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, which maximizes the utilization of daylighting from large existing exterior windows while allowing views of the outdoors. Daylight and occupancy sensors in all rooms will control interior lighting and temperature in order to reduce energy consumption by lighting and HVAC equipment.

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.

**PROJECT HIGHLIGHTS**

**LEED® Facts**

EPS Museum

Harvard Department of Earth and Planetary Sciences

2009 Renovation

Location…………………Cambridge, Massachusetts

Rating System……………Commercial Interiors v2.0

Certification Pending………………. Gold

Total Points Attempted………………43 / 59

- Sustainable Sites……………………………………4 / 7
- Water Efficiency……………………………………2 / 2
- Energy and Atmosphere…………………………12 / 14
- Materials and Resources…………………………10 / 14
- Indoor Environmental Quality……………………10 / 17
- Innovation in Design……………………………..5 / 5

34% reduction of Wastewater by plumbing fixtures.

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.

Only low or zero-VOC materials were used during Construction.
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.

Lighting for Occupancy: Each space enclosed by ceiling-height partitions has an independent, accessible control that operates general lighting in the space, while task lighting is separately controlled.

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.

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

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

Construction IAQ Measures Implemented During Construction

Photos: Harvard Office for Sustainability: 2009

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
Photo: Harvard Office of Sustainability: 2009

Renovated Office Space
Photo: Harvard Office of Sustainability: 2010

Please print this project profile only if necessary. If printing is required, please print double sided and recycle when finished. Thank you!
Materials & Waste

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.

- 25% of the materials contained recycled content
- 30% of the materials were regionally manufactured
- 19% of the materials were regionally extracted
- 89% of the wood was FSC Certified

<table>
<thead>
<tr>
<th>ENVIRONMENTALLY PREFERABLE MATERIALS IN EPS MUSEUM 2ND FLOOR RENOVATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corded Carpet Tile (Shaw)</td>
</tr>
<tr>
<td>Recycled Content: 28% pre-consumer, 11% post-consumer</td>
</tr>
<tr>
<td>Quartersawn Red Oak (Kiever Willard Lumber)</td>
</tr>
<tr>
<td>Regional: 42 Miles (Newburyport, MA)</td>
</tr>
<tr>
<td>Glazed Glass (Pilkington)</td>
</tr>
<tr>
<td>Recycled Content: 20% pre-consumer</td>
</tr>
<tr>
<td>Ceiling Fabric (Barrisol)</td>
</tr>
<tr>
<td>Recycled Content: 50% pre-consumer</td>
</tr>
<tr>
<td>Door Hardware</td>
</tr>
<tr>
<td>Locks (Arrow): Recycled Content: 59% post-consumer</td>
</tr>
<tr>
<td>Closers (LCN): 44% post-consumer, 15% pre-consumer</td>
</tr>
<tr>
<td>Hinges (Stanley): 25% post-consumer</td>
</tr>
<tr>
<td>Gypsum Wallboard (USG)</td>
</tr>
<tr>
<td>Recycled Content: 94% pre-consumer, 5% post-consumer</td>
</tr>
<tr>
<td>Particle Board (NU Green)</td>
</tr>
<tr>
<td>Recycled Content: 100% pre-consumer</td>
</tr>
</tbody>
</table>

Additional Resources

Harvard FAS, Dept. of Earth and Planetary Sciences: [http://www.eps.harvard.edu/icb/icb.do](http://www.eps.harvard.edu/icb/icb.do)

Harvard FAS Green Program: [http://green.harvard.edu/fas](http://green.harvard.edu/fas)

Harvard OFS - Green Building Services: [http://green.harvard.edu/green-building-services](http://green.harvard.edu/green-building-services)

Harvard OFS - Green Building Resource: [http://green.harvard.edu/theresource](http://green.harvard.edu/theresource)

Seating and Display Space
Photo: Harvard Office for Sustainability: 2010

Renovated Office Space
Photo: Harvard Office of Sustainability: 2010