HARVARD GRADUATE SCHOOL OF EDUCATION
Working at the Nexus of Practice, Policy, & Research

HARVARD UNIVERSITY | Sustainability

HGSE LONGFELLOW HALL RENOVATION
13 APPIAN WAY CAMBRIDGE, MA 02138
PROJECT PROFILE

LEED CI-2009
LEED PLATINUM

The Harvard Graduate School of Education (HGSE) made significant upgrades to Longfellow Hall that helped transform the building to better meet the current teaching and learning needs and position the school to advance the mission; Learn to Change the World. The project created a new 5th floor/penthouse addition, and made substantial improvements to the building infrastructure. The building had not seen any significant improvements since the 1940's and as part of the Longfellow Renovation the project team developed an implemented an infrastructure master plan aligned with the future vision of the building. This plan allowed for the development of the electrical switchgear and heating and cooling plants, installation of new systems on the 4th and 5th floors, and new vertical distribution throughout that can be leveraged when the lower floors are renovated in the future. New fire alarm and fire sprinkler systems were installed throughout the building and the project improved the accessibility of Longfellow through the installing a new elevator and upgrades to the entries. The project reorganized space on the 3rd floor to position the school to create two new 60 seat flat floor flexible learning spaces that can be combined to create one large 150 person classroom. The additional space created on the 4th and 5th floors helped develop a more cohesive campus on Appian Way by supporting the relocation of HGSE's Executive Education Program and Project Zero from leased space to the main campus. The Longfellow renovation achieved LEED-CI v3 Platinum certification.

Photo: copyright GSE, 2015

As part of the early integrated design meetings for this project, the team identified several key requirements as critical to the success of the project. These critical items included:

- Environmental Footprint—The goal of the project was to keep the environmental footprint of the building the same as the pre-renovation building even though the overall square footage of the building has increased
- Boiler Plant Efficiency—Improve the overall efficiency of the hot water plant serving the Longfellow building
- Efficient Ventilation—Install Energy Recovery Units (ERU) which recover energy from the exhaust air to condition ventilation air
- Building Insulation—Improve the exterior envelope of the 4th and 5th floors
- Daylight—Utilize natural daylight instead of artificial lighting where available
- Green Building Standards and LEED—Follow Harvard' Green Building Standards and pursue LEED certification

LEED® Facts

HGSE Longfellow Hall Renovation

Location	Cambridge, MA
Rating System	LEED-CI 2009
Certification	Platinum
Total Points Anticipated	83/110
Sustainable Sites	19/21
Water Efficiency	11/11
Energy and Atmosphere	31/37
Materials and Resources	5/14
Indoor Environmental Quality	9/17
Innovation and Design	5/6
Regional Priority	3/4

Project Metrics

45% Reduction in expected water consumption, compared to an EPAct 1992 baseline

39% Reduction in the installed lighting power density, compared to ASHRAE 90.1-2007

17% Recycled content value as a percentage of total material cost

92% Amount of construction waste which was diverted from a landfill

100% All paints and adhesives are low VOC

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Energy Efficiency and Indoor Environmental Quality

Mechanical and Electrical Systems

ECM 1: Reduced Lighting Density

The installed lighting system at Longfellow has an overall lighting power density (LPD) of 0.61 W/SF, which is 39% below AHSRAE 90.1-007's allowable LPD maximum.

ECM 2: High efficiency heat recovery wheels

Ventilation and space dehumidification is provided by two energy recovery units (ERU's) which have a total energy recovery wheel. These recovery wheels transfer energy from the air exhaust stream, which is normally released out of the building, to temper outside air entering.

ECM 3: Chilled Beams

Chilled beam are utilized to more efficiently provide space cooling and heating.

ECM 4: Improved Envelope Performance

The building envelope of the 4th floor and the new 5th floor were insulated at levels well above code minimums in order to reduce energy usage.

ECM 5: Improved Base Building Systems

A new modular heating hot water plant, consisting of high efficiency condensing boilers, was installed as a part of this project.

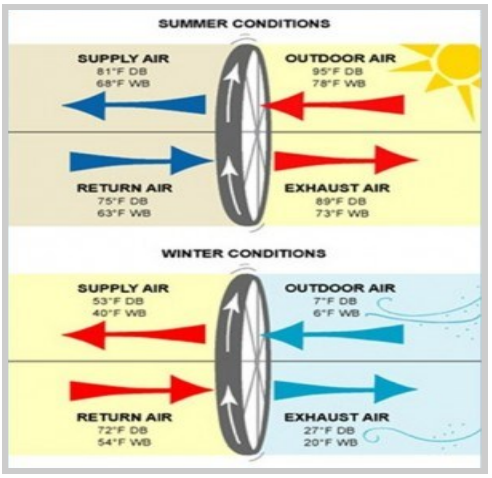


Photo: copyright DAC Sales, 2012

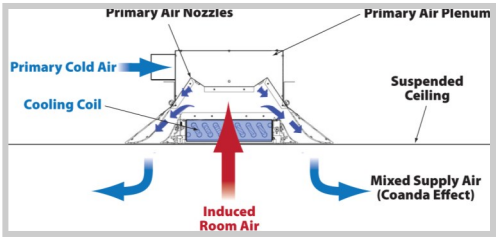


Photo: copyright Taco Advanced Hydronics, 2013

Plumbing Systems and Potable Water Use Reduction

1.28 GPF Toilet: copyright GSE, 2015

0.125 GPF Urinal: copyright GSE, 2015

Decreasing the demand for potable water is the first step towards sustainable water management. Sinks, toilets, urinals, showers, and irrigation systems that are designed to use less water than typical fixtures and systems are widely available and when combined with conscientious occupant use patterns and controls, can result in a large reduction in water use.

Some of the water conservation strategies incorporated in the project include:

- Low-flow plumbing fixtures (urinals: 0.125 GPF; toilets: 1.28 GPF; lavatory faucets: 0.5 GPM)
- Water efficient appliances
- Water efficient irrigation system
- Reduced HVAC water use

These strategies led to a 45% reduction in water use, compared to the EPAct 1992 baseline.

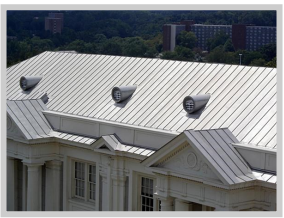
Products and Materials

Sarnatherm Tapered

- 55% post -consumer recycled content
- 45% pre-consumer recycled content
- 100% regionally manufactured

Clark Dietrich Metal Framing

- 24% post -consumer recycled content
- 10% pre-consumer recycled content
- 100% regionally manufactured
- 100% regionally extracted materials



Revere Freedom Gray Copper

- 24% post -consumer recycled content
- 10% pre-consumer recycled content
- 100% regionally manufactured
- 100% regionally extracted materials

ProMar 200 Paint

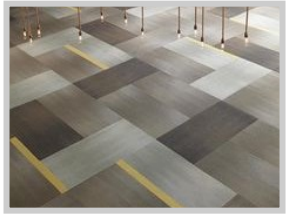
- No VOCs

Stix 2230

- No VOCs

Flakeboard Vesta MDF

- 95% pre -consumer recycled content
- 100% FSC wood content
- No added formaldehyde



Shaw Man Stria

- Green Label GLP9968

Fritztile Classical Terrazzo

- Floor Score

Key Highlights

18% Recycled content contained in the materials specified in Divisions 2-10, by cost

19% Regional content contained in the materials specified in Divisions 2-10, by cost

86% Percent of permanently installed wood which is FSC certified

Please note that while many products are described in this project profile, these are provided for informational purposes only, to show a representative sample of what was included in this project. Harvard University and its affiliates do not specifically endorse nor recommend any of the products listed in this project profile and this profile may not be used in commercial or political materials, advertisements, emails, products, promotions that in any way suggests approval or endorsement of Harvard University.

Project Highlights - Step-Dimming

One innovative strategy employed at Longfellow which expects to save a great deal of energy is the use of step-dimming of the lighting fixtures located throughout the building. While step-dimming is not a new strategy, what is unique is the way the lighting is set up. Typically, spaces which have an occupancy sensor will go initially turn the lights in the room to full illumination and rely on the space occupant to dim the lights to meet their preference. The project team decided to instead set up the lights to turn on initially at 50% illumination, thus allowing occupants to turn the lights up as needed. This strategy was first used at GSE's Gutman Library, and it was observed most building occupants left their lights on at their lower settings. While it is hard to quantify the exact savings for this energy conservation measure, the team's experience at Gutman would suggest a significant amount of savings are possible without affecting the indoor environmental quality of the space.

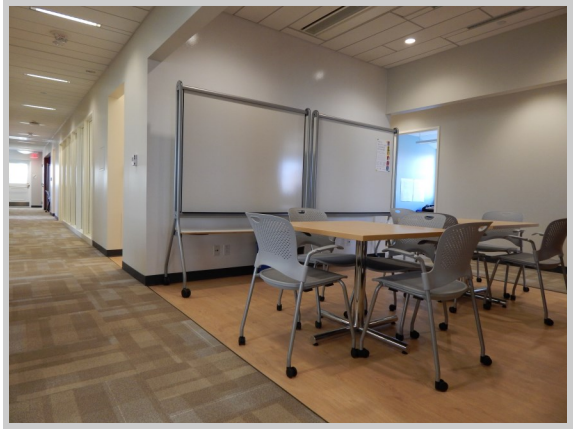


Photo: copyright GSE, 2015

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Photo: copyright GSE, 2015

Project Team

Owner	Harvard Graduate School of Education
Project Manager	Jason Carlson, Harvard GSE
Architect	Baker Design Group, Inc.
MEP Engineer	BLW Engineers
Contractor	Bond Brothers Construction
Commissioning Authority	MAW Consulting Inc
Sustainability Consultant	Harvard Green Building Services

More Information

- Longfellow Building: http://www.gse.harvard.edu/about/campus/buildings/longfellow
- Harvard - Green Building Resource: http://energyandfacilities.harvard.edu/green-building-resource
- Harvard - Sustainability Plan: http://green.harvard.edu/commitment/our-plan
- Follow Green Building Services: http://www.facebook.com/HarvardGBS or @Harvard_GBS

PROJECT SCORECARD

HGSE Longfellow Hall Renovation

Project ID	1000035478
Rating system & version	LEED-CI v2009
Project registration date	09/12/2013

Certified (Platinum)

CERTIFIED: 40-49, SILVER: 50-59, GOLD: 60-79, PLATINUM: 80+

DOWNLOAD SCORECARD

LEED FOR COMMERCIAL INTERIORS (V2009)

ATTEMPTED: 81, DENIED: 1, PENDING: 0, AWARDED: 83 OF 110 POINTS

SUSTAINABLE SITES — 19 OF 21

SSc1	Site Selection	5 / 5
SSc2	Development Density and Community Connectivity	6 / 6
SSc3.1	Alternative Transportation-Public Transportation Access	6 / 6
SSc3.2	Alternative Transportation-Bicycle Storage and Changing Room	0 / 2
SSc3.3	Alternative Transportation-Parking Availability	2 / 2

WATER EFFICIENCY — 11 OF 11

WEp1	Water Use Reduction-20% Reduction	Y
WEc1	Water Use Reduction	11 / 11

ENERGY AND ATMOSPHERE — 31 OF 37

EAp1	Fundamental Commissioning of the Building Energy Systems	Y
EAp2	Minimum Energy Performance	Y
EAp3	Fundamental Refrigerant Mgmt	Y
EAc1.1	Optimize Energy Performance-Lighting Power	5 / 5
EAc1.2	Optimize Energy Performance-Lighting Controls	0 / 3
EAc1.3	Optimize Energy Performance-HVAC	10 / 10
EAc1.4	Optimize Energy Performance-Equipment and Appliances	4 / 4
EAc2	Enhanced Commissioning	5 / 5
EAc3	Measurement and Verification	2 / 5
EAc4	Green Power	5 / 5

MATERIALS AND RESOURCES — 5 OF 14

MRp1	Storage and Collection of Recyclables	Y
MRc1.1	Tenant Space-Long-Term Commitment	1 / 1
MRc1.2	Building Reuse	0 / 2
MRc2	Construction Waste Mgmt	2 / 2
MRc3.1	Materials Reuse	0 / 2
MRc3.2	Materials Reuse-Furniture and Furnishings	1 / 1
MRc4	Recycled Content	1 / 2
MRc5	Regional Materials	0 / 2
MRc6	Rapidly Renewable Materials	0 / 1
MRc7	Certified Wood	0 / 1

INDOOR ENVIRONMENTAL QUALITY — 9 OF 17

IEQp1	Minimum IAQ Performance	Y
IEQp2	Environmental Tobacco Smoke (ETS) Control	Y
IEQc1	Outdoor Air Delivery Monitoring	1 / 1
IEQc2	Increased Ventilation	0 / 1
IEQc3.1	Construction IAQ Mgmt Plan-During Construction	1 / 1
IEQc3.2	Construction IAQ Mgmt Plan-Before Occupancy	1 / 1
IEQc4.1	Low-Emitting Materials-Adhesives and Sealants	1 / 1
IEQc4.2	Low-Emitting Materials-Paints and Coatings	1 / 1
IEQc4.3	Low-Emitting Materials-Flooring Systems	1 / 1
IEQc4.4	Low-Emitting Materials-Composite Wood and Agrifiber Products	1 / 1
IEQc4.5	Low-Emitting Materials-Systems Furniture and Seating	0 / 1
IEQc5	Indoor Chemical and Pollutant Source Control	0 / 1
IEQc6.1	Controllability of Systems-Lighting	0 / 1
IEQc6.2	Controllability of Systems-Thermal Comfort	0 / 1
IEQc7.1	Thermal Comfort-Design	1 / 1
IEQc7.2	Thermal Comfort-Verification	1 / 1
IEQc8.1	Daylight and Views-Daylight	0 / 2
IEQc8.2	Daylight and Views-Views for Seated Spaces	0 / 1

INNOVATION IN DESIGN — 5 OF 6

IDc1.1	Innovation in Design	0 / 1
IDc1.1	Innovation in Design: Occupant Engagement	1 / 1
IDc1.2	Innovation in Design	0 / 1
IDc1.2	Innovation in Design	0 / 1
IDc1.3	Pilot Credit 24: EQ - Acoustic Performance	1 / 1
IDc1.3	Innovation in Design	0 / 1
IDc1.4	Exemplary Performance: Water Use Reduction	1 / 1
IDc1.4	Innovation in Design	0 / 1
IDc1.5	SSc3.1 Exemplary Performance - Public Transportation Access	1 / 1
IDc1.5	Innovation in Design	0 / 1
IDc2	LEED® Accredited Professional	1 / 1

REGIONAL PRIORITY CREDITS — 3 OF 4

SSc3.2	Alternative Transportation-Bicycle Storage and Changing Room	0 / 1
WEc1	Water Use Reduction	1 / 1
EAc1.1	Optimize Energy Performance-Lighting Power	1 / 1
EAc1.3	Optimize Energy Performance-HVAC	1 / 1
MRc3.1	Materials Reuse	0 / 1
MRc5	Regional Materials	0 / 1

TOTAL — 83 OF 110

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