

EXTAVOUR LABORATORY
16 DIVINITY AVE, CAMBRIDGE, MA
PROJECT PROFILE

LEED CI v4.0
LEED CERTIFIED
OCTOBER 2016

Laboratories are typically regarded as an energy intensive building typology. Many of these buildings have extended occupancy periods, energy intensive equipment and machinery, and in some cases, strict air quality code requirements (high air changes per hour). These factors contribute to a high average energy use intensity value (National Average EUI of 370 kBtu/SF/year). Nevertheless, there are many strategies that can be employed to make laboratories more energy and water efficient as well as healthy and productive spaces with minimal environmental impact. The Extavour Laboratory is a great example of the successful implementation of these strategies.



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The FAS Extavour Laboratory project scope included the renovation of approximately 6,000 SF of research and office space in the BioLabs Building. The 4,600 SF second floor renovation provided new laboratories, office areas, a central tea room, kitchenette, and four interconnected research spaces with a temperature controlled microscopy room. The fifth floor scope included modest renovations to a 1,400 SF existing fly facility which was converted into an arthropod facility for USDA regulated research.

The project team was committed to sustainability from the onset and followed the Harvard Green Building Standards to make more informed decisions. The project achieved LEED-CI v4 Certification in October 2016 and is the first LEED v4 certified project in the state of Massachusetts.

LEED® Facts
Harvard University
Extavour Laboratory



Location.....	Cambridge, MA
Rating System.....	LEED-CI v4
Certification Awarded.....	Certified
Total Points Awarded.....	42/110
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Integrative Process.....	2/2
Location and Transportation.....	10/18
Water Efficiency.....	6/12
Energy and Atmosphere.....	12/38
Materials and Resources.....	4/13
Indoor Environmental Quality.....	3/17
Innovation.....	3/6
Regional Priority.....	2/4

PROJECT METRICS

- 38%** reduction in water use below EPA Act 1992
- 95%** of the eligible equipment and appliances by rated power are ENERGY STAR certified
- 72%** of the on-site generated construction waste was diverted from landfills.
- 30%** reduction in lighting power density below ASHRAE 90.1-2010
- 25%** of the project materials were manufactured using recycled content
- 73%** of the project's connected lighting load is controlled by occupancy sensors



ENERGY EFFICIENCY AND INDOOR ENVIRONMENTAL QUALITY

ENERGY EFFICIENCY

ECM 1: Occupancy Sensors

ECM 2: High Efficiency Fan Coil Units

ECM 3: Chilled Beam Conditioning

The project's mechanical scope included the modification of an existing 6,000 CFM AHU, with a new chilled water coil and various associated piping and control valve modifications. Existing AHU modifications also included the provision of a reheat coil. These modifications were required to ensure proper supply air capacity and dew point control. The spaces are conditioned with a combination of two-pipe chilled beams (induction beams), high efficiency fan coil units, and perimeter fin tube radiation.

Piping systems serving the new chilled beams include local zone pumps to mix and adjust the supply water temperature to the beams in order to match load but also to avoid condensation. The chilled beam primary air systems are controlled to maintain the supply air temperature dew point below the supply water temperature, and the supply water temperature to the chilled beams is controlled to be above the air dew point temperature. The chilled beams are essential to energy conservation because the sensible cooling/heating is performed at the beam rather than at the air handler, thus the ductwork only supplies the makeup ventilation air (typically less than 50% of the total required air volume) that satisfies the load of the space.

All control points and space temperatures and set-points are mapped to the facility's Siemens building automation system (BAS), which uses space conditions in its various energy management strategies, and adjusts HVAC system operation to space loads via the occupancy sensors. The occupancy sensors act as an important energy efficiency measure by setting back the ventilation and saving energy when occupants are not present in the office and meeting spaces.



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INDOOR ENVIRONMENTAL QUALITY

The high indoor environmental quality of the Extavour Laboratory renovation was a significant focus of the project. An indoor Quality Management Plan was enacted to ensure the protection of building systems, building occupants, construction related occupants, and interior building materials from air pollutants, excessive moisture exposure, and moisture damage during construction.

The selection of low chemical-emitting construction and finish materials was an important driving force in the design phase. The project includes low emitting flooring systems, ceilings, walls, thermal, and acoustic insulation. All wood and agrifiber products are also free of urea-formaldehyde.

Further, the project includes 20 products that have Environmental Product Declarations (EPDs). These 20 products have environmentally, economically, and socially preferable life-cycle impacts, ensuring sustainable materials have been installed within the project.

ENERGY EFFICIENCY AND INDOOR ENVIRONMENTAL QUALITY

LIGHTING AND ELECTRICAL SYSTEMS

The Extavour Laboratory space is expected to be occupied for extended periods through-out the year, therefore, it is crucial that the energy reduction strategies also focus on reducing lighting energy. The lighting system was designed to not only reduce energy use, but also to improve in the indoor environmental quality of the space and provide optimal lighting. Some of the strategies employed include:

- Reduce lighting power density by 30% below the ASHRAE 90.1-2010 baseline standard
- High performance LED and CFLs installed throughout the project space
- Ceiling mounted occupancy sensors capable of managing lighting setbacks for lab, work spaces, and support rooms
- Lighting controls with multiple lighting levels to provide occupants with the ability to control how much or how little lighting they want.



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PLUMBING SYSTEMS AND POTABLE WATER USE REDUCTION



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Decreasing the demand for potable water is the first step towards sustainable water management. Therefore, the plumbing system for the Extavour Laboratory was designed to reduce resource consumption, specifically potable water use. Potable water use was reduced by incorporating a low-flow fixture in the project space. In the Team Room, a 0.5 gallons per minute (GPM) aerator was installed on the kitchen sink.

The bathroom which is used by the project tenants has a low flow water closet with a flush rate of 1.28 gallon per flush (GPF, waterless urinals, and a lavatory faucet of 0.5 GPM. With the addition of these fixtures, the overall percent reduction of water use in all fixtures is just over 37%.



PRODUCTS AND MATERIALS

LIGHTING AND CONTROLS

- 30% reduction in lighting power density (watts/square foot)



Edge LED Recessed Linear
Pinnacle

- ✓ High efficiency: 62 lumens/watt



Dual Technology Occupancy Sensor
LMDX-100
WattStopper

- ✓ Uses passive infrared and ultrasonic technologies to achieve precise occupancy sensing for energy-efficient control of lighting



LED Spot Light
Bruck

- ✓ High efficiency: 66 lumens/watt

ENERGY EFFICIENT APPLIANCES & WATER EFFICIENCY

- 95% of the equipment purchased for the project is **ENERGY STAR RATED** (by rated power).
- 38% reduction in annual water use when compared to EAct 1992 baseline standard.



LCD Monitor
Model# HW-191APB
Hanns-G

- ✓ ENERGY STAR®



Side by Side Refrigerator
Model #FGHS2631PF
Frigidaire

- ✓ ENERGY STAR®
- ✓ Energy Saver Plus Technology enables automatic energy-saving mode if not opened for 24 hours

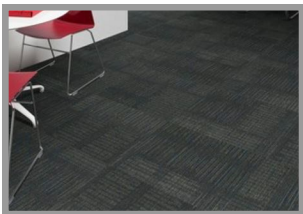


Manual Faucet
Model #947-CP
Chicago

- ✓ 0.5 gallons per minute (gpm) aerator vs. EAct baseline of 2.2 gpm.

LOW-EMITTING MATERIALS

- 100% of the project's flooring systems are **low-emitting**.



Carpet Tile Flooring
Model #Paradigm #04316
Tandus Centiva

- ✓ FloorScore Certified



Wall-base Adhesive
Model #Ultrabond Eco 575
Mapei

- ✓ Low VOC content



Interior Latex Primer
Model #Eco Spec WB
Benjamin Moore

- ✓ No VOCs

Please note that while many products are described in this project profile, these are provided for informational purposes only, to show a representative sample of what was included in this project. Harvard University and its affiliates do not specifically endorse nor recommend any of the products listed in this project profile and this profile may not be used in commercial or political materials, advertisements, emails, products, promotions that in any way suggests approval or endorsement of Harvard University.



PROJECT SCORECARD

FAS Extavour Lab

Project ID 1000061551
Rating system & version LEED v4 ID+C: CI
Project registration date 09/01/2015



D and C Application Decision

CERTIFIED: 40-49, SILVER: 50-59, GOLD: 60-79, PLATINUM: 80+

LEED FOR COMMERCIAL INTERIORS (V4)

ATTEMPTED: 46, DENIED: 9, PENDING: 0, AWARDED: 42 OF 128 POINTS

INTEGRATIVE PROCESS	2 OF 2
Integrative Process	2 / 2

LOCATION AND TRANSPORTATION	10 OF 36
LEED for Neighborhood Development Location	0 / 18
Surrounding Density and Diverse Uses	2 / 8
Access to Quality Transit	7 / 7
Bicycle Facilities	1 / 1
Reduced Parking Footprint	0 / 2

WATER EFFICIENCY	6 OF 12
Indoor Water Use Reduction	Y
Indoor Water Use Reduction	6 / 12

ENERGY AND ATMOSPHERE	12 OF 38
Fundamental Commissioning and Verification	Y
Minimum Energy Performance	Y
Optimize Energy Performance	6 / 25
Fundamental Refrigerant Mgmt	Y
Enhanced Commissioning	4 / 5
Advanced Energy Metering	0 / 2
Renewable Energy Production	0 / 3
Enhanced Refrigerant Mgmt	0 / 1
Green Power and Carbon Offsets	2 / 2

MATERIALS AND RESOURCES	4 OF 13
Storage and Collection of Recyclables	Y
Construction and Demolition Waste Mgmt Planning	Y
Long-Term Commitment	1 / 1
Interiors Life-Cycle Impact Reduction	0 / 4
Product disclosure & optimization - Environmental	1 / 2
Product disclosure & optimization - Sourcing of R	1 / 2
Product disclosure & optimization - Material Ingr	0 / 2
Construction and Demolition Waste Mgmt	1 / 2

INDOOR ENVIRONMENTAL QUALITY	3 OF 17
Minimum IAQ Performance	Y
Environmental Tobacco Smoke Control	Y
Enhanced IAQ Strategies	2 / 2
Low-Emitting Materials	0 / 3
Construction IAQ Mgmt Plan	1 / 1
IAQ Assessment	0 / 2
Thermal Comfort	0 / 1
Interior Lighting	0 / 2
Daylight	0 / 3
Quality Views	0 / 1
Acoustic Performance	0 / 2

INNOVATION	3 OF 6
Innovation	2 / 5
LEED Accredited Professional	1 / 1

REGIONAL PRIORITY CREDITS	2 OF 4
Bicycle Facilities	1 / 1
Reduced Parking Footprint	0 / 1
Indoor Water Use Reduction	0 / 1
Optimize Energy Performance	0 / 1
Renewable Energy Production	0 / 1
Product disclosure & optimization - Environmental	1 / 1

TOTAL 42 OF 128

MORE INFORMATION

- › Harvard Faculty of Arts and Sciences: <http://www.fas.harvard.edu/home/>
- › Extavour Lab: <http://www.extavourlab.com/>
- › Harvard - Green Building Resource: <http://www.energyandfacilities.harvard.edu/green-building-resource>
- › Harvard - Green Building Services: <http://www.energyandfacilities.harvard.edu/project-technical-support/capital-projects/sustainable-design-support-services>

