

SUSTAINABLE DESIGN FEATURES

New Visitor Activity Center

Pocono Environmental Education Center/ National Park Service
Delaware Water Gap National Recreation Area
Dingmans Ferry, PA

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Architecture Planning Interior Design

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"Sustainability" can be defined as a way of meeting our needs today without destroying the resources that will be needed by future generations; based on an approach of long range planning and the recognition of the finite nature of our natural resources. This environmental awareness and stewardship of our planet is central to the Pocono Environmental Education Center and its partner in the construction of this project, the National Park Service. The design and execution of this project, therefore, must respond to the concept of conservation and environmental sensitivity as demonstrated by employing principals of economy in construction; use of environmentally-sensitive, non-toxic and recycled materials; use of daylighting, passive solar heating and natural ventilation principles; and the selection of energy efficient insulating and environmental systems.

The following sustainable design features have been incorporated into the Visitor Activity Center:

Site design/building orientation

- The project has been sited to minimize cutting of mature trees on PEEC's campus.
- The building has been oriented with its long dimension running east/west, maximizing solar gain on south face while minimizing exposure to north winter winds.

Passive solar/natural ventilation

- The building's major activity space, the dining room, has been designed with a large south-facing glass wall to maximize solar heat gain during the heating season. Through direct gain passive solar heating, the concrete floor slab of the dining space will collect solar energy coming through the south wall and radiate it back into the room.
- The south roof overhang has been designed to eliminate solar gain in peak summer conditions. The large porch on the west side of the dining room will assist in screening the west glass during afternoon hours.
- Operable windows are being utilized to naturally ventilate the dining hall and other major spaces. By placing low intake windows on the east and west faces and high outlet windows on the south face of the dining room cooler outside air will be drawn into the

space while warmer air is discharged through the high windows. All windows will be operated manually to allow the users to learn about the principles of natural ventilation while they control the flow of air in the space.

- Ceiling fans are being utilized in the main dining room to assist in moving air within the space when natural ventilation alone cannot provide comfort.
- Passive solar energy effectiveness, natural ventilation and energy conservation techniques were assessed using DOE2, an energy modeling program.

Daylighting Principles

- The main dining room has been designed to use natural light to daylight the space and minimize dependence on artificial light during daytime use. This use of natural light will have the benefits of reducing heat generation caused by artificial lighting (and therefore, cooling requirements) and a reduction of energy usage for the building.
- Where artificial lighting is required energy efficient fixtures with electronic ballasts are being used to reduce energy consumption and heat generation. The lights will be controlled by motion sensors in most areas to further reduce energy consumption.

Radiant Heating

- The floor slabs of the dining room and classroom are designed to include a hydronic radiant heating system. This is a high efficiency heating system that minimizes energy usage and requires minimal maintenance. In addition to conserving energy usage, this system will provide more effective heat at the user level of the dining room than a conventional ducted heating system blowing conditioned air from above.

Materials Selections

- Materials have been selected which are durable, have a long life span, require little or no maintenance and have a low impact on the environment. Reused, Recycled or recyclable materials have been selected where performance is not compromised.
- The concrete floor slab has an integral stain to minimize additional floor finishes and reduce floor maintenance.
- A porcelain tile used in the kitchen area is comprised of more than 95 percent reclaimed and reused unfired raw materials. Other interior materials, such as ceiling tile, drywall and rubber lobby flooring all contain recycled content.
- Engineered wood products have been utilized wherever possible to reduce reliance on old growth forests. Glue-laminated timbers and wood composite framing members are used for the building's roof structure. Stress-skin panels, incorporating a top and bottom skin of plywood sheathing and a closed cell polyurethane core, have been used for the roof of the dining and porch areas where long span sheathing and high insulating values are desirable.

- Light colored roofing products have been utilized to reflect summer sun and reduce cooling requirements within the building.
- Reclaimed rubber passenger tires have been removed from the park grounds and other local sources and used as shingles. The re-used tires have been cut into strips and applied to the exterior of the curving north wall of the building to provide a waterproof skin that is long lasting and maintenance free. This honest expression of sustainability not only provides a creative solution to the north (entrance) side of the building, but will further serve to educate users on the ability to reclaim materials from the waste stream and reuse them with a minimal use of additional energy as compared to many recycled products which utilize a great deal of energy in the recycling process to transform the recycled materials into a new product.
- The windows include a thermal break to improve thermal performance and utilize low-e insulated glass units and low conductivity edge spacers to further increase energy efficiency.
- Toilet partitions and vanities are manufactured from recycled high-density polyethylene (HDPE) by a local manufacturer.
- Solvent-based finishes, adhesives, carpeting, and particle board that release formaldehyde and volatile organic compounds (VOC's) have been avoided. Where finishes are required water-based low VOC paint or non-VOC finishes have been utilized.
- Existing kitchen equipment from PEEC's current dining hall will be re-used where possible in the new facility.
- The kitchen has been designed to enable future upgrades to higher efficiency units as new technologies are introduced or existing kitchen equipment requires replacement.
- Reusable china, silverware, and glassware will be utilized in lieu of disposable products to reduce the amount of waste produced.

The Pocono Environmental Education Center is committed to the ideal of architecture as pedagogy and hopes that through the use of this new building, all who enter it will learn the importance of sustainability, not just in construction, but in the way it effects all the decisions of our day-to-day lives. While striving to minimize its impact on the natural environment, the new Visitor Activity Center will inform and educate all who use it to broaden their understanding of our interdependency with our environment.