



Sustainable Facilities at EPA



Facility Type: Office space

Construction: New construction

Location: Cincinnati, Ohio

Size: 42,750 gross square feet

Occupancy: 70 EPA employees (permanent); 150 employees during renovation of existing laboratory building

Opened: North Wing: October 2007
West Wing: February 2008

LEED Status: Gold 2.1/2.2 for New Construction

EXEMPLARY GREEN DESIGN is evident at EPA's new Research Support Annex (Annex 2) at the Andrew W. Breidenbach Environmental Research Center (AWBERC), in Cincinnati, Ohio. The new building includes energy efficient systems, sustainable landscaping, and a green roof, among many other features.

The 42,750 square foot annex is being used initially as temporary work space for employees relocated as part of a six year phased renovation of the AWBERC research facility. Annex 2 will eventually become a permanent workplace for EPA employees currently based at a nearby facility in Norwood, Ohio. Even as temporary workspace, Annex 2 achieved the U.S. Green Building Council's (USGBC's) Leadership in Energy and Environment Design (LEED®) Gold certification for new construction. The facility also complies with the Federal Leadership in High Performance and Sustainable Buildings Memorandum of Understanding that EPA signed in January 2006, along with 16 other federal agencies.



Research Support Annex 2

Cincinnati, Ohio

SFA Architects in Cincinnati designed the new building. Monarch Construction Company served as the contractor. In order to ensure maximum building performance, EPA hired a third party—Engineering Economics, Inc.—to commission and evaluate the building's systems and controls when the building was occupied.

Annex 2 contains a variety of energy efficient features, which EPA anticipates will produce a collective 23 percent savings in energy consumption compared to a conventionally designed building. In addition to innovative daylighting techniques, the building features temperature controls, variable air volume water-side economizers that allow for 100 percent outside air ventilation when possible, and an underfloor air distribution system, which enhances employee comfort while saving energy.



To maximize the amount of natural light entering the building, 40 percent of the building's exterior is glass, which, as an added safety feature, meets federal blast resistance specifications. Other daylighting features include a skylight and a "daylight harvesting" system that detects the amount of natural sunlight in the building and adjusts the indoor lights accordingly. Occupancy sensors throughout the building also conserve energy while supplementing interior lighting.

Drawing all of its heating and cooling needs from the existing mechanical system located in the main AWBERC building, Annex 2 required no additional primary heating or cooling equipment. This set-up enhanced the energy efficiency of the existing equipment, avoided energy consumption that would have been associated with a new primary system, and saved construction dollars.



One of the building's most striking features is the 8,322 square foot green roof that helps conserve energy by providing excellent thermal insulation and also captures 30 percent of the rainwater hitting the roof, thereby significantly reducing runoff. The roof is made of lightweight, recycled plastic module trays pre-planted with sedum, which is a drought-resistant, hearty, low maintenance plant. Annex 2's green roof is the first of its kind in Cincinnati and has generated much interest among the local environmental, construction, and design interests.



To help ensure optimum energy performance, Annex 2 features advanced meters that monitor total electricity and natural gas consumption. To enable more precise monitoring, EPA plans to expand the advanced metering network to include submeters for electricity, chilled water, high-temperature hot water, and steam consumption at Annex 2. When complete, this network will transmit detailed data to the Agency's national advanced metering software system to continually improve energy conservation measures.

In addition to the green roof, EPA used permeable pavement for the 3,500 square foot triangular courtyard between AWBERC's Annexes 1 and 2. This sustainable design feature also helps manage stormwater runoff by filtering water into the ground, not only reducing the quantity of runoff but also improving runoff quality by filtering pollutants.

Light colored/high albedo concrete was utilized for the sidewalks surrounding the building. This surface absorbs less heat and reduces the "heat island" effect that can occur in urban areas when roads, buildings, and other structures replace natural land cover and retain the sun's heat. Native shade trees, such as sycamores, white pines, maples, and magnolias, have also been planted to cool the building's exterior spaces.



The design and construction of Annex 2 employed the use of recycled content and regionally sourced materials and products, including carpet backing, ceiling tiles, metal siding, and concrete.

During construction, EPA demonstrated exemplary waste management by recycling 96 percent of construction and demolition wastes, including concrete, wood, and steel and diverting 924 tons of materials from disposal. The facility also implemented a recycling collection program for mixed paper, corrugated cardboard, plastic, glass, aluminum beverage containers, fluorescent lamps, and batteries.



With the completion of Annex 2, EPA has added another green asset to its growing portfolio of high performance and sustainable buildings.

To ensure indoor air quality, designers selected construction materials and indoor furnishings, including paints, caulk, carpet, and furniture, that minimize fumes and harmful odors.

Final LEED® Scorecard for Cincinnati Annex 2

Points Documented			Points Possible
11	Sustainable Sites		14
Yes	Prerequisite 1	Erosion & Sedimentation Control	0
1	Credit 1	Site Selection	1
1	Credit 2	Urban Redevelopment	1
	Credit 3	Brownfield Redevelopment	1
1	Credit 4.1	Alternative Transportation, Public Transportation Access	1
1	Credit 4.2	Alternative Transportation, Bicycle Storage & Changing Rooms	1
1	Credit 4.3	Alternative Transportation, Alternative Fuel Refueling Stations	1
1	Credit 4.4	Alternative Transportation, Parking Capacity	1
	Credit 5.1	Reduced Site Disturbance, Protect or Restore Open Space	1
1	Credit 5.2	Reduced Site Disturbance, Development Footprint	1
1	Credit 6.1	Stormwater Management, Rate or Quantity	1
	Credit 6.2	Stormwater Management, Treatment	1
1	Credit 7.1	Landscape & Exterior Design to Reduce Heat Islands, Non-Roof	1
1	Credit 7.2	Landscape & Exterior Design to Reduce Heat Islands, Roof	1
1	Credit 8	Light Pollution Reduction	1
4	Water Efficiency		5
Yes	Prerequisite 1	Erosion & Sedimentation Control	0
1	Credit 1.1	Water Efficient Landscaping, reduce by 50%	1
1	Credit 1.2	Water Efficient Landscaping, No Potable Use or No Irrigation	1
	Credit 2	Innovative Wastewater Technologies	1
2	Credit 3.1-3.2	Water Use Reduction	2
6	Energy & Atmosphere		17
Yes	Prerequisite 1	Erosion & Sedimentation Control	0
Yes	Prerequisite 1	Fundamental Building Systems Commissioning	0
Yes	Prerequisite 2	Minimum Energy Performance	0
Yes	Prerequisite 3	CFC Reduction in HVAC&R Equipment	0
3	Credit 1.0-1.10	Optimize Energy Performance	10
	Credit 2.1-2.3	Renewable Energy	3
1	Credit 3	Additional Commissioning	1
1	Credit 4	Ozone Depletion	1
	Credit 5	Measurement & Verification	1
1	Credit 6	Green Power	1

Points Documented			Points Possible
7	Materials & Resources		13
Yes	Prerequisite 1	Storage & Collection of Recyclables	0
	Credit 1.1-1.3	Building Reuse	3
2	Credit 2.1-2.2	Construction Waste Management	2
	Credit 3.1-3.2	Resource Reuse	2
2	Credit 4.1-4.2	Recycled Content	2
2	Credit 5.1-5.2	Local/Regional Materials	2
	Credit 6	Rapidly Renewable Materials	1
1	Credit 7	Certified Wood	1

Points Documented			Points Possible
14	Indoor Environmental Quality		15
Yes	Prerequisite 1	Minimum IAQ Performance	0
Yes	Prerequisite 2	Environmental Tobacco Smoke (ETS) Control	0
1	Credit 1	Carbon Dioxide (CO2) Monitoring	1
1	Credit 2	Increase Ventilation Effectiveness	1
1	Credit 3.1	Construction IAQ Management Plan, During Construction	1
0	Credit 3.2	Construction IAQ Management Plan, Before Occupancy	1
4	Credit 4.1-4.4	Low-Emitting Materials	4
1	Credit 5	Indoor Chemical & Pollutant Source Control	1
2	Credit 6.1-6.2	Controllability of Systems	2
1	Credit 7.1	Thermal Comfort, Comply with ASHRAE 55-1992	1
1	Credit 7.2	Thermal Comfort, Permanent Monitoring System	1
1	Credit 8.1	Daylight & Views, Daylight 75% of Spaces	1
1	Credit 8.2	Daylight & Views, Views for 90% of Spaces	1

Points Documented			Points Possible
5	Innovation & Design Process		5
1	Credit 1	Innovation in Design 1.1	1
1	Credit 1	Innovation in Design 1.2	1
1	Credit 1	Innovation in Design 1.3	1
1	Credit 1	Innovation in Design 1.4	1
1	Credit 2	LEED Accredited Professional	1

CREDIT SUMMARY

47	Points Earned	Points Possible:	69
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39 to 51 points = Gold

For more information on the USGBC's LEED® Green Building Rating System, visit <www.usgbc.org/LEED>.

For more information on the Cincinnati Annex 2 project, visit <www.epa.gov/greeningepa/facilities/cinci_annex.htm> or <www.epa.gov/greeningepa/facilities/cincinnati.htm>.

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