



Gallatin Hall Renovation Project Profile
LEED-NC version 2.2 GOLD
August 2008



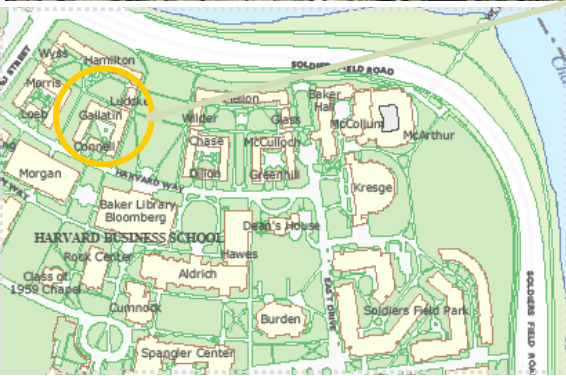
Project Summary

Gallatin Hall is a 48,218 square foot, four story residence hall located on the Harvard Business School campus at 24 Harvard Way in Boston, MA. The original 1927 Georgian Revival building was designed by McKim, Mead and White and completed as a part of Charles McKim and Frederick Law Olmsted's competition-winning HBS master plan. The renovation of Gallatin Hall included a pre-design, programmatic study to determine the most productive and best use of the building. The program called for decompressing the bedroom space by recapturing common space and non-residential space. Although the exterior was left largely in its original state, it required a complete restoration. The building infrastructure (HVAC, tel/data connections, elevator, etc.) was replaced with more energy efficient systems. Throughout the project, the team consistently analyzed materials and systems that were both sustainable and stylistically appropriate, in order to pursue LEED-NC Gold certification.

- > **98.4%** of the construction waste was diverted from the landfills.
- > **96%** of the shell and structural components were retained.
- > **52%** reduction in water consumption
- > **12.5%** of the total value of materials have post-consumer and pre-consumer recycled content.

Project Highlights

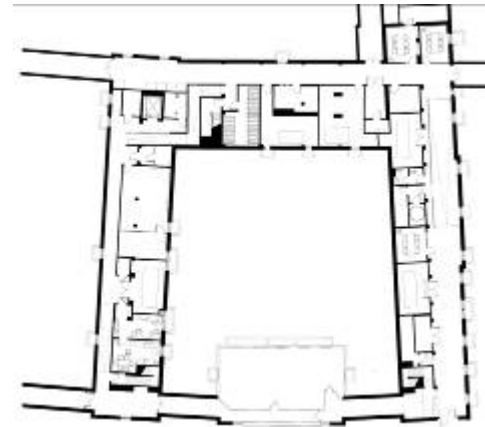
- > Temperature setbacks based on occupancy
- > Window sensors turn off HVAC in room when windows are open
- > Real-time utility displays educate occupants on the building's energy and water consumption
- > A comprehensive occupant thermal comfort survey will be used to evaluate satisfaction of occupants.
- > Renewable Energy Certificates (RECs) offset 100% of the anticipated two-year electricity usage of the building.
- > Comprehensive recycling program for occupants
- > Use of low-emitting paints, adhesives and sealants; green cleaning practices



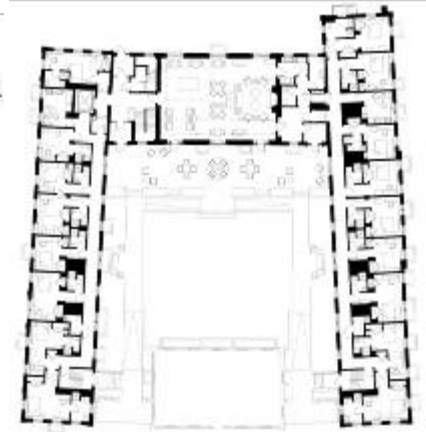
Project Scope

- > Gallatin has 73 bedrooms with private baths, 8 shared kitchens, 1 new staircase, 4 group study rooms and 1 lounge. On two floors of the building, offices were converted into lounges.
- > New windows (347) were installed to visually match the original fenestration but with improved envelope efficiency.
- > HVAC systems were fully renovated.

Gallatin Hall



Gallatin Hall– Basement Plan



Gallatin Hall– First Floor Plan

Project Team

Owner:

Harvard Business School

Project Manager:

Kristen Carey

Architect:

Shepley Bulfinch Richardson & Abbott

Contractor:

Richard White Sons, Inc.

HVAC Engineer:

BLW Engineers, Inc.

Commissioning Agent:

MAW Consulting, LLC

Waste Management Consultant:

Institution Recycling Network

Irrigation Consultant:

Irrigation Consulting, Inc.

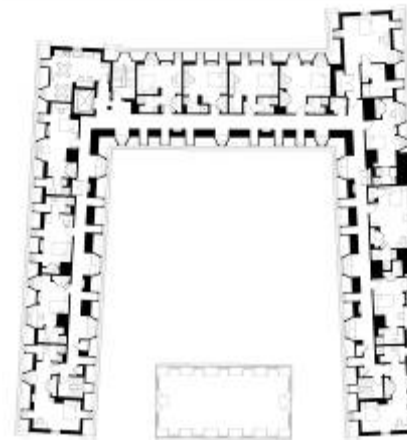
Sustainability Consultant:

Harvard University Office for Sustainability

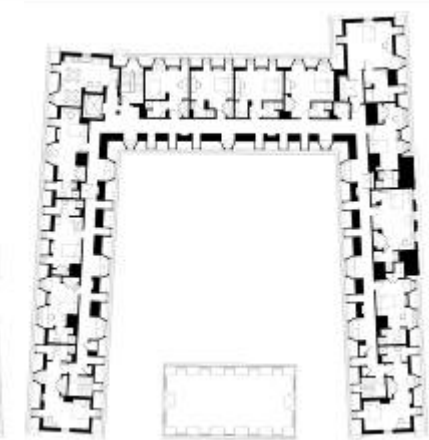
Drawings



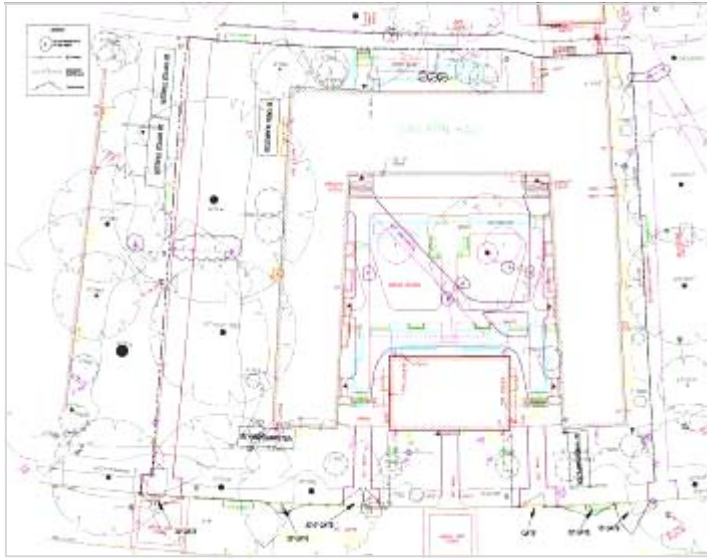
Gallatin Hall– Second Floor Plan



Gallatin Hall– Third Floor Plan



Gallatin Hall– Fourth Floor Plan



Erosion and Sedimentation Control Plan;
Recycling During Demolition



Sustainable Strategies

Site

- > A Construction Activity Pollution Prevention Plan was implemented. This included installing soil stabilizer fabric on top of the existing lawn, protecting the trees from truck and vehicular traffic, as well as using catch basin sediment traps.
- > A 29.4 % reduction in quantity of storm water runoff and a 32.6 % reduction in runoff rates was designed for using StormTech underground storm water chambers for water detention, retention, and recharge.
- > 58% of impervious surfaces are weathered white concrete with a high Solar Reflectance Index that helps reduce the area's heat island effect.
- > Occupants have access to Harvard's Commuter Choice program, which provides discounts on public transportation and carpooling incentives. Public transportation such as the MBTA bus service and the Harvard University Shuttle is easily accessible.
- > No new parking was added for the project, but HBS provides preferred parking for low-emitting/fuel efficient vehicles.

Dedicated Open Space— Central Courtyard

Water Efficiency

- > Landscaping and irrigation systems were designed to reduce potable water use by 51.4%. Rain-Bird pressure-regulating spray head were installed for irrigation at Gallatin Hall. Also, central control systems with weather station inputs were installed to automatically manage irrigation duration on campus.
- > To further reduce water consumption, water efficient fixtures were installed, such as Sloan uppercut's Dual-Flush flushometer with 1.6/1.1 gpf flush-rate, Chicago Ultra 0.5 gpm low-flow lavatories, Chicago 0.5 gpm low-flow kitchen sink aerators and 1.5 gpm Zurn low-flow showerheads. These measures will reduce domestic water consumption by at least 52% over standard EPA-compliant fixtures.

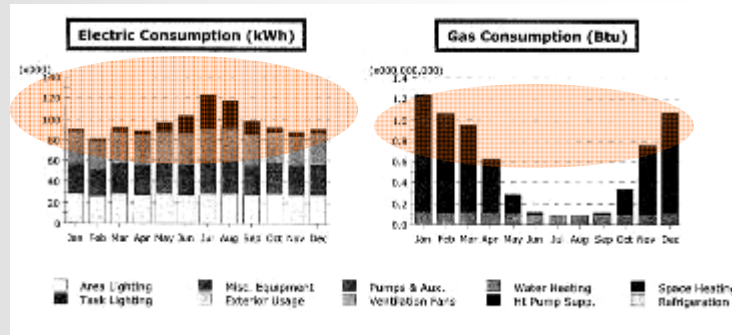
Energy Savings

- > Harvard Business School replaced two existing Carrier Centrifugal 800 ton Chillers and all associated equipment with two new 1400 ton high efficiency York chillers. HBS has also phased out the use of CFC-based refrigerants for their central chilled water plant, and has chosen refrigerants with lower global warming potential.
- > Gallatin is designed to reduce energy consumption by 34% over an ASHRAE 90.1-2004 compliant building by employing the following methods:
 - > High Efficiency Glazing: The assembly U-value for the fenestration is 0.48 is versus the 0.67 allowed by ASHRAE 90.1
 - > Three Heat Recovery Units provide ventilation/build exhaust make up air throughout the building.
 - > Carbon Dioxide Sensors are installed in each space for demand control ventilation.
 - > Occupancy sensors are tied to thermostats to set back the temperature of individual spaces based on actual occupancy.

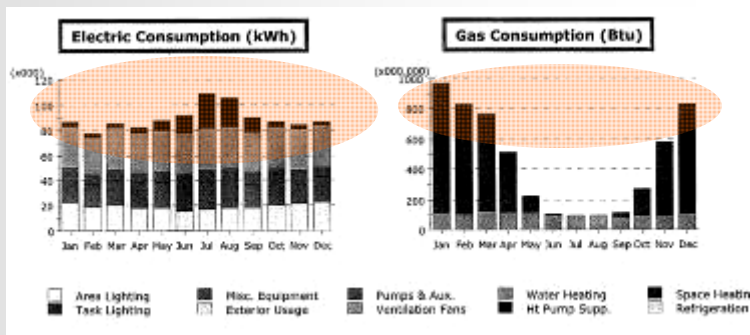
> These measures are expected to save \$42,611 in natural gas consumption and \$8,567 in electricity consumption annually.

> To track actual energy consumption, the project team has developed and implemented a Measurement and Verification plan.

> This includes sub-metering of building chilled water and hot water usage, domestic hot water flow, re-circulated hot water return flow, domestic cold water flow, irrigation, electrical load, receptacle load, lighting, emergency power, HVAC constant speed motors' power consumption, ventilation air volumes, as well as the overall building.



ASHRAE 90.1-2004 Base Case (Monthly Energy Consumption by End-Use)



Proposed Design Energy Usage (Monthly Energy Consumption by End-Use)

Optimizing Energy Performance: Lighting

- > Energy efficient T5 lighting fixtures were selected with consideration for ceiling height, day lighting, lighting levels, use, and maintenance.
- > Also integrating occupancy sensors in each room ensures lights are not left on unnecessarily.



Green Power: Renewable Energy Certificates

- > Renewable Energy Certificates were purchased from Sterling Planet (wind power) to offset 100% of the anticipated energy used in the Gallatin Hall project for 2 years.
- > The project is offsetting 1,497,024 kWh, which avoids emitting 2,040,444 pounds of CO₂, and is equivalent to:
 - > 200 passenger cars NOT driven for one year
 - > 119 households' electricity use for one year
 - > 771 acres of pine or fir forests storing carbon for one year
 - > 312 tons of waste recycled instead of sent to landfill

Materials and Resources

- > This project included demolition and removal of existing finishes including carpet, hard ceiling, and acoustic wall panels. The spaces were subsequently upgraded with new finishes including flooring, paint, ceilings, automatic lighting controls, and an extensive audio visual package.
- > During this process, over 98.4% of the construction waste was recycled, which is the equivalent of 1,529.7 tons of waste.

ENVIRONMENTAL IMPACT ASSESSMENT	MTCO2	MTCO2E	BARRELS OIL SAVED	REUSE/RECYCLING ENERGY SAVINGS (Btu)		
TOTAL REDUCTION	444	1627	1,040	6,833	87	88

- > Over 96% of the shell and structural components were retained.
- > About 12.5% of the total value of materials used in the project consists of materials with recycled content, including Forbo linoleum tack boards, Forbo linoleum flooring, USG gypsum boards, Dietrich studs, Agrifiber door cores, etc.



2/28/08 Covered Ductwork



2/28/08 Covered Ductwork



2/28/08 Covered Unit Heaters

Construction IAQ Management Plan
During Construction
 SMACNA-compliant measures include HVAC protection, pollutant source control, pathway interruption, housekeeping and appropriate scheduling of installations



2/28/08 Dust Control



6/11/08 Walk-Off Mats



6/11/08 Low VOC Paints, Covered Containers

Indoor Air Quality

- > A carbon dioxide sensor was installed in the Main Lounge. The building energy management system monitors the carbon dioxide levels in the occupied space and operates to modulate the air handling unit indoor air, return air and exhaust air dampers.
- > During construction, an IAQ Management Plan and Checklist were developed to ensure that the project intent for highest environmental air quality was met during construction.
- > Low VOC adhesives and sealants, from Bentley Prince Street, Johnsonite, Forbo, etc. were used. Low-VOC paints from Benjamin Moore were also used.
- > All the carpet, manufactured by Bentley Prince Street, Collins and Aikman is CRI Green Label Plus certified.
- > Wood products used in the project such as Sierra Pine, Roseburg etc. have recycled content and have no added urea-formaldehyde.
 - > All spaces within the building have been provided with fan-coil units and individual space temperature controls.
 - > Harvard Business School plans to administer occupant surveys and adjust HVAC parameters to respond to comfort issues.
 - > More than 93% of regularly occupied space has access to daylight and outside views.

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 student 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.

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Graduate Green Living Program at Harvard Business School

A program supported by HBS Housing & Operations department in partnership with the HBS Office for Sustainability. We encourage them to recycle as much as possible.

Recycling and Waste Reduction

What can I recycle?

Single Stream Recycling: Recycle all paper, cardboard, metal cans & foil, bottles, jars, cups & containers mixed together in the same bins, bags and barrels. Plastics must be labeled with a recycling symbol and #1-7. Staples, binding, plastic window envelopes are okay. No film bags or wraps, no foam cups or packaging, no trash.

Electronic & other waste recycling:

Cell Phones & Accessories (e.g. PDAs)	Rock mail room; Leave in a bag outside your room marked "recycle"
Batteries	Rock mail room; Leave in a bag outside your room marked "recycle"
Inkjet Printer Cartridges**	Rock mail room; Leave in a bag outside your room marked "recycle"
CPUs	Leave in a bag outside your room marked "recycle"
Computers	Call Operations, 617-495-6311
Clothing & Shoes	Collection bin in dorm laundry room; Must be in good condition for donation
Plastic Bags	Bag caddy in dorm laundry room

**Return laser cartridges to the manufacturer for recycling or reuse. Use the new cartridge's bin & the provided return label. Alternatively, bring it into Staples and receive a \$3 refund.

Where can I recycle @ HBS?

Each on-campus dorm room should have its own recycling bin, that will be emptied by the custodian. There are also bins in dorm lounges, laundry rooms, and other academic and administrative buildings. See above for electronic and other waste recycling locations.

Search the HGCI Website

Questions?
Contact: [Natalie Nohden](#), Coordinator, Green Living Programs



Real-Time Utility Displays

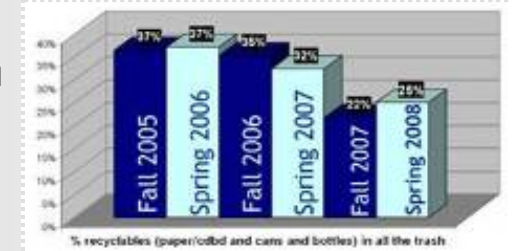
- > Gallatin Hall has installed real-time utility displays - Green Touch Screens - to educate occupants on Gallatin's utility consumption.

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. Since October 2005 the amount of recyclables in the trash has decreased each semester. 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 changes. In 2007, the score for each dorm in the competition was calculated with electricity savings as 75% of the total and Sustainability Pledge participation rate as 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.