



HARVARD SCHOOL OF ENGINEERING AND APPLIED SCIENCES
B1 ANNEX - NORTHWEST LABS BUILDING
52 OXFORD STREET -LEVEL B1, CAMBRIDGE, MA 02138

LEED-ID&Cv3.0 PLATINUM

The B1 Annex is a 22,450 square foot interior fit out created by reclaiming and converting a portion of the four level underground parking garage at the Northwest Science Building. Located on the B1 garage level at 52 Oxford Street in Cambridge Massachusetts, the renovation is comprised of newly created office space, a machine shop, and storage space set aside to accommodate future laboratory growth. The Harvard School of Engineering and Applied Sciences (SEAS) has developed the space to accommodate future research needs, allowing SEAS the opportunity to bring together research activities at the intersection of engineering, applied sciences, biology, and medicine.



Existing mechanical systems, ductwork, and piping serving the garage and Northwest Science Building were relocated to make room for the Annex space. HVAC equipment was enclosed in acoustically treated rooms to mitigate noise and vibration and skylights were added to bring natural light into some of the common spaces in the subterranean Annex.

In support of Harvard's greenhouse gas reduction goal, SEAS and the project team were committed to sustainability throughout the duration of the project. This helped to guide decision making and inform the selection of material, mechanical, electrical and plumbing systems. Ultimately, the B1 Annex renovation achieved LEED-ID&Cv3.0 Platinum certification, the highest possible rating offered by the USGBC.

Photo: Harvard University, Green Building Services

PROJECT HIGHLIGHTS

LEED® Facts
B1 Annex
Harvard School of Engineering & Applied Sciences
2010 Renovation
Location.....Cambridge, Massachusetts
Rating System.....Commercial Interiors v3.0
Certification..... Platinum
Total Points..... 82/110
Sustainable Sites.....20/21
Water Efficiency..... 6/11
Energy and Atmosphere.....28/37
Materials and Resources.....6/14
Indoor Environmental Quality.....12/17
Innovation and Design..... 6/6
Regional Priority 4/4



96% of on-site generated construction waste was diverted from landfills.

33% reduction in overall water consumption compared to a code compliant base case.

30% reduction in lighting power density was achieved.



PROJECT OVERVIEW

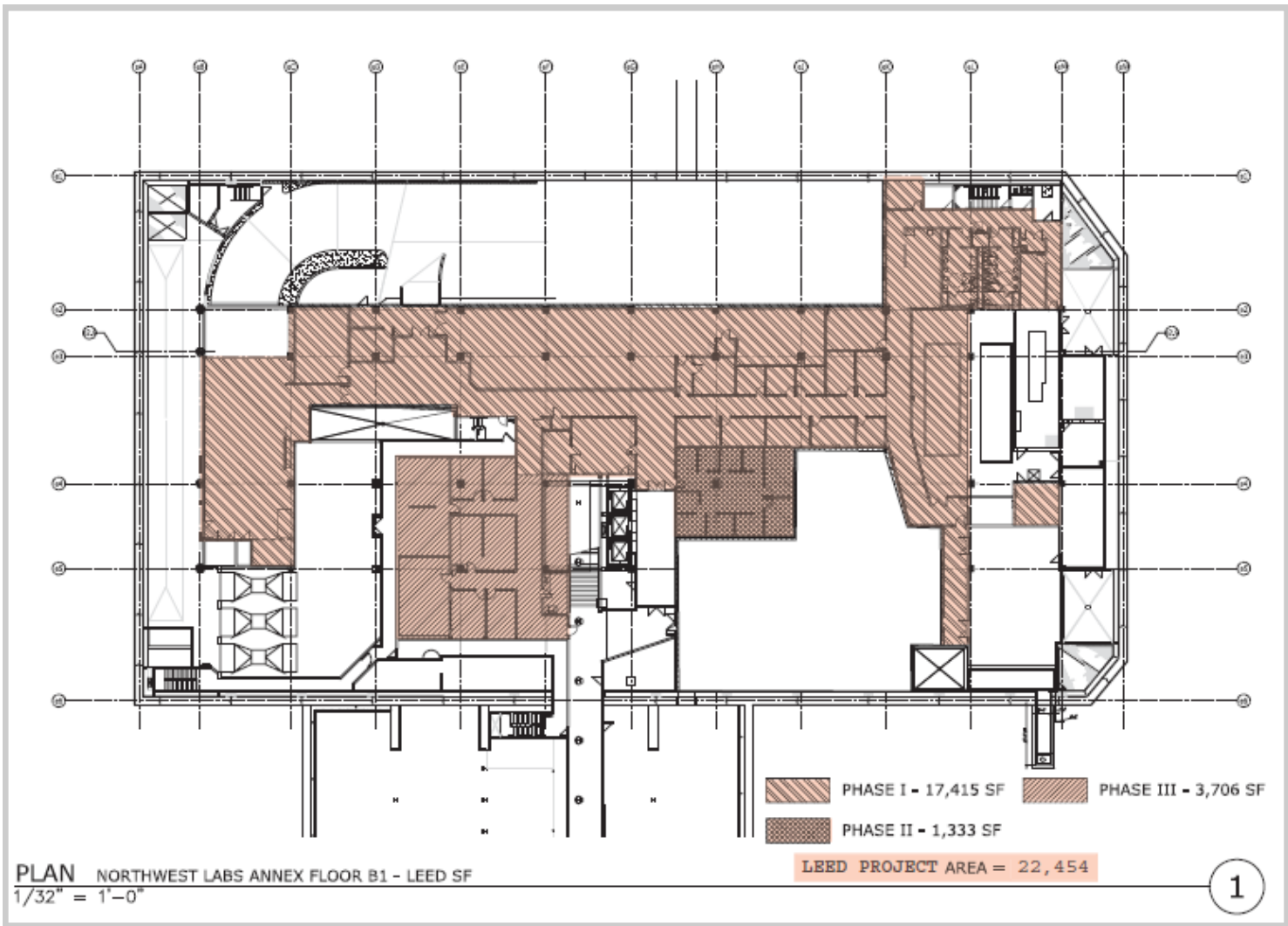


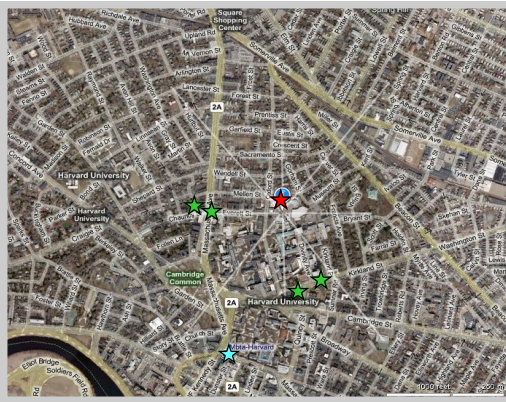
Photo: Harvard University, Green Building Services

PROJECT TEAM

Owner	Harvard University, School of Engineering and Applied Sciences (SEAS)
Project Manager	Harvard University, School of Engineering and Applied Sciences (SEAS)
Architect	HKT Architects Inc.
Construction Manager	Elaine Construction
FP/MEP Engineer	RDK Engineers
Commissioning Agent	Harvard Green Building Services
Sustainability Consultant	Harvard Green Building Services



SITE



- ★ Northwest Science Labs Building
- ★ MBTA Subway Station
- ★ Bus Stop Location

- To encourage alternatives to driving, all occupants of B1 Annex have access to Harvard's **CommuterChoice 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 Northwest 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.



Northwest Labs Building
 Cambridge, MA 02138

Bike Racks at Hammond Street
 Photo: Harvard Green Building Services



WATER EFFICIENCY

Water efficient plumbing fixtures were selected for restrooms added as part of the B1 Annex renovation. The fixtures in the existing Northwest Science Lab Building are also efficient selections. Overall, these fixtures reduce domestic water consumption by **33%** over standard EPA 1992 fixtures.

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

Fixture Type	B1 Annex Flush & Flow Rates	EPA 1992 Standard Flush & Flow Rates
Water Closet [GPF]	Dual-Flush 1.6 & 1.1	1.6
Bathroom Faucet [GPM]	0.5	0.5
Shower [GPM]	2.0	2.5
Kitchen Faucet [GPM]	1.5	2.2
Urinal [GPF]	0.125	1.0
GPF - Gallons Per Flush		GPM - Gallons Per Minute



Photos: Sloan Uppercut & Symmons Scot Faucet product brochures



Symmons SCOT 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

- **Glycol Loop Heat Recovery:** Exhaust air runs over a glycol 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 less fresh air is required, ultimately saving energy on conditioning unnecessary ventilation air.
- **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 B1 Annex space 30% more fresh outdoor air than required by ASHRAE ventilation standards to improve occupant comfort.
- **Equipment Efficiency:** The new air handler servicing the space consists of four exhaust fans designed to operate on a rotational lead/lag schedule providing the required redundancy while extending the useful life of the installed equipment.

Photo: Harvard University, Green Building Services

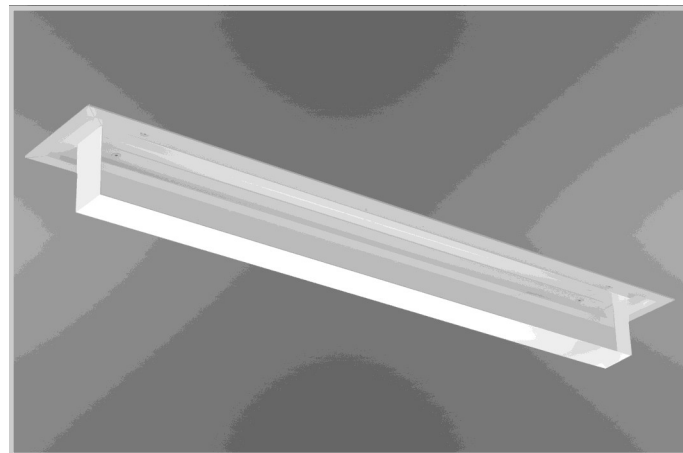


Photo: MARK Architectural Lighting Brochure; The Fin Series

ELECTRICAL SYSTEMS

- **Lighting Fixtures:** Energy-efficient LED 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.
- **M&V:** Utilities in the B1 Annex are metered separately from the Northwest Science Building. A Measurement and Verification plan is in place to monitor the heating, cooling, and electricity use for the 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 Sterling Planet (wind power) 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 ready for operation. Fans were used to exhaust air directly to the outdoors, and building materials were kept sealed and off the ground until they were installed to prevent moisture infiltration that could lead to future mold problems.

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 B1 Annex 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 include:

Category	Product & Manufacturer	VOC Content (g/l)	VOC Limit (g/l)	Standard
Paints & Coatings	➤ Benjamin Moore 372 Eco Spec Latex Primer	0	200	Green Seal GS-11
	➤ Benjamin Moore Interior Flat Coating	0	50	Green Seal GS-11
	➤ Benjamin Moore Interior Non Flat Coating	1	150	Green Seal GS-11
Adhesives & Sealants	➤ Tremco Architectural Sealant	0	250	SCAQMD Rule #1168
	➤ Laticrete Special Purpose Contact Adhesive	136	250	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 during demolition and construction to prevent contamination.



Absorbent materials stored onsite were protected from moisture by elevating from potential wet surfaces and covering with plastic until permanently installed.



Photos: Harvard University, Green Building Services

COMFORT: To combat the lack of natural light in the reclaimed subterranean space, the project includes spacious open corridors, reflective surfaces to bounce the electric light, acoustical panels to reduce noise from the machine shop, and full height glass partitions in the office spaces to provide interior views where exterior views are lacking. Skylights were added to the communal space where possible.

GREEN HOUSEKEEPING: SEAS has made a commitment to using green cleaning processes in all of its buildings, including the B1 Annex 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 B1 Annex renovation. The project team gave preference to low-emitting materials with recycled content and local manufacturing.

25% of the total value of materials used in the project consist of materials with recycled content.

79% of the material value of wood products purchased for the B1 Annex consist of wood products grown sustainably and responsibly in Forests certified by the Forrest Stewardship Council.

96% of the on-site generated construction waste was diverted from landfills.

ENVIRONMENTALLY PREFERABLE MATERIALS IN THE B1 ANNEX FIT OUT

- › Steel Framing (Clark Western)
 Recycled Content: **68%** pre-consumer, **26%** post-consumer
- › Bathroom Partitions (Scranton Products)
 Recycled Content: **100%** post-consumer
- › Gypsum Board (USG)
 Recycled Content: **94%** 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 FSC Certified Wood materials used in the project

Product Name	Manufacturer	Project Implementation
FSC Veneer Core Plywood	Columbia Atlantic	Casework
Maple Panels	Rulon Company	Casework & Partitions



Photos: Harvard University, Green Building Services

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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