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A|L architectural lighting

MARCH 10
VOL 24, NO 2

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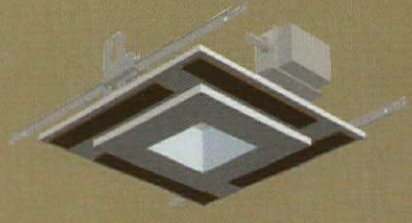

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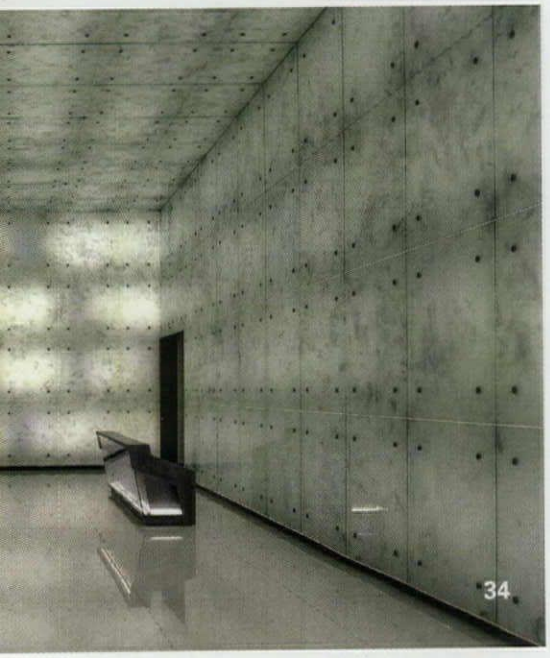

MARCH 2010

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Cover: The Grand Canal in Hangzhou, China.

COURTESY CONCEPTO STUDIO AND ZHONGTAI LIGHTING GROUP

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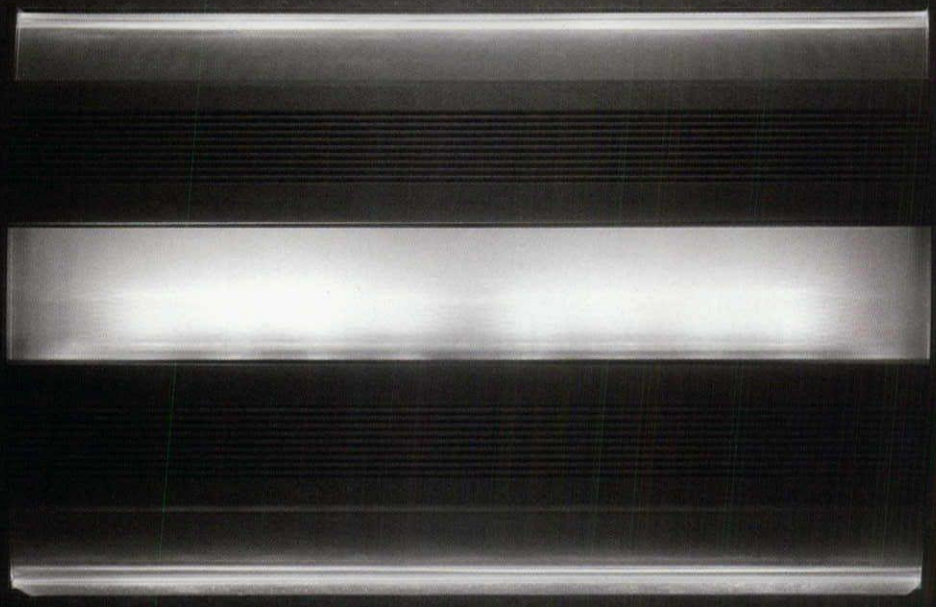

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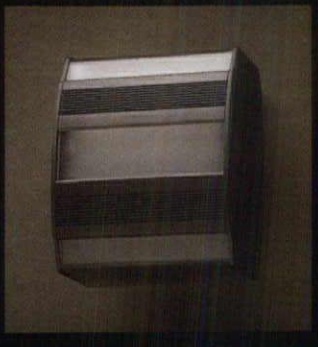

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LUMINIS

Safeguarding Lighting Design

What constitutes professional qualifications? How does a lighting designer define their work? These are two important questions that have come up in a number of conversations I have had with individuals in the lighting design industry. Recently, I have noticed several situations in which lighting design is either being omitted or limited in discussions. Consequently, questions regarding the importance of lighting qualifications have come up.

The three items that come to mind are the Solar Decathlon's deletion of lighting as a separate contest for its 2011 program ("2011 Solar Decathlon Competition Changes Eliminate Lighting Sub-Competition," page 12), the issue of having to charge sales tax in New York state ("A Taxing Situation: New York Lighting Designers Confront Sales Tax issue," page 12), and the situation that surrounded the Texas House Bill 2649 in May 2009 ("A Rude Awakening," June 2009, page 8).

It seems apparent that governmental bureaucracies and legislatures do not regard lighting design as a distinct profession. Also, the scope of lighting design services is not very well understood. As we covered in June 2009, the debate surrounding the Texas House Bill 2649 showed that it was all too easy for a politician to use licensing as the determining factor as to whether someone is permitted to practice lighting design in the state of Texas.

Now, the lighting community has been reminded of a sales tax issue that only affects lighting designers in New York state. Had it not been for the audit of a lighting colleague, other New York–based lighting designers might have been caught off guard and faced a similar and unpleasant process dealing with tax officials. (Thankfully, the situation was successfully resolved, but it is troubling nonetheless.) Lighting designers can remain within the bounds of the law in New York state by charging sales tax and filing for a Certificate of Authority, but the situation revealed that New York state interprets lighting design services as an interior design service. Despite efforts to explain to the state tax authorities exactly what a lighting designer does and why this scope of work is not, and should not be, treated as an optional element, the tax authority still groups lighting design under interior design services.

These three scenarios highlight two core issues that need to be addressed. The first is that the lighting design community needs to better promote awareness about itself as a profession and the value of its services. The second is that the lighting community needs to establish a credentialing system.

Not only is establishing credentials for lighting designers necessary to prevent future legal misinterpretations of the role of the lighting designer and lighting design services, it also will help the design community define the nature of its work. And by credentialing, I do not meant licensing. Credentialing would be a way to define the skill set, the technical expertise, and the value of insight and experience that a lighting designer brings to a project. The Lighting Certified (LC) designation, which is achieved by successfully completing the National Council on Qualifications for Lighting Professionals (NCQLP) exam, was an attempt to address this need for credentialing. But everyone has now had the opportunity to take the NCQLP exam, and there is nothing about the LC designation that distinguishes a lighting designer from someone who is working in manufacturing or in sales.

What then are the tangible criteria that distinguish a lighting designer's work? Most lighting designers cannot quite put their finger on what makes the profession distinctive, although one of the most commonly cited aspects is that a lighting designer is independent, meaning they are not beholden to any one specific entity.

So how would the criteria for this credentialing be determined? Some of the individuals I have spoken with have suggested that the criteria for IALD professional-level membership could be used as a guide because it is rigorous. Perhaps, but it would be a mistake for any one professional association to become the administrator of such a credentialing system; that should be left to an independent body. Word has it the IALD is forming a task force to look into the credentialing issue. But the writing is on the wall: To safegauard the profession, a credentialing system for lighting designers must be established.

ELIZABETH DONOFF
EDITOR

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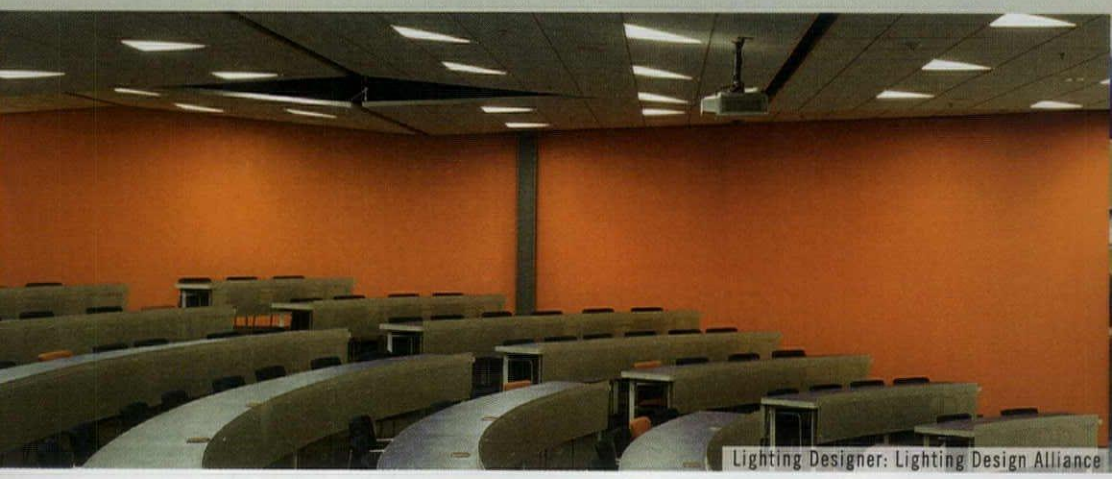

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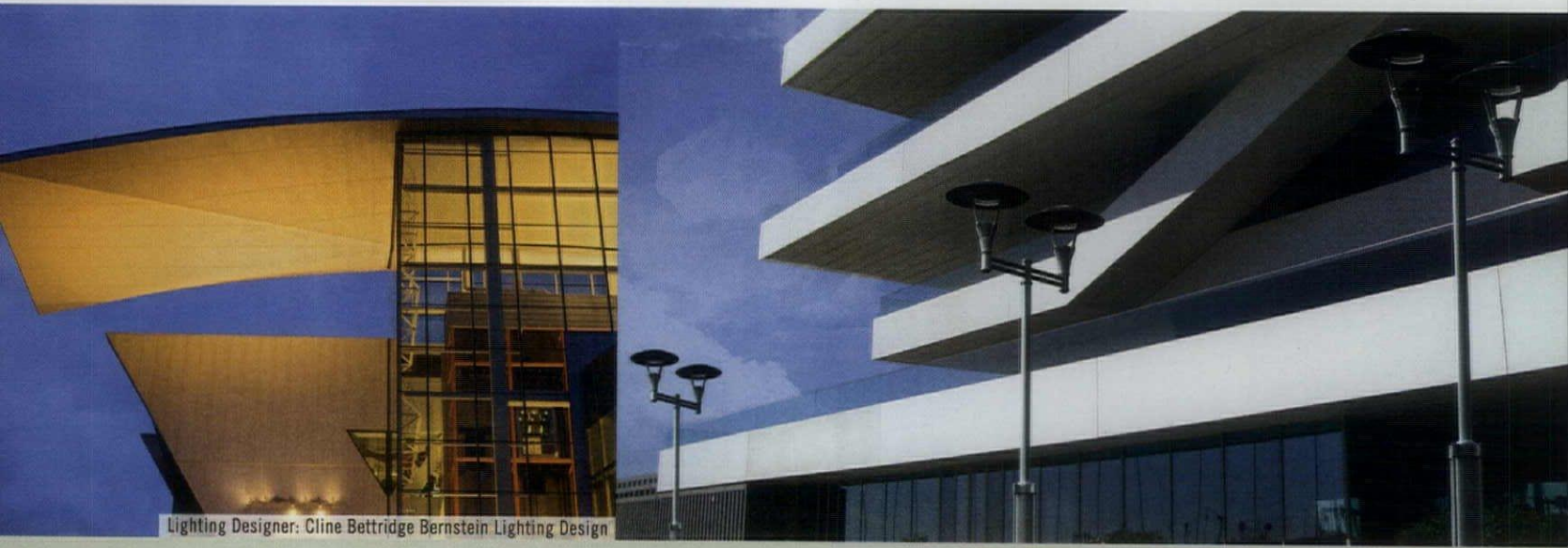

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LETTERS

SPECTRALLY ENHANCED LIGHT

Editor's Comment: An interesting discussion is under way initiated by Jim Benya's Jan. 10 blog posting, "Blue Light Blues." The debate about spectrally enhanced light is not new. What follows is an excerpt of an exchange between lighting designers Brian Liebel and Jim Benya; the full text is available on Benya's blog at archlighting.com.

Brian Liebel's letter:

The 1941 Kruithof curve has largely been discredited due to the fact that it is based solely on a pilot study of observations by Kruithof and his assistant. A study by Peter Boyce and Christopher Cuttle (1990) tested the Kruithof curve and concluded that, for light sources ranging from 2700K to 6000K at illuminances ranging from 30 to 600 lux, "once fully adapted, people's impressions of the lighting of a room are little affected by CCT."

Because of the negative association with higher color temperature lighting generated by the Kruithof curve, the Department of Energy (DOE) has gone to great lengths to test occupant acceptance and satisfaction for the 850 fluorescent lamp in office spaces at lowered illuminance levels to maintain equal vision and save energy. These field studies concluded that there is equal satisfaction among occupants between 3500K lamps and 5000K lamps. As a result, the DOE is confident in the use of 850 lamps and advocates their use in commercial spaces through the Spectrally Enhanced Lighting program. The DOE is not alone on this matter; there are now hundreds of buildings in California that are successfully using high color temperature lighting, and Pacific Gas and Electric promotes high color temperature lighting as one of the top 5 lighting recommendations for commercial office spaces.

After participating in the field studies that demonstrated occupant satisfaction with the 850 lamps, I have now accepted that my personal color bias did not coincide with that of the general public (contrary to my expectations). People do not view the 850 lamps as icy cold; instead, we find that after spending a little time under the 850 lamps, occupants often describe the warmer hues of 3500K lamps as "dirty," and the 5000K lamps as "clean and white."

BRIAN LIEBEL, THE LIGHTING PARTNERSHIP, WEST PALM BEACH, FLA.

Jim Benya's reply:

In my blog, "Blue Light Blues," I hoped to raise awareness for the two distinct aspects of lighting in which a boosted blue spectrum is an issue. One is in outdoor lighting, where certain LED sources have been claimed to permit the use of fewer lumens and lower light levels because of increased blue radiation. The International Dark Sky Association has raised this as an issue, and in a soon-to-be released white paper, a very thorough discussion of the issues of blue-enhanced outdoor lighting is presented.

The other is in indoor lighting, where for over a decade, several lighting practitioners claim that lamps enhanced with exaggerated blue spectrum permit the use of lower light levels than possible with ordinary lamps.

The use of high correlated color temperature (CCT) sources to improve visibility on some visual tasks has been vividly demonstrated by Dr. Sam Berman, Francis Rubinstein, and others from Lawrence Berkeley National Laboratory. As I get older, I find that high CCT sources help with fine visual tasks, especially involving small parts or extremely fine print. But there is a difference in making the leap from small visual tasks to the ambient light of entire spaces.

Lighting designers have long known that Kruithof's findings were of thin scientific substance. Despite this, I think Kruithof's curve remains a practical indicator of color temperature preference. As a designer, it makes sense to me; it mimics the color temperature cycle of daylight. Boyce and Cuttle made a workable point about color adaptation, but in a large number of applications the immediate color temperature perception is critical. So while Kruithof may have been scientifically sloppy, I challenge the existence of a better tool to predict color temperature preference.

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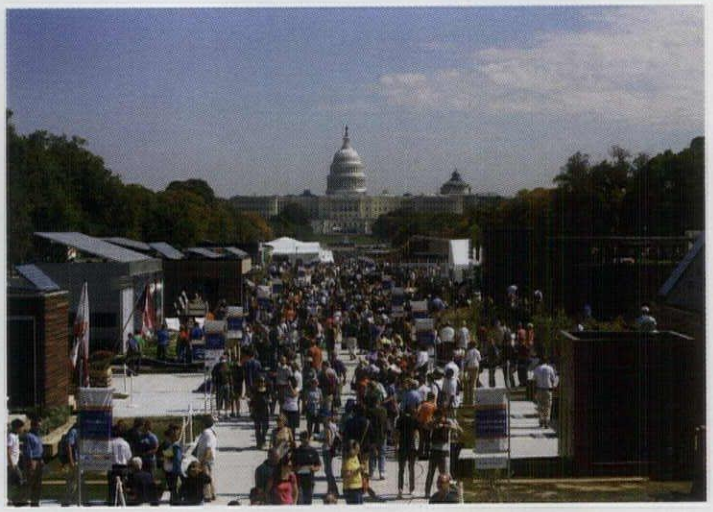
2011 Solar Decathlon Competition Changes Eliminate Lighting Sub-Competition

The Solar Decathlon—the U.S. Department of Energy's (DOE) biennial student competition for the design and construction of energy-efficient homes—has made significant strides in reaching a wide audience and spreading the sustainability message the past five years. The program is modeled using the decathlon format of 10 individual competitions, and lighting has always been one of those—until now.

The 2011 draft rules have eliminated lighting as a separate contest and incorporated qualitative and quantitative lighting evaluations in four other contests: architecture, engineering, market appeal, and home entertainment. When asked about the change, competition manager Michael Wassmer explained that at the end of each Solar Decathlon the DOE evaluates the program in order to make improvements to the event. For the 2009 competition, for instance, given the economic conditions, the student teams were asked to consider issues of affordability.



The DOE is committed to continuing this theme in 2011. "In the past the houses have been more experimental," Wassmer says. "Going forward, the DOE wants to incentivize teams to build more market-ready homes." As a result, for 2011 the Decathlon has introduced an "affordability" competition. And because the decathlon structure is based on 10 competitions, not 11, lighting is out as one of the stand-alone evaluations. Wassmer acknowledges that it was a difficult decision and indicates that every effort has been made to integrate lighting evaluations into other areas of the competition criteria. The competition managers incorporated feedback from the 2009 lighting contest jury—lighting professionals Nancy Clanton, Ron Kurtz, and Naomi Miller—in making the assessment.

To ensure that lighting issues will not be overlooked in the 2011 Solar Decathlon, the architecture contest jury will now include a lighting designer. Lighting also will contribute to one-third of the points scored in the architecture contest. Additionally, architecture jury members will now visit the houses both during the day and at night. The lighting contest previously was the only competition in which the jury visited the houses at two different times of the day. Finally, quantitative lighting control items will be evaluated in the engineering contest.

The competition managers are committed to making sure that lighting discussions remain central to the Solar Decathlon evaluations. The draft of the 2011 rules are just that—a draft—and Wassmer indicated that the competition is open to suggestions to ensure that the competition literature appropriately acknowledges lighting in the contest criteria and that decathlon participants are versed in the 2011 updates. For more information about the Solar Decathlon go to solardecathlon.org.

ELIZABETH DONOFF

A Taxing Situation: New York Lighting Designers Confront Sales Tax Issue

To tax or not to tax? The question of whether a lighting designer must charge New York state sales tax has been the subject of much discussion recently among lighting designers in New York. This conundrum arose as a result of an audit experienced by a New York lighting designer in July 2008, and it has taken nearly two years for the firm to receive a ruling and favorably resolve the issue.

The New York State Department of Taxation and Finance interpreted lighting design services to be the same as interior design services, simplifying lighting as the selection of fixtures. Further compounding the predicament the lighting firm found itself in was the fact that the New York State Department of Taxation and Finance was auditing the office back through 2002 because it had not filed for a Certificate of Authority. This certificate gives a business the authority to collect the required sales and use taxes, to issue or accept sales tax exemption documents, and may protect firms from being audited further back than three years. After extensive discussions and consults with a tax adviser, rounds of tele-conferences with tax department representatives in Albany, N.Y., and assemblage of documents, the lighting design firm received a tax advisory opinion written specifically (and only for this particular lighting design firm) indicating that it would not be retroactively charged. However, as of Dec. 1, 2009, the firm had to begin to charge sales tax.

So what does this all mean for lighting designers practicing in New York? It means that all interior architectural lighting design services when performed under agreement with a New York–based architecture, engineering, interior design, and/or owner, for projects located in or outside the United States are subject to New York state sales tax. Exterior architectural lighting design services are not subject to sales tax. It also means that New York state considers lighting design services the same as interior design services and they can be audited as far back as seven years, unless a firm files for a Certificate of Authority. The state's interior design tax law went into effect in 1971, but further complicating this is the fact that New York City repealed the law on Dec. 1, 1995, so charging sales tax applies to work only done in New York state, not New York City.

While the audit situation that the New York City–based lighting design firm had to deal with certainly was an unpleasant and exhaustive process, the firm's experience has revealed critically important issues that impact all lighting designers in New York: the stipulations for charging sales tax and how lighting design services are understood by bureaucratic entities. The lighting design firm's efforts to seek a reasonable solution has paved the way for other lighting designers to protect their business. Additional links and resources are available on the Lighting 311 website at lighting311.org. **ED**

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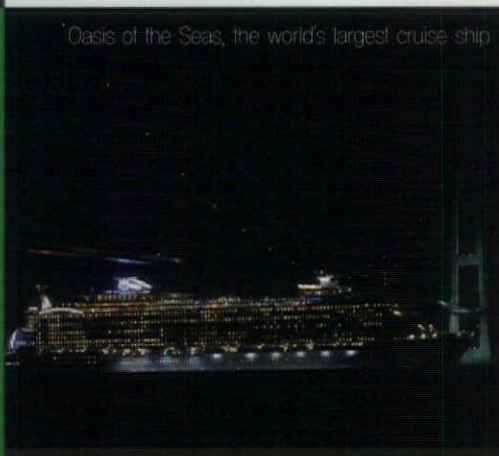

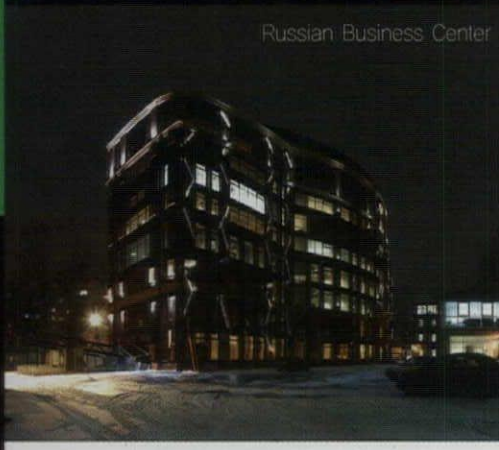

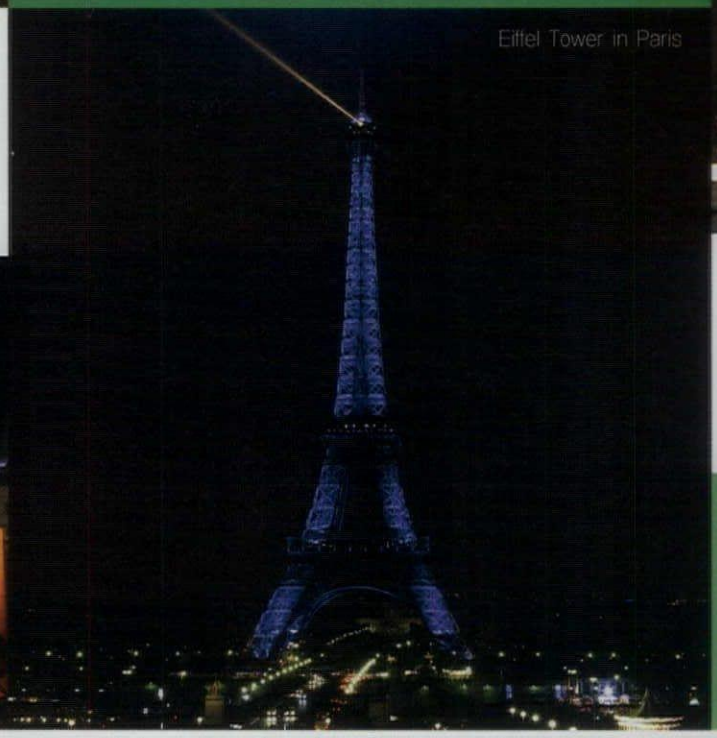

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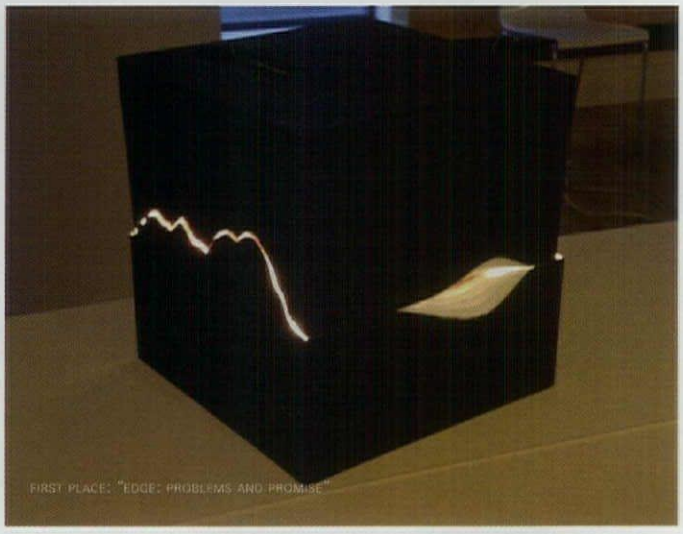
Student Projects Shine

On March 3, the Illuminating Engineering Society New York City Section (IESNYC) announced the winners of its 10th annual student lighting competition during an award exhibit and reception in New York City. This year's competition, titled "Liminal Luminosity," asked students to interpret how light "facilitates, defines, or bridges a point of transition, while exploring the spatial, psychological, physiological, and temporal realms of their chosen concepts." The competition is open to students in New York area schools and is not limited to those enrolled only in lighting programs.

This year, the competition received one of its best showings. Sixty-five students from a diverse range of programs including environmental policy, product design, and electrical engineering submitted projects. The students represented seven schools: Parsons the New School for Design, the Fashion Institute of Technology, Columbia University, Pratt Institute, Fordham University, the New York School for Interior Design, and New York University's Tisch School of the Arts. Overall, the judges—a team of five professional architects and lighting designers—were impressed with the range of ideas expressed in the projects and the variety of materials used to represent light.



FIRST PLACE: "EDGE: PROBLEMS AND PROMISE"

Three principal awards were given out. There also were two honorable mentions, one for craftsmanship and one for use of materials. First place went to J. Parkman Carter, a student enrolled in both the architecture and MFA Lighting Design programs at Parsons the New School for Design, for his project "Edge: Problems and Promise." Presented as an internally illuminated box with different exterior treatments, the piece explores how light, in combination with edges, can lead the human eye to perceive different levels of darkness. As the first place winner, Carter received a $2,000 award and a trip to the 2010 Professional Lighting Designers' Association workshop in Alingsas, Sweden.

New York School of Interior Design student Suerrisa Blecher received sec-

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SECOND PLACE: "CUSP"

THIRD PLACE: "LIMINALLY ENLIGHTENED"

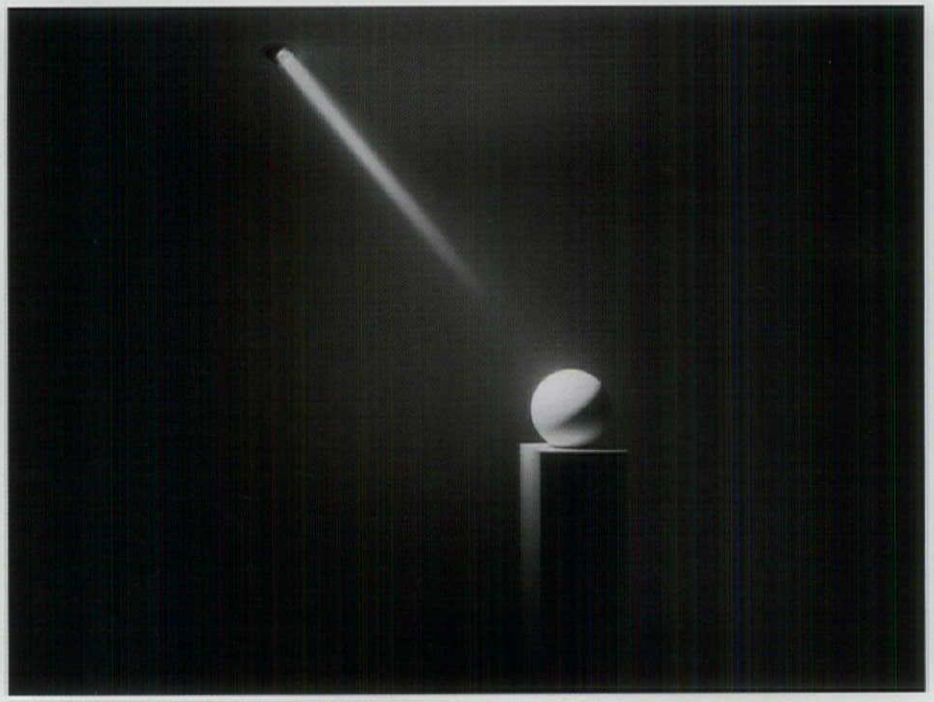
ond place for her project called "Cusp." She explored the point of transition using two intersecting arcs outfitted with red and blue LEDs. When the arcs meet, the colors combine to create purple light. Blecher received a $1,000 prize and a trip to the GE Lighting & Electrical Institute at Nela Park in Cleveland.

The third place winner, Megan Pfeffer, also an MFA Lighting Design student at Parsons the New School for Design, explored the competition brief using psychological theories on luminality. Presented as a series of reflecting planes within an enclosure, perception of space transforms as light refracts off the different planar surfaces. Pferrer received a $500 award. As with the second place prize, Pfeffer also received a trip to the GE Lighting & Electrical Institute in Cleveland. For further information about the IESNYC student competition, go to iesnyc.org. **ED**

Erco's *Light Perspectives*

As part of the celebration for its 75th anniversary in 2009–10, Erco Lighting has written a new lighting reference book, *Light Perspectives*. The 268-page volume enhances its text by using luxurious photographs and clear illustrative diagrams to explore lighting concepts, techniques, technologies, and terms. The book's 21 chapters are arranged in three sections: Light (an examination of the qualities of light), Space (the relationship between light and space), and Perspectives (light as it relates to culture). Each chapter focuses on a specific lighting term and presents the reader with the fundamentals of light and lighting—everything from issues of light and dark to color temperature and to spatial patterns.

Although the project images included in the book come from work in which Erco's products have been specified, the text does not specifically promote the company or its products. Rather, it is a first-rate discussion of the principles of architectural lighting design, one that manages to take a complex subject covering a vast amount of information and breaks it down in an accessible way regardless of the reader's background or familiarity with lighting. *Light Perspectives* is a welcome addition to the library of lighting books and reference materials. **ED**



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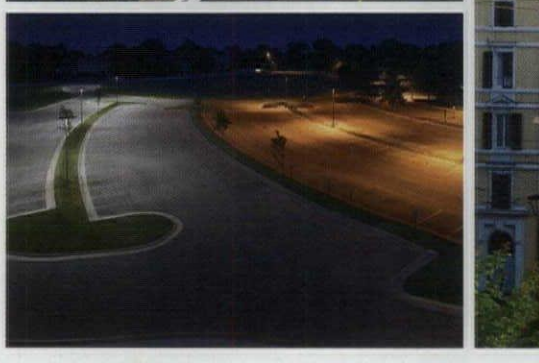

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NYSERDA Implements New SSL Policy

To respond to the abundance of diverse manufacturer claims regarding solid-state lighting (SSL) products, the New York State Energy Research and Development Authority (NYSERDA) has implemented a new policy for its Existing Facilities Program. Starting June 1, NYSERDA will accept only SSL products listed by either Energy Star or the DesignLights Consortium's Qualified Products List. NYSERDA has made the change in order "to ensure that the products [they] support will deliver promised light levels and energy savings throughout their product lives." Furthermore, the Existing Facilities Program will require that both LM-79 and LM-80 test documentation be included for all SSL products specified on performance-based projects.

Currently, NYSERDA does not provide any incentives for SSL products, save for those listed under the "Exit Sign" category. Going forward, however, NYSERDA will not provide incentives for products that have not met LM-79 and LM-80 testing criteria. In addition to these requirements, NYSERDA will require that all SSL products be backed by a three-year manufacturer's unconditional warranty. For further details, visit NYSERDA's website: nyserda.org/programs/Existing_Facilities/default.html. **ED**

NEMA Publishes White Paper on SSL Dimming

The latest offering on the solid-state lighting (SSL) product documentation front is the National Electrical Manufacturers Association's (NEMA) white paper: LSD 49-2010 Solid State Lighting for Incandescent Replacement—Best Practices for Dimming. With its release, LSD 49 joins NEMA's compendium of white paper reports on a variety of lighting topics.

Drafted by NEMA's Solid-State Lighting Section, chaired by Robert Hick of Leviton Manufacturing, the paper outlines recommended practices for the dimming and design of screw-based incandescent replacement SSL products. The goal of the document is to promote coordination between control, power supply, and LED modules between manufacturers in order to achieve industry-wide synchronicity for all LED-based luminaire products that enter the market.

The NEMA SSL Section also has started work on a related NEMA standard. Additionally, the U.S. Department of Energy (DOE) is participating in the working group that NEMA set up to devote to this subject, as the DOE has shared concerns related to the performance of SSL products in the marketplace. LSD 49 can be downloaded for free at nema.org/stds/lsd49.cfm **ED**


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Mixed Numbers; Mixed Signals

The economy continues to be on everyone's mind, as people wait for a decisive indicator that economic conditions have turned the corner and are on the upswing. While changes to the economic indexes that are related to the design and construction industries appear to have stabilized of late, settling down from their dramatic highs and lows experienced throughout the past year, current reported numbers in the field of lighting are off by a quarter. This is most likely a reflection of the delay from the architect down to the consultant level, and it makes analyzing the data more difficult to decipher and to find out what the numbers mean for the industry's recovery.

For example, the American Institute of Architects' Architecture Billings Index (ABI) reported a drop of 3 points for the month of January—down to 42.5. This is a decline from the December 2009 reading of 45.4. The ABI is a leading economic indicator of construction activity and reflects an approximate nine- to 12-month offset between architecture billings and construction spending.

However, the National Electrical Manufacturers Association's (NEMA) Lighting System Index (LSI) reported its fourth-quarter 2009 results at the end of February. While not as up-to-date as the ABI, the LSI's data does give us some insight into the progress of recovery in the lighting industry. The LSI, which reflects the demand for lighting equipment, rose 4.1 percent in the fourth quarter of 2009. All luminaire categories showed an increase except for emergency lighting. The large lamp categories in particular saw an increase in shipments. The increase was the first time since 2007.

NEMA's lamp indexes for both incandescent and compact fluorescent lamps (CFLs) also were on the rise at the close of the fourth quarter of 2009—by 6.7 percent and 15.5 percent, respectively. This helped stave off the declines these two sectors have seen over the past year. Generally speaking, CFLs continue to lose market share to incandescent lamps. This suggests that consumer demand has a hit a plateau. The cause for this market shift can be linked to lamp price points—CFLs typically are more expensive than incandescents—which is certainly a consideration for cash-strapped consumers.

Last but not least, NEMA's Electroindustry Business Confidence Index (EBCI) for current North American conditions managed significant gains—7.4 points—for the second straight month in February, reaching its highest level—64.6 points—in more than four years. The EBCI had already achieved a nine-point increase in January. The EBCI for future conditions lost some ground in February—7.7 points—but still remained strong overall at 70.8 points, well above the 50-point mark that indicates improved business conditions.

The key to attempting to diagnose the industry's health for this year will be found in watching the specific sectors—commercial and residential. The housing market did see some recovery in 2009, but that has not necessarily translated into significant increases for residential lighting. It also is generally acknowledged across the industry that 2010 will be a tough year for commercial buildings, since the number of new construction projects will be limited. However, retrofit opportunities might make up some of the gap for commercial lighting. One potential bright spot will be the outdoor lighting category, as these projects will benefit from money that will be spent from the American Recovery and Reinvestment Act. Overall, prudent vigilance remains the economic constant. **ED**

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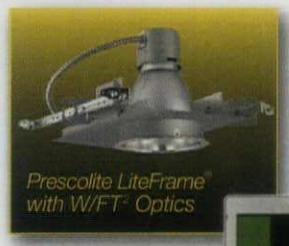

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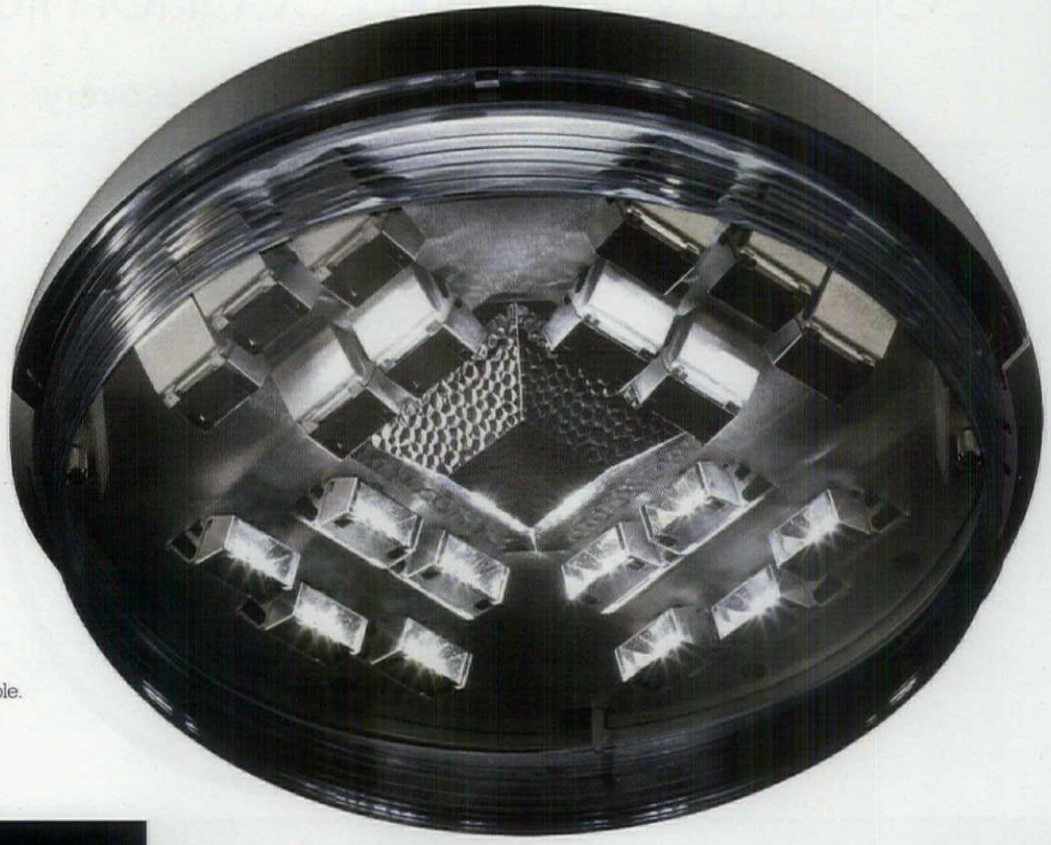
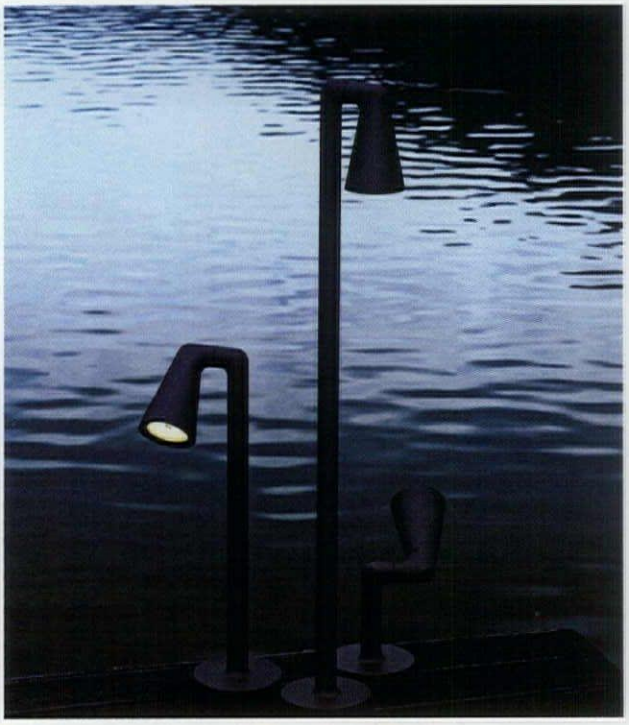
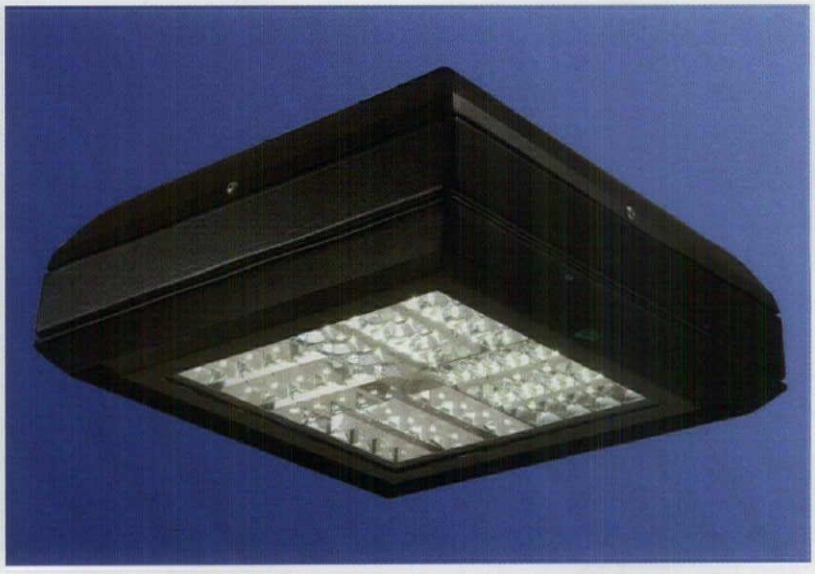


KIM LIGHTING PGL7 LED
The PGL7 LED parking garage fixture head mounts to a 4-inch junction box in the ceiling and uses Kim Lighting's MicroEmitter modules to aim the beam distribution of individual LED clusters for wide or narrow illumination without creating excessive glare. An advanced dual thermal system transmits and dissipates heat away from the LED components to extend their lifespan, while the modules' internal thermal monitor prevents overheating. The 18-inch-wide, 7½-inch-high PGL7 LED is available in three standard color temperatures—1700K, 3500K, and 5100K—and offers a choice of four occupancy sensors. Platinum silver (standard), white, and custom colors are available. *kimlighting.com* CIRCLE 125

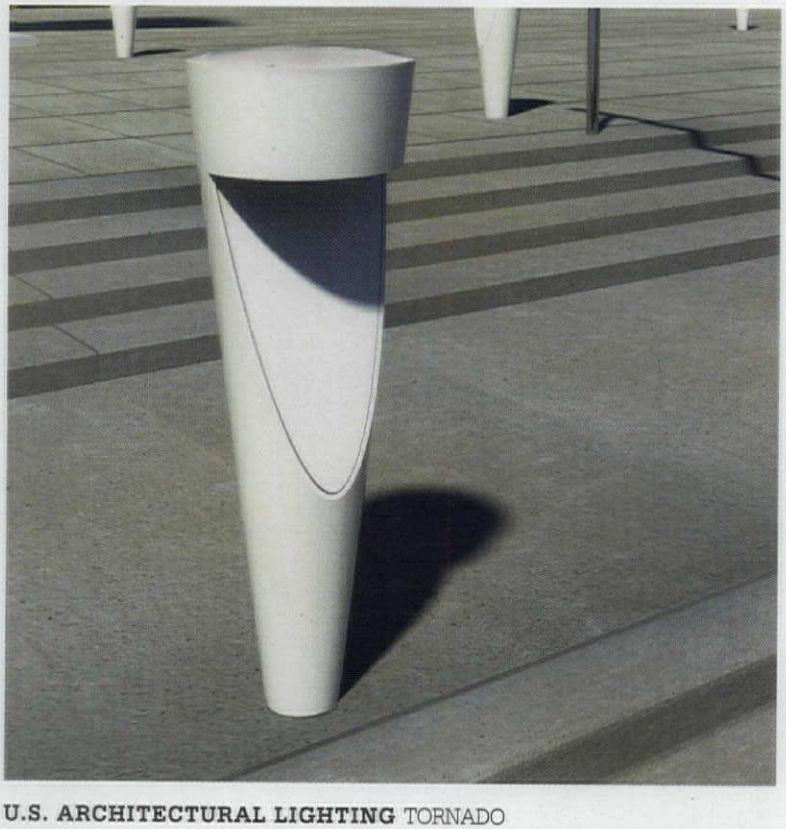


FLOS BELVEDERE SPOT
The Spot model of outdoor fixtures in the Belvedere collection (designed by architect Antonio Citterio) is available in three sizes—9.9 inches, 19.7 inches, and 35.4 inches. The luminaire has three light source options: 11.8W remote phosphor LED, collection of six 1W power LEDs, or a 20W mini compact discharge lamp. The fixture also is offered with the option of one or two adjustable projectors with vertical and horizontal rotation. A four-phase finishing process combines a cast-aluminum alloy, anodized surfacing, a polyester powdercoat, and a layer of vinyl with metallic-effect pigments and anti-corrosive properties. The Belvedere Spot meets IP67 and IP68 standards and comes with a 5.4-inch round base to stand on floor or tile, or a stake for in-ground installations. *flos.com* CIRCLE 126



LSI LIGHTING SOLUTIONS PLUS CROSSOVER XPG HL
The latest addition to LSI's Crossover series of LED parking garage lighting solutions is the XPG HL, a high-lumen fixture that meets the Illuminating Engineering Society's RP-20-98 criteria (recommended practices for designing fixed lighting for parking facilities) for spacing and mounting height. According to the manufacturer, the Crossover XPG HL's LED source uses 50 percent to 65 percent less energy than high-intensity discharge sources and is compatible with surveillance cameras in security systems. With full cutoff optics, the fixture boasts a minimum 60,000 to 100,000 hours expected life, a slim 7⅛-inch profile, and an IP67 rating. The Crossover XPG HL connects to a rigid ¾-inch pendant mount or 4-inch octagonal box for direct-surface mounting. Quick mounting or a hook-cord-plug assembly also are options. *lsi-industries.com* CIRCLE 127

ITRE SIT-UP
Designed by architect Kostas Syrtariotis, this oversized floor luminaire doubles as a bench and can be arranged in several configurations, including circular and serpentine formations. Each arc-shaped unit is made of stainless steel and a durable, white, plastic composite. The indoor/outdoor luminaire measures 43¾ inches by 21¾ inches and 17⅝ inches tall, and uses a 23W fluorescent lamp for an E27 socket. *itreusa.com* CIRCLE 128



U.S. ARCHITECTURAL LIGHTING TORNADO
Designed with a modern sensibility to public area lighting, the Tornado bollard is available in two models: the TNA with asymmetric light distribution and the TNS with a symmetric light pattern. The TNA is intended for areas where only perimeter lighting is needed, such as pathways, curbs, and driveways. The TNS can be placed in open plazas and commercial centers, where illumination is needed on both sides of the bollard. Either Tornado model can be specified with metal halide (39W to 100W), high-pressure sodium (50W to 100W), or compact fluorescent (26W to 42W) sources, or a new proprietary LED system. A microprism lens is incorporated for diffused illumination and the housing is constructed from a corrosion-resistant low-copper cast-aluminium alloy with a powdercoat finish. *usaltg.com* CIRCLE 129

BEGA RECESSED WALL ROUND LED
Available in flush, tempered matte glass (8688LED, shown) or white glass (3822LED), Bega's recessed wall LED luminaires can be installed in any vertical or horizontal surface, according to the manufacturer. The housing comprises an aluminum outer ring surrounding a stainless-steel inner ring. The matte glass luminaire uses a 0.5W LED source, while the white glass option uses a 1.5W LED source. Both luminaires use 24V DC, measure 1.9 inches in diameter, are UL-listed, and meet IP67 standards, making them suitable for outdoor as well as indoor installations. *bega-us.com* CIRCLE 130

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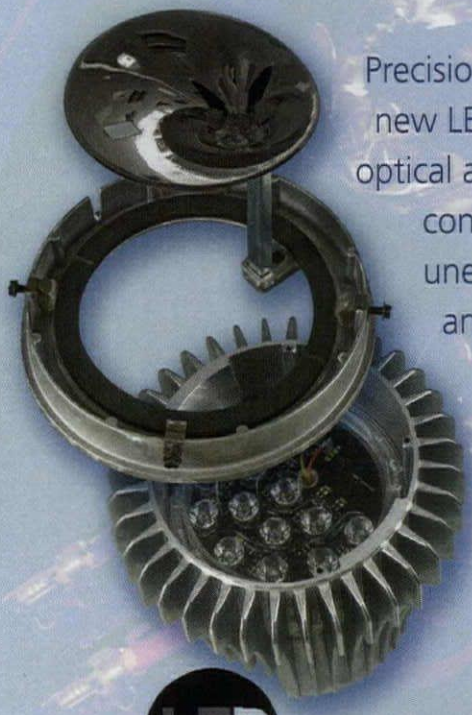

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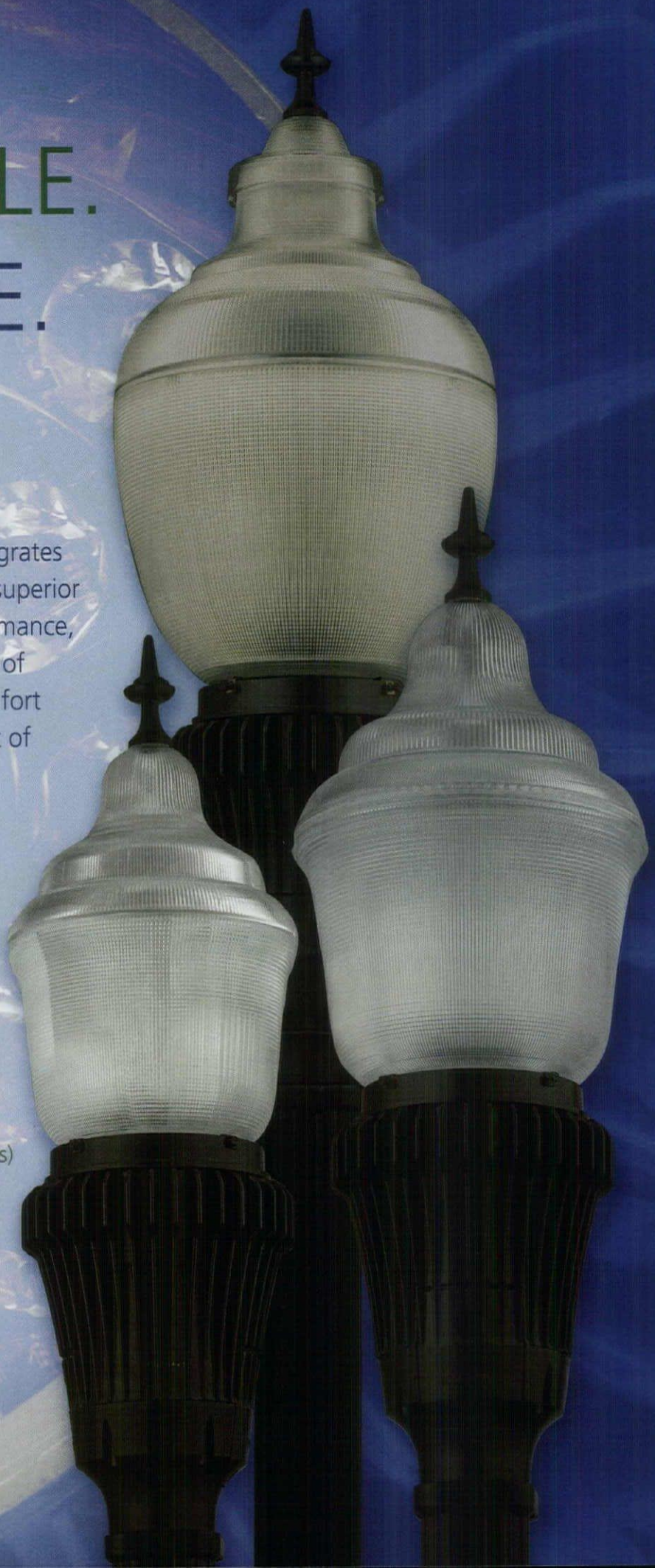

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House Lights

LIGHTING HELPS DALLAS' WYLY THEATRE TAKE CENTER STAGE

The Dee and Charles Wyly Theatre creates a bold architectural statement for the Dallas Arts District, a complex of performance venues connected by outdoor public spaces. Exterior lighting for the new theater is kept to a minimum. The façade relies on architectural and lighting gestures to project a glow from within. The plaza adjacent to the building is accented with illuminated strips in the sidewalks and pavement, and the trees are highlighted with recessed inground uplights.

COURTESY OF AT&T PERFORMING ARTS CENTER, PHOTO: IWAN BAAN

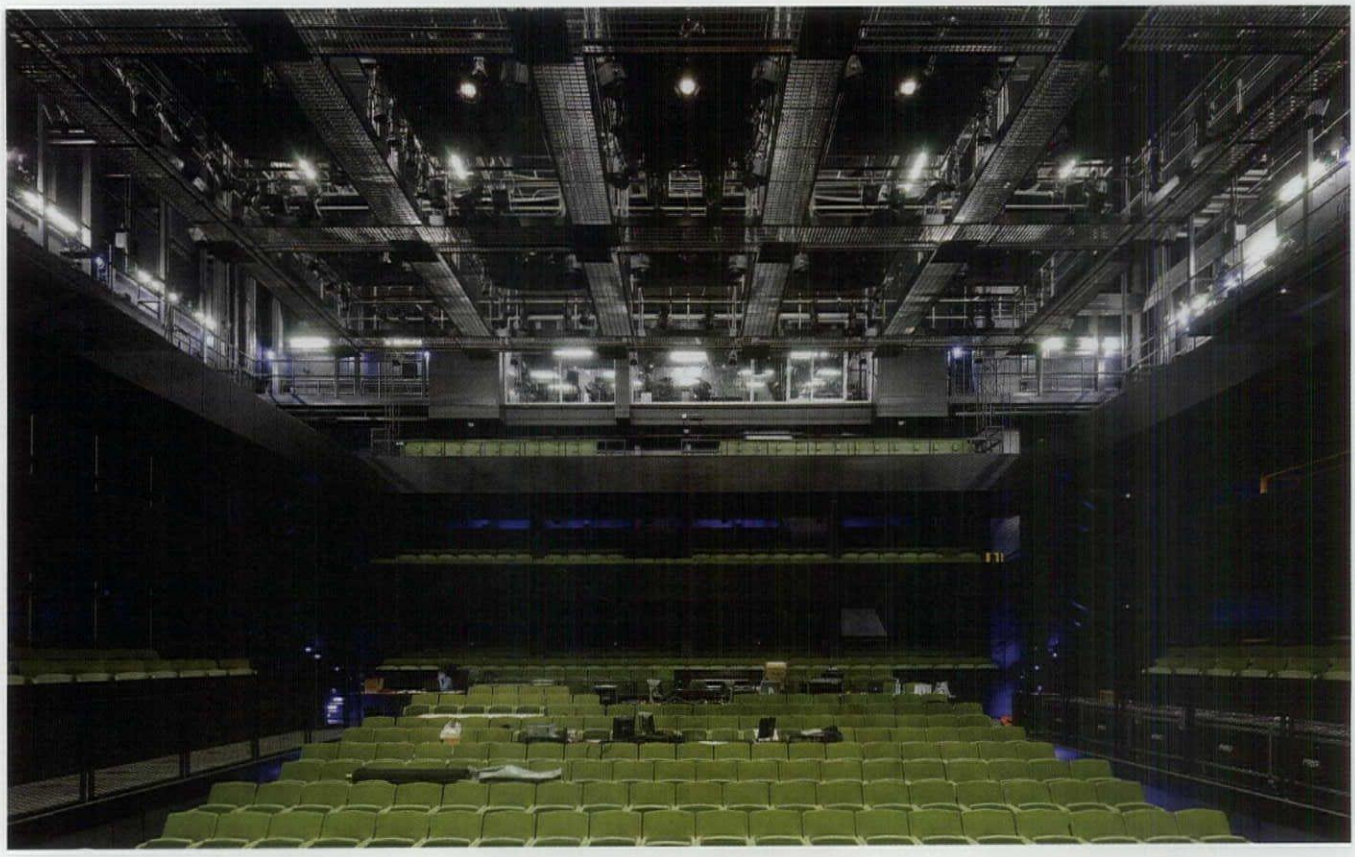
The Dee and Charles Wyly Theatre looks like a moon lander in the middle of the Dallas Arts District, a shimmering aluminum cube in a brick and limestone world, at once coolly remote and eerily seductive. For architects Rem Koolhaas and Joshua Prince-Ramus, the Wyly was an opportunity to reinvent the contemporary theater by combining ultimate spatial flexibility with maximum mechanical ingenuity. Whereas conventional theaters usually flow horizontally, with the stage in the middle and support spaces to the sides, the Wyly rises nine stories with the lobby below grade, the stage at street level, and offices, rehearsal studios, and a costume shop stacked on top in another version of Koolhaas' "vertical city."

"Going up allowed us to free the ground plane so that control of how the play is seen or changed passes to the director instead of the building," explains principal-in-charge Joshua Prince-Ramus, who previously headed OMA's New York office before starting his own firm, REX.

The interiors are uniformly raw and industrial: gray concrete walls, sleek aluminum canopies, chain link that feels like fabric on the staircase walls, all surrounded by pulleys, winches, ladders, and catwalks that you'd expect to find in an engine room. Seats and sets fly up into the ceiling at the touch of a button; the stage can be reconfigured from proscenium to thrust to flat floor in a matter of hours, dramatically reducing labor and production costs. Perhaps the only precedent for such mechanical pizzazz is Bauhaus founder Walter Gropius' 1927 design for a "Total Theater," but it wasn't built, allowing the Wyly to corner the performing machine market.

A centerpiece of Dallas' $355 million AT&T Performing Arts Center—a complex of two performance venues—the Wyly is supported by massive steel and concrete X braces that are sheathed in slender aluminum tubes reminiscent of a rippling theater curtain. Lighting designer Suzan Tillotson inserted simple MR16 lamps in the tubes to create pools of light around the base of the building, "enhancing its mystery without going overboard."

More challenging was finding ways to pull audiences into the Wyly's sunken lobby, then up elevators and staircases to the Potter Rose Performance Hall, without making them feel like they'd wandered into the house that Jack built. Tillotson's solution is a grid of slender fluorescent tubes in the lobby ceiling that extends up a narrow staircase to the stage. The tubes read as minimalist extrusions, like the exterior aluminum tubes, thus complementing the spare industrial look of the rest of the building. "Those tough interiors forced us not to get fussy or precious," Tillotson explains.



The lighting complements the architecture's industrial aesthetic. In the 600-seat performance hall (top), lighting designer Suzan Tillotson celebrates the space's functionality, highlighting the network of catwalks above. In the lobby (above left), a custom grid of thin fluorescent tubes takes on its own sculptural qualities. In the costume shop (above right), circular fluorescent tubes add whimsy to the space.

In the 600-seat performance hall Tillotson chose to light the audience and make the architecture disappear, not that there was much to deal with. Decorative blackout curtains had already been cut for budget reasons, leaving only balcony fascias and a warren of pulleys and platforms overhead. For the audience she designed custom LED lights on the sidewalls to help people read their programs and find their seats.

The program for the rest of the building was bare bones and the lighting follows suit: Fluorescent sources for workspaces, halogen lamps for highlighting. No fancy fixtures or clever special effects, not that Tillotson stopped lobbying for them. Her early drawings of the ninth floor rehearsal space, for example, show richly textured and painted walls with 2- to 4-foot-diameter acrylic balls suspended from the ceiling. But for budget reasons the walls ended up as painted gypsum board and the globes became ordinary PAR lamps in recessed sockets. "Layers kept getting peeled off until we were down to concrete and plywood, period," she recalls.

Yet while a few of what she calls "glamour touches" might have produced a livelier and more engaging theater, the Wyly is ultimately a working building, a "machine for performing in," in Corbusian terms, that doesn't need potentially dated flourishes.

Far more problematic is the sharp break between the Wyly plaza and the grander Sammons Park in front of the Margot and Bill Winspear Opera House across the street. The arts center master plan shows the two as visually and metaphorically linked, the pools and greenery of one carrying across Flora Street to the Wyly. In Tillotson's

TOP AND BOTTOM RIGHT: COURTESY OF AT&T PERFORMING ARTS CENTER. PHOTO: IWAN BAAN; BOTTOM LEFT: IWAN BAAN

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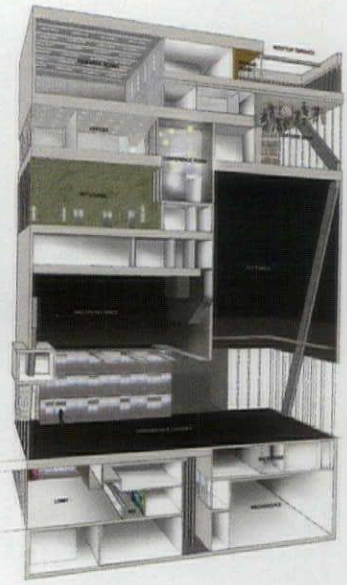

Budget restrictions meant creative lighting solutions. An early presentation drawing for the ninth floor rehearsal space (above) shows richly textured walls and a series of repetitive acrylic ball-shaped luminaires, which were eventually changed to PAR lamps in recessed sockets. Stacked like a vertical city, a section through the building (right) shows how the back-of-house spaces connect to the performance hall.

early sketches, the Wyly lobby extends out to the street as a bed of light, including thin illuminated strips in sidewalks and pavement.

Those remain but most everything else was eliminated, including water features and decorative lighting on the plaza floor. The city of Dallas compounded the problem by insisting that the tall and intensely bright street lamps remain in front of the building, effectively killing the glow from the lobby. "Those things really tied our hands," Tillotson says. "The whole plaza area got diluted to the point that you can't see it as one whole thing."

That said, critical reaction to the Wyly has been largely positive. The theatrical machinery has worked nearly flawlessly; the audience experience, except for poor sight lines on the side balconies, has been excellent. Artistic director Kevin Moriarty says that the Wyly has exceeded expectations, with the caveat that it is an experiment that must be tested and retested over the next few years.

Most of the testing will take place inside, on the stage. Outside, the Wyly is what it is, a shimmering silver cube that absorbs the ambient light around it and, like theater itself, transforms it into something exciting and occasionally magical. **DAVID DILLON**

David Dillon was the architecture critic for the Dallas Morning News *for 20 years and now teaches in the architecture school at the University of Massachusetts Amherst.*

LEFT: COURTESY TILLOTSON LIGHTING DESIGN; RIGHT: COURTESY OF AT&T PERFORMING ARTS CENTER

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Lamp Legislation

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MATT WOOD

Light bulbs, or lamps as they are known in lighting parlance, are seemingly simple objects, but the issues associated with them are not. In fact, their energy use and environmental impact encompass some of the most complex discussions under way in the field of lighting. Dictating these conversations are an intricate set of legislative mandates, at both the federal and state level, that are setting the course for lighting today—and tomorrow.

What Are the Rules?

There are several key pieces of legislation currently impacting lamps and, in turn, the types of luminaries we will be able to use in the future. At the federal level, there is the Energy Independence and Security Act of 2007 and the 2009 Department of Energy (DOE) Lamp Rulemaking on incandescent reflector and general-service fluorescent lamps. These two pieces of legislation are game changers in discussions about energy usage; they lay the groundwork for the key issues with which the industry is dealing. The most notable issue is the phasing out of the incandescent A-lamp. As of July 14, 2012, this type of light bulb will no longer be allowed to be sold commercially in the United States. Europe is ahead of the U.S. when it comes to this process, as incandescent light bulbs were pulled from store shelves there in July 2009.

Fifteen states and the District of Columbia have some form of lamp legislation on their books. One of these is California Assembly Bill 1109 (AB 1109), which is having a significant impact on energy and environmental issues. It went into effect on Jan. 1 and is groundbreaking—according to Pamela Horner, director of government regulatory and industry relations for Osram Sylvania and chairwoman of the National Electrical Manufacturers Association's (NEMA) Lamp Committee—as the bill outlines target reductions in energy use by 2018. Using levels of energy consumption from 2007 as the baseline from which to target these reductions, the bill sets a 10-year period in which to reduce residential lighting energy use by 50 percent, outdoor lighting by 25 percent, and interior and commercial lighting by 25 percent.

The question on everyone's mind is: "Is this doable?" Simply installing a few compact fluorescent light bulbs will not be enough, and the legislation acknowledges that building codes and appliance regulations, along with controls and education, will be needed to achieve these goals. California's Title 24 also can help, and there are talks under way, spearheaded by Southern California Edison, to upgrade Title 24 with stricter provisions to attain the required energy savings.

AB 1109 also addresses two important environmental issues: toxic content

reduction and lamp recycling. The bill stipulates that mercury levels in fluorescent lamps and lead levels in incandescent lamps cannot exceed a maximum allowable rate. The component of the bill that covers recycling has not yet been implemented and the bill is the first time that an individual state has tracked a lamp standard from the European Union and used this as a baseline, with modifications for the United States.

When it comes to legislation concerning recycling, the state leading the way is Maine. In June 2009, the state implemented LD 973: "An Act to Provide for the Safe Collection and Recycling of Mercury-containing Lighting." This legislation requires lamp manufacturers to share the cost and responsibility of recycling mercury-containing light bulbs. Other states are closely following the success of Maine's initiative to determine whether they should adopt a similar policy.

While none of these legislative acts make any distinction between residential and commercial use, it is clear that residential lighting is most greatly impacted by the A-lamp legislation. Fluorescent sources, on the other hand, are under the most scrutiny when it comes to commercial lighting. In fact, a recent rulemaking that concerns fluorescent ballasts, meant to complement the 2009 lamp rulemaking, further accelerates the phase out of T12 lamps and ballasts in favor of T8 or T5 fluorescent lighting systems. This targets existing installations, since T12s are not found in new construction. As of July 1, the magnetic ballasts most commonly used for the operation of 4-foot T12 lamps will no longer be produced for commercial and industrial applications.

Who's in Charge?

There is only one regulatory body that has the final word when it comes to lamp legislation: the DOE. This is the agency of record for every rulemaking. That being said, there are other entities that have a certain level of influence.

For example, some have wondered how the Energy Star program fits into these issues of governance.

There are two arms of the Energy Star program, one through the Environmental Protection Agency and one through the DOE. The program is held in very high regard, but it varies by lighting product. For example, when it comes to compact fluorescents, the Energy Star program has become so effective—you don't see a non-Energy Star fluorescent lamp—that it has become the de facto standard. However, while in the past the Energy Star program has had its greatest impact on residential luminaries and lighting products, the DOE has been charged with overseeing all things related to solid-state lighting (SSL), including technical support and the establishment of metrics.

There are several other stakeholders that have an active voice in these lamp legislation discussions, even though they do not have any formal rulemaking authority. Most visibly, there are the lamp manufacturers themselves—Osram Sylvania, General Electric, and Philips generally being acknowledged as the "big three" lamp companies. However, when you look at certain types of lamps, there are other companies, such as Technical Consumer Products when discussing compact fluorescents, who are major players. When it comes to metal halide sources, Venture Lighting is an example of a notable lamp manufacturer.

NEMA also participates in pertinent lamp discussions through its member companies and six sections—controls, luminaries, ballasts, lamps, SSL, and emergency. However, since NEMA is a trade association, governed by federal law, it cannot talk about market share, pricing, or warranties. Because of this, it is difficult to assign concrete revenue numbers to the lamp industry.

At the state level, other entities are players, such as the California Energy Commission and the New York State Energy Research and Development Authority. These groups have significant influence on energy policy and they work collaboratively with the various stakeholders. On an issue specific to their area of expertise, an organization such as the Dark Sky Association or a utility company such as Con Edison or Pacific Gas and Electric might get involved. Nongovernmental organizations such as the Institute of Electrical and Electronics Engineers or the National Resources Defense Council also play a role in the debate.

Finally, the lighting design community has been vocal about lamp legislation, particularly when it comes to the incandescent phase-out. The International Association of Lighting Designers issued a position statement on the subject in March 2008, saying that while the association "supports the development and use of technologies, methods, and appropriate regulation to minimize the energy use of lighting systems, we believe that 'incandescent bans' must be carefully conceived or they are likely to be ineffective." The Professional Lighting Designers' Association has issued its own position statement supporting energy efficiency, but it also is concerned that incandescent "bans" are not the most effective means to achieving this objective.

What Are the Next Steps?

Perhaps the most important step to be taken when it comes to lamp legislation is in education. The Environmental Protection Agency's lamp labeling program is an important step, providing consumers with more information. Revisions to the labeling format will be released this summer. But surveys have found that 50 percent to 70 percent of the general public is not aware of the impending incandescent phase out in 2012, according to Kyle Pitsor, vice president of government relations for NEMA. The Energy Independence and Security Act of 2007 stipulates that a national consumer education campaign needs to be established. No launch date for the campaign has been set, and Pitsor believes it will not occur until the July 2012 deadline is in sight.

Whether it happens at the consumer or the professional level, purchasing lamps has become a complicated endeavor as individuals try to balance the demands of energy efficiency with lighting quality. Current regulations steer us toward a greener future, but this doesn't mean it will be easy. The lighting industry must stay vigilant to make sure legislative initiatives represent long-term solutions. **ELIZABETH DONOFF**

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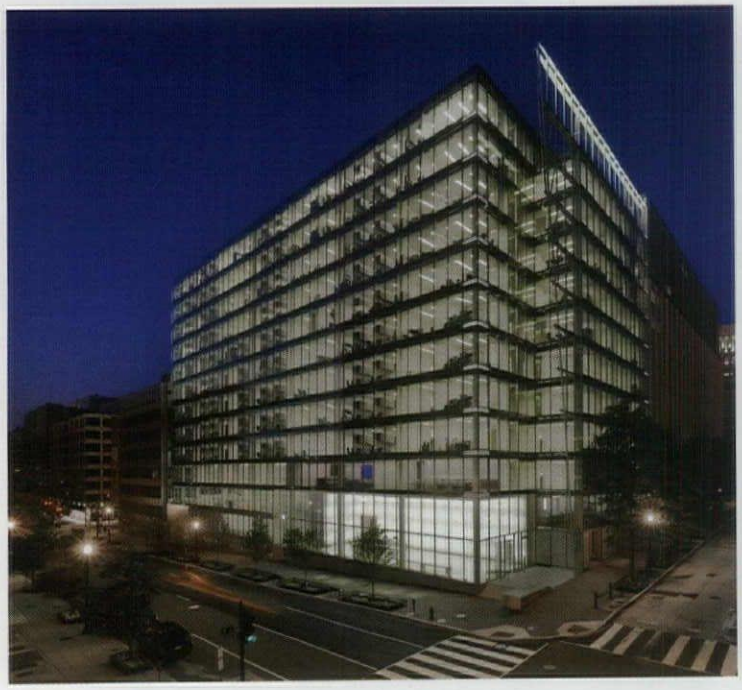
Project Size 318,057 square feet (gross area); 3,150 square feet (lobby) **Project Cost** $54.6 million **Manufacturers** Bartco; iLight; Lighting Science Group; Lutron; and Philips Color Kinetics



A sophisticated addition to Washington, D.C.'s K Street corridor of office buildings, the new 12-story structure at the corner of 20th and K streets stakes its claim with a luminous architectural presence (left). The lobby's signature feature is a backlit glass-panel wall that transforms into the ceiling, richly textured thanks to diffusion and art film, and fluorescent and LED sources (right).

Located in Washington, D.C.'s business corridor along K Street Northwest, a 12-story structure designed by architect Helmut Jahn sits luminous and sophisticated. Completed in September 2009 and designed to attain LEED Silver certification, the single-tenant building is a fresh, contemporary addition to the city's skyline with floor-to-ceiling glazing and a green roof.

To highlight the building's entrance on the northeast corner of 20th and K streets, the client (developer Vornado/Charles E. Smith) and the architect enlisted French artist Yann Kersalé to create an original lighting concept for the entrance lobby. Conceived as full-height art-glass panels illuminating the walls and ceiling of the double-height atrium, the team brought on St. Louis–based Randy Burkett Lighting Design to devise the lighting solution to backlight the panels.

Since the luminous wall and ceiling are the principal sources of light in the lobby (in addition to the vast amount of daylight), the designers wanted the solution for the electric lighting both to backlight the glass panels uniformly and animate the surfaces with subtle shifts of light. Two mock-ups were constructed in order to test this strategy. The first employed a single 5-foot-by-5-foot panel to test the effects of different light sources, color temperatures, and the position, from the structural support frame, of the low-E glass panels laminated with diffusion and art film. This resulted in a lighting solution that was less uniform than expected, so the team built a full-scale mock-up to "fully study and explore the nuances of the final result," Burkett says.

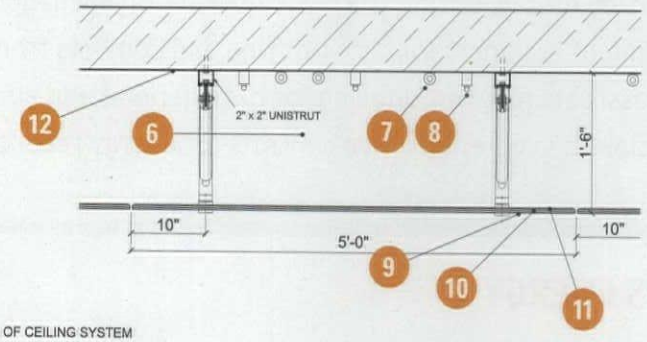
The second mock-up consisted of six full-scale laminated glass panels on the wall and another six panels to create the ceiling. Since the proposed solution included both linear fluorescent lamps and dynamic RGB LED strips, this mock-up helped to determine the spacing required for both lighting systems. The fluorescents are used for even illumination, while the LED strips are laid out in a more random pattern to create moments of visual interest.

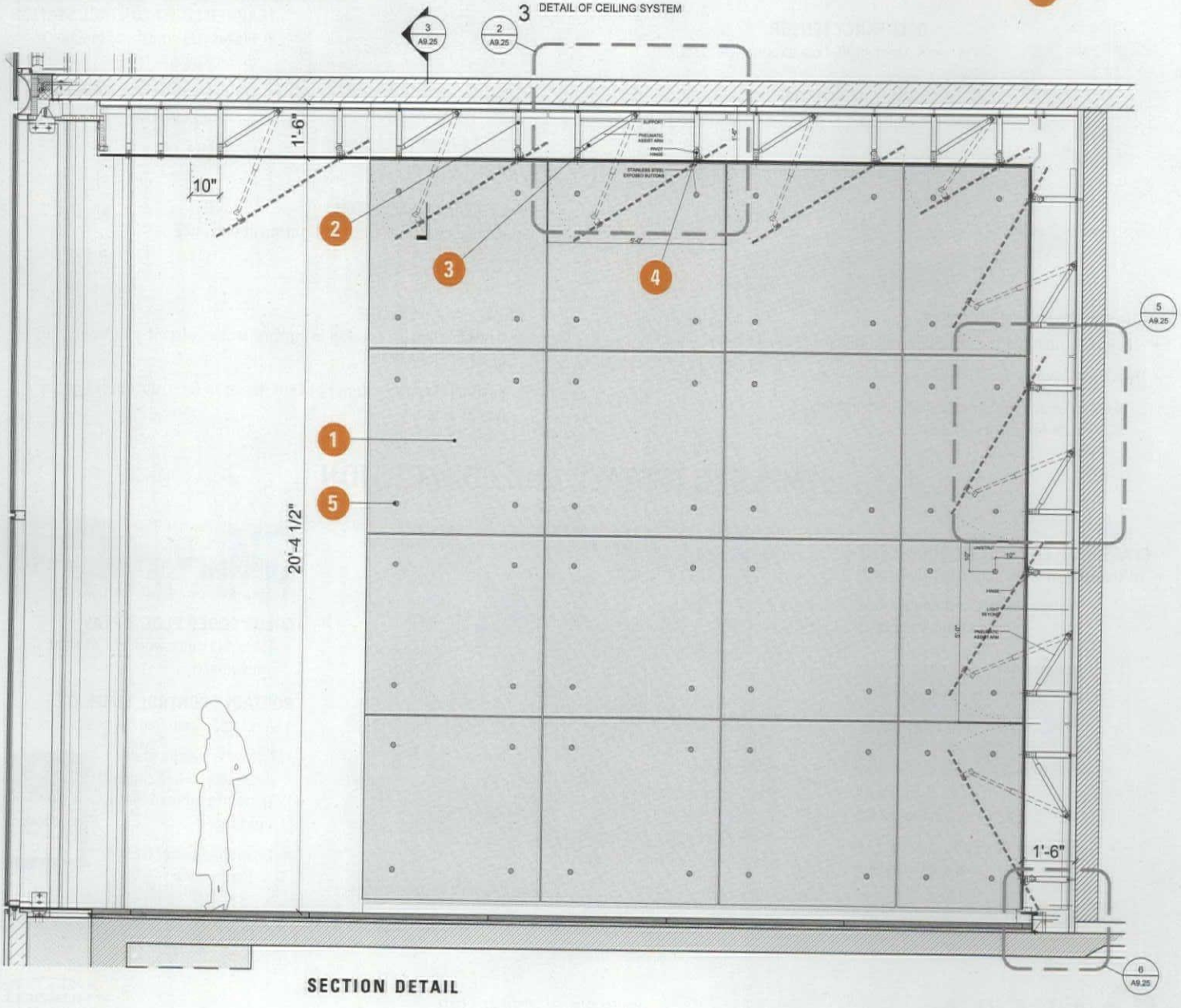
The larger mock-up also helped the designers assess the pattern of art film and its interaction with the electric light. The lighting, programmed to reveal multiple artistic scenes throughout the day, causes the film to appear to shift from green to blue. The final effect is a dynamic entrance that reveals an organic emergence of color and pattern. "The life of the lobby is reflected in the art and light behind," says Randy Burkett. "It is a living lobby." Through the collaborative efforts of the design team this new building, including its illuminated lobby, creates a distinctive presence on K Street. **JENNIFER BICKFORD**

RAINER VIERTLBÖCK

A full-scale mock-up (left) was constructed to test the placement of the lighting—linear fluorescents and RGB LED strips—used to backlight the laminated glass panels of the lobby's walls and ceiling. As seen in the section details below, careful attention was paid to the assembly of lights sources, glass, and art film to create an even but nuanced illumination.

1. 5-FOOT-BY-5-FOOT LAMINATED GLASS PANEL
2. STRUCTURAL SUPPORT
3. PNEUMATIC ARM ASSIST ARM FOR LAMP ACCESS
4. PIVOT HINGE
5. EXPOSED STAINLESS STEEL BUTTONS
6. 18-INCH SPACE BETWEEN GLASS AND WALL
7. 6-INCH DYNAMIC RGB LIGHT STRIP, TYP.
8. 4-FOOT LINEAR FLUORESCENT LIGHTSTRIP, TYP.
9. 1/2-INCH LOW-E LAMINATED GLASS PANEL
10. COLOR FILM BY ARTIST ADHERED TO BACKSIDE OF GLASS
11. 1/8-INCH FROSTED ACRYLIC SHEET ADHERED TO BACK OF COLOR FILM
12. MATTE WHITE FINISH





SECTION DETAIL

TOP LEFT: RANDY BURKETT LIGHTING DESIGN; DRAWINGS COURTESY MURPHY/JAHN AND VORNADO/CHARLES E. SMITH

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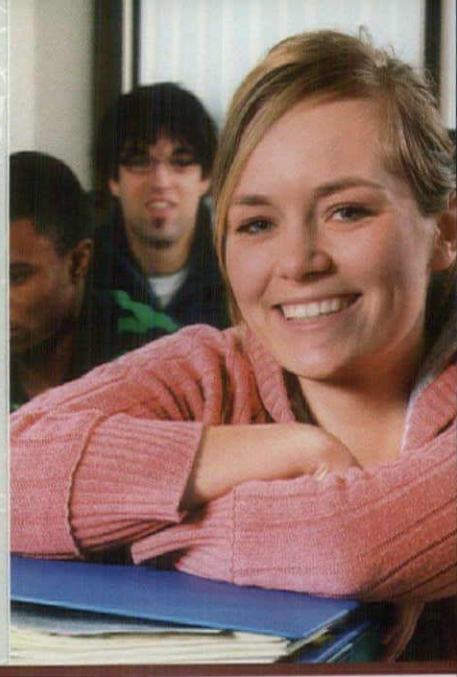

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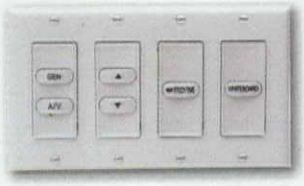

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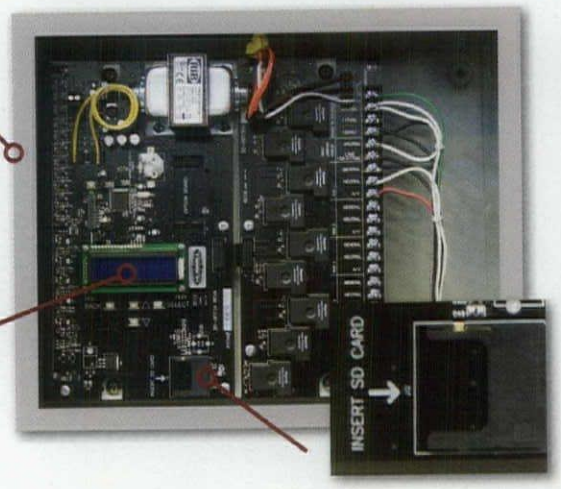

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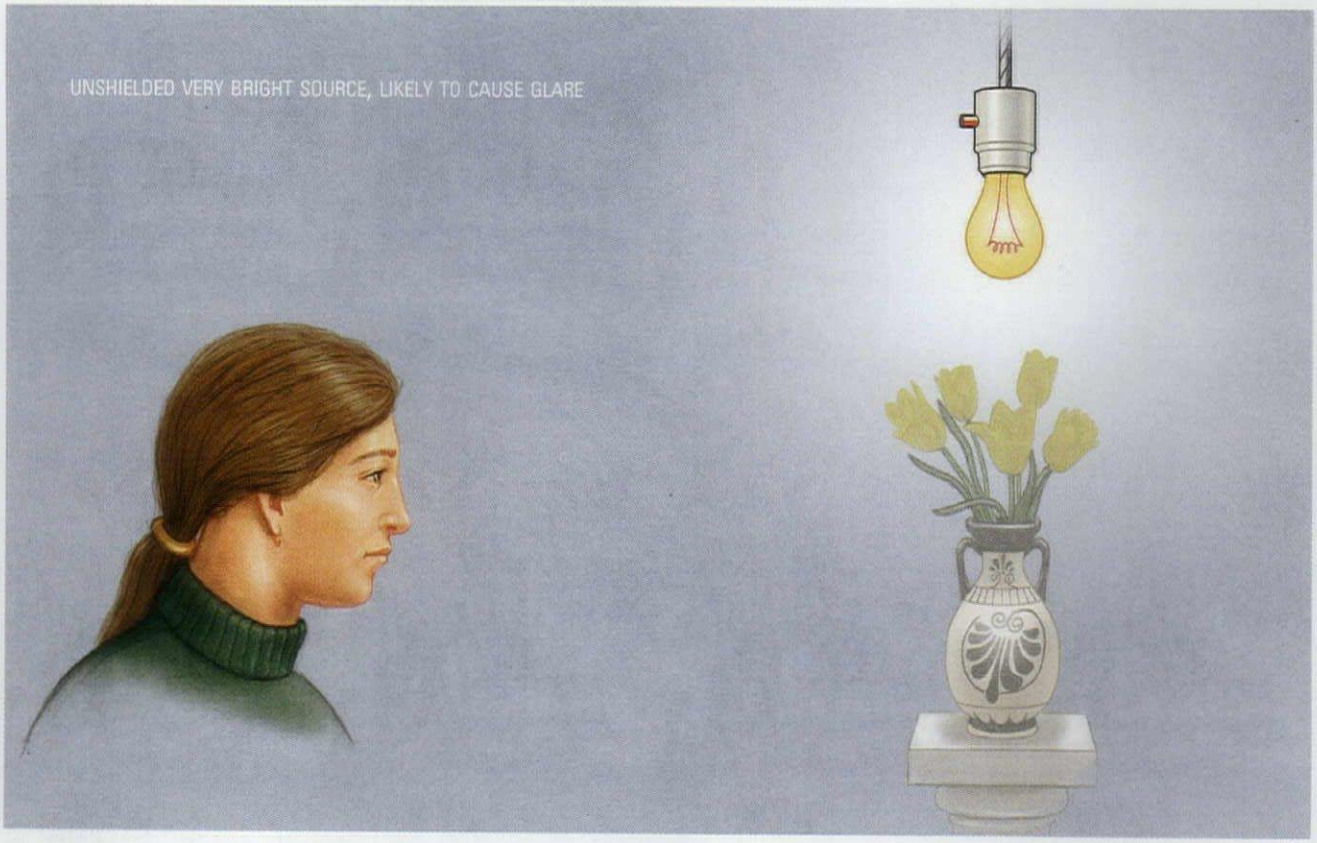


JOHN HARTMAN

Controlling Glare

DECIPHERING THIS TECHNICAL CONDITION TO CREATE RESPONSIVE LIGHTING SOLUTIONS

Glare is a fact of life. All of us certainly know it when we see it. But believe it or not, glare is not so easy to define in technical terms. Several measurement systems, such as visual comfort probability (VCP) and unified glare rating, have been developed, but none has gained universal support from the lighting community. For the time being, most designers use a combination of one or more of the glare metrics, plus their own subjective assessment and common sense to address glare in lighting and daylighting design.

At present, the Illuminating Engineering Society (IES) defines glare as one of two conditions:

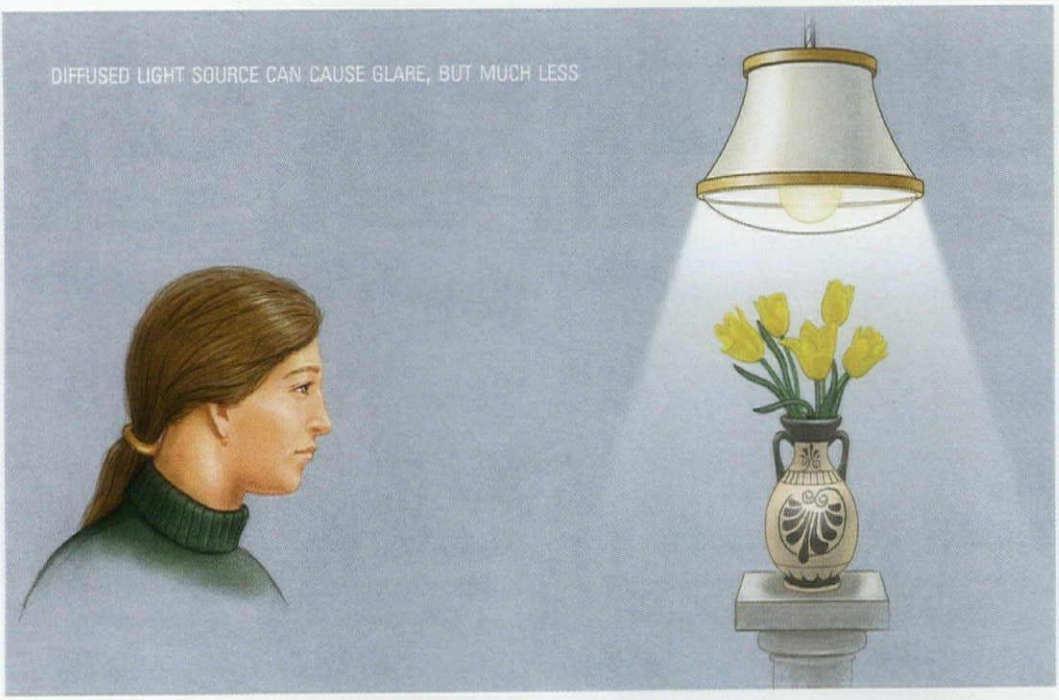
- Too much light
- Excessive contrast, meaning the range of luminance in the field of view is too great

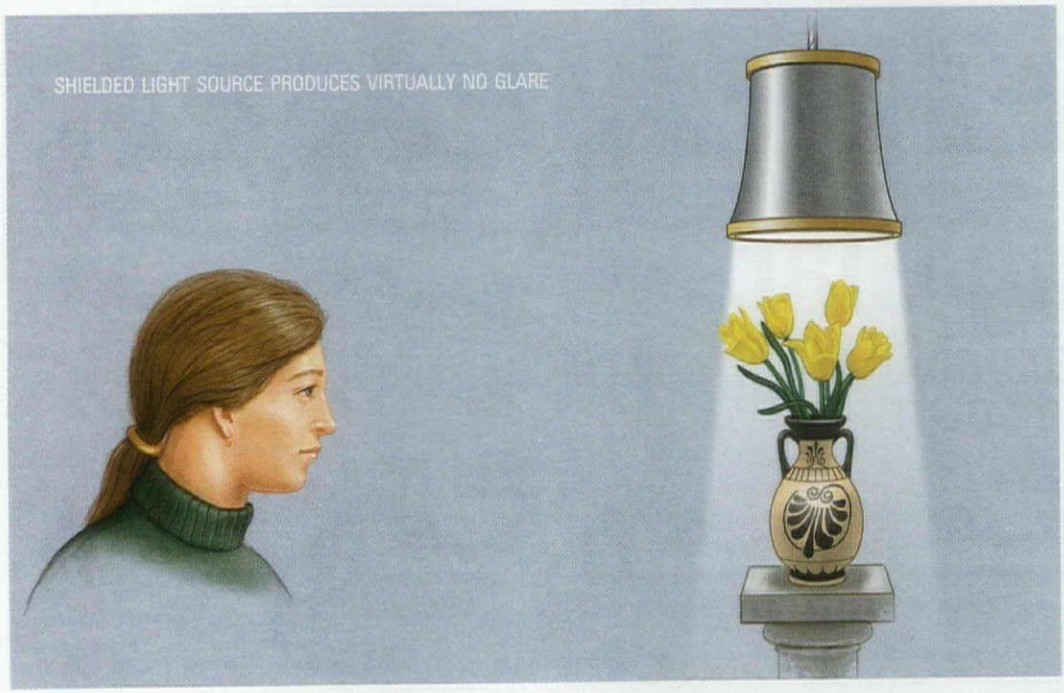
Whether designing lighting or daylighting, the principal objective is to ensure that there is the right amount of light with appropriate limits to glare. Because glare is physiological and can cause intense physical response, there are occasions when glare is wanted, such as scanning a concert audience with a spotlight to heighten the excitement. In architecture, glare is desirable when a designer wants to cause extreme contrast that exhilarates the visual experience. But for most architectural lighting and daylighting, effective methods of glare control and prevention are essential to good lighting practices.

To better understand glare, it is important to consider that the human eye adapts to the average luminance of a visual scene. The eye's range is amazing, perceiving scenes with light levels of less than .01 lux (which equates to starlight) to more than 100,000 lux (the equivalent of a sunny day). But the eye can only adapt to a part of this range at one time, and it takes a few moments for the eye to adapt, such as when you enter a movie theater on a sunny day. When you first enter the theater, you are temporarily blinded because your eyes are adapted to daylight; but when you leave the theater, even the reflected outdoor daylight is temporarily glaring. In other words, your susceptibility to glare is a direct function of adaptation: The darker the scene to which you are adapted, the more likely you are to experience glare from a light source.

In practice, glare is almost always a situation where a source of unshielded light is at least 1,000 times brighter than the average visual field. For instance, since the night sky is dark, almost all outdoor light sources, such as a street luminaire or automobile headlight, cause glare. To evaluate glare, however, light can't be measured in lux or footcandles—one must use luminance, which typically is measured in candelas per square meter (cd/m^2) or nits. It also is common, although not technically correct, to use the term brightness rather than luminance.

Good lighting design practice either diffuses the light to reduce the luminance or shields the source from view. The control of glare





JOHN HARTMAN

in electric lighting is generally called shielding. For natural light, however, the term shading is used. While technically they are almost the same thing, the slight difference in language is welcome to help differentiate between lighting and daylighting.

CONTROLLING TOO MUCH LIGHT

Too much light from an electric lamp is not common. The brightest lamp we are likely to use is a 1000W high-intensity discharge or, perhaps, a high-wattage xenon arc lamp. It is hard to imagine that anyone would use these lamps without proper enclosures, optics, and shielding.

On the other hand, direct sunlight is, for most practical purposes, too much light—indoors or out. Regardless of the eye's ability to adapt to brightness levels, one cannot look directly at the sun without risking retinal damage. The sun's brightness must be mitigated by some type of shading device. In humans and other mammals, the shape of eye socket and eyebrow provides shading during the brightest part of the day. At low solar angles, the pain of too much light causes physical aversion and one must turn away or shield his or her eyes. Outdoors, the use of sunglasses and billed hats is strongly recommended for both comfort and to prevent long-term damage to the eyes. For instance, those who wear glasses or contacts have fewer cataracts and other aging eye issues because of the ultraviolet protection of corrective lenses.

In buildings, too much natural light is almost always manageable. The simplest roof provides shade during the brightest period of the day. Without direct sunlight, the diffuse light of the lower sky near the horizon, in combination with reflected light from the ground plane and vertical surfaces, produces adequate light. However, in the early morning and late afternoon, direct sunlight does penetrate into the structure. Shading, therefore, is needed to control glare.

CONTROLLING TOO MUCH RANGE OF LUMINANCE

In electric lighting, a lot has been said over the years about the importance of maintaining "balance of luminance." In recent years, the IES' office lighting recommendations and manufacturers' literature have promoted the concept of balanced luminance in which room surfaces should be no more than 10 times brighter than the task nor less than one-tenth of the task. Assuming that the average luminance of a computer screen is about 100 cd/m^2, this means that the brightest surface of the room should be 1,000 cd/m^2 or less, and the darkest should be 10 cd/m^2 or greater.

But if the sunlight on the floor near the window is 10,000 cd/m^2, is that OK? I suggest that maybe it is and maybe it isn't, depending on whether the work being done in the space and the overall intent of the design is harmed in some way by the extremes in condition. After all, contrast is drama. While I would hate to have an overly dramatic workspace, I often create borderline-excessive contrast to draw attention to certain aspects of the architecture and to appeal to people's visual interest, especially for retail and other dramatic types of spaces.

When it comes to daylighting, the extreme contrast of sunlight to the luminance of interior surfaces (whether by natural or electric light) mandates shading. This is not a new issue: throughout history, mankind has learned to shade interiors from direct sun, devising a number of exterior solutions, such as awnings and overhangs, and interior solutions ranging from curtains and sheers to blinds, louvers, and roller shades. Because the sun moves while the structure remains stationary, almost all static shading systems are imperfect. These work well during certain seasons or during certain hours of

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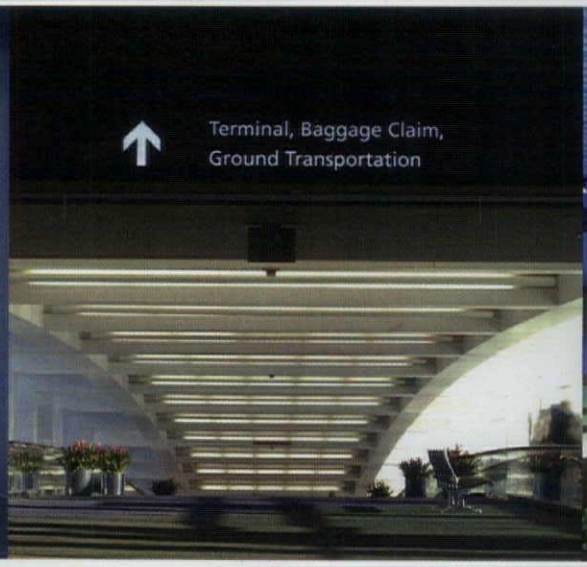

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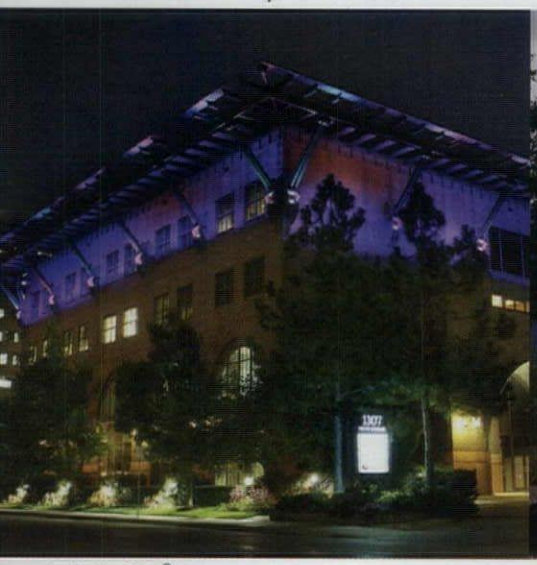

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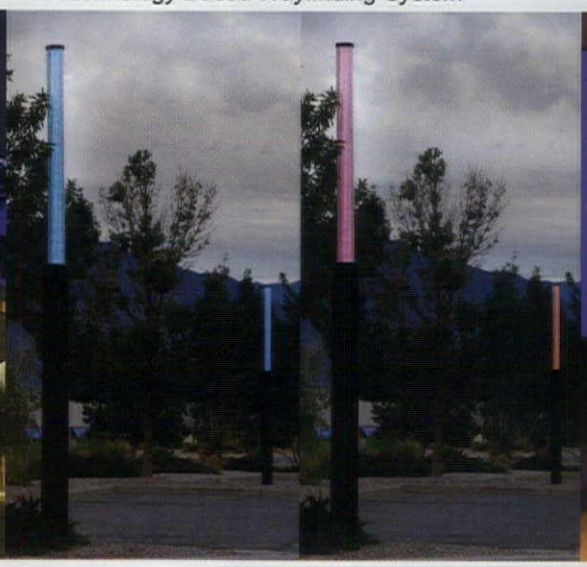

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the day, but they are ineffective during others. Moreover, on cloudy days the shade often is undesirable in order to get enough light indoors. The need for dynamic shading has resulted in a number of clever solutions, from motorized exterior louvers to automated roller shades and blinds.

In the 20th century, improvements in window glass enabled the windows themselves to shade the interior by letting in a controlled amount of direct sunlight. Today, glass can be:

- Tinted to absorb a specific amount of light energy. (Note that the absorbed energy becomes heat and will cause the glass to expand, with the threat of cracking.)
- Treated with a reflective mirror-like coating, redirecting a portion of solar energy away from the building. Even if the building appears as a mirror, the reflection is not total and a controlled amount of light enters the space.
- Coated with a pattern of white reflective ceramic elements called frits. Frits allow some direct light penetration while reflecting unwanted light. Frits are not diffusers—they simply reduce the amount of light equal to the ratio of fritted to unfritted surface area.

All of these treatments allow windows to shade the interior space. Since they are static, they will produce darker interiors on darker days. But this often is a good solution, especially for multistory buildings with relatively large areas of glass, as the treatments reduce excessive light and heat gain.

Many projects today employ perforated roller shades as a primary means of glare control. The percentage of openness—meaning the density of the weave of the shading material—determines the amount of light penetration and is a function of the visible light transmission of the glass. For instance, from tests performed on the New York Times building, the highly transmittive glass (more than 70 percent) requires 1 percent to 2 percent openness before people find direct sunlight too glaring. If glass with half the transmission (35 percent to 40 percent) were used, the openness could be doubled.

These shades are used on the south, east, and west faces to control direct solar glare; shades on the north side of the structure can be far more open, if they're needed at all. I typically recommend 10 percent openness on the north façade to reduce the luminance (brightness) of the sky without cutting out all of the light. The best thing about roller shades is that they can be easily automated so that they can be raised to harvest as much daylight as possible on cloudy days.

SHADING AS DESIGN

Current daylighting design in the U.S. usually involves a combination of exterior, interior, and self-shading elements that alternate to play the roles of controlling direct sunlight, controlling solar gain, and controlling glare. In my daylighting practice, I work from the outside in to develop shading solutions. Exterior shading is studied first and is generally used to prevent direct overhead sun penetration during the cooling season; the shading of the glass is used to control the total light entering the space and to control sky brightness during most of the day; and the interior shading is used primarily for morning, afternoon, and winter daytime direct solar glare control. This is a relatively foolproof way to design shading for a building with good solar orientation.

In a current project in Chicago with complex interior lighting requirements and having east and west facing façades, my firm's design uses a combination of dark-tinted low-E glass, frits in a pattern to reduce solar glare and sky luminance, and motorized perforated roller shades to control the brightness when the sun is rising and setting. We developed calculations for both lighting performance and solar energy performance. A mock-up is being developed to test the theories against worker acceptance of the light levels. Because projects with complex luminance requirements are almost impossible to predict, this is a situation where the architect, lighting designer, and owner will know the right solution when they see it. **JAMES R. BENYA**

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DETAILS

Project Lighting Master Plan for the Grand Canal Hangzhou, China
Client City of Hangzhou, China
Lighting Design and Master Plan Concepto Studio, Agence de Conception Lumiere, Bagneux, France
Lighting Design and Technical Design Office in China Zhongtai Lighting Group, Hangzhou
Photographer Images courtesy Concepto Studio and Zhongtai Lighting Group
Project Size Grand Canal—10 kilometers (6.2 miles); Ying Yue nightscape area—300 meters (984 feet)
Manufacturers There is no specific manufacturer. All luminaires are custom-designed by Concepto Studio with the Zhongtai Lighting Group, who in turn coordinated with local suppliers to produce all the fittings and luminaires.

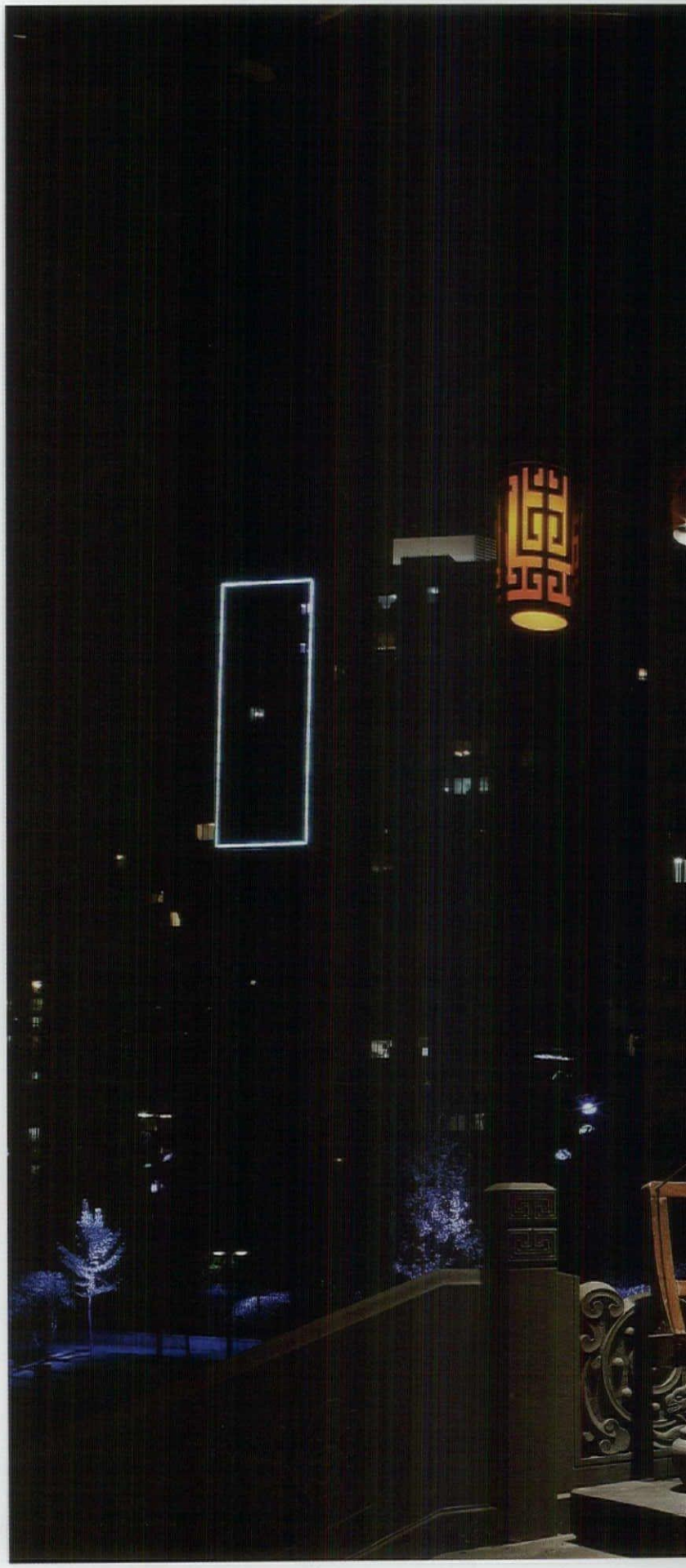
Aqua Vita

FRENCH DESIGN AND CHINESE INGENUITY SHEDS LIGHT ON HANGZHOU'S GRAND CANAL

To call the lighting master plan for Hangzhou, China's Grand Canal ambitious is to understate the project's accomplishments. The narrow site stretches for six miles, north to south, through the heart of the city. The municipal government wanted nothing less than to transform this South Eastern city known for its surrounding natural landscape into a world-class tourist destination on par with Paris or Las Vegas. What's more, the government laid down an abbreviated time schedule of only 12 months.

The process began in early 2008, when lighting designer Roger Narboni, founder of the Bagneux, France–based Concepto Studio, traveled to Hangzhou to meet with city officials and the local design team. Two months later his firm and the Zhongtai Lighting Group revealed a comprehensive master plan, followed by a mock-up of a 1,000-foot-long canal section running through the city center. Constructed at a pace unheard of by European or American counterparts, Zhongtai employed round-the-clock teams of engineers, contractors, designers, and technicians so the project could open in January 2009, only a year from design start to construction finish.

The Hangzhou government first imagined the canal's civic transformation in 2007. It wanted Chinese as well as foreign tourists to walk on the canal banks or to boat on the water, day or night. When Narboni first surveyed the site, however, he found crumbling banks and piecemeal lighting solutions for the bridges. Despite these infrastructural problems, his biggest challenge was cultural. "When I arrived there and I met Guoping Wang, governor [akin



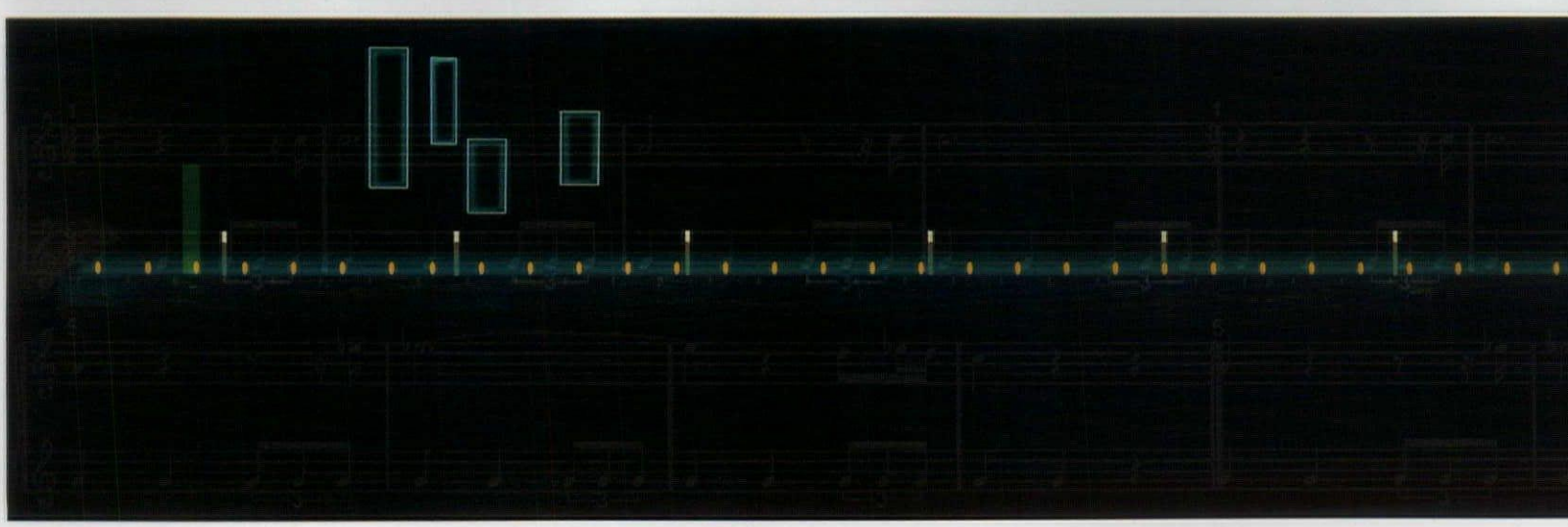
Past is connected to present in the lighting master plan for Hangzhou's Grand Canal. Both traditional Chinese and contemporary motifs are celebrated to create a lighting ambiance where people can enjoy the nightscape and a stroll along the canal.

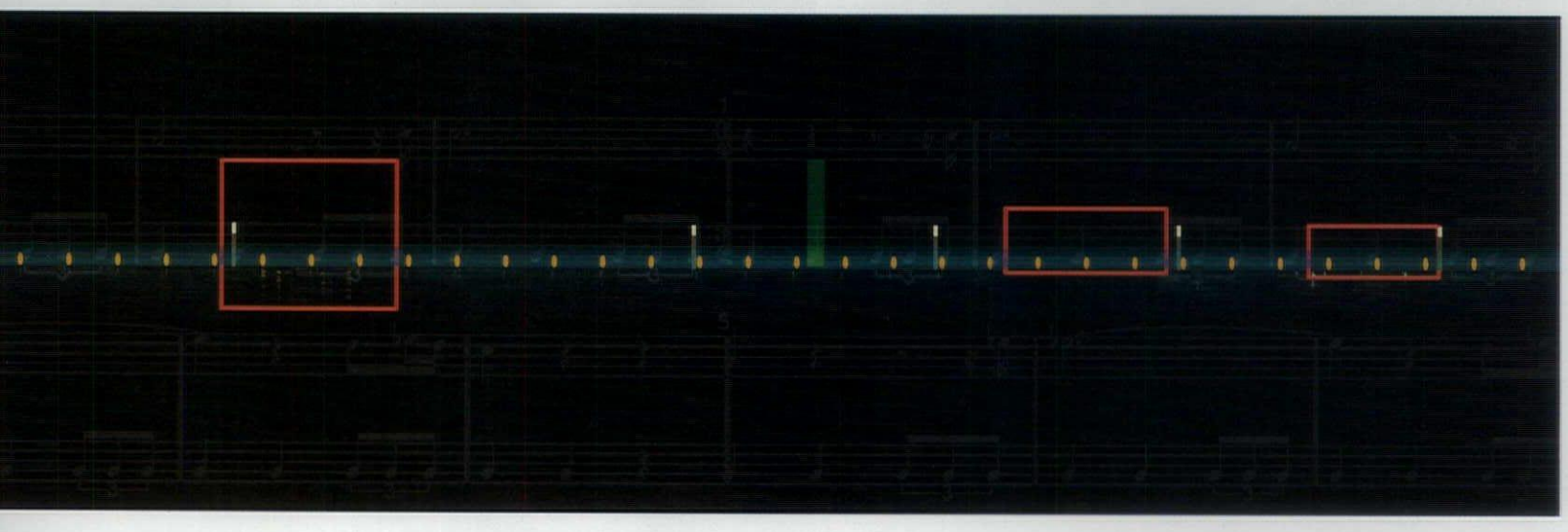
to the mayor] of the city, the first thing he said to me was that he was in love with everything in Las Vegas and Dubai," Narboni recalls. "I was shocked. This was so far away from my work. I routinely fight against dynamic effects and too many colors. But then I thought that maybe I could convince him that this was the wrong solution. Shanghai was already like Las Vegas and Dubai. Why should we do something that everyone else was doing?"

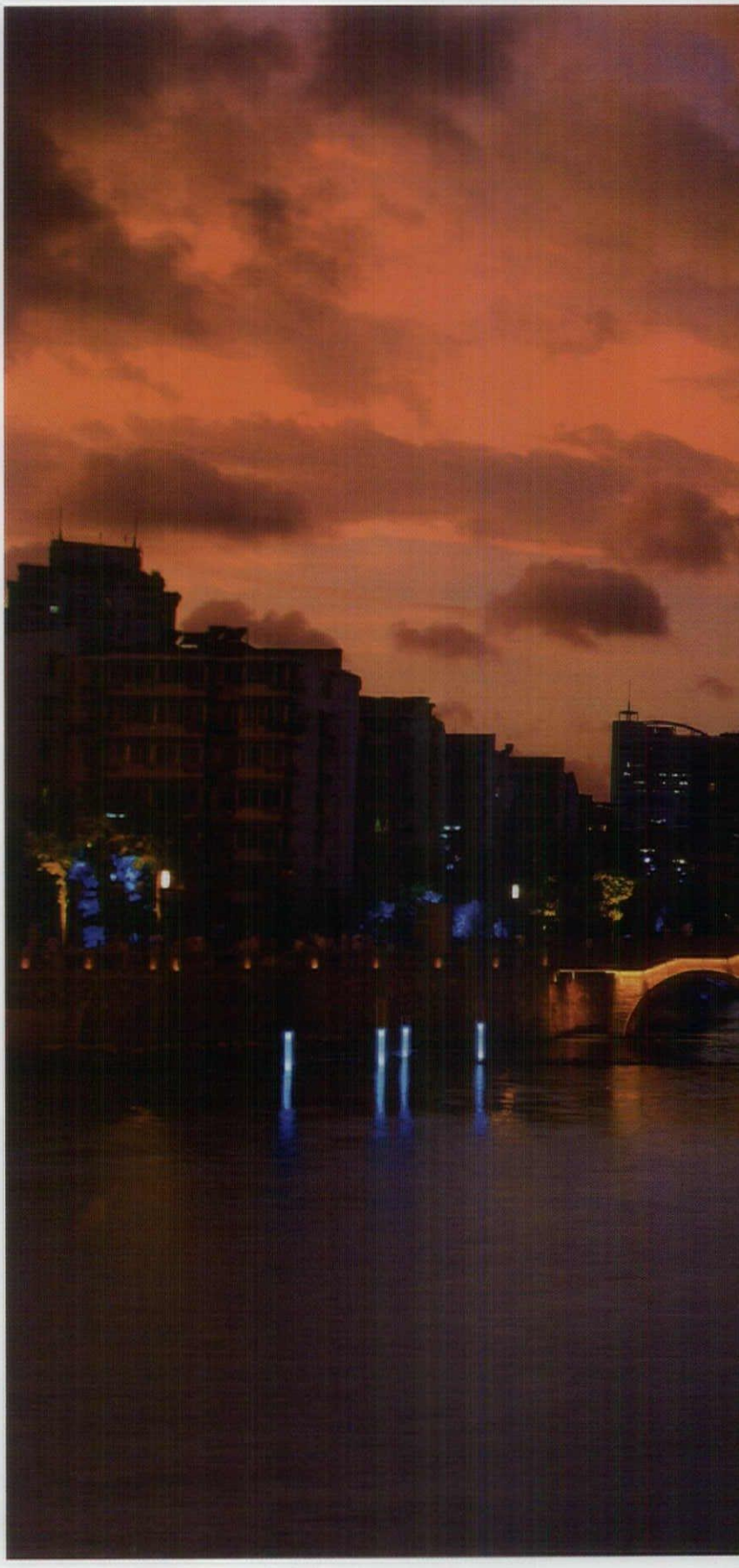
The Concepto Studio scheme calls attention to Hangzhou's identity as a water-oriented city—in addition to the canal, the metropolis boasts two large bodies of water, the Tang Qian River and the West Lake. To make Hangzhou an international destination, Narboni swapped spectacle for subtlety. The design illuminates the existing built environment: the canal landscape of promenades, historic buildings and pavilions, and bridges. Aqua-hued LEDs run along both banks of the entire channel. At night, green and blue LED projectors illuminate the fog that tends to rise from the water's surface. It's a color palette not common to Chinese custom, which trends to celebratory reds and yellows, but the effect is dynamic. Early in the evening the light moves like waves through the mist, then becomes still before shutting off for the night at midnight.

Although Narboni chose to use only blue and green LEDs, the coloration can change according to the seasons: ice blue in the winter and jade green in the summer. With references to Venice, luminous translucent poles called "Venetian masts" were installed directly in the water. Each cylindrical mast is equipped with 12 1W LEDs (six blue and six amber). As with much of the LED lighting on the Grand Canal, the poles are custom designed by Narboni, who worked with the local Zhongtai office so that they could coordinate directly with Chinese manufacturers.

The 6.2-mile-long Grand Canal stretches through the city, dotted with 20 bridges and 60 historic structures (below). Conceptualized like a symphony (bottom), the lighting accents the edges of the historic architecture (right) with traditionally inspired lanterns, while adding new elements such as luminous light masts in the water and light frames on façades (left).







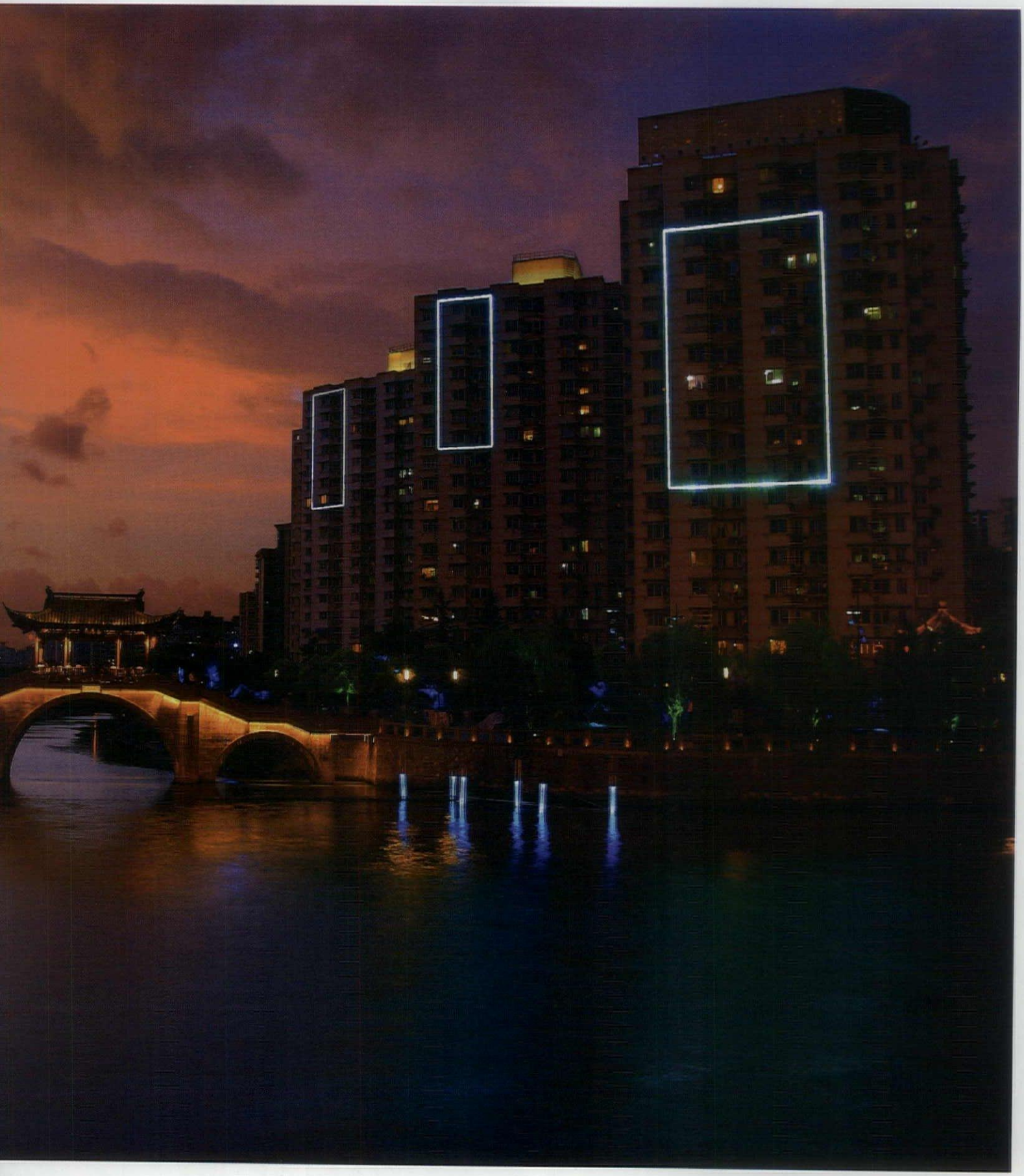
Departing from a traditional Chinese palette of reds and yellows, Narboni selected a color scheme of green and blue to create a luminous line of light that recalls the city's connection to the water (above). To soften the building edges of the housing blocks along the canal and visually connect them to the master plan, LED light frames are applied to the façades (right).

Before the new installation, the Grand Canal was almost invisible within the dense urban fabric of Hangzhou. Towering housing blocks encroached on the crumbling historic center. "The canal is 50 meters (164 feet) wide, but unless you were on the bank or a bridge, it was hard to see it," Narboni says. "Spatially, lighting on both sides gives the canal a sense of being a water line, a water street." Pedestrian and tree lighting along the promenade emphasize the canal route and create low-key public spaces. New custom-designed columns—also a collaboration between Narboni and the Zhongtai office, each made up of one 18W 3000K fluorescent lamp—create a staccato rhythm along the pathways. Here, previously multicolored recessed ground lights have been retrofitted with uniform warm-white 70W 3000K ceramic metal halide lamps. Along the balustrade railing, the existing in-ground fixtures were modified to support low-wattage LED lamps.

Historically, this water artery is intricately linked to Hangzhou's development and prosperity as a city, trafficking goods in and out of the region. The canal dates to 610 A.D., when it was constructed to connect Hangzhou to nearby Suzhou—the Song dynasty's 12th century diplomatic and cultural capital of Southern China. Over the centuries, the Grand Canal became linked with other Chinese waterways, and today the canal system runs as far north as Beijing, more than 1,000 miles away. To call attention to this legacy, Narboni installed "milestones" along the north bank. Equipped with LED lamps, these 36-foot-tall stainless steel poles mark out the distance to the Tang Qian River and to Beijing. Green LEDs display kilometers, while red LEDs read in Shi, an ancient Chinese measuring system that is in everyday use, even though the metric system has been widely adopted in China.

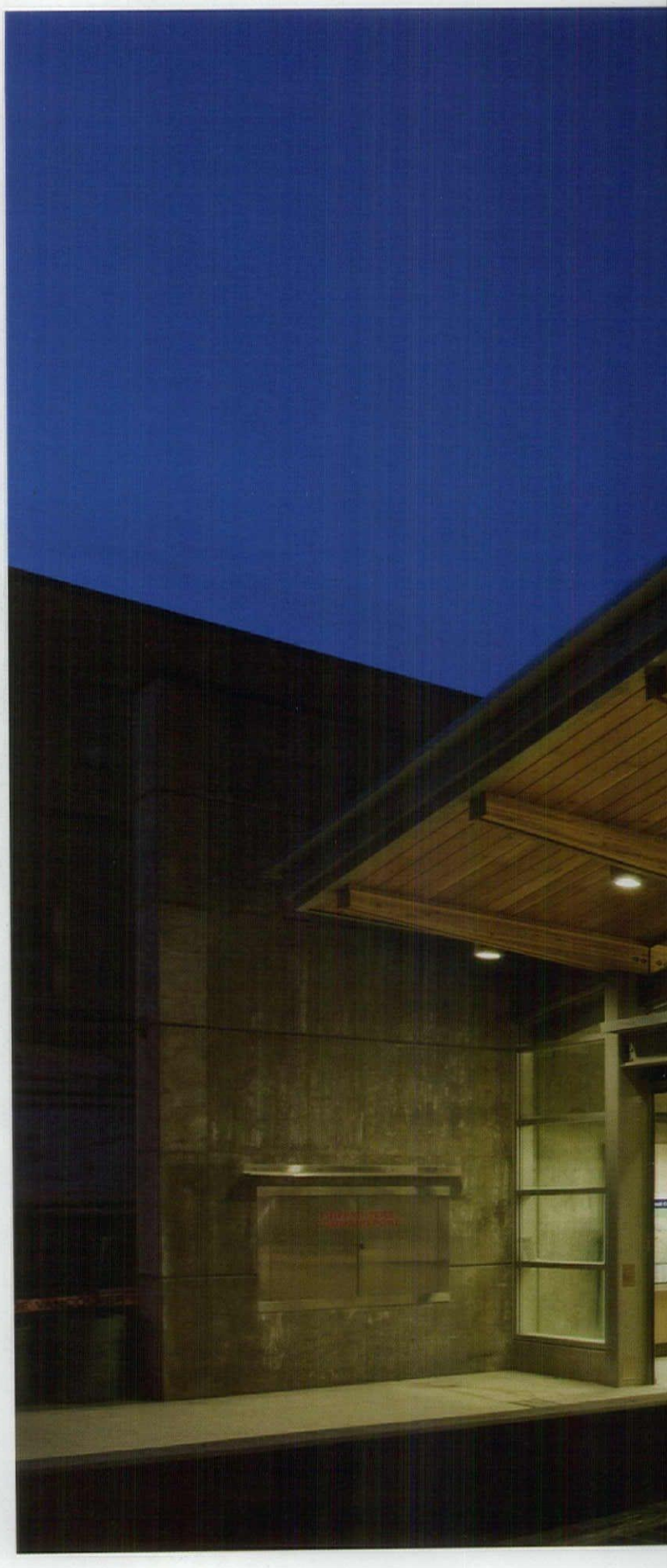
Taking a cue from his relighting of the bridges along the Seine in Paris, in Hangzhou each crossing is illuminated with white light. Red-lensed custom fixtures hung from the eaves of temples, pavilions, and waterfront edifices are similarly unified; each lantern contains a 20W compact fluorescent lamp. To emphasize the cyan color palette of light on the canal, and let the disparate modern buildings fade to the background, Narboni installed 1W LEDs on their façades. These rectangular frames, several stories tall, act as abstract billboards, indicating the canal district without any neon bedazzlement.

Given that the master plan incorporates some 20 bridges built during different historic periods, 60 historic structures, and more than a 100 modern buildings, it's remarkable how well Narboni's design weaves old and new into a unified nightscape. Ultimately, the project's success lies in how well it has fostered a nocturnal rhythm in the city. "Spring and summer is very warm in Hangzhou," says Narboni. "People wait until it is night and then they come out and gather on the banks—they dance, practice tai chi, and sing." It's a destination for travelers, but preserves the city's unique character. Unlike the brazen flash of the Las Vegas Strip, the Grand Canal elegantly illuminates civic life with a soft touch. **MIMI ZEIGER**



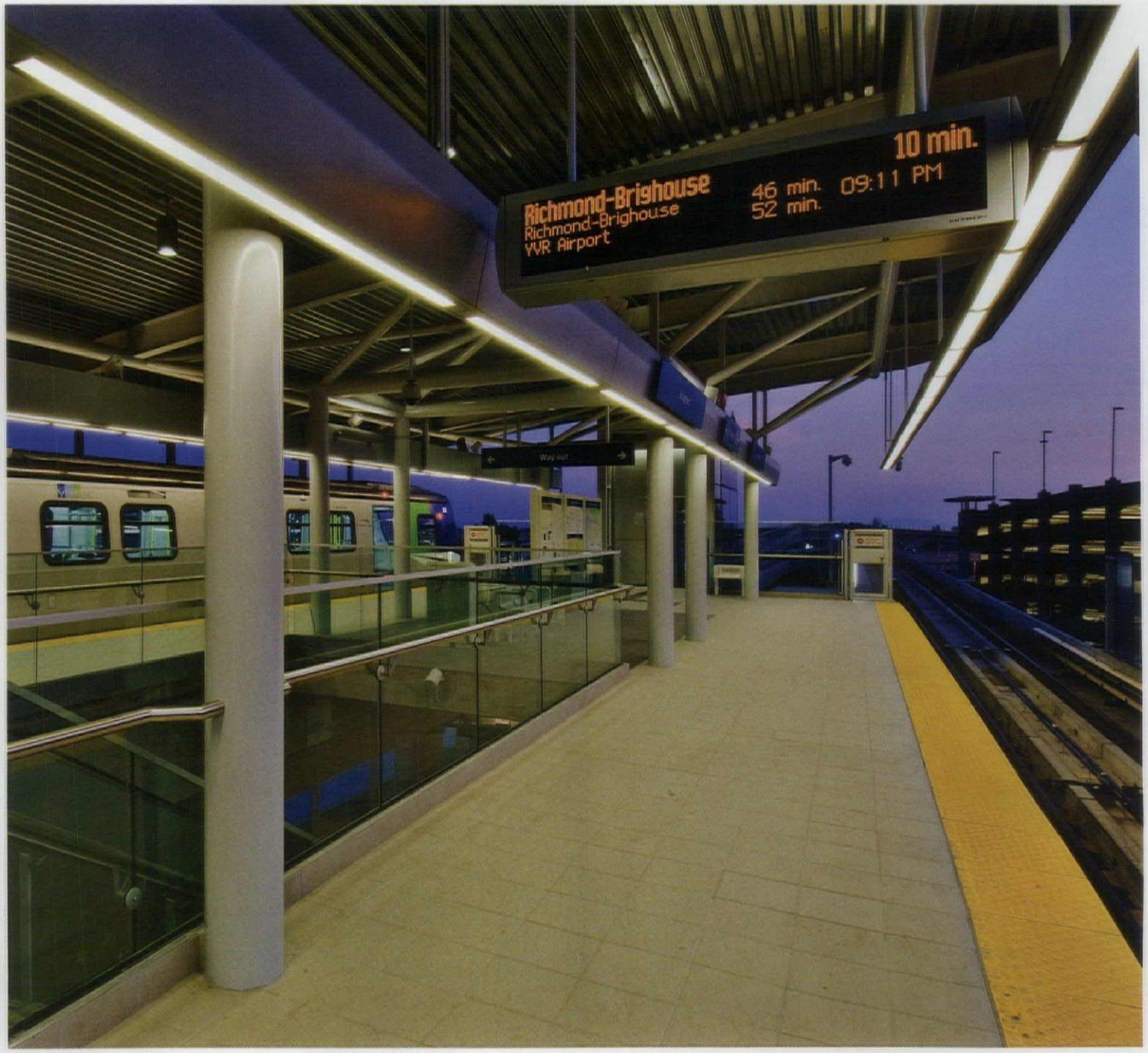
DETAILS

Project Canada Line, Cities of Vancouver and Richmond (including Sea Island, serving Vancouver International Airport), British Columbia, Canada
Owner Public-private partnership funded by the Government of Canada, Province of British Columbia, Vancouver Airport Authority, the South Coast British Columbia Transportation Authority (Translink), and City of Vancouver
Project Management SNC Lavalin, Vancouver
Architect of Record Allen Parker Consulting, Vancouver
Lighting Designer Total Lighting Solutions, Vancouver
Architects Varies according to station
VIA Architecture, Vancouver: Waterfront, Vancouver City Centre, Yaletown-Roundhouse, Marine Drive, and Bridgeport stations
Stantec Architecture, Vancouver: Olympic Village and Broadway-City Hall stations
Hotson Bakker Boniface Haden Architects + Urbanistes, Vancouver: King Edward, Oakridge-41st Avenue, and Langara-49th Avenue stations
Busby Perkins + Will, Vancouver: Aberdeen, Lansdowne, and Richmond-Brighouse stations
Walter Francl Architect, Vancouver: Templeton and Sea Island Centre stations
Kasian Architecture Interior Design and Planning, Vancouver: YVR-Airport station
Hywel Jones Architect Limited, Vancouver: North entrance and connector at the Waterfront station complex
Engineering More than 30 engineering firms worked on the project
Photographer Douglas A. Salin, San Francisco
Project Size 16 stations (eight above ground, eight below grade); 19 kilometers (11.8 miles)
Project Cost $1.93 billion ($2 billion Canadian)
Watts per Square Foot 0.64
Manufacturers B-K Lighting, Delray, Gotham, Hydrel, Insight, Peerless, Selux, Sistemalux, Zumtobel



Light Speed

FOR VANCOUVER'S NEW TRANSIT LINE, THE LIGHTING STRATEGY STAYS TRAINED ON ESSENTIALS AMID A KALEIDOSCOPE OF ARCHITECTURAL DEMANDS

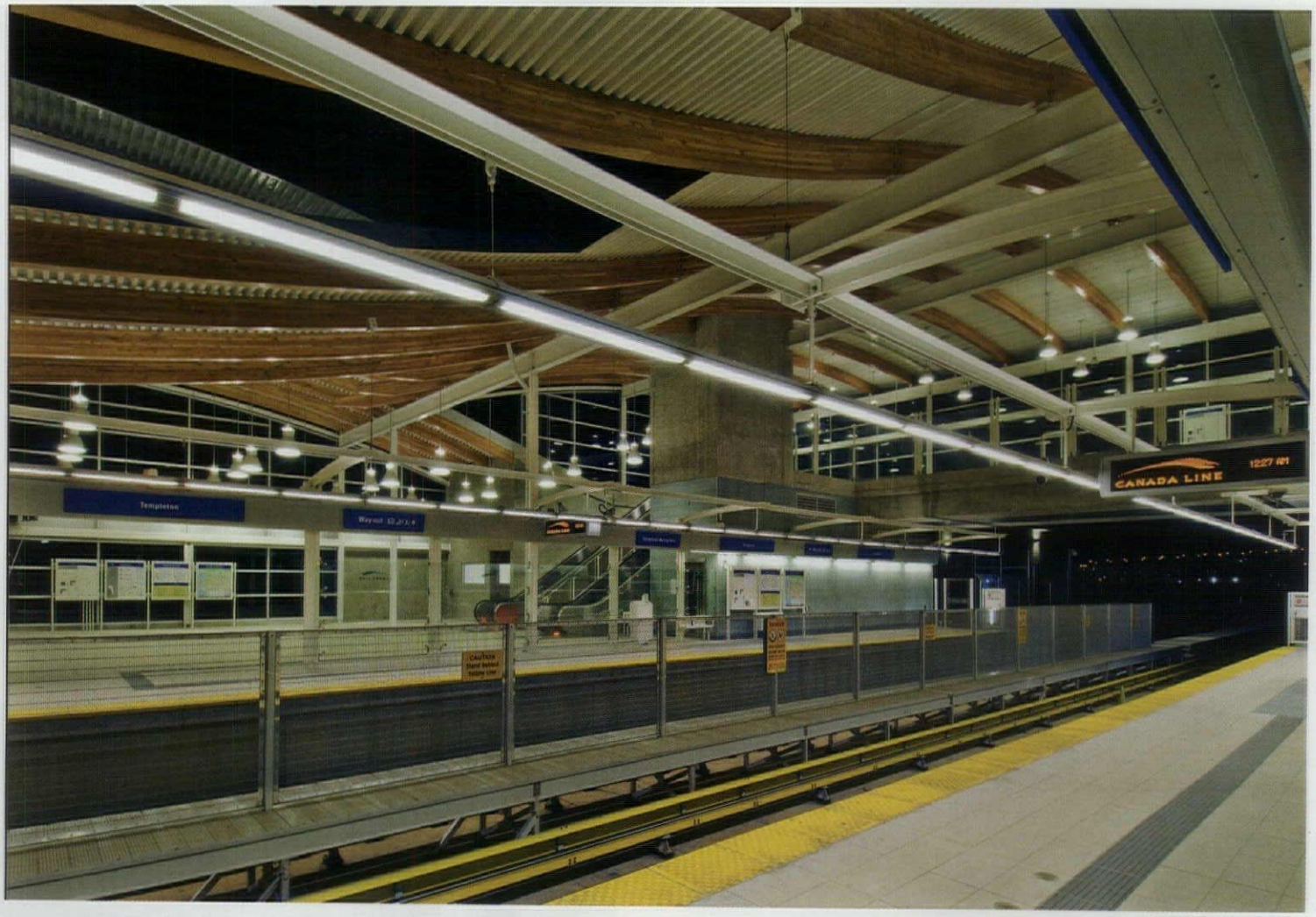


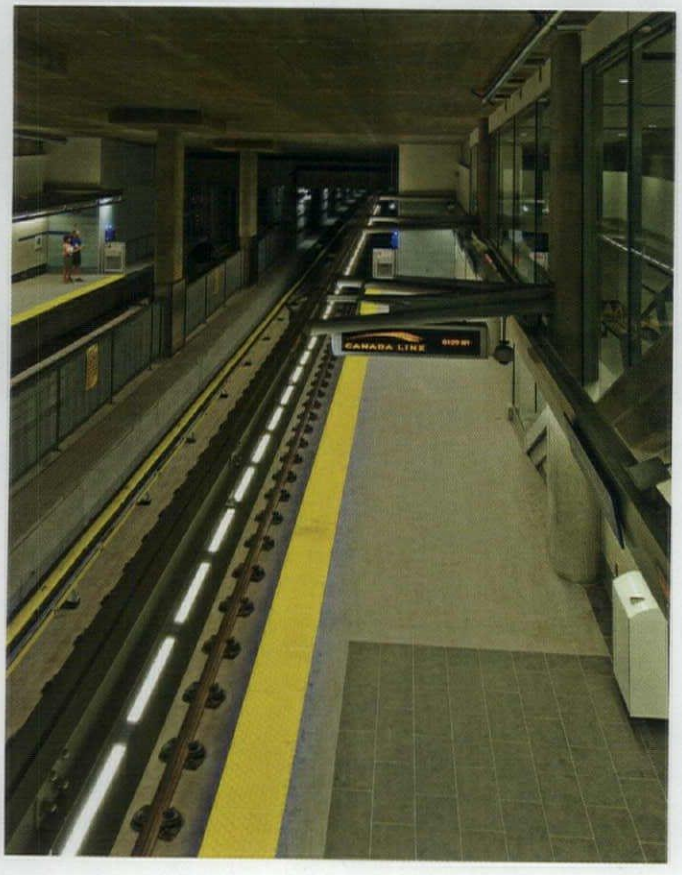
To meet the aesthetic requirements and technical performance criteria of providing 20 footcandles on the train platforms, lighting designer Galina Zbrizher worked with a manufacturer to customize an existing fixture and transform it into a single-lamp T8 linear direct/indirect luminaire that could be used for the platform edge lighting (above). Depending on the station configuration (of the 16 stations, eight are above ground and eight are below grade) the platform lighting can either be pendant mounted (facing page top) or supported from a bracket armature (facing page bottom).

Lighting designer Galina Zbrizher's solution for illuminating Vancouver's new Canada Line rapid-transit rail system is as straightforward a design as it is complex. The massive project, a public-private partnership funded by the Government of Canada, the Province of British Columbia, the Vancouver Airport Authority, the South Coast British Columbia Transportation Authority, and the City of Vancouver, cost $1.93 billion ($2 billion Canadian). Constructed in preparation for Vancouver's hosting of the 2010 Winter Olympics, and to provide a link from downtown Vancouver out to the airport as well as meeting the region's expansion along its north-south corridor, the Canada Line runs on 12 miles of track and includes 16 stations designed by seven different architectural teams. There are both above-ground and below-grade stations, and all had to withstand the wear of 100,000-plus passengers a day and the often punishing weather of the Pacific Northwest. Given these factors, the lighting had to be up to the task so Total Lighting Solutions, Zbrizher's Vancouver firm, single-handedly devised a clean, elementary strategy that would unify the entire system and perform under a multitude of different spatial configurations.

The lighting concept is conceived as a line of light and the lighting layouts at each station are broken down into a series of dots and lines. The "dots" are typically 6-inch-diameter downlights. Depending on the location, they are either recessed and outfitted with 26W triple-tube fluorescent sources or surface mounted with 39W ceramic metal halide PAR lamps. The "lines" are a family of linear fluorescent fixtures that Zbrizher located along passenger pathways to mark the direction of movement between station entrances and platforms, as well as to

Vancouver's new transit line covers 12 miles of track and 16 new stations. Station entrance areas are illuminated with 6-inch-diameter downlights to provide enough light so people feel safe, and so they can perform the task of purchasing their tickets, as seen here in the Broadway-City Hall station.





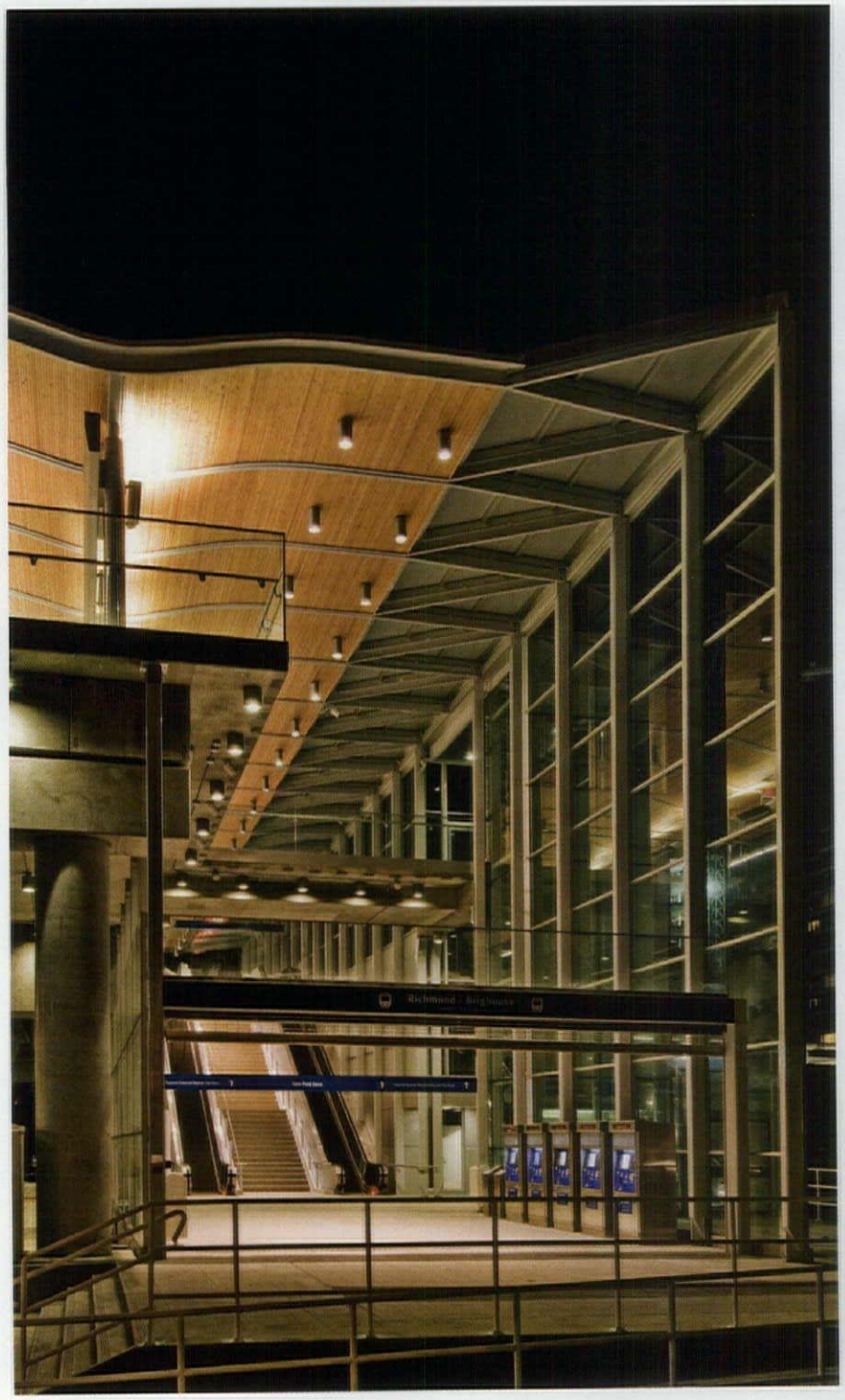
edge light the station platforms themselves.

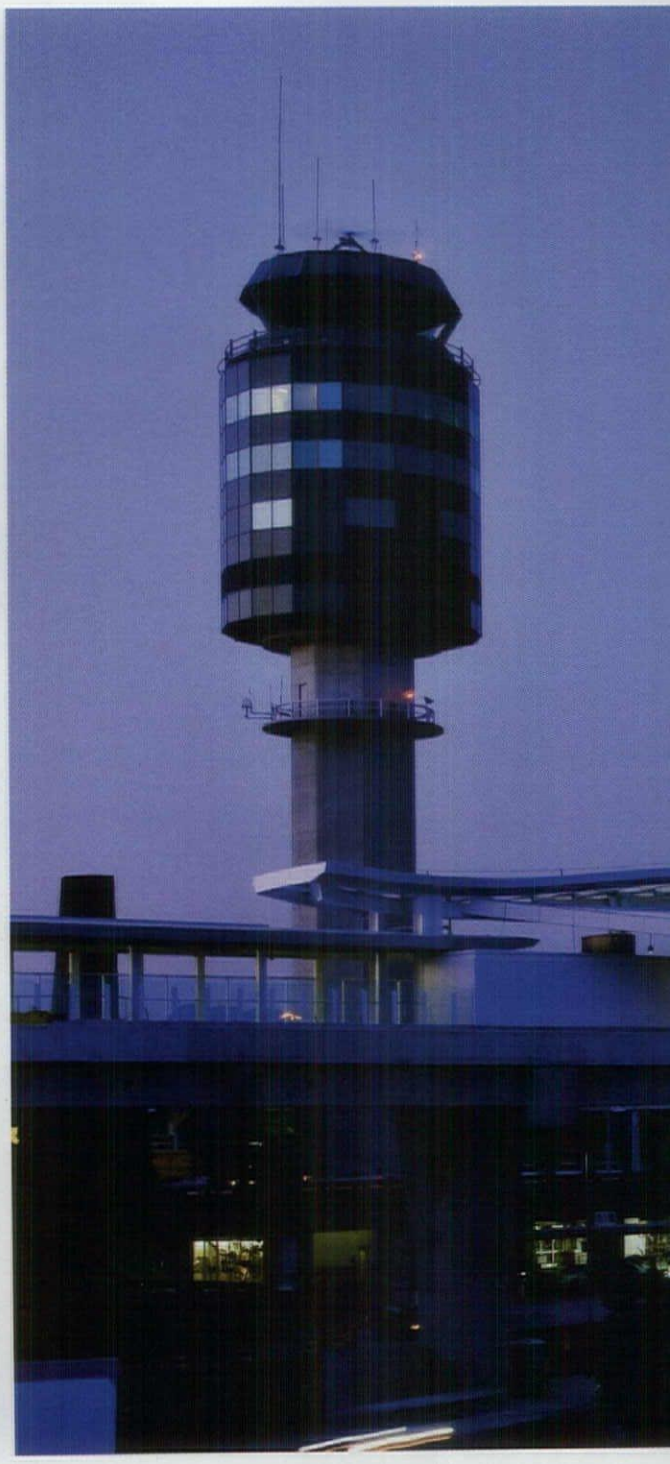
However, before the lighting layout could be diagrammed, Zbrizher took on a wholesale evaluation of the transit system's lighting standards, which dated to the construction of the Millennium Line in 2000. These guidelines were based on outdated lighting technologies and had to be updated to establish the new lighting design criteria. "Today, we have a better understanding about how we, as human beings, function with different aspects of lighting," Zbrizher says. "And we're still learning." The business of electrified lighting is, she stresses, only slightly more than a century old and continually evolving.

One key to the updated guidelines Zbrizher developed specifically for the Canada Line stations is the illumination of vertical surfaces—lighting the walls to reap the multiplier effects those brightened surfaces produce in extending the boundaries of a space. The goal this time around was to light the people, not the floors, to provide an enhanced sense of security for riders.

Vertical illumination had not really figured into the transit system's earlier standards. "[Vertical illumination] was only addressed in the ticketing machine areas, which were not computerized and needed to be lit. Now, they are digital and the LCD screens are backlit. If you light them you will obscure the [screen] readout," Zbrizher explains. "It's about understanding what the lighting is for—not for the machine but for people to see what's happening with the machine."

The other crucial aspect to the new lighting design is integrating the lighting requirements with those of the architecture. This means a lighting scheme that considers the variety of material finishes and their reflective qualities, which are the actual light levels people respond to and determine what a person actually sees. If the design as a whole doesn't consider both dynamically, it won't produce the correct result. "It's a symbiotic relationship," Zbrizher says. "The lighting and





Creating clear layers of light was paramount to the lighting design concept, particularly when it came to vertical illumination. Downlights at the station entrances provide enough light for people to purchase tickets without interfering with the LCD screen of the ticket machines, as seen in the Richmond-Brighouse station (above left). The Canada Line was constructed to meet Vancouver's growing population and provide a direct connection from the downtown out to the airport (above right).

architecture are interrelated. They need to be in harmony."

A key aspect of the project is the lighting on the train platform. Zbrizher didn't want to blind passengers with light, rather, she wanted a clear, non-glary line of illumination on the platform edge. In search of a fixture that was simple, tough, attractive, energy efficient, and met her strategic lighting goals, she could not find an available market-ready fixture. "All the available platform edge lighting that I'm aware of were two- and three-lamp luminaires," she says.

The fixture that came closest to meeting Zbrizher's requirements was an existing luminaire in a line from Peerless Lighting—a single-lamp linear uplight of extruded aluminum with a flat top and a curved bottom. Zbrizher believed that if she flipped the fixture so the curved plane became the top (which would help shed moisture as well as prevent the trains' break dust from getting into the fixtures) and the flat edge became the bottom, the fixture could work as the platform's lighting solution. She approached Peerless, and the company was open to the collaboration needed to customize the fixture to meet the project's specifications.

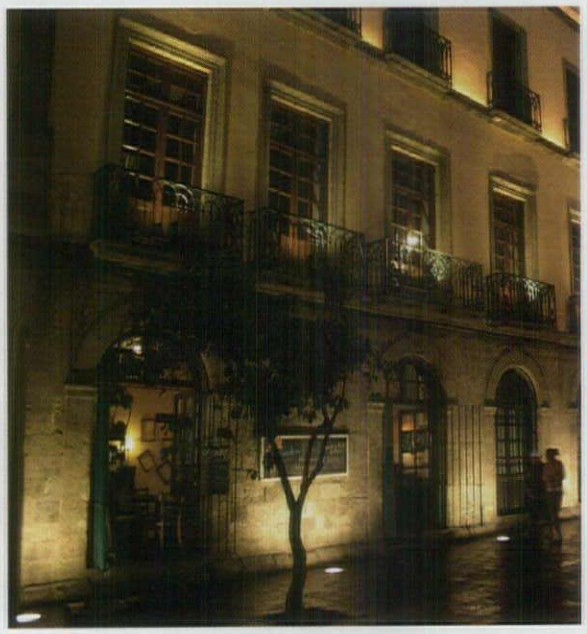
Flipping the housing to transform it from an uplight-only into a direct/indirect fixture was the easy part. The hard part was modifying the luminaire so that it could become IP65 rated for moisture protection. "It's always a challenge to take a modified fixture and make it

meet an IP65 requirement," says Jim Young, vice president and general manager of Peerless Lighting, with whom Zbrizher worked closely.

The resulting custom linear direct/indirect fixture for the Canada Line not only meets all of the lighting criteria, but it does so with a single lamp. This was a bit of a coup since it reduced the number of lamps required throughout the system—no small feat in terms of cost and energy savings given the scale of the project, the number of stations, and the number of luminaires. The extruded aluminum housing is based on a module 5 meters long and has a single T8 lamp that meets the project's goal of 20 footcandles on the platform. T8 lamps were selected for their thermal performance; T5s would not have worked well at outdoor temperatures that fall to near freezing.

Every aspect of the custom fixture needed special detailing, including the addition of a gasket (the existing luminaire did not have one) to meet the seal requirements for an IP65 rating. The luminaire's hinge also needed to run along the side of the track so that the luminaire could be accessed from the platform for easy relamping. Additionally, every fourth lamp along the track is connected to an emergency lighting circuit. This allowed Zbrizher to counter-balance the ballasts and, overall, reduce the quantity needed along the run. This also helped to reduce the amount of weight on the fixtures and ensure a visibly smooth connection between luminaries.

"One of the major contributors to [the project's] success was that the client recognized the value of quality lighting," Zbrizher says. "Any detail developed, starting with the building module and the lighting module, is repeated hundreds and thousands of times. It's a huge scale." Throughout the Canada Line, the spectrum of interior and exterior conditions are expressed at the individual stations. The result is a crisply beautiful ensemble of lighting that complements the architecture while lending an intimate feel to these public spaces. **BRADFORD MCKEE**



Once one of the most dangerous streets in Mexico City's historic town center, a new lighting master plan has transformed Regina Street and the surrounding neighborhood into a place that's occupied day and night. The new lighting scheme celebrates the existing architecture by highlighting façades (top left and center right), and encourages people to be outside at night (above).

DETAILS

Project Calle de Regina (Regina Street), Mexico City
Client and Urban Designer Department of Public Works, Mexico City
Lighting Designers Mantenimiento Arquitectónico Integral and Avantgarde Lighting, Mexico City
Photographer Diana Solis, Mexico City
Project Size 100,000 square feet
Project Cost $500,000
Watts per Square Foot 0.4
Manufacturers Agabekov, Agaled, Philips Allscape, Philips Lumec

Light Renewal

MEXICO CITY'S REGINA STREET PROMOTES SOCIAL CHANGE THROUGH IMPROVED LIGHTING

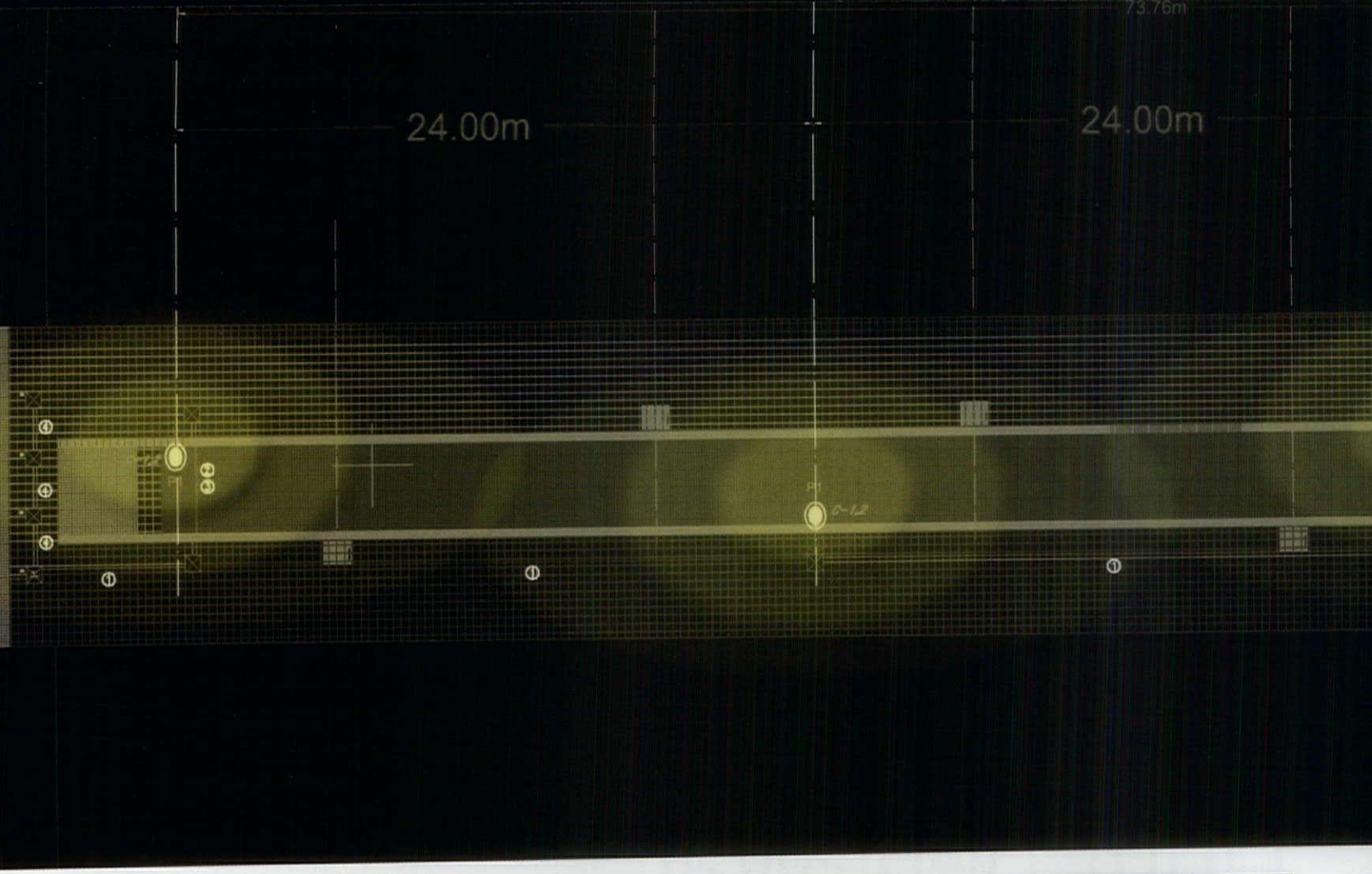
For centuries, Regina Street has been a highly active five-block thoroughfare in the historic town center of Mexico City. However, because of overpopulation, urban disorder, and years of neglect, it had become unsafe to travel down the street at night. But that has started to change thanks to the implementation of a program from Mexico City's Department of Public Works. Known as the Historical Town Centre Rehabilitation Program, the city's initiative brings together a multidisciplinary team of restorers, architects, engineers, lighting designers, and urban planners to recover the city's public spaces for the people who live and work there.

Part of this ambitious goal is an overhaul of the existing lighting strategies. On the city's Regina Street, the program's success is tangible. With the removal of vehicular traffic, the street has been transformed into a vibrant pedestrian-only corridor that displays a sample of Mexico City's new downtown lighting master plan.

Improved safety was one of the primary objectives of the project. "Regina [Street] was one of the darkest streets in the downtown area and by far the most unsecured," explains Pedro A Garza de Yta, architect and director at Mantenimiento Arquitectónico Integral, the firm responsible for the lighting master plan. The original lighting was a mixture of high-pressure sodium luminaires that created high glare and very low uniformity along the streets with an average illumination level of around 6 lux (0.6 footcandles). The new lighting scheme calls for 9-meter-tall (29.5-foot-tall) light poles equipped with 140W ceramic metal halide lamps specifically designed for outdoor use, replacing the existing 175W or 250W luminaires that were typical for streets in the historic town center. The color rendering index from the new lamp source (70), along with its color temperature of 2750K, aids in improved facial recognition and reinforces a sense of security. Additionally, the new, improved optical control and efficiency of the luminaires provides an increase in illuminance levels by 200 percent, meeting the project's target average illumination of 24 lux (2.4 footcandles), while providing a more even illumination of the pedestrian corridor with a 3:1 uniformity ratio.

In addition to increasing the amount of light in the Regina Street Corridor, the efficient lamp and reflector system used in the new luminaires also has helped to reduce the number of fixtures required by increasing the distance between light poles. As a result of using fewer fixtures, the total energy consumption is now half as much as other streets in the town center, which have not yet been changed to incorporate the new standards. Visual clutter is minimized by the reduced quantity of fixtures, and by selecting luminaires with full cut-off light distribution, the new fixtures reduce glare and prevent light pollution. All of these factors contribute to a more pleasant experience for pedestrians traveling at night.

Several decorative lighting strategies also were introduced to satisfy another goal of the project: city beautification. The lighting of 10 historic buildings that line the mostly residential street were selected to receive special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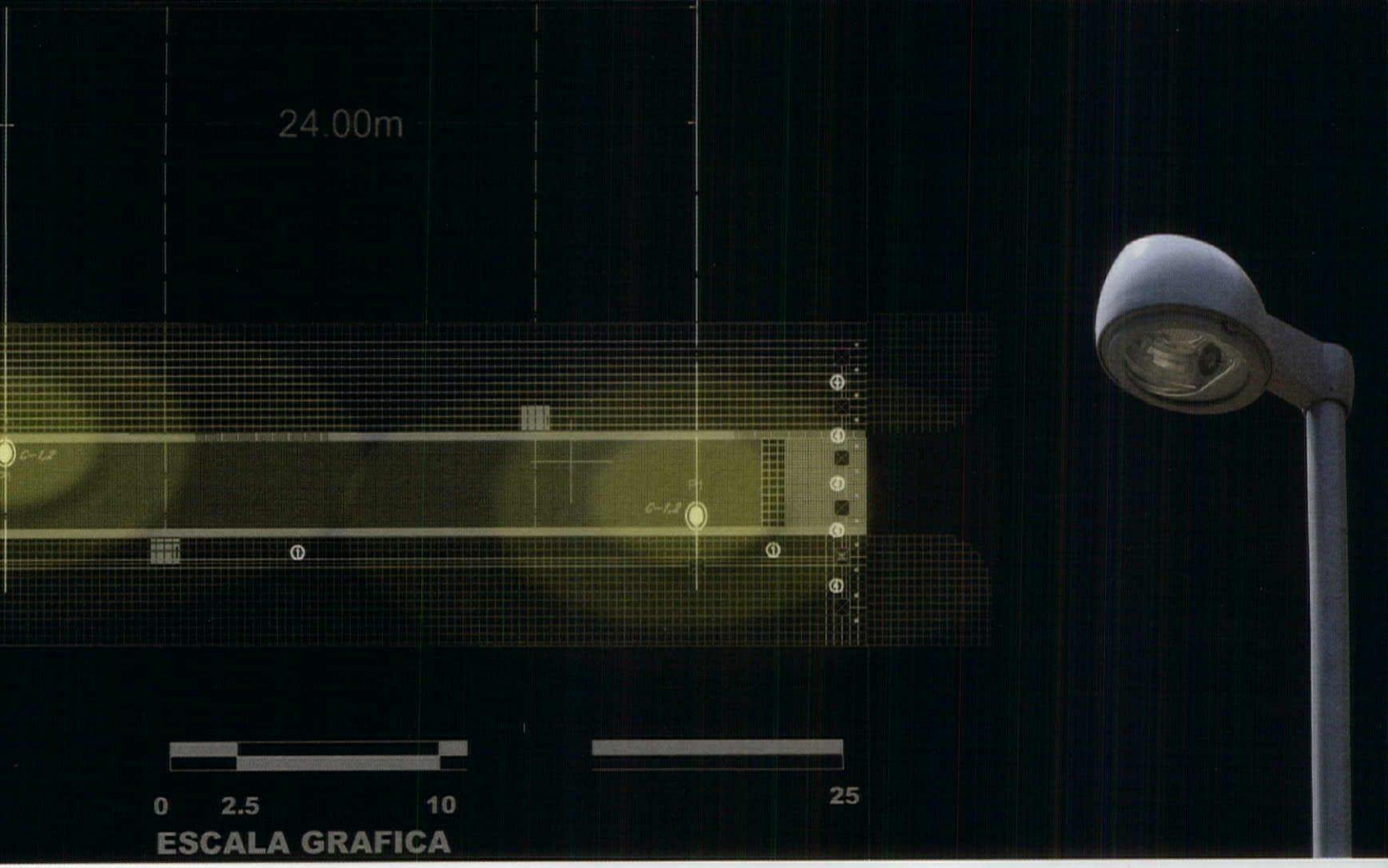
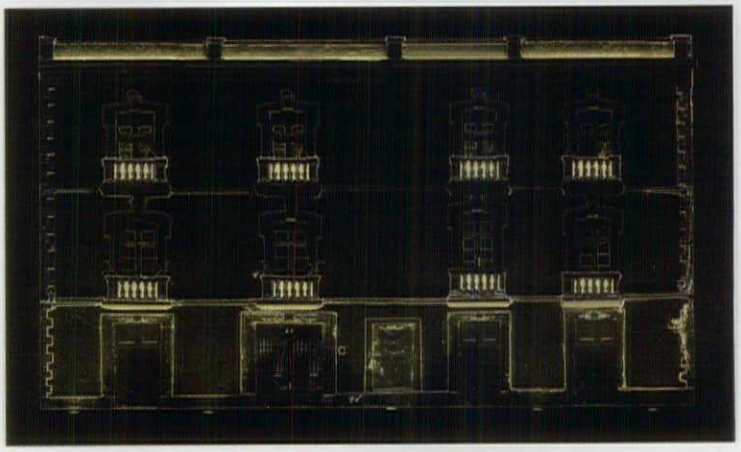


New streetlights—29.5-foot-tall light poles with a 140W ceramic metal halide lamp—replace less-efficient 175W/250W high-pressure sodium fixtures, and contribute to the overall cost and energy savings (above). Architecturally significant façades are uplit with a combination of LED, ceramic metal halide, and xenon sources (right center and bottom). The street ends at the plaza in front of the church known as Temple of Regina Coeli, where inground uplights and illuminated water features create an elegant yet celebratory nighttime atmosphere (facing page).



treatment. These included a church, several restaurants, and houses. "We had different approaches," Garza says. "The first strategy, which was used for six of the buildings, mainly consisted of recessed uplighting to wallwash the façades. We balanced that with luminaires in the upper portion of the façade to counteract the strong shadows created by the uplighting." The other strategy, used on the four remaining buildings, enhances the unique architectural details of each façade. All of the strategies incorporate LED technology as well as ceramic metal halide and 5W xenon lamp sources to highlight the buildings' textures using grazing techniques instead of floodlighting. By illuminating the vertical surfaces, the designers were able to give the illusion of widening the street and creating a larger volume of space through the pedestrian corridor. Recessed resin blocks with integral 5W warm-white LEDs are scattered across the ground among the paving stones to add visual interest to the corridor.

It was very important to the design team that the city and the local residents adopt the new lighting scheme so that they would develop a sense of ownership of the area that had been missing prior to the renovation. By installing systems that make the space more usable at night, the comprehensive lighting plan at Regina Street has resulted in positive social change for the neighborhood. Inhabitants have gained the confidence to use the space after dark, something that would have been unthinkable only a few years ago. "Quality of life is related to the use of public space. A well-lit nighttime environment is fundamental to achieve the urban development that modern cities need," Garza explains. Using light as a catalyst, Regina Street has been infused with a new sense of vitality, and the groundwork has been laid for a renewed sense of civic pride. **MEGAN CASEY**

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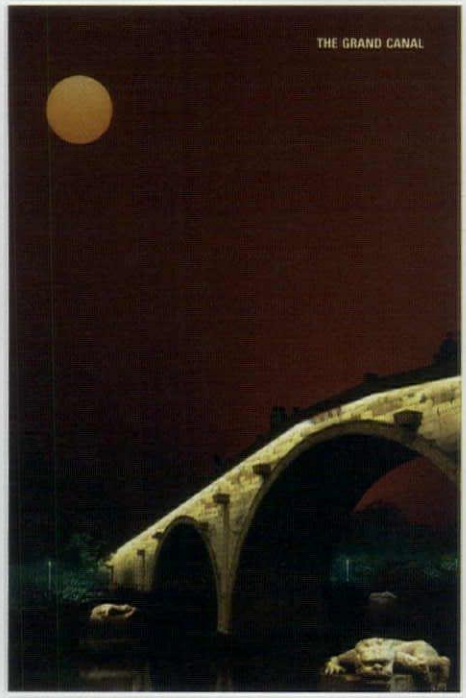
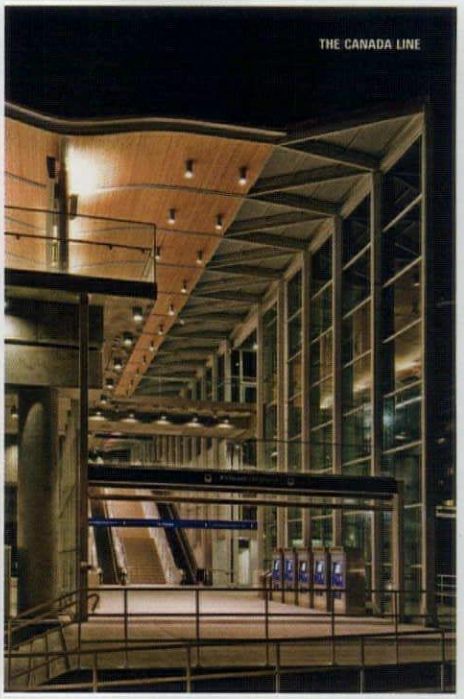
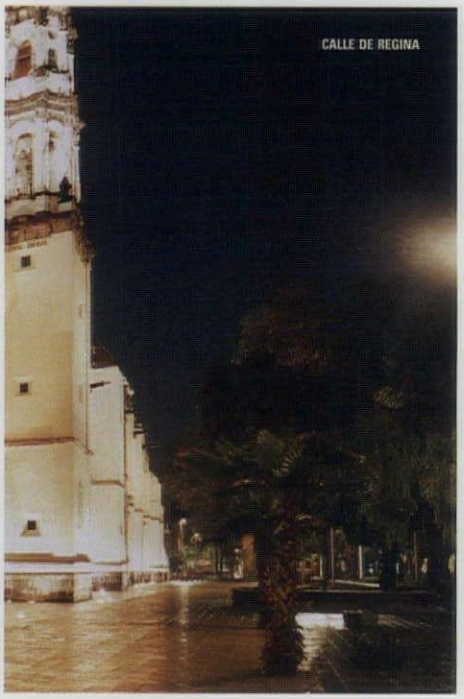
SPECS


THE GRAND CANAL


THE CANADA LINE


CALLE DE REGINA

The Grand Canal, Hangzhou, China
Note: There is no specific manufacturer. All luminaires are custom-designed by Concepto Studio with the Zhongtai Lighting Group. They, in turn, coordinated with local suppliers to produce all fittings and luminaires. What follows is a list of the types of fixtures and their lamp and wattage details.

Floodlight projectors on the canal with 18 1W green and 18 1W blue LEDs
Luminous translucent poles ("Venetian masts") installed directly in the water. Each cylindrical mast is equipped with 12 1W LEDs, six blue and six amber
Custom designed columns made up of one 18W, 3000K fluorescent lamps for pedestrian and tree lighting along the promenade
Recessed ground lights retrofitted in uniform warm white 70W 3000K ceramic metal halide lamps along the promenade
Existing recessed ground fitting (with dichroic lamp) modified on 3W 3000K LED lamps for lighting the balustrade railing along the promenade
"Milestones"—36-foot-tall stainless steel poles—along the north bank equipped with LED lamps. Green LEDs display kilometers and red LEDs read in Shi, an ancient Chinese measuring system
Bridge crossings illuminated in white light with linear, dimmable LED fixtures (12 by 1W 3000K LEDs per meter)
Red-lensed custom fixtures hung from eaves of temples, pavilions, and waterfront edifices are similarly unified; each lantern contains a 20W compact fluorescent lamp
"Abstract billboards"—rectangular frames on surrounding building façades, the largest of which measure approximately 98 feet tall by 65 feet wide—are linear dimmable LED fixtures with 12 by 1W cyan LEDs per meter

The Canada Line, Vancouver, Canada
B-K Lighting Luminaire used to light the reveal of the columns at the platform level of the Airport Station
Delray Up/down pendant with four 26W triple-tube fluorescent lamps at Templeton Station Concourse level; decorative linear T5 fluorescent glass cylinders at Olympic Village Station
Gotham Lighting Recessed 26W triple-tube fluorescent and 39W ceramic metal halide surface-mounted downlights over stair area at future turnstile locations
Hydrel Lighting 22W LED fixtures with narrow beam to graze "green" wall feature at station entrance
Insight Surface-mounted asymmetric linear wallwashers with either 28W T5 lamps or 54W T5HO lamps
Peerless Lighting Platform edge lighting with single super T8 lamp and program start ballast; T5 linear wallwashers at station concourse levels
Selux 54W T5HO luminaires for underground stations
Sistamalux LED Downlights at station entrance
Zumtobel Recessed 25W T5 fixtures in cable chases along back wall of waiting platforms

Calle de Regina, Mexico City, Mexico
Agabekov Linear fixtures with 5W xenon lamps for high-lighting building cornice details
Agaled Inground 5W uplights used as paving accent feature along pedestrian walkways
Philips Allscape Wallwashers with 150W 3000K T6 lamps embedded in ground to illuminate building façades; 70W to 150W 3000K T6 spotlights with narrow to flood throws for church bell towers and overall building façades
Philips Lumec Pole lights for streetlighting with Philips' Cosmopolis cosmowhite 140W ceramic metal halide lamps

LEFT: COURTESY CONCEPTO STUDIO AND ZHONGTAI LIGHTING GROUP; CENTER: DOUGLAS A. SALIN; RIGHT: DIANA SOLIS

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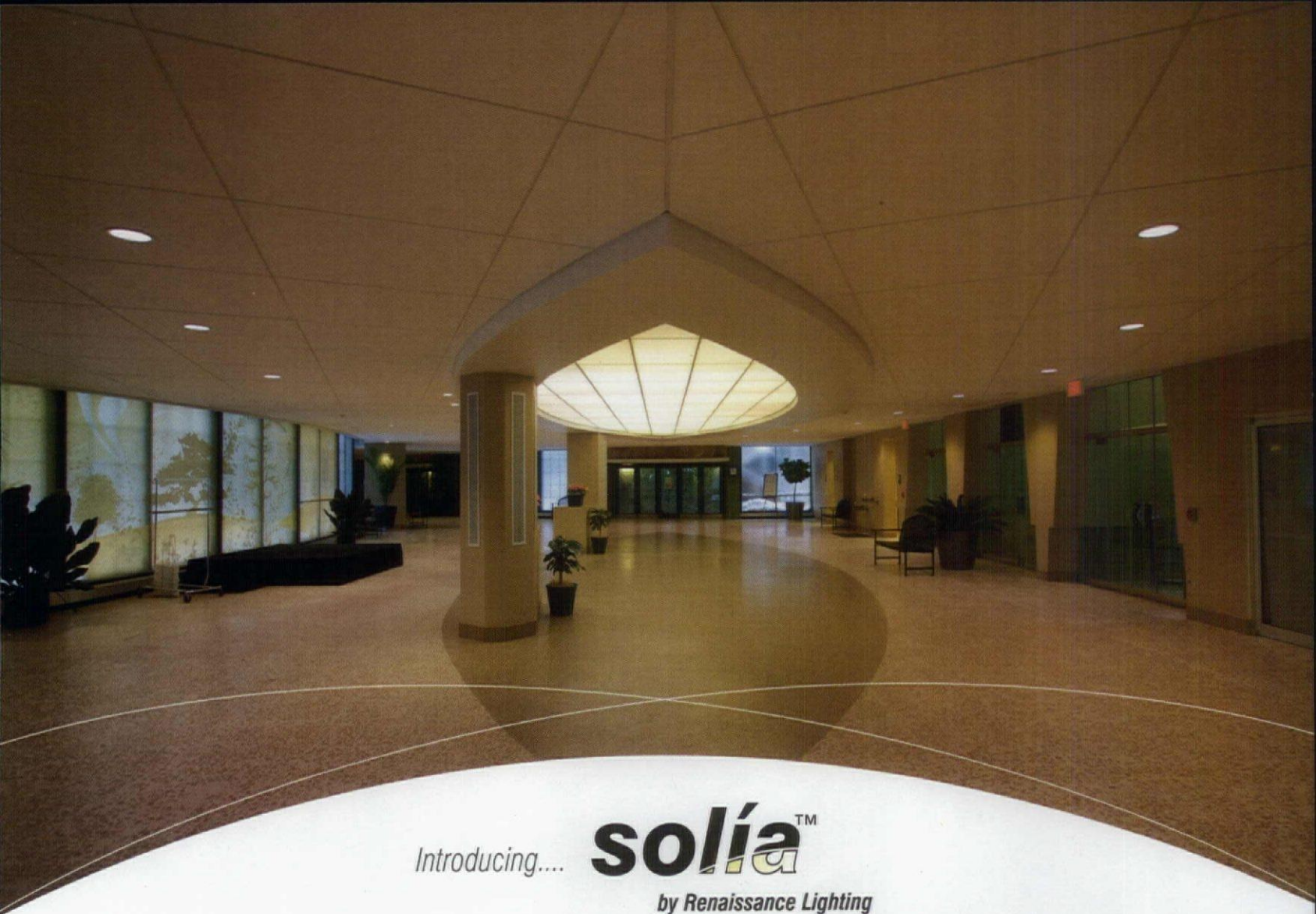

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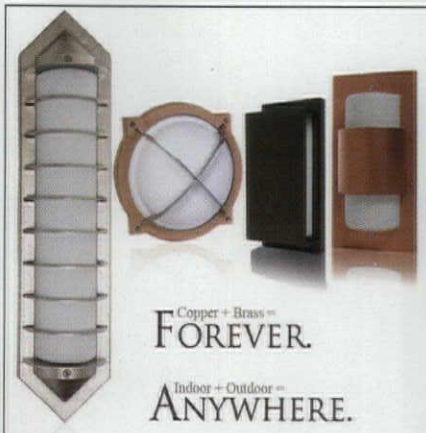

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AD INDEX

Ulrike Brandi

INVESTIGATING THE POSSIBILITIES OF LIGHT ACROSS SCALES

A student of industrial designer Dieter Rams, Ulrike Brandi's work is rooted in problem solving. Her first foray into lighting began with her thesis project, the lighting design for the entrance hall of a ballet school and theater. Without knowing lighting design and how it works, she designed a luminaire aided by information from Erco Lighting's then technical director Harald Hofmann. After graduation she struck out on her own, determined to define lighting for herself. In turn, Brandi has made her mark on the public realm effortlessly, creating a dialogue with cities through lighting. **ELIZABETH DONOFF**

How does scale change the way you think about light?
I try to think about it in terms of light and shadow, daylight and electric light, and daytime versus nighttime. I think about the shapes and sizes of buildings in an urban network and what space that leaves for light—especially daylight.

What is the greatest challenge for urban lighting?
Making it functional, but also creating an atmosphere where both pedestrians and vehicles feel comfortable and can co-exist.

How did your book *Light for Cities* come about?
I wanted to help our clients understand the design process and our working methodology, while figuring out a way to help them understand the role that lighting can play in adding value to a public space.

What impact are LEDs having on outdoor lighting?
They are definitely starting to be the source of choice for outdoor lighting applications. However, there is still a way to go when it comes to optics and solving issues associated with glare and brightness.

Has your thinking about outdoor lighting changed over time?
Absolutely. Lighting isn't just about one thing. I'm interested in figuring out how to bring aesthetic considerations together with environmental, behavioral, and cultural issues.

Is there something we are overlooking with so much of our focus being put toward LEDs?
Daylight. Maybe because we are surrounded by it, we forget about it, but using the light we have is the simplest way to save energy.

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