



HARVARD SCHOOL OF ENGINEERING AND APPLIED SCIENCES
VECITIS LAB- ENGINEERING & SCIENCE LABORATORY
58 OXFORD STREET, CAMBRIDGE, MA 02138

LEED-ID&CV3.0
PLATINUM

The Vecitis Lab is located at 58 Oxford Street is occupied and operated by the School of Engineering of Applied Science (SEAS), in a four-story glass, steel and concrete structure that provides research and office space to support efforts in fluidics, soft condensed matter and advanced sensor research. The Vecitis Lab renovation project is a 960 square foot renovation of existing research space located on the second floor of the 58 Oxford Building and includes reconfiguring the existing space to meet the programmatic requirements of the researchers, updating finishes and furnishings, and increasing the efficiency and quality of the lighting, heating, ventilation, and air conditioning controls.



A sustainability charrette held with the design team and representatives from SEAS including the building manager and occupants identified key sustainability goals for implementation. An ASHRAE Level II Energy Audit was performed to identify opportunities to increase building energy efficiency and many of these recommendations were incorporated into the renovation of the Wyss Institute project.

New fan coil units, variable air volume boxes, fans, fume hoods, and new automatic control points to allow for automated mechanical system controllability were added, and lighting was upgraded with efficient fixtures.

Lifecycle costing was used to evaluate recommended Energy Efficiency Measures and the project has earned a LEED-ID&CV3.0 Platinum certification.

PROJECT HIGHLIGHTS

LEED® Facts

Vecitis Lab
Harvard School of Engineering & Applied Sciences
2010 Renovation



Location.....	Cambridge, Massachusetts
Rating System.....	Commercial Interiors v3.0
Certification.....	Platinum
Total Points.....	81/110
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Sustainable Sites.....	18/21
Water Efficiency.....	8/11
Energy and Atmosphere.....	32/37
Materials and Resources.....	3/14
Indoor Environmental Quality.....	11/17
Innovation and Design.....	5/6
Regional Priority	4/4

33% Reduction in lighting power density achieved.

35% reduction in overall water consumption compared to a code compliant base case.

100% Of the eligible equipment purchased for the project was Energy Star certified.



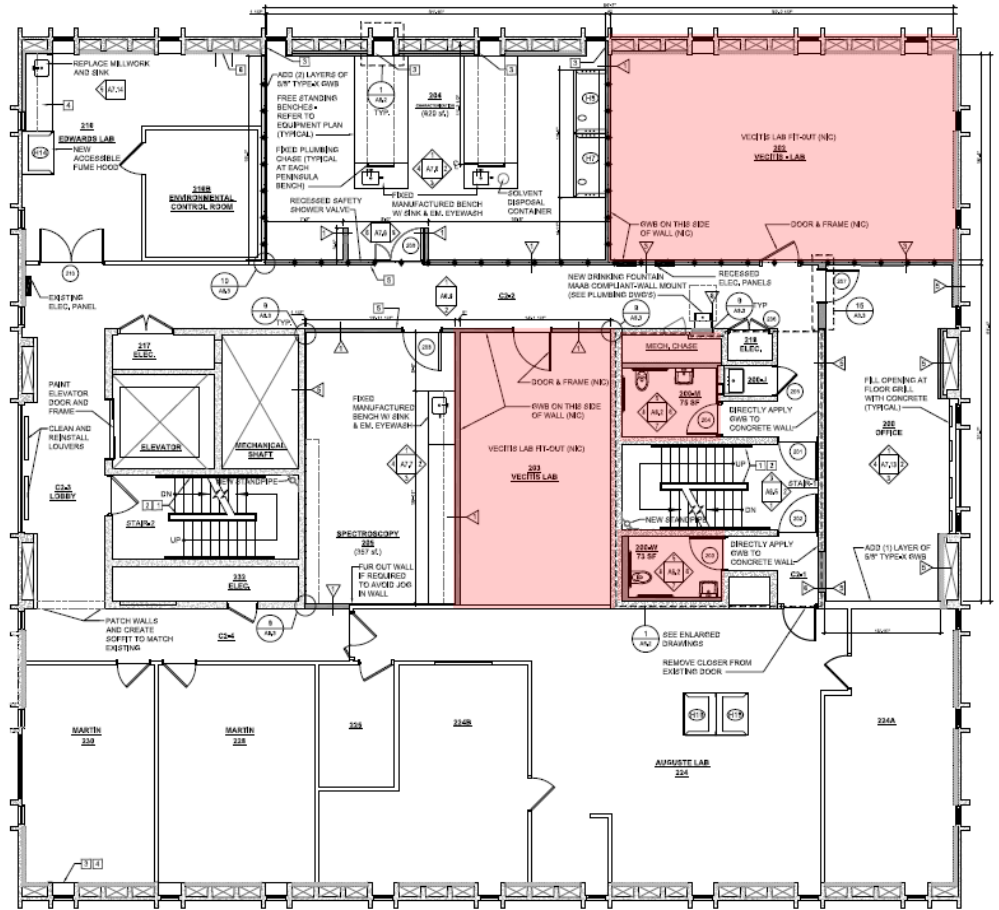
PROJECT OVERVIEW

Vecitis Lab Project Boundary

Second Floor
 58 Oxford Street

Additional spaces renovated by SEAS in the 58 Oxford Street Building include: the *LEED-CI Wyss Institute* space, circulation corridors and restrooms located on the third and fourth floor, and two occupant lounges. The third and fourth floor corridors, restrooms, and lounges, as well as energy efficiency improvements made to other lab spaces on the third and fourth floor were excluded from *LEED-CI Vecitis Lab* project boundary because these spaces are not occupied solely by the Vecitis Lab research group.

Renovations at the Vecitis Lab and Wyss Institute allowed SEAS to leverage the Contractor to make efficiency improvements throughout the entire 4 floors of 58 Oxford Street including upgrading the building exhaust fan and energy recovery system.

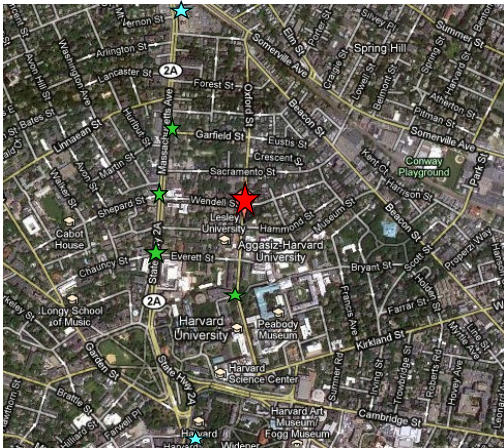


PROJECT TEAM

Owner	Harvard University, School of Engineering and Applied Sciences (SEAS)
Project Manager	Pamela Choi Redfern, SEAS Director Capital Projects Don Claflin, SEAS Facilities Manager
Architect	Douglas Okun Associates
Construction Manager	Elaine Construction
FP/MEP Engineer	RGV Engineers
Commissioning Agent	Harvard Green Building Services
Sustainability Consultant	Harvard Green Building Services



SITE



- ★ 58 Oxford Street
- ★ MBTA Subway Station
- ★ Bus Stop Location

- To encourage alternatives to driving, all occupants of the Vecitis Lab have access to Harvard's **Commuter Choice Program**, which provides incentives, such as discounts, for all modes of alternative transportation as well as carpooling and fuel efficient vehicles. The Program is promoted through informational kiosks in building common areas and an extensive website. (www.commuterchoice.harvard.edu)
- The Engineering and Science Laboratory Building is located in a dense urban area which allows occupants easy access to amenities such as restaurants, banks, churches and retail stores that are within walking distance.
- The building is located within walking distance to the Harvard Square subway station and several bus lines.
- Existing bicycle racks are accessible to occupants of the Northwest Labs Building, providing storage for 72 bicycles. Four shower and changing facilities are located within 200 yards of the building for bicycle commuters.



Engineering and Science Laboratory Building
 58 Oxford Street Cambridge, MA

Bike Racks located between 58 and 60 Oxford Street
 Photo: Harvard Green Building Services, 2011



WATER EFFICIENCY

Water efficient plumbing fixtures were selected for restrooms renovated as part of the Vecitis Lab project. The fixtures in the other restrooms in 58 Oxford Street were also replaced with efficient selections. Overall, these fixtures reduce domestic water consumption by **35%** over standard EAct 1992 fixtures.

Differences in the Flush & Flow Rates for EAct 1992 Standard fixtures and the fixtures utilized by B1 Annex Occupants:

Fixture Type	B1 Annex Flush & Flow Rates	EAct 1992 Standard Flush & Flow Rates
Water Closet [GPF]	1.28	1.6
Bathroom Faucet [GPM]	0.35	0.5
Shower [GPM]	1.5	2.5
Kitchen Faucet [GPM]	1.5	2.2
Urinal [GPF]	0.125	1.0

GPF - Gallons Per Flush GPM - Gallons Per Minute

Toto EcoPower Flush Valve
 (1.28 gallons per flush)



Symmons Ultra-Sense Metering Faucet
 (with 0.5 gallon per minute aerator)



ENERGY EFFICIENCY

Harvard School of Engineering and Applied Sciences (SEAS) 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 focus.

MECHANICAL SYSTEMS

- **Refrigerant Loop Heat Recovery:** Exhaust air runs over a refrigerant heat recovery loop. The heat recovery loop preheats incoming outside air to maintain the mixed air temperature.
- **Demand Control Ventilation:** CO₂ sensors in all high density spaces control the amount of outdoor air supplied. If there are fewer people occupying the space then less air is required, ultimately saving energy.
- **Occupancy and Temperature Sensors:** Occupancy sensors tied to the building's control system modulate the supply air and maintain temperature set-points, allowing both to be set back whenever spaces are unoccupied.
- **Increased Ventilation:** The mechanical system has been designed to provide the Vecitis Lab space 30% more fresh outdoor air than required by ASHRAE ventilation standards to improve occupant comfort.
- **Equipment Efficiency:** High Performance Fume hoods receive supply air from VAV terminal boxes with reheat coils and are exhausted by a variable volume exhaust air valve. The exhaust valve is controlled by a sash sensor that adjusts the exhaust valve based on the sash height to maintain a safe but minimum face velocity. The supply and exhaust VAV boxes modulate in cooperation to maintain the space design system pressurization.



ELECTRICAL SYSTEMS

- **Lighting Fixtures:** Energy-efficient and low-mercury fluorescent lamps were carefully chosen and strategically placed to reduce electricity consumption while maintaining adequate lighting levels for each type of space. Occupancy sensor controlled LED task lights were included in the bench cabinetry to further reduce ambient lighting levels.
- **M&V:** A Measurement and Verification plan is in place to monitor the heating, cooling, and electricity use for the Vecitis Lab space.
- **Plug Loads:** Energy Star equipment was selected for all new equipment in the space.
- **Commissioning:** The mechanical and electrical systems have been fully commissioned, ensuring that all energy-related systems were installed as designed and operate efficiently prior to occupancy.
- **Renewable Energy:** Renewable Energy Certificates (RECs) were purchased from Renewable Choice equivalent to 100% of the anticipated electricity over 2 years.



INDOOR ENVIRONMENTAL QUALITY

SEAS 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 grills and vents were sealed and ductwork remained sealed until it was installed and covered. Fans were used to exhaust air directly to the outdoors, and building materials were kept sealed and off the grounds until they were installed.

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 Vecitis 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 and consequently occupant health and productivity.

- **COMPOSITE WOOD AND LAMINATE ADHESIVES** used have no added urea formaldehyde.
- **ADHESIVES AND SEALANTS | PAINTS AND COATINGS** Examples of the products used:

Category	Product & Manufacturer	VOC Content (g/l)	VOC Limit (g/l)	Standard
Paints & Coatings	➤ Benjamin Moore Latex Block Filler	44.9	200	SCAQMD Rule #1168
	➤ Benjamin Moore Interior Flat Coating	78	100	Green Seal GS-11
	➤ Benjamin Moore Latex Dry Concrete Coating	46.4	200	SCAQMD Rule #1168
Adhesives & Sealants	➤ Polyseam all purpose construction adhesive	25	70	SCAQMD Rule #1168
Low Emitting Flooring Systems	➤ Dur-A-Guard Epoxy Resin Flooring	0	100	SCAQMD Rule #1168

Construction IAQ Measures Implemented During Construction

Photos: Harvard Green Building Services

HVAC Protection



The contractor sealed all HVAC ductwork prior to installation. Supply and return air vents were sealed prior to and during demolition and construction to prevent contamination.



Absorptive materials onsite, such as these ceiling tiles, were protected from moisture by elevating from potential wet surfaces and covering with plastic until permanently installed.



AIR QUALITY & SAFETY: A building spectra gas detection system monitors the air for the presence of gasses used in the building for research purposes. The system notifies occupants of gas leaks and oxygen deficiencies in occupied labs with an audible and visual alarm in the spaces containing the gas systems.

GREEN HOUSEKEEPING: SEAS has made a commitment to using green cleaning processes in all of its buildings, including the Vecitis Lab Renovation. This includes the use of Green Seal certified cleaning solutions, 100% recycled content toilet tissue and paper towels, portion control chemical dispensers, staff training.



MATERIALS & WASTE

Selecting environmentally preferable materials and minimizing the amount of construction waste sent to the landfill was important in the Vecitis Lab renovation. The project team gave preference to low-emitting materials with recycled content and local manufacturing.

20% of the total value of materials used in the project consist of materials with recycled content.

100% of the material value of wood products purchased for the Vecitis Lab consist of wood products grown sustainably and responsibly in Forests certified by the Forrest Stewardship Council.

59% Of the total value of project materials consisted of materials manufactured within 500 miles of the project site.

ENVIRONMENTALLY PREFERABLE MATERIALS IN THE B1 ANNEX FIT OUT

- > Steel Framing (Clark Western)
 Recycled Content: **17%** pre-consumer, **37%** post-consumer
- > Bathroom Partitions (Scranton Products)
 Recycled Content: **76%** pre-consumer, **15%** post-consumer
- > Gypsum Board (USG)
 Recycled Content: **96%** pre-consumer, **3%** post-consumer
- > Ceiling Tile (Armstrong)
 Recycled Content: **67%** pre-consumer, **15%** post-consumer
- > Systems Cubicle Furniture (Herman Miller)
 Recycled Content: **26%** pre-consumer, **28%** post-consumer

Examples of Sustainable Materials used in the project:

Product Name	Manufacturer	Project Implementation
Ultima Ceiling tiles and Silhouette grid	Armstrong	Acoustical Ceiling Panels
Metal & Wood Casework	Mott Manufacturing	Lab benches and case-work



ADDITIONAL RESOURCES

- > HARVARD SCHOOL OF ENGINEERING AND APPLIED SCIENCES (SEAS): <http://seas.harvard.edu/>
- > SUSTAINABILITY EFFORTS AT SEAS: <http://intranet.seas.harvard.edu/audience/sustainability>
- > HARVARD GREEN BUILDING SERVICES: <http://green.harvard.edu/green-building-services>
- > HARVARD GREEN BUILDING RESOURCE: <http://green.harvard.edu/theresource>
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