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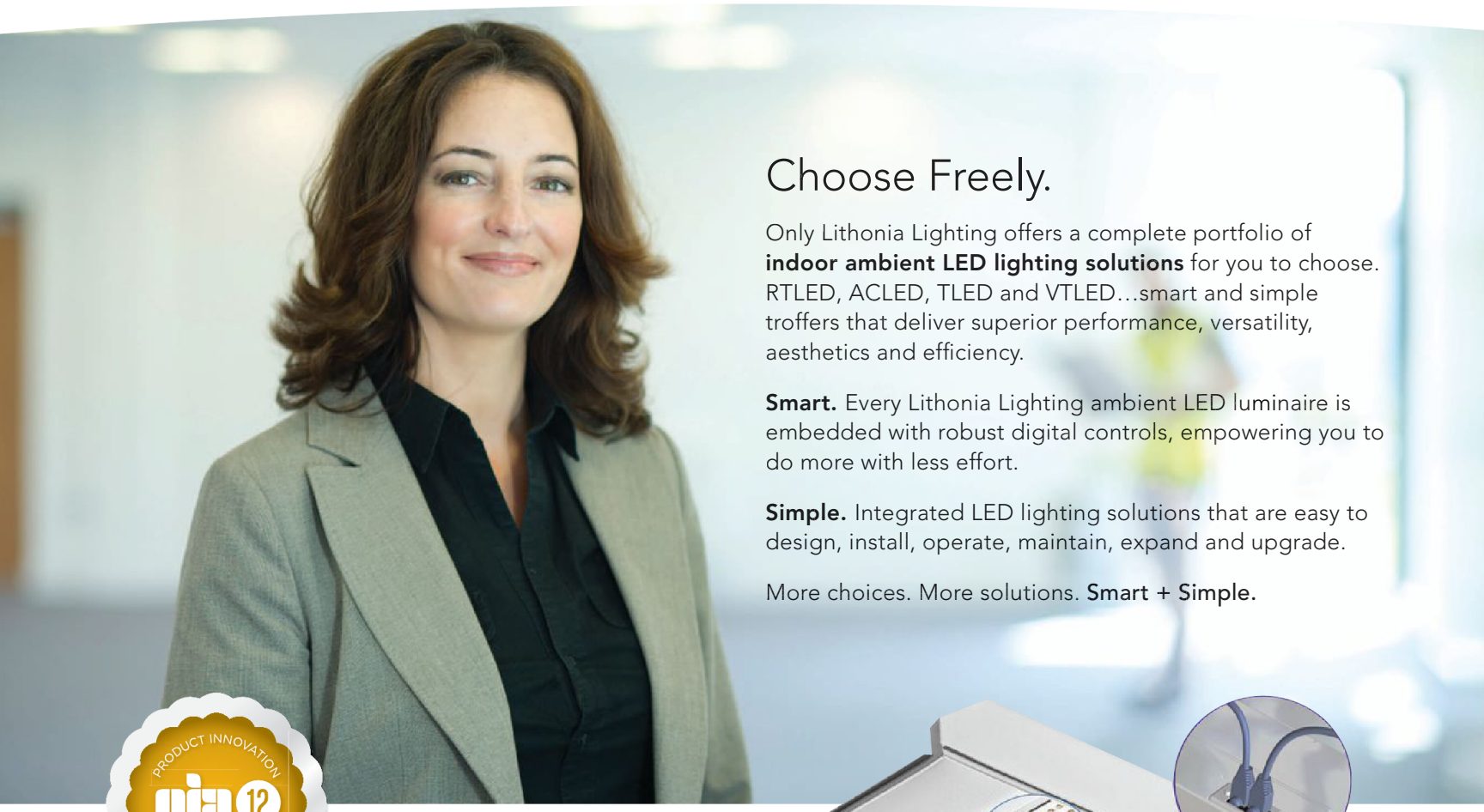

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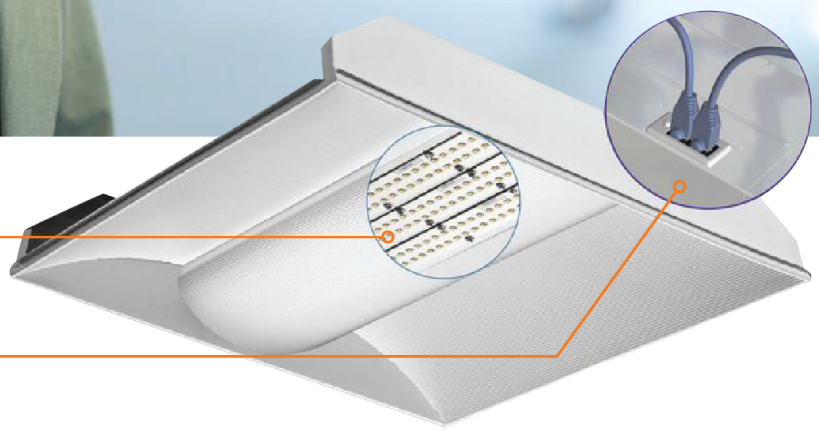

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Courtesy the Port Authority of New York and New Jersey (left); Courtesy London 2012 (top right); Tang Yau Hoong (bottom right)

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imagination at work

"As we transform our cities and develop their illuminated personalities, we should be asking some fundamental questions relating to good design and good urban-design practices."

TO LIGHT, OR NOT TO LIGHT?

All eyes will be focused on London from July 27 to Aug. 12 for the Olympic Games. The city has been preparing for several years, and, unlike most previous Olympic host cities, has been making a concerted effort to create an infrastructure that will both meet the immediate demands of the games and serve the city well into the future. The buzzword being heard over and over again regarding London's Olympic preparations is "legacy."

It's a powerful premise: How do you create something of and for the time, that will also have a lasting effect? And it is a challenge faced at all scales—from cities to buildings. It even impacts how we light our important civic monuments.

The latest iconic piece of architecture to join the illuminated fray is London's Tower Bridge. The City of London is lighting it first for Queen Elizabeth II's Diamond Jubilee festivities (which are occurring as this issue goes to press), and then for the Olympics later this summer. But its lighting design is not getting very good reviews. U.K. lighting designers who have seen the installation in person are abuzz with less than favorable reports on Twitter; they seem especially concerned with the use of color and color blending. (The default setting is white, while color is reserved for special occasions.)

Press photos and videos of the bridge make it clear that something is off. The colors are garish—Disneyesque, really—and the lighting flattens the Victorian Gothic architecture instead of giving it an illuminated dimensionality. Also, there is no fluidity of light across the bridge as it spans the River Thames and as the bridge abutments knit themselves into the city fabric.

The lighting design is attributed to a French firm, Citelum, which is known for lighting other icons such as the Eiffel Tower and the Valley of the Kings in Egypt. The new lighting scheme incorporates GE architectural LED systems, which replace floodlights, and is intended to remain in place for 25 years.

According to a statement from GE, the installation uses "6,500 feet of LED linear lights, 1,800 LED lamps, and 1,000 junction boxes with 16,500 feet of cable," and it will cut the bridge's energy consumption by 40 percent. Not surprisingly, GE is a sponsor of the 2012 London Olympics.

There is, of course, a tradition of illuminating buildings at night, and in color, often to mark important events or weather conditions. The Empire State Building in New York City comes to mind. As does the Berkeley Building in Boston (also known as the old John Hancock Building), which uses red and blue light to forecast the weather. A local popular rhyme explains the color code:

Steady blue, clear view.
Flashing blue, clouds due.
Steady red, rain ahead.
Flashing red, snow instead.

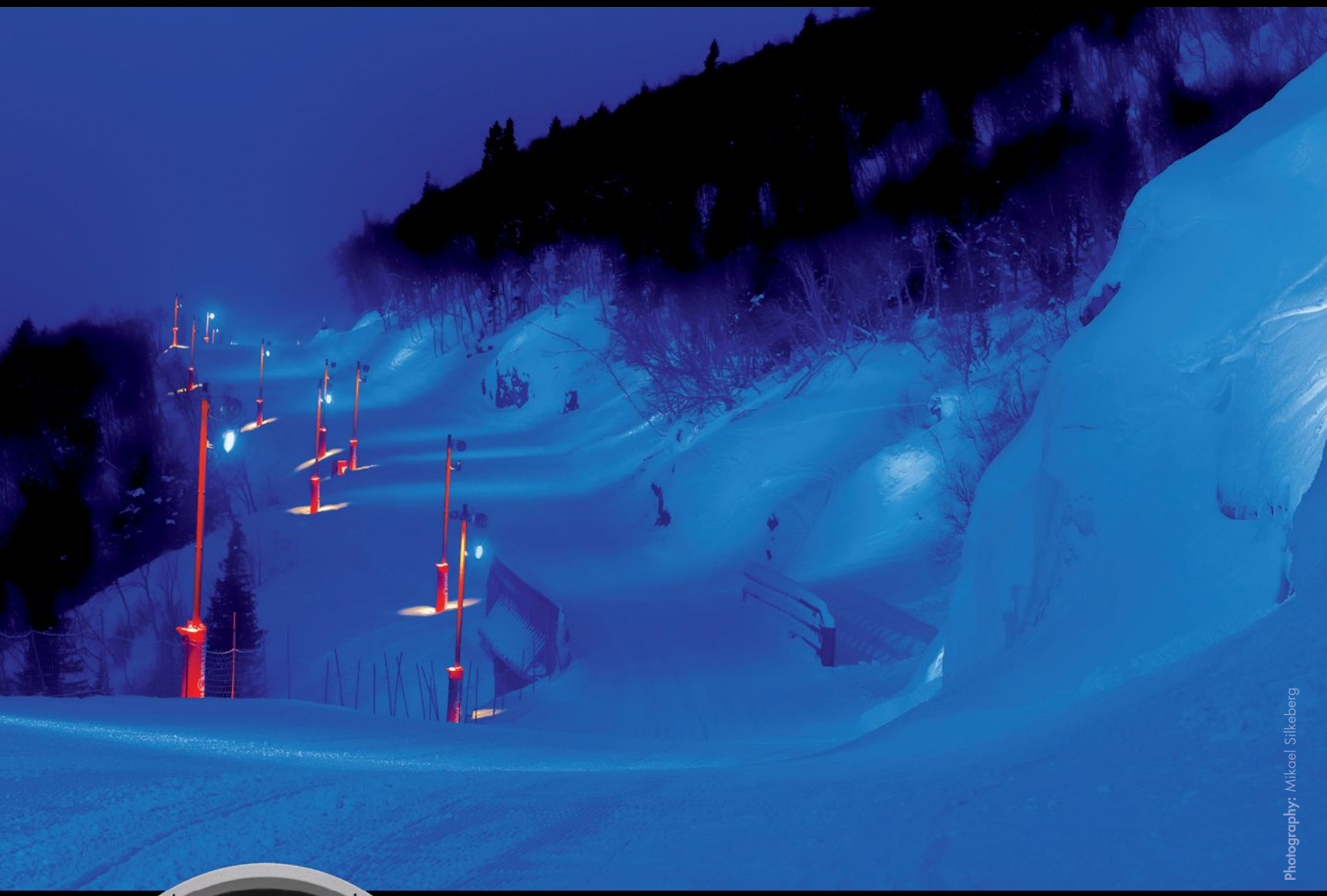
As we transform our cities and develop their illuminated personalities, we should be asking some fundamental questions relating to good design and good urban-design practices. For instance, does a building or monument need to have a nighttime presence, especially if it has never been illuminated before? If it does, how should it relate to other monuments and important structures in the city? Then there's the issue of how to light a landmark, and what kind of light to use.

Bringing light to our cities and important monuments should come from a sense of urban placemaking as well as from a desire to balance the everyday with spectacle. But at times, lighting decisions are in jeopardy of being made for the wrong, often purely commercial, reasons—especially when it comes to big events that take on a more corporate feel, and the need to bring in sponsor dollars (or, in this case, sponsor pounds).

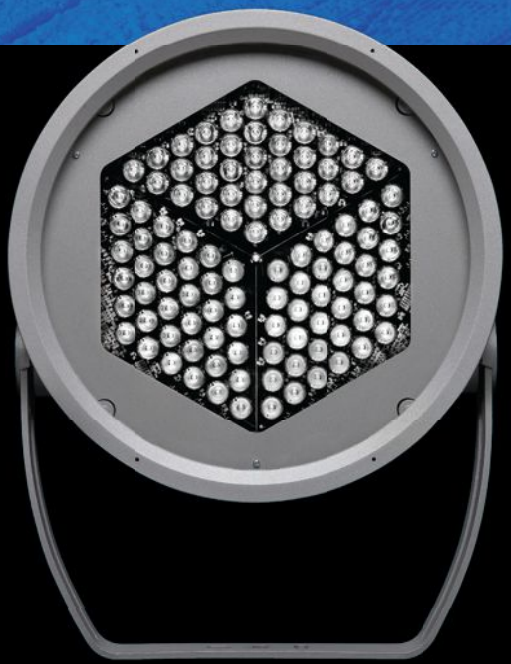
We should light our cities and our civic monuments in a way that makes them better places to live, work, and celebrate—not because there exists the potential to sell a lot of lighting products.

Elizabeth Donoff
Editor

lumenpulse™



Photography: Mikael Silkeberg



SWEDISH SKI RESORT GETS MAGICAL MAKEOVER

Leading Scandinavian design practice Ljusarkitektur turned Sweden's best-known ski resort, Åre, into a magical, family experience at night. The designers used 240 Lumenbeam luminaires to cast an eerie moonlight glow over the slopes, creating an attraction aimed at boosting the resort's nighttime economy.

Project: Åre Ski Resort, Sweden
Lighting Design: Ljusarkitektur

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LIGHTING DESIGN AWARD SEASON

Lightfair served as the backdrop for the announcement of several annual architectural-lighting-design award programs, including the 29th-annual IALD International Lighting Awards, the 29th-annual GE Edison Awards, and the 35th-annual Cooper Lighting Source Awards.

text by Elizabeth Donoff

United States Institute of Peace, Washington, D.C.

GE EDISON AWARDS

GE Edison Award

United States Institute of Peace, Washington, D.C., by Lam Partners, Cambridge, Mass.

Awards of Excellence

Museum of the Bavarian Kings, Hohenschwangau, Germany, by Licht Kunst Licht, Bonn and Berlin, Germany; **Cornell University, Milstein Hall,** Ithaca, N.Y., by Tillotson Design Associates, New York

Awards of Merit

University of Minnesota Amplatz Children's Hospital, Minneapolis, HGA Architects and Engineers, Minneapolis; **Daley Library, the University of Illinois at Chicago,** by Schuler Shook, Chicago; **Lighting Experience Center,** Budapest, Hungary, by Cerquiglini & Rossi Architecture, Varedo, Italy; **Joe and Rika Mansueto Library,** the University of Chicago, by L-Plan, Berlin; **Confidential Trading Company**, Chicago, by Schuler Shook, Chicago

Award for Environmental Design

University of Arizona Likins and Arbol de la Vida Residence Halls, by Benya Lighting Design, West Linn, Ore., and Monrad Engineering, Tucson, Ariz.

Award for Residential Design

Toro Canyon Residence, Santa Barbara, Calif., by Anne Kale Associates, Santa Barbara.

Special Citations

Ogden High School Auditorium Restoration, Spectrum Engineers, Salt Lake City; **Louisville Second Street Transportation Project,** Louisville, Ky., by Leni Schwendinger Light Projects, New York

For more information about the GE Edison Awards visit bit.ly/M5hHaY.

IALD INTERNATIONAL LIGHTING AWARDS

Radiance Award

Broken Light, Rotterdam, Netherlands, by Daglicht & Vorm, Rotterdam

Awards of Excellence

The National September 11 Memorial, New York, by Fisher Marantz Stone, New York; **Futako Tamagawa Rise,** Tokyo, by Lightdesign, Tokyo; **Lighting Beirut Architecture,** Beirut, by Light Cibles, Paris; **Banner MD Anderson Cancer Center Lantern of Hope,** Gilbert, Ariz., by Cannon Design, Phoenix, Ariz.; **Lagares Showroom,** Girona, Spain, by Artec3 Studio, Barcelona; **United States Institute of Peace,** Washington, D.C., by Lam Partners, Cambridge, Mass.

Awards of Merit

Harrow School Chapel, Harrow, Middlesex, United Kingdom, by DPA Lighting Design, London; **Chandler City Hall Exterior Lighting,** Chandler, Ariz., by SmithgroupJJR, Detroit; **St. Regis Osaka,** Osaka, Japan, by Lighting Planners Associates, Tokyo; **Martin Luther King Jr. National Memorial,** Washington, D.C., by David Mintz in association with Randy Burkett Lighting Design, St. Louis; **Hatoya 3 Building,** Tokyo, by Forlights, Tokyo; **Yotel,** New York, by Focus Lighting, New York

Special Citations

For Sensitive Application of Light in a Repurposed Urban Setting: the High Line, New York, by L'Observatoire International, New York; *For the Successful Translation of a Visual Theme into Light:* Novamed Polyclinic, by Skira Ltd., Pula, Croatia

For more information about the IALD Awards, visit bit.ly/KxDn0E.

COOPER LIGHTING SOURCE AWARDS

Professional Commercial Category

The Chandelier Bar, the Cosmopolitan, Las Vegas, by Focus Lighting, New York

Professional Residential Category

Vail Townhome, Vail, Colo., by Robert Singer and Associates, Basalt, Colo.

Professional Honorable Mentions

Dorsey & Whitney, Denver, by RNL, Denver; Indian Wells Residence, Indian Wells, Calif., by Studio Lux, Seattle

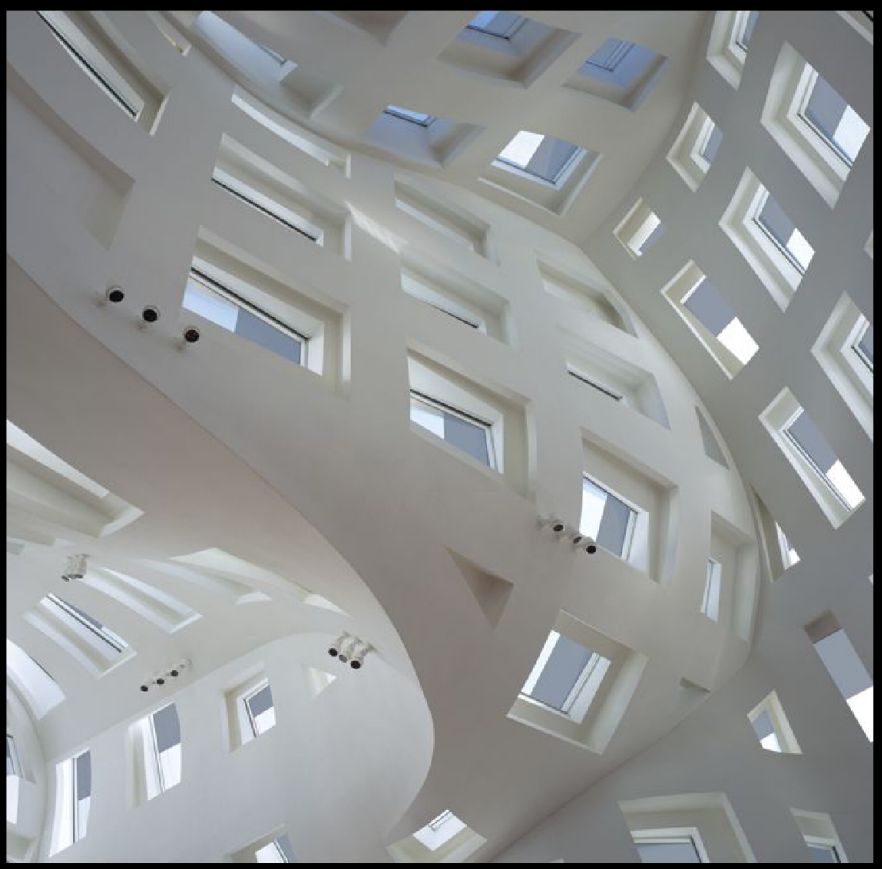
Professional Award of Recognition

Dinosaur Hall at the Natural History Museum of Los Angeles County, Los Angeles, by Focus Lighting, New York

For complete list of Cooper Source Award winners, including student categories, visit bit.ly/M6C8jW.

Courtesy GE Lighting

No, it's not by Photoshop; it's by Frank Gehry.



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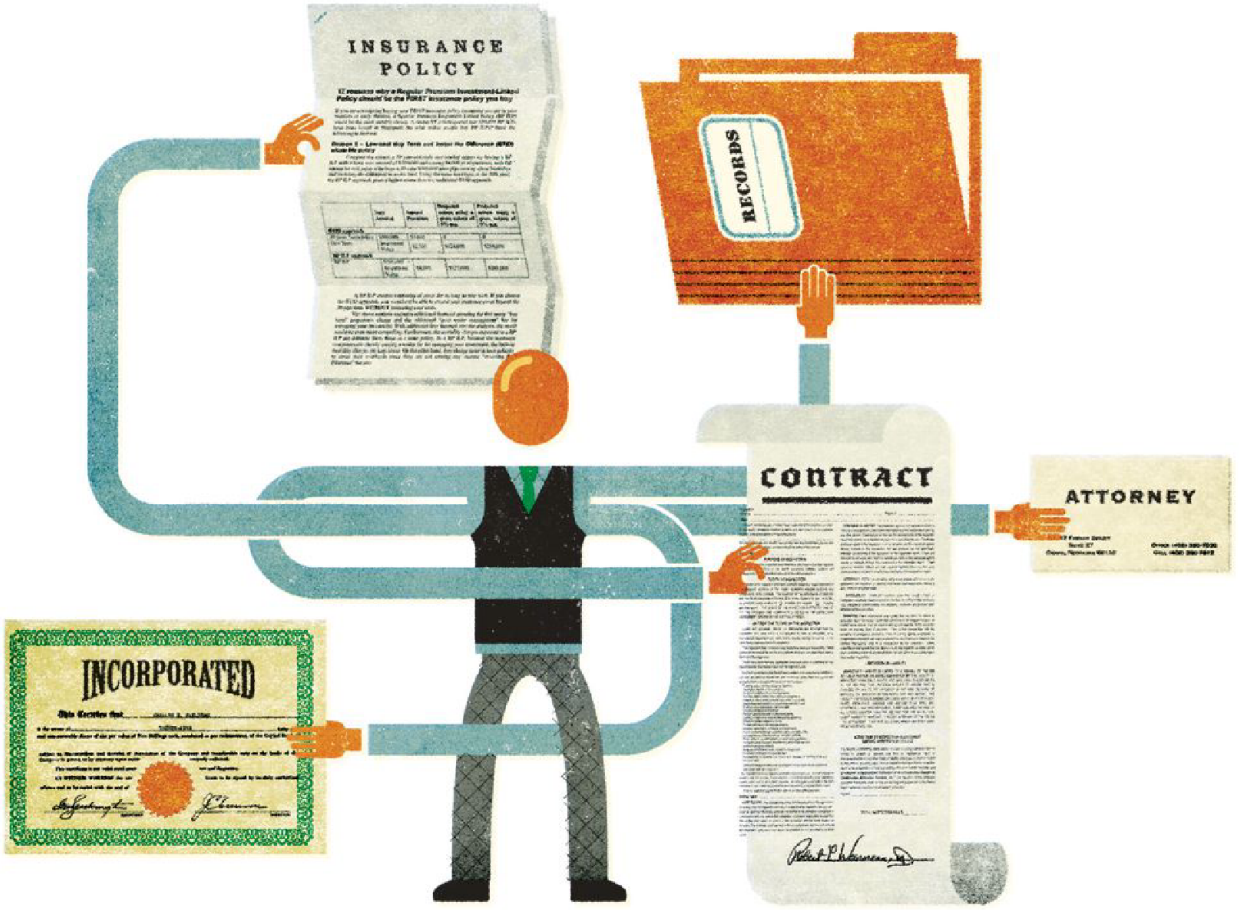

PROFESSIONAL PRACTICE

HANGING OUT A SHINGLE

Five areas of focus when starting a design firm.

text by Peter J. Lamont
illustration by Headcase

Starting a design firm requires patience, perseverance, focus, and planning. Unfortunately, many design entrepreneurs fail to spend enough time on the planning phase and ultimately lose the business or incur significant liability. But those who do put their resources into thinking through their business setup generally experience significant growth and success in their firm. Below, we address the five main areas that all designers should focus on prior to starting their own design firm.

Professional Services Support

The first and most often overlooked area of a design startup is the designer's need for proper support personnel. Most lighting designers who are contemplating starting their own firm have limited financial resources. The money that they do have is typically spent on office space, furniture and equipment, supplies, and marketing efforts. While these are certainly important, the two most important resources in which a designer should invest are a good accountant and an experienced business attorney. Designers starting out on their own often attempt to handle the accounting and legal aspects of their business by themselves. Concerned with incurring high accounting and legal service bills, they find Internet resources and stock forms appealing. Yet, while the low cost of these is attractive, the results and protections they provide are anything but.

On the other hand, there is no need to hire a huge accounting firm or a worldwide law office. There are plenty of established and experienced accountants and attorneys in every town and city. There are also a number of online directories that can assist designers when selecting professional service providers. One of the best websites for searching accountants is the CPA directory (cpadirectory.com), and for searching for attorneys check AVVO (avvo.com). Both sites provide detailed listings of accountants and attorneys as well as their backgrounds in specific areas of practice.

When hiring an accountant, look for one who is a certified public accountant, and whose office can provide you with business startup services in addition to bookkeeping and related assistance. Without an accountant, designers can expose themselves to tax liabilities and mismanagement of client funds.

When choosing an attorney, look for one whose practice area is focused around business

Peter J. Lamont is a business and commercial litigation attorney nationally recognized in a wide variety of highly specialized areas within the kitchen, bath, lighting, construction, and design industries. He routinely represents various national and international companies within the design sector, and has achieved the highest rating in both legal ability and ethical standards as awarded by AVVO (avvo.com).

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There are a number of ways in which a designer can do business. For example, an individual designer can operate as a sole proprietorship or a corporation. Two or more people interested in doing business together can form a partnership or a corporation. And there are variations on these basic formats, such as a joint venture or a professional corporation.

law and contracts. If possible, look for someone who has had experience representing design professionals. Also, many attorneys are now providing alternate fee arrangements for startup business services. Before meeting with an attorney, you should confirm that the attorney will not charge a consultation fee. If the attorney does, contact someone else.

Business Setup

Once you have selected your professional-services team, decide what business structure to establish and confirm that your business complies with any local, state, or federal licensing requirements. There is a tremendous amount of misinformation about the benefits and pitfalls of the various business structures. Your attorney and accountant can provide the most accurate information on this.

There are a number of ways in which a designer can do business. For example, an individual designer can operate as a sole proprietorship or a corporation. Two or more people interested in doing business together can form a partnership or a corporation. And there are variations on these basic formats, such as a joint venture or a professional corporation.

Sole Proprietorship

A sole proprietorship is the most basic and least formal business structure. Basically, the designer operates under his or her own name or under a "doing business under" name. In order to operate under an assumed name, either the designer or the designer's attorney must file paperwork with the county clerk or the state wherein they will operate.

Sole proprietors must also keep separate bank accounts for their business and home finances, but all income will be taxed on the designer's individual income tax return. But all liability remains the personal responsibility of the designer. Any settlements or judgments arising out of a lawsuit will come directly out of the designer's personal assets.

Incorporation

Many designers seeking to protect themselves from personal liability choose to incorporate. Incorporation is basically the process of the formation of a separate entity. The benefit of incorporating is that the designer and the business are no longer considered to be the same entity in the eyes of the law. Liability can attach to the corporation but not always to the individual designer.

A traditional corporation requires the filing of a Certificate of Incorporation and the distribution of stock. Incorporation also requires the formation of a board of directors to make major policy decisions and the delegation of officers to run the day-to-day affairs of the corporation. It is important to note that an individual designer can form a corporation; in this case, the designer simply wears multiple hats, meaning that he or she is the board of directors as well as all the corporate officers, and is usually the sole shareholder.

Contracts

You may be surprised to learn that many designers operate without a proper contract, relying on an architect's contract, a stock form contract from the American Institute of Architects (AIA), or, even worse, an email agreement or a purchase-order agreement. Without a properly tailored contract, designers will not be able to adequately protect their rights to payment or to protect themselves from liability.

Design contracts must be clear and easy to understand. Form contracts that contain legalese can be confusing and are often considered to be unenforceable by certain courts. The best contracts state the terms and conditions in clear and concise language.

One area of a contract that must specifically be addressed is the scope-of-work provision. This area gives rise to the most litigation. A designer must be clear in the contract as to the scope of the work, and must fully explain what he or she will and will not be doing. In the event that changes to the scope of work are required, these should be made part of the contract as addendums for change-order purposes.

Another significant area of a contract to consider thoughtfully are the indemnification provisions. In its most simple form, indemnification is a legal and contractual principal that requires a corporation or individual to hold another individual or entity harmless when faced with a particular set of circumstances. Indemnification provisions are often overlooked, but they can create a significant risk of liability if they are not properly developed.

An experienced business attorney will review contracts that a designer may be required to sign and can formulate the designer's contract to provide for maximum protection. While form contracts such as those prepared by the AIA may offer some basic protection to the designer, they are very general and fail to address particular issues relevant to a lighting designer. Thus, it is better business protocol to have an individually tailored contract prepared and reviewed on an annual basis.

Insurance

In addition to protection through the contract, lighting designers should obtain professional liability insurance. This type of insurance is widely available, generally affordable even for startup firms, and can protect the designer against various claims arising out of his or her professional design services.

A designer should enlist the help of an insurance broker who specializes in professional liability coverage. You should explain in detail the full extent of your services in order to obtain adequate coverage for your activities.

Typically, a professional liability policy will, for a fee, cover claims made against the designer that arise out of the rendering of professional design services. Such policies do not cover claims for nonpayment of fees by the designer's client. But when a designer sues a client for outstanding fees, the client routinely will bring counterclaims against the designer for professional malpractice or negligence, all in an effort to offset their payment obligations. In most circumstances, professional liability coverage would be triggered by such a counterclaim.

Many designers confuse general liability insurance with professional liability coverage. General liability insurance will not protect a designer from professional malpractice claims. General liability typically covers property damage and bodily injury claims. A designer who is opening a studio or an office and expects foot traffic may want to have general liability insurance to protect against claims made by a client who might be injured while on the premises. Many designers choose to forgo general liability insurance either as a cost savings or because bodily injury claims are limited, though. While general liability coverage is not necessary for every designer, professional liability coverage should be a basic staple of any lighting design practice.

Record Keeping

Liability can also be triggered as a result of poor or improper record keeping on the part of the designer. There are a few general rules with respect to record keeping that every new design business should adhere to. The first of these is that every client should have its own client file, and all communication between the designer and the client should be kept inside it.

A client file should be maintained in reverse chronological order, meaning that the most recent communication or correspondence should be on top. Every written piece of correspondence—including emails, letters, contracts, and drawing sign-off sheets—should be maintained in the file.

Another tenant of proper record keeping is that all verbal communication should be reduced to some form of writing. Verbal communication is often at the heart of a lawsuit concerning the designer's failure to provide proper services. Too frequently, designers do not keep records of telephone calls or face-to-face conversations and are forced to rely on memory—and memory does not hold much weight at trial. A far better practice is to take detailed notes of all telephone and verbal communications, which should include the date and name of the person with whom the designer is speaking. These notes also should be placed in the client file. When it is the designer's routine business practice to maintain notes of verbal communications, such communications may be deemed admissible at trial. Proper record keeping is a critical component in preventing unnecessary litigation and should not be overlooked by the designer.

Deciding to start one's own design firm—for lighting, architecture, or some other business—is no small undertaking. It is worth investing the time that is necessary to properly research the appropriate business model to use, as well as to determine the professional services support, both legal and financial, that you will need. Doing all of this will start your firm off on the right foot and put it on the path to success. More importantly, it means you can focus your time on design, which was the purpose of the business to begin with. To not invest in the proper planning is to put oneself at a disadvantage before you've even started your first project. •

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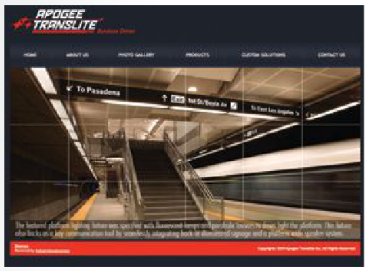

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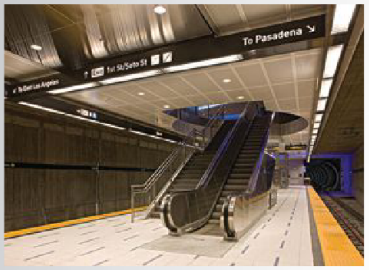

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Design & Engineering


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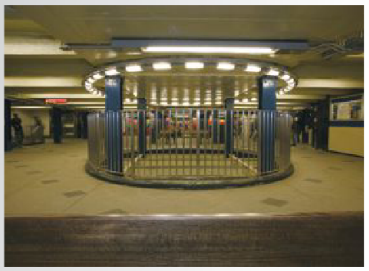
Linear Fluorescent, NYC


Tiara I, NYC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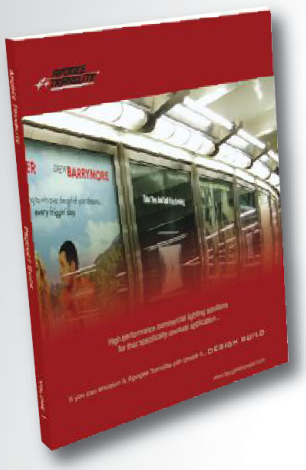

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REPORT

LONDON'S LEGACY

In lighting the Olympic and Paralympic Games, designers balance the needs for a high-profile identity today and a character that's appropriate for the years ahead.

text by Jeffrey Lee

There's a buzzword at the 2012 London Olympic and Paralympic Games, and it has nothing to do with Wenlock, the games' shiny, one-eyed mascot. "Legacy" is the word on the tip of everybody's tongue: From the 618-acre Olympic Park, set to become a focal point in the regeneration of its East London neighborhood, to new housing, transportation links, and utility infrastructure, the Olympic organizers hope that the massive development for the games will bring about a lasting physical and social transformation in London.

The lighting strategy was no different. It had to meet the Olympic Park's games-time needs—creating a positive experience for visitors while also minimizing costs, energy consumption, and environmental effect. And it also had to account for the site's future as a central urban parkland.

"Inevitably, the specifications for safety and security during an event in which there will be tens of thousands of visitors in the park are different than what you'd expect to find in a typical London parkland in the future," says Mark Major, director and founding partner of Speirs + Major, the firm appointed as lighting design advisers to the Olympic Development Authority, in prepared comments. "To that end, we followed the ODA's approach of planning games and legacy in tandem to ensure that high-quality and safe lighting would be procured in a form appropriate for the future."

Architects and lighting designers for the new Olympic venues brought that philosophy to each project. Architect Populous's design for the Olympic Stadium venue, for example, includes a demountable upper tier that allows the stadium to be reduced from a capacity of 80,000 during the games to 25,000 for future use.

"We took it on with the motto that we would embrace the temporary," says Mark Craine, the firm's associate principal. Spectator lighting inside the stadium will be kept low to maintain the powerful effect of the fabric wrap that dresses the stadium's exterior. Sports lighting will be installed on 14 30-meter-tall (98-foot-tall) towers mounted on the stadium's inner tension ring in order to avoid creating glare for broadcast cameras. "Trying to keep things small and efficient has led to us having to be fairly ingenious about not only the design, but the buildability of the stadium," Craine says.

Populous's approach was just one of the resourceful architectural and lighting strategies used for the Olympic and Paralympic Games in response to the legacy goals. In the pages ahead, we highlight this and eight more sites that will greet visitors from around the world—and which will meet London's needs for the years ahead.

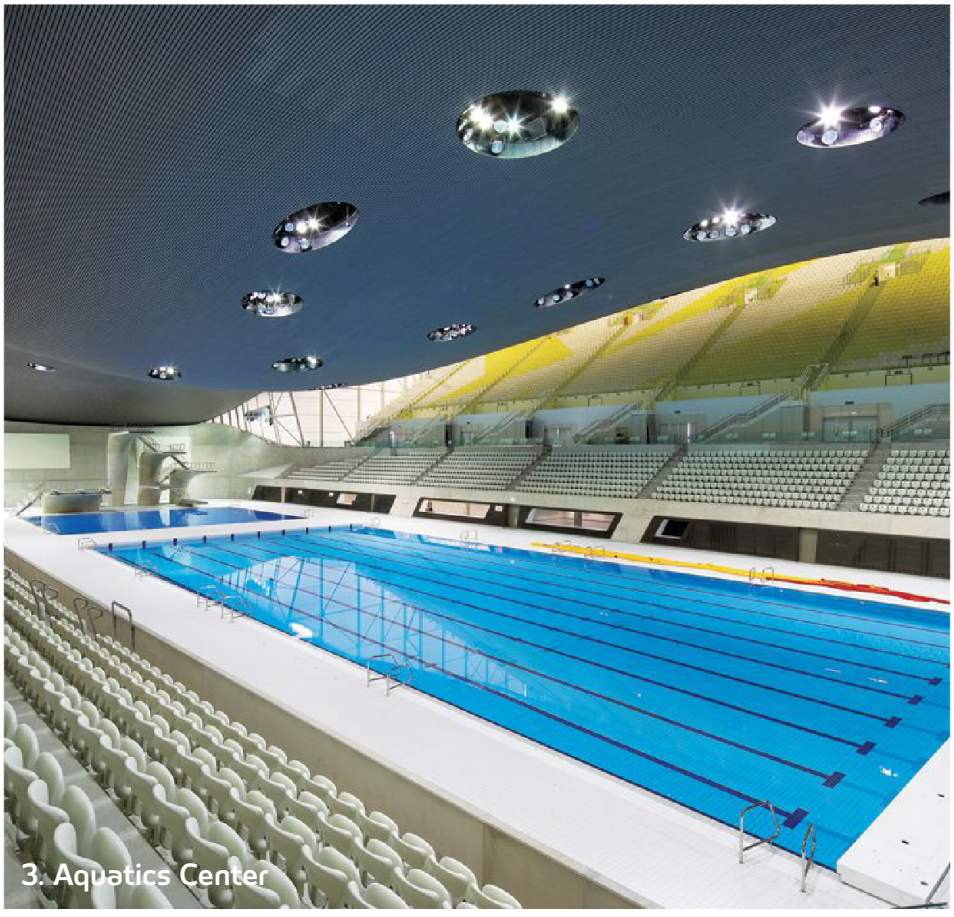
Venue: Central Park Bridges
Architect: Heneghan Peng Architects, Dublin
Lighting Designer: Arup, London
Olympic Use: The bridges span the River Lea at a focal point between the Olympic Stadium and Aquatics Centre; a multicolored temporary deck between the permanent spans of the bridge increases the width during the games, allowing it to carry more spectators.
Legacy Use: The temporary bridge surface will be removed to create new links from the Olympic Park concourse level to the river towpaths and Carpenters Lock, a 1930s historic structure on the River Lea.
Architectural Features:
• Two permanent footbridges are linked by a narrow, diagonal walkway, creating a "Z" shape.
• Bridges clad in mirror-finish stainless steel.
• Temporary bridge deck will be covered with a multicolored rubber surface, inspired by the colors of the Olympic rings.

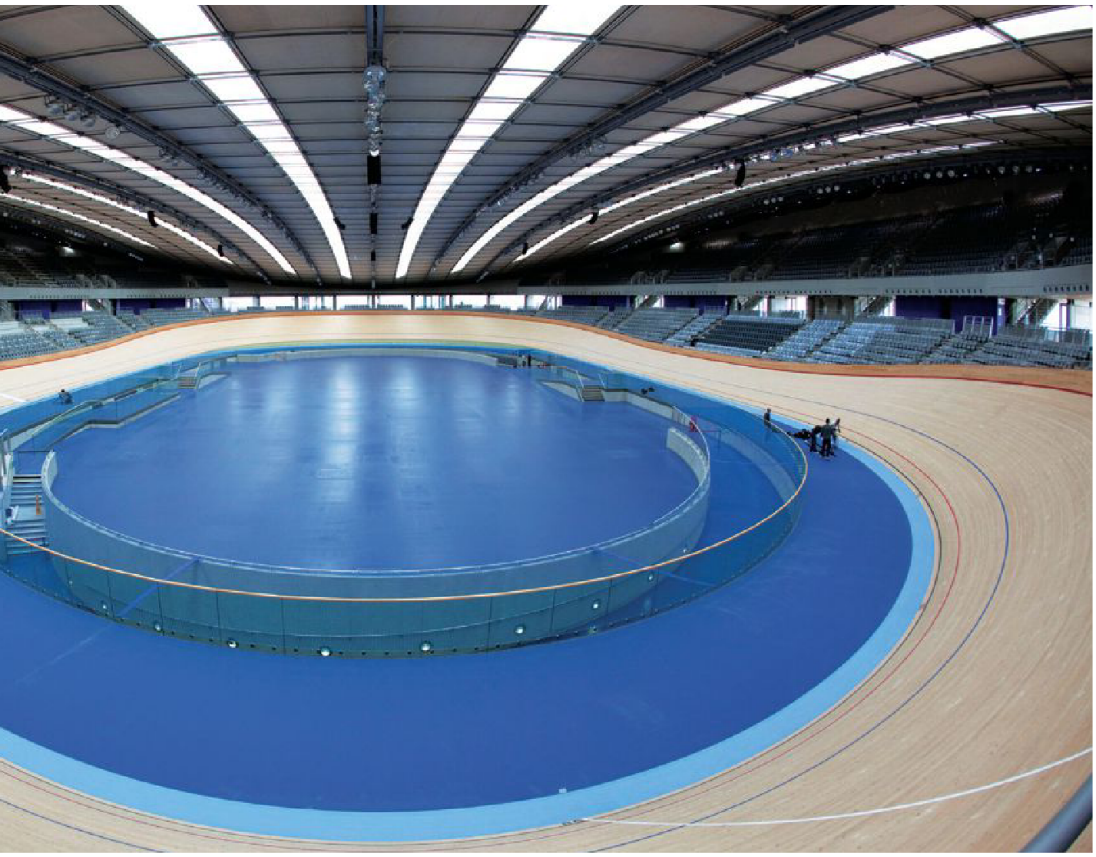
Venue: Olympic Stadium
Architect: Populous, London
Lighting Designer: Buro Happold, London and Bath, England, and Edinburgh, Scotland
Project Size: 40 acres (total site); Olympic Stadium has a perimeter of 860 meters (2,821 feet); and the field of play is 20,000 square meters (215,278 square feet)
Olympic Use: The stadium will host the opening and closing ceremonies, as well as the track and field events. The permanent lower tier has a capacity of 25,000 seats; a temporary upper tier holds 55,000 additional spectators.
Legacy Use: The stadium will remain under public ownership and will host other sporting, cultural, and community events, including the 2017 World Athletics Championships.
Architectural Features:
• Upper tier uses off-the-shelf, temporary seating, and its lightweight steel structure is designed to be demountable and dismantled after the Games.
• Lower tier sits in an excavated bowl in the ground, reducing overall amount of construction materials.
• Upper-tier black-steel structure hidden behind fabric wrap.
• White steel structure supports a cable-net roof system that covers two-thirds of the seating with a 25,500-square-meter (274,480-square-foot) white fabric canopy.
• Construction used 10,000 tonnes (11,023 tons) of steel, about one-tenth the amount used in the 2008 Olympic stadium in Beijing.
• Spectators will reach the stadium, which is surrounded by waterways on three sides, via five bridges that link the site to the surrounding area.
Lighting Design Features:
• Sports lighting is housed on 14 lighting towers, each 28 meters tall (92 feet), weighing 34 tonnes (37.48 tons), and reaching 70 meters (230 feet) above the field in order to prevent glare to broadcast cameras.
• Sports lighting was studied in and tested on the ground to avoid the need for modifications after the tower erection.
• Darker space between the exterior fabric wrap and the seating creates a theatrical transition area between the festival-like exterior concourse and the bright lights inside the stadium bowl.
• Low-powered spectator lighting, most at a height of less than 10 feet, avoids lighting interior of fabric wrap to allow for more-dramatic exterior feature lighting.

Venue: Velodrome
Architect: Hopkins Architects, London
Lighting Designer: BDSP, London


1. Central Park Bridges and Olympic Stadium


2. Velodrome


3. Aquatics Center



Project Size: 233,576 square feet
Olympic Use: The venue for the track-cycling events has capacity for 6,000 spectators, with the seating split into two tiers. The adjacent 400-meter BMX track will hold BMX cycling events.
Legacy Use: After the games, the Velodrome will continue to be used for international cycling events as well as by the community. The surrounding Velopark will be transformed to include a road-cycling circuit, mountain bike trails, cycling speedway, and a modified BMX track.
Architectural Features:
• Glass wall around the venue's perimeter, between the lower and upper tiers of seating, gives spectators a 360-degree view of the Olympic Park.
• Concourse visually separates the upper bowl (clad in FSC-certified Western Red Cedar) from the ground floor, which is largely hidden behind landscaped earth berms.
• Natural ventilation eliminates mechanical air-conditioning.
• Designed energy-efficiency improvement of 31 percent over building regulations makes it most energy-efficient venue on the Olympic Park.
Lighting Design Features:
• Abundance of natural light reduces the amount of energy needed for electric lighting.

Venue: Aquatics Centre
Architect: Zaha Hadid Architects, London
Lighting Designer: Arup, London
Project Size: 215,278 square feet
Olympic Use: The Aquatics Centre will have a capacity of 17,500 during the games, hosting swimming, diving, synchronized swimming, water polo finals, and the swimming portion of the Modern Pentathlon.
Legacy Use: The venue will be reduced to a maximum capacity of 2,500 (with the ability to add 1,000 for major events). It will provide two 50-meter swimming pools with movable floors and separation booms, a diving pool, and dry diving area for a variety of swimming-event use.
Architectural Features:
•The undulating roof, inspired by water in motion, is 160 meters (525 feet) long and 90 meters (295 feet) wide at its broadest point. The steel structure rests on three supports and has an aluminum covering, half of which is recycled-material content.
• Its location along the new Stratford City Bridge makes the building the main gateway into the Olympic Park.
• 100-percent-recycled aggregate used on almost all of the concrete.
• GGBS (Ground granulated blast-furnace slag, a byproduct of steel manufacture) reduced the cement requirement by 50 percent.
• Overflow pool water is reused in flushing toilets.
Lighting Design Features:
• Lighting-bubble recesses in the main pool-ceiling provide glare-free lighting.

Venue: Handball Arena
Architect: Make, London
Lighting Designer: Arup, London
Olympic Use: The venue will accommodate 7,000 spectators and host the handball competition and the modern pentathlon in the Olympics, as well as the goalball competition in the Paralympics.
Legacy Use: The building will convert into a multisports community venue with a seating capacity of 6,000. The arena will also include a health and fitness club and café for use by local residents.

4. Handball Arena

Page 19: Courtesy London 2012. This page: Courtesy London 2012, except for No. 3, by Hufton + Crow.

Architectural Features:
• Façade is clad in sustainably sourced copper, earning the venue its "Copper Box" moniker. The copper will develop a rich, natural patina as it ages.
• Rainwater-harvesting system collects water from the roof.
• Retractable seating can change the floor size, facilitating different activities during and after the games.
Lighting Design Features:
• The roof incorporates 88 custom light-pipes, drawing natural light into the venue with the goal of achieving energy savings of up to 40 percent.
• For televised events, blackout shutters built into the light pipes allow electric light to take over and deliver consistent illumination for broadcast requirements.
• Glazed concourse level encircles the building, illuminating the venue at night.

Venue: Basketball Arena
Architect: Wilkinson Eyre Architects, London
Lighting Designer: United Visual Artists, London
Olympic Use: The arena will have 12,000 seats for the basketball and handball competitions and a reduced capacity of 10,000 for wheelchair basketball and wheelchair rugby during the Paralympic Games.
Legacy Use: The arena will be taken down after the games, with parts reused or relocated elsewhere.
Architectural Features:
• Steel frame wrapped in 20,000 square meters (215,278 square feet) of recyclable white PVC membrane, stretched over three different arched panels.
• Two-thirds of the materials and elements within the building can be reused or recycled after the games.
Lighting Features:
• During the games, the exterior will act as a canvas for an artistic lighting design that will turn the audience into participants.

Venue: Olympic Parklands and Public Realm
Architect: LDA Design, London, and Hargreaves Associates, London
Lighting Designer: Sutton Vane Associates, London
Project Size: 618 acres (26,909,776 square feet)
Olympic Use: Designed to host hundreds of thousands of visitors each day during the Olympic and Paralympic Games, the Olympic Park is the site of eight venues and will host a number of attractions and events. It includes large areas of concourse linking the venues, spectator lawns for breakout spaces, and landscape features such as the London 2012 Gardens and the Great British Garden.
Legacy Use: Parklands will be transformed into a permanent urban park to catalyze regeneration in East London.
Architectural Features:
• Divided into four zones, each with a unique atmosphere.
• Site's hourglass shape divides the park into a wilder northern half and more urban southern half connected by improved river banks.
• Previously canalized River Lee transformed into wetland, swales, woodland, and meadow, forming an absorbent flood-control measure.
• 95 percent of existing site material will be recycled within the park.
Lighting Design Features:
• During the games, temporary, galvanized-steel,


5. Basketball Arena


7. Shooting Venue and Royal Artillery Barracks

6. Olympic Parklands

8. Olympic Village

Courtesy London 2012, except for No. 6, courtesy LDA Design.

10-meter-high (32.8-foot-tall) lighting columns housing a cluster of medium-beam spotlights (3000K ceramic metal halide lamps) will light common areas. After the games, columns and luminaires will be removed and reused or recycled as part of a buy-back program.

• Seven Memory Masts designed by Sutton Vane Associates illuminate the concourse and will provide a permanent reminder of the event. Each 32-meter-tall (105-foot-tall) mast will have a vertical wind turbine uplit by 12 luminaires. A ring of LEDs can change color in sequence from mast to mast.

• Lux levels will vary from an average maintained illuminance of 30 lux (15 lux minimum) for highly populated concourse areas to 15 lux average (5 lux minimum) for general routes. Light levels will be reduced after the games so that areas such as towpaths will have 5 lux average (1 lux minimum).

• After the games, main lighting will occur via 6-meter-tall (19.8-foot-tall) columns with replaceable LED lanterns. Each LED luminaire contains state-of-the-art lamp and gear technologies with a sealed optical-lens array providing an even distribution of layered light. An energy-saving step-down control ballast was used so that light levels could be reduced after the games. The majority of the columns have photovoltaic panels that feed energy into the grid, which is more efficient than powering the lighting directly.

• To minimize light pollution and concentrate footfall at night, only key routes will be lit.

• Lighting strategy identifies dark zones, free from electric light, in order to be sensitive to wildlife.

Venue: Shooting Venue at Royal Artillery Barracks
Architect: Magma Architecture, Berlin
Olympic Use: Three temporary indoor ranges will be used for pistol and rifle shooting; three outdoor ranges will host trap and skeet events and Paralympic archery. Each shooting range will have temporary grandstands.
Legacy Use: The venue will be dismantled and the site will be returned to the Ministry of Defence. The enclosure can be rented and reused after the games.
Architectural Design Features:

• Indoor range structure will be clad in 18,000 square meters (193,750 square feet) of PVC membrane.

Lighting Design Features:

• Vibrantly colored openings break up the white façade and provide natural ventilation and light.

Venue: Olympic Village
Architect: Fletcher Priest Architects, London
Lighting Designer: Speirs + Major, London
Olympic Use: The village has residential apartments for 17,000 athletes and officials, along with shops, restaurants, medical and leisure facilities, and large open spaces.
Legacy Use: Apartments will be retrofitted by removing partitions and adding kitchens, transforming the village into 2,818 new homes, including 1,379 affordable homes and houses for sale and rent, and creating a new residential neighborhood that will be called East Village. The neighborhood will also have new parklands, transportation links, and community facilities.
Architectural Features:

• Eleven residential plots are built around communal squares and courtyards, a traditional London layout that also offers private space to athletes.

Lighting Design Features:

• Detailed daylight and sunlight analysis for the residential blocks ensure that the buildings meet planning requirements for natural light.

• Bedroom blackout curtains help athletes get daytime rest.

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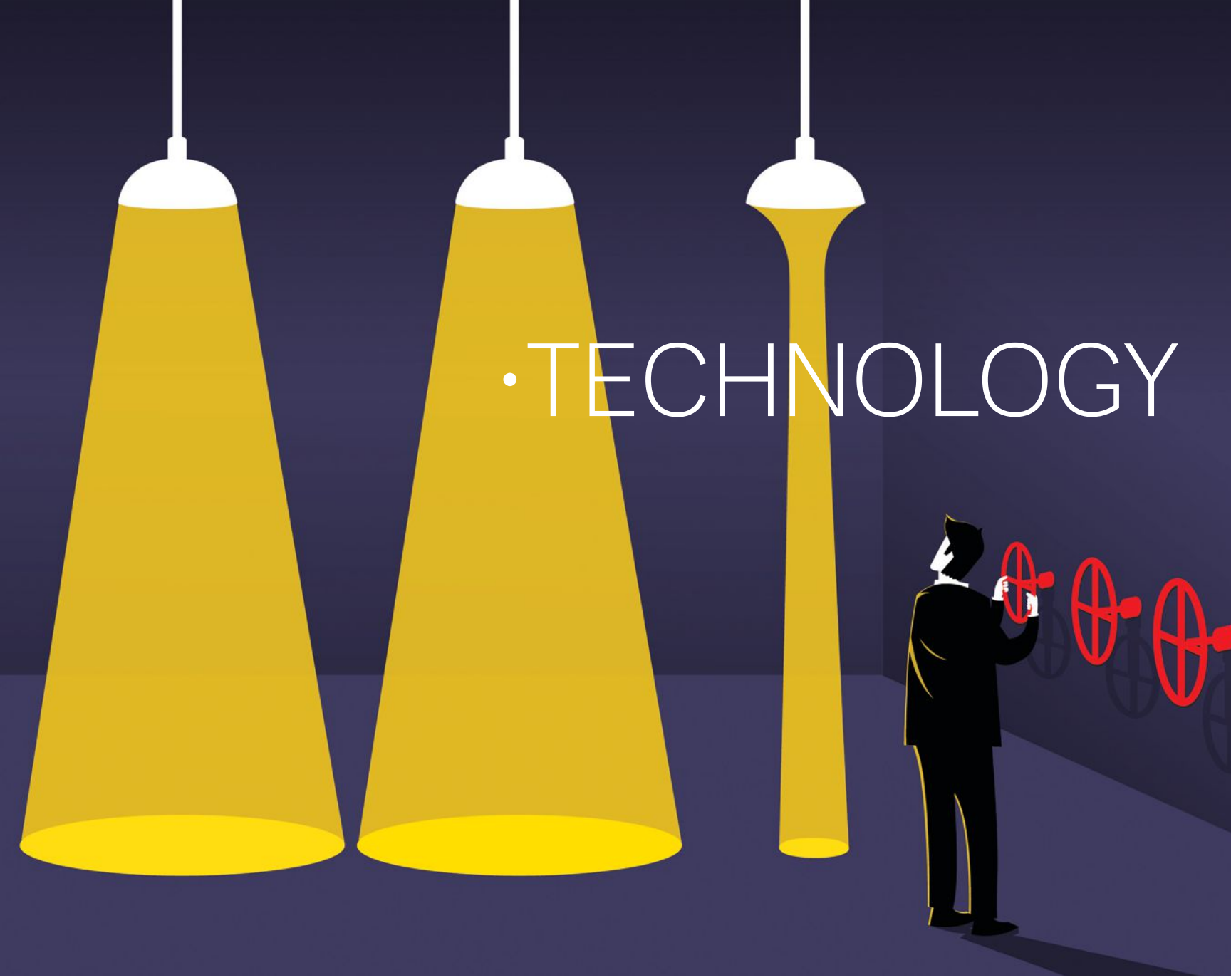

CONTROL INTEGRATION

As lighting technology evolves, illumination and control capabilities are becoming integrated.

text by Craig DiLouie
illustration by Tang Yau Hoong

Lighting controls have always been an essential component of a lighting system, as they enable basic functionality: turning lights on and off, and dimming. But today, these functions are being automated in order to reduce energy consumption—a trend driven by sustainable design and commercial-building energy codes, which have made automatic controls a staple in new construction. According to a new study—"A Meta-Analysis of Energy Savings from Lighting Controls in Commercial Buildings," prepared by Lawrence Berkeley National Laboratory (LBNL) in Sept. 2011, in which 88 papers and case studies were analyzed—popular lighting control strategies yield an average of 24 to 38 percent lighting-energy savings in commercial buildings.

As lighting designers, clients, and building owners require greater functionality for lighting controls, more sophisticated lighting-control solutions are being specified. Traditionally, these lighting controls were built as systems separate from the luminaire. But a growing number of luminaire manufacturers are beginning to integrate lighting controls as product components, enhancing visual aesthetics while simplifying design and installation.

Control Trends

Lighting controls are input–output devices. The input can be manual, such as changing the slider on a dimmer (intended to support

Lighting-control outputs are highly compatible with solid-state lighting. LED luminaires are instant-on, and frequent switching does not decrease diode life, making them suitable for use with occupancy sensors. Dimming not only saves energy in a linear relationship between light output and power across most of the dimming range, but it can also extend the lives of these products.

a visual change, but with energy savings as a byproduct). Or the input can be automatic, such as with an occupancy sensor (intended to manage energy use). The output is the power that the controller allows through to the lighting load, using either switching or dimming, depending on how much flexibility is desired. If the controller is intelligent, it can make decisions based on a programmed optimal output.

Specific lighting-control options include the aforementioned occupancy controls, which reduce lighting based on occupancy (indoors) or motion (outdoors), and daylight-based controls, which reduce lighting based on daylight availability. In both, input is automatic and output may be switched, step-switched, step-dimmed, or continuous-dimmed.

Additionally, personal tuning provides individual-user control of light levels to support visual needs; the input is manual and the output may be the same as for automatic controls. And institutional tuning serves groups using ballast-factor reduction, high-end trim, and manual group controls.

Over the past 10 years, energy codes have encouraged the growth of these options by requiring space controls and automatic shutoff; the LEED system has also helped by promoting daylight harvesting. In addition, the decentralization of commercial-building controller function and system intelligence has encouraged the use of luminaire-integrated control systems for code-compliant lighting designs.

Luminaire-Based Control

There are a number of different approaches to configuring a lighting control system. One option, a simple occupancy-sensing or daylight-harvesting system, includes a sensor element and a controller that controls power to the lighting load, which may include a fixed-output or dimmable ballast. A digital dimmable ballast also could serve as the controller.

Any of these elements may be specified as part of a luminaire. Integrating the sensor into the luminaire can achieve several benefits:

- Aesthetics can be improved, as the sensor is removed from the ceiling plane.
- When suspended luminaires are used, the sensor gains an unobstructed view of its coverage area, and is closer to the task, resulting in greater alignment between the light level falling on the sensor and that falling on the task.
- Control design and installation are simplified, as the sensor and controller are pre-installed in the luminaire, with no additional low-voltage wiring required.

A growing number of lighting manufacturers are offering integrated control options for their general lighting products, but they're taking different approaches. In general, they are either offering a product that contains an individual sensor supplied by a control manufacturer, or partnering with that control manufacturer for a broader solution.

Finelite, for example, offers luminaires with either an integral switching or continuous-dimming light sensor from WattStopper; a continuous-dimming light sensor from Philips; or a continuous-dimming light sensor from Lutron, which is compatible with EcoSystem ballasts and controls. This means that when you specify fixtures with integral control options, you need to familiarize yourself with the control manufacturer and its products—because, essentially, in cases such as that one, there are two manufacturers being specified.

Daylight harvesting is another popular application for luminaire-integrated sensors and controls, making control of individual luminaires possible (although multiple lights can be connected to create larger zones that respond to a single input). So if you have a series of suspended fluorescent luminaires mounted in rows perpendicular to a window, the fixture in each row closest to the window can be specified with onboard photocontrol for daylight harvesting. Alternately, if the rows are mounted parallel to the window, a single luminaire with an integral light sensor may serve to control the entire row as a single zone. Solutions are thus possible for virtually any luminaire configuration in the daylit area.

Some manufacturers offer their luminaires packaged with a broader control system to offer solutions for certain applications. And some of those now offer integrated classroom lighting systems that provide flexibility and energy savings. Prudential's Sense family of fixtures, for one, includes dimmable ballasts; teacher manual controls that provide switching from general to A/V modes, with dimming available in the A/V mode; luminaire-integrated light sensors for daylight harvesting; and a ceiling-mounted occupancy sensor for automatic shutoff.

Another interesting application for integrated control is stairwell lighting, which is typically operated continuously, although research suggests the average stairwell is occupied for less than 5 percent of the day. A growing number of stairwell-lighting products feature occupancy sensors that switch or dim from full output (e.g., 10 footcandles) during occupancy to a lower level (e.g., 1 footcandle) when the stairs are unoccupied.

While many manufacturers now offer an integrated control option, at least one lighting-controls company, Lutron, has a line of fixtures with dimming ballasts and other control options automatically pre-installed, including high bay, linear recessed, CFL and LED downlights, videoconferencing, and stairwell retrofits.

Expanding Wireless

With luminaire-integrated controls, sensor placement is limited by fixture placement, and creating control zones for multiple lights is tied to hardwiring between the sensor and the luminaire controllers. For applications requiring greater flexibility, some manufacturers offer wireless controls. Such sensors, switches, and dimmers are placed where needed, and send signals to receivers or transceivers and controllers that are pre-installed in the fixture. These input devices can communicate with multiple fixtures, allowing the creation of control zones without hardwiring.

A number of companies already offer wireless control as an option for their luminaires. Hubbell Outdoor Lighting's system offers the Hubbell Building Automation's wiHUBB System, which consists of a self-organizing, self-healing mesh network of wireless luminaire-integrated receivers–controllers, occupancy sensors, light sensors, and switches.

LaMar Lighting also offers an integrated wireless-control system, Control-Smart, as an option with its fixtures. These wireless controls are based on the EnOcean standard, making the switches and sensors self-powered—that is, they are able to operate without the need for batteries.

Lutron puts wireless technology to use with its PowPak stairwell-retrofit luminaire, which contains a digital-dimming ballast, preprogrammed with occupied and unoccupied light levels that can be changed in the field. The luminaire accepts signals from a wireless occupancy sensor, and raises or lowers output accordingly. This allows the sensor to be placed wherever it is needed in the stairwell, avoiding blind spots. Additionally, the sensor not only raises the output of the luminaire that covers the occupied portion of stairwell, but also the output of the luminaire on the floor above and the floor below, providing a relatively seamless experience for occupants.

Solid-State Lighting Control

Lighting-control outputs are highly compatible with solid-state lighting. LED luminaires are instant-on, and frequent switching does not decrease diode life, making them suitable for use with occupancy sensors. Dimming not only saves energy in a linear relationship between light output and power across most of the dimming range, but it can also extend the lives of these products.

LED systems are compatible with basic control strategies such as manual dimming, occupancy sensing, time scheduling, and daylight harvesting. Advanced strategies such as lumen management, high-end trim tuning, and demand response can also be implemented, taking advantage of solid-state lighting's inherent compatibility with digital controls. LED luminaires can monitor characteristics such as occupancy, light level, ambient temperature, product light-output and life, and system faults, and can subsequently respond in preprogrammed ways using onboard logic to optimize energy use and maintenance.

Digitally addressable, the LED luminaire can network with control devices and other fixtures, enabling centralized control and information feedback. One interesting example of integrated LED control is Lithonia's RTLED recessed volumetric-distribution fixture, which contains embedded nLight control technology from fellow Acuity brand Sensor Switch. The luminaire dims to 5 percent using zero-to-10V DC control; a fully operational lighting and control system can be constructed by simply connecting the luminaires. Additionally, the nLight controller underdrives the fixture to deliver constant light output over the product's rated life, in addition to saving energy. Each luminaire tracks its own operating hours and provides a visual indicator that it has reached the end of its service life.

Digital Lumens also offers intelligent, industrial high-bay LED luminaires with a built-in occupancy sensor, light sensor, an onboard controller that tracks power use and occupancy, and wireless mesh networking.

NXP (formerly a division of Philips) offers the GreenChip, a technology built into solid-state and compact fluorescent lighting that gives each luminaire or lamp its own IP address and wireless ability, enabling new ways to control lighting and manage energy use.

The Sylvania Ultra LED BR30, an energy-saving 12W replacement for 65W incandescent BR30 lamps, features integrated dimming control, operated using a handheld remote that can be used to recall lighting scenes from a network of up to 50 lamps.

The ultimate solution, though, is integrated networking, in which DC devices such as LED luminaires and lighting controls are served by a low-voltage cabling system that forms both a communication network and power grid. This simplifies the wiring and increases the efficiency of the system. Luminaires and controls connect to the power system by using snap connections to access power and communication. Redwood Systems offers a fully developed proprietary solution, while the EMerge Alliance is promoting building DC power standards and compliant solutions from its member companies—which includes Crestron, Leviton, Sensor Switch, WattStopper, and a number of lighting manufacturers.

Lighting controls have become a critical part of today's lighting design. Manufacturers offer a wide range of fixture and controls solutions—from luminaire-integrated sensors and controllers, to complete hardwired and wireless control systems, to sophisticated embedding control capability into the actual light source. And as clients and projects continue to call for greater functionality in order to provide higher-quality illumination and energy savings, these solutions will only become more commonplace and continue to evolve in capabilities. •

Craig DiLouie, principal of Zing Communications, has been a journalist, educator, and marketing consultant in the lighting industry for more than 20 years.

LEADING LUMINAIRES

Some of the mony lighting offerings seen on display at Light+Building in Frankfurt this post April.

text by Elizabeth Donoff

Tam Tam, Marset • This playful assemblage of light is composed of a large central shade in lacquered aluminum surrounded by a series of smaller shades. The large shade measures 19.6 inches in diameter and the smaller shades, which can be rotated 360-degrees, each measure 13.77 inches in diameter. Tam Tam takes either a 20W E27 lamp or a 42W compact fluorescent. The light is softened with an opalescent, methacrylate diffuser. The luminaire is available in several configurations, including as a suspension lamp with either three or five surrounding shades, or as a wall lamp with either one or two shades. Shade colors are available in black, white, orange, brown, green, or gray. • *marset.com* • Circle 125

Orio, Ansorg • Designed in cooperation with architect Antonio Citterio, the new Orio LED spotlight features a dynamic form-factor, for maximum flexibility in retail settings, and advanced reflector technology. An articulated joint between the ballast housing and the luminaire head enables Orio to be positioned in any direction—from 180-degrees horizontal to 90-degrees vertical and everything in between. The compact fixture head incorporates a circular array of 10 3000K LEDs, and the lens attachments refract the light into specific beam angles—these are available in spot, medium-flood, flood, and elliptical. The fixture has two mounting options: a three-current power-track adaptor or recessed. • *ansorg.com* • Circle 126

Light Board, Erco • This new family of LED luminaires includes spotlights, floodlights, and wallwashers, and is designed specifically for exhibit and retail lighting. The luminaires all feature Erco's Spherolit lens technology that collimates the light for effective distribution, whether it be for a narrow or a wide beam angle. The overall compact design of the cast-aluminum housing integrates the control gear and hides the wiring, and its modularity also provides flexibility for lumen packages up to 4,320 lumens. Fixtures can either be track mounted or ceiling recessed. • *erco.com* • Circle 127

Hornet

Hornet Recessed Trimless Multiple

Hornet Recessed Multiple

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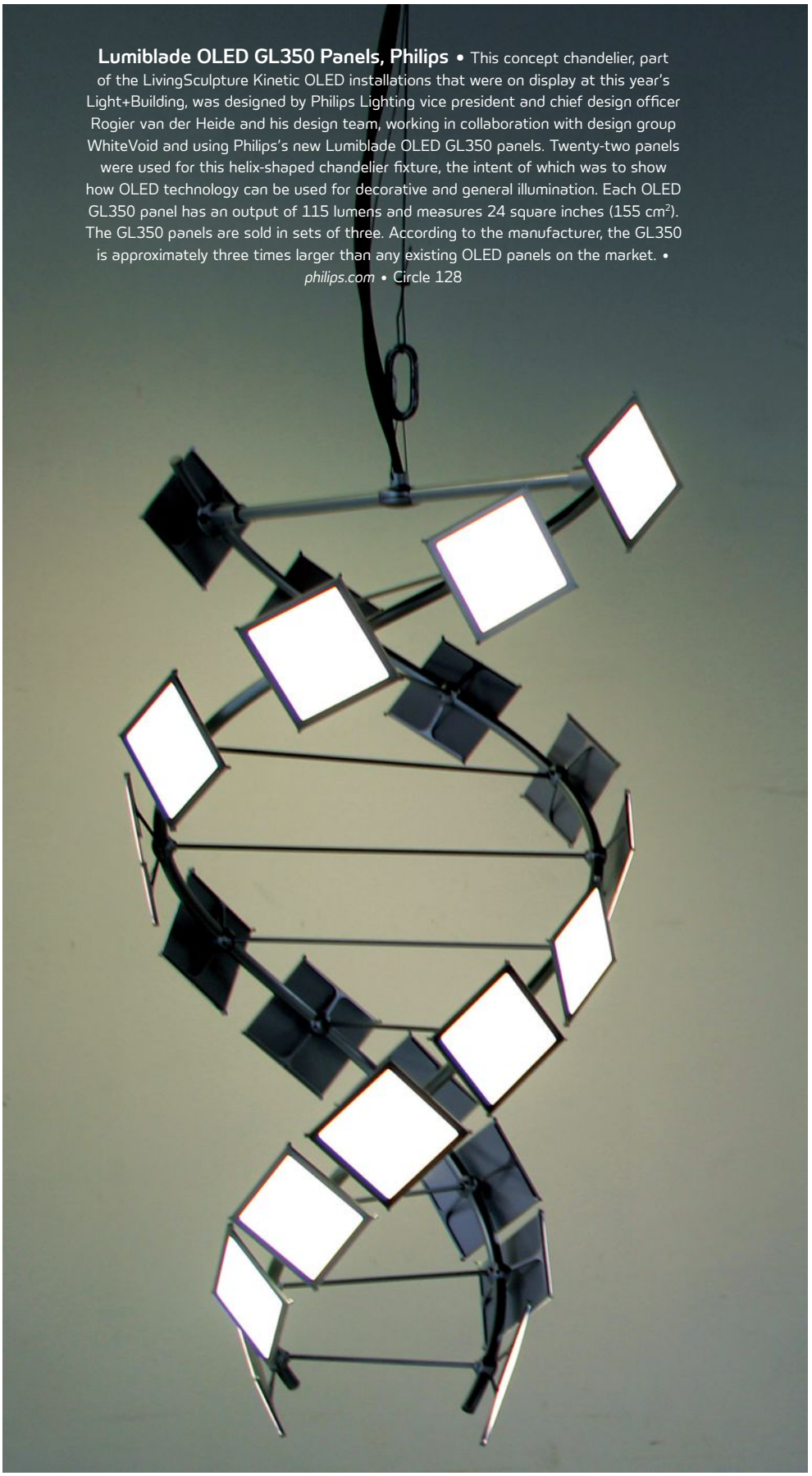
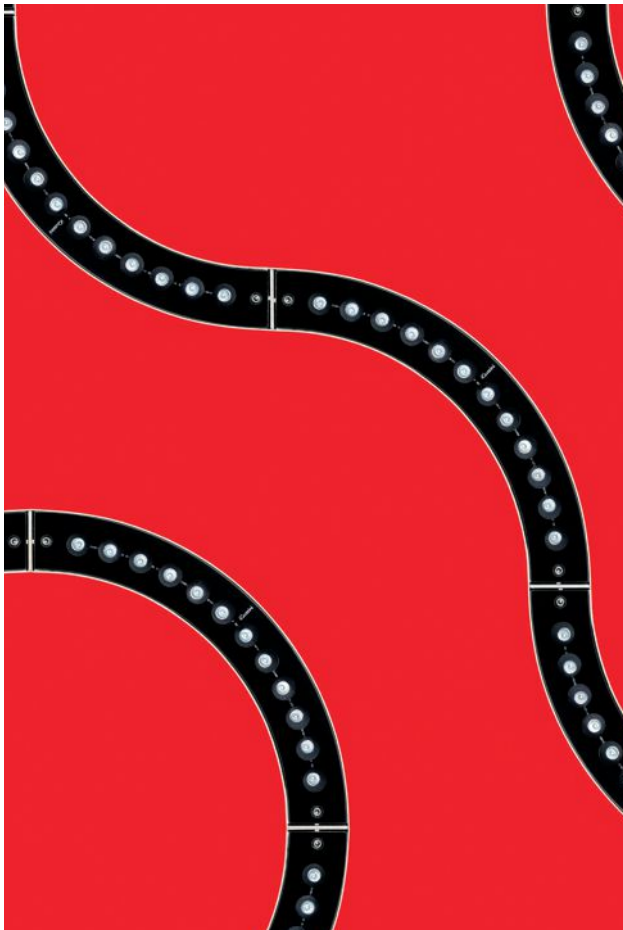
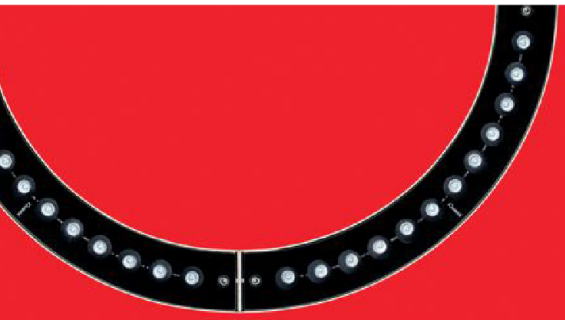


Lumiblade OLED GL350 Panels, Philips • This concept chandelier, part of the LivingSculpture Kinetic OLED installations that were on display at this year's Light+Building, was designed by Philips Lighting vice president and chief design officer Rogier van der Heide and his design team, working in collaboration with design group WhiteVoid and using Philips's new Lumiblade OLED GL350 panels. Twenty-two panels were used for this helix-shaped chandelier fixture, the intent of which was to show how OLED technology can be used for decorative and general illumination. Each OLED GL350 panel has an output of 115 lumens and measures 24 square inches (155 cm^2). The GL350 panels are sold in sets of three. According to the manufacturer, the GL350 is approximately three times larger than any existing OLED panels on the market. • *philips.com* • Circle 128

You-Turn, DeltaLight • The You-Turn family of luminaires has newly introduced a surface-mounted and track version (shown). You-Turn can be tilted up to 90 degrees and rotated up to 350 degrees, and the fixture head is 4 3/4 inches in diameter. Multiple light source options are available, including 6W to 8W 3000K LEDs, ceramic metal halide, or halogen lamps. The luminaire design features no visible screws and the housing is available in either a white or a black finish. • *deltalight.com* • Circle 129



VFL LED Street and Area Lighting Series, We-ef • The VFL LED Street and Area Lighting Series of luminaires features advanced reflector and lens technologies under the company's proprietary IOS Innovative Optical System. This system efficiently directs light to the task while providing even illumination. The VFL series is available in three models—VFL530, VFL540, and VFL560—offering lumen packages from 6,000 to more than 12,000 lumens. Single- or double-arm (shown) mounting options are possible. The luminaires can also incorporate the company's Eco Step Dim light-management system to control and monitor the luminaire's function—no matter how small or how large the network of fixtures. • *we-ef.com* • Circle 131



Lun-up, iGuzzini • From lighting designer Dean Skira, this quarter-round LED luminaire has a small footprint (approximately 12 inches long) and is designed for outdoor installations. It can be configured as a full circle, a half circle, a quarter circle, or any other variation on a curved line. The housing is composed of die-cast aluminum and can be installed directly inground, in other paving materials, or vertically. It is available in both a white LED and an RGB version, and is compatible with DALI and DMX protocols for color-changing and other lighting effects. IP67-rated, it has an F seal for water resistance. • *iguzzini.com* • Circle 130

Avanza, Selux • This family of outdoor luminaires features a compact design and advanced LED technology. Avanza is available in two sizes—the 450 (whose fixture head measures approximately 18 inches long by 4 inches deep) and the 600 (whose fixture head measures approximately 23 1/2 inches long by 4 inches deep). A patented optics system, called Cross Beam Technology, provides uniform illumination and arranges the LEDs (3000K or 4500K) in clusters targeted to the application. Different reflectors are available for roadway lighting. The housing is composed of high-pressure, die-cast aluminum in a graphite finish. Avanza is IP66-rated. • *selux.com* • Circle 132


EXIT

SAVING SAARINEN

After decades in the dark, Eliel Saarinen's original coffered ceilings at the Cranbrook Art Museum are restored by the lighting designers of SmithGroupJJR.

text by Elizabeth Evitts Dickinson

photos by James Haefner, except where noted

The signature coffered ceilings in the Cranbrook Art Museum have been restored to their former illuminated elegance, as originally envisioned by architect Eliel Saarinen in his 1942 design. The difference today is the light source; LEDs replace the original fluorescent system (this page). Saarinen used the attic space above the ceiling to house the lighting components, including the ballasts, but in the 1980s they started to smoke. Fearing they would start a fire, the fluorescent lighting system was turned off and a makeshift tracklighting system installed in its place (opposite, left). The newly renovated lighting system uses the coffer track for a series of spotlights, which accent the artworks (opposite, right).

When Jeff Gerwing, principal in the Detroit office of SmithGroupJJR, walked into the Cranbrook Art Museum in 2008, he had one question: "Why aren't the lights on?" Gerwing, a co-leader of SmithGroupJJR's lighting-design practice, was touring the facility with his colleagues to assess the extent of a much-needed restoration to Finnish architect Eliel Saarinen's iconic brick-and-peristyle building. Built in 1942 on the campus of the Cranbrook Academy of Art in Bloomfield Hills, Mich., the museum houses a permanent collection of 6,000 items and plays host to traveling exhibitions of contemporary art and design, but in the mid-2000s, outdated mechanical systems were threatening the museum's accreditation, not to mention the art. SmithGroupJJR was hired to renovate the existing structure and to add a new building for storage of the museum's growing collection. That day in 2008, Gerwing stood in the galleries looking up at the coffered ceiling original to the Saarinen design: the lights were turned off and the coffers were punctured by ad hoc tracklighting. "The galleries, from a lighting standpoint, weren't in good shape," he says.

Gerwing suspected that the coffers were something special and a trip to Cranbrook's archives confirmed his belief. After poring over original blueprints, construction documents, and correspondence between the architect and contractors, Gerwing learned that Saarinen, always ahead of his time, had installed the newest lighting technology for the time—fluorescent tubing, as it was the early 1940s—into a custom-designed ceiling that was equal parts architecture and lighting. "It wasn't just lighting, it was his architectural vision for the space," Gerwing explains. The coffers organized the ceiling overhead, creating a geometric pathway to guide visitors from one gallery to the next. The coffers also provided a unique solution to ambient light through a Modernist play on skylight design used in many 19th-century museums. Saarinen "extrapolated that skylight effect to create a luminous plane on the ceiling," Gerwing says.

Saarinen made the ceiling seem lit from within by using attic space above the ceiling to house the luminaire components, including the ballasts, thereby setting off the sculptural quality of the coffer's recessed angles. "He took the first generation of commercially available fluorescent lamps, and the size of the coffer was built off the length of that tube," Gerwing says. "The coffers are structure, they are lighting, they are architectural form, they are electrical conduit—they are all of that designed into one, and everything was detailed down to the tiniest degree."

Along with the illuminated coffers, Saarinen added a handful of spot luminaires to each gallery and installed fixtures inside the wood casework to illuminate art displayed within. The lighting plan was, at the time, just right. "The initial photographs of what the galleries looked like in the '40s were gorgeous," says Gregory Wittkopp, director of the Cranbrook Art Museum. But over the years, the evolving nature of the collection—with additions of digital media, for example—and the constant movement from traveling and student exhibitions changed the needs of the curatorial staff. "The problem was that it was very inflexible," Wittkopp says. Saarinen's lighting scheme was just too static.

Then, in the 1980s, the original ballasts started to smoke in the attic and the staff worried about the possibility of fire. "We just turned them off and a makeshift tracklighting system was installed, one that literally was tacked onto the ceiling," Wittkopp says.

The mandate to SmithGroupJJR was to update the systems in the building and make it seem as though nothing had changed from

Bottom left: Courtesy Cranbrook Archive

In the museum addition, which houses storage and conservation facilities, lighting designer Jeff Gerwing and his team at SmithGroupJJR wanted to create a contrast to the lighting approach in the galleries. A metal-grate system hangs below the ceiling so that the downlights, which have fluorescent fill, create texture on the walls.

Saarinen's original design. Lighting wasn't initially on the list of things to fix, but it soon became evident that the coffers were an important element of the original design, so they were added to the scope of work for the $22 million project. Gerwing and his partner, lighting designer Matthew Alleman, were given the go-ahead on the condition that the new system be flexible and easy to maintain.

Just as Saarinen had used the latest in lighting technology in the early 1940s, so did Gerwing and Alleman as they started the project in 2008 and completed it this past fall. They wanted the coffer system to be dimmable and knew that the varying color temperatures of fluorescents wouldn't work. "When you get to 30 percent output, they [fluorescent lamps] can go purple." Gerwing says.

LEDs were the solution, both for their lumen output and efficacy as well as from a conservation standpoint. At the time, though, an off-the-shelf linear white-light LED solution didn't exist. Gerwing contacted Kevin Dowling, who was then vice president of strategy and technology at Color Kinetics. "If you looked up at that ceiling with the individual coffers, even though you didn't see the fixtures, you would easily see any difference in color temperature," Dowling says. "Getting the binning of the LEDs tight enough so that you didn't get color disparities was important, and it was also important that the light didn't pulse or flicker when dimmed."

The new, linear LED fixture provided a diffuse light that glowed in the galleries. Gerwing and Alleman designed a multilayered system with a secondary layer of track accentlights for texture and focus. They channeled Saarinen in the selection of those fixtures, choosing a cylindrical trackhead with a simple stem and no yoke—a minimalist look that the modernist architect would have liked. They also customized the tracklighting with a PAR38 lamp to provide enough output for the galleries' high ceilings. In some galleries, non-coffered ceiling space could be used to hang the tracklighting, but in several other rooms, the fixtures had to go above the coffers. The lighting designers created electrical access at the corner of the coffers where the PAR38s could be plugged in when needed or covered to camouflage the hole when not in use.

Mark Baker, preparator/assistant registrar at the museum, is now able to control and fine-tune the layers of light in each gallery using a remote-control system. A series of preprogrammed scenes—house cleaning, museum open, and museum closed, for example—make it possible for staff to operate the lighting.

Baker says that the coffers have garnered a lot of attention. "People just love it. The LEDs are excellent lights and they make the cavities within the ceiling look so sculptural and modern. They return them to this life that they once had," he says.

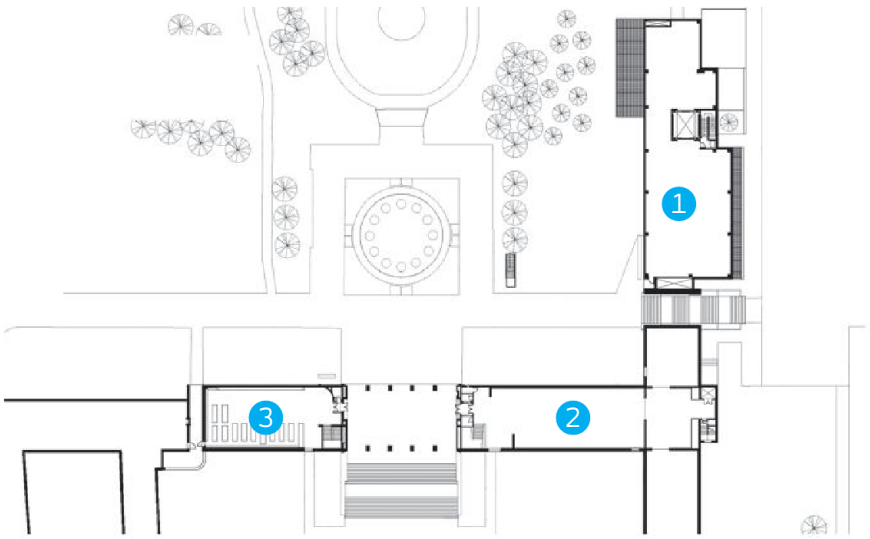
For the new three-story, 28,000-square-foot addition to the museum, Gerwing and Alleman wanted to create a contrast from the gallery-lighting approach. The new space holds storage facilities, offices, and storage vaults where students, academics, and artists may view the museum's collection. The lighting materials are basic. "We wanted it to feel like you were in a crypt, almost like you shouldn't be there, and to make it feel special in a different way," Gerwing says.

For the main corridors, the lighting designers requested a metal-grate system to hang below the ceiling plane so that the fixtures—downlights with fluorescent fill—could create a bit of texture on the walls. In the storage-display areas, the art is showcased behind glass walls and has a feel that is similar to a storefront. Here, the designers installed luminous squares in the ceiling that are reminiscent of the coffers and that alert passersby that something special is happening, that they should pause and take a look.

Wittkopp says that the project more than achieved its goals of updating Saarinen's vision without altering it. "When you're doing a restoration like this, it's a sign of success if people come into the gallery and they look around and say: 'Greg, I thought this was $22 million, what did you do?' Your goal is to make sure you're restoring, not changing," he says.

Except when it comes to the lighting, he adds: "What people do say is: 'Did you have lights on in the ceiling like that before?' That is what people notice first when they walk into the galleries." •

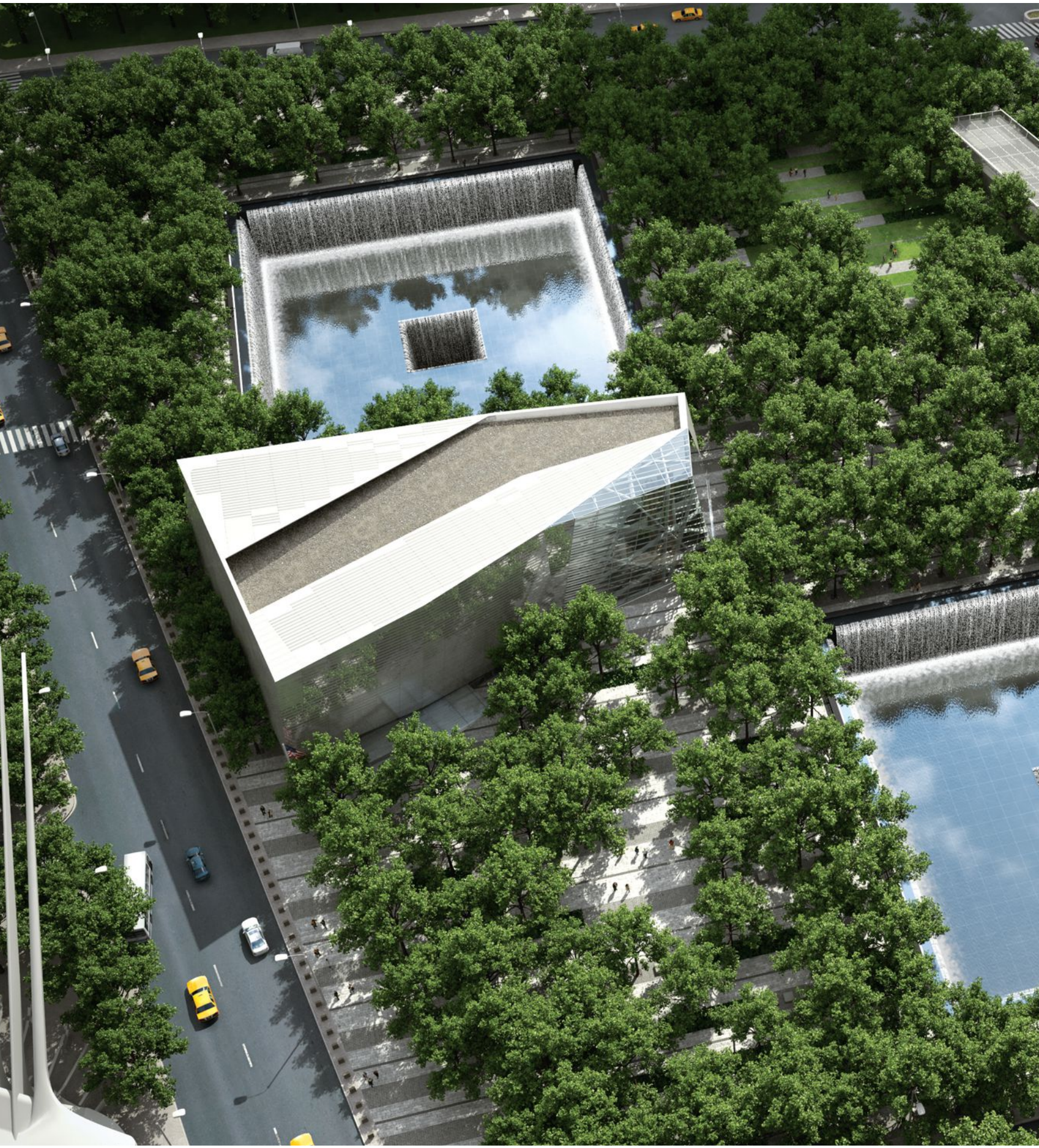
PLAZA LEVEL, FLOOR PLAN



1. Collections Addition
2. Existing museum
3. Existing library

Details

Project: Cranbrook Art Museum and Library Renovation/ Collections Building Addition, Bloomfield Hills, Mich.
Client: Cranbrook Educational Community and Cranbrook Academy of Art & Art Museum, Bloomfield Hills, Mich.
Architect and Lighting Designer: SmithGroupJJR, Detroit
Structural, Mechanical, and Electrical Engineers: SmithGroupJJR, Detroit
Project Size: 97,000 square feet (museum and library renovation—60,000 square feet; Collections Addition—37,000 square feet)
Watts per Square Foot: National Historic Landmark Exempt
Energy Code Compliance: ASHRAE 90.1-2004
Manufacturers/Applications: Bega Lighting (exterior lighting); Lighting Services Inc (tracklighting in galleries); Philips Color Kinetics (LED lighting at ceiling coffers)

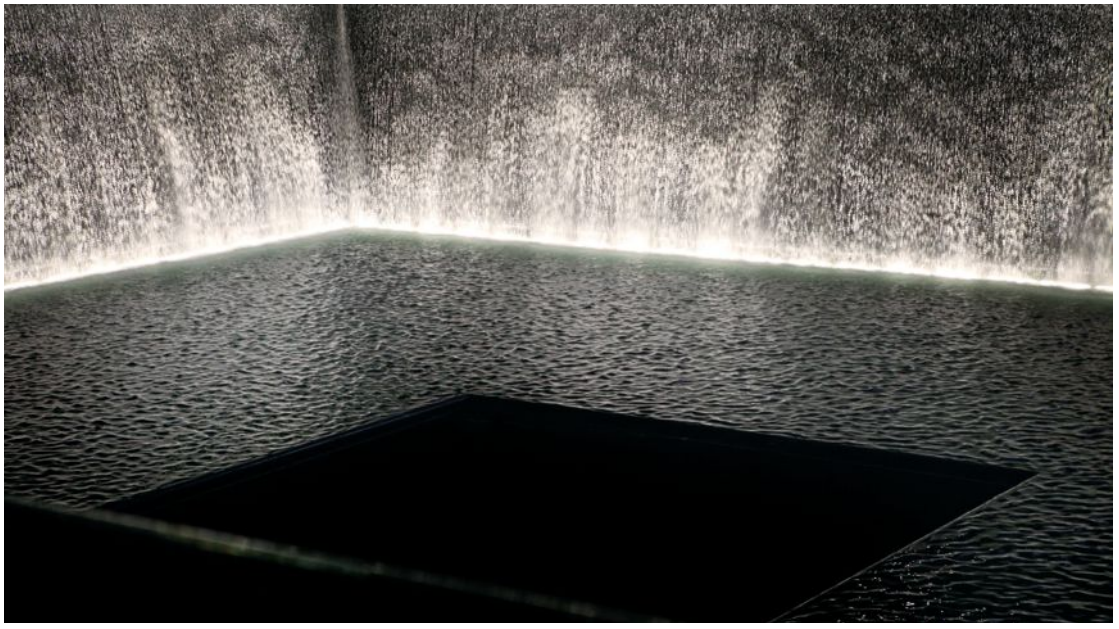


ILLUMINATED TRIBUTE

The lighting design for the National September 11 Memorial creates an elegant site for respectful remembrance and reflection, and breaks new ground in luminaire design.

text by Elizabeth Donoff


EXIT

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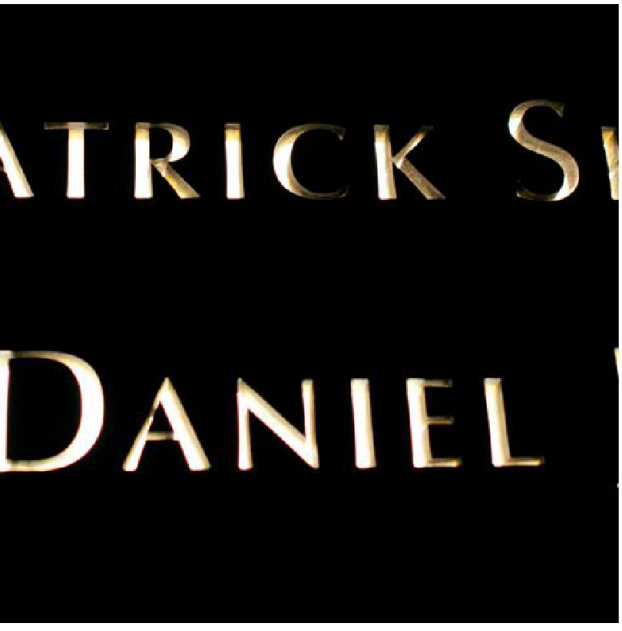


The 16 acres in lower Manhattan known as ground zero is arguably the most emotionally charged site of our time. It is the location of the Sept. 11, 2001, and Feb. 23, 1993, terrorist attacks, where 2,983 people lost their lives. Creating an appropriate commemoration that recognizes all the victims at the World Trade Center site, the Pentagon, and Shanksville, Pa., where flight 93 crashed, has been an important part of the rebuilding efforts. But how to proceed with the process of healing and renewal, while also addressing New York City's need to repair its public and private infrastructure, has been a complex, and at times, highly political process.

A number of forums took place in the immediate weeks and months after 9/11, and hundreds of ideas were gathered from the public and the design and construction communities. Then New York City, along with private developers and a number of public agencies—including the Port Authority of New York and New Jersey, the owner of the site where the World Trade Center had once stood—mapped out a strategic plan for rebuilding. In 2003, a design competition was then held for the memorial component of the site. Architect Michael Arad and landscape architect Peter Walker won with their entry, "Reflecting Absence," which called for a landscape of trees surrounding two reflecting pools that would echo the void of the Twin Tower's footprints.

As the design for the memorial and a museum (to be built separately on the site by architecture firm Snøhetta) proceeded along, Paul Marantz and his firm Fisher Marantz Stone (FMS) were asked to join the team in 2005. Marantz was an easy fit, as he had worked extensively with Peter Walker in the past, and had also worked with Davis Brody Bond, the firm serving as project architect for the memorial and the museum.

He was also already well versed in the language of Sept. 11 tributes. Along with fellow firm principals Jules Fisher and Charles Stone, Marantz was part of the team behind the Tribute in Light commemoration that has been held each year since 2002. His firm also designed the lighting for the Staten Island and the New Jersey September 11th Memorials.

From the start, the competition-winning design required a lighting component, as the site was intended to be accessible to the public by night, as well as by day. "The issues were one of aesthetics and appropriateness," Marantz says, "and the second issue was security."

Marantz and his team didn't want to overlight the space, but city officials mandated a significant amount of light across the plaza—5 footcandles per square foot. FMS worked closely with Robert Ducibella of DVS Security and Consulting & Engineering, which was in charge of security for the project. FMS visited a number of New York City parks to take light-level readings, and, based on the data collected, were able to convince officials that an average of 0.5 footcandles would provide enough illumination. As Marantz explains: "It became clear that the entire plaza would be supervised by video for which light intensity is no longer a challenge because the cameras are so good. But we needed the vertical footcandles." To achieve the light levels, Marantz decided to use prismatic refractors around a 4-foot linear fluorescent light source.

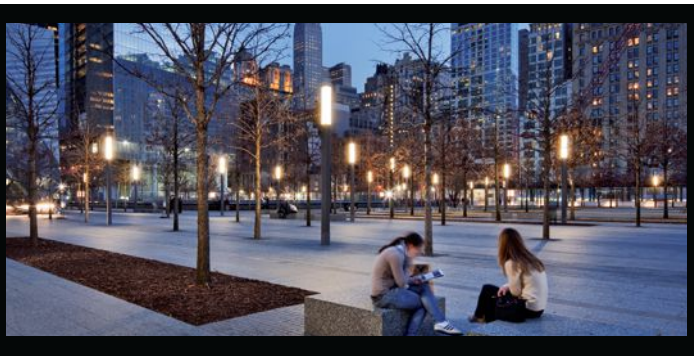
But Arad and Walker's design for the plaza, which used orthogonal lines, required that the luminaire be done in a square format. Previously, the technology had only ever been used in a cylindrical form. Marantz approached lighting manufacturer Selux, who had been instrumental in developing this technology, and asked if they could adapt it to the form factor required. "Selux was extremely cooperative," Marantz says, and FMS detailed the pole luminaire for the plaza in collaboration with Peter Walker. The luminaire functions as more than just a light source; it also houses cameras and radio antennas for the security system.

Although the lighting design for the plaza and the memorial employs a mere three fixtures, each of them responds to challenging design, maintenance, and public-safety criteria, while technologically breaking new ground.

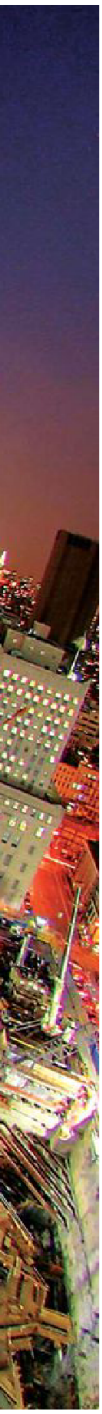
One of these technical achievements occurs at the central feature of the memorial's design, the two reflecting pools, each measuring 200 by 200 feet, which sit in the voided footprints of the World Trade Center towers. "We knew from the beginning that we would uplight the fountain," Marantz says. But the new technical challenge here was how to create something that would be bright enough and withstand the constant volume of water from the 30-foot cascading waterfall. The relevant National Electric Code (NEC) dictated that such

A rendered view of the National September 11 Memorial & Museum site (previous spread). For the 200-foot-by-200-foot square reflecting pools with a 30-foot cascading waterfall on each side, Fisher Marantz Stone worked closely with the lighting manufacturer to create a submersible fixture that would meet the technical requirements of the National Electric Code and run on 25V or less (far left). Narrow-profile 3500K LED luminaires backlight the names of the victims which are stencil cut in the bronze parapet that rings the two reflecting pools (left).

Previous spread: Squared Design Lab, courtesy the National September 11 Memorial & Museum;
This page: Courtesy the National September 11 Memorial & Museum (top); Fisher Marantz Stone (bottom left and right)



An aerial view of the World Trade Center site. The National September 11 Memorial & Museum are in the foreground and One World Trade Center and Seven World Trade Center are to the right (above). The landscape design includes more than 400 white oak trees across the site. Square light columns, each standing just over 16 feet tall, incorporate security cameras and radio antennas along with the lighting element at the top: prismatic refractors with four 4-foot-long T8 lamps (left). A rendered view of the lighting master plan (opposite page).



a submersible fixture run on 25V or less. And New York City's code was even more stringent; it required that the fixture run on 12V or less. No such luminaire existed to achieve these requirements, so the team received an exemption to work to NEC standards.

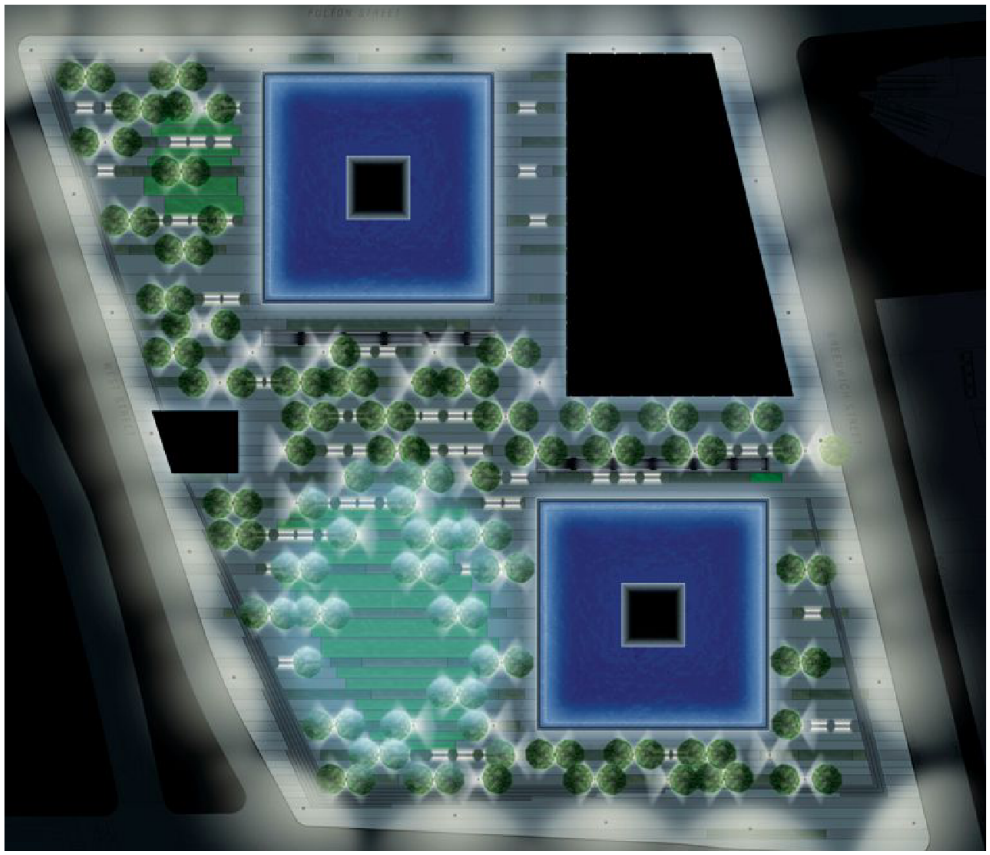
And then came the issue of the light source. In 2005, the only source available for an application such as this was a low-voltage incandescent or halogen. "It was unimaginable to us that we were going to have 1,600 feet of individual lamps of short life. The maintenance picture was just horrendous," Marantz says. LEDs, still in their infancy, seemed to provide a possible solution. "They held the promise of a long-life light source that would be operated if the voltage is under 25," he says. But LEDs were still new and unproven. Nevertheless, FMS decided to take the gamble.

Fountain consultant Dan Euser worked closely with the team, and he built a full-scale mock-up in his Toronto backyard of an LED system that would sit in a stationary waterproof box. Once the team saw that their concept would work, the project was sent out to bid. Winona Lighting, an Acuity Brand, designed a new luminaire that achieved the designers' desire for a singular steady line of light that traces the perimeter of the waterfall and pool edge. This fixture also was able to use the water to its technical advantage. LEDs, by nature, run very hot, and this heat has to be dissipated. Ron Schimmelpfenning, director of new product engineering at Winona, and his team designed the luminaire to incorporate water cooling. The fixture's wiring is also designed so that the entire luminaire can be disconnected and replaced from an access space adjacent to the pool and out of public view.

A third luminaire type is located at the parapet of names that ring each reflecting pool, where victim names are stencil cut through bronze plates. This makes the underside, where the fixture sits, susceptible to rain, snow, and debris. So FMS designed a light strip (three rows of 3500K LEDs) tucked out of sight and covered with a plastic reflector, which directs the light upward to backlight the names. For maintenance purposes, the reflectors also can be easily be removed and cleaned.

Despite the commotion of the city as a backdrop and the active construction that surrounds the memorial, there is a transformative, hushed reverence from the moment you enter the World Trade Center site. It is an awareness that you are stepping on hollowed ground. Lighting plays a key role in realizing the memorial design and creating a place for solace and contemplation. To get to this point, the design requirements pushed lighting technology to new bounds. •

LIGHTING MASTER PLAN



Details

Project: The National September 11 Memorial, New York
Client: The National September 11 Memorial & Museum, New York
Architect: Michael Arad, New York
Landscape Architect: PWP Landscape Architecture, Berkeley, Calif.
Lighting Designer: Fisher Marantz Stone, New York
Fountain Consultant: Dan Euser Waterarchitecture, Toronto
Project Size: 16 acres (entire site)
Watts per Square Foot: 0.5
Manufacturers/Applications:
Selux (light columns in the plaza); Winona Lighting, an Acuity Brand (submersible LED luminaire at waterfall and LED striplight to backlight names on the parapet)

The Port Authority of New York and New Jersey (opposite top);
Ines Leong/archphoto (opposite bottom);
Fisher Marantz Stone (this page)

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Leni Schwendinger

interview by Elizabeth Donoff

"I want to make the unknown known. The unseen, seen. I try to bring out the hidden aspects of a place and make it available and understood through light."

Lighting has long been a natural outlet for Leni Schwendinger and her creative interests in storytelling and placemaking. While still in high school in Berkeley, Calif., she began by studying theater and lighting stagecraft, and then in 1972, she went on to study cinema at the London Film School. She returned to California in the early 1980s to pursue a career in film, but soon found herself drawn back to theater lighting. Just as she was about to start a lighting apprenticeship at the San Francisco Opera, though, her funding was cut. She saw this as a sign to head to New York.

The turning point came in 1993 when she designed a large-scale lighting projection for the façade of the James A. Farley General Post Office Building on Eighth Avenue in New York. She realized that she no longer wanted to work indoors. Ever since, her focus has been on combining her artistic vision with an exploration of the city's nocturnal side to create an approach to urban lighting uniquely her own.

What fascinates you about light?
Except for sound, it remains the only medium that is malleable and abstract at the same time.

What texts about light have influenced you?
Leonardo da Vinci's notebooks, particularly the chapters on light and shade; *In Praise of Shadows* by Jun'ichiro Tanizaki [2006]; and *Vision in Motion* by Laszlo Moholy-Nagy [1947].

How has the role of the lighting designer changed since you first started working?
There is closer collaboration. We are moving out of that box of just being technical or just being on the mechanical side of architecture.

You've incorporated social media platforms such as Twitter into your day-to-day work. How has that changed your lighting practice?
It's another form of teaching for me, a way to share information and raise questions.

What opportunities do new lighting technologies present to today's practitioner?
Technological advances in lighting are exciting, but it's the use of them that is more exciting.

How would you characterize your work?
It's about civic theater and engaging with the community. Light plays a critical role in the health of cities—both during the day and at night. People should feel just as comfortable being out in the city at night and using spaces as they do during the day.

What is the greatest challenge for designers?
Having one's work be valued artistically, not just in a pragmatic or utilitarian way.


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