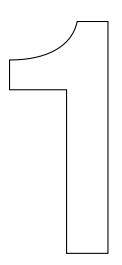
Kirsch Center for Environmental Studies De Anza College Cupertino, California

ROOM CAPACIT

CBE Livable Buildings Award 2007 Submission

ALCON.



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 it's 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 station throughout the building.

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

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 every operable window 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 lead the effort to privately fund raise major donations to the building possible.

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.



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 facility 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 daylit 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 daylit 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 a 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 State 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 nonprofits, such as the Community Foundation of Silicon Valley, service clubs and business leaders have both toured and participated in events here. When Hewlett Package 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 semester 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 Marlane, 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 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."

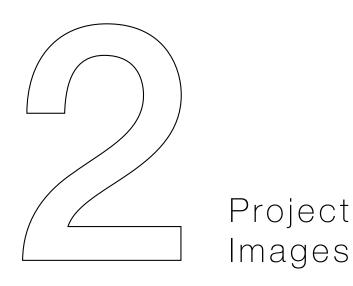
"I've seen students' lives change here. Some come without focus or direction and they find a life's purpose in helping the environment. We train leaders here. They are happy here."

"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."



















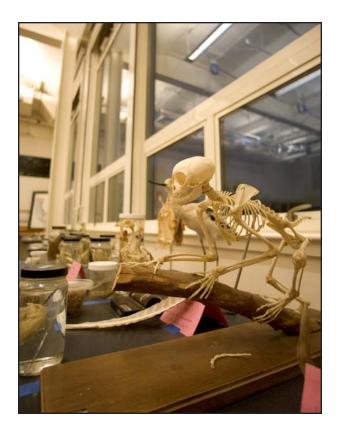






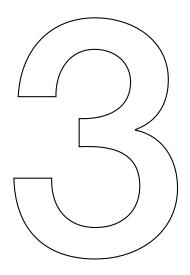










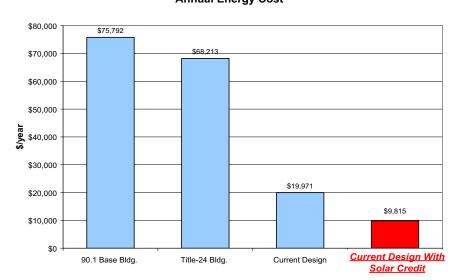


Energy Performance Data

Demonstrated Energy Performance

For the building's LEED cerification, 25% of all possible LEED points are being pursued. 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_2 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







LEED Score Card

Platinum documents submitted, under final review at USGBC

			Kirsch Cente Project Sco		Envi	iron	me			
Γ	15	Total F	Project Score	necard	1 4 5			enno	Possible Points	60
	15		-	DI (I						U.
			26 to 32 points Silver 33 to 38 points Gold 39 to 51 points							_
		Sustai	nable Sites Possible Points	14	4			lateri	ials & Resources Possible Points	1
?		1		_	Y 1					
////]////	Prereq 1 Credit 1	Erosion & Sedimentation Control		Y ///				Storage & Collection of Recyclables	
		Credit 1	Site Selection	1		1	-	edit 1.1 edit 1.2	Building Reuse, Maintain 75% of Existing Shell	1
	1	Credit 2 Credit 3	Urban Redevelopment			1		edit 1.2 edit 1.3	Building Reuse, Maintain 100% of Existing Shell	1
	1	Credit 3 Credit 4.1	Brownfield Redevelopment	1	1	1	_	edit 1.3 edit 2.1	Building Reuse, Maintain 100% Shell & 50% Non-Shell	1
	1	Credit 4.1	Alternative Transportation, Public Transportation Access	1	1			edit 2.2	Construction Waste Management, Divert 50%	4
	1	Credit 4.2 Credit 4.3	Alternative Transportation, Bicycle Storage & Changing Room	1	1	1		edit 3.1	Construction Waste Management, Divert 75%	1
		Credit 4.3	Alternative Transportation, Alternative Fuel Refueling Stations	1		1	-	edit 3.2	Resource Reuse, Specify 5%	1
		Credit 4.4 Credit 5.1	Alternative Transportation, Parking Capacity Reduced Site Disturbance, Protect or Restore Open Space		1			edit 4.1	Resource Reuse, Specify 10% Recycled Content, Specify 25%	4
		Credit 5.1	Reduced Site Disturbance, Protect of Restore Open Space	1		1		edit 4.2	Recycled Content, Specify 25%	4
		Credit 6.1	Stormwater Management, Rate and Quantity	1		1		edit 5.1	Local/Regional Materials, 20% Manufactured Locally	1
	1	Credit 6.2	Stormwater Management, Treatment	1		1		edit 5.2	Local/Regional Materials, 20% Manufactured Locally	1
		Credit 7.1	Landscape & Exterior Design to Reduce Heat Islands, Non-Roc			1	-	edit 6	Rapidly Renewable Materials	1
		Credit 7.1	Landscape & Exterior Design to Reduce Heat Islands, Non-Kot		1			edit 7	Certified Wood	1
		Credit 8	Light Pollution Reduction	1	•			oun /	Certified Wood	'
		Concut o	Light Pollution Reduction	_	15	-		doo	r Environmental Quality Possible Points	1
	2	Water	Efficiency Possible Points			/ ? N		1000		
?		Water	Enciency Fossible Folinta		Y		77	ereq 1	Minimum IAQ Performance	
•		Credit 1.1	Water Efficient Landscaping, Reduce by 50%		Y	11/1	44	ereq 2	Environmental Tobacco Smoke (ETS) Control	
	1	Credit 1.2	Water Efficient Landscaping, No Potable Use or No Irrigation	1	1	/////	· / /	edit 1	Carbon Dioxide (CO2) Monitoring	1
	1	Credit 2	Innovative Wastewater Technologies	1	1			edit 2	Increase Ventilation Effectiveness	1
		Credit 3.1	Water Use Reduction, 20% Reduction	1	1			edit 3.1	Construction IAQ Management Plan, During Construction	1
		Credit 3.2	Water Use Reduction, 20% Reduction	1	1			edit 3.2	Construction IAQ Management Plan, Before Occupancy	1
		Colour o.2	Water Ose Reduction, 50% Reduction		1			edit 4.1	Low-Emitting Materials, Adhesives & Sealants	1
	1	Energy	Atmosphere Possible Points	17	1			edit 4.2	Low-Emitting Materials, Paints	1
?	_	Lifeig			1			edit 4.3	Low-Emitting Materials, Carpet	1
///	7////	Prereq 1	Fundamental Building Systems Commissioning		1			edit 4.4	Low-Emitting Materials, Composite Wood	1
///	77777	Prereq 2	Minimum Energy Performance		1			edit 5	Indoor Chemical & Pollutant Source Control	1
11	7777	Prereg 3	CFC Reduction in HVAC&R Equipment		1			edit 6.1	Controllability of Systems, Perimeter	1
///	/////	Credit 1.1	Optimize Energy Performance, 20% New / 10% Existing	2	1			edit 6.2	Controllability of Systems, Non-Perimeter	1
		Credit 1.2	Optimize Energy Performance, 30% New / 20% Existing	2	1			edit 7.1	Thermal Comfort, Comply with ASHRAE 55-1992	1
		Credit 1.3	Optimize Energy Performance, 40% New / 20% Existing	2	1			edit 7.2	· · · · ·	1
		Credit 1.4	Optimize Energy Performance, 50% New / 30% Existing	2	1			edit 8.1	Daylight & Views, Daylight 75% of Spaces	1
		Credit 1.5	Optimize Energy Performance, 60% New / 40% Existing		1			edit 8.2		1
		Credit 2.1	Renewable Energy, 5%	1						'
		Credit 2.2	Renewable Energy, 10%	_	5		Ŀ	nov	ation & Design Process Possible Points	5
		Credit 2.3	Renewable Energy, 20%	1		/ ? N		move		
		Credit 3	Additional Commissioning	1	1		_	edit 1.1	Innovation in Design: Green Demonstration Project	1
		Credit 4	Ozone Depletion	1	1			edit 1.2		1
	1	Credit 5	Measurement & Verification		1			edit 1.3		1
		Credit 6	Green Power	-	1			edit 1.4	Innovation in Design: Exemplary Performance UAC2	1
		I STOULD			1			edit 2	LEED Accredited Professional	1
			oSmith Design and Consulting							

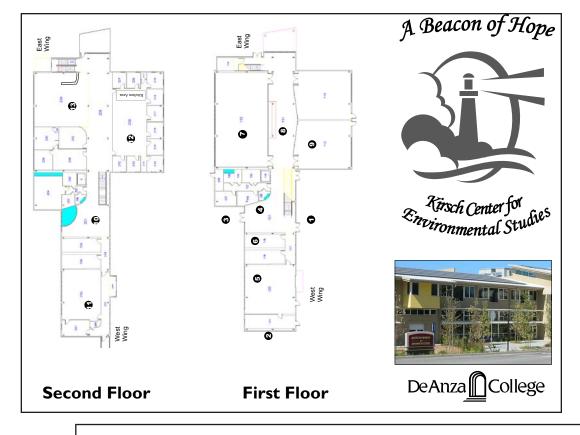
Beacon of Hope

From an orientation PowerPoint by Julie Philips



Beacon of Hope

Brochure for Kirsch Center written by students



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 ulility systems are exposed as much as pos sible. The interior atmosphere is a clean, high-tech look similar to many of the most innovative Silicon Valley com-

panies. 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, maxi-mize flexibility of use of building spaces; and minimize emissions from construction materials, building construc-

tion 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 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 suntight 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 send-ing 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

a) norm 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 stu-dents. Students learn better in naturally daylit 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 Depart-

ment's instructional program and includes nature-based films in a video-on-demand exhibit. An Energy Monitoring Imms in a video of relation statute of the state of the sense of the state of the s ment program to monitor the building's heating and cooling systems.

(John Muir Institute of Natural Sciences) (John Muir Institute of Natural Sciences) This hands-on learning lab teaches students about Califor-nia's incredible diversity of plants, animals and ecosys-tems. The natural daylighting is more pleasant than fluo-rescent lights, and studies show that students perform better in natural daylit classrooms. The floor contains fly-bein in theorem the fluence in our performance of performance in the student of the student of performance of the student of the student of the student better in natural daylit classrooms. The floor contains flybetter in natural dayili classrooms. The floor contains fly-ash in the concrete. Fly ash, a by-product of coal free 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 plasic tubes which heat or cool the concrete. The win-dows and fams 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

b) 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 oid 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

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 tectures. How do you like to leam? 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 her terturn ducts in the ceiling and takes dust and other contaminants with it, improving air quality. Löök at the carpeting; it's modular, made from recycled materials, the backing contains no winj0 er 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. and are recyclable

Kirsch Center for Environmental Studies

"a building that teaches about energy, resources and stewards

8) MAX 1 (Student Learning Spaces)

6) 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 pol-icy. Look to the west to observe the "truth wall" that showcases the radiant floor system for the west wing.

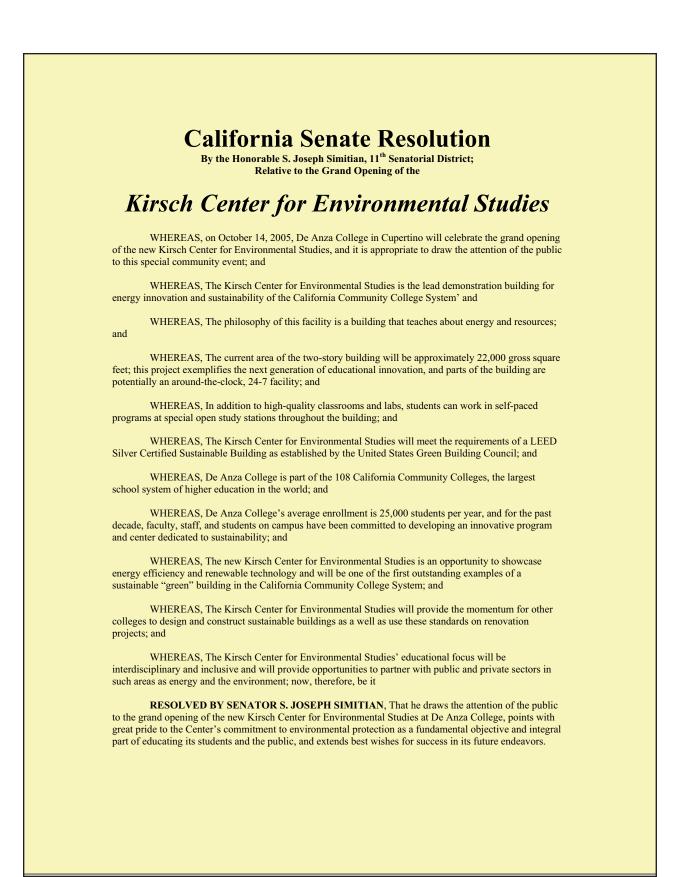
12) Stewardship Circle, the Jim Anderson Memorial

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 collabo-rate 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 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 stu-dent projects. dent projects.

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

California State Senate Resolution No. 1404

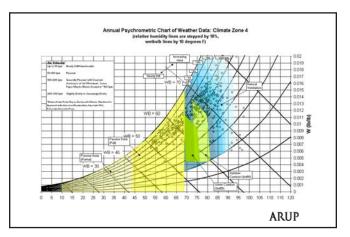


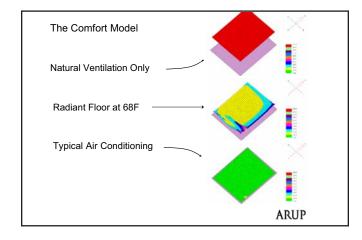
PowerPoint Presentation

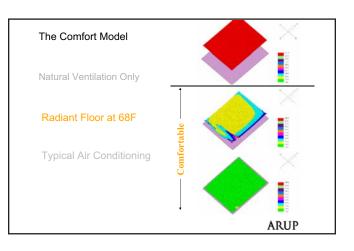
West Wing- Interior Comfort Without Air Conditioning and at an Exterior Temperature of 96 Degrees

[6 pages of Arup Powerpoint]

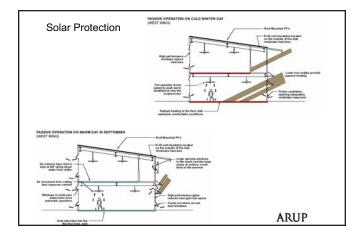






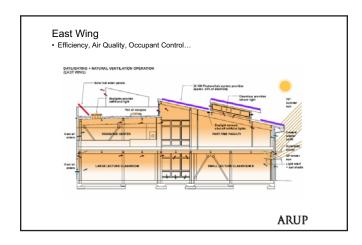


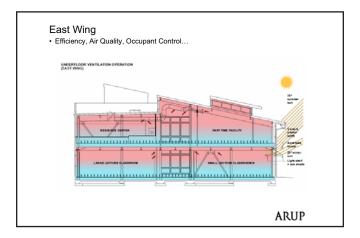


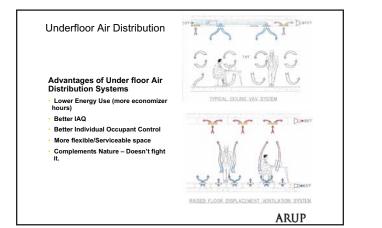


PowerPoint Presentation

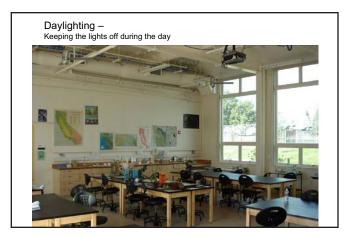
East Wing- Efficiency, Air Quality, Occupant Control... [5 pages of Arup Powerpoint]











Magazine article excerpt

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



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-ofthe-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-

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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.

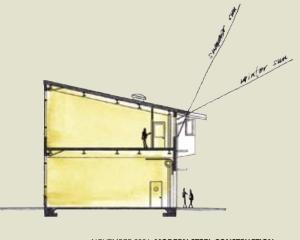
Designing for Quakes

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.



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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_{y} 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 accommodate 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-togusset 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

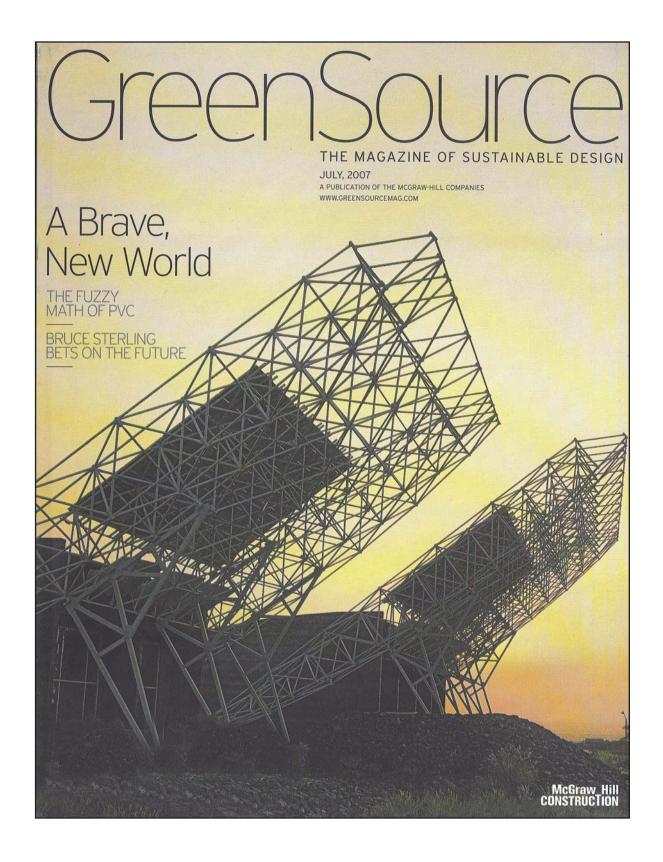
RAM Structural System

General Contractor

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

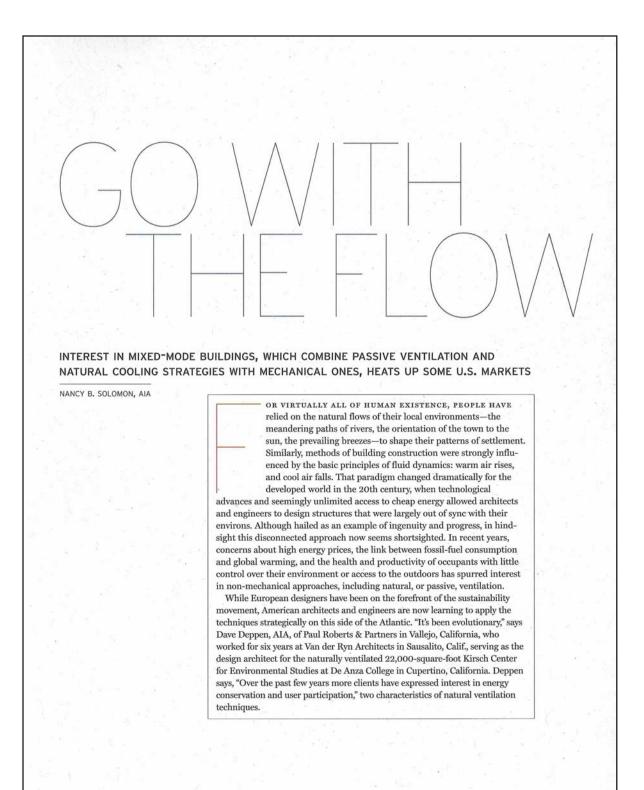
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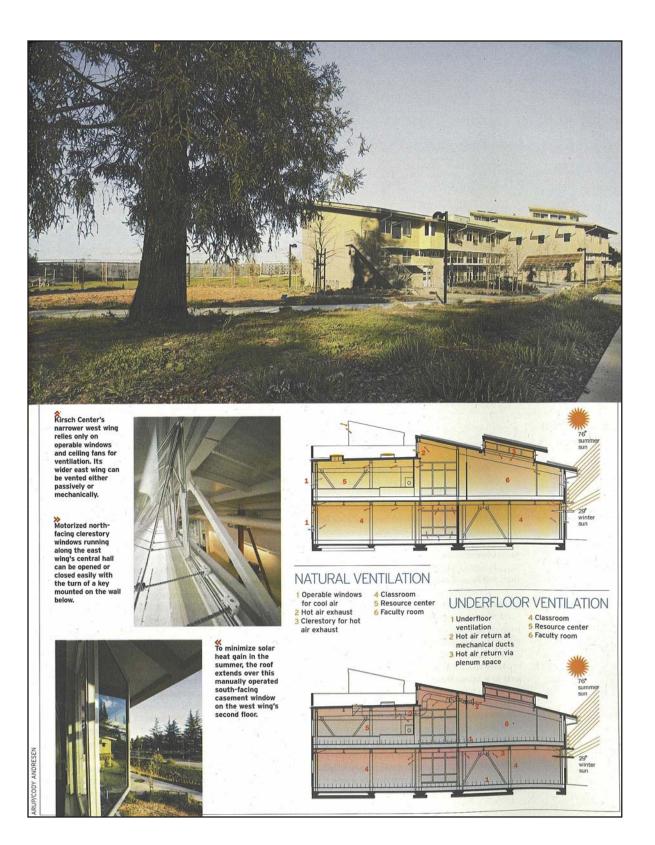
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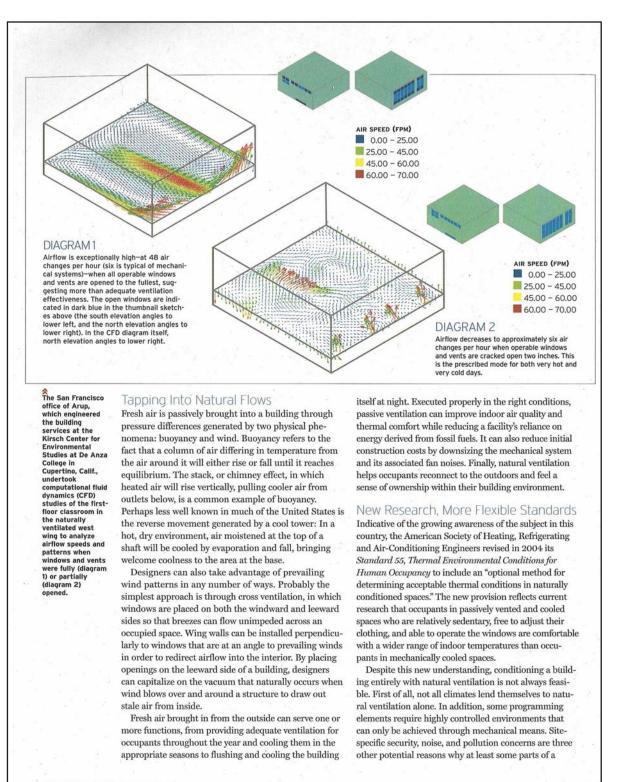
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> building may not be able to rely completely on passive strategies. Further, many building owners simply feel more comfortable with a backup mechanical system, just in case. To maximize the energy and environmental benefits of passive ventilation 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), 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.

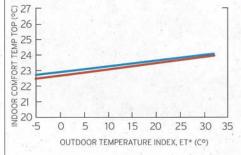
Mixed Modes

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, rcing most designers to stay within this narrow comfort zone.

In 2004, ASHRAE

revised Standard 55 to include a

broader comfort

that take advantage of

designers to

incorporate alternative

ventilation and

cooling technic

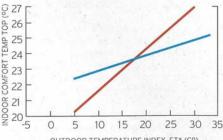
zone for buildings

natural ventilation. This is making it easier for today's

- PREDICTED: LAB-BASED HEAT-BALANCE MODEL **OBSERVED: FIELD-BASED ADAPTIVE MODEL** *Lines are weighted linear regression through the data points (not shown)

NATURALLY VENTILATED BUILDINGS

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



OUTDOOR TEMPERATURE INDEX, ET* (C°)

--- PREDICTID: LAB-BASED HEAT BALANCE MODEL OBSERVED: FIELD-BASED ADAPTIVE MODEL Lines are weighted linear regression through the data points (not shown

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

and getting the air to flow through the whole buildingbefore 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-

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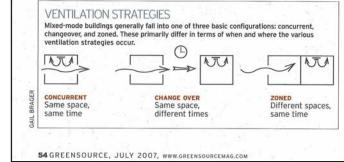


Seminar II, a cluster of structures at Evergreen State College in Olympia, Washington, is zoned. Each first floor features two large, mechanically cooled meeting rooms plus a naturally ventilated lounge. Classrooms and offices above rely on the stack effect. Mahlum Architects worked with Keen Engineering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

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Who's in Control? Starting at the According to Cole Roberts, a senior consultant at second floor of Seminar II at Arup's San Francisco office and the building-services Evergreen, cool engineer for the Kirsch Center, hybrid systems can be air flows from exterior windows and trickle vents managed in three basic ways: active, seasonal lockout, and informed occupancy. "Active control" describes an toward this central hall. As the air automated system in which a sensor determines a warms, it rises up need for a change from one mode to another and, as a the three-level tilation-and result, electronically closes windows and vents while daylight shaft and activating the mechanical system (or vice versa). In a is released. A fan was installed at the seasonal lockout, a facility manager would physically top as a backup just shut and lock windows at the beginning of certain in case the building ainter ce staff seasons and unlock them at the end of these periods. needed to increase In the case of informed occupancy, staff is made airflow 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 discus-Students appreciate the passively ventilated loun sions with occupancy groups and their representatives. What will their role be? Do they want the system to manthe first floor of Evergreen, which features large, age itself, or do they want to feel a part of the process? And what is the cost implication? Motorized actuators on operable windows that provide a strong connection each window come at a price premium." This conversation among designers, clients, and users should occur to the outdoors. 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.

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 mixedmode 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. «

At the Kirsch Center, which was completed in 2005,



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Participant Credits

Owner

Foothill De Anza Community College District Dr. Martha Kanter, Chancellor

Kirsch Center Building Committee

Julie Phillips, Morgan Family Chair in Environmental Studies, Chair

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

Design Team

Arup

Integrated Energy and Comfort Engineering Mechanical Engineering Electrical Engineering Lighting Engineering Acoustics Engineering Telecom Engineering Energy Modeling

Van der Ryn Architects Design Architect

VBN Architects Architect of Record

Dasse Design Structural Engineering

Donald Aitken Energy Consulting

Rumsey Engineers Commissioning