FACULTY OF ARTS AND SCIENCES

GREEN is the new Crimson

HARVARD FACULTY OF ARTS AND SCIENCES

LEED-CI v3

LECTURE HALL | BIOLOGICAL LABORATORIES BUILDING

GOLD

16 Divinity Avenue, Cambridge, MA 02138

The Biological Laboratories (BioLabs) Building Lecture Hall renovation project, located on the first floor of 16 Divinity Avenue in Cambridge, MA, was an 1,780 square foot renovation undertaken by the Harvard Faculty of Arts of Sciences (FAS) to renovate an existing lecture hall. The overall intent of this project is to renew/rejuvenate the space and to provide the infrastructure needed to support contemporary teaching and presentation methods. The BioLabs Building, originally constructed in 1954, is a five-story building that provides lab and classroom space for numerous Harvard organizations.

BioLabs Lecture Hall
Photo: Ben Myers, Green Building Services, 2011.

The renovation was an opportunity to reconfigure the space to meet programmatic requirements, such as handicapped accessibility, updated finishes and furnishings, and increased efficiency and quality of the lighting, heating, ventilation, and air conditioning controls. Construction began in the May 2010 and was completed in August 2010.

From the early stages of conceptual design, the project team was focused on achieving sustainability objectives by reducing energy use while maintaining occupant comfort within the space. The renovation leverages a more efficient mechanical system to minimize energy waste.

As part of Harvard's goal to reduce greenhouse gas emissions 30% below 2006 levels by 2016, inclusive of growth, FAS is committed to sustainability. The BioLabs Lecture Hall project is evidence of this commitment.

PROJECT HIGHLIGHTS

LEED® Facts

Lecture Hall | BioLabs Building
Faculty of Arts and Sciences
2011

Location	Cambridge MA
Rating System	LEED-CI v3
Certification Achieved	Gold
Total Points Achieved	77/110
Sustainable Sites	16/21
Water Efficiency	0/11
Energy and Atmosphere	32/37
Materials and Resources	7/14
Indoor Environmental Quality	14/17
Innovation and Design	5/6
Regional Priority Credits	3/4

30% reduction in lighting power by using efficient lamps and fixtures

85% of waste from construction was diverted from landfills

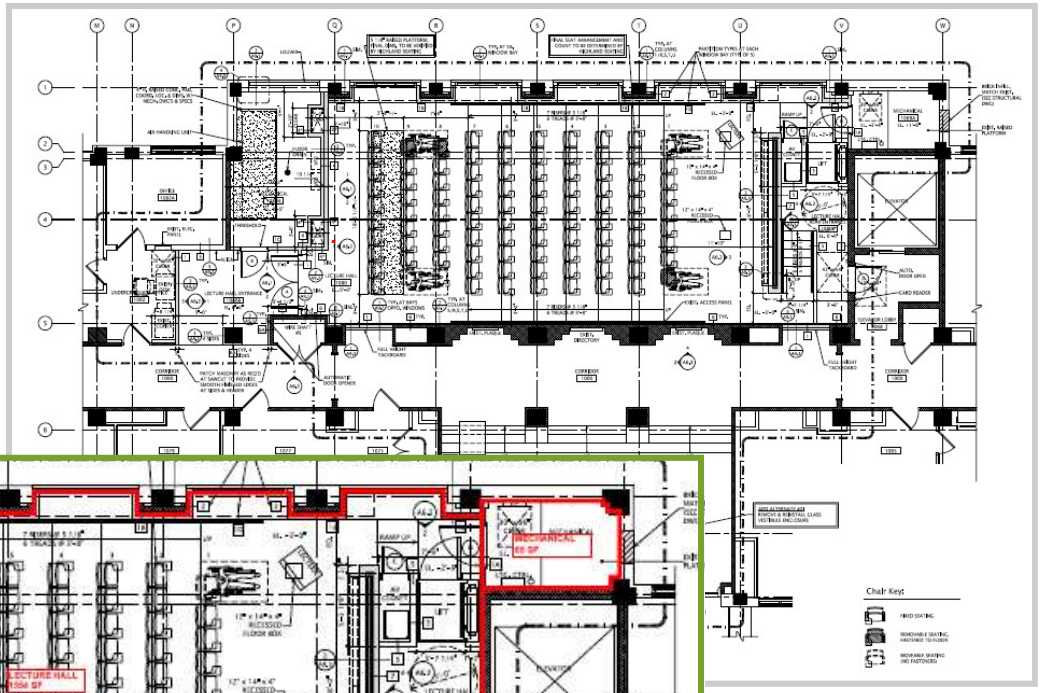
37% of materials were manufactured regionally

Only low or zero-VOC materials were used for the project during construction

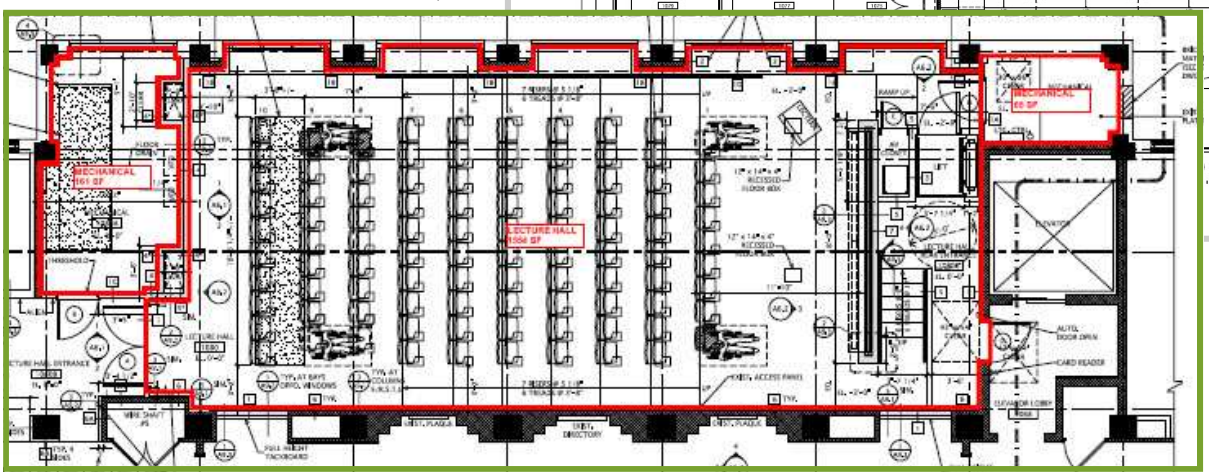
Please print this project profile only if necessary.
If printing is required, please print double sided and recycle when finished. Thank you!

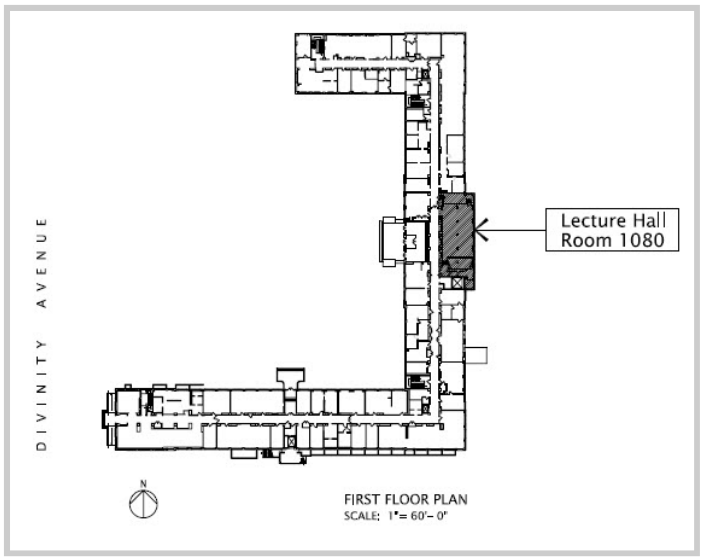
PROJECT OVERVIEW

BIOLABS LECTURE HALL FLOOR PLAN & LEED BOUNDARY



Lecture Hall/BioLabs Building Plans
Construction Documents:
HECHT & ASSOCIATES ARCHITECTS, 2010.





PROJECT TEAM

Owner	Harvard Faculty of Arts and Sciences
Project Manager	Harvard Faculty of Arts and Sciences
Architect	Hecht and Associates Architects
Contractor	Shawmut Design and Construction
HVAC Engineer	Rist-Frost-Shumway Engineering
MEP Engineer	Robert W. Sullivan Engineering
Commissioning Authority	Harvard University, Office for Sustainability Green Building Services
Sustainability Consultant	Harvard University, Office for Sustainability Green Building Services

SITE

- To encourage alternatives to driving, all occupants of the BioLabs building 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.

BioLabs Building
16 Divinity Avenue, Cambridge, MA

- The building is located in a dense urban area, which allows occupants to walk and easily access amenities such as restaurants, banks, churches, and retail stores.

- The building is located within walking distance to the Harvard Square MBTA stop, several bus lines, and the Harvard University Shuttle.

- BioLabs Building
- MBTA Bus Stops
- Harvard University Shuttle Bus Stops
- MBTA Subway Station

Bike Racks at BioLabs Building
Photo: Harvard Office for Sustainability, 2010.

- **BICYCLE RACKS** are provided directly outside of the BioLabs Building, encouraging bicycle transportation.

ENERGY EFFICIENCY

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

MECHANICAL SYSTEMS

Potential energy savings are the result of using variable volume fans, variable volume pumps, and demand controlled ventilation. Also, the system is off when the space is unoccupied.

BUILDING AUTOMATION SYSTEM: All automatic temperature controls are direct digital control (DDC). Automatic controls provide energy savings based on system zoning, scheduling, occupied/unoccupied setbacks and demand control ventilation. This system monitors carbon dioxide (C02) sensors throughout the space and modulates the air handling unit return, exhaust and outdoor air dampers as required to maintain the C02 set-point for demand control ventilation.

OCCUPANCY-BASED VENTILATION: The project consists of a single thermal zone. As the space's load varies, the system's fans and pumps modulate accordingly to meet the load in the space.

C02 SENSORS: The $C0_2$ sensors will increase or decrease the outdoor air supply based on the occupancy of the room at any given time. The sensors are programmed and only brings in enough outside air to meet the ventilation requirements of the zone.

Ventilation Controls
Photo: Harvard's Office for Sustainability, 2009

ELECTRICAL SYSTEMS

Efficient lighting systems were designed in order to reduce unnecessary energy consumption.

LIGHT FIXTURES: To reduce the amount of toxic material in the building, linear fluorescent lighting was chosen instead of compact fluorescent lighting wherever possible. Low mercury lamps were also specified and installed whenever this option was available.

Energy-efficient fluorescent lighting fixtures and lamps were carefully chosen and placed to reduce electricity consumption. Through these measures, the lighting power density (wattage) is reduced by **30%** below code-compliant fixtures.

OCCUPANCY SENSORS: Occupancy sensors are strategically placed throughout the project that sense the presence of people. Occupancy sensors have the ability to turn off all room lighting upon room vacancy.

DAYLIGHT SENSORS AND DIMMING are capable of dimming lighting in response to the amount of natural light coming through the windows.

COMMISSIONING: The mechanical and electrical systems within the Lecture Hall were fully commissioned, which helps ensure that all energy-related systems were installed in accordance with the manufacturer's specifications and operating efficiently prior to occupancy.

INDOOR ENVIRONMENTAL QUALITY

Harvard 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: During the renovation, the construction team implemented an Indoor Air Quality Management plan to ensure the health of the workers and the eventual inhabitants. Some of the aspects of the plan included walk-off mats to reduce the amount of debris tracked into the project, masking all return grills and ventilation with polyethylene sheets, green sweep practices, and storing all materials in cool, dry areas to prevent mold.

Thermal Comfort Survey: Occupants will be surveyed about their thermal comfort once per season. The Operations team will adjust the heating or cooling in the project space as needed.

Only Materials with **LOW OR NO VOC CONTENT** were used in the Lecture Hall project. Volatile Organic Compounds (VOCs) are chemical compounds and known carcinogens found in many construction materials 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 in the renovation do not have any added Urea Formaldehyde
- **ADHESIVES AND SEALANTS | PAINTS AND COATINGS:** Examples of low VOC products used:

Product Category	Product & Manufacturer	VOC Content (g/l)	VOC Limit (g/l)	Standard
Paints & Coatings	Floor Coating | Protect Crete	0	100	SCAQ rule 1168
	Primer | Benjamin Moore *EcoSpec 372*	0	200	SCAQ rule 1168
	Interior Flat Coating | Benjamin Moore *EcoSpec 373*	0	50	SCAQ rule 1168
Adhesives & Sealants	Top & Trim Adhesive | Johnsonite *445 Contact Bond*	1	250	SCAQ rule 1168
	Subfloor Adhesive | LEES *Wet Seal*	0	50	SCAQ rule 1168

CONSTRUCTION IAQ MEASURES IMPLEMENTED DURING CONSTRUCTION

Good Housekeeping
Wetting agents control dust levels

HVAC Protection
Plastic covering vents not in use

BioLabs Lecture Hall
Photo: Ben Myers, Green Building Services, 2011.

DAYLIGHT AND VIEWS: The spaces architecture and fenestration provides a connection between indoor and outdoor environment by introducing daylight and views to the space, 99% of the space has access to daylight and views.

SMOKING POLICY: In addition to prohibiting smoking in all facilities, FAS does not allow smoking within 25 feet of buildings with LEED certified spaces.

MATERIALS & WASTE

Selecting environmentally preferable materials and minimizing the amount of construction waste sent to landfill was important to the project. For the additional materials purchased, the project gave preference to low-emitting materials with recycled content and local manufacturing.

Construction waste accounts for a surprising 40 percent of the total solid waste produced in the United States. Much of this waste can be reused or diverted into a useful pathway.

37% **of the total material value consists of products salvaged or manufactured locally.**

85% **of the on-site generated construction waste was diverted from the landfill.**

25% **of the total value of materials used in the project consist of materials with recycled content.**

ENVIRONMENTALLY PREFERABLE MATERIALS IN LECTURE HALL | BIOLABS BUIDLING

- Reinforcing Steel (Barker Steel)
  85% pre-consumer, **13%** post-consumer
- Doors (VT Industries)
  90% pre-consumer, **0%** post-consumer
- Fabric (Knauf)
  0% pre-consumer, **100%** post-consumer
- Ceiling Grid (Armstrong)
  5% pre-consumer, **66%** post-consumer

Material Name	Manufacturer	Distance between project & Manufacturer (mi)
Concrete	Aggregate Industries	South Boston, MA, 5 Miles
Floor Coating	Pavilion	Woburn, MA, 8 Miles
Olybond	OMG	Agawam, MA, 97 Miles

Lecture Hall (BEFORE)
Photo: Harvard FAS, 2010.

Lecture Hall (AFTER)
Photo: Harvard Green Building Services, 2011.

ADDITIONAL RESOURCES

- HARVARD UNIVERSITY FACULTY OF ARTS AND SCIENCES (FAS): http://www.fas.harvard.edu/home
- FAS GREEN LABS PROGRAM: http://green.harvard.edu/fas/labs
- HARVARD OFS - GREEN BUILDING SERVICES: http://green.harvard.edu/green-building-services
- HARVARD OFS - GREEN BUILDING RESOURCE: http://green.harvard.edu/theresource