

**HARVARD UNIVERSITY FACULTY OF ARTS AND SCIENCES**  
**STUBBS LABORATORY | GORDON MCKAY LABS BUILDING**

**LEED-CI v3.0**  
**GOLD**

Gordon McKay Building , 9 Oxford Street, Cambridge, MA 02138

The Stubbs Laboratory is a 2,035 square foot dry lab space within the Gordon McKay Building. The renovated area supports the research of Professor Christopher Stubbs and his team of undergraduate students, graduate students, postdoctoral associates and technical staff. The space has been designed to accommodate the study of dark energy, dark matter, and related aspects of fundamental physics.

The new lab will provide working space for the development of hardware and software that will enable inquiry into the most pressing questions in fundamental physics.

In support of Harvard University's goal to reduce greenhouse gas emissions 30% below 2006 levels by 2016, inclusive of growth, the Harvard Faculty of Arts and Sciences (FAS) and the design and construction team were committed to sustainability throughout the duration of the project. Decision making was performed with sustainability in mind during the selection of materials and design of mechanical systems. The lab is the 30th LEED Gold certified space at Harvard University.



**Gordon McKay Building**  
Photo: Green Building Services, 2011

**PROJECT HIGHLIGHTS**

**LEED® Facts**

**Stubbs Laboratory**

Harvard Faculty of Arts and Sciences  
2010 Renovation



Location.....	Cambridge, MA
Rating System.....	LEED-CI v 3.0
Certification Pending .....	Gold
Total Points Achieved.....	73/110
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Sustainable Sites.....	18/21
Water Efficiency.....	6/11
Energy and Atmosphere.....	26/37
Materials and Resources.....	7/14
Indoor Environmental Quality.....	10/17
Innovation and Design.....	6/6

**34%** Reduction of water use in all fixtures

**81%** Of the wood purchased for the project is FSC certified

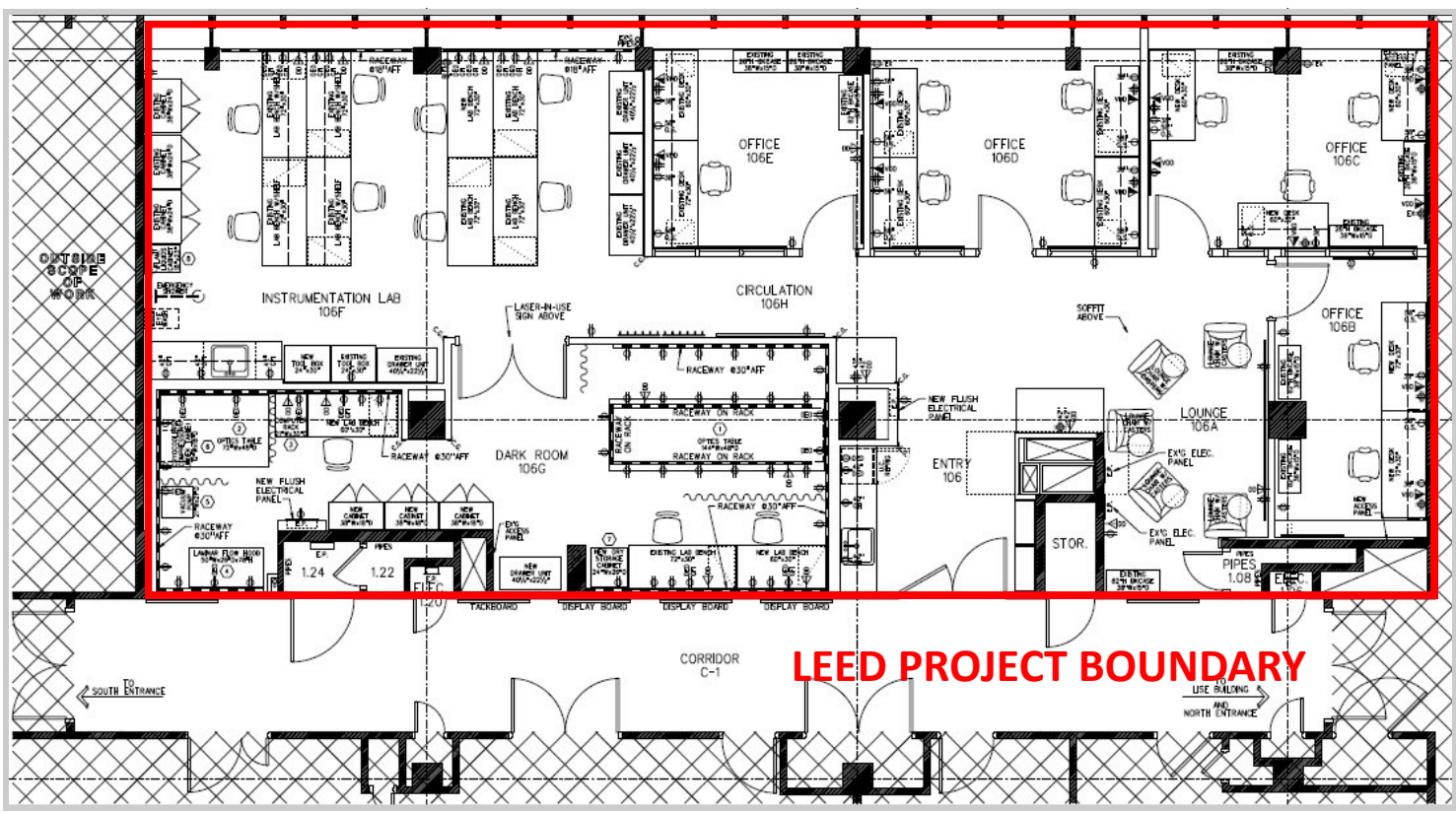
**84%** Of on-site generated construction waste was diverted from landfill

**19%** Of materials used in the project consist of recycled content.



# PROJECT OVERVIEW

## STUBBS LABORATORY FLOOR PLAN & LEED BOUNDARY



**Stubbs Lab Floor Plan**  
Perry & Radford Architects, 2010

**Stubbs Lab**  
Photo: Green Building Services, 2011



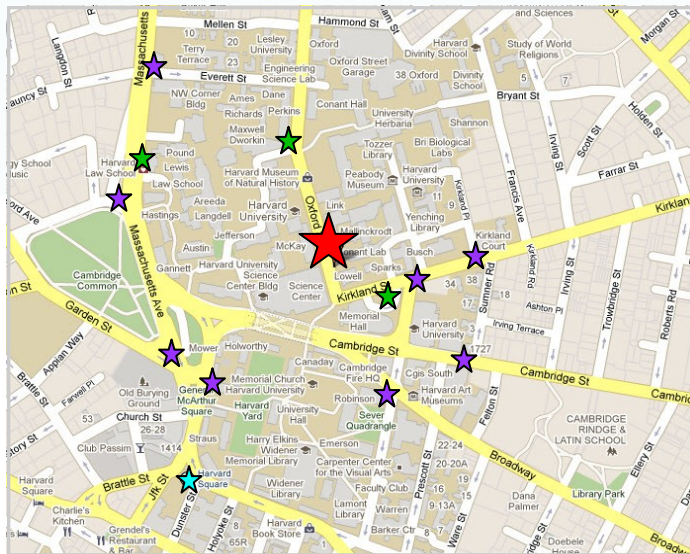
### PROJECT TEAM

<b>Owner</b>	Harvard University FAS
<b>Project Manager</b>	Harvard University FAS
<b>Architect</b>	Perry and Radford Architects
<b>Contractor</b>	Richard White Sons, Inc
<b>HVAC Engineer</b>	Energy Planning, Inc
<b>Commissioning Authority</b>	Harvard Green Building Services
<b>Sustainability Consultant</b>	Harvard Green Building Services



## SITE

- The Gordon McKay building is located in a dense urban area, which allows occupants to walk and easily access local amenities.
- To encourage alternatives to driving, all occupants of the Stubbs Laboratory 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 within walking distance to the Harvard Square MBTA stop and several bus lines.
- Two existing bicycle racks are accessible to occupants of the McKay Building, providing storage for 20 bicycles. Four shower and changing facilities are located within 200 yards of the building for bicycle commuters.



- ★ McKay Labs Building
- ★ MBTA Bus Stops
- ★ Harvard University Shuttle Bus Stops
- ★ MBTA Subway Station

## FAS GREEN LABS

The FAS Green Labs Program works with researchers, staff, faculty, and building managers to implement sustainable practices and technologies in the FAS lab buildings. Due to the resource intensity of lab science, lab sustainability approaches must be made from both a building-wide perspective and individual lab perspective, with the intent of identifying local opportunities to reduce operational impacts. FAS Green Labs Program initiatives, with the support of paid lab sustainability representatives, help mitigate resource intensity, while respecting the resource demands of science.

### LAB SUSTAINABILITY ASSESSMENTS:

The Lab Sustainability Assessment program, a component of FAS Green Labs, operates under the conviction that scientific research can be conducted in more environmentally sustainable ways without adversely impacting research quality. By involving researchers in the process of assessing potential sustainability opportunities, the program aims to share best practices regarding lab energy efficiency, lab water efficiency, lab material recycling, lab material procurement, and toxic waste reduction/prevention.

### KEY ENERGY CONSERVATION MEASURES (ECMs):

- Installing occupancy sensors on lights
- Setting back building temperatures and ventilation rates slightly at night
- Replacing inefficient lighting
- Converting constant volume fume hoods into variable volume fume hoods



## ENERGY EFFICIENCY

The Harvard Faculty of Arts and Sciences is 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 a variable air volume system, variable volume pumps, demand controlled ventilation, and temperature setbacks.

**VARIABLE AIR VOLUME (VAV) UNITS** provide conditioned ventilation air for heating and cooling. Fan coil units provide cooling only for specific equipment loads, and are on secondary controls.

The **HVAC SYSTEM** is separately zoned and controlled to account for equipment loads and solar heat gain. Private offices and laboratory spaces are separately zoned and controlled to allow for controllability of thermal systems and maintain the thermal comfort of occupants

**OCCUPANCY SENSORS** are employed to control both lighting and HVAC setbacks.

An advanced **SIEMENS DIRECT DIGITAL CONTROL SYSTEM** allows for the interoperability of occupancy sensors with lighting and HVAC systems. Moreover, where occupancy doesn't drive HVAC setbacks, time-clock settings adjust airflow and temperature set-points.

**COMMISSIONING:** The mechanical and electrical systems within the Stubbs Lab were fully commissioned, which helps ensure that all energy-related systems are installed in accordance with the manufacturer's specifications and design intent prior to occupancy.

### ELECTRICAL SYSTEMS

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

**HIGH EFFICIENCY LIGHT FIXTURES:** Energy-efficient lighting fixtures and lamps were selected to reduce electricity consumption. Lighting power density (wattage) was reduced by **10%** below an ASHRAE 90.1 baseline.

**LOW MERCURY LIGHTING:** to reduce the amount of toxic material in the building, low mercury lamps were specified and installed instead of conventional linear and compact fluorescents.

**MOTORIZED SUN SHADES** are integrated with daylight sensing capability to maximize daylight harvesting while providing some glare control. The sun shades are also controllable by manual override switching, which makes the space more comfortable for occupants.

**OCCUPANCY SENSORS** were strategically placed throughout the project to control the operation of lighting and HVAC zones based on occupancy trends.



Photo: Green Building Services, 2011

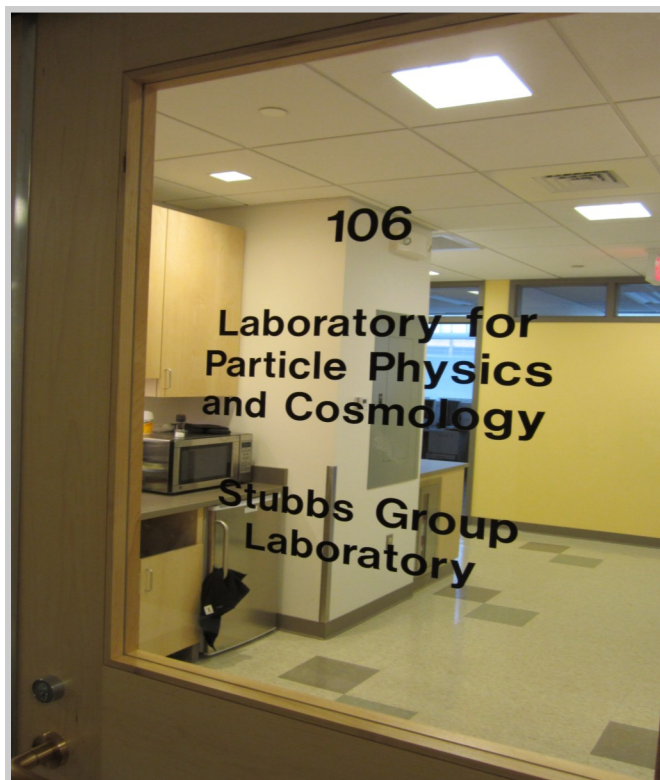


Photo: Green Building Services, 2011



## INDOOR ENVIRONMENTAL QUALITY (IAQ)

Harvard Faculty of Arts and Sciences 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. All ductwork and vents remained sealed and a HEPA filtration unit maintained negative pressure to keep any construction debris from migrating into occupied spaces. Additionally, porous building materials were kept sealed and off the ground until installation.

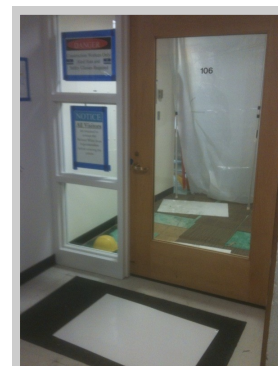
Only Materials with **LOW OR NO VOC CONTENT** were used in the Stubbs Lab renovation. Volatile Organic Compounds (VOCs) are chemical compounds and known carcinogens found in many construction materials that are considered detrimental to indoor air quality. Reducing the use of VOCs whenever possible improves indoor air quality, occupant health and productivity.

- > **COMPOSITE WOOD AND LAMINATE ADHESIVES** have no added urea formaldehyde.
- > **FURNITURE AND LAB BENCHES:** Furniture in the new Stubbs Lab was salvaged from old lab spaces, minimizing the need to manufacture and ship new furnishings.
- > **ADHESIVES AND SEALANTS | PAINTS AND COATINGS:** Examples of the products used:

Product Category	Product & Manufacturer	VOC Content (g/l)	VOC Limit (g/l)	Standard
<b>Paints &amp; Coatings</b>	> Benjamin Moore   Eco Spec Latex Primer 231	0	50	SCAQMD 1113
	> Benjamin Moore   Eco Spec Interior Flat Paint 219	0	50	SCAQMD 1113
	> Benjamin Moore   Eco Spec N374	0	50	SCAQMD 1113
<b>Adhesives &amp; Sealants</b>	> Magpie   ECO 575	0	50	SCAQMD 1113
	> Gasbag   Indoor Carpet Adhesive	0	50	SCAQMD 1113

### Construction IAQ Measures

#### Temporary Barriers



#### Negative Air Machines



Photo: Green Building Services, 2011.

**DAYLIGHT AND VIEWS:** To provide a connection between indoor and outdoor environments, **79%** of the occupied spaces have access to daylight and views. (Excluding the Laboratory's Dark Room, where daylight would inhibit laboratory procedures).

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

**GREEN HOUSEKEEPING:** A green cleaning program has been developed by Facilities Maintenance Operations (FMO), which will be followed during routine maintenance of the laboratory space. The program enforces the use of environmentally friendly cleaning chemicals, less wasteful cleaning practices, and a series of Standard Operation Procedures (SOPs) that aim to reduce the environmental impacts of janitorial maintenance.

## 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 locally manufactured, low-emitting materials with high recycled content.

- 35%** of the total material value consists of products salvaged or manufactured locally.
- 84%** of the on-site generated construction waste was diverted from landfill.
- 19%** of the total value of materials used in the project consists of materials with recycled content.



Photo: Green Building Services, 2011

### ENVIRONMENTALLY PREFERABLE MATERIALS IN STUBBS LABORATORY, MCKAY LABS BUILDING

- > **Laminate** (Wilson art)  
80% pre-consumer, 20% post-consumer
- > **Drywall** (USG Gypsum)  
94% pre-consumer, 5% post-consumer
- > **Insulation** (Knout)  
45% post-consumer
- > **MDF** (Onboard)  
100% pre-consumer

#### Examples of regional materials used in project:

Material Name	Manufacturer	Distance between project & Manufacturer ( mi )
Steel Framing	Clark Western	106
Joint Compound	USG	496
MDF	Onboard	53



Photo: 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 GREEN BUILDING SERVICES:** <http://green.harvard.edu/green-building-services>
- > **HARVARD GREEN BUILDING RESOURCE:** <http://green.harvard.edu/theresource>
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