HARVARD | BUSINESS | SCHOOL

McCollum Hall Classroom Renovation Project Profile
LEED-CI Gold, August 2007

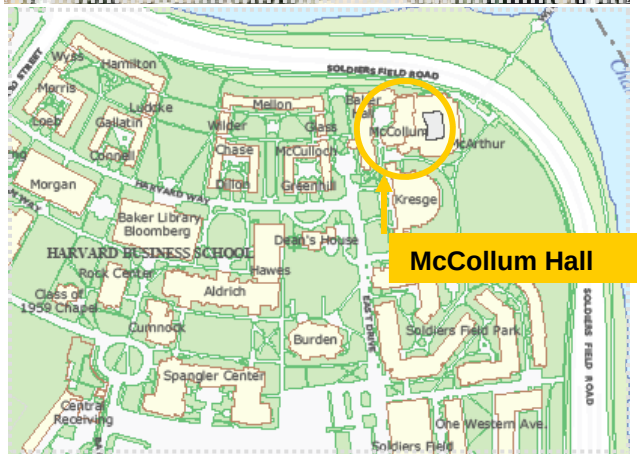
Project Highlights

- 42.7% reduction in potable water usage achieved with high-efficiency low-flow fixtures
- 94.6% of the construction waste diverted from landfills.
- Built-in millwork desks refurbished and reused, resulting in a resource reuse rate of nearly 35%.
- 39% of the total value of materials used in the project manufactured regionally and 15.7% extracted within 500 miles of the project site
- Use of low-emitting paints, adhesives and sealants and no added urea-formaldehyde in composite woods
- Renewable Energy Certificates (wind power) offset 100% of the energy used in the classrooms for two years
- Commissioned by a third-party commissioning agent
- Extensive recycling efforts
- Green Cleaning practices

Project Summary

In 2007, the Harvard Business School (HBS) upgraded four Executive Education classrooms in McCollum Hall (101, 102, 201, and 202). McCollum is located at 47 Harvard Way in Boston, MA. The classrooms encompass 7,940 square feet of the building, and provide space for more than half of the 8,000 participants that participate in the HBS Executive Education program each year. The last significant improvement made to these classrooms occurred in 1992. The scope of this project included complete architectural finish enhancement, built-in millwork desk refurbishment, some furniture replacement, improved HVAC air delivery and distribution systems with the space, and room access/egress improvements.

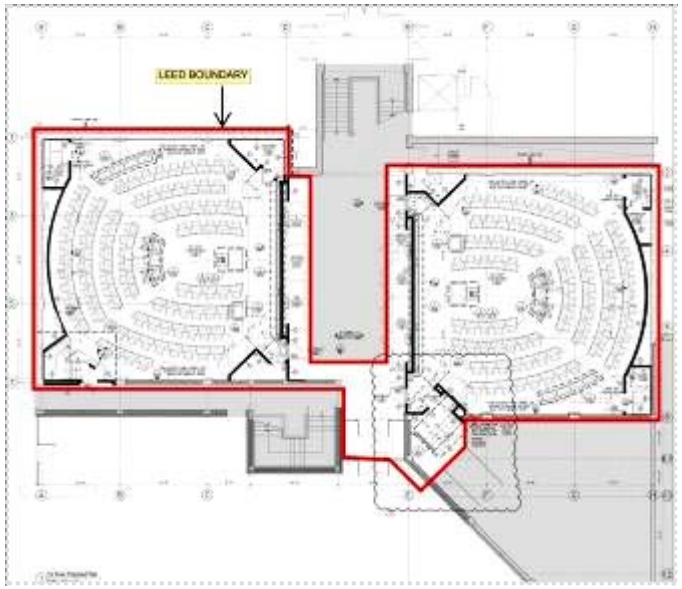
The project team was committed to all facets of sustainability throughout the design and construction process. In order to pursue LEED-CI Gold certification, the team consistently analyzed and implemented available materials and practices that are both sustainable and stylistically appropriate.



Location

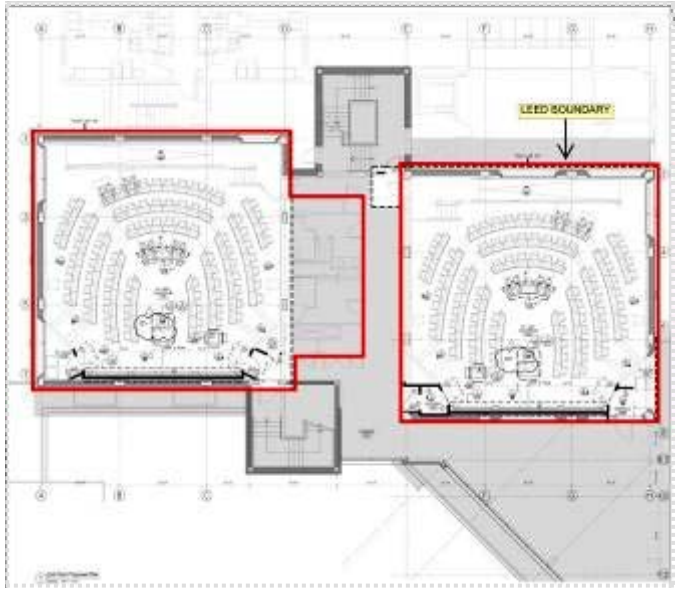
> McCollum Hall is located at 47 Harvard Way in Boston, Massachusetts on the Harvard Business School campus. The renovation included four classrooms on the first and second floor.

McCollum Hall - First Floor Plan
Classrooms 101 and 102



Drawings

McCollum Hall - Second Floor Plan
Classrooms 201 and 202



Project Team

Owner and Project Management: Harvard Business School
Architect: Baker Design Group, Inc.
Engineer: Bard, Rao + Athanas Consulting Engineers, LLC
Contractor: Richard White Sons, Inc.
Commissioning Agent: MAW Consulting, LLC
Waste Management Consultant: Institution Recycling Network
Sustainability Consultant: Harvard Green Campus Initiative

Alternative Transportation

BICYCLE STORAGE ON CAMPUS

Classrooms

INTERIORS

Sustainable Strategies

Site

> The project is located in a dense urban area with close proximity to the Harvard Square subway stop, several bus lines, and the Harvard University Shuttle system.

> The HBS campus provides bicycle storage for over 14% of HBS students and staff on campus. While enrolled in the program, Executive Education students live in Baker Hall, so showers are provided.

> Harvard Business School has chosen to address light pollution and trespass by developing and adopting a campus-wide lighting master plan that addresses uniform lighting levels, energy efficient lighting, minimal up-lighting, and minimizing light trespass.

Harvard Business School light-trespass is minimized beyond the HBS site boundary.

Water

> A campus-wide irrigation audit was conducted by Irrigation Consulting, Inc., which identified efficient fixtures to reduce the volume of potable water used for irrigation.

> To reduce potable water consumption, McCollum's restrooms were retrofitted with 0.375 gallon per minute sink aerators, 0.5 gallon per flush low-flow urinals, and dual-flush toilets with 1.1 gallon per flush or 1.6 gallon per flush options. These measures are predicted to reduce water consumption by at least 42.7 % over standard EPAct 1992 compliant fixtures.

Energy

Optimizing Energy Performance: HVAC, Lighting Power and Controllability

> Harvard Business School's primary HVAC objective was to upgrade the air delivery and distribution system in these four classrooms to improve the occupant comfort levels and eliminate drafts. The spaces are served by four existing air handling units and two fan coil units. The HVAC design reused the existing air handlers to serve the classrooms and the existing fan coil units to serve two of the four AV closets. Two new fan coil units were installed to serve the remaining two AV rooms so that these rooms can be conditioned independently of the air handling units. Other than the installation of new diffusers and ductwork in the classrooms, the existing air handling units were not modified.

> The lighting power density was reduced 15% below the ASHRAE 90.1-2004 standard with the use of compact fluorescent down lights and T8 fluorescent lighting. In classrooms, ASHRAE allows a maximum of 1.4 watts per square foot of lighting power density. In LEED-CI projects, designing efficient lighting can have huge energy savings.

Enhanced Commissioning

Commissioning is the process of ensuring that the building's energy related systems are designed, installed, calibrated, and will perform according to the owner's project requirements (OPR), basis of design (BOD), and construction documents.

> The McCollum Hall was fully commissioned by an independent third-party commissioning agent. This commissioning agent reviewed drawings and submittals, and inspected equipment throughout installation for the mechanical, lighting, and building management control systems.

> Verification tests and functional performance tests were developed and executed. O&M and balancing reports manuals were reviewed.

Green Power: Renewable Energy Certificates

> Renewable Energy Certificates were purchased to offset 100% of the electricity use in the tenant space for two years.

> The project is offsetting 254,080 kWh, which avoids emitting 353,678 pounds of C02, and is equivalent to:

  > 35 passenger cars NOT driven for one year
  > 21 households' electricity use for one year
  > 134 acres of pine or fir forests storing carbon for one year
  > 54 tons of waste recycled instead of sent to the landfill

Materials and Waste

- Institution Recycling Network (IRN), a waste management consultant, ensured that the highest possible rate of construction waste recycling was achieved.
- Wood was recycled as mulch, gypsum board was recycled to create new gypsum, and chairs were donated to community organizations. This resulted in a construction waste recycling rate of over 94.6%. Built-in millwork desks were refurbished and reused, resulting in a resource reuse rate of nearly 35%.
- The project team was committed to specifying and installing environmentally-preferable materials. Materials with recycled content and from local sources were specified and installed whenever possible. 39% of the total value of materials used in the project were manufactured regionally and 15.7% were extracted within 500 miles of the project site.
- 19% of the total value of materials had recycled content.

Indoor Air Quality

- Volatile Organic Compounds (VOCs) are chemical compounds found in many construction materials that can have detrimental health effects on occupants. Reducing the use of VOCs where possible improves indoor air quality and consequently occupant health and productivity. VOC limits are set by Green Seal standards and the South Coast Air Quality Management District Rules #1168 and #1113.
- Only low-VOC paints, adhesives, and sealants were used in the classrooms. Interior paint primers, base adhesives, and carpet adhesives all contained zero VOCs.
- Composite wood used in the classrooms contain no added urea-formaldehyde. All the systems furniture are Green Guard certified, fulfilling LEED criteria for Indoor Air Quality.
- An Indoor Air Quality Management Plan was implemented to maintain healthy indoor air quality during construction, as the building remained occupied. For example, all grills and vents were sealed. Green sweep like products were used to minimize dust during cleanup.
- Prior to Occupancy, indoor air quality testing was performed to test the levels of formaldehyde, particulates, and the total levels of VOCs, and MERV 8 filtration media was replaced by MERV 13 media.

Green Cleaning

- The Harvard Business School (HBS) is committed to ensuring that sustainable practices continue into occupancy. To this end, HBS has entered into contract with Unicco to utilize their green cleaning services.
- Green cleaning practices include the use of green cleaning chemicals, employing cleaning methods that benefit public health and the environment, such as preventing dirt and dust from entering the building, using HEPA filtration vacuums, and using micro fiber cloths.
- Custodial training is an integral step in the process to ensure that custodians are using the products in a safe and efficient manner.
- Green cleaning also takes into consideration the product's entire life cycle, favoring concentrated products that are packaged in reduced, refillable, or recyclable packaging.

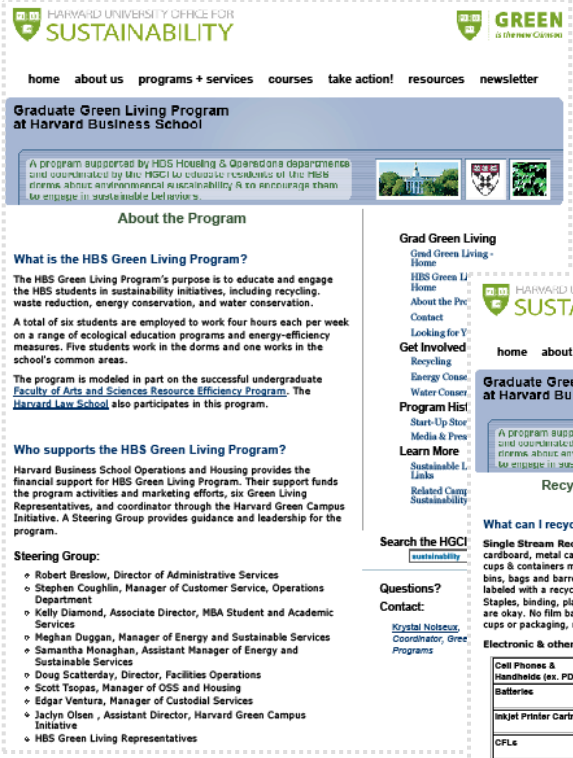
Harvard Business School - Green Living Program

> The Graduate Green Living Program at HBS is a peer-to-peer education program that promotes sustainable living.

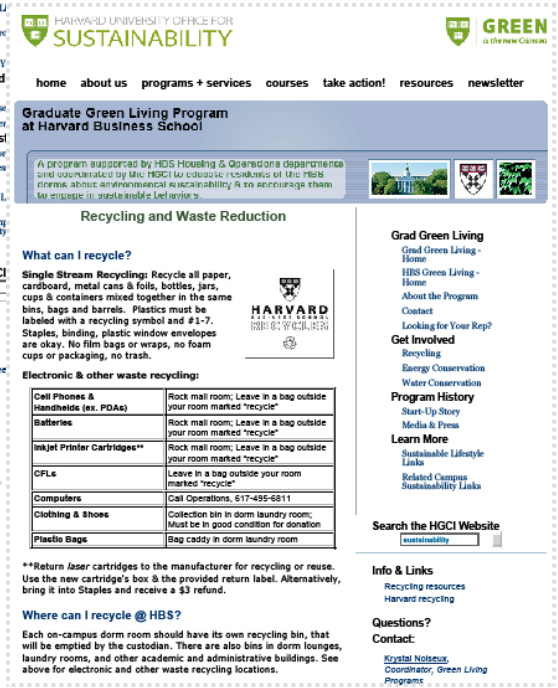
> Green Living Representatives (REPs) work to encourage energy and water conservation and recycling and waste reduction through activities and information sharing in each HBS dorm and the common areas. They also suggest infrastructure and policy improvements to remove barriers to conservation.

> The program is supported by Harvard Business School Housing and Operations, and is just one of the many ways that these departments are working to make the campus more sustainable.

HBS Green Living Program



HBS Graduate Recycling Initiative

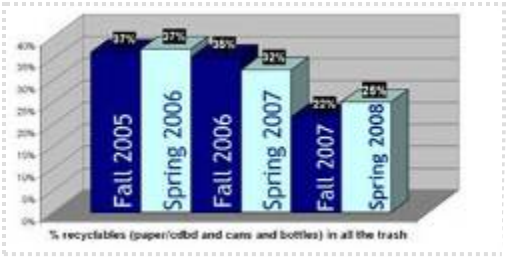


Green Mission

HBS promotes following green projects to help its green mission:

> **Recycling**

Increasing the amount of waste that is recycled is one of the main goals of Harvard Business School. During the 2006 fiscal year (June 30, 2005 through July 1, 2006) HBS recycled 182.5 tons of paper, 37.4 tons of corrugated cardboard, and 28.2 tons of cans and bottles.



> **Waste Audits**

HBS conducts two waste audits each year- in October and April. The results of the waste audits show that recycling in the dorms has been increasing since 2005. Much of this is due to the distribution of recycling bins and bags in the dorms, new signs above bins, and the Reps' recycling education & outreach.

> **Sustainability Pledge**

The Harvard Sustainability Pledge is an annual event across the University. Each year, thousands of students, staff, and faculty pledge to make changes in their lifestyle to reduce their environmental impact. For each pledge made in 2007, Harvard put aside $1.50 to fund a future renewable energy project on campus.

> **Energy Competition**

Every year, HBS conducts a month-long energy competition between the dorms to educate residents about what they can do to reduce their energy use and use the utility data to track the energy changes. In 2007, the score for each dorm in the competition was calculated with electricity savings of 75% and Sustainability Pledge participation rate was 25%.

> **Move Out Collection**

At the end of year, students throw out tons of clothes, school and dorm supplies, and food. HBS has partnered with Harvard Recycling to collect these reusables, which are sold in September at the annual Stuff Sale. The Stuff Sale allows Harvard students to get what they need for the school year at a low price, promotes reuse, and the proceeds benefit Habitat for Humanity and other non-profits.