



## LETTERS TO THE EDITOR

Thumbing through the recently arrived Winter 2005 *SBSE News*, I became interested in the letter from Harold Hay. He was a bit irate, a bit eccentric, but he had some good ideas, including hardware that he said would illustrate some basic principles of passive solar design. I worked with small solar test chambers at LBNL when I was a grad student at Berkeley, and I've been thinking of building something like that to show to my Energy Fundamentals students at the New School of Architecture and Design in San Diego.

However, the letter you printed gave no contact information, and I am wondering if you might have an e-mail address for Mr. Hay? I want to suggest that he share some of his apparatus with my class, and perhaps we can provide him with some useful data for his paper.

—Stephen LeSourd, *New School*

*[Naturally, I've hooked up Harold and Stephen and am anticipating some amazing outcomes.—ed.]*



I can't read many of those fancy signatures used in the newsletter ... unless I enlarge them several times. Yes, it's my eyes. Otherwise, I read it from head to toe.

—Glenn Sweitzer, *Ball State*

*[Thanks for the praise and candid feedback. I use my cheaters to decipher those, so it seems the demographics of our group is dictating a change in typography. Can you read your signature now, Glenn?—ed.]*



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## ARCHITECTURE 2030 COMBATS WARMING

*[It's likely that our well-connected readership is aware of Ed Mazria's nascent web site aimed at inspiring architects to become proactive in reversing global warming. I urge you all to check out its evolving content, bookmark it, and foist it upon your students. Send feedback to SBSE <[sbse@uidaho.edu](mailto:sbse@uidaho.edu)> and Ed <[mazria@mazria.com](mailto:mazria@mazria.com)>. Help Ed become "Smokey, the Bear" of global warming, "Only you can prevent earth warming!"—ed.]*

Launched January 3, 2006 <<http://www.architecture2030.org>> is part of an ongoing effort, initiated by Edward Mazria, to provide information and innovative solutions in the fields of architecture and planning and to address and reverse our destructive trend toward global climate change.

Using the latest research, the web site clearly illustrates that the building sector is currently responsible for about one half of all U.S. and global emissions annually and that this sector's emissions are increasing at an alarming rate. Architecture 2030 outlines the steps necessary to address this situation. As part of this effort, our web site includes a variety of resources to help professionals, government officials, and those in the building sector, plan and design for a carbon-neutral future.

The web site comes at a critical time—at December 2005's UN climate change conference in Montreal the United States and China refused to agree to mandatory steps to curtail their greenhouse gas emissions. Also at that time, NASA's James Hansen told 11,000 earth systems scientists at an American Geophysical Union Conference that humankind has at most 10 years to curb emissions or else global warming would take our planet into climate patterns it has not experienced for more than 500,000 years. While the earth is plunging into the most serious crisis of modern times, the politics of action and the science of climate change could not be further apart.

However, a bright side to this worrisome dilemma is emerging. Many cities, states, organizations, and design professionals are accepting the challenge to tackle climate change. The American Institute of Architects, representing 74,000 professionals, recently announced a bold initiative to reverse the environmental impact and greenhouse gas emissions of the American building sector. The AIA, adopting many of the actions called for by Architecture 2030 (see "open letter" on the web site), set a goal of reducing the fossil fuel consumption of buildings by 50% in 4 years, with additional 10% reductions every 5 years thereafter. The implications of this initiative are considerable, and when implemented will transform the built environment in a way we have not seen since the Industrial Revolution.

Architecture 2030 was established in 2005 and is sponsored by New Energy Economy, a nonprofit, nonpartisan, independent organization whose mission is to conduct research and provide information and innovative solutions in the fields of architecture and planning to address global climate change. Supported by a range of individuals, firms, and charitable organizations, the web site will report on the activities and progress in the global building sector and critical information will be updated regularly. ■

—Edward Mazria, *Mazria Inc. Odems Dzurec*

## OUR JOURNAL?

SBSE endorses BRI for its relevance, depth, and excellence, special deals on the subscription rate for SBSEers, and as a venue for dissemination of our work. Imagine an issue dedicated to articles based on our annual retreat!

In the Mar/Apr 2006 issue (pictured at right), Gultch and Stenberg examined, "How do trade media influence green building practice?"

We should all consider contributing content to one of the rare venues receptive to our scholarship. See <<http://www.rbri.co.uk>>. ■

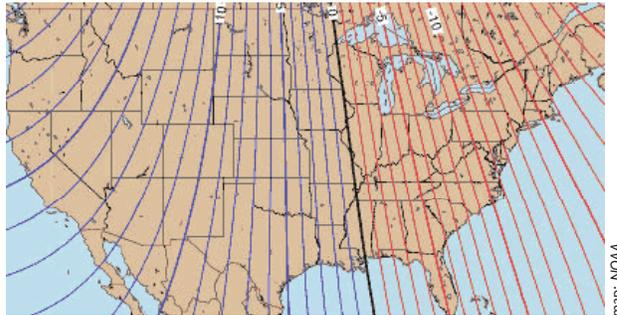
—Bruce Haglund

BUILDING RESEARCH & INFORMATION  
International Research, Development, Demonstration & Innovation

## MAGNETIC VARIATION AND SUN PATHS

Solar orientation relates an object, building, or site to true north (and true south), points defined by the earth's axis of rotation. The compass needle points to magnetic north rather than true north. The needle will point either east of true north (easterly variation) or west of true north (westerly variation) since magnetic north and true north rarely coincide. The map which comes from the *Sun Angle Calculator User's Manual* (1.8 MB PDF download: <<http://www.sbse.org/resources/sac/index.htm>>) was printed in 1951 and included with the original LOF Sun Angle Calculators. It provides values for magnetic variation for the contiguous United States. However, the magnetic north pole is not stationary; the magnetic variation for your location has changed over time.

As can be seen in the 2001 map (right) from NOAA's web site dealing with geomagnetism, the location of the agonic line (a line where magnetic north and true north are aligned—0° magnetic variation) has moved from its 1951 location off the east coast of Florida to a point near New Orleans. In the 50 years separating these two maps, the magnetic variation in the Dallas–Fort Worth area has changed by nearly 5°—from over 9½° of easterly variation at the UTA campus in 1951 to a 4° 51' easterly variation in February 2006.



The direction of true north can be determined with a compass if you know your current magnetic variation. Current or historic magnetic variations of your locality can be obtained by consulting <<http://www.ngdc.noaa.gov/seg/geomag/jsp/Declination.jsp>>. Canada also maintains <[http://gsc.nrcan.gc.ca/geomag/field/mdcalc\\_e.php](http://gsc.nrcan.gc.ca/geomag/field/mdcalc_e.php)> which deals with these issues and contains some interesting historical background on geomagnetism.

—Truett James

### SAC INSTRUCTION MANUAL AND UPDATE

The instruction manual that accompanies the Sun Angle Calculator, “Designing with the Pilkington Sun Angle Calculator,” is now available in electronic format and may be downloaded via the SBSE web site <<http://www.sbse.org>>. An update for magnetic variation, inspired by Truett's discovery, is also available on the web site.

### PLOT YOUR OWN SUN PATH CHARTS

The University of Oregon Solar Radiation Monitoring Laboratory has developed a very handy sun path chart program! Just put in latitude and longitude or zip code for U.S. locations, time zone, and it prints out a pdf! See <<http://solardat.uoregon.edu/SunChartProgram.html>>. Contact Lab Director Frank Vignola <[fev@uoregon.edu](mailto:fev@uoregon.edu)> for further information. ■

—Alison Kwak

## RETREAT '06 [CONTINUED FROM P.1]

Inspired yet? I hope so. Let's discuss these issues and much more while collectively devising a new integral approach to architecture that could be the new post-post-modern intellectual terrain we have been anticipating. Here's the radical hypothesis: we're collectively already doing it.

I'm sure many of you are already pursuing strands of this new emerging integral design in your studios and classrooms (and your secret journals!). As William McDonough said in the *Mon-ticello Dialogues*, Jefferson teaches us that it is acceptable to think great thoughts and to wake up every morning planning sedition! So let the rest of us in on your big ideas; your seditious interconnective theories; your integrated, interdisciplinary, cross-fertilized experiments; your box-transcending class exercises; your social–technical–aesthetic lecture gem; your revolutionary wholeness-seeking self. Join the conversation in Colorado this summer!

I can't wait. ■

—Mark DeKay

## GREEN JOB OPS

### AIA

Resource Architect is a professional position with a focus on sustainable design/green architecture. For a detailed job description see <[http://www.aia.org/careers\\_default](http://www.aia.org/careers_default)> and select “Jobs at AIA National.” Forward résumé and cover letter with salary requirements to <[aiajobs@aia.org](mailto:aiajobs@aia.org)>, and reference job code FB05–52.

### BETTERBRICKS IDL SEATTLE

Two Research Assistant Professors in Architecture (Integrated Design, Daylighting) and in Architecture or Mechanical Engineering (Integrated Design, Mechanical Engineering) to manage the Lab's consulting practice, conduct regional outreach and educational activities, and teach at UW weekly. These full-time, non-tenured research positions in the University of Washington Department of Architecture are funded through December 2008, with an excellent prospect of funding through 2011. Contact Joel Loveland <[loveland@u.washington.edu](mailto:loveland@u.washington.edu)> for details.

### ENVIRONMENTAL BUILDING NEWS

For the first time since our inception in 1992, we want someone to join our editorial team! An experienced writer/editor with green building knowledge and research skills with a knack for distinguishing meaningful information from hype is preferred. Learn more about us at <<http://www.BuildingGreen.com>>. To apply e-mail a letter of interest, résumé, and writing samples to <[jobs@buildinggreen.com](mailto:jobs@buildinggreen.com)>.

### PALADINO AND COMPANY

Three positions: Senior Building Consultant (develop consulting services to major clients and quality entrepreneurial staff), Green Building Consultant (manage and deliver green consulting services to major clients), and Associate Green Building Consultant (technical assistant to senior staff). See the full job postings at <<http://www.paladinoandco.com/home/jobs>>.

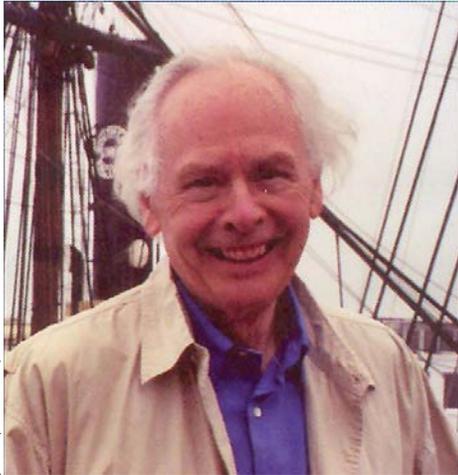
### UNIVERSITY OF CALGARY

A unique opportunity for leading research and exploration of integrated design + production of sustainable products, interiors, buildings, and cities, the Haworth Chair in Integrated Design, funded by Haworth Inc., will focus on interdisciplinary research and teaching, bridging academia and industry by disseminating valid, vital, and thought-provoking research. Contact Brian R. Sinclair, MRAIC, Professor and Dean, EVDS, University of Calgary.

All of the above are eo/aa employers. ■

✦ **G. Z. Charlie Brown** is now a Fellow of the American Institute of Architects. Investiture will be in June at Gehry's Walt Disney Concert Hall in Los Angeles.

📖 **Ralph Knowles'** new book, *Ritual House*, published by Island Press, is now at book sellers near you.



jacket photo: Mary Knowles

🏆 The **John Reynolds** trifecta—(1) elected as an ASES representative to the ISES Board (his first board meeting will be in Scotland in June, in connection with the EuroSolar Conference), (2) re-elected as Vice-President of the board of the Energy Trust of Oregon (a nonprofit organization with an annual budget of some \$50,000,000, of which 80% is spent on energy-efficiency projects [including daylighting, passive heating and cooling], and 20% on renewable energy generation [including PV, wind farms, and biomass]), and (3) the 2005 recipient of the ARCC James Haecker Distinguished Leadership Award for Architectural Research. The award will be presented at the ARCC/EAAE International Conference in June, in Philadelphia. ■



photo: Moji Navvab

Mojji Navvab living large within the BSRB double-skin.

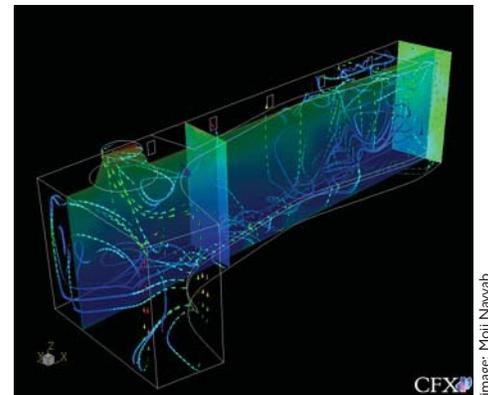
## MICHIGAN

[*Peripatetic Moji Navvab has been involved in three projects that use the UM campus as a laboratory for sustainable design.—ed.*]

**Light Pollution.** Debates about light often focus on amounts—too little limits activity and raises safety concerns; too much wastes resources and becomes a nuisance. This debate at the University of Michigan has shifted to a pursuit of balance as administrators grapple with new lighting technology, updated City of Ann Arbor codes, and real or perceived public safety concerns. Moji Navvab, enlisted by the university to survey and research lighting campus-wide, believes understanding how the human eye reacts to different combinations of color and light may be the key to finding the right balance between darkness and light.

To evaluate the present lighting conditions and to gather accurate scotopic and photopic illuminance and luminance levels, Navvab designed specialized sensors fixed in the eye sockets of a mannequin mounted on a golf cart. When driven at walking speed during nighttime hours, Moji's mannequin simulates a person walking during low-light conditions. Combining his measurements with digital aerial photometry and a questionnaire about lighting quality, Moji's established a database of both objective and subjective results for analyses and evaluation of exterior lighting on campus. Decision-making tools in the form of maps depicting perceived lighting scenarios help identify areas in need of lighting improvement and how new or proposed buildings might affect existing conditions. Future uses may involve campus master planning and lighting standards development. Navvab isn't sure where the debate will go; he's just pleased he and his golf cart mannequin have been able to shed some light on how we look.

**Double-Skin Façade (DSF).** Given the climate of Ann Arbor, "You could be in an office space where you roast in summer and freeze in winter," says Moji. The Polshek Architects (New York office), designers and engineers for the newly constructed Biological Science Research Building (BSRB), have done their best to avoid such conditions while improving energy efficiency and comfort within the building. Laboratories and their support spaces demand high volumes of treated air to maintain safe and comfortable working environments for research staff and students. The design team's goals were to significantly improve the total building environmental performance in terms of energy reduction. The use of a Double-Skin Façade (DSF) for the office spaces facing south provides a well-insulated wall that shields occupants from high summer heat and severe heat loss in winter through a fenestration system that uses clear glazing. This DSF acts as a chimney and allows free wind flow through the DSF void. It also acts as a good sound isolation against the continuous campus traffic noise. CFX was used to analyze the temperature gradient within offices adjacent to the DSF and the atrium space. The CFX program provides an easy way to compute comfort and to visualize airflow patterns within the complex geometry of the building. Results shows that air velocity and heat transfer through the DSF contribute to energy-efficient operation of the office space zone and reduction of unwanted heat storage within the atrium space.



Ventilation patterns at BSRB as modeled in CFX.

image: Moji Navvab

**Breathing Solutions for Buildings.** Many architects have begun to rethink and re-examine their ideas on energy costs and on how best to ventilate buildings naturally or mechanically using efficient and aesthetically pleasing strategies. The use of the state-of-the-art, multi-physics design tools, modern materials, and new techniques combined with ancient architectural understanding of airflow and heat transfer make it possible to create designs for healthy, energy-efficient "Breathing Solution for Buildings."

So, how does Hill Auditorium breathe when occupied by over 3,500 people? This historic Albert Khan Associates-designed building on the UM campus uses a displacement ventilation system. "After years of waiting, the old system was replaced, retrofitted to deliver cooled

• continued next page

air through registers under each seat,” Moji Navvab reports. “To provide ventilation, the space below the hall is filled with cooled air. The underfloor spaces beneath the seats of the main hall and the upper two balconies act as large plenums. Cooled air is sent to the plenum, then is forced very slowly through the grills under the seats into the auditorium. The slow airflow creates a uniform cool blanket of air along the floor and it moves up the ankles of the seated audience. As the cool air contacts or interacts with the body of the audience, it picks up the generated body heat and moves slowly upward from each level of the occupied spaces toward the specially designed outlets in the ceiling. This system has three advantages: (1) air quality is greatly improved because particulates are removed from the audience along with the warmed air, (2) it is more efficient (energy and delivery) than traditional overhead air distribution systems that require a much longer time and initially cooler temperatures, and (3) it provides better control of humidity in the hall. Studies have shown that given the size of this hall, the humidity level may affect the sound absorption at various frequencies differently. The new HVAC system has been in full operation since January 2004.



CFX underfloor ventilation model for Hill Hall.

—Moji Navvab

## TENNESSEE

Mark DeKay and Tracy Moir–McClellan, at the University of Tennessee’s Green Vision Studio, just completed work for the Beaver Creek Green Infrastructure Plan. The plan proposes future stewardship and settlement patterns to achieve cultural, aesthetic, environmental, and economic benefits in the 25-mile-long Knox County in the Tennessee Valley. The team developed GIS methods and new design patterns for a Land Stewardship Network—an interconnected system of water, slope, and heritage protection corridors. Within this framework, the plan proposes locations for a Constellation of Centers (new and strengthened settlement centers) and a Tapestry of Neighborhoods of various types. The team designed a Family of Parks located primarily within the stewardship network of varying scales and types and a Soft Transit Network of greenways, trails, and pedestrian links to connect the centers. ■

—Mark DeKay



Excerpt from the Family of Parks and Soft Transit Network map. For full effect, see page 1.

## STUFF FOR YOU

### ECS ON CD

Because the number of requests from SBSE members for the CD version of *Environmental Control Systems* has been both surprising and gratifying, I’ve added all the book illustrations plus related color “slides” in PowerPoint format. Previous recipients are invited to request the updated version.

The CD is available in two versions. Both contain the “ECS book” pdf. Instructor’s version is free for teachers plus \$4.00 per student, payable two weeks after the beginning of the course for which the CD contents are required or recommended. The contents may be distributed to students in any form. It also contains an Instructor’s Manual. Pay by check to Fuller Moore or PayPal to <fuller.moore@gmail.com>. Because many adopter’s institutions are paying the fees (rather than trying to collect from each student), I can send an invoice. Individual version (\$15) is for all others who agree not to allow additional copies to be made or distributed. It does not include the Instructor’s Manual nor the instructional slide files. I will include an invoice with the CD.

E-mail me to request either version, stating your agreement with the above terms. Include your title and mailing address, and I’ll send you the CD (and, in the case of the Individual version, an invoice for \$15). ■

—Fuller Moore

## LETTERS [CONT. FROM P. 2]

Thanks for putting that piece together for the newsletter and sending out the notice. I would like to ask you how you think you can actually stimulate and facilitate the discussion beyond this. I posted before, perhaps a year or more ago, but there were no comments. I wrote offline to Erv and Aydan because I thought I would get a response that way. I did. But everyone is too busy ... the eternal problem ... to take a look at how we are doing. I have some ideas, but I’d like to know if you have any thoughts on how to get something going that could be worthwhile.

Hoping for health and peace in 2006, for all of us and everyone else, too.

—Hal Levin, Building Ecology Research Group

*[SBSE’s retreats are conceived to give us all a chance to step out of our busy lives and to think about the big issues. Y’all come to the retreat to think and share!—ed.]* ■

## GREEN EVENTS

### ARCHITECTURE OF SUSTAINABILITY

The Architecture of Sustainability Conference May 4–7 in Washington, DC, and Shepherdstown, WV, cosponsored by the AIA Committee on Design (COD) and Committee on the Environment (COTE), promises to open new forms of discussion on design excellence and environmental innovation and marks an unprecedented collaboration between the two committees <[http://www.aia.org/br\\_cod\\_may06](http://www.aia.org/br_cod_may06)>. “The combination creates a perfect synergy,” remarks Greg Mella, one of the conference co-chairs and a COTE representative. “Sustainability enriches design just as much as design enriches sustainability.”

—Kathleen Lane

### HOPES

The Ecological Design Center (EDC) is pleased to invite you to the 12th Annual HOPES Eco-Design Arts Conference, to be held April 13–16, 2006, at the School of Architecture & Allied Arts on the University of Oregon campus. The theme of this year’s conference is “Permanence and Impermanence,” and we hope you’ll be there!

At HOPES 2006, the opportunities for learning, networking, and knowledge sharing are vast. Gain inspiration from the ideas and experiences of Permaculture Institute founder Penny Livingston. Join Christine Macy and Sarah Bonnemaison from the design partnership Filum, a research-based practice focusing on the design of ephemeral architecture and design research in the form-finding and fabrication of lightweight structures. Hear architect and professor Sergio Palleroni speak about designing for impoverished and marginalized communities around the world. Enjoy Lance Hosey, founder of atmo/atelier modern, a Washington-based design practice focused on multidisciplinary collaboration and environmental innovation and winner of the Next Generation Design Prize from *Metropolis*.

Please visit our web site <<http://hopes.uoregon.edu>> for more details. Save a stamp and an envelope by registering for the conference online! Credit cards will be accepted. And if you register before April 1, you can save \$10 off the registration fee. ■

—Jessica Gracie Garner

## POST-KATRINA/RITA UPDATE

After receiving several requests for updates on what’s been happening here on the Gulf Coast, I decided to provide a brief report. There are many universities and other institutions involved in the recovery efforts, and I’m sure that I’ll not be able to even come close to covering everything, but hopefully I can give you a meaningful overview with sources for additional information.

The Tulane School of Architecture had students scattered literally all over the world last fall. Tulane faculty and staff are now back and operating at full tilt in New Orleans with approximately 97% of their students returning. I’m told that applications for next year are up more than 20% over last year. The school has launched two related initiatives high on president Scott Cowen’s list of priorities for the rebuilding efforts of the university. The first is the creation of the Tulane City Center, already part of the School of Architecture’s Strategic Plan before Katrina/Rita, but now fully endorsed and supported by the university as a broader strategic initiative on urbanism. One of the center’s initial roles will be to act as an information clearinghouse for all the various rebuilding projects in New Orleans and surrounding areas. The center’s web site isn’t up yet, but you can contact Alan Lewis <[alewis5@tulane.edu](mailto:alewis5@tulane.edu)> or Dan Etheridge <[dether@tulane.edu](mailto:dether@tulane.edu)> for more information. The second is currently called CITYbuild: An Urban/Design/Build Consortium of Schools. It is conceived as a coalition of various outreach and design-build programs located at institutions throughout North America who have agreed to form a collaborative framework to work together in New Orleans for five years, during which a model for concentrated collective action would be developed. Later, the consortium would turn its efforts toward other cities and challenges. At this point I know that over 20 institutions are involved, and I’m sure that number will grow. If you are interested in learning more about the consortium, you can contact Doug Harmon at <[dharmon@tulane.edu](mailto:dharmon@tulane.edu)>.

There have been many conferences and workshops focused on rebuilding the Gulf Coast. I have been a participant at several of these events, and the two that impressed me most were the charrettes at the USGBC Greenbuild conference in Atlanta in November, and the ReInhabiting NOLA workshops in New Orleans in December, organized by the Tulane/Xavier Center for Bio-Environmental Research. Reports on the outcomes of these events can be found at <[http://green\\_reconstruction.buildinggreen.com/index.html](http://green_reconstruction.buildinggreen.com/index.html)> and at <<http://www.kernn.org>>. I highly recommend you visit these web sites for more information.

I’m sure most of you have seen photographs of the devastation wrought by these two storms (and, in the case of New Orleans, the resultant levee breaks), but I can assure you that unless you’ve seen it firsthand, you simply can’t comprehend the magnitude of the disaster. I’ve been to New Orleans several times, and participated in the ReInhabiting NOLA workshops last fall that included a bus tour of the lower Ninth Ward, but I hadn’t been over to the Mississippi Gulf Coast until recently. Driving between Biloxi and Gulfport on Mardi Gras, I saw the full extent of the damage, and I can tell you it was simply unbelievable! I know that John Quale and his students from UVA are working on a project on the Mississippi Gulf Coast. You can find out more about it at <<http://www.ecomod.virginia.edu>>.

The rebuilding efforts are really just beginning, and I’m sure it will be several years before things return to any state that might be considered “normal.” Serious socio-political issues have yet to be addressed. As an example, the City of New Orleans is not likely to see its population return to anything close to what it was before the storms. The so-called “footprint” concern (where rebuilding not occur) is an extremely volatile issue in the city right now. Ingenious plans and design ideas by dozens of well-known architects, urban planners, and scholars were recently presented at a conference and exhibit in Rotterdam <<http://www.nai.nl/e/index.html>>, but, as Dr. John recently observed, you can’t expect physical rebuilding alone to restore the heart and soul of a very special place. ■

—Chris Theis



*Katrina poised over the Gulf of Mexico on collision course with New Orleans and the Mississippi Coast.*

photo: NOAA

## DENVER TOOL DAY AT REI

This year the gap between the ASES Conference and SBSE Retreat will be filled with a Tool Day on Thursday, July 13 from 10am until 6pm, at the Mithun-designed REI building in Denver. Mithun has established a reputation for leading-edge sustainable design, winning acclaim for IslandWood and REI's Seattle Flagship Store among other projects. Led by Tool Day gurus Walter Grondzik, Bruce Haglund, Alison Kwok, and Heidi Spaly, participants will observe and assess REI Denver during working hours on a typical summer day.



REI as seen from the Platt River.

photo: Heidi Spaly

As usual, the goal of Tool Day is to bring together teams of teachers, students, and practitioners to learn to perform post-occupancy evaluations of buildings using Vital Signs methodology and state-of-the-art handheld instrumentation. We'll provide the tools and training, and you'll provide laptops, digital cameras, and unbounded enthusiasm. See <<http://www.sbse.org/>>.

SBSEers are privy to a 50% discount for this ASES-sponsored workshop, but will need to download the registration form from the Solar 2006 web site <<http://www.solar2006.org>> and register by fax or mail. ▮

—Bruce Haglund

## SHADING DEVICES IN QUESTION

[Here's a bit of outcomes assessment that may help shape your teaching.—ed.]

Posed to 70 ECS students in December 2005: Identify two reasons you have not used shading devices on your past studio designs.

<u>Response</u>	<u>Number</u>
1. Not aware of the significance of shading devices	36
2. Shading devices are not aesthetic ... hard to aesthetically integrate	34
3. Did not know how to size	20
4. Takes too long or too complicated to figure out how to size	12
5. Not a priority of instructor or project program	8
6. Not aware of the different types of shading devices or aesthetic possibilities	6
7. Blocks view	4
8. Not integrated into design concept	3
9. Lack of precedents	2
10. Shading devices diminish amount of light	2
11. Tinting or interior shades take care of heat gain	2
12. Need full solar gain	1

—Phil Mead



photos: Tisha Egashira

Operable shading devices enliven the façade of Arup Associates' Arup Campus at Solihull, UK.



Richard Rogers' shading devices glow at Chiswick Park, a virtual ode to shading.

## PAST AND FUTURE?

### 50 YEARS OF CLIMATE CHANGE HISTORY IN BRIEF

[Harold offers a droll view flavored by 90+ years' experience.—ed.]

1. Coal, oil, and gas are forever; nuclear energy will be "too cheap to meter." Half the world lacks comfortable housing.
2. 1954: university science starts active/passive research.
3. 1974: federal funds for "short-term research solutions" fail and are essentially eliminated. Government turns to its own "long-term lab research."
4. Favored-industry subsidies assure "guarantee" of near-term paybacks.
5. Nearly all solar research was cut for years, started for a few years, then cut again, started again, and cut again.
6. 1994: electricity shortages become apparent, active solar systems are hyped; passive ones are forgotten.
7. New passive progress is ignored, even by architects. Uneconomic active systems again are subsidized on a massive scale though half the world still lacks comfortable housing.
8. Again, a worldwide water shortage is recognized and regretted; but the 1965 research is not resumed nor used.
9. Money for war and outer-space would solve housing and water problems for half the world.

### 50 YEARS OF CLIMATE CHANGE IN THE FUTURE (HOPE)

1. Parents ask their child's 8th-grade teacher to average the local annual high and low temperature (min + max/2).
2. High-school frosh science teachers tell your child how to use passive solar energy to keep a building within human thermal comfort zone by storing nature's solar heat or cold from the night sky.
3. Your child goes to college where a professor, a reader of elementary solar energy technology, has a brilliant idea to justify an advanced degree and tenure.
4. Your child builds something according to the professor's recommendation and regrets the failure.
5. Your child finds a builder who managed the first year of high school and who knows the elements of water conservation to design/rebuild. ▮

—Harold Hay

## FATAL ATTRACTION?



photo: Heidi Spaly

The climbing wall at REI Denver affords means for Tool Day participants to ascend into the space to test for temperature stratification.

## NICK'S D-CUBES

The most popular forms of solar heating seem uneconomical these days, with high costs and low solar fractions (20% for some FSEC-certified water heaters), so they seem to require customers who are concerned about climate change, among other things. If solar house heating were to simply cost less than other forms of house heating, more people might use it.

After hearing lots of doubt that low-cost solar house heating can work with a high solar fraction outside the Southwest from local architects, reporters, and others who read SBIC guidelines which say houses in Philadelphia can only be 60% solar-heated at best and seeing lots of “solar houses” that are only 30–50% solar-heated versus those “with no other form of heat,” we should dispatch Deployable Doubt Dispellers (“D-cubes”) to regional Infestations of Doubt, unboltable 8' cubes with little windows so people can peer in to see big dial thermometers inside that stay at 70°F for a few cold, cloudy days.

Lots of people (eg., AIA, SBIC, and SBSE) seem to have forgotten that things like this can be engineered, notwithstanding high-school physics and houses by PE Norman Saunders, who calculates needs for “purchased heat” with Gaussian weather stats in the same way that other engineers calculate 100-year floods: The 1954 *ASHRAE Handbook* gives the 1% and 2½% temperatures for Boston as 0° and 8°F (−17.8° and −13.4°C). For −15°C, the holding time for our houses is 3 days, giving a standard deviation of 7.8°C. In December, the 1% temperature is 2.1 standard deviations lower than average, so can be expected to occur about once every 4.5 years. This calculation suggests the need to purchase heat [or wear a sweater :-)-Nick] in December once in 35 years. [Naturally, Nick goes on at length to prove several D-cube scenarios.—ed.]

We might deploy D-cubes to Rifton, Port Jervis, and Harlem, NY; Kempton, Philadelphia, Pottstown, and Bryn Mawr, PA; at a wintertime MREF or ASES conference; a DOE Solar Decathlon; the Chicago Museum of Science and Industry; and lots of YMCAs and high schools. ■

—Nick Pine



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