



ROCKEFELLER HALL

LEED-NC v2.2 CERTIFIED GOLD 2009

Originally constructed in 1970, Rockefeller Hall is a 26,715 square foot building on the Harvard Divinity School campus. In 2007-8, Rockefeller underwent a complete renovation. The project team was able to creatively redesign the building to meet modern needs, while keeping a large portion of the building mass.

In keeping with its commitment to sustainability, the Rockefeller project implemented numerous energy conservation measures and pursued certification by the U.S. Green Building Council's LEED program. Rockefeller achieved a LEED Gold rating in November, 2009.



Rockefeller Hall

Photo: Katherine Moxhet, Harvard Office for Sustainability. 2008

PROJECT HIGHLIGHTS

LEED® Facts

Rockefeller Hall
Harvard Divinity School
2007-2008 Renovation



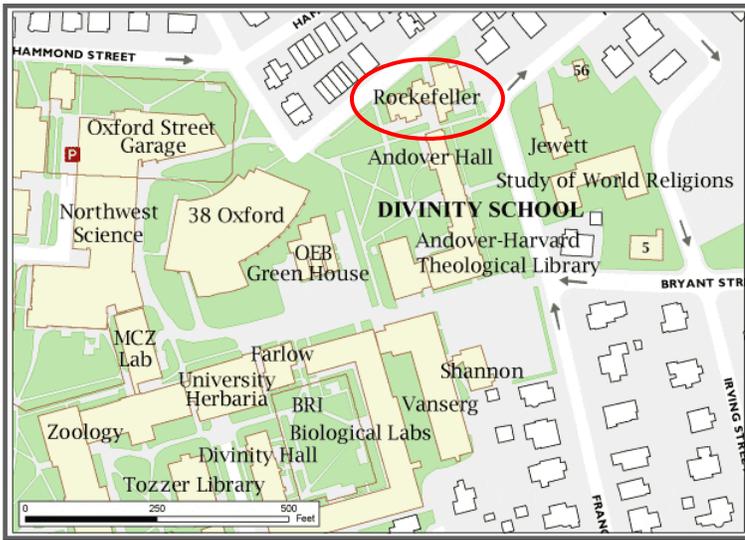
Table with 2 columns: Category and Value. Location: Cambridge, Massachusetts; Rating System: New Construction v2.2; Certification Achieved: Gold; Total Points Achieved: 49 / 69

Table with 2 columns: Category and Score. Sustainable Sites: 9/14; Water Efficiency: 2/5; Energy and Atmosphere: 13/17; Materials and Resources: 7/13; Indoor Environmental Quality: 13/15; Innovation and Design: 5/5

- 95% of the original structure's floors, walls, and roofing was preserved in the renovation
42% reduction in energy consumption over a standard code-compliant building
44% reduction in water consumption over EPA 1992 compliant fixtures.
4.2 x the amount of vegetated open space compared with the building footprint



PROJECT OVERVIEW



Rockefeller Hall on Harvard Map

The main goals of the Rockefeller renovation were to:

- Make the building fully accessible
- Convert floors 2-4 from graduate dormitory to administrative use
- Reconfigure first-floor dining area along with kitchen and food service facilities upgrades
- Upgrade life safety and building energy systems
- Improve the building envelope

Another major component was to create a new campus green.

Overall, the Rockefeller renovation aimed to improve comfort and health at the Divinity School while reducing costs and environmental impact.

PROJECT TEAM

Owner	Harvard Divinity School
Project Manager	Cecilia Wan, Harvard Real Estate Services
Architect	VSBA
Contractor	Shawmut
Landscape Architect	Stimson
Civil Engineer	Green International, Inc.
MEP Engineer	SEI
Commissioning Authority	Facility Dynamics Engineering
Sustainability Consultant	Harvard University, Office for Sustainability Green Building Services

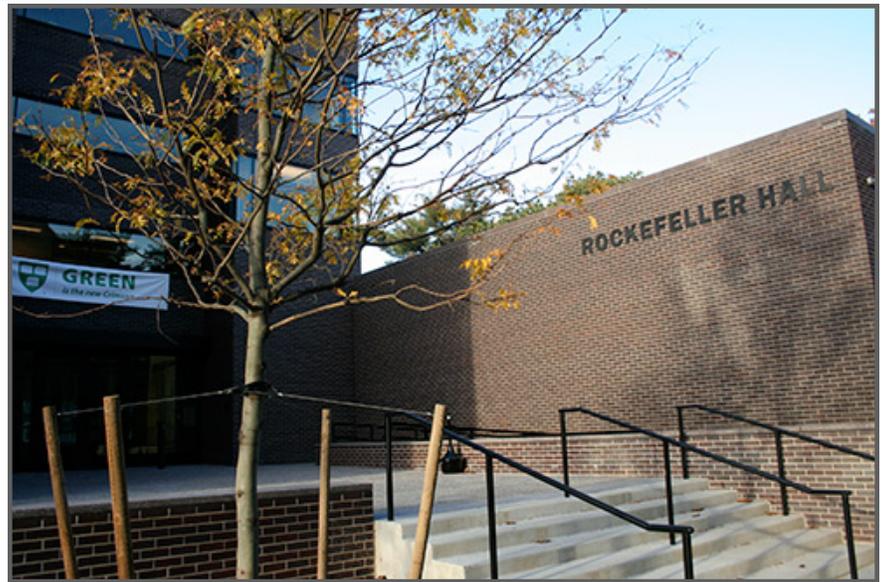


Rockefeller Hall Campus Green Rendering
VSBA. 2007



SITE

- Rockefeller Hall is located near Harvard Square in Cambridge, MA. This location allows easy access to multiple amenities and ample public transportation. A Harvard shuttle provides access to all parts of the Harvard campus, and the nearby subway and MBTA bus routes provide access across the Boston metro area.
- To encourage alternatives to driving, all occupants of Rockefeller Hall have access to Harvard's comprehensive **CommuterChoice Program**, which provides incentives and discounts for all modes of alternative transportation as well as carpooling and fuel efficient vehicles.
- **New Campus Green:** A large asphalt parking lot was removed, recycled and replaced with a green space, supporting recreation and community-building activities and helping to provide a campus identity.



Rockefeller Hall
Photo: Katherine Moxhet. Harvard Office for Sustainability. 2008

WATER EFFICIENCY

All plumbing fixtures in Rockefeller Hall are low-flow models, resulting in a **reduction of domestic water consumption by 43.7%** over standard EPAAct 1992 fixtures. This is the equivalent of saving over 167,000 gallons per year.

FIXTURES IN ROCKEFELLER HALL

Differences in the Flush & Flow Rates for EPAAct 1992 Standard Fixtures and the fixtures installed in Rockefeller Hall		
Fixture Type	Rockefeller Hall Flush & Flow Rates	EPAAct 1992 Standard Flush & Flow Rates
Water Closet [GPF]	Dual-Flush 1.6 & 1.1	1.6
Urinal [GPF]	0	1.0
Bathroom Sink [GPM]	0.5	2.5
Kitchen Sink [GPM]	1.5	2.5
GPF - Gallons Per Flush GPM - Gallons Per Minute		



SLOAN Uppercut #WES-111
Electronic Dual Flush
(Full Flush 1.6 gpf and Reduced Flush 1.1 gpf)

Photo: Sloan Valve Company

YUKON Waterless Urinal #2101
(No-Flush 0 gpf)

Photo: Waterless Company



ENERGY EFFICIENCY

The Rockefeller project utilized the Green Campus Loan Fund to implement numerous energy conservation measures to reduce operating costs and greenhouse gas emissions. The following measures alone have been estimated to save the Divinity School 32,192 kilowatt-hours of electricity, 185 ton-days of chilled water, and 293 million BTUs of steam, reducing carbon emissions by 48 metric tons each year. The payback from these measures is estimated at 7.8 years. An energy model was also produced for this project, estimating that the renovated Rockefeller Hall will use 42.2% less energy than a code-compliant building.

MECHANICAL SYSTEMS

- ▶ **Variable Frequency Drives (VFDs):** Drives on the chilled water and hot water pumps and fans slow down when demand is low, and different zones can be separately operated. For example, the upper office floor can be isolated while the first floor public space is energized for an extended schedule of use.
- ▶ **Pressure Control Chilled Water:** Pressure Independent Characterized Control Valves (PICC) were installed to send the right amount of chilled water through each cooling coil, maximizing efficiency and improving dehumidification.
- ▶ **Occupancy Sensors:** Occupancy sensors in the offices, meeting rooms, and kitchenette are tied to the building's control system, allowing temperature setting to be set back whenever those spaces are unoccupied.
- ▶ **Energy Recovery Wheel:** An enthalpy wheel installed on the central ventilation air handling unit recovers heat, cool air, and humidity, so less energy is required to condition fresh outdoor air.
- ▶ **Fan Coil Unit Fan Cycling:** The fans that distribute heating and cooling within each room cycle on and off as the space temperature set point is satisfied.
- ▶ **Melink System:** A Melink system was installed on the kitchen exhaust fan, varying the speed according to exhaust hood requirements.
- ▶ **Gearless, Regenerative Elevator:** The Otis Gen 2 elevator is a machineroom-less system that generates electricity when slowing the cab, claiming to be up to 75% more energy-efficient than conventional elevators.
- ▶ **Commissioning:** The mechanical and electrical systems were 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.

Efficient Hand Dryer

Photo: Harvard Office for Sustainability. 2007



LIGHTING

- ▶ **Lighting Optimization:** Lighting power density was reduced by 20% compared to ASHRAE 90.1 code requirements, by installing highly efficient linear fluorescent and compact fluorescent lights.
- ▶ **Lighting Controls:** Occupancy sensors were installed to control lighting fixtures in all occupied spaces.

ENVELOPE

- ▶ **Improved Building Envelope:** Insulation of walls and roofs were increased as was the performance of windows when compared with ASHRAE 90.1 code requirements.
- ▶ **Heat Island Effect:** A Firestone UltraPly TPO 96 white roof with a high solar reflective index was incorporated into the building envelope to reduce cooling costs and also to minimize impact on the local microclimate.

RENEWABLE ENERGY

- ▶ **Renewable Energy:** The Harvard Divinity School purchases Renewable Energy Credits (RECs) to cover their entire campus's electricity consumption, including that of Rockefeller Hall.



MATERIALS AND WASTE

- ▶ **Building Reuse:** By renovating an existing building, the Divinity School avoided the significant quantities of materials and energy consumption necessary to construct a new building. Over 95% of the existing walls, floors and roof were retained.
- ▶ **Recycling Waste:** 418 tons of waste removed from the building during construction was diverted from the landfill, and mostly reused or recycled. This included asphalt from the parking lot, brick, metals and old furniture.

Selecting environmentally preferable materials and minimizing the amount of construction waste sent to landfill was important to the project. When selecting materials, preference was given to locally manufactured, low-emitting materials with recycled content.

- ▶ **Recycled Content Materials:** **18.6%** of the total material value consists of post-consumer and/or pre-consumer recycled content materials.
- ▶ **Regionally Extracted & Manufactured Materials:** **42.5%** of the total material value consists of materials manufactured within 500 miles of the project site.

ENVIRONMENTALLY PREFERABLE MATERIALS IN ROCKEFELLER HALL

- ▶ Acoustical Ceiling Tiles (Armstrong) Recycled Content: **68% pre-consumer.**
- ▶ Arreis MDF (Sierra Pine): Recycled Content: **100% pre-consumer,**
- ▶ Greenguard certified Batt Insulation (Roxul): Recycled Content: **40% pre-consumer**
- ▶ Carpet Tile (Lees) Recycled Content: **35% pre-consumer.**
- ▶ Metal Framing Stud (Dietrich) Recycled Content: **17% post-consumer, 37% pre-consumer.** Regional: **355 Miles** (Sparrow Point, MD)
- ▶ Metal Framing Stud Drywall (USG): **95% post-consumer, 4% pre-consumer,** Regional: **248 Miles**

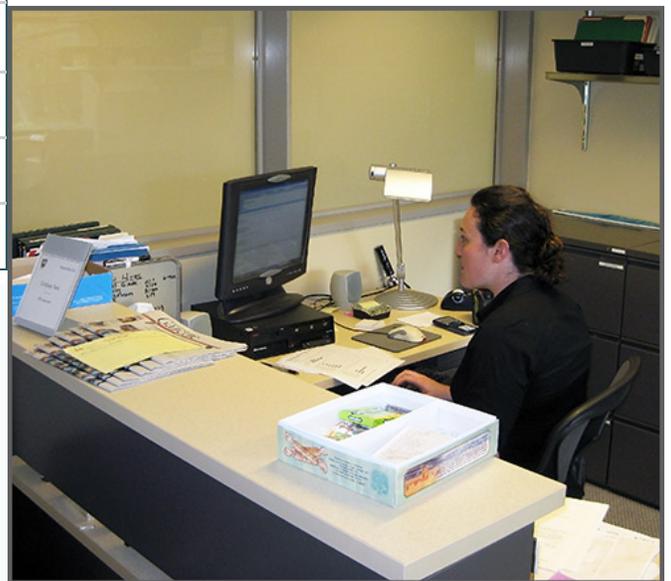


INDOOR ENVIRONMENTAL QUALITY

- **Air quality during construction:** An air quality management plan was implemented to keep pollutant levels down during the renovation, and to ensure the building was fully ventilated prior to occupancy.
- **Air filtration:** MERV 13 filters were installed on the building's air handling units to improve air filtration.
- **Low Emitting Paints and Adhesives:** Volatile Organic Materials (VOCs) are compounds and known carcinogens found in many construction materials that are considered detrimental to indoor air quality. Reducing the use of VOCs improves indoor air quality and occupant health and productivity. Only products with low or no VOCs were used in the Rockefeller renovation, such as construction adhesives, paints and carpets. Doors and other composite wood are free of urea-formaldehyde. Further steps were taken to reduce sources of indoor pollution, such as janitors closets — exhausting those areas separately.

Low Emitting Furniture and Occupant Lighting Controls

Photos: Harvard Office for Sustainability, 2007



Product Category	Product & Manufacturer	VOC Content (g/l)	VOC Limit (g/l)	Standard
Paints & Coatings	➤ Eco Spec Flat—219, Benjamin Moore	0	50	Green Seal Standards GS-11
	➤ Eco Spec Eggshell—223, Benjamin Moore	0	150	Green Seal Standards GS-11
	➤ M29 D.T.M. Acrylic Semi-gloss rust inhibitor	207	250	Green Seal Standards GS-11
Adhesives & Sealants	➤ 3M Fire Barrier CP 25WB + Caulk	0	250	SCAQMD Rule #1168
	➤ Heavy Duty Construction Adhesive, Greenchoice	6.6	70	SCAQMD Rule #1168

- **Lighting Control:** To promote productivity, comfort and wellbeing, 100% of individual workstations and multi-occupant spaces have lighting controls, either via wall switches or task lighting.
- **Thermal Comfort Survey:** Occupants will be surveyed about their thermal comfort within the first 6 to 18 months of occupancy. If greater than 20% of survey respondents are dissatisfied, the operations team will adjust the building management system.

ADDITIONAL RESOURCES

FOR MORE INFORMATION:

- > Sustainability at the Harvard Divinity School: <http://www.green.harvard.edu/hds>
- > Harvard Green Building Services: <http://www.green.harvard.edu/green-building-services>
- > Harvard Green Building Resource: <http://www.green.harvard.edu/theresource>

