The Biological Laboratories (BioLabs) Building Lecture Hall, located on the first floor of 16 Divinity Avenue in Cambridge, MA, is a 1,780 square foot renovation project undertaken by the Harvard Faculty of Arts of Sciences (FAS) to modernize an existing lecture hall. The overall intent of this project is to renew 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 multiple Harvard organizations. 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 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

<table>
<thead>
<tr>
<th>Category</th>
<th>Points Achieved</th>
<th>Maximum Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sustainable Sites</td>
<td>16/21</td>
<td>21</td>
</tr>
<tr>
<td>Water Efficiency</td>
<td>0/11</td>
<td>11</td>
</tr>
<tr>
<td>Energy and Atmosphere</td>
<td>32/37</td>
<td>37</td>
</tr>
<tr>
<td>Materials and Resources</td>
<td>7/14</td>
<td>14</td>
</tr>
<tr>
<td>Indoor Environmental Quality</td>
<td>14/17</td>
<td>17</td>
</tr>
<tr>
<td>Innovation and Design</td>
<td>5/6</td>
<td>6</td>
</tr>
<tr>
<td>Regional Priority Credits</td>
<td>3/4</td>
<td>4</td>
</tr>
</tbody>
</table>

**BioLabs Lecture Hall**

Photo: Ben Myers, Green Building Services, 2011

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
PROJECT OVERVIEW

BIO Labs Lecture Hall Floor Plan & LEED Boundary

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 Green Building Services

Sustainability Consultant
Harvard University Green Building Services

Please print this project profile only if necessary. If printing is required, please print double sided and recycle when finished. Thank you!
To encourage alternatives to driving, all occupants of the BioLabs building have access to Harvard’s comprehensive Commuter Choice Program, which provides incentives and discounts for all modes of alternative transportation as well as carpooling and fuel efficient vehicles.

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.

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 greenhouse 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 (CO2) sensors throughout the space and modulates the air handling unit return, exhaust and outdoor air dampers as required to maintain the CO2 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.

CO2 SENSORS: The CO2 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.

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 ADESIVES** used in the renovation do not have any added Urea Formaldehyde
- **ADHESIVES AND SEALANTS | PAINTS AND COATINGS:** Examples of low VOC products used:

<table>
<thead>
<tr>
<th>Product Category</th>
<th>Product &amp; Manufacturer</th>
<th>VOC Content (g/l)</th>
<th>VOC Limit (g/l)</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Paints &amp; Coatings</strong></td>
<td>Floor Coating</td>
<td>Protect Crete</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Primer</td>
<td>Benjamin Moore EcoSpec 372</td>
<td>0</td>
<td>200</td>
</tr>
<tr>
<td></td>
<td>Interior Flat Coating</td>
<td>Benjamin Moore EcoSpec 373</td>
<td>0</td>
<td>50</td>
</tr>
<tr>
<td><strong>Adhesives &amp; Sealants</strong></td>
<td>Top &amp; Trim Adhesive</td>
<td>Johnsonite 445 Contact Bond</td>
<td>1</td>
<td>250</td>
</tr>
<tr>
<td></td>
<td>Subfloor Adhesive</td>
<td>LEES Wet Seal</td>
<td>0</td>
<td>50</td>
</tr>
</tbody>
</table>

**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.
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 40% 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 BUILDING

- **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

<table>
<thead>
<tr>
<th>Material Name</th>
<th>Manufacturer</th>
<th>Distance between project &amp; Manufacturer (mi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete</td>
<td>Aggregate Industries</td>
<td>South Boston, MA, 5 Miles</td>
</tr>
<tr>
<td>Floor Coating</td>
<td>Pavilion</td>
<td>Woburn, MA, 8 Miles</td>
</tr>
<tr>
<td>Olybond</td>
<td>OMG</td>
<td>Agawam, MA, 97 Miles</td>
</tr>
</tbody>
</table>

**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 Green Building Services](http://green.harvard.edu/green-building-services)
- [Harvard Green Building Resource](http://green.harvard.edu/theresource)
- [Follow Harvard GBS](https://twitter.com/harvardgb) | [Facebook](https://www.facebook.com/harvardgb)