occupant thermal comfort, reduced glare and can be reused repeatedly.

### **Geothermal System**

A geothermal system uses the constant 55 degree temperature of the earth to help heat and cool the building. Water flows through the system's tubes in the ground and then returns to the heat pump which either releases heat in the water in the winter or "reverses" the process in the summer to release the cool air into the building. This system is expected to use 20% less energy than a traditional system for heating and cooling the facilities. Additionally, because this system does not rely on burning fuels either on-site or at a power plant, harmful emissions that degrade our air quality and contribute to acid rain are not produced. Advantages of the geothermal system are the low energy/operating cost, no carbon dioxide generation, and no need for gas hookup.

### **Energy Management**

The site plan for the new construction produced the greatest energy savings for the Foundation by constructing the longest wings of the building facing north and south to maximize sun exposure. This orientation, which involved strategic site planning and not material expense, provides the interior spaces with more natural interior lighting

and creates less reliance on artificial light. Fifty-two percent of the building's north-south façade is glass, while only 29% of its east-west façade is glass. The differences in surface area and opacity allow cool northern daylight and controlled southern light to penetrate the building while shading it from morning and afternoon light that is more difficult to control.

Attractive sunshades and light shelves were installed at moderate first cost and the result was significant energy savings. During the winter, when the sun is low in the sky, light and warmth enter the building from overhanging sunshades on the building's south sides. When the summer sun is high in the sky, the sunshades block hot, direct rays. Exterior sunshades and interior light shelves work together to bounce indirect natural light deeply and evenly into the building's interior. This harvested light is monitored and complemented by just the right amount of artificial lighting for a pleasant worker experience with minimal use of energy.

A monitored light system was installed with motion sensors to promote security and ensure a comfortable work environment. Although there was a cost associated with specialized controls, the result was low energy and operating costs.

The Kresge office building is super-insulated. Its walls and roofs provide double the thermal resistance of the typical office building. Two-thirds of the 19,500 square foot building is located in the lower courtyard level. One wing is embedded in the earth, where year-round temperatures remain near 55 degrees, which provides natural insulation and shelters the building from temperature change so that less energy is needed to heat and cool the building. The interior remains cooler in the summer and is insulated in the winter. The result is significant ongoing savings from high energy performance.

A staff entrance was designed to act as a link between the new building's two wings. Since no one works in the staff entrance, the space is simply tempered in the winter and summer. This small change resulted in a 2.5% annual savings in energy use for the entire building.



A raised floor system allows Kresge staff to control their workspace temperatures using adjustable vents. This increases individual comfort and encourages eco-friendly behaviors. Without individualized controls, people tend to work against buildings systems, which can compromise energy and cost savings. The raised floor ultimately increased the energy savings and resulted in smaller distance required between floors.

The building is partially covered by four green roofs—each populated with drought-resistant native plants. Instead of deep soil, the rooftop plants are rooted in five fine layers of materials selected to irrigate foliage and protect the building's interior. The remaining roof is covered with a membrane light in color so that it reflects, rather than absorbs, sunlight and solar energy back into the atmosphere to minimize heat pollution. The green roof extended the life expectancy of the covered roof materials, provides insulation, absorbs stormwater, and is coherent with natural grasses on-site.

### **Water Management**

The site's stormwater management system reduces demand on the community's potable water and stormwater systems and produces minimal sanitary wastewater. The management system naturally filters pollutants from rainwater, collects rainwater for supplemental use on green roofs and bioswales provide snow storage. The native landscape creates wildlife habitat with low maintenance cost. The parking area is covered with pervious pavers

resting on layers of crushed rock. Water soaks through the pavers and filters into the ground naturally rather than running off into the sewer system as a harmful concentrate of automotive chemicals. The parking pavers are light-colored to minimize heat generation therefore reducing heat island effect. The pavers filter pollutants from the lot, provide additional onsite stormwater retention, make effective use of scarce land, and are attractive.

Most precipitation drains to constructed wetlands and remains on-site. The wetlands naturally filter impurities from the collected water. During heavy precipitation events, excess water is pumped from the wetlands to a cistern. Water collected in the cistern is used to water the green roofs during drought and provide recirculation for the wetlands.

Approximately 72% of the site is covered with native plants that require little maintenance. The long native prairie grasses are highly absorbent, allowing for reductions in the size of retention ponds. All of the water needed for landscaping is obtained through direct rainfall or rainwater collected by the cistern. Rainwater nourishes the deep-rooted plants and recharges groundwater. Any excess water is diverted into a system of bioswales, which are shallow, vegetation-filled channels, and constructed wetlands that encourage further percolation into the site resulting in naturally filtered water.

Inside the building, dual-flush toilets and a waterless urinal minimize use of potable water. The dual-flush system with its half flush of 0.8 gallons and full flush of 1.6 gallons can reduce water usage by up to 67% compared with the traditional toilet that uses 2.9 gallons in a single flush. The waterless urinals work completely without water or flush valves. A Waterless fixture saves up to 45,000 gallons of water per year per urinal and supports the Foundations intent for sustainability of natural resources.

### **Society**

The Foundation believes that stronger nonprofits lead to stronger communities. Through its grant programs, the Foundation seeks to strengthen

nonprofit organizations by catalyzing their growth, connecting them to their stakeholders, and challenging greater support through grants. In 2003, the Foundation launched its Green Building Initiative to encourage nonprofit organizations without environmentally-focused missions to consider building green.

The Green Building Initiative encourages nonprofit board and staff members to consider planning and designing a green building through grant support and educational materials. A green building is one that in its design, construction, and operation makes a minimal draw on non-renewable resources. The Foundation provides planning grants to support fees, materials analysis, site considerations, and other expenses associated with implementing an integrated design. The United States Green Building Council recognized the Kresge Foundation for its “vision, leadership and commitment to the evolution of green building and construction, ‘by awarding it the 2005 Leadership Award.

### Sustainability

The building’s components were designed to work together as part of an eco-system. The created workplace integrates elements new and old, fabricated and natural. Glass walls flood the offices and conference rooms with natural light, yet grassy embankments obscure neighboring office buildings and highway traffic. As occupants of a green building, Kresge staff became fully aware of the behaviors required to achieve the building’s intended economic, health and environmental benefits. Maintenance and cleaning crews use methods and products that maintain balance of the interdependent systems. The organization examines ways to work green on a daily basis from using recycled and recyclable office supplies to carpooling.

With this project, the Foundation feels that its priorities were met. They are supporting the health

and productivity of the building users. They have created an appealing environment that attracts and retains Foundation employees and welcomes visitors. They have remained in their pre-existing location while preserving and utilizing the farmhouse, barn and other agricultural structures on the site. They have achieved efficiencies in energy, water use, and long-term expense. They reduced waste production. They obtained materials from surrounding areas to minimize transportation fuel used to move the materials. Finally, the Foundation achieved Leadership in Energy and Environmental Design (LEED) certification through the United States Green Building Council.

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