

# Academic Instructional Center

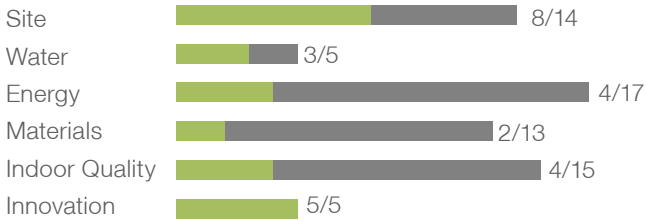
Western Washington University | Bellingham, Washington



The Academic Instructional Center (AIC) represents the University's latest innovative endeavor to create a balance between the natural and built environment. This LEED Certified facility takes advantage of passive solar techniques both in the building siting and its extensive natural ventilation system.



## LEED NC v.2.1 Credits Achieved



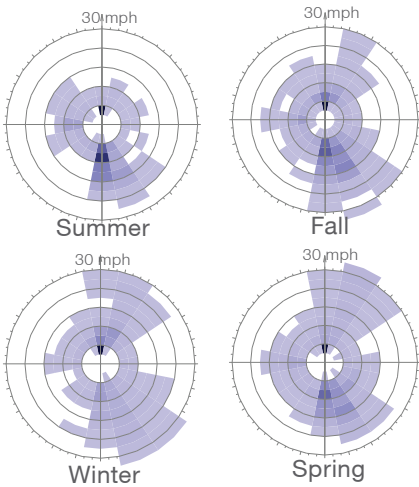
The innovative new Academic Instructional Center (AIC) at Western Washington University provides the campus with 750 classroom seats and a new home for the Psychology and the Communication Sciences & Disorders Departments. Among the sustainable attributes helping it to achieve LEED Certification from the U.S. Green Building Council is an extensive natural ventilation system to draw fresh air indoors and expansive daylighting throughout the building, reducing the building’s need for conventional lighting and heating.

## site ecology & land use

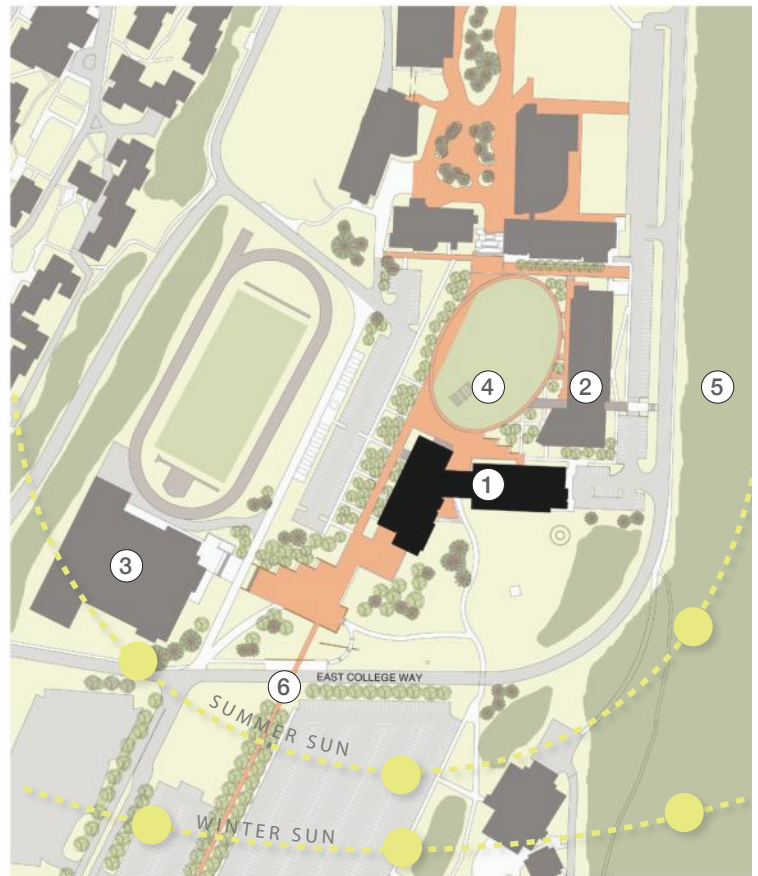
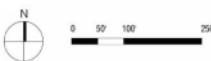
The AIC responds to the scale of the new Communications Facility to the north, and defines the southeast edge of a new campus quad. The building was designed to remain low in scale and maximize sun exposure for passive thermal heating.

A number of site and land use features contribute to making the AIC a more environmentally sensitive facility. The building is positioned to take advantage of public transportation. Seven bus lines service a public transit stop located 0.1 mile from the building’s entrance.

**Wind Roses** (colored areas indicate wind direction and speed; darker colors indicate higher wind frequency)



- 1 Academic Instructional Center
- 2 Communications Building
- 3 Wade King Student Recreation Center
- 4 Ellipse Quadrangle
- 5 Sehome Hill Arboretum
- 6 Public Transit Stop





## project summary

location: bellingham, washington  
 gross sf: 127,000  
 building footprint: 29,000 sf  
 cost: \$36M  
 completed: January 2009

To further promote alternative transportation on the campus, no additional parking was added when the AIC was constructed. Building users who drive can park in an existing lot located south of the building across East College Way. The building footprint was kept minimal at only 29,000 sf. As part of the AIC project, a contract was signed by the University to preserve 58,048 sf (1.33 acres) of open space within the nearby Sehome Hill Arboretum. A white TPO membrane on the building's roof reduces heat island effect on the site, and decreases the building's energy loads by reducing unwanted heat gain.

## average monthly precipitation



## water cycle

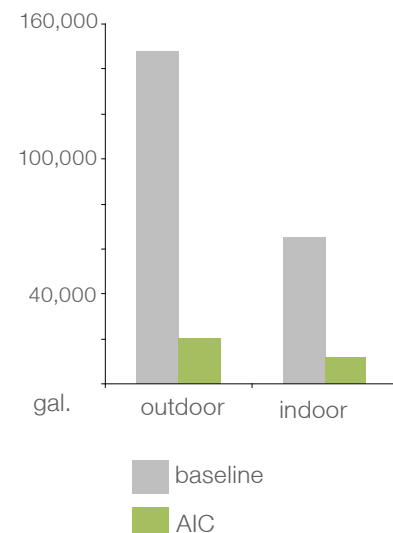
A number of measures help to make the AIC a more water efficient facility and the campus of Western Washington University more water efficient. New landscaping reduces the irrigated area by 50%. A no-water turfgrass, consisting of fescue and Kentucky Bluegrass, requires no irrigation to supplement Bellingham's 36 inches of annual rainfall. This turf mix also requires less maintenance and reduces the need for fertilizers. This planting strategy is estimated to save 654,432 gallons every year, a 55.6% outdoor water use reduction for irrigation.

The AIC is also part of Western Washington University's campus-wide stormwater management system. Included in the south campus drainage basin, stormwater runoff from the AIC site is channeled into a combination of biofiltration swales, rock/plant filters and detention vaults located south of the AIC site. The vaults detain stormwater and use a stilling well/flow splitter system to treat and slowly release stormwater at a rate that can be infiltrated on-site. This comprehensive system treats 100% of the stormwater on the site.

Water use within the building is reduced by a combination of low flow faucets, dual flush toilets and low flow urinals. These measures have reduced the indoor water use by 42.6%, or 115,886 gallons every year.

770,318 gal/yr  
 Water Use Reduction

## water use reduction



# energy flows

11%  
CO<sub>2</sub> Emissions  
Reduction

14.6%  
Annual Energy  
Cost Savings

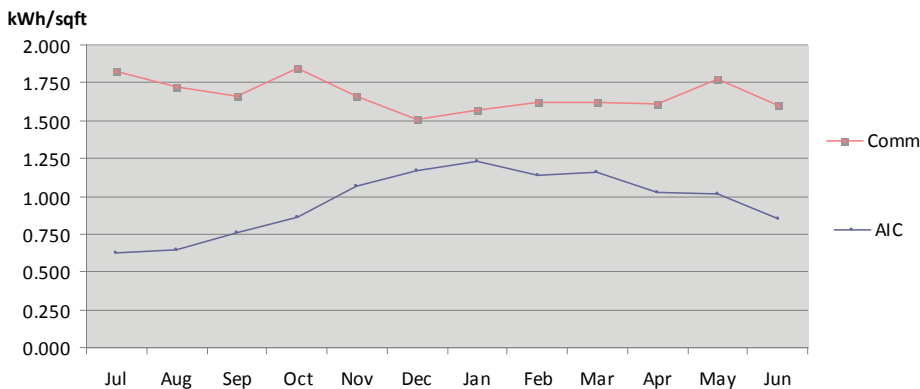
The ability to provide a more energy efficient building begins with the very framework of the AIC. By using concrete rather than more traditional steel, the building's frame retains warmth during the day and radiates it at night. This, in turn, reduces the need for heat inputs from outside of the building system. Operable windows, radiant heat panels and extensive daylighting further decrease the building's energy consumption by providing natural cooling and reducing the need for artificial lighting systems. Energy data recorded in 2009 from actual building usage shows that the building is performing even better than it was designed to perform.

Solar shading elements consist of slats placed on the building. Horizontal slats are placed on the south side of the building (where the sun is higher), while vertical slats are on the west side of the building (where the sun is lower), preventing the sun from excessively warming the building. The solar shading elements provide a reduction in energy consumption with the benefits of natural daylight while simultaneously reducing excess heat transfer. They also reduce incoming solar glare, which allows even more daylight to enter the building. Occupancy sensors located in each room in the AIC automatically shut off lights if no movement is detected within 15 minutes, eliminating unnecessary energy use when spaces are unoccupied.

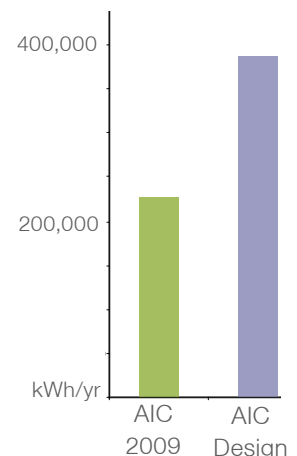


Heating in the classrooms and offices is supplied by radiant panels, which are flat panel heaters that circulate warm water to warm the spaces. The flow of heating water is controlled by the building environmental system, but occupants are able to adjust the temperature in their space by adjusting the radiant panel temperature valve and opening or closing operable windows and trickle vents. The additional energy used by the facility is provided by renewable energy credits through Puget Sound Energy. This campus-wide renewable energy policy was a student-led initiative, funded through a partnership between Students for Renewable Energy, Facilities Management and Western Washington University's administration.

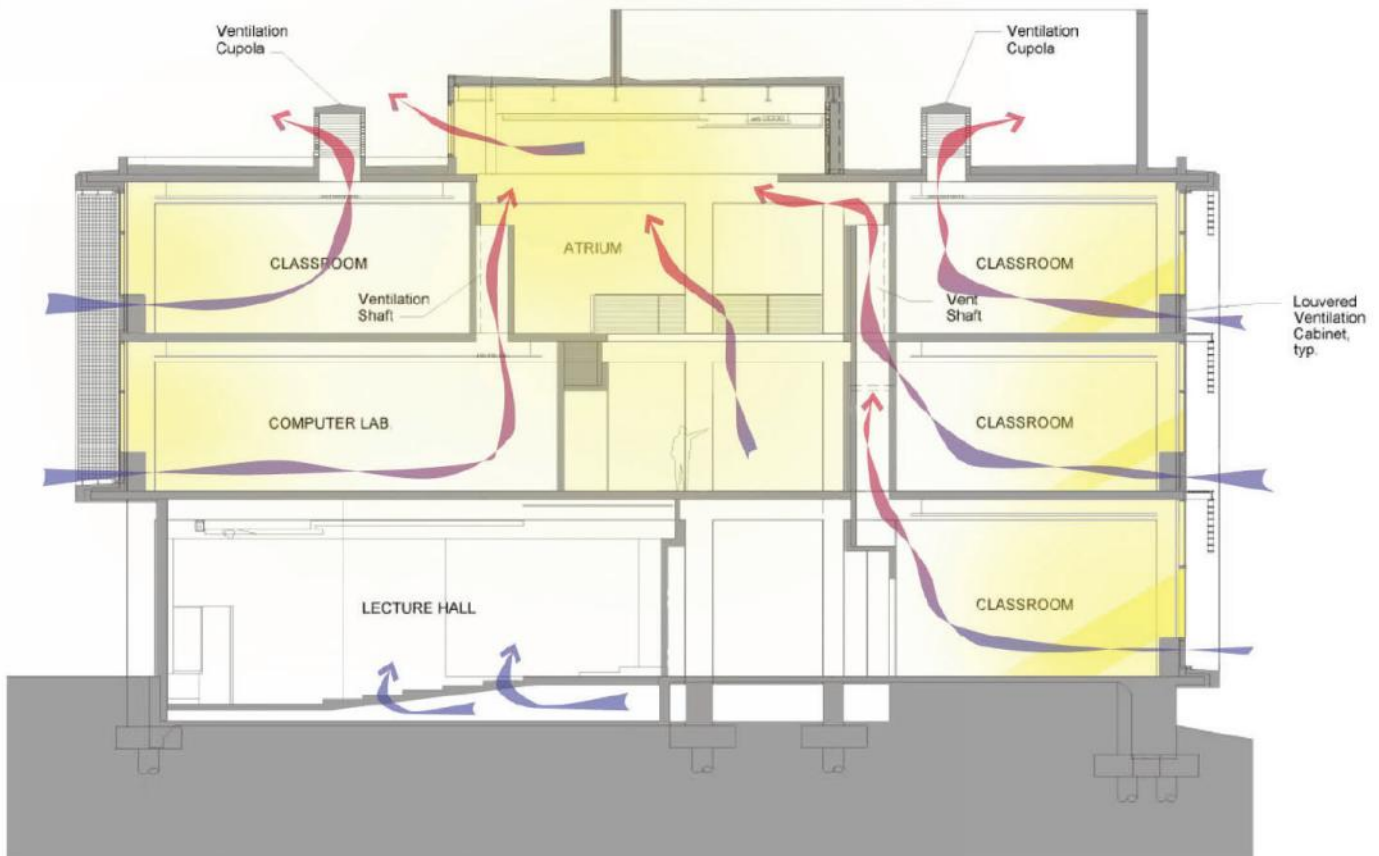
## AIC Energy Performance



Monthly energy data for AIC and its neighbor, the Communications Building, averaged over three years (2007-2010) and normalized by square foot





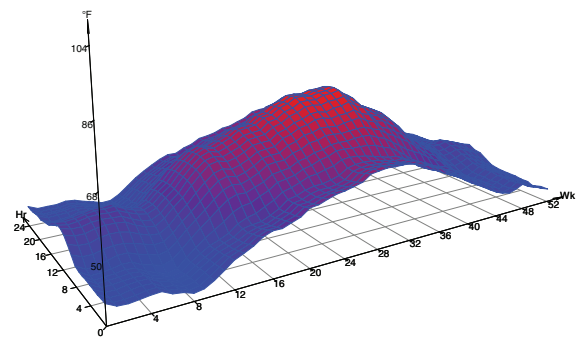


## project highlight: natural ventilation

One of the AIC's most unique energy conservation features is its extensive natural ventilation system, unusual for large projects of this type. Throughout the building, highly sophisticated thermostats monitor the indoor air temperature and CO2 levels to initiate an internal alert that opens the roof dampers when the building needs cooling or CO2 levels exceed the set maximum level. With the roof dampers open, fresh outdoor airflow moves through the building efficiently and effectively.

Rather than using standard ventilation hoods with noisy fans to move the air through the classrooms, each room has a 'cloud ceiling', which looks like a double ceiling, with one ceiling slightly smaller and below the structural ceiling. Since the warmer air from the dampers naturally rises, the 'cloud ceiling' allows this warm air to flow upwards and get trapped between it and the higher ceiling, warming or cooling the room as necessary. Then, the air leaves the space through ceiling shafts and vents.

Perhaps most importantly, the natural ventilation system in the AIC requires its occupants to be active participants in their thermal control. All of the classrooms and offices in the building are equipped with operable windows, ceiling fans and trickle vents. Trickle vents are occupant controlled slot vents under the windowsill which, when open, allow fresh air to move through the slot.



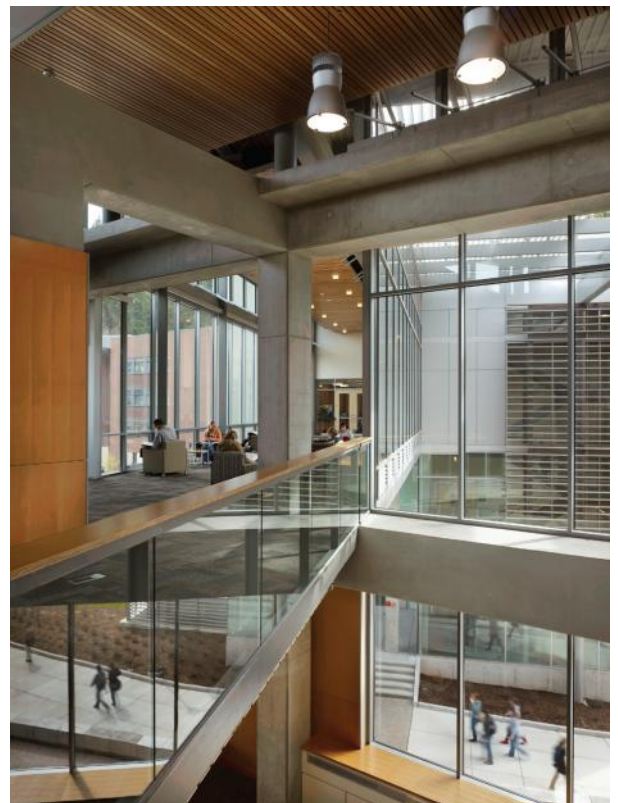
Average Monthly Temperature: Bellingham, WA

# materials & construction

The design of the AIC sought to maintain a simple, local materials palette. During the materials selection process for the AIC, recycled, regional and rapidly renewable products were prioritized. Recycled content can be found in over 10% of the building materials used, from the ceiling, wall and floor tiles to fiberglass insulation and the exterior sunscreens. Steel used for the project ranged from 25-90% recycled content. Wood paneling on the AIC's casework is made up of 98% post-consumer\* recycled content. The concrete mix used for the project used 100% captured rainwater.

Also, an estimated 88.4%, or 1,793.4 tons, of waste generated during construction was diverted from landfills and taken to a local recycling center. Waste recycling is still continuing at the AIC. Recycling stations located on every floor of the building allow building users to recycle paper, cardboard, metals and glass.

*\* Post-consumer recycled content comes from consumer waste, much of which comes from residential curbside recycling programs. Pre-consumer recycled content comes from industry process waste, for example, saw dust from a lumber mill.*

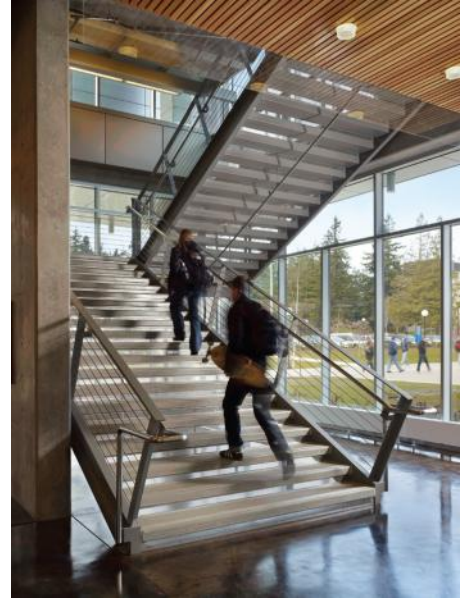




## light & air

Appropriate lighting and fresh air are two of the most important factors in providing a healthy indoor environment. The AIC has ample daylight provided by the numerous windows located throughout the building. Bringing natural light into classroom, office and study spaces reduces the electricity needed to power artificial lighting and allows students, faculty and staff to work and study in a lighter, brighter environment. To prevent glare and unwanted solar radiation from entering the building through the AIC's extensive window system, solar shading elements were added to the building's exterior.

Operable windows allow users to access fresh air at their own discretion, and a CO2 sensor system opens the roof dampers for added air flow when CO2 levels exceed a maximum set level. Volatile organic compounds (VOCs) are emitted as gases from many building materials, and are a primary indoor air contaminant in buildings. The adhesives, sealants, paints, coatings, carpet systems, composite wood and agrifiber products selected for the AIC were all low- or no-VOC.





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