

The Holyoke Center Floor 4/College renovation project is a 7,730 square foot renovation undertaken by the Harvard Faculty of Arts of Sciences (FAS) to renovate existing leased space for the College's Advising Program Office and the Program in General Education. Holyoke Center, which is owned by Harvard University Real Estate Services (HRES), is a ten-story concrete building that provides leased office space for numerous Harvard organizations. The project included the north wing of the fourth floor of Holyoke Center. The renovation was an opportunity to reconfigure spaces to meet programmatic requirements for twenty-seven occupants - such as additional conference room space - update finishes and furnishings, and increase the efficiency and quality of the fourth floor lighting and heating, ventilation, and air conditioning controls. Construction began in the spring of 2009 and was completed in August 2009.



Photo: Anmahian Winton Architects, 2009

FAS is committed to sustainability and reducing greenhouse gas emissions as part of Harvard's goal to reduce greenhouse gas emissions 30% below 2006 levels by 2016, inclusive of growth. The project has achieved LEED for Commercial Interiors (LEED-CI) Gold certification and has met all applicable Harvard Green Building Guidelines.

PROJECT HIGHLIGHTS

LEED® Facts

Holyoke Floor 4/College
Harvard Faculty of Arts and Sciences
2009 Renovation



Location.....	Cambridge, Massachusetts
Rating System.....	Commercial Interiors v2.0
Certification Pending.....	GOLD
Total Points Achieved.....	38 / 57
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Sustainable Sites.....	6/7
Water Efficiency.....	2/2
Energy and Atmosphere.....	8/12
Materials and Resources.....	7/14
Indoor Environmental Quality.....	10/17
Innovation and Design.....	5/5

- 35%** reduction in lighting power by using efficient lamps and fixtures
- 39%** of the materials contain recycled content, by overall material value
- 20,930** gallons of water are estimated to be saved annually over code-maximum fixtures
- 25.9** tons of construction waste were diverted from landfills through recycling and salvage
- 11%** of the materials are rapidly renewable, by overall material value.
- 100%** of the composite wood in the project is urea-formaldehyde free

Daylight dimming controls are integrated into light fixtures near windows, which dim lights when there is sufficient daylight in the space.

Only low or zero-VOC materials were used during construction



PROJECT OVERVIEW

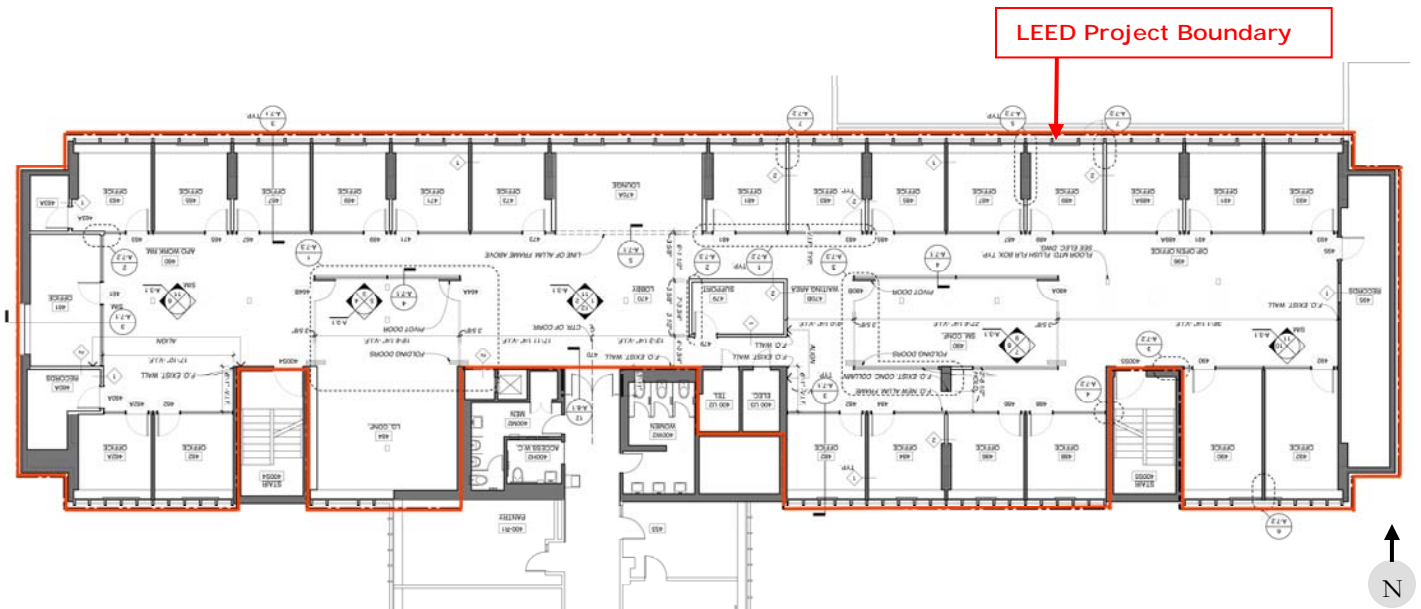


Photo: Anmahian Winton Architects, 2009



Photo: Anmahian Winton Architects, 2009

PROJECT TEAM

Owner Harvard Faculty of Arts and Sciences

Project Manager Harvard Faculty of Arts and Sciences
 ▶ Lois Stanley

Architect Anmahian Winton

Construction Management Turner Construction

HVAC Engineer R.W. Sullivan Engineering

Lighting Designer LAM Partners

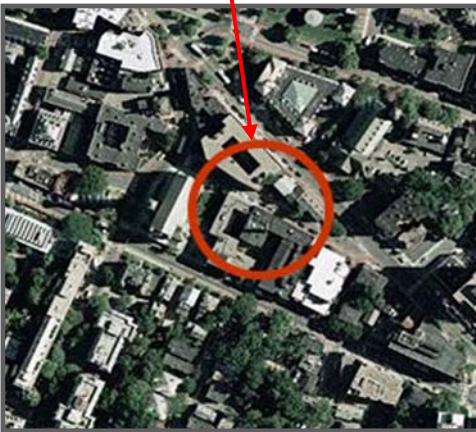
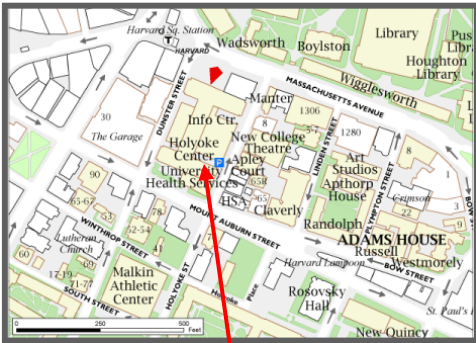
Custom Furniture Fabricators Bill Bancroft Furniture
 Gloucester Builders

Commissioning Authority Harvard Office for Sustainability
 Green Building Services

Sustainability Consultant Harvard Office for Sustainability
 Green Building Services



SITE



Holyoke Center
75 Mount Auburn Street, Cambridge, Massachusetts

- To encourage alternatives to driving, all occupants of Holyoke Center have access to Harvard's comprehensive Commuter Choice program, which provides discounts on public transportation and carpooling incentives.
- The building is located across the street from the Harvard Square MBTA stop, several bus lines, and the Harvard University Shuttle.
- Bicycle racks are located adjacent to the building as well as in the basement. The building is across the street from Harvard's Malkin Athletic Center, which includes showers and is accessible to all Harvard affiliates.
- Holyoke is located in the middle of Harvard Square, with easy access to amenities such as restaurants, banks, churches, and retail stores.



WATER EFFICIENCY

Two restrooms are used by occupants of the fourth floor north wing. The building owner, HRES, has installed water-efficient fixtures, which **reduce domestic water consumption by 48.7% below standard EPA 1992 fixtures**. This is the equivalent of saving over 20,000 gallons per year. The restrooms include waterless urinals, dual-flush water closets, and ultra low-flow faucets.

Differences in the Flush & Flow Rates for EPA 1992 Standard Fixtures and the fixtures installed in Holyoke Center		
Fixture Type	Holyoke Center Flush & Flow Rates	EPA 1992 Standard Flush & Flow Rates
Water Closet [GPF]	Dual-Flush 1.6 & 1.1	1.6
Urinal [GPF]	0	1.0
Restroom Sink [GPM]	0.5	2.5
GPF - Gallons Per Flush GPM - Gallons Per Minute		

FIXTURES IN HOLYOKE



Restroom water closets
Photo: Harvard Office for Sustainability, 2009

SLOAN UPPERCUT®
Dual-Flush Flushometer
(Up 1.1 gpf and Down 1.6 gpf)



SLOAN WES-1000®
Waterless Urinal



ENERGY EFFICIENCY

The fourth floor's HVAC controls were modified to improve occupant comfort and provide healthy indoor air quality. The Advising Program Office and Program in General Education space were provided with new or relocated fan coil units and new automatic control points to allow for maximum controllability of systems. The system's controls will be operated by the base building's automation control system.

MECHANICAL SYSTEMS

- **HVAC SYSTEM** New and existing fan coil units use chilled water for cooling and hot water for heating. Chilled water is supplied from the central campus system and hot water is supplied from a local boiler plant. Perimeter spaces have baseboard heat controlled by fan coil units serving the respective zones for temperature and control and preventing simultaneous heating and cooling.
- **VENTILATION** is provided to the space via a dedicated outside air system. Each duct run-out was balanced for a design airflow rate that meets or exceeds ASHRAE 62.1-2004 ventilation requirements.
- **PLUG LOADS** No new equipment was purchased for the space. The majority (79% by rated power) of equipment - desktops, laptops, printers, and monitors - is Energy Star rated.
- **COMMISSIONING** The mechanical and electrical systems were fully commissioned by a Commissioning Authority, which ensured that all energy-related systems were installed as designed, and operating efficiently prior to occupancy. During the electrical portion of the commissioning, the team confirmed all occupancy sensors were working correctly and set to the proper timing. However, the team noticed that the light fixtures were not dimming up and down based on the presence of daylight, as intended. It became evident that they needed to be set up with the photosensor tool in order to dim. The team was able to work with the lighting installer and have them set the minimum (nearly off) and maximum (set to provide just over 50 footcandles at the work surfaces rather than fully on) levels for each fixture. The team also ensured that operating the daylight responsive dimming feature was added to the operator training session, which was held to ensure a smooth handoff from construction to occupancy.
- **RENEWABLE ENERGY** Renewable Energy Certificates (RECs) were purchased from Sterling Planet (wind power) equivalent to 100% of the anticipated electricity use based on LEED default assumptions. 250,000 kWh of RECs were purchased over two years, which annually is equivalent to avoiding 169,375 pounds of carbon dioxide, or 10 household's electricity use for one year, or 17 passenger cars not driven for one year.

ELECTRICAL SYSTEMS

The lighting was upgraded to reduce electricity use in the space. New energy-efficient fixtures were selected for each area considering ceiling height, lighting levels, use and maintenance. All work was designed to comply with applicable State and National codes and HRES and FAS standards.

- **LIGHT FIXTURES** Energy-efficient fluorescent lighting fixtures and lamps were carefully chosen and placed to reduce electricity consumption. The fixtures include T5 and T8 linear fluorescent fixtures with low-mercury lamps.
- **OCCUPANCY SENSORS** are used to further reduce energy consumption. All lighting fixtures are tied to dual technology (ultrasonic and passive infrared) sensors to turn off lights in spaces that have not been activated by motion for set periods of time.
- **DAYLIGHT SENSORS AND DIMMING BALLASTS** Daylighting controls were provided in perimeter spaces to dim electrical lighting in response to the amount of natural light coming through the windows. These controls, which are integrated into the light fixtures, will also help to further reduce electric consumption in the space.



Left to Right:
Photosensor
Setup Tool;
Light Fixture
with Photocell;
T5 Linear
Fluorescent
Light Fixture
Photos: Nathan Gauthier,
Harvard Office for
Sustainability. 2009



INDOOR ENVIRONMENTAL QUALITY

The Holyoke Center building was fully occupied during the renovation of the fourth floor north wing. The project team was careful to maintain healthy indoor air quality during construction but to also ensure the space is designed to ensure healthy indoor air quality during occupancy.

INDOOR AIR QUALITY DURING CONSTRUCTION: A comprehensive indoor air quality management plan was implemented during construction to maintain healthy indoor air quality. For example, all ducts were sealed and a filtration unit maintained negative pressure to keep any construction debris from migrating into occupied spaces. A walk-off mat was used to ensure that pollutants were not tracked outside of the construction space.

Only products with **low or zero VOC content** were used in the Holyoke Floor 4/ College project. Volatile Organic Compounds (VOCs) are chemical compounds and known carcinogens found in many construction materials that are considered detrimental to healthy indoor air quality. Reducing the use of VOCs whenever 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.

- **COMPOSITE WOOD AND LAMINATE ADHESIVES:** All of the composite wood is free of urea formaldehyde. Much of the furniture is made of composite wood.
- **SYSTEMS FURNITURE:** Herman Miller Aeron and Aside Chairs are Greenguard™ certified. Steelcase files and chairs are SCS Indoor Advantage™ certified.
- **ADHESIVES AND SEALANTS:** All adhesives and sealants used in the project have low VOC content. Below are examples of products used in the project.



Product Category	Product & Manufacturer	VOC Content (g/l)	VOC Limit (g/l)	Standard
Select Adhesives & Sealants	➤ Wakol Cork Adhesive	0	50	SCAQMD Rule #1168
	➤ Mapei ECO 575 Rubber Base adhesive	0	60	SCAQMD Rule #1168
	➤ Tremco Spectrum 2 Sealant	8	250	SCAQMD Rule #1168
	➤ ProForm Joint Compound	2	250	SCAQMD Rule #1168

- **LIGHTING CONTROL:** Energy-efficient (13 watt) task lamps are provided for each occupant, to allow occupants to turn off overhead lights.
- **DAYLIGHT AND VIEWS:** Glazing throughout the space, such as the conference room and corridor walls, provide ample daylight and views throughout the space.



Top to Bottom, Counterclockwise: Covered Ducts; Filters; Walk-off Mat; Commissioning/Functional Testing; Demo
 Photos: Harvard Office for Sustainability, 2009



MATERIALS AND WASTE

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

79% of the construction waste was diverted from landfills.

39% of the total material value consists of post-consumer and/or pre-consumer recycled content materials.

51% of the wood is Forest Stewardship Council (FSC) Certified.

100% of the composite wood is free of urea-formaldehyde

11% of the materials, by value, have rapidly renewable materials, which means they can be grown and harvested in less than ten years.

ENVIRONMENTALLY PREFERABLE MATERIALS IN HOLYOKE FLOOR 4/COLLEGE

- > Cork Flooring (Expanko): 100% rapidly renewable
- > Gypsum Wallboard (USG): 94% post-consumer, 5%, pre-consumer, 392 miles
- > Batt Insulation (CertainTeed CertaPro): 84% rapidly renewable
- > Plywood (UltraStock MDF): 25% post-consumer, 75%, pre-consumer, urea-formaldehyde free
- > Ceiling Grid (Armstrong Prelude): 7% post-consumer, 23%, pre-consumer, 390 miles
- > Ceiling Tile (CertainTeed Ecophon Focus): 75% post-consumer, 5% pre-consumer
- > Chairs (Herman Miller Aeron): 40% post-consumer, 20% pre-consumer, Greenguard
- > Chairs (Herman Miller Aside): 17% post-consumer, 10% pre-consumer, Greenguard
- > File Cabinets (Steelcase Universal): 22%, 6% post-consumer, 20% pre-consumer, SCS certified



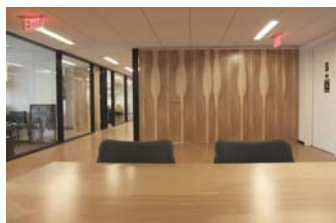
East Before
 Photo: Anmahian Winton Architects, 2009



East After
 Photo: Anmahian Winton Architects, 2009



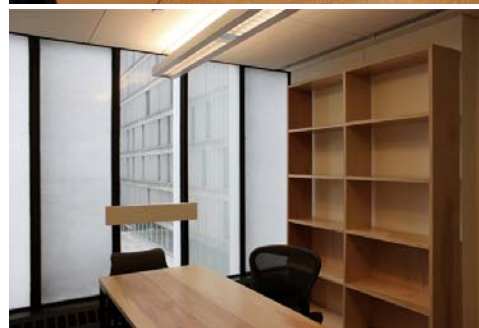
West Before
 Photo: Anmahian Winton Architects, 2009



West After
 Photo: Anmahian Winton Architects, 2009



Cork Flooring
 Photo: Anmahian Winton Architects, 2009



Custom Furniture
 Photo: Anmahian Winton Architects, 2009

ADDITIONAL RESOURCES

FOR MORE INFORMATION:

- > Sustainability at Harvard Faculty of Arts and Sciences : <http://www.greencampus.harvard.edu/fas>
- > Harvard Faculty of Arts and Sciences: <http://www.fas.harvard.edu/home/>
- > Harvard Green Office certification program: <http://www.greencampus.harvard.edu/green-office>
- > Harvard Green Building Services : <http://www.greencampus.harvard.edu/green-building-services>
- > Harvard Green Building Resource : <http://www.green.harvard.edu/theresource>

