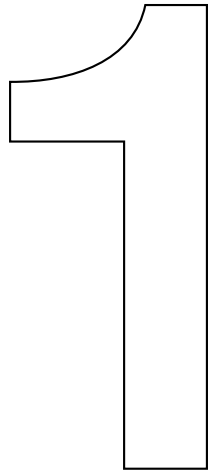


Kirsch Center for Environmental Studies  
De Anza College  
Cupertino, California

CBE Livable Buildings Award 2007 Submission





Project  
Narrative

## Section 1: Project Narrative



***The Kirsch Center for Environmental Studies at De Anza College is an ongoing grassroots story that represents the best in American education.***

### How It Started

A group of faculty, students and college staff initiated the idea of a green building for the Environmental Studies Department and general classes for De Anza College in Cupertino, California. De Anza, with approximately 25,000 average yearly enrollment is part of California's Community College System. It is located in the heart of Silicon Valley.

The group worked a number of years developing ideas and support for the project.

Undaunted that the project was initially unfunded, the students felt so strongly that they needed a green building that the student government voted to allocate \$180,000 of its own funds to hire a design team and initiate conceptual studies.

Starting in 1999, the Kirsch Center Committee held many programming and design workshops including every segment of campus life. Students were always among the most articulate voices. The group pushed for environmental ethics, energy efficiency, renewable energy, operable windows, natural ventilation, daylighting, non-toxic and recycled materials, user controls, a variety of small group study areas and windows for bird watching.

The guiding motto that the group established was "a building that teaches", and the longer version: "a building that teaches about energy, resources and stewardship". In response, the building design: 1) made every exterior elevation different to respond to solar paths and local climate and 2) incorporated "transparency" throughout.

### A Building Program is Created

Out of the shared governance process of the California Community College System, this building program emerged:

The Kirsch Center is the lead demonstration building for energy innovation and sustainability of the California Community College System. The philosophy of this facility is "a building that teaches about energy resources, and stewardship". This project exemplifies the next generation of educational innovation, as parts of the building are potentially an around-the-clock, 24-7 facility. In addition to high quality classrooms and labs, students can work in self-paced programs at special open study stations throughout the building.

<b>Use</b>	<i>Classrooms, labs, offices, meeting areas</i>
<b>Site</b>	<i>Previously developed tennis courts</i>
<b>Gross Area</b>	<i>22,000 square feet</i>
<b>Stories</b>	<i>2</i>
<b>Total Project Cost</b>	<i>\$10,000,000</i>
<b>LEED Target</b>	<i>Silver</i>
<b>LEED Entry</b>	<i>Platinum</i>
<b>Energy Use</b>	<i>88% below comparable buildings</i>

### Resource Conservation Features

#### *Social*

Occupant leadership in every step of planning, design, construction and occupancy

Student Mentor Program runs much of building day-to-day operations

Incorporating occupant controls throughout

Transparency: Windows into utility rooms. Transparent panels over radiant floor manifolds, access floor system, etc.

Red Light/Green Light System at operable windows to show recommendations of building management system

Energy monitoring - public monitor display

#### *Building Envelope Energy Conservation*

Each side of building different to optimize for sun path, shading and daylighting.

Better than Title - 24 Walls & Roof Insulation

Minimal thermal bridging (rigid insulation sheathing)

Light shelves at south

Sun shade louvers at south

Special external sun shades for west and east windows

High performance glazing

High performance roofing

### Engineered Comfort and Energy Conservation/Energy Production

- Natural Ventilation/Passive Cooling- West Wing
- High Efficiency Electrical Lighting
- Low installed watts/sq. ft.
- Good user & automatic lighting controls
- Optimized Use of Daylighting
- High Efficiency Air Conditioning- East Wing
- Heat Recovery System
- Solar Hot Water Heaters for DHW
- Low Pressure Fan Systems
- CO2 Ventilation Control
- Building Management System- Measurement and Verification
- Radiant Floor for Heating and Cooling
- High Efficiency Evaporatively Cooled Chiller
- High Efficiency Condensing Boiler
- Nighttime Pre-Cooling
- Photovoltaics
- Commissioning Process

### Water Conservation

- Waterless urinals
- Low flow fixtures
- Native and Climate adapted, no/low irrigation plantings
- Bioswale to recharge local groundwater

### Early Broad Green Building Policy Accomplishments

Simultaneous to the design of the building and using the momentum of the interest in the center's green design, Committee members worked for broader policy changes to promote green buildings in 1992. Working with the Community College Chancellor's office and state legislators, they got the state education code changed to add requirements for a Statewide Energy Management Plan (SEMP) for Community Colleges and green building policies.

Reference: *California Education Code Section 81622 (b,c), 81623, 81624*

### Green Building Brings New Funding to the College

As early planning workshops progressed: Dr. Martha Kanter, at the time President of De Anza College (and now District Chancellor) got very excited about green building. She led the effort to privately fundraise major donations to the building.

Thanks to Dr. Kanter's efforts, the foundation

***"I've seen students' lives change here. Some come without focus or direction and they find a life's purpose in helping the environment. We train leaders here. They are happy here."***

***- Julie Phillips, Morgan Family Chair in Environmental Studies***

of Silicon Valley entrepreneur Steve Kirsch and Michele Kirsch gave the lead gift of \$2 million.

This was the first time a major, private donation for a building was made to the college.

Significant funds to assist the building and its programs were also made by a number of other local individuals and foundations.

These donations became ongoing relationships in which donors, administrators, students and faculty continue to work together.

### The Place to Be

When classes opened in the Fall of 2005, word quickly spread throughout the campus that the Kirsch Center was a really cool place and that the classes were exciting. Enrollment in the Environmental Studies curriculum skyrocketed. Classes continue to be packed. The students "get" the green features immediately. Their typical reaction is, "Why aren't all the buildings like this?" More and more students are getting re-inspired about life from Kirsch Center classes and the overall atmosphere. When the student mentors at the Center wrote the Kirsch Tour Guide, they decided to title it, "A Beacon of Hope – the Kirsch Center for Environmental Studies".

### Students as Leaders

From the beginning, students have been at the center of project's inception, programming and the design process. Now, in a virtually unprecedented way, students run key operations of the facility and of the educational programs.

Students in the Environmental Stewardship Program are in training to be leaders. They mentor other students, operate building windows, monitor for smooth overall operations and run the Environmental Stewardship Center services. And most of all they are role models.



## Section 1: Project Narrative

### *Wildlife Corridor Project*

Habitat fragmentation largely due to urbanization is isolating wildlife. "Connectivity" (or wildlife corridors) is disappearing throughout California and the nation. Wildlife are less able to move freely. And climate change is further impacting wildlife and ecosystems.

Students and faculty have identified perhaps the most important and threatened wildlife connectivity link in Central California - Coyote Valley. This is the area directly south of



urbanized San Jose which is the last natural link between California's Inner Coast Range and Outer Coast Range.

Using the Kirsch Center as headquarters, students conduct research, organize onsite wildlife tracking and night photography, GIS mapping and hold conferences and seminars for stakeholders in the area. With walls covered with student research in beautifully daylight spaces in a green building, many participants from the community have noted that the Kirsch Center gives the students special credibility and serves as a draw to encourage participation from the community.

The students recently participated in responding to a draft EIR process for planned development in a key wildlife corridor area. Their participation was especially valuable because their field research was so thorough.

### *Wise 37- Campus Food Projects*

This student organization based at the Kirsch Center is working with the College Food Services to bring community based agriculture, organic foods into mainstream food service. This group cultivates its own organic garden in raised beds adjacent to the building. These students distribute their harvest free of charge to other students.



### **Mixing Biodiversity Students & Energy Management Technicians**

The Kirsch Center is the home of both the ecology-focused environmental studies and technically-focused energy management programs. The layout of the building helps these students mix and learn from each other.

Imagine a future where the facilities managers for buildings consider the baseline to be a naturally daylight space with operable windows and renewables - and have a passion for biodiversity in their decisions!

The Kirsch Center also serves the campus as a general classroom facility. On a typical day political science, English, business and nursing students, etc. are all mixing with biodiversity and energy management students.



### **The Max**

How is the mixing of students accomplished? One of the ways is in one of the building's most successful features- the "Max".

At the project's beginning, the design team was told that corridors should be six foot wide, straight routes - for "efficiency". The students on the building committee were very vocal in pointing out that they wanted wide public circulation spaces with a variety of small group gathering places- adjacent and open to the general circulation.

The students pointed out that they learn best in small groups and can juggle several forms of digital communication as well as group discussion at once. Thus evolved "the Max" -one on the first floor and one on the second floor.

Go to the second floor Max. On a typical class day you will see students studying together in a 1950's diner booth, a class grouped over rows of laptops doing their research together, individual students watching lessons on video screens, a small class perched on the mini amphitheatre (modeled after one in the Monterey Bay Aquarium), students filling walls with maps for their wildlife corridor project, small study groups all over, one on one mentoring, and the first official Ornithological Birding Station in the California Community College System (through the east windows to the deck beyond).

To many students and faculty, the Max is perhaps the most popular place on campus.

### **Local Businesses, Agencies and Schools Meet Here**

The Kirsch Center is in high demand as a meeting place for every walk of life.

Thousands of students (K-12, community colleges, universities) have come in buses (De Anza Students lead the tours).

Many local and regional Department of Fish and Game employees participate in classes and events here on a continuing basis, the Planning and Conservation League recently held its Board of Directors Meeting here, Chris Paine writer and director of "Who Killed the Electronic Car" recently met here with a cross section of Silicon Valley residents and students.

The center partners with the California Energy Commission and PGE to provide HVAC/energy management training for community college energy/facilities personnel.

To date a wide cross section of local non-profits, such as the Community Foundation of Silicon Valley, service clubs and business leaders have both toured and participated in events here. When Hewlett Packard recently saw the center, they said that they wanted to schedule meetings here. Everyday, we experience the green building adage, "If you build it..."

### Design Team Becomes Teachers and Faculty

A number of members of the design team are involved with the Center's ongoing curriculum.

Dave Deppen, the design architect from Van der Ryn Architects, talks with many classes every quarter and facilitates workshops for the student-lead Wildlife Corridor Project and will soon start teaching, "Introduction to Green Building".

Cole Roberts, chief engineer from Arup, continues to advise the Environmental Studies Department and participates in continuing Center events. David Sungarian, commissioning engineer from Rumsey, now teaches energy management technicians classes. Bob Malone, the District's energy controls consultant now teaches energy management classes.

### The Evolution of a Kitchen

A small kitchen was designed next to the faculty offices and near the second floor Max where students work.

The original official program stated that this kitchen would be for the faculty. After the center was opened, faculty members noticed that some students were coming to class without eating any breakfast. Faculty began to bring cereal and invite students to use the kitchen. The kitchen has become very popular. Student mentors now oversee its use.

The building was designed as a "Loose Fit" –allowing the flexibility for evolving uses. This is one example of that evolution.

If you are on the east end of the second floor Max early in the morning, you will hear "crunch, crunch, crunch..."

### Digital Outreach

[www.deanza.edu/kirschcenter](http://www.deanza.edu/kirschcenter)  
[www.wise37.com](http://www.wise37.com) (student environmental club at Kirsch Center)

Real time energy production (PV) and use monitor in entry lobby

Energy management students also have access to detailed real time and historical data for their research and studies.

Classes are available on video stream.

### Special Significance

The California Community College System is the largest system of higher education in the world – with over 2.5 million students and 110 campuses.

Community colleges influence their communities. The Kirsch Center has been influencing – and will continue to influence – its community and the broader system.

### User Observations

Julie Phillips, Morgan Family Chair in Environmental Studies is the first endowed chair in environmental studies in a community college in the nation. Ms. Phillips was chair of the Kirsch Center Building Committee and is head of the Environmental Studies Department. She shared her observations, in a discussion dated August 21, 2007:

*"This building allows us to accomplish our mission, as well as being very liveable."*

*"The kids want to be here. They don't want to leave. It's gone beyond all our expectations."*

*"I'll be direct: it's about saving kids lives. Community Colleges represent our communities- with all of the challenges that implies."*

*"Between classes, kids who would normally leave, stay here. It's amazing. They study. They work on their resumes. They work in the organic garden. They especially love weeding. They feel safe here."*

*"This place has evolved to be like a Community Center."*

*"I've seen students' lives change here. Some come without focus or direction and they find a life's purpose in helping the environment. We train leaders here. They are happy here."*

*"We now have a bread making machine. Every morning the students take turns, make bread and share it. The aroma is great!"*

*"Now that we have this green building, there are so many spinoffs. We can barely keep track. It's created a life on its own."*

*"The love that went into this place is coming back many fold."*

*"Grassroots efforts change the world. We are living it."*



2

Project  
Images

## Section 2: Project Images





## Section 2: Project Images



## Section 2: Project Images



## Section 2: Project Images



## Section 2: Project Images



## Section 2: Project Images



3

Energy  
Performance  
Data

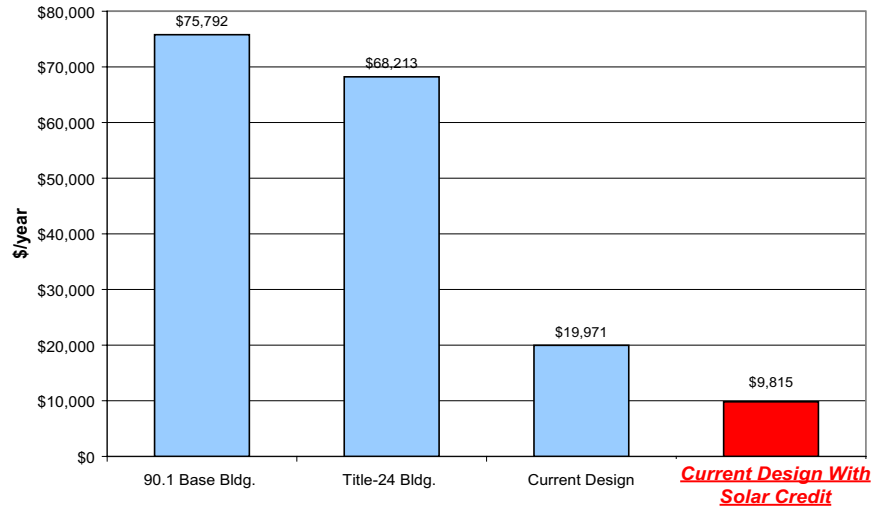
## Section 3: Energy Performance Data

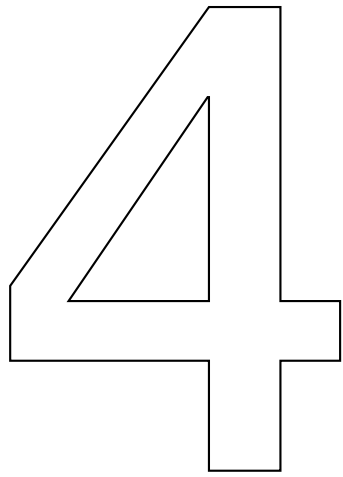
### Demonstrated Energy Performance

For the building's LEED certification, 25% of the LEED points being pursued are related to energy performance. Some of the complex systems installed in the building include radiant heating & cooling, underfloor ventilation, photovoltaics, solar hot water, heat recovery systems, dimmable lighting and CO<sub>2</sub> monitoring.

When compared to a typical building (ASHRAE 90.1-99), the total regulated energy cost is reduced by 88%. Costs are reduced from nearly \$75,000 per year to approximately \$10,000 per year, representing \$65,000 in savings.

**Kirsch Center for Environmental Studies:  
Annual Energy Cost**





Additional  
Information



# Section 4: Additional Information

## LEED Score Card

Platinum documents submitted, under final review at USGBC

De Anza College Kirsch Center For Environmental Studies Project Scorecard as of December 2006									
54		15		<b>Total Project Score</b>				Possible Points 69	
Certified 26 to 32 points Silver 33 to 38 points Gold 39 to 51 points Platinum 52 or more points									
11		3		<b>Sustainable Sites</b>		Possible Points 14		4 9 Materials & Resources Possible Points 13	
Y	?	N			Y	?	N		
Y			Prereq 1	<b>Erosion &amp; Sedimentation Control</b>		Y		Prereq 1	<b>Storage &amp; Collection of Recyclables</b>
1			Credit 1	<b>Site Selection</b>	1	1		Credit 1.1	<b>Building Reuse, Maintain 75% of Existing Shell</b>
1			Credit 2	<b>Urban Redevelopment</b>	1	1		Credit 1.2	<b>Building Reuse, Maintain 100% of Existing Shell</b>
		1	Credit 3	<b>Brownfield Redevelopment</b>	1	1		Credit 1.3	<b>Building Reuse, Maintain 100% Shell &amp; 50% Non-Shell</b>
1			Credit 4.1	<b>Alternative Transportation, Public Transportation Access</b>	1	1		Credit 2.1	<b>Construction Waste Management, Divert 50%</b>
1			Credit 4.2	<b>Alternative Transportation, Bicycle Storage &amp; Changing Room</b>	1	1		Credit 2.2	<b>Construction Waste Management, Divert 75%</b>
1			Credit 4.3	<b>Alternative Transportation, Alternative Fuel Refueling Stations</b>	1	1		Credit 3.1	<b>Resource Reuse, Specify 5%</b>
1			Credit 4.4	<b>Alternative Transportation, Parking Capacity</b>	1	1		Credit 3.2	<b>Resource Reuse, Specify 10%</b>
1			Credit 5.1	<b>Reduced Site Disturbance, Protect or Restore Open Space</b>	1	1		Credit 4.1	<b>Recycled Content, Specify 25%</b>
1			Credit 5.2	<b>Reduced Site Disturbance, Development Footprint</b>	1	1		Credit 4.2	<b>Recycled Content, Specify 50%</b>
1			Credit 6.1	<b>Stormwater Management, Rate and Quantity</b>	1	1		Credit 5.1	<b>Local/Regional Materials, 20% Manufactured Locally</b>
1		1	Credit 6.2	<b>Stormwater Management, Treatment</b>	1	1		Credit 5.2	<b>Local/Regional Materials, of 20% Above, 50% Harvested Locally</b>
1			Credit 7.1	<b>Landscape &amp; Exterior Design to Reduce Heat Islands, Non-Roof</b>	1	1		Credit 6	<b>Rapidly Renewable Materials</b>
1			Credit 7.2	<b>Landscape &amp; Exterior Design to Reduce Heat Islands, Roof</b>	1	1		Credit 7	<b>Certified Wood</b>
1			Credit 8	<b>Light Pollution Reduction</b>	1	1			
3		2		<b>Water Efficiency</b>		Possible Points 5		15 15 Indoor Environmental Quality Possible Points 15	
Y	?	N			Y	?	N		
1			Credit 1.1	<b>Water Efficient Landscaping, Reduce by 50%</b>	1	Y		Prereq 1	<b>Minimum IAQ Performance</b>
		1	Credit 1.2	<b>Water Efficient Landscaping, No Potable Use or No Irrigation</b>	1	Y		Prereq 2	<b>Environmental Tobacco Smoke (ETS) Control</b>
		1	Credit 2	<b>Innovative Wastewater Technologies</b>	1	1		Credit 1	<b>Carbon Dioxide (CO2) Monitoring</b>
1			Credit 3.1	<b>Water Use Reduction, 20% Reduction</b>	1	1		Credit 2	<b>Increase Ventilation Effectiveness</b>
1			Credit 3.2	<b>Water Use Reduction, 30% Reduction</b>	1	1		Credit 3.1	<b>Construction IAQ Management Plan, During Construction</b>
						1		Credit 3.2	<b>Construction IAQ Management Plan, Before Occupancy</b>
						1		Credit 4.1	<b>Low-Emitting Materials, Adhesives &amp; Sealants</b>
						1		Credit 4.2	<b>Low-Emitting Materials, Paints</b>
						1		Credit 4.3	<b>Low-Emitting Materials, Carpet</b>
						1		Credit 4.4	<b>Low-Emitting Materials, Composite Wood</b>
						1		Credit 5	<b>Indoor Chemical &amp; Pollutant Source Control</b>
						1		Credit 6.1	<b>Controllability of Systems, Perimeter</b>
						1		Credit 6.2	<b>Controllability of Systems, Non-Perimeter</b>
						1		Credit 7.1	<b>Thermal Comfort, Comply with ASHRAE 55-1992</b>
						1		Credit 7.2	<b>Thermal Comfort, Permanent Monitoring System</b>
						1		Credit 8.1	<b>Daylight &amp; Views, Daylight 75% of Spaces</b>
						1		Credit 8.2	<b>Daylight &amp; Views, Views for 90% of Spaces</b>
16		1		<b>Energy &amp; Atmosphere</b>		Possible Points 17		5 5 Innovation & Design Process Possible Points 5	
Y	?	N			Y	?	N		
Y			Prereq 1	<b>Fundamental Building Systems Commissioning</b>		1		Credit 1.1	<b>Innovation in Design: Green Demonstration Project</b>
Y			Prereq 2	<b>Minimum Energy Performance</b>		1		Credit 1.2	<b>Innovation in Design: Exemplary Performance EAc1</b>
Y			Prereq 3	<b>CFC Reduction in HVAC&amp;R Equipment</b>		1		Credit 1.3	<b>Innovation in Design: Exemplary Performance EAc 2</b>
2			Credit 1.1	<b>Optimize Energy Performance, 20% New / 10% Existing</b>	2	1		Credit 1.4	<b>Innovation in Design: Exemplary Performance WEc3</b>
2			Credit 1.2	<b>Optimize Energy Performance, 30% New / 20% Existing</b>	2	1		Credit 2	<b>LEED Accredited Professional</b>
2			Credit 1.3	<b>Optimize Energy Performance, 40% New / 30% Existing</b>	2	1			
2			Credit 1.4	<b>Optimize Energy Performance, 50% New / 40% Existing</b>	2	1			
2			Credit 1.5	<b>Optimize Energy Performance, 60% New / 50% Existing</b>	2	1			
1			Credit 2.1	<b>Renewable Energy, 5%</b>	1				
1			Credit 2.2	<b>Renewable Energy, 10%</b>	1				
1			Credit 2.3	<b>Renewable Energy, 20%</b>	1				
1			Credit 3	<b>Additional Commissioning</b>	1				
1			Credit 4	<b>Ozone Depletion</b>	1				
1		1	Credit 5	<b>Measurement &amp; Verification</b>	1				
1			Credit 6	<b>Green Power</b>	1				

Prepared by EcoSmith Design and Consulting

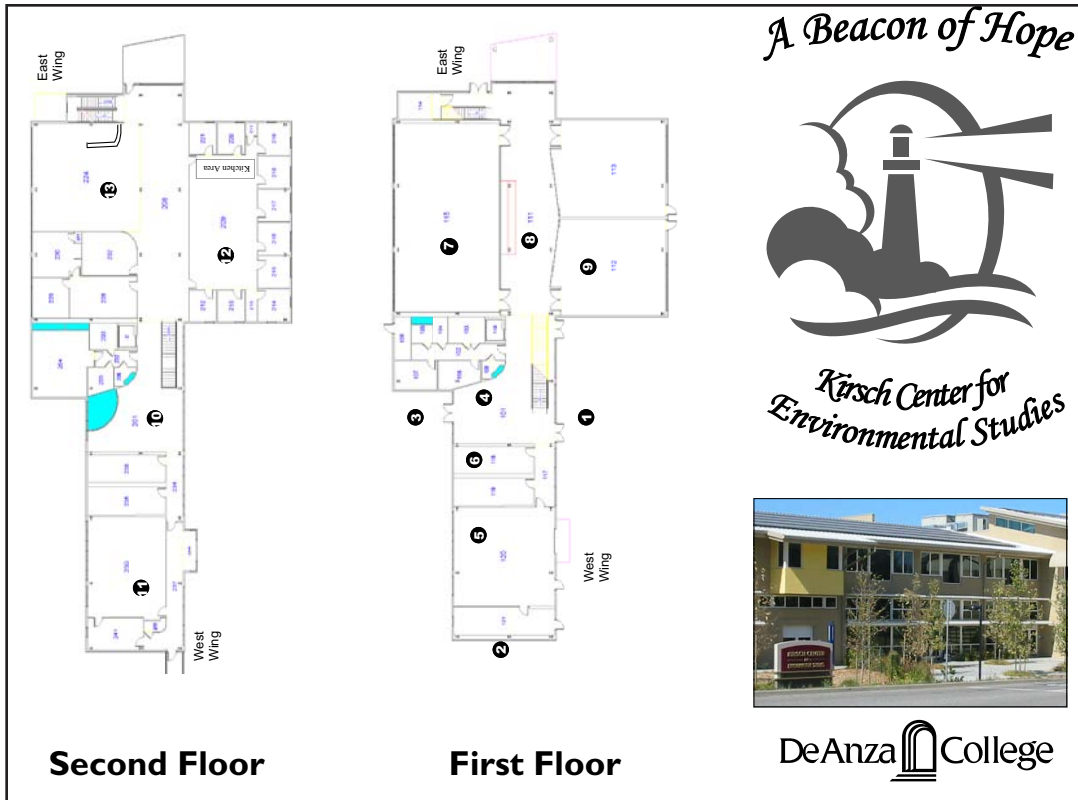
Beacon of Hope

From an orientation PowerPoint by Julie Philips



## Beacon of Hope

Brochure for Kirsch Center written by students



Second Floor

First Floor

DeAnza College

### Welcome to the Kirsch Center for Environmental Studies!

- The Kirsch Center - A Beacon of Hope
- A Climate Responsive, Energy Efficient Building
- Designed to use the sun and seasons

The Kirsch Center uses less energy than a conventional building. The building itself is a teaching tool; the interior structure and utility systems are exposed as much as possible. The interior atmosphere is a clean, high-tech look similar to many of the most innovative Silicon Valley companies.

The primary energy design goals were to: maximize use of on-site renewable energy; minimize energy demand from the utility grid; assure thermal and visual comfort; maximize flexibility of use of building spaces; and minimize emissions from construction materials, building construction and lifetime use of the building.

You will notice the natural light reflecting off the white walls and ceilings, creating an atmosphere that is healthy, bright and comfortable.

#### 1) Solar Plaza

The Solar Plaza showcases important features of a green building. Windows and sun shades on the south side maximize heat and light from the sun in the winter and block the sunlight in the summer. The Sycamore trees are deciduous. In the summer, the trees block the sun while in winter, the leafless branches allow the sunlight into the building. The bioswale, a type of biofilter, to the south of the walkway, captures rainwater from the slanted roof. This system stores the stormwater runoff rather than sending it into the storm drain.

#### 2) West Wing

Notice the narrow design of this space and that there are no windows. Afternoon summer sun is very harsh and heat a building very quickly. Not having windows reduces heat transfer from the outside to the inside of the building. The west outdoor space will soon house the Stewardship Amphitheater for outdoor student and public events.

#### 3) North Entrance

Like the south side, the north has many windows. These windows flood the classrooms with natural daylighting, providing a bright and comfortable environment for students. Students learn better in naturally daylight classrooms. Daylighting reduces the amount of electricity needed for lighting these rooms.

#### 4) Energy Exhibit Hall

This transitional area connects the "passive" narrow west wing and the "active" expansive east wing. The plasma screens are part of the Environmental Studies Department's instructional program and includes nature-based films in a video-on-demand exhibit. An Energy Monitoring Display can be switched to view a graphic on the energy generated by roof-top photovoltaics (36.5 kW PV system) or the Building Monitoring System (BMS) for real-time temperature readings to allow students in the energy management program to monitor the building's heating and cooling systems.

ment's instructional program and includes nature-based films in a video-on-demand exhibit. An Energy Monitoring Display can be switched to view a graphic on the energy generated by roof-top photovoltaics (36.5 kW PV system) or the Building Monitoring System (BMS) for real-time temperature readings to allow students in the energy management program to monitor the building's heating and cooling systems.

#### 5) Biodiversity Lab

(John Muir Institute of Natural Sciences)  
This hands-on learning lab teaches students about California's incredible diversity of plants, animals and ecosystems. The natural daylighting is more pleasant than fluorescent lights, and studies show that students perform better in natural daylight classrooms. The floor contains fly ash in the concrete. Fly ash, a by-product of coal fired power plants, replaces cement in the concrete. We get a high-quality concrete and reduce the amount of waste to landfills. The radiant floor system in this room includes plastic tubes which heat or cool the concrete. The windows and fans provide additional natural ventilation. The red light/green light system tells the user to open or close the windows. This room also has a biodiversity "garage door," which opens to our outdoor learning areas.

#### 6) Restrooms

Waterless urinals in the men's room save 45,000 gallons (170,000 liters) of potable water each year; floor tiles are made of old car windshields; and the toilet seat lids are made from recycled water bottles. The countertops are made from granite, which is a highly durable material and connects the building to the California landscape.

#### 7) KC 115

This room encourages students to work in teams. Students enjoy working together on community-based projects. In this environment, teachers and student mentors are facilitators, not lecturers. *How do you like to learn?* This room demonstrates an efficient raised floor heating and cooling system. Air flows beneath the floor and rises through circular vents, not blown out ceiling vents. Rising air exhausts out the return ducts in the ceiling and takes dust and other contaminants with it, improving air quality. Look at the carpeting; it's modular, made from recycled materials, the backing contains no vinyl or PVCs, and uses non-toxic adhesives. The furniture found in this building is durable, cost effective and minimizes environmental impact. For example, the tables have 80% wheat stalk as their core and the chairs are made from recycled materials and are recyclable.

#### Kirsch Center for Environmental Studies

"a building that teaches about energy, resources and stewardship"

#### 8) MAX 1 (Student Learning Spaces)

Students can use the raised seating in these area throughout the building to study, debate environmental topics, meet with others and view videos. The Monterey Bay Aquarium was an inspiration for us. Our Kirsch Center design team, including students, faculty, staff, leadership and consultants wanted to create special learning spaces.

#### 9) KC 113

This classroom is on the south side of the building. The light shelf just under the windows bounces light into the room to maximize daylighting. *See our Mecho shades?*

#### 10) Biodiversity Exhibit Hall (Upstairs)

This area encourages community learning with our "diner booth" and the breakout areas for study groups. One of the design criteria for the Kirsch Center was to be able to bird watch out of every window. *How many birds can you count outside? Are you keeping a bird life list?*

The large windows to the south provide a spectacular view of the surrounding coastal ranges and connect us to the local environment. Students enjoy the comfortable and welcoming atmosphere. *What do you think?*

#### 11) Statewide Energy Management Program Lab

This classroom is the headquarters for SEMP classes. Students learn about energy management systems and controls, lighting, green building design and energy policy. Look to the west to observe the "truth wall" that showcases the radiant floor system for the west wing.

#### 12) Stewardship Circle, the Jim Anderson Memorial Library and the Student Mentor Wall of Fame

The pop-up clerestory above you floods this special gathering area with natural daylight. This notable place welcomes students, faculty and our partners to collaborate on stewardship projects along the 37th parallel.

#### 13) Stewardship Resource Center (SRC) and MAX 2

To the east is the Cheeseman Environmental Study Area (ESA) which showcases the California Floristic Province, with over 400 native species and 12 plant communities of California. To the north is the SRC, where students can study, check out class materials, work on puzzles, or bird watch. The SRC countertop is made of pressed sunflower seed hulls; the cabinets are constructed from FSC certified lumber. The red steel beams around you are made from recycled steel. On the south wall are the 37th parallel wildlife corridors student projects.

To join us or to learn more, contact: Pat Cornely, Executive Director, Kirsch Center for Environmental Studies at [cornelypat@fhda.edu](mailto:cornelypat@fhda.edu) or (408) 864-8628

## California Senate Resolution

By the Honorable S. Joseph Simitian, 11<sup>th</sup> Senatorial District;  
Relative to the Grand Opening of the

### *Kirsch Center for Environmental Studies*

WHEREAS, on October 14, 2005, De Anza College in Cupertino will celebrate the grand opening of the new Kirsch Center for Environmental Studies, and it is appropriate to draw the attention of the public to this special community event; and

WHEREAS, The Kirsch Center for Environmental Studies is the lead demonstration building for energy innovation and sustainability of the California Community College System' and

WHEREAS, The philosophy of this facility is a building that teaches about energy and resources; and

WHEREAS, The current area of the two-story building will be approximately 22,000 gross square feet; this project exemplifies the next generation of educational innovation, and parts of the building are potentially an around-the-clock, 24-7 facility; and

WHEREAS, In addition to high-quality classrooms and labs, students can work in self-paced programs at special open study stations throughout the building; and

WHEREAS, The Kirsch Center for Environmental Studies will meet the requirements of a LEED Silver Certified Sustainable Building as established by the United States Green Building Council; and

WHEREAS, De Anza College is part of the 108 California Community Colleges, the largest school system of higher education in the world; and

WHEREAS, De Anza College's average enrollment is 25,000 students per year, and for the past decade, faculty, staff, and students on campus have been committed to developing an innovative program and center dedicated to sustainability; and

WHEREAS, The new Kirsch Center for Environmental Studies is an opportunity to showcase energy efficiency and renewable technology and will be one of the first outstanding examples of a sustainable "green" building in the California Community College System; and

WHEREAS, The Kirsch Center for Environmental Studies will provide the momentum for other colleges to design and construct sustainable buildings as a well as use these standards on renovation projects; and

WHEREAS, The Kirsch Center for Environmental Studies' educational focus will be interdisciplinary and inclusive and will provide opportunities to partner with public and private sectors in such areas as energy and the environment; now, therefore, be it

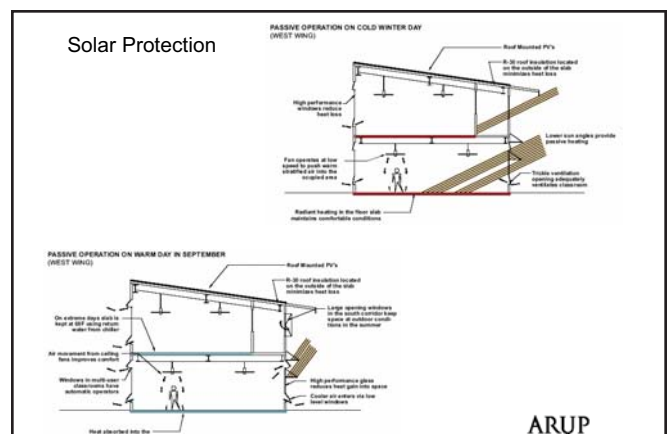
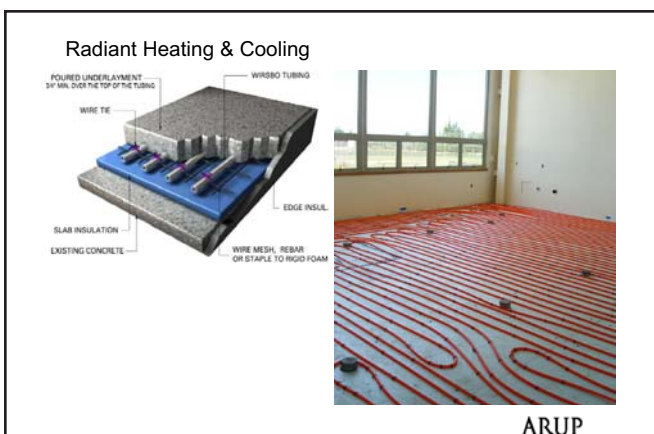
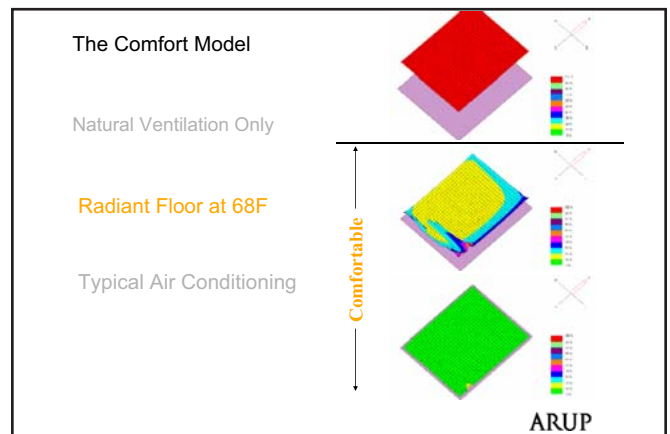
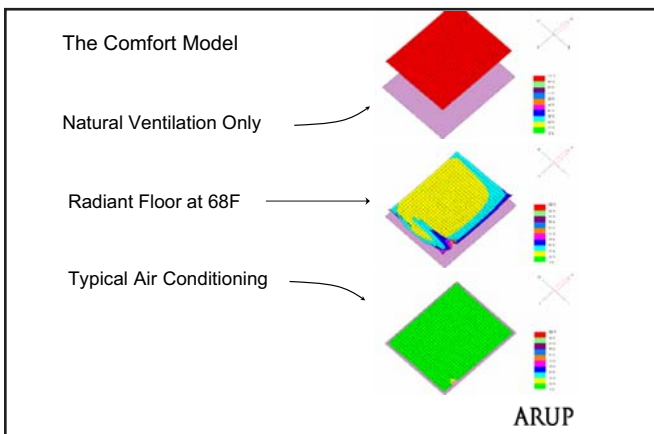
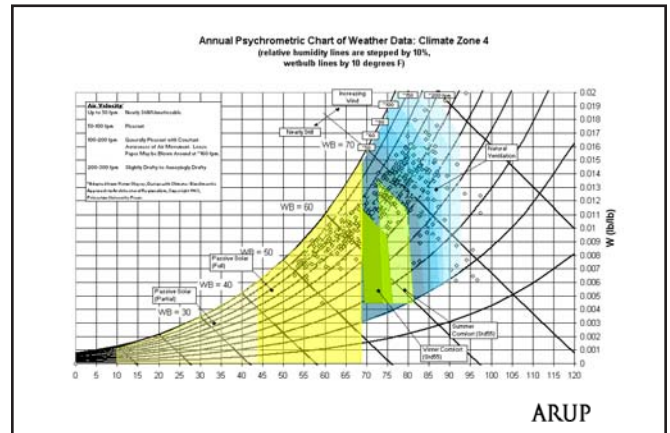
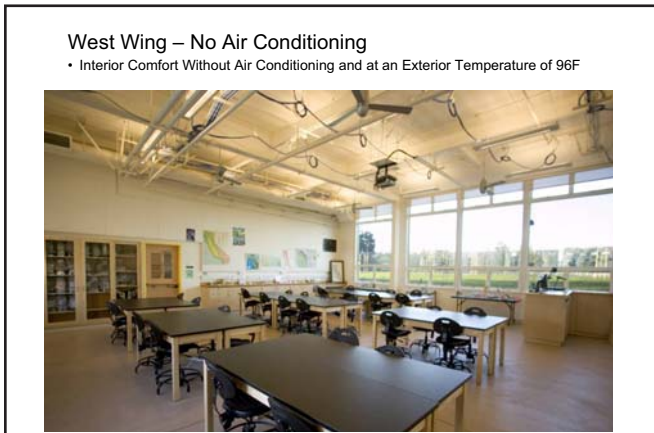
**RESOLVED BY SENATOR S. JOSEPH SIMITIAN**, That he draws the attention of the public to the grand opening of the new Kirsch Center for Environmental Studies at De Anza College, points with great pride to the Center's commitment to environmental protection as a fundamental objective and integral part of educating its students and the public, and extends best wishes for success in its future endeavors.

# Section 4: Additional Information

## PowerPoint Presentation

West Wing- Interior Comfort Without Air Conditioning and at an Exterior Temperature of 96 Degrees

[6 pages of Arup Powerpoint]



# Section 4: Additional Information

## PowerPoint Presentation

East Wing- Efficiency, Air Quality, Occupant Control...

[5 pages of Arup Powerpoint]

**East Wing**  
• Efficiency, Air Quality, Occupant Control...

**DAYLIGHTING + NATURAL VENTILATION OPERATION (EAST WING)**

**ARUP**

**East Wing**  
• Efficiency, Air Quality, Occupant Control...

**UNDERFLOOR VENTILATION OPERATION (EAST WING)**

**ARUP**

**Underfloor Air Distribution**

**Advantages of Under floor Air Distribution Systems**

- Lower Energy Use (more economizer hours)
- Better IAQ
- Better Individual Occupant Control
- More flexible/Serviceable space
- Complements Nature – Doesn't fight it.

**ARUP**

**East Wing**  
• Efficiency, Air Quality, Occupant Control

**ARUP**

**Daylighting –**  
Keeping the lights off during the day

## Magazine article excerpt

*"Built to Last"**Modern Steel Construction**November 2006**Authored by Dasse, project structural engineers*

innovation

# Built to Last

BY WILLIAM ANDREWS, S.E., RAFAEL SABELLI, S.E., AND GON NG, P.E.

The Kirsch Center at DeAnza Community College stands as an eco-friendly example of how sustainability and structural steel go hand-in-hand.

**YOU CAN LEARN A LOT FROM A BUILDING.** As the lead demonstration building for energy innovation and sustainability of the 108-campus California Community College system, the Kirsch Center for Environmental Studies at DeAnza Community College in Cupertino, Calif., is a building that “teaches about energy and resources.” Integrating state-of-the-art energy and communications technologies in a unique demonstration of “whole building” and “environmentally responsive” design advantages, the facility was designed as a showcase for energy efficiency and renewable energy technology, in hopes to encourage other community colleges to design and construct sustainable buildings.

The award-winning project is the culmination of nine years of groundwork laid by DeAnza faculty, staff and students through open workshops in which participants debated, sketched, and brainstormed concepts. The two-story, 22,000 sq. ft building is framed in structural steel—an integral component in sustainable concepts, due to its inherently high recycled content and its ability to integrate well with sustainable design features without incurring a significant cost premium to the structure.

The structural system was designed in accordance with the 2001 California Building Code, which consists of the 2002 AISC *Seismic Provisions for Structural Steel Buildings* and the 1997 Uniform Building Code, including amendments by the California Division of the State Architect (DSA is the enforcement agency for public school and community college construction in California). Where conflict existed in the seismic requirements between the two documents, the most stringent requirement was followed. Supported on a conventional spread footing foundation with slab-on-grade, the typical column bay spacing is 21 ft by 18 ft and 21 ft by

38 ft. The second-floor framing is a composite system with lightweight concrete fill over composite steel floor deck and wide flange steel beams. The roof framing consists of metal deck on a 3:12 slope over wide flange beams, with long cantilevered overhangs at the south face of the building. The seismic/wind lateral force resisting system is a special concentric steel braced frame (SCBF). The exterior cladding system consists of cement plaster and sheathing over light gage steel stud framing.

#### Challenges Come to Light

While the basic framing system is conventional, a number of structural challenges emerged through implementation of the sustainable design concepts:

**High-volume fly ash.** The use of high-volume fly ash (HVFA) concrete fill over metal deck required specification of 56-day design compressive strength versus 28-day strength. This meant that the composite steel beams would take longer to reach their full design strength, something the contractor needed to recognize in the construction schedule.

**Diaphragm discontinuities.** The use of extensive day lighting led to the creation of several large roof clerestories and a two-story atrium at the main entry. This created irregularities and discontinuities in the roof and floor diaphragm systems. The desire to further maximize day light-

## Section 4: Additional Information

### Magazine article excerpt

"Built to Last"

Modern Steel Construction

November 2006

Authored by Dasse, project structural engineers



For tension, the exposed braces are reinforced by four angles mounted over the corners of the square HSS brace. These angles provide additional area to prevent a weak section where the brace is slotted to fit over the gusset plate.

ing on the north face of the building drove the decision to orient the framing in the east-west direction—parallel to the exterior face of the building—in order to minimize the depth of the spandrel beams and maximize the glazing height.

**Cantilevered framing.** Special cantilevered framing details were developed to create a long, thin, profiled roof overhang to shade south-facing windows at the second floor. Support of exterior sunshade elements was provided by supplemental HSS steel framing, which was carefully coordinated with the architect and embedded in the exterior stud wall system.

**Photovoltaic system.** Additional steel roof framing was added to provide secure anchorage locations for the photovoltaic system mounted over the roof deck.

**Unusual floor conditions.** The second-floor framing in the west wing was designed for the additional weight of a 3 in. topping slab with a radiant heating system. In the east wing, however, the preference for a raised access floor led to a vertical step of 15 in. in the second floor, creating challenges in maintaining continuity in the lateral load path of the diaphragm, while also accommodating mechanical and plumbing penetrations throughout the floor deck.

**Exposed steel framing.** Minimizing the use of unnecessary finish materials, especially dropped ceilings, led to exposure of much of the structural steel framing. To minimize the added cost associated with specifying Architecturally Exposed Structural Steel (AESS), only steel columns, braces, and stairs were designated as AESS, following the basic requirements of the *AISC Code of Standard Practice*, Chapter 10. The added cost of specifying all exposed steel as AESS was judged unnecessary; instead, the AESS designation was only given to framing members that were most visible to the building occupants.

#### Designing for Quakes

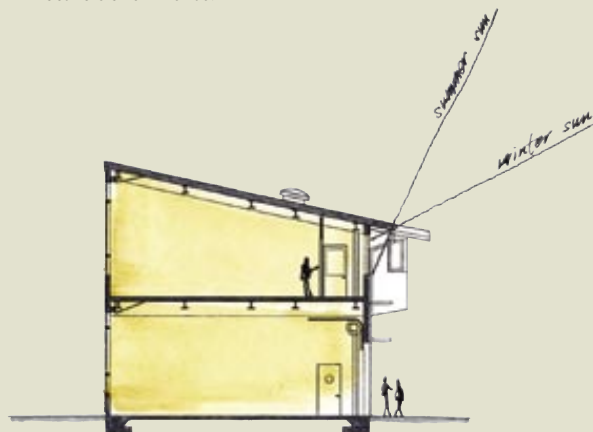
The Kirsch Center is located approximately five miles from the San Andreas Fault and thirteen miles from the Hayward Fault, which have the capability of generating an earthquake of Richter magnitude 7.9 and 7.1, respectively. Consistent with the California Building Code (CBC), the Kirsch center was designed for an expected ground acceleration of 57 percent *g*. Using a response spectrum, and a Response Modification Coefficient (*R*) of 6.4 (as specified for SCBF in the CBC), the design base shear was calculated to be 32 percent of the weight of the building.

### Getting Green

#### AS A FACILITY FOR ENVIRONMENTAL STUDIES, THE KIRSCH CENTER HAS A CERTAIN GREEN REPUTATION TO MAINTAIN.

From its conception, through design and construction, and now into its educational use, the Kirsch center stands as an outstanding example of a sustainable higher education building. Below are some of the sustainable features the project planners incorporated into the building:

- LEED Gold Certified as established by the U.S. Green Building Council.
- 60 to 70 percent below California Title 24 Energy Standards.
- Building sited adjacent to an outdoor environmental study area.
- Structural steel, manufactured with 95 percent recycled content.
- Light-gage steel partition and cladding framing with 95 percent recycled content.
- East-west orientation for passive solar benefits, plus natural day lighting through clerestories and a central atrium.
- Advanced natural ventilation in the west wing/raised floor for air distribution and flexibility in the east wing.
- Rooftop photovoltaic panels to generate electricity.
- Radiant heating/thermal mass in the concrete floors.
- Rainwater collection for irrigation.
- Model for use of recycled/renewable/nontoxic materials and finishes.





## Magazine article excerpt

*"Built to Last"**Modern Steel Construction**November 2006**Authored by Dasse, project structural engineers*

The braces are prominently featured as interior architectural elements.

Typical gusset-plate detailing for the braces ensure that the SCBF perform as intended, accommodating both the expected tension and compression behavior of braces. In tension, the exposed braces are reinforced by four angles mounted over the corners of the square HSS brace. These angles provide additional area to prevent a weak section where the brace is slotted to fit over the gusset plate. The gusset plate is shaped like a paddle to provide the area that is required to resist the brace tension (including a factor  $R_p$  of 1.4). This area is symmetric about the brace centerline, providing for a more compact gusset plate than more typical methods.

The welds of the gusset plate to the beam and column flanges are sized to be slightly stronger than the expected gusset material strength, so any yielding required to redistribute stresses in the connection will take place in the ductile gusset, rather than in the less ductile weld material. In compression, the gusset provides a hinge zone to permit brace buckling without loss of connection integrity. This hinge zone is at least twice the gusset thickness, as is typical to provide for adequate plate rotation capacity (and as is required by the CBC).

Additionally, the gusset at the beam-column connection (which is a rigid connection) provides haunch plates that aid in the transfer of moment between the beam and column. The presence of these plates relieves the gusset plate from resisting these haunch forces, which tend to cause high stresses at the re-entrant corner of the gusset-flange intersection. These haunch plates also provide stiffening of the gusset to resist compression.

Because of the steep brace angle, braces exert a large vertical force on the beams at the beam/column/brace connection. The relatively shallow beams require reinforcement to transmit this shear to the columns, and the shear plate is extended to serve this function. On the second-floor V-braced frames in the east wing (where the slab is lower to allow for a raised access floor), a different approach was used for the design of gussets at the beam midspan. In order to prevent the gusset from extending above the raised floor, a fixed bracing connection was designed. In this approach, rather than providing a hinge in the gusset to accommo-

date the rotation associated with brace buckling, the connection is designed to restrain the brace rotation; thus when the brace buckles, it forms a plastic hinge adjacent to the connection (in addition to the plastic hinge that forms at the brace midpoint and the hinge at the other end of the brace). This allows the brace to be brought very close to the beam flange, as no hinge zone is required.

Fixity is achieved by sandwich plates, which provide two additional benefits. First, providing two plates permits the brace-to-gusset connection to transfer forces in a shorter distance, thus ensuring a very compact connection. Second, this connection does not require a reduction of the brace area, so no reinforcement is required; the eccentricity between the brace and the connection, required for the calculation of shear-lag effects, is much smaller. As the braces are expected to buckle out-of-plane, the bracing connection must resist moments that tend to twist the beam. These are transmitted to an orthogonal beam via a section stiffened with split HSS sections. **MSC**

*William Andrews and Rafael Sabelli are principals, and Gon Ng a project engineer, with DASSE Design Inc. in San Francisco.*

**Owner**

DeAnza Community College, Cupertino, Calif.

**Executive Architect**

VBN Architecture, Oakland, Calif.

**Design Architect**

Van Der Ryn Architects, Sausalito, Calif.

**Structural Engineer**

DASSE Design Inc., San Francisco

**Engineering Software**

ETABS

RAM Structural System

**General Contractor**

S.J. Amoroso, Inc., Redwood Shores, Calif.

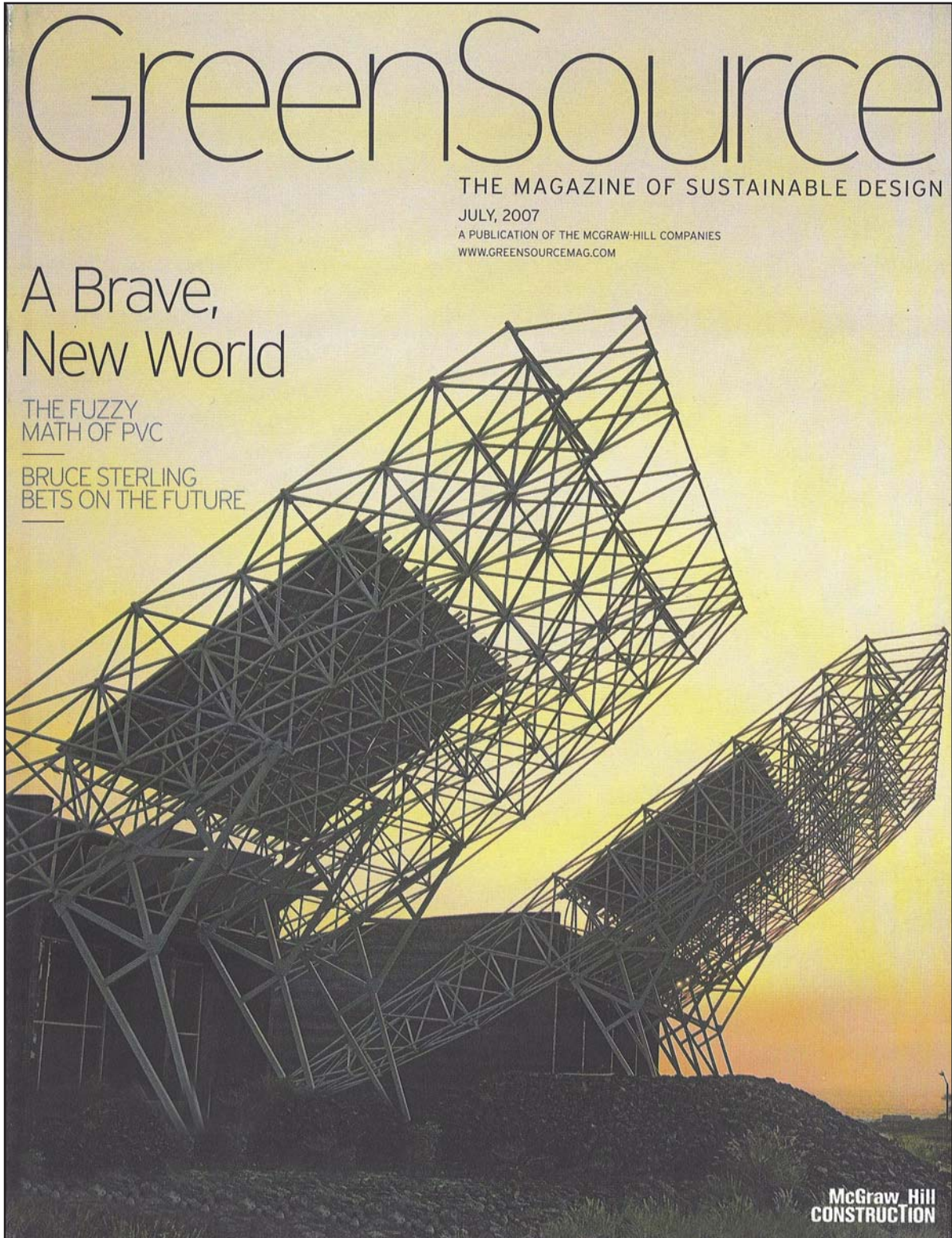
## Section 4: Additional Information

### Magazine article excerpt

"Go With the Flow"

*Green Source*

July 2007



## Magazine article excerpt

"Go With the Flow"

Green Source

July 2007

# GO WITH THE FLOW

## INTEREST IN MIXED-MODE BUILDINGS, WHICH COMBINE PASSIVE VENTILATION AND NATURAL COOLING STRATEGIES WITH MECHANICAL ONES, HEATS UP SOME U.S. MARKETS

NANCY B. SOLOMON, AIA

FOR VIRTUALLY ALL OF HUMAN EXISTENCE, PEOPLE HAVE relied on the natural flows of their local environments—the meandering paths of rivers, the orientation of the town to the sun, the prevailing breezes—to shape their patterns of settlement. Similarly, methods of building construction were strongly influenced by the basic principles of fluid dynamics: warm air rises, and cool air falls. That paradigm changed dramatically for the developed world in the 20th century, when technological advances and seemingly unlimited access to cheap energy allowed architects and engineers to design structures that were largely out of sync with their environs. Although hailed as an example of ingenuity and progress, in hindsight this disconnected approach now seems shortsighted. In recent years, concerns about high energy prices, the link between fossil-fuel consumption and global warming, and the health and productivity of occupants with little control over their environment or access to the outdoors has spurred interest in non-mechanical approaches, including natural, or passive, ventilation.

While European designers have been on the forefront of the sustainability movement, American architects and engineers are now learning to apply the techniques strategically on this side of the Atlantic. "It's been evolutionary," says Dave Deppen, AIA, of Paul Roberts & Partners in Vallejo, California, who worked for six years at Van der Ryn Architects in Sausalito, Calif., serving as the design architect for the naturally ventilated 22,000-square-foot Kirsch Center for Environmental Studies at De Anza College in Cupertino, California. Deppen says, "Over the past few years more clients have expressed interest in energy conservation and user participation," two characteristics of natural ventilation techniques.

## Section 4: Additional Information

### Magazine article excerpt

"Go With the Flow"

Green Source

July 2007

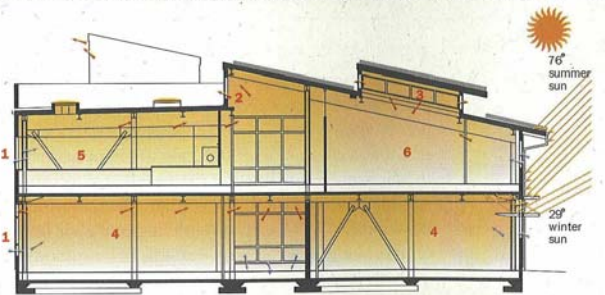


Kirsch Center's narrower west wing relies only on operable windows and ceiling fans for ventilation. Its wider east wing can be vented either passively or mechanically.

Motorized north-facing clerestory windows running along the east wing's central hall can be opened or closed easily with the turn of a key mounted on the wall below.



To minimize solar heat gain in the summer, the roof extends over this manually operated south-facing casement window on the west wing's second floor.

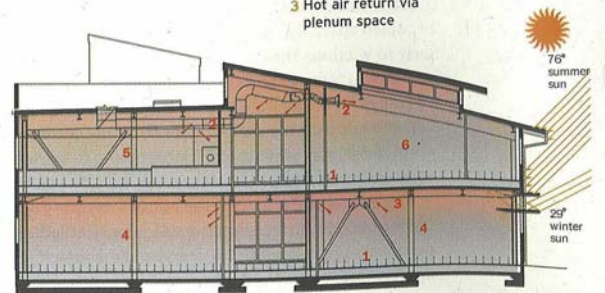


#### NATURAL VENTILATION

- 1 Operable windows for cool air
- 2 Hot air exhaust
- 3 Clerestory for hot air exhaust
- 4 Classroom
- 5 Resource center
- 6 Faculty room

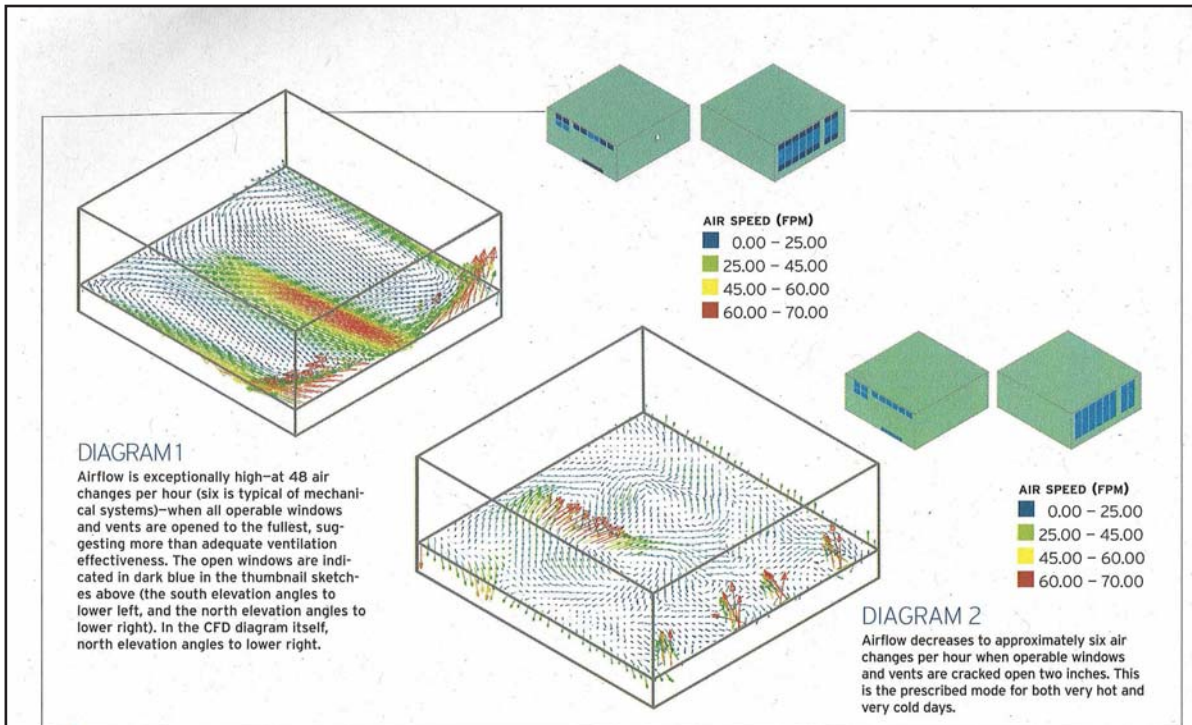
#### UNDERFLOOR VENTILATION

- 1 Underfloor ventilation
- 2 Hot air return at mechanical ducts
- 3 Hot air return via plenum space
- 4 Classroom
- 5 Resource center
- 6 Faculty room



Magazine article excerpt

"Go With the Flow"  
 Green Source  
 July 2007



The San Francisco office of Arup, which engineered the building services at the Kirsch Center for Environmental Studies at De Anza College in Cupertino, Calif., undertook computational fluid dynamics (CFD) studies of the first-floor classroom in the naturally ventilated west wing to analyze airflow speeds and patterns when windows and vents were fully (diagram 1) or partially (diagram 2) opened.

Tapping Into Natural Flows

Fresh air is passively brought into a building through pressure differences generated by two physical phenomena: buoyancy and wind. Buoyancy refers to the fact that a column of air differing in temperature from the air around it will either rise or fall until it reaches equilibrium. The stack, or chimney effect, in which heated air will rise vertically, pulling cooler air from outlets below, is a common example of buoyancy. Perhaps less well known in much of the United States is the reverse movement generated by a cool tower: In a hot, dry environment, air moistened at the top of a shaft will be cooled by evaporation and fall, bringing welcome coolness to the area at the base.

Designers can also take advantage of prevailing wind patterns in any number of ways. Probably the simplest approach is through cross ventilation, in which windows are placed on both the windward and leeward sides so that breezes can flow unimpeded across an occupied space. Wing walls can be installed perpendicularly to windows that are at an angle to prevailing winds in order to redirect airflow into the interior. By placing openings on the leeward side of a building, designers can capitalize on the vacuum that naturally occurs when wind blows over and around a structure to draw out stale air from inside.

Fresh air brought in from the outside can serve one or more functions, from providing adequate ventilation for occupants throughout the year and cooling them in the appropriate seasons to flushing and cooling the building

itself at night. Executed properly in the right conditions, passive ventilation can improve indoor air quality and thermal comfort while reducing a facility's reliance on energy derived from fossil fuels. It can also reduce initial construction costs by downsizing the mechanical system and its associated fan noises. Finally, natural ventilation helps occupants reconnect to the outdoors and feel a sense of ownership within their building environment.

New Research, More Flexible Standards

Indicative of the growing awareness of the subject in this country, the American Society of Heating, Refrigerating and Air-Conditioning Engineers revised in 2004 its *Standard 55, Thermal Environmental Conditions for Human Occupancy* to include an "optional method for determining acceptable thermal conditions in naturally conditioned spaces." The new provision reflects current research that occupants in passively vented and cooled spaces who are relatively sedentary, free to adjust their clothing, and able to operate the windows are comfortable with a wider range of indoor temperatures than occupants in mechanically cooled spaces.

Despite this new understanding, conditioning a building entirely with natural ventilation is not always feasible. First of all, not all climates lend themselves to natural ventilation alone. In addition, some programming elements require highly controlled environments that can only be achieved through mechanical means. Site-specific security, noise, and pollution concerns are three other potential reasons why at least some parts of a

## Magazine article excerpt

"Go With the Flow"

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building may not be able to rely completely on passive strategies. Further, many building owners simply feel more comfortable with a backup mechanical system, just in case. To maximize the energy and environmental benefits of passive ventilation without relinquishing attributes that only mechanical cooling can guarantee, an increasing number of U.S. clients have been working with architects and mechanical engineers to create mixed-mode, or hybrid, buildings. In these cases, passive and mechanical strategies are used for ventilation, cooling, or both.

The Center for the Built Environment at the University of California, Berkeley, which has been compiling a worldwide database of mixed-mode buildings ([www.cbe.berkeley.edu/mixedmode](http://www.cbe.berkeley.edu/mixedmode)), has also conducted to date, surveys of more than 41,000 occupants in more than 300 buildings representing mechanically cooled, passively ventilated, and mixed-mode strategies to gauge how people rate the performance of their buildings. According to Gail S. Brager, the center's associate director, the survey results suggest that, on average, occupants of mixed-mode buildings were more satisfied in terms of thermal comfort and air quality than their counterparts in conventional buildings and even many LEED-rated green buildings that may or may not have natural ventilation options.

### Mixed Modes

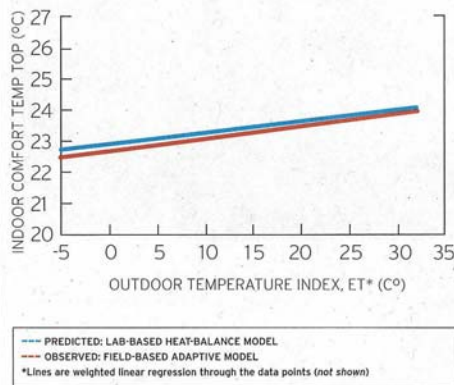
Designing mixed-mode buildings, like all high-performance structures, requires an integrated multidisciplinary team from the start. First, the team must understand the regional weather patterns and microclimate of the site, including typical atmospheric conditions, solar orientation, and prevailing winds throughout the year. Next, the designers must consider program functions and the associated comfort criteria required by each. From this, the building program should be organized by the various ventilation and cooling needs. Through site orientation, massing, and detailing, the structure must be designed to minimize unwanted heat gain while maximizing passive ventilation opportunities. The most efficient mechanical equipment should then be specified to handle any cooling needs that exceed the capacity of these passive strategies. Finally, the designers must consider the transparency and ease of use of all operating mechanisms and controls, from the opening of windows and vents to the programming of electronic sensors that govern the interplay between passive and mechanical systems. "Education of the occupants about the performance of the building and operable windows is also critical to ensure that the building achieves its potential for optimizing both energy conservation and thermal comfort," says Brager.

Professor G.Z. Brown, director of the Energy Studies in Buildings Laboratory at the University of Oregon, stresses the importance of designing for natural ventilation first—getting the right-sized holes in the right places

## SELECTED RESULTS: OBSERVED VERSUS PREDICTED COMFORT

### CENTRALLY CONTROLLED HVAC BUILDINGS

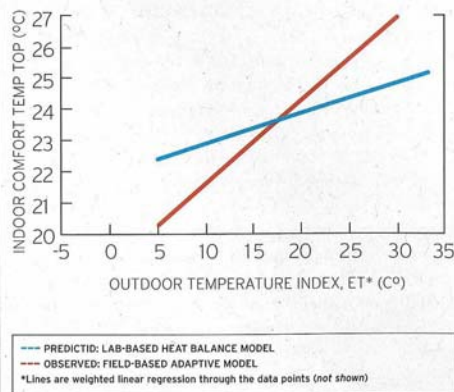
Research conducted by Gail Brager of U.C. Berkeley and Richard de Dear of Macquarie University in Sydney, Australia, confirmed that lab-based models accurately predict the average preferred indoor temperature in mechanically conditioned spaces.



ASHRAE Standard 55 was first released in 1966 to provide guidelines for buildings with centrally controlled HVAC. Unfortunately, the original, lab-based standard was applied too broadly, forcing most designers to stay within this narrow comfort zone.

### NATURALLY VENTILATED BUILDINGS

Brager and de Dear's study indicated that occupants of buildings with natural ventilation prefer a broader range of temperatures than predicted by the lab-based model. Their data supports an adaptive model of thermal comfort.



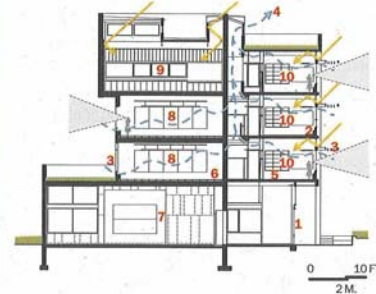
In 2004, ASHRAE revised Standard 55 to include a broader comfort zone for buildings that take advantage of natural ventilation. This is making it easier for today's designers to incorporate alternative ventilation and cooling techniques.

Source: U.C. Berkeley Center for the Built Environment

and getting the air to flow through the whole building—before introducing mechanical cooling. "The mechanical system is what consumes energy," Brown points out, "while the cooling load determines the size of the mechanical cooling system." So it follows that passive strategies—from orientation and shading devices to nat-

Magazine article excerpt

"Go With the Flow"  
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OVERALL VENTILATION SYSTEMS

- 1 Operable windows
- 2 Perimeter heating
- 3 Cool air enters
- 4 Stack effect exhaust air
- 5 Radiant floor
- 6 Raised floor
- 7 Lecture hall
- 8 Classroom
- 9 Lab
- 10 Office

**Seminar II**, a cluster of structures at Evergreen State College in Olympia, Washington, is zoned. Each first floor features two large, mechanically cooled meeting rooms plus a naturally ventilated lounge. Classrooms and offices above rely on the stack effect. Mahlum Architects worked with Keen Engineering (now Stantec), among others, on the 2004 project.

ural ventilation—should be the first steps taken to get the greatest reduction in energy costs. When designing for mixed mode, it is also very important to reevaluate any preconceived assumptions about occupancy behavior. Brown has found, for example, that a large portion of the staff in some companies would be very happy to come to (and leave from) work two hours earlier in the hottest months, thereby reducing the peak cooling load in the afternoon and, subsequently, the size requirements for the mechanical system.

There is no one solution for a mixed-mode project. The term has been applied to a whole spectrum of configurations: At one extreme are buildings that have no full-fledged mechanical system at all but merely rely on electrically powered fans to augment the circulation of air that enters the building through operable vents and windows. At the other extreme are projects that have fully ducted mechanical ventilation and cooling systems that can switch on when the passive techniques are not operational for whatever reasons. Brown suggests that a building should be called mixed-mode if natural ventilation serves as the primary method of cooling.

Although the field is so new that there is no formal, agreed-upon nomenclature, the terms *zoned*, *changeover*, and *concurrent* seem to appear frequently in

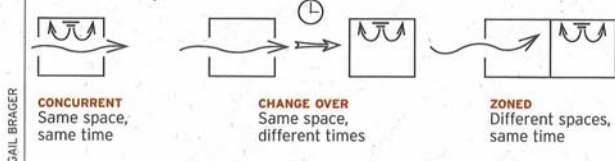
the literature to describe three common configurations. In a zoned project, passive and mechanical strategies occur at the same time but in different parts of the building. According to Peter Alspach, an associate in Arup's Seattle office, this configuration is climate-restrictive because it assumes that natural ventilation will be able to fully handle portions of the building throughout the year. Such a configuration may be appropriate for buildings that have isolated functions that must maintain stricter standards or for buildings whose site conditions make it impossible to have operable windows on particular elevations.

In a changeover configuration, natural and mechanical conditioning occurs in the same spaces but at different times of the day or year. Here, the air-conditioning serves as a backup whenever natural ventilation cannot meet cooling demands. The advantage of this scenario, continues Alspach, is that it can be done in almost any climate. Of course, projects in some areas will realize greater operational savings than others, depending on the number of days that the building can be adequately serviced by natural ventilation.

"Concurrent" describes the scenario in which both natural and mechanical strategies occur at the same time in the same space. In this case, fresh air is provided throughout the year by operable vents in the building façade. In addition, larger quantities of fresh air can flow through operable windows during the cooling season to reduce the cooling load on the mechanical system. According to Alspach, concurrent mode is suited to a mild climate in which some natural ventilation is always desirable. It would not be appropriate for more extreme climates, where untreated fresh air flowing into the building during very hot or very cold months would work against mechanical conditioning, thereby increasing operational costs.

VENTILATION STRATEGIES

Mixed-mode buildings generally fall into one of three basic configurations: concurrent, changeover, and zoned. These primarily differ in terms of when and where the various ventilation strategies occur.



GAIL BRAGER

## Section 4: Additional Information

### Magazine article excerpt

"Go With the Flow"

Green Source

July 2007

#### Who's in Control?

According to Cole Roberts, a senior consultant at Arup's San Francisco office and the building-services engineer for the Kirsch Center, hybrid systems can be managed in three basic ways: active, seasonal lockout, and informed occupancy. "Active control" describes an automated system in which a sensor determines a need for a change from one mode to another and, as a result, electronically closes windows and vents while activating the mechanical system (or vice versa). In a seasonal lockout, a facility manager would physically shut and lock windows at the beginning of certain seasons and unlock them at the end of these periods. In the case of informed occupancy, staff is made aware of the building's various passive and mechanical strategies and typically given a visual cue, such as a green light, to indicate when the windows could or should be opened.

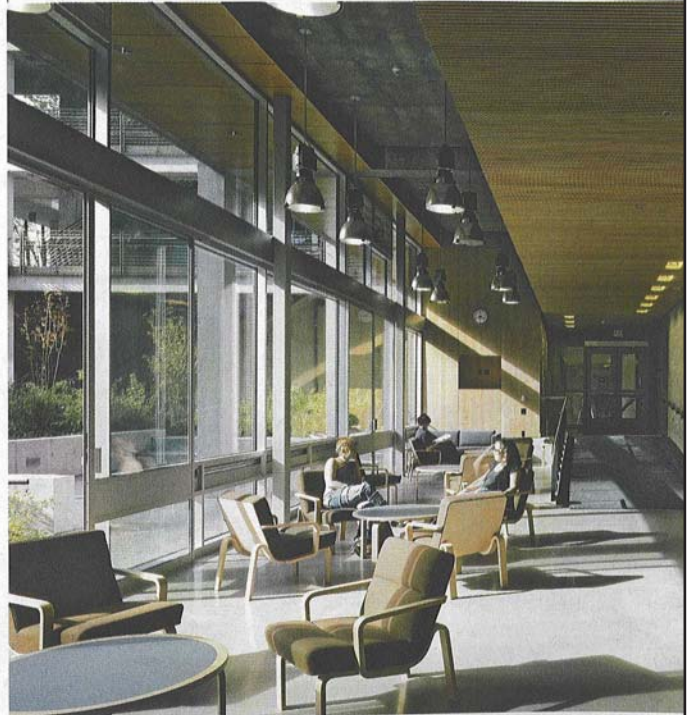
Roberts explains that the level of control should reflect the culture of the building. "It's about having good discussions with occupancy groups and their representatives. What will their role be? Do they want the system to manage itself, or do they want to feel a part of the process? And what is the cost implication? Motorized actuators on each window come at a price premium." This conversation among designers, clients, and users should occur early in the design process, because a poorly managed system can actually waste energy. If someone leaves a manually controlled window open on a very hot and humid day in a changeover configuration, for example, the mechanical air-conditioning will have to work even harder than if the building had been fully sealed. The design should be tailored to the management policy.

At the Kirsch Center, which was completed in 2005, informed occupants and active involvement was a criterion from the start. In fact, the students were so enthusiastic about having a high-performance green building that, through their governing body, they contributed the initial \$180,000 for the conceptual design phase and then participated in the design process. According to Julie Phillips, Morgan Family Chair in De Anza College's Environmental Studies Department, "the students enjoy opening windows, turning on fans, and adjusting the vents at their feet as needed" and are so comfortable in the building that they "don't want to go home."

Deppen sees the Kirsch Center and other mixed-mode projects as part of a transition back to a healthier relationship between occupants and the built environment. "In the past few decades, we have gotten so out of kilter. We didn't fully lose control in our houses, but we certainly gave it up in our offices." People are again becoming more aware of the buildings they inhabit and want to regain the ability to effect changes to their personal environments. "Today, mixed mode is becoming the norm and operable windows, a given," says Deppen. ◀◀

» Starting at the second floor of Seminar II at Evergreen, cooler air flows from exterior windows and trickle vents toward this central hall. As the air warms, it rises up the three-level ventilation-and-daylight shaft and is released. A fan was installed at the top as a backup just in case the building maintenance staff needed to increase airflow.

Students appreciate the passively ventilated lounge on the first floor of Evergreen, which features large, operable windows that provide a strong connection to the outdoors.





### Participant Credits

#### Owner

Foothill De Anza Community College District Board of Trustees

Dr. Martha Kanter, Chancellor

#### Kirsch Center Building Committee

It was the vision, perseverance, hard work, good humor and dedication of the Kirsch Center Building Committee members that made this project a reality.

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