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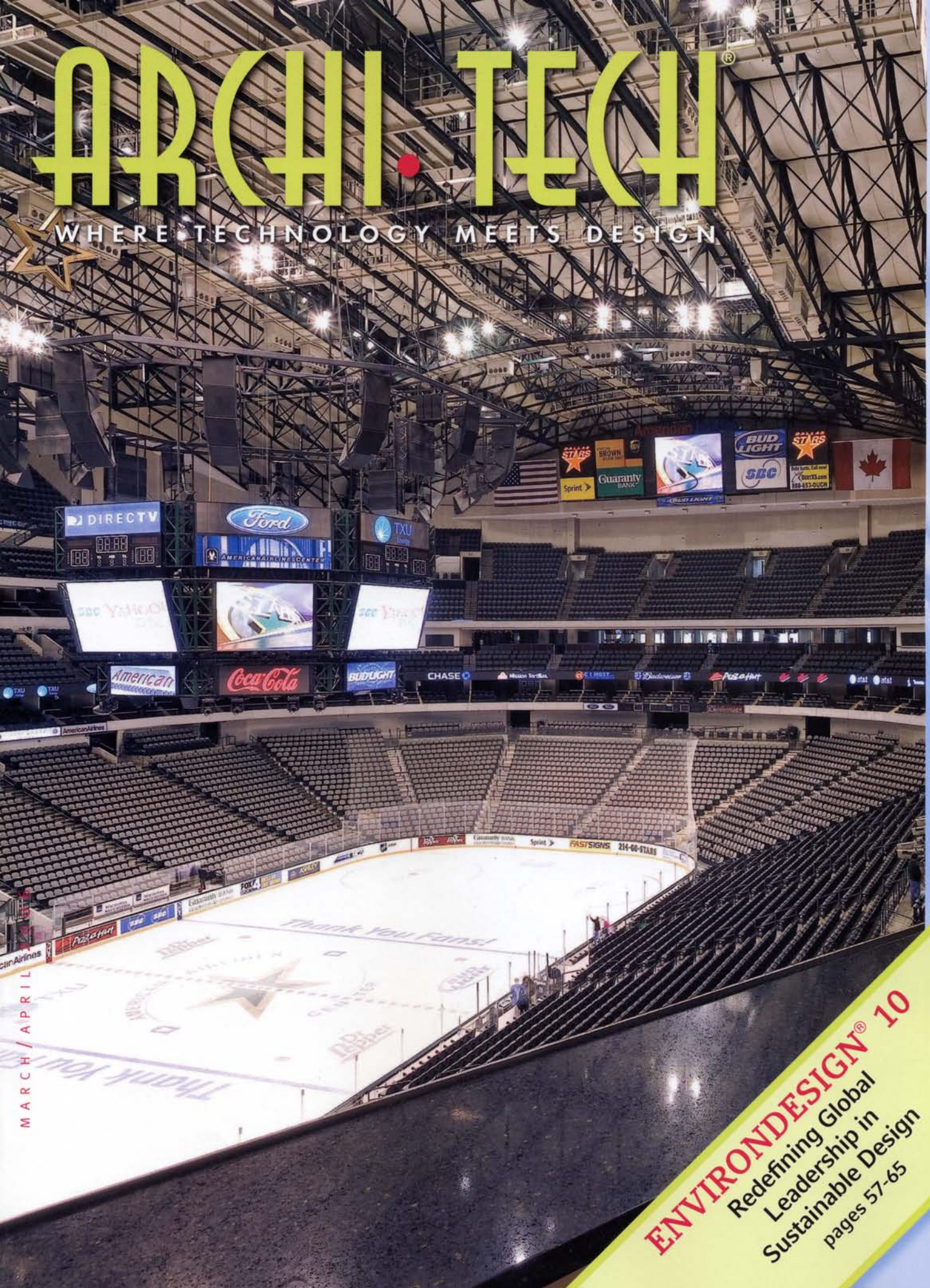

MARCH / APRIL

ENVIRONDESIGN® 10
Redefining Global Leadership in Sustainable Design
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INTEGRATED LIGHTING

Sustainable office building blends technology, architecture, comfort, control

By Craig DiLouie

Built on a rise in a campus of county buildings in Santa Barbara, CA, the "Casa Nueva" office building integrates nature, architecture, and technology to provide a sustainable, comfortable workplace for 105 employees. Home to the Air Pollution Control District, County Association of Governments, and the Department of Social Services, Casa Nueva, says architect Ken Radtkey,

AIA, provides "vibrant spaces reflecting the tenants' aspirations for a great workplace and that allows the building users to practice what they preach. The building identity and performance reflect the agency mission of environmental stewardship and social reconnection." The jurors of the 2005 Savings by Design awards program agreed; they granted the project the Award of High Honor.

Radtkey, president and founder of Blackbird Architects Inc., describes his work as an ideal integration of workplace building and surrounding landscape that "resensitizes occupants to our environment and art, seamlessly merges architecture and landscape elements, reconnects users to ecology." Casa Nueva blends sustainable materials; amenities such as natural landscape, outdoor workstations, and occupiable artwork; and efficient lighting technology – exceeding 2001 Title 24 requirements by 20 percent – without costing more than conventional construction. Since construction, the level of sustainability achieved for this project, realized within a conventional budget, has become a model for all future Santa Barbara County construction.

A 330-foot trellis of simple, recycled-plastic shade fabric shields, along the south and west sides of the building, minimizes seasonal heat gain.

Daylight and Electric Light

One of the county's most important project goals was to design a building that would be energy-efficient, and maximizing the use of daylight was the first step.

Blackbird Architects chose sidelighting as the primary daylighting strategy, providing a continuous strip of windows along all orientations

The use of single-pane laminated glass results in additional cooling savings while minimizing UV penetration and exterior noise.

that, coupled with an open floorplan of modular workspaces instead of enclosed offices, resulted in daylight availability in most interior spaces in addition to an environment that supports collaboration. Toplighting, via skylights, is used for daylight penetration in public spaces. To minimize seasonable heat gain along the south and west sides of the building, a 330-foot trellis of simple recycled-plastic shade fabric shields was installed 2 to 4 feet from the wall. Wisteria plants – hardy, twining vines that grow fast, climb high, and produce large, colorful flower clusters in the spring – grow along the trellis, providing further shading and a pleasing point of integration with ecology for both occupants and the nearby Highway 101 corridor. In addition, the window glazing consists of single-pane laminated glass, resulting in additional cooling savings while minimizing UV penetration and blocking out exterior noise. The windows are operable to allow occupants to control their windows and enjoy the area's temperate climate.

The interior electric lighting is highly efficient, visually comfortable, and closely integrated with the open web truss system in all spaces. "We were able to work very closely with the owner to achieve a lighting solution that integrated into the design of the building," says Radtkey. Lighting design and engineering firm JMPE collaborated with Blackbird for lighting design. In private offices, pendant-mounted semi-indirect light fixtures were installed, while in open offices indirect lighting was mounted in central core coves. These fixtures use T8 lamps and electronic ballasts for maximum efficiency. More accent lighting is used in public spaces. In energy calculations prepared by Eley Associates, the resulting power density of the design was 0.7W/sq.ft., a significant savings compared to the code.

The daylight and electric lighting systems are integrated to optimize energy cost reduction using Lutron's Digital MicroWatt system, which provides automated on/off switching and full-range continuous dimming capability in addition to real-time monitoring of the lighting system. The high level of granularity of this system, with each individual dimming ballast being addressable and separately controllable as its own control zone or grouped in any configuration to create larger zones, enables any area of the lighting system to be monitored and automated. Photosensors were installed about 7 feet from the

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walls to measure light levels and signal the control system to automatically raise or lower electric illumination accordingly, based on daylight availability, in about 60 percent of the lights. The light level threshold was set at an ample 75 footcandles.

The lights were also scheduled based on anticipated building occupancy. About 90 percent of the lighting is on during typical office hours; fewer lights are on a few hours before and after regular hours and on Saturday mornings. About 5 percent of the lights stay on during the night and unoccupied hours during the weekends.

In addition, because each ballast is separately controllable, the building's users were given control of their own lighting using their PCs as the interface to raise or lower light levels in their local area. Studies by organizations such as the Light Right Consortium indicate that people have a wide preference for light levels, and worker satisfaction increases when users are given control of their light levels. "The daylighting system is used as a prescribed light level that occupants can manually dim down from," says Radtkey. "If desired, a lower level can be adjusted in each space, but the system will not allow raising the light level above the level set by the photosensor."

Toplighting, via skylights, is used for daylight penetration in public spaces.

The result is an efficient lighting system that is controllable by individual users at the fixture level based on preference, by photosensors in larger zones based on daylight availability, and by a programmed schedule for automatic shut-off. The dimming system is easily expandable to adapt the lighting to future space needs without rewiring.

In addition to lighting, energy-efficient building measures included shade fabric roof screens to reduce roof temperature and cool intake air to help eliminate the need for air-conditioning equipment, a user-controlled heating ventilating system that brings fresh air into the building, and a roof and building infrastructure designed to accommodate future photovoltaics. All daylighting and efficiency measures were extensively modeled, funded by an $11,000 grant from Southern California Edison.

Sustainable and Cost-effective

Besides maximizing energy performance, Blackbird Architects cultivated sustainability throughout the project, causing Savings by Design jurors to remark, "This project can establish a precedent as a standard for technology, a standard for aesthetics, and a standard for honesty in environmental design." Savings by Design is an annual awards program produced by California utilities Pacific Gas & Electric, San Diego Gas & Electric, Southern California Edison, and Southern California Gas in conjunction with the California American Institute of Architects. The jurors added, "This is the epitome of integration. The vegetation, landscape, shading devices, and mechanical system all work together wonderfully. The building has great interior spaces – the fuzziness between interior and exterior works very well."

Casa Nueva's sustainable design begins with a simple footprint that maximizes access to daylight and ventilation in a drought-tolerant landscape. A courtyard bioswale pretreats and filters storm water runoff and feeds it into a cistern designed by artist Michale Singer. Existing oak trees were preserved and incorporated into the design. Amenities include native landscape, occupiable artwork, outdoor workstations, and shielded outdoor meeting spaces equipped with power/data ports for PC connectivity. Van Atta Associates Inc. collaborated with Blackbird for landscape design. "We wanted to integrate the functions of specific design elements to meet multiple objectives," says Radtkey. "For example, a multidisciplinary approach enabled us to use art and landscape to improve building performance." In addition, bicycle commuting and electric vehicles are encouraged with showers, lockers, and electric vehicle-charging stations. "We focused on creating positive user experiences in the day-to-day life of the building," Radtkey adds.

Indoors, waterless urinals save thousands of gallons of water each year, steel framing is highly recyclable and has high recycled content, paint products were selected for low and no VOCs, carpeting has 66 percent recycled content and is itself recyclable and avoids off-gassing, and custom

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"Building green is not about sacrifice; it's actually about getting more enjoyment every day out of our surroundings."

—Ken Radtkey, AIA, president and founder, Blackbird Architects Inc.

cabinetry is made of bamboo, a highly renewable wood. In addition, materials were left finished or exposed, which aided sustainability while reducing cost. Lobby, kitchen, and laboratory floors use the exposed concrete slabs, eliminating the need for decorative flooring. Steel framing was left exposed wherever possible in the ceilings, eliminating suspended ceilings. "Simple, affordable, and easy-to-use materials were sought that positively affected the space and light," says Radtkey.

To help ensure success, Blackbird emphasized collaboration with other project members to maximize the utility of specific design elements, used a specifications writer with experience in green specs to ensure smooth construction and practical operation, and held work sessions with the owner and building tenants about the trade-offs and options of various sustainable features, which fostered buy-in and user participation after move-in.

The result? A sustainable building that provides a comfortable workplace, delivered within a conventional construction budget.

"Building green is not about sacrifice; it's actually about getting more enjoyment every day out of our surroundings," says Radtkey. "Incorporate sustainable features that minimize additional cost while creating poetic, productive, and economical space."

The Savings by Design jurors concluded, "It's the type of environment in which anybody would love to work." •

Craig DiLouie is principal of ZING Communications Inc. **(www.zinginc.com)** *and communications director for the Lighting Controls Association* **(www.aboutlightingcontrols.org)**.

Top: In private offices, pendant-mounted, semi-indirect light fixtures use T8 lamps and electronic ballasts for maximum efficiency.

Bottom: A continuous strip of windows along all orientations of the building, coupled with an open floorplan of modular workspaces, results in daylight availability in most interior spaces.

BUILDING CREDITS

Owner/Developer: Santa Barbara County
Architect: Blackbird Architects Inc.
Lighting Engineer/Designer: JMPE
Mechanical Engineer: Mechanical Engineering Consultants Inc.
Landscape Designer: Van Atta Associates Inc.
Energy Analysis: Eley Associates
Photography: William B. Dewey