HARVARD UNIVERSITY | DEPARTMENT OF
Molecular and Cellular Biology

GREEN is the new Crimson

HARVARD FACULTY OF ARTS AND SCIENCES

LEED – CI v2.0

BIOLOGICAL LABORATORIES – MURTHY LAB

SILVER 2011

16 Divinity Avenue, Cambridge, MA, 02138

The Murthy Laboratory project is an approximately 3,000 square foot laboratory renovation to accommodate research personnel under the direction of Professor Murthy. The laboratory program includes faculty office, graduate student seating, wet lab, prototyping lab, tissue culture and imaging facilities.

Murthy Lab Renovation
Photo: Harvard Office for Sustainability. 2009

Murthy Lab is part of the Department of Molecular and Cellular Biology within Harvard's Faculty of Arts and Sciences (FAS). Research areas of the department include: biochemistry, biophysics, genetics, cell biology, molecular evolution, neurobiology, gene expression, structural biology, and other related disciplines.

From the early stages of conceptual design, the project team was focused on achieving sustainability objectives by reducing energy use while maintaining occupant comfort. 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 Murthy Lab project is evidence of this commitment.

PROJECT HIGHLIGHTS

LEED® Facts

BioLabs - Murthy Lab
Harvard FAS
2009 Renovation

Location	Cambridge, MA
Rating System	LEED-CI v 2.0
Certification Achieved	Silver
Total Points Achieved	30/57
Sustainable Sites	4/7
Water Efficiency	0/2
Energy and Atmosphere	6/12
Materials and Resources	4/14
Indoor Environmental Quality	12/17
Innovation and Design	4/5

87% of the project waste was diverted from landfills

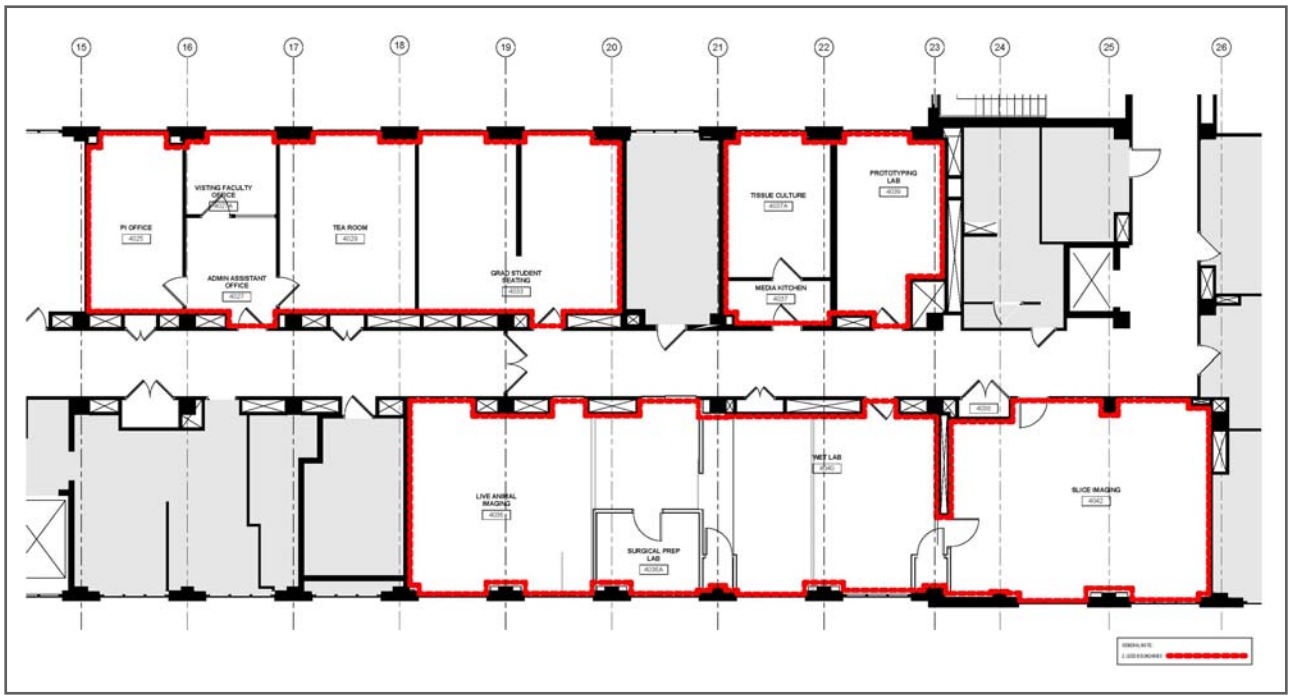
64% of interior non-structural components were reused

73% of the equipment and appliances are Energy Star® rated

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

PROJECT OVERVIEW

MURTHY LAB RENOVATION FLOOR PLAN & LEED



Murthy Lab LEED Boundary
Drawing: Perkins + Will, 2009

Murthy Lab Office
Photo: Harvard Office for Sustainability, 2009

PROJECT TEAM

Owner	Department of Molecular and Cellular Biology
Project Manager	FAS Capital Projects
Architect	Perkins + Will
Contractor	Shawmut Design and Construction
HVAC Engineer	Rist-Frost-Shumway Engineering
Commissioning Authority	Rist-Frost-Shumway Engineering
Sustainability Consultant	Harvard University, Office for Sustainability Green Building Services

PUBLIC TRANSPORTATION

The BioLabs Building is located within a quarter mile of 5 MBTA bus stops and 2 Harvard shuttle bus stops. The building footprint is within the bounds of a vibrant urban area, which affords occupants plentiful access to amenities such as restaurants, banks, churches, and retail stores.

BUS STOPS AND SERVICES WITHIN 1/4 MILE OF MURTHY LAB

Legend	Service Name or Bus Stop	Distance From Site	Line Name/ Number or Service type
1	Kirkland St @ Kirkland Place	0.13	86
2	Kirkland St & Summer Rd.	0.14	
3	Kirkland St & Quincy St.	0.14	
4	Kirkland St & Towbridge St.	0.22	
5	Cambridge St @ Prescott St	0.23	69
A	Memorial Hall	0.15	Quad Express and Mather Express
B	Maxwell Dworkin	0.12	
α	Harvard Yard Child Care Center	0.07	Daycare
β	Church of the New Jerusalem	0.2	Place of worship
γ	Queens Head pub	0.19	Restaurant
δ	Shady Hill Square	0.25	Park

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. Because of the resource intensity of lab science and the unique conditions and requirements in each individual lab, lab sustainability approaches must be made from both a building-wide perspective, as well as a granular perspective aimed at identifying local opportunities at the lab level. 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

Harvard Faculty Arts and Sciences 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

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 ($C0_2$) sensors throughout the building and modulates the air handling unit return, exhaust and outdoor air dampers as required to maintain the $C0_2$ set-point for demand control ventilation.

Occupancy-Based Ventilation and Occupancy: Occupancy sensors are used to allow for the reduction of exhaust and makeup air rates. Ventilation fluctuates based on detected occupancy or vacancy.

Heat Recovery: A heat recovery unit was added to the air handler to increase outdoor air for ventilation from 25% of total air volume to 50% of total air volume.

Plug Loads: Energy Star equipment was selected for all eligible equipment, which includes three computers and a commercial refrigerator.

Commissioning: The mechanical and electrical systems were fully commissioned by a third-party, which helps ensure that all energy-related systems were installed in accordance with the manufacturer's specifications and operating efficiently prior to occupancy.

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

ELECTRICAL SYSTEMS

OCCUPANCY SENSORS All lighting fixtures within the project scope are capable of adjusting lighting levels based on occupancy. The sensors are motion activated and the more movement in a space the brighter the lights will become. All corridor fixtures are controlled via ceiling-mounted occupancy control sensors. These occupancy controls sensors also include a photocell in the sensor that will shut off fixtures if they sense enough daylight.

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

Light Fixtures: Energy-efficient fluorescent lighting fixtures and lamps were carefully chosen and placed to reduce electricity consumption.

Renewable Energy: In order to help offset the greenhouse gas emissions, Murthy Laboratory renovation bought 50,000 kilowatt-hours renewable energy certificates (REC). The RECs offset approximately 67,750 pounds of carbon dioxide.

Lighting Sensor
Photo: Harvard's Office for Sustainability, 2009

INDOOR ENVIRONMENTAL QUALITY

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** The building maintained occupancy throughout construction. A comprehensive indoor air quality management plan was implemented during construction to maintain healthy indoor air quality not only for the workers in the space, but for the occupants within the building potentially impacted by operations. For example, all grills and vents were sealed and a HEPA Filtration unit maintained negative pressure to keep any construction debris from migrating outside the work area.

- **Thermal Comfort Survey** To ensure comfort, occupants will be surveyed about their thermal comfort at least once per season. FAS Operations will adjust the heating or cooling in the project space as needed.

- **Composite Wood and Laminate Adhesives** used in the renovation do not have any added Urea Formaldehyde

- **Systems Furniture** Herman Miller VIVO system furniture is both GREENGUARD Certified and BIFMA X7.1-2005

- **Adhesives and Sealants and Paints and Coatings** All interior paints used in the project have low or zero VOC content. Below are examples of products used in the project.

Product Category	Product & Manufacturer	VOC Content (g/l)	VOC Limit (g/l)	Standard
Paints & Coatings	Benjamin Moore EcoSpec Primer 231	0.0	50	GS-11
	Benjamin Moore EcoSpec Flat 219	0.0	50	GS-11
Adhesives & Sealants	Chapco SS3 Carpet Adhesive	0.0	50	SCAQMD Rule# 1168
	ECO 575 Adhesive	0.0	50	SCAQMD Rule# 1168

Natural Light
Photo: Harvard Office for Sustainability

Construction IAQ Measures Implemented During Construction

HVAC Protection:
Ductwork sealed throughout Construction/preoccupancy

Pathway Interruption
Exhaust filtered and direct to outside

Daylight and Views: The laboratory architecture and fenestration provides a connection between indoor and outdoor environment by introducing daylight and views to 89% of the occupied spaces.

Health and Wellness: Recent studies have linked having access to views of nature in the workplace to the relief of boredom, anxiety, and stress[1].

[1] Ulrich, R. S. Effects of interior design on wellness: theory and recent scientific research. (Journal of Health-care Design, Vol 3, pp. 97-109, 1992)

MATERIALS & WASTE

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

64% **of the total material value consists of products salvaged or manufactured locally.**

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

15% **of the total value of materials used in the project consist of materials with recycled content.**

ENVIRONMENTALLY PREFERABLE MATERIALS IN MURTHY LAB, BIOLABS

- MDF Panels (Arrels)
  0% pre-consumer, **100%** post-consumer
- Metal Cabinets (Ficher Hamilton)
  10% pre-consumer, **15%** post-consumer
- Work Stations (Praxis)
  69% pre-consumer, **0%** post-consumer
- Wood Doors (Marshfield)
  54% pre-consumer, **0%** post-consumer

Examples of regional materials used in project:

Material Name	Manufacturer	Distance between project & Manufacturer (mi)
Drywall	USG	248
Metal Studs	Dietrich	46

Murthy Break Room
Photo: Harvard's Office For Sustainability, 2009

Murthy Office Space
Photo: Harvard Office for Sustainability, 2009

ADDITIONAL RESOURCES

- Harvard FAS, Dept of Molecular and Cellular Biology: http://mcb.harvard.edu
- Harvard FAS, Green Labs Program: http://green.harvard.edu/fas/green-labs
- Harvard OFS - Green Building Services: http://green.harvard.edu/green-building-services
- Harvard OFS - Green Building Resource: http://green.harvard.edu/theresource