

**HARVARD FAS  
EPS MUSEUM RENOVATION  
GOLD (PENDING)**

**LEED-CI V2.0**

This project is a renovation of approximately 3,500 square feet on the second floor of the Geology Museum to create faculty offices and support space for three professors with the Department of Earth and Planetary Sciences (EPS). In addition to the three private offices, the renovation will include offices for Post Docs, Graduate Students and a receptionist, workrooms, a seminar room, and a kitchenette. The Geology Museum is located within the 175,710 square foot Harvard University Museum at 24 Oxford Street in Cambridge, Massachusetts. The renovation occurred between September 2009 through December 2009.

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.



**Seminar Room**  
Photo: Jessica Parks, 2010

**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
<b>Total Points Attempted.....</b>	<b>43 / 59</b>
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.

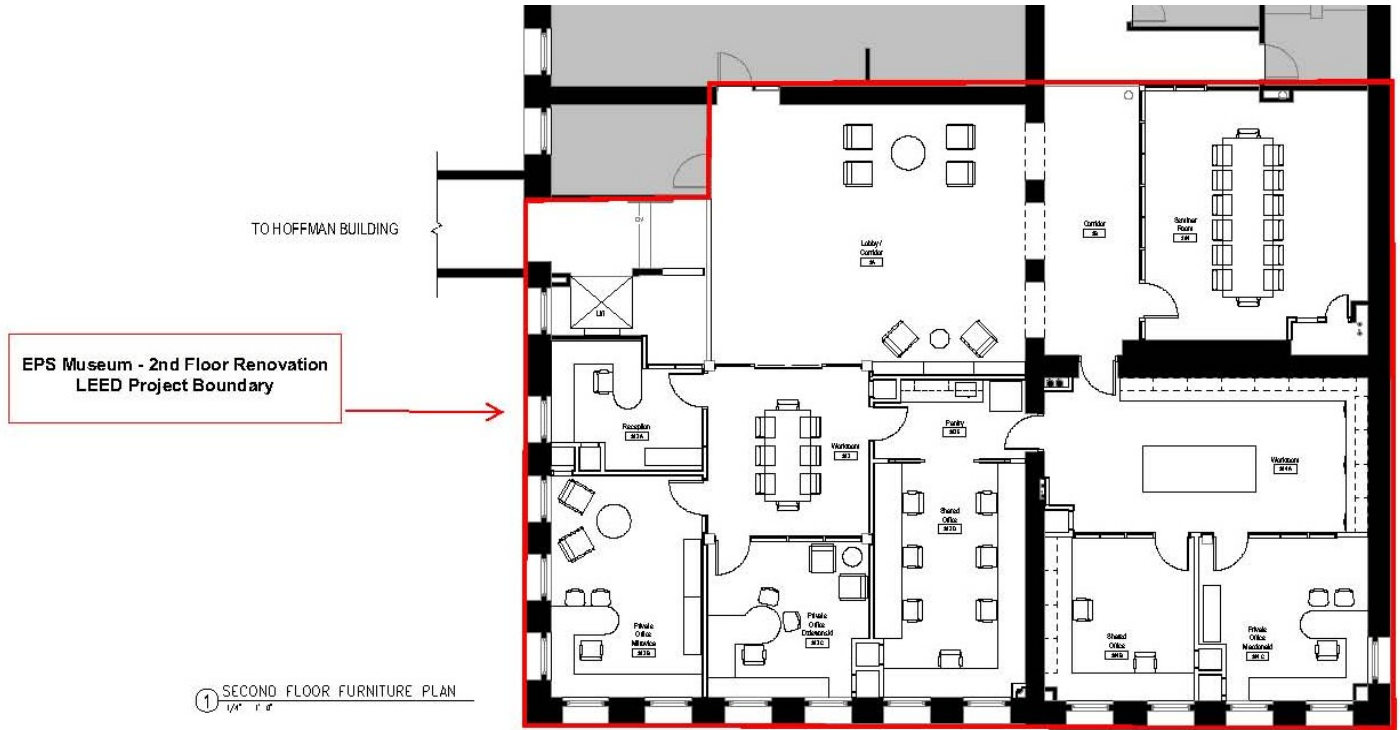
**38%** reduction in installed interior lighting power density (watts/square feet) below the code standard.

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



## PROJECT OVERVIEW

### EPS MUSEUM RENOVATION FLOOR PLAN & LEED BOUNDARY



**Lobby**  
Jessica Parks, 2010

## PROJECT TEAM

<b>Owner</b>	Harvard University FAS
<b>Project Manager</b>	FAS Capital Projects
<b>Architect</b>	Perkins + Will
<b>Contractor</b>	Delta Design & Construction, Inc.
<b>HVAC Engineer</b>	R.W. Sullivan Engineering
<b>Commissioning Authority</b>	Harvard University, Office for Sustainability
<b>Sustainability Consultant</b>	Harvard University, Office for Sustainability

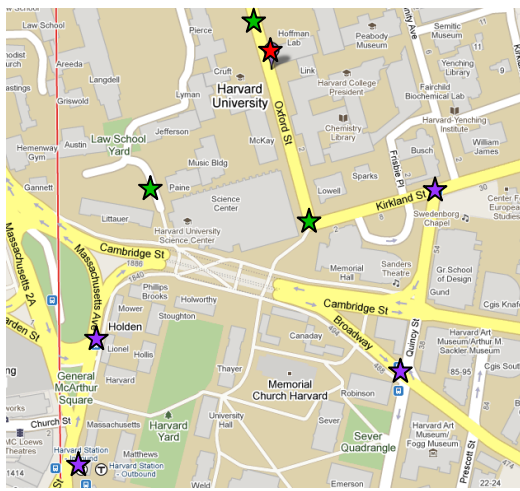


## SITE



**Harvard University Museum**  
24 Oxford St., Cambridge, MA 02138

- 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.



- ★ Harvard University Museum
- ★ MBTA Bus Stops
- ★ Harvard University Shuttle Bus Stops



**Bicycle Racks**  
Photo: Harvard Office for Sustainability: 2009

## 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 EPA 1992 fixtures**. This is the equivalent of saving over 8,561 gallons per year.

### FIXTURES



**SLOAN SOLIS®**  
Solar Powered, Electronic  
Hand Washing Faucet

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



Differences in the Flush & Flow Rates for EPA 1992 Standard Fixtures and the fixtures utilized by the EPS Museum Occupants		
Fixture Type	EPS Museum Flush & Flow Rates	EPA 1992 Standard Flush & Flow Rates
Water Closet [GPF]	1.1 or 1.6 Dual Flush	1.6
Urinal [GPF]	0.125	1.0
Bathroom Sink [GPM]	0.5	2.5
Shower [GPM]	1.6	2.5
GPF - Gallons Per Flush	GPM - Gallons Per Minute	



## 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.



**HVAC Actuator**

Photo: Harvard Office of Sustainability: 2010



**Renovated Office Space**

Photo: Harvard Office of Sustainability: 2010



**Sensor Switch ®: CMR PDT 9**

Photo: <http://sensorswitch.com>

## 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

### 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



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



**Office Space During Renovations**

Photo: Harvard Office of Sustainability: 2009



**Renovated Office Space**

Photo: Harvard Office of Sustainability: 2010



## 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



**Seating and Display Space**

Photo: Harvard Office for Sustainability: 2010



**Renovated Office Space**

Photo: Harvard Office of Sustainability: 2010

### ENVIRONMENTALLY PREFERABLE MATERIALS IN EPS MUSEUM 2ND FLOOR RENOVATION

- Corded Carpet Tile (Shaw)  
Recycled Content: 28% pre-consumer, 11% post-consumer
- Quartersawn Red Oak (Kiever Willard Lumber)  
Regional: 42 Miles (Newburyport, MA)
- Glazed Glass (Pilkington)  
Recycled Content: 20% pre-consumer
- Ceiling Fabric (Barrisol)  
Recycled Content: 50% pre-consumer
- Door Hardware  
Locks (Arrow): Recycled Content: 59% post-consumer  
Closers (LCN): 44% post-consumer, 15% pre-consumer  
Hinges (Stanley): **25%** post-consumer
- Gypsum Wallboard (USG)  
Recycled Content: 94% pre-consumer, 5% post-consumer
- Particle Board (NU Green)  
Recycled Content: 100% pre-consumer

## ADDITIONAL RESOURCES

Harvard FAS, Dept. of Earth and Planetary Sciences: <http://www.eps.harvard.edu/icb/icb.do>

Harvard FAS Green Program: <http://green.harvard.edu/fas>

Harvard OFS - Green Building Services: <http://green.harvard.edu/green-building-services>

Harvard OFS - Green Building Resource: <http://green.harvard.edu/theresource>