



FACULTY OF ARTS AND SCIENCES

## TEACHING LABS - NORTHWEST LABS BUILDING

52 OXFORD STREET, CAMBRIDGE, MA 02138

LEED-Civ2.0  
**GOLD**

A fit-out of approximately 16,000 square feet of laboratory and office space in the basement and 1st floor of the Northwest Labs building was completed in September of 2009. With the Teaching Labs project, the primary vision of Harvard's Faculty of Arts and Sciences (FAS) and the Committee on Learning in Science and Engineering (COLSE) was to create a better physical environment for undergraduate learning in science and engineering. They aimed to create an environment that offers flexibility to meet the changing needs in the science field while encouraging collaboration between students, teachers and faculty.



As part of the design exercise to fit out the Teaching Labs, the architects examined the physical and pedagogical assessment of all the existing teaching labs in the Faculty of Arts and Sciences. In addition to creating flexible interdisciplinary spaces, the Teaching Labs design allowed for the development of more efficient lighting and HVAC systems. Careful selection of furnishings and finishes was an important element of the project, as was a careful plan during construction to improve indoor air quality.

In support of Harvard's goal of reducing greenhouse gas emissions 30% below 2006 levels by 2016, inclusive of growth, FAS and the project team were committed to sustainability from the onset and throughout the duration of the project. This dedication ultimately allowed the Teaching Labs to achieve a LEED Gold Certification under the LEED for Commercial Interiors (LEED-CI) version 2.0 rating system.

### Teaching Labs

Photo: Burt Hill Architects, 2009

## PROJECT HIGHLIGHTS

### LEED® Facts

Northwest Teaching Labs  
Harvard Faculty of Arts & Sciences  
Completed 2009

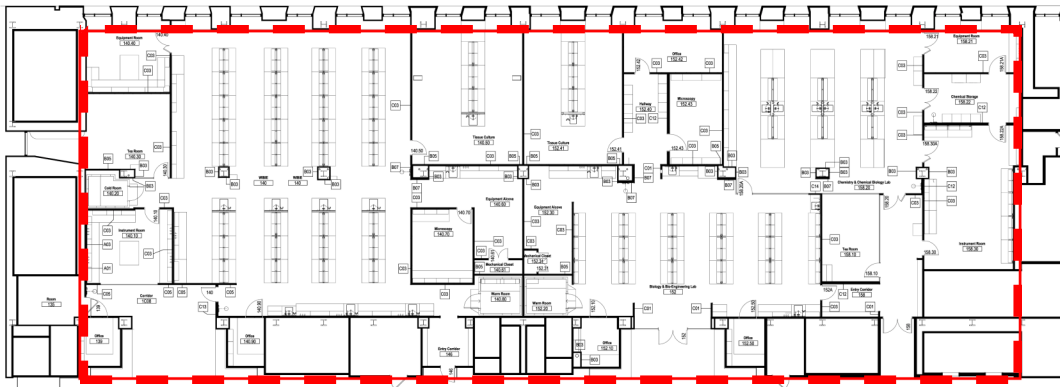


Location.....	Cambridge, Massachusetts
Rating System.....	Commercial Interiors v2.0
Certification Achieved.....	Gold
Total Points Earned.....	38/57
Sustainable Sites.....	7/7
Water Efficiency.....	2/2
Energy and Atmosphere.....	6/14
Materials and Resources.....	6/14
Indoor Environmental Quality.....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

- 26%** reduction in lighting power by using efficient lamps and fixtures.
- 25%** of the materials, by value, have recycled content.
- 76%** of the materials, by value, were manufactured from within 500 miles of the project.
- 87%** of the construction waste has been diverted from landfills.
- 93%** of the total value of new wood used in the project is Forest Stewardship Council (FSC) Certified.



## PROJECT OVERVIEW



First Floor Plan



Basement Floor Plan

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LEED Boundary

Level 01 is used for project-based courses. The design team developed plans for overlapping usage between different disciplines. The lab is modeled after a research lab, and provides space for multiple biology, engineering, and chemistry courses. The program includes a bioengineering lab, a chemistry lab, associated support spaces, 3 offices, and a shared collaboration room (Tea Room). The use of glass optimizes daylight and views, while providing visibility between lab spaces and the corridor.

Level B1 is used for laboratory activities tied to lecture courses. Flexible, moveable benches allow for a variety of projects, both wet and dry, and can be rearranged to accommodate large equipment or differing course setups. Rooms are partitioned with moveable walls, allowing for either small or large classes. There is an emphasis on data collection and sharing with computers at the benches, large projection screens, and whiteboards for group interaction. The program includes the sub-dividable “science studios”, their associated support spaces and two offices. Glazing is used to allow indirect daylight to permeate into this below-grade space and optimize a visual connection with the corridor.

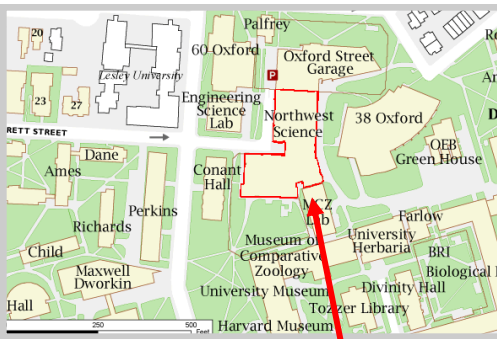


Teaching Labs  
Photos: Burt Hill Architects, 2009

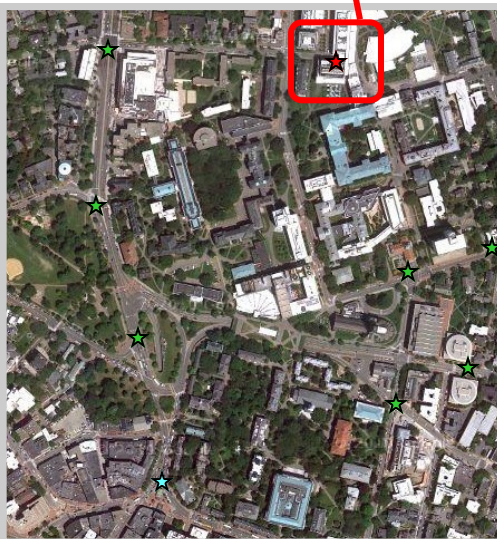
## PROJECT TEAM

<b>Owner</b>	Harvard Faculty of arts and Sciences
<b>Project Manager</b>	Harvard Faculty of Arts and Sciences
<b>Architect</b>	Burt Hill Architects
<b>Contractor</b>	Shawmut Design and Construction
<b>HVAC Engineer</b>	Bard, Rao + Athanas Consulting Engineers
<b>Lighting Consultant</b>	Sladen Feinstein Integrated Lighting
<b>Commissioning Agent</b>	Energy Management Associates
<b>Sustainability Consultant</b>	Harvard Green Building Services

## SITE



**Northwest Labs**  
52 Oxford Street, Cambridge, MA



- ★ Northwest Labs
- ★ MBTA Subway Station
- ★ Bus Stop Location

- To encourage alternatives to driving, all occupants of the Teaching Labs have access to Harvard's **CommuterChoice Program**, which provides incentives, such as discounts, for all modes of alternative transportation as well as carpooling and fuel efficient vehicles. The Program is promoted through informational kiosks in building common areas and an extensive website. ([www.commuterchoice.harvard.edu](http://www.commuterchoice.harvard.edu))
- The Northwest Labs building is located in a dense urban area which allows occupants to easily access amenities such as restaurants, banks, churches and retail stores that are within walking distance.
- The building is located within walking distance to the Harvard Square T station, the MBTA route 77 & 96 buses, and the Harvard campus shuttle.
- Three bicycle racks with a capacity of 70 bicycles are located adjacent to the building for use by the occupants. Seven showers and changing facilities are located throughout the building.



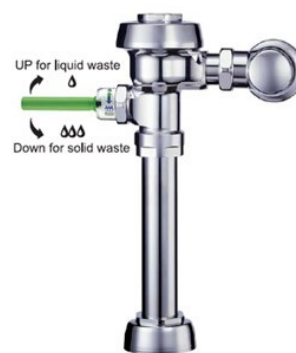
**Bike Racks For Northwest Labs**  
Photo: Harvard Office for Sustainability, 2009

## WATER EFFICIENCY

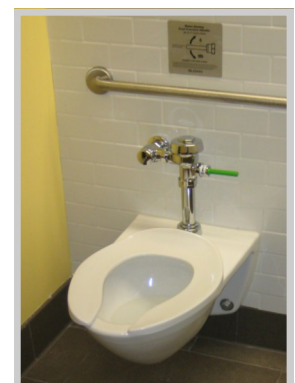
Per LEED requirements, if a project boundary does not include bathrooms, calculations must be for the fixtures in the nearest bathroom. The closest bathrooms to the Teaching Labs have water efficient fixtures, which **reduce domestic water consumption by 32% over standard EAct 1992 fixtures** - the equivalent of saving over 13,000 gallons of water per year.

**Differences in the Flush & Flow Rates for EAct 1992 Standard fixtures and the fixtures utilized by the Teaching Labs Occupants:**

Fixture Type	Teaching Labs Flush & Flow Rates	EAct 1992 Standard Flush & Flow Rates
Water Closet [GPF]	Dual-Flush 1.6 & 1.1	1.6
Urinal [GPF]	1.0	1.0
Bathroom Sink [GPM]	0.5	2.2
Shower [GPM]	2.0	2.5
GPF - Gallons Per Flush		GPM - Gallons Per Minute



**SLOAN UPPERCUT®**  
Dual-Flush Flushometer  
(Up: 1.1 gpf for half flush  
Down 1.6 gpf for full flush)



## ENERGY EFFICIENCY

Harvard Faculty of Arts and Sciences (FAS) has committed, along with Harvard University as a whole, to reduce greenhouse gas emissions 30% below 2006 levels by 2016, inclusive of growth. Therefore, energy efficiency was a main focus.

### MECHANICAL SYSTEMS

The primary source for building heat and humidification is the existing campus steam plant, while the primary source for cooling is the campus chiller plant. A glycol/water energy recovery loop in the building transfers sensible heat between the major laboratory supply and exhaust systems.

- **Efficient Lab Equipment:** The lab spaces are 100% exhausted. Minimum ventilation rates are set at 6 air changes per hour or exhaust make-up requirement.

The chemistry portion of the lab includes a cluster of 12 - 6' VAV chemical fume hoods and one 4' chemical fume hood, outfitted with air, vacuum, natural gas and nitrogen. The prep rooms on level B1 and the bioengineering portion of the lab each have one 4' chemical fume hood with air, vacuum, and natural gas services.

- **Building Automation System:** All automatic temperature controls are direct control (DDC). Automatic controls provide energy savings based on system zoning, demand control ventilation, scheduling and setbacks. The system monitors CO<sub>2</sub> sensors and modulates the air handling unit return, exhaust and outdoor air dampers as required.
- **Commissioning:** The mechanical and electrical systems have been fully commissioned, ensuring that all energy-related systems were installed as designed and operate efficiently prior to occupancy.
- **Renewable Energy:** Renewable Energy Certificates (RECs) were purchased from Sterling Planet (wind power) equivalent to 100% of the anticipated electricity for two years, offsetting a total of 422,000 kWh.



Teaching Labs  
Photo: Burton Hill Architects, 2009

### ELECTRICAL SYSTEMS

- **Lighting Fixtures:** Energy-efficient and low-mercury fluorescent lamps were carefully chosen and strategically placed to reduce electricity consumption while maintaining adequate lighting levels for each space.

General Lighting was achieved with high efficiency 1X4 recessed fixtures, with an efficiency of 87%, and T5HO lamps to maximize light output. For the lab areas, a user-controlled fluorescent under cabinet light supplements the general lighting. The overall lighting power density shows a **26% reduction from the ASHRAE 90.1-2004 baseline.**

- **Lighting Controls and sensors:** Occupancy sensors in the space utilize passive infrared technology, to prevent false trips.



# INDOOR ENVIRONMENTAL QUALITY

FAS is committed to providing a healthy indoor environment for all occupants. The project team was careful to maintain healthy indoor air quality during construction and to also ensure the space is designed to promote 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 workers and future occupants. For example, all grills and vents were sealed and a HEPA filtration unit maintained negative pressure, preventing construction debris from migrating into occupied spaces. A flush-out of the space was done prior to construction to remove any potential contaminants.

**Thermal Comfort Survey:** Occupants will be surveyed about thermal comfort during both summer and winter conditions. At least 80% of surveys must indicate acceptable comfort to ensure performance of the design, otherwise corrective measures will be taken.

**No Smoking Policy:** To protect the health of the occupants, Harvard University's Faculty of Art and Sciences does not permit smoking either inside or within 25 feet of the Northwest Labs facility.

Only Materials with **Low or No VOC Content** were used in the Teaching Labs. Volatile Organic Compounds (VOCs) are chemical compounds and known carcinogens that are considered detrimental to indoor air quality. Reducing the use of VOCs whenever possible improves indoor air quality and consequently occupant health and productivity.

- **Composite Wood and Laminate Adhesives** used have no added urea formaldehyde.
- **Carpet System:** Both Blueridge Carpet Tile and Lees Mast Modular Carpet Tile are CIR Green Label Plus certified.
- **Systems Furniture:** Herman Miller Caper chairs and Eames Oval Conference tables are both Greenguard certified. Steelcase Think Chairs and Universal Workstations are SCS Indoor Advantage™ Gold.
- **Adhesives and Sealants and Paints and Coatings:** Examples of the products used:

Category	Product & Manufacturer	VOC Content (g/l)	VOC Limit (g/l)	Standard
Paints & Coatings	➤ PPG Speedhide Latex Primer/Sealer	98.0	150.0	Green Seal GS-11
	➤ PPG Speedhide Interior Eggshell Latex	67.0	150.0	Green Seal GS-11
	➤ Metal Coating Powder	0.0	150.0	Green Seal GS-11
Adhesives & Sealants	➤ Carlisle Flex-Grip 550	75.0	250.0	SCAQMD Rule #1168
	➤ Blueridge BR200 Enviroflex Adhesive	0.0	50.0	SCAQMD Rule #1168
	➤ Hilti FS-ONE Frestop Sealant	75.0	250.0	SCAQMD Rule #1168

## Construction IAQ Measures Implemented During Construction

Photos: Harvard Green Building Services



**Pathway Interruption**  
Exhaust filtered and directed outside



**Housekeeping**  
GreenSweep keeps dust particulates to a minimum



**Housekeeping**  
Ductwork kept sealed after installation



**Housekeeping**  
Walk off mats reduce the amount of dust and contaminants tracked into the project interior



## MATERIALS & WASTE

Selecting environmentally preferable materials and minimizing the amount of construction waste sent to landfill was important in the Teaching Labs project. The project team gave preference to low-emitting materials with recycled content and local manufacturing.

**87%** of the on-site generated construction waste was diverted from landfills.

**25%** of the total material value consists of products that contain post-consumer and/or pre-consumer recycled content.

**76%** of the total material value consists of products manufactured within 500 miles of the site.



Teaching labs  
Photo: Burt Hill Architects, 2009



Herman Miller Caper Chair  
Photo: [www.hermanmiller.com](http://www.hermanmiller.com)



Steelcase Think Chair  
Photo: [www.steelcase.com](http://www.steelcase.com)

### ENVIRONMENTALLY PREFERABLE MATERIALS IN THE TEACHING LABS

- › Structural Steel/Trench (Bushwick Metals)  
Recycled Content: **10%** pre-consumer, **90%** post-consumer
- › Gypsum Wall Board (USG)  
Recycled Content: **95%** pre-consumer, **5%** post-consumer
- › Marmoleum Vinyl Sheet (Forbo)  
Recycled Content: **45%** post-consumer
- › MechoShade 1350 (Mecho Shade)  
Recycled Content: **20%** pre-consumer, **49%** post-consumer
- › Folding Partition (Skyfold)  
Recycled Content: **65%** pre-consumer, **35%** post-consumer
- › Elective Elements® 6 Workstations (Steelcase)  
Recycled Content: **80%** pre-consumer, **1%** post-consumer
- › Steelcase Think Chairs  
Recycled Content: **4%** pre-consumer, **34%** post-consumer
- › Herman Miller Eames Conference Table  
Recycled Content: **67%** pre-consumer, **15%** post-consumer
- › Metal Fume Hoods (Mott Manufacturing LTD)  
Recycled Content: **6%** pre-consumer, **21%** post-consumer

## ADDITIONAL RESOURCES

- › Harvard Faculty of Arts and Sciences: <http://www.fas.harvard.edu/home/>
- › Harvard Faculty of Arts and Sciences' Green Program: <http://www.greencampus.harvard.edu/fas>
- › Harvard Green Building Services: <http://green.harvard.edu/green-building-services>
- › Harvard Green Building Resource: <http://green.harvard.edu/theresource>