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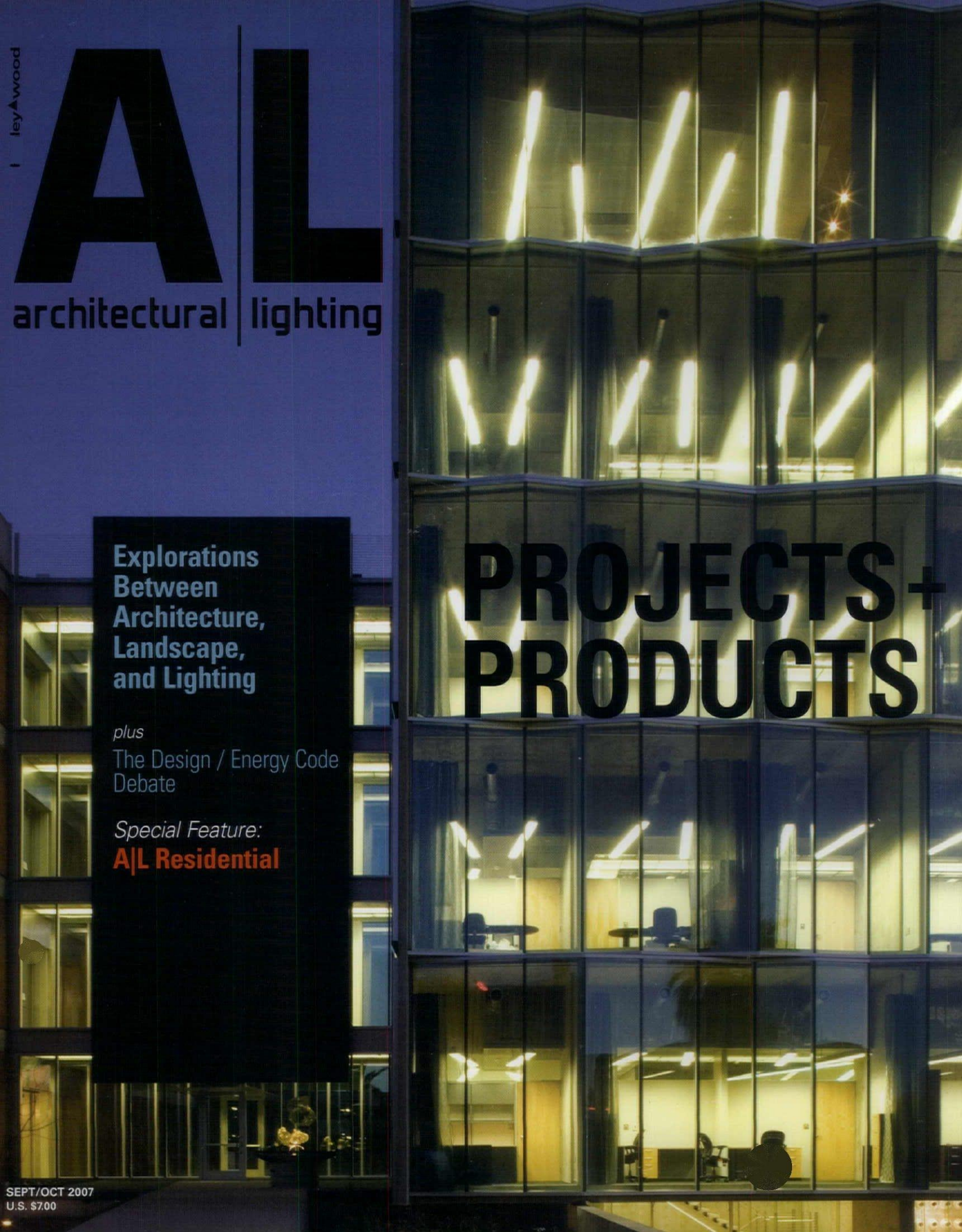

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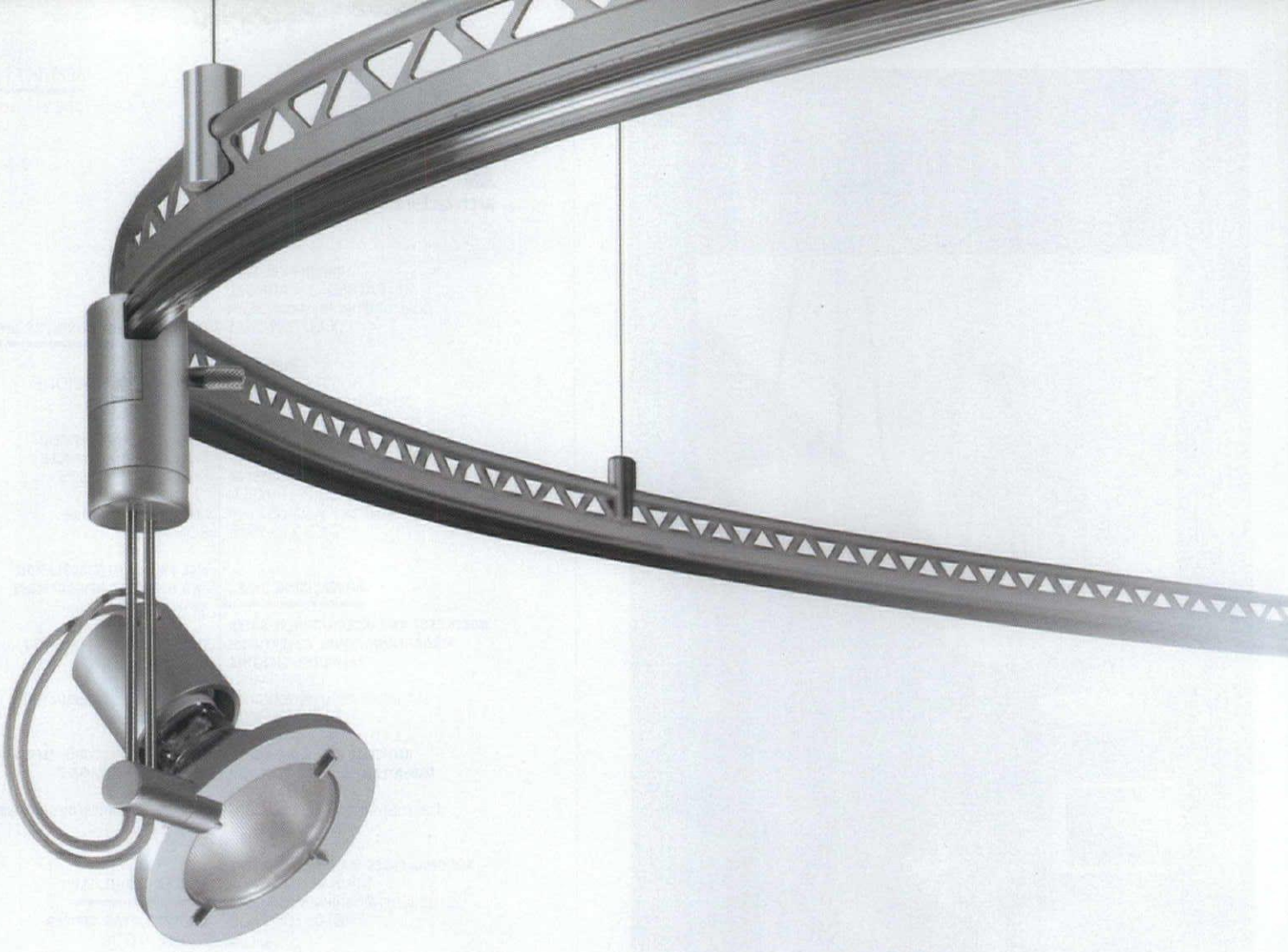

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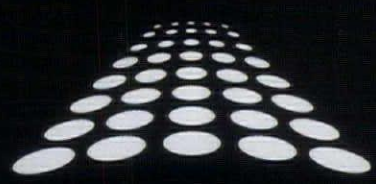

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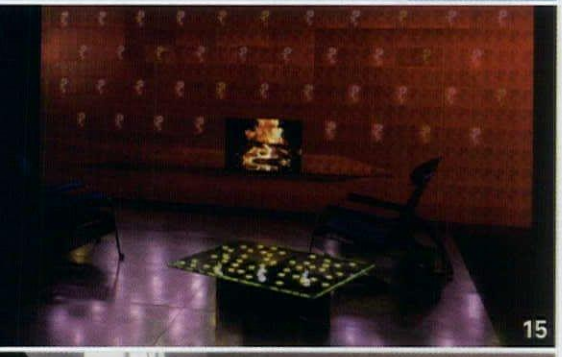

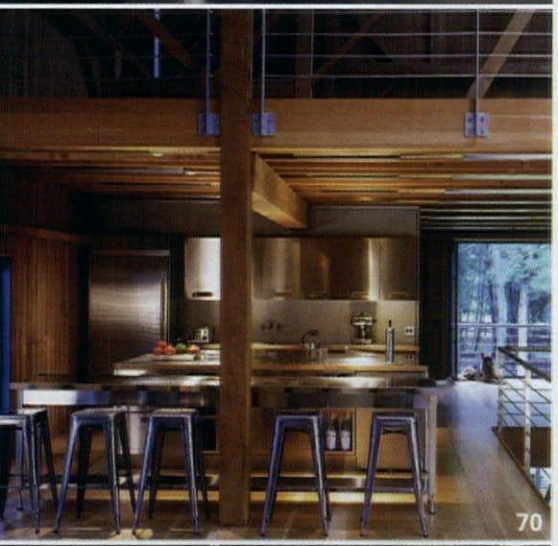

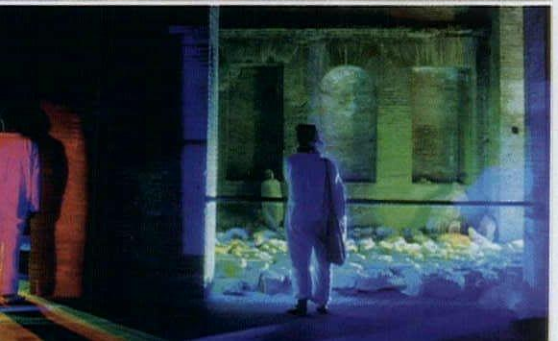

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SPECIAL FEATURE

A|L Residential

details

Cover: The Meinel Optical Sciences Research Building at the University of Arizona, Tucson, illuminated at night. PHOTOGRAPHER BILL TIMMERMAN, PHOENIX

This page: Ingo Maurer's *Rose, Rose, on the Wall*, (2006) at the Cooper-Hewitt National Design Museum, New York; the new Bloch Building at the Nelson-Atkins Museum of Art, Kansas City, Missouri; the kitchen at 7 Oaks Farm Studio, St. Charles, Illinois; Peter Erskine's *Secrets of the Sun*.

These articles can be found at www.archlighting.com.

PHOTO BY SPENCER LUM

A MORE PRODUCTIVE PRODUCT DISCUSSION

I HAVE A CONFESSION TO MAKE—I have a love/hate relationship with lighting products. Perhaps as editor of a publication whose existence derives from advertising revenue generated by product manufacturers, this is not something I should admit. However, during my tenure at *Architectural Lighting* magazine, and particularly in the past year as its principal editor, I have always found that editorial honesty is well received and welcomed by a readership that is composed of both the design and manufacturing communities.

So what do I mean by a "love/hate relationship" with lighting products? In reality the publication has two main audiences—designers and manufacturers. Of course there is overlap between the two groups, but for the most part the dividing line is quite clear. (And as much as I would like to think of our readership as one entity, not to acknowledge multiple audiences would be to ignore the diversity that exists in the lighting community.) As an editor, one of the greatest challenges in crafting the editorial lineup for each issue is finding a balance between project and product coverage that will appeal to the publication's two principal audiences. But the longer I work on this magazine it becomes clear to me that to think of products only in terms of commodified objects—the form of a 50 word write-up with an accompanying image—does not serve well the luminaire, the luminaire designer and engineer, the manufacturer, the designer specifying the product, or even the end-user. What if instead we were to view products as tools and resources, and described them as such?

It seems particularly appropriate to address this topic in *Architectural Lighting*'s annual "Projects and Products" issue. Editorially, this anchor issue was conceived long before I arrived on the scene, but its purpose—to expand the design discussion and include information about the actual products (tools and resources) used to realize the design—is just as important today. This year the editorial staff and individual writers have paid extra attention in developing these entries, making sure to describe both how the products (tools and resources) are actually used in the projects, and whether any modifications or customizations were required. And yes, we the editorial staff write these entries. I am always amazed when I meet readers who think that the product write-ups are paid advertising. As with all the editorial content that finds its way to the print and web pages of *Architectural Lighting* magazine, the editors read and review specifications sheets for each product culling out the points that we in our editorial capacity and design experience believe will be the salient features of interest to you.

Going forward it is my wish to recast the product discussion on the pages of *Architectural Lighting* magazine in a way that will expand the thinking behind these components that enable designers and manufacturers each in their own way to create. The exact form of this discussion is still taking shape, but will most likely rely on several editorial typologies including case studies and manufacturer interviews. Just as the pages of *Architectural Lighting* have served as a place for discussion on pressing industry issues, our pages can also help serve as a forum between designers and manufacturers to address product development. And I know that a more regular discourse between designers and manufacturers is something of interest to all parties. I heard it repeatedly throughout conversations during the spring conference season, and it's expressed on the very pages of this issue as well.

Products, reconsidered as tools and resources are a good thing. Without them, projects would be incomplete, impossible really, and the inquiries behind their development serve more than just the end result object. As new technologies emerge and raise the bar for product discussions, so too must we continue to refine and raise the standard for this type of editorial reportage. I hope all readers—designers and manufacturers alike—will join me in this tools and resources editorial revolution.

I'D ALSO LIKE TO TAKE A MOMENT TO SHARE SOME RECENT AND EXCITING HAPPENINGS here at the magazine. The hard work and long hours have been rewarded in the form of two Eddie Awards for editorial excellence. In the category B-to-B: Design/Advertising/Marketing, *Architectural Lighting*'s March 2007 issue won bronze, and in the category B-to-B: Design/Advertising/Marketing, Single Article, my April/May 2007 Editor's Comment "An Incandescent Truth" received silver. But as it is said, no man (or woman) is an island, and this work would not have been possible without a dedicated editorial and art team as well as contributing writers. So to all of you who were involved with these two issues, I say, thank you.

I am also pleased to announce that after a year of transition, the editorial staff is rebuilding itself. Jennifer Lash joins A|L this month as associate editor, Stephani L. Miller joined A|L in June as associate web editor, and Aubrey Altmann, Marcy Ryan, and Sam Resta join A|L this month as the new art team. Their talent is seen throughout the pages of this issue. Please join me in welcoming them.

ELIZABETH DONOFF
EDITOR

NOVEMBER/DECEMBER 2007 EXCHANGE QUESTION:
There are many ways in which an individual can arrive at the practice of lighting design. For some it is born out of architectural study and training. For others it is an engineering path, and yet still there are those individuals who discover lighting through artistic pursuits. The question then is, whether through formal academic means or individual inquiries: How do you educate for lighting? How do you prepare and train someone to practice lighting design?

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A TALE OF TWO LIGHT ARTISTS

TAKE YOUR TIME: OLAFUR ELIASSON

ICELANDIC ARTIST OLAFUR ELIASSON IS A WIZARD. HE EMBRACES AND MODIFIES THE ENVIRON-ment, with light and time as his primary tools, creating installations that offer the visitor contemplative experiences. Just 40 years old, Eliasson emerges from a complex media age not previously imagined. Therein lies the challenge for a post-object artist: How can one create something powerful enough to engage and move viewers without resorting to entertainment?

Unlike other major artists working with light, such as James Turrell, Eliasson's work reveals its mechanics. The pieces and environments are organizationally simple, and that is part of his genius. What remains left to the viewer is the experience of the moment, or as Eliasson likes to say, "Seeing yourself seeing." Eliasson's emphasis on the viewers' experience in each constructed environment hopefully inspires visitors to create something. His work successfully creates a forum for self-exploration as well as communal exchange, and this acknowledgement of the vital interconnection between the individual and the commonweal is a profoundly democratic idea underlying his work. The exhibition at San Francisco MOMA, which is essentially chronological in its organization, discusses six major tenants of Eliasson's work: a distinctive use of mirrors; an exploration of light and optical phenomena; kaleidoscopic elements; landscape referents; scientific methods and materials; and photographic suites of the Icelandic landscape.

In 2003 Eliasson installed *The Weather Project*, a kind of sun made from light and mirrors, at the Tate Modern in London, which drew record crowds and pushed the artist into the pantheon of contemporary, accessible artists. The San Francisco exhibit also begins with a bath of yellow light as visitor walks into *Room for One Colour*, 1997. For a brief moment, I imagined that all would be golden as with *Weather Project*, but then everything pales and people turn shades of gray, the result of the eye's retina responding to the saturated yellow and compensating for the lack of any other visible color.

One of the exhibit highlights is the *360° room for All Colours*, 2002, with hundreds of lamps changing color in a panorama that recalls historic dioramas but without pictorial content. In *One-way Colour Tunnel*, commissioned for SFMOMA's interior pedestrian bridge, Eliasson borrows from the experience of the kaleidoscope. Seen from the west, the acrylic triangles look black, and on the return trip heading east, each facet explodes with a rainbow of color.

Eliasson uses his considerable power of inquiry and environmental ingenuity to prod each viewer to see and engage again, to take time back from whomever steals it, and to think bravely as a unique person within a larger community. This show is no light entertainment; it's transformative.

KENNETH CALDWELL

Olafur Eliasson's *Notion Motion*, 2005, (left). Ingo Maurer's *Lucellino*, 1992 (right).

PROVOKING MAGIC LIGHTING OF INGO MAURER

"LIGHT'S EPHEMERAL AND ILLUSORY NATURE," THE TEXT READS, AND SO BEGINS INGO MAURER'S first solo museum exhibit in the United States currently on display at the Cooper-Hewitt, National Design Museum in New York City through January 27, 2008. With a healthy combination of humor and poetry, Maurer has been exploring light and lighting technologies for the past four decades.

The exhibit installation takes advantage of the Carnegie Mansion's architecture, although by Maurer's own admittance the landmark status of the building proved challenging. As you walk up the stairs to the second floor (where the exhibit begins) an existing chandelier is wrapped in red fabric with small winged-light bulbs emerging from the red bundle. Two portraits, in a distinctly Ingo Maurer drawing style, one of Carnegie and the other of his wife, whisper to one another as visitor's pass by. Carnegie's wife says, "Look at what they have done to our villa," to which Carnegie replies, "It was time for a change."

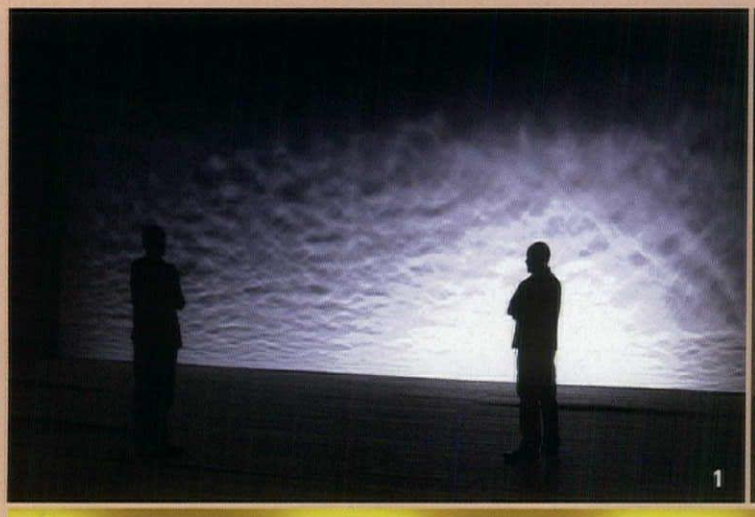
A combination of installations fitted directly for the Carnegie Mansion coupled with Maurer designs people have come to know provide a complete overview of the artist's work. One of the more dramatic, as well as new, pieces is called *MaNo Nouchies*, 2007, paper light fixtures inspired by a traditional Japanese textile-dying technique. The effect of light and pleated paper is magic-like, just as the title of the exhibition states—Provoking Magic.

Particularly helpful in navigating the exhibit is the audio tour, written and narrated by Maurer himself. It offers a first-hand look into the artist's thinking and the raison d'etre behind many of the displays. A modest man who is not looking for compliments, Mr. Maurer was particularly excited to show this editor one of his latest creations—*LED Wallpaper*, 2007. Although still a one-off, one can imagine the amazing possibilities this LED technology, in the form of wallpaper, can take.

Maurer is interested in exploring the kinetic relationships that occur when light meets light or object meets object. This is clearly seen in a piece like *L'Eclat Joyeaux*, 2005, where Maurer explores the moment of "explosion." Although many of his works have specific meanings to Maurer himself, he is more concerned with the viewer being able to form their own opinion of the work. One of Maurer's favorite installations in the exhibition, as he describes in a webcast on Cooper-Hewitt's website, is *Wo bist du Edison,...?*, 1997, which translates into Where are you Edison? Enamored with the simple elegance of the light bulb, a hologram of a light bulb appears in a pendant-styled fixture that hangs over a table and chairs. Not a new piece, its installation in the Cooper-Hewitt setting is quite striking.

A stimulating visual and thought-provoking journey, Maurer wants to "change the way you think about light." And that he does, as the visitor is inspired to find the poetry in the everyday lights they find around them.

ELIZABETH DONOFF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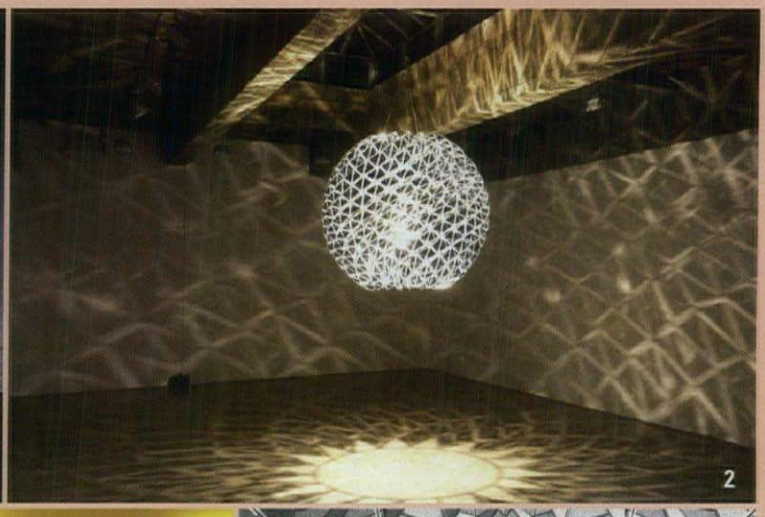
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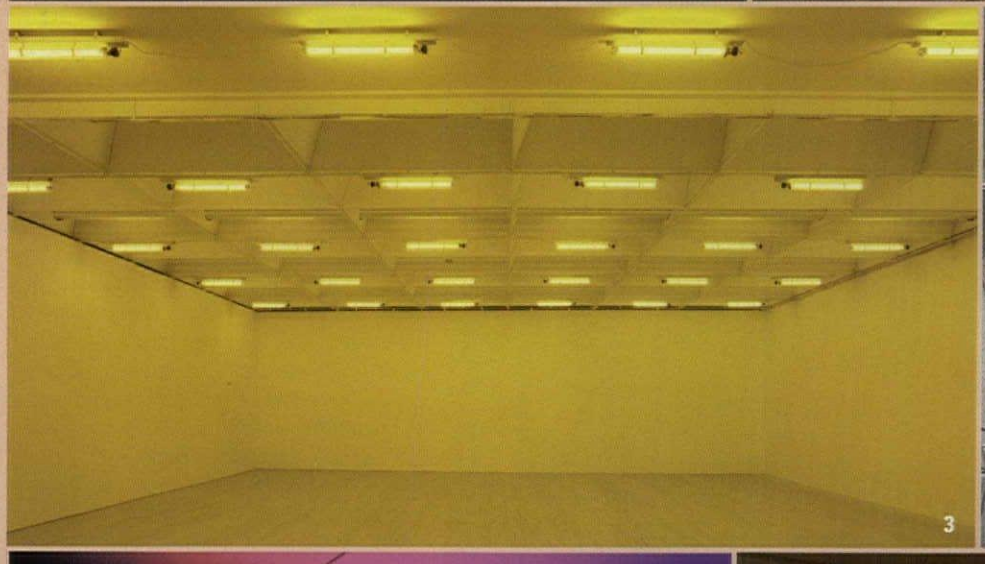
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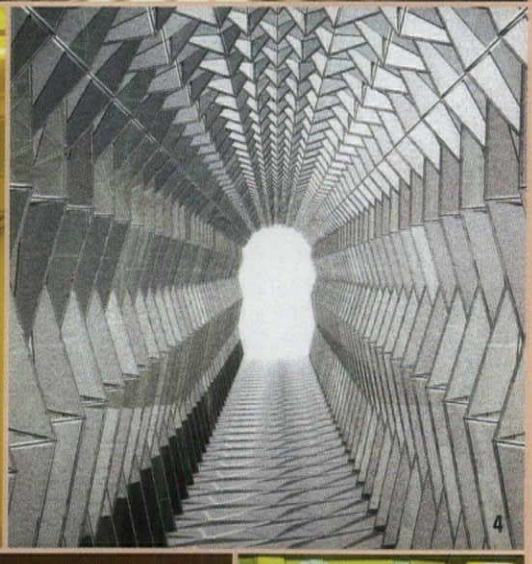
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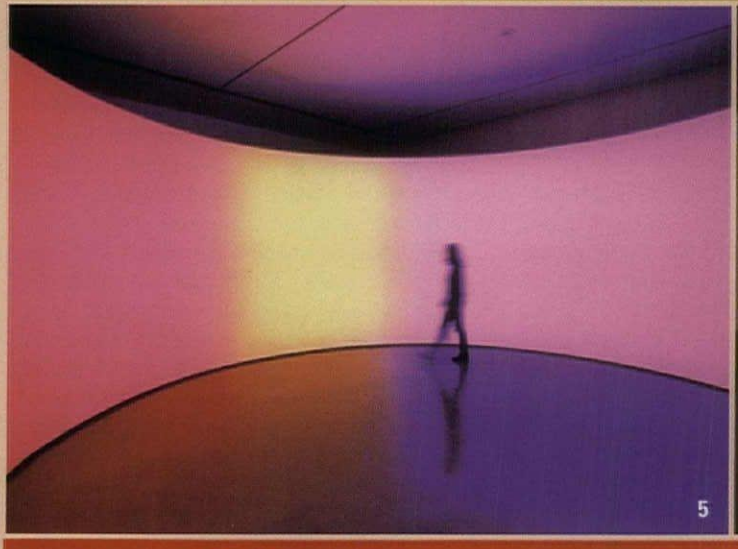
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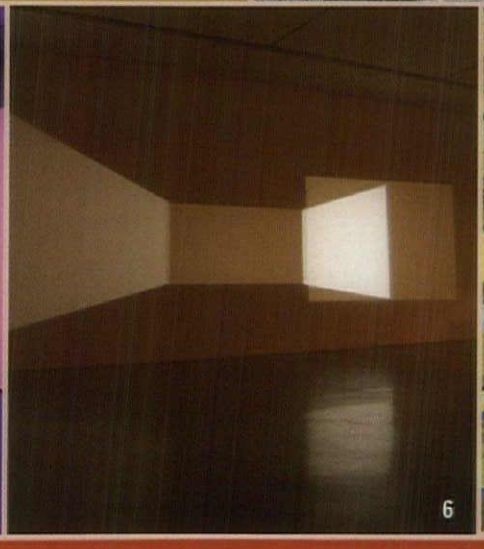
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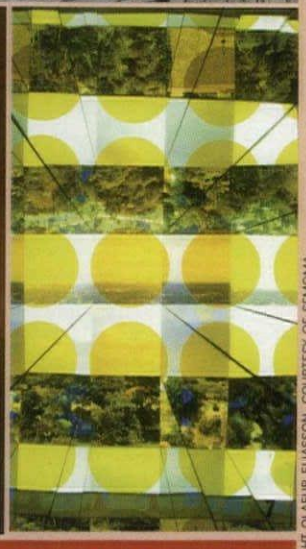

A sampling of artist Olafur Eliasson's work. His first retrospective in the United States, *Take Your Time* is on view at the San Francisco Museum of Modern Art through February 24, 2008. (1) *Notion Motion*, 2005; (2) *Inverted Berlin sphere*, 2005; (3) *Room for one colour*, 1997; (4) *One-way colour tunnel*, 2007; (5) *360° room for all colours*, 2002; (6) *Remagine*, 2002; (7) *Sunset kaleidoscope*, 2005.

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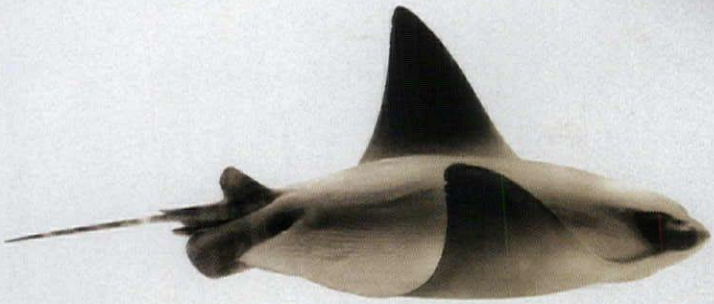

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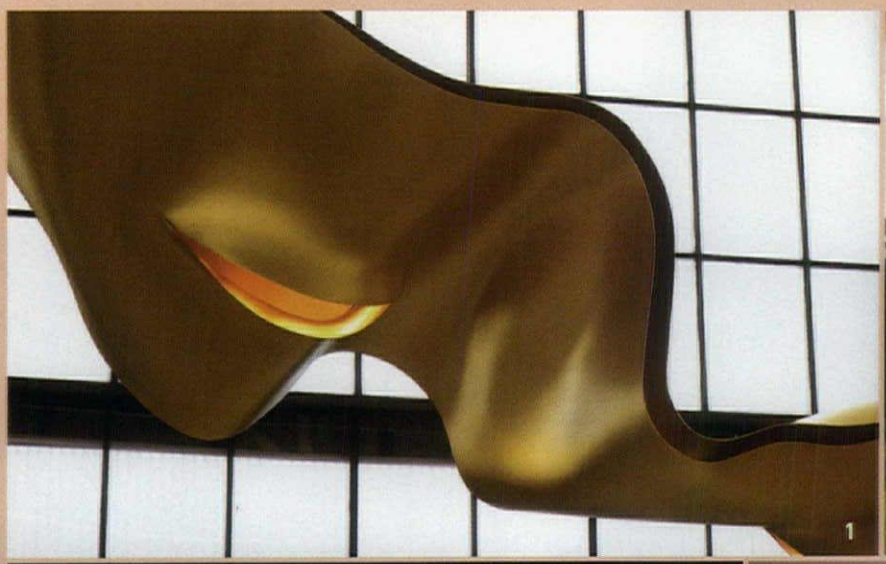
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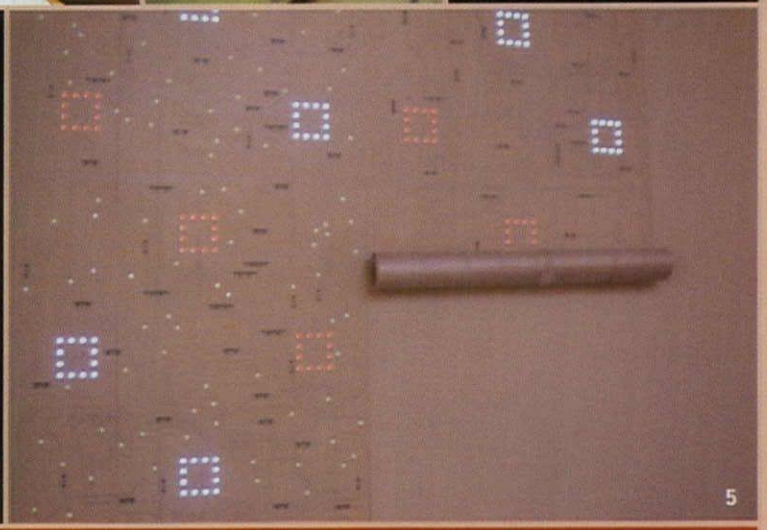
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A sampling of Ingo Maurer's work on display at the Cooper Hewitt, National Design Museum in New York. The exhibit, *Provoking Magic: Lighting of Ingo Maurer* on display through January 27, 2008. the following: (1) *Golden Ribbon*, 2006; (2) *Tableaux Chinois*, 1989; 3. *One chandelier at the Cooper-Hewitt*, 2007 ; (4) *MaMo Nouchies*, 2007; (5) *LED Wallpaper*, (2007); 6. *Wo bist du Edison,...?*, 1997; (7) *L'Eclat Joyeux*, 2005; 8. *Pensatoio d'Oro* (foreground), 2004 and *Symphonia Silenziosa Installation*, 2000 (background).


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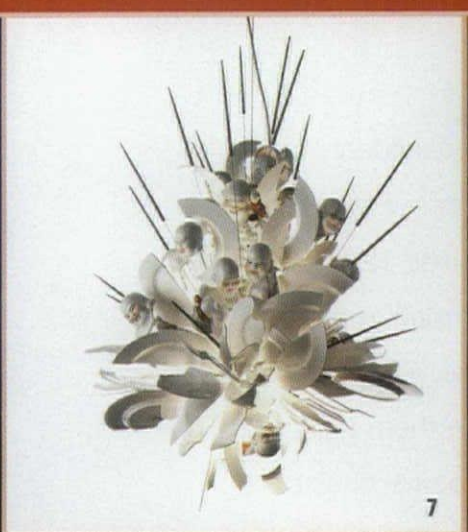
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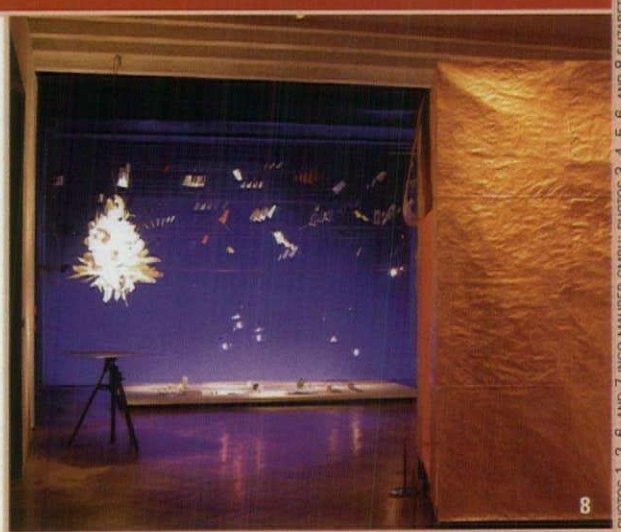
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PHOTOS 1, 2, 6, AND 7 INGO MAURER GMBH; PHOTOS 3, 4, 5, 6, AND 8 ELIZABETH DONOFF

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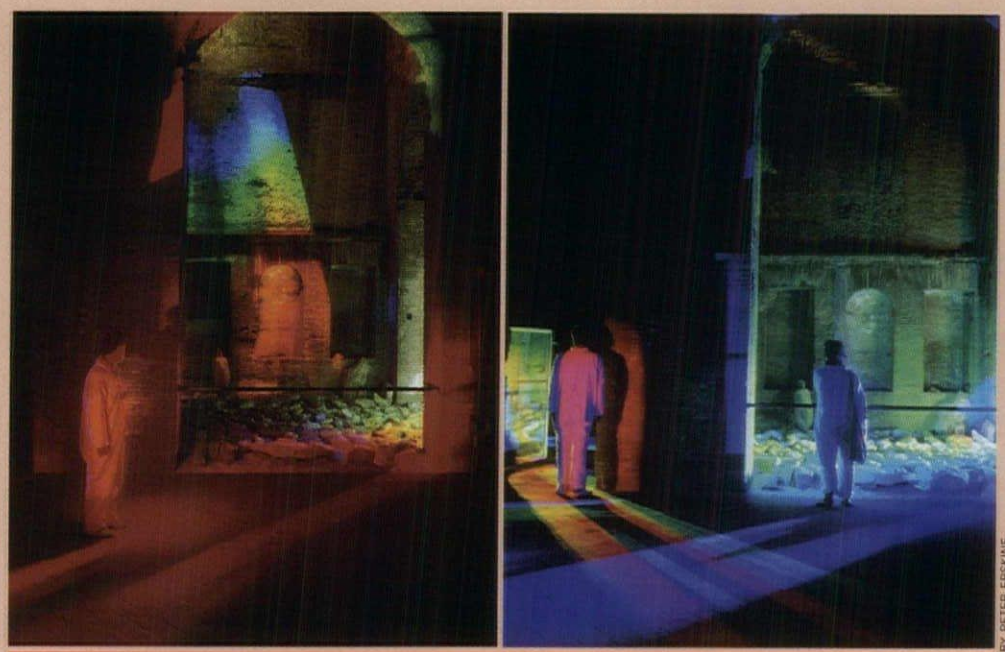
SECRETS OF THE SUN

IN SEPTEMBER 2007, SCULPTOR PETER ERSKINE VISITED FIVE cities around the United States lecturing on his solar spectrum environmental artwork called *Secrets of the Sun*, which uses the sun as its subject, medium, and energy source. Originally installed in the ancient Roman Forum, this interactive light sculpture draws upon the visible light spectrum to stimulate a deep emotional and physical response. Laser-cut prisms were positioned around the Roman Forum to direct light into its interior spaces, breaking it down into the visible spectrum. Mirrors directed the colored light around the rooms of the Forum, highlighting different architectural details and surfaces as the light moved and changed throughout the day. Visitors, clothed in white jumpsuits, became part of the canvas. Presented by the International Association of Lighting Designers (IALD), Erskine's presentation also discussed solar spectrum art installations in the central station of Milan, the new LAPD Headquarters, and a shade garden in the California desert. **STEPHANI L. MILLER**



Peter Erskine's *Secrets of the Sun* installation in the Roman Forum (above left and right).

PHOTOS BY PETER ERSKINE

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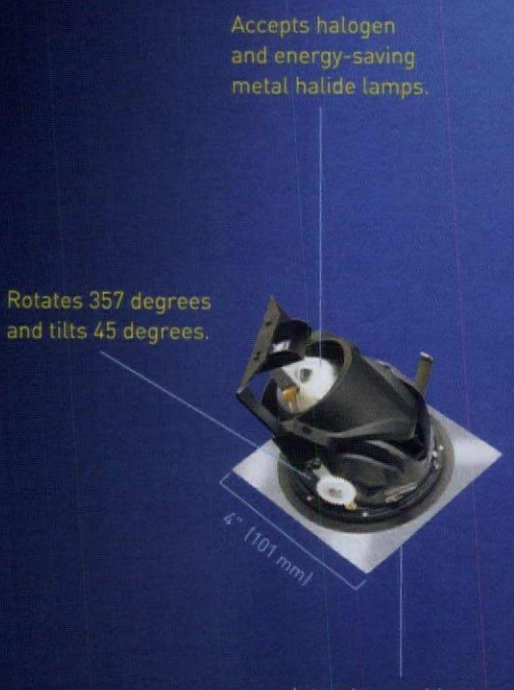

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LIGHTING DESIGNERS FORM HUMANITARIAN GROUP

RESPONDING TO THE GLOBAL CRISES THAT PLAGUE THE WORLD TODAY, AND HOW THE LIGHTING design community can provide assistance, a group of French lighting designers led by Roger Narboni, Marc Dumas, and Francois Magos have formed Lighting Designers Without Borders. With 40 members at present, the association's goal is "to bring help to exposed populations, in emergency or post emergency situations." Professionals in other fields have been engaged in humanitarian work for many years, most notably the healthcare profession and the organization Doctors Without Borders.

Light and lighting are one of the most basic and critical needs during times of disaster, natural or man-made. The association's press release explains, "The action of Lighting Designers without Borders is part of the changing face of humanitarian aid, a sector which now seeks to create a glimmer of hope and undertake actions with long-lasting effects rather than just providing operational assistance."

When called upon, the association will assist in three areas:

- During major emergency crises: Lighting designers will work with energy experts to determine the lighting needs for emergency services and ambient lighting for general populations;
- Post-emergency situations: To provide intelligently and sensitively designed lighting for individuals and communities that have experienced traumatic events; and
- Regional development: To develop consistency between projects, including sustainable lighting features, no matter the economic scenario.

To that end the association plans to "initiate lighting projects at the request of local people, based on their local customs and expertise; to submit lighting solutions that respond to the functional requirements and enhancement of public areas; to design systems that are environmentally friendly and cost effective in terms of energy use; to teach and design the use of lighting systems in places where this trade does not exists; and to create a network of knowledge and contacts to generate financial aid and sponsorship." For more information visit: www.conceptteurslumieresansfrontieres.org. **A|L**

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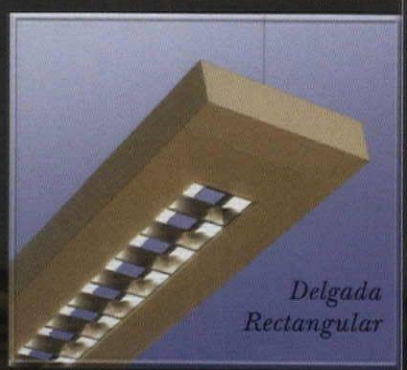

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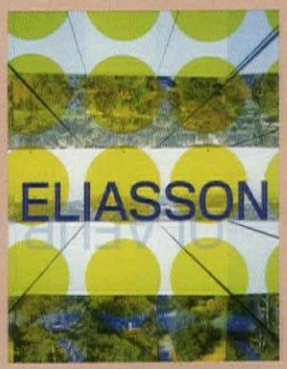
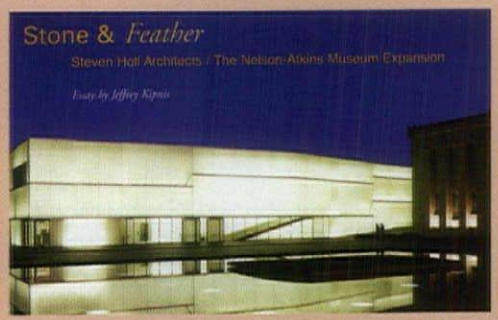


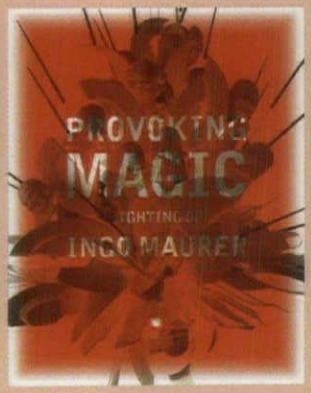
Take Your Time: Olafur Eliasson
PUBLISHER: SFMOMA IN CONJUNCTION WITH THAMES & HUDSON, NEW YORK AND LONDON, 2007

To accompany the exhibition of the same title, this 272-page catalog compiles Mr. Eliasson's work from 1991 to the present. Edited by Madeleine Grynsztejn, SFMOMA's Elise S. Haas senior curator of painting and sculpture, the book features 250 reproductions along with essays by prominent art historians and critics. Particular essays of interest include art historian Pamela M. Lee's discussion of Eliasson's work in the context of the Light and Space Movement of the 1960s. **A|L**



Stone & Feather, Steven Holl Architects / The Nelson-Atkins Museum Expansion
PUBLISHER: PRESTEL, 2007

With an introduction by museum director Marc F. Wilson, essays by architectural critic Jeffrey Kipnis, architect Steven Holl and project principal Chris McVoy, and photographs by Roland Halbe, this monograph luxuriously documents the Nelson-Atkins Museum's new Bloch Building from design concept to realized and completed project. **A|L**



Provoking Magic Lighting of Ingo Maurer
PUBLISHER: SMITHSONIAN INSTITUTION, COOPER HEWITT, NATIONAL DESIGN MUSEUM, 2007

This 162-page color catalog documents Maurer's work on display in the exhibition of the same title. Interviews with Maurer by Kim Hastreiter, editor of Paper Magazine, as well as Julie V. Iovine, Claude Maurer, and Trojan Schmid explore the Maurer's unique and unconventional explorations of light. **A|L**

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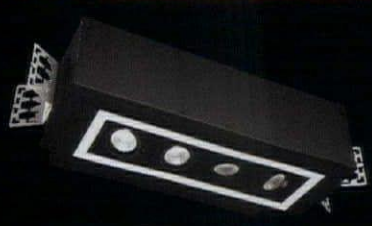

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OBSERVATIONS FROM PRACTICE

BY FRANCESCA BETTRIDGE

THROUGHOUT MY LIGHTING CAREER I HAVE ALWAYS APPROACHED EACH new project with the question: "What am I lighting?" This simple question actually encompasses a lot; not only accenting objects, but illuminating the vertical and horizontal planes of the three-dimensional space. As lighting designers, we think about how we use light to model a space, which surfaces and materials should be highlighted and at what angle. Equally important to consider is how do we make people look and feel good in the space? In the past, as designers, our creative ideas were shaped by architectural style, and really, limited only by the project budget. But increasingly, over the past 10 years, as the designer responsible for the creation of the lighting scheme, I find myself asking a different question: "What can I light with the watts I'm allowed to use?" and a corollary "How little light can I afford to live with?"

AN ENERGY-EFFICIENT MINDSET

Over the years, a consciousness among the general public and certainly the design community has grown about energy consumption. The need to conserve energy has gone from a virtue to an imperative. The last energy crisis in the early 1990s was a wake-up call, with energy rebate programs beginning to appear, and lamp manufacturers being spurred on to "build a better light bulb." We have always used new energy-efficient sources in our work at Cline Bettridge Bernstein Lighting Design, and we are constantly looking for sources with longer life and greater output.

For me, part of the excitement of lighting design comes from using new light sources and fixtures in unexpected ways. The lure of new technology is irresistible because it solves problems, creates opportunity, and helps address energy issues, which have become more critical over the past 15 years. At our office, we like to think of ourselves as pioneers:

- In 1981 we used MR16 fixtures for the first time in a residence;
- In 1988 for a school library we created decorative fixtures with compact fluorescent lamps that successfully mimicked incandescent while providing modern light levels with easy to maintain sources;
- In 1999, we convinced our clients to take the risk of using new LED technology in custom fixtures to meet the challenge of Title 24 and extend "lamp" life.

Using energy-efficient sources has become part of our basic vocabulary, as is the norm for many lighting design firms, but meeting the Leadership in Energy and Environmental Design (LEED) requirements has demanded further adjustment to our practice. One of our first LEED certified projects was the William J. Clinton Presidential Center in Little Rock, Arkansas. From the beginning of the design process, the former president expressed his real interest in energy conservation and wanted the center to be as sensitive to the environment as possible. We were introduced to the process of working with the LEED consultants and experienced expanded coordination time with the engineers and architects. We currently are working on One Bryant Park in New York City, the first office tower to seek a platinum LEED rating in the United States. Here, too, the clients are completely dedicated to investing the time and money necessary to achieve this goal. For a project this large—56 stories and 2.2 million square feet—and complex, I do not think we, as a firm, ever could have estimated the amount of time the certification process would consume. More to the point, I don't think there are many clients who are willing to invest in the extra work, time, and cost this process commands.

CODES AND CONTRADICTIONS

The purpose of the various building energy and energy conservation codes—the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) 90.1, the International Energy Conservation Code (IECC), and California's Energy-Efficient Standards for Residential and Non-Residential Buildings (Title 24)—which are required, as well as LEED, which is voluntary but actively influencing the building process, now governing our practice locally, nationally, and internationally, is to limit energy consumption. They are well-meaning and necessary, coincidentally challenging designers to do more with less, and encouraging lamp and fixture manufacturers to make products that are more efficient. At the same time, we see inexplicable exemptions to the requirements and inherent contradictions in the rules. For example, in ASHRAE 90.1, why are "casino gaming areas" exempt? Signage is exempt from watts limitations, but why are there no restrictions on the mind-numbing brightness of LED signs that have taken over the pedestrian-level experience?

Sometimes we encounter seeming contradictions between recommended best practices and the new legislation. ASHRAE allows 1.3 watts per square foot for libraries, while at the same time the Illuminating Engineering Society (IES) recommends 30 footcandles at 30 inches above finished floor in the stacks. We can achieve this only by reducing the general light level in the circulation and public areas, and the contrast can result in an unbalanced composition. If an office design uses fixtures that comply with the IES office standard RP-1 we can take advantage of an additional .35 watts per square foot of energy allowed. The standard defines maximum average luminance allowed above a certain angle; this is intended to pre-

Too often clients have old expectations, assuming that we will be able to light the new building the same way we lit the old building, to the same light levels and with the same flexibility.

vent glare on the CRT (computer) monitor in an office and was very valuable when written. However, given technological advances of computer screen technology, some of the reasons behind the RP-1 standards no longer apply, and taking advantage of the "watts bonus" further reduces fixture options. Fixtures with a wider distribution that put light high up on the wall do not comply, even if they contribute to better lighting solutions.

Exterior lighting is fraught with its own problems and contradictions. Under current ASHRAE requirements building façades are allowed .2 watts per square foot for each illuminated wall or 5 watts per linear foot for each wall or surface length. On a recent project, we calculated that we could floodlight the façade of the building but could not achieve an alternate scheme illuminating certain specific elements of the façade, even though we actually would use fewer watts overall. The IES acknowledges environmental context and recommends different light levels, while ASHRAE does not make a distinction with the allowable watts.

THE ROLE OF DIMMING

While many of the energy codes and energy programs promote the use of daylight harvesting they do not give any consideration for the slightly higher wattage consumption of the dimming ballasts, the so-called "dimming penalty." At the same time we are trying to convince clients to pay more for the dimming ballasts and control systems to better manage their electrical usage, we have fewer watts for the design. LEED certification programs give credit for dimming, but the dimming capabilities of metal halide sources is still very limited and the technology needs to mature. We have found that the metal halide lamp color loses stability after 50 percent dimming, a visual reduction, which is not significantly noticeable to the eye. It helps in the overall reduction of energy consumption, but while we are waiting for the technology to catch up with our needs, we are lacking the tools to further refine our designs. And although we are very active in speaking with the manufacturers explaining to them what we need, responsiveness varies from lighting company to lighting company.

The reality of practice today is that the lighting designer's options are more limited. Often difficult to find the balance between design and codes, we face what I call the "unintended consequences of good intentions."

LIGHTING DESIGNER AS EDUCATOR

Our role now includes educating the clients and sometimes the designers on how energy legislation will affect the project. Clients imagine a new energy-efficient building will not cost more on account of its energy efficiency. This is rarely the case. Too often clients have old expectations, assuming that we will be able to light the new building the same way we lit the old building, to the same light levels and with the same flexibility. In a corporate office project, we were able to satisfy the client's desire to illuminate the dark wood walls used throughout with 20 PAR20 metal halide wallwashers, but they had to accept that they could not be on the dimming system, and as a result there would be a start-up time for the lamps.

For commercial clients, restroom designs often provoke the most discussion. Clients want these areas to be bright, inviting, and perhaps even residential in character, however, these spaces are inefficient and at .9 watts per square foot, we no longer can give the client what they are used to, an energy consumption that used to allow for 1.5 watts per square foot. Corridor spaces are even more difficult because they are long narrow spaces with low ceilings. The new codes, particularly ASHRAE 90.1, allow only .5 watts per square foot with only one extra watt per square foot permitted for decorative fixtures or art on the wall. Lighting corridors is still achievable, but there is an ongoing process of readjustment of expectations by both the client and even of ourselves as designers.

The reality of practice today is that the lighting designer's options are more limited. Modern masterpieces that we love, such as the Seagram building in New York City with its illuminated ceilings at the perimeter offices on every floor, are today unobtainable if not for reasons of energy consumption, then for cost. I frequently receive conceptual renderings from architects showing coves, glowing ceilings and wall planes, but even with LEDs it often is impossible to create the lighting effect that the architect envisions. The code only allows for so many watts. Other times the geometry of the architecture makes it difficult to light the space within the confines of the codes. If the lobby, for example is a double height space—30 or 40 feet high—you are not even allowed a fraction of the energy that you would have consumed had the floors been filled in with useable space. Another challenge we frequently face is when the architectural ceiling grid requires a tight spacing of the light fixtures, which will in turn exceed the watts allowance, but a wider spacing will compromise the lighting design.

CONCLUSION

As lighting designers we are in a transition period. Often difficult to find the balance between design and codes, we face what I call the "unintended consequences of good intentions." Available technology, both traditional sources and solid-state lighting (although offering great promise) is either still not energy-efficient enough, too expensive, or lacks the subtleties that we have with incandescent sources. Even though there are successful lighting design solutions that exemplify and justify the codes, these solutions do not speak to the many styles and spaces found in architecture today. At this point we are waiting for the review process, technology, and the price of these new technologies to catch up with our needs so that once again the only limitations of design are style and budget.

Throughout her career, Ms. Bettridge has collaborated with highly esteemed architects on award-winning national and international work, which encompasses a broad range of types and styles. She has been honored with multiple Lumen, IALD, and GE Awards, as well as this publication's own A|L Light & Architecture Design Awards. Ms. Bettridge is a professional member and former secretary of the International Association of Lighting Designers, and has served on the Board of Managers and the Richard Kelly Scholarship Committee of the New York Section of the Illuminating Engineering Society. A graduate of Barnard College, Ms. Bettridge studied at Parsons The New School for Design and the Open Atelier of Design, which she helped found. She also has taught at the Fashion Institute of Technology and Parsons The New School for Design.

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house of sweden

WITH THE RECENTLY COMPLETED HOUSE OF SWEDEN IN WASHINGTON, D.C., THIS Nordic nation has created a "home away from home." Located in Georgetown, on a prime waterfront site overlooking the banks of the Potomac River and bordering Rock Creek, the building celebrates the country's Scandinavian traditions of environmental awareness and design aesthetics that include a material palette of light, wood, stone, and glass.

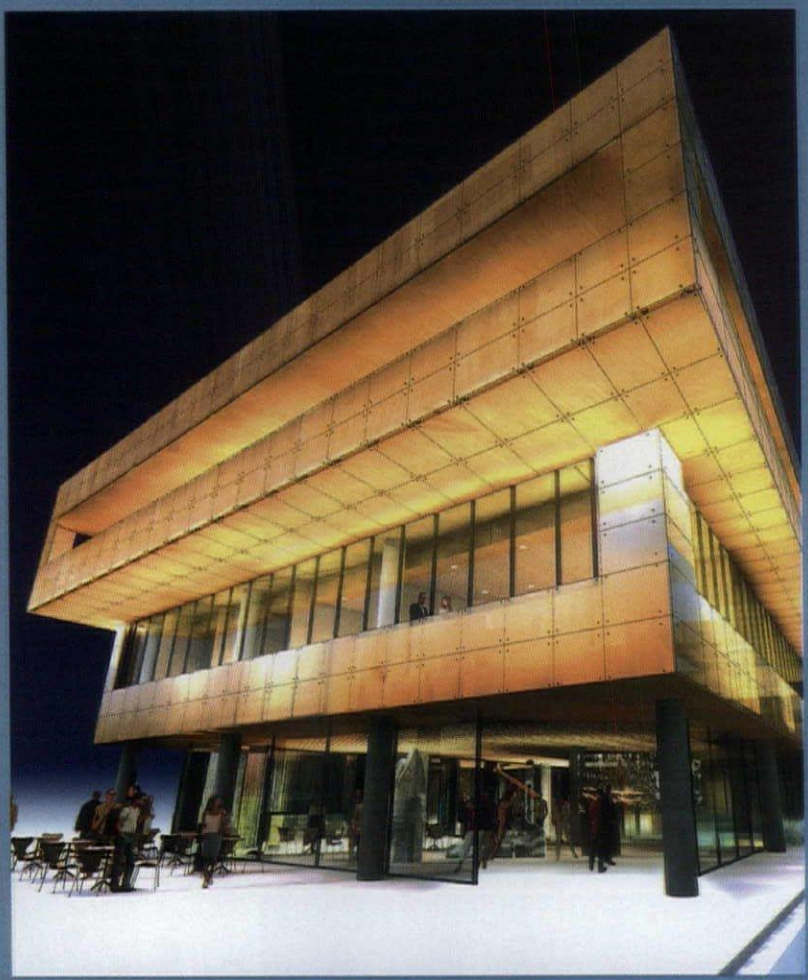
A competition-winning design by architects Tomas Hansen and Gert Wingardh, the project is owned by the National Property Board of Sweden, which following a 1960 parliamentary decree, has been responsible for all of the country's official buildings outside of Sweden. The seven-story structure is sectionally divided into distinct programmatic areas: Public reception spaces on the ground floor; the embassy on levels 2 and 3; a below-grade conference center; corporate apartments on floors 4 and 5; and a rooftop terrace.

Called upon by the architects and the property board, Stockholm-based lighting design firm Ljusarkitektur had a challenging task before them—to realize an already very clearly defined concept of light as integrated into the architecture and the distinctive wood-patterned glass façade of the building's upper-level balconies. As project principal Kai Piippo explains, "We had to make their [the architect's] ideas real."

The lighting design starts at the building's exterior. Taking almost a full year to define how they would create the luminous quality and effects as modeled in the architect's original rendering of the building at night, the lighting design team embarked on a lengthy full-scale mockup process. The task was to create a building that would glow from the inside, reminiscent of traditional Swedish wood veneer lamps, yet still be clearly visible from a distance. The solution was a T5, 2700K fluorescent fixture, designed with Swedish lighting manufacturer Smedmarks, positioned in the 2nd floor balcony handrails to provide indirect light. Allowing the handrail to function as a reflector, light washes the glass panels and the underside of the balcony above. To illuminate the building's corners, the designers used inground-recessed fixtures with metal halide lamps. Rounding out the exterior luminaires are downlights along the main entrance ramp and recessed LED fixtures in the entry steps.

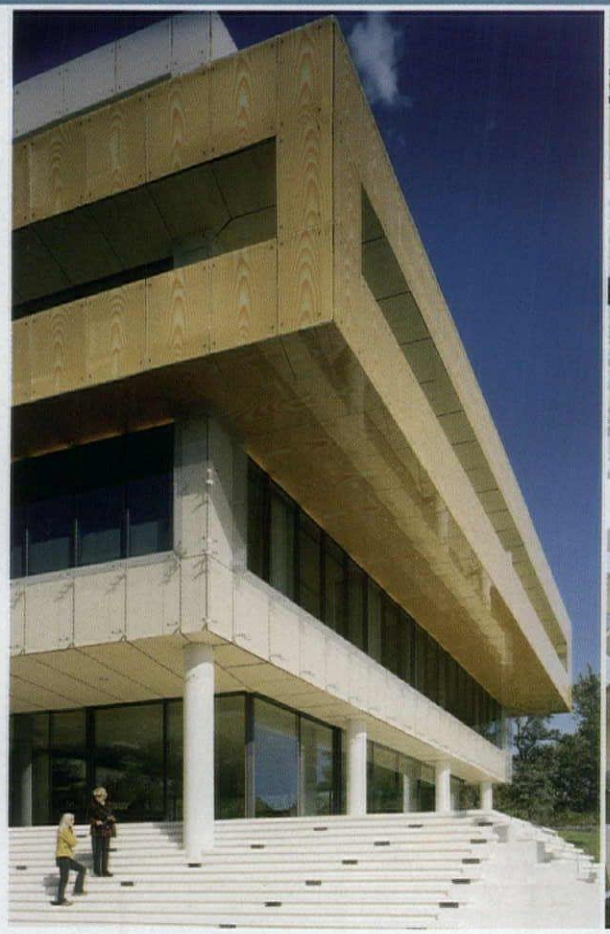
Continuing the idea of glowing light into the building's interior, the ceiling plane is transformed into a shimmering luminous surface, what the designer's refer to as the "cloud." The perforated wooden ceiling, patterned with dimensionally thin holes, densely clustered in the center and randomly extending to the ceiling edges, is backlit with linear fluorescent tubes. A white acoustic fabric backs the wood and acts as a light diffuser. The dappled lighting effect creates a sense of movement across the ceiling and leads the visitor's eye through the space. As lighting designer and project manager Eva Persson explains, 'The presence of light is strongly felt without seeing a light fixture." The "dot" motif, which recalls the early morning mist common to the Swedish natural landscape, is repeated elsewhere in the building, most noticeably as a frit pattern on the interior vertical glass planes of the stairway that leads to the below-grade conference center, and the interior glass walls that separate the embassy entrance from the public reception area.

The House of Sweden deftly marries architecture and light, creating a building that stays rooted in and promotes its cultural heritage. With large glass expanses, nature is drawn into the building's interiors. Washington, D.C., is not generally known for innovative architecture, but as the House of Sweden proves, the city has an architectural future. **ELIZABETH DONOFF**

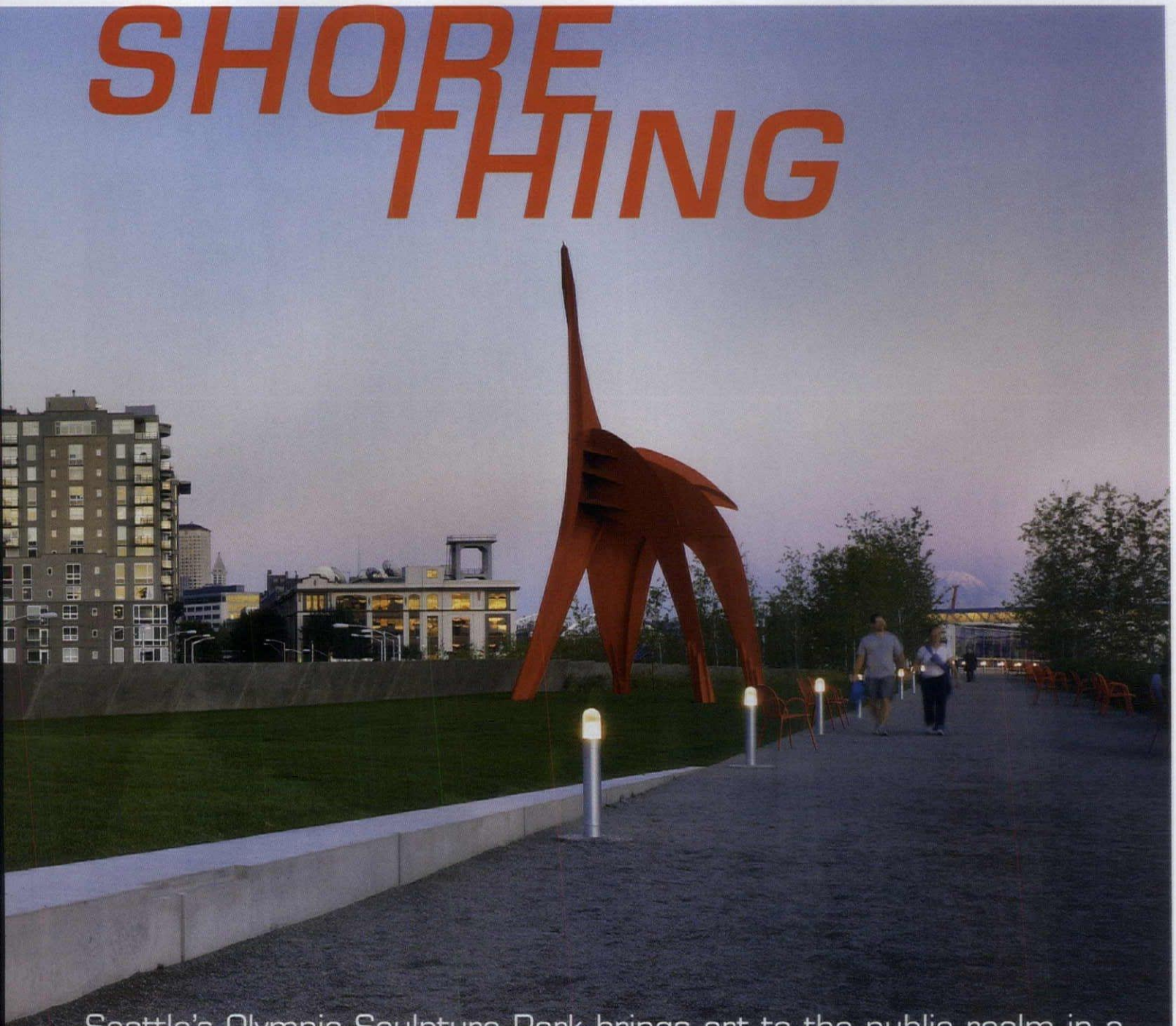


PROJECT: House of Sweden/Swedish Embassy **LOCATION:** Washington, D.C. **CLIENT:** The National Property Board, Stockholm **ARCHITECT:** Wingardh, Stockholm **ARCHITECT OF RECORD:** VOA Associates, Washington, D.C. **LIGHTING DESIGNER:** Ljusarkitektur, Stockholm **BUILDING COST:** $67 million **PHOTOGRAPHER:** Ake Lindman, Stockholm **MANUFACTURERS:** Artemide, DeltaLight, Erco, Fagerhult, Lightolier, Lithonia, Lucifer, Luxo, Selux, Smedmarks, Zumtobel

Large glass expanses coupled with a perforated wooden ceiling create a sense of openness in the ground floor public reception area (above). Fluorescent T5 tubes hidden behind the wood ceiling and a layer of white acoustic fabric along with the dot pattern creates a shimmering lighting effect. The dot motif is carried throughout the building as seen in the glass panels of the stairway leading to the conference center (facing page) and on the glass partitions in the embassy's staff quarters (below). Decorative fixtures with tulle shade add a playful touch in the staff's lunchroom area. A wood-patterned glass gives the façade its distinctive character (below left).



SHORE THING

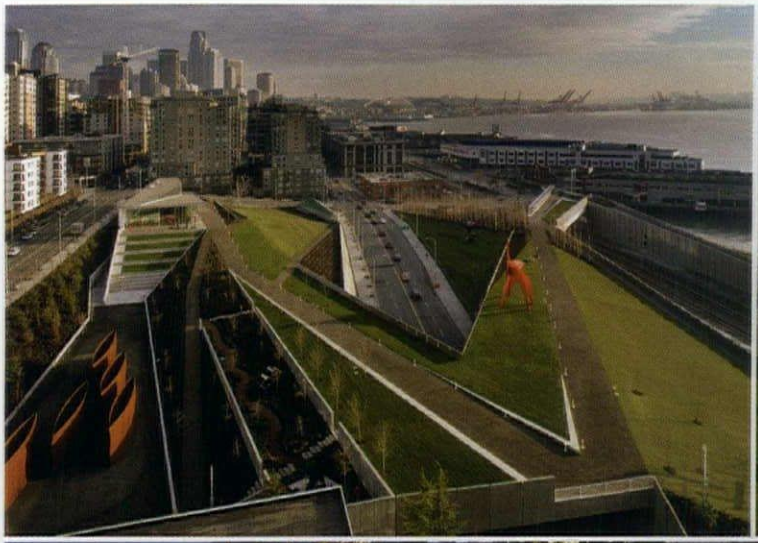


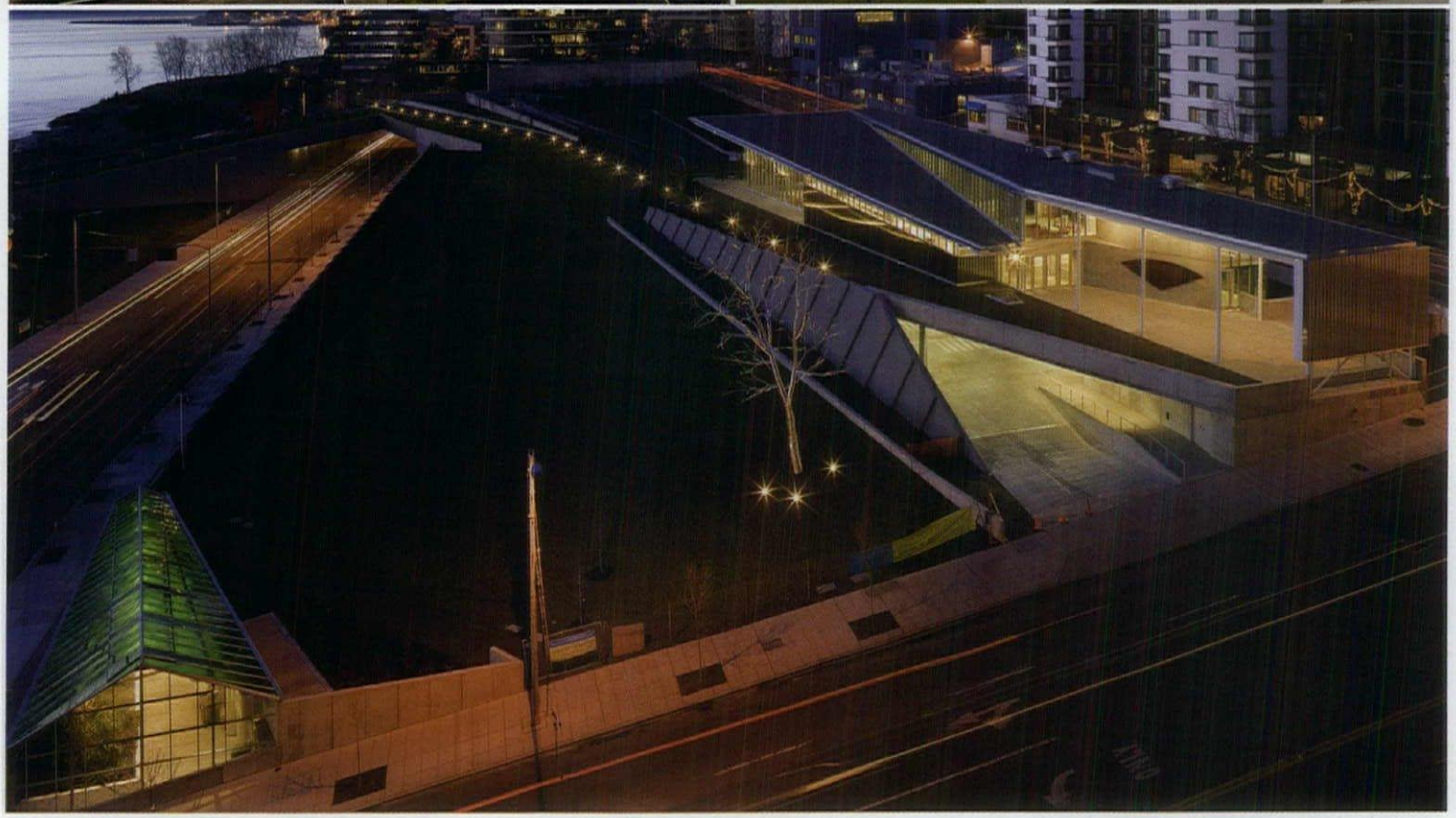
Seattle's Olympic Sculpture Park brings art to the public realm in a dynamic integration of landscape, architecture, and urban design.

ONCE A DESOLATE AND CONTAMINATED AREA FORMERLY USED FOR INDUSTRIAL PURPOSES, the site of Seattle's new Olympic Sculpture Park has been transformed into an urban sanctuary where art, nature, and infrastructure harmoniously coexist. The site, a 9-acre parcel of land on Seattle's downtown waterfront, is now owned and operated by the Seattle Art Museum. In 2001, the museum, with support from the National Endowment of the Arts, held an international competition to find a designer that could not only reinvent the site but also form a connection between the city and its neglected shoreline.

The museum selected New York-based Weiss/Manfredi Architecture/Landscape/Urbanism as lead designer from a pool of 52 applicants, a firm ideally suited for such a project based on its cross-discipline expertise in architecture, landscape, and urban design. Resolving to return the site to a functioning ecosystem, while providing a one-of-a-kind setting for outdoor sculpture and public recreation, the museum turned to Weiss/Manfredi's innovative competition design—a continuous and constructed landscape rising over existing infrastructure and connecting three separate brownfield sites into one uninterrupted z-shaped landform that wanders from the city to the water's edge.

Affording an array of environmental restoration processes, including brownfield remediation and the creation of a salmon habitat, the design also offers sweeping panoramic views of Puget Sound, the Olympic Mountains, Mount Rainier, and the surrounding city. The design provides "a broad, continuous ribbon where all kinds of different art can be sited," says Michael Manfredi, design partner at Weiss/Manfredi. The firm also addressed the site's significant infrastructural challenges, including an arterial highway and railway lines. Instead of enclosing them, Weiss/Manfredi





built up the site's topography by 40 feet, in turn creating a seamless and slow decent down to the 850-foot strip of restored shoreline.

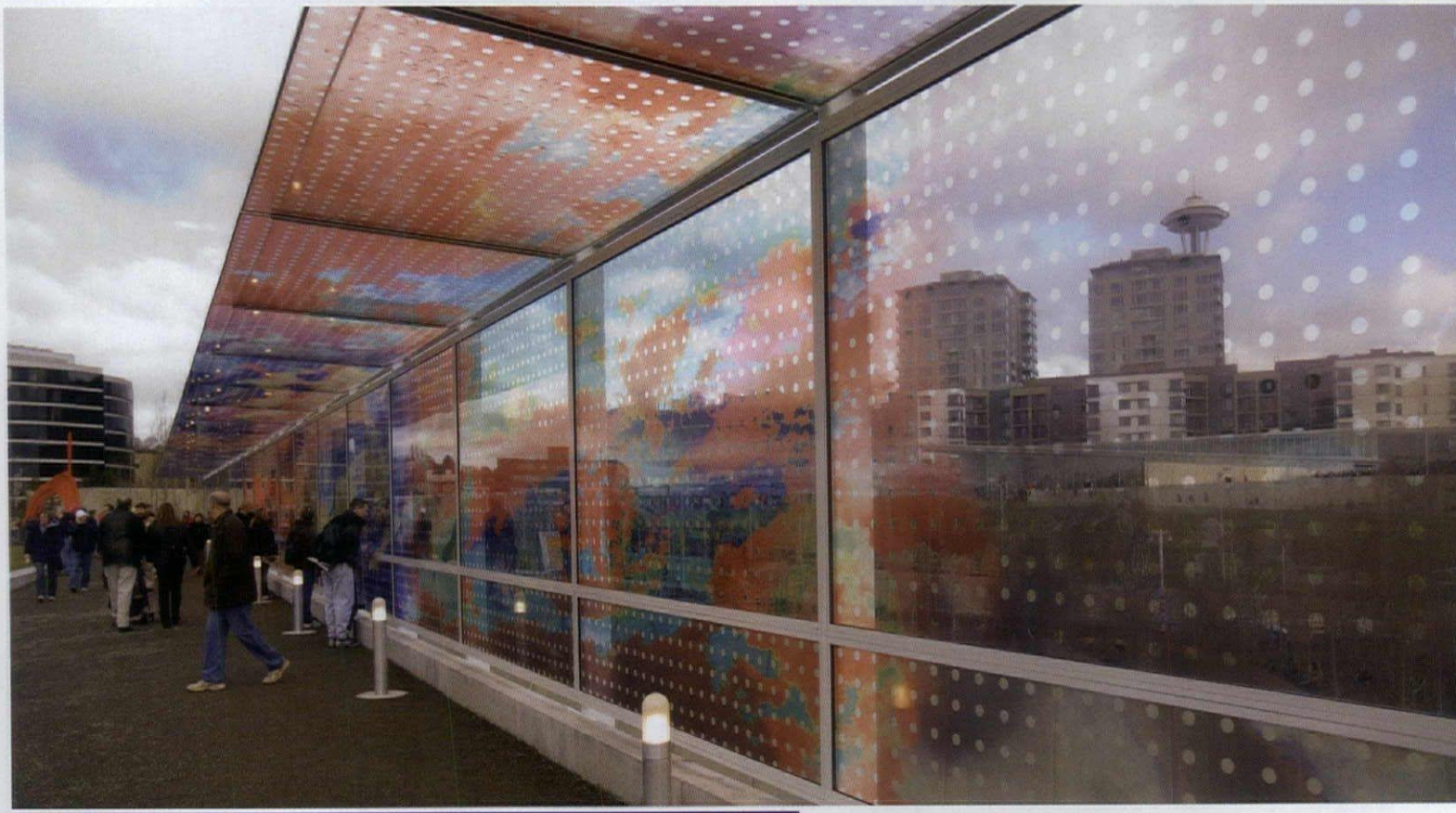
Unlike other sculpture gardens that are hidden behind a series of museum walls, the Olympic Sculpture Park is completely open, integrating the park into the landscape of the city. Because of its open nature, the site required a lighting scheme that would not overwhelm its natural surroundings or draw attention away from the artwork. Weiss/Manfredi worked closely with New York-based lighting design firm Brandston Partnership Inc. (BPI) to design a subtle, integrated lighting scheme that was flexible and maintenance-friendly.

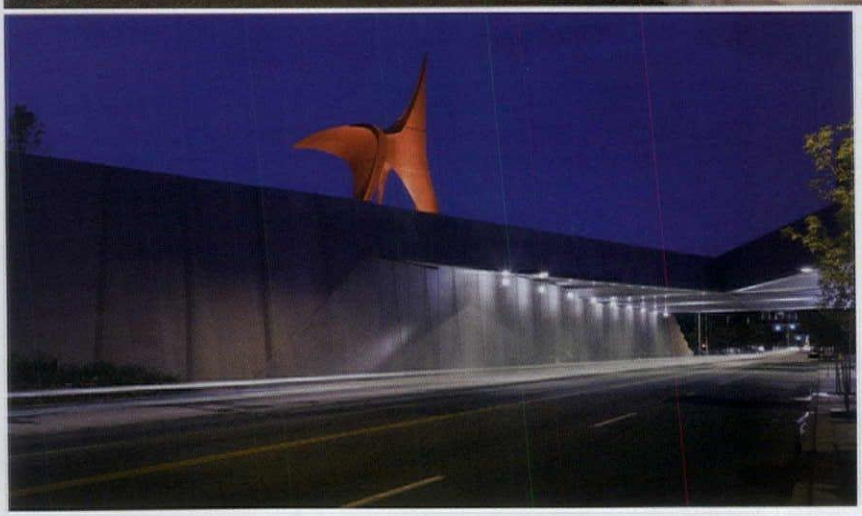
"In my view, the beauty of this project is that the lighting does not have to do much; the architecture is so open, welcoming, and beautiful already. We only used the light to present the elements as they were designed," says lighting designer Chou Lien, partner at BPI. Already a major component to the park, nature also played an important role in its general illumination, which was provided by natural light from the night sky as well as surrounding streetlights and buildings. As Chou explains, "The sculptures are not solo objects, they are part of a large environment, to be seen at night with other light conditions nearby."

One building that provides such light is the park's PACCAR Pavilion, an 18,000-square-foot glass and steel structure located at the park's main entrance that houses exhibition and event space, areas for educational programming, underground parking, a bookshop, and a café. Designed as an extension of the z-shaped landform, the pavilion—which includes a series of cantilevered roofs and stepped terraces—links the indoor and outdoor spaces via folded stainless steel and mirrored frit glass that capture the reflections of the surrounding city and landscape.

Outside, 250W quartz halogen fixtures uplight the building's canopies. Inside, low-wattage track-mounted luminaires with 50W incandescent AR70 quartz lamps accent artwork and architectural features, providing a setting for art and special events and offering flexibility for changing exhibits and functions. In addition, 250W DC quartz uplights have been placed in parts of the double-height space to fully illuminate the structure's form, transforming the pavilion at dusk into a glowing lantern. "We see the pavilion as a place of sanctuary as well as a place of celebration," Chou says.

From the pavilion, through an adjoining plaza and amphitheater, a 2,200-foot crushed-stone z-shaped path leads visitors through a series of gradu-





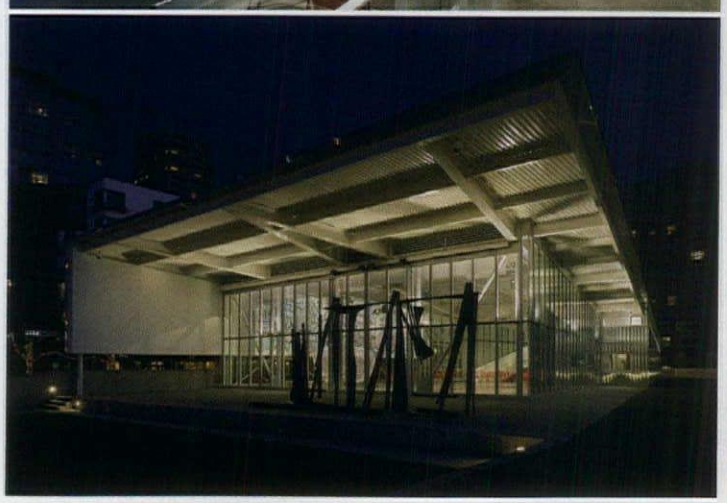
Surrounded by downtown Seattle, the Olympic Sculpture Park is intersected by an arterial highway and railroad tracks. Incorporating this infrastructure into the design, Weiss/Manfredi created an uninterrupted z-shaped landform that wanders from the city to the water's edge. The custom bollards lining the path create a sense of scale and legibility without raising the light levels too high (facing page, top left and right). The PACCAR Pavilion (facing page, bottom), located at the main entrance of the park, is a glass and steel structure that houses exhibition and event space, educational programming, underground parking, a bookshop, and a café. One of two bridges that merges with the z-shaped path, the Elliott Avenue Bridge (above) affords a striking view of Alexander Calder's "Eagle" illuminated with 100W QPAR38HIR FL lamps (left).

ally descending distinct "galleries" to the newly restored shore, and offers a multitude of radically different views at each turn, from the sea and mountains to the city and port. Lining the path at 30-foot intervals are custom-designed bollards that create a rhythm to the walkway. As Manfredi explains, the bollards "give the park some scale at dusk, and provide a legibility without raising the light levels too high, so there's a rather subtle trajectory of light that, particularly in the often wet, damp climate of Seattle, plays with that wetness and gives off a glow."

Because there were no suitable products on the market, Weiss/Manfredi and BPI collaborated with d'ac Lighting to create the ideal fixture. As Marion Weiss, design partner at Weiss/Manfredi, explains, "The point was to try and make something that looked as undesigned as possible." The resulting bollard is a 32-inch-tall spun-aluminum fixture topped with a glass globe that houses an 18W compact fluorescent lamp. "We were very interested in a light fixture that would, among other things, bring the light level down," Weiss says. "Because the z-shaped path follows the park's highest point, we wanted to give the sense of the infinite scale of the sky and the horizon, as opposed to light fixtures being right at eye level or higher." To achieve this, a sense of measure was key and a significant amount of time was spent on calculating the bollard's height and spacing, as well as on understanding the impact of so many fixtures. The goal was "to create a very soft reference," Chou notes.

Along the path, sculptures reside in their designated spaces, each particularly suited to the artwork they contain. Because the museum required flexibility to light changing exhibits in the future, each section of the park is controllable by a wall box to meet the requirements of each distinct space. To keep the light levels low enough for the art to have a presence, in-grade adjustable fixtures illuminate the majority of the sculptures. Adding some variety, cast-in-place 13W compact fluorescent 3000K steplights are recessed into retaining walls throughout the park.

"This incredibly difficult collection of sites was brought together in one very clear and powerful form," Weiss says. With a minimal, unobtrusive lighting scheme, the juxtaposition of city and nature comes together seamlessly, allowing for different settings to coexist. With its fusion of art, landscape, architecture, and infrastructure, this magnificent addition to Seattle's landscape may very well give the Space Needle a run for its money. **SALLIE MOFFAT**



Track fixtures are used throughout the pavilion to provide flexibility for changing exhibits and functions and to accent the structure's architectural features (top and middle). Outside, quartz halogen fixtures uplight the building's canopies for a soft glow (above).

DETAILS

PROJECT Olympic Sculpture Park, Seattle

CLIENT Seattle Art Museum, Seattle

LEAD DESIGNER: SITE DESIGN/ARCHITECTURE Weiss/Manfredi Architecture/Landscape/Urbanism, New York

LIGHTING DESIGNER Brandston Partnership Inc., New York

CONSULTANTS:

STRUCTURAL AND CIVIL ENGINEERING Magnusson Klemencic Associates, Seattle

LANDSCAPE ARCHITECTURE Charles Anderson Landscape Architecture, Seattle

MECHANICAL AND ELECTRICAL ENGINEERING ABACUS Engineered Systems, Seattle

GEOTECHNICAL ENGINEERING Hart Crowser, Seattle

ENVIRONMENTAL CONSULTANT Aspect Consulting, Seattle

AQUATIC ENGINEERING Anchor Environmental, Seattle

PROJECT SIZE 9 acres

PROJECT COST $85 million

PHOTOGRAPHERS Ben Benschneider, Seattle; and Paul Warchol, New York (images top left and right, p. 36 and bottom, p. 38)

MANUFACTURERS	APPLICATION
B-Light	Surface-mounted signage light at garage entry
Bega	Recessed steplights at landscape exterior steps; exterior surface-mounted floodlight on underside of Elliott Avenue bridge
BK Lighting	Surface-mounted adjustable accent lights at exterior pavilion entry; front entry signage
d'ac Lighting	Custom bollards lining z-shaped path
Elliptipar	Asymmetric uplights at pavilion perimeter mounted at mullions, exterior pavilion entry, and pavilion lower-level west wall; signage light at Elliott Avenue bridge
Fabulux	Ceiling surface-mounted jelly jar on underside of Elliott Avenue bridge
Holophane	Ceiling-mounted parking light
Kenall	Ceiling-mounted area light on underside of Elliott Avenue bridge
Lightolier	Accentlights, downlights, and wallwashers at pavilion interior and throughout
Litelab	Track and track heads in pavilion, multipurpose spaces, and exhibit galleries
Prudential	Linear strips in parking garage

LITELAB | M-1333LHO | LITELAB.COM
Used throughout the pavilion, including the galleries and exhibition spaces, Litelab's M-1333LHO track fixture is made of 6000-series aluminum and takes an AR70 incandescent lamp. Four fittings are available, however, in the pavilion, the BusRun Busway 9i was used, which features a fused plug-in fitter and an integral transformer. The fixture comes in natural aluminum, black, white, and custom paint. Numerous accessories, including a linear spread lens, hex cell louver, and tapered glare shield, are offered. CIRCLE 111

D'AC LIGHTING | CUSTOM BOLLARD | DACLIGHTING.COM
Lining the park's z-shaped path, the custom bollard was created through the collaboration of d'ac Lighting, Weiss/Manfredi, and Brandston Partnership Inc. Standing 32 inches tall, it is constructed of spun aluminum and is topped by a glass globe that houses an 18W compact fluorescent lamp, creating a soft reference point throughout the park while providing a subtle sense of sparkle. CIRCLE 112

HYDREL | M9710 SERIES | HYDREL.COM
Designed for the uplighting of architectural and landscape features, Hydrel's M9710 Series was used in the park to illuminate select sculptures. Measuring 12 inches in diameter, the modular in-grade single-lens spot fixture is constructed of aluminum and features a stainless perforated trim insert. One PAR38 lamp is housed under a flat, clear lens outfitted with a linear spread filter. CIRCLE 113

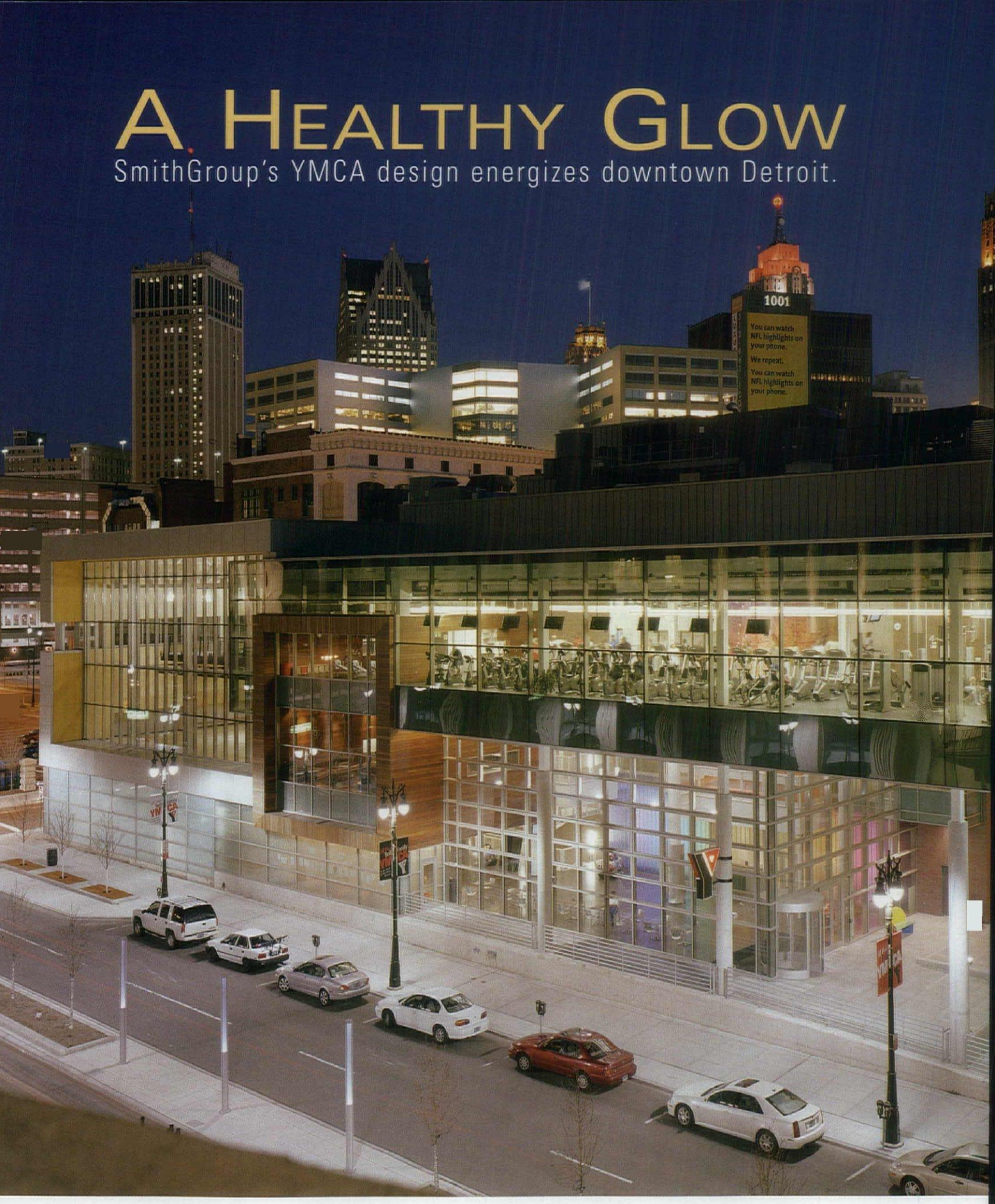
ELLIPTIPAR | STYLE 151 | ELLIPTIPAR.COM
Used to uplight the PACCAR Pavilion, Elliptipar's Style 151 asymmetric fixture was modified for the project with a custom cantilevered mounting. Featuring a micro-prismatic, thermal- and impact-resistant lens, this compact luminaire houses a 250W tungsten halogen lamp and has a custom polyester powder-coated finish that was electrostatically applied and thermoset for abrasion, fade, and corrosion resistance. CIRCLE 114

LIGHTOLIER | C4ALV | LIGHTOLIER.COM
Located throughout the pavilion, Lightolier's C4ALV Evolution downlight takes an MR16 lamp and has a 4-inch aperture. Made of 20-gauge steel with a matte black finish, the fixture features an EZ-Aim gear drive adjustment mechanism, a Push-Lock trim retention system, and is available with a complete palette of interchangeable optical assemblies. CIRCLE 115

BEGA | 2032P | BEGA-US.COM
This recessed, compact fluorescent steplight by Bega, located at the park's exterior steps, measures 13 inches wide by 3 1/2 inches tall. Constructed of die-cast and extruded aluminum with a brushed stainless-steel faceplate and etched tempered glass, the luminaire can be vertically or horizontally mounted and is suitable for all types of construction. CIRCLE 116

A Healthy Glow

SmithGroup's YMCA design energizes downtown Detroit.



"I REMEMBER TAKING SWIMMING LESSONS AT THE Y AS A KID. IT WAS AN INWARD-FACING, CONcrete block building—a purely functional box," recalls lighting designer Jeff Gerwing, principal and co-leader along with Rodrigo Manriquez of the lighting team at SmithGroup's Detroit office. Stately, and occasionally heroic, YMCAs, unlike health clubs and spas, generally are thought of as historic fixtures of urban life, but the Boll Family YMCA, whose architecture also is designed by the SmithGroup Detroit office, is no stodgy throwback. Glass curtain walls make the building's mission transparent: The YMCA provides fitness, creative arts, and child care to the community. Located in downtown Detroit, the luminous structure is bright and open, a symbol of the city's revitalization efforts.

"Detroit has a stigma, but the city's been changing in the last decade," Gerwing says. "From a lighting perspective, we responded to the Y's needs, but we wanted to infuse the building with energy, and have that energy read to the outside and impact the context." Energy and motion are conceptual keywords that drive the project, taking both literal and abstract forms. For example, the building is adjacent to a stop on the "People Mover" (Detroit's light rail system) and riders have views into the lantern-like gymnasium. Industrial high-bay fixtures with 250- and 400W lamps provide general sports lighting in the space, but 39W metal halide track-mounted fixtures create pools of light along the suspended running track. For joggers the accent light breaks up the laps, but for transit riders it highlights the activity and creates a metaphoric link between bodies in motion and machines.

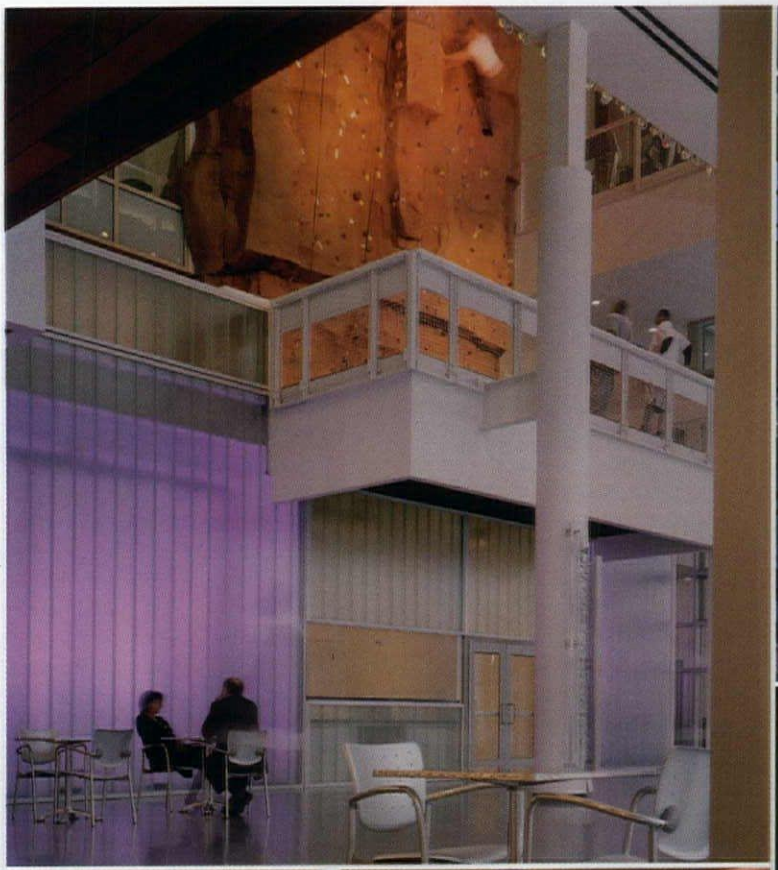
Streetside, the porch-like ground floor presented the lighting designers with both challenges and opportunities; because there is no traditional façade to wash with light, Gerwing and his team needed to consider the whole volume of the glazed lobby. The rear wall glows in a loop of pastel hues—an effect created by integrating the architecture and lighting. Backlit by a LED system, translucent, structural glass forms a scrim between the lobby and the YMCA's 200-seat black-box theater. The architects allowed for a space behind the glass to optimize the color rendering: The LED output lights the cavity wall, not the glass. Located near Detroit's Ford Stadium, the facility receives a lot of evening foot traffic, particularly on game days. Left on after hours, the LEDs animate the YMCA even when it is closed, bathing the lobby and the sidewalk in pink, blue, green, and yellow light.

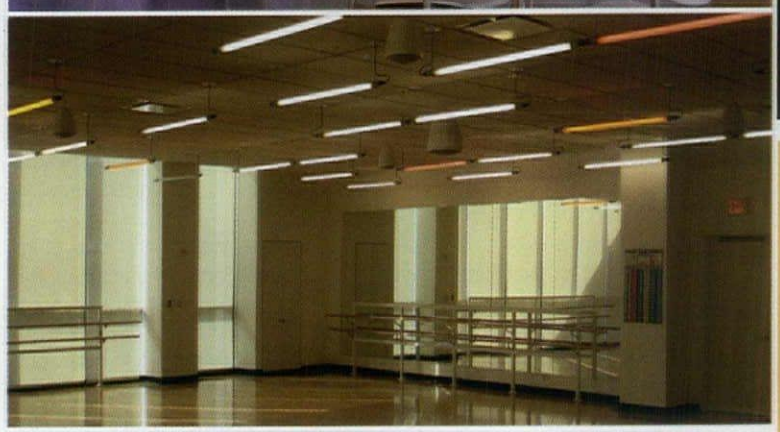
Colored light is used to activate other spaces as well. In the lobby, two rows of spotlights with tinted filters enhance the earthy character of the climbing wall that rises from a mezzanine to the second floor fitness room. The wall is lit with a variety of wattages—39-, 70-, and 100W—with 20, 30, and 38 PAR lamps, so that each beam spread or wattage variation is obvious for future lamp replacement. The lighting designers wanted to accent its cliff-like texture and drew on the shades of the Southwest. "Red, yellows, and ochres layer on top of each other to look like red rock," Gerwing explains. "The lighting gradually changes from warm tones to a cool, blue sky on top."

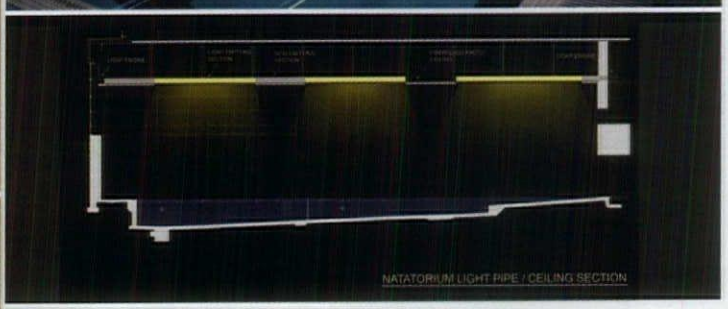
In the aerobics room, vibrant orange and yellow lines dance across the ceiling, giving the space an energetic boost. Conscious of the YMCA's need for easy maintenance and functional performance, SmithGroup created the lively array using T8 32W fluorescent tubes (standard YMCA lamp stock) fitted with color filters. The design provides 30 footcandles illuminance in the studio without sacrificing a poetic approach. "It is not just about the lighting. It is how people feel in the space," says lighting designer Rodrigo Manriquez. "It is about how all these principles work together—materials, volumes, lighting, color, and texture."

The natatorium illustrates this exact marriage of architecture, lighting concept, and facility maintenance. The swimming pool is the biggest selling point for new Y membership, so a bright, aesthetic design was important, but in a wet and humid environment, upkeep is key. (The YMCA did not want to have to close and drain the pool each time a light bulb needed changing.) SmithGroup's solution was to use a light pipe. The system places the lighting components that need to be accessed for maintenance along

Re-energizing downtown Detroit, the Boll Family YMCA acts as a beacon for the surrounding neighborhood and for the city. The new facility opens itself—literally and figuratively—to the community (left).







A LED system illuminates the structural glass rear wall of the lobby (top left). The aerobics studio is brought to life by T8 32W fluorescent tubes fitted with colored filters (above). A light pipe was the solution in the swimming pool area providing access for maintenance along the perimeter of the pool deck (top and bottom right).

the perimeter of the pool area, while optics efficiently direct light over the water. In this custom installation, the light pipe is placed above the ceiling and shines through linear slots. Viewed from a lobby window overlooking the pool, the design is an unfussy pattern of clean white lines reflected in the water's surface.

Interaction between each of the YMCA's recreational and creative arts areas is carefully built into the architecture: Floor plates are offset and volumes overlap, offering views of activity in each space. This arrangement makes for dynamic spaces, but is difficult to represent in a standard reflected ceiling plan. The lighting designers visualized the scheme by applying the computer program Lightscape to a three-dimensional digital model crafted by SmithGroup, which offers a nuanced way to understand how light, materials, and massing come together. "Ten years ago architects had a preconceived idea of the ceiling plan," Gerwing reflects. "We've been able to break out of that mold and focus on lighting from a conceptual level, not simply fixture selection." This mold-breaking approach freed the team to fully realize its energetic concept and let that vision enliven the YMCA and downtown Detroit. **MIMI ZEIGER**

DETAILS

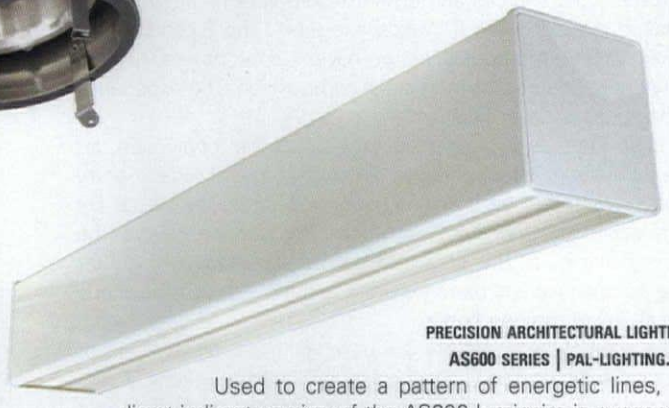
PROJECT Boll Family YMCA, Detroit
CLIENT YMCA of Metropolitan Detroit, Detroit
ARCHITECT SmithGroup, Detroit
LIGHTING DESIGNER SmithGroup, Detroit
PROJECT SIZE 100,000 square feet
PROJECT COST $24.5 million
LIGHTING INSTALLATION COST $630,000
WATTS PER SQUARE FOOT 1.2
PHOTOGRAPHS Justin Maconochie, Ferndale, Michigan

MANUFACTURER	APPLICATION
Bega	Exterior downlight wall sconce at building perimeter; indirect luminaries in lobby
Cole Lighting	Atrium stairway handrail lighting
Color Kinetics*	ColorBlast 12 at structural glass wall in lobby
Day-Brite	Industrial high-bay fixtures in gymnasium
Elliptipar	Wall-mounted indirect fixtures at natatorium/ swimming pool area
Lighting Services Inc.	Spotlight track lighting with colored filters at climbing wall
PAL	Suspended indirect/direct luminaire and wall-mounted asymmetric fixtures in workout room
SPI	Uplighting at the exterior entry soffit
TIR**	IllumiWave tubular light pipe in natatorium/swimming pool area
Waldmann	T8 linear fluorescents in aerobics/dance studio; linear sconces in natatorium and lobbies

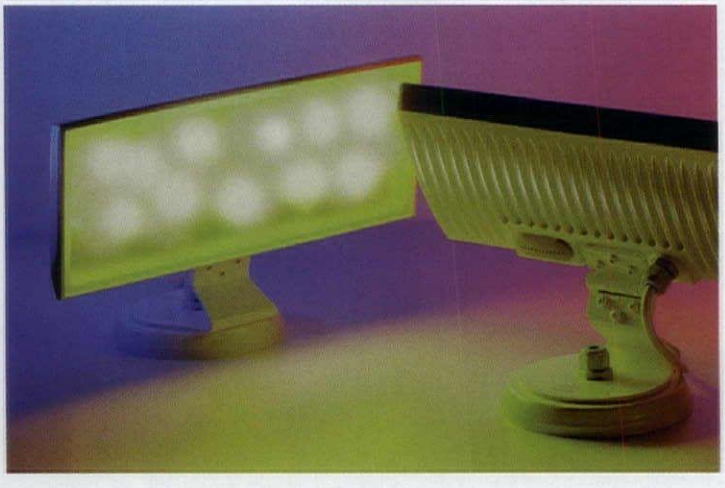
* In August 2007 Philips Solid State Lighting acquired Color Kinetics.
** In June 2007 Philips Solid State Lighting acquired TIR Systems.

SPI | ECHO SERIES | SPILIGHTING.COM
To create luminous, inviting surfaces, a 6-inch-diameter by 12-inch-long wallwasher was used to uplight the underside of the workout space that cantilevers over the main entry. The fixture can be specified for forward throw, plane wash, and vertical graze optics. Additionally, the extruded aluminum housing is field adjustable for flexible aiming. Available in two versions: fluorescent with an acrylic lens or high-intensity discharge with an impact, heat-resistant, tempered glass lens. CIRCLE 100

LIGHTING SERVICES INC | M2807 SERIES | LIGHTINGSERVICESINC.COM
A track-mounted M2807 spotlight is used at the climbing wall. Equipped with colored filters, at the YMCA, the lightweight steel and aluminum fixture also can be accessorized with louvers, baffles, and spread lenses. Adjustable and self-locking, it is mountable in five different configurations and available in white, black, and platinum. CIRCLE 103



PRECISION ARCHITECTURAL LIGHTING | AS600 SERIES | PAL-LIGHTING.COM
Used to create a pattern of energetic lines, the direct-indirect version of the AS600 luminaire is suspended in the workout room, while wall-mounted asymmetric fixtures are used along the perimeter of the space. Offered in a large variety of powdered coat finishes, the extruded aluminum housing is 6-1/2 inches square, and the fixture is specifiable in 4, 8, and 12-foot standard lengths. Linear prismatic, white cross baffle, and parametric baffle lenses also are available. CIRCLE 104



COLOR KINETICS | COLORBLAST 12 | COLORKINETICS.COM
Tucked behind structural glass, the ColorBlast 12 washes the lobby's rear wall with ever-changing shades. The 12.6-inch-wide by 8.4-inch-tall fixture is packed with 36 high-intensity RGB LED lamps that can produce an astonishing spectrum of 16.7 million colors. Equipped with a soft focus glass lens, it produces a soft-edge 23-degree beam of light; the clear glass lens offers a 10-degree beam of light. The die-cast aluminum fixture is available in black or white finishes. CIRCLE 101

TIR SYSTEMS | ILLUMIWAVE 1000 | TIRSYS.COM
The IllumiWave 1000 light pipe system provides lighting over the pool in the natatorium, but is easily maintained because 1000W metal halide lamps are located over the deck. Available in lengths from 20 to 60 feet from a single source, the system illuminates without glare. The light pipe is fitted with white, powder-coated aluminum side panels, and a non-emitting white ABS upper housing. CIRCLE 102

DAY-BRITE LIGHTING | HBD-EXPRESSIONS HIGH BAY ACRYLIC | DAYBRITELIGHTING.COM
This industrial high-bay fixture provides general illumination in the gymnasium. Equipped with an acrylic reflector, to provide an even distribution of light, the luminaire can be used with either metal halide, high pressure sodium, or pulse start metal halide lamps. The fixture offers numerous assembly combinations with pendant stems ranging from 12- to 60-inches long and three decorative ring options. The reflectors all have heavy wall aluminum housings and are UL listed for damp locations. CIRCLE 105

ELLIPTIPAR | STYLE 153 | ELLIPTIPAR.COM
This large, cylindrical indirect light is wall-mounted around the perimeter of the swimming pool deck. Round, aluminum endplates conceal a parabolic reflector and house either a 1000W halogen or two 400W lamps. The asymmetric reflector minimizes spill light. The fixture is UL listed for wet locations. CIRCLE 106

SOME PROJECTS SIMPLY INCLUDE LIGHTING IN THEIR DESIGN, OTHERS ROOT LIGHT IN their core. The Bloch Building, the new addition to the Nelson-Atkins Museum of Art in Kansas City, Missouri, is one such project. From its inception to its realization, light permeates every aspect of the new building. "The primary building material is light," states Steven Holl Architects partner-in-charge, Chris McVoy. "Lighting is not seen as separate from the architecture."

The competition-winning scheme is composed of five "lenses," glass pavilions that embed themselves along the eastern edge of the museum site. The Bloch Building offers a new paradigm for the museum visitor—a meandering path, a route of one's own choosing, where ever-present but ever-changing natural light creates a dynamic experience. In contrast, the 1933 Atkins Building provides the visitor with a more traditional museum experience with its sequential "black-box" galleries, which rely on electric sources and do not incorporate natural light. As museum director Marc F. Wilson explains, "The Bloch Building presents us with propositions we haven't seen before. Light is everywhere. It's part of the spatial composition. The experience of the space is never finished."

Lense One, as it is referred to, houses the lobby, café, art library, museum shop, and the director's office. Multiple entry points—whether it be from the main drop off by the Walter De Maria sculpture *One Sun / 34 Moons*, the parking garage, the Atkins building, or the sculpture garden—are woven together using perspective and permit visitors to move through the space via a series of ramped floors.

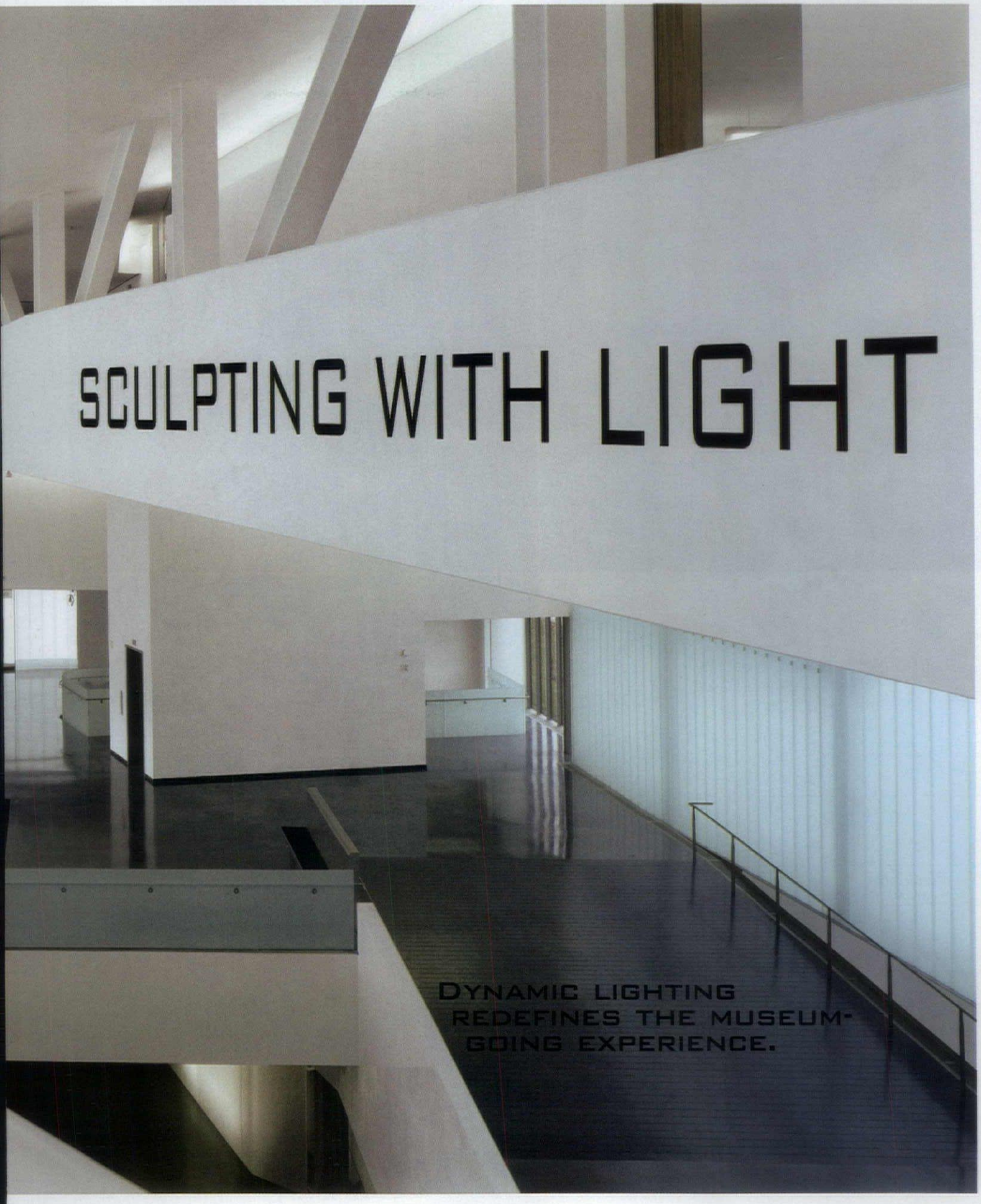
The walls of the lenses are composed of 16-inch wide planks of structural self-spanning channel glass. An intricate system of stippling the center glass surface along with a sandblasted translucent insulation, depending on the angle the viewer is looking at the glass, it will appear to have either a satin reflection or a moiré effect. "The surface become pure light and glass," McVoy says. Inside the glass cavity wall two layers of low-iron laminated sheet glass are applied to maintain the clearest color rendering of daylight as possible. As McVoy explains, "The lenses are instruments of light that play with the qualities of intensity and color."

Working with the architects, lighting designer Richard Renfro and his team played a fairly technical role on the project because as Renfro explains, "The concept of light was already there." To understand how light would work in the glass cavities, Renfro built a full-scale mock-up at his home in Brooklyn, New York, and then wheeled it down the street to study the change of light conditions.

Through the center of the glass lenses are a series of T-walls, referred to a "Breathing T's," which form a structural spine and allow a mix of north and south light into the galleries, creating a volumetric play of light. "They curve out to cup the space and diffuse light into the galleries," McVoy explains. Renfro and his team also used a fair amount of computer modeling to determine the amount of light in the galleries to devise a passive shading system, at the request of the museum, that would let natural light in without risking damage to the artwork. Renfro devised a three-layer shade system, with 7-, 11-, and 50-percent transmission, so that the daylight light levels in the galleries are no less than a minimum of 7 footcandles and no more than a maximum of 27 footcandles. As Renfro explains, "The multiple shades allow a maximum flexibility."

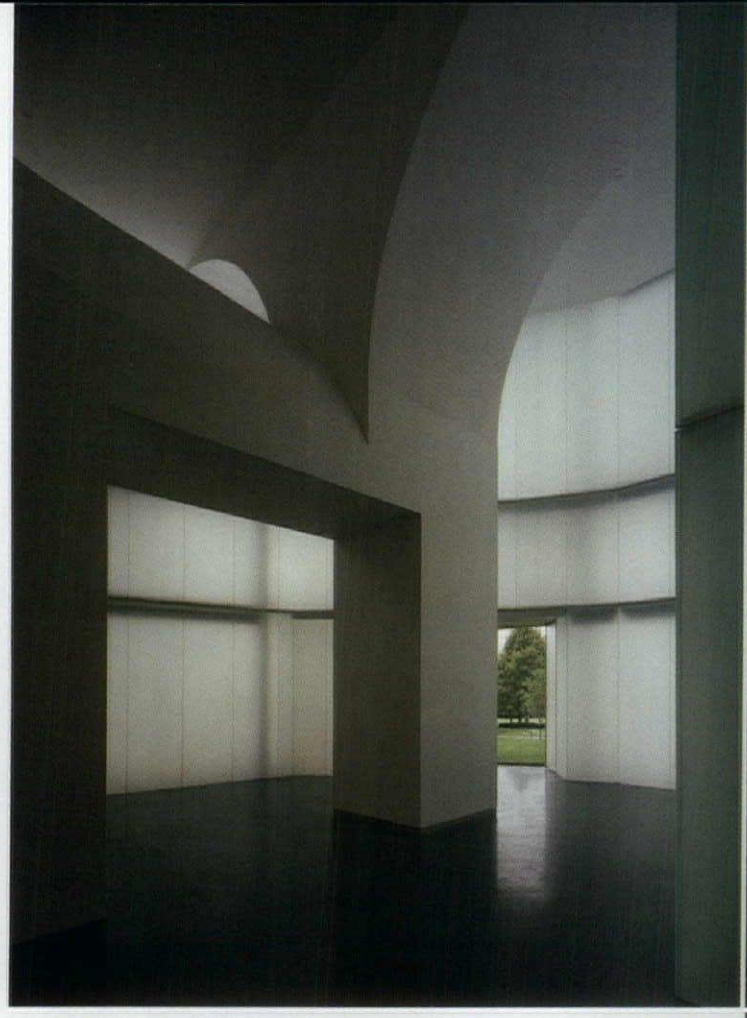
The other main gallery lighting element is the "stitch track"—short runs of track that create a zipper-like effect on the ceiling plane and tie the long and short perspectives of the galleries together. Lighting designer Rebecca Malkin explains, "The architects did not want continuous 'slashes' in the ceiling." In a demanding exercise, to ensure the exact flow of the dashed stitch track through each gallery in relation to the height of the

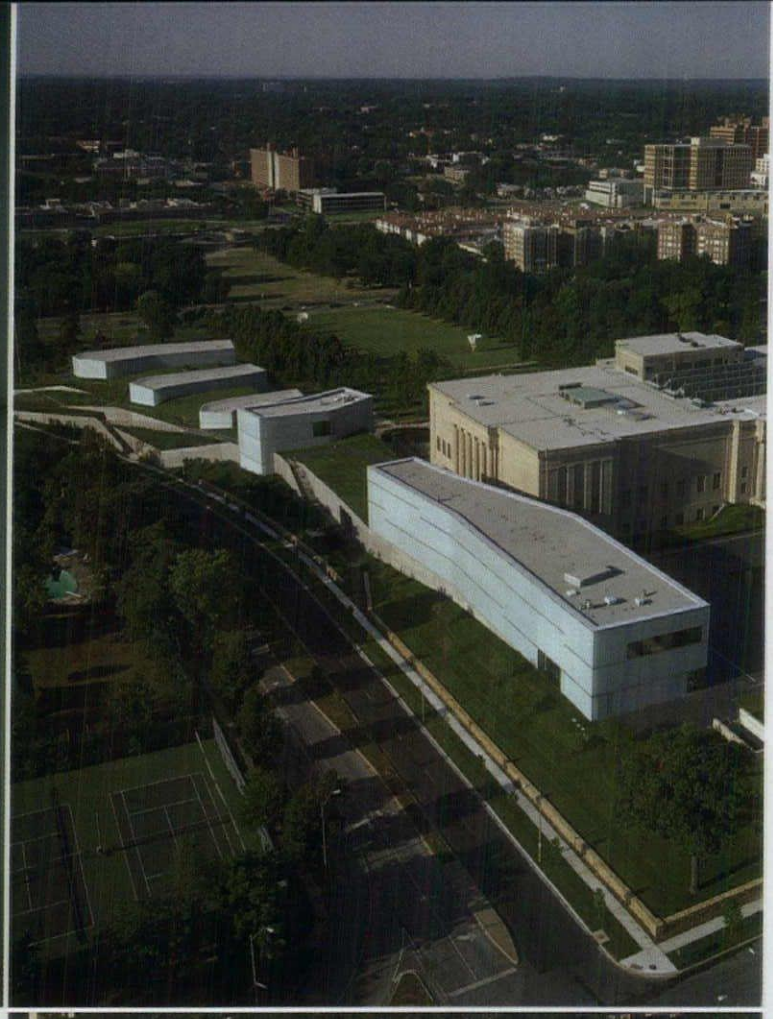
Architecture and light become one in the entry area of the Bloch Building (right).

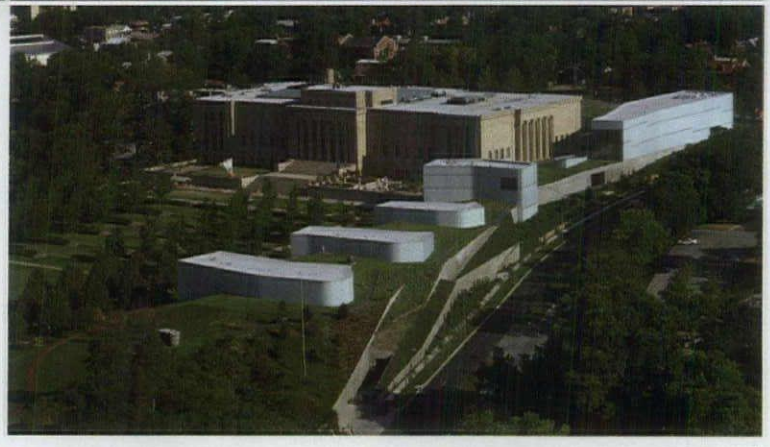


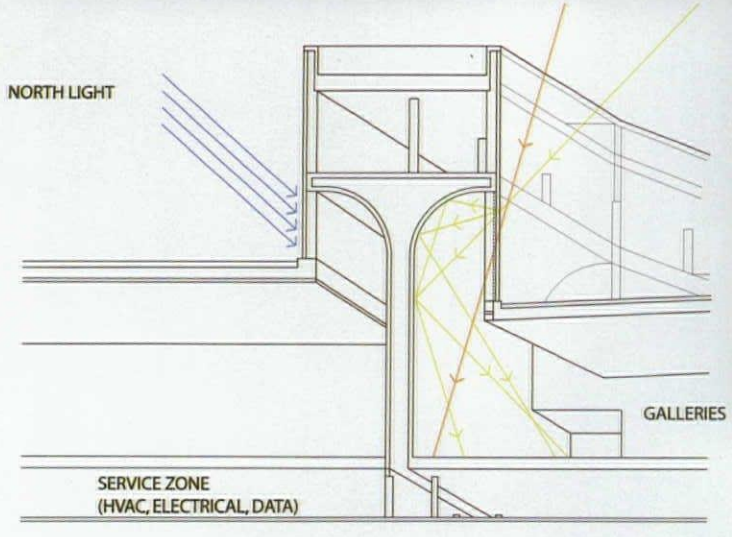
SCULPTING WITH LIGHT

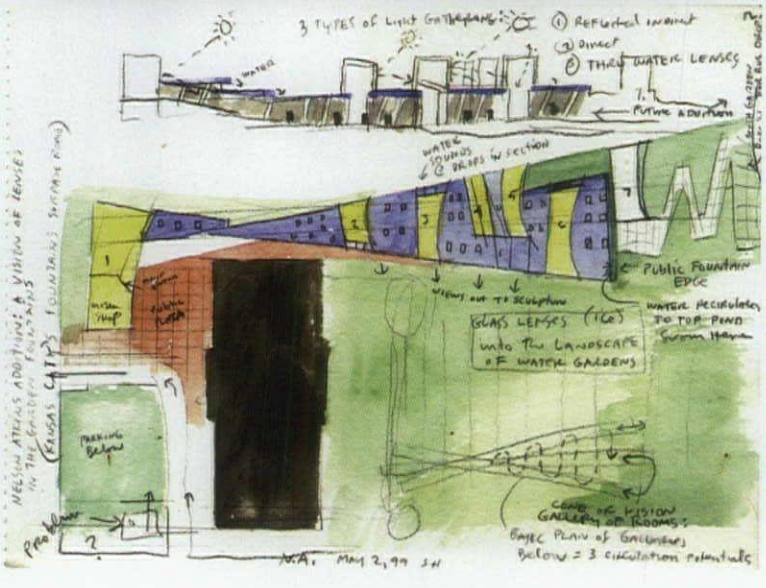
Dynamic lighting redefines the museum-going experience.







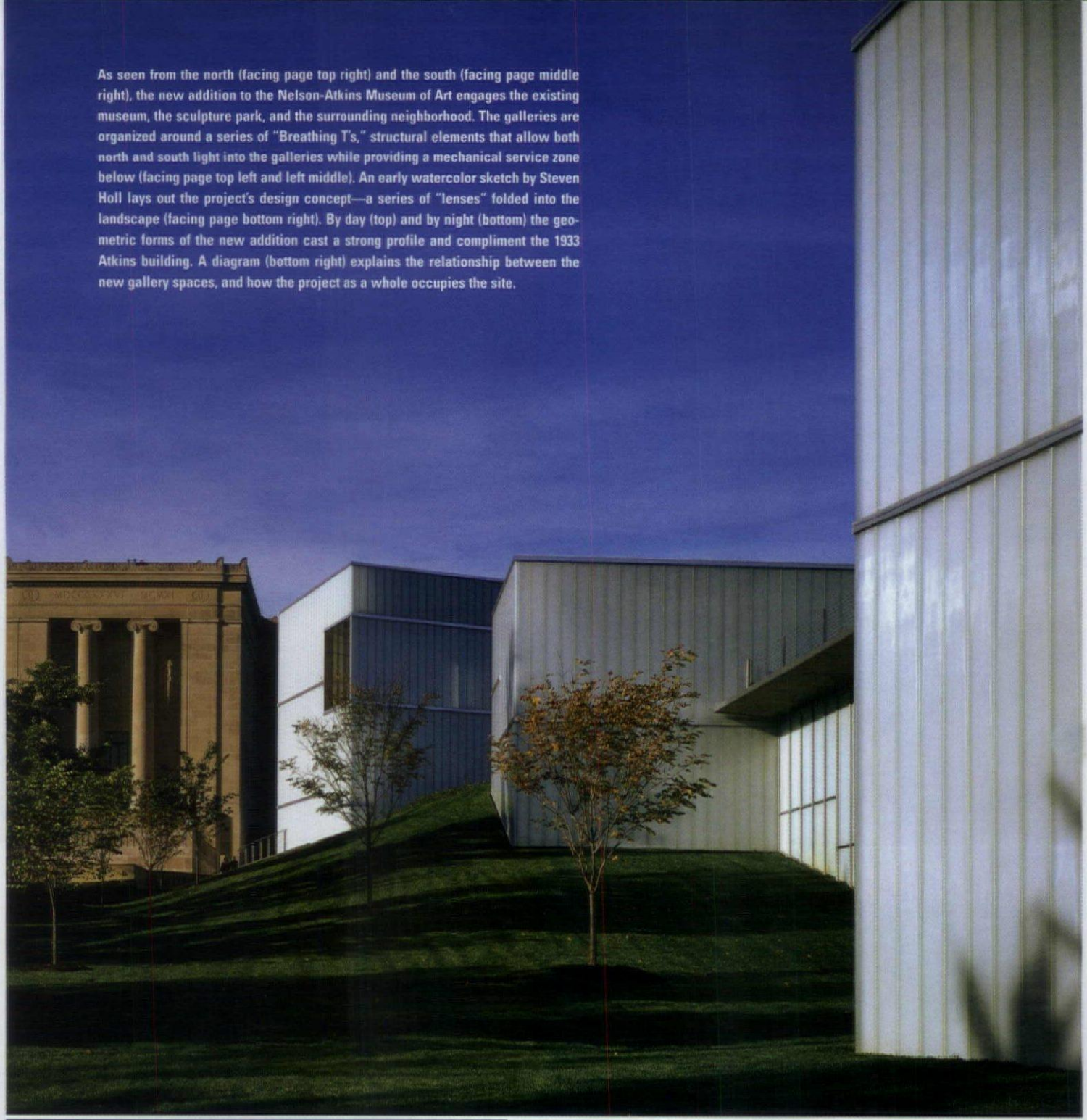




space and the slope of the ceiling, Renfro and Malkin first laid out each line of track making a paper template before it was installed.

Certainly dynamic by day as light and shadow move across the Bloch Building's surfaces, at night the building become something else altogether—an other-worldly series of glowing glass blocks, which tumble gently down the sloped landscape. Low-mercury 54W T5HL fluorescent lamps, chosen for their color rendering capabilities, are located in the glass cavity walls to achieve the nighttime glowing quality. The light is intense, but not distracting, making the grass greener, and the blue of the night sky deeper. The Bloch Building celebrates light creating a series of formal and experiential moments unrivaled in their expression—an expression that sculpts architecture through light. **ELIZABETH DONOFF**

As seen from the north (facing page top right) and the south (facing page middle right), the new addition to the Nelson-Atkins Museum of Art engages the existing museum, the sculpture park, and the surrounding neighborhood. The galleries are organized around a series of "Breathing T's," structural elements that allow both north and south light into the galleries while providing a mechanical service zone below (facing page top left and left middle). An early watercolor sketch by Steven Holl lays out the project's design concept—a series of "lenses" folded into the landscape (facing page bottom right). By day (top) and by night (bottom) the geometric forms of the new addition cast a strong profile and compliment the 1933 Atkins building. A diagram (bottom right) explains the relationship between the new gallery spaces, and how the project as a whole occupies the site.



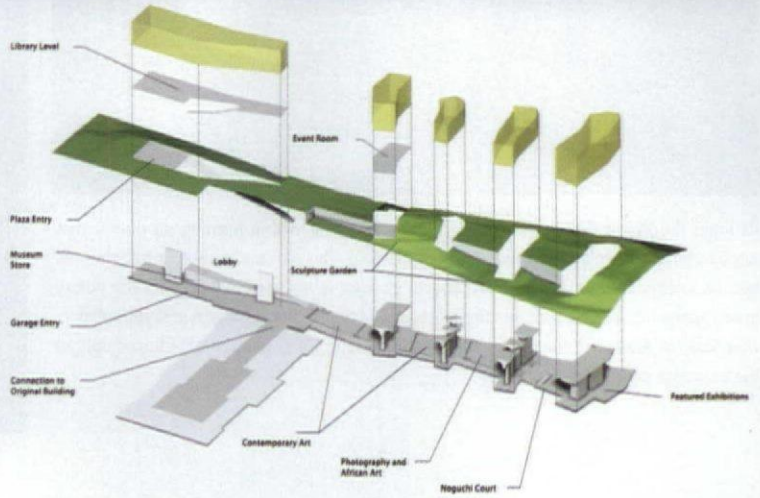


IMAGE THIS PAGE BOTTOM RIGHT AND FACING PAGE BOTTOM LEFT AND RIGHT COURTESY OF STEVEN HOLL ARCHITECTS

At night the Bloch Building's five "lenses" glow from within forming an illuminated edge to the museum's 22-acre sculpture park (top). The parking garage is transformed into an unexpected art installation (above) as light is allowed to permeate the below grade space through the circular skylights, part of the Walter De Maria sculpture above, *One Sun / 34 Moons*. Column wall sconces fitted with 250W metal halide lamps uplight the concrete ceiling.

DETAILS

PROJECT Bloch Building, Nelson-Atkins Museum of Art Addition, Kansas City, Missouri

CLIENT Nelson-Atkins Museum, Kansas City, Missouri

ARCHITECT Steven Holl Architects, New York

LIGHTING DESIGNER Renfro Design Group, New York

STRUCTURAL ENGINEER Guy Nordenson and Associates, New York

GLASS CONSULTANT R.A. Heintges & Associates, New York

PROJECT SIZE 165,000 square feet (addition); 234,000 square feet (renovation); 450 square feet (parking garage)

PROJECT COST $200 million (expansion and renovation)

PHOTOGRAPHERS Roland Halbe, Stuttgart, Germany, unless otherwise noted

APPLICATION / MANUFACTURERS

Bloch Building Expansion:
Alera, Alexandra Lighting Systems, Bartco Lighting, Bega, Cathode Lighting Systems, C.J. Lighting, Columbia Lighting, C.W. Cole and Company, Edison Price Lighting, Elliptipar, Finelite, Focal Point Lighting, H.E. Williams, Kirlin Company, Lightcontrol Corporation, Nulux, Paramount, Prudential Lighting Industries, Winona Lighting

Parking Garage:
B.K. Lighting, Bega, Canlet, C.W. Cole and Company, Elliptipar, Finelite, Greenlee Lighting, Kim Lighting, Paramount Industries

Sculpture Gallery & Kirkwood Hall Renovation:
Barbican (custom laylight glass), Cathode Lighting Systems, Edison Price Lighting, Elliptipar, Fiber Optic Lighting Solutions, H.E. Williams, Lumenyte, Nulux, Winona Lighting

C.W. COLE | CUSTOM-DESIGNED LINEAR PENDANT | COLELIGHTING.COM
Custom-designed pendant-mounted fixtures are used to supplement the illumination of the café at the Bloch building entrance. The luminaries use a 150W 150Q T4 frosted lamp and have a clear, textured glass shade. CIRCLE 117

NULUX | CUSTOM SLOTLUX | NULUX.COM
Hidden behind the ceiling plane of the Bloch building entry ticket area, a custom-designed fully recessed linear fluorescent T5HO fixture with two lamps in conjunction with an incandescent spotlight provide a secondary layer of light in the daylight space. A 9-inch-wide textured, tempered white water glass lens diffuses the light. CIRCLE 119

C.W. COLE | CUSTOM-DESIGNED LINEAR PENDANT |
In the library, custom-designed pendant-mounted 54W T5HO 5-foot-long linear fluorescent fixtures with an integral ballast are located over each reading table. The luminaire's bent glass "shade" is made of 1/4 inch thick glass in a water white finish, sandblasted and sealed at both sides. CIRCLE 118

EDISON PRICE | TRACK MOUNTED GALLERY LIGHTING | EDISONPRICE.COM
In the galleries of the Bloch building a "stitch track" track lighting system is used. Selected to keep the ceiling plane in the galleries as uninterrupted as possible, several lamp types, including PAR 36, PAR38, AR70, and AR111, and spread lenses ranging from 30- to 70-degrees are used depending on the artwork on display. CIRCLE 120

PHOTOS THIS PAGE: ELIZABETH DONOFF; FACING PAGE BOTTOM LEFT PHOTO COURTESY OF STEVEN HOLL ARCHITECTS

The Science *and Art* of Light

Richärd+Bauer's new Meinel Optical Sciences Research Building creates substance out of light.

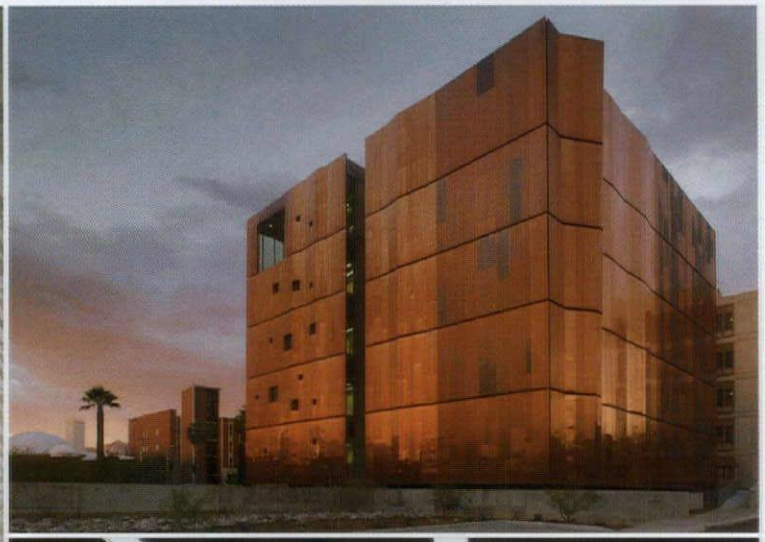
ARCHITECTURE TODAY OFTEN IS PRAISED FOR ITS TECTONICS, FLOATING VOLUMES, AND SENSATION-al, gravity-defying stunts of "starchitecture." Yet, very so often there is a building that inspires descriptions of the sublime, the experiential, and the power of light and architecture to transcend our expectations. The new Meinel Optical Sciences Research Building, designed by Phoenix-based Richärd+Bauer for the University of Arizona, Tucson, is one of these architectural rarities. Already drawing comparisons to Louis Kahn's 1965 Salk Institute for Biological Studies in La Jolla, California, the indescribable quality of light that characterizes the best of Kahn's work also resonates in Richärd+Bauer's new building. Both an expansion and renovation of the existing College of Optical Sciences facilities, the Meinel building includes teaching and research laboratories, six floors of offices, discussion areas, conference rooms, and an auditorium. The new 47,000 square-foot cast-in-place concrete structure, wrapped on three-sides in copper-alloy panels, harmonizes with the largely brick vocabulary of the campus while reflecting the ethereal quality of the wide Arizona sky. The façade, however, is merely a prelude for what awaits inside—where light and architecture seamlessly combine to create moments of pure awe.

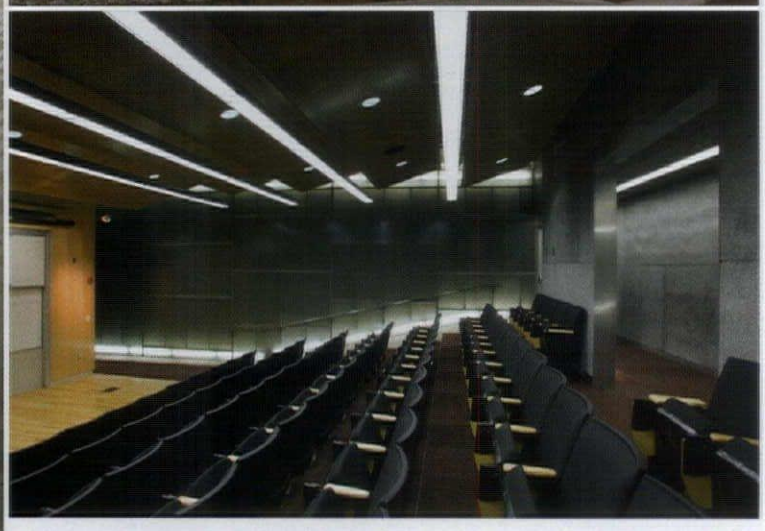
The Meinel Optical Sciences building began with the simple request of a "signature building for the department," according to John Greivenkamp, professor at the College of Optical Sciences and user representative for the Meinel project. The faculty and administration wanted the architecture to express the college's reputation as a world-class research institution. Since its completion in April 2006, the project has received numerous state, regional, and national design awards, including a 2007 American Institute of Architects (AIA) Honor Award for Architecture, but as Greivenkamp describes, no one expected "a building of AIA honor status...that was never our intention, but we are thrilled at the attention it has received." The creative wedding of program and expression at the Meinel Optical Sciences building stems from Richärd+Bauer's thoughtful approach

to architecture—and lighting design, which is handled in-house. James Richärd, principal, explains, "We like to tie the building and the architecture back to the primary intent—what are the programmatic requirements and what is the mission of the institution? And here, their mission statement is pretty neat—the science and application of light—how can you go wrong with that?"

Richärd+Bauer's concept for the Meinel Optical Sciences building takes inspiration from the camera obscura (an ancient optics tool used to study light), responding directly to the programmatic requirements; particularly the light-restricted "darkroom" laboratories, the sheer number of which effectively sealed-off a large portion of the interior from access to natural light. Bringing that light into the interior of the building then became a primary challenge. To "introduce light into a dark volume," Richärd says, they designed three structure-piercing light shafts, each terminating in a two-story interaction space. The light wells occupy a different elevation and orientation, producing unique light effects. The tallest of these, roughly 85 feet, pulls abundant natural light into the below-grade lobby, creating a powerful experience. According to Greivenkamp the typical response of visitors is, "Wow!" Another aperture contains the fire stairs and Richärd+Bauer smartly solved the problem of emergency and ambient lighting by recessing standard T8 fluorescent fixtures behind vinyl panels on each rise, thereby emphasizing the sculptural quality of the shaft. Nature provides the best effects though as the transitory play of natural light animates the wells. "We let the sky paint the inside of these shafts," Richärd says. "You get these amazing blues, purples, reds, magentas, and oranges."

The spirit of the optical sciences also informs the division of the building into "blind" and "seeing" spaces. Extremely light-sensitive research is conducted in laboratories along the southern, windowless wall of the building—the "blind space." Here Richärd+Bauer designed a simple and economical solution to the high ambient-light levels needed for teaching and priming experiments, and the low light-levels required for experiments which involve precise measurement of lasers, mounting standard T8 fluo-



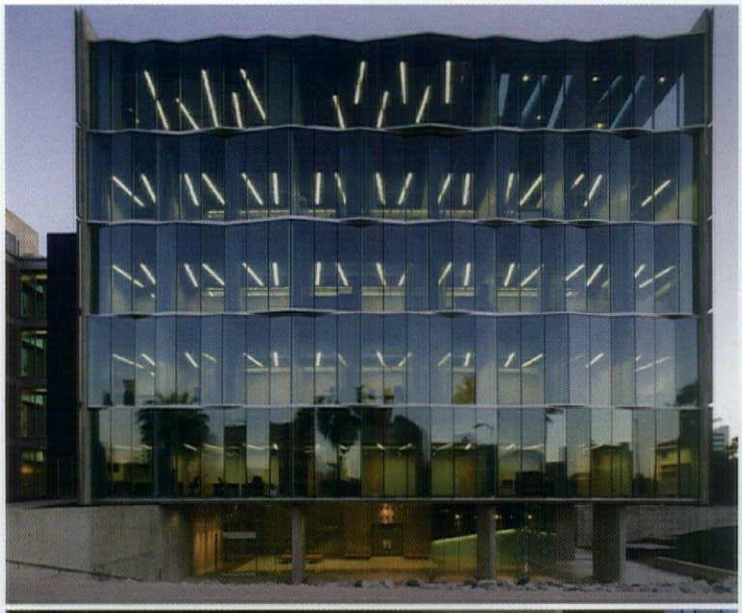


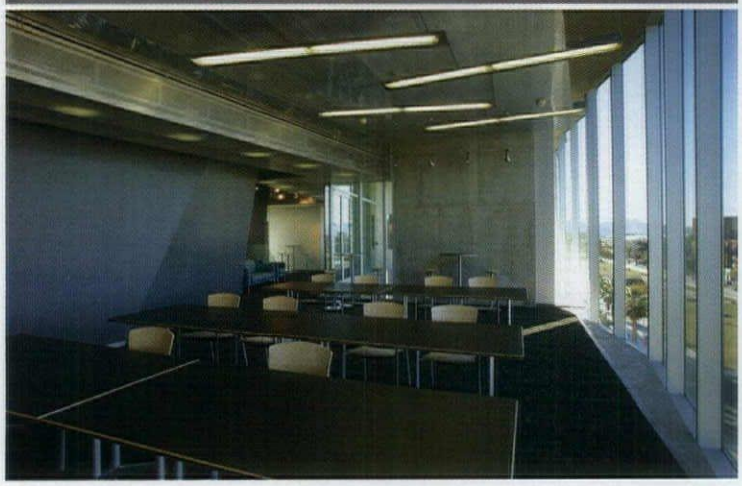
Using the idea of a camera obscura—an optics tool used to study light—as the project's design inspiration for the volumetric play of space within the building, the architects create a dialogue between "light" and "dark" relying on a combination of daylight and readily available sources. In the lobby (facing page) linear fluorescent T8 fixtures define the underside of the stair and perimeter edges of the light shaft—one of three in the project. The light shafts allow natural light to permeate throughout the building while creating unique effects (left). Three sides of the new addition are wrapped in copper-alloy panels, which create a breathable rain screen. The southern elevation is purposely kept windowless for the light sensitive research that is conducted in the laboratories behind (top). In the auditorium (above) low-profile T8s accent the side wall-panel covelights.

rescent lamps on a chasse alongside dimmable 90W PAR38 incandescent uplights. Using off-the-shelf products, Richärd+Bauer's laboratory lighting system is not only effective, but also easy to use and maintain.

The same simplicity characterizes the lighting of the "seeing" zones of the building, including offices, classrooms, and support spaces that all have varying levels of exposure to natural light. The offices located behind the folded-glass curtain wall are the most dramatic of these areas, offering abundant light and views of the Catalina Mountains to the north. Daylight is balanced by T8 luminaries mounted at angles corresponding to the faceted glass curtain wall; after dark these echo the rhythm of the façade and create a dramatic nighttime presence for the building. The east and west façades' carefully edited fenestration enlivens the elevation and minimizes solar exposure, heat gain, and glare. Keeping the southern elevation windowless, besides protecting the laboratories, was an obvious "green" choice, dramatically reducing the impact of the desert sun. Similarly sustainable, the copper panels sheathing the structure create a breathable rain screen that protects the surface of the building (thereby avoiding sealants) and allows for natural ventilation up through the skin.

Throughout the project, Richärd+Bauer's choices were inspired by the optical sciences, as is evident in their reliance on light's effects, as opposed to elaborate fixtures. From the light wells to the industrial T8s mounted behind perforated aluminum ceilings in many of the public areas and meeting rooms, light becomes matter. The consistency of the firm's vision and its ability to solve design challenges economically and gracefully has resulted in a remarkable building that speaks directly to its users as well as its use, aesthetically and sustainably. The movement of daylight through the architecture, whether filtering down the light shafts or saturating the office spaces, infuses the building with a living dynamism often lacking in research facilities. Humbly explaining the surprise success of this project, Richärd says, "We looked for responses that were intrinsic both to solving regular programmatic and functional issues, but tried to do them in ways that were also poetic." **MARGARET MAILE PETTY**





The new addition's north façade, a folded-glass curtain wall, provides views out to the surrounding landscape and abundant natural light into the office and classroom areas by day. Daylight is balanced with T8 fixtures positioned at angles, which correspond to the faceted glass wall. At night, the skewed patterning of the fluorescent tubes takes on a sculptural quality (top and above).

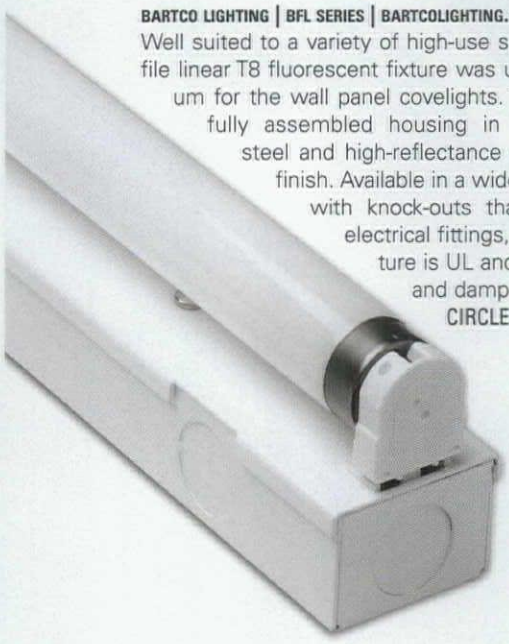
DETAILS

PROJECT Meinel Optical Sciences Research Building, Tucson, Arizona
CLIENT The University of Arizona, Tucson, Arizona
ARCHITECT AND LIGHTING DESIGNER Richärd+Bauer Architecture, Phoenix
STRUCTURAL, MECHANICAL, ELECTRICAL ENGINEER Arup, Los Angeles
PROJECT SIZE 66,000 square feet (addition and renovation)
PROJECT COST $14 million
LIGHTING INSTALLATION COST $549,000 (building); $30,000 (site)
PHOTOGRAPHER Bill Timmerman, Phoenix

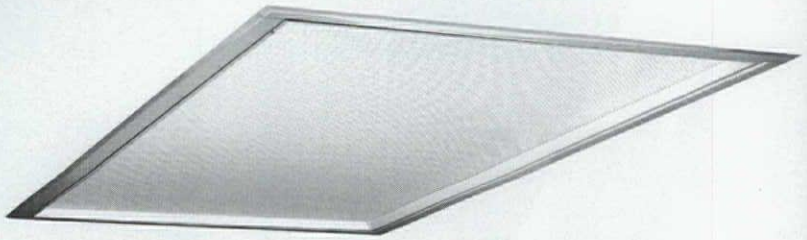
MANUFACTURER	APPLICATION
Bartco	Auditorium wall-panel light coves
Kurt Versen	Auditorium downlights; laboratory uplights
Prudential	Striplights at stairs and perimeter of light shafts; industrial strips within perforated aluminum ceilings in laboratories, corridor, and offices
Zumtobel	Auditorium, office, and conference room pendants; T8 fluorescent fixtures in laboratories and Ledos series "Lazer On" light

PRODUCTS

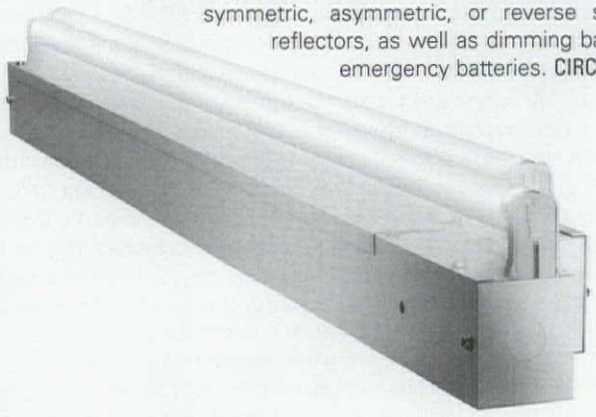
BARTCO LIGHTING | BFL SERIES | BARTCOLIGHTING.COM
Well suited to a variety of high-use spaces, this low-profile linear T8 fluorescent fixture was used in the auditorium for the wall panel covelights. The fixture offers a fully assembled housing in corrosion-resistant steel and high-reflectance white powder coat finish. Available in a wide range of wattages with knock-outs that accept standard electrical fittings, this all-purpose fixture is UL and C-UL listed for dry and damp locations. CIRCLE 108



PRUDENTIAL LIGHTING | P-8600 SERIES | PRULITE.COM
This T8 troffer, with a premium-quality prismatic acrylic lens and 5-inch-deep body, was selected for use in the perforated aluminum ceilings in the laboratories, corridors, and offices. It features mitered door corners, spring-loaded latches, and reversible hinges and is available in four models: 1/2 inch regressed aluminum, flat aluminum, flat steel or floating 1/2 inch regressed aluminum. The P-8600 series also can be fitted with stainless-steel flanges and doorframes. CIRCLE 109



PRUDENTIAL LIGHTING | PSS-162 | PRULITE.COM
Used for the stairs and light shaft perimeters, this staggered two-lamp T8 striplight comes with a 4-inch overlapping system and a telescoping end-module for flexibility. Available in 2, 3, 4, 6, or 8-foot standard lengths, the multipurpose PSS-162 can be specified with symmetric, asymmetric, or reverse symmetric reflectors, as well as dimming ballasts and emergency batteries. CIRCLE 110



ENVISION **LIGHT**

architect: Office dA photography: John Horner Photography

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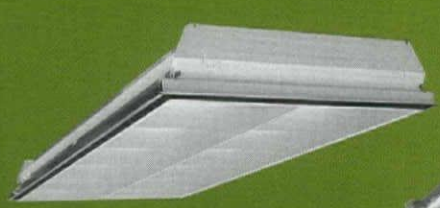

EnergyMax

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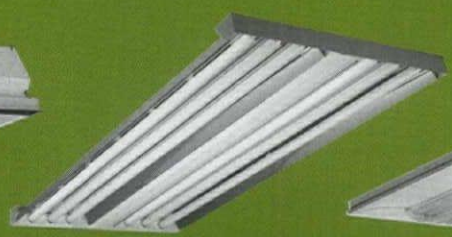

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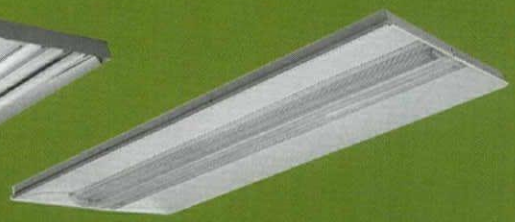

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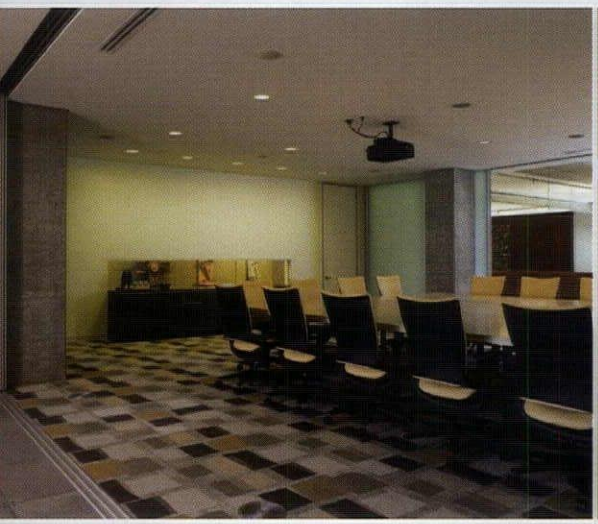
SKANSKA AT ALLEY24, SEATTLE

CHALLENGE When the Seattle office of Skanska—a global company with expertise in construction and project development—decided to move its operations from its previous home of 30 years, a traditionally styled office interior with limited daylight exposure, its principals knew they wanted an energy-efficient space imbued with structural transparency radiating with natural light that would provide all employees with a healthy work environment rich in exterior views. Their search led them to a 25,000-square-foot single-floor office within a new mixed-used building known as Alley24, conveniently located one floor above the buildings designer and Skanskas project architect and lighting designer, NBBJ.

Skanska wanted the space lit primarily by way of natural light and with a minimum of task lighting to reduce the companys electricity dependency. Luckily for the designers, this LEED-candidate building was already enveloped in clear glass, a feature that allowed a significant amount of natural light to penetrate deep into the interior core.

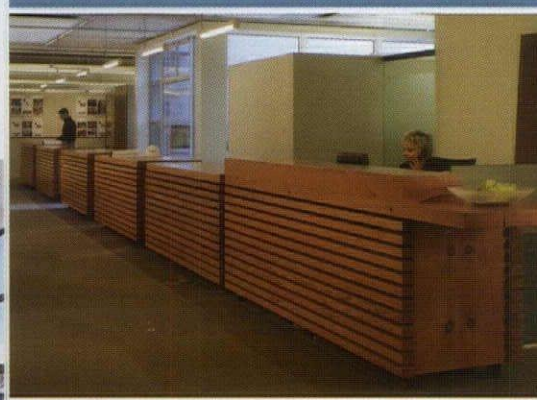


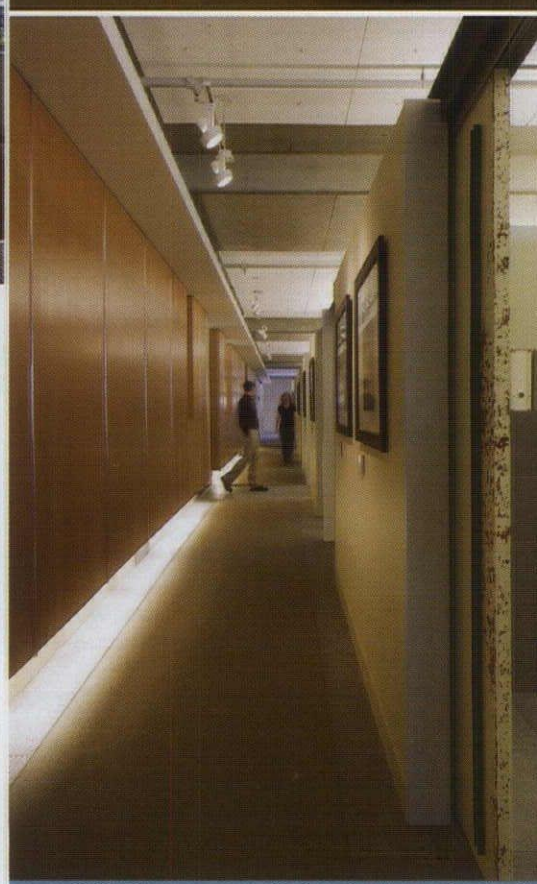
ARCHITECTURAL AND LIGHTING SOLUTION To meet the clients daylight requirements NBBJ focused on gradating the spatial experience and reversing the typical office interior layout. Cubicles housing administrative and support staff are positioned along the exterior wall and next to the windows. Private executive offices and the board room, spaces typically placed around the interior perimeter, are located in the 10-foot-high core and enclosed with 7-foot-high clear- and frosted-glass walls, a gesture that lets natural light stream over the interior partitions and extend across the space. More important, as Skanska Vice President Tony Stewart explains, the design accomplishes an important project requirement: it dismantles the traditional corporate hierarchy typically defined architecturally via darkly lit cubicles and partitioned perimeter offices. The result is a warm and welcoming home characterized by visually intersecting spaces that both enable and encourage collaboration.

Another technique the NBBJ team used to accentuate the layout and its permeation of natural light was clipping the bottoms off the wood panels lining the corridor that cuts through the core, a space that serves as both the offices primary artery and Skanskas gallery for exhibiting its collection of project photos and construction-theme sculpture. Daylight, which streams beneath the wood panels, effectively illuminates the floor. To support this light, NBBJ lighting designer Megan Strawn looked for unusual opportunities to provide practical solutions that complement and continue the interiors vibrant quality of natural light. She attached T5HO lamps atop the wall defining the interior offices and concealed T5 lamps below the wood panels. "Integrating the lighting into the architecture," Strawn says, "produced elegant results." To light the artwork, Strawn added low-voltage wall- and ceiling-mounted PAR30 track fixtures. She also selected dimming controls to maintain a continuous quality of functional light throughout the office. The controls allow occupants to comfortably work at night and during overcast days. To keep the interior mood bright, NBBJ interior design principal Anne Cunningham selected desks and furnishings in light woods and fabrics, objects of clean geometric proportions, which subtly convey Skanskas Scandinavian roots. For Strawn, who cites her biggest project challenge as "being judicious with the monetary and energy budget to find a balance between the two" the lighting design creates "a space that is a comfortable, practical, and respectful; a solution with high-aesthetic intent." **JOSEPH DENNIS KELLY**

DETAILS

PROJECT | Skanska at Alley24, Seattle
DESIGN TEAM | NBBJ, Seattle (architect and lighting designer)
PHOTOGRAPHER | Ben Benschneider, Seattle
PROJECT SIZE | 23,300 square feet
WATTS PER SQUARE FOOT | .97
MANUFACTURERS | Deltalight, Edison Price, Focal Point, Greenlee, Halo, iO Lighting, Metalux, Portfolio, Xenon





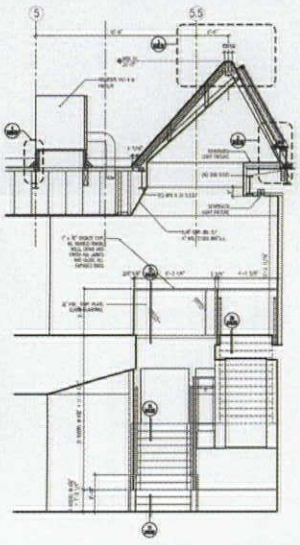
PRIVATE EQUITY OFFICE, MENLO PARK

DETAILS

PROJECT | Private Equity Office, Menlo Park, California
DESIGN TEAM | Gensler, San Francisco (architect); Alfred Scholze & Associates, Venice, California (lighting designer)
PHOTOGRAPHERS | Benny Chan, Fotoworks, Los Angeles, California (images facing page); Sherman Takata, Gensler, San Francisco (image this page)
DRAWING | Courtesy of Gensler, San Francisco (below)
PROJECT SIZE | 31,000 square feet
WATTS PER SQUARE FOOT | 1.1
MANUFACTURERS | Bartco, Delta, Elite, Iris, Legion, Lightolier, Louis Poulsen, Mark Lighting, Metalux, Nippo, Peerless, RSA, Systemalux

CHALLENGE Working in the financial services industry is a stressful, highly charged experience in which 15-hour workdays are the norm. When one quickly growing northern California equity firm needed to move its operations to accommodate its personnel expansion, it hired Gensler to transform two unconnected floors in a typical suburban office park building into an interconnected open-planned space that both defied the traditional Wall Street aesthetic (dark woods and indistinct partitioned interiors) and created a hospitable and luminous working environment that encourages dynamic activity, cross-collaboration, and enables private meetings with clients.

ARCHITECTURAL AND LIGHTING SOLUTION The result is a highly transparent yet quiet multilayered space that conveys a sophisticated casualness appropriate for a West Coast equity firm and takes advantage of the building's large windows to channel natural light across the space, a key client requirement that Gensler fulfilled by selecting glass walls to enclose the perimeter offices and removing all structural obstructions from the core to create an open administrative area. This arrangement enabled Gensler to use natural light—rather than rely on electric sources—as the primary source of interior illumination. Doing so allowed the design team to not only realize another client requirement—integrating the exterior and the interior environments—but also create what Gensler design director Douglas Giesey describes as a dynamic workspace enlivened by "its subtle but unexpected visibility and views."



To develop a lighting scheme that would support the use of natural light as the primary source of interior illumination, Gensler turned to Los Angeles-based lighting designer Alfred Scholze. Scholze used digital imaging to create a plan that ensured the quality of natural light pervaded throughout the two floors.

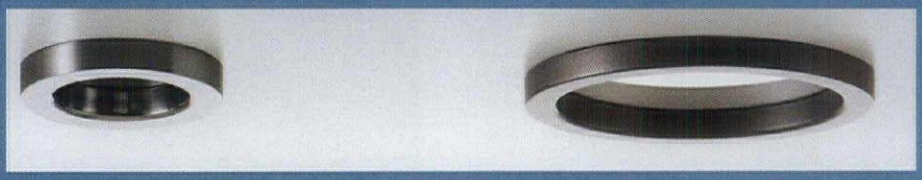
One architectural element that enabled Scholze to accomplish this is the office area's cove ceiling. The cove not only subtly maximizes the office's volume through its visual extension of the space's structural linearity but also provided Scholze with an opportunity to tuck away T6 lamps—generating 33 watts per 4 square feet—and create a stream of end-to-end fixtures thus eliminating socket channels. The result successfully unifies the interior through a continuous quality of bright light that extends from perimeter to core. "Rarely," Scholze explains, "does an office feel this open and this lively."

The cove's electrically illuminated curvilinear planes effectively maintain the quality of natural light, while the white ceiling's reflective property efficiently transmits the fluorescent light across the space, visually suggesting the interior presence of the sky. The cove's design also enabled Scholze to develop an interior lighting scheme that—because it required fewer fixtures than the typical office space—uses a mere 1.1 watts per square foot, a calculation that meets California's stringent Title 24 energy code and gave the equity firm's principals what they wanted: A practical lighting solution that was more about providing functional quality than creating a signature space or an architectural mood.

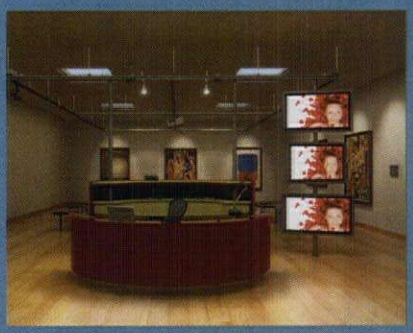
To enhance the flow of natural light throughout the space, Gensler added a skylight above the new staircase that connects the upper-level workspace with the lower-level hospitality-oriented floor, which also houses showers, casual dining, and seating areas. And because this skylight channels so much natural light into the core, Scholze was able to select low-voltage pendant downlights to illuminate the dining area and complement the natural light flowing into the seating area. This type of downlight also is used to illuminate the traditionally partitioned lobby and reception areas, spaces the Gensler team adorned in lightly hued fabrics (carpeting, upholstery) and wood elements (floors, desks, glass-wall trim) to enhance the quality of natural light, enable daylight to fully permeate the space, and to provide a formal tactility appropriate for a serious-minded business environment. **JOSEPH DENNIS KELLY**

LIGHTING THE WORKLOAD

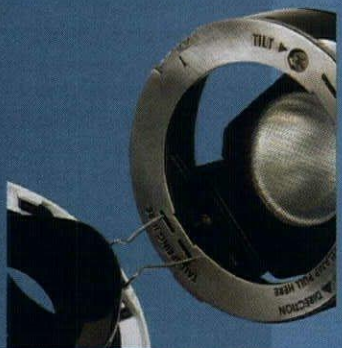
LIGHTING | MODULEX M3.7 SERIES | ARDEELIGHTING.COM
Made of stamped steel or aluminum, the ModuleX M3.7 Series recessed ceiling downlights feature a 3-inch aperture, provide a high light-output, and have a long operating life. Designed to use a MR16 20W metal halide lamps, all ModuleX M3.7 Series also are UL and CUL listed for damp locations with select trims for wet locations. CIRCLE 125



ELEMENTI | LUCEPLAN | ELEMENTI.LUCEPLAN.COM
With a focus on architectural lighting, Elementi—a company in the Luceplan Group—offers a collection of products for the higher range of the technical and contract sector, according to the manufacturer. The product line features four main families: E01, recessed adjustable die-cast aluminum units; E02, fixed recessed die-cast aluminum units with a circular layout; E03, recessed wall or ceiling fixtures with asymmetrical optics; and E04, ceiling, suspension or wall units with a cylindrical body. CIRCLE 127

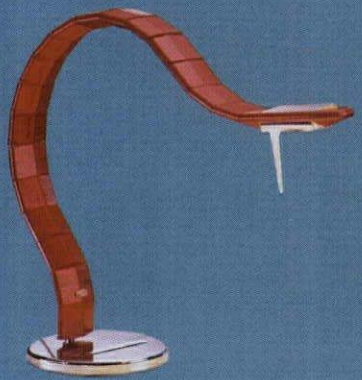


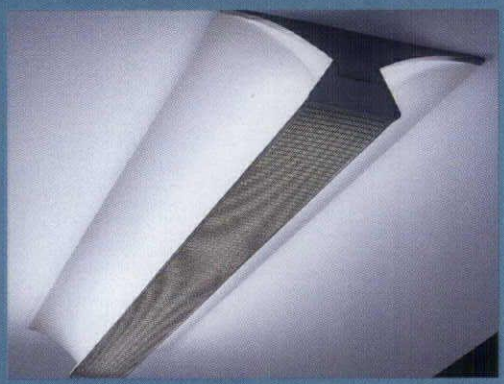
CONVIA - A HERMAN MILLER COMPANY | CONVIA PROGRAMMABLE INFRASTRUCTURE | CONVIA.COM
The Convia Programmable Infrastructure essentially allows for the rewiring of a building with a remote control, according to the manufacturer, and can reduce energy consumption in a building by as much as 30 percent. The technology's purpose is to eliminate the expense and time that comes with rewiring a traditional electrical infrastructure. CIRCLE 128



FOCAL POINT | ID | FOCALPOINTLIGHTS.COM
ID, a new downlight, offers both flush and overlap trim styles for halogen and compact metal halide MR16 downlights. Some features include "Gloves Off Aim" to easily adjust the beam angles, "Auto Memory" to return the lamp to its original angle after being replaced, and "Perfect Fit" to allow for the alignment of multiple trims and a seamless integration with the ceiling. CIRCLE 126

TOBIAS GRAU | SOON | TOBIAS-GRAU.COM
The SOON table lamp was relaunched at Euroluce in Milan in April 2007. Originally available only in a transparent finish, the lamp is now offered in red and blue color schemes with a polished base. The fixture, which has won multiple awards, uses a 50W GY 6.35 lamp. CIRCLE 129





ZUMTOBEL LIGHTING | ML4 | ZUMTOBEL.US
Now with expanded optics, the ML4 is more versatile, according to the manufacturer, and can be used in a variety of spaces such as offices, retail, and health care facilities. A secondary light chamber creates a gradient, and color inlays are available to customize the look. The ML4 recessed fluorescent fixtures also have an improved air return design, working to eliminate possible airflow past the lamps. CIRCLE 130

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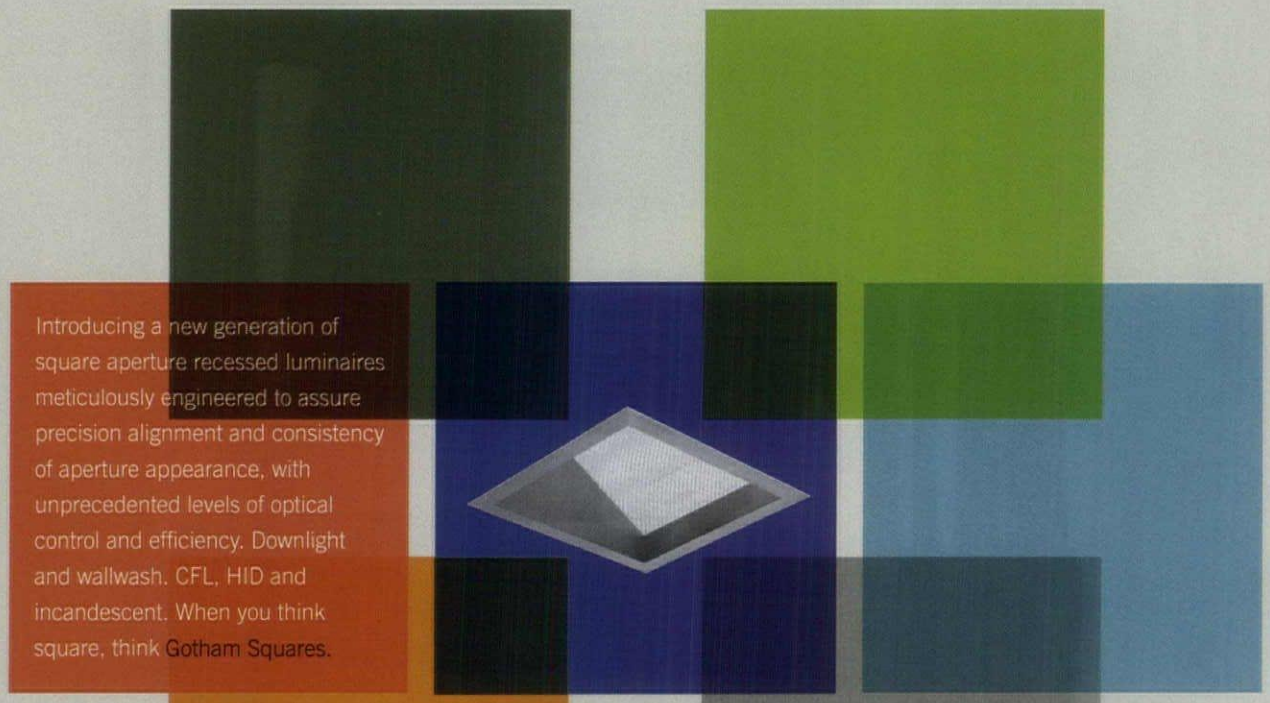

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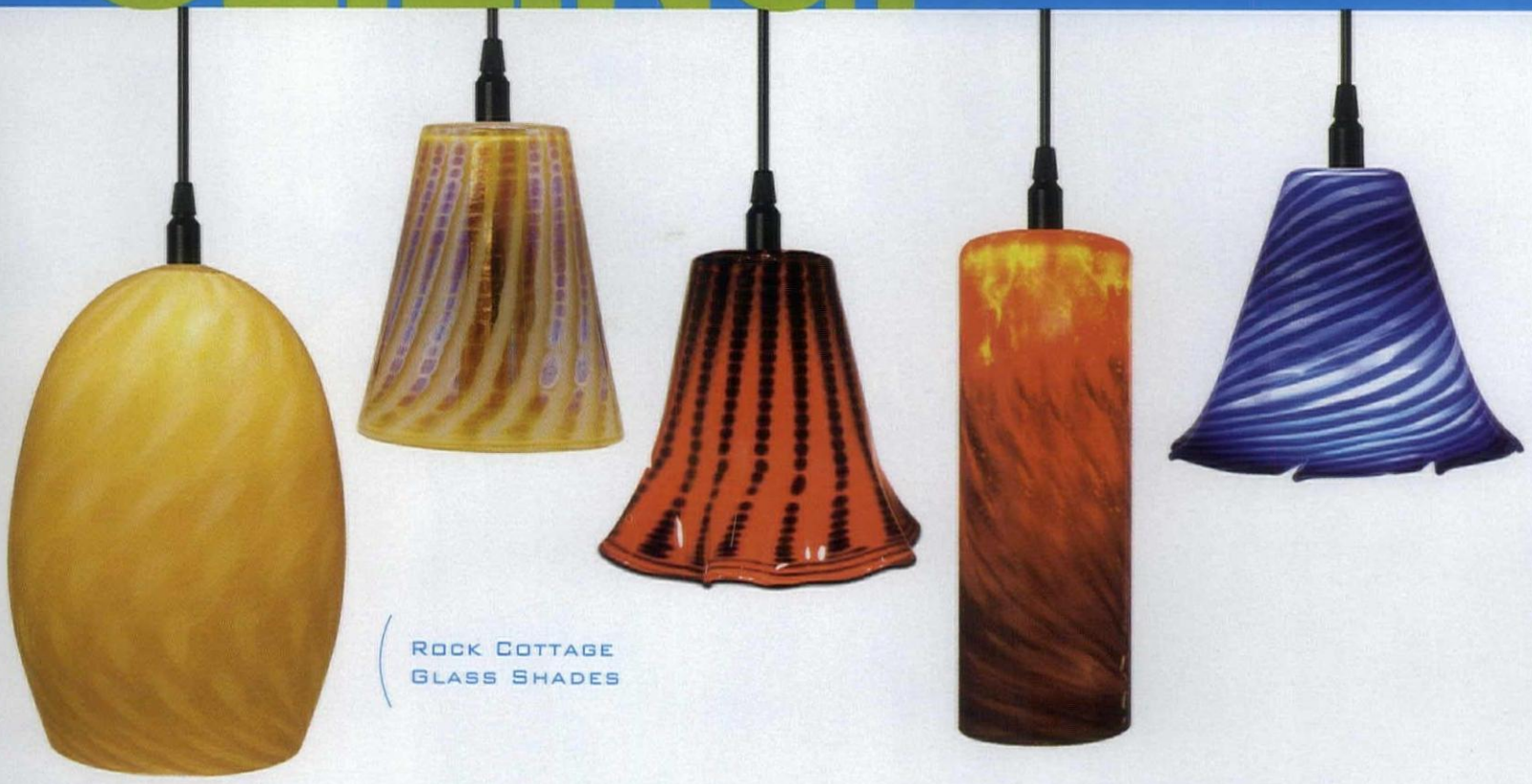

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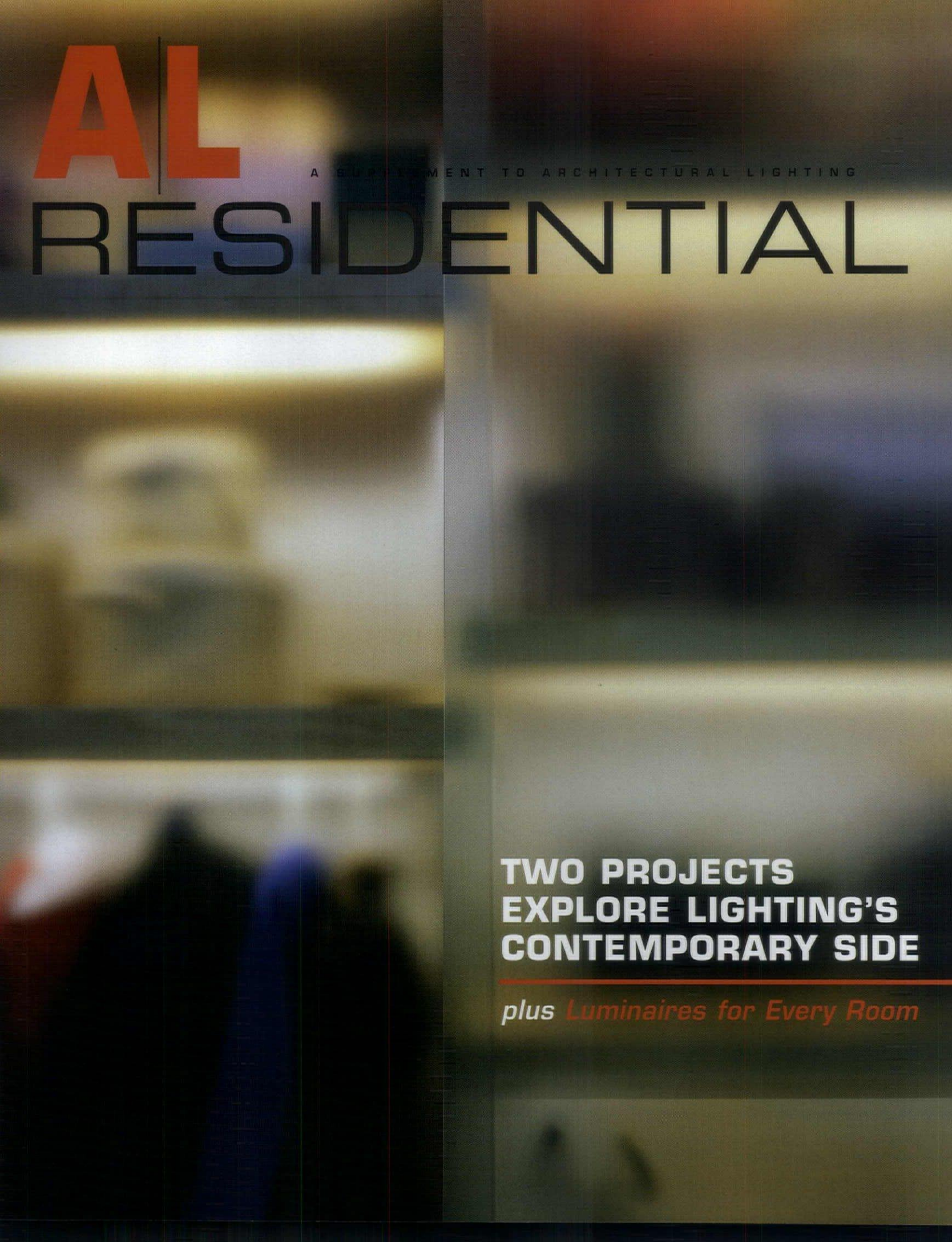

A|L

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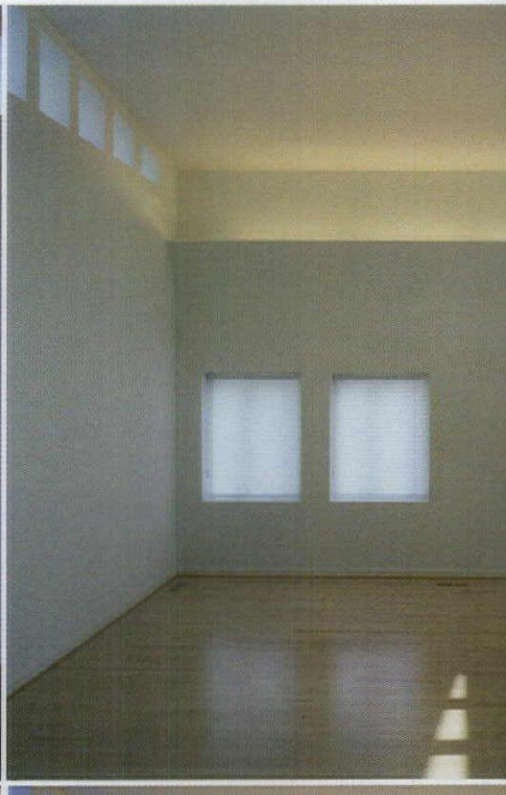
RESIDENTIAL

TWO PROJECTS EXPLORE LIGHTING'S CONTEMPORARY SIDE

plus Luminaires for Every Room

TIME PASSAGES

A Contemporary Lighting Approach Redefines a Kansas City Residence.



With no exterior views to speak of, the lighting design turns this apartment's focus inward, emphasizing the presence of daylight and how it moves through the space from morning to night (sequence spread below, facing page top left, clockwise). Punched-window clerestories alternating with a cove detail wrap the perimeter of the main living area creating a complementary relationship between daylight and electric light. Linear fluorescent fixtures with a 3500K-color temperature are selected for their neutral rendering of cool and warm tones.

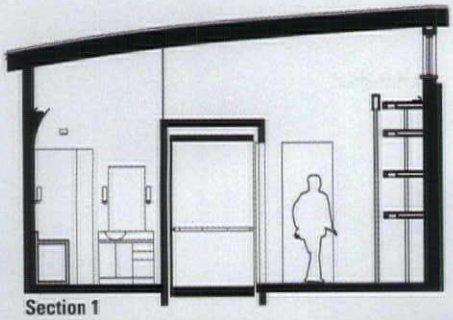
LAYERING LIGHT IN A RESIDENTIAL SETTING OFTEN RELIES ON THE LIGHT FIXTURE AS A DECORATIVE object. But in the case of this converted two-story commercial building, a contemporary treatment was requested. In a somewhat unusual project structure, lighting designer Derek Porter and his team at Derek Porter Studio were hired directly by the clients—an older couple in their 60s and 70s. Faced with an interesting set of project conditions: no exterior views to speak of, and a vaulted SIP (structurally insulated panel) roof structure that had recently been installed, rather than be hindered by these circumstances, Porter manipulated these potential obstructions into project opportunities. He explains, "The way in which the light integrated with the architecture evolved significantly from the fact that we couldn't use the ceiling."

Several site visits into the preliminary design, it was apparent that the roof clerestory and thick parapet wall (18 to 24 inches) allowed a fair amount of natural light into the space. Studying exactly how daylight moved through the residence enabled Porter to turn the apartment's focus inward. "The presence of daylight phenomenologically became more important in the design," he states. Also early on in the design discussions, Porter and his team introduced the idea of energy efficient fluorescent sources. "The client had no preconceived notion of this, but to their credit, despite the typical aversion to the first mention of fluorescent, they were very open in considering it," he says. Once the client was in agreement about the light sources, Porter and his team began to explore the relationship between daylight and electric light, specifically how to balance static and dynamic light sources, along with directionality, and color temperature. "I'm interested in the kind of complement of these independent dualities, and not trying to blur the relationship between the two," he explains.

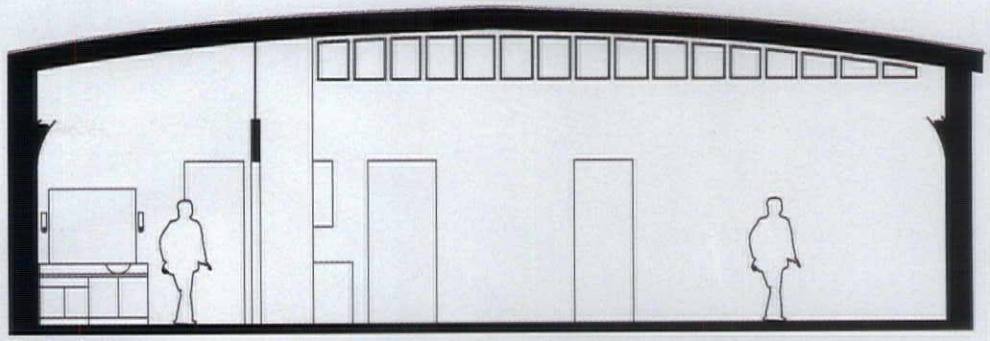
The lighting scheme's design parti is best expressed in the cove detail below the parapet. Because the clerestory has repeated punched openings, geometric in aperture scale and proportion with no trim detail, the lighting designers wanted to create a complementing gesture with electric light. "We didn't want something just attached to the architecture," Porter describes. The solution was a constant linear shelf, which houses the electric 3500K fluorescent sources, whose form peels away form the wall—a poetic gesture in keeping with the vaulted roof line and contemporary aesthetic of the interiors.

Another project element, which receives a similar poetic touch, is the entryway closet. A unique architectural feature, but one that roots itself in the new cabinetry pieces found elsewhere in the apartment, sliding glass doors with a satin finish hung from a steel I-beam, allow the contents of the closet to be seen, but abstractly. Each shelf is essentially a maple box with a slim linear fluorescent lamp hidden behind the front fascia that allows the light to wash back onto the contents of each shelf. When the glass doors are closed and the lights turned on the effect is a diffuse glow and the closet as an entire entity functions as the entryway luminaire.

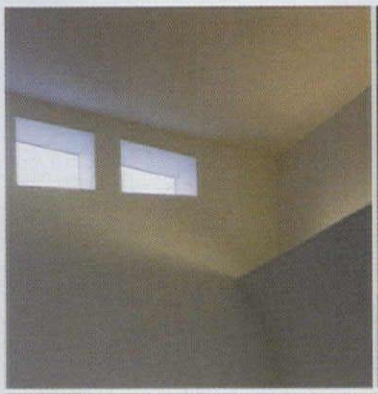
With no preconceived ideas as to what their residence should be, the client allowed the lighting design team to explore light in a way that focuses on quality and color temperature. Light exists as both a measure and an experience. The result is a contemplative space where residence becomes refuge from the busy daily happenings of life. **ELIZABETH DONOFF**



Section 1



Section 2



A zone of indirect light—at the upper portion of each wall—gives this loft-like residence an airy feeling. The apartment's open kitchen and living room are the heart of the residence (facing page). The guest bedroom and bath, and a study are accessible from the open living area. Sectional drawings describe the building's vaulted roof structure. Section 1 (above left) is cut through the master bath, elevator, and entry hall. Section 2 (above right) is cut through the guest bath and living room. The perimeter covelight is designed to look as if a layer of the wall is being peeled away to reveal the light (far left). A glass clerestory allows light into the bedrooms, bath, and study, while continuing the theme of top light, which rings the apartment (left). The entryway's special feature (bottom left) is a closet that takes on sculptural qualities with translucent-glass sliding doors, which diffuses the light from linear fixtures at each shelf. In the guest bath (below) the "peeling" cove detail provides indirect light, while wall sconces at the mirror plane provide additional task lighting.

DETAILS

PROJECT West Plaza Residence, Kansas City, Missouri
LIGHTING DESIGNER Derek Porter Studio, Kansas City, Missouri
PHOTOGRAPHER Michael Spillers, Kansas City, Missouri

MANUFACTURER	APPLICATION
Ardee	Kitchen under cabinet fixtures
Elliptipar	Linear fluorescents throughout project
GE	Lamps throughout project
Ginger Lighting	Bathroom wall sconces
Lutron	Graphic Eye control system
Osram Sylvania	Lamps throughout project

A|L RESIDENTIAL COVER, WEST PLAZA RESIDENCE ENTRYWAY CLOSET, PHOTOGRAPHER: MICHAEL SPILLERS

RUSTIC MINIMALISM

An Illinois barn is given new life and light as an architectural retreat.

ELEGANT AND SIMPLE, BUT IN NO WAY SIMPLISTIC, THAT IS HOW AN 85-YEAR-OLD abandoned cow barn in rural Illinois, transformed into a sophisticated architectural retreat, is best described. Collaboration between longtime colleagues and friends, Helmut Jahn and Michael Rohde, the project exemplifies the synchronicity between architect and lighting designer born out of a working relationship built on mutual respect and trust.

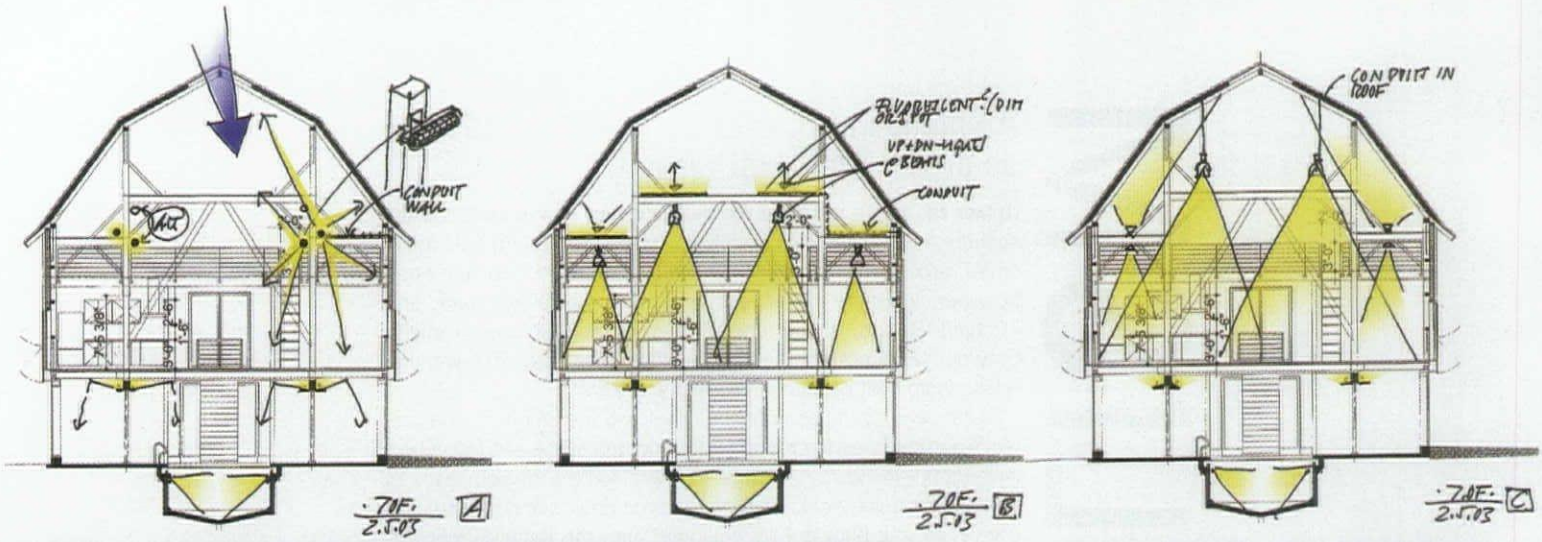
With Jahn acting as both the client and the architect, the project's purpose was to create a retreat for his office—Murphy/Jahn Architects—in nearby Chicago. A place for the design team to gather for a quiet weekend or to focus on project and competition charrettes, the barn is fully equipped with the technical components of a remote office.

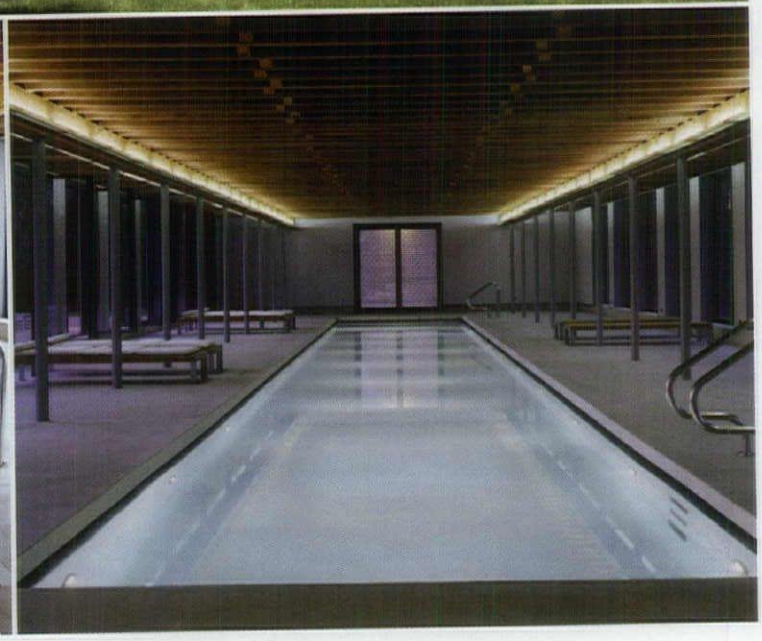
Two primary architectural interventions were made to the existing structure; a new skylight running the length of the main roof, and the addition of a swimming pool in what was once the stalls for manure collection. Jahn wanted the space to retain an "open" feeling and be respectful of the existing architecture with its timber post and beam structure. To that end, spaces like the kitchen area and sleeping quarters with bunk beds (similar to a hostel setup) are kept to one end of the main hall. But it is the role of daylight that makes this spaciousness complete. As Michael Rohde explains, "The whole structure was stripped and simply opened. The building [faces] absolute north, it works like a sun clock. You could actually put lines on the floor, write numbers, and see by the numbers what time it is." Industrial-style pendants with glass prismatic lenses and tungsten halogen lamps run the center of the hall and side wings. These fixtures provide a supplementary layer of light and were chosen for their excellent color rendering and dimming capabilities. To ensure sufficient illumination at night, a third layer of fluorescent luminaires, located on top of the beams and hidden in a U-shaped aluminum profile to prevent glare, round out the lighting scheme. The use of indirect lighting throughout the project is essential to Jahn's minimal architectural approach and desire that light be seen, not the light fixture. This holds true in the kitchen as well where the beam structure once again serves as the foil for task lighting in the form of track spotlights.

The swimming pool area by day is a light-infused space. Large window openings line the perimeter walls, allowing daylight to provide a cool illumination, while four lines of fluorescent fixtures housed in a perforated metal enclosure highlight the wooden beam structure of the ceiling with a warm glow, and accentuate the length of the pool. At night the atmosphere of the pool area takes on dramatic proportions as the indirect fluorescent ceiling luminaires cast a cool glow on the ceiling structure and recessed low-voltage tungsten halogen fixtures define the volume of the pool itself.

Not a typical residential setting in that it is not a permanent home; nonetheless the attention to detail and consideration of the quality of light throughout the project has a warm and intimate feel. "Every project is individual but the principals of lighting are always the same," Rohde explains. "You try and understand the language of the building, and you discuss the client's aim." And in that the design team has succeeded, creating a light-infused and welcoming place that nurtures the creative process. **ELIZABETH DONOFF**

An 85-year-old barn structure is respected and left intact with only the most minimal of interventions—a new skylight that runs the length of the roof and allows the space to be flooded with daylight. At night, industrial-style pendants provide indirect illumination (facing page).


CONDUIT WALL
FLUORESCENT STRIP
UP+DN-LIGHT C BEAMS
CONDUIT
CONDUIT IN ROOF
70F. 2.5.03 A
70F. 2.5.03 B
70F. 2.5.03 C



Early sketches by architect Helmut Jahn describe the lighting design's evolution and placement of fixtures (facing page top). The naturally ventilated barn strikes a handsome pose in the rural Illinois landscape (facing page middle). Day or night the pool area, the other major new intervention to the structure besides the skylight, is dramatic (facing page bottom left and bottom right). Low-voltage tungsten halogen fixtures define the perimeter edges of the pool volume, while four lines of custom designed linear fluorescent fixtures housed in perforated metal and integrated perpendicularly to the beam structure accent the length of the ceiling. In accordance with Jahn's preference to keep the view of fixtures at a minimum, halogen spotlights are hidden within the beam structure of the kitchen ceiling (above).

DETAILS

PROJECT 7 Oaks Farm Studio, St. Charles, Illinois
CLIENT Murphy/Jahn Architects, Chicago
ARCHITECT Murphy/Jahn Architects, Chicago
LIGHTING DESIGNER L-Plan Lighting Design, Berlin
PROJECT SIZE 960 square meters (approx. 10,335 square feet)
LIGHTING INSTALLATION COST 52,000 Euros (approx. $73,730)
WATTS PER SQUARE FOOT 1.5
PHOTOGRAPHERS Helmut Jahn and Doug Snower

MANUFACTURER	APPLICATION
Bega	Low-voltage tungsten halogen fixtures in pool area
Erco	Halogen spotlights in kitchen
GE	T5, PAR30, and halogen lamps throughout
Hess	Exterior luminaries at terrace
Sill	Pendant luminaires with prismatic lens in the main hall

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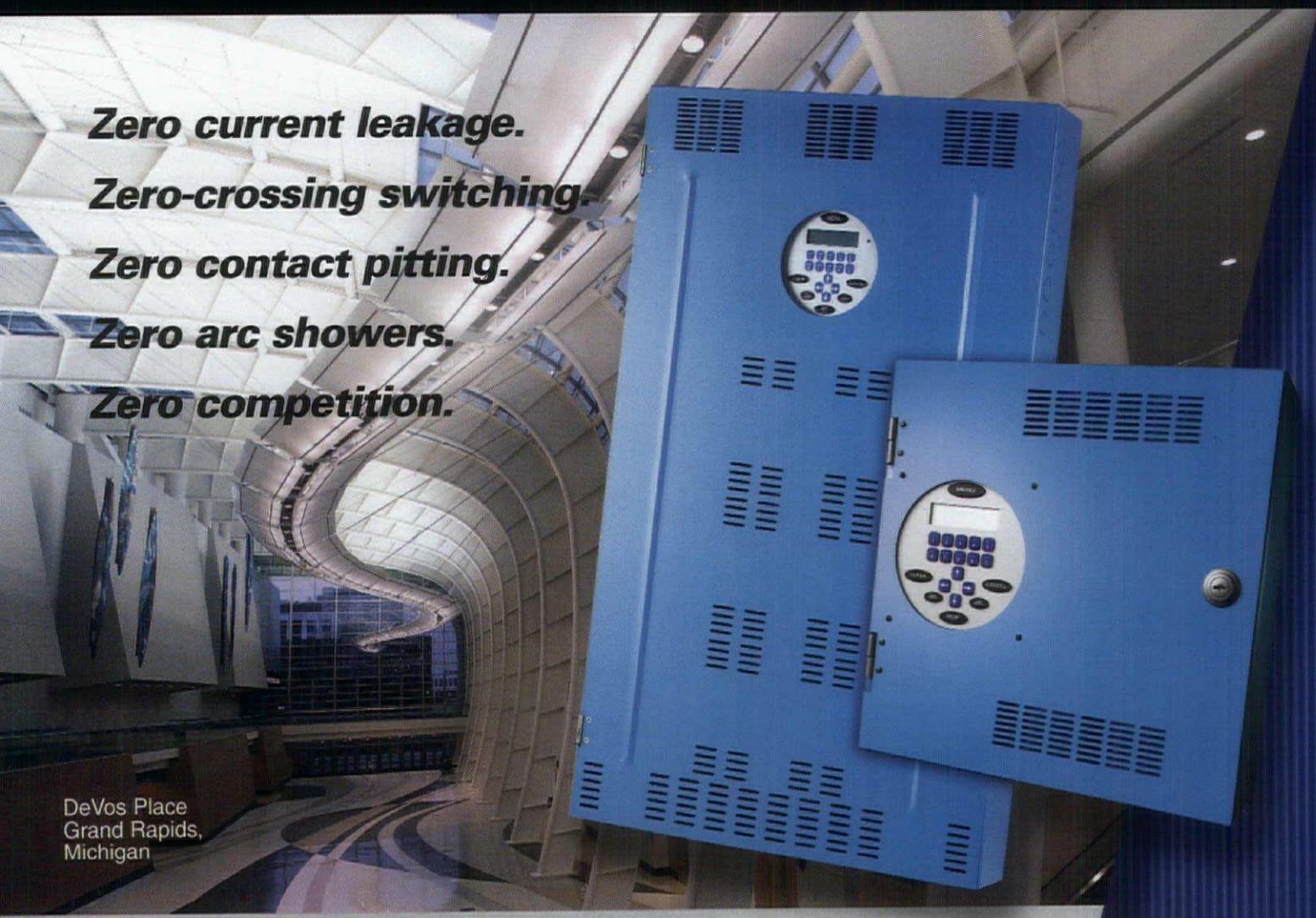

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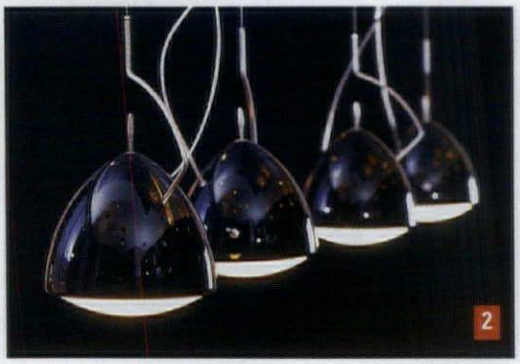
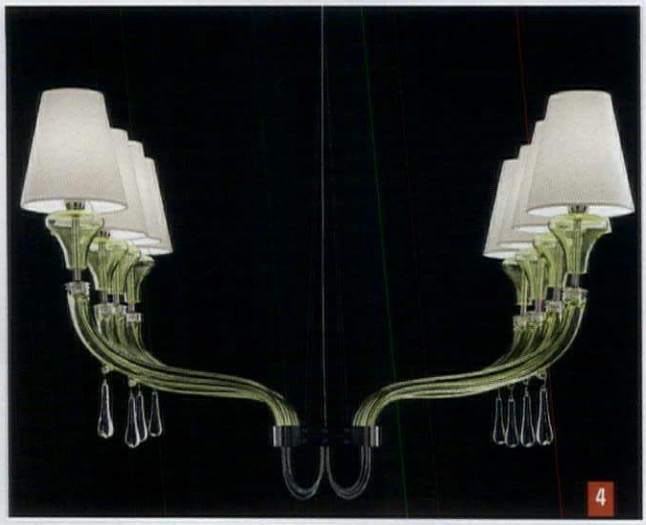
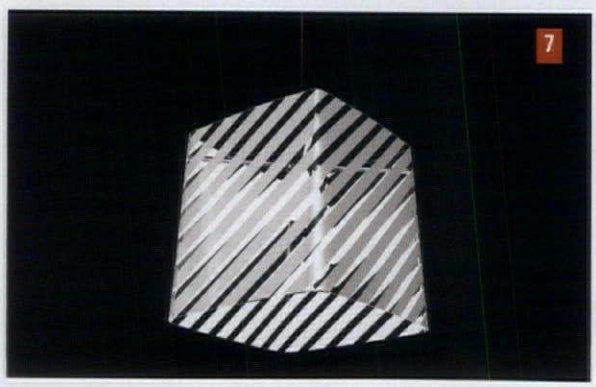


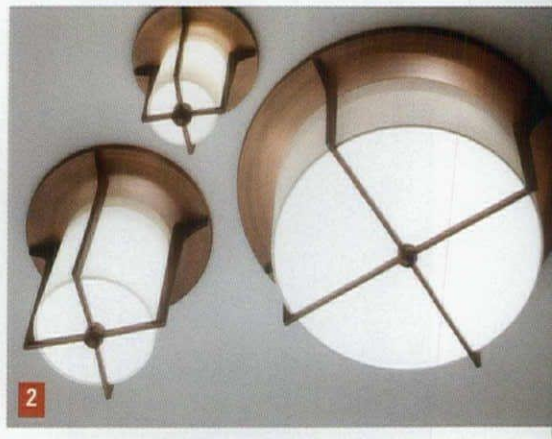


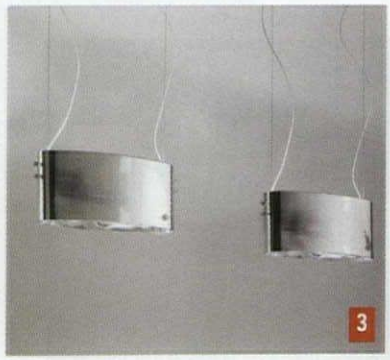


SUSPENDED ELEGANCE

1 Noaxis, a hanging lamp from **FontanaArte**, is made of a painted fiberglass and works well in contemporary spaces. With a glass diffuser, the lamp is available in black, white, gray, metallic gray, and gold. CIRCLE 131 **2 Tobias Grau** presents George, a suspension design with a shiny black lamp head made of PC glass. The sleek fixture is adjustable for height, can be dimmed, and has an integrated switch. CIRCLE 132 **3** Neutra by **Kartell** is a circular suspension lamp that comes in either black or white. The modern design uses plastic as a light vector and the housing consists of two elements that are similar to shells. CIRCLE 133 **4** Available with either eight or 12 lights, Maine by **Barovier&Toso** is height adjustable, with lampshades in either black or white. CIRCLE 134 **5** With 24 concave and convex blown glass blocks fitting into its frame, Bellissima from **Studio Italia Design** is available as either a cylinder or a straight line and in any color combination of white, red, and amber. CIRCLE 135 **6** A unique suspension lamp from **Terzani**, Tresor, available in gold or silver, is made from 3,900 coins that are hand-welded by craftsmen. CIRCLE 136 **7** J'Adore Venice, another fixture from **Terzani**, is crafted from blown crystal and is available in white/transparent or black/transparent finishes. CIRCLE 137

LIVING AREA LUMINANCE





1 The Up-Down hanging lamp by **FontanaArte** features an upper diffuser in acid-etched blown white glass and a lower diffuser in a metallic blown glass. CIRCLE 138 **2 The Kentfield Collection** presents the Soleil ceiling fixtures with solid copper frames that hold either a white cased glass diffuser or a white fabric shade. CIRCLE 139 **3** Vittoria, a pendant lamp from **Leucos**, has a glass diffuser with a mirrored chrome finish. CIRCLE 140 **4** Named for its resemblance to a cue ball, the Cue pendant from **Nessen Lighting** is made from hand-blown glass. CIRCLE 141 **5** Three by **hansandfranz** is assembled via a do-it-yourself kit. The chic lamp has a lampshade made out of synthetics. CIRCLE 142 **6** New from **HutJ** is the Saw Table Light, made from white oak and nickel plated steel. Each cut in the table gives off a different intensity of light when the fixture is inserted. CIRCLE 143 **7 Flos** introduces Ray, which features a stand that is part lighthouse and part power pylon. CIRCLE 144 **8** The Bamboo Light System from **Yamagiwa** is made from polycarbonate and aluminum. Its shape is inspired by the form of bamboo. CIRCLE 145 **9** Mary by **Tobias Grau** has a mouth-blown white crystal glass shade and is designed as a reading lamp for use next to a sofa. CIRCLE 146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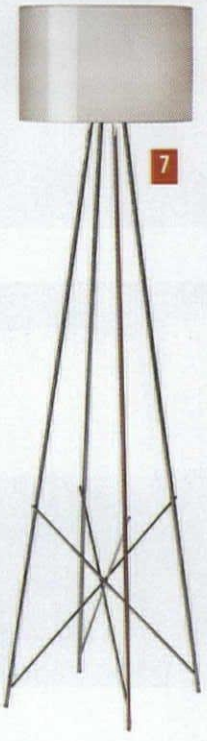
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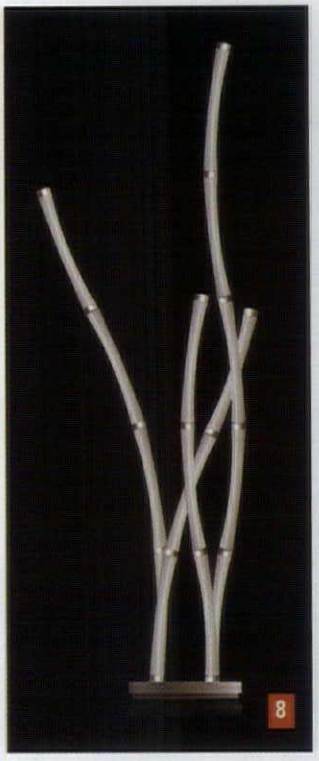
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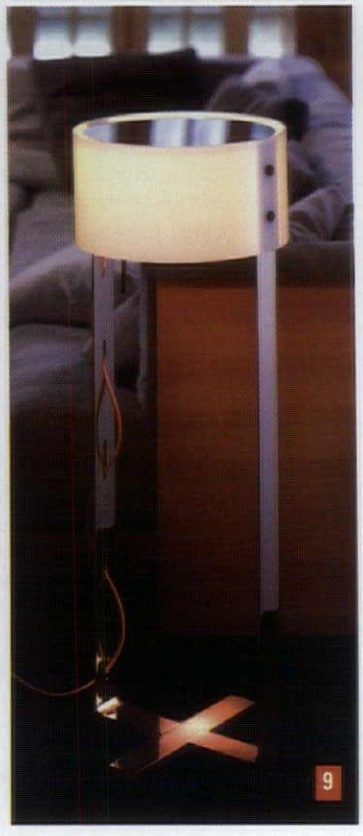
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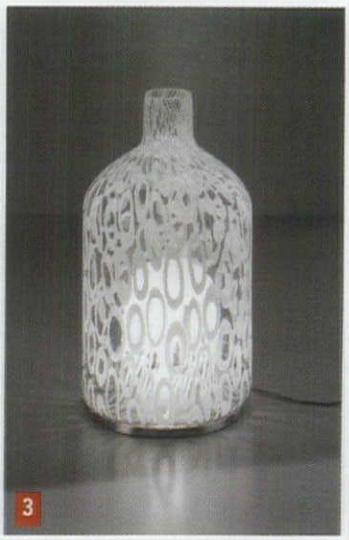
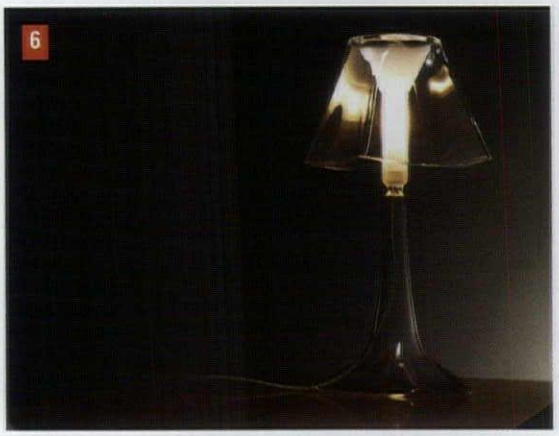
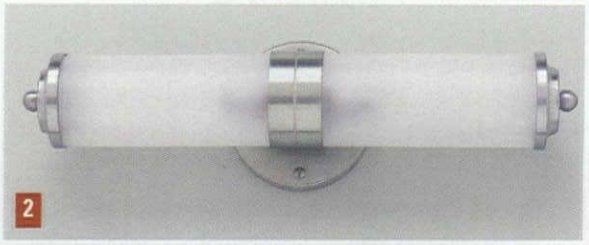
TABLE TOPPERS

1 FontanaArte presents 100 Metri, a table lamp available in two sizes. It features a dimmer and a diffuser in transparent glass, which is wound by a transparent cable. CIRCLE 147 **2** The Robsjohn-Gibbings Classic Square Marble Table Lamp by **Hinson Lighting** is back on the market after 30 years. With a marble base that comes in white or black, the lamp has on/off pull chain sockets and either a round or square shade. CIRCLE 148 **3** Pullo from **Leucos** has a blown glass diffuser with an inside spot and can be both a floor (shown) or table lamp. Available in numerous chromatic versions. CIRCLE 149 **4** Tosca by **Foscarini** has a thick glass shade and a base available in opaque white, opaque black with white stripes, or wood. CIRCLE 150 **5 Barovier&Toso**'s Lara has black or white shades with the base available in liquid orange (shown), green, or yellow. Clear plastic is used for the wires and switches. CIRCLE 151 **6** Made from transparent Pyrex glass, Karina by **Estiluz** uses the simple elements of light and glass to create a warm glow. Each fixture is hand-crafted from a single piece of glass. CIRCLE 152 **7** Slight by **AXO Light** comes in two sizes and can be used with an incandescent or fluorescent lamp. This bi-dimensional fixture has the silhouette of a typical table lamp but appears as if it's been pressed almost flat. CIRCLE 153

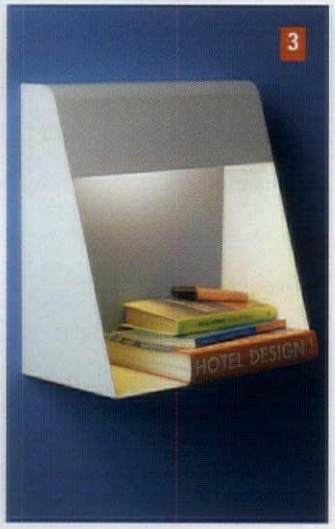


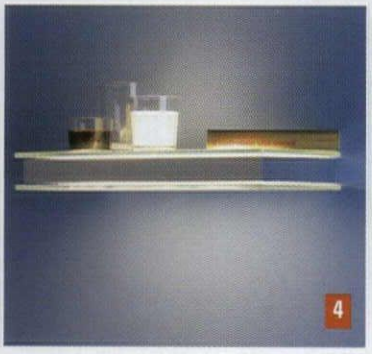


WALL ILLUMINATORS



1 Rotaliana presents OpenEye, sleek wall or ceiling lamps that are "designed to meld seamlessly with your wall," according to the manufacturer. The modern, simple fixtures are suitable for both indoor and outdoor use. The lamps have a die-cast aluminum body and a molded prism glass diffuser. CIRCLE 154 **2** This simple, double horizontal wall light from **Nicholas Antiques**, W6 002, is ideal for use in bathrooms and features a frosted glass housing. The fixture also is available in a brass, chrome, or bronze finish. CIRCLE 155 **3 AND 4 Alkco Lighting**'s WayGlo family of LED night lights provides an equal distribution of light at the floor plane via an optical lens and is ideal for illuminating corridors, steps, and aisles. The lights also can be used as a tasklight at the counter surface or in an inverted fashion to light the ceiling plane. CIRCLE 156 **5** The Sala sconce from **Boyd Lighting** is available in single or double glass shade versions. Using an incandescent lamp, Sala is offered in a satin nickel, satin brass, antiqued Boyd brass, and blackened brass finishes. CIRCLE 157





GOOD NIGHT LIGHTS

1 Buonanotte by **Studio Italia Design** was designed as a book rest and table lamp. Translating into "good night" in English, Buonanotte is ideal for those who read before going to bed. The fixture's metal frame has a sensor that turns the light on when the book is lifted and turns it off when the book is rested on the frame. CIRCLE 158 **2 Rotaliana**'s MultiBook features a three-way multisocket to recharge electronics and is available in white, black, red, or dark blue. The book-shaped multifunctional piece has 74 LEDs around three sides for diffused light and the spine features a digital clock and calendar, making it a convenient bedside table accessory. CIRCLE 159 **3** She, a wall lamp from **FontanaArte**, is available in two sizes and comes in polished white, polished gray, and polished black. Below the lighting source is a shelf to rest things such as nighttime reading materials. CIRCLE 107 **4** Created as a wall and bedside lamp, **FontanaArte**'s Ivory has shades in clear acid-etched glass, with the center of the piece finished in a polished aluminum. The electronic power supply is housed in the base of the shelf-like structure. CIRCLE 122

RESOURCES

SUSPENDED ELEGANCE

1. **FontanaArte,** 212-334-3295; www.fontanaarte.it
2. **Tobias Grau,** www.tobias-grau.com
3. **Kartell,** www.kartell.it
4. **Barovier&Toso,** www.barovier.com
5. **Studio Italia Design,** 305-621-9602; www.sid-usa.com

6 and 7. **Terzani,** 866-837-9264; www.terzani.com

LIVING AREA LUMINANCE

1. **FontanaArte,** 212-334-3295; www.fontanaarte.it
2. **The Kentfield Collection,** 866-251-7777; www.kentfieldcollection.com
3. **Leucos,** 732-225-0010; www.leucos.com
4. **Nessen Lighting,** 914-698-7799; www.nessenlighting.com
5. **hansandfranz,** www.hansandfranz.de
6. **HutJ,** 204-943-4733; www.hutj.ca
7. **Flos,** www.flos.com
8. **Yamagiwa,** 888-879-8611; www.yamagiwausa.com
9. **FontanaArte,** 212-334-3295; www.fontanaarte.it

TABLE TOPPERS

1. **FontanaArte,** 212-334-3295; www.fontanaarte.it
2. **Hinson Lighting,** 212-688-5538
3. **Leucos,** 732-225-0010; www.leucos.com
4. **Foscarini,** www.foscarini.com/en
5. **Barovier&Toso,** www.barovier.com
6. **Estiluz,** 201-641-1997; www.estiluz.com
7. **AXO Light,** www.axolight.it

WALL ILLUMINATORS

1. **Rotaliana,** www.rotaliana.it
2. **Nicholas Antiques,** 212-688-3312; www.nicholasantiques.com

3 and 4. **Alkco Lighting,** 847-451-0700; www.alkco.com

5. **Boyd Lighting,** 415-778-4300; www.boydlighting.com

GOOD NIGHT LIGHT

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THE LED EVOLUTION

BY STEPHANI L. MILLER

LED PERFORMANCE, COLOR QUALITY, OUTPUT, AND CONSISTENCY HAVE COME A LONG WAY, BUT IMPROVEMENTS ARE STILL TO BE HAD WITH THIS EVER-EVOLVING TECHNOLOGY.

SOLID-STATE LIGHTING (SSL) TECHNOLOGY IS ONE OF THE fastest-evolving illumination sources. Use of light emitting diodes (LEDs) is well-established in a variety of applications that many people take for granted: automobile interiors and dashboards, cellular phone keypads and screens, televisions, computers, and other electronic devices, as well as theatrical stage lighting, street lighting, and architectural lighting.

Lately, the SSL industry has been focused on developing LED lamps and luminaires for general lighting applications in buildings as building owners and occupants grow increasingly aware of and concerned about energy use and costs and seek more efficient solutions. In the past five years alone the technology has progressed so rapidly that architects and lighting designers are tested to constantly keep up with all the latest developments. The challenge for the SSL industry lies in developing general-use LED luminaires and lamps that will deliver high-efficacy, high-quality (warm) white light at a cost-effective price point.

COLOR QUALITY, COST, AND EFFICACY

Currently, the SSL industry is working toward producing lower-cost, daylight-equivalent white light LED sources that exhibit minimal color shift and degradation, longer life, and greater light output for general use. While the costs of LED sources are decreasing continually, the price for white light is not yet low enough to make LED lamps or luminaires cost-effective for most applications. "Step one is to get the cost down so there's not such a huge gap between incandescent, fluorescent, and LED," according to Kraig Kasler, vice president of product management and marketing for GE Illumination.

Lighting quality is an equally important aspect from the designer's viewpoint, but as Kasler points out, even if high-quality LED light becomes available, few designers will be able to use it unless costs also have fallen to acceptable levels.

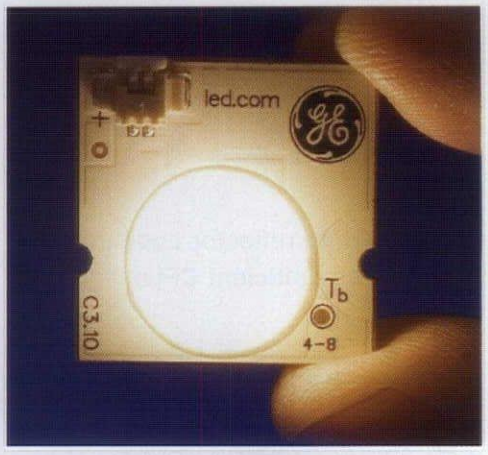
On the other hand, Kathy Abernathy of North Providence, Rhode Island-based Abernathy Lighting Design and chair of the International Association of Lighting Designers' (IALD) Energy and Sustainability Committee, points out that using LED luminaires, even in limited applications, allows peripheral savings in HVAC load and costs because of their minimal heat output, which is attractive both to designers and their clients.

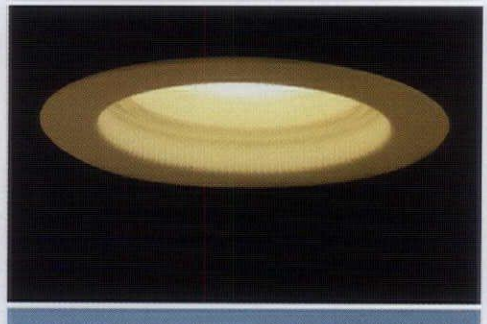
Delivering the warm-white light end-users are accustomed to receiving from incandescent lamps at high enough outputs, combined with low color temperature variation and high efficacy has been a big challenge. While cool-white LEDs provide stable, efficient light output, warm-white LEDs have greater color instability and color variation, and lower efficacies.

Warm-white LED technology is still new, and manufacturers of luminaires and LED chips still have a lot of work ahead of them. Because LED light is not naturally white, developers have had to find ways to create white light, and the two main processes available deliver different types of white light with different benefits and drawbacks. Applying different phosphor coatings is one method, but certain phosphors decrease LED efficacy. Color-mixing RGB systems are another method, but because each LED color degrades at different rates in application, color quality and efficacy are inconsistent. Some lighting companies are experimenting with different phosphors to discover which can deliver the best mix of desired light color with high efficacy, while others are developing better RGB color-mixing systems.

GE Lighting's Lumination VIO high-power LED uses a proprietary chip and phosphor system to effect a color shift of less than 100K within the overall Kelvin scale over a 50,000-hour rated life, which the manufacturer says also overcomes color control issues and provides high efficiency at warmer color temperatures. Philips Lumileds has developed a new phosphor technology, Lumiramic, that allows specific colors and temperatures of white LEDs to be produced. The company plans to introduce Luxeon products incorporating Lumiramic phosphor technology early in 2008. Ledon's Tempura LED spotlight, utilizing Philips TIR Systems' Lexel RGB color-mixing technology, allows the color temperature of the light to be adjusted from 2500K to 6500K while providing a constant luminous flux of 1000 lumens and consuming between 40 and 75 watts.

Heat in application also affects LED performance. When too much heat is generated in an LED fixture, the lamp's lumen output and useful life decrease. Managing heat in the fixture and understanding the environmental conditions of the lighting application are critical to the success of the LED product. Manufacturers use conductive materials to create a heat sink in their LED products that pull heat away from the light source; the better the heat sink, the more stable the LED's lumen output, color, and life.





GE's VIO high-power LED chip promises minimal color shift over its lifetime (top). Ledon/Zumtobel's Tempura fixture allows color temperature to be adjusted (middle). LED Lighting Fixtures' LR6 downlight is an example of a popular LED retrofit fixture (above).

Winona Lighting's POPS! LED fixtures (left) are designed to resemble conventional decorative fixtures, while io Lighting's Luxrail LED-lit handrails (right) deliver illumination in a new format.

Both higher efficiencies and lower costs will deliver the payback that designers, end-users, and building owners are looking for. According to Kevin Dowling, vice president of technical innovation for Philips Solid-State Lighting Solutions, consistency, quality, and amount of light output in warm-white LEDs have all improved dramatically in the past 18 months.

MEASURING PERFORMANCE

Absence of standards has made it difficult for designers to decipher the life expectancy and other performance aspects of white LEDs and white LED luminaires. A safety standard from United Laboratories (UL) recently was published. Along with UL and the U.S. Department of Energy (DOE), several other organizations, including the Illuminating Engineering Society of North America (IESNA), the Institute of Electrical and Electronics Engineers (IEEE), the International Commission on Illumination (CIE), the National Electrical Manufacturers Association (NEMA), and the American National Standards Institute (ANSI), are working on standards for measuring LED life, efficacy, lumens per watt, chromaticity, and color shift. Late in September 2007, DOE's Energy Star program released standards for LED lighting, which will go into effect September 30, 2008, with requirements for light output, efficacy, warmth of light, and light focus.

"DOE is accelerating their efforts in this standards area, because they know what happened when CFLs [compact fluorescent lamps] came online years ago. There were few standards and inaccurate claims, and that really inhibited the adoption of CFLs," Kasler says.

One of the issues of debate has been manufacturers claiming their LED's efficacy, life expectancy, and light output based on the testing lab performance of the LED source, not its real-world performance in a complete lighting system. The DOE's most recent round of solid-state luminaire testing, released in August 2007, indicates that the problem of accurate reporting has not significantly improved.

Rensselaer Polytechnic Institute's Lighting Research Center (LRC) also offers guidelines for the effective use of SSL through its Alliance for Solid-State Illumination Systems and Technologies (ASSIST) program.

The SSL industry is acting quickly to develop standards for this lighting category, in part because the technology itself is evolving so quickly but also because the DOE and the aforementioned industry groups are confident

that LEDs offer one of the best means of reducing the energy usage of lighting—one of the largest electricity consumers in the United States. Lighting represents about 22 percent of all energy use in the U.S.—one-fifth of national electrical consumption, according to the DOE. Four to five performance standards are expected to be completed this year.

SO LONG, INCANDESCENTS?

Though it is unlikely that general service incandescent lamps will be banned outright, the lighting efficacy standards under consideration in Congress this session would set minimum standards so high that most incandescents would become ineligible for use by 2012 at the earliest. Though there are alternatives to incandescents that are less expensive than LEDs at this point in time, the lack of incandescent sources efficient enough to meet the standards proposed will leave a huge gap in the market, one that potentially could be at least partially filled by LED lamps and luminaires.

However promising LED technology is, though, it is important to understand that most of the people who currently purchase incandescent lamps do so because it is an inexpensive light source—and LEDs still are an expensive option that do not yet reliably deliver the high-quality light for which incandescent sources are appreciated.

FORM FACTORS AND APPLICATIONS

There is a slight division in the lighting industry regarding the form LED luminaires should take. Some manufacturers are focusing on producing products that will accommodate existing lighting infrastructure and resemble conventional decorative and task lighting fixtures, while others are designing new formats that deliver lighting in unexpected and innovative ways that previously could not be accomplished with old lighting technologies.

LED fixtures designed to resemble conventional light fixtures range from recessed downlights and pendants to undercabinet lights and tracklights. LED Lighting Fixtures has introduced its LR6 downlight, a complete recessed downlight trim kit with LED light engine, designed to fit into standard recessed housings. Winona Lighting's POPS fixtures offer conventional sconce, chandelier, and pendant light fixture configurations, but are integrated with LED light sources in several colors, including warm white, and have a playful, contemporary vibe.

LEDs can be used to provide illumination in nearly any kind of application, such as io Lighting's Luxrail LED-based handrail, designed to illuminate a path or stairs while providing ADA-compliant gripping surfaces. The fact that LEDs can be incorporated into just about any material, including fabrics, means that lighting could be made to emanate from the very surfaces and shapes of a building, from architectural elements to furniture. "LEDs have such unique characteristics that lend themselves well to new forms of lighting; new form factors, new bulb types that will perform much better than existing bulb sources," Dowling says.

Some industry experts think that maintaining the same old form factors for lamping and luminaires with such a promising technology is short-sighted and wastes the potential of LEDs. "Trying to replace an existing light bulb in a socket with an LED light bulb is a waste of the LED's talent," says Dr. Nadarajah Narendran, director of solid-state lighting for the LRC. "If you can look at applications where LEDs can be of better service to the end-user, that becomes a better value proposition." But he concedes, there is a market for both.

GOOD INVESTMENTS

The lighting industry is investing heavily in LED technology. Several big-name lighting companies have acquired smaller, specialized LED development companies in the past few years. Royal Philips Electronics, for example, has acquired a number of LED developers, including Lumileds, TIR Systems, and Color Kinetics, and Cooper Lighting recently acquired io Lighting. Several industry partnerships between conventional lamp manufacturers and LED chip or semiconductor manufacturers also have been arranged, including cross-licensing agreements.

The DOE also has been investing in solid-state lighting research and development with $7 million in funding going to a variety of projects and industry partnerships. According to Jim Brodrick, DOE's solid-state lighting portfolio manager, nearly $200 billion or more can be saved if the DOE is successful in achieving general illumination with LEDs.

"These investments are advancing LED technology as well as associated technologies required to make LEDs useful, such as controls, power, thermal management, and optics," says Jim Anderson, director of technology and projects for Philips Solid-State Lighting Solutions.

Every major lighting manufacturer wants to have some play in LED technology for when the market catches on; missing the boat could be disastrous. "I think probably over the next five to six years or so, we will see the market go to about 20 to 25 percent LED," Narendran predicts. "Market transformation takes a long time. To get to 50 percent may take much longer."

All in all, LED technology appears to be progressing in the right direction for adoption in general illumination and architectural applications, according to Kasler. "Efficiencies are getting better, costs are coming down, people are being forced to talk about the quality of light," he says.

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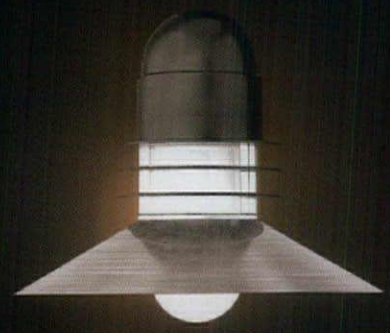

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Legislating Lighting Efficiency

BY STEPHANI L. MILLER

MOVEMENT TO BAN THE INCANDESCENT BULB SPARKS FEDERAL PROPOSALS TO SET ENERGY EFFICIENCY STANDARDS.

FOR MORE THAN 125 YEARS, THOMAS EDISON'S INCANDESCENT LIGHT BULB HAS REMAINED THE most commonly used light source in the United States, particularly in residential applications. The U.S. Department of Energy (DOE) estimates there are approximately four billion general service incandescent lamps in use across the nation. But several legislative initiatives proposed over the past year seek to either ban the sale of general service medium screw-base incandescent lamps outright by 2012 or would set efficiency standards so high that currently available incandescent technology would not be viable by 2012.

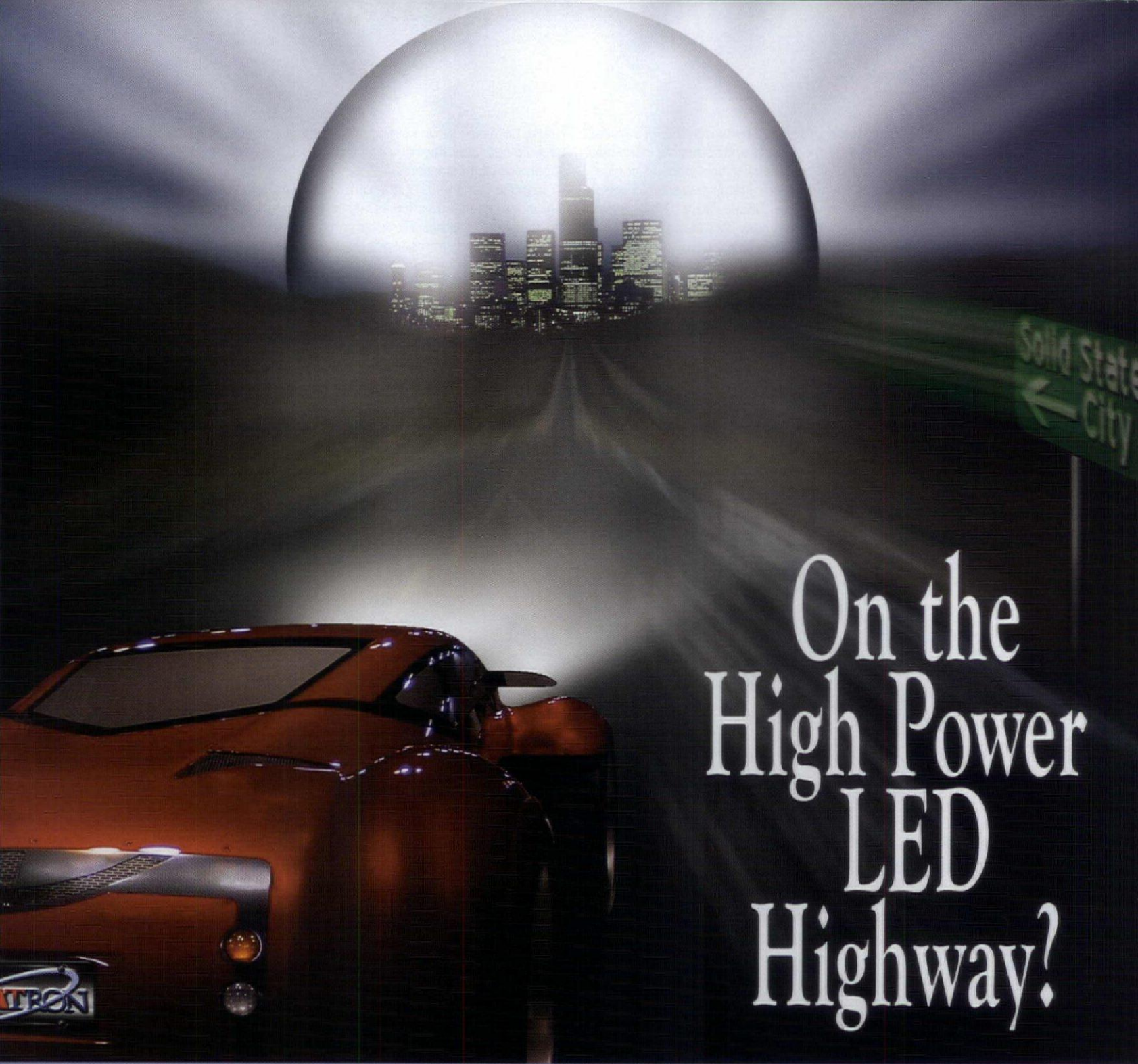
In January 2007, California State Assemblyman Lloyd Levine introduced a bill to ban the sale of incandescent bulbs by 2012. The bill, AB 722, was later changed to promote a plan for phasing in energy efficiency standards for general service lamps, before being permanently shelved in June 2007.

Though now effectively dead, Levine's bill acted as something of a catalyst, sparking conversation and debate about cutting the energy use of lighting in buildings. A competing bill, AB 1109, was introduced soon after by Levine's colleague in the assembly, Jared Huffman. Huffman's bill proposes performance standards for a variety of lighting types aimed at reducing the energy consumption of general purpose residential indoor lighting by at least 50 percent by 2018. By 2018, the bill's standards also would cut energy consumption of indoor commercial and outdoor lighting by at least 25 percent. It also outlaws the sale, after January 2010, of general purpose lights containing hazardous substances—namely, lead and mercury—at levels prohibited by the European Union.

Between February and March 2007, the conversation in the U.S. evolved from simply banning incandescent lamps to developing national efficiency standards for all general service lamps. Along with several state legislators, some members of Congress introduced their own bills that address lighting efficiency. Consumer dissatisfaction with compact fluorescent lamps (CFLs), the primary alternative to incandescents, plus the inability of CFLs to replace incandescents in all applications, led lawmakers to reconsider the approach to reining in lighting's energy usage.

Currently on the Senate's calendar for consideration is H.R. 3221, which passed in the House of Representatives in August 2007. Among other energy-related matters, this bill would prohibit the sale of 100W general service incandescents that do not emit at least 60 lumens per watt after January 2012; phase out general service lamps from 2012 to 2014 that do not meet a range of minimum efficiency levels specified; and prohibit the sale of general service lamps emitting less than 300 percent of the average lumens per watt emitted by 100W general service incandescents currently available.

The most recently introduced bill in the Senate, S. 2017, would phase out current 40-, 60-, 75-, and 100W incandescent bulbs from 2012 to 2014 to be replaced by lower wattage bulbs with equivalent light output. Introduced by New Mexico Democratic Senator Jeff Bingaman, the bill was crafted with input from a consortium of lighting industry players and advocates, including Philips Lighting, Osram Sylvania, General Electric, the Alliance to Save Energy, the American Council for an Energy-Efficient Economy (ACEEE), and the Natural Resources Defense Council. Hearings on S. 2017 were held September 12, 2007, where senior policy analyst for the International Energy Agency's Energy Efficiency and Environment Division, Dr. Paul Waide, along with the American Council for an Energy Efficient Economy's executive director, Steven Nadel, and the National Electrical Manufacturers Association's vice president of government relations, Kyle Pitsor, all testified as to their organizations' positions on the proposals of the bill.



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Even if a federal bill is not enacted this year, points out ACEEE's Nadel, there is bipartisan support for such a bill in Congress and sometime in the next few years lighting efficacy standards will be nationally legislated. If Congress does not act this year, he says, there are several states prepared to act on their own lighting efficiency bills. Connecticut, Rhode Island, New Jersey, South Carolina, Illinois, Minnesota, Hawaii, and New York all are considering bills addressing lighting efficiency.

However, as Kim Freeman, spokesperson for GE Consumer & Industrial points out, a national policy on lighting efficacy would have a much greater impact on the environment and on energy savings than could a state-by-state effort. Also, a national standard would be more beneficial for lighting designers, who could refer to a single set of requirements and regulations rather than having to learn a different set for each state in which they work. The House bill would allow existing state lighting efficacy standards to continue to be enforced until the bill went into effect; however, the Senate bill would supercede state standards.

Lighting designers, on the other hand, are rightfully concerned that such legislation may tie their hands when it comes to design possibilities by limiting the type of lamps allowable in certain applications. Many already have experienced such immobilizing encroachment on their design prerogatives, particularly in California where every energy-consuming system is heavily regulated by Title 24.

For Charles Cameron, principal of Meeker Cameron Lighting Design Group in New York, the issue is less a question of whether legislation addressing lighting efficiency will pass, but rather how the lighting industry can influence the standards being set to ensure the legislation accomplishes the right objectives for designers, end-users, the environment, and lighting manufacturers.

"We [the design community] need to get out there and affect [the process] so that it's actually good legislation and that it accomplishes the goal of really bringing the worst-performing, least-efficient lighting methods and technologies to their retirement; encourages people to design smarter, and encourages manufacturers to put the money into research and development of new product," Cameron says. "There is a way to do this that doesn't cut off legitimate use of some less-efficient technology."

The conversation about lighting efficiency has grown in intensity and complexity over the past year. Phasing out the most inefficient lighting technologies appears to be favored by much of the lighting industry and by lawmakers, but many designers and manufacturers are quick to clarify that any legislation passed should be technology-neutral. As long as legislation remains nonspecific on allowable lighting technologies, manufacturers have a chance to improve existing affordable technologies. As ACEEE's Nadel says, "Set the performance standard and let the manufacturers meet it with the best mousetrap they can."

But is it possible to develop a much more efficient incandescent, and if so, why haven't manufacturers attempted it yet? According to GE's Freeman, the timing just hasn't been right—that is, until now. The current focus on energy efficiency has generated a perfect storm of demand for more efficient lighting and the coming-of-age of the necessary technology, she says.

In fact, GE announced in February 2007 that it will introduce an incandescent bulb in 2010, already in development for three years, that will be twice as efficient as current incandescents, operating at 30 lumens per watt. By 2012, the technology will be four times as efficient—60 lumens per watt, the company says. But what about cost? According to Freeman, it is too early to say definitively what the price tag will be, but she says the new incandescent likely will cost less than a CFL because it will not be a long-life product.

Regardless of whether lighting efficacy legislation passes this Congressional session, there is more focus on openness to energy efficient products and technologies in general among consumers and in the lighting industry. "The industry is moving toward the use of more energy efficient sources anyway, because more people are thinking of environmental responsibility and energy efficiency—more than ever before," says Susan Bloom, director of marketing for Philips Lighting. If incandescents cannot keep up with an increasing demand for efficient lighting products, then they will become obsolete.

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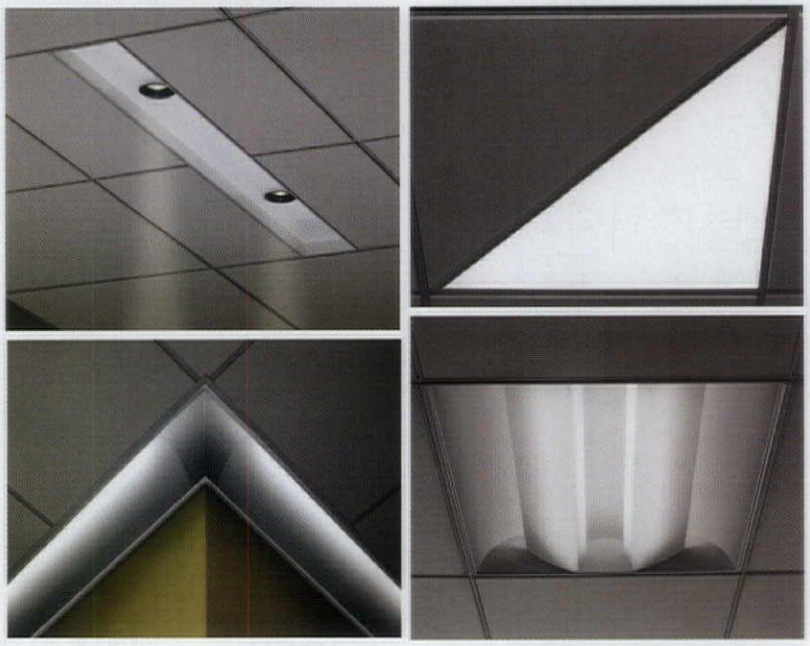

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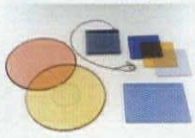

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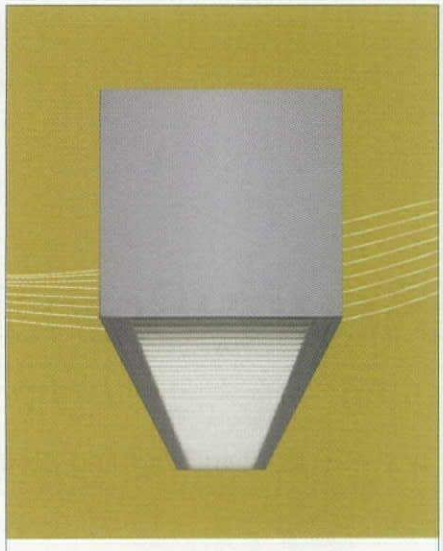

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THE DESIGN / ENERGY CODE DEBATE

How do you balance the design process while adhering to energy code requirements? *Is it possible for both to coexist without any sacrifices to the lighting design concept and implementation?*

Responses from all readers are always welcome to Exchange topics. Replies and proposed topic questions can be submitted directly to **exchange@archlighting.com** or **edonoff@hanleywood.com**.

DOUGLASS R. WERNER, LIGHTING DESIGNER | **STV INCORPORATED**

The biggest hurdle in balancing the design process with energy code requirements is, as designers, to have a thorough knowledge of the energy codes affecting our projects and to share this knowledge with our clients. The design process is clearly a collaborative, creative process between the designer and the client that includes many factors; we cannot ignore the importance of energy codes and energy savings among those factors.

While many designers work with energy codes on a daily basis, many of our clients are relatively unfamiliar with these codes. In discussions with my colleagues, I'm finding this to be especially evident on the East Coast where the implementation of energy codes seems to have lagged behind the western part of the country. It is our responsibility as professionals to educate our clients regarding energy codes and their impact on lighting design and control strategies, in the same way we have educated them as new lamp technologies and luminaire designs have been introduced.

It is clear to me that energy code requirements can, and must, coexist with the design process without sacrificing design. I find this to be apparent as good design practice puts less emphasis on providing the appropriate quantity of light and more emphasis on the correct quality of light and how that light shapes the visual environment. Quantity of light is not the only factor affecting energy usage, however, limiting the amount of lighting in a particular space, both by design and the use of effective lighting controls, is a significant factor in reducing energy consumption. It also is apparent that there is an ongoing "push" among lighting manufacturers to develop new fixture designs committed not only to photometric performance, but also to reducing the amount of energy consumed by these fixtures. These are ways the lighting industry exemplifies its seriousness about the "art of illumination" as well as energy codes and how these energy codes ultimately affect the future of our planet.

JEFF GERWING, PRINCIPAL | **SMITHGROUP**

There is no doubt that the continued development of energy codes creates a significant design challenge when it comes to meeting the aesthetic goals for a project. Our design process always begins with a conceptual study of how lighting relates to the architecture of the spaces we are designing. These aesthetic concepts translate into a reality that impacts the way people perceive and experience space and therefore must remain fresh in our minds as the target of what the lighting design will become. If we begin with a focus on energy, we already have forgotten why we design buildings—for people.

There are many parameters that impact the design process and pull you off course, but energy codes quickly are becoming one of the most difficult challenges to navigate. Beginning with the aesthetic and following with the technical allows us to focus our design work on the most critical areas. It's really about creating a hierarchy of spaces and using your allowable energy where it matters most. We target energy savings in areas of the building that are more functional so we can apply more energy to the critical "impact spaces." There are times when a great idea cannot be implemented within code, but the majority of the time these challenges simply force us to dig deeper into a better overall design solution.

KAI PIIPPO, MANAGING/DESIGN PRINCIPAL | **LJUSARKITEKTUR**
EVA PERSSON, PROJECT MANAGER | **LJUSARKITEKTUR**

The lighting design profession has a great responsibility for future generations. Light is energy and we need to handle it with care. The goal is to create good lighting design that agrees with the energy codes or is even more energy efficient. Often there is no contradiction between good lighting design and energy efficient lighting. By planning and use of modern energy efficient light sources you get the right light where you need it and avoid unnecessary light and energy where you don't.

Light control also is an important tool to receive the right light environment and to save energy. In some cases we have a high installed effect but it is never meant to be used all at the same time. An environment can have different needs of light depending on time of day or function. In the House of Sweden we have a multipurpose room where the activity can be a conference, an exhibition, or a party—all need a different kind of lighting. Depending on the use of the room we can control the different luminaires and the light level to suit the situation.

The most difficult environment to make good lighting design, energy efficiency, and the needs from the customer to coexist is the commercial environment. The general situation today is the more light the better. In this case we believe you might have a chance to compete with less light if you do it differently to your surroundings and with the combination of special design of both light and architecture together.

MICHAEL A MANFREDI, PRINCIPAL | **WEISS/MANFREDI**

In our work we have found that the energy code does not compromise the design concept. In fact, we would argue that often restraints—building codes, energy codes, or economic pressures—elicit or provoke a higher level of inventiveness. All codes, including the energy code requirements, are blunt tools and are design blind. They do need to be revisited in the context of emergent technologies and changing environmental or life-safety concerns and are only as effective as they are simple and free of shifting interpretations. If good design is foregrounded and if a design is successful then all codes, including the energy code, need to be incorporated into the design at the conceptual level and holistically, in the context of all project parameters and conditions.

RICHARD RENFRO, PRINCIPAL | **RENFRO DESIGN GROUP**

What to light and where the light sources are located define the lighting concept. If you are mindful of the code as you brainstorm ideas, just as you are of the quality of light and user needs, this should not cause sacrifices to the concept. Implementation of the concept is where the energy code will impact the lighting design variables: aesthetics, function, and budget. Sacrifices are relative to one's expectations. Ideally, sufficient dollars would be allocated in the concept budget to accommodate the technology of efficient sources, fixtures, and controls to not compromise the lighting's aesthetics or function.

Another major facet of energy use is the choice of how much light to use. Once your concept establishes what to light, the amount of light has a significant impact on all the other design variables. Most designers and even institutions look to generic guidelines to determine light level requirements. While many of the recommendations for critical tasks are based on scientific research, there are many parts of a building and exterior landscape where the requirements are subjective. The next step toward reducing energy as a profession is to challenge how much illumination truly is needed, not in a reckless way but with a true understanding of the needs of the occupants, the adjacent visual environment and the building's context. This is where an experienced design team can provide the owner with the best balance of design with the energy code.

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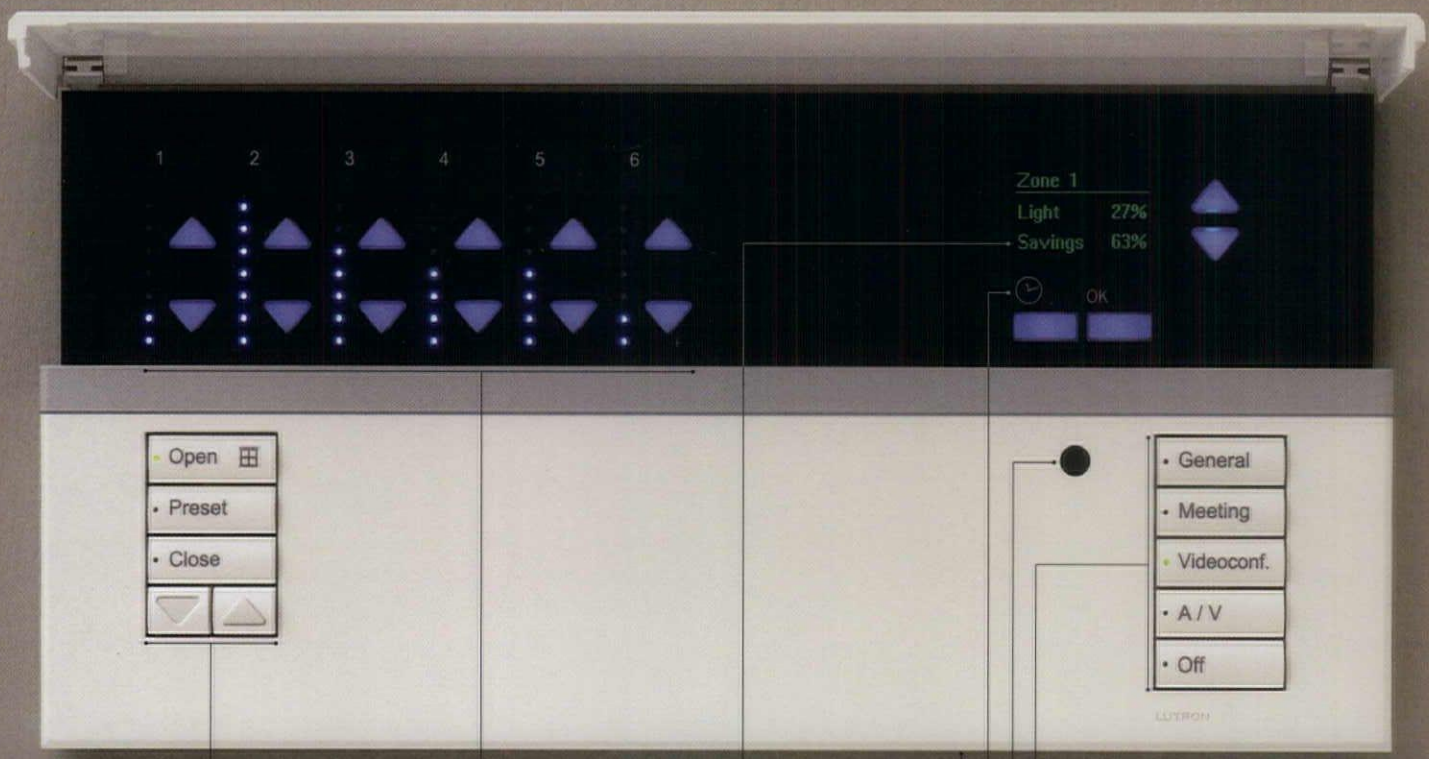

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