



Each year, the Harvard Graduate School of Education (HGSE) guides an average of 900 students to promising careers in education. In 1963, HGSE acquired Longfellow Hall, a four story building designed in 1929 and named for Alice Longfellow, daughter of famous American poet and educator Henry Wadsworth Longfellow. Currently, the building houses public common areas, dining services, several classrooms and office spaces for the school.



A June through September renovation at Longfellow Hall in 2007 stands as an example of the University's campus-wide effort to augment efficiency and sustainability. The project was a three phase, 8,100 square foot renovation that updated the Registrar, Financial Aid and Career Services Departments' office space on the basement level of 13 Appian Way, Cambridge Massachusetts.

The space renewal provided an opportunity to improve the basement's lighting and HVAC systems, in addition to updated finishes and reconfiguring spaces to better suite current demands. Several furniture items were salvaged, while new furniture was upgraded to meet the HGSE community standards. In support of Harvard's goal of reducing greenhouse gas emissions 30% below 2006 levels by 2016, inclusive of growth, HGSE and the project team were committed to energy efficiency and sustainability throughout the duration of the project. As a result, Longfellow Hall has received LEED Silver Certification under the LEED for Commercial Interiors version 2.0 (LEED-CI) rating system.

Longfellow Hall Renovation

PROJECT HIGHLIGHTS

- 89%** of construction waste was recycled.
- 66%** of the interior non-structural components were retained and reused.
- 41%** of water consumption was eliminated by using more efficient restroom fixtures.
- 100%** of composite wood is free of urea formaldehyde
- 100%** of the energy used in the area of renovation was offset by purchasing Renewable Energy Certificates (RECs) for two years.

LEED® Facts

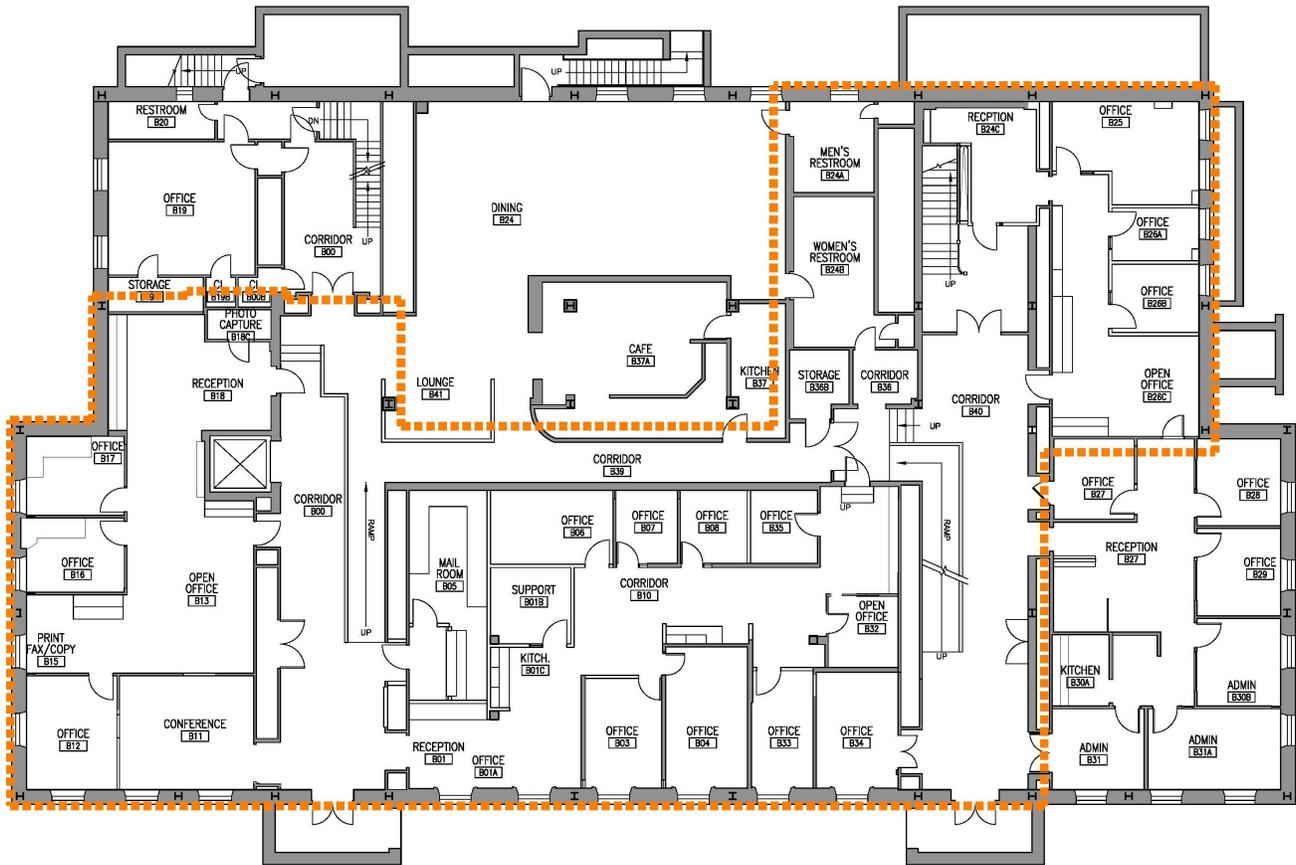
Longfellow Hall
Harvard GSE
2007 Renovation



Location.....	Cambridge, Massachusetts
Rating System.....	Commercial Interiors v2.0
Certification Achieved.....	Silver
Total Points Earned.....	31
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Sustainable Sites.....	5/7
Water Efficiency.....	0/2
Energy and Atmosphere.....	5/14
Materials and Resources.....	6/14
Indoor Environmental Quality.....	10/17
Innovation and Design.....	5/5



PROJECT OVERVIEW



1 Basement Plan LEED Boundary

PROJECT TEAM	
Owner	Harvard Graduate School of Education
Project Manager	Jason Carlson, Director of Operations
Architect	Baker Design Group, Inc.
Construction Manager	Shawmut Design and Construction
MEP Engineer	BLW Engineers, Inc.
Indoor Air Quality Testing	Environmental Health, Inc.
Sustainability Consultant	Harvard University, Office for Sustainability Green Building Services
Commissioning Agent	Harvard Office for Sustainability

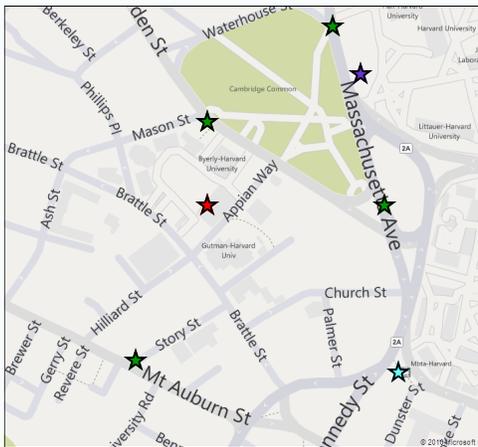


Harvard University, Longfellow Hall
13 Appian Way, Cambridge, MA



SITE

- To encourage alternatives to driving, all occupants of Longfellow Hall, as have access to Harvard's **CommuterChoice Program**, which provides incentives, such as discounts, for all modes of alternative transportation as well as carpooling and fuel efficient vehicles. The Program is promoted through informational kiosks in building common areas and an extensive website. (www.commuterchoice.harvard.edu)
- The building is located within walking distance to the Harvard Square MBTA stop, several bus lines, and the Harvard University Shuttle.
- Longfellow Hall provides bicycle racks with storage for 30 bicycles. The nearby Hemenway Gymnasium, as well as Loeb Center, provide occupants access to showers and locker rooms.



- ★ Longfellow Hall
- ★ MBTA Subway Station
- ★ Bus Stop Location
- ★ Hemenway Gymnasium



Bike Racks Outside Main Entrance

WATER EFFICIENCY

As part of the renovation, restrooms in the basement were retrofitted to improve water efficiency. These measures **reduced domestic water consumption by 41% over standard EPA 1992 fixtures.**

Differences in Flush & Flow Rates for EPA 1992 Standard Fixtures and the fixtures utilized by the Longfellow Hall Occupants

Fixture Type	Longfellow Hall 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

HGSE has committed, along with the larger Harvard University, to reduce greenhouse gas emissions 30% below 2006 levels by 2016, inclusive of growth. To this end, energy efficiency was one of the primary sustainability-related goals in the renovation project.

MECHANICAL SYSTEMS

Five split systems were installed. These **ENERGY STAR** Carrier Comfort 13 Series systems range from 3 to 4 tons with a range of 34,000 - 46,600 BTUH and a SEER (unit efficiency) of 14 or 14.5. Puron refrigerant is used, meaning that no CFCs are used in the new HVAC equipment. The systems have Carrier Electronically Commutated Motors, which maximize efficiency and reduce power consumption during fan-only operation.

Fresh air is delivered to each branch of ductwork with a duct that stems from the main outdoor air delivery. Fan coil units (FCUs) deliver conditioned and fresh air to each office space.

- **Occupant Controlled Thermostats:** Temperature in each combined office space is regulated with a programmable thermostat under the occupants' control. The thermostat can be set to run on an automatic or fan setting. Under the automatic setting, the coupled fan coil unit and condensing unit turn on or off depending on the delta between the ambient temperature and the thermostat setting. Under the cooling settings, if the temperature falls out of the allotted range set by the occupant, tempered air is delivered to the space. Management set the deadband for each thermostat between 69 and 75° F.
- **Commissioning:** The mechanical and electrical systems have been fully commissioned. This means that Facility Maintenance Operations (FMO) reviewed the HVAC and lighting design and installation to ensure that the performance met the intent of design.
- **Renewable Energy:** Renewable Energy Certificates were purchased from Sterling Planet (wind power) to offset 100% of the energy used with the project scope, for two years. The project is offsetting 259,200 kWh, which avoids emitting 360,806 pounds of CO₂.



2x2 Recessed Fluorescent Lighting
Longfellow Hall Basement Renovation

ELECTRICAL SYSTEMS

- **Light Fixtures:** Energy-efficient and low-mercury fluorescent lighting fixtures were carefully chosen and strategically located within each space to reduce electricity consumption while maintaining adequate lighting levels for each type of space. The project is using efficient Osram Sylvania T5 lamps in direct/indirect fixtures.
- **Lighting Sensors & Controls:** Motion sensor controls and lighting control systems are provided based on the space and utilization. For all common areas the lighting controls consist of motion sensors. Bathrooms have occupancy sensing light controls.



**Carrier Comfort™ 13 Series
Air Conditioner**
Photo: www.wrightheating.com



**WI-300 Passive Infrared Dual
Relay Wall Switch Sensor**
Photo: www.wattstopper.com

INDOOR ENVIRONMENTAL QUALITY

HGSE 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: The building maintained occupancy throughout construction. Thus, a comprehensive indoor air quality management plan was implemented during construction to maintain healthy indoor air quality. Multiple ACSI HEPA (MERV 17) Filtration units were utilized to mitigate dust and maintain a negative pressure construction zone relative to finished spaces. In addition, sheet plastic was used to prohibit dust mitigation into adjacent occupied spaces. Greensweep and face masks minimized the impact of air born dust to construction related personnel, and materials were stored in a dry and secure area until ready to be installed.

Green Housekeeping: Longfellow Hall 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.

No Smoking Policy: To protect the health of the occupants, Harvard Graduate School of Education does not permit smoking within 25 feet of any HGSE building.

Only Materials with **Low or No VOC Content** were used in the Longfellow Hall basement 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 have no added Urea Formaldehyde.
- **Systems Furniture and Seating:** Herman Miller Passage System furniture and Herman Miller Aeron and Equa 2 chairs are both Greenguard certified
- **Carpet System** Patcraft "Dazzle" and Shaw "Ducks in a Row" carpets have both been awarded the Carpet and Rug Institute (CIR) Green Label Plus, and were applied with zero VOC Shaw 1000 Superior Grade Carpet Adhesive.
- **Adhesives and Sealants and Paints and Coatings** Examples of the products used:

Construction IAQ Measures Implemented During Construction

Photos: Harvard Office for Sustainability 2007

HVAC Protection:
Ductwork sealed after installation



Source Control:
VOC-free Joint Compound



Category	Product & Manufacturer	VOC Content (g/l)	VOC Limit (g/l)	Standard
Paints & Coatings	➤ Benjamin Moore EcoSpec Interior Latex	0	150.0	Green Seal GS-11
	➤ Benjamin Moore Aura	49.7	150.0	Green Seal GS-11
Adhesives & Sealants	➤ Shaw Contract Group Adhesive 1000	0	50.0	SCAQMD Rule #1168
	➤ Armstrong S700 Floor Tile Adhesive	0	50.0	SCAQMD Rule #1168
	➤ USG Sheetrock Joint Compound,	0	250.0	SCAQMD Rule #1168





MATERIALS & WASTE

Selecting environmentally preferable materials and minimizing the amount of construction waste sent to landfill was important to the project. The Longfellow Hall renovation was able to reuse a large percentage of the existing furniture. For the additional materials purchased, the project gave preference to low-emitting materials with recycled content.

66% of the interior, non-structural components were retained. This includes finished ceilings, flooring, interior wall partitions, doors and built-in case goods.

69% of the furniture and furnishings were reused in the project - items such as chairs, desks, file cabinets and tables were saved.

89% of construction waste was diverted from landfills, and instead recycled.

ENVIRONMENTALLY PREFERABLE MATERIALS & FURNITURE IN LONGFELLOW HALL BASEMENT RENOVATION

- > Armstrong Cirrus Ceiling Tile (Armstrong)
69% pre-consumer
- > Cirrus ceiling grid (Armstrong)
25% pre-consumer
- > Dazzle Carpet Tiles (Patcraft)
37% pre-consumer
- > Sheetrock Gypsum (USG)
3% pre-consumer, 34% post-consumer
- > Metal Framing (Dietrich)
16.7% pre-consumer, 37% post-consumer
- > Wood Doors (Harring)
20% pre-consumer
- > Nevamar Greenuard Plastic Laminate
25.8% pre-consumer
- > Herman Miller Passage Desk Systems
25% pre-consumer, 15% post-consumer
- > Herman Miller Aeron Chairs
22% pre-consumer, 44% post-consumer
- > Herman Miller Equa 2 Chairs
17% pre-consumer, 19% post-consumer



Longfellow Hall Renovation
Photo: Harvard Office of Sustainability 2007



Patcraft Dazzle Carpet Tile
Photo: www.patcraft.com



Herman Miller Aeron Chair
Photo: www.hermanmiller.com

ADDITIONAL RESOURCES

- > Harvard Graduate School of Education: <http://gseweb.harvard.edu/>
- > Harvard OFS - Green Building Services: <http://green.harvard.edu/green-building-services>
- > Harvard OFS - Green Building Resource: <http://green.harvard.edu/theresource>

