centerline

Newsletter of the Center for the Built Environment at the University of California, Berkeley

Winter 2008

Using Feedback from Building Users

Director's Note

Contents

Contact Us

Email: **cbe@berkeley.edu**
Web: **www.cbe.berkeley.edu**

Center for the Built Environment (CBE)
University of California, Berkeley
390 Wurster Hall #1839
Berkeley, CA 94720-1839
510.642.4950 | fax 510.643.5571

Dear Industry Partners,

A fundamental part of CBE's mission is to provide the building industry with feedback about completed projects. In this edition of *Centerline* we focus on our Occupant IEQ Survey, one of our most exciting research programs. The CBE survey allows building owners, managers, and design teams to easily collect and compare information about building users' preferences, satisfaction, and self-assessed work effectiveness. We also use the survey in many of our own research projects, and as such it provides the underpinnings for much of our research.

Interest in the CBE survey is growing, as evidenced in several upcoming publications. It is cited in an article on post-occupancy evaluation in the February issues of *Architectural Record* and *Engineering News Record*, and in some of McGraw-Hill's regional construction publications. As our database of buildings grows, it becomes a more valuable resource for benchmarking and studying trends in building design and operations. Industry partners receive special access to the survey tools and database, and we encourage you to learn about, and to take advantage of this valuable resource.

Sincerely,
Edward Arens

Using Feedback from Building Occupants

Listening to users to improve operations and design

Although building occupants can provide valuable insights about how buildings are performing, they are rarely encouraged to share their observations and opinions. Facility managers, who frequently get feedback from building occupants only in the form of complaints, tend to have a less-is-more attitude towards such feedback. However within the building industry there is a growing appreciation of the importance of building commissioning and post-occupancy evaluation (POE).

Of the methods available for gathering feedback from occupants, the use of electronic surveys has proven to be one of the most cost effective. Researchers at the Center for the Built Environment, working in collaboration with their building industry partners, have developed CBE's Occupant Indoor Environmental Quality (IEQ) Survey. One of the key goals of this effort is to encourage the use of feedback from occupants, and to create a feedback mechanism in the building industry that will improve the ways buildings are operated, and to inform the design process for future buildings.

This web-enabled survey tool includes a series of individual web pages, or modules, for office layout, office furnishings, thermal comfort, air quality, lighting, acoustics, and building cleanliness and maintenance. This set of "core" survey modules has been kept consistent in order to accumulate a large, standardized database useful for benchmarking and trend analysis. Optional modules have been added for special types of occupancies, and to study specific or unusual design options.

One of the key collaborators for CBE's survey research has been the **U.S. General Services Administration** (GSA), and CBE has developed and implemented surveys in support of several GSA programs. In addition, GSA now uses occupant surveys as the first phase in its "deep dive" process, a consultant-facilitated pre-design phase during which organizational patterns are studied and workplace strategies are developed. The surveys are used as the consultant's first interaction with user groups, and acts as an invitation for them to participate in the process. In subsequent phases, consultants conduct focus groups, and make observations of how occupants use their workplaces.

Through this process GSA has made unexpected discoveries about how people perceive their own work patterns. For example, people tend to overestimate the amount of time that they spend in their workplaces, explains Kevin Powell, Director of Research with GSA's Office of Applied Science. "People think that they are spending 80% of their time in their workspace, but our observations show that they spend only 30% of their time there. They actually spend more time in meetings in various places, and the times they are out of the office they simply take out of the calculation." After a redesign is completed and occupied, GSA implements additional surveys to assess the effectiveness of the new workplace.

Building occupants represent a wealth of information about how well a building works.

CBE's occupant survey has now been implemented in over 400 buildings, and now contains responses from over 45,000 individual building occupants. This rich dataset has been used for studies conducted by CBE staff, industry partners, and other research organizations. CBE has mined the survey data to investigate the performance of green and LEED-rated buildings, to study workplace acoustics, and for a study of naturally ventilated buildings that led to ASHRAE's adoption of a new "adaptive" comfort standard—a standard that allows naturally ventilated buildings to be designed based on parameters that better represent occupants' varying preferences over time.

In addition, CBE member firms such as **Stantec** and **HOK** have used the survey, in combination with interviews and other data collection activities, to evaluate a number of their projects. Both firms have presented results of their POE studies at USGBC's Greenbuild conference, and HOK also included their findings in their *Guidebook to Sustainable Design*.

Kim Fowler, Chief Research Engineer with the **Pacific Northwest National Laboratory**, used the CBE survey as part of a recent study that looked at whole building performance in terms of energy, waste, water, maintenance, transportation, and occupant satisfaction in 12 GSA buildings. The study, currently pending publication, compares individual building metrics with relevant aspects of occupant satisfaction, for example comparing energy costs against occupant satisfaction with lighting and thermal comfort. [See inset box, page 6.]

Kim found the survey beneficial to her research, "I find this tool very useful," and she suggests that it will be valuable both to researchers and to building owners and operators. She adds that the survey would be especially useful to institutional building managers, for example at universities and national laboratories, to assess operational improvement needs. However, when the survey is used for research purposes, she points out the importance of managing the expectations of building occupants taking the survey. "People taking the survey may expect someone to address their hot and cold complaints."

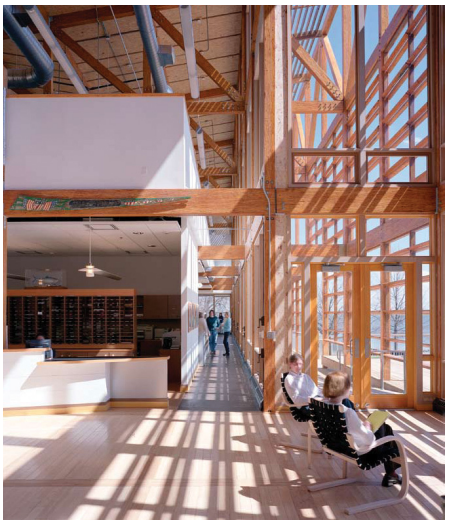
Surveys results can be viewed with advanced reporting tools such as CBE's "building scorecard," which enables the viewing of results of single buildings via a web browser, which allows for filtering and sorting of the survey results, or by means of a printable PDF document with summary graphs. For users wanting to conduct more in-depth analyses of one or more buildings, the survey's "data explorer" allows users to create and compare sets of buildings based on any number of attributes. John Goins, CBE's lead researcher for CBE's survey research, thinks that these data analysis tools can be addictive. "Once people start using the data, they want more and more," he says. In response to users needs, CBE recently improved the data explorer with the addition of standardized building sets, such as all LEED buildings in the database.

Using occupant surveys to identify 'Livable Buildings'

Last fall CBE created the a new award program to recognize buildings that demonstrate exceptional performance in occupant satisfaction, resource efficiency, and overall design. This program is unique among building industry awards, as it is the only one to include the preferences of building occupants in its selection criteria To be considered for the award, buildings must rank among the top scorers in CBE's occupant survey.

A seven-member jury comprised of building industry leaders selected three 2007 Livable Buildings Award winners, based on the results of the occupant surveys, and other information submitted by project

teams. The jury identified these buildings as ones that reinforce the owners' sustainability goals, and do so while promoting the health and productivity of occupants working inside.



Winners of the Livable Buildings Award 2007, clockwise from top: Global Ecology Research Center, **EHDD Architecture;** Kirsch Center for Environmental Studies, **VBN Architects/Van der Ryn Architects;** Philip Merrill Environmental Center, **SmithGroup**

Using occupant surveys with LEED for new construction

In 2005, LEED NC standards were revised to allow occupant surveys to be used for thermal comfort verification, credit point EQ 7.2. Since then adoption of the survey has grown, and has now been implemented in 60 LEED-rated buildings. This increase in LEED buildings in the survey database reflects similar trends in the building industry, and will be used to study whether these high-performance buildings are providing IEQ that is better than that in standard buildings.

John Goins notes that many survey users are initially interested in using the survey to obtain the LEED point, but soon appreciate the additional benefits of using the survey. "People put a lot of effort into designing buildings, they want to get the pat on the back for doing a good job, and developers want to know that they have chosen a good design team."

One recent survey user describes getting exactly this type of positive feedback. **Paladino Green Building Strategies** of Seattle used CBE's survey as part of USGBC's new volume certification process, which has been developed to streamline LEED certification for retail roll-outs, or other "volume-build" projects. Paladino's office implemented CBE's survey in 20 branch banks, including ten existing banks, and ten new banks based on a new green prototype designed by **Gensler**.

Brad Pease, who led the LEED certification process for Paladino, says the clients were thrilled with the results. "The results show that the new branches save energy, and provide higher occupant satisfaction," he explains. "The green branches were in the 90th percentile in many of the survey categories, while the old ones were around the 50th and 60th percentiles," when compared to other buildings in the database of a similar age. The project team found obtaining the LEED EQ 7.2 credit point to be relatively simple, as building owners need only submit a letter of intent outlining their plans to implement the survey in the future.

The team encountered one obstacle when their client's HR department expressed concerns that the bank occupants might think that survey would affect their work environment, or that their responses would be used in performance reviews. They

addressed these concerns by making it clear in the survey's welcome page that a neutral third party was conducting the survey for research purposes. Brad thinks that Paladino will use the survey for future projects, as the cost of implementing the survey is well below the cost of most other upgrades that would provide LEED credit.

Occupant surveys beyond the office workplace

CBE has implemented its survey primarily in office environments for several practical reasons: office workers generally have web access, and are very familiar with conditions in their individual workspaces. As the survey research matures, CBE faculty and staff are looking for ways to adapt the standard survey for other building types besides office buildings.

As John Goins explains, "There is a demand for surveys in health care and schools. We would like to make new standard surveys for these types of buildings, with questions that will be parallel to those in our office survey, but worded appropriately for each building type." CBE has already developed and implemented a "clinical" module for health care facilities, and has conducted surveys in four hospitals.

In collaboration with **University of California, San Francisco**, CBE also developed a specialized version of its survey for health science laboratories, and implemented it in four labs at the school. Craig Peterson, AIA, Associate Director of Capital Programs at UCSF, explains that his group is using the results of the surveys to determine customer satisfaction with the various lab layouts, and to learn of the benefits and shortcomings of each. His group was surprised to see that in labs with identical building footprints, satisfaction levels among user groups vary widely. "These are different floors in the same building, with interiors done by different design teams, but the results show substantial differences. It is up to us to go back and analyze these labs; its fertile ground for study."

The UCSF facilities group found that the survey provided valuable information about the labs. Craig explains that his department is "looking to use the survey on all appropriate major projects, in both pre- and post-occupancy studies. We are planning to do a survey for a new child care center, and with other child care centers to follow. We will use the survey for offices, labs, community centers, and likely classrooms as well."

The future of the CBE survey

For GSA, surveys have become a core tool for many consultant-directed projects, and Kevin Powell tells us that GSA plans to expand its use of surveys in the future. "The deep dive process we are doing is about to be rolled out on a much broader basis in a slimmed down version." In the future, GSA's "realty specialists," or project managers, will have the ability to implement occupant surveys as part of an integrated electronic toolkit.

To facilitate setting up new survey implementations, CBE collaborated with GSA to create a "survey setup wizard" which allows some survey users to launch surveys without assistance from CBE staff. The tool has been used by GSA and Paladino, and holds promise for greatly expanding the survey's reach. John Goins would like to see CBE implement 100 or more surveys per year, but thinks that the center could do up to 50 a week by optimizing the use of the setup wizard. John hopes that the use of occupant surveys will become a standard method in industry to describe and compare buildings in general. "Eventually occupant surveys could be used as part of appraisal, insurance and mortgage underwriting, and life-cycle analysis, that's one grand vision for occupant surveys."

Additional Information

Information on the CBE survey: http://www.cbe.berkeley.edu/research/survey.htm

Detailed information for setting up a survey: http://www.cbe.berkeley.edu/research/survey_links.htm

"Looking Back and Moving Forward," *Architectural Record*, February 2008: http://construction.com/CE/articles/0802edit-1.asp

K.M. Fowler, and E.M. Rauch, 2007. "Building Sustainably: Assessing Whole Building Performance," Pacific Northwest National Laboratory, Richland, WA.

Project Updates

Findings from our current research

CBE's new commissioning cart was tailored for use at the New York Times (center), by **Renzo Piano Building Workshop.**

Fred Bauman demonstrates the cart's user interface during a tour of the building.

Project: **Field Studies and Commissioning of UFAD Buildings**

The UFAD research team at CBE has created a new four-part protocol for field-study evaluation of UFAD buildings. The protocol is part of a project being conducted with support from the **U.S. General Services Administration**. The four-part evaluation method includes: (1) implementation of the CBE survey with specific raised floor questions, (2) collection of EnergyStar data, (3) measurement with CBE's building commissioning cart, and (4) interviewing design engineers and building operators. The project team tested the new protocol in one GSA location, submitted a draft report based on that field study, and is currently planning to study approximately three more sites. In addition to the evaluation of these GSA buildings, the project will provide valuable knowledge on building operations that will be used as part of a related CBE project, the development of UFAD commissioning guidelines.

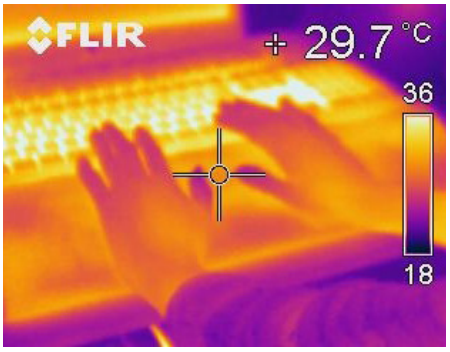
In our previous issue of *Centerline*, we described the use of CBE's commissioning cart at the new 52-story headquarters for the New York Times. CBE researchers Fred Bauman and Tom Webster recently participated in a seminar on this commissioning effort at the ASHRAE Winter Meeting in New York, along with representatives from the Times and Lawrence Berkeley National Laboratory. (A video of the seminar may be downloaded from the ASHRAE website, fee required.) In conjunction with the seminar, a student tour of the building was held, and a related presentation on the project was provided by David Cooper, Managing Director with Flack & Kurtz. From all accounts the commissioning work has been very successful, and many of the building's highly advanced control system are operating effectively. CBE's research staff hopes to report on the commissioning process and results in the near future via reports or publications.

Project: **Low-Power Task-Ambient Systems Hold Promise for Energy Savings**

Results from CBE's study on Task-Ambient Conditioning (TAC) show that TAC systems have the potential for saving energy, providing a high level of comfort, and improving the perception of indoor air quality. The project team tested a TAC system in a series of 90 three-hour tests, with varying ambient temperatures. The tests used a TAC system that gives subjects the ability to control airflow around the head and hands, and to control localized radiant heating of the hands and feet. During the tests subjects were asked to conduct performance tests such as typing, sudoku puzzles, and math questions.

Our analysis of the test results show that by adjusting the TAC system, occupants can be comfortable at a wide range of room ambient temperatures, from 64°F (18°C) to 86°F (30°C). In addition, with the non-uniform environments created by the TAC devices, task performance did not decrease. In fact, in some cases task performance was better with the TAC system than under the neutral conditions. The perception of good air quality was also significantly improved by providing more air motion in warm conditions, even if it was simply re-circulated room air.

Instead of air-conditioning an entire space to a tightly limited range of temperatures as do conventional HVAC systems, TAC systems allow for a wider range of acceptable conditions. Energy modeling with EnegyPlus shows that energy savings compared to conventional HVAC systems could be as high as 60% in a climate such as Oakland, CA. The smallest savings occurred when the climate is very cold, such as winter in Minneapolis. The report is available on the CBE website at http://www.cbe.berkeley.edu/research/pdf_files/Zhang2008_TAC.pdf.



Infrared image of hands with heated keyboard, one of the TAC devices used in the human subjects test.

A test subject completes a math test during the TAC test.

Project: **Simplified Airflow Design Calculator for UFAD Buildings**

Until recently, the lack of guidelines for cooling airflow design has created much uncertainty for UFAD system designers. As part of CBE's development of whole-building energy modeling tools for UFAD, CBE recently released to industry partners a simplified airflow calculator for beta-testing. The calculator consists of an Excel spreadsheet and user notes, and is supplied with a series of default values to assist first-time users. This beta-version is intended to provide support for the design of UFAD interior zones, and integrates the impacts of heat transfer that are specific to UFAD buildings including heat loss into the underfloor plenum and temperature stratification. Future versions of this tool, now in development with support from the California Energy Commission's PIER Program, will include support for the design of perimeter zones.

A description of the design tool and sample results from the calculator were published in the *ASHRAE Journal* article, "Cooling Airflow Design Calculations for UFAD," in October 2007, and is on CBE's website at http://www.cbe.berkeley.edu/research/pdf_files/Bauman2007_UFADairflowDesign.pdf. We have already gotten positive feedback about the article, and from users of the calculator. Industry partners wishing to test the beta-version may email us at cbe@berkeley.edu.

Partner News

Research collaborations with CBE consortium members

Photo: Anton Grassi

Boston's BioSquare Biomedical Laboratory Facility by **KlingStubbins** received LEED certification.

Photo: Jim Meggerson

At the Missouri Employers Mutual Insurance building, **Larson Binkley** incorporated UFAD in the majority of the building, and displacement ventilation in non-raised floor areas.

New Industry Partners Practice Sustainably Nationwide

In CBE's October 2007 meeting we welcomed several new architecture and engineering partners having practices with broad geographical exposure. The latest additions to CBE's consortium include **KlingStubbins**, which provides professional services in architecture, engineering, interiors, planning, and landscape architecture. The firm consists of more than 550 professionals with locations in Cambridge, MA; Las Vegas, NV; Philadelphia, PA; Raleigh, NC; San Francisco, CA; and Washington, DC. Its areas of market focus and specialization include corporate, government, health care, higher education, hospitality and entertainment, civic, R&D, and mission-critical facilities. The firm views sustainability as an inherent component of the design process, and has implemented an integrated approach to address the interrelationships between building siting, envelope, systems, and energy and resource consumption.

Also new to CBE's consortium is **Larson Binkley, Inc.**, an MEP engineering firm located in Kansas City and practicing nationwide. Larson Binkley has a staff of nearly 100 employees, including 70 engineers and designers with professional registrations in all 50 states. The firm is known for its wide use of innovative technologies for HVAC, indoor air quality, and electrical and water efficiency on a variety of project types including retail, restaurants, schools, office buildings, data centers, laboratories, and other high-performance buildings. Larson Binkley has also built a significant resume applying UFAD and displacement ventilation (DV) systems in commercial buildings, and has completed over 4M ft^2 of UFAD in over 30 buildings, and has designed 2M ft^2 of DV projects.

The work of these two industry leaders is closely aligned with CBE's research, and we look forward to collaborating with them.

Pacific Energy Center Named Top Building Industry Educator

The **PG&E Pacific Energy Center** in San Francisco was recently honored under the AIA's Continuing Education System's (AIA/CES) Award for Excellence program. The Energy Center received the maximum rating of five stars from the award jury, in the Professional Organization Category. Organizations are evaluated in a number of areas including commitment, development of a strategic plan for education programs, design and implementation of individual programs, record keeping, participant satisfaction, program evaluation, and improvement.

This award builds upon the Energy Center's record of excellence in educating building professionals to design, renovate, and retrofit energy efficient buildings. Previous recognition for the Energy Center has included an Honorable Mention from Education from the American Council for an Energy Efficient Economy's (ACEEE) America's Best Awards in 2003, the AIA San Francisco Chapter's Special Recognition Award in 2006, and most recently, the 2008 Nathaniel A. Owings Award from the AIA California Council.

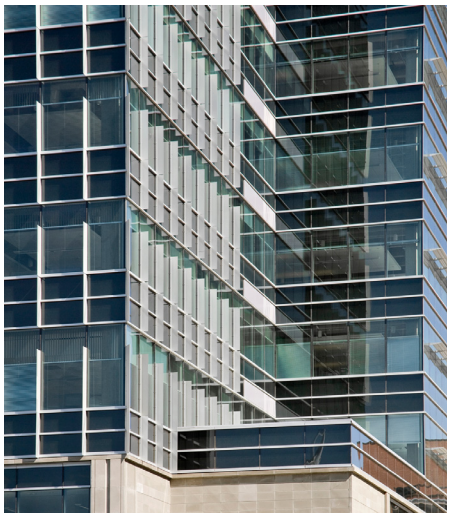
New Study of High Performance Facades and Zero-Energy Buildings

Mark Perepelitza, Associate Partner with **Zimmer Gunsul Frasca Architects**, has received funding to study high-performance window systems that support the goal of zero-energy buildings in the Northwest. With support from Janet M. and Van Evera Bailey Fellowship, Mark will collaborate with a number of experts and institutions including CBE, Lawrence Berkeley National Laboratory, and the University of Oregon, to collect best-practice research and performance details on fenestration systems.

His investigation of case studies in the United States and Europe will include site visits and interviews with a wide variety of industry experts. To identify assemblies with the most promise, a set of distinct window system configurations will be analyzed to measure daylighting, energy performance, user comfort and perception, and relative cost. "My goal," he says, "is to engage professionals, industry, and the general public in an on-going dialogue about how we can create buildings that maintain essential connections for building users, are a dynamic part of the urban fabric, and also meet performance demands." We look forward to collaborating with Mark on this study and learning from his findings.

In related work at ZGF, Mark served as project architect for the EPA Regional Headquarters in Denver (right). The project incorporates several exterior and interior shading strategies, with automated interior louver blinds in the daylight zone of the south facades to maximize daylighting and control glare.

Mark Perepelitza, AIA, LEED AP



Courtesy of Zimmer Gunsul Frasca Architects LLP; Photo: Robert Canfield

EPA Regional Headquarters, Denver
Zimmer Gunsul Frasca Architects with Opus Northwest

CBE Welcomes New Partner Leadership

At CBE's Industry Advisory Board (IAB) meeting last October, the board chose Phil Williams to be the new Partner Chair, and Allan Daly to be the new Vice Chair. Both Phil and Allan have actively supported CBE's work for many years, and have extensive hands-on experience delivering high-performance buildings.

Phil Williams is Webcor's Vice President of Systems Engineering and Sustainable Design. His project experience ranges from commercial office to hotels, high density residential, large central plants, hospitals and advanced technology/ biotech production facilities. Phil recently served as the Chairman of the San Francisco Mayor's Task Force on Green Buildings. As CBE's Partner Chair, Phil will act as a facilitator for the Friday portion of the IAB meeting, and will be an advocate and representative for all industry partners.

Phil believes that this is a remarkable time for the building industry and CBE. "As our understanding of good design broadens to incorporate sustainable design, CBE is among a select group of organizations, positioned both strategically and tactically, to immediately contribute active measures and continuing research to the improvement of our built environments. Buildings are where we live and work, where 40%-50% of all energy is consumed, and where 70% of our lives are spent, these are the very buildings that our firms, and we as professionals, have designed and built.

Allan Daly, a principal with Taylor Engineering, is a graduate of UC Berkeley and worked as a researcher for UC Berkeley's Center for Environmental Design Research. Allan and has made great contributions to CBE's UFAD whole-building energy model development over the course of many years. Before joining Taylor Engineering in 2000, Allan worked as a program assistant for the Environmental Protection Agency's Indoor Air Division and the Department of Energy, and as a mechanical engineer for Arup in San Francisco. In his role as CBE Partner Vice-Chair, Allan will assist the Chair and serve as alternate when he unable to attend. Allan tells us that he is honored to have been chosen the Vice-Chair for CBE. "I look forward to working with CBE industry partners, researchers, and students to focus the incredible talent and experience that CBE represents on issues that will help move our industry forward."

Phil and Allan take over for former Partner Chair, Kevin Kampschroer, and Vice Chair, Dru Crawley, who served in these roles for several years. With this transition we would like to thank Kevin and Dru for their involvement.

Phil Williams, PE, LEED AP
CBE Partner Chair

Allan Daly, PE
CBE Partner Vice-Chair

New UFAD research planned at Johnson Controls lab

Photo: JCI

UFAD lab facility showing solar array, capable of accurately modeling solar gain into the test space.

In the development of underfloor air distribution (UFAD) modeling capability for EnergyPlus, researchers from CBE and **YORK** utilized YORK's full-scale test facility in York, Pennsylvania. The lab utilizes a sophisticated environmental chamber, capable of simulating outdoor temperatures ranging from zero to 110ºF, allowing researchers and product designers to determine how UFAD systems perform under a range of solar effects and outdoor temperatures. The results from these tests have been incorporated into the current version of EnergyPlus, and provide accurate modeling of interior zones in UFAD buildings.

This lab facility was recently updated and now provides support for testing, training, and demonstrations for YORK air-distribution technology, now marketed by **Johnson Controls, Inc.** CBE researchers are assisting in the design of a second JCI lab in Kansas City, Kansas. As a continuation of the EnergyPlus for UFAD development, CBE plans additional tests in the Kansas City lab for the development of the UFAD perimeter zone model. This series of tests is expected to begin in early summer of 2008 and results incorporated into EnergyPlus later in the fall of 2008.

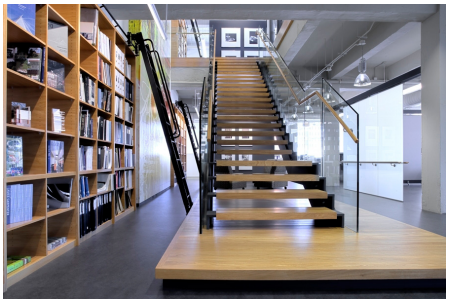


Photo: Ray Steinke

"Customspace," the new Calgary office for **Cohos Evamy integratedesign™**

CBE partners demonstrate leadership with new LEED projects

The new Calgary studio of **Cohos Evamy integratedesign™** has achieved LEED Silver certification for its new office located in Calgary's historic Customs House building.

Janice Liebe, a partner with the firm, describes the project as an opportunity to clearly demonstrate the firm's commitment to sustainable design. "But perhaps the most satisfying element was the level of enthusiasm, pride and ownership our design professionals took in the process. They took it upon themselves to build a greater understanding of what sustainability means in the work environment and certainly delivered a product that has been universally applauded by the rest of the staff."

Photo: Ron Blunt

Walter Reed Community Center, Arlington County, VA, by **RTKL**

The new Walter Reed Community Center by **RTKL** was designed to LEED Silver and is in the process of being certified. Runoff from parking areas is captured in rain gardens, and a planted roof covering 70% of the building eliminates the need for water filtration while providing a haven for butterflies.

The project will receive construction waste management LEED credits for diverting 79% of the construction waste from landfills. Stone from the building previously occupying the site was reused in new landscape walls. The project has won the Northern Virginia National Association of Industrial & Office Properties Award for Best Building in the category of Environmentally Responsible.

Committee Report

CBE staff and partners propose revision to ASHRAE comfort standards

CBE's Ed Arens, Hui Zhang, Charlie Huizenga, and CBE Partner Gwelen Paliaga are proposing a revision to ASHRAE Standard 55 that will enable designers to use air movement to offset air temperature in warm conditions. The existing standard views air movement primarily as a source of drafts, and restricts air movement to almost imperceptible levels unless it is under the personal control of the occupants. CBE studies in buildings have without exception shown an overwhelming preference for more air movement in neutral and warm temperatures, in direct conflict with the standard's requirements. The standard causes substantially more discomfort due to lack of air movement than it averts by limiting drafts. In addition, the standard requires higher energy expenditure by preventing air movement cooling.

The proposed revision defines a zone extending from 23°C (73.5°F) and 30°C (86°F) in which combinations of air movement and temperature will provide comfort without the requirement for personal control. Temperature-sensing fan controllers can be used to maintain comfortable conditions in the zone.

Charlie Huizenga will program several associated upgrades to the ASHRAE Comfort Tool to simplify designing to the new requirements, and to predict air speed requirements for a wider range of occupancies, including industrial work.

The proposed revision will be released for public review in the next few months.

USGBC increases research funding to $2 million

Last summer we reported that the USGBC had made a commitment of $1 million to fund research that would advance building science and market transformation toward environmental and human sustainability. The USGBC recently announced that the funding level has been increased to $2 million, with $500,000 reserved for K-12 school research relating to occupant impacts.

The USGBC also announced that the pre-proposal phase for applications is scheduled for February 12 – March 6, 2008. The purpose of this first phase is to evaluate abstracts of proposed research in order to save time for applicants and reviewers. Selected applicants will be invited to submit comprehensive proposals in a later phase of the award process.

The USGBC's objective is to support projects that will have an immediate and positive impact on sustainable building development, design, construction and operation. An emphasis will be placed on outcomes that can be immediately applied by owners, designers, builders, and operators. The USGBC cites several examples of applicable research, such as design guidelines for integrated systems; process improvements and tools for design, delivery and operations; metrics, benchmarks, and databases; advanced building materials, components and systems; policy analysis and development; and codes and standards.

Research grants will be awarded in two general ranges: $50,000 to $150,000, and $150,000 to $250,000. Projects should be planned for one to two years, or up to three years for projects that will collect data over longer periods of time. Academic, non-profit and other research institutions are the primary audiences for the grants. For-profit entities may apply, but are encouraged to partner with academic or non-profit institutions. For more information, see http://www.usgbc.org/Docs/News/ResearchFund_RFPP_Feb4.pdf.

Industry Partners at the Center for the Built Environment

CBE's research is supported and guided by CBE's consortium of industry partners, a diverse group of leaders in the building industry. The Center's membership includes the following firms and organizations (as of Jan. 2008):

Armstrong World Industries
Arup*
California Energy Commission
Charles M. Salter Associates
Cohos Evamy
CPP
EHDD Architecture
Engineered Interiors Group (EIG)
Flack + Kurtz
Gensler
Haworth
HOK
Johnson Controls*
KlingStubbins
Larson Binkley
Pacific Gas & Electric Company
Price Industries
RTKL Associates
Skidmore, Owings & Merrill LLP
Stantec
Steelcase
Syska Hennessy Group
Tate Access Floors*
Taylor Team:
- Taylor Engineering
- CTG Energetics
- Guttmann & Blaevoet
- Southland Industries
- Swinerton Builders

Trane
U.S. Department of Energy*
U.S. General Services Administration*
Webcor Builders*
Zimmer Gunsul Frasca Architects

* founding partner

CBE
CENTER FOR THE BUILT ENVIRONMENT

Contact Us

Email: **cbe@berkeley.edu**
Web: **www.cbe.berkeley.edu**

Center for the Built Environment (CBE)
University of California, Berkeley
390 Wurster Hall #1839
Berkeley, CA 94720-1839
510.642.4950 | fax 510.643.5571