HARVARD FAS
EPS MUSEUM RENOVATION
24 OXFORD STREET, CAMBRIDGE, MA 02138

The Earth and Planetary Sciences (EPS) Museum Project was the renovation of approximately 3,500 square feet on the second floor of the Geological Museum to create faculty offices and support space for three professors within the Department. In addition to the three private offices, the renovation included offices for Post Docs, Graduate Students and a receptionist, workrooms, a seminar room, and a kitchenette. The Geological Museum is located within the 175,710 square foot Harvard University Museum at 24 Oxford Street in Cambridge, Massachusetts.

The renovated space will provide faculty and students with upgraded interior finishes, furniture and lighting for work and study environments. Work areas are located along the building’s perimeter, thereby capitalizing on the large existing exterior windows that not only bring daylight into the spaces and reduce ambient lighting demands, but also create a comfortable work environment by allowing for views of the outdoors.

EPS is committed to sustainability and to the reduction of greenhouse gas emissions, therefore energy efficiency and sustainability goals - including Harvard’s Green Building Guidelines and LEED-CI certification - were a key component of the project. This is the first LEED project for EPS, and will serve as an example of successful sustainable design for all future projects.

**PROJECT HIGHLIGHTS**

**LEED® Facts**

EPS Museum Renovation
Harvard Faculty of Arts & Sciences
Department of Earth & Planetary Sciences
2009 Renovation

<table>
<thead>
<tr>
<th>Sustainable Sites</th>
<th>5 / 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Efficiency</td>
<td>2 / 2</td>
</tr>
<tr>
<td>Energy and Atmosphere</td>
<td>10 / 12</td>
</tr>
<tr>
<td>Materials and Resources</td>
<td>7 / 14</td>
</tr>
<tr>
<td>Indoor Environmental Quality</td>
<td>11 / 17</td>
</tr>
<tr>
<td>Innovation in Design</td>
<td>4 / 5</td>
</tr>
</tbody>
</table>

| 34% | reduction of potable water use below code standard. |
| 69% | of occupants have the ability to adjust ventilation and temperature controls to meet their individual needs. |
| 38% | reduction in installed interior lighting power density (watts/square feet) below the code standard. |
| 64% | of the existing interior elements (walls, flooring, ceilings) have been reused. |
| 74% | of the equipment and appliances are EnergyStar (by rated power) |
Project Overview

EPS Museum Renovation—Floor Plan & LEED Boundary

Project Team

Owner
Harvard Faculty of Arts & Sciences
Department of Earth & Planetary Sciences

Project Manager
FAS Capital Projects

Architect
Perkins + Will

Contractor
Delta Design & Construction, Inc.

Engineer
R.W. Sullivan Engineering

Commissioning Authority
Harvard University, Campus Services
Green Building Services

Sustainability Consultant
Harvard University, Campus Services
Green Building Services

Lobby
Photo: Jessica Eisenman Parks, Harvard Green Building Services, 2010
SITE

- To encourage alternatives to driving, all occupants of the Harvard University Museum have access to Harvard’s comprehensive CommuterChoice Program, which provides incentives and discounts for all modes of alternative transportation as well as carpooling and fuel efficient vehicles.

- The building is located within walking distance to multiple MBTA bus stops and HU shuttle bus stops.

- Storage for 129 bicycles is located near entrance of the University Museum for use by the building’s occupants. Showers and changing facilities are located on the 4th floor of the EPS Museum.

- The building is located in a dense urban area, which allows occupants to walk and easily access amenities such as restaurants, banks, churches, and retail stores.

WATER EFFICIENCY

Per LEED requirements, if a project boundary does not include bathrooms, calculations must be for the fixtures in the closest bathroom. The closest bathrooms to the EPS Museum Renovation have water efficient fixtures, which reduce domestic water consumption by 34% over standard EPAct 1992 fixtures. This is the equivalent of saving over 8,561 gallons per year.

<table>
<thead>
<tr>
<th>Fixture Type</th>
<th>EPS Museum Flush &amp; Flow Rates</th>
<th>EPAct 1992 Standard Flush &amp; Flow Rates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Closet [GPF]</td>
<td>1.1 or 1.6 Dual Flush</td>
<td>1.6</td>
</tr>
<tr>
<td>Urinal [GPF]</td>
<td>0.125</td>
<td>1.0</td>
</tr>
<tr>
<td>Bathroom Sink [GPM]</td>
<td>0.5</td>
<td>2.5</td>
</tr>
<tr>
<td>Shower [GPM]</td>
<td>1.6</td>
<td>2.5</td>
</tr>
<tr>
<td>GPF - Gallons Per Flush</td>
<td>GPM - Gallons Per Minute</td>
<td></td>
</tr>
</tbody>
</table>

FIXTURES

- SLOAN SOLIS® Solar Powered, Electronic Hand Washing Faucet

- SLOAN UPPERCUT® Dual-Flush Flushometer (Up 1.1 gpf and Down 1.6 gpf)
ENERGY EFFICIENCY

The Faculty of Arts and Sciences has committed, along with Harvard University as a whole, to reduce greenhouse gas emissions 30% below 2006 levels by 2016, inclusive of growth. Therefore energy efficiency was a main goal of the renovation project.

MECHANICAL SYSTEMS

The HVAC design for the renovation area is a two pipe system with cooling only fan coil units, interlocked with individually controlled steam radiators for heating. Outside air ventilation is mechanically provided by a local air handling unit. The ventilation system exceeds the minimum outside air CFM's by 30%, to improve the IAQ.

Commissioning: The mechanical and electrical systems have been fully commissioned by a third-party Commissioning Authority, which helped ensure that all energy-related systems were installed as designed, and operating efficiently prior to occupancy.

Adjustable Thermostats: Each occupied space will have its own (re-settable) room sensor, advanced thermostat, for user comfort.

Thermostat Zoning: Each space is equipped with an individual fan coil unit.

Set-backs: Using set-backs reduces energy consumption by adjusting temperature set-points based on occupancy. The type of space, and the activities carried out within it, dictate the appropriate occupied and unoccupied set-points for temperature.

ELECTRICAL SYSTEMS

Each office and the conference room has been provided with local lighting controls. Lighting in the corridor and lobby is controlled by occupancy sensors.

Occupancy Sensors: Occupancy sensors automatically turn lights on when the space becomes occupied and automatically turn lights off when the space becomes unoccupied.

Daylight Harvesting: Photocells are in all renovated perimeter offices which automatically adjust lighting levels in response to available daylight.

Light Fixtures: Energy-efficient, low-mercury fluorescent lighting fixtures and lamps were carefully chosen and strategically located within each space to reduce electricity consumption while maintaining adequate lighting intensity.

Dimming: Lutron slide-to-off dimmers are installed in each space. All light fixtures are provided with Hi-Lume 1% dimming ballasts.
INDOOR ENVIRONMENTAL QUALITY

Harvard Faculty of Arts and Sciences is committed to providing a healthy indoor environment for all occupants. The project team was careful to maintain healthy indoor air quality during construction and to ensure the space was designed to promote healthy indoor air quality during occupancy.

**Indoor Air Quality During Construction:** The building maintained occupancy throughout construction. A comprehensive indoor air quality management plan was implemented during construction to maintain healthy indoor air quality for both workers and building occupants. This effort included providing negative air pressure in the space to prevent the migration of particulate matter.

**Thermal Comfort Survey:** Occupants will be regularly surveyed about their thermal comfort, and the operations team will make prompt adjustments to temperature and ventilation, as needed.

Only Materials with **Low or No VOC Content** were used in the EPS Museum 2nd Floor Renovation. Volatile Organic Compounds (VOCs) are chemical compounds and known carcinogens found in many construction materials that are considered detrimental to indoor air quality. Reducing the use of VOCs whenever possible improves indoor air quality and consequently occupant health and productivity.

- **Composite Wood and Laminate Adhesives** used in the renovation do not have any added Urea Formaldehyde
- **Carpet System:** Shaw Cross Stitch and Shaw Corded Tile are CIR Green Label Plus Certified
- **Adhesives and Sealants and Paints and Coatings** Examples of the products used:

<table>
<thead>
<tr>
<th>Product Category</th>
<th>Product &amp; Manufacturer</th>
<th>VOC Content (g/l)</th>
<th>VOC Limit (g/l) Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adhesives &amp; Sealants</td>
<td>AAT-280, Advanced Adhesive</td>
<td>0</td>
<td>50 Green Seal GS-36</td>
</tr>
<tr>
<td></td>
<td>Airseal 33, Polymer Adhesives</td>
<td>0</td>
<td>250 SAQMD #1168</td>
</tr>
<tr>
<td></td>
<td>Proform, National Gypsum</td>
<td>&lt;2</td>
<td>250 SAQMD #1168</td>
</tr>
<tr>
<td>Paints &amp; Coatings</td>
<td>Elements Interior Flat 100% Acrylic, California Closets</td>
<td>0</td>
<td>50 Green Seal GS-11</td>
</tr>
</tbody>
</table>

*Construction IAQ Measures Implemented During Construction*


*HVAC Protection:*
Sealed during construction

*Source Control*
VOC-free interior base paint

*Construction Air Quality:*
Vents used to filter air to exterior

Office Space During Renovations

Private Office
Photo: Harvard Green Building Services. 2010
Selecting environmentally preferable materials and minimizing the amount of construction waste sent to landfills was important to the project. 100% of the miscellaneous metals and 80% of the mixed materials were recycled. In total, over 30,000 pounds of waste was diverted from landfills.

29% of the materials (by cost) contained recycled content

12% of the materials (by cost) were regionally manufactured and/or extracted

89% of the wood was FSC Certified