DEPARTMENT OF EARTH AND PLANETARY SCIENCES
HARVARD UNIVERSITY

GREEN is the new Crimson

FACULTY OF ARTS AND SCIENCES

LEED-CI v2.0

PEARSON LAB, EARTH AND PLANETARY SCIENCES

GOLD

HOFFMAN BUILDING, 24 OXFORD ST, CAMBRIDGE, MA 02138

The Pearson Lab, part of the Department of Earth and Planetary Sciences (EPS), is an approximately 2,900 sq. ft. lab on the ground floor of the Hoffman Building located at 24 Oxford Street in Cambridge, Massachusetts. The project is a complete renovation of an existing lab space to accommodate the specific needs of Ann Pearson, a newly tenured professor, and her lab group. Professor Pearson directs the Laboratory for Molecular Biogeochemistry and Organic Geochemistry. Recent research in the Pearson Lab focuses on understanding the origins of important environmental and taxonomic lipid molecular fossils.

EPS is committed to sustainability and to the reduction of greenhouse gas emissions; therefore, the Harvard University Green Building Guidelines and the LEED-CI rating system helped the project team develop sustainability goals and guide selection of materials as well as the mechanical, electrical and plumbing (MEP) systems installed.

To support Professor Pearson's research activities, 3 variable air volume (VAV) chemical fume hoods were installed that significantly reduce exhaust rates when the sashes are closed. In addition, these hoods are be able to run at a face velocity of 80 feet per minute instead of 100 feet per minute – reducing airflow by 20% and conserving the energy that would have been required to condition that air.

Pearson Lab
Photo: Green Building Services, 2010.

The lighting design meets the researchers' requirements without exceeding recommended lighting power limits. The design incorporates energy efficient fixtures and task lights, which leads to a 25% reduction in the lighting power density below code standards.

Throughout the entire space, DDC thermostatic sensors tie into the building's control system, allowing temperature settings to be set back whenever those spaces are unoccupied.

PROJECT HIGHLIGHTS

LEED® Facts

Pearson Lab Renovation

Harvard Faculty of Arts and Sciences

2010 Renovation

Location	Cambridge, Massachusetts
Rating System	Commercial Interiors v2.0
Certification Achieved	Gold
Total Points Achieved	35/57
Sustainable Sites	4/7
Water Efficiency	2/2
Energy and Atmosphere	8/12
Materials and Resources	6/14
Indoor Environmental Quality	10/17
Innovation in Design	5/5

25% reduction in the lighting power density when compared to ASHRAE 90.1-2004 standards.

44% reduction in the amount of water consumption compared to EPAct 1992 baselines.

20% reduction in the air flow of lab fume hood by installing VAV fume hoods

PROJECT OVERVIEW

PEARSON LAB FLOOR PLAN & LEED BOUNDARY

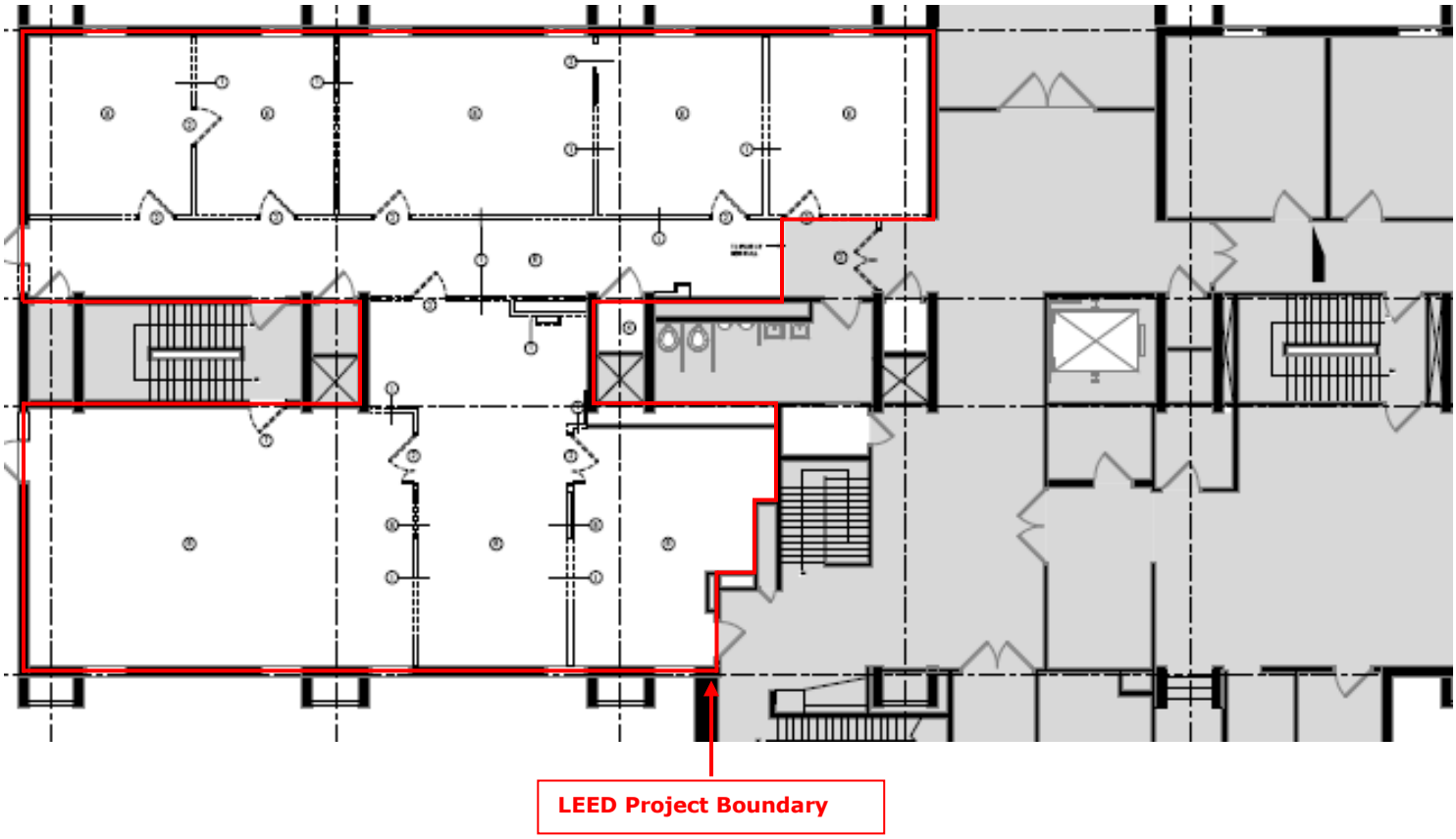
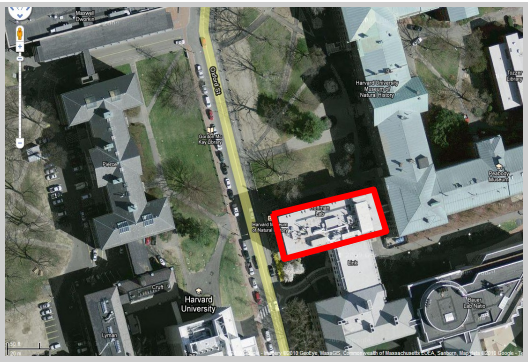


Photo: Green Building Services, 2010.

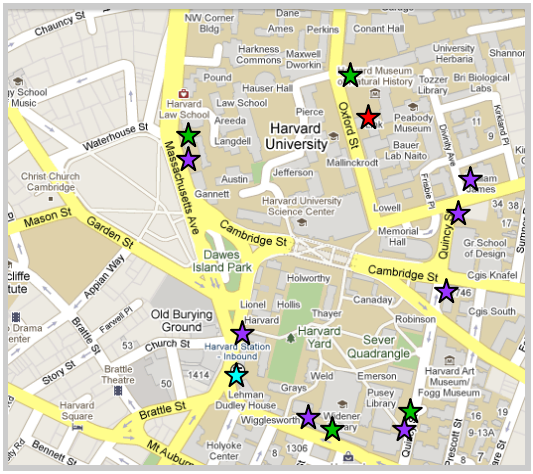
PROJECT TEAM

Owner	Harvard Faculty of Arts and Sciences
Project Manager	Harvard University Department of Earth and Planetary Sciences
Architect	Perkins + Will
Contractor	Wise Construction Corporation
HVAC Engineer	RW Sullivan
Commissioning Authority	Harvard Green Building Services
Sustainability Consultant	Harvard Green Building Services

SITE



Hoffman Building
24 Oxford Street, Cambridge, MA



Hoffman Building
MBTA Bus Stops
Harvard University Shuttle Bus Stops
MBTA Subway Station

- To encourage alternatives to driving, all occupants of the Pearson Lab have access to Harvard's ***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 the Harvard Square MBTA stop, several bus lines, and the Harvard University Shuttle.
- Three bicycle racks with a total capacity of 90 bicycles are fixed to the rear and front of the Hoffman building. The building's cantilevered second floor provides some shelter against weather.
- 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.

Bike Racks at Hoffman
Photo: Zhen Wu, Green Building Services, 2009.

WATER EFFICIENCY

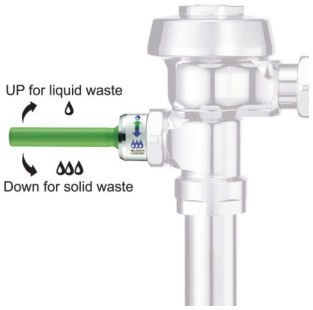
Pearson Lab space used fixtures such as the solar power electronic lavatory faucets, dual flush flushometers, low flow shower heads, and high efficiency urinal systems (HEU) **to reduce domestic water usage by 44% over standard EPAct 1992 fixtures.**

Differences in the Flush & Flow Rates for EPAct 1992 Standard Fixtures and the fixtures installed for the Pearson Lab Project

Fixture Type	Pearson Lab Flush & Flow Rates	EPAct 1992 Standard Flush & Flow Rates
Water Closet [GPF]	Dual Flush 1.6 & 1.1	1.6
Urinal [GPF]	0.5	1.0
Bathroom Sink [GPM]	0.5	2.2
Shower [GPM]	1.6	2.5
Kitchen Sink [GPM]	1.5	2.2
GPF - Gallons Per Flush	GPM - Gallons Per Minute	

FIXTURES IN PEARSON LAB PROJECT SCOPE

SLOAN SOLIS®
Solar Power, Electronic
Lavatory Faucet
0.5 gpm



SLOAN UPPERCUT®
Dual Flush Flushometer
Down 1.6 gpm
Up 1.1 gpm

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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 primary goal of this renovation project.

MECHANICAL SYSTEMS

Airflow Control System: The project specified the Siemens Venturi Air Valve which allows for fast-acting and precise control on all supply airflow. The valve to designed to respond within one second to changes in static pressure.

High Performance Fume Hoods installed as part of the project include Variable Air Volume (VAV) fume hoods which run at a maximum face velocity of 80 feet per minute instead of 100 feet per minute. This reduces air flow by at least 20% and conserves the energy that would have been required to condition the additional air in conventional models.

Occupancy and Temperature Sensors: For each room within the project boundary, occupancy sensors tied to the building's control system modulate the supply air and maintain temperature set-points, allowing both to be set back whenever spaces are unoccupied. The type of space and the activities carried out within it dictate the appropriate occupied and unoccupied set-points for temperature.

$C0_2$ Sensors: Similar to the temperature sensors, the $C0_2$ sensor located in the seminar room monitors the $C0_2$ levels and will increase or decrease the outdoor air supply based on the occupancy of the room at any given time.

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

Pearson Lab Equipment
Photo: Green Building Services, 2010.

ELECTRICAL SYSTEMS

Plug Loads: Energy Star equipment was selected for all equipment in the space, including computers and printers.

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

Light Controls: Each space has overhead lighting controlled by multiple switches/zones and each desk has either under-counter task lights or desk lamps for multiple lighting levels based on occupant needs. Strategies that allow for increased personal control have been shown to increase occupant productivity and comfort while decreasing energy use by allowing lower levels of ambient lighting to be provided.

Light Sensors: Perimeter lighting fixtures are hooked up to sensors which adjust the amount of light based on the amount of natural light present in the space.

Pearson Lab Equipment
Photo: Green Building Services, 2010.

INDOOR ENVIRONMENTAL QUALITY

Harvard Faculty 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 also ensure the space is designed to promote healthy indoor air quality during occupancy.

INDOOR AIR QUALITY DURING CONSTRUCTION: To maintain the a high indoor air quality, contractors were mandated to vacuum on a daily bases as well as to protect all vents and intakes. There were also sticky mats that employees stepped on when leaving the site.

THERMAL COMFORT SURVEY: Occupants will be surveyed about their comfort once per season. The Operations team will adjust the heating or cooling in the project space as needed.

Only Materials with **LOW OR NO VOC CONTENT** were used in the Pearson Lab project. 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.

- **ADHESIVES AND SEALANTS AND PAINTS AND COATINGS** Products used in the project include:

Product Category	Product & Manufacturer	VOC Content (g/l)	VOC Limit (g/l)	Standard
Paints & Coatings	Eco Spec, Benjamin Moore	0	50	Green Seal GS-11
	Benjamin Moore - EcoSpec Interior Primer - # 231	0	150	Green Seal GS-11
	Armor Top - Floor Coating - Dur A Flex	74	150	SCAQMD Rule #1168
Adhesives & Sealants	Latricrete - 253 Gold Thinset	0	50	SCAQMD Rule #1168
	Borden Adhesive	1	70	SCAQMD Rule #1168

Photo: Harvard Green Building Services, 2010.

Construction IAQ Measures Implemented During Construction
Photos: Green Building Services, 2010

HVAC Protection
Plastic prevents dust from contaminating circulating airflow

Pathway Interruption
Exhaust filtered and directed outside

Green Housekeeping: Pearson Lab Participates in Harvard's Facilities and Maintenance Operations (FMO) Green Cleaning Program, which uses 100% recycled paper products and Green Seal certified cleaning solutions, among other green housekeeping practices

Daylight and Views: To provide a connection between indoor and outdoor environments, the regularly occupied spaces have access to daylight and views.

MATERIALS & WASTE

Selecting environmentally preferable materials and minimizing the amount of construction waste sent to landfill was important to the project. For the additional materials purchased, the project gave preference to low-emitting materials with recycled content and local manufacturing.

20% **of the total material value consists of products salvaged or manufactured locally.**

80% **of the on-site generated construction waste was diverted from the landfill.**

30% **of the total value of materials used in the project consist of materials with recycled content.**

ENVIRONMENTALLY PREFERABLE MATERIALS IN THE PEARSON LAB

- MarkerBoards *(Claridge)*
  25% pre-consumer, **45%** post-consumer
- Dry Wall Framing *(Dietrich)*
  37% pre-consumer, **17%** post-consumer
- CAPZ Ceiling *(Armstrong)*
  80% pre-consumer, **0%** post-consumer
- TrackBoards *(Claridge)*
  10% pre-consumer, **57%** post-consumer

Examples of regional materials used in project:

Material Name	Manufacturer	Distance between project & Manufacturer (mi)
Hollow Metal Door Frames	DeLa Fontaine	8
Mecho Window Shades	Mecho	185
Corner Guards	Weiss Sheetmetal	17

Pearson Lab Equipment
Photo: Green Building Services, 2010.

Deconstruction
Photo: Green Building Services, 2010.

ADDITIONAL RESOURCES

- **HARVARD FAS, DEPT OF EARTH AND PLANETARY SCIENCES:** http://www.eps.harvard.edu
- **FAS GREEN PROGRAM:** http://green.harvard.edu/fas/green-labs
- **FAS GREEN LABS PROGRAM:** http://green.harvard.edu/fas/green-labs
- **HARVARD GREEN BUILDING SERVICES:** http://green.harvard.edu/green-building-services
- **HARVARD GREEN BUILDING RESOURCE:** http://green.harvard.edu/theresource

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